NTE1513
Integrated Circuit
9–Step LED Driver Circuit for Logarithmic Scale

Functions:
- Indication Way: Indicates input level in a series bar by 9 red or green LED's
- Input Amp: DC amp installed the aim of which can be varied by a peripheral resistor.
- Comparator Level: Designed with 3dB rate;
                        −18dB, −15dB, −12dB, −9dB, −6dB, −3dB, 0dB, +3dB, +6dB
- Supply Voltage: Wide recommended supply voltage: 5.5 to 16V At V_{ref2}: 7 to 16V
- Reference Voltage: V_{ref} (5V) pin can prepare another voltage regulator with added transistor

Applications:
- For AC Level Meter as VU Meter
- For DC Level Metetr as Signal Meter

Comparator Level: (T_A =+ 25°C, V_{CC} = 12V, V_{refl} = 3V)

Comparator Level	Pin	Min	Typ	Max	Unit
D1	7	0.11	0.18 (Note 1)	0.25	V
D2	8	0.20	0.27 (Note 1)	0.34	V
D3	9	0.30	0.38 (Note 1)	0.46	V
D4	10	0.45	0.53 (Note 1)	0.61	V
D5	11	0.66	0.75	0.84	V
D6	12	0.97	1.06	1.15	V
D7	13	1.40	1.50	1.60	V
D8	14	2.02	2.12	2.22	V
D9	15	2.90	3.00	3.10	V

Note 1. No

Absolute Maximum Ratings: (T_A = +25°C unless otherwise specified)
Maximum Supply Voltage (Pin1), V_{CC}max . . . . −0.3V to +18V
Input Voltage (Pin3, Pin4), V_{IN} . . . . −0.3V to V_{CC}
D1 to D9 Output Voltage (D1 to D9: Off), $V_{OUT\,D}$ . . . . −0.3V to +18V
D1 to D9 Output Current (Pin7 to Pin15, D1 to D9: On), $I_{OL\,D}$ . . . . +30mA
Reference Voltage Flow–Out Current,
        Pin2, I_{ref1} . . . . −1mA to 0mA
        Pin16, I_{ref2} . . . . −6mA to 0mA
V_{OUT} Supply Voltage (Pin5), V_{OUT} . . . . −0.3V to +6.0V
Allowable Power Dissipation (T_A = +55°C), $P_d$max 500mW
Operating Temperature Range, T_{opr} . . . . −10° to +60°C
Storage Temperature Range, T_{stg} . . . . −40° to +125°C

Allowable Operation Condition: (T_A = +25°C unless otherwise specified)

Recommended Supply Voltage (Pin1), V_{CC} .... +55V to +16V

      Using V_{ref2} .... +7V to +16V

Input Voltage (Pin3, Pin4), $V_{IN}+$, $V_{IN}-$ .... –0.3V to V_{CC}

Load Resistance (Pin5 to Pin6), R_L .... 15kΩ to 20kΩ

Electrical Characteristics: (T_A = +25°C, V_{CC} = 12V unless otherwise specified)

Parameter	Symbol	Pin	Test Conditions	Min	Typ	Max	Unit
Input Bias Current (Amp Section)	$I_{IN}+(A)$	3	$V_{IN}+$ = 0V, $V_{IN}-$ = 3V, GND = 0V	–2	–	0	μA
	$I_{IN}-(A)$	4	$V_{IN}+$ = 3V, $V_{IN}-$ = 0V, GND = 0V	–2	–	0	μA
Input Bias Current (Comparator Section) + Output Leakage Current	$I_{IN}+(C)$ + $I_{OL}(A)$	5	$V_{IN}+$ = 0V, $V_{IN}-$ = 3V, OUT = 0V, GND = 0V	–10	–	0	μA
Offset Voltage	$V_{offset1}$	5	V_{CC} = 6V, $V_{IN}+$ = $V_{IN}-$ = 0V, GND = –6V, Gain 20dB	–180	–	+180	mV
	$V_{offset2}$	5	$V_{IN}+$ = $V_{IN}-$ = 0V, GND = 0V, Gain 20dB	0	–	+180	mV
Reference Voltage	V_{ref1}	2	I_{ref} = 0 to 1mA	2.6	–	3.0	V
	V_{ref2}	16	I_{ref} = 0 to 6mA	4.2	4.7	5.2	V
Current Dissipation	I_{CC}	1	$V_{IN}+$ = 3V, $V_{IN}-$ = 0V	–	10	20	mA
Amp Gain	VG		Open Looped	30	–	–	dB
Output Flow–out Current	I_{OH}	5	V_{OUT} = 0V, $V_{IN}+$ = 3V, $V_{IN}-$ = 0V	–	–	–10	μA
Pin D Output On Voltage	$V_{OL\ D}$	7 to 15	D1 to D9: I_{OL} = 20mA, $V_{IN}+$ = 3V, $V_{IN}-$ = 0V	–	–	1.2	V
Pin D Output Leakage Current	$I_{OH\ D}$	7 to 15	D1 to D9: $V_{IN}+$ = 0V, $V_{IN}-$ = 3V, V_{D1} to $_{D9}$ = 12V	–	–	10	μA
Output Voltage (Amp Section)	V_{OH}	5	V_{CC} = 5.5V, $V_{IN}+$ = 3V, $V_{IN}-$ = 0V, R_L = 15kΩ	4	–	–	V
			$V_{IN}+$ = 3V, $V_{IN}-$ = 0V, R_L = 15kΩ	9.5	–	–	V

Pin Connection Diagram

V_{CC}	**1**		**16**	V_{ref} (2)
V_{ref} (1)	**2**		**15**	LED9
Input (+)	**3**		**14**	LED8
Input (−)	**4**		**13**	LED7
Output	**5**		**12**	LED6
GND	**6**		**11**	LED5
LED1	**7**		**10**	LED4
LED2	**8**		**9**	LED3

16   9

.260 (6.6) Max

1   8

.785 (19.9) Max

.200 (5.08)
Max

.300 (7.62)

.245
(6.22)
Min

.100 (2.54)

.700 (17.7)