

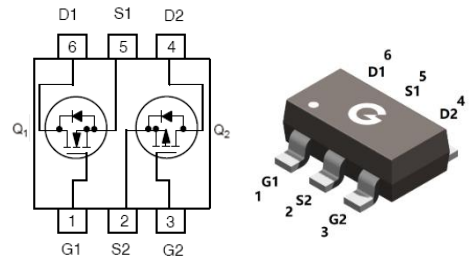
Features

- Complementary P + N channel
- Advanced trench technology
- Exceptional on-resistance and maximum DC current capability

HF

Mechanical Data

- Case: SOT-23-6L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



SOT-23-6L

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
BL2038D-6L	SOT-23-6L	3000 pcs / Tape & Reel	2038D

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

Parameter	Symbol	Q1	Q2	Unit
Drain-to-Source Voltage	V _{DSS}	20	-20	V
Gate-to-Source Voltage	V _{GSS}	±12	±12	V
Continuous Drain Current (T _A = 25°C) *1	I _D	3.2	-2.3	A
Continuous Drain Current (T _A = 70°C) *1		2.6	-1.8	A
Pulsed Drain Current (t _p = 10μs, T _A = 25°C)	I _{DM}	16	-12	A
Single Pulse Avalanche Energy *4	E _{AS}	2	2	mJ
Power Dissipation (T _A = 25°C) *1	P _D	1		W
Power Dissipation (T _A = 25°C) *2		0.5		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-Air *1	R _{θJA}	-	100	125	°C/W
Thermal Resistance Junction-to-Air *2	R _{θJA}	-	-	250	°C/W

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

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	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} = ±12V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance ^{*3}	V _{GS} = 4.5V, I _D = 3A	-	54	65	mΩ
		V _{GS} = 2.5V, I _D = 2A	-	76	85	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	0.5	0.9	1.2	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	17	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 10V f = 1.0MHz	-	188	-	pF
C _{OSS}	Output Capacitance		-	28	-	
C _{RSS}	Reverse Transfer Capacitance		-	22	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time ^{*5}	V _{DD} = 10V V _{GS} = 4.5V I _D = 1A R _G = 6Ω	-	5	-	ns
t _r	Turn-on Rise Time ^{*5}		-	8.5	-	
t _{d(OFF)}	Turn-Off Delay Time ^{*5}		-	11	-	
t _f	Turn-Off Fall Time ^{*5}		-	3	-	
Q _G	Total Gate-Charge	V _{DD} = 10V V _{GS} = 4.5V I _D = 3.6A	-	3.3	-	nC
Q _{GS}	Gate to Source Charge		-	0.8	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	0.6	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage ^{*3}	I _F = 1A, V _{GS} = 0V	-	0.8	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	-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} = ±12V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance ^{*3}	V _{GS} = -4.5V, I _D = -1.5A	-	118	140	mΩ
		V _{GS} = -2.5V, I _D = -1.1A	-	157	180	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-0.4	-0.6	-1.0	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	40	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = -10V f = 1.0MHz	-	199	-	pF
C _{OSS}	Output Capacitance		-	29	-	
C _{RSS}	Reverse Transfer Capacitance		-	22	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time ^{*5}	V _{DD} = -10V V _{GS} = -4.5V I _D = -1A R _G = 5Ω	-	11	-	ns
t _r	Turn-on Rise Time ^{*5}		-	5	-	
t _{d(OFF)}	Turn-Off Delay Time ^{*5}		-	20	-	
t _f	Turn-Off Fall Time ^{*5}		-	8	-	
Q _G	Total Gate-Charge	V _{DD} = -16V V _{GS} = -4.5V I _D = -1.5A	-	3.5	-	nC
Q _{GS}	Gate to Source Charge		-	0.7	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	0.8	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage ^{*3}	I _{SD} = -1.5A, V _{GS} = 0V	-	-0.9	-1.1	V

Notes:

- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The E_{AS} data shows Max. rating. N: The test condition is V_{DD} = 15V, V_{GS} = 10V, L = 0.1mH;
P: The test condition is V_{DD} = -15V, V_{GS} = -10V, L = 0.1mH
- Guaranteed by design, not subject to production

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

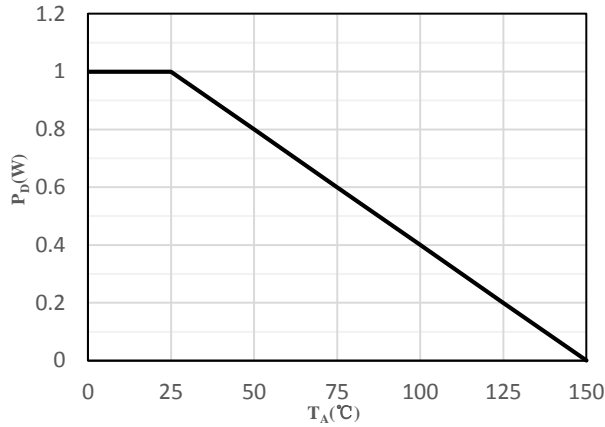


Fig 1 Power Dissipation

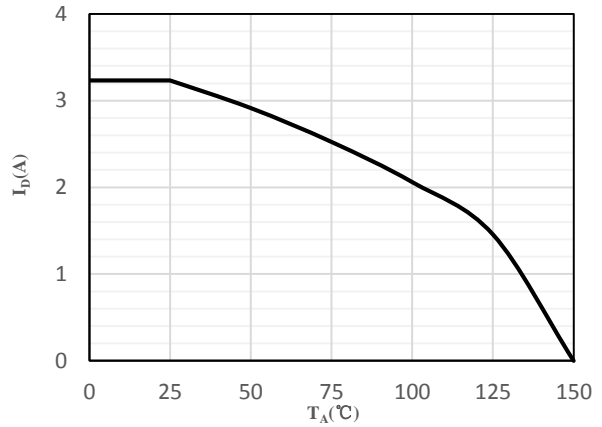


Fig 2 Drain Current

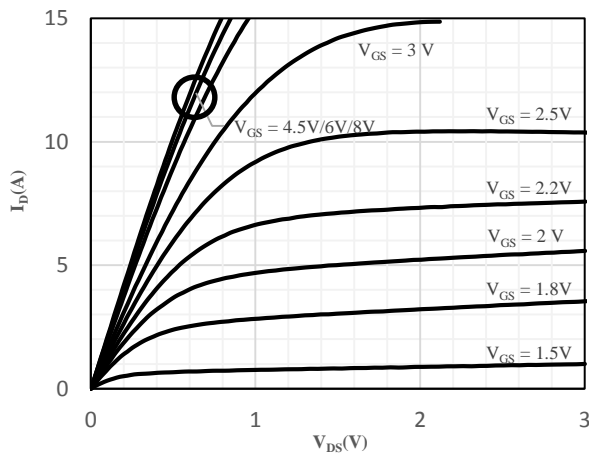


Fig 3 Typical Output Characteristics

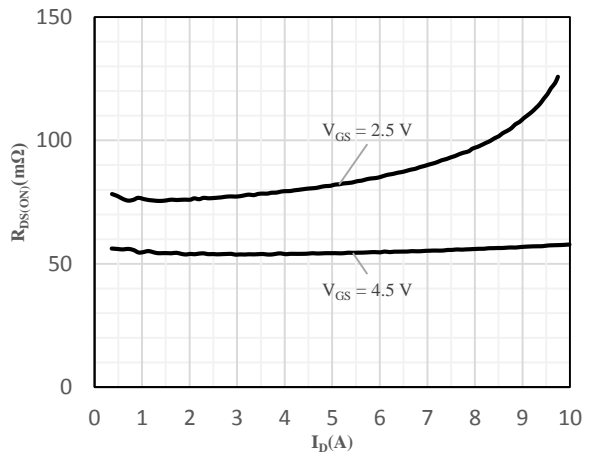


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

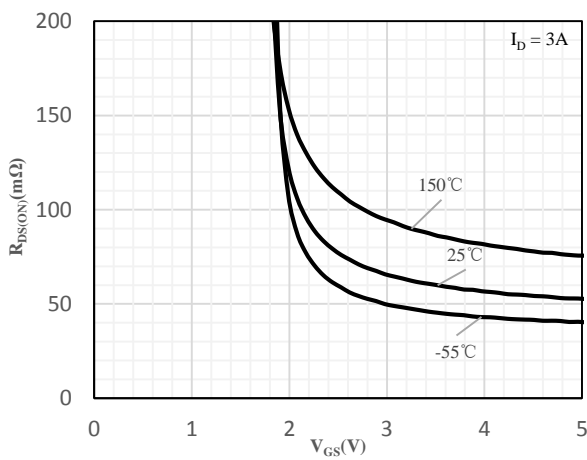


Fig 5 On-Resistance vs. Gate-Source Voltage

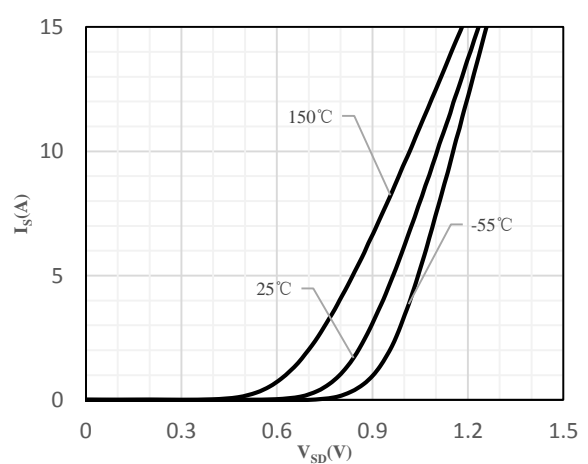


Fig 6 Body-Diode Characteristics

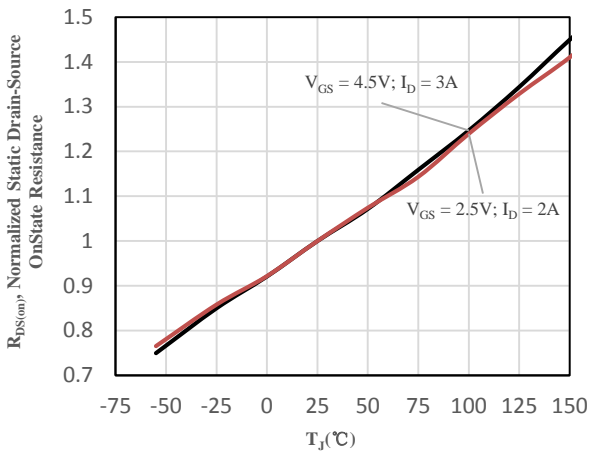


Fig 7 Normalized On-Resistance vs. Junction Temperature

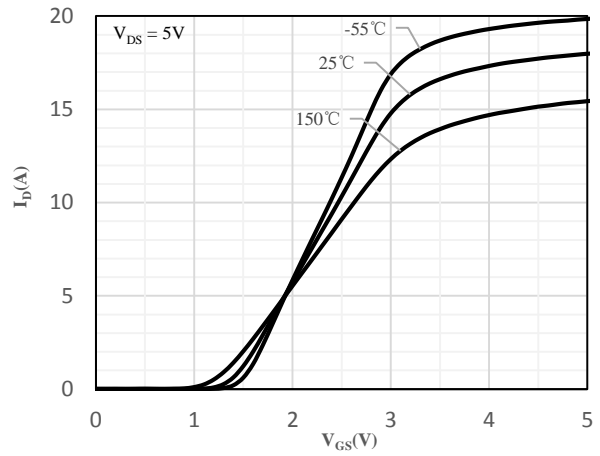


Fig 8 Transfer Characteristics

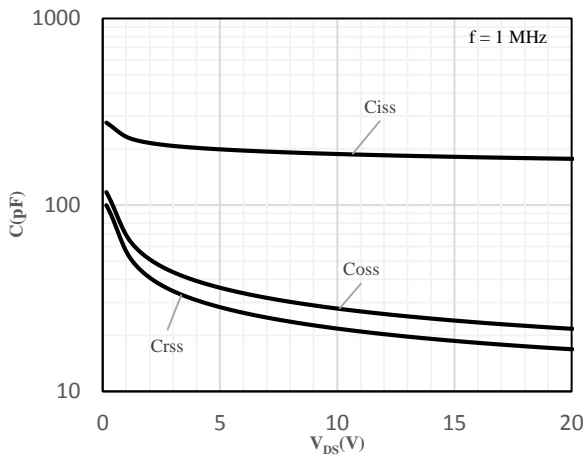


Fig 9 Capacitance Characteristics

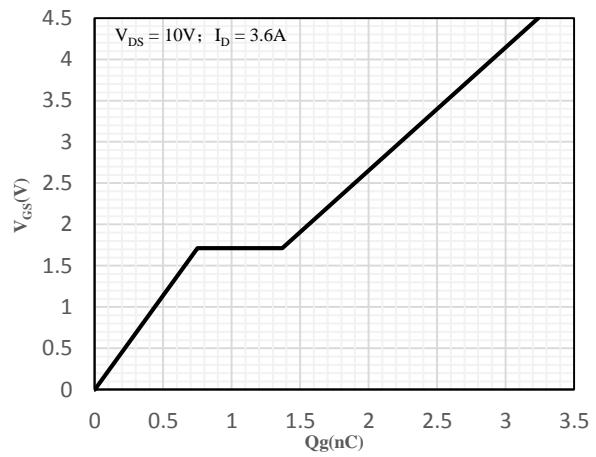


Fig 10 Gate-Charge Characteristics

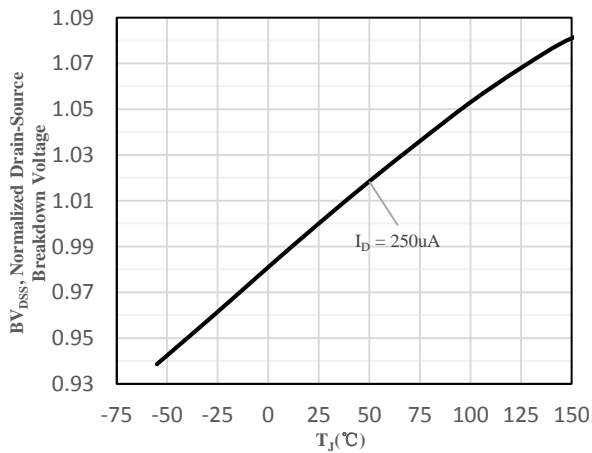


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

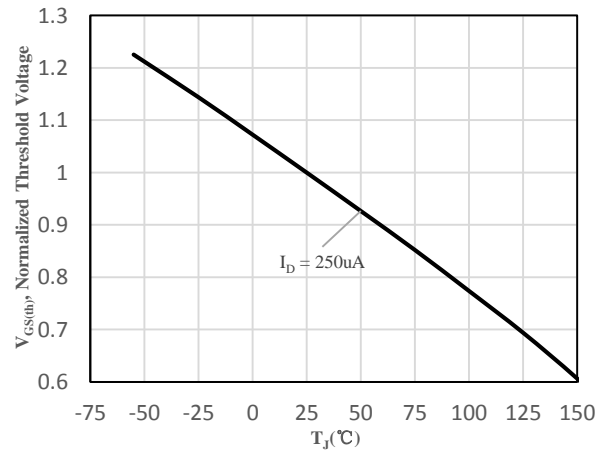


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

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

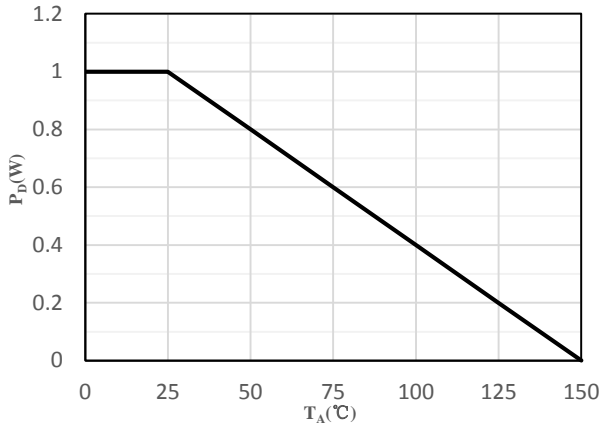


Fig 1 Power Dissipation

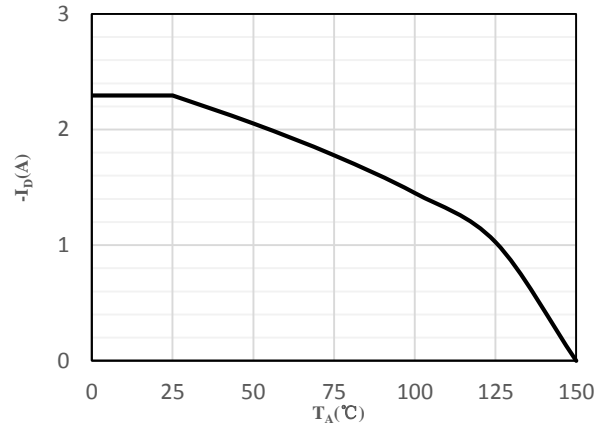


Fig 2 Drain Current

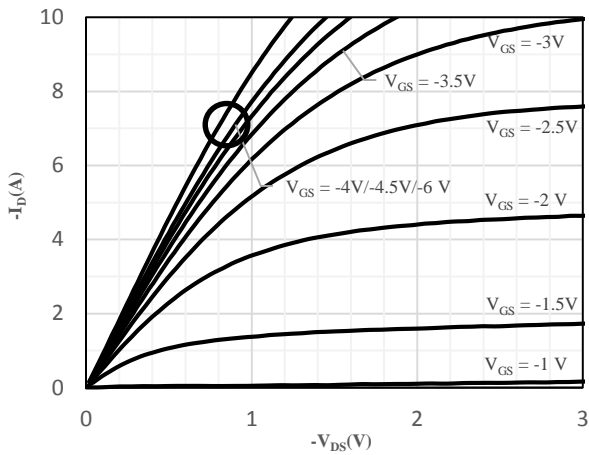


Fig 3 Typical Output Characteristics

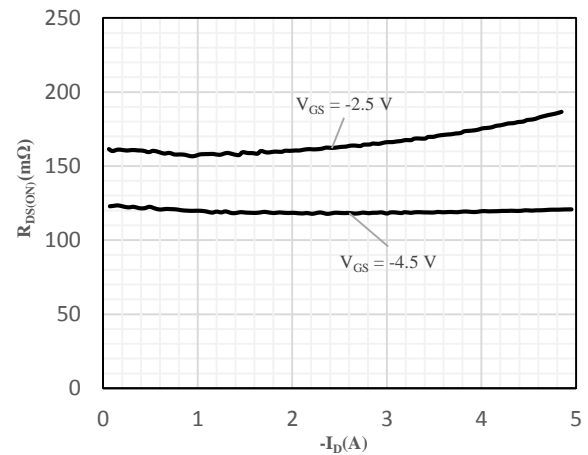


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

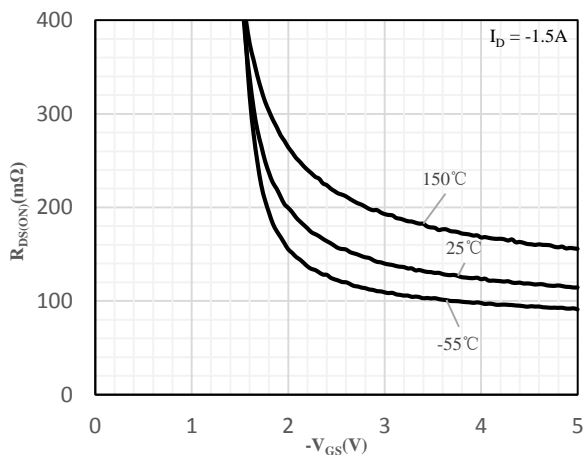


Fig 5 On-Resistance vs. Gate-Source Voltage

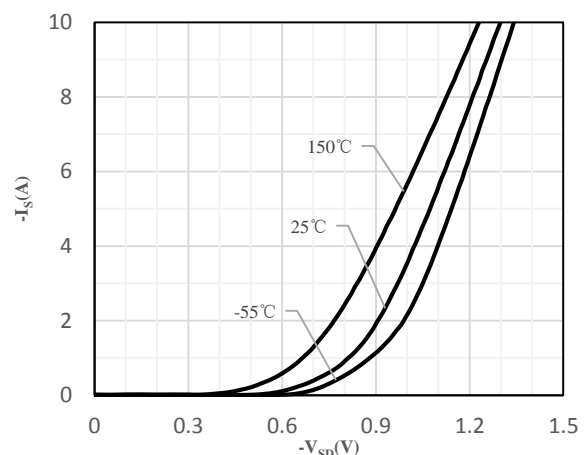


Fig 6 Body-Diode Characteristics

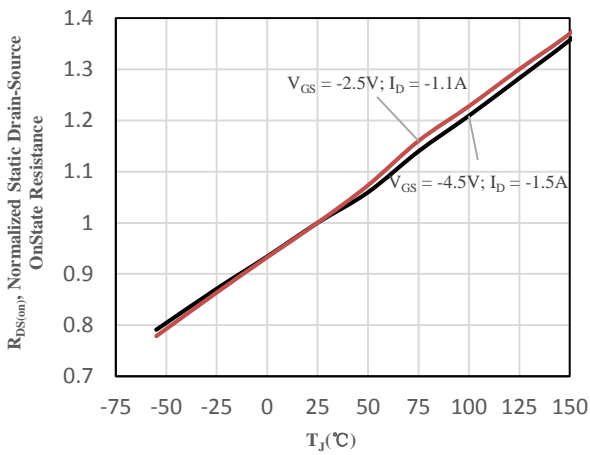


Fig 7 Normalized On-Resistance vs. Junction Temperature

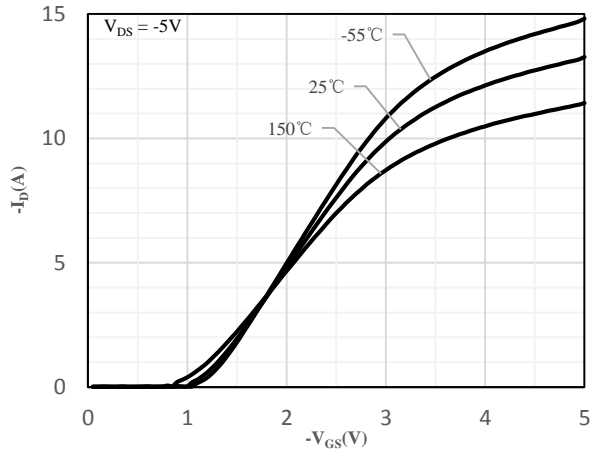


Fig 8 Transfer Characteristics

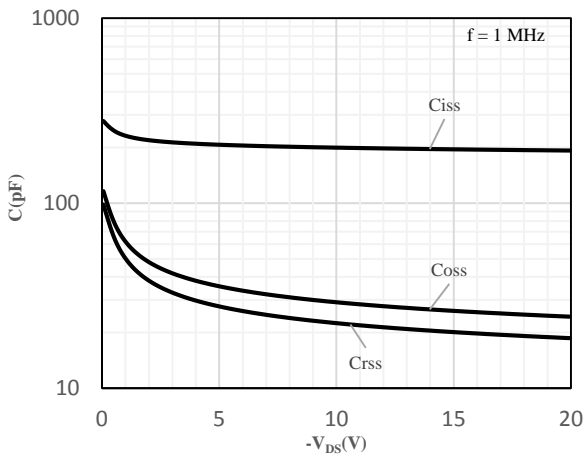


Fig 9 Capacitance Characteristics

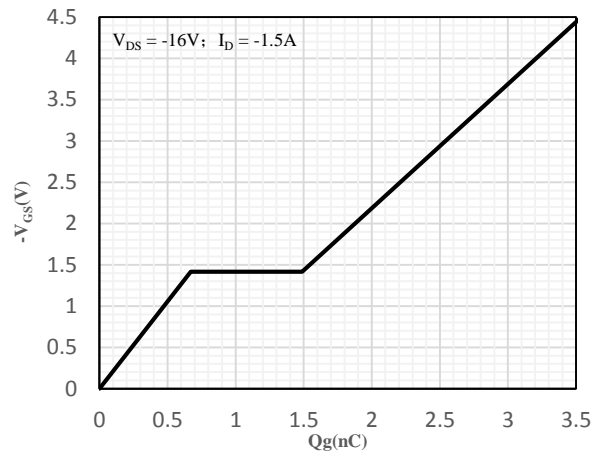


Fig 10 Gate-Charge Characteristics

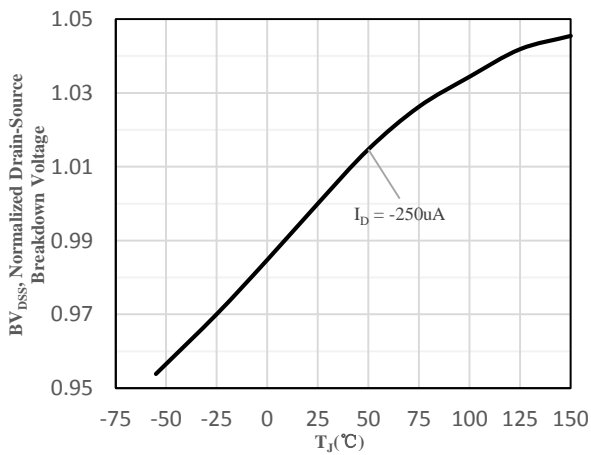


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

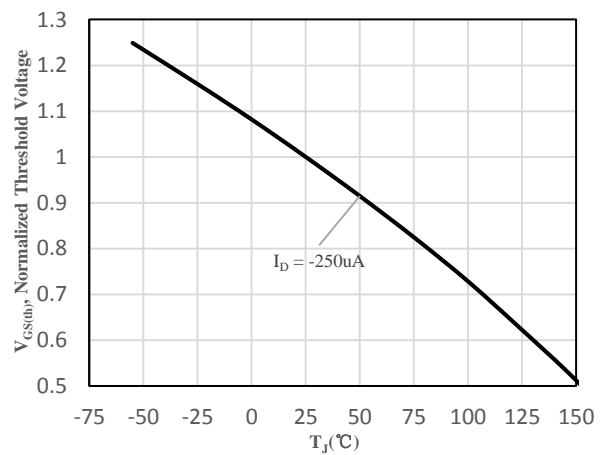
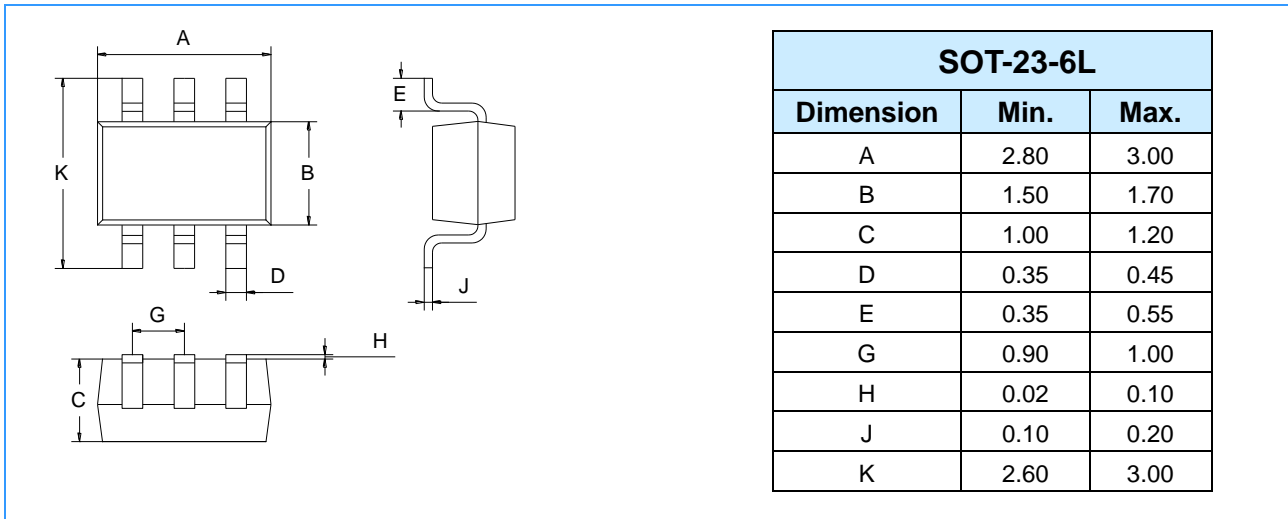
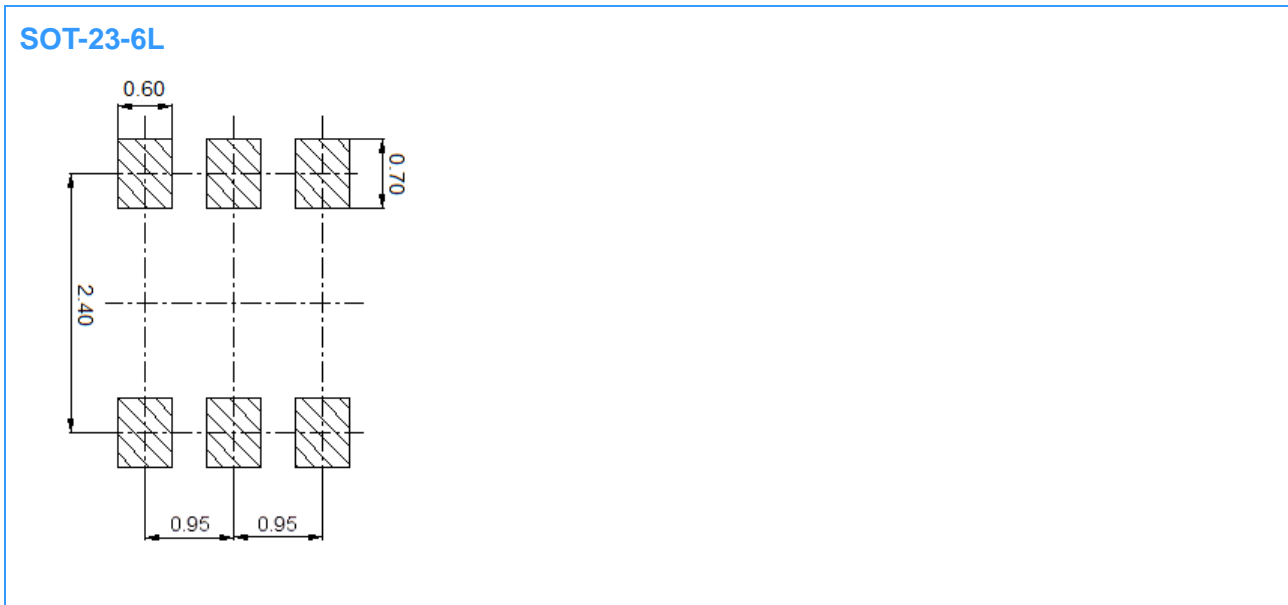


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



Package Outline Dimensions (Unit: mm)



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