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NTE1511 Integrated Circuit 5-Step LED Driver for Linear Scale

Description:

The NTE1511 is an integrated circuit in an 14-Lead DIP type package designed for use in level meter applications. This device is capable of driving 5 LEDs to create a bar-type display. In accordance with the input level, the uppermost LED brightness varies to form a linear indicator, making the NTE1511 ideal for use in signal meters and VU meters. A low-voltage reference power supply is built-in, so that the only external components required are LEDs, resistors, and capacitors.

Features:

- Wide Supply Voltage Range: +5V to +16V
- Reference Voltage: $V_{ref} = 2.8V \pm 0.2V$
- LED Output Voltage: Constant Voltage
- LED Current: Constant Current by Means of an External Resistor
- Allowable Power Dissipation: $P_{dmax} = 1.15W @ T_A = +25^\circ C$

Absolute Maximum Ratings: ($T_A = +25^\circ C$ unless otherwise specified)

Maximum Supply Voltage (Pin8), V_{CCmax}	-0.3V to +18V
Input Voltage (Pin1, Pin2, Pin3), V_{IN}	-0.3V to V_{CC}
Output Voltage (Pin14), V_{OUT}	-0.3V to +8.0V
Output Voltage (Pin9 to Pin13, $V_{OUT(D)} \leq V_{CC}$ at output (D ₁ to D ₅) OFF), $V_{OUT(D)}$..	-0.3V to +10V
Reference Flow-Out Current (Pin5), I_{ref}	-1.0mA to 0mA
Allowable Power Dissipation, P_{dmax}	
Without Heatsink	1.3W
With 50 x 50 x 1mm ³ Al plate	2.15W
Operating Temperature Range, T_{opr}	-10° to +60°C
Storage Temperature Range, T_{stg}	-40° to +125°C

Note 1. A voltage of $V_{CC}+0.3V$ or more must not be applied to the input and output pins.

Recommended Operating Conditions: ($T_A = +25^\circ C$ unless otherwise specified)

Parameter	Symbol	Pin #	Test Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}	8		5	-	16	V
Input Voltage	$V_{IN1^+, 2}$	2, 3		-0.3	-	V_{CC}	V
Output Pin Load Resistance	R_{LOUT}	14	Between OUT (Pin14) and GND (Pin7)	15	-	20	kΩ

Electrical Characteristics: ($T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V}$ to 16V unless otherwise specified)

Parameter	Symbol	Pin #	Test Conditions	Min	Typ	Max	Unit
Input Bias Current (Amplifier)	$I_{DC}(IN^-)$	1	$V_{IN^-} = 0\text{V}$, $V_{IN1^+} = V_{IN2^+} = 1\text{V}$	-4	-	0	μA
	$I_{DC}(IN_1^+)$	2	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{IN2^+} = 0\text{V}$	-2	-	0	μA
	$I_{DC}(IN_2^+)$	3	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{IN2^+} = 0\text{V}$	-2	-	0	μA
Input Bias Current (Comparator)	$I_{DC}(-C)$	4, 6	$V_{IN^-} = 0\text{V}$, $V_{IN1^+} = V_{IN2^+} = 1\text{V}$, $V_{RO1} = V_{RO2} = 0\text{V}$	-5	-	0	μA
	$I_{DC}(+C)$	14	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{IN2^+} = 0\text{V}$, $V_{OUT} = 0\text{V}$, $V_{RO1} = V_{RO2} = V_{ref}$	-5	-	0	μA
Amplifier Offset Voltage (Amplifier)	$V_{OFF}(1)$	14	$V_{CC} = 6\text{V}$ to 12V , Amp Gain = 20dB	-150	-	+150	mV
	$V_{OFF}(2)$			-150	-	+150	mV
Reference Voltage	V_{ref}	5	$I_{ref} = 0$ to -0.3mA	2.6	-	3.0	V
Pin D Output Current (D_1 to D_5)	$I_{OL}(D)$	9 to 13	$V_{IN^-} = 0\text{V}$, $V_{IN1^+} = V_{IN2^+} = 1\text{V}$, $V_{D1\text{ to }5} = 2.0\text{V}$ to 2.3V	-25	-18	-10	mA
Pin D Output Leakage Current	$I_{OFF}(D)$	9 to 13	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{IN2^+} = 0\text{V}$, $V_{D1\text{ to }5} = 0\text{V}$	-50	-	0	μA
Output Pin Output Flow-Out Current	$I_{OH}(1)$	14	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{CC}$, $V_{IN2^+} = 0\text{V}$, $V_{OUT} = 0\text{V}$	-	-	-3	mA
	$I_{OH}(2)$		$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = 0\text{V}$, $V_{IN2^+} = V_{CC}$, $V_{OUT} = 0\text{V}$	-	-	-3	mA
Current Dissipation	I_{CC}	8	$V_{IN^-} = 1\text{V}$, $V_{IN1^+} = V_{IN2^+} = 0\text{V}$	-	12	25	mA
Amplifier Gain	V_{G1} , V_{G2}	-	Open Loop	30	-	-	dB

Comparator Level: ($T_A = +25^\circ\text{C}$, $V_{CC} = 5\text{V}$ to 16V unless otherwise specified)

Comparator Level	Symbol	Pin #	Test Conditions	Min	Typ	Max	Unit
LED5 (D_5)	GD_5	13	$V_{RO1} = 0\text{V}$, $V_{RO2} = 3\text{V}$	2.9	3.0	3.1	dB
LED4 (D_4)	GD_4	12		2.3	2.4	2.5	dB
LED3 (D_3)	GD_3	11		1.7	1.8	1.9	dB
LED3 (D_2)	GD_2	10		1.1	1.2	1.3	dB
LED1 (D_1)	GD_1	9		0.5	0.6	0.7	dB

Pin Connection Diagram



