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**

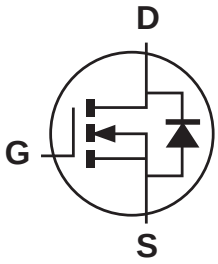
Mechanical Data

- 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)

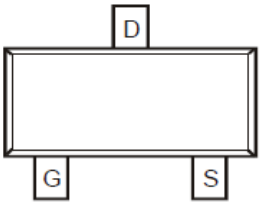
SOT-23



Top View



Device symbol



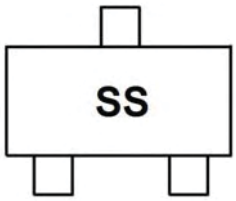
Pin-Out
Top View

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

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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

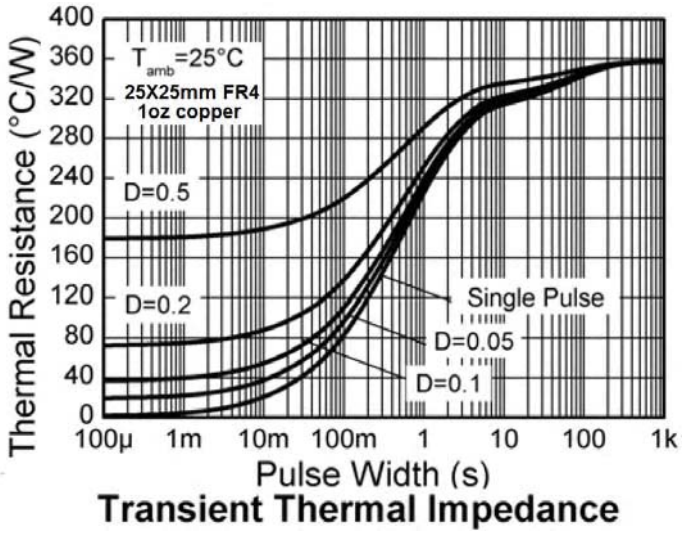
Thermal Characteristics @T_A = 25°C unless otherwise specified

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

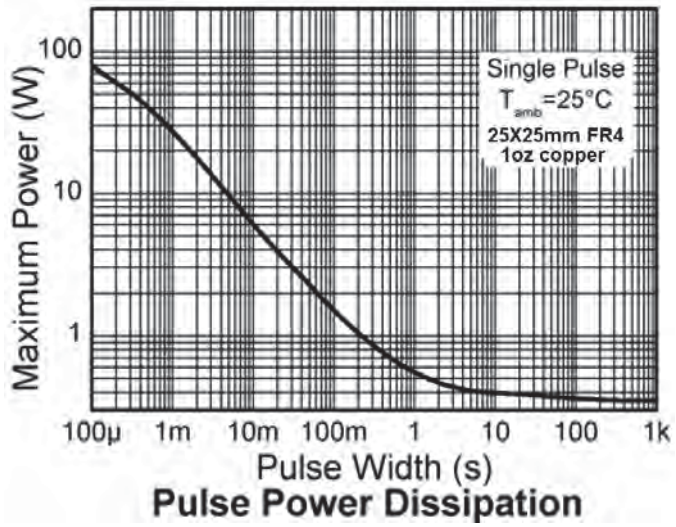
Notes: 4. For a device mounted on 25mm X 25mm X 1.6mm FR-4 PCV with high coverage of single sided 1oz copper, in still air condition.
5. Device mounted on minimum recommended pad layout test board, 10μs pulse duty cycle = 1%.
6. Thermal resistance from junction to solder-point (at the end of the collector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

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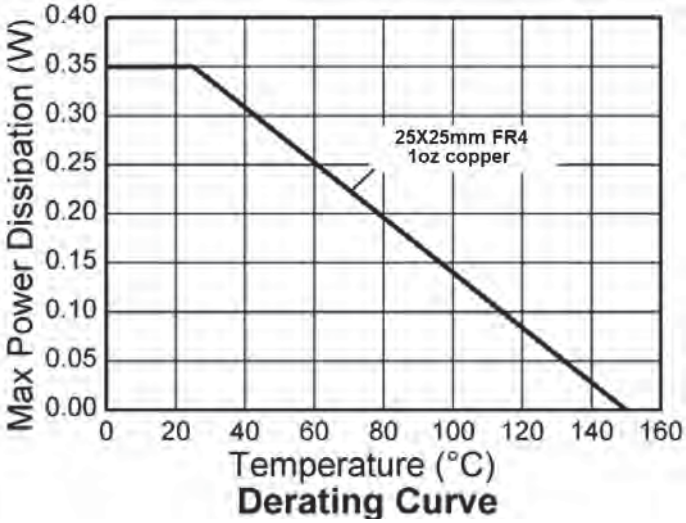
Thermal Characteristics



Transient Thermal Impedance



Pulse Power Dissipation



Derating Curve

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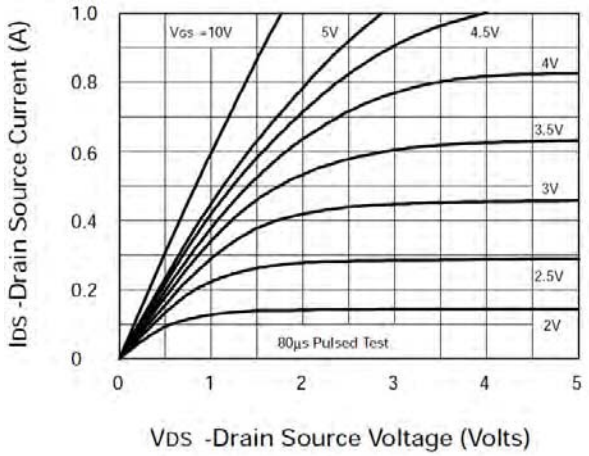
Electrical Characteristics @T_A = 25°C unless otherwise specified

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	

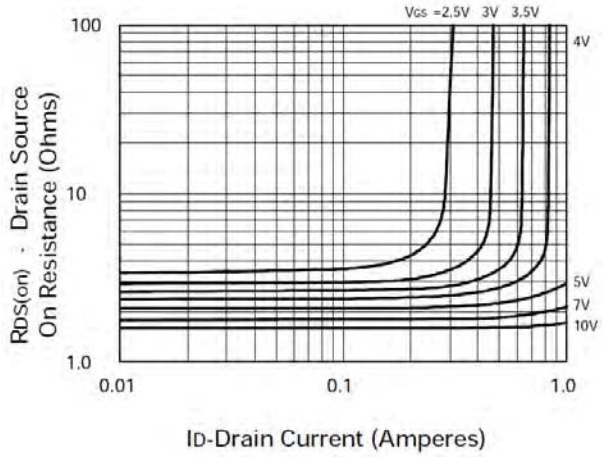
Notes: 7. Measured under pulsed conditions. Width = 300µs. Duty cycle ≤ 2%.
8. Sample test.
9. Switching times measured with 50Ω source impedance and <5ns rise time on a pulse generator.

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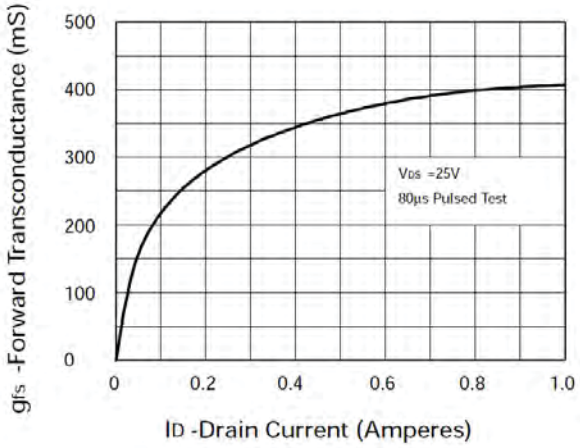
Electrical Characteristics



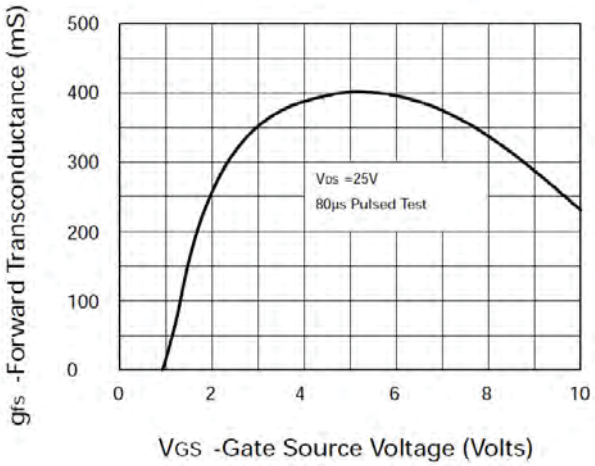
Saturation Characteristics



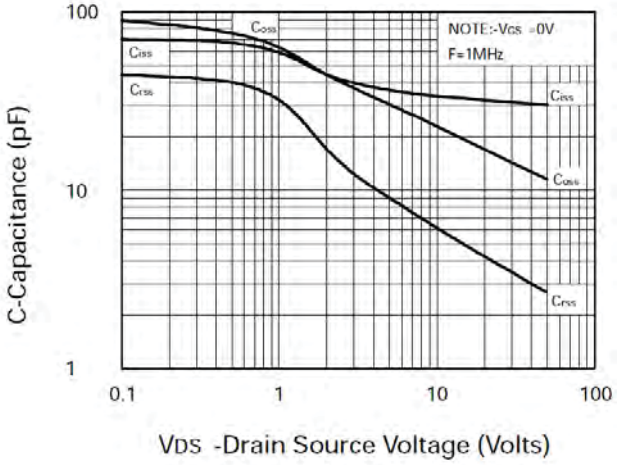
Typical On Resistance vs. Drain Current



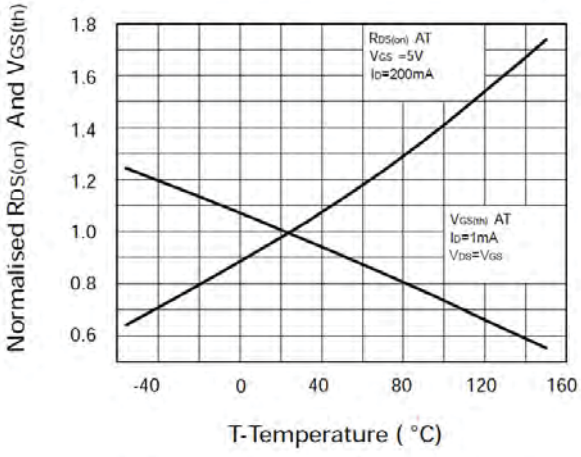
Typical Transconductance vs. Drain Current



Typical Transconductance vs. Gate - Source Voltage



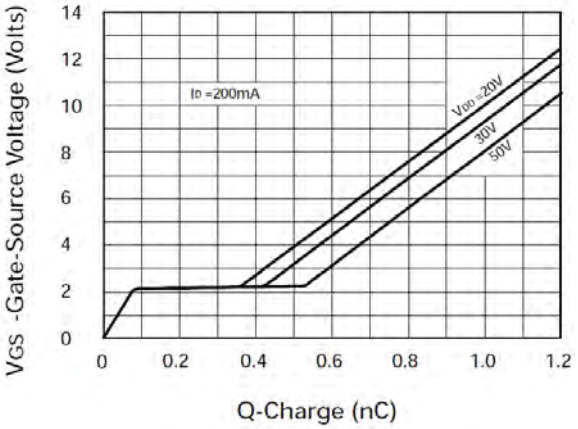
Typical Capacitance vs. Drain - Source Voltage



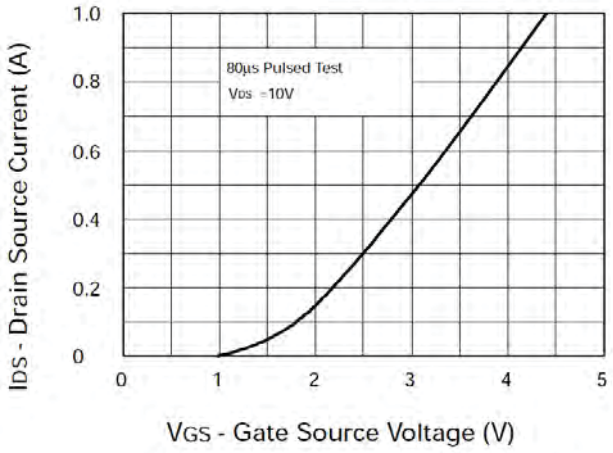
Normalised RDS(on) And VGS(th) vs. Temperature

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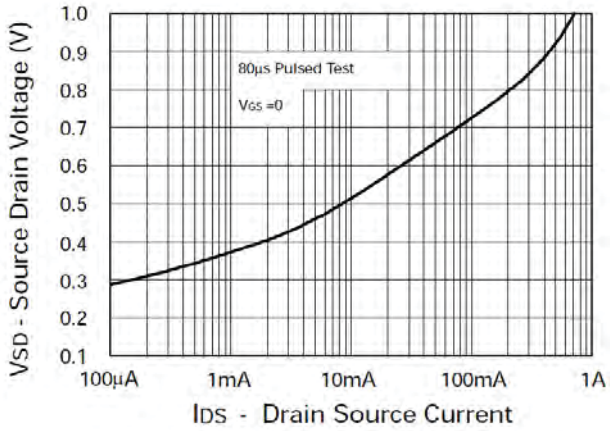
Electrical Characteristics – (Continuous)



Typical Gate Charge vs. Gate-Source Voltage



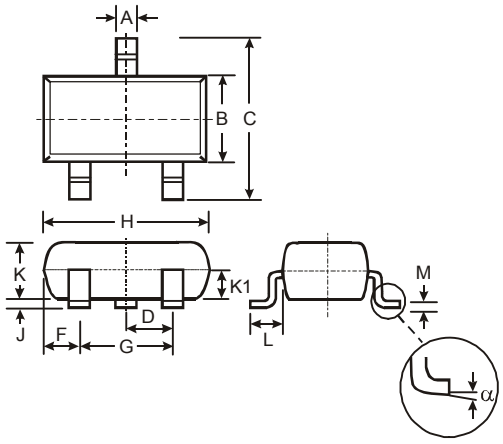
Typical Transfer Characteristics



Typical Diode Forward Voltage

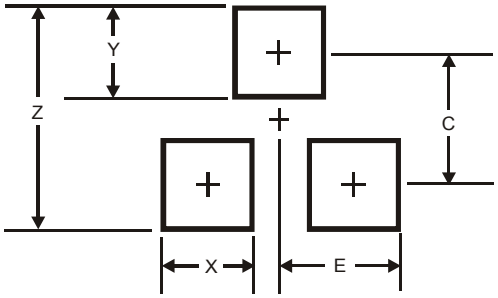
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Package Outline Dimensions



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

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