M52759SP

Uniformity for CRT Display Monitor

REJ03F0197-0201
Rev.2.01
Mar 31, 2008

Description

M52759SP is semiconductor integrated circuit for uniformity of CRT display monitor.

It generates horizontal and vertical parabola waves and is able to revise contrast of CRT display monitor if it is used with Video Pre.Amp. M52742SP that has uniformity circuit.

Features

- It can control phase of horizontal wave.
- It can changes the parabola wave unbalance.
- It contains the horizontal saw wave generator and Auto Gain Control circuit, so that it is able to keep the amplitude constant if frequency change.
- It can changes the parabola wave unbalance.
- Frequency Band Width: horizontal 24 to 120 kHz
  Vertical 50 to 185 Hz
- Input: horizontal 5 V_{P-P} Pulse
  Vertical 3.2 V_{P-P} V Saw

Application

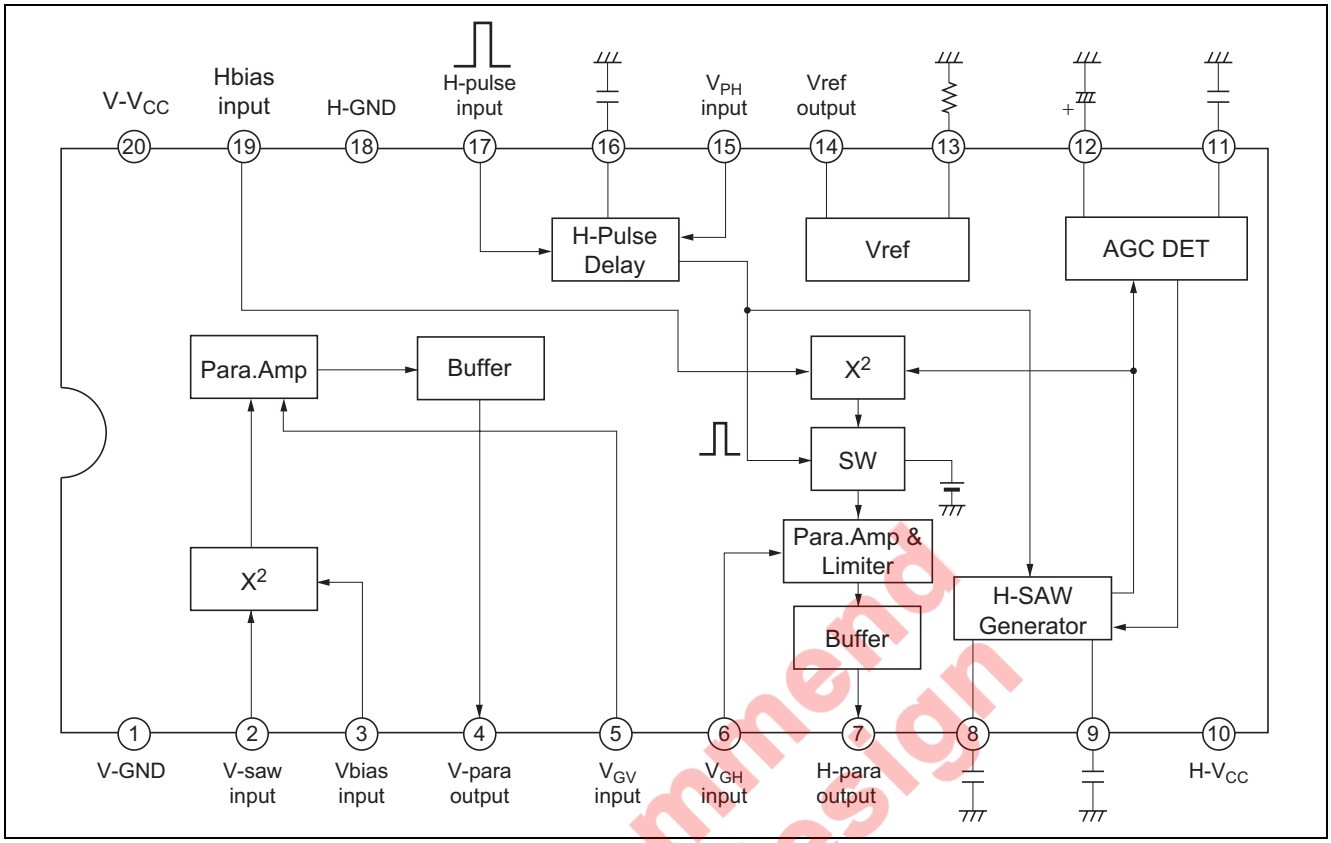
CRT display monitor

Recommended Operating Condition

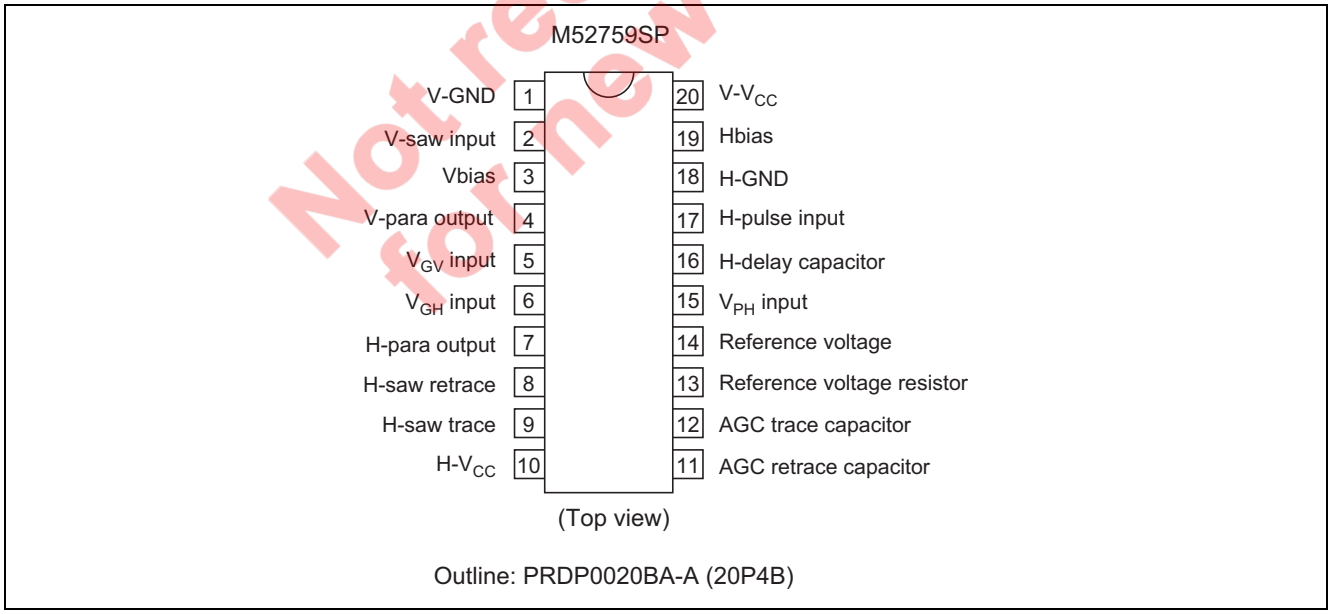
Supply voltage range: 11.5 V to 12.5 V

Rated supply voltage: 12 V

Block Diagram



Pin Arrangement



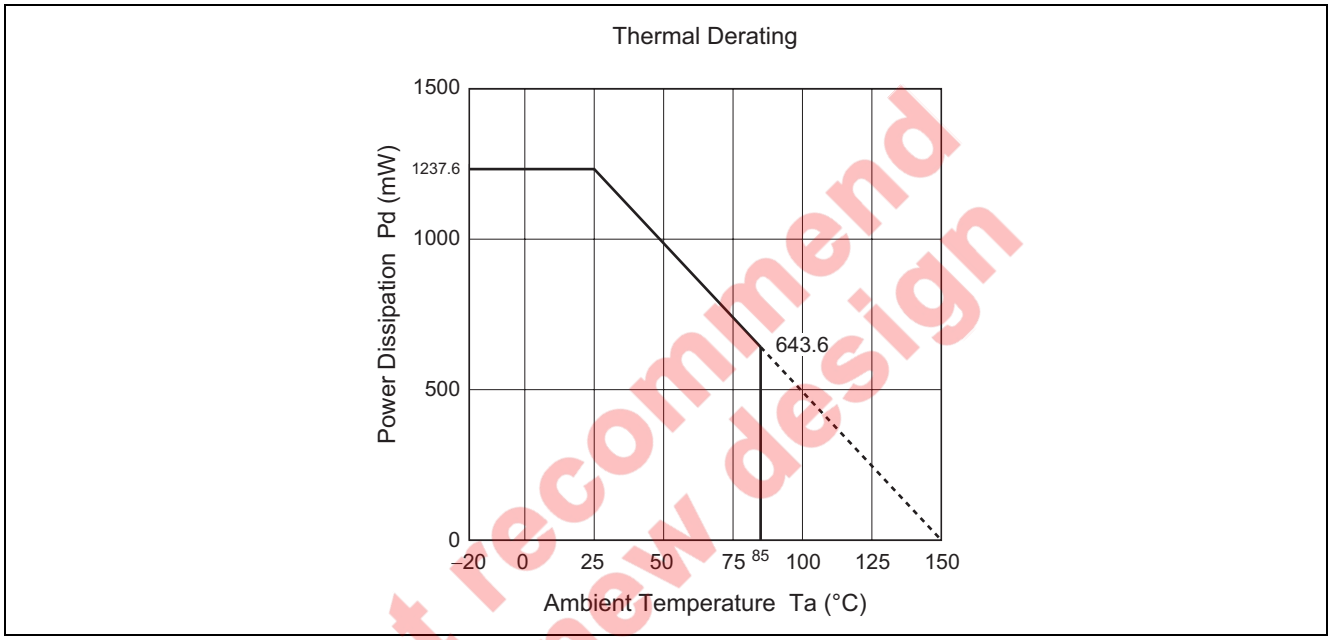
(Top view)

Outline: PRDP0020BA-A (20P4B)

Absolute Maximum Ratings

(Ta = 25°C, Surge capacity = 200 pF)

Item	Symbol	Ratings			Unit
		Min.	Typ.	Max.	
Supply voltage	V_{CC}	—	—	13.0	V
Power dissipation	Pd	—	—	1237.6	mW
Operating temperature	Topr	–20	—	+85	°C
Storage temperature	Tstg	–40	—	+150	°C
Recommended operating voltage	Vopr	—	12.0	—	V
Recommended operating voltage range	Vopr'	11.5	—	12.5	V
Surge	Vsurge	±200	—	—	V



Electrical Characteristics

(Ta = 25°C, V_{CC} = 12 V, unless otherwise noted)

Item	Symbol	Limits			Unit	Test Conditions	Pin No.
		Min.	Typ.	Max.			
Circuit current 1	I_{CCH}	15.1	21.5	27.9	mA	(10) Measure	10
Circuit current 2	I_{CCV}	5.2	7.4	9.6	mA	(20) Measure	20
Reference voltage output	V_{REF}	6.75	6.95	7.15	V	(14) Measure	14
Reference voltage temperature drift	D_{REF}	—	49	—	ppm/deg	(14) Measure	14
Horizontal Block							
H-pulse low input range	V_{IL}	0.0	—	2.0	V	(6) 2.4 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H-pulse high input range	V_{IH}	3.0	—	V_{CC} –2.0	V	(6) 2.4 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H-pulse low input current	I_{IL}	–5.0	–0.6	–0.1	µA	(17) 0 V in, measure	17
H-pulse high input current	I_{IH}	–1.0	0.0	1.0	µA	(17) 5 V in, measure	17
H parabola width	T_W	0.6	0.8	1.0	µs	(6) 2.4 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H parabola delay 1	T_{D1}	0.1	0.3	0.5	µs	(6) 2.4 V in (7) Measure (15) 0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H parabola delay 2	T_{D2}	0.4	0.6	0.8	µs	(6) 2.4 V in (7) Measure (15) 1.3 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H parabola delay 3	T_{D3}	2.9	3.1	3.3	µs	(6) 2.4 V in (7) Measure (15) 4.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
Delay temperature drift	D_D	—	0.08	—	ns/deg	(6) 2.4 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
Pin 15 input current	I_{15}	–5.0	–0.3	–0.1	µA	(17) 2.5 V in, measure	15

Electrical Characteristics (cont.)

Item	Symbol	Limits			Unit	Test Conditions	Pin No.
		Min.	Typ.	Max.			
H para. unbalance control 1	U_{HP1}	–2.6	–2.2	–1.8	V	(6) 1.8 V in (7) Measure (15) 0 V in (17) fH = 96 kHz H-pulse in (19) 5.7 V in	7
H para. unbalance control 2	U_{HP2}	0.1	0.5	0.9	V	(6) 2.4 V in (7) Measure (15) 0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. unbalance control 3	U_{HP3}	1.7	2.1	2.5	V	(6) 1.8 V in (7) Measure (15) 0 V in (17) fH = 96 kHz H-pulse in (19) 6.4 V in	7
H para. unbalance V_{CC}. character 1	V_{UHP1}	–0.2	0.0	0.2	V	(6) 2.4 V in (7) Measure (15) 0 V in (10) (20) 11.5 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. unbalance V_{CC}. character 2	V_{UHP2}	–0.2	0.0	0.2	V	(6) 2.4 V in (7) Measure (15) 0 V in (10) (20) 12.5 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. unbalance temperature drift	D_{UHP}	—	–2.2	—	mV/deg	(6) 2.4 V in (7) Measure (15) 0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. gain control 1	G_{HP1}	0.2	0.4	0.6	V_{P-P}	(6) 1.0 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. gain control 2	G_{HP2}	2.9	3.3	3.7	V_{P-P}	(6) 2.5 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. gain control 3	G_{HP3}	5.3	6.0	6.7	V_{P-P}	(6) 4.0 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7

Electrical Characteristics (cont.)

Item	Symbol	Limits			Unit	Test Conditions	Pin No.
		Min.	Typ.	Max.			
H para. freq. characteristics 1	F_{HP1}	–0.2	0.0	0.2	V	(6) 4.0 V in (7) Measure (15) 3.0 V in (17) fH = 24 kHz H-pulse in (19) 6.1 V in	7
H para. freq. characteristics 2	F_{HP2}	–0.2	0.0	0.2	V	(6) 4.0 V in (7) Measure (15) 3.0 V in (17) fH = 120 kHz H-pulse in (19) 6.1 V in	7
H para. V_{CC} characteristics 1	V_{VHP1}	–0.2	0.0	0.2	V	(6) 4.0 V in (7) Measure (15) 3.0 V in (10) (20) 11.5 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. V_{CC} characteristics 2	V_{VHP2}	–0.2	0.0	0.2	V	(6) 4.0 V in (7) Measure (15) 3.0 V in (10) (20) 12.5 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
H para. size temperature drift	D_{HP}	—	–1.3	—	mV/deg	(6) 4.0 V in (7) Measure (15) 3.0 V in (17) fH = 96 kHz H-pulse in (19) 6.1 V in	7
Pin 6 input current	I_6	–5.0	–0.3	–0.1	µA	(6) 2.4 V in, measure	6
Pin 19 input current	I_{19}	0.1	0.3	5.0	µA	(19) 6.1 V in, measure	19
Vertical Block							
V parabola accuracy 1	A_{VP1}	4.5	5.0	5.5	V	(2) 3.5 V in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V parabola accuracy 2	A_{VP2}	2.5	3.0	3.5	V	(2) 1.9 V in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V parabola accuracy 3	A_{VP3}	20	25	30	%	(2) 2.7 V in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V parabola accuracy 4	A_{VP4}	20	25	30	%	(2) 4.3 V in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V parabola accuracy 5	A_{VP5}	90	100	110	%	(2) 5.1 V in (3) 3.5V in (4) Measure (5) 2.3 V in	4

Electrical Characteristics (cont.)

Item	Symbol	Limits			Unit	Test Conditions	Pin No.
		Min.	Typ.	Max.			
V para. unbalance control 1	U_{VP1}	–2.8	–2.5	–2.2	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 2.8 V in (4) Measure (5) 1.6 V in	4
V para. unbalance control 2	U_{VP2}	–0.3	0	0.3	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V para. unbalance control 3	U_{VP3}	2.2	2.5	2.8	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 4.2 V in (4) Measure (5) 1.6 V in	4
V unbalance. V_{CC}. characteristics 1	V_{UVP1}	–0.1	0.0	0.1	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 2.3 V in (10) (20) 11.5 V in	4
V unbalance. V_{CC}. characteristics 2	V_{UVP2}	–0.1	0.0	0.1	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 2.3 V in (10) (20) 12.5 V in	4
V unbalance. temperature drift	D_{UVP}	—	0.5	—	mV/deg	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 2.3 V in	4
V parabola amplitude 1	G_{VP1}	0	0	0.3	V_{P-P}	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 1.0 V in	4
V parabola amplitude 2	G_{VP2}	2.1	2.4	2.7	V_{P-P}	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 2.0 V in	4
V parabola amplitude 3	G_{VP3}	4.2	4.7	5.2	V_{P-P}	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in	4
V para. freq. characteristics 1	F_{VP1}	–0.1	0.0	0.1	V	(2) f_V = 50 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in	4
V para. freq. characteristics 2	F_{VP2}	–0.1	0.0	0.1	V	(2) f_V = 185 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in	4

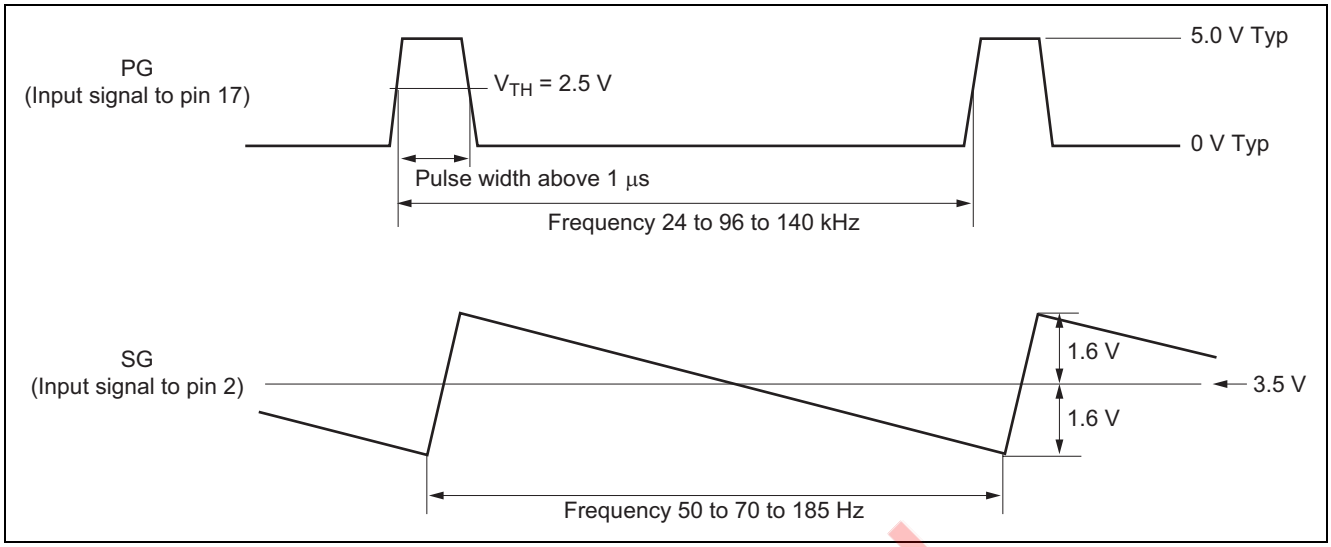
Electrical Characteristics (cont.)

Item	Symbol	Limits			Unit	Test Conditions	Pin No.
		Min.	Typ.	Max.			
V para. V_{CC}. characteristics 1	V_{VP1}	–0.1	0.0	0.1	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in (10) (20) 11.5 V in	4
V para. V_{CC}. characteristics 2	V_{VP2}	–0.1	0.0	0.1	V	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in (10) (20) 12.5 V in	4
V para. temperature drift	D_{VP}	—	–2.2	—	mV/deg	(2) f_V = 70 Hz, 3.2 V_{P-P} saw wave in (3) 3.5 V in (4) Measure (5) 3.0 V in	4
Pin 2 input current	I_2	–5.0	–0.3	–0.1	µA	(2) 3.5 V in, measure	2
Pin 3 input current	I_3	–5.0	–0.3	–0.1	µA	(3) 3.5 V in, measure	3
Pin 5 input current	I_5	–5.0	–0.3	–0.1	µA	(5) 2.3 V in, measure	5

Switch and Voltage Condition

Symbol	Switch									Voltage (V)							
	SW2	SW3	SW5	SW6	SW10	SW15	SW17	SW19	SW20	V_{CC}	V2	V3	V5	V6	V15	V17	V19
I_{CCH}	a	a	a	a	b	a	b	a	a	12.0	3.5	3.5	2.5	2.4	3.0	0	6.1
I_{CCV}					a				b								
V_{REF}									a								
D_{REF}																	
V_{IL}							a									—	
V_{IH}																	
I_{IL}							b									0	
I_{IH}																5.0	
T_W							a									—	
T_{D1}															0		
T_{D2}															1.3		
T_{D3}															4.0		
D_D															3.0		
I_{15}						b	b								—	0	
U_{HP1}						a	a							1.8	0	—	5.7
U_{HP2}														2.4			6.1
U_{HP3}														1.8			6.4
V_{UHP1}										11.5				2.4			6.1
V_{UHP2}										12.5							
D_{UHP}										12.0							
G_{HP1}														1.0	3.0		
G_{HP2}														2.5			
G_{HP3}														4.0			
F_{HP1}																	
F_{HP2}																	
V_{VHP1}										11.5							
V_{VHP2}										12.5							
D_{HP}										12.0							
I_6				b			b							—		0	
I_{19}				a				b						2.4			—
A_{VP1}								a					2.3				6.1
A_{VP2}											1.9						
A_{VP3}											2.7						
A_{VP4}											4.3						
A_{VP5}											5.1						
U_{VP1}	b										—	2.8	1.6				
U_{VP2}												3.5	2.3				
U_{VP3}												4.2	1.6				
V_{UVP1}										11.5		3.5	2.3				
V_{UVP2}										12.5							
D_{UVP}										12.0							
G_{VP1}													1.0				
G_{VP2}													2.0				
G_{VP3}													3.0				
F_{VP1}																	
F_{VP2}																	
V_{VP1}										11.5							
V_{VP2}										12.5							
D_{VP}										12.0							
I_2	c										3.5		2.3				
I_3	a	b															
I_5		a	b										—				

Input Signal



Electrical Characteristics Test Method

I_{CCH} Circuit Current1

Measure the input current to pin 10.

I_{CCV} Circuit Current2

Measure the input current to pin 20.

V_{REF} Reference Voltage Output

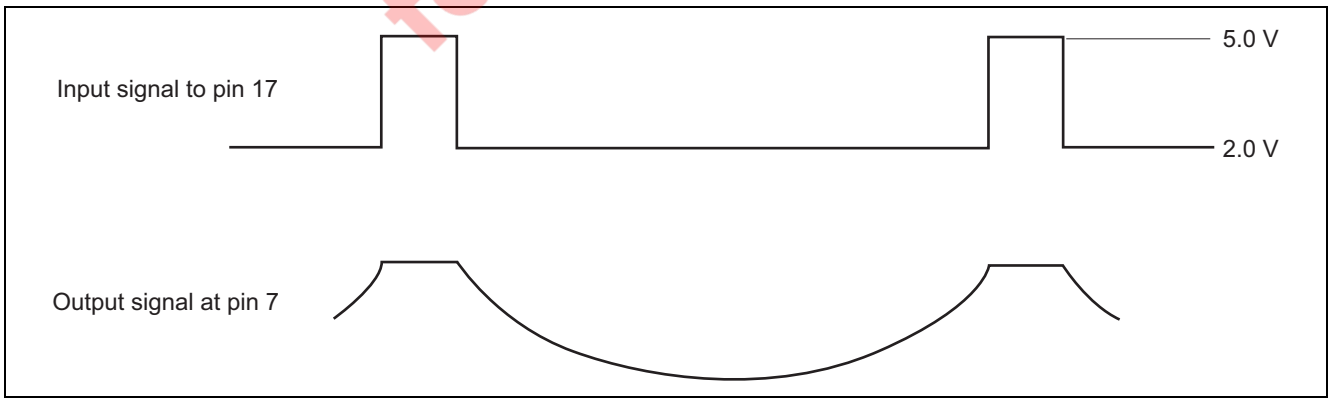
Measure the output voltage at pin 14.

D_{REF} Reference Voltage Temperature Drift

Measure temperature drift of pin 14. (–20°C to 85°C)

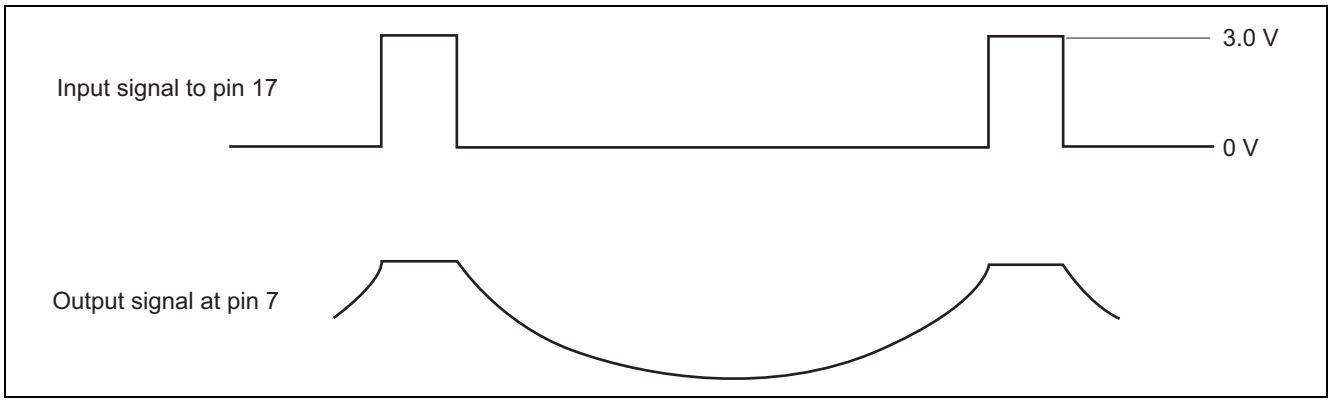
V_{IL} H-pulse Low Input Range

Input horizontal pulse which low level is 2 V in pin 17 and confirm output horizontal signal at pin 7.



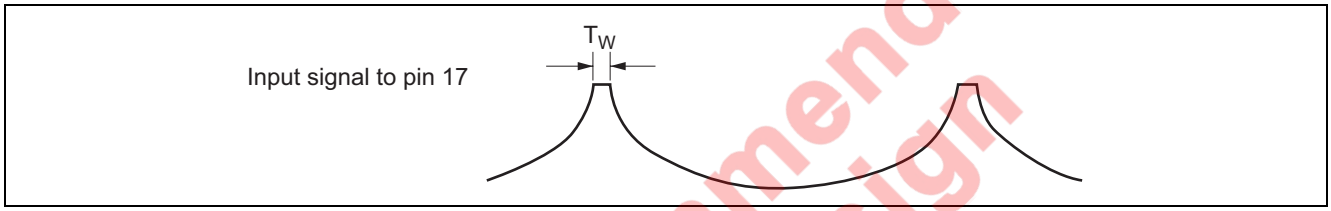
V_{IH} H-pulse High Input Range

Input horizontal pulse which high level is 3 V in pin 17 and confirm output horizontal signal at pin 7.



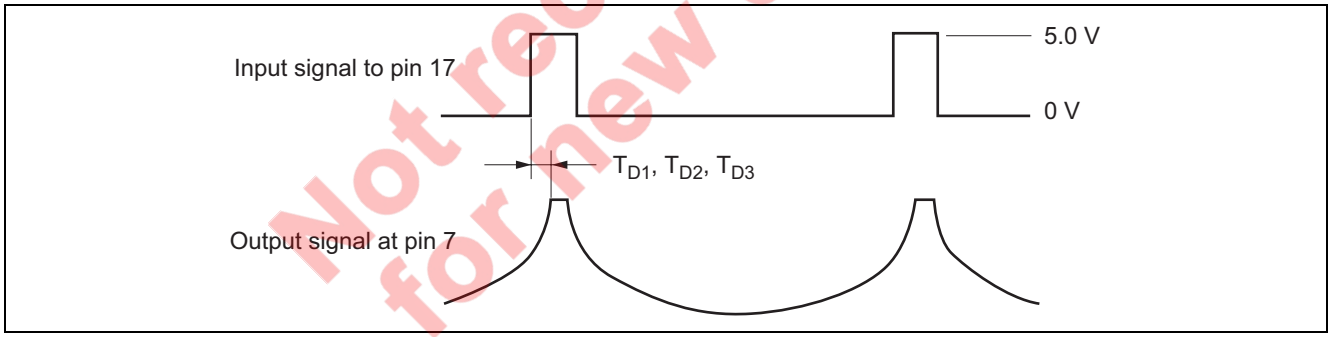
T_W H Parabola Width

Measure the time width of retrace period at pin 7.



T_{D1}, T_{D2}, T_{D3} H Parabola Delay

Measure the delay time from rise time of input signal to start of retrace period of output signal when the voltage of pin 15 is 0 V, 1.3 V, and 4 V.



D_D Delay Temperature Drift

Measure the temperature drift of the delay time. (–20°C to 85°C)

I_{15} Pin 15 Input Current

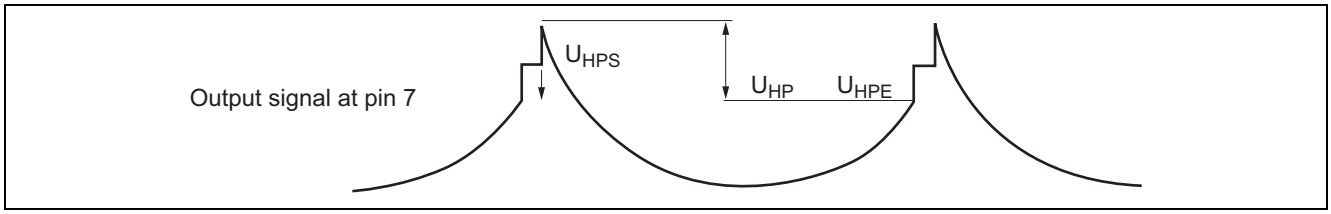
Measure the input current to pin 15 when the voltage of pin 15 is 2.5 V.

U_{HP1}, U_{HP2}, U_{HP3} H para. Unbalance Control

U_{HPS} is defined as the voltage of parabola start point. U_{HPE} is defined as the voltage of parabola end point. U_{HP1}, U_{HP2}, U_{HP3} is defined as follows

$$U_{HP1}, U_{HP2}, U_{HP3} = U_{HPS} - U_{HPE}$$

Measure the unbalance of parabola waveform at pin 4 when the voltage of pin 19 is 5.7 V, 6.1 V, and 6.4 V. Pin 6 is controlled so that the amplitude of parabola is 3 V_{P-P} constant.



V_{UHP1} H para. Unbalance V_{CC}. Characteristics1

When the supply voltage of pin 10, 20 is 11.5 V, the unbalance of parabola waveform at pin 7 is defined as $U_{HP11.5\ V}$.

$$V_{UHP1} = U_{HP2} - U_{HP11.5\ V}$$

V_{UHP2} H para. Unbalance V_{CC}. Characteristics2

When the supply voltage of pin 10, 20 is 12.5 V, the unbalance of parabola waveform at pin 7 is defined as $U_{HP12.5\ V}$.

$$V_{UHP2} = U_{HP2} - U_{HP12.5\ V}$$

D_{UHP} H para. Unbalance Temperature Drift

Measure temperature drift of U_{HP2}. (–20°C to 85°C)

G_{HP1} H Para. Gain Control1

Measure the amplitude of parabola waveform at pin 7 and it is defined as $HP_{-6,\ 1.0\ V}$.

G_{HP2} H Para. Gain Control2

The amplitude of parabola waveform at pin 7 is defined as $HP_{-6,\ 2.5\ V}$.

G_{HP3} H Para. Gain Control3

The amplitude of parabola waveform at pin 7 is defined as $HP_{-6,\ 4.0\ V}$.

F_{HP1} H Para. Freq. Characteristics1

When the frequency of input signal in pin 17 is 96 kHz, the amplitude of parabola waveform at pin 7 is defined as $HP_{96\ kHz}$. When the frequency of input signal is 24 kHz, the amplitude of parabola waveform is defined as $HP_{24\ kHz}$.

$$F_{HP1} = HP_{96\ kHz} - HP_{24\ kHz}$$

F_{HP2} H Para. Freq. Characteristics2

When the frequency of input signal in pin 17 is 140 kHz, the amplitude of parabola waveform at pin 7 is defined as $HP_{120\ kHz.}$

$$F_{HP2} = HP_{96\ kHz} - HP_{140\ kHz}$$

V_{VHP1} H Para. V_{CC}. Characteristics1

When the supply voltage of pin 10, 20 is 12.0 V, the amplitude of parabola waveform at pin 7 is defined as $HP_{12.0\ V}$. When the supply voltage is 11.5 V, the amplitude of parabola waveform is defined as $HP_{11.5\ V}$.

$$V_{VHP1} = HP_{12.0\ V} - HP_{11.5\ V}$$

V_{VHP2} H Para. V_{CC}. Characteristics2

When the supply voltage of pin 10, 20 is 12.5 V, the amplitude of parabola waveform at pin 7 is defined as $HP_{12.5\ V}$.

$$V_{VHP2} = HP_{12.0\ V} - HP_{12.5\ V}$$

D_{HP} H Para. Size Temperature Drift

Measure the temperature drift of $HP_{96\ kHz}$. (–20°C to 85°C)

I_6 Pin 6 Input Current

Measure the input current to pin 6 when voltage of pin 6 is 2.4 V.

I_{19} Pin 19 Input Current

Measure the input current to pin 19 when voltage of pin 19 is 6.1 V.

A_{VP1} V Parabola Accuracy1

Measure the output voltage at pin 4 and it is defined as $VP_{-2,\ 3.5\ V}$.

A_{VP2} V Parabola Accuracy2

The output voltage at pin 4 is defined as $VP_{-2,\ 1.9\ V}$.

$$A_{VP2} = VP_{-2,\ 1.9\ V} - VP_{-2,\ 3.5\ V}$$

A_{VP3} V Parabola Accuracy3

The output voltage at pin 4 is defined as $VP_{-2,\ 2.7\ V}$.

$$A_{VP3} = \frac{VP_{-2,\ 2.7\ V} - VP_{-2,\ 3.5\ V}}{VP_{-2,\ 1.9\ V} - VP_{-2,\ 3.5\ V}} \times 100\ (\%)$$

A_{VP4} V Parabola Accuracy4

The output voltage at pin 4 is defined as $VP_{-2,\ 4.3\ V}$.

$$A_{VP4} = \frac{VP_{-2,\ 4.3\ V} - VP_{-2,\ 3.5\ V}}{VP_{-2,\ 1.9\ V} - VP_{-2,\ 3.5\ V}} \times 100\ (\%)$$

A_{VP5} V Parabola Accuracy5

The output voltage at pin 4 is defined as $VP_{-2,\ 5.1\ V}$.

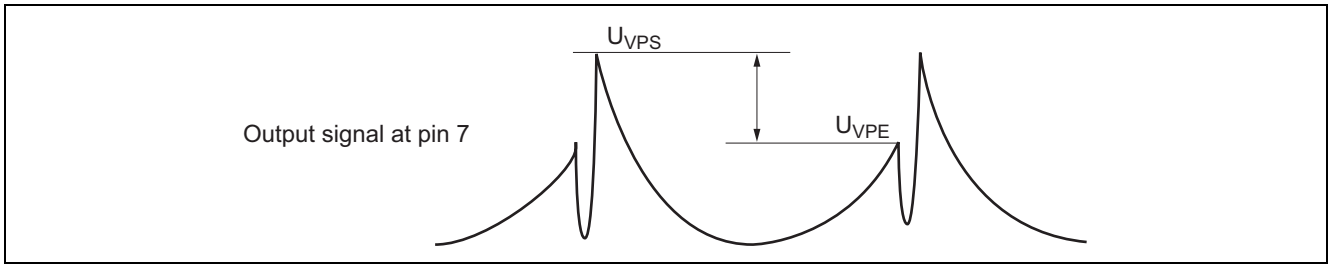
$$A_{VP5} = \frac{VP_{-2,\ 5.1\ V} - VP_{-2,\ 3.5\ V}}{VP_{-2,\ 1.9\ V} - VP_{-2,\ 3.5\ V}} \times 100\ (\%)$$

U_{VP1}, U_{VP2}, U_{VP3} V Para. Unbalance Control

U_{VPS} is defined as the voltage of parabola start point. U_{VPE} is defined as the voltage of parabola end point. U_{VP1}, U_{VP2}, U_{VP3} is defined as follows

$$U_{VP1}, U_{VP2}, U_{VP3} = U_{VPS} - U_{VPE}$$

Measure the unbalance of parabola waveform at pin 4 when the voltage of pin 3 is 2.8 V, 3.5 V, and 4.2 V. Pin 5 is controlled so that the amplitude of parabola is 3 V_{P-P} constant.



V_{UVP1} V Unbalance V_{CC}. Characteristics1

When the supply voltage of pin 10, 20 is 11.5 V, the unbalance of parabola waveform at pin 4 is defined as $U_{VP11.5\ V}$.

$$V_{UHP1} = U_{VP2} - U_{VP11.5\ V}$$

V_{UVP2} V Unbalance V_{CC}. Characteristics2

When the supply voltage of pin 10, 20 is 12.5 V, the unbalance of parabola waveform at pin 4 is defined as $U_{VP\ 12.5\ V}$.

$$V_{UVP2} = U_{VP2} - U_{VP12.5\ V}$$

D_{UVP} V Unbalance Temperature Drift

Measure temperature drift of U_{VP2} (–20°C to 85°C)

G_{VP1}, G_{VP2}, G_{VP3} V Parabola Amplitude

Measure the amplitude of parabola waveform at pin 4 when the voltage of pin 5 is 1 V, 2 V, and 3 V.

F_{VP1} V Para. Freq. Characteristics1

When the frequency of input signal in pin 2 is 70 Hz, the amplitude of parabola waveform at pin 4 is defined as $VP_{70\ Hz}$. When the frequency of input signal is 50 Hz, the amplitude of parabola waveform is defined as $VP_{50\ Hz}$.

$$F_{VP1} = VP_{70\ Hz} - VP_{50\ Hz}$$

F_{VP2} V Para. Freq. Characteristics2

When the frequency of input signal in pin 2 is 185 Hz, the amplitude of parabola waveform at pin 4 is defined as $VP_{185\ Hz}$.

$$F_{VP2} = VP_{70\ Hz} - VP_{185\ Hz}$$

V_{VP1} V Para. V_{CC}. Characteristics1

When the voltage of pin 10, 20 is 12.0 V, the amplitude of parabola waveform is defined as $VP_{12.0\ V}$. When the voltage is 11.5 V, the amplitude of parabola waveform is defined as $VP_{11.5\ V}$.

$$V_{VP1} = VP_{12.0\ V} - VP_{11.5\ V}$$

V_{VP2} V Para. V_{CC}. Characteristics2

When the voltage of pin 10, 20 is 12.5 V, the amplitude of parabola waveform is defined as $VP_{12.5\ V}$.

$$V_{VP2} = VP_{12.0\ V} - VP_{12.5\ V}$$

D_{VP} V Para. Temperature Drift

Measure temperature drift of $VP_{70\ Hz}$. (−20°C to 85°C)

I_2 Pin 2 Input Current

Measure the input current to pin 2 when the voltage of pin 2 is 3.5 V.

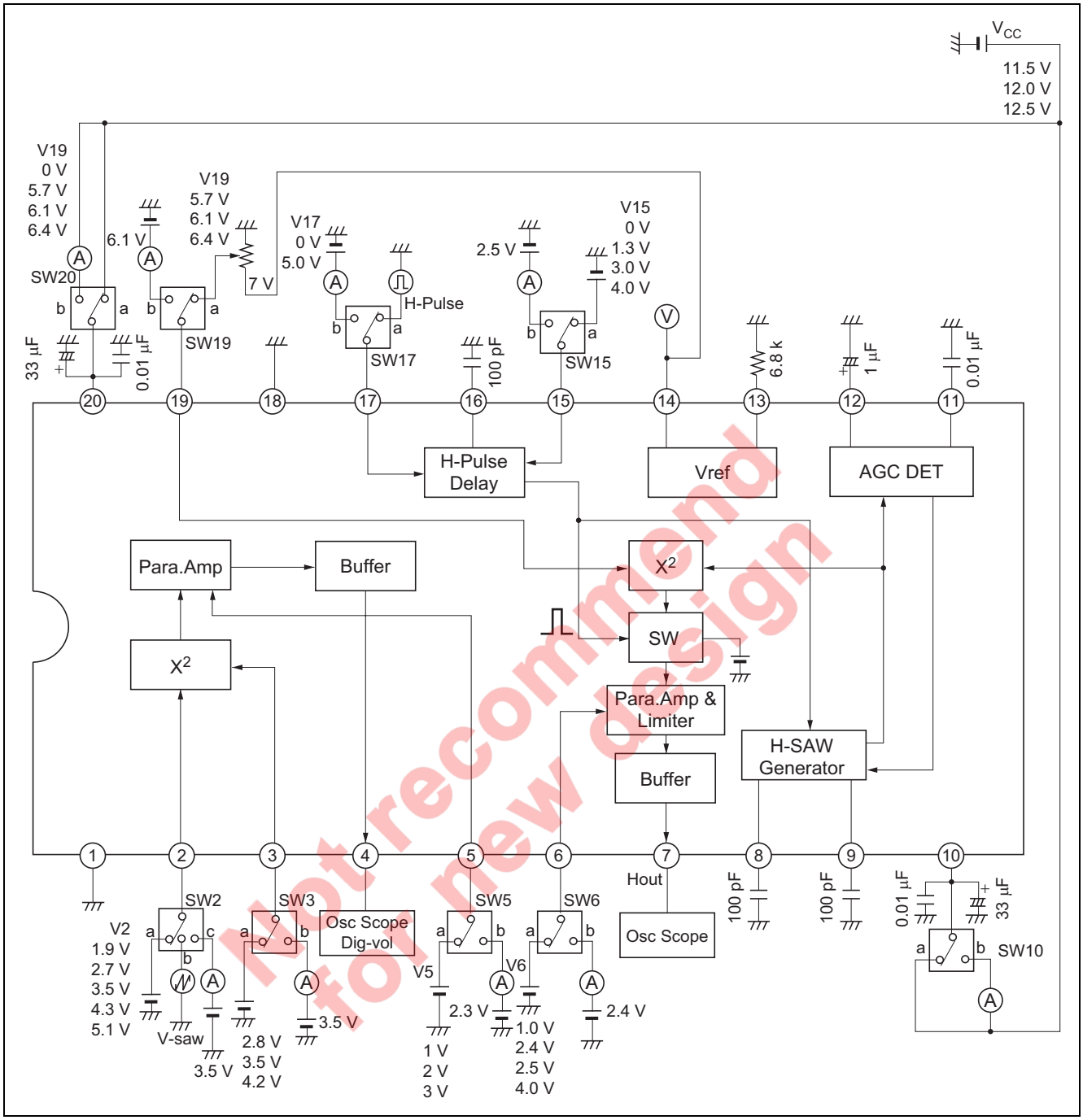
I_3 Pin 3 Input Current

Measure the input current to pin 3 when the voltage of pin 3 is 3.5 V.

I_5 Pin 5 Input Current

Measure the input current to pin 5 when the voltage of pin 5 is 2.4 V.

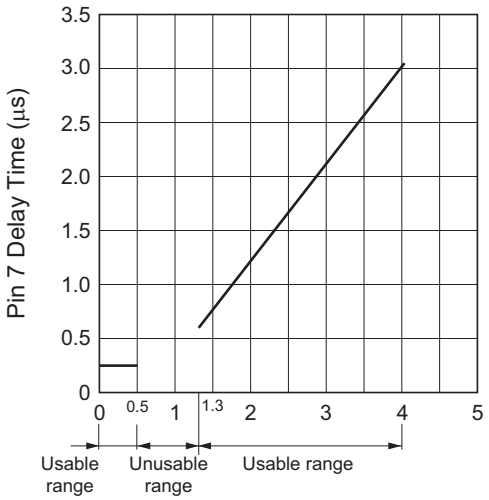
Test Circuit

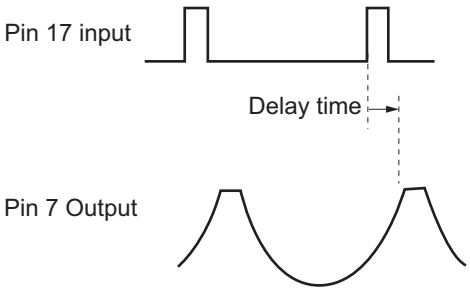


Typical Characteristics

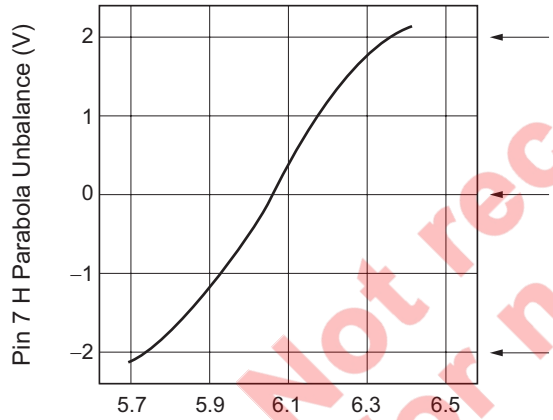
Horizontal Block

Delay Control Voltage vs. Delay Time



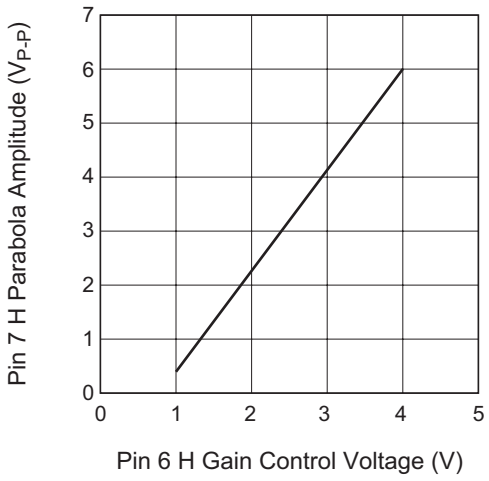


H Unbalance Control Bias Voltage vs.
H Parabola Unbalance



Pin 6 is controlled as the amplitude of parabola is 3 V_{P-P} constant

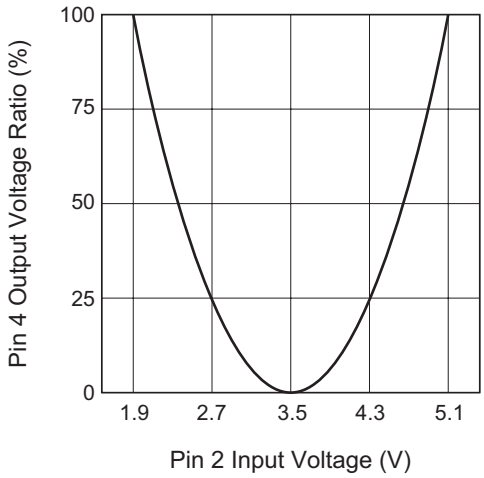
H Gain Control Voltage vs.
H Parabola Amplitude



Pin 19 = 6.1 V const.

Vertical Block

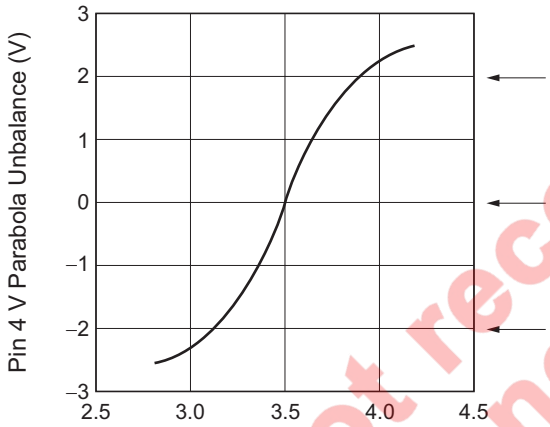
V Para DC Output Voltage Ratio



Pin 3 = 3.5 V const.
Pin 5 = 2.3 V const.

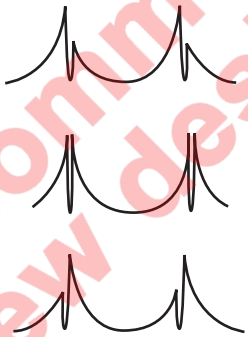
$$\text{Output ratio} = \frac{\text{Pin 4out} - \text{Pin 4out@Pin 4 = 3.5 V}}{\text{Pin 4out@Pin 2 = 1.9 V} - \text{Pin 4out@Pin 2 = 3.5 V}} \times 100\ (\%)$$

V Unbalance Control Bias Voltage vs.
V Parabola Unbalance

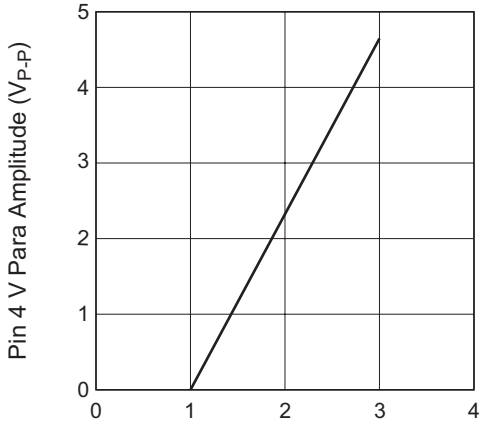


Pin 5 is controlled as the amplitude of parabola is 3 V_{P-P} constant

Pin 4 output



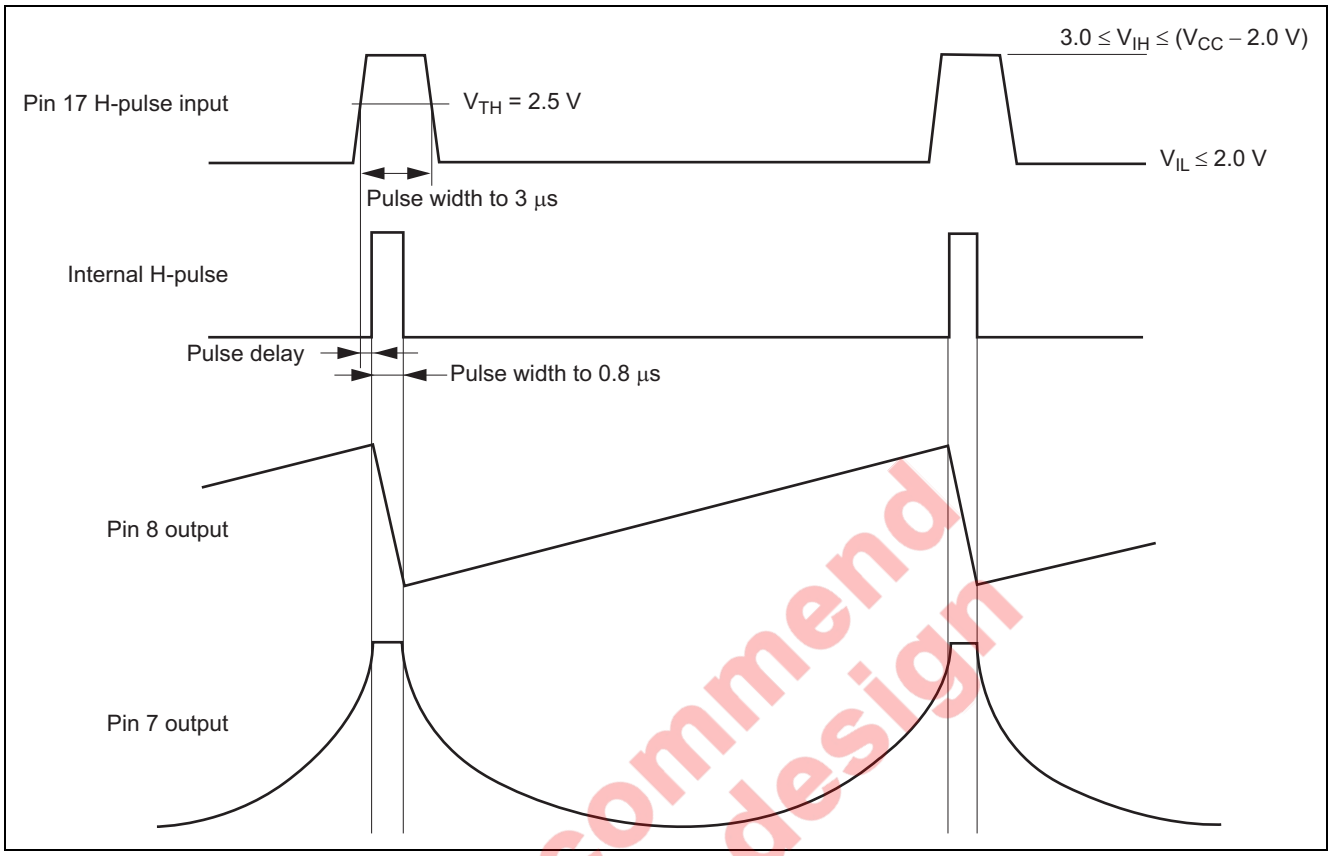
V Para Amp Gain Control Voltage vs.
Output Amplitude



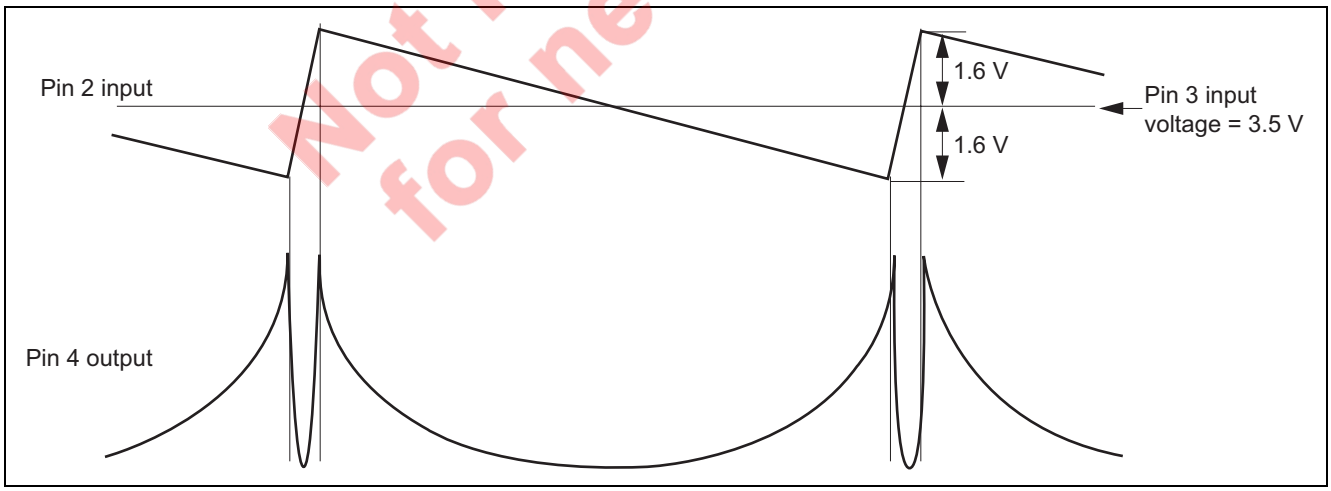
Pin 2 3.2 V_{P-P} sawtooth wave input

Timing Chart

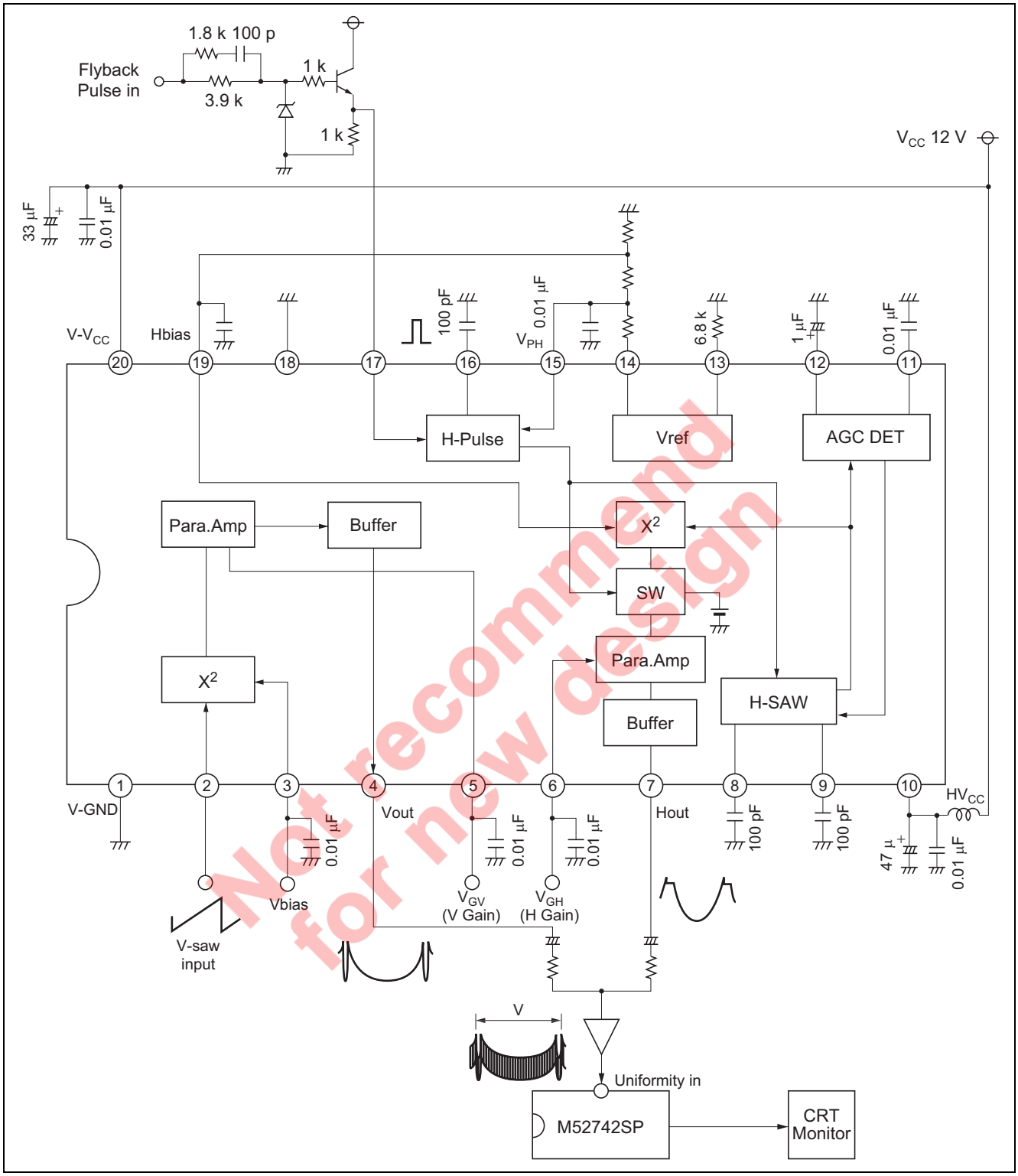
Horizontal Block

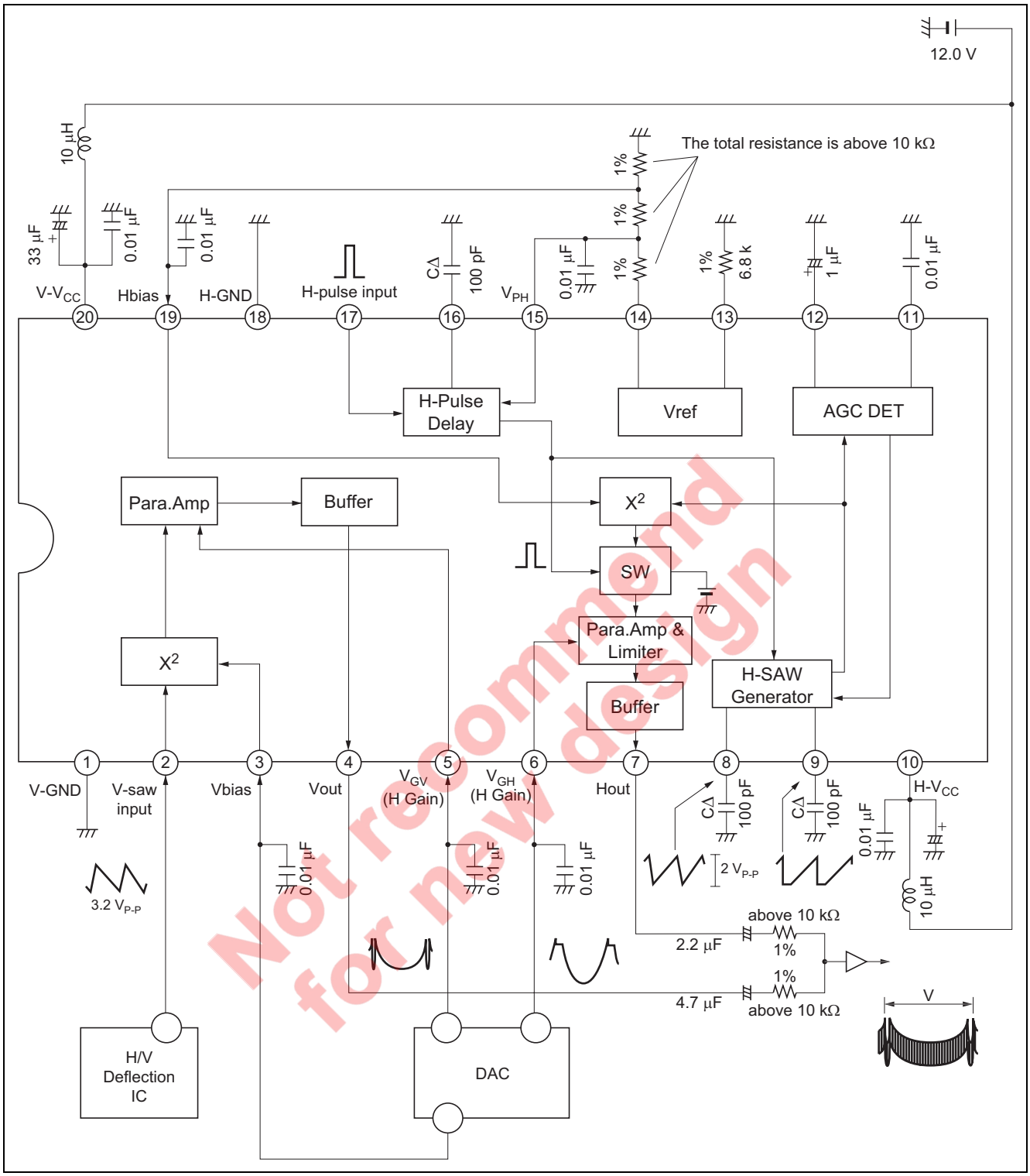


Vertical Block

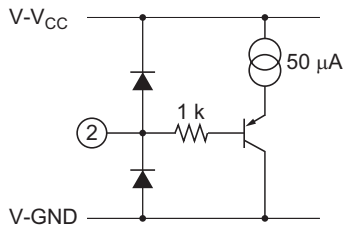
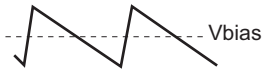
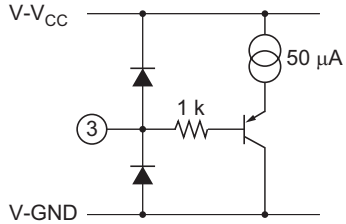
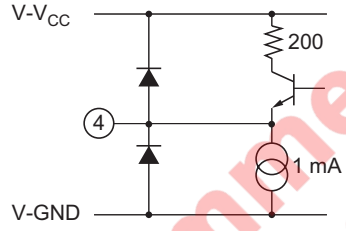
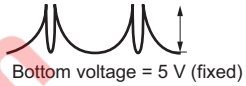
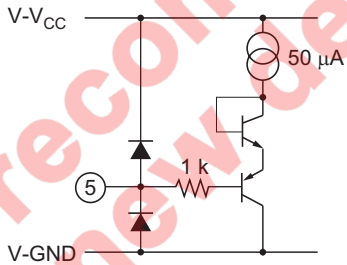
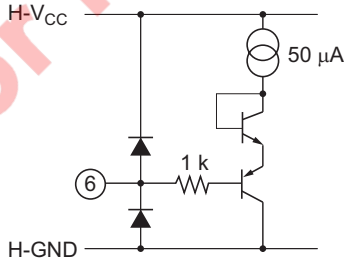


Application Example

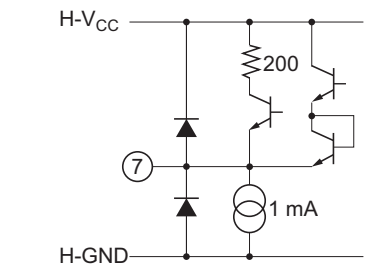
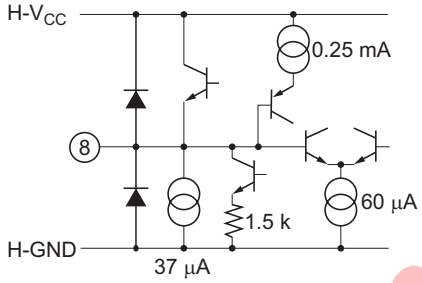
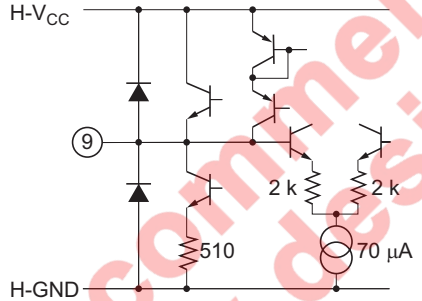
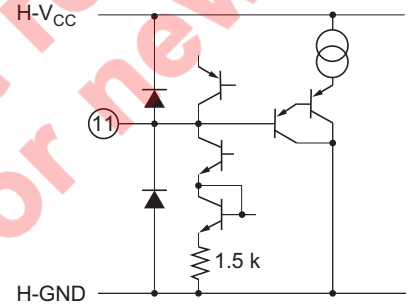



12.0 V
10 µH
The total resistance is above 10 kΩ
1%
1%
1%
33 µF
0.01 µF
0.01 µF
CΔ
100 pF
0.01 µF
1%
6.8 k
1 µF
0.01 µF
V-VCC
Hbias
H-GND
H-pulse input
VPH
20
19
18
17
16
15
14
13
12
11
H-Pulse Delay
Vref
AGC DET
Para.Amp
Buffer
X2
SW
Para.Amp & Limiter
H-SAW Generator
Buffer
X2
1
2
3
4
5
6
7
8
9
10
V-GND
V-saw input
Vbias
Vout
VGV (H Gain)
VGH (H Gain)
Hout
H-VCC
CΔ
100 pF
CΔ
100 pF
0.01 µF
10 µH
3.2 VP-P
0.01 µF
0.01 µF
0.01 µF
2 VP-P
above 10 kΩ
2.2 µF
1%
1%
4.7 µF
above 10 kΩ
V
H/V Deflection IC
DAC
Not recommend for new design

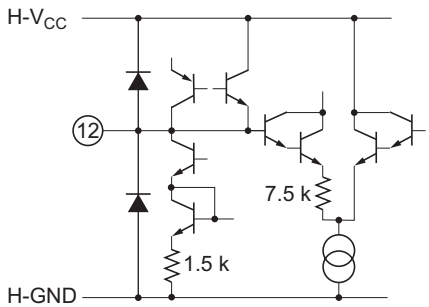
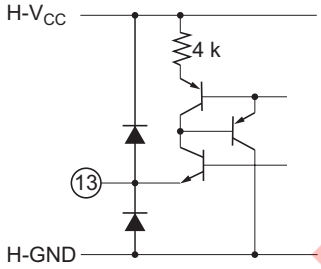
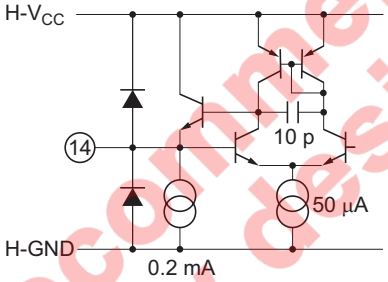
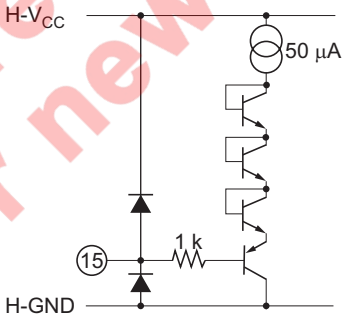
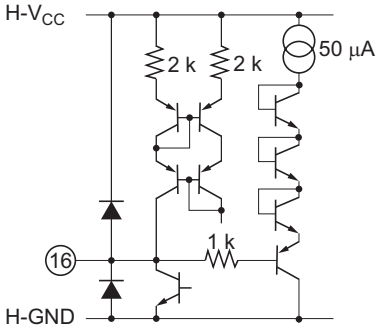
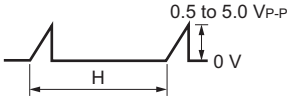
Pin Description

Pin No.	Name	DC Voltage (V)	Peripheral Circuit	Function
1	V-GND	—	—	GND of vertical block
2	Vsawi	3.5 V		Vertical sawtooth wave input pin. 
3	Vbias	2.8 to 4.2 V		Vertical parabola unbalance control bias voltage input pin. Input voltage range is 2.8 to 4.2 V
4	Vout	5 V (Bottom)		Vertical parabola wave output pin.  Amplitude is possible to control by pin 5
5	V_{GV}	1.0 to 3.0 V		Vertical parabola wave gain control voltage input pin. Input voltage range is 1.0 to 3.0 V.
6	V_{GH}	1.0 to 4.0 V		Horizontal parabola wave gain control voltage input pin. Input voltage range is 1.0 to 4.0 V.

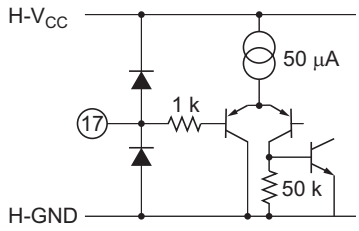
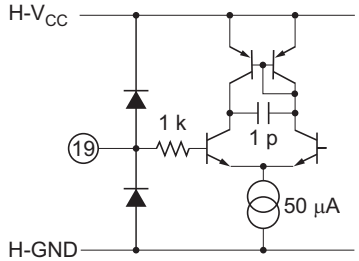
Pin Description (cont.)

Pin No.	Name	DC Voltage (V)	Peripheral Circuit	Function
7	Hout	2.4 to 9.2 V		Horizontal parabola wave output pin.  Amplitude is possible to control by pin 6
8	Cret	7.1 V (Top) 4.9 V (Bottom)		Connection pin of horizontal retrace capacitor. Recommended capacitance is 100 pF. 
9	Ctrc	7.1 V (Top) 4.9 V (Bottom)		Connection pin of horizontal trace capacitor. Recommended capacitance is 100 pF. 
10	H-V_{CC}	12.0 V		V_{CC} of horizontal block.
11	C_{AGCr}	2.5 V		Connection pin of horizontal sawtooth wave AGC retrace capacitor. Recommended capacitance is 0.01 µF.

Pin Description (cont.)

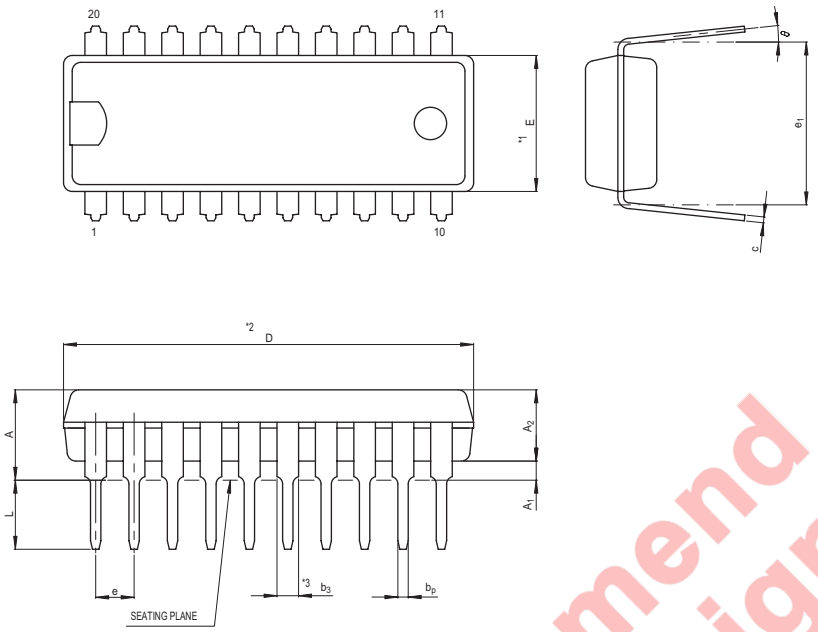
Pin No.	Name	DC Voltage (V)	Peripheral Circuit	Function
12	C_{AGC}	4.0 V		Connection pin of horizontal AGC capacitor. Recommended capacitance is 1 μF.
13	Vrefr	1.28 V		Connection pin of reference current source resister. Recommended resistance is 6.8 kΩ.
14	Vrefo	7.0 V		Reference voltage output for horizontal pulse delay circuit. Should be connect more than 10 kΩ external resister.
15	V_{PH}	0 to 0.5 V 1.3 to 4.0 V		Delay adjustment voltage input pin of horizontal pulse. Input voltage range is 1.3 to 4.0 V. At 0 to 0.5 V, delay is minimized. (0.5 to 1.3 V is unusable range.)
16	Chpd	0 V (Bottom)		Connection pin of horizontal pulse delay timing capacitor. Recommended capacitance is 100 pF. 

Pin Description (cont.)

Pin No.	Name	DC Voltage (V)	Peripheral Circuit	Function
17	HPin	—		Horizontal pulse input pin. Low input level is less than 2.0 V, and high is 3.0 to 10 V. (at V_{CC} = 12 V)
18	H-GND	—	—	GND of horizontal block
19	Hbias	5.7 to 6.4 V		Horizontal parabola unbalance control bias voltage input pin. Input voltage range is 5.7 to 6.4 V.
20	V-V_{CC}	12.0 V	—	V_{CC} of vertical block

Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SDIP20-6.3x19-1.78	PRDP0020BA-A	20P4B	1.0g



NOTE)
1. DIMENSIONS "*1" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	7.32	7.62	7.92
D	18.8	19.0	19.2
E	6.15	6.3	6.45
A	—	—	4.5
A_1	0.51	—	—
A_2	—	3.3	—
b_p	0.38	0.48	0.58
b_3	0.9	1.0	1.3
c	0.22	0.27	0.34
θ	0°	—	15°
e	1.528	1.778	2.028
L	3.0	—	—

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Colophon .7.2