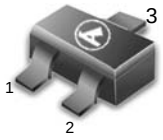
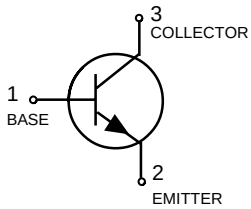
Switching Transistors

- We declare that the material of product compliance with RoHS requirements.

LMBT2369LT1G
LMBT2369ALT1G



SC-23/TO-236AB



ORDERING INFORMATION

Device	Marking	Shipping
LMBT2369LT1G	M1J	3000/Tape & Reel
LMBT2369ALT1G	1JA	3000/Tape & Reel
LMBT2369LT3G	M1J	10000/Tape & Reel
LMBT2369ALT3G	1JA	10000/Tape & Reel

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	15	Vdc
Collector–Emitter Voltage	V_{CES}	40	Vdc
Collector–Base Voltage	V_{CBO}	40	Vdc
Emitter–Base Voltage	V_{EBO}	4.5	Vdc
Collector Current — Continuous	I_C	200	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

DEVICE MARKING

LMBT2369LT1G= M1J, LMBT2369A LT1G = 1JA

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage(3) (I_C = 10 mAdc, I_B = 0)	$V_{(BR)CEO}$	15	—	—	Vdc
Collector–Emitter Breakdown Voltage (I_C = 10 µAdc, V_{BE} = 0)	$V_{(BR)CES}$	40	—	—	Vdc
Collector–Base Breakdown Voltage (I_C = 10 µAdc, I_E = 0)	$V_{(BR)CBO}$	40	—	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 µAdc, I_C = 0)	$V_{(BR)EBO}$	4.5	—	—	Vdc
Collector Cutoff Current (V_{CB} = 20Vdc, I_E = 0)	I_{CBO}	—	—	0.4	µAdc
(V_{CB} = 20Vdc, I_E = 0, T_A=150 °C)		—	—	30	
Collector Cutoff Current (V_{CE} = 20Vdc, V_{BE} = 0) LMBT2369A	I_{CES}	—	—	0.4	µAdc

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%.

LMBT2369LT1G LMBT2369ALT1G

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

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain(3)		h_{FE}				—
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	LMBT2369		40	—	120	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)	LMBT2369A		—	—	120	
(I_C = 10 mAdc, V_{CE} = 0.35 Vdc)	LMBT2369A		40	—	—	
(I_C = 10 mAdc, V_{CE} = 0.35 Vdc,T_A = –55°C)	LMBT2369A		20	—	—	
(I_C = 30 mAdc, V_{CE} = 0.4Vdc)	LMBT2369A		30	—	—	
(I_C = 100mAdc, V_{CE} = 2.0 Vdc)	LMBT2369		20	—	—	
(I_C = 100mAdc, V_{CE} = 1.0 Vdc)	LMBT2369A		20	—	—	
Collector–Emitter Saturation Voltage(3)		$V_{CE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)	LMBT2369		—	—	0.25	
(I_C = 10 mAdc, I_B = 1.0 mAdc)	LMBT2369A		—	—	0.20	
(I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = + 125°C)	LMBT2369A		—	—	0.30	
(I_C = 30mAdc, I_B = 3.0 mAdc)	LMBT2369A		—	—	0.25	
(I_C = 100mAdc, I_B = 10 mAdc)	LMBT2369A		—	—	0.50	
Base–Emitter Saturation Voltage		$V_{BE(sat)}$				Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)	LMBT2369A		0.7	—	0.85	
(I_C = 10 mAdc, I_B = 1.0 mAdc, T_A = – 55°C)	LMBT2369A		—	—	1.02	
(I_C = 30 mAdc, I_B = 3.0 mAdc)	LMBT2369A		—	—	1.15	
(I_C = 100 mAdc, I_B = 10 mAdc)	LMBT2369A		—	—	1.60	
SMALL–SIGNAL CHARACTERISTICS						
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)		C_{obo}	—	—	4.0	pF
Small–Signal Current Gain (V_{CE}=10 Vdc, I_C = 10 mAdc, f = 100 MHz)		h_{fe}	5.0	—	—	—
SWITCHING CHARACTERISTICS						
Storage Time (I_{B1} = I_{B2} = I_C = 10 mAdc)		t_s	—	5.0	13	ns
Turn–On Time (V_{CC} = 3.0 Vdc, I_C = 10 mAdc, I_{B1} = 3.0 mAdc)		t_{on}	—	8.0	12	ns
Turn–Off Time (V_{CC} = 3.0 Vdc, I_C = 10 mAdc, I_{B1} = 3.0 mAdc, I_{B2} = 1.5 mAdc)		t_{off}	—	10	18	ns

3. Pulse Test: Pulse Width ≤ 300 ms, Duty Cycle ≤ 2.0%.

LMBT2369LT1G LMBT2369ALT1G

SWITCHING TIME EQUIVALENT TEST CIRCUITS FOR 2N2369, 2N3227

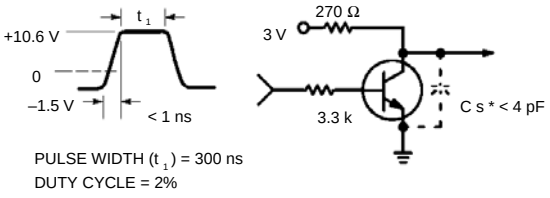


Figure 1. t_{on} Circuit — 10 mA

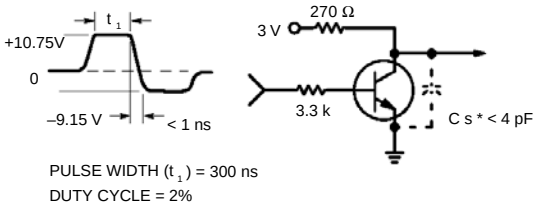


Figure 3. t_{off} Circuit — 10 mA

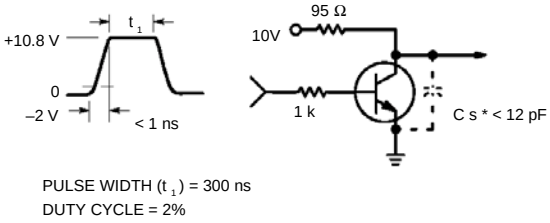


Figure 2. t_{on} Circuit — 100 mA

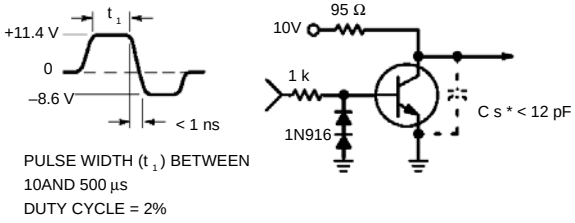


Figure 4. t_{off} Circuit — 100 mA

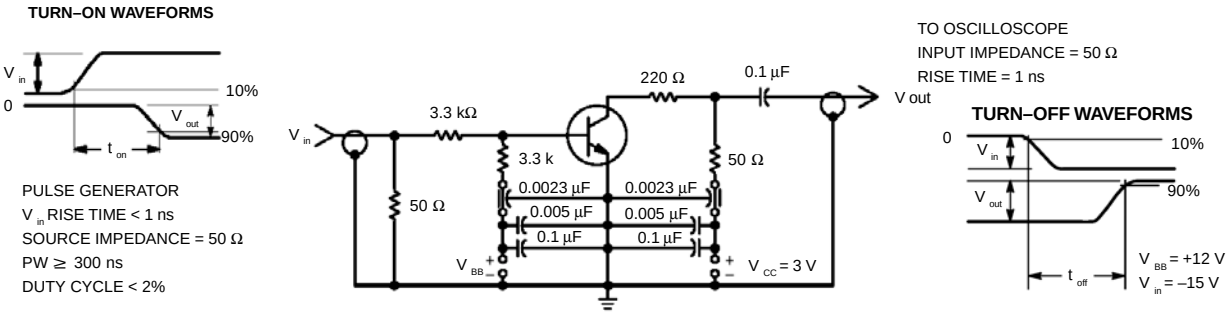


Figure 5. Turn–On and Turn–Off Time Test Circuit

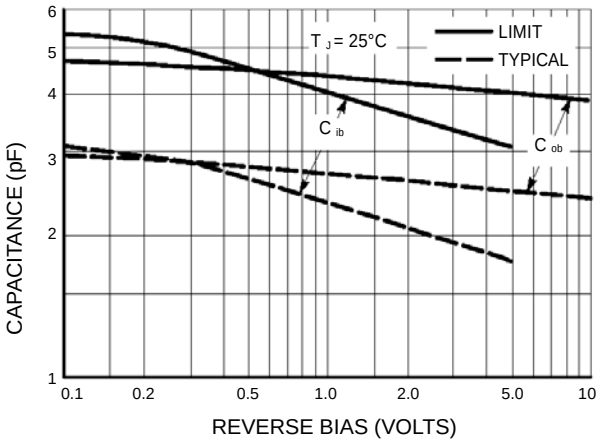


Figure 6. Junction Capacitance Variations

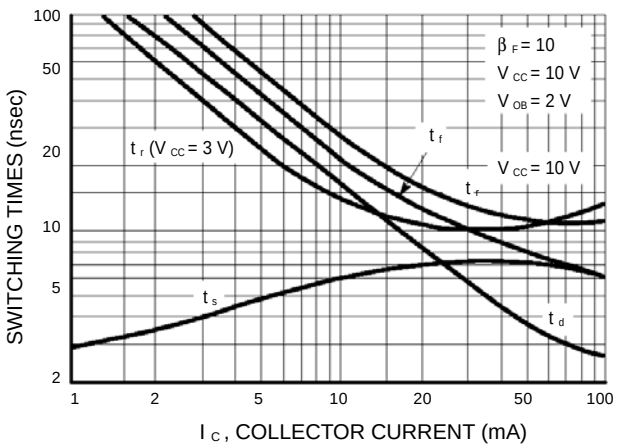


Figure 7. Typical Switching Times

LMBT2369LT1G LMBT2369ALT1G

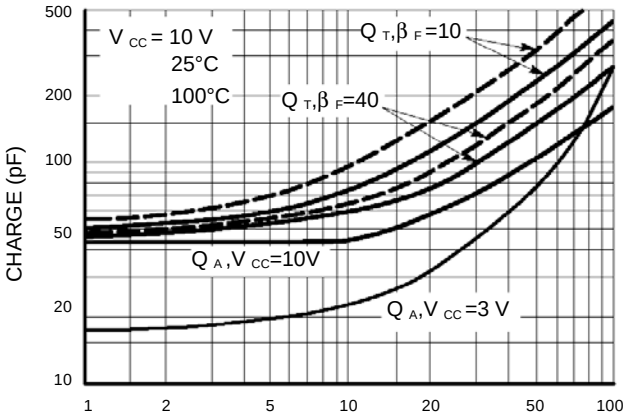


Figure 8. Maximum Charge Data

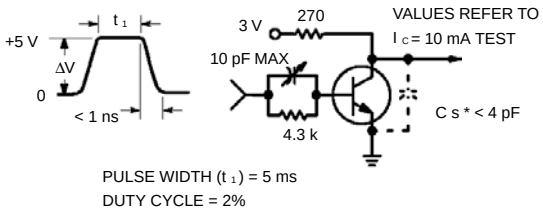


Figure 9. Q T Test Circuit

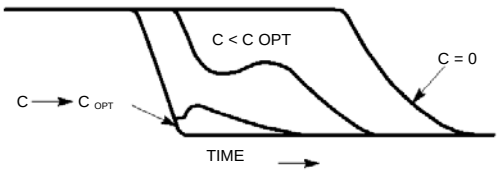


Figure 10. Turn–Off Waveform

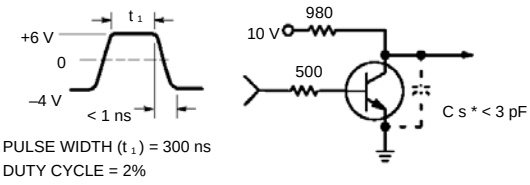


Figure 11. Storage Time Equivalent Test Circuit

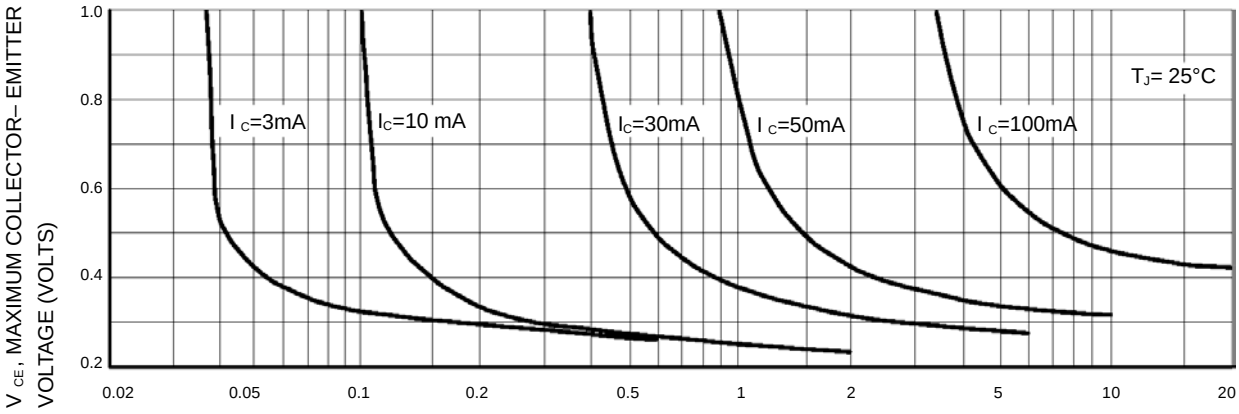


Figure 12. Maximum Collector Saturation Voltage Characteristics

LMBT2369LT1G LMBT2369ALT1G

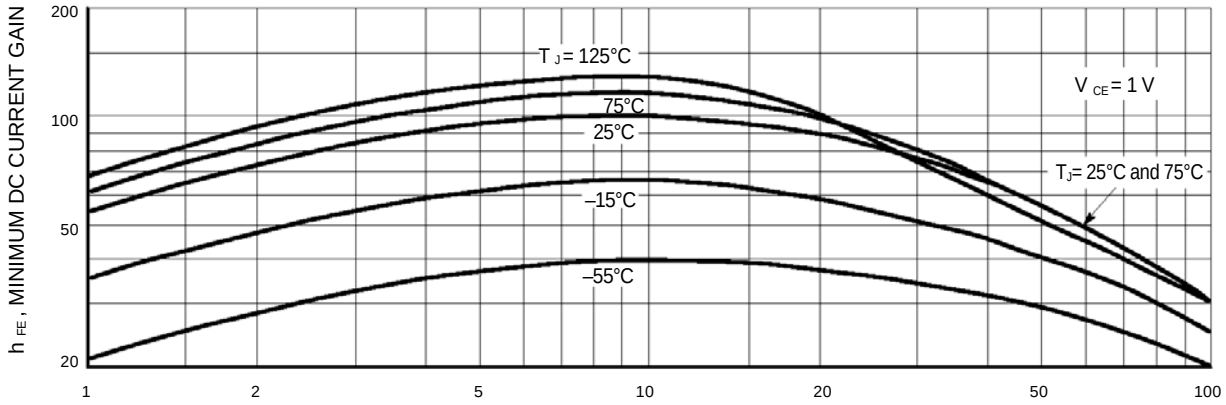


Figure 13. Minimum Current Gain Characteristics

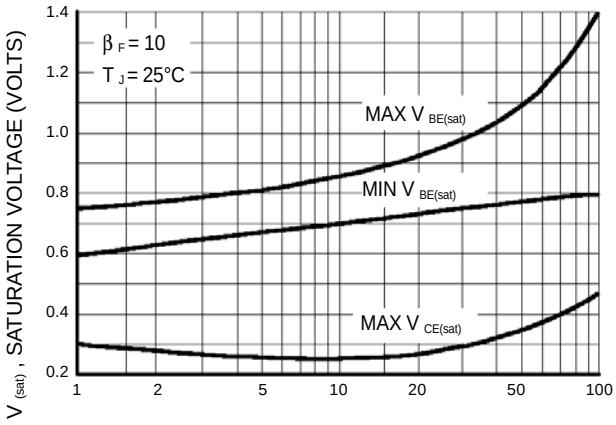


Figure 14. Saturation Voltage Limits

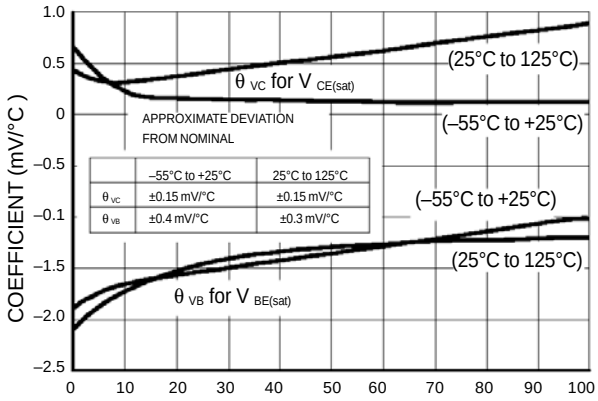
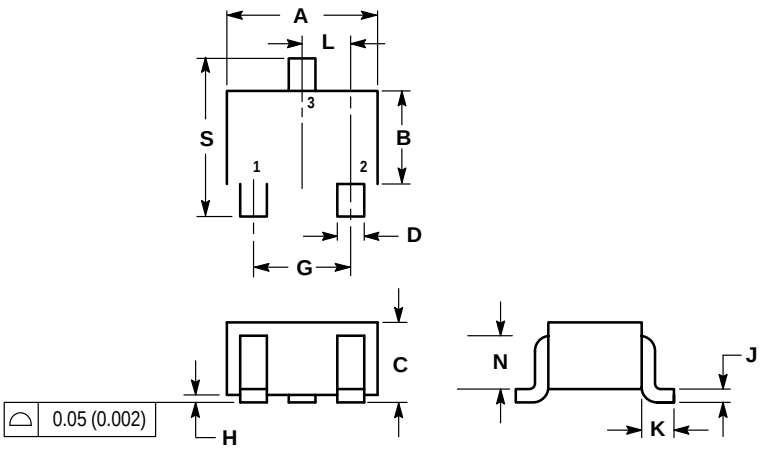


Figure 15. Typical Temperature Coefficients

LMBT2369LT1G LMBT2369ALT1G

SC–70 / SOT–323



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	0.032	0.040	0.80	1.00
D	0.012	0.016	0.30	0.40
G	0.047	0.055	1.20	1.40
H	0.000	0.004	0.00	0.10
J	0.004	0.010	0.10	0.25
K	0.017 REF		0.425 REF	
L	0.026 BSC		0.650 BSC	
N	0.028 REF		0.700 REF	
S	0.079	0.095	2.00	2.40

PIN 1. BASE
2. EMITTER
3. COLLECTOR