

General Purpose Transistors

PNP Silicon

MMBT3906TT1

This transistor is designed for general purpose amplifier applications. It is housed in the SOT-416/SC-75 package which is designed for low power surface mount applications.

Features

- NSVM Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb–Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS (T_A = 25°C)

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	Ic	-200	mAdc

THERMAL CHARACTERISTICS

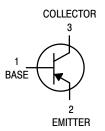
Characteristic	Symbol	Max	Unit
Total Device Dissipation, FR-4 Board (Note 1) @T _A = 25°C Derated above 25°C	P _D	200 1.6	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	600	°C/W
Total Device Dissipation, FR-4 Board (Note 2) @T _A = 25°C Derated above 25°C	P _D	300 2.4	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{ heta JA}$	400	°C/W
Junction and Storage Temperature Range	T _J , T _{stg}	-65 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1

- 1. FR-4 @ Minimum Pad
- 2. FR-4 @ 1.0 × 1.0 Inch Pad

GENERAL PURPOSE AMPLIFIER TRANSISTORS SURFACE MOUNT





CASE 463 SOT-416/SC-75 STYLE 1

MARKING DIAGRAM



2A = Device Code
M = Date Code*

= Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping _†
MMBT3906TT1G	SOT-416 (Pb-Free)	3000 / Tape & Reel
NSVMMBT3906TT1G	SOT-416 (Pb-Free)	3000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

Characteristic		Symbol	Min	Max	Unit	
OFF CHARACTERIST	ics	<u>.</u>			•	
Collector – Emitter Brea (I _C = –1.0 mAdc, I _B	akdown Voltage (Note 3) = 0)	V _{(BR)CEO}	-40	-	Vdc	
Collector – Base Break (I _C = –10 μAdc, I _E :		V _(BR) CBO	-40	-	Vdc	
Emitter – Base Breakdo ($I_E = -10 \mu Adc, I_C =$		V _{(BR)EBO}	-5.0	-	Vdc	
Base Cutoff Current (V _{CE} = -30 Vdc, V _E	_{EB} = -3.0 Vdc)	I _{BL}	_	-50	nAdc	
Collector Cutoff Currer (V _{CE} = -30 Vdc, V _E		I _{CEX}	_	-50	nAdc	
ON CHARACTERISTI	CS (Note 3)		•	•	•	
DC Current Gain	_{CE} = -1.0 Vdc) _{CE} = -1.0 Vdc) _{CE} = -1.0 Vdc)	h _{FE}	60 80 100 60 30	- 300 - -	_	
Collector – Emitter Saturation (I _C = -10 mAdc, I _B (I _C = -50 mAdc, I _B	= -1.0 mAdc)	V _{CE(sat)}	- -	-0.25 -0.4	Vdc	
Base – Emitter Saturation Voltage $ \begin{pmatrix} I_C = -10 \text{ mAdc, } I_B = -1.0 \text{ mAdc, } \\ (I_C = -50 \text{ mAdc, } I_B = -5.0 \text{ mAdc)} \end{pmatrix} $		V _{BE(sat)}	-0.65 -	-0.85 -0.95	Vdc	
SMALL-SIGNAL CHA	ARACTERISTICS					
Current – Gain – Band (I _C = –10 mAdc, V _C	width Product c _E = −20 Vdc, f = 100 MHz)	f _T	250	-	MHz	
Output Capacitance (V _{CB} = -5.0 Vdc, I _E	= 0, f = 1.0 MHz)	$C_{ m obo}$	_	4.5	pF	
Input Capacitance1 (V _{EB} = -0.5 Vdc, I _C	; = 0, f = 1.0 MHz)	C _{ibo}	-	10.0	pF	
Input Impedance (V _{CE} = -10 Vdc, I _C	= -1.0 mAdc, f = 1.0 kHz)	h _{ie}	2.0	12	kΩ	
Voltage Feedback Ratio $(V_{CE} = -10 \text{ Vdc}, I_{C} = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz})$		h _{re}	0.1	10	X 10-	
Small – Signal Current Gain $(V_{CE} = -10 \text{ Vdc}, I_{C} = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz})$		h _{fe}	100	400	-	
Output Admittance $(V_{CE} = -10 \text{ Vdc}, I_{C} = -1.0 \text{ mAdc}, f = 1.0 \text{ kHz})$		h _{oe}	3.0	60	μmho	
Noise Figure (V _{CE} = -5.0 Vdc, I _C = -100 μ Adc, R _S = 1.0 k Ω , f = 1.0 kHz)		NF	-	4.0	dB	
SWITCHING CHARAC	CTERISTICS				-	
Delay Time	$(V_{CC} = -3.0 \text{ Vdc}, V_{BE} = 0.5 \text{ Vdc})$	t _d	_	35	ns	
Rise Time	$(I_C = -10 \text{ mAdc}, I_{B1} = -1.0 \text{ mAdc})$	t _r	_	35		
Storage Time	$(V_{CC} = -3.0 \text{ Vdc}, I_C = -10 \text{ mAdc})$	t _s	_	225	ns	
Fall Time	Time $(I_{B1} = I_{B2} = -1.0 \text{ mAdc})$ t_f -		75			

^{3.} Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

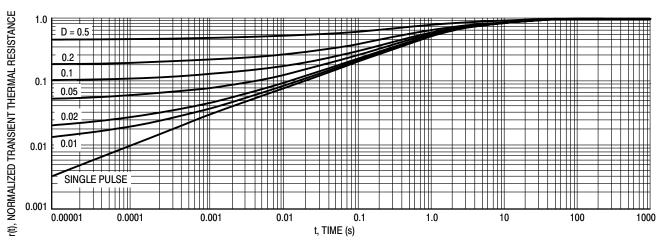
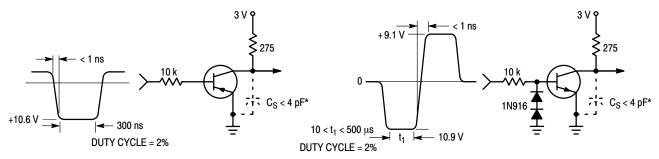


Figure 1. Normalized Thermal Response



* Total shunt capacitance of test jig and connectors

Figure 2. Delay and Rise Time Equivalent Test Circuit

Figure 3. Storage and Fall Time Equivalent Test Circuit

TYPICAL TRANSIENT CHARACTERISTICS

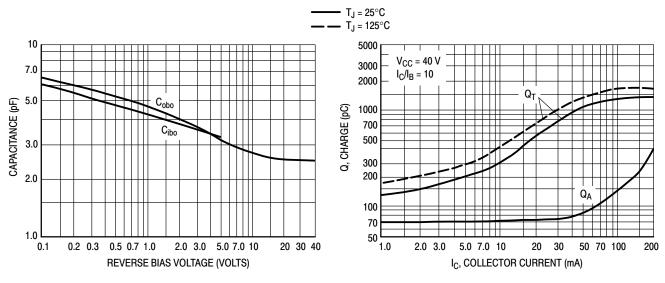
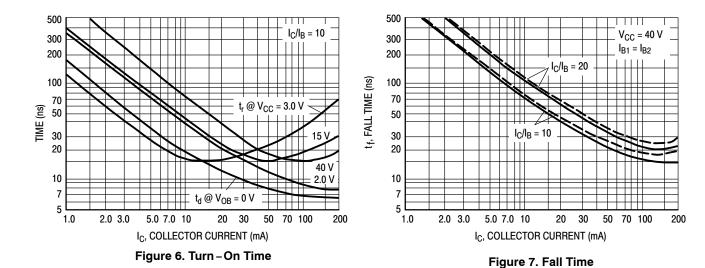


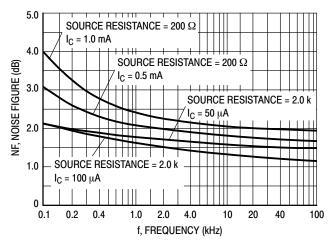
Figure 4. Capacitance

Figure 5. Charge Data



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

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



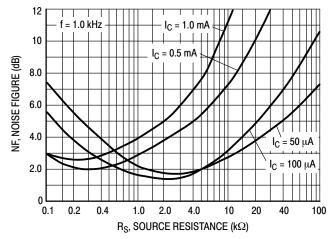
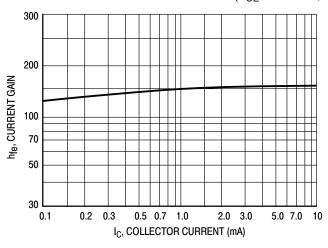


Figure 8.

Figure 9.

h PARAMETERS

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



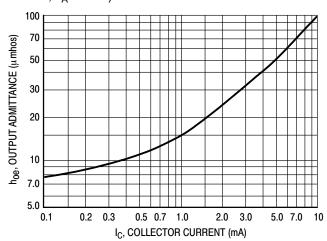
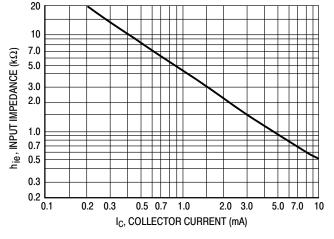


Figure 10. Current Gain

Figure 11. Output Admittance 10



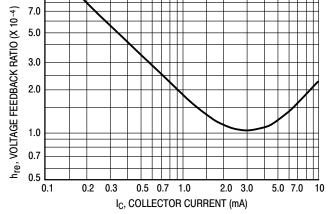


Figure 12. Input Impedance

Figure 13. Voltage Feedback Ratio

STATIC CHARACTERISTICS

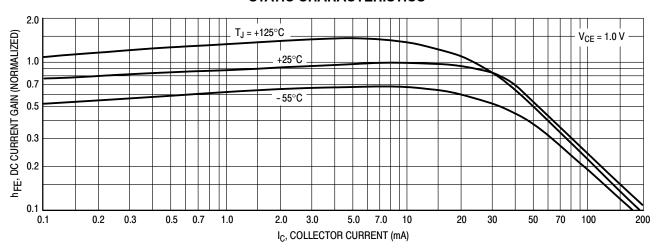


Figure 14. DC Current Gain

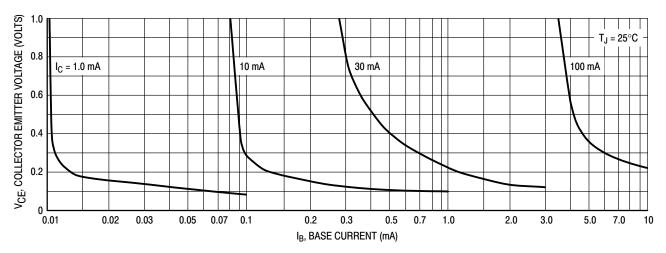


Figure 15. Collector Saturation Region

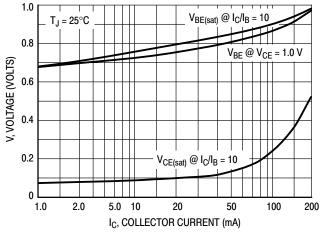


Figure 16. "ON" Voltages

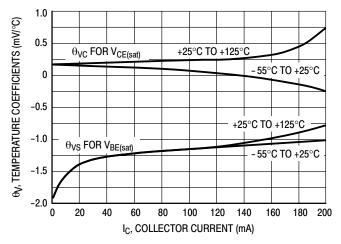


Figure 17. Temperature Coefficients



SC75-3 1.60x0.80x0.80, 1.00P

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DATE 01 FEB 2024

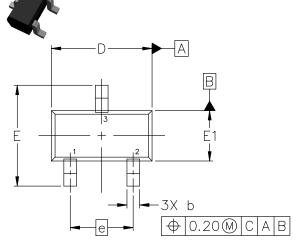
NOTES:

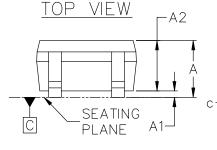
- DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
- ALL DIMENSION ARE IN MILLIMETERS.

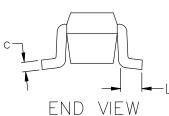
DIM	MILLIMETERS		
DIM	MIN.	NOM.	MAX.
А	0.70	0.80	0.90
A1	0.00	0.05	0.10
A2	0.80 REF.		
b	0.15	0.20	0.30
С	0.10	0.15	0.25
D	1.55	1.60	1.65
Е	1.50	1.60	1.70
E1	0.70	0.80	0.90
е	1.00 BSC		
L	0.10	0.15	0.20

-0.356

0.787







SIDE VIEW

GENERIC MARKING DIAGRAM*



XX = Specific Device Code

Μ = Date Code

= Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

STYLE 1:	
PIN 1. BASE	
2. EMITTER	

3 COLLECTOR

STYLE 2: PIN 1. ANODE 2. N/C 3. CATHODE

STYLE 3: PIN 1. ANODE 2. ANODE 3 CATHODE

RECOMMENDED MOUNTING FOOTPRINT* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES

REFERENCE MANUAL, SOLDERRM/D.

1.000

STYLE 4:	STYLE 5:
PIN 1. CATHODE	PIN 1. GATE
2. CATHODE	2. SOURCE
3. ANODE	3. DRAIN

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DESCRIPTION: SC75-3 1.60x0.80x0.80, 1.00P PAGE 1 OF 1

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