

20V N+P-CHANNEL ENHANCEMENT MODE MOSFET

MAIN CHARACTERISTICS

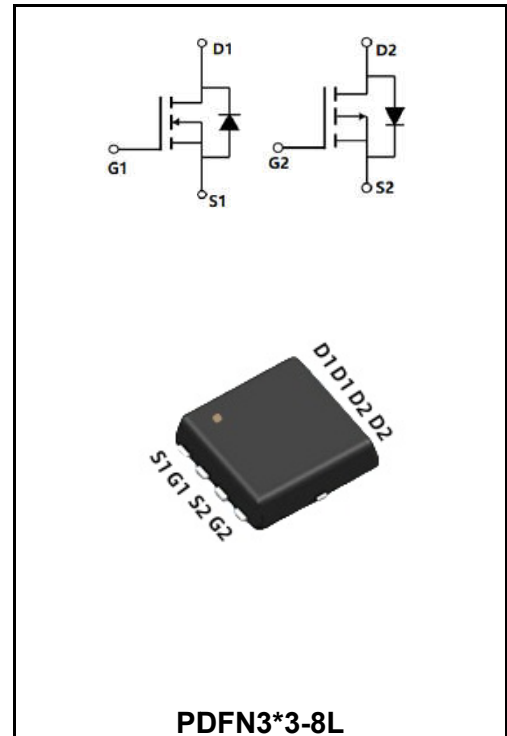
I_D	20A
V_{DSS}	20V
$R_{DS(on)-typ}(@V_{GS}=4.5V)$	$<22m\Omega$ (Typ:16mΩ)
$R_{DS(on)-typ}(@V_{GS}=2.5V)$	$<30m\Omega$ (Typ:20mΩ)
I_D	-18.8A
V_{DSS}	-20V
$R_{DS(on)-typ}(@V_{GS}=-4.5V)$	$<35m\Omega$ (Typ:27mΩ)
$R_{DS(on)-typ}(@V_{GS}=-2.5V)$	$<57m\Omega$ (Typ:38mΩ)

DESCRIPTION

The YFW20G02DF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application

APPLICATION

- ◆High FreTuency Circuit
- ◆low-power consumption



Maximum Ratings at $T_C=25^\circ C$ unless otherwise specified

Characteristics	Symbols	Value		Units
		N-Ch	P-Ch	
Drain-Source Voltage	V_{DS}	20	-20	V
Gate - Source Voltage	V_{GS}	± 12	± 12	V
Continuous Drain Current, $V_{GS} @ 10V^1 @ T_C=25^\circ C$	I_D	20	-18.8	A
Continuous Drain Current, $V_{GS} @ 10V^1 @ T_C=70^\circ C$	I_D	16.2	-15.5	A
Pulsed Drain Current ²	I_{DM}	60	-54	A
Single Pulse Avalanche Energy ³	E_{AS}	85	78	mJ
Total Power Dissipation ⁴ @ $T_C=25^\circ C^4$	P_D	3.5	3.5	W
Storage Temperature Range	T_{STG}	-55 to +150	-55 to +150	$^\circ C$
Operating Junction Temperature Range	T_J	-55 to +150	-55 to +150	$^\circ C$
Thermal Resistance Junction-Ambient ¹	$R_{\theta JA}$	105		$^\circ C/W$
Thermal Resistance Junction-Case ¹	$R_{\theta JC}$	50		$^\circ C/W$

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

Parameter	Test Condition	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV_{DSS}	20	23	-	V
Gate Leakage Current	V _{GS} = ±12V, V _{DS} = 0V	I_{gss}	-	-	±100	nA
Drain Cut-off Current	V _{DS} = 20V, V _{GS} = 0V	I_{DSS}	-	-	1	μA
Gate Threshold Voltage	V _{GS} = V _{DS} , I _D = 250μA	V_{GS(th)}	0.4	0.7	1.2	V
Drain-Source On-State Resistance ³	V _{GS} = 4.5V, I _D = 4.0A	R_{DS(ON)}	-	16	22	mΩ
	V _{GS} = 2.5V, I _D = 3.0A		-	20	30	
Input Capacitance	V _{GS} = 0V, V _{DS} = 10V, f = 1MHz	C_{iss}	-	700	-	pF
Output Capacitance		C_{oss}	-	120	-	
Reverse Transfer Capacitance		C_{rss}	-	105	-	
Total Gate Charge	V _{GS} = 4.5V, V _{DS} = 10V, I _D = 5A	Q_g	-	9.6	-	nC
Gate-Source Charge		Q_{gs}	-	1.4	-	
Gate-Drain Charge		Q_{gd}	-	2.7	-	
Turn-On Time	V _{GS} = 4.5V, V _{DD} = 10V, I _D = 5A, R _G = 3Ω	t_{d(on)}	-	5.5	-	nS
Rise Time		T_r	-	1.3	-	
Turn-Off Time		t_{d(OFF)}	-	10.4	-	
Fall Time		t_f	-	4.8	-	
Body Diode Voltage ³	I _S = 4A, V _{GS} = 0V	V_{SD}	-	-	1.2	V
Continuous Source Current		I_S	-	-	5	A

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 power dissipation is limited by 150°C junction temperature
- 4.The EAS data shows Max. rating . The test condition is VDD=18V,RG=25Ω VGS=4.5V,L=0.1mH,IAS=11A
- 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 (T_J=25 °C, unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = -250μA	BV_{DSS}	-20	-23	-	V
Gate-Body Leakage	V _{DS} = 0V, V _{GS} = ±12V	I_{GSS}	-	-	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = -20V, V _{GS} = 0V	I_{DSS}	-	-	-1	μA
Gate-Threshold Voltage	V _{DS} = V _{GS} , I _D = -250μA	V_{GS(th)}	-0.4	-0.7	-1.2	V
Drain-Source on-Resistance ³	V _{GS} = -4.5V, I _D = -4.1A	R_{DS(ON)}	-	27	35	mΩ
	V _{GS} = -2.5V, I _D = -3.0A		-	38	57	
Input Capacitance	V _{GS} = 0V V _{DS} = -10V f= 1MHz	C_{iss}	-	751	-	pF
Output Capacitance		C_{oss}	-	97	-	
Reverse Transfer Capacitance		C_{rss}	-	80	-	
Total Gate Charge	V _{GS} = -4.5V V _{DS} = -10V I _D = -4A	Q_g	-	9.3	-	nC
Gate-Source Charge		Q_{gs}	-	1	-	
Gate-Drain Charge		Q_{gd}	-	2.2	-	
Turn-on Delay Time	V _{GS} = -4.5V V _{DS} = -10V R _G = 3Ω I _D = -4A	t_{d(on)}	-	13	-	nS
Rise time		T_r	-	9	-	
Turn-off Delay Time		t_{d(OFF)}	-	19	-	
Fall Time		t_f	-	29	-	
Body Diode Voltage ³	I _S = -1A, V _{GS} = 0V	V_{SD}	-	-	-1	V
Continuous Source Current		I_S	-	-	-4.1	A

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 power dissipation is limited by 150°C junction temperature

4.The EAS data shows Max. rating . The test condition is VDD=18V,RG=25Ω VGS=4.5V,L=0.1mH,IAS=18A

5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

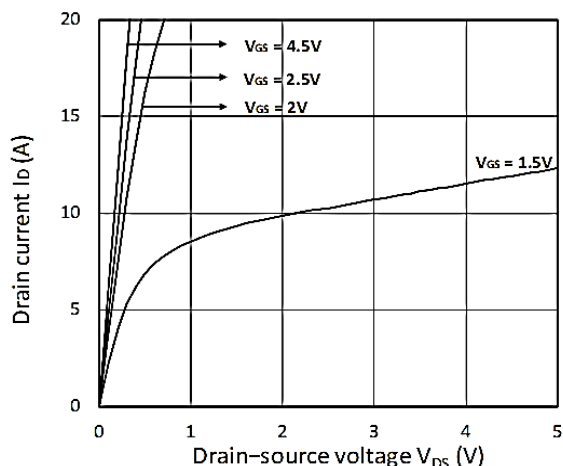


Figure 1. Output Characteristics

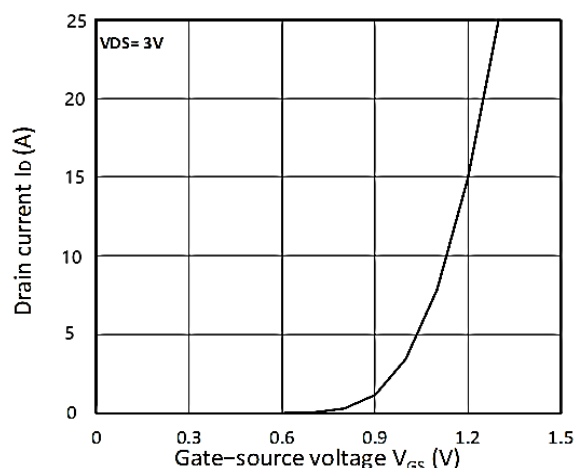


Figure 2. Transfer Characteristics

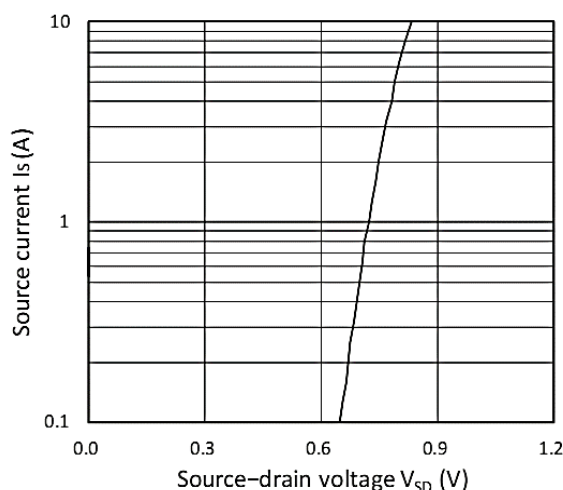


Figure 3. Forward Characteristics of Reverse

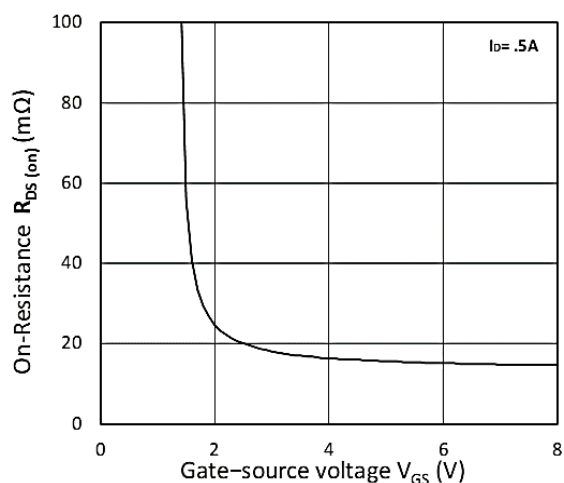


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

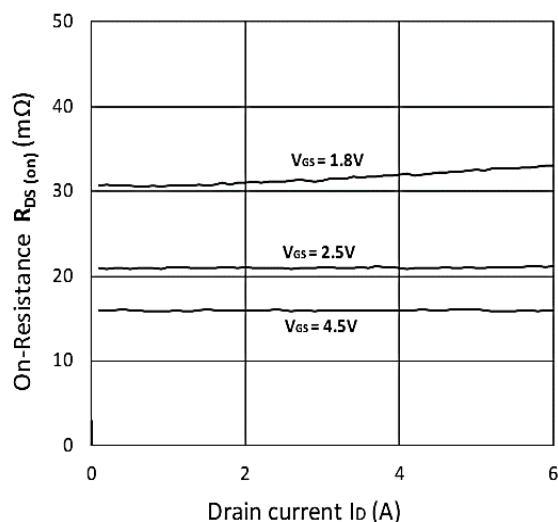


Figure 5. $R_{DS(ON)}$ vs. I_D

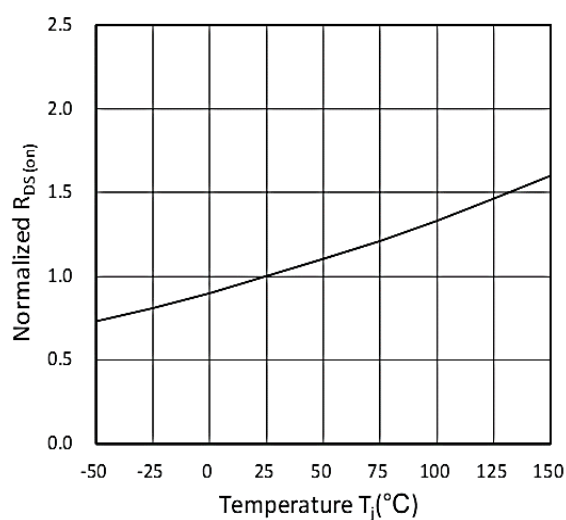


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

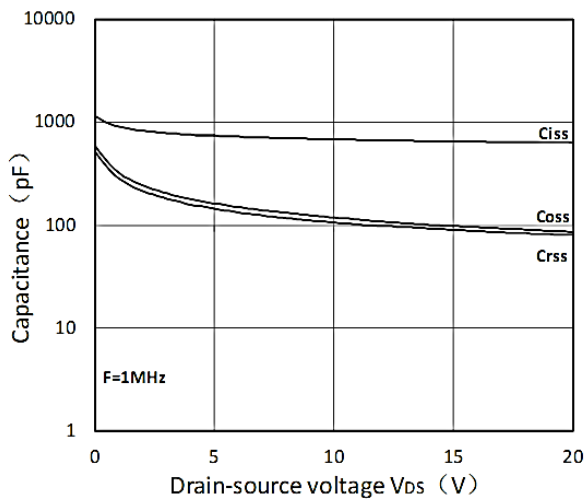


Figure 7. Capacitance Characteristics

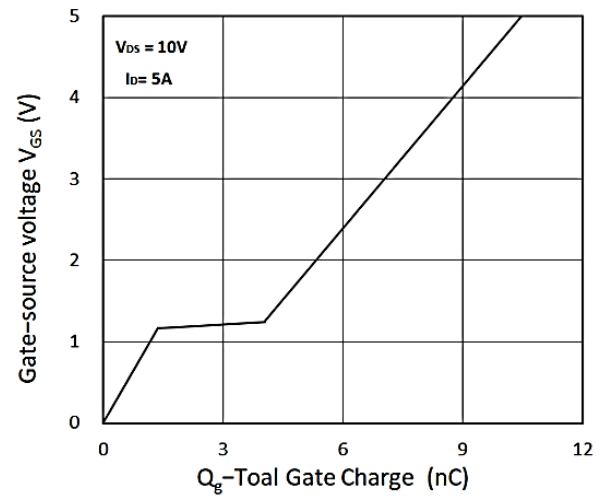


Figure 8. Gate Charge Characteristics

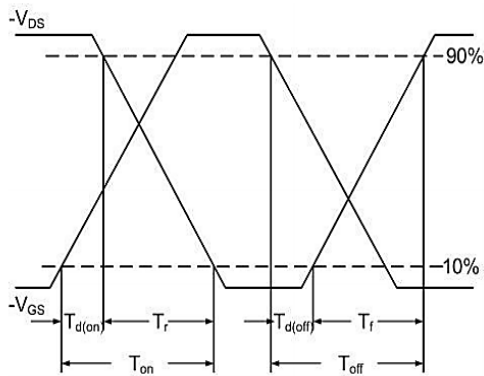


Figure.9 Switching Time Waveform

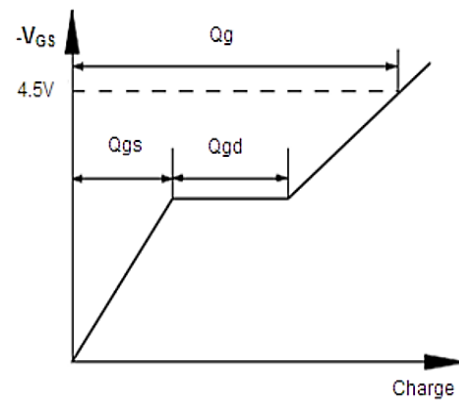


Figure.10 Gate Charge Waveform

P-Typical Characteristics

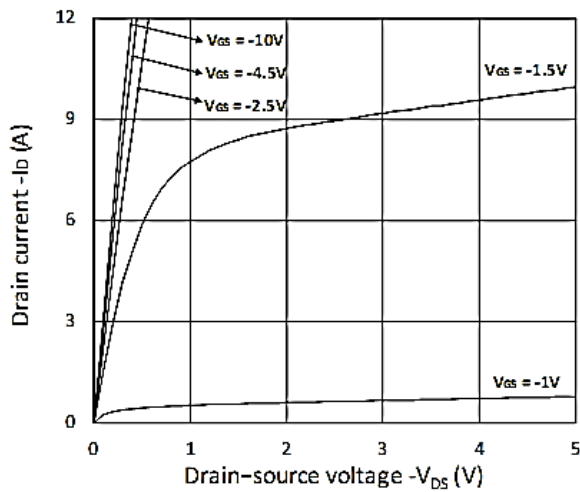


Figure 1. Output Characteristics

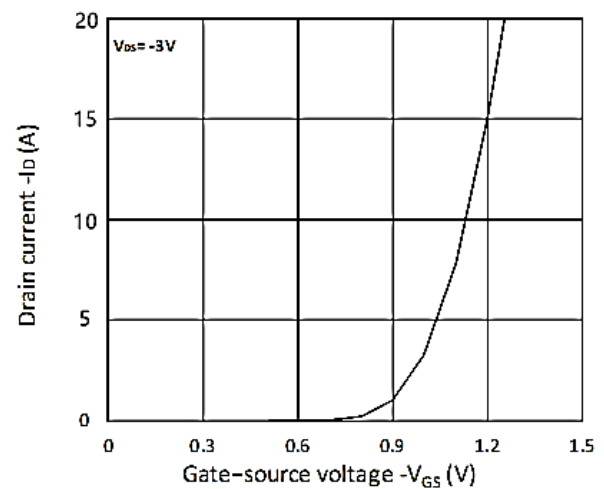


Figure 2. Transfer Characteristics

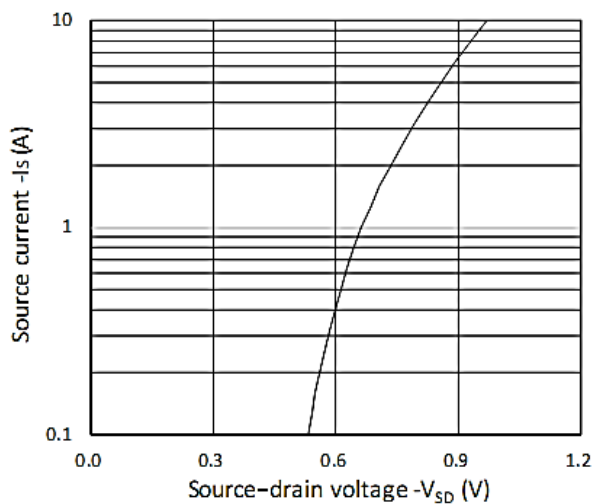


Figure 3. Forward Characteristics of Reverse

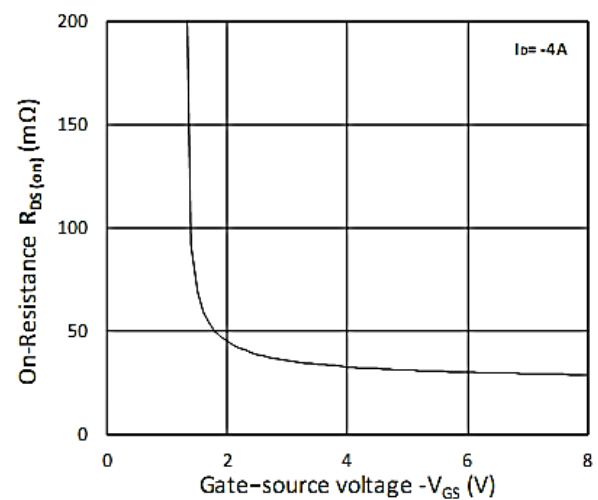


Figure 4. R_DS(ON) vs. V_GS

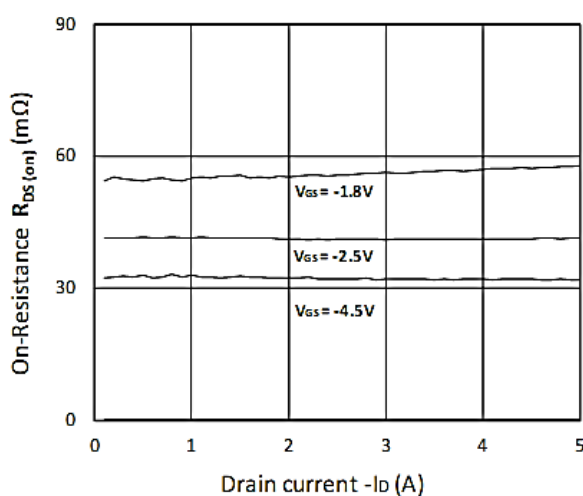


Figure 5. R_DS(ON) vs. I_D

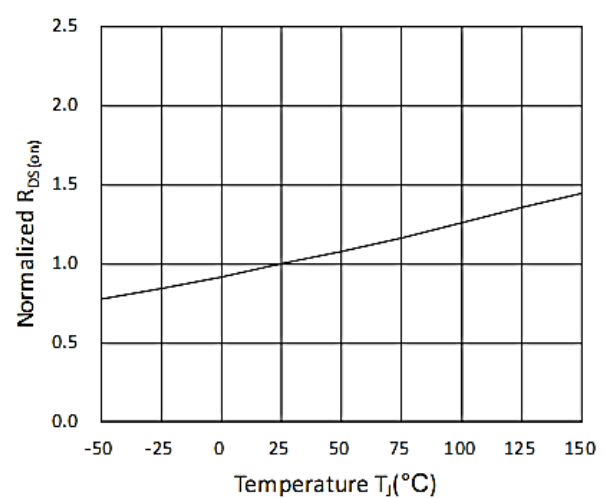


Figure 6. Normalized R_DS(on) vs. Temperature

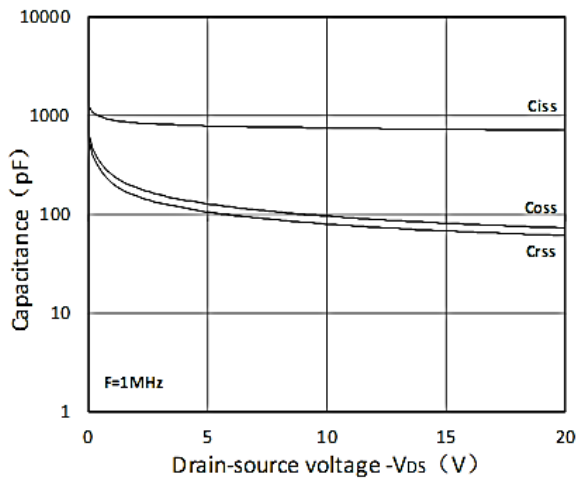


Figure 7. Capacitance Characteristics

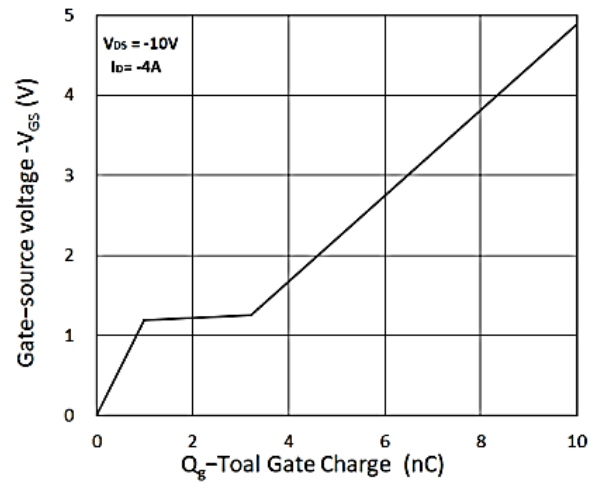


Figure 8. Gate Charge Characteristics

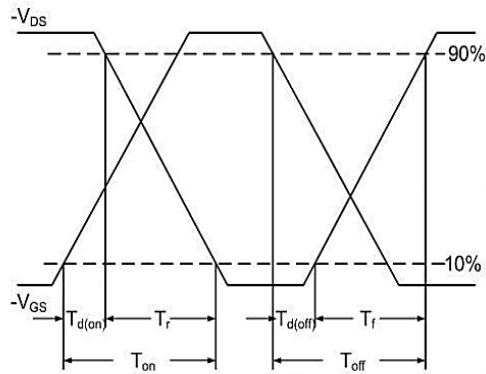


Figure.9 Switching Time Waveform

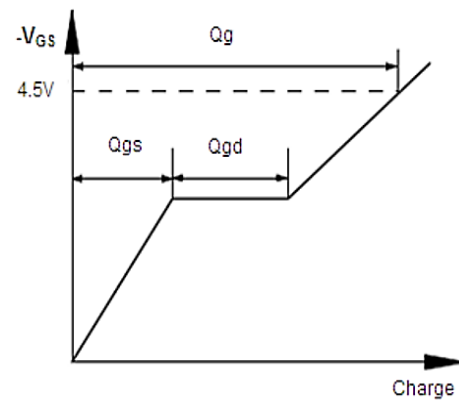
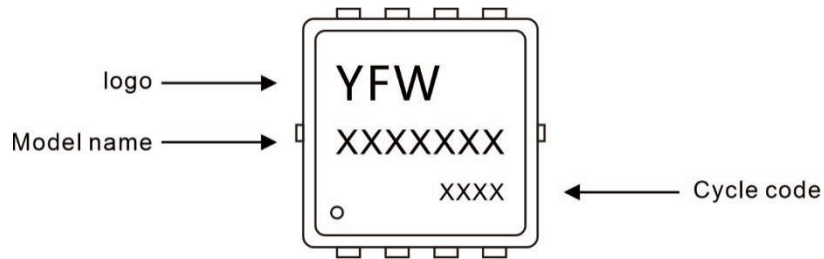


Figure.10 Gate Charge Waveform

Marking Diagram



Ordering information

Model name	Package	Unit Weight	Base Quantity	Packing Quantity
YFW20G02DF	PDFN3*3-8L	0.0023oz(0.065g)	5000pcs/reel	10000pcs/box 50000pcs/Carton

Package Dimensions

PDFN3*3-8L

Dim	Millimeter		mil	
	Min.	Max.	Min.	Max.
A	0.70	0.85	0.028	0.034
A1	-	0.05	-	0.002
b	0.25	0.39	0.010	0.015
c	0.14	0.20	0.006	0.008
D	3.20	3.45	0.126	0.136
D1	3.05	3.25	0.120	0.128
D2	0.84	1.24	0.033	0.049
D3	2.30	2.60	0.091	0.102
E	3.20	3.40	0.126	0.134
E1	2.95	3.15	0.116	0.124
E2	1.60	1.90	0.063	0.075
E3	0.28	0.65	0.011	0.026
E4	0.37	0.77	0.015	0.030
E5	0.10	0.30	0.004	0.012
e	0.60	0.70	0.024	0.028
K	0.50	0.80	0.020	0.032
K1	0.30	0.53	0.012	0.021
K2	0.15	0.35	0.006	0.014
L	0.30	0.50	0.012	0.020
L1	0.06	0.20	0.002	0.008
L2	0.27	0.57	0.011	0.022
t	0	0.13	0	0.005
Φ	10°	14°	10°	14°

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