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

GreenMOS®

RoHS compliant

- 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

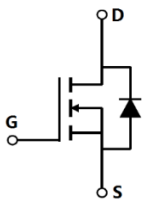
Parameter	Value	Unit
$V_{DS,\ min}$ @ $T_{j(max)}$	1000	V
$I_{D,\ pulse}$	15	A
$R_{DS(ON)\ ,\ max}$ @ V_{GS}=10V	1.2	Ω
Q_g	14.9	nC

Marking Information

Product Name	Package	Marking
OSG95R1K2PF	TO220	OSG95R1K2P

Package & Pin Information





Oriental Semiconductor © Copyright Reserved V2.0

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

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	950	V
Gate-source voltage	V_{GS}	±30	V
Continuous drain current[1], T_C=25 °C	I_D	5	A
Continuous drain current[1], T_C=100 °C		3.2	
Pulsed drain current[2], T_C=25 °C	$I_{D,\ pulse}$	15	A
Continuous diode forward current[1], T_C=25 °C	I_S	5	A
Diode pulsed current[2], T_C=25 °C	$I_{S,\ pulse}$	15	A
Power dissipation[3], T_C=25 °C	P_D	83	W
Single pulsed avalanche energy[5]	E_{AS}	160	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}≤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	$R_{\theta JC}$	1.5	°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}	950			V	V_{GS}=0 V, I_D=250 μA
		1000				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	$R_{DS(ON)}$		0.92	1.2	Ω	V_{GS}=10 V, I_D=2 A
			2.82			V_{GS}=10 V, I_D=2 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}			10	μA	V_{DS}=950 V, V_{GS}=0 V
Gate resistance	R_G		29.5		Ω	f=1 MHz, Open drain

Oriental Semiconductor © Copyright Reserved V2.0

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		878		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		34		pF	
Reverse transfer capacitance	C_{rss}		1.5		pF	
Effective output capacitance, energy related	C_O(er)		21		pF	V_{GS}=0 V, V_{DS}=0V - 400V
Effective output capacitance, time related	C_O(tr)		108		pF	
Turn-on delay time	$t_{d(on)}$		30		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=2 Ω, I_D=2.5 A
Rise time	t_r		14		ns	
Turn-off delay time	$t_{d(off)}$		59.6		ns	
Fall time	t_f		27.2		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		14.9		nC	V_{GS}=10 V, V_{DS}=400 V, I_D=2.5 A
Gate-source charge	Q_{gs}		4.8		nC	
Gate-drain charge	Q_{gd}		3.4		nC	
Gate plateau voltage	$V_{plateau}$		5		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	I_S=5 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		216		ns	V_R=400 V, I_S=2.5 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		1.8		μC	
Peak reverse recovery current	I_{rrm}		15.8		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 square 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.

Oriental Semiconductor © Copyright Reserved V2.0

Electrical Characteristics Diagrams

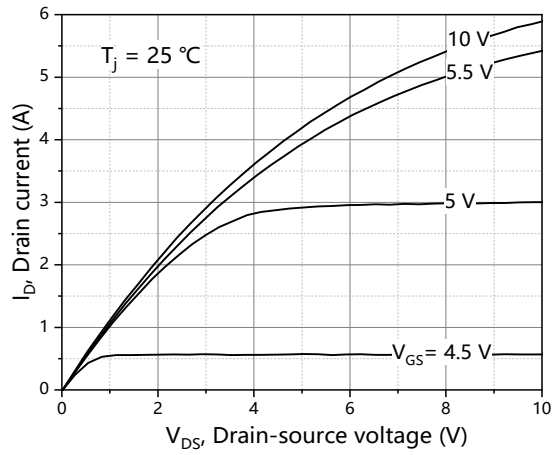


Figure 1. Typ. output characteristics

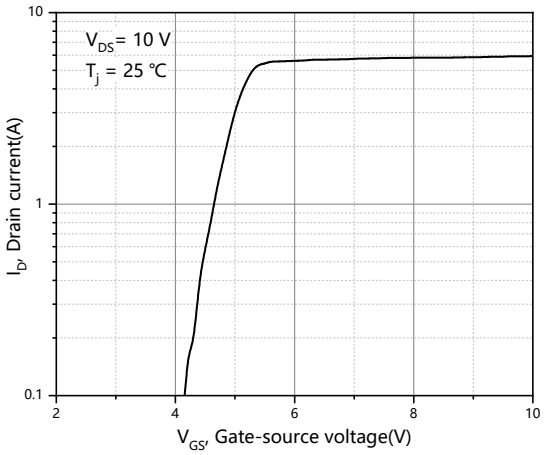


Figure 2. Typ. transfer characteristics

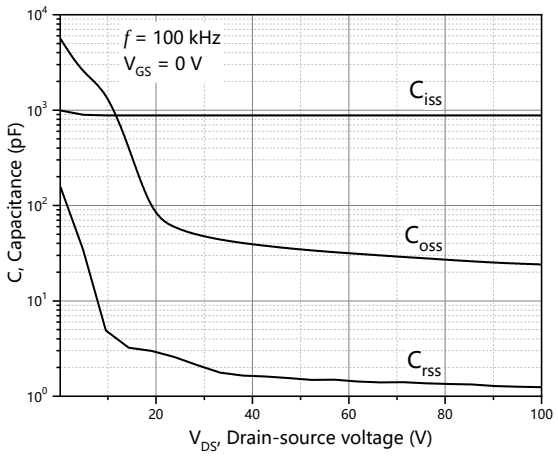


Figure 3. Typ. capacitances

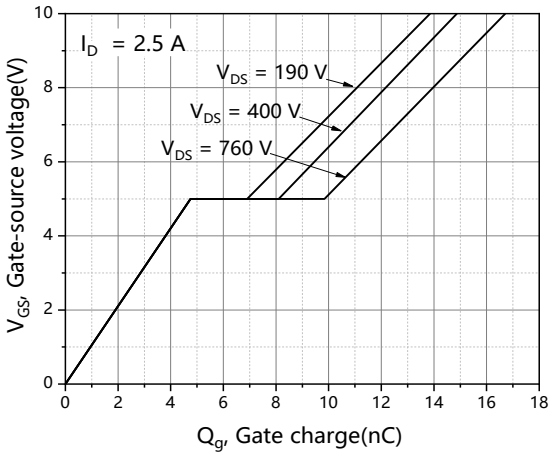


Figure 4. Typ. gate charge

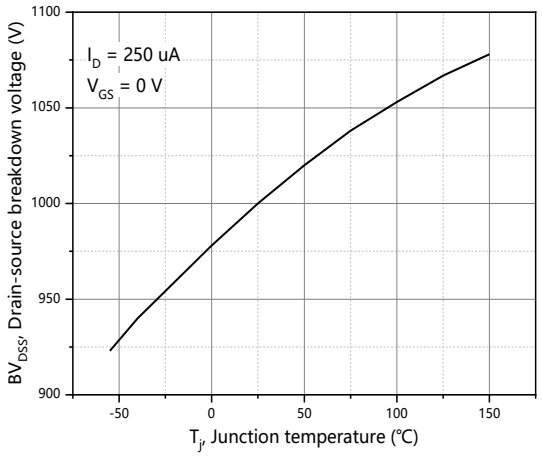


Figure 5. Drain-source breakdown voltage

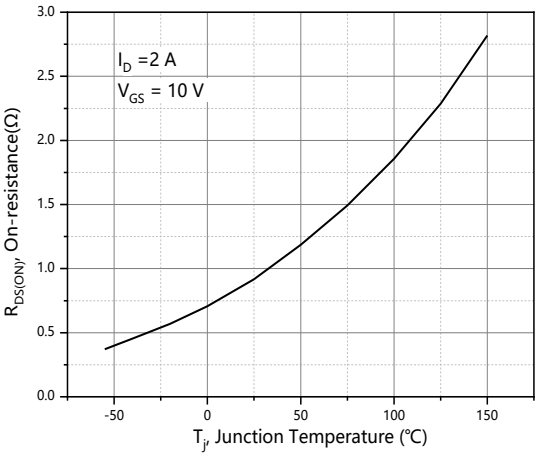


Figure 6. Drain-source on-state resistance

Oriental Semiconductor © Copyright Reserved V2.0

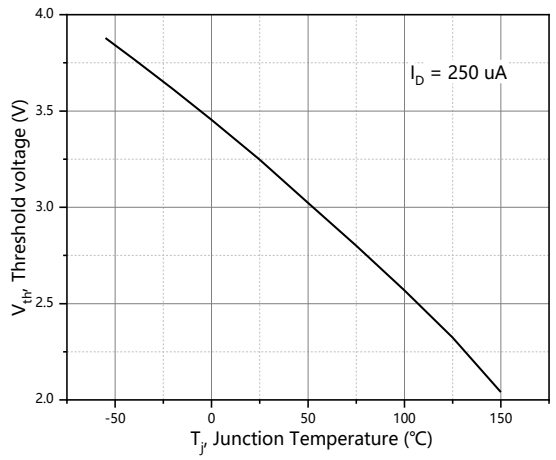


Figure 7. Threshold voltage

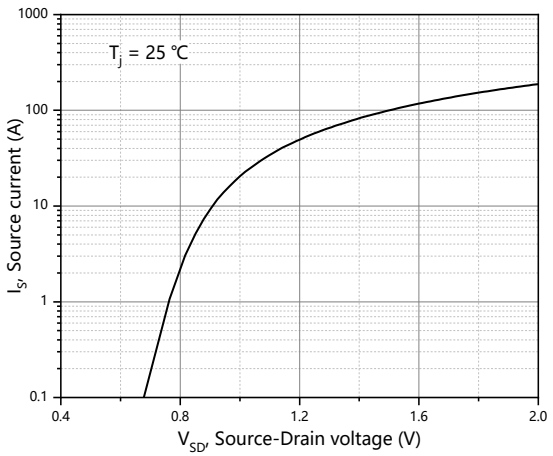


Figure 8. Forward characteristic of body diode

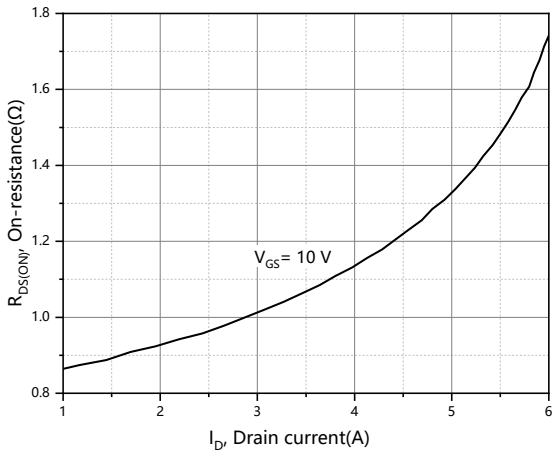


Figure 9. Drain-source on-state resistance

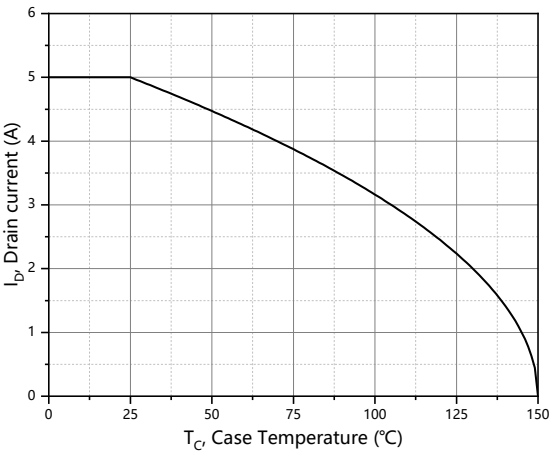


Figure 10. Drain current

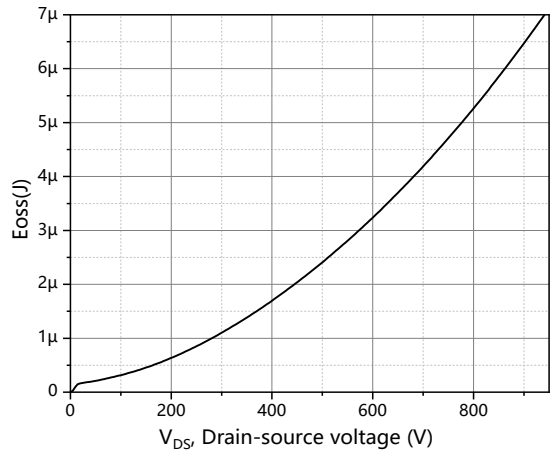


Figure 11. Typ. Coss stored energy

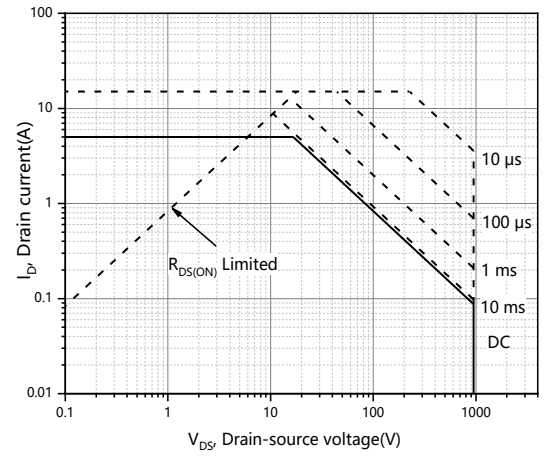


Figure 12. Safe operation area T_C=25 °C

Oriental Semiconductor © Copyright Reserved V2.0

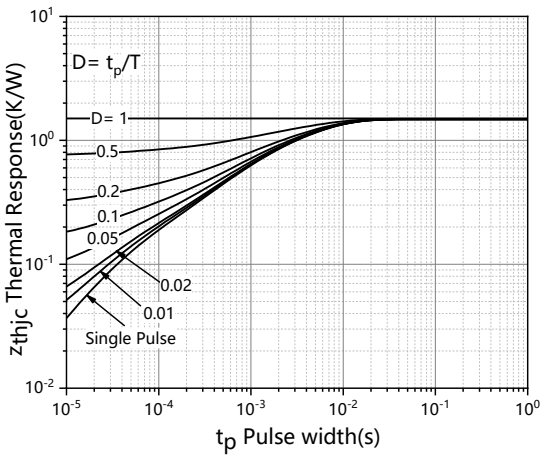


Figure 13. Max. transient thermal impedance

Oriental Semiconductor © Copyright Reserved V2.0

Test circuits and waveforms

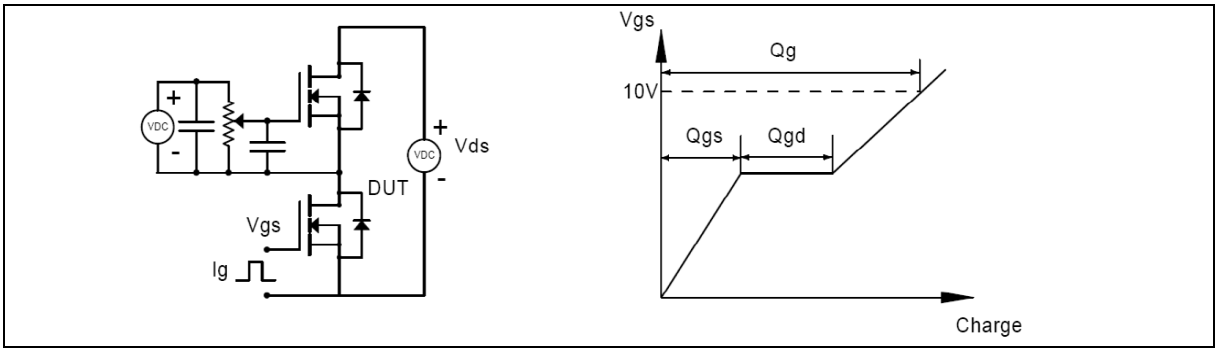


Figure 1. Gate charge test circuit & waveform

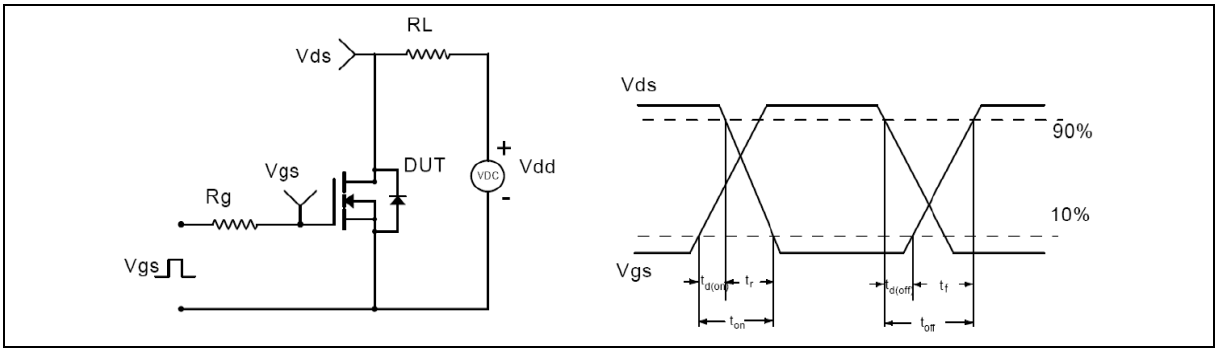


Figure 2. Switching time test circuit & waveforms

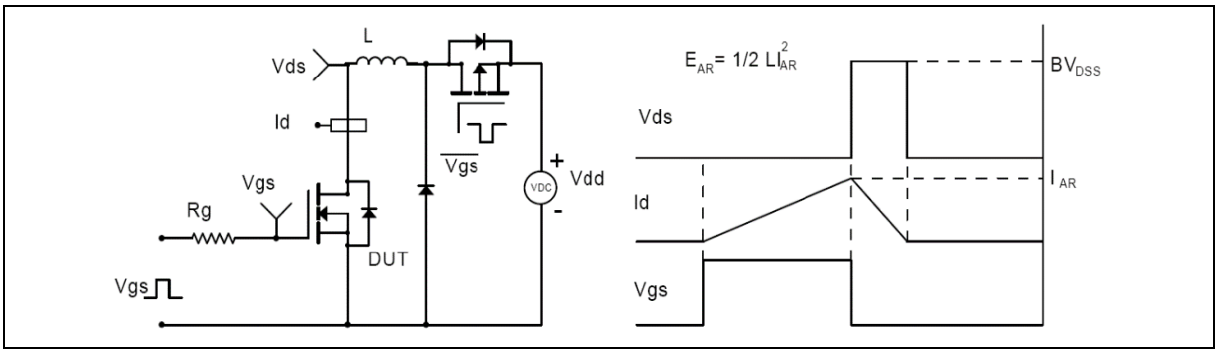


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

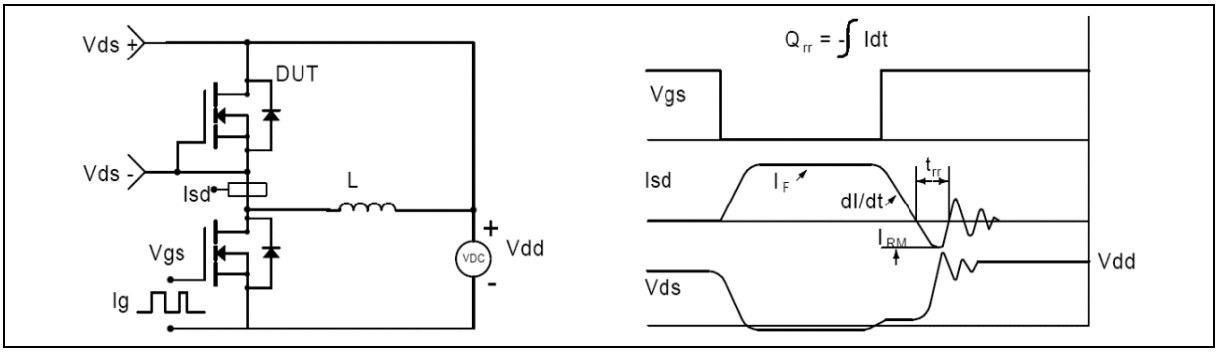
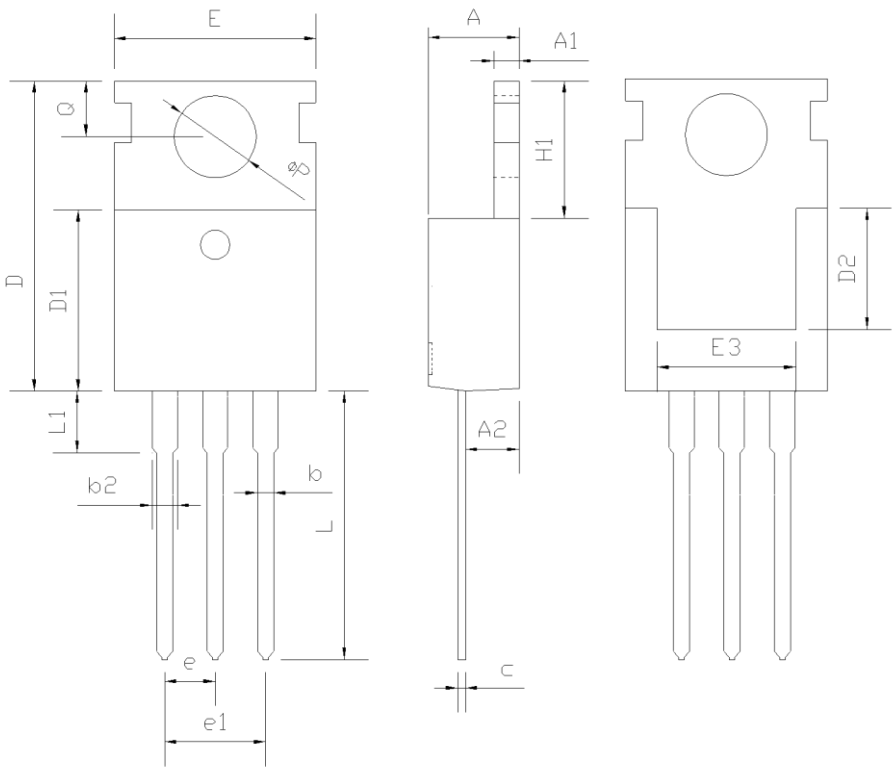


Figure 4. Diode reverse recovery test circuit & waveforms

Oriental Semiconductor © Copyright Reserved V2.0

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54BSC		
e1	5.08BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00

Version 1: TO220-P package outline dimension

Oriental Semiconductor © Copyright Reserved V2.0

Ordering Information

Package Type	Units/ Tube	Tubes/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO220-P	50	20	1000	6	6000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG95R1K2PF	TO220	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