

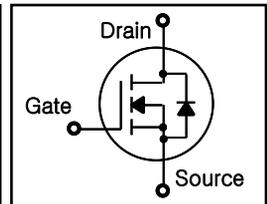
PFP65R180 / PFF65R180

N-Channel Super Junction MOSFET

FEATURES

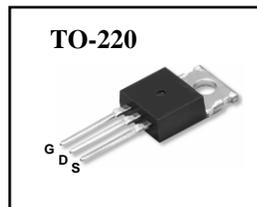
- New technology for high voltage device
- Low $R_{DS(on)}$ low conduction losses
- Small package
- Ultra low gate charge cause lower driving requirement
- 100% avalanche tested
- RoHS

$BV_{DSS} = 650\text{ V}$
 $R_{DS(on)} = 0.15\ \Omega$
 $I_D = 21\text{ A}$



APPLICATION

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



Absolute Maximum Ratings T_c=25°C unless otherwise specified

Symbol	Parameter	PFP65R180	PFF65R180	Units
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	650		V
I_D	Drain Current – Continuous ($T_c = 25\ ^\circ C$)	21	21*	A
	Drain Current – Continuous ($T_c = 100\ ^\circ C$)	13.2	13.2*	A
$I_{DM(pulse)}$	Drain Current – Pulsed * Note 1	63	63*	A
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 30		V
E_{AS}	Single Pulsed Avalanche Energy * Note 2	690		mJ
I_{AR}	Avalanche Current * Note 1	7.0		A
E_{AR}	Repetitive Avalanche Energy * Note 1	1.0		mJ
dv/dt	Drain Source Voltage Slope, $V_{DS} \leq 480V$	50		V/ns
	Reverse Diode dv/dt, $V_{DS} \leq 480V$	15		V/ns
P_D	Maximum Power Dissipation ($T_c = 25\ ^\circ C$)	200	34	W
	Derate above 25 °C	1.6	0.27	W/°C
T_I, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C

* Limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	PFP65R180	PFF65R180	Units
$R_{\theta JC}$	Junction-to-Case (Maximum)	0.62	3.67	°C/W
$R_{\theta JA}$	Junction-to-Ambient (Maximum)	62	80	

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5	3.0	3.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 10.5\text{ A}$	--	150	180	m.ohm
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	650	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	μA
		$V_{DS} = 650\text{ V}, T_C=125\text{ }^\circ\text{C}$	--	--	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	$V_{DS} = 20\text{ V}, I_D = 10.5\text{ A}$	--	17.5	--	S
R_G	Intrinsic Gate Resistance	$f = 1.0\text{ MHz}$, open drain	--	1.0	--	ohm
C_{iss}	Input Capacitance	$V_{DS} = 50\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$	--	1950	--	pF
C_{oss}	Output Capacitance		--	150	--	pF
C_{rss}	Reverse Transfer Capacitance		--	5.0	--	pF
Q_g	Total Gate Charge	$V_{DS} = 480\text{ V}, I_D = 21\text{ A},$ $V_{GS} = 10\text{ V}$	--	45	70	nC
Q_{gs}	Gate-Source Charge		--	9	--	nC
Q_{gd}	Gate-Drain Charge		--	18	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Time	$V_{DS} = 380\text{ V}, I_D = 11\text{ A},$ $R_G = 4\text{ }\Omega, V_{GS} = 10\text{ V}$	--	11	--	ns
t_r	Turn-On Rise Time		--	6	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	61	100	ns
t_f	Turn-Off Fall Time		--	4.5	12	ns
Source-Drain Diode Maximum Ratings and Characteristics						
I_S	Continuous Source-Drain Diode Forward Current		--	--	21	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	63	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 21\text{ A}, V_{GS} = 0\text{ V}$	--	0.9	1.3	V
t_{rr}	Reverse Recovery Time	$I_S = 21\text{ A}$	--	310	--	ns
Q_{rr}	Reverse Recovery Charge	$di/dt = 100\text{ A}/\mu\text{s}$	--	5	--	μC

Notes ;

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

Typical Characteristics

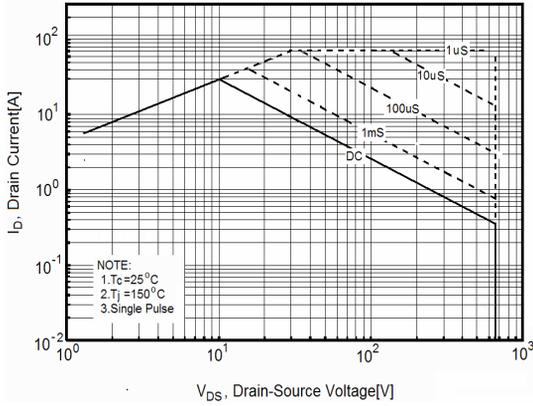


Figure 1. Safe Operating Area(TO-220)

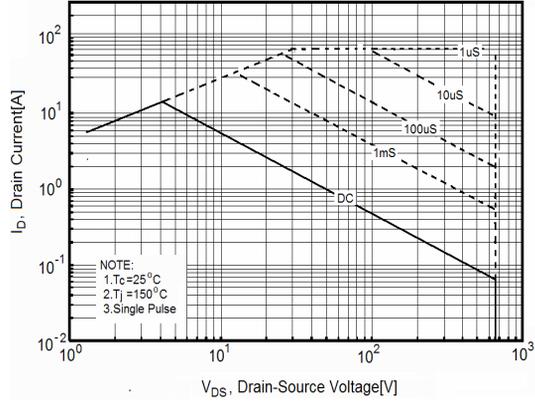


Figure 2. Safe Operating Area(TO-220F)

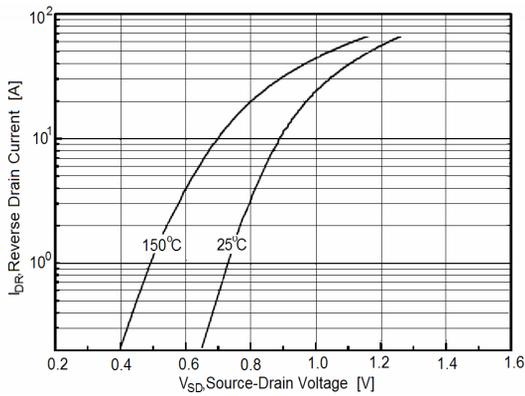


Figure 3. Source-Drain Diode Forward Voltage

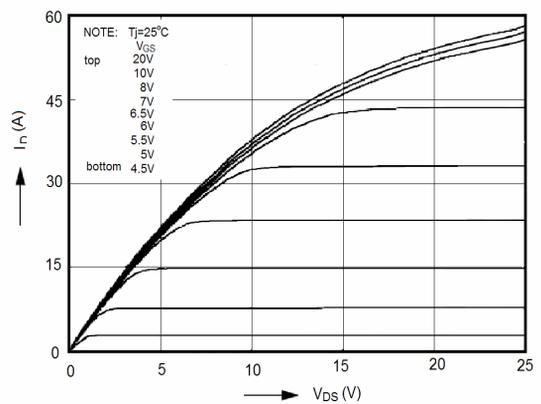


Figure 4. Output Characteristics

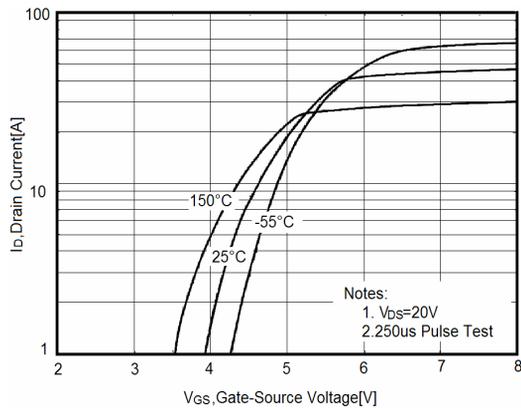


Figure 5. Transfer Characteristics

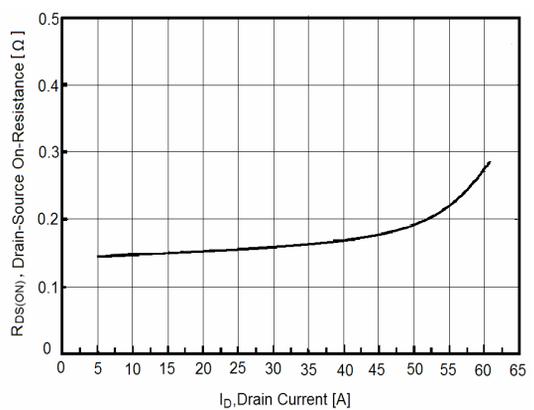


Figure 6. Static Drain-Source On Resistance

Typical Characteristics (continued)

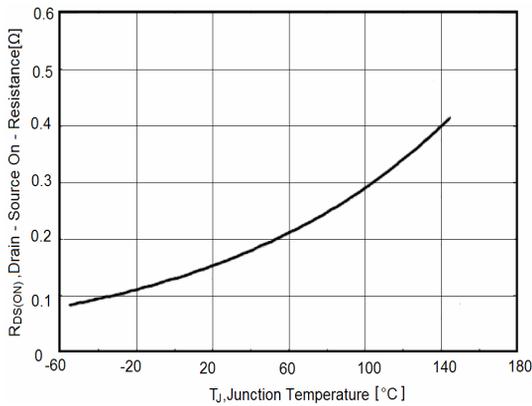


Figure 7. Rds(on) vs. Junction Temperature

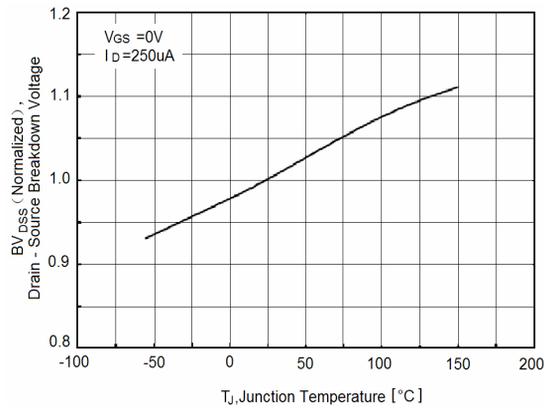


Figure 8. BVdss vs. Junction Temperature

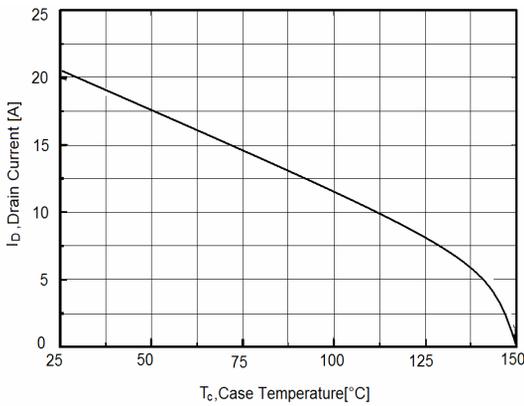


Figure 9. Maximum ID vs. Junction Temperature

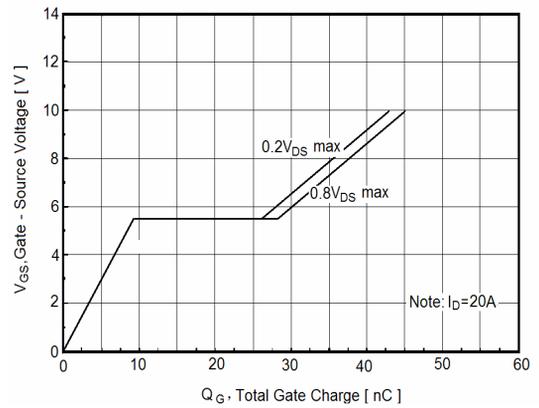


Figure 10. Gate Charge Waveforms

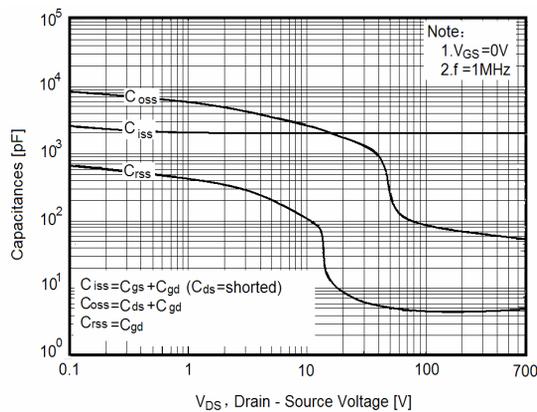


Figure 11. Capacitance

Typical Characteristics (continued)

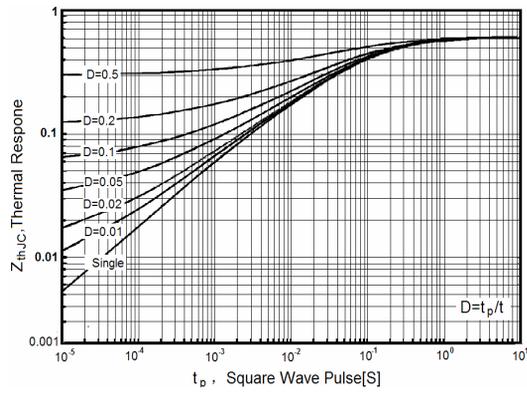


Figure 12. Transient Thermal Response Curve (TO-220)

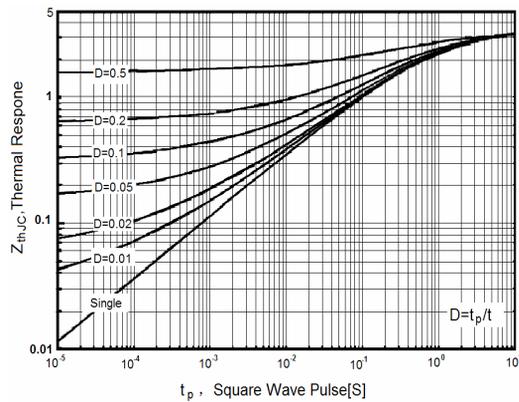
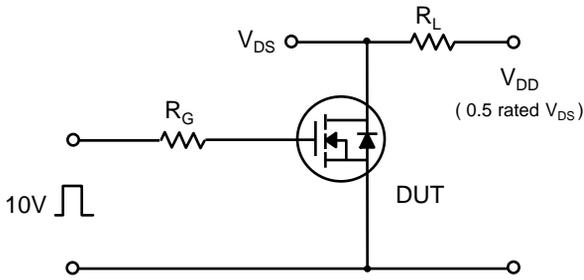
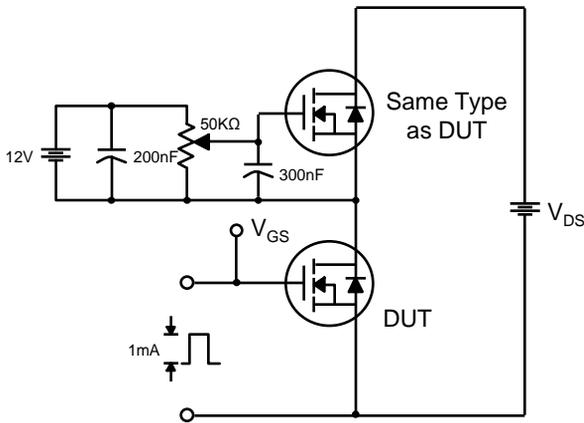


Figure 13. Transient Thermal Response Curve (TO-220F)

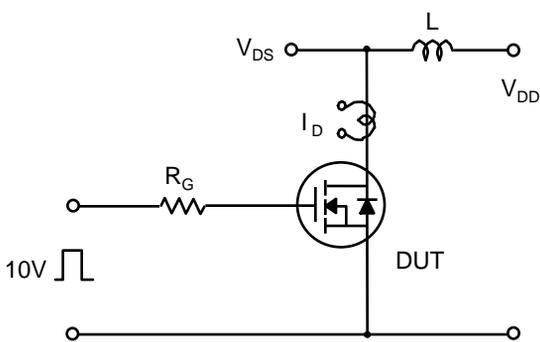
Characteristics Test Circuit & Waveform



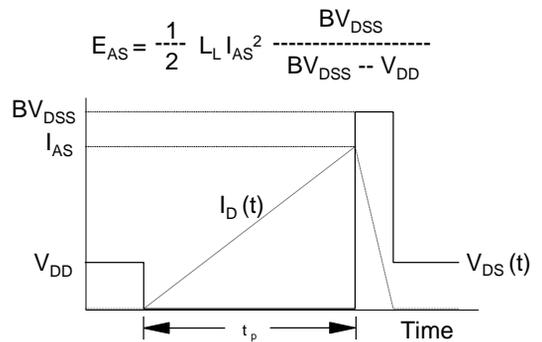
Switching Time Test Circuit & Waveforms



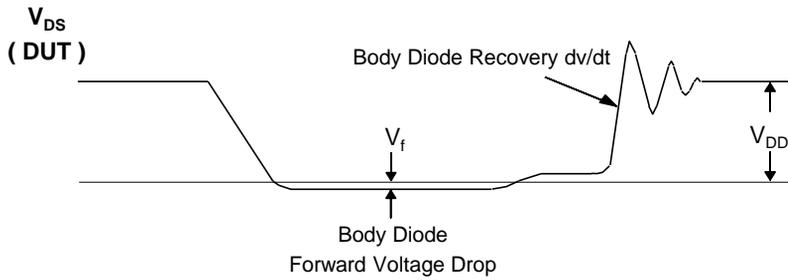
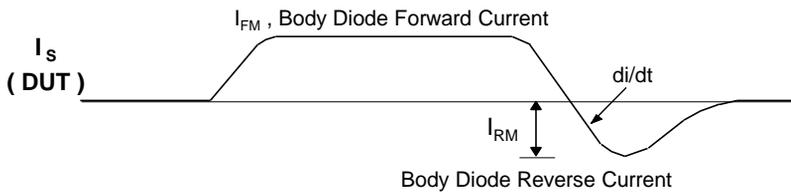
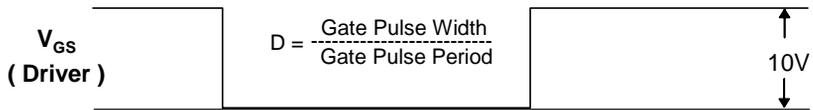
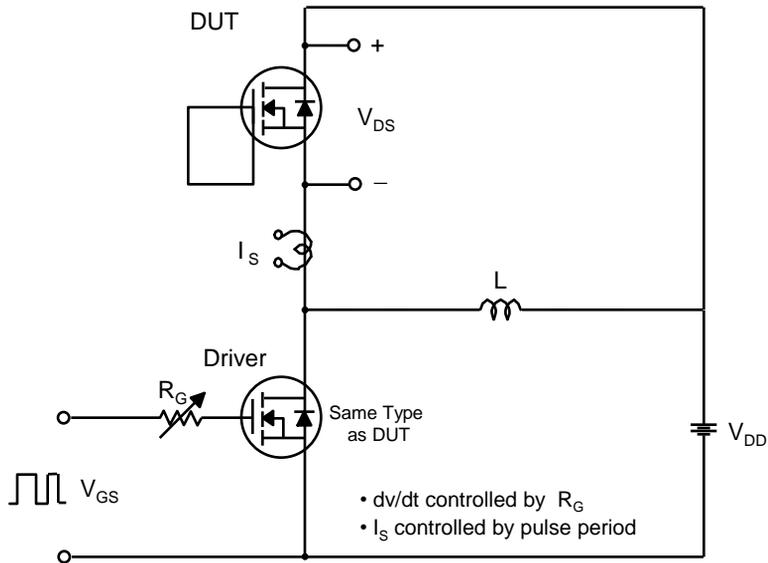
Gate Charge Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveforms



Characteristics Test Circuit & Waveform (continued)



Peak Diode Recovery dv/dt Test Circuit & Waveforms