

AN5793K

Deflection signal processing IC for CRT display

Overview

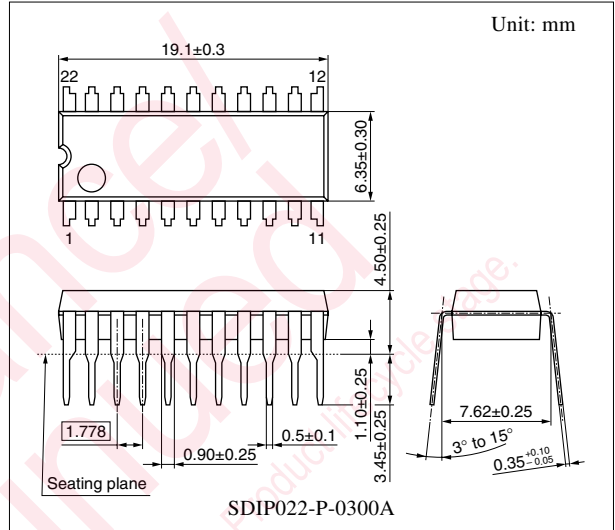
The AN5793K is a deflection signal processor IC for CRT display. It incorporates a stable wide-band horizontal oscillation circuit and a vertical oscillation circuit.

Features

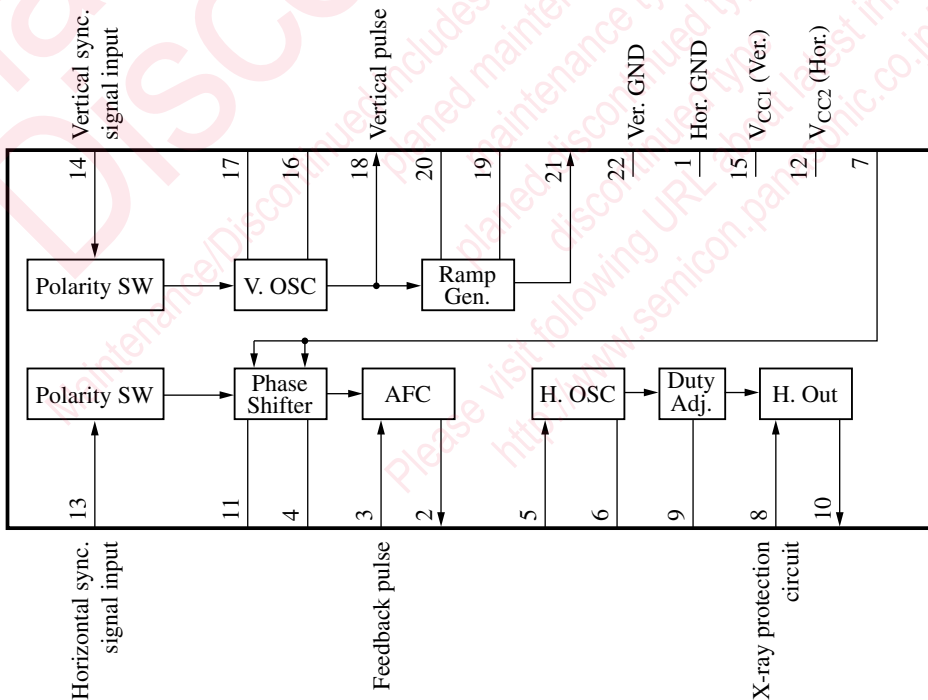
- Built-in horizontal oscillation circuit (applicable from $f_H = 15.75 \text{ kHz}$ to 115 kHz)
- With horizontal phase adjustment and output duty adjustment functions
- Built-in vertical oscillation circuit ($f_V = 50 \text{ Hz}$ to 150 Hz)

Applications

- CRT monitors



Block Diagram



■ Pin Descriptions

Pin No.	Description	Pin No.	Description
1	Horizontal system GND	12	Horizontal system V_{CC2}
2	AFC output	13	Horizontal synchronous signal input
3	AFC input (Feedback pulse)	14	Vertical synchronous signal input
4	Pulse width control	15	Vertical system V_{CC1}
5	Resistor for horizontal oscillation	16	Capacitor for vertical oscillation
6	Capacitor for horizontal oscillation	17	Resistor for vertical oscillation
7	Phase shifter circuit main control	18	Vertical pulse output
8	X-ray protection circuit	19	Capacitor for ramp wave generation
9	Duty adjustment control	20	Resistor for ramp wave control
10	Horizontal system output	21	Ramp wave output
11	Phase shifter control	22	Vertical system GND

■ Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Supply voltage	V_{CC1}	13.2	V
	V_{CC2}		
Supply current	$I_{12}+I_{15}$	46.0	mA
Power dissipation *2	P_D	700.0	mW
Operating ambient temperature *1	T_{opr}	-25 to +75	°C
Storage temperature *1	T_{stg}	-55 to +150	°C

Note) *1: Except for the operating ambient temperature and storage temperature, all ratings are for $T_a = 25^\circ\text{C}$.

*2: The power dissipation shown is the value for $T_a = 75^\circ\text{C}$.

■ Recommended Operating Range

Range	Symbol	Rating	Unit
Supply voltage	V_{CC1}	9.8 to 13.0	V
	V_{CC2}		

■ Electrical Characteristics at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Circuit current	I_{15}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}$	6.9	8.1	10.1	mA
	I_{12}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	12.9	15.0	17.1	
Circuit terminal voltage	V_3	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	6.2	7.0	7.8	V
	V_5	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	2.60	2.95	3.25	
	V_7	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	6.4	7.4	8.2	
	V_{13}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	2.4	2.9	3.4	
	V_{14}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	2.4	2.9	3.4	
	V_{17}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	6.4	7.4	8.2	
	V_{20}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 8 = 0\text{ V}$	4.9	5.9	6.8	
Horizontal output pin voltage	$V_{10-1(H)}$	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 6 = 8\text{ V}, \text{pin } 9 = 6.8\text{ V}$	3.8	4.3	4.9	V
Horizontal output saturation voltage	$V_{10-1(L)}$	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 6 = 6.8\text{ V}, \text{pin } 9 = 8\text{ V}$	-0.2	0.1	0.2	V
X-ray protection circuit operation start voltage	V_{8-1}	$V_{CC1} = 12\text{ V}, V_{CC2} = 12\text{ V}, \text{pin } 6 = 8\text{ V}, \text{pin } 9 = 6.8\text{ V}, \text{pin } 8 = 0\text{ V to } 1\text{ V}$	0.65	0.75	0.90	V
Horizontal system						
Horizontal oscillation start voltage	$V_{TH,S}$	$f_{HO} = 15.8\text{ kHz (allowance: } \pm 5\%)$	—	—	9.0	V
Horizontal oscillation frequency	f_{HO1}	$V_{CC2} = 12\text{ V}, \text{pin } 5 = 8.5\text{ k}\Omega, \text{pin } 6 = 1800\text{ pF (J)}$	15.0	15.75	16.5	kHz
Maximum horizontal oscillation frequency	f_{HO2}	$V_{CC2} = 12\text{ V}, \text{pin } 5 = 3.4\text{ k}\Omega, \text{pin } 6 = 470\text{ pF (J)}$	100	115	130	kHz
Oscillation frequency control sensitivity	β	$V_{CC2} = 12\text{ V}, \Delta I = \pm 25\text{ }\mu\text{A}$	35.0	43.0	50.0	Hz/ μA
Minimum horizontal output pulse duty	T_{D1}	$V_{CC2} = 12\text{ V}, \text{pin } 9 = 8.5\text{ V}$	7.0	10.3	13.5	%
Maximum horizontal output pulse duty	T_{D2}	$V_{CC2} = 12\text{ V}, \text{pin } 9 = 5.8\text{ V}$	89.0	93.2	97.0	%
Minimum phase shifter amount	T_{P1}	$V_{CC2} = 12\text{ V}, \text{pin } 11 = 1.2\text{ V}, \text{pin } 7 = 24\text{ k}\Omega$	0.5	1.0	1.5	μs
Maximum phase shifter amount	T_{P2}	$V_{CC2} = 12\text{ V}, \text{pin } 7 = 24\text{ k}\Omega, \text{pin } 11 = 5\text{ V}$	3.2	3.7	4.2	μs
Phase shifter range	T_{P3}	$V_{CC2} = 12\text{ V}, \text{pin } 7 = 83\text{ k}\Omega, \text{pin } 11 = 5\text{ V}$	11.5	12.4	13.3	μs
Minimum pulse width	T_{PW1}	$V_{CC2} = 12\text{ V}, \text{pin } 4 = 1.5\text{ V}, \text{pin } 7 = 24\text{ k}\Omega$	0.5	1.0	1.5	μs
Maximum pulse width	T_{PW2}	$V_{CC2} = 12\text{ V}, \text{pin } 7 = 83\text{ k}\Omega, \text{pin } 4 = 5\text{ V}$	11.1	12.2	13.2	μs
Minimum horizontal input level	V_{13-1}	$V_{CC2} = 12\text{ V}$	—	—	2.9	V[p-p]

■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Vertical system						
Vertical oscillation start voltage	$V_{IV,S}$	$f_{VO} = 56 \text{ Hz}$ (allowance: $\pm 10\%$)	—	—	8.0	V
Vertical oscillation frequency	f_{VO1}	$V_{CC1} = 12 \text{ V}$, pin 17 = $30.0 \text{ k}\Omega$, pin 16 = $0.027 \mu\text{F}$ (J)	45	50	55	Hz
Maximum vertical oscillation frequency	f_{VO2}	$V_{CC1} = 12 \text{ V}$ pin 17 = $7.7 \text{ k}\Omega$, pin 16 = $0.027 \mu\text{F}$ (J)	140	150	160	Hz
Vertical pulse width	T_{VO}	$V_{CC1} = 12 \text{ V}$, $f_{VIN} = 60 \text{ Hz}$ $f_{VO} = 50 \text{ Hz}$ (free-running frequency)	0.17	0.21	0.25	ms
Vertical pull-in range	f_{PV}	$V_{CC1} = 12 \text{ V}$, $f_{VIN} = 140 \text{ Hz}$ $f_{VO} = 50 \text{ Hz}$ (free-running frequency)	89	90	91	Hz
Minimum vertical input level	V_{14-22}	$V_{CC1} = 12 \text{ V}$, $f_{VIN} = 60 \text{ Hz}$ $f_{VO} = 50 \text{ Hz}$ (free-running frequency)	—	—	2.9	V[p-p]
Ramp wave output	V_{21}	$V_{CC1} = 12 \text{ V}$, $f_{VIN} = 60 \text{ Hz}$ $f_{VO} = 50 \text{ Hz}$ (free-running frequency)	1.70	2.00	2.30	V[p-p]

• Design reference data

Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Horizontal system						
Horizontal oscillation supply voltage variation	$\Delta f_{HO} / \Delta V_{CC2}$	$V_{CC2} = 10.8 \text{ V}$ to 13.2 V $f_{HO} = 31.5 \text{ kHz}$	—	15	—	Hz/V
Horizontal oscillation temperature variation	$\Delta f_{HO} / \Delta T$	$V_{CC2} = 12 \text{ V}$, $T_a = -20^\circ\text{C}$ to 70°C $f_{HO} = 31.5 \text{ kHz}$	—	1.0	—	Hz/ $^\circ\text{C}$
Phase detection sensitivity	μ	$V_{CC2} = 12 \text{ V}$	—	67	—	$\mu\text{A}/\mu\text{s}$
Horizontal output pulse duty supply voltage variation	$\Delta T_D / \Delta V_{CC2}$	$V_{CC2} = 10.8 \text{ V}$ to 13.2 V , $T_D = 32\%$ $f_{HO} = 31.5 \text{ kHz}$	—	0.25	—	%/V
Horizontal output pulse duty temperature variation	$\Delta T_D / \Delta T$	$V_{CC2} = 12 \text{ V}$, $T_D = 32\%$ $T_a = -20^\circ\text{C}$ to 70°C , $f_{HO} = 31.5 \text{ kHz}$	—	0.01	—	%/ $^\circ\text{C}$
Horizontal output drive current	I_{10}	$V_{CC2} = 12 \text{ V}$	—	—	5	mA
Phase shifter amount supply voltage variation	$\frac{\Delta T_P / T_{PREF}}{\Delta V_{CC2}}$	$V_{CC2} = 10.8 \text{ V}$ to 13.2 V $T_{PREF} = 6 \mu\text{s}$ ($V_{CC2} = 12 \text{ V}$)	—	0.06	—	%/V
Phase shifter amount temperature variation	$\frac{\Delta T_P / T_{PREF}}{\Delta T}$	$V_{CC2} = 12 \text{ V}$, $T_{PREF} = 6 \mu\text{s}$ $T_a = -20^\circ\text{C}$ to 70°C	—	0.02	—	%/ $^\circ\text{C}$
Pulse width supply voltage variation	$\frac{\Delta T_{PW} / T_{PWREF}}{\Delta V_{CC2}}$	$V_{CC2} = 10.8 \text{ V}$ to 13.2 V $T_{PWREF} = 6 \mu\text{s}$ ($V_{CC2} = 12 \text{ V}$)	—	0.2	—	%/V
Pulse width temperature variation	$\frac{\Delta T_{PW} / T_{PWREF}}{\Delta T}$	$V_{CC2} = 12 \text{ V}$, $T_{PWREF} = 6 \mu\text{s}$ $T_a = -20^\circ\text{C}$ to 70°C	—	0.02	—	%/ $^\circ\text{C}$

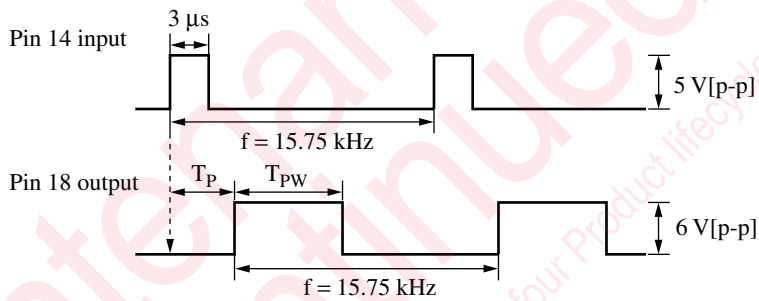
■ Electrical Characteristics at $T_a = 25^\circ\text{C}$ (continued)

• Design reference data (continued)

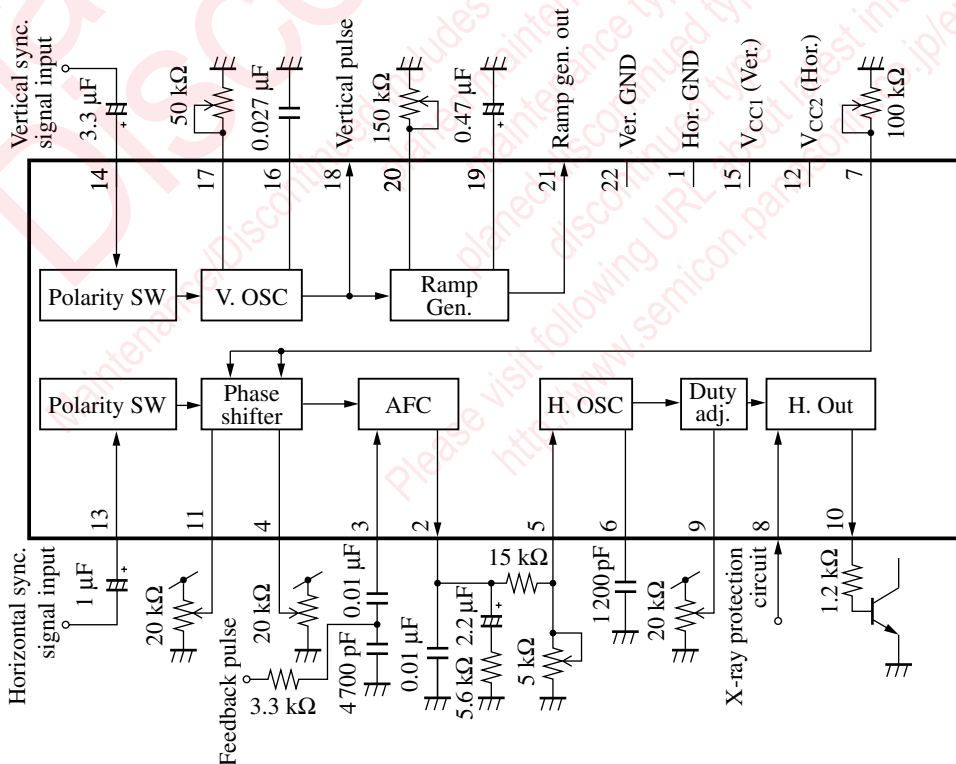
Note) The characteristics listed below are theoretical values based on the IC design and are not guaranteed.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Vertical system						
Vertical oscillation supply voltage variation	$\Delta f_{VO} / \Delta V_{CC1}$	$V_{CC1} = 10.8\text{ V to }13.2\text{ V}$ $f_{VO} = 50\text{ Hz}$	—	1.08	—	Hz/V
Vertical oscillation temperature variation	$\Delta f_{VO} / \Delta T$	$V_{CC1} = 12\text{ V}$, $f_{VO} = 50\text{ Hz}$ $T_a = -20^\circ\text{C to }70^\circ\text{C}$	—	0.01	—	Hz/ $^\circ\text{C}$

• T_P , T_{PW}



■ Application Circuit Example



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