



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

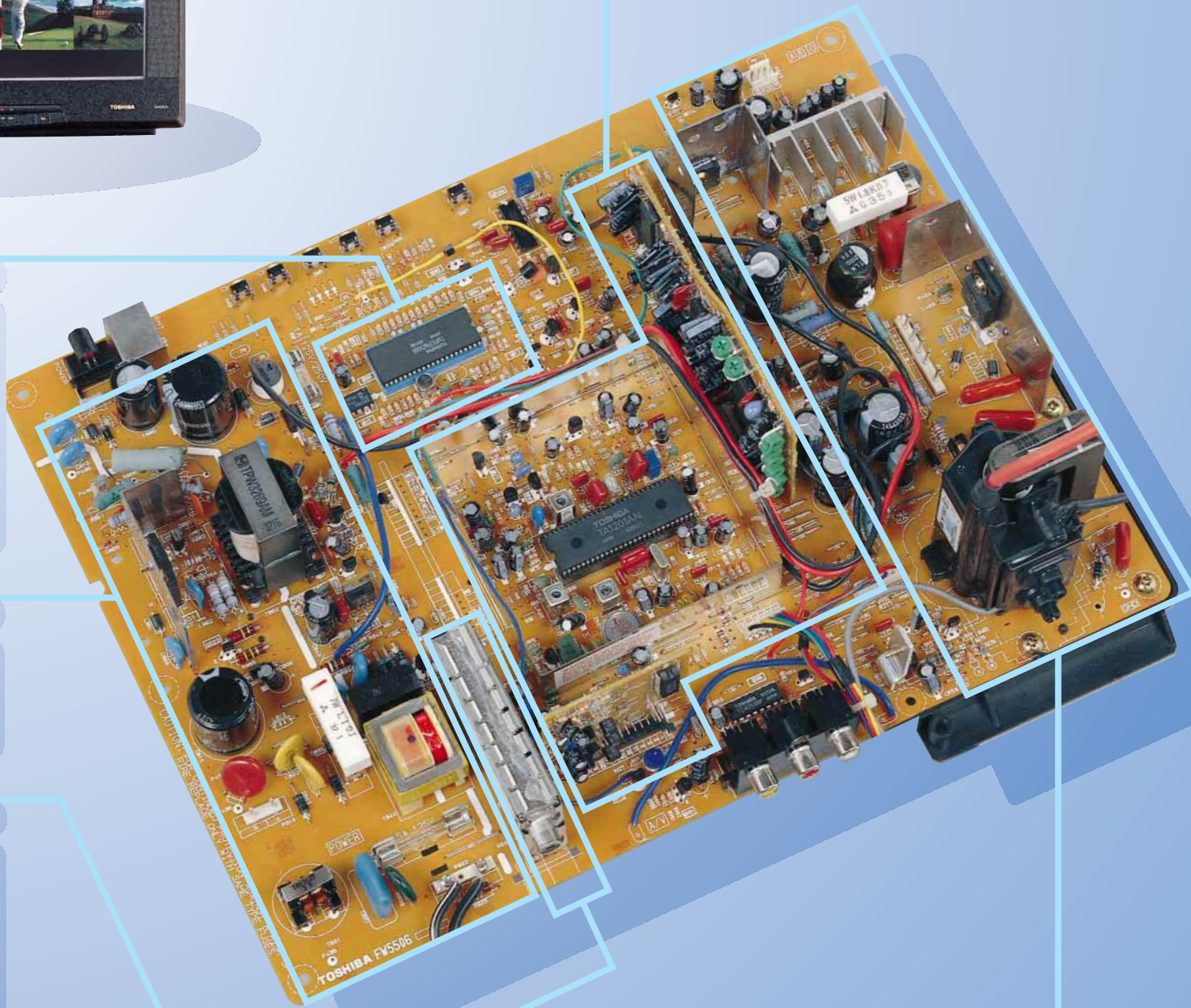
Tuners P. 15 to 16

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 I²C 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 I²C bus
TB1233F/FN Frequency synthesizer for I²C 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)

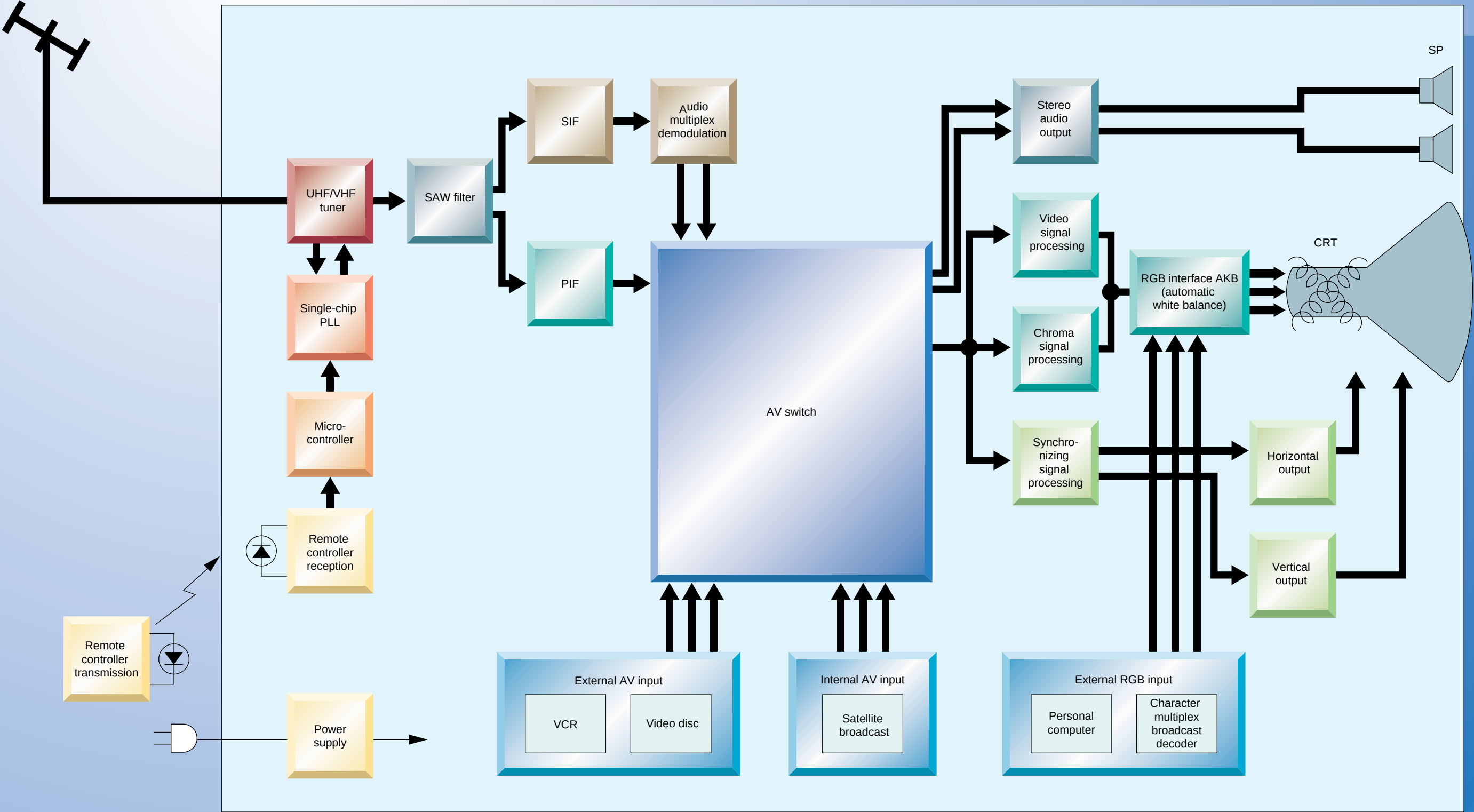
Audio Signal Processors

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

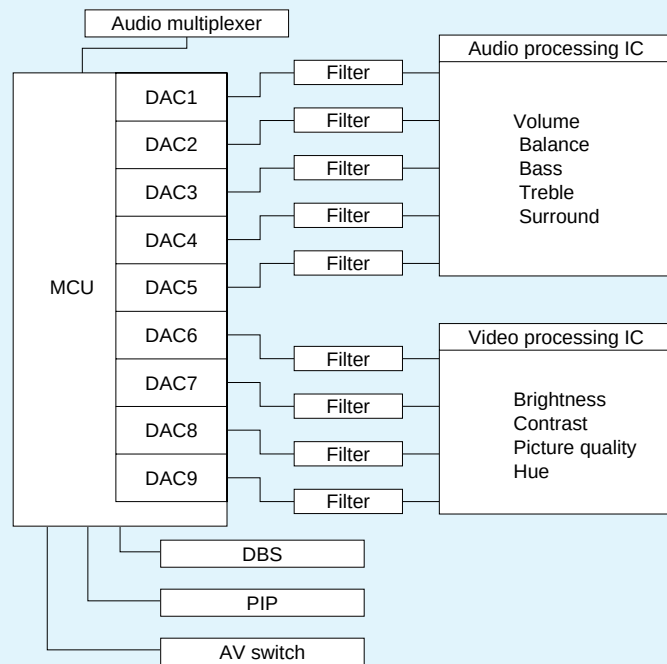
ICs directly controlled by microcontrollers are increasing due to the growing desire for digital control of various functions.

■ Advantages of Bus Control

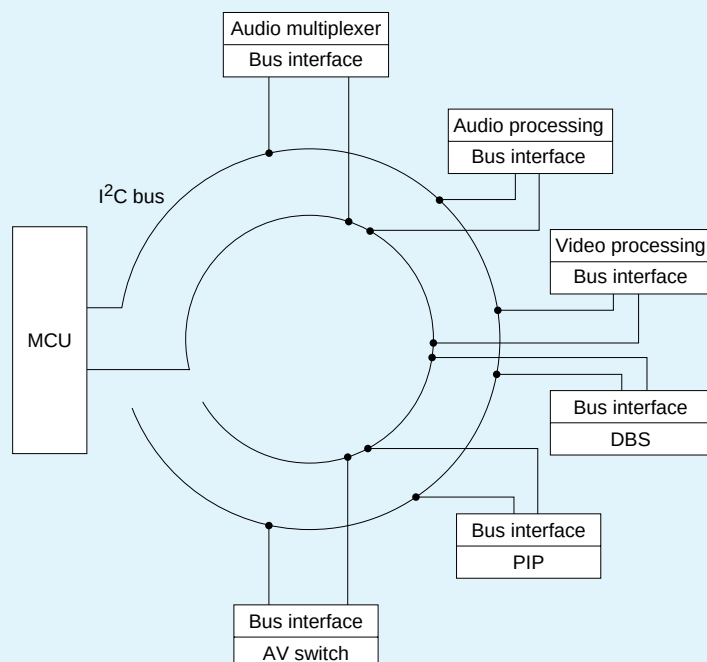
- Enables a significant reduction in the number of peripheral components due to simplification of the interface between the microcontroller and signal processing IC.
- Allows a reduction in the number of wires and reduced board surface area of the set.
- Enables chassis unification, labor-saving set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

Comparison of Conventional System and Bus Control System

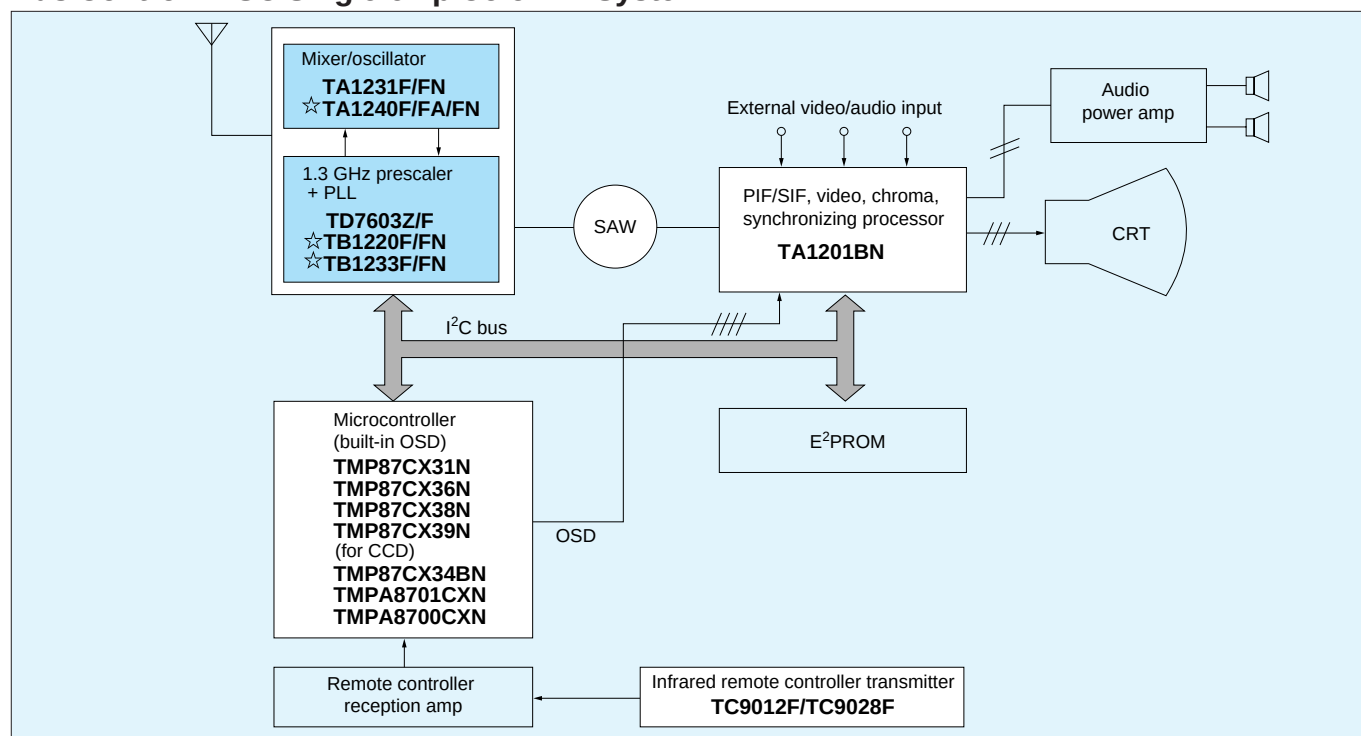
Conventional System



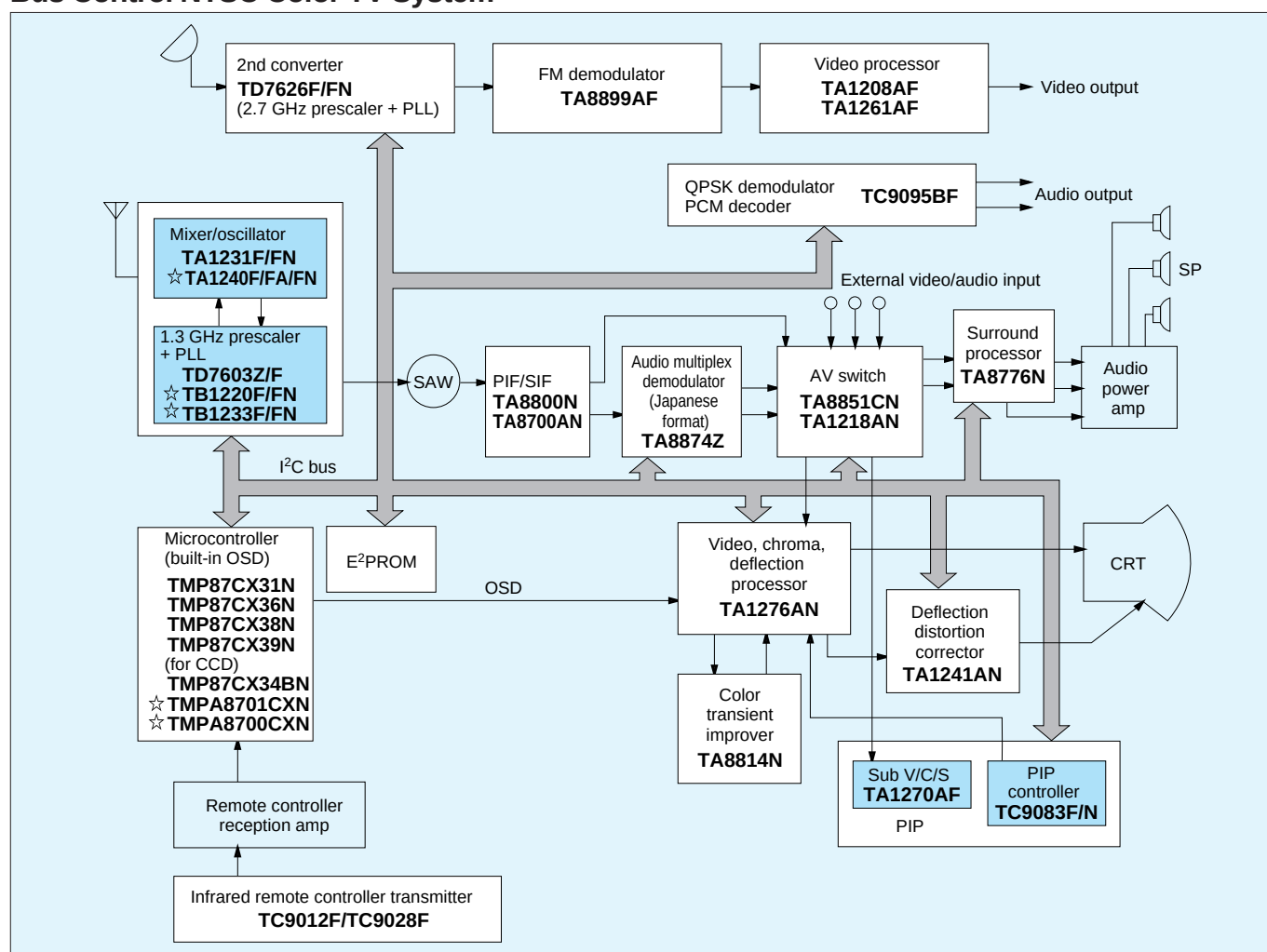
Bus Control System



Bus Control NTSC Single-chip Color TV System

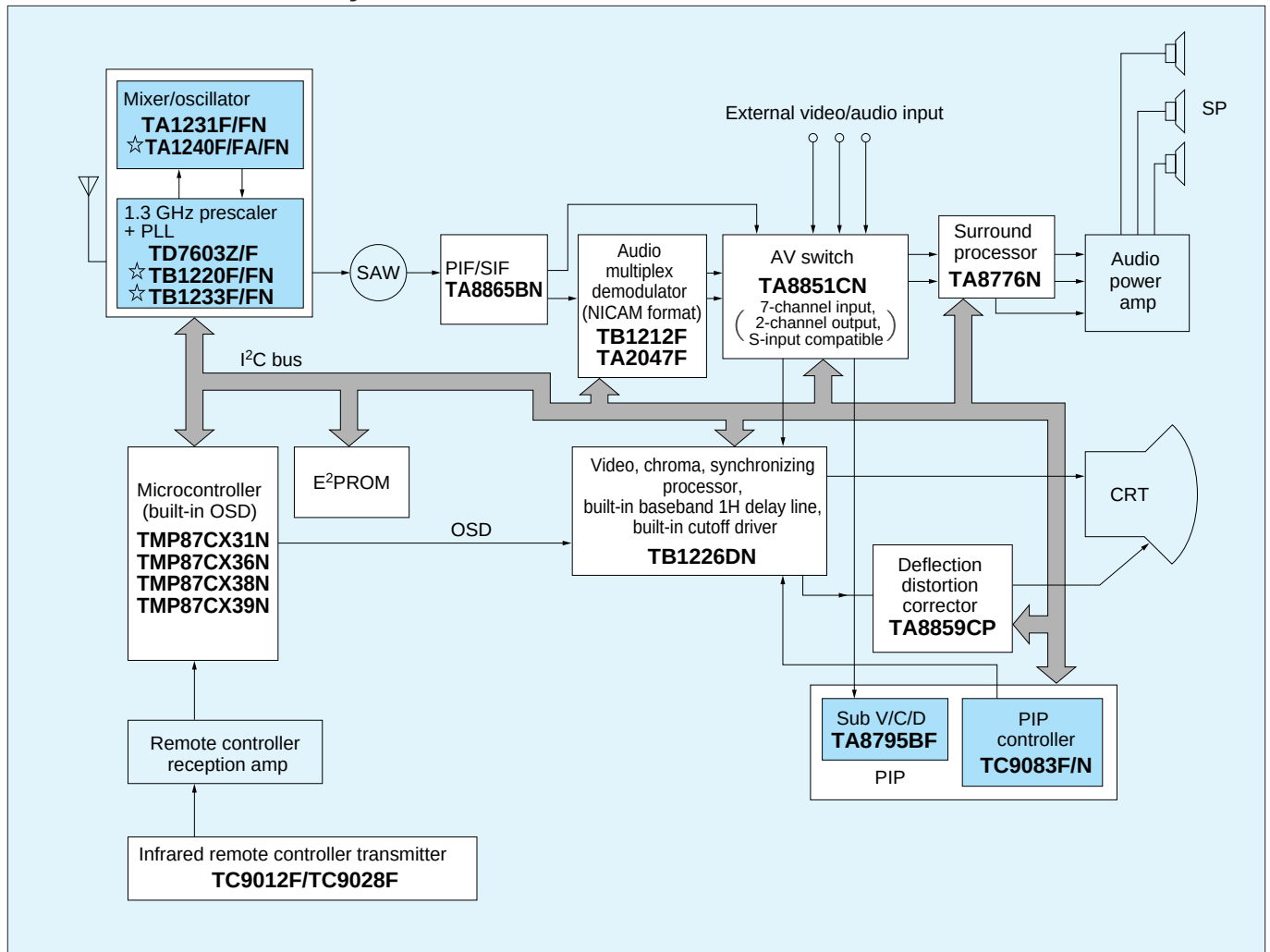


Bus Control NTSC Color TV System



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

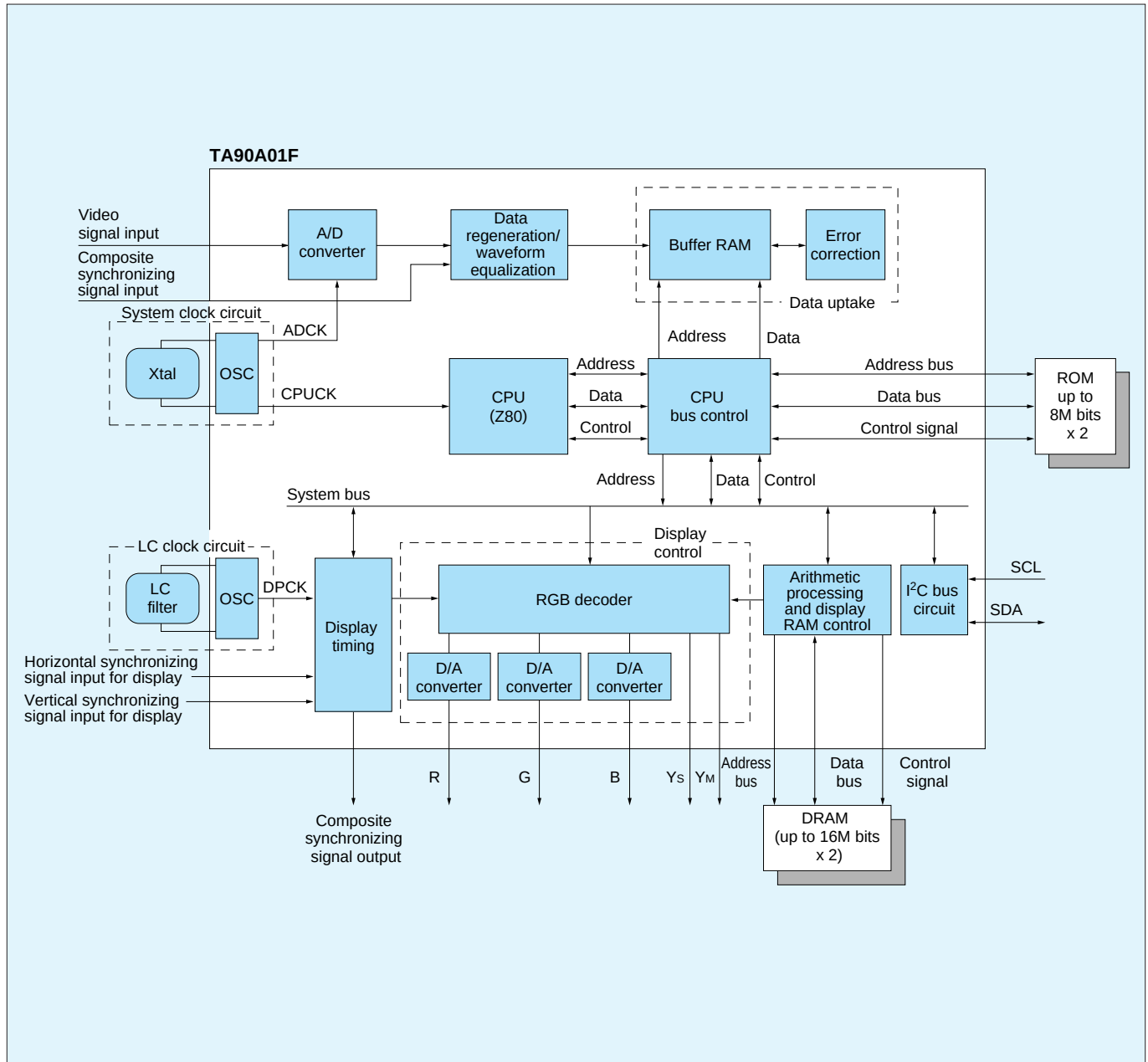
Device	Summary	Functions	Package
TD7603Z/F	Frequency synthesizer	1.3 GHz prescaler + PLL	SZIP21 SOP20
☆ TB1220F/FN ☆ TB1233F/FN	Frequency synthesizer	1.3 GHz prescaler + PLL + built-in peripherals + built-in A/D converter	SOP16 SSOP16
TD7626F/FN	Frequency synthesizer	2.7 GHz prescaler + PLL + built-in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



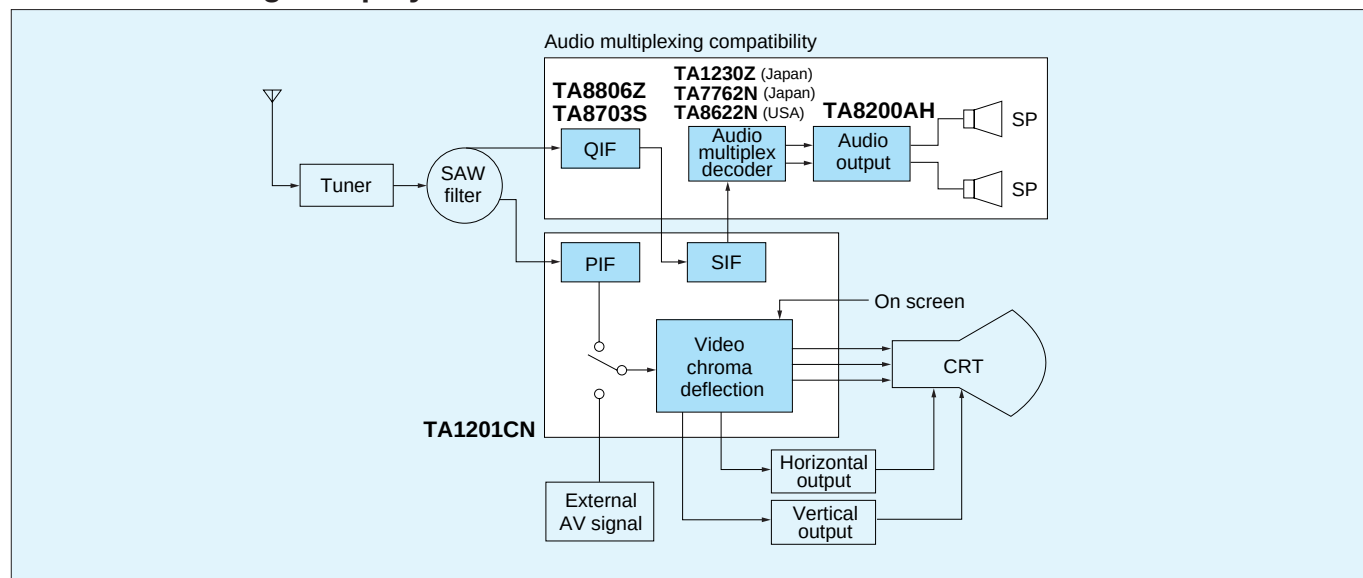
Device	Function	Features	Package
TC90A01F	Character Multiplex Broadcast Decoder System	● Built-in CPU ● Digital data slicer ● Fully digital data regeneration ● Waveform equalization ● On-screen-compatible color RAM (16 of 4096 colors displayed) ● Built-in buffer memory (for 8 packets) ● Horizontal 4/5, 1/2, 1/5 and vertical 1/2 reduced display function ● I²C interface with microcontroller ● Single 5 V power supply	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.

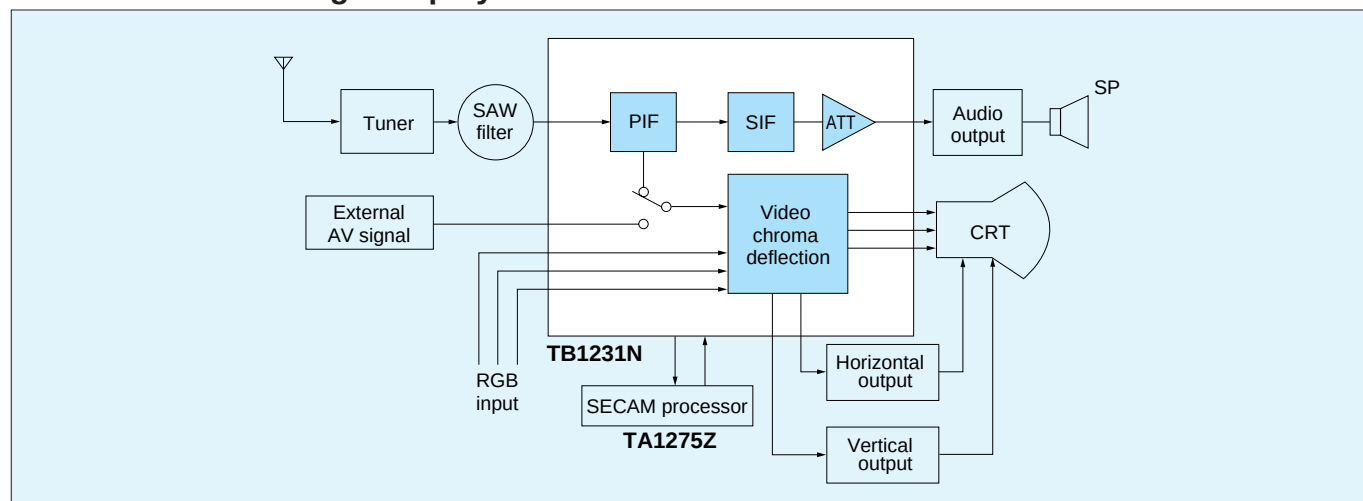
The TA8864AN/79N are NTSC format, single-chip ICs featuring a built-in 1-channel AV switch, on-screen interface and bandpass filter for chroma signals. The TA8690AN/91N are PAL/NTSC and PAL format single-chip ICs featuring pin compatibility to facilitate board sharing. The TA8725AN is an NTSC format, 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 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 ² C bus	SDIP56
TB1231N	○	○	○	○	—	○	Built-in 1HDL, add-on SECAM TA1275Z, I ² C bus	SDIP56

Multi-standard Systems

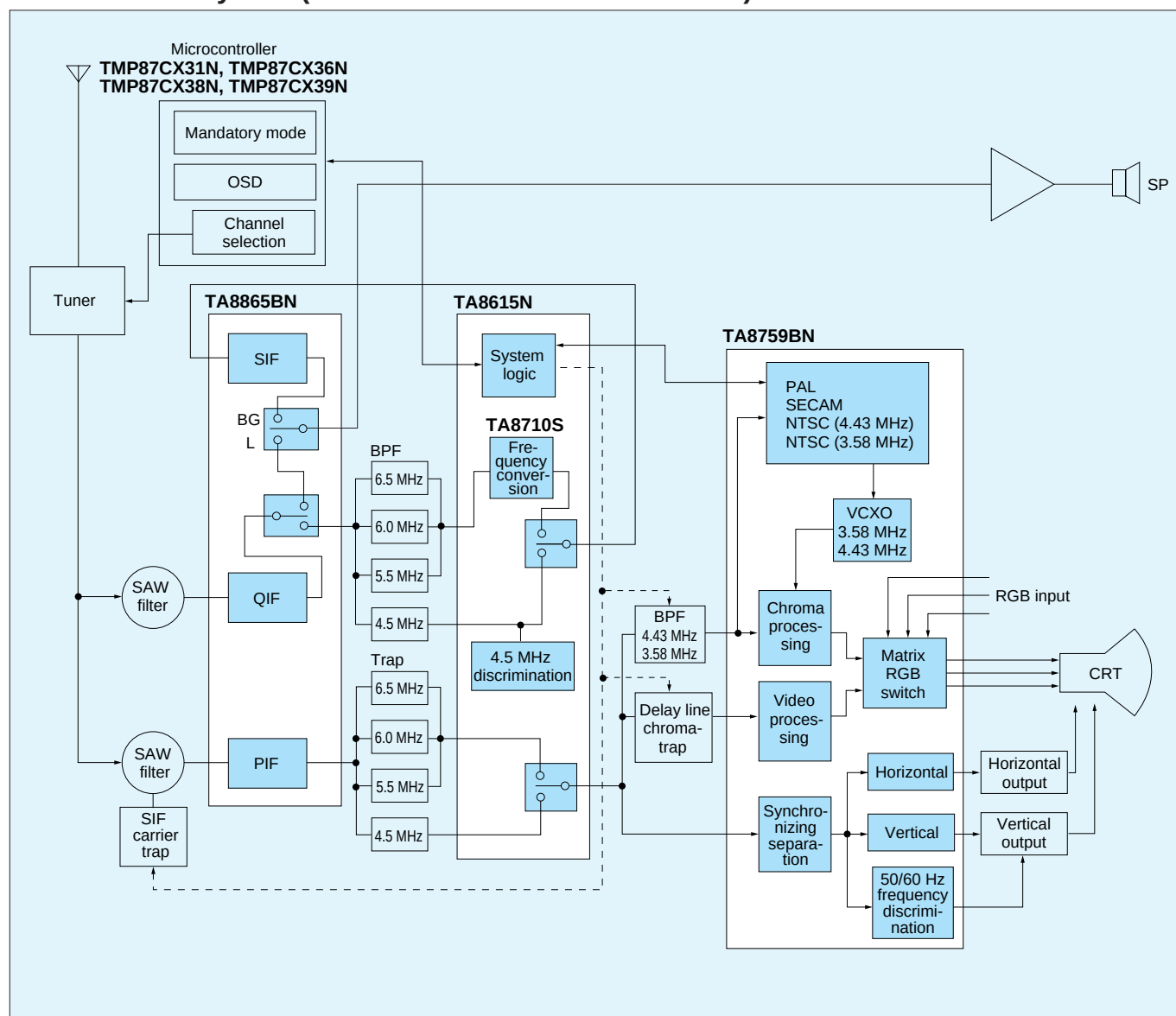
Accompanying the proliferation of AV equipment such as VCRs and video disc players, it has become possible to enjoy programs produced in various countries at home.

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 I²C bus-compatible version of the TA8783N.

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



Multi-standard ICs

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

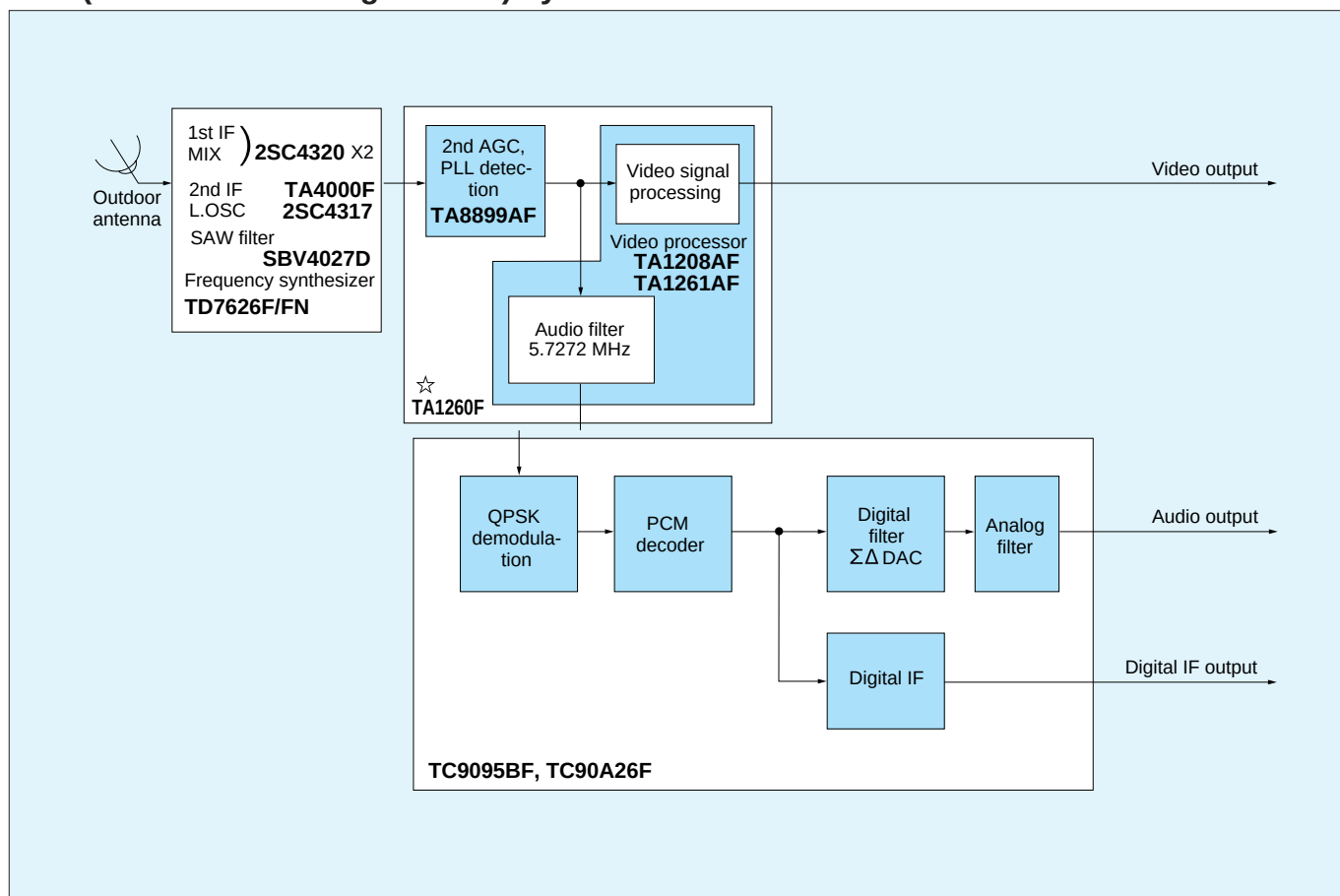
ICs for Satellite Broadcast Transmission and Reception Systems

Device	Functions	Remarks	Process	Package
☆ TA1260F	PLL-type FM demodulation + 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, C/N detection circuit, built-in NR circuit	Bipolar	SSOP30
TA1248F	IQ demodulation for digital 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, C/N detection circuit, built-in NR circuit, CS-compatible	Bipolar	SSOP30
TC9095BF	QPSK demodulation + PCM decoder + digital filter + $\Sigma\Delta$ DAC + analog filter	Digital PLL, QPSK demodulation, PCM decoder, 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

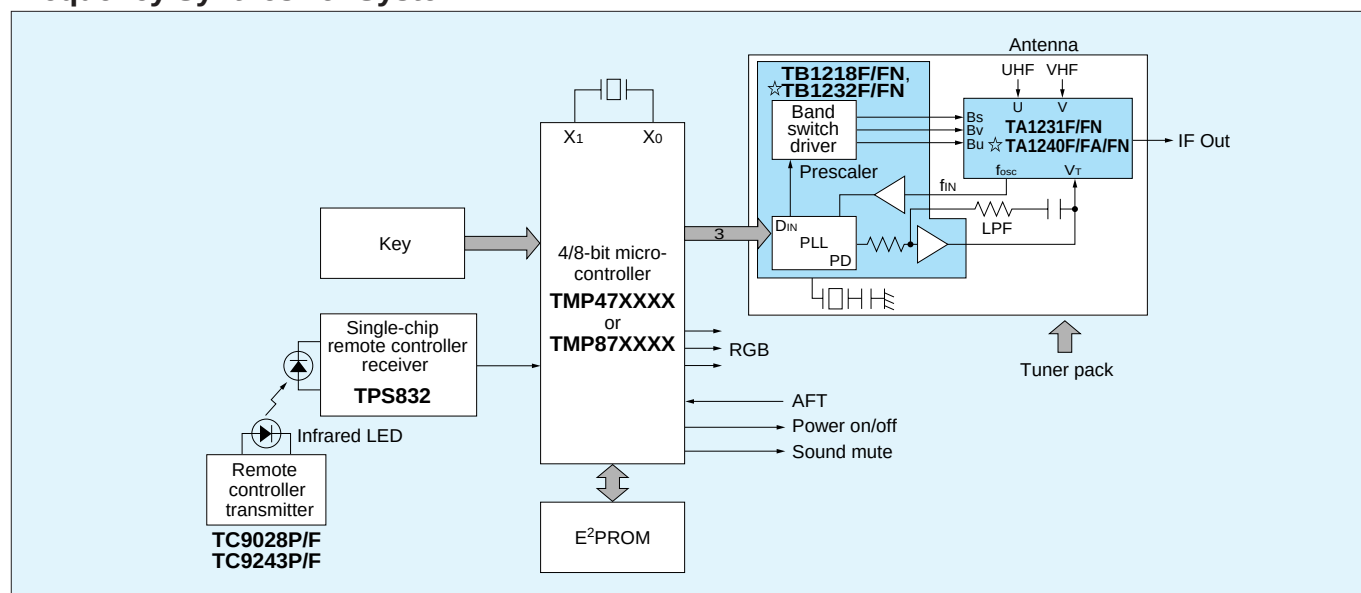


☆ : Under development

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) SSOP16 (0.65 mm pitch)
☆TA1240F/FA/FN	2-band OSC, MIX, IF AMP	5 V	SSOP16 (1 mm pitch) SOP16 (1.27 mm pitch) SSOP16 (0.65 mm pitch)

☆ : Under development

ICs for Frequency Synthesizers

Item	Device	TD7603Z/F	TD7614F	TB1218F/FN TB1232F/FN	☆TB1220F/FN ☆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/ 7.8125 kHz Switchable by bus control	7.8125/12.5/ 15.625 kHz Switchable by selector switch	3.90625/ 7.8125 kHz	3.90625/6.25/ 7.8125 kHz Switchable by bus control	3.90625/ 7.8125 kHz Switchable by 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 SOP20 (1.27 mm pitch)	SOP20 (1.27 mm pitch)	SOP16 (1.27 mm pitch) SSOP16 (0.65 mm pitch)	SOP16 (1.27 mm pitch) SSOP16 (0.65 mm pitch)	SOP16 (1.27 mm pitch) SSOP16 (0.65 mm pitch)
Remarks			Built-in 4-ch band driver Built-in tuning amp	Built-in 4-ch band driver Built-in tuning amp Bi-CMOS process	Built-in 4-ch band driver Built-in tuning amp Bi-CMOS process 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 _E Min. (mW/sr)	θ _{1/2} Typ.(°)	Package
TLN105B	For trans- mission	12	±23.5	5φ resin type
TLN115A		15	±21	

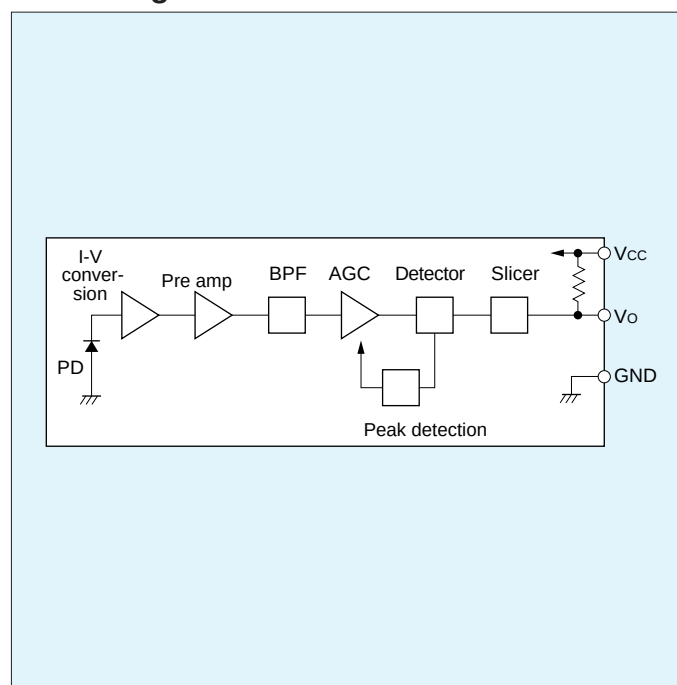
Photodiodes

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

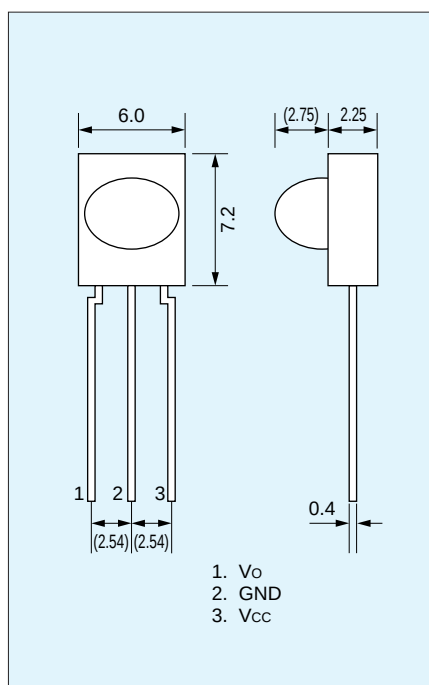
Photodetector IC for Infrared Remote Controllers

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



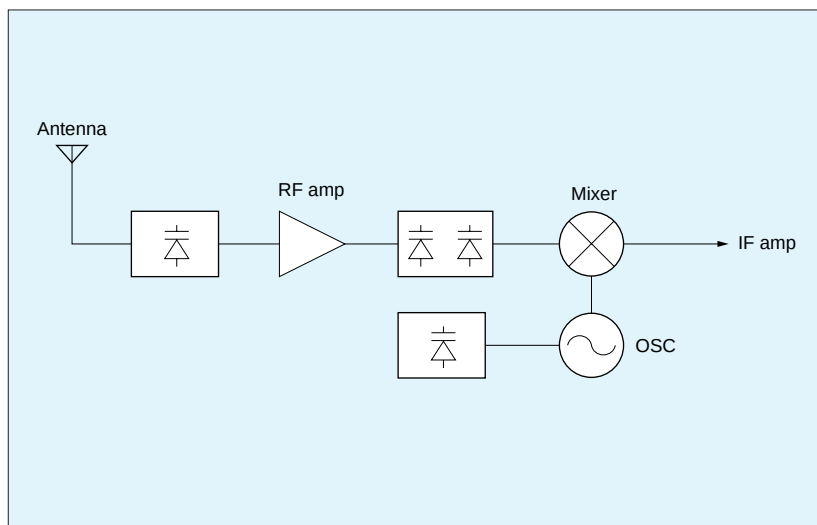
Device	Function	Package
TPS832	Operating power supply voltage: Vcc = 5 V Receiving frequency: 38 kHz Typical transmission range: L = 12 m	Side view 3-pin Equipped with oval lens (using a visible light blocking resin)

ICs for Remote Controller Transmission and Reception

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

Transistors and Diodes for Tuners

Tuner System



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

▼: New product

☆: Under development

(Note) # GaAs

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

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

Synthesizer Systems

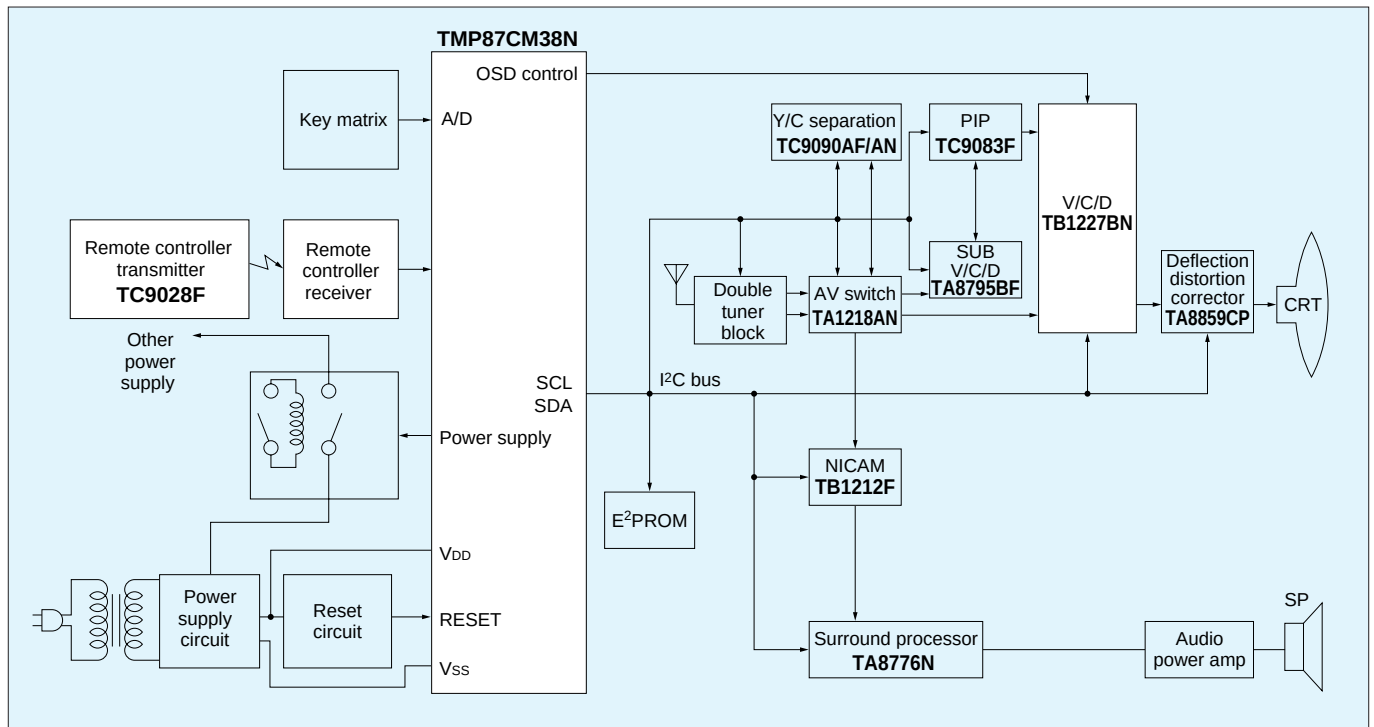
Reference Application Software (RAS)

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.

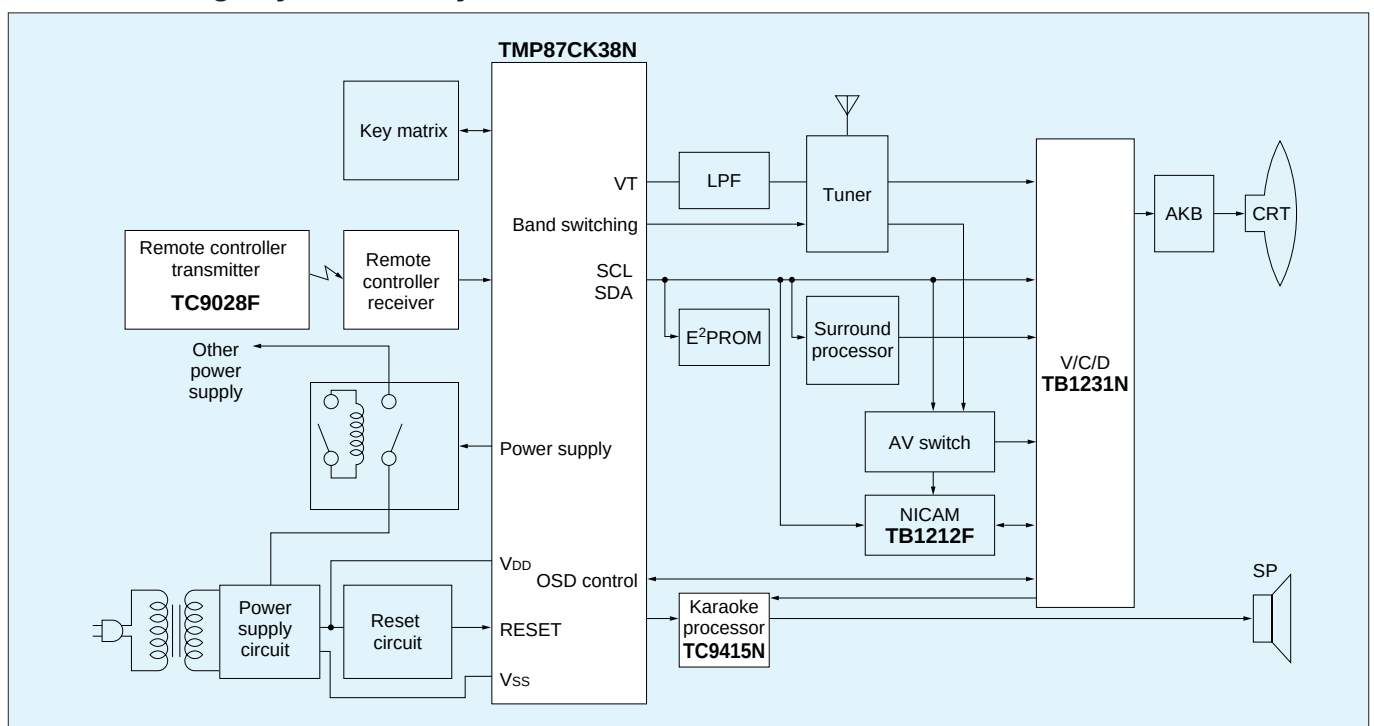
These reference software products can be used to improve the efficiency of your software development and shorten development time.

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 Channel search Channel direct access	Channel skip Channel search Channel direct access	Position up/down, position direct, search up/down, manual up/down	Position up/down, position direct, search up/down, 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, self-adjustment	NICAM, Karaoke, surround, multi-color, PIP, double tuner	NICAM, Karaoke, surround, multi-color, PIP, double tuner
OSD display contents	Channel, volume, sound multiplexing, analog volume, video, clock, sleep, timer, menu, CCD	Channel, volume, sound multiplexing, analog volume, video, clock, sleep, timer, menu, CCD, bus adjustment	Channel, volume, sound multiplexing, analog volume, video, clock, sleep, timer, menu, PIP, bus adjustment	Channel, volume, sound multiplexing, analog volume, video, clock, sleep, timer, menu, PIP, bus adjustment
Back-up operation	MCU RAM/E ² PROM	E ² PROM	E ² PROM	E ² PROM
Package	42-SDIP	42-SDIP	42-SDIP	42-SDIP
System kit IC	PLL: TD6359/6380/6382 R/C: TC9012F/28F E ² PROM: I ² C bus (1KB)	PLL: TD6359/6380/TD7603 R/C: TC9012F/28F E ² PROM: I ² C bus (2KB) V/C/D: TA1201BN Surround: TA8776N S.MPX: TA8622P	PLL: TB1220F R/C: TC9028F E ² PROM: I ² C bus (2KB) V/C/D: TA8880CN Surround, NICAM RGB cut off, DPC, PIP Karaoke, 3-line-Y/C	PLL: TB1220F R/C: TC9028F E ² PROM: I ² C bus (4KB) V/C/D: TB1226DN/TB1227BN Surround, NICAM DPC, PIP 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, bus compatibility	Teletext compatibility	Multi-color system, bus compatibility	Multi-color system, bus compatibility
MCU	TMP87CK38N	TMP87CH31N	TMP87CM38N	TMP87CK36N-3098
Bus system compatibility	○	—	○	○
Compatible bus LSI	TB1231N	—	TB1226DN/TB1227BN	TA8880CN
Station selection functions	Position up/down, position direct, search up/down, manual up/down	Position up/down, position direct, search up/down, manual up/down	Position up/down, position direct, search up/down, manual up/down	Position up/down, position direct, search up/down, 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, surround	Teletext, multi-color system, NICAM/IGR, surround	NICAM, Karaoke, surround, multi-color system	NICAM, Karaoke, multi-color system, surround
OSD display contents	Position, volume, sleep, S. MPX, analog volume, Karaoke, multi-color system, bus adjustment	Position, volume, clock, sleep, timer, analog volume, multi-color system	Position, volume, clock, sleep, timer, S. MPX, analog volume, Karaoke, multi-color system, bus adjustment	Position, volume, clock, sleep, timer, S. MPX, analog volume, Karaoke, multi-color system
Package	42-SDIP	42-SDIP	42-SDIP	42-SDIP
System kit IC	R/C : TC9028F E ² PROM : I ² C bus (4KB) V/C/D : TB1231N Surround, DPC Karaoke, 2-line-Y/C	R/C : TC9012F/28F E ² PROM : I ² C bus (2KB/4KB) Teletext : CF70200 Surround : TA8776	R/C : TC9028F E ² PROM : I ² C bus (2KB) V/C/D : TB1226DN/TB1227BN Surround, NICAM RGB cut off, DPC Karaoke, 3-line-Y/C	R/C : TC9028F E ² PROM : I ² C bus (2KB) V/C/D : TA8880CN NICAM, Surround RGB cut off, DPC Karaoke, 3-line-Y/C

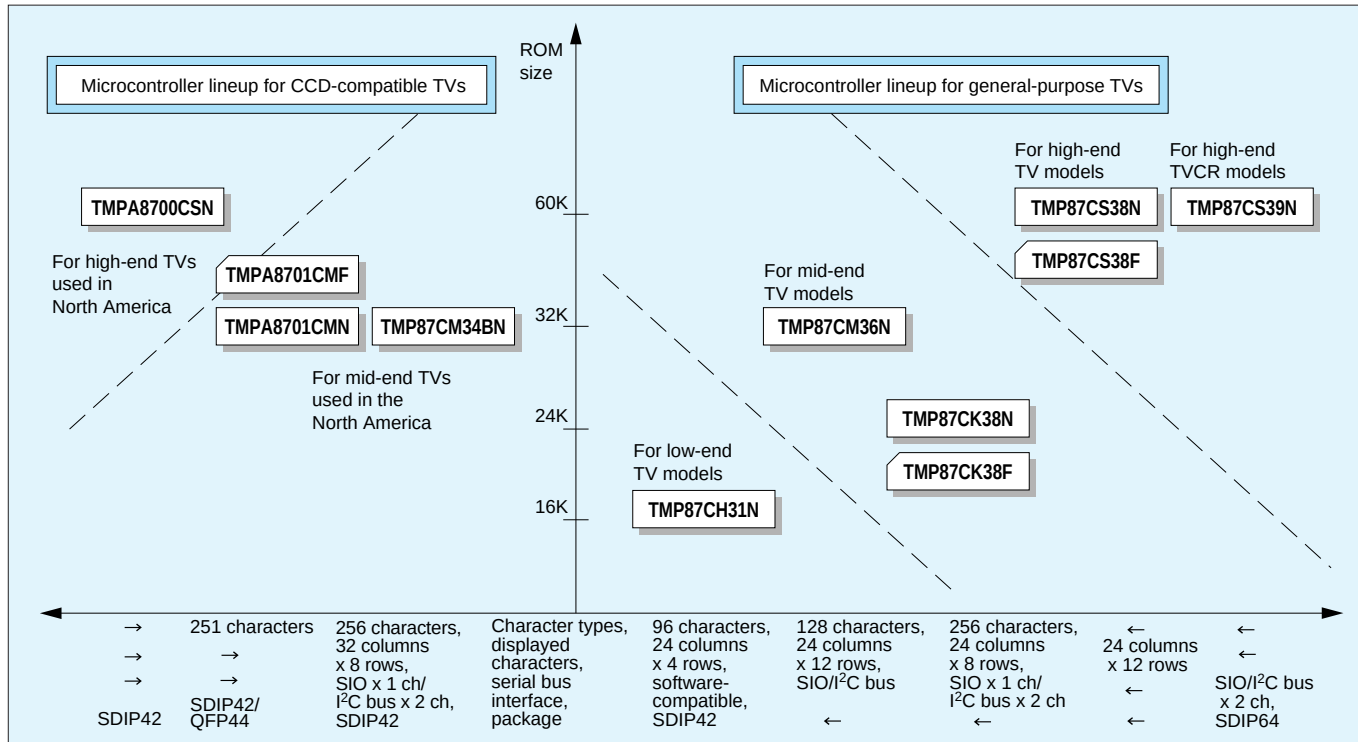
Common functions: Auto-memory, clock, on/off timer, sleep timer

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

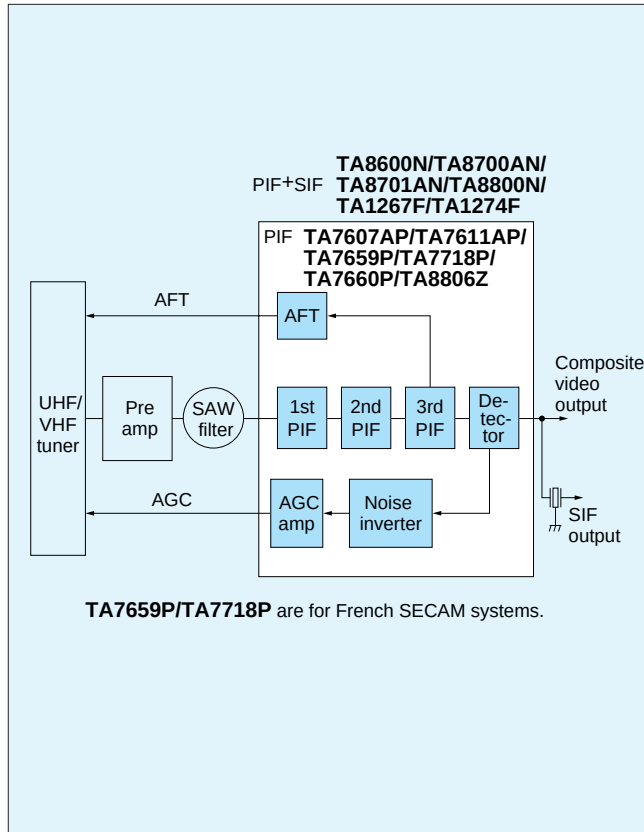


Microcontrollers for TVs with Built-in OSD

Device	ROM size	RAM size	Functions	Package
TMP87CH34BN	16K byte	1K byte	For CCD, 256 characters, display of 32 characters x 8 rows, I ² 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 ² C bus compatibility, 8-bit A/D converter x 6 ch	SDIP42 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 ² 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 ² 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 ² 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 ² C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit	SDIP42 QFP44
TMP87CK38N/F	24K bytes			
TMP87CM38N/F	32K bytes	1K byte	256 characters, display of 24 characters x 12 rows, I ² C bus compatibility, 8-bit A/D converter x 6 ch, PWM output, remote control signal preprocessor circuit	SDIP42 QFP44
TMP87CP38N/F	48K bytes	2K bytes		
TMP87CS38N/F	60K bytes			
TMP87CM39N	32K bytes	1K byte	256 characters, display of 24 characters x 12 rows, I ² 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 RF	Peak AGC		Mean AGC		Power supply (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	38.9	D, G, I	S-1C	LT	F045LSL	45.75	M, N	S-6B	LN
F56CM		B, D, G, I	TM-3	LT	F032USM			S-2C	LT
F034LSM		B, G	S-2C	LT	F072ESM			S-2C	LN
F074ASL/LSL			S-6B	LN	F052VSM			S-2C	LT
F1034AS			S-1C	LT	F062DSL			S-6B	LT
F1037B/C			T-1	LT	F072ASL/BSL			S-6B	LN
F1037CS		M	S-1C	LT	F1052B/Z	58.75	M, N	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			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	58.75	M, N	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

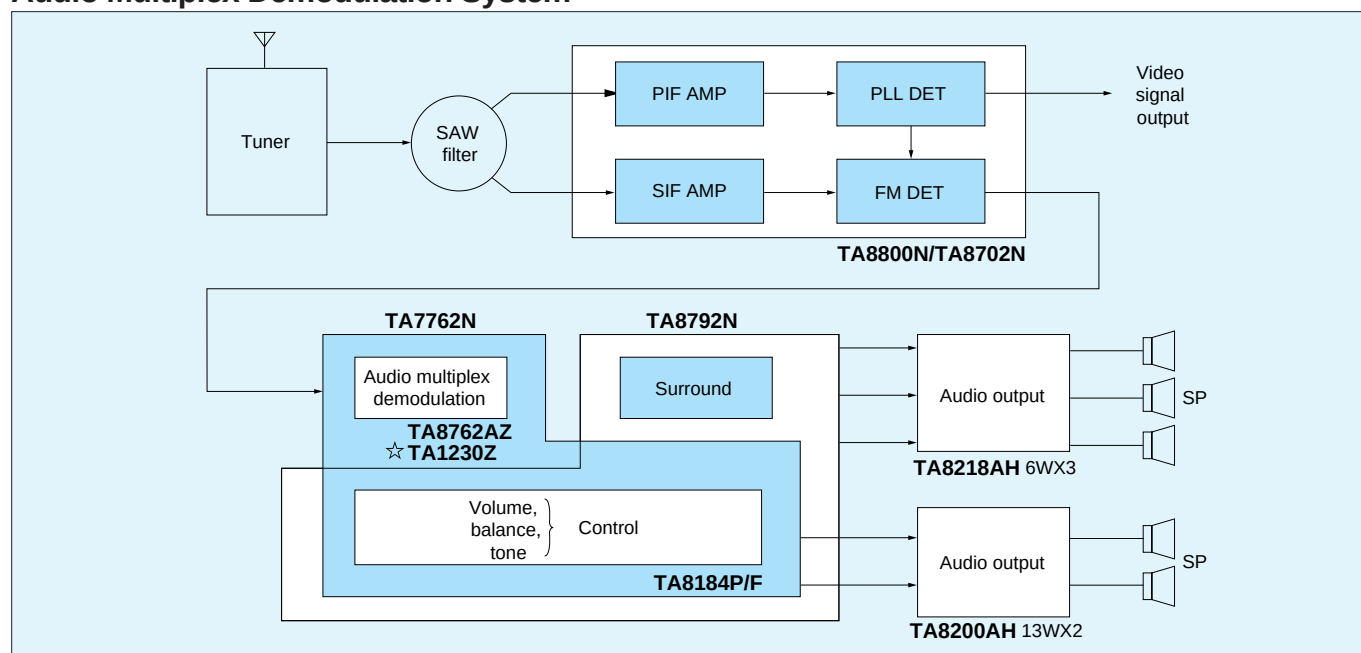
For PIF and SIF

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
TA7762N	Japanese format audio multiplexing, built-in filter, with surround processor	8.1 to 9.9 V	SDIP30
TA8762AZ	Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast compatibility		SZIP21
☆ TA1230Z	Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast compatibility		SZIP21
TA8874Z	Japanese format audio multiplexing, built-in filter, adjustment-free, FAX broadcast and I ² C bus compatibility		SZIP21
TA8792N	Surround processor, Toshiba bus compatibility	8.1 to 9.9 V/10.8 to 13.2 V	SDIP30
TA8776N	Surround processor, I ² C bus compatibility	8.1 to 9.9 V/10.8 to 13.2 V	SDIP30

☆ : Under development

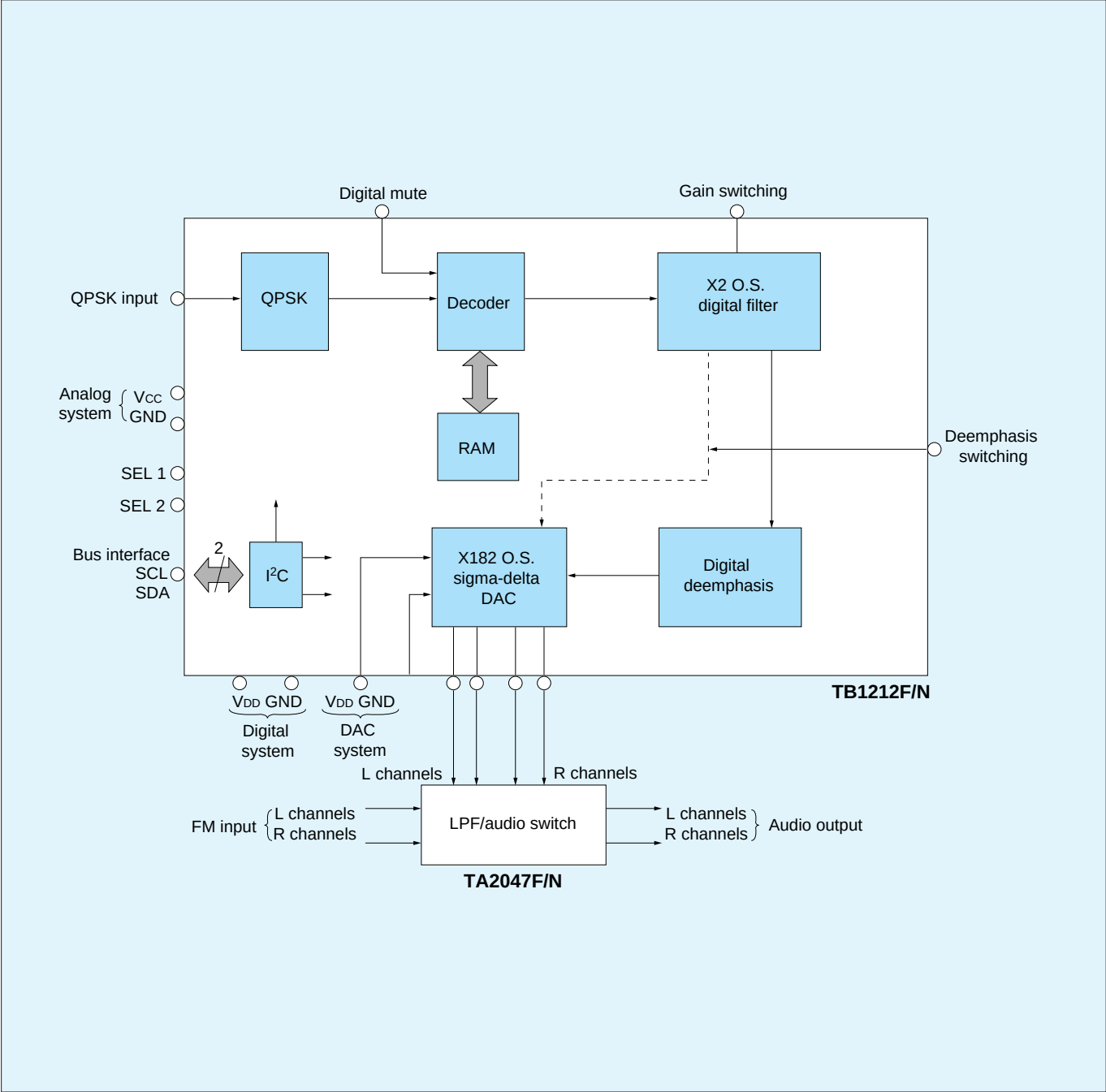
Power ICs for Audio Output

Device	Typ. output (f = 1 kHz, THD = 10%)	Functions	Operating power supply (V)	Package
TA8200AH	13 W x 2 ch (V _{CC} = 28 V R _L = 8 Ω)	Audio muting, fixed gain (G _v = 34 dB), thermal cutoff protective circuit	10 to 37 V	HZIP12
TA8211AH	6 W x 2 ch (V _{CC} = 20 V R _L = 8 Ω)	Variable gain, thermal cutoff protective circuit	10 to 30 V	HZIP12
TA8213K	6 W x 1 ch (V _{CC} = 20 V R _L = 8 Ω)	Fixed gain (G _v = 34 dB), thermal cutoff protective circuit, compact 7-pin package	10 to 30 V	MSIP7
TA8216H	13 W x 2 ch (V _{CC} = 24 V R _L = 4 Ω)	Audio muting, fixed gain (G _v = 34 dB), thermal cutoff protective circuit, operation at R _L = 4 Ω	10 to 24 V (R = 4 Ω) 10 to 37 V (R = 8 Ω)	HZIP12
TA8218AH	6 W x 3 ch (V _{CC} = 20 V R _L = 8 Ω)	Stereo (2 ch) + surround (1 ch), 2 independent channels, audio muting (stereo/surround), fixed gain (G _v = 34 dB), thermal cutoff protective circuit, low thermal resistance package	10 to 30 V	HZIP17
TA8246H	6 W x 2 ch (V _{CC} = 20 V R _L = 8 Ω)	Audio muting, fixed gain (G _v = 34 dB), no NF terminal, thermal cutoff/overvoltage protective circuits, interchangeable with TA8256H	10 to 30 V	HZIP12
TA8256H	6 W x 3 ch (V _{CC} = 20 V R _L = 8 Ω)	Audio muting, fixed gain (G _v = 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
TB1212F/N	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 SDIP64
TA2047F/N	LPF	Audio switch, analog muting, increaseable signal level (6 dB), externally connectable analog deemphasis	SSOP24 SDIP24

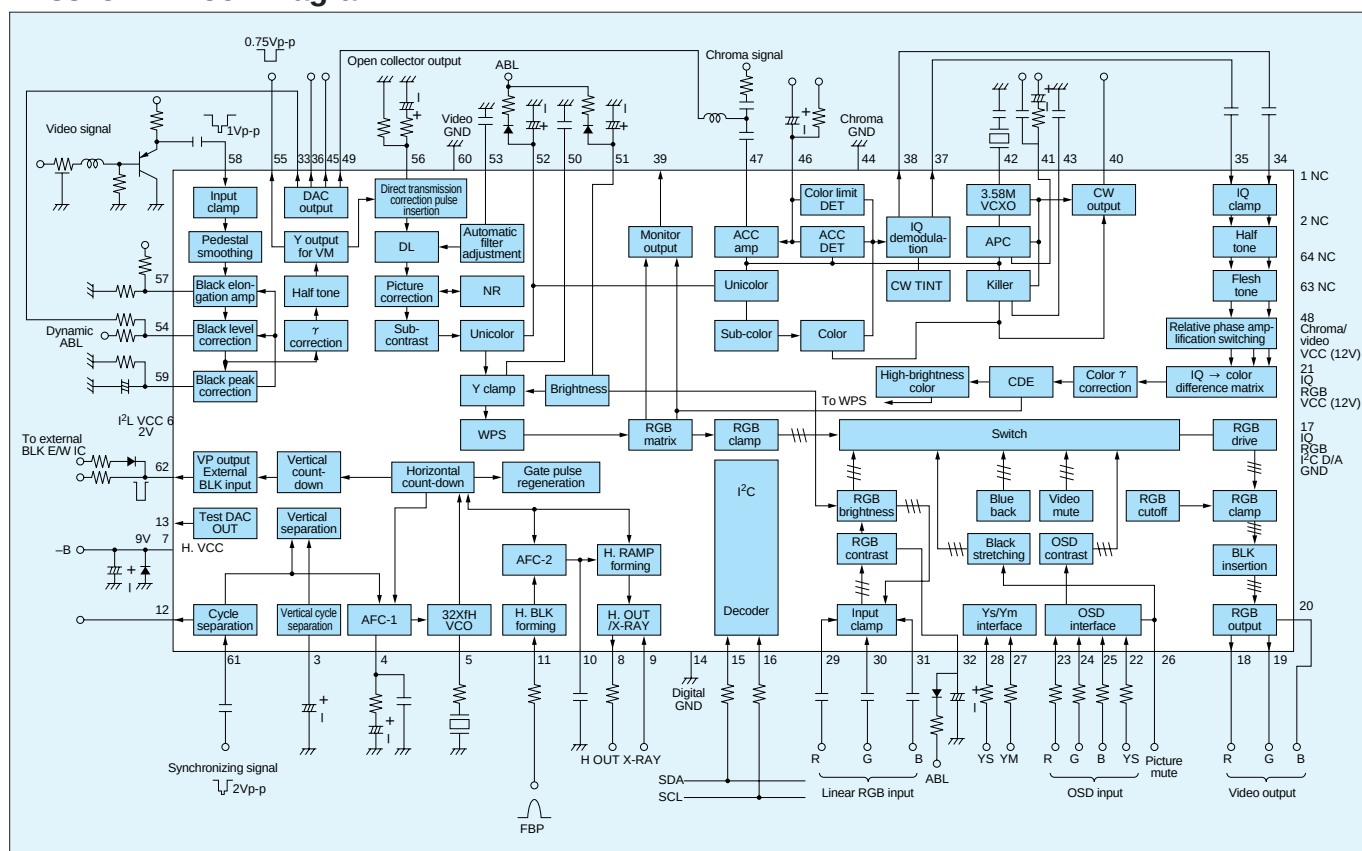
Video and Chroma Processing Systems

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 ² 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

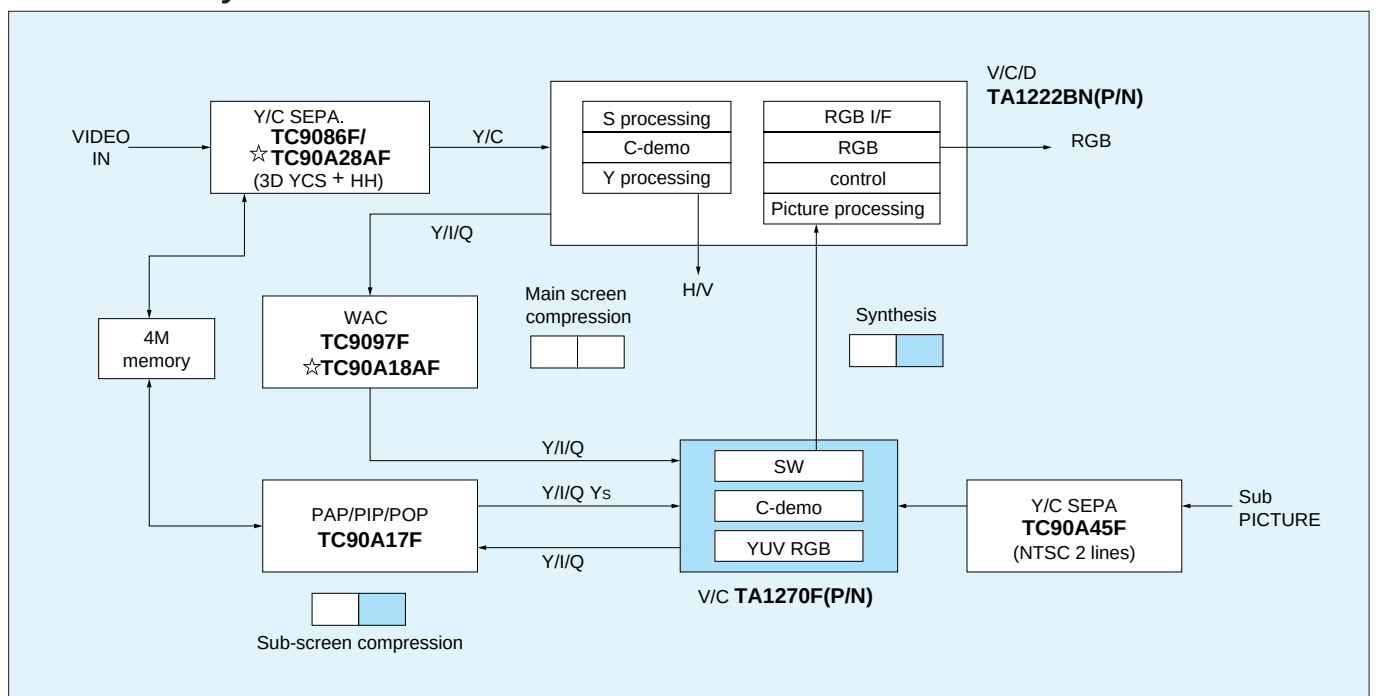
The televisions of today are featuring wider screens and higher levels of picture quality more than ever before. Toshiba offers a wide lineup of products to accommodate a diverse range of needs, including analog V/C/D systems, digital V/C/D systems, double window system, digital 3-line Y/C separation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

ICs for Wide-screen TVs

Device	Functions	Features	Package
TA1222BN	PAL/NTSC V/C/D	For WAC, PAL/NTSC video, chroma and synchronizing processing	SDIP56
TA1227AP	EDTV2 discrimination	Detects 22,285 lines of EDTV2 discrimination signals (B1-B27)	DIP16
TC90A13F/N	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 SOP28
TC9090AF/AN	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 SOP28
TC9086F	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
TC9097F	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
☆ TC90A18AF	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
TA1270AF	PAL/NTSC V/C	PAL/NTSC video chroma processing for sub-screen	QFP48
TC90A17F	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

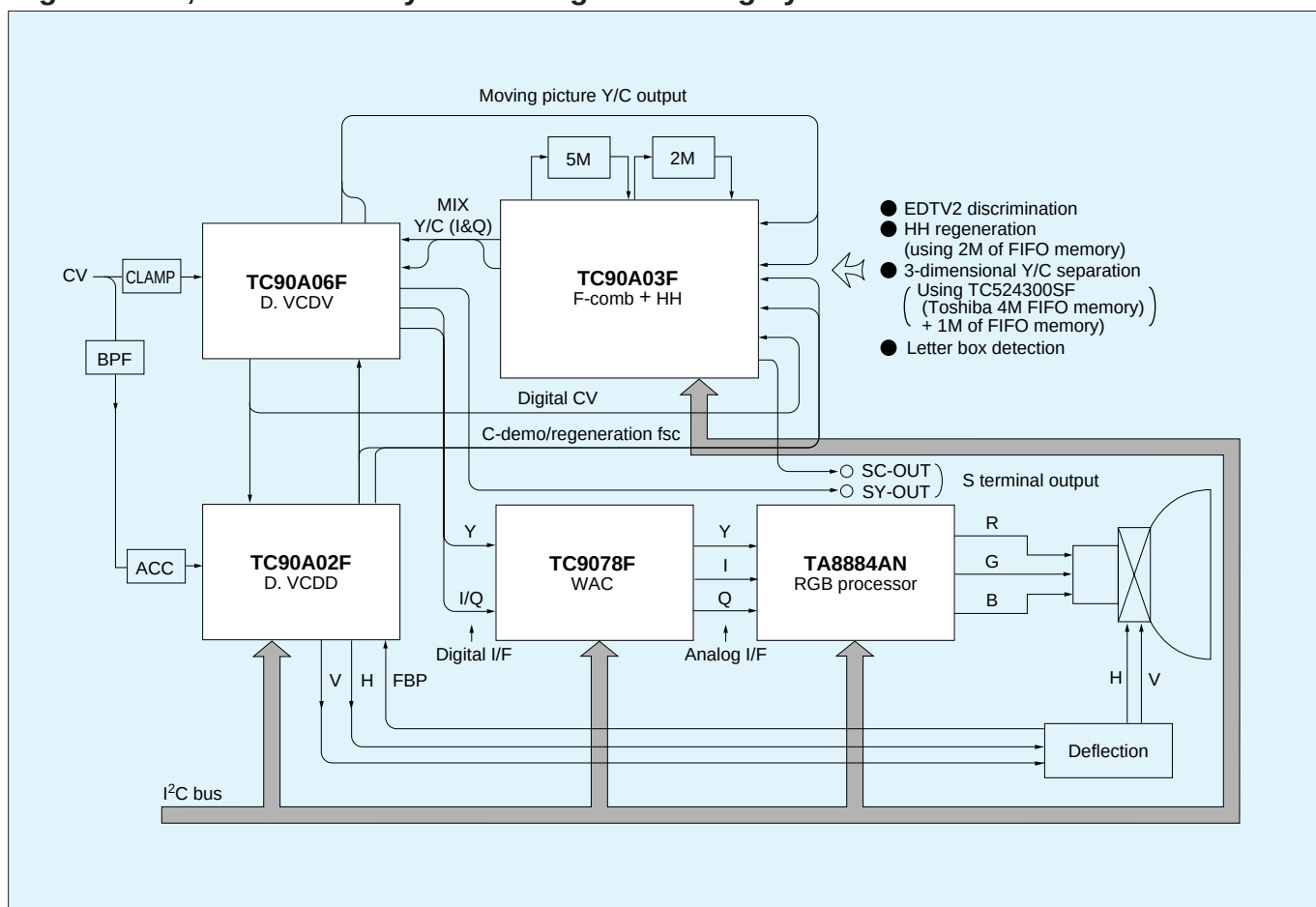
EDTV2-compatible Digital TV Systems

- 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
TC90A02F	Horizontal/vertical synchronizing processing, color processing	● Horizontal synchronizing processing: fh synchronous clock generation, clamp control, horizontal synchronous separation, horizontal synchronous regeneration, horizontal deflection timing control ● Vertical synchronizing processing: Vertical synchronous separation, vertical synchronous regeneration ● Color processing: ACC control, color demodulation, format discrimination, color killer ● C input ADC, synchronizing value, A/D and D/A converters for deflection	QFP100
TC90A06F	Video processing	● Y/C separation by 3-line digital comb filter ● Y/C independent processing ● Y contrast improvement ● CTI ● Video input A/D converter, D/A converters for SVHS output and I/Q output	QFP100
TC90A03F	Y/C separation, EDTV2 HH regeneration	● EDTV2 discrimination, movement-adaptive 3-dimensional Y/C separation, HH regeneration, letter box detection, caption detection	QFP144
TC9078F	Wide aspect conversion	● NTSC/PAL-compatible wide aspect conversion ● Zoom mode possible by combining with deflection distortion correction IC (TA8859CP)	QFP100
TA8884AN	RGB processor	● Black stretching, DC correction factor correction, ABL, ACL, cutoff, drive adjustment ● Analog RGB input, OSD interface	SDIP54

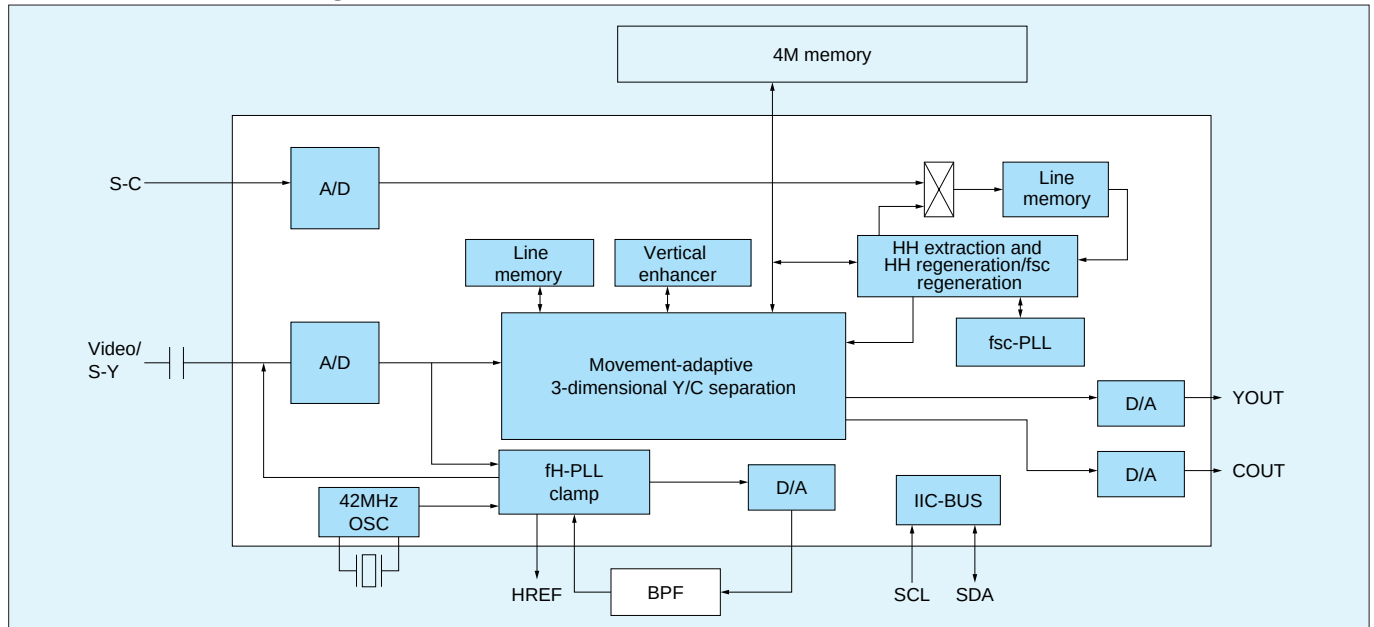
Digital Video, Chroma and Synchronizing Processing System



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
TC9086F	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
☆ TC90A28AF	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 HP LL, using 4M bits of FIFO memory	3.3	QFP100
☆ TC90A30F	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
TA8667P/F	Horizontal AFC	Horizontal and vertical synchronous separation, high-frequency clock generation synchronized with horizontal synchronizing signal	9	DIP18 SSOP24

☆ : Under development

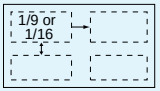
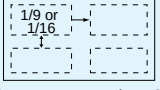
ICs for 2-line and 3-line Y/C Separation

Device	Functions	Features	Power supply (V)	Package
TC90A44F/P TC90A45F/P	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 SOP16
TC90A13F/N	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 SOP28
TC9090AF/AN	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 ² C bus compatibility, built-in 2-ch 8-bit D/A converter, PAL/NTSC multi-color format compatibility	5	SDIP28 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.

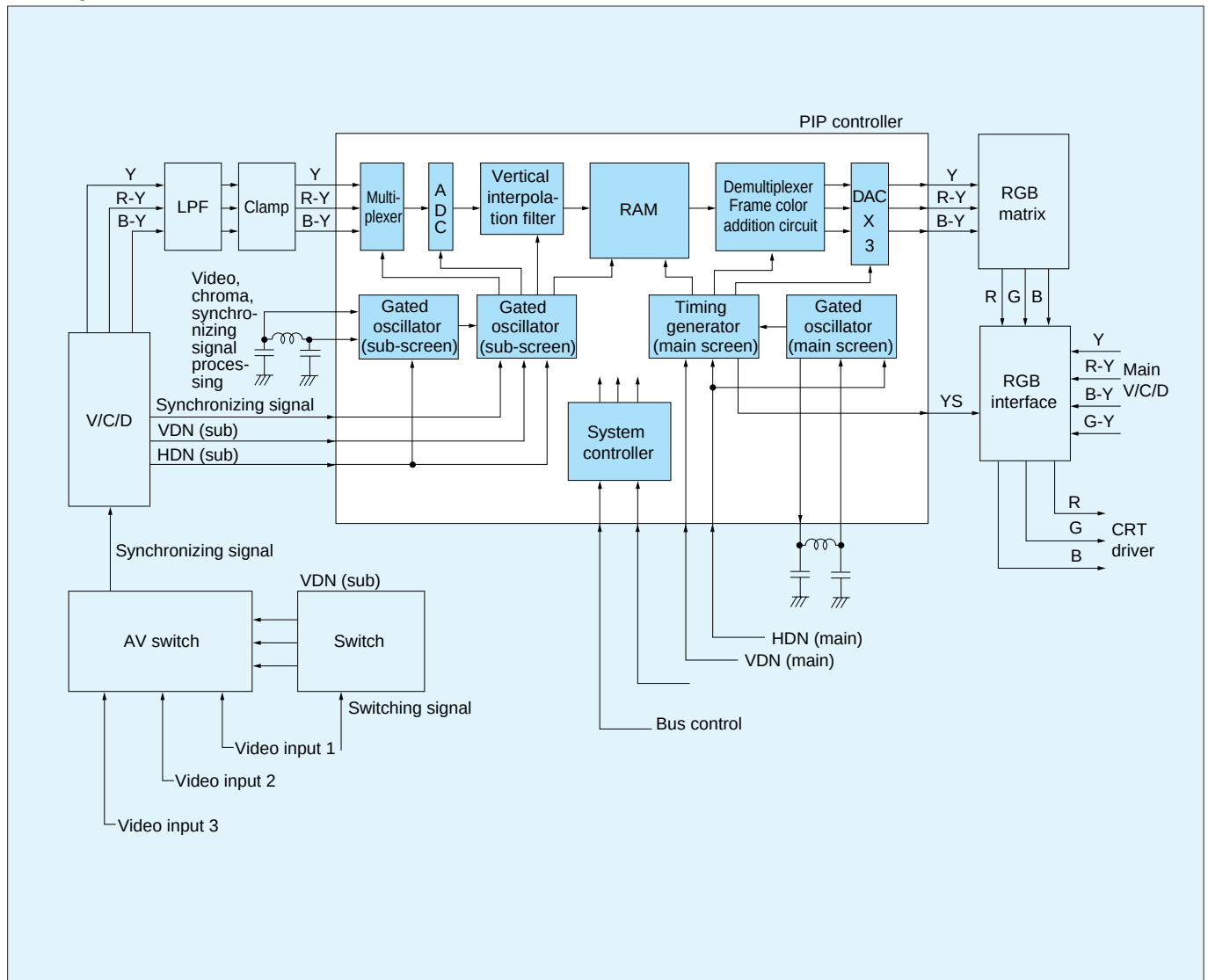
PIP Controller Systems

Device	Functions	Display function	Package
TC9083F/N	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	 Screen aspect ratio: 4:3	DIP42 QFP80
TC90A27F	Single-chip PIP with built-in video decoder	 Screen aspect ratio: 4:3	QFP80

Video, Chroma and Synchronizing Signal Processing

Device	Functions	Package
TA8779F	NTSC format, video, chroma and synchronizing regeneration	SSOP30
TA8795BF	PAL/NTSC/SECAM formats, video, chroma and synchronizing regeneration	QFP60

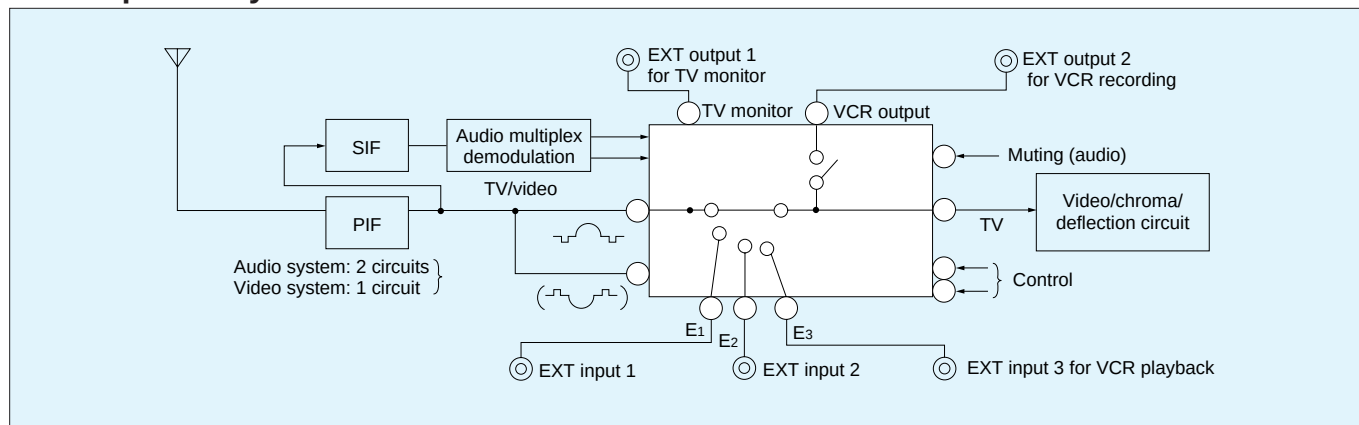
PIP System



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

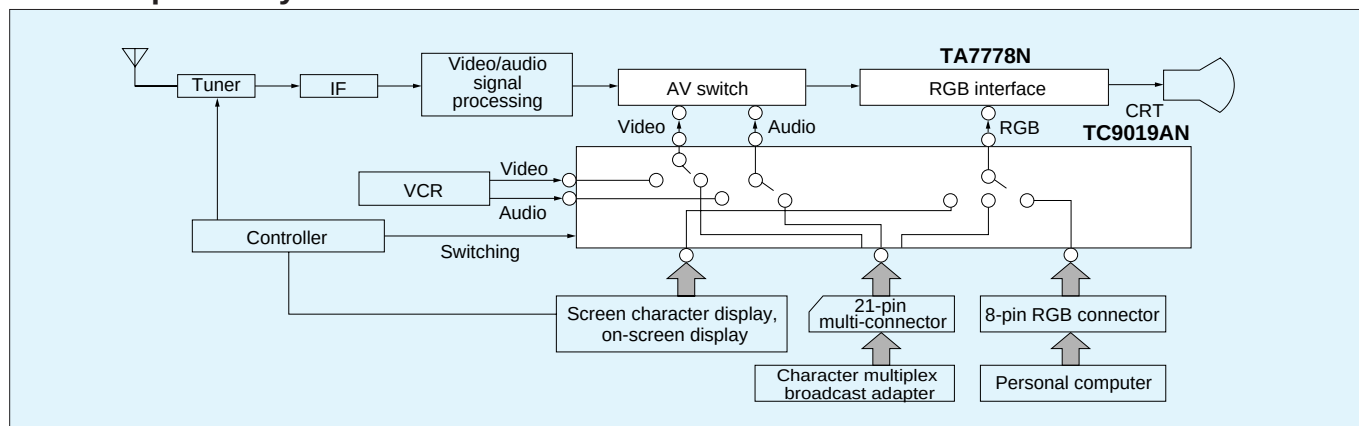
Device	Video system	Audio system	Functions	Package
TA8628N	2-input, 1-output	2-input, 1-output	Audio/video muting, audio volume	SDIP24
TA8720AN	4-input, 1-output	4-input, 1-output	S terminal compatibility (1 channel)	SDIP30
TA8742N	2-input, 1-output	2-input, 1-output	Audio/video muting, audio volume	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 ² 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 ² C bus compatibility, S terminal compatibility (3 channels)	SDIP54
TA1218AN	5-input, 2-output	5-input, 3-output	I ² C bus compatibility, S terminal compatibility (3 channels)	SDIP42
TA1219AN	5-input, 1-output	5-input, 2-output	I ² 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 ² C bus compatibility	SDIP30

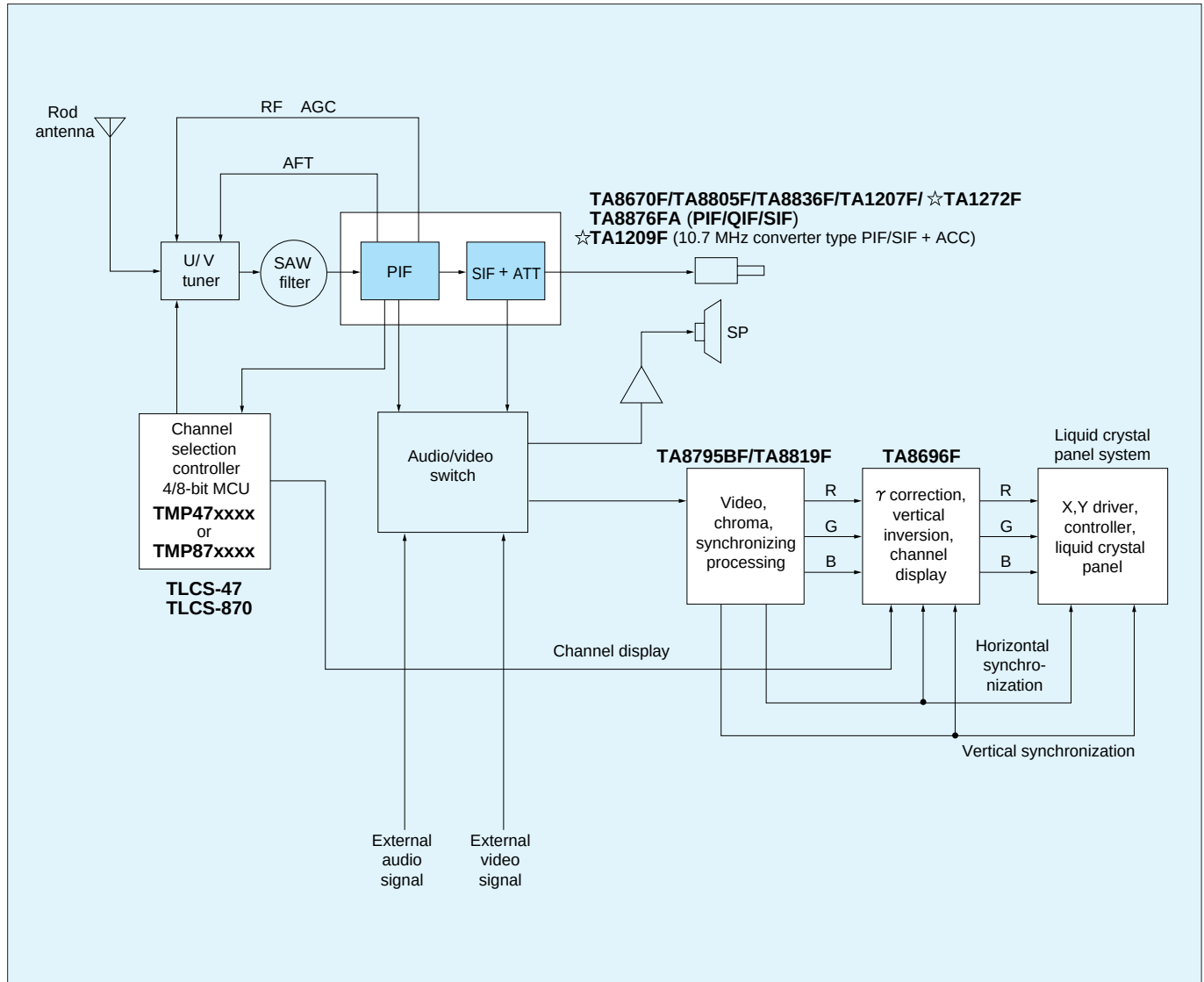
* In cases when a potential is applied to the ground (GND) terminal of the television set when using ICs such as AV switches and RGB interfaces (as in the case of a hot chassis), it is necessary to insulate the devices with a photocoupler or input transformer.

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
TA8670F/TA8805F/TA8836F/TA1207F	Low voltage, PIF, SIF, ATT (TA8836F/TA1207F: without noise inverter)	3.5 to 7.5 V	SSOP24
☆ TA1272F	Low voltage, PIF, SIF (for diversity)	3.5 to 5.5 V	SSOP24
TA8876FA	Low voltage, PIF, QIF, SIF (high sound quality, for diversity)	3.5 to 7.5 V	SSOP30
☆ TA1209F	Low voltage, 10.7 MHz converter type PIF, SIF, audio accessories (high sound quality, for diversity)	4.5 to 5.5 V 8.0 to 9.0 V	QFP48
TA8819F	Low voltage, NTSC format, video, chroma, synchronization	3.5 to 7.5 V	SSOP30
TA8795BF	Low voltage, NTSC/PAL/SECAM formats, video, chroma, synchronization	4.5 to 5.5 V	QFP60
TA8696F	γ 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 _{CEO} = 150 V I _C = 50 mA f _r = 120 to 200M Hz	NPN		—	2SC2229 2SC2705	—	—	2SC3423	—	—	
	PNP		—	2SA949 2SA1145	—	—	2SA1360	—	—	
V _{CEO} = 250 V I _C = 50 mA f _r = 120M Hz	NPN		2SC3333	2SC3334	—	—	—	—	—	
	PNP		2SA1320	2SA1321	—	—	—	—	—	
V _{CEO} = 250 to 300 V I _C = 100 to 150 mA f _r = 240M Hz	NPN		—	—	—	—	2SC4679	—	2SC4448 2SC4678	For HDTV
V _{CEO} = 300 V I _C = 50 to 100 mA f _r = 80 to 120M Hz	NPN		2SC2551	2SC2482	2SC3805 (LB)	2SC5027	2SC3619 2SC3620	2SC5173	2SC4544	
	PNP		2SA1091	—	—	—	—	—	—	

Video Output Transistors

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

☆: Under development

Speed Modulation Transistors

I _C (A)	Polarity	V _{CEO}	230V	Package
1.0 A	NPN		2SC4793	TO-220N IS
	PNP		2SA1837	

Dynamic Focus Transistors

I _C (mA)	V _{CEO} (V)	800	1000	1200	Package
50		—	2SC4686	2SC4686A	TO-220N IS
		2SC5460	—	—	TO-126 IS

MOSFETs for Resonance Frequency Switching (N-ch)

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

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

* : Tc = 25°C

VCBO = 1700 V Series

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

Damper Diodes

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

ICs for Vertical Output

Device	Functions	Operating power supply (V) range	Package
TA8403K/8427K	CTV vertical output, output current: 1.8 Ap-p./2.2 Ap-p (max.)	21 to 27 V	HSIP7
TA8432K/8445K	CTV vertical output, with ramp circuit, input trigger polarity: positive/negative	21 to 29 V	HSIP12
TA8638N	Synchronizing/deflection circuit	21 to 29 V	SDIP24
TA8859CP	Deflection distortion correction, I ² 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 Characteristics	TO-92 MOD.	TO-126 IS	TO-220AB	TO-220 IS
V _{CEO} = 160 V I _C = 1 A	2SC2383 2SA1013	—	—	—
V _{CE} = 150 V I _C = 1.5 V	—	2SC3621 2SA1408	2SC2073 2SA940	2SC3296 2SA1304

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

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 π -MOS series.

V_{DS} (V) Id (A)	250 *300	400	500 *600	*700 800	900
2	◆ 2SK2146 (2.0) ☆ 2SK2230 (2.0)		☆ 2SK2599 (3.0) *☆ 2SK2846 (5.0)		
2.5					◆ 2SK2718 (6.4)
3				■ 2SK2603 (3.6) ○ 2SK2883 (3.6)	■ 2SK2608 (4.3) ◆ 2SK2700 (4.3)
3.5			*◆ 2SK2750 (2.2)		
5	◆ 2SK2840 (1.0) [◆ 2SJ512 (1.25)]		◆ 2SK2662 (1.5) *◆ 2SK2661 (1.5) ○ 2SK2991 (1.5)	□ 2SK2604 (2.2) ◆ 2SK2605 (2.2) ○ 2SK2884 (2.2)	□ 2SK2610 (2.5) ◆ 2SK2717 (2.5)
5.5		◆ 2SK2679 (1.2)			
6			*■ 2SK2544 (1.25) *◆ 2SK2545 (1.25) *□ 2SK2602 (1.25)		
6.5	[◆ 2SJ516 (0.8)]				
7.5	◆ 2SK2417 (0.5) [◆ 2SJ514 (0.625)]			□ 2SK2746 (1.7)	
8			■ 2SK2542 (0.85) ◆ 2SK2543 (0.85) □ 2SK2600 (0.85)		◎ 2SK2847 (1.4)
8.5	◆ 2SK2914 (0.5)	◆ 2SK2952 (0.55)			
9				□ 2SK2607 (1.2)	□ 2SK2611 (1.4)
10	◆ 2SK2966 (0.32)	■ 2SK2841 (0.55)	□ 2SK2601 (1.0) *◆ 2SK2843 (0.75)		□ 2SK2968 (1.25)
12			◆ 2SK2842 (0.55) *□ 2SK2699 (0.65)		
13	◆ 2SK2508 (0.25)		◎ 2SK2916 (0.4)		
15			□ 2SK2698 (0.4) *◎ 2SK2953 (0.4)		
16			*□ 2SK2915 (0.4)		
18			◎ 2SK2917 (0.27)		
20			□ 2SK2837 (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 _{RRM} (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 _{RRM} (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 _{RRM} (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 _{RRM} (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 _{RRM} (V)	30	—	U1FWJ44N	1FWJ43N	—	U2FWJ44N	2FWJ42N	U3FWJ44N	3FWJ42N	—
	40	U1GWJ49	U1GWJ44	1GWJ43	1GWJ42	—	2GWJ42/2GWJ42C	—	3GWJ42/3GWJ42C	5GWJZ47

For AC Rectification

	V _{RRM} (V) I _T (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 _{RRM} (V) I _T (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 _{RRM} (V) I _T (AV) (A)	400	Package	Remarks
3.0	S6785G	TO-220NIS	t _q = 3.5 μs

Transistor Arrays

		I _O (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 TD62084AP/F/AF/CP
		700 to 1500	TD62308AP/BP-1/AF/AF/BF	—	—	TD62074P/AF/F/AF to TD62107P/BP/F	—	—
		—	—	—	—	—	—	—
Output (source)	Single	up to 200	—	TD62703P/F	—	—	TD62505P/F to TD62506P/F	—
		up to 500	—	—	TD62785P/F	—	—	—
	Darlington	up to 200	—	—	—	—	TD62705P/F to TD62771AP	TD62781AP/F/AF to TD62782AP/F/AF
		up to 500	—	—	TD62786AP/F/AF/AFN	—	—	TD62783AP/F/AF/AFN to TD62784AP/F/AF/AFN
		700 and over	—	—	—	TD62707AP	—	TD62708N
	Channel	—	2 to 4	5 to 7	8	2 to 4	5 to 7	8

Output withstand voltage (V_{CE(SUS)}) P: 35 V AP: 50 V BP/BP-1: 80 V CP: 100 V F: 35 V AF: 50 V BF: 80 V

C²MOS Logic ICs

Toshiba's C²MOS 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 C²MOS Logic ICs

Item	Symbol	3.3 V system logic			5 V system logic			Units	Conditions
		TC74VCX	TC74LCX	TC74LVX	74AC (ACT)	74VHC (VHCT)	74HC (HCT)	4xxxB	
Propagation delay time ("240 type")*1	tpLH tpLH	2.5	6.5	11	8	8.5	23	200	V _{CC} =4.5 V T _a =85°C*2 C=50pF 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 _{CC} =5 V*3 Worst values for entire temperature range
	VIL	0.8	0.8	0.8	1.5 (0.8)	1.5 (0.8)	1.5 (0.8)	1.5	
Output current	IOH	-24	-24	-4	-24	-8	-4/-6	-0.42	mA
	IOL	24	24	4	24	8	4/6	0.42	
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 _{CC}	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 _D	0.01 μ							W
Operating temperature	T _{OPR}	-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_{CC} = 3 V for members of the 74VCX/LCX/LVX series, V_{CC} = 5 V, T_a = 25°C for members of the 4xxxB series,

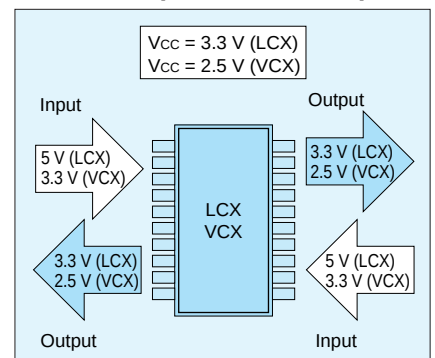
C = 30 pF for members of the VCX series

*3: V_{CC} = 3 V for members of the 74VCX/LCX/LVX series

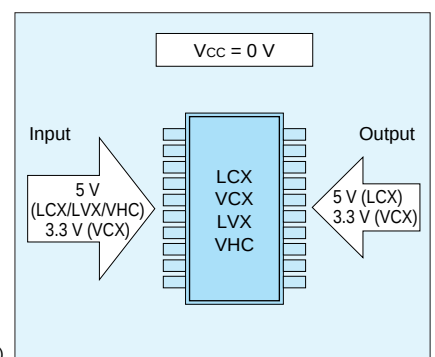
*4: Voltage of up to 5.5 V can be applied to either input or output regardless of power supply voltage (up to 3.6 V for the TC74VCX)

*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 _{CC} /V _{CE0} (V)	Bandwidth (Hz)	Voltage gain
TLP551 (VIDEO)		2500	(V _{CC}) <15	>4.5M	0.5 to 2.0
TLP651 (VIDEO)		5000			
TLP751 (VIDEO)		5000 (complies with IEC65)			0.4 to 1.8
TLP531 (VIDEO)		2500	(V _{CE0}) <55	<100k	0.7 to 2.0
TLP631 (VIDEO)		5000			
TLP731 (VIDEO)		4000 (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 _F (mA)	V _{CEO} (V)	I _C (mA)		UL	TUV	VDE (*1)	BSI	SEMKO
TLP181		—	50	600	5	55	50	AC3750	○ 1577				
		GB	100	600									
		GB	100	300									
TLP521		—	50	600	5	55	50	AC2500	○ 1577				
		GB	100	600									
Y		50	150	5	55	50	AC2500	○ 1577	△ 0884	○ 0884	○ 415		
GR		100	300										
BL		200	600										
GRL		100	200										
GRH		150	300										
TLP621		—	50	600	5	55	50	AC4000	○ 1577	△ 0884	○ 0884	○ 415	○
		GB	100	600									
		GR	100	300									
[TLP732 (*1)]		—	50	600	5	55	50	AC4000	○ 1577	△ 0884	○ 0884	○ 415	
		GB	100	600									
		GR	100	300									
TLP734/F		—	50	600	5	55	50	AC4000	○ 1577	△ 0884	○ 0884	○ 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)
TLPGU1002	Pure green	6		TLGD262	Green	50	
TLGU1002	Green	27		TLOU262	Orange	120	
TLOU1002	Orange	40		TLSU262	Red	100	
TLSU1002	Red	30					

Dual-Color LED Lamps

Device	Emitted color	Light emitting surface size (mm)	External dimensions (Unit: mm)
TLSG205	Red/green	1 X 5	
TLSG208	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) USA (NTSC) Brazil (PAL)	Argentina (PAL)	Germany VHF (PAL)	Germany UHF (PAL)	Belgium (PAL)	U.K. (PAL)	China (PAL) 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

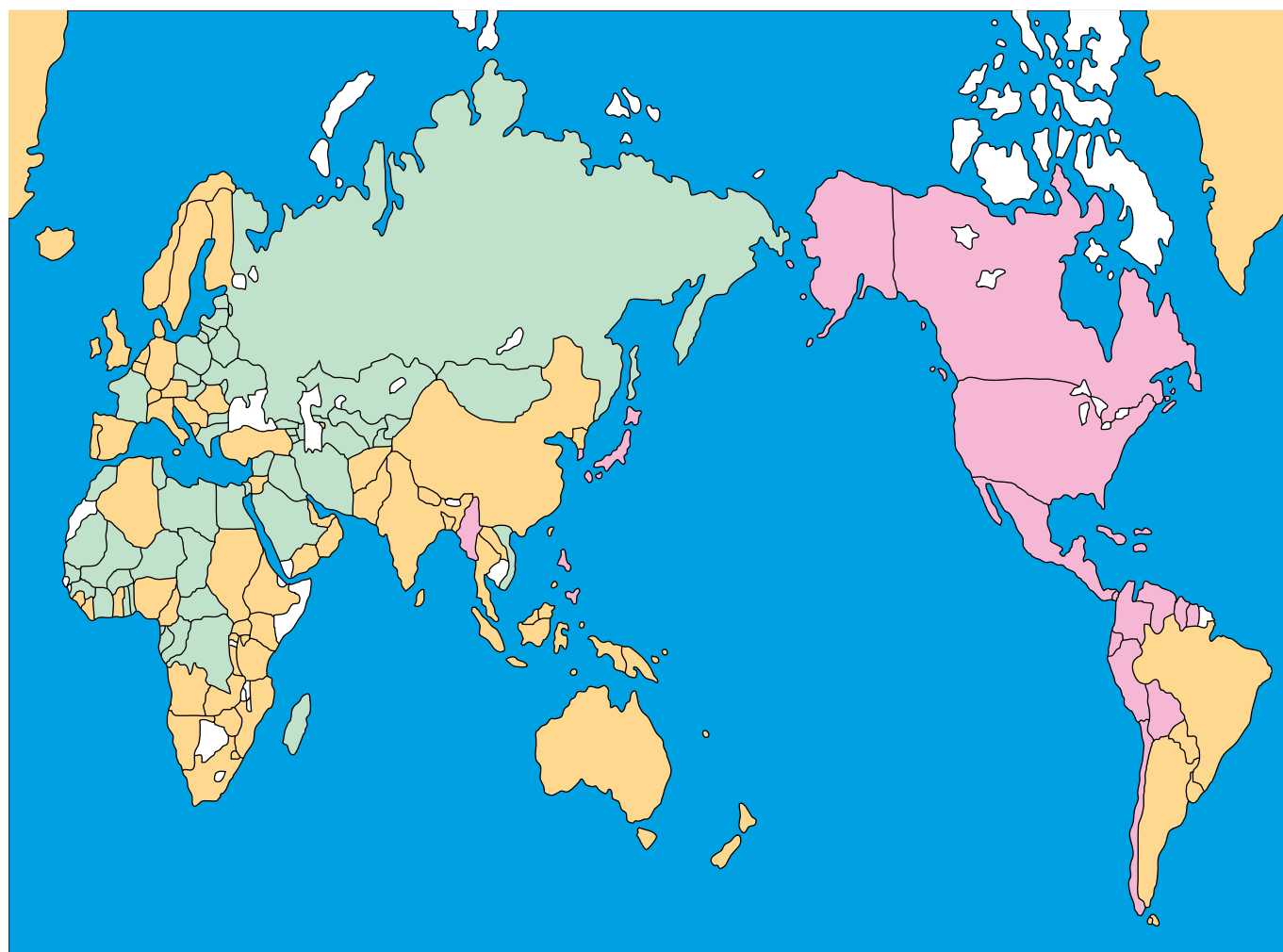
Difference between audio frequency and video frequency: 5.5 MHz

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.



**Toshiba America
Electronic Components, Inc.**

Headquarters-Irvine, CA
9775 Toledo Way, Irvine,
CA 92718, U.S.A.
Tel: (714)455-2000 Fax: (714)859-3963

Altamonte Springs, FL(Orland)
600 S, North Lake Blvd., Suite 250,
Altamonte Springs, FL 32701, U.S.A.
Tel: (407)332-0966 Fax: (407)339-3777

Deerfield, IL(Chicago)
One Pkwy., North, Suite 500, Deerfield,
IL 60015-2547, U.S.A.
Tel: (847)945-1500 Fax: (847)945-1044

Denver, CO
8400 E, Prentice Englewood, CO 80111, U.S.A.
Tel: (303)220-9848 Fax: (303)220-9856

Edison, NJ
2035 Lincoln Hwy. Ste. #3000, Edison
NJ 08817, U.S.A.
Tel: (908)248-8070 Fax: (908)248-8030

Irvine, CA
2 Venture Plaza, Suite 500, Irvine,
CA 92718, U.S.A.
Tel: (714)453-0224 Fax: (714)453-0125

Microelectronics Center-Sunnyvale, CA
1220 Midas Way, Sunnyvale,
CA 94088-3509, U.S.A.
Tel: (408)739-0560 Fax: (408)746-0577

Norcross, GA(Atlanta)
655 Engineering Dr. #160, Norcross,
GA 30092, U.S.A.
Tel: (404)368-0203 Fax: (404)368-0075

Richardson, TX(Dallas)
777 East Campbell Rd., Suite 650, Richardson,
TX 75081, U.S.A.
Tel: (214)480-0470 Fax: (214)235-4114

Wakefield, MA(Boston)
401 Edgewater Place, Suite #360, Wakefield,
Essex, MA 01880-6229, U.S.A.
Tel: (617)224-0074 Fax: (617)224-1095

San Jose Engineering Center, CA
1060 Rincon Circle, San Jose,
CA 95131, U.S.A.
Tel: (408)456-8900 Fax: (408)456-8910

**Toshiba Electronics
Europe GmbH**

Düsseldorf Head Office
Hansaallee 181, D-40549 Düsseldorf
Germany
Tel: (0211)5296-0 Fax: (0211)5296-400

Stuttgart Office
Buro Stuttgart, Eltinger Str.
61, D-71229 Leonberg, Germany
Tel: (07152)6045-0 Fax: (07152)6045-45

München Office
Büro München Hofmannstrasse 52,
D-81378, München, Germany
Tel: (089)748595-0 Fax: (089)748595-42

Berlin Office
Buro Berlin, Alt-Moabit 96B,
D-10559, Berlin, Germany
Tel: (030)-3999000 Fax: (030)-3999017

Toshiba Electronics France SARL
Immeuble Robert Schumann 3 Rue de Rome,
F-93561, Rosny-Sous-Bois, Cedex, France
Tel: (1)48-12-48-12 Fax: (1)48-94-51-15

Toshiba Electronics Italiana S.R.L.
Centro Direzionale Colleoni
Palazzo Perseo Ingr. 2-Piano 6,
Via Paracelso n.12,
1-20041 Agrate Brianza Milan, Italy
Tel: (039)68701 Fax: (039)6870205

Toshiba Electronics España, S.A.
Parque Empresarial San Fernando Edificio Europa,
1ª Planta, ES-28831 Madrid, Spain
Tel: (91)660-6700 Fax: (91)660-6799

Toshiba Electronics(UK) Limited
Riverside Way, Camberley Surrey,
GU15 3YA, U.K.
Tel: (01276)69-4600 Fax: (01276)69-4800

Toshiba Electronics Scandinavia AB
Gustavslundsvägen 12, 2nd Floor
S-161 15 Bromma, Sweden
Tel: (08)704-0900 Fax: (08)80-8459

**Toshiba Electronics Asia
(Singapore) Pte. Ltd.**

Singapore Head Office
460 Alexandra Rd., #21-00 PSA Bldg.,
Singapore 0511
Tel: (278)5252 Fax: (271)5155, (270)6056

Bangkok Office
135 Moo 5 Bangkadi Industrial Park, Tivanon Rd.,
Bangkadi Amphur Muang Pathumthani 12000,
Thailand
Tel: (2)501-1635 Fax: (2)501-1638

**Toshiba Electronics Trading
(Malaysia) Sdn. Bhd.**

Kuala Lumpur Head Office
Suite W1203, Wisma Consplant, No.2,
Jalan SS 16/4, Subang Jaya, 47500 Petaling Jaya,
Selangor Darul Ehsan, Malaysia
Tel: (3)731-6311 Fax: (3)731-6307

Penang Office
Suite 13-1, 13th Floor, Menard Penang Garden,
42-A, Jalan Sultan Ahmad Shah,
100 50 Penang, Malaysia
Tel: 4-226-8523 Fax: 4-226-8515

Toshiba Electronics Asia, Ltd.

Hong Kong Head Office
Level 11, Top Glory Insurance Building,
Grand Century Place,
No.193, Prince Edward Road West,
Mong Kok, Kowloon, Hong Kong
Tel: 2375-6111 Fax: 2375-0969

Seoul Branch
14/F, KEC B/D, 257-7 Yangjae-dong,
Seocho-ku, Seoul, Korea
Tel: (02)589-4334 Fax: (02)589-4302

Seoul Branch, Gumi Office
6/F, Ssangyong Investment Securities B/D,
56 Songjung-Dong, Gumi City
Kyeongbuk, Korea
Tel: (0645)456-7613-6 Fax: (0546)456-7617

Shenzhen Office
Rm 3010-3012, Shun Hing Square,
Di Wang Commercial Centre,
333 Shennan Road East,
Shenzhen, China, 518008
Tel: (0755)246-1582 Fax: (0755)246-1581

Shanghai Office
RM2612 26F, Rui Jin Bldg., 205 Mao Ming
South Rd., Shanghai, China
Tel: (021)64723077 Fax: (021)64727028

Tsurong Xiamen Xiangyu Trading Co., Ltd.
8N, Xiamen Sez Bonded Goods Market Building,
Xiamen, Fujian, China
Tel: (0592)562-3798 Fax: (0592)562-3799

Beijing Office
Rm 714, Beijing Fortune Building,
No.5 Dong San Huan Bei-Lu, Chao Yang District,
Beijing, China, 10004
Tel: (010)6595-8795 Fax: (010)6591-9346

**Toshiba Electronics
Taiwan Corporation**

Taipei Head Office
17F, Union Enterprise Plaza Bldg. 109
Min Sheng East Rd., Section 3, 0446 Taipei,
Taiwan R.O.C.
Tel: (02)514-9988 Fax: (02)514-7892

Kaohsiung Office
16F-A, Chung-Cheng Bldg., Chung-Cheng 3Rd.,
80027, Kaohsiung, Taiwan R.O.C.
Tel: (07)222-0826 Fax: (07)223-0046

**Toshiba Display Devices
(Thailand) Co., Ltd.**
142 Moo 5, Bangkadi Industrial Park,
Tivanon Rd., Pathumthani 12000, Thailand
Tel: (2)501-1200 Fax: (2)501-1209

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In Touch with Tomorrow
TOSHIBA

TOSHIBA CORPORATION
International Operations-Electronic Components
1-1, Shibaura 1-chome, Minato-ku, Tokyo, 105-01, Japan
Tel: (03)3457-3495 Fax: (03)5444-9431