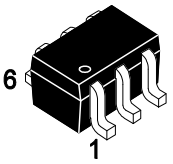
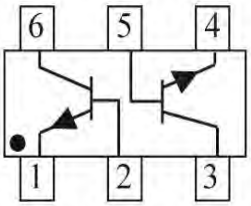
JXND ELECTRONICS CO.,LTD

General Purpose Transistors NPN Silicon
MBT3904DW1T1G S-MBT3904DW1T1G

1. FEATURES



SC88(SOT-363)



- We declare that the material of product compliance with RoHS requirements and Halogen Free.
- S- prefix for automotive and other applications requiring unique site and control change requirements; AEC-Q101 qualified and PPAP capable.
- Low VCE(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
- hFE, 100–300

2. DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
MBT3904DW1T1G	MA	3000/Tape&Reel
MBT3904DW1T3G	MA	10000/Tape&Reel

3. MAXIMUM RATINGS(Ta = 25ºC)

Parameter	Symbol	Limits	Unit
Collector–Emitter Voltage	VCEO	40	Vdc
Collector–Base Voltage	VCBO	60	Vdc
Emitter–Base Voltage	VEBO	6	Vdc
Collector Current — Continuous	IC	200	mAdc

4. THERMAL CHARACTERISTICS

Parameter	Symbol	Limits	Unit
Total Device Dissipation, FR−5 Board (Note 1) @ TA = 25ºC Derate above 25ºC	PD	 150 1.2	 mW mW/ºC
Thermal Resistance, Junction–to–Ambient(Note 1)	RΘJA	833	ºC/W
Junction and Storage temperature	TJ,Tstg	−55~+150	° C

1. FR–5 = 1.0×0.75×0.062 in.

5. ELECTRICAL CHARACTERISTICS (Ta= 25°C)

OFF CHARACTERISTICS

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

ON CHARACTERISTICS (Note 2.)

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

SMALL–SIGNAL CHARACTERISTICS

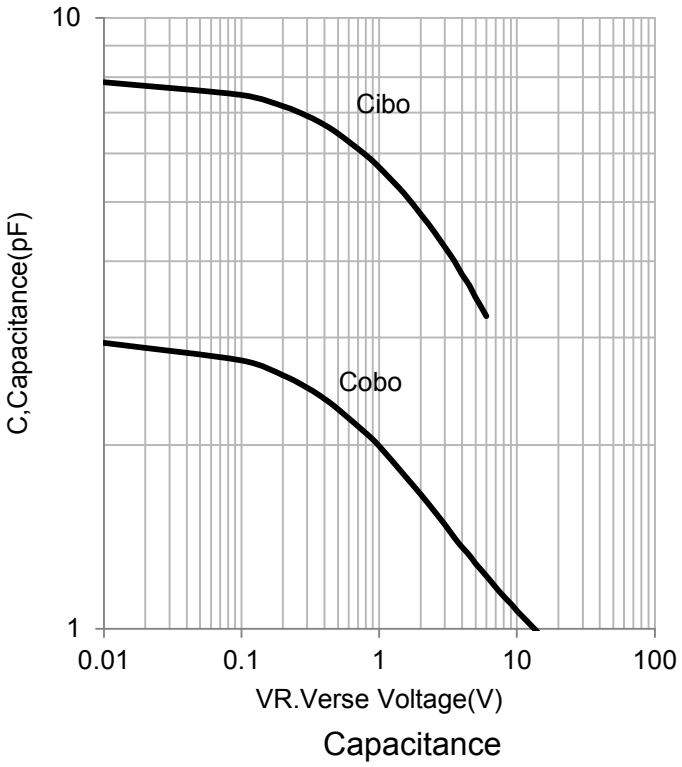
Current–Gain — Bandwidth Product (IC = 10mAdc, VCE= 20Vdc, f = 100MHz)	fT	300	-	-	MHz
Output Capacitance (VCB = 5.0 Vdc, IE = 0, f = 1.0 MHz)	Cobo	-	-	4	pF
Input Capacitance (VEB = 0.5 Vdc, IC = 0, f = 1.0 MHz)	Cibo	-	-	8	pF
Input Impedance (VCE= 10 Vdc, IC = 1.0 mAdc, f = 1.0 kHz)	hie	1	-	10	k Ω
Voltage Feedback Ratio (VCE= 10 Vdc, IC = 1.0 mAdc, f = 1.0 kHz)	hre	0.5	-	8	X 10^{-4}
Small–Signal Current Gain (VCE= 10 Vdc, IC = 1.0 mAdc, f = 1.0 kHz)	hfe	100	-	400	
Output Admittance (VCE= 10 Vdc, IC = 1.0 mAdc, f = 1.0 kHz)	hoe	1	-	40	μmhos
Noise Figure (VCE =5V, IC =100μ1, RS =1.0kΩ, f =1.0kHz)	NF	–	-	5	dB

SWITCHING CHARACTERISTICS

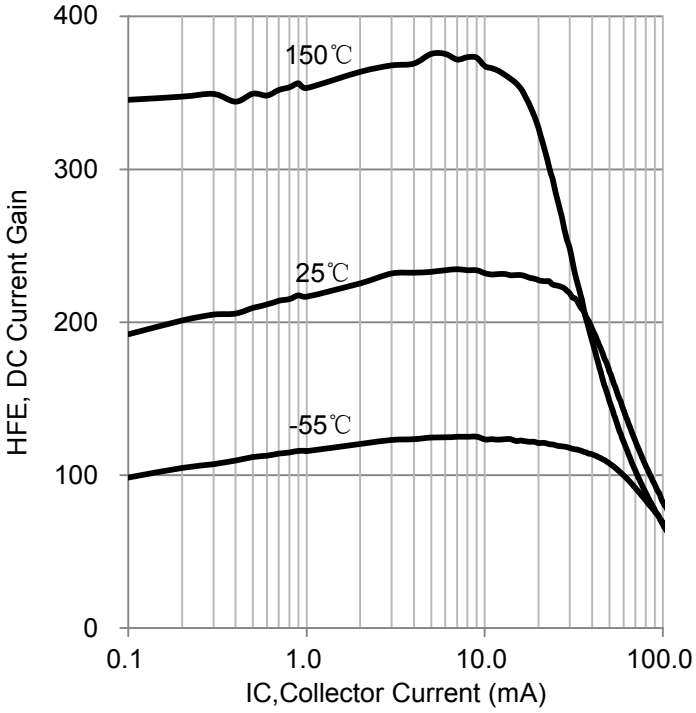
Delay Time	(VCC = 3.0 Vdc,VBE=-0.5Vdc, IC = 10mAdc, IB1 = 1.0 mAdc)	td	-	-	35	ns
Rise Time		tr	-	-	35	
Storage Time	(VCC = 3.0 Vdc, IC = 10 mAdc,IB1 = IB2 = 1.0 mAdc)	ts	-	-	200	
Fall Time		tf	-	-	50	

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

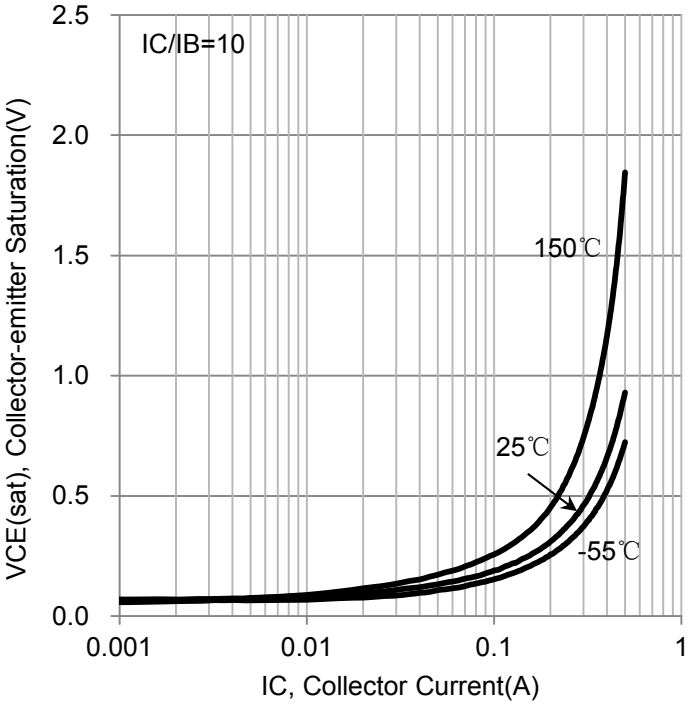
6. ELECTRICAL CHARACTERISTICS CURVES



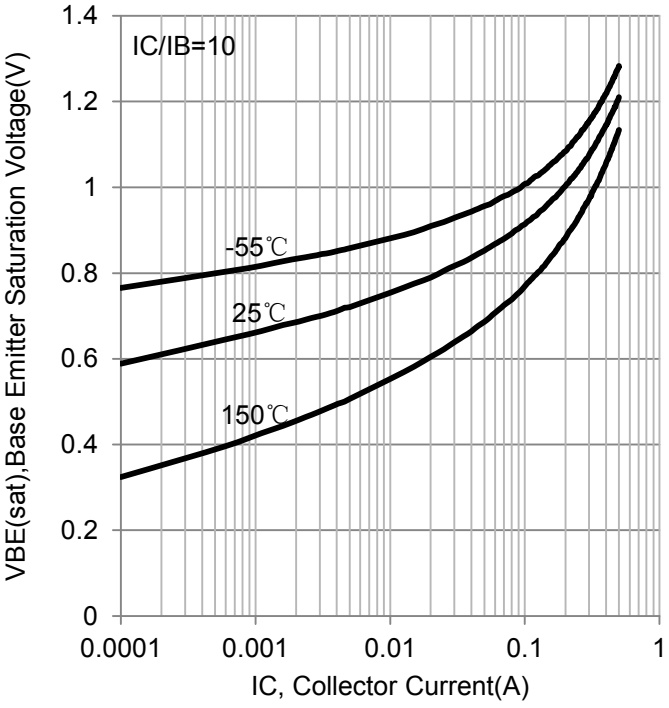
Capacitance



DC Current Gain

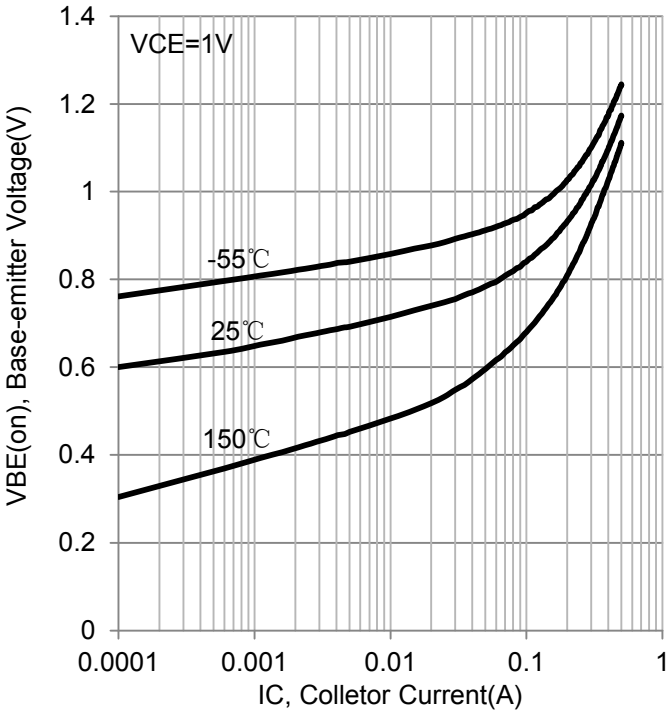


VCE(sat) vs. IC

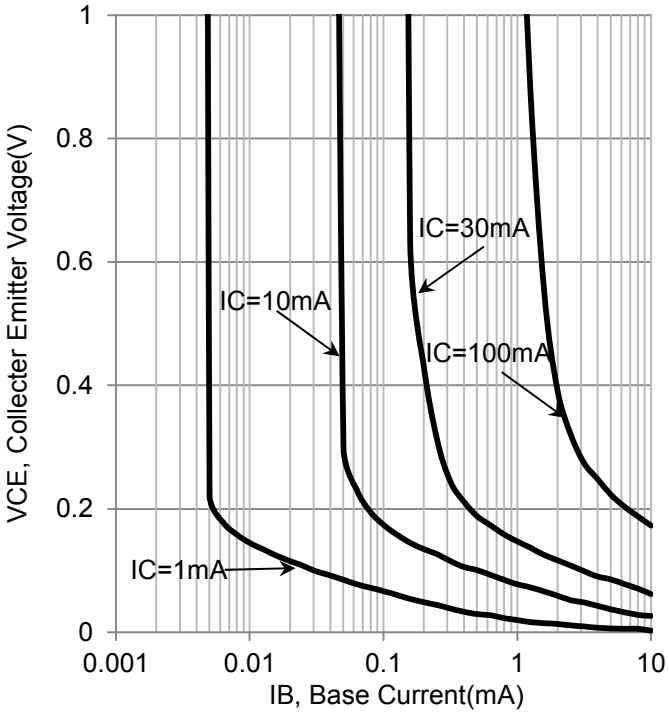


VBE(sat) vs. IC

6. ELECTRICAL CHARACTERISTICS CURVES



VBE(on) vs. IC



Collector Saturation Region

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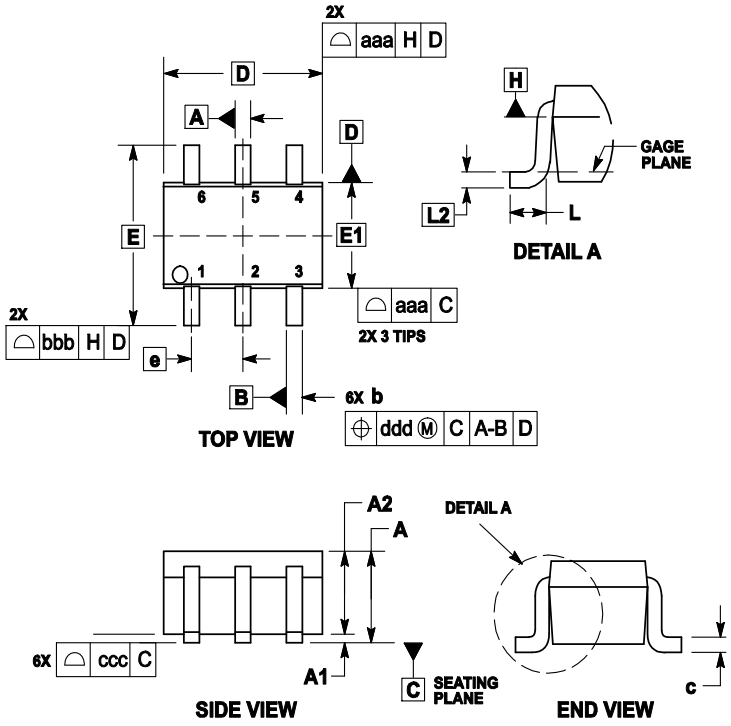
7.OUTLINE AND DIMENSIONS



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 E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.04
A1	0.00	---	0.10	0	---	0
A2	0.70	0.90	1.00	0.03	0.04	0.04
b	0.15	0.20	0.25	0.01	0.01	0.01
C	0.08	0.15	0.22	0	0.01	0.01
D	1.80	2.00	2.20	0.07	0.08	0.09
E	2.00	2.10	2.20	0.08	0.08	0.09
E1	1.15	1.25	1.35	0.05	0.05	0.05
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	####	0.01	0.02
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