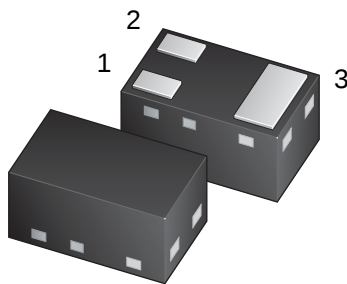


General Purpose Transistors NPN Silicon

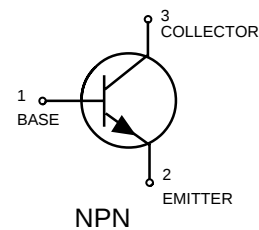
FEATURES:

- We declare that the material of product compliance with RoHS requirements.

Circuit Diagram & Pin Configuration:



SOT-883



DEVICE MARKING AND ORDERING INFORMATION

Device	Marking	Shipping
TMBT3904N3	1A	3000/Tape&Reel

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

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

●THERMAL CHARACTERISTICS

Total Device Dissipation, FR–5 Board (Note 1) @ $T_A = 25^\circ\text{C}$	P_D	250	mW
Derate above 25°C		2	mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient(Note 1)	$R_{\theta JA}$	500	$^\circ\text{C}/\text{W}$
Junction and Storage temperature	T_J, T_{stg}	$-55 \sim +150$	$^\circ\text{C}$

1. FR–5 = 1.0×0.75×0.062 in.

●ELECTRICAL CHARACTERISTICS (Ta= 25℃)
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})	h _{FE}	40	–	–	
(I _C = 1.0 mA _{dc} , V _{CE} = 1.0 V _{dc})		70	–	–	
(I _C = 10 mA _{dc} , V _{CE} = 1.0 V _{dc})		100	–	300	
(I _C = 50 mA _{dc} , V _{CE} = 1.0 V _{dc})		60	–	–	
(I _C = 100 mA _{dc} , V _{CE} = 1.0 V _{dc})		30	–	–	

ON CHARACTERISTICS (Note 2.)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Collector-Emitter Saturation Voltage(2) ($I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$) ($I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$)	$V_{CE(sat)}$	— —	— —	0.2 0.3	V
Base-Emitter Saturation Voltage ($I_C = 10 \text{ mA}$, $I_B = 1.0 \text{ mA}$) ($I_C = 50 \text{ mA}$, $I_B = 5.0 \text{ mA}$)	$V_{BE(sat)}$	0.65 —	— —	0.85 0.95	V

SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 10 \text{ mA}$, $V_{CE} = 20 \text{ V}$, $f = 100 \text{ MHz}$)	f_T	300	—	—	MHz
Output Capacitance ($V_{CB} = 5.0 \text{ V}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{obo}	—	—	4	pF
Input Capacitance ($V_{EB} = 0.5 \text{ V}$, $I_C = 0$, $f = 1.0 \text{ MHz}$)	C_{ibo}	—	—	8	pF
Input Impedance ($V_{CE} = 10 \text{ V}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{ie}	1	—	10	k Ω
Voltage Feedback Ratio ($V_{CE} = 10 \text{ V}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{re}	0.5	—	8	$\times 10^{-4}$
Small-Signal Current Gain ($V_{CE} = 10 \text{ V}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{fe}	100	—	400	
Output Admittance ($V_{CE} = 10 \text{ V}$, $I_C = 1.0 \text{ mA}$, $f = 1.0 \text{ kHz}$)	h_{oe}	1	—	40	μmhos
Noise Figure ($V_{CE} = 5 \text{ V}$, $I_C = 100 \mu\text{A}$, $R_s = 1.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$)	NF	—	—	5	dB

SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = 3.0 Vdc, V _{BE} = -0.5 Vdc, I _C = 10 mA, I _{B1} = 1.0 mA)	t _d	—	—	35	ns
Rise Time		t _r	—	—	35	
Storage Time	(V _{CC} = 3.0 Vdc, I _C = 10 mA, I _{B1} = I _{B2} = 1.0 mA)	t _s	—	—	200	
Fall Time		t _f	—	—	50	

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

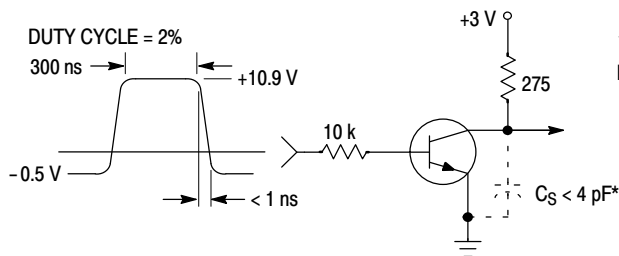


Figure 1. Delay and Rise Time Equivalent Test Circuit

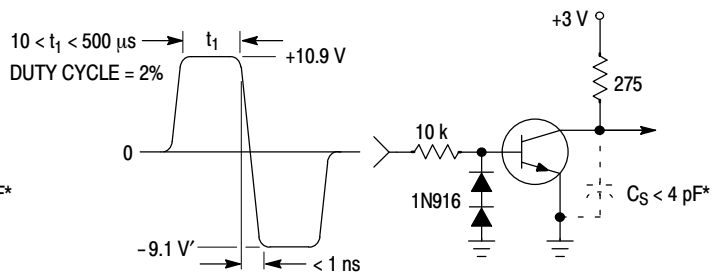


Figure 2. Storage and Fall Time Equivalent Test Circuit

* Total shunt capacitance of test jig and connectors

ELECTRICAL CHARACTERISTICS CURVES

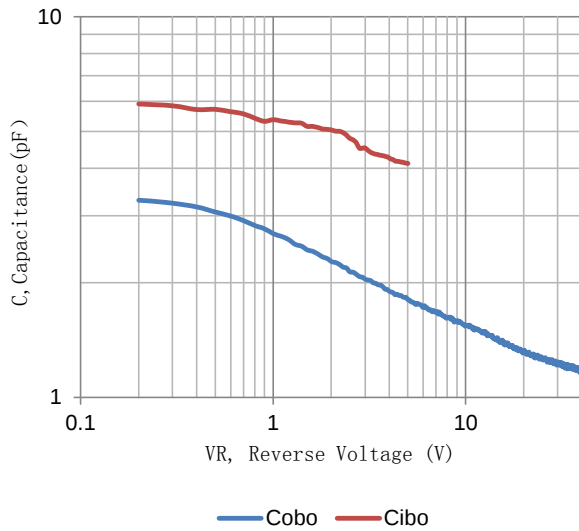


Figure 3. Capacitance

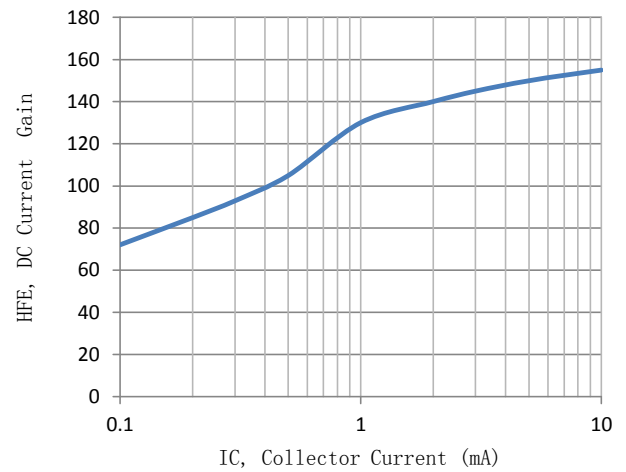


Figure 4. Current Gain

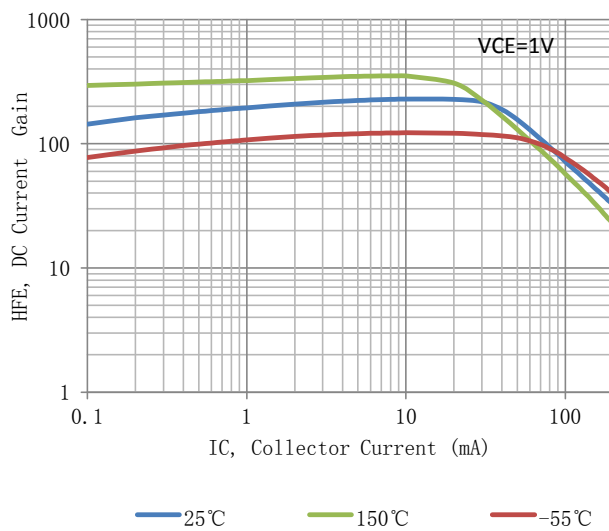


Figure 5. DC Current Gain

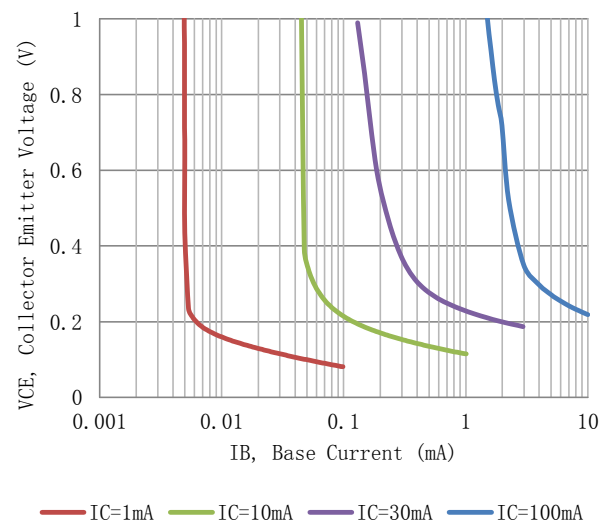


Figure 6. Collector Saturation Region

ELECTRICAL CHARACTERISTICS CURVES

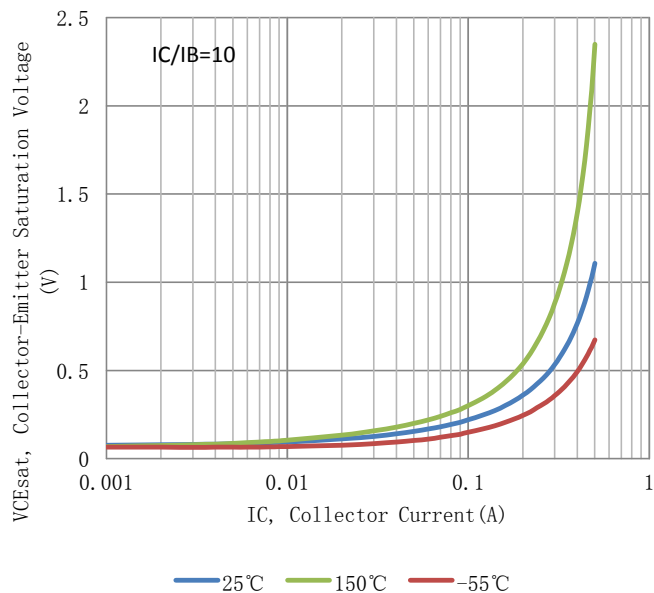


Figure 7. $V_{CE(sat)}$ vs. I_C

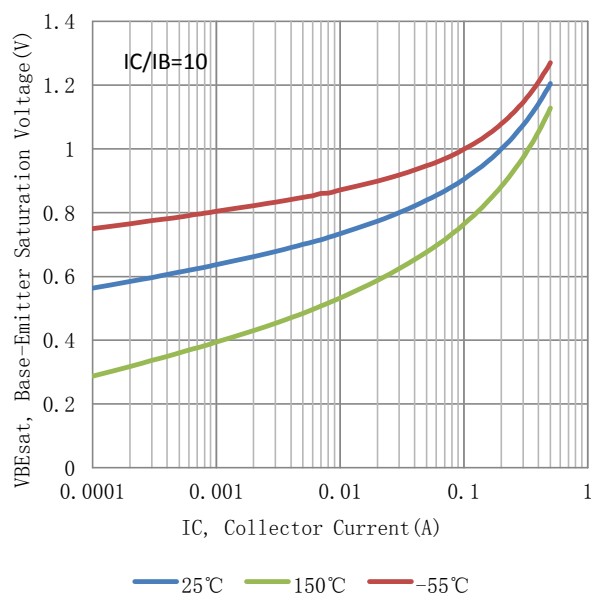


Figure 8. $V_{BE(sat)}$ vs. I_C

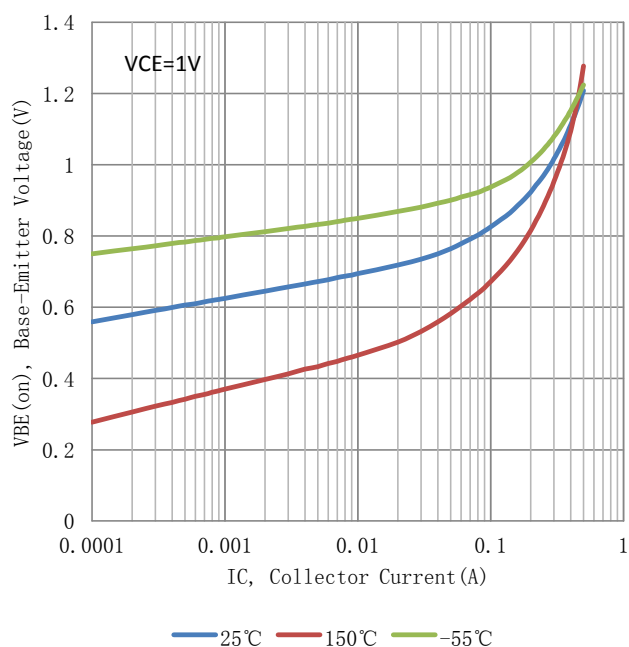
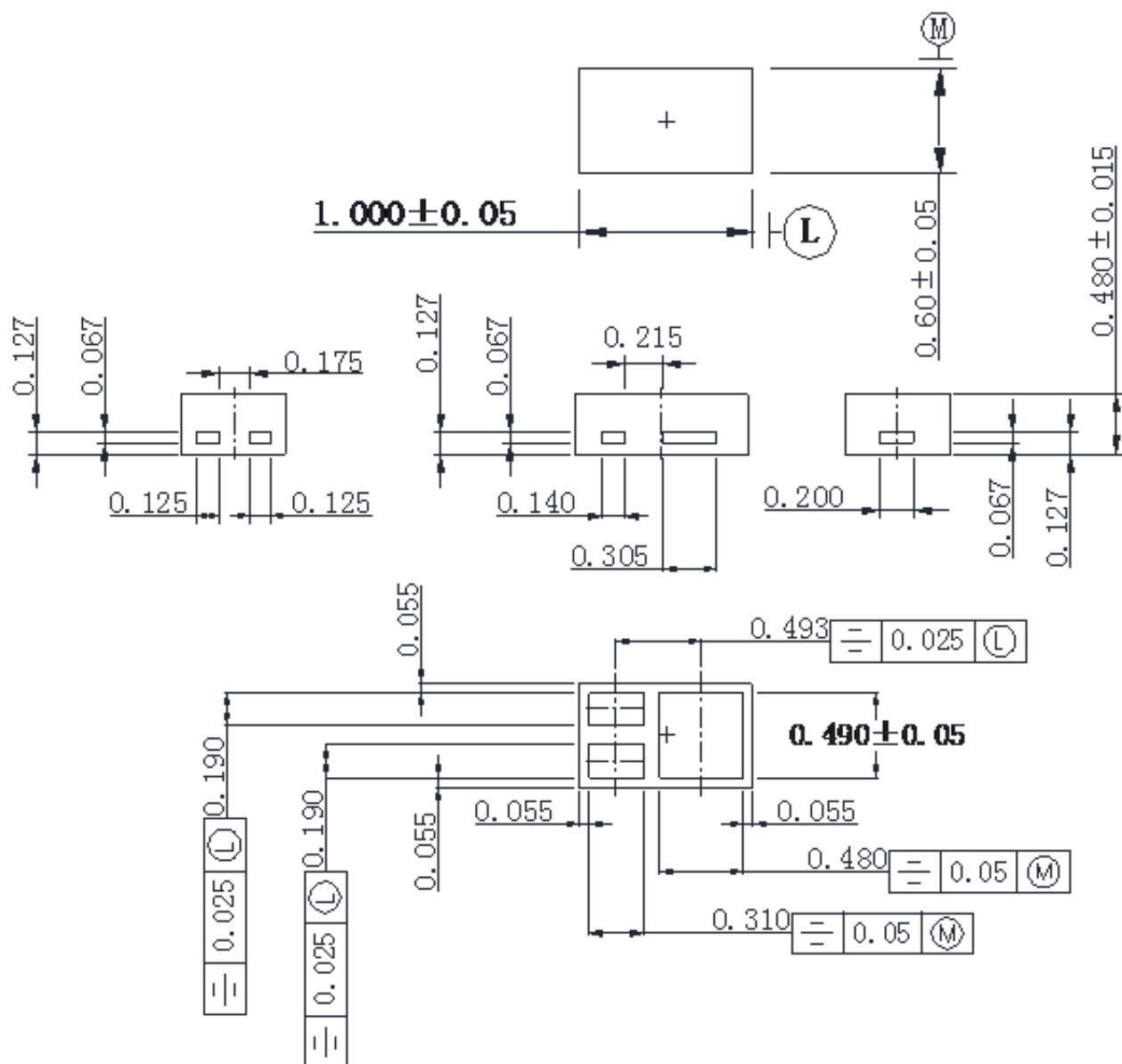


Figure 9. $V_{BE(on)}$ vs. I_C

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DIMENSION OUTLINE:

Unit:mm



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