


GENERAL PURPOSE AMPLIFIERS AND SWITCHES

DESCRIPTION

The 2N2904, 2N2905, 2N2906 and 2N2907 are silicon planar epitaxial PNP transistors in Jedec TO-39 (for 2N2904, 2N2905) and in Jedec TO-18 (for 2N2906 and 2N2907) metal cases. They are designed for high-speed saturated switching and general purpose applications.

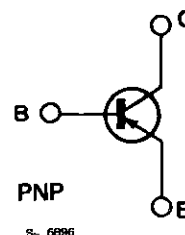
 2N2904/2N2905 approved to CECC 50002-102, 2N2906/2N2907 approved to CECC 50002-103 available on request.



TO-18

TO-39

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 ($I_B = 0$)	- 40	V
V_{EBO}	Emitter-base Voltage ($I_C = 0$)	- 5	V
I_C	Collector Current	- 600	mA
P_{tot}	Total Power Dissipation at $T_{amb} \leq 25^\circ\text{C}$		
	for 2N2904 and 2N2905	0.6	W
	for 2N2906 and 2N2907	0.4	W
	at $T_{case} \leq 25^\circ\text{C}$		
	for 2N2904 and 2N2905	3	W
	for 2N2906 and 2N2907	1.8	W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	$^\circ\text{C}$

2N2904-2N2905-2N2906-2N2907

THERMAL DATA

			2N2904 2N2905	2N2906 2N2907
$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	58.3 °C/W	97.3 °C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max	292 °C/W	437.5 °C/W

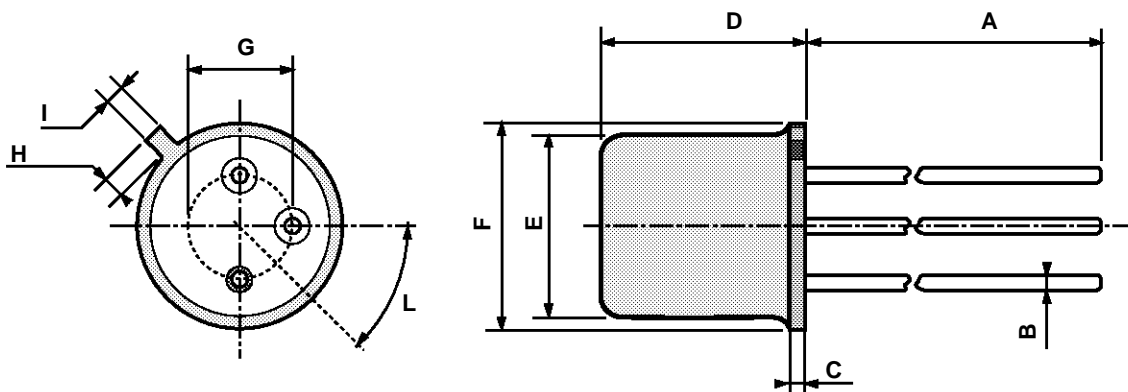
ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ °C}$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = -50\text{ V}$ $V_{CB} = -50\text{ V}$ $T_{amb} = 150\text{ °C}$			- 20 - 20	nA μA
I_{CEX}	Collector Cutoff Current ($V_{BE} = 0.5\text{ V}$)	$V_{CE} = -30\text{ V}$			- 50	nA
I_{BEX}	Base Cutoff Current ($V_{BE} = 0.5\text{ V}$)	$V_{CE} = -30\text{ V}$			- 50	nA
$V_{(BR)\ CBO}$	Collector-base Breakdown Voltage ($I_E = 0$)	$I_C = -10\text{ μA}$	- 60			V
$V_{(BR)\ CEO}^*$	Collector-emitter Breakdown Voltage ($I_B = 0$)	$I_C = -10\text{ mA}$	- 40			V
$V_{(BR)\ EBO}$	Emitter-base Breakdown Voltage ($I_C = 0$)	$I_E = -10\text{ μA}$	- 5			V
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = -150\text{ mA}$ $I_B = -15\text{ mA}$ $I_C = -500\text{ mA}$ $I_B = -50\text{ mA}$			- 0.4 - 1.6	V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = -150\text{ mA}$ $I_B = -16\text{ mA}$ $I_C = -500\text{ mA}$ $I_B = -50\text{ mA}$			- 1.3 - 2.6	V V
h_{FE}^*	DC Current Gain	for 2N2904 and 2N2906 $I_C = -0.1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -10\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -150\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -500\text{ mA}$ $V_{CE} = -10\text{ V}$	20 25 35 40 20		120	
h_{FE}^*	DC Current Gain	for 2N2905 and 2N2907 $I_C = -0.1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -1\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -10\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -150\text{ mA}$ $V_{CE} = -10\text{ V}$ $I_C = -500\text{ mA}$ $V_{CE} = -10\text{ V}$	35 50 75 100 30		300	
f_T	Transition Frequency	$I_C = -50\text{ mA}$ $V_{CE} = -20\text{ V}$ $f = 100\text{ MHz}$	200			MHz
C_{EBO}	Emitter-base Capacitance	$I_C = 0$ $V_{EB} = -2\text{ V}$ $f = 1\text{ MHz}$			30	pF
C_{CBO}	Collector-base Capacitance	$I_E = 0$ $V_{CB} = -10\text{ V}$ $f = 1\text{ MHz}$			8	pF
t_d	Delay Time	$I_C = -150\text{ mA}$ $V_{CC} = -30\text{ V}$ $I_{B1} = -15\text{ mA}$			10	ns
t_r	Rise Time	$I_C = -150\text{ mA}$ $V_{CC} = -30\text{ V}$ $I_{B1} = -15\text{ mA}$			40	ns
t_s	Storage Time	$I_C = -150\text{ mA}$ $V_{CC} = -6\text{ V}$ $I_{B1} = -I_{B2} = -15\text{ mA}$			80	ns
t_f	Fall Time	$I_C = -150\text{ mA}$ $V_{CC} = -6\text{ V}$ $I_{B1} = -I_{B2} = -15\text{ mA}$			30	ns

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

TO-18 MECHANICAL DATA

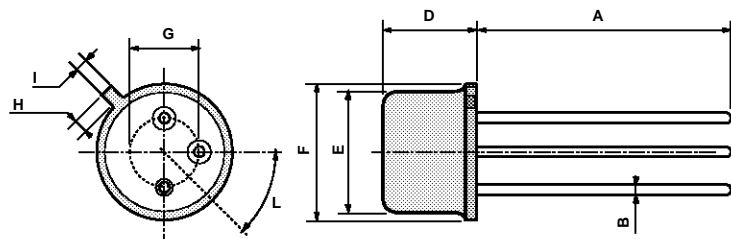
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



0016043

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.)					



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