



SGS-THOMSON
MICROELECTRONICS

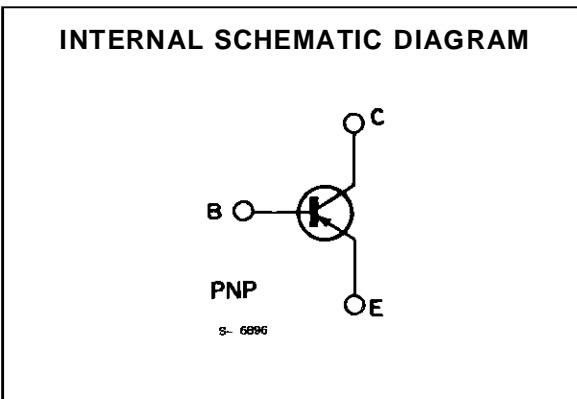
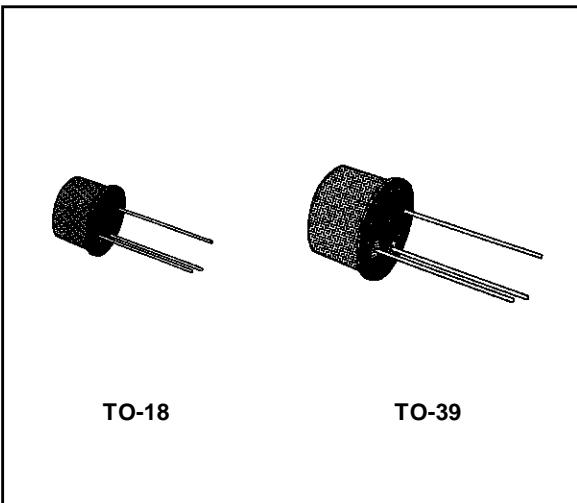
**2N2904/2N2905
2N2906/2N2907**

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.



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 for 2N2906 and 2N2907 at $T_{case} \leq 25^\circ\text{C}$ for 2N2904 and 2N2905 for 2N2906 and 2N2907	0.6 0.4 3 1.8	W W W W
T_{stg}, T_j	Storage and Junction Temperature	- 65 to 200	°C

2N2904-2N2905-2N2906-2N2907

THERMAL DATA

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

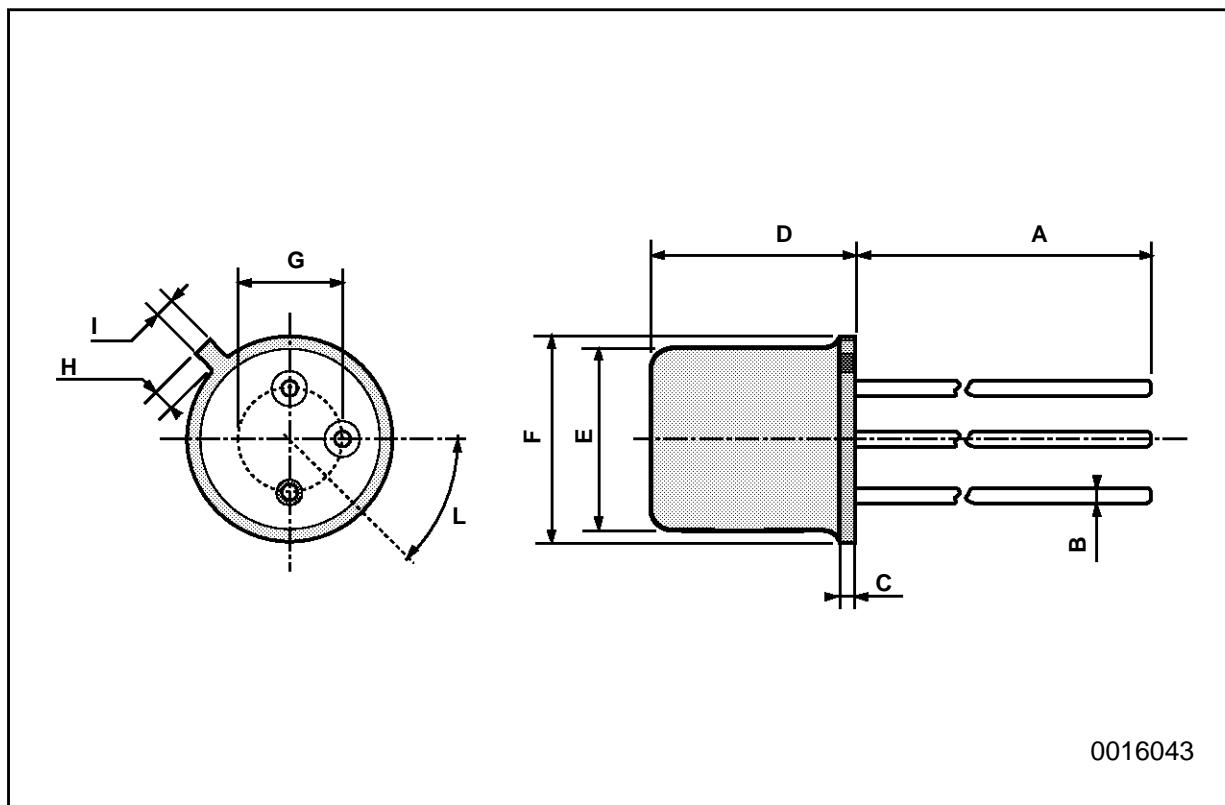
ELECTRICAL CHARACTERISTICS ($T_{amb} = 25^\circ C$ unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CBO}	Collector Cutoff Current ($I_E = 0$)	$V_{CB} = -50\text{ V}$ $V_{CB} = -50\text{ V}$ $T_{amb} = 150^\circ C$			-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
$V_{(BR)EBO}$	Emittter-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

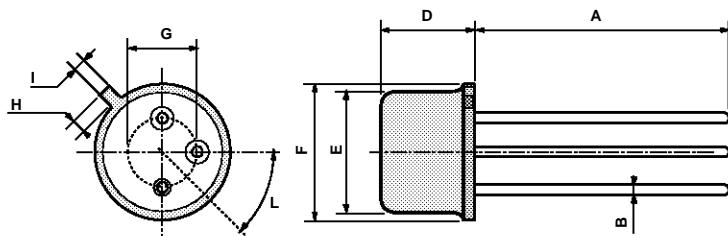
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



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.)					



P008B

Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES
Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A