ORIENTAL SEMICONDUCTOR

GreenMOS™

OSG80R380FF_Datasheet

Green PRODUCT

RoHS compliant

Enhancement Mode N-Channel Power MOSFET

Features

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Easy to drive

Applications

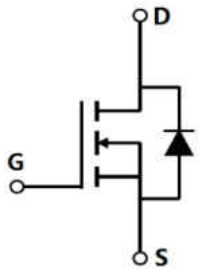
- Lighting
- Hard switching PWM
- Server power supply
- Charger

■ General Description

OSG80R380FF uses advanced GreenMOS™ technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for active power factor correction and switching mode power supply applications.

- ◆ $V_{DS,\ min@Tjmax}$ 850 V
- ◆ $I_{D,\ pulse}$ 33 A
- ◆ $R_{DS(ON),\ max\ @\ VGS=10\ V}$ 380 mΩ
- ◆ Q_g 22.2 nC

■ Schematic and Package Information

Schematic Diagram	Pin Assignment Top View
	 **TO220F** **OSG80R380FF**

■ Absolute Maximum Ratings at T_j=25℃ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	800	V
Gate source voltage	V_{GS}	±30	V
Continuous drain current[1], T_C=25 ℃	I_D	11	A
Continuous drain current[1], T_C=100 ℃		6.9	
Pulsed drain current[2], T_C=25 ℃	$I_{D,\ pulse}$	33	A
Power dissipation[3], T_C=25 ℃	P_D	34	W
Single pulsed avalanche energy[5]	E_{AS}	400	mJ
MOSFET dv/dt ruggedness, V_{DS}=0...640 V	dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0...640 V, I_{SD}≤I_D	dv/dt	15	V/ns
Operation and storage temperature	T_{stg} , T_j	-55 to 150	℃

■ Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	3.68	°C/W
Thermal resistance, junction-ambient[4)]	$R_{\theta JA}$	62.5	°C/W

■ Electrical Characteristics at T_j=25 ℃ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	800			V	V_{GS}=0 V, I_D=250 μA
		850	950			V_{GS}=0 V, I_D=250 μA, T_j=150 ℃
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		0.30	0.38	Ω	V_{GS}=10 V, I_D=5.5 A
			0.69			V_{GS}=10 V, I_D=5.5 A, T_j=150 ℃
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=30 V
				-100		V_{GS}=-30 V
Drain-source leakage current	I_{DSS}			10	μA	V_{DS}=800 V, V_{GS}=0 V

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1442.9		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		83.7		pF	
Reverse transfer capacitance	C_{rss}		1.9		pF	
Turn-on delay time	$t_{d(on)}$		28.4		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=10 Ω, I_D=6 A
Rise time	t_r		15.8		ns	
Turn-off delay time	$t_{d(off)}$		50.2		ns	
Fall time	t_f		4.7		ns	

■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		22.2		nC	I_D=6 A, V_{DS}=400 V, V_{GS}=10 V
Gate-source charge	Q_{gs}		6.8		nC	
Gate-drain charge	Q_{gd}		6.3		nC	
Gate plateau voltage	$V_{plateau}$		5.7		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward current	I_S			11	A	V_{GS}<V_{th}
Pulsed source current	I_{SP}			33		
Diode forward voltage	V_{SD}			1.3	V	I_S=11 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		262.0		ns	V_R=400 V, I_S=6 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		3.9		μC	
Peak reverse recovery current	I_{rrm}		29.1		A	

■ Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) 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 °C.
5) V_{DD}=100 V, R_G=25 Ω, L=10 mH, starting T_j=25 °C.

■ Electrical Characteristics Diagrams

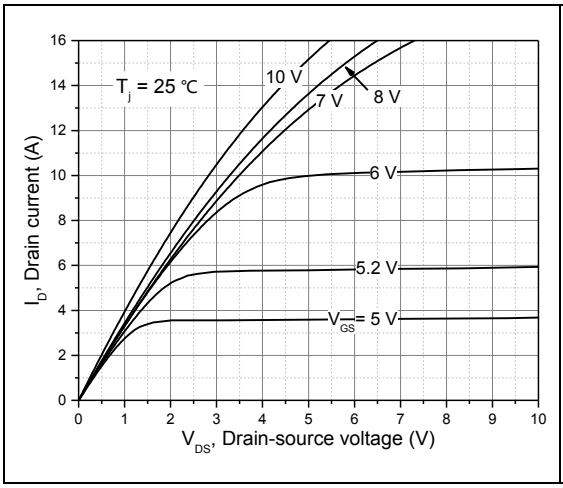


Figure 1, Typ. output characteristics

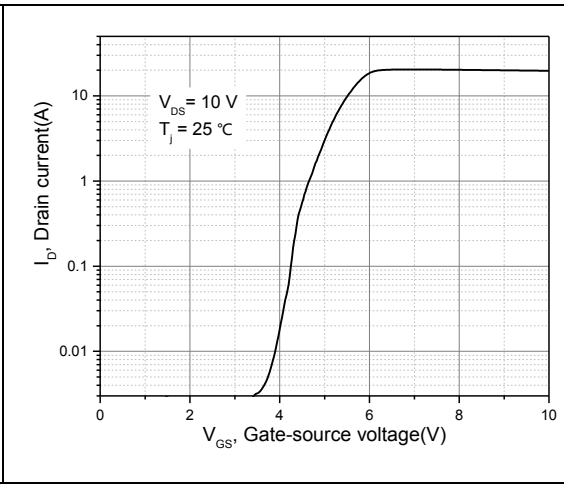


Figure 2, Typ. transfer characteristics

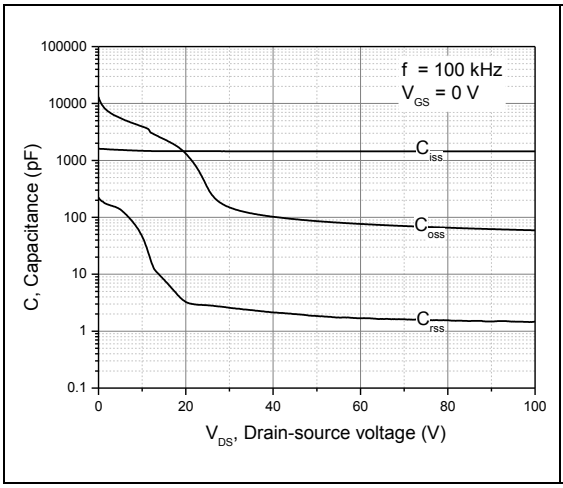


Figure 3, Typ. capacitances

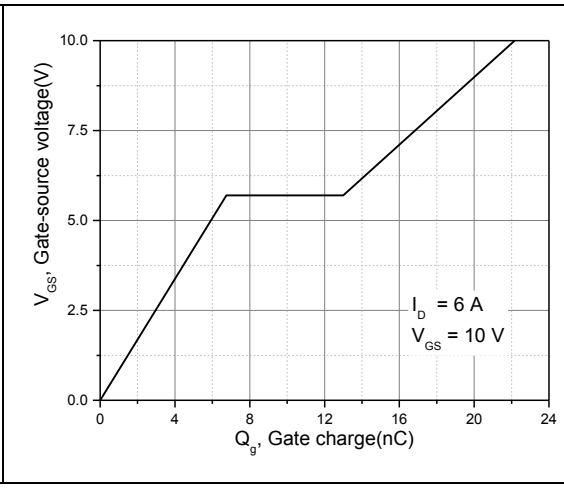


Figure 4, Typ. gate charge

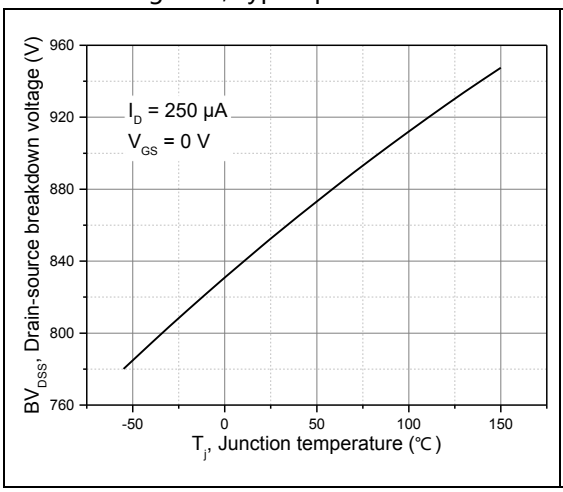


Figure 5, Drain-source breakdown voltage

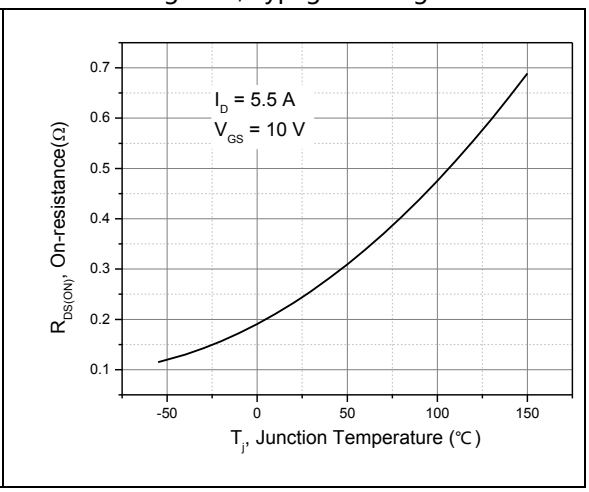


Figure 6, Drain-source on-state resistance

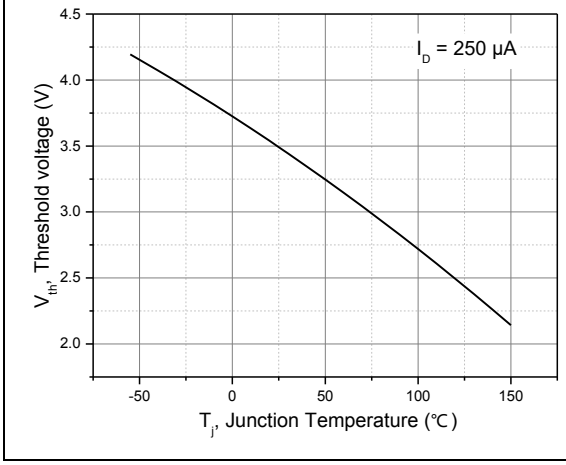


Figure 7, Threshold voltage

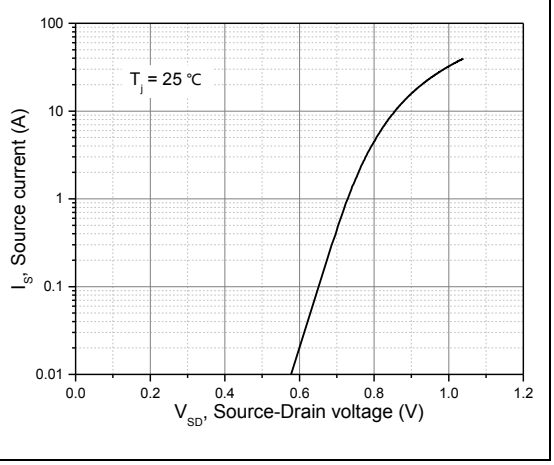


Figure 8, Forward characteristic of body diode

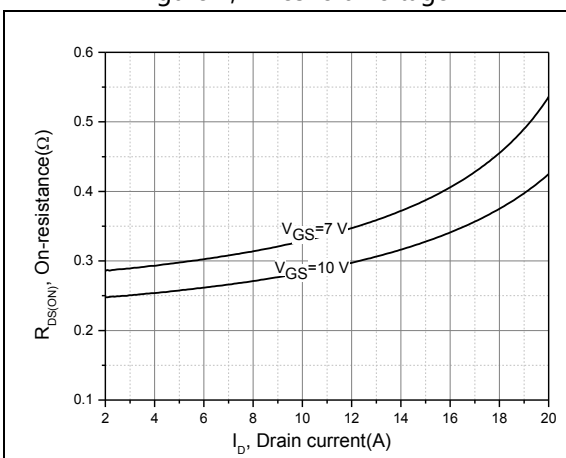


Figure 9, Drain-source on-state resistance

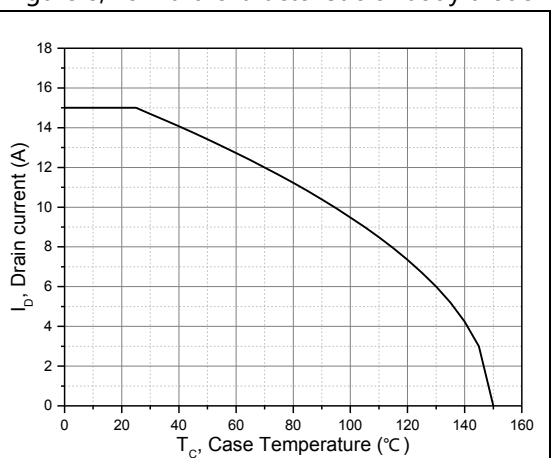


Figure 10, Drain current

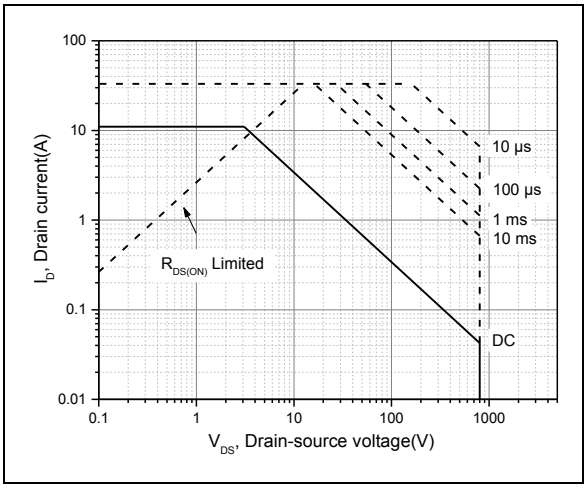


Figure 11, Safe operation area for TO220F

T_C=25 ℃

■ Test circuits and waveforms

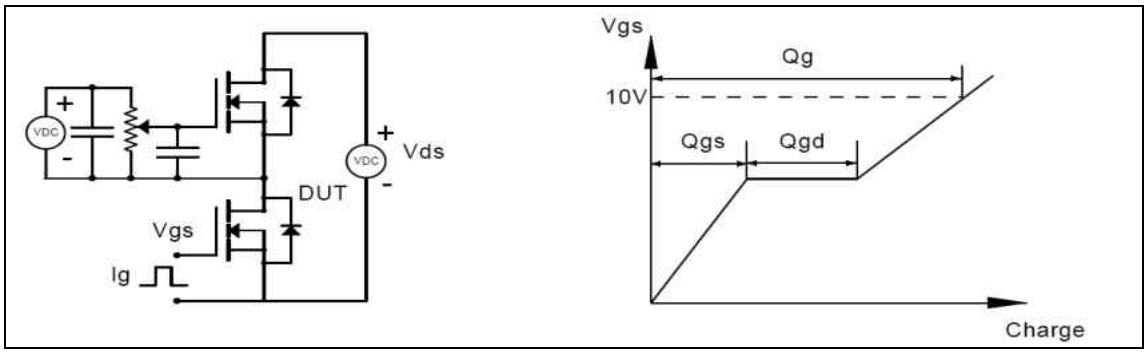


Figure 1, Gate charge test circuit & waveform

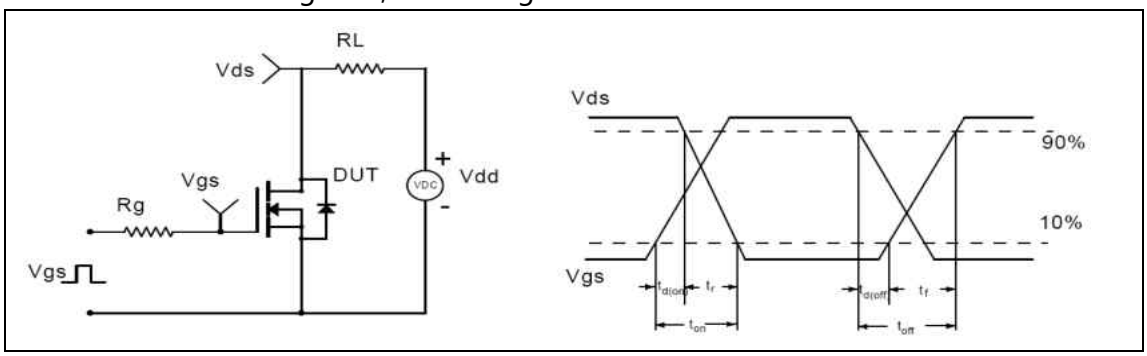


Figure 2, Switching time test circuit & waveforms

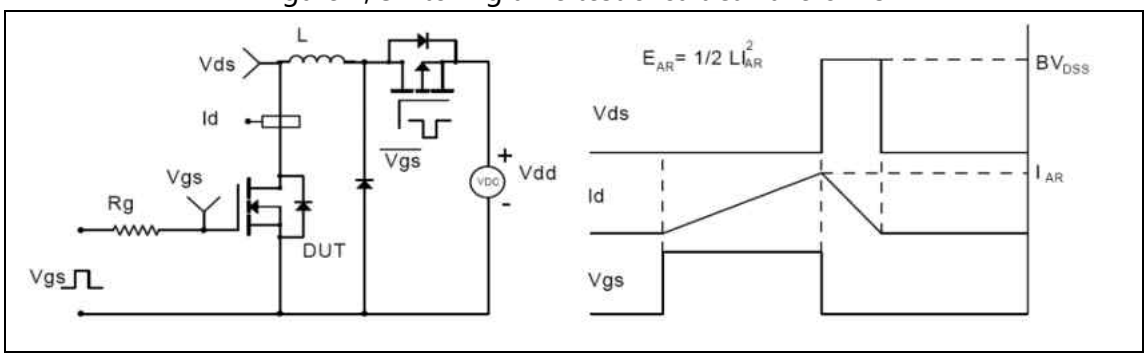


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

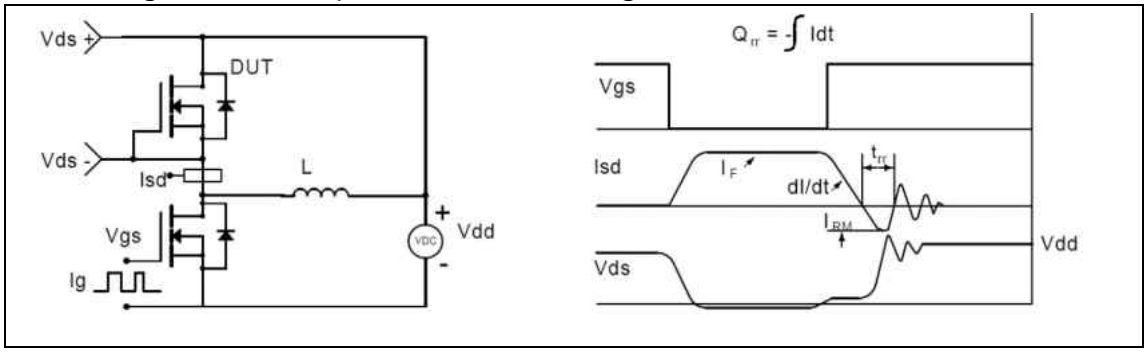
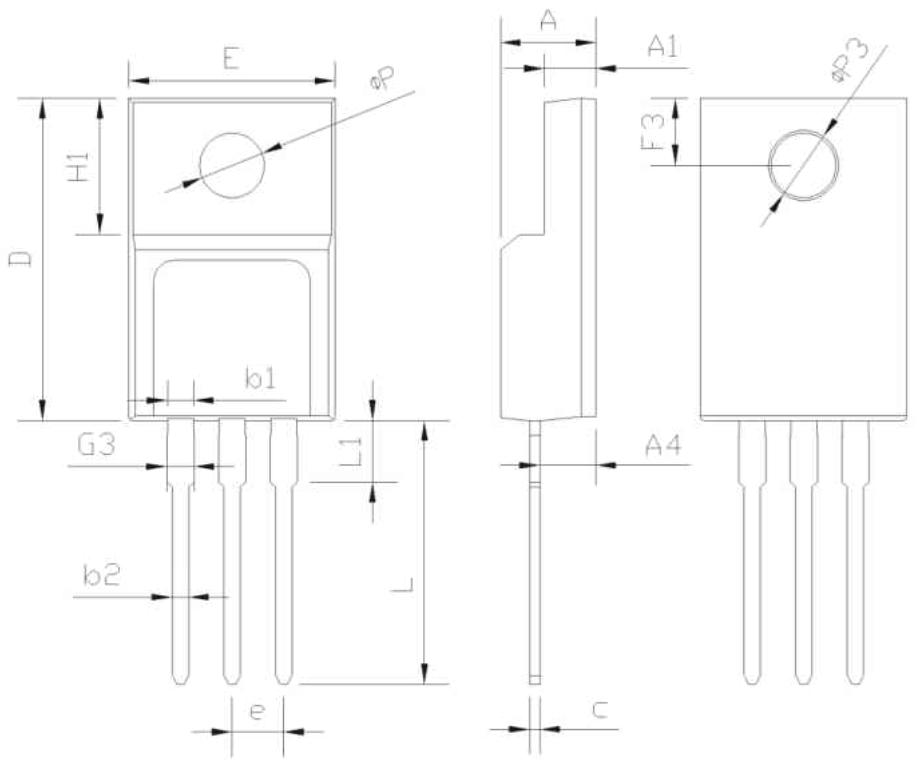


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, TO220F package outline dimension



SYMBOL	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1		6.70REF	
e		2.54BSC	
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95

■ Ordering Information

Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO220F	50	20	1000	6	6000

■ Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG80R380FF	TO220F	yes	yes	yes