

High Voltage Transistor

PNP Silicon

MMBT5401M3

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

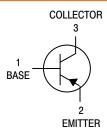
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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	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.





MARKING DIAGRAM



RJ = Specific Device Code Μ = Date Code

ORDERING INFORMATION

Device	Package	Shipping [†]
MMBT5401M3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel
NSVMMBT5401M3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel

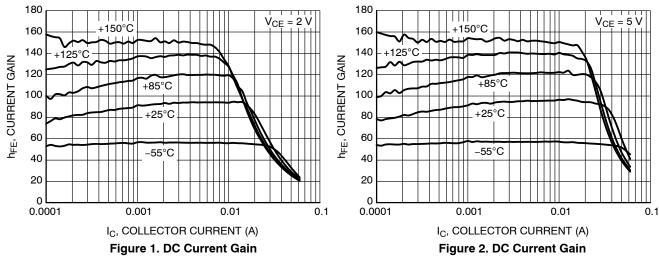
[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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

Characteristic	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS					
Collector – Emitter Breakdown Voltage $(I_C = -1.0 \text{ mA}, I_B = 0)$	V _{(BR)CEO}	-150	-	-	V
Collector – Base Breakdown Voltage $(I_C = -100 \mu A, I_E = 0)$	V _{(BR)CBO}	-160	-	-	V
Emitter – Base Breakdown Voltage ($I_E = -10 \mu A$, $I_C = 0$)	V _{(BR)EBO}	-5.0	-	-	V
Collector-Base Cutoff Current (V _{CB} = -120 V, I _E = 0)	Ісво	-	-1.6	-100	nA
Emitter Cutoff Current (V _{BE} = -5 V)	I _{EBO}	-	-0.20	-100	nA
ON CHARACTERISTICS					
DC Current Gain	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 $(V_{EB} = -3 \text{ V, } I_C = 0, f = 1.0 \text{ MHz})$	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 = $-200 \mu\text{A}$, V _{CE} = -5.0V , R _S = 10Ω , f = 1.0kHz)	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





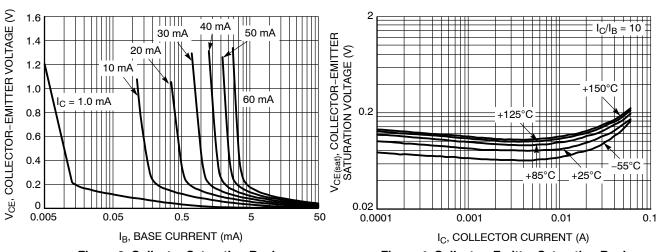


Figure 3. Collector Saturation Region

Figure 4. Collector-Emitter Saturation Region

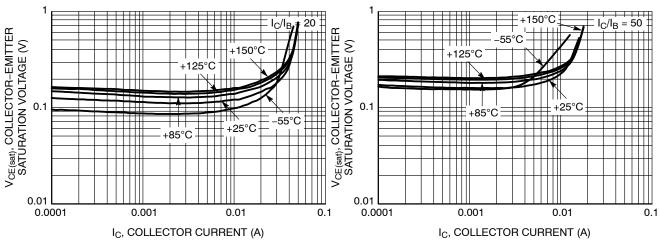


Figure 5. Collector-Emitter Saturation Region

Figure 6. Collector-Emitter Saturation Region

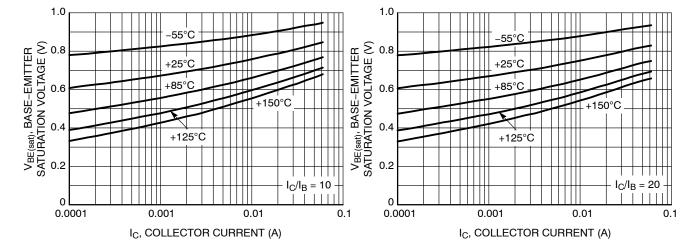


Figure 7. Base-Emitter Saturation Voltage

Figure 8. Base-Emitter Saturation Voltage

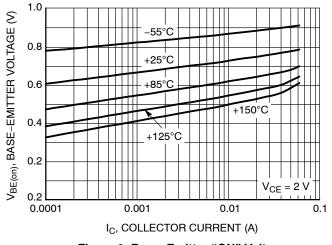


Figure 9. Base-Emitter "ON" Voltage

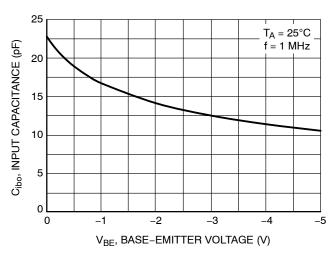


Figure 10. Input Capacitance

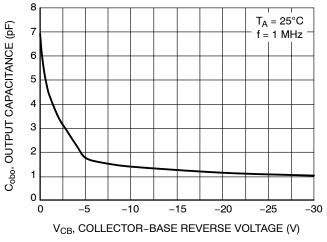


Figure 11. Output Capacitance

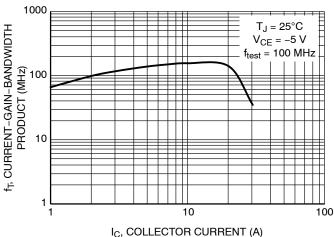


Figure 12. Current Gain Bandwidth Product

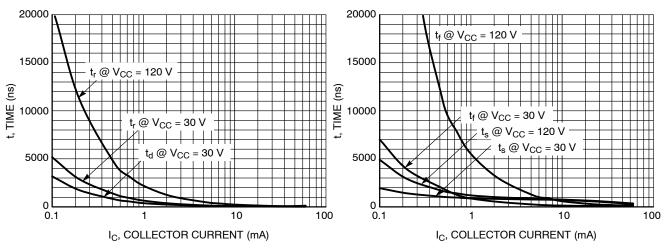


Figure 13. Turn-On Time

Figure 14. Turn-Off Time

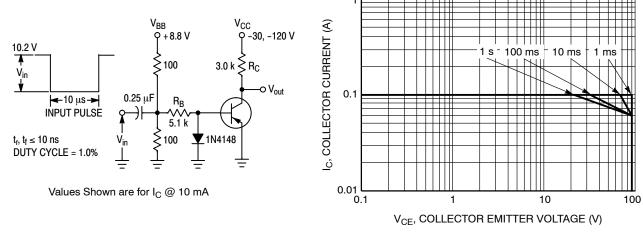


Figure 15. Switching Time Test Circuit

Figure 16. Safe Operating Area





SOT-723 1.20x0.80x0.50, 0.40P CASE 631AA ISSUE E

DATE 24 JAN 2024

MAX.

0.55

0.27

0.37

0.17

1.25

0.85

1.25

0.25

MILLIMETERS

 $N\square M$.

0.50

0.21

0.31

0.12

1.20

0.80

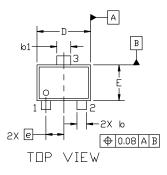
0.40 BSC

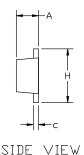
1.20

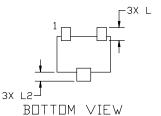
0.29 REF

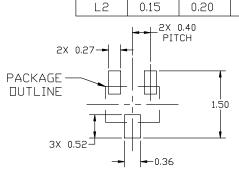
NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
- 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.









DIM

Α

b

b1

c D

Ε

e H

L

MIN.

0.45

0.15

0.25

0.07

1.15

0.75

1.15

RECOMMENDED MOUNTING FOOTPRINT

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

GENERIC MARKING DIAGRAM*



XX = Specific Device Code M = Date Code

*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:	STYLE 2:	STYLE 3:	STYLE 4:	STYLE 5:
PIN 1. BASE	PIN 1. ANODE	PIN 1. ANODE	PIN 1. CATHODE	PIN 1. GATE
2. EMITTER	2. N/C	2. ANODE	CATHODE	SOURCE
COLLECTOR	CATHODE	CATHODE	ANODE	DRAIN

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DESCRIPTION:	SOT-723 1.20x0.80x0.50, 0.40P		PAGE 1 OF 1	

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