

NPN SILICON SWITCHING TRANSISTOR
Qualified per MIL-PRF-19500/255
Devices

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

Qualified Level

JAN
JANTX
JANTXV
JANS
JANHC

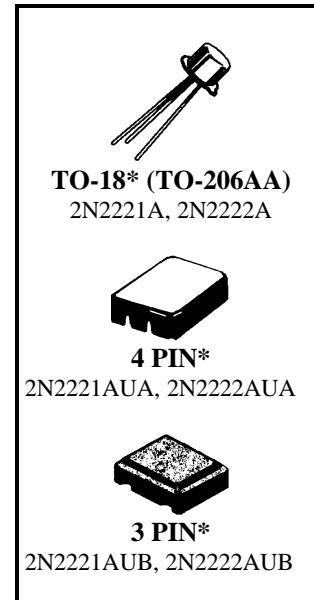
MAXIMUM RATINGS

Ratings	Symbol	All Types	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	mAdc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ 2N2221A, L; 2N2222A, L ⁽¹⁾ 2N2221AUA; 2N2222AUA ⁽²⁾ 2N2221AUB; 2N2222AUB ⁽¹⁾	P_T	0.5 0.65 0.50	W
Operating & Storage Junction Temperature Range	T_{op}, T_{stg}	-65 to +200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

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

 1) Derate linearly 3.08 mW/ $^\circ\text{C}$ above $T_A > +37.5^\circ\text{C}$

 2) Derate linearly 4.76 mW/ $^\circ\text{C}$ above $T_A > +63.5^\circ\text{C}$


*See appendix A for package outline

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

Characteristics	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mA}$	$V_{(BR)CEO}$	50		Vdc
Collector-Base Cutoff Current $V_{CB} = 75 \text{ Vdc}$ $V_{CB} = 60 \text{ Vdc}$	I_{CBO}		10 10	μA ηA
Emitter-Base Cutoff Current $V_{EB} = 6.0 \text{ Vdc}$ $V_{EB} = 4.0 \text{ Vdc}$	I_{EBO}		10 10	μA ηA
Collector-Base Cutoff Current $V_{CE} = 50 \text{ Vdc}$	I_{CES}		50	ηA

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS⁽³⁾				
Forward-Current Transfer Ratio $I_C = 0.1 \text{ mA DC}, V_{CE} = 10 \text{ V DC}$	h_{FE}	30		
$I_C = 1.0 \text{ mA DC}, V_{CE} = 10 \text{ V DC}$		50		
$I_C = 10 \text{ mA DC}, V_{CE} = 10 \text{ V DC}$		35	150	
$I_C = 150 \text{ mA DC}, V_{CE} = 10 \text{ V DC}$		75	325	
$I_C = 500 \text{ mA DC}, V_{CE} = 10 \text{ V DC}$		40		
		100		
		40	120	
		100	300	
		20		
		30		
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	V DC
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	V DC

DYNAMIC CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

Turn-On Time See Figure 8 of MIL-PRF-19500/255	t_{on}		35	μs
Turn-Off Time See Figure 9 of MIL-PRF-19500/255	t_{off}		300	μs

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