

2N1303 2N1305
2N1307 2N1309

**GERMANIUM
PNP TRANSISTORS**



TO-5 CASE



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DESCRIPTION:

The CENTRAL SEMICONDUCTOR 2N1303, 2N1305, 2N1307, and 2N1309 are germanium PNP transistors designed for computer and switching applications.

MARKING: FULL PART NUMBER

MAXIMUM RATINGS: ($T_A=25^\circ\text{C}$)

Collector-Base Voltage
Emitter-Base Voltage
Continuous Collector Current
Power Dissipation
Operating Junction Temperature
Storage Temperature

SYMBOL		UNITS
V_{CB0}	30	V
V_{EBO}	25	V
I_C	300	mA
P_D	150	mW
T_J	-65 to +85	$^\circ\text{C}$
T_{stg}	-65 to +100	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS: ($T_A=25^\circ\text{C}$)

SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{CBO}	$V_{CB}=25\text{V}$			10	μA
I_{EBO}	$V_{EB}=25\text{V}$			10	μA
BV_{CBO}	$I_C=100\mu\text{A}$	30			V
BV_{EBO}	$I_E=100\mu\text{A}$	25			V
$V_{CE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.5\text{mA}$ (2N1303)			0.20	V
$V_{CE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.25\text{mA}$ (2N1305)			0.20	V
$V_{CE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.17\text{mA}$ (2N1307)			0.20	V
$V_{CE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.13\text{mA}$ (2N1309)			0.20	V
$V_{BE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.5\text{mA}$ (2N1303)	0.15		0.40	V
$V_{BE(SAT)}$	$I_C=10\text{mA}$, $I_B=0.5\text{mA}$ (2N1305, 07, 09)	0.15		0.35	V
h_{FE}	$V_{CE}=1.0\text{V}$, $I_C=10\text{mA}$ (2N1303)	20			
h_{FE}	$V_{CE}=1.0\text{V}$, $I_C=10\text{mA}$ (2N1305)	40		200	
h_{FE}	$V_{CE}=1.0\text{V}$, $I_C=10\text{mA}$ (2N1307)	60		300	
h_{FE}	$V_{CE}=1.0\text{V}$, $I_C=10\text{mA}$ (2N1309)	80			
h_{FE}	$V_{CE}=0.35\text{V}$, $I_C=200\text{mA}$ (2N1303)	10			
h_{FE}	$V_{CE}=0.35\text{V}$, $I_C=200\text{mA}$ (2N1305)	15			
h_{FE}	$V_{CE}=0.35\text{V}$, $I_C=200\text{mA}$ (2N1307, 09)	20			
h_{ib}	$V_{CB}=5.0\text{V}$, $I_E=1.0\text{mA}$, $f=1.0\text{kHz}$		29		Ω
h_{rb}	$V_{CB}=5.0\text{V}$, $I_E=1.0\text{mA}$, $f=1.0\text{kHz}$		7.0		$\times 10^{-4}$
h_{ob}	$V_{CB}=5.0\text{V}$, $I_E=1.0\text{mA}$, $f=1.0\text{kHz}$		0.40		μS
h_{fe}	$V_{CB}=5.0\text{V}$, $I_E=1.0\text{mA}$, $f=1.0\text{kHz}$		140		
NF	$V_{CB}=5.0\text{V}$, $I_E=1.0\text{mA}$, $f=1.0\text{kHz}$		3.0		dB
C_{ob}	$V_{CB}=5.0\text{V}$, $f=1.0\text{MHz}$			20	pF
C_{ib}	$V_{EB}=5.0\text{V}$, $f=1.0\text{MHz}$		9.0		pF

R1 (5-May 2014)

2N1303 2N1305
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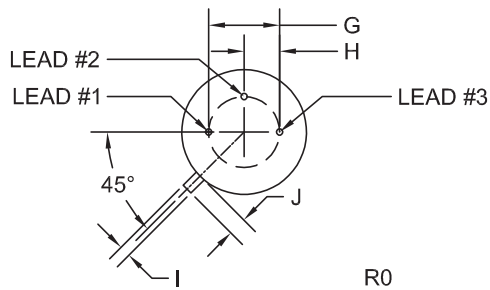
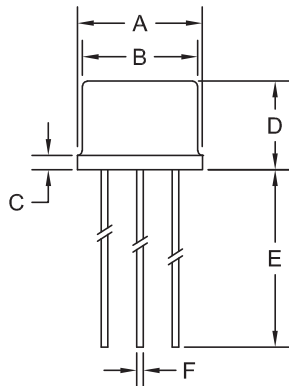
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ELECTRICAL CHARACTERISTICS - Continued: ($T_A=25^\circ\text{C}$)

SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNITS	
t_d	$I_C=10\text{mA}, I_{B1}=1.3\text{mA}, I_{B2}=0.7\text{mA}$ $V_{BE(\text{OFF})}=0.8\text{V}, R_L=1.0\text{k}\Omega$		0.06		μs	
t_r			0.16		μs	
t_s				0.75		μs
t_f				0.35		μs
f_{hfb}	$V_{CB}=5.0\text{V}, I_E=1.0\text{mA}$ (2N1303)	3.0			MHz	
f_{hfb}	$V_{CB}=5.0\text{V}, I_E=1.0\text{mA}$ (2N1305)	5.0			MHz	
f_{hfb}	$V_{CB}=5.0\text{V}, I_E=1.0\text{mA}$ (2N1307)	10			MHz	
f_{hfb}	$V_{CB}=5.0\text{V}, I_E=1.0\text{mA}$ (2N1309)	15			MHz	

TO-5 CASE - MECHANICAL OUTLINE



SYMBOL	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A (DIA)	0.335	0.370	8.51	9.40
B (DIA)	0.315	0.335	8.00	8.51
C	-	0.040	-	1.02
D	0.240	0.260	6.10	6.60
E	1.500	1.752	38.1	44.5
F (DIA)	0.016	0.021	0.41	0.53
G (DIA)	0.200		5.08	
H	0.100		2.54	
I	0.028	0.034	0.71	0.86
J	0.029	0.045	0.74	1.14

TO-5 (REV: R0)

LEAD CODE:

- 1) Emitter
- 2) Base
- 3) Collector

MARKING: FULL PART NUMBER

R1 (5-May 2014)