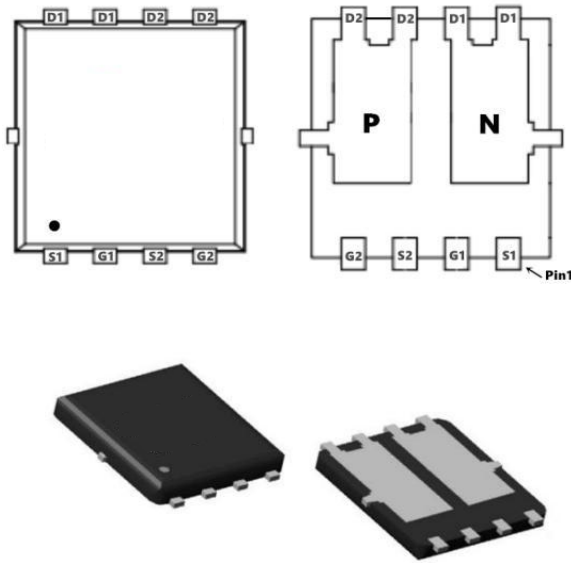


Description

The SX15G04NF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

$V_{DS} = 40V$ $I_D = 21A$

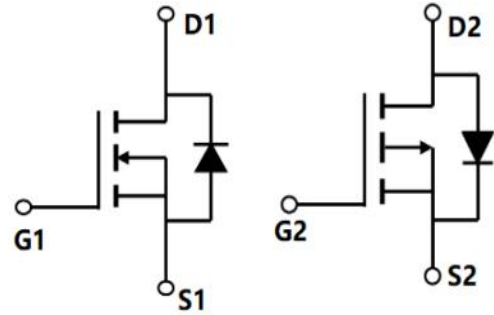
$R_{DS(ON)} < 17m\Omega$ @ $V_{GS}=10V$

$V_{DS} = -40V$ $I_D = -18A$

$R_{DS(ON)} < 45m\Omega$ @ $V_{GS}=-10V$

Application

Wireless charging
Boost driver
Brushless motor



Absolute Maximum Ratings ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Ch	P-Ch	Units
V_{DS}	Drain-Source Voltage	40	-40	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_C=25^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	21	-18	A
$I_D @ T_C=100^\circ C$	Continuous Drain Current, V_{GS} @ 10V ¹	17.5	-14	A
I_{DM}	Pulsed Drain Current ²	38	-32	A
EAS	Single Pulse Avalanche Energy ³	66	66	mJ
I_{AS}	Avalanche Current	28.8	-23.2	A
$P_D @ T_C=25^\circ C$	Total Power Dissipation ⁴	25	31.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	5		$^\circ C/W$

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	40	46	---	V
ΔBV _{DSS} /ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.032	---	V/°C
R _{DS(on)}	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =15A	---	13.5	17	mΩ
		V _{GS} =4.5V , I _D =10A	---	18.4	24	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4.8	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =32V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =32V , V _{GS} =0V , T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V , I _D =15A	---	34	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	2.1	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =32V , V _{GS} =4.5V , I _D =15A	---	10	---	nC
Q _{gs}	Gate-Source Charge		---	2.55	---	
Q _{gd}	Gate-Drain Charge		---	4.8	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =20V , V _{GS} =10V , R _G =3.3Ω I _D =15A	---	2.8	---	ns
T _r	Rise Time		---	12.8	---	
T _{d(off)}	Turn-Off Delay Time		---	21.2	---	
T _f	Fall Time		---	6.4	---	
C _{iss}	Input Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz	---	1013	---	pF
C _{oss}	Output Capacitance		---	107	---	
C _{rss}	Reverse Transfer Capacitance		---	76	---	
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	40	A
I _{SM}	Pulsed Source Current ^{2,5}		---	---	85	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1.2	V
t _{rr}	Reverse Recovery Time	I _F =15A , dI/dt=100A/μs , T _J =25°C	---	10	---	nS
Q _{rr}	Reverse Recovery Charge		---	3.1	---	nC

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=10A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

Electrical Characteristics (T_c=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	-40	-46	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA	---	-0.012	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-10V , I _D =-5A	---	35	45	mΩ
		V _{GS} =-4.5V , I _D =-4A	---	48	60	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-1.2	-1.6	-2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	4.32	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-32V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =-32V , V _{GS} =0V , T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =-5V , I _D =-8A	---	12.6	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	13	16	Ω
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-20V , V _{GS} =-4.5V , I _D =-12A	---	9	---	nC
Q _{gs}	Gate-Source Charge		---	2.54	---	
Q _{gd}	Gate-Drain Charge		---	3.1	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-15V, V _{GS} =-10V , R _G =3.3Ω, I _D =-1A	---	19.2	---	ns
T _r	Rise Time		---	12.8	---	
T _{d(off)}	Turn-Off Delay Time		---	48.6	---	
T _f	Fall Time		---	4.6	---	
C _{iss}	Input Capacitance	V _{DS} =-15V , V _{GS} =0V , f=1MHz	---	1004	---	pF
C _{oss}	Output Capacitance		---	108	---	
C _{rss}	Reverse Transfer Capacitance		---	80	---	
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current			-20	A
I _{SM}	Pulsed Source Current ^{2,5}				-40	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V , I _S =-1A , T _J =25°C			-1	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is V_{DD}=-25V, V_{GS}=-10V, L=0.1mH, I_{AS}=-10A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

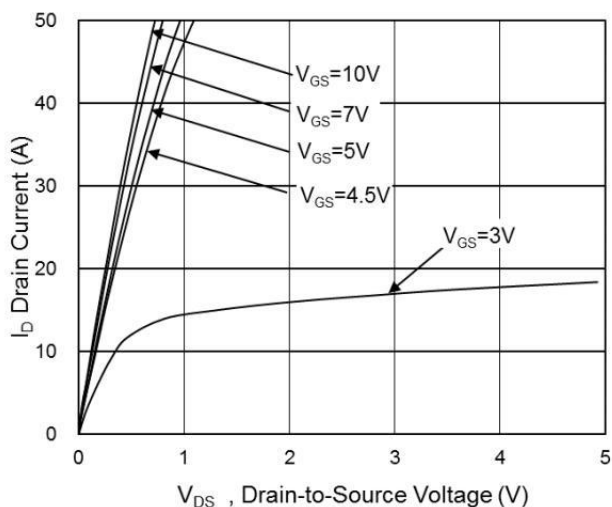


Fig.1 Typical Output Characteristics

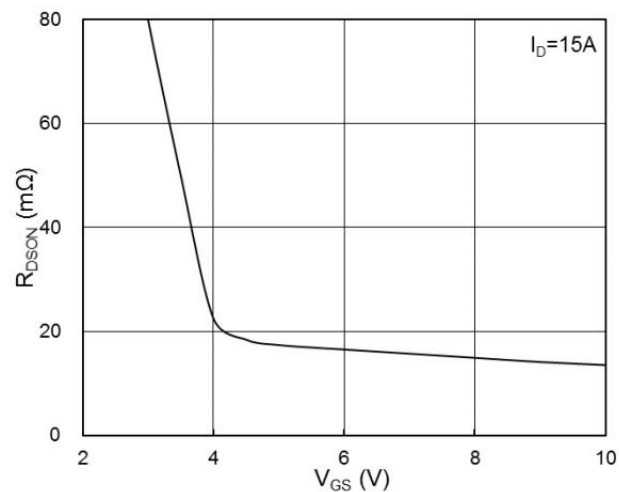


Fig.2 On-Resistance vs. G-S Voltage

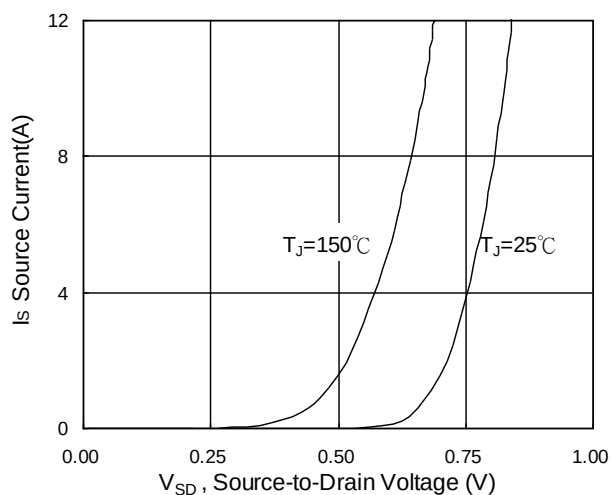


Fig.3 Forward Characteristics of Reverse

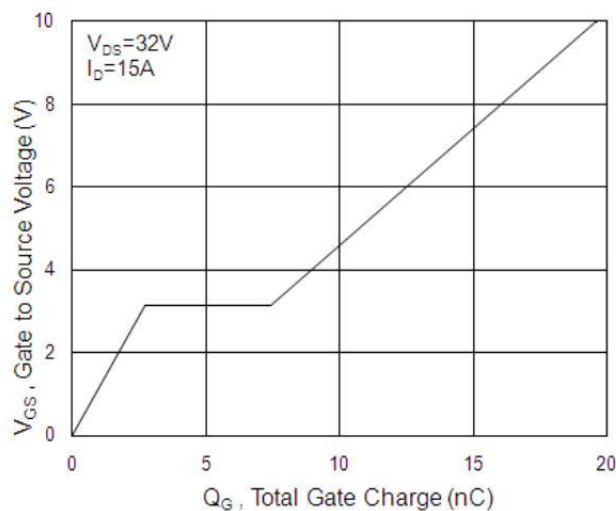
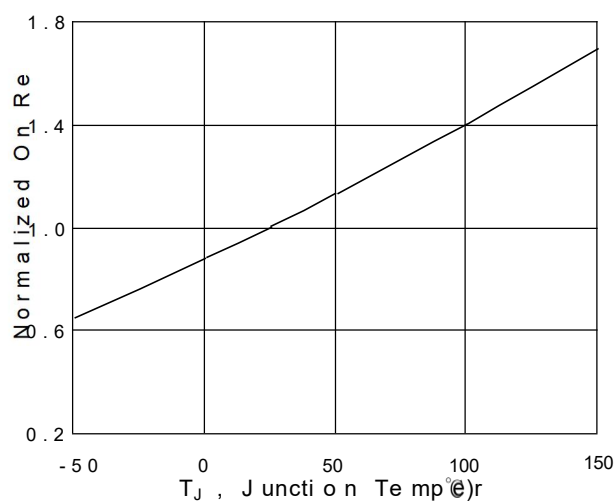
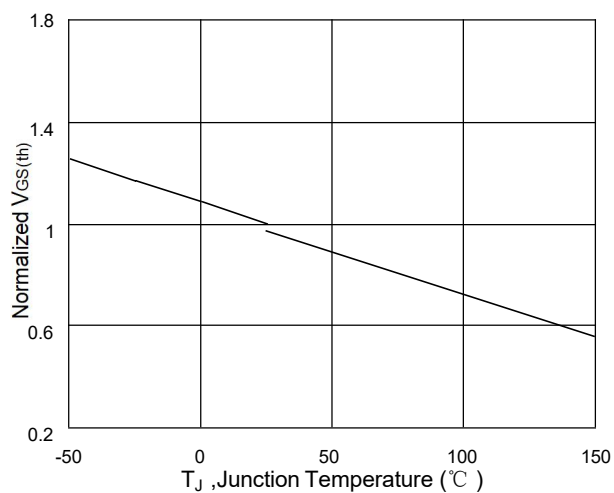
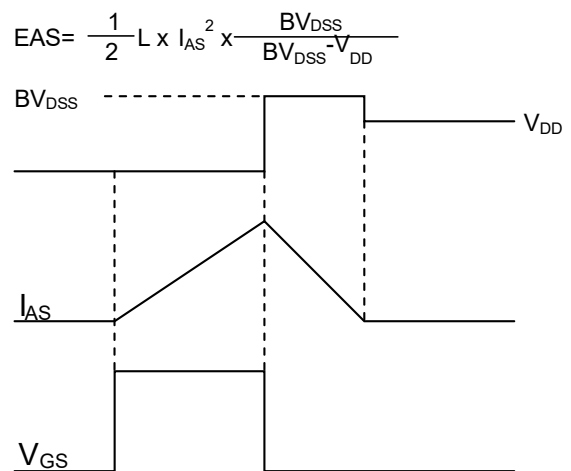
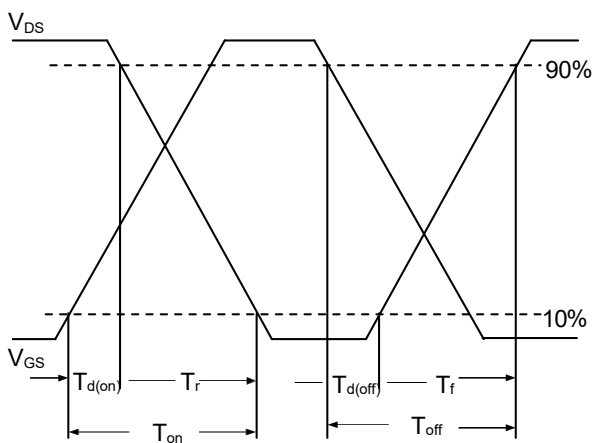
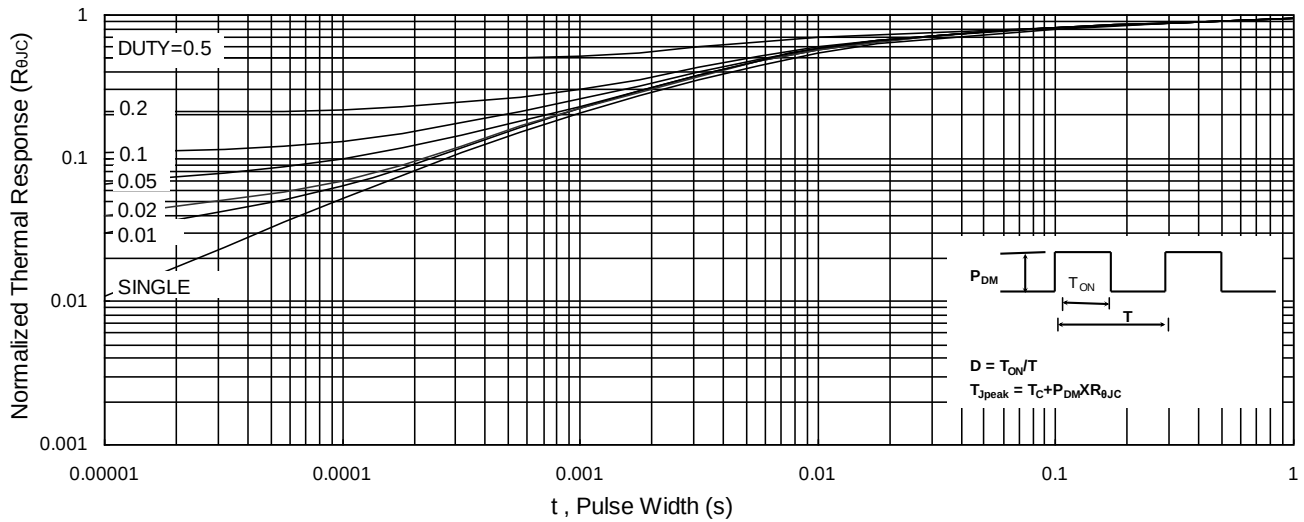
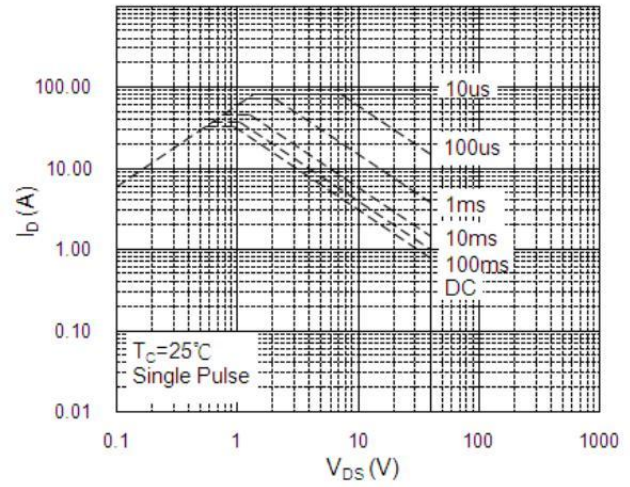
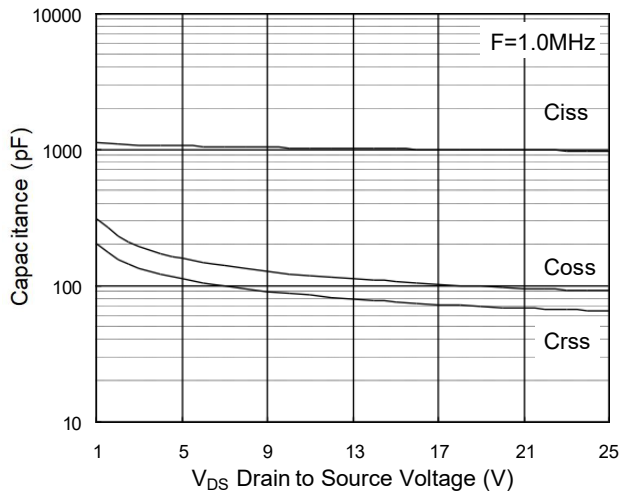


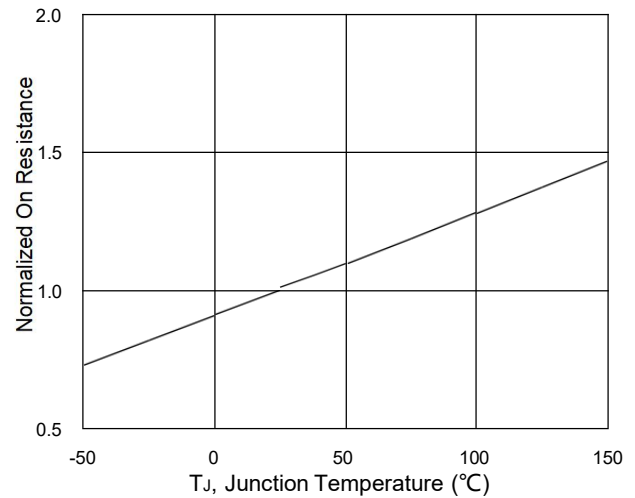
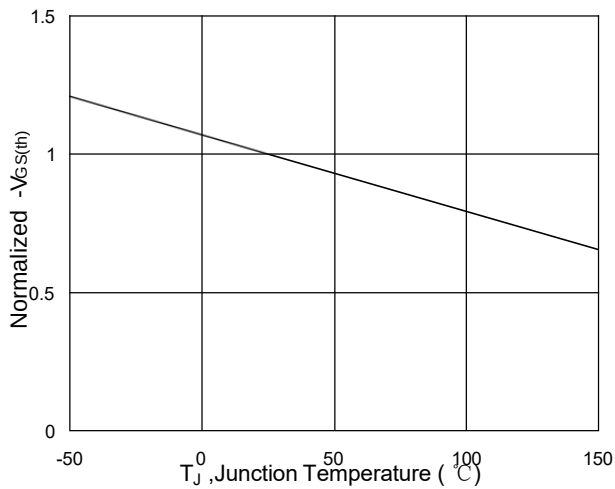
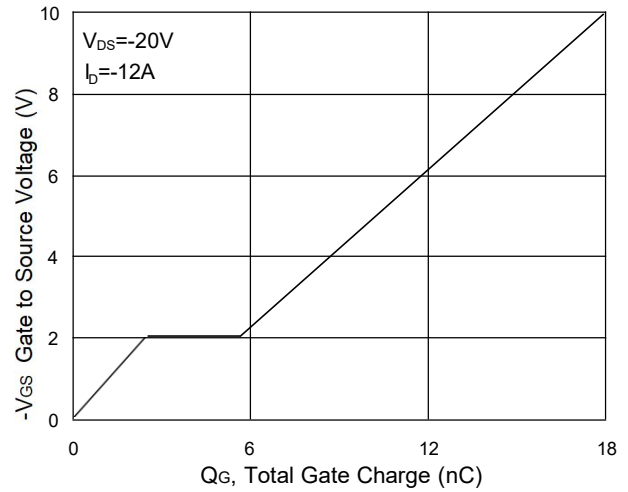
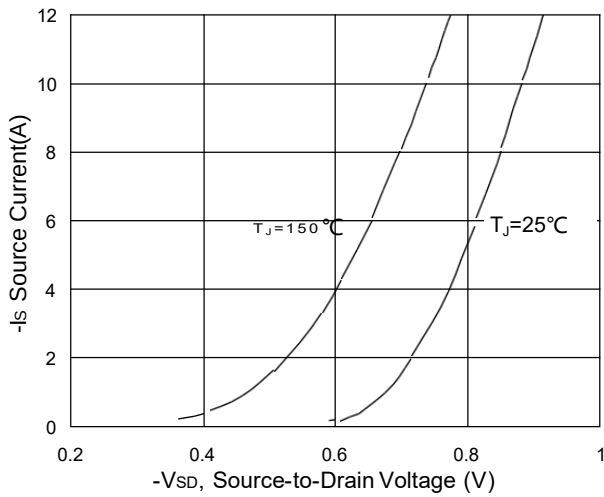
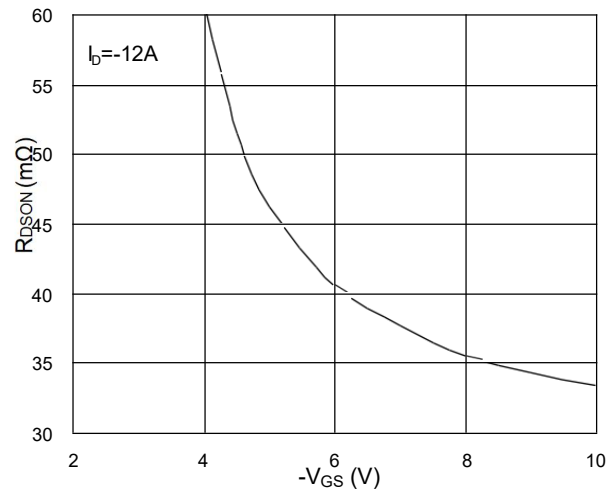
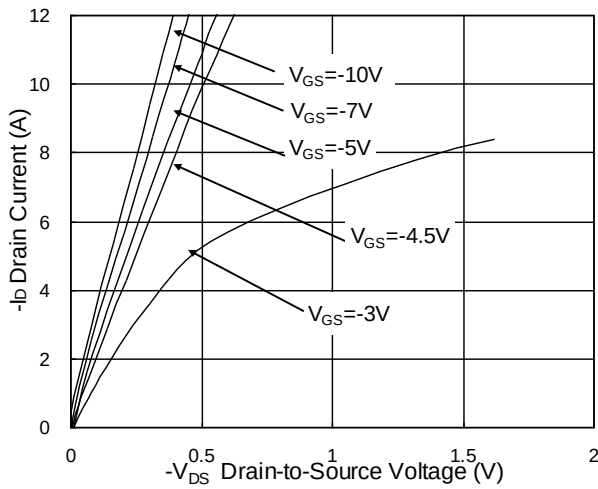
Fig.4 Gate-Charge Characteristics



N-Typical Characteristics



P-Typical Characteristics



P-Typical Characteristics

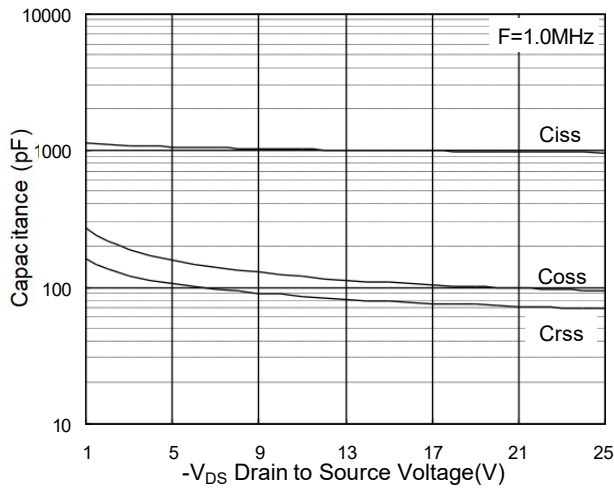


Fig.7 Capacitance

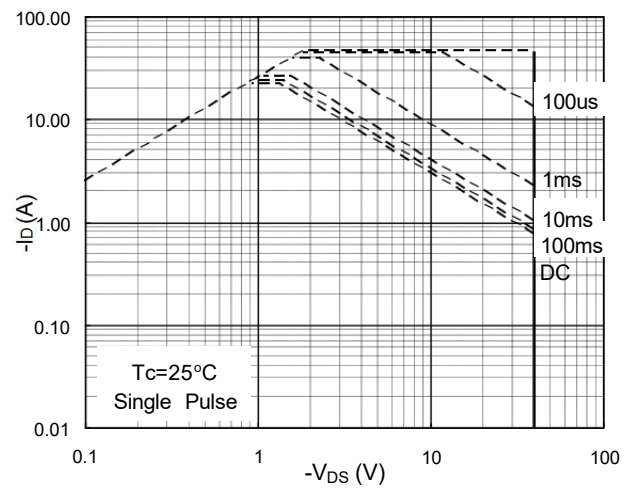


Fig.8 Safe Operating Area

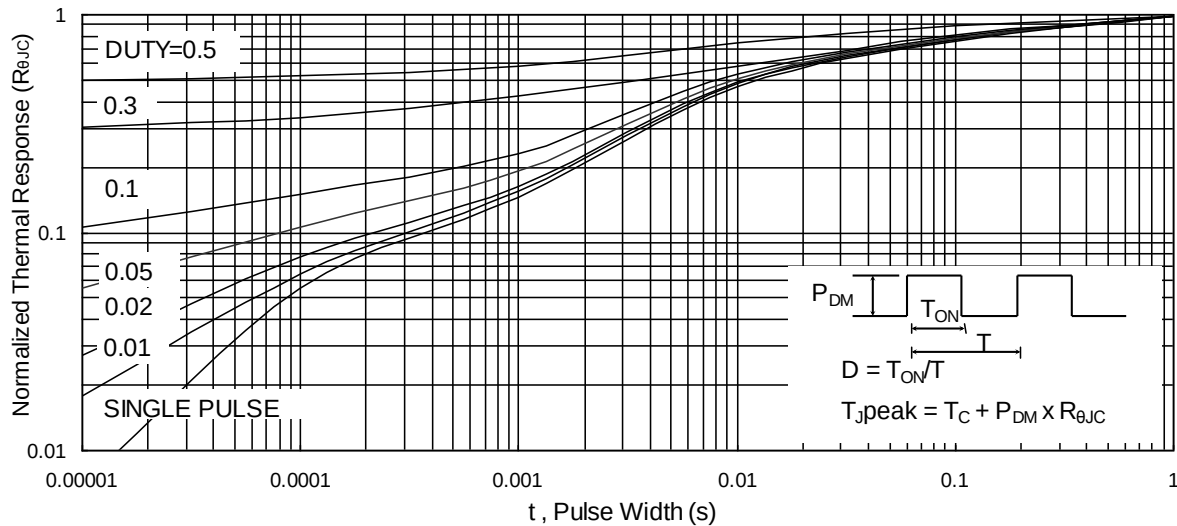


Fig.9 Normalized Maximum Transient Thermal Impedance

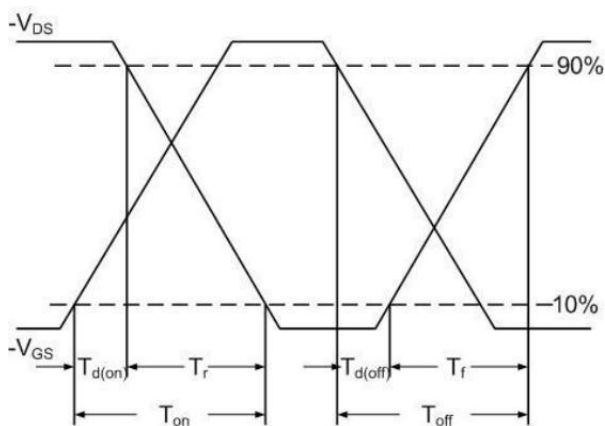


Fig.10 Switching Time Waveform

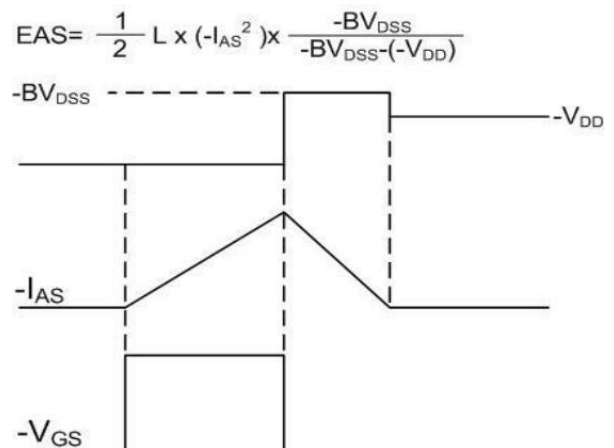
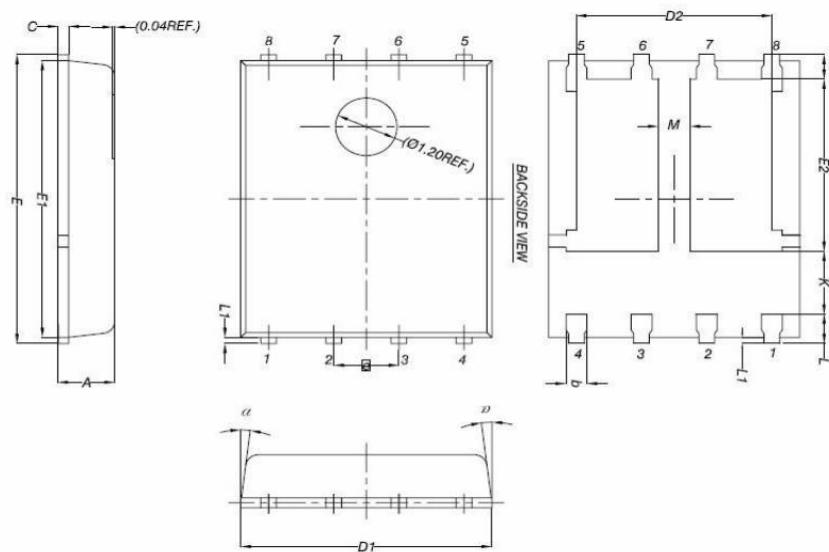


Fig.11 Unclamped Inductive Waveform

MOSFET Package Mechanical Data-PDFN5*6-8L-JQ Double



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.66	5.76	5.83
E2	3.37	3.47	3.58
e	1.27BSC		
H	0.41	0.51	0.61
K	1.10	--	--
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	--	--
a	0°	--	12°

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	PDFN5*6-8L		5000