NPN SMALL SIGNAL SURFACE MOUNT TRANSISTOR

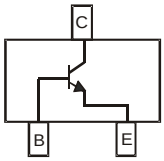
Features

- Epitaxial Planar Die Construction
- Complementary PNP Type Available (MMBT5401)
- Ideal for Low Power Amplification and Switching
- **Lead, Halogen and Antimony Free, RoHS Compliant**
- **"Green" Device (Notes 2 and 3)**

Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Marking Information: See Page 3
- Ordering Information: See Page 3
- Weight: 0.008 grams (approximate)

Top View



Device Schematic

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	180	V
Collector-Emitter Voltage	V_{CEO}	160	V
Emitter-Base Voltage	V_{EBO}	6.0	V
Collector Current - Continuous (Note 1)	I_C	600	mA

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 1)	P_D	300	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	417	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

Notes:
1. Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at http://www.diodes.com/datasheets/ap02001.pdf.
2. No purposefully added lead. Halogen and Antimony Free.
3. Product manufactured with Data Code V9 (week 33, 2008) and newer are built with Green Molding Compound. Product manufactured prior to Date Code V9 are built with Non-Green Molding Compound and may contain Halogens or Sb_2O_3 Fire Retardants.

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 4)					
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	180	—	V	I_C = 100μA, I_E = 0
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	160	—	V	I_C = 1.0mA, I_B = 0
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6.0	—	V	I_E = 10μA, I_C = 0
Collector Cutoff Current	I_{CBO}	—	50	nA μA	V_{CB} = 120V, I_E = 0 V_{CB} = 120V, I_E = 0, T_A = 100°C
Emitter Cutoff Current	I_{EBO}	—	50	nA	V_{EB} = 4.0V, I_C = 0
ON CHARACTERISTICS (Note 4)					
DC Current Gain	h_{FE}	80 80 30	— 250 —	—	I_C = 1.0mA, V_{CE} = 5.0V I_C = 10mA, V_{CE} = 5.0V I_C = 50mA, V_{CE} = 5.0V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	0.15 0.20	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	—	1.0	V	I_C = 10mA, I_B = 1.0mA I_C = 50mA, I_B = 5.0mA
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{obo}	—	6.0	pF	V_{CB} = 10V, f = 1.0MHz, I_E = 0
Small Signal Current Gain	h_{fe}	50	250	—	V_{CE} = 10V, I_C = 1.0mA, f = 1.0kHz
Current Gain-Bandwidth Product	f_T	100	300	MHz	V_{CE} = 10V, I_C = 10mA, f = 100MHz
Noise Figure	nF	—	8.0	dB	V_{CE} = 5.0V, I_C = 200μA, R_S = 1.0kΩ, f = 1.0kHz

Notes: 4. Short duration pulse test used to minimize self-heating effect.

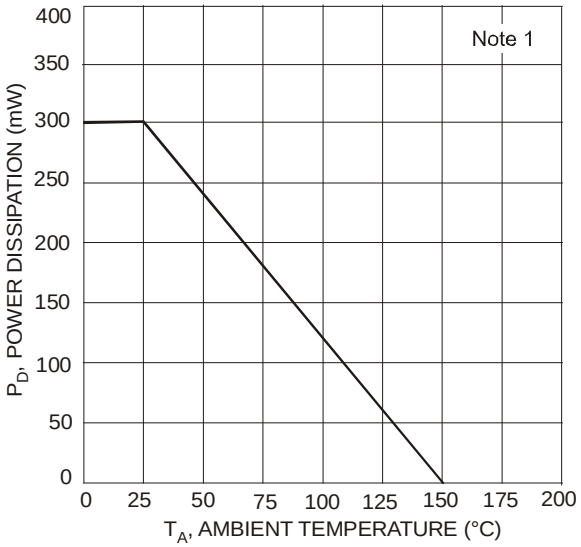


Fig. 1 Power Dissipation vs. Ambient Temperature

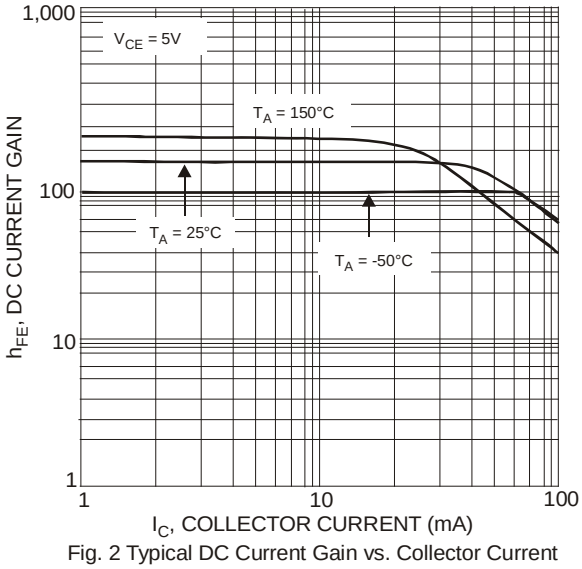


Fig. 2 Typical DC Current Gain vs. Collector Current

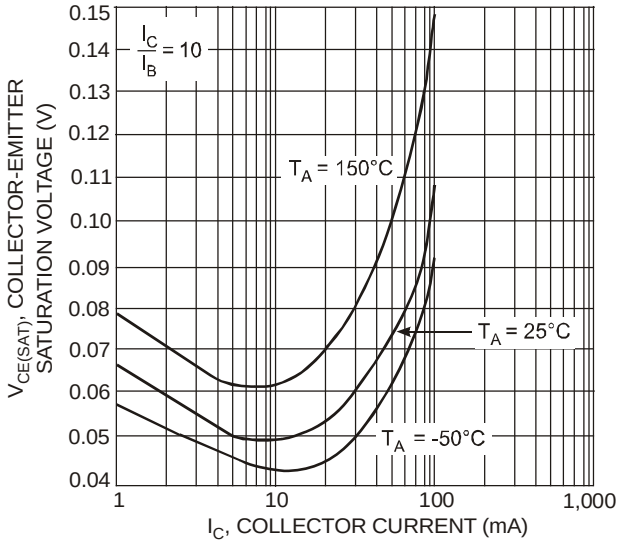


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

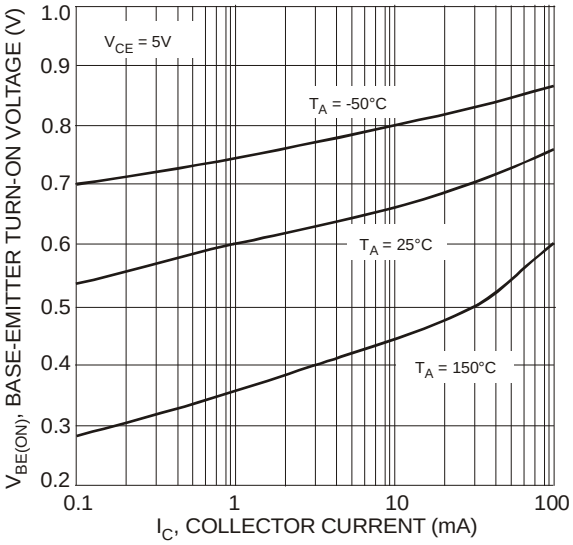


Fig. 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

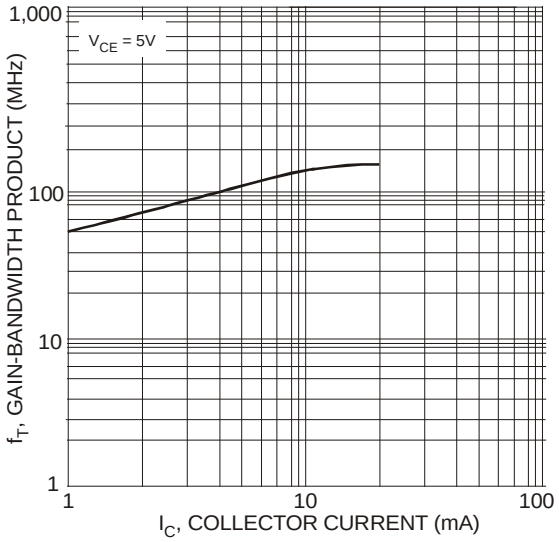


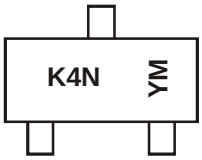
Fig. 5 Typical Gain-Bandwidth Product vs. Collector Current

Ordering Information (Note 5)

Part Number	Case	Packaging
MMBT5551-7-F	SOT-23	3000/Tape & Reel

Notes: 5. For packaging details, go to our website at http://www.diodes.com/datasheets/ap02007.pdf.

Marking Information



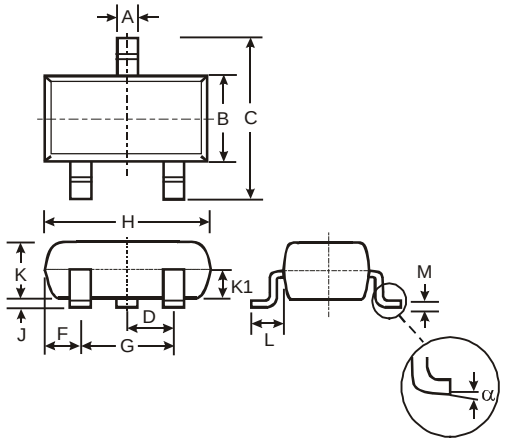
K4N = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: N = 2002)
M = Month (ex: 9 = September)

Date Code Key

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Code	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	Z	A	B	C

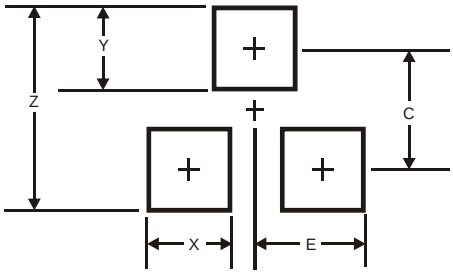
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Package Outline Dimensions



SOT-23			
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



Dimensions	Value (in mm)
Z	2.9
X	0.8
Y	0.9
C	2.0
E	1.35