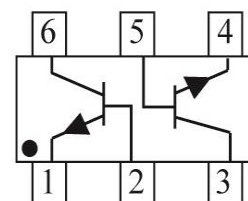
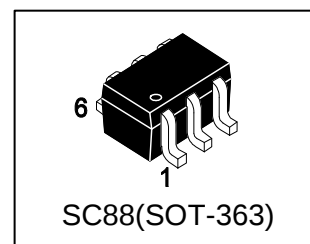


LMBT3904DW1T1G

General Purpose Transistors NPN Silicon

1. FEATURES

- We declare that the material of product compliance with RoHS requirements and Halogen Free.
- Low $V_{CE(sat)}$, ≤ 0.4 V
- Simplifies circuit design
- Reduces board space
- Reduces component count
- Available in 8 mm, 7-inch/3,000 unit tape and reel
- h_{FE} , 100–300



2. DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
LMBT3904DW1T1G	MA	3000/Tape&Reel
LMBT3904DW1T3G	MA	13000/Tape&Reel

3. MAXIMUM RATINGS($T_a = 25^\circ\text{C}$)

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

4. THERMAL CHARACTERISTICS

Parameter	Symbol	Limits	Unit
Total Device Dissipation, FR-5 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above 25°C	PD	150 1.2	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient(Note 1)	$R_{\theta JA}$	833	$^\circ\text{C}/\text{W}$
Junction and Storage temperature	T_J, T_{stg}	$-55 \sim +150$	$^\circ\text{C}$

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.

5. ELECTRICAL CHARACTERISTICS (Ta= 25°C)

OFF CHARACTERISTICS

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector–Emitter Breakdown Voltage (IC = 1.0 mA, IB = 0)	VBR(CEO)	40	-	-	V
Collector–Base Breakdown Voltage (IC = 10 µA, IE = 0)	VBR(CBO)	60	-	-	V
Emitter–Base Breakdown Voltage (IE = 10 µA, IC = 0)	VBR(EBO)	6	-	-	V
Collector Cutoff Current (VCE = 30 V, VEB = 3.0V)	ICEX	-	-	50	nA
Base Cutoff Current (VCE = 30 V, VEB = 3.0V)	IBL	-	-	50	nA

ON CHARACTERISTICS (Note 2.)

DC Current Gain (IC = 0.1 mA, VCE = 1.0 V)	HFE	40	-	-	
(IC = 1.0 mA, VCE = 1.0 V)		70	-	-	
(IC = 10 mA, VCE = 1.0 V)		100	-	300	
(IC = 50 mA, VCE = 1.0 V)		60	-	-	
(IC = 100 mA, VCE = 1.0 V)		30	-	-	
Collector–Emitter Saturation Voltage (IC = 10 mA, IB = 1.0 mA)	VCE(sat)	-	-	0.2	V
(IC = 50 mA, IB = 5.0 mA)		-	-	0.3	
Base–Emitter Saturation Voltage (IC = 10 mA, IB = 1.0 mA)	VBE(sat)	0.65	-	0.85	V
(IC = 50 mA, IB = 5.0 mA)		-	-	0.95	

SMALL–SIGNAL CHARACTERISTICS

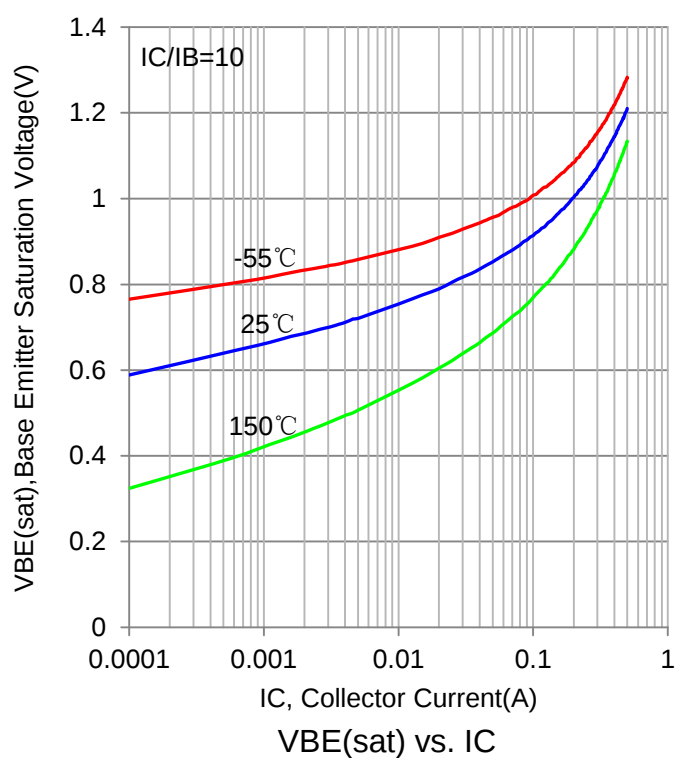
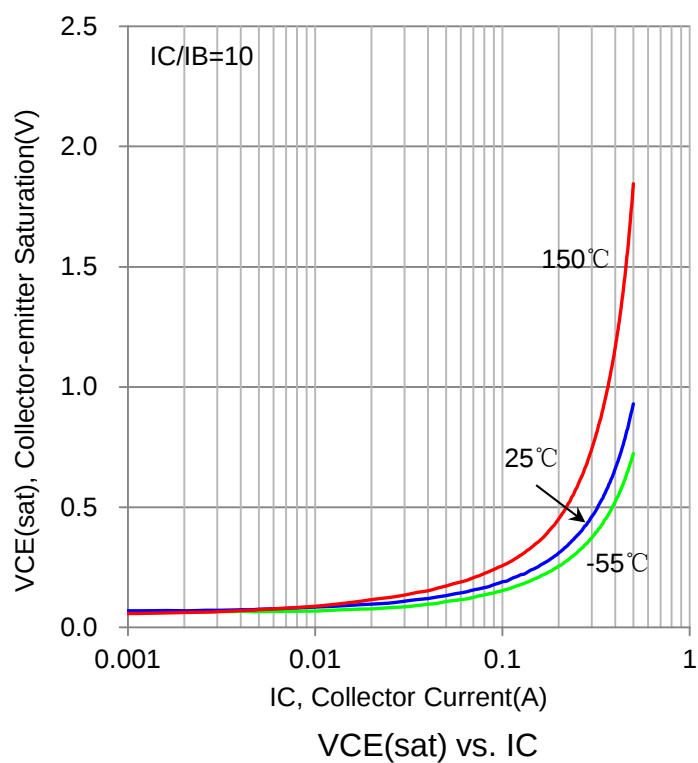
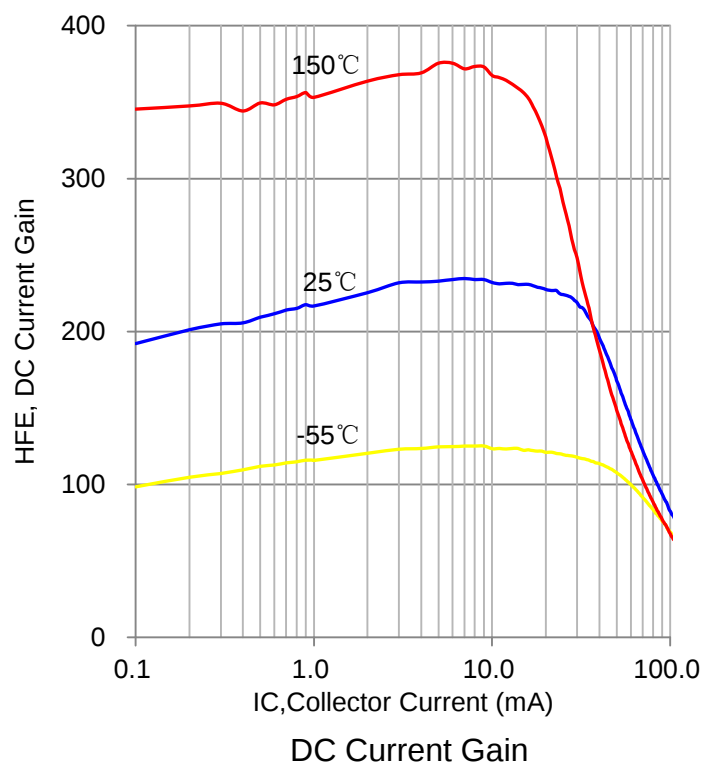
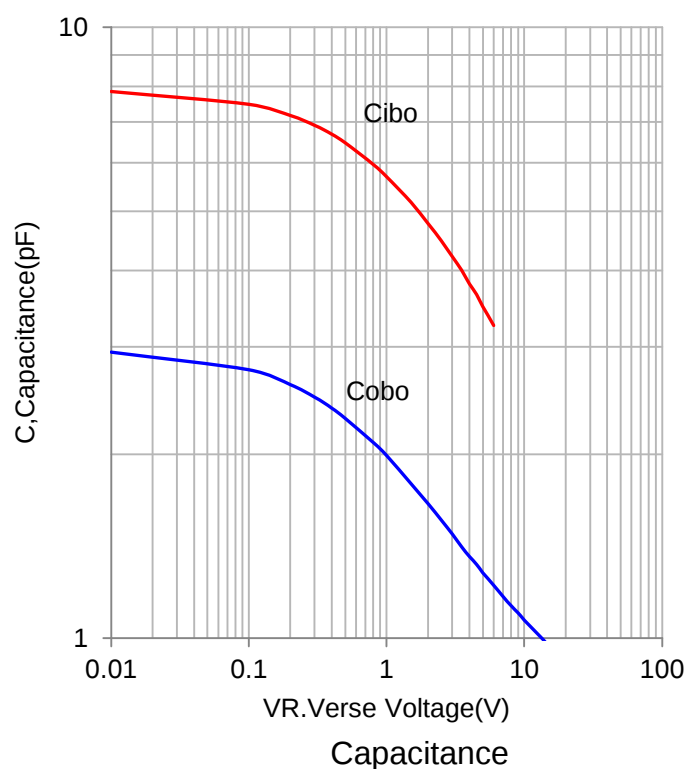
Current–Gain — Bandwidth Product (IC = 10mA, VCE= 20V, f = 100MHz)	fT	300	-	-	MHz
Output Capacitance (VCB = 5.0 V, IE = 0, f = 1.0 MHz)	Cobo	-	-	4	pF
Input Capacitance (VEB = 0.5 V, IC = 0, f = 1.0 MHz)	Cibo	-	-	8	pF
Input Impedance (VCE= 10 V, IC = 1.0 mA, f = 1.0 kHz)	hie	1	-	10	KΩ
Voltage Feedback Ratio (VCE= 10 V, IC = 1.0 mA, f = 1.0 kHz)	hre	0.5	-	8	X 10 ⁻⁴
Small–Signal Current Gain (VCE= 10 V, IC = 1.0 mA, f = 1.0 kHz)	hfe	100	-	400	
Output Admittance (VCE= 10 V, IC = 1.0 mA, f = 1.0 kHz)	hoe	1	-	40	µmhos
Noise Figure (VCE =5V, IC =100µA, RS =1.0kΩ, f =1.0kHz)	NF	–	-	5	dB

SWITCHING CHARACTERISTICS

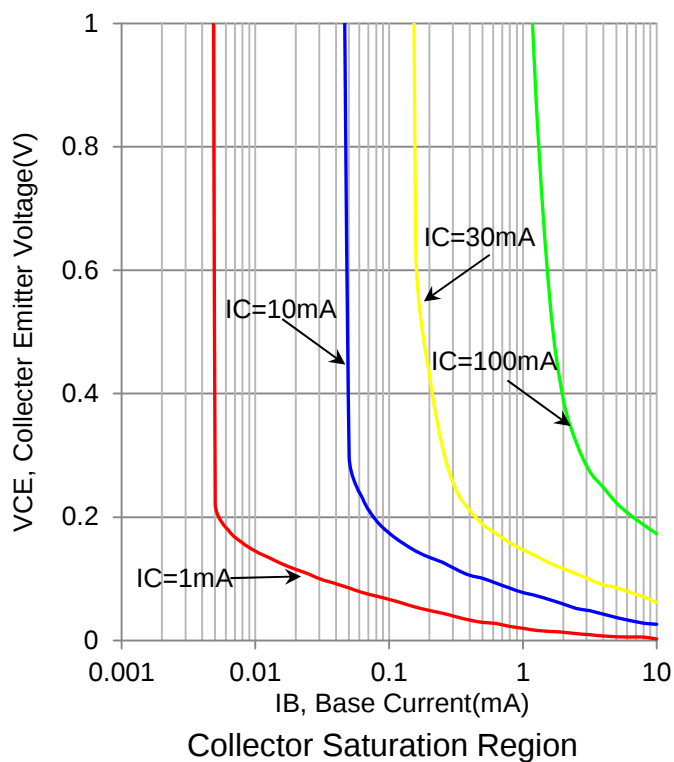
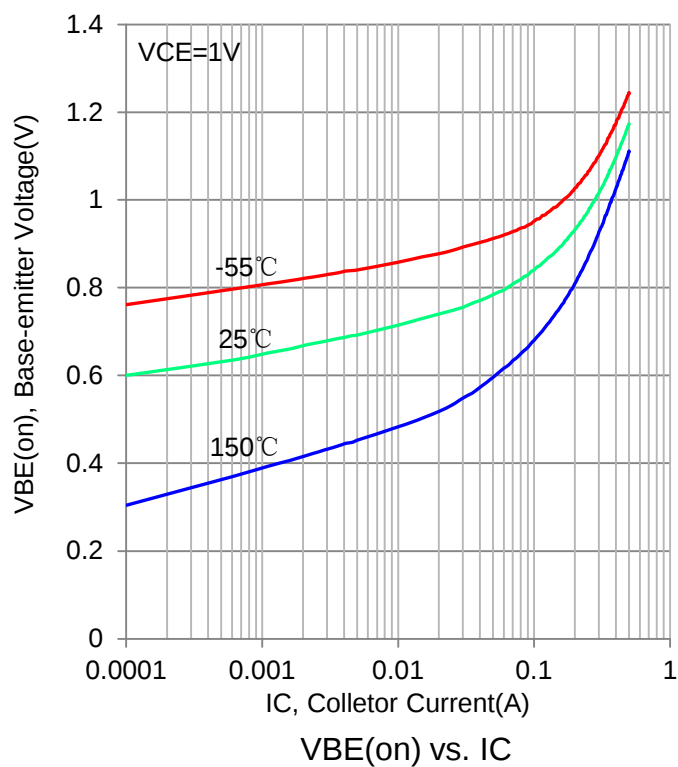
Delay Time	(VCC = 3.0 V, VBE= -0.5V, IC = 10mA, IB1 = 1.0 mA)	td	-	-	35	ns
Rise Time		tr	-	-	35	
Storage Time	(VCC = 3.0 V, IC = 10 mA, IB1 = IB2 = 1.0 mA)	ts	-	-	200	
Fall Time		tf	-	-	50	

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

6. ELECTRICAL CHARACTERISTICS CURVES



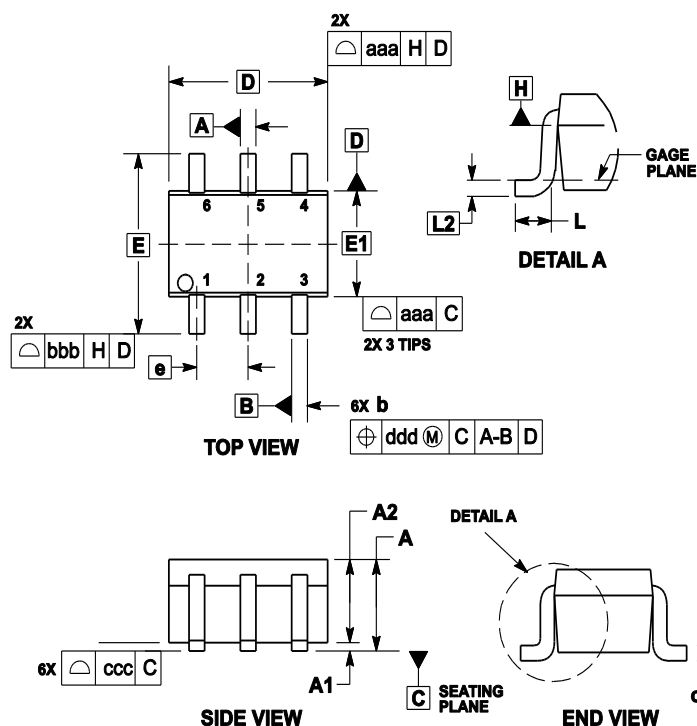
6. ELECTRICAL CHARACTERISTICS CURVES



7.OUTLINE AND DIMENSIONS

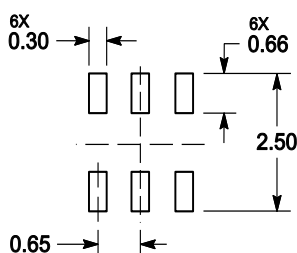
Notes:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.043
A1	0.00	---	0.10	0	---	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.01
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.07	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.01		
bbb	0.30			0.01		
ccc	0.10			0.00		
ddd	0.10			0.00		

8.SOLDERING FOOTPRINT



DISCLAIMER

- Curve guarantee in the specification. The curve of test items with electric parameter is used as quality guarantee. The curve of test items without electric parameter is used as reference only.
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