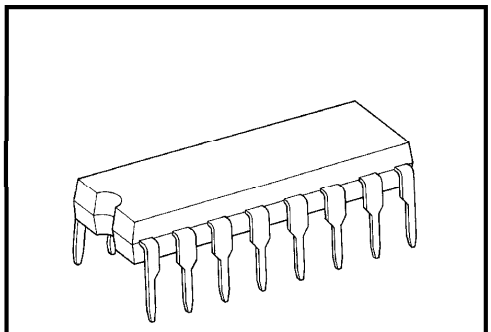
TENTATIVE TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8859CP

TV BIAS DISTORTION COMPENSATION IC

The TA8859CP is an IC for TV deflection stage to compensate various horizontal, vertical distortion, with a package of 16 pin DIP, controlled via I^2C bus.



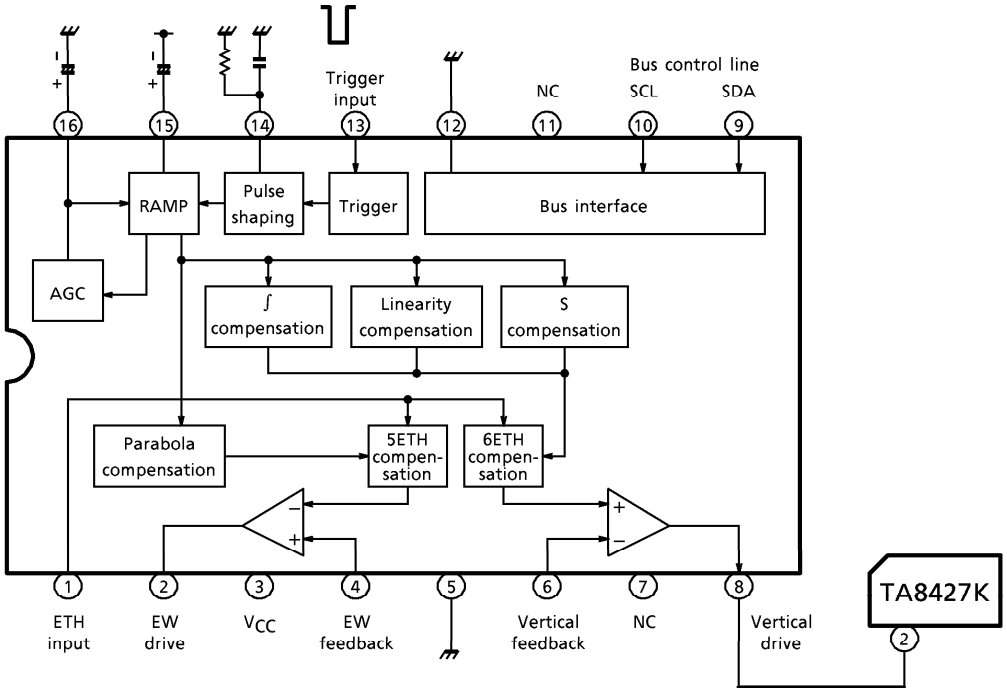
DIP16-P-300-2.54B

Weight : 1.11g (Typ.)

FEATURES

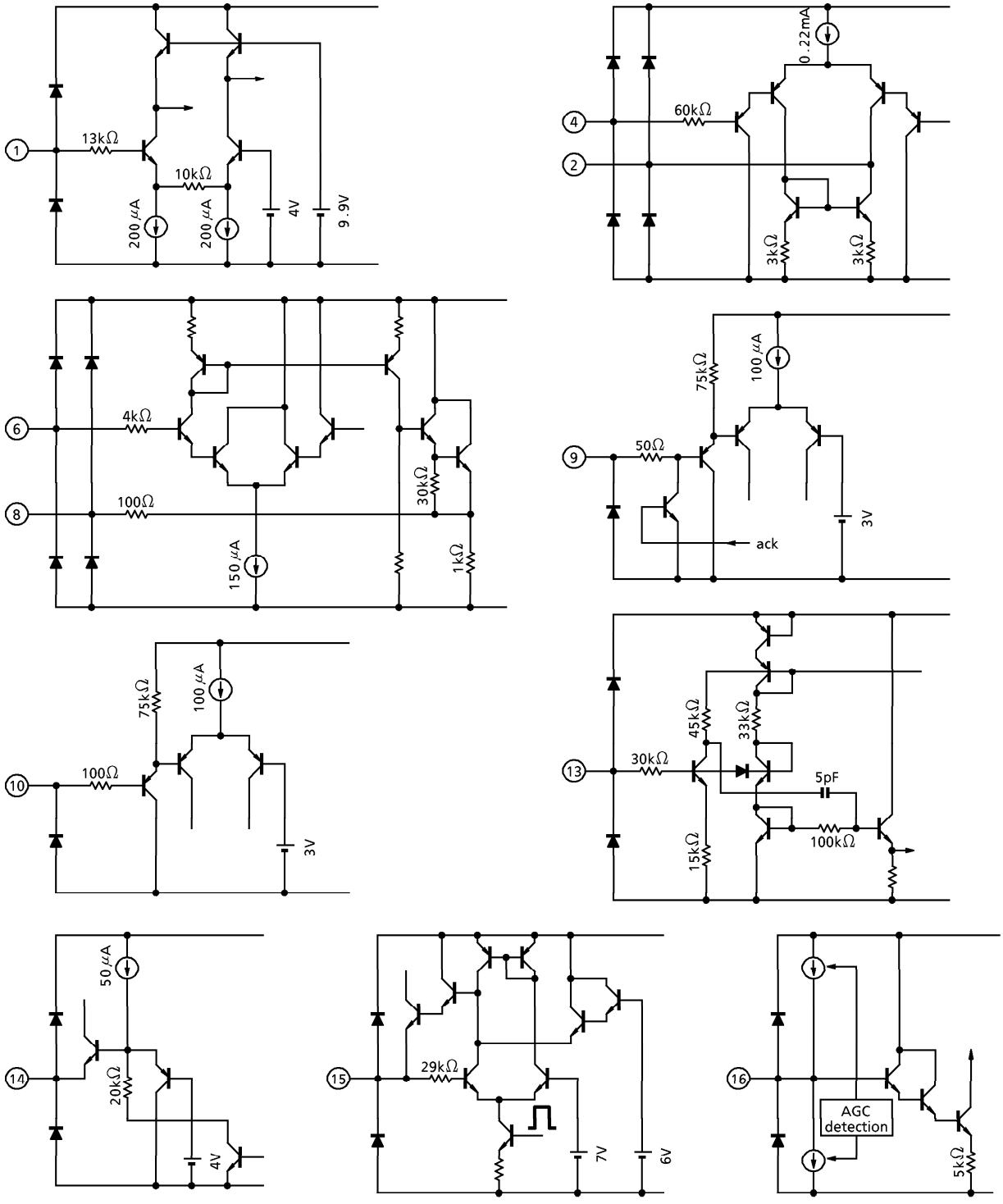
- Vertical linearity correction
- Vertical S correction
- E-W parabola
- E-W corner
- Trapezium distortion compensation

BLOCK DIAGRAM

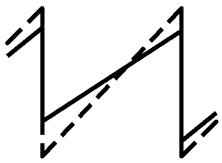
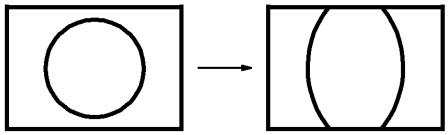
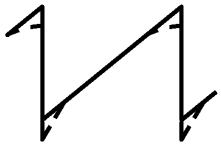
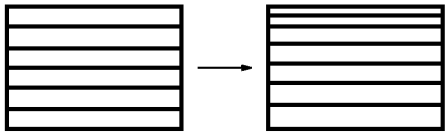
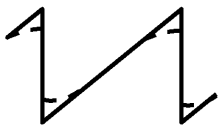
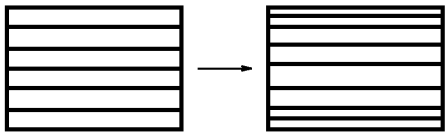
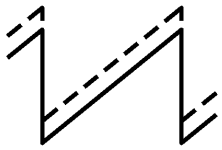
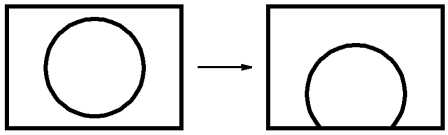
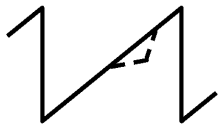
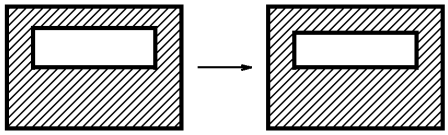
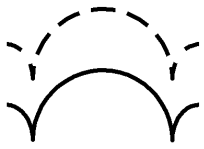
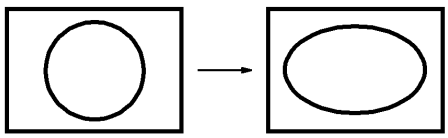
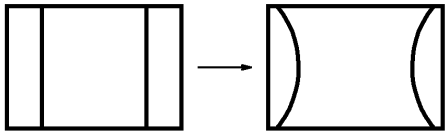


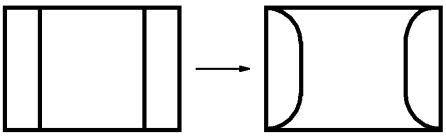
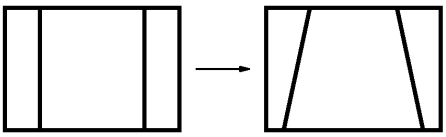
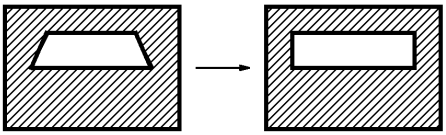
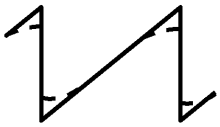
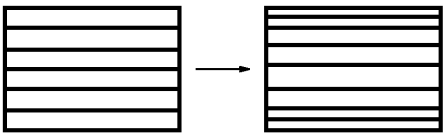
980910EBA2

TERMINAL INTERFACE



OUTLINE OF FUNCTIONS

FUNCTION	SUB ADDRESS	BIT	OUTPUT WAVEFORM	PICTURE
Picture Height Adjustment	0010	6		
Vertical Linearity correction	0011	5		 Lower expansion upper contraction
Vertical "S" Correction (X^3)	0100	5		
Vertical Shift	0101	3		 Upper and lower contraction
Vertical Compensation	0110	—		 Correction of distortion caused by high-voltage fluctuations
Picture Width Adjustment	0111	6		
E-W Parabola	1000	6		

FUNCTION	SUB ADDRESS	BIT	OUTPUT WAVEFORM	PICTURE
E-W Corner Correction	1001	4		 Corner maximum
Trapezium Distortion Compensation	1010	6		
Horizontal Compensation	1011	—		 Correction of distortion caused by high-voltage fluctuations
Vertical $\int$ Correction (X^5)	1110	4		 Upper and lower contraction

I²C BUS CONTROL FUNCTIONS

FUNCTION	SUB ADDRESS	DATA	PRESET	RANGE
Picture Height	00000010	×-×-7bit	01000000	−48~48%
V-linearity	00000011	×-×-×-5bit	00010000	−13~13%
V-S Correction	00000100	×-×-×-5bit	00000000	0~22%
V-shift	00000101	×-×-×-AGC-3bit-×	00001000	−800~800mV
V-compensation	00000110	×-×-×-×-4bit	00000000	0~9%
Picture Width	00000111	×-×-6bit	00100000	1.6~7.3V
E-W Parabola	00001000	×-×-6bit	00100000	0~5.6V
E-W Corner	00001001	×-×-×-×-4bit	00000000	0~3.2V
Trapezium	00001010	×-×-6bit	00100000	0~1.2V
H-compensation	00001011	×-×-×-×-4bit	00000000	0~9%
V-∫ Correction	00001100	×-×-×-×-4bit	00000000	0~4%

(Note 1) Vertical Height is controlled by Sub Address 02 (H), so no external control is required.

(Note 2) AGC bit determines vertical AGC responce speed.
0 : High speed for Channel / Mode change
1 : Low speed (1 / 5 × High speed). for Normal reception / Text Mode.

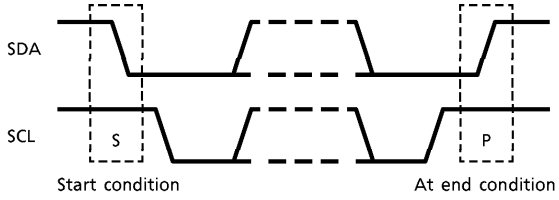
(Note 3) All registers are cleared into the preset value under the condition of $V_{CC} \leqq 3V$.

I²C BUS CONTROL FORMAT OUTLINE

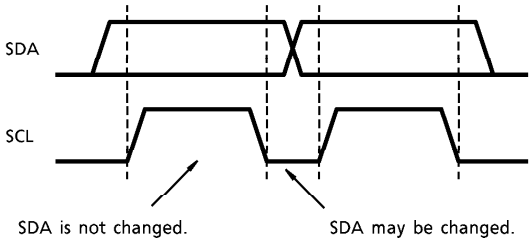
Bus controlled format of TA8859CP is based on I²C Bus Control format of PHILIPS.

Data transmission format

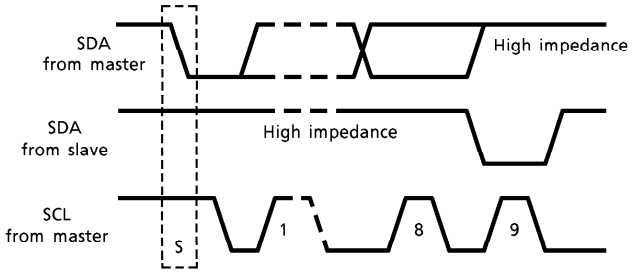
(1) Start condition, at end condition



(2) Bit transmission



(3) Verification response



(4) Slave address

A6	A5	A4	A3	A2	A1	A0	R / $\overline{W}$
1	0	0	0	1	1	0	0

Purchase of TOSHIBA I^2C components conveys a license under the Philips I^2C Patent Rights to use these components in an I^2C system, provided that the system conforms to the I^2C Standard Specification as defined by Philips.

MAXIMUM RATINGS (Ta = 25°C, V_{CC} = 12V)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	15	V
Power Dissipation	$P_{D\ max}$	1.4 (Note)	W
Input Signal Voltage	e_{in}	5	V_{p-p}
Operating Temperature	T_{opr}	− 20~65	°C
Storage Temperature	T_{stg}	− 55~150	°C

(Note) Derated above Ta = 25°C, in the proportion of 11.2mW / °C.

RECOMMENDED POWER SUPPLY VOLTAGE

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	10.8	12	13.2	V

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{CC} = 12V, Ta = 25°C)

Power supply current

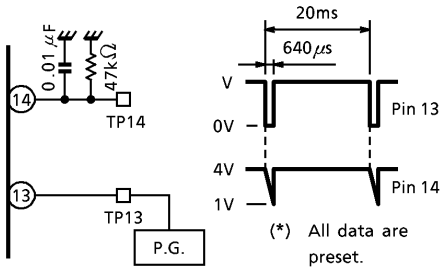
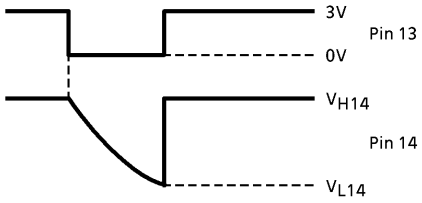
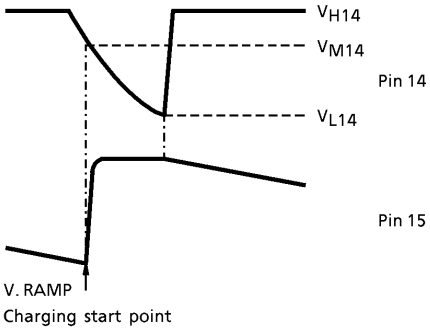
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Current	I_{CC}	20	30	45	mA

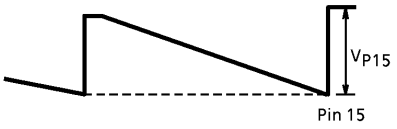
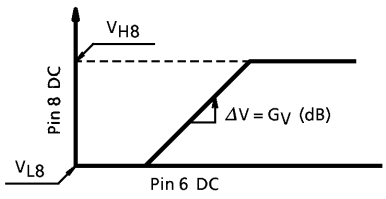
Terminal voltage

No.	ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
1	ΔEHT	V_1	7.5	8.0	8.5	V	—
2	EW-OUT	V_2	5.8	6.1	6.4		—
3	V_{CC} (12V)	V_3	—	12.0	—		Terminal = V_{CC} (12.0V)
4	EW-FB	V_4	—	12.0	—		Terminal = V_{CC} (12.0V)
5	GND	V_5	—	0.0	—		Terminal = GND
6	V.FB	V_6	2.0	2.4	2.8		—
7	N.C.	V_7	—	0.0	—		Terminal = GND
8	V.OUT	V_8	2.8	3.5	4.3		—
9	SDA	V_9	4.8	5.1	5.4		—
10	SCL	V_{10}	4.8	5.1	5.4		—
11	N.C.	V_{11}	—	0.0	—		Terminal = GND
12	I^2L GND	V_{12}	—	0.0	—		Terminal = GND
13	V.IN	V_{13}	—	0.0	—		Terminal = GND
14	T.C.	V_{14}	3.7	4.0	4.3		—
15	V.RAMP	V_{15}	3.7	4.0	4.3		—
16	V.AGC	V_{16}	—	0.0	—		Terminal = GND

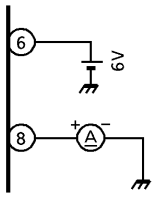
(Note) Data : Preset

AC CHARACTERISTICS

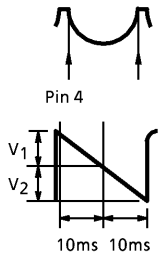
No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
1	Vertical Trigger Input Threshold Voltage	V_{TH13}	02	03	04	05	• Change the height of trigger pulse given to TP13, and measure the time pulse height when a timing pulse is output.  (*) All data are preset.	0.7	1.0	1.4	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						
2	Clamp Voltage At TP14	V_{H14}	02	03	04	05	• Give the trigger pulse to TP13. (Pulse width : 640μs, cycle : 20ms, Low level : 0V, High level : 3V). • Observe the wave shape at TP14. 	3.7	4.0	4.2	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						
3	Threshold Voltage I At TP14	V_{M14}	02	03	04	05	• Same as No.2. • Observe the wave shape at TP14 and TP15. 	2.8	3.0	3.2	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						

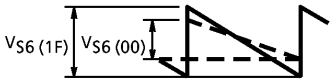
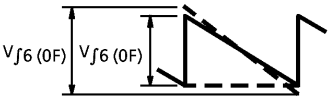
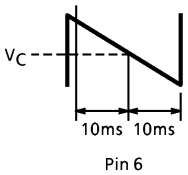
No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
4	Threshold Voltage II At TP14	V_{L14}	02	03	04	05	• Same as No.3.	0.9	1.0	1.1	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						
5	Vertical Ramp Pulse Amplitude	V_{P15}	02	03	04	05	• Measure the vertical ramp pulse amplitude at TP15.  (*) All data are preset.	1.9	2.0	2.1	V_{p-p}
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						
6	Vertical Amplifier Gain	G_V	02	03	04	05	• Give no pulse to TP13. • Connect an external power supply to TP6. • Measure the voltage of TP8 when the voltage of TP6 is changed from 0V to 6V. 	22	26	30	dB
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						

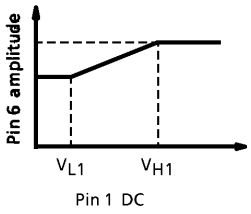
No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
7	Vertical Amplifier Max. Output Voltage	V_{H8}	02	03	04	05	• Same as No.6. (*) All data are preset.	2.9	3.6	4.5	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						
8	Vertical Amplifier Min. Output Voltage	V_{L8}	02	03	04	05	• Same as No.6.	0	0	0.3	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00	00					
9	Vertical Amplifier Max. Output Current	I_{max8}	02	03	04	05	• Same as No.6. • Measure the current between TP8 and GND when the voltage of TP6 is 6V.	20	40	—	mA
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						



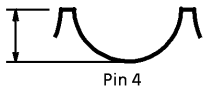
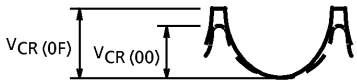
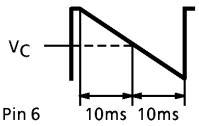
(*) All data are preset.

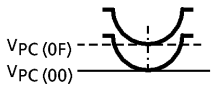
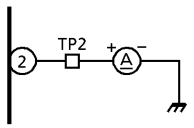
No.	ITEM	SYM-BOL	BUS CONTROL DATA	TEST METHOD	MIN.	TYP.	MAX.	UNIT
10	Vertical Saw Wave Amplitude	V_{P6}	02 03 04 05 40 10 00 08 06 07 08 09 00 20 00 00 0A 0B 0C 20 00 00	• Same as No.2. • Measure the amplitude of saw wave at TP6. (*) All data are preset.	1.7	1.9	2.2	V_{p-p}
11	Vertical Amplitude Variable Range	V_{PH}	02 03 04 05 7F ↓ 00 10 00 08 06 07 08 09 00 20 00 00 0A 0B 0C 20 00 00	• Same as No.10. • Measure the amplitude $V_{P6\,(00)}$ at TP6 when the data of sub address (02) is turned to (00). • Measure the amplitude $V_{P6\,(3F)}$ at TP6 when the data of sub address (02) is turned to (00). $V_{PH} = \pm \frac{V_{P6\,(3F)} - V_{P6\,(00)}}{V_{P6\,(3F)} + V_{P6\,(00)}} \times 100\%$	+45 −45	+48 −48	+51 −51	%
12	Vertical Linearlity Max. Correction	V_ℓ	02 03 04 05 40 1F 10 00 00 08 06 07 08 09 00 20 00 00 0A 0B 0C Adjust 00 00	• Turn it to (3F) the data of sub address (08) and adjust the data of sub address (0A) for making the shape of parabolic wave of TP4 symmetrical. • Turn it to (00) the data of sub address (08). • Measure $V_{1\,(10)}$ and $V_{2\,(10)}$ at TP6 when the data of sub address (03) is (10). • Similarly measure $V_{1\,(00)}$, $V_{2\,(CC)}$, $V_{1\,(1F)}$ and $V_{2\,(1F)}$. (00) and (1F) are the data of sub address (08).  $V_\ell = \pm 100 \times \frac{V_{1\,(00)} - V_{1\,(1F)} + V_{2\,(1F)} - V_{2\,(00)}}{2 \times (V_{1\,(10)} + V_{2\,(10)})}$	+10.0 −10.0	+12.5 −12.5	+15.0 −15.0	%

No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
13	Max. Of Vertical S Correction	V_S	02	03	04	05	• Same as No.12. • Measure the amplitude $V_{S6\,(00)}$ at TP6 when the data of sub address (04) is (00). • Measure the amplitude $V_{S6\,(1F)}$ at TP6 when the data of sub address (04) is (00).  $V_S = \frac{V_{S6\,(00)} - V_{S6\,(1F)}}{V_{S6\,(00)}} \times 100\ (\%)$	20	24	28	%
			40	10	1F 00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			Adjust	00	00						
14	Max. Of Vertical ∫ Correction	$V_\int$	02	03	04	05	• Same as No.13. • Measure the amplitude $V_{\int 6\,(00)}$ at TP6 when the data of sub address (0C) is (00). • Measure the amplitude $V_{\int 6\,(0F)}$ at TP6 when the data of sub address (0C) is (0F).  $V_\int = \frac{V_{\int 6\,(0F)} - V_{\int 6\,(00)}}{V_{\int 6\,(00)}} \times 100\ (\%)$	3	—	—	%
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			Adjust	00	0F 00						
15	Vertical NF Center Voltage	V_C	02	03	04	05	• Same as No.12. • Observe the wave shape at TP6.  Pin 6	3.8	4.1	4.4	V
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			Adjust	00	00						

No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
16	Vertical NF DC Variation	V_{DC}	02	03	04	05	• Same as No.15. • Measure the vertical NF center voltage $V_{C\,(00)}$ when the data of sub address (05) is (00). • Measure the vertical NF center voltage $V_{C\,(0F)}$ when the data of sub address (05) is (00). $V_{DC} = \pm \frac{V_{C\,(0F)} - V_{C\,(00)}}{2}$ (V)	±720	±800	±880	mV
			40	10	00	0F 00					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			Adjust	00	00						
17	Vertical Amplitude EHT Correction	V_{EHT}	02	03	04	05	• Same as No.12. • Connect an external power supply to TP1 and turn its voltage to 0V. • Measure the amplitude $V_{EHT\,(00)}$ at TP6 when the data of sub address (06) is (00). • Measure the amplitude $V_{EHT\,(0F)}$ at TP6 when the data of sub address (06) is (0F). $V_{EHT} = \frac{V_{EHT\,(00)} - V_{EHT\,(0F)}}{V_{EHT\,(00)}} \times 100$ (%)	8	9	10	V
			40	10	00	08					
			06	07	08	09					
			0F 00	20	00	00					
			0A	0B	0C						
			Adjust	00	00						
18	EHT Input Dynamic Range I	V_{H1}	02	03	04	05	• Same as No.17. • Change it from 1V to 7V the voltage of the external power supply connected with TP1. • At this time, measure the variation of amplitude at TP6.  	6.0	6.5	7.0	V
			40	10	00	08					
			06	07	08	09					
			0F	20	00	00					
			0A	0B	0C						
			Adjust	00	00						

No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
19	EHT Input Dynamic Range II	V_{L1}	02	03	04	05	• Same as No.18.	1.3	1.8	2.3	V
			40	10	00	08					
			06	07	08	09					
			0F	20	00	00					
			0A	0B	0C						
			Adjust	00	00						
20	E-W NF Max. DC (Picture Width)	—	02	03	04	05	• Same as No.12. • Measure the voltage at TP4.	6.8	7.4	8.0	V
			40	10	00	08					
			06	07	08	09					
			00	00	00	00					
			0A	0B	0C						
			Adjust	00	00						
21	E-W NF Min. DC (Picture Width)	V_{L4}	02	03	04	05	• Measure the voltage at TP4.	1.4	1.5	1.7	V
			40	10	00	08					
			06	07	08	09					
			00	3F	00	00					
			0A	0B	0C						
			Adjust	00	00						

No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
22	E-W NF Max. Parabolic Correction (Parabola)	V_{PB}	02	03	04	05	• Give 7V to TP1. • Measure the parabolic amplitude at TP4.  	4.8	5.6	6.6	V_{p-p}
			40	10	00	08					
			06	07	08	09					
			00	3F	3F	00					
			0A	0B	0C						
			Adjust	00	00						
23	E-W NF Corner Correction (Corner)	V_{CR}	02	03	04	05	• Give 7V to TP1. • Measure the parabolic amplitude at TP4. • Measure the amplitude $V_{CR\,(00)}$ when the data of sub address (09) is (00). • Measure the amplitude $V_{CR\,(0F)}$ when data of sub address (09) is (0F).  $V_{CR} = V_{CR\,(00)} - V_{CR\,(0F)}$	2.5	3.2	4.1	V_{p-p}
			40	10	00	08					
			06	07	08	09					
			00	3F	3F	0F 00					
			0A	0B	0C						
			Adjust	00	00						
24	Parabolic Symmetry Correction	V_{TR}	02	03	04	05	• Same as No.10. • Measure the vertical scan center voltage $V_{C\,(00)}$ at TP6 when the data of sub address (0A) is (00). • Measure the vertical scan center voltage $V_{C\,(3F)}$ at TP6 when the data of sub address (0A) is (3F). $V_{TR} = \pm \frac{V_{C\,(00)} - V_{C\,(3F)}}{2 \times V_{P6}} \times 100\ (\%)$  	±3	±4.5	±6	%
			40	10	00	08					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			3F 00	00	00						

No.	ITEM	SYM-BOL	BUS CONTROL DATA				TEST METHOD	MIN.	TYP.	MAX.	UNIT
25	E-W Parabolic EHT Correction	V_{EH1}	02	03	04	05	• Same as No.22. • Connect an external power supply to TP1. • Measure the parabolic amplitude $V_{EH\,(7)}$ at TP4 when the voltage of TP1 is 7V. • Measure the amplitude $V_{EH\,(1)}$ when the voltage of TP1 is 1V. $V_{EH1} = \frac{V_{EH\,(7)} - V_{EH\,(1)}}{V_{EH\,(7)}} \times 100\ (\%)$	—	4.7	—	%
			40	10	00	08					
			06	07	08	09					
			00	00	3F	00					
			0A	0B	0C						
			Adjust	00	00						
26	E-W DC EHT Correction	V_{EH2}	02	03	04	05	• Give 1V to TP1. • Measure the parabolic phase center voltage $V_{PC\,(00)}$ at TP4 when the data of sub address (0B) is (00). • Measure the voltage $V_{PC\,(0F)}$ when the data is (0F).  $V_{EH2} = V_{PC\,(0F)} - V_{PC\,(00)}$	1.0	1.4	1.8	V
			40	10	00	08					
			06	07	08	09					
			00	3F	3F	00					
			0A	0B	0C						
			Adjust	00 ↕ 0F	00						
27	Max. Of E-W Amplifier Output Current	I_{max2}	02	03	04	05	• Connect an ampere meter between TP2 and GND. • Measure the current.  	0.14	0.2	0.27	mA
			40	10	00	10					
			06	07	08	09					
			00	20	00	00					
			0A	0B	0C						
			20	00	00						

(Note) Concerning fall time

When used in actual applications, if the fall time for input pulse becomes greater output may not be generated in some cases, so please take care.

CHARACTERISTIC	TEST METHOD	MIN.	TYP.	MAX.	UNIT
Trigger Input Fall Time	As below	—	1.0	7.6	μs

While monitoring the input waveform of Pin 13 oscilloscope, please measure fall time from 10% to 90%.

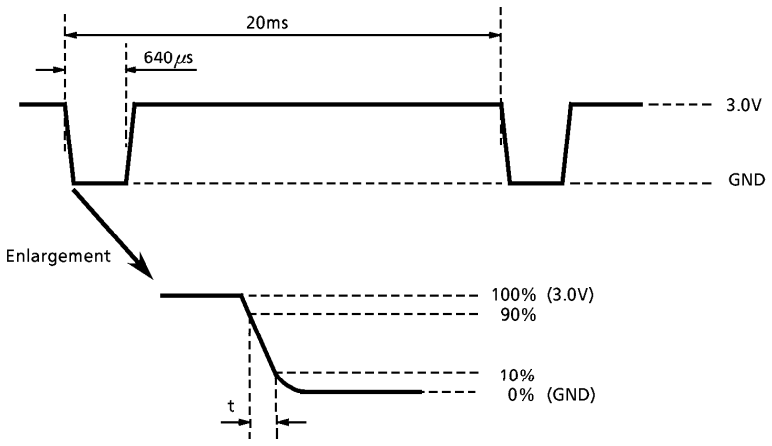
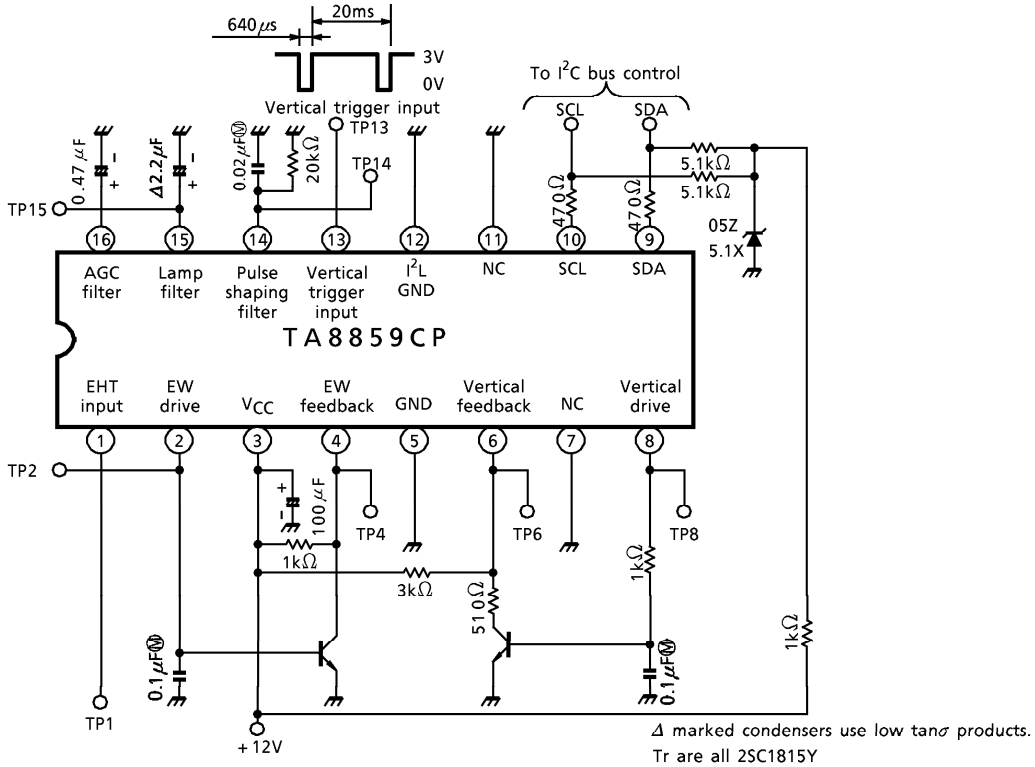


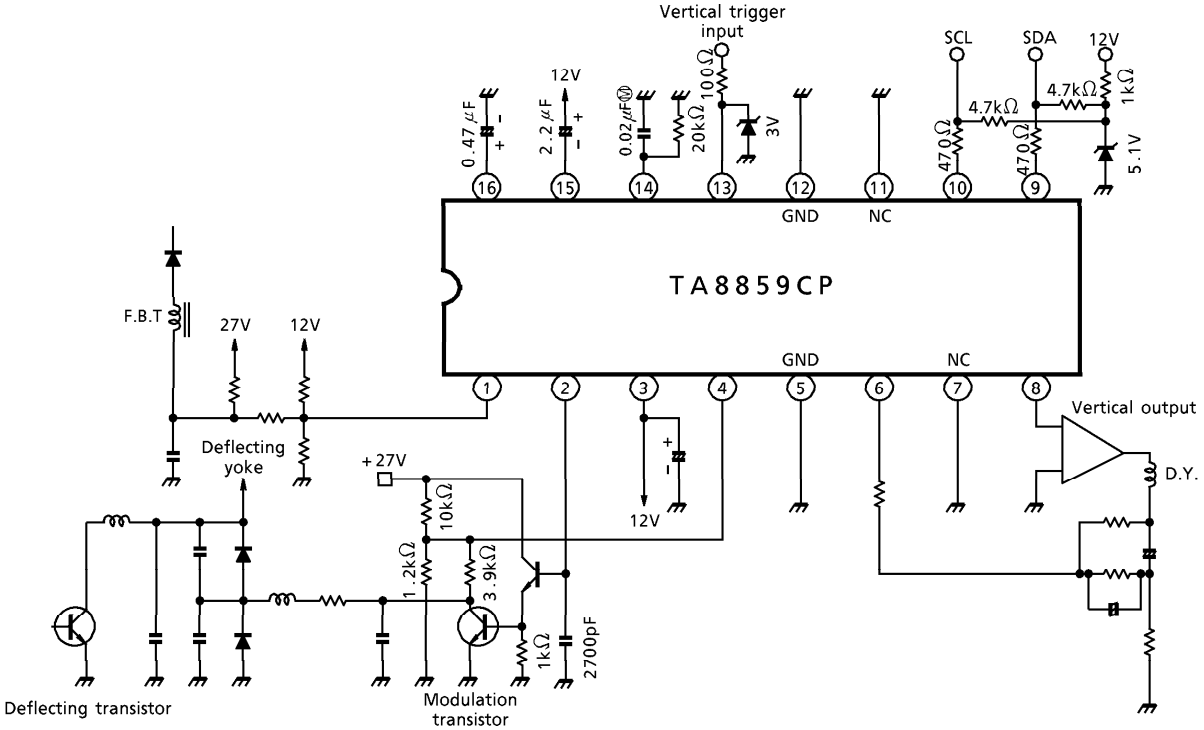
Fig.

TEST CIRCUIT



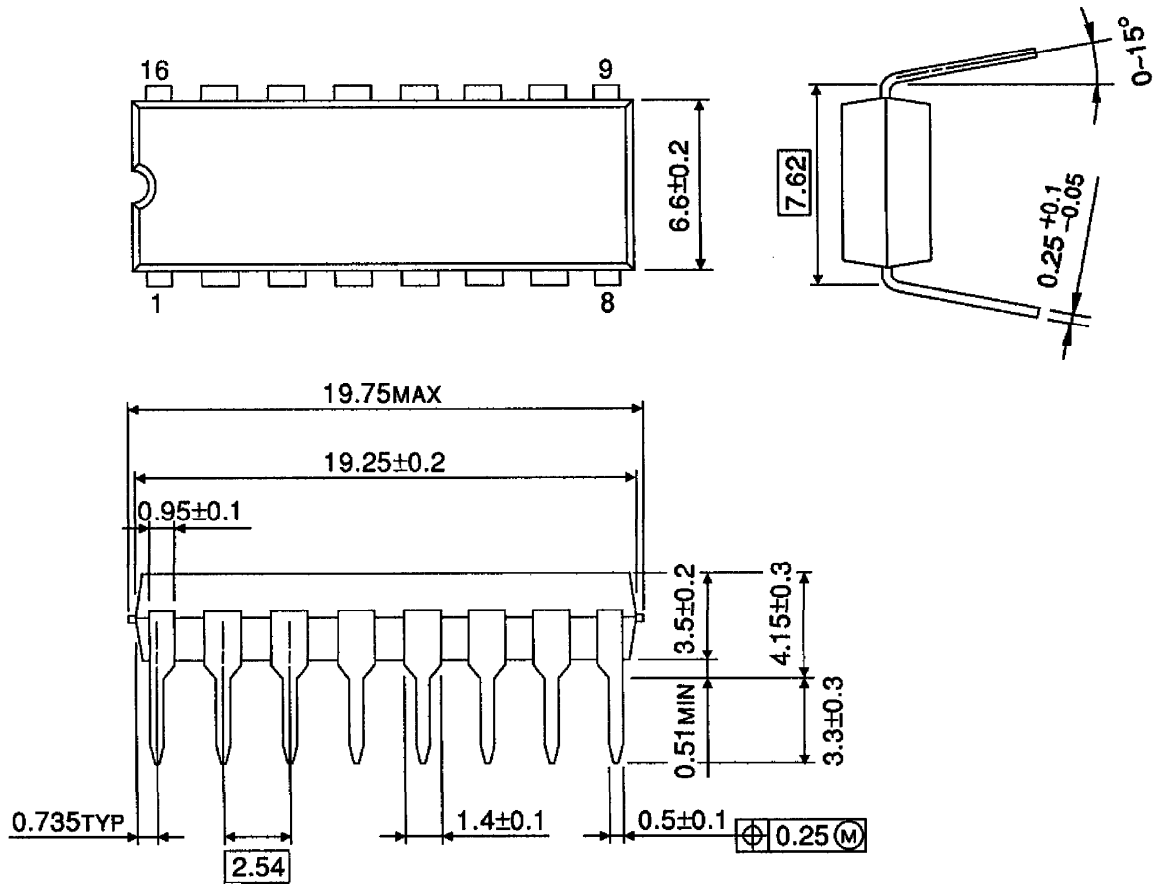
Δ marked condensers use low tanσ products.
Tr are all 2SC1815Y

APPLICATION CIRCUIT



PACKAGE DIMENSIONS

DIP16-P-300-2.54B UNIT : mm



Weight : 1.11g (Typ.)