NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

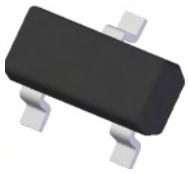
Features

- 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)**

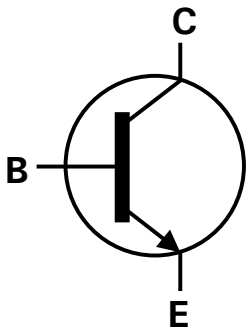
Mechanical Data

- 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 e3
- Weight: 0.008 grams (approximate)

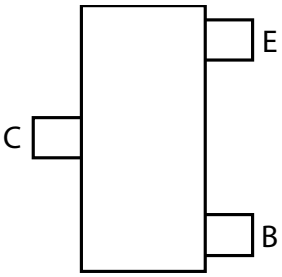
SOT23



Top view



Device symbol



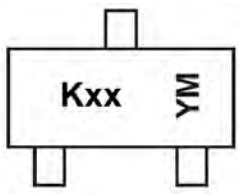
Top View
Pin Configuration

Ordering Information (Notes 4 & 5)

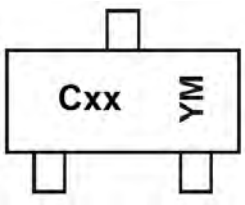
Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
MMBTA05-7-F	AEC-Q101	K1G / K1H / C1G / C1H	7	8	3,000
MMBTA05Q-13-F	Automotive	K1G / K1H	13	8	10,000
MMBTA06-7-F	AEC-Q101	K1G / C1G	7	8	3,000
MMBTA06Q-7-F	Automotive	K1G	7	8	3,000

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.
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.
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	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.)

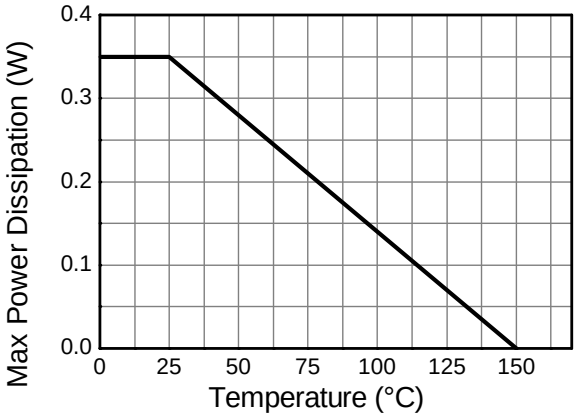
Characteristic	Symbol	MMBTA05	MMBTA06	Unit
Collector-Base Voltage	V_{CBO}	60	80	V
Collector-Emitter Voltage	V_{CEO}	60	80	V
Emitter-Base Voltage	V_{EBO}	4.0		V
Collector Current - Continuous	I_C	500		mA
Peak Collector Current	I_{CM}	1		A

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

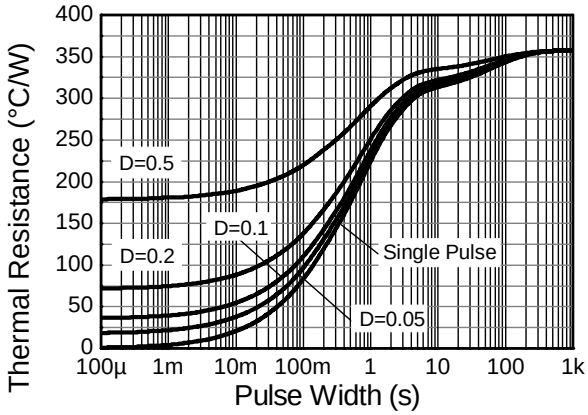
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	310	mW
	(Note 7)		350	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	403	°C/W
	(Note 7)		357	
Thermal Resistance, Junction to Leads	(Note 8)	$R_{\theta JL}$	350	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-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).

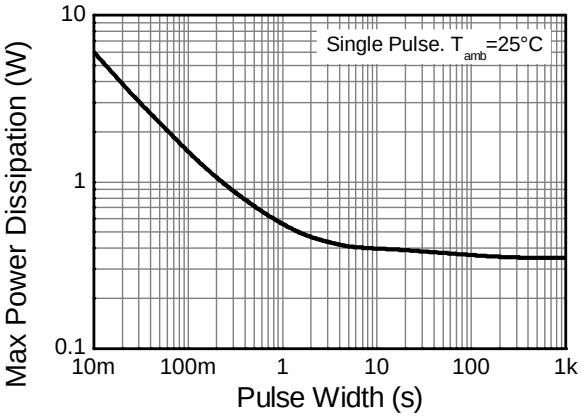
Thermal Characteristics



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic		Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 9)						
Collector-Base Breakdown Voltage	MMBTA05 MMBTA06	BV_{CBO}	60 80	—	V	I_C = 100µA, I_E = 0
Collector-Emitter Breakdown Voltage	MMBTA05 MMBTA06	BV_{CEO}	60 80	—	V	I_C = 10.0mA, I_B = 0
Emitter-Base Breakdown Voltage		BV_{EBO}	4.0	—	V	I_E = 100 µA, I_C = 0
Collector Cutoff Current	MMBTA05 MMBTA06	I_{CBO}	—	100	nA	V_{CB} = 60V, I_E = 0 V_{CB} = 80V, I_E = 0
Collector Cutoff Current	MMBTA05 MMBTA06	I_{CES}	—	100	nA	V_{CE} = 60V, I_{BO} = 0V V_{CE} = 80V, I_{BO} = 0V
ON CHARACTERISTICS (Note 9)						
DC Current Gain		h_{FE}	100	—	—	I_C = 10mA, V_{CE} = 1.0V I_C = 100mA, V_{CE} = 1.0V
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	0.25	V	I_C = 100mA, I_B = 10mA
Base-Emitter Saturation Voltage		$V_{BE(sat)}$	—	1.2	V	I_C = 100mA, V_{CE} = 1.0V
SMALL SIGNAL CHARACTERISTICS						
Current Gain-Bandwidth Product		f_T	100	—	MHz	V_{CE} = 2.0V, I_C = 10mA, f = 100MHz

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

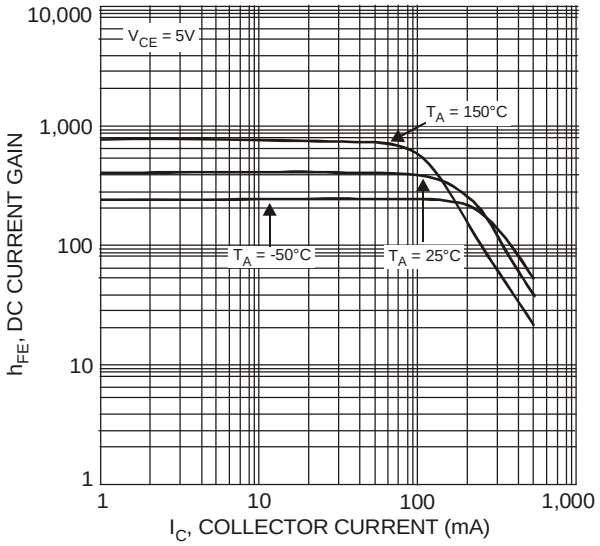


Figure 1 Typical DC Current Gain vs. Collector Current

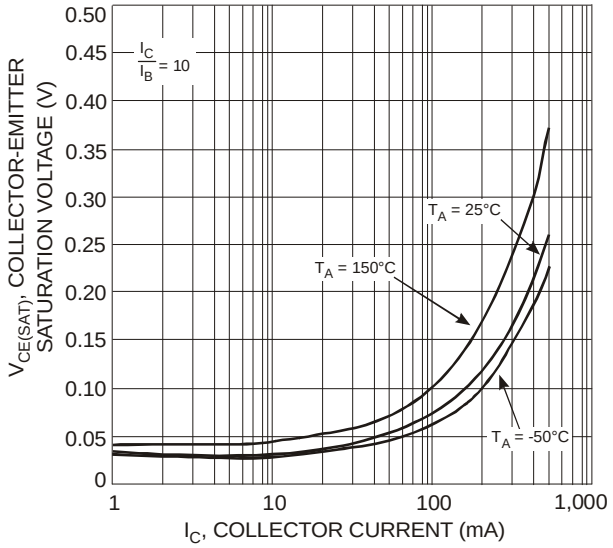


Figure 2 Collector-Emitter Saturation Voltage vs. Collector Current

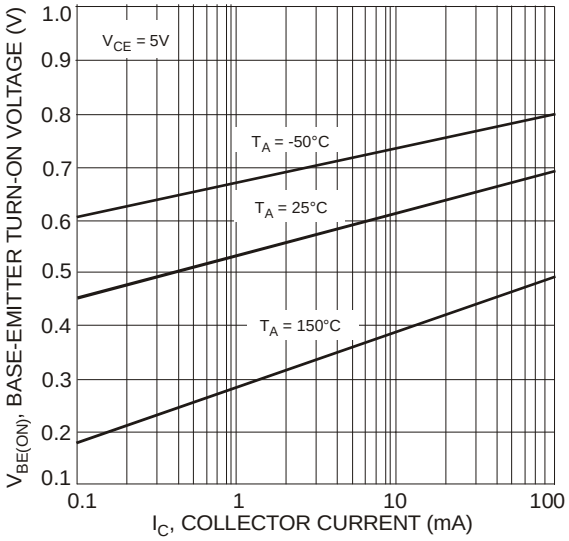


Figure 3 Typical Base-Emitter Turn-On Voltage vs. Collector Current

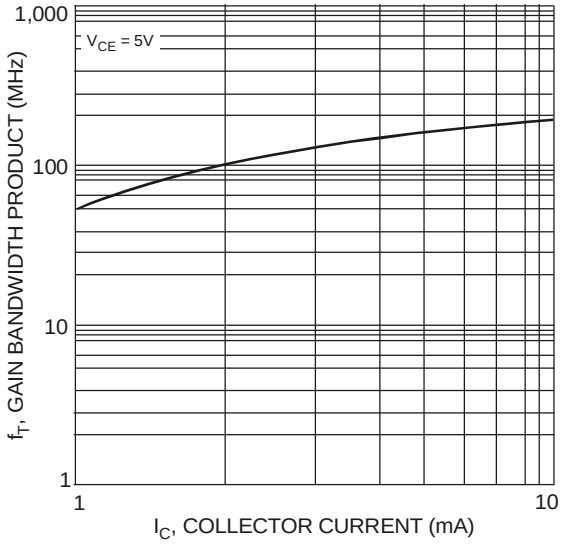


Figure 4 Typical Gain Bandwidth Product vs. Collector Current

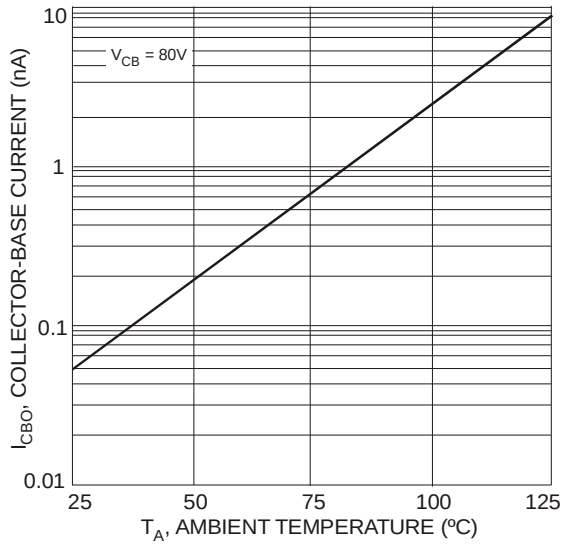


Figure 5 Typical Collector-Cutoff Current vs. Ambient Temperature

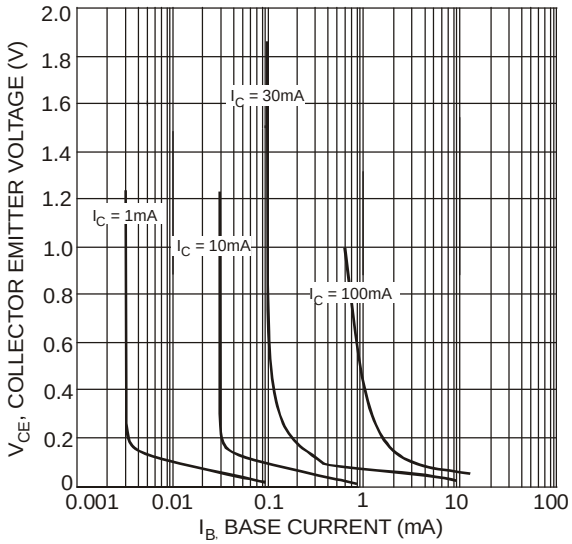
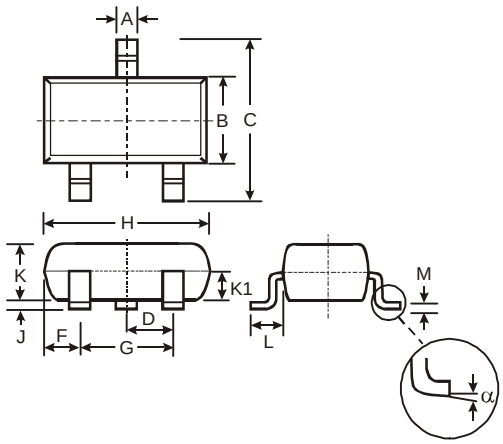


Figure 6 Typical Collector Saturation Region

Package Outline Dimensions

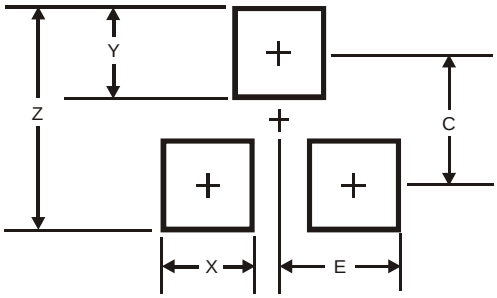
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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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