

# Central<sup>TM</sup> Semiconductor Corp.

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Manufacturers of World Class Discrete Semiconductors

2N2221A  
2N2222A

NPN SILICON TRANSISTOR

JEDEC TO-18 CASE

## DESCRIPTION:

The CENTRAL SEMICONDUCTOR 2N2221A, 2N2222A types are Silicon NPN Planar Epitaxial Transistors designed for small signal general purpose and switching applications.

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

	<u>SYMBOL</u>		<u>UNITS</u>
Collector-Base Voltage	$V_{CB0}$	75	V
Collector-Emitter Voltage	$V_{CEO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current	$I_C$	800	mA
Power Dissipation	$P_D$	400	mW
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	1.2	W
Operating and Storage Junction Temperature	$T_J, T_{stg}$	-65 to +200	$^\circ\text{C}$
Thermal Resistance	$\Theta_{JA}$	438	$^\circ\text{C/W}$
Thermal Resistance	$\Theta_{JC}$	146	$^\circ\text{C/W}$

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

<u>SYMBOL</u>	<u>TEST CONDITIONS</u>	2N2221A		2N2222A		<u>UNITS</u>
		<u>MIN</u>	<u>MAX</u>	<u>MIN</u>	<u>MAX</u>	
$I_{CB0}$	$V_{CB}=60\text{V}$		10		10	nA
$I_{CB0}$	$V_{CB}=60\text{V}, T_A=150^\circ\text{C}$		10		10	$\mu\text{A}$
$I_{EBO}$	$V_{EB}=3.0\text{V}$		10		10	nA
$I_{CEV}$	$V_{CE}=60\text{V}, V_{EB}=3.0\text{V}$		10		10	nA
$BV_{CB0}$	$I_C=10\mu\text{A}$	75		75		V
$BV_{CEO}$	$I_C=10\text{mA}$	40		40		V
$BV_{EBO}$	$I_E=10\mu\text{A}$	6.0		6.0		V
$V_{CE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$		0.3		0.3	V
$V_{CE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$		1.0		1.0	V
$V_{BE(SAT)}$	$I_C=150\text{mA}, I_B=15\text{mA}$	0.6	1.2	0.6	1.2	V
$V_{BE(SAT)}$	$I_C=500\text{mA}, I_B=50\text{mA}$		2.0		2.0	V
$h_{FE}$	$V_{CE}=10\text{V}, I_C=0.1\text{mA}$	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		

(Continued on Reverse Side)

**ELECTRICAL CHARACTERISTICS:** Continued

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

**JEDEC TO-18 CASE - MECHANICAL OUTLINE**

All Dimensions in Inches (mm).

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