MMBT4403M3T5G

PNP Switching Transistor

The MMBT4403M3T5G device is a spin−off of our popular SOT−23 three−leaded device. It is designed for general purpose switching applications and is housed in the SOT−723 surface mount package. This device is ideal for low−power surface mount applications where board space is at a premium.

Features

- Reduces Board Space
- This is a Halide−Free Device
- This is a Pb−Free Device

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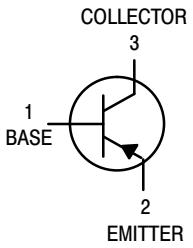


MAXIMUM RATINGS

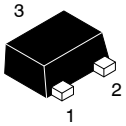
Rating	Symbol	Value	Unit
Collector − Emitter Voltage	V_{CEO}	−40	Vdc
Collector − Base Voltage	V_{CBO}	−40	Vdc
Emitter − Base Voltage	V_{EBO}	−5.0	Vdc
Collector Current − Continuous	I_C	−600	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board (Note 1) T_A = 25°C Derate above 25°C	P_D	265 2.1	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	470	°C/W
Total Device Dissipation Alumina Substrate, (Note 2) T_A = 25°C Derate above 25°C	P_D	640 5.1	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	195	°C/W
Junction and Storage Temperature	T_J, T_{stg}	−55 to +150	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR−5 = 1.0 × 0.75 × 0.062 in.
2. Alumina = 0.4 × 0.3 × 0.024 in. 99.5% alumina.



SOT−723
CASE 631AA
STYLE 1

MARKING DIAGRAM

AG = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
MMBT4403M3T5G	SOT−723 (Pb−Free)	8000/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 CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (Note 3)	(I_C = –1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	–40	–	Vdc
Collector – Base Breakdown Voltage	(I_C = –0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	–40	–	Vdc
Emitter – Base Breakdown Voltage	(I_E = –0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	–5.0	–	Vdc
Base Cutoff Current	(V_{CE} = –35 Vdc, V_{EB} = –0.4 Vdc)	I_{BEV}	–	–0.1	μAdc
Collector Cutoff Current	(V_{CE} = –35 Vdc, V_{EB} = –0.4 Vdc)	I_{CEX}	–	–0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			–
	(I_C = –0.1 mAdc, V_{CE} = –1.0 Vdc)		30	–	
	(I_C = –1.0 mAdc, V_{CE} = –1.0 Vdc)		60	–	
	(I_C = –10 mAdc, V_{CE} = –1.0 Vdc)		100	–	
(Note 3)	(I_C = –150 mAdc, V_{CE} = –2.0 Vdc)		100	300	
(Note 3)	(I_C = –500 mAdc, V_{CE} = –2.0 Vdc)		20	–	
Collector – Emitter Saturation Voltage (Note 3)		$V_{CE(sat)}$			Vdc
	(I_C = –150 mAdc, I_B = –15 mAdc)		–	–0.4	
	(I_C = –500 mAdc, I_B = –50 mAdc)		–	–0.75	
Base – Emitter Saturation Voltage (Note 3)		$V_{BE(sat)}$			Vdc
	(I_C = –150 mAdc, I_B = –15 mAdc)		–0.75	–0.95	
	(I_C = –500 mAdc, I_B = –50 mAdc)		–	–1.3	
SMALL–SIGNAL CHARACTERISTICS					
Current – Gain – Bandwidth Product	(I_C = –20 mAdc, V_{CE} = –10 Vdc, f = 100 MHz)	f_T	200	–	MHz
Collector–Base Capacitance	(V_{CB} = –10 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	–	8.5	pF
Emitter–Base Capacitance	(V_{BE} = –0.5 Vdc, I_C = 0, f = 1.0 MHz)	C_{eb}	–	30	pF
Input Impedance	(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)	h_{ie}	1.5	15	kΩ
Voltage Feedback Ratio	(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)	h_{re}	0.1	8.0	X 10^{-4}
Small – Signal Current Gain	(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)	h_{fe}	60	500	–
Output Admittance	(I_C = –1.0 mAdc, V_{CE} = –10 Vdc, f = 1.0 kHz)	h_{oe}	1.0	100	μMhos
SWITCHING CHARACTERISTICS					
Delay Time	(V_{CC} = –30 Vdc, V_{EB} = –2.0 Vdc, I_C = –150 mAdc, I_{B1} = –15 mAdc)	t_d	–	15	ns
Rise Time		t_r	–	20	
Storage Time	(V_{CC} = –30 Vdc, I_C = –150 mAdc, I_{B1} = I_{B2} = –15 mAdc)	t_s	–	225	ns
Fall Time		t_f	–	30	

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

SWITCHING TIME EQUIVALENT TEST CIRCUIT

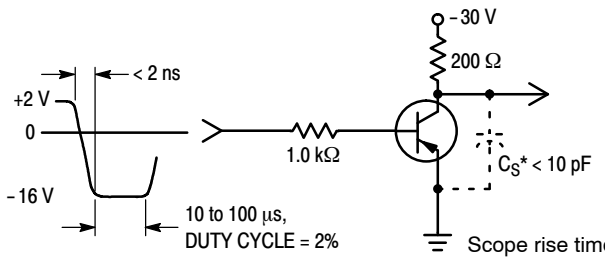


Figure 1. Turn–On Time

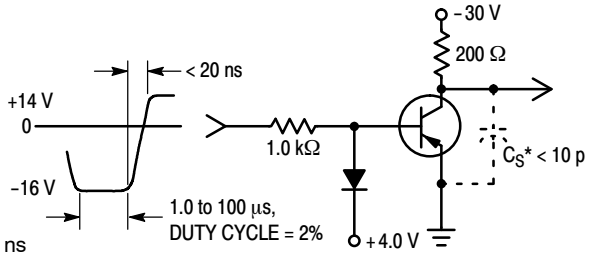


Figure 2. Turn–Off Time

Scope rise time < 4.0 ns
*Total shunt capacitance of test jig connectors, and oscilloscope

STATIC CHARACTERISTICS

Figure 3. DC Current Gain

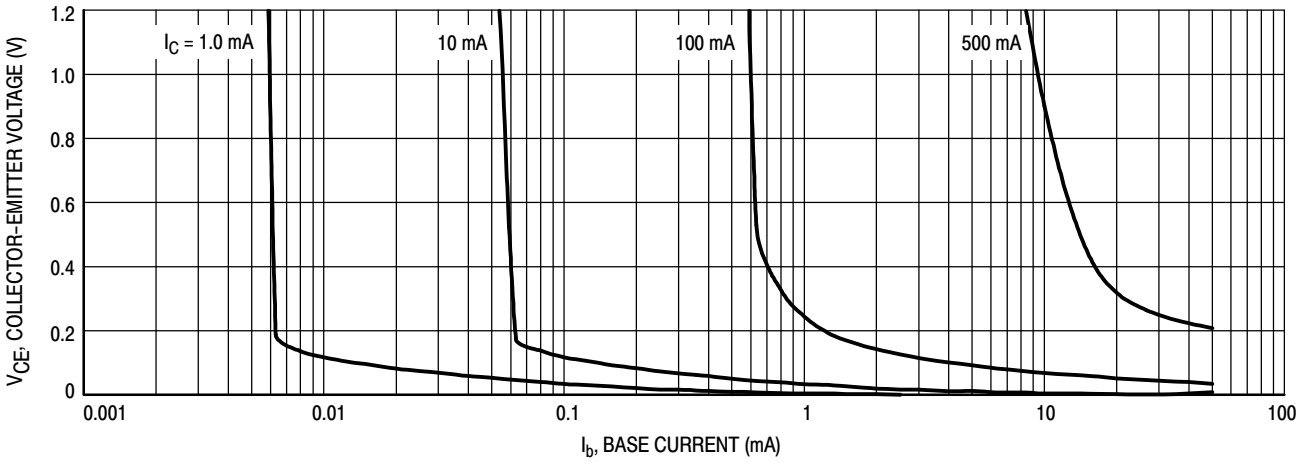


Figure 4. Collector Saturation Region

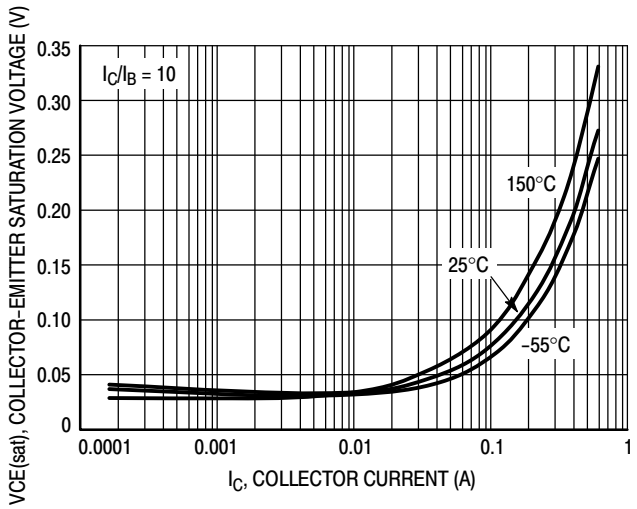


Figure 5. Collector−Emitter Saturation Voltage vs. Collector Current

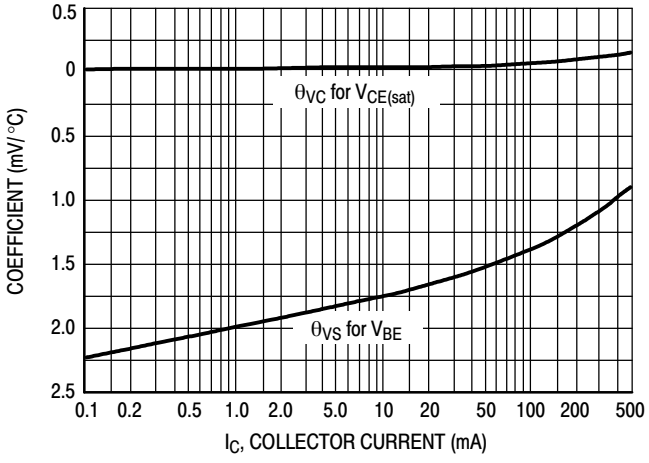


Figure 6. Temperature Coefficients

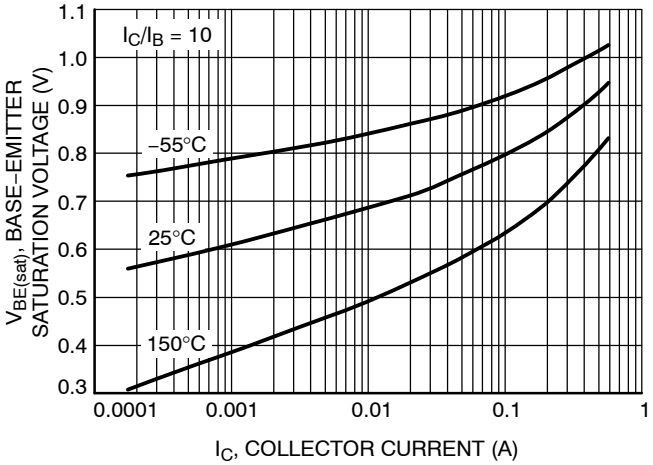


Figure 7. Base−Emitter Saturation Voltage vs. Collector Current

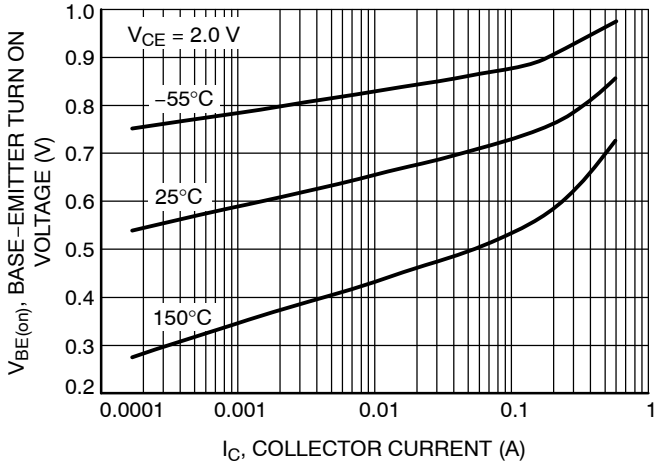


Figure 8. Base−Emitter Turn On Voltage vs. Collector Current

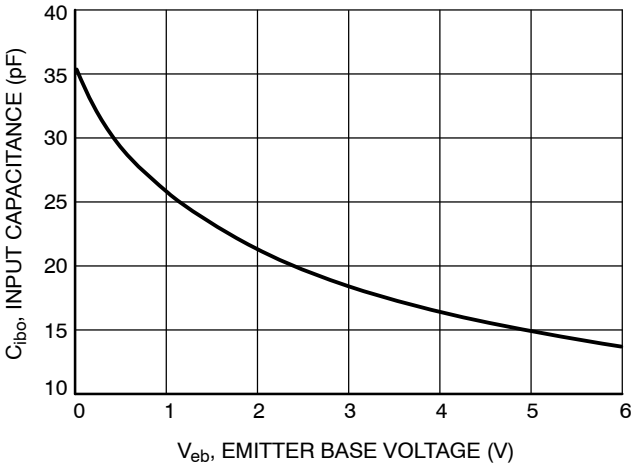


Figure 9. Input Capacitance vs. Emitter Base Voltage

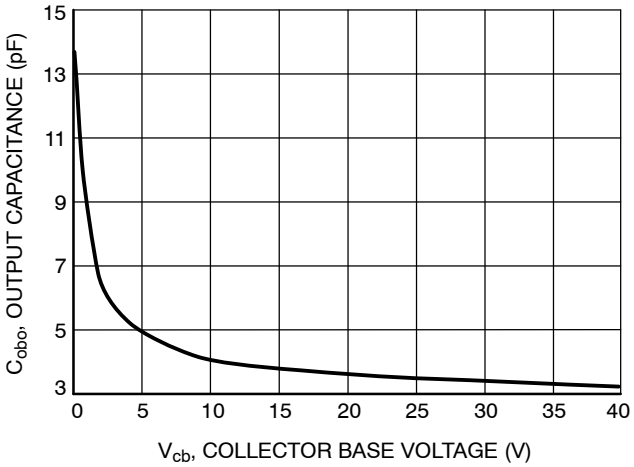
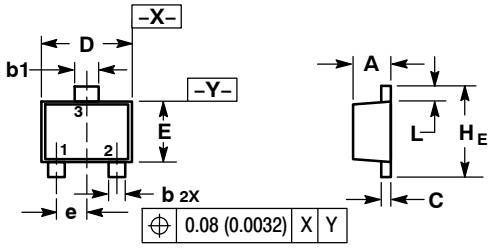


Figure 10. Output Capacitance vs. Collector Base Voltage

MMBT4403M3T5G

PACKAGE DIMENSIONS

SOT−723
CASE 631AA−01
ISSUE C

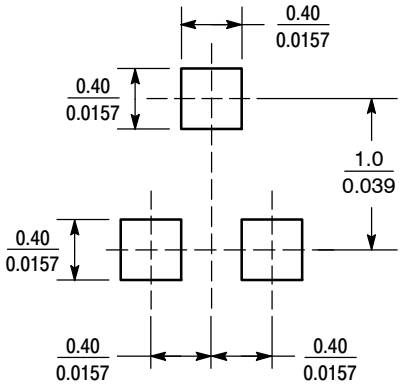


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
b	0.15	0.21	0.27	0.0059	0.0083	0.0106
b1	0.25	0.31	0.37	0.010	0.012	0.015
C	0.07	0.12	0.17	0.0028	0.0047	0.0067
D	1.15	1.20	1.25	0.045	0.047	0.049
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.40 BSC			0.016 BSC		
H E	1.15	1.20	1.25	0.045	0.047	0.049
L	0.15	0.20	0.25	0.0059	0.0079	0.0098

STYLE 1:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



SCALE 20:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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