

Features

- Low on-resistance
- Low input capacitance
- Fast switching speed
- HBM: JESD22-A114-B: 2

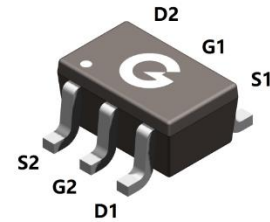
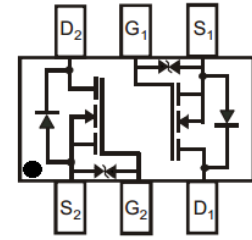
HF

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
BSS138EDW	SOT-363	3000 pcs / Tape & Reel	MM5

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	50	V
Gate-to-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_A = 25^\circ\text{C}$)* ¹	I_D	360	mA
Continuous Drain Current ($T_A = 70^\circ\text{C}$)* ¹		290	mA
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_A = 25^\circ\text{C}$)	I_{DM}	1500	mA
Single Pulse Avalanche Energy * ⁴	E_{AS}	0.2	mJ
Power Dissipation ($T_A = 25^\circ\text{C}$) * ¹	P_D	350	mW
Operating Junction Temperature Range	T_J	$-55 \sim +150$	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^\circ\text{C}$

Thermal Characteristics

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

Electrical Characteristics (@ $T_A = 25^{\circ}\text{C}$ 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	50	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 50V, 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} = 1.8V, I _D = 0.01A	-	3.3	10	
V _{GS(TH)}	Static Drain-Source On-resistance	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	-	4	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = 10V	-	0.5	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = 0.2A	-	0.4	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *3	I _S = 0.5A, V _{GS} = 0V	-	0.89	1.4	V
t _{rr}	Reverse Recovery Time	I _F = 1A, V _{GS} = 0V	-	15	-	ns
Q _{rr}	Reverse Recovery Charge	dl _F /dt = 100A/μs	-	8	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
- The data tested by surface mounted on a minimum recommended FR-4 board
- The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 30\text{V}$, $V_{GS} = 10\text{V}$, $L = 0.5\text{mH}$
- Guaranteed by design, not subject to production

Ratings and Characteristic Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

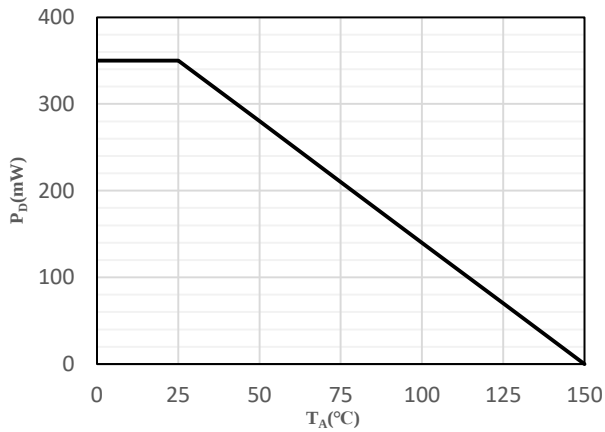


Fig 1 Power Dissipation

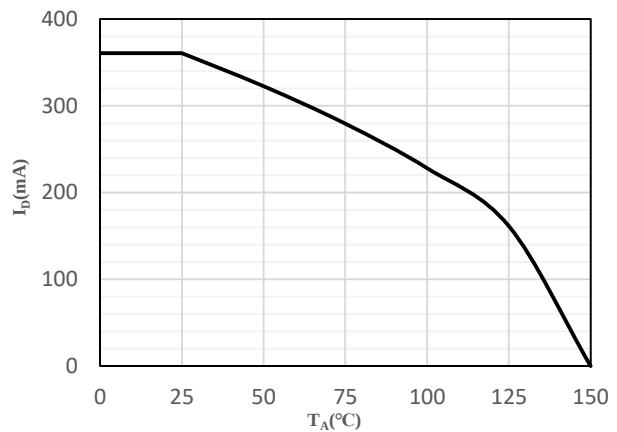


Fig 2 Drain Current

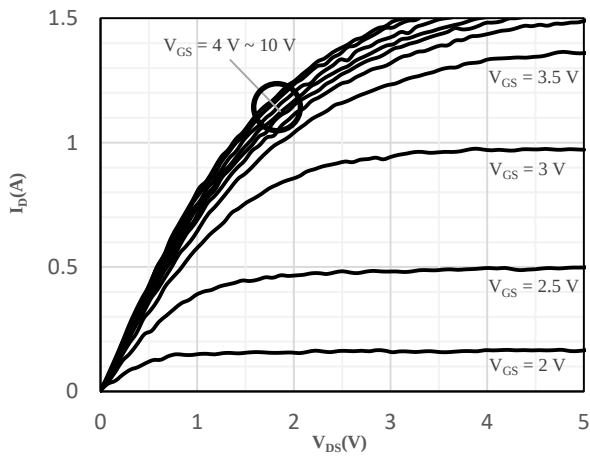


Fig 3 Typical Output Characteristics

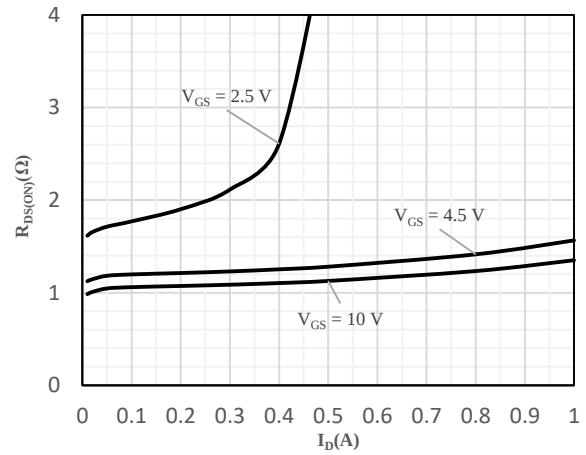


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

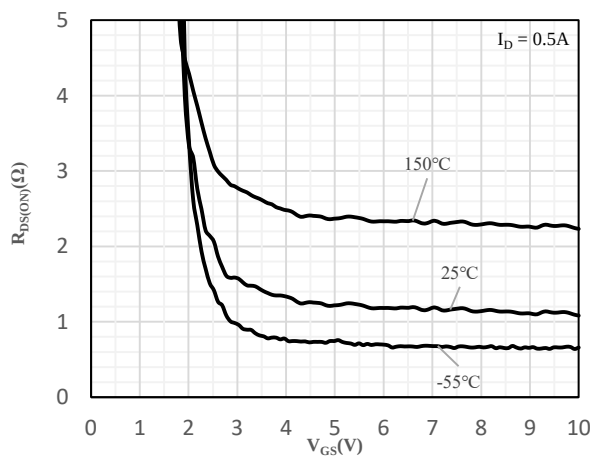


Fig 5 On-Resistance vs. Gate-Source Voltage

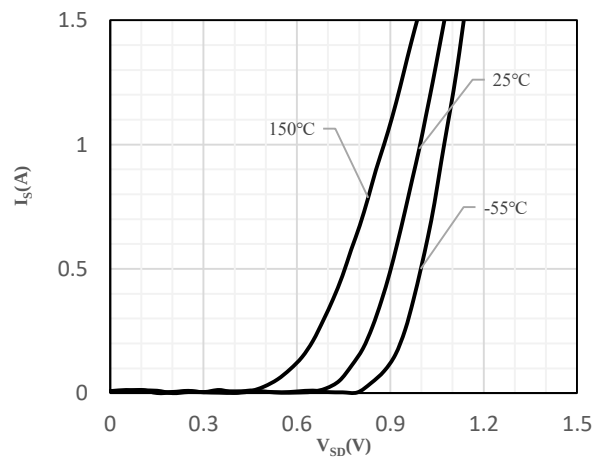


Fig 6 Body-Diode Characteristics

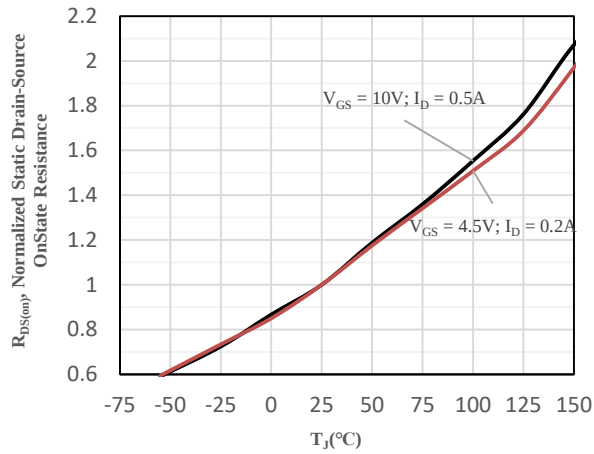


Fig 7 Normalized On-Resistance vs. Junction Temperature

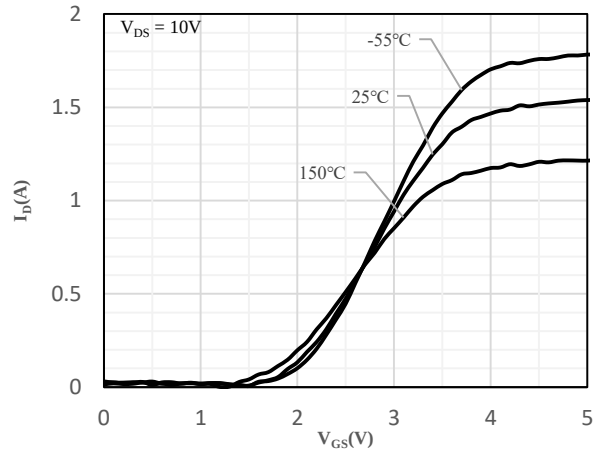


Fig 8 Transfer Characteristics

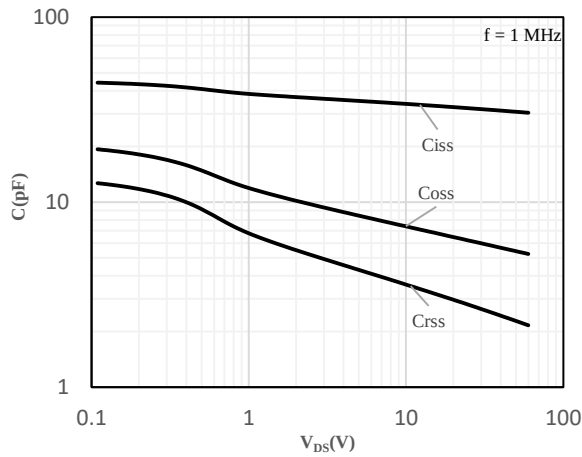


Fig 9 Capacitance Characteristics

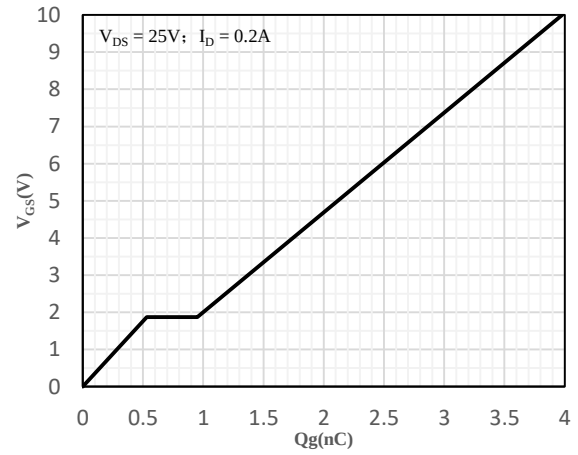


Fig 10 Gate-Charge Characteristics

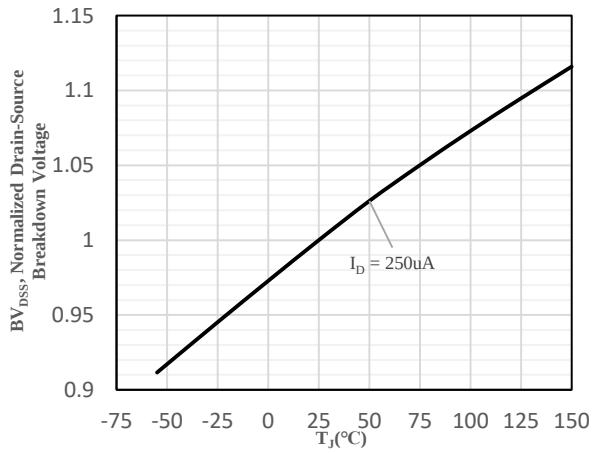


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

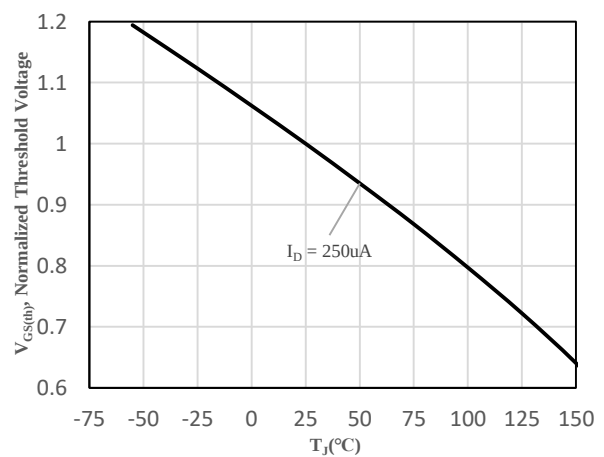


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

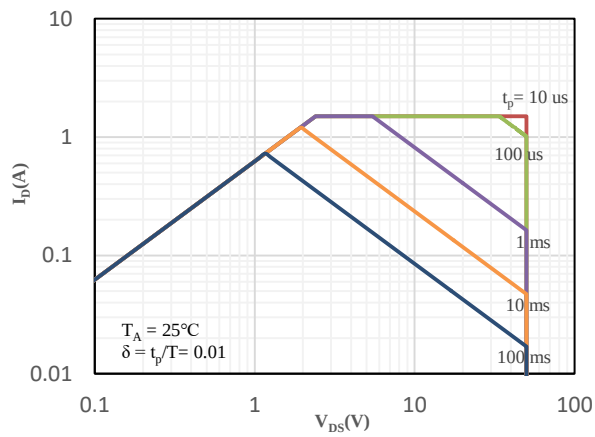


Fig 13 Safe Operation Area

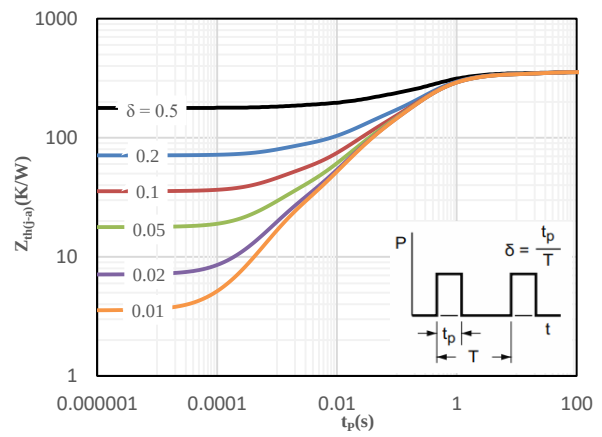
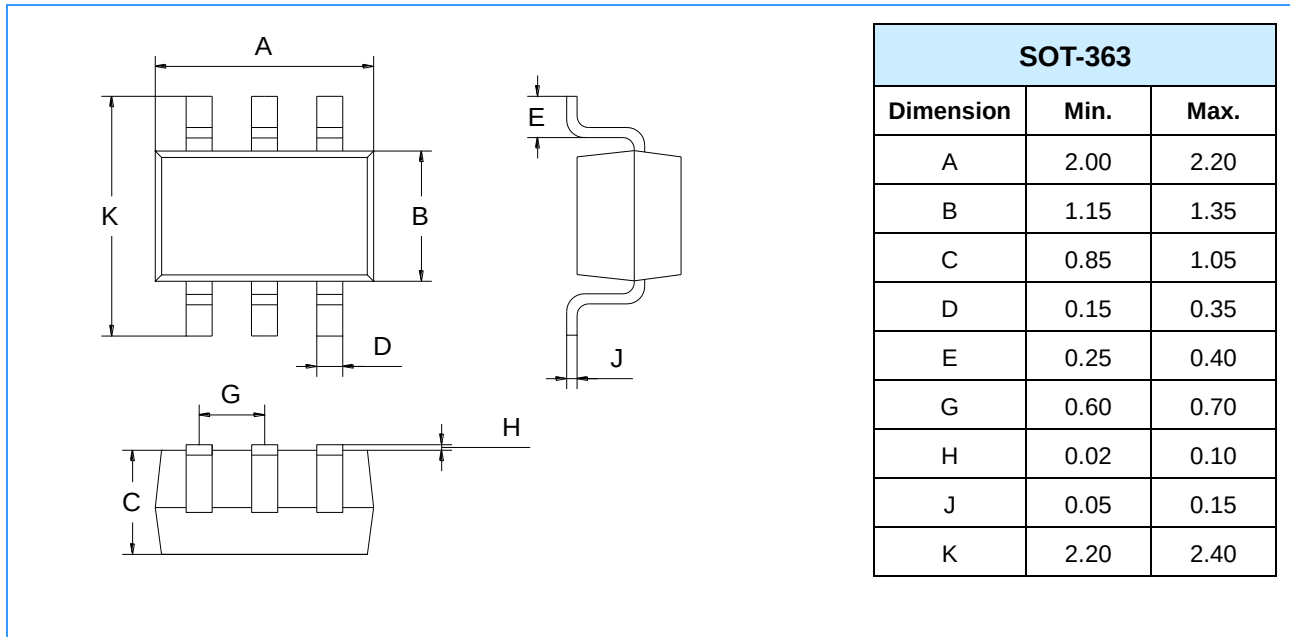
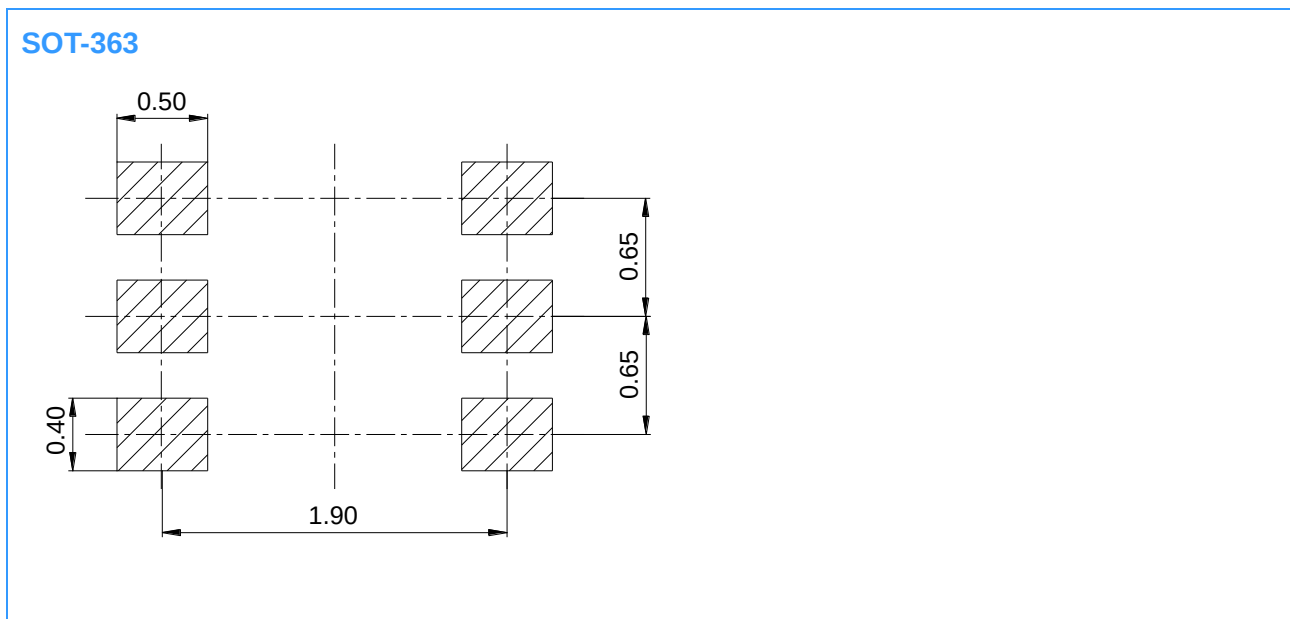


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



Mounting Pad Layout (Unit: mm)



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