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NTE7237
Integrated Circuit
3–Terminal Adjustable Current Source
TO–92 Type Package

Description:

The NTE7237 is a 3–terminal adjustable current source in a TO–92 type package featuring 10,000:1 range in operating current, excellent current regulation and a wide dynamic voltage range of 1V to 40V. Current is established with one external resistor and no other parts are required. Initial current accuracy is ±3%. This device is a true floating current source with no separate power supply connections. In addition, reverse applied voltages of up to 20V will draw only a few dozen microamperes of current, allowing the device to act as both a rectifier and current source in AC applications.

The sense voltage used to establish operating current in the NTE7237 is 64mV at +25°C and is directly proportional to absolute temperature (°K). The simplest one external resistor connection, then, generates a current with ≈ +0.33%/°C temperature dependence. Zero drift operation can be obtained by adding one extra resistor and a diode.

Applications for the current sources include bias networks, surge protection, low power reference, ramp generation, LED driver, and temperature sensing.

The NTE7237 is guaranteed over a temperature range of 0° to +70°C.

Features:

- Operates From 1V to 40V
- 0.02%/V Current Regulation
- Programmable from 1μA to 10mA
- True 2–Terminal Operation
- ±3% Initial Accuracy

Absolute Maximum Ratings:

V+ to V– Forward Voltage 40V
V+ to V– Reverse Voltage 20V
R Pin to V– Voltage 5V
Set Current 10mA
Power Dissipation 400mW
ESD Susceptibility (Note 1) 2000V
Operating Temperature Range (Note 2), T_{opr} . . . . . 0° to +70°C
Thermal Resistance, Junction–to–Ambient, R_{thJA}
0.4” Leads . . . . . 180°C/W
0.125” Leads . . . . . 160°C/W
Lead Temperature (During Soldering, 10sec), T_L . . . . . +260°C

Note 1. Human body model, 100pF discharge through a 1.5kΩ resistor.
Note 2. For elevated temperature operation, $T_J$max is +100°C.

RoHS 2002/95/EC

Electrical Characteristics: (Note 3)

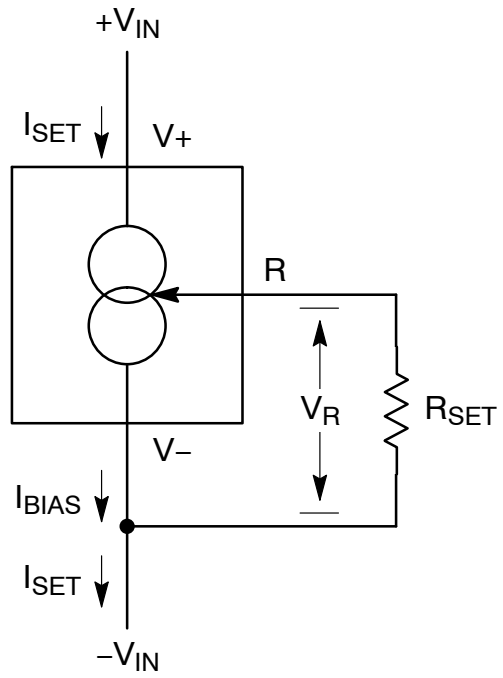
Parameter	Test Conditions		Min	Typ	Max	Unit
Set Current Error	V+ = 2.5V, Note 4	10μA ≤ I_{SET} ≤ 1mA	–	–	6	%
		1mA ≤ I_{SET} ≤ 5mA	–	–	8	%
		2μA ≤ I_{SET} ≤ 10μA	–	–	12	%
Ratio of Set Current to Bias Current	100μA ≤ I_{SET} ≤ 1mA		14	18	26	
	1mA ≤ I_{SET} ≤ 5mA		–	14	–	
	2μA ≤ I_{SET} ≤ 100μA		–	18	26	
Minimum Operating Voltage	2μA ≤ I_{SET} ≤ 100μA		–	0.8	–	V
	100μA ≤ I_{SET} ≤ 1mA		–	0.9	–	V
	1mA ≤ I_{SET} ≤ 5mA		–	1.0	–	V
Average Change in Set Current with Input Voltage	2μA ≤ I_{SET} ≤ 1mA	1.5V ≤ V+ ≤ 5V	–	0.02	0.1	%/V
		5V ≤ V+ ≤ 40V	–	0.01	0.05	%/V
	1mA ≤ I_{SET} ≤ 5mA	1.5V ≤ V+ ≤ 5V	–	0.03	–	%/V
		5V ≤ V+ ≤ 40V	–	0.02	–	%/V
Temperature Dependence of Set Current	25μA ≤ I_{SET} ≤ 1mA, Note 5		0.96T	T	1.04T	
Effective Shunt Capacitance			–	15	–	pF

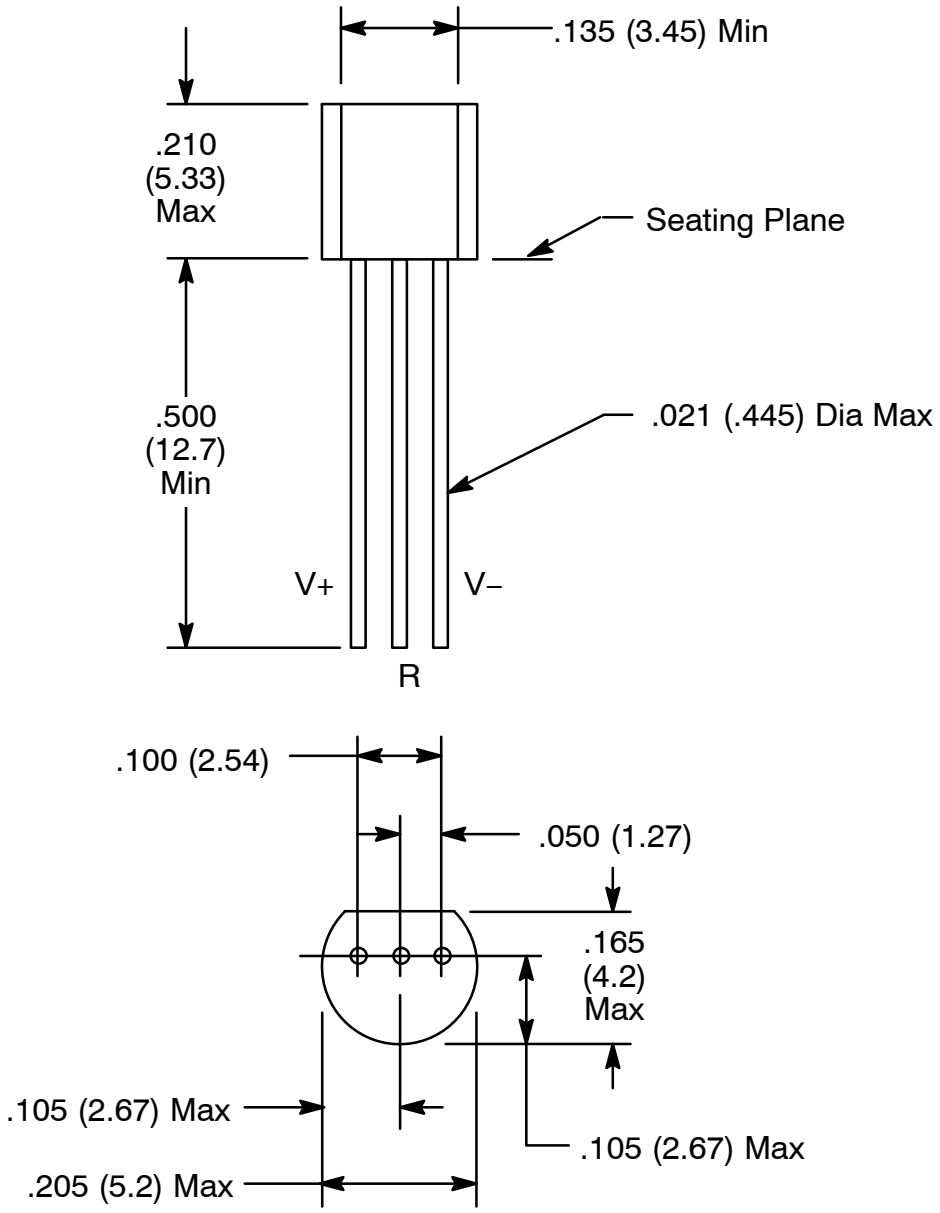
Note 3. Unless otherwise specified, tests are performed at T_J = +25°C with pulse testing so that junction temperature does not change during test.

Note 4. Set current is the current flowing into the V+ pin. For the Basic 2−Terminal Current Source circuit, I_{SET} is determined by the following formula: $I_{SET} = 67.7mV/R_{SET}$ (@ +25°C). Set current error is expressed as a percent deviation from this amount. I_{SET} increases at 0.336%/C at T_J = +25°C (227μV/°C)

Note 5. I_{SET} is directly proportional to absolute temperature (°K). I_{SET} at any temperature can be calculated from: $I_{SET} = I_o(T/T_o)$ where I_o is I_{SET} measured at T_o (°K).

Basic 2−Terminal Current Source




.135 (3.45) Min
.210
(5.33)
Max
Seating Plane
.500
(12.7)
Min
.021 (.445) Dia Max
V+
V−
R
.100 (2.54)
.050 (1.27)
.165
(4.2)
Max
.105 (2.67) Max
.105 (2.67) Max
.205 (5.2) Max