

Features

- Reliable and Rugged
- Green device available
- RoHS compliant with Halogen-free

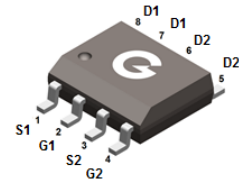
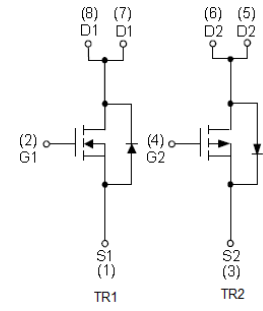
HF

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
GBLH4402-S8	SOP-8	4000 pcs / Tape & Reel	GBLH4402

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

Parameter	Symbol	N Channel	P Channel	Unit
Drain-to-Source Voltage	V _{DSS}	40	-40	V
Gate-to-Source Voltage	V _{GSS}	±20	±20	V
Continuous Drain Current (T _C = 25°C)	I _D	12.5	-9.2	A
Continuous Drain Current (T _A = 25°C) *1		8	-5.2	A
Continuous Drain Current (T _A = 100°C) *1		5	-3.3	A
Pulsed Drain Current (t _p = 10μs, T _A = 25°C)	I _{DM}	50	-40	A
Single Pulse Avalanche Energy *3	E _{AS}	18	20	mJ
Power Dissipation (T _C = 25°C)	P _D	6.3		W
Power Dissipation (T _A = 25°C) *1		2.5		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-Case	R _{θJC}	-	-	20	°C/W
Thermal Resistance Junction-to-Air *1	R _{θJA}	-	-	50	°C/W

Electrical Characteristics-N (@ T_C = 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	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40V, 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 = 4A	-	17	21	mΩ
		V _{GS} = 4.5V, I _D = 3A	-	21	27	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.4	2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	4.5	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 20V f = 1.0MHz	-	732	-	pF
C _{OSS}	Output Capacitance		-	59	-	
C _{RSS}	Reverse Transfer Capacitance		-	46	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time *4	V _{DD} = 20V V _{GS} = 10V I _D = 8A R _G = 3Ω, R _L = 1Ω	-	10	-	ns
t _r	Turn-on Rise Time *4		-	12	-	
t _{d(OFF)}	Turn-Off Delay Time *4		-	32	-	
t _f	Turn-Off Fall Time *4		-	8	-	
Q _G	Total Gate-Charge	V _{DD} = 20V V _{GS} = 10V I _D = 5A	-	16.7	-	nC
Q _{GS}	Gate to Source Charge		-	2.6	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	2.5	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = 8A, V _{GS} = 0V	-	0.8	1.2	V
t _{rr}	Reverse Recovery Time	I _S = 8A, V _{GS} = 0V di/dt = 100A/μs	-	17	-	ns
Q _{rr}	Reverse Recovery Charge		-	6.2	-	nC

Electrical Characteristics-P (@ T_c = 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	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, 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 = -5A	-	46	55	mΩ
		V _{GS} = -4.5V, I _D = -4A	-	56	70	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	-1	-1.5	-2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	7.5	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = -20V f = 1.0MHz	-	882	-	pF
C _{OSS}	Output Capacitance					
C _{RSS}	Reverse Transfer Capacitance					
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time ^{*4}	V _{GS} = -10V V _{DD} = -20V I _D = -5A R _G = 2.5Ω	-	7.2	-	ns
t _r	Turn-on Rise Time ^{*4}					
t _{d(OFF)}	Turn-Off Delay Time ^{*4}					
t _f	Turn-Off Fall Time ^{*4}					
Q _G	Total Gate-Charge	V _{DD} = -20V V _{GS} = -10V I _D = -5A	-	19.3	-	nC
Q _{GS}	Gate to Source Charge					
Q _{GD}	Gate to Drain (Miller) Charge					
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage ^{*2}	I _{SD} = -5A, V _{GS} = 0V	-	-0.9	-1.2	V
t _{rr}	Reverse Recovery Time	I _S = -5A, V _{GS} = 0V di/dt = 100A/μs	-	35	-	ns
Q _{rr}	Reverse Recovery Charge		-	22	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The E_{AS} data shows Max. rating. The test condition is: N channel: V_{DD} = 20V, V_{GS} = 10V, L = 10mH
P channel: V_{DD} = -20V, V_{GS} = -10V, L = 10mH
- Guaranteed by design, not subject to production

Ratings and Characteristics Curves-N (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

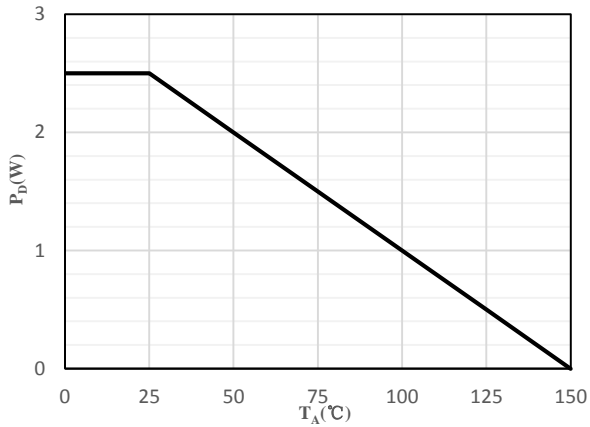


Fig 1 Power Dissipation

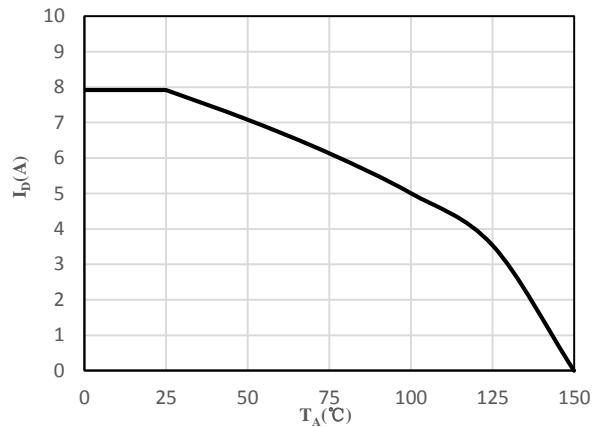


Fig 2 Drain Current

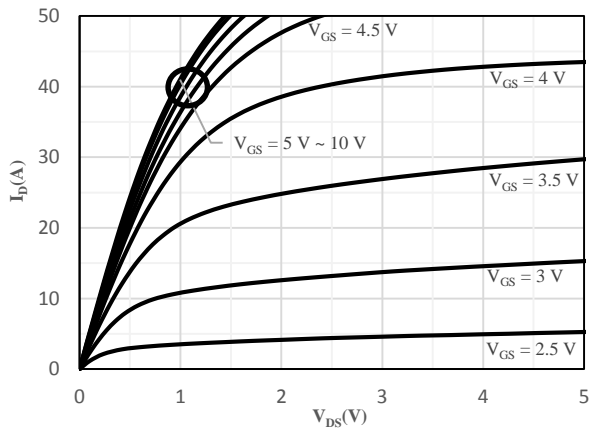


Fig 3 Typical Output Characteristics

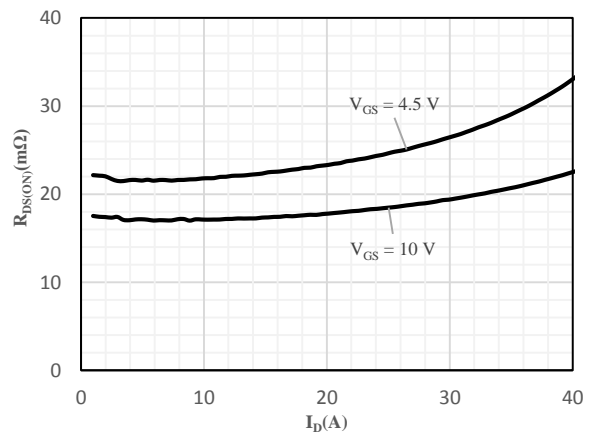


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

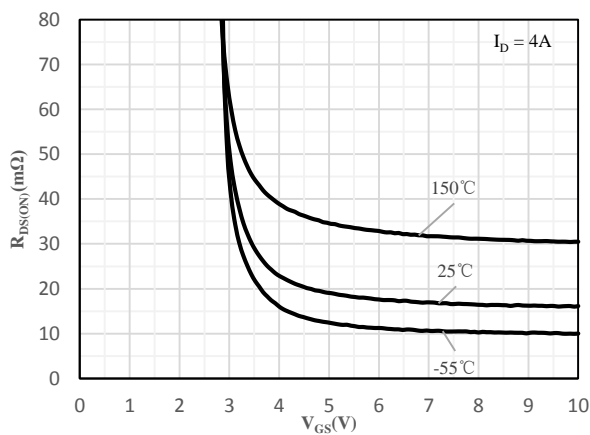


Fig 5 On-Resistance vs. Gate-Source Voltage

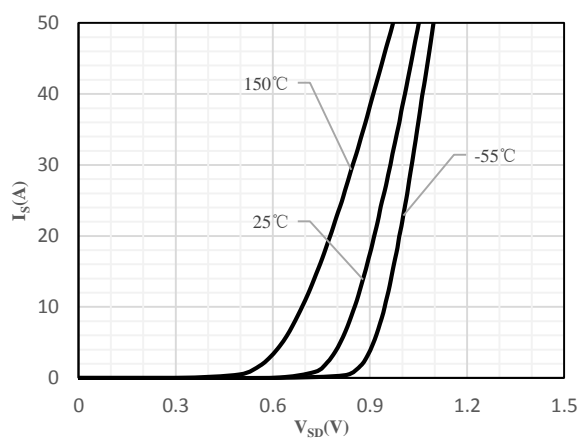


Fig 6 Body-Diode Characteristics

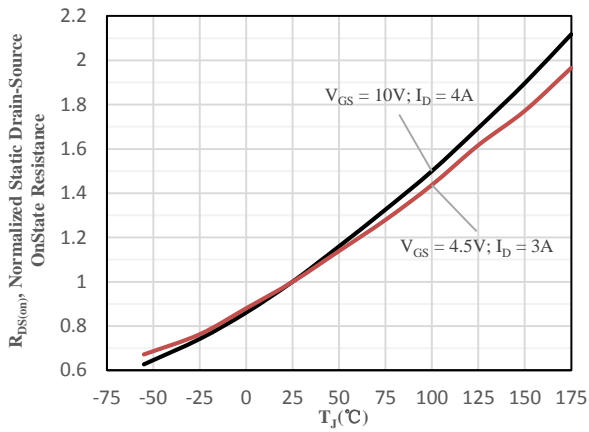


Fig 7 Normalized On-Resistance vs. Junction Temperature

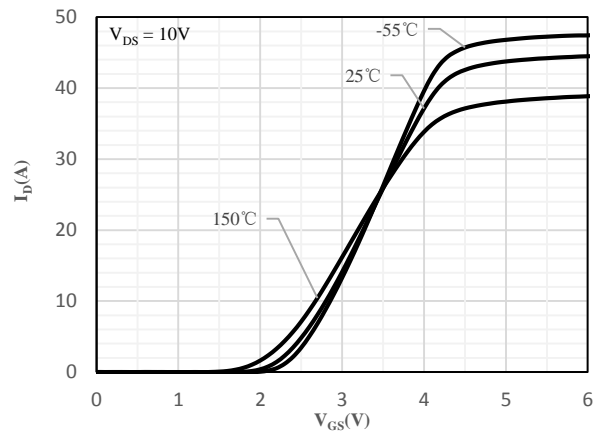


Fig 8 Transfer Characteristics

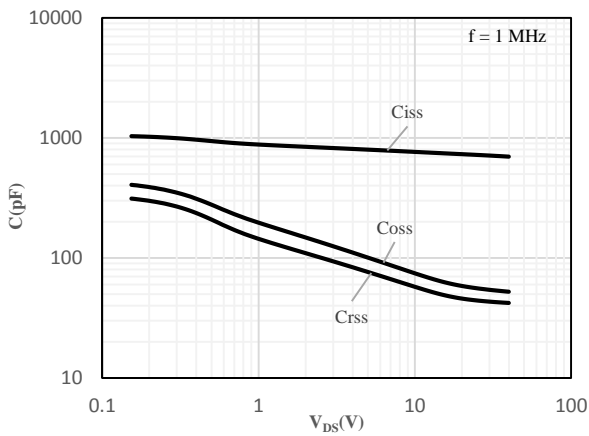


Fig 9 Capacitance Characteristics

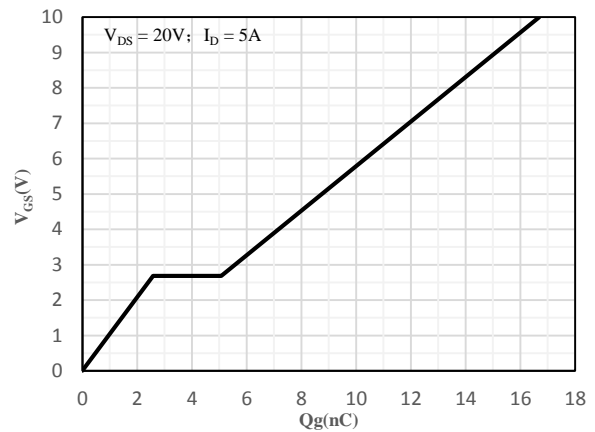


Fig 10 Gate-Charge Characteristics

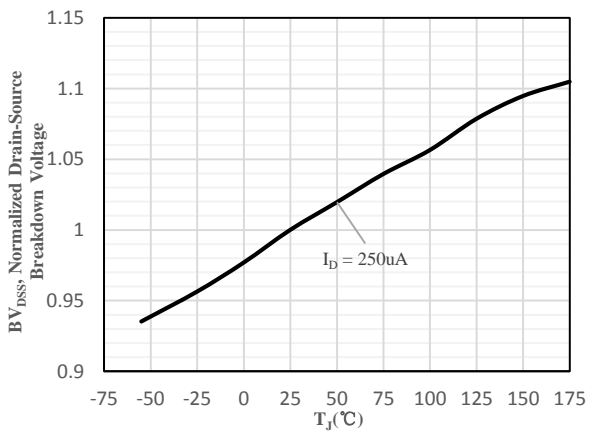


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

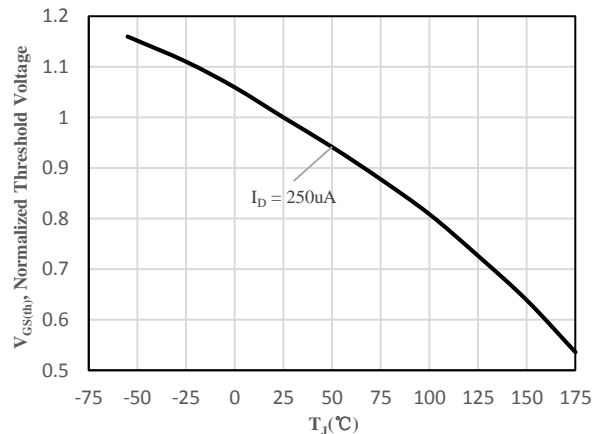


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Ratings and Characteristics Curves-P (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

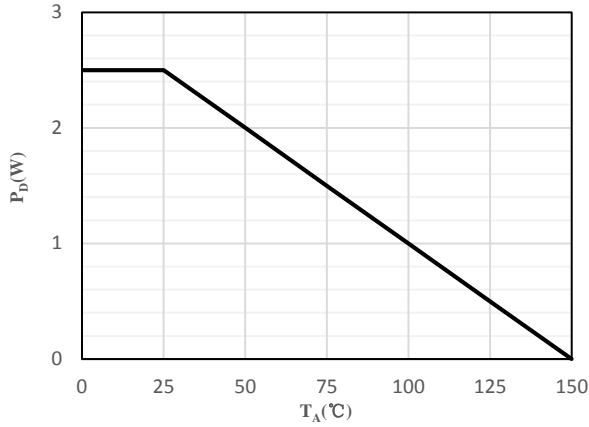


Fig 1 Power Dissipation

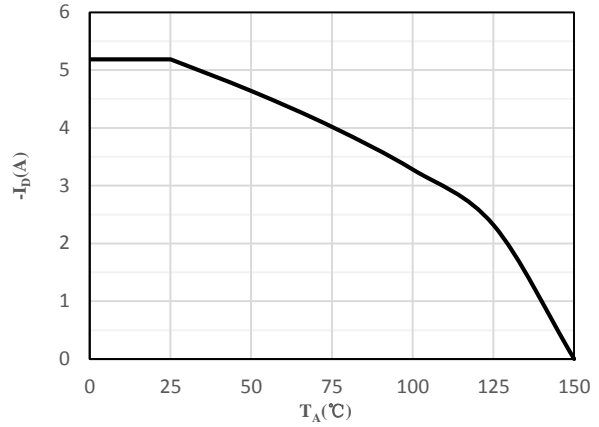


Fig 2 Drain Current

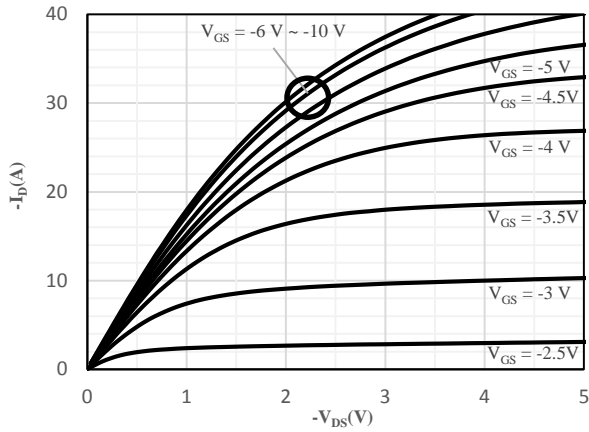


Fig 3 Typical Output Characteristics

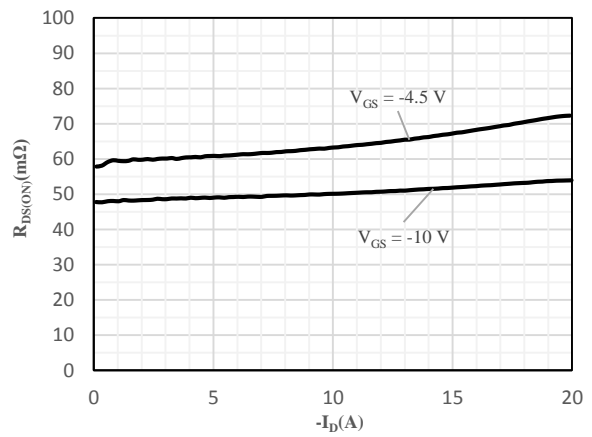


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

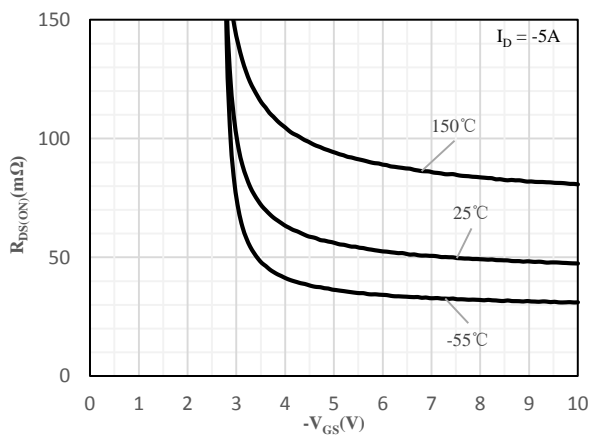


Fig 5 On-Resistance vs. Gate-Source Voltage

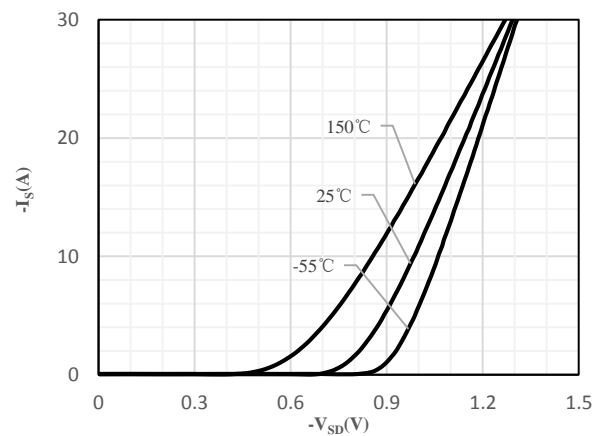


Fig 6 Body-Diode Characteristics

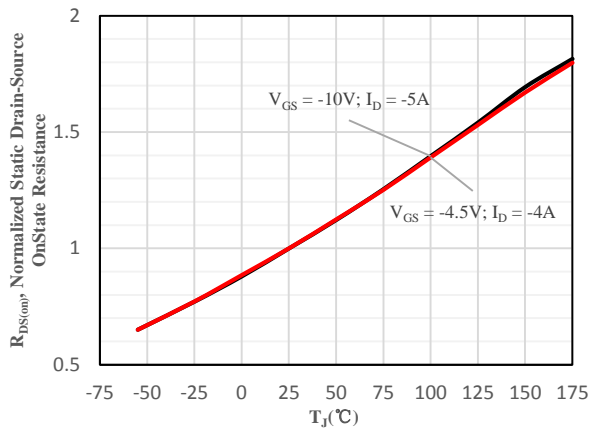


Fig 7 Normalized On-Resistance vs. Junction Temperature

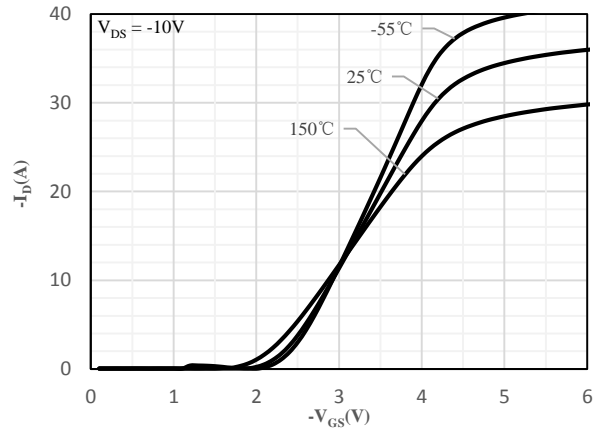


Fig 8 Transfer Characteristics

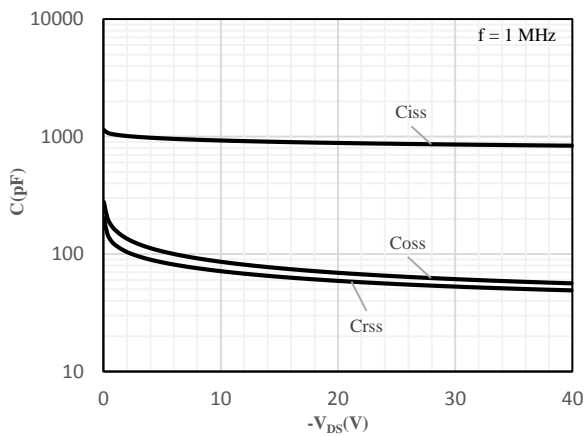


Fig 9 Capacitance Characteristics

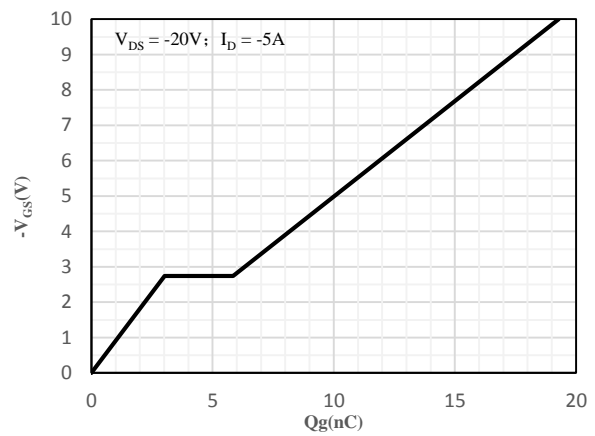


Fig 10 Gate-Charge Characteristics

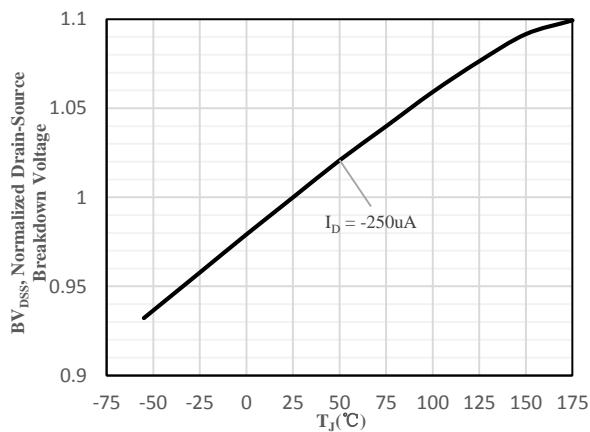


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

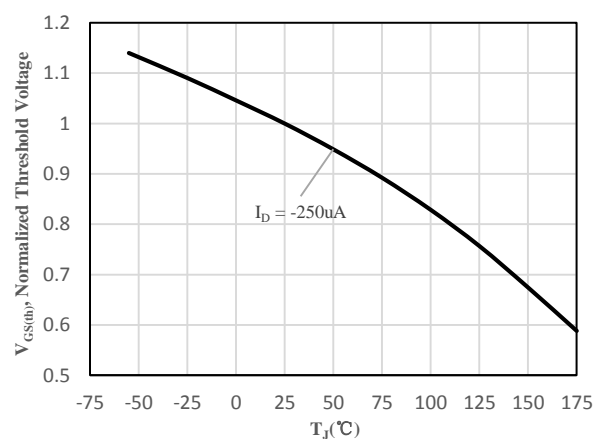
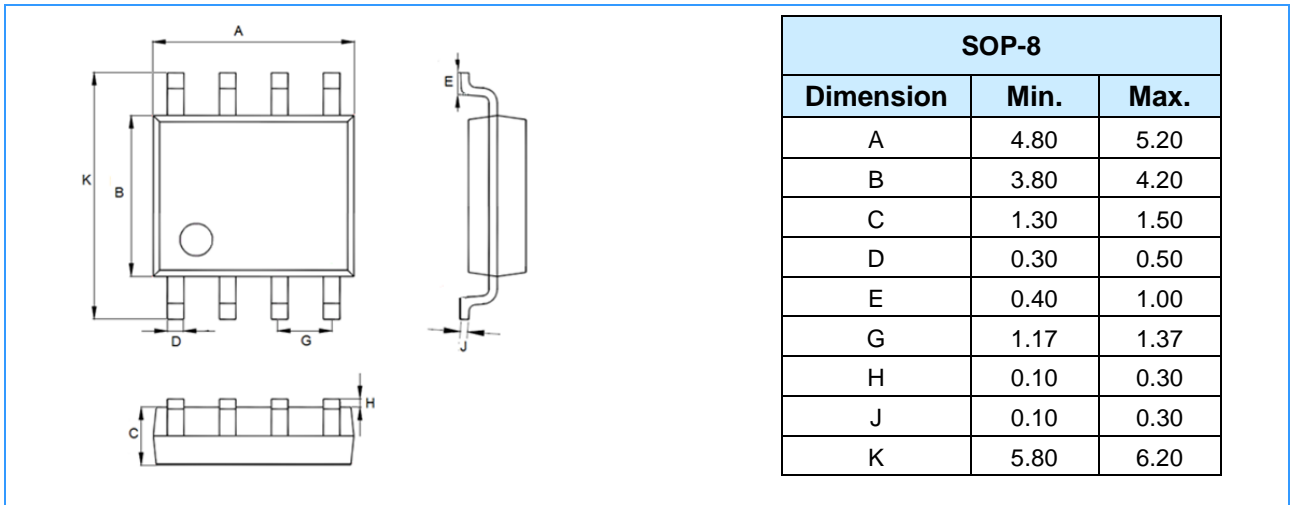


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



Mounting Pad Layout (Unit: mm)

