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## NTE1888 Integrated Circuit Horizontal and Vertical Deflection Monitor

**Features:**

- Direct Line Darlington Drive
- Direct Frame Yoke Drive ( $\pm 1A$ )
- Composite Video Signal Input Capability
- Frame Output Protection Against Short Circuits
- PLL

**Description:**

The NTE1888 is both a horizontal and a vertical deflection circuit in one 16-Lead DIP package.

**Absolute Maximum Ratings:**

Supply Voltage $V_{CC1}$ .....	30V
Flyback Generator Supply Voltage $V_2$ .....	35V
Frame Power Supply Voltage $V_7$ .....	60V
Frame Output Current, $I_8$	
Non-Repetitive .....	$\pm 1.5A$
Continuous .....	$\pm 1.0A$
Line Output Voltage (External), $V_{14}$ .....	60V
Line Output Peak Current, $I_{P14}$ .....	0.8A
Line Output Continuous Current, $I_{C14}$ .....	0.4A
Storage Temperature Range, $T_{stg}$ .....	$-40^\circ$ to $+150^\circ C$
Maximum Operating Junction Temperature, $T_j$ .....	$+150^\circ C$
Maximum Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	$15^\circ C/W$
Typical Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ (soldered on a $35\mu m$ thick $45cm^2$ PC board copper area) .....	$45^\circ C/W$
Maximum Recommended Junction Temperature, $T_J$ .....	$+120^\circ C$

**Electrical Characteristics:** ( $T_A = +25^\circ C$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Current	$I_{CC1}$	@ Pin16	10	–	20	mA
Supply Voltage	$V_{CC1}$	$I_{CC1} = 15mA$	9.0	9.8	10.5	V
Voltage Variation	$\Delta V_{CC1}$	$I_{CC1} = 10mA \rightarrow 20mA$	-280	50	+280	mV
Starting Threshold for Line Output Pulses	LPS		–	–	5	V

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reference Voltage	$V_{15}$	@ Pin15 $I_{15} = -1\mu\text{A}$	1.4	1.75	2.0	V
Minimum Width of Frame Pulse (when synchronized with TTL signal)	MWF		50	–	–	$\mu\text{s}$
Low Threshold Voltage	$LT_9$	@ Pin9	2.8	3.2	3.6	V
High Threshold Voltage	$HT_9$		6.4	6.6	7.8	V
Bias Current	$BI_9$		–	100	–	nA
Discharge Impedance	$DR_9$		1.0	1.4	1.8	k $\Omega$
Free Running Line Period	FLP1	$R = 34.9\text{k}\Omega$ to $V_{CC1}$ , $C = 2.2\text{nF}$ to GND	62	64	66	$\mu\text{s}$
	FLP2	$R = 13.7\text{k}\Omega$ , $C = 2.2\text{nF}$	–	27	–	$\mu\text{s}$
Oscillator Threshold for Line Output Pulse Triggering	$OT_9$		–	4.6	–	V
Horizontal Frequency Drift w/Temperature	$\frac{DF}{\Delta\theta}$		–	2	–	Hz/ $^\circ\text{C}$
Saturation Voltage	$LV_{14}$	@ Pin14 $I_{14} = 200\text{mA}$	–	1.1	1.6	V
Output Pulse Width	OPW	Line Period = $64\mu\text{s}$	20	22	24	$\mu\text{s}$
Bias Voltage	$V_{11}$	@ Pin11	1.8	2.4	3.2	V
Input Impedance	$Z_{11}$		4.5	5.8	8.0	k $\Omega$
Output Current During Synchro Pulse	$I_{10}$	@ Pin10	250	450	800	$\mu\text{A}$
Current Ratio	$RI_{10}$	Positive/Negative	0.95	1.0	1.05	
Leakage Current	$LI_{10}$		–2	–	+2	$\mu\text{A}$
Control Range Voltage	$CV_{10}$		2.6	–	7.1	V
Low Threshold Voltage	$LT_1$	@ Pin1	1.6	2.0	2.3	V
High Threshold Voltage	$HT_1$		2.6	3.1	3.6	V
Bias Current	$BI_1$		–	30	–	nA
Discharge Impedance	$DR_1$		300	470	700	W
Free Running Frame Period	FFP1	@ Pin1 $R = 845\text{k}\Omega$ to $V_{CC1}$ , $C = 180\text{nF}$ to GND	20.5	23.0	25.0	ms
Minimum Frame Period	MFP	$I_{15} = -100\mu\text{A}$ , $R = 845\text{k}\Omega$ to $V_{CC1}$ , $C = 180\text{nF}$ to GND	–	12.8	–	ms
Free Running Frame Period	FFP2	$R = 408\text{k}\Omega$ , $C = 220\text{nF}$	–	14.3	–	ms
Frame Period Ratio	FPR	Note 1	1.7	1.8	1.9	
Frame Sawtooth Gain	FG	Between Pin1 and Non-Inverting input of the Frame Amplifier	–	–0.4	–	
Vertical Frequency Drift w/Temperature	$\frac{DF}{\Delta\theta}$	@ Pin1	–	$4.1^{-3}$	–	Hz/ $^\circ\text{C}$
Operating Voltage	$V_7$	@ Pin7 w/Flyback Generator	10	–	58	V

Note 1. Frame Period Ratio =  $\frac{FFP}{MFP}$

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit	
Supply Current	$I_7$	@ Pin7	$V_7 = 30\text{V}$	–	–	22	mA	
Operating Voltage	$V_2$	@ Pin2		10	–	30	V	
Saturation Voltage to GND	$LV_{8A}$	@ Pin8	$V_7 = 80\text{V}, I_8 = 0.1\text{A}$	–	0.06	0.6	V	
	$LV_{8B}$		$V_7 = 80\text{V}, I_8 = 1\text{A}$	–	0.37	1.0	V	
Saturation Voltage to $V_7$	$HV_{8A}$		$V_7 = 30\text{V}, I_8 = -0.1\text{A}$	–	1.3	1.6	V	
	$HV_{8B}$		$V_7 = 30\text{V}, I_8 = -1\text{A}$	–	1.7	2.4	V	
Saturation Voltage to $V_7$ in Flyback Mode	$FV_{8A}$		$V_8 > V_7, I_8 = 0.1\text{A}$	–	1.6	2.1	V	
	$FV_{8B}$		$V_8 > V_7, I_8 = 1\text{A}$	–	2.5	4.5	V	
Flyback Transistor ON (Output = High State)	$F_{2DA}$		@ Pin2 & Pin3, $V_2 = 30\text{V}$	$V_{2/3}$ with $I_3 \rightarrow 2 = 0.1\text{A}$	–	1.5	2.1	V
	$F_{2DB}$			$V_{2/3}$ with $I_3 \rightarrow 2 = 1\text{A}$	–	3.0	4.5	V
	$FSVA$	$V_{3/2}$ with $I_2 \rightarrow 3 = 0.1\text{A}$		–	0.8	1.1	V	
	$FSVB$	$V_{3/2}$ with $I_2 \rightarrow 3 = 0.1\text{A}$		–	2.2	4.5	V	
Flyback Transistor OFF (Output = $V_7 - V_8$ )	$FCI$	@ Pin2 & Pin3	$V_7 = V_2 = 30\text{V}$ , Leakage Current Pin2	–	–	170	$\mu\text{A}$	

Note 1. Frame Period Ratio =  $\frac{FFP}{MFP}$

**Application Notes:**

The NTE1888 performs all the video and power functions required to provide signals for the direct drive of the line darlington and frame yoke. It contains:

- A shunt regulator
- A synchronization separator
- An integrated frame separator without external components
- A saw-tooth generator for the frame
- A power amplifier for direct drive of frame yoke (short circuit protected)
- An open collector output for the line darlington drive
- A line phase detector and a voltage control oscillator

**Synchronization Separator**

The slice level of sync separation is fixed by the value of external resistors controlled by an internally fixed voltage.

**Frame Separator**

The sync-pulse allows the discharge of the external capacitor by a  $2 \times I$  current. Capacitor discharge is held by  $V_Z/2$ , and a frame sync pulse permits the complete discharge of the capacitor to provide current for the other parts of the circuit.

**Line Oscillator**

The oscillator thresholds are internally fixed by resistors. The discharge of the capacitor depends on an internal resistor.

**Phase Comparator**

The sync-pulse drives the current in the comparator. The line flyback integrated by the external network gives a sawtooth on Pin11. The comparator output provides a positive current for the part of the signal on Pin11 greater than  $V_{CC}$  and a negative current for the other part. When the line flyback and the video signal are synchronized, the output of the comparator is an alternately negative and positive current. The frame sync-pulse inhibits the comparator to prevent frequency drift of the line oscillator on the frame beginning.

## Application Notes (Cont'd):

### Line Output (Pin14)

It is an open collector output which is able to drive a pulse current of 800mA for a rapid discharging of the darlington base. The output pulse time is  $22\mu\text{s}$  for a  $64\mu\text{s}$  period.

### Frame Oscillator

The oscillator thresholds are internally fixed by resistors. The oscillator is synchronized during the last half free run period. The input current during the charge of the capacitor is less than  $100\text{nA}$ .

### Frame Output Amplifier

This amplifier is able to directly drive the frame yoke. Its output is short circuit and overload protected; it contains also thermal protection

Pin Connection Diagram

