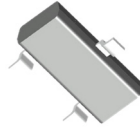


Product Summary

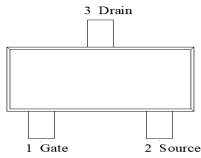
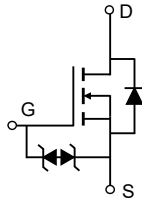
V_{DS}	$R_{DS(ON)_TYP}$	I_{D_MAX}
60 V	$1.5 \Omega @ V_{GS} = 10V$	0.33 A
	$2.3 \Omega @ V_{GS} = 4.5V$	

SOT-23


Top View



Bottom View


 PIN Configuration
(Top View)


Schematic Diagram

Features

- High Density Cell Design for Low $R_{DS(ON)}$
- Voltage Controlled Small Signal Switch
- Rugged and Reliable
- High Saturation Current Capability
- ESD Protected up to 2.0KV(HBM)


Applications

- Load Switch for Portable Devices
- DC/DC Converter

Mechanical Data

- Green Molding Compound
- UL Flammability Classification Rating 94V-0

Ordering Information

Orderable Part Number	Package Type	Device Marking	Form	Quantity (pcs)
BSS138M	SOT-23	S138	7" Tape&Reel	3,000

Maximum Ratings (@ $T_A = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Value	Unit
Drain - Source Voltage	V_{DS}	60	V
Gate - Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($V_{GS} = 10V$) ⁽¹⁾	$T_A = 25^\circ\text{C}$	0.33	A
	$T_A = 70^\circ\text{C}$	0.26	A
Pulsed Drain Current ⁽²⁾	I_{DM}	1.3	A
Power Dissipation	$T_A = 25^\circ\text{C}$	0.48	W
	$T_A = 70^\circ\text{C}$	0.31	W
Junction & Storage Temperature Range	T_J, T_{STG}	-55 ~ +150	$^\circ\text{C}$

Thermal Characteristics

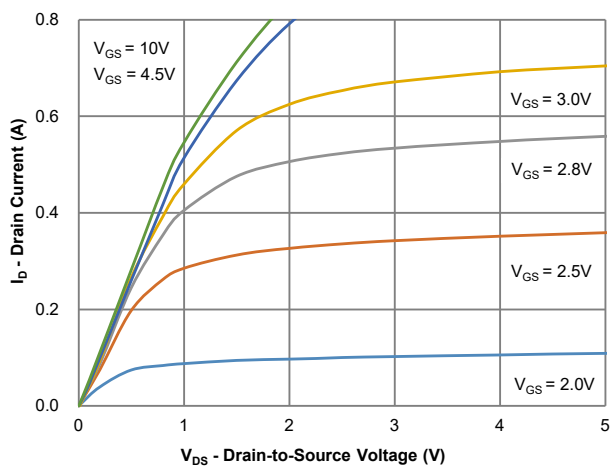
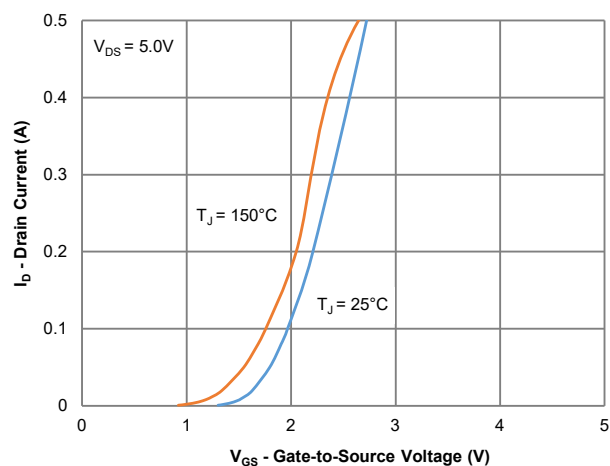
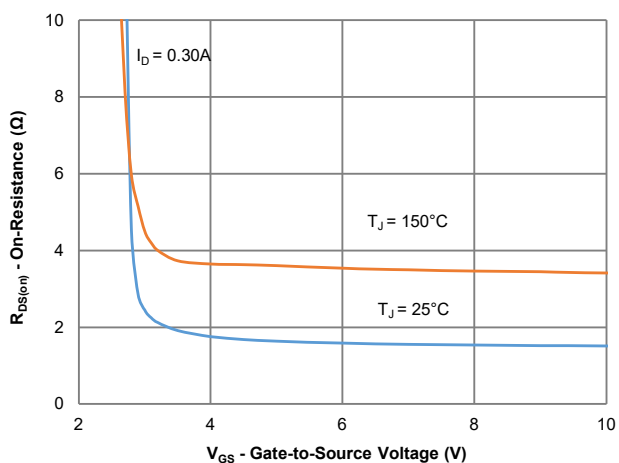
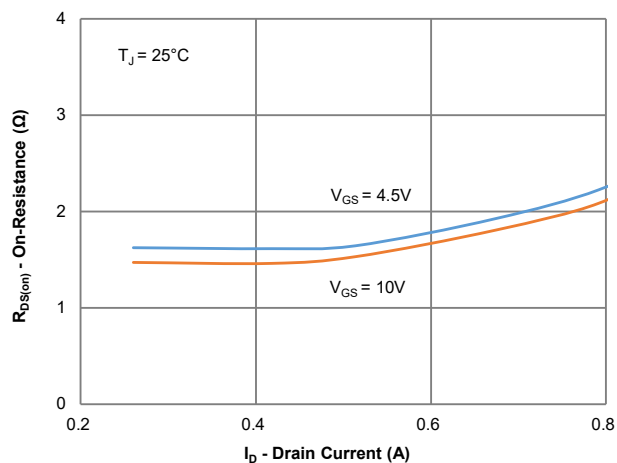
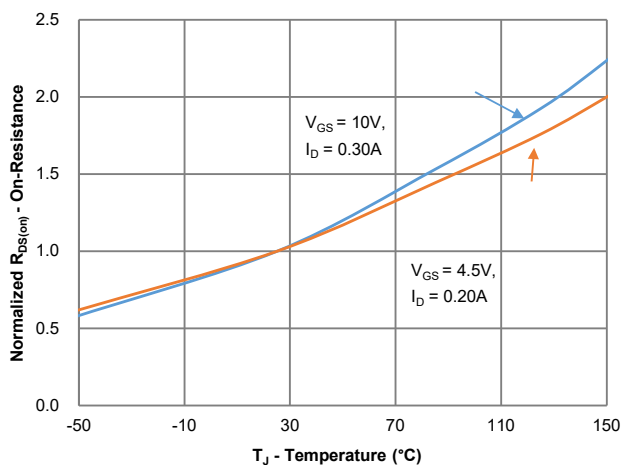
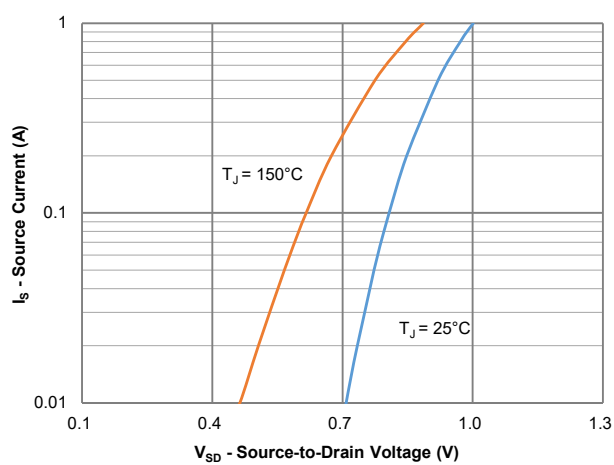
Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Ambient ⁽³⁾	$R_{\theta JA}$	200	260	$^\circ\text{C/W}$

Electrical Characteristics (@ $T_J = 25^\circ\text{C}$, unless otherwise specified.)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off Characteristics ⁽⁴⁾						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60V, V _{GS} = 0V	-	-	1.0	μA
		T _J = 125°C	-	-	100	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V	-	-	±10	μA
On Characteristics ⁽⁴⁾						
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = 250μA	0.8	1.2	1.6	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 0.30A	-	1.5	2.0	Ω
		V _{GS} = 4.5V, I _D = 0.20A	-	1.5	2.1	Ω
		V _{GS} = 2.5V, I _D = 0.10A	-	2.3	3.2	Ω
Forward Transconductance	g _{fs}	V _{DS} = 5.0V, I _D = 0.20A	-	425	-	mS
Diodes Forward Voltage	V _{SD}	I _S = 0.30A, V _{GS} = 0V	-	0.90	1.2	V
Dynamic Characteristics ⁽⁵⁾						
Input Capacitance	C _{iss}	V _{DS} = 30V, V _{GS} = 0V, f = 1MHz	-	17	-	pF
Output Capacitance	C _{oss}		-	4.0	-	pF
Reverse Transfer Capacitance	C _{rss}		-	2.0	-	pF
Gate Resistance	R _g	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	172	-	Ω
Switching Characteristics ⁽⁵⁾						
Turn-On DelayTime	t _{d(on)}	V _{GS} = 10V, V _{DS} = 30V I _D = 0.30A, R _{GEN} = 3.0Ω	-	2.4	-	ns
Rise Time	t _r		-	4.1	-	ns
Turn-Off DelayTime	t _{d(off)}		-	16	-	ns
Fall Time	t _f		-	11.7	-	ns
Gate Charge Characteristics ⁽⁵⁾						
Total Gate Charge (V _{GS} = 10V)	Q _g	V _{DS} =30V, I _D = 0.30A V _{GS} = 10V	-	0.85	-	nC
Total Gate Charge (V _{GS} = 4.5V)	Q _g		-	0.42	-	nC
Gate-Source Charge	Q _{gs}		-	0.16	-	nC
Gate-Drain Charge	Q _{gd}		-	0.10	-	nC
Gate Plateau Voltage	V _{plateau}		-	2.5	-	V
Drain-Source Diode Characteristics ⁽⁵⁾						
Diode Forward Current	I _S	T _A = 25°C	-	-	0.33	A

Notes:

1. This current is chip limited, which is calculated based on R_{thja} .
2. This current is calculated on single pulse with 10 μ s Single Pulse .
3. Device mounted on FR-4 substrate PC board with 2oz copper in 1inch square cooling area.
4. Short duration pulse test used to minimize self-heating effect.
5. Defined by design, not subject to production.

Typical Electrical and Thermal Characteristics

Figure 1: Output Characteristics

Figure 2: Transfer Characteristics

Figure 3: On-Resistance vs. Gate-Source Voltage

Figure 4: On-Resistance vs. Drain Current and Gate Voltage

Figure 5: On-Resistance vs. Junction Temperature

Figure 6: Source-Drain Diode Forward Voltage

Typical Electrical and Thermal Characteristics

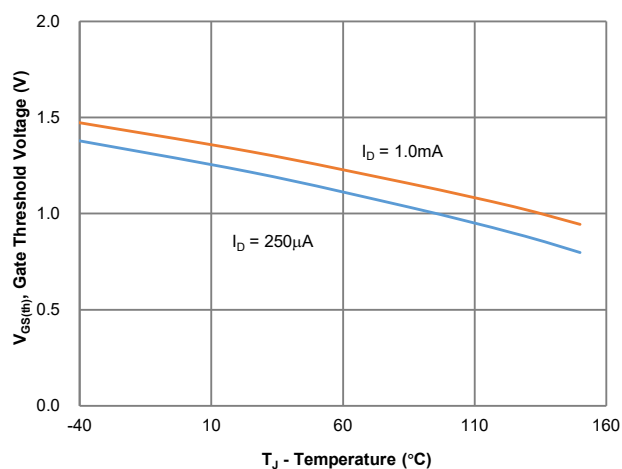


Figure 7: Gate Threshold Variation vs. Junction Temperature

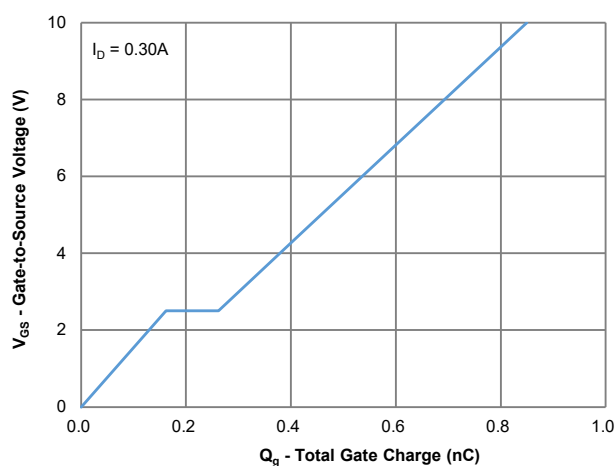


Figure 8: Gate Charge Characteristics

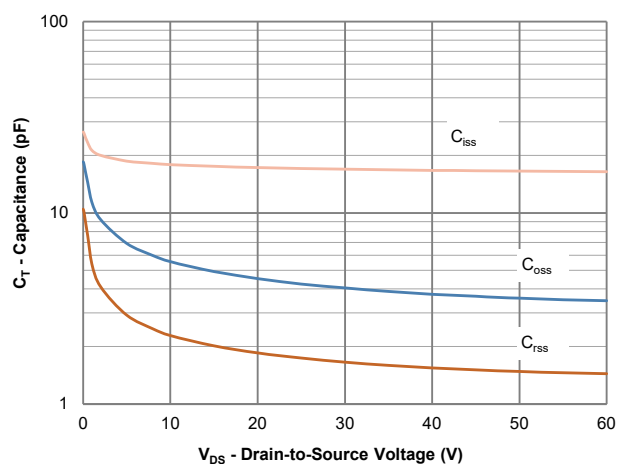


Figure 9: Capacitance Characteristics

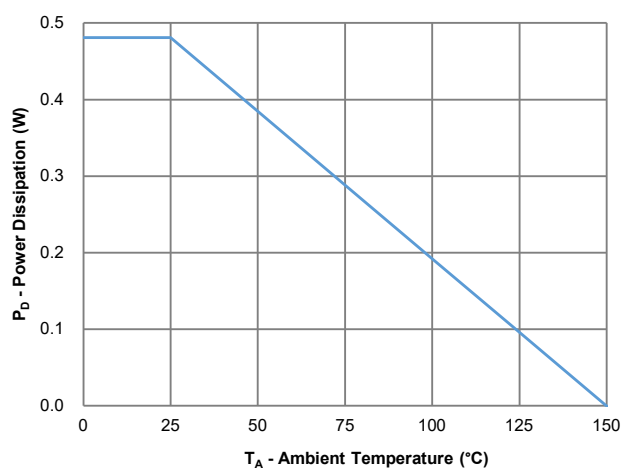


Figure 10: Power Derating

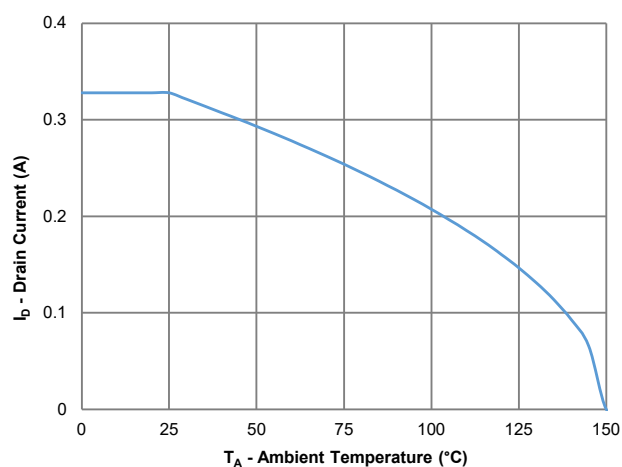


Figure 11: Current Derating

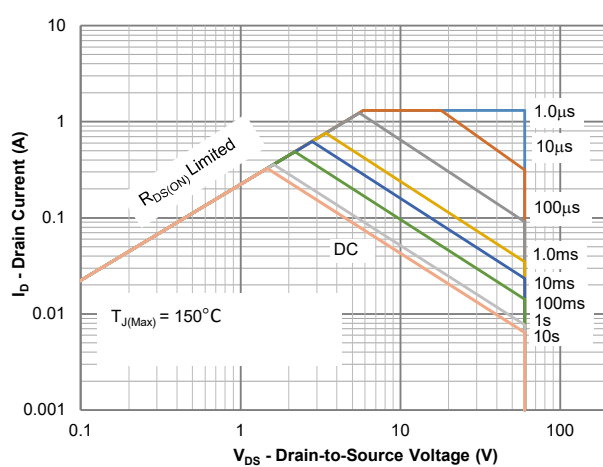


Figure 12: Safe Operating Area

Typical Electrical and Thermal Characteristics

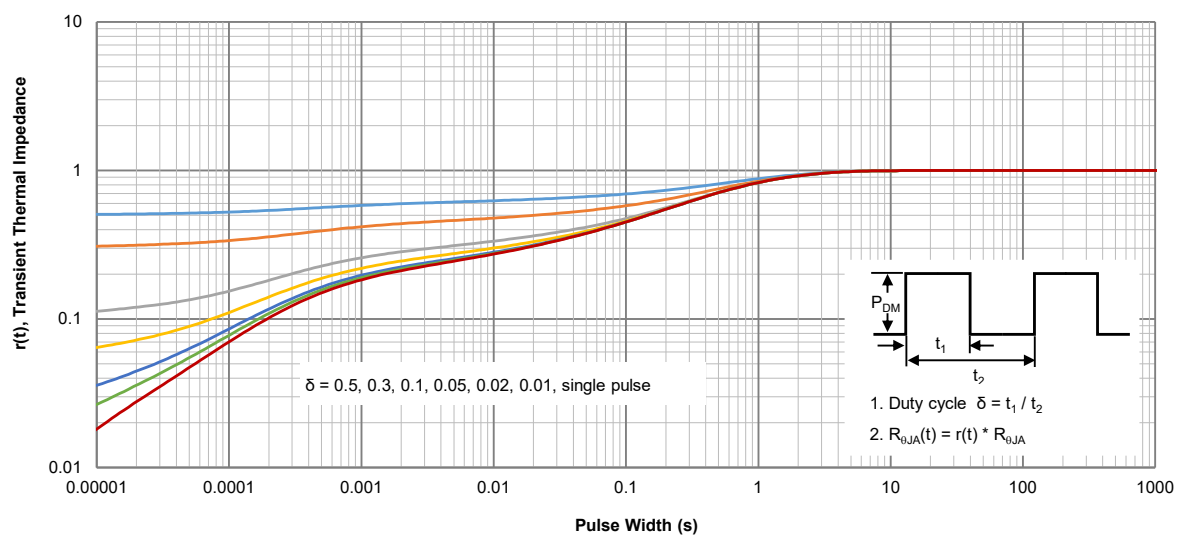
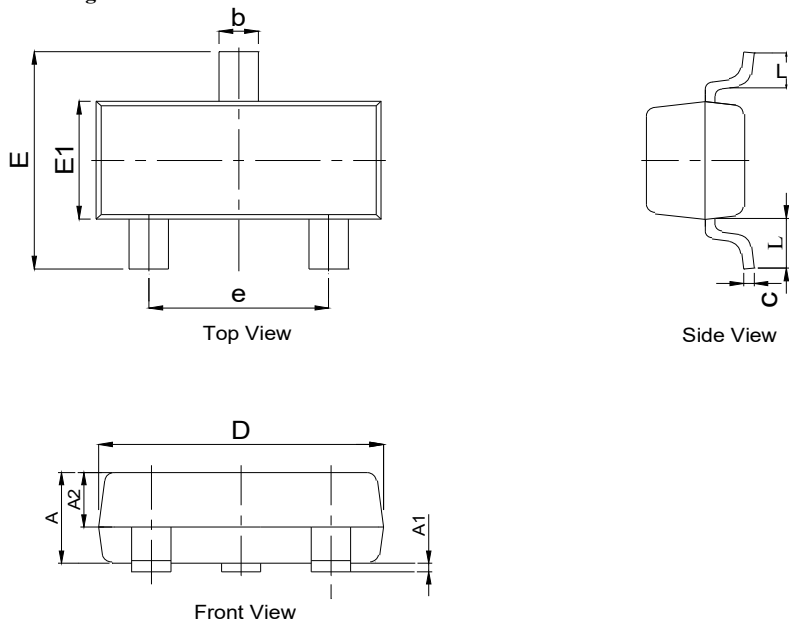
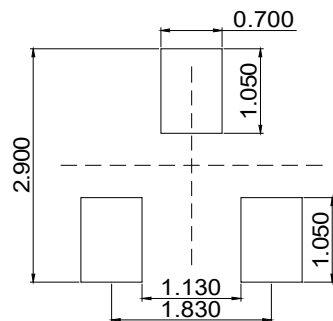


Figure 13: Normalized Maximum Transient Thermal Impedance

SOT-23 Package Outline
Package Outline

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
2. ALL DIMNESIONS IN MILLIMETER (ANNGL E IN DEGREE).
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH.

DIM.	MILLIMETER		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0.00	-	0.10
A2	0.45	0.55	0.65
D	2.80	2.90	3.00
E	2.30	2.40	2.50
E1	1.20	1.30	1.40
L	0.45	0.55	0.65
L1	0.20	-	0.55
b	0.30	0.40	0.50
c	-	-	0.20
e	-	1.90	-

Recommended Soldering Footprint


DIMENSIONS:MILLIMETERS