

The GreenMOS<sup>®</sup> 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.

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**Absolute Maximum Ratings** at  $T_j=25$  unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	650	V
Gate-source voltage	$V_{GS}$	$\pm 30$	V
Continuous drain current <sup>1)</sup> , $T_C=25$ °C	$I_D$	11	A
Continuous drain current <sup>1)</sup> , $T_C=100$ °C		7	
Pulsed drain current <sup>2)</sup> , $T_C=25$ °C	$I_{D, pulse}$	33	A
Continuous diode forward current <sup>1)</sup> , $T_C=25$ °C	$I_S$	11	A
Diode pulsed current <sup>2)</sup> , $T_C=25$ °C	$I_{S, pulse}$	33	A
Power dissipation <sup>3)</sup> , $T_C=25$ °C	$P_D$	89	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	211	mJ
MOSFET dv/dt ruggedness, $V_{DS}$ ( (	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}$ ( ( $S_D$ 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	1.4	°C/W
Thermal resistance, junction-ambient <sup>4)</sup>	R	62	°C/W

**Electrical Characteristics** at  $T_j=25$  unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	650			V	$V_{GS}=0$ V, $I_D=250$ A
		700				$V_{GS}=0$ V, $I_D$ ( , $T_j=150$ °C
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}$ , $I_D=250$ A
Drain-source on-state resistance	$R_{DS(ON)}$		0.30	0.38		$V_{GS}=10$ V, $I_D=5.5$ A
			0.75			$V_{GS}=10$ V, $I_D=5.5$ 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	A	$V_{DS}=650$ V, $V_{GS}=0$ V
Gate resistance	$R_G$		16			=1 MHz, Open drain

### Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{iss}$		875.2		pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , 100 kHz
Output capacitance	$C_{oss}$		94.8		pF	
Reverse transfer capacitance	$C_{rss}$		2.9		pF	
Turn-on delay time	$t_{d(on)}$		25.7		ns	$V_{GS}=10\text{ V}$ , $V_{DS}=400\text{ V}$ , $R_G=2.5$ $I_D=10\text{ A}$
Rise time	$t_r$		25.9		ns	
Turn-off delay time	$t_{d(off)}$		58.4		ns	
Fall time	$t_f$		21		ns	

### Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$		20.6		nC	$V_{GS}=10\text{ V}$ , $V_{DS}=400\text{ V}$ , $I_D=10\text{ A}$
Gate-source charge	$Q_{gs}$		6.7		nC	
Gate-drain charge	$Q_{gd}$		6.3		nC	
Gate plateau voltage	$V_{plateau}$		5.7		V	

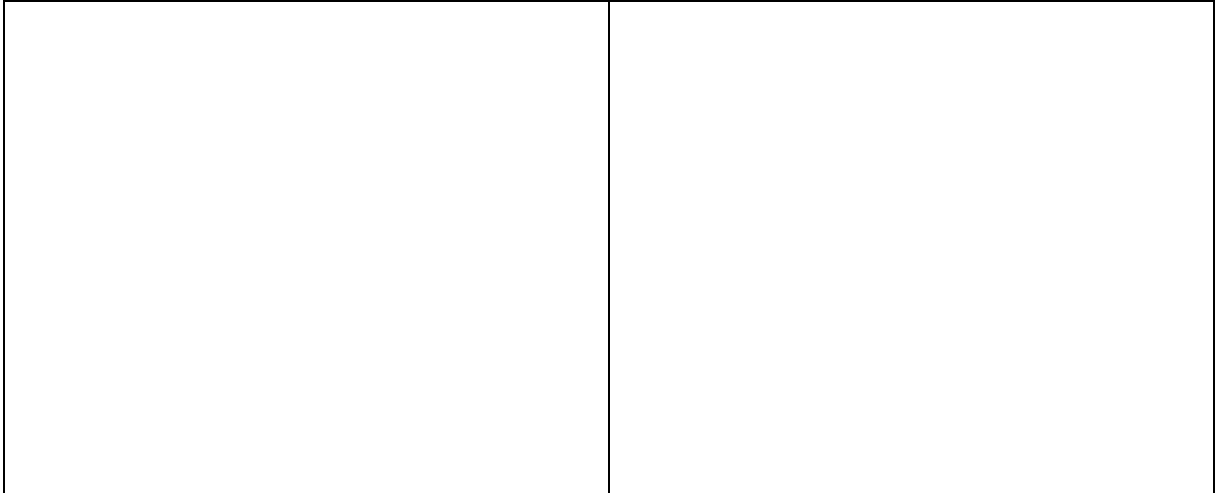
### Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	$V_{SD}$			1.3	V	$I_S=11\text{ A}$ , $V_{GS}=0\text{ V}$
Reverse recovery time	$t_{rr}$		306.7		ns	$I_S=10\text{ A}$ , $di/dt=10(\text{A}/\mu\text{s})$
Reverse recovery charge	$Q_{rr}$		3.7		C	
Peak reverse recovery current	$I_{rrm}$		21.5		A	

### Note

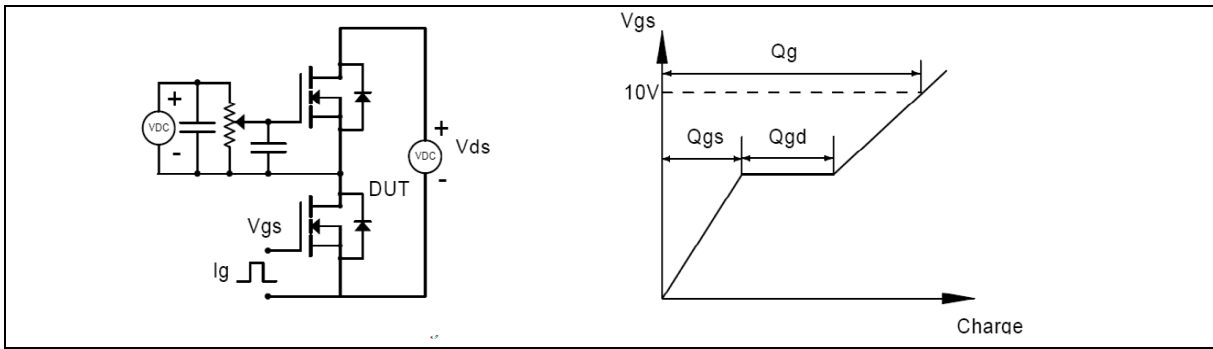
- 1) Calculated continuous current based on maximum allowable junction temperature.
- 2) Repetitive rating; pulse width limited by max. junction temperature.
- 3)  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.
- 4) The value of  $R_{\theta jc}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_a=25\text{ }^\circ\text{C}$ .
- 5)  $V_{DD}=100\text{ V}$ ,  $V_{GS}=10\text{ V}$ ,  $L=79.9\text{ mH}$ , starting  $T_j=25\text{ }^\circ\text{C}$ .

## Electrical Characteristics Diagrams





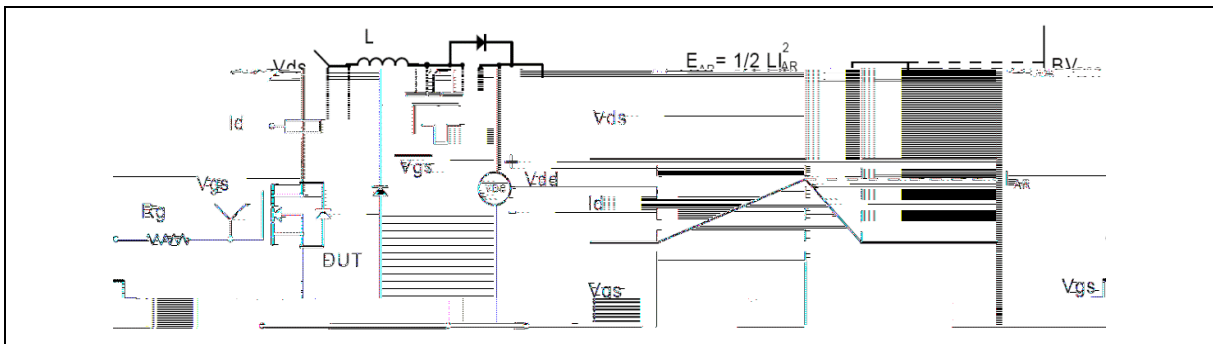
**Test circuits and waveforms**



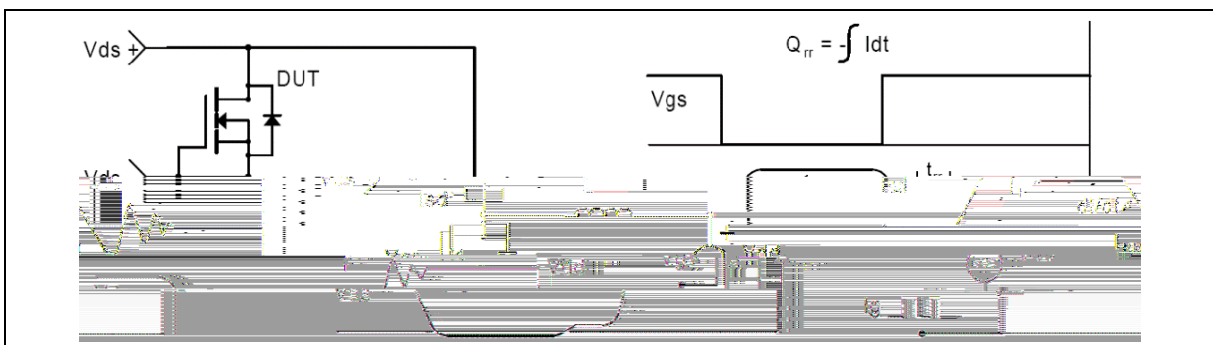
**Figure 1. Gate charge test circuit & waveform**



**Figure 2. Switching time test circuit & waveforms**

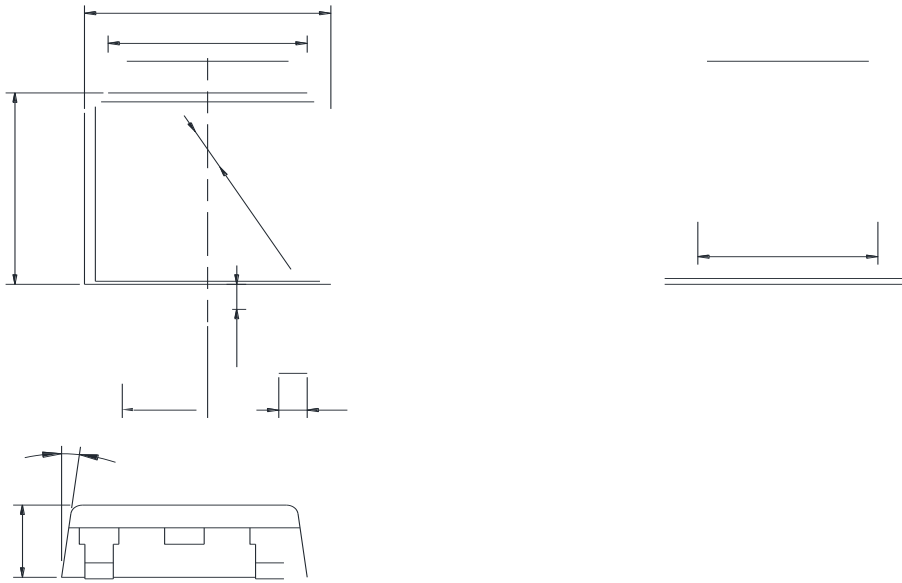


**Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms**



**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	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	0.47	-	0.60
D	6.00	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80 REF		
)	0	-	

Version 1: TO252-J package outline dimension

**Ordering Information**

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-J	2500	2	5000	5	25000

**Product Information**

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R380DSF	TO252	yes	yes	yes

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