



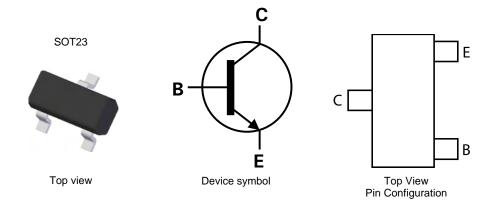
#### NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

## **Features**

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBTA55 / MMBTA56)
- Ideal for Low 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
- 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 <a>®3</a>:
- Weight: 0.008 grams (approximate)



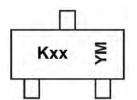
## Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MMBTA05-7-F	AEC-Q101	K1G/K1H/C1G/C1H	7	8	3,000
MMBTA05Q-13-F	Automotive	K1G / K1H	13	8	10,000
MMBTA06-7-F	AEC-Q101	K1G / C1G	7	8	3,000
MMBTA06Q-7-F	Automotive	K1G	7	8	3,000

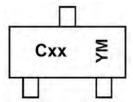
Notes:

- 1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- 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.
- 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.
- 5. For packaging details, go to our website at http://www.diodes.com

## **Marking Information**



K = SAT (Shanghai Assembly / Test site) xx = Product Type Marking Code For MMBTA05: xx = 1G or 1H For MMBTA06: xx = 1G YM = Date Code Marking Y = Year (ex: Y = 2011) M = Month (ex: 9 = September)



C = CAT (Chengdu Assembly / Test site)
xx = Product Type Marking Code
For MMBTA05: xx = 1G or 1H
For MMBTA06: xx = 1G
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

### Date Code Key

Year	2010	20	011	2012	2	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



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

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

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

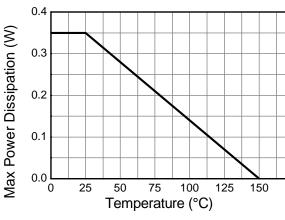
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	D-	310	mW
Power Dissipation	(Note 7)	P <sub>D</sub>	350	IIIVV
Thermal Desistance Junction to Ambient	(Note 6)	D	403	°C/W
Thermal Resistance, Junction to Ambient	(Note 7)	$R_{\theta JA}$	357	-0/٧٧
Thermal Resistance, Junction to Leads (Note 8)		$R_{\theta JL}$	350	°C/W
Operating and Storage Temperature Range		$T_{J}$ , $T_{STG}$	-55 to +150	°C

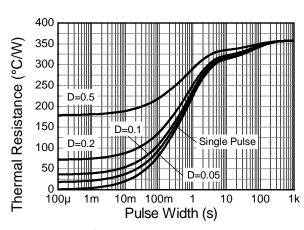
Notes:

- 6. For the device mounted on minimum recommended pad layout FR4 PCB with high coverage of single sided 1oz copper in still air condition.
  7. Same as Note 6, except the device is mounted on 15mm X 15mm X 1.6mm FR4 PCB.
  8. Thermal resistance from junction to solder-point (at the end of the leads).



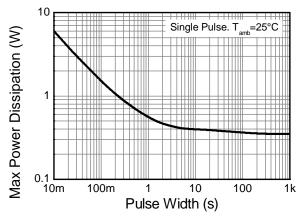
# **Thermal Characteristics**





**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 (Note 9)							
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	MMBTA05 MMBTA06	BV <sub>CEO</sub>	60 80	_	V	$I_C = 10.0 \text{mA}, I_B = 0$	
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 9)	02 , 50						
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	$V_{CE} = 2.0V$ , $I_{C} = 10mA$ , $f = 100MHz$	

Notes: 9. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%.





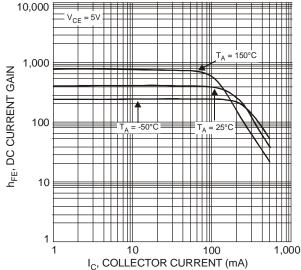


Figure 1 Typical DC Current Gain vs. Collector Current

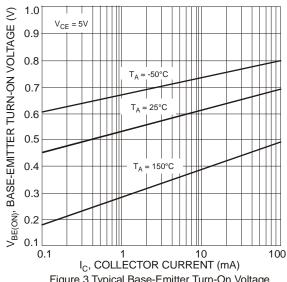


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

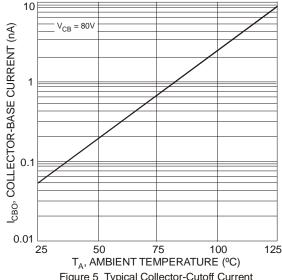


Figure 5 Typical Collector-Cutoff Current vs. Ambient Temperature

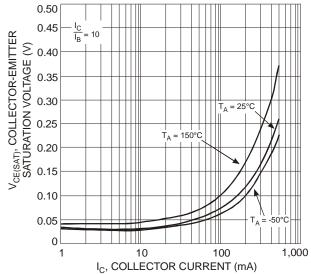


Figure 2 Collector-Emitter Saturation Voltage vs. Collector Current

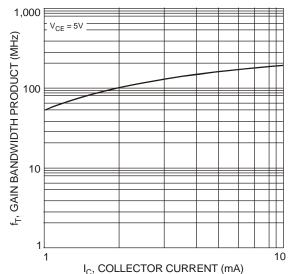


Figure 4 Typical Gain Bandwidth Product vs. Collector Current

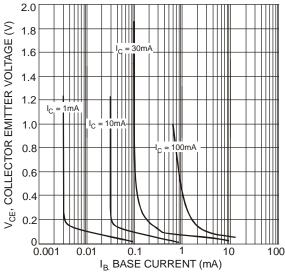
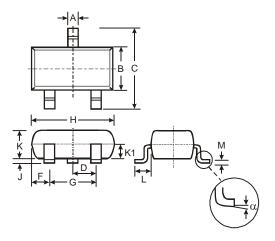


Figure 6 Typical Collector Saturation Region



# **Package Outline Dimensions**

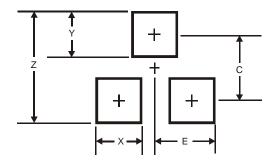
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



SOT23						
Dim	Min	Max	Тур			
Α	0.37	0.51	0.40			
В	1.20	1.40	1.30			
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			
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
Е	1.35



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