

FEATURES

- Originative New Design
- 100% EAS Test
- Rugged Gate Oxide Technology
- Extremely Low Intrinsic Capacitances
- Remarkable Switching Characteristics
- Unequalled Gate Charge : 22.2 nC (Typ.)
- Extended Safe Operating Area
- Lower $R_{DS(ON)}$: 2.4 Ω (Typ.) @ $V_{GS}=10V$

APPLICATION

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

PFP6N80 / PFF6N80

800V N-Channel MOSFET

$BV_{DSS} = 800\text{ V}$ $R_{DS(on)} = 2.4\ \Omega$ $I_D = 5.5\text{ A}$	
TO-220 1.Gate 2. Drain 3. Source	TO-220F 1.Gate 2. Drain 3. Source

Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	PFP6N80	PFF6N80	Units
V_{DSS}	Drain-Source Voltage	800		V
I_D	Drain Current – Continuous ($T_C = 25^\circ\text{C}$)	5.5	5.5*	A
	Drain Current – Continuous ($T_C = 100^\circ\text{C}$)	3.5	3.5*	A
I_{DM}	Drain Current – Pulsed (Note 1)	22	22*	A
V_{GS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	600		mJ
I_{AR}	Avalanche Current (Note 1)	5.5		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	17.9		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Total Power Dissipation ($T_A=25^\circ\text{C}$) *	2.0		W
	Power Dissipation ($T_C = 25^\circ\text{C}$) - Derate above 25°C	179	60	W
		1.43	0.48	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		$^\circ\text{C}$

* Drain current limited by maximum junction temperature.

Thermal Resistance Characteristics

Symbol	Parameter	PFP6N80	PFF6N80	Units
$R_{\theta JC}$	Junction-to-Case	0.7	2.1	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient*	0.5	--	
$R_{\theta JA}$	Junction-to-Ambient	62.5	62.5	

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

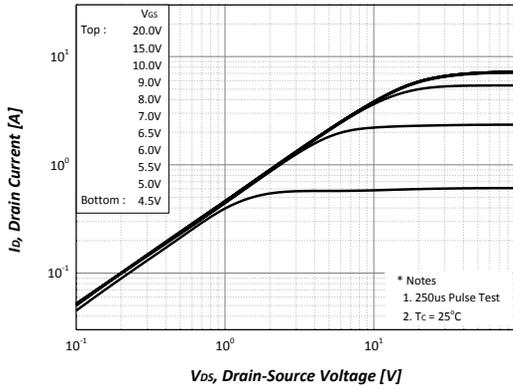
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
V_{GS}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 3.0 \text{ A}$	--	2.4	3.0	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	800	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250 \mu\text{A}$, Referenced to 25°C	--	0.56	--	$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 800 \text{ V}, V_{GS} = 0 \text{ V}$	--	--	10	μA
		$V_{DS} = 640 \text{ V}, T_C = 125^\circ\text{C}$	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 30 \text{ V}, V_{DS} = 0 \text{ V}$	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -30 \text{ V}, V_{DS} = 0 \text{ V}$	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 25 \text{ V}, V_{GS} = 0 \text{ V}, f = 1.0 \text{ MHz}$	--	1175	1530	pF
C_{oss}	Output Capacitance		--	76	100	pF
C_{rss}	Reverse Transfer Capacitance		--	22	30	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	$V_{DS} = 400 \text{ V}, I_D = 6.0 \text{ A}, R_G = 25 \Omega, R_L = 67 \Omega$ (Note 4,5)	--	26	55	ns
t_r	Turn-On Rise Time		--	18	40	ns
$t_{d(off)}$	Turn-Off Delay Time		--	53	110	ns
t_f	Turn-Off Fall Time		--	28	60	ns
Q_g	Total Gate Charge	$V_{DS} = 640 \text{ V}, I_D = 6.0 \text{ A}, V_{GS} = 10 \text{ V}$ (Note 4,5)	--	22.2	33	nC
Q_{gs}	Gate-Source Charge		--	8.5	--	nC
Q_{gd}	Gate-Drain Charge		--	4.2	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	5.5	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	22	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 6.0 \text{ A}, V_{GS} = 0 \text{ V}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 6.0 \text{ A}, V_{GS} = 0 \text{ V}, di_f/dt = 100 \text{ A}/\mu\text{s}$ (Note 4)	--	530	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.3	--	μC

Notes ;

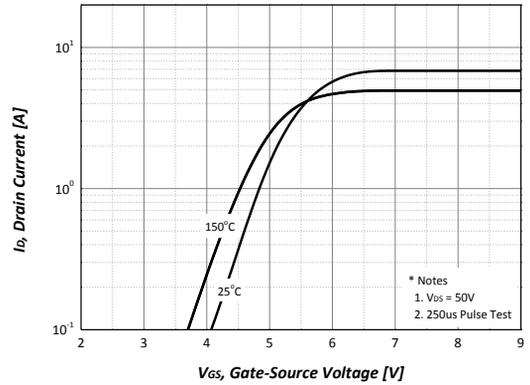
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=6.0\text{A}, V_{DD}=50\text{V}, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 6.0\text{A}, di/dt\leq 300\text{A}/\mu\text{s}, V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

Typical Characteristics

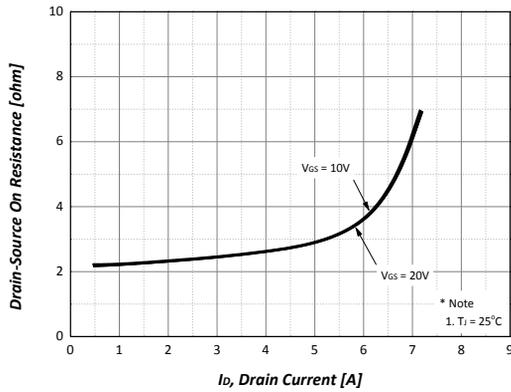
On Region Characteristics



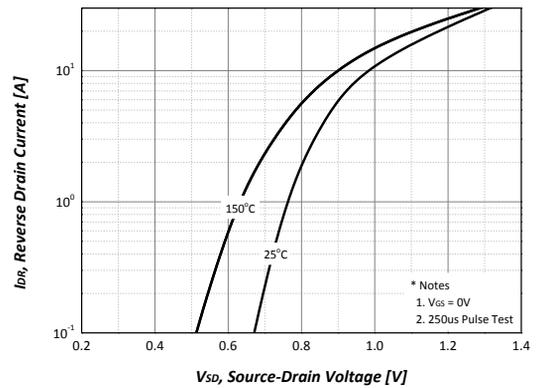
Transfer Characteristics



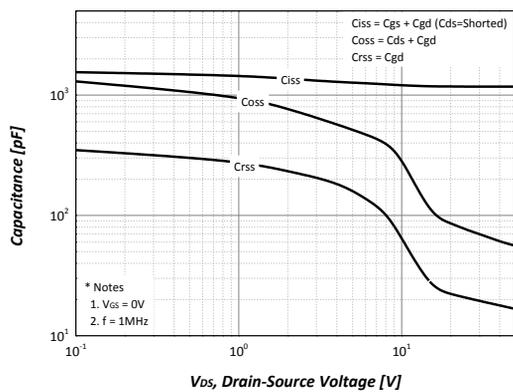
Static Drain-Source On Resistance



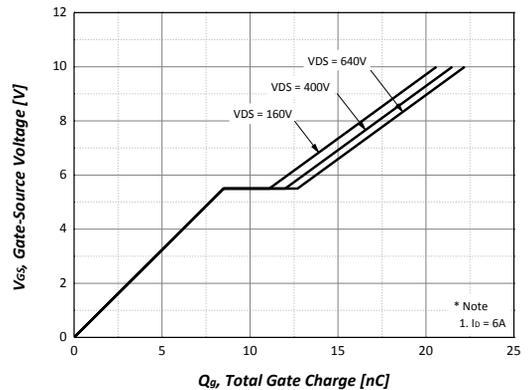
Body Diode Forward Voltage



Capacitance Characteristics

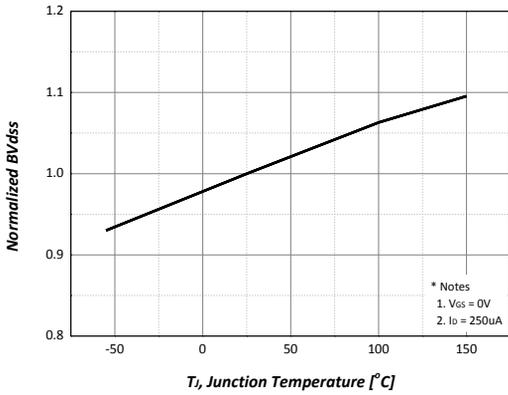


Gate Charge Characteristics

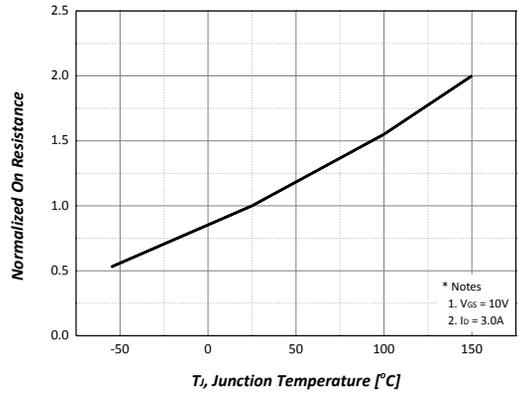


Typical Characteristics

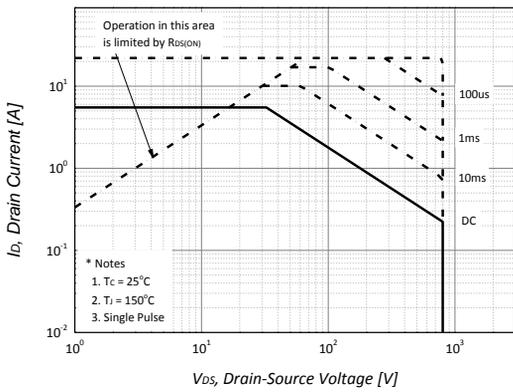
BV_{ds} Variation vs. Temperature



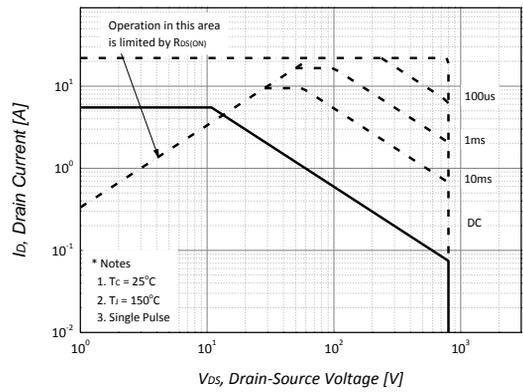
On Resistance Variation vs. Temperature



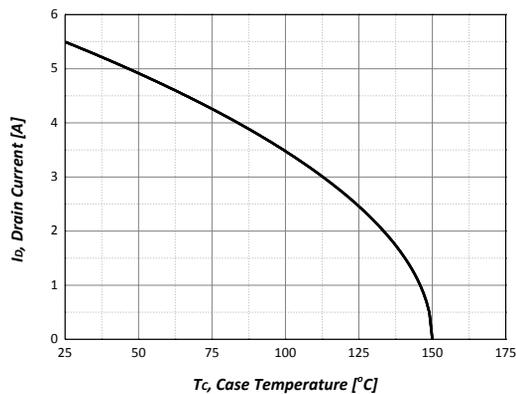
Safe Operation Area (TO-220)



Safe Operation Area (TO-220F)

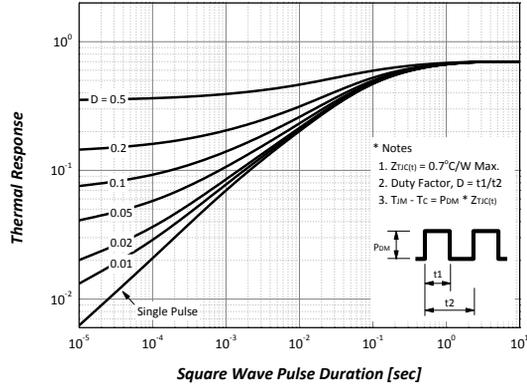


Maximum Drain Current vs. Case Temperature

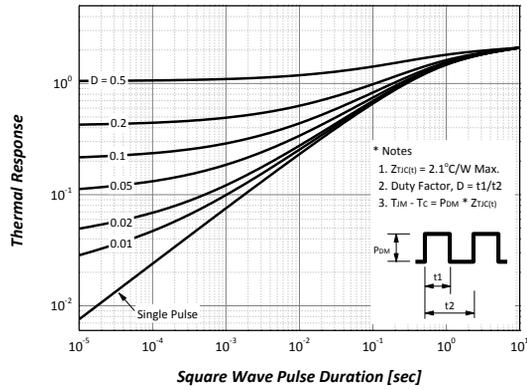


Typical Characteristics

Transient Thermal Response Curve (TO-220)



Transient Thermal Response Curve (TO-220F)



Characteristics Test Circuit & Waveform

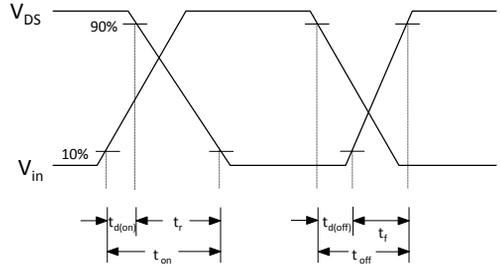
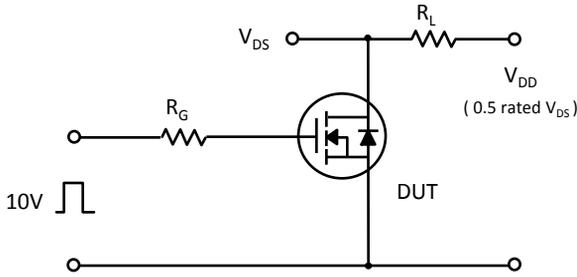


Fig 14. Resistive Switching Test Circuit & Waveforms

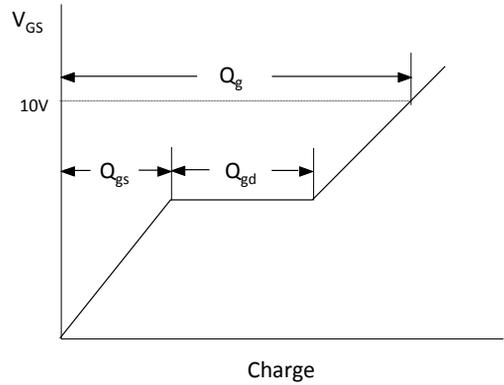
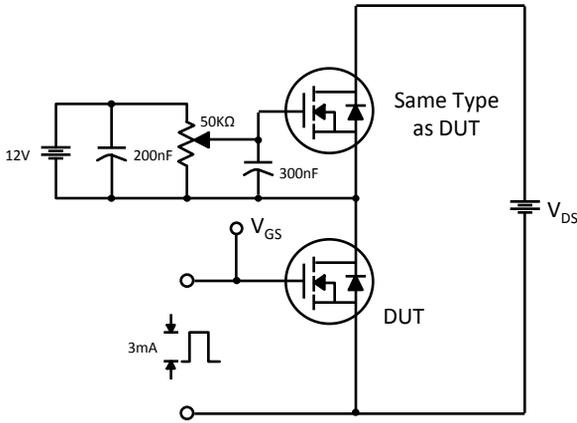


Fig 15. Gate Charge Test Circuit & Waveform

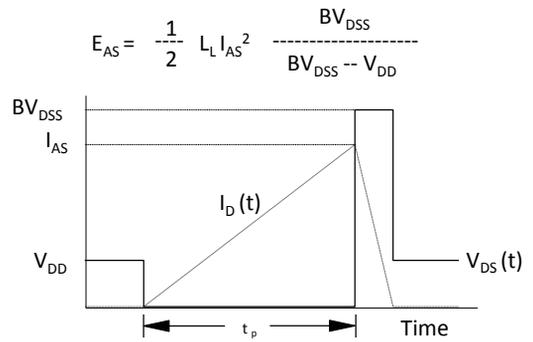
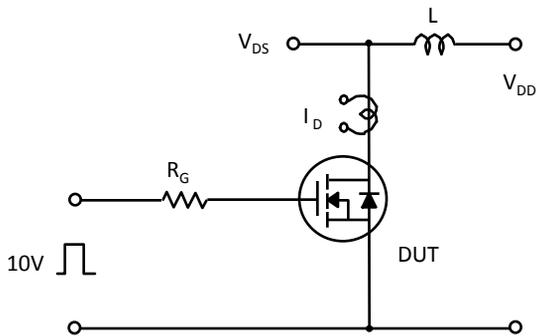


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

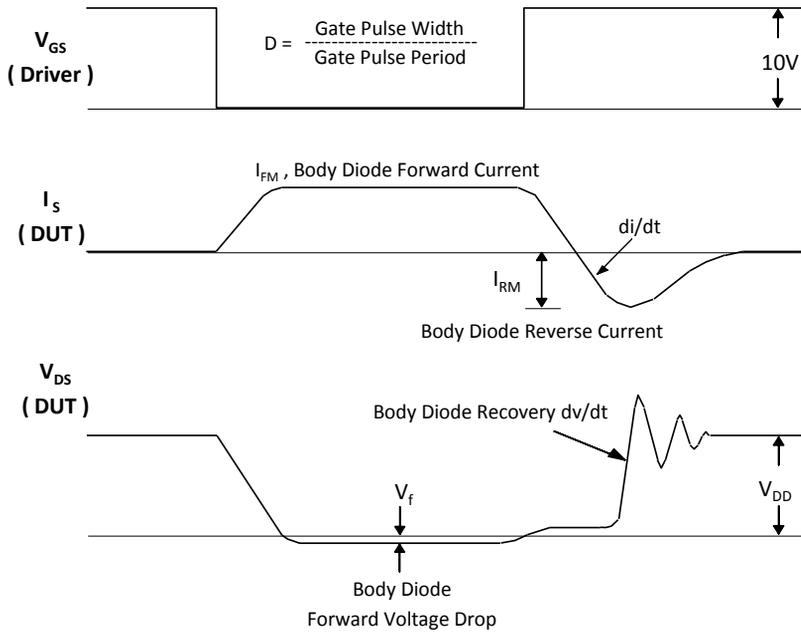
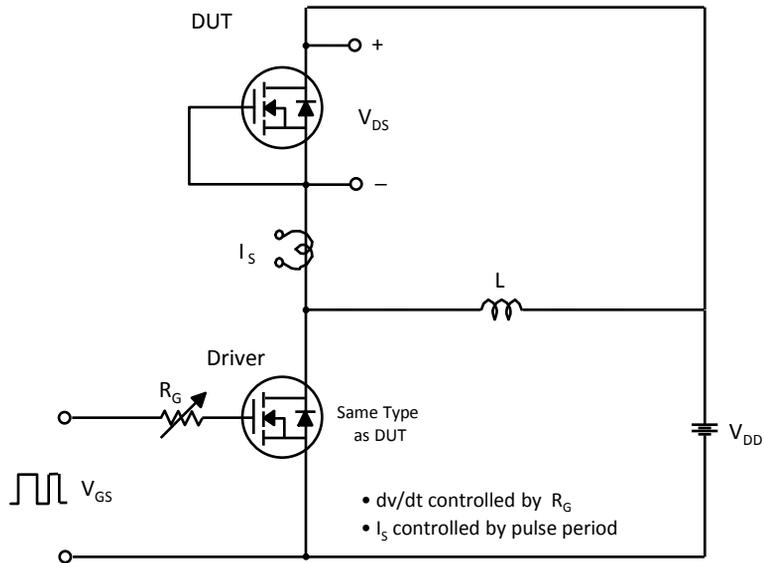


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms