MMBT5401M3

High Voltage Transistor

PNP Silicon

The MMBT5401M3 device is a spin−off of our popular SOT−23 three−leaded device. It is designed for general purpose amplifier 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

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector − Emitter Voltage	V_{CEO}	−150	Vdc
Collector − Base Voltage	V_{CBO}	−160	Vdc
Emitter − Base Voltage	V_{EBO}	−5.0	Vdc
Collector Current − Continuous	I_C	−60	mAdc

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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR−5 Board (Note 1) T_A = 25°C Derate Above 25°C	P_D	130 1.0	mW mW/°C
Thermal Resistance, Junction−to−Ambient (Note 1)	$R_{\theta JA}$	470	°C/W
Junction and Storage Temperature	T_J, T_{stg}	−55 to +150	°C

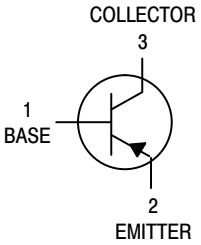
1. FR−5 @ 100 mm^2, 1.0 oz. copper traces, still air.

ON Semiconductor®

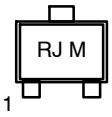
www.onsemi.com



SOT−723
CASE 631AA



MARKING DIAGRAM



RJ = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
MMBT5401M3T5G	SOT−723 (Pb−Free)	8000 / Tape & Reel
NSVMMBT5401M3T5G	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.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage (I_C = −1.0 mA, I_B = 0)	$V_{(BR)CEO}$	−150	–	–	V
Collector – Base Breakdown Voltage (I_C = −100 μA, I_E = 0)	$V_{(BR)CBO}$	−160	–	–	V
Emitter – Base Breakdown Voltage (I_E = −10 μA, I_C = 0)	$V_{(BR)EBO}$	−5.0	–	–	V
Collector–Base Cutoff Current (V_{CB} = −120 V, I_E = 0)	I_{CBO}	–	−1.6	−100	nA
Emitter Cutoff Current (V_{BE} = −5 V)	I_{EBO}	–	−0.20	−100	nA
ON CHARACTERISTICS					
DC Current Gain (I_C = −1.0 mA, V_{CE} = −5.0 V) (I_C = −10 mA, V_{CE} = −5.0 V) (I_C = −50 mA, V_{CE} = −5.0 V)	h_{FE}	 50 60 20	 80 90 40	 – 240 –	–
Collector – Emitter Saturation Voltage (I_C = −10 mA, I_B = −1.0 mA) (I_C = −50 mA, I_B = −5.0 mA)	$V_{CE(sat)}$	 – –	 −0.09 −0.15	 −0.25 −0.60	V
Base – Emitter Saturation Voltage (I_C = −10 mA, I_B = −1.0 mA) (I_C = −50 mA, I_B = −5.0 mA)	$V_{BE(sat)}$	 – –	 −0.76 −0.92	 −1.0 −1.0	V
SMALL– SIGNAL CHARACTERISTICS					
Current – Gain — Bandwidth Product (I_C = −10 mA, V_{CE} = −5.0 V, f = 100 MHz)	f_T	100	180	300	MHz
Input Capacitance (V_{EB} = −3 V, I_C = 0, f = 1.0 MHz)	C_{ibo}	–	12.5	15	pF
Output Capacitance (V_{CB} = −10 V, I_E = 0, f = 1.0 MHz)	C_{obo}	–	1.5	6.0	pF
Small Signal Current Gain (I_C = −1.0 mA, V_{CE} = −10 V, f = 1.0 kHz)	h_{fe}	40	–	200	–
Noise Figure (I_C = −200 μA, V_{CE} = −5.0 V, R_S = 10 Ω, f = 1.0 kHz)	NF	–	–	8.0	dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

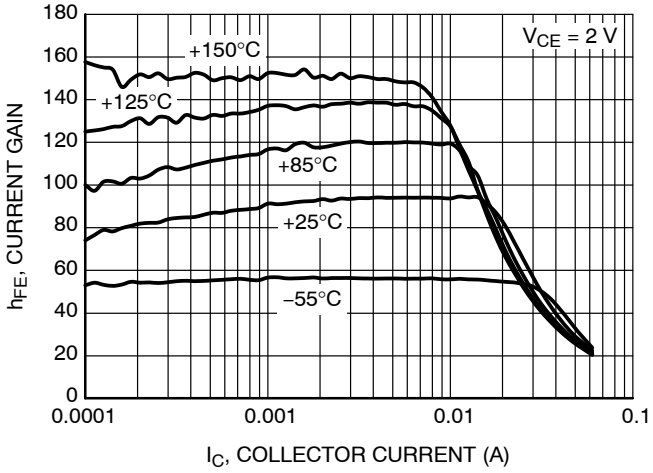


Figure 1. DC Current Gain

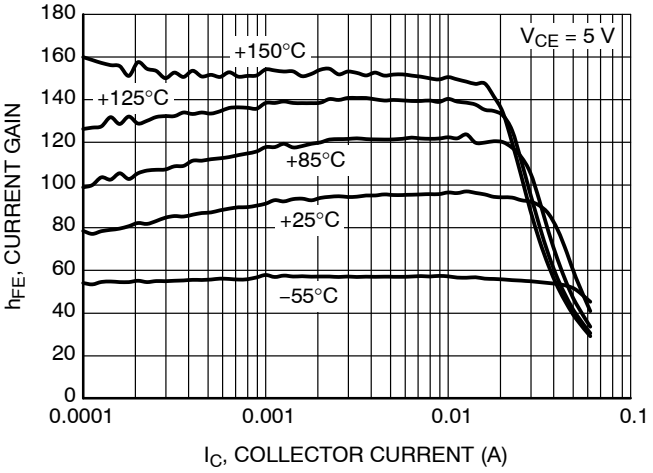


Figure 2. DC Current Gain

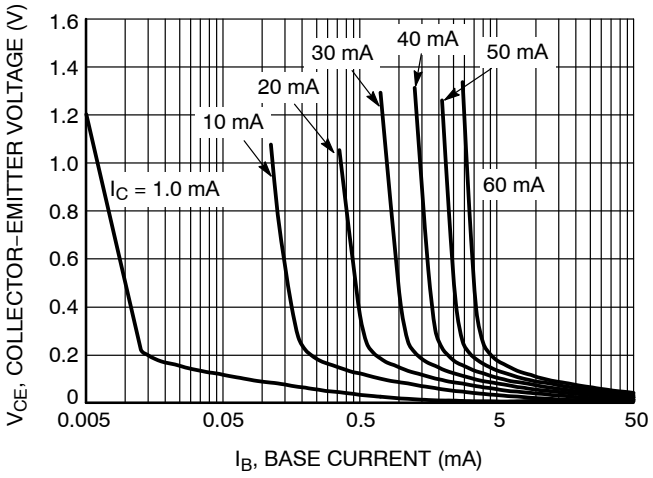


Figure 3. Collector Saturation Region

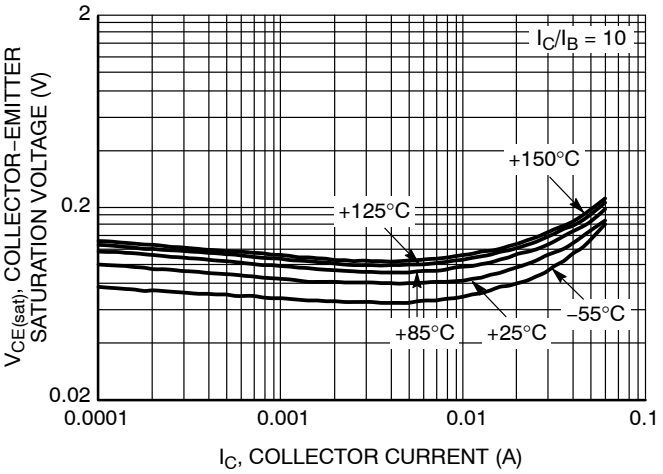


Figure 4. Collector−Emitter Saturation Region

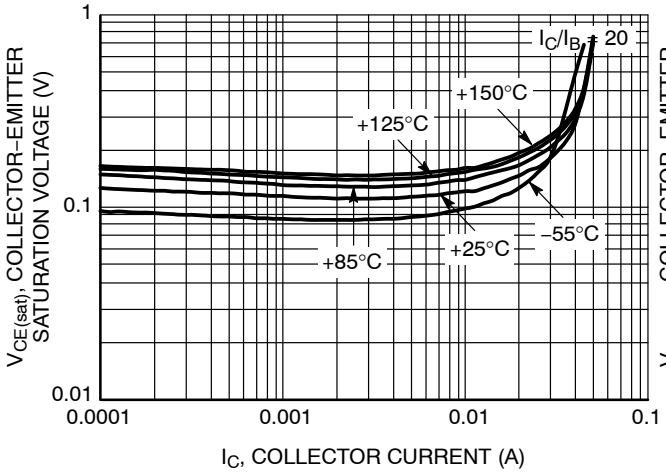


Figure 5. Collector−Emitter Saturation Region

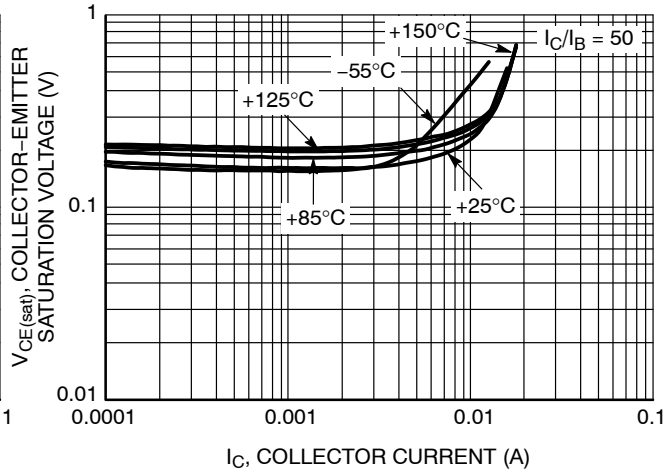


Figure 6. Collector−Emitter Saturation Region

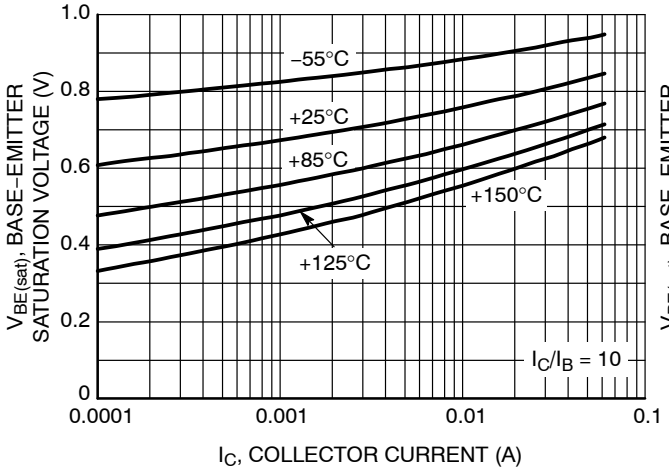


Figure 7. Base−Emitter Saturation Voltage

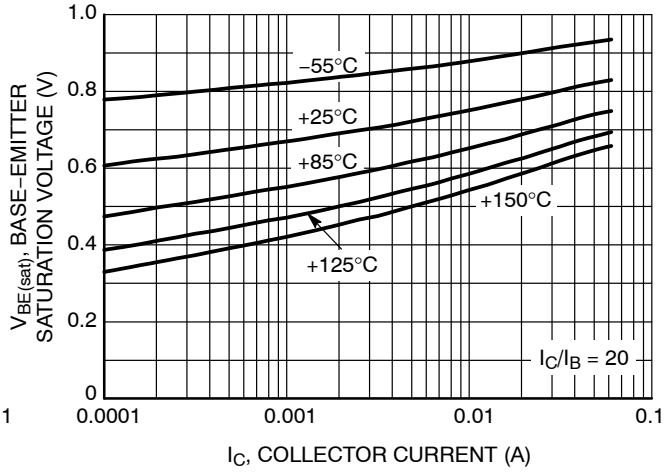


Figure 8. Base−Emitter Saturation Voltage

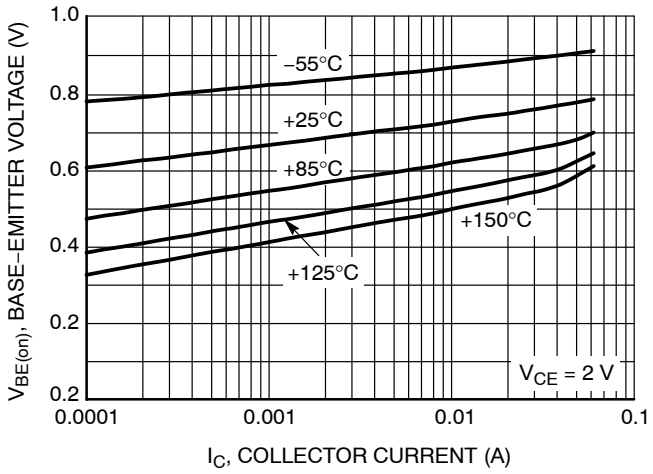


Figure 9. Base−Emitter “ON” Voltage

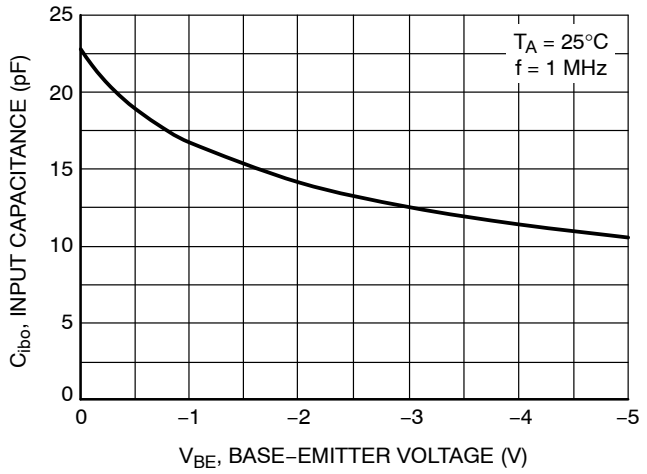


Figure 10. Input Capacitance

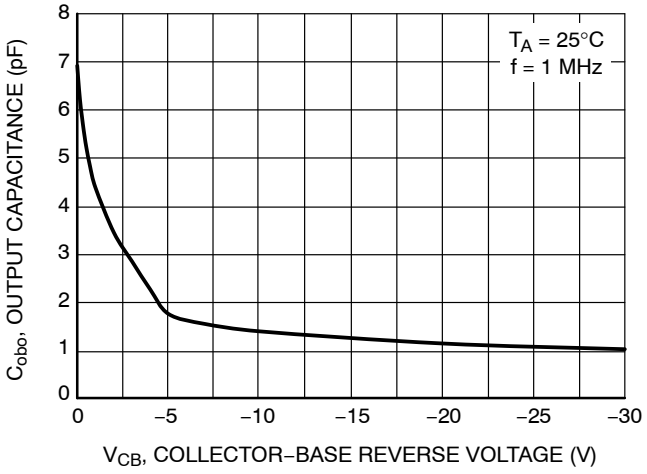


Figure 11. Output Capacitance

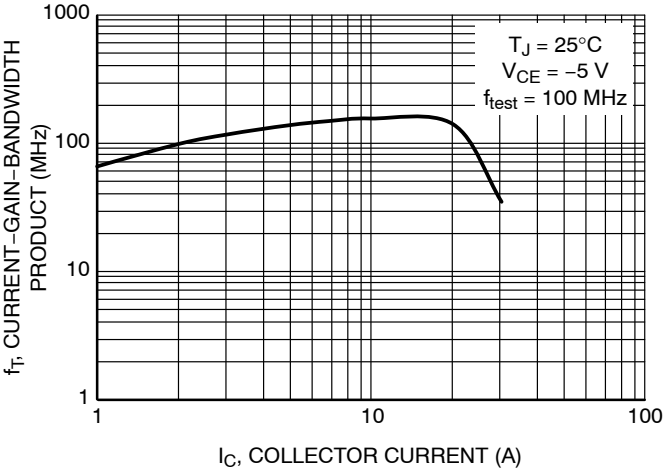


Figure 12. Current Gain Bandwidth Product

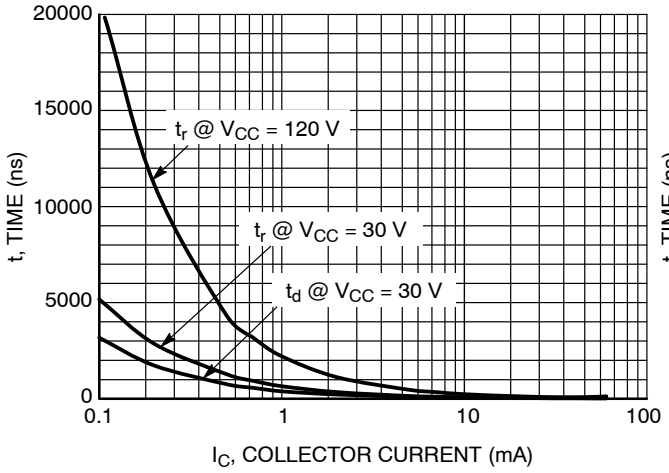


Figure 13. Turn−On Time

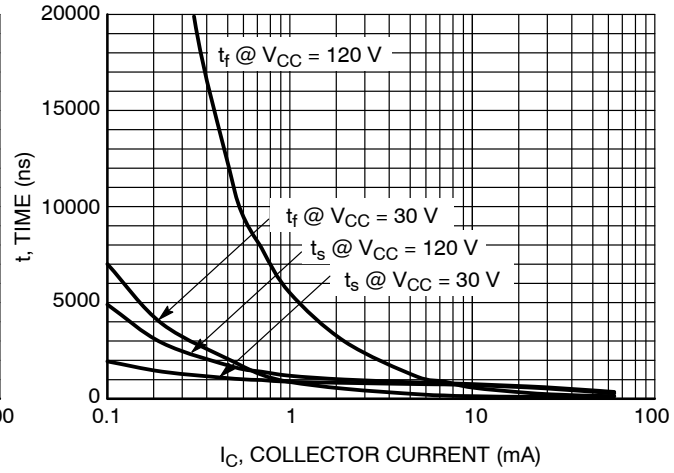


Figure 14. Turn−Off Time

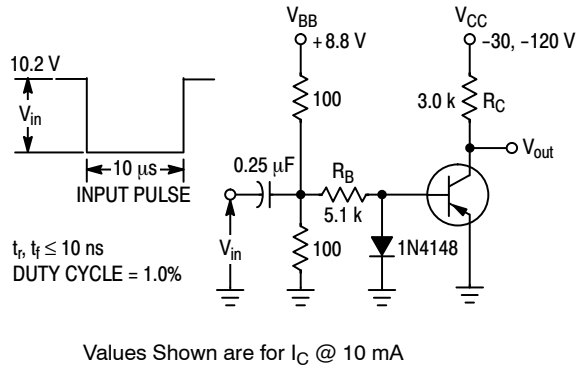


Figure 15. Switching Time Test Circuit

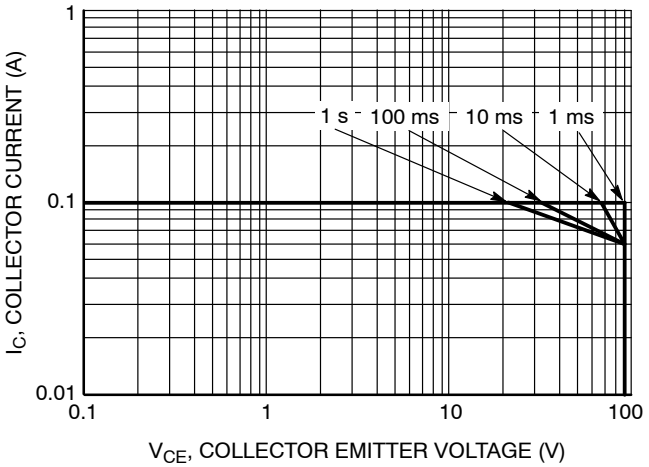
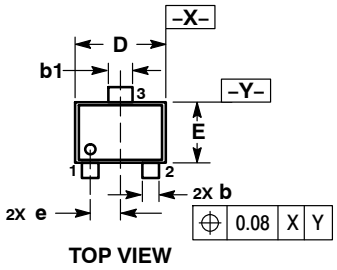


Figure 16. Safe Operating Area

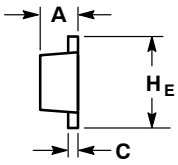
MMBT5401M3

PACKAGE DIMENSIONS

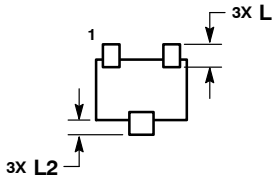
SOT−723
CASE 631AA
ISSUE D



TOP VIEW



SIDE VIEW

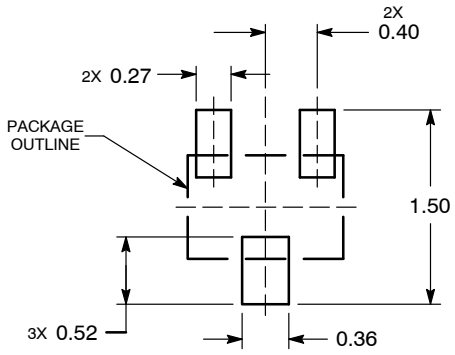


BOTTOM VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
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		
DIM	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

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