

# General Purpose Transistor

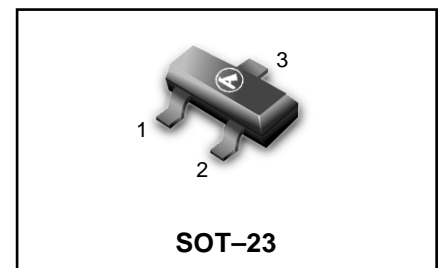
## PNP Silicon

- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

**LMBT2907LT1G**  
**LMBT2907ALT1G**  
**S-LMBT2907LT1G**  
**S-LMBT2907ALT1G**

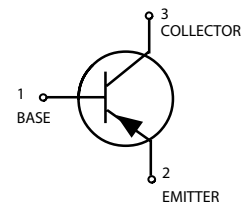
### ORDERING INFORMATION

Device	Marking	Shipping
LMBT2907LT1G,S-LMBT2907LT1G	M2B	3000/Tape & Reel
LMBT2907LT3G,S-LMBT2907LT3G	M2B	10000/Tape & Reel
LMBT2907ALT1G,S-LMBT2907ALT1G	2F	3000/Tape & Reel
LMBT2907ALT3G,S-LMBT2907ALT3G	2F	10000/Tape & Reel



### MAXIMUM RATINGS

Rating	Symbol	Value		Unit
		2907	2907A	
Collector–Emitter Voltage	$V_{CEO}$	-40	-60	Vdc
Collector–Base Voltage	$V_{CBO}$		-60	Vdc
Emitter–Base Voltage	$V_{EBO}$		-5.0	Vdc
Collector Current — Continuous	$I_C$		-600	mAdc



### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (1) $T_A = 25^\circ\text{C}$	$P_D$	225	mW
Derate above $25^\circ\text{C}$		1.8	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$	$P_D$	300	mW
Derate above $25^\circ\text{C}$		2.4	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
2. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.

**LMBT2907LT1G LMBT2907ALT1G**  
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**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

Collector–Emitter Breakdown Voltage(3) ( $I_C = -10\text{ mAdc}$ , $I_B = 0$ )	LMBT2907 LMBT2907A	$V_{(BR)CEO}$	-40 -60	— —	Vdc
Collector–Emitter Breakdown Voltage( $I_C = -10\ \mu\text{Adc}$ , $I_E = 0$ )		$V_{(BR)CBO}$	-60	—	Vdc
Emitter–Base Breakdown Voltage( $I_E = -10\ \mu\text{Adc}$ , $I_C = 0$ )		$V_{(BR)EBO}$	-5.0	—	Vdc
Collector Cutoff Current( $V_{CB} = -30\text{Vdc}$ , $I_{BE(OFF)} = -0.5\text{Vdc}$ )		$I_{CEX}$	—	-50	nAdc
Collector Cutoff Current ( $V_{CB} = -50\text{Vdc}$ , $I_E = 0$ )	LMBT2907 LMBT2907A	$I_{CBO}$	— —	-0.020 -0.010	$\mu\text{Adc}$
( $V_{CB} = -50\text{Vdc}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$ )	LMBT2907 LMBT2907A		— —	-20 -10	
Base Current( $V_{CE} = -30\text{Vdc}$ , $V_{EB(OFF)} = -0.5\text{Vdc}$ )		$I_B$	—	-50	nAdc

**ON CHARACTERISTICS**

DC Current Gain ( $I_C = -0.1\text{mAdc}$ , $V_{CE} = -10\text{ Vdc}$ )	LMBT2907 LMBT2907A	$h_{FE}$	35 75	— —	
( $I_C = -1.0\text{mAdc}$ , $V_{CE} = -10\text{ Vdc}$ )	LMBT2907 LMBT2907A		50 100	— —	
( $I_C = -10\text{ mAdc}$ , $V_{CE} = -10\text{Vdc}$ )	LMBT2907 LMBT2907A		75 100	— —	
( $I_C = -150\text{mAdc}$ , $V_{CE} = -10\text{ Vdc}$ )(3)	LMBT2907 LMBT2907A		— 100	— 300	
( $I_C = -500\text{mAdc}$ , $V_{CE} = -10\text{ Vdc}$ )(3)	LMBT2907 LMBT2907A		30 50	— —	
Collector–Emitter Saturation Voltage(3) ( $I_C = -150\text{mAdc}$ , $I_B = -15\text{ mAdc}$ ) ( $I_C = -500\text{ mAdc}$ , $I_B = -50\text{ mAdc}$ )		$V_{CE(sat)}$	— —	-0.4 -1.6	Vdc
Base–Emitter Saturation Voltage(3) ( $I_C = -150\text{mAdc}$ , $I_B = -15\text{ mAdc}$ ) ( $I_C = -500\text{mAdc}$ , $I_B = -50\text{ mAdc}$ )		$V_{BE(sat)}$	— —	-1.3 -2.6	Vdc

3. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

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

Characteristic	Symbol	Min	Max	Unit
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**SMALL-SIGNAL CHARACTERISTICS**

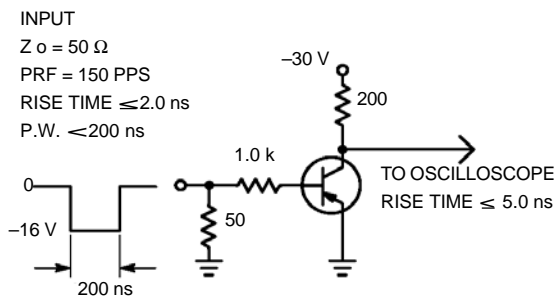
Current-Gain — Bandwidth Product(3),(4) ( $I_C = -50\text{mA dc}$ , $V_{CE} = -20\text{V dc}$ , $f = 100\text{MHz}$ )	$f_T$	200	—	MHz
Output Capacitance ( $V_{CB} = -10\text{V dc}$ , $I_E = 0$ , $f = 1.0\text{MHz}$ )	$C_{obo}$	—	8.0	pF
Input Capacitance ( $V_{EB} = -2.0\text{V dc}$ , $I_C = 0$ , $f = 1.0\text{MHz}$ )	$C_{ibo}$	—	30	pF

**SWITCHING CHARACTERISTICS**

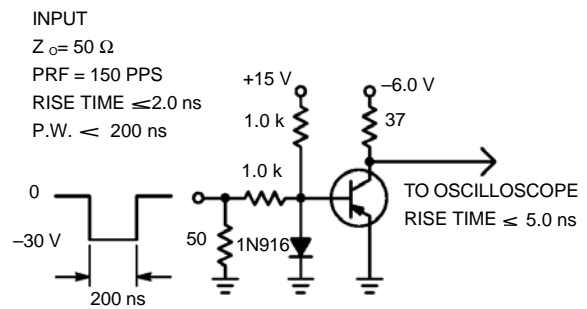
Turn-On Time	( $V_{CC} = -30\text{V dc}$ ,	$t_{on}$	—	45	
Delay Time	$I_C = -150\text{mA dc}$ , $I_{B1} = -15\text{mA dc}$ )	$t_d$	—	10	ns
Rise Time		$t_r$	—	40	
Fall Time	( $V_{CC} = -6.0\text{V dc}$ ,	$t_f$	—	60	
Storage Time	$I_C = -150\text{mA dc}$ , $I_{B1} = I_{B2} = 15\text{mA dc}$ )	$t_s$	—	225	ns
Turn-Off Time		$t_{off}$	—	280	

4.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

**TYPICAL CHARACTERISTICS**



**Figure 1. Delay and Rise Time Test Circuit**



**Figure 2. Storage and Fall Time Test Circuit**

TYPICAL CHARACTERISTICS

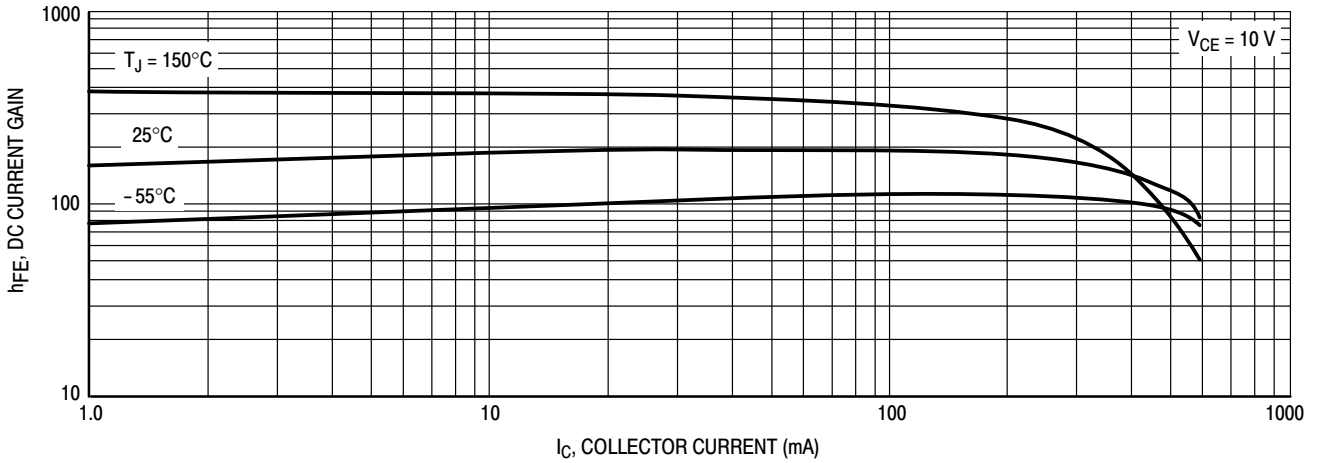


Figure 3. DC Current Gain

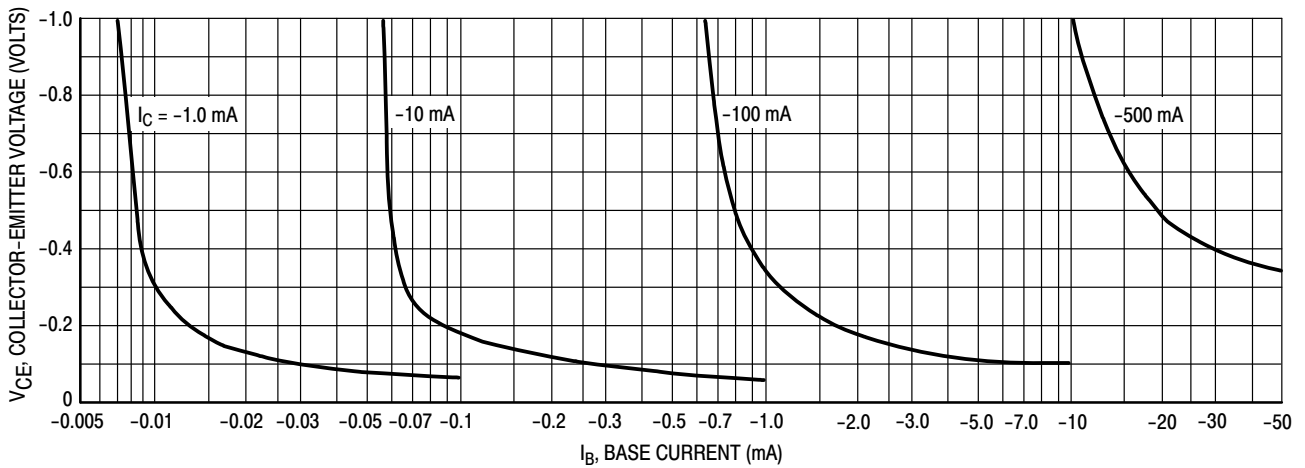


Figure 4. Collector Saturation Region

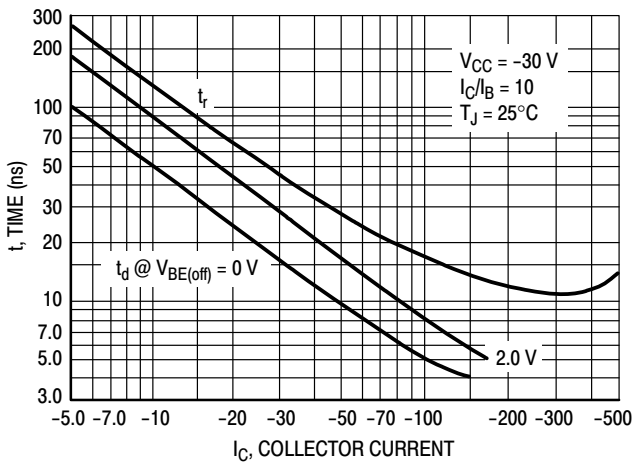


Figure 5. Turn-On Time

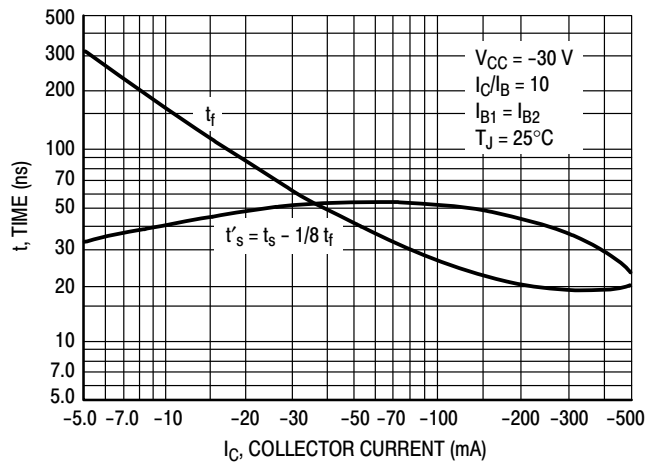


Figure 6. Turn-Off Time

TYPICAL SMALL-SIGNAL CHARACTERISTICS

NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

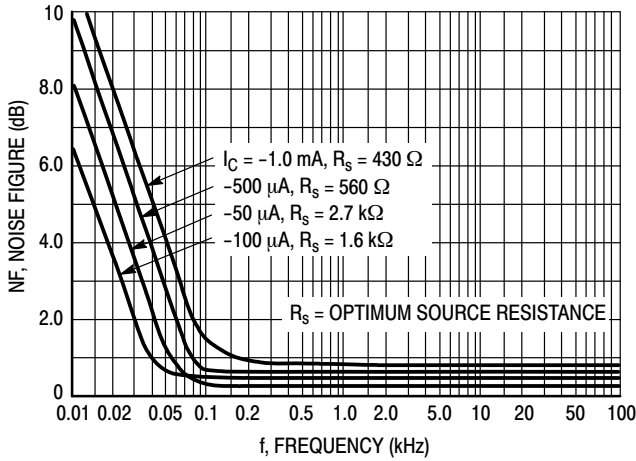


Figure 7. Frequency Effects

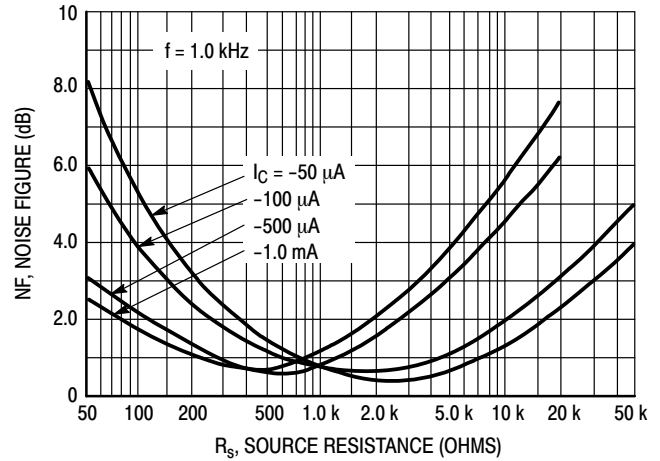


Figure 8. Source Resistance Effects

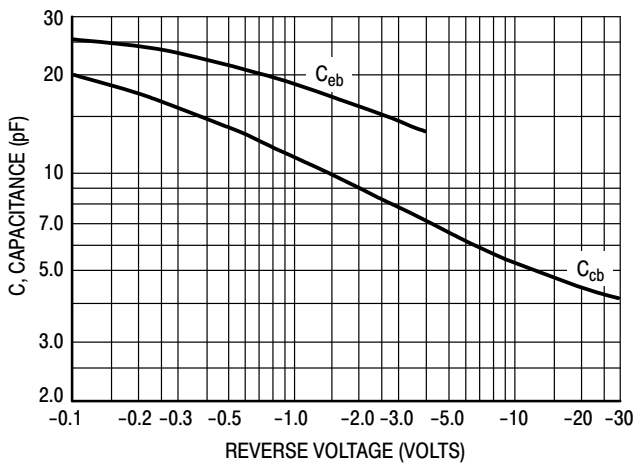


Figure 9. Capacitances

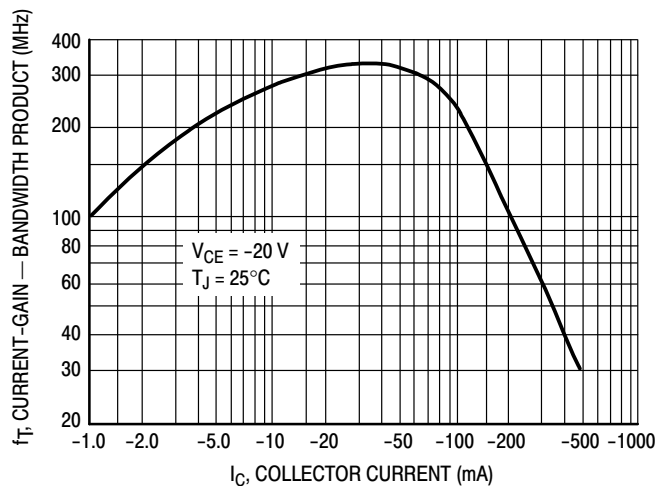


Figure 10. Current-Gain - Bandwidth Product

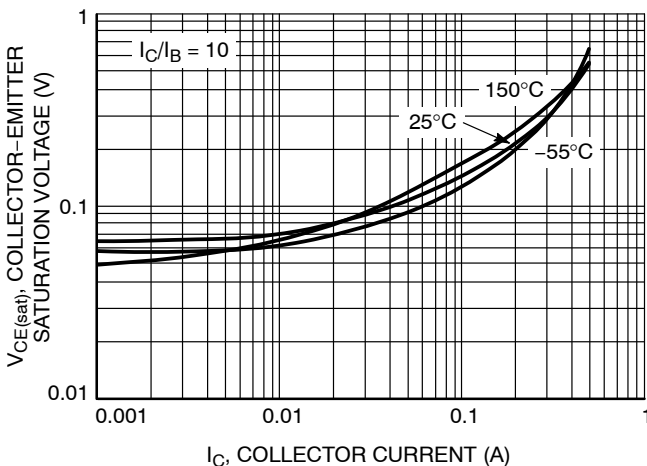


Figure 11. Collector Emitter Saturation Voltage vs. Collector Current

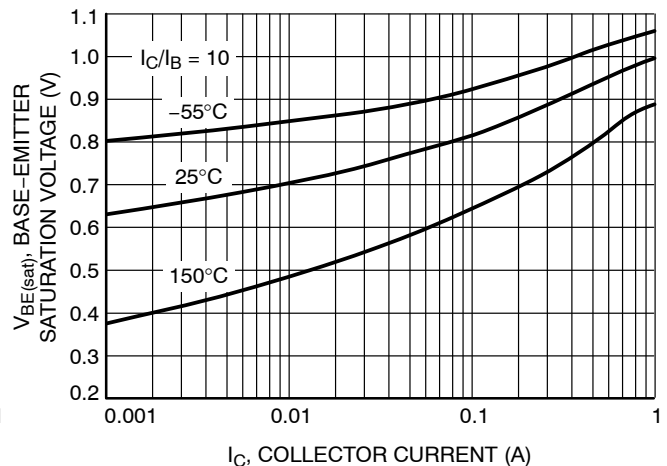


Figure 12. Base Emitter Saturation Voltage vs. Collector Current

TYPICAL SMALL-SIGNAL Characteristics  
NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

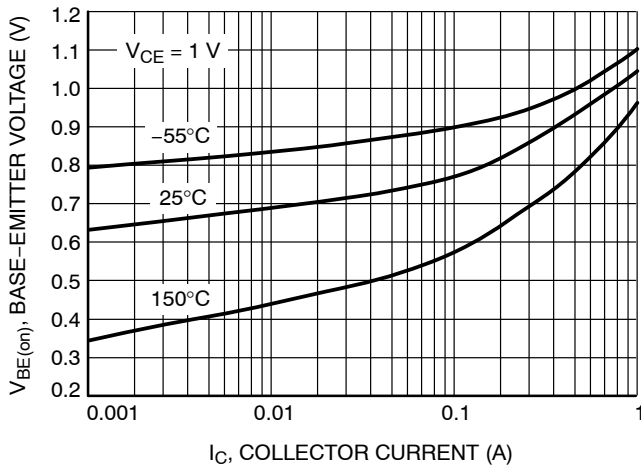


Figure 13. Base Emitter Voltage vs. Collector Current

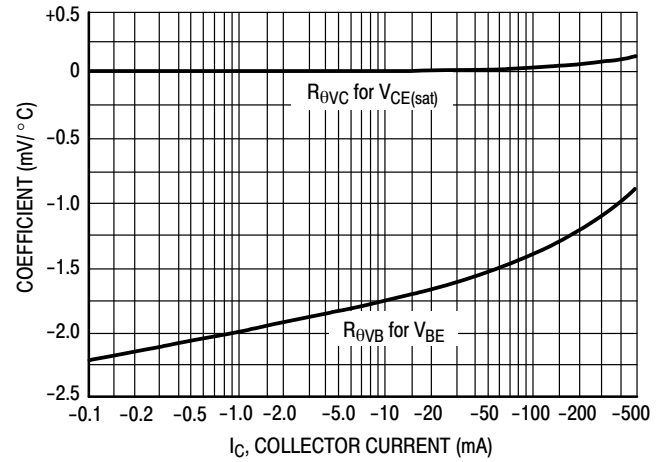


Figure 14. Temperature Coefficients

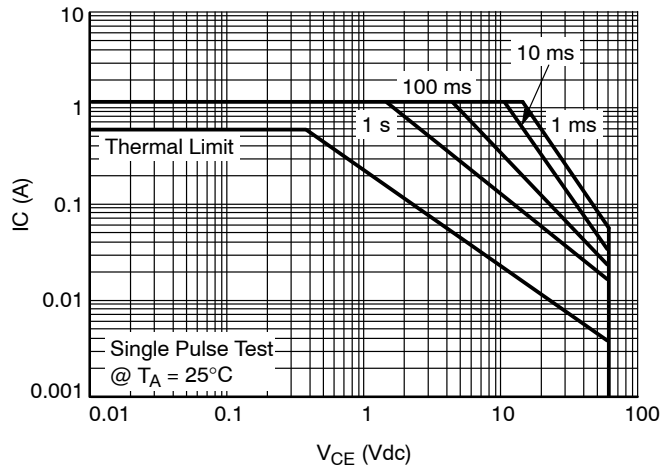
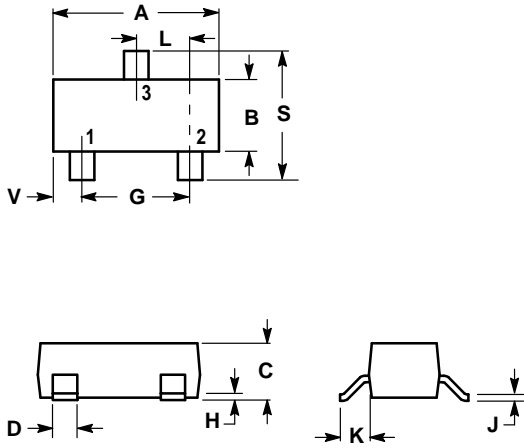


Figure 15. Safe Operating Area

**LMBT2907LT1G LMBT2907ALT1G**  
**S-LMBT2907LT1G S-LMBT2907ALT1G**

**SOT-23**



**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60

- PIN 1. BASE  
 2. EMITTER  
 3. COLLECTOR

