

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

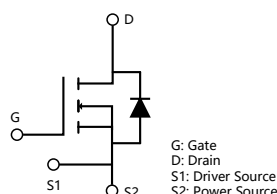
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, \min} @ T_{j(max)}$	650	V
I_D, pulse	110	A
$R_{DS(ON)}, \max @ V_{GS}=10V$	55	$m\Omega$
Q_g	64	nC

Marking Information

Product Name	Package	Marking
OSG60R055TT3F	TOLL	OSG60R055TT3

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}	600	V
Gate-source voltage	V_{GS}	± 30	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	44	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		27.8	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, \text{pulse}}$	110	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	44	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, \text{pulse}}$	110	A
Power dissipation ³⁾ , $T_C=25^{\circ}\text{C}$	P_D	320	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	360	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	$R_{\theta JC}$	0.39	$^{\circ}\text{C/W}$
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}	600			V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
Gate threshold voltage	$V_{GS(th)}$	3.5		4.5	V	$V_{DS}=V_{GS}$, $I_D=1\text{ mA}$
Drain-source on-state resistance	$R_{DS(ON)}$		45	55	m Ω	$V_{GS}=10\text{ V}$, $I_D=15.1\text{ A}$
			118			$V_{GS}=10\text{ V}$, $I_D=15.1\text{ A}$, $T_j=150^{\circ}\text{C}$
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	$V_{DS}=600\text{ V}$, $V_{GS}=0\text{ V}$
Gate resistance	R_G		2.4		Ω	$f = 1\text{ MHz}$, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		3961		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		220		pF	
Reverse transfer capacitance	C_{rss}		3		pF	
Effective output capacitance, energy related	$C_{o(er)}$		135		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		787		pF	
Turn-on delay time	$t_{d(on)}$		19		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=20\text{ A}$
Rise time	t_r		6		ns	
Turn-off delay time	$t_{d(off)}$		60		ns	
Fall time	t_f		4		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		64		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=20\text{ A}$
Gate-source charge	Q_{gs}		18.5		nC	
Gate-drain charge	Q_{gd}		18		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	$I_S=44\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		408		ns	$V_R=400\text{ V}$, $I_S=20\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		6.0		μC	
Peak reverse recovery current	I_{rrm}		25.8		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) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with $T_a=25\text{ }^\circ\text{C}$.
- 5) $V_{DD}=100\text{ V}$, $V_{GS}=10\text{ V}$, $L=80\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.

Electrical Characteristics Diagrams

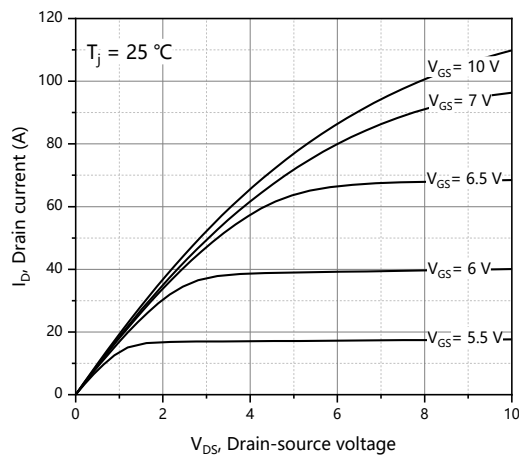


Figure 1. Typ. output characteristics

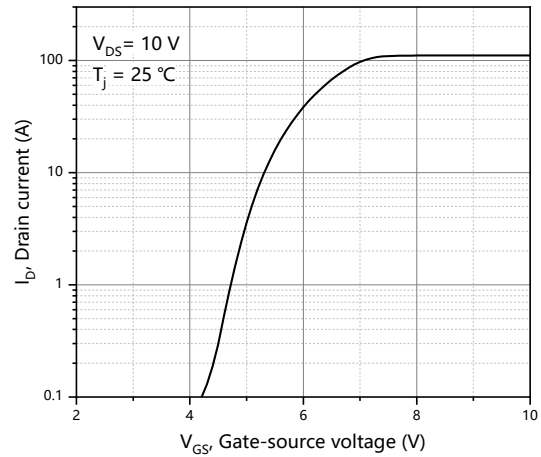


Figure 2. Typ. transfer characteristics

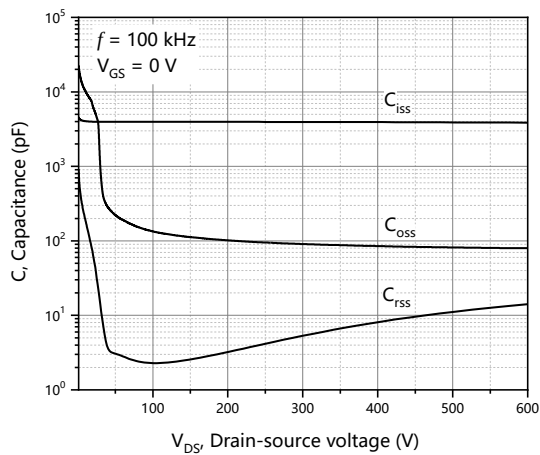


Figure 3. Typ. capacitances

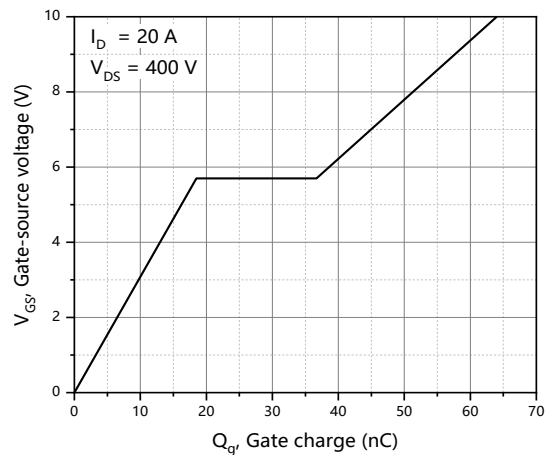


Figure 4. Typ. gate charge

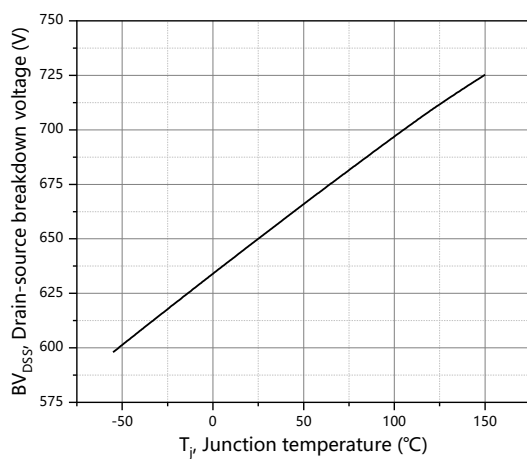


Figure 5. Drain-source breakdown voltage

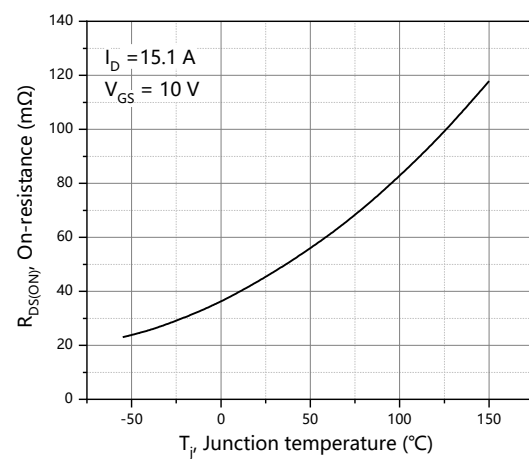


Figure 6. Drain-source on-state resistance

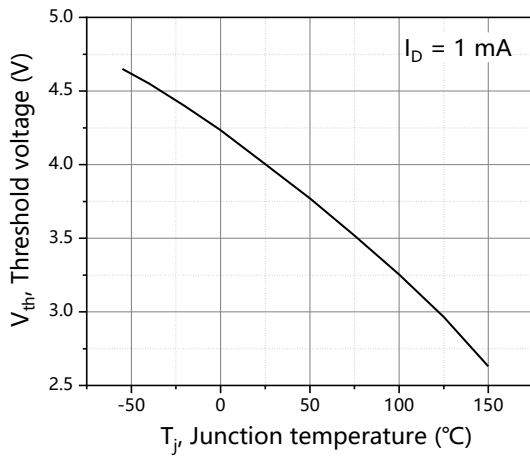


Figure 7. Threshold voltage

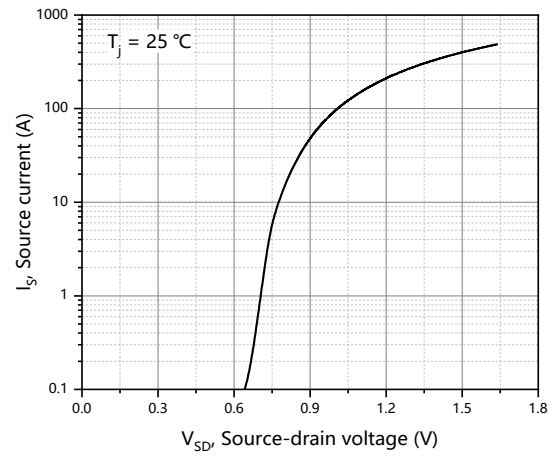


Figure 8. Forward characteristic of body diode

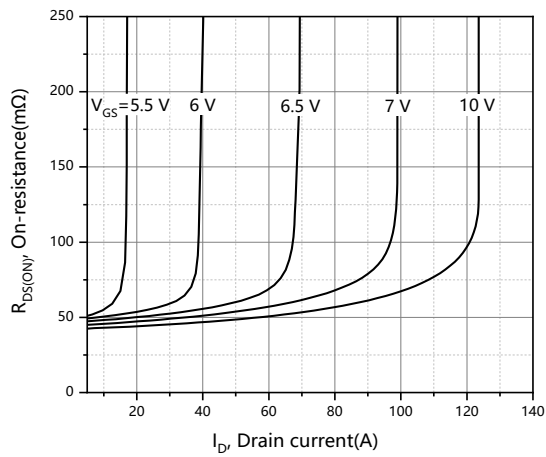


Figure 9. Drain-source on-state resistance

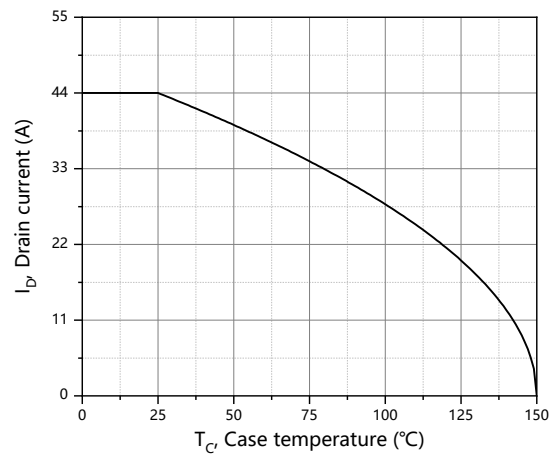


Figure 10. Drain current

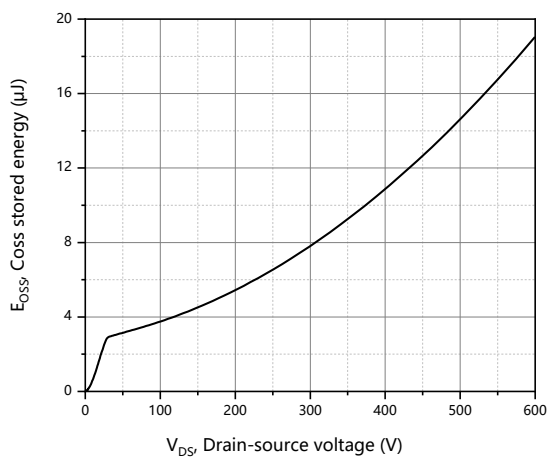


Figure 11. Typ. Coss stored energy

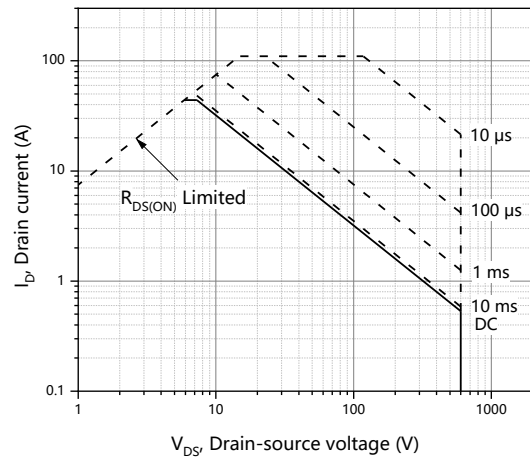


Figure 12. Safe operation area for $T_c=25$ °C

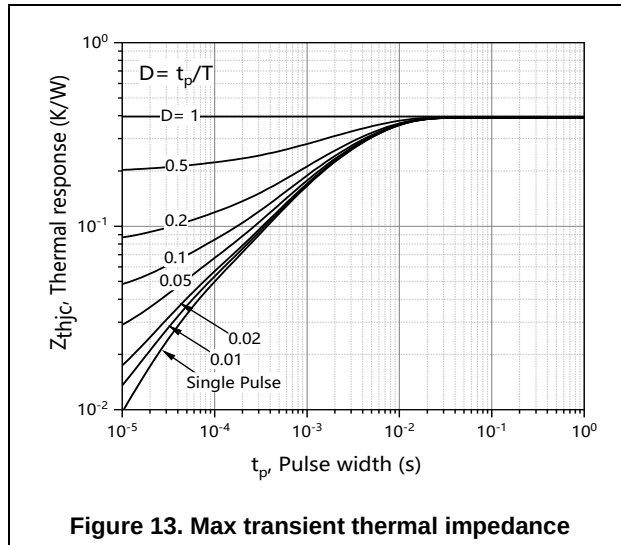


Figure 13. Max transient thermal impedance

Test circuits and waveforms

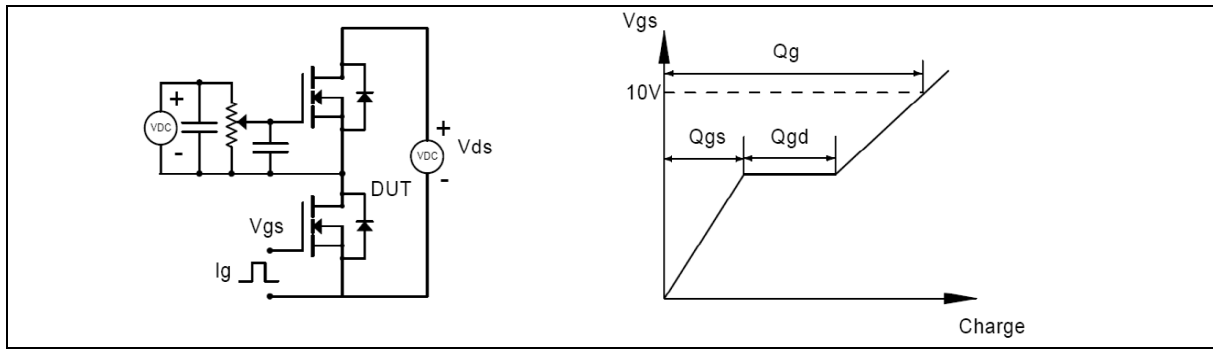


Figure 1. Gate charge test circuit & waveform

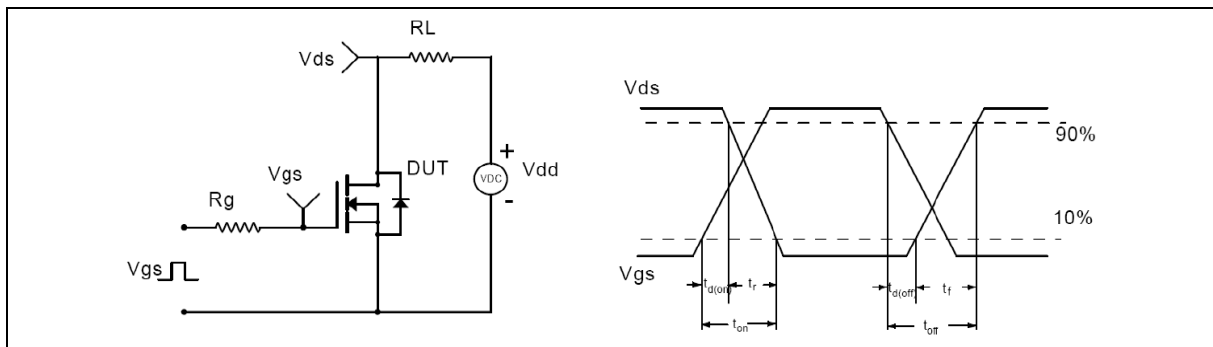


Figure 2. Switching time test circuit & waveforms

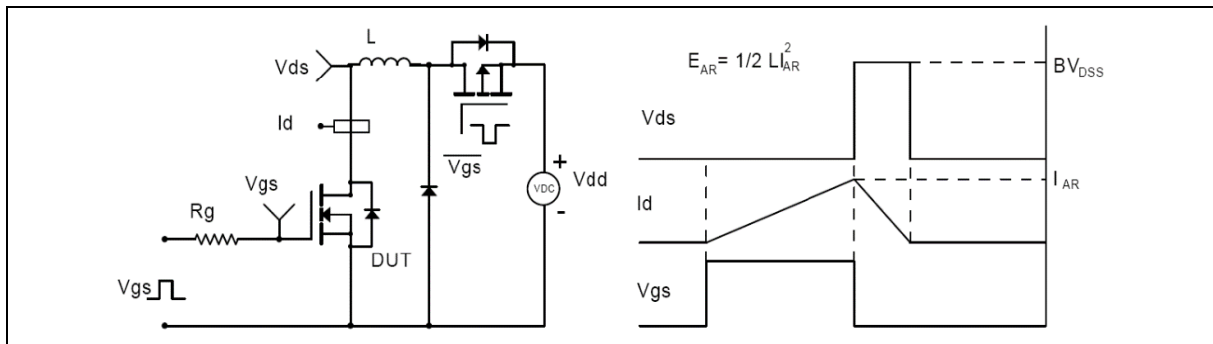


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

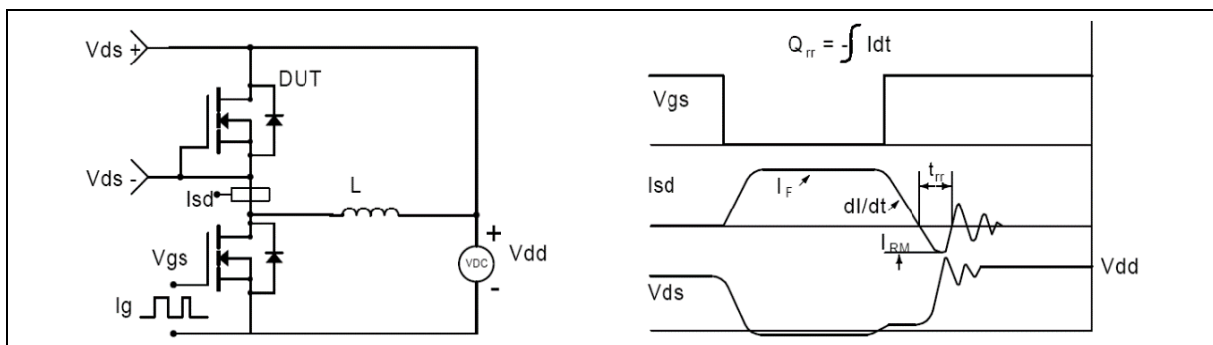
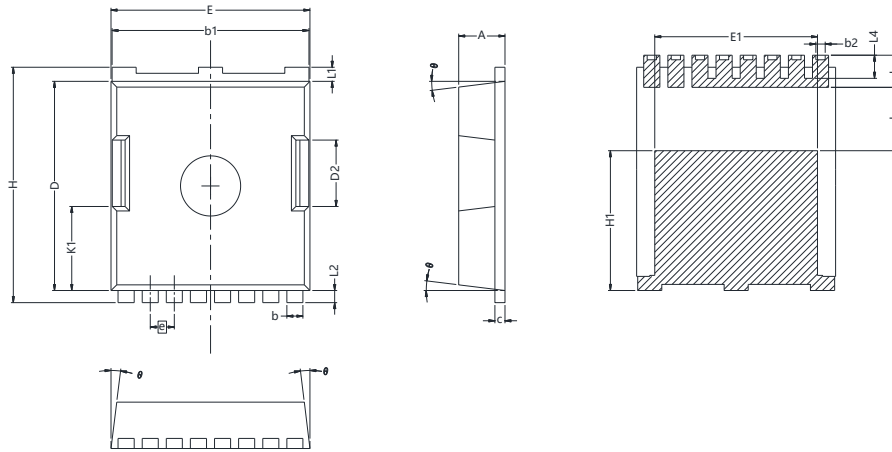


Figure 4. Diode reverse recovery test circuit & waveforms

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	-	2.40
b	0.70	-	0.90
b1	9.70	-	9.90
b2	0.42	-	0.50
c	0.40	-	0.60
D	10.28	-	10.58
D2	3.10	-	3.50
E	9.70	-	10.10
E1	7.90	-	8.30
e	1.20 BSC		
H	11.48	-	11.88
H1	6.75	-	7.15
N	8.00		
J	3.00	-	3.30
K1	3.98	-	4.38
L	1.40	-	1.80
L1	0.60	-	0.80
L2	0.50	-	0.70
L4	1.00	-	1.30
θ	4°	-	10°

Version 1: TOLL-S package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TOLL-S	2000	1	2000	7	14000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG60R055TT3F	TOLL	yes	yes	yes

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