

PFP70R900 / PFF70R900

N-Channel Super Junction MOSFET

FEATURES

- New technology for high voltage device
- Low $R_{DS(on)}$ low conduction losses
- Small package
- Ultra low gate charge cause lower driving requirement
- 100% avalanche tested
- RoHS

APPLICATION

- Power Factor Correction(PFC)
- Switched mode power supply (SMPS)
- Uninterruptible Power Supply (UPS)

$BV_{DSS} = 700\text{ V}$ $R_{DS(on)} = 0.78\ \Omega$ $I_D = 5.0\text{ A}$	
TO-220 	TO-220F

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

Symbol	Parameter	Value		Units
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	700		V
I_D	Drain Current – Continuous ($T_c = 25^\circ\text{C}$)	5	5*	A
	Drain Current – Continuous ($T_c = 100^\circ\text{C}$)	3	3*	A
$I_{DM(pulse)}$	Drain Current – Pulsed * Note 1	15	15*	A
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 30		V
E_{AS}	Single Pulsed Avalanche Energy * Note 2	135		mJ
I_{AR}	Avalanche Current * Note 1	6.0		A
E_{AR}	Repetitive Avalanche Energy * Note 1	0.4		mJ
dv/dt	Drain Source Voltage Slope, $V_{DS} \leq 480V$	48		V/ns
	Reverse Diode dv/dt , $V_{DS} \leq 480V$	15		V/ns
P_D	Maximum Power Dissipation ($T_c = 25^\circ\text{C}$)	49	29	W
	Derate above 25°C	0.39	0.23	W/ $^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$

* Limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	PFP70R900	PFF70R900	Units
$R_{\theta JC}$	Junction-to-Case (Maximum)	2.55	4.3	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Junction-to-Ambient (Maximum)	62.5	80	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250 \mu\text{A}$	2.5	3.0	4.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 3.0 \text{ A}$	--	780	900	m.ohm
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_D = 250 \mu\text{A}$	700	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 700 \text{ V}, V_{GS} = 0 \text{ V}$	--	--	10	μA
		$V_{DS} = 700 \text{ V}, T_C=125^\circ\text{C}$	--	--	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						
g_{FS}	Forward Transconductance	$V_{DS} = 20 \text{ V}, I_D = 3.0 \text{ A}$	--	4.8	--	S
R_G	Intrinsic Gate Resistance	$f = 1.0 \text{ MHz}$, open drain	--	2.5	--	ohm
C_{iss}	Input Capacitance	$V_{DS} = 50 \text{ V}, V_{GS} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$	--	460	--	pF
C_{oss}	Output Capacitance		--	45	--	pF
C_{rss}	Reverse Transfer Capacitance		--	13	--	pF
Q_g	Total Gate Charge		--	10.0	20	nC
Q_{gs}	Gate-Source Charge	$V_{DS} = 560 \text{ V}, I_D = 5.0 \text{ A}$, $V_{GS} = 10 \text{ V}$	--	1.6	--	nC
Q_{gd}	Gate-Drain Charge		--	4.0	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	$V_{DS} = 380 \text{ V}, I_D = 5.0 \text{ A}$, $R_G = 18 \Omega, V_{GS} = 10 \text{ V}$	--	6	--	ns
t_r	Turn-On Rise Time		--	3	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	50	60	ns
t_f	Turn-Off Fall Time		--	9	15	ns
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	5.0	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	15.0	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 5.0 \text{ A}, V_{GS} = 0 \text{ V}$	--	1.0	1.3	V
t_{rr}	Reverse Recovery Time	$I_S = 5.0 \text{ A}$, $di/dt = 100 \text{ A}/\mu\text{s}$	--	250	--	ns
Q_{rr}	Reverse Recovery Charge		--	2.2	--	μC

Notes ;

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $V_{DS}=50\text{V}$, $R_G=25\Omega$, Starting $T_j=25^\circ\text{C}$

Typical Characteristics

Fig 1. Safe Operation Area for TO-220

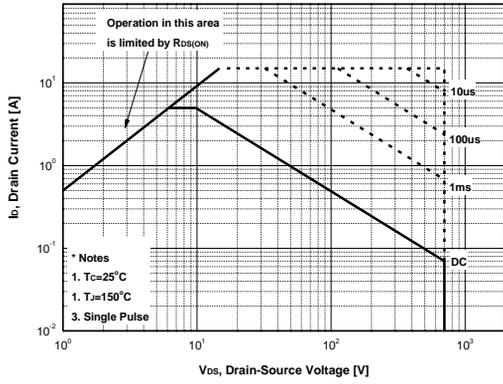


Fig 2. Safe Operation Area for TO-220F

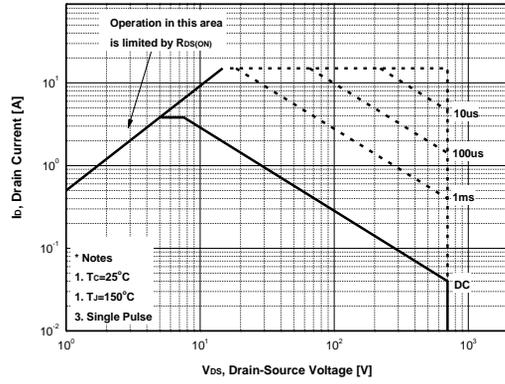


Fig 3. Source-Drain Diode Forward Voltage

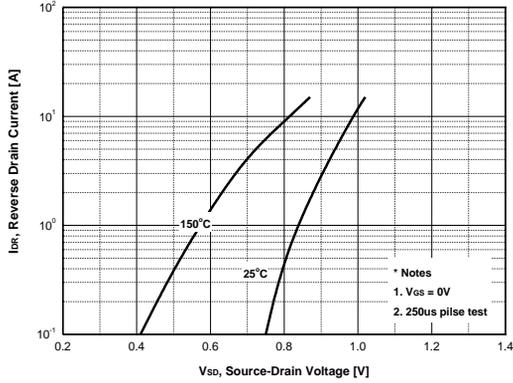


Fig 4. Output Characteristics

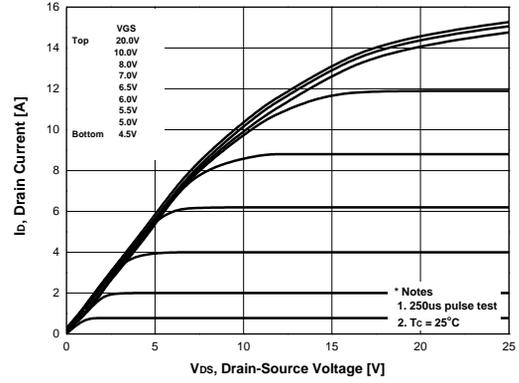


Fig 5. Transfer Characteristics

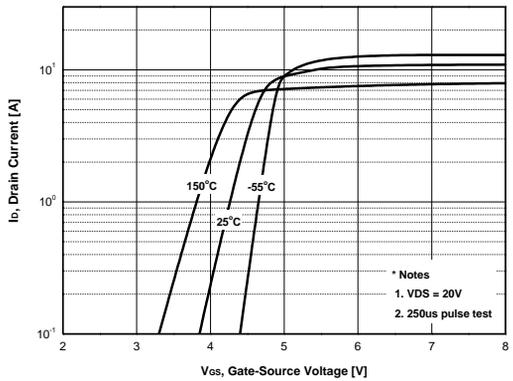
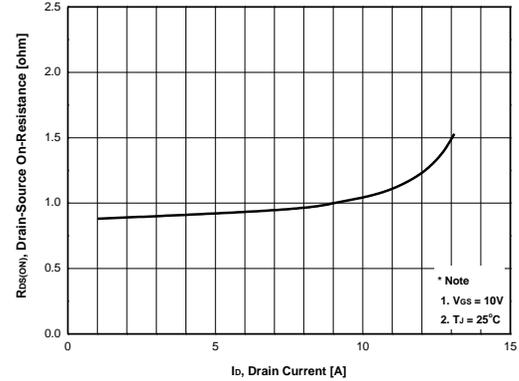


Fig 6. Static Drain-Source On Resistance



Typical Characteristics (continued)

Fig 7. $R_{DS(on)}$ vs. Junction Temperature

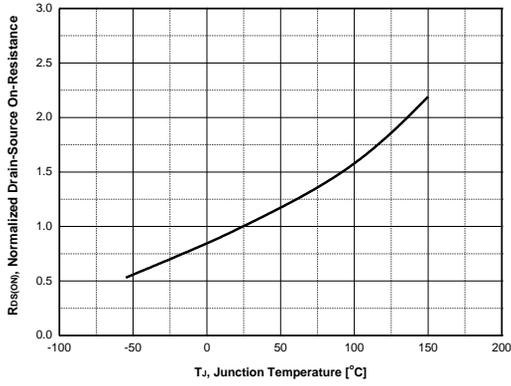


Fig 8. BV_{DSS} vs. Junction Temperature

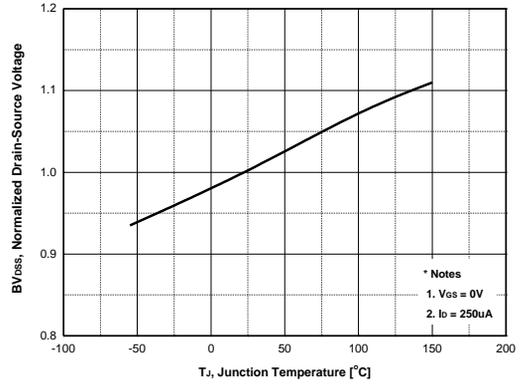


Fig 9. Maximum I_D vs. Junction Temperature

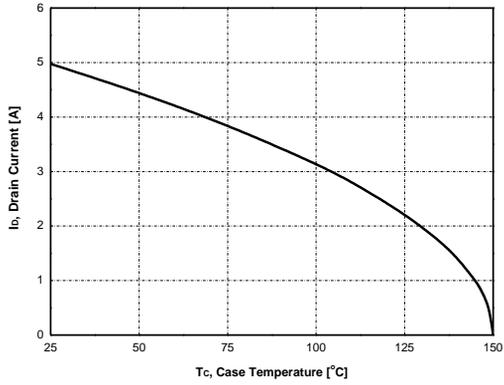


Fig 10. Gate Charge Characteristics

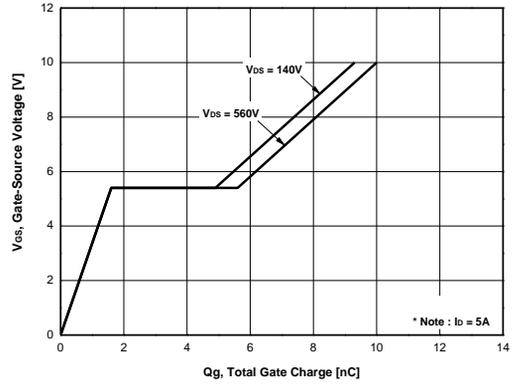
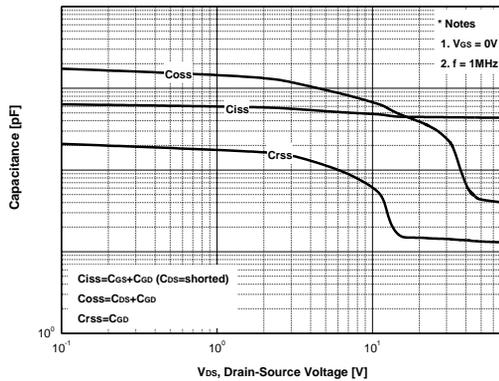


Fig 11. Capacitance Characteristics



Typical Characteristics (continued)

Fig 12. Transient Thermal Response Curve for TO-220

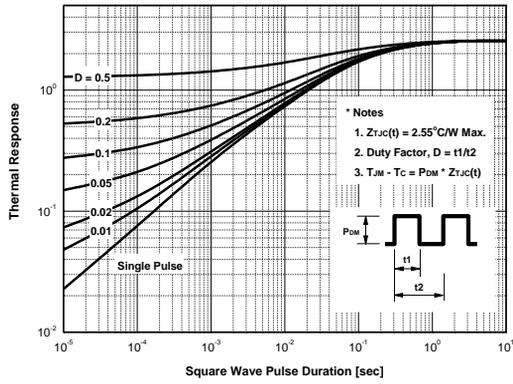
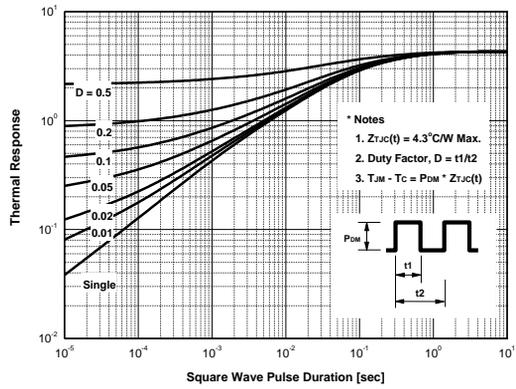
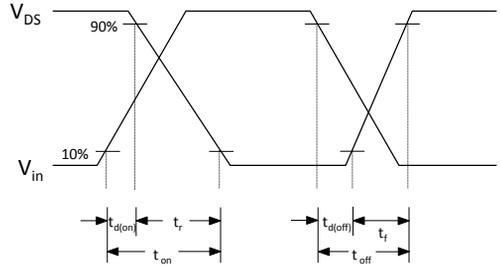
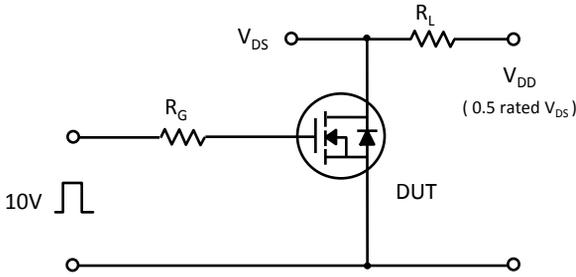


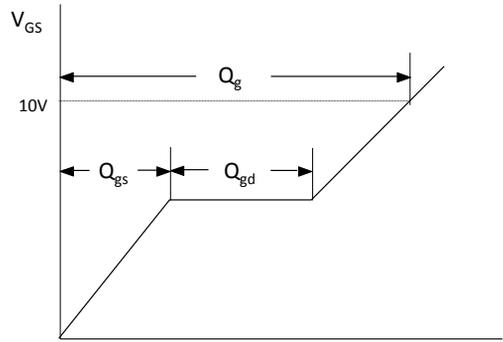
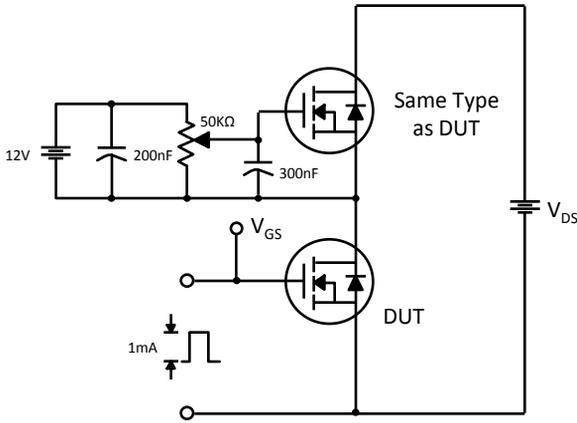
Fig 13. Transient Thermal Response Curve for TO-220F



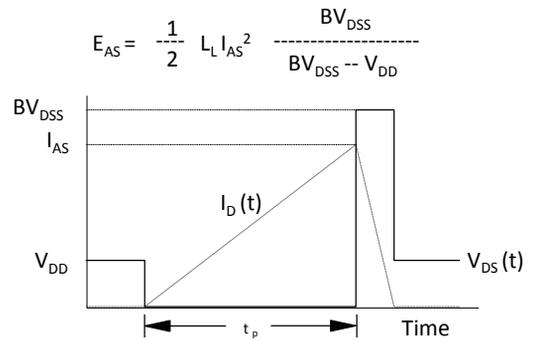
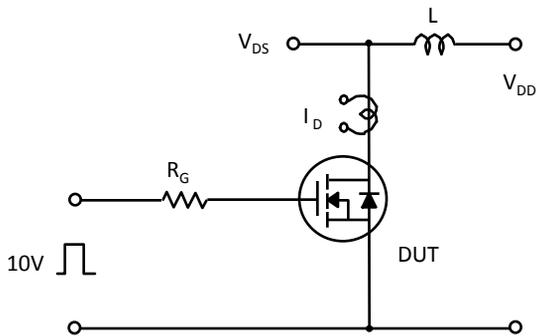
Characteristics Test Circuit & Waveform



Switching Time Test Circuit & Waveforms

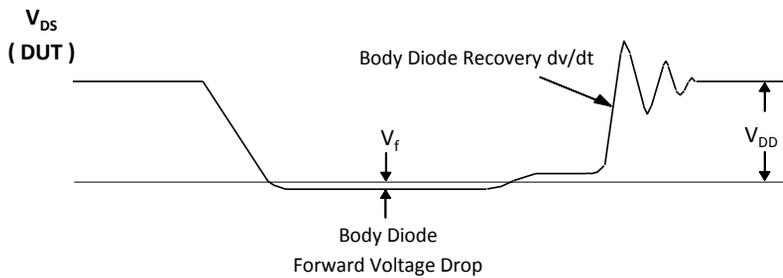
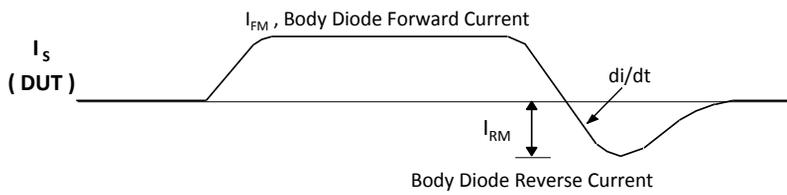
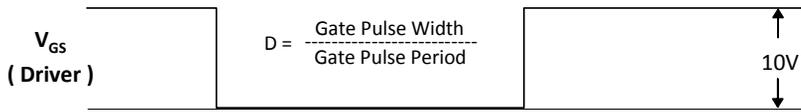
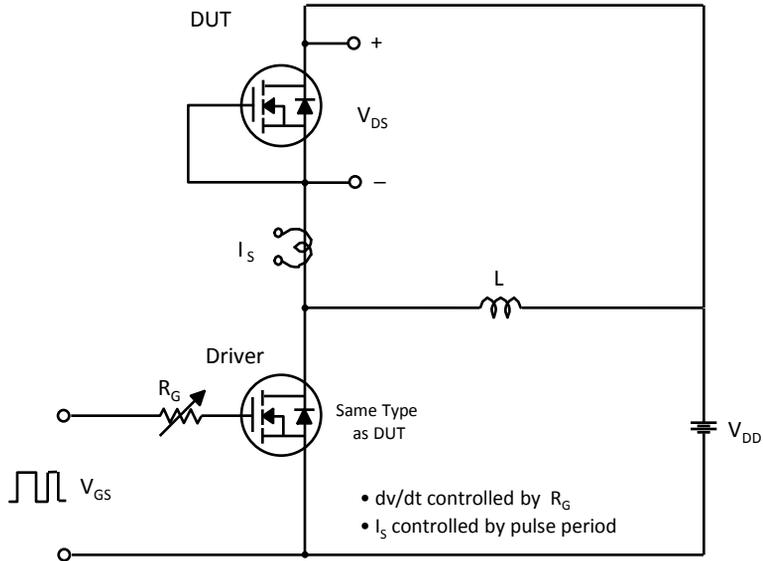


Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)



Peak Diode Recovery dv/dt Test Circuit & Waveforms