

Features

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

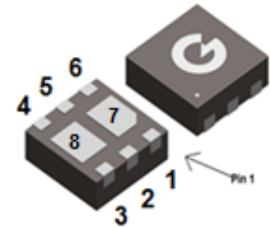
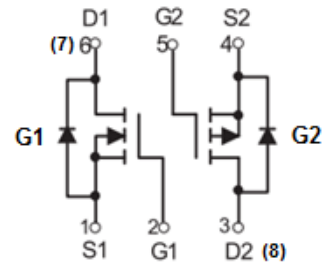
Applications

- Synchronous Rectification
- Motor Control
- Portable equipment application

Mechanical Data

- Case: DFN2020-6LC
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208

HF



DFN2020-6LC

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
GBLH3301DF2	DFN2020-6LC	3000 pcs / Tape & Reel	H3301

Maximum Ratings (@ $T_A = 25^\circ\text{C}$ 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 ($T_C = 25^\circ\text{C}$)	I_D	9.2	-7.3	A
Continuous Drain Current ($T_A = 25^\circ\text{C}$) ^{*1}		5.5	-4.4	
Continuous Drain Current ($T_A = 100^\circ\text{C}$) ^{*1}		3.5	-2.8	
Pulsed Drain Current ($t_p = 10\mu\text{s}$, $T_C = 25^\circ\text{C}$)	I_{DM}	25	-20	A
Single Pulse Avalanche Energy ^{*3}	E_{AS}	10	10	mJ
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	4.2		W
Power Dissipation ($T_A = 25^\circ\text{C}$) ^{*1}		1.5		W
Operating Junction Temperature Range	T_J	-55 ~ +150		$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +150		$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	-	-	30	$^\circ\text{C/W}$
Thermal Resistance Junction-to-Air ^{*1}	$R_{\theta JA}$	-	-	83	$^\circ\text{C/W}$

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} = 0V	-	0.76	1.1	V
t _{rr}	Reverse Recovery Time	I _F = 5A, V _{GS} = 0V	-	88	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100A/μs	-	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	-	6	-	nC
Q _{GS}	Gate to Source Charge	V _{GS} = -4.5V	-	2.9	-	
Q _{GD}	Gate to Drain (Miller) Charge	I _D = -3A	-	1.3	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = -1A, V _{GS} = 0V	-	-0.78	-1.0	V
t _{rr}	Reverse Recovery Time	I _{SD} = -3A, V _{GS} = 0V di/dt = 100A/μs	-	150	-	ns
Q _{rr}	Reverse Recovery Charge		-	160	-	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: V_{DD} = 20V, V_{GS} = 10V, L = 0.5mH
P: V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH
- Guaranteed by design, not subject to production

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

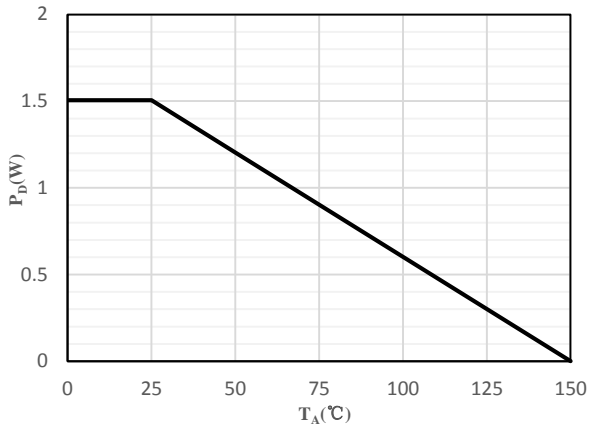


Fig 1 Power Dissipation

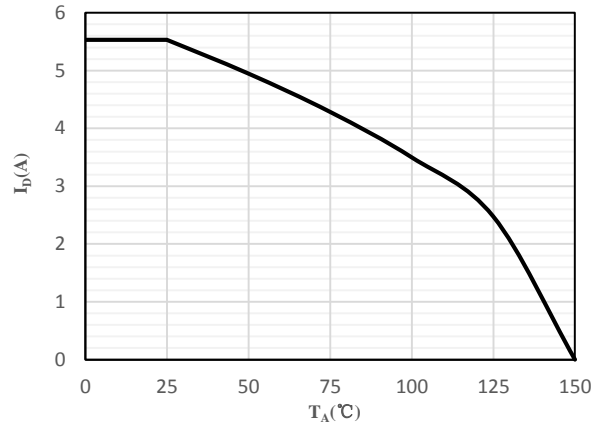


Fig 2 Drain Current

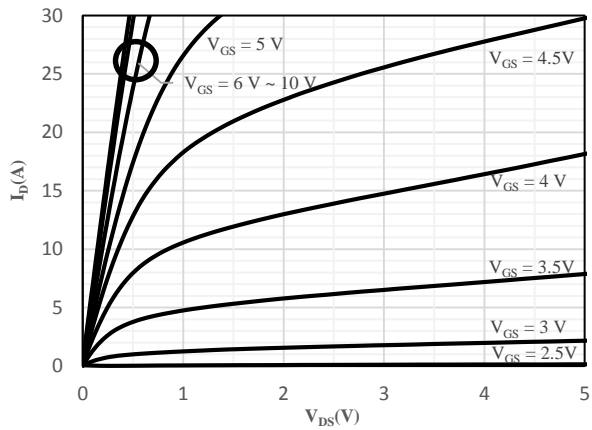


Fig 3 Typical Output Characteristics

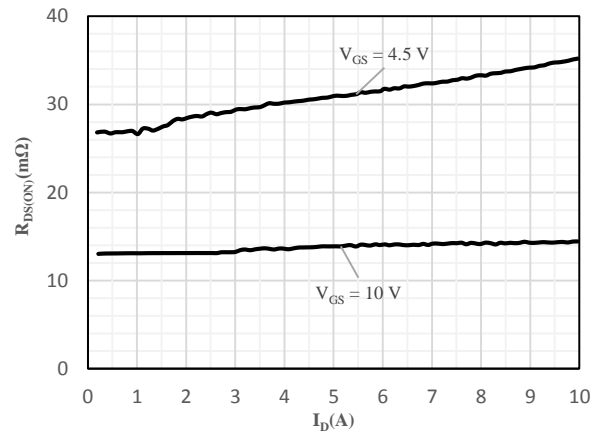


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

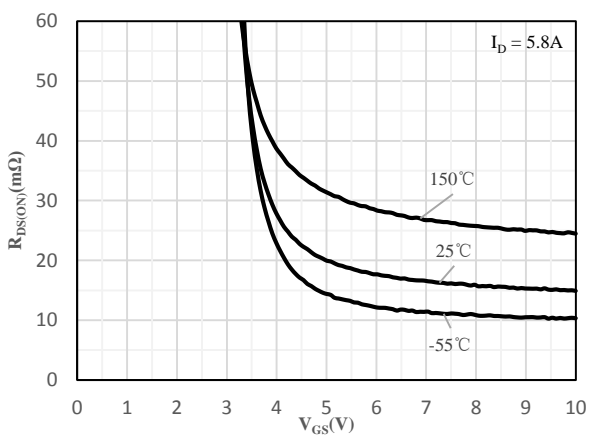


Fig 5 On-Resistance vs. Gate-Source Voltage

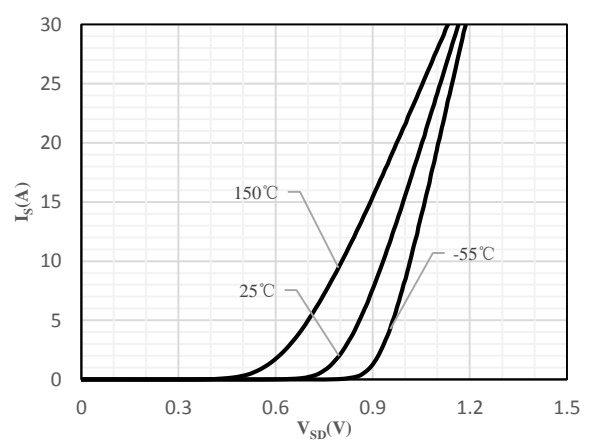


Fig 6 Body-Diode Characteristics

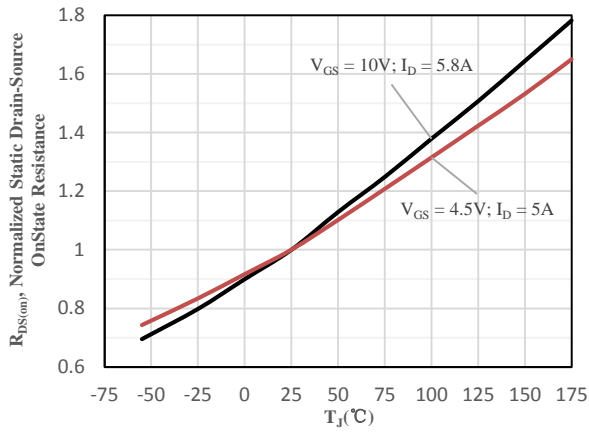


Fig 7 Normalized On-Resistance vs. Junction Temperature

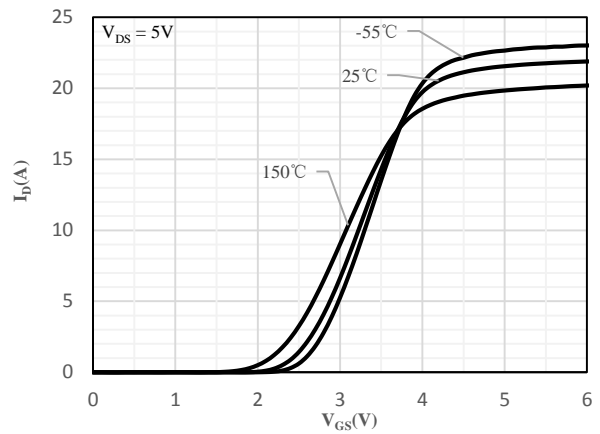


Fig 8 Transfer Characteristics

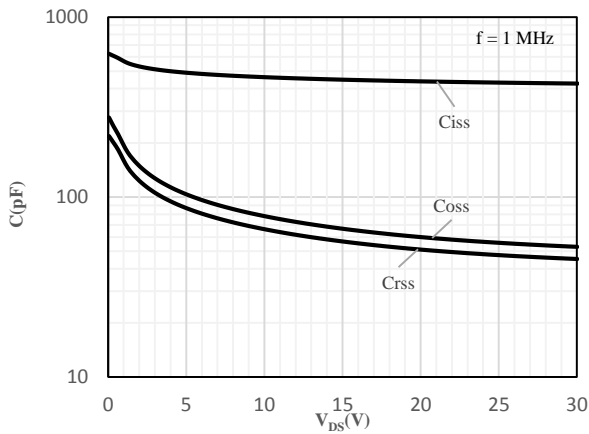


Fig 9 Capacitance Characteristics

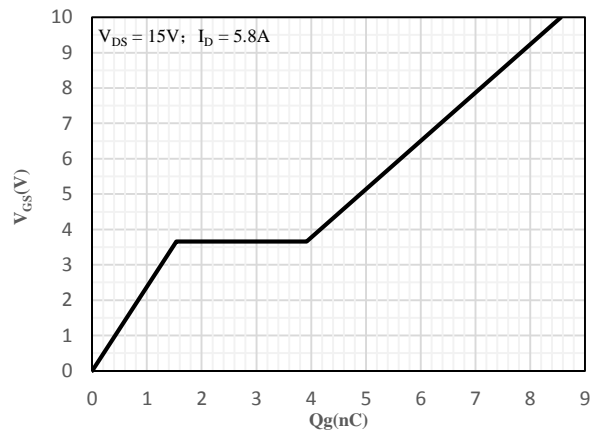


Fig 10 Gate-Charge Characteristics

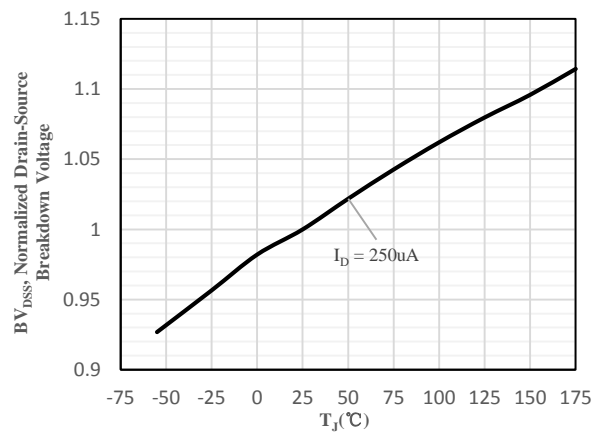


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

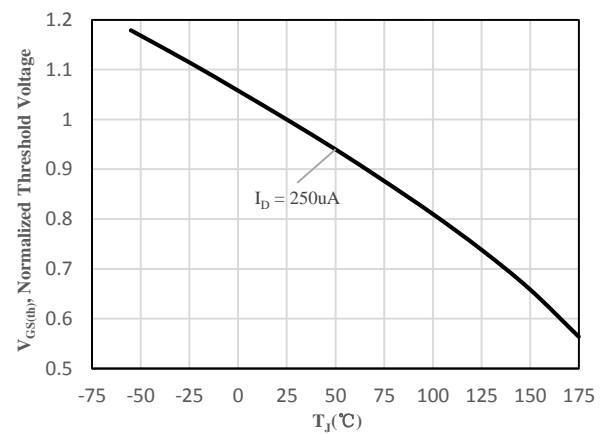


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

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

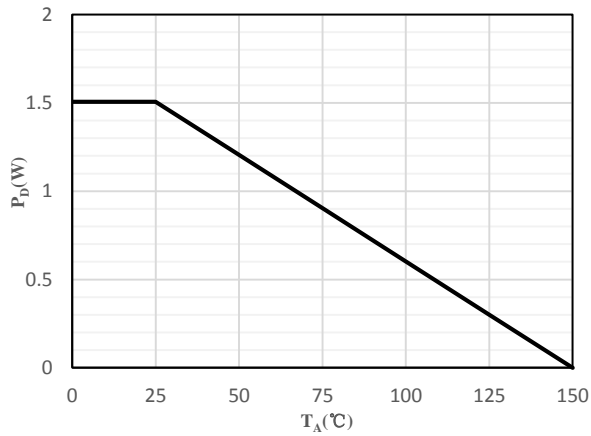


Fig 1 Power Dissipation

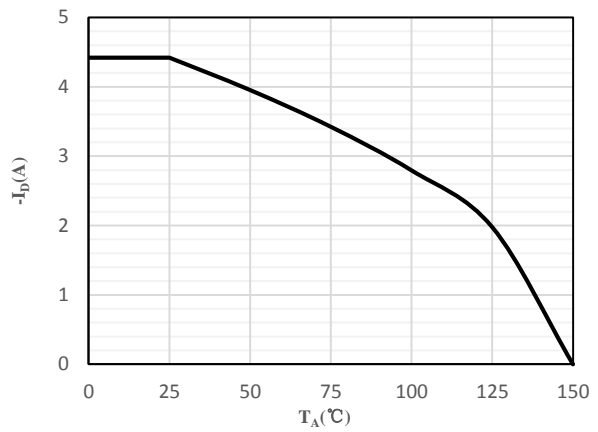


Fig 2 Drain Current

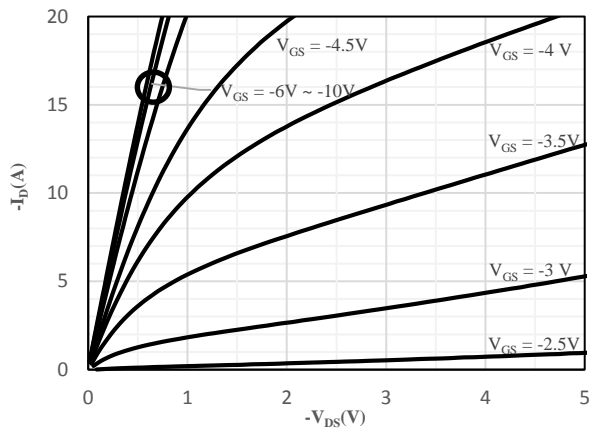


Fig 3 Typical Output Characteristics

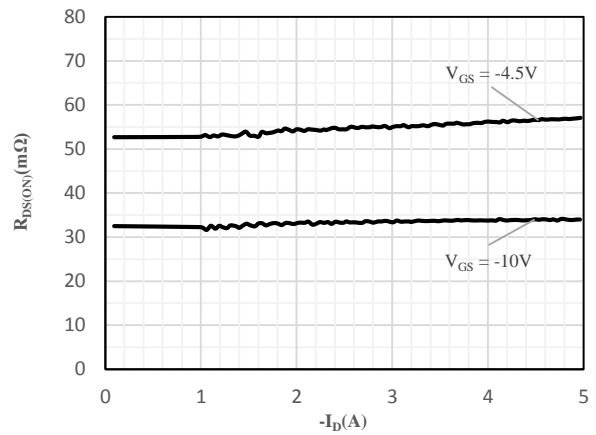


Fig 4 On-Resistance vs. Drain Current and Gate Voltage

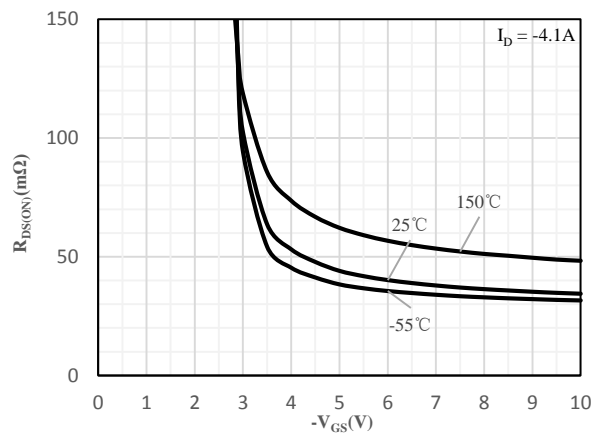


Fig 5 On-Resistance vs. Gate-Source Voltage

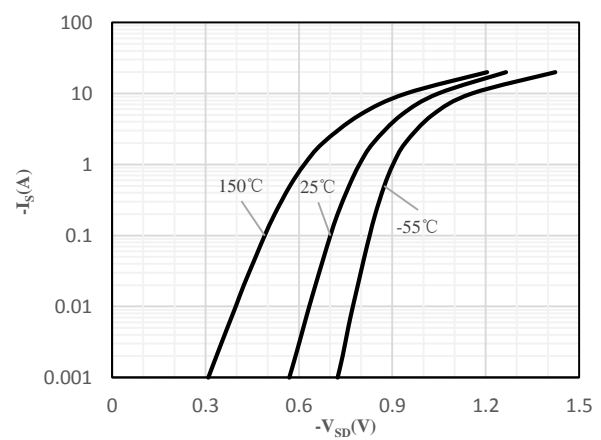


Fig 6 Body-Diode Characteristics

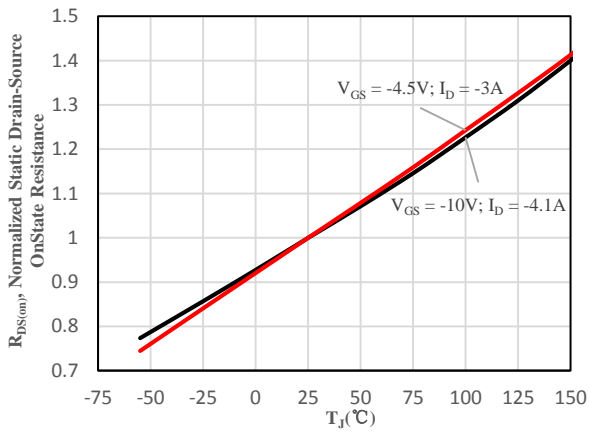


Fig 7 Normalized On-Resistance vs. Junction Temperature

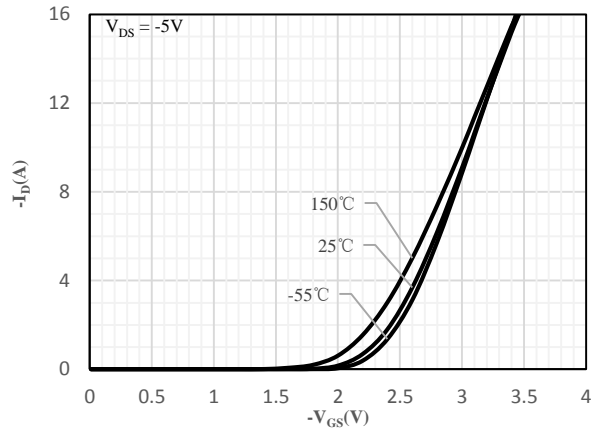


Fig 8 Transfer Characteristics

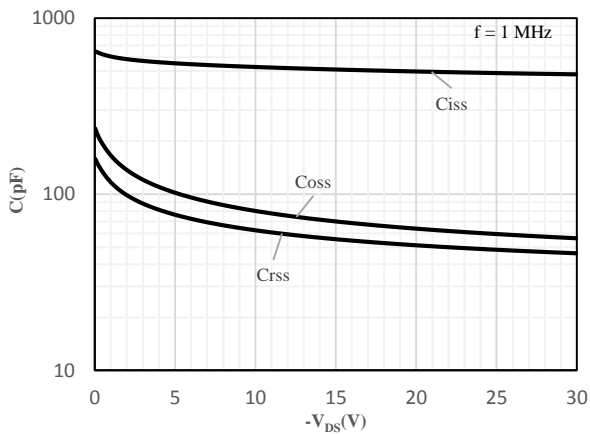


Fig 9 Capacitance Characteristics

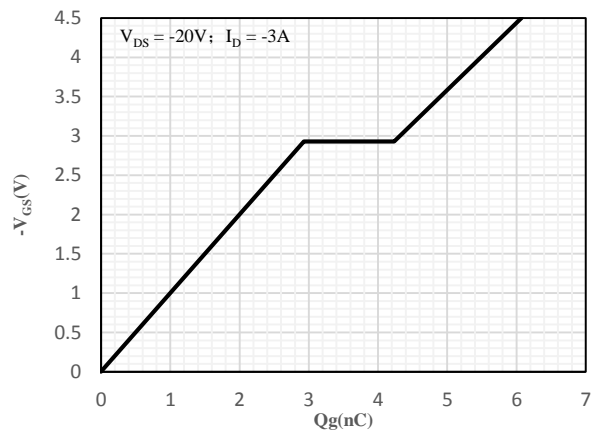


Fig 10 Gate-Charge Characteristics

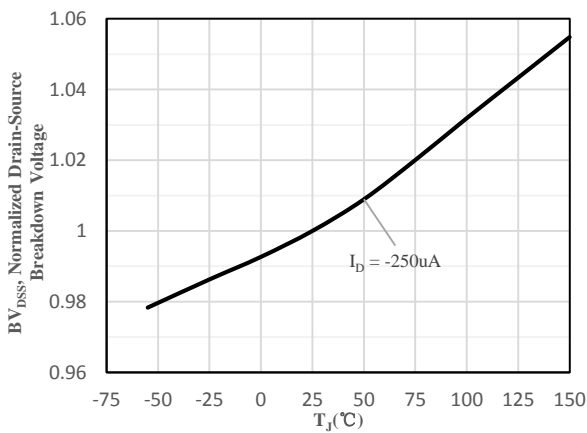


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

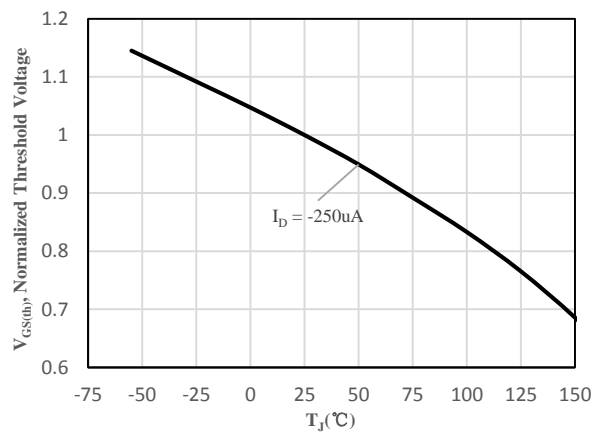
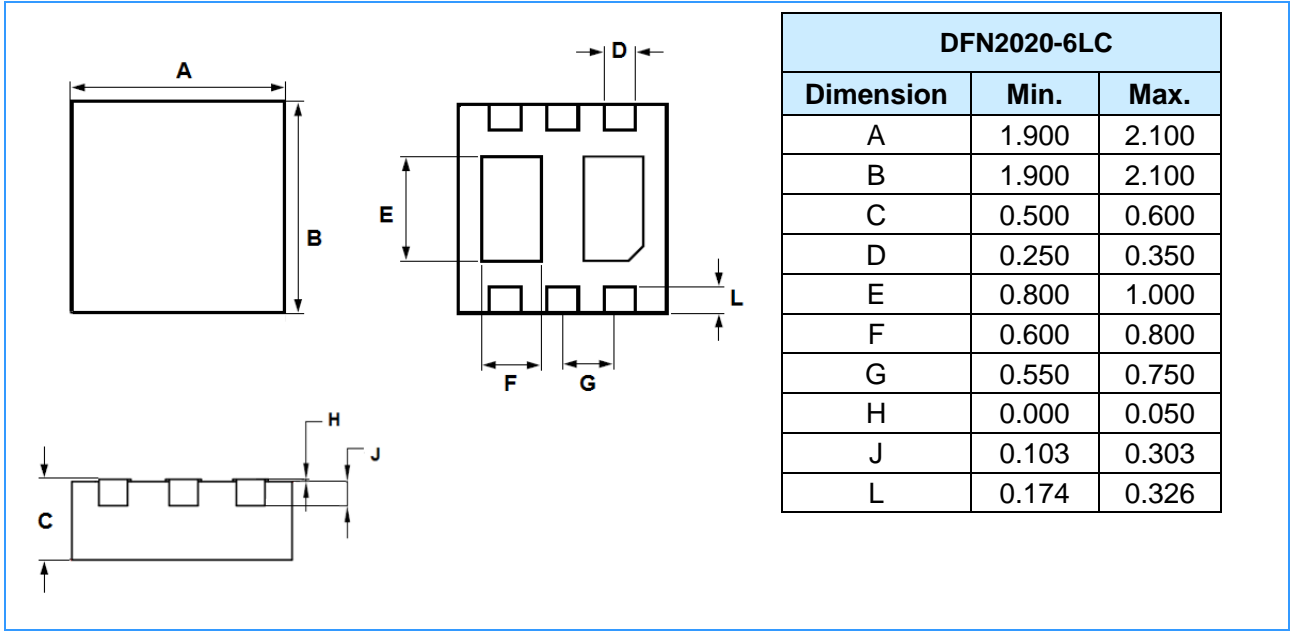


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

Package Outline Dimensions (Unit: mm)



Mounting Pad Layout (Unit: mm)

