





#### **500V PNP HIGH VOLTAGE TRANSISTOR IN SOT23**

#### **Description**

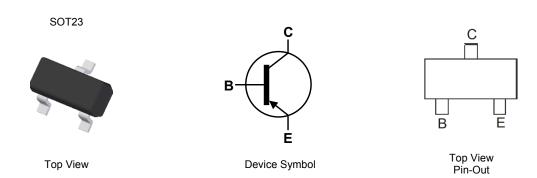
This Bipolar Junction Transistor (BJT) has been designed to meet the stringent requirements of Automotive Applications.

#### **Features**

- BV<sub>CEO</sub> > -500V
- I<sub>C</sub> = -150mA high Continuous Collector Current
- I<sub>CM</sub> Up to 500mA Peak Pulse Current
- Excellent h<sub>FE</sub> Characteristics up to I<sub>C</sub> = 100mA
- 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
- Weight 0.008 grams (approximate)



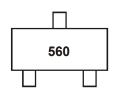
#### Ordering Information (Notes 4 & 5)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT560QTA	Automotive	560	7	8	3,000
FMMT560QTC	Automotive	560	13	8	10,000

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/quality/product\_compliance\_definitions/.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html

## **Marking Information**



560 = Product Type Marking Code





# Absolute Maximum Ratings (@TA = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	-500	V
Collector-Emitter Voltage	V <sub>CEO</sub>	-500	V
Emitter-Base Voltage	$V_{EBO}$	-7	V
Continuous Collector Current	Ic	-150	mA
Peak Pulse Current	I <sub>CM</sub>	-500	mA

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

Characteristic	Symbol	Value	Unit	
Power Dissipation	(Note 6)	$P_{D}$	500	mW
Thermal Resistance, Junction to Ambient (Note 6)		R <sub>0JA</sub>	250	°C/W
Thermal Resistance, Junction to Lead (Note 7)		$R_{\theta JL}$	194	°C/W
Operating and Storage Temperature Range	$T_{J_i}T_{STG}$	-55 to +150	°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	С

Notes:

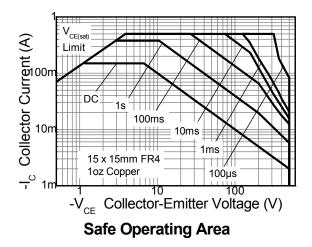
<sup>6.</sup> For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.

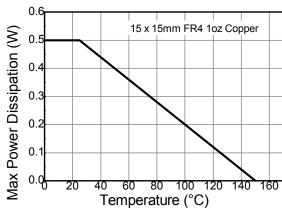
<sup>7.</sup> Thermal resistance from junction to solder-point (at the end of the collector lead).

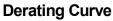
<sup>8.</sup> Refer to JEDEC specification JESD22-A114 and JESD22-A115.

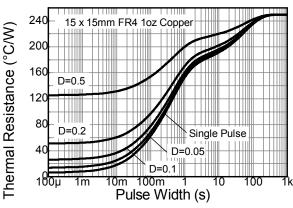


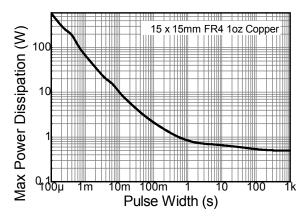
# **Thermal Characteristics and Derating Information**











**Transient Thermal Impedance** 

**Pulse Power Dissipation** 





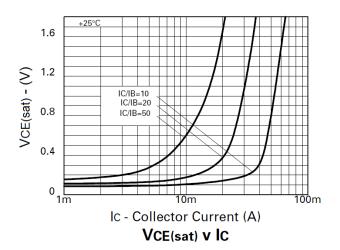
# Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

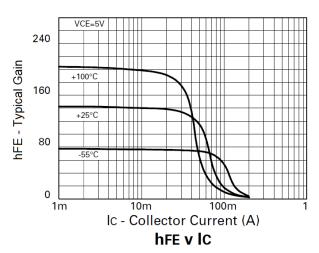
Characteristic	Symbol	Min	Тур	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	-500	_	_	V	I <sub>C</sub> = -100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	-500	_	_	V	$I_C = -1mA$
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	-7	_	_	V	I <sub>E</sub> = -100μA
Collector Cutoff Current	Ісво	_	_	-100	nA	V <sub>CB</sub> = -500V
Emitter Cutoff Current	I <sub>EBO</sub>	_	_	-100	nA	V <sub>EB</sub> = -5V
Static Forward Current Transfer Ratio (Note 9)	h <sub>FE</sub>	100 80 —	_ _ 15	300 300 —	_	$I_C = -1 \text{mA}, V_{CE} = -10 \text{V}$ $I_C = -50 \text{mA}, V_{CE} = -10 \text{V}$ $I_C = -100 \text{mA}, V_{CE} = -10 \text{V}$
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	_	_	-200 -500	mV	$I_C = -20$ mA, $I_B = -2$ mA $I_C = -50$ mA, $I_B = -10$ mA
Base-Emitter Saturation Voltage (Note 9)	V <sub>BE(sat)</sub>	_	_	-0.9	V	$I_C = -50 \text{mA}, I_B = -10 \text{mA}$
Base-Emitter Turn-On Voltage (Note 9)	$V_{BE(on)}$	_	_	-0.9	V	$I_C = -50 \text{mA}, V_{CE} = -10 \text{V}$
Output Capacitance	C <sub>obo</sub>	_	_	8	pF	V <sub>CB</sub> = -20V, f = 1MHz
Transition Frequency	fτ	60	_	_	MHz	$V_{CE} = -20V, I_{C} = -10mA,$ f = 50MHz
Turn-On Time	t <sub>on</sub>	_	110	_	ns	$V_{CE} = -100V, I_{C} = -50mA,$
Turn-Off Time	t <sub>off</sub>	_	1.5	_	μs	$I_{B1} = -5mA$ , $I_{B2} = 10mA$

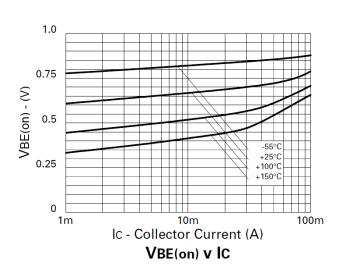
Note: 9. Measured under pulsed conditions. Pulse width  $\leq$  300 $\mu$ s. Duty cycle  $\leq$  2%

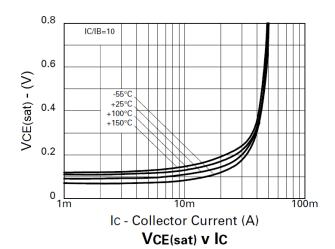


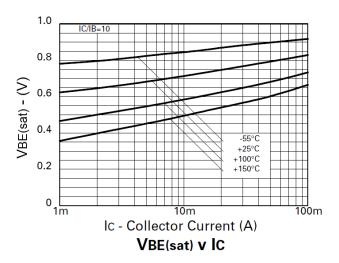
## Typical Electrical Characteristics (@TA = +25°C, unless otherwise specified.)









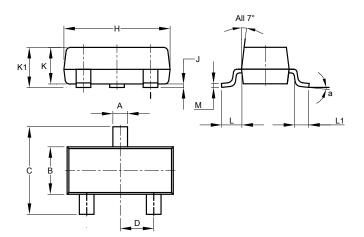






# **Package Outline Dimensions**

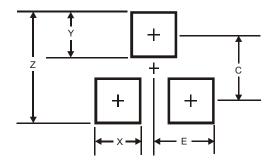
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.



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		
Η	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	8°				
All	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		
С	2.0		
E	1.35		

Note: For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.





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