

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

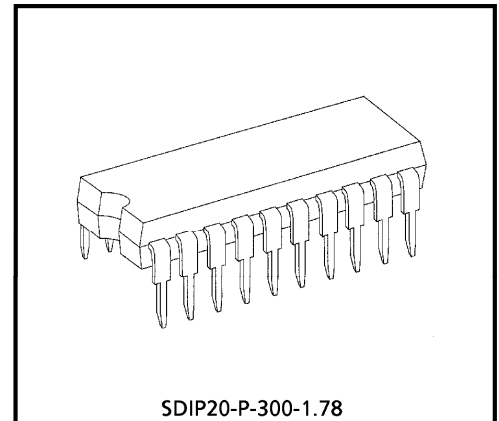
# TA8814N

## COLOR TRANSIENT IMPROVER IC FOR TV

The TA8814N is an integrated circuit having the following two functions in the shrink DIP 20 pin package: the CTI (Color Transient Improvor) function to improve protrusion and dullness of color signal edge, and function to improve medium luminance and replay of dark area detail by  $\gamma$  correction.

### FEATURES

- CTI function (built-in DL)
- $\gamma$  correction
- Color bandwidth switching
- Clamp circuit



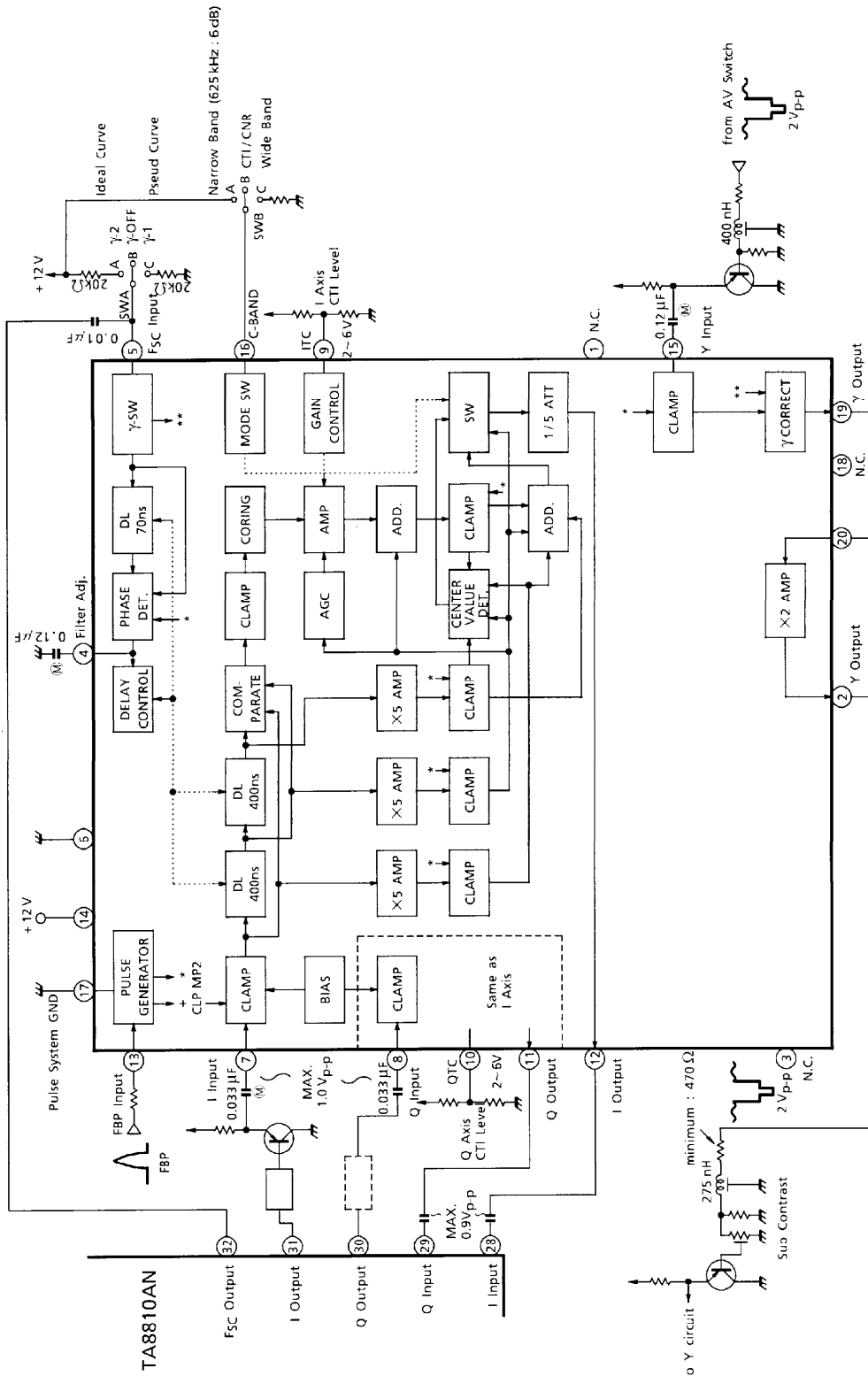
SDIP20-P-300-1.78

Weight : 1.02 g (Typ.)

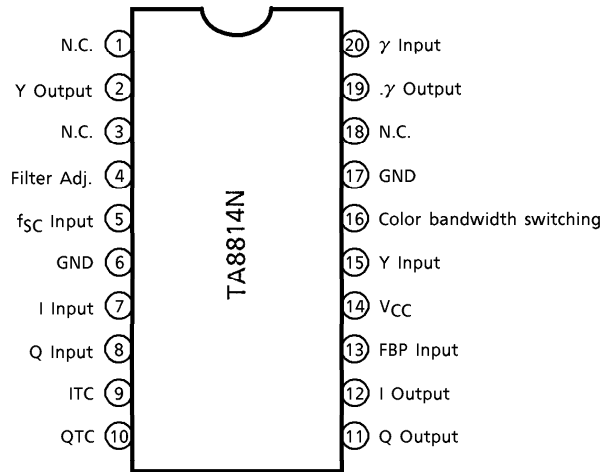
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BLOCK DIAGRAM



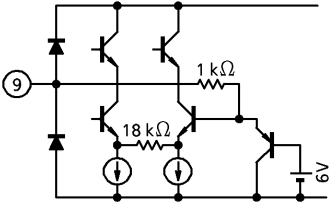
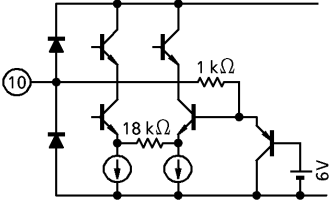
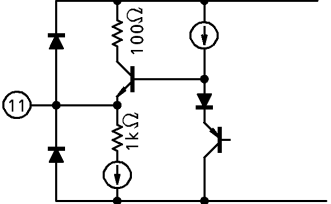
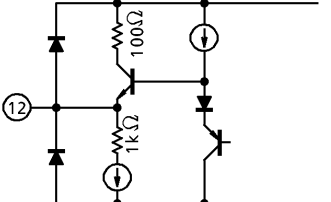
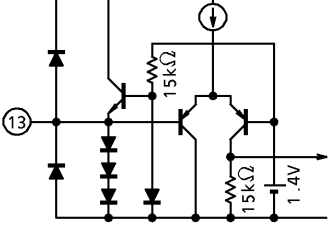
TERMINAL CONNECTION DIAGRAM



TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
1	N.C.	This is an non-connected pin.	—
2	Y Output	This is an output pin of a twice amplifier. Since this pin is an emitter open type, it is necessary to connect a resistor between this pin and GND.	
3	N.C.	This is an non-connected pin.	—
4	Filter Adj.	This is a pin for a filter to adjust internal delay lines automatically. 0.1 μF capacitor is recommended for this filter.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
5	f <sub>SC</sub> Input	<p>This is an input pin of reference signal (f<sub>SC</sub>) to adjust delay lines automatically. This is also a <math>\gamma</math> correction curve switching pin.</p> <p>0 ~3.6 V Ideal curve                      3.6~8.4 V <math>\gamma</math> correction off                      8.4~12 V Pseudo curve</p>	
6	GND	—	—
7	I Input	<p>This pin is for I input. The input dynamic range is 1.2 V<sub>p-p</sub> (Typ.). The delay time between in / output is 400 ns (Typ.).</p>	
8	Q Input	<p>This pin is for Q input. The input dynamic range is 1.2 V<sub>p-p</sub> (Typ.). The delay time between in / output is 400 ns (Typ.).</p>	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
9	ITC	This is a pin for adjusting the CTI level of I signal.	
10	QTC	This is a pin for adjusting the CTI level of Q signal.	
11	Q Output	This pin is for Q output.	
12	I Output	This pin is for I output.	
13	FBP Input	This pin is for FBP input. The input threshold level is 1.4 V (Typ.).	
14	VCC	—	—

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
15	Y Input	This pin is for Y input of $\gamma$ correction circuit. The input level is 1V <sub>p-p</sub> (Typ.).	
16	Color Bandwidth Switching	This pin is a CTI on / off SW and color bandwidth changing SW. 0 ~3.6 V Through mode 3.6~8.4 V CTI mode 8.4~12 V LPF mode	
17	GND	—	—
18	N.C.	This is an non-connected pin.	—
19	$\gamma$ Output	This pin is for Y output of $\gamma$ correction circuit.	
20	$\gamma$ Input	This is an input pin of twice amplifier circuit.	

## MAXIMUM RATING (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V <sub>CC</sub>	15	V
Power Dissipation	P <sub>Dmax</sub>	1400 (Note)	mW
Input Signal Voltage	e <sub>in</sub>	9	V <sub>p-p</sub>
Operating Temperature	T <sub>opr</sub>	-20~65	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

(Note) : When using the device at above Ta = 25°C, decrease the power dissipation by 11.2 mW for each increase of 1°C.

## ELECTRICAL CHARACTERISTICS

DC characteristics

DC voltage characteristics (Unless otherwise specified, V<sub>CC</sub> = 9 V, Ta = 25°C.)

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
2	Y Output	V <sub>2</sub>	—	—	6.2	6.4	6.8	V
4	Filter Adj.	V <sub>4</sub>	—	—	5.2	6.0	6.8	V
5	f <sub>SC</sub> Input	V <sub>5</sub>	—	—	5.8	6.0	6.2	V
6	GND	V <sub>6</sub>	—	—	—	0	—	V
7	I Input	V <sub>7</sub>	—	—	3.8	4.0	4.2	V
8	Q Input	V <sub>8</sub>	—	—	3.8	4.0	4.2	V
9	ITC	V <sub>9</sub>	—	—	7.8	8.0	8.2	V
10	QTC	V <sub>10</sub>	—	—	7.8	8.0	8.2	V
11	Q Output	V <sub>11</sub>	—	—	4.7	4.9	5.1	V
12	I Output	V <sub>12</sub>	—	—	4.7	4.9	5.1	V
13	FBP Input	V <sub>13</sub>	—	—	0.71	0.76	0.81	V
14	V <sub>CC</sub>	V <sub>14</sub>	—	—	11.0	12.0	13.0	V
15	Y Input	V <sub>15</sub>	—	—	3.8	4.0	4.2	V
16	Color Bandwidth Switching	V <sub>16</sub>	—	—	5.8	6.0	6.2	V
17	GND	V <sub>17</sub>	—	—	—	0	—	V
19	γ Output	V <sub>19</sub>	—	—	3.8	4.0	4.2	V
20	γ Input	V <sub>20</sub>	—	—	3.8	4.0	4.2	V

DC current characteristic

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
14	V <sub>CC</sub>	I <sub>CC</sub>	—	—	45	55	70	mA

AC current characteristics (Unless otherwise specified,  $V_{CC} = 9\text{ V}$ ,  $HV_{CC} = 9\text{ V}$ ,  $T_a = 25^\circ\text{C}$ .)

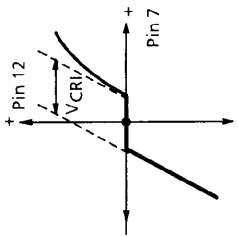
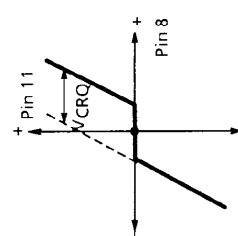
CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
I Input Clamp Voltage	$V_{CL7}$	—	(Note 1)	3.8	4.0	4.2	V
Q Input Clamp Voltage	$V_{CL8}$	—	(Note 2)	3.8	4.0	4.2	V
I Input D Range	$V_{MAX7}$	—	(Note 3)	1.0	1.2	1.3	$V_{p-p}$
Q Input D Range	$V_{MAX8}$	—	(Note 4)	1.0	1.2	1.3	$V_{p-p}$
Gain Between I Input And Output	$G_{VI}$	—	(Note 5)	0.1	0.5	0.9	dB
Gain Between Q Input And Output	$G_{VQ}$	—	(Note 6)	0	0.4	0.8	dB
Delay Time Between I Input And Output	$T_{DI}$	—	(Note 7)	360	400	440	ns
Delay Time Between Q Input And Output	$T_{DQ}$	—	(Note 8)	360	400	440	ns
I Bandwidth Switch Offset Voltage	$\Delta V_{SWI}$	—	(Note 9)	—	0	$\pm 6.0$	mV
Q Bandwidth Switch Offset Voltage	$\Delta V_{SWQ}$	—	(Note 10)	—	0	$\pm 6.0$	mV
Frequency Characteristics On Narrow Bandwidth Mode And Maximum ITC	$G_{VPI}$	—	(Note 11)	2.7	5.7	8.7	dB
Frequency Characteristics On Narrow Bandwidth Mode And Maximum QTC	$G_{VPQ}$	—	(Note 12)	7.6	10.6	13.6	dB
Secondary Differential AMP Coring Band (I Axis)	$V_{CRI}$	—	(Note 13)	3.0	6.0	9.0	$mV_{p-p}$
Secondary Differential AMP Coring Band (Q Axis)	$V_{CRQ}$	—	(Note 14)	3.0	6.0	9.0	$mV_{p-p}$
Bandwidth Switching Threshold Value I	$V_{THC1}$	—	(Note 15)	8.2	8.5	8.8	V
Bandwidth Switching Threshold Value II	$V_{THC2}$	—	(Note 16)	3.3	3.6	3.9	V
Clamp Pulse Phase	$T_{CLB}$	—	(Note 17)	6.0	6.3	6.6	$\mu\text{s}$
Clamp Pulse Width	$T_{CLW}$	—	(Note 18)	1.4	1.81	2.2	$\mu\text{s}$
Y Input Clamp Voltage	$V_{CL15}$	—	(Note 19)	3.8	4.0	4.2	V
I/Q Output Residual Noise	$V_N$	—	(Note 20)	0.7	1.2	1.7	$mV_{p-p}$
$\gamma$ Correction I Point I	$V_{\gamma 1-1}$	—	(Note 21)	115	120	125	mV
$\gamma$ Correction I Point II	$V_{\gamma 1-2}$	—	(Note 22)	697	704	711	mV
$\gamma$ Correction II Point I	$V_{\gamma 2-1}$	—	(Note 23)	134	141	148	mV
$\gamma$ Correction II Point II	$V_{\gamma 2-2}$	—	(Note 24)	695	705	715	mV
Y Amplifier Total Gain	$G_{VY}$	—	(Note 25)	8.2	8.7	9.2	dB
Y Amplifier Total Frequency Characteristic	$F_{CY}$	—	(Note 26)	10	30	—	MHz

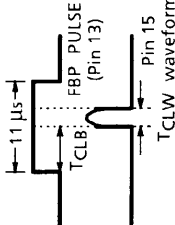
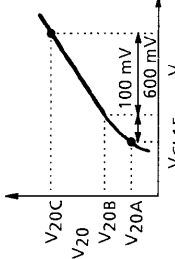


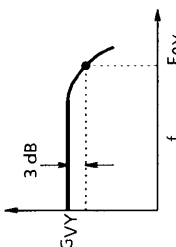
TEST CONDITION

NOTE	ITEM	MEASUREMENT CONDITION (V <sub>CC</sub> = 9V, T <sub>a</sub> = 25 ± 3°C)										MEASUREMENT METHOD	
		SW & VR MODE											
		SW7	SW8	SW15	SW16	VR9	VR10	VR16	VR9	VR10	VR16		
1	I Input Clamp Voltage	a	a	c									Measure the TP7 voltage.
2	Q Input Clamp Voltage	a	a	c									Measure the TP8 voltage. (1) Input a 500 kHz signal into IN3. (2) While increasing input amplitude, measure the amplitude at TP7 when TP12 output waveform starts to distort.
3	I Input D Range	b	b	c	c	Min.	Min.						(1) Input a 500 kHz signal into IN3. (2) While increasing input amplitude, measure the amplitude at TP8 when TP11 output waveform starts to distort.
4	Q Input D Range	b	b	a	c	Min.	Min.						(1) Input a 0.5 V <sub>p-p</sub> , 500 kHz signal into IN3. (2) Measure the amplitude at TP12, which is V <sub>p12</sub> . (3) Calculate : $GV1 = 20 \log \frac{Vp12}{0.5 Vp-p}$
5	Gain Between I Input And Output	b	b	a	c	Min.	Min.						(1) Input a 0.5 V <sub>p-p</sub> , 500 kHz signal into IN3. (2) Measure the amplitude at TP11, which is V <sub>p11</sub> . (3) Calculate : $GVQ = 20 \log \frac{Vp11}{0.5 Vp-p}$
6	Gain Between Q Input And Output	b	b	a	c	Min.	Min.						(1) Input a 0.5 V <sub>p-p</sub> , 3.58 MHz sine wave into TP5a. (2) Input a 0.5 V <sub>p-p</sub> , 500 kHz signal into IN3. (3) Observe a TP12 signal and measure the delay time between TP7 and TP12
7	Delay Time Between I Input And Output	b	b	a	a	Min.	Min.						(1) Input a 0.5 V <sub>p-p</sub> , 500 kHz signal into IN3. (2) Measure the amplitude at TP11, which is V <sub>p11</sub> . (3) Calculate : $GVQ = 20 \log \frac{Vp11}{0.5 Vp-p}$

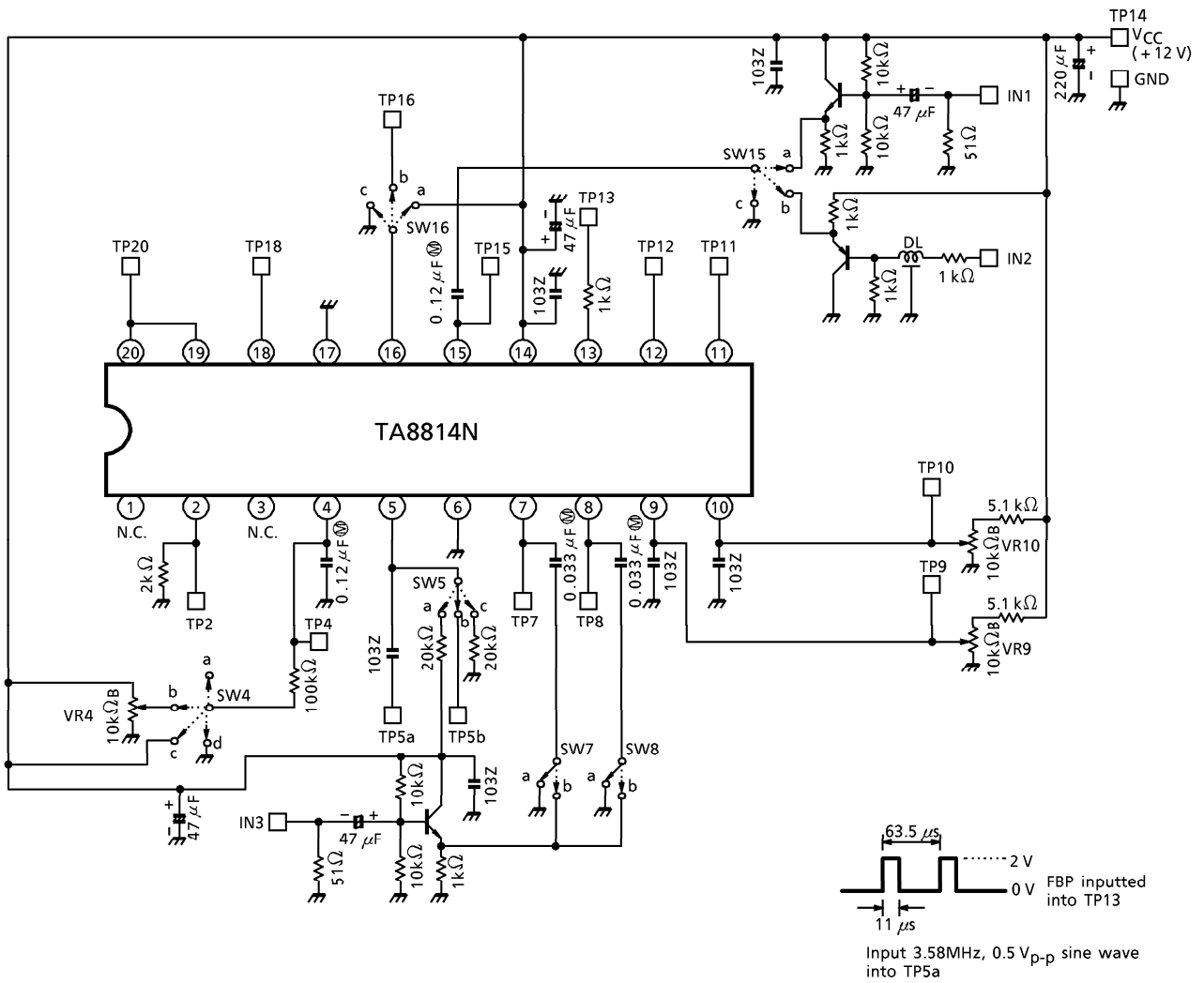
NOTE	ITEM	MEASUREMENT CONDITION (V <sub>CC</sub> = 9 V, T <sub>a</sub> = 25 ± 3°C)												
		SW & VR MODE												
		SW7	SW8	SW15	SW4	VR9	VR10							
8	Delay Time Between Q Input And Output	b	b	a	a	c	a	Min.	Min.			MEASUREMENT METHOD (1) Input a 0.5 V <sub>p-p</sub> , 3.58 MHz sine wave into TP5a. (2) Input a 0.5 V <sub>p-p</sub> , 500 kHz signal into IN3. (3) Observe a TP11 signal and measure the delay time between TP8 and TP11.  (1) Measure the TP12 voltage when SW16 is a. (V <sub>a</sub> ) (2) Measure the TP12 voltage when SW16 is c. (V <sub>c</sub> ) $\Delta V_{SWI} = V_a - V_c$		
9	I Bandwidth Switch Offset Voltage	a	a	c	a	Min.	Min.	Min.				(1) Measure the TP11 voltage when SW16 is a. (V <sub>a</sub> ) (2) Measure the TP11 voltage when SW16 is c. (V <sub>c</sub> ) $\Delta V_{SWQ} = V_a - V_c$		
10	Q Bandwidth Switch Offset Voltage	a	a	c	a	Min.	Min.	Min.				(1) Measure the TP11 voltage when SW16 is a. (V <sub>a</sub> ) (2) Measure the TP11 voltage when SW16 is c. (V <sub>c</sub> ) $\Delta V_{SWQ} = V_a - V_c$		
11	Frequency Characteristics On Narrow Bandwidth Mode And Maximum ITC	b	a	c	a	a	a	Max.	Max.	VR9	VR10		(1) Input a 50 mV <sub>p-p</sub> , 1.0 MHz signal into IN3. (2) Measure the amplitude at TP12, which is V <sub>PI</sub> . (3) Calculate :  $G_{VPI} = 20 \log \frac{V_{PI}}{0.05}$	
12	Frequency Characteristics On Narrow Bandwidth Mode And Maximum QTC	a	b	c	a	a	a	Max.	Max.				(1) Input a 50 mV <sub>p-p</sub> , 1.0 MHz signal into IN3. (2) Measure the amplitude at TP11, which is V <sub>PQ</sub> . (3) Calculate :  $G_{VPQ} = 20 \log \frac{V_{PQ}}{0.05}$	

NOTE	ITEM	MEASUREMENT CONDITION (V <sub>CC</sub> = 9V, T <sub>a</sub> = 25 ± 3°C)										
		SW & VR MODE										
		SW7	SW8	SW15	SW16	SW4	VR9	VR10				
13	Secondary Differential AMP Coring Band (I Axis)	b	b	a	a	b	Max.	Max.				 <p>(1) Input a 1.5MHz signal into IN3.                      (2) Set VR9 minimum, and adjust VR4 so that the TP12 amplitude turns minimum.                      (3) Set VR9 maximum.                      (4) Measure amplitude characteristic between TP7 and TP12, and read V<sub>CRI</sub>.</p>
14	Secondary Differential AMP Coring Band (Q Axis)	b	b	a	a	b	Max.	Max.				 <p>(1) Input a 1.5 MHz signal into IN3.                      (2) Set VR10 minimum, and adjust VR4 so that the TP11 amplitude turns minimum.                      (3) Set VR10 maximum.                      (4) Measure amplitude characteristic between TP8 and TP11, and read V<sub>CRQ</sub>.</p>
15	Bandwidth Switching Threshold Value I	a	a	c	b	—	—	—				Decrease TP16 voltage from 12V and measure the voltage at which the TP11 and TP12 voltages change.
16	Bandwidth Switching Threshold Value II	a	a	c	b	—	—	—				Increase TP16 voltage from 0V and measure the voltage at which the TP11 and TP12 voltages change.

NOTE	ITEM	MEASUREMENT CONDITION (V <sub>CC</sub> = 9 V, T <sub>a</sub> = 25 ± 3°C)								MEASUREMENT METHOD
		SW & VR MODE								
		SW7	SW8	SW15	SW16	SW4	VR9	VR10		
17	Clamp Pulse Phase	a	a	OPEN		—	—	—	(1) Ground TP15 with 20 kΩ resistance. (2) Measure T <sub>CLB</sub> and T <sub>CLW</sub> .	
18	Clamp Pulse Width	—	—	—	—	—	—	—		
19	Y Input Clamp Voltage	a	a	c	b	a	Max.	Max.	Measure the TP15 voltage.	
20	I/Q Output Residual Noise	a	a	a	b	a	Max.	Max.	Measure residual noises (0~20 MHz) during picture periods at TP11 and 12.	
21	γ Correction I Point I	a	a	c	c	—	—	—	(1) While increasing TP15 voltage, measure the TP20 voltage. (2) Read V <sub>20A</sub> , V <sub>20B</sub> , and V <sub>20C</sub> . (3) Calculate : V <sub>γ1-1</sub> = V <sub>20B</sub> - V <sub>20A</sub> (4) Calculate : V <sub>γ1-2</sub> = V <sub>20C</sub> - V <sub>20A</sub>	
22	γ Correction I Point II	a	a	c	c	—	—	—		
23	γ Correction II Point I	a	a	c	a	—	—	—	(1) Same as (1), (2) of NOTE 21, 22. (2) Calculate : V <sub>γ2-1</sub> = V <sub>20B</sub> - V <sub>20A</sub> (4) Calculate : V <sub>γ2-2</sub> = V <sub>20B</sub> - V <sub>20A</sub>	
24	γ Correction II Point II	a	a	c	a	—	—	—		

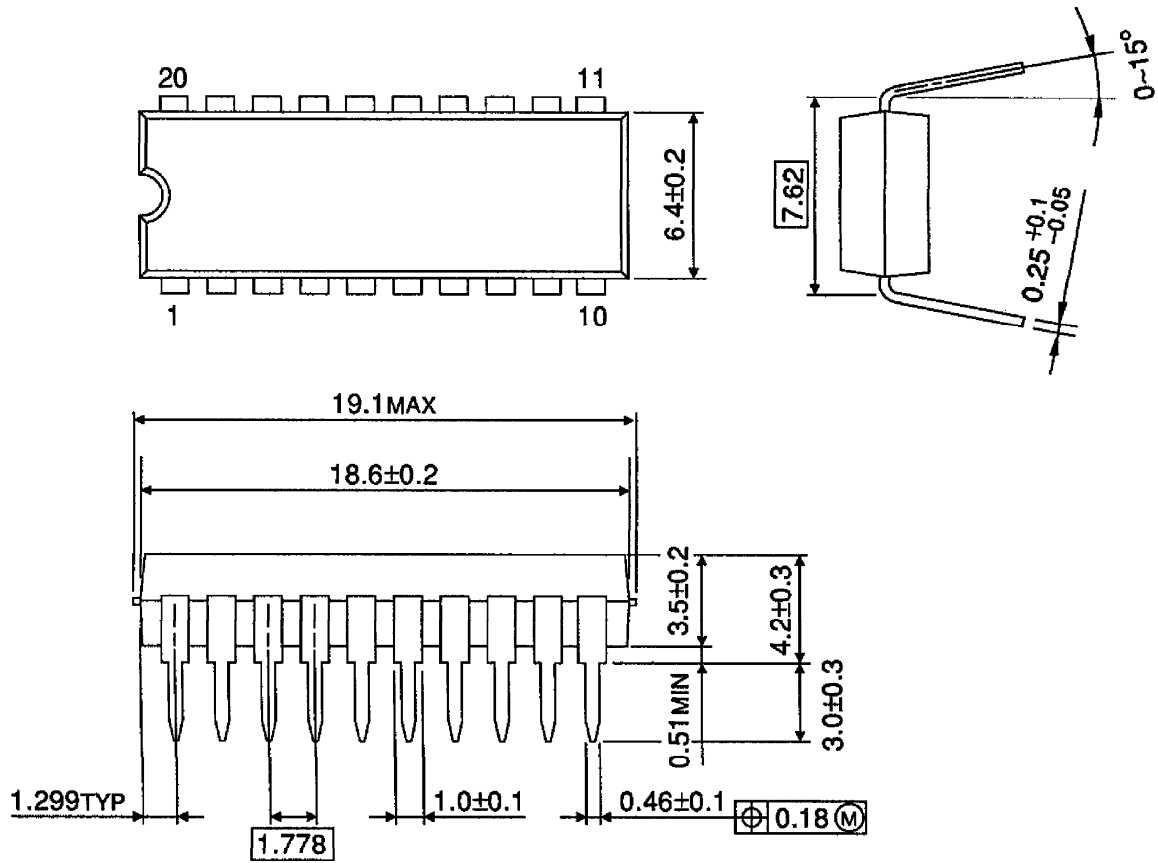
NOTE	ITEM	MEASUREMENT CONDITION (V <sub>CC</sub> = 9 V, T <sub>a</sub> = 25 ± 3°C)					MEASUREMENT METHOD
		SW & VR MODE					
		SW7	SW8	SW15	SW5		
25	Y Amplifier Total Gain	a	a	a	b		(1) Input a 0.1 V <sub>p-p</sub> , 500 kHz signal into IN1. (2) Measure the amplitude at TP2, which is V <sub>2</sub> . (3) Calculate : $GVY = 20 \log \frac{V_2}{0.1}$
26	Y Amplifier Total Frequency Characteristic	a	a	a	b		(1) Input a 0.1 V <sub>p-p</sub> sweep signal into IN1. (2) Measure the frequency characteristics between TP15 and TP2, and read F <sub>0Y</sub> . 

TEST CIRCUIT



PACKAGE DIMENSIONS  
SDIP20-P-300-1.78

Unit : mm



Weight : 1.02 g (Typ.)