

FEATURES

- ☐ Originative New Design
- ☐ 100% EAS Test
- ☐ Rugged Gate Oxide Technology
- ☐ Extremely Low Intrinsic Capacitances
- ☐ Remarkable Switching Characteristics
- ☐ Unequalled Gate Charge : 30 nC (Typ.)
- ☐ Extended Safe Operating Area
- ☐ Lower $R_{DS(ON)}$: 1.45 Ω (Typ.) @ $V_{GS}=10V$

APPLICATION

- ☐ High current, High speed switching
- ☐ Suitable for power supplies, adaptors and PFC
- ☐ SMPS (Switched Mode Power Supplies)

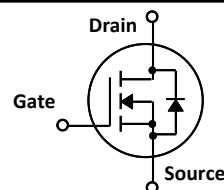
PFP7N80E / PFF7N80E

800V N-Channel MOSFET

$$BV_{DSS} = 800 V$$

$$R_{DS(on)} = 1.45 \Omega$$

$$I_D = 6.7 A$$

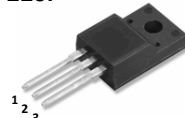


TO-220



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	PFP7N80E	PFF7N80E	Units
V_{DSS}	Drain-Source Voltage	800		V
I_D	Drain Current – Continuous ($T_C = 25^{\circ}C$)	6.7	6.7*	A
	Drain Current – Continuous ($T_C = 100^{\circ}C$)	4.2	4.2*	A
I_{DM}	Drain Current – Pulsed (Note 1)	26.8	26.8*	A
V_{GS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	596		mJ
I_{AR}	Avalanche Current (Note 1)	6.7		A
E_{AR}	Repetitive Avalanche Energy (Note 1)	16.7		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation ($T_C = 25^{\circ}C$)	167	55.6	W
	- Derate above $25^{\circ}C$	1.33	0.44	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	PFP7N80E	PFF7N80E	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.75	2.25	$^{\circ}C/W$
$R_{\theta JS}$	Thermal Resistance, Junction-to-Sink	0.5	--	
$R_{\theta JA}$	Thermal Resistance, 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	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	--	4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 3.5\text{ A}$	--	1.45	1.85	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	800	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.9	--	$\text{V}/^\circ\text{C}$
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	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1665	2165	pF
C_{oss}	Output Capacitance		--	110	140	pF
C_{rss}	Reverse Transfer Capacitance		--	7	9	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Time	$V_{DS} = 400\text{ V}, I_D = 7.0\text{ A},$ $R_G = 25\text{ }\Omega$ (Note 4,5)	--	20	40	ns
t_r	Turn-On Rise Time		--	21	42	ns
$t_{d(off)}$	Turn-Off Delay Time		--	54	108	ns
t_f	Turn-Off Fall Time		--	22	44	ns
Q_g	Total Gate Charge	$V_{DS} = 640\text{ V}, I_D = 7.0\text{ A},$ $V_{GS} = 10\text{ V}$ (Note 4,5)	--	30	40	nC
Q_{gs}	Gate-Source Charge		--	10	--	nC
Q_{gd}	Gate-Drain Charge		--	7	--	nC

Source-Drain Diode Maximum Ratings and Characteristics

I_S	Continuous Source-Drain Diode Forward Current		--	--	6.7	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	26.8	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 7.0\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.4	V
t_{rr}	Reverse Recovery Time	$I_S = 7.0\text{ A}, V_{GS} = 0\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	490	--	ns
Q_{rr}	Reverse Recovery Charge		--	5.2	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L=21\text{ mH}, I_{AS}=7.0\text{ A}, V_{OD}=50\text{ V}, R_G=25\text{ }\Omega$, Starting $T_J=25^\circ\text{C}$
3. $I_{SD} \leq 7.0\text{ A}, di/dt \leq 200\text{ A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, 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

Fig.1 On Region Characteristics

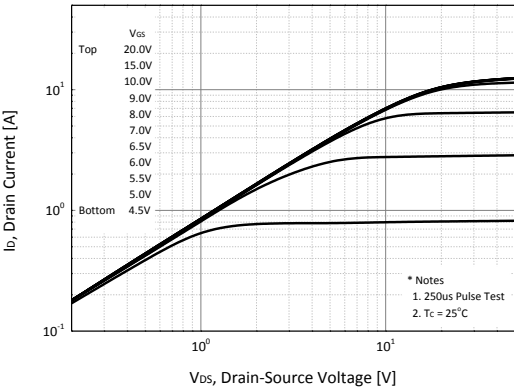


Fig.2 Transfer Characteristics

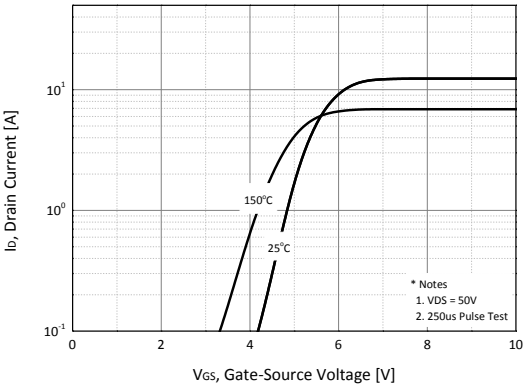


Fig.3 Static Drain-Source On Resistance

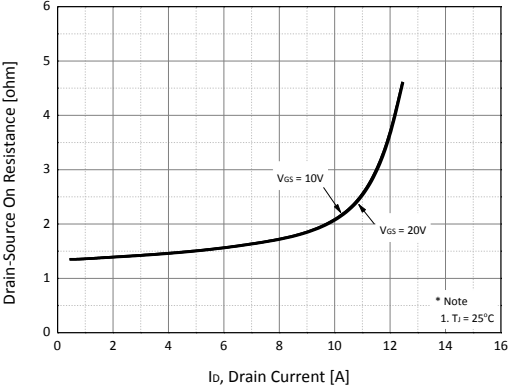


Fig.4 Body Diode Forward Voltage

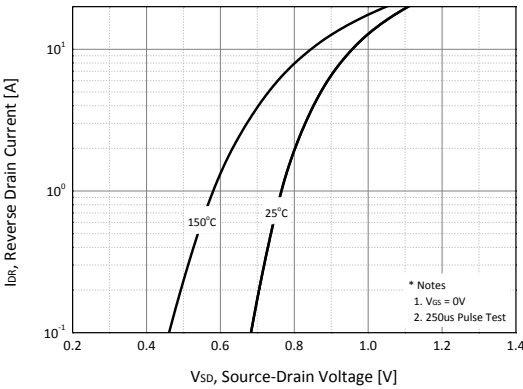


Fig.5 Capacitance Characteristics

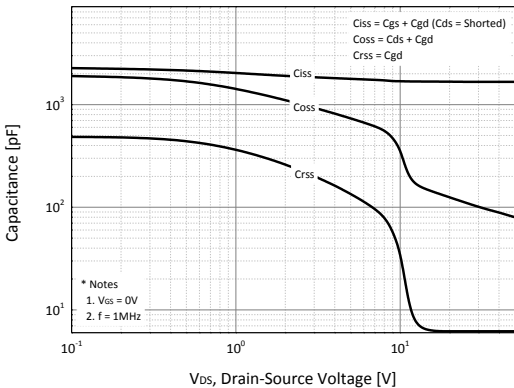
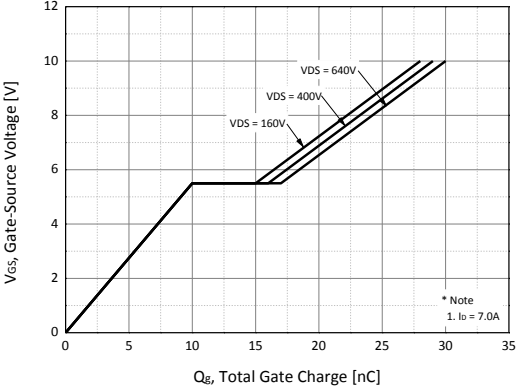


Fig.6 Gate Charge Characteristics



Typical Characteristics

Fig.7 BV_{DSS} Variation vs. Temperature

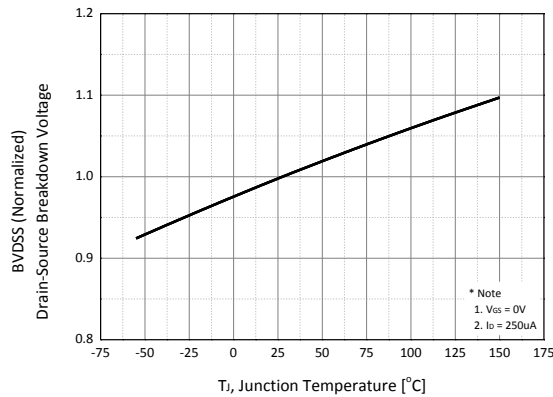


Fig.8 On-Resistance Variation vs. Temperature

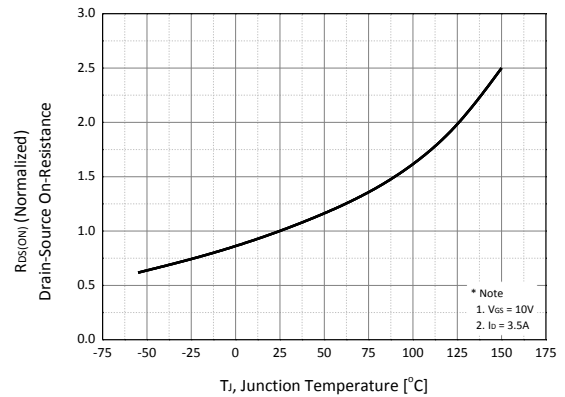


Fig.9-1 Safe Operation Area for TO-220

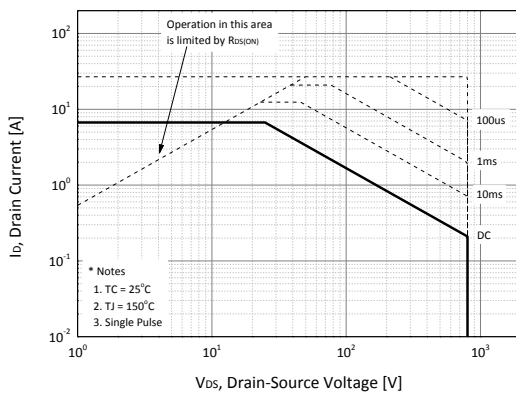


Fig.9-2 Safe Operation Area for TO-220F

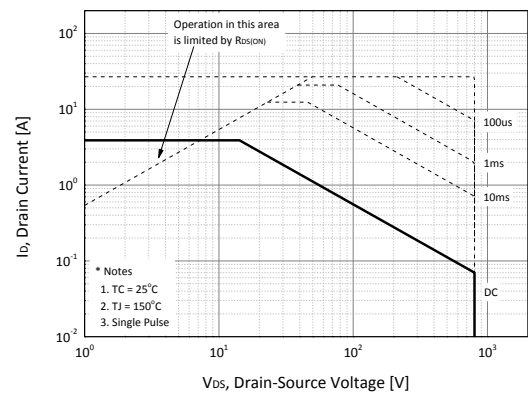
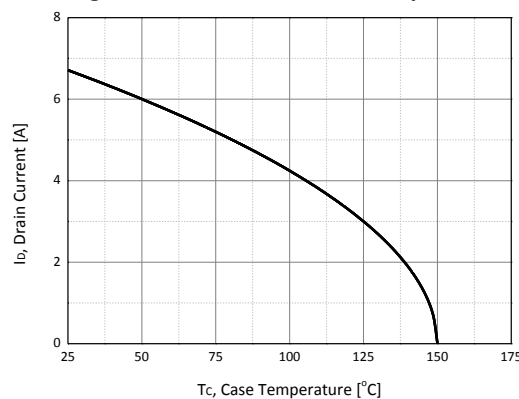


Fig.10 Maximum I_D vs. Case Temperature



Typical Characteristics

Fig.11-1 Transient Thermal Response Curve

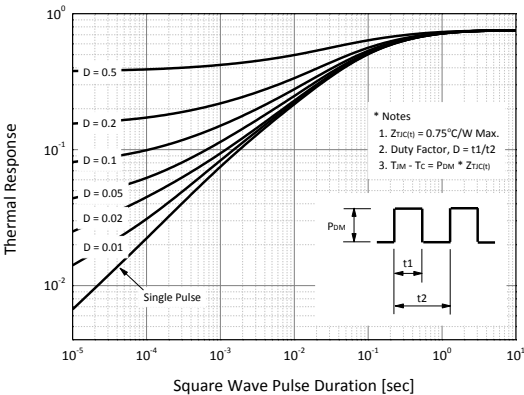
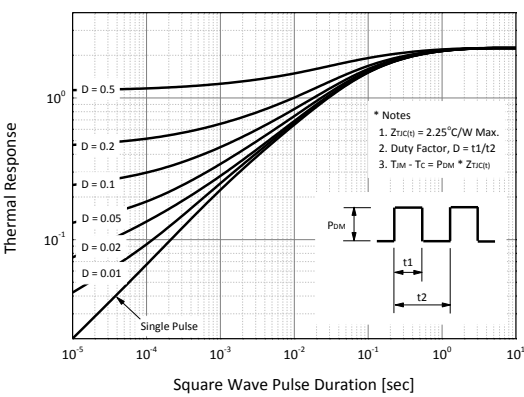


Fig.11-2 Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

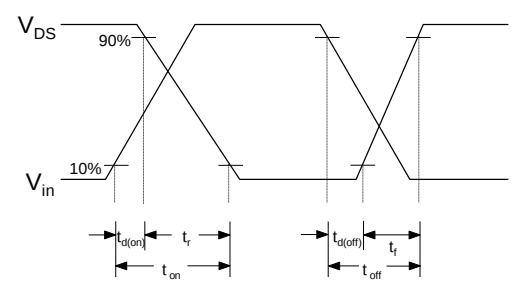
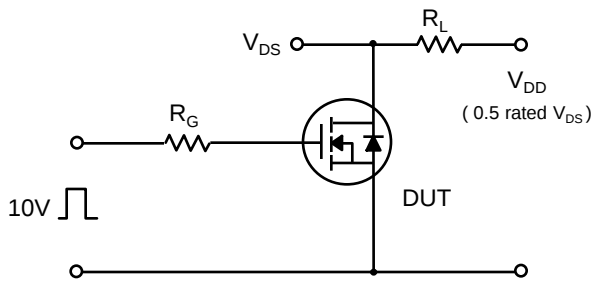


Fig 14. Resistive Switching Test Circuit & Waveforms

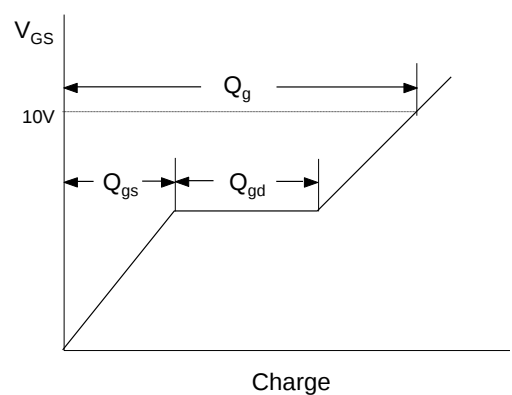
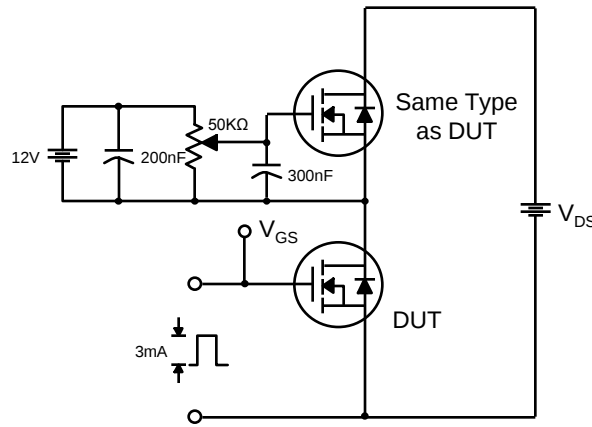


Fig 15. Gate Charge Test Circuit & Waveform

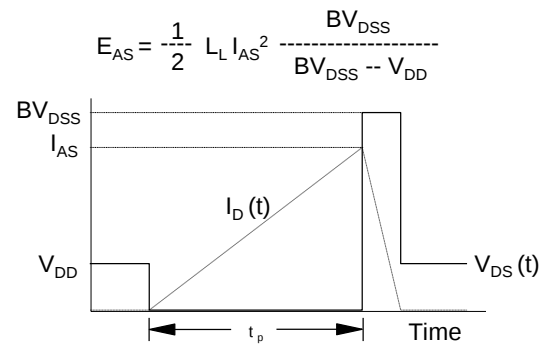
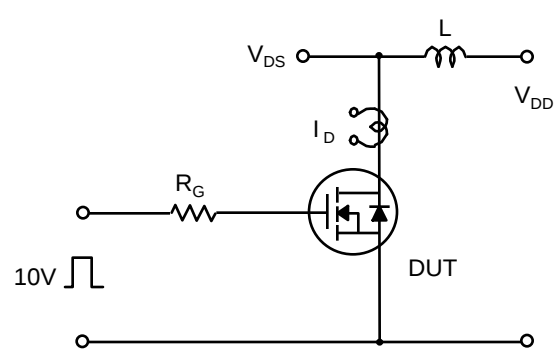


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

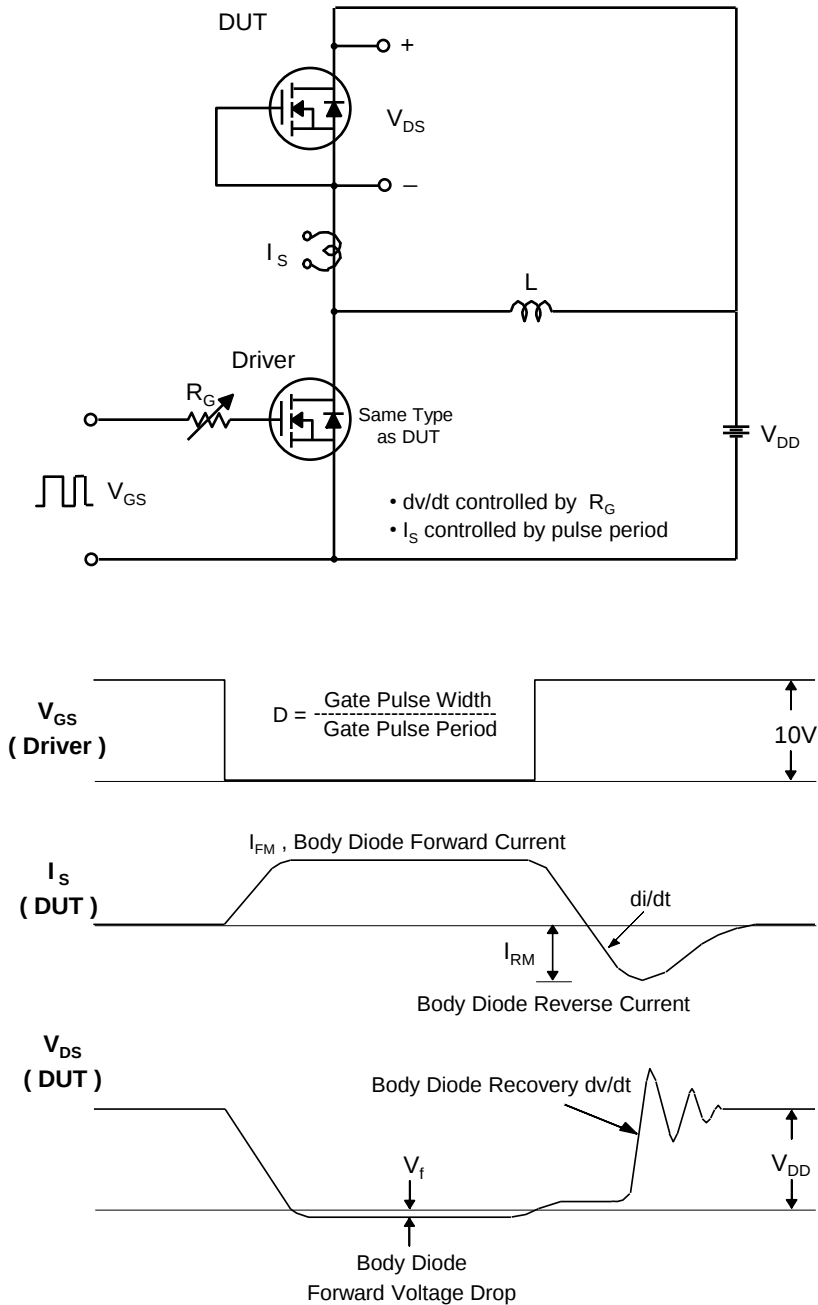


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Package Dimension

TO-220

