

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

- LED lighting
- Telecom
- Adapter
- Sever
- Solar/UPS

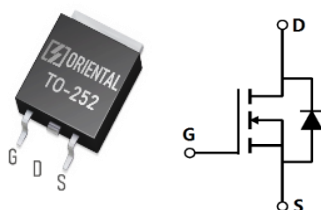
Key Performance Parameters

Parameter	Value	Unit
V_{DS}	650	V
I_D , pulse	72	A
$R_{DS(ON)}$, max @ $V_{GS}=10V$	140	m Ω
Q_g	30.6	nC
PD	160	W

Marking Information

Product Name	Package	Marking
OSG65R140DT3F	TO252	OSG65R140DT3

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}	650	V
Gate-source voltage (static)	V_{GS}	± 20	V
Gate-source voltage (dynamic)		± 30	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	24	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		15	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	72	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	24	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	72	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	160	W
Single pulsed avalanche energy ⁴⁾	E_{AS}	192	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 400\text{ V}$	dv/dt	100	V/ns
Reverse diode dv/dt, $V_{DS}=0\ldots 400\text{ V}$, $I_{SD}\leq I_D$	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	$R_{\theta JC}$	0.78	$^{\circ}\text{C/W}$
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}	650			V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}$, $I_D=1\text{ mA}$
Drain-source on-state resistance	$R_{DS(ON)}$		104	140	m Ω	$V_{GS}=10\text{ V}$, $I_D=12\text{ A}$
			264			$V_{GS}=10\text{ V}$, $I_D=12\text{ A}$, $T_j=150^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=20\text{ V}$
				-100		$V_{GS}=-20\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=650\text{ V}$, $V_{GS}=0\text{ V}$
Gate resistance	R_G		14		Ω	$f=1\text{ MHz}$, Open drain

Dynamic Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Input capacitance	C_{iss}		1447		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		96.8		pF	
Reverse transfer capacitance	C_{rss}		2		pF	
Effective output capacitance, energy related	$C_{o(er)}$		65		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		394		pF	
Turn-on delay time	$t_{d(on)}$		16.4		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=12\text{ A}$
Rise time	t_r		20.4		ns	
Turn-off delay time	$t_{d(off)}$		70.6		ns	
Fall time	t_f		18		ns	

Gate Charge Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Total gate charge	Q_g		30.6		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=12\text{ A}$
Gate-source charge	Q_{gs}		6		nC	
Gate-drain charge	Q_{gd}		11		nC	
Gate plateau voltage	$V_{plateau}$		5.2		V	

Body Diode Characteristics

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Diode forward voltage	V_{SD}			1.2	V	$I_S=24\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		284.7		ns	$V_R=400\text{ V}$, $I_S=12\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		3.16		μC	
Peak reverse recovery current	I_{rrm}		19.8		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) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=80\text{ mH}$, starting $T_J=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

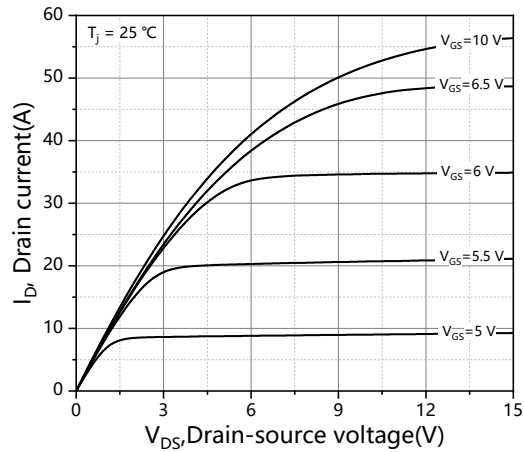


Figure 1. Typ. output characteristics $T_J=25^{\circ}\text{C}$

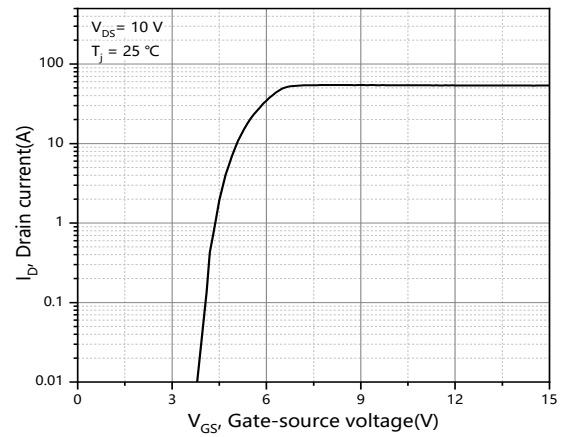


Figure 2. Typ. transfer characteristics

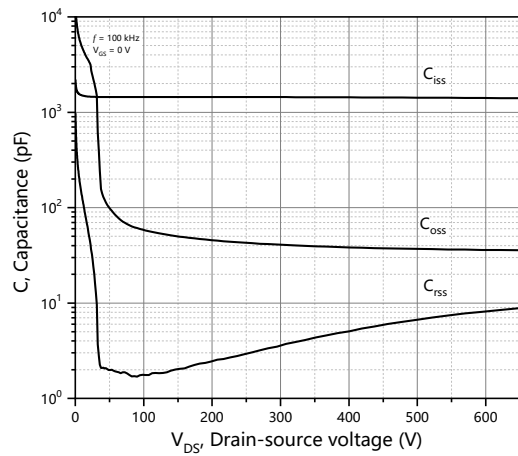


Figure 3. Typ. capacitances

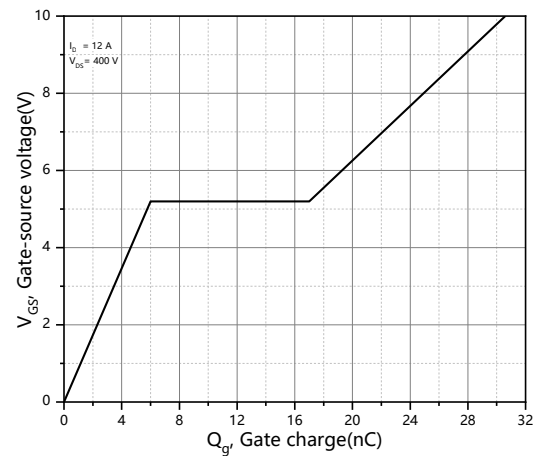


Figure 4. Typ. gate charge

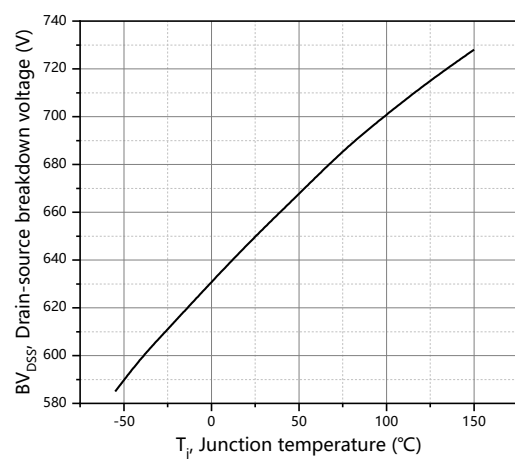


Figure 5. Drain-source breakdown voltage

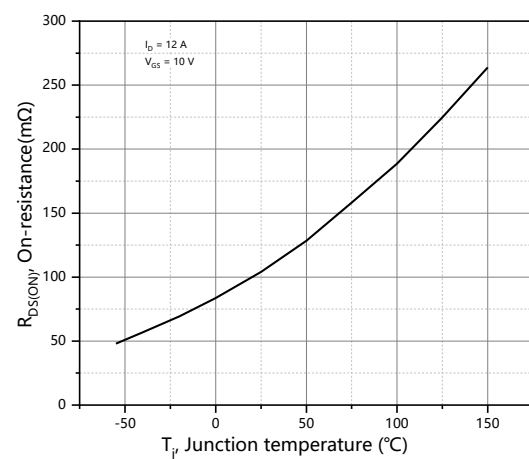


Figure 6. Drain-source on-state resistance

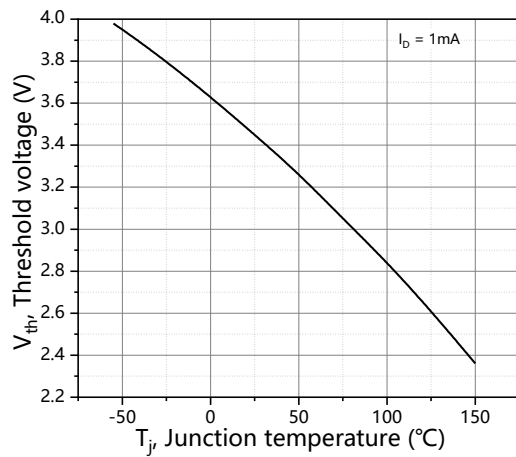


Figure 7. Threshold voltage

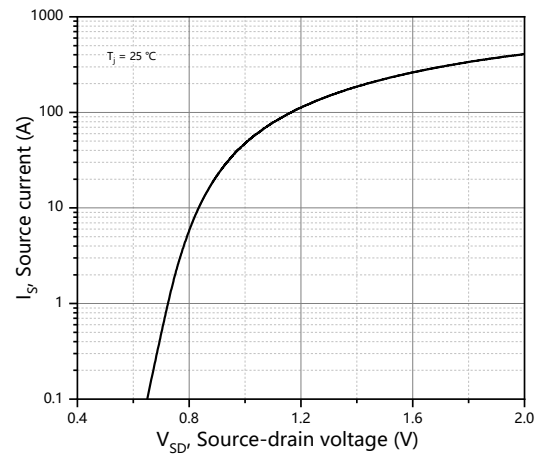


Figure 8. Forward characteristic of body diode

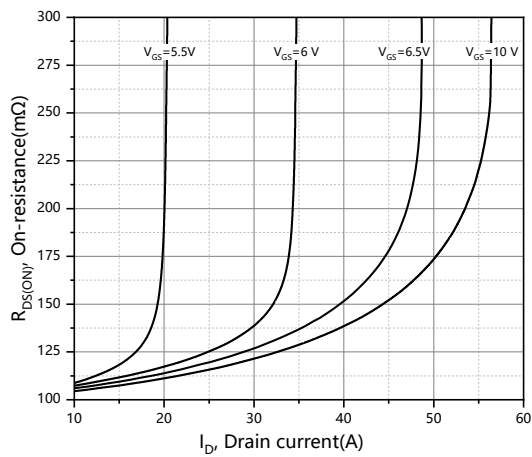


Figure 9. Drain-source on-state resistance

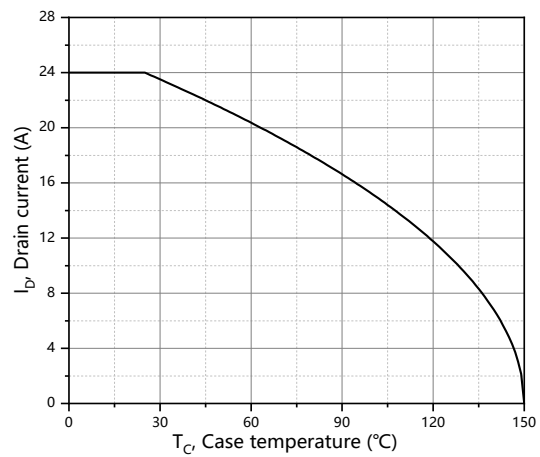


Figure 10. Drain current

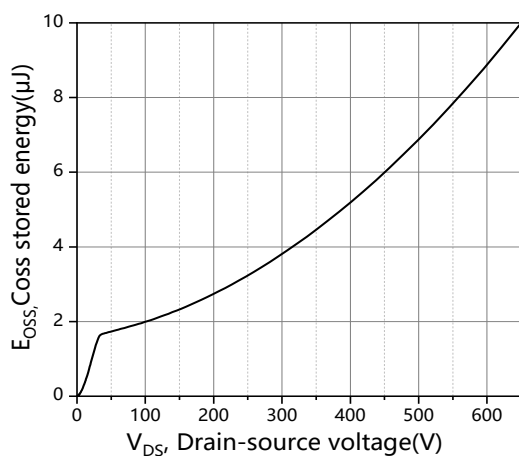


Figure 11. Typ. Coss stored energy

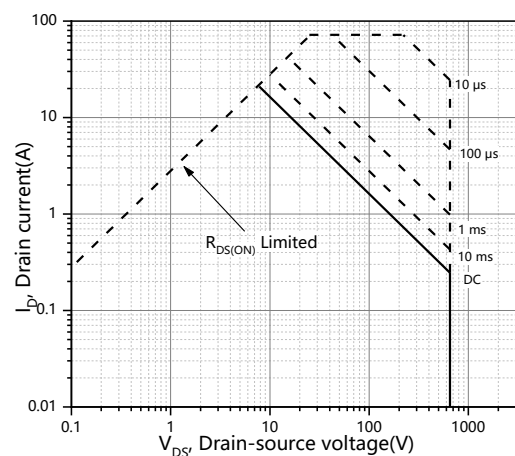
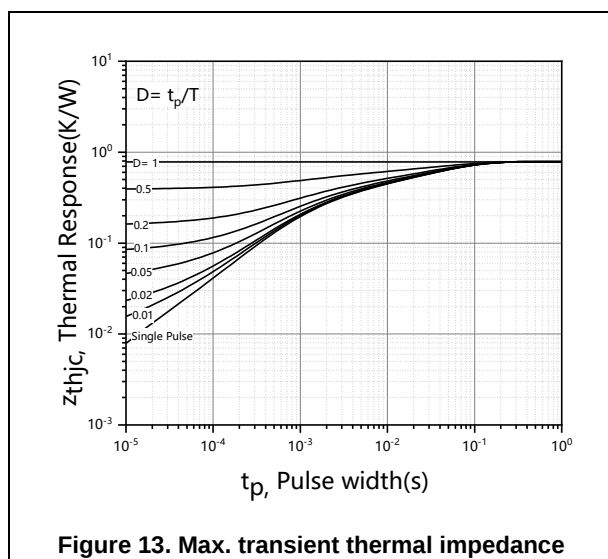


Figure 12. Safe operation area $T_C=25^\circ C$



Test circuits and waveforms



Figure 1. Gate charge test circuit & waveform



Figure 2. Switching time test circuit & waveforms

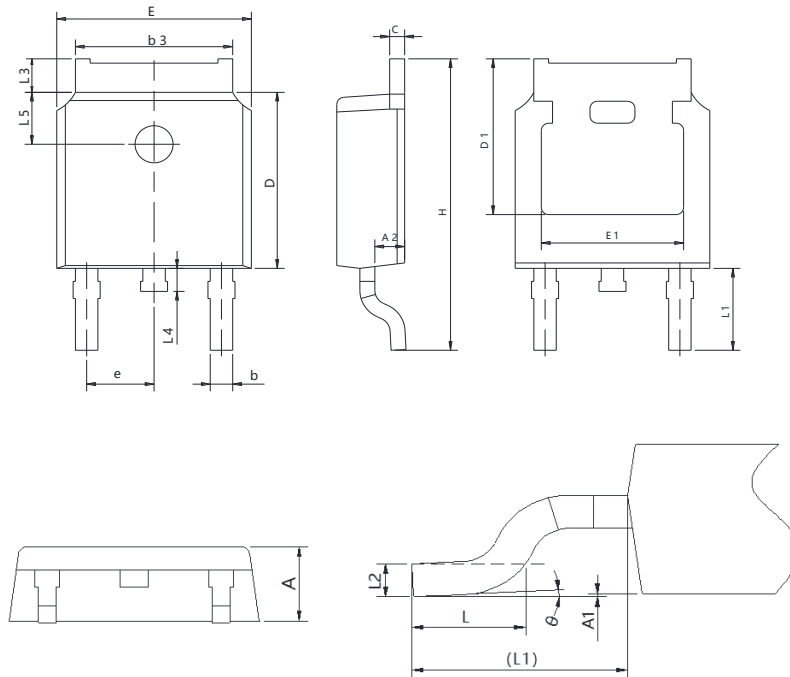


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms



Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286 BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90 REF		
L2	0.51 BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
L5	1.65	1.80	1.95
θ	0°	-	8°

Version: TO252-P package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-P	2500	2	5000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R140DT3F	TO252	yes	yes	yes

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