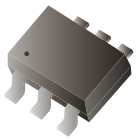
MOSFET

BSS138PDW-HF

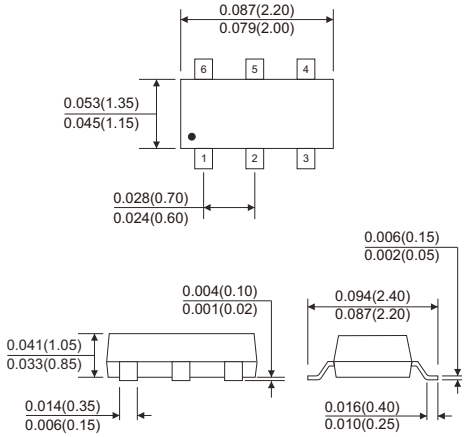
Dual N-Channel
RoHS Device
Halogen Free



Features

- Low on-resistance.
- Low input capacitance.
- Fast switching speed.

SOT-363



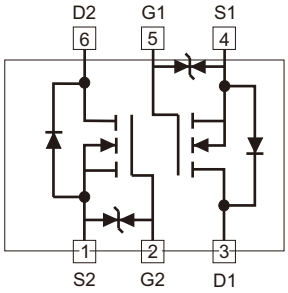
Dimensions in inches and (millimeters)

Mechanical data

- Case: SOT-363, molded plastic.
- Molding compound: UL flammability classification rating 94V-0.
- Terminals: Matte tin-plated leads, solderability-per MIL-STD-202, method 208.

Circuit Diagram

G : Gate
S : Source
D : Drain



Maximum Ratings (at TA=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	60	V
Gate-source voltage	V_{GS}	±20	V
Continuous drain current (T_A=25°C) (Note 1)	I_D	360	mA
Continuous drain current (T_A=70°C) (Note 1)	I_D	290	
Pulsed drain current (tp= 10μs, T_A=25°C)	I_{DM}	1500	mA
Single pulse avalanche energy (Note 4)	E_{AS}	0.2	mJ
Power dissipation (T_A=25°C) (Note 1)	P_D	350	mW
Operating junction temperature range	T_J	-55 to +150	°C
Storage temperature range	T_{STG}	-55 to +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 (Note 1)	$R_{\theta JA}$		340	357	°C/W
Thermal resistance junction to air (Note 2)	$R_{\theta JA}$		424	500	°C/W

Electrical Characteristics (at T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	V_{DSS}	V_{GS} = 0V, I_D = 250μA	60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 60V, V_{GS} = 0V			1	μA
Gate-body leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V			±10	μA
On Characteristics						
Drain-source on-resistance (Note 2)	$R_{DS(on)}$	V_{GS} = 10V, I_D = 0.5A		1	1.6	Ω
	$R_{DS(on)}$	V_{GS} = 4.5V, I_D = 0.2A		1.2	2.5	Ω
	$R_{DS(on)}$	V_{GS} = 2.5V, I_D = 0.1A		1.7	4.5	Ω
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.8	1	1.5	V
Gate resistance	R_G	V_{GS} = 0V, f = 1MHz		48		Ω
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		32		pF
Output capacitance	C_{oss}			6		
Reverse transfer capacitance	C_{rss}			3		
Switching Characteristics						
Turn-on delay time (Note 4)	$t_{d(on)}$	V_{DD} = 25V, I_D = 0.36A V_{GS} = 10V, R_G = 6Ω		2.2		ns
Turn-on rise time (Note 4)	t_r			19.2		
Turn-off delay time (Note 4)	$t_{d(off)}$			6.2		
Turn-off fall time (Note 4)	t_f			23		
Total gate charge	Q_g	V_{DS} = 25V, V_{GS} = 10V, I_D = 0.2A		4		nC
Gate to source charge	Q_{gs}			0.5		
Gate to drain (miller) charge	Q_{gd}			0.4		
Source-Drain Diode Characteristics						
Diode forward voltage (Note 2)	V_{SD}	I_S = 0.5A, V_{GS} = 0V		0.89	1.4	V
Reverse recovery time	t_{rr}	I_F = 1A, V_{GS} = 0V, dI_F/d_t = 100A/μs		15		ns
Reverse recovery change	Q_{rr}			8		nC

Notes: 1. The data tested by surface mounted on a 1 inch² 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.

Typical Rating and Characteristic Curves (BSS138PDW-HF)

Fig.1 - Power Dissipation

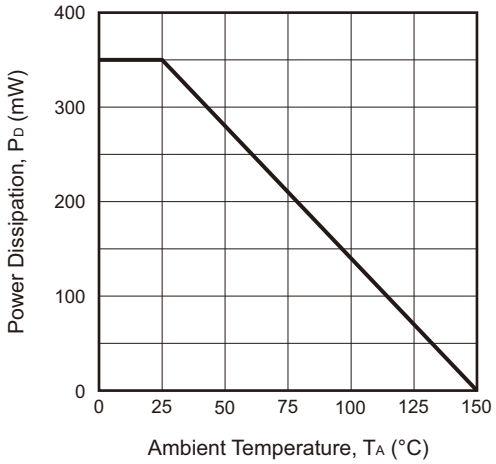


Fig.2 - Drain Current

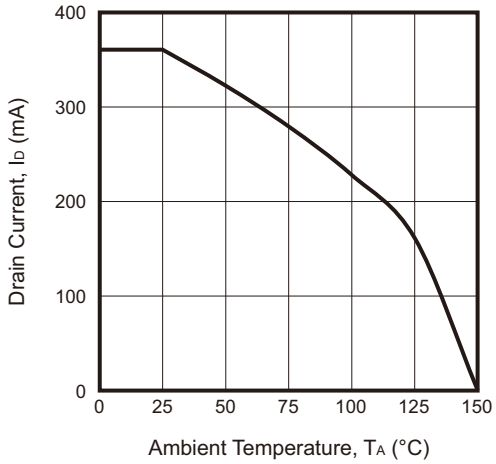


Fig.3 - Typical Output Characteristics

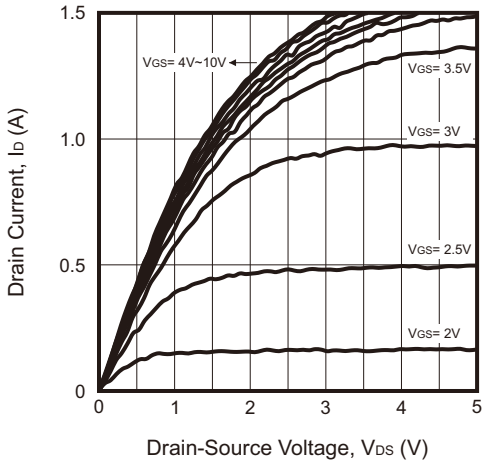


Fig.4 - On-Resistance vs. Drain Current and Gate Voltage

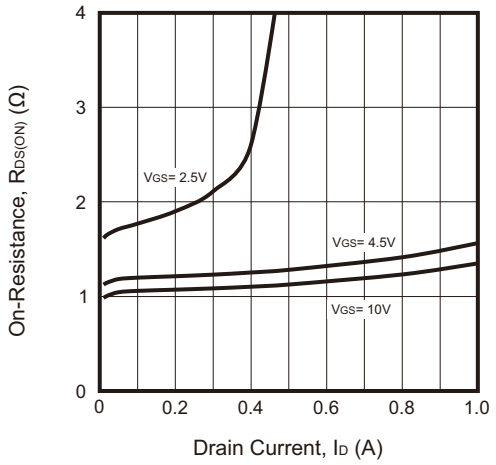


Fig.5 - On-Resistance vs. Gate-Source Voltage

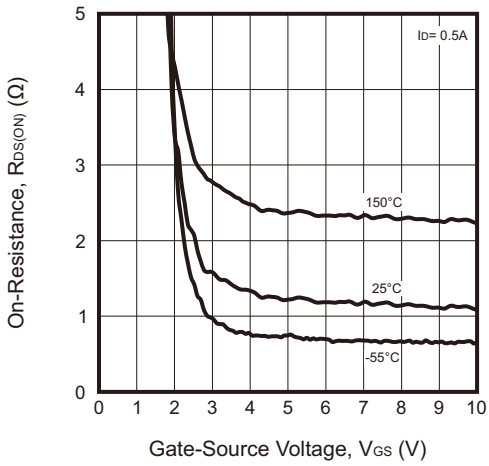
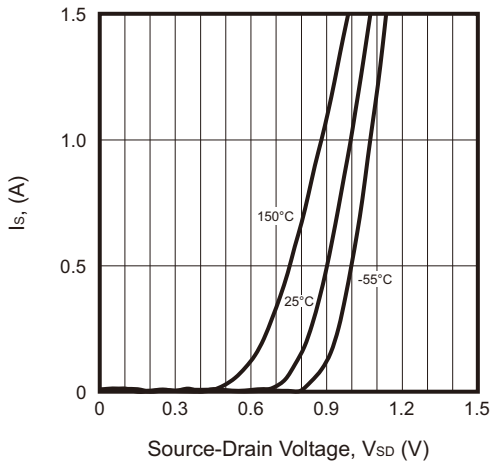


Fig.6 - Body-Diode Characteristics



Typical Rating and Characteristic Curves (BSS138PDW-HF)

Fig.7 - Normalized On-Resistance vs. Junction Temperature

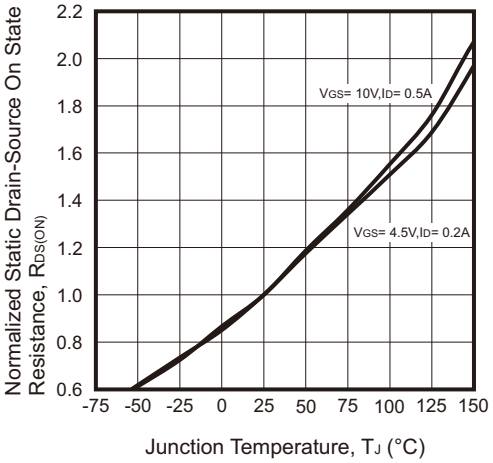


Fig.8 - Transfer Characteristics

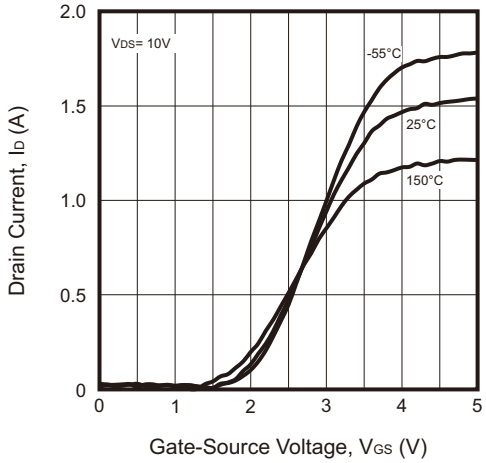


Fig.9 - Capacitance Characteristics

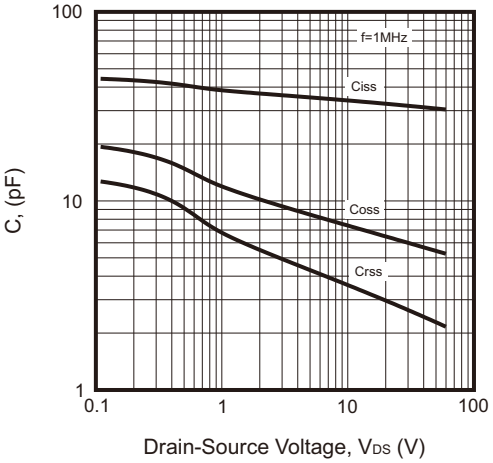


Fig.10 - Gate-Charge Characteristics

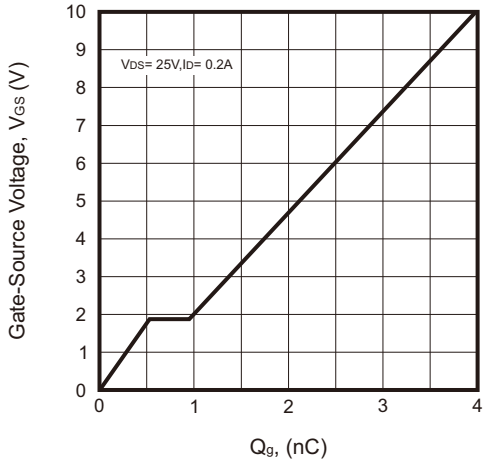


Fig.11 - Normalized Breakdown Voltage vs. Junction Temperature

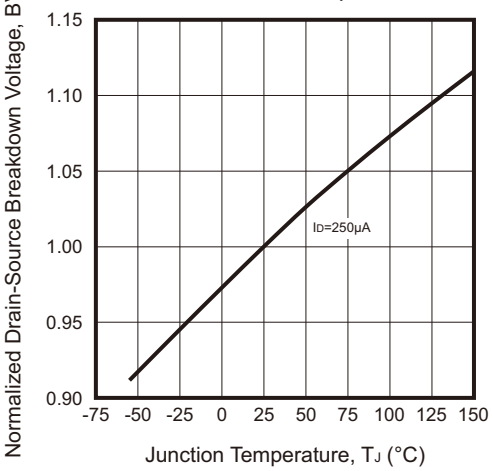
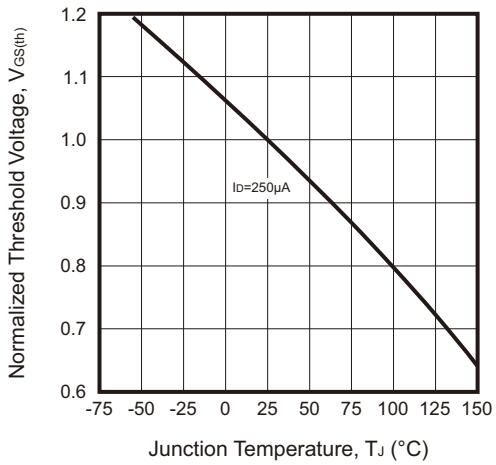
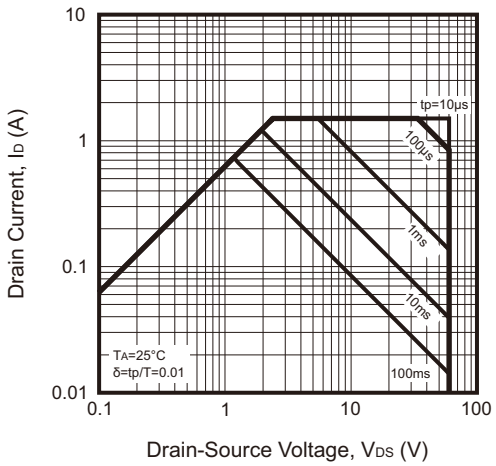


Fig.12 - Normalized $V_{GS(th)}$ vs. Junction Temperature

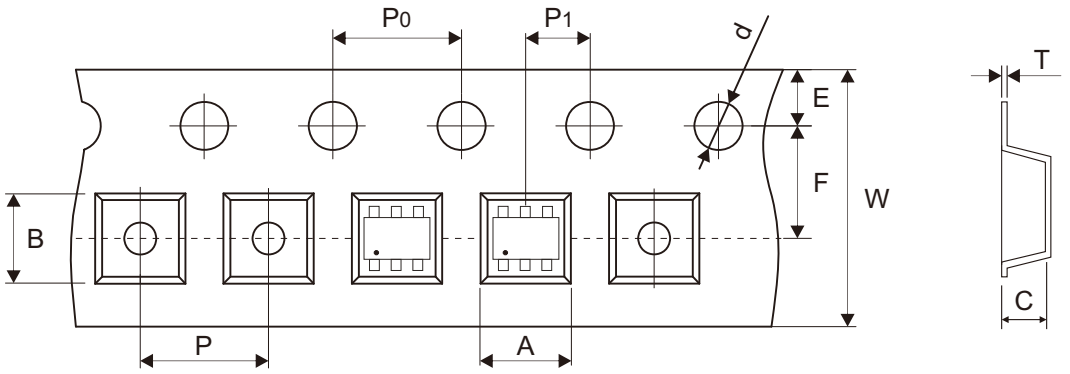


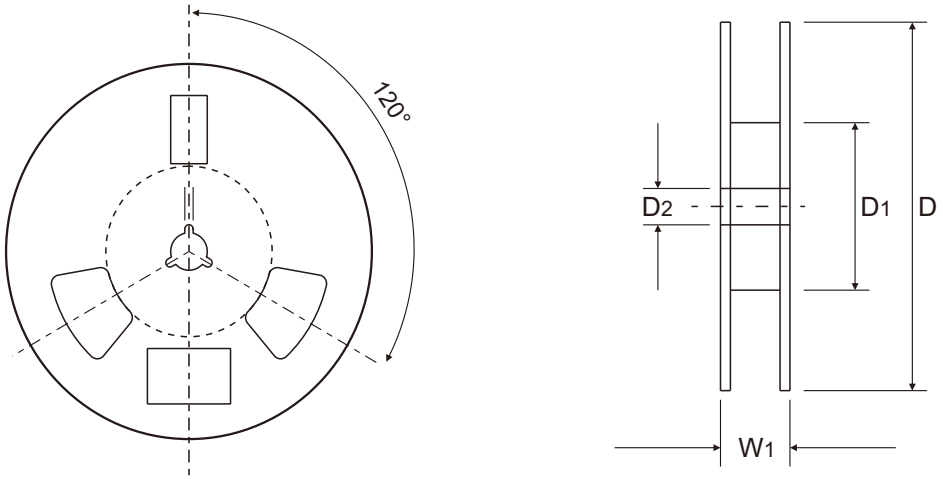
Typical Rating and Characteristic Curves (BSS138PDW-HF)

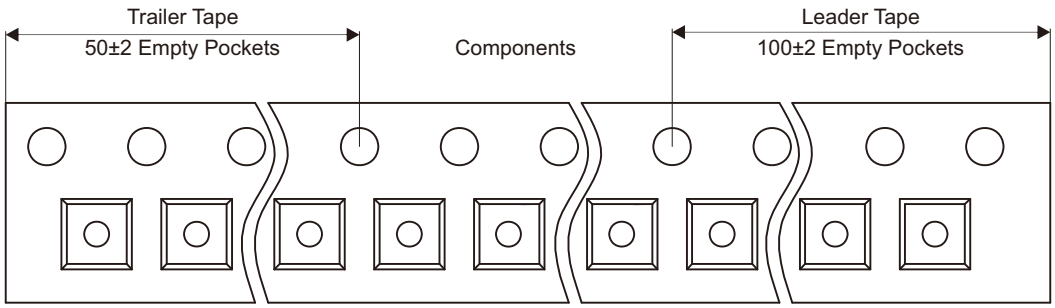
Fig.13 - Safe Operating Area



Reel Taping Specification





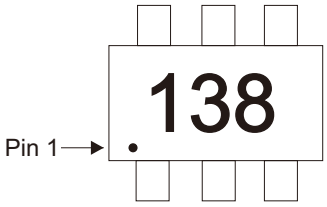


	SYMBOL	A	B	C	d	D	D1	D2
SOT-363	(mm)	2.40 ± 0.10	2.50 ± 0.10	1.20 ± 0.10	1.50 ± 0.10	178.00 ± 1.00	54.00 ± 0.50	13.00 ± 0.50
	(inch)	0.094 ± 0.004	0.098 ± 0.004	0.047 ± 0.004	0.059 ± 0.004	7.008 ± 0.039	2.126 ± 0.020	0.512 ± 0.020

	SYMBOL	E	F	P	P0	P1	T	W	W1
SOT-363	(mm)	1.75 ± 0.10	3.50 ± 0.05	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	0.20 ± 0.02	8.00 + 0.30 − 0.10	12.50 ± 1.00
	(inch)	0.069 ± 0.004	0.138 ± 0.002	0.157 ± 0.004	0.157 ± 0.004	0.079 ± 0.002	0.008 ± 0.001	0.315 + 0.012 − 0.004	0.492 ± 0.039

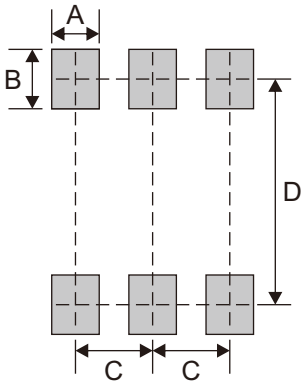
Marking Code

Part Number	Marking Code
BSS138PDW-HF	138



Suggested P.C.B. PAD Layout

SIZE	SOT-363	
	(mm)	(inch)
A	0.40	0.016
B	0.50	0.020
C	0.65	0.026
D	1.90	0.075



Standard Packaging

Case Type	REEL PACK	
	REEL (pcs)	Reel Size (inch)
SOT-363	3,000	7