

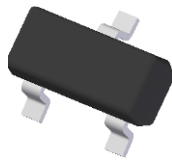
Features

- Epitaxial Planar Die Construction
- Complementary NPN Type - MMBT5551
- Ideal for Low Power Amplification and Switching
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **This part is qualified to JEDEC standards (as references in AEC-Q) for High Reliability.**
<https://www.diodes.com/quality/product-definitions/>
- **An automotive-compliant part is available under separate datasheet ([MMBT5401Q](#))**

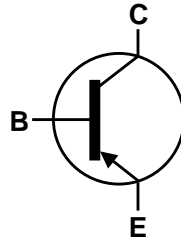
Mechanical Data

- Package: SOT23
- Package Material: Molded Plastic, "Green" Molding Compound
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 [Ⓢ]
- Weight: 0.008 grams (Approximate)

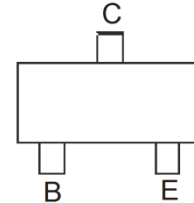
SOT23



Top View



Device Symbol



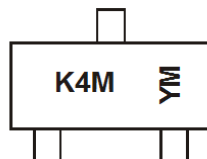
Top View
Pinout

Ordering Information (Note 4)

Part Number	Package	Marking	Reel Size (inches)	Tape Width (mm)	Packing	
					Qty.	Carrier
MMBT5401-7-F	SOT23	K4M	7	8	3,000	Reel
MMBT5401-13-F	SOT23	K4M	13	8	10,000	Reel

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
 3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 4. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K4M = Product Type Marking Code
 YM = Date Code Marking
 Y = Year (ex: L = 2024)
 M = Month (ex: 3 = March)

Date Code Key

Year	2017	-	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	E	-	L	M	N	P	R	S	T	U	V	W

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	-160	V
Collector-Emitter Voltage	V _{CEO}	-150	V
Emitter-Base Voltage	V _{EBO}	-5	V
Collector Current	I _C	-600	mA

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

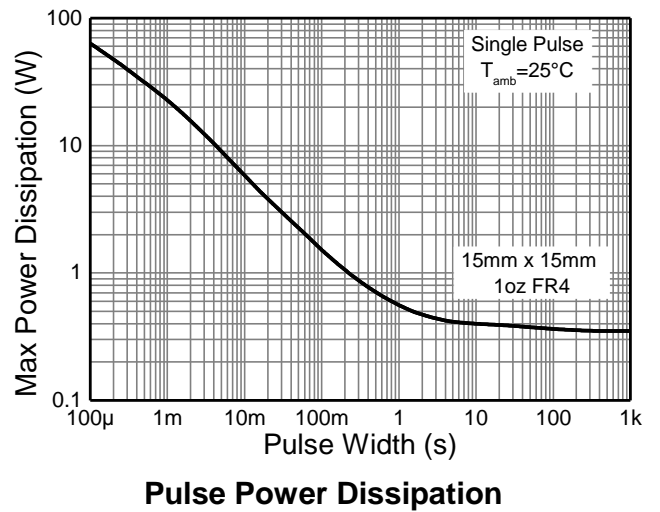
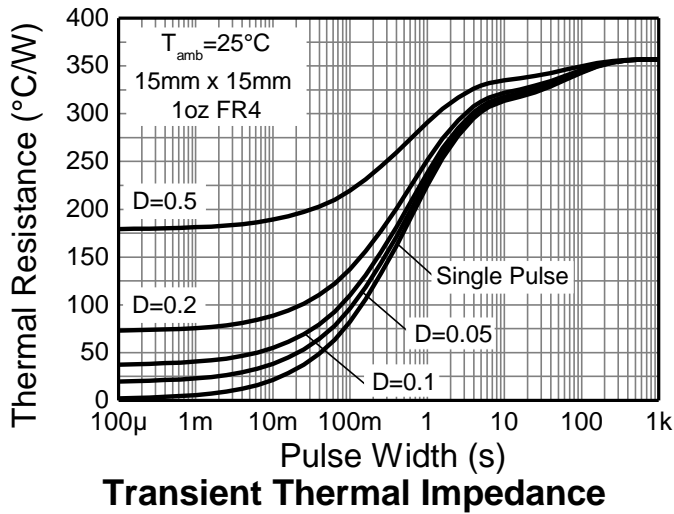
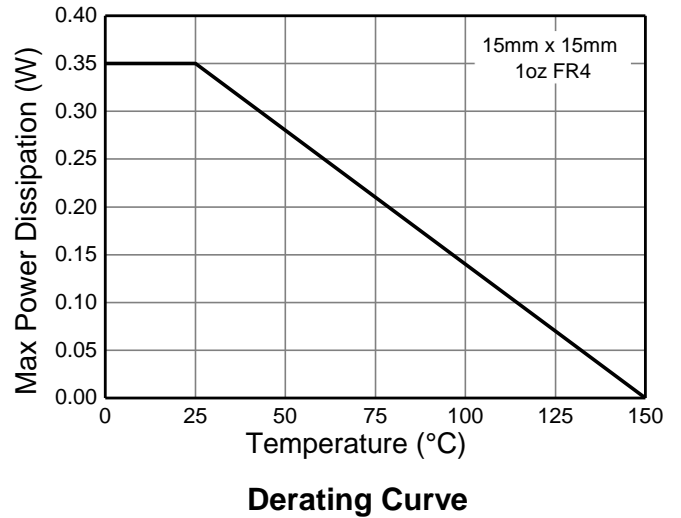
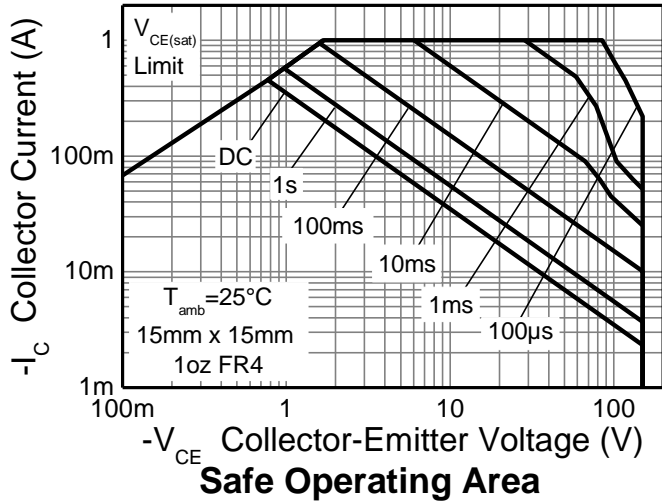
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 5) 310	mW
		(Note 6) 350	
Thermal Resistance, Junction to Ambient	R _{θJA}	(Note 5) 403	°C/W
		(Note 6) 357	
Thermal Resistance, Junction to Leads	R _{θJL}	350	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 8)

Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as note (5), except the device is mounted on 15mm x 15mm 1oz copper.
 7. Thermal resistance from junction to solder-point (at the end of the leads).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Thermal Characteristics and Derating Information



Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)					
Collector-Base Breakdown Voltage	BV _{CBO}	-160	—	V	I _C = -100μA, I _E = 0
Collector-Emitter Breakdown Voltage	BV _{CEO}	-150	—	V	I _C = -1mA, I _B = 0
Emitter-Base Breakdown Voltage	BV _{EBO}	-5	—	V	I _E = -100μA, I _C = 0
Collector Cutoff Current	I _{CBO}	—	-50 -50	nA μA	V _{CB} = -120V, I _E = 0 V _{CB} = -120V, I _E = 0, T _A = +100°C
Emitter Cutoff Current	I _{EBO}	—	-50	nA	V _{EB} = -4V, I _C = 0
ON CHARACTERISTICS (Note 9)					
DC Current Gain	h _{FE}	50 60 50	— 240 —	—	I _C = -1mA, V _{CE} = -5V I _C = -10mA, V _{CE} = -5V I _C = -50mA, V _{CE} = -5V
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	-0.2 -0.5	V	I _C = -10mA, I _B = -1mA I _C = -50mA, I _B = -5mA
Base-Emitter Saturation Voltage	V _{BE(sat)}	—	-1	V	I _C = -10mA, I _B = -1mA I _C = -50mA, I _B = -5mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C _{obo}	—	6	pF	V _{CB} = -10V, f = 1MHz, I _E = 0
Small Signal Current Gain	h _{fe}	40	260	—	V _{CE} = -10V, I _C = -1mA, f = 1kHz
Current Gain-Bandwidth Product	f _T	100	300	MHz	V _{CE} = -10V, I _C = -10mA, f = 100MHz
Noise Figure	NF	—	8.0	dB	V _{CE} = -5V, I _C = -200μA, R _S = 10Ω, f = 1kHz

Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

Typical Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

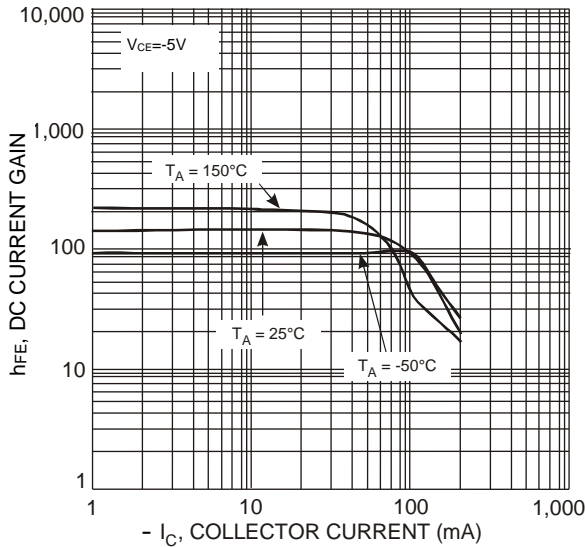


Fig. 1 Typical DC Current Gain vs. Collector Current

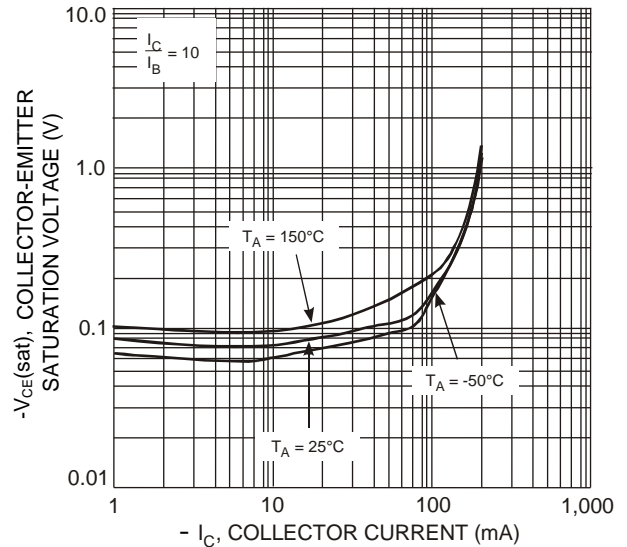


Fig. 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

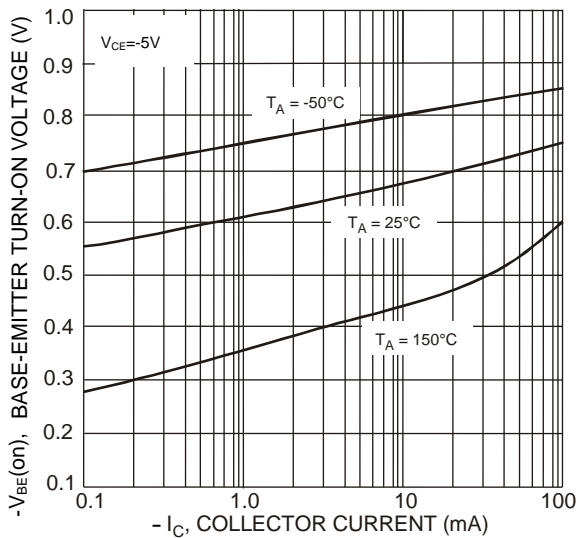


Fig. 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

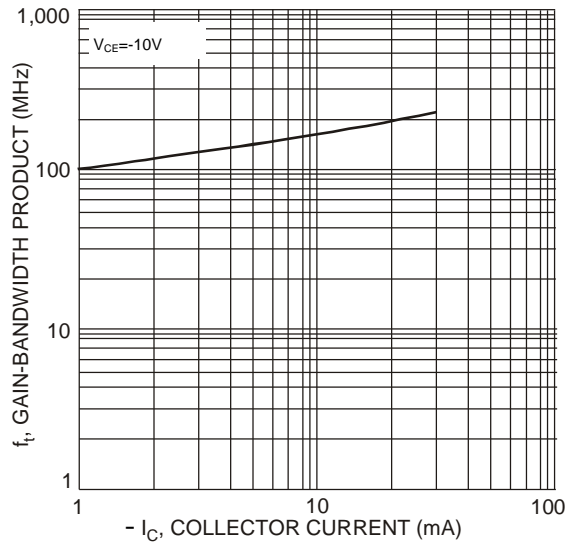
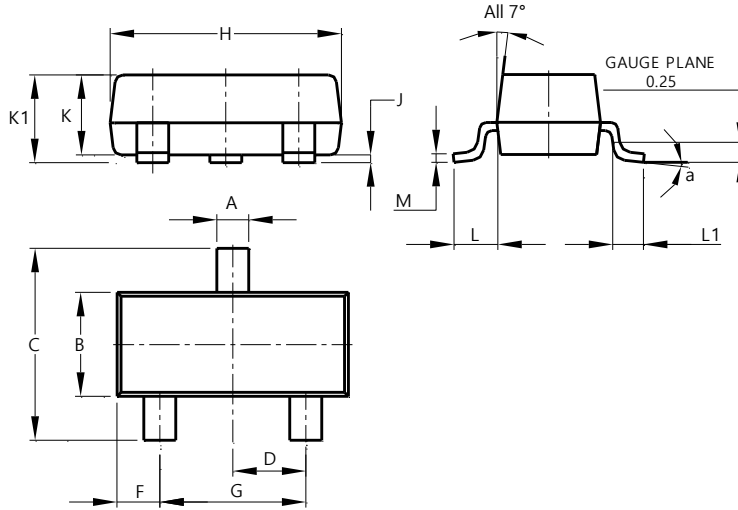


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

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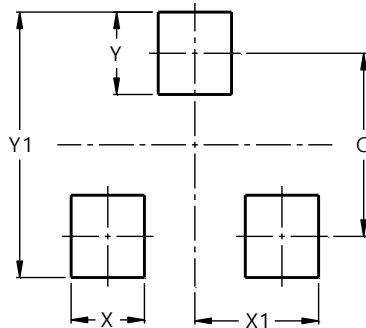


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device terminals and PCB tracking.

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