

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

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

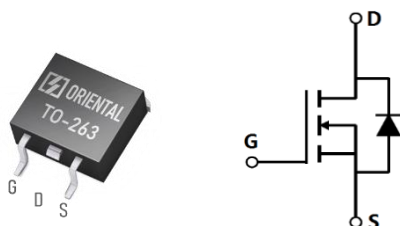
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, \min} @ T_{j(max)}$	700	V
I_D, pulse	24	A
$R_{DS(ON)}, \max @ V_{GS}=10V$	580	m Ω
Q_g	16	nC

Marking Information

Product Name	Package	Marking
OSG65R580KT3F	TO263	OSG65R580KT3

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	V_{GS}	± 30	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	8	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		5.1	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	24	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	8	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	24	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	98	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	84	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\ldots 480\text{ V}$, $I_{SD}\leq I_D$	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	$R_{\theta JC}$	1.28	$^{\circ}\text{C/W}$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	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	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$
		700				$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$, $T_j=150^{\circ}\text{C}$
Gate threshold voltage	$V_{GS(th)}$	3.5		4.5	V	$V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		0.47	0.58	Ω	$V_{GS}=10\text{ V}$, $I_D=4\text{ A}$
			1.23			$V_{GS}=10\text{ V}$, $I_D=4\text{ A}$, $T_j=150^{\circ}\text{C}$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=30\text{ V}$
				-100		$V_{GS}=-30\text{ V}$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=650\text{ V}$, $V_{GS}=0\text{ V}$
Gate resistance	R_G		29		Ω	$f = 1\text{ MHz}$, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		347		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		29		pF	
Reverse transfer capacitance	C_{rss}		1.8		pF	
Effective output capacitance, energy related	$C_{o(er)}$		18		pF	$V_{GS} = 0\text{ V}$, $V_{DS} = 0\text{V-}400\text{V}$
Effective output capacitance, time related	$C_{o(tr)}$		98		pF	
Turn-on delay time	$t_{d(on)}$		22		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=8\text{ A}$
Rise time	t_r		22		ns	
Turn-off delay time	$t_{d(off)}$		63		ns	
Fall time	t_f		16		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		16		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=8\text{ A}$
Gate-source charge	Q_{gs}		2.4		nC	
Gate-drain charge	Q_{gd}		8.6		nC	
Gate plateau voltage	$V_{plateau}$		6.4		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=8\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		253		ns	$V_R=400\text{ V}$, $I_S=8\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		2.3		μC	
Peak reverse recovery current	I_{rrm}		17		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 $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=75\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

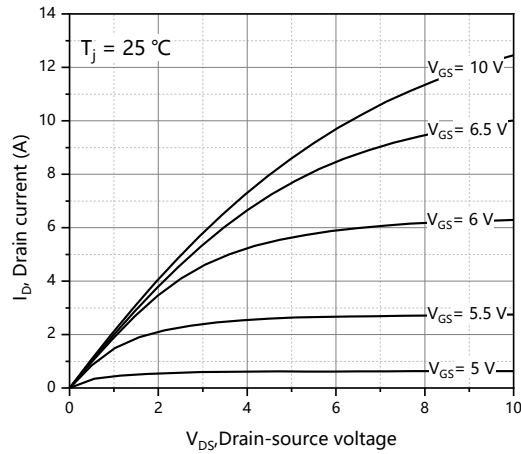


Figure 1. Typ. output characteristics

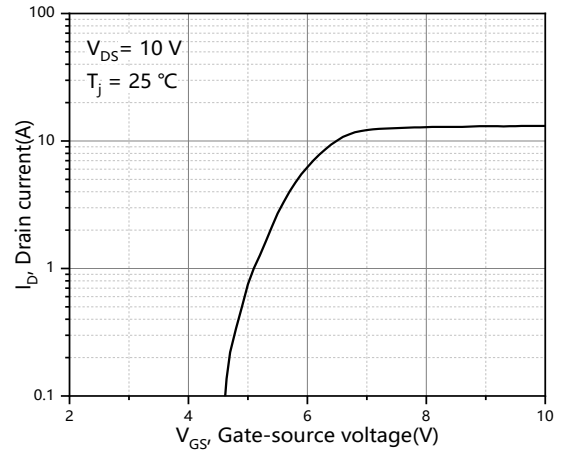


Figure 2. Typ. transfer characteristics

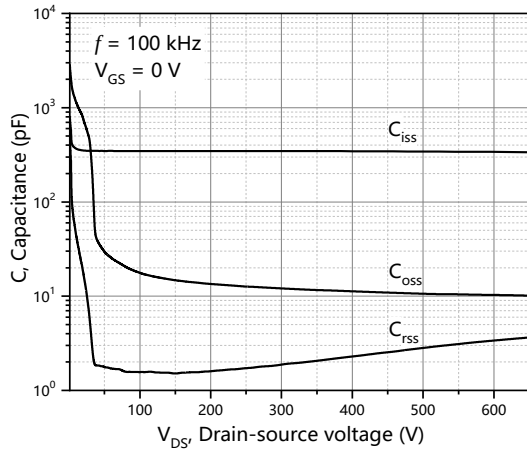


Figure 3. Typ. capacitances

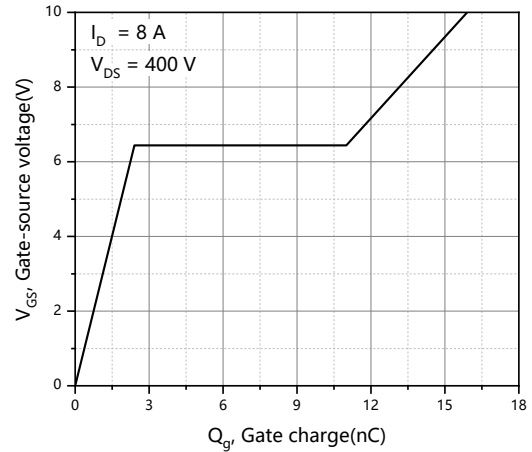


Figure 4. Typ. gate charge

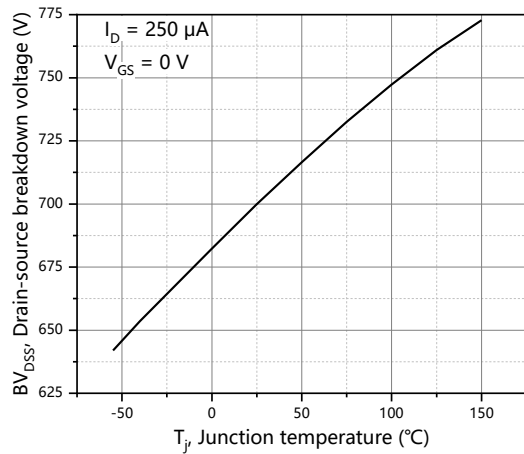


Figure 5. Drain-source breakdown voltage

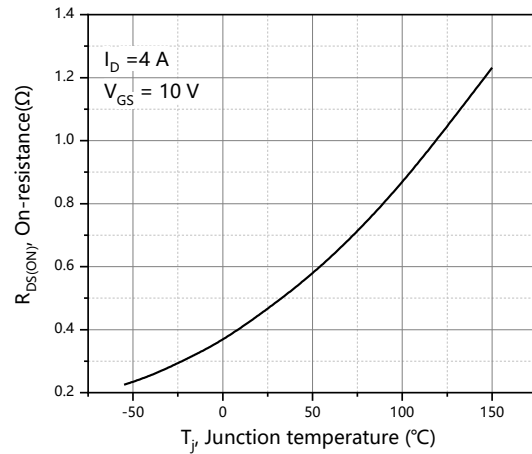


Figure 6. Drain-source on-state resistance

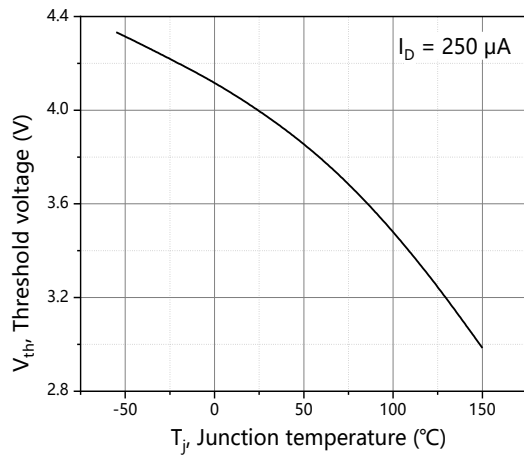


Figure 7. Threshold voltage

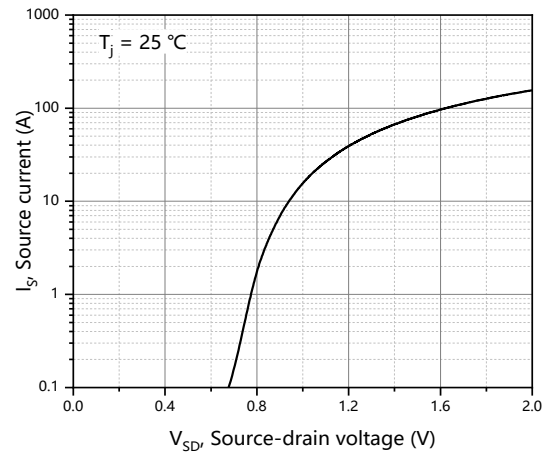


Figure 8. Forward characteristic of body diode

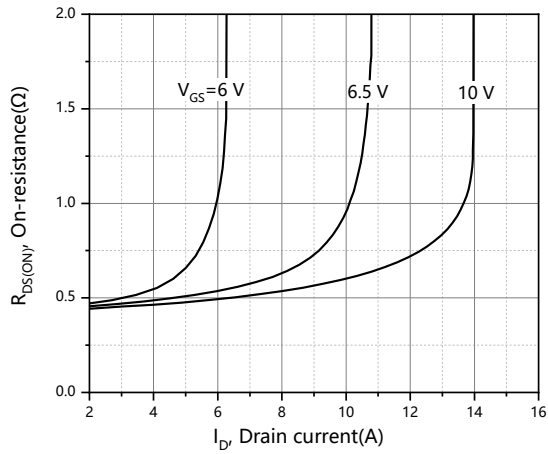


Figure 9. Drain-source on-state resistance

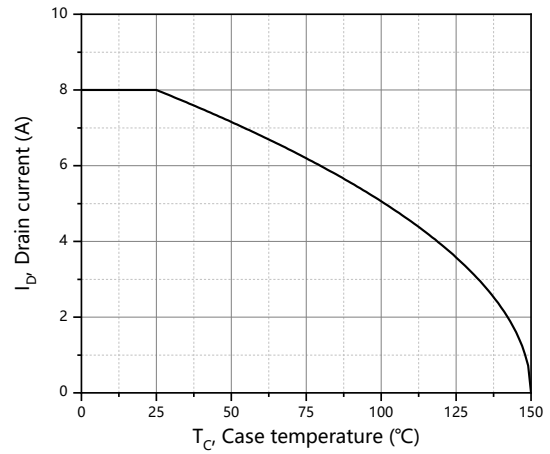


Figure 10. Drain current

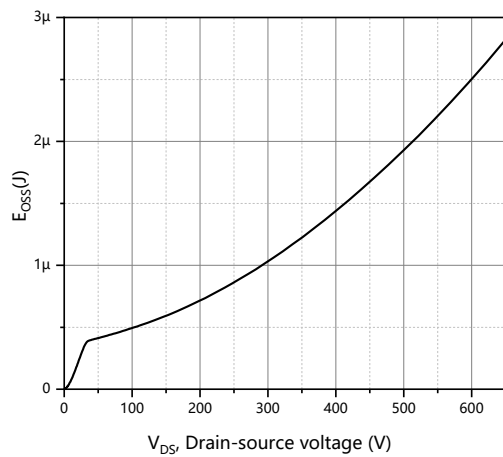


Figure 11. Typ. Coss stored energy

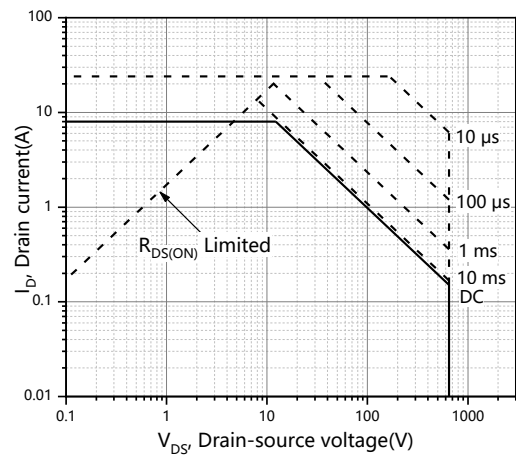


Figure 12. Safe operation area for $T_C=25\text{°C}$

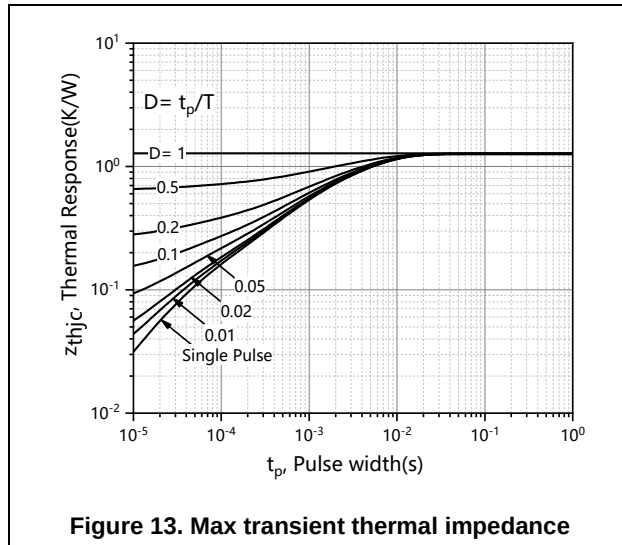


Figure 13. Max transient thermal impedance

Test circuits and waveforms

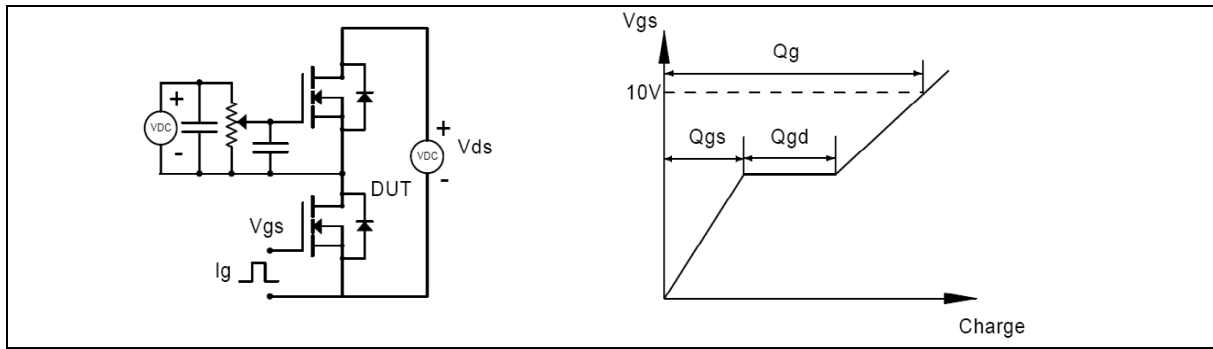


Figure 1. Gate charge test circuit & waveform

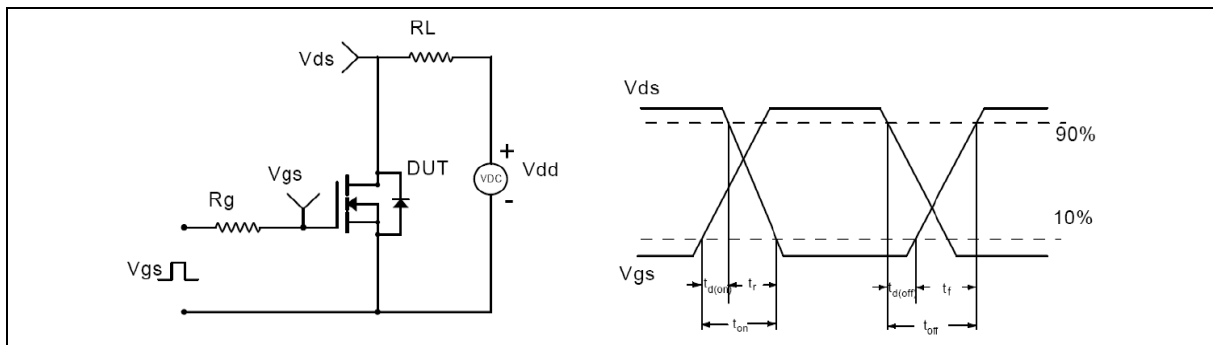


Figure 2. Switching time test circuit & waveforms

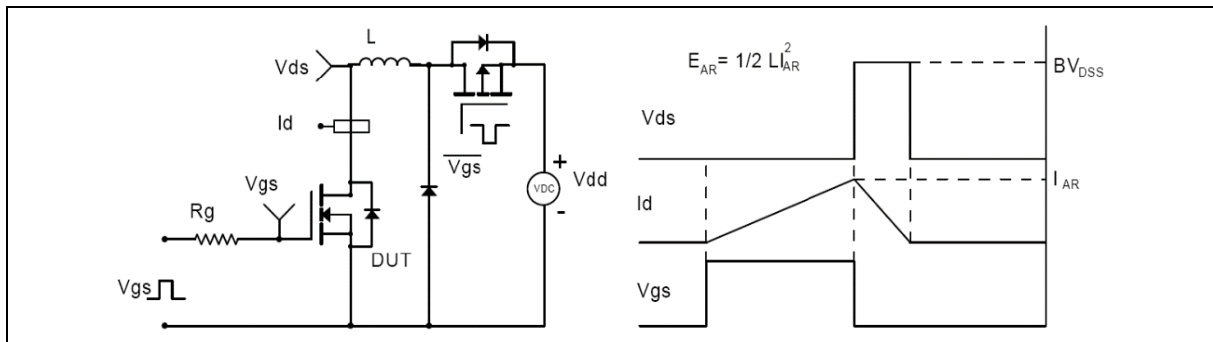


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

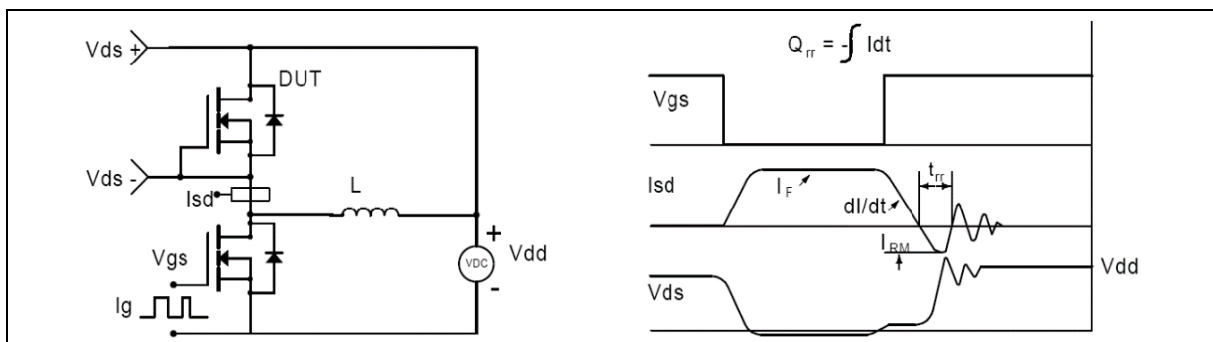
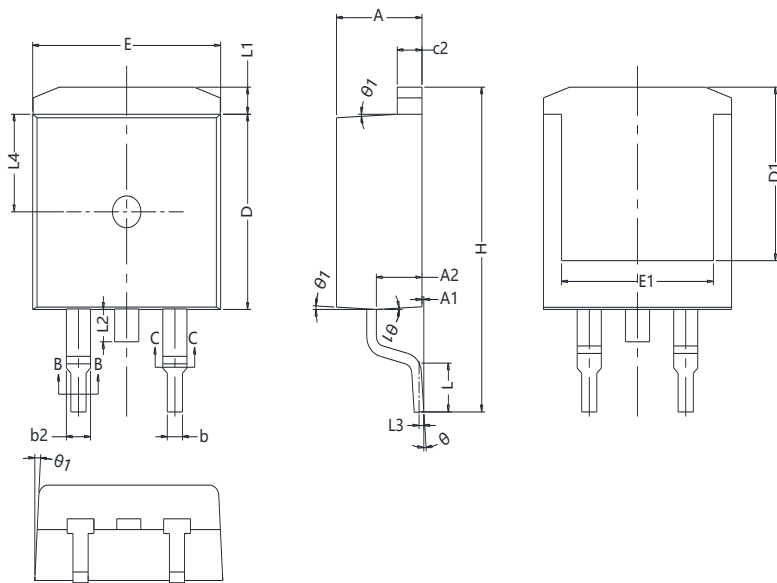


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	4.40	4.50	4.60
A1	0.00	0.10	0.25
A2	2.20	2.40	2.60
b	0.76	-	0.89
b1	0.75	0.80	0.85
b2	1.23	-	1.37
b3	1.22	1.27	1.32
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	1.25	1.30	1.35
D	9.10	9.20	9.30
D1	8.00	-	-
E	9.80	9.90	10.00
E1	7.80	-	-
e	2.54 BSC		
H	14.90	15.30	15.70
L	2.00	2.30	2.60
L1	1.17	1.27	1.40
L2	-	-	1.75
L3	0.25 BSC		
L4	4.60 REF		
θ	0°	-	8°
θ1	1°	3°	5°

Version 1: TO263-J package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO263-J	800	1	800	10	8000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R580KT3F	TO263	yes	yes	yes

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