

General Description

The GreenMOS[®] high voltage MOSFET utilizes charge balance technology to achieve outstanding low on-resistance and lower gate charge. It is engineered to minimize conduction loss, provide superior switching performance and robust avalanche capability.

The GreenMOS[®] Generic series is optimized for extreme switching performance to minimize switching loss. It is tailored for high power density applications to meet the highest efficiency standards.

Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity

GreenMOS[®]



Applications

- PC power
- LED lighting
- Telecom power
- Server power
- EV Charger
- Solar/UPS

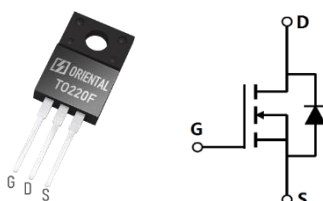
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	550	V
I_D , pulse	60	A
$R_{DS(ON)}$, max @ $V_{GS}=10V$	190	m Ω
Q_g	16.4	nC

Marking Information

Product Name	Package	Marking
OSG55R190FF-F	TO220F	OSG55R190F

Package & Pin Information



Absolute Maximum Ratings at $T_j=25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	550	V
Gate-source voltage	V_{GS}	± 30	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	20	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		12.5	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	60	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	20	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	60	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	34	W
Single pulsed avalanche energy ⁴⁾	E_{AS}	200	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0 \dots 480 \text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0 \dots 480 \text{ V}$, $I_{SD} \leq I_D$	dv/dt	15	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^{\circ}\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	3.67	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient	$R_{\theta JA}$	62	$^{\circ}\text{C/W}$

Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	550			V	$V_{GS}=0 \text{ V}$, $I_D=250 \mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}$, $I_D=250 \mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		183	190	m Ω	$V_{GS}=10 \text{ V}$, $I_D=10 \text{ A}$
			445			$V_{GS}=10 \text{ V}$, $I_D=10 \text{ A}$, $T_j=150^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=30 \text{ V}$, $V_{DS}=0 \text{ V}$
				-100		$V_{GS}=-30 \text{ V}$, $V_{DS}=0 \text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=550 \text{ V}$, $V_{GS}=0 \text{ V}$
Gate resistance	R_G		4.9		Ω	$f=1 \text{ MHz}$, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1066		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		102		pF	
Reverse transfer capacitance	C_{rss}		2.3		pF	
Effective output capacitance, energy related	$C_{o(er)}$		50.6		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		265		pF	
Turn-on delay time	$t_{d(on)}$		10.8		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=10\text{ A}$
Rise time	t_r		6.3		ns	
Turn-off delay time	$t_{d(off)}$		25.7		ns	
Fall time	t_f		2.3		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		16.4		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=10\text{ A}$
Gate-source charge	Q_{gs}		5.3		nC	
Gate-drain charge	Q_{gd}		4.5		nC	
Gate plateau voltage	$V_{plateau}$		5.4		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=20\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		270.4		ns	$V_R=400\text{ V}$, $I_S=10\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		3.2		μC	
Peak reverse recovery current	I_{rrm}		22.2		A	

Note

- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=75\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

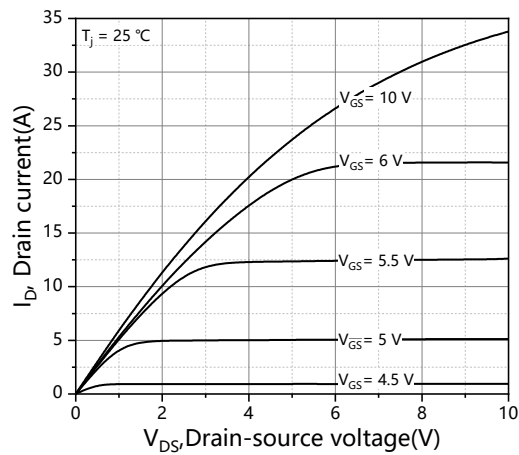


Figure 1. Typ. output characteristics $T_j=25^{\circ}\text{C}$

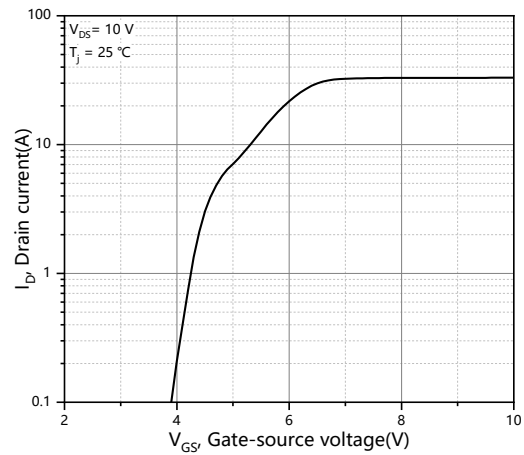


Figure 2. Typ. transfer characteristics

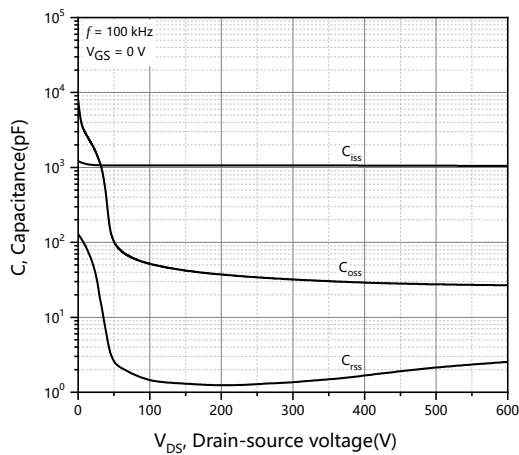


Figure 3. Typ. capacitances

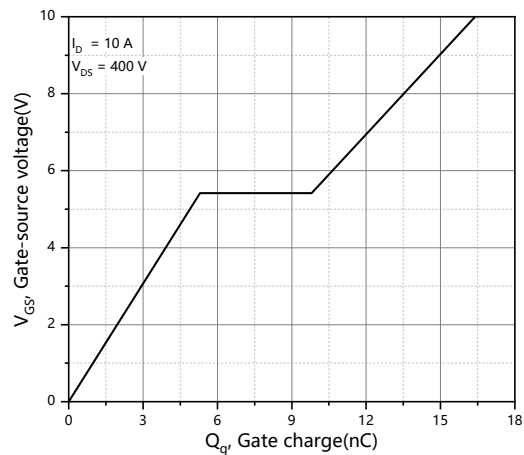


Figure 4. Typ. gate charge

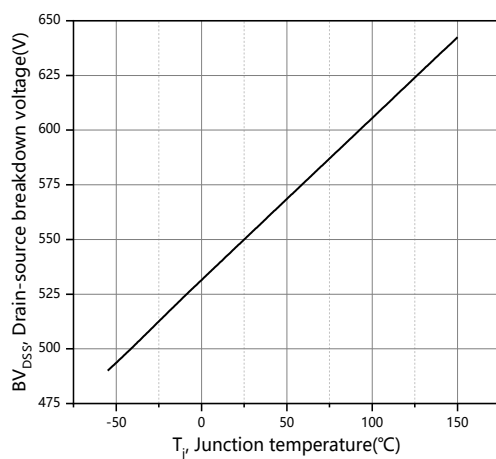


Figure 5. Drain-source breakdown voltage

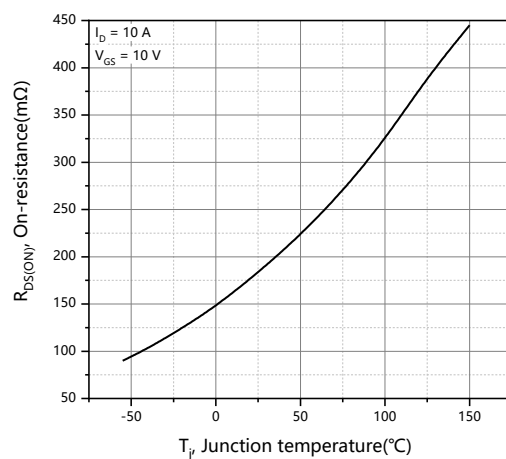


Figure 6. Drain-source on-state resistance

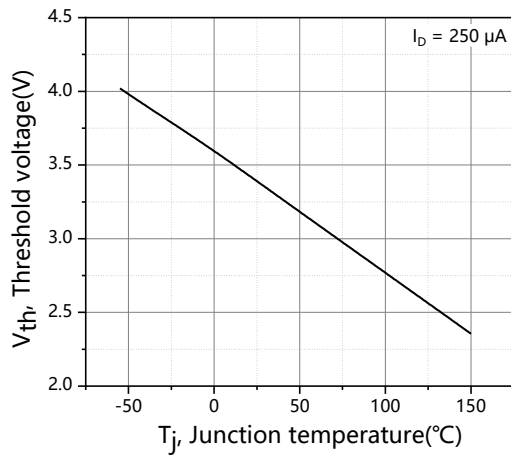


Figure 7. Threshold voltage

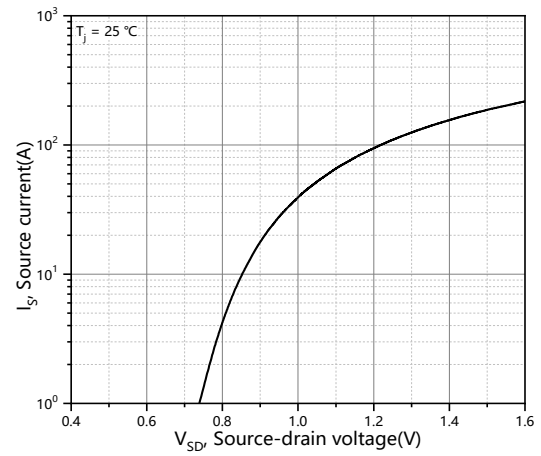


Figure 8. Forward characteristic of body diode

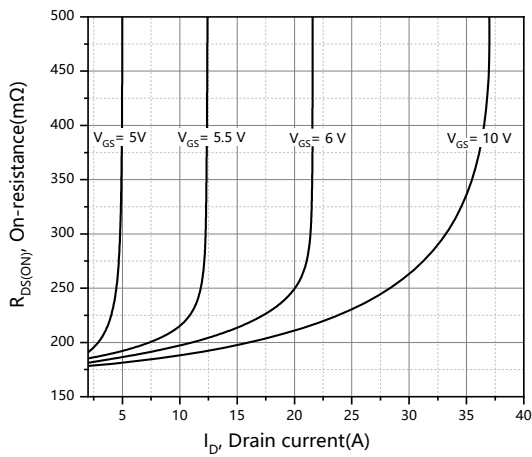


Figure 9. Drain-source on-state resistance

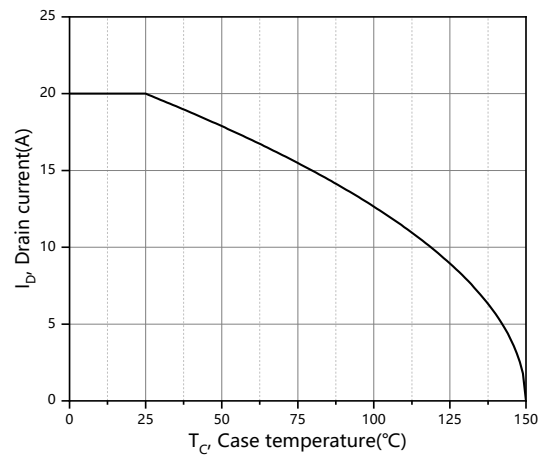


Figure 10. Drain current

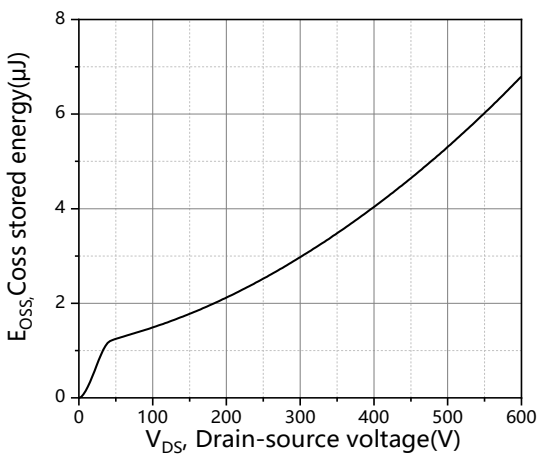


Figure 11. Typ. Coss stored energy

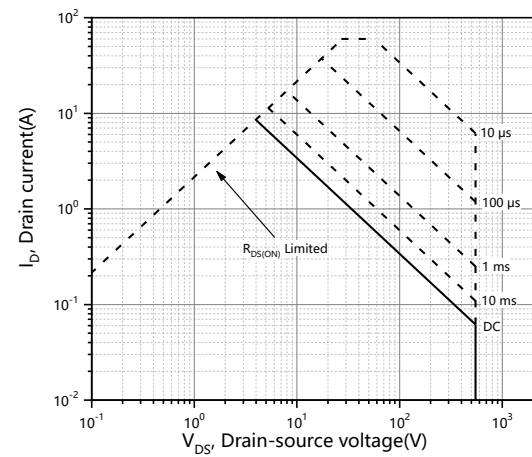
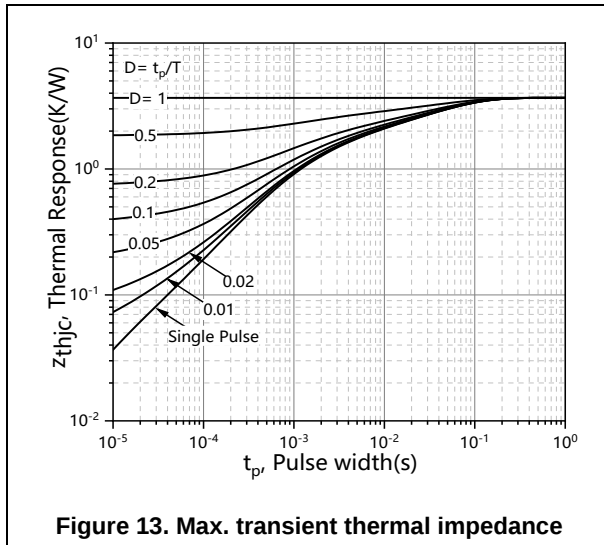


Figure 12. Safe operation area $T_c = 25 \text{ °C}$



Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



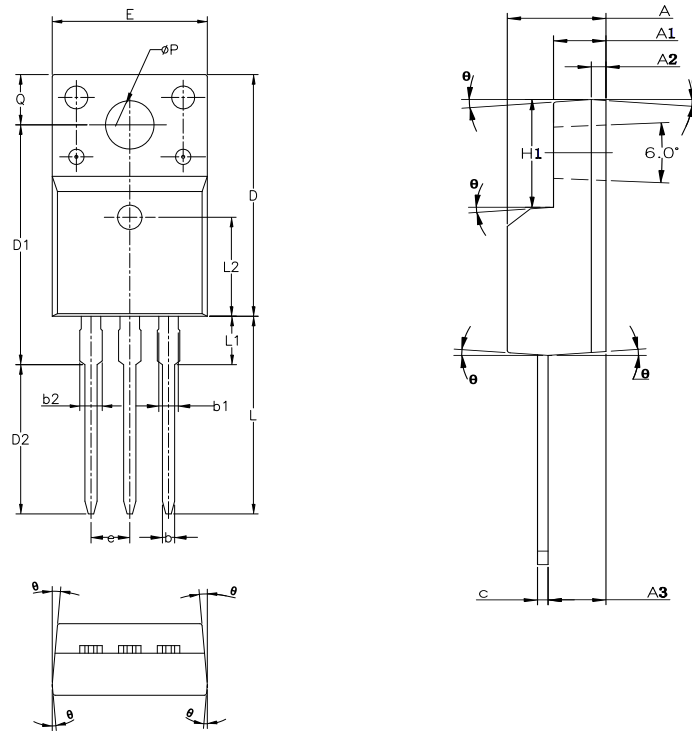
Figure 2. Switching time test circuit & waveforms



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



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information


Symbol	mm		
	Min	Nom	Max
A	4.50	4.70	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.70	-	0.90
b1	1.18	-	1.38
b2	-	-	1.47
c	0.45	0.50	0.60
D	15.67	15.87	16.07
D1	15.55	15.75	15.95
D2	9.60	9.80	10.00
E	9.96	10.16	10.36
e	2.54 BSC		
H1	6.48	6.68	6.88
L	12.68	12.98	13.28
L1	-	-	3.50
L2	6.50 REF		
ØP	3.08	3.18	3.28
Q	3.20	-	3.40
θ	1°	3°	5°

Version: TO220F-J package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220F-J	50	20	1000	5	5000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG55R190FF-F	TO220F	yes	yes	yes

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