POWER™

PFP65R380 / PFF65R380

N-Channel Super Junction MOSFET

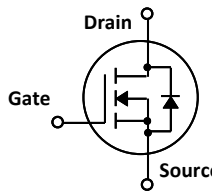
FEATURES

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

BV_{DSS} = 650 V

$R_{DS(on)}$ = 0.35 Ω

I_D = 11 A



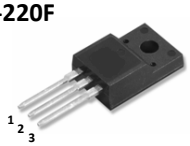
APPLICATION

- PFC(Power Factor Correction)
- SMPS(Switched Mode Power Supplies)
- UPS(Uninterruptible Power Supplies)

TO-220

1.Gate 2. Drain 3. Source

TO-220F



1.Gate 2. Drain 3. Source

Absolute Maximum Ratings

T_C=25°C unless otherwise specified

Symbol	Parameter		PFP65R380	PFF65R380	Units
V_{DSS}	Drain-Source Voltage		650		V
I_D	Drain Current – Continuous (T_C = 25°C)		11	11*	A
	Drain Current – Continuous (T_C = 100°C)		7	7*	A
I_{DM}	Drain Current – Pulsed	(Note 1)	33	33*	A
V_{GS}	Gate-Source Voltage		+/-30		V
E_{AS}	Single Pulsed Avalanche Energy	(Note 2)	210		mJ
I_{AR}	Avalanche Current	(Note 3)	1.8		A
E_{AR}	Repetitive Avalanche Energy	(Note 3)	0.32		mJ
P_D	Power Dissipation (T_C = 25°C)		83	31	W
	- Derate above 25°C		0.67	0.25	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		300		°C

* Drain current limited by maximum junction temperature.

Thermal Resistance Characteristics

Symbol	Parameter	PFP65R380	PFF65R380	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.5	4.0	°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 °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 uA	2.5	--	3.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 5.5 A	--	0.35	0.38	Ω
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 uA	650	--	--	V
ΔBV_{DSS} /ΔT_J	Breakdown Voltage Temperature Coefficient	I_D = 250 uA, Referenced to25°C	--	0.6	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 650 V, V_{GS} = 0 V	--	--	1	uA
		V_{DS} = 520 V, T_C = 125°C	--	--	10	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 100 V, V_{GS} = 0 V, f = 1.0 MHz	--	760	990	pF
C_{oss}	Output Capacitance		--	54	70	pF
C_{rss}	Reverse Transfer Capacitance		--	12	16	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	V_{DS} = 400 V, I_D = 4.8 A, R_G = 3.4 Ω, V_{GS} = 13 V	--	11	--	ns
t_r	Turn-On Rise Time		--	9	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	56	--	ns
t_f	Turn-Off Fall Time		--	8	--	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 4.8 A, V_{GS} = 10 V	--	34	50	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	11	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	30	
V_{SD}	Source-Drain Diode Forward Voltage	I_S = 5.5 A, V_{GS} = 0 V	--	--	1.4	V
trr	Reverse Recovery Time	I_S = 4.8 A, V_{GS} = 0 V di_F/dt = 100 A/us	--	275	--	ns
Qrr	Reverse Recovery Charge		--	3.2	--	uC

Notes ;

1. Limited by maximum junction temperature, maximum duty cycle is 0.75
2. I_{AS} = 1.8A, V_{DD} = 50V, Starting T_J =25°C
3. Repetitive rating : Pulse width limited by maximum junction temperature.

Typical Characteristics

Fig.1 On Region Characteristics

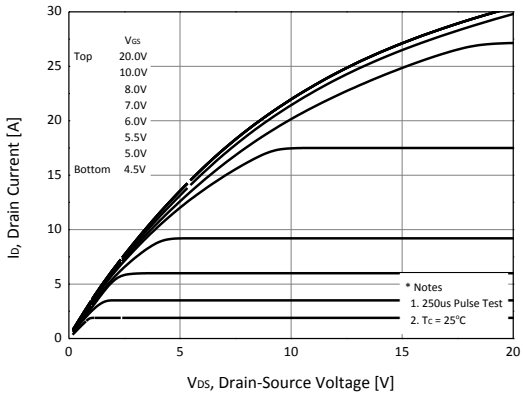


Fig.2 Transfer Characteristics

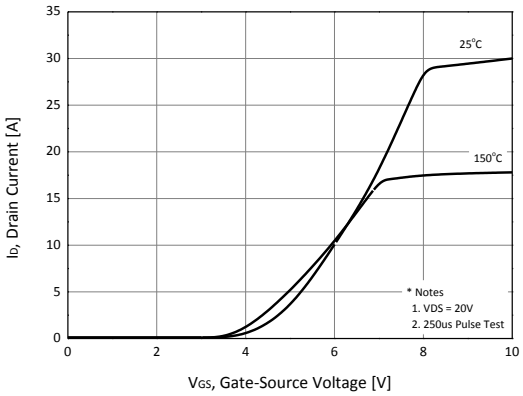


Fig.3 On-Resistance Variation vs. Drain Current

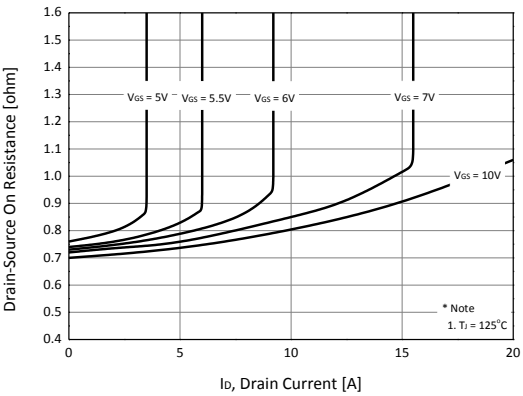


Fig.4 Power Dissipation

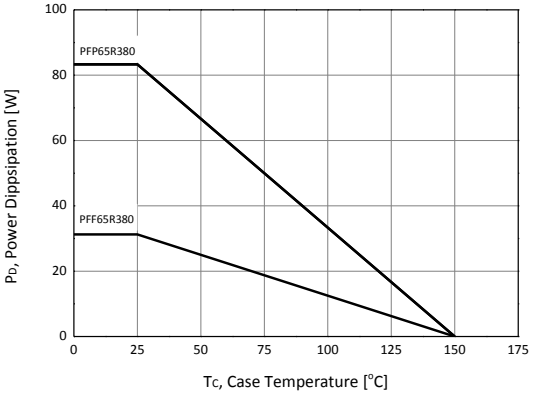


Fig.5 Capacitance Characteristics

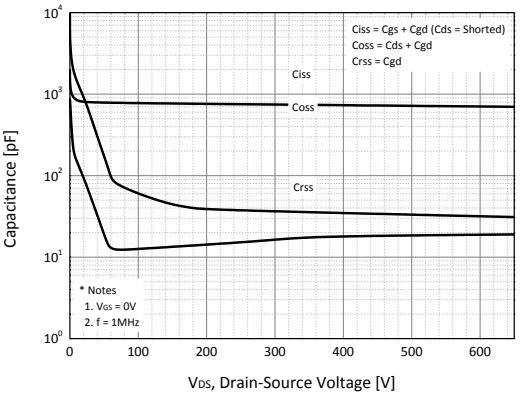
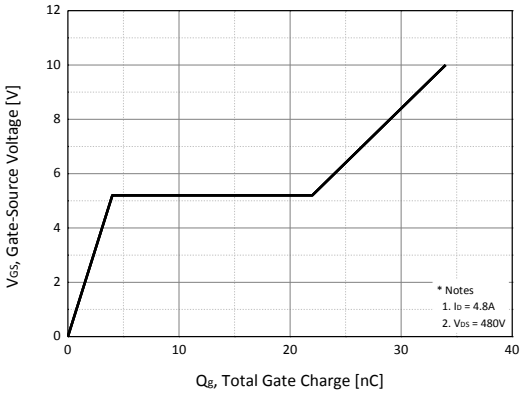


Fig.6 Gate Charge Characteristics



Typical Characteristics

Fig.7 BV_{DSS} Variation vs. Temperature

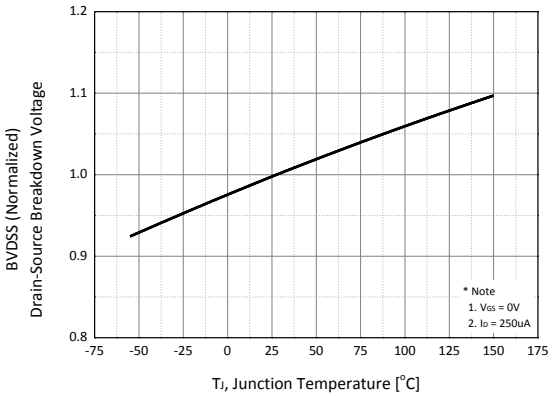


Fig.8 On-Resistance Variation vs. Temperature

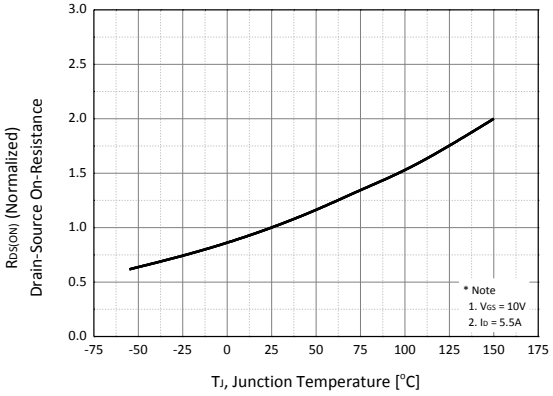


Fig.9-1 Safe Operation Area

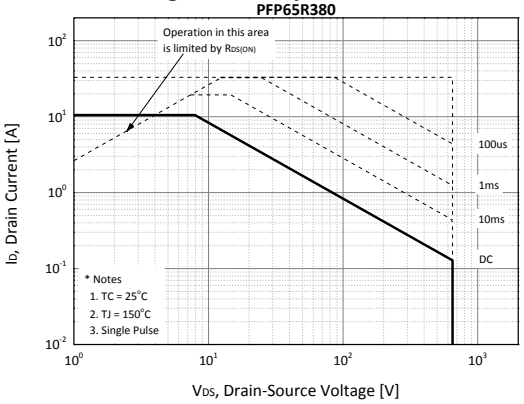


Fig.9-2 Safe Operation Area

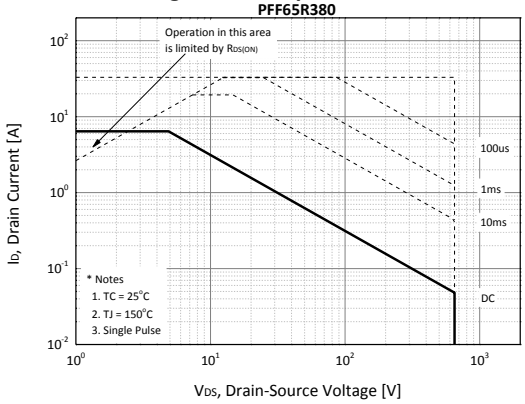
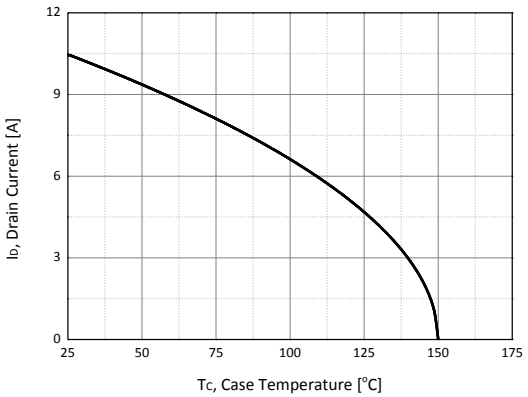


Fig.10 Maximum I_D vs. Case Temperature



Typical Characteristics

Fig.11-1 Transient Thermal Response Curve

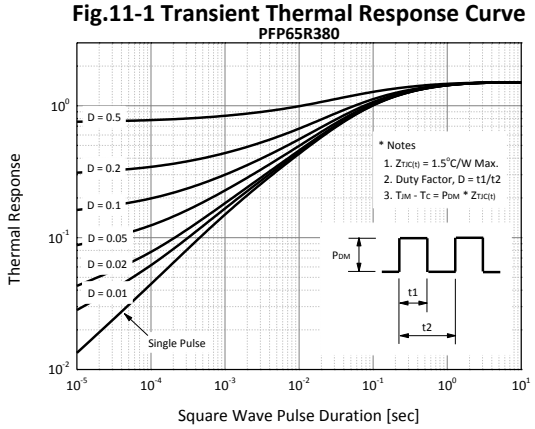
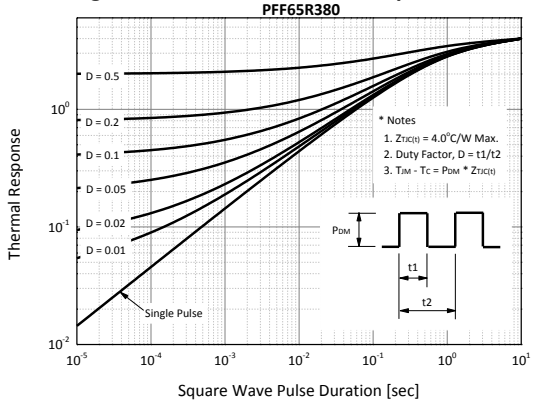


Fig.11-2 Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

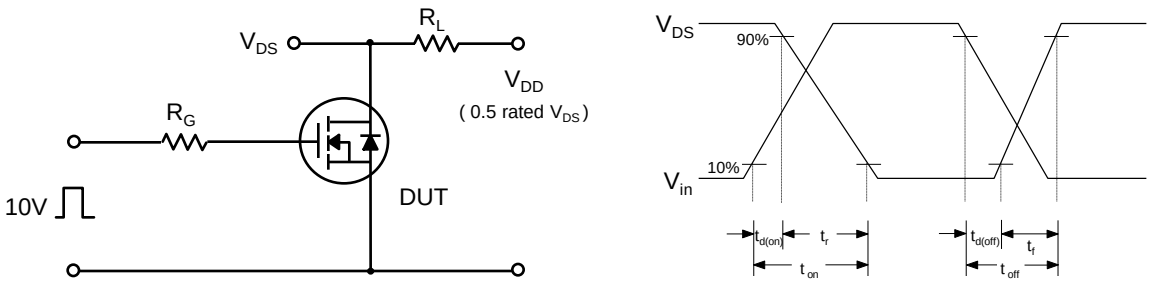


Fig 14. Resistive Switching Test Circuit & Waveforms

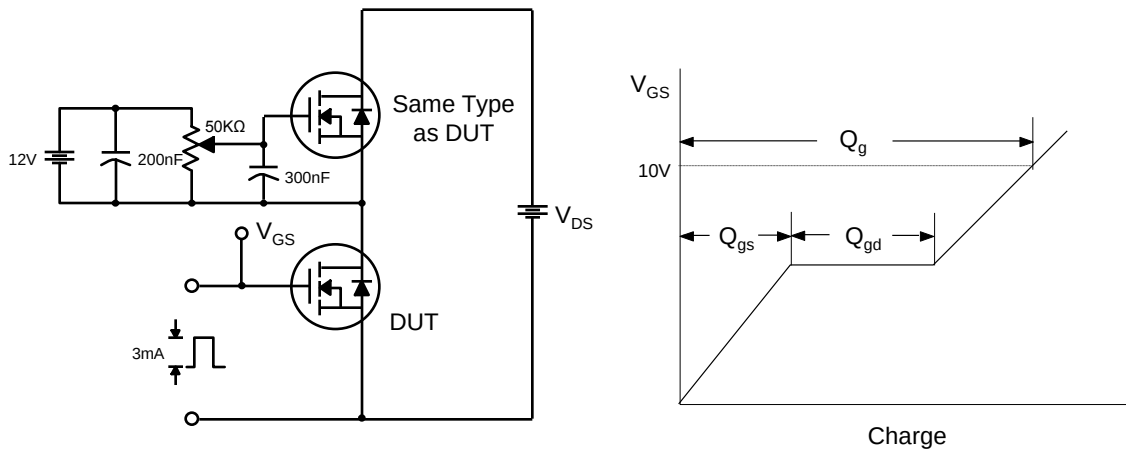


Fig 15. Gate Charge Test Circuit & Waveform

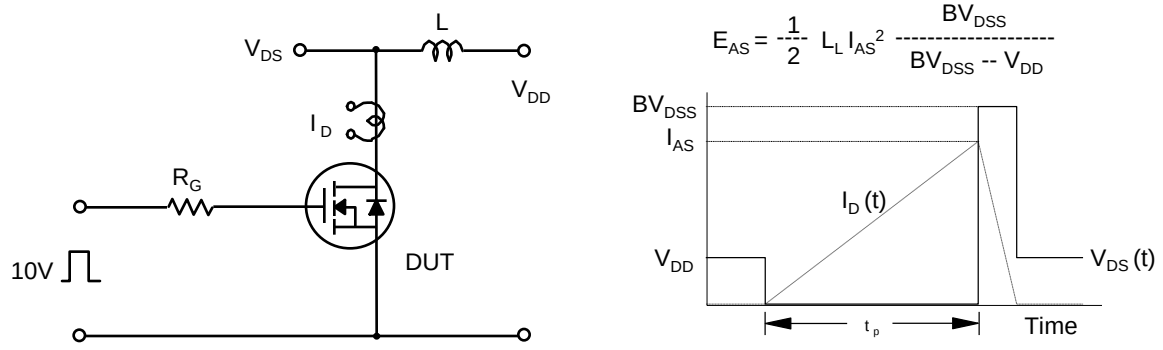


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Characteristics Test Circuit & Waveform (continued)

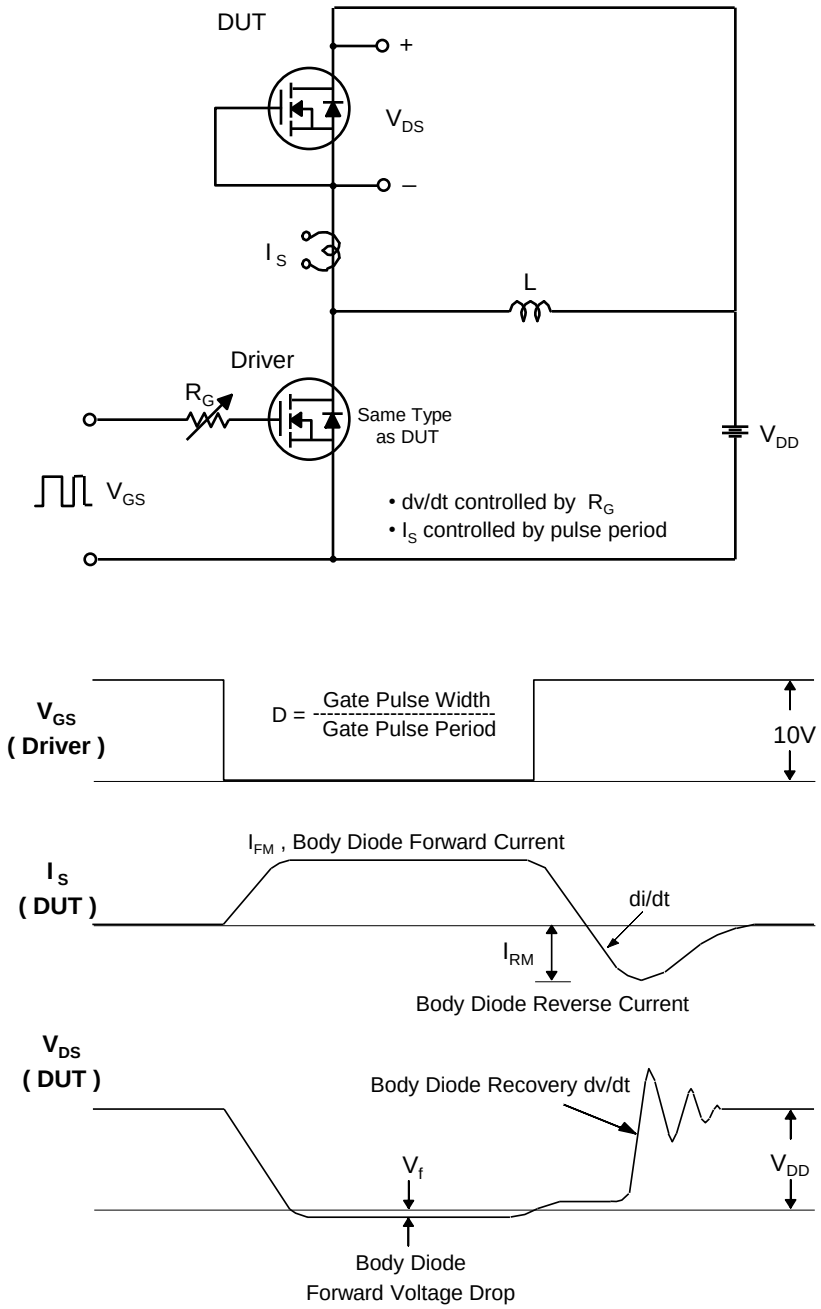


Fig 17. Peak Diode Recovery dv/dt Test Circuit & Waveforms