



**Channel Selectors** P. 18 to 20

**Synthesizer Systems**

CTS-856 system  
CTS-162 system

**Microcontrollers for Single-chip TVs**

TMPA8700CSN for North America  
TMP87CH31N PAL/NTSC  
TMP87CS38N PAL/NTSC  
TMP87CS39N PAL/NTSC

**Power Supplies** P. 34 to 35

Bipolar transistors  
Power MOSFETs  
High-durability shunt regulators  
Power supply thyristors

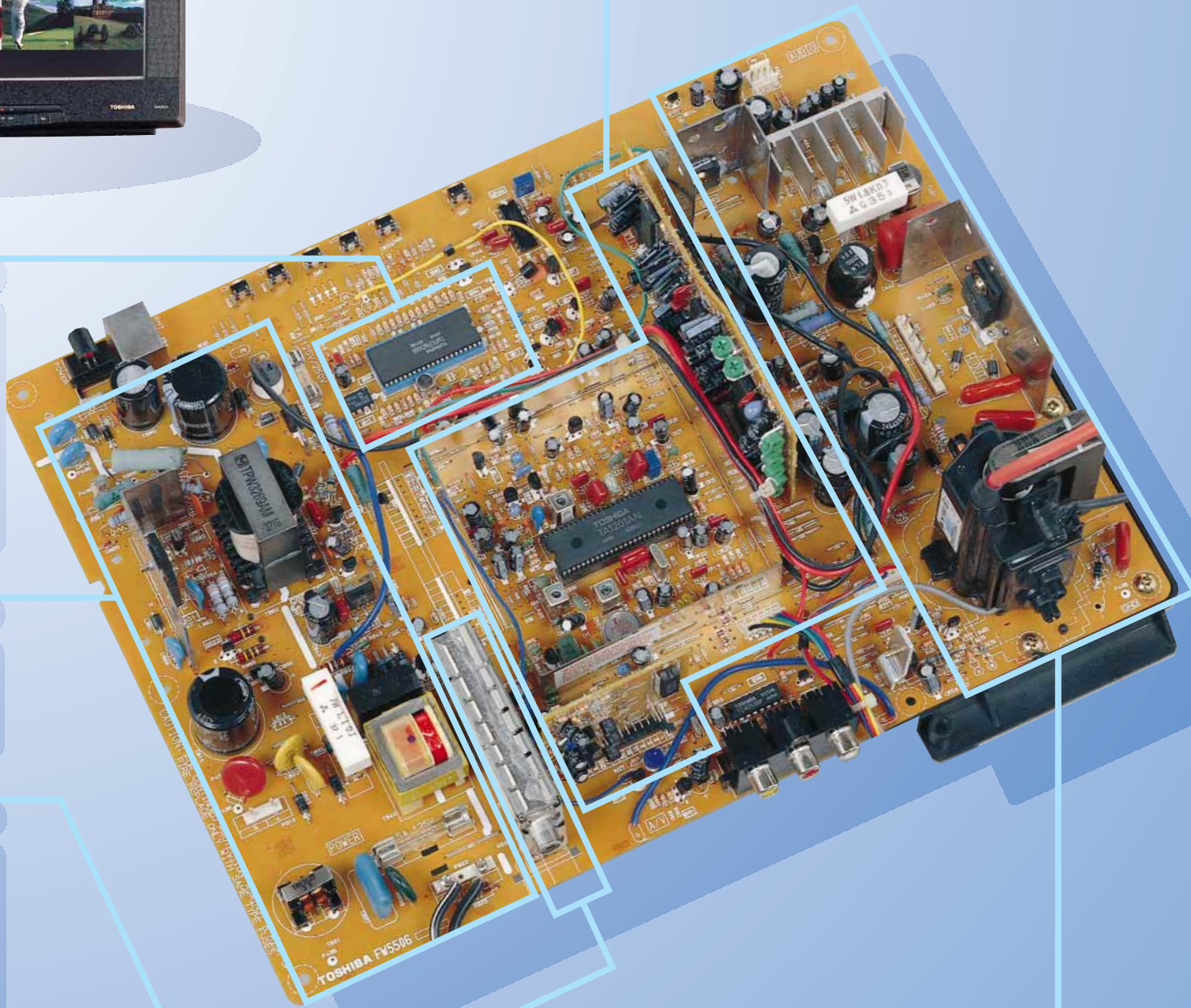
**Tuners** P. 15 to 16

**Frequency Synthesizers**

Frequency Synthesizers  
TD6380P/N/Z Frequency synthesizer for 3-wire bus  
TD6381P/N/Z Frequency synthesizer for 3-wire bus  
TD6382P/N/Z Frequency synthesizer for 3-wire bus  
TD7603Z/F Frequency synthesizer for I<sup>2</sup>C bus  
TD7614F Frequency synthesizer for 3-wire bus  
TB1234F/FN Frequency synthesizer for 3-wire bus  
TB1232F/FN Frequency synthesizer for 3-wire bus  
TB1220F/FN Frequency synthesizer for I<sup>2</sup>C bus  
TB1233F/FN Frequency synthesizer for I<sup>2</sup>C bus

**U/V Single-chip Tuners**

TA1231F/FN Mixer oscillator, IF AMP (9 V)  
TA1240F/FN/FA Mixer oscillator, IF AMP (5 V)



**Deflectors** P. 32

**Vertical Deflection Output**

TA8403K For medium and small TVs  
TA8427K For large TVs  
TA8445K For large TVs

**Signal Processors** P.12, 21 to 24, 27, 29

**Single-chip Color TV Systems**

TA8879N NTSC format  
(artificial synchronization)  
TA8725AN NTSC format (PLL)  
TA1201CN NTSC format (PLL)  
TA1268N NTSC format (PLL)  
TA8690AN PAL/NTSC format  
TB1231N PAL/NTSC format

**Video, Chroma and Synchronous Deflection**

TA8801AN NTSC format  
TA8845BN NTSC format  
TA8759BN PAL/SECAM/NTSC format  
TA1222BN PAL/NTSC format  
TB1226DN PAL/SECAM/NTSC format

**Y/C Separation**

TA8748AN 2H delay type  
TA8728P 1H delay type  
TC9086F Three-dimensional  
TC90A28AF Three-dimensional  
TC90A30F Three-dimensional  
TC90A13F/N 3-line  
TC9090AF/AN Multi-3-line  
TC90A44P/F 2-line  
TC90A45P/F 2-line

**Audio Multiplex Demodulation**

TA1230Z Japan, adjustment-free  
TB1212F/N NICAM

**RGB Switches, AKB**

TA7778N Color difference input AKB  
TA8751AN Primary color input AKB

**AV Switches**

TA8747N For S terminals  
TA8777BN For S terminals  
TA8851CN For S terminals  
TA1218AN For S terminals  
TA1219AN For S terminals

**PIF/SIF Systems**

TA8700AN PIF/SIF  
TA8701AN PIF/SIF/ATT  
TA8800N PLL/PIF/SIF  
TA8865BN PLL/PIF/SIF  
(multi-standard compatible)

**Audio Signal Processors**

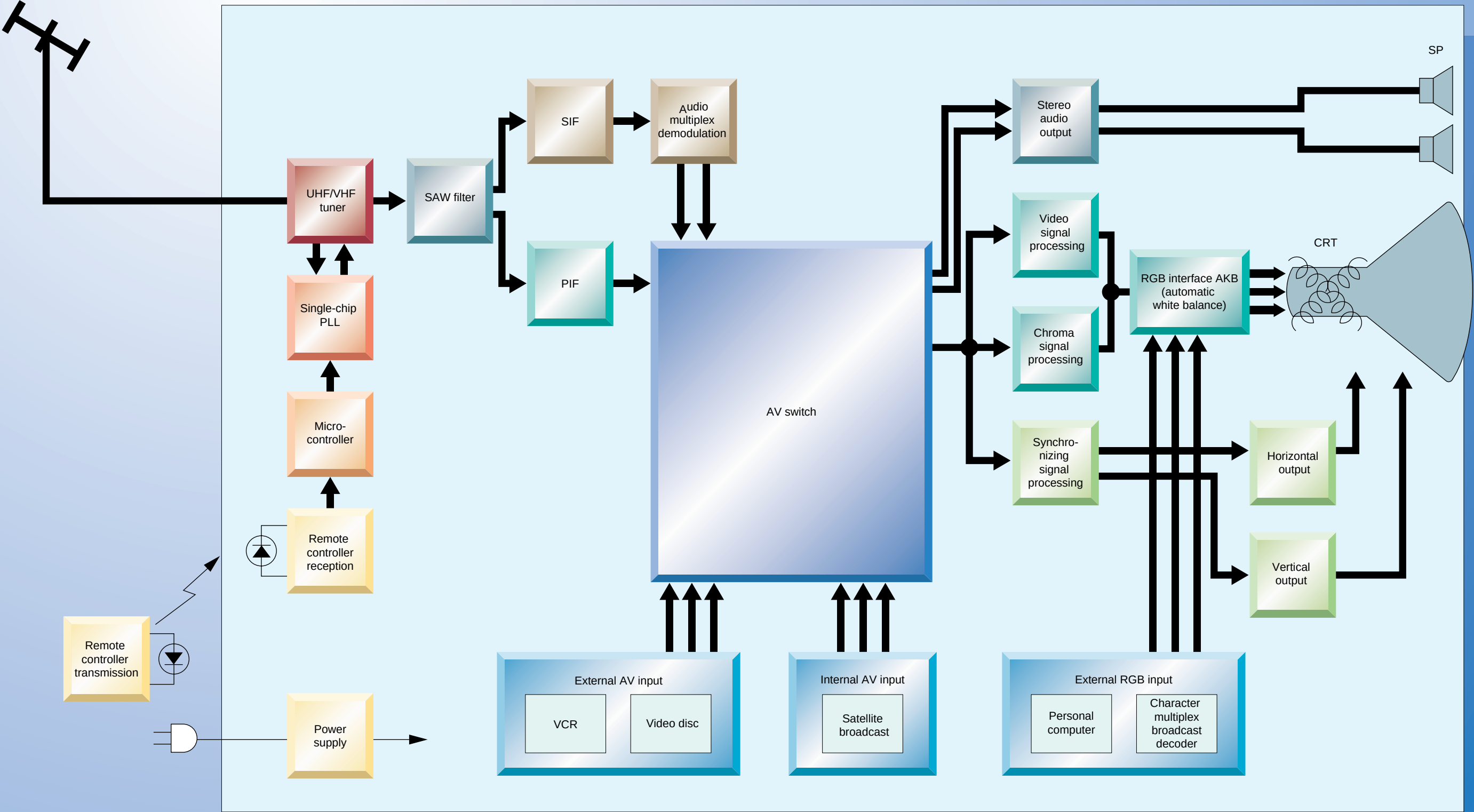
TA8776N Surround processor



# Basic Block Diagrams by Individual TV Functions

## Semiconductors for TVs

Semiconductors for TVs are heading in new directions, including reduction of peripheral components through higher levels of integration, simplification of the chassis board through the integration of all necessary components onto a single chip, and high picture quality through the addition of ICs for peripheral equipment. In order to accommodate the requirements of these devices, Toshiba's semiconductors offer improved performance in the form of high picture quality, compact size, light weight and reduced power consumption.



# Bus Control Systems

## Sales Points



### ■ System Trends

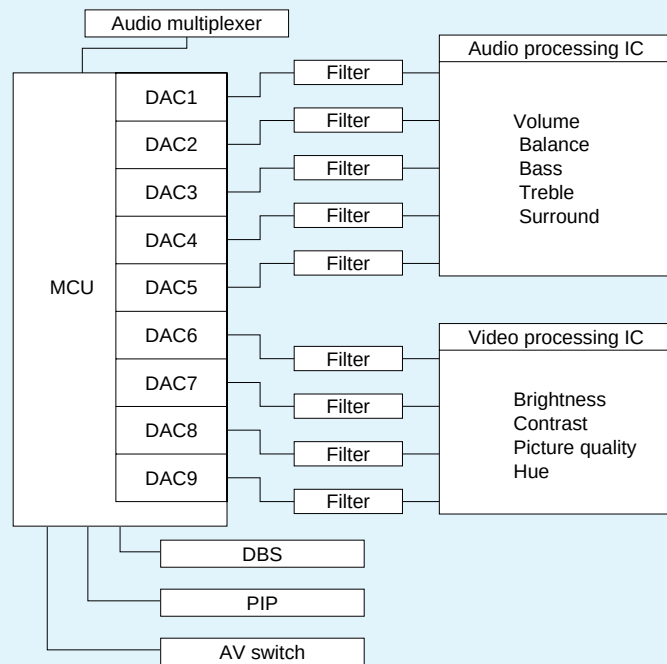
ICs directly controlled by microcontrollers are increasing due to the growing desire for digital control of various functions.

### ■ Advantages of Bus Control

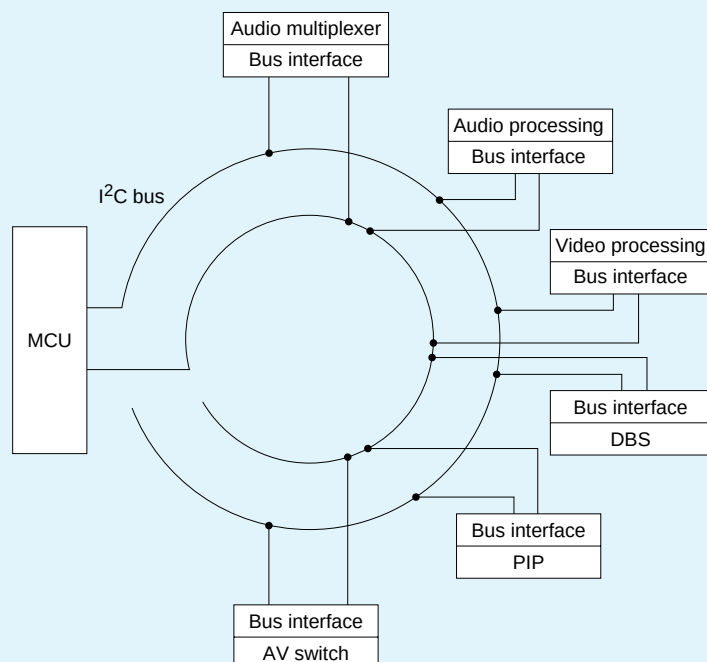
- Enables a significant reduction in the number of peripheral components due to simplification of the interface between the microcontroller and signal processing IC.
- Allows a reduction in the number of wires and reduced board surface area of the set.
- Enables chassis unification, labor-saving set design and streamlined set production through the use of microcontroller software.

## Comparison of Conventional System and Bus Control System

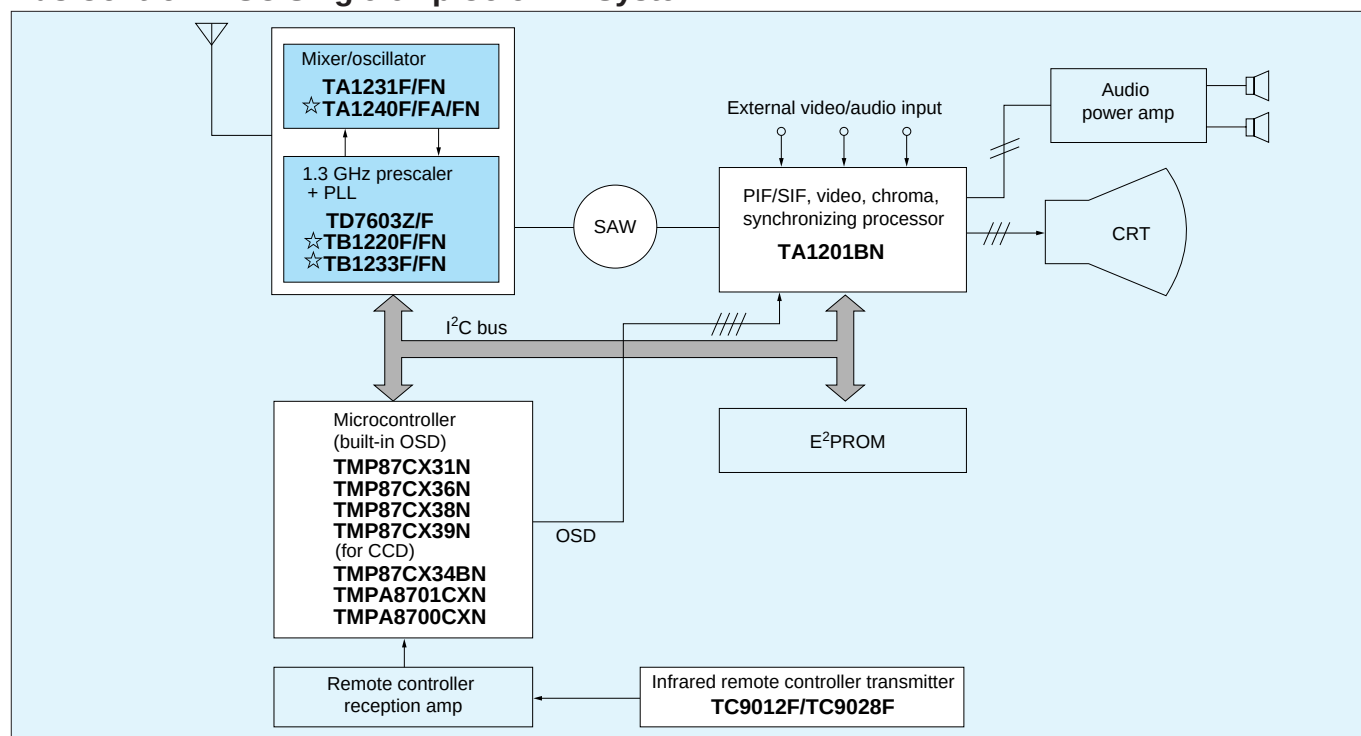
### Conventional System



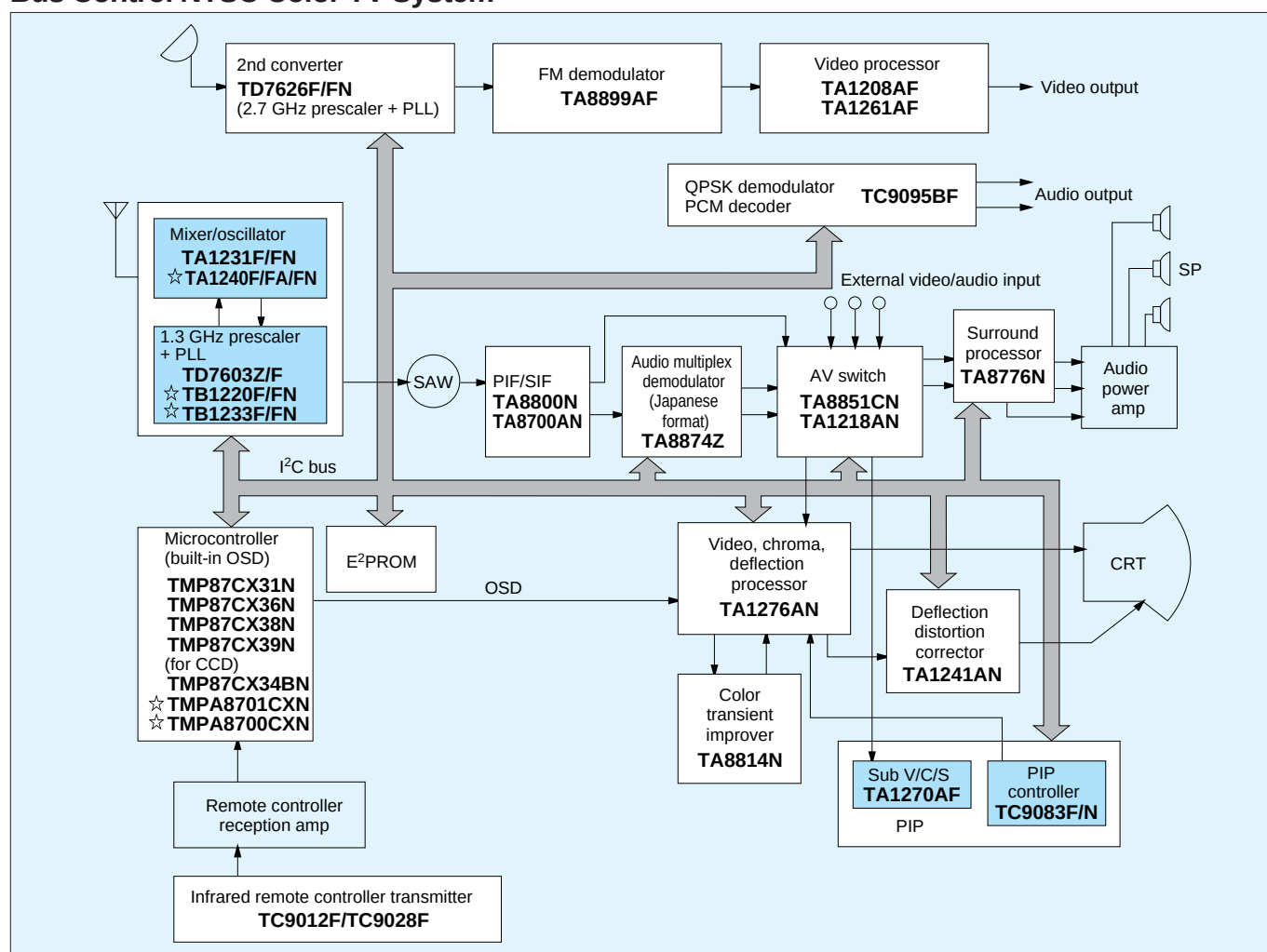
### Bus Control System



## Bus Control NTSC Single-chip Color TV System

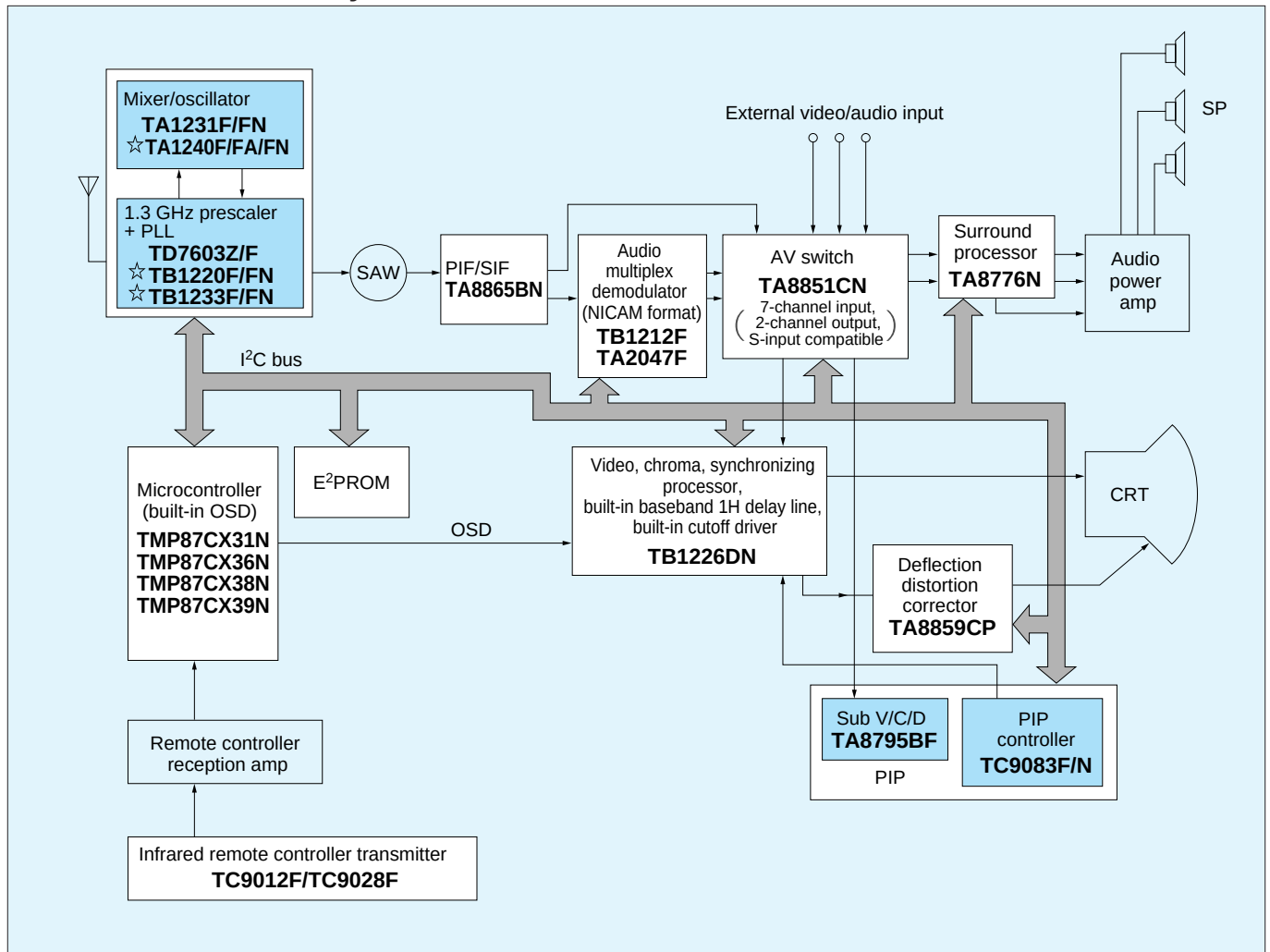


## Bus Control NTSC Color TV System



# Bus Control Systems

## Bus Control Multi-color System



☆ : Under development

Purchase of TOSHIBA I²C components conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard Specification as defined by Philips.

## Bus Control System ICs

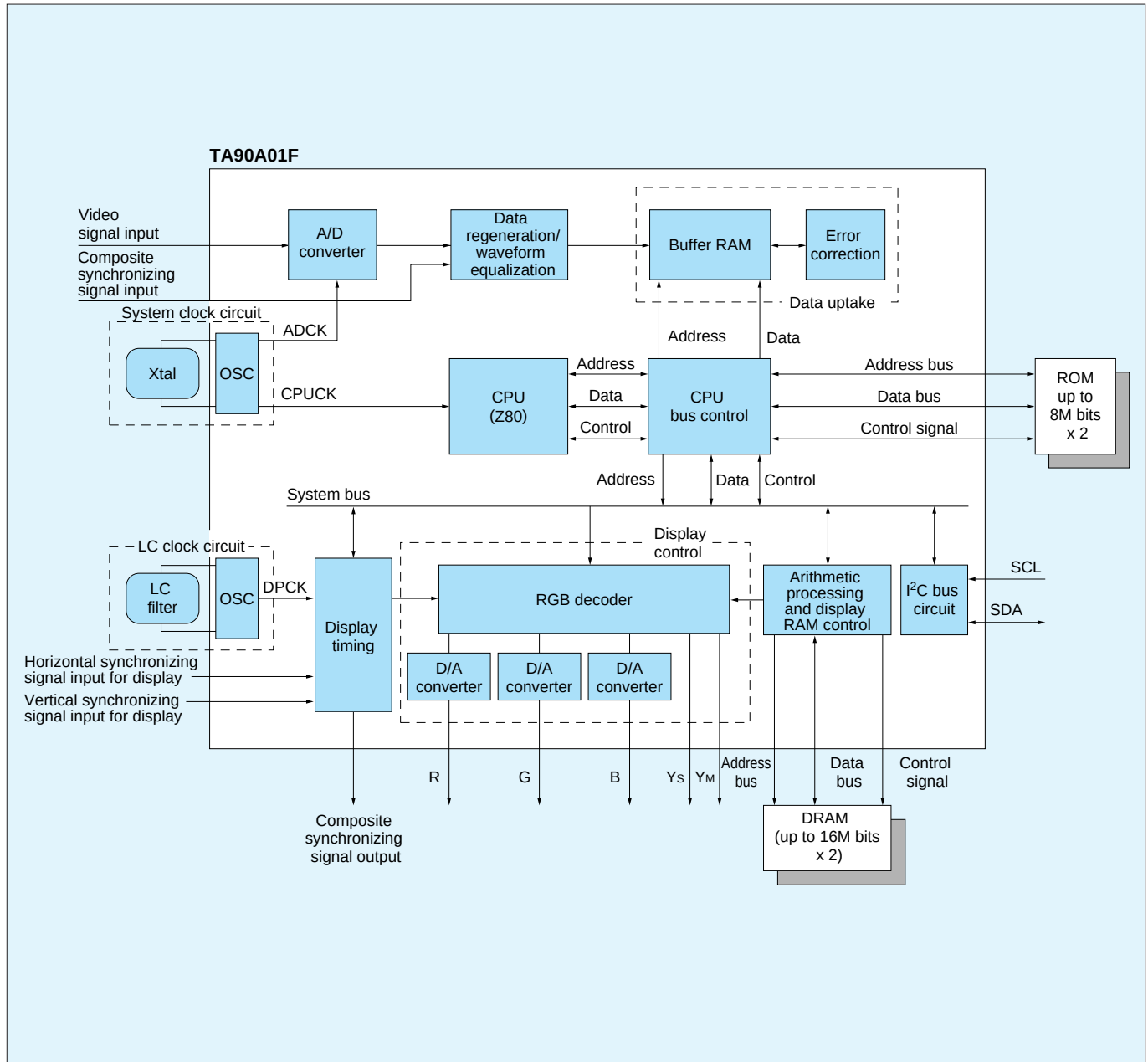
| Device                                     | Summary                         | Functions                                                                              | Package         |
|--------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------|-----------------|
| <b>TD7603Z/F</b>                           | Frequency synthesizer           | 1.3 GHz prescaler + PLL                                                                | SZIP21<br>SOP20 |
| ☆ <b>TB1220F/FN</b><br>☆ <b>TB1233F/FN</b> | Frequency synthesizer           | 1.3 GHz prescaler + PLL + built-in peripherals + built-in A/D converter                | SOP16<br>SSOP16 |
| <b>TD7626F/FN</b>                          | Frequency synthesizer           | 2.7 GHz prescaler + PLL + built-in A/D converter                                       | SOP16<br>SSOP16 |
| <b>TA1201BN</b>                            | Single-chip NTSC V/C/D          | PLL PIF + SIF, NTSC video, chroma, synchronizing processor                             | SDIP56          |
| <b>TA1222BN</b><br><b>TA1276N</b>          | NTSC V/C/D                      | PAL/NTSC video, chroma, synchronizing processor                                        | SDIP56          |
| <b>TA8859CP</b>                            | Deflection distortion corrector | Deflection distortion corrector                                                        | DIP16           |
| <b>TA8874Z</b>                             | Audio multiplex demodulator     | Japanese format audio multiplexer, built-in filter, built-in facsimile-removing filter | SZIP21          |
| <b>TB1212F</b>                             | Audio multiplex demodulator     | Single-chip NICAM, QPSK demodulator                                                    | QPF80           |
| <b>TA8776N</b>                             | Surround processor              | Surround processor                                                                     | SDIP30          |
| <b>TA1216AN</b>                            | Surround processor              | Surround processor, 3 inputs/3 outputs                                                 | SDIP30          |
| <b>TA1217AN</b>                            | Surround processor              | Surround processor, 4 inputs/4 outputs                                                 | SDIP36          |
| <b>TA8851CN</b>                            | AV switch                       | 7-channel input, 2-channel output, S-input compatible                                  | SDIP54          |
| <b>TC9083F/N</b>                           | PIP                             | Picture in picture processor for NTSC/PAL                                              | SDIP42<br>QFP44 |

☆ : Under development

# Character Multiplex Broadcast Demodulation Systems

Character multiplex broadcast systems transmit image data consisting of characters and graphics using the gaps between broadcast waves to display that data on television screens after demodulation on the receiving end. In addition to synchronized regeneration, waveform equalization, data regeneration and display control circuits necessary for decoding character multiplex broadcasts, the TC90A01F is composed to provide all other required functions using three chips consisting of a single chip for the CPU, one containing program and character font ROM, and one containing arithmetic processing and display DRAM.

## Character Multiplex Broadcast Decoder System



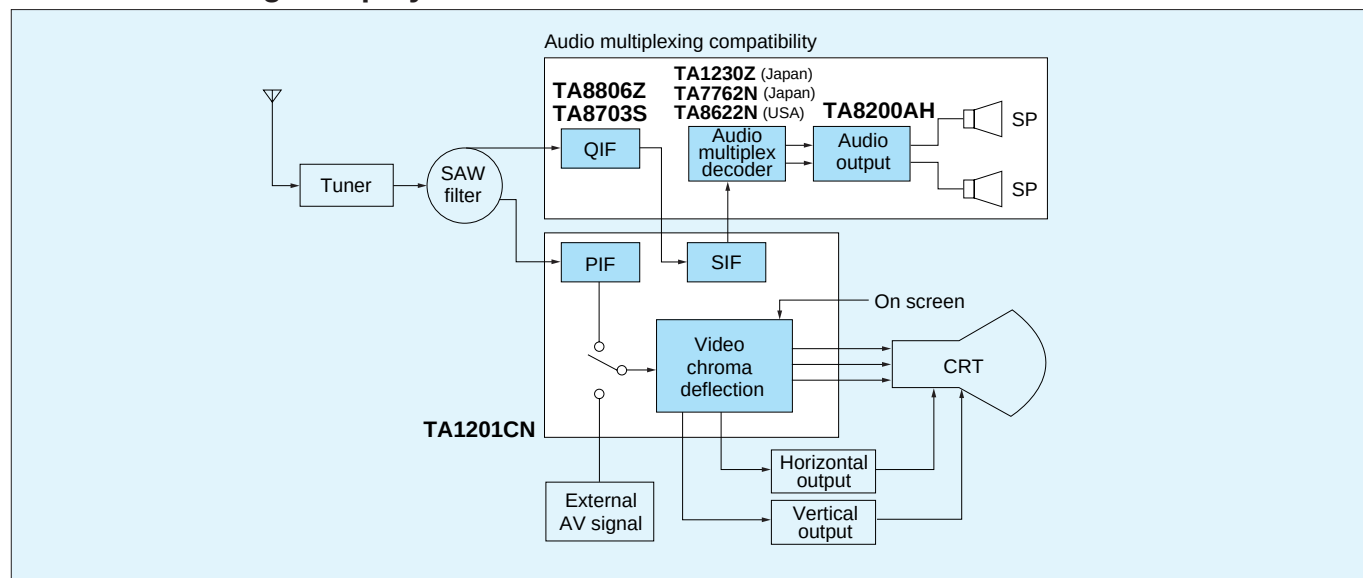
| Device   | Function                                     | Features                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Package |
|----------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| TC90A01F | Character Multiplex Broadcast Decoder System | <ul style="list-style-type: none"> <li>● Built-in CPU</li> <li>● Digital data slicer</li> <li>● Fully digital data regeneration</li> <li>● Waveform equalization</li> <li>● On-screen-compatible color RAM (16 of 4096 colors displayed)</li> <li>● Built-in buffer memory (for 8 packets)</li> <li>● Horizontal 4/5, 1/2, 1/5 and vertical 1/2 reduced display function</li> <li>● I²C interface with microcontroller</li> <li>● Single 5 V power supply</li> </ul> | QFP144  |

# Single-chip Color TV Systems

These ICs for single-chip color TVs integrate all the functions required for small signal processing of color TVs, making them perfect for use in popularly-priced products.

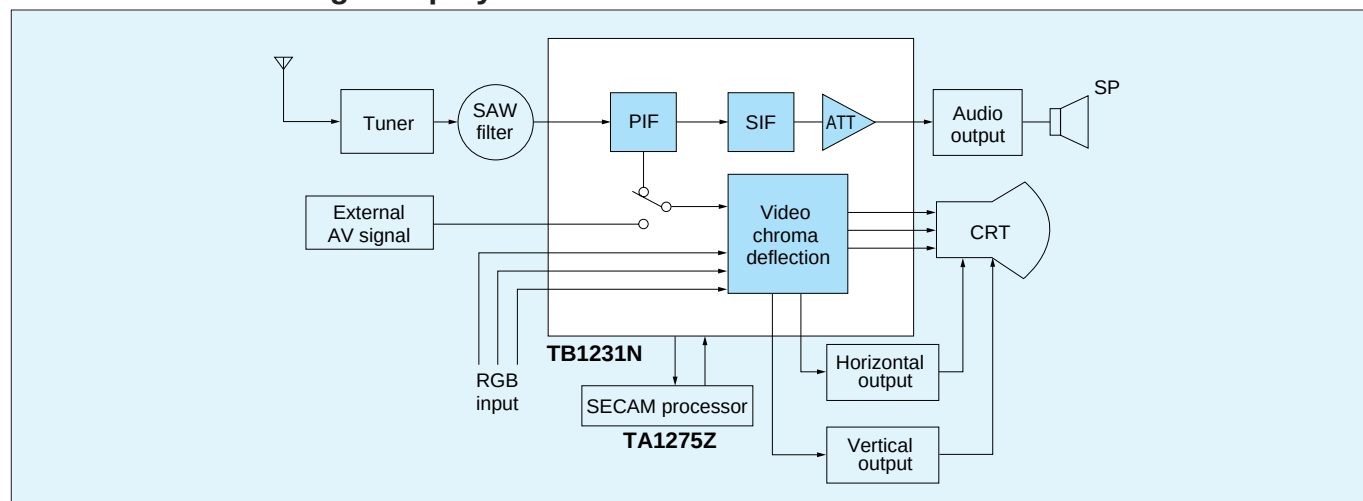
The TA8864AN/79N are NTSC format, single-chip ICs featuring a built-in 1-channel AV switch, on-screen interface and bandpass filter for chroma signals. The TA8690AN/91N are PAL/NTSC and PAL format single-chip ICs featuring pin compatibility to facilitate board sharing. The TA8725AN is an NTSC format, single-chip IC employing PLL demodulation for application in high-end sets.

## NTSC Format Single-chip System



☆ : Under development

## PAL/NTSC Format Single-chip System



## Single-chip ICs

| Functions<br>Device | IF | Video processing | Chroma processing |     |       | Synchronizing processing | Remarks                                                   | Package |
|---------------------|----|------------------|-------------------|-----|-------|--------------------------|-----------------------------------------------------------|---------|
|                     |    |                  | NTSC              | PAL | SECAM |                          |                                                           |         |
| TA8864AN            | ○  | ○                | ○                 | —   | —     | ○                        | AV switch, OSD, built-in filter                           | SDIP54  |
| TA8879N             | ○  | ○                | ○                 | —   | —     | ○                        | AV switch, OSD, built-in filter                           | SDIP56  |
| TA8725AN            | ○  | ○                | ○                 | —   | —     | ○                        | PLL PIF, split carrier, OSD                               | SDIP56  |
| TA8825BN            | ○  | ○                | ○                 | —   | —     | ○                        | PLL PIF, inter-carrier, OSD, audio ATT                    | SDIP56  |
| TA8690AN            | ○  | ○                | ○                 | ○   | —     | ○                        | Adjustment-free APC, countdown type, OSD                  | SDIP54  |
| TA1201BN            | ○  | ○                | ○                 | —   | —     | ○                        | PLL PIF, AV switch, OSD, I <sup>2</sup> C bus             | SDIP56  |
| TB1231N             | ○  | ○                | ○                 | ○   | —     | ○                        | Built-in 1HDL, add-on SECAM TA1275Z, I <sup>2</sup> C bus | SDIP56  |

# Multi-standard Systems

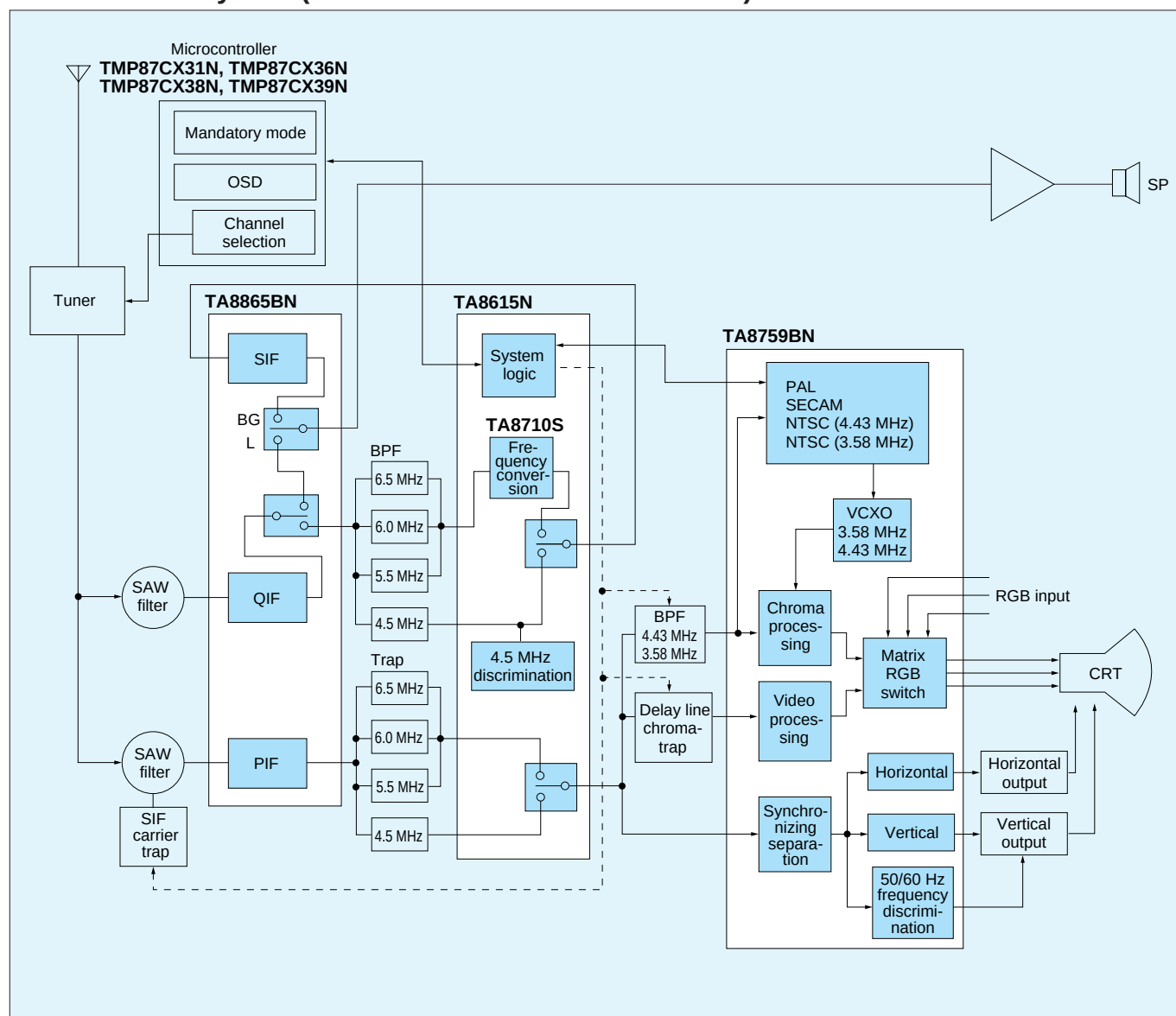
Accompanying the proliferation of AV equipment such as VCRs and video disc players, it has become possible to enjoy programs produced in various countries at home.

In the past, since television systems able to accommodate multiple broadcast formats were composed discretely, the systems ended up being complex and expensive.

The TA8615N, TA8759BN and TA8865BN can be combined to perform automatic discrimination, video and audio demodulation, automatic discrimination of audio carrier waves and discrete interfacing for all broadcast formats (PAL, SECAM and NTSC), making it possible to easily realize multi-system color TVs featuring a significant reduction in the number of peripheral components.

The TA8759BN is available from Toshiba as an I<sup>2</sup>C bus-compatible version of the TA8783N.

## Multi-standard System (for the L-SECAM broadcast format)



## Multi-standard ICs

| Device          | Functions                            | Remarks                                                                                            | Package |
|-----------------|--------------------------------------|----------------------------------------------------------------------------------------------------|---------|
| <b>TA8865BN</b> | PIF, QIF, SIF                        | L-SECAM audio demodulation for all broadcast formats                                               | SDIP36  |
| <b>TA8759BN</b> | Video, chroma, deflection processing | Automatic discrimination for all broadcast formats                                                 | SDIP64  |
| <b>TA8783N</b>  | Video, chroma, deflection processing | Automatic discrimination and I <sup>2</sup> C bus control for all broadcast formats                | SDIP64  |
| <b>TA8615N</b>  | System switch                        | System switch for TA8759BN                                                                         | SDIP30  |
| <b>TB1226DN</b> | Video, chroma, deflection processing | Automatic discrimination, built-in 1HDL and I <sup>2</sup> C bus control for all broadcast formats | SDIP56  |
| <b>TB1227BN</b> | Video, chroma, deflection processing | Automatic discrimination, built-in 1HDL and I <sup>2</sup> C bus control for all broadcast formats | SDIP56  |



# Satellite Broadcast Transmission and Reception Systems

## Satellite Broadcast Transmission and Reception Systems (Japan)

The basic circuits required for transmission and reception of satellite broadcasts are integrated into an IC to compose a compact decoder.

The TA1208AF contains built-in filters required for BS/CS video processing. The TC9095BF integrates QPSK (Quadrature Phase Shift Keying) demodulation, PCM decoder, digital filter, D/A converter and analog filter into a single-chip LSI.

The TC90A26F achieves even greater optimization by containing all necessary functions in a VQFP 64-pin package, and when combined with the TA1261AF, enables simple configuration of all processors beyond the 2nd converter of the BS receiver.

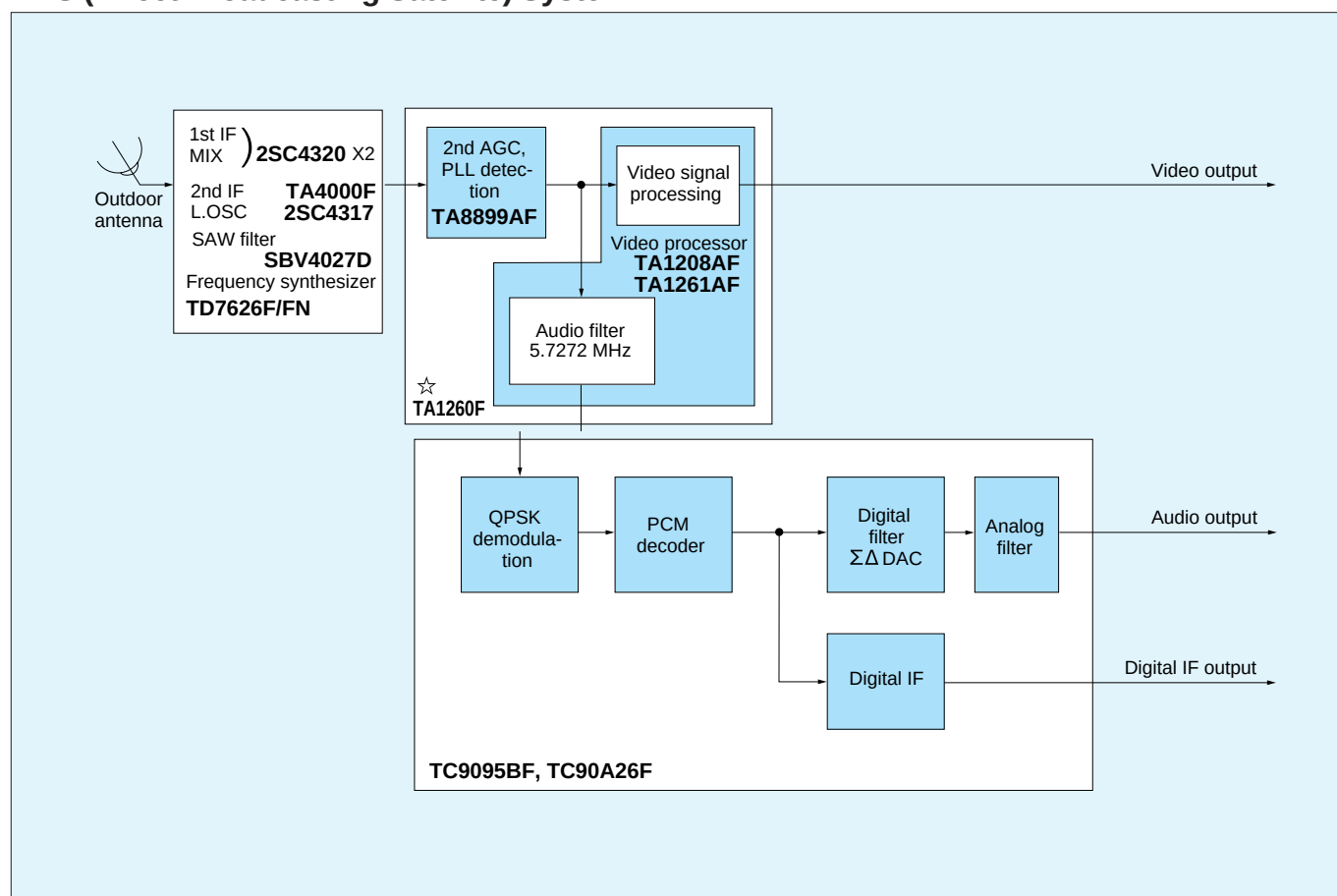
## ICs for Satellite Broadcast Transmission and Reception Systems

| Device    | Functions                                                                                         | Remarks                                                                                                         | Process | Package |
|-----------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------|---------|
| ☆ TA1260F | PLL-type FM demodulation<br>+ BS video processing                                                 | AGC of 2nd IF, PLL detection, BS video processing                                                               | Bipolar | QFP52   |
| TA1261AF  | BS video processing                                                                               | Built-in 4.5 MHz LPF, 5.73 MHz BPF and 12 MHz BPF,<br>C/N detection circuit, built-in NR circuit                | Bipolar | SSOP30  |
| TA1248F   | IQ demodulation for digital<br>satellite reception                                                | AGC of 2nd IF, PLL detection, I/Q demodulation                                                                  | Bipolar | HQFP30  |
| TA8899AF  | PLL-type FM demodulation                                                                          | AGC of 2nd IF, PLL detection, digital AFT                                                                       | Bipolar | SSOP30  |
| TA1208AF  | BS/CS video processing                                                                            | Built-in 4.5 MHz LPF, 5.73 MHz BPF and 12 MHz BPF,<br>C/N detection circuit, built-in NR circuit, CS-compatible | Bipolar | SSOP30  |
| TC9095BF  | QPSK demodulation<br>+ PCM decoder<br>+ digital filter<br>+ $\Sigma\Delta$ DAC<br>+ analog filter | Digital PLL, QPSK demodulation, PCM decoder,<br>8-times O.S. digital filter, $\Sigma\Delta$ DAC, analog filter  | CMOS    | QFP80   |
| TC90A26F  |                                                                                                   |                                                                                                                 |         | VQFP64  |

☆ : Under development

O.S.: Over-sampling

## DBS (Direct Broadcasting Satellite) System

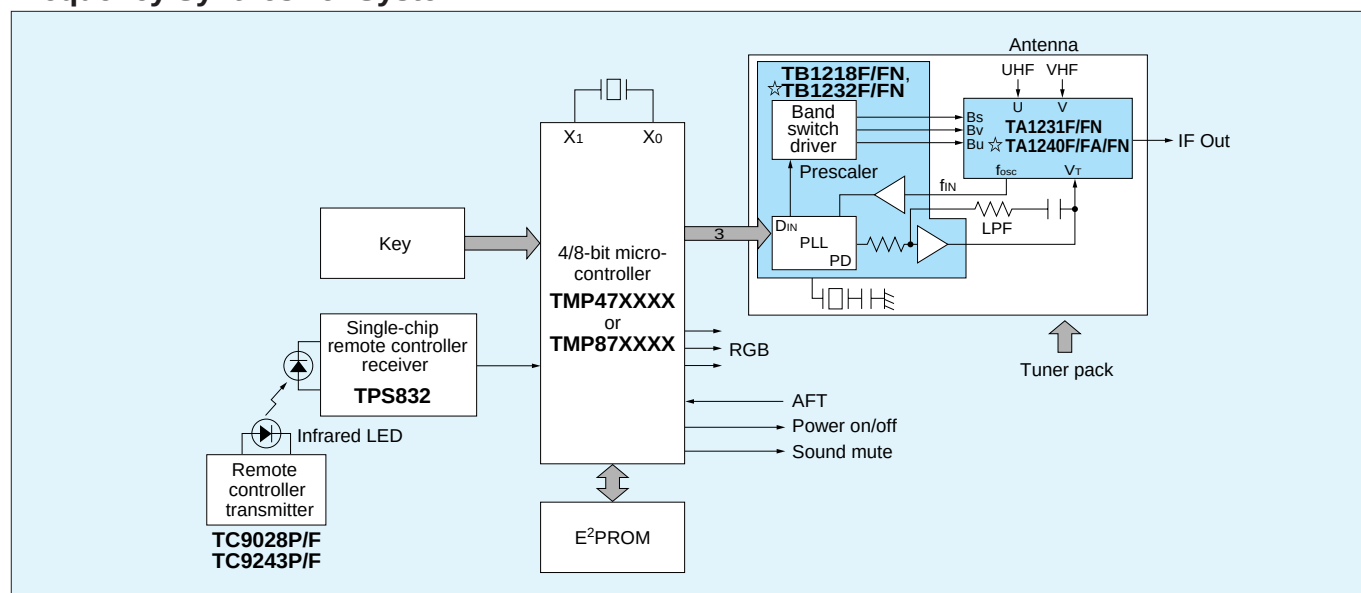


☆ : Under development

O.S.: Over-sampling

# Tuner/Remote Controller Transmission and Reception

## Frequency Synthesizer System



☆ : Under development

## Mixer/Oscillators

| Device         | Functions               | Power supply (V) | Package                                                                |
|----------------|-------------------------|------------------|------------------------------------------------------------------------|
| TA1231F/FN     | 2-band OSC, MIX, IF AMP | 9 V              | SSOP16 (1 mm pitch)<br>SSOP16 (0.65 mm pitch)                          |
| ☆TA1240F/FA/FN | 2-band OSC, MIX, IF AMP | 5 V              | SSOP16 (1 mm pitch)<br>SOP16 (1.27 mm pitch)<br>SSOP16 (0.65 mm pitch) |

☆ : Under development

## ICs for Frequency Synthesizers

| Item                        | Device                | TD7603Z/F                                                   | TD7614F                                                        | TB1218F/FN<br>TB1232F/FN                                            | ☆TB1220F/FN<br>☆TB1233F/FN                                                                    | TD7626F/FN                                             |
|-----------------------------|-----------------------|-------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------|
| Min. input sensitivity(50Ω) | fin 80 MHz to 100 MHz | -20dBmW min.                                                | -20dBmW min.                                                   | -20dBmW min.                                                        | -20dBmW min.                                                                                  | —                                                      |
|                             | 100 MHz to 1.0 GHz    | -27dBmW min.                                                | -27dBmW min.                                                   | -27dBmW min.                                                        | -27dBmW min.                                                                                  | —                                                      |
|                             | 1.0 GHz to 1.3 GHz    | -17dBmW min.                                                | -17dBmW min.                                                   | -17dBmW min.                                                        | -17dBmW min.                                                                                  | —                                                      |
|                             | 500 MHz to 2.6 GHz    | —                                                           | —                                                              | —                                                                   | —                                                                                             | -15dBmW min.                                           |
| Max. input level (50Ω)      |                       | +3dBmW max.                                                 | +3dBmW max.                                                    | +3dBmW max.                                                         | +3dBmW max.                                                                                   | +3dBmW max.                                            |
| Prescaler                   |                       | 1/8                                                         | 1/4                                                            | 1/8                                                                 | 1/8                                                                                           | 1/16                                                   |
| Modulus counter             |                       | 1/32,1/33                                                   | 1/32,1/33                                                      | 1/32,1/33                                                           | 1/32,1/33                                                                                     | 1/32,1/33                                              |
| Programmable counter        |                       | 5 bytes                                                     | 18 bits/19 bits                                                | 18 bits/19 bits                                                     | 5 bytes                                                                                       | 5 bytes                                                |
|                             | Main                  | 10 bits                                                     | 9 bits/10 bits                                                 | 9 bits/10 bits                                                      | 10 bits                                                                                       | 10 bits                                                |
|                             | Swallow               | 5 bits                                                      | 5 bits                                                         | 5 bits                                                              | 5 bits                                                                                        | 5 bits                                                 |
|                             | Band SW               | 4 bits                                                      | 4 bits                                                         | 4 bits                                                              | 4 bits                                                                                        | 6 bits                                                 |
| Reference frequencies       |                       | 3.90625/6.25/<br>7.8125 kHz<br>Switchable by<br>bus control | 7.8125/12.5/<br>15.625 kHz<br>Switchable by<br>selector switch | 3.90625/<br>7.8125 kHz                                              | 3.90625/6.25/<br>7.8125 kHz<br>Switchable by<br>bus control                                   | 3.90625/<br>7.8125 kHz<br>Switchable by<br>bus control |
| Frequency steps             |                       | 62.5/31.25/50 kHz                                           | 62.5/31.25/50 kHz                                              | 62.5/31.25 kHz                                                      | 31.25/50/62.5 kHz                                                                             | 62.5/125 kHz                                           |
| Bus control                 |                       | I²C bus                                                     | 3-wire bus                                                     | 3-wire bus                                                          | I²C bus                                                                                       | I²C bus                                                |
| Power supply (V)            |                       | 4.5 to 5.5 V                                                | 4.5 to 5.5 V                                                   | 4.5 to 5.5 V                                                        | 4.5 to 5.5 V                                                                                  | 4.5 to 5.5 V                                           |
| Power consumption           |                       | Icc = 50 mA (typ.)                                          | Icc = 45 mA (typ.)                                             | Icc = 30 mA (tent.)                                                 | Icc = 30 mA (tent.)                                                                           | Icc = 35 mA (tent.)                                    |
| Package                     |                       | SZIP21<br>SOP20<br>(1.27 mm pitch)                          | SOP20<br>(1.27 mm pitch)                                       | SOP16<br>(1.27 mm pitch)<br>SSOP16<br>(0.65 mm pitch)               | SOP16<br>(1.27 mm pitch)<br>SSOP16<br>(0.65 mm pitch)                                         | SOP16<br>(1.27 mm pitch)<br>SSOP16<br>(0.65 mm pitch)  |
| Remarks                     |                       |                                                             | Built-in 4-ch band driver<br>Built-in tuning amp               | Built-in 4-ch band driver<br>Built-in tuning amp<br>Bi-CMOS process | Built-in 4-ch band driver<br>Built-in tuning amp<br>Bi-CMOS process<br>Built-in A/D converter | Built-in A/D converter                                 |

☆ : Under development

# Tuner/Remote Controller Transmission and Reception

## Remote Controller Transmission and Reception Devices

### Infrared LEDs

| Device  | Function              | I <sub>E</sub><br>Min. (mW/sr) | θ <sub>1/2</sub><br>Typ.(°) | Package       |
|---------|-----------------------|--------------------------------|-----------------------------|---------------|
| TLN105B | For trans-<br>mission | 12                             | ±23.5                       | 5φ resin type |
| TLN115A |                       | 15                             | ±21                         |               |

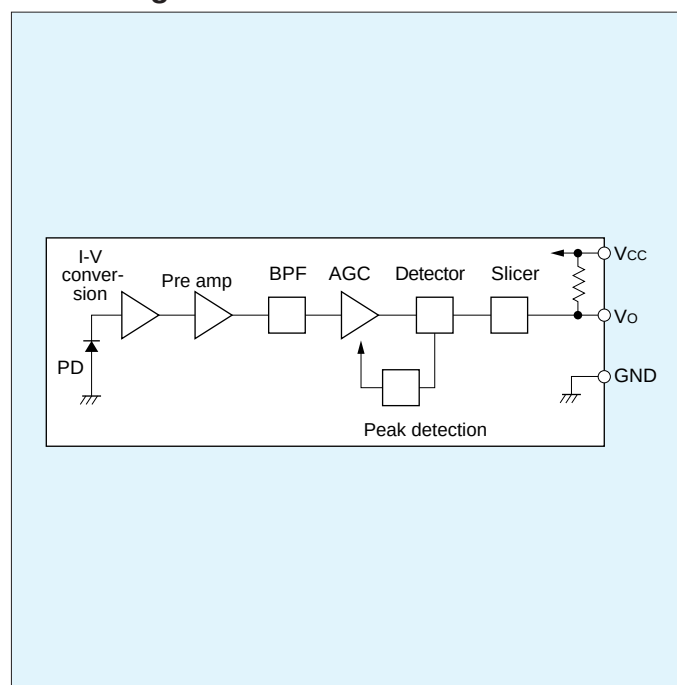
### Photodiodes

| Device | Function           | I <sub>sc</sub><br>Min. (μA) | Sensitivity<br>wavelength<br>(nm) | Package                 |
|--------|--------------------|------------------------------|-----------------------------------|-------------------------|
| TPS703 | For recep-<br>tion | 0.9                          | λ > 700                           | Side-view<br>resin type |
| TPS704 |                    | 0.5                          | λ > 800                           | TO-92<br>resin type     |
| TPS705 |                    |                              |                                   |                         |
| TPS706 |                    | 1.0                          |                                   |                         |

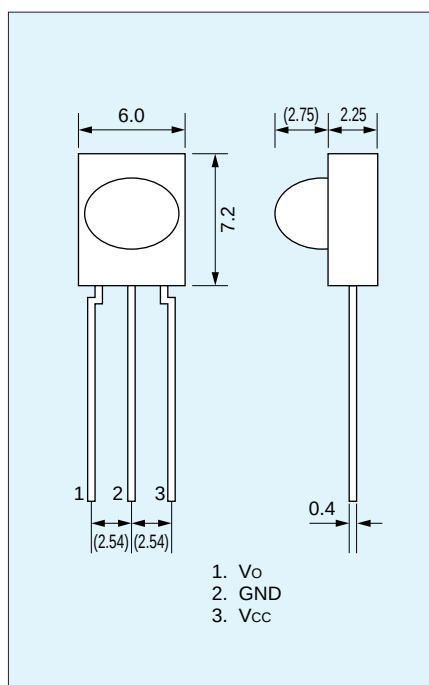
### Photodetector IC for Infrared Remote Controllers

This IC offers major advantages in terms of cost and mounting as a result of saving on space by integrating the photodiode and receiving IC into a single chip.

#### Block Diagram



#### External Dimensions



#### Appearance



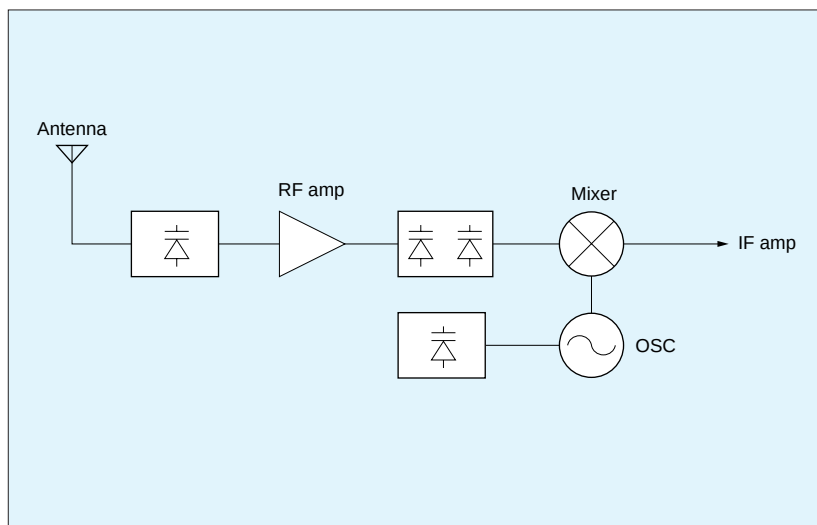
| Device | Function                                                                                                         | Package                                                                              |
|--------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| TPS832 | Operating power supply voltage: Vcc = 5 V<br>Receiving frequency: 38 kHz<br>Typical transmission range: L = 12 m | Side view 3-pin<br>Equipped with oval lens<br>(using a visible light blocking resin) |

### ICs for Remote Controller Transmission and Reception

| Device        | Functions                                                                                                                                                                                                  | Package        |
|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| TC9028P/F-XXX | For transmission, programmable transmission format, 32 keys standard                                                                                                                                       | DIP20<br>SOP20 |
| TC9243P/F     | For transmission, 32 key functions, double-push operation<br>Reception IC: TC9244P, TC9259N, TC9285P                                                                                                       | DIP20<br>SOP20 |
| TC9244P       | For reception, built-in 9-command decoder<br>Transmission IC: TC9243P/F                                                                                                                                    | DIP20          |
| TC9259N       | For reception, built-in 17-command decoder<br>Transmission IC: TC9243P/F                                                                                                                                   | SDIP28         |
| TC9285P       | For reception, built-in 11-command decoder<br>Transmission IC: TC9243P/F                                                                                                                                   | DIP20          |
| TC9290P/F     | For transmission, 32 key functions, double-push operation, switchable remote controller code/<br>key data code format, compatible with wired remote controllers<br>Reception IC: TC9244P, TC9259N, TC9285P | DIP20<br>SOP20 |

# Transistors and Diodes for Tuners

## Tuner System



| Circuit block | Classification             | Frequency         | Package              | Product No.                                                               |
|---------------|----------------------------|-------------------|----------------------|---------------------------------------------------------------------------|
| Diode         | Variable capacitance diode | Wide-band VHF     | USC                  | <b>1SV215 1SV217 1SV262 1SV288</b><br><b>1SV231 1SV232 1SV269 ☆1SV302</b> |
|               |                            |                   | ESC                  | <b>1SV282 1SV290</b><br><b>1SV283 ☆1SV303</b>                             |
|               |                            |                   | S-MINI (Double type) | <b>1SV242</b>                                                             |
|               |                            | UHF               | USC                  | <b>1SV214</b>                                                             |
|               |                            |                   | ESC                  | <b>1SV278</b>                                                             |
|               | AFC diode                  | VHF to UHF        | USC                  | <b>1SV216</b>                                                             |
| RF amp        | Dual gate FET              | VHF (wide-band)   | SMQ                  | <b>3SK126 3SK153 3SK195 3SK225</b><br><b>3SK226 ▼3SK292</b>               |
|               |                            |                   | USQ                  | <b>3SK259 3SK257 3SK258 ▼3SK294</b>                                       |
|               |                            | UHF               | SMQ                  | <b>#3SK240 #3SK283 3SK199</b><br><b>3SK207 3SK232 ▼3SK291</b>             |
|               |                            |                   | USQ                  | <b>#3SK274 #3SK284 3SK256</b><br><b>3SK249 ▼3SK293</b>                    |
|               | Cell pack                  | VHF (wide-band)   | SMV                  | <b>TA4006F TA4007F</b>                                                    |
|               |                            | UHF               | SMV                  | <b>#TG2000F</b>                                                           |
| Mixer         | Dual gate FET              | VHF/wide-band VHF | SMQ                  | <b>3SK151 3SK153</b>                                                      |
|               |                            |                   | USQ                  | <b>3SK260 3SK259</b>                                                      |
|               | Schottky diode             | UHF               | S-MINI               | <b>1SS295 (Double)</b>                                                    |
|               |                            |                   | USC                  | <b>1SS315</b>                                                             |

▼: New product

☆: Under development

(Note) # GaAs

| Circuit block | Classification | Frequency         | Type   | Package | Product No.                    |
|---------------|----------------|-------------------|--------|---------|--------------------------------|
| Diode         | Band switch    | VHF/wide-band VHF | Single | USC     | <b>1SS314</b>                  |
|               |                |                   |        | ESC     | <b>1SS381</b>                  |
|               |                |                   | Twin   | S-MINI  | <b>1SS269</b><br><b>1SS268</b> |
|               |                |                   |        | USM     | <b>1SS313</b>                  |
|               |                |                   |        | SSM     | —                              |
|               |                |                   |        | USM     | <b>1SS312</b>                  |
|               |                |                   |        | SSM     | <b>1SS364</b>                  |
|               |                |                   |        | SSM     | <b>1SS364</b>                  |

| Circuit block | Classification | Frequency       | Circuit diagram | Package | Product No.                                        |
|---------------|----------------|-----------------|-----------------|---------|----------------------------------------------------|
| RF amp        | Bi-Tr          | VHF             |                 | USM     | <b>2SC4249</b>                                     |
|               |                |                 |                 | SM      | <b>2SC3122</b>                                     |
|               |                | UHF             |                 | USM     | <b>2SC4244</b>                                     |
|               |                |                 |                 | SMQ     | <b>2SC4214</b>                                     |
| OSC           | Bi-Tr          | VHF (wide-band) |                 | USM     | <b>2SC4251</b><br><b>2SC4246</b><br><b>2SC4252</b> |
|               |                |                 |                 | S-MINI  | <b>2SC3124</b><br><b>2SC3121</b><br><b>2SC4255</b> |
|               |                | UHF             |                 | USM     | <b>2SC4246</b>                                     |
|               |                |                 |                 | S-MINI  | <b>2SC3121</b>                                     |
|               | Bi-Tr          | VHF (wide-band) |                 | USM     | <b>2SC4247</b><br><b>2SC4248</b>                   |
|               |                |                 |                 | S-MINI  | <b>2SC3547A</b><br><b>2SC3547B</b>                 |
|               |                | UHF             |                 | USM     | <b>2SC4250</b><br><b>2SC4245</b>                   |
|               |                |                 |                 | S-MINI  | <b>2SC3123</b><br><b>2SC3120</b>                   |
| Mixer         | Bi-Tr          | VHF (wide-band) |                 | USM     | <b>2SC4253</b><br><b>2SC4251</b><br><b>2SC4246</b> |
|               |                |                 |                 | S-MINI  | <b>2SC3125</b><br><b>2SC3124</b><br><b>2SC3121</b> |
|               |                | UHF             |                 | S-MINI  | <b>2SC3120</b><br><b>2SC3862</b>                   |
|               |                |                 |                 | S-MINI  | <b>2SC3547A</b><br><b>2SC3547B</b>                 |
|               |                |                 |                 | USM     | <b>2SC4245</b>                                     |
|               |                |                 |                 | USM     | <b>2SC4247</b><br><b>2SC4248</b>                   |



# Synthesizer Systems

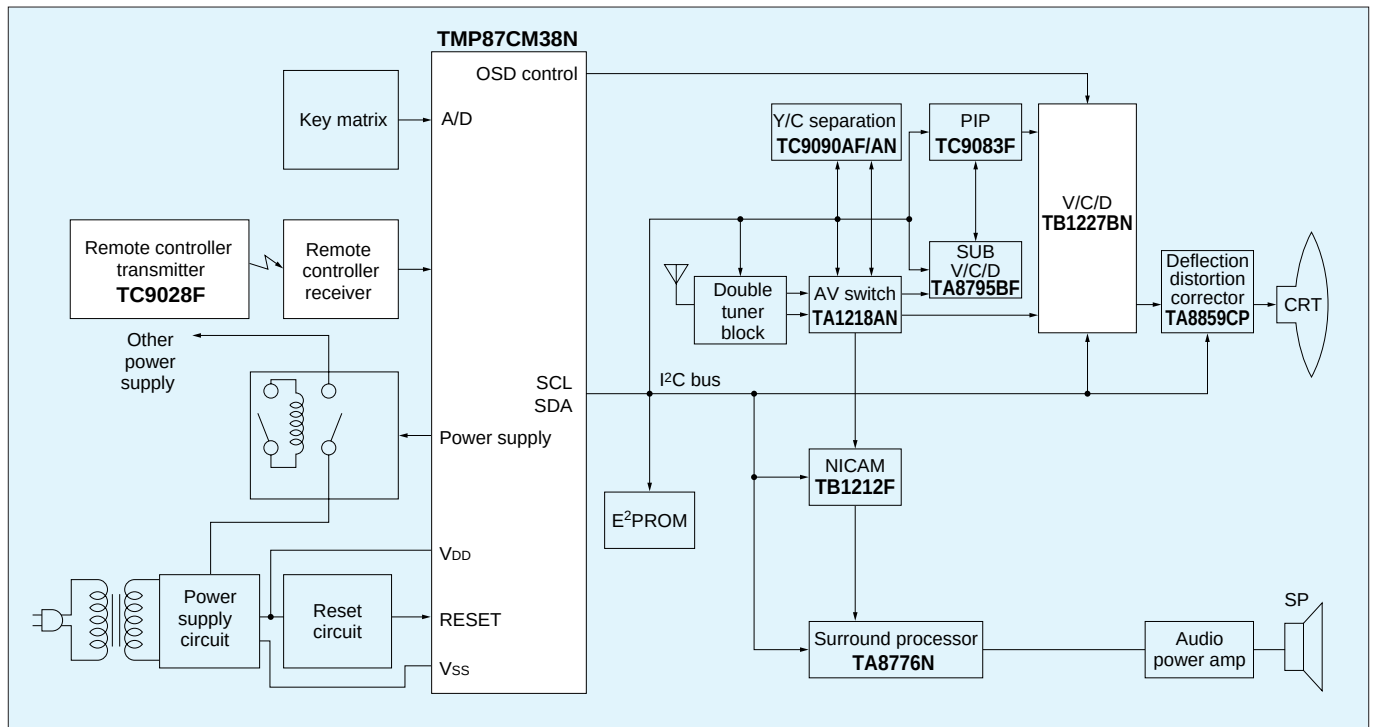
## Reference Application Software (RAS)

Toshiba offers its CTS Series of reference application software (RAS) products that are able to be used in microcontrollers (MCU) installed in TV application systems. The CTS series consists of a family of MCU incorporated with control software for TV tuners. Types are available for each function, and can be used in the form of kits with TV system ICs.

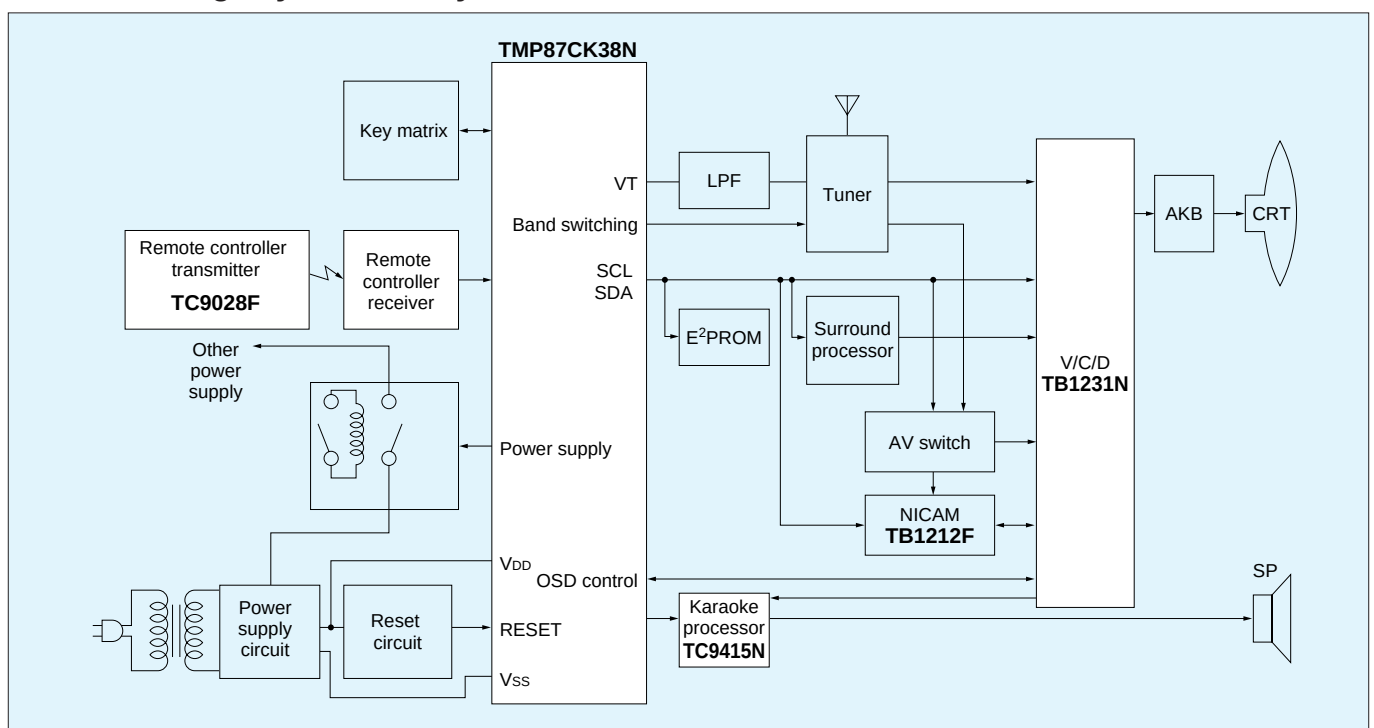
These reference software products can be used to improve the efficiency of your software development and shorten development time.

Furthermore, please contact your sales representative regarding precautions concerning usage conditions and usage when using these software products.

## CTS-862 Frequency Synthesizer System



## CTS-763 Voltage Synthesizer System



## Main Functions of Frequency Synthesizer Systems

| System                      | CTS-664                                                                                            | CTS-856A                                                                                                                                                 | CTS-860                                                                                                                                                               | CTS-862                                                                                                                                                           |
|-----------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Function                    | CCD for USA                                                                                        | CCD for USA                                                                                                                                              | Multi-color system, Chinese language, PIP compatibility, double tuner compatibility                                                                                   | Multi-color system, Chinese language, PIP compatibility, double tuner compatibility                                                                               |
| MCU                         | TMP87CK34BN                                                                                        | TMP87CK34BN                                                                                                                                              | TMP87CK36N-3454                                                                                                                                                       | TMP87CM38N                                                                                                                                                        |
| Bus system compatibility    | —                                                                                                  | ○                                                                                                                                                        | ○                                                                                                                                                                     | ○                                                                                                                                                                 |
| Compatible bus LSI          | —                                                                                                  | TA1201BN                                                                                                                                                 | TA8880CN                                                                                                                                                              | TB1226DN/TB1227BN                                                                                                                                                 |
| CCD                         | ○                                                                                                  | ○                                                                                                                                                        | —                                                                                                                                                                     | —                                                                                                                                                                 |
| Channel plan                | USA 155/181 channels                                                                               | USA 155/181 channels                                                                                                                                     | Multi-color system                                                                                                                                                    | Multi-color system                                                                                                                                                |
| Station selection functions | Channel skip<br>Channel search<br>Channel direct access                                            | Channel skip<br>Channel search<br>Channel direct access                                                                                                  | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                                                                            | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                                                                        |
| Memory                      | All channels                                                                                       | All channels                                                                                                                                             | 50/60 position                                                                                                                                                        | 50/100 position                                                                                                                                                   |
| Analog volume control       | Volume + 5                                                                                         | TA1201BN control                                                                                                                                         | TA8880CN control                                                                                                                                                      | TB1226DN/TB1227BN control                                                                                                                                         |
| Other functions             | Sound multiplexing                                                                                 | Sound multiplexing,<br>self-adjustment                                                                                                                   | NICAM, Karaoke,<br>surround, multi-color,<br>PIP, double tuner                                                                                                        | NICAM, Karaoke,<br>surround, multi-color,<br>PIP, double tuner                                                                                                    |
| OSD display contents        | Channel, volume,<br>sound multiplexing,<br>analog volume, video, clock,<br>sleep, timer, menu, CCD | Channel, volume, sound<br>multiplexing, analog volume, video,<br>clock, sleep, timer, menu, CCD,<br>bus adjustment                                       | Channel, volume,<br>sound multiplexing, analog volume,<br>video, clock, sleep, timer, menu,<br>PIP, bus adjustment                                                    | Channel, volume,<br>sound multiplexing, analog volume,<br>video, clock, sleep, timer, menu,<br>PIP, bus adjustment                                                |
| Back-up operation           | MCU RAM/E <sup>2</sup> PROM                                                                        | E <sup>2</sup> PROM                                                                                                                                      | E <sup>2</sup> PROM                                                                                                                                                   | E <sup>2</sup> PROM                                                                                                                                               |
| Package                     | 42-SDIP                                                                                            | 42-SDIP                                                                                                                                                  | 42-SDIP                                                                                                                                                               | 42-SDIP                                                                                                                                                           |
| System kit IC               | PLL: TD6359/6380/6382<br>R/C: TC9012F/28F<br>E <sup>2</sup> PROM: I <sup>2</sup> C bus (1KB)       | PLL: TD6359/6380/TD7603<br>R/C: TC9012F/28F<br>E <sup>2</sup> PROM: I <sup>2</sup> C bus (2KB)<br>V/C/D: TA1201BN<br>Surround: TA8776N<br>S.MPX: TA8622P | PLL: TB1220F<br>R/C: TC9028F<br>E <sup>2</sup> PROM: I <sup>2</sup> C bus (2KB)<br>V/C/D: TA8880CN<br>Surround, NICAM<br>RGB cut off, DPC, PIP<br>Karaoke, 3-line-Y/C | PLL: TB1220F<br>R/C: TC9028F<br>E <sup>2</sup> PROM: I <sup>2</sup> C bus (4KB)<br>V/C/D: TB1226DN/TB1227BN<br>Surround, NICAM<br>DPC, PIP<br>Karaoke, 3-line-Y/C |

Common functions: Remote control, auto-memory function, clock function, on/off timer function, sleep timer function, video input switching (3 channels)

## Major Functions of Voltage Synthesizer Systems

| System                      | CTS-763                                                                                                                      | CTS-591                                                                                                              | CTS-762                                                                                                                                                      | CTS-760                                                                                                                                             |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Function                    | Multi-color system,<br>bus compatibility                                                                                     | Teletext compatibility                                                                                               | Multi-color system,<br>bus compatibility                                                                                                                     | Multi-color system,<br>bus compatibility                                                                                                            |
| MCU                         | TMP87CK38N                                                                                                                   | TMP87CH31N                                                                                                           | TMP87CM38N                                                                                                                                                   | TMP87CK36N-3098                                                                                                                                     |
| Bus system compatibility    | ○                                                                                                                            | —                                                                                                                    | ○                                                                                                                                                            | ○                                                                                                                                                   |
| Compatible bus LSI          | TB1231N                                                                                                                      | —                                                                                                                    | TB1226DN/TB1227BN                                                                                                                                            | TA8880CN                                                                                                                                            |
| Station selection functions | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                                   | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                           | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                                                                   | Position up/down,<br>position direct,<br>search up/down,<br>manual up/down                                                                          |
| AFT                         | Digital                                                                                                                      | Digital                                                                                                              | Digital                                                                                                                                                      | Analog                                                                                                                                              |
| Compatible bands            | VHF, UHF, CATV                                                                                                               | VHF, UHF                                                                                                             | VHF, UHF, CATV                                                                                                                                               | VHF, UHF, CATV                                                                                                                                      |
| Positions                   | 50/100                                                                                                                       | 40/100/200                                                                                                           | 50/100                                                                                                                                                       | 50/100                                                                                                                                              |
| Analog volume control       | TB1231N control                                                                                                              | Volume +8                                                                                                            | TB1226DN/TB1227BN control                                                                                                                                    | TA8880CN control                                                                                                                                    |
| Video input switching       | 2                                                                                                                            | 1                                                                                                                    | 3                                                                                                                                                            | 3                                                                                                                                                   |
| Other functions             | Karaoke, multi-color system,<br>surround                                                                                     | Teletext, multi-color system,<br>NICAM/IGR, surround                                                                 | NICAM, Karaoke, surround,<br>multi-color system                                                                                                              | NICAM, Karaoke,<br>multi-color system, surround                                                                                                     |
| OSD display contents        | Position, volume, sleep,<br>S. MPX, analog volume,<br>Karaoke, multi-color system,<br>bus adjustment                         | Position, volume, clock,<br>sleep, timer, analog volume,<br>multi-color system                                       | Position, volume, clock, sleep,<br>timer, S. MPX, analog volume,<br>Karaoke, multi-color system,<br>bus adjustment                                           | Position, volume, clock,<br>sleep, timer, S. MPX,<br>analog volume, Karaoke,<br>multi-color system                                                  |
| Package                     | 42-SDIP                                                                                                                      | 42-SDIP                                                                                                              | 42-SDIP                                                                                                                                                      | 42-SDIP                                                                                                                                             |
| System kit IC               | R/C : TC9028F<br>E <sup>2</sup> PROM : I <sup>2</sup> C bus (4KB)<br>V/C/D : TB1231N<br>Surround, DPC<br>Karaoke, 2-line-Y/C | R/C : TC9012F/28F<br>E <sup>2</sup> PROM : I <sup>2</sup> C bus (2KB/4KB)<br>Teletext : CF70200<br>Surround : TA8776 | R/C : TC9028F<br>E <sup>2</sup> PROM : I <sup>2</sup> C bus (2KB)<br>V/C/D : TB1226DN/TB1227BN<br>Surround, NICAM<br>RGB cut off, DPC<br>Karaoke, 3-line-Y/C | R/C : TC9028F<br>E <sup>2</sup> PROM : I <sup>2</sup> C bus (2KB)<br>V/C/D : TA8880CN<br>NICAM, Surround<br>RGB cut off, DPC<br>Karaoke, 3-line-Y/C |

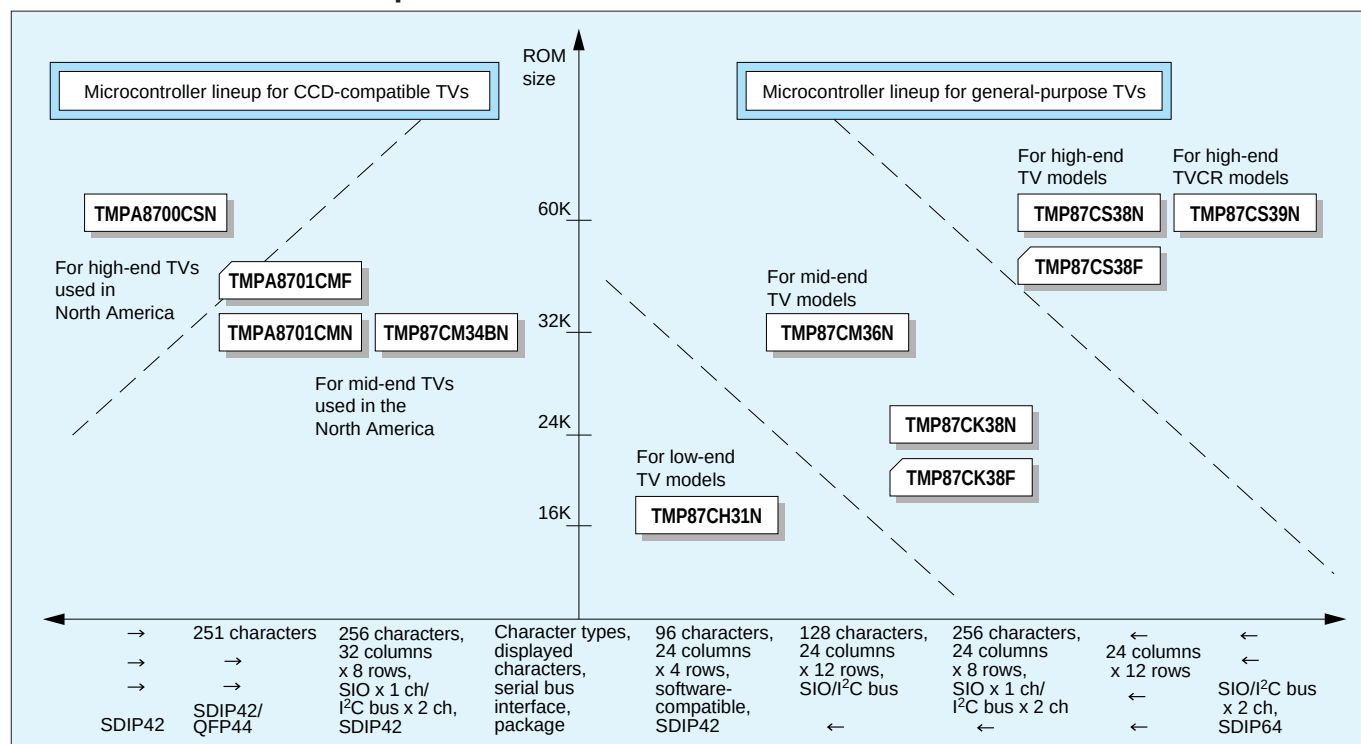
Common functions: Auto-memory, clock, on/off timer, sleep timer

# Microcontrollers for Single-chip TVs

Toshiba's microcontrollers for single-chip TVs are 8-bit microcontrollers containing a built-in on-screen display circuit that displays characters and symbols on the television screen, and a peripheral circuit for controlling channel selection. These microcontrollers are perfect for digital tuning systems. A wide range of types are available featuring ROM sizes from 12K to 60K bytes.

Microcontrollers for CCD contain a built-in data slicer optimum for televisions equipped with closed caption decoders for the hearing impaired that are mandatory in the U.S. They are also compatible with expanded data services (EDS) and text mode.

## 8-bit Microcontroller Lineup for TVs

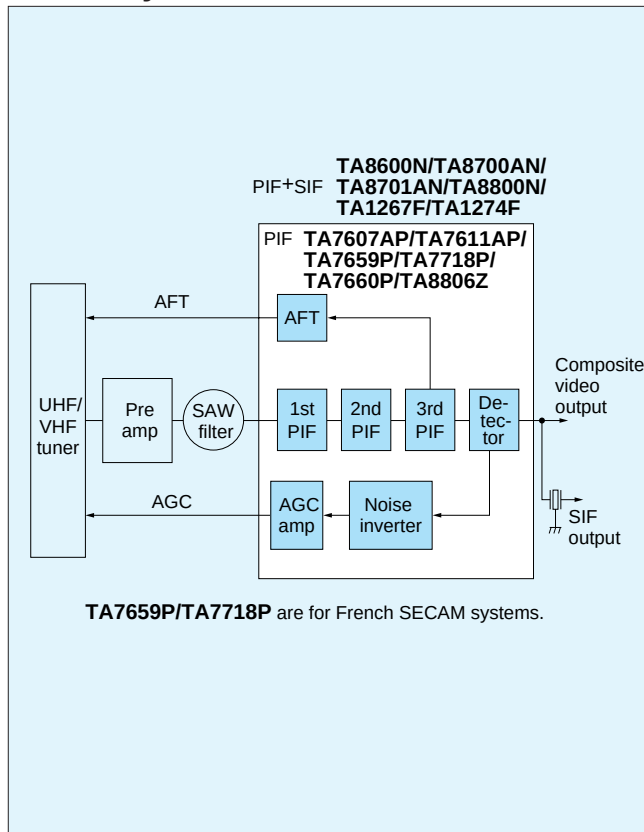


## Microcontrollers for TVs with Built-in OSD

| Device        | ROM size  | RAM size  | Functions                                                                                                                                                                                 | Package         |
|---------------|-----------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| TMP87CH34BN   | 16K byte  | 1K byte   | For CCD, 256 characters, display of 32 characters x 8 rows, I <sup>2</sup> C bus compatibility, 6-bit A/D conversion input x 4 ch, PWM output, remote control signal preprocessor circuit | SDIP42          |
| TMP87CK34BN   | 24K byte  |           |                                                                                                                                                                                           |                 |
| TMP87CM34BN   | 32K byte  |           |                                                                                                                                                                                           |                 |
| TMPA8701CHN/F | 16K bytes | 768 bytes | For CCD, 251 characters, display of 32 characters x 8 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 6 ch                                                                | SDIP42<br>QFP44 |
| TMPA8701CKN/F | 24K bytes |           |                                                                                                                                                                                           |                 |
| TMPA8701CMN/F | 32K bytes |           |                                                                                                                                                                                           |                 |
| TMPA8700CHN   | 16K bytes | 1K byte   | For CCD, 251 characters, display of 32 characters x 8 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit        | SDIP42          |
| TMPA8700CKN   | 24K bytes |           |                                                                                                                                                                                           |                 |
| TMPA8700CMN   | 32K bytes |           |                                                                                                                                                                                           |                 |
| TMPA8700CPN   | 48K bytes | 2K bytes  | For CCD, 251 characters, display of 32 characters x 8 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit        | SDIP42          |
| TMPA8700CSN   | 60K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CC31N    | 12K bytes | 256 bites | 96 characters, display of 24 characters x 4 rows, 6-bit A/D conversion input x 4 ch, PWM output, remote control signal preprocessor circuit                                               | SDIP42          |
| TMP87CH31N    | 16K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CH36N    | 16K bytes | 1K byte   | 128 characters, display of 24 characters x 12 rows, I <sup>2</sup> C bus compatibility, 6-bit A/D conversion input x 4 ch, PWM output, remote control signal preprocessor circuit         | SDIP42          |
| TMP87CK36N    | 24K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CM36N    | 32K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CH38N/F  | 16K bytes | 512 bytes | 256 characters, display of 24 characters x 8 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit                 | SDIP42<br>QFP44 |
| TMP87CK38N/F  | 24K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CM38N/F  | 32K bytes | 1K byte   | 256 characters, display of 24 characters x 12 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit                | SDIP42<br>QFP44 |
| TMP87CP38N/F  | 48K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CS38N/F  | 60K bytes |           |                                                                                                                                                                                           |                 |
| TMP87CM39N    | 32K bytes | 1K byte   | 256 characters, display of 24 characters x 12 rows, I <sup>2</sup> C bus compatibility, 8-bit A/D converter x 8 ch, PWM output, remote control signal preprocessor circuit                | SDIP64          |
| TMP87CP39N    | 48K bytes | 2K bytes  |                                                                                                                                                                                           |                 |
| TMP87CS39N    | 60K bytes |           |                                                                                                                                                                                           |                 |

# PIF/SIF Systems and SAW Filters

## PIF/SIF Systems



## ICs for PIF

| Functions                    | AGC<br>RF | Peak AGC                                |                                         | Mean AGC          |                   | Power supply<br>(V) |
|------------------------------|-----------|-----------------------------------------|-----------------------------------------|-------------------|-------------------|---------------------|
|                              |           | Reverse direction                       | Forward direction                       | Reverse direction | Forward direction |                     |
| PIF                          | ☆TA1290FN | SSOP16                                  |                                         |                   |                   | 9 V                 |
|                              | TA7607AP  | DIP16                                   | TA7611AP DIP16                          | TA7718P DIP16     | TA7659P DIP16     | 12 V                |
|                              | TA7710P   | DIP16                                   |                                         |                   |                   | 12 V                |
|                              | TA7660P   | DIP16                                   |                                         |                   |                   | 12 V                |
| PIF+SIF (without AFT)        |           |                                         | TA7678AP DIP16                          |                   |                   | 12 V                |
| PIF+SIF                      |           | TA8700AN                                | SDIP20                                  |                   |                   | 9 V                 |
| PIF+SIF/ATT                  |           | TA7680AP                                | DIP24                                   | TA7681AP DIP24    |                   | 12 V                |
|                              |           | TA8701AN                                | SDIP24                                  |                   |                   | 9 V                 |
| PIF+QIF                      |           | TA8712N                                 | SDIP20                                  |                   |                   | 9 V                 |
|                              |           | TA8796N                                 | SDIP20                                  |                   |                   | 9 V                 |
| PIF+QIF+SIF                  |           | TA8600N                                 | SDIP30                                  |                   |                   | 9 V                 |
| PLL+PIF+SIF                  |           | TA8800N                                 | SDIP24                                  |                   |                   | 9 V                 |
|                              |           | TA1267F                                 | SSOP24                                  |                   |                   | 9 V                 |
|                              |           | ☆TA1274F                                | SSOP24                                  |                   |                   | 9 V                 |
|                              |           | TA8805F                                 | SSOP24                                  | TA8670F SSOP24    |                   | 3.5 V to 7.5 V      |
| Low voltage PIF+SIF/ATT      |           | TA8836F SSOP24 (without noise inverter) | TA1207F SSOP24 (without noise inverter) |                   |                   | 3.5 V to 7.5 V      |
| Low voltage PIF+SIF          |           | TA1272F                                 | SSOP24                                  |                   |                   | 3.5 V to 5.5 V      |
| Low voltage PIF+QIF+SIF      |           | TA8876FA                                | SSOP30                                  |                   |                   | 3.5 V to 7.5 V      |
| Peak/mean switchable PIF     |           | TA8806Z                                 | ZIP16                                   |                   | TA8806Z ZIP16     | 9 V                 |
| Multi-standard compatibility |           | TA8865BN*                               | SDIP36                                  |                   |                   | 9 V                 |
| Converter format             |           | TA1209F                                 |                                         |                   |                   | 8.5 V               |
| PIF+SIF+ACC                  |           |                                         | QFP48                                   |                   |                   | 5 V                 |

☆: Under development \* : TA8865BN operates with keyed AGC when using the L-SECAM format.

## ICs for SIF

| Device    | Function        | Package |
|-----------|-----------------|---------|
| TA8703S   | QIF             | SSIP12  |
| TA8603P   | QIF + SIF       | DIP16   |
| TA8721ASN | DUAL SIF        | SSIP12  |
| TA8710S   | 6 MHz converter | SIP7    |

## SAW Filters for TVs

### For PIF

| Device      | fp (MHz) | System       | Package | Remarks | Device        | fp (MHz) | System | Package | Remarks       |
|-------------|----------|--------------|---------|---------|---------------|----------|--------|---------|---------------|
| F056GSM     | 38.0     | (B), D, G, I | S-2C    | LT      | F035LSM       | 39.5     | I      | S-2C    | LT            |
| F046USL     |          | B, D, G, K   | S-6B    | LN      | F1035         |          |        | T-1     | LT            |
| F047RSL     |          |              | S-6B    | LN      | F1035DS       |          |        | S-1C    | LT            |
| F1036CS/HS  |          | (B), D, G, I | S-1C    | LT      | F045ESL       |          |        | S-6B    | LN            |
| F1046BS     |          | D            | S-1C    | LN      | F1045AS/ES    |          |        | S-1C    | LN            |
| F1056DS     |          | D, G, I      | S-1C    | LT      | F045LSL       |          |        | S-6B    | LN            |
| F56CM       |          | B, D, G, I   | TM-3    | LT      | F032USM       |          |        | S-2C    | LT            |
| F034LSM     | 38.9     | B, G         | S-2C    | LT      | F072ESM       | 45.75    | M, N   | S-2C    | LN            |
| F074ASL/LSL |          |              | S-6B    | LN      | F052VSM       |          |        | S-2C    | LT            |
| F1034AS     |          |              | S-1C    | LT      | F062DSL       |          |        | S-6B    | LT            |
| F1037B/C    |          | M            | T-1     | LT      | F072ASL/BSL   |          |        | S-6B    | LN            |
| F1037CS     |          |              | S-1C    | LT      | F1052B/Z      |          |        | T-1     | LT            |
| F1037DS     |          |              | S-1C    | LT      | F1062BS/ES    |          |        | S-1C    | LT, wide-band |
| F047MSL     |          | B, D, G, I   | S-6B    | LN      | F32AM/HM/LP   |          |        | TM-2    | LT            |
| F1044QS/RS  |          | B, G         | S-1C    | LN      | F52LM         |          |        | TM-3    | LT, wide-band |
| F1047AS/LS  |          | B, D, G, I   | S-1C    | LN      | F051TSM       | 58.75    | M, N   | S-2C    | LT            |
| F1054D/E    |          | B, G         | T-1     | LT      | F1051C/D/E/F  |          |        | T-1     | LT            |
| F1057D/F/G  |          | B, G         | T-1     | LT      | F1061CS/DS/HS |          |        | S-1C    | LT, wide-band |
| F1057DS     |          | B, G         | S-1C    | LT      | F31HM/XM      |          |        | TM-2    | LT            |
| F34AM       |          | B, G         | TM-3    | LT      | F51LM/RM/UM   |          |        | TM-3    | LT, wide-band |
| F54DM       |          | D, I, B, G   | TM-3    | LT      | F061JSL       |          |        | S-6B    | LT, wide-band |

### For SIF

| Device    | fp (MHz) | System        | Package | Remarks | Device  | fp (MHz) | System  | Package | Remarks |
|-----------|----------|---------------|---------|---------|---------|----------|---------|---------|---------|
| F328EM/FM | 32.9     | B, G, L       | TM-3    | LT      | F322CSL | 45.75    | M, N    | S-6B    | LT      |
| F337ESL   | 38.9     | B, D, G, K, I | S-6B    | LN      | F321CSL | 58.75    | M, N    | S-6B    | LT      |
| F1334AS   |          | B, G          | S-1C    | LN      | F1807H  | 38.9     | B, G +1 | T-4     | LT      |

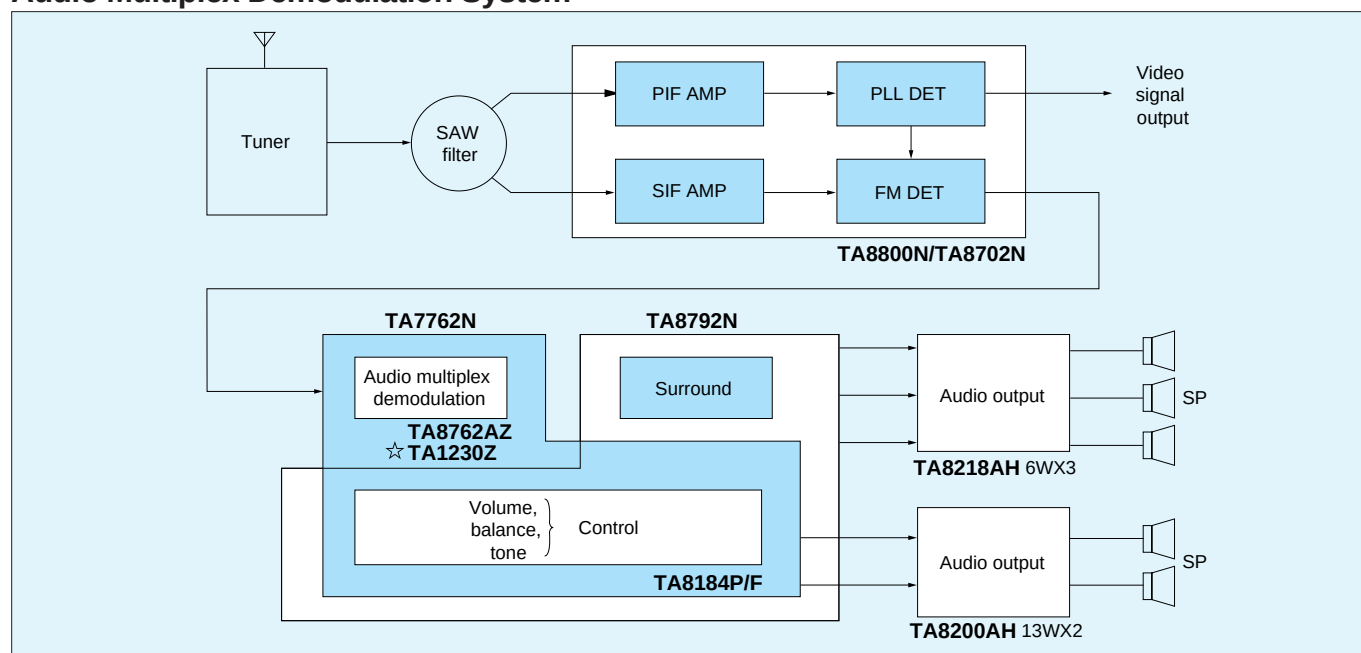
### For PIF and SIF

| Device      | fp (MHz) | System     | Package | Remarks       | Device         | fp (MHz) | System | Package | Remarks       |
|-------------|----------|------------|---------|---------------|----------------|----------|--------|---------|---------------|
| F1806D/E    | 38.0     | B, D, G, I | T-4     | LT            | F1802X/Y/ZE    | 45.75    | M, N   | T-4     | LT, wide-band |
| F1804J/M    | 38.9     | B, D, G, I | T-4     | LT            | F822FM         |          |        | TM-4    | LT, wide-band |
| F1814B/D/H  |          | B, G       | T-4     | LN            | F1801          | 58.75    | M, N   | T-4     | LT            |
| F1815B      | 39.5     | I          | T-4     | LN            | F1801F/H/D/J/R |          |        | T-4     | LT, wide-band |
| F1802N/R/RE | 45.75    | M, N       | T-4     | LT, wide-band | F801TM/VM      |          |        | TM-4    | LT, wide-band |
| F812FSL     |          |            | S-6B    | LN, wide-band | F811ASL        |          |        | S-6B    | LN, wide-band |

# Audio Multiplex Demodulation Systems

Demodulation of audio multiplex signals requires a broad SIF detection area. Toshiba recommends the SIF demodulation circuit of a QIF (Quasi-parallel IF) system to obtain a high-quality demodulation output. Toshiba offers the TA7762N, TA8762AZ, TA1230Z and TA8874Z for use with the Japanese format (EIAJ). Use of the TA8762AZ, TA1230Z or TA8874Z eliminates pilot detection and filter adjustment. The TA8622N is suitable for the U.S. format.

## Audio Multiplex Demodulation System



☆ : Under development

## ICs for Audio Multiplex Demodulation

| Device           | Functions                                                                                                                  | Operating power supply (V)  | Package |
|------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------|
| <b>TA7762N</b>   | Japanese format audio multiplexing, built-in filter, with surround processor                                               | 8.1 to 9.9 V                | SDIP30  |
| <b>TA8762AZ</b>  | Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast compatibility                          |                             | SZIP21  |
| ☆ <b>TA1230Z</b> | Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast compatibility                          |                             | SZIP21  |
| <b>TA8874Z</b>   | Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast and I <sup>2</sup> C bus compatibility |                             | SZIP21  |
| <b>TA8792N</b>   | Surround processor, Toshiba bus compatibility                                                                              | 8.1 to 9.9 V/10.8 to 13.2 V | SDIP30  |
| <b>TA8776N</b>   | Surround processor, I <sup>2</sup> C bus compatibility                                                                     | 8.1 to 9.9 V/10.8 to 13.2 V | SDIP30  |

☆ : Under development

## Power ICs for Audio Output

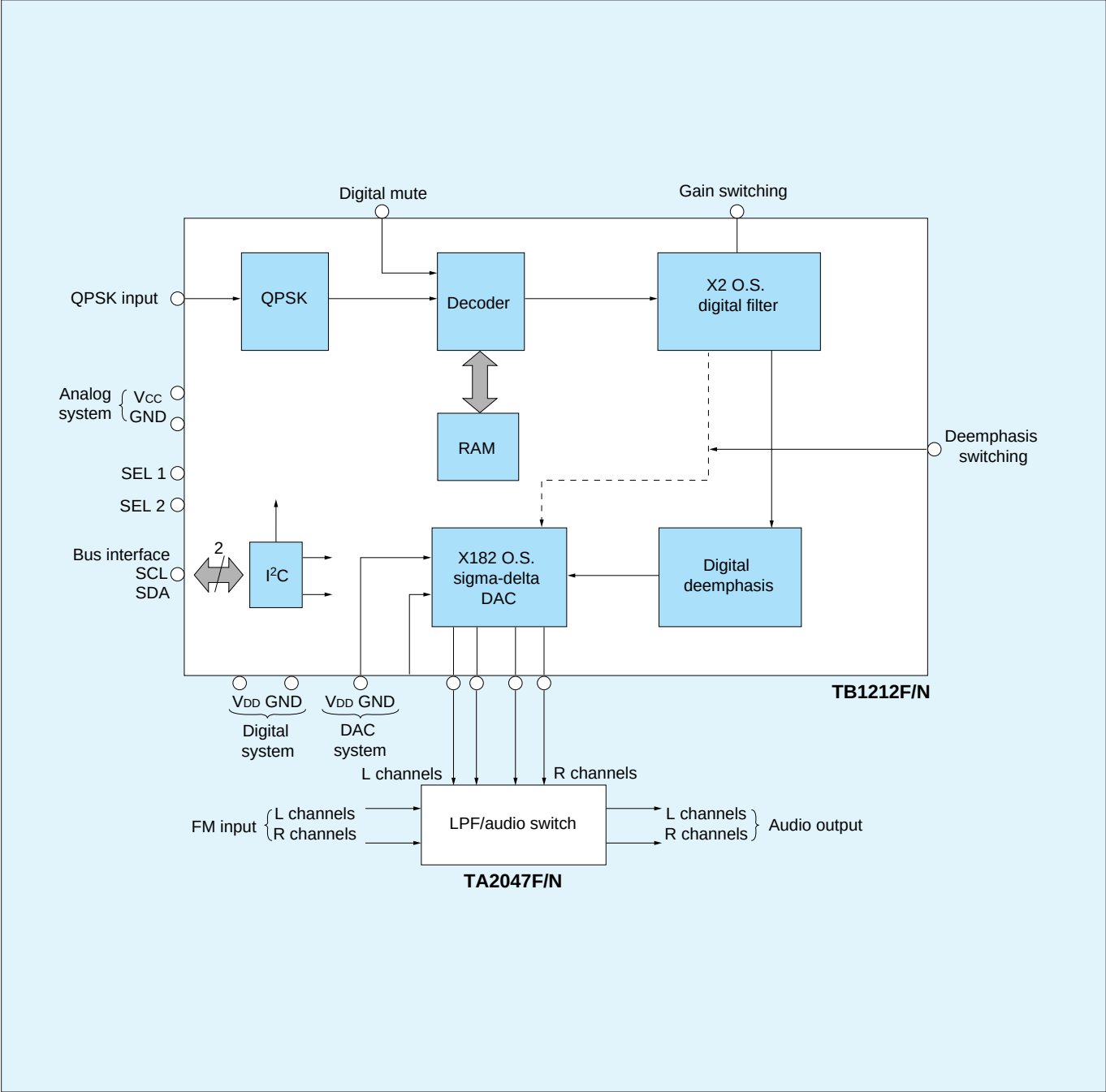
| Device          | Typ. output (f = 1 kHz, THD = 10%)                           | Functions                                                                                                                                                                                       | Operating power supply (V)                   | Package |
|-----------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|---------|
| <b>TA8200AH</b> | 13 W x 2 ch<br>(V <sub>CC</sub> = 28 V R <sub>L</sub> = 8 Ω) | Audio muting, fixed gain (G <sub>v</sub> = 34 dB), thermal cutoff protective circuit                                                                                                            | 10 to 37 V                                   | HZIP12  |
| <b>TA8211AH</b> | 6 W x 2 ch<br>(V <sub>CC</sub> = 20 V R <sub>L</sub> = 8 Ω)  | Variable gain, thermal cutoff protective circuit                                                                                                                                                | 10 to 30 V                                   | HZIP12  |
| <b>TA8213K</b>  | 6 W x 1 ch<br>(V <sub>CC</sub> = 20 V R <sub>L</sub> = 8 Ω)  | Fixed gain (G <sub>v</sub> = 34 dB), thermal cutoff protective circuit, compact 7-pin package                                                                                                   | 10 to 30 V                                   | MSIP7   |
| <b>TA8216H</b>  | 13 W x 2 ch<br>(V <sub>CC</sub> = 24 V R <sub>L</sub> = 4 Ω) | Audio muting, fixed gain (G <sub>v</sub> = 34 dB), thermal cutoff protective circuit, operation at R <sub>L</sub> = 4 Ω                                                                         | 10 to 24 V (R = 4 Ω)<br>10 to 37 V (R = 8 Ω) | HZIP12  |
| <b>TA8218AH</b> | 6 W x 3 ch<br>(V <sub>CC</sub> = 20 V R <sub>L</sub> = 8 Ω)  | Stereo (2 ch) + surround (1 ch), 2 independent channels, audio muting (stereo/surround), fixed gain (G <sub>v</sub> = 34 dB), thermal cutoff protective circuit, low thermal resistance package | 10 to 30 V                                   | HZIP17  |
| <b>TA8246H</b>  | 6 W x 2 ch<br>(V <sub>CC</sub> = 20 V R <sub>L</sub> = 8 Ω)  | Audio muting, fixed gain (G <sub>v</sub> = 34 dB), no NF terminal, thermal cutoff/overvoltage protective circuits, interchangeable with TA8256H                                                 | 10 to 30 V                                   | HZIP12  |
| <b>TA8256H</b>  | 6 W x 3 ch<br>(V <sub>CC</sub> = 20 V R <sub>L</sub> = 8 Ω)  | Audio muting, fixed gain (G <sub>v</sub> = 34 dB), no NF terminal, thermal cutoff/overvoltage protective circuits, interchangeable with TA8246H                                                 | 10 to 30 V                                   | HZIP12  |



# U.K. Audio Multiplex Demodulation (NICAM) Systems

The U.K. has implemented practical application of an NICAM (Near Instantaneous Compound Audio Multiplex) audio multiplexing system in which a second carrier is newly added to the I format television modulation systems. This system consists of digitizing 2 channels of audio and data signals, and modulating these signals with a 6.552 MHz sound carrier using 4-phase QPSK (Quadrature Phase Shift Keying). The sound carrier is at 5.85 MHz in Scandinavian countries since the B/G format is used in those countries.

## NICAM Single-chip IC Block Diagram



| Device           | Summary           | Functions                                                                                                                            | Package          |
|------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <b>TB1212F/N</b> | Single-chip NICAM | QPSK demodulation, 2 built-in O.S. filters, built-in digital deemphasis (on/off switchable), built-in DAC, increaseable signal level | QFP80<br>SDIP64  |
| <b>TA2047F/N</b> | LPF               | Audio switch, analog muting, increaseable signal level (6 dB), externally connectable analog deemphasis                              | SSOP24<br>SDIP24 |

# Video and Chroma Processing Systems

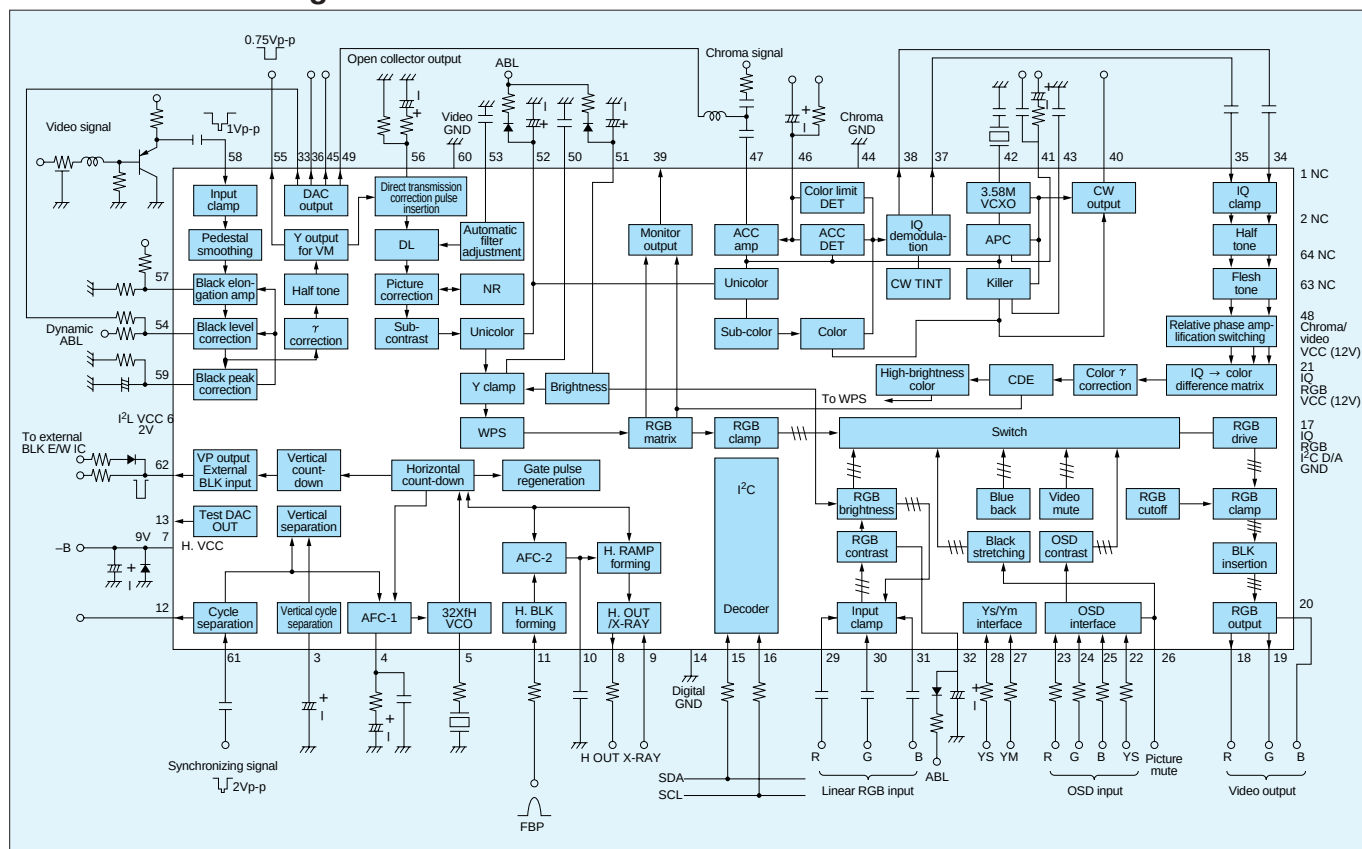
Toshiba offers a complete lineup of ICs to accommodate the NTSC, PAL and SECAM color transmission formats. Some of our more commonly used products include video, chroma and deflection ICs combining video and chroma systems with a deflection system, and ICs integrating video, chroma and detection systems as a portion of a single-chip IC. The TA8728P is equipped with a comb filter function that separates brightness signals and color signals by arithmetic processing of composite video signals and 1H delay signals, while the TA8748AN offers this same function by arithmetic processing of composite video signals, 1H delay signals and 2H delay signals. In addition, both of these products feature a vertical contour enhancement function.

The TA8647S is provided with a correction circuit that automatically and faithfully reproduces flesh tones that tend to appear unnatural in the case of long-distance transmission paths and U.S. CATV stations.

## ICs for Video and Chroma Processing

| Device   | Functions | Video processing |     |       | Synchronizing processing | Functions                                                                                                                                     | Package |
|----------|-----------|------------------|-----|-------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|
|          |           | NTSC             | PAL | SECAM |                          |                                                                                                                                               |         |
| TA8801AN |           | ○                | ○   | —     | ○                        | DL up-conversion, black stretching                                                                                                            | SDIP36  |
| TA8745EN |           | ○                | ○   | —     | ○                        | RGB switch, DL up-conversion, black stretching, flesh tone correction, IQ demodulation                                                        | SDIP54  |
| TA8845BN |           | ○                | ○   | —     | ○                        | RGB switch, DL up-conversion, black stretching, flesh tone correction, IQ demodulation, cutoff drive adjustment, I <sup>2</sup> C bus control | SDIP64  |
| TA7698AP |           | ○                | ○   | ○     | ○                        | PAL/NTSC switching                                                                                                                            | DIP42   |
| TA8718N  |           | ○                | —   | ○     | ○                        | Externally connectable with TA8759BN                                                                                                          | SDIP30  |
| TA8759BN |           | ○                | ○   | ○     | ○                        | Multi-system compatibility, automatic system discrimination                                                                                   | SDIP64  |
| TA8750AN |           | —                | —   | ○     | —                        | OSD, V.Iden compatibility                                                                                                                     | SDIP36  |
| TA8647S  |           | —                | —   | —     | —                        | Automatic flesh tone correction                                                                                                               | SIP9    |
| TA8728P  |           | —                | —   | —     | —                        | 2-line comb filter, vertical contour correction                                                                                               | DIP16   |
| TA8748AN |           | —                | —   | —     | —                        | 3-line comb filter, vertical contour correction                                                                                               | SDIP30  |
| TA8870AN |           | ○                | ○   | —     | ○                        | OSD, linear RGB, 2-line comb filter arithmetic processing                                                                                     | SDIP42  |
| TA8867AN |           | ○                | ○   | ○     | ○                        | Linear RGB, glass delay line adjustment                                                                                                       | SDIP48  |
| TA1222BN |           | ○                | ○   | ○     | ○                        | Bus control, PAL/NTSC systems                                                                                                                 | SDIP56  |
| TA1259N  |           | ○                | ○   | ○     | ○                        | Bus control, PAL/NTSC double-speed systems                                                                                                    | SDIP56  |
| TA1252N  |           | ○                | ○   | —     | ○                        | Bus control, NTSC systems, built-in deflection distortion correction                                                                          | SDIP56  |

## TA8845BN Block Diagram



## Wide-screen TV Systems

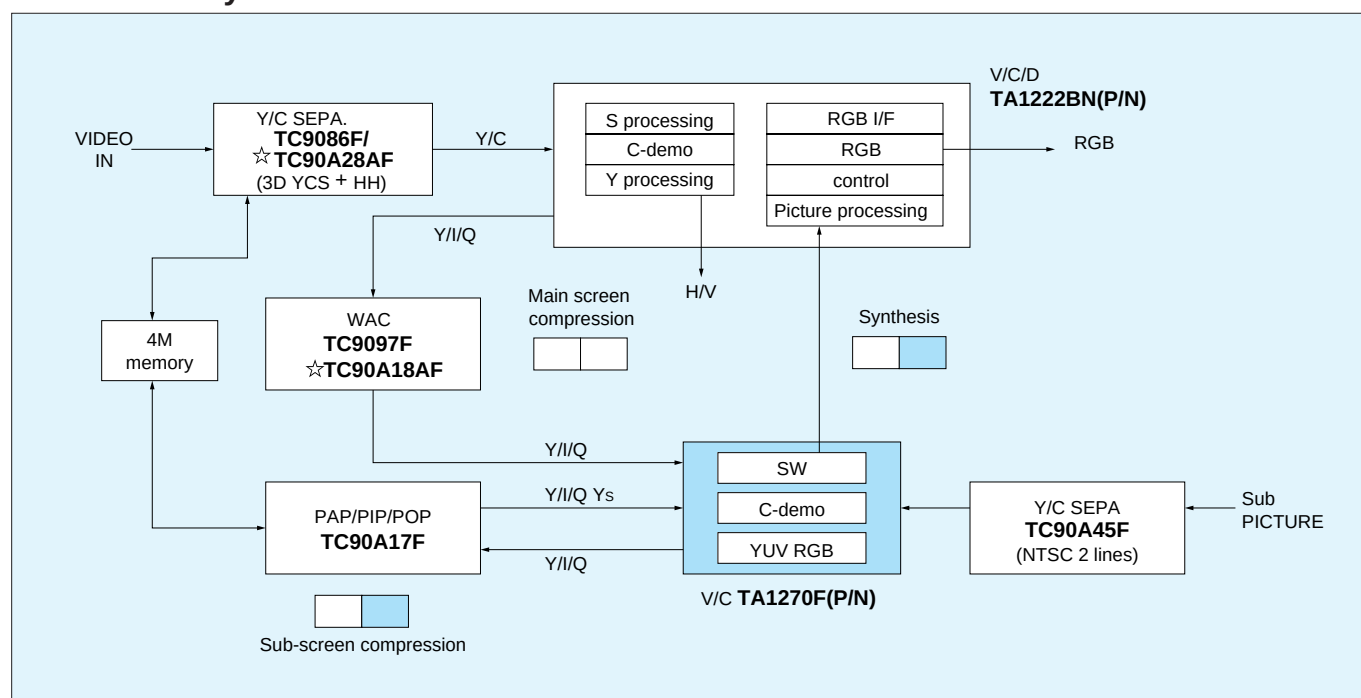
The televisions of today are featuring wider screens and higher levels of picture quality more than ever before. Toshiba offers a wide lineup of products to accommodate a diverse range of needs, including analog V/C/D systems, digital V/C/D systems, double window system, digital 3-line Y/C separation and 3-dimensional Y/C separation.

## ICs for Wide-screen TVs

| Device             | Functions                    | Features                                                                                                                                                                                                                                              | Package         |
|--------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <b>TA1222BN</b>    | PAL/NTSC V/C/D               | For WAC, PAL/NTSC video, chroma and synchronizing processing                                                                                                                                                                                          | SDIP56          |
| <b>TA1227AP</b>    | EDTV2 discrimination         | Detects 22,285 lines of EDTV2 discrimination signals (B1-B27)                                                                                                                                                                                         | DIP16           |
| <b>TC90A13F/N</b>  | 3-line Y/C separation        | For NTSC, built-in 4-times VCO, built-in clamp circuit, built-in 8-bit A/D converter, built-in 2H line memory, significant improvement in diagonal cross color by using Toshiba's original logical comb filter, built-in 2-ch 8-bit D/A converter     | SDIP28<br>SOP28 |
| <b>TC9090AF/AN</b> | 3-line Y/C separation        | For NTSC/PAL, built-in 4-times VCO, built-in clamp circuit, built-in 8-bit A/D converter, built-in 2H line memory, significant improvement in diagonal cross color by using Toshiba's original logical comb filter, built-in 2-ch 8-bit D/A converter | SDIP28<br>SOP28 |
| <b>TC9086F</b>     | 3-dimensional Y/C separation | Uses 4M bits of memory, moving picture processing by Y/C separation using a dynamic comb filter, still picture processing by frame Y/C separation, built-in A/D and D/A converters                                                                    | QFP100          |
| <b>TC9097F</b>     | Wide aspect conversion       | For NTSC/PAL, wide aspect conversion, built-in 2-ch 8-bit A/D converter, built-in 3-ch 8-bit D/A converter                                                                                                                                            | QFP80           |
| ☆ <b>TC90A18AF</b> | Wide aspect conversion       | For NTSC/PAL, wide aspect conversion, digital super live mode (adaptive aspect conversion), letter box detection, built-in 2-ch 8-bit A/D converter, built-in 3-ch 8-bit D/A converter                                                                | QFP100          |
| <b>TA1270AF</b>    | PAL/NTSC V/C                 | PAL/NTSC video chroma processing for sub-screen                                                                                                                                                                                                       | QFP48           |
| <b>TC90A17F</b>    | PAP/PIP/POP                  | Sub-screen processing IC (2-screen/3-screen search/multi-search), built-in 2-ch 8-bit A/D converter, built-in 3-ch 8-bit D/A converter                                                                                                                | QFP100          |

☆ : Under development

## Wide-screen System



NTSC only      ☆ : Under development

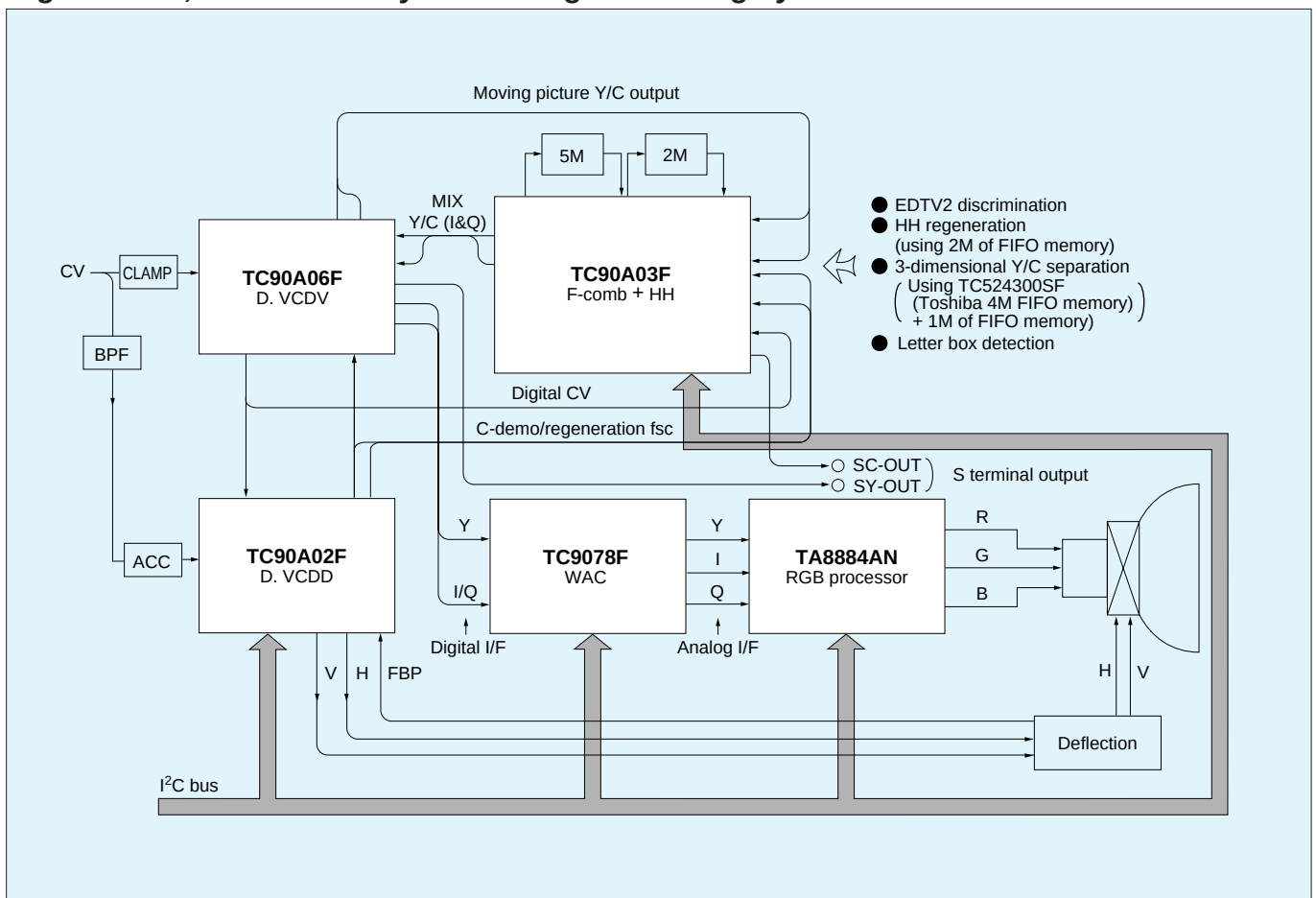
# EDTV2-compatible Digital TV Systems

- Toshiba has developed digital signal processing LSI for movement-adaptive 3-dimensional Y/C separation, EDTV2 HH regeneration, color demodulation, synchronizing/deflection processing and aspect conversion.
- A basic system can be configured that is also compatible with the PAL format with 2 digital video, chroma and synchronizing processing chips (TC90A02F, TC90A06F) and 3 analog processing RGB processors.
- Combining the TC90A03F (F-comb + HH) and TC9078F (WAC) makes it easy to upgrade systems for wide-screen TVs featuring EDTV2 compatibility and high picture quality.

## ICs for Digital V/C/D

| Device          | Functions                                                      | Features                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Package |
|-----------------|----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|
| <b>TC90A02F</b> | Horizontal/vertical synchronizing processing, color processing | <ul style="list-style-type: none"> <li>● Horizontal synchronizing processing: fh synchronous clock generation, clamp control, horizontal synchronous separation, horizontal synchronous regeneration, horizontal deflection timing control</li> <li>● Vertical synchronizing processing: Vertical synchronous separation, vertical synchronous regeneration</li> <li>● Color processing: ACC control, color demodulation, format discrimination, color killer</li> <li>● C input ADC, synchronizing value, A/D and D/A converters for deflection</li> </ul> | QFP100  |
| <b>TC90A06F</b> | Video processing                                               | <ul style="list-style-type: none"> <li>● Y/C separation by 3-line digital comb filter</li> <li>● Y/C independent processing</li> <li>● Y contrast improvement</li> <li>● CTI</li> <li>● Video input A/D converter, D/A converters for SVHS output and I/Q output</li> </ul>                                                                                                                                                                                                                                                                                 | QFP100  |
| <b>TC90A03F</b> | Y/C separation, EDTV2 HH regeneration                          | <ul style="list-style-type: none"> <li>● EDTV2 discrimination, movement-adaptive 3-dimensional Y/C separation, HH regeneration, letter box detection, caption detection</li> </ul>                                                                                                                                                                                                                                                                                                                                                                          | QFP144  |
| <b>TC9078F</b>  | Wide aspect conversion                                         | <ul style="list-style-type: none"> <li>● NTSC/PAL-compatible wide aspect conversion</li> <li>● Zoom mode possible by combining with deflection distortion correction IC (TA8859CP)</li> </ul>                                                                                                                                                                                                                                                                                                                                                               | QFP100  |
| <b>TA8884AN</b> | RGB processor                                                  | <ul style="list-style-type: none"> <li>● Black stretching, DC correction factor correction, ABL, ACL, cutoff, drive adjustment</li> <li>● Analog RGB input, OSD interface</li> </ul>                                                                                                                                                                                                                                                                                                                                                                        | SDIP54  |

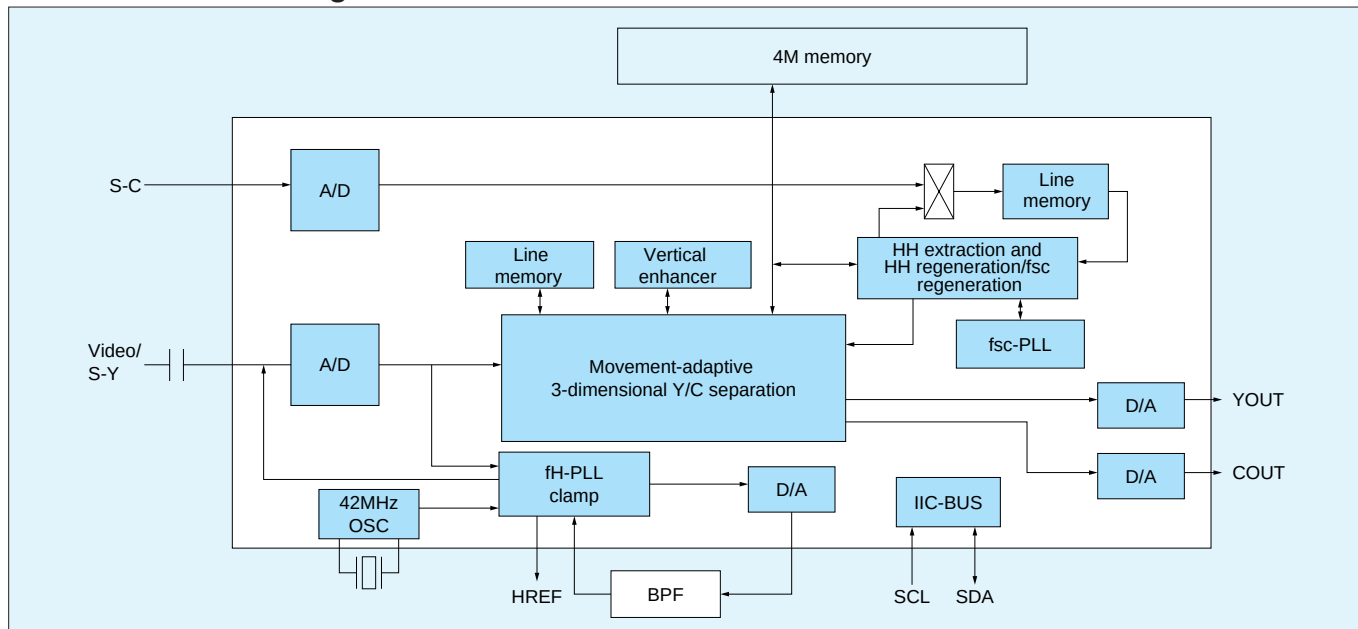
## Digital Video, Chroma and Synchronizing Processing System



# Digital Y/C Separation Systems

In order to obtain high picture quality, it is necessary to precisely separate composite video signals into brightness signals (Y) and chroma signals (C). Toshiba offers a complete lineup of products for applications ranging from three-dimensional Y/C separation for wide-screen, clear-vision processing using 4M bits of memory to inexpensive 2-line digital processing.

## TC90A28AF Block Diagram



## ICs for 3-dimensional Y/C Separation

| Device             | Functions                                                                      | Features                                                                                                                                                             | Power supply (V) | Package         |
|--------------------|--------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|
| <b>TC9086F</b>     | Movement-adaptive 3-dimensional Y/C separation (NTSC)                          | Movement-adaptive 3-dimensional Y/C separation, YNR, built-in A/D and D/A converters, built-in 4-times VCO, using 4M bits of FIFO memory                             | 5                | QFP100          |
| ☆ <b>TC90A28AF</b> | 3-dimensional Y/C separation for wide-screen, clear-vision applications (NTSC) | Movement-adaptive 3-dimensional Y/C separation, YNR, EDTV2 detection, HH demodulation, built-in A/D converter, D/A converter and HPLL, using 4M bits of FIFO memory  | 3.3              | QFP100          |
| ☆ <b>TC90A30F</b>  | Movement-adaptive, 3-dimensional Y/C separation (NTSC)                         | Movement-adaptive 3-dimensional Y/C separation, YNR, CNR, NRZ detection (EDTV2), built-in A/D converter, D/A converter and 8-times VCO, using 2M bits of FIFO memory | 3.3              | QFP100          |
| <b>TA8667P/F</b>   | Horizontal AFC                                                                 | Horizontal and vertical synchronous separation, high-frequency clock generation synchronized with horizontal synchronizing signal                                    | 9                | DIP18<br>SSOP24 |

☆ : Under development

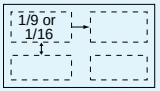
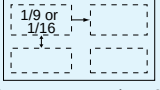
## ICs for 2-line and 3-line Y/C Separation

| Device                                 | Functions                            | Features                                                                                                                                                                                                                                                                                                               | Power supply (V) | Package         |
|----------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-----------------|
| <b>TC90A44F/P</b><br><b>TC90A45F/P</b> | 2-line Y/C separation (NTSC)         | Built-in 4-times VCO, built-in clamp circuit, built-in 8-bit A/D converter, built-in 2H line memory, significant reduction in dot interference by using Toshiba's original logical comb filter, built-in 8-bit D/A converter                                                                                           | 5                | DIP16<br>SOP16  |
| <b>TC90A13F/N</b>                      | 3-line digital Y/C separation (NTSC) | Built-in 4-times VCO, built-in clamp circuit, built-in 8-bit A/D converter, built-in 2H line memory, significant improvement in diagonal cross color by using Toshiba's original logical comb filter, built-in 2-ch 8-bit D/A converter                                                                                | 5                | SDIP28<br>SOP28 |
| <b>TC9090AF/AN</b>                     | 3-line Y/C separation (multi-color)  | Built-in 4-times VCO, built-in clamp circuit, built-in 8-bit A/D converter, built-in 4H line memory, significant improvement in diagonal cross color by using Toshiba's original logical comb filter, I <sup>2</sup> C bus compatibility, built-in 2-ch 8-bit D/A converter, PAL/NTSC multi-color format compatibility | 5                | SDIP28<br>SOP28 |

# PIP (Picture-in-Picture) Controller Systems

This family of ICs is for use in processing of picture-in-picture (PIP) digital signals. These ICs enable high-quality PIP TV systems to be configured with ease.

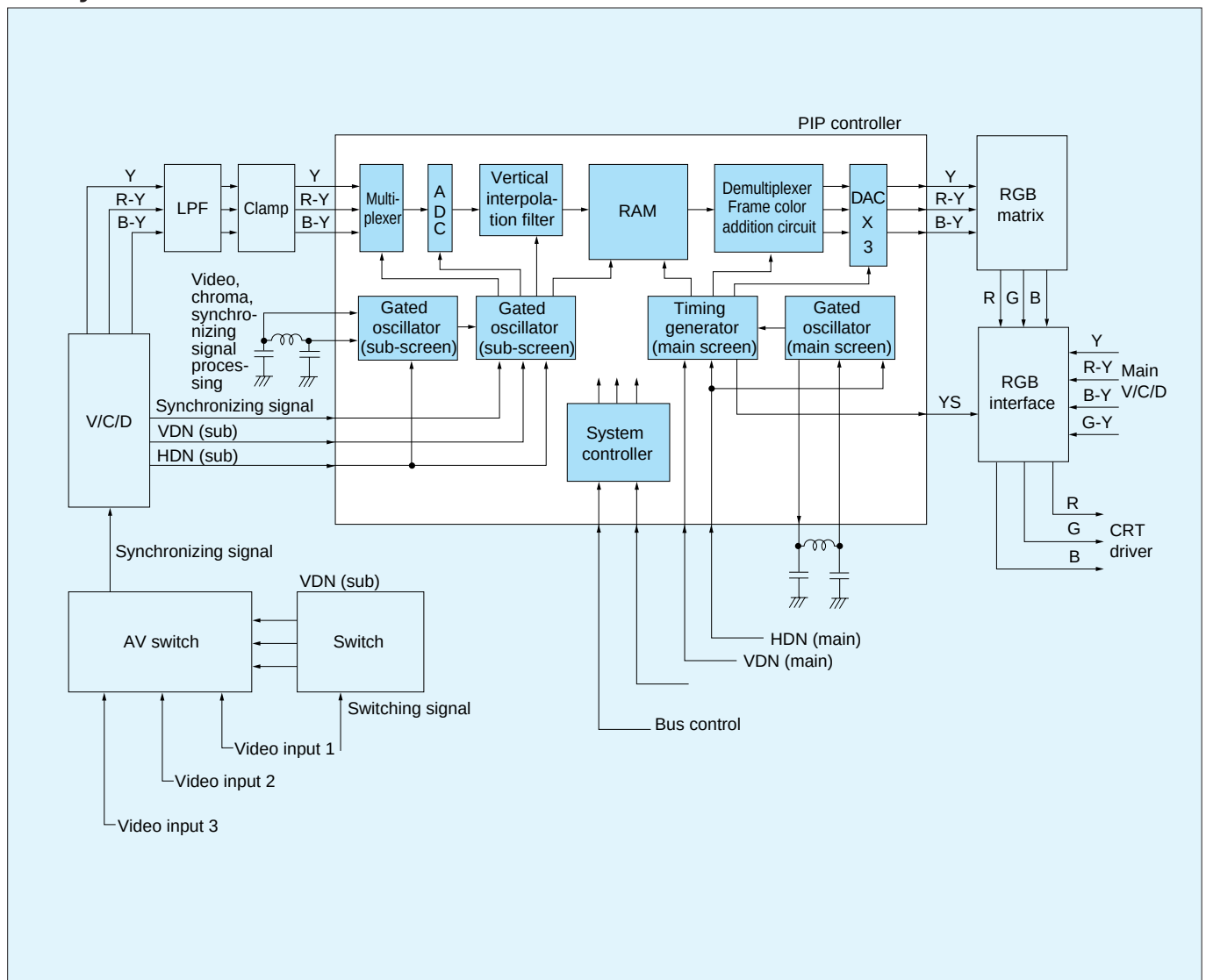
## PIP Controller Systems

| Device           | Functions                                                                                                                             | Display function                                                                                               | Package        |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------|
| <b>TC9083F/N</b> | For NTSC/PAL, MPX, clamp, built-in 6-bit A/D and D/A converters, 130K bits of built-in RAM, variable frame color and display position | <br>Screen aspect ratio: 4:3 | DIP42<br>QFP80 |
| <b>TC90A27F</b>  | Single-chip PIP with built-in video decoder                                                                                           | <br>Screen aspect ratio: 4:3 | QFP80          |

## Video, Chroma and Synchronizing Signal Processing

| Device          | Functions                                                            | Package |
|-----------------|----------------------------------------------------------------------|---------|
| <b>TA8779F</b>  | NTSC format, video, chroma and synchronizing regeneration            | SSOP30  |
| <b>TA8795BF</b> | PAL/NTSC/SECAM formats, video, chroma and synchronizing regeneration | QFP60   |

## PIP System

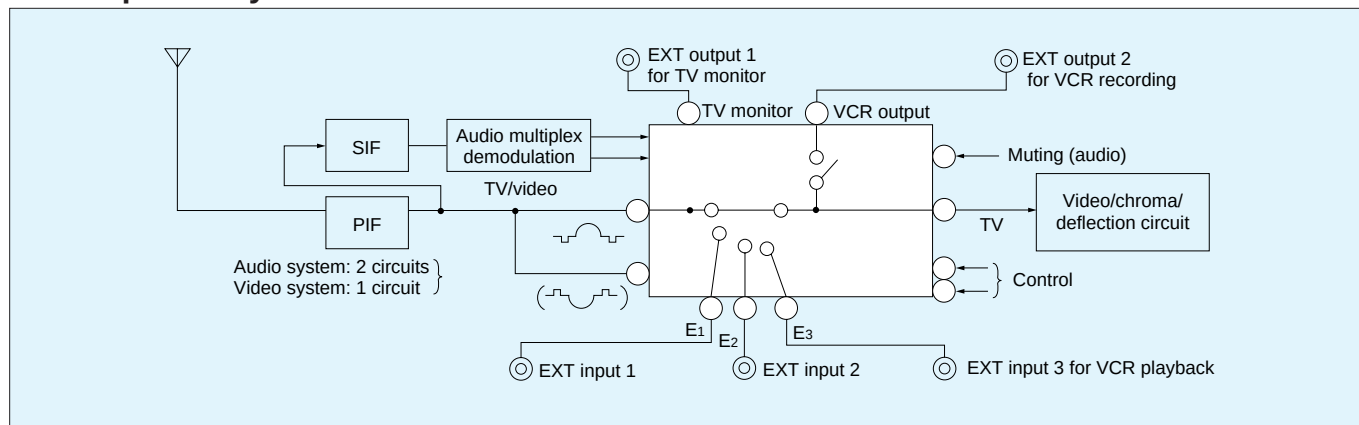




# AV Switches and RGB Interfaces

AV switches are interface switches for connecting the video output of VCRs and video disc players to a television. Since they enable the video signal to be input directly into the video circuit, there is no deterioration of picture quality in the resulting picture.

## AV-compatible System



## ICs for AV Switches

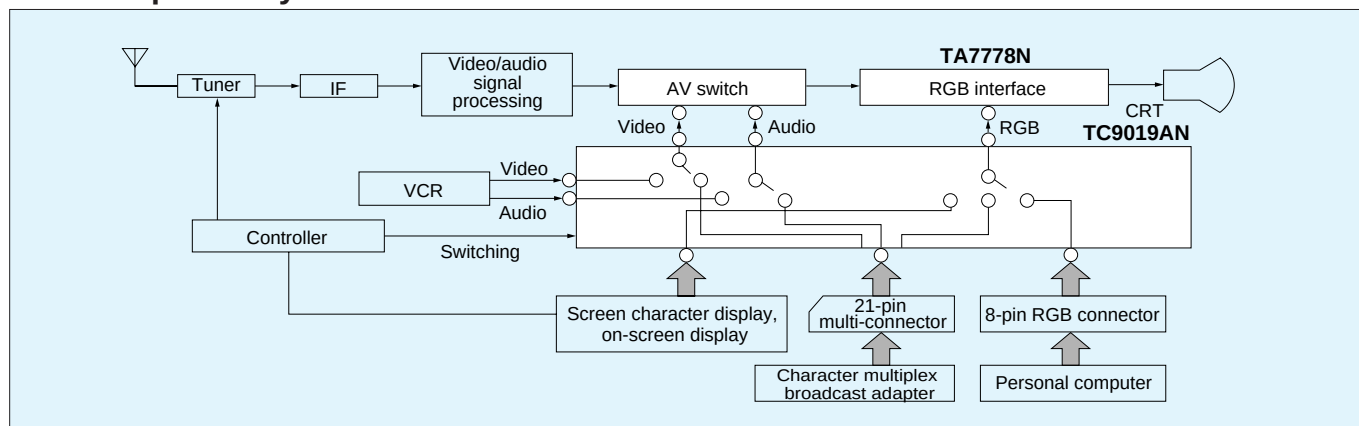
| Device   | Video system       | Audio system      | Functions                                                                 | Package |
|----------|--------------------|-------------------|---------------------------------------------------------------------------|---------|
| TA8628N  | 2-input, 1-output  | 2-input, 1-output | Audio/video muting, audio volume                                          | SDIP24  |
| TA8720AN | 4-input, 1-output  | 4-input, 1-output | S terminal compatibility (1 channel)                                      | SDIP30  |
| TA8742N  | 2-input, 1-output  | 2-input, 1-output | Audio/video muting, audio volume                                          | SDIP24  |
| TA8747N  | 8-input, 1-output  | 5-input, 1-output | S terminal compatibility (3 channels)                                     | SDIP36  |
| TA8777BN | 5-input, 1-output  | 5-input, 1-output | I <sup>2</sup> C bus compatibility, S terminal compatibility (2 channels) | SDIP36  |
| TA8822SN | 2-input, 1-output  | 2-input, 1-output | Audio volume                                                              | SSIP12  |
| TA8851CN | 10-input, 2-output | 7-input, 3-output | I <sup>2</sup> C bus compatibility, S terminal compatibility (3 channels) | SDIP54  |
| TA1218AN | 5-input, 2-output  | 5-input, 3-output | I <sup>2</sup> C bus compatibility, S terminal compatibility (3 channels) | SDIP42  |
| TA1219AN | 5-input, 1-output  | 5-input, 2-output | I <sup>2</sup> C bus compatibility, S terminal compatibility (3 channels) | SDIP36  |

## ICs for Video Switches

| Device  | Input | Output | Features            | Package |
|---------|-------|--------|---------------------|---------|
| TA7347P | 2     | 1      | —                   | SDIP7   |
| TA7348P | 3     | 1      | With muting circuit | SIP9    |

RGB interface circuits that interface with RGB output from a television or personal computer are becoming essential features of highly functional TVs. Toshiba offers a diverse lineup of ICs, including its TA7778N equipped with an automatic white balance circuit (AKB).

## RGB-compatible System



## ICs for RGB Interfaces

| Device   | Input                  |     | Output | Functions           | Package |
|----------|------------------------|-----|--------|---------------------|---------|
|          | Color difference input | RGB |        |                     |         |
| TA7778N  | 1                      | 1   | RGB    | RGB switch with AKB | SDIP30  |
| TA8751AN | —                      | 2   | RGB    | RGB switch with AKB | SDIP30  |

## ICs for RGB Switches

| Device   | Functions                                                                             | Package |
|----------|---------------------------------------------------------------------------------------|---------|
| TC9019AN | 8-pin RGB, 21-pin RGB, external video signal switching (for screen character display) | SDIP42  |
| TA8775AN | 4 inputs, I <sup>2</sup> C bus compatibility                                          | SDIP30  |

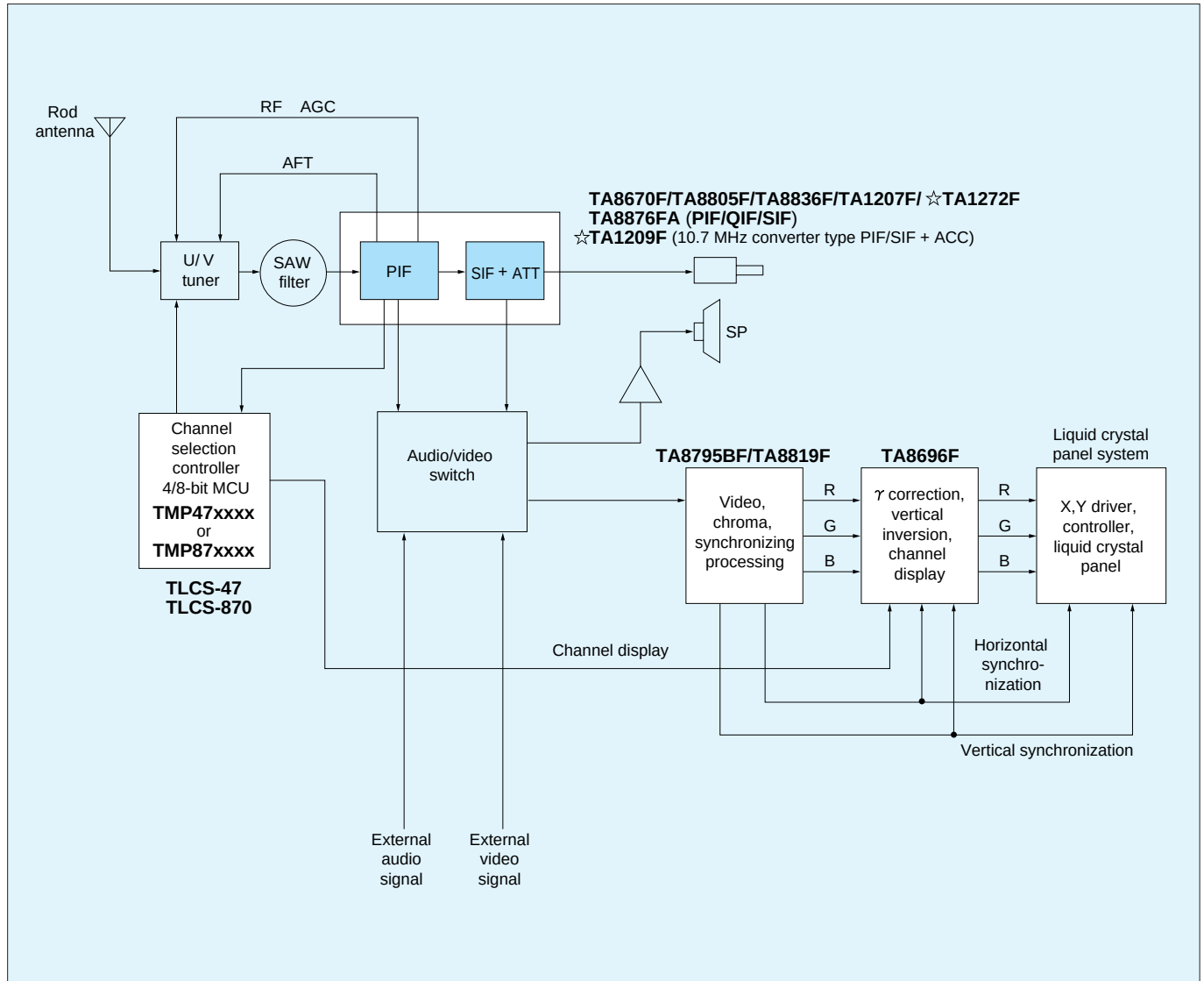
\* In cases when a potential is applied to the ground (GND) terminal of the television set when using ICs such as AV switches and RGB interfaces (as in the case of a hot chassis), it is necessary to insulate the devices with a photocoupler or input transformer.

# Liquid Crystal Color TV Systems

Amidst the rapidly growing demand for portable televisions at present, greater importance is being placed on compact size, light weight and thin design. Liquid crystal televisions are gradually becoming popular as the most effective means of satisfying these requirements.

In addition to offering basic performance, the TA8670F, TA8805F, TA8836F, TA1207F, TA1272F, TA8876FA, TA8795BF, TA8819 and TA8696F satisfy performance requirements for a compact package, low power consumption and wide range of operating voltages that are sought after in ICs for liquid crystal TVs.

## Liquid Crystal Color TV System



☆ : Under development

| Device                                 | Functions                                                                                               | Power supply (V)             | Package |
|----------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------|---------|
| <b>TA8670F/TA8805F/TA8836F/TA1207F</b> | Low voltage, PIF, SIF, ATT<br>(TA8836F/TA1207F: without noise inverter)                                 | 3.5 to 7.5 V                 | SSOP24  |
| ☆ <b>TA1272F</b>                       | Low voltage, PIF, SIF (for diversity)                                                                   | 3.5 to 5.5 V                 | SSOP24  |
| <b>TA8876FA</b>                        | Low voltage, PIF, QIF, SIF (high sound quality, for diversity)                                          | 3.5 to 7.5 V                 | SSOP30  |
| ☆ <b>TA1209F</b>                       | Low voltage, 10.7 MHz converter type PIF, SIF, audio accessories<br>(high sound quality, for diversity) | 4.5 to 5.5 V<br>8.0 to 9.0 V | QFP48   |
| <b>TA8819F</b>                         | Low voltage, NTSC format, video, chroma, synchronization                                                | 3.5 to 7.5 V                 | SSOP30  |
| <b>TA8795BF</b>                        | Low voltage, NTSC/PAL/SECAM formats, video, chroma, synchronization                                     | 4.5 to 5.5 V                 | QFP60   |
| <b>TA8696F</b>                         | $\gamma$ correction, liquid crystal panel interface                                                     | 3.5 to 7.5 V                 | SSOP30  |

☆ : Under development

## Chroma Output Transistors

| Rating                                                                                        | Polarity | Package | TO-92          | TO-92 MOD                        | PW MOLD             | TPS            | TO-126 IS                        | TPL            | TO-220N IS                       | Remarks  |
|-----------------------------------------------------------------------------------------------|----------|---------|----------------|----------------------------------|---------------------|----------------|----------------------------------|----------------|----------------------------------|----------|
| V <sub>CEO</sub> = 150 V<br>I <sub>C</sub> = 50 mA<br>f <sub>r</sub> = 120 to 200M Hz         | NPN      |         | —              | <b>2SC2229</b><br><b>2SC2705</b> | —                   | —              | <b>2SC3423</b>                   | —              | —                                |          |
|                                                                                               | PNP      |         | —              | <b>2SA949</b><br><b>2SA1145</b>  | —                   | —              | <b>2SA1360</b>                   | —              | —                                |          |
| V <sub>CEO</sub> = 250 V<br>I <sub>C</sub> = 50 mA<br>f <sub>r</sub> = 120M Hz                | NPN      |         | <b>2SC3333</b> | <b>2SC3334</b>                   | —                   | —              | —                                | —              | —                                |          |
|                                                                                               | PNP      |         | <b>2SA1320</b> | <b>2SA1321</b>                   | —                   | —              | —                                | —              | —                                |          |
| V <sub>CEO</sub> = 250 to 300 V<br>I <sub>C</sub> = 100 to 150 mA<br>f <sub>r</sub> = 240M Hz | NPN      |         | —              | —                                | —                   | —              | <b>2SC4679</b>                   | —              | <b>2SC4448</b><br><b>2SC4678</b> | For HDTV |
| V <sub>CEO</sub> = 300 V<br>I <sub>C</sub> = 50 to 100 mA<br>f <sub>r</sub> = 80 to 120M Hz   | NPN      |         | <b>2SC2551</b> | <b>2SC2482</b>                   | <b>2SC3805 (LB)</b> | <b>2SC5027</b> | <b>2SC3619</b><br><b>2SC3620</b> | <b>2SC5173</b> | <b>2SC4544</b>                   |          |
|                                                                                               | PNP      |         | <b>2SA1091</b> | —                                | —                   | —              | —                                | —              | —                                |          |

## Video Output Transistors

| Rating                                                                          | Polarity | Package | TO-92 MOD      | PW MOLD             | TO-126 IS        | TO-220N IS     | Remarks                                        |
|---------------------------------------------------------------------------------|----------|---------|----------------|---------------------|------------------|----------------|------------------------------------------------|
| V <sub>CEO</sub> = 18 V, I <sub>C</sub> = 0.5 A<br>f <sub>r</sub> = 3.5G Hz     | NPN      |         | —              | —                   | <b>2SC3613</b>   | —              | High-definition VDT,<br>for video drives       |
| V <sub>CEO</sub> = 18 V, I <sub>C</sub> = 0.6 A<br>f <sub>r</sub> = 2.5G Hz     | NPN      |         | —              | —                   | <b>2SC4200</b>   | —              | Ultra-high-definition<br>VDT, for video drives |
| V <sub>CEO</sub> = 100 V, I <sub>C</sub> = 0.5 A<br>f <sub>r</sub> = 1.1G Hz    | NPN      |         | —              | —                   | <b>2SC4479</b>   | <b>2SC4605</b> | Ultra-high-definition<br>VDT                   |
| V <sub>CEO</sub> = 150 V<br>I <sub>C</sub> = 300 mA<br>f <sub>r</sub> = 400M Hz | NPN      |         | —              | <b>2SC4203 (LB)</b> | <b>2SC4439</b>   | —              | High-definition VDT                            |
|                                                                                 | PNP      |         | —              | —                   | ☆ <b>2SA1801</b> | —              |                                                |
| V <sub>CEO</sub> = 150 V<br>I <sub>C</sub> = 50 mA<br>f <sub>r</sub> = 200M Hz  | NPN      |         | <b>2SC2705</b> | —                   | —                | —              | For SEPP buffer<br>circuits                    |
|                                                                                 | PNP      |         | <b>2SA1145</b> | —                   | —                | —              |                                                |

☆: Under development

## Speed Modulation Transistors

| I <sub>C</sub> (A) | Polarity | V <sub>CEO</sub> | 230V           | Package    |
|--------------------|----------|------------------|----------------|------------|
| 1.0 A              | NPN      |                  | <b>2SC4793</b> | TO-220N IS |
|                    | PNP      |                  | <b>2SA1837</b> |            |

## Dynamic Focus Transistors

| I <sub>C</sub> (mA) | V <sub>CEO</sub> (V) | 800            | 1000           | 1200            | Package    |
|---------------------|----------------------|----------------|----------------|-----------------|------------|
| 50                  |                      | —              | <b>2SC4686</b> | <b>2SC4686A</b> | TO-220N IS |
|                     |                      | <b>2SC5460</b> | —              | —               | TO-126 IS  |

## MOSFETs for Resonance Frequency Switching (N-ch)

| I <sub>D</sub> (A) | V <sub>DSS</sub> (V) | 200 to 250                | 400 to 500     | 800            | 900            | Package    |
|--------------------|----------------------|---------------------------|----------------|----------------|----------------|------------|
| 3                  |                      | —                         | —              | —              | <b>2SK2700</b> | TO-220N IS |
| 4                  |                      | —                         | —              | —              | —              |            |
| 5                  |                      | <b>2SK2381</b>            | <b>2SK2662</b> | <b>2SK2605</b> | <b>2SK2717</b> |            |
| 6                  |                      | —                         | <b>2SK2545</b> | —              | —              |            |
| 8 [7.5]            |                      | <b>[2SK2417]</b>          | <b>2SK2543</b> | —              | —              |            |
| 8.5                |                      | <b>2SK2350</b>            | —              | —              | —              |            |
| 10 [13]            |                      | <b>2SK2996, [2SK2508]</b> | <b>2SK2842</b> | —              | —              |            |
| 15                 |                      | <b>2SK2382</b>            | —              | —              | —              |            |

# Deflection Systems

## Sales Points



### ■ System Trends

Accompanying the use of larger screens in color televisions such as wide-screen and Hi-Vision televisions, horizontal deflection output circuits are using higher voltages and higher currents. In addition, there is also a growing demand for televisions compatible with multi-media applications due to the growing popularity of the Internet.

Toshiba is accommodating these needs by offering horizontal deflection output transistors having the features indicated below.

### ■ Features of Toshiba's Horizontal Deflection Output Transistors

- Products to accommodate various set specifications can be selected from a complete lineup of transistors having withstand voltages (VCBO) of 1500 V or 1700 V and current ratings of 3.5 A to 20 A.
- High switching speed and low saturation voltage enable low power consumption.
- The three-layer dispersed mesa structure results in a wide range for safe operation.
- The addition of new 4th generation products results in a wider selection of optimum driving conditions than in the past facilitating greater ease in circuit design.

## Horizontal Deflection Output Transistors for Color TVs

### VCBO = 1500 V Series

| Applications<br>(Display type) | Reference<br>horizontal<br>frequency<br>(kHz) | Reference<br>screen<br>size<br>(inches) | Max. ratings |           | Damper<br>diode<br>(O: Provided) | Allowable package loss           |                               | Deve-<br>lop-<br>ment<br>genera-<br>tion | Remarks                   |
|--------------------------------|-----------------------------------------------|-----------------------------------------|--------------|-----------|----------------------------------|----------------------------------|-------------------------------|------------------------------------------|---------------------------|
|                                |                                               |                                         | VCBO<br>(V)  | Ic<br>(A) |                                  | TO-3P<br>(H) (IS)<br>50 W (typ.) | TO-3P<br>(LH)<br>200 W (typ.) |                                          |                           |
| TV                             | 15.75                                         | up to 15                                | 1500         | 3.5       | O                                | <b>2SD2599</b>                   | —                             | 4                                        | Removable<br>heat shield  |
| TV                             | 15.75                                         | 17 to 19                                |              | 5         | O                                | <b>2SD2586</b>                   | —                             | 4                                        | —                         |
| TV/power supply                | 15.75                                         | 21 to 25                                |              | 6         | —                                | <b>2SD2498</b>                   | —                             | 3                                        | —                         |
| TV                             | 15.75                                         | 21 to 25                                |              | 6         | O                                | <b>2SD2499</b>                   | —                             | 3                                        | —                         |
| TV                             | 15.75                                         | 25 to 27                                |              | 7         | O                                | <b>2SD2539</b>                   | —                             | 3                                        | —                         |
| TV                             | 15.75                                         | 29 to 36                                |              | 8         | O                                | <b>2SC5280</b>                   | —                             | 4                                        | —                         |
| TV                             | 15.75                                         | 29 to 36                                |              | 8         | —                                | <b>2SC5148</b>                   | —                             | 3                                        | —                         |
| TV                             | 15.75                                         | 29 to 36                                |              | 8         | —                                | <b>2SC5386</b>                   | —                             | 4                                        | —                         |
| TV/power supply                | 15.75                                         | 29 to 36                                |              | 10        | —                                | <b>2SD2500</b>                   | —                             | 3                                        | —                         |
| TV                             | 15.75                                         | 36                                      |              | 12        | —                                | —                                | <b>2SC5331</b>                | 3                                        | Allowable loss<br>180 W * |
| TV                             | 15.75                                         | 36 and<br>over                          |              | 15        | —                                | —                                | <b>2SC5421</b>                | 4                                        |                           |
| TV                             | 15.75                                         | 36 and<br>over                          |              | 20        | —                                | —                                | <b>2SC5142</b>                | 3                                        | —                         |
| TV                             | 15.75                                         | 36 and<br>over                          |              | 20        | —                                | —                                | <b>2SC5445</b>                | 4                                        | —                         |

\* : Tc = 25°C

### VCBO = 1700 V Series

|                             |          |                |      |    |   |                |                |   |          |
|-----------------------------|----------|----------------|------|----|---|----------------|----------------|---|----------|
| Wide-screen TV              | 15.75    | 16 to 20       | 1700 | 4  | O | <b>2SD2550</b> | —              | 3 | —        |
| Wide-screen TV              | 15.75    | 20 to 24       |      | 6  | O | <b>2SD2551</b> | —              | 3 | —        |
| Wide-screen TV              | 15.75    | 24 to 28       |      | 8  | O | <b>2SD2553</b> | —              | 3 | —        |
| Wide-screen TV/power supply | 15.75    | 28 to 32       |      | 10 | — | <b>2SC5150</b> | —              | 3 | —        |
| Wide-screen TV              | 15.75    | 28 to 32       |      | 10 | O | <b>2SC5143</b> | —              | 3 | —        |
| Wide-screen TV              | 15.75    | 32 and<br>over |      | 14 | — | —              | <b>2SC5332</b> | 3 | —        |
| HDTV/multi-media TV         | 15.75/32 | 32 and<br>over |      | 15 | — | —              | <b>2SC5422</b> | 4 | —        |
| HDTV/multi-media TV         | 15.75/32 | 32 and<br>over |      | 18 | — | —              | <b>2SC5446</b> | 4 | 98/1Q MP |
| HDTV/multi-media TV         | 15.75/32 | 32 and<br>over |      | 20 | — | —              | <b>2SC5144</b> | 3 | —        |

## Damper Diodes

|                      | IF (AV) (A)   | 3             | 5              |                |
|----------------------|---------------|---------------|----------------|----------------|
| V <sub>RRM</sub> (V) | Package       | DO-201AD      | TO-220NIS      | TO-3P (H) (IS) |
|                      | trr           | —             | —              | —              |
| 1500                 | trrMAX 1.5 μs | <b>3TH41</b>  | —              | <b>5THZ52</b>  |
|                      | trrMAX 1.0 μs | <b>3TH41A</b> | <b>5TUZ47C</b> | <b>5TUZ52C</b> |
|                      | trrMAX 0.6 μs | —             | <b>5TUZ47</b>  | <b>5TUZ52</b>  |
| 1700                 | trrMAX 0.6 μs | —             | <b>5VUZ47</b>  | <b>5VUZ52</b>  |

## ICs for Vertical Output

| Device               | Functions                                                                         | Operating power supply (V) range | Package |
|----------------------|-----------------------------------------------------------------------------------|----------------------------------|---------|
| <b>TA8403K/8427K</b> | CTV vertical output, output current: 1.8 Ap-p./2.2 Ap-p (max.)                    | 21 to 27 V                       | HSIP7   |
| <b>TA8432K/8445K</b> | CTV vertical output, with ramp circuit, input trigger polarity: positive/negative | 21 to 29 V                       | HSIP12  |
| <b>TA8638N</b>       | Synchronizing/deflection circuit                                                  | 21 to 29 V                       | SDIP24  |
| <b>TA8859CP</b>      | Deflection distortion correction, I <sup>2</sup> C bus compatibility              | 10.8 to 13.2 V                   | DIP16   |

## Vertical Output Transistors

Due to the relative large loss at the vertical output stage, select the product that best matches screen size from the lineup shown below.

| Package<br>Characteristics                        | TO-92<br>MOD.                    | TO-126<br>IS                     | TO-220AB                        | TO-220<br>IS                     |
|---------------------------------------------------|----------------------------------|----------------------------------|---------------------------------|----------------------------------|
| V <sub>CEO</sub> = 160 V<br>I <sub>C</sub> = 1 A  | <b>2SC2383</b><br><b>2SA1013</b> | —                                | —                               | —                                |
| V <sub>CE</sub> = 150 V<br>I <sub>C</sub> = 1.5 V | —                                | <b>2SC3621</b><br><b>2SA1408</b> | <b>2SC2073</b><br><b>2SA940</b> | <b>2SC3296</b><br><b>2SA1304</b> |

Toshiba offers a wide assortment of devices for use as switching power supplies including bipolar transistors and power MOSFETs.

## Bipolar Transistors

The lineup of products shown in the table below is available for each package having withstand voltages ( $V_{CEO}$ ) of 400 to 800 V.

| Package<br>Ic | PW-MOLD                           | DP              | TPS            | TO-126 IS      | TPL             | TO-220 NIS      | TO-220 (FL)     | TO-3P (N)                        |
|---------------|-----------------------------------|-----------------|----------------|----------------|-----------------|-----------------|-----------------|----------------------------------|
| 0.8 A         | <b>2SC3075</b><br><b>2SC3405#</b> | —               | <b>2SC5208</b> | <b>2SC3425</b> | —               | —               | —               | —                                |
| 2 A           | <b>2SC3233</b>                    | —               | <b>2SC5351</b> | <b>2SC5368</b> | —               | —               | <b>2SC4754</b>  | —                                |
| 3 A           | —                                 | <b>2SC5356#</b> | —              | —              | —               | <b>2SC5353#</b> | <b>2SC5361#</b> | <b>2SC3376#</b>                  |
| 4 A           | —                                 | —               | —              | —              | —               | —               | —               | <b>2SC3657#</b>                  |
| 5 A           | —                                 | <b>2SC5355</b>  | —              | —              | <b>2SC5266A</b> | <b>2SC5172</b>  | —               | <b>2SC3783#</b>                  |
| 8 A           | —                                 | —               | —              | —              | —               | —               | —               | —                                |
| 10 A          | —                                 | —               | —              | —              | —               | —               | —               | <b>2SC5352</b><br><b>2SA4157</b> |

No mark: 400 to 450 V series # : 800 V series

## Power MOSFETs

The following table provides an introduction to a new series comprising a wide range of products of  $V_{DSS} = 250$  to 900 V. We have taken advantage of our original hyperfine technology to enable these products to offer even greater performance than the previous  $\pi$ -MOS series.

| $V_{DS}$ (V)<br>Id (A) | 250<br>*300                                         | 400                     | 500<br>*600                                                                      | *700<br>800                                                                | 900                                              |
|------------------------|-----------------------------------------------------|-------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------|--------------------------------------------------|
| 2                      | ◆ <b>2SK2146</b> (2.0)<br>☆ <b>2SK2230</b> (2.0)    |                         | ☆ <b>2SK2599</b> (3.0)<br>*☆ <b>2SK2846</b> (5.0)                                |                                                                            |                                                  |
| 2.5                    |                                                     |                         |                                                                                  |                                                                            | ◆ <b>2SK2718</b> (6.4)                           |
| 3                      |                                                     |                         |                                                                                  | ■ <b>2SK2603</b> (3.6)<br>○ <b>2SK2883</b> (3.6)                           | ■ <b>2SK2608</b> (4.3)<br>◆ <b>2SK2700</b> (4.3) |
| 3.5                    |                                                     |                         | *◆ <b>2SK2750</b> (2.2)                                                          |                                                                            |                                                  |
| 5                      | ◆ <b>2SK2840</b> (1.0)<br>[◆ <b>2SJ512</b> (1.25)]  |                         | ◆ <b>2SK2662</b> (1.5)<br>*◆ <b>2SK2661</b> (1.5)<br>○ <b>2SK2991</b> (1.5)      | □ <b>2SK2604</b> (2.2)<br>◆ <b>2SK2605</b> (2.2)<br>○ <b>2SK2884</b> (2.2) | □ <b>2SK2610</b> (2.5)<br>◆ <b>2SK2717</b> (2.5) |
| 5.5                    |                                                     | ◆ <b>2SK2679</b> (1.2)  |                                                                                  |                                                                            |                                                  |
| 6                      |                                                     |                         | *■ <b>2SK2544</b> (1.25)<br>*◆ <b>2SK2545</b> (1.25)<br>*□ <b>2SK2602</b> (1.25) |                                                                            |                                                  |
| 6.5                    | [◆ <b>2SJ516</b> (0.8)]                             |                         |                                                                                  |                                                                            |                                                  |
| 7.5                    | ◆ <b>2SK2417</b> (0.5)<br>[◆ <b>2SJ514</b> (0.625)] |                         |                                                                                  | □ <b>2SK2746</b> (1.7)                                                     |                                                  |
| 8                      |                                                     |                         | ■ <b>2SK2542</b> (0.85)<br>◆ <b>2SK2543</b> (0.85)<br>□ <b>2SK2600</b> (0.85)    |                                                                            | ◎ <b>2SK2847</b> (1.4)                           |
| 8.5                    | ◆ <b>2SK2914</b> (0.5)                              | ◆ <b>2SK2952</b> (0.55) |                                                                                  |                                                                            |                                                  |
| 9                      |                                                     |                         |                                                                                  | □ <b>2SK2607</b> (1.2)                                                     | □ <b>2SK2611</b> (1.4)                           |
| 10                     | ◆ <b>2SK2966</b> (0.32)                             | ■ <b>2SK2841</b> (0.55) | □ <b>2SK2601</b> (1.0)<br>*◆ <b>2SK2843</b> (0.75)                               |                                                                            | □ <b>2SK2968</b> (1.25)                          |
| 12                     |                                                     |                         | ◆ <b>2SK2842</b> (0.55)<br>*□ <b>2SK2699</b> (0.65)                              |                                                                            |                                                  |
| 13                     | ◆ <b>2SK2508</b> (0.25)                             |                         | ◎ <b>2SK2916</b> (0.4)                                                           |                                                                            |                                                  |
| 15                     |                                                     |                         | □ <b>2SK2698</b> (0.4)<br>*◎ <b>2SK2953</b> (0.4)                                |                                                                            |                                                  |
| 16                     |                                                     |                         | *□ <b>2SK2915</b> (0.4)                                                          |                                                                            |                                                  |
| 18                     |                                                     |                         | ◎ <b>2SK2917</b> (0.27)                                                          |                                                                            |                                                  |
| 20                     |                                                     |                         | □ <b>2SK2837</b> (0.27)                                                          |                                                                            |                                                  |

Package  
 ◆ TO-220 (NIS) ■ TO-220AB ▲ TO-92MOD □ TO-3P (N) ○ TO-220FL/SM ▼ PW-MOLD  
 ● TO-3P (L) ◇ PW-MINI △ NPM ◎ TO-3P (IS) ☆ TPS

( ) : Indicates Rds (ON) Max. (Ω) [ ] : Indicates types under development



## Thyristors and Rectifiers for Power Supplies

### Very Fast Recovery Diodes (V-FRD)

| IF (AV) (A)             |      | 0.5     |        | 1.0     |       |        |       | 1.5     |         |         | 2.0      | 3.0   |       |
|-------------------------|------|---------|--------|---------|-------|--------|-------|---------|---------|---------|----------|-------|-------|
| Package                 |      | DO-41SS | DO-41S | DO-41SS |       | DO-41S |       | DO-15L  |         |         | DO-201AD |       |       |
| V <sub>RRM</sub><br>(V) | 400  | —       | —      | 1GH46   | —     | 1GH45  | —     | 1R5GH45 | —       | —       | —        | 3GH45 | —     |
|                         | 600  | —       | —      | —       | 1JH46 | —      | 1JH45 | —       | 1R5JH45 | —       | —        | —     | 3JH45 |
|                         | 1000 | 05NH46  | 05NH45 | —       | —     | —      | —     | —       | —       | 1R5NH45 | 2NH45    | —     | —     |

### Super Fast Recovery Diodes (S-FRD)

| IF (AV) (A)          |      | 0.5     |         |        | 0.8     | 1.0    |        |         |       |        |       |
|----------------------|------|---------|---------|--------|---------|--------|--------|---------|-------|--------|-------|
| Package              |      | I-FLAT  | DO-41SS | DO-41S | DO-41   | I-FLAT |        | DO-41SS |       | DO-41S | DO-15 |
| V <sub>RRM</sub> (V) | 400  | —       | —       | —      | OR8GU41 | U1GU44 | —      | 1GU42   | —     | —      | —     |
|                      | 600  | —       | —       | —      | —       | —      | U1JU44 | —       | 1JU42 | 1JU41  | —     |
|                      | 1000 | U05NU44 | 05NU42  | 05NU41 | —       | —      | —      | —       | —     | —      | 1NU41 |

| IF (AV) (A)             |      | 1.5     |         |         | 2.0      | 3.0   |       | 5.0       |   |
|-------------------------|------|---------|---------|---------|----------|-------|-------|-----------|---|
| Package                 |      | DO-15L  |         |         | DO-201AD |       |       | TO-220NIS |   |
| V <sub>RRM</sub><br>(V) | 400  | 1R5GU41 | —       | —       | —        | 3GU41 | —     | 5GUZ47    | — |
|                         | 600  | —       | 1R5JU41 | —       | —        | —     | 3JU41 | 5JUZ47    | — |
|                         | 1000 | —       | —       | 1R5NU41 | 2NU41    | —     | —     | —         | — |

### High Efficiency Diodes (HED)

| IF (AV) (A)          |     | 1.0     |         |        | 1.5      | 3.0      | 5.0       |
|----------------------|-----|---------|---------|--------|----------|----------|-----------|
| Package              |     | I-FLAT  | DO-41SS | DO-41S | DO-15L   | DO-201AD | TO-220NIS |
| V <sub>RRM</sub> (V) | 200 | U1DL44A | 1DL42A  | 1DL41A | 1R5DL41A | 3DL41A   | 5DLZ47A   |
|                      | 400 | —       | —       | —      | —        | —        | 5GLZ47A   |
|                      | 600 | —       | —       | —      | —        | —        | 5JLZ47    |

### Schottky Barrier Diodes (SBD)

| IF (AV) (A)          |    | 1.0     |          |         |        | 2.0      |                | 3.0      |                | 5.0       |
|----------------------|----|---------|----------|---------|--------|----------|----------------|----------|----------------|-----------|
| Package              |    | PW-MINI | I-FLAT   | DO-41SS | DO-41S | I-FLAT   | DO-15L         | I-FLAT2  | DO-201AD       | TO-220NIS |
| V <sub>RRM</sub> (V) | 30 | —       | U1FWJ44N | 1FWJ43N | —      | U2FWJ44N | 2FWJ42N        | U3FWJ44N | 3FWJ42N        | —         |
|                      | 40 | U1GWJ49 | U1GWJ44  | 1GWJ43  | 1GWJ42 | —        | 2GWJ42/2GWJ42C | —        | 3GWJ42/3GWJ42C | 5GWJZ47   |

### For AC Rectification

|        | V <sub>RRM</sub> (V)<br>I <sub>T</sub> (AV) (A) | 100     | 400     | 600     | 1000    | Package      |
|--------|-------------------------------------------------|---------|---------|---------|---------|--------------|
| Unit   | 1.0                                             | S5688B  | S5688G  | S5688J  | S5688N  | DO-41SS      |
|        |                                                 | S5566B  | S5566G  | S5566J  | S5566N  | DO-41S       |
|        |                                                 | 1S1885  | 1S1887  | 1S1888  | 1S1830  | DO-15        |
|        | 1.2                                             | 1S1885A | 1S1887A | 1S1888A | TVR4N   | DO-15/DO-15L |
|        | 1.5                                             | 1R5BZ41 | 1R5GZ41 | 1R5JZ41 | 1R4NZ41 | DO-15L       |
|        | 3.0                                             | 3BZ41   | 3GZ41   | 3JZ41   | 3NZ41   | DO-201AD     |
| Bridge | 1.0                                             | 1B4B42  | 1G4B42  | 1J4B42  | —       | DIP          |

### SCR for X-ray Protective Circuits, SCR for Power Supply Protective Circuits

| V <sub>RRM</sub> (V)<br>I <sub>T</sub> (AV) (A) | 400        | 600     | Package   |
|-------------------------------------------------|------------|---------|-----------|
| 0.3                                             | SF0R3G42   | —       | TO-92     |
| 0.5                                             | RSF05G1-1P | —       | TO-92     |
| 3.0                                             | SF3GZ47    | SF3JZ47 | TO-220NIS |

### SCR for Power Supply Choppers

| V <sub>RRM</sub> (V)<br>I <sub>T</sub> (AV) (A) | 400    | Package   | Remarks                 |
|-------------------------------------------------|--------|-----------|-------------------------|
| 3.0                                             | S6785G | TO-220NIS | t <sub>q</sub> = 3.5 μs |

## Transistor Arrays

|                 |            | I <sub>O</sub><br>(mA) | LOW LEVEL INPUT ACTIVE  |                          |                    | HIGH LEVEL INPUT ACTIVE           |                                      |                                  |
|-----------------|------------|------------------------|-------------------------|--------------------------|--------------------|-----------------------------------|--------------------------------------|----------------------------------|
|                 |            |                        | INPUT                   |                          |                    | INPUT                             |                                      |                                  |
|                 |            |                        |                         |                          |                    |                                   |                                      |                                  |
| Output (sink)   | Single     | up to 200              | TD62476P to TD62479P    | —                        | TD62382AP/F/AF/AFN | TD62551S to TD62555S              | TD62501P/F to TD62303P/F             | TD62583AP/F/AF to TD62598AP/AF   |
|                 |            | up to 700              | TD62318AP/F/AF/BP/BF    | —                        | TD62383P           | TD62164AP/AF/BP/BF                | TD62309P/F                           | TD62381P/F                       |
|                 | Darlington | up to 200              | —                       | —                        | —                  | —                                 | TD62006P/F to TD62007P/F             | —                                |
|                 |            | up to 500              | TD62304P/AF/F/AF/AFN    | TD62387AFN to TD62388AFN | —                  | —                                 | TD62001P/AF/F/AF to TD62004P/AF/F/AF | TD62081AP/F/AF/CP to TD62084AFN  |
|                 |            | 700 to 1500            | TD62308AP/BP-1/AF/AF/BF | —                        | —                  | TD62074P/AF/F/AF to TD62107P/BP/F | —                                    | —                                |
|                 | Darlington | up to 200              | —                       | —                        | —                  | —                                 | TD62705P/F to TD62771AP              | TD62781AP/F/AF to TD62782AP/F/AF |
| Output (source) | Single     | up to 200              | —                       | —                        | —                  | —                                 | —                                    | —                                |
|                 |            | up to 500              | —                       | —                        | —                  | —                                 | —                                    | —                                |
|                 | Darlington | up to 200              | —                       | —                        | —                  | —                                 | —                                    | —                                |
|                 |            | up to 500              | —                       | —                        | —                  | —                                 | —                                    | —                                |
|                 |            | 700 and over           | —                       | —                        | —                  | —                                 | —                                    | —                                |
|                 | Channel    |                        | 2 to 4                  | 5 to 7                   | 8                  | 2 to 4                            | 5 to 7                               | 8                                |

Output withstand voltage (V<sub>CE(SUS)</sub>) P: 35 V AP: 50 V BP/BP-1: 80 V CP: 100 V F: 35 V AF: 50 V BF: 80 V

## C<sup>2</sup>MOS Logic ICs

Toshiba's C<sup>2</sup>MOS logic IC families are provided with outstanding features, including low power consumption, high noise tolerance, wide operating temperature range and an interface function, that allow them to be used in a wide range of applications.

In particular, the VHS/ACL for 5 V systems and the VCX/LCX/LVX for 3.3 V systems are available for the interface units of high-speed digital image processing, while members of the 4000 series and 74HC series support analog multiplexers and switches by realizing analog signal processing with a CMOS device. Compact and thin TSSOP are available for the package types in addition to the conventional SOP package, thereby greatly contributing to reduced size, lighter weight and thin design of liquid crystal televisions and other products.

### Performance Comparison of C<sup>2</sup>MOS Logic ICs

| Item                                  | Symbol           | 3.3 V system logic |          |          | 5 V system logic |                  |                | Units   | Conditions                                                                |
|---------------------------------------|------------------|--------------------|----------|----------|------------------|------------------|----------------|---------|---------------------------------------------------------------------------|
|                                       |                  | TC74VCX            | TC74LCX  | TC74LVX  | 74AC (ACT)       | 74VHC (VHCT)     | 74HC (HCT)     |         |                                                                           |
| Propagation delay time ("240 type")*1 | tpLH<br>tpLH     | 2.5                | 6.5      | 11       | 8                | 8.5              | 23             | 200     | V <sub>CC</sub> =4.5 V<br>T <sub>a</sub> =85°C*2<br>C=50pF<br>Max. values |
| Input voltage                         | VIH              | 2.0                | 2.0      | 2.0      | 3.5 (2.0)        | 3.5 (2.0)        | 3.5 (2.0)      | 3.5     | V                                                                         |
|                                       | VIL              | 0.8                | 0.8      | 0.8      | 1.5 (0.8)        | 1.5 (0.8)        | 1.5 (0.8)      | 1.5     | V                                                                         |
| Output current                        | IOH              | -24                | -24      | -4       | -24              | -8               | -4/-6          | -0.42   | mA                                                                        |
|                                       | IOL              | 24                 | 24       | 4        | 24               | 8                | 4/6            | 0.42    | mA                                                                        |
| Input power-down protection           |                  | Yes*4              | Yes*4    | Yes*4    | No               | Yes*4            | No             | No      | —                                                                         |
| Output power-down protection          |                  | Yes*4              | Yes*4    | No       | No               | No (Yes*4)       | No             | No      | —                                                                         |
| Operating power supply voltage        | V <sub>CC</sub>  | 1.8 to 3.6         | 2 to 3.6 | 2 to 3.6 | 2 to 5.5 (5±0.5) | 2 to 5.5 (5±0.5) | 2 to 6 (5±0.5) | 3 to 18 | V                                                                         |
| Static power consumption              | P <sub>D</sub>   |                    |          |          | 0.01 μ           |                  |                |         | W                                                                         |
| Operating temperature                 | T <sub>OPR</sub> |                    |          |          | -40 to 85        |                  |                |         | °C                                                                        |
| Types                                 |                  | 37*5               | 30       | 21       | 83               | 61               | 142            | 30      | —                                                                         |

\*1: 4011B for the 4xxxB series, 16245 type for the VCX series

\*2: V<sub>CC</sub> = 3 V for members of the 74VCX/LCX/LVX series, V<sub>CC</sub> = 5 V, T<sub>a</sub> = 25°C for members of the 4xxxB series,

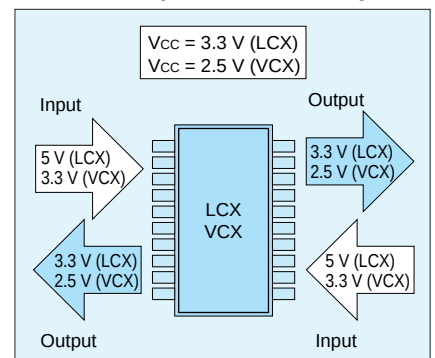
C = 30 pF for members of the VCX series

\*3: V<sub>CC</sub> = 3 V for members of the 74VCX/LCX/LVX series

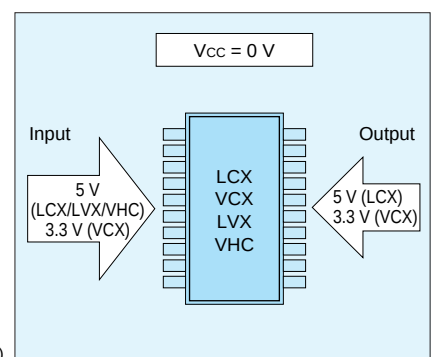
\*4: Voltage of up to 5.5 V can be applied to either input or output regardless of power supply voltage (up to 3.6 V for the TC74VCX)

\*5: Including types scheduled for development

### Bi-directional Interface Function (5/3.3 V, 3.3/2.5 V)



### Power-down Protection Function



# Photocouplers for Regulated Switching Power Supplies and LED Lamps

In color televisions equipped with AV terminals, terminal insulating methods are applied due to the need to use cold external terminals. Photocouplers are used in applications involving transmission of video and audio linear signals in terminal insulating methods, and in applications involving error amplification feedback in switching power supply insulating methods.

## Photocouplers (Terminal insulation applications)

| Device                | Pin configuration | Isolation voltage (Vrms)      | V <sub>CC</sub> /V <sub>CE0</sub> (V) | Bandwidth (Hz) | Voltage gain |
|-----------------------|-------------------|-------------------------------|---------------------------------------|----------------|--------------|
| <b>TLP551</b> (VIDEO) |                   | 2500                          | (V <sub>CC</sub> )<br><15             | >4.5M          | 0.5 to 2.0   |
| <b>TLP651</b> (VIDEO) |                   | 5000                          |                                       |                |              |
| <b>TLP751</b> (VIDEO) |                   | 5000<br>(complies with IEC65) |                                       |                | 0.4 to 1.8   |
| <b>TLP531</b> (VIDEO) |                   | 2500                          | (V <sub>CE0</sub> )<br><55            | <100k          | 0.7 to 2.0   |
| <b>TLP631</b> (VIDEO) |                   | 5000                          |                                       |                |              |
| <b>TLP731</b> (VIDEO) |                   | 4000<br>(complies with IEC65) |                                       |                |              |

## Photocouplers (Switching power supply applications)

| Device        | Pin configuration | Current transfer ratio classification | Current transfer ratio (%) |        |                     | Rating               |                     | Insulation voltage (V) for 1 minute | Safety standards |           |           |          |       |
|---------------|-------------------|---------------------------------------|----------------------------|--------|---------------------|----------------------|---------------------|-------------------------------------|------------------|-----------|-----------|----------|-------|
|               |                   |                                       | (min.)                     | (max.) | I <sub>F</sub> (mA) | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) |                                     | UL               | TUV       | VDE (*1)  | BSI      | SEMKO |
| TLP181        |                   | —                                     | 50                         | 600    | 5                   | 55                   | 50                  | AC3750                              | ○<br>1577        |           |           |          |       |
|               |                   | GB                                    | 100                        | 600    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | GB                                    | 100                        | 300    |                     |                      |                     |                                     |                  |           |           |          |       |
| TLP521        |                   | —                                     | 50                         | 600    | 5                   | 55                   | 50                  | AC2500                              | ○<br>1577        |           |           |          |       |
| GB            |                   | 100                                   | 600                        |        |                     |                      |                     |                                     |                  |           |           |          |       |
| Y             |                   | 50                                    | 150                        |        |                     |                      |                     |                                     |                  |           |           |          |       |
| TLP621        |                   | GR                                    | 100                        | 300    | 5                   | 55                   | 50                  | AC2500                              | ○<br>1577        | △<br>0884 | ○<br>0884 | ○<br>415 |       |
|               |                   | BL                                    | 200                        | 600    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | GRL                                   | 100                        | 200    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | GRH                                   | 150                        | 300    |                     |                      |                     |                                     |                  |           |           |          |       |
| TLP721/F      |                   | —                                     | 50                         | 600    | 5                   | 55                   | 50                  | AC4000                              | ○<br>1577        | △<br>0884 | ○<br>0884 | ○<br>415 | ○     |
|               |                   | GB                                    | 100                        | 600    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | GR                                    | 100                        | 300    |                     |                      |                     |                                     |                  |           |           |          |       |
| [TLP732 (*1)] |                   | —                                     | 50                         | 600    | 5                   | 55                   | 50                  | AC4000                              | ○<br>1577        | △<br>0884 | ○<br>0884 | ○<br>415 |       |
|               |                   | GB                                    | 100                        | 600    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | GR                                    | 100                        | 300    |                     |                      |                     |                                     |                  |           |           |          |       |
| TLP734/F      |                   | —                                     | 50                         | 600    | 5                   | 55                   | 50                  | AC4000                              | ○<br>1577        | △<br>0884 | ○<br>0884 | ○<br>415 | ○     |
|               |                   | GB                                    | 100                        | 600    |                     |                      |                     |                                     |                  |           |           |          |       |
|               |                   | BR                                    | 100                        | 300    |                     |                      |                     |                                     |                  |           |           |          |       |

Products shown in brackets are produced at Toshiba Semiconductor Thailand. △: Complying products ○: Certified products (as of November 1995)  
 \*1: VDE0884 certified when using optional (D4) product.  
 \*2: TLP732 is recommended to be used for the TLP732 for those products employing the new design.

## LED Lamps

### Single Color LED Lamps

| Device           | Emitted color | Typ. luminosity (mcd) at 20 mA | External dimensions (Unit: mm) | Device         | Emitted color | Typ. luminosity (mcd) at 20 mA | External dimensions (Unit: mm) |
|------------------|---------------|--------------------------------|--------------------------------|----------------|---------------|--------------------------------|--------------------------------|
| <b>TLPGU1002</b> | Pure green    | 6                              |                                | <b>TLGD262</b> | Green         | 50                             |                                |
| <b>TLGU1002</b>  | Green         | 27                             |                                | <b>TLOU262</b> | Orange        | 120                            |                                |
| <b>TLOU1002</b>  | Orange        | 40                             |                                | <b>TLSU262</b> | Red           | 100                            |                                |
| <b>TLSU1002</b>  | Red           | 30                             |                                |                |               |                                |                                |

### Dual-Color LED Lamps

| Device         | Emitted color | Light emitting surface size (mm) | External dimensions (Unit: mm) |
|----------------|---------------|----------------------------------|--------------------------------|
| <b>TLSG205</b> | Red/green     | 1 X 5                            |                                |
| <b>TLSG208</b> | Red/green     | 2 X 5                            |                                |

# World's Color TV Broadcast Systems

The following table shows the international television transmission standards. Japan, for example, follows the M/NTSC system.

The color subcarrier band uses 4.43 MHz on the PAL system and 3.58 MHz on the NTSC system.

As exceptions, Brazil uses 3.575 MHz (PAL), and Argentina uses 3.582 MHz (N/PAL).

## Representative Television Standards

| Item \ Typ. system                                                      | M                                          | N               | B                 | G                 | H             | I          | D                              | K               | K             | L                  |
|-------------------------------------------------------------------------|--------------------------------------------|-----------------|-------------------|-------------------|---------------|------------|--------------------------------|-----------------|---------------|--------------------|
| Scan lines                                                              | 525                                        | 625             | 625               | 625               | 625           | 625        | 625                            | 625             | 625           | 625                |
| Field frequency (Hz)                                                    | 60                                         | 50              | 50                | 50                | 50            | 50         | 50                             | 50              | 50            | 50                 |
| Number of channel bands (MHz)                                           | 6                                          | 6               | 7                 | 8                 | 8             | 8          | 8                              | 8               | 8             | 8                  |
| Audio band width (MHz)                                                  | 4.2                                        | 4.2             | 5                 | 5                 | 5             | 5.5        | 6                              | 6               | 6             | 6                  |
| Difference between audio frequency & video transmission frequency (MHz) | +4.5                                       | +4.5            | +5.5              | +5.5              | +5.5          | 6          | +6.5                           | +6.5            | +6.5          | +6.5               |
| Residual-wave bandwidth (MHz)                                           | 0.75                                       | 0.75            | 0.75              | 0.75              | 1.25          | 1.25       | 0.75                           | 0.75            | 1.25          | 1.25               |
| Video modulation polarity negative, positive                            | Negative                                   | Negative        | Negative          | Negative          | Negative      | Negative   | Negative                       | Negative        | Negative      | Positive           |
| Audio modulation system                                                 | FM                                         | FM              | FM                | FM                | FM            | FM         | FM                             | FM              | FM            | AM                 |
| User countries (colorsystems)                                           | Japan (NTSC)<br>USA (NTSC)<br>Brazil (PAL) | Argentina (PAL) | Germany VHF (PAL) | Germany UHF (PAL) | Belgium (PAL) | U.K. (PAL) | China (PAL)<br>CIS VHF (SECAM) | CIS UHF (SECAM) | Zaire (SECAM) | France UHF (SECAM) |

(1) VCRs operate with the following systems:

4.43 MHz NTSC

Color subcarrier band frequency: 4.43 MHz

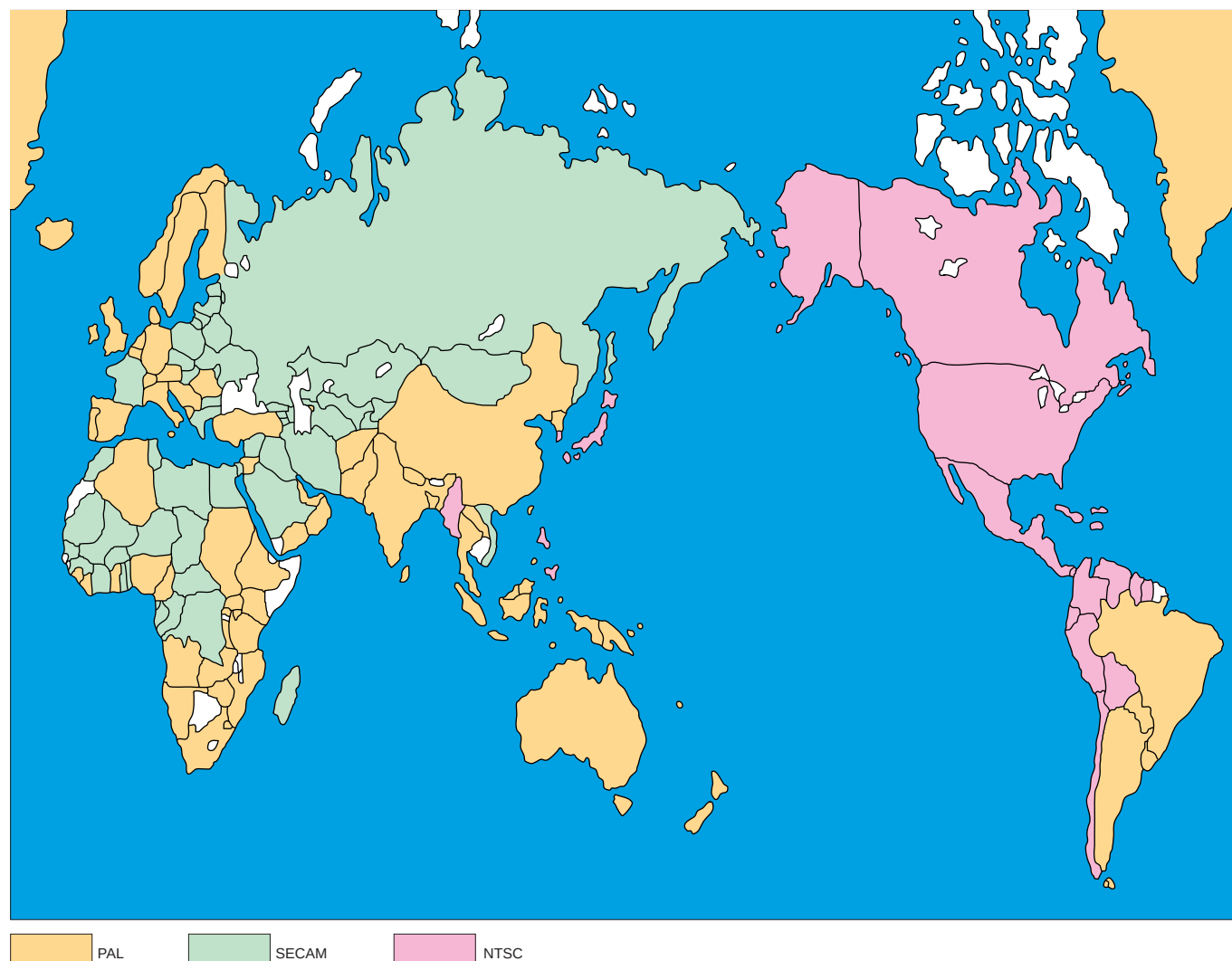
Difference between audio frequency and video frequency: 5.5 MHz

5.5 MHz NTSC

Color subcarrier band frequency: 3.58 MHz

Difference between audio frequency and video frequency: 5.5 MHz

(2) For VHD video discs, the field frequency is determined by the disc-recording system, not by the player system, and hence they operate on 60 Hz PAL or 50 Hz NTSC.



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