

PNP SWITCHING SILICON TRANSISTOR

Qualified per MIL-PRF-19500/350

Devices

2N3867
2N3867S

2N3868
2N3868S

Qualified Level

JAN
JANTX
JANTXV

MAXIMUM RATINGS

Ratings	Symbol	2N3867 2N3867S	2N3868 2N3868S	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	Vdc
Collector-Base Voltage	V_{CBO}	40	60	Vdc
Emitter-Base Voltage	V_{EBO}	4.0		Vdc
Collector Current -- Continuous	I_C	3.0		Adc
Total Power Dissipation @ $T_A = 25^{\circ}\text{C}^{(1)}$ @ $T_C = 25^{\circ}\text{C}^{(2)}$	P_T	1.0 10		W W
Operating & Storage Temperature Range	T_{OP}, T_{STG}	-55 to +200		$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	17.5	$^{\circ}\text{C/W}$

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

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



TO-5*
2N3867, 2N3868



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

*See Appendix A for
Package Outline

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

Characteristics	Symbol	Min.	Max.	Unit
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OFF CHARACTERISTICS

Collector-Base Breakdown Voltage $I_C = 100 \mu\text{Adc}$	2N3867, S 2N3868, S	$V_{(BR)CBO}$	40 60	Vdc
Collector-Emitter Breakdown Voltage $I_C = 20 \text{ mAdc}$	2N3867, S 2N3868, S	$V_{(BR)CEO}$	40 60	Vdc
Emitter-Base Breakdown Voltage $I_E = 100 \mu\text{Adc}$		$V_{(BR)EBO}$	4.0	Vdc
Collector-Emitter Cutoff Current $V_{EB} = 2.0 \text{ Vdc}, V_{CE} = 40 \text{ Vdc}$ $V_{EB} = 2.0 \text{ Vdc}, V_{CE} = 60 \text{ Vdc}$	2N3867, S 2N3868, S	I_{CEX}	1.0 1.0	μAdc
Collector-Base Cutoff Current $V_{CB} = 40 \text{ Vdc}$ $V_{CB} = 60 \text{ Vdc}$	2N3867, S 2N3868, S	I_{CBO}	100	μAdc
Emitter-Base Cutoff Current $V_{EB} = 4 \text{ Vdc}$		I_{EBO}	100	μAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio $I_C = 500 \text{ mAdc}, V_{CE} = 1.0 \text{ Vdc}$ $I_C = 1.5 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 2.5 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$ $I_C = 3.0 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$	h_{FE} 	 50 35 40 30 25 20 20	 200 150	
Collector-Emitter Saturation Voltage $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ $I_C = 1.5 \text{ Adc}, I_B = 150 \text{ mAdc}$ $I_C = 2.5 \text{ Adc}, I_B = 250 \text{ mAdc}$	$V_{CE(sat)}$		0.5 0.75 1.5	Vdc
Base-Emitter Saturation Voltage $I_C = 500 \text{ mAdc}, I_B = 50 \text{ mAdc}$ $I_C = 1.5 \text{ Adc}, I_B = 150 \text{ mAdc}$ $I_C = 2.5 \text{ Adc}, I_B = 250 \text{ mAdc}$	$V_{BE(sat)}$	0.9	1.0 1.4 2.0	Vdc

DYNAMIC CHARACTERISTICS

Magnitude of Common Emitter Small-Signal Short Circuit Forward Current Transfer Ratio $I_C = 100 \text{ mAdc}, V_{CE} = 5.0 \text{ Vdc}, f = 20 \text{ MHz}$	$ h_{fe} $	3.0	12	
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

SWITCHING CHARACTERISTICS

Delay Time	$V_{CC} = -30 \text{ Vdc}, V_{EB} = 0,$	t_d	35	ns
Rise Time	$I_C = 1.5 \text{ Adc}, I_{B1} = 150 \text{ mAdc}$	t_r	65	ns
Storage Time	$V_{CC} = -30 \text{ Vdc}, V_{EB} = 0,$	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 $V_{CC} = 30, I_C = 1.5 \text{ Adc}, I_B = 150 \text{ mAdc}$		t_{on}	100	ns
Turn-Off Time $V_{CC} = 30, I_C = 1.5 \text{ Adc}, I_B = 150 \text{ mAdc}$		t_{off}	600	ns

SAFE OPERATING AREA

DC Tests $T_C = 25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$				
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, S $V_{CE} = 60 \text{ Vdc}, I_C = 80 \text{ mAdc}$ 2N3868, S				

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