

2N2221  
2N2222

**SILICON  
NPN TRANSISTORS**



**TO-18 CASE**

**DESCRIPTION:**

The CENTRAL SEMICONDUCTOR 2N2221 and 2N2222 are silicon NPN epitaxial planar transistors designed for small signal, general purpose switching applications.

**MARKING: FULL PART NUMBER**

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

Collector-Base Voltage	Collector-Emitter Voltage	Emitter-Base Voltage	Continuous Collector Current	Power Dissipation	Power Dissipation ( $T_C=25^\circ\text{C}$ )	Operating and Storage Junction Temperature	Thermal Resistance	Thermal Resistance
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SYMBOL		UNITS
$V_{CB0}$	60	V
$V_{CEO}$	30	V
$V_{EBO}$	5.0	V
$I_C$	800	mA
$P_D$	500	mW
$P_D$	1.2	W
$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$
$\theta_{JA}$	350	$^\circ\text{C/W}$
$\theta_{JC}$	146	$^\circ\text{C/W}$

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

SYMBOL	TEST CONDITIONS	MIN	MAX	UNITS
$I_{CB0}$	$V_{CB}=50\text{V}$	-	10	nA
$I_{CB0}$	$V_{CB}=50\text{V}, T_A=150^\circ\text{C}$	-	10	$\mu\text{A}$
$I_{EBO}$	$V_{EB}=3.0\text{V}$	-	10	nA
$BV_{CB0}$	$I_C=10\mu\text{A}$	60	-	V
$BV_{CEO}$	$I_C=10\text{mA}$	30	-	V
$BV_{EBO}$	$I_E=10\mu\text{A}$	5.0	-	V
$V_{CE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	-	0.4	V
$V_{CE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$	-	1.6	V
$V_{BE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	0.6	1.3	V
$V_{BE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$	-	2.6	V
$f_T$	$V_{CE}=20\text{V}, I_C=20\text{mA}, f=100\text{MHz}$	250	-	MHz
$C_{ob}$	$V_{CB}=10\text{V}, I_E=0, f=100\text{kHz}$	-	8.0	pF
$C_{ib}$	$V_{EB}=0.5\text{V}, I_C=0, f=100\text{kHz}$	-	30	pF

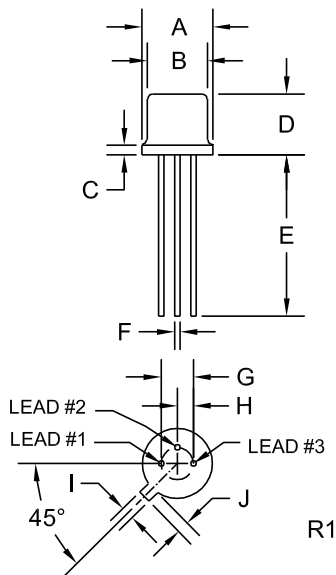
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**ELECTRICAL CHARACTERISTICS - Continued:** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted)

SYMBOL	TEST CONDITIONS	2N2221		2N2222	
		MIN	MAX	MIN	MAX
$h_{FE}$	$V_{CE}=10\text{V}, I_C=0.1\text{mA}$	20	-	35	-
$h_{FE}$	$V_{CE}=10\text{V}, I_C=1.0\text{mA}$	25	-	50	-
$h_{FE}$	$V_{CE}=10\text{V}, I_C=10\text{mA}$	35	-	75	-
$h_{FE}$	$V_{CE}=10\text{V}, I_C=10\text{mA}, T_A=-55^{\circ}\text{C}$	15	-	35	-
$h_{FE}$	$V_{CE}=10\text{V}, I_C=150\text{mA}$	40	120	100	300
$h_{FE}$	$V_{CE}=1.0\text{V}, I_C=150\text{mA}$	20	-	50	-
$h_{FE}$	$V_{CE}=10\text{V}, I_C=500\text{mA}$	25	-	40	-

**TO-18 CASE - MECHANICAL OUTLINE**



SYMBOL	DIMENSIONS			
	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A (DIA)	0.209	0.230	5.31	5.84
B (DIA)	0.178	0.195	4.52	4.95
C	-	0.030	-	0.76
D	0.170	0.210	4.32	5.33
E	0.500	-	12.70	-
F (DIA)	0.016	0.019	0.41	0.48
G (DIA)	0.100		2.54	
H	0.050		1.27	
I	0.036	0.046	0.91	1.17
J	0.028	0.048	0.71	1.22

TO-18 (REV: R1)

**LEAD CODE:**

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

**MARKING: FULL PART NUMBER**

R2 (24-July 2013)