

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 $R_{DS(on)}$: 3.2 Ω (Typ.) @ $V_{GS}=10V$
- ☐ Halogen Free

APPLICATION

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

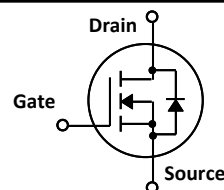
PFU5N90G / PFD5N90G

900V N-Channel MOSFET

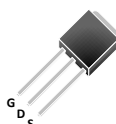
$$BV_{DSS} = 900 \text{ V}$$

$$R_{DS(on)} = 3.2 \Omega$$

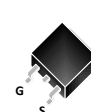
$$I_D = 4.0 \text{ A}$$



I-PAK(TO-251)



D-PAK(TO-252)



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

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	900	V
I_D	Drain Current – Continuous ($T_C = 25^\circ\text{C}$)	4.0	A
	Drain Current – Continuous ($T_C = 100^\circ\text{C}$)	2.5	A
I_{DM}	Drain Current – Pulsed (Note 1)	16	A
V_{GS}	Gate-Source Voltage	± 30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	600	mJ
I_{AR}	Avalanche Current (Note 1)	4.0	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	12.5	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 ($T_C = 25^\circ\text{C}$)	125	W
	- Derate above 25°C	1.0	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	$^\circ\text{C}$

Thermal Resistance Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	--	1.0	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient*	--	62	
$R_{\theta JA}$	Junction-to-Ambient	--	110	

* When mounted on the minimum pad size recommended (PCB Mount)

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	$V_{GS} = 10\text{ V}$, $I_D = 2.5\text{ A}$	--	3.2	4.0	Ω

Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	900	--	--	V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	--	0.6	--	$\text{V}/^{\circ}\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 900\text{ V}$, $V_{GS} = 0\text{ V}$	--	--	10	μA
		$V_{DS} = 720\text{ V}$, $T_C = 125^{\circ}\text{C}$	--	--	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	$V_{DS} = 450\text{ V}$, $I_D = 5.0\text{ A}$, $R_G = 25\text{ }\Omega$, $R_L = 90\text{ }\Omega$ (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	$V_{DS} = 720\text{ V}$, $I_D = 5.0\text{ A}$, $V_{GS} = 10\text{ V}$ (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

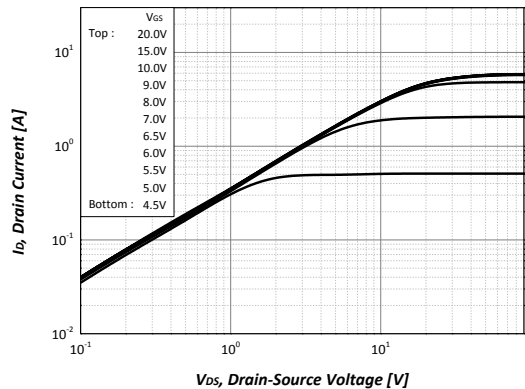
I_S	Continuous Source-Drain Diode Forward Current		--	--	4.0	A
I_{SM}	Pulsed Source-Drain Diode Forward Current		--	--	16	
V_{SD}	Source-Drain Diode Forward Voltage	$I_S = 5.0\text{ A}$, $V_{GS} = 0\text{ V}$	--	--	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 5.0\text{ A}$, $V_{GS} = 0\text{ V}$ $di_F/dt = 100\text{ A}/\mu\text{s}$ (Note 4)	--	560	--	ns
Q_{rr}	Reverse Recovery Charge		--	4.05	--	μC

Notes ;

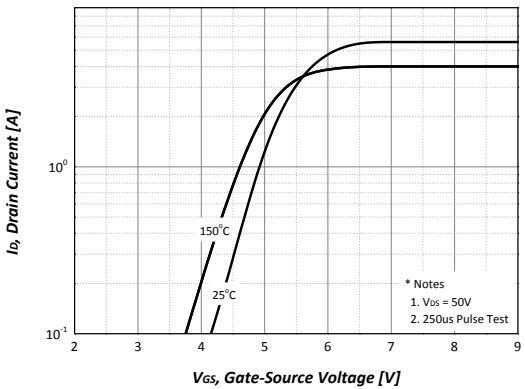
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=5.0\text{ A}$, $V_{DD}=50\text{ V}$, $R_G=25\text{ }\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. $I_{SD}\leq 5.0\text{ A}$, $di/dt\leq 300\text{ A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^{\circ}\text{C}$
4. Pulse Test : Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

Typical Characteristics

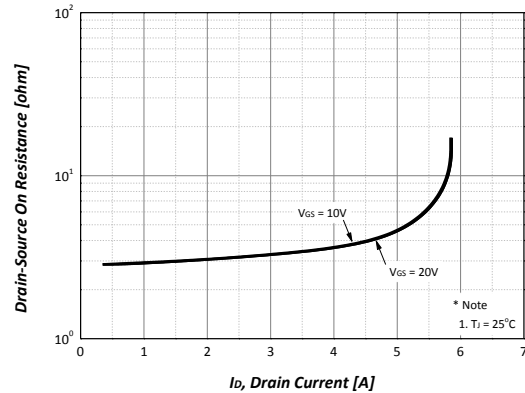
On Region Characteristics



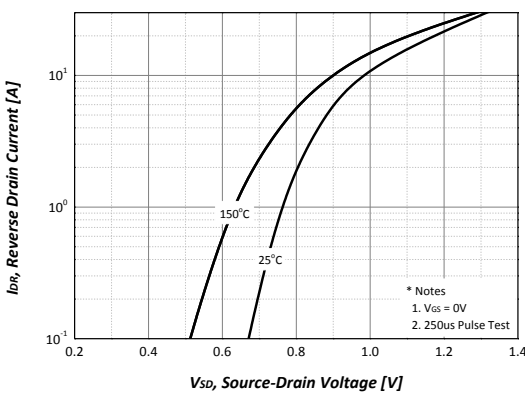
Transfer Characteristics



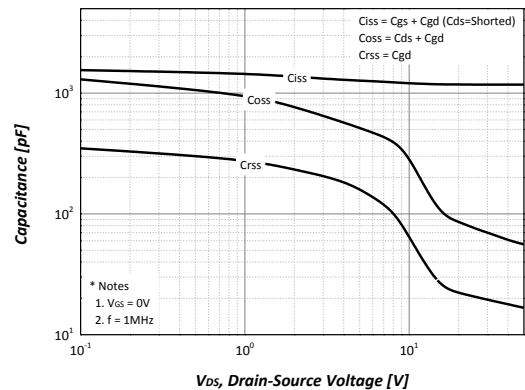
Static Drain-Source On Resistance



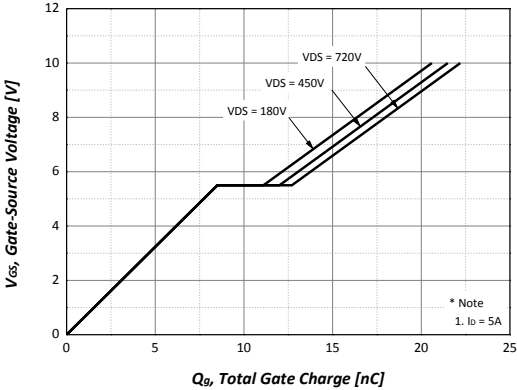
Body Diode Forward Voltage



Capacitance Characteristics

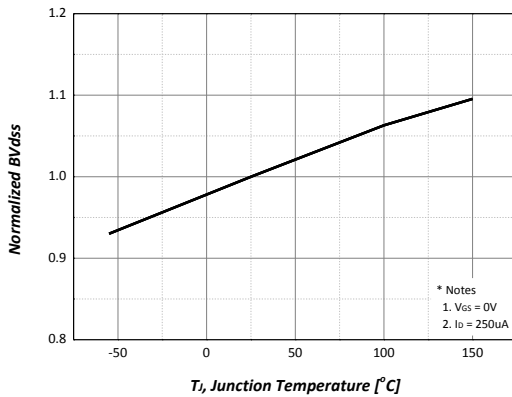


Gate Charge Characteristics

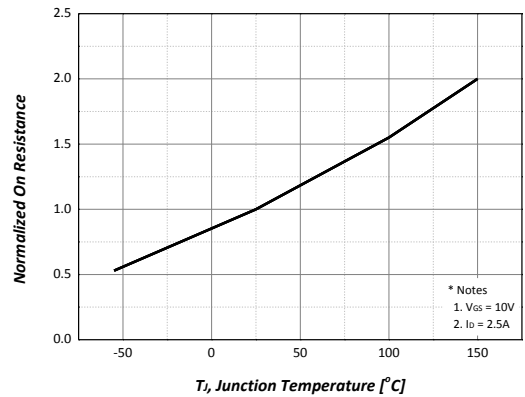


Typical Characteristics

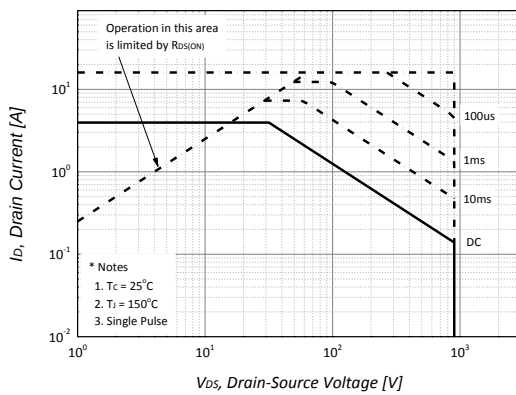
BV_{dss} Variation vs. Temperature



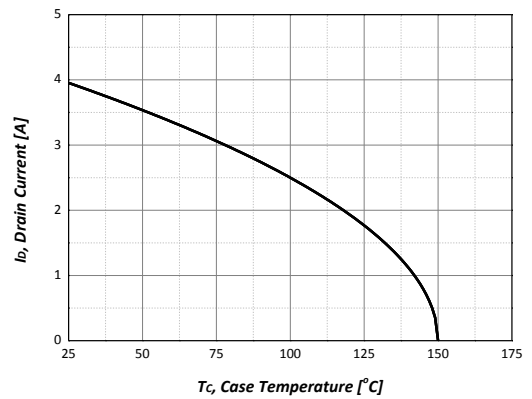
On Resistance Variation vs. Temperature



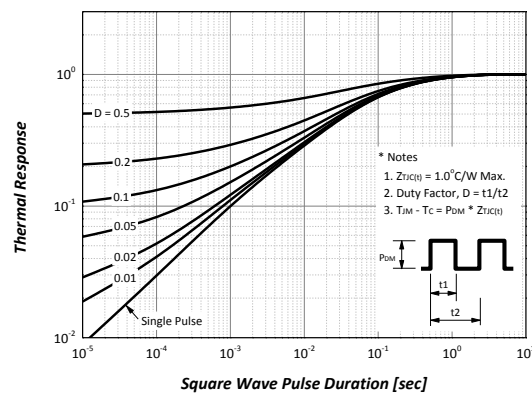
Safe Operation Area



Maximum Drain Current vs. Case Temperature



Transient Thermal Response Curve



Characteristics Test Circuit & Waveform

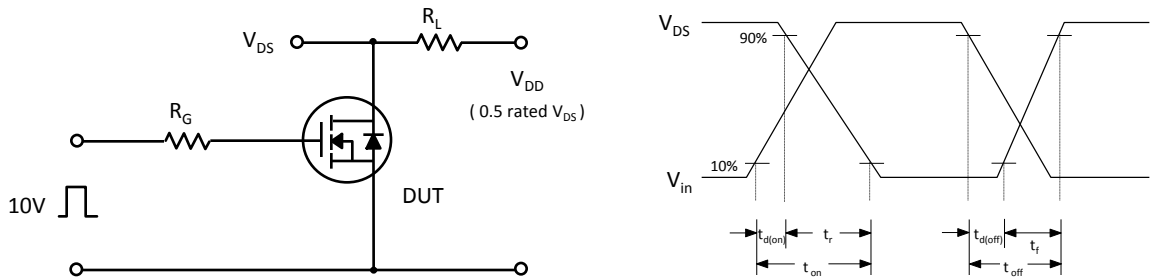


Fig 14. Resistive Switching Test Circuit & Waveforms

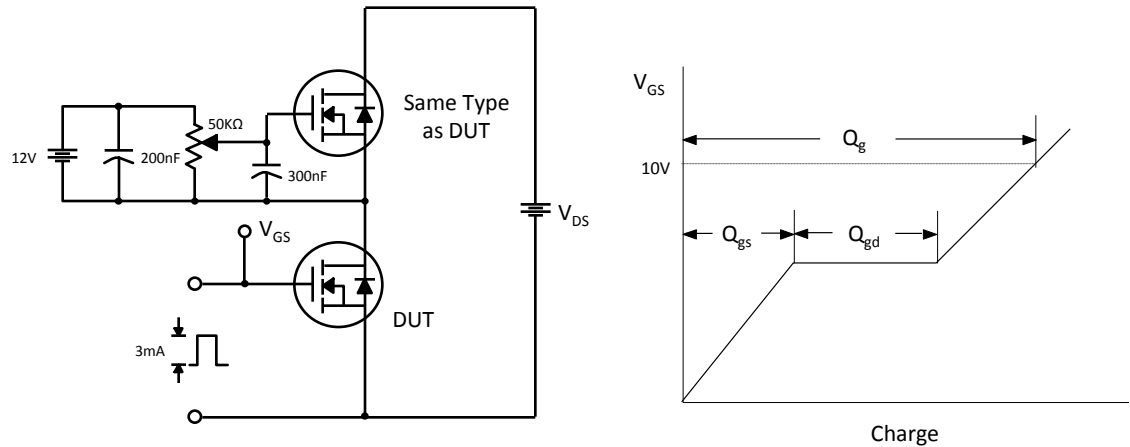


Fig 15. Gate Charge Test Circuit & Waveform

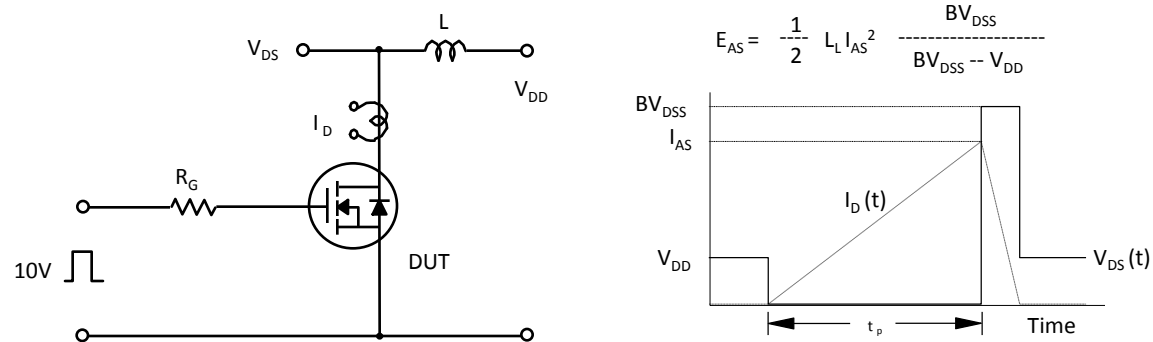
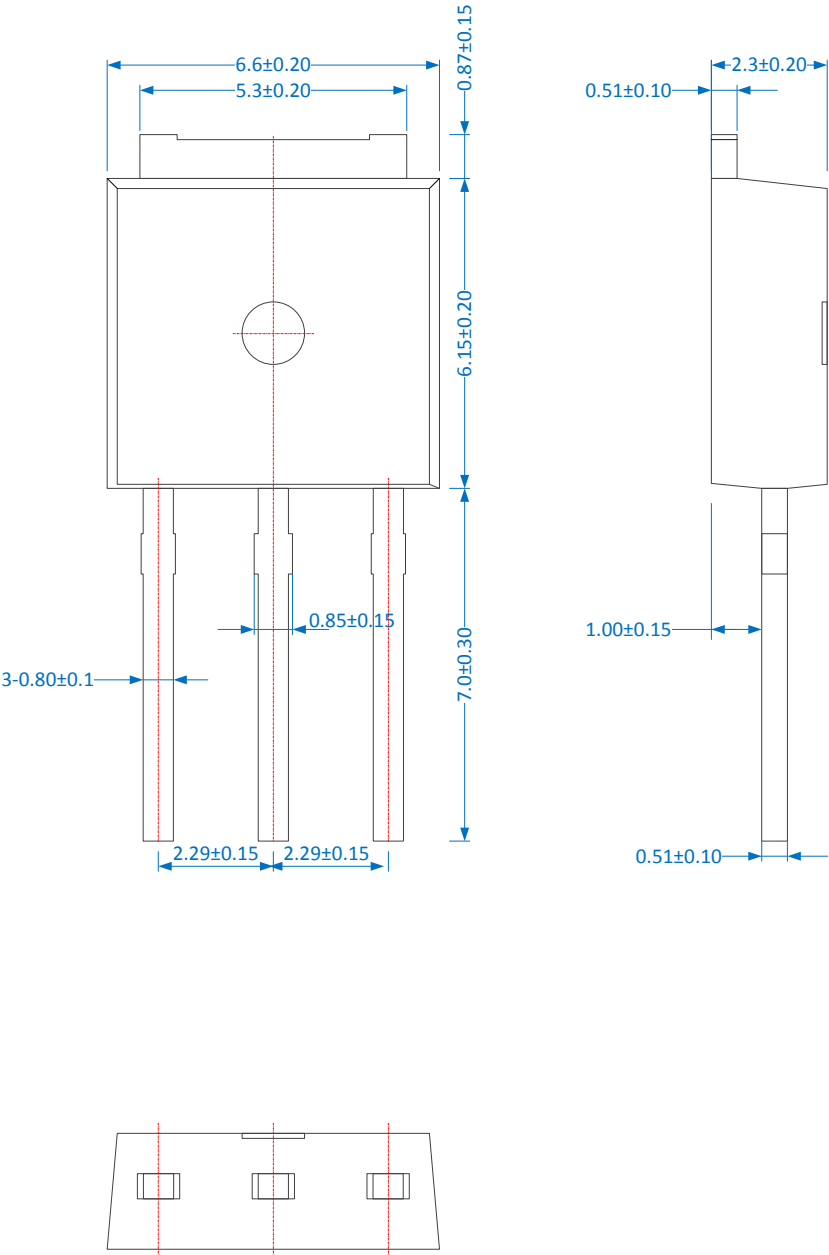


Fig 16. Unclamped Inductive Switching Test Circuit & Waveforms

Package Dimension

I-PAK(TO-251)



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