

2N2221A
2N2222A

SILICON
NPN TRANSISTORS



TO-18 CASE



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DESCRIPTION:

The CENTRAL SEMICONDUCTOR 2N2221A and 2N2222A 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	V_{CB0}	75	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Continuous Collector Current	I_C	800	mA
Power Dissipation	P_D	500	mW
Power Dissipation ($T_C=25^\circ\text{C}$)	P_D	1.8	W
Operating and Storage Junction Temperature	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$
Thermal Resistance	θ_{JA}	350	$^\circ\text{C/W}$
Thermal Resistance	θ_{JC}	97	$^\circ\text{C/W}$

SYMBOL			UNITS
V_{CB0}	75		V
V_{CEO}	40		V
V_{EBO}	6.0		V
I_C	800		mA
P_D	500		mW
P_D	1.8		W
T_J, T_{stg}	-65 to +200		$^\circ\text{C}$
θ_{JA}	350		$^\circ\text{C/W}$
θ_{JC}	97		$^\circ\text{C/W}$

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

SYMBOL	TEST CONDITIONS	MIN	MAX	UNITS
I_{CBO}	$V_{CB}=60\text{V}$		10	nA
I_{CBO}	$V_{CB}=60\text{V}, T_A=150^\circ\text{C}$		10	μA
I_{CEV}	$V_{CE}=60\text{V}, V_{EB}=3.0\text{V}$		10	nA
I_{EBO}	$V_{EB}=3.0\text{V}$		10	nA
BV_{CBO}	$I_C=10\mu\text{A}$	75		V
BV_{CEO}	$I_C=10\text{mA}$	40		V
BV_{EBO}	$I_E=10\mu\text{A}$	6.0		V
$V_{CE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$		0.3	V
$V_{CE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$		1.0	V
$V_{BE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	0.6	1.2	V
$V_{BE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$		2.0	V
		2N2221A		
		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
		2N2222A		
		MIN	MAX	
		35	-	
		50	-	
		75	-	
		35	-	
		100	300	
		50	-	
		40	-	

R5 (5-December 2013)

**2N2221A
2N2222A**

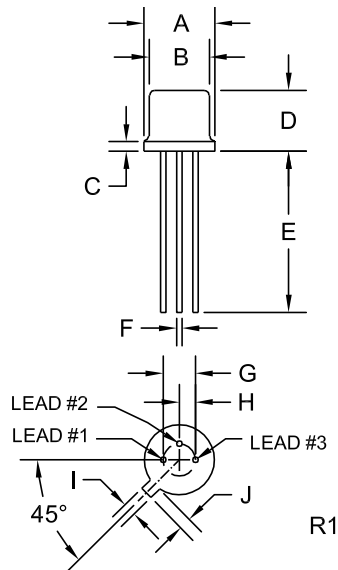
**SILICON
NPN TRANSISTORS**



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

SYMBOL	TEST CONDITIONS	2N2221A		2N2222A		UNITS
		MIN	MAX	MIN	MAX	
f_T	$V_{CE}=20\text{V}, I_C=20\text{mA}, f=100\text{MHz}$	250	-	300	-	MHz
C_{ob}	$V_{CB}=10\text{V}, I_E=0, f=100\text{kHz}$	-	8.0	-	8.0	pF
C_{ib}	$V_{EB}=0.5\text{V}, I_C=0, f=100\text{kHz}$	-	25	-	25	pF
h_{ie}	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$	1.0	3.5	2.0	8.0	$k\Omega$
h_{ie}	$V_{CE}=10\text{V}, I_C=10\text{mA}, f=1.0\text{kHz}$	0.2	1.0	0.25	1.25	$k\Omega$
h_{re}	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$	-	5.0	-	8.0	$\times 10^{-4}$
h_{re}	$V_{CE}=10\text{V}, I_C=10\text{mA}, f=1.0\text{kHz}$	-	2.5	-	4.0	$\times 10^{-4}$
h_{fe}	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$	30	150	50	300	
h_{fe}	$V_{CE}=10\text{V}, I_C=10\text{mA}, f=1.0\text{kHz}$	50	300	75	375	
h_{oe}	$V_{CE}=10\text{V}, I_C=1.0\text{mA}, f=1.0\text{kHz}$	3.0	15	5.0	35	μS
h_{oe}	$V_{CE}=10\text{V}, I_C=10\text{mA}, f=1.0\text{kHz}$	10	100	25	200	μS
$rb'C_c$	$V_{CB}=10\text{V}, I_E=20\text{mA}, f=31.8\text{MHz}$	-	150	-	150	ps
NF	$V_{CE}=10\text{V}, I_C=100\mu\text{A}, R_S=1.0k\Omega, f=1.0\text{kHz}$	-	-	-	4.0	dB
t_d	$V_{CC}=30\text{V}, V_{BE}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$	-	10	-	10	ns
t_r	$V_{CC}=30\text{V}, V_{BE}=0.5\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$	-	25	-	25	ns
t_s	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=I_{B2}=15\text{mA}$	-	225	-	225	ns
t_f	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=I_{B2}=15\text{mA}$	-	60	-	60	ns

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

R5 (5-December 2013)

OUTSTANDING SUPPORT AND SUPERIOR SERVICES



PRODUCT SUPPORT

Central's operations team provides the highest level of support to insure product is delivered on-time.

- Supply management (Customer portals)
- Inventory bonding
- Consolidated shipping options
- Custom bar coding for shipments
- Custom product packing

DESIGNER SUPPORT/SERVICES

Central's applications engineering team is ready to discuss your design challenges. Just ask.

- Free quick ship samples (2nd day air)
- Online technical data and parametric search
- SPICE models
- Custom electrical curves
- Environmental regulation compliance
- Customer specific screening
- Up-screening capabilities
- Special wafer diffusions
- PbSn plating options
- Package details
- Application notes
- Application and design sample kits
- Custom product and package development

REQUESTING PRODUCT PLATING

1. If requesting Tin/Lead plated devices, add the suffix " TIN/LEAD" to the part number when ordering (example: 2N2222A TIN/LEAD).
2. If requesting Lead (Pb) Free plated devices, add the suffix " PBFREE" to the part number when ordering (example: 2N2222A PBFREE).

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