P＋N-Channel Enhancement Mode MOSFET

GBLH3301-S8

Features

- Advanced trench technology
- Reliable and Rugged
- HBM: JESD22-A114-B: 1B
- RoHS compliant with Halogen-free

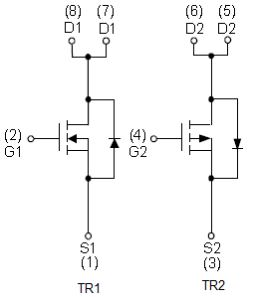
HF

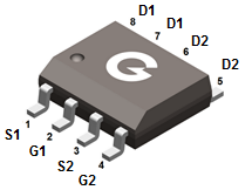
Applications

- Synchronous Rectification
- Motor Control
- Portable equipment application

Mechanical Data

- Case: SOP-8
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208





SOP-8

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GBLH3301-S8	SOP-8	4000 pcs / Tape & Reel	GBLH3301

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

Parameter	Symbol	N	P	Unit
Drain-to-Source Voltage	V_{DSS}	30	-30	V
Gate-to-Source Voltage	V_{GSS}	±20	±20	V
Continuous Drain Current (T_C = 25°C)	I_D	10	-8	A
Continuous Drain Current (T_A = 25°C) *1		6.4	-5.1	
Continuous Drain Current (T_A = 100°C) *1		4	-3.2	
Pulsed Drain Current (t_p = 10μs, T_C = 25°C)	I_{DM}	40	-32	A
Single Pulse Avalanche Energy *3	E_{AS}	10	10	mJ
Power Dissipation (T_C = 25°C)	P_D	5		W
Power Dissipation (T_A = 25°C) *1		2		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	$R_{\theta JC}$	-	-	25	°C/W
Thermal Resistance Junction-to-Air *1	$R_{\theta JA}$	-	-	62	°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	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 = 5.8A	-	14	30	mΩ
		V_{GS} = 4.5V, I_D = 5A	-	30	45	
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1	1.9	2.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	9	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = 15V f = 1.0MHz	-	450	-	pF
C_{OSS}	Output Capacitance		-	66	-	
C_{RSS}	Reverse Transfer Capacitance		-	56	-	
Switching Characteristics						
$t_{d(ON)}$	Turn-on Delay Time *4	V_{GS} = 10V V_{DD} = 15V R_L = 2.6Ω R_G = 3Ω	-	4.5	-	ns
t_r	Turn-on Rise Time *4		-	2.4	-	
$t_{d(OFF)}$	Turn-Off Delay Time *4		-	14.8	-	
t_f	Turn-Off Fall Time *4		-	2.5	-	
Q_G	Total Gate-Charge	V_{GS} = 10V V_{DS} = 15V I_D = 5.8A	-	8.6	-	nC
Q_{GS}	Gate to Source Charge		-	1.5	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	2.4	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_S = 1A, V_{GS} = 0 V	-	0.76	1.1	V
trr	Reverse Recovery Time	I_F = 5A, V_{GS} = 0V dI/dt = 100A/μs	-	88	-	ns
Qrr	Reverse Recovery Charge		-	54	-	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	-	33	55	mΩ
		V_{GS} = -4.5V,I_D = -3A	-	54	80	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1	-1.7	-2.5	V
R_G	Gate Resistance	V_{GS} = 0V, f = 1MHz	-	34	-	Ω
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{GS} = 0V V_{DS} = -15V f = 1.0MHz	-	510	-	pF
C_{OSS}	Output Capacitance		-	70	-	
C_{RSS}	Reverse Transfer Capacitance		-	56	-	
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	-	6	-	nC
Q_{GS}	Gate to Source Charge		-	2.9	-	
Q_{GD}	Gate to Drain (Miller) Charge		-	1.3	-	
Source-Drain Diode Characteristics						
V_{SD}	Diode Forward Voltage *2	I_{SD} = -1A, V_{GS} = 0V	-	-0.78	-1.0	V
trr	Reverse Recovery Time	I_{SD} = -3A, V_{GS} = 0V dI/dt = 100A/μs	-	150	-	ns
Qrr	Reverse Recovery Charge		-	160	-	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} = 20V, V_{GS} = 10V, L = 0.5mH
   P: V_{DD} = -20V, 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)

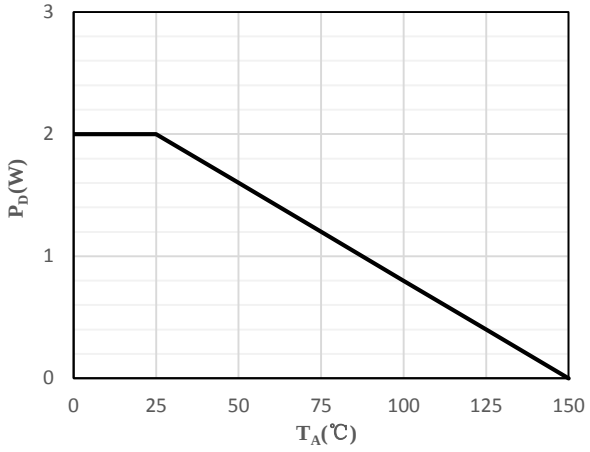


Fig 1 Power Dissipation

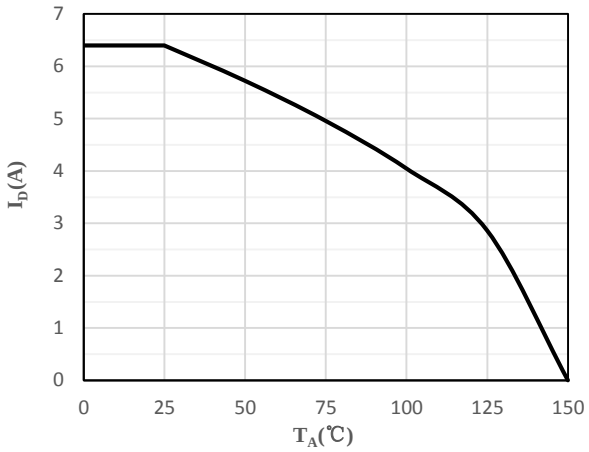


Fig 2 Drain Current

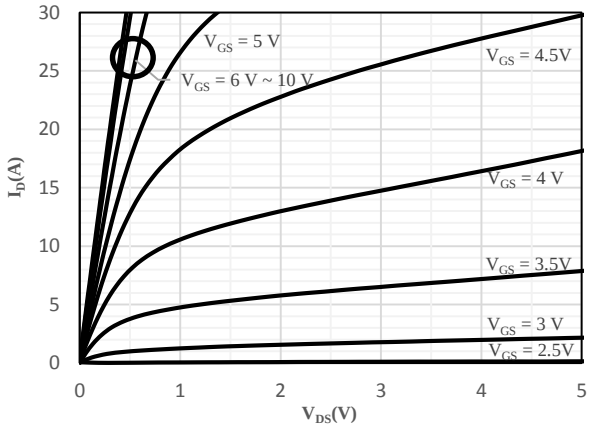


Fig 3 Typical Output Characteristics

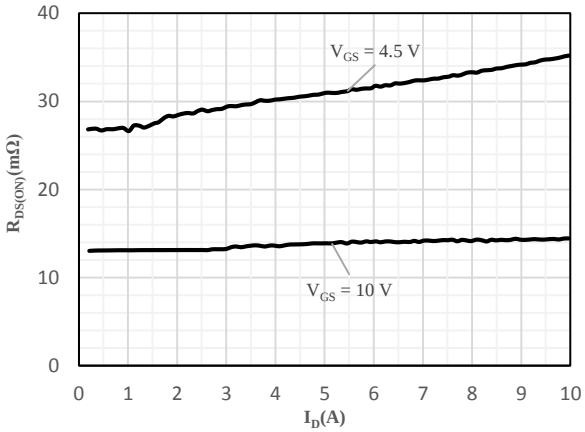


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

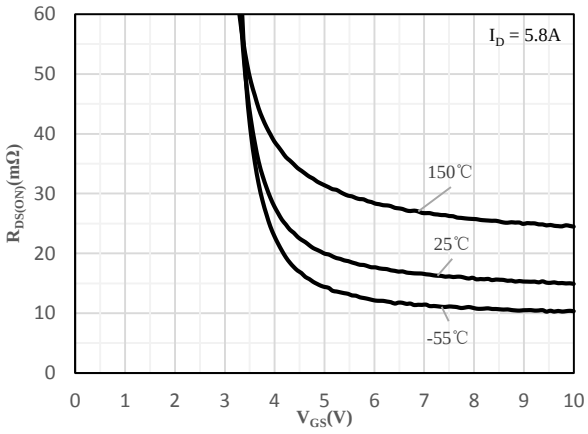


Fig 5 On-Resistance vs. Gate-Source Voltage

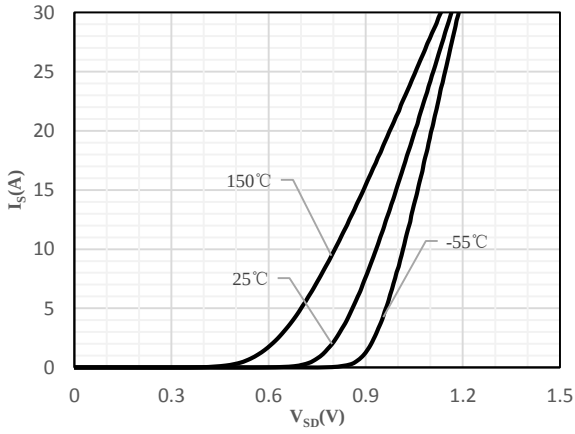


Fig 6 Body-Diode Characteristics

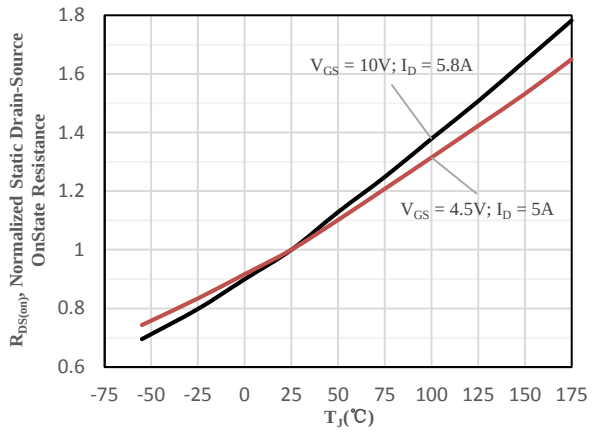


Fig 7 Normalized On-Resistance vs. Junction Temperature

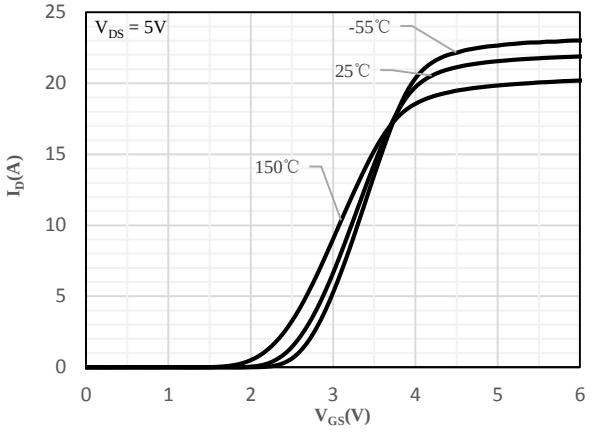


Fig 8 Transfer Characteristics

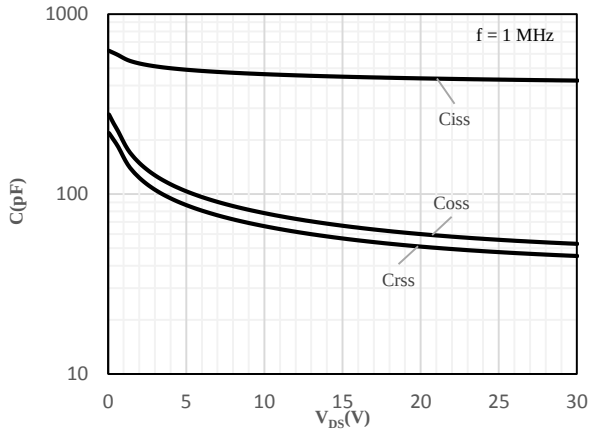


Fig 9 Capacitance Characteristics

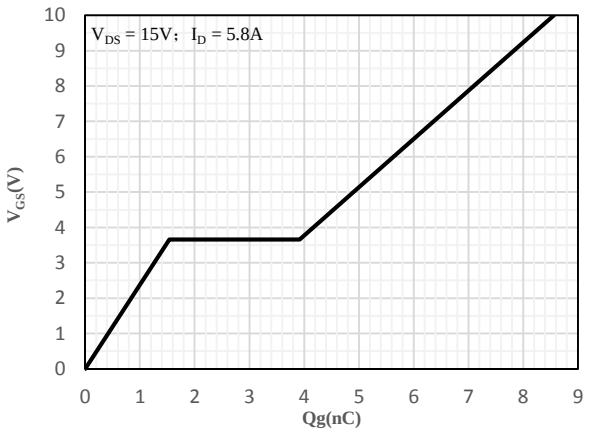


Fig 10 Gate-Charge Characteristics

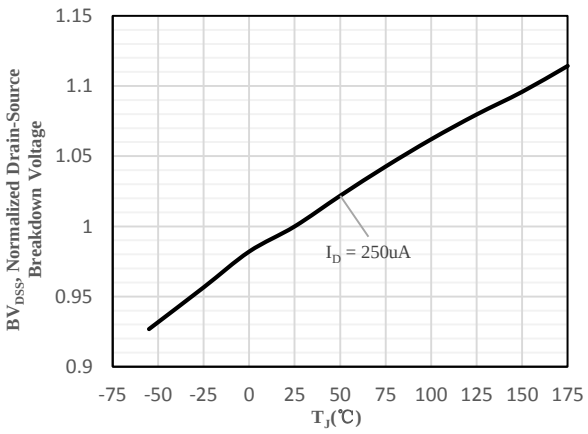


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

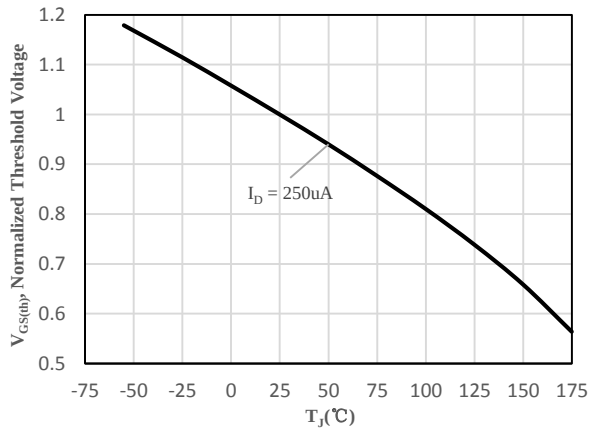


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

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

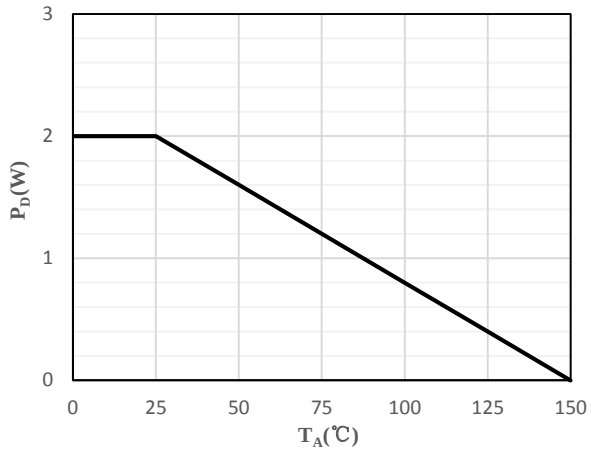


Fig 1 Power Dissipation

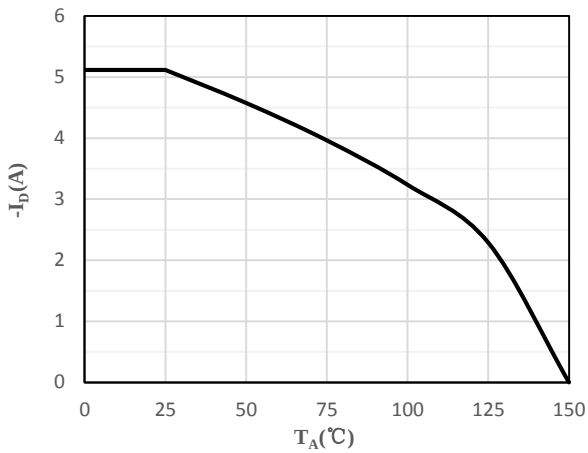


Fig 2 Drain Current

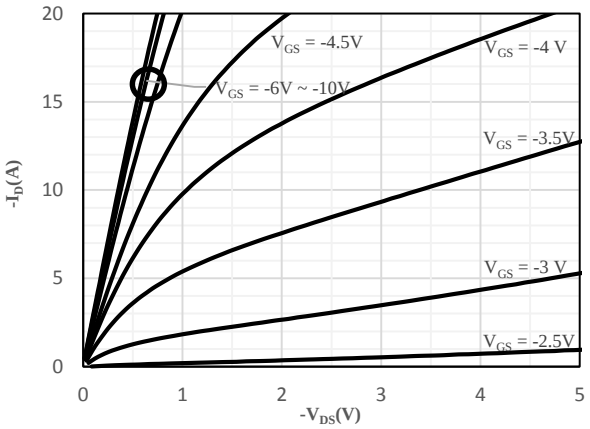


Fig 3 Typical Output Characteristics

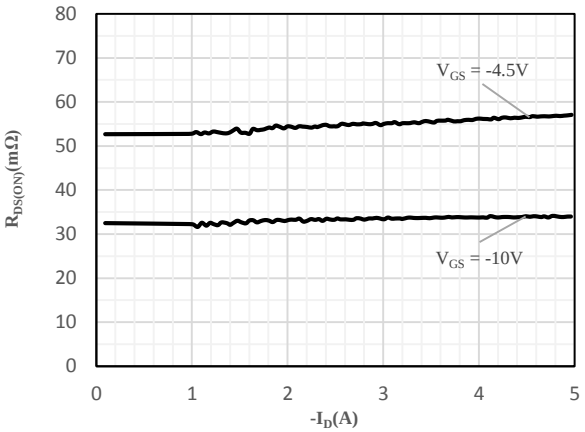


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

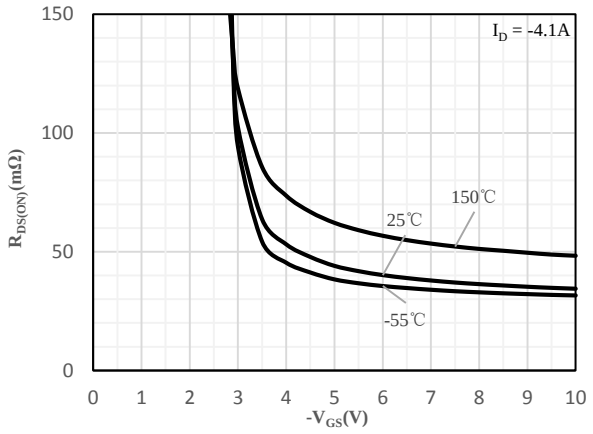


Fig 5 On-Resistance vs. Gate-Source Voltage

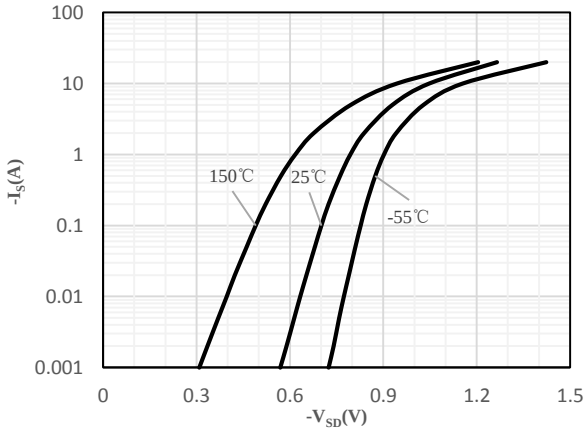


Fig 6 Body-Diode Characteristics

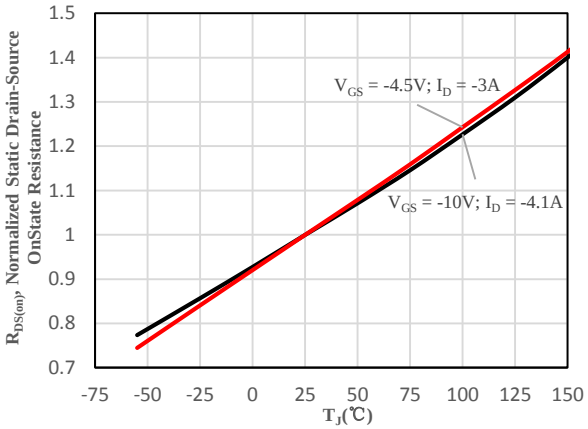


Fig 7 Normalized On-Resistance vs. Junction Temperature

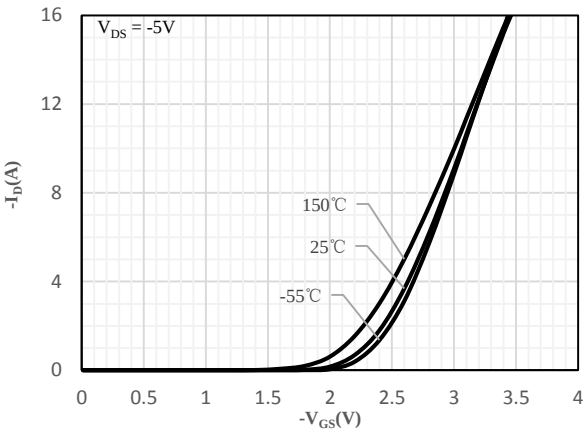


Fig 8 Transfer Characteristics

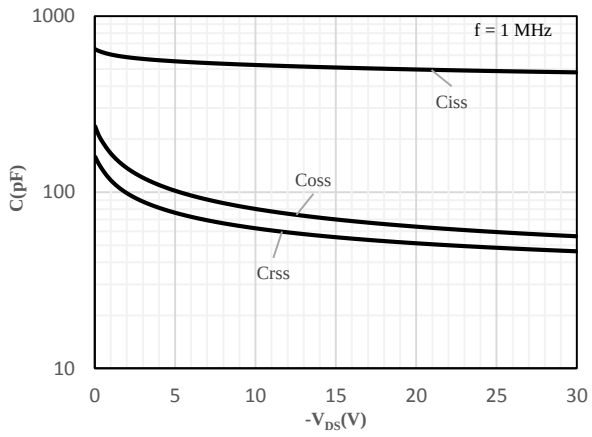


Fig 9 Capacitance Characteristics

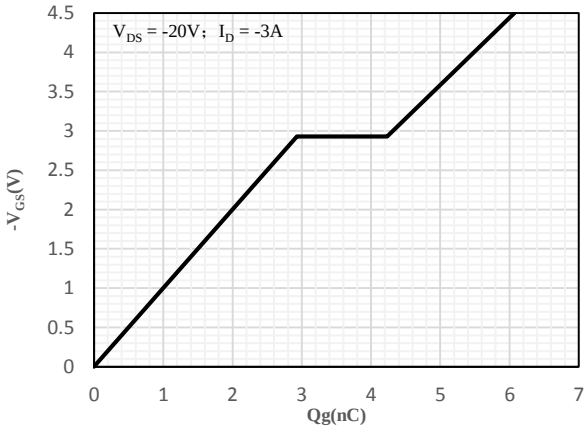


Fig 10 Gate-Charge Characteristics

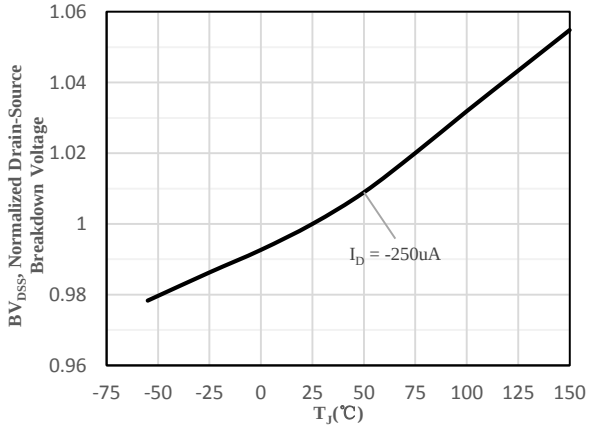


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

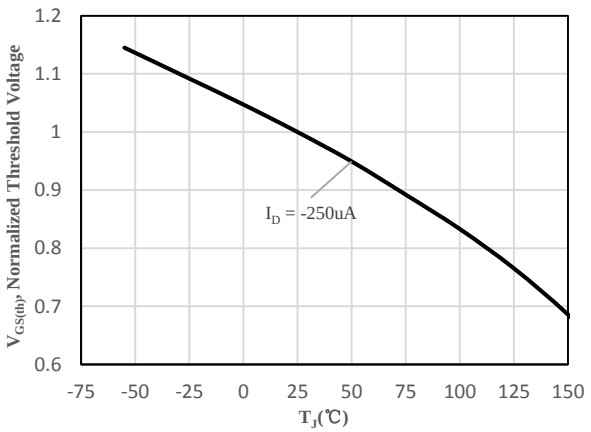
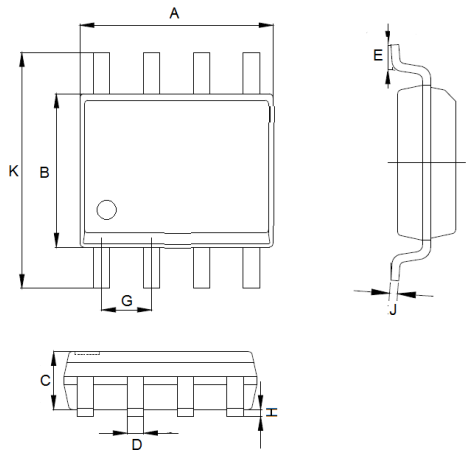


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



SOP-8		
Dimension	**Min.**	**Max.**
A	4.80	5.20
B	3.80	4.20
C	1.30	1.50
D	0.30	0.50
E	0.40	1.00
G	1.17	1.37
H	0.10	0.30
J	0.10	0.30
K	5.80	6.20

Mounting Pad Layout (Unit: mm)

SOP-8