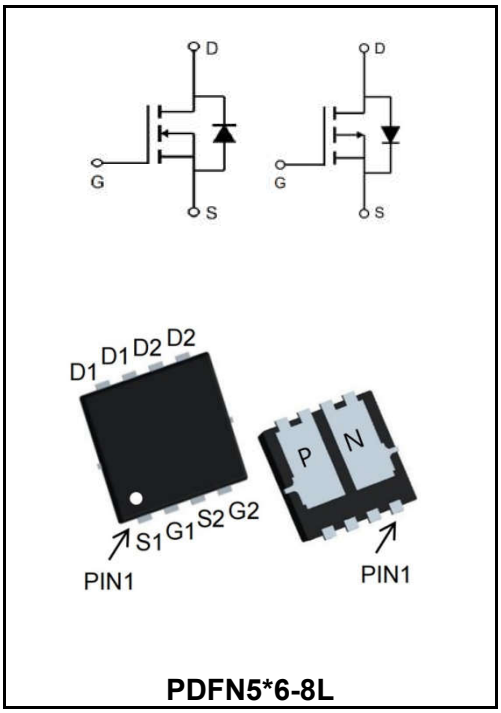
40V N+P-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

I_D	23A
V_{DSS}	40V
R_{DSON}-typ(@V_{GS}=10V)	＜19mΩ(Typ:14 mΩ)
R_{DSON}-typ(@V_{GS}=4.5V)	＜24mΩ(Typ:18 mΩ)
I_D	-20A
V_{DSS}	-40V
R_{DSON}-typ(@V_{GS}=-10V)	＜30mΩ(Typ:20 mΩ)
R_{DSON}-typ(@V_{GS}=-4.5V)	＜40mΩ(Typ:28 mΩ)



PDFN5*6-8L

DESCRIPTION

The YFW23G04NF 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

APPLICATION

- Wireless charging
- Boost driver
- Brushless motor

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, VGS @ 10V[1]@T_C=25℃	I_D	23	-20	A
Continuous Drain Current, VGS @ 10V[1]@T_C=100℃	I_D	18	-16	A
Pulsed Drain Current[2]	I_{DM}	46	-40	A
Single Pulse Avalanche Energy[3]	E_{AS}	28	66	mJ
Avalanche Current	I_{AS}	17.8	-27.2	A
Total Power Dissipation[4]@T_C=25℃	P_D	25	31.3	W
Storage Temperature Range	T_{STG}	-55 to +150	-55 to +150	°C
Operating Junction Temperature Range	T_J	-55 to +150	-55 to +150	°C
Thermal Resistance Junction-Ambient [1]	$R_{\theta JA}$	62		°C/W
Thermal Resistance Junction-Case[1]	$R_{\theta JC}$	5		°C/W

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	V(BR)DSS	40	-	-	V
BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	△BVDSS/△TJ	-	0.032	-	V/℃
Static Drain-Source On-Resistance note[2]	V_{GS}=10V, I_D=15A	$R_{DS(ON)}$	-	14	19	mΩ
	V_{GS}=4.5V, I_D=10A		-	18	24	mΩ
Gate -Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	$V_{GS(th)}$	1.0	1.7	2.5	V
$V_{GS(th)}$ Temperature Coefficien		△$V_{GS(th)}$	-	-4.8	-	mV/℃
Drain-Source Leakage Current	V_{DS}=32V , V_{GS}=0V , T_J=25℃	I_{DSS}	-	-	1	μA
	V_{DS}=32V , V_{GS}=0V , T_J=55℃		-	-	5	
Gate to Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	-	-	±100	nA
Forward Transconductance	V_{DS}=5V , I_D=15A	gfs	-	34	-	S
Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	Rg	-	2.1	-	Ω
Total Gate Charge(4.5V)	V_{DS}=32V V_{GS}=4.5V I_D=15A	Q_g	-	10	-	nC
Gate-Source Charge		Q_{gs}	-	2.55	-	
Gate-Drain Charge		Q_{gd}	-	4.8	-	
Turn-on delay time	V_{DD}=20V V_{GS}=10V R_G=3.3Ω I_D=15A	$t_{d(on)}$	-	2.8	-	ns
Turn-on Rise Time		T_r	-	12.8	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	21.2	-	
Turn-on Fall Time		t_f	-	6.4	-	
Input Capacitance	V_{DS}=15V V_{GS}=0V f=1.0MHz	C_{iss}	-	1013	-	pF
Output Capacitance		C_{oss}	-	107	-	
Reverse Transfer Capacitance		C_{rss}	-	76	-	
Continuous Source Current [1,5]	V_G=V_D=0V , Force Curren	I_S	-	-	23	A
Pulsed Source Current[2,5]		I_{SM}	-	-	46	A
Drain to Source Diode Forward Voltage	V_{GS}=0V , I_S=1A T_J=25℃	V_{SD}	-	-	1.2	V
Reverse Recovery Time	I_F=15A,dI/dt=100A/μs, TJ=25℃	trr	-	10	-	nS
Reverse Recovery Charge		Qrr	-	3.1	-	nS

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=0.1mH,I_{AS}=25A
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.

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

Characteristics	Test Condition	Symbols	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250uA	**V(BR)DSS**	-40	-	-	**V**
BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	$\triangle BV_{DSS/\triangle TJ}$	-	-0.012	-	**V/℃**
Static Drain-Source On-Resistance note[2]	V_{GS}=-10V, I_D=-5A	$R_{DS(ON)}$	-	20	30	**mΩ**
	V_{GS}=-4.5V, I_D=-3.5A		-	28	40	**mΩ**
Gate -Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	$V_{GS(th)}$	-1.0	-1.6	-2.5	**V**
$V_{GS(th)}$ Temperature Coefficien		$\triangle V_{GS(th)}$		4.32	-	**mV/℃**
Drain-Source Leakage Current	V_{DS}=-32V , V_{GS}=0V , T_J=25℃	I_{DSS}	-	-	1	**μA**
	V_{DS}=-32V , V_{GS}=0V , T_J=55℃		-	-	5	
Gate to Body Leakage Current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	-	-	±100	**nA**
Forward Transconductance	V_{DS}=-5V , I_D=-8A	**gfs**	-	12.6	-	**S**
Gate Resistance	VDS=0V , VGS=0V , f=1MHz	**Rg**		13	16	**Ω**
Total Gate Charge（-4.5V）	V_{DS}=-20V V_{GS}=-4.5V I_D=-12A	Q_g	-	9	-	**nC**
Gate-Source Charge		Q_{gs}	-	2.54	-	
Gate-Drain Charge		Q_{gd}	-	3.1	-	
Turn-on delay time	V_{DD}=-15V V_{GS}=-10V R_G=3.3Ω I_D=-1A	$t_{d(on)}$	-	19.2	-	**ns**
Turn-on Rise Time		T_r	-	12.8	-	
Turn-Off Delay Time		$t_{d(OFF)}$	-	48.6	-	
Turn-on Fall Time		t_f	-	4.6	-	
Input Capacitance	V_{DS}=-15V V_{GS}=0V f=1MHz	C_{iss}	-	1004	-	**pF**
Output Capacitance		C_{oss}	-	108	-	
Reverse Transfer Capacitance		C_{rss}	-	80	-	
Continuous Source Current [1,5]	V_G=V_D=0V , Force Curren	I_S	-	-	-20	**A**
Pulsed Source Current[2,5]		I_{SM}	-	-	-40	**A**
Drain to Source Diode Forward Voltage	V_{GS}=0V , I_S=-1A T_J=25℃	V_{SD}	-	-	-1	**V**

Note :
1.The data tested by surface mo unted 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 VDD=-25V,VGS=-10V,L=0.1mH,IAS=-27.2A
4.The power dissipation is limited by 150℃ junction temperature
5 .The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

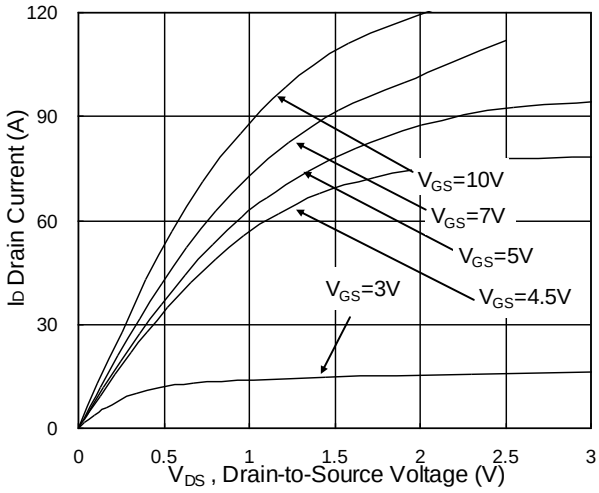


Fig.1 Typical Output Characteristics

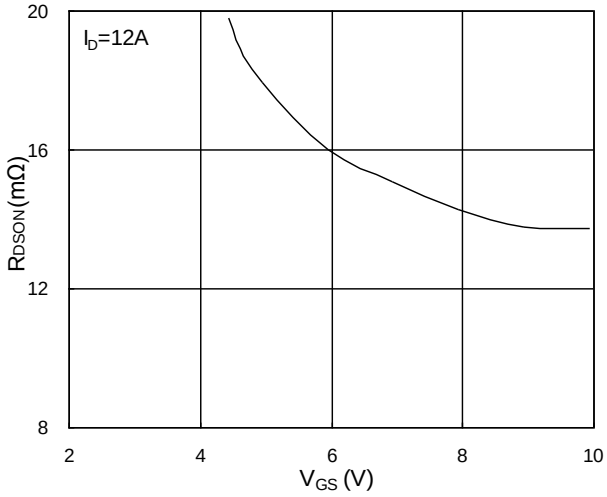


Fig.2 On-Resistance vs. G-S Voltage

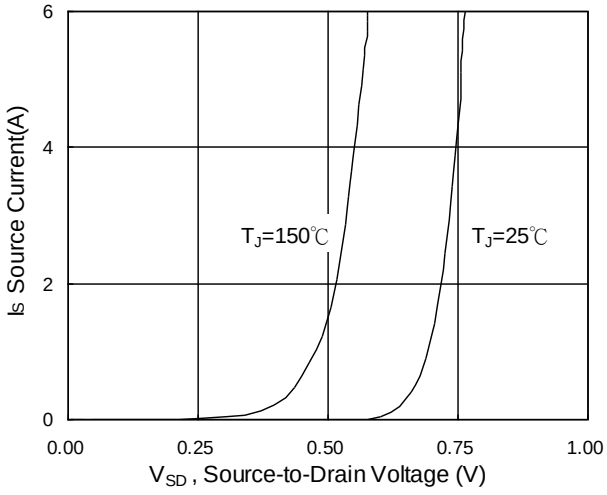


Fig.3 Forward Characteristics of Reverse

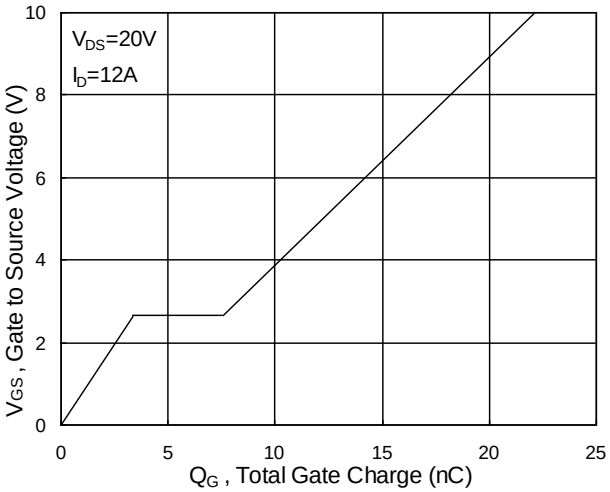


Fig.4 Gate-Charge Characteristics

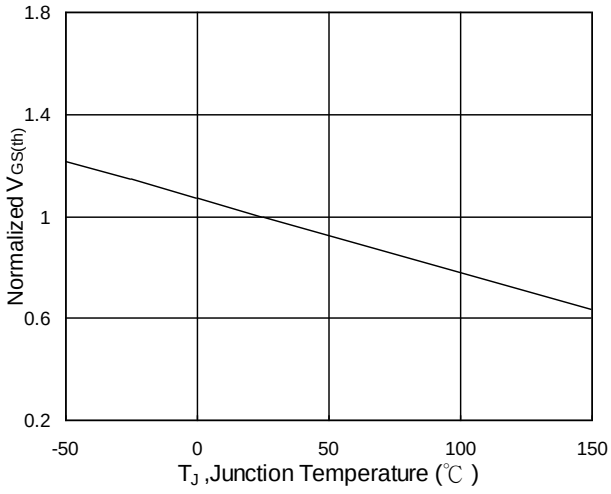


Fig.5 $V_{GS(th)}$ vs. T_J

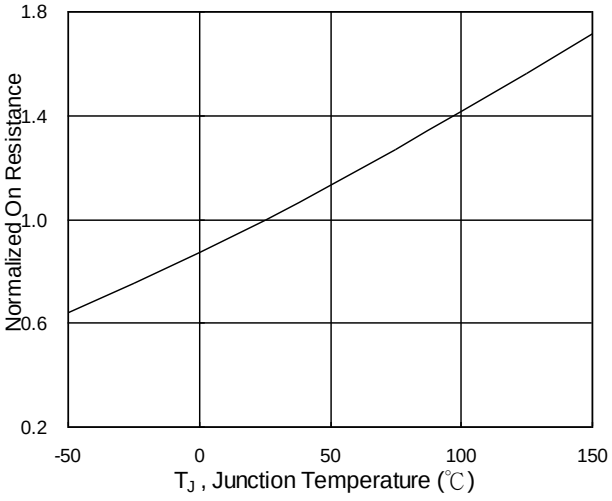


Fig.6 Normalized R_{DSON} vs. T_J

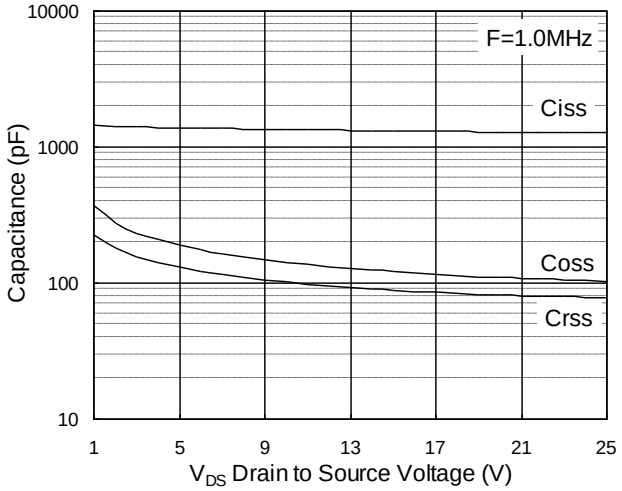


Fig.7 Capacitance

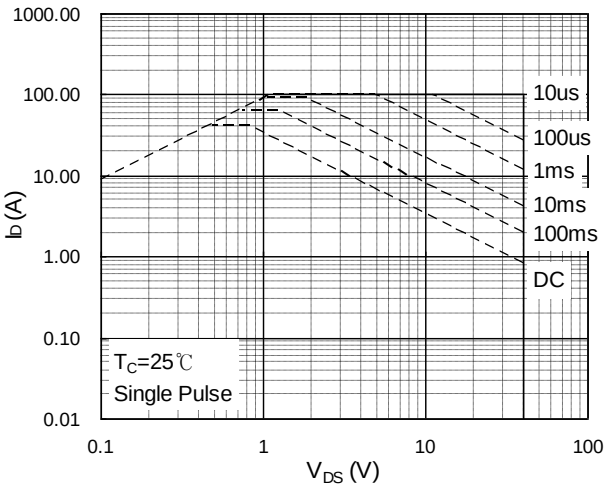


Fig.8 Safe Operating Area

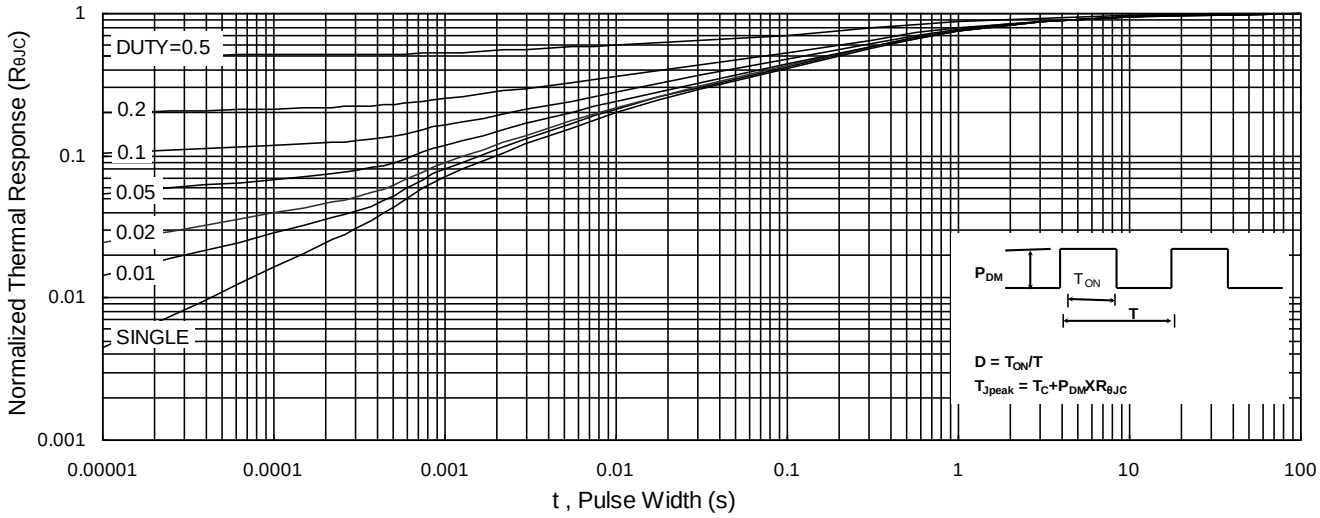


Fig.9 Normalized Maximum Transient Thermal Impedance

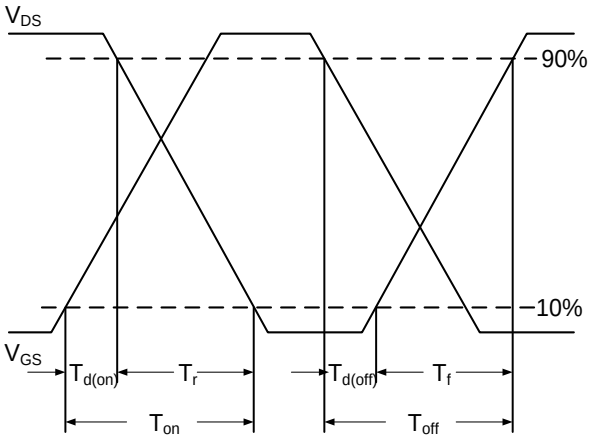


Fig.10 Switching Time Waveform

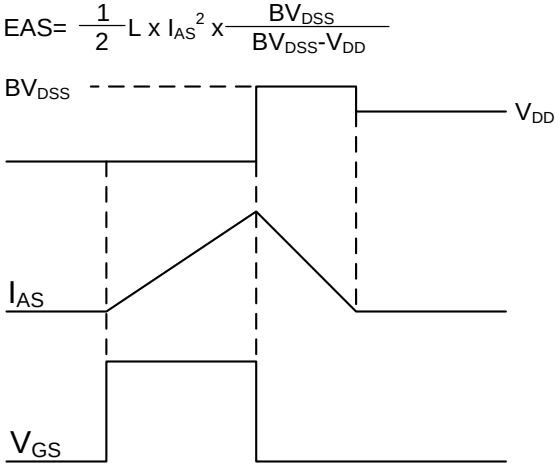


Fig.11 Unclamped Inductive Switching Waveform

P-Typical Characteristics

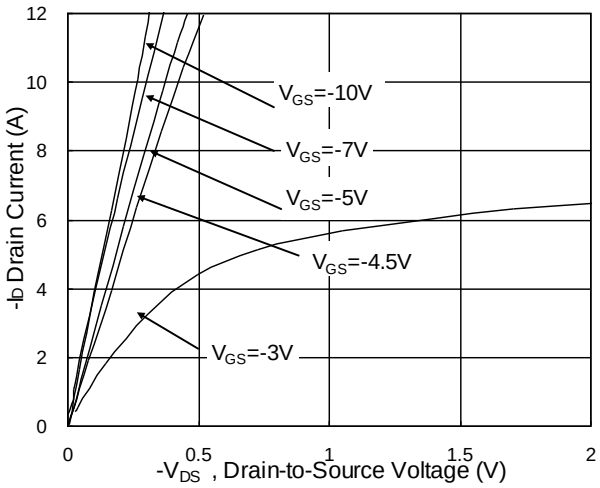


Fig.1 Typical Output Characteristics

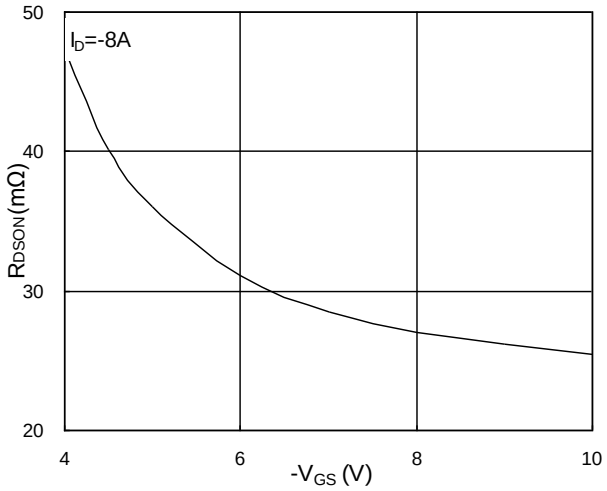


Fig.2 On-Resistance v.s Gate-Source

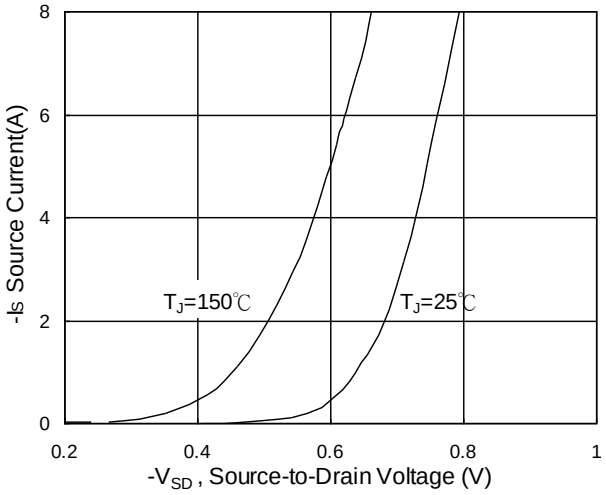


Fig.3 Forward Characteristics Of Reverse

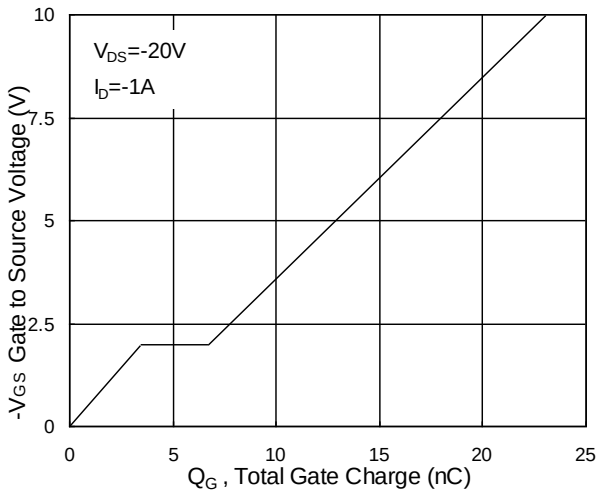


Fig.4 Gate Charge Characteristics

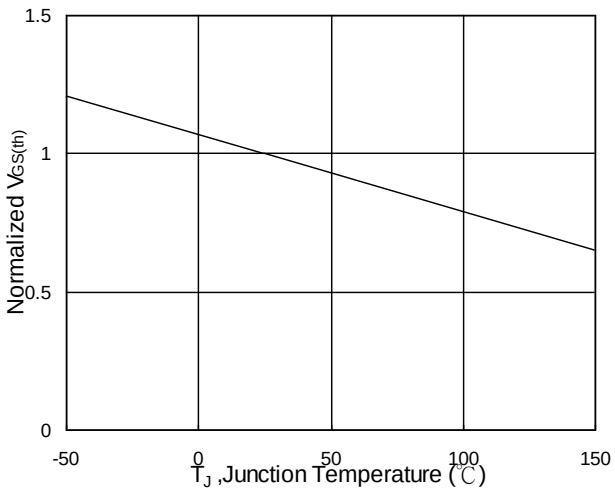


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

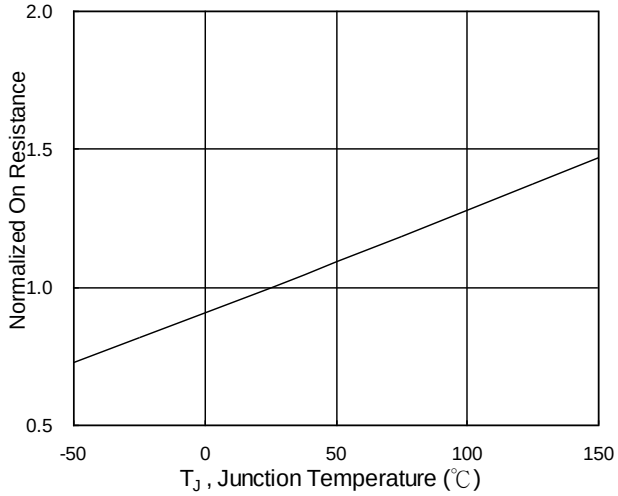


Fig.6 Normalized R_{DSON} v.s T_J

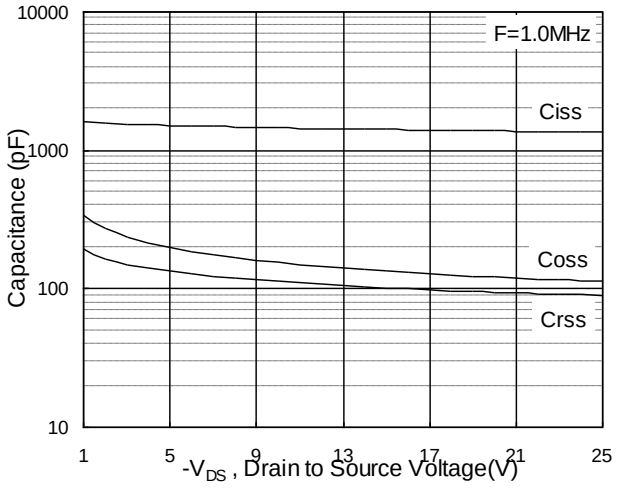


Fig.7 Capacitance

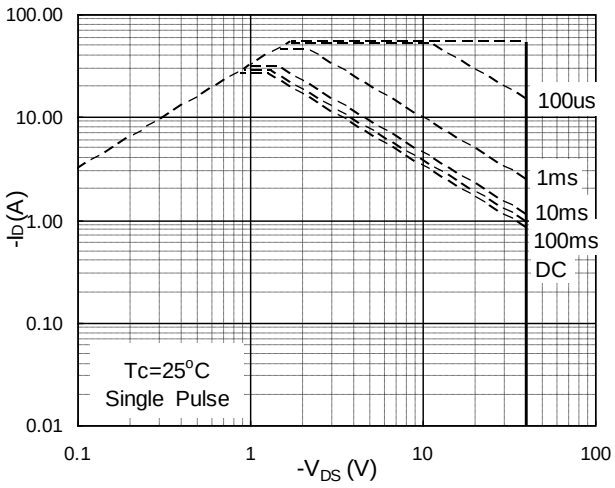


Fig.8 Safe Operating Area

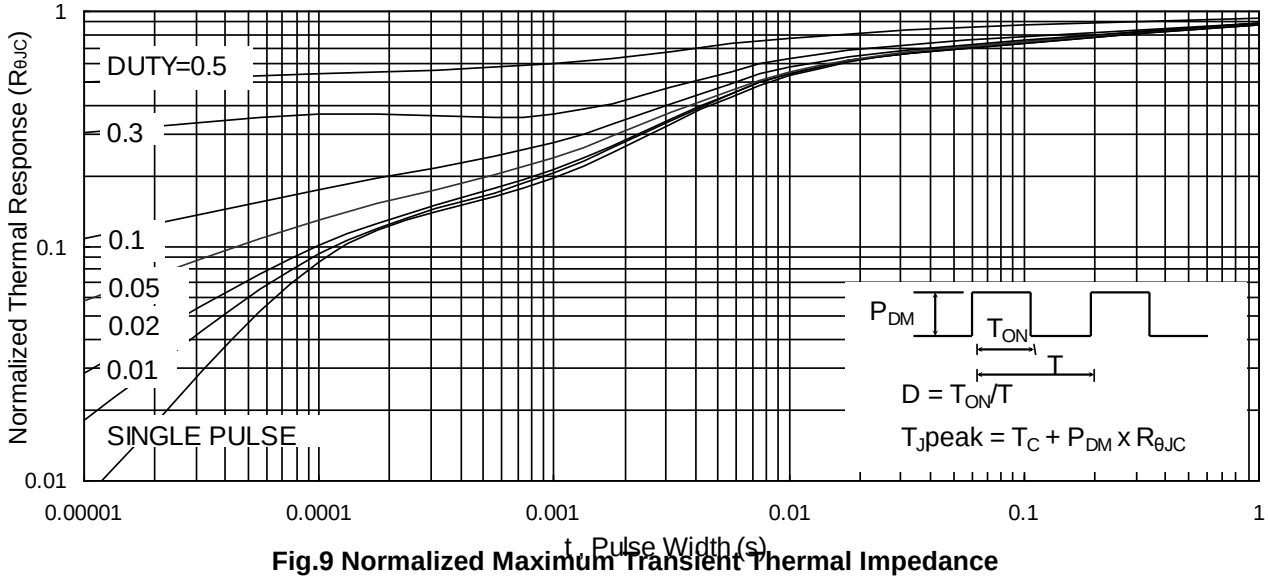


Fig.9 Normalized Maximum Transient Thermal Impedance

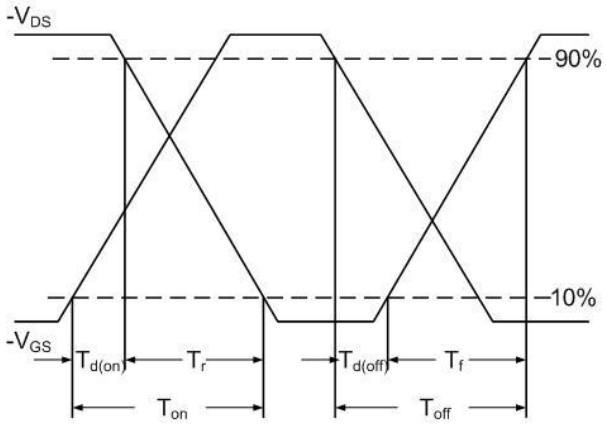


Fig.10 Switching Time Waveform

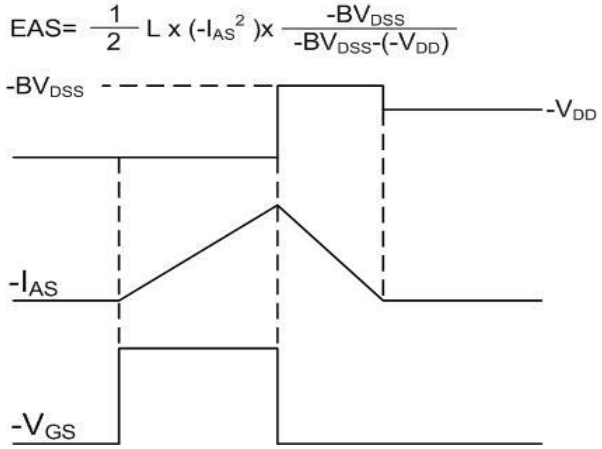
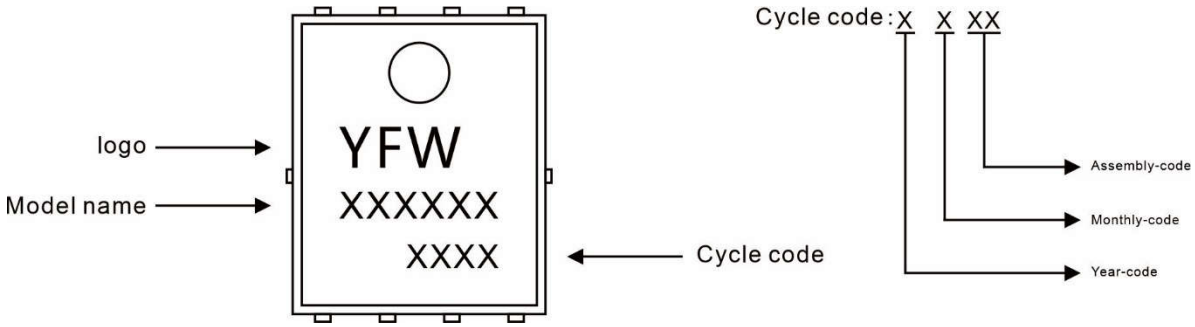


Fig.11 Unclamped Inductive Waveform

Marking Diagram

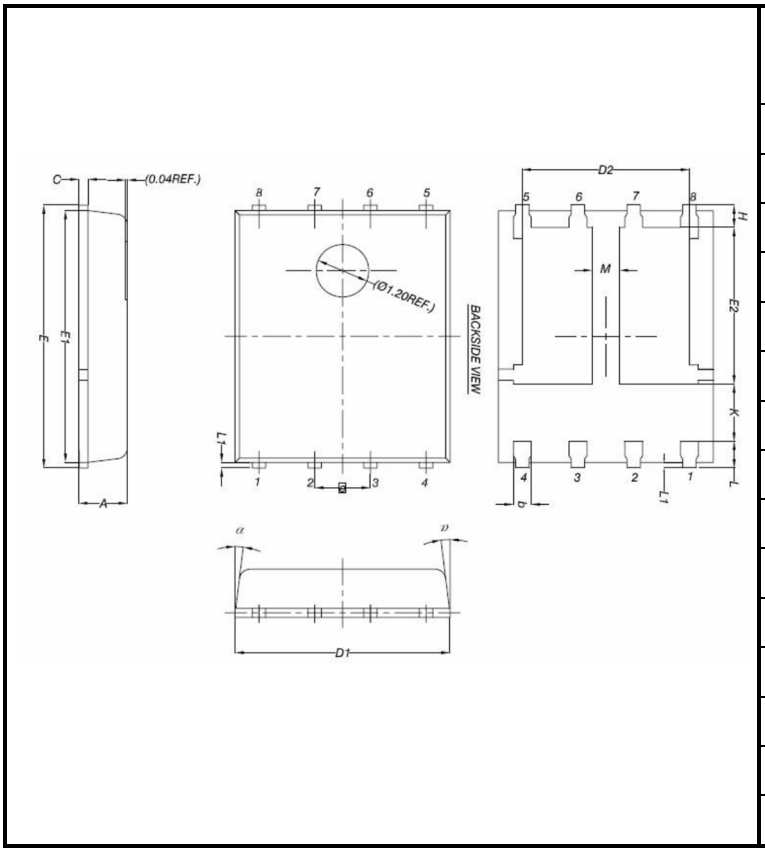


Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW23G04NF	PDFN5*6-8L	0.0032oz(0.093g)	5000pcs/reel	10000pcs/box 50000pcs/Carton

Package Dimensions

PDFN5*6-8L



Dim	Millimeter		mil	
	Min.	Max.	Min.	Max.
A	0.90	1.10	35.43	43.31
b	0.33	0.51	12.99	20.08
C	0.20	0.30	7.87	11.81
D1	4.80	5.00	188.98	196.85
D2	3.61	3.96	142.13	155.91
E	5.90	6.10	232.28	240.16
E1	3.45	5.70	135.83	224.41
E2	3.05	3.38	120.08	133.07
e	1.27BSC		50BSC	
H	0.41	0.61	16.14	24.02
K	1.10	-	43.31	-
L	0.51	0.71	20.08	27.95
L1	0.06	0.20	2.46	7.87
M	0.50	-	19.69	-
a	0°	12°	0°	12°

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