

Features

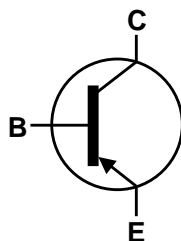
- Epitaxial Planar Die Construction
- Ideal for Low Power Amplification and Switching
- Complementary NPN Type: MMBT2222A
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please [contact us](#) or your local Diodes representative. <https://www.diodes.com/quality/product-definitions/>**

Mechanical Data

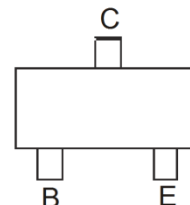
- Package: SOT23
- Package Material: Molded Plastic, "Green" Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol

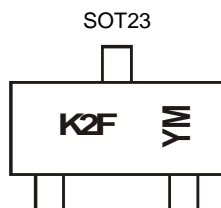

 Top View
Pin-Out

Ordering Information (Note 4)

Product	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
MMBT2907A-7-F	Active	Standard	K2F	7	8	3,000
MMBT2907A-13-F	Active	Standard	K2F	13	8	10,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
 2. See <https://www.diodes.com/quality/lead-free/> 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



K2F = Product Type Marking Code
 YM = Date Code Marking
 Y or \bar{Y} = Year (ex: I = 2021)
 M or \bar{M} = Month (ex: 9 = September)

Date Code Key

Year	2013	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Code	A	I	J	K	L	M	N	O	P	R	S
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

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-60	V
Collector-Emitter Voltage	V_{CEO}	-60	V
Emitter-Base Voltage	V_{EBO}	-6.0	V
Collector Current	I_C	-600	mA
Peak Collector Current	I_{CM}	-800	mA
Peak Base Current	I_{BM}	-200	mA

Thermal Characteristics

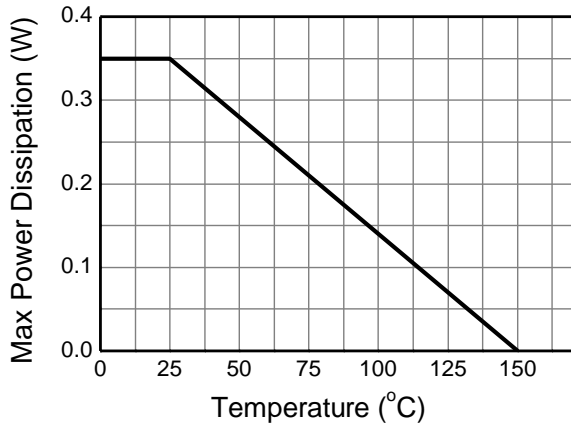
Characteristic	Symbol	Value	Unit
Collector Power Dissipation	P_D	(Note 5) 310	mW
		(Note 6) 350	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	(Note 5) 403	$^\circ\text{C/W}$
		(Note 6) 357	
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	350	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	120	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

ESD Ratings (Note 8)

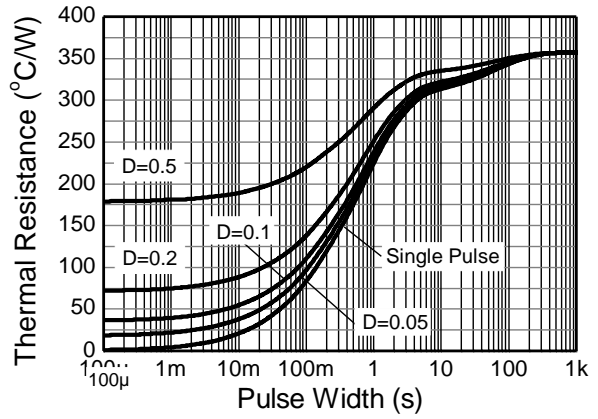
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted on minimum recommended pad layout 1oz copper that is on a single-sided FR-4 PCB; device is measured under still air conditions whilst operating in a steady-state.
 6. Same as Note 5, except the device is mounted on 15 mm x 15mm 1oz copper.
 7. Thermal resistance from junction to solder-point (at the end of the leads).
 8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

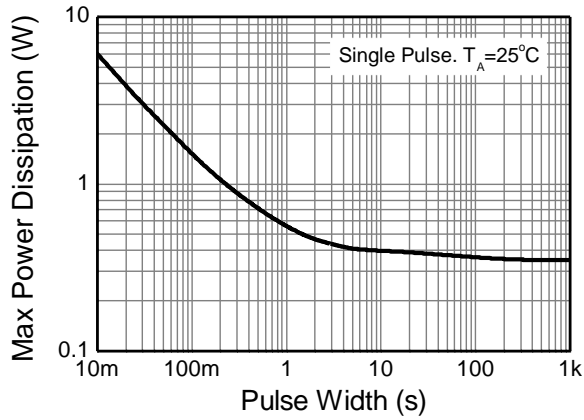
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	BV_{CBO}	-60	—	V	$I_C = -100\mu\text{A}$, $I_E = 0$
Collector-Emitter Breakdown Voltage (Note 9)	BV_{CEO}	-60	—	V	$I_C = -10\text{mA}$, $I_B = 0$
Emitter-Base Breakdown Voltage	BV_{EBO}	-6.0	—	V	$I_E = -100\mu\text{A}$, $I_C = 0$
Collector Cut-Off Current	I_{CBO}	—	-10	nA μA	$V_{CB} = -50\text{V}$, $I_E = 0$ $V_{CB} = -50\text{V}$, $I_E = 0$, $T_A = +125^\circ\text{C}$
Collector Cut-Off Current	I_{CEX}	—	-50	nA	$V_{CE} = -30\text{V}$, $V_{EB(\text{off})} = -0.5\text{V}$
Base Cut-Off Current	I_{BL}	—	-50	nA	$V_{CE} = -30\text{V}$, $V_{EB(\text{off})} = -0.5\text{V}$
Emitter Cut-Off Current	I_{EBO}	—	-50	nA	$V_{EB} = -6.0\text{V}$
ON CHARACTERISTICS (Note 9)					
DC Current Gain	h_{FE}	75 100 100 100 50	— — — 300 —	—	$I_C = -100\mu\text{A}$, $V_{CE} = -10\text{V}$ $I_C = -1.0\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -10\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -150\text{mA}$, $V_{CE} = -10\text{V}$ $I_C = -500\text{mA}$, $V_{CE} = -10\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(\text{sat})}$	—	-0.4 -1.6	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	$V_{BE(\text{sat})}$	—	-1.3 -2.6	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}	—	8.0	pF	$V_{CB} = -10\text{V}$, $f = 1.0\text{MHz}$, $I_E = 0$
Input Capacitance	C_{ibo}	—	30	pF	$V_{EB} = -2.0\text{V}$, $f = 1.0\text{MHz}$, $I_C = 0$
Current Gain-Bandwidth Product	f_T	200	—	MHz	$V_{CE} = -20\text{V}$, $I_C = -50\text{mA}$, $f = 100\text{MHz}$
SWITCHING CHARACTERISTICS					
Turn-On Time	t_{on}	—	45	ns	$V_{CC} = -30\text{V}$, $I_C = -150\text{mA}$, $I_{B1} = -15\text{mA}$
Delay Time	t_d	—	10	ns	
Rise Time	t_r	—	40	ns	
Turn-Off Time	t_{off}	—	100	ns	$V_{CC} = -6.0\text{V}$, $I_C = -150\text{mA}$, $I_{B1} = I_{B2} = -15\text{mA}$
Storage Time	t_s	—	80	ns	
Fall Time	t_f	—	30	ns	

Note: 9. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.

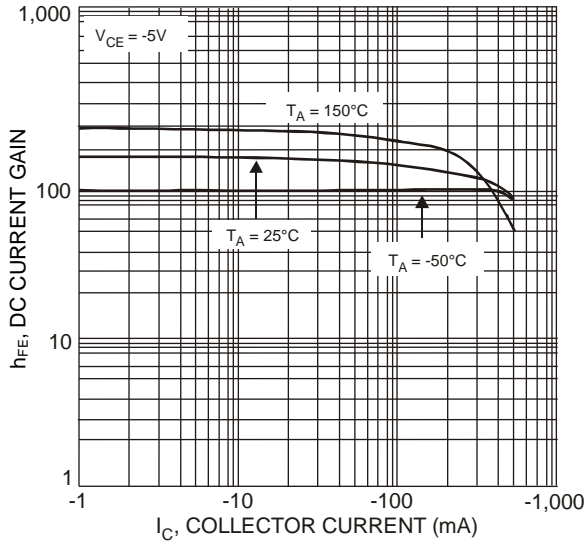


Fig. 1 Typical DC Current Gain vs. Collector Current

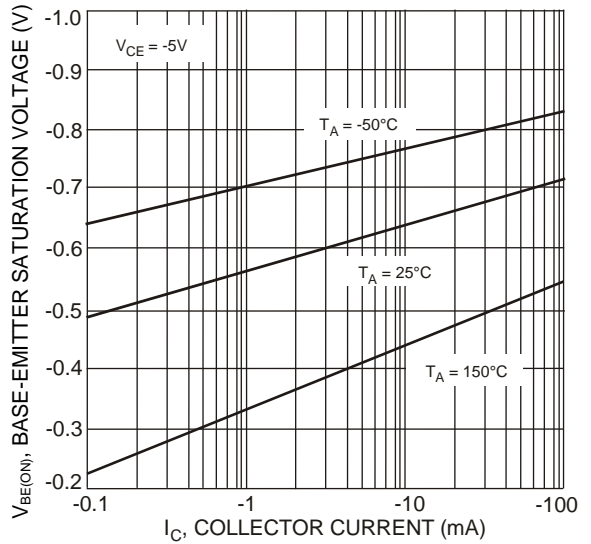


Fig. 2 Typical Base-Emitter Saturation Voltage vs. Collector Current

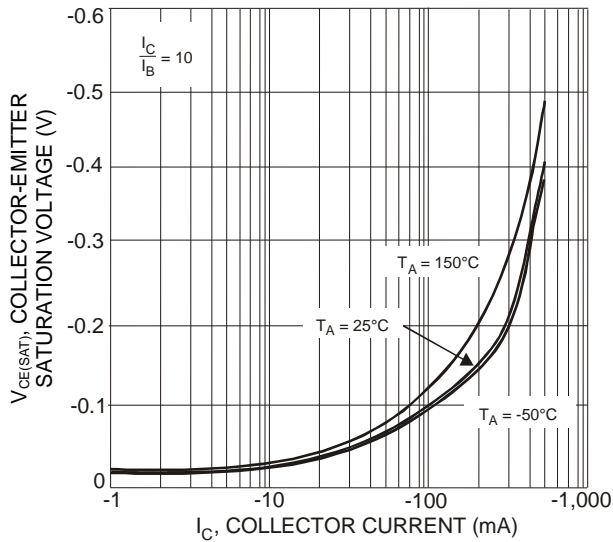


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

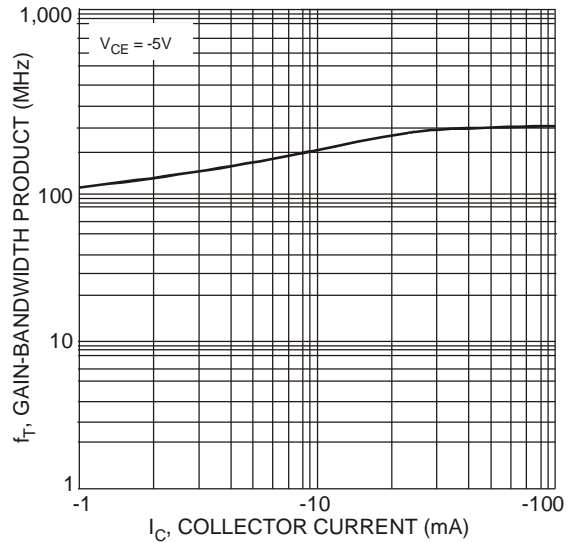


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current

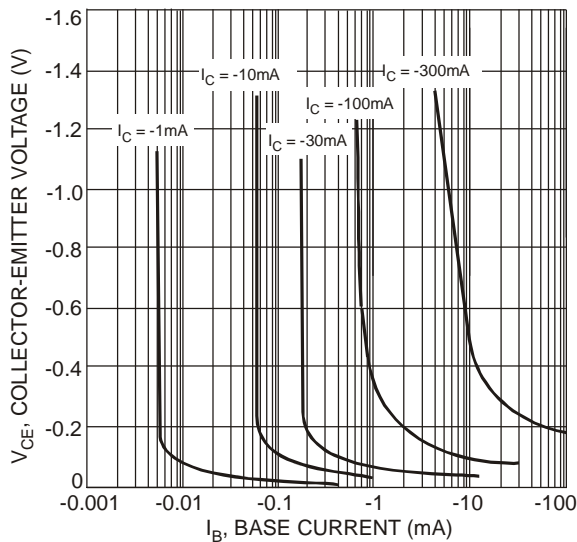


Fig. 5 Typical Collector Saturation Region

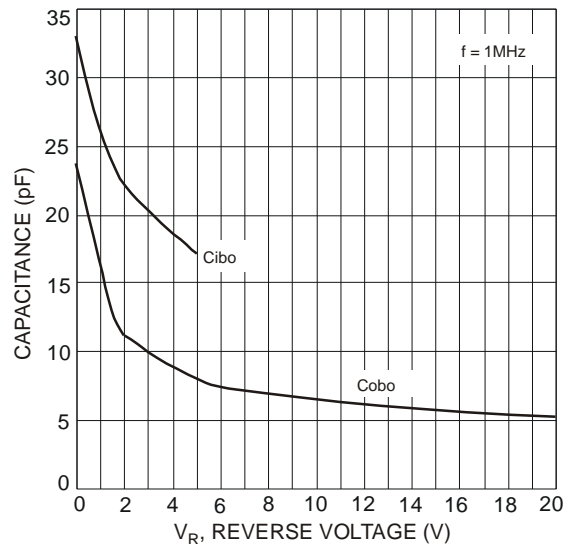
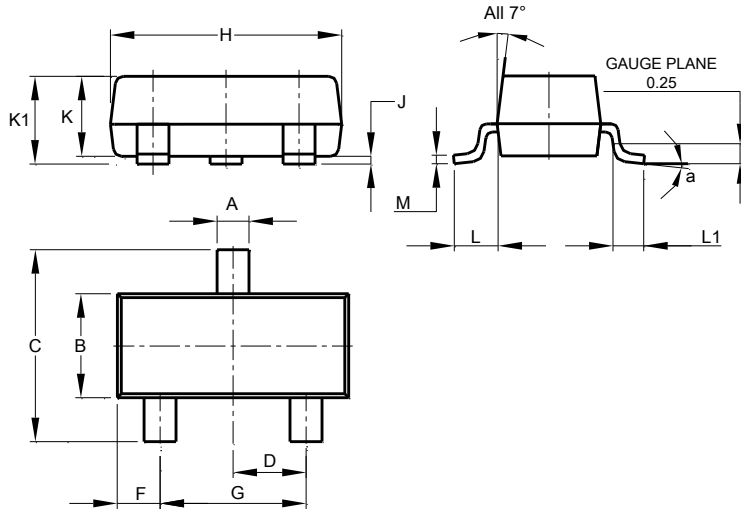


Fig. 6 Typical Capacitance Characteristics

Package Outline Dimensions

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23

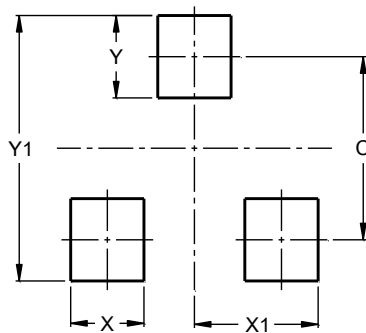


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

SOT23



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

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