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® S series is optimized for its switching characteristics to achieve aggressive EMI standards. It is easy to use for smaller power supply systems to meet the both efficiency and EMI standards.

Features

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

Applications

- LED lighting
- Charger
- Adapter
- Telecom power
- Server power
- Solar/UPS

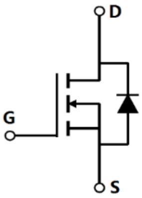
Key Performance Parameters

Parameter	Value	Unit
$V_{DS,\ min}$ @ $T_{j(max)}$	700	V
$I_{D,\ pulse}$	60	A
$R_{DS(ON),\ max}$ @ V_{GS}=10V	200	mΩ
Q_g	45.4	nC

Marking Information

Product Name	Package	Marking
OSG65R200FSF_NB	TO220F_NL	OSG65R200FS

Package & Pin Information



Absolute Maximum Ratings at T_j=25°C unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Gate-source voltage	V_{GS}	±30	V
Continuous drain current[1), T_C=25 °C	I_D	20	A
Continuous drain current[1), T_C=100 °C		12.5	
Pulsed drain current[2), T_C=25 °C	$I_{D, pulse}$	60	A
Continuous diode forward current[1), T_C=25 °C	I_S	20	A
Diode pulsed current[2), T_C=25 °C	$I_{S, pulse}$	60	A
Power dissipation[3), T_C=25 °C	P_D	34	W
Single pulsed avalanche energy[5)	E_{AS}	578	mJ
MOSFET dv/dt ruggedness, V_{DS}=0…480 V	dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS}=0…480 V, $I_{SD} \leq I_D$	dv/dt	15	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	3.67	°C/W
Thermal resistance, junction-ambient[4)	$R_{\theta JA}$	62.5	°C/W

Electrical Characteristics at T_j=25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	650			V	V_{GS}=0 V, I_D=250 μA
		700				V_{GS}=0 V, I_D=250 μA, T_j=150 °C
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		0.15	0.2	Ω	V_{GS}=10 V, I_D=10 A
			0.37			V_{GS}=10 V, I_D=10 A, T_j=150 °C
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=30 V
				-100		V_{GS}=-30 V
Drain-source leakage current	I_{DSS}			1	μA	V_{DS}=650 V, V_{GS}=0 V
Gate resistance	R_G		8.8		Ω	f=1 MHz, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1745		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		102		pF	
Reverse transfer capacitance	C_{rss}		2.6		pF	
Effective output capacitance, energy related	Co(er)		58		pF	V_{GS} = 0V, V_{DS} = 0V-400V
Effective output capacitance, time related	Co(tr)		288		pF	
Turn-on delay time	$t_{d(on)}$		28.2		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=2 Ω, I_D=10 A
Rise time	t_r		11		ns	
Turn-off delay time	$t_{d(off)}$		70.8		ns	
Fall time	t_f		7.8		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		45.4		nC	V_{GS}=10 V, V_{DS}=400 V, I_D=4 A
Gate-source charge	Q_{gs}		10.2		nC	
Gate-drain charge	Q_{gd}		12.5		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 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		320		ns	V_R=400 V, I_S=10 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		4.1		μC	
Peak reverse recovery current	I_{rrm}		23.2		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, V_{GS}=10 V, L=79.9 mH, starting T_j=25 °C.

Electrical Characteristics Diagrams

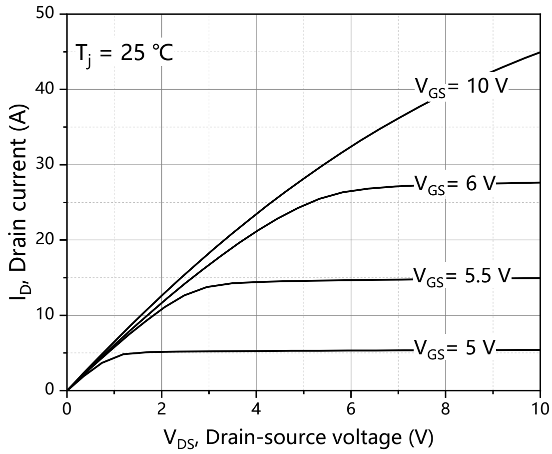


Figure 1. Typ. output characteristics

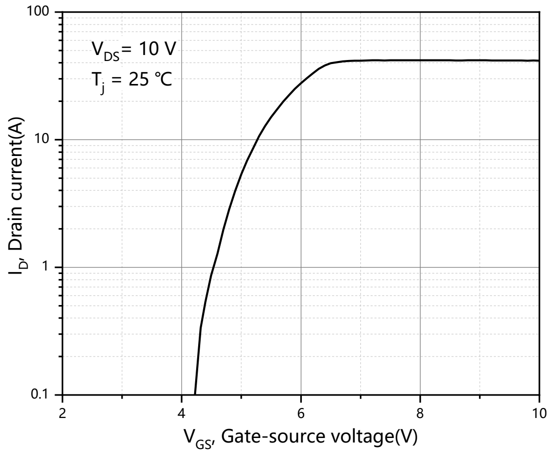


Figure 2. Typ. transfer characteristics

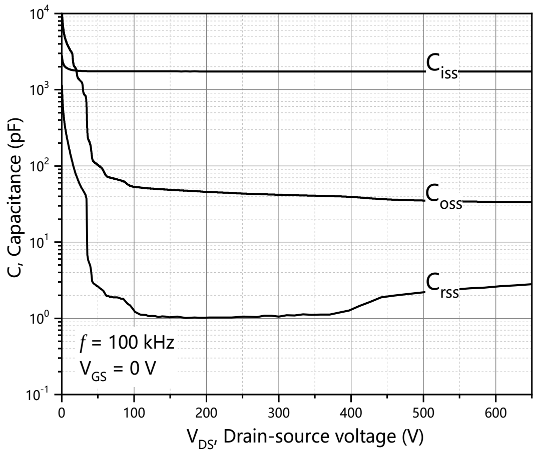


Figure 3. Typ. capacitances

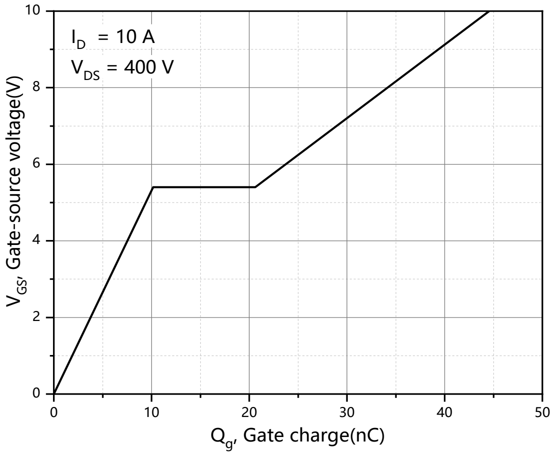


Figure 4. Typ. gate charge

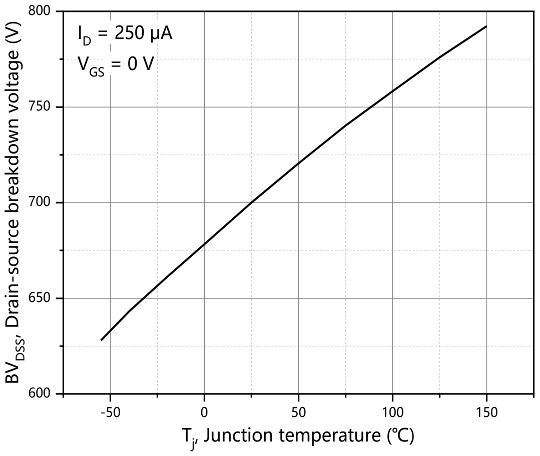


Figure 5. Drain-source breakdown voltage

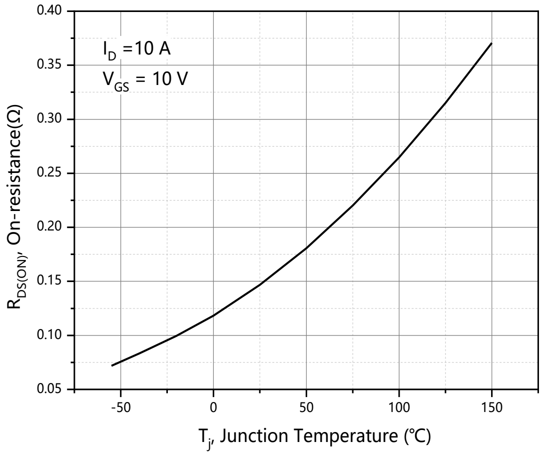


Figure 6. Drain-source on-state resistance

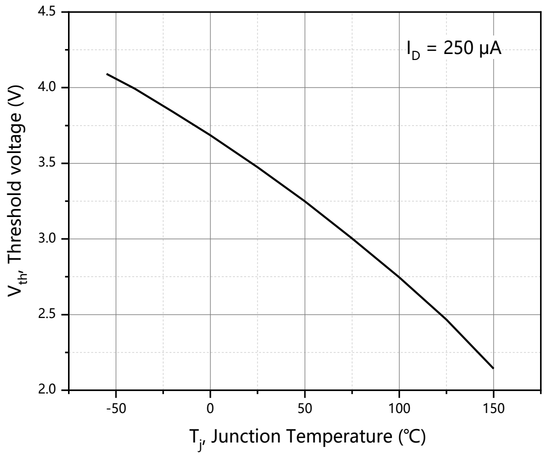


Figure 7. Threshold voltage

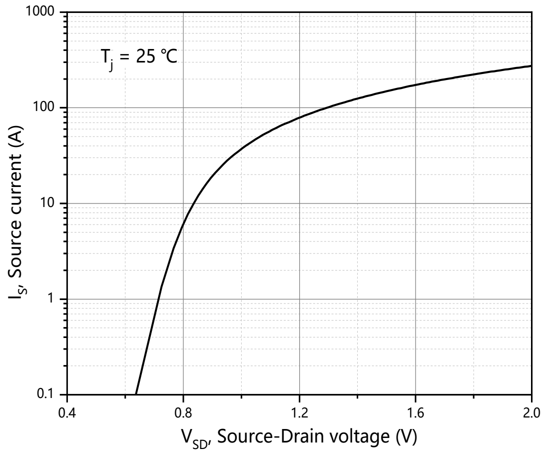


Figure 8. Forward characteristic of body diode

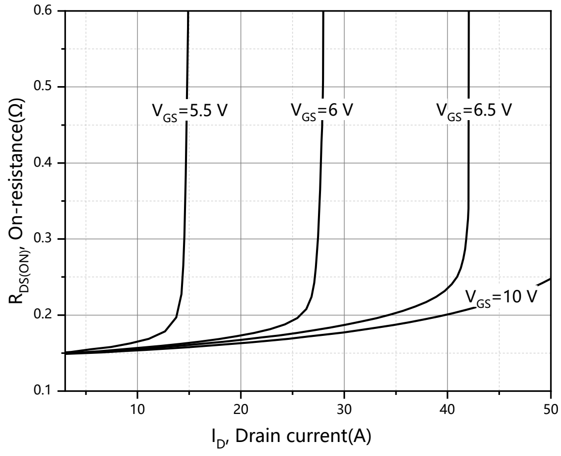


Figure 9. Drain-source on-state resistance

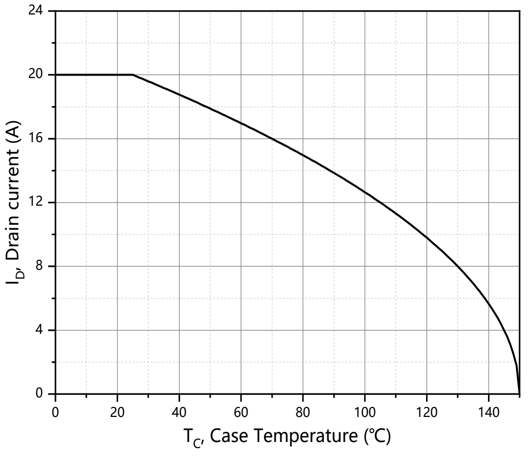


Figure 10. Drain current

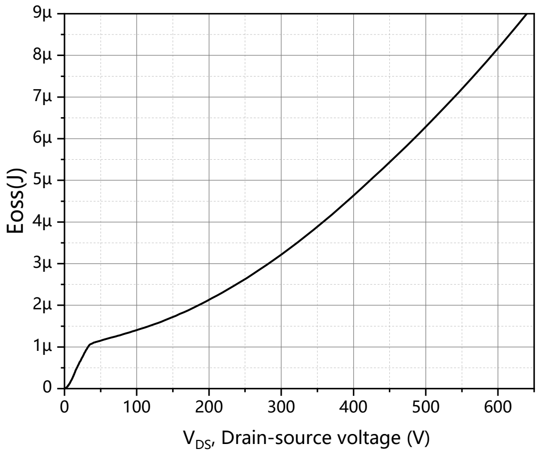


Figure 11. Safe operation area T_C=25 °C

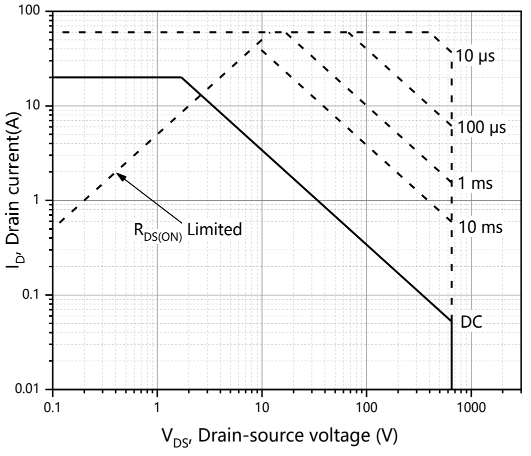


Figure 12, Safe operation area T_C=25 ℃

Figure 13, Max. transient thermal impedance

Test circuits and waveforms

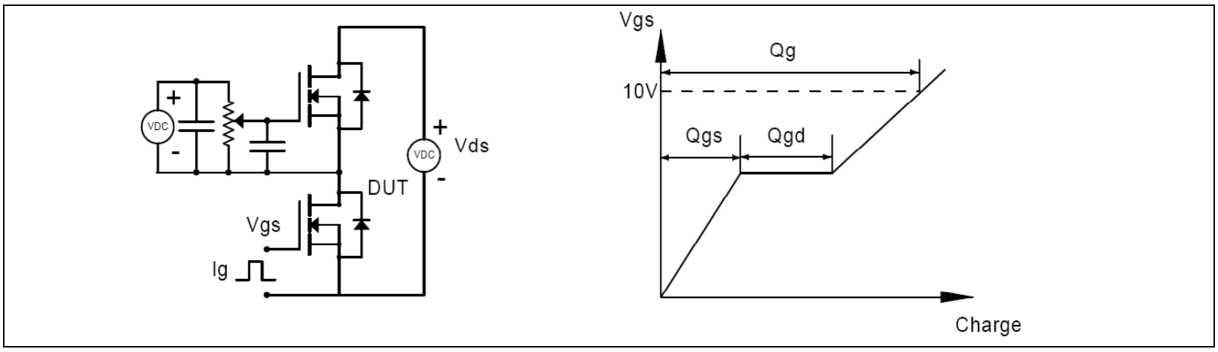


Figure 1. Gate charge test circuit & waveform

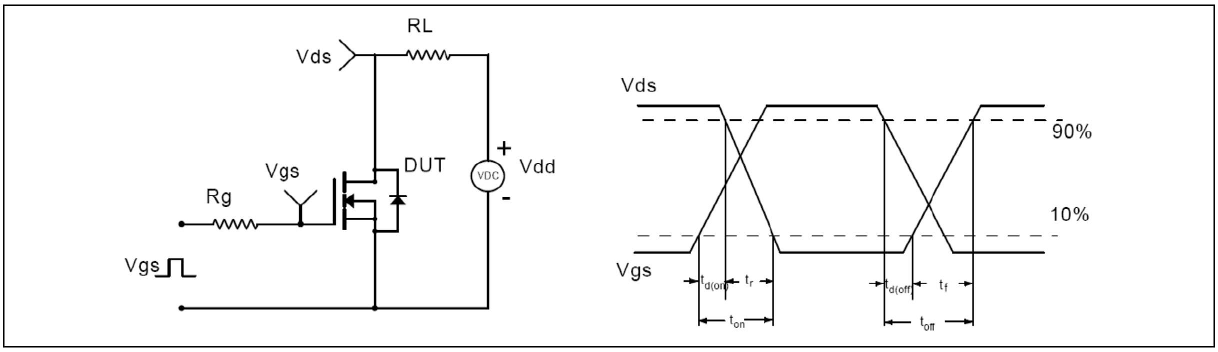


Figure 2. Switching time test circuit & waveforms

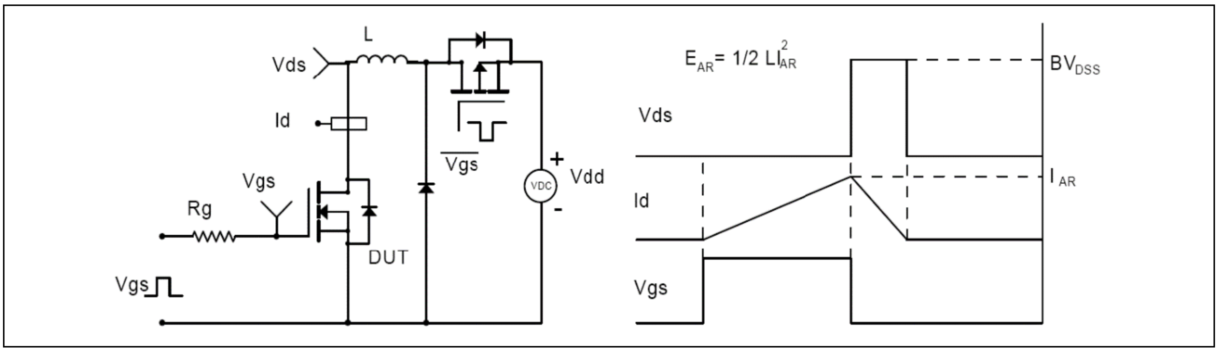


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

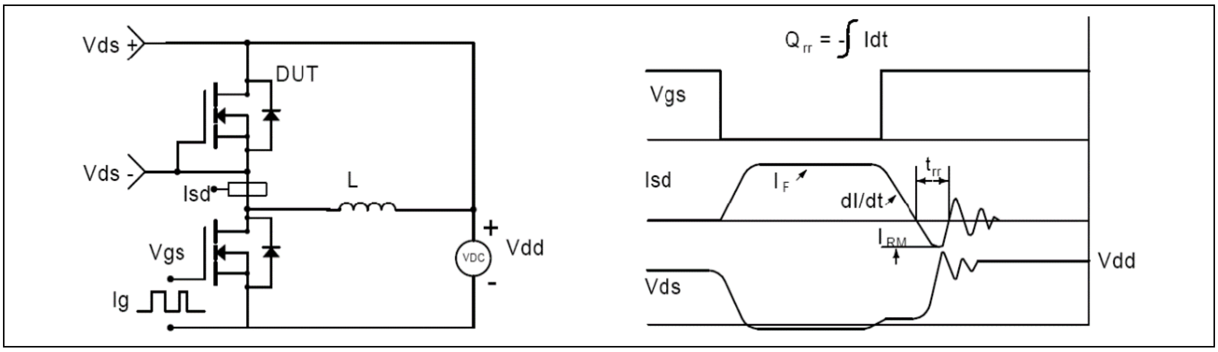
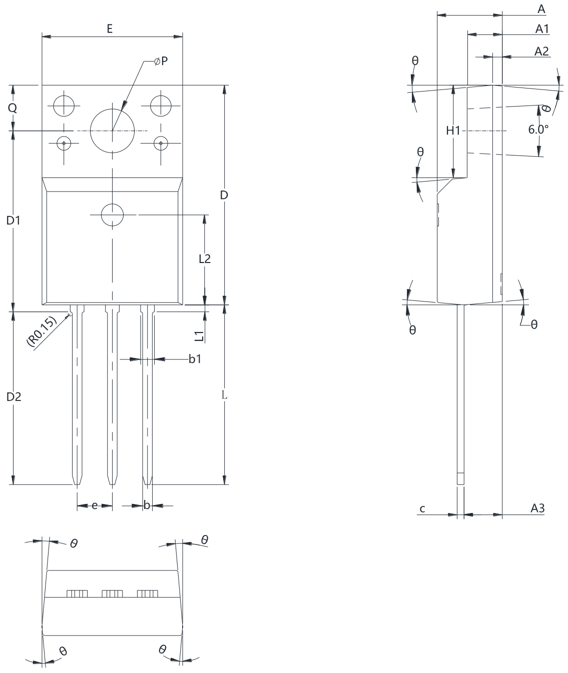


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.5	4.7	4.83
A1	2.34	2.54	2.74
A2	0.70 REF		
A3	2.56	2.76	2.93
b	0.6	-	0.8
b1	0.9	-	1.1
c	0.45	0.5	0.6
D	15.67	15.87	16.07
D1	12.87	13.07	13.27
D2	12.28	12.48	12.68
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	-	-	0.85
L2	6.50 REF		
ΦP	3.08	3.18	3.28
Q	3.20	-	3.40
θ1	1º	3º	5º

Version 1: TO220F_NL-J package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220F_NL-J	50	20	1000	5	5000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R200FSF_NB	TO220F_NL	yes	yes	yes

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