

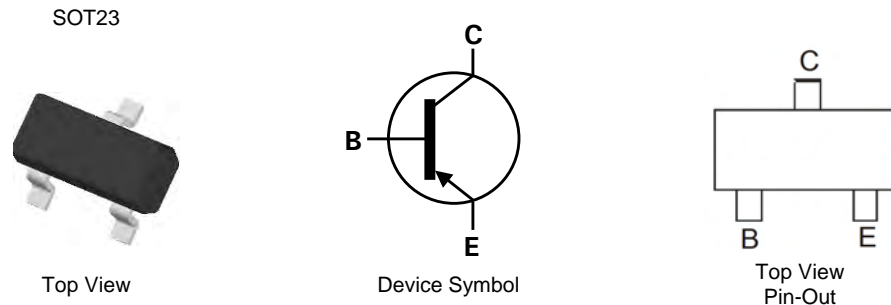
40V PNP SURFACE MOUNT SMALL SIGNAL TRANSISTOR IN SOT23

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)

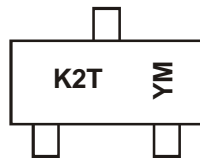


Ordering Information (Note 4)

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 + Cl) and <1000ppm antimony compounds.
 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 Key

Year	2010	2011	2012	2013	2014	2015	2016	2017
Code	X	Y	Z	A	B	C	D	E

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

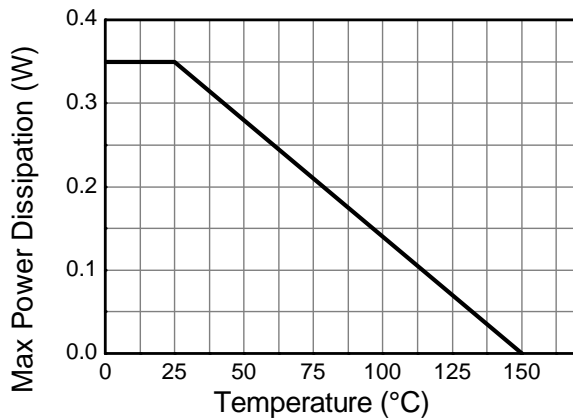
Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V _{CB0}	-40	V
Collector-Emitter Voltage	V _{CEO}	-40	V
Emitter-Base Voltage	V _{EBO}	-6.0	V
Collector Current - Continuous (Note 7)	I _C	-600	mA

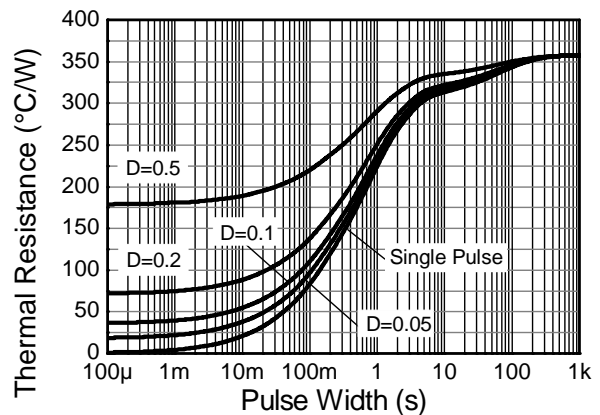
Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector Power Dissipation	P _D	(Note 5)	310
		(Note 6)	350
Thermal Resistance, Junction to Ambient	R _{θJA}	(Note 5)	403
		(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

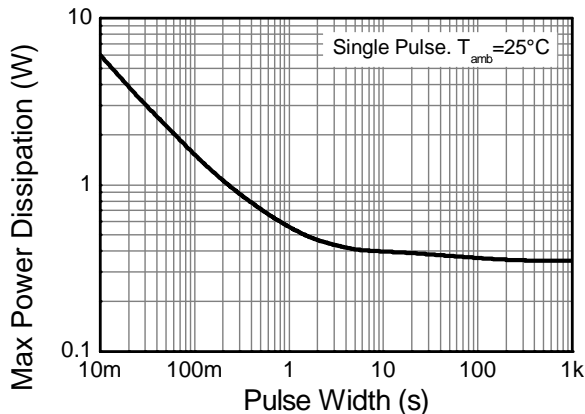
Notes: 5. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 6. For the device mounted on 15mm x 15mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
 7. Thermal resistance from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



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic	Symbol	Min	Max	Unit	Test Condition	
OFF CHARACTERISTICS (Note 8)						
Collector-Base Breakdown Voltage	BV_{CBO}	-40	—	V	$I_C = -100\mu\text{A}$, $I_E = 0$	
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	$I_E = -100\mu\text{A}$, $I_C = 0$	
Collector Cutoff Current	I_{CEX}	—	-100	nA	$V_{CE} = -35\text{V}$, $V_{EB(OFF)} = -0.4\text{V}$	
Base Cutoff Current	I_{BL}	—	-100	nA	$V_{CE} = -35\text{V}$, $V_{EB(OFF)} = -0.4\text{V}$	
ON CHARACTERISTICS (Note 8)						
DC Current Gain	h_{FE}	30	—	—	$I_C = -100\mu\text{A}$, $V_{CE} = -1.0\text{V}$	
		60	—			$I_C = -1.0\text{mA}$, $V_{CE} = -1.0\text{V}$
		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 -0.75	V	$I_C = -150\text{mA}$, $I_B = -15\text{mA}$ $I_C = -500\text{mA}$, $I_B = -50\text{mA}$	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	-0.75 —	-0.95 -1.30	V	$I_C = -150\text{mA}$, $I_B = -15\text{mA}$ $I_C = -500\text{mA}$, $I_B = -50\text{mA}$	
SMALL SIGNAL CHARACTERISTICS						
Output Capacitance	C_{obo}	—	8.5	pF	$V_{CB} = -10\text{V}$, $f = 1.0\text{MHz}$, $I_E = 0$	
Input Capacitance	C_{ibo}	—	30	pF	$V_{EB} = -0.5\text{V}$, $f = 1.0\text{MHz}$, $I_C = 0$	
Input Impedance	h_{ie}	1.5	15	$k\Omega$	$V_{CE} = -10\text{V}$, $I_C = -1.0\text{mA}$, $f = 1.0\text{kHz}$	
Voltage Feedback Ratio	h_{re}	0.1	8.0	$\times 10^{-4}$		
Small Signal Current Gain	h_{fe}	60	500	—		
Output Admittance	h_{oe}	1.0	100	μS		
Current Gain-Bandwidth Product	f_T	200	—	MHz	$V_{CE} = -10\text{V}$, $I_C = -20\text{mA}$, $f = 100\text{MHz}$	
SWITCHING CHARACTERISTICS						
Delay Time	t_d	—	15	ns	$V_{CC} = -30\text{V}$, $I_C = -150\text{mA}$,	
Rise Time	t_r	—	20	ns	$V_{BE(off)} = -2.0\text{V}$, $I_{B1} = -15\text{mA}$	
Storage Time	t_s	—	225	ns	$V_{CC} = -30\text{V}$, $I_C = -150\text{mA}$,	
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

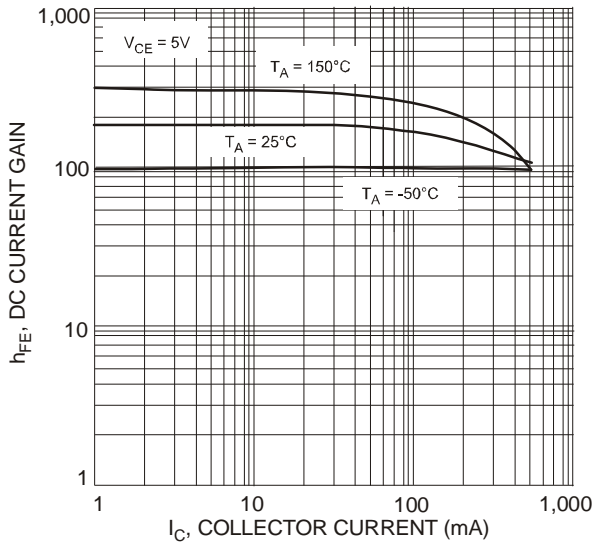


Figure 1 Typical DC Current Gain vs. Collector Current

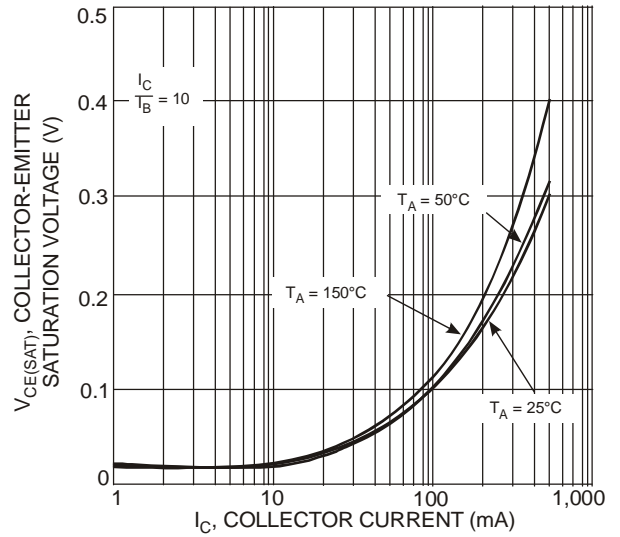


Figure 2 Typical Collector-Emitter Saturation Voltage vs. Collector Current

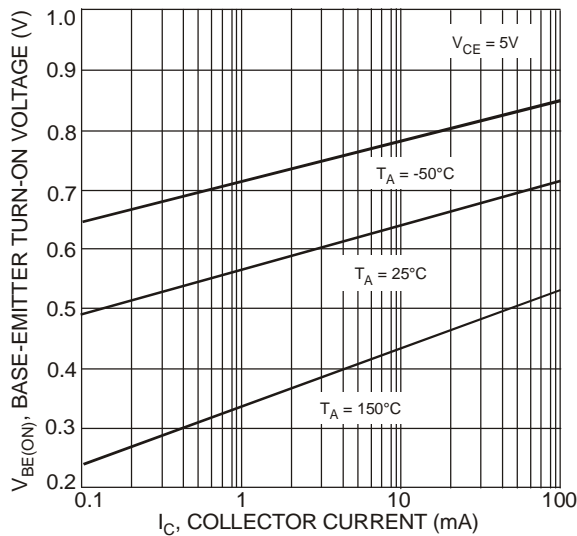


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

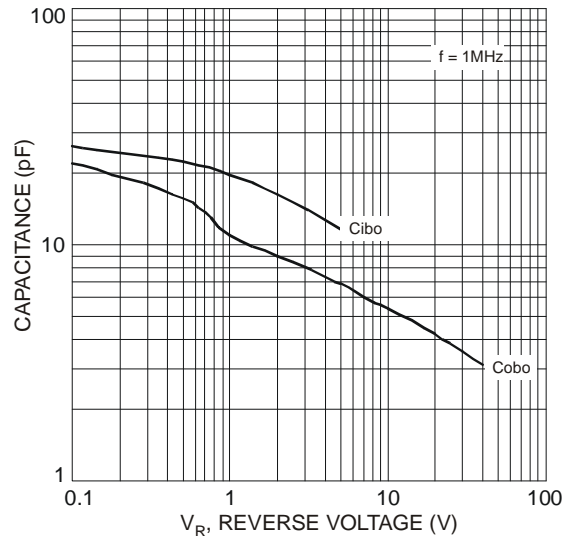


Figure 4 Typical Capacitance Characteristics

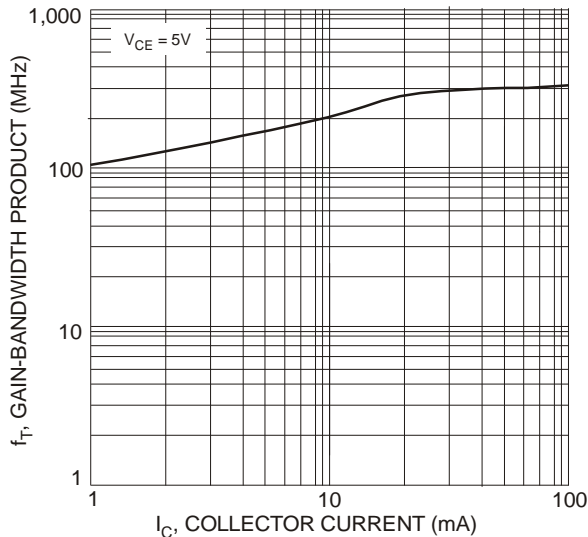


Figure 5 Typical Gain-Bandwidth Product vs. Collector Current

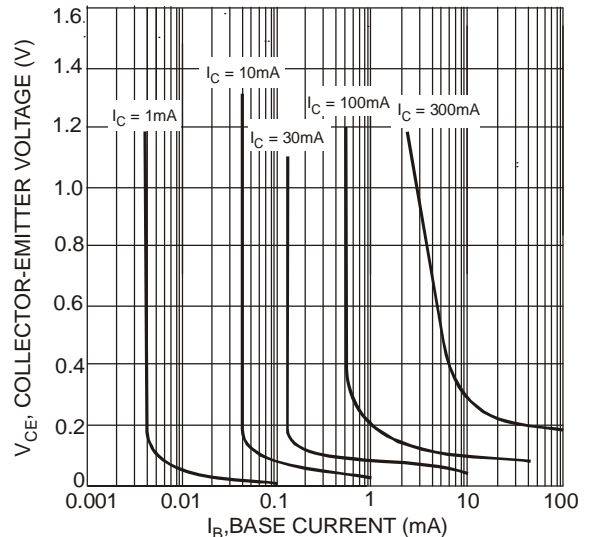
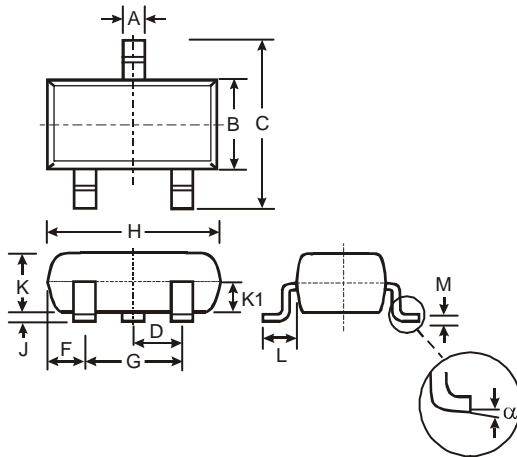


Figure 6 Typical Collector Saturation Region

Package Outline Dimensions

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

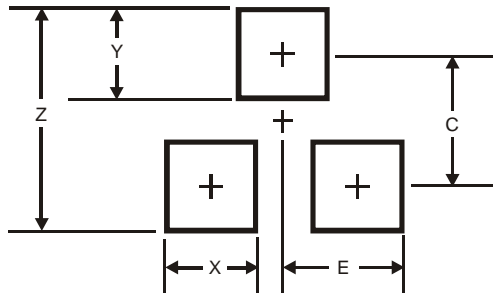


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.903	1.10	1.00
K1	-	-	0.400
L	0.45	0.61	0.55
M	0.085	0.18	0.11
α	0°	8°	-

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
X	0.8
Y	0.9
C	2.0
E	1.35

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