

40V N+P-CHANNEL ENHANCEMENT MODE MOSFET

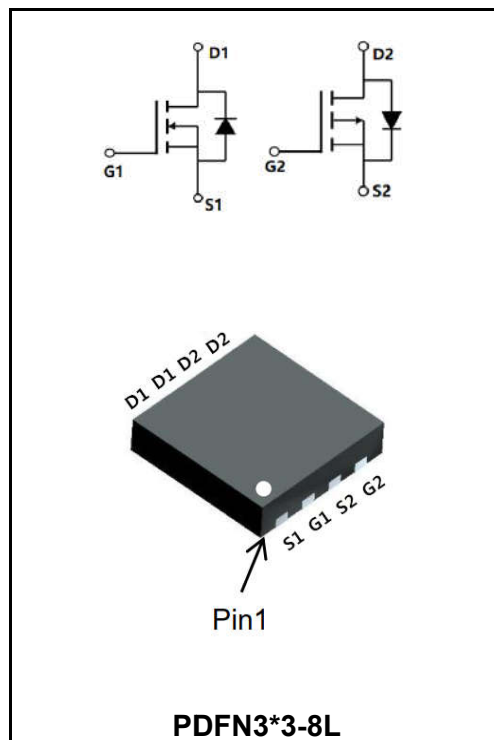
MAIN CHARACTERISTICS

I_D	9.8A
V_{DSS}	40V
$R_{DS(on)-typ}(@V_{GS}=10V)$	< 26mΩ (Type: 17.5mΩ)
I_D	-7.5A
V_{DSS}	-40V
$R_{DS(on)-typ}(@V_{GS}=-10V)$	< 45mΩ (Type: 38 mΩ)



Application

- ◆ Wireless charging
- ◆ Boost driver
- ◆ Brushless motor



Product Specification Classification

Part Number	Package	Marking	Pack
YFW10G04DF	PDFN3*3-8L	YFW 10G04DF 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}	40	-40	V
Gate - Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current, V_{GS} @ 10V ¹ @ T _A =25°C	I_D	9.8	-7.5	A
Continuous Drain Current, V_{GS} @ 10V ¹ @ T _A =70°C	I_D	5.2	-4.8	A
Pulsed Drain Current ²	I_{DM}	23	-22	A
Single Pulse Avalanche Energy ³	E_{AS}	16.2	39	mJ
Avalanche Current	I_{AS}	18	-28	A
Total Power Dissipation ⁴ @ T _A =25°C	P_D	1.67	1.67	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	$R_{\theta JA}$	75		°C/W
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	30		°C/W

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	BV_{DSS}	40	-	-	V
BVDSS Temperature Coefficient	Reference to 25 °C, I _D =1mA	ΔBV_{DSS}/ΔT_J	-	0.034	-	V/°C
Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =5A	R_{DS(ON)}	-	17.5	26	mΩ
	V _{GS} =4.5V, I _D =4A		-	25.0	35	mΩ
Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	V_{GS(th)}	1.0	1.6	2.5	V
V _{GS(th)} Temperature Coefficient		ΔV_{GS(th)}	-	-4.56	-	mV/°C
Drain-Source Leakage Current	V _{DS} =32V, V _{GS} =0V, T _J =25 °C	I_{DSS}	-	-	1	uA
	V _{DS} =32V, V _{GS} =0V, T _J =55 °C		-	-	5	
Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V _{DS} = 5V, I _D = 5A	g_{fs}	-	14	-	S
Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	R_g	-	2.6	-	Ω
Total Gate Charge(4.5V)	V _{DS} =20V V _{GS} =4.5V I _D =5A	Q_g	-	5.5	-	nC
Gate-Source Charge		Q_{gs}	-	1.25	-	
Gate-Drain Charge		Q_{gd}	-	2.5	-	
Turn-on delay time	V _{DD} =20V V _{GS} =10V R _G = 3.3Ω I _D = 1A	t_{d(on)}	-	8.9	-	ns
Rise Time		T_r	-	2.2	-	
Turn-Off Delay Time		t_{d(OFF)}	-	41	-	
Fall Time		t_f	-	2.7	-	
Input Capacitance	V _{DS} =15V V _{GS} =0V f=1MHz	C_{iss}	-	593	-	pF
Output Capacitance		C_{oss}	-	76	-	
Reverse Transfer Capacitance		C_{rss}	-	56	-	
Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	I_S	-	-	6.1	A
Pulsed Source Current ^{2,5}		I_{SM}	-	-	23	A
Diode Forward Voltage ²	V _{GS} =0V, I _S =1A, T _J =25 °C	V_{SD}	-	-	1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 20Z 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.

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	BV_{DSS}	-40	-	-	V
BVDSS Temperature Coefficient	Reference to 25°C, I _D =-1mA	ΔBV_{DSS}/ΔT_J	-	-0.02	-	V/°C
Static Drain-Source On-Resistance ²	V _{GS} =-10V, I _D =-6A	R_{DS(ON)}	-	38	45	mΩ
	V _{GS} =-4.5V, I _D =-3A		-	48	60	
Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250uA	V_{GS(th)}	-1.0	-1.6	-2.5	V
V _{GS(th)} Temperature Coefficient		ΔV_{GS(th)}	-	3.72	-	mV/°C
Drain-Source Leakage Current	V _{DS} =-32V, V _{GS} =0V T _J =25°C	I_{DSS}	-	-	1	uA
	V _{DS} =-32V, V _{GS} =0V, T _J =55°C		-	-	5	
Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V _{DS} = -5V, I _D = -6A	g_{fs}	-	13	-	S
Total Gate Charge(-4.5V)	V _{DS} =-20V V _{GS} =-4.5V I _D =-6A	Q_g	-	11.5	-	nC
Gate-Source Charge		Q_{gs}	-	3.5	-	
Gate-Drain Charge		Q_{gd}	-	3.3	-	
Turn-on delay time	V _{DD} =-15V V _{GS} =-10V R _G = 3.3Ω I _D =-1A	t_{d(on)}	-	22	-	ns
Rise Time		T_r	-	15.7	-	
Turn-Off Delay Time		t_{d(OFF)}	-	59	-	
Fall Time		t_f	-	5.5	-	
Input Capacitance	V _{DS} =-15V V _{GS} =0V f=1MHz	C_{iss}	-	1415	-	pF
Output Capacitance		C_{oss}	-	134	-	
Reverse Transfer Capacitance		C_{rss}	-	102	-	
Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	I_S	-	-	-6	A
Pulsed Source Current ^{2,5}		I_{SM}	-	-	-22	A
Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	V_{SD}	-	-	-1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch² FR-4 board with 20Z 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.

Ratings and Characteristic Curves

N-Typical Characteristics

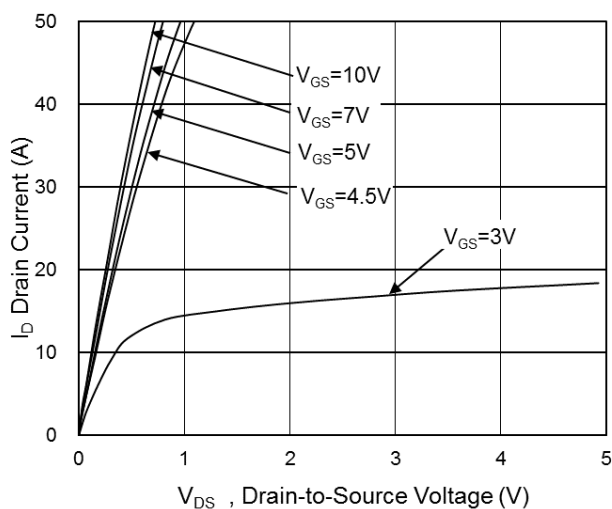


Fig.1 Typical Output Characteristics

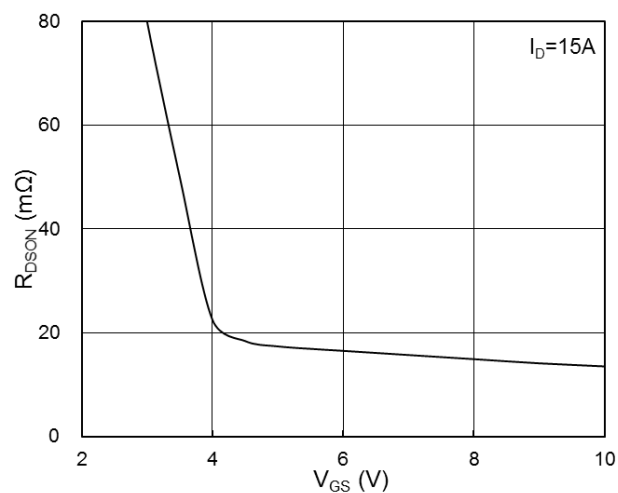


Fig.2 On-Resistance vs. G-S Voltage

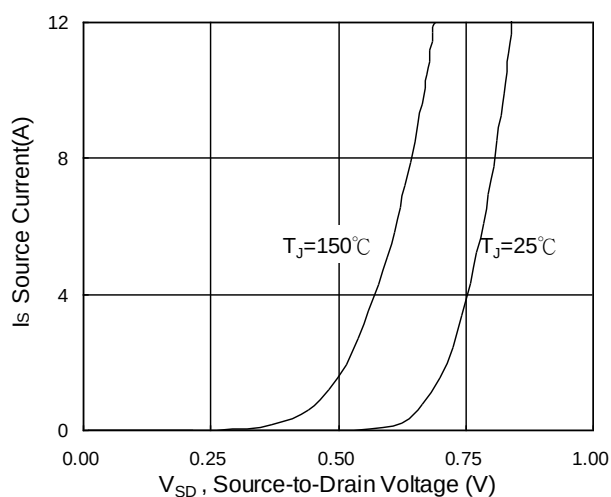


Fig.3 Forward Characteristics of Reverse

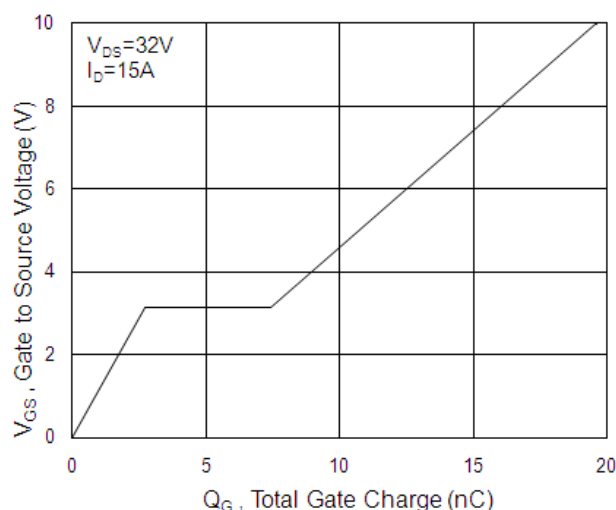


Fig.4 Gate-Charge Characteristics

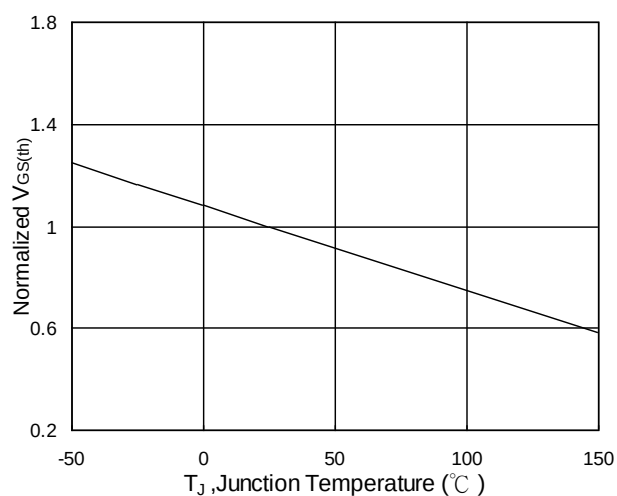


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

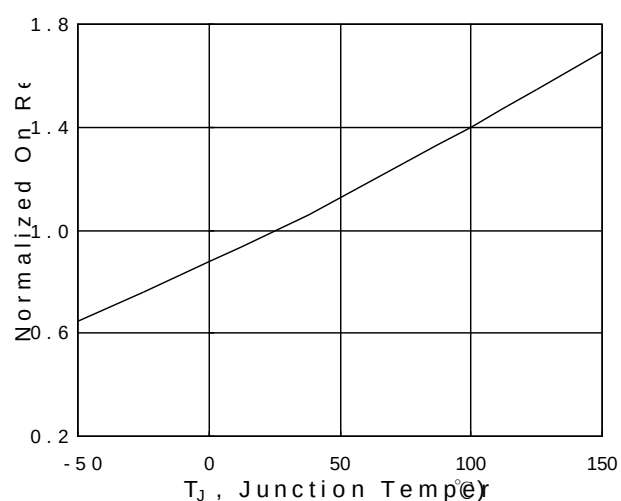


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Ratings and Characteristic Curves

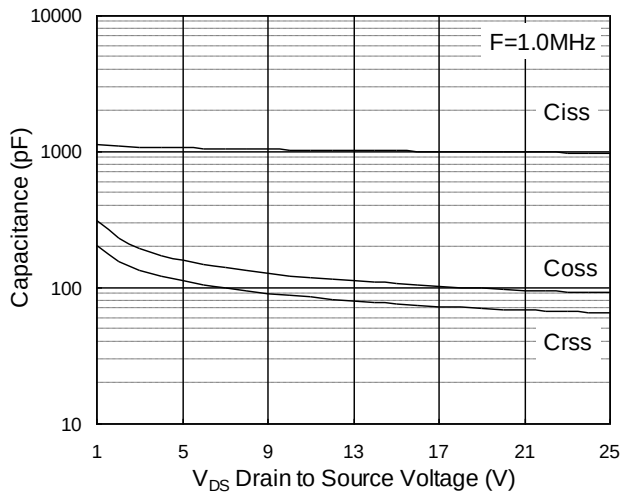


Fig.7 Capacitance

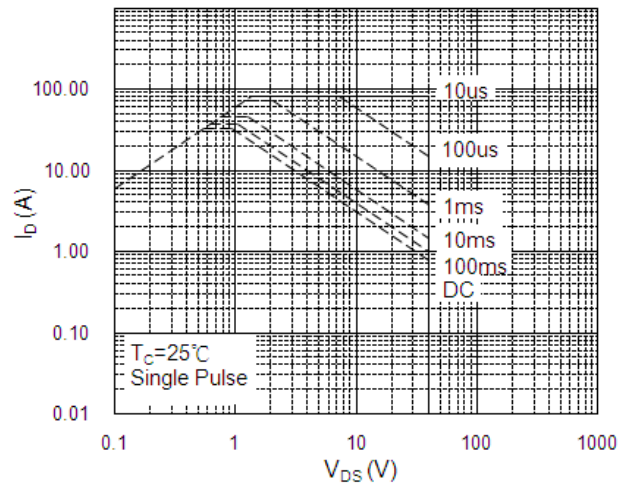


Fig.8 Safe Operating Area

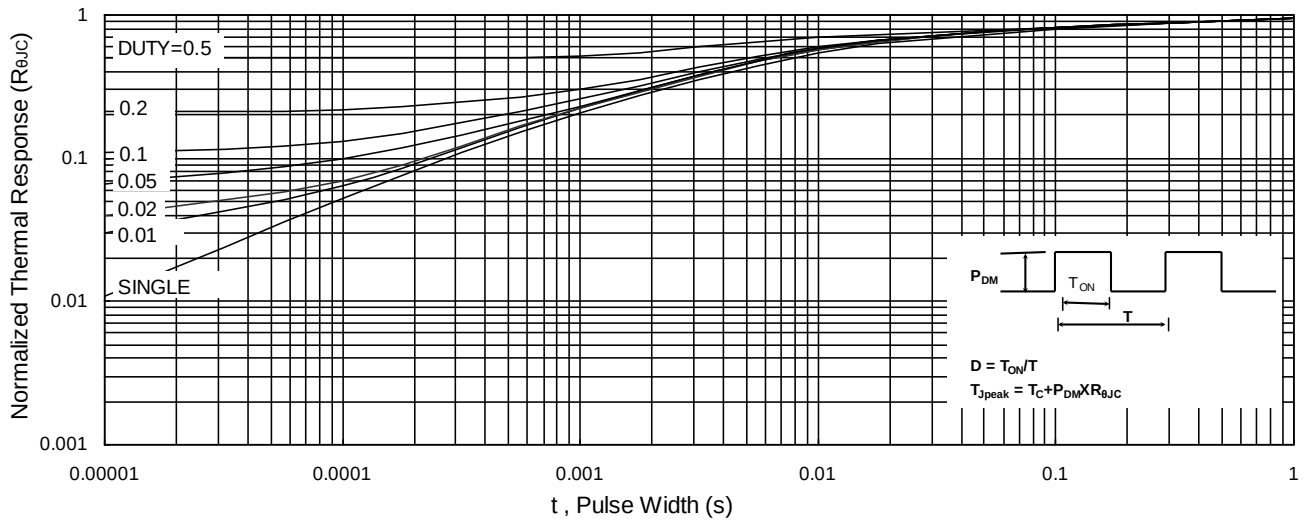


Fig.9 Normalized Maximum Transient Thermal Impedance

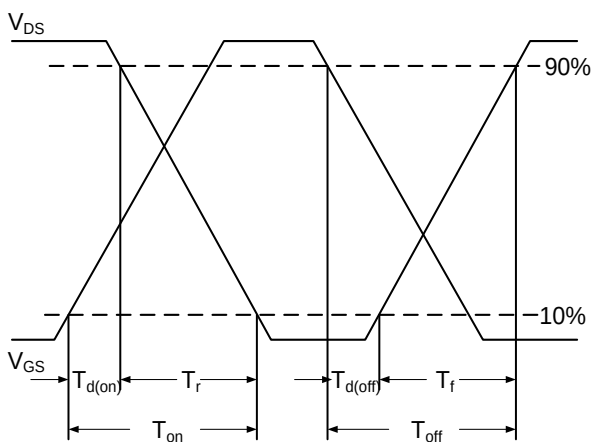


Fig.10 Switching Time Waveform

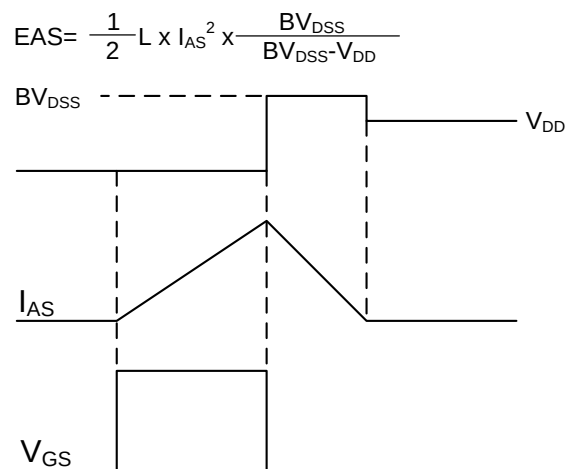


Fig.11 Unclamped Inductive Switching Waveform

Ratings and Characteristic Curves

P-Typical Characteristics

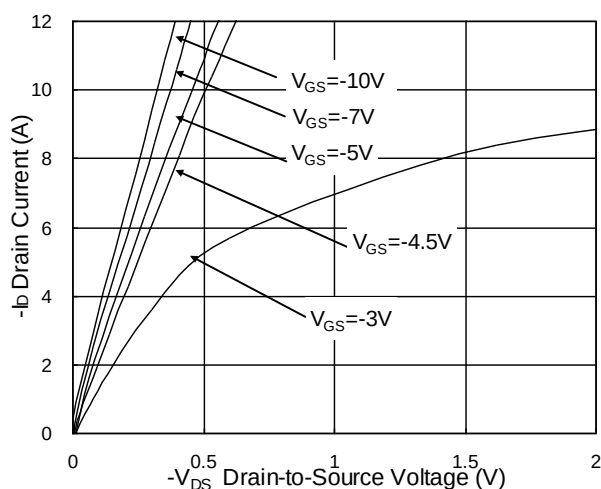


Fig.1 Typical Output Characteristics

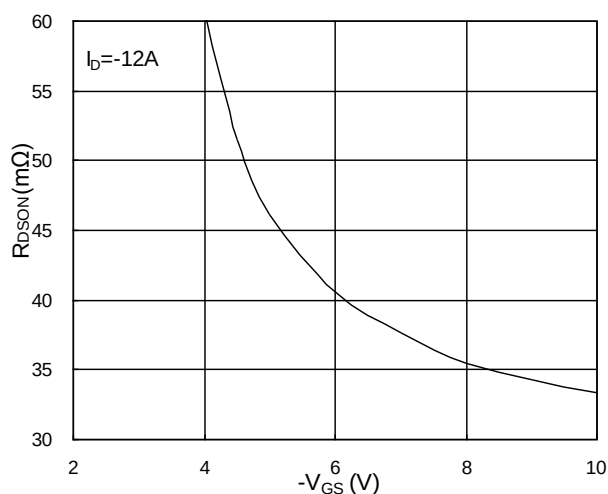


Fig.2 On-Resistance v.s Gate-Source

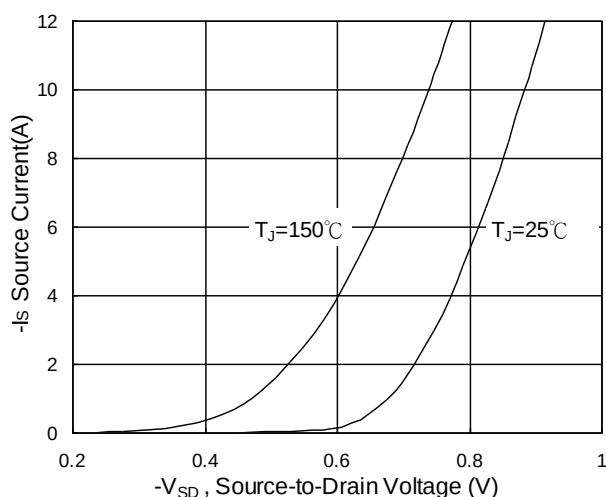


Fig.3 Forward Characteristics of Reverse

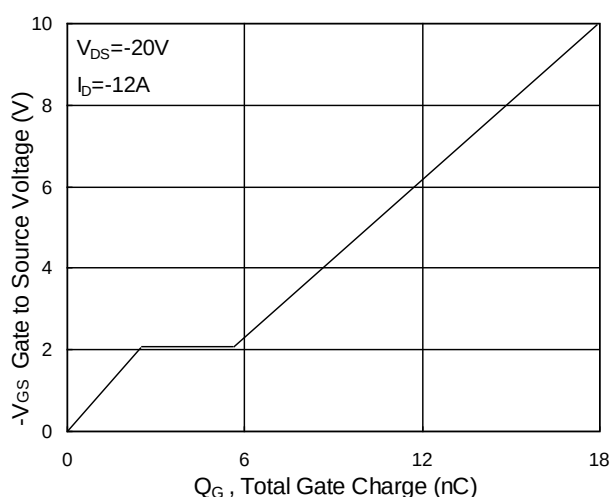


Fig.4 Gate-Charge Characteristics

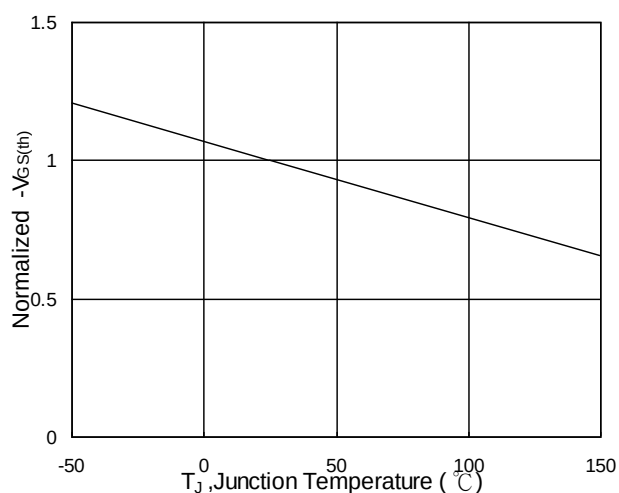


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

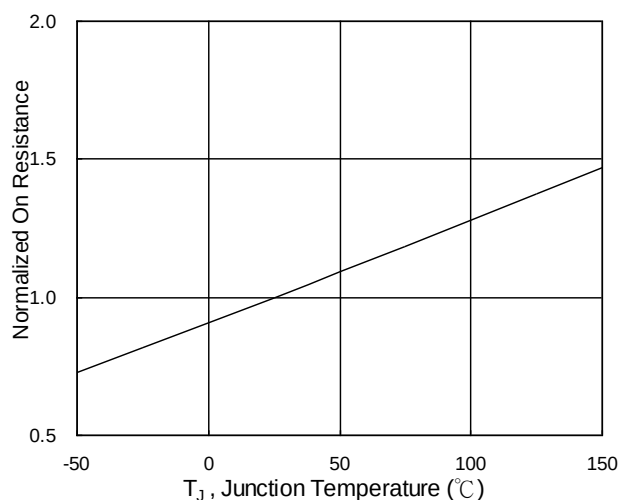


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

Ratings and Characteristic Curves

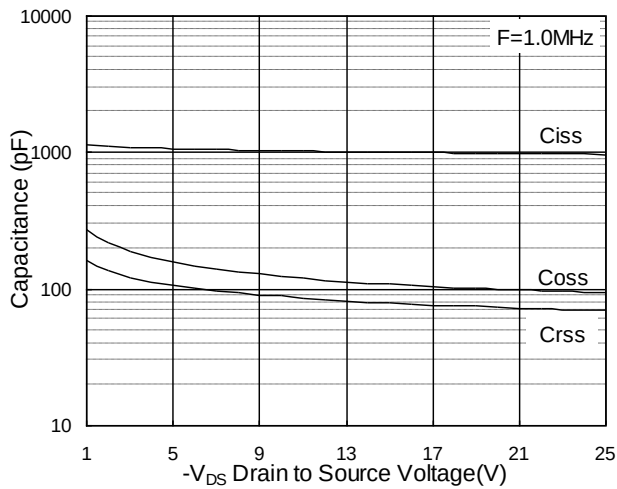


Fig.7 Capacitance

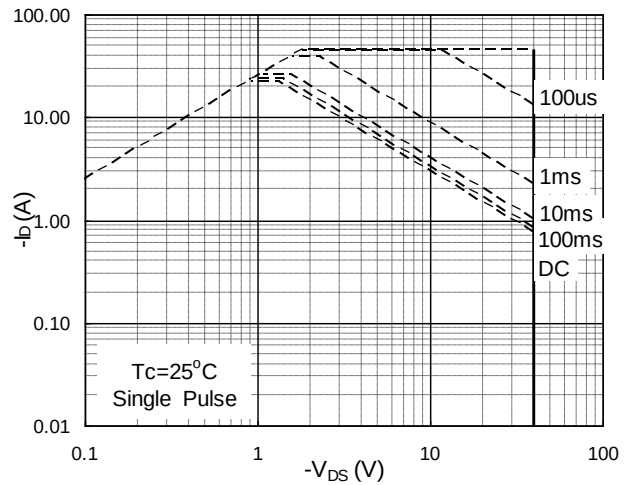


Fig.8 Safe Operating Area

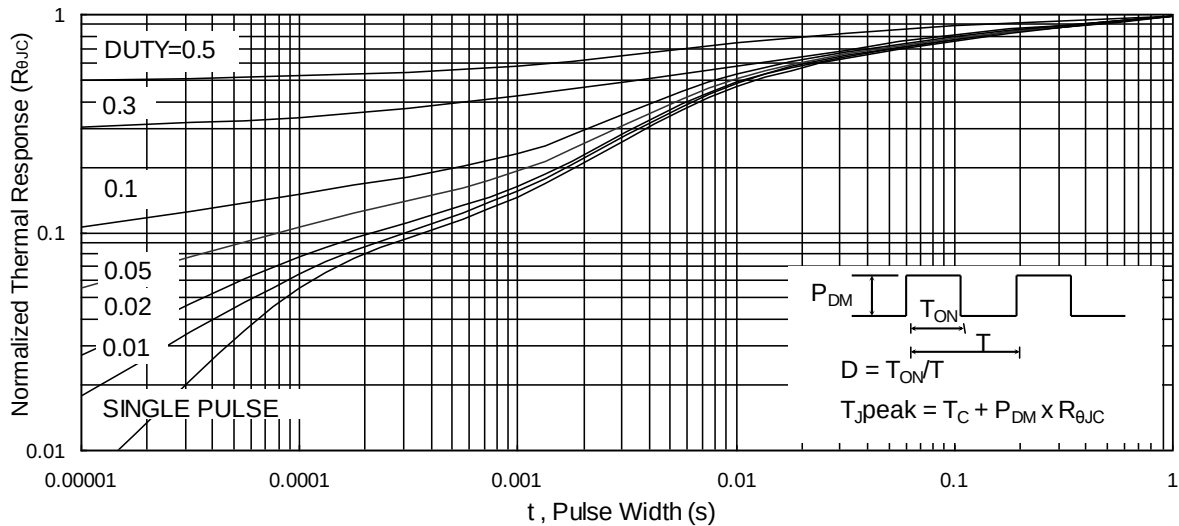


Fig.9 Normalized Maximum Transient Thermal Impedance

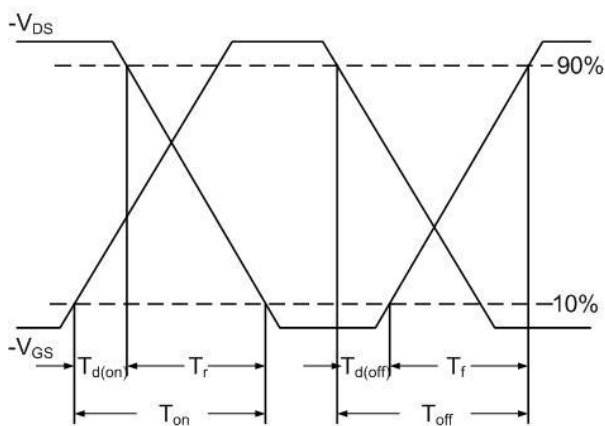


Fig.10 Switching Time Waveform

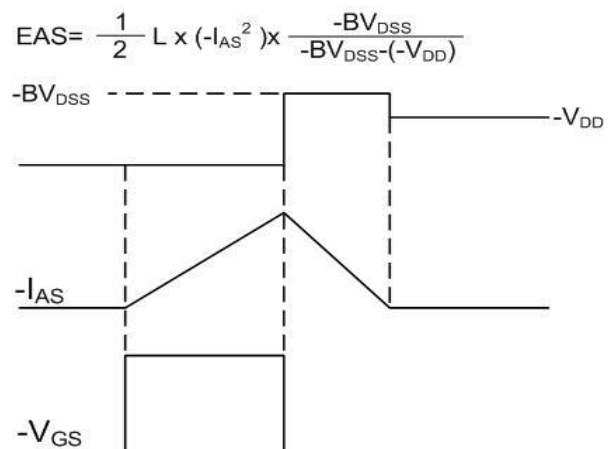
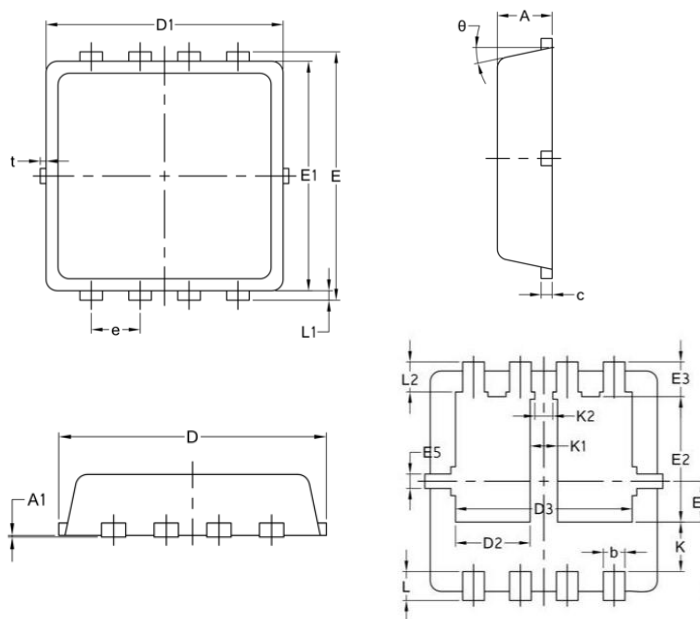


Fig.11 Unclamped Inductive Waveform

PDFN3*3*-8L



Symbol	Common		
	Mm		
	Min	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.25	0.30	0.39
c	0.14	0.152	0.20
D	3.20	3.30	3.45
D1	3.05	3.15	3.25
D2	0.84	1.04	1.24
D3	2.30	2.45	2.60
E	3.20	3.30	3.40
E1	2.95	3.05	3.15
E2	1.60	1.74	1.90
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.50	0.69	0.80
K1	0.30	0.38	0.53
K2	0.15	0.25	0.35
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
L2	0.27	0.42	0.57
t	0	0.075	0.13
Φ	10°	12°	14°