General Description

The series of devices use advanced trench gate super junction technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This super junction MOSFET fits the industry's AC-DC SMPS requirements for PFC, AC/DC power conversion, and industrial power applications.

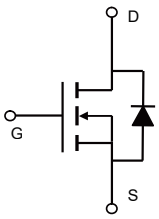
Features

- Optimized body diode reverse recovery performance
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested
- ROHS&Halogen compliant

Application

- Power factor correction（PFC）
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply（UPS）
- LLC Half-bridge

TO-220F



Schematic

Parameter	Symbol	Value	Unit
Drain-Source Voltage (V_{GS}=0V）	V_{DS}	600	V
Gate-Source Voltage (V_{DS}=0V) ,AC (f>1 Hz)	V_{GS}	±30	V
Gate-Source Voltage (V_{DS}=0V) ,DC	V_{GS}	±20	V
Continuous Drain Current at Tc=25°C	$I_{D\ (DC)}$	10	A
Continuous Drain Current at Tc=100°C	$I_{D\ (DC)}$	7	A
Pulsed drain current **(Note 1)**	$I_{DM\ (pluse)}$	30	A
Maximum Power Dissipation(Tc=25℃) Derate above 25°C	P_D	32 0.21	W W/°C
Single pulse avalanche current **(Note 2)**	I_{AS}	2	A
Reverse diode dv/dt，V_{DS} ≤480 V,I_{SD}<I_D	dv/dt	50	V/ns
Drain Source voltage slope，V_{DS} ≤480 V	dv/dt	50	V/ns
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55...+175	°C

Table 2. Thermal Characteristic

Parameter	Symbol	Value	Unit
Thermal Resistance，Junction-to-Case（Maximum）	R_{thJC}	4.68	°C /W
Thermal Resistance，Junction-to-Ambient （Maximum）	R_{thJA}	62	°C /W

Table 3. Electrical Characteristics (T_J=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/off states						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250uA	600			V
Zero Gate Voltage Drain Current(Tc=25℃)	I_{DSS}	V_{DS}=600V,V_{GS}=0V			10	μA
Zero Gate Voltage Drain Current(Tc=125℃)	I_{DSS}	V_{DS}=600V,V_{GS}=0V			300	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V			±200	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	3.5	4.2	5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A		380	420	mΩ
Dynamic Characteristics						
Gate Resistance	Rg	F=1MHZ, D-S short		41		Ω
Input Capacitance	C_{lss}	V_{DS}=50V,V_{GS}=0V, F=1MHz		591		pF
Output Capacitance	C_{oss}			17		pF
Reverse Transfer Capacitance	C_{rss}			1.9		pF
Total Gate Charge	Q_g	V_{DS}=400V,I_D=5A, V_{GS}=10V		13.7	15	nC
Gate-Source Charge	Q_{gs}			3.3		nC
Gate-Drain Charge	Q_{gd}			6.9		nC
Gate plateau voltage	Vgp			7.2		V
Switching times						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=380V,I_D=5A, R_G=4Ω,V_{GS}=10V		16		nS
Turn-on Rise Time	t_r			12		nS
Turn-Off Delay Time	$t_{d(off)}$			50		nS
Turn-Off Fall Time	t_f			9		nS
Source- Drain Diode Characteristics						
Source-drain current(Body Diode)	I_{SD}	T_C=25°C			10	A
Pulsed-Source-drain current(Body Diode)	I_{SDM}				30	A
Forward on voltage	V_{SD}	Tj=25°C,I_{SD}=10A,V_{GS}=0V		1.0	1.2	V
Reverse Recovery Time	t_{rr}	Tj=25°C,I_F=5A, di/dt=100A/μs		80		nS
Reverse Recovery Charge	Q_{rr}			0.24		uC
Peak reverse recovery current	I_{rrm}			6		A

Notes: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. Tj=25℃,VDD=50V,VG=10V, R_G=25Ω

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (curves)

Figure1. Safe operating area

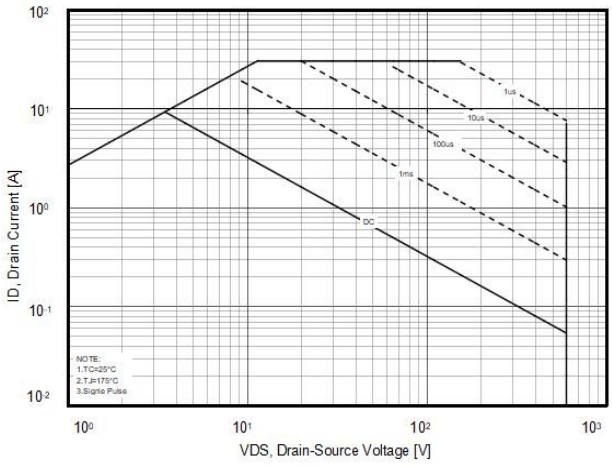


Figure2. Source-Drain Diode Forward Voltage

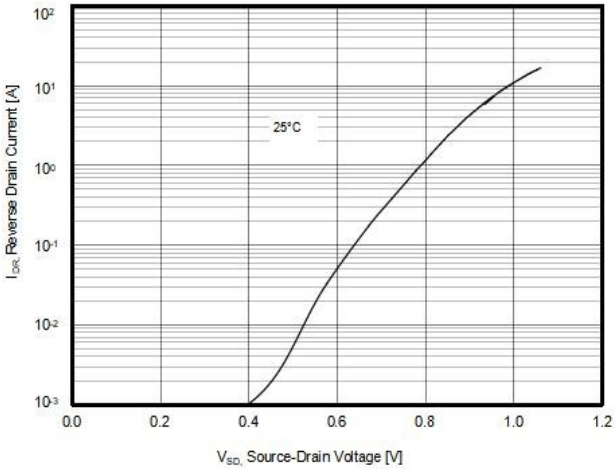


Figure3. Transfer characteristics

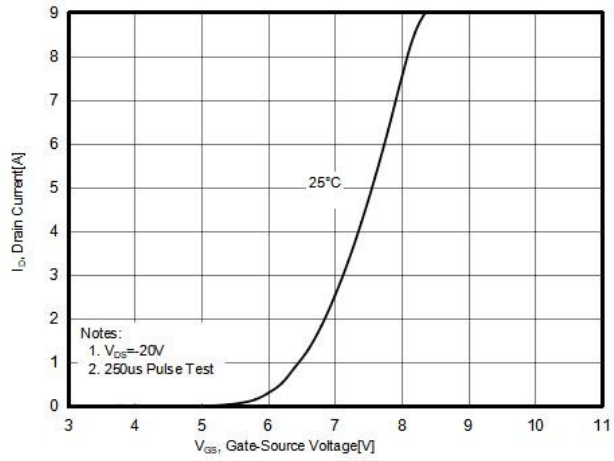


Figure4. Output characteristics

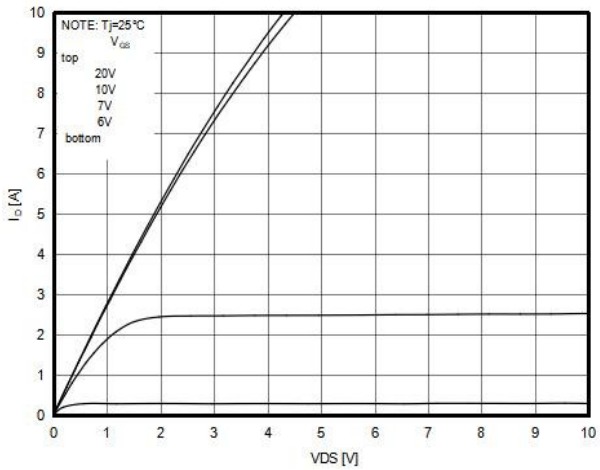


Figure5. Static drain-source on resistance

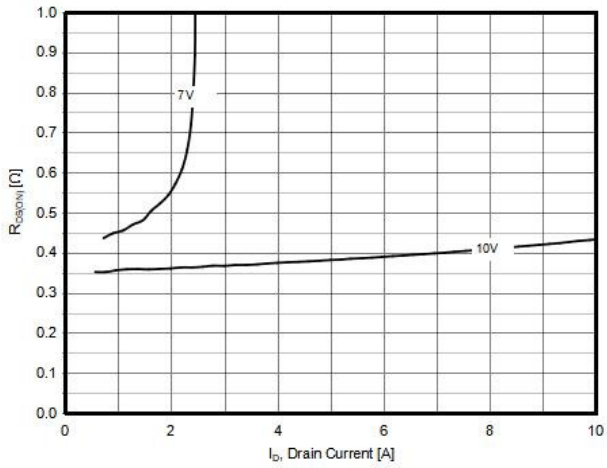


Figure6. $R_{DS(ON)}$ vs Junction Temperature

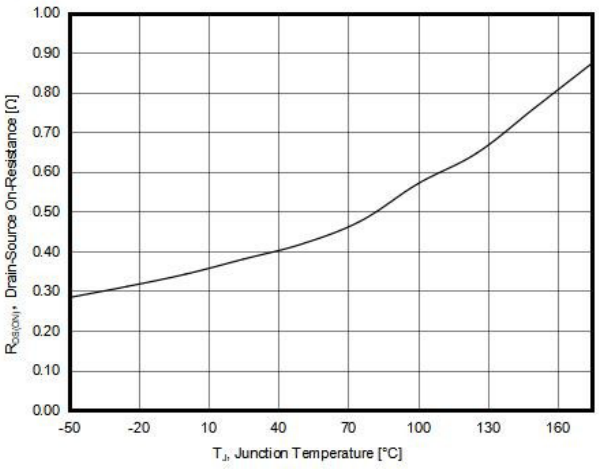


Figure7. BV_{DSS} vs Junction Temperature

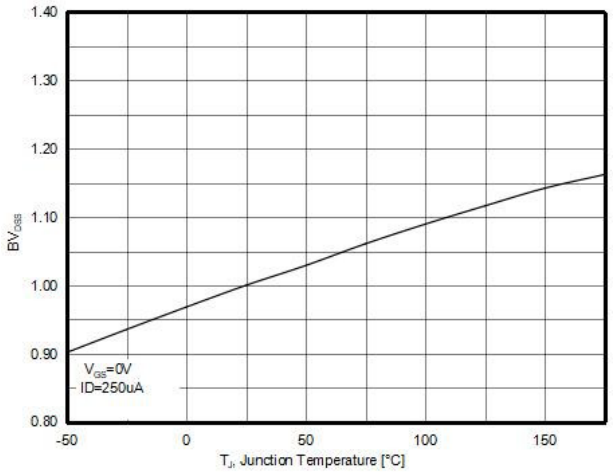


Figure8. Maximum I_D vs Junction Temperature

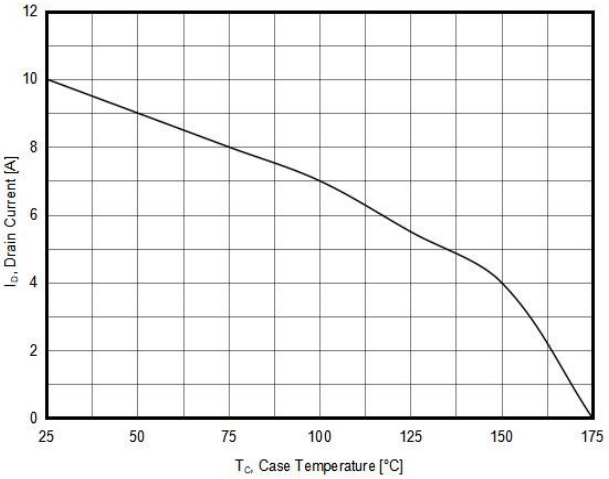


Figure9. Gate charge waveforms

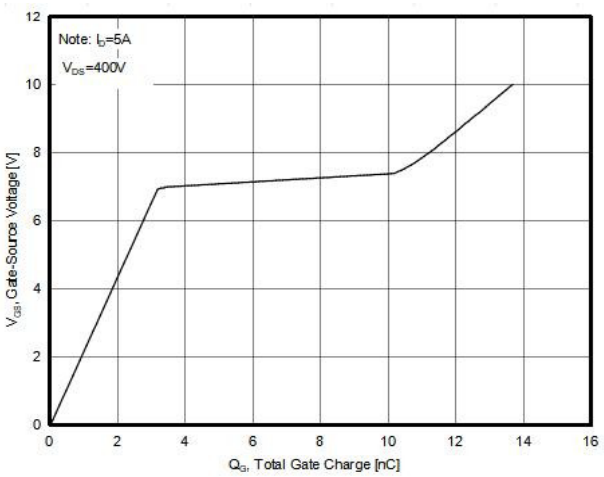
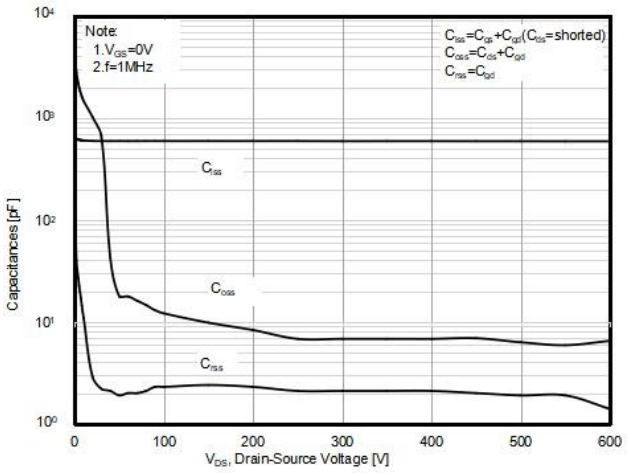
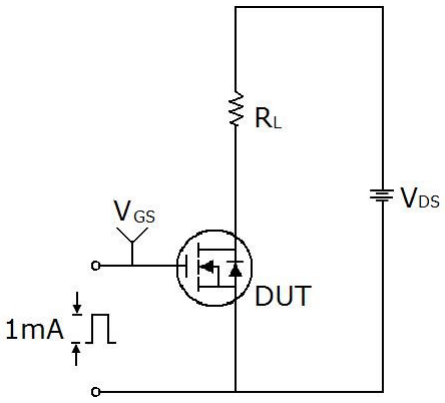


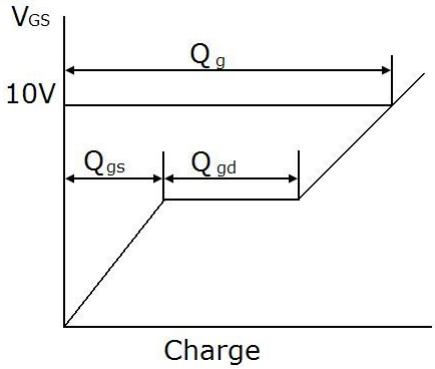
Figure10. Capacitance



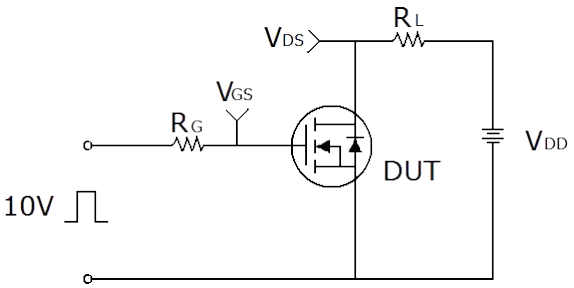
Test circuit

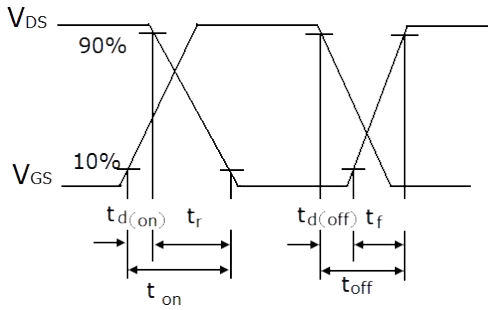
1） **Gate charge test circuit & Waveform**





2） **Switch Time Test Circuit:**





3） **Unclamped Inductive Switching Test Circuit & Waveforms**