BSS138

50V N-CHANNEL ENHANCEMENT MODE VERTICAL DMOS FET IN SOT23

Features and Benefits

- BV_{DSS} > 50V
- $R_{DS(on)}$ ≤ 3.5Ω @ V_{GS}= 5V
- Maximum continuous drain current I_D = 200mA
- **"Lead Free", RoHS Compliant (Note 1)**
- **Halogen and Antimony Free. "Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

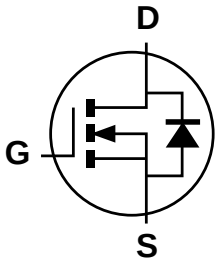
Mechanical Data

- Case: SOT-23
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matt Tin Finish; Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)

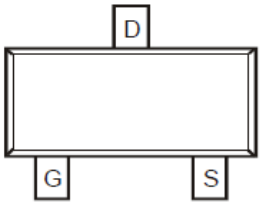
SOT-23



Top View



Device symbol



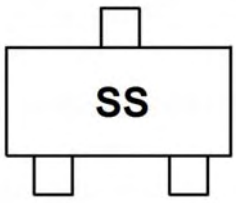
Pin-Out
Top View

Ordering Information (Note 3)

Part Number	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
BSS138TA	SS	7	8	3000

Notes:
1. No purposefully added lead
2. Diodes Inc's "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



SS = Product Type Marking Code

© Diodes Incorporated

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	50	V
Gate-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current	I_D	200	mA
Pulsed Drain Current (Note 5)	I_{DM}	800	mA

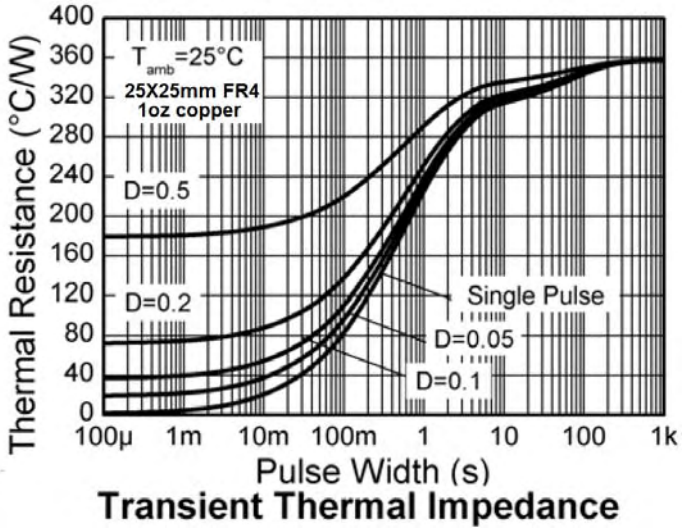
Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 4)	P_D	350	mW
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	357	°C/W
Thermal Resistance, Junction to Leads	(Note 6)	$R_{\theta JL}$	195	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

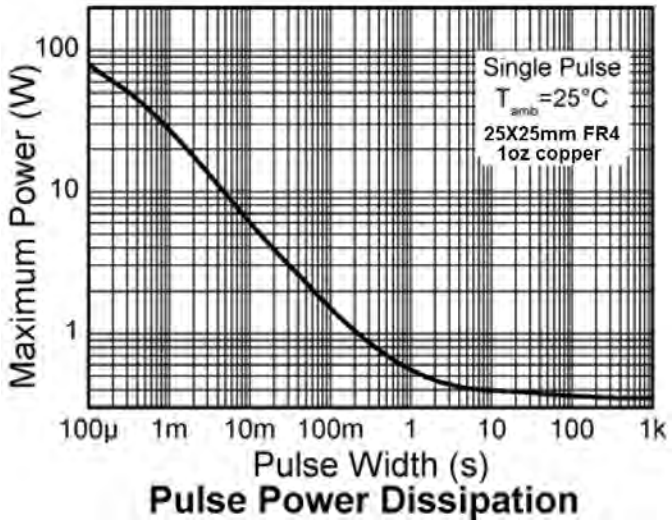
Notes: 4. For a device mounted on 25mm X 25mm X 1.6mm FR-4 PCV with high coverage of single sided 1oz copper, in still air condition.
5. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
6. Thermal resistance from junction to solder-point (at the end of the collector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

© Diodes Incorporated

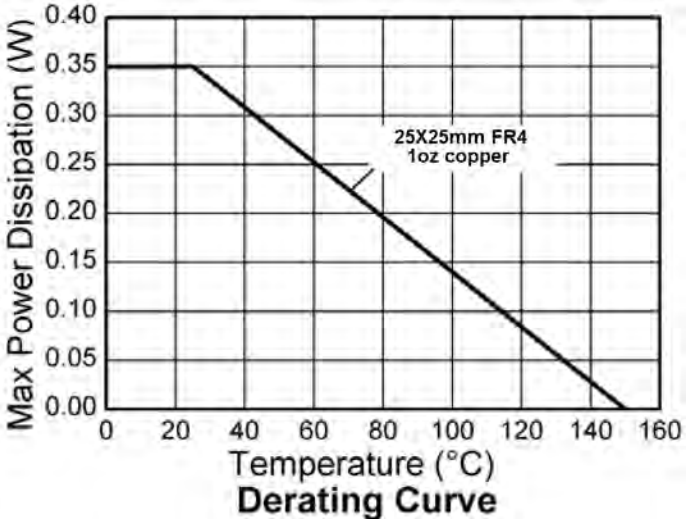
Thermal Characteristics



Transient Thermal Impedance



Pulse Power Dissipation



Derating Curve

© Diodes Incorporated

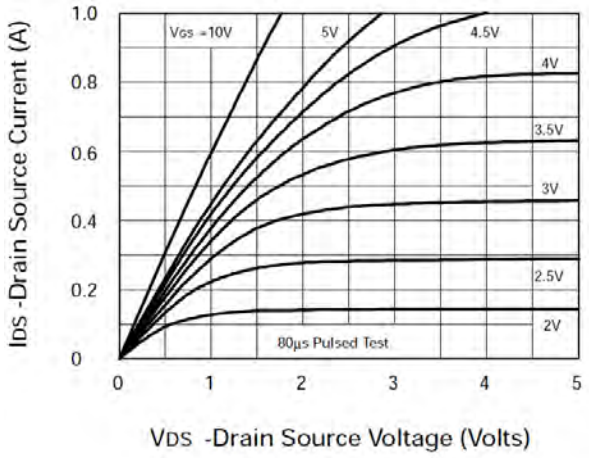
Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	50	-	-	V	V_{GS} = 0V, I_D = 0.25mA
Zero Gate Voltage Drain Current	I_{DSS}	-	-	0.5 5 100	µA µA nA	V_{DS} = 50V, V_{GS} = 0V V_{DS} = 50V, V_{GS} = 0V, T_A = 125°C V_{DS} = 20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	0.5	-	1.5	V	V_{DS} = V_{GS}, I_D = 1mA
Static Drain-Source On-Resistance (Note 7)	$R_{DS\ (on)}$	-	-	3.5	Ω	V_{GS} = 5V, I_D = 200mA
Forward Transconductance (Note 7 & 8)	g_{fs}	120	-	-	mS	V_{DS} = 25V, I_D = 200mA
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	-	50	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	-	25	pF	
Reverse Transfer Capacitance	C_{rss}	-	-	8	pF	
Turn-On Delay Time (Note 9)	$t_{D(on)}$	-	10	-	ns	V_{DD} = 30V, I_D = 280mA
Turn-On Rise Time (Note 9)	t_r	-	10	-	ns	
Turn-Off Delay Time (Note 9)	$t_{D(off)}$	-	15	-	ns	
Turn-Off Fall Time (Note 9)	t_f	-	25	-	ns	

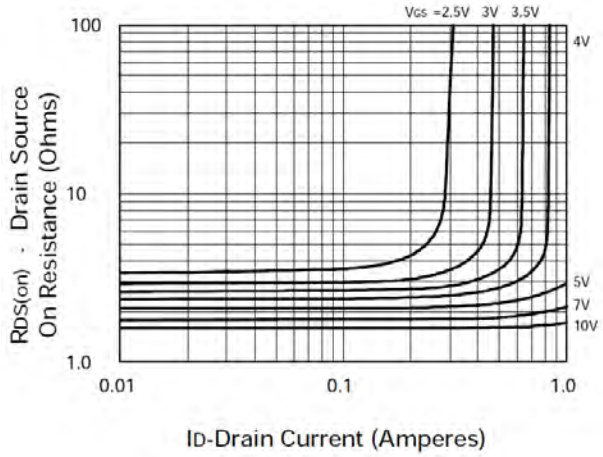
Notes: 7. Measured under pulsed conditions. Width = 300µs. Duty cycle ≤ 2%.
8. Sample test.
9. Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator.

© Diodes Incorporated

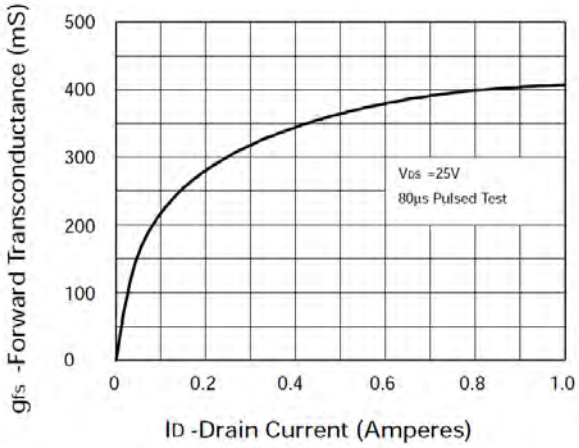
Electrical Characteristics



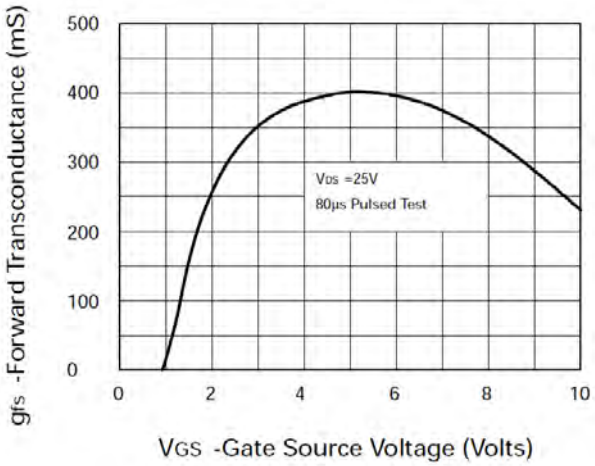
Saturation Characteristics



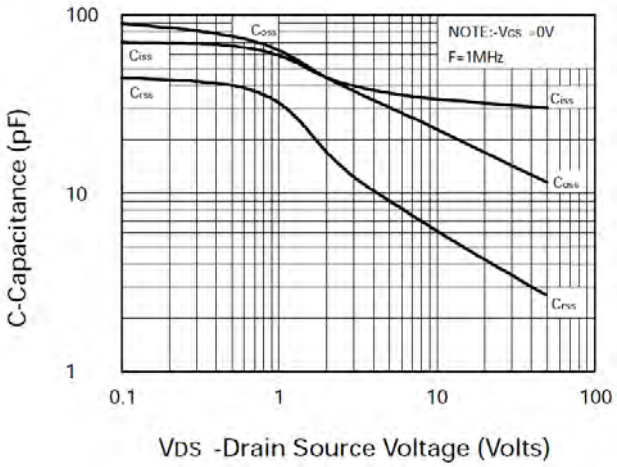
Typical On Resistance vs. Drain Current



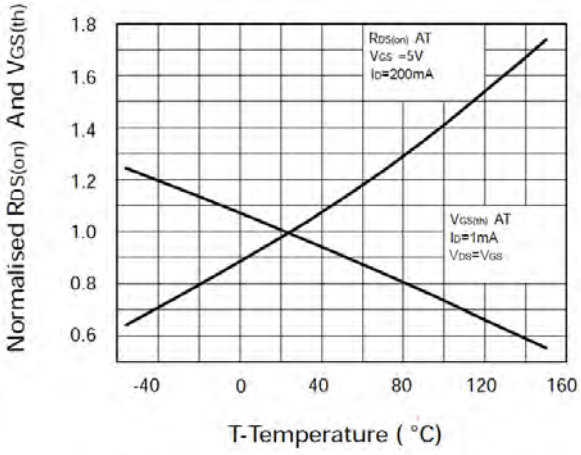
Typical Transconductance vs. Drain Current



Typical Transconductance vs. Gate - Source Voltage



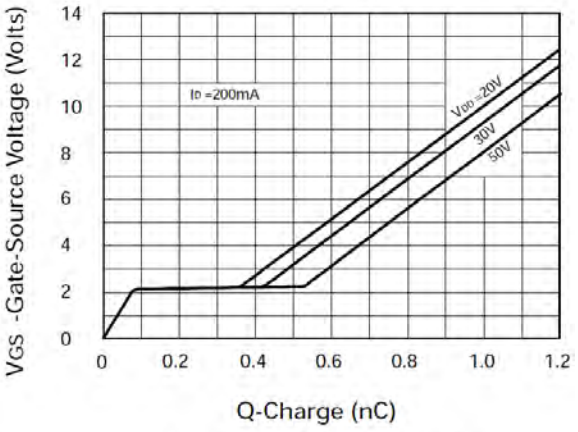
Typical Capacitance vs. Drain - Source Voltage



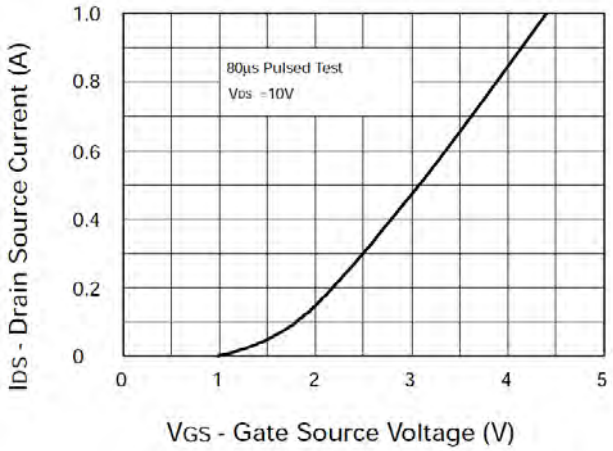
Normalised RDS(on) And VGS(th) vs. Temperature

© Diodes Incorporated

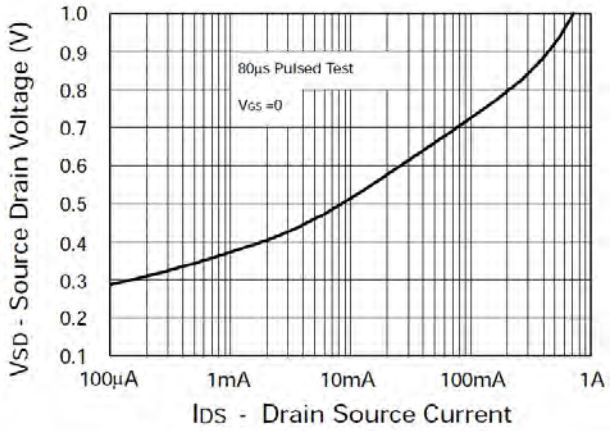
Electrical Characteristics – (Continuous)



Typical Gate Charge vs. Gate-Source Voltage



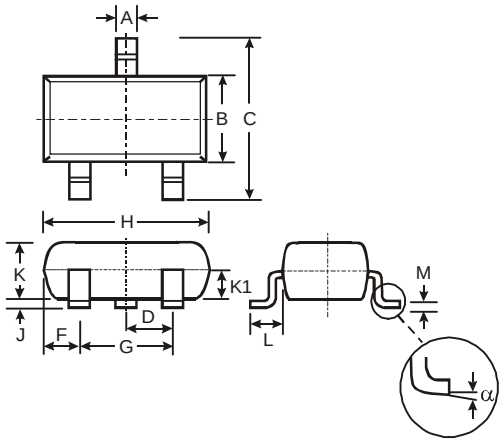
Typical Transfer Characteristics



Typical Diode Forward Voltage

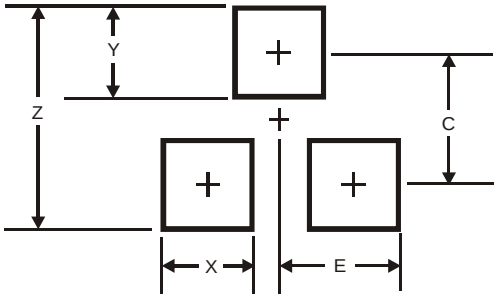
© Diodes Incorporated

Package Outline Dimensions



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	0.903	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

© Diodes Incorporated

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2011, Diodes Incorporated

www.diodes.com