XR4G15F

N-Ch and P-Ch Fast Switching MOSFETs

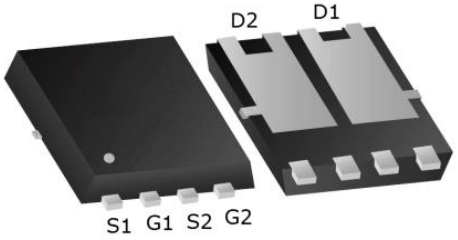
- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

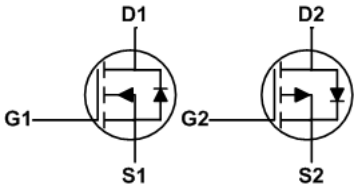
Product Summary

Green

BVDSS	RDSON	ID
150V	240mΩ	6A
-150V	650mΩ	-4.1A

PDFN5060-8L Pin Configuration





Description

The XR4G15F is the highest performance complementary N-ch and P-ch MOSFETs MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The XR4G15F meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	150V	-150V	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	6	-4.1	A
I_D@T_A=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	3.2	-2.7	A
I_{DM}	Pulsed Drain Current[2]	21	-16	A
EAS	Single Pulse Avalanche Energy[3]	9.8	12.5	mJ
I_{AS}	Avalanche Current	—	–	A
P_D@T_A=25℃	Total Power Dissipation[4]	40.3	7.8	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	62	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	3.1	℃/W

Electrical Characteristics（T_J = 25°C, unless otherwise noted）

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	150	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=4A	---	240	300	mΩ
		V_{GS}=6V , I_D=0.5A	---	--	—	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	2	2.5	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=150V , V_{GS}=0V , T_J=25°C	---	---	1	uA
		V_{DS}=150V , V_{GS}=0V , T_J=100°C	---	---	100	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	—	2	–	Ω
Q_g	Total Gate Charge	V_{DS}=75V , V_{GS}=10V , I_D=4A	–	14	–	nC
Q_{gs}	Gate-Source Charge		--	1.6	–	
Q_{gd}	Gate-Drain Charge		--	4	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=75V , V_{GS}=10V , R_G=3Ω, I_D=4A	---	5.8	---	ns
T_r	Rise Time		---	2.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	16.9	---	
T_f	Fall Time		---	2.6	---	
C_{iss}	Input Capacitance	V_{DS}=75V , V_{GS}=0V , f=1MHz	---	465	---	pF
C_{oss}	Output Capacitance		---	23	---	
C_{rss}	Reverse Transfer Capacitance		---	14	---	

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

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}=8A

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.

P-Channel Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-150	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-1A	---	650	780	mΩ
		V_{GS}=-6V , I_D=-0.5A	---	700	980	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-2	-3	-4	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-120V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-120V , V_{GS}=0V , T_J=85℃	---	---	30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	5	12	20	Ω
Q_g	Total Gate Charge (-10V)	V_{DS}=-75V , V_{GS}=-10V , I_D=-1A	6.5	10.8	15.2	nC
Q_{gs}	Gate-Source Charge		1.6	3.1	4.7	
Q_{gd}	Gate-Drain Charge		1.1	2.2	3.3	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-30V , V_{GS}=-10V , R_G=6Ω, I_D=-1A	---	21	32	ns
T_r	Rise Time		---	16	24	
$T_{d(off)}$	Turn-Off Delay Time		---	40	60	
T_f	Fall Time		---	18	27	
C_{iss}	Input Capacitance	V_{DS}=-75V , V_{GS}=0V , f=1MHz	424	706	988	pF
C_{oss}	Output Capacitance		12	23	35	
C_{rss}	Reverse Transfer Capacitance		7	13	20	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-2.2	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note :
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 ≦ 300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is V_{DD}=-25V,V_{GS}=-10V,L=0.5mH,I_{AS}=-14A
4.The power dissipation is limited by 150℃ 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-Channel Typical Characteristics

Typical Characteristics

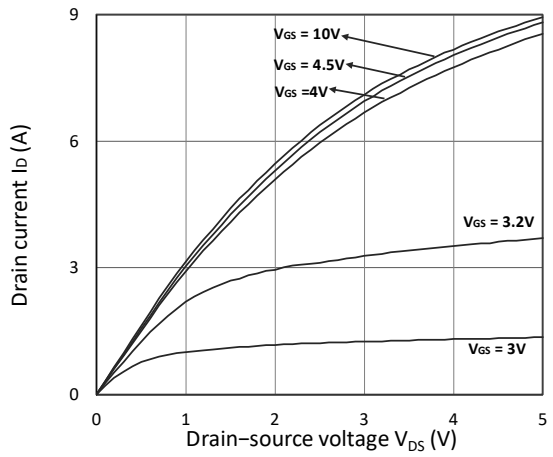


Figure 1. Output Characteristics

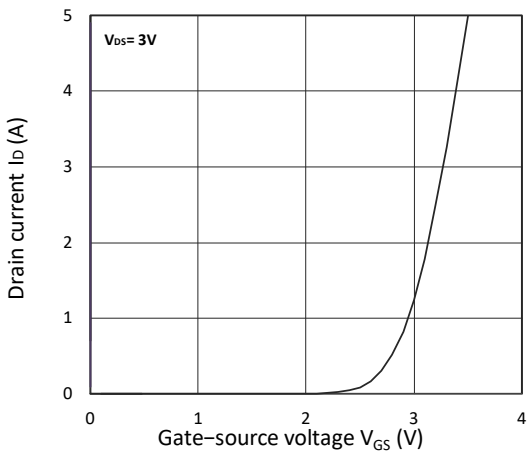


Figure 2. Transfer Characteristics

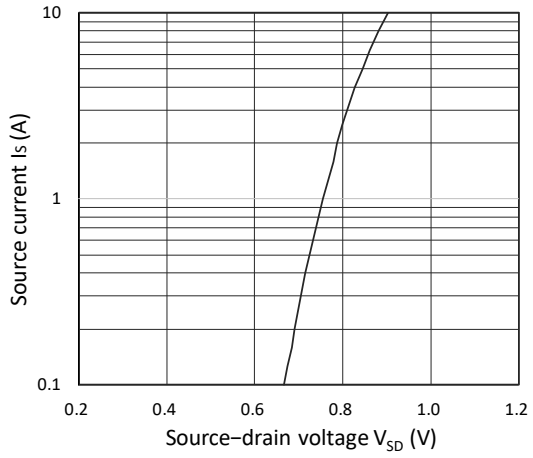


Figure 3. Forward Characteristics of Reverse

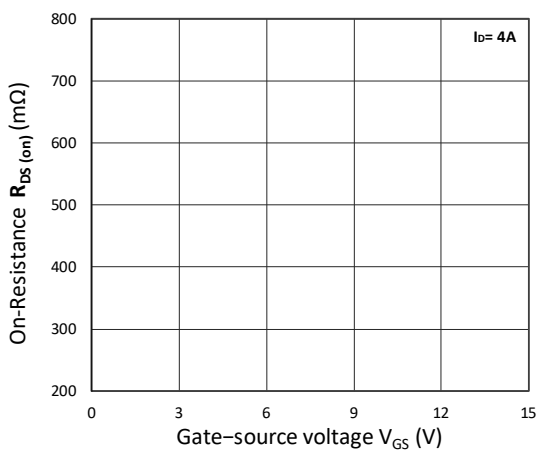


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

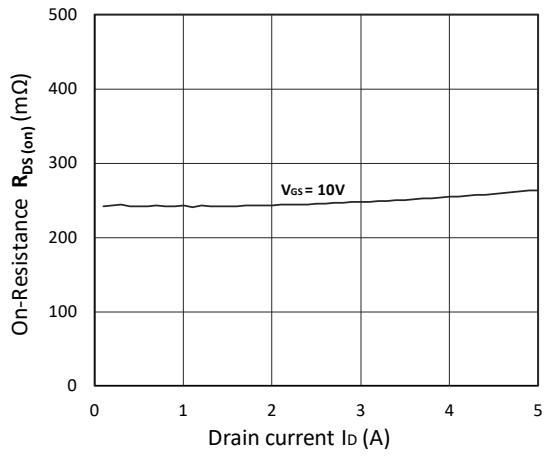


Figure 5. $R_{DS(ON)}$ vs. I_D

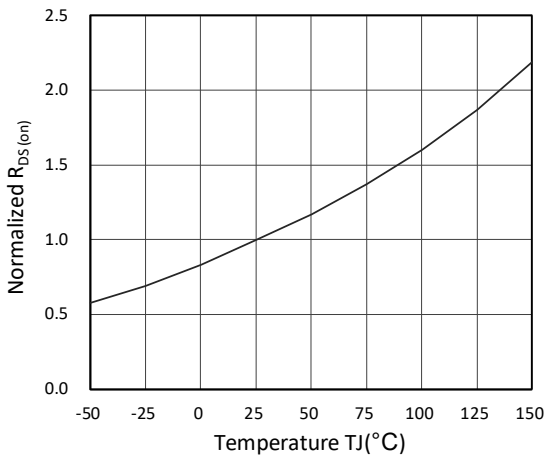


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

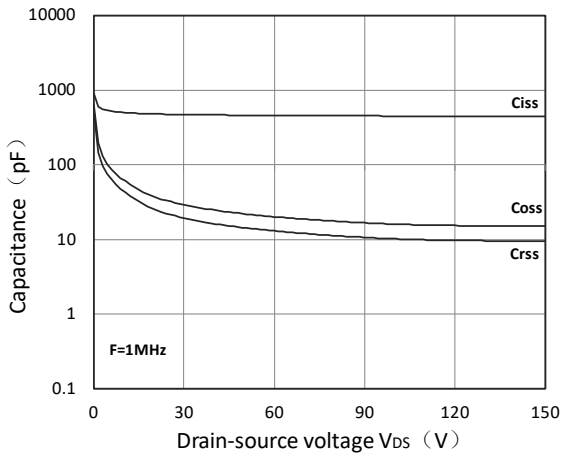


Figure 7. Capacitance Characteristics

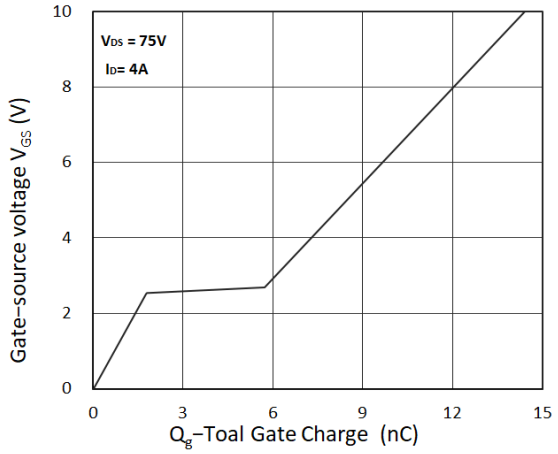


Figure 8. Gate Charge Characteristics

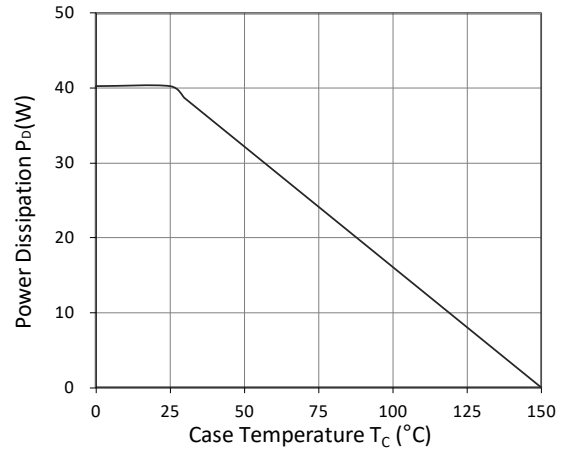


Figure 9. Power Dissipation

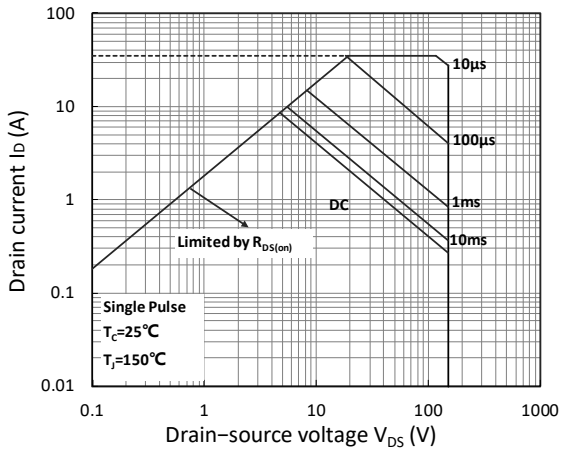


Figure10. Safe Operating Area

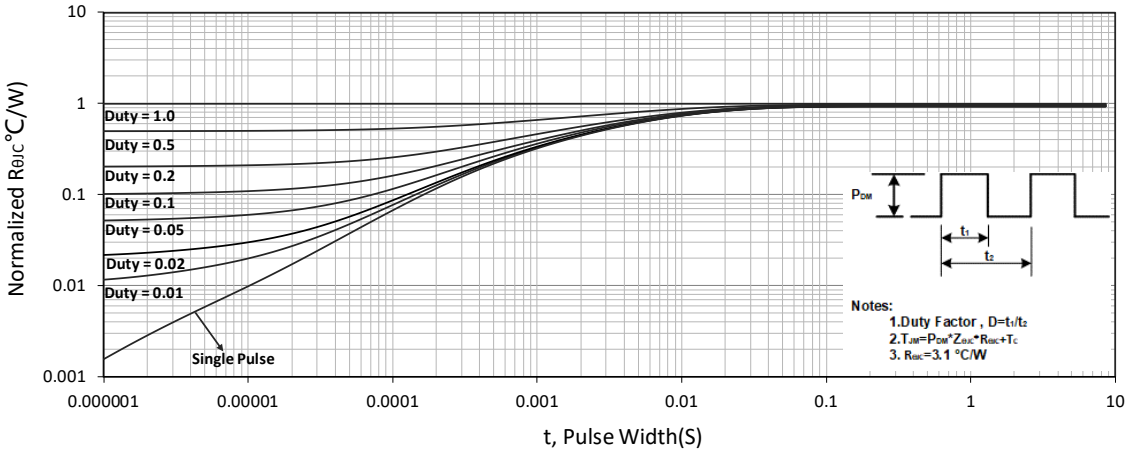


Figure 11. Normalized Maximum Transient Thermal Impedance

P-Channel Typical Characteristics

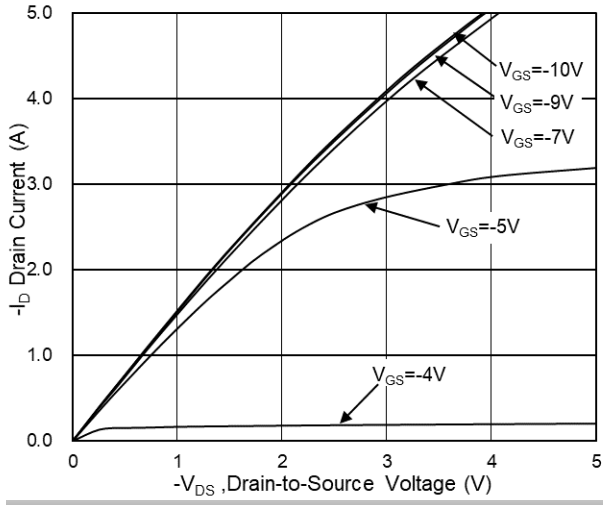


Fig.1 Typical Output Characteristics

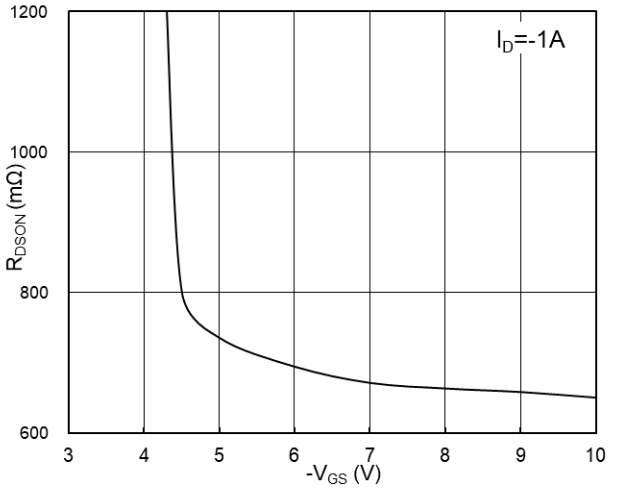


Fig.2 On-Resistance vs G-S Voltage

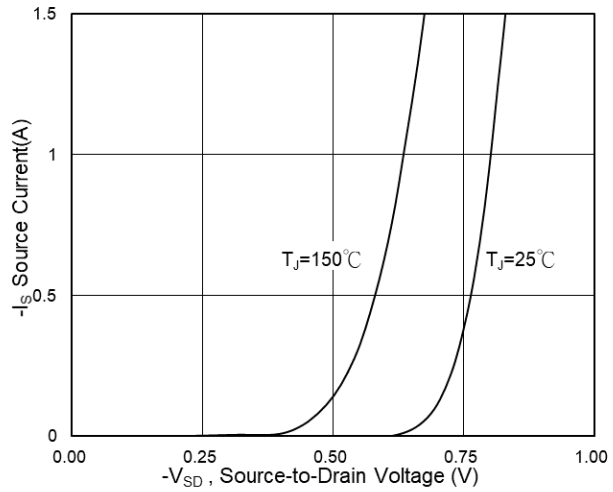


Fig.3 Source Drain Forward Characteristics

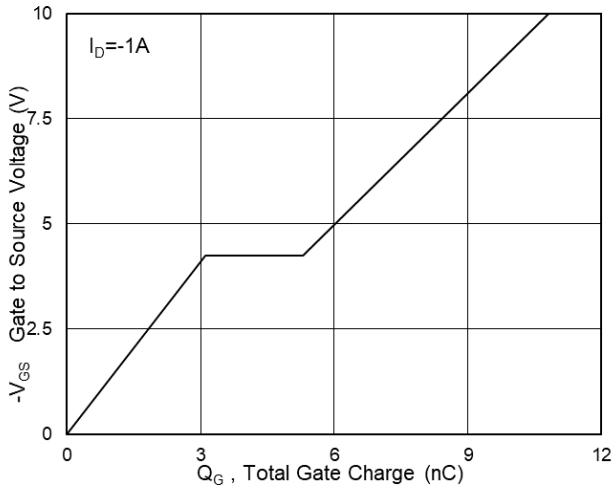


Fig.4 Gate-Charge Characteristics

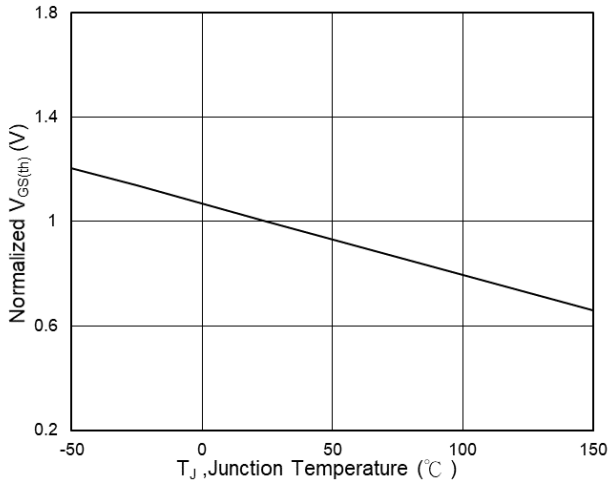


Fig.5 Normalized $V_{GS(th)}$ vs T_J

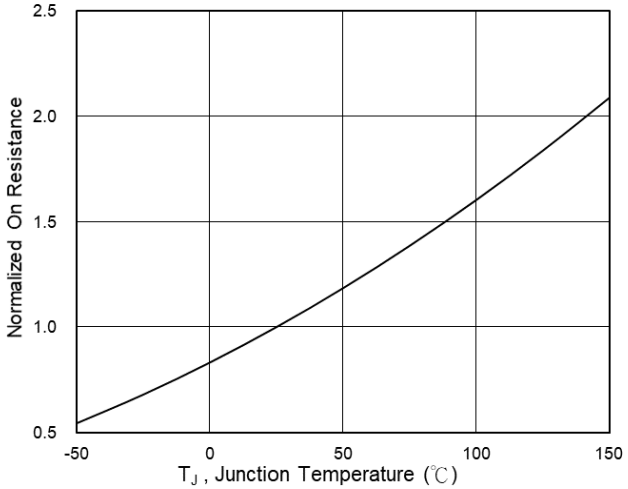


Fig.6 Normalized R_{DSON} vs T_J

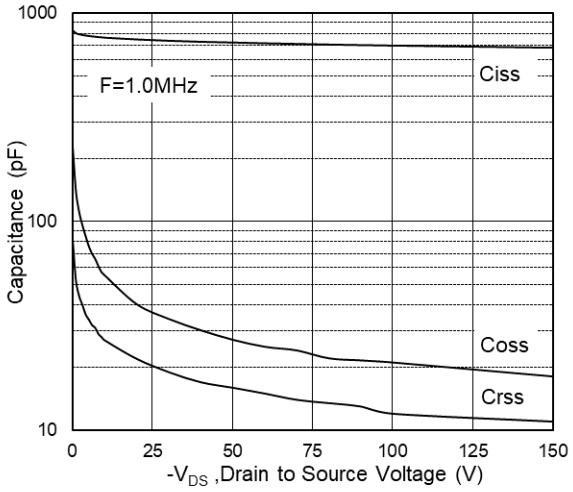


Fig.7 Capacitance

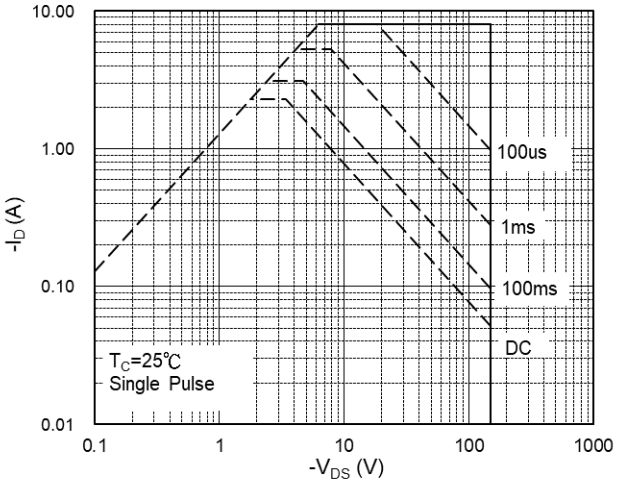


Fig.8 Safe Operating Area

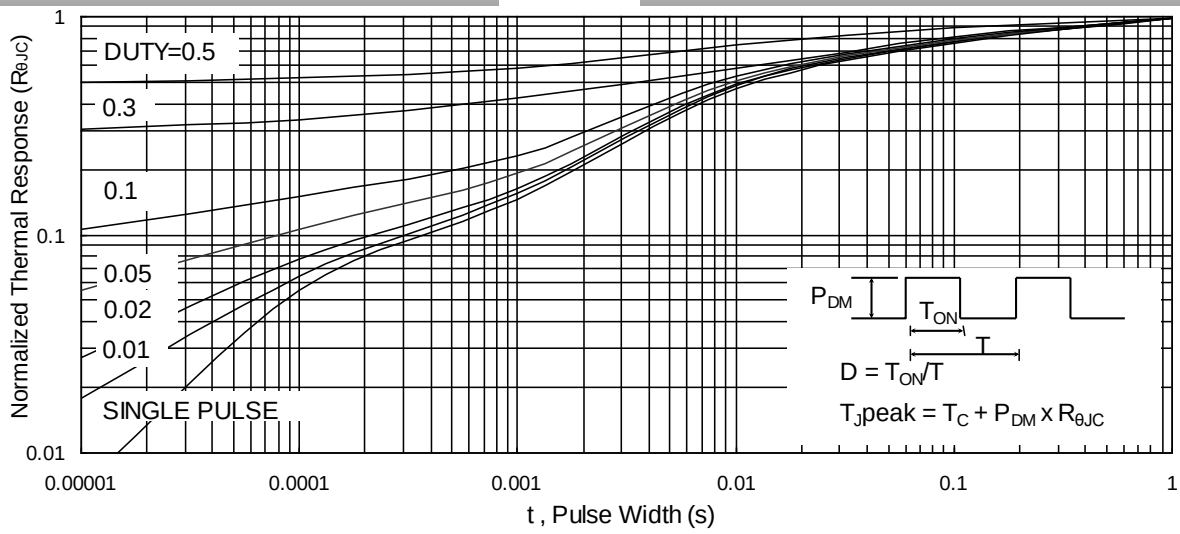


Fig.9 Normalized Maximum Transient Thermal Impedance

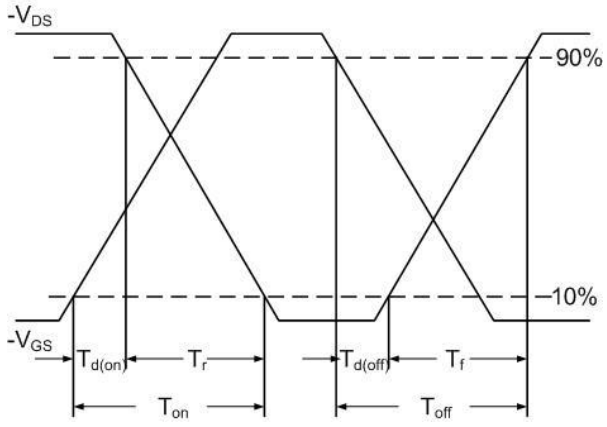


Fig.10 Switching Time Waveform

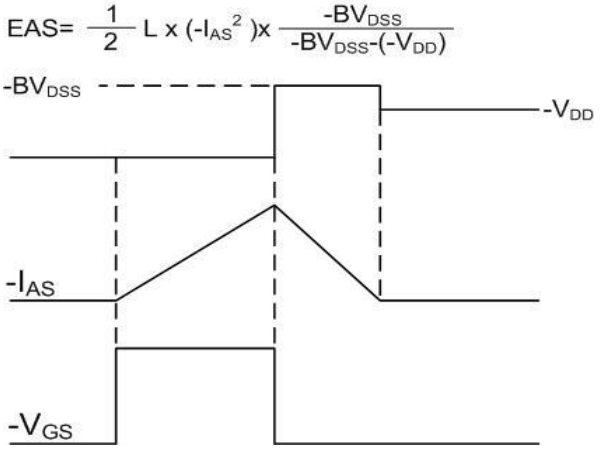
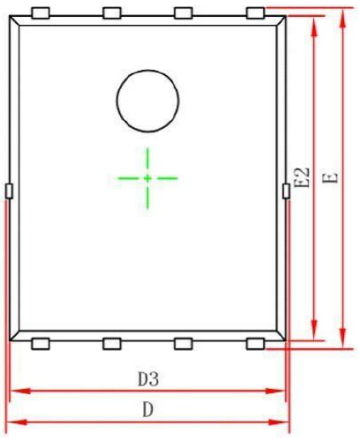
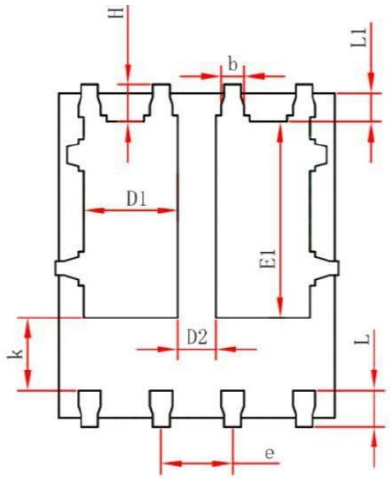


Fig.11 Unclamped Inductive Waveform

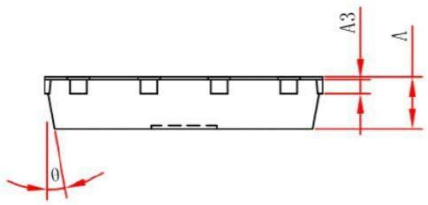
Package Mechanical Data- PDFN5060-8L



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°