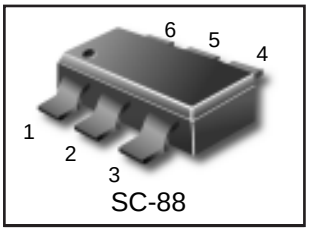
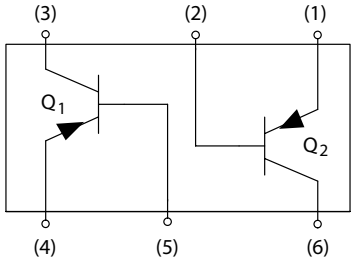
# Dual General Purpose Transistor

**LMBT2907DW1T1G**
**LMBT2907ADW1T1G**
**S-LMBT2907DW1T1G**
**S-LMBT2907ADW1T1G**

**Featrues**

- 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.




## MAXIMUM RATINGS

| Rating | Symbol | Value 2907 | Value 2907A | Unit |
|---|---|---|---|---|
| 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°C | $P_D$ | 225 | mW |
| Derate above 25°C | | 1.8 | mW/°C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 556 | °C/W |
| Total Device Dissipation Alumina Substrate, (2) $T_A$ = 25°C | $P_D$ | 300 | mW |
| Derate above 25°C | | 2.4 | mW/°C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 417 | °C/W |
| Junction and Storage Temperature | $T_J$ , $T_{stg}$ | –55 to +150 | °C |

## ORDERING INFORMATION

| Device | Packing | Shipping |
|---|---|---|
| LMBT2907ADW1T1G<br>S-LMBT2907ADW1T1G | **SC88** | 3000 Units/Reel |
| LMBT2907ADW1T3G<br>S-LMBT2907ADW1T1G | **SC88** | 10000 Units/Reel |

## DEVICE MARKING

(S-)LMBT2907 DW1T1G = M2B, (S-)LMBT2907ADW1T1G = 2F

## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted.)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Breakdown Voltage(3) | | $V_{(BR)CEO}$ | | | Vdc |
| ($I_C$ = –10 mAdc, $I_B$ = 0) | LMBT2907 | | –40 | — | |
| | LMBT2907A | | –60 | — | |
| Collector–Emitter Breakdown Voltage($I_C$ = –10 µAdc, $I_E$ = 0) | | $V_{(BR)CBO}$ | –60 | — | Vdc |
| Emitter–Base Breakdown Voltage($I_E$ = –10 µAdc, $I_C$ = 0) | | $V_{(BR)EBO}$ | –5.0 | — | Vdc |
| Collector Cutoff Current( $V_{CB}$ = –30Vdc, $I_{BE(OFF)}$ = –0.5Vdc) | | $I_{CEX}$ | — | –50 | nAdc |
| Collector Cutoff Current | | $I_{CBO}$ | | | µAdc |
| ( $V_{CB}$ = –50Vdc, $I_E$ = 0) | LMBT2907 | | — | –0.020 | |
| | LMBT2907A | | — | –0.010 | |
| ( $V_{CB}$ = –50Vdc, $I_E$ = 0, $T_A$ =125°C ) | LMBT2907 | | — | –20 | |
| | LMBT2907A | | — | –10 | |
| Base Current( $V_{CE}$ = –30Vdc, $V_{EB(off)}$= –0.5Vdc ) | | $I_B$ | — | –50 | nAdc |

1. FR–5 = 1.0 x 0.75 x 0.062 in.
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.
3. Pulse Test: Pulse Width ≤ 300 µs, Duty Cycle ≤ 2.0%.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted) (Continued)

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain | | $h_{FE}$ | | | — |
| ($I_C$ = –0.1mAdc, $V_{CE}$ = –10 Vdc) | LMBT2907 | | 35 | — | |
| | LMBT2907A | | 75 | — | |
| ($I_C$ =–1.0mAdc, $V_{CE}$ = –10 Vdc) | LMBT2907 | | 50 | — | |
| | LMBT2907A | | 100 | — | |
| ($I_C$ = –10 mAdc, $V_{CE}$ = –10Vdc) | LMBT2907 | | 75 | — | |
| | LMBT2907A | | 100 | — | |
| ($I_C$ = –150mAdc, $V_{CE}$ =–10 Vdc)(3) | LMBT2907 | | — | — | |
| | LMBT2907A | | 100 | 300 | |
| ($I_C$ = –500mAdc, $V_{CE}$ =–10 Vdc)(3) | LMBT2907 | | 30 | — | |
| | LMBT2907A | | 50 | — | |
| Collector–Emitter Saturation Voltage(3) | | $V_{CE(sat)}$ | | | Vdc |
| ($I_C$ = –150mAdc, $I_B$ = –15 mAdc) | | | — | –0.4 | |
| ($I_C$ = –500 mAdc, $I_B$ = –50 mAdc) | | | — | –1.6 | |
| Base–Emitter Saturation Voltage(3) | | $V_{BE(sat)}$ | | | Vdc |
| ($I_C$ = –150mAdc, $I_B$ = –15 mAdc) | | | — | –1.3 | |
| ($I_C$ = –500mAdc, $I_B$ = –50 mAdc) | | | — | –2.6 | |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | |
| Current–Gain — Bandwidth Product(3),(4) ($I_C$ = –50mAdc, $V_{CE}$= –20Vdc, f = 100MHz) | | $f_T$ | 200 | — | MHz |
| Output Capacitance ($V_{CB}$ = –10 Vdc, $I_E$ = 0, f = 1.0 MHz) | | $C_{obo}$ | — | 8.0 | pF |
| Input Capacitance ($V_{EB}$ = –2.0Vdc, $I_C$ = 0, f = 1.0 MHz) | | $C_{ibo}$ | — | 30 | pF |
| **SWITCHING CHARACTERISTICS** | | | | | |
| Turn–On Time | ($V_{CC}$ = –30 Vdc, $I_C$ = –150 mAdc, $I_{B1}$ = –15 mAdc) | $t_{on}$ | — | 45 | ns |
| Delay Time | | $t_d$ | — | 10 | |
| Rise Time | | $t_r$ | — | 40 | |
| Fall Time | ($V_{CC}$ = –6.0 Vdc, $I_C$ = –150 mAdc,$I_{B1}$ = $I_{B2}$ = 15 mAdc) | $t_f$ | — | 60 | ns |
| Storage Time | | $t_s$ | — | 225 | |
| Turn–Off Time | | $t_{off}$ | — | 280 | |

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
4. $f_T$ is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

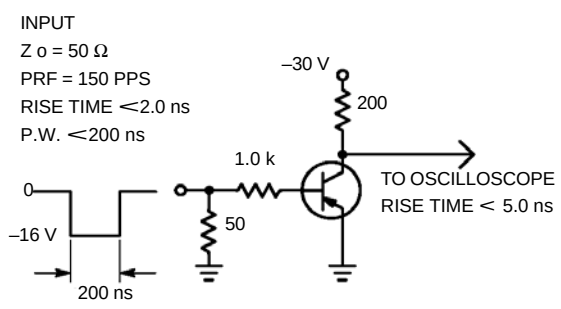



**Figure 1. Delay and Rise Time Test Circuit**

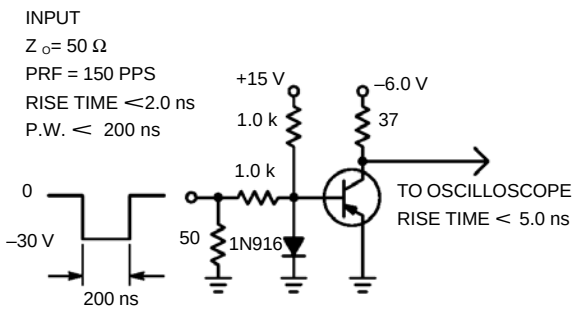



**Figure 2. Storage and Fall Time Test Circuit**

## TYPICAL CHARACTERISTICS

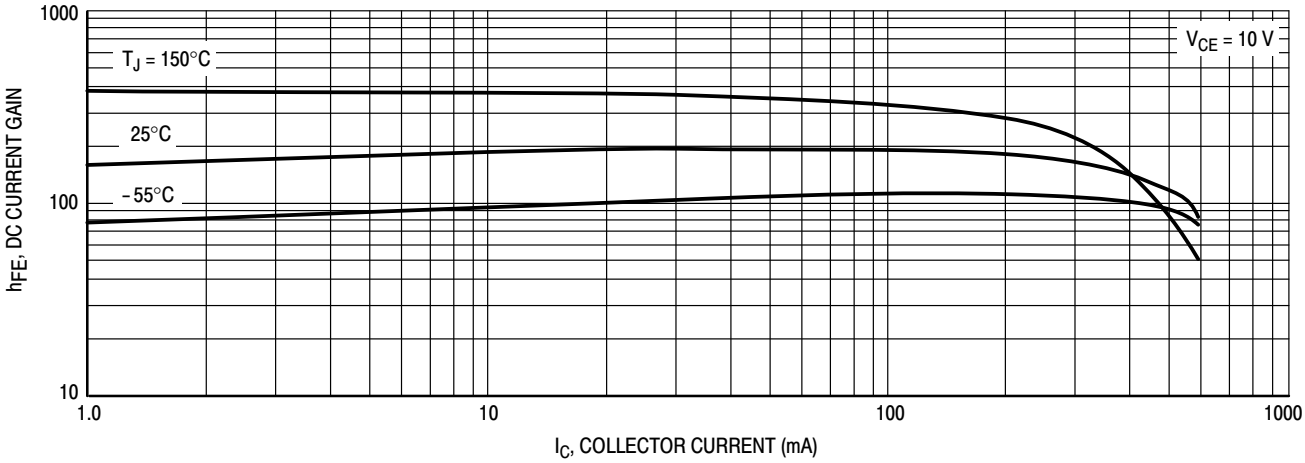



**Figure 3. DC Current Gain**

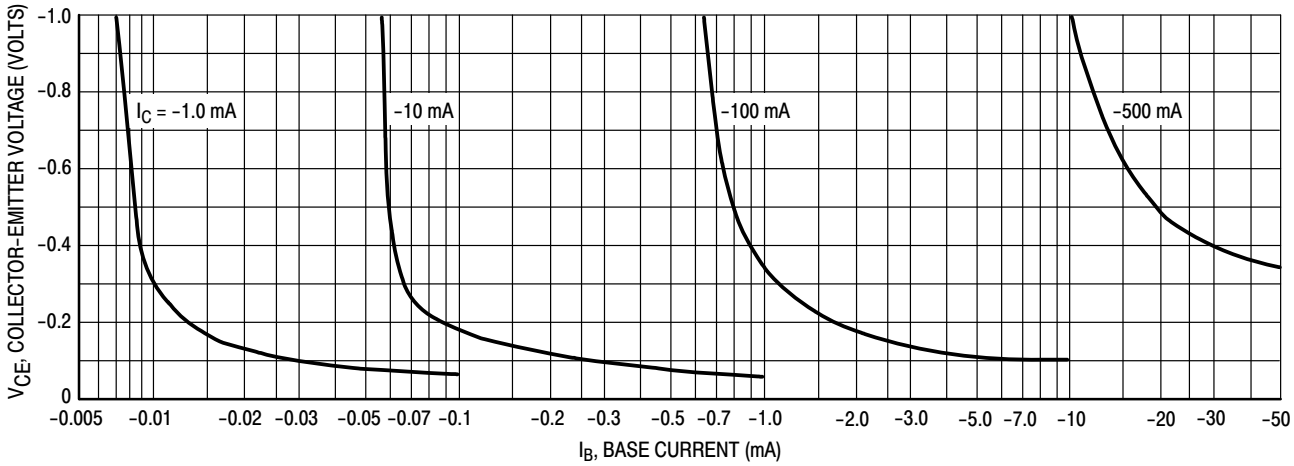



**Figure 4. Collector Saturation Region**

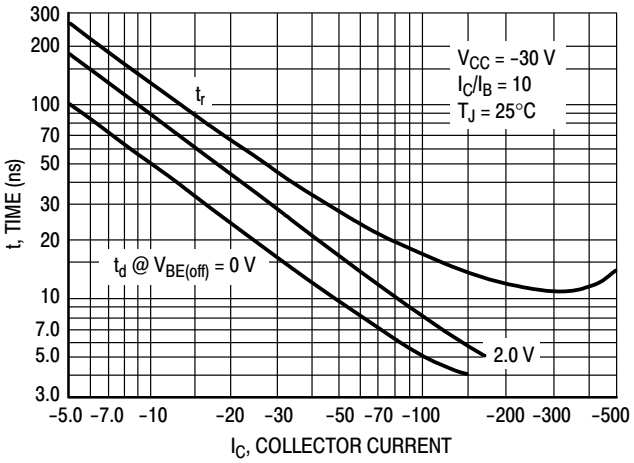



**Figure 5. Turn–On Time**

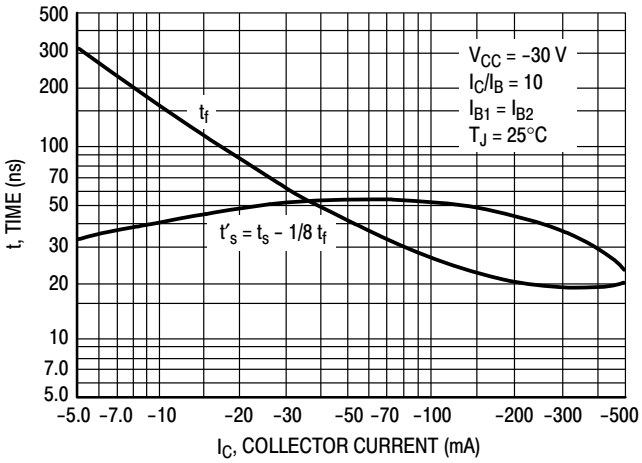



**Figure 6. Turn–Off Time**

## TYPICAL SMALL–SIGNAL CHARACTERISTICS

### NOISE FIGURE

$V_{CE}$ = 10 Vdc, $T_A$ = 25°C

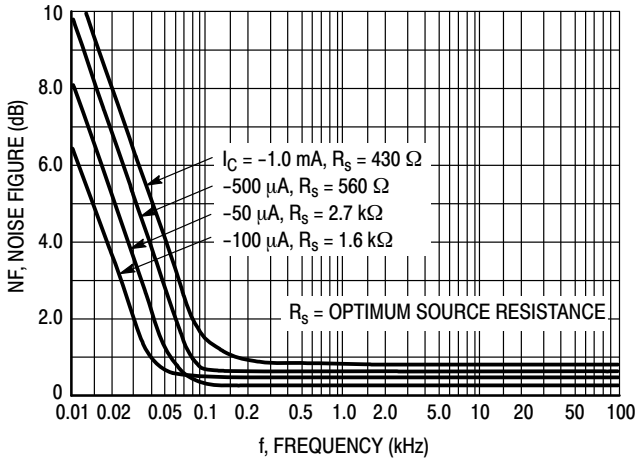



Figure 7. Frequency Effects

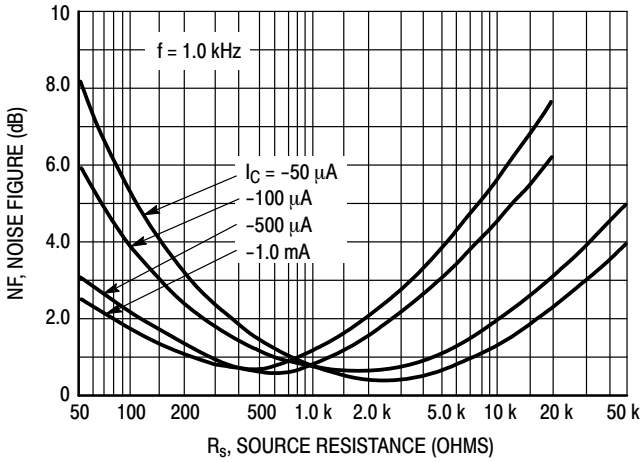



Figure 8. Source Resistance Effects

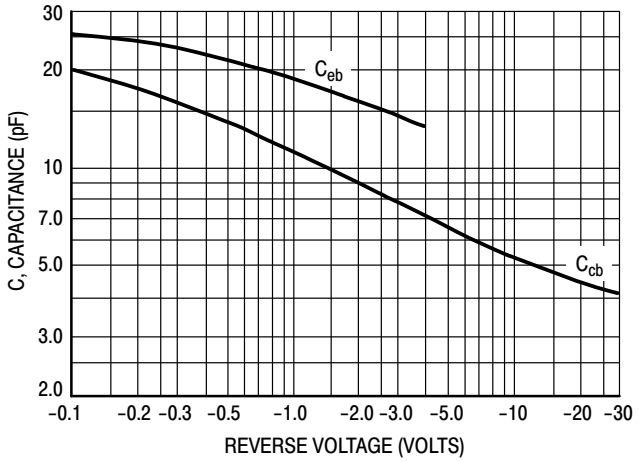



Figure 9. Capacitances

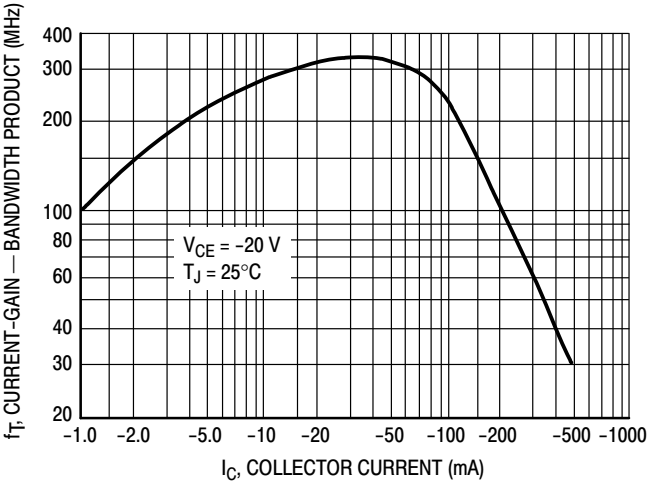



Figure 10. Current–Gain – Bandwidth Product

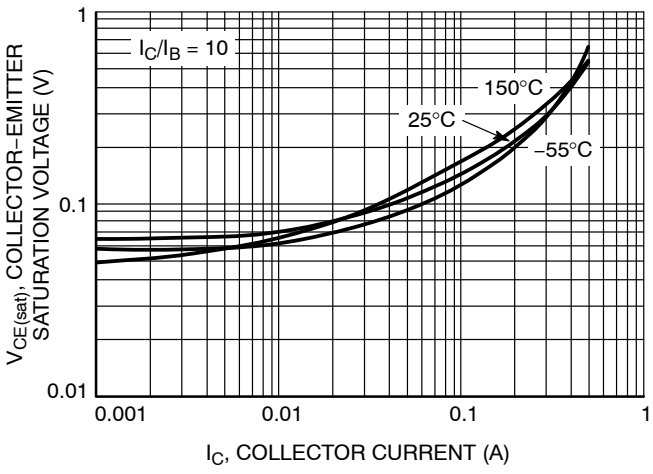



Figure 11. Collector Emitter Saturation Voltage vs. Collector Current

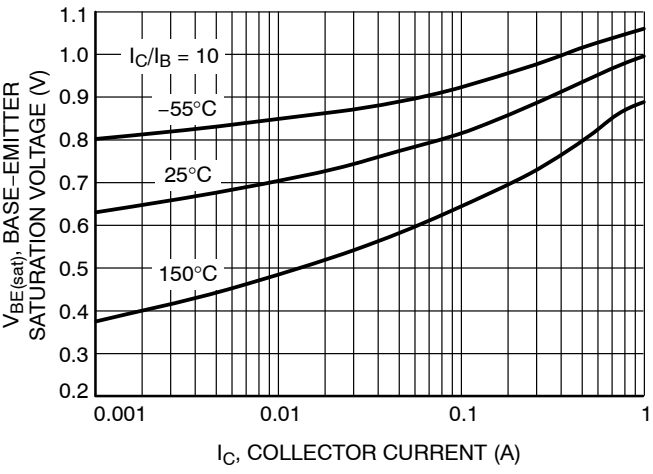



Figure 12. Base Emitter Saturation Voltage vs. Collector Current

## TYPICAL SMALL–SIGNAL Characteristics

### NOISE FIGURE

$V_{CE}$ = 10 Vdc, $T_A$ = 25°C

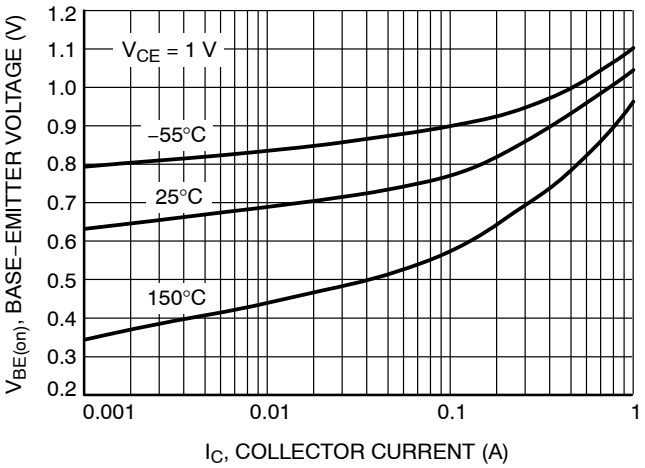



**Figure 13. Base Emitter Voltage vs. Collector Current**

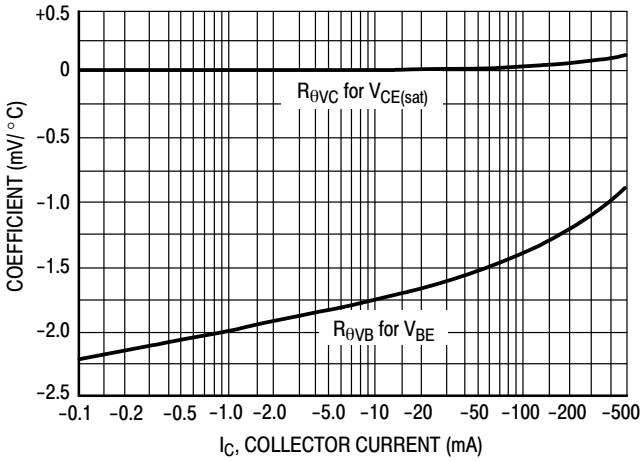



**Figure 14. Temperature Coefficients**

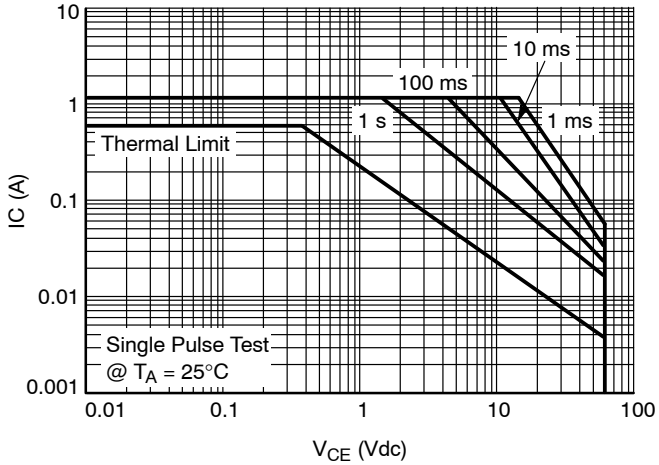
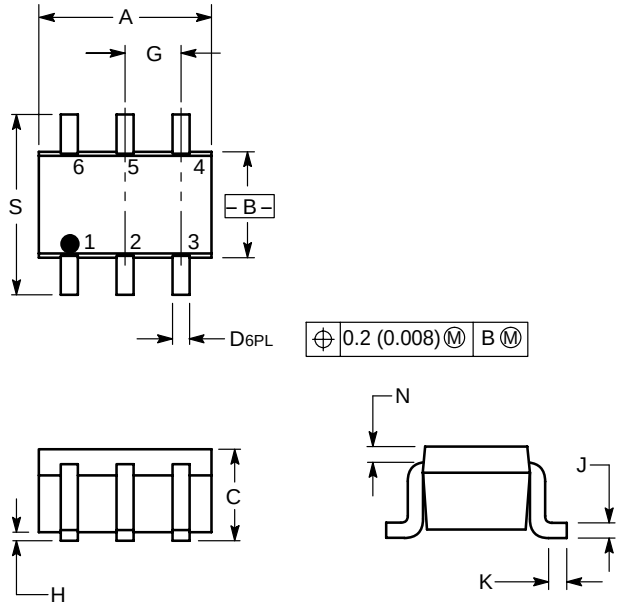



**Figure 15. Safe Operating Area**

# LMBT2907DW1T1G, LMBT2907ADW1T1G
# S-LMBT2907DW1T1G, S-LMBT2907ADW1T1G

## SC−88/SOT−363




NOTES:

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

| DIM | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |

PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2