

40V PNP SURFACE MOUNT SMALL SIGNAL TRANSISTOR IN SOT23

Features

- **Epitaxial Planar Die Construction**
- Complementary NPN Type Available (MMBT4401)
- Ideal for Medium Power Amplification and Switching
- Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability

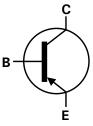
Mechanical Data

- Case: SOT23
- UL Flammability Rating 94V-0
- Case material: molded Plastic "Green" Compound
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish
- Weight: 0.008 grams (Approximate)

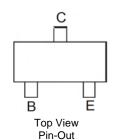




Top View



Device Symbol



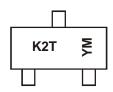
Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MMBT4403-7-F	K2T	7	8	3,000
MMBT4403-13-F	K2T	13	8	10,000

Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 2. See http://www.diodes.com 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 + CI) and <1000ppm antimony compounds.</p>4. For packaging details, go to our website at http://www.diodes.com

Marking Information



K2T = Product Type Marking Code YM = Date Code Marking Y = Year (ex: Y = 2011)M = Month (ex: 9 = September)

Date Code Kev

Year	2010		2011	2012		2013	2014		2015	2016		2017
Code	X		Υ	Z		Α	В		С	D		Е
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	0	N	D

March 2012



Maximum Ratings (@ $T_A = +25^{\circ}C$, unless otherwise specified.)

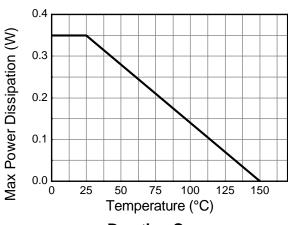
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-40	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Base Voltage	V_{EBO}	-6.0	V
Collector Current - Continuous (Note 7)	Ic	-600	mA

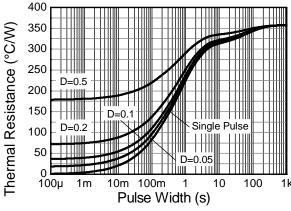
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit		
Collector Power Dissipation	(Note 5)	D-	310	mW	
Collector Power Dissipation	(Note 6)	P _D	350		
Thermal Desistance, Junction to Ambient	(Note 5)	0	403	0000	
Thermal Resistance, Junction to Ambient	(Note 6)	R _{0JA}	357	°C/W	
Thermal Resistance, Junction to Leads (Note 7)		$R_{\theta JL}$	350	°C/W	
Operating and Storage Temperature Range	T _J ,T _{STG}	-55 to +150	°C		

Notes:

- 5. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions. 6. For the device mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
- 7. Thermal resistance from junction to solder-point (at the end of the collector lead).





Derating Curve

10 Max Power Dissipation (W) 0.1 L 10m 10 100 100m Pulse Width (s)

Pulse Power Dissipation

Transient Thermal Impedance



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

Characteristic	Symbol	Min	Max	Unit	Test Condition		
OFF CHARACTERISTICS (Note 8)							
Collector-Base Breakdown Voltage	BV _{CBO}	-40	_	V	$I_C = -100 \mu A, I_E = 0$		
Collector-Emitter Breakdown Voltage	BV _{CEO}	-40	_	V	$I_C = -10.0 \text{mA}, I_B = 0$		
Emitter-Base Breakdown Voltage	BV _{EBO}	-6.0	_	V	$I_E = -100 \mu A, I_C = 0$		
Collector Cutoff Current	I _{CEX}	_	-100	nA	$V_{CE} = -35V, V_{EB(OFF)} = -0.4V$		
Base Cutoff Current	I _{BL}		-100	nA	$V_{CE} = -35V, V_{EB(OFF)} = -0.4V$		
ON CHARACTERISTICS (Note 8)							
		30	_		$I_C = -100\mu A, V_{CE} = -1.0V$		
		60	_		$I_C = -1.0 \text{mA}, V_{CE} = -1.0 \text{V}$		
DC Current Gain	h _{FE}	100	_	_	$I_C = -10 \text{mA}, V_{CE} = -1.0 \text{V}$		
		100	300		$I_C = -150 \text{mA}, V_{CE} = -2.0 \text{V}$		
		20	_		$I_C = -500 \text{mA}, V_{CE} = -2.0 \text{V}$		
Collector-Emitter Saturation Voltage	V _{CE(sat)}	_	-0.40	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$		
Concetor Entitles Catalation Voltage	VCE(sat)		-0.75	V	$I_C = -500 \text{mA}, I_B = -50 \text{mA}$		
Base-Emitter Saturation Voltage	V _{BE(sat)}	-0.75	-0.95	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$		
		_	-1.30	V	$I_C = -500 \text{mA}, I_B = -50 \text{mA}$		
SMALL SIGNAL CHARACTERISTICS	1				<u> </u>		
Output Capacitance	C _{obo}	_	8.5	pF	$V_{CB} = -10V$, $f = 1.0MHz$, $I_E = 0$		
Input Capacitance	C _{ibo}		30	pF	$V_{EB} = -0.5V$, $f = 1.0MHz$, $I_{C} = 0$		
Input Impedance	h _{ie}	1.5	15	kΩ			
Voltage Feedback Ratio	h _{re}	0.1	8.0	x 10 ⁻⁴	$V_{CE} = -10V, I_{C} = -1.0mA,$		
Small Signal Current Gain	h _{fe}	60	500	_	f = 1.0kHz		
Output Admittance	h _{oe}	1.0	100	μS			
Current Gain-Bandwidth Product	f _T	200	_	MHz	$V_{CE} = -10V$, $I_{C} = -20mA$, $f = 100MHz$		
SWITCHING CHARACTERISTICS							
Delay Time	t _d	_	15	ns	$V_{CC} = -30V, I_{C} = -150mA,$		
Rise Time	t _r	_	20	ns	$V_{BE(off)} = -2.0V, I_{B1} = -15mA$		
Storage Time	ts		225	ns	$V_{CC} = -30V, I_{C} = -150mA,$		
Fall Time	t _f	_	30	ns	$I_{B1} = I_{B2} = -15\text{mA}$		

Notes:

8. Short duration pulse test used to minimize self-heating effect.



Typical Electrical Characteristics

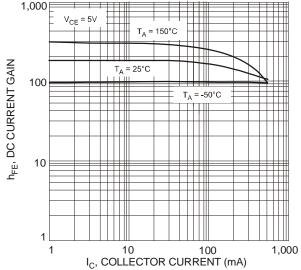
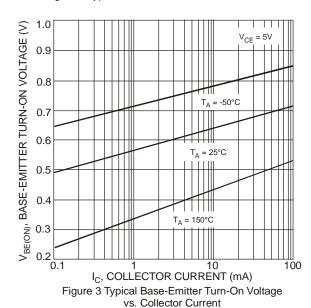


Figure 1 Typical DC Current Gain vs. Collector Current



1,000 V_{CE} = 5V V_{CE}

Figure 5 Typical Gain-Bandwidth Product vs. Collector Current

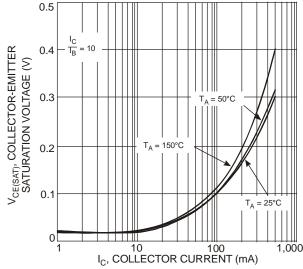


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

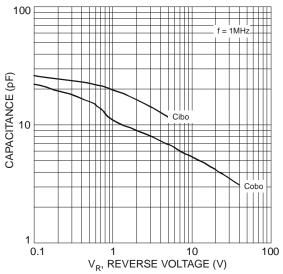


Figure 4 Typical Capacitance Characteristics

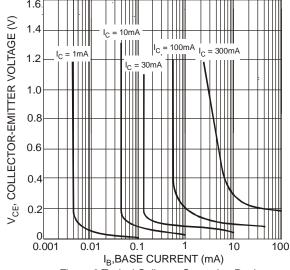
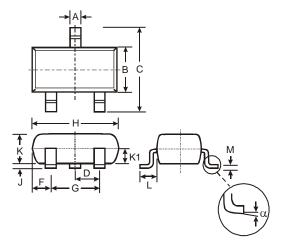


Figure 6 Typical Collector Saturation Region



Package Outline Dimensions

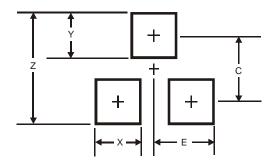
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT23						
Dim	Min	Max	Тур			
Α	0.37	0.51	0.40			
В	1.20	1.40	1.30			
С	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			
Н	2.80	3.00	2.90			
7	0.013	0.10	0.05			
K	0.903	1.10	1.00			
K1	-	-	0.400			
L	0.45	0.61	0.55			
М	0.085	0.18	0.11			
α	0°	8°	-			
All Dimensions in mm						

Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.



Dimensions	Value (in mm)
Z	2.9
Х	0.8
Y	0.9
С	2.0
F	1.35



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