

PNP Silicon

FEATURE

- Simplifies Circuit Design.
- RoHS product for packing code suffix "G"
Halogen free product for packing code suffix "H"

ORDERING INFORMATION

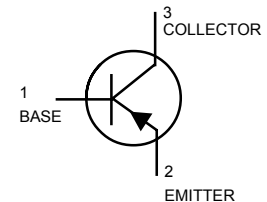
Device	Marking	Shipping
MMBT3906TT1	2A	3000/Tape & Reel



SC-89

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	- 40	Vdc
Collector–Base Voltage	V_{CBO}	- 40	Vdc
Emitter–Base Voltage	V_{EBO}	- 5.0	Vdc
Collector Current — Continuous	I_C	- 200	mAdc



THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-4 Board(1) $T_A = 25^\circ\text{C}$	P_D	200	mW
Derate above 25°C		1.6	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	600	$^\circ\text{C}/\text{W}$
Total Device Dissipation FR-4 Board (2), $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate above 25°C		2.4	mW/ $^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	400	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBT3906TT1 = 2A

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage (3) ($I_C = -1.0\text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	- 40	—	Vdc
Collector–Base Breakdown Voltage ($I_C = -10\ \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	- 40	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = -10\ \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	- 5.0	—	Vdc
Base Cutoff Current ($V_{CE} = -30\text{ Vdc}, V_{EB} = -3.0\text{ Vdc}$)	I_{BL}	—	- 50	nAdc
Collector Cutoff Current ($V_{CE} = -30\text{ Vdc}, V_{EB} = -3.0\text{ Vdc}$)	I_{CEX}	—	- 50	nAdc

1. FR-4 Minimum Pad.
2. FR-4 1.0 x 1.0 Inch Pad.
3. Pulse Width $\leq 300\ \mu\text{s}$; Duty Cycle $\leq 2.0\%$.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (3)				
DC Current Gain (I _C = -0.1 mA _{dc} , V _{CE} = -1.0 V _{dc})	h _{FE}	60	—	—
(I _C = -1.0 mA _{dc} , V _{CE} = -1.0 V _{dc})		80	—	
(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	—	
Collector-Emitter Saturation Voltage (I _C = -10 mA _{dc} , I _B = -1.0 mA _{dc})	V _{CE(sat)}	—	-0.25	V _{dc}
(I _C = -50 mA _{dc} , I _B = -5.0 mA _{dc})		—	-0.4	
Base-Emitter Saturation Voltage (I _C = -10 mA _{dc} , I _B = -1.0 mA _{dc})	V _{BE(sat)}	-0.65	-0.85	V _{dc}
(I _C = -50 mA _{dc} , I _B = -5.0 mA _{dc})		—	-0.95	

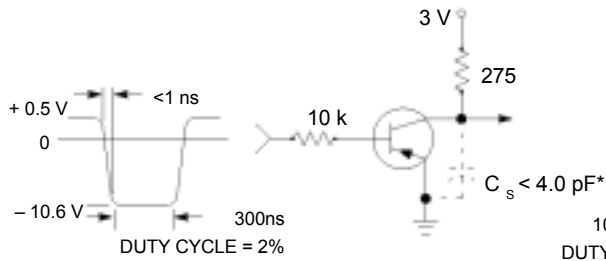
SMALL-SIGNAL CHARACTERISTICS

Current-Gain — Bandwidth Product (I _C = -10 mA _{dc} , V _{CE} = -20 V _{dc} , f = 100 MHz)	f _T	250	—	MHz
Output Capacitance (V _{CB} = -5.0 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	—	4.5	pF
Input Capacitance (V _{EB} = -0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	—	10	pF
Input Impedance (V _{CE} = -10 V _{dc} , I _C = -1.0 mA _{dc} , f = 1.0 kHz)	h _{ie}	2.0	12	kΩ
Voltage Feedback Ratio (V _{CE} = -10 V _{dc} , I _C = -1.0 mA _{dc} , f = 1.0 kHz)	h _{re}	0.1	10	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}	3.0	60	μmhos
Noise Figure (V _{CE} = -5.0 V _{dc} , I _C = -100 μA _{dc} , R _S = 1.0 kΩ, f = 1.0 kHz)	NF	—	4.0	dB

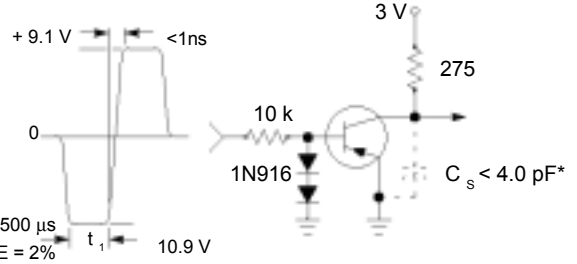
SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = -3.0 V _{dc} , V _{BE} = 0.5 V _{dc} , I _C = -10 mA _{dc} , I _{B1} = -1.0 mA _{dc})	t _d	—	35	ns
Rise Time		t _d	—	35	
Storage Time	(V _{CC} = -3.0 V _{dc} , I _C = -10 mA _{dc} , I _{B1} = I _{B2} = -1.0 mA _{dc})	t _s	—	225	ns
Fall Time		t _f	—	75	

3. 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

TYPICAL TRANSIENT CHARACTERISTICS

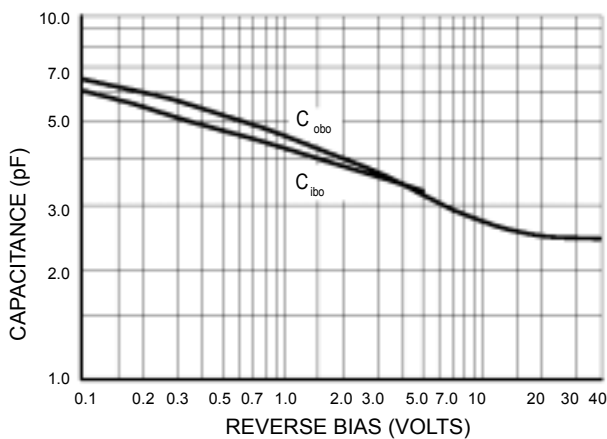


Figure 3. Capacitance

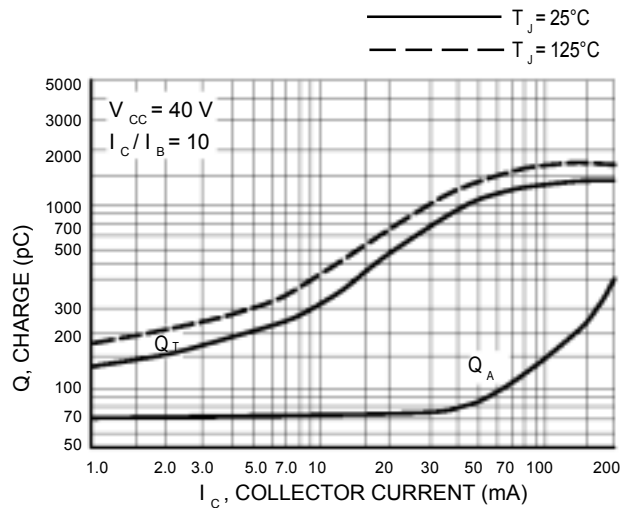


Figure 4. Charge Data

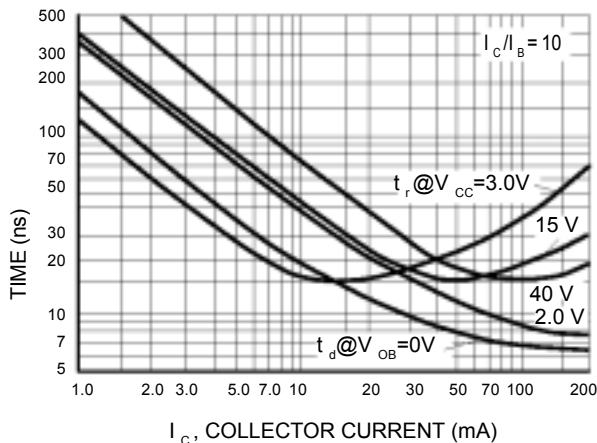


Figure 5. Turn-On Time

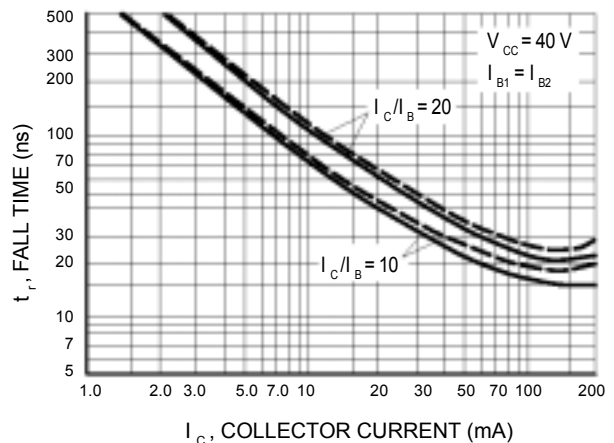


Figure 6. Fall Time

General Purpose Transistors

**TYPICAL AUDIO SMALL-SIGNAL CHARACTERISTICS
NOISE FIGURE VARIATIONS**

($V_{CE} = -5.0$ Vdc, $T_A = 25^\circ\text{C}$, Bandwidth = 1.0 Hz)

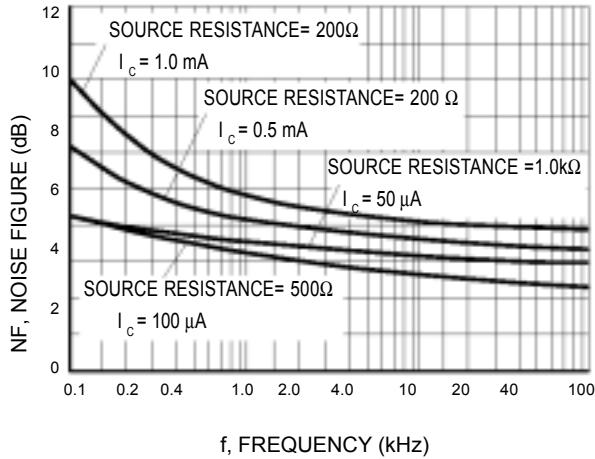


Figure 7. Noise Figure

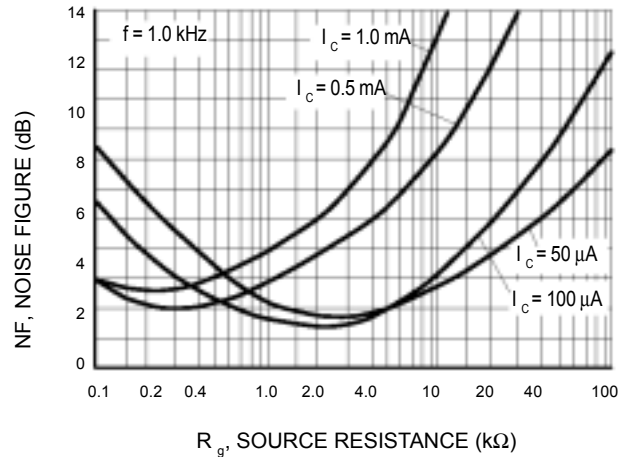


Figure 8. Noise Figure

h PARAMETERS

($V_{CE} = 10$ Vdc, $f = 1.0$ kHz, $T_A = 25^\circ\text{C}$)

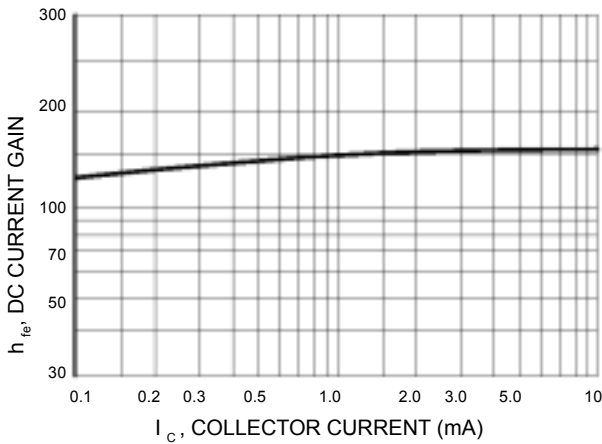


Figure 9. Current Gain

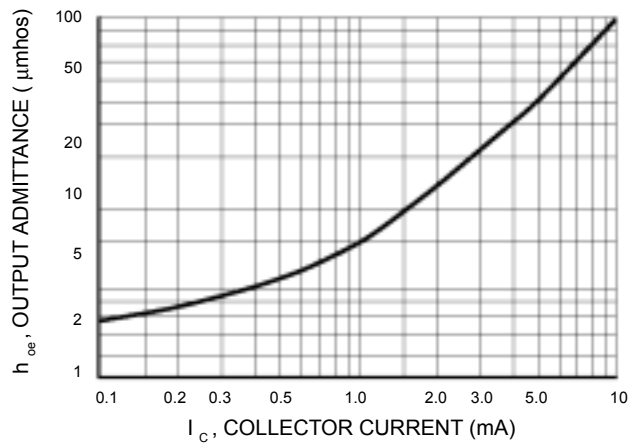


Figure 10. Output Admittance

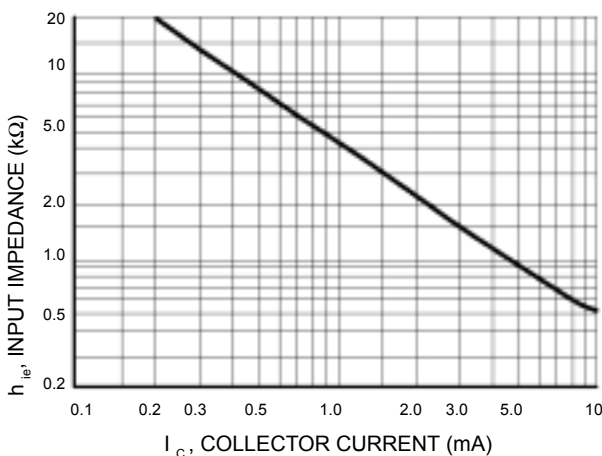


Figure 11. Input Impedance

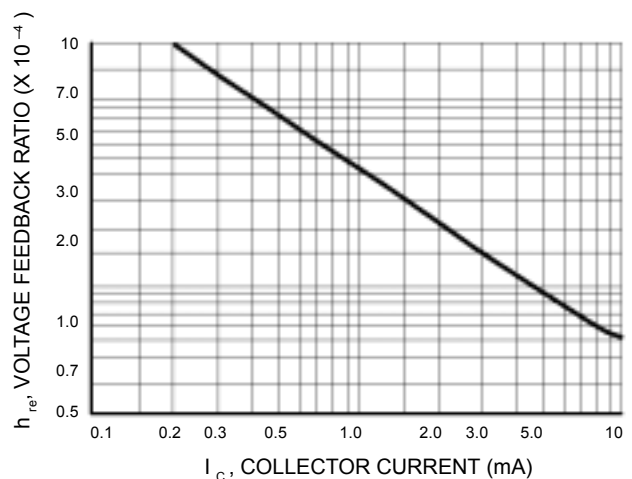


Figure 12. Voltage Feedback Ratio

General Purpose Transistors

TYPICAL STATIC CHARACTERISTICS

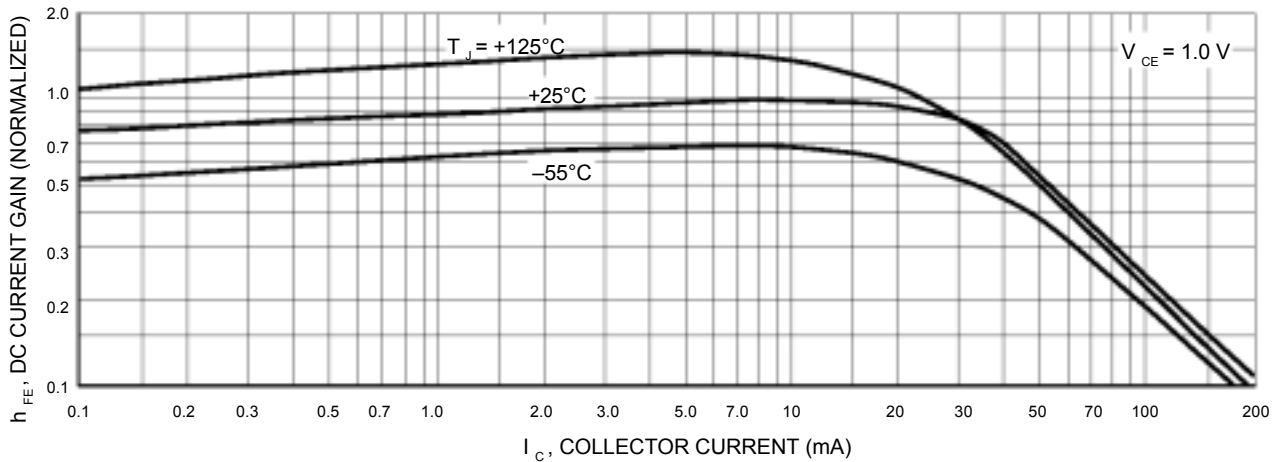


Figure 13. DC Current Gain

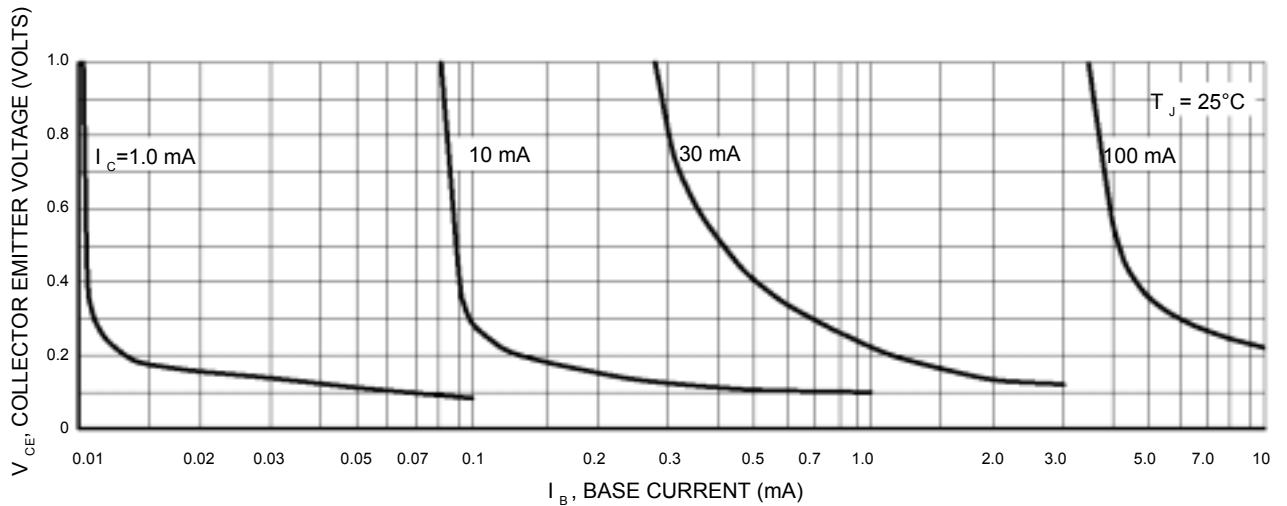


Figure 14. Collector Saturation Region

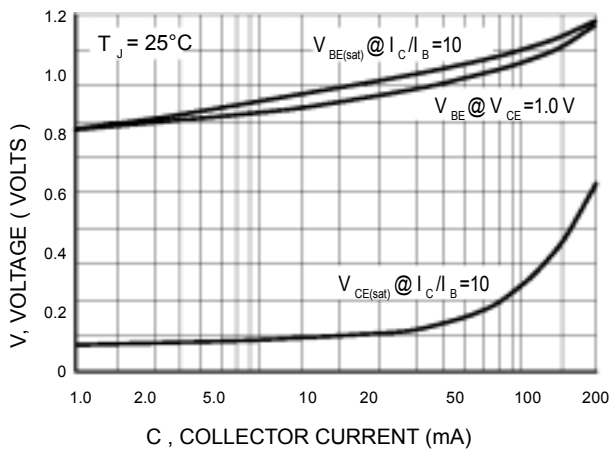


Figure 15. "ON" Voltages

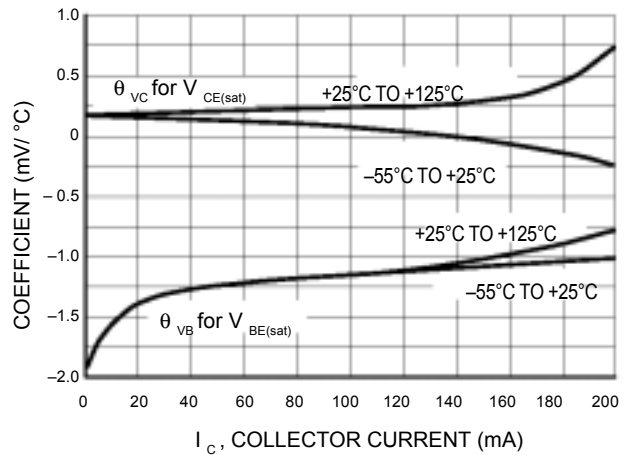
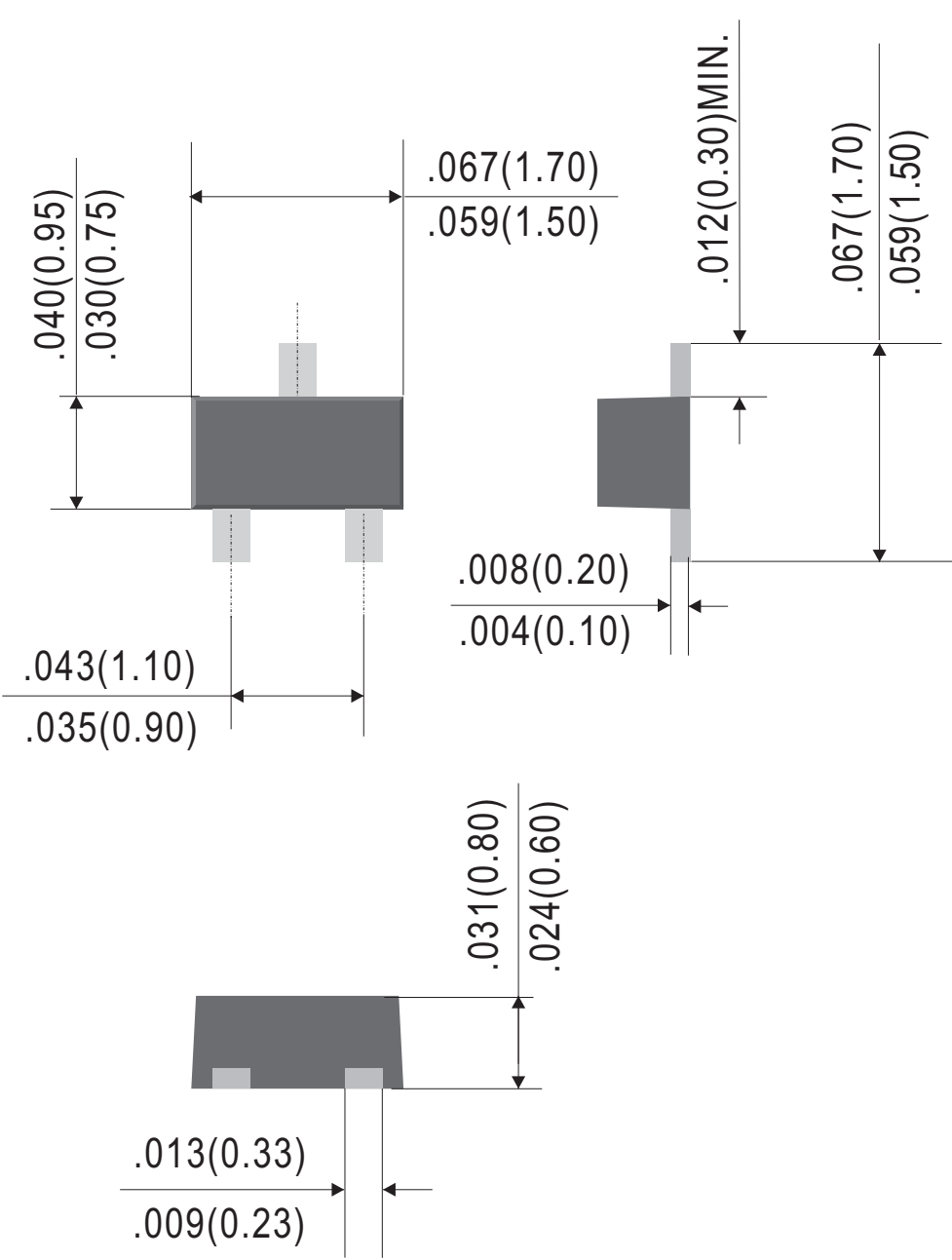


Figure 16. Temperature Coefficients

Outline Drawing

SC-89



Dimensions in inches and (millimeters)

Ordering Information:

Device PN	Packing
MMBT3906TT1 G ⁽¹⁾ -WS	Tape&Reel: 3 Kpcs/Reel

Note: (1) RoHS product for packing code suffix "G" ; Halogen free product for packing code suffix "H"

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