



**ELECTRONICS, INC.**  
 44 FARRAND STREET  
 BLOOMFIELD, NJ 07003  
 (973) 748-5089

## NTE7135 Integrated Circuit Vertical Deflection Power Amplifier for Monitors

**Description:**

The NTE7135 is a vertical power amplifier for differential input signals in a 9-Lead SIP type package suitable for color monitor/TV systems with deflection frequencies up to 140Hz.

**Features:**

- Vertical Pre-Amplifier with Differential Inputs
- Powerless Vertical Shift
- Flyback Voltage Generation Suitable for Two Operating Modes (Doubling the Supply Voltage or External Supply for the Short Flyback Time, this Achieves a Minimum of Power Dissipation)
- Vertical Output Stage with Thermal and SOAR Protection
- High Deflection Frequency up to 140Hz
- High Linear Sawtooth Signal Amplification
- Possibility of Guarding the Deflection
- Voltage Stabilizer

**Absolute Maximum Ratings:** (Voltages referenced to substrate (Pin6) unless otherwise specified)

Supply Voltage (Pin1), $V_{P1}$ .....	40V
Supply Voltage (Pin4), $V_{P2}$ .....	60V
Supply Voltage (Pin8), $V_{P3}$ .....	60V
Voltage on Pin2, Pin3, and Pin9, $V_2, V_3, V_9$ .....	$V_{P1}$
Voltage on Pin5 and Pin7, $V_5, V_7$ .....	60V
Current on Pin4, $I_4$ .....	1A
Output Current on Pin5 (Peak Value, Note 1), $I_5 (M)$ .....	$\pm 1.3A$
Flyback Current on Pin7 (Peak Value), $I_7 (M)$ .....	$\pm 1.3A$
Current on Pin9, $I_9$ .....	-8A
Junction Temperature (Note 1), $T_{VJ}$ .....	+168°C
Operating Ambient Temperature Range, $T_A$ .....	-20° to +75°C
Storage Temperature Range, $T_{stg}$ .....	-25° to +150°C
Thermal Resistance, Junction-to-Case, $R_{thJC}$ .....	10K/W
Electrostatic Handling for all Pins (Note 2), $V_{es}$ .....	$\pm 300V$

Note 1. Internally limited by thermal protection; switching temperature point at  $160 \pm 8^\circ C$

Note 2. Equivalent to discharging a 200pF capacitor through a 0Ω series resistor.

**Electrical Characteristics:** ( $V_{P1} = V_{P2} = 25V$ ,  $V_N = V_6 = 0V$ ,  $T_A = +25^\circ C$ , voltages referenced to substrate (Pin6) unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Supply Voltage 1 (Pin1)	$V_{P1}$		9	25	30	V
Supply Voltage 2 (Pin4)	$V_{P2}$		9	25	60	V
Supply Voltage 3 (Pin8)	$V_{P3}$		9	–	60	V
Supply Current (Pin1)	$I_{P1}$		–	–	10	mA
Quiescent Supply Current (Pin4)	$I_{P2}$	Without Input Signal	–	9	–	mA
<b>Pre-Amplifier</b>						
Input Voltage (Pin2 and Pin3)	$V_2, V_3$		1.6	–	$V_{P1}-0.5$	V
Input Quiescent Current	$I_2, I_3$	Without Input Signal	–	100	–	nA
<b>Flyback Generator</b>						
Output Voltage	$V_7$	Upper Value, $I_7 = -1A$	–	$V_{P3}-2.2$	–	V
Flyback Output Current (Maximum Value, Pin7)	$I_7 (M)$		–	–	$\pm 1$	A
Threshold Voltage to Switch Flyback	$V_{1-5}$	ON/OFF Threshold	–	1.4	–	V
Flyback Pulse Time	$t_p \text{ FLB}$		–	250	–	$\mu s$
<b>Vertical Output</b>						
Output Voltage	$V_5$	Upper Value, $I_5 = -1A$	$V_{P3}-2.3$	$V_{P2}-2$	–	V
		Lower Value, $I_5 = 1A$	–	1.5	1.7	V
Vertical Output Current (Maximum Value, Pin5)	$I_5 (M)$		–	–	$\pm 1$	A
Non-Linearity of Output Signal	LIN		–	–	1	%
<b>Pulse Circuit Output</b>						
Output Voltage	$V_9$	$R_{PCO} = 10k\Omega$	0.4	–	$V_{P1}-0.4$	V
Output Voltage for Thermal Protection Active	$V_9$		$V_{P1}-0.4$	–	–	V
Voltage to Insert Flyback Pulse on Pin9	$V_{1-5}$	Normal Condition	–	–	1.4	V
Pulse Width	$t_{p9}$	Deflection Open-Circuit	–	50	–	%
		Normal Condition	$t_p \text{ FLB}$	–	–	$\mu s$

## Functional Description:

### Differential Input Amplifier

The differential sawtooth input signal (coming from a ramp output of the NTE7132 for example) is fed to the input pins 2 and 3. The non-inverted signal is attached to Pin3. The vertical feedback signal is superimposed on the inverted input signal on Pin2.

Vertical shift is applied at the inputs in a power-less way.

### Flyback Generator

Signals for the flyback generator and the pulse circuit are generated in the flyback driver stage. The flyback output consists of a Darlington transistor and a flyback diode. The flyback generator can operate in two modes:

1. An external supply voltage is applied for the short flyback time, thus power dissipation is minimum.
2. The flyback voltage is generated by doubling the supply voltage. The  $100\mu F$  capacitor C2 between Pin4 and Pin7 is charged up to  $V_{P1}$  during scan, using the external diode and the resistor R2. The cathode of the capacitor C2 is connected to the positive rail during flyback. Thus, the flyback voltage is twice the supply voltage.

## **Functional Description (Cont'd):**

### **Vertical Output**

The vertical output stage is a quasi-complementary class-B amplifier with a high linearity. The output contains SOAR (short-circuit protection) and thermal protection. The output current on Pin5 is reduced for a short time (to let the temperature decrease to  $T_J < +150^{\circ}\text{C}$ ), when the junction temperature ( $T_J$ ) exceeds  $+160^{\circ}\text{C}$ .

### **Deflection GUARD**

Pin9 will go HIGH if the junction temperature goes to high. A pulse signal with 50% duty cycle is output on Pin9, if the deflection coil is open-circuit. A flyback pulse signal is output at normal conditions.

Further watching can be achieved by means of an external GUARD circuit. The  $22\mu\text{F}$  capacitor is charged during flyback time ( $V_5 > V_8$ ) at normal conditions. In case of failures, the capacitor is discharged and the GUARD output goes HIGH.

GUARD output level:

- LOW for normal conditions
- HIGH for deflection coil short-circuit respectively open-circuit
- HIGH when there are neither input or output signals

**Pin Connection Diagram**  
(Front View)



