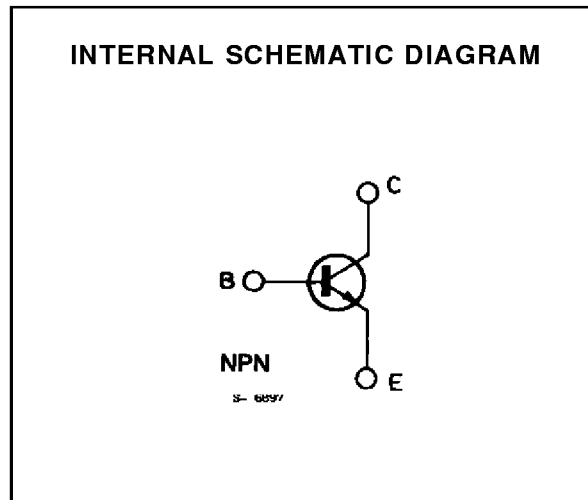
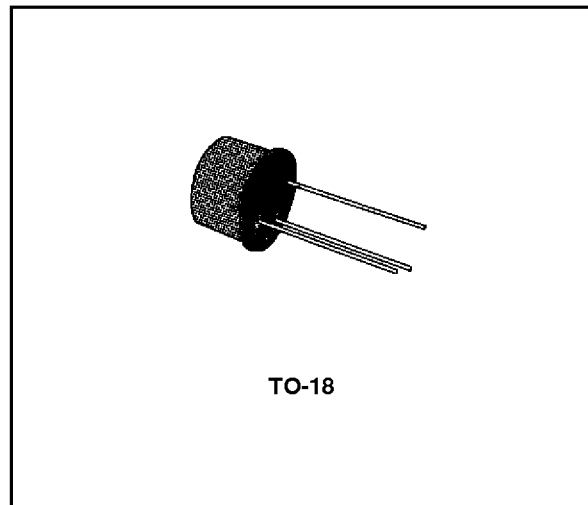


GENERAL PURPOSE AMPLIFIERS AND SWITCHES

DESCRIPTION

The 2N3301 and 2N3302 are silicon planar epitaxial NPN transistors in Jedec TO-18 metal case. They are designed to cover a wide range of amplifier and switching applications.



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-base Voltage ($I_E = 0$)	60	V
V_{CEO}	Collector-emitter Voltage ($I_B = 0$)	30	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	5	V
I_C	Collector Current	0.5	A
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25\text{ }^\circ\text{C}$ at $T_{case} \leq 25\text{ }^\circ\text{C}$	0.36	W
		1.8	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ\text{C}$

2N3301-2N3302

THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	97.2	$^{\circ}C/W$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	486	$^{\circ}C/W$

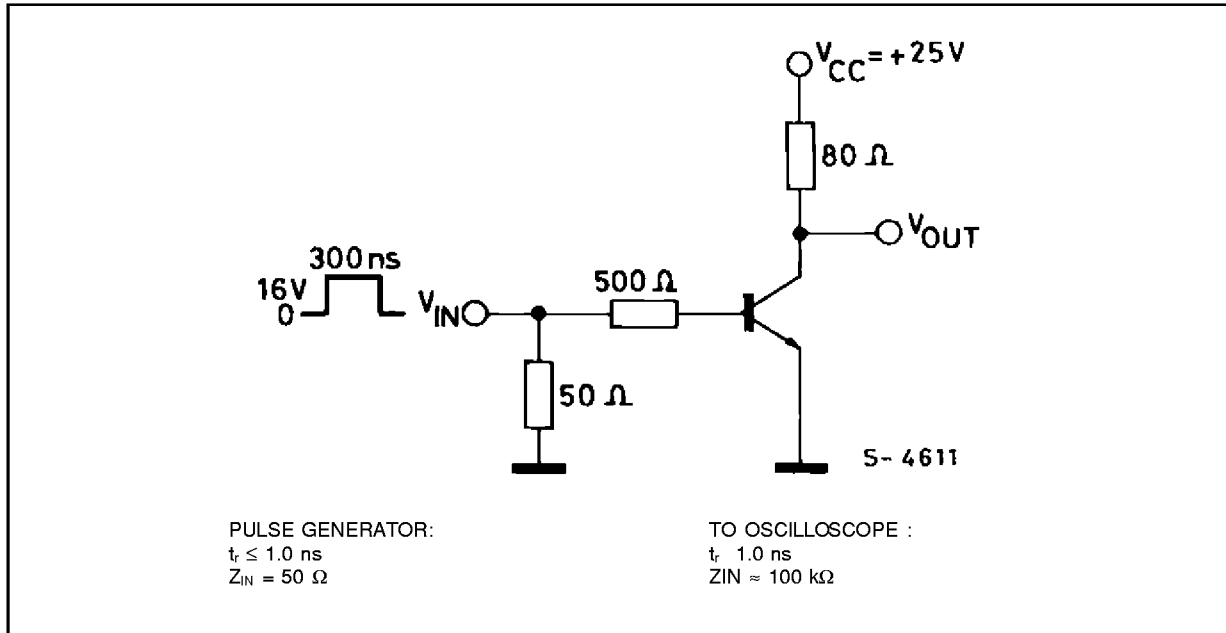
ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\ ^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CES}	Collector Cutoff Current ($V_{BE} = 0$)	$V_{CB} = 50\ V$ $V_{CB} = 50\ V$ $T_{amb} = 150\ ^{\circ}C$			10 10	nA μA
I_{EBO}	Emitter-cutoff Current ($I_C = 0$)	$V_{EB} = 3\ V$			10	nA
$V_{(BR)CBO}$	Collector-base Breakdown Voltage ($I_E = 0$)	$I_C = 10\ \mu A$	60			V
$V_{(BR)CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = 10\ mA$	30			V
$V_{(BR)EBO}$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = 10\ \mu A$	5			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 150\ mA$ $I_B = 15\ mA$ $I_C = 500\ mA$ $I_B = 50\ mA$			0.22 0.6	V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 150\ mA$ $I_B = 15\ mA$ $I_C = 500\ mA$ $I_B = 50\ mA$			1.1 1.5	V V
h_{FE}^*	DC Current Gain	for 2N3301 $I_C = 0.1\ mA$ $V_{CE} = 10\ V$ $I_C = 1\ mA$ $V_{CE} = 10\ V$ $I_C = 10\ mA$ $V_{CE} = 10\ V$ $I_C = 150\ mA$ $V_{CE} = 10\ V$ $I_C = 500\ mA$ $V_{CE} = 10\ V$ $I_C = 150\ mA$ $V_{CE} = 1\ V$ for 2N3302 $I_C = 0.1\ mA$ $V_{CE} = 10\ V$ $I_C = 1\ mA$ $V_{CE} = 10\ V$ $I_C = 10\ mA$ $V_{CE} = 10\ V$ $I_C = 150\ mA$ $V_{CE} = 10\ V$ $I_C = 500\ mA$ $V_{CE} = 10\ V$ $I_C = 150\ mA$ $V_{CE} = 1\ V$	20 25 35 40 20 20	40 60 70 60 50	120 300	
h_{fe}	High Frequency Current Gain	$I_C = 50\ mA$ $V_{CE} = 10\ V$ $f = 100\ MHz$	2.5			
C_{EBO}	Emitter-base Capacitance	$V_{EB} = 2\ V$ $f = 1\ MHz$			20	pF
C_{CBO}	Collector-base Capacitance	$V_{CB} = 10\ V$ $f = 1\ MHz$			8	pF
t_{on}^{**}	Turn-on Time	$I_C = 300\ mA$ $V_{CC} = 25\ V$ $I_{B1} = 30\ mA$			60	ns
t_{off}^{**}	Turn-off Time	$I_C = 300\ mA$ $V_{CC} = 25\ V$ $I_{B1} = -I_{B2} = 30\ mA$			150	ns

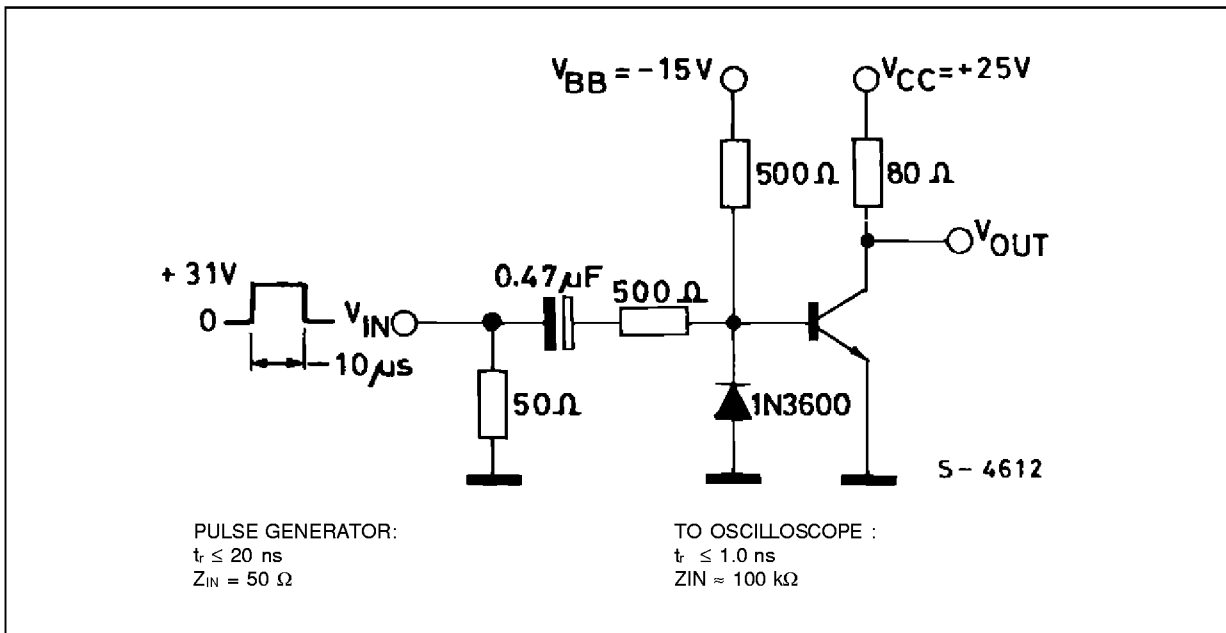
* Pulsed : pulse duration = 300 μs , duty cycle = 1 %.

** See test circuits.

Test Circuit for t_{on} .

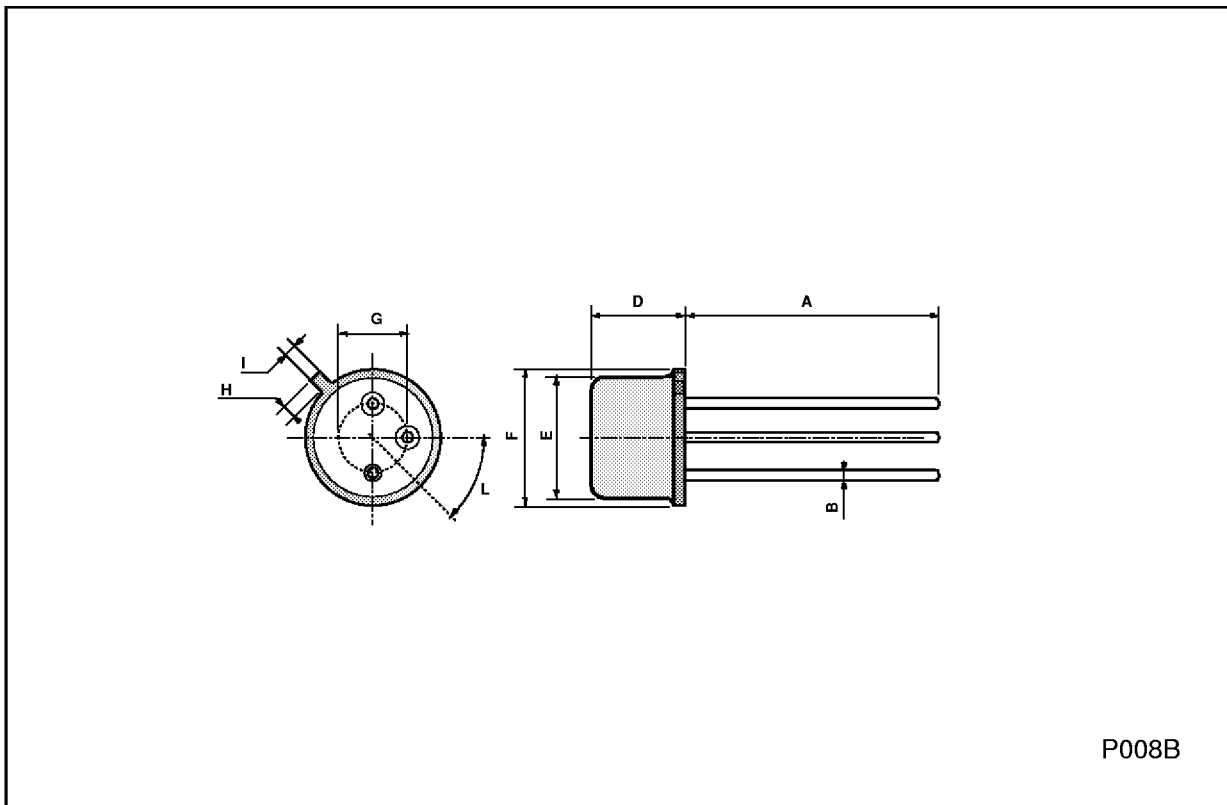


Test Circuit for t_{off} .



TO39 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.7			0.500		
B			0.49			0.019
D			6.6			0.260
E			8.5			0.334
F			9.4			0.370
G	5.08			0.200		
H			1.2			0.047
I			0.9			0.035
L	45° (typ.)					



P008B

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