

N-Channel Power MOSFET

50V, 260mA, 2.5Ω

FEATURES

- Low $R_{DS(ON)}$ to minimize conductive losses
- Logic level
- Low gate charge for fast power switching
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

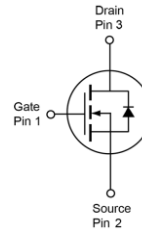
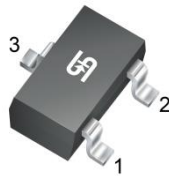
APPLICATIONS

- Low Side Load Switching
- Level Shift Circuits
- General Switch Circuits

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
V_{DS}	50	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	2.5
	$V_{GS} = 4.5V$	3
Q_g	1	nC



SOT-23



Note: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V_{DS}	50	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	$T_A = 25^\circ\text{C}$	mA
		$T_A = 125^\circ\text{C}$	
Pulsed Drain Current	I_{DM}	1.04	A
Total Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	mW
		$T_A = 125^\circ\text{C}$	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	MAXIMUM	UNIT
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	350	$^\circ\text{C/W}$

Thermal Performance Note: $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. The $R_{\theta JA}$ limit presented here is based on mounting on a 1 in² pad of 2 oz copper.

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	50	--	--	V
Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250μA	V _{GS(TH)}	0.8	1.1	1.6	V
Gate-Source Leakage Current	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Drain-Source Leakage Current	V _{GS} = 0V, V _{DS} = 50V	I _{DSS}	--	--	1	μA
	V _{GS} = 0V, V _{DS} = 50V T _J =125°C		--	--	100	
Drain-Source On-State Resistance (Note 3)	V _{GS} = 10V, I _D = 260mA	R _{DS(on)}	--	1.1	2.5	Ω
	V _{GS} = 4.5V, I _D = 240mA		--	1.2	3	
Forward Transconductance (Note 3)	V _{DS} = 5V, I _D = 260mA	g _{fs}	--	0.8	--	S
Dynamic (Note 3)						
Total Gate Charge	V _{GS} = 10V, V _{DS} = 25V, I _D = 260mA	Q _g	--	2	--	nC
Total Gate Charge	V _{GS} = 4.5V, V _{DS} = 25V, I _D = 240mA	Q _g	--	1	--	
Gate-Source Charge		Q _{gs}	--	0.3	--	
Gate-Drain Charge		Q _{gd}	--	0.3	--	
Input Capacitance	V _{GS} = 0V, V _{DS} = 25V f = 1.0MHz	C _{iss}	--	32	--	pF
Output Capacitance		C _{oss}	--	10	--	
Reverse Transfer Capacitance		C _{rss}	--	6	--	
Switching (Note 3)						
Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 25V, I _D = 260mA, R _G = 6Ω	t _{d(on)}	--	3	--	ns
Turn-On Rise Time		t _r	--	11	--	
Turn-Off Delay Time		t _{d(off)}	--	20	--	
Turn-Off Fall Time		t _f	--	48	--	
Source-Drain Diode						
Forward Voltage (Note 2)	V _{GS} = 0V, I _S = 260mA	V _{SD}	--	--	1.2	V
Reverse Recovery Time	I _S = 260mA , di/dt = 100A/μs	t _{rr}	--	13	--	ns
Reverse Recovery Charge		Q _{rr}	--	4	--	nC

Notes:

1. Silicon limited current only.
2. Pulse test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Switching time is essentially independent of operating temperature.

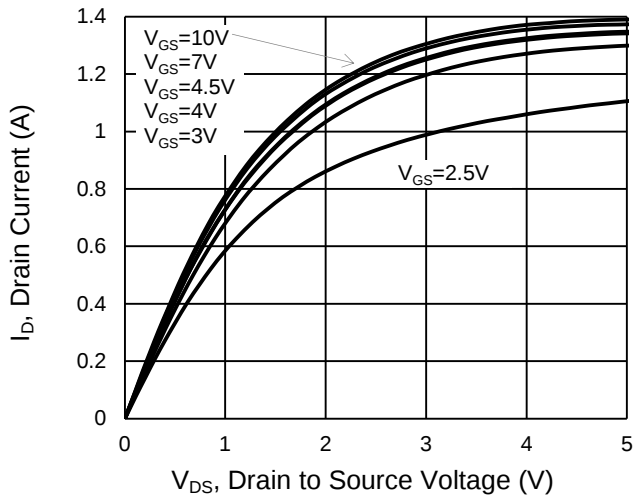
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
BSS138 RFG	SOT-23	3,000pcs / 7" Reel

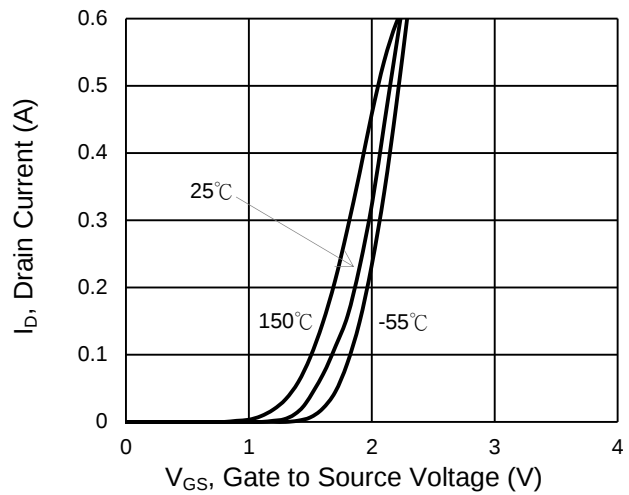
CHARACTERISTICS CURVES

($T_A = 25^\circ\text{C}$ unless otherwise noted)

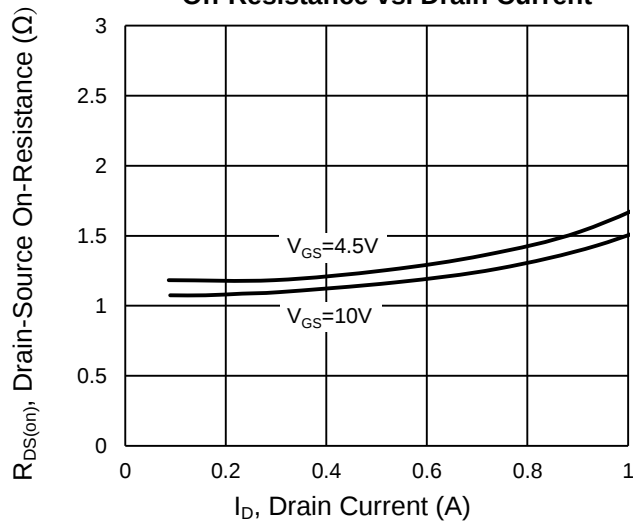
Output Characteristics



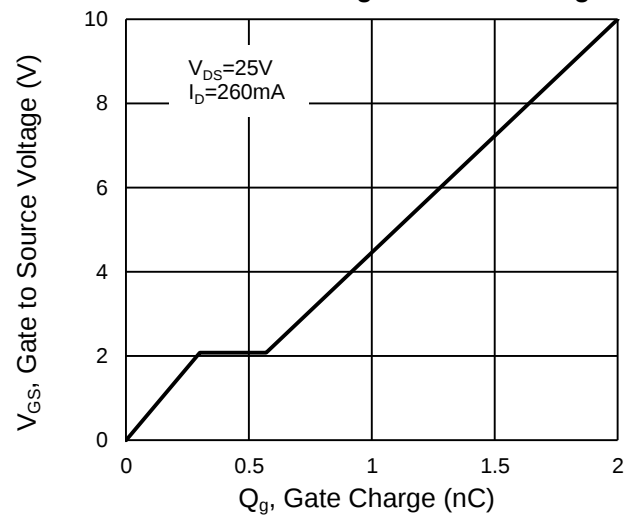
Transfer Characteristics



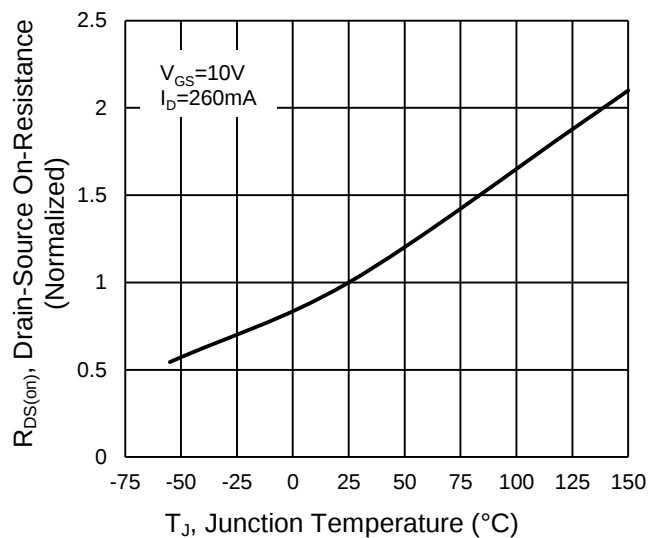
On-Resistance vs. Drain Current



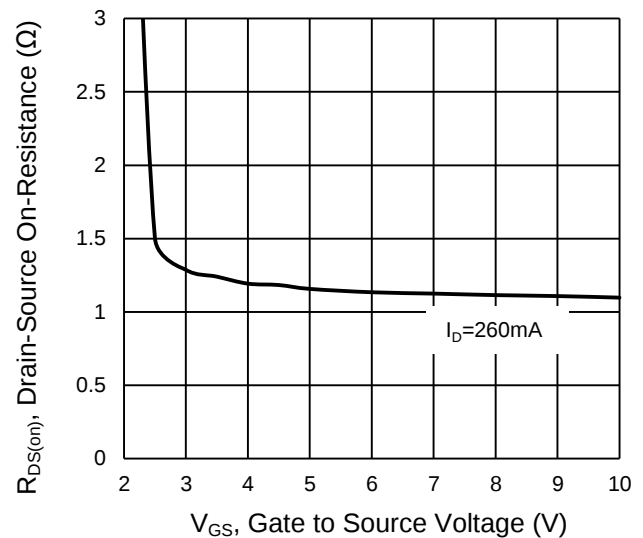
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature



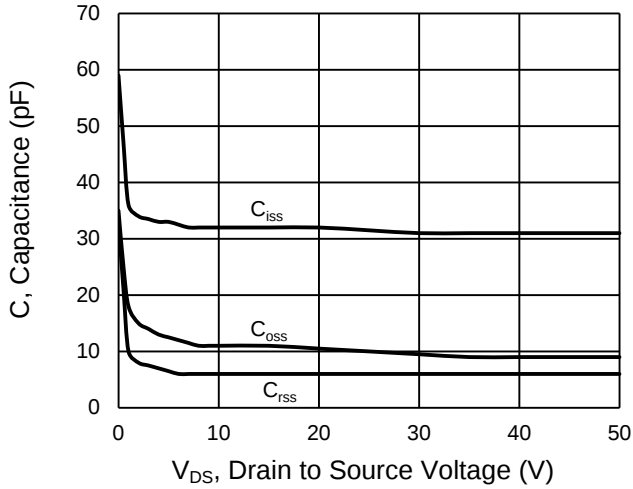
On-Resistance vs. Gate-Source Voltage



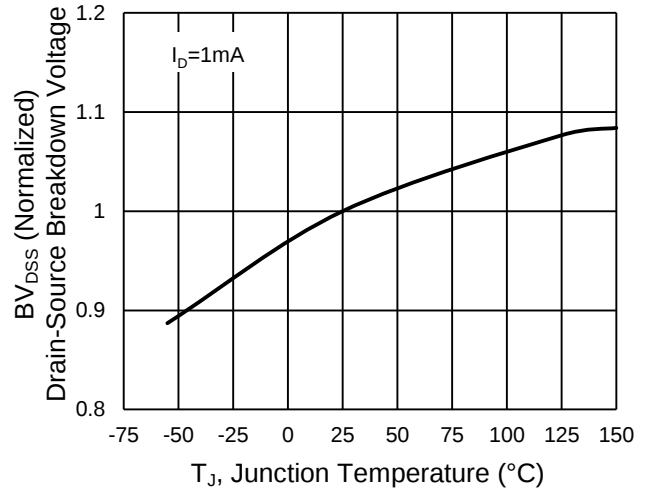
CHARACTERISTICS CURVES

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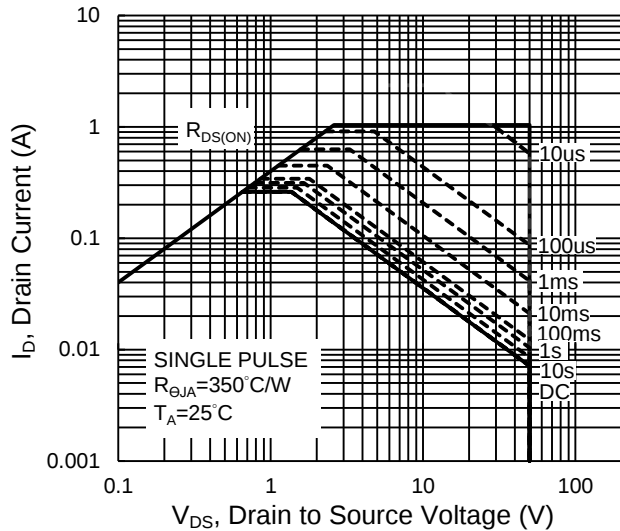
Capacitance vs. Drain-Source Voltage



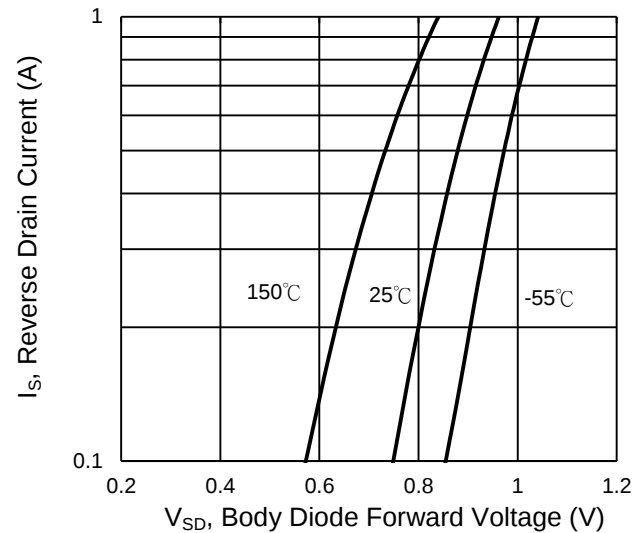
BV_{DSS} vs. Junction Temperature



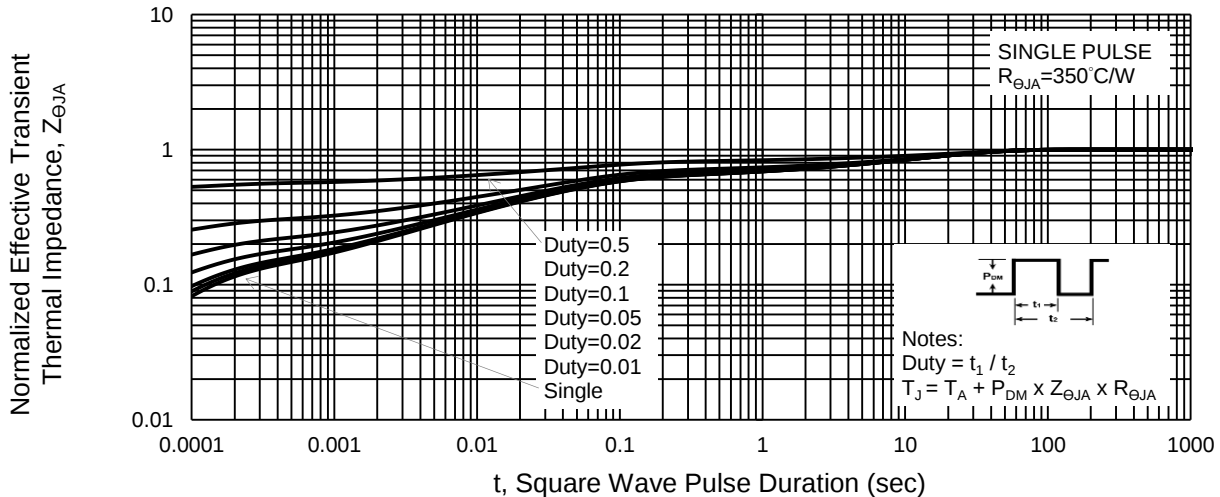
Maximum Safe Operating Area, Junction-to-Ambient



Source-Drain Diode Forward Current vs. Voltage

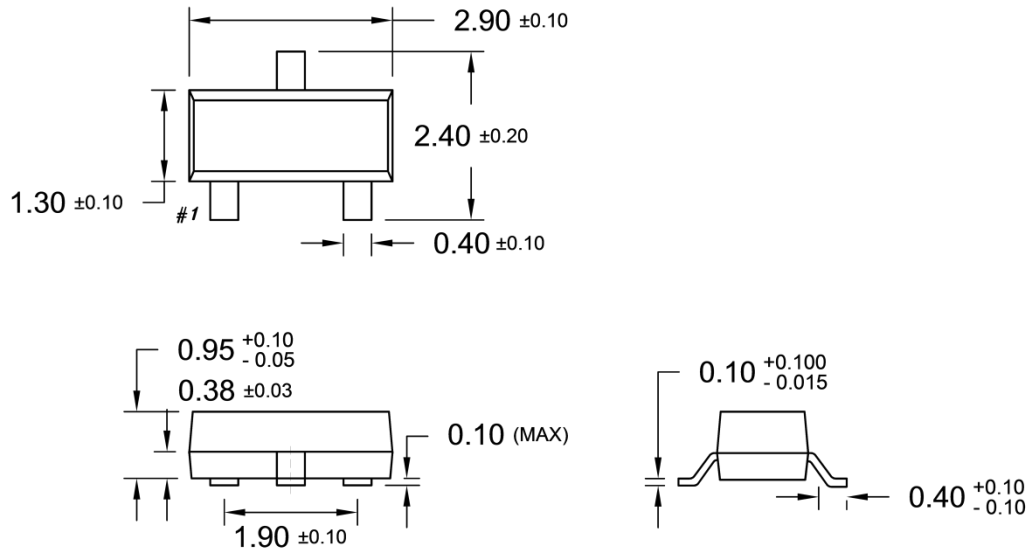


Normalized Thermal Transient Impedance, Junction-to-Ambient

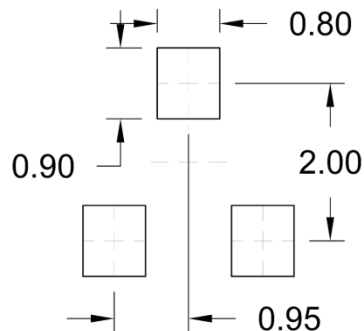


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

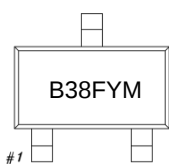
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SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



B38	= Device code				
F	= Site Code				
Y	= Year Code				
M	= Month code				
O	=Jan	P	=Feb	Q	=Mar
R	=Apr	S	=May	T	=Jun
U	=Jul	V	=Aug	W	=Sep
X	=Oct	Y	=Nov	Z	=Dec

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