



### MMBTA05 / MMBTA06

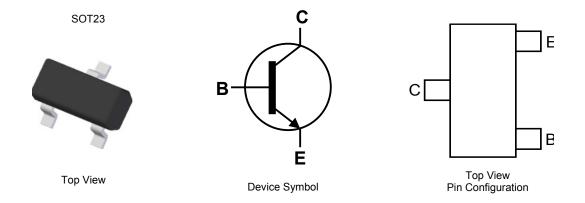
#### **NPN SMALL SIGNAL TRANSISTOR IN SOT23**

#### **Features**

- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Complementary PNP Type: MMBTA55 & MMBTA56
- 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
- PPAP capable (Note 4)

### **Mechanical Data**

- Case: SOT23
- Case 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 @3
- Weight: 0.008 grams (approximate)



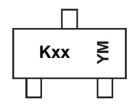
### Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MMBTA05-7-F	AEC-Q101	K1G / K1H	7	8	3,000
MMBTA05Q-13-F	Automotive	K1G / K1H	13	8	10,000
MMBTA06-7-F	AEC-Q101	K1G	7	8	3,000
MMBTA06Q-7-F	Automotive	K1G	7	8	3,000

Notes:

- $1.\ No\ purposely\ added\ lead.\ Fully\ EU\ Directive\ 2002/95/EC\ (RoHS)\ \&\ 2011/65/EU\ (RoHS\ 2)\ compliant.$
- See http://www.diodes.com/quality/lead\_free.html 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product\_compliance\_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

# Marking Information



Kxx = Product Type Marking Code (See Ordering Information)

YM = Date Code Marking

Y or  $\overline{Y}$  = Year (ex: A = 2013)

M or  $\overline{M}$  = Month (ex: 9 = September)

Date Code Key

Year	2010	20	)11	2012	2	2013	2014		2015	2016		2017
Code	Χ		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



# **Absolute Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	MMBTA05	MMBTA06	Unit
Collector-Base Voltage	V <sub>CBO</sub>	60	80	V
Collector-Emitter Voltage	V <sub>CEO</sub>	60	80	V
Emitter-Base Voltage	$V_{EBO}$	4	.0	V
Collector Current	I <sub>C</sub>	500		mA
Peak Collector Current	I <sub>CM</sub>		1	A

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

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	D-	310	mW
Power Dissipation	(Note 7)	$P_{D}$	350	IIIVV
Thermal Desistance, Junction to Ambient	(Note 6)	0	403	°C/W
Thermal Resistance, Junction to Ambient	(Note 7)	$R_{ heta JA}$	R <sub>0JA</sub> 357	
Thermal Resistance, Junction to Leads (Note 8)		$R_{ heta JL}$	350	°C/W
Operating and Storage Temperature Range	$T_{J,}T_{STG}$	-55 to +150	°C	

## ESD Ratings (Note 9)

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	С

Notes:

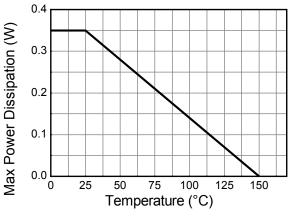
<sup>6.</sup> For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.

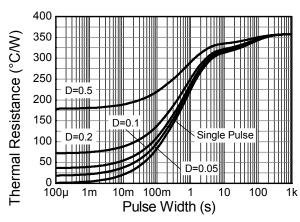
<sup>7.</sup> Same as note (6), except the device is mounted on 15 mm x 15mm 1oz copper.

<sup>8.</sup> Thermal resistance from junction to solder-point (at the end of the leads).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.



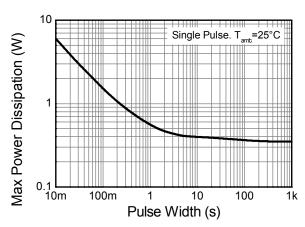
## **Thermal Characteristics and Derating Information**





**Derating Curve** 

**Transient Thermal Impedance** 



**Pulse Power Dissipation** 



# **Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic		Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	MMBTA05 MMBTA06	BV <sub>CBO</sub>	60 80	_	V	I <sub>C</sub> = 100μA, I <sub>E</sub> = 0
Collector-Emitter Breakdown Voltage (Note 10)	MMBTA05 MMBTA06	BV <sub>CEO</sub>	60 80	_	V	I <sub>C</sub> = 10.0mA, I <sub>B</sub> = 0
Emitter-Base Breakdown Voltage		BV <sub>EBO</sub>	4.0		V	$I_E = 100 \mu A, I_C = 0$
Collector Cutoff Current	MMBTA05 MMBTA06	I <sub>CBO</sub>		100	nA	$V_{CB} = 60V, I_{E} = 0$ $V_{CB} = 80V, I_{E} = 0$
Collector Cutoff Current	MMBTA05 MMBTA06	I <sub>CES</sub>		100	nA	$V_{CE} = 60V, I_{BO} = 0V$ $V_{CE} = 80V, I_{BO} = 0V$
ON CHARACTERISTICS (Note 10)						
DC Current Gain		h <sub>FE</sub>	100	_	_	$I_C = 10$ mA, $V_{CE} = 1.0$ V $I_C = 100$ mA, $V_{CE} = 1.0$ V
Collector-Emitter Saturation Voltage		V <sub>CE(sat)</sub>	_	0.25	V	I <sub>C</sub> = 100mA, I <sub>B</sub> = 10mA
Base-Emitter Saturation Voltage		V <sub>BE(sat)</sub>		1.2	V	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 1.0V
SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product	· ·	f <sub>T</sub>	100	_	MHz	$V_{CE} = 2.0V$ , $I_{C} = 10mA$ , $f = 100MHz$

Note: 10. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%.



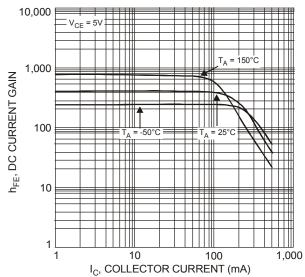


Figure 1 Typical DC Current Gain vs. Collector Current

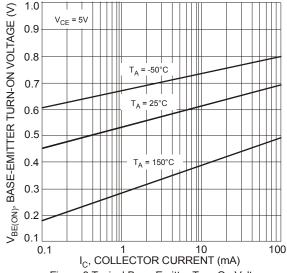
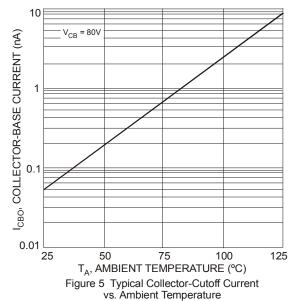


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current



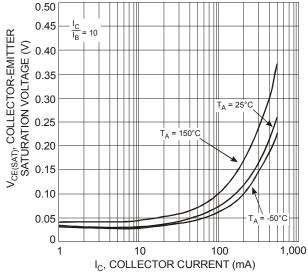


Figure 2 Collector-Emitter Saturation Voltage vs. Collector Current

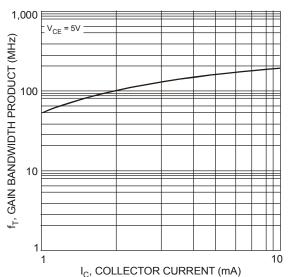


Figure 4 Typical Gain Bandwidth Product vs. Collector Current

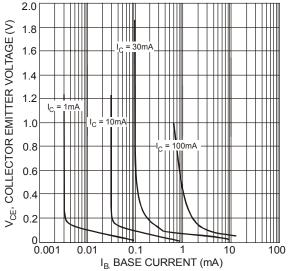
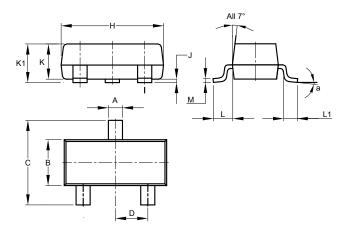


Figure 6 Typical Collector Saturation Region



## **Package Outline Dimensions**

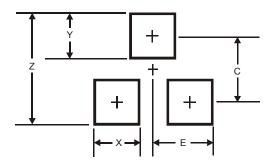
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



	SOT23							
Dim	Min	Max	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					
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					
а	8°							
All	Dimens	ions 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
С	2.0
Е	1.35



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