

## Features and Benefits

- $BV_{DSS} > 50V$
- $R_{DS(on)} \leq 3.5\Omega$  @  $V_{GS} = 5V$
- Maximum Continuous Drain Current  $I_D = 200mA$
- **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**

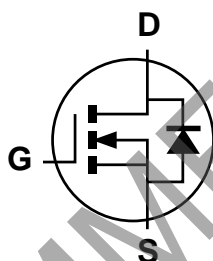
## Mechanical Data

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish; Solderable per MIL-STD-202,  
Method 208 (3)
- Weight: 0.008 grams (Approximate)

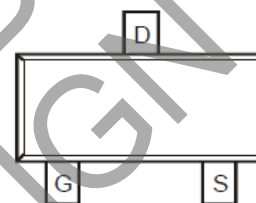
SOT23



Top View



Device symbol



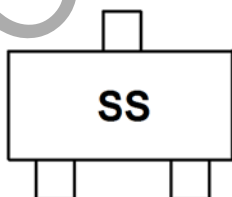
Pin-Out  
Top View

## Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BSS138TA	SS	7	8	3000

- 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



SS = Product Type Marking Code

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DSS</sub>	50	V
Gate-Source Voltage	V <sub>GSS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	200	mA
Pulsed Drain Current (Note 6)	I <sub>DM</sub>	800	mA

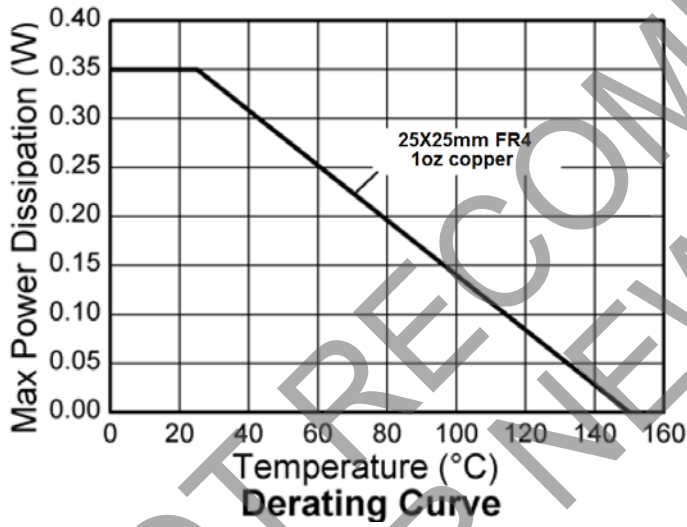
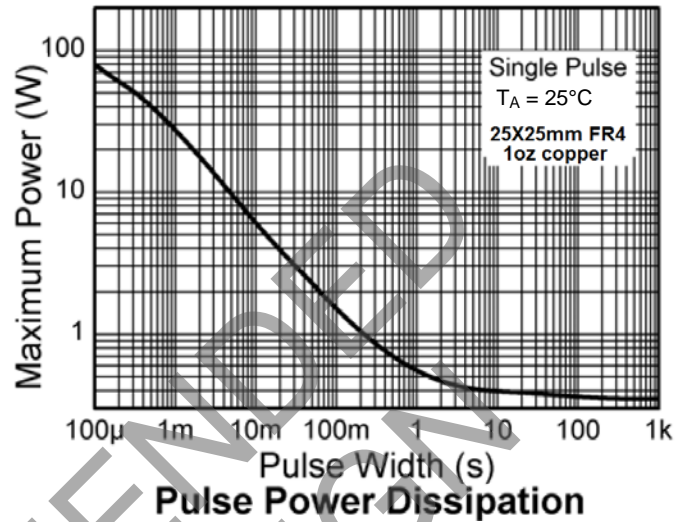
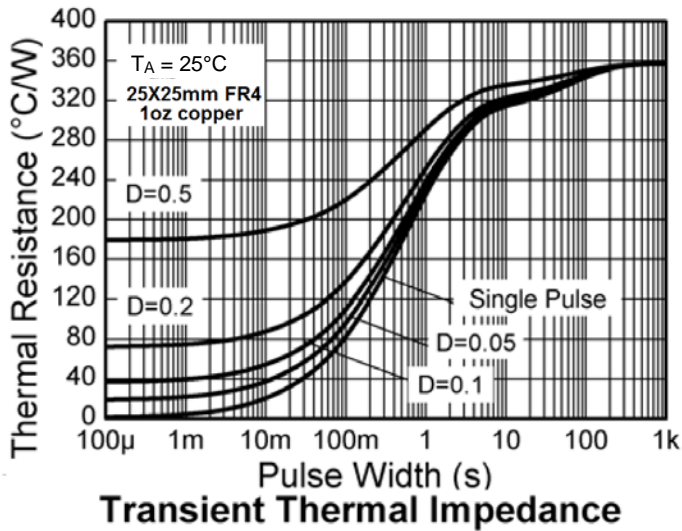
**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	350	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	357	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	195	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
5. For a device mounted on 25mm x 25mm x 1.6mm FR-4 PCV with high coverage of single sided 1oz copper, in still air condition.
  6. Device mounted on minimum recommended pad layout test board, 10µs pulse duty cycle = 1%.
  7. Thermal resistance from junction to solder-point (at the end of the collector lead).

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**Thermal Characteristics**



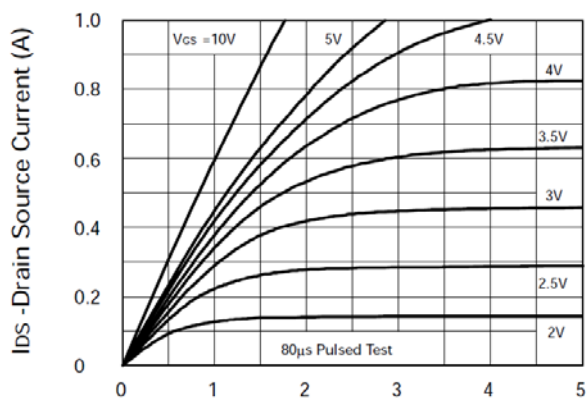
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	50	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 0.25mA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	0.5 5 100	μA μA nA	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, T <sub>A</sub> = +125°C V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V
Gate-Source Leakage	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	0.5	—	1.5	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 1mA
Static Drain-Source On-Resistance (Note 8)	R <sub>DS(on)</sub>	—	—	3.5	Ω	V <sub>GS</sub> = 5V, I <sub>D</sub> = 200mA
Forward Transconductance (Notes 8 & 9)	g <sub>fs</sub>	120	—	-	mS	V <sub>DS</sub> = 25V, I <sub>D</sub> = 200mA
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	C <sub>iss</sub>	—	—	50	pF	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz
Output Capacitance	C <sub>oss</sub>	—	—	25	pF	
Reverse Transfer Capacitance	C <sub>rss</sub>	—	—	8	pF	
Turn-On Delay Time (Note 10)	t <sub>D(on)</sub>	—	10	—	ns	V <sub>DD</sub> = 30V, I <sub>D</sub> = 280mA
Turn-On Rise Time (Note 10)	t <sub>r</sub>	—	10	—	ns	
Turn-Off Delay Time (Note 10)	t <sub>D(off)</sub>	—	15	—	ns	
Turn-Off Fall Time (Note 10)	t <sub>f</sub>	—	25	—	ns	

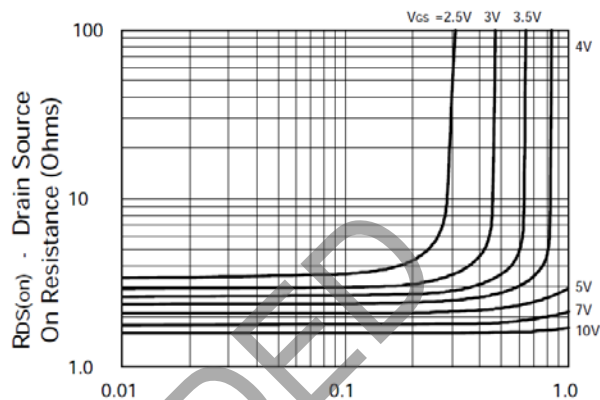
- Notes:
8. Measured under pulsed conditions. Width = 300μs. Duty cycle ≤ 2%.
  9. Sample test.
  10. Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator.

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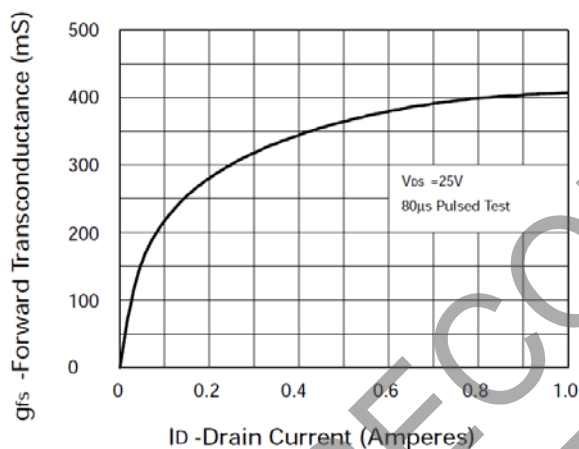
**Electrical Characteristics** (continued)



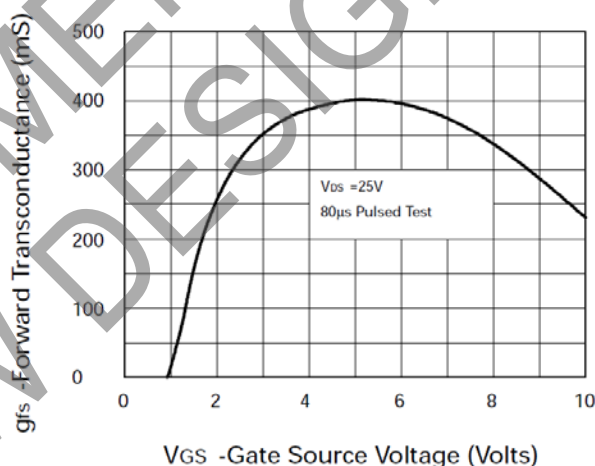
**Saturation Characteristics**



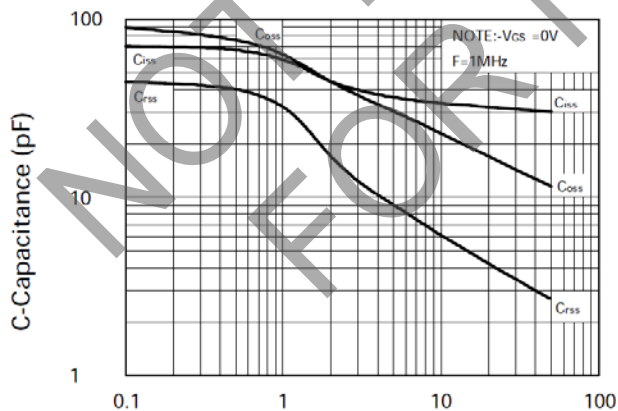
**Typical On Resistance vs. Drain Current**



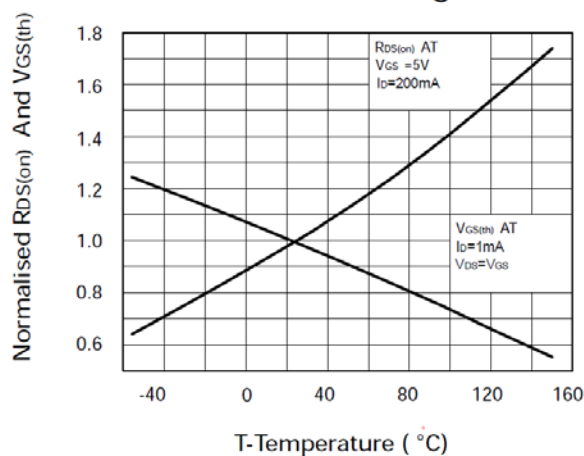
**Typical Transconductance vs. Drain Current**



**Typical Transconductance vs. Gate - Source Voltage**

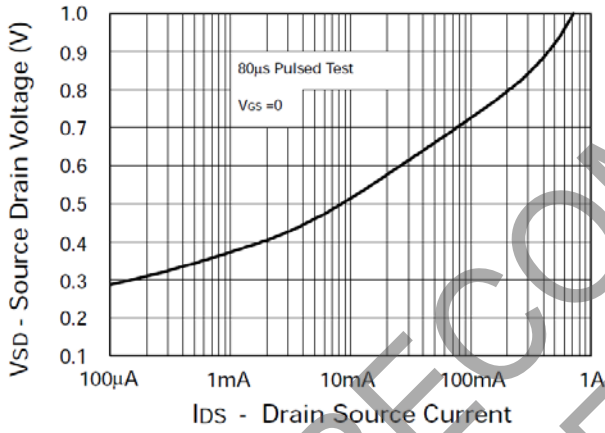
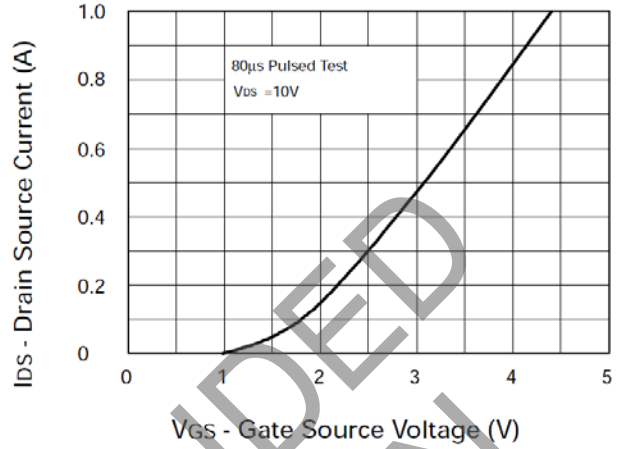
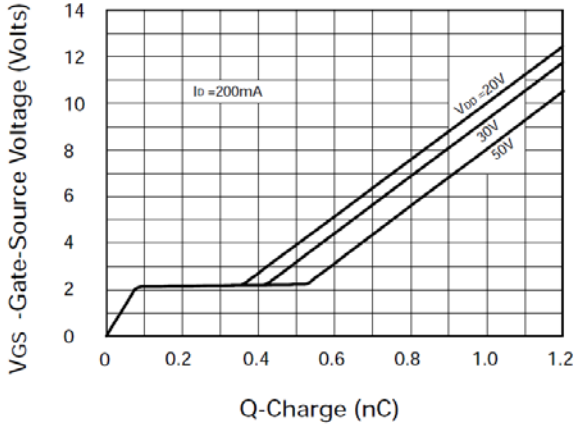


**Typical Capacitance vs. Drain - Source Voltage**



**Normalised  $R_{DS(on)}$  And  $V_{GS(th)}$  vs. Temperature**

**Electrical Characteristics (cont.)**

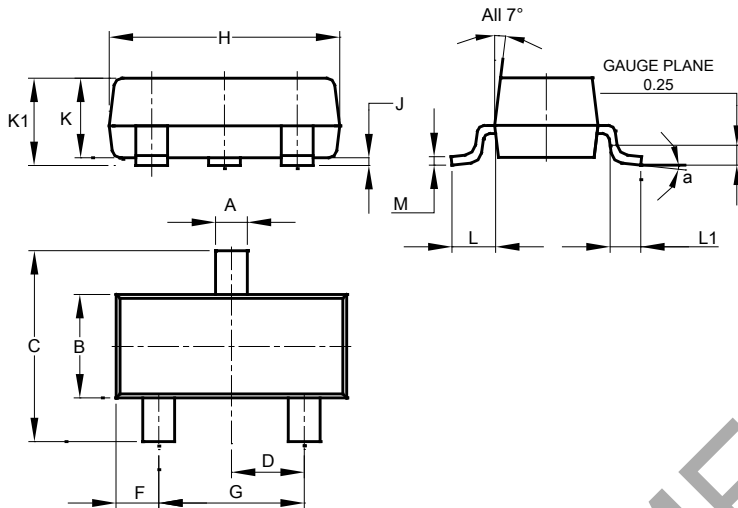


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## Package Outline Dimensions

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

**SOT23**

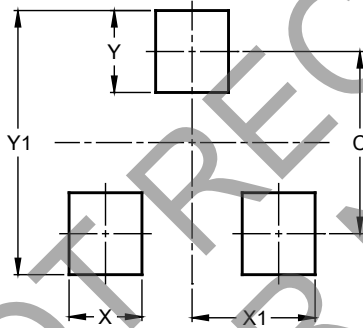


SOT23			
Dim	Min	Max	Typ
A	0.37	0.51	0.40
B	1.20	1.40	1.30
C	2.30	2.50	2.40
D	0.89	1.03	0.915
F	0.45	0.60	0.535
G	1.78	2.05	1.83
H	2.80	3.00	2.90
J	0.013	0.10	0.05
K	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	0°	8°	--
All Dimensions in mm			

## 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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