Dual N-Channel Enhancement Mode MOSFET

BSS138PDW

Features

HF

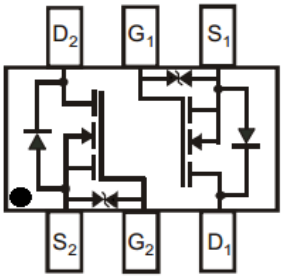
- Low on-resistance
- Low input capacitance
- Fast switching speed
- HBM: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

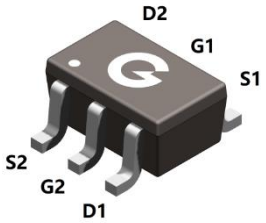
Typical Applications

- DC-DC Converters
- Power management functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc

Mechanical Data

- Case: SOT-363
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208





SOT-363

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BSS138PDW	SOT-363	3000 pcs / Tape & Reel	138

Maximum Ratings (@ T_A = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	60	V
Gate-to-Source Voltage	V_{GSS}	±20	V
Continuous Drain Current (T_A = 25°C)*1	I_D	360	mA
Continuous Drain Current (T_A = 70°C)*1		290	
Pulsed Drain Current (t_p = 10μs, T_A = 25°C)	I_{DM}	1500	mA
Single Pulse Avalanche Energy (L = 0.5mH) *4	E_{AS}	0.2	mJ
Power Dissipation (T_A = 25°C) *1	P_D	350	mW
Operating Junction Temperature Range	T_J	-55 ~ +150	°C
Storage Temperature Range	T_{STG}	-55 ~ +150	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	190	250	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	340	357	°C/W
Thermal Resistance Junction-to-Air *2		-	424	500	

Electrical Characteristics (@ T_A = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	60	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 60V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±20V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *3	V_{GS} = 10V, I_D = 0.5A	-	1	1.6	Ω
		V_{GS} = 4.5V, I_D = 0.2A	-	1.2	2.5	
		V_{GS} = 2.5V, I_D = 0.1A	-	1.7	4.5	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.8	1	1.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	48	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 25V f = 1.0MHz	-	32	-	pF
C_{OSS}	Output Capacitance		-	6	-	
C_{RSS}	Reverse Transfer Capacitance		-	3	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *5	V_{DD} = 25V, I_D = 0.36A V_{GS} = 10V, R_G = 6Ω	-	2.2	-	ns
t_r	Turn-on Rise Time *5		-	19.2	-	
$t_{d(OFF)}$	Turn-Off Delay Time *5		-	6.2	-	
t_f	Turn-Off Fall Time *5		-	23	-	
Q_G	Total Gate-Charge	V_{DS} = 25V V_{GS} = 10V I_D = 0.2A	-	4	-	nC
Q_{GS}	Gate to Source Charge		-	0.5	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.4	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *3	I_S = 0.5A, V_{GS} = 0V	-	0.89	1.4	V
trr	Reverse Recovery Time	I_F = 1A, V_{GS} = 0V dI_F/d_t = 100A/μs	-	15	-	ns
Qrr	Reverse Recovery Charge		-	8	-	nC

Notes:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper
2. The data tested by surface mounted on a minimum recommended FR-4 board
3. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
4. The E_{AS} data shows Max. rating. The test condition is V_{DD} = 30V, V_{GS} = 10V, L = 0.5mH
5. Guaranteed by design, not subject to production

Ratings and Characteristics Curves (@ T_A = 25°C unless otherwise specified)

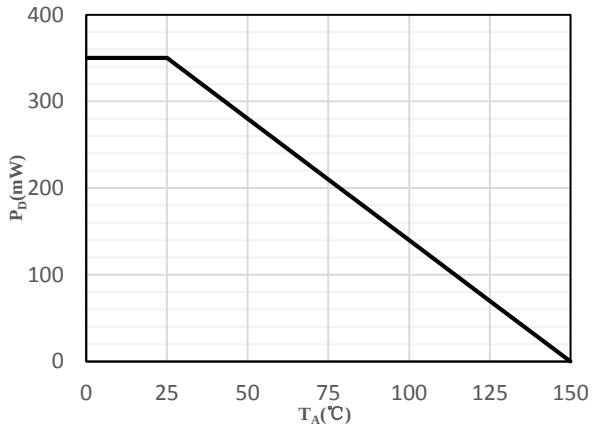


Fig 1 Power Dissipation

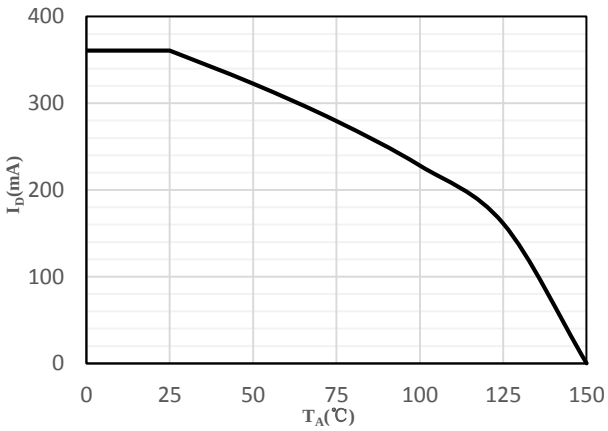


Fig 2 Drain Current

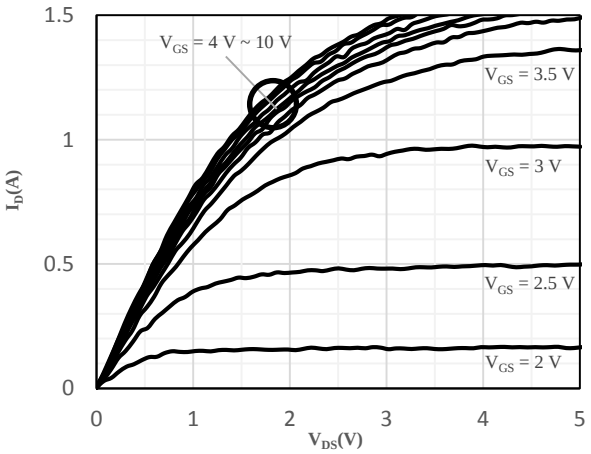


Fig 3 Typical Output Characteristics

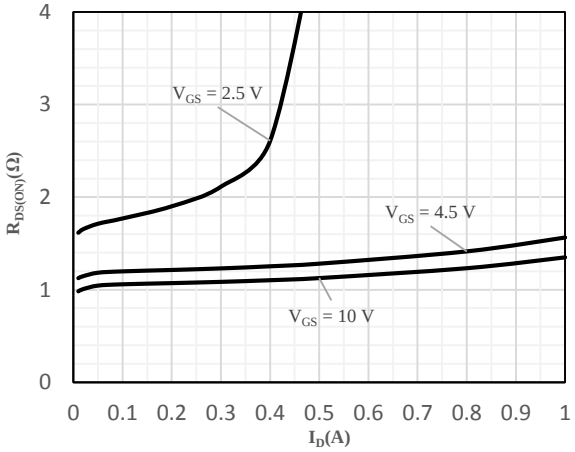


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

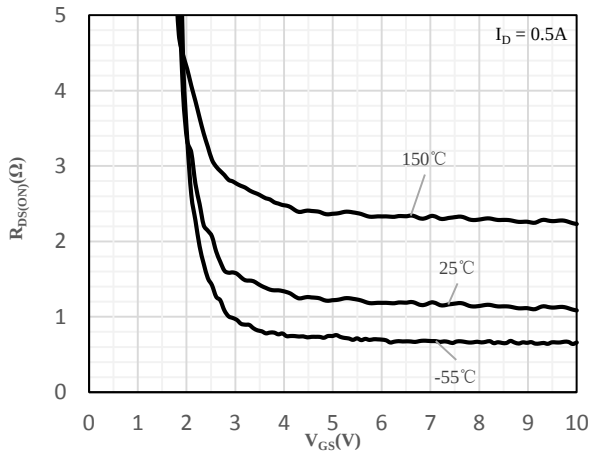


Fig 5 On-Resistance vs. Gate-Source Voltage

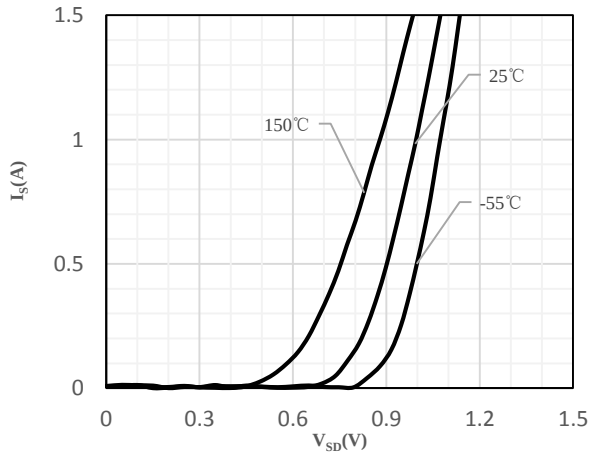


Fig 6 Body-Diode Characteristics

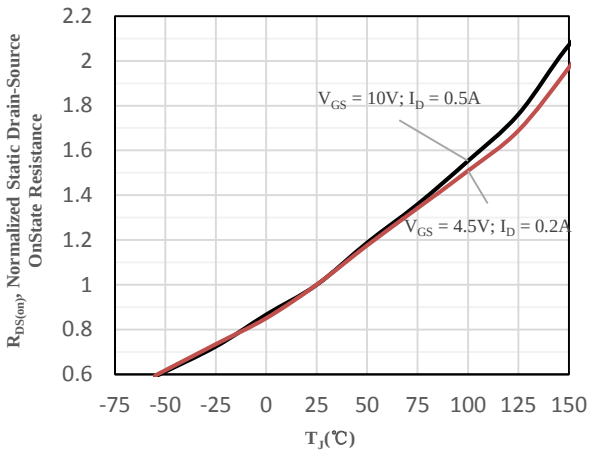


Fig 7 Normalized On-Resistance vs. Junction Temperature

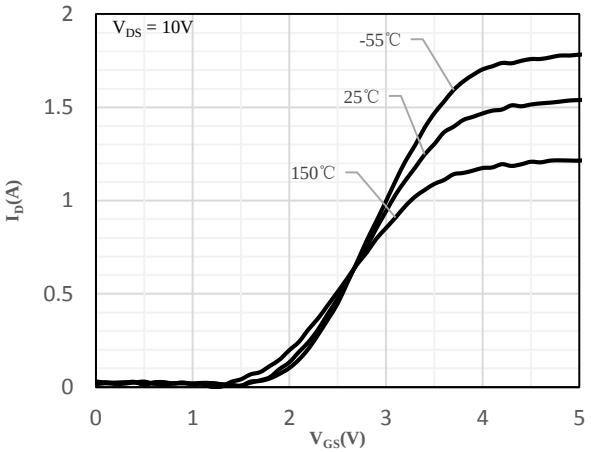


Fig 8 Transfer Characteristics

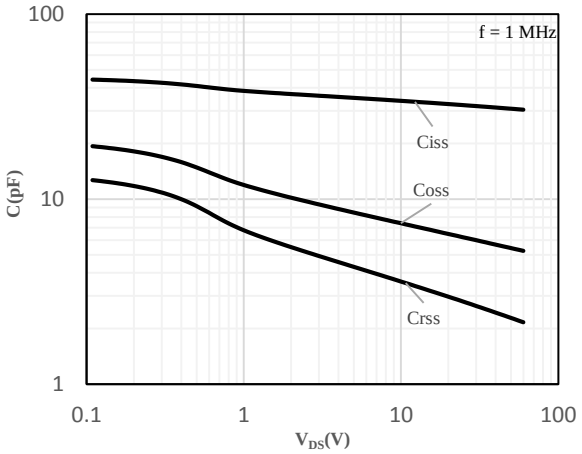


Fig 9 Capacitance Characteristics

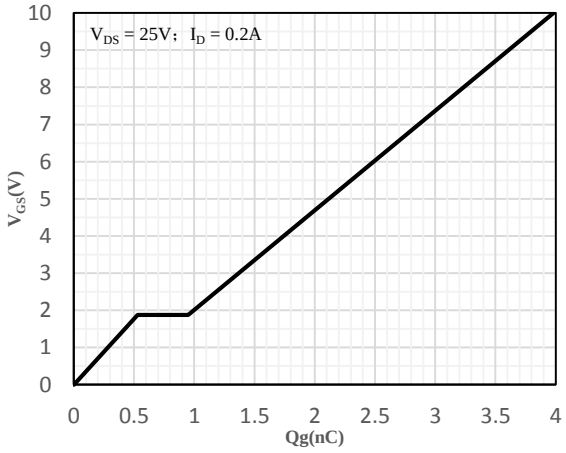


Fig 10 Gate-Charge Characteristics

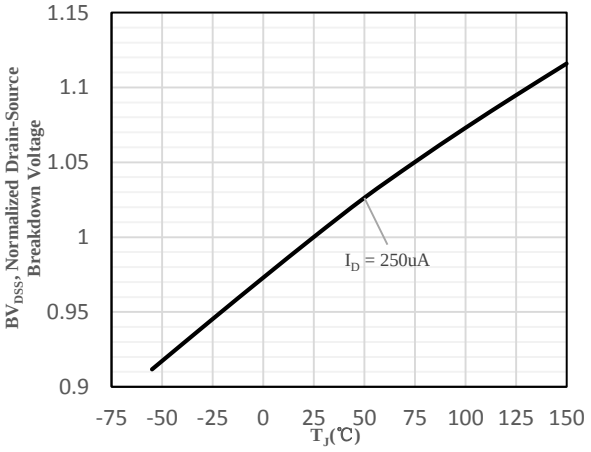


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

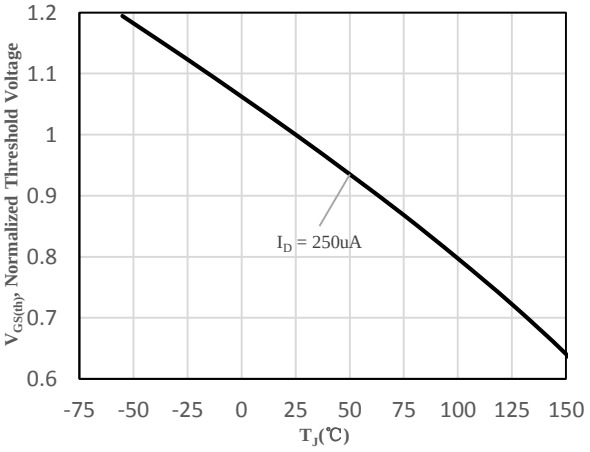


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

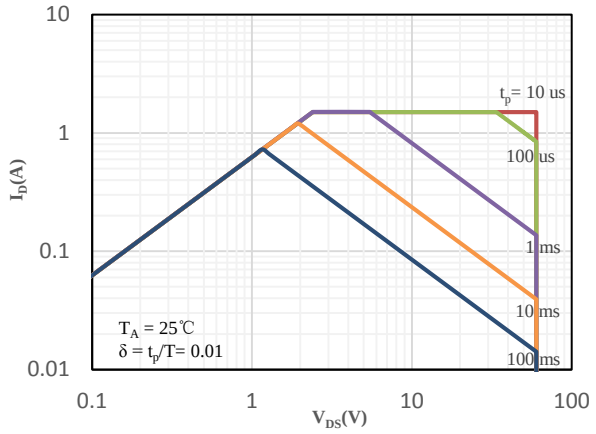


Fig 13 Safe Operation Area

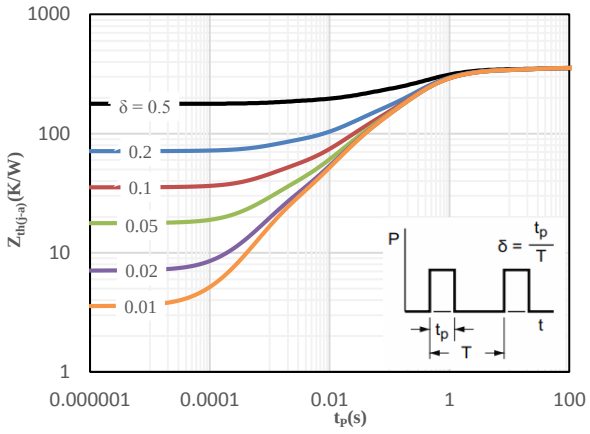
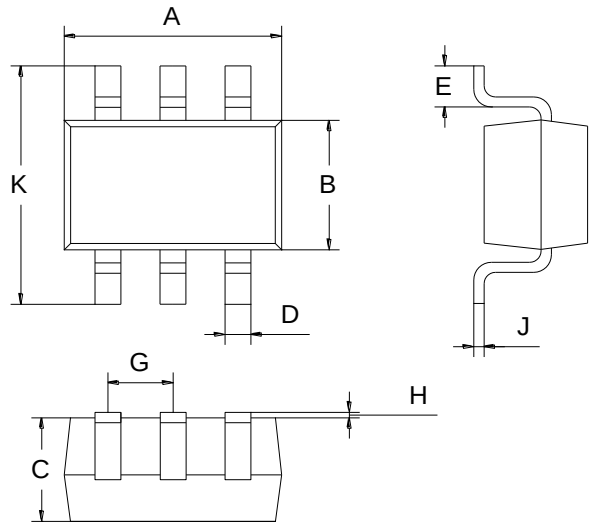


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



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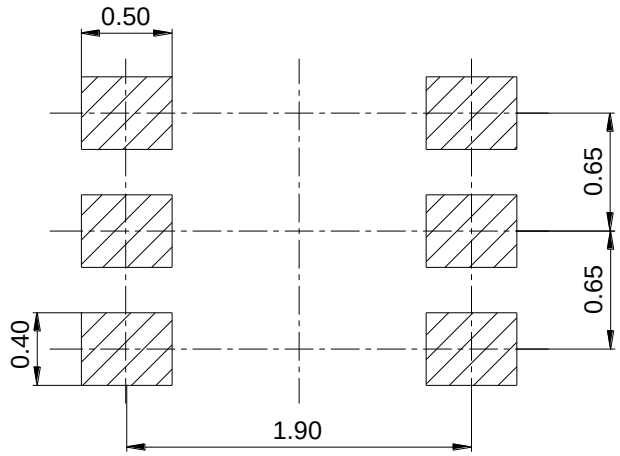
Dimension	**Min.**	**Max.**
A	2.00	2.20
B	1.15	1.35
C	0.85	1.05
D	0.15	0.35
E	0.25	0.40
G	0.60	0.70
H	0.02	0.10
J	0.05	0.15
K	2.20	2.40

Mounting Pad Layout (Unit: mm)

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