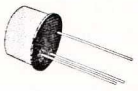
SGS-THOMSON MICROELECTRONICS

2N3301
2N3302

GENERAL PURPOSE AMPLIFIERS AND SWITCHES

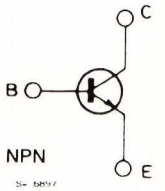
DESCRIPTION

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.



TO-18

INTERNAL SCHEMATIC DIAGRAM



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 $T_{amb} \leq 25$ °C at $T_{case} \leq 25$ °C	0.36 1.8	W W
T_{stg}, T_j	Storage and Junction Temperature	– 65 to 200	°C

THERMAL DATA

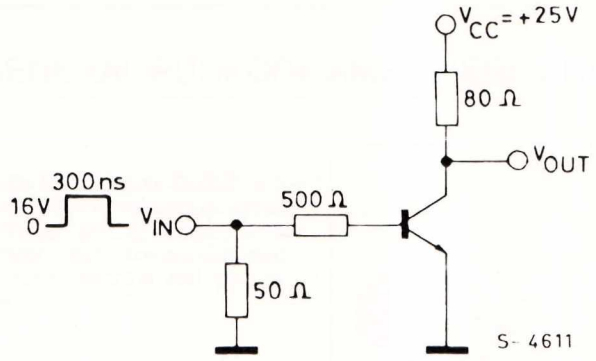
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Max	97.2	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max	486	°C/W

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °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 °C			10 10	nA µA
I_{EBO}	Emitter-cutoff Current (I_C = 0)	V_{EB} = 3 V			10	nA
$V_{(BR)CBO}$	Colllector-base Breakdown Voltage (I_E = 0)	I_C = 10 µA	60			V
$V_{(BR)CEO}$*	Collector-emitter Breakdown Voltage (I_B = 0)	I_C = 10 mA	30			V
$V_{(BR)\ EBO}$	Emittter-base Breakdown Voltage (I_C = 0)	I_E = 10 µA	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 35 50 75 100 50 50	 40 60 70 60 50 80 140 200 125 75	 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 I_{B1} = 30 mA V_{CC} = 25 V			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.

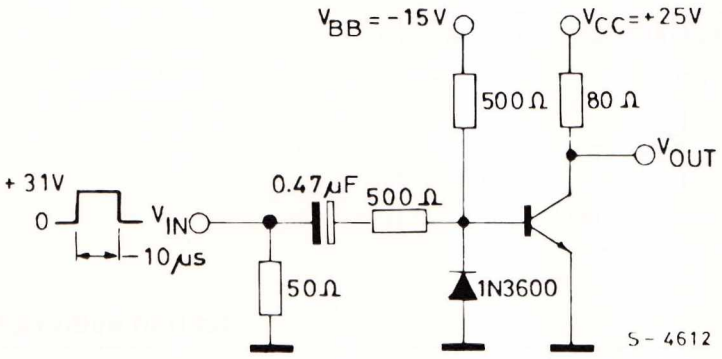
Test Circuit for t_{on}.



PULSE GENERATOR:
$t_r \leq 1.0$ ns
$Z_{IN} = 50\ \Omega$

TO OSCILLOSCOPE :
t_r 1.0 ns
ZIN = 100 kΩ

Test Circuit for t_{off}.



PULSE GENERATOR:
$t_r \leq 20$ ns
$Z_{IN} = 50\ \Omega$

TO OSCILLOSCOPE :
$t_r \leq 1.0$ ns
ZIN = 100 kΩ