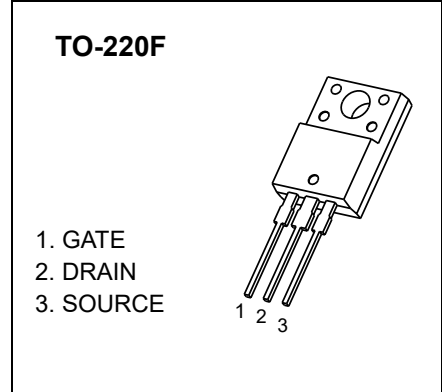




TO-220F Plastic-Encapsulate MOSFETS

PF12N65 N-Channel Power MOSFET

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
650V	0.7Ω@10V	12A



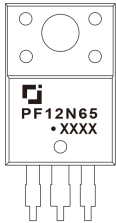
GENERAL DESCRIPTION

This advanced high voltage MOSFET is designed to stand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor controls and bridge circuits.

FEATURE

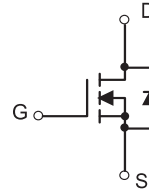
- High Current Rating
- Lower $R_{DS(on)}$
- Lower Capacitance
- Lower Total Gate Charge
- Tighter V_{SD} Specifications
- Avalanche Energy Specified
- Fast Switching Capability

MARKING



PF12N65= Device code Solid dot = Green molding compound device, if none, the normal device
XXXX=Code

EQUIVALENT CIRCUIT



Maximum ratings ($T_a=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	650	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D ^①	12	A
Pulsed Drain Current	I_{DM} ^②	48	A
Single Pulsed Avalanche Energy	E_{AS} ^③	540	mJ
Power Dissipation	P_D ^①	50	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$ ^⑥	62.5	°C/W
Thermal Resistance from Junction to Case	$R_{\theta JC}$ ^①	2.5	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 ~+150	°C

MOSFET ELECTRICAL CHARACTERISTICS

$T_a=25^\circ\text{C}$ unless otherwise specified

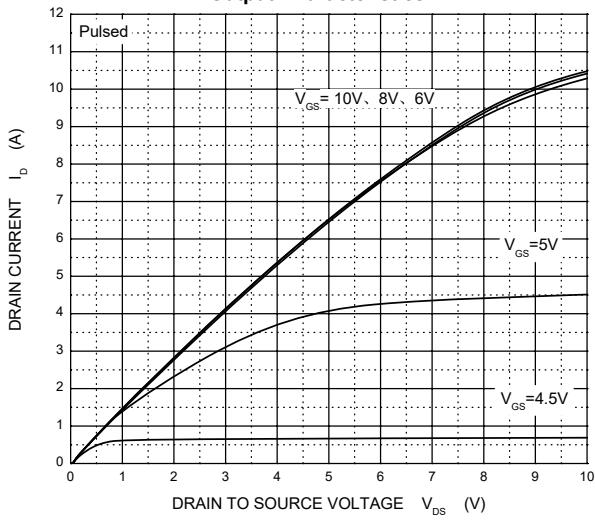
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Off characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 650V, V_{GS} = 0V$			10	μA
Gate-body leakage current	I_{GSS}	$V_{DS} = 0V, V_{GS} = \pm 30V$			± 100	nA
On characteristics ^④						
Gate-threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	3.5	4	V
Static drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 6A$		0.7	0.85	Ω
Dynamic characteristics ^{④ ⑤}						
Input capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1MHz$		1800		pF
Output capacitance	C_{oss}			200		
Reverse transfer capacitance	C_{rss}			25		
Switching characteristics ^{④ ⑤}						
Total gate charge	Q_g	$V_{DS} = 520V, V_{GS} = 10V, I_D = 12A$		42	54	nC
Gate-source charge	Q_{gs}			8.6		
Gate-drain charge	Q_{gd}			21		
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 325V, V_{GS} = 10V, R_G = 25\Omega, I_D = 12A$		30		ns
Turn-on rise time	t_r			90		
Turn-off delay time	$t_{d(off)}$			160		
Turn-off fall time	t_f			90		
Drain-Source Diode Characteristics						
Drain-source diode forward voltage	V_{SD} ^④	$V_{GS} = 0V, I_S = 12A$			1.4	V
Maximum continuous drain-source diode forward current	I_S ^①				12	A
Maximum pulsed drain-source diode forward current	I_{SM} ^②				48	A

Notes :

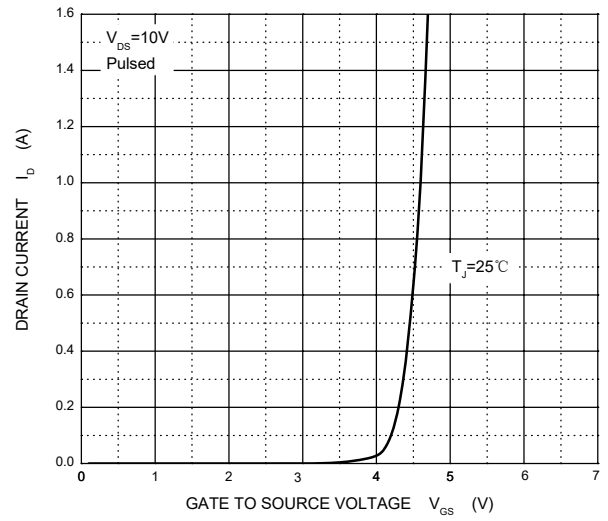
- $T_C=25^\circ\text{C}$ Limited only by maximum temperature allowed.
- $P_W \leq 10\mu s$, Duty cycle $\leq 1\%$.
- EAS condition: $V_{DD}=50V, V_{GS}=10V, L=7.5mH, R_g=25\Omega$ Starting $T_J = 25^\circ\text{C}$.
- Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production.
- The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25^\circ\text{C}$.

Typical Characteristics

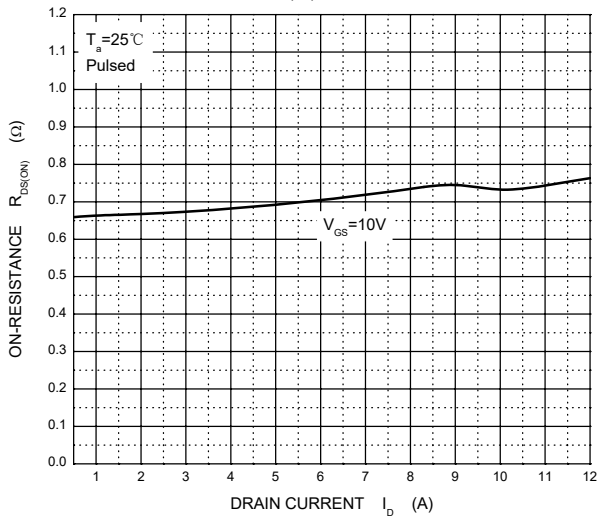
Output Characteristics



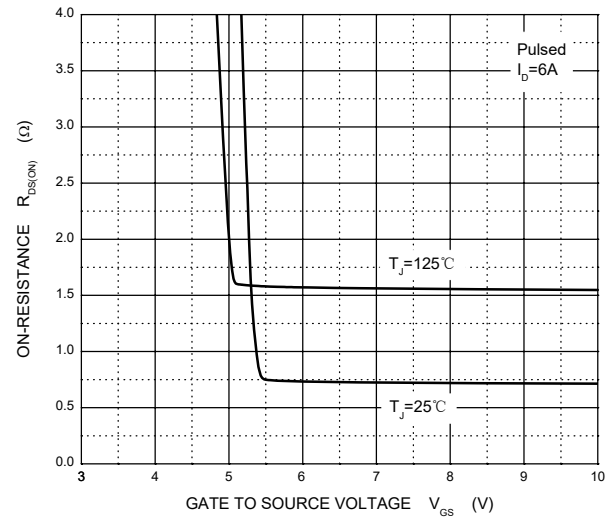
Transfer Characteristics



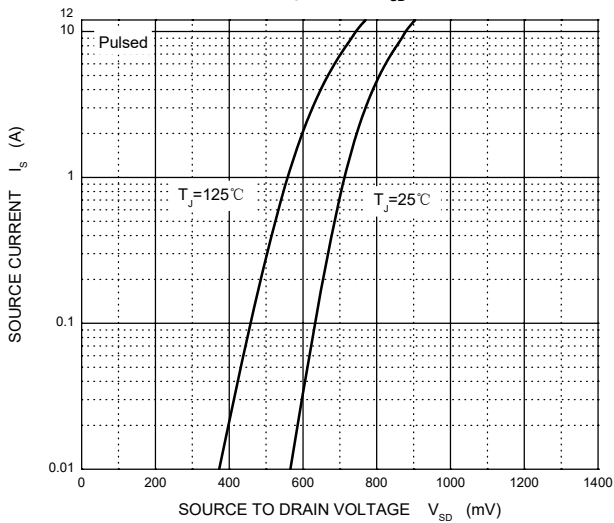
$R_{DS(ON)}$ — I_D



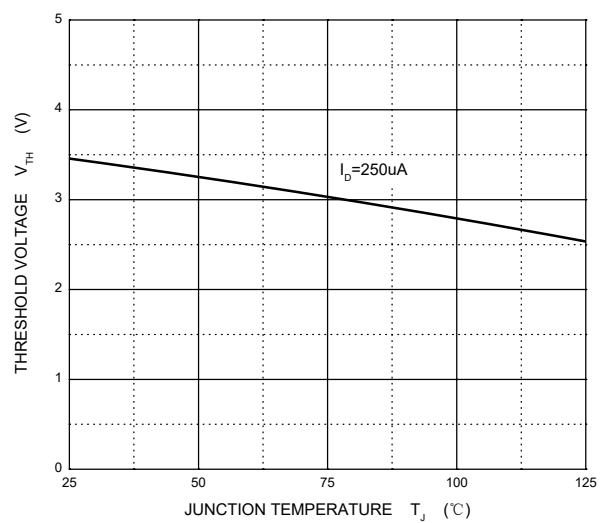
$R_{DS(ON)}$ — V_{GS}



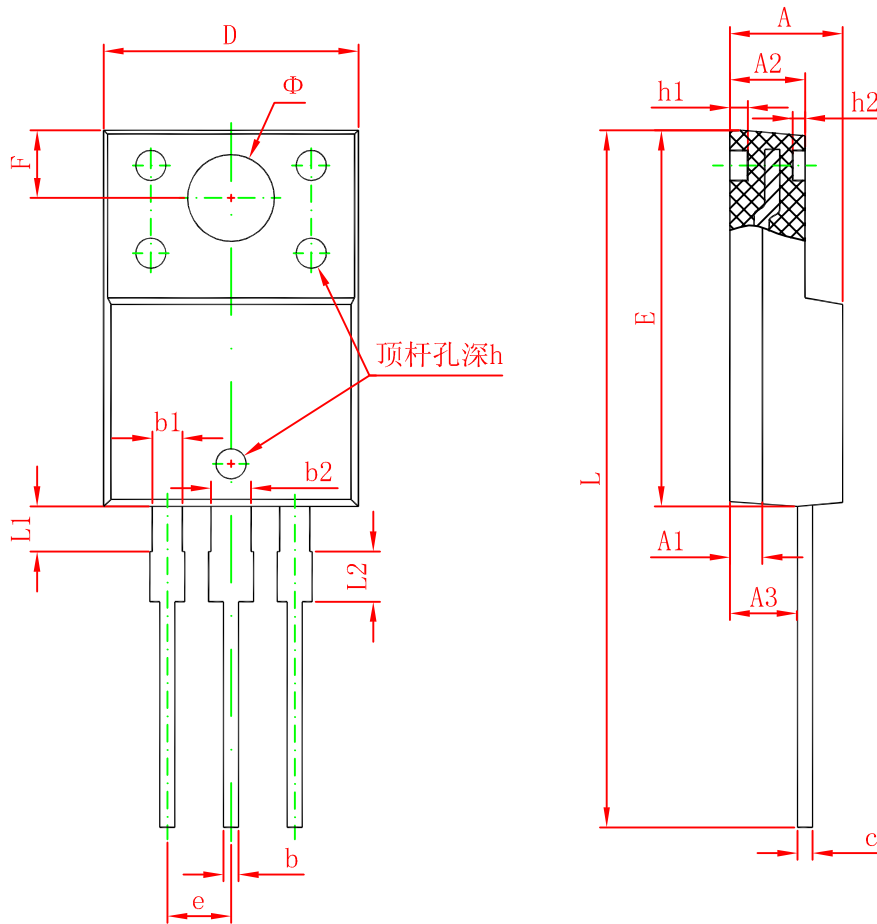
I_S — V_{SD}



Threshold Voltage



TO-220F Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	0.900	1.100	0.075	0.083