



**NPN 2N2221 – 2N2221A
2N2222 – 2N2222A**

SWITCHING SILICON TRANSISTORS

The 2N2221-A and 2N2222-A are NPN transistors mounted in TO-18 metal case . They are designed for high-speed switching applications and feature useful current gain over a wide range of collector current, low leakage currents and low saturation voltages.

Compliance to RoHS

ABSOLUTE MAXIMUM RATINGS

Symbol	Ratings	Value		Unit
		2N2221 2N2222	2N2221A 2N2222A	
V _{CEO}	Collector-Emitter Voltage	30	40	V
V _{CBO}	Collector-Base Voltage	60	75	V
V _{EBO}	Emitter-Base Voltage	5	6	V
I _c	Collector Current	800		mA
P _D	Total Power Dissipation	T _{amb} = 25°	0.5	W
		T _{case} = 25°	1.8	
T _J	Junction Temperature	175		°C
T _{Stg}	Storage Temperature range	-65 to +200		°C

THERMAL CHARACTERISTICS

Symbol	Ratings	Value	Unit
R _{thJ-a}	Thermal Resistance, Junction to ambient in free air	50	°C/W
R _{thJ-c}	Thermal Resistance, Junction to case	187.5	°C/W

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ELECTRICAL CHARACTERISTICS

TC=25°C unless otherwise noted

Symbol	Ratings	Test Condition(s)			Min	Typ	Mx	Unit
I_{CBO}	Collector Cutoff Current	$V_{CB}= 50\text{ V}$ $I_E= 0$	$T_j= 25^\circ\text{C}$	2N2221-2N2222	-	-	10	nA
			$T_j= 150^\circ\text{C}$	2N2221-2N2222	-	-	10	μA
		$V_{CB}= 60\text{ V}$ $I_E= 0$	$T_j= 25^\circ\text{C}$	2N2221A-2N2222A	-	-	10	nA
			$T_j= 150^\circ\text{C}$	2N2221A-2N2222A	-	-	10	μA
I_{EBO}	Emitter Cutoff Current	$V_{BE}= 3.0\text{ V}, I_C=0$		-	-	10	nA	
		2N2221-2N2222	2N2221A-2N2222A					
I_{CEX}	Collector Cutoff Current	$V_{CE}= 60\text{ V}, -V_{BE}= 3\text{V}$		-	-	10	nA	
V_{CEO}	Collector Emitter Breakdown Voltage (*)	$I_C= 10\text{ mA}, I_B= 0$		2N2221-2N2222	30	-	-	V
				2N2221A-2N2222A	40	-	-	
V_{CBO}	Collector Base Breakdown Voltage	$I_C= 10\text{ }\mu\text{A}, I_E= 0$		2N2221-2N2222	60	-	-	V
				2N2221A-2N2222A	75	-	-	
V_{EBO}	Emitter Base Breakdown Voltage	$I_E= 10\text{ }\mu\text{A}, I_C= 0$		2N2221-2N2222	5	-	-	V
				2N2221A-2N2222A	6	-	-	
h_{FE}	DC Current Gain (*)	$I_C=0.1\text{ mA}, V_{CE}=10\text{ V}$		2N2221-2N2221A	20	-	-	-
				2N2222-2N2222A	35	-	-	
		$I_C=1\text{ mA}, V_{CE}=10\text{ V}$		2N2221-2N2221A	25	-	-	
				2N2222-2N2222A	50	-	-	
		$I_C=10\text{ mA}, V_{CE}=10\text{ V}$		2N2221-2N2221A	35	-	-	
				2N2222-2N2222A	75	-	-	
		$I_C=10\text{ mA}, V_{CE}=10\text{ V}$ $T_{amb} = -55^\circ\text{C}$		2N2221A	15	-	-	
				2N2222A	35	-	-	
		$I_C=150\text{ mA}, V_{CE}=1\text{ V}$		2N2221-2N2221A	20	-	-	
				2N2222-2N2222A	50	-	-	
		$I_C=150\text{ mA}, V_{CE}=10\text{ V}$		2N2221-2N2221A	40	-	120	
				2N2222-2N2222A	100	-	300	
$I_C=500\text{ mA}, V_{CE}=10\text{ V}$		2N2221	20	-	-			
		2N2221A	25	-	-			
		2N2222	30	-	-			
		2N2222A	40	-	-			

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ELECTRICAL CHARACTERISTICS

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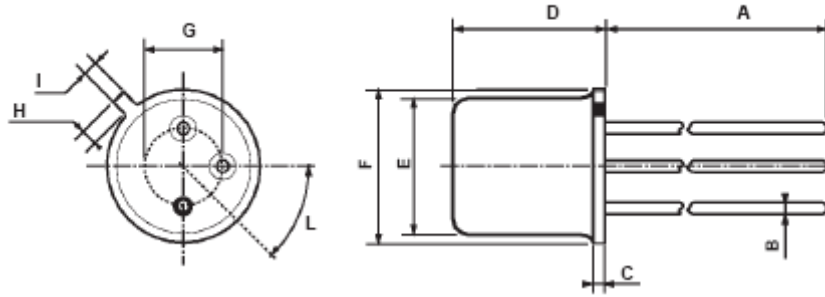
Symbol	Ratings	Test Condition(s)		Min	Typ	Mx	Unit
$V_{CE(SAT)}$	Collector-Emitter saturation Voltage (*)	$I_C=150\text{ mA}, I_B=15\text{ mA}$	2N2221-2N2222	-	-	0.4	V
			2N2221A-2N2222A	-	-	0.3	
		$I_C=500\text{ mA}, I_B=50\text{ mA}$	2N2221-2N2222	-	-	1.6	
			2N2221A-2N2222A	-	-	1	
$V_{BE(SAT)}$	Base-Emitter saturation Voltage (*)	$I_C=150\text{ mA}, I_B=15\text{ mA}$	2N2221-2N2222	-	-	1.3	V
			2N2221A-2N2222A	0.6	-	1.2	
		$I_C=500\text{ mA}, I_B=50\text{ mA}$	2N2221-2N2222	-	-	2.6	
			2N2221A-2N2222A	-	-	2	
f_T	Transition frequency	$I_C=20\text{ mA}, V_{CE}=20\text{ V}$ $f=100\text{ MHz}$	2N2221-2N22218A	250	-	-	MHz
			2N2222				
			2N2222A	300	-	-	
h_{fe}	Small signal current gain	$I_C=1\text{ mA}, V_{CE}=10\text{ V}$ $f=1\text{ kHz}$	2N2221A	30	-	150	-
			2N2222A	50	-	300	
		$I_C=10\text{ mA}, V_{CE}=10\text{ V}$ $f=1\text{ kHz}$	2N2221A	50	-	300	
			2N2222A	75	-	375	
t_d	Delay time	$I_C=150\text{ mA}, I_B=15\text{ mA}$ $-V_{BB}=0.5\text{ V}, V_{CC}=30\text{ V}$	2N2221A	-	-	10	ns
			2N2222A				
t_r	Rise time	$I_C=150\text{ mA}, I_B=15\text{ mA}$ $-V_{BB}=0.5\text{ V}, V_{CC}=30\text{ V}$	2N2221A	-	-	25	ns
			2N2222A				
t_s	Storage time	$I_C=150\text{ mA}, V_{CC}=30\text{ V}$ $I_{B1} = -I_{B2} = 15\text{ mA}$	2N2221A	-	-	225	ns
			2N2222A				
t_f	Fall time	$I_C=150\text{ mA}, V_{CC}=30\text{ V}$ $I_{B1} = -I_{B2} = 15\text{ mA}$	2N2221A	-	-	60	ns
			2N2222A				
r_b, C_c	Feedback time constant	$I_C=20\text{ mA}, V_{CE}=20\text{ V}$ $f=31.8\text{ MHz}$	2N2221A	-	-	150	ps
			2N2222A				

(*) Pulse conditions : $t_p < 300\text{ }\mu\text{s}$, $\delta = 2\%$

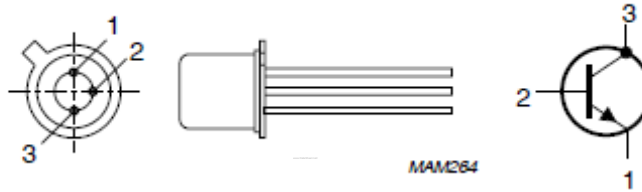
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MECHANICAL DATA CASE TO-18

DIMENSIONS (mm)		
	min	max
A	12.7	-
B	-	0.49
C	0.9	-
D	-	5.3
E	-	4.9
F	-	5.8
G	2.54	-
H	-	1.2
I	-	1.16
L	45°	-



Pin 1 :	emitter
Pin 2 :	base
Pin 3 :	Collector
Case :	Collector



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