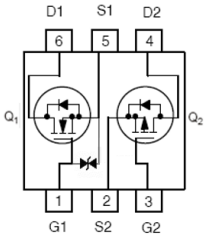
P+N-Channel Enhancement Mode MOSFET

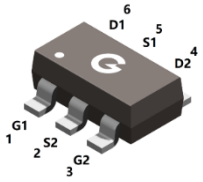
GBLH5301-6L

Features

- Advanced trench technology
- Custom-designed for clients' special needs
- Reliable and Rugged
- Green device available
- RoHS compliant with Halogen-free

HF





SOT-23-6L

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

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GBLH5301-6L	SOT-23-6L	3000 pcs / Tape & Reel	H5301

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

Parameter	Symbol	N	P	Unit
Drain-to-Source Voltage	V_{DSS}	50	-30	V
Gate-to-Source Voltage	V_{GSS}	±20	±20	V
Continuous Drain Current (T_A = 25°C) *1	I_D	0.36	-4.3	A
Continuous Drain Current (T_A = 70°C) *1		0.29	-3.5	A
Pulsed Drain Current (t_p =10μs, T_A = 25°C)	I_{DM}	1.5	-17	A
Single Pulse Avalanche Energy *3	E_{AS}	0.2	12	mJ
Power Dissipation (T_A = 25°C) *1	P_D	0.5	1	W
Operating Junction Temperature Range	T_J	-55 ~ +150		°C
Storage Temperature Range	T_{STG}	-55 ~ +150		°C

Thermal Characteristics

Parameter	Symbol	N	P	Unit
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	250	125	°C/W

Electrical Characteristics-N (@ 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	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 *2	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	
$V_{GS(TH)}$	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 *4	V_{DD} = 25V, I_D = 0.36A V_{GS} = 10V, R_G = 6Ω	-	2.2	-	ns
t_r	Turn-on Rise Time *4		-	19.2	-	
$t_{d(off)}$	Turn-Off Delay Time *4		-	6.2	-	
t_f	Turn-Off Fall Time *4		-	23	-	
Q_G	Total Gate-Charge	V_{DS} = 25V V_{GS} = 10V I_D = 0.2A	-	4	-	nC
Q_{GS}	Gate to Source Charge		-	0.5	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	0.4	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = 0.5A, V_{GS} = 0V	-	0.9	1.2	V
trr	Reverse Recovery Time	I_F = 1A, V_{GS} = 0V d_{IF}/d_t = 100A/μs	-	15	-	ns
Qrr	Reverse Recovery Charge		-	8	-	nC

Electrical Characteristics-P (@ 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} = ±20V, V_{DS} = 0V	-	-	±100	nA
On Characteristics						
$R_{DS(ON)}$	Drain-Source On-resistance *2	V_{GS} = -10V,I_D = -4.1A	-	35	52	mΩ
		V_{GS} = -4.5V,I_D = -3A	-	45	87	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1	-1.5	-2.1	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	32	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -15V f = 1.0MHz	-	613	-	pF
C_{OSS}	Output Capacitance		-	72	-	
C_{RSS}	Reverse Transfer Capacitance		-	60	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{DD} =-15V, V_{GS} = -10V R_G = 2.5Ω, R_L = 15Ω I_D = -1A	-	5	-	ns
t_r	Turn-on Rise Time *4		-	6	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	28	-	
t_f	Turn-Off Fall Time *4		-	7	-	
Q_G	Total Gate-Charge	V_{DD} = -20V V_{GS} = -4.5V I_D = -3A	-	7.3	-	nC
Q_{GS}	Gate to Source Charge		-	2.1	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	2.2	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = -1A, V_{GS} = 0V	-	-0.8	-1.2	V
trr	Reverse Recovery Time	I_{SD} = -3A, V_{GS} = 0V di/dt = 100A/μs	-	125	-	ns
Qrr	Reverse Recovery Charge		-	110	-	nC

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} = 30V, V_{GS} = 10V, L = 0.5mH
   P: V_{DD} = -15V, V_{GS} = -10V, L = 0.5mH
4. Guaranteed by design, not subject to production

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

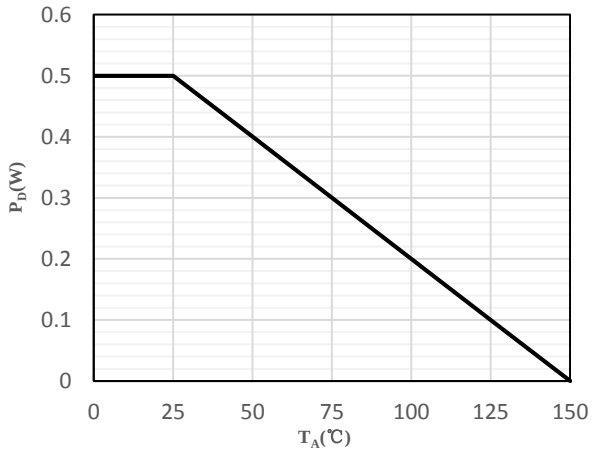


Fig 1 Power Dissipation

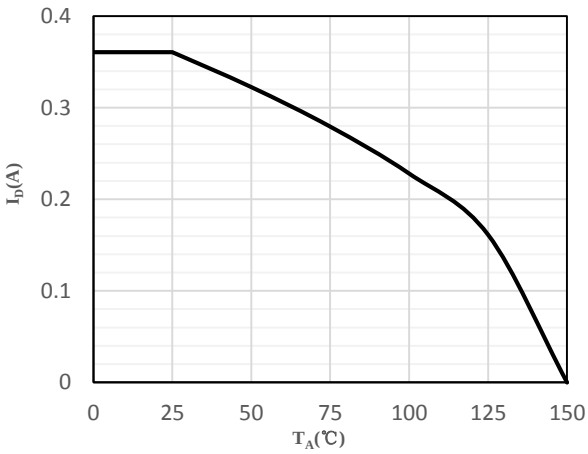


Fig 2 Drain Current

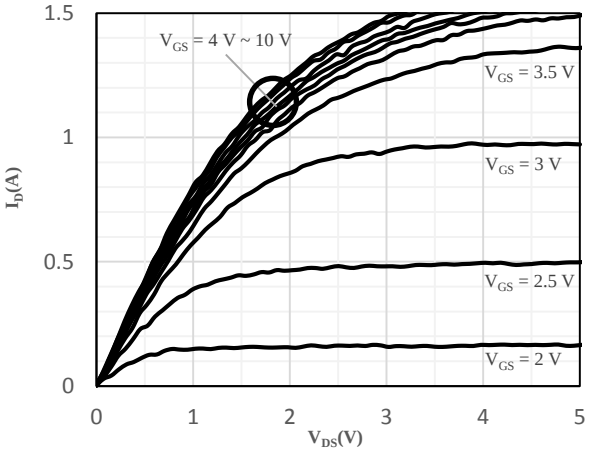


Fig 3 Typical Output Characteristics

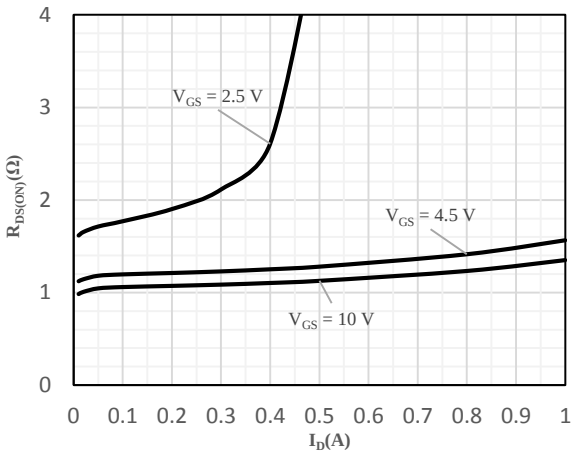


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

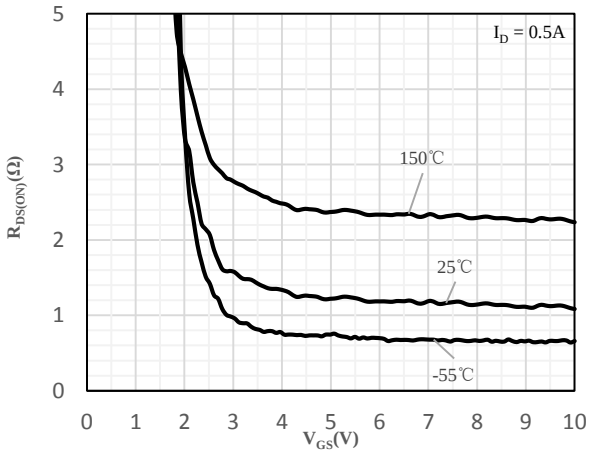


Fig 5 On-Resistance vs. Gate-Source Voltage

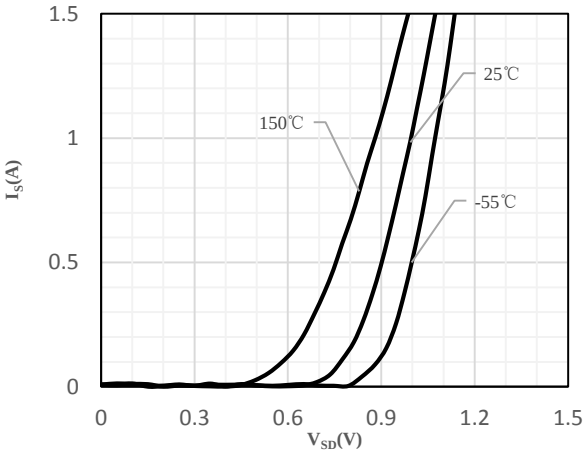


Fig 6 Body-Diode Characteristics

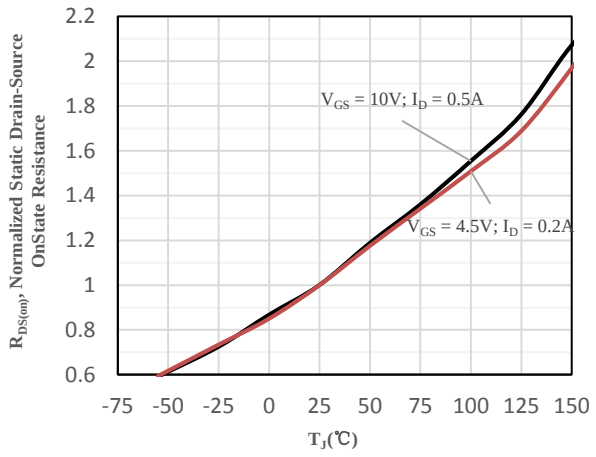


Fig 7 Normalized On-Resistance vs. Junction Temperature

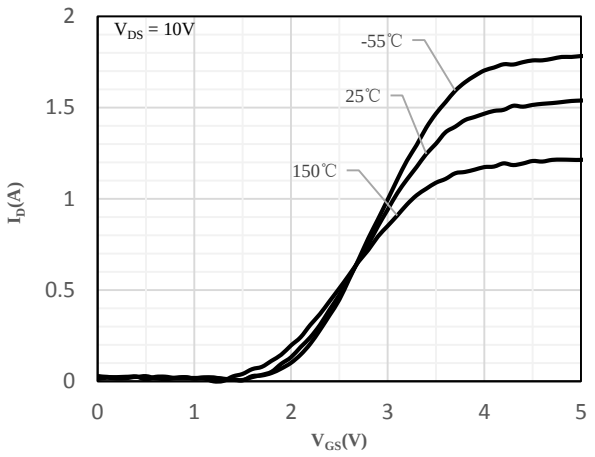


Fig 8 Transfer Characteristics

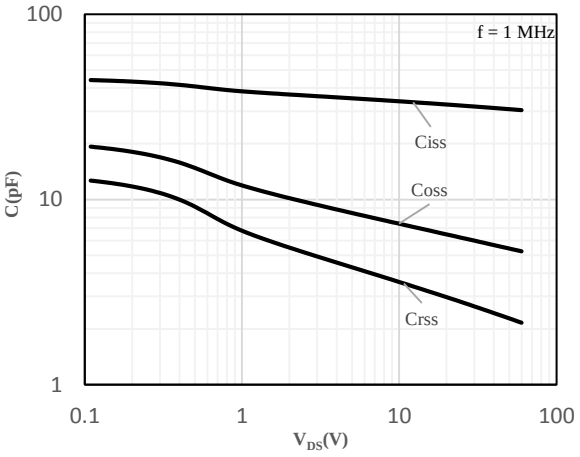


Fig 9 Capacitance Characteristics

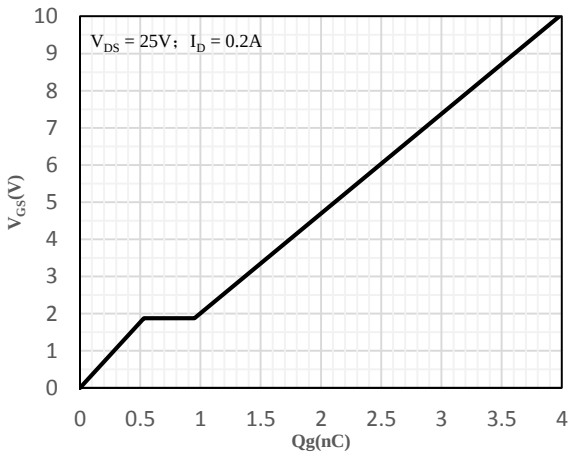


Fig 10 Gate-Charge Characteristics

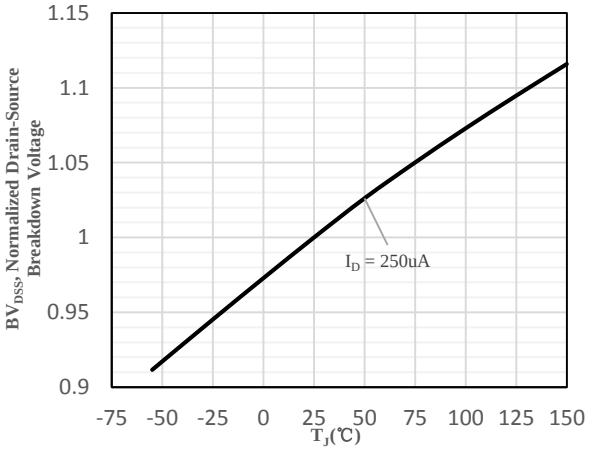


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

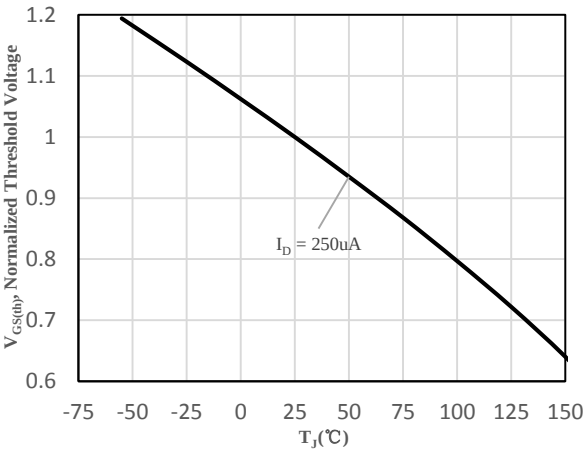


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

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

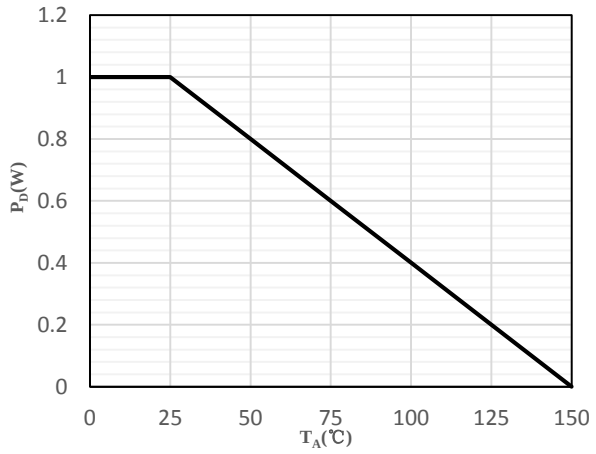


Fig 1 Power Dissipation

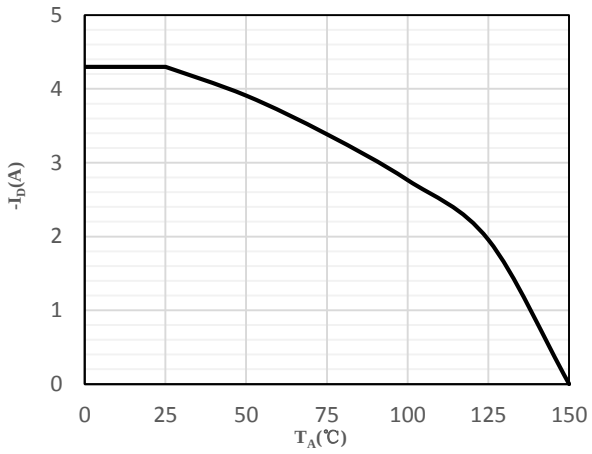


Fig 2 Drain Current

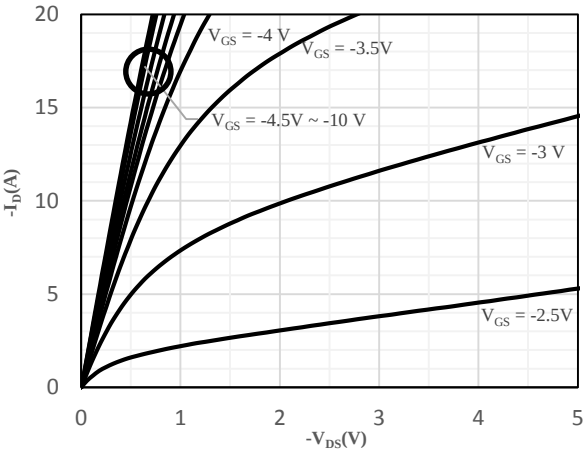


Fig 3 Typical Output Characteristics

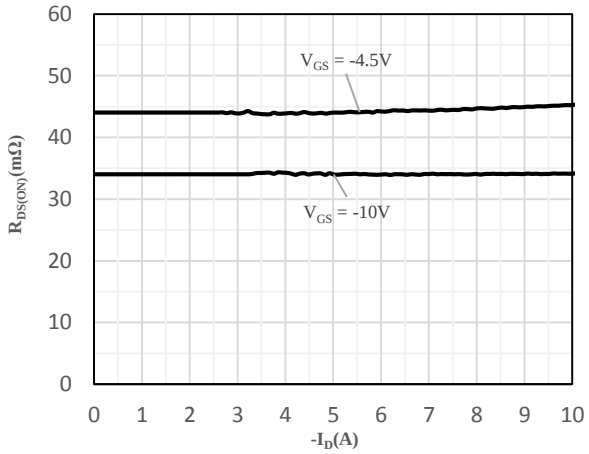


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

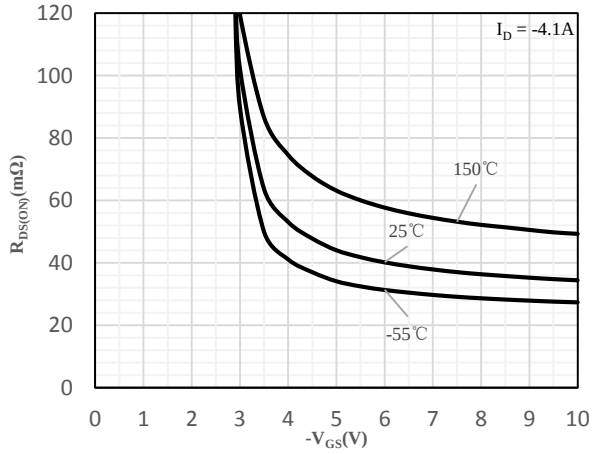


Fig 5 On-Resistance vs. Gate-Source Voltage

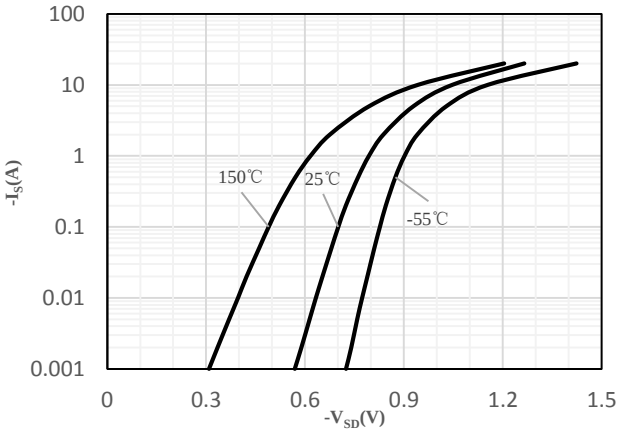


Fig 6 Body-Diode Characteristics

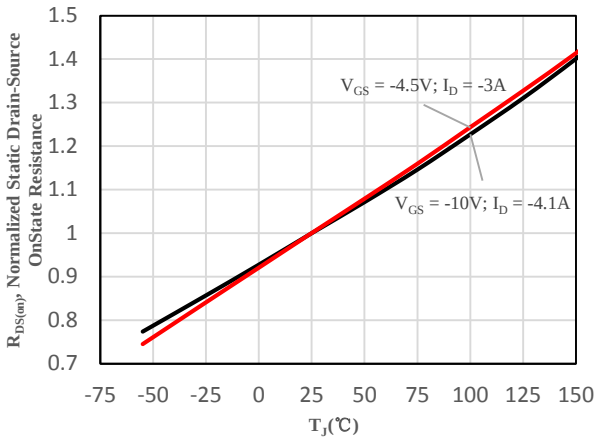


Fig 7 Normalized On-Resistance vs. Junction Temperature

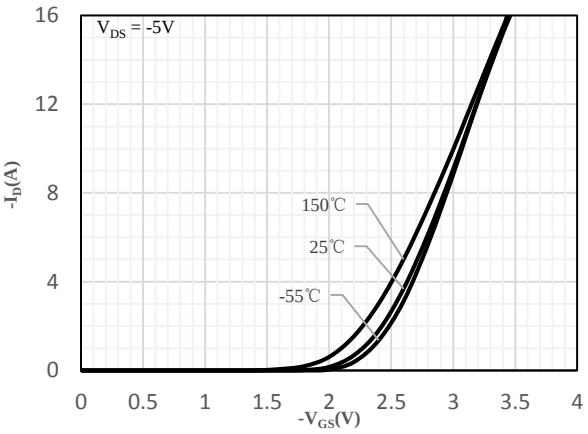


Fig 8 Transfer Characteristics

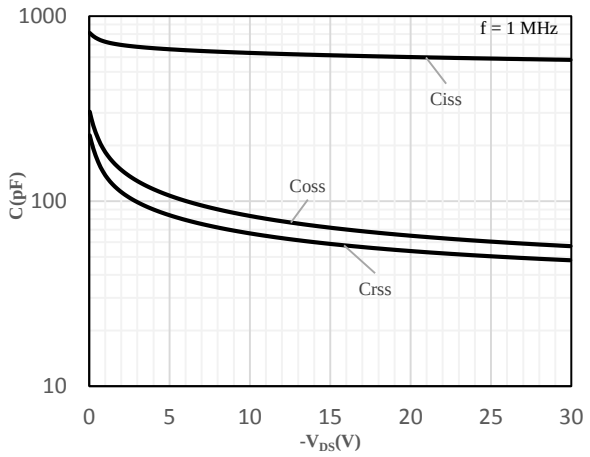


Fig 9 Capacitance Characteristics

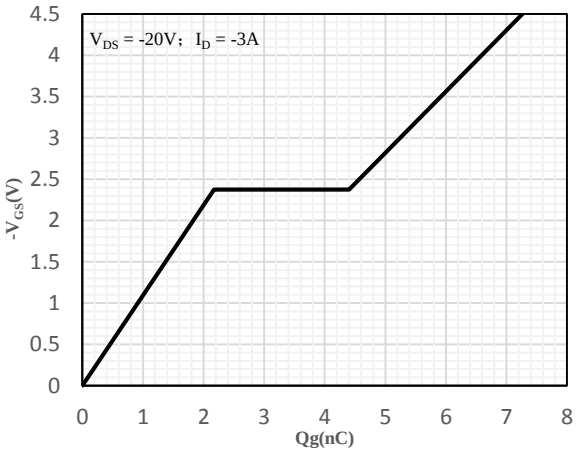


Fig 10 Gate-Charge Characteristics

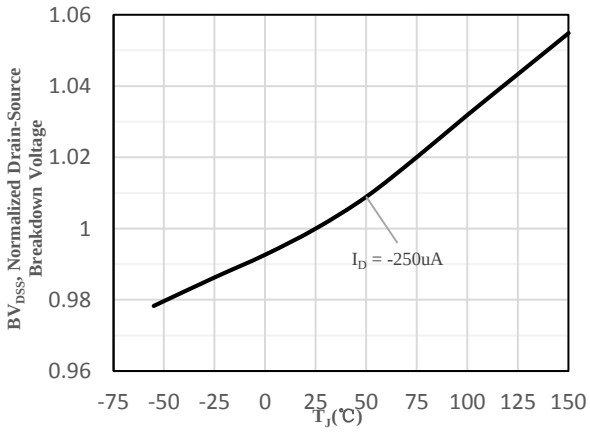


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

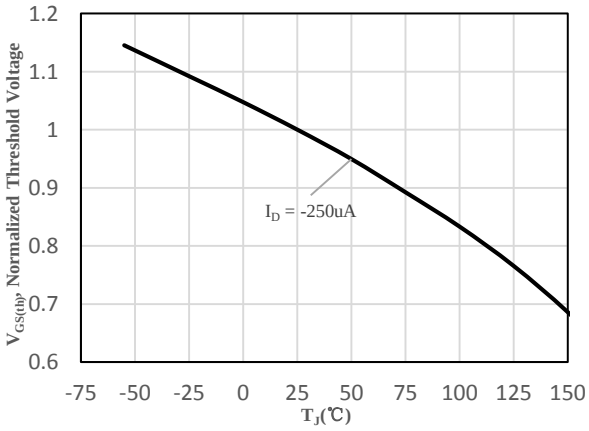
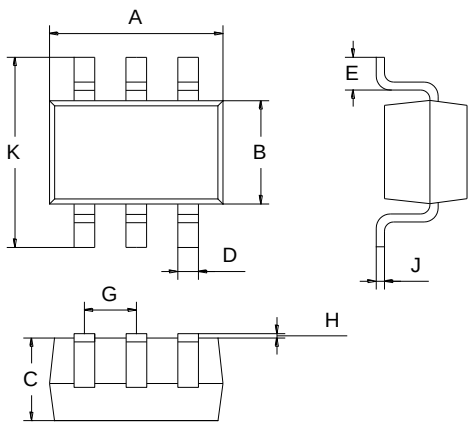


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



SOT-23-6L		
Dimension	**Min.**	**Max.**
A	2.80	3.00
B	1.50	1.70
C	1.00	1.20
D	0.35	0.45
E	0.35	0.55
G	0.90	1.00
H	0.02	0.10
J	0.10	0.20
K	2.60	3.00

Package Outline Dimensions (Unit: mm)

SOT-23-6L