

60V PNP SMALL SIGNAL TRANSISTOR IN SOT23

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)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

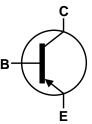
Mechanical Data

- Case: SOT23
- Case 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 <a>®
- Weight: 0.008 grams (Approximate)

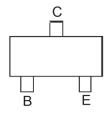




Top View



Device Symbol



Top View Pin-Out

Ordering Information (Notes 4 & 5)

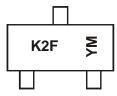
Product	Status	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
MMBT2907A-7-F	Active	AEC-Q101	K2F	7	8	3,000
MMBT2907A-13-F	Active	AEC-Q101	K2F	13	8	10,000
MMBT2907AQ-7-F	Active	Automotive	K2F	7	8	3,000

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/product_compliance_definitions.html.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information

SOT23



K2F = Product Type Marking Code YM = Date Code Marking Y or \overline{Y} = Year (ex: D = 2016) M or \overline{M} = Month (ex: 9 = September)

Date Code Key

Year	2013		2014	2015		2016	2017		2018	2019		2020
Code	Α		В	С		D	E		F	G		Н
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_A = +25°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	Ic	-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	(Note 6)	6	310	mW	
Collector Power Dissipation	(Note 7)	P_{D}	350	IIIVV	
Thermal Desigtance Junction to Ambient	(Note 6)	D.	403	°C/W	
Thermal Resistance, Junction to Ambient	(Note 7)	R _{0JA}	357	C/VV	
Thermal Resistance, Junction to Leads (Note 8)		$R_{\theta JL}$	350	°C/W	
Operating and Storage Temperature Range	$T_{J_i}T_{STG}$	-55 to +150	°C		

ESD Ratings (Note 9)

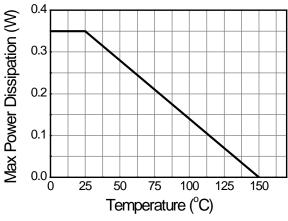
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	С

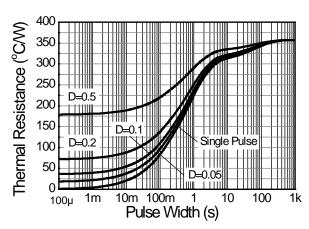
Notes:

- 6. 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.
- 7. Same as Note 6, except the device is mounted on 15 mm x 15mm 1oz copper.
- 8. Thermal resistance from junction to solder-point (at the end of the leads).
- 9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.



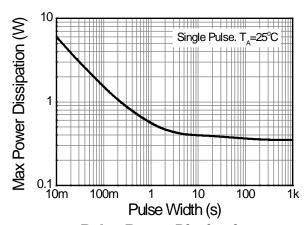
Thermal Characteristics and Derating Information





Derating Curve

Transient Thermal Impedance



Pulse Power Dissipation



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

Characteristic	Symbol	Min	Max	Unit	Test Condition
OFF CHARACTERISTICS					
Collector-Base Breakdown Voltage	BV_{CBO}	-60		V	$I_C = -100\mu A, I_E = 0$
Collector-Emitter Breakdown Voltage (Note 10)	BV_{CEO}	-60		V	$I_C = -10 \text{mA}, I_B = 0$
Emitter-Base Breakdown Voltage	BV _{EBO}	-6.0		V	$I_E = -100 \mu A, I_C = 0$
Collector Cut-Off Current	I _{CBO}	_	-10	nA	$V_{CB} = -50V, I_{E} = 0$
			-10	μΑ	$V_{CB} = -50V$, $I_E = 0$, $T_A = +125$ °C
Collector Cut-Off Current	I _{CEX}	_	-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -0.5V$
Base Cut-Off Current	I_{BL}	_	-50	nA	$V_{CE} = -30V, V_{EB(OFF)} = -0.5V$
Emitter Cut-Off Current	I _{EBO}		-50	nA	$V_{EB} = -6.0V$
ON CHARACTERISTICS (Note 10)					
		75	_		$I_C = -100\mu A, V_{CE} = -10V$
		100	_		$I_C = -1.0 \text{mA}, V_{CE} = -10 \text{V}$
DC Current Gain	h _{FE}	100		_	$I_C = -10mA$, $V_{CE} = -10V$
Do Garroni Garr		100 50	300		$I_C = -150 \text{mA}, V_{CE} = -10 \text{V}$
			_		$I_C = -500 \text{mA}, V_{CE} = -10 \text{V}$
Collector-Emitter Saturation Voltage	V _{CE(SAT)}	_	-0.4 -1.6	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$
Concetor Emilier Cataration Voltage				٧	$I_C = -500 \text{mA}, I_B = -50 \text{mA}$
Base-Emitter Saturation Voltage	V _{BE(SAT)}		-1.3	V	$I_C = -150 \text{mA}, I_B = -15 \text{mA}$
ŭ	V BE(SAT)		-2.6	·	$I_C = -500 \text{mA}, I_B = -50 \text{mA}$
SMALL SIGNAL CHARACTERISTICS					
Output Capacitance	C_{obo}		8.0	pF	$V_{CB} = -10V$, $f = 1.0MHz$, $I_E = 0$
Input Capacitance	C_{ibo}		30	pF	$V_{EB} = -2.0V$, $f = 1.0MHz$, $I_{C} = 0$
Current Gain-Bandwidth Product	f_T	200	_	MHz	$V_{CE} = -20V, I_{C} = -50mA,$ f = 100MHz
SWITCHING CHARACTERISTICS				ı	
Turn-On Time	ton	_	45	ns	
Delay Time	t _D	_	10	ns	$V_{CC} = -30V, I_C = -150mA,$
Rise Time	t _R		40	ns	I _{B1} = -15mA
Turn-Off Time	t _{OFF}	_	100	ns	\\
Storage Time	ts	_	80	ns	V _{CC} = -6.0V, I _C = -150mA,
Fall Time	t _F	_	30	ns	$I_{B1} = I_{B2} = -15\text{mA}$

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



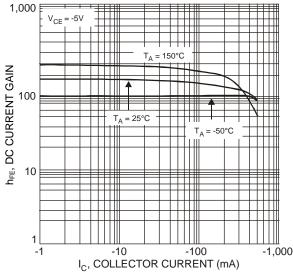


Fig. 1 Typical DC Current Gain vs. Collector Current

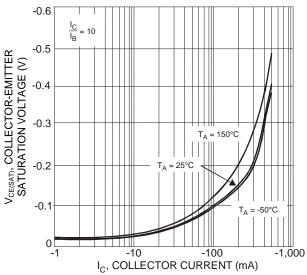


Fig. 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

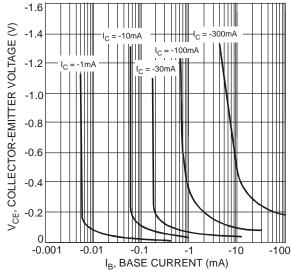


Fig. 5 Typical Collector Saturation Region

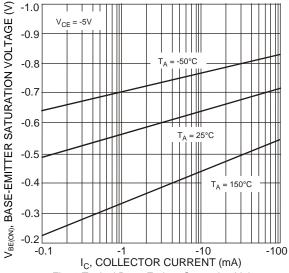


Fig. 2 Typical Base-Emitter Saturation Voltage vs. Collector Current

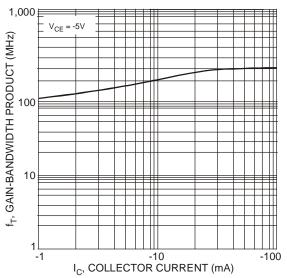


Fig. 4 Typical Gain-Bandwidth Product vs. Collector Current

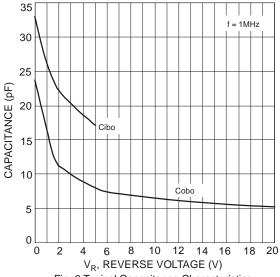


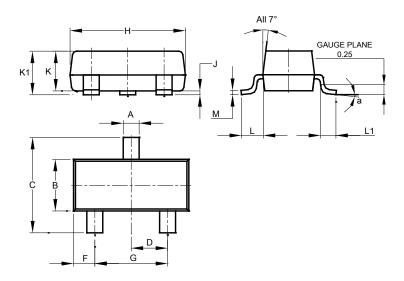
Fig. 6 Typical Capacitance Characteristics



Package Outline Dimensions

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

SOT23

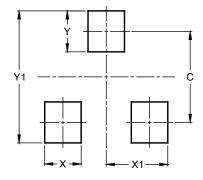


SOT23						
Dim	Min	Max	Тур			
Α	0.37	0.51	0.40			
В	1.20	1.40	1.30			
С	2.30	2.50	2.40			
D	0.89	1.03	0.915			
F	0.45	0.60	0.535			
G	1.78	2.05	1.83			
Н	2.80	3.00	2.90			
J	0.013	0.10	0.05			
K	0.890	1.00	0.975			
K1	0.903	1.10	1.025			
L	0.45	0.61	0.55			
L1	0.25	0.55	0.40			
М	0.085	0.150	0.110			
а	0°	8°				
All	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)
С	2.0
Х	0.8
X1	1.35
Y	0.9
V1	2.0



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