M52775FP

VIF, SIF, VIDEO, CHROMA, DEFLECTION FOR NTSC

DESCRIPTION

The M52775FP is desinged to provide a solution to NTSC color television system. It is an I²C bus controlled NTSC 1 chip. It consists of various processing blocks such as video IF, sound IF, luminance, chrominance, mono-sound, OSD display, interface, H and V deflection. At each block, I²C control is possible and a total of 30 parameters can be controlled by I²C bus.

FEATURES

- AFT coil-less
- FM det coil-less
- Dynamic AGC
- AV switch (TV/EXT video)
- Y/C switch
- Built-in black stretch circuit
- Delay line aperture control
- Luminance peak limiter
- Two window vertical countdown
- Built-in chroma BPF and Trap
- Built-in Y Delay line
- Built-in ACC/Killer filters

APPLICATION

NTSC type color TV, projecter

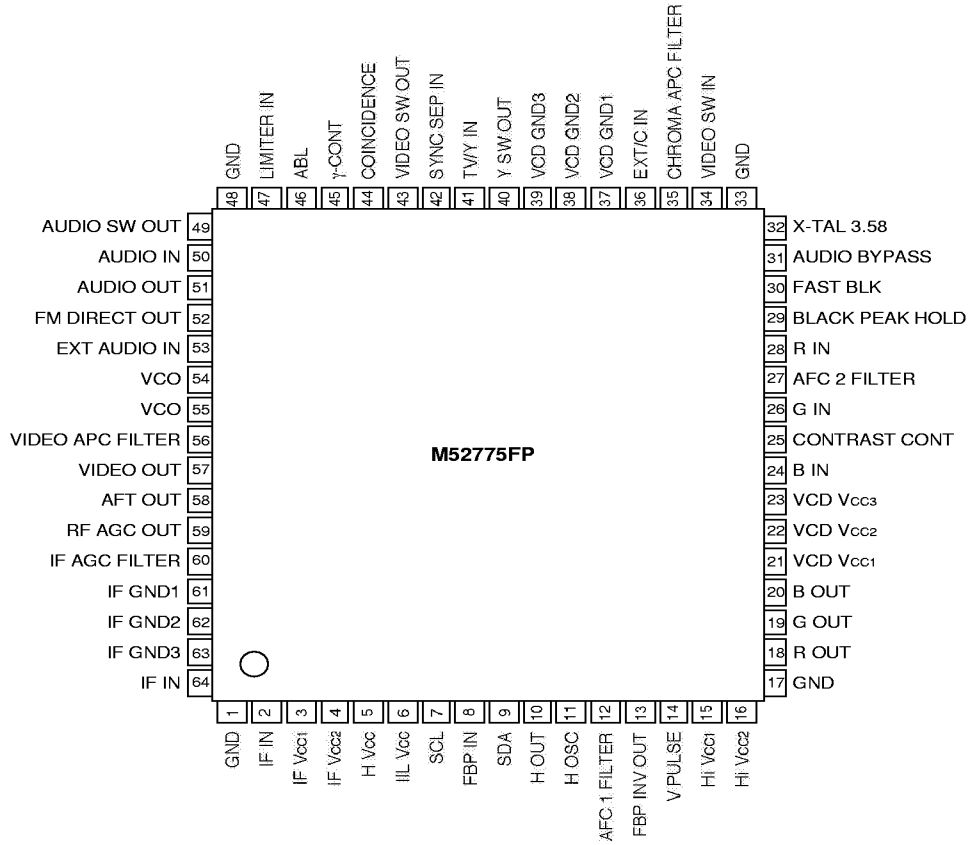
RECOMMENDED OPERATING CONDITION

Recommended supply voltage.....V3, 4, 21, 22, 23=4.75V
V5, 15, 16=8.0V

Supply voltage range.....V3, 4, 21, 22, 23=4.50 to 5.00V
V5, 15, 16 =7.6 to 8.8V

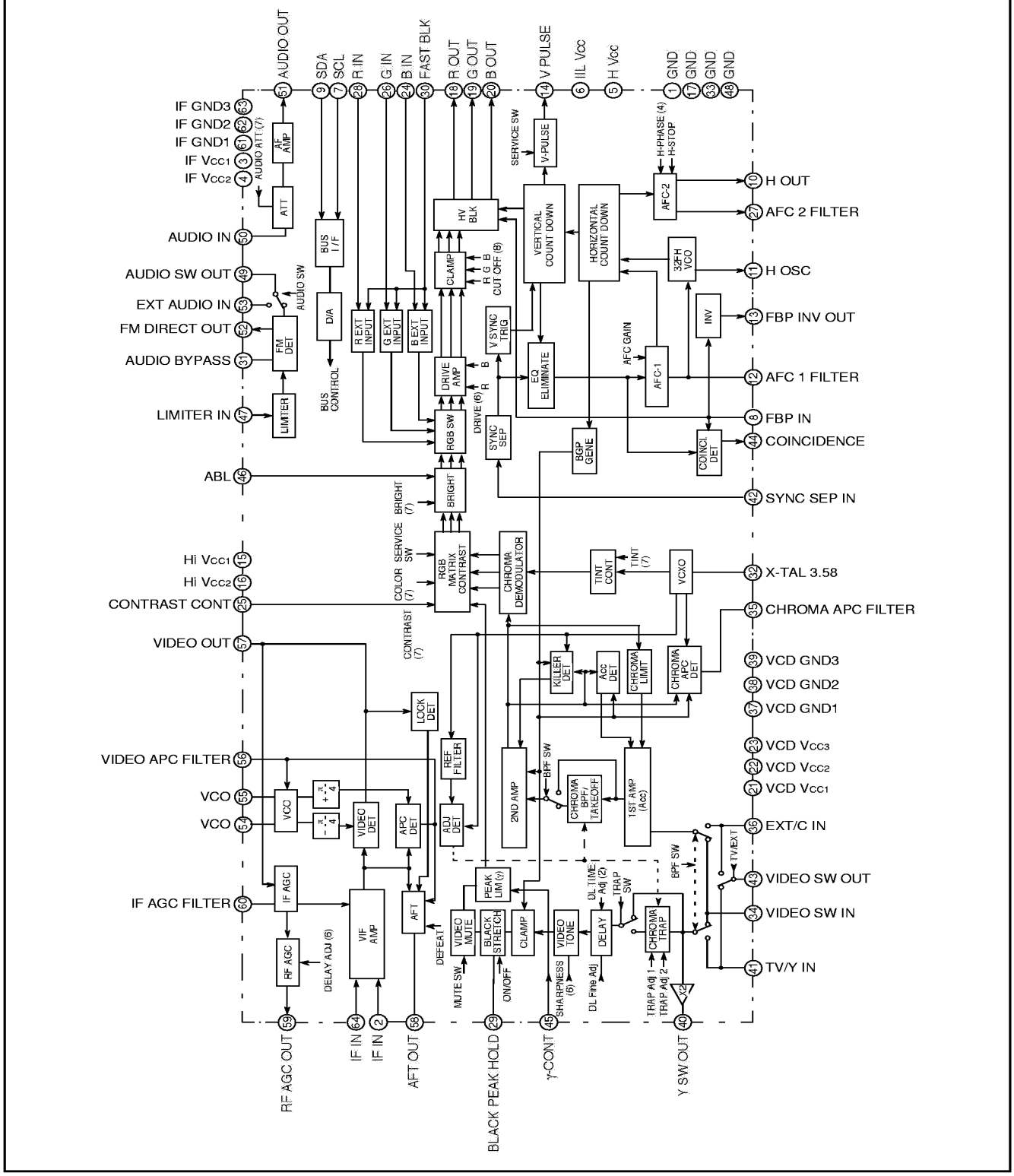
Maximum output current.....3.0mA (pin14)
4.0mA (pin13)
8.0mA (RGB output current)
3.0mA (AUDIO OUT output current)

PIN CONFIGURATION (TOP VIEW)



Outline 64P6N-A

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	6.0, 9.0	V
P_d	Power dissipation	0.85	W
T_{opr}	Operating temperature	-20 to +65	°C
T_{stg}	Storage temperature	-40 to +150	°C
Surge	Electrostatic discharge	±200	V

I²C BUS DEFAULT CONDITION OF ALL BLOCKS IN M52775FP

	sub address	00H		01H		02H					03H	04H		05H	06H					07H
	function	DLA	P/N		AVSW		DFA	TADJ2	TRAP		ATT	SHARP	DEFE	CONT	DLTA	TV/EXT	Y/C	black	HADJ	TINT
All Blocks	DATA	20H		00H		00H					40H	20H		20H	02H					40H
	function	32	0		0		0	0	0	0	64	32	0	32	2	0	0	0	0	64

	sub address	08H	09H		0AH	0BH		0CH	0DH	0EH	0FH	10H			12H	13H			
	function	COLOR		HP	BRI	DR	MUTE	DB	CR	CG	CB		TRF		2WIND		SER	HST	AFCG
All Blocks	DATA	20H	40H		20H	20H		20H	80H	80H	80H	00H			00H	00H			
	function	32	0	8	32	32	0	32	128	128	128	0	0	0	0		0	0	0

* Please refer to the following sub-address data for each parameter you measure.

ELECTRICAL CHARACTERISTICS (Ta=25°C, pin3, 4, 21, 22, 23:4.75V supply/pin5, 15, 16:8V supply unless otherwise noted.)

Symbol	Parameter	Input signal		SW	Test conditions																						Limits			Unit	Note
					S12	S60	S45								Sub address function									Vcc							
															00H		01H		03H	04H										
		Input	SG	PIN	P49	P51	P52	P57	P58	P59	P60				DLA		VCOA	AVSW	ATT	DEF-EAT			P34	P9	P15 16	P21 22 23	Min.	Typ.	Max.		
Supply current																															
–	Default conditions of supply current	–	–	SW											20H		20H		40H								–	–	–	–	
				PIN											32	0	32	0	64				4.75V	8V	8V	4.75V					
I_{CC4} I_{CC75}	Pin3, 4, 21, 22, 23 supply current	–	–	SW																							60	86	112	mA	
				PIN																			M			M					
I_{CC8a}	Pin5 supply current	–	–	SW																							23	33	43	mA	
				PIN																				M							
I_{CC8b}	Pin 15, 16 supply current	–	–	SW																							11	16	21	mA	
				PIN																					M						
VIF block																															
–	Default conditions of IF type	–	–	SW	1	1	1								20H		00H		00H	00H							–	–	–	–	
				PIN											32	0	0	0	0	0			4.75V	8V	8V	4.75V					
Vdc	Video detection output DC voltage	–	–	SW																							3.7	4.2	5.1	V	
				PIN				M																							
Vo	Video detection output	64 2	SG1	SW		0																					1.9	2.2	2.5	V	
				PIN				M																							
P/N	Video S/N	64 2	SG3	SW		0																					43	53	–	dB	
				PIN				M																							
V_f	Video frequency characteristics	64 2	SG4	SW		0																					4.5	5.5	–	MHz	
				PIN				M																							
Vin min	Input sensitivity	64 2	SG5	SW		0																					–	43	50	dBμ	
				PIN				M																							
Vin max	Maximum permissible input	64 2	SG6	SW		0																					102	107	–	dB	
				PIN				M																							

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																								Limits			Unit	Note
					S12	S60	S45								Sub address function										Vcc								
															00H		01H		03H	04H													
		Input	SG	PIN	P49	P51	P52	P57	P58	P59	P60				DLA		VCOA	AVSW	ATT	DEF-EAT				P34	P9	P15 16	P21 22 23						
GR	AGC control range	–	–	SW																									50	64	–	dBμ	calcu-late
				PIN																													
VIH	IF AGC maximum voltage	–	–	SW		0																							3.8	4.2	4.6	V	
				PIN							M																						
VIT	IF AGC voltage (80 dBu)	64 2	SG7	SW		0																							2.4	2.8	3.2	V	
				PIN							M																						
VIL	IF AGC minimum voltage	64 2	SG8	SW		0																							1.6	2.0	2.4	V	
				PIN							M																						
V58	AFT DEFEAT voltage	–	–	SW		0																							3.7	4.0	4.3	V	
				PIN					M																								
uAFTN	AFT detection sensitivity	64 2	SG9	SW																									52	74	96	mV/ kHz	
				PIN					M																								
V58H	AFT maximum voltage	64 2	SG10	SW		0																			4.75 V	8V	8V	4.75 V	6.5	7.0	–	V	
				PIN					M																								
V58L	AFT minimum voltage	64 2	SG11	SW		0																							–	0.8	1.3	V	
				PIN					M																								
V59H	RF AGC maximum voltage	64 2	SG3	SW		0									00H														7.2	7.8	–	V	
				PIN						M					0																		
V59L	RF AGC minimum voltage	64 2	SG3	SW		0									3FH														–	0.2	0.8	V	
				PIN						M					63																		
CRU	Capture range (upper)	64 2	SG9	SW		0																							0.7	1.0	–	MHz	
				PIN				M																									
CRL	Capture range (lower)	64 2	SG9	SW		0																							0.7	1.0	–	MHz	
				PIN				M																									
CRT	Capture range (total)	–	–	SW																									1.4	2.0	–	MHz	calcu-late
				PIN																													
IM	Inter modulation	64 2	SG12	SW		0																							30	35	–	dB	
				PIN				M																									
DG	DG	64 2	SG13	SW		0																							–	2	7	%	
				PIN				M																									
DP	DP	64 2	SG13	SW		0																							–	2	7	deg	
				PIN				M																									
SPN	Sync ratio	64 2	SG13	SW		0																							25.0	27.5	32.0	%	
				PIN				M																									
DLPH	Maximum delay point	64 2	SG14	SW		0									00H														95	105	–	dBμ	
				PIN						M					00																		
DLPL	Minimum delay point	64 2	SG15	SW		0									3FH														–	63	73	dBμ	
				PIN						M					63																		
SIF block																																	
–	SIF type standard condition	–	–	SW		0									20H		20H		40H										–	–	–	–	
				PIN											32			0	64					4.75 V	8V	8V	4.75 V					
VAF	AF output DC voltage	47	SG17	SW																									2.0	2.4	2.8	V	
				PIN			M																										
VoAF	AF direct output	47	SG16	SW																									240	340	440	mVrms	
				PIN			M																										
VoAF max	AF maximum output	47	SG16	SW															7FH										410	590	770	mVrms	
				PIN		M													127														
ATT	Maximum attenuation	47	SG16	SW															00H										59	68	–	dB	
				PIN		M													0														
THD AF	AF output distortion factor	47	SG16	SW																									–	0.6	3	%	
				PIN			M																										
LIM	Input limiting sensitivity	47	SG16	SW																									–	40	46	dB	
				PIN			M																										

ELECTRICAL CHARACTERISTICS (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																								Limits			Unit	Note
					S12	S60	S45								Sub address function										Vcc								
															00H		01H		03H	04H													
		Input	SG	PIN	P49	P51	P52	P57	P58	P59	P60				DLA		VCOA	AVSW	ATT	DEF-EAT			P34	P9	P15 16	P21 22 23			Min.	Typ.	Max.		
AMR	AMR	47	SG20	SW																									45	50	–	dB	
				PIN			M																										
AFSN	AF S/N	47	SG17	SW																									49	58	–	dB	
				PIN			M																										
GEAu	EXT audio GAIN	53	SG22	SW													40H												-2.0	0.0	2.0	dB	
				PIN	M													1															

ELECTRICAL CHARACTERISTICS

chroma block (∗C0 to C13:input SGS at pin41 IN)

Symbol	Parameter	Input signal		SW	Test conditions																								Limits			Unit	Note
					S12	S60	S45								Sub address function										Vcc								
															06H			07H	09H		05H	08H	0BH										
		Input	SG	PIN	P12	P18	P19	P20							DLTA	TV/EXT	AUTO	TINT		HP	CONT	COL	V mute	P34	P5	P15 16	P21 22 23			Min.	Typ.	Max.		
–	Default conditions of chroma	–	–	SW	1	1	1								02H			40H	40H		40H	40H	64H										
				PIN											2	0	0	64	0	8	64	64	100	4.75V	8V	8V	4.75V			–	–	–	
Cn1	Output signal amplitude 1	36	SS	SW																									2000	2800	3600	mVP-P	
				PIN		M																											
Cn2	Output signal amplitude 2	36	SS	SW																									1900	2700	3500	mVP-P	
				PIN				M																									
Acc1	Acc 1	36	VS	SW																									1	4	6	dB	
		v=+6dB		PIN				M																									
Acc2	Acc 2	36	VS	SW																									-3	0	3	dB	
		v=-20dB		PIN				M																									
OV	Chroma overload	36	VS	SW																									-1	2	5	dB	
		eb=800mV		PIN				M																									
VikP	Threshold color killer on	36	VS	SW																									–	-41	-30	dB	
		v=variable		PIN				M																									
killP	Residual color leakage at killer on	36	VS	SW																									0	40	150	mVP-P	
		v=-45dB		PIN				M																									
APC1	APC Pull-in range 1	36	VS	SW																									+300	+800	–	Hz	f=eb =ec
		f=variable		PIN				M																					-300	-1100	–		
R/BP	Ratio of (R-Y/B-Y)	36	VS	SW																									0.60	0.81	1.00	–	ec= eb+ 100kHz
		eb=monochroma		PIN		M		M																									
θR-Y P	Demoduration phase θR-Y	36	VS	SW																									80	95	110	deg	ec= eb+ 100kHz
		eb=monochroma		PIN		M		M																									
CC	Residual carrier leakage	36	SS	SW																									0	60	120	mVP-P	
				PIN				M																									
TC1	Tint control 1	36	VS	SW														7FH											30	44	60	deg	
		eb=monochroma		PIN				M										127															
TC2	Tint control 2	36	VS	SW														00H											30	46	60	deg	
		eb=monochroma		PIN				M										0															

No.	Sub address	08H	0BH		13H				
	function	COLOR	DR	MUTE		SER	HST	AFCG	
Y 0	DATA	00H	20H			00H			
	function	0	32	0		0	0	0	

ELECTRICAL CHARACTERISTICS

Video & RGB I/F block (* input SGS at pin42 IN. Vcc:P3, P4, P21, P22, P23=4.75V. P5, P15, P16=8.0V supply)

Symbol	Parameter	Input signal		SW	Test conditions: S12	S60	S45						Sub address function: 02H			04H		05H	06H						0AH	0BH		0CH	10H	Limits			Unit	Note
		Input	SG	PIN	P18	P19	P20	P25	P40	P43	P45	P46	DFA	TRF2	TRAP	SHARP	DEFP	CONT	DLTA	TV/EXT	Y/C	Black	HADJ	BRI	DR	MUTE	DB	TRF	Min.	Typ.	Max.		
–	Default conditions of video & RGB I/F	–	–	SW	1	1	1						00H			20H		40H	02H					40H	20H		20H	60H					
				PIN									0	0	0	32	0	64	2	0	1	0	0	64	32	0	32	96					
Ymax	Maximum video amplitude	34	SGA	SW														7FH														VP-P	
				PIN	M	M	M											127											2.5	3.5	4.5		
GY	Video gain	34	SGA	SW																													
				PIN	M	M	M																						5	8	11	dB	
FBY	Video frequency characteristics	34	SGB	SW																													
				PIN		M																							-1	2	5	dB	
2AGY	Double amplifier standard output	34	SGA	SW																					20H								
				PIN					M																32	0			1.6	2.1	2.6	VP-P	
CTR1	Chroma trap attenuation 1	34	SGF	SW									00/20H												20H								
				PIN	M	M	M								0/1										32	0			–	–	-18	dB	
TRF1	Chroma trap fine adj. attenuation 1	34	SGF	SW									20/30H												20H			00/60H					
				PIN	M	M	M							0/1	1										32	0		0/1					
YSW	Y SW OUT standard output	34	SGB V=0.71 VP-P	SW																									0.51	0.71	0.91	VP-P	
				PIN						M																							
YSmax	Y SW OUT maximum output	34	SGB V= 1.5VP-P	SW																									1.0	1.4	1.8	VP-P	
				PIN						M																							
E→T CT	EXT→TV crosstalk	36	SGB f=5MHz	SW															0EH/0AH										–	-50	-40	dB	
				PIN						M									1/0														
T→E CT	TV→EXT crosstalk	34	SGB f=5MHz	SW															0AH/0EH										–	-45	-35	dB	
				PIN						M									0/1														
YDL1	Y delay time 1	34	SGA	SW															08H										200	280	360	nsec	
				PIN	M	M	M												0														
YDL2	Y delay time 2	34	SGA	SW															09H										150	200	250	nsec	
				PIN	M	M	M												1														
YDL3	Y delay time 3	34	SGA	SW																									210	300	390	nsec	
				PIN	M	M	M																										
GTnor	Video tone 1	34	SGB	SW																									1.5	2.1	2.7	VP-P	
				PIN	M	M	M																										
GTmax	Video tone 2	34	SGB	SW												3FH													-1.3	2.2	5.7	dB	
				PIN	M	M	M									63	0																
GTmin	Video tone 3	34	SGB	SW												00H													-12	-8	-4	dB	
				PIN	M	M	M									0	0																
GT2M	Video tone 4	34	SGB	SW																									-1.8	1.2	4.2	dB	
				PIN	M	M	M																										
GT5M	Video tone 5	34	SGB	SW																									-7	-3.5	0	dB	
				PIN	M	M	M																										

ELECTRICAL CHARACTERISTICS

Video & RGB I/F block (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																												Limits			Unit	Note
					S12	S60	S45							Sub address function																							
		Input	SG	PIN	P18	P19	P20	P25	P40	P43	P45	P46	02H			04H		05H	06H						0AH	0BH		0CH	10H								
													DFA	TRF2	TRAP	SHARP	DEFP	CONT	DLTA	TV/EXT	Y/C	Black	HADJ	BRI	DR	MUTE		DB	TRF								
GYnor	Contrast 1	34 f=100kHz	SGB	SW																													1.1	1.6	2.1	VP-P	
				PIN	M	M	M																															
GYmin	Contrast 2	34 f=100kHz	SGB	SW														00H															–	20	100	mV	
				PIN	M	M	M											0																				
Lumnor	Bright 1	–	–	SW																													2.2	2.6	3.0	V	
				PIN	M	M	M																															
Lummax	Bright 2	–	–	SW																					7FH								0.7	1.0	1.3	V	
				PIN	M	M	M																		127												
Lummin	Bright 3	–	–	SW																					00H								-1.3	-1.0	-0.7	V	
				PIN	M	M	M																		0												
D (R)	Drive R	34	SGA	SW																						00/3FH							3.5	5.5	7.5	dB	
				PIN	M																					0/63											
D (B)	Drive B	34	SGA	SW																								00/3FH					3.5	5.5	7.5	dB	
				PIN			M																					0/63									
EX (R)	EXT (R) I/O	30 28	SGD	SW														7FH							00H								3.5	4.3	5.1	VP-P	
				PIN	M													127							0											
EX (G)	EXT (G) I/O	30 26	SGD	SW														7FH							00H								3.5	4.3	5.1	VP-P	
				PIN		M												127							0											
EX (B)	EXT (B) I/O	30 24	SGD	SW														7FH							00H								3.5	4.3	5.1	VP-P	
				PIN			M											127							0											

Video & RGB I/F block (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																												Limits			Unit	Note
					S12	S60	S45							Sub address function																							
		Input	SG	PIN	P18	P19	P20	P25	P40	P43	P45	P46	02H			05H	06H					08H	0AH	0DH	0EH	0FH											
													DFA	TRF2	TRAP	CONT	DLTA	TV/EXT	Y/C	Black	HADJ	COLOR	BRI	CR	CG	CB											
OFRG	Offset voltage R-G	–	–	SW																													-120	0	120	mV	
				PIN		M																															
OFBG	Offset voltage B-G	–	–	SW																													-120	0	120	mV	
				PIN		M	M																															
C (R)	Cut off R	–	–	SW																				00/FFH									1.2	1.5	1.8	V	
				PIN	M																			0/255												
C (G)	Cut off G	–	–	SW																						00/FFH							1.2	1.5	1.8	V	
				PIN		M																				0/255											
C (B)	Cut off B	–	–	SW																							00/FFH						1.2	1.5	1.8	V	
				PIN			M																				0/255										
DLF	DL fine delay amount	34	SGA	SW									02/00H																				20	45	70	nsec	
				PIN	M	M	M						1/0																									

ELECTRICAL CHARACTERISTICS

Video & RGB I/F block (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																								Limits			Unit	Note
					S12	S60	S45						Sub address function																				
													02H			05H	06H					08H	0AH	0DH	0EH	0FH						
		Input	SG	PIN	P18	P19	P20	P25	P40	P43	P45	P46	DFA	TRF2	TRAP	CONT	DLTA	TV/EXT	Y/C	Black	HADJ	COLOR	BRI	CR	CG	CB	Min.	Typ.	Max.		
Ccon1	Color control 1	36	SGE	SW													02H					7FH	48H							mVP-P	
				PIN	M														0			127	72				1.0	1.6	2.2		
Ccon2	Color control 2	36	SGE	SW													02H					7FH	48H							mVP-P	
				PIN	M														0			127	72				–	30	100		
VMF	Video mute	34	SGB f=3.58M	SW																											0BH 00/40H MUTE :0/1
				PIN	M	M	M																				–	-45	-35	dB	
MTXB	Matrix 1	36 ec=eb+100kHz	VS	SW													02H					40H	64H							VP-P	
				PIN	M														0			64	100				1.8	2.6	3.4		
MTXG	Matrix 2	36 ec=eb+100kHz	VS	SW													02H					40H	64H							VP-P	
				PIN		M													0			64	100				0.7	1.0	1.3		
MTXR	Matrix 3	36 ec=eb+100kHz	VS	SW													02H					40H	64H							VP-P	
				PIN			M												0			64	100				1.4	2.0	2.6		
OSD1	OSD speed 1	24,26 28,30	SGD	SW																											
				PIN	M	M	M																				–	20	100	nsec	
OSD2	OSD speed 2	24,26 28,30	SGD	SW																											
				PIN	M	M	M																				–	50	130	nsec	
GYmax1	Contrast 3	34	SGA	SW												7FH															
				PIN	M	M	M	2.9V								127											2.0	2.8	3.6	VP-P	
GYmin1	Contrast 4	34	SGA	SW												7FH															
				PIN	M	M	M	0V								127											–	20	100	mVP-P	
BLS1	Black expansion characteristics 1	34 V=0.2VP-P	SGC	SW													0AH/1AH														
				PIN		M														0/1							100	250	850	mVP-P	
BLS2	Black expansion characteristics 2	34 V=0.45VP-P	SGC	SW													0AH/1AH														
				PIN		M														0/1							-100	50	200	mVP-P	
BLS3	Black expansion characteristics 3	34 V=0VP-P	SGC	SW													0AH/1AH														
				PIN		M														0/1							-100	0	100	mVP-P	
ABL1	ABL characteristics 1	–	–	SW																											
				PIN		M						4.75V															3.35	3.75	4.15	V	
ABL2	ABL characteristics 2	–	–	SW																											
				PIN		M						0V															1.05	1.55	2.05	V	
γ1	Gamma characteristics 1	34	SGA	SW												7FH															
				PIN		M					4.75V					127											2.6	3.5	4.4	VP-P	
γ2	Gamma characteristics 2	34	SGA	SW												7FH															
				PIN		M					1V					127											2.0	2.7	3.4	VP-P	

No.	Sub address	06H			08H
	function	DLTA	TV/EXT	AUTO	COLOR
D0	DATA	20H			00H
	function	0	0	1	0

ELECTRICAL CHARACTERISTICS

Synchronization/Deflection Block

Symbol	Parameter	Input signal		SW	Test conditions																						Limits			Unit	Note
					S12	S60									Sub address function										Vcc						
		Input	SG	PIN	P8	P10	P16	P12	P13	P14	P18	P19	P20	P42	09H HP				12H SUBVPO	13H					P34	P5	P15 16	P21 22 23	Min.	Typ.	Max.		
																					SER	HST	AFCG									
–	Default conditions of synchronization deflection	–	–	SW		1	1			0	0				40H				00H	00H								–	–	–	–	
				PIN										8				0		0	0	0	4.75V	8V	8V	4.75V					
ISS	Sync. sep. input sensitivity; current	–	–	SW																							–	0.1	0.2	mA	
				PIN										M																	
BGP1	Burst gate pulse timing 1	SY	SGa	SW																							3.5	4.5	5.5	µsec	
				PIN	M									M																	
BGP2	Burst gate pulse timing 2	SY	SGb	SW																							3.5	4.5	5.5	µsec	
				PIN	M									M																	
BGPW	Burst gate pulse width	SY	SGa	SW																							4.8	6.0	7.2	µsec	
				PIN	M																										
fH	Horizontal free run frequency	–	–	SW																							15.3	15.7	16.1	kHz	
				PIN		M																									
FPH1	Horizontal pull-in range 1	SY	SGc f=variable	SW																							+350	+600	–	Hz	
				PIN		M								M																	
FPH2	Horizontal pull-in range 2	SY	SGc f=variable	SW																							–	-800	-350	Hz	
				PIN		M								M																	
HPT1	Horizontal pulse timing 1	SY	SGa	SW																							7.2	8.3	9.4	µsec	
				PIN		M								M																	
HPT2	Horizontal pulse timing 2	SY	SGa	SW											00H												-2.6	-2.0	-1.4	µsec	
				PIN		M								M	0																
HPT3	Horizontal pulse timing 3	SY	SGa	SW											78H												1.2	1.7	2.2	µsec	
				PIN		M								M	15																
TH	Horizontal pulse width	–	–	SW																							21	25	29	µsec	
				PIN		M																				6.7					
VH	Horizontal pulse amplitude	–	–	SW																							3	3.7	–	V	
				PIN		M																									
HSTO	Horizontal pulse stop function	–	–	SW																10H							–	0.2	0.5	V	
				PIN		M															1										
AFCG	AFG gain	SY	SGa	SW	0															00/20H							2.0	3.7	10	dB	
				PIN				M															0/1								
fV	Vertical free run frequency	–	–	SW																							51	54	57	Hz	
				PIN						M															4.75V	8V	8V	4.75V			
SW	Service switch	–	–	SW																00H/08H							–	0	0.5	V	
				PIN						M										0/1										
FPV	Vertical pull-in range	SY	SGd f=variable	SW																							–	–	67	Hz	
				PIN						M																					
VW	Vertical pulse width	–	–	SW																							0.35	0.52	0.65	msec	
				PIN						M																					

ELECTRICAL CHARACTERISTICS

Synchronization/Deflection Block (cont.)

Symbol	Parameter	Input signal		SW	Test conditions																									Limits			Unit	Note
					S12	S60									Sub address function												Vcc								
		Input	SG	PIN	P8	P10	P16	P12	P13	P14	P18	P19	P20	P42	09H	10H			11H	12H	13H				P34	P5	P1516	P212223	Min.	Typ.	Max.		
															HP	V-PO	TRF	HA	V SIZ	SUB VPO	SER	HST	AFCG										
VBLKW	Vertical blanking width	–	–	SW																										0.9	1.1	1.3	msec	
				PIN							M	M	M																					
WVSS	Vertical sync. detection minimum width	SY	SGd	SW																										9.5	12.5	–	µsec	
		f60Hz width variable		PIN						M																								
FBPI	FBP inv OUT			SW																										4.65	4.75	4.85	V	H
				PIN					M																					–	0	0.5		L

ELECTRICAL CHARACTERISTICS TEST METHOD

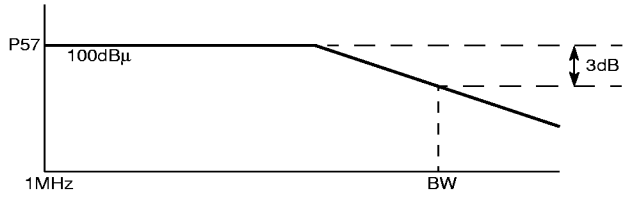
P/N Video S/N

1. Input SG3 and measure the rms value of output signal at pin 57.
2. P/N is defined as follows:

$$P/N=20\log\frac{V_{ONEG}\text{ measured value }(V_{P\text{-}P})\times10^3\times0.7}{\text{Measured value (mVrms)}}\ (dB)$$

Vf Video frequency characteristics

1. Input SG4 and set the frequency f2 to 44.75MHz so that the beat element of 1MHz is output to pin 57.
2. Then set the applied voltage at pin 60 so that the beat element of 1MHz at pin 57 may be 100dBμ.
3. Decrease f2 to the level at which the beat element becomes 3dB smaller than the element of 1MHz, and read the value at that level.



Vin min. Input sensitivity

1. Decrease SG5 level until the video detector output is 3dB smaller then the measured value of Parameter V3 "Video detector output".

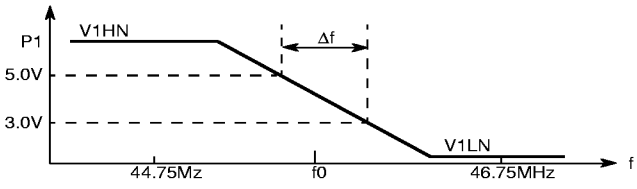
Vin max. Maximum permissible input

1. Input 90dBμ SG6.
2. V_A is the output level at pin 57. Increase SG6 voltage until the output at pin 57 becomes 3dB smaller than V_A. The input levell at that time is the maximum permissible input.

μAFTN AFT detector sensitivity

V58H Maximum AFT voltage, V58L Minimum AFT voltage

See the following figure.

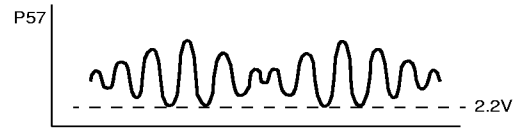


μAFTN is defined as follows:

$$\mu AFTN=\frac{(5.0\text{-}3.0)\times10^3 mV}{\Delta f\ kHz}\ (mV/kHz)$$

IM Intermodulation

1. Adjust the applied voltage at pin 60 so that the lowest output signal voltage at pin 57 is 2.2V.



2. Measure elements of 0.92MHz and 3.579545MHz of output at pin 57.
3. IM is defined as follows:

$$IM=20\log\frac{\text{Element of 0.92MHz}}{\text{Element of 3.579545MHz}}\ (dB)$$

ATT Maximum attenuation

1. Measure the element of 400Hz of output at pin 51.
2. $ATT=20\log\frac{V_{OAFmax}}{\text{Measured value}}\ (dB)$

LIM Input limiting sensitivity

Decrease the input level of SG18. Measure the input level when the element of 400Hz at pin 52 is 3dB smaller than V_{OAFM} (S6: Maximum AF output (6.0M)).

AMR

1. Vam is the element of 400Hz at pin 52.
2. AMR is defined as follows:

$$AMR=20\log\frac{V_{OAF}\text{ (mVrms)}}{\text{Vam (mVrms)}}\ (dB)$$

AF S/N

1. Measure the noise (20Hz to 100kHz) of output at pin 52.
2. AF S/N is defined as follows:

$$AF\ S/N=20\log\frac{V_{OAFmax}}{\text{Measured value}}\ (dB)$$

GEAu EXT Audio GAIN

Input SG22 at pin 53, and measure the output $V_{P\text{-}P}$ at pin 49.

$$GAIN=20\log\frac{\text{Input signal }V_{P\text{-}P}}{\text{Output signal }V_{P\text{-}P}\text{ (pin49)}}\ (dB)$$

Cn1 Output signal amplitude 1

Cn2 Output signal amplitude 2

1. Input SS from pin 36 IN.
2. Measure output amplitude, Cn1 and Cn2, at pins 18 and 20 respectively.

ACC1

1. Input VS (eb=570mV:level+6dB) from pin 36 IN.
2. Measure the output amplitude at pin 20.
3. ACC1 is defined as follows:

$$ACC1=20\log \frac{\text{Measured value } (V_{P-P})}{\text{Cn1 } (V_{P-P})} \text{ (dB)}$$

ACC2

1. Input VS (input level:-20dB) from pin 36 IN.
2. Measure the output amplitude at pin 20.
3. ACC2 is defined as follows:

$$ACC2=20\log \frac{\text{Measured value } (V_{P-P})}{\text{Cn1 } (V_{P-P})} \text{ (dB)}$$

OV Chroma overload

1. Input VS (ec=800mV$_{P-P}$:chroma+3dB) from pin 36 IN.
2. Measure the output amplitude at pin 20.
3. OL is defined as follows:

$$OL=20\log \frac{\text{Measured value } (V_{P-P})}{\text{Cn1 } (V_{P-P})} \text{ (dB)}$$

VikP Threshold color killer on

1. Input VS (level:variable) from pin 36 IN at input level 0dB.
2. Lower the input level whth monitoring the output amplitude at pin 20 and measure the input level when output amplitude isnot found.

KillP Residual color leakage at killer on

1. Input VS (level:-45dB) from pin 36 IN.
2. Measure the output amplitude at pin 20.

APC1 APC pull-in range 1

1. Input VS (f=eb=ec=variable) from pin 36 IN.
2. Change the input signal frequency and measure the frequency range from the point at which signal is output to pin 20 and to the point that no signal is output to the pin. The reference value is 3.579545MHz.

R/B P Ratio of (R-Y/B-Y)

1. Input VS (eb=single chroma=ec+100kHz) from pin 36 IN.
2. V20 is the output amplitude at pin 20.
3. V18 is the output amplitude at pin 18.
4. R/B P is defined as follows:

$$R/B\ P=20\log \frac{V18\ (V_{P-P})}{V20\ (V_{P-P})} \text{ (dB)}$$

θR-Y P Demodulation phase

1. Input VS (ed=single chroma=ec+100kHz) from pin 36 IN.
2. V20 is the output amplitude at pin 20.
3. V18 is the output amplitude at pin 18.
4. R-YP is defined as follows:

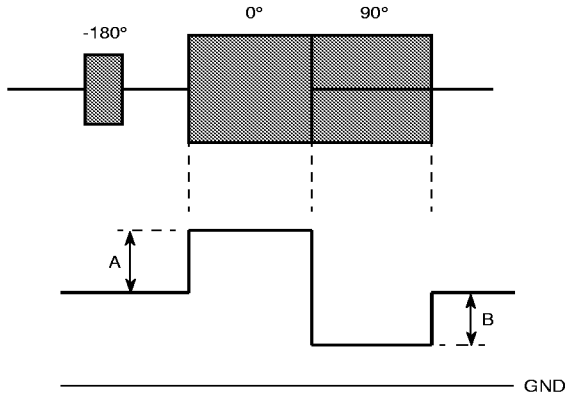
$$\theta R\text{-}Y\ P=\tan^{-1}\frac{V18\times 3.8}{(V20\times 1.9)+45^\circ} \text{ (deg)}$$

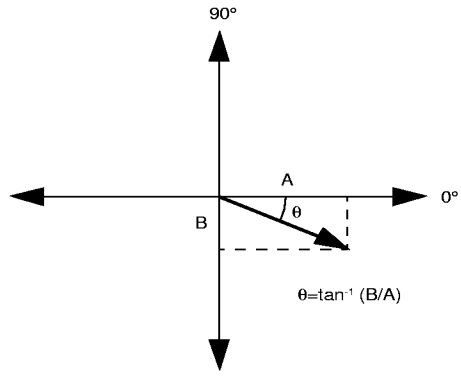
CC Residual carrier leakage

Measure the element of 3.58MHz of the demodulated output in no-input state.

TC1 Tint control 1, TC2 Tint control 2

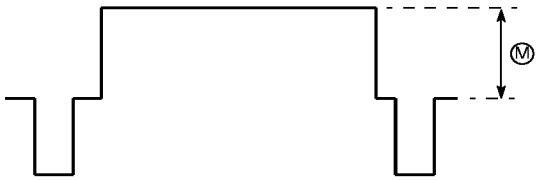
1. Input VS (see the following figure) from pin 36 IN. Based on the output voltage at pin 20, find the absolute angle as shown in the following figure.





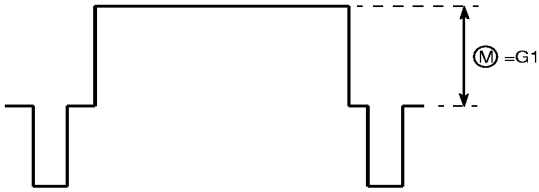
Ymax Maximum video output

1. Input SGA into pin 34 IN and input SGS from pin 42 IN.
2. Measure the amplitude (V_{P-P}) except that at blanking part of output at pins 18, 19 and 20.



GY Video gain

1. Input SGA into pin 34 IN and input SGS from pin 42 IN.
2. Measure the amplitude (V_{P-P}) except that at blanking part of output at pins 18, 19 and 20. This amplitude is defined as G1.



3. GY is defined as follows:

$$GY=20 \log (G1V_{P-P}/0.714V_{P-P}) \ (dB)$$

BW Video frequency characteristics

1. Input SGB (5MHz, 0.4V_{P-P}) into pin 34 IN and input SGS from pin 42 IN.
2. Measure the amplitude (V_{P-P}) except that at blanking part of the output at pin 19. The amplitude is defined as YB.
3. BW is defined as follow:

$$BW=20 \log (YB\ V_{P-P}/GY\ V_{P-P}) \ (dB)$$

2AGY Double amplifier standard output

1. Input SGA into pin 34 IN and input SGS from pin 42 IN.
2. Measure the amplitude (V_{P-P}) at pin 40 output.

CTR1 Chroma trap attenuation 1 (common to R/G/B output)

1. Input SS from pin 41 IN and input SGS into pin 42 IN. Measure the frequency level of 3.58MHz at trap data 0. The level is defined as N_0.
2. Then, measure the level at trap data 1.
3. CTR1 is defined as follows.

$$CTR1=20\log \frac{\text{Measured value } (mV_{P-P})}{N_0\ (mV_{P-P})} \ (dB)$$

TRF1 Chroma trap fine adj. attenuation 1 (common to R/G/B output)

1. Input SS from pin 34 IN and input SGS from pin 42 IN.
2. Measure the output amplitude of the element of 3.58MHz when trap fine adj. switch is on. (TRFon)
3. TRF1 is defined as follows.

$$TRF1=20\log \frac{TRFon\ (mV_{P-P})}{N_0\ (mV_{P-P})} \ (dB)$$

4. Measure the most attenuation part in three condition of (2), and the most attenuation part is defined as Y6.

   The three condition of (2) is shown below.

	TRAP FINE ADT SW	FINE 2
condition 1	ON	OFF
condition 2	OFF	ON
condition 3	ON	ON

YSW Y SW OUT standard output

1. Input SGB from pin 34 IN and input SGS into pin 42 IN.
2. Measure the output amplitude of the pin 43 output video block.

YSmax Y SW OUT standard output

1. Input SGB (video amplitude 1.5V_{P-P}) from pin 34 IN and input SGS into pin 42 IN.
2. Measure the output amplitude of the pin 43 output video block.

E→T CT EXT→TV crosstalk

1. Input SGB (f=5MHz) from pin 36 IN and input SGS into pin 42 IN.
2. Specify pin 43 output for EXT to be VEXT.
3. Specify pin 43 output for TV to be VTV.
4. E→T CT is defined as follows.

$$E\rightarrow T\ CT=20\log \frac{VTV\ (mV_{P-P})}{VEXT\ (mV_{P-P})} \ (dB)$$

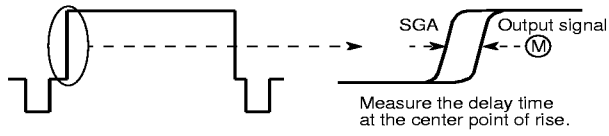
T→E CT TV→EXT crosstalk

1. Input SGB (f=5MHz) from pin 41 IN and input SGS into pin 42 IN.
2. Specify pin 43 output for TV to be VTV.
3. Specify pin 43 output for EXT to be VEXT.
4. T→E CT is defined as follows.

$$T\rightarrow E\ CT=20\log \frac{VEXT\ (mV_{P-P})}{VTV\ (mV_{P-P})} \ (dB)$$

YDL1 Y delay time1

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure the delay time from signal input to output at pins 18, 19 and 20.



YDL2 to 3 Y delay time2 to 3

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure the delay time from signal output at pins 18, 19 and 20 to Y11, YDL1.

GTnor Video tone 1

1. Input SGB (f=3MHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.

GTmax Video tone 2

1. Input SGB (f=3MHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.
3. GTmax is defined as follows:

$$GTmax=20\log\frac{\text{Measured value } (V_{P\text{-}P})}{GTnor\ (V_{P\text{-}P})}\ (dB)$$

GTmin Video tone 3

1. Input SGB (f=3MHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.
3. GTmin is defined as follows:

$$GTmin=20\log\frac{\text{Measured value } (V_{P\text{-}P})}{GTnor\ (V_{P\text{-}P})}\ (dB)$$

GT2M Video tone 4

1. Input SGB (f=2MHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.
3. GT2M is defined as follows:

$$GT2M=20\log\frac{\text{Measured value } (V_{P\text{-}P})}{GTnor\ (V_{P\text{-}P})}\ (dB)$$

GT5M Video tone 5

1. Input SGB (f=5MHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.
3. GT5M is defined as follows:

$$GT5M=20\log\frac{\text{Measured value } (V_{P\text{-}P})}{GTnor\ (V_{P\text{-}P})}\ (dB)$$

GYnor Contrast 1

1. Input SGB (f=100kHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.

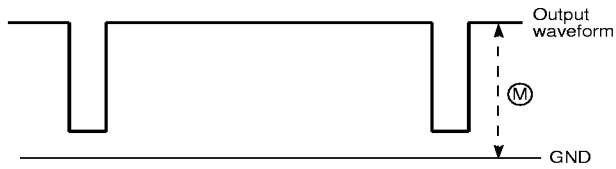
GYmin Contrast 2

1. Input SGB (f=100kHz) from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20.
3. GYmin is defined as follows:

$$GYmin=20\log\frac{\text{Measured value } (V_{P\text{-}P})}{GYnor\ (V_{P\text{-}P})}\ (dB)$$

Lum nor Brightness control 1, Lum max Brightness control 2, Lum min Brightness control 3

1. No signal is input. (Only SGS is input to pin 42 IN.)
2. Measure DC voltage of output at pins 18, 19 and 20 except that at blanking part.



3. Y22=(Lum max)-(Lum nor), Y23=(Lum min)-(Lum nor)

D (R) Drive R

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure DRmin and DRmax which are output amplitude at pins 18 at D (R) data min and D (R) data max respectively.
3. D (R) is defined as follows:

$$D\ (R)=20\log\frac{DRmax\ (V_{P\text{-}P})}{DRmin\ (V_{P\text{-}P})}\ (dB)$$

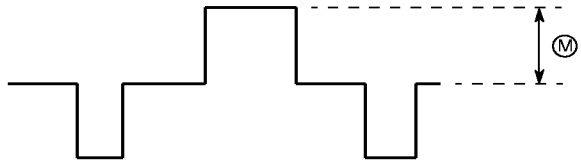
D (B) Drive B

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure DBmin and DBmax which are output amplitude at pin 20 at D (B) data min and D (B) data max respectively.
3. D (B) is defined as follows:

$$D\ (B)=20\log\frac{DBmax\ (V_{P\text{-}P})}{DBmin\ (V_{P\text{-}P})}\ (dB)$$

EX (R) EXT (R) I/O, EX (G) EXT (G) I/O, EX (B) EXT (B) I/O

1. Input SGD into each of pin 30, 24, 26 and 28 and input SGS into pin 42 IN.
2. Measure output amplitude which is higher than the pedestal level at pins 18, 19 and 20. The amplitude at blanking part should not be measured.



OFRG Offset voltage R-G, OFBG Offset voltage B-G

1. Measure DC voltage of output at pin 18, 19 and 20 except that at blanking part .
2. OFRG and OFBG are defines as follows:

   OFRG=

   (pin 18 Measured voltage)-(pin 19 Measured voltage) (mV)

   OFBG=

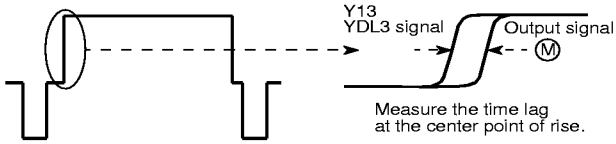
   (pin 20 Measured voltage)-(pin 19 Measured voltage) (mV)

R (C) Cutoff R, G (C) Cutoff G, B (C) Cutoff B

1. Measure DC voltage of output at pin 18, 19 and 20 when R (C), G (C) and B (C) data are maximum and minimum respectively. The DC voltage at blanking part should not be measured.
2. R (C), G (C) and B (C) are defined as follows:
   R (C), G (C) and B (C)=
   (Voltage at data max.)-(Voltage at data min.) (V)

DLF Y delay time 〈fine〉

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure the time lag (absolute value) between signal YDL3 and output signal at pins 18, 19 and 20.



Ccon1 Color control 1, Ccon2 Color control 2

1. Input VS (ec=eb+100kHz) from pin 36 and input SGS into pin 42 IN.
2. Measure output amplitude at pins 18, 19 and 20 under each condition.

VMF Video mute

1. Input SGF from pin 34 and input SGS into pin 42 IN.
2. Measure output amplitude of the element of 3.58MHz when the mute switch is on and off. (VMFon, VMFoff)
3. VMF is defined as follows:

$$VMF=20\log\frac{VMFon\ (V_{P\text{-}P})}{VMFoff\ (V_{P\text{-}P})}\ (dB)$$

MTXB Matrix 1, MTXG Matrix 2

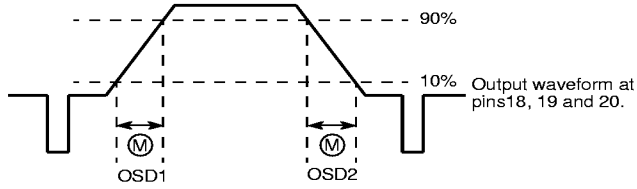
1. Input VS (ec=eb+100kHz) from pin 36 and input SGS into pin 42 IN.
2. Measure output amplitude at pins 20 and 19.
   (P20=MTXB, P19=MTXG)

MTXR Matrix 3

1. Input VS (ec=eb+100kHz) from pin 36 and input SGS into pin 42 IN.
2. Measure output amplitude at pin 18.
   (P18=MTXR)

OSD1 OSD speed 1, OSD2 OSD speed 2

1. Input SGD into each of pin 30, 24, 26 and 28 and input SGS into pin 42 IN.
2. Measure rise time and fall time of the signal of output at pins 18, 19 and 20. Measurement points should be higher than the pedestal level and blanking part should not be measured.



GYmax1 Contrast 3, GYmin1 Contrast 4

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. Measure output amplitude at pina 18, 19 and 20 when 2.9V and 0V are extemally applied to pin 25.

ABR Bright increase voltage

1. Non-input.
2. Measure the voltage except for pin 19 blanking.

BLS1 Black expansion characteristics 1,
BLS2 Black expansion characteristics 2,
BLS3 Black expansion characteristics 3

1. Input SGC (BLS1=0.2$V_{P\text{-}P}$, BLS2=0.45$V_{P\text{-}P}$, BLS1=0$V_{P\text{-}P}$) from pin 34 IN and input SGS into pin 42 IN.
2. With black expansion set to ON/OFF, specify the pin 19 output voltages to be VBLSON1 to 3/BVLSOFF1 to 3, respectively.
3. The standard shall be expressed by BLS1 to 3=VBLSOFF1 to 3-BVLSON1 to 3 ($mV_{P\text{-}P}$).

ABL1 ABL characteristics 1, ABL2 ABL characteristics 2

1. Non-input.
2. When a voltage of 4.75V is applied to pin 46, measure the output voltage at pin 19 and specify the value to be ABL1.
3. When a voltage of 0V is applied to pin 46, measure the output voltage at pin 19 and specify the value to be ABL2.

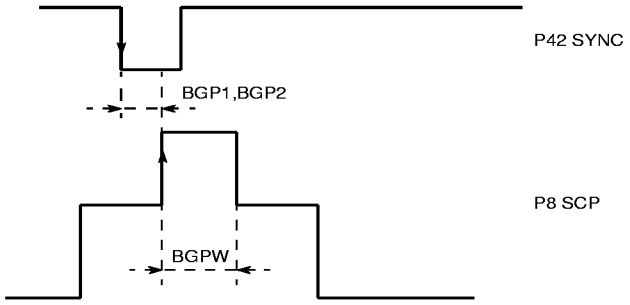
γ1 Gamma characteristics 1, γ2 Gamma characteristics 2

1. Input SGA from pin 34 IN and input SGS into pin 42 IN.
2. When a voltage of 4.75V is applied to pin 45, measure the amplitude of pin 19 output and specify the value to be γ1.
3. When a voltage of 0V is applied to pin 45, measure the amplitude of pin 19 output and specify the value to be γ2.
4. γ1, γ2 are defined as follows:
   γ2=γ1-Measured value ($mV_{P\text{-}P}$)

ISS Sync separation input sensitivity current

When current flows from pin 42, measure the flow current with the burst gate pulse of P8SCP eliminated.

BGP1 Burst gate pulse timing 1
BGP2 Burst gate pulse timing 2, BGPW Burst gate pulse width

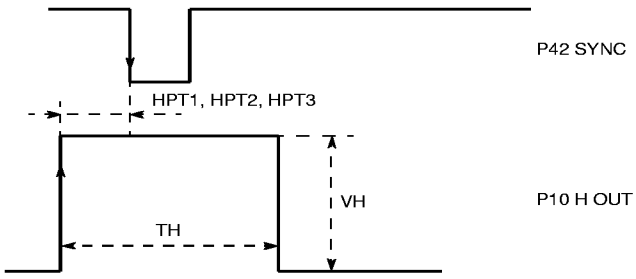


FH Horizontal free running frequency
Measure the output frequency at pin 10 when no signal is input .

FPH1 Horizontal pull-in range 1
FPH2 Horizontal pull-in range 2
Change the frequency of SGc and measure the frequency at the moment when the output signal at pin 10 and the input signal at pin 42 are pulled in. The horizontal pull-in range is measured by comparing with 15.734kHz.

HPT1 Horizontal pulse timing 1
HPT2 Horizontal pulse timing 2
HPT3 Horizontal pulse timing 3

HPT2 = Hphase data (0) - HPT1
HPT3 = Hphase data (15) - HPT1



TH Horizontal pulse width, VH Horizontal pulse amplitude

HSTO Horizontal pulse stop function
Confirm that the horizontal output is high when the horizontal stop switch is on.

AFCG AFC gain
1. Measure AFC on which is the output amplitude of pin 12 when AFC switch is on and AFC off which is that when the switch is off.
2. AFCG is defined as follows:

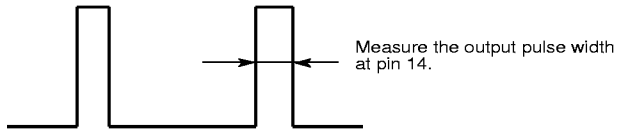
$$AFCG=20\log \frac{AFCon\ (V_{P\text{-}P})}{AFCoff\ (V_{P\text{-}P})}\ (dB)$$

FV Vertical free running frequency
Measure the output frequency at pin 14 when no signal is input.

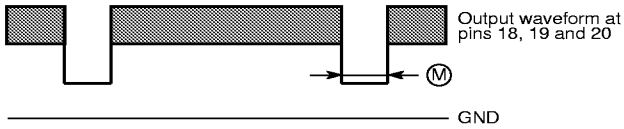
SW Service SW operation
Measure the output DC voltage at pin 14 when the service switch is on.

FPV Vertical pull-in range
Decrease the frequency of SGd and measure the frequency when output waveform at pin 14 is pulled in.

VW Vertical pulse width (free running)

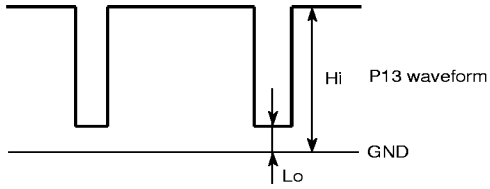


VBLKW Vertical blanking width

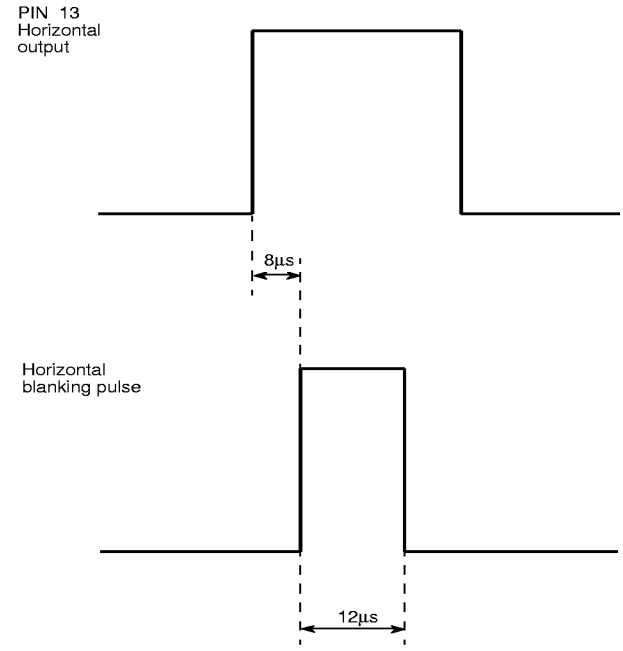


WVSS Vertical sync.detection minimum width
Change the input pulse width of SGd and measure the input pulse width at the moment when the output signal at pin 14 is pulled in.

FBPI FBP inv OUT
Measure the Hi and Lo voltages of the pin 13 output pulse.



Note: The timing and pulse width of the horizontal blanking pulse should be as shown in the following figure by adjusting the variable resistor of the single shot multi vibrator.

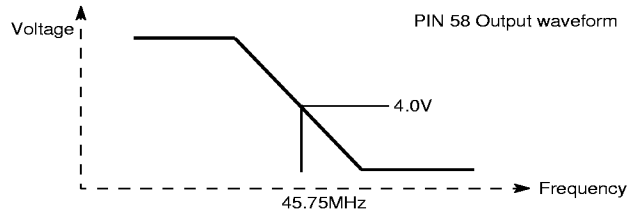


The variable resistor at pin 15 of the TTL IC, M74LS221P, is used to fix the timing at 8µs and that at pin 7 is used to fix the pulse width at 12µs.

∗Coil adjustment

VCO COIL

1. Input CW (fo=45.75MHz, Vi=90dBµ) to input pin A.
2. Set the DC voltage at pin 58 (AFT OUT) to 1/2Vcc (4.0V) by adjusting VCO coil.



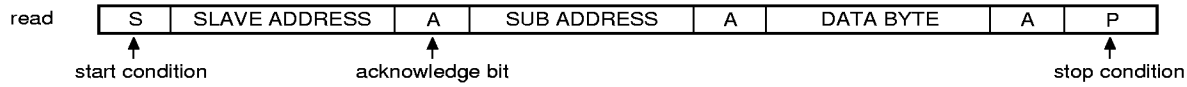
Note: VCO coil should always be adjusted as above before using this IC.

I²C BUS FORMATS

(1) Slave address:

A6	A5	A4	A3	A2	A1	A0	R/W	
1	0	1	1	1	0	1	0	(=BAH)

(2) Slave address format:



(3) Sub address byte and data byte format:

read

	No.	Functions	BIT	SUB ADD	Data byte							
					D7	D6	D5	D4	D3	D2	D1	D0
VIF/SIF	1	DELAY ADJ	6	00H	0	–	A05	A04	A03	A02	A01	A00
	4	AUDIO SW	1	01H		AUDIO SW						
	6	DEFEAT	1	04H		DEFEAT						
	7	AUDIO ATT	7	03H	0	A36	A35	A34	A33	A32	A31	A30
VIDEO	8	VIDEO TONE	6	04H	0	–	A45	A44	A43	A42	A41	A40
	9	CONTRAST	7	05H	0	A56	A55	A54	A53	A52	A51	A50
	10	DL time ADJ	2	06H	0	–	0	–	–	–	A61	A60
	25	DL fine ADJ.	1	02H							DLfine	
	11	TV/EXT SW	1	06H						TV/EXT		
	12	Y/C SW	1	06H					Y/C IN			
	13	Black Stretch	1	06H				black				
	14	TRAP SW	1	02H			TRAP					
	38	TRAP ADJ 1	1	10H			TADJ1					
	40	TRAP ADJ 2	1	02H				TADJ2				
	36	VIDEO MUTE	1	0BH		V MUTE						
CHROMA	15	TINT	7	07H	0	A76	A75	A74	A73	A72	A71	A70
	16	COLOR	7	08H	0	A86	A85	A84	A83	A82	A81	A80
	26	KILLER OFF	1	09H						KILL OFF		
INTER-FACE	19	BRIGHT	7	0AH	0	AA6	AA5	AA4	AA3	AA2	AA1	AA0
	20	DRIVE (R)	6	0BH	0	–	AB5	AB4	AB3	AB2	AB1	AB0
	21	DRIVE (B)	6	0CH	0	0	AC5	AC4	AC3	AC2	AC1	AC0
	22	CUT OFF (R)	8	0DH	AD7	AD6	AD5	AD4	AD3	AD2	AD1	AD0
	23	CUT OFF (G)	8	0EH	AE7	AE6	AE5	AE4	AE3	AE2	AE1	AE0
	24	CUT OFF (B)	8	0FH	AF7	AF6	AF5	AF4	AF3	AF2	AF1	A100
DEFLEC-TION	27	AFC-2 H PHASE	4	09H	0	A96	A95	A94	A93	–	–	–
	33	SERVICE SW	1	13H					Service SW			
	34	H STOP	1	13H				H STOP				
	35	AFC GAIN	1	13H			AFC GAIN					
	42	H fo ADJ	1	06H		HADJ						
	32	2 WINDOW SW	1	12H			2WS					

DATA BYTE CONDITIONS AT SW

	Functions	Data		Condition	Initial condition
IF	AUDIO SW	AUDIO SW	0	TV	TV
			1	EXT	
	DEFEAT	DEFEAT	0	OFF	OFF
			1	ON	
VIDEO	DL time ADJ	A61, A60	0 0	220nsec	420nsec
			0 1	320nsec	
			1 0	420nsec	
			1 1	420nsec	
	DL time fine ADJ	DL fine	0	+50nsec	+0nsec
			1	+0nsec	
	TV/EXT	TV/EXT	0	TV	TV
			1	EXT	
	Y/C IN	Y/C IN	0	Y/C	Y/C
			1	TV or EXT	
	black stretch	black	0	OFF	OFF
			1	ON	
	TRAP SW	TRAP	0	OFF	OFF
			1	ON	
	TRAP fine adj. 1	TADJ1	0	OFF	OFF
			1	ON	
	TRAP fine adj. 2	TADJ2	0	OFF	ON
			1	ON	
	VIDEO MUTE	V MUTE	0	OFF	OFF
			1	ON	
CHROMA	KILLER OFF		0	Normal	Normal
			1	KILLER OFF	
DEFLECTION	Service SW	Service SW	0	Normal mode	Normal mode
			1	Service mode	
	H STOP	H STOP	0	H out	H out
			1	H stop	
	AFC GAIN	AFC GAIN	0	NORMAL	NORMAL
			1	HIGH	
	H fo ADJ	H ADJ	0	fo down	fo down
			1	fo up	
	2 WINDOW	2 WINDOW SW	0	Normal	Normal
			1	2 WINDOW	

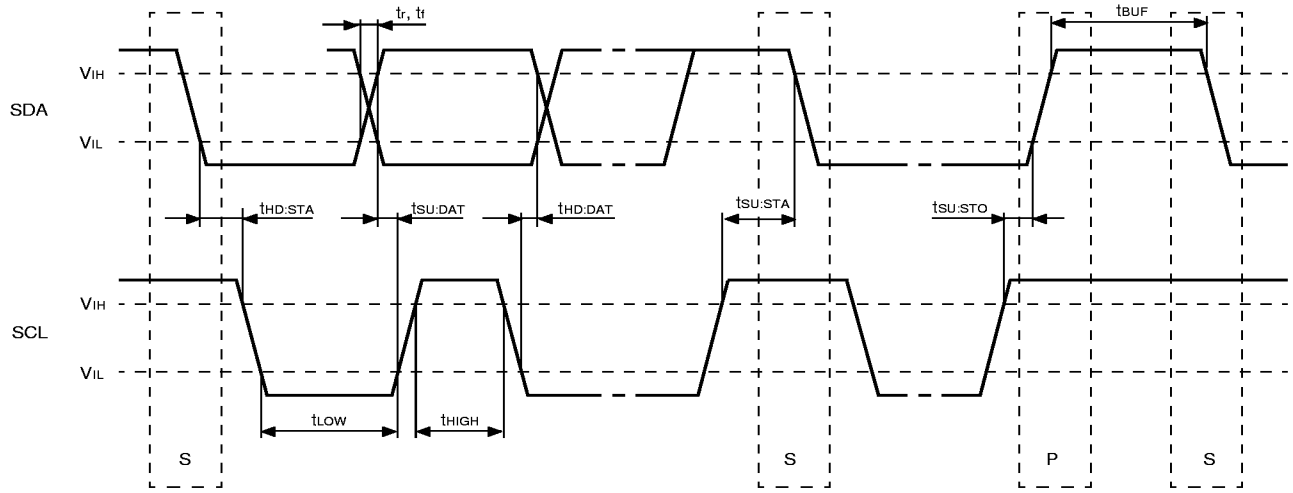
DATA BYTE CONDITIONS AT D/A

	Functions	BIT	Data	Condition	Intial condition
IF	DELAY ADJ	6	0 to 63		32
	AUDIO ATT	7	0 to 127		32
VIDEO	VIDEO TONE	6	0 to 63		0
	contrast cont	7	0 to 127		32
CHROMA	tint cont	7	0 to 127		64
	color cont	7	0 to 127		32
INTERFACE	bright cont	7	0 to 127		32
	drive (R)	6	0 to 63		32
	drive (B)	6	0 to 63		32
	cut off (R)	8	0 to 255		128
	cut off (G)	8	0 to 255		128
	cut off (B)	8	0 to 255		128
DEFLECTION	AFC-2 H phase	4	0 to 15		10

I²C BUS CONTROL SECTION SDA, SCL CHARACTERISTICS

Symbol	Parameter	Limits		Unit
		Min.	Max.	
V_{IL}	Min. input low voltage	-0.5	1.5	V
V_{IH}	Max. input high voltage	3.0	5.5	V
f_{SCL}	SCL clock frequency	0.0	100	kHz
t_{BUF}	Time the bus must be free before a new transmission can start	4.7	–	µs
$t_{HD:STA}$	Hold time start condition. After this period the first clock pulse is generated	4.0	–	µs
t_{LOW}	The low period of the clock	4.7	–	µs
t_{HIGH}	The high period of the clock	4.0	–	µs
$t_{SU:STA}$	Setup time for start condition (Only relevant for a repeated start condition)	4.7	–	µs
$t_{HD:DAT}$	Hold time DATA	0.0	–	µs
$t_{SU:DAT}$	Set-up time DATA	250	–	ns
t_r	Rise time of both SDA and SCL lines	–	1000	ns
t_f	Fall time of both SDA and SCL lines	–	300	ns
$t_{SU:STO}$	Set-up time for stop condition	4.0	–	µs

TIMING DIAGRAM

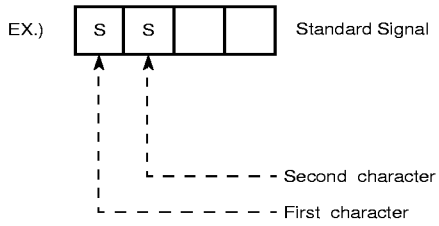


INPUT SIGNAL
VIF/SIF

SG No.	Signals (50Ω termination)
1	f_0=45.75MHz 90dBμ fm=20kHz AM77.8%
3	f_0=45.75MHz 90dBμ CW
4	f_1=45.75MHz 90dBμ CW (Mixed signal) f_2=44±5MHz 70dBμ CW (Mixed signal)
5	f_0=45.75MHz variable fm=20kHz AM77.8%
6	f_0=45.75MHz fm=20kHz AM16% level variable
7	f_0=45.75MHz 80dBμ CW
8	f_0=45.75MHz 110dBμ CW
9	f_0=45.75±5MHz 90dBμ CW
10	f_0=44.75MHz 90dBμ CW
11	f_0=46.75MHz 90dBμ CW
12	f_1=45.75MHz 90dBμ CW (Mixed signal) f_2=41.25MHz 80dBμ CW (Mixed signal) f_3=42.17MHz 80dBμ CW (Mixed signal)
13	f_0=45.75MHz standard 10-step modulation Sync ratio 28.6% AM=87.5%video modulation Sync chip level 90dBμ
14	f_0=45.75MHz 93dBμ CW
15	f_0=45.75MHz 73dBμ CW
16	f_0=4.5MHz 100dBμ fm=400Hz FM±25kHz dev
17	f_0=4.5MHz 50dBμ CW
20	f_0=4.5MHz 100dBμ fm=400Hz AM30%
22	f=1kHz 1V_{P-P} CW

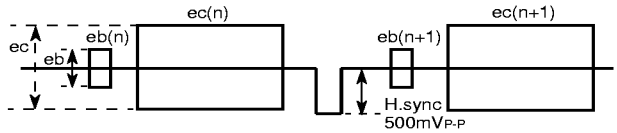
INPUT SIGNAL PARAMETERS INCLUDING INPUT SIGNALS

1. Input signal name is two alphanumeric characters.



First character: Standard=S, Nonstandard=V
(Modified parts should be specified.)
Second character: Meaning of signal

2. Structure of input color signal
The following figure shows the structure of color signal.

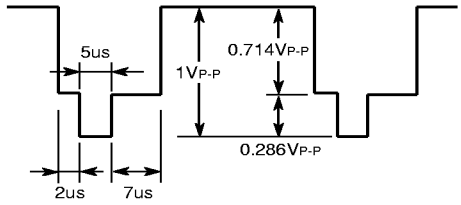
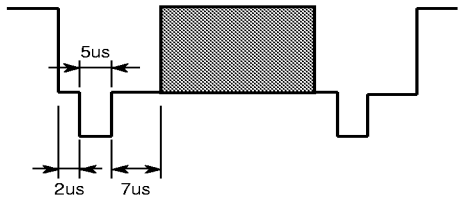
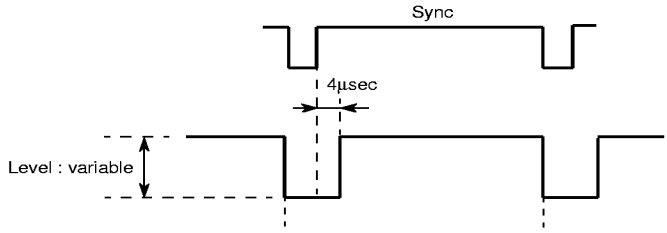
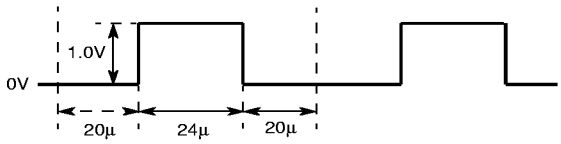
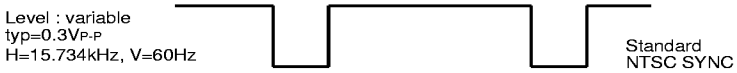
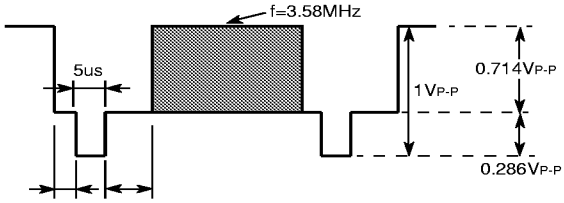


1) When S (standard) is used as the first character, the standard color bar signal of each system is applied. H.sync should be added for input clamp.

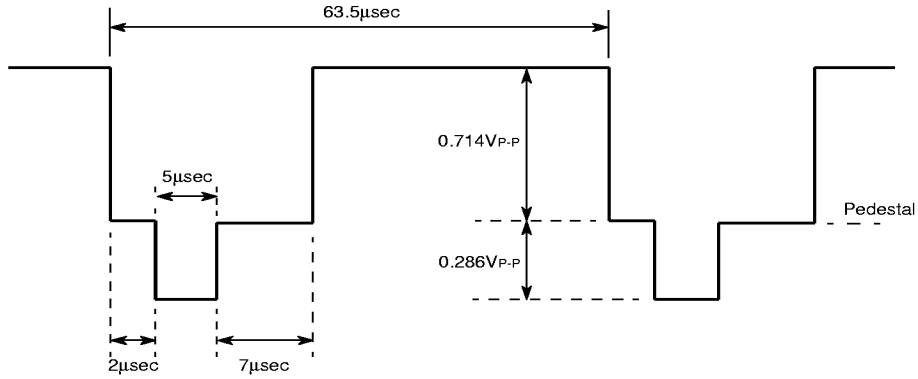
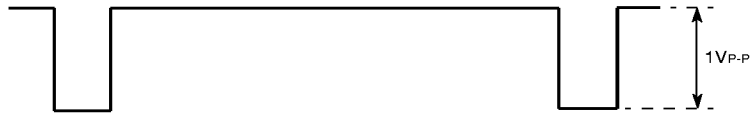
2) Amplitude and frequency of burst are represented as ed. In case of standard signal, the amplitude is 285mV_{P-P}.

3) Amplitude and frequency of chroma are represented as ec. In case of standard signal, the amplitude is 570mV_{P-P} and the frequency is 3.579545MHz.

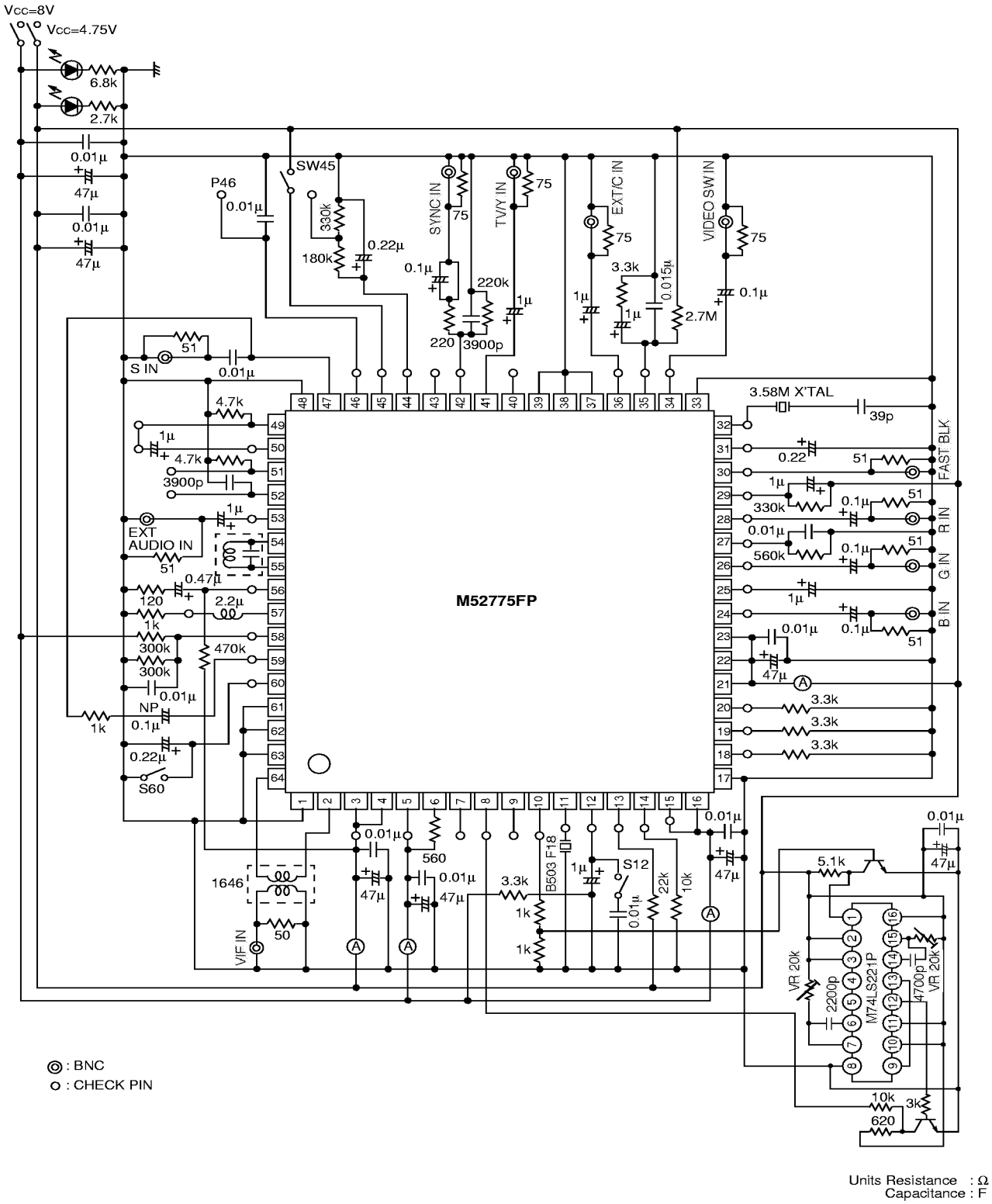
VIDEO/INTERFACE

SG No.	Signal (50Ω termination)
SGA	NTSC system APL100% standard video signal should be input as sync separation input as shown in the figure. The vertical signal should be interlaced at 60Hz. 
SGB	The frequency and amplitude of signal Lumi can be changed by signal SGA. The typical amplitude is 0.714mVP-P. 
SGC	
SGD	
SGS	
SGF	

DEFLECTION

SG No.	Signal (50Ω termination)
SGa	The input signal should be NTSC system APL-variable video signal. Vertical should be interlaced at 60Hz. 
SGb	Duty90% Frequency:variable Level:variable (Typ. :1VP-P) 
SGc	Duty95% Frequency:variable Level:variable (Typ. :1VP-P) Duty: variable (95%) 

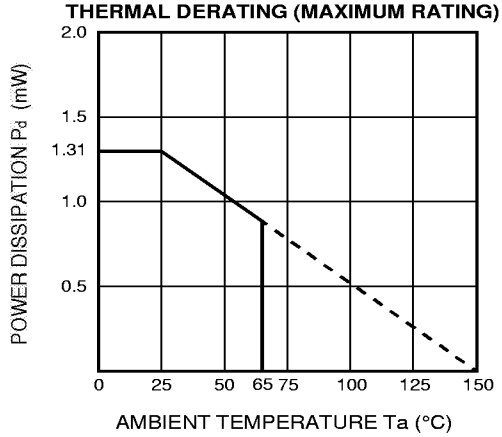
TEST CIRCUIT



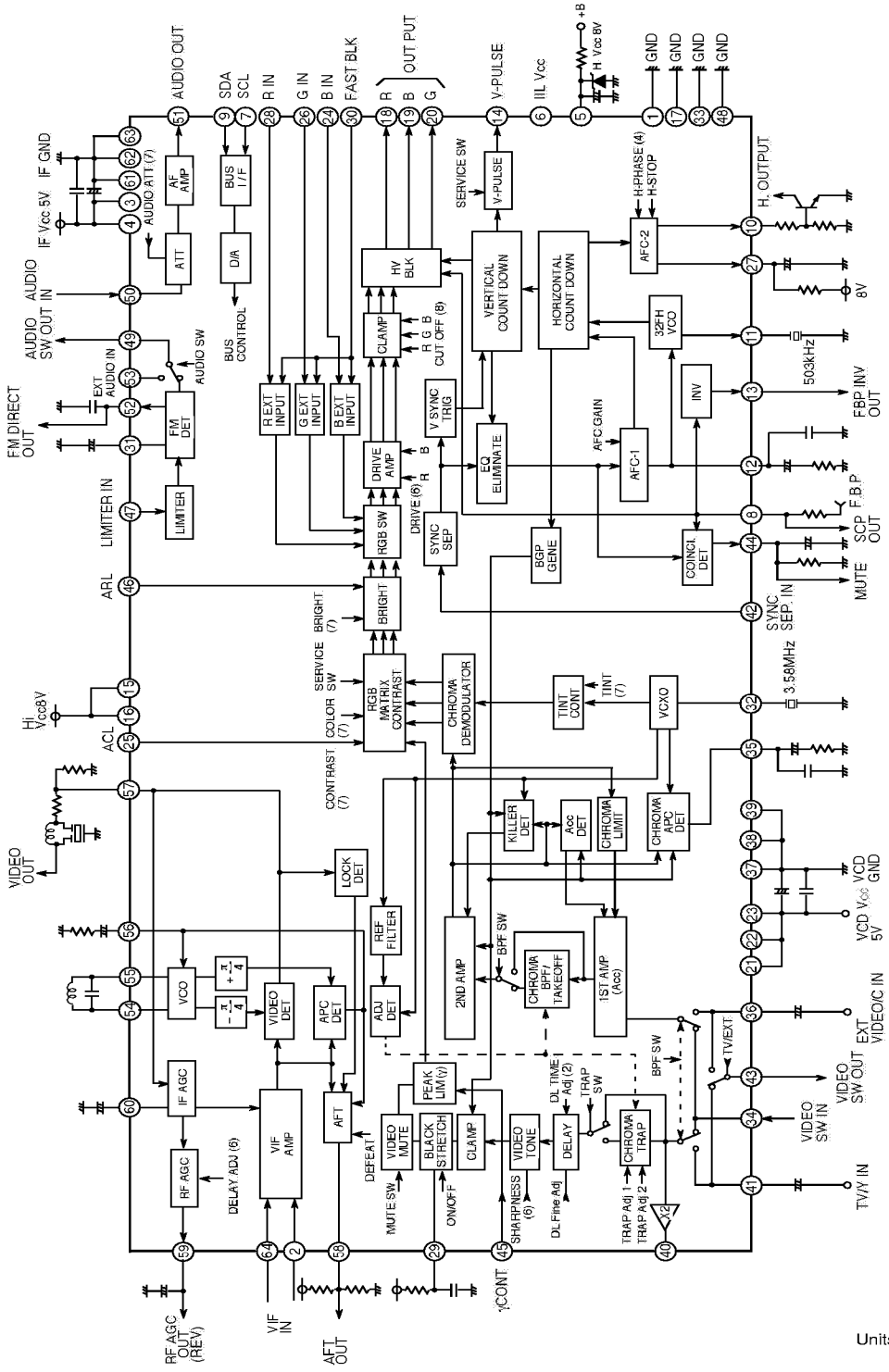
Units Resistance : Ω
Capacitance : F

TYPICAL CHARACTERISTICS

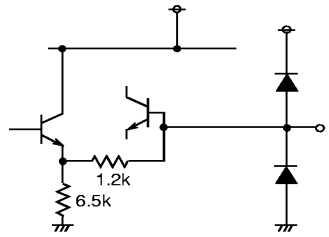
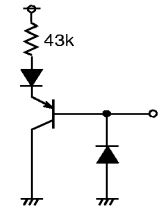
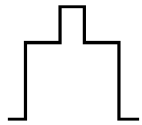
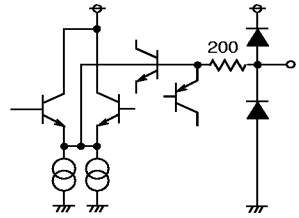
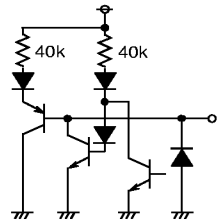
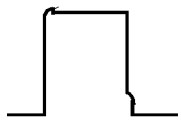
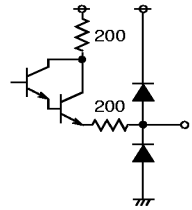
THERMAL DERATING (MAXIMUM RATING)



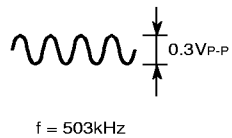
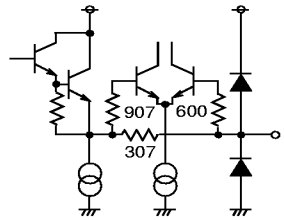
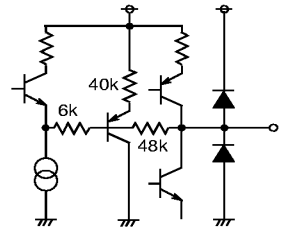
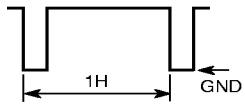
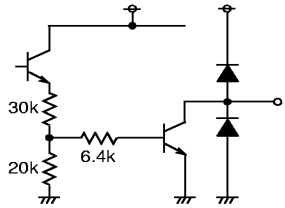
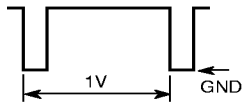
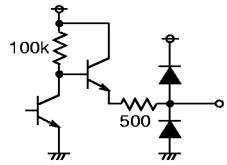
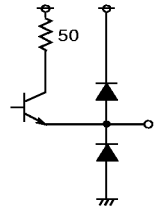
APPLICATION EXAMPLE



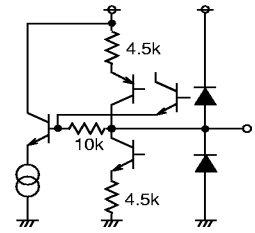
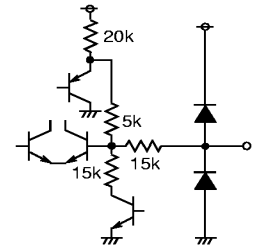
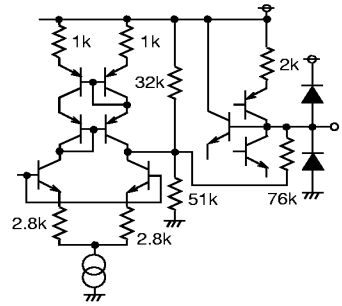
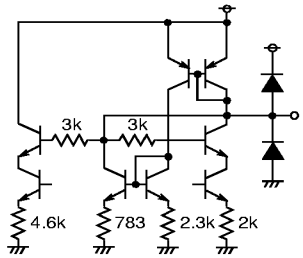
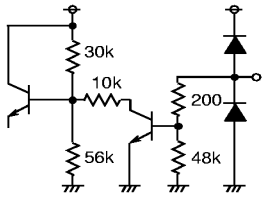
DESCRIPTION OF PIN

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
1	GND	–	–	–	
2 64	IF IN	–		1.45	
3 4	IF V_{CC1} IF V_{CC2}	–	–	4.75	
5	H V_{CC}	–	–	8.0	
6	ILL V_{CC}	–	–	1.5	
7	SCL	–		–	
8	FBP IN			4.20 3.1 1.55	BGP HBLK VBLK
9	SDA	–		–	
10	H OUT			3.70 0	H L

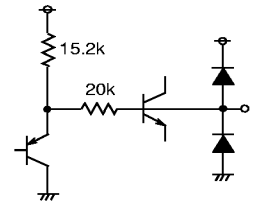
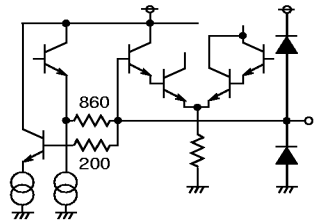
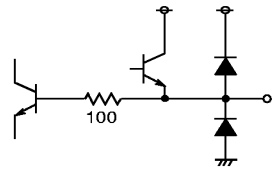
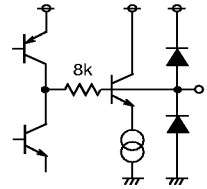
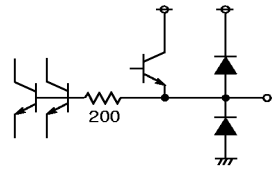
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
11	H OSC			3.2	
12	AFC1 FILTER	-		5.1	
13	FBP INV OUT			8.0 0.2	H L
14	V PULSE			6.5 0	H L
15 16	Hi V_{CC1} Hi V_{CC2}	-	-	8.0	
17	GND	-	-	0	
18 19 20	R OUT G OUT B OUT	-		2.5 0	H L
21 22 23	VCD V_{CC1} VCD V_{CC2} VCD V_{CC3}	-	-	4.75	

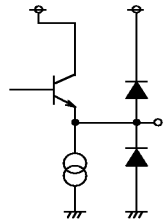
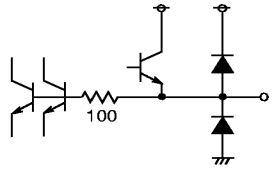
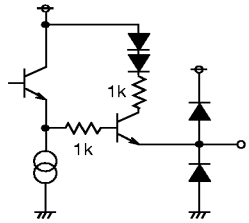
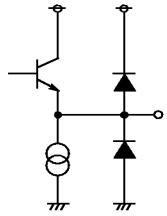
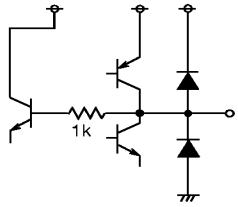
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
24 26 28	B IN G IN R IN	–		2.6	
25	CONTRAST CONT.	–		3.1	
27	AFC2 FILTER	–		5.4	
29	BLACK PEAK HOLD	–		2.2	
30	FAST BLK	–		0	

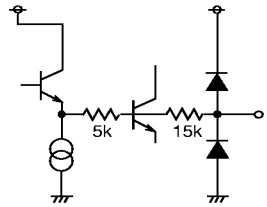
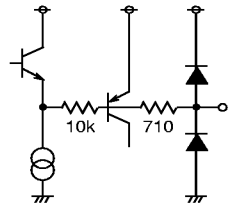
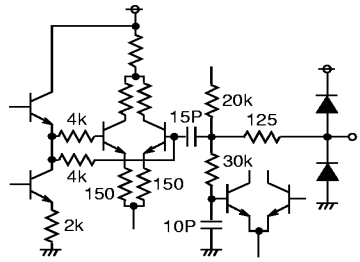
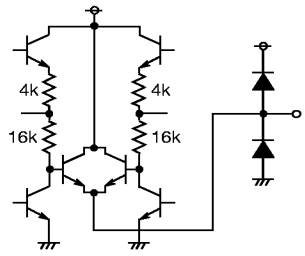
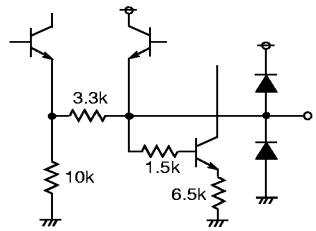
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
31	AUDIO BYPASS	–		2.7	
32	X-TAL 3.58			2.7	
33	GND	–	–	0	
34	VIDEO SW IN	–		2.1	
35	CHROMA APC FILTER	–		2.9	
36	EXT/C IN	–		2.0	
37 38 39	VCD GND	–	–	0	

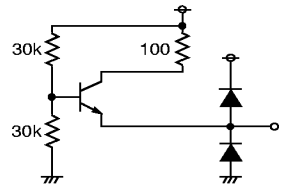
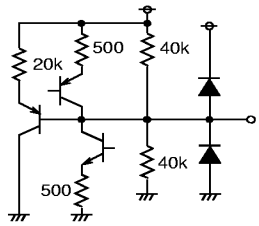
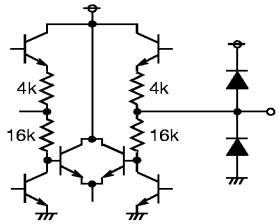
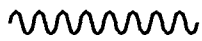
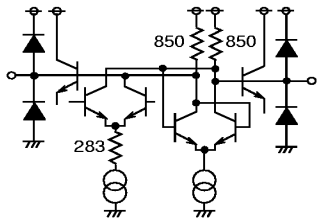
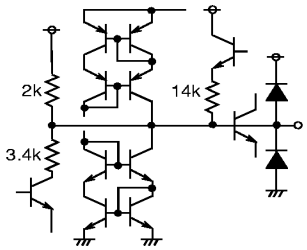
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
40	Y SW OUT	–		2.0	
41	TV/Y IN	–		2.0	
42	SYNC SEP IN	–		5.9	
43	VIDEOSW OUT	–		1.4	
44	COINCI-DENCE	–		0.2	

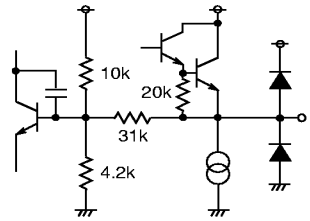
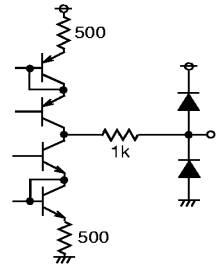
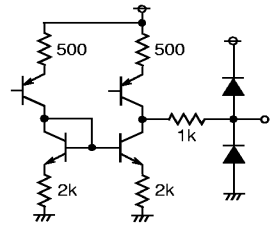
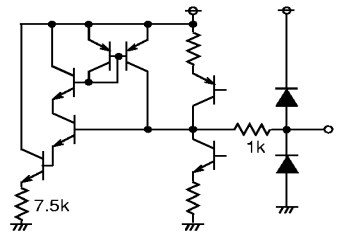
DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
45	γ-CONT	–		3.0	
46	ABL	–		2.2	
47	LIMITER IN	–		1.9	
48	GND	–	–	0	
49	AUDIO SW OUT	–		2.4	
50	AUDIO IN	–		2.4	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
51	AUDIO OUT	–		3.3	
52	FM DIRECT OUT	–		2.4	
53	EXT AUDIO IN	–		1.9	
54 55	VCO	 f = 45.75MHz 0.28Vp-p		4.0	
56	VIDEO APC FILTER	–		2.6	

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Pin wave	Peripheral circuit of pins	Pin voltage (V)	Remark
57	VIDEO OUT	–		3.6	
58	AFT OUT	–		4.0	
59	RF AGC OUT	–		7.7	
60	IF AGC FILTER	–		4.2	
61 62 63	IF GND	–	–	0	