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

Applications

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

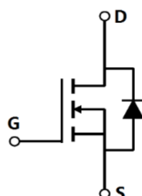
Key Performance Parameters

Parameter	Value	Unit
$V_{DS,\ min}$ @ $T_{j(max)}$	700	V
$I_{D,\ pulse}$	24	A
$R_{DS(ON)\ ,\ max}$ @ V_{GS}=10V	580	mΩ
Q_g	9.5	nC

Marking Information

Product Name	Package	Marking
OSG65R580AF	TO251	OSG65R580A

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	8	A
Continuous drain current[1], T_C=100 °C		5	
Pulsed drain current[2], T_C=25 °C	$I_{D, pulse}$	24	A
Continuous diode forward current[1], T_C=25 °C	I_S	8	A
Diode pulsed current[2], T_C=25 °C	$I_{S, pulse}$	24	A
Power dissipation[3], T_C=25 °C	P_D	63	W
Single pulsed avalanche energy[5]	E_{AS}	150	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	$R_{\theta JC}$	2	°C/W
Thermal resistance, junction-ambient[4]	$R_{\theta JA}$	62	°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	750			V_{GS}=0 V, I_D=250 μA, T_j=150 °C
Gate threshold voltage	$V_{GS(th)}$	2.0		4.0	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		0.52	0.58	Ω	V_{GS}=10 V, I_D=4 A
			1.27			V_{GS}=10 V, I_D=4 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

Oriental Semiconductor © Copyright Reserved V2.0

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		464		pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}		38.3		pF	
Reverse transfer capacitance	C_{rss}		1.47		pF	
Turn-on delay time	$t_{d(on)}$		18		ns	V_{GS}=10 V, V_{DS}=380 V, R_G=25 Ω, I_D=8 A
Rise time	t_r		18		ns	
Turn-off delay time	$t_{d(off)}$		27		ns	
Fall time	t_f		22		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		9.5		nC	V_{GS}=10 V, V_{DS}=480 V, I_D=8 A
Gate-source charge	Q_{gs}		2.7		nC	
Gate-drain charge	Q_{gd}		3.8		nC	
Gate plateau voltage	$V_{plateau}$		5.6		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=8 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		211		ns	V_R=400 V, I_S=8 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		1.8		μC	
Peak reverse recovery current	I_{rrm}		10.5		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 $R_{θJA}$ 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}=50 V, V_{GS}=10 V, L=10.8 mH, starting T_j=25 °C.

Electrical Characteristics Diagrams

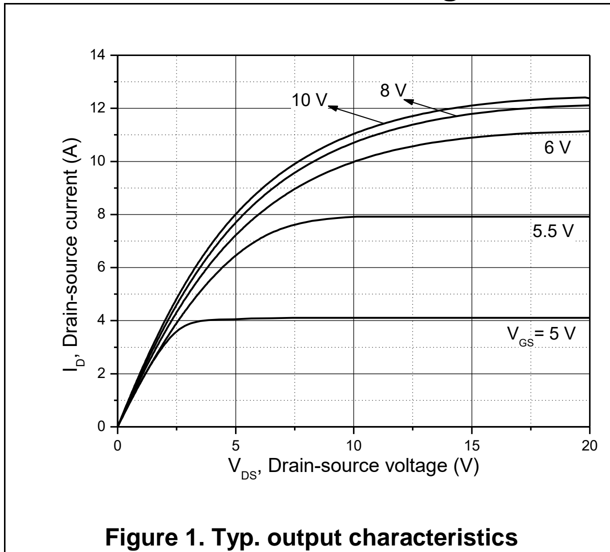


Figure 1. Typ. output characteristics

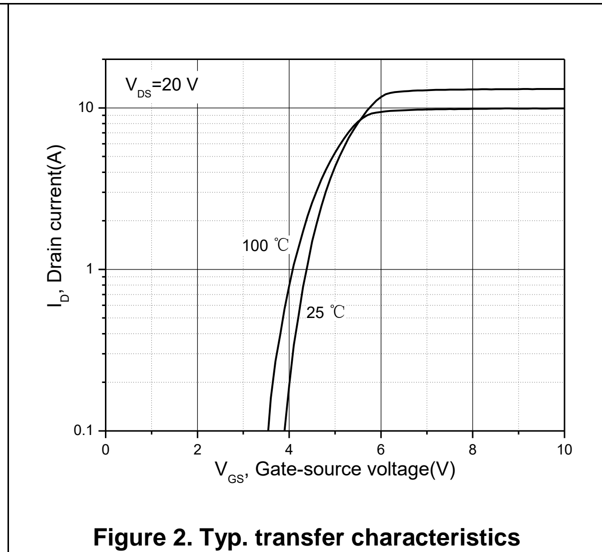


Figure 2. Typ. transfer characteristics

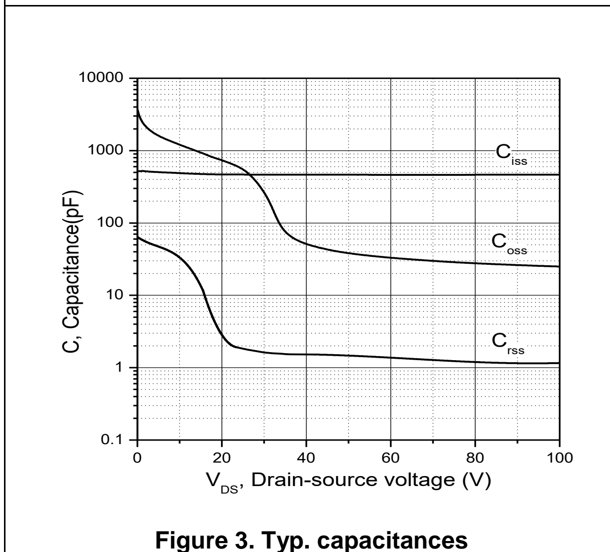


Figure 3. Typ. capacitances

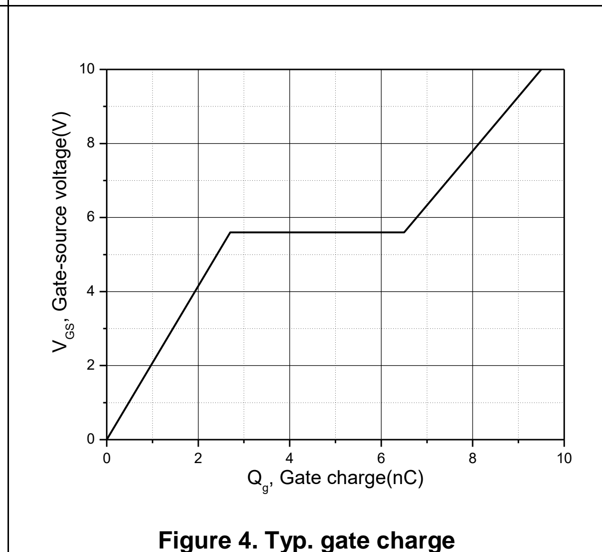


Figure 4. Typ. gate charge

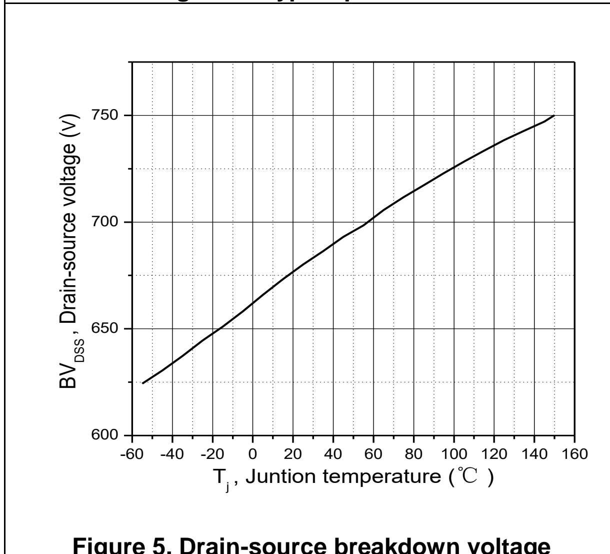


Figure 5. Drain-source breakdown voltage

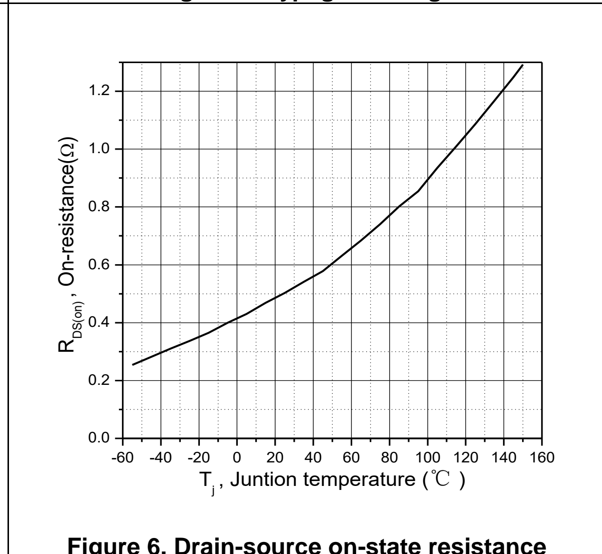


Figure 6. Drain-source on-state resistance

Oriental Semiconductor © Copyright Reserved V2.0

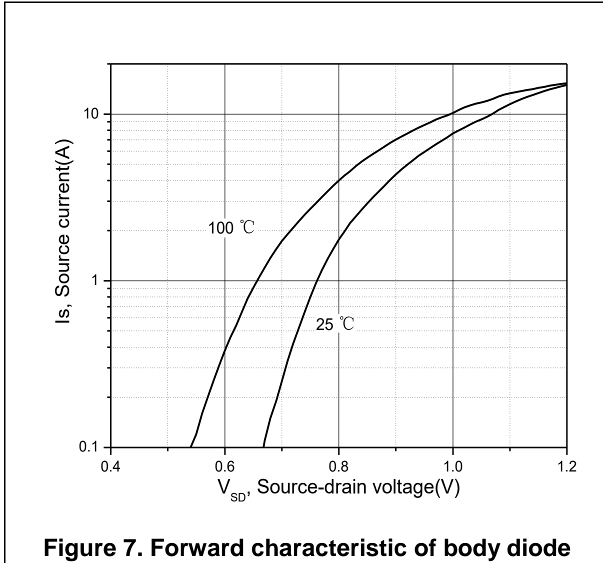


Figure 7. Forward characteristic of body diode

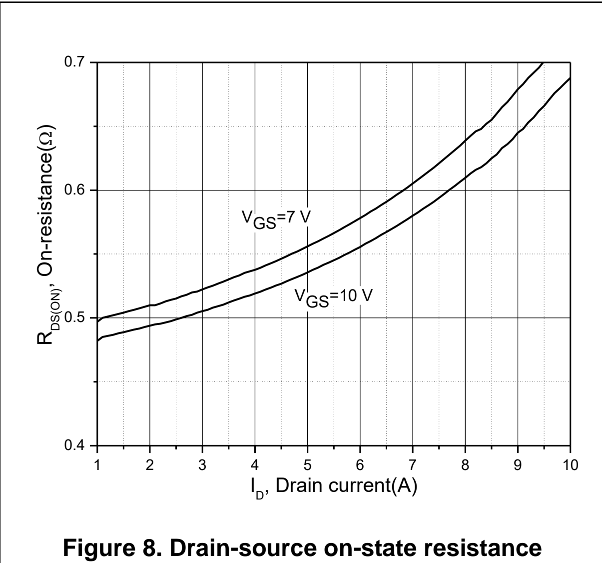


Figure 8. Drain-source on-state resistance

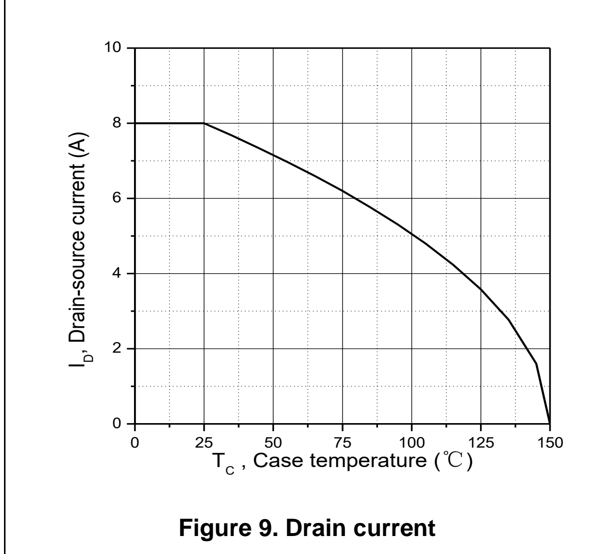


Figure 9. Drain current

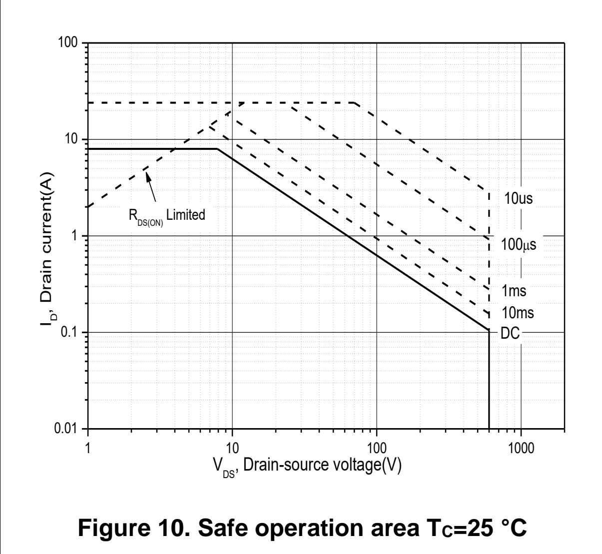


Figure 10. Safe operation area Tc=25 °C

Oriental Semiconductor © Copyright Reserved V2.0

Test circuits and waveforms

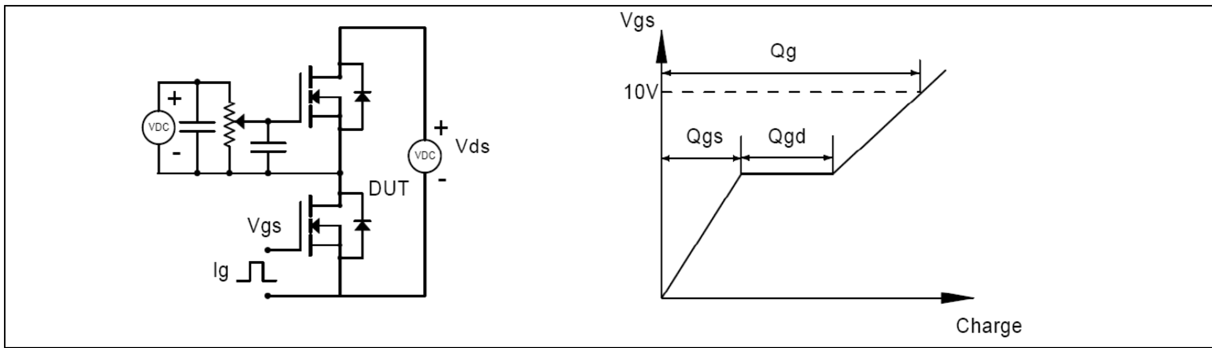


Figure 1. Gate charge test circuit & waveform

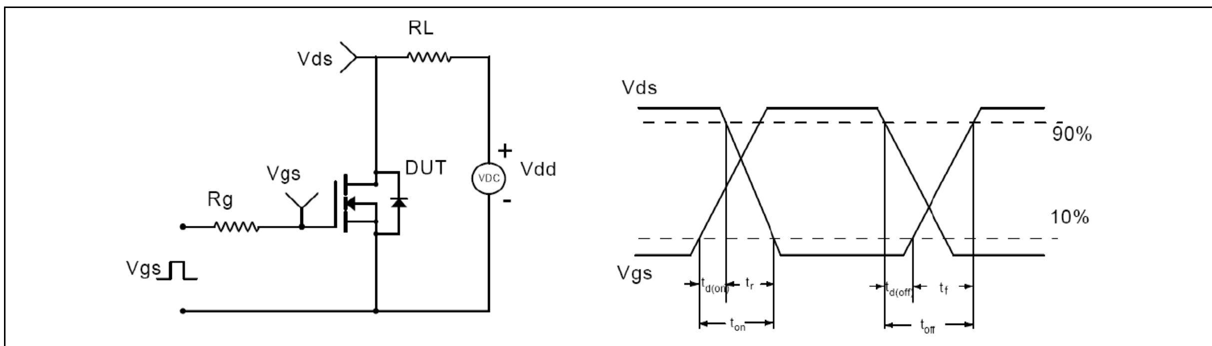


Figure 2. Switching time test circuit & waveforms

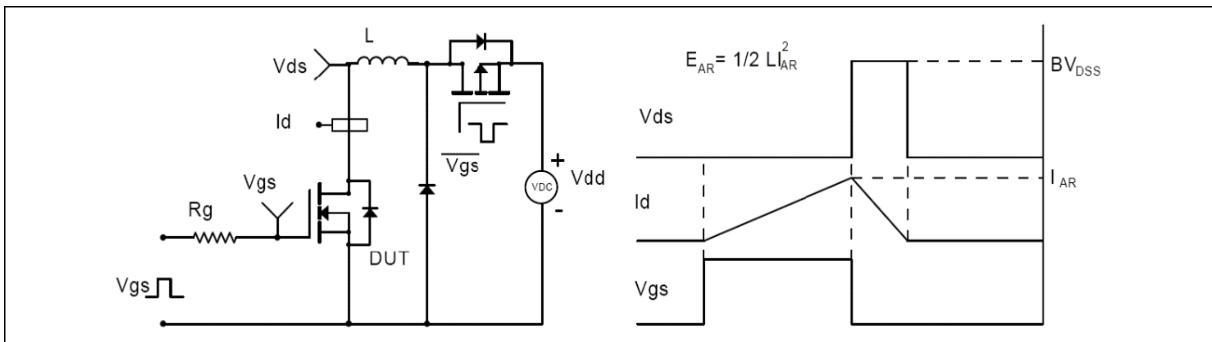


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

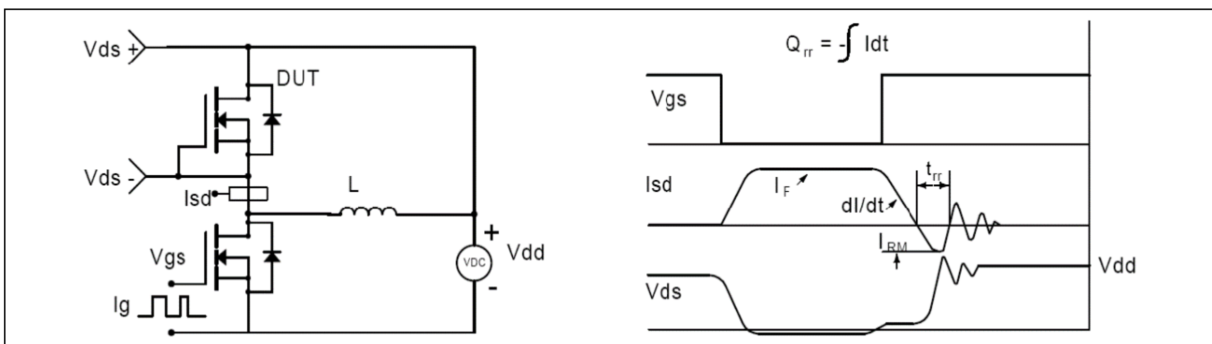
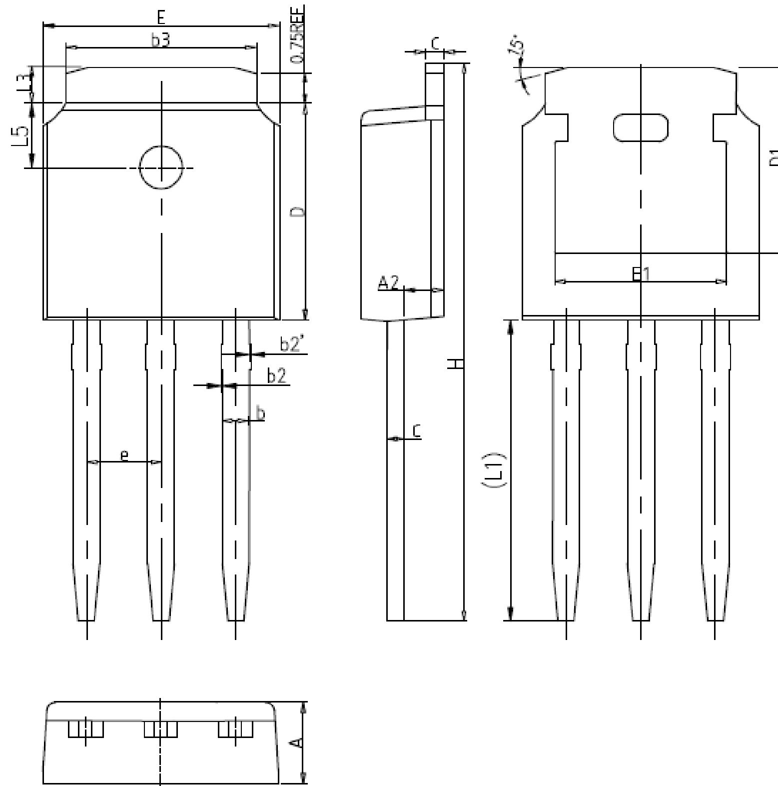


Figure 4. Diode reverse recovery test circuit & waveforms

Oriental Semiconductor © Copyright Reserved V2.0

Package Information



<table>
<tr><th rowspan="2">Symbol</th><th colspan="3">mm</th></tr>
<tr><th>Min</th><th>Nom</th><th>Max</th></tr>
<tr><td>A</td><td>2.20</td><td>2.30</td><td>2.40</td></tr>
<tr><td>A2</td><td>0.97</td><td>1.07</td><td>1.17</td></tr>
<tr><td>b</td><td>0.68</td><td>0.78</td><td>0.90</td></tr>
<tr><td>b2</td><td>0.00</td><td>0.04</td><td>0.10</td></tr>
<tr><td>b2'</td><td>0.00</td><td>0.04</td><td>0.10</td></tr>
<tr><td>b3</td><td>5.20</td><td>5.33</td><td>5.50</td></tr>
<tr><td>c</td><td>0.43</td><td>0.53</td><td>0.63</td></tr>
<tr><td>D</td><td>5.98</td><td>6.10</td><td>6.22</td></tr>
<tr><td>D1</td><td colspan="3">5.30REF</td></tr>
<tr><td>E</td><td>6.40</td><td>6.60</td><td>6.80</td></tr>
<tr><td>E1</td><td>4.63</td><td>-</td><td>-</td></tr>
<tr><td>e</td><td colspan="3">2.286BSC</td></tr>
<tr><td>H</td><td>16.22</td><td>16.52</td><td>16.82</td></tr>
<tr><td>L1</td><td>9.15</td><td>9.40</td><td>9.65</td></tr>
<tr><td>L3</td><td>0.88</td><td>1.02</td><td>1.28</td></tr>
</table>

Version 1: TO251-C package outline dimension

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO251-C	75	66	4950	6	29700

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R580AF	TO251	yes	yes	yes

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Oriental Semiconductor hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

For further information on technology, delivery terms and conditions and prices, please contact the Oriental Semiconductor sales representatives (www.orientalsemi.com).

© Oriental Semiconductor Co.,Ltd. All Rights Reserved

ORIENTAL® SEMICONDUCTOR

A Power Semiconductor Innovator