

2N3867, 2N3867S & 2N3868, 2N3868S

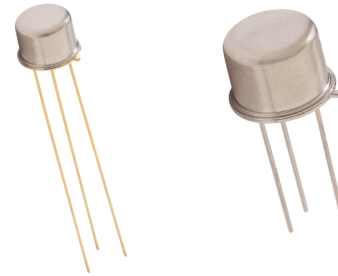


PNP Silicon Low Power Transistor

Rev. V3

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/350
- TO-5 Package: 2N3867, 2N3868
- TO-39 Package: 2N3867S, 2N3868S
- Designed for High Speed Switching and Amplifier Applications



Electrical Characteristics (T_A = 25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Base Breakdown Voltage	V _{CB} = -40V 2N3867, 2N3867S V _{CB} = -60V 2N3868, 2N3868S	I _{CBO1}	µA dc		-100
Collector - Emitter Breakdown Voltage	I _C = -20 mA dc, 2N3867, 2N3867S I _C = -20 mA dc, 2N3868, 2N3868S	V _{(BR)CEO}	V dc	-40 -60	—
Collector - Emitter Cutoff Current	V _{EB} = +2.0 V dc, V _{CE} = -40 Vdc, 2N3867, 2N3867S V _{EB} = +2.0 V dc, V _{CE} = -60 Vdc, 2N3868, 2N3868S	I _{CEx1}	µA dc	—	-1.0 -1.0
Emitter - Base Cutoff Current	V _{EB} = -4.0 Vdc	I _{EBO1}	µA dc	—	-100
Forward Current Transfer Ratio	V _{CE} = -1.0 V dc, I _C = -500 mA dc 2N3867, 2N3867S 2N3868, 2N3868S V _{CE} = -2.0 Vdc, I _C = -1.5 A dc 2N3867, 2N3867S 2N3868, 2N3868S V _{CE} = -3.0 V dc, I _C = -2.5 A dc 2N3867, 2N3867S 2N3868, 2N3868S V _{CE} = -5.0 V dc, I _C = -3.0 mA dc All Types	h _{FE}	-	50 35 40 30 25 20 20	— — 200 150 — — —
Collector - Emitter Saturation Voltage	I _C = -500 mA dc, I _B = -50 mA dc I _C = -1.5 A dc, I _B = -150 mA dc I _C = -2.5 A dc, I _B = -250 mA dc	V _{CE(sat)1} V _{CE(sat)2} V _{CE(sat)3}	V dc	—	-0.5 -0.75 -1.5
Base - Emitter Saturation Voltage	I _C = -500 mA dc, I _B = -50 mA dc I _C = -1.5 A dc, I _B = -150 mA dc I _C = -2.5 A, I _B = -250 mA dc	V _{BE(sat)1} V _{BE(sat)2} V _{BE(sat)3}	V dc	-0.9	-1.0 -1.4 -2.0

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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{EB} = +2.0\text{ V dc}, V_{CE} = -40\text{ Vdc}$, 2N3867, 2N3867S $V_{EB} = +2.0\text{ V dc}, V_{CE} = -60\text{ Vdc}$, 2N3868, 2N3868S	I_{CEX2}	$\mu\text{A dc}$	—	-50 -50
Forward-Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = -1.0\text{ V dc}, I_C = -500\text{ mA dc}$ 2N3867, 2N3867S 2N3868, 2N3868S	h_{FE5}	V dc	25 17	
Dynamic Characteristics					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = -5.0\text{ V dc}, I_C = -100\text{ mA dc}$, $f = 20\text{ MHz}$	$ h_{fe} $	-	3	12
Open Circuit Output Capacitance	$V_{CB} = 10\text{ Vdc}, I_E = 0, 100\text{ kHz} \leq f \leq 1\text{ MHz}$	C_{obo}	pF	—	120
Input Capacitance	$V_{CB} = -3\text{ Vdc}, I_C = 0, 100\text{ kHz} \leq f \leq 1\text{ MHz}$	C_{ibo}	pF	—	800
Switching Characteristics					
Delay Time	$V_{CC} = -30\text{ V dc}, V_{EB} = 0, I_C = -1.5\text{ A dc}$, $I_{B1} = -150\text{ mA dc}$	t_d	ns	—	35
Rise Time	$V_{CC} = -30\text{ V dc}, V_{EB} = 0\text{ V dc}$, $I_C = -1.5\text{ A dc}, I_{B1} = -150\text{ mA dc}$	t_r	ns	—	65
Storage Time	$V_{CC} = -30\text{ V dc}, V_{EB} = 0\text{ V dc}$, $I_C = -1.5\text{ A dc}, I_{B1} = I_{B2} = -150\text{ mA dc}$	t_s	ns	—	500
Fall Time	$V_{CC} = -30\text{ V dc}, V_{EB} = 0\text{ V dc}$, $I_C = -1.5\text{ A dc}, I_{B1} = I_{B2} = -150\text{ mA dc}$	t_f	ns	—	100

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

Ratings	Symbol	Value
Collector - Emitter Voltage 2N3867, 2N3867S 2N3868, 2N3868S	V_{CEO}	-40 V dc -60 V dc
Collector - Base Voltage 2N3867, 2N3867S 2N3868, 2N3868S	V_{CBO}	-40 V dc -60 V dc
Emitter - Base Voltage	V_{EBO}	-4.0 V dc
Collector Current	I_C	-3.0 A dc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ ⁽¹⁾ @ $T_C = +25^\circ\text{C}$ ⁽²⁾	P_T	1.0 W 10 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to +200°C

(1) For derating, see figures 5, 6, 7 and 8 of MIL-PRF-19500/350.

(2) For thermal curves, see figures 9, 10, 11 and 12 of MIL-PRF-19500/350.

Thermal Characteristics

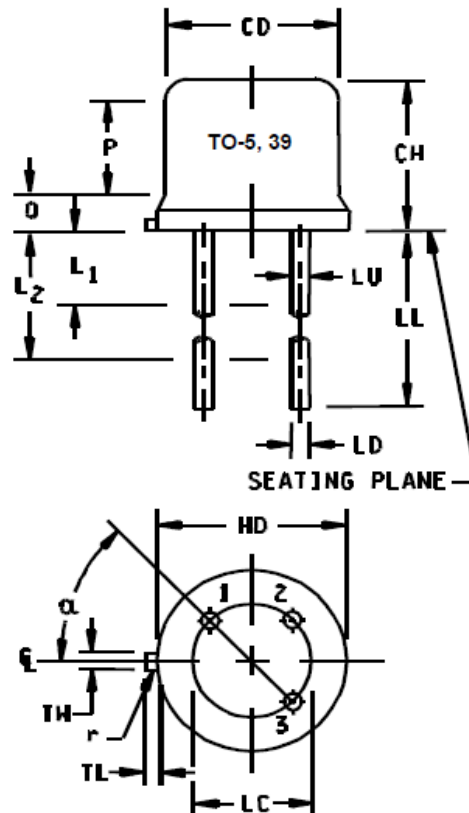
Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	17.5°C/W

Safe Operating Area

DC Tests:	$T_C = +25^\circ\text{C}$, 1 Cycle, $t = 1.0$ s (see figure 15 of MIL-PRF-19500/350)
Test 1:	$V_{CE} = -3.33$ V dc, $I_C = -3$ A dc
Test 2:	$V_{CE} = -40$ V dc, $I_C = -160$ mA dc, 2N3867, 2N3867S
Test 3:	$V_{CE} = -60$ V dc, $I_C = -80$ mA dc, 2N3868, 2N3868S

Outline Drawings (TO-5, TO-39)

Symbol	Dimensions				Note
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	5, 6
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	4, 5
LC	.200 TP		5.08 TP		7
LD	.016	.019	0.41	0.48	8, 9
LL	See note 8, 14				
LU	.016	.019	0.41	0.48	8, 9
L ₁		.050		1.27	8, 9
L ₂	.250		6.35		8, 9
P	.100		2.54		7
Q		.030		0.76	5
TL	.029	.045	0.74	1.14	3, 4
TW	.028	.034	0.71	0.86	3
r		.010		0.25	10
α	45° TP		45° TP		7
	1, 2, 10, 12, 13, 14				



NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
- Dimension TL measured from maximum HD.
- Body contour optional within zone defined by HD, CD, and Q.
- CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods or by gauging procedure.
- Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in and beyond LL minimum.
- All three leads.
- The collector shall be internally connected to the case.
- Dimension r (radius) applies to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.
- Lead 1 = emitter, lead 2 = base, lead 3 = collector.
- For non-S-suffix devices (TO-5), dimension LL = 1.5 inches (38.10 mm) min. and 1.75 inches (44.45 mm) max. For S-suffix types (TO-39), dimension LL = .5 inch (12.70 mm) min. and .750 inch (19.05 mm) max.

FIGURE 1. Physical dimensions (similar to TO-5, TO-39).

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