

### Features

- JAN and JANTX Quality Levels per MIL-PRF-19500/268
- For Use in Military and High Reliability Applications
- TO-18 (TO-206AA) Hermetic Package



### Electrical Characteristics ( $T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Breakdown Voltage Collector - Emitter	$I_C = 30 \text{ mA dc}$	$V_{(BR)CEO}$	V dc	15	—
Collector - Emitter Breakdown Voltage	$I_C = 1.0 \mu\text{A dc}$	$V_{(BR)CES}$	V dc	30	—
Collector - Base Breakdown Voltage	$I_C = 10 \mu\text{A dc}$	$V_{(BR)CBO}$	V dc	40	—
Emitter - Base Breakdown Voltage	$I_E = 100 \mu\text{A dc}$	$V_{(BR)EBO}$	V dc	5.0	—
Collector - Base Cutoff Current	$V_{CB} = 20 \text{ V dc}$	$I_{CBO1}$	nA dc	—	50
Emitter - Base Cutoff Current	$V_{EB} = 4 \text{ V dc}$	$I_{EBO}$	nA dc	—	100
Forward Current Transfer Ratio	$V_{CE} = 1.0 \text{ V dc}; I_C = 1.0 \text{ mA dc}$	$h_{FE1}$	-	25	—
Forward Current Transfer Ratio	$V_{CE} = 1.0 \text{ V dc}; I_C = 10 \text{ mA dc}$	$h_{FE2}$	-	40	120
Forward Current Transfer Ratio	$V_{CE} = 1.0 \text{ V dc}; I_C = 150 \text{ mA dc}$	$h_{FE3}$	-	20	—
Collector - Emitter Saturation Voltage	$I_C = 10 \text{ mA dc}; I_B = 1.0 \text{ mA dc}$	$V_{CE(sat)1}$	V dc	—	0.25
Collector - Emitter Saturation Voltage	$I_C = 100 \text{ mA dc}; I_B = 10 \text{ mA dc}$	$V_{CE(sat)2}$	V dc	—	0.4
Base - Emitter Saturation Voltage	$I_C = 10 \text{ mA dc}; I_B = 1.0 \text{ mA dc}$	$V_{BE(sat)1}$	V dc	0.7	0.82

### Electrical Characteristics (+25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Base - Emitter Saturation Voltage	$I_C = 100 \text{ mA dc}; I_B = 10 \text{ mA dc}$	$V_{BE(sat)2}$	V dc	—	1.25
Collector - Base Cutoff Current	$T_A = +150^\circ\text{C}; V_{CB} = 20 \text{ V dc}$	$I_{CBO}$	$\mu\text{A dc}$	—	50
Forward Current Transfer Ratio	$T_A = -65^\circ\text{C}$ $V_{CE} = 1.0 \text{ V dc}; I_C = 10 \text{ mA dc}$	$h_{FE}$	-	20	—
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = 10 \text{ V dc}; I_C = 10 \text{ mA dc}; f = 100 \text{ MHz}$	$ h_{FE} $		3.0	12
Open Circuit Output Capacitance	$V_{CB} = 5 \text{ V dc}; I_E = 0; 100 \text{ kHz} \leq f \leq 1 \text{ Mhz}$	$C_{obo}$	pF	—	5.0
Input Capacitance (Output Open-Circuited)	$V_{CB} = 5.0 \text{ V dc}; I_E = 0; 100 \text{ kHz} \leq f \leq 1 \text{ Mhz}$	$C_{ibo}$	pF	—	7.0
Real Part of Small-Signal Shorted-Circuit Input Impedance	$V_{CE} = 10 \text{ V dc}; I_C = 10 \text{ mA dc}; f = 250 \text{ MHz}$	$RE_{hie}$	$\Omega$	—	60

### Switching Characteristics

Turn-On Time	$V_{CC} = 10 \text{ V dc}; I_C = 100 \text{ mA dc}; I_{B1} = 10 \text{ mA dc}; V_{BE(off)} = 2.0 \text{ V dc}$	$t_{on1}$	ns	—	40
Turn-On Time	$V_{CC} = 3.0 \text{ V dc}; I_C = 10 \text{ mA dc}; I_{B1} = 1.0 \text{ mA dc}; V_{BE(off)} = 2.0 \text{ V dc}$	$t_{on2}$	ns	—	75
Turn-Off Time	$V_{CC} = 10 \text{ V dc}; I_C = 100 \text{ mA dc}; I_{B1} = 10 \text{ mA dc}; I_{B2} = 5.0 \text{ mA dc}$	$t_{off1}$	ns	—	55
Turn-Off Time	$V_{CC} = 3.0 \text{ V dc}; I_C = 10 \text{ mA dc}; I_{B1} = 1.0 \text{ mA dc}; I_{B2} = 0.5 \text{ mA dc}$	$t_{off2}$	ns	—	45
Storage Time	$V_{CC} = 10 \text{ V dc}; I_C = 10 \text{ mA dc}; I_{B1} = 10 \text{ mA dc}; I_{B2} = 10 \text{ mA dc}$	$t_s$	ns	—	20

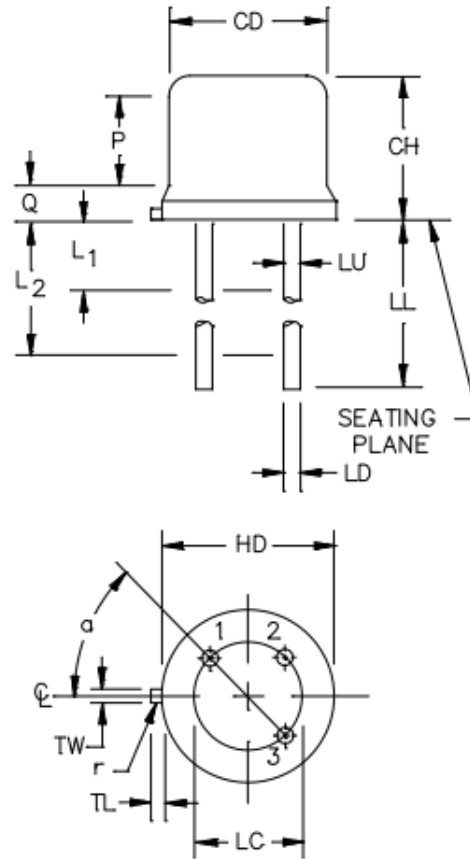
### Absolute Maximum Ratings ( $T_A = +25^\circ\text{C}$ unless otherwise specified)

Ratings	Symbol	Value
Collector - Emitter Voltage	$V_{CEO}$	15 V dc
Collector - Base Voltage	$V_{CBO}$	40 Vdc
Collector - Emitter Voltage	$V_{CES}$	30 V dc
Emitter - Base Voltage	$V_{EBO}$	5.0 V dc
Operating & Storage Temperature Range	$T_{OP}, T_{STG}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$
Junction Temperature	$T_J$	$+200^\circ\text{C}$
Power Dissipation $T_A = +25^\circ\text{C}$	$P_T^{(1)}$	0.36 W
Power Dissipation $T_C = +25^\circ\text{C}$	$P_T^{(2)}$	1.2 W

- (1) Derate linearly 2.06 mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$ .  
 (2) Derate linearly 6.85 mW/ $^\circ\text{C}$  for  $T_C > +25^\circ\text{C}$ .

### Outline Drawing (TO-18)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.178	.195	4.52	4.95	
CH	.170	.210	4.32	5.33	
HD	.209	.230	5.31	5.84	
LC	.100 TP		2.54 TP		3
LD	.016	.021	0.41	0.53	4, 5
LL	.500	.750	12.70	19.05	5, 6
LU	.016	.019	0.41	0.48	4, 5, 6
L <sub>1</sub>		.050		1.27	6
L <sub>2</sub>	.250		6.35		6
P	.100		2.54		
Q		.030		0.76	7
r					
TL	.028	.048	0.71	1.22	8
TW	.036	.046	0.91	1.17	
α	45° TP		45° TP		



#### NOTES:

1. Dimensions are in inches. Millimeters equivalents are given for general information only.
2. Terminal 1 is the emitter, terminal 2 is the base, and terminal 3 is the collector. The collector shall be internally connected to the case.
3. When measured in a gauging plane  $.054 +.001 -.000$  inch ( $1.37 +0.03 -0.00$  mm) below the seating plane of the transistor, maximum diameter leads shall be within  $.007$  inch ( $0.18$  mm) of their true location relative to a maximum width tab. Smaller diameter leads shall fall within the outline of the maximum diameter lead tolerance.
4. Measured in the zone beyond  $.250$  inch ( $6.35$  mm) from the seating plane.
5. All 3 leads.
6. Symbol LU applies between L<sub>1</sub> and L<sub>2</sub>. Dimension LD applies between L<sub>2</sub> and LL minimum. Lead diameter shall not exceed  $.042$  inch ( $1.07$  mm) within L<sub>1</sub> and beyond LL minimum.
7. Details of outline in this zone are optional.
8. Measured from the maximum diameter of the actual device.
9. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi \times$  symbology.

FIGURE 1. Physical dimensions and configuration of TO-206AA (formerly TO-18) package.

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