

PNP SILICON LOW POWER TRANSISTOR

Qualified per MIL-PRF-19500/350

DEVICES

2N3867	2N3867S
2N3868	2N3868S

LEVELS

JAN
JANTX
JANTXV
JANS

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

Parameters / Test Conditions	Symbol	2N3867	2N3868	Unit
Collector-Base Voltage	V_{CBO}	40	60	Vdc
Collector-Emitter Voltage	V_{CEO}	40	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0		Vdc
Collector Current	I_C	3.0		mA
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ (1)	P_T	1.0		W/°C
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	175	°C/mW

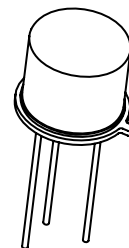
Note: * Electrical characteristics for "S" suffix devices are identical to the "non S" corresponding devices.

1/ Derate linearly 5.71mW/°C for $T_A > +25^\circ\text{C}$

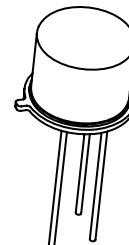
2/ Derate linearly 57.1mW/°C for $T_C > +25^\circ\text{C}$

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Current $I_C = 10\mu\text{A}$	$V_{(BR)CEO}$	40		Vdc
		60		
Collector-Base Cutoff Current $V_{CB} = 40\text{Vdc}$	I_{CBO}		100	μA
Emitter-Base Cutoff Current $V_{EB} = 4.0\text{Vdc}$	I_{EBO}		100	μA
Collector-Emitter Cutoff Current $V_{CE} = 40\text{Vdc}$	I_{CEX}		1.0	μA
			1.0	
$V_{CE} = 60\text{Vdc}$			50	
$V_{CE} = 40\text{Vdc}, T_A = +150^\circ\text{C}$			50	
$V_{CE} = 60\text{Vdc}, T_A = +150^\circ\text{C}$			50	



TO-5 *
2N3867, 2N3868



TO-39 * (TP-205AD)
2N3867S, 2N3868S

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

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽²⁾				
Forward-Current Transfer Ratio $I_C = 500\text{mA}$, $V_{CE} = 1.0\text{Vdc}$ 2N3867, S 2N3868, S	h_{FE}	50 35		
$I_C = 1.5\text{A}$, $V_{CE} = 2.0\text{Vdc}$ 2N3867, S 2N3868, S		40 30	200 150	
$I_C = 2.5\text{A}$, $V_{CE} = 3.0\text{Vdc}$ 2N3867, S 2N3868, S		25 20		
$I_C = 3.0\text{A}$, $V_{CE} = 5.0\text{Vdc}$ 2N3867, S 2N3868, S		20 20		
$I_C = 500\text{mA}$, $V_{CE} = 1.0\text{Vdc}$, $T_A = -55^\circ\text{C}$ 2N3867, S 2N3868, S		25 17		
Collector-Emitter Saturation Voltage $I_C = 500\text{mA}$, $I_B = 50\text{mA}$ $I_C = 1.5\text{A}$, $I_B = 150\text{mA}$ $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$	$V_{CE(sat)}$		0.5 0.75 1.5	Vdc
Base-Emitter Saturation Voltage $I_C = 500\text{mA}$, $I_B = 50\text{mA}$ $I_C = 1.5\text{A}$, $I_B = 150\text{mA}$ $I_C = 2.5\text{A}$, $I_B = 250\text{mA}$ 2N3867, S 2N3868, S	$V_{BE(sat)}$	0.9 0.85	1.0 1.4 1.4 2.0	Vdc

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short Circuit Forward Current Transfer Ratio $I_C = 100\text{mA}$, $V_{CE} = 5.0\text{Vdc}$, $f = 20\text{MHz}$	$ h_{fe} $	3	12	k Ω
Output Capacitance $V_{CB} = 10\text{Vdc}$, $I_E = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{obo}		120	pF
Input Capacitance $V_{EB} = 3.0\text{Vdc}$, $I_C = 0$, $100\text{kHz} \leq f \leq 1.0\text{MHz}$	C_{ibo}		800	pF

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

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Delay Time $V_{CC} = -30\text{dc}, V_{EB} = 0$	t_d		35	nS
Rise Time $I_C = 1.5\text{Adc}, I_{B1} = 150\text{mAdc}$	t_r		65	nS
Storage Time $V_{CC} = -30\text{dc}, V_{EB} = 0$	t_s		500	nS
Fall Time $I_C = 1.5\text{Adc}, I_{B1} = I_{B2} = 150\text{mAdc}$	t_f		100	nS
Turn-On Time $V_{CC} = 30, I_C = 1.5\text{Adc}, I_B = 150\text{mA}$	t_{on}		100	nS
Turn-Off Time $V_{CC} = 30, I_C = 1.5\text{Adc}, I_B = 150\text{mA}$	t_{off}		600	nS

SAFE OPERATING AREA

DC Test

$T_C = 25^\circ\text{C}$, 1 cycle, $t = 1.0\text{s}$

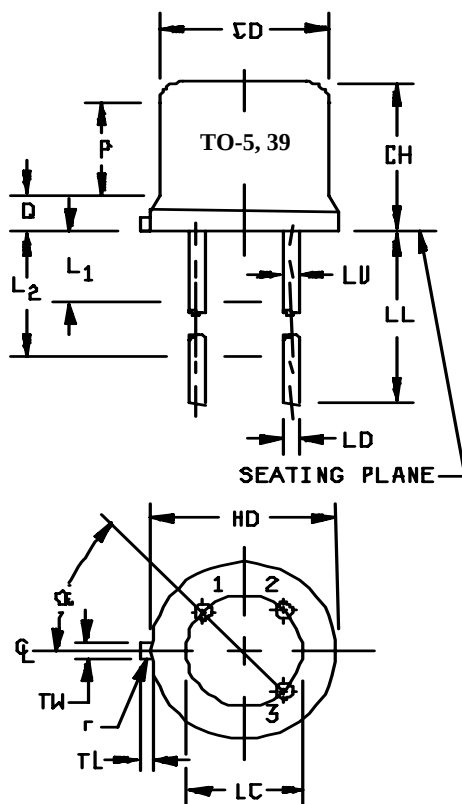
Test 1

$V_{CE} = 3.33\text{Vdc}, I_C = 3.0\text{Adc}$

Test 2

$V_{CE} = 40\text{Vdc}, I_C = 160\text{mAdc}$ 2N3867,
 $V_{CE} = 60\text{Vdc}, I_C = 80\text{mAdc}$ 2N3868, S

PACKAGE DIMENSIONS



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 ϕ x 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)