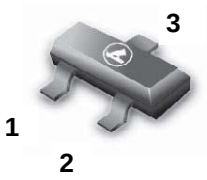
General Purpose Transistors
NPN Silicon

LMBT3904LT1G
S-LMBT3904LT1G



SOT-23

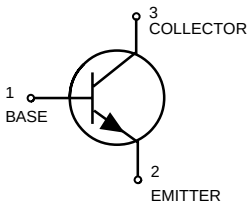
●FEATURES
1) We declare that the material of product compliance with RoHS requirements.
2) S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

●DEVICE MARKING AND RESISTOR VALUES

Device	Marking	Shipping
LMBT3904LT1G	1AM	3000/Tape&Reel
LMBT3904LT3G	1AM	10000/Tape&Reel

●MAXIMUM RATINGS(Ta = 25℃)

Parameter	Symbol	Limits	Unit
Collector–Emitter Voltage	V_{CEO}	40	Vdc
Collector–Base Voltage	V_{CBO}	60	Vdc
Emitter–Base Voltage	V_{EBO}	6	Vdc
Collector Current — Continuous	I_C	200	mAdc



●THERMAL CHARACTERISTICS

Total Device Dissipation, FR−5 Board (Note 1) @ T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/℃
Thermal Resistance, Junction–to–Ambient(Note 1)	$R_{\Theta JA}$	556	℃/W
Total Device Dissipation, Alumina Substrate (Note 2) @ T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/℃
Thermal Resistance, Junction–to–Ambient(Note 2)	$R_{\Theta JA}$	417	℃/W
Junction and Storage temperature	T_J,Tstg	−55～+150	℃

1. FR–5 = 1.0×0.75×0.062 in.
2. Alumina = 0.4×0.3×0.024 in. 99.5% alumina.

LMBT3904LT1G,S-LMBT3904LT1G

●ELECTRICAL CHARACTERISTICS (Ta= 25℃)

OFF CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector–Emitter Breakdown Voltage (I_C = 1.0 mAdc, I_B = 0)	$V_{BR(CEO)}$	40	–	–	V
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{BR(CBO)}$	60	–	–	V
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{BR(EBO)}$	6	–	–	V
Collector Cutoff Current (V_{CE} = 30 Vdc, V_{EB} = 3.0Vdc)	I_{CEX}	–	–	50	nA
Base Cutoff Current (V_{CE} = 30 Vdc, V_{EB} = 3.0 Vdc)	I_{BL}	–	–	50	nA

ON CHARACTERISTICS (Note 3.)

DC Current Gain	h_{FE}				
(I_C = 0.1 mAdc, V_{CE} = 1.0 Vdc)		40	–	–	
(I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc)		70	–	–	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)		100	–	300	
(I_C = 50 mAdc, V_{CE} = 1.0 Vdc)		60	–	–	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)		30	–	–	
Collector–Emitter Saturation Voltage(3)	$V_{CE(sat)}$				V
(I_C = 10 mAdc, I_B = 1.0 mAdc)		–	–	0.2	
(I_C = 50mAdc, I_B = 5.0 mAdc)		–	–	0.3	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$				V
(I_C = 10 mAdc, I_B = 1.0 mAdc)		0.65	–	0.85	
(I_C = 50mAdc, I_B = 5.0 mAdc)		–	–	0.95	

SMALL–SIGNAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Current–Gain — Bandwidth Product (I_C = 10mAdc, V_{CE}= 20Vdc, f = 100MHz)	f_T	300	–	–	MHz
Output Capacitance (V_{CB} = 5.0 Vdc, I_E = 0, f = 1.0 MHz)	C_{obo}	–	–	4	pF
Input Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{ibo}	–	–	8	pF
Input Impedance (V_{CE}= 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{ie}	1	–	10	kΩ
Voltage Feedback Ratio (V_{CE}= 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{re}	0.5	–	8	X 10^{-4}
Small–Signal Current Gain (V_{CE}= 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{fe}	100	–	400	
Output Admittance (V_{CE}= 10 Vdc, I_C = 1.0 mAdc, f = 1.0 kHz)	h_{oe}	1	–	40	μmhos
Noise Figure (V_{CE}=5V, I_C=100μA, R_S=1.0kΩ ,f =1.0kHz)	NF	–	–	5	dB

3. Pulse Test: Pulse Width <300 μs, Duty Cycle <2.0%.

LMBT3904LT1G,S-LMBT3904LT1G

●ELECTRICAL CHARACTERISTICS (Ta= 25℃)

SWITCHING CHARACTERISTICS

Delay Time	(V_{CC} = 3.0 Vdc, V_{BE}= – 0.5 Vdc,I_C = 10 mAdc, I_{B1} = 1.0 mAdc)	t_d	–	–	35	ns
Rise Time		t_r	–	–	35	
Storage Time	(V_{CC} = 3.0 Vdc, I_C = 10 mAdc,I_{B1} = I_{B2} = 1.0 mAdc)	t_s	–	–	200	
Fall Time		t_f	–	–	50	

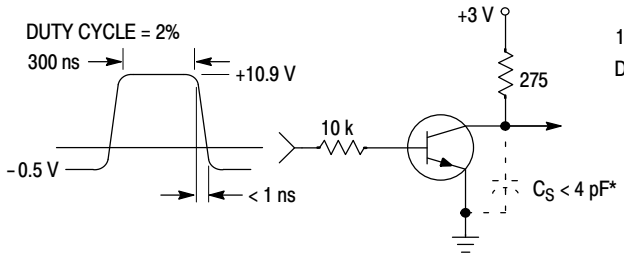


Figure 1. Delay and Rise Time Equivalent Test Circuit

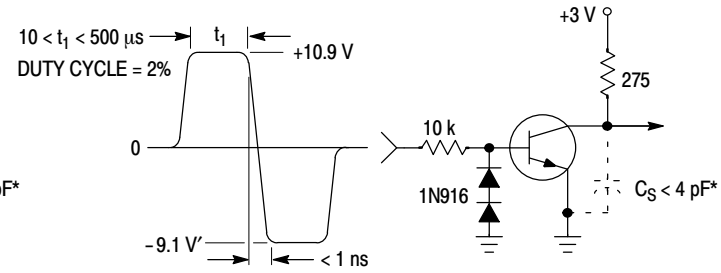


Figure 2. Storage and Fall Time Equivalent Test Circuit

* Total shunt capacitance of test jig and connectors

LMBT3904LT1G,S-LMBT3904LT1G

ELECTRICAL CHARACTERISTICS CURVES

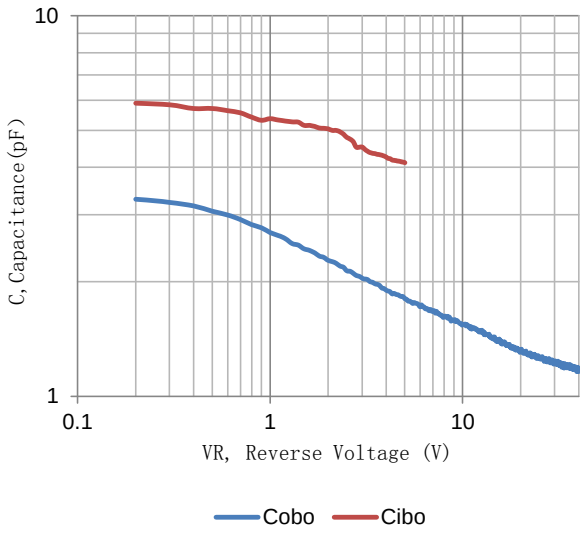


Figure 3. Capacitance

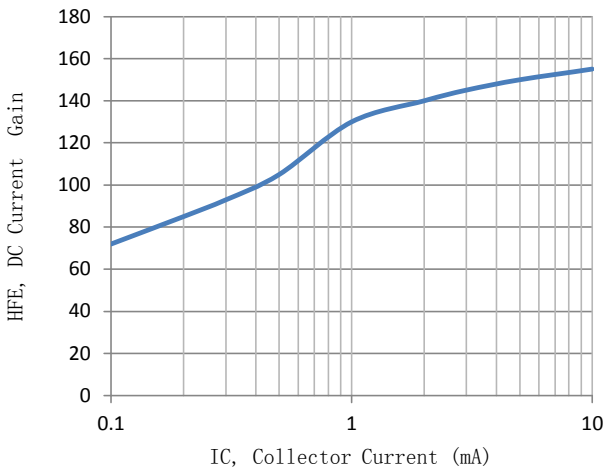


Figure 4. Current Gain

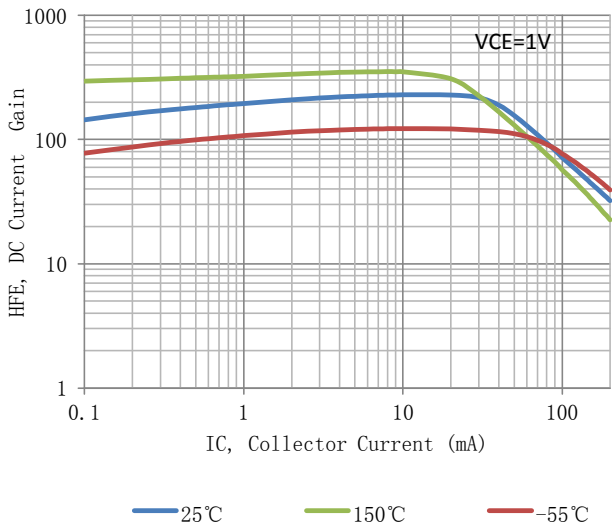


Figure 5. DC Current Gain

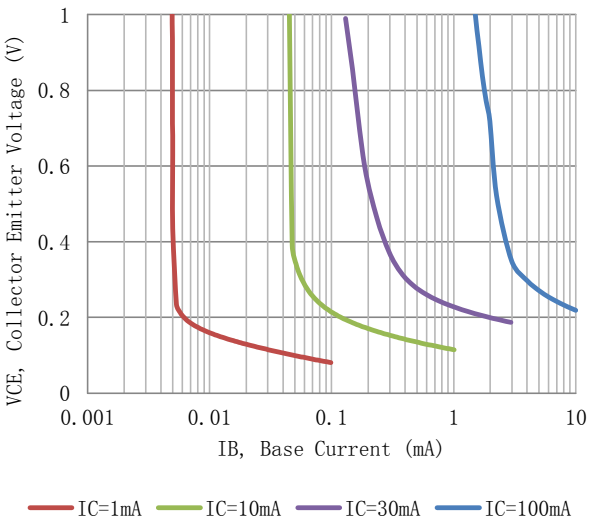


Figure 6. Collector Saturation Region

LMBT3904LT1G,S-LMBT3904LT1G

ELECTRICAL CHARACTERISTICS CURVES

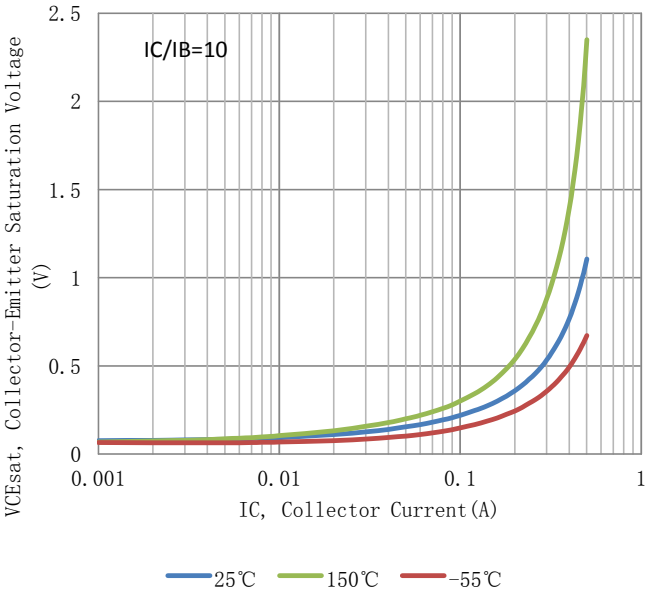


Figure 7. VCE(sat) vs IC

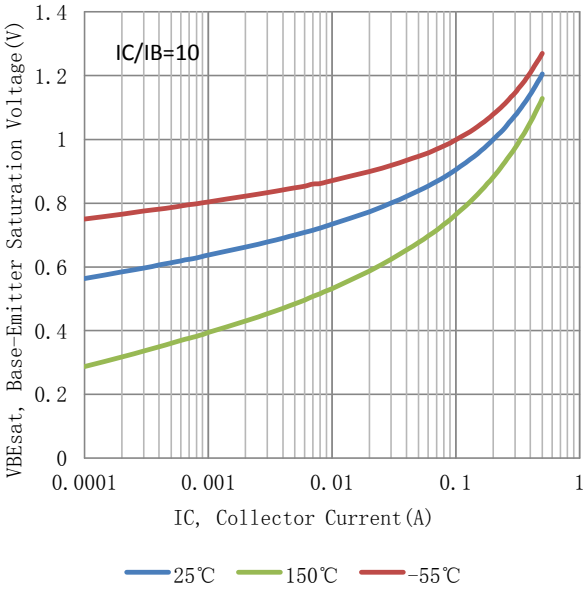


Figure 8. VBE(sat) vs IC

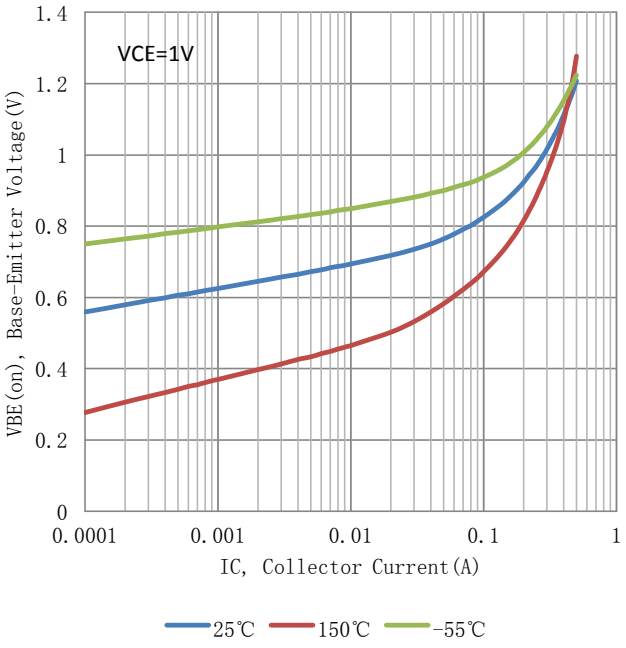
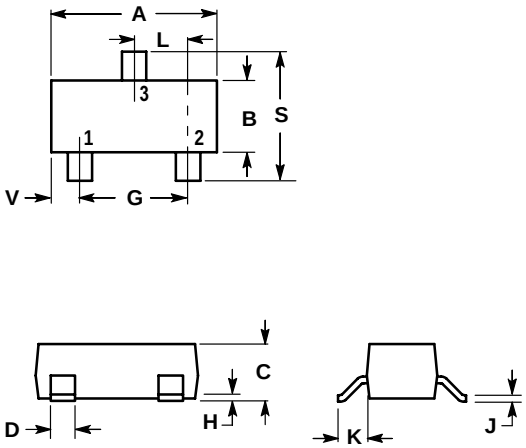


Figure 9. VBE(on) vs. IC

LMBT3904LT1G,S-LMBT3904LT1G

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