

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	$\theta_{JA}$	350	$^\circ\text{C/W}$
Thermal Resistance	$\theta_{JC}$	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		$^\circ\text{C}$
$\theta_{JA}$	350		$^\circ\text{C/W}$
$\theta_{JC}$	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	$\mu\text{A}$	
$I_{CEV}$	$V_{CE}=60\text{V}, V_{EB}=3.0\text{V}$		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	
		<b>2N2221A</b>		<b>2N2222A</b>	
		<b>MIN</b>	<b>MAX</b>	<b>MIN</b>	<b>MAX</b>
$h_{FE}$	$V_{CE}=10\text{V}, I_C=0.1\text{mA}$	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	-

R5 (5-December 2013)

**2N2221A  
2N2222A**

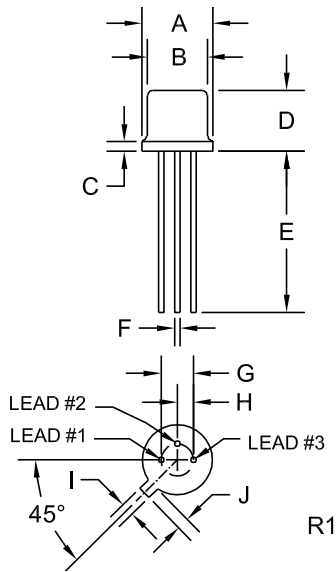
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**ELECTRICAL CHARACTERISTICS - Continued: ( $T_A=25^\circ\text{C}$ )**

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	$\mu\text{S}$
$h_{oe}$	$V_{CE}=10\text{V}, I_C=10\text{mA}, f=1.0\text{kHz}$	10	100	25	200	$\mu\text{S}$
$rb'C_c$	$V_{CB}=10\text{V}, I_E=20\text{mA}, f=31.8\text{MHz}$	-	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)

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

- Supply management (Customer portals)
- Inventory bonding
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- Custom product packing

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- Customer specific screening
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- PbSn plating options
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- Application notes
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- Custom product and package development

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### CONTACT US

#### Corporate Headquarters & Customer Support Team

Central Semiconductor Corp.  
145 Adams Avenue  
Hauppauge, NY 11788 USA  
Main Tel: (631) 435-1110  
Main Fax: (631) 435-1824  
Support Team Fax: (631) 435-3388  
[www.centalsemi.com](http://www.centalsemi.com)

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