

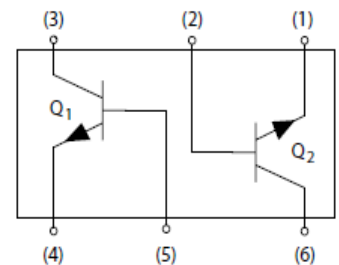
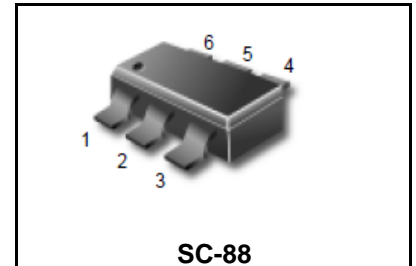
Dual General Purpose Transistors

The LMBT3904DW1T1G device is a spin-off of our popular SOT-23/SOT-323 three-lead device. It is designed for general purpose amplifier applications and is housed in the SOT-363 six-lead surface mount package. By putting two discrete devices in one package, this device is ideal for low-power surface mount applications where board space is at a premium.

● FEATURES

- 1) Low $V_{CE(sat)}$, $\leq 0.4 V$
- 2) Simplifies Circuit Design
- 3) Reduces Board Space
- 4) Reduces Component Count
- 5) Available in 8 mm, 7-inch/3,000 Unit Tape and Reel
- 6) h_{FE} , 100-300
- 7) We declare that the material of product compliant with RoHS requirements and Halogen Free.
- 8) S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

LMBT3904DW1T1G S-LMBT3904DW1T1G



● DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LMBT3904DW1T1G	MA	3000/Tape&Reel
LMBT3946DW1T3G	MA	10000/Tape&Reel

● MAXIMUM RATINGS ($T_a = 25^\circ C$)

Parameter	Symbol	Limits	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	60	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	200	mAdc

● THERMAL CHARACTERISTICS

Total Device Dissipation, FR-5 Board (Note 1) @ $T_A = 25^\circ C$	P_D	150	mW
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	833	$^\circ C/W$
Junction and Storage temperature	T_J, T_{stg}	-55 ~ +150	$^\circ C$

1. Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.

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● 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 2.)

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 (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	X 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

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

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● ELECTRICAL CHARACTERISTICS (Ta= 25°C)(CONTINUED)

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	

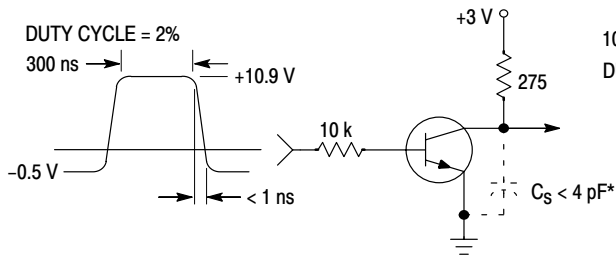


Figure 1. Delay and Rise Time Equivalent Test Circuit

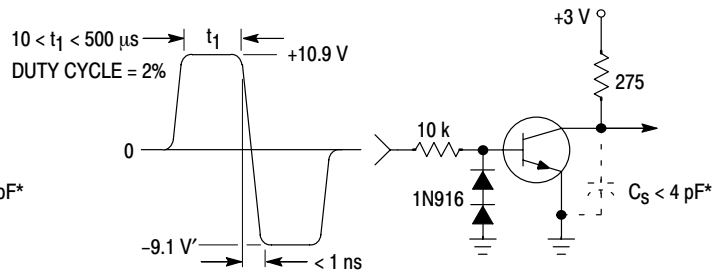


Figure 2. Storage and Fall Time Equivalent Test Circuit

* Total shunt capacitance of test jig and connectors

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ELRCTRICAL CHARACTERISTICS CURVES

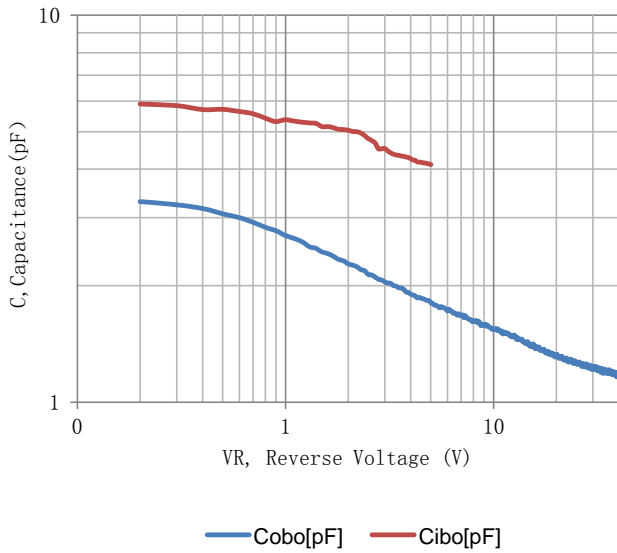


FIG.3 Capacitance

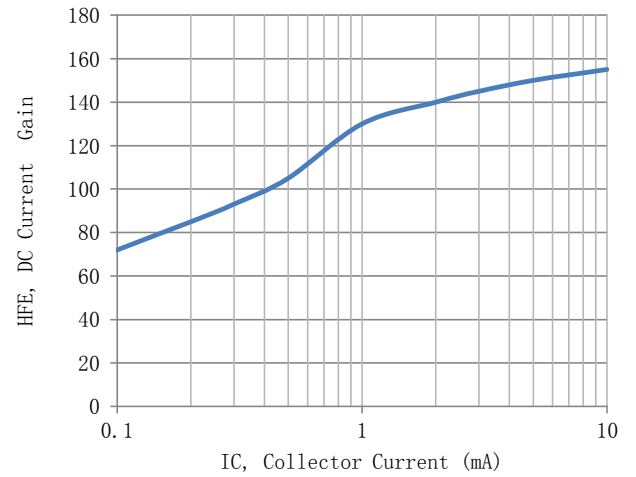


FIG.4 Current Gain

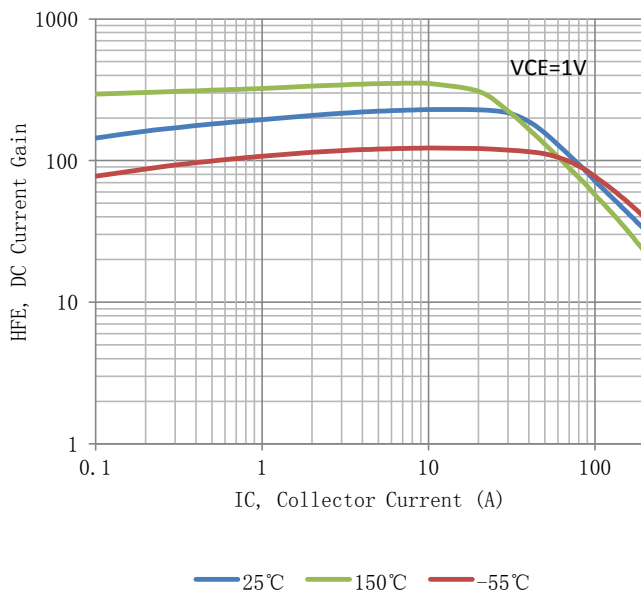


FIG.5 DC Current Gain

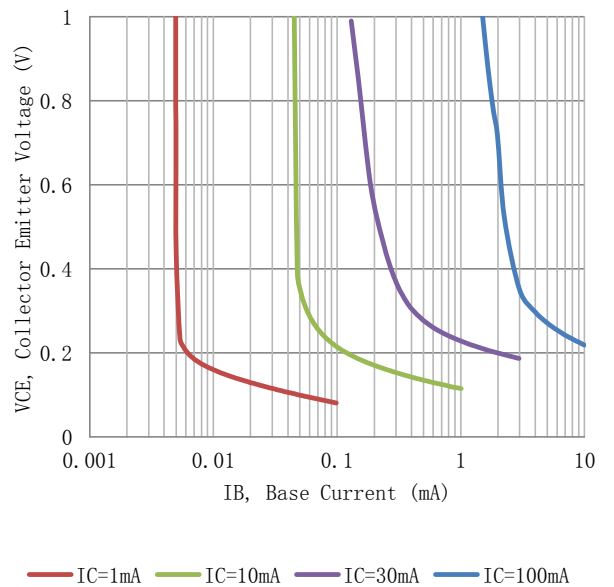


FIG.6 Collector Saturation Region

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ELRCTRICAL CHARACTERISTICS CURVES

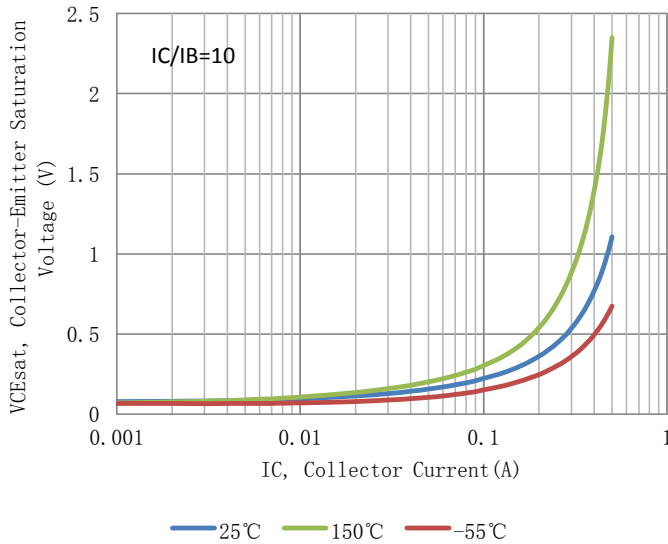


FIG.7 VCE(sat) vs. IC

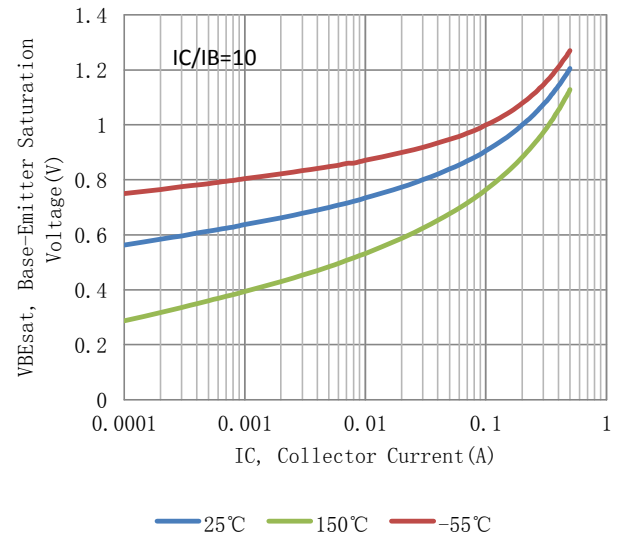


FIG.8 VBE(sat) vs. IC

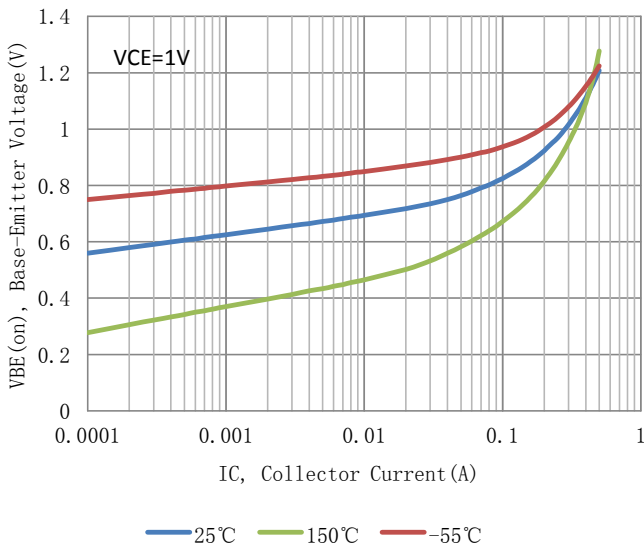
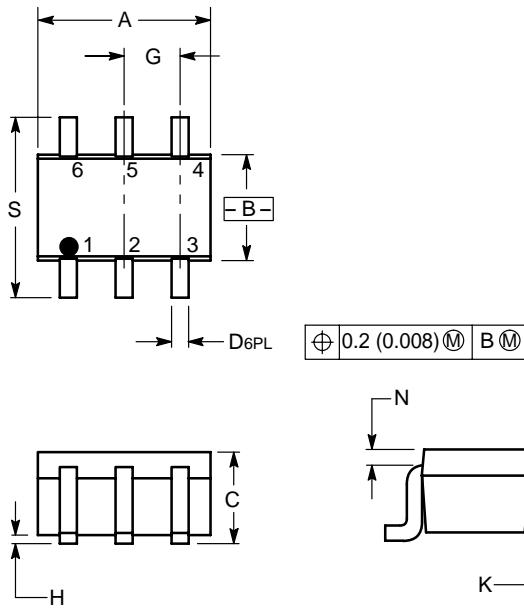


FIG.9 VBE(on) vs. IC

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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

