2N2481

NPN Silicon High-Speed Switching Transistors

Rev. V1

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°C unless otherwise specified)

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

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Electrical Characteristics (+25°C unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Base - Emitter Saturation Voltage	I_C = 100 mA dc; I_B = 10 mA dc	$V_{BE(sat)2}$	V dc	—	1.25
Collector - Base Cutoff Current	T_A = +150°C; V_{CB} = 20 V dc	I_{CBO}	µA dc	—	50
Forward Current Transfer Ratio	T_A = -65°C V_{CE} = 1.0 V dc; I_C = 10 mA dc	h_{FE}	-	20	—
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	V_{CE} = 10 V dc; I_C = 10 mA dc; f = 100 MHz	$\lvert h_{FE} \rvert$		3.0	12
Open Circuit Output Capacitance	V_{CB} = 5 V dc; I_E = 0; 100 kHz≤f≤1 Mhz	C_{obo}	pF	—	5.0
Input Capacitance (Output Open-Circuited)	V_{CB} = 5.0 V dc; I_E = 0; 100 kHz≤f≤1 Mhz	C_{ibo}	pF	—	7.0
Real Part of Small-Signal Shorted-Circuit Input Impedance	V_{CE} = 10 V dc; I_C = 10 mA dc; f = 250 MHz	RE_{hie}	Ω	—	60
Switching Characteristics					
Turn-On Time	V_{CC} = 10 V dc; I_C = 100 mA dc; I_{B1} = 10 mA dc; $V_{BE(off)}$ = 2.0 V dc	t_{on1}	ns	—	40
Turn-On Time	V_{CC} = 3.0 V dc; I_C = 10 mA dc; I_{B1} = 1.0 mA dc; $V_{BE(off)}$ = 2.0 V dc	t_{on2}	ns	—	75
Turn-Off Time	V_{CC} = 10 V dc; I_C = 100 mA dc; I_{B1} = 10 mA dc; I_{B2} = 5.0 mA dc	t_{off1}	ns	—	55
Turn-Off Time	V_{CC} = 3.0 V dc; I_C = 10 mA dc; I_{B1} = 1.0 mA dc; I_{B2} = 0.5 mA dc	t_{off2}	ns	—	45
Storage Time	V_{CC} = 10 V dc; I_C = 10 mA dc; I_{B1} = 10 mA dc; I_{B2} = 10 mA dc	t_s	ns	—	20

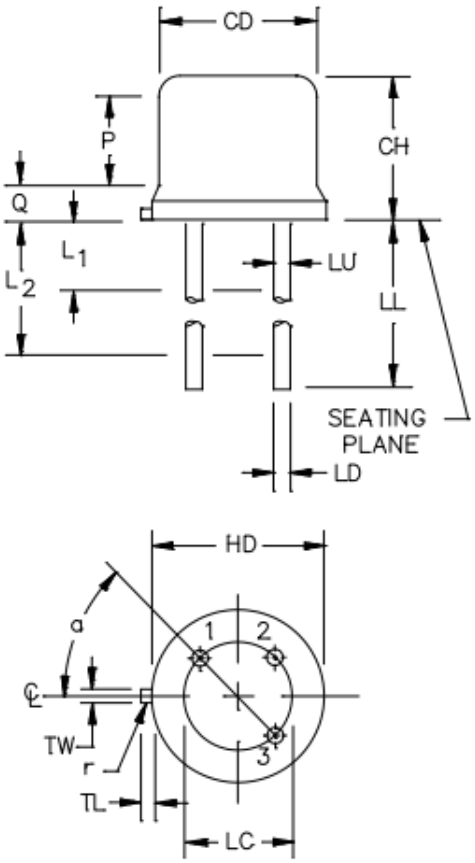
Absolute Maximum Ratings (T_A = +25°C unless otherwise specified)

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°C to +200°C
Junction Temperature	T_J	+200°C
Power Dissipation T_A = +25°C	P_T(1)	0.36 W
Power Dissipation T_C = +25°C	P_T(2)	1.2 W

(1) Derate linearly 2.06 mW/°C for T_A > +25°C.
(2) Derate linearly 6.85 mW/°C for T_C > +25°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_1		.050		1.27	6
L_2	.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_1 and L_2. Dimension LD applies between L_2 and LL minimum. Lead diameter shall not exceed .042 inch (1.07 mm) within L_1 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 ϕx symbology.

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