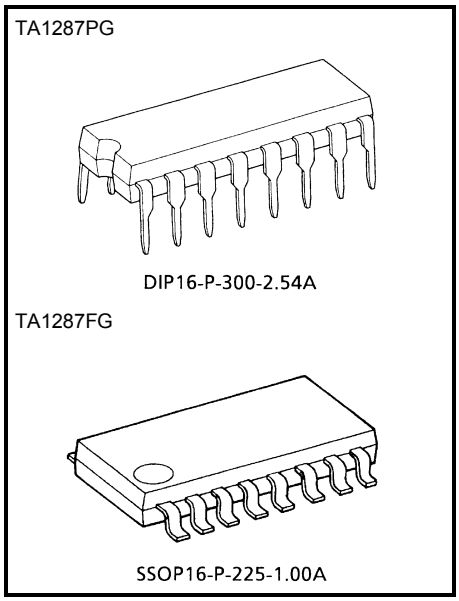
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA1287PG,TA1287FG

RGB TO YUV / IQ HIGH-SPEED MATRIX IC

TA1287PG, TA1287FG are a high-speed switching IC which have 2-channel inputs circuit and a RGB to YUV / IQ matrix circuit. Another feature, TA1287PG, TA1287FG have a signals mixing circuit, which are enable to mix a main signal with an external input signal and outputs the mixed signal. The mixing circuit has 8 combinations of mixing gain ratio of a main to an external signals, which is controlled by high-speed switch.

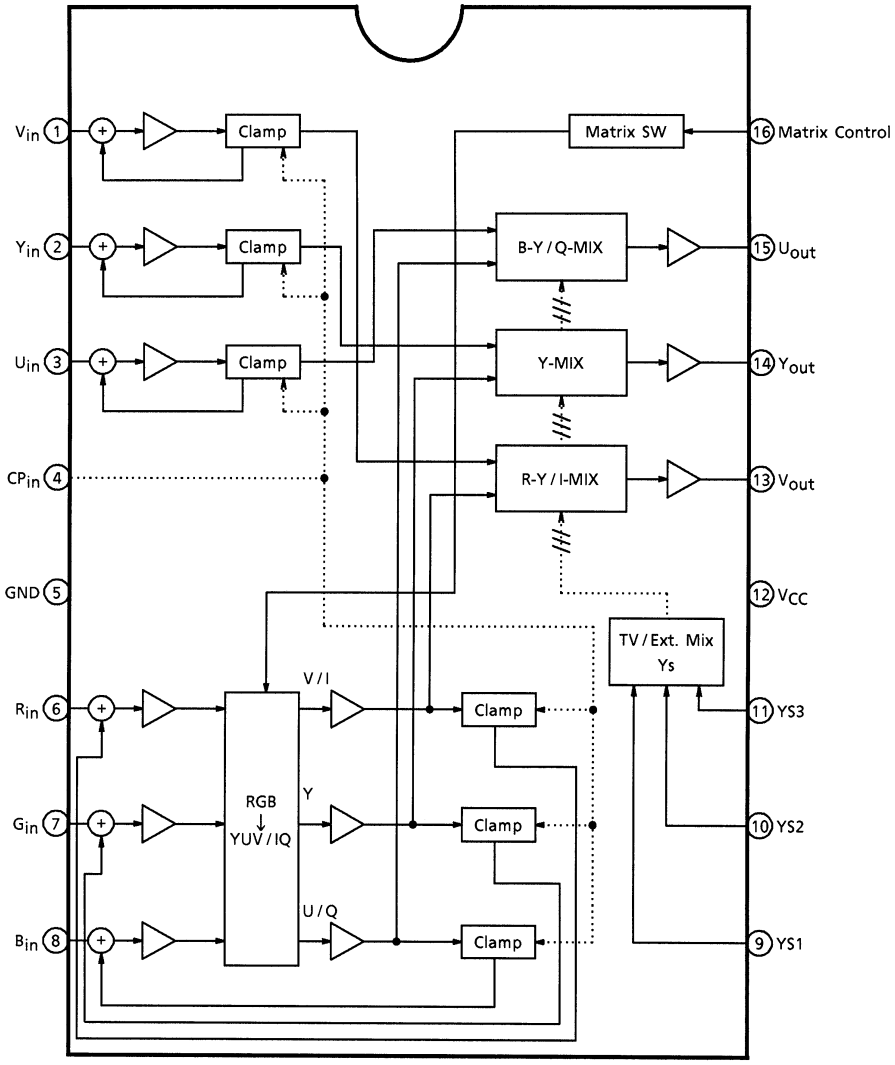


Weight
DIP16-P-300-2.54A: 1.0 g (typ.)
SSOP16-P-225-1.00A: 0.14 g (typ.)

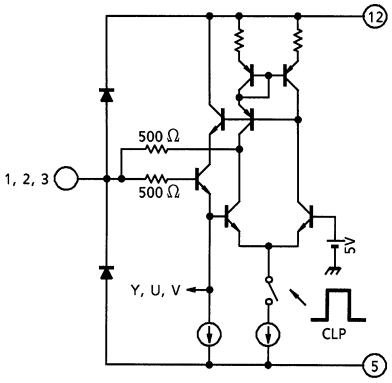
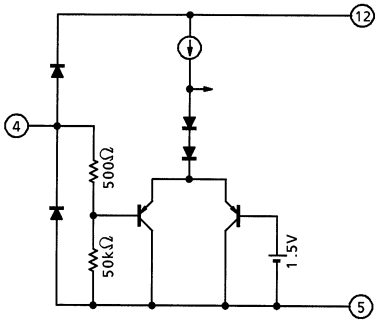
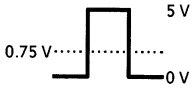
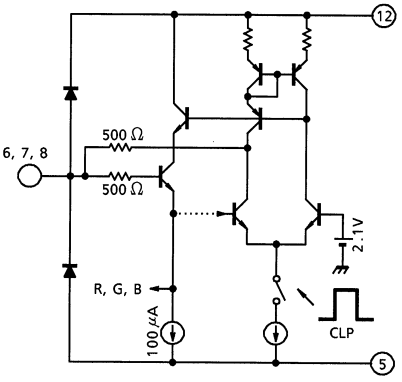
FEATURES

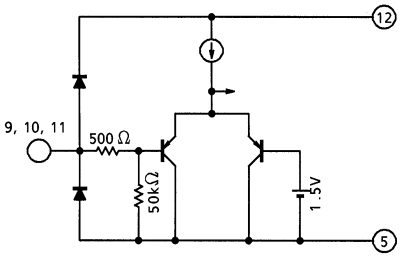
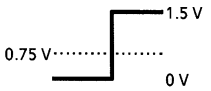
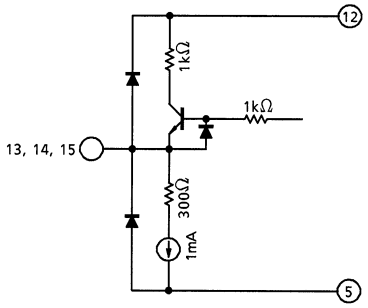
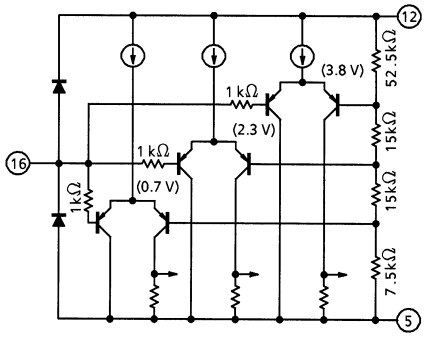
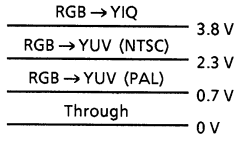
- RGB to YUV / IQ matrix circuit
- The mixing circuit for a main signal and an external signal
- The high-speed switching circuit of a main signal an external signal
- Band Width : 30MHz at −3dB point.

BLOCK DIAGRAM



TERMINAL FUNCTIONS

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
1	V_{IN}	Input R-Y (V) or R signal through a clamping capacitor.		DC : 6.2 V Y : 1 V_{p-p} (with sync) U / V : 0.3 V_{p-p} (B : C = 1 : 1) R / G / B : 0.7 V_{p-p} (100% white)
2	Y_{IN}	Input Y or G signal through a clamping capacitor.		
3	U_{IN}	Input B-Y (U) or B signal through a clamping capacitor.		
4	CP_{IN}	Input clamping pulse. Threshold : 0.75 V		
5	GND	GND.	—	—
6	R_{IN}	Input R or R-Y (V) signal through clamping capacitor.		DC : 6.2 V Y : 1V $_{p-p}$ (with sync) U / V : 0.3 V_{p-p} (B : C = 1 : 1) R / G / B : 0.7 V_{p-p} (100% white)
7	G_{IN}	Input G or Y signal through a clamping capacitor.		
8	B_{IN}	Input B or B-Y (U) signal through a clamping capacitor.		

PIN No	PIN NAME	FUNCTION	INTERFACE CIRCUIT	INPUT / OUTPUT SIGNAL
9 10 11	YS1,2, 3	Selector to switch mixing ratios. Threshold : 0.75 V		
12	V_{CC}	Supply 9 V.	—	DC : 9 V
13	V_{OUT}	Outputs R-Y (V) or R signal.		DC : 4.7 V Y : 1 V_{p-p} (with sync) U / V : 0.3 V_{p-p} (B : C = 1 : 1) R / G / B : 0.7 V_{p-p} (100% color bar)
14	Y_{OUT}	Outputs Y or G signal.		
15	U_{OUT}	Outputs B-Y (U) or B signal.		
16	Matrix Control	This terminal's voltage control the matrix coefficient for output signals.Selects the output mode.		

FUNCTION DESCRIPTION

MIXING RATIO

TA1287PG, TA1287FG have a circuit, which mixes a main signal with an external input signal and outputs the mixed signal. The mixing circuit has 8 combinations of mixing gain ratio of a main to an external signals.

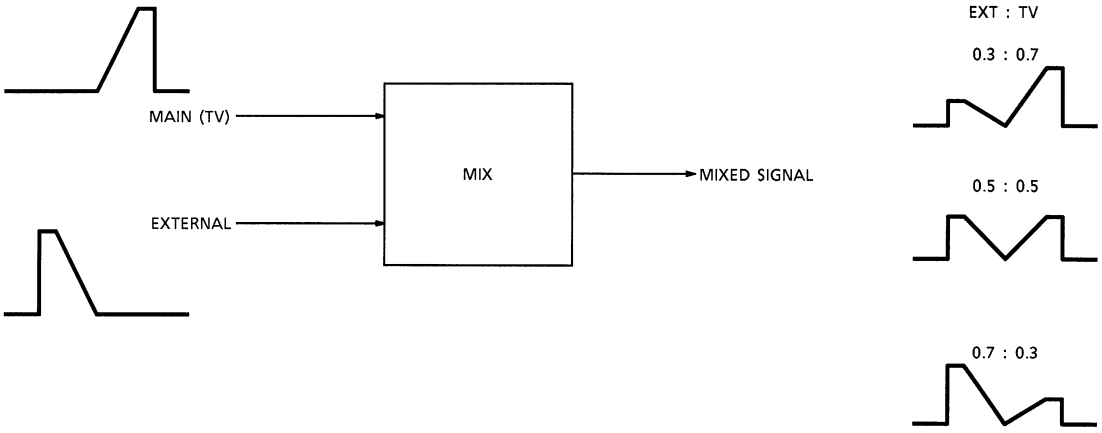


Table The mixing ratio of external to main (TV)

YS1	YS2	YS3	THE MIXING RATIO	
			EXTERNAL	MAIN (TV)
L	L	L	0	1
H	L	L	0.3	0.7
L	H	L	0.4	0.6
H	H	L	0.5	0.5
L	L	H	0.6	0.4
H	L	H	0.7	0.3
L	H	H	0.8	0.2
H	H	H	1	0

MATRIX CONTROL

Pin 16 is a high-speed switch to control the matrix mode for output signals.

Table Matrix mode depending on by the voltage of pin 16

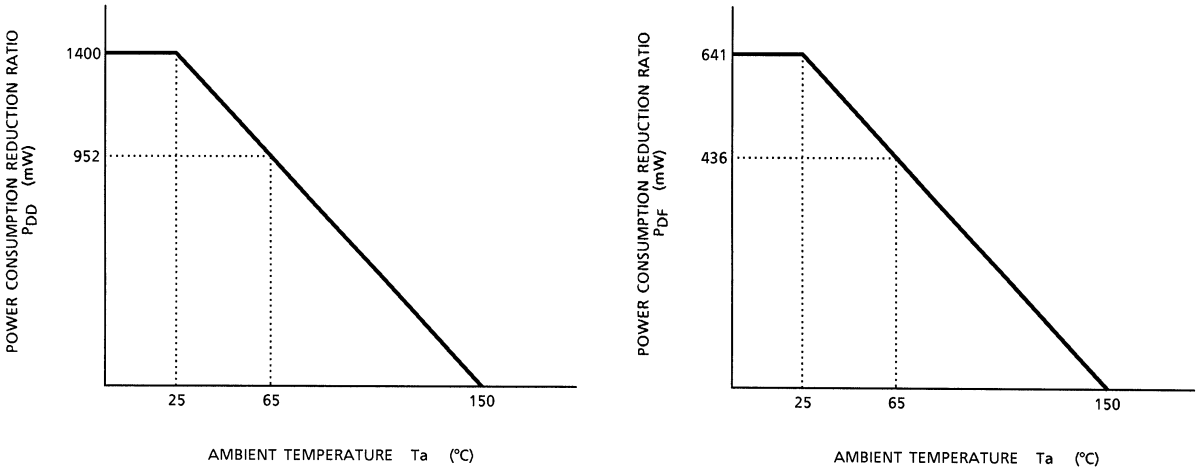
VOLTAGE OF PIN 16 [V]	MODE
0 ~ 0.7	Through
~ 2.3	RGB to YUV (PAL)
~ 3.8	RGB to YUV (NTSC)
3.8 ~	RGB to YIQ

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CCmax}	12	V
Input Pin Voltage		V_{in}	GND − 0.3 to V_{CC} + 0.3	V
Power Consumption	TA1287PG	P_{DD} (Note 1)	1400	mW
	TA1287FG	P_{DF} (Note 1)	641	
Power Consumption Reduction Ratio	TA1287PG	$1 / \theta_{jaD}$	−11.2	mW / °C
	TA1287FG	$1 / \theta_{jaF}$	−5.13	mW / °C
Operating Temperature		T_{opr}	−20~65	°C
Storage Temperature		T_{stg}	−55~150	°C

Note 1: Refer to the figure below.

Note 2: It is possible that TA1287FG function faultily caused by leak problems according to a field intensity from CRT. Put IC lay-out position to CRT be far more than 20 cm. If there is not a enough distance, intercept it by a shield.



(a) TA1287PG (b) TA1287FG

Fig. Power consumption reduction against ambient temperature

OPERATING CONDITIONS

CHARACTERISTIC	DESCRIPTION	MIN	TYP.	MAX	UNIT
Supply Voltage	Pin 12	8.1	9.0	9.9	V
Y Input Signal Level	White : 100% with sync.	—	1.0	—	V_{p-p}
U Input Signal Level	B : C = 1 : 1	—	300	—	mV_{p-p}
V Input Signal Level	B : C = 1 : 1	—	300	—	mV_{p-p}
R Input Signal Level	100% white	—	700	—	mV_{p-p}
G Input Signal Level	100% white	—	700	—	mV_{p-p}
B Input Signal Level	100% white	—	700	—	mV_{p-p}
CP Input Level	Pin 4	1.1	1.5	5.0	V
YS1, YS2, YS3, Input Level	Pin 9, 10, 11	1.1	1.5	5.0	V

ELECTRICAL CHARACTERISTICS
(V_{CC} = 9V and Ta = 25°C, unless otherwise specified)

Current consumption

PIN NAME	SYMBOL	TESTCIRCUIT	MIN	TYP.	MAX	UNIT
V_{CC}	I_{CC}	—	20.0	26.0	32.0	mA

Terminal voltages

PIN No.	PIN NAME	SYMBOL	TEST CIRCUIT	MIN	TYP.	MAX	UNIT
1	V_{IN}	V_1	—	6.0	6.2	6.4	V
2	Y_{IN}	V_2	—	6.0	6.2	6.4	
3	U_{IN}	V_3	—	6.0	6.2	6.4	
6	R_{IN}	V_6	—	6.0	6.2	6.4	
7	G_{IN}	V_7	—	6.0	6.2	6.4	
8	B_{IN}	V_8	—	6.0	6.2	6.4	
13	V_{OUT}	V_{13}	—	4.5	4.7	4.9	
14	Y_{OUT}	V_{14}	—	4.5	4.7	4.9	
15	U_{OUT}	V_{15}	—	4.5	4.7	4.9	

AC CHARACTERISTICS

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
YUV Gain	GTRY	—	(Note A_1)	−0.5	0	0.5	dB
(Through Mode)	GTY			−0.5	0	0.5	
	GTBY			−0.5	0	0.5	
RGB Gain	GRR	—	(Note A_2)	−0.5	0	0.5	dB
(Through Mode)	GRG			−0.5	0	0.5	
	GRB			−0.5	0	0.5	
R Gain (Input to Pin 6)	GRRYP	—	(Note A_3)	−4.7	−4.2	−3.7	dB
(Matrix Mode)	GRYP			−10.3	−9.8	−9.3	
	GRBYP			−17.3	−16.8	−16.3	
	GRRYN			−4.3	−3.8	−3.3	
	GRYN			−10.3	−9.8	−9.3	
	GRBYN			−18.4	−17.9	−17.4	
	GRRYI			−4.6	−4.1	−3.6	
	GRYI			−10.3	−9.8	−9.6	
	GRBYI			−13.0	−12.5	−12.0	
G Gain (Input to Pin 7)	GGRYP	—	(Note A_4)	−6.3	−5.8	−5.3	dB
(Matrix Mode)	GGYP			−4.5	−4.0	−3.5	
	GGBYP			−11.5	−11.0	−10.5	
	GGRYN			−5.9	−5.4	−4.9	
	GGYN			−4.5	−4.0	−3.5	
	GGBYN			−10.9	−10.4	−9.9	
	GGRYI			−11.5	−11.0	−10.5	
	GGYI			−4.5	−4.0	−3.5	
	GGBYI			−5.6	−5.1	−4.6	
B Gain (Input to Pin 8)	GBRYP	—	(Note A_5)	−21.1	−20.6	−20.1	dB
(Matrix Mode)	GBYP			−19.1	−18.6	−18.1	
	GBBYP			−7.7	−7.2	−6.7	
	GBRYN			−20.3	−19.8	−19.3	
	GBYN			−19.1	−18.6	−18.1	
	GBBYN			−7.9	−7.4	−6.9	
	GBRYI			−10.2	−9.7	−9.2	
	GBYI			−19.1	−18.6	−18.1	
	GBBYI			−10.7	−10.2	−9.7	
R-Y Gain (Input to Pin 1)	GTRY73	—	(Note A_6)	−3.7	−3.2	−2.7	dB
(Matrix Mode)	GTRY64			−5.0	−4.5	−4.0	
	GTRY55			−6.6	−6.1	−5.6	
	GTRY46			−8.5	−8.0	−7.5	
	GTRY37			−11.0	−10.5	−10.0	
	GTRY28			−14.3	−13.8	−13.3	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
Y Gain (Input to Pin 2)	GTY73	—	(Note A_7)	−3.7	−3.2	−2.7	dB
(Mixing Mode)	GTY64			−5.0	−4.5	−4.0	
	GTY55			−6.6	−6.1	−5.6	
	GTY46			−8.5	−8.0	−7.5	
	GTY37			−11.0	−10.5	−10.0	
	GTY28			−14.3	−13.8	−13.3	
B-Y Gain (Input to Pin 3)	GTBY73	—	(Note A_8)	−3.7	−3.2	−2.7	dB
(Mixing Mode)	GTBY64			−5.0	−4.5	−4.0	
	GTBY55			−6.6	−6.1	−5.6	
	GTBY46			−8.5	−8.0	−7.5	
	GTBY37			−11.0	−10.5	−10.0	
	GTBY28			−14.3	−13.8	−13.3	
R Gain (Input to Pin 6)	GRR37	—	(Note A_9)	−3.7	−3.2	−2.7	dB
(Mixing Mode)	GRR46			−5.0	−4.5	−4.0	
	GRR55			−6.6	−6.1	−5.6	
	GRR64			−8.5	−8.0	−7.5	
	GRR73			−11.0	−10.5	−10.0	
	GRR82			−14.3	−13.8	−13.3	
G Gain (Input to Pin 7)	GRG37	—	(Note A_{10})	−3.7	−3.2	−2.7	dB
(Mixing Mode)	GRG46			−5.0	−4.5	−4.0	
	GRG55			−6.6	−6.1	−5.6	
	GRG64			−8.5	−8.0	−7.5	
	GRG73			−11.0	−10.5	−10.0	
	GRG82			−14.3	−13.8	−13.3	
B Gain (Input to Pin 8)	GRB37	—	(Note A_{11})	−3.7	−3.2	−2.7	dB
(Mixing Mode)	GRB46			−5.0	−4.5	−4.0	
	GRB55			−6.6	−6.1	−5.6	
	GRB64			−8.5	−8.0	−7.5	
	GRB73			−11.0	−10.5	−10.0	
	GRB82			−14.3	−13.8	−13.3	
YUV Input Dynamic Range	DTV	—	(Note A_{12})	1.2	1.5	1.7	V_{p-p}
(Through Mode)	DTY			1.2	1.5	1.7	
	DTU			1.2	1.5	1.7	
RGB Input Dynamic Range	DRR	—	(Note A_{13})	1.2	1.5	1.7	V_{p-p}
(Through Mode)	DRG			1.2	1.5	1.7	
	DRB			1.2	1.5	1.7	
R Input Dynamic Range	DRP	—	(Note A_{14})	1.2	1.5	1.7	V_{p-p}
(Input to Pin 6)	DRNU			1.2	1.5	1.7	
(Matrix Mode)	DRNI			1.2	1.5	1.7	
G Input Dynamic Range	DGP	—	(Note A_{15})	1.2	1.5	1.7	V_{p-p}
(Input to Pin 7)	DGNU			1.2	1.5	1.7	
(Matrix Mode)	DGNI			1.2	1.5	1.7	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN	TYP.	MAX	UNIT
B Input Dynamic Range	DBP	—	(Note A_{16})	1.2	1.5	1.7	V_{p-p}
(Input to Pin 8)	DBNU			1.2	1.5	1.7	
(Matrix Mode)	DBNI			1.2	1.5	1.7	
YUV Input and Output	GfTRY	—	(Note A_{17})	30	—	—	MHz
Frequency Characteristic	GfTY			30	—	—	
(At −3 dB Point)	GfTBY			30	—	—	
(Through Mode)							
RGB Input and Output	GfRR	—	(Note A_{18})	30	—	—	MHz
Frequency Characteristic	GfRG			30	—	—	
(At −3 dB Point)	GfRB			30	—	—	
(Through Mode)							
	YsRYR	—	(Note A_{19})	—	25.0	40.0	ns
	YsRRY			—	20.0	40.0	
Ys Switching Delay	YsYG			—	25.0	40.0	
Time	YsGY			—	20.0	40.0	
	YsBYB			—	25.0	40.0	
	YsBBY			—	20.0	40.0	
Crosstalk between Each Input	—	—	(Note A_{20})	—	−50	−40	dB

TEST CONDITION

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						
		SW MODE						MEASURING METHOD
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
								<Common test condition> 1) V_{CC} = 9 V and Ta = 25 ± 3°C. 2) ALL switch modes are B, unless otherwise specified.
A_1	YUV Gain (Through Mode)	B	B	B	B	B	B	1) Input Signal 1 into pin 4 2) Supply DC 0 V to YS1 (pin 9), YS2 (pin 10), YS (pin 11). 3) Input Signal 2 (f_0 = 100 kHz, V_0 = 0.2 Vp-p) into V-IN (pin 1, SW_1 = A). 4) Measure the amplitude of V-OUT at pin 13. Calculate the gain. (GTRY) 5) Calculate gains of Y-IN to Y-OUT and U-IN to U-OUT, in the same way as 3) to 4) GTY : Y-IN (pin 2) to Y-OUT (pin 14) GTBY : U-IN (pin 3) to U-OUT (pin 15)
A_2	RGB Gain (Through Mode)	A	A	A	B	B	B	1) Calculate gains against R, G and B, in the same way as NOTE A_1. GRR : SW_6 = A, R-IN (pin 6) to V-OUT (pin 13) GRG : SW_7 = A, R-IN (pin 7) to Y-OUT (pin 14) GRB : SW_8 = A, R-IN (pin 8) to U-OUT (pin 15)

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						
		SW MODE						MEASURING METHOD
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_3	R Gain (Input to Pin 6) (Matrix Mode)	A	A	A	B	B	A	1) Calculate gains against each item, in the same way as NOTE A_1. (PAL) GRRYP : R-IN (pin 6) to V-OUT (pin 13) GRYP : R-IN (pin 6) to Y-OUT (pin 14) GRBYP : R-IN (pin 6) to U-OUT (pin 15)
					A	B	A	(NTSC, UV) GRRYN : R-IN (pin 6) to V-OUT (pin 13) GRYN : R-IN (pin 6) to Y-OUT (pin 14) GRBYN : R-IN (pin 6) to U-OUT (pin 15)
					A	A	A	(NTSC, IQ) GRRYI : R-IN (pin 6) to V-OUT (pin 13) GRYI : R-IN (pin 6) to Y-OUT (pin 14) GRBYI : R-IN (pin 6) to U-OUT (pin 15)

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_4	G Gain (Input to Pin 7) (Matrix Mode)	A	A	A	B	B	A	1) Calculate gains against each item, in the same way as NOTE A_1. (PAL) GGRYP : G-IN (pin 7) to V-OUT (pin 13) GGYP : G-IN (pin 7) to Y-OUT (pin 14) GGBYP : G-IN (pin 7) to U-OUT (pin 15)
					A	B	A	(NTSC, UV) GGRYN : G-IN (pin 7) to V-OUT (pin 13) GGYN : G-IN (pin 7) to Y-OUT (pin 14) GGBYN : G-IN (pin 7) to U-OUT (pin 15)
					A	A	A	(NTSC, IQ) GGRYI : G-IN (pin 7) to V-OUT (pin 13) GGYI : G-IN (pin 7) to Y-OUT (pin 14) GGBYI : G-IN (pin 7) to U-OUT (pin 15)

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_5	B Gain (Input to Pin 8) (Matrix Mode)	A	A	A	B	B	B	1) Calculate gains against each item, in the same way as NOTE A_1. (PAL) GGRYP : B-IN (pin 8) to V-OUT (pin 13) GGYP : B-IN (pin 8) to Y-OUT (pin 14) GGBYP : B-IN (pin 8) to U-OUT (pin 15)
					A	B	A	(NTSC, UV) GGRYN : B-IN (pin 8) to V-OUT (pin 13) GGYN : B-IN (pin 8) to Y-OUT (pin 14) GGBYN : B-IN (pin 8) to U-OUT (pin 15)
					A	A	A	(NTSC, IQ) GGRYI : B-IN (pin 8) to V-OUT (pin 13) GGYI : B-IN (pin 8) to Y-OUT (pin 14) GGBYI : B-IN (pin 8) to U-OUT (pin 15)

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_6	R-Y Gain (Input to Pin 1) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Input Signal into pin 4. 2) Supply DC 0V to YS1 (pin 9), YS2 (pin 10), YS3 (pin 11). 3) Input Signal 2 (f_0 = 100 kHz, V_0 = 0.2 V_{p-p}) into V-IN (pin 1, SW_1 = A). 4) Measure each amplitude of output signal from V-OUT (pin 13) in each SW MODE. Calculate the gains.
A_7	Y Gain (Input to Pin 2) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Calculate gains of Y-IN (pin 2) to Y-OUT (pin 14), in the same way as NOTE A_6. (SW_2 = A)
A_8	B-Y Gain (Input to Pin 3) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Calculate gains of U-IN (pin 3) to Y-OUT (pin 15), in the same way as NOTE A_6. (SW_3 = A)
A_9	R Gain (Input to Pin 6) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Calculate gains of R-IN (pin 6) to V-OUT (pin 13), in the same way as NOTE A_6. (SW_6 = A)
A_{10}	G Gain (Input to Pin 7) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Calculate gains of G-IN (pin 7) to Y-OUT (pin 14), in the same way as NOTE A_6. (SW_7 = A)

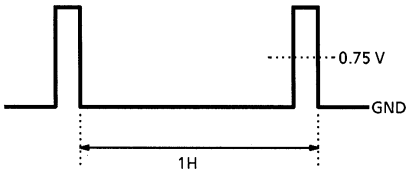
NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_{11}	B Gain (Input to Pin 8) (Mixing Mode)	A B A B A B	B A A B B A	B B B A A A	B	B	B	1) Calculate gains of B-IN (pin 8) to U-OUT (pin 15), in the same way as NOTE A_6. (SW_8 = A)
A_{12}	YUV Input Dynamic Range (Through Mode)	B	B	B	B	B	B	1) Input Signal into pin 4. 2) Supply DC 0V to YS1 (pin 9), YS2 (pin 10), YS3 (pin 11). 3) Input Signal 2 (f_0 = 100 kHz, V_0 = 0.2 V_{p-p}) into V-IN (pin 1, SW_1 = A). 4) Increase the amplitude of input-signal 2 gradually. Measure the biggest amplitude of input-signal 2 without any distortion on V-OUT wave shape. (DTRY) 5) Measure in the same way as (pin 3) to (pin 4) for Y-IN (pin 2, SW_2 = A) and U-IN (pin 3, SW_3 = A), DTY : Y-IN (pin 2) to Y-OUT (pin 14) DTBY : U-IN (pin 3) to U-OUT (pin 15)
A_{13}	RGB Input Dynamic Range (Through Mode)	B	B	B	B	B	B	1) Measure in the same way as NOTE A_{12} for R-IN (pin 6, SW_6 = A) G-IN (pin 7, SW_7 = A) and B-IN (pin 8, SW_8 = A).
A_{14}	R Input Dynamic Range (Input to Pin 6) (Matrix Mode)	A	A	A	B A A	B B A	A A A	1) For each combination of $SW_{16A, 16B}$ and $_{16C}$, measure each item in the same way as 1) to 4) of NOTE A_{12}. (SW_6 = A, R-IN (pin 6) to V-OUT (pin 13)) DRP : PAL DRNU : NTSC, UV DRNI : NTSC, IQ

NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_{15}	G Input Dynamic Range (Input to Pin 7) (Matrix Mode)	A	A	A	B A A	B B A	A A A	1) Measure each item in the same way as NOTE A_{14}. (SW_7 = A, G-IN (pin 7) to Y-OUT (pin 14)) DGP : PAL DGNU : NTSC, UV DGNI : NTSC, IQ
A_{16}	B Input Dynamic Range (Input to Pin 8) (Matrix Mode)	A	A	A	B A A	B B A	A A A	1) Measure each item in the same way as NOTE A_{14}. (SW_8 = A, B-IN (pin 8) to U-OUT (pin 15)) DBP : PAL DBNU : NTSC, UV DBNI : NTSC, IQ
A_{17}	YUV Input and Output Frequency Characteristic (At −3 dB Point) (Through Mode)	B	B	B	B	B	B	1) Input Signal 1 into pin 4. 2) Supply DC 0V to YS1 (pin 9), YS2 (pin 10), YS3 (pin 11). 3) Input Signal 2 (f_0 = 30 MHz, V_0 = 0.2 V_{p-p}) into V-IN (pin 1, SW_1 = A). 4) Measure the amplitude during picture period on V-OUT (pin13). (v_{13}-30 MHz) 5) Calculate the frequency gain by using the following equation and v_{13}, which is measured as the output amplitude in NOTE A_1. GfTRY = 20 ℓog (v_{13}-30 MHz / v_{13}) 6) Calculate following items, in the same way as clause 5). GfTY : Y-IN (pin 2) to Y-OUT (pin 14) GfTBY : U-IN (pin 3) to U-OUT (pin 15)

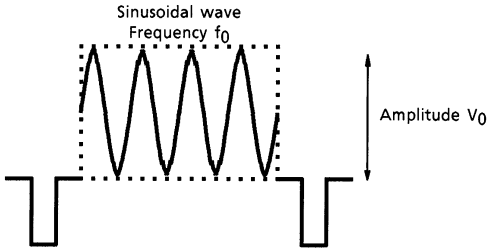
NOTE	ITEM	TEST CONDITION (UNLESS OTHERWISE SPECIFIED, V_{CC} = 9 V and Ta = 25 ± 3°C)						MEASURING METHOD
		SW MODE						
		SW_9	SW_{10}	SW_{11}	SW_{16A}	SW_{16B}	SW_{16C}	
A_{18}	RGB Input and Output Frequency Characteristic (At −3 dB Point) (Through Mode)	A	A	A	B	B	B	1) In the same way as NOTE A_{17}, calculate items against R-IN (pin 6, SW_6 = A), G-IN (pin 7, SW_7 = A) and B-IN (pin 8, SW_8 = A). GfRR : R-IN (pin 6) to V-OUT (pin 13) GfRG : G-IN (pin 7) to Y-OUT (pin 14) GfRB : B-IN (pin 8) to U-OUT (pin 15)
A_{19}	Ys Switching Delay Time	—	—	—	B	B	B	1) Input Signal 1 into pin 4. 2) Input Signal 3 into R-IN (pin 6, SW_6 = A). Input Signal 4 into YS1 (pin 9), YS2 (pin 10), YS3 (pin 11). 3) Measure (I) and (II) periods on V-OUT (pin 13). 4) Measure in the same way as 2) to 3) for G-IN (pin 7, SW_7 = A) and B-IN (pin 8, SW_8 = A). R-IN (I) : YsRYR (II) : YsRYR G-IN (I) : YsYG (II) : YsYG B-IN (I) : YsBYB (II) : YsBBY
A_{20}	Crosstalk between Each Input	A or B	A or B	A or B	B	B	B	1) Input Signal into pin 4. 2) Supply DC 0V to YS1 (pin 9), YS2 (pin 10), YS3 (pin 11). 3) Input Signal 2 (f_0 = 4 MHz, V_0 = 0.5 V_{p-p}) into V-IN (pin 1, SW_1 = A). 4) Changing SW_9, SW_{10}, and SW_{11} against each case, measure each leak levels. 5) Calculate the gains, input level to leak level.

TEST SIGNALS

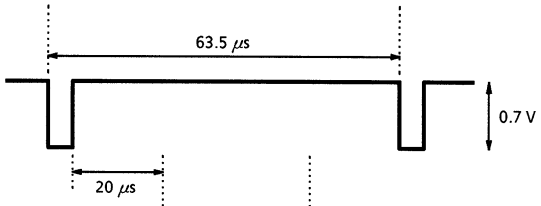
Signal 1



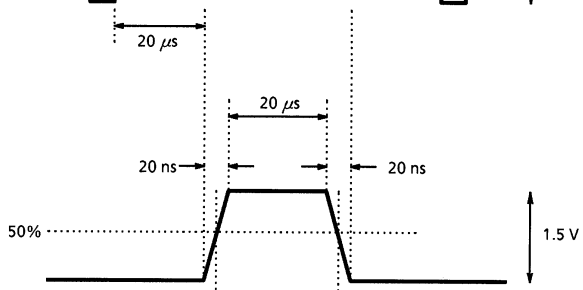
Signal 2



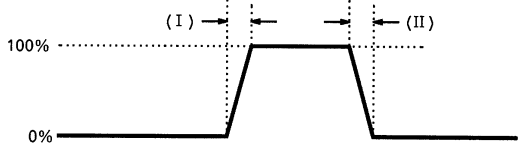
Signal 3



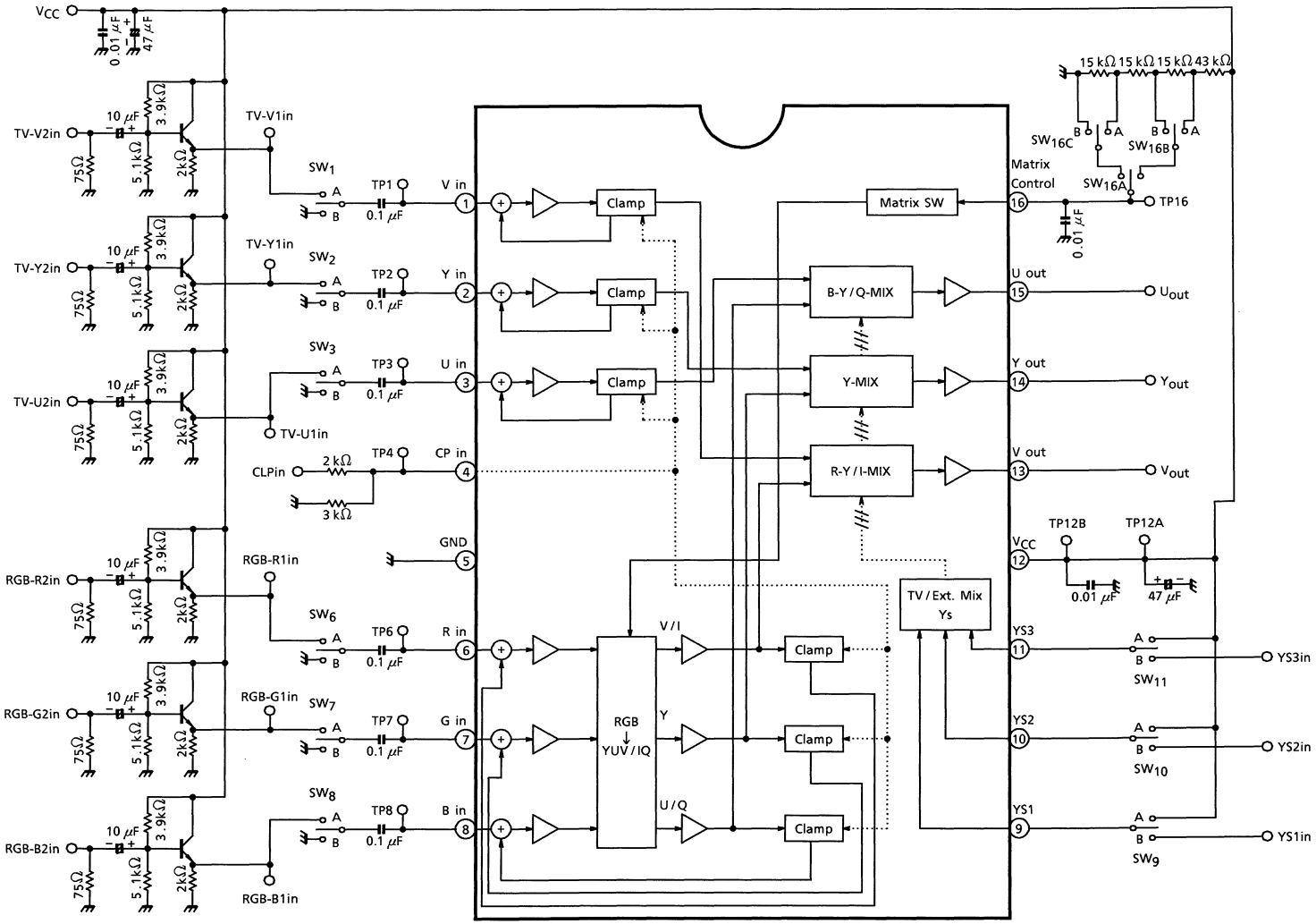
Signal 4



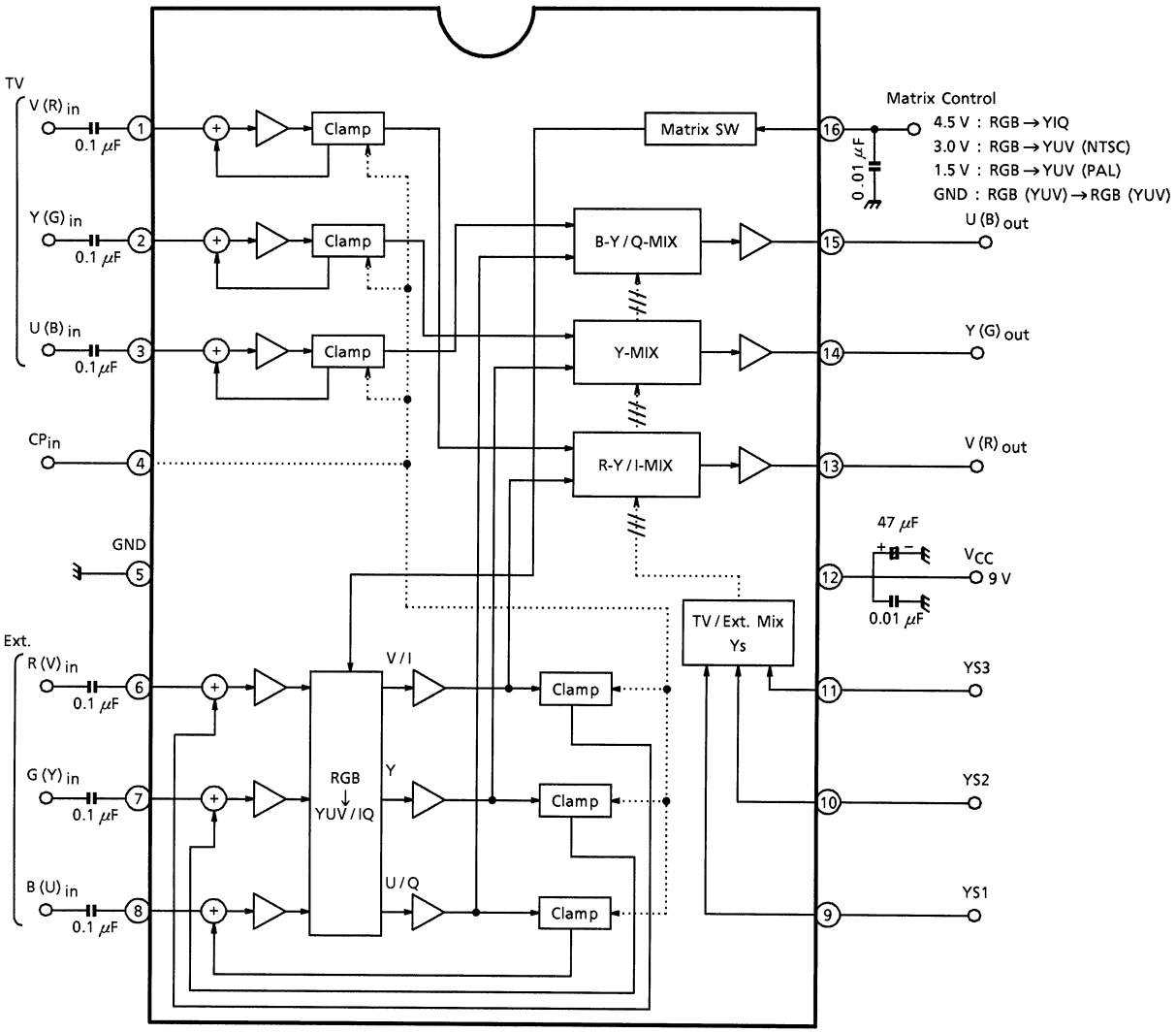
Output wave-form



TEST CIRCUIT



APPLICATION CIRCUIT

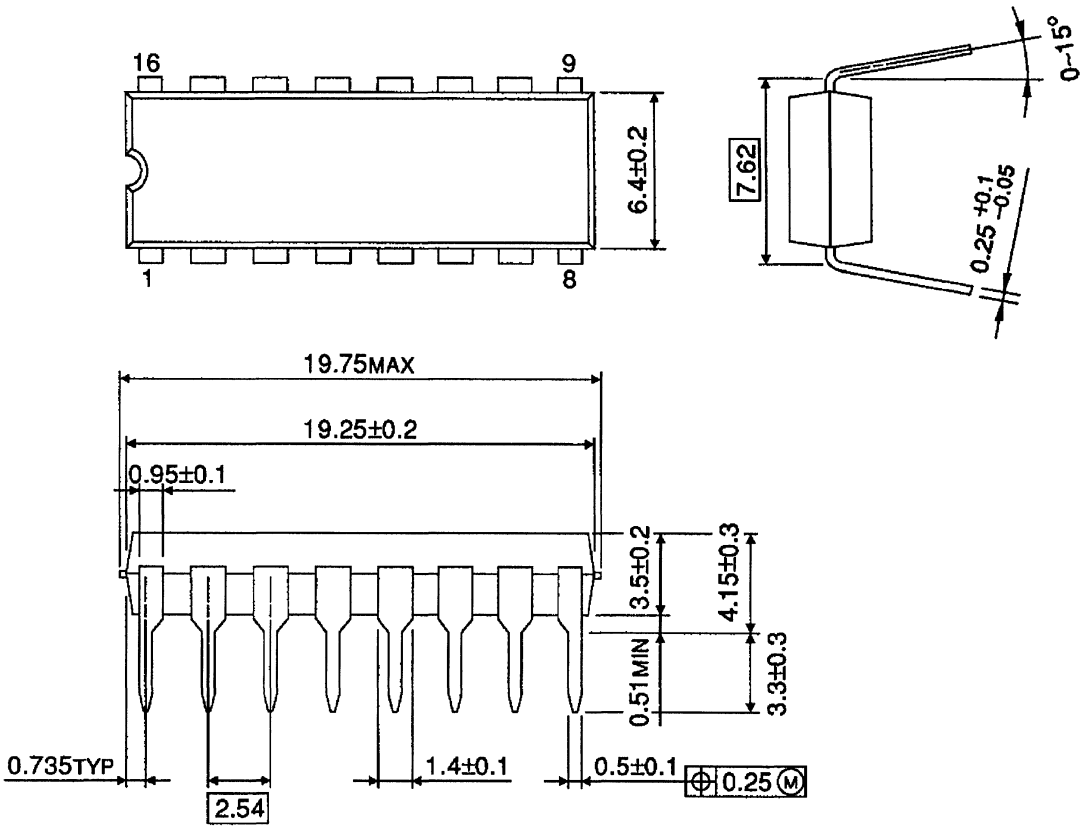


THE MIXING RATIO TABLE FOR EXTERNAL TO TV

Ys1	Ys2	Ys3	EXT : TV
L	L	L	0 : 1
H	L	L	0.3 : 0.7
L	H	L	0.4 : 0.6
H	H	L	0.5 : 0.5
L	L	H	0.6 : 0.4
H	L	H	0.7 : 0.3
L	H	H	0.8 : 0.2
H	H	H	1 : 0

PACKAGE DIMENSIONS

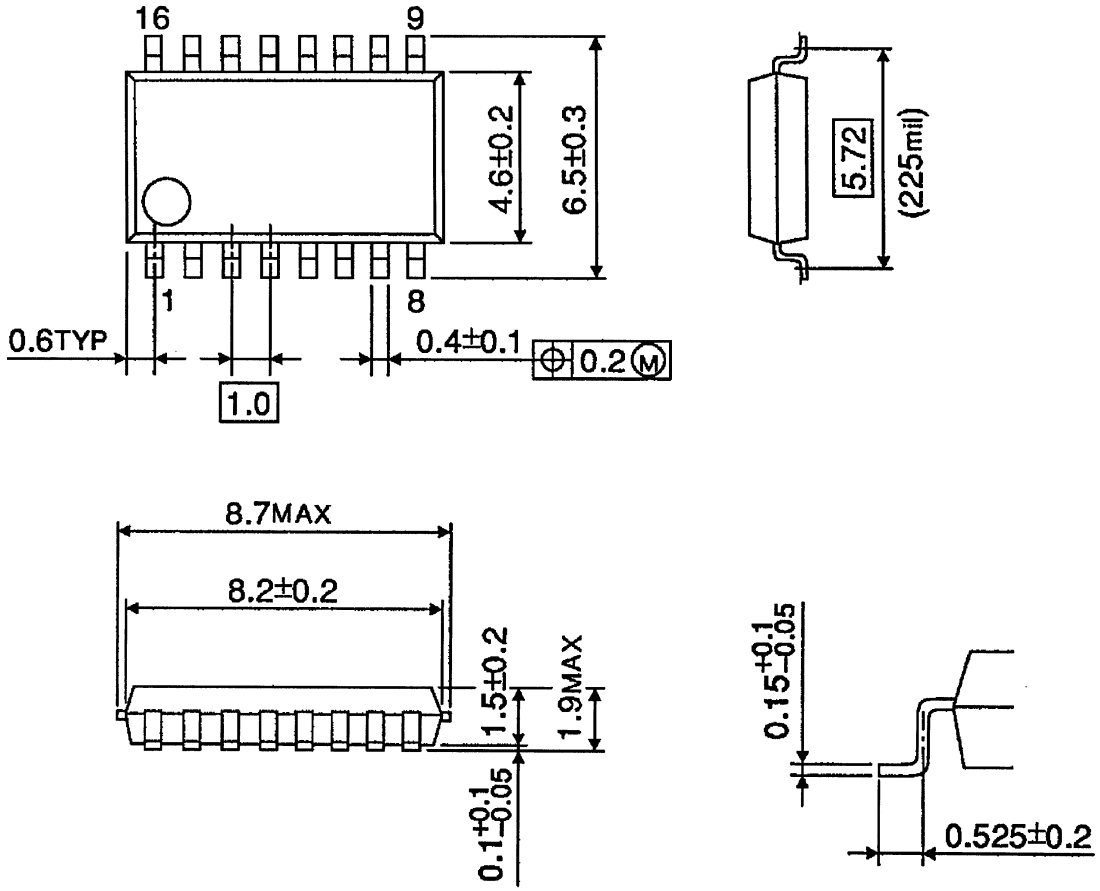
DIP16-P-300-2.54A Unit : mm



Weight: 1.0g (Typ.)

PACKAGE DIMENSIONS

SSOP16-P-225-1.00A Unit : mm



Weight: 0.14g (Typ.)

About solderability, following conditions were confirmed

- Solderability

(1) Use of Sn-63Pb solder Bath
- solder bath temperature = 230°C
- dipping time = 5 seconds
- the number of times = once
- use of R-type flux

(2) Use of Sn-3.0Ag-0.5Cu solder Bath
- solder bath temperature = 245°C
- dipping time = 5 seconds
- the number of times = once
- use of R-type flux

RESTRICTIONS ON PRODUCT USE

030619EBA

- The information contained herein is subject to change without notice.
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
  In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the “Handling Guide for Semiconductor Devices,” or “TOSHIBA Semiconductor Reliability Handbook” etc..
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury (“Unintended Usage”). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc.. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer’s own risk.
- The products described in this document are subject to the foreign exchange and foreign trade laws.
- TOSHIBA products should not be embedded to the downstream products which are prohibited to be produced and sold, under any law and regulations.