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NTE7147 Integrated Circuit Full Bridge Current Driven Vertical Deflection Booster

Description:

The NTE7147 is a power amplifier in a 9-Lead SIP type package designed for use in 90 degree color vertical deflection systems for frame frequencies of 50Hz to 160Hz. This device provides a high CMRR current driven differential input. Due to the bridge configuration of the two output stages, DC-coupling of the deflection coil is achieved.

Features:

- Pre-Amplifier with Differential High CMRR Current Mode Inputs
- Low Offsets
- High Linear Sawtooth Signal Amplification
- High Efficient DC-Coupled Vertical Output Bridge Circuit
- Powerless Vertical Shift
- High Deflection Frequency up to 160Hz
- Power Supply and Flyback Supply Voltage Independent Adjustable to Optimize Power Consumption and Flyback Time
- Excellent Transition Behaviour Duriing Flyback
- Guard Circuit for Screen Protection

Absolute Maximum Ratings: (Voltage referenced to Pin5 (GND) unless otherwise specified)

Supply Voltage (Pin3), V_P	30V
Flyback Supply Voltage (Pin7), V_{FB}	60V
Flyback Supply Current, I_{FB}	$\pm 1.8A$
Input Voltage, V_1, V_2	0 to V_P V
Input Current, I_1, I_2	0 to $\pm 5mA$
Output Voltage, V_4, V_6	0 to V_P V
Output Current (Note 1), I_4, I_6	0 to $\pm 1.8A$
Feedback Voltage, V_9	0 to V_P V
Feedback Current, I_9	0 to $\pm 5mA$
Guard Voltage (Note 2), V_8	0 to $V_P + 0.4V$
Guard Current, I_8	0 to $\pm 5mA$
Operating Junction Temperature Range (Note 3), T_J	-20° to $+150^\circ C$
Ambient Temperature Range, T_A	-20° to $+75^\circ C$
Storage Temperature Range, T_{stg}	-20° to $+150^\circ C$
Thermal Resistance, Junction-to-Mounting Base, R_{thJ-MB}	4K/W
Electrostatic Handling Voltage (Note 4), V_{es}	$-500V$ to $+500V$

Note 1. Maximum output currents I_4 and I_6 are limited by current protection.

Note 2. For $V_P > 13V$, the guard voltage V_8 is limited to 13V.

Note 3. Internally limited by thermal protection; switching point $\geq +150^\circ C$.

Note 4. Equivalent to discharging a 200pF capacitor through a 0 Ω series resistor,

Electrical Characteristics: ($V_P = 15V$, $T_A = +25^\circ C$, $V_{FB} = 40V$, voltage referenced to Pin5 (GND) unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage (Pin3)	V_P		8.2	–	25	V
Flyback Supply Voltage (Pin7)	V_{FB}	Note 5	V_P+6	–	60	V
Quiescent Feedback Current (Pin7)	I_{FB}	No Load, No Signal	–	7	10	mA
Input Stage						
Differential Input Current ($I_{id} = I_1 - I_2$) (Peak-to-Peak Value)	$I_{id(p-p)}$		–	± 500	± 600	μA
Single Ended Input Current (Peak-to-Peak Value)	$I_{1,2(p-p)}$	Note 6	0	± 300	± 600	μA
Common Mode Rejection Ratio	CMRR	Note 7	–	–54	–	dB
Input Clamp Voltage	V_1	$I_1 = 300\mu A$	2.7	3.0	3.3	V
	V_2	$I_2 = 300\mu A$	2.7	3.0	3.3	V
Input Clamp Signal TC on Pin1	$TC_{i,1}$		0	–	± 800	$\mu V/K$
Input Clamp Signal TC on Pin2	$TC_{i,2}$		0	–	± 800	$\mu V/K$
Differential Input Voltage	$V_1 - V_2$	$I_{id} = 0$	0	–	± 10	mV
Feedback Current	I_9		–	± 500	± 600	μA
Feedback Voltage	V_9		1	–	$V_P - 1$	V
Differential Input Offset Current ($I_{id(offset)} = I_1 - I_2$)	$I_{id(offset)}$	$I_{defl} = 0$, $R_{ref} = 1.5k\Omega$, $R_m = 1\Omega$	0	–	± 20	μA
Input Capacity Pin1 Reference to GND	$C_{i INA}$		–	–	5	pF
Input Capacity Pin2 Reference to GND	$C_{i INB}$		–	–	5	pF
Output Stages A and B						
Output Current	I_4, I_6		–	–	± 1	A
Output A Saturation Voltage to GND	V_6	$I_6 = 0.7A$	–	1.3	1.5	V
		$I_6 = 1.0A$	–	1.6	1.8	V
Output A Saturation Voltage to V_P	$V_{6,3}$	$I_6 = 0.7A$	–	2.3	2.9	V
		$I_6 = 1.0A$	–	2.7	3.3	V
Output B Saturation Voltage to GND	V_4	$I_4 = 0.7A$	–	1.3	1.5	V
		$I_4 = 1.0A$	–	1.6	1.8	V
Output B Saturation Voltage to V_P	$V_{4,3}$	$I_4 = 0.7A$	–	1.0	1.6	V
		$I_4 = 1.0A$	–	1.3	1.9	V
Linearity Error	LE	$I_{defl} = \pm 0.7A$, Note 8	–	–	2	%

Note 5. Up to $60V \geq V_{FB} \geq 40V$ a decoupling capacitor $C_{FB} = 22\mu$ (between Pin7 and Pin5) and a resistor $R_{FB} = 100\Omega$ (between Pin7 and V_{FB}) are required.

Note 6. Saturation voltages of output stages A and B can be increased in the event of negative input currents $I_{1,2} < -500\mu A$.

Note 7. $D_i = \frac{I_{deflc}}{I_{idc}} \times \frac{I_{id}}{I_{defl}}$ with I_{deflc} = common mode deflection current and I_{idc} = common mode input current.

Note 8. Deviation of the output slope at a constant input slope.

Electrical Characteristics (Cont'd): ($V_P = 15V$, $T_A = +25^\circ C$, $V_{FB} = 40V$, voltage referenced to Pin5 (GND) unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Output Stages A and B (Cont'd)						
DC Output Voltage	V_4, V_6	$I_{id} = 0A$, Closed-Loop	6.6	7.2	7.8	V
Open-Loop Current Gain ($I_4, 6/I_{id}$)	G_{oi}	$I_4, 6 < 100mA$, Note 9	–	100	–	dB
Open-Loop Current Gain ($I_4, 6/I_9$)	G_{ofb}	$I_4, 6 < 100mA$, Note 9	–	100	–	dB
Current Ratio (I_{id}/I_9)	G_{ifb}	Closed-Loop	–	–0.2	–	dB
Output Ripple Current as a Function of Supply Ripple	$I_{defl(ripple)}$	$V_{P(ripple)} = \pm 0.5V$, $I_{id} = 0$, Closed-Loop	–	± 1	–	mA
Flyback Generator						
Voltage Drop During Flyback Reverse Forward	$V_{7, 6}$	$I_{defl} = 0.7A$	–	–2.0	–3.0	V
		$I_{defl} = 1.0A$	–	–2.3	–3.5	V
		$I_{defl} = 0.7A$	–	+5.6	+6.1	V
		$I_{defl} = 1.0A$	–	+5.9	+6.5	V
Switching On Threshold Voltage	V_6		$V_P - 1$	–	$V_P + 1.5$	V
Switching Off Threshold Voltage	V_6		$V_P - 1.5$	–	$V_P + 1$	V
Flyback Current During Flyback	I_7		–	–	± 1	A
Guard Circuit						
Output Voltage	V_8	Guard On	7.5	8.5	10	V
		Guard On, $V_P = 8.2V$	6.9	–	$V_P - 0.4$	V
		Guard Off	–	–	0.4	V
Output Current	I_8	Guard On	5	–	–	mA
		Guard Off, $V_8 = 5V$	0.5	1.0	1.5	mA
Allowable External Voltage on Pin8	$V_{8(ext.)}$		0	–	13	V
		$V_P \leq 13V$	0	–	$V_P + 0.3$	V

Note 9. Frequency behaviour of G_{oi} and G_{ofb} .

- a) –3dB open-loop bandwidth (-45°) at 15kHz; second pole (-135°) at 1.3MHz.
- b) Open-loop gain at second pole (-135°) 55dB.



