

General Purpose Transistors

NPN Silicon

●FEATURES

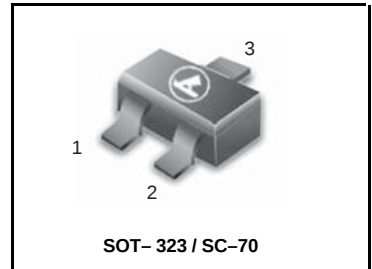
- 1) We declare that the material of product compliant with RoHS requirements and Halogen Free.
- 2) S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

●DEVICE MARKING AND RESISTOR VALUES

Device	Marking	Shipping
LMBT3904WT1G	AM	3000/Tape&Reel
LMBT3904WT3G	AM	10000/Tape&Reel

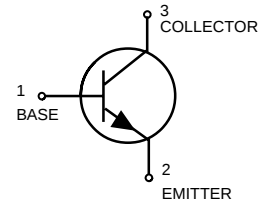
LMBT3904W T1G

S-LMBT3904W T1G



●MAXIMUM RATINGS(Ta = 25°C)

Parameter	Symbol	Limits	Unit
Collector-Emitter Voltage	V _{CEO}	40	V _{dc}
Collector-Base Voltage	V _{CB0}	60	V _{dc}
Emitter-Base Voltage	V _{EB0}	6	V _{dc}
Collector Current — Continuous	I _C	200	mA _{dc}



●THERMAL CHARACTERISTICS

Total Device Dissipation, FR-5 Board (Note 1) @ T _A = 25°C	P _D	150	mW
Thermal Resistance, Junction-to-Ambient(Note 1)	R _{θJA}	833	°C/W
Junction and Storage temperature	T _J ,T _{stg}	-55 ~ +150	°C

1. FR-5 = 1.0×0.75×0.062 in.

LMBT3904W T1G,S-LMBT3904W T1G
● ELECTRICAL CHARACTERISTICS (Ta= 25°C)
OFF CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector–Emitter Breakdown Voltage (I _C = 1.0 mA _{dc} , I _B = 0)	V _{BR(CEO)}	40	–	–	V
Collector–Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0)	V _{BR(CBO)}	60	–	–	V
Emitter–Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0)	V _{BR(EBO)}	6	–	–	V
Collector Cutoff Current (V _{CE} = 30 V _{dc} , V _{EB} = 3.0V _{dc})	I _{CEx}	–	–	50	nA
Base Cutoff Current (V _{CE} = 30 V _{dc} , V _{EB} = 3.0 V _{dc})	I _{BL}	–	–	50	nA

ON CHARACTERISTICS (Note 3.)

DC Current Gain (I _C = 0.1 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 1.0 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 10 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 50 mA _{dc} , V _{CE} = 1.0 V _{dc}) (I _C = 100 mA _{dc} , V _{CE} = 1.0 V _{dc})	h _{FE}	40 70 100 60 30	– – – – –	– – 300 – –	
Collector–Emitter Saturation Voltage(3) (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50mA _{dc} , I _B = 5.0 mA _{dc})	V _{CE(sat)}	– –	– –	0.2 0.3	V
Base–Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 1.0 mA _{dc}) (I _C = 50mA _{dc} , I _B = 5.0 mA _{dc})	V _{BE(sat)}	0.65 –	– –	0.85 0.95	V

SMALL–SIGNAL CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Current–Gain — Bandwidth Product (I _C = 10mA _{dc} , V _{CE} = 20V _{dc} , f = 100MHz)	f _T	300	–	–	MHz
Output Capacitance (V _{CB} = 5.0 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	–	–	4	pF
Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	–	–	8	pF
Input Impedance (V _{CE} = 10 V _{dc} , I _C = 1.0 mA _{dc} , f = 1.0 kHz)	h _{ie}	1	–	10	kΩ
Voltage Feedback Ratio (V _{CE} = 10 V _{dc} , I _C = 1.0 mA _{dc} , f = 1.0 kHz)	h _{re}	0.5	–	8	× 10 ^{–4}
Small–Signal Current Gain (V _{CE} = 10 V _{dc} , I _C = 1.0 mA _{dc} , f = 1.0 kHz)	h _{fe}	100	–	400	
Output Admittance (V _{CE} = 10 V _{dc} , I _C = 1.0 mA _{dc} , 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%.

LMBT3904W T1G,S-LMBT3904W T1G

●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	

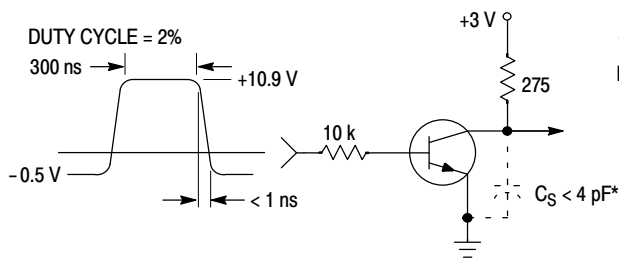


Figure 1. Delay and Rise Time
Equivalent Test Circuit

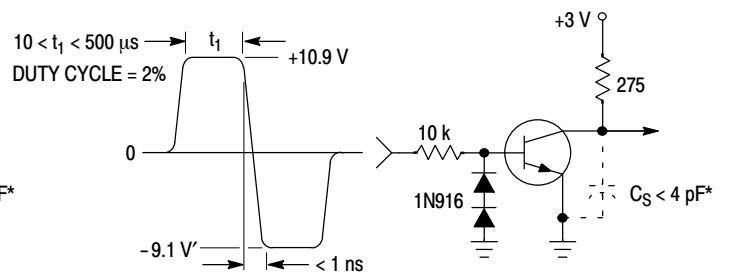


Figure 2. Storage and Fall Time
Equivalent Test Circuit

* Total shunt capacitance of test jig and connectors

LMBT3904W T1G,S-LMBT3904W T1G

ELECTRICAL CHARACTERISTICS CURVES

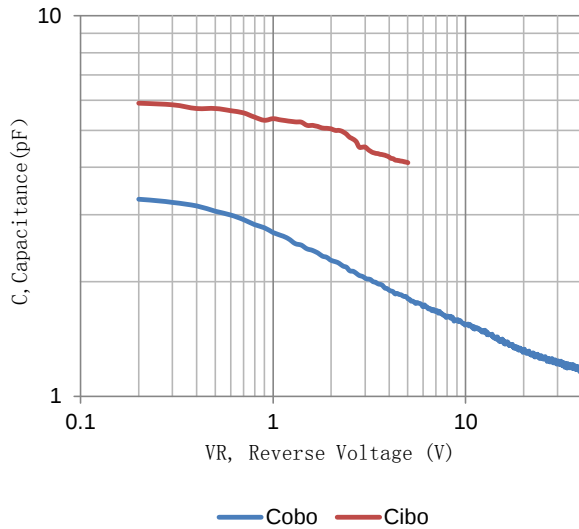


Figure 3. Capacitance

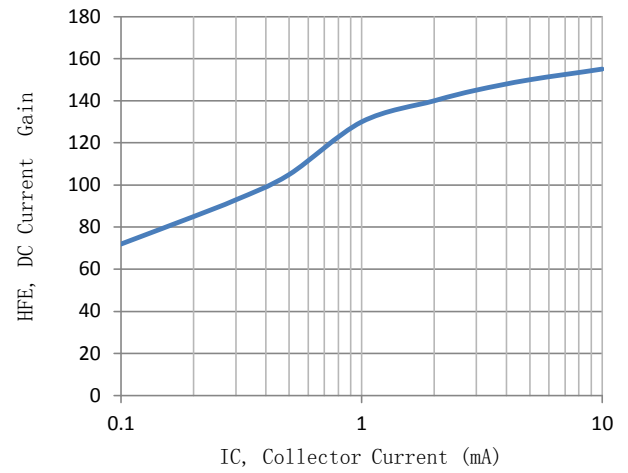


Figure 4. Current Gain

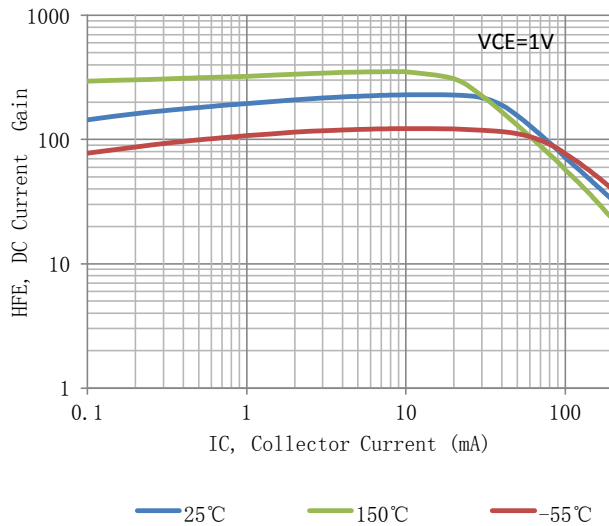


Figure 5. DC Current Gain

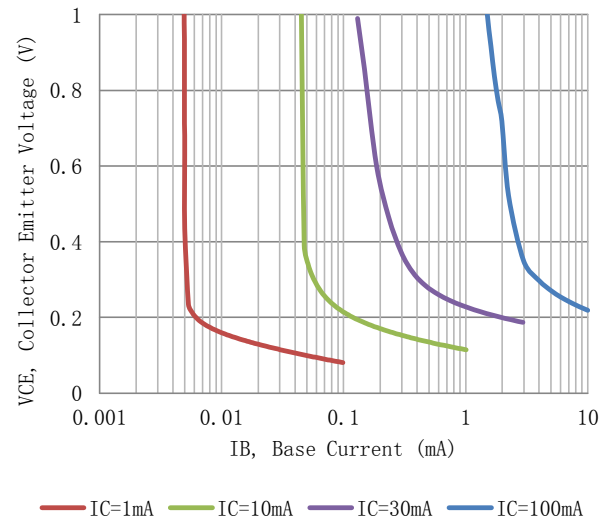


Figure 6. Collector Saturation Region

LMBT3904W T1G,S-LMBT3904W T1G

ELECTRICAL CHARACTERISTICS CURVES

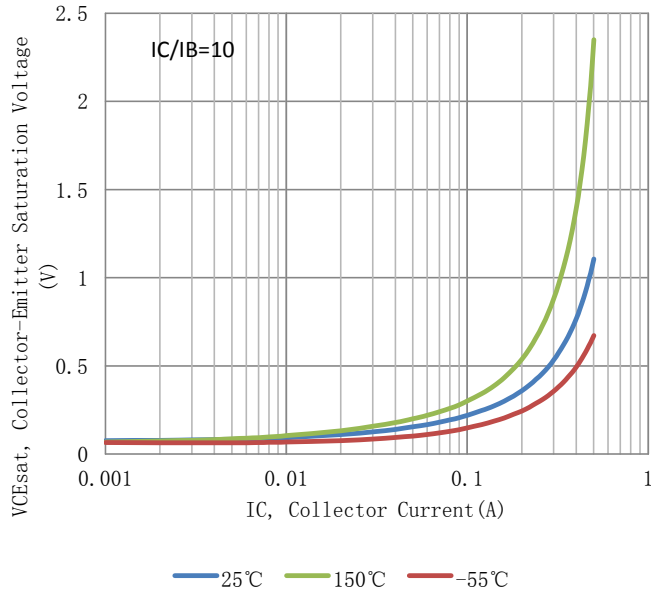


Figure 7. $V_{CE(sat)}$ vs I_C

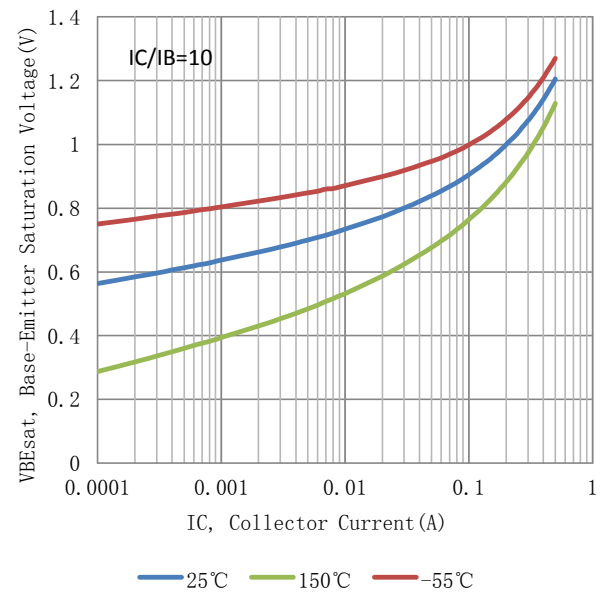


Figure 8. $V_{BE(sat)}$ vs I_C

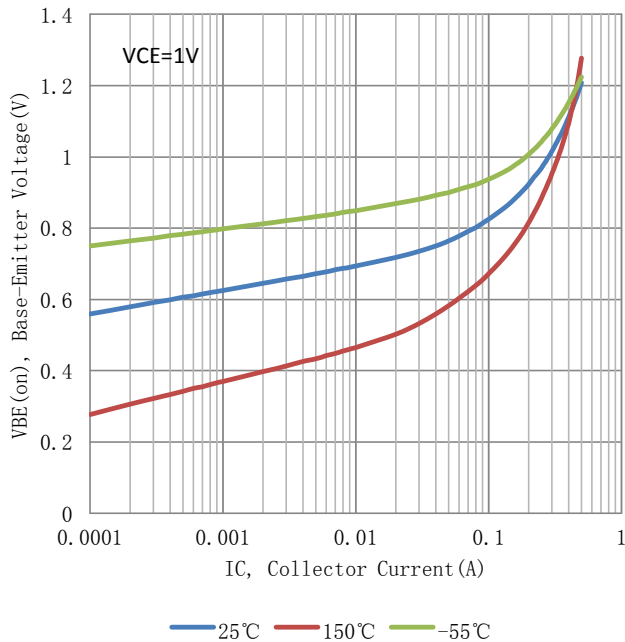


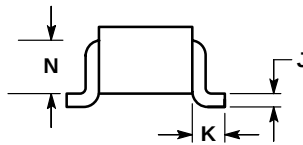
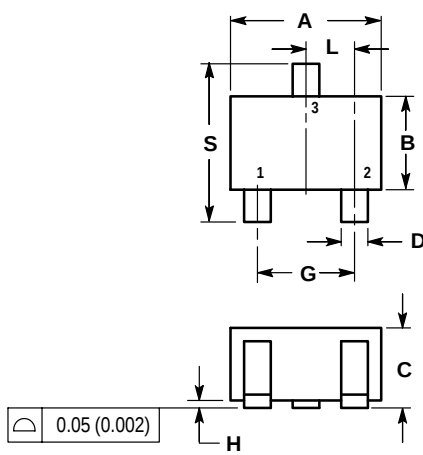
Figure 9. $V_{BE(on)}$ vs. I_C

LMBT3904W T1G,S-LMBT3904W T1G

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

