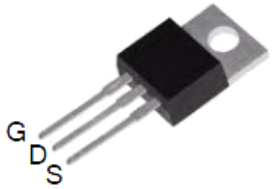
600V N-Channel MOSFET

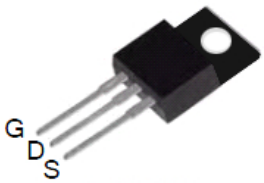
GENERAL DESCRIPTION

This Power MOSFET is produced using advanced planar stripe 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 switched mode power supplies, active power factor correction.electronic lamp ballasts based on half bridge topology.

V_{DSS}	$R_{DS(ON)}$	I_D
600V	1.2Ω	7.5A



TO-220
Not to Scale



TO-220F
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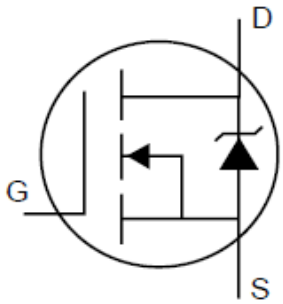

Features

- 7.5A, 600V, RDS(on) = 1.2Ω @VGS = 10 V
- Low gate charge (typical 30nC)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

Ordering Information

PART NUMBER	PACKAGE	BRAND
8N60/8N60F	TO-220/220F	0GFD

Absolute Maximum Ratings

TC = 25°Cunless otherwise noted

Symbol	Parameter	8N60	8N60F	Units
V_{DSS}	Drain-Source Voltage	600		V
I_D	Drain Current - Continuous (TC = 25°C)	7.5	7.5	A
	- Continuous (TC = 100°C)	4.5	4.5	A
I_{DM}	Drain Current- Pulsed (Note 1)	30	30	A
V_{GSS}	Gate-Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	285		mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	15.5		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P_D	Power Dissipation (TC = 25°C)	165	55	W
	Derate above 25°C	1.21	0.4	W/°C
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		°C
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		°C

Thermal Characteristics

Symbol	Parameter	8N60	8N60F	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.85	2.2	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink Typ.	0.5	--	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

Electrical Characteristics

TC = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	600	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C	--	0.57	--	V/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V	--	--	10	μA
		V_{DS} = 480 V, T_C = 125°C	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D= 250 μA	2.0	--	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10 V, I_D = 3.75 A	--	1.0	1.2	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	1255	--	pF
C_{oss}	Output Capacitance		--	115	--	pF
C_{rss}	Reverse Transfer Capacitance		--	14.2	--	pF

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 7.5A, R_G = 25 Ω (Note 4, 5)	--	22	--	ns
t_r	Turn-On Rise Time		--	90	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	76	--	ns
t_f	Turn-Off Fall Time		--	44	--	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 7.5A, V_{GS} = 10 V (Note 4, 5)	--	30	--	nC
Q_{gs}	Gate-Source Charge		--	5.2	--	nC
Q_{gd}	Gate-Drain Charge		--	16.3	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	7.5	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	30	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 7.5A,	--	--	1.5	V
t_{rr}	Reverse Recovery Time	V_{GS} = 0 V, I_S = 7.5A, dI_F / dt = 100 A/μs (Note 4)	--	390	--	ns
Q_{rr}	Reverse Recovery Charge		--	3.3	--	μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 20 mH, IAS = 7.5 A, VDD = 50V, RG = 50 Ω, Starting TJ = 25°C
3. ISD ≤ 7.5 A, di/dt ≤ 200A/μs, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Fig 1. On-State Characteristics

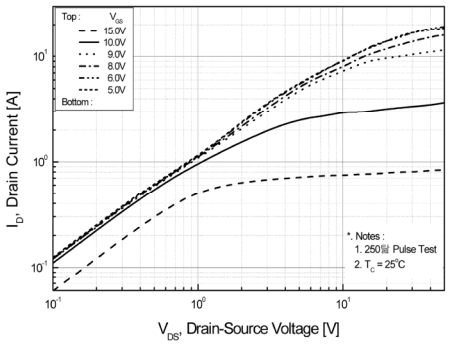

Fig 2. Transfer Characteristics

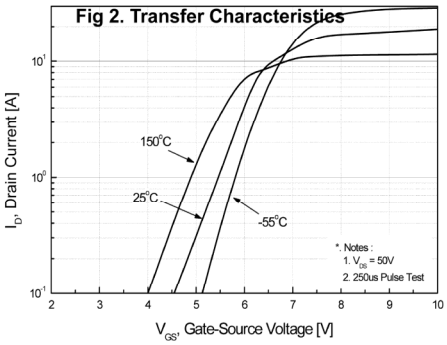

Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

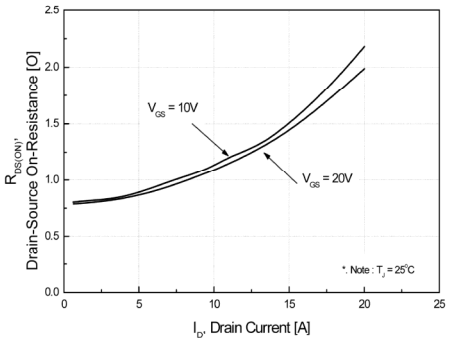

Fig 4. On State Current vs.

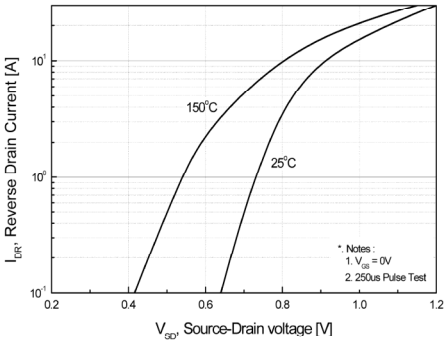

Fig 5. Capacitance Characteristics (Non-Repetitive)

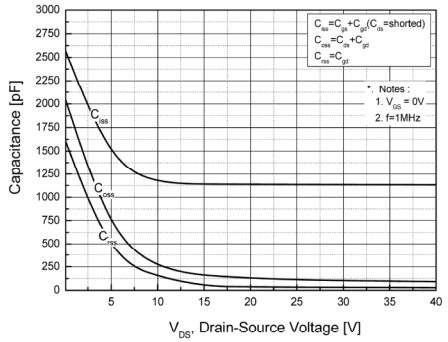

Fig 6. Gate Charge Characteristics

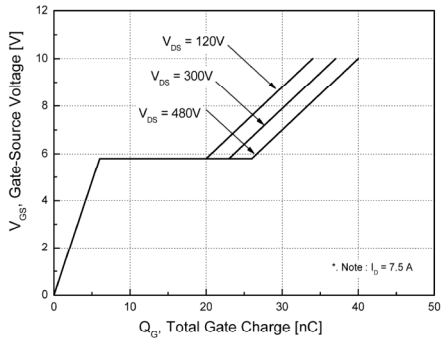

Fig 7. Breakdown Voltage Variation vs. Junction Temperature

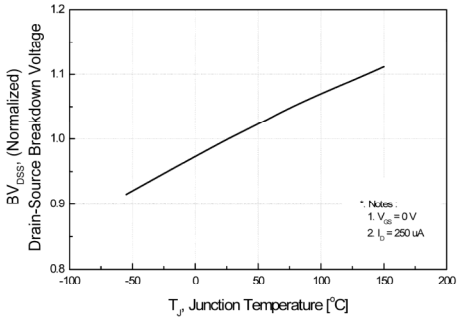

Fig 8. On-Resistance Variation vs. Junction Temperature

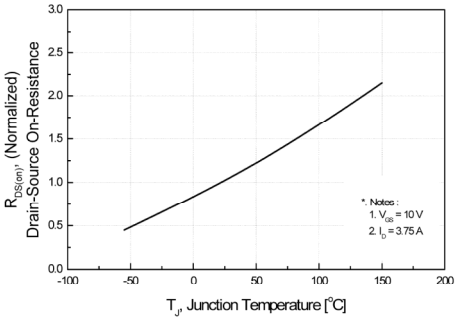

Fig 9-1. Maximum Safe Operating Area fo TSP8N60M

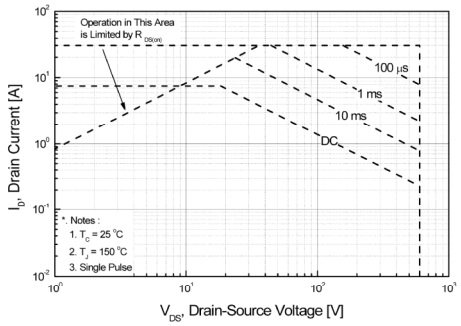

Fig 9-2. Maximum Safe Operating Area for TSF8N60M

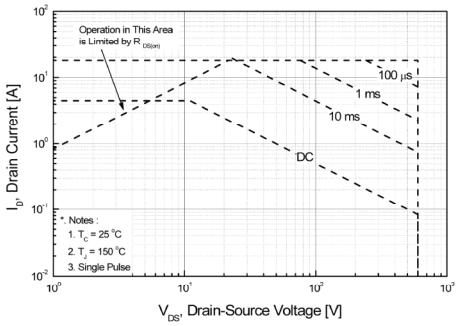

Fig 10. Maximum Drain Current vs. Case Temperature

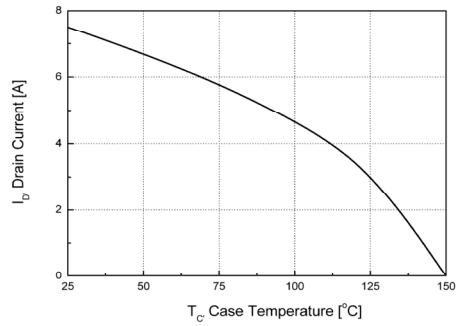

Fig 11-1 . Transient Thermal Response Curve fo TSP8N60M

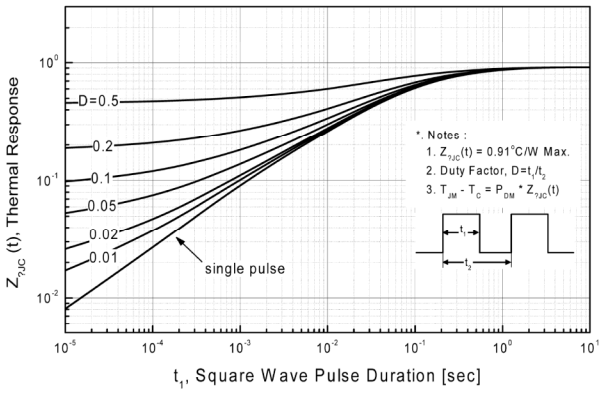

Fig 11-2 . Transient Thermal Response Curve for TSF8N60M

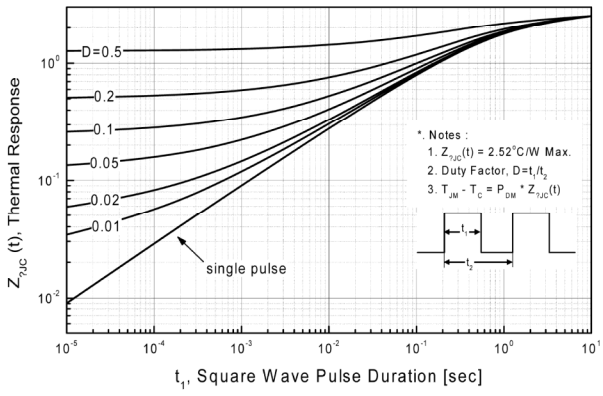

Fig. 12. Gate Charge Test Circuit & Waveforms

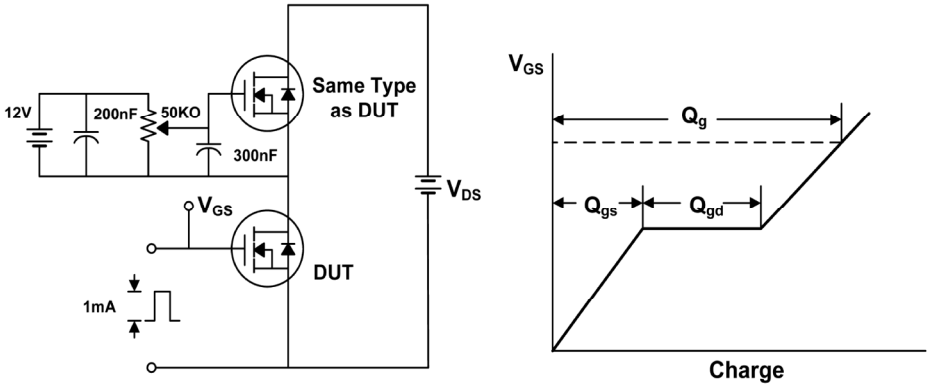

Fig 13. Switching Time Test Circuit & Waveforms

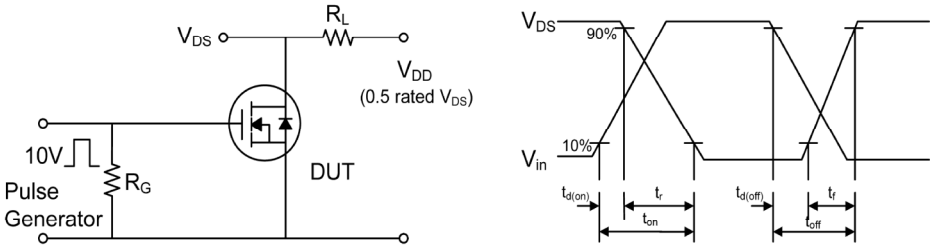

Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

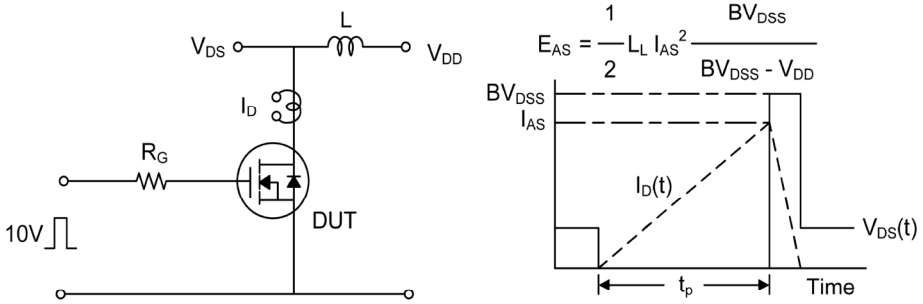

Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms