

FEATURES

- ☐ Originative New Design
- ☐ 100% EAS Test
- ☐ Rugged Gate Oxide Technology
- ☐ Extremely Low Intrinsic Capacitances
- ☐ Remarkable Switching Characteristics
- ☐ Unequalled Gate Charge : 13.2 nC (Typ.)
- ☐ Extended Safe Operating Area
- ☐ Lower $R_{DS(ON)}$: 2.0 Ω (Typ.) @ $V_{GS}=10V$
- ☐ RoHS PKG

APPLICATION

- ☐ Low power battery chargers
- ☐ Switch mode power supply (SMPS)
- ☐ AC adaptors

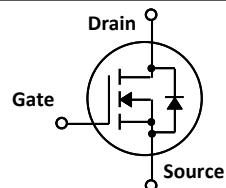
PFP6N70F / PFF6N70F

700V N-Channel MOSFET

$$BV_{DSS} = 700 V$$

$$R_{DS(on)} = 2.0 \Omega$$

$$I_D = 4.0 A$$

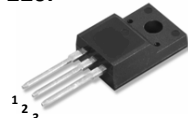


TO-220



1.Gate 2. Drain 3. Source

TO-220F



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

$T_C=25^\circ C$ unless otherwise specified

Symbol	Parameter	PFP6N70F	PFF6N70F	Units
V_{DSS}	Drain-Source Voltage	700		V
I_D	Drain Current – Continuous ($T_C = 25^\circ C$)	5.0	5.0*	A
	Drain Current – Continuous ($T_C = 100^\circ C$)	3.1	3.1*	A
I_{DM}	Drain Current – Pulsed (Note 1)	20	20*	A
V_{GS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	240		mJ
I_{AR}	Avalanche Current (Note 1)	5.0		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	12		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation ($T_C = 25^\circ C$)	119		W
	- Derate above $25^\circ C$	0.95		W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ C$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		$^\circ C$

* Drain current limited by maximum junction temperature.

Thermal Resistance Characteristics

Symbol	Parameter	PFP6N70F	PFF6N70F	Units
$R_{\theta JC}$	Junction-to-Case	1.05	3.20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient	62.5	62.5	

Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.0	--	4.0	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	--	2.0	2.4	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	700	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	1.0	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 700\text{ V}, V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 560\text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	100	μA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30\text{ V}, V_{DS} = 0\text{ V}$	--	--	-100	μA

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	760	990	pF
C_{oss}	Output Capacitance		--	70	90	pF
C_{rss}	Reverse Transfer Capacitance		--	6	8	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS} = 350\text{ V}, I_D = 2.5\text{ A},$ $R_G = 25\text{ }\Omega, R_L = 70\text{ }\Omega$ (Note 4,5)	--	17	34	ns
t_r	Turn-On Rise Time		--	17	34	ns
$t_{d(off)}$	Turn-Off Delay Time		--	31	62	ns
t_f	Turn-Off Fall Time		--	16	32	ns
Q_g	Total Gate Charge	$V_{DS} = 560\text{ V}, I_D = 5.0\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4,5)	--	13.2	20	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	4	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I_S	Continuous Source-Drain Diode Forward Current		--	--	4.0	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	16	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 5.0\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 5.0\text{ A}, V_{GS} = 0\text{ V}$ $di_f/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	300	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.5	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=5.0\text{ A}, V_{DD}=50\text{ V}, R_G=25\text{ }\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 5.0\text{ A}, di/dt\leq 300\text{ A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

Typical Characteristics

Figure1. On Region Characteristics

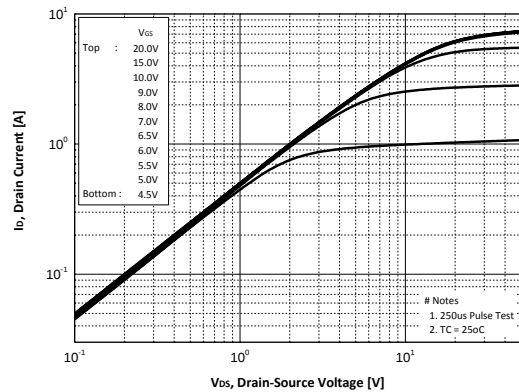


Figure 2. Transfer Characteristics

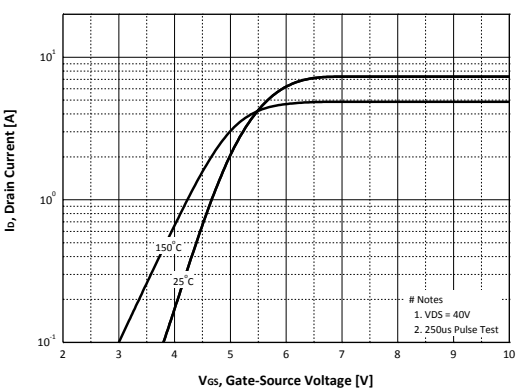


Figure 3. Static Drain-Source On Resistance

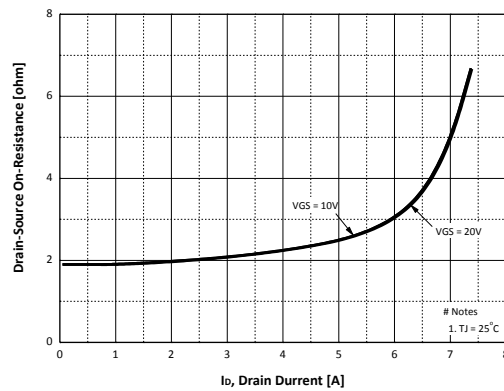


Figure 4. Body Diode Forward Voltage

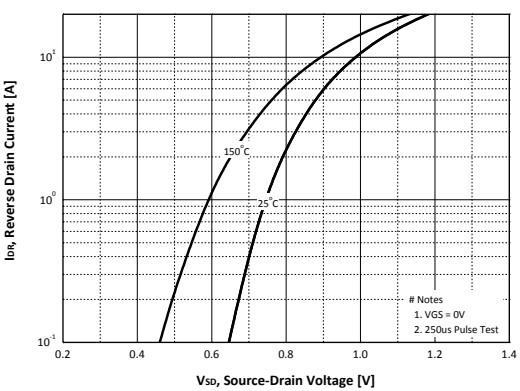


Figure 5. Capacitance Characteristics

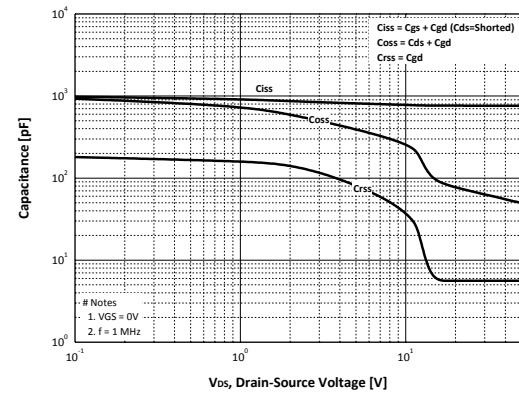
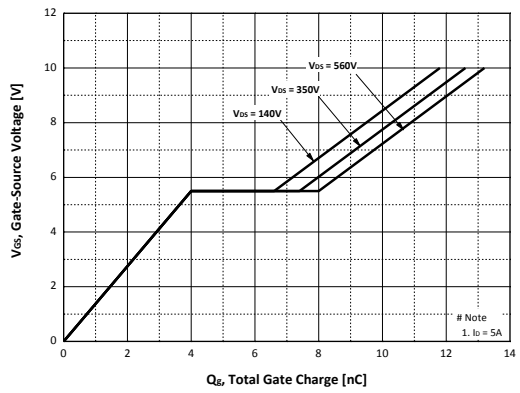


Figure 6. Gate Charge Characteristics



Typical Characteristics

Figure 7. Breakdown Voltage Variation vs. Temperature

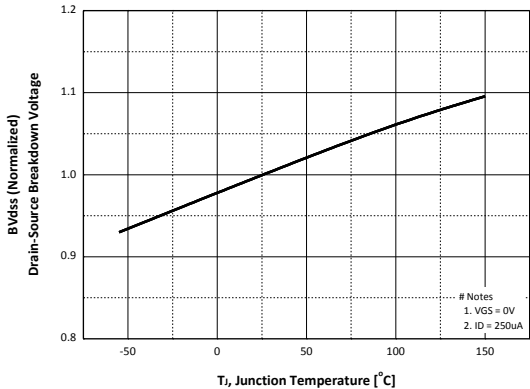


Figure 8. On-Resistance Variation vs. Temperature

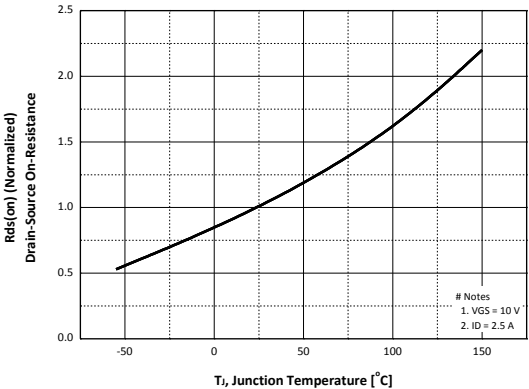


Figure 9. Safe Operation Area (PFP6N70F)

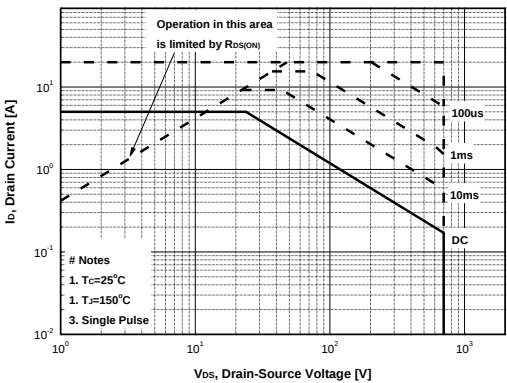


Figure 9. Safe Operation Area (PFF6N70F)

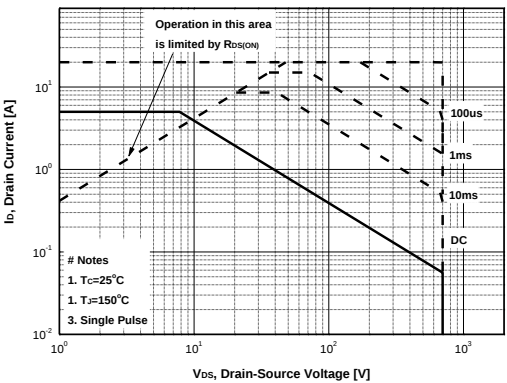
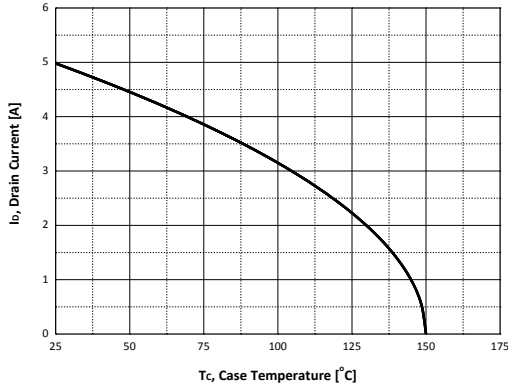


Figure 10. Maximum Drain Current vs. Case Temperature



Typical Characteristics

Figure 11. Transient Thermal Response Curve
(PFP6N70F)

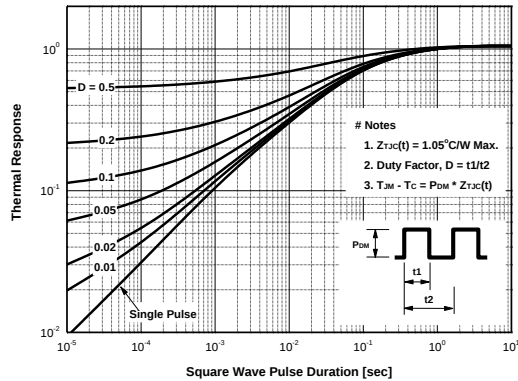
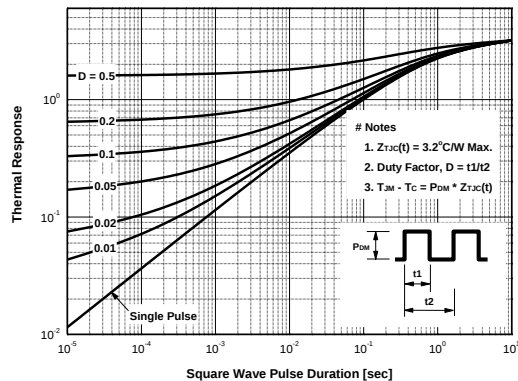


Figure 11. Transient Thermal Response Curve
(PFF6N70F)



Characteristics Test Circuit & Waveform

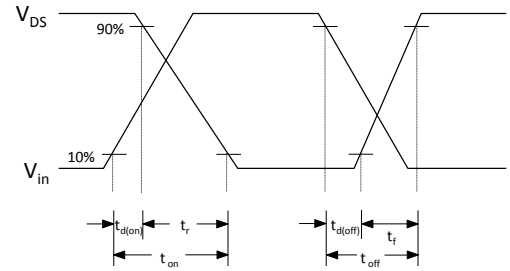
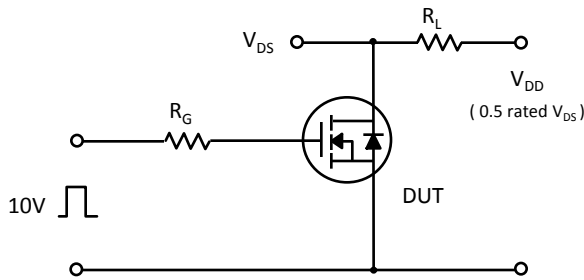


Fig 14. Resistive Switching Test Circuit & Waveforms

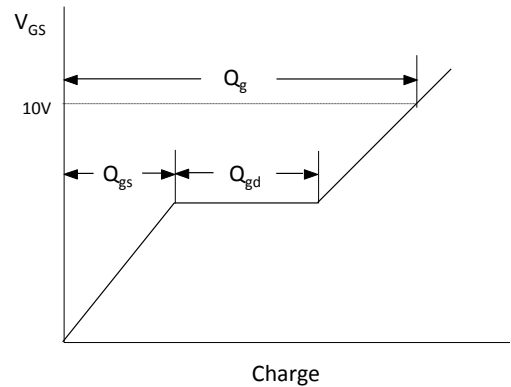
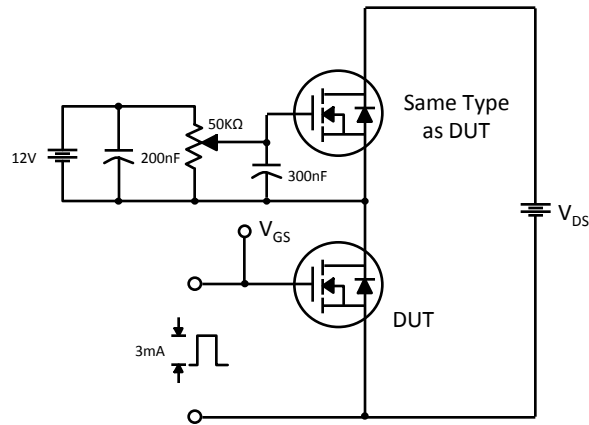


Fig 15. Gate Charge Test Circuit & Waveform

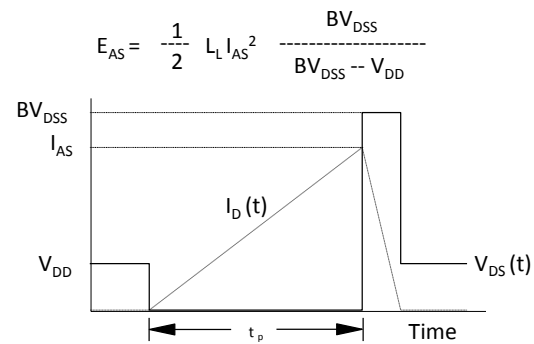
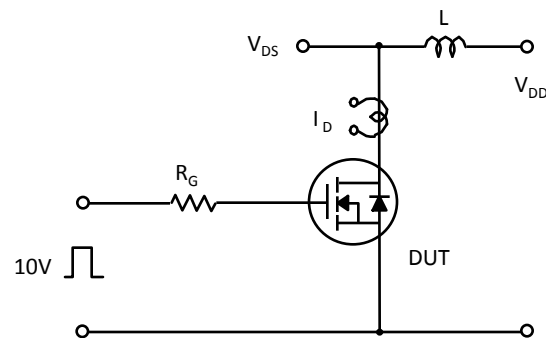


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

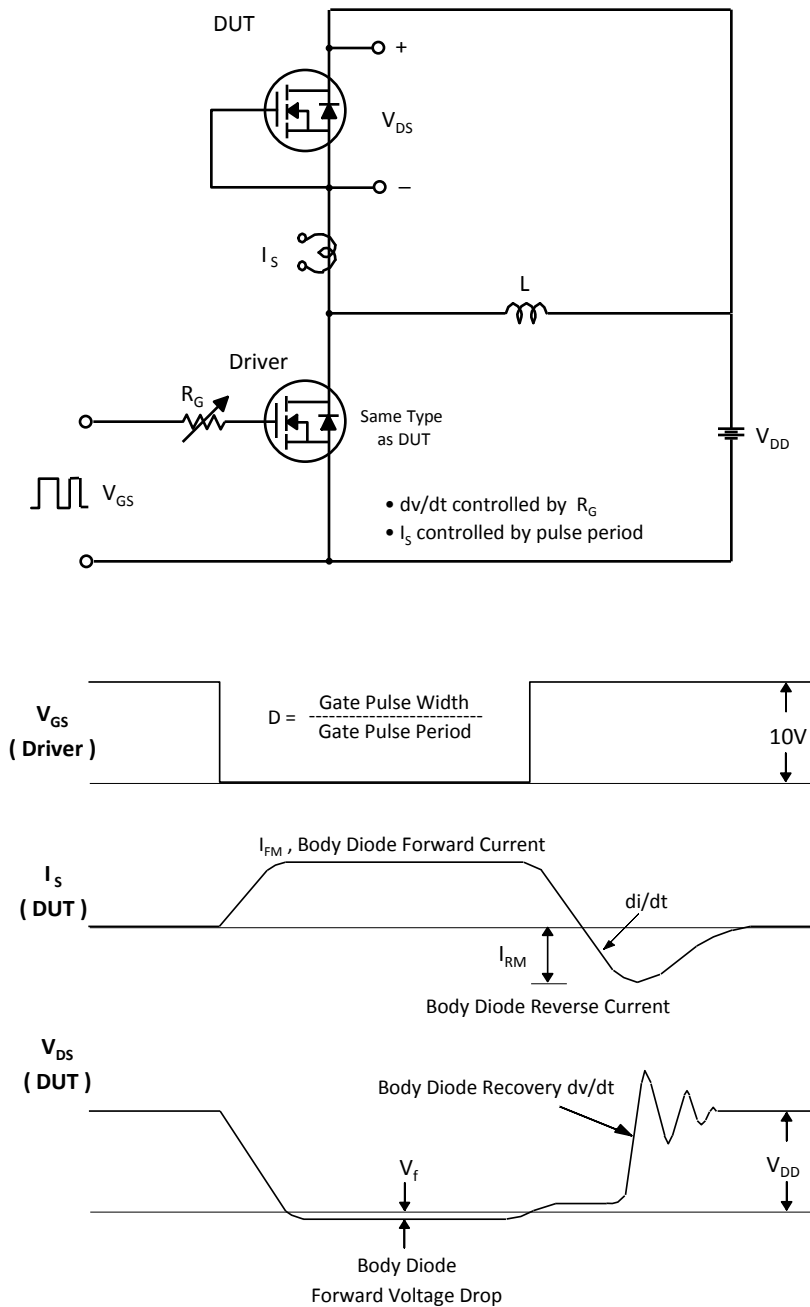


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms