



6 Lake Street, Lawrence, MA 01841
1-800-446-1158 / (978) 620-2600 / Fax: (978) 689-0803
Website: <http://www.microsemi.com>

TECHNICAL DATA SHEET

RADIATION HARDENED NPN SILICON SWITCHING TRANSISTOR *Qualified per MIL-PRF-19500/255*

DEVICES

2N2221A	2N2222A
2N2221AL	2N2222AL
2N2221AUA	2N2222AUA
2N2221AUB	2N2222AUB
2N2221AUBC	2N2222AUBC

LEVELS

JANSM – 3K Rads (Si)
JANS D – 10K Rads (Si)
JANSP – 30K Rads (Si)
JANSL – 50K Rads (Si)
JANSR – 100K Rads (Si)
JANSF – 300K Rads (Si)
JANS G – 500K Rads (Si)
JANS H – 1MEG Rads (Si)

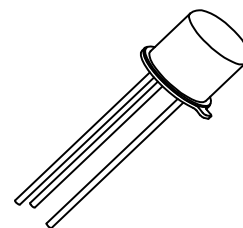
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^{\circ}\text{C}$ unless otherwise noted)

Parameters / Test Conditions	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	50	Vdc
Collector-Base Voltage	V_{CBO}	75	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current	I_C	800	mA dc
Total Power Dissipation @ $T_A = +25^{\circ}\text{C}$	P_T		W
2N2221A, L		0.5	
2N2221AUA		0.65	
2N2221AUB, UBC		0.50	
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200	$^{\circ}\text{C}$

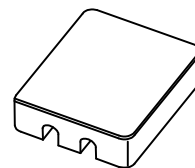
THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$		$^{\circ}\text{C/W}$
2N2221A, L		325	
2N2221AUA		210	
2N2221AUB, UBC		325	

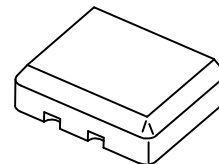
- Derate linearly 3.08 mW/ $^{\circ}\text{C}$ above $T_A > +37.5^{\circ}\text{C}$
- Derate linearly 4.76 mW/ $^{\circ}\text{C}$ above $T_A > +63.5^{\circ}\text{C}$



TO-18 (TO-206AA)
2N2221A, 2N2222A



4 PIN
2N2221AUA, 2N2222AUA



3 PIN
2N2221AUB, 2N2222AUB
2N2221AUBC, 2N2222AUBC
(UBC = Ceramic Lid Version)



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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage I _C = 10mA _{dc}	V _{(BR)CEO}	50		V _{dc}
Collector-Base Cutoff Current V _{CB} = 75V _{dc} V _{CB} = 60V _{dc}	I _{CBO}		10 10	μA _{dc} ηA _{dc}
Emitter-Base Cutoff Current V _{EB} = 6.0V _{dc} V _{EB} = 4.0V _{dc}	I _{EBO}		10 10	μA _{dc} ηA _{dc}
Collector-Emitter Cutoff Current V _{CE} = 50V _{dc}	I _{CES}		50	ηA _{dc}
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio I _C = 0.1mA _{dc} , V _{CE} = 10V _{dc} 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	h _{FE}	30 50	150 325	
I _C = 1.0mA _{dc} , V _{CE} = 10V _{dc} 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC		35 75		
I _C = 10mA _{dc} , V _{CE} = 10V _{dc} 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC		40 100		
I _C = 150mA _{dc} , V _{CE} = 10V _{dc} 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC		40 100		
I _C = 500mA _{dc} , V _{CE} = 10V _{dc} 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC		20 30		
Collector-Emitter Saturation Voltage I _C = 150mA _{dc} , I _B = 15mA _{dc} I _C = 500mA _{dc} , I _B = 50mA _{dc}	V _{CE(sat)}		0.3 1.0	V _{dc}
Base-Emitter Voltage I _C = 150mA _{dc} , I _B = 15mA _{dc} I _C = 500mA _{dc} , I _B = 50mA _{dc}	V _{BE(sat)}	0.6	1.2 2.0	V _{dc}



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DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0\text{mA}$, $V_{CE} = 10\text{Vdc}$, $f = 1.0\text{kHz}$ 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	h_{fe}		30 50	
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 20\text{mA}$, $V_{CE} = 20\text{Vdc}$, $f = 100\text{MHz}$	$ h_{fe} $		2.5	
Output Capacitance $V_{CB} = 10\text{Vdc}$, $I_E = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{obo}		8.0	pF
Input Capacitance $V_{EB} = 0.5\text{Vdc}$, $I_C = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{ibo}		25	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time See figure 8 of MIL-PRF-19500/255	t_{on}		35	ns
Turn-Off Time See Figure 9 of MIL-PRF-19500/255	t_{off}		300	ns

(3) Pulse Test: Pulse Width = 300 μ s, Duty Cycle $\leq$ 2.0%.

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