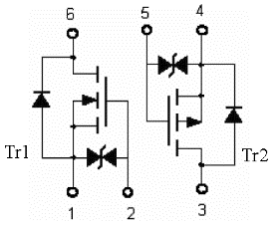
N＋P Channel Enhancement Mode MOSFET

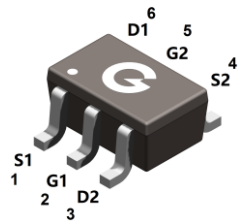
BL1415DW

Features

- Advanced trench technology
- Low-voltage drive
- Integrated ESD protection diode：
  HBM: NMOS: JESD22-A114-B: 1C
  PMOS: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

HF





SOT-363

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

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL1415DW	SOT-363	3000 pcs / Tape & Reel	K5

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

Parameter	Symbol	Q1	Q2	Unit
Drain-to-Source Voltage	V_{DSS}	30	-30	V
Gate-to-Source Voltage	V_{GSS}	±10	±10	V
Continuous Drain Current (T_C = 25°C)	I_D	0.78	-0.36	A
Continuous Drain Current (T_A = 25°C) *1		0.4	-0.3	
Continuous Drain Current (T_A = 70°C) *1		0.32	-0.24	
Pulsed Drain Current (t_p =10μs, T_C = 25°C)	I_{DM}	3.1	-3	A
Pulsed Drain Current (t_p =10μs, T_A = 25°C)		2	-2	
Single Pulse Avalanche Energy (L = 0.1mH) *3	E_{AS}	0.1	0.2	mJ
Power Dissipation(T_A = 25°C) *1	P_D	0.3		W
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	$R_{\theta JC}$	-	-	150	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	416	°C/W

Electrical Characteristics-Q1 (@ 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	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±10V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = 4.5V,I_D = 0.5A	-	0.7	1.2	Ω
		V_{GS} = 2.5V,I_D = 0.2A	-	0.8	1.6	
		V_{GS} = 1.8V,I_D = 0.1A	-	0.9	2	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	0.5	0.7	1.0	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	90	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 10V f = 1.0MHz	-	38	-	pF
C_{OSS}	Output Capacitance		-	5	-	
C_{RSS}	Reverse Transfer Capacitance		-	3.4	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} = 10V V_{GS} = 4V R_G = 10Ω I_D = 0.3A	-	8.3	-	ns
t_r	Turn-on Rise Time *4		-	5.7	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	35	-	
t_f	Turn-Off Fall Time *4		-	12	-	
Q_G	Total Gate-Charge	V_{DD} = 15V V_{GS} = 4.5V I_D = 0.5A	-	2.1	-	nC
Q_{GS}	Gate to Source Charge		-	0.4	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.25	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = 0.5A, V_{GS} = 0V	-	0.9	1.2	V

Electrical Characteristics-Q2 (@ 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	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -24V, V_{GS} = 0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±8V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = -4.5V,I_D = -0.3A	-	1.4	2.5	Ω
		V_{GS} = -2.5V,I_D = -0.2A	-	1.8	2.9	
		V_{GS} = -1.8V,I_D = -0.1A	-	2.2	5	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-0.4	-0.65	-1.0	V
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -10V f = 1.0MHz	-	6	-	pF
C_{OSS}	Output Capacitance		-	5	-	
C_{RSS}	Reverse Transfer Capacitance		-	1.3	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} =-10V, V_{GS} = -4.5V R_G = 6Ω, R_L = 150Ω I_D = -0.1A	-	3.4	-	ns
t_r	Turn-on Rise Time *4		-	13	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	37	-	
t_f	Turn-Off Fall Time *4		-	23	-	
Q_G	Total Gate-Charge	V_{DD} = -15V V_{GS} = -4.5V I_D = -0.3A	-	2.1	-	nC
Q_{GS}	Gate to Source Charge		-	0.5	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.25	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = -0.3 A, V_{GS} = 0V	-	-0.9	-1.3	V

Notes:

1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. The E_{AS} data shows Max. rating. The test condition is N: V_{DD} = 15V, V_{GS} = 8V, L = 0.1mH
   P: V_{DD} = -15V, V_{GS} = -8V, L = 0.1mH
4. Guaranteed by design, not subject to production

Ratings and Characteristics Curves-Q1 (@ T_A = 25°C unless otherwise specified)

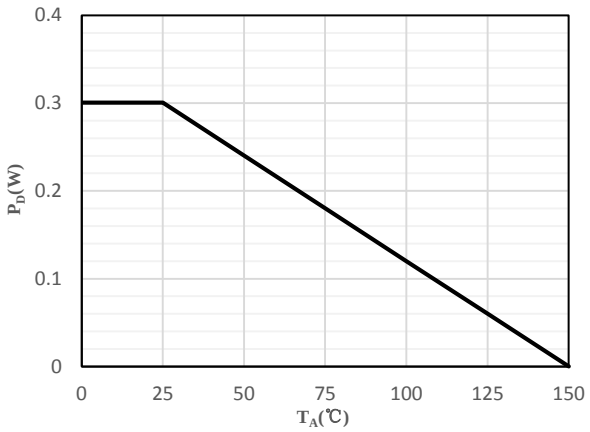


Fig 1 Power Dissipation

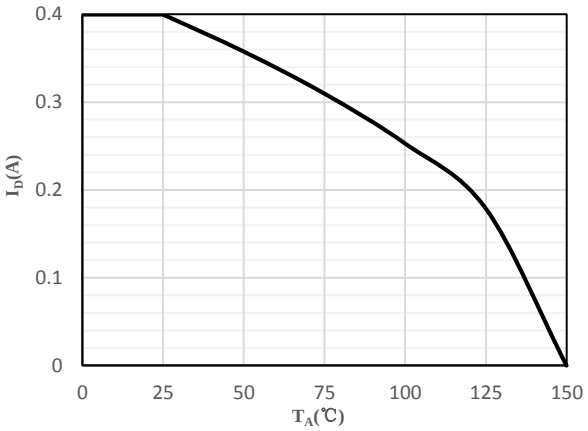


Fig 2 Drain Current

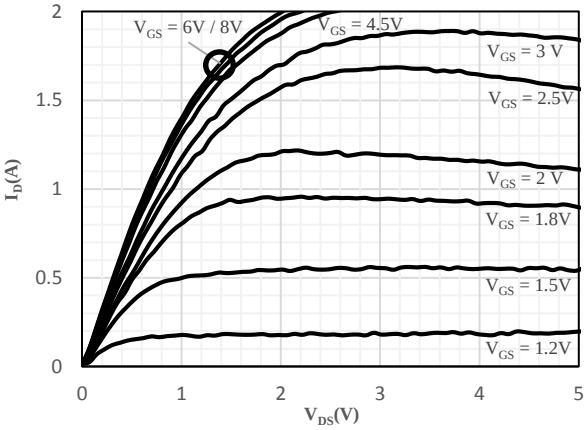


Fig 3 Typical Output Characteristics

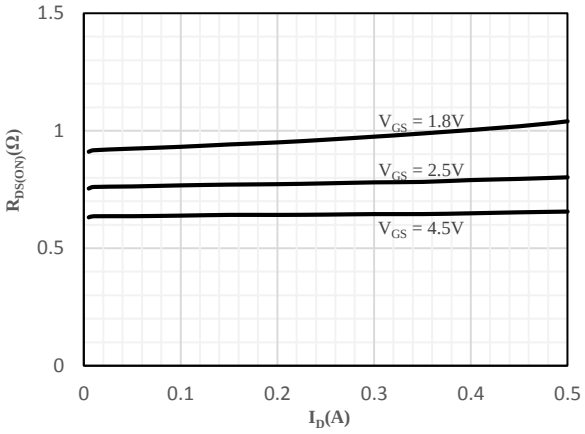


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

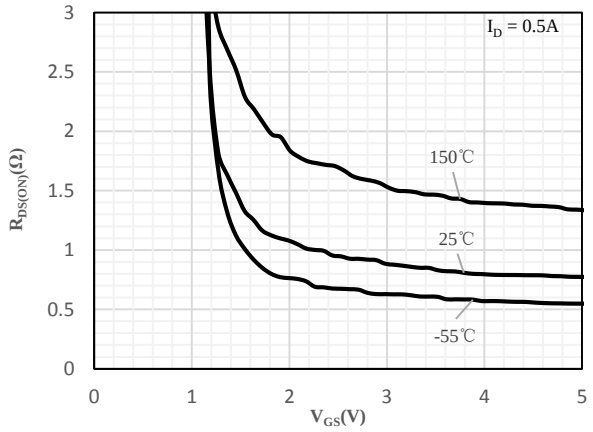


Fig 5 On-Resistance vs. Gate-Source Voltage

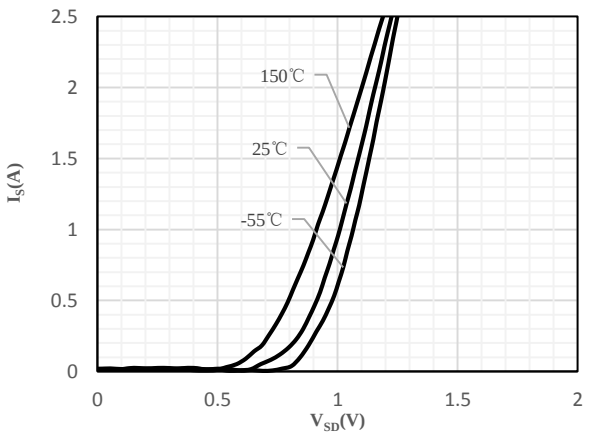


Fig 6 Body-Diode Characteristics

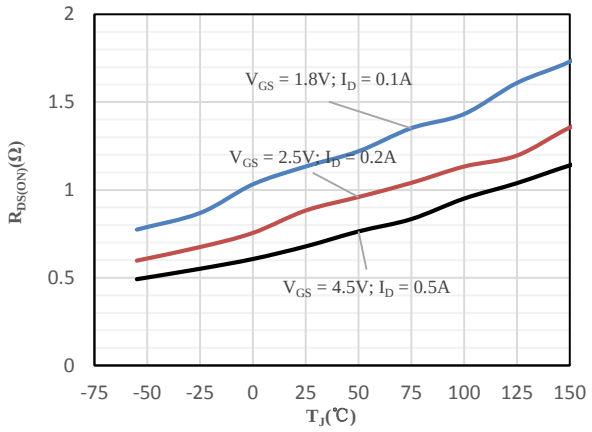


Fig 7 On-Resistance vs. Junction Temperature

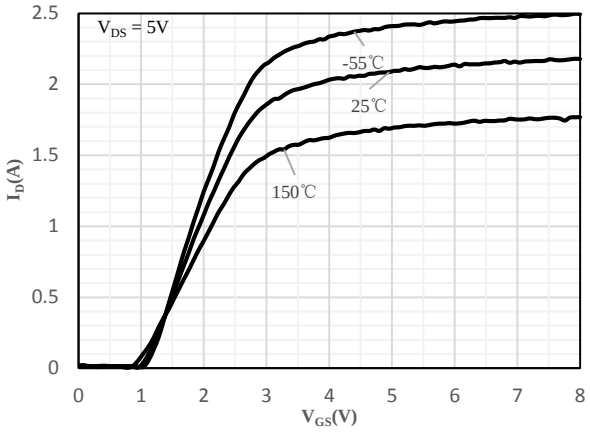


Fig 8 Transfer Characteristics

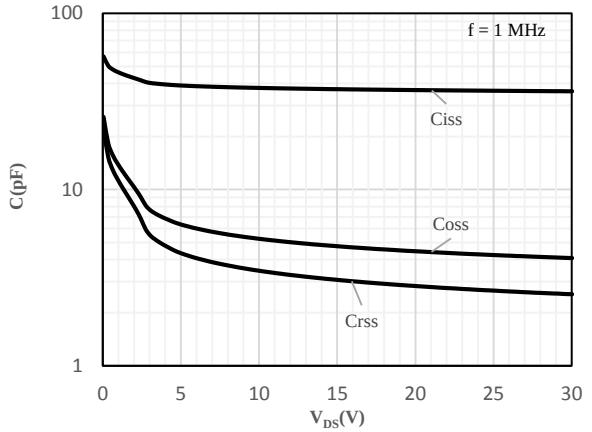


Fig 9 Capacitance Characteristics

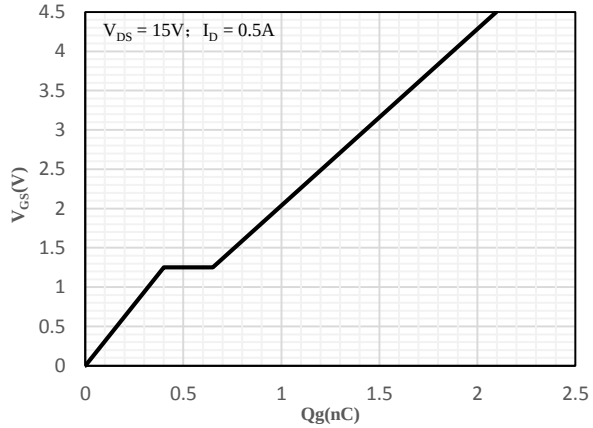


Fig 10 Gate-Charge Characteristics

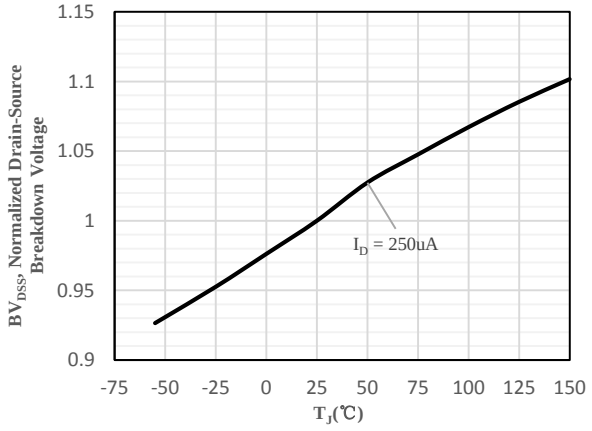


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

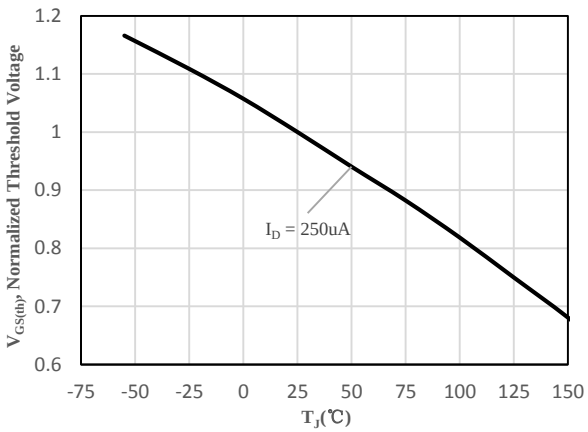


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

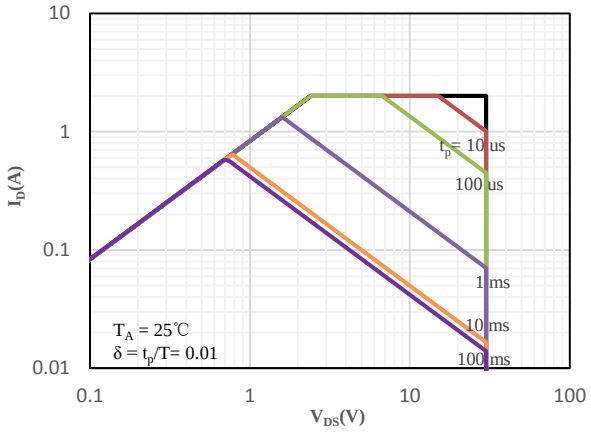


Fig 13 Safe Operating Area

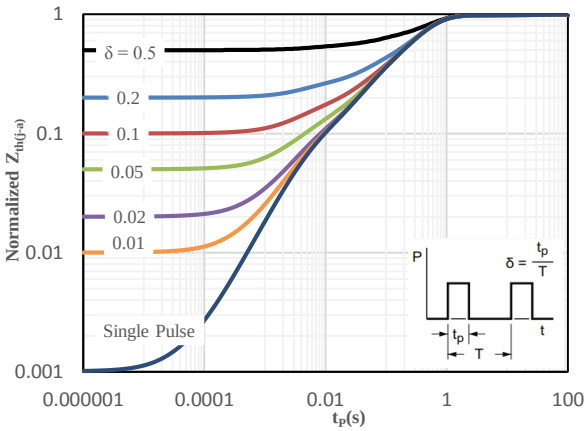


Fig 14 Normalized Maximum transient thermal impedance

Ratings and Characteristics Curves-Q2 (@ T_A = 25°C unless otherwise specified)

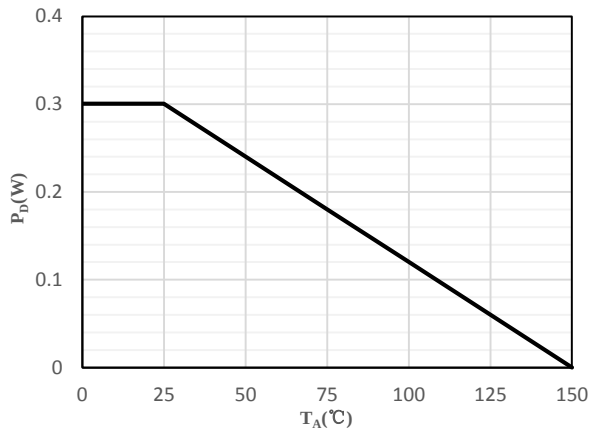


Fig 1 Power Dissipation

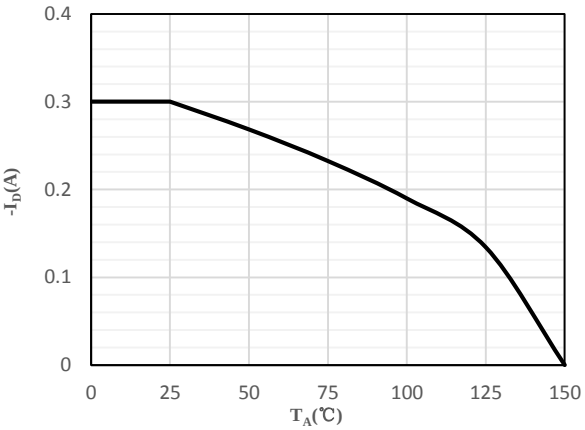


Fig 2 Drain Current

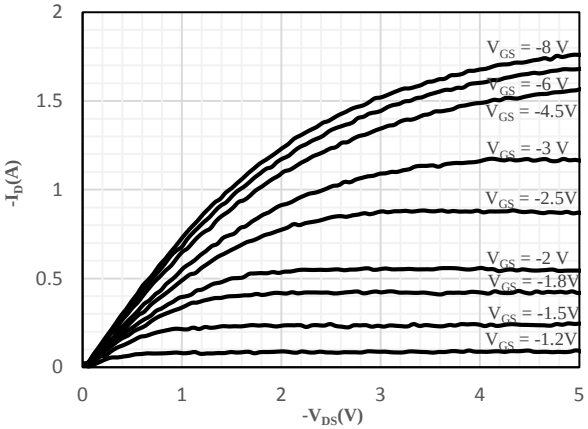


Fig 3 Typical Output Characteristics

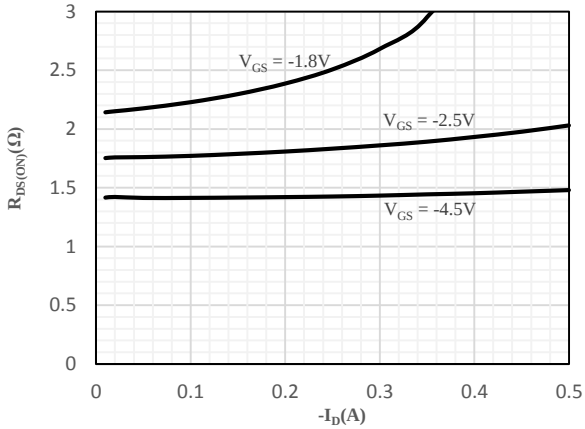


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

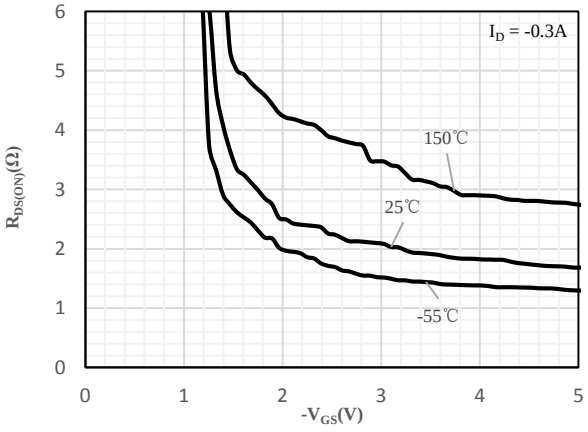


Fig 5 On-Resistance vs. Gate-Source Voltage

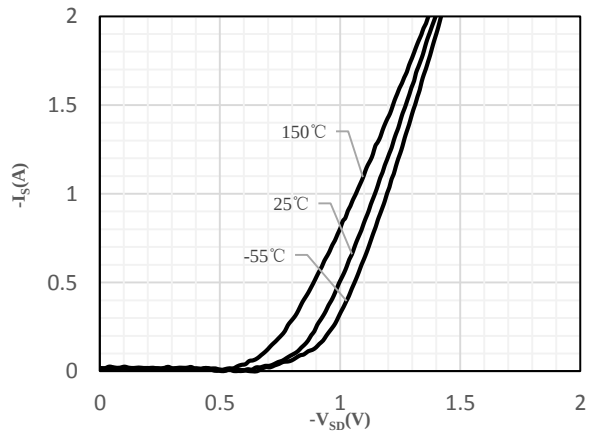


Fig 6 Body-Diode Characteristics

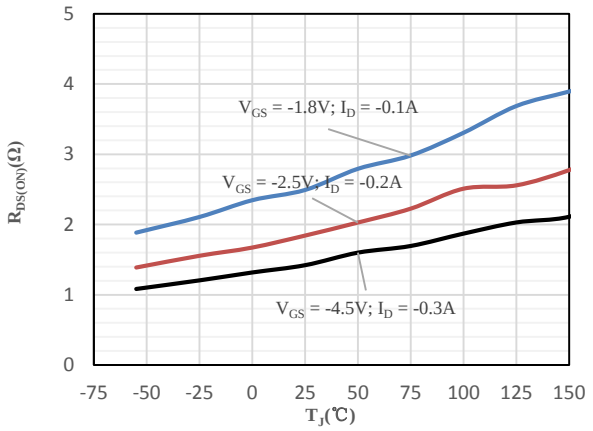


Fig 7 On-Resistance vs. Junction Temperature

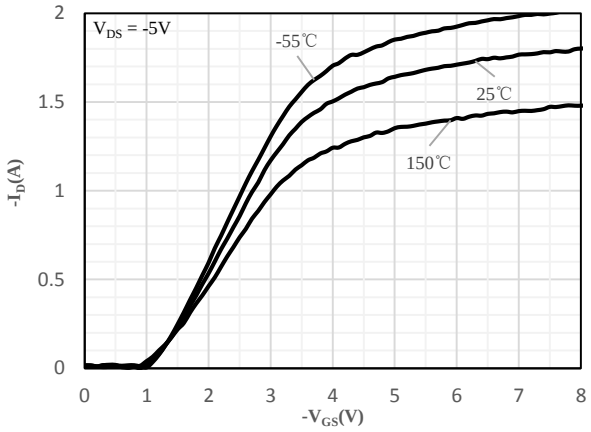


Fig 8 Transfer Characteristics

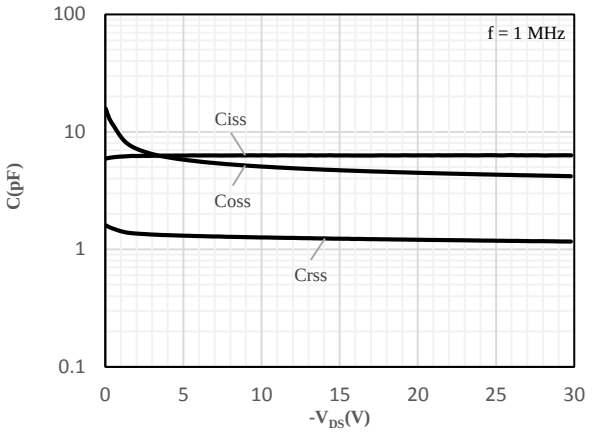


Fig 9 Capacitance Characteristics

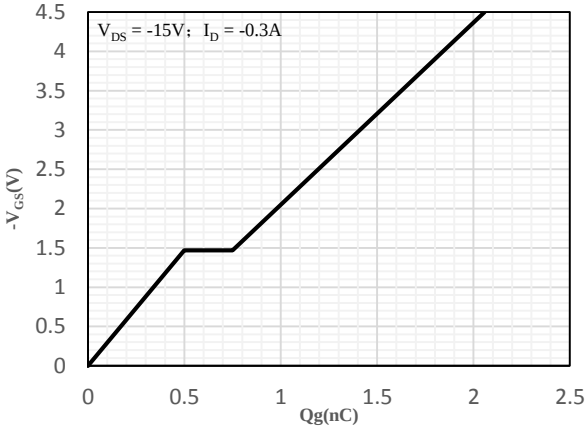


Fig 10 Gate-Charge Characteristics

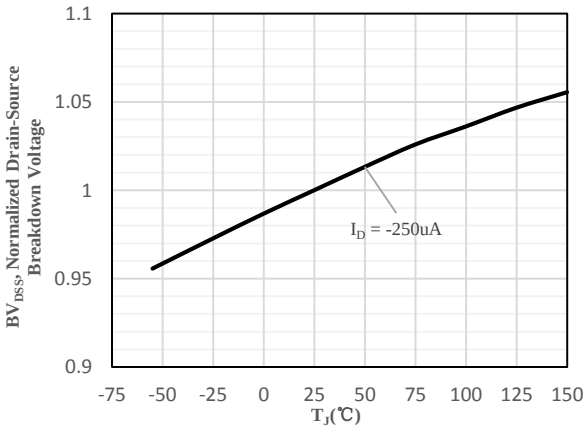


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

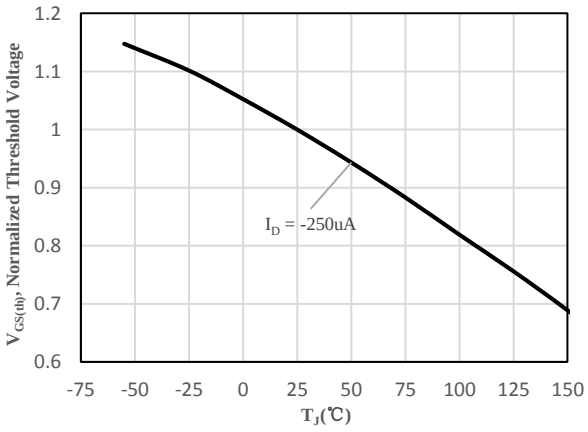


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

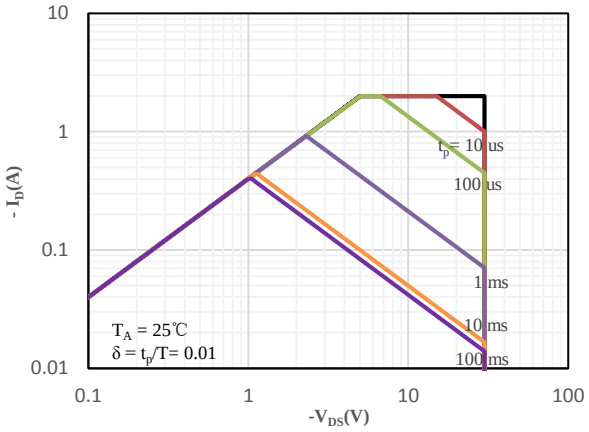


Fig 13 Safe Operating Area

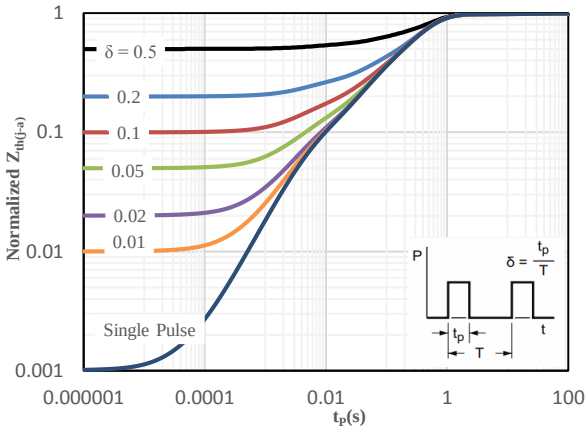
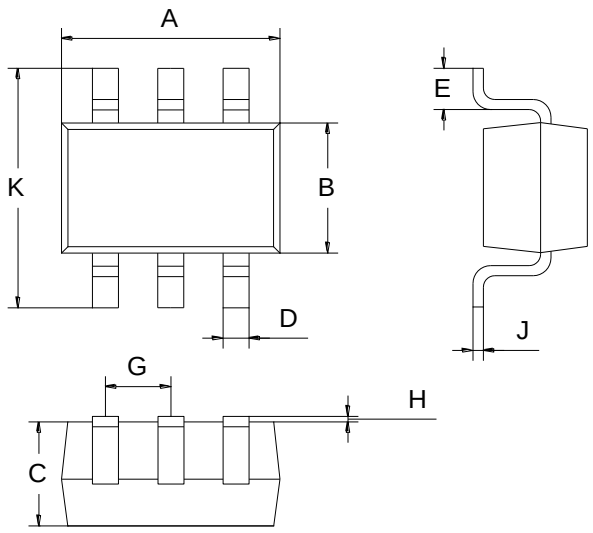


Fig 14 Normalized Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



SOT-363		
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)

SOT-363