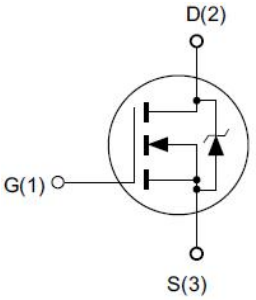
SUPER semiconductor

SPF12N60M

N-Channel Power MOSFET

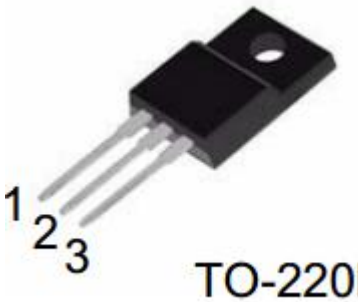
Features

- ◆ 600V, 12A, $R_{DS(ON)}$(Max.) = 0.75Ω@VGS = 10V.
- ◆ Low Crss
- ◆ Fast Switching
- ◆ 100% Avalanche Tested



Application

- ◆ Adapter
- ◆ LCD Panel Power
- ◆ E-Bike Charger
- ◆ Switching Mode Power Supply



TO-220F

Absolute Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Limit	Unit
		TO-220F	
V_{DS}	Drain-Source Voltage [a]	600	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, T_C =25°C	12	A
	Drain Current-Continuous, T_C =100°C	7.5	A
I_{DM}	Drain Current-Pulsed [b]	48	A
P_D	Maximum Power Dissipation @ T_J =25°C	42	W
EAS	Single Pulsed Avalanche Energy [d]	500	mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Value	Unit
		TO-220F	
$R_{\theta JC}$	Thermal Resistance, Junction-Case Max.	3.5	°C/W
$R_{\theta JA}$	Thermal Resistance Junction-Ambient Max	62.5	°C/W

Electrical Characteristics T_J = 25°C unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	600	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	V_{DS} = 0V, V_{GS} = ±30V	-	-	±100	nA

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{GS}(th)	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D =250μA	2	-	4	V
R_{DS}(on)	Static Drain-Source On-Resistance [c]	V_{GS} = 10V, I_D =6A	-	-	0.75	Ω

Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Ciss	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	2055	-	pF
Coss	Output Capacitance		-	180	-	pF
Crss	Reverse Transfer Capacitance		-	7	-	pF

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300V, I_D =12A, R_G = 10Ω,V_{GS}=10V	-	27	-	ns
t_r	Turn-On Rise Time		-	25	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	63	-	ns
t_f	Turn-Off Fall Time		-	39	-	ns
Qg	Total Gate Charge	V_{DS} = 480V, I_D =12A, V_{GS} = 10V	-	40		nC
Qgs	Gate-Source Charge		-	9.8	-	nC
Qgd	Gate-Drain Charge		-	14.5	-	nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	V_{GS} = 0V	-	-	12	A
I_{SM}	Maximum Pulsed Current	V_{GS} = 0V	-	-	48	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S =12A	-		1.4	V

Notes:

a. T_J=-55 ℃ to +150 ℃

b. Repetitive rating; pulse width limited by maximum junction temperature.

c. Pulse width≦300us; duty cycle≦2%

d. L=10mH, V_{DD}=50V,I_{as}=10A,Rg=25Ω Starting TJ=25 ℃

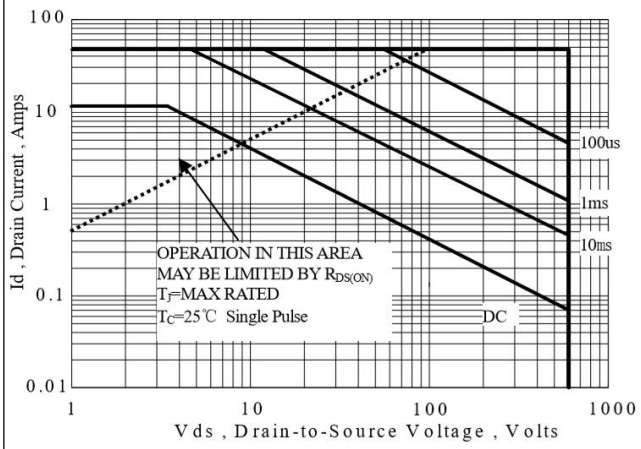


Figure 1 Maximum Safe Operating Area

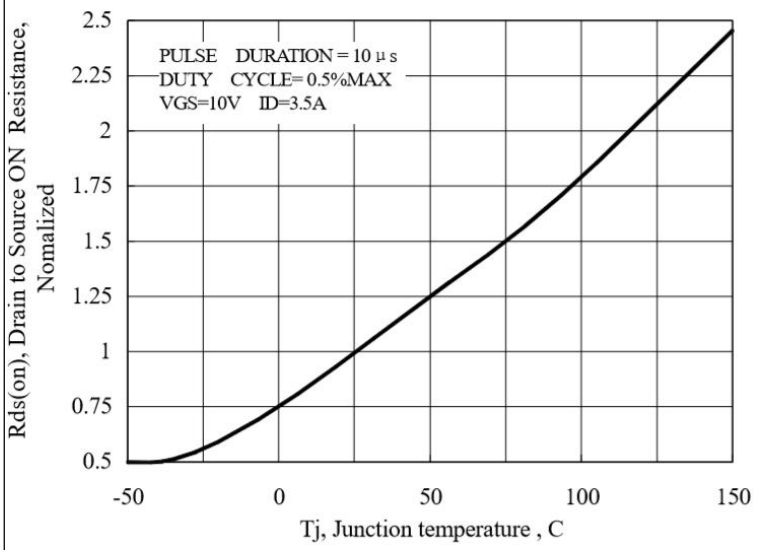


Figure 2 Normalized On-Resistance Variation with Temperature

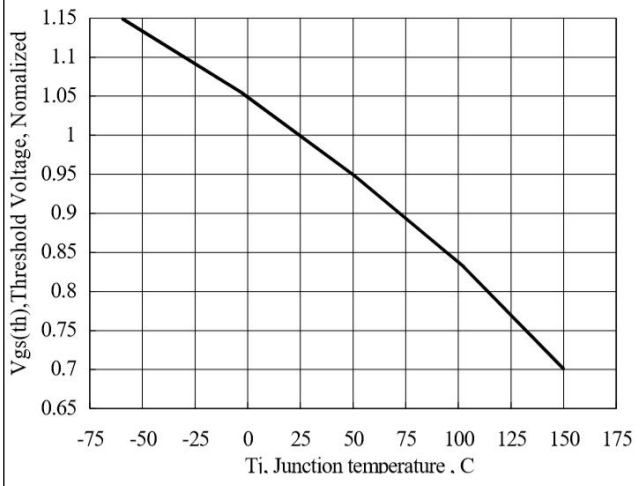


Figure 3. Typical Theshold Voltage vs Junction Temperature

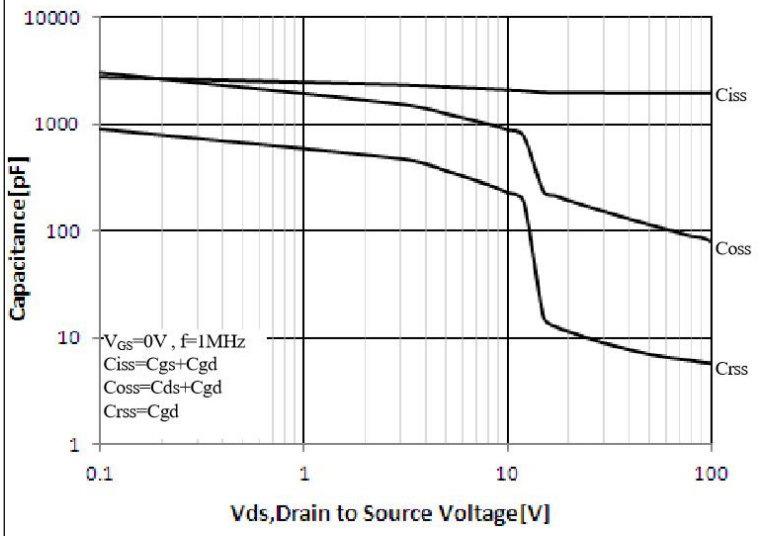


Figure 4. Capacitance Characteristics

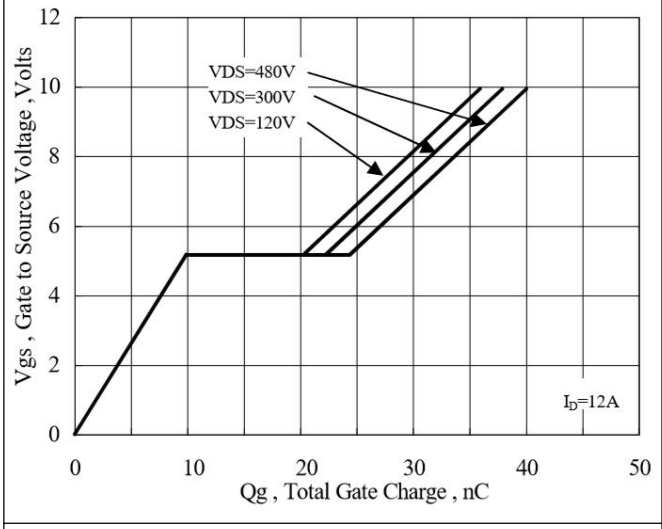


Figure 5. Gate Charge Characteristics

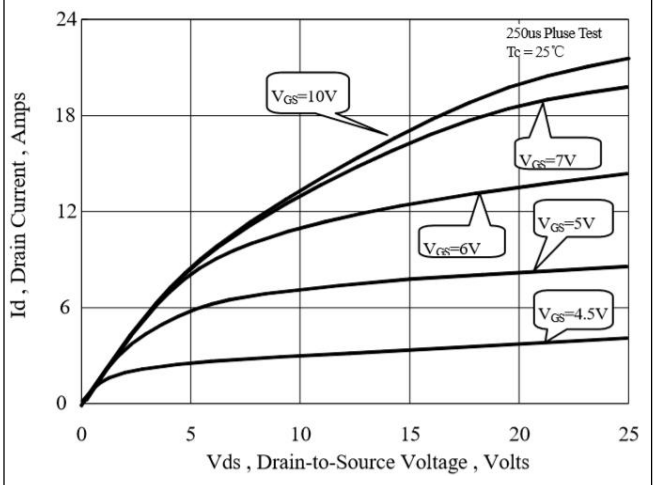


Figure 6. On-State Characteristics

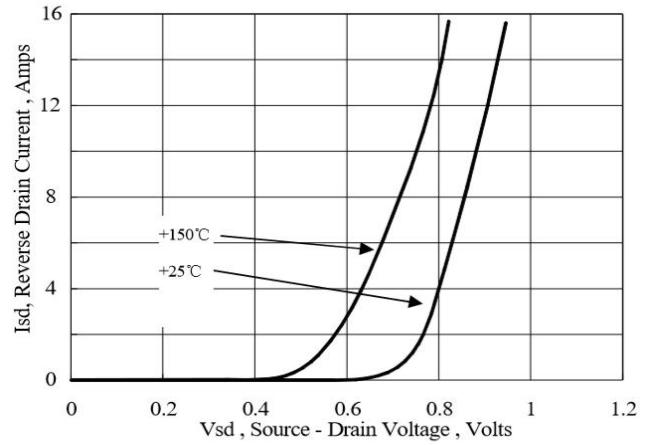


Figure 7. Typical Body Diode Transfer Characteristics

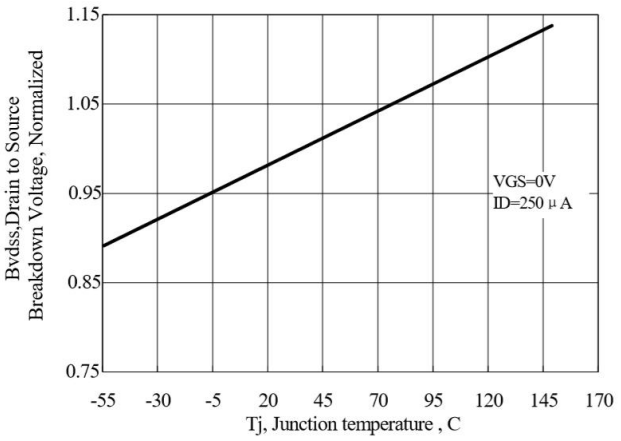


Figure 8. Typical Breakdown Voltage vs Junction Temperature

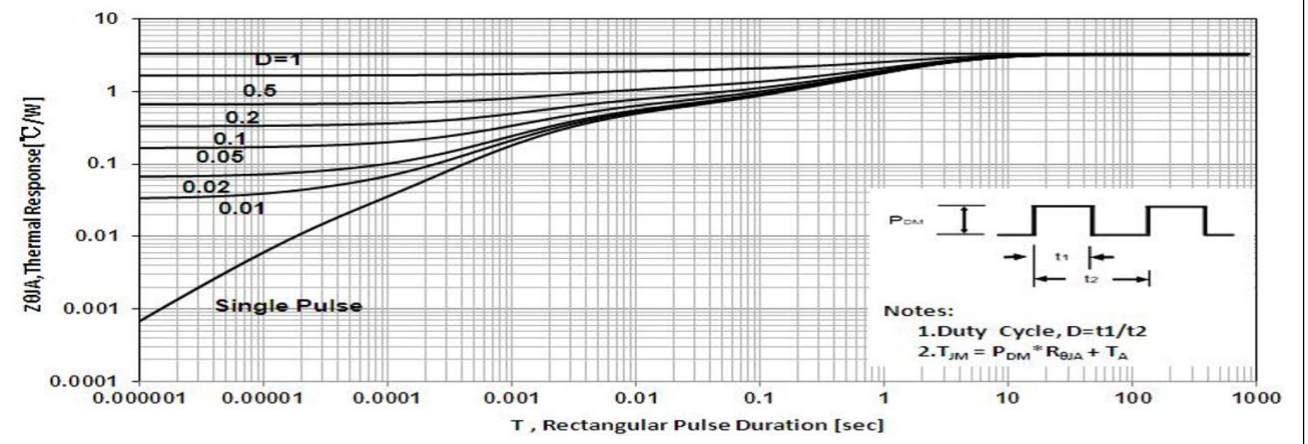


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration