

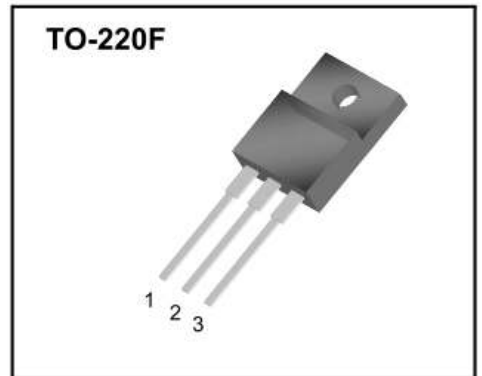
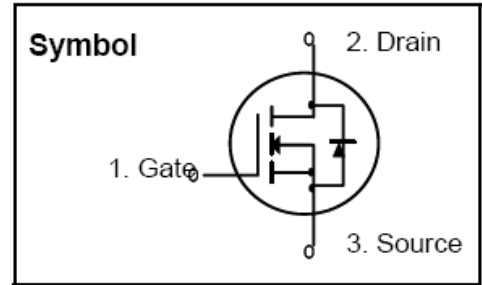
N-Channel MOSFET

Features

- ◆ $R_{DS(ON)}$ Max 2.5 ohm at $V_{GS} = 10V$
- ◆ Gate Charge (Typical 16.0nC)
- ◆ Improve dv/dt capability, Fast switching
- ◆ 100% avalanche Tested

General Description

This MOSFET is produced using advanced planar strip DMOS technology. This latest technology has been especially designed to minimize on-state resistance have a high rugged avalanche characteristics. These devices are well suited for high efficiency switch mode power supply active power factor correction. Electronic lamp based on half bridge topology



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

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current $T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	4 2.4	A
V_{GSS}	Gate-Source Voltage	± 30	V
I_{DM}	Drain Current pulse (Note 1)	8	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	180	mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	10.4	mJ
dv/dt	Peak diode Recovery dv/dt (Note 3)	4.5	V/ns
P_D	Power Dissipation $T_C=25^\circ\text{C}$	104	W
T_J, T_{STG}	Operation and Storage Temperature range	-45 ~ 150	$^\circ\text{C}$

SFF4N60

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.2	$^{\circ}C/W$
$R_{\theta CS}$	Thermal Resistance Case to Sink Typ.	0.5	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	62.5	$^{\circ}C/W$

Electrical Characteristics (TC = 25 $^{\circ}C$ Unless otherwise noted)

Symbol	Items	Conditions	Ratings			Unit
			Min	Typ.	Max	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	600			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature coefficient	$I_D = 250\mu A$, Reference to 25 $^{\circ}C$		0.6		V/ $^{\circ}C$
I_{DSS}	Zero gate voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$ $V_{DS} = 480V, T_S = 125^{\circ}C$			1 10	μA
I_{GSSF}	Gate body leakage current Forward	$V_{GS} = 30V, V_{DS} = 0V$			100	nA
I_{GSSR}	Gate body leakage current Reverse	$V_{GS} = -30V, V_{DS} = 0V$			-100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu A$	2.5		4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 2.0A$		2.0	2.5	Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V$ $f = 1.0MHz$		560		pF
C_{oss}	output Capacitance			55		pF
C_{rss}	Reverse Transfer Capacitance			7		pF

Switching Characteristics

Symbol	Items	Conditions	Min	Typ.	Max	Units
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 300V, I_D = 4.0A$ $R_G = 25 \Omega$ (note 4,5)		10		ns
t_r	Turn-on Rise Time			40		ns
$t_{d(off)}$	Turn-off Delay Time			40		ns
t_f	Turn-off Fall Time			50		ns
Q_g	Total Gate Charge	$V_{DS} = 480V, I_D = 4.0A$ $V_{GS} = 10V$ (note 4,5)		16		nC
Q_{gs}	Gate-Source Charge			2.5		nC
Q_{gd}	Gate-Drain Charge			6.5		nC

Drain-Source Diode Characteristics

I_S	Maximum Continuous Drain-Source diode Forward Current			4.0	A
I_{SM}	Maximum Pulse Drain-Source diode Forward Current			16.0	A
V_{SD}	Drain-Source diode Forward voltage	$V_{GS} = 0V, I_S = 4.0A$		1.4	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0V, I_S = 4.0A$ $di_F/dt = 100 A/us$ (note 4)		300	nS
Q_{rr}	Reverse Recovery Charge			2.0	μC

Notes

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 20mH, I_{AS} = 4.0A, V_{DD} = 50V, R_G = 25 \Omega$, starting $T_J = 25^\circ C$
3. $I_{SD} \leq 4.0A, di/dt \leq 200A/us, V_{DD} \leq BV_{DSS}$, starting $T_J = 25^\circ C$
4. Pulse Test : Pulse width $\leq 300us$, Duty cycle $\leq 2\%$
5. Essentially independent of operation temperature

SFF4N60

Fig. 1 On-Region Characteristics

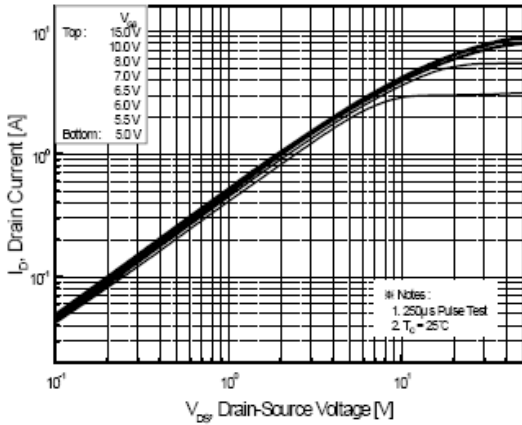


Fig. 2 On-Resistance variation vs Drain Current And gate Voltage

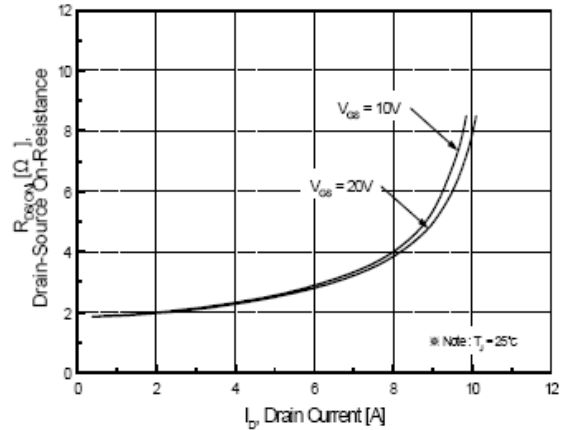


Fig. 3 Breakdown Voltage Variation vs Temperature

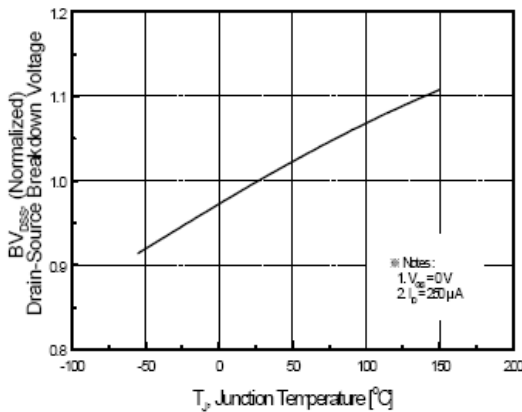


Fig. 4. On-Resistance Variation vs Temperature

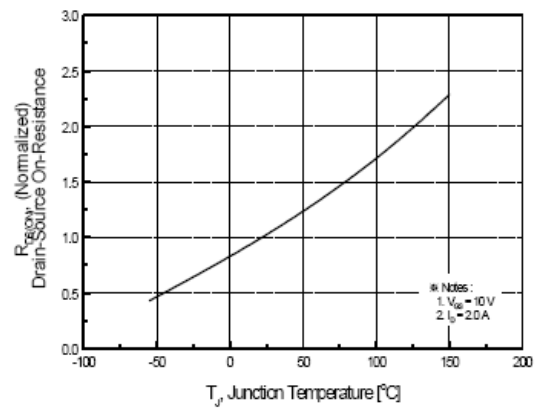


Fig. 5 Maximum Safe Operation Area

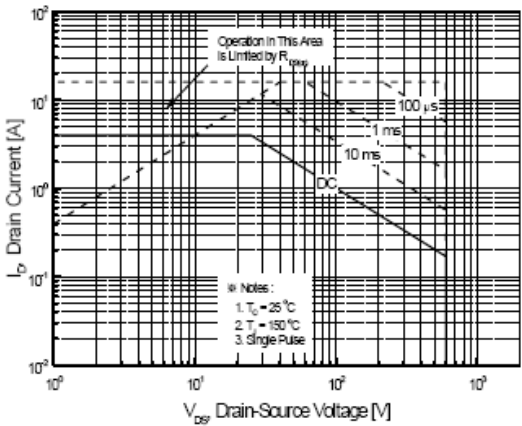
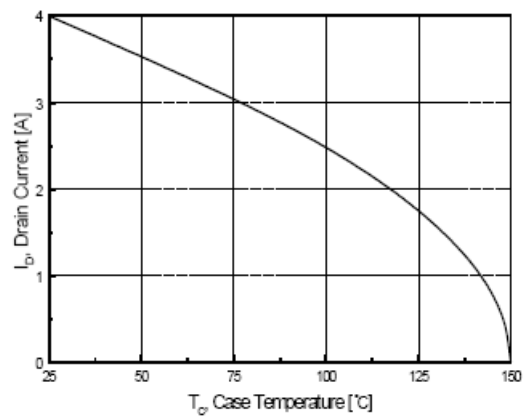


Fig. 6 Maximum Drain Current vs Case Temp.



TO-220F Package Dimension

Dim.	mm			Inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	10.4		10.6	0.409		0.417
B	6.18		6.44	0.243		0.254
C	9.55		9.81	0.376		0.386
D	13.47		13.73	0.530		0.540
E	6.05		6.15	0.238		0.242
F	1.26		1.36	0.050		0.054
G	3.17		3.43	0.125		0.135
H	1.87		2.13	0.074		0.084
I	2.57		2.83	0.101		0.111
J		2.54			0.100	
K		5.08			0.200	
L	2.51		2.62	0.099		0.103
M	1.23		1.36	0.048		0.054
N	0.45		0.63	0.018		0.025
O	0.65		0.78	0.0025		0.031
ϕ		3.7			0.146	
$\phi 1$		3.2			0.126	
$\phi 2$		1.5			0.059	

