



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)

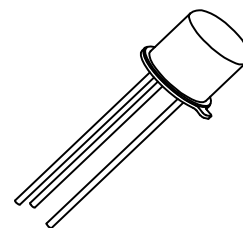
ABSOLUTE MAXIMUM RATINGS ($T_C = +25^{\circ}\text{C}$ unless otherwise noted)

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 @ $T_A = +25^{\circ}\text{C}$			
2N2221A, L 2N2222A, L	P_T	0.5	W
2N2221AUA 2N2222AUA		0.65	
2N2221AUB, UBC 2N2222AUB, UBC		0.50	
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200	$^{\circ}\text{C}$

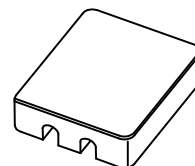
THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Ambient			
2N2221A, L 2N2222A, L	$R_{\theta JA}$	325	$^{\circ}\text{C/W}$
2N2221AUA 2N2222AUA		210	
2N2221AUB, UBC 2N2222AUB, UBC		325	

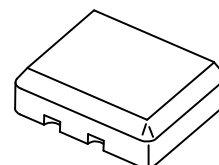
- Derate linearly 3.08 mW/ $^{\circ}\text{C}$ above $T_A > +37.5^{\circ}\text{C}$
- Derate linearly 4.76 mW/ $^{\circ}\text{C}$ above $T_A > +63.5^{\circ}\text{C}$



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 $I_C = 10\text{mA}_{dc}$	$V_{(BR)CEO}$	50		Vdc
Collector-Base Cutoff Current $V_{CB} = 75\text{Vdc}$ $V_{CB} = 60\text{Vdc}$	I_{CBO}		10 10	μA_{dc} ηA_{dc}
Emitter-Base Cutoff Current $V_{EB} = 6.0\text{Vdc}$ $V_{EB} = 4.0\text{Vdc}$	I_{EBO}		10 10	μA_{dc} ηA_{dc}
Collector-Emitter Cutoff Current $V_{CE} = 50\text{Vdc}$	I_{CES}		50	ηA_{dc}
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio $I_C = 0.1\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$ $I_C = 1.0\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$ $I_C = 10\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$ $I_C = 150\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$ $I_C = 500\text{mA}_{dc}$, $V_{CE} = 10\text{Vdc}$	2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC 2N2221A, L, UA, UB, UBC 2N2222A, L, UA, UB, UBC	h_{FE}	30 50 35 75 40 100 40 100 20 30	150 325 120 300
Collector-Emitter Saturation Voltage $I_C = 150\text{mA}_{dc}$, $I_B = 15\text{mA}_{dc}$ $I_C = 500\text{mA}_{dc}$, $I_B = 50\text{mA}_{dc}$	$V_{CE(sat)}$		0.3 1.0	Vdc
Base-Emitter Voltage $I_C = 150\text{mA}_{dc}$, $I_B = 15\text{mA}_{dc}$ $I_C = 500\text{mA}_{dc}$, $I_B = 50\text{mA}_{dc}$	$V_{BE(sat)}$	0.6	1.2 2.0	Vdc



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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%.