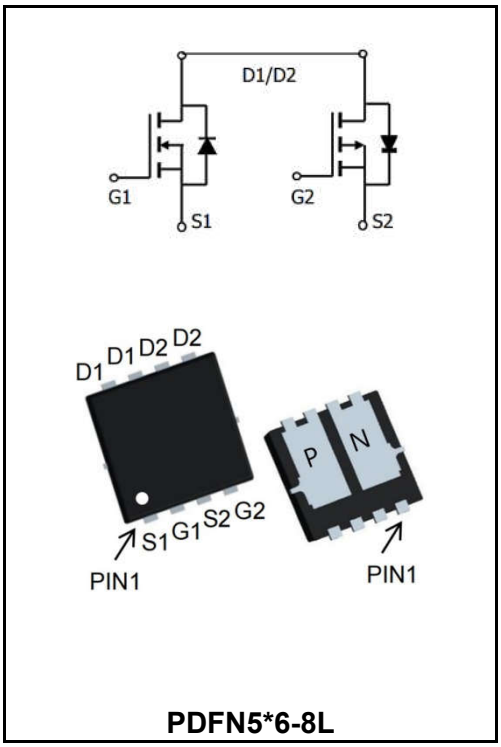
30V N+P-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

I_D	42A
V_{DSS}	30V
R_{DSON}-typ(@V_{GS}=10V)	< 10mΩ(Type:6.5 mΩ)
I_D	-38A
V_{DSS}	-30V
R_{DSON}-typ(@V_{GS}=-10V)	< 13mΩ(Type:9.0 mΩ)



PDFN5*6-8L

Application

- Wireless charging
- Boost driver
- Brushless motor

Product Specification Classification

Part Number	Package	Marking	Pack
YFW40G03NF	PDFN5*6-8L	YFW 40G03NF XXXXX	5000PCS/Tape

Maximum Ratings at Tc=25°C unless otherwise specified

Characteristics	Symbols	Value		Units
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	30	-30	V
Gate - Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current, V_{GS} @ 10V[1]@T_C=25℃	I_D	42	-38	A
Continuous Drain Current, V_{GS} @ 10V[1]@T_C=100℃	I_D	32.5	-27.5	A
Pulsed Drain Current[2]	I_{DM}	123	-115	A
Single Pulse Avalanche Energy[3]	E_{AS}	289	378	mJ
Avalanche Current	I_{AS}	42	50	A
Total Power Dissipation[4]@T_C=25℃	P_D	46	41.3	W
Storage Temperature Range	T_{STG}	-55 to +150		°C
Operating Junction Temperature Range	T_J	-55 to +150		°C
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	25		°C/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	2.3		°C/W

N-Channel Electrical Characteristics (TJ=25 ℃, unless otherwise noted)

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	BV_{DSS}	30	-	-	V
BVDSS Temperature Coefficient	Reference to 25℃ , I_D=1mA	$\Delta BV_{DSS/\Delta TJ}$	-	0.027	-	V/℃
Static Drain-Source On-Resistance[2]	V_{GS}=10V, I_D=12A	$R_{DS(ON)}$	-	6.5	10	mΩ
	V_{GS}=4.5V, I_D=10A		-	10	13	mΩ
Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	$V_{GS(th)}$	1.0	-	2.5	V
VGS(th) Temperature Coefficient		$\Delta V_{GS(th)}$	-	-5.8	-	mV/℃
Drain-Source Leakage Current	V_{DS}=24V, V_{GS}=0V T_J=25℃	I_{DSS}	-	-	1	uA
	V_{DS}=24V , V_{GS}=0V , T_J=55℃		-	-	5	
Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V_{DS} = 5V, I_D =15A	g_{fs}	-	9.8	-	S
Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	R_g	-	1.7	-	Ω
Total Gate Charge(4.5V)	V_{DS}=20V V_{GS}=4.5V I_D=12A	Q_g	-	12.8	-	nC
Gate-Source Charge		Q_{gs}	-	3.3	-	
Gate-Drain Charge		Q_{gd}	-	6.5	-	
Turn-on delay time	V_{DD} =12V V_{GS}=10V R_G = 3.3Ω I_D= 5A	$t_{d(on)}$	-	4.5	-	ns
Rise Time		T_r	-	10.8	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	25.5	-	
Fall Time		t_f	-	9.6	-	
Input Capacitance	V_{DS}=15V V_{GS}=0V f=1MHz	C_{iss}	-	1317	-	pF
Output Capacitance		C_{oss}	-	163	-	
Reverse Transfer Capacitance		C_{rss}	-	131	-	
Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	I_S	-	-	46	A
Pulsed Source Current[2,6]		I_{SM}	-	-	92	A
Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	V_{SD}	-	-	1	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 .The EAS data shows Max. rating .
3、The power dissipation is limited by 175℃ junction temperature
4、EAS condition: TJ=25℃, VDD= 24V, VG= 10V, RG=25Ω, L=0.1mH, IAS= 34A
5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	BV_{DSS}	-30	-34	-	V
BVDSS Temperature Coefficient	Reference to 25℃ , I_D=-1mA	$\Delta BV_{DSS/\Delta TJ}$	-	-0.0232	-	V/℃
Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-30A	$R_{DS(ON)}$	-	9.0	13	mΩ
	V_{GS}=-4.5V, I_D=-15A		-	16	20	mΩ
Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	$V_{GS(th)}$	-1.2	-1.4	-2.5	V
V_{GS}(th) Temperature Coefficient		$\Delta V_{GS(th)}$	-	4.6	-	mV/℃
Drain-Source Leakage Current	V_{DS}=-24V, V_{GS}=0V T_J=25℃	I_{DSS}	-	-	-1	uA
	V_{DS}=-24V , V_{GS}=0V , T_J=55℃		-	-	-5	
Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V_{DS} = -5V, I_D =- 30A	g_{fs}	-	30	-	S
Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	R_g	-	9	-	Ω
Total Gate Charge(-4.5V)	V_{DS}=-15V V_{GS}=-4.5V I_D=-15A	Q_g	-	22	-	nC
Gate-Source Charge		Q_{gs}	-	8.7	-	
Gate-Drain Charge		Q_{gd}	-	7.2	-	
Turn-on delay time	V_{DD} =-15V V_{GS}=-10V R_G = 3.3Ω I_D=-15A	$t_{d(on)}$	-	8	-	ns
Rise Time		T_r	-	73.7	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	61.8	-	
Fall Time		t_f	-	24.4	-	
Input Capacitance	V_{DS}=-15V V_{GS}=0V f=1MHz	C_{iss}	-	2215	-	pF
Output Capacitance		C_{oss}	-	310	-	
Reverse Transfer Capacitance		C_{rss}	-	237	-	
Continuous Source Current	V_G=V_D=0V , Force Current	I_S	-	-	-42	A
Pulsed Source Current		I_{SM}	-	-	-130	A
Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	V_{SD}	-	-	-1	A
Reverse Recovery Time	IF=-15A , dI/dt=100A/μs , T_J=25℃	t_{rr}	-	19	-	nS
Reverse Recovery Charge		Q_{rr}	-	9	-	nC

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 .The EAS data shows Max. rating .
3、The power dissipation is limited by 175℃ junction temperature
4、EAS condition: TJ=25℃, VDD= -24V, VG= -10V, RG=7Ω, L=0.1mH, IAS= -50A
5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

Ratings and Characteristic Curves

N-Typical Characteristics

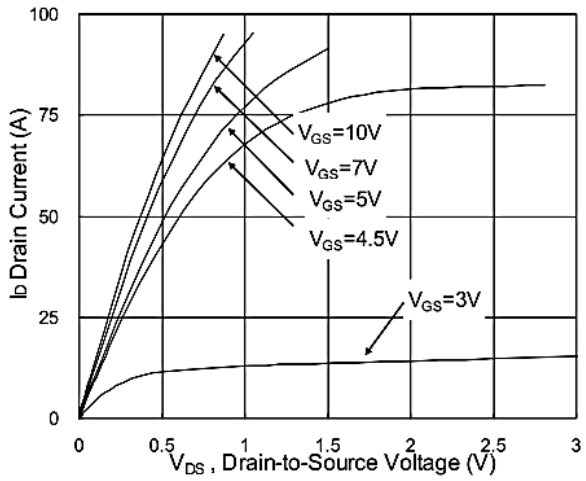


Fig.1 Typical Output Characteristics

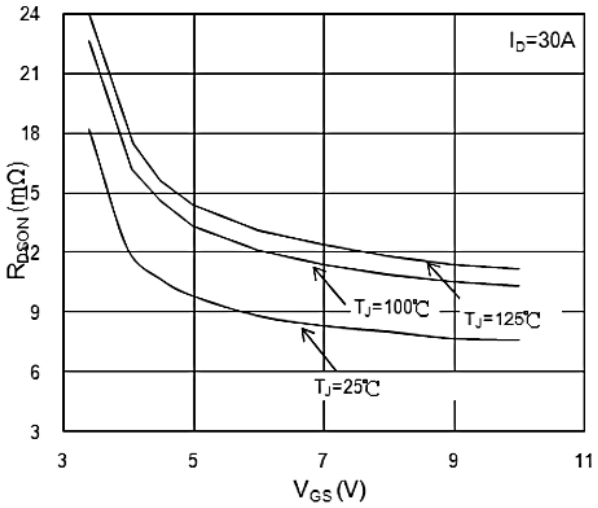


Fig.2 On-Resistance vs. Gate-Source

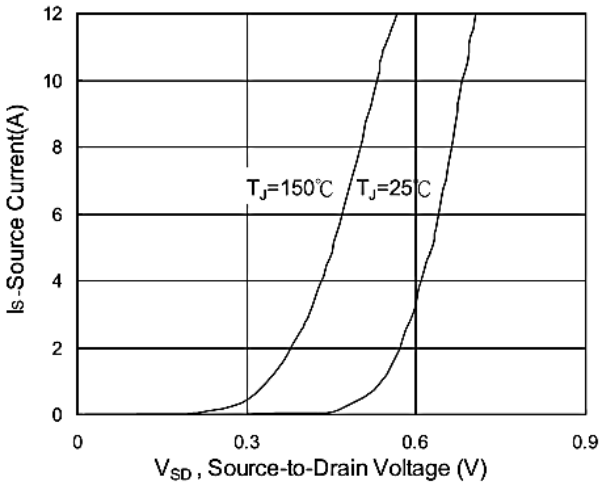


Fig.3 Forward Characteristics of reverse

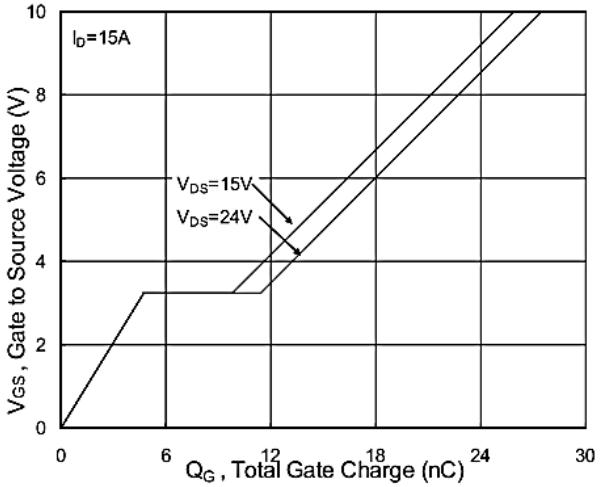


Fig.4 Gate-Charge Characteristics

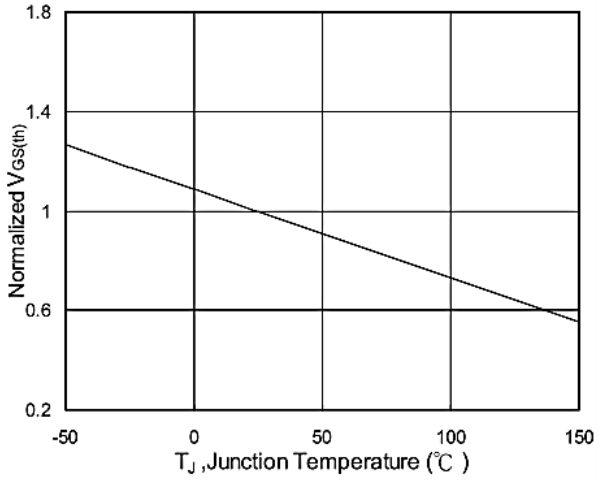


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

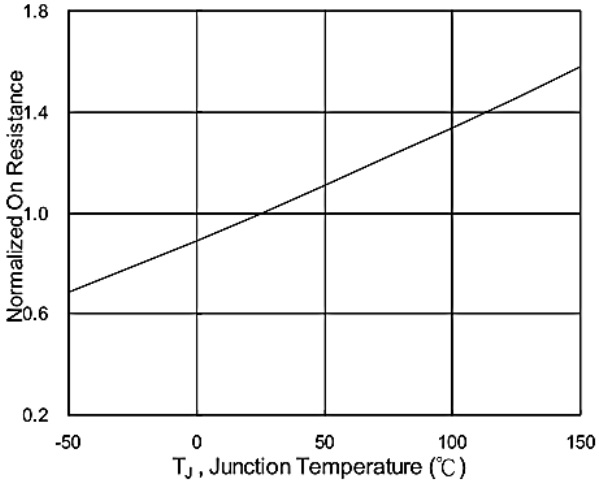


Fig.6 Normalized R_{DSON} vs. T_J

Ratings and Characteristic Curves

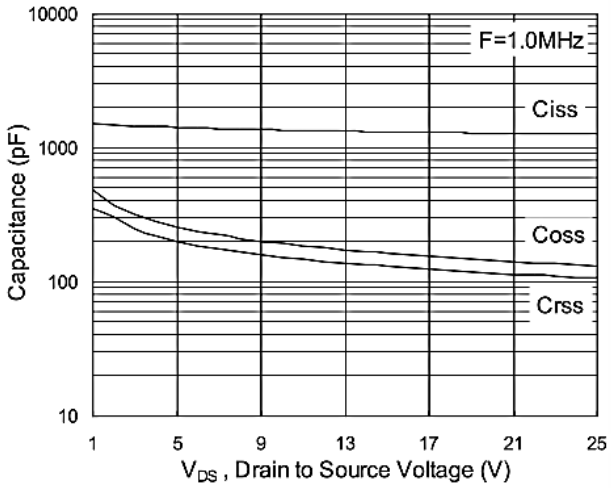


Fig.7 Capacitance

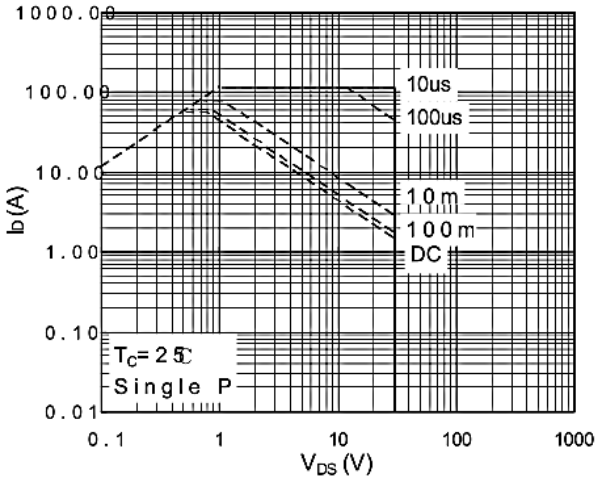


Fig.8 Safe Operating Area

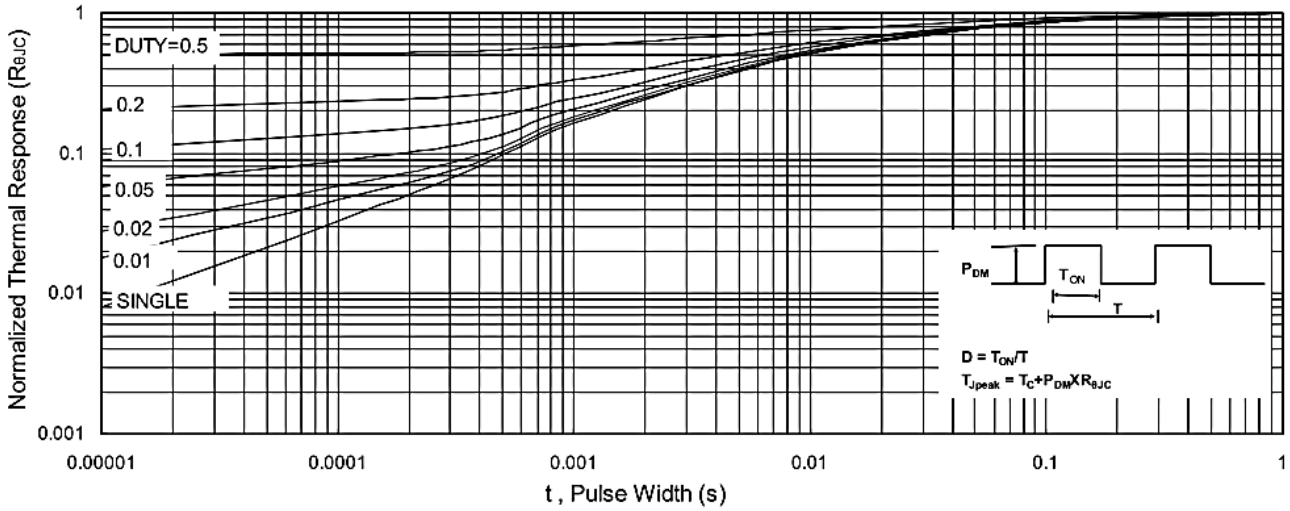


Fig.9 Normalized Maximum Transient Thermal Impedance

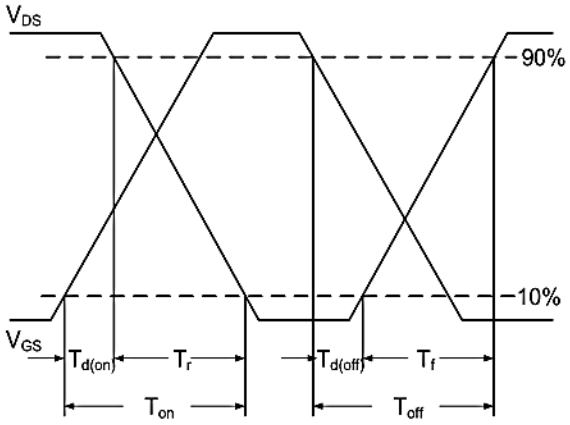


Fig.10 Switching Time Waveform

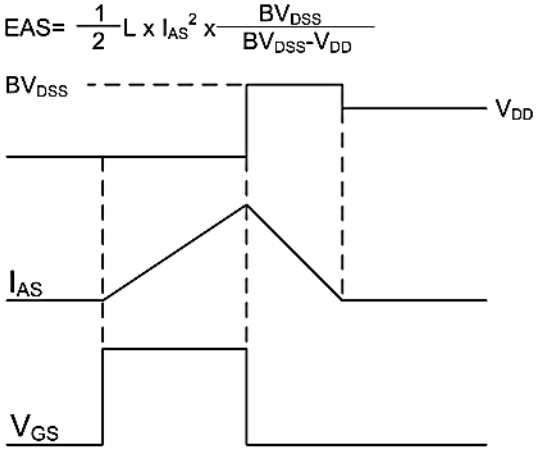


Fig.17 Unclamped Inductive Switching Waveform

Ratings and Characteristic Curves

P-Typical Characteristics

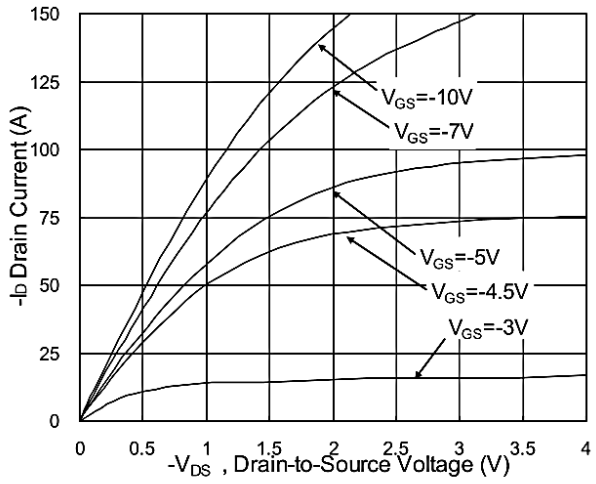


Fig.1 Typical Output Characteristics

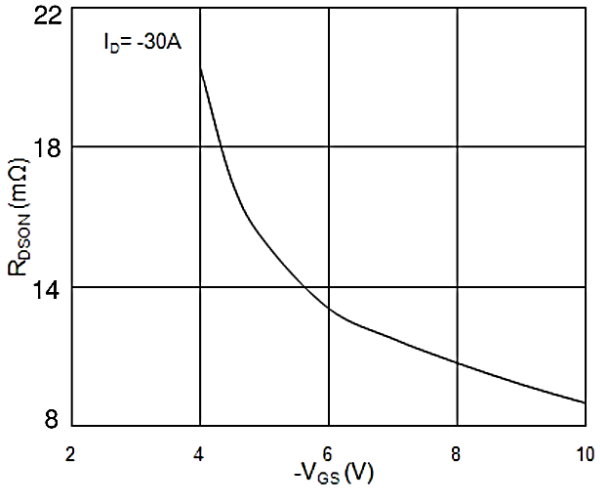


Fig.2 On-Resistance vs. G-S Voltage

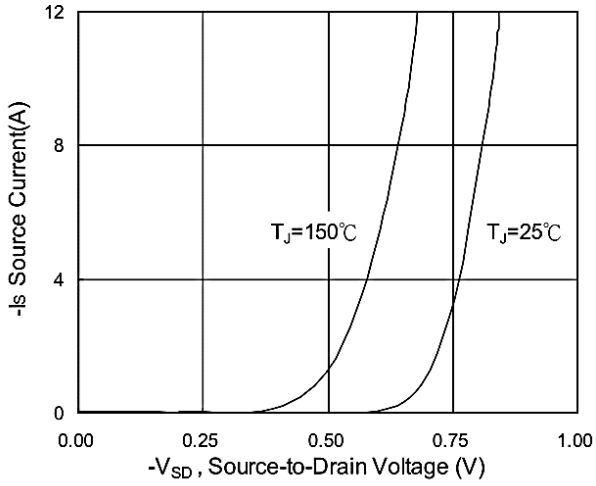


Fig.3 Forward Characteristics of Reverse

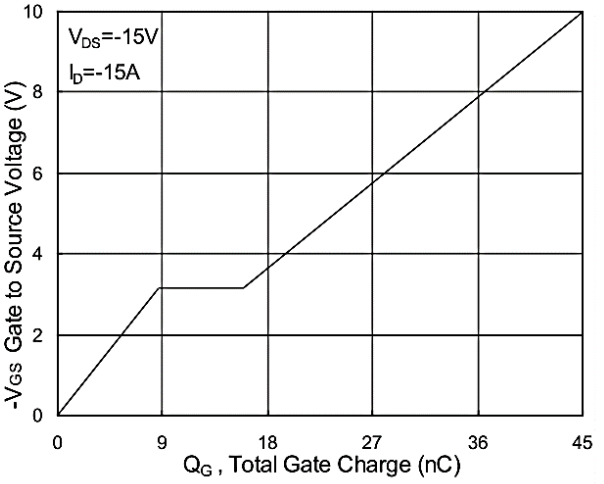


Fig.4 Gate-Charge Characteristics

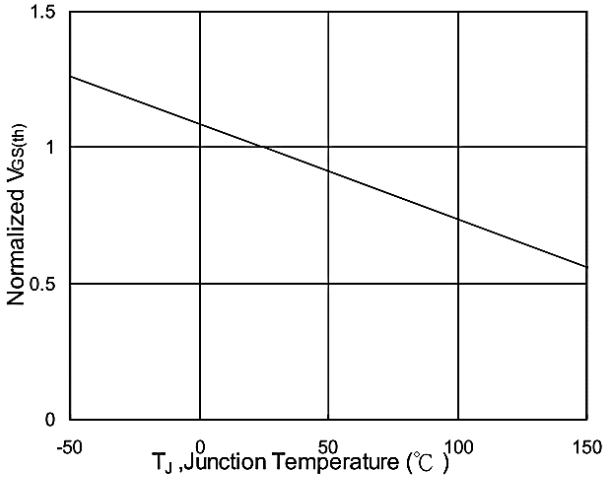


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

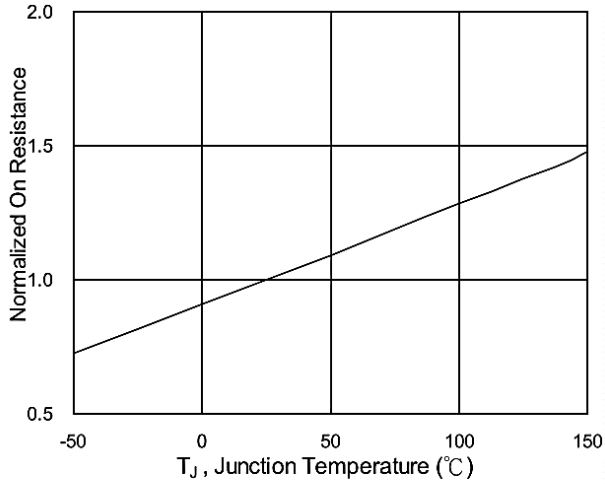


Fig.6 Normalized R_{DSON} vs. T_J

Ratings and Characteristic Curves

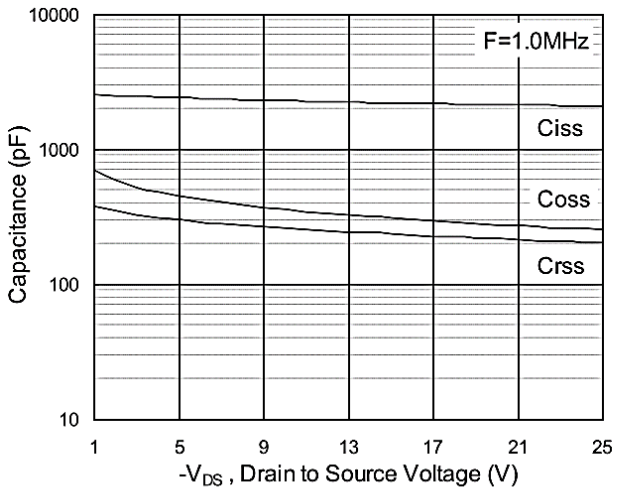


Fig.7 Capacitance

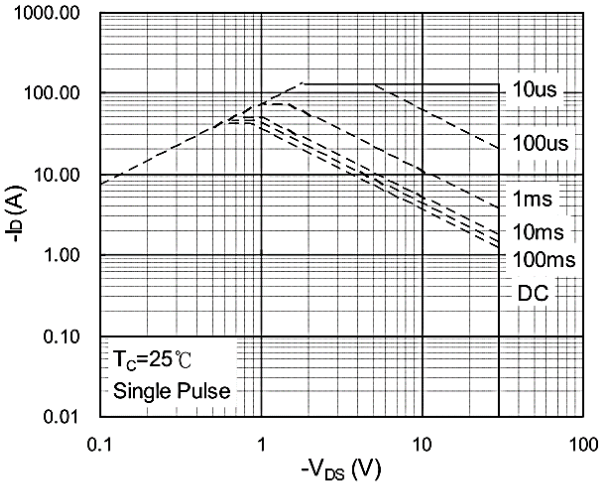


Fig.8 Safe Operating Area

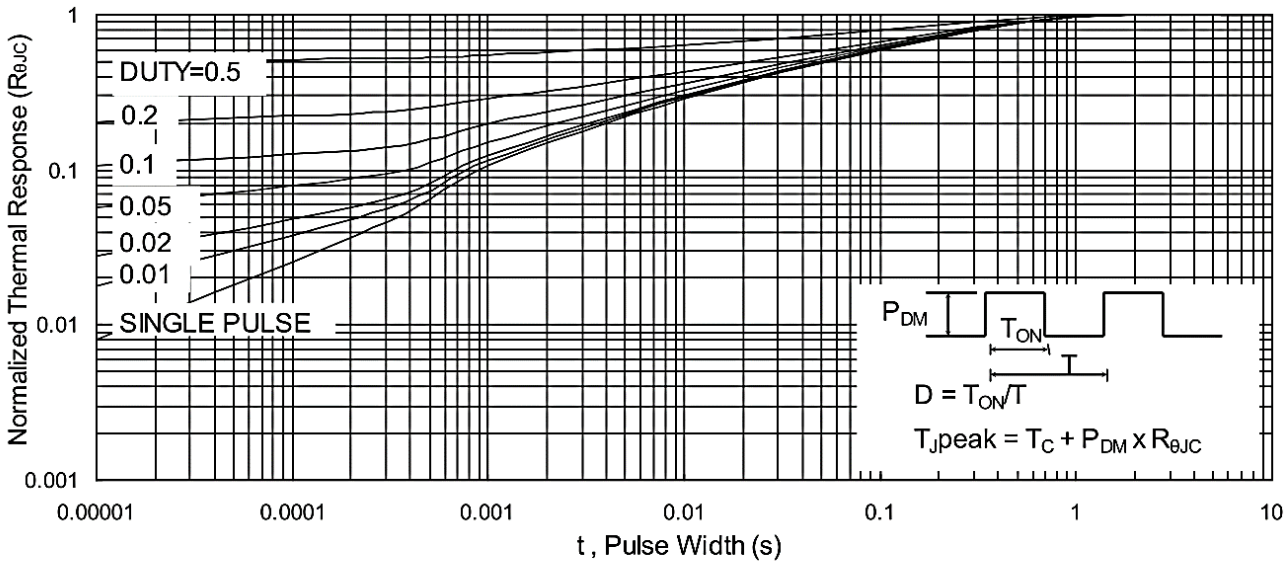


Fig.9 Normalized Maximum Transient Thermal Impedance

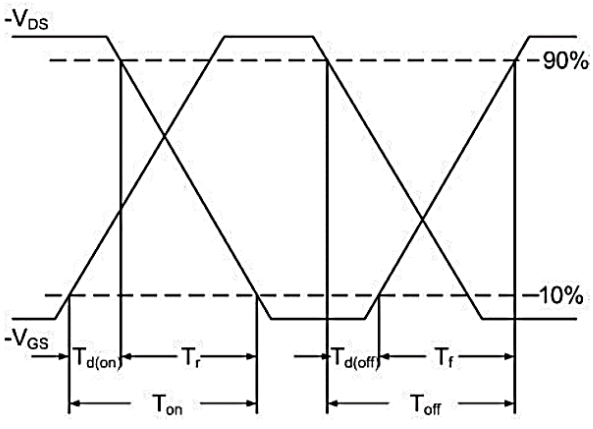


Fig.10 Switching Time Waveform

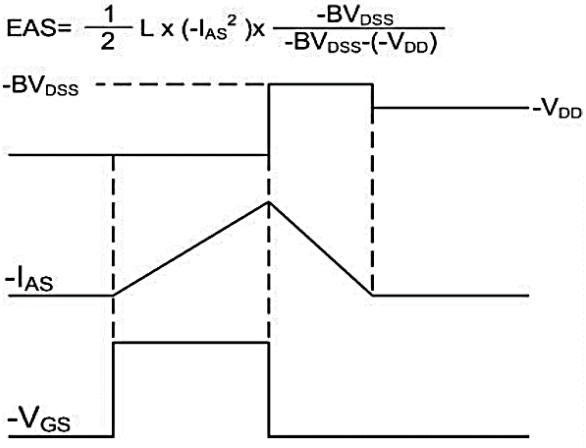
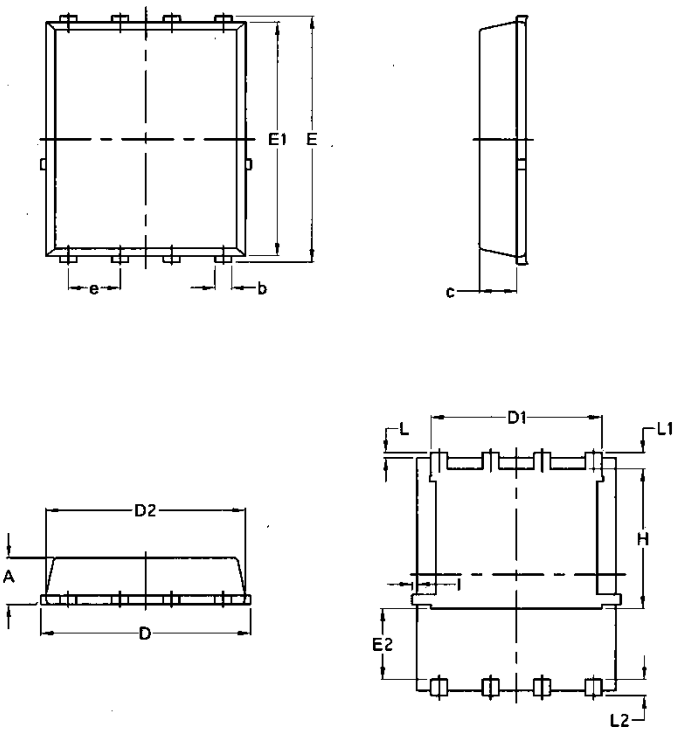


Fig.11 Unclamped Inductive Switching Waveform

Package Outline Dimensions Millimeters

PDFN5*6-8L



Symbol	Common			
	mm		Inch	
	Mim	Max	Min	Max
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.0970	0.0324	0.082
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	/	0.0630	/
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
I	/	0.18	/	0.0070