N＋P Channel Enhancement Mode MOSFET

BL1213

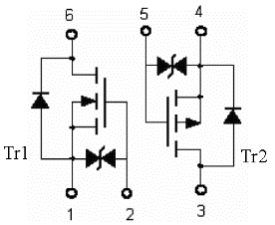
Features

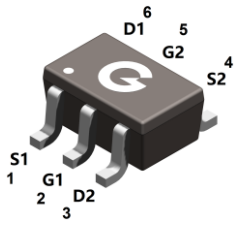
- Advanced trench technology
- High speed switching
- Low-voltage drive
- Integrated ESD protection diode：HBM: JESD22-A114-B: 2
- RoHS compliant with Halogen-free

HF

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
BL1213	SOT-363	3000 pcs / Tape & Reel	1213

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

Parameter	Symbol	T_{r1}	T_{r2}	Unit
Drain-to-Source Voltage	V_{DSS}	20	-20	V
Gate-to-Source Voltage	V_{GSS}	±8	±8	V
Continuous Drain Current (T_A = 25°C) *1	I_D	0.82	-0.65	A
Continuous Drain Current (T_A = 70°C) *1		0.66	-0.52	A
Pulsed Drain Current (t_p = 10μs, T_A = 25°C)	I_{DM}	5	-5	A
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	$R_{\theta JC}$	-	-	230	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	415	°C/W

Electrical Characteristics-T_{r1} @ 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	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 20V, V_{GS} = 0V	-	-	100	nA
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=0.6A	-	0.22	0.4	Ω
		V_{GS}=2.5V, I_D=0.2A	-	0.28	0.456	
		V_{GS}=1.8V, I_D=0.1A	-	0.35	0.546	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	0.5	0.67	1.2	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	115	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 10V f = 1.0MHz	-	67	-	pF
C_{OSS}	Output Capacitance		-	12	-	
C_{RSS}	Reverse Transfer Capacitance		-	8	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time*3	V_{DD} = 10V V_{GS} = 4V I_D = 0.15A R_G = 10Ω	-	2.8	-	ns
t_r	Turn-on Rise Time*3		-	20	-	
$t_{d(OFF)}$	Turn-Off Delay Time*3		-	23	-	
t_f	Turn-Off Fall Time*3		-	23	-	
Q_G	Total Gate-Charge	V_{DS} = 10V V_{GS} = 4.5V I_D = 0.5A	-	2.35	-	nC
Q_{GS}	Gate to Source Charge		-	0.46	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.35	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = 0.5A, V_{GS} = 0 V	-	0.9	1.0	V

Electrical Characteristics-T_{r2} (@ 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	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V	-	-	-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS} = ±4.5V, V_{DS} = 0V	-	-	±10	μA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = -4.5V, I_D = -780mA	-	0.40	0.48	Ω
		V_{GS} = -4V, I_D = -300mA	-	0.44	0.55	
		V_{GS} = -2.5V, I_D = -660mA	-	0.6	0.67	
		V_{GS} = -1.8V, I_D = -100mA	-	0.75	2.2	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250uA	-0.5	-0.6	-1.2	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	94	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -16V f = 1.0MHz	-	76	-	pF
C_{OSS}	Output Capacitance		-	13	-	
C_{RSS}	Reverse Transfer Capacitance		-	10	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *3	V_{DD} = -10V V_{GS} = -4.5V R_G = 3Ω R_G = 50Ω	-	8	-	ns
t_r	Turn-on Rise Time *3		-	5.5	-	
$t_{d(OFF)}$	Turn-Off Delay Time *3		-	30	-	
t_f	Turn-Off Fall Time *3		-	17	-	
Q_G	Total Gate-Charge	V_{DS} = -16V V_{GS} = -4.5V I_D = -0.2A	-	2.6	-	nC
Q_{GS}	Gate to Source Charge		-	0.57	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.34	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = -0.15A, V_{GS} = 0 V	-	-0.8	-1.2	V

Notes:

1. The data tested by surface mounted on a minimum recommended pad
2. The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
3. Guaranteed by design, not subject to production

Ratings and Characteristics Curves-T_{r1} (@ T_A = 25°C unless otherwise specified)

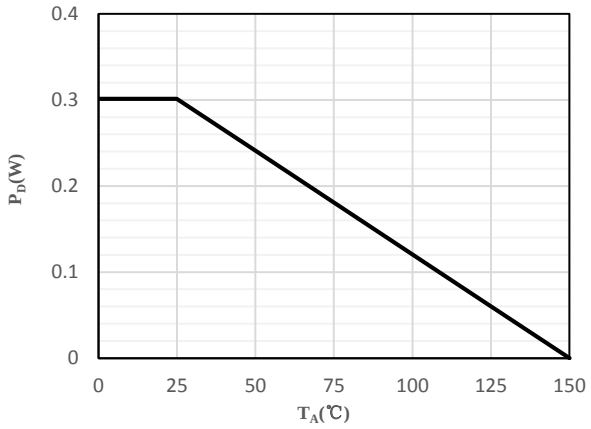


Fig 1 Power Dissipation

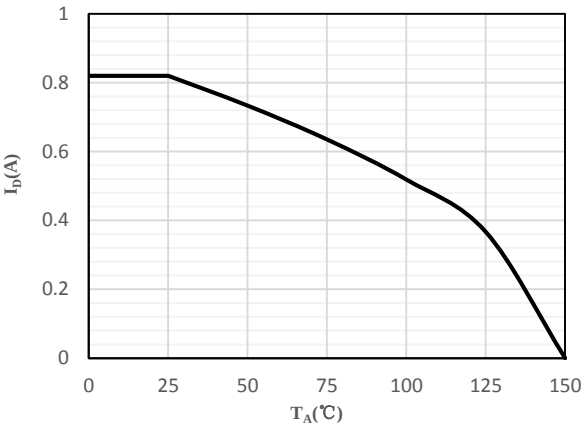


Fig 2 Drain Current

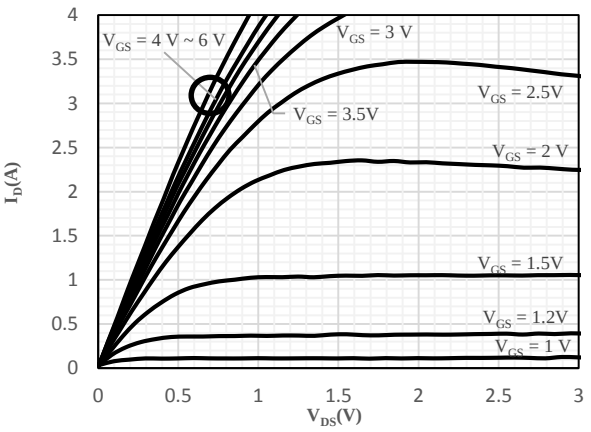


Fig 3 Typical Output Characteristics

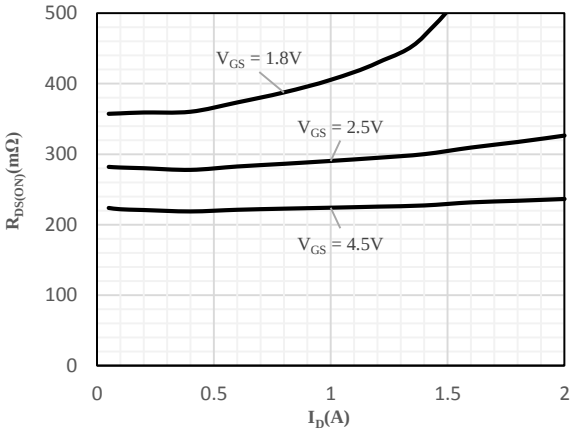


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

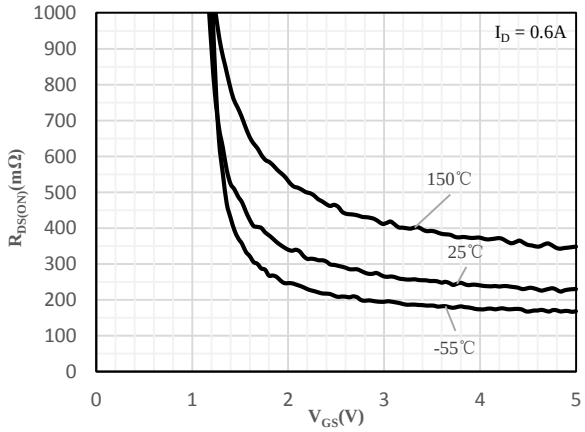


Fig 5 On-Resistance vs. Gate-Source Voltage

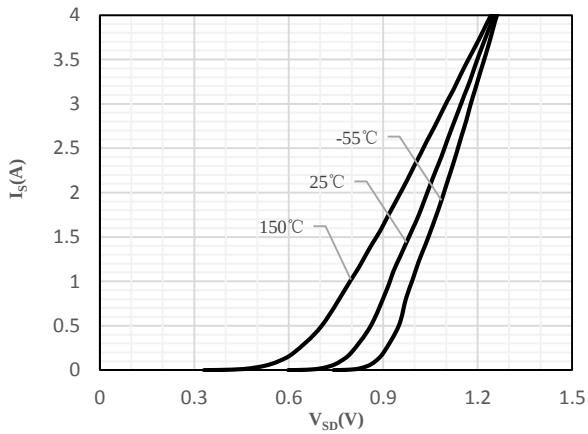


Fig 6 Body-Diode Characteristics

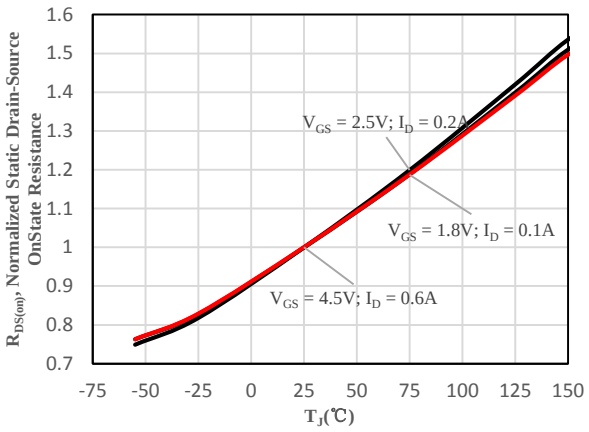


Fig 7 Normalized On-Resistance vs. Junction Temperature

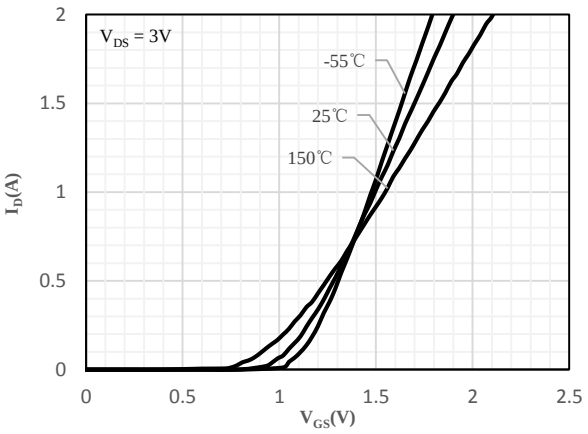


Fig 8 Transfer Characteristics

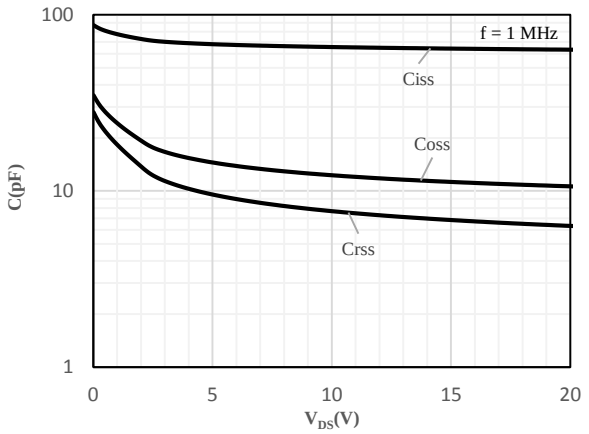


Fig 9 Capacitance Characteristics

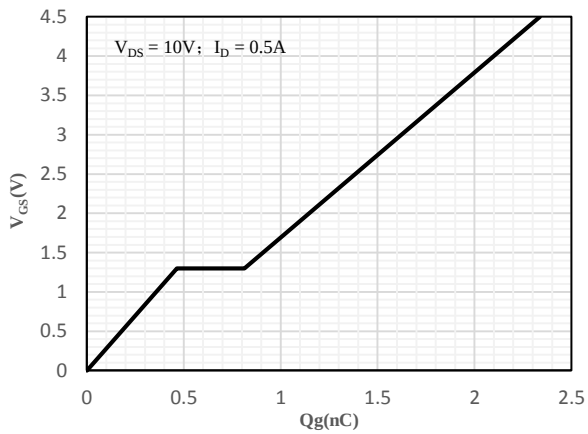


Fig 10 Gate-Charge Characteristics

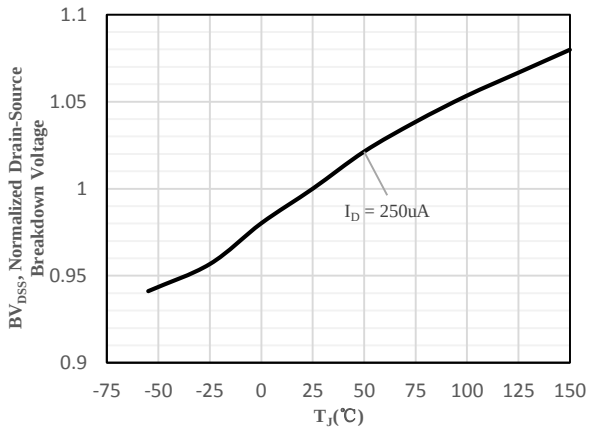


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

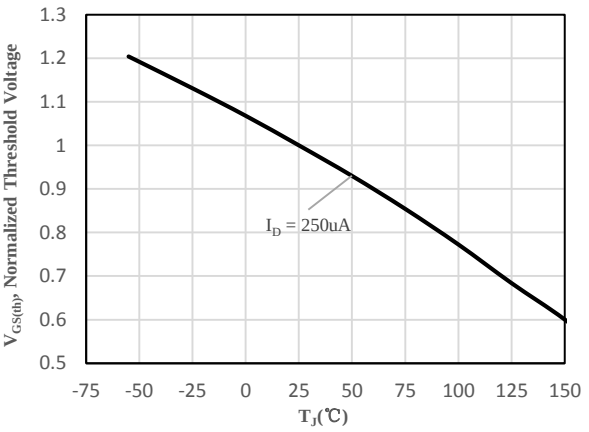


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Ratings and Characteristics Curves-T_{r2} (@ T_A = 25°C unless otherwise specified)

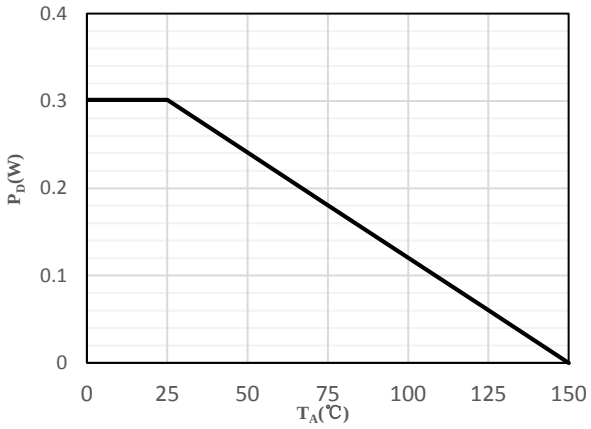


Fig 1 Power Dissipation

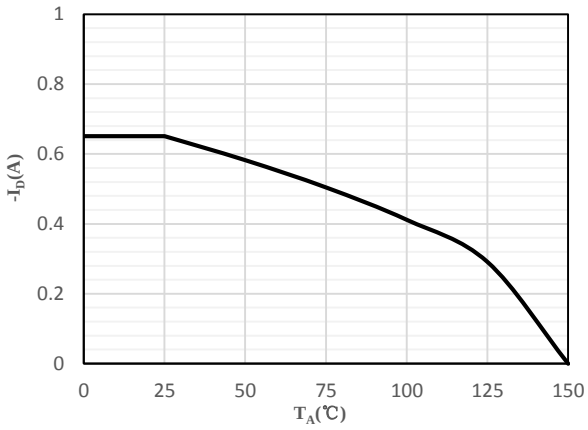


Fig 2 Drain Current

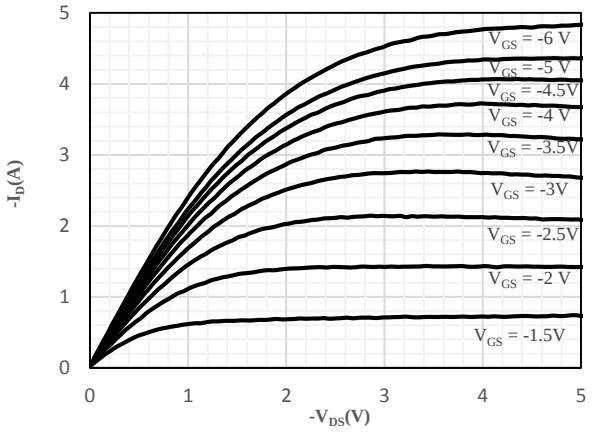


Fig 3 Typical Output Characteristics

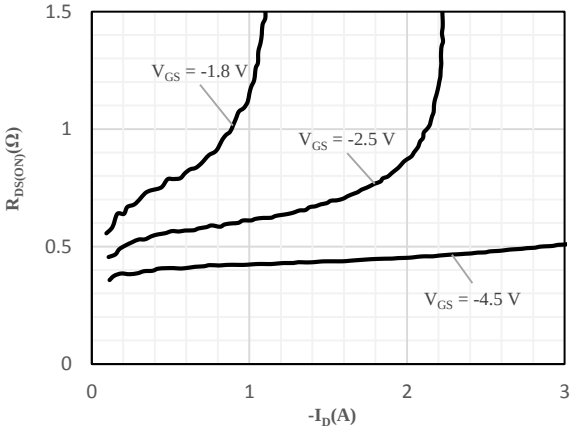


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

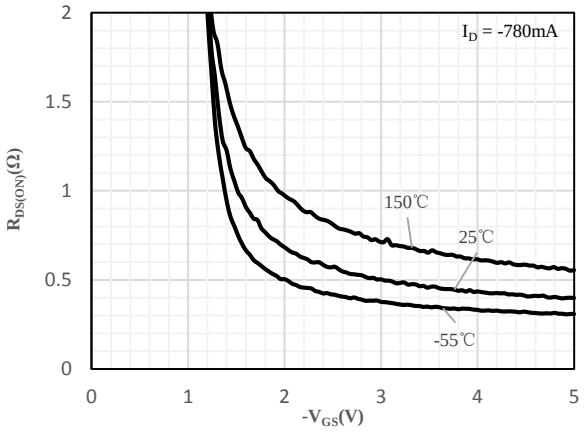


Fig 5 On-Resistance vs. Gate-Source Voltage

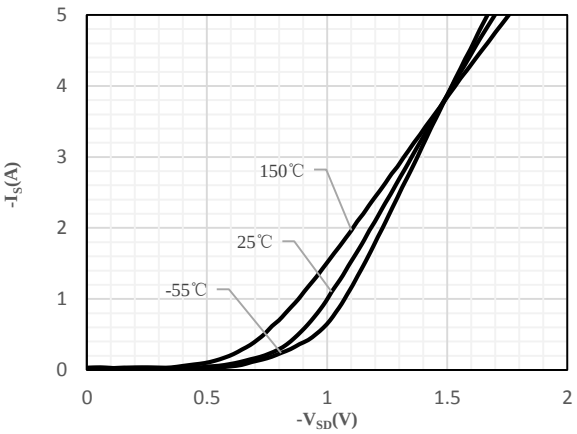


Fig 6 Body-Diode Characteristics

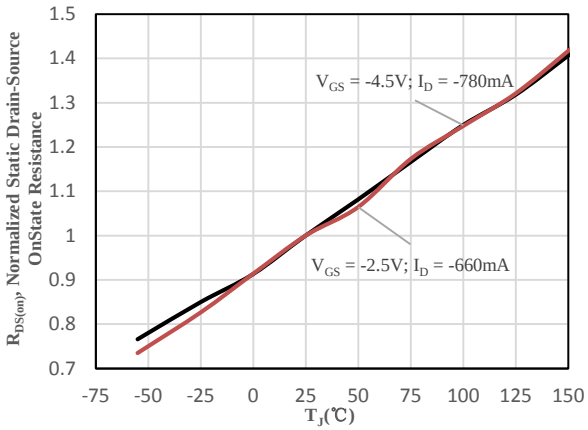


Fig 7 Normalized On-Resistance vs. Junction Temperature

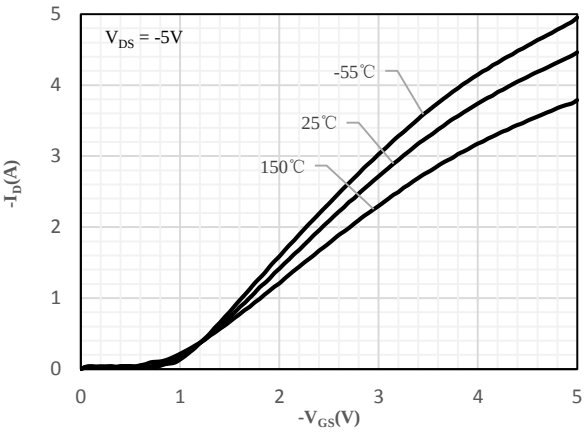


Fig 8 Transfer Characteristics

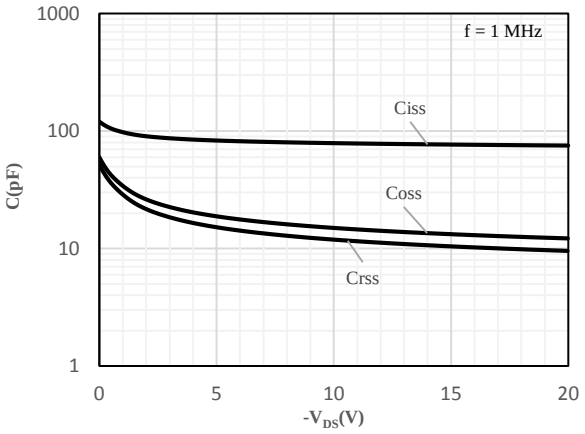


Fig 9 Capacitance Characteristics

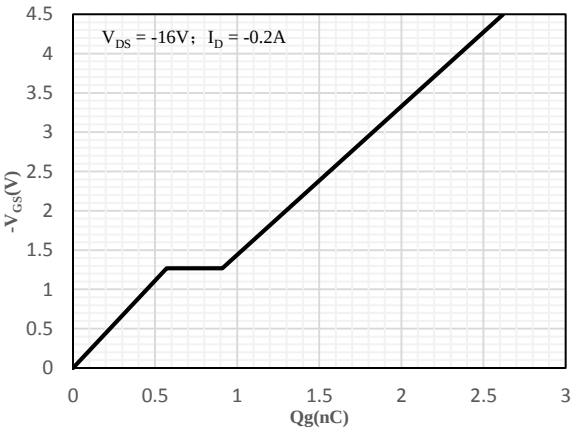


Fig 10 Gate-Charge Characteristics

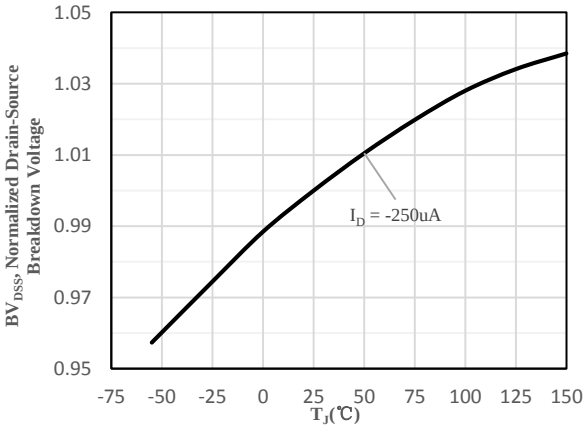


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

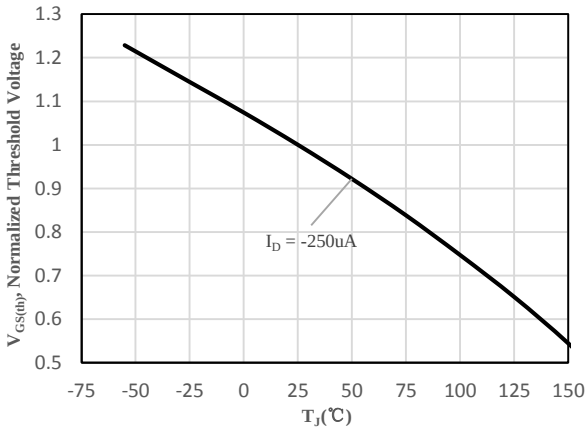
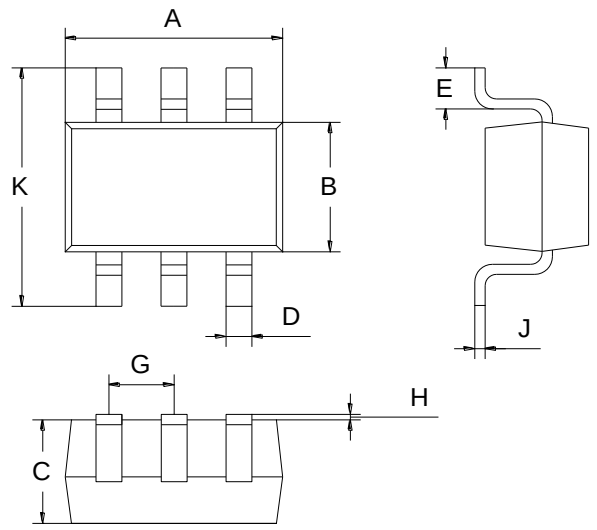


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

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