ORIENTAL® SEMICONDUCTOR

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® SuperSi series is based on Oriental Semiconductor's unique device design to achieve extremely fast switching characteristics. It is the perfect replacement for the Gallium Nitride (GaN) device in high frequency operations with better ruggedness and cost. It is targeted to meet the most aggressive efficiency standards of power supply systems by pushing both performance and power density to extreme limits.

Features

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity

GreenMOS®

RoHS compliant

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
$I_{D, pulse}$	90	A
$R_{DS(ON), max}$ @ $V_{GS}=10V$	99	mΩ
Q_g	21.6	nC

Marking Information

Product Name	Package	Marking
OSS60R099TF	TOLL	OSS60R099T

Package & Pin Information

G: Gate
D: Drain
S1: Driver Source
S2: Power Source
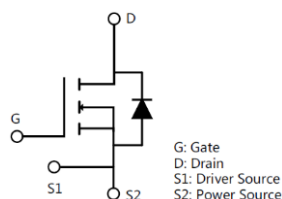
Absolute Maximum Ratings at T_j=25°C unless otherwise noted

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 °C	I_D	30	A
Continuous drain current[1], T_C=100 °C		19	
Pulsed drain current[2], T_C=25 °C	$I_{D, pulse}$	90	A
Continuous diode forward current[1], T_C=25 °C	I_S	30	A
Diode pulsed current[2], T_C=25 °C	$I_{S, pulse}$	90	A
Power dissipation[3], T_C=25 °C	P_D	219	W
Single pulsed avalanche energy[5]	E_{AS}	577.6	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	$R_{\theta JC}$	0.57	°C/W
Thermal resistance, junction-ambient[4]	$R_{\theta JA}$	62.5	°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}	600			V	V_{GS}=0 V, I_D=250 µA
		650	740			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	$R_{DS(ON)}$		0.080	0.099	Ω	V_{GS}=10 V, I_D=15 A
			0.192			V_{GS}=10 V, I_D=15 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}=600 V, V_{GS}=0 V

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1282.1		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 kHz
Output capacitance	C_{oss}		235.9		pF	
Reverse transfer capacitance	C_{rss}		9.1		pF	
Turn-on delay time	$t_{d(on)}$		24.9		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=2 Ω, I_D=20 A
Rise time	t_r		32.3		ns	
Turn-off delay time	$t_{d(off)}$		42.3		ns	
Fall time	t_f		27.5		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		21.6		nC	V_{GS}=10 V, V_{DS}=400 V, I_D=20 A
Gate-source charge	Q_{gs}		6.9		nC	
Gate-drain charge	Q_{gd}		7.8		nC	
Gate plateau voltage	$V_{plateau}$		6.5		V	

Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.4	V	I_S=30 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		416.0		ns	V_R=400V, I_S=20 A, di/dt=100 A/µs
Reverse recovery charge	Q_{rr}		6.8		µC	
Peak reverse recovery current	I_{rrm}		32.1		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}=100 V, V_{GS}=10 V, L=60 mH, starting T_j=25 °C.

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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

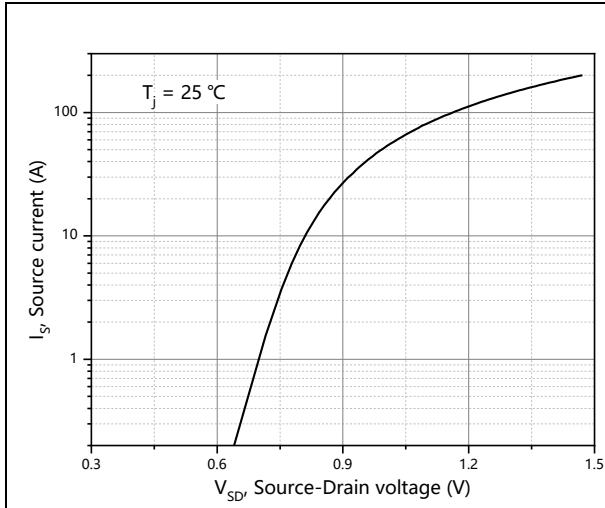

Figure 6. Drain-source on-state resistance
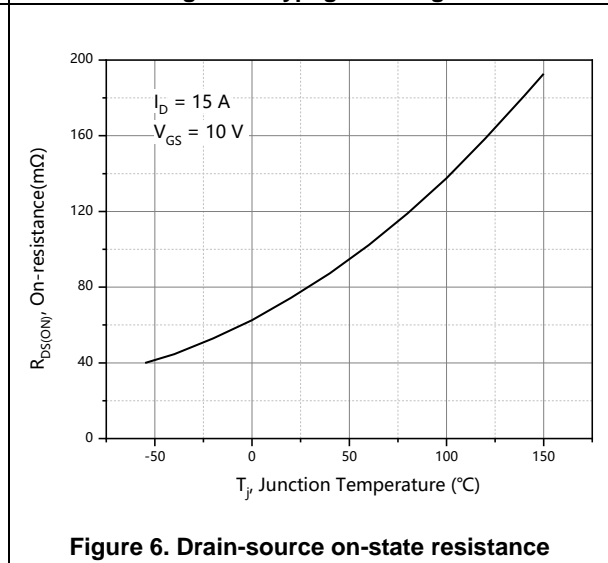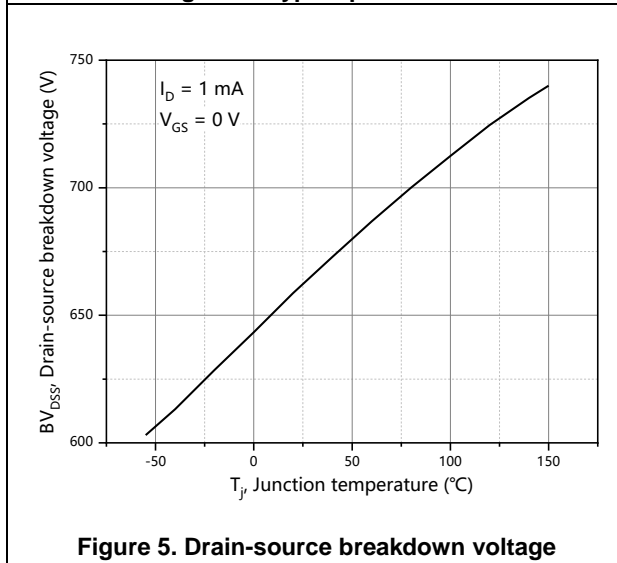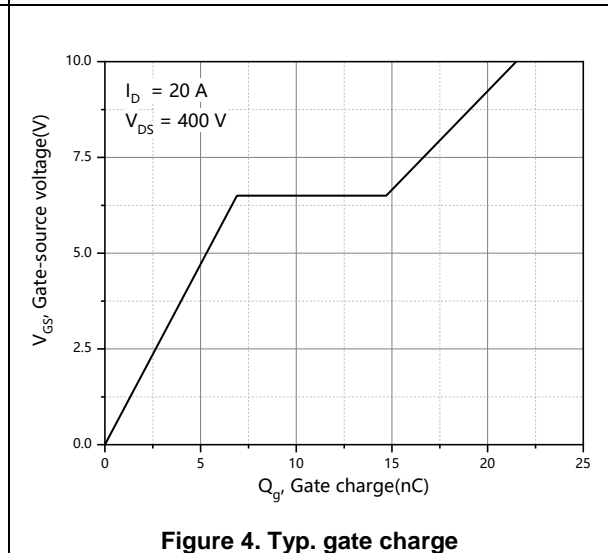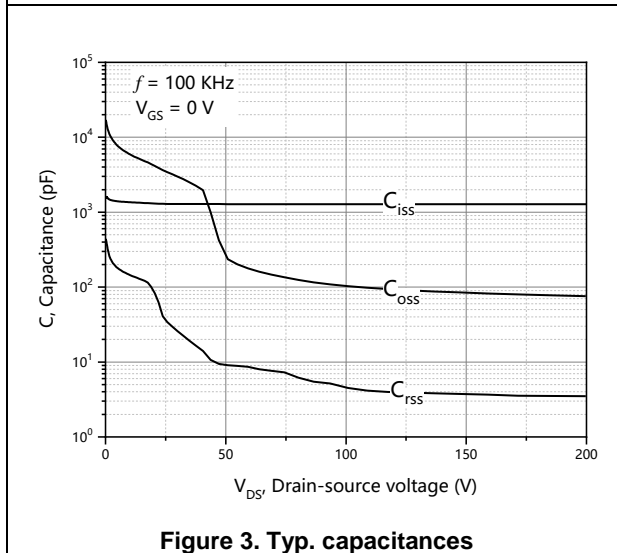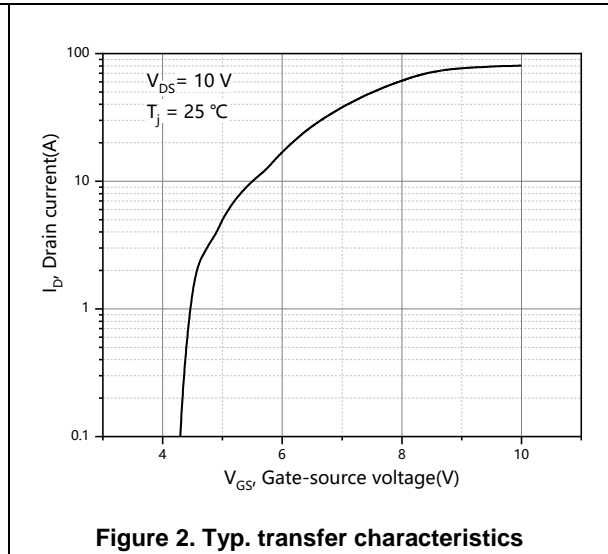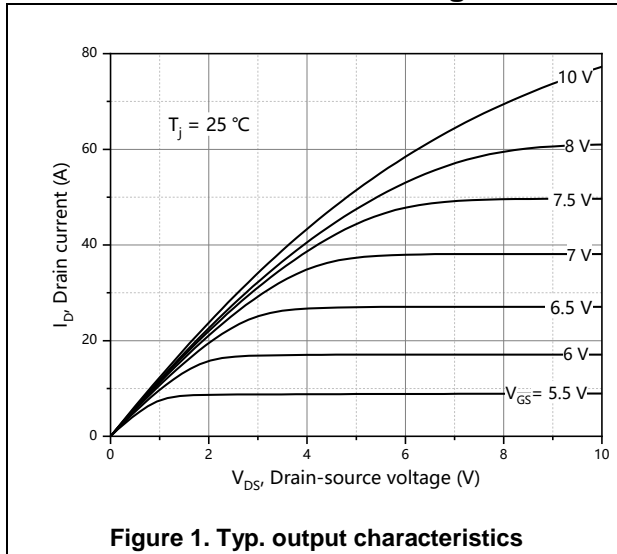
Figure 7. Forward characteristic of body diode
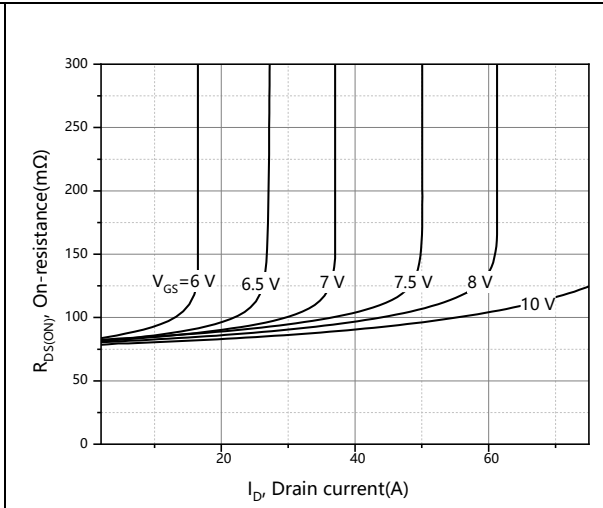
Figure 8. Drain-source on-state resistance
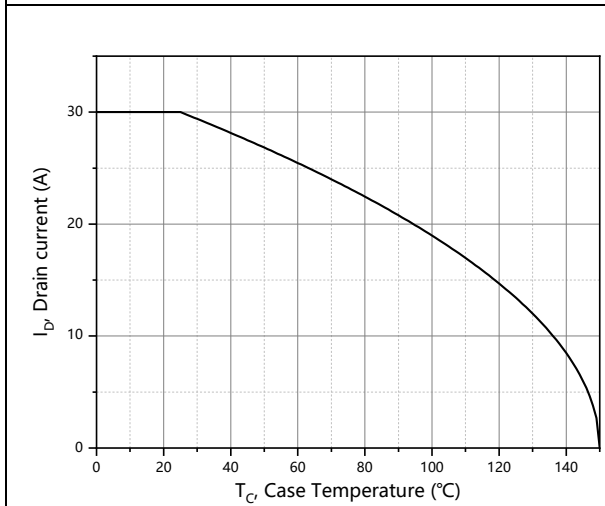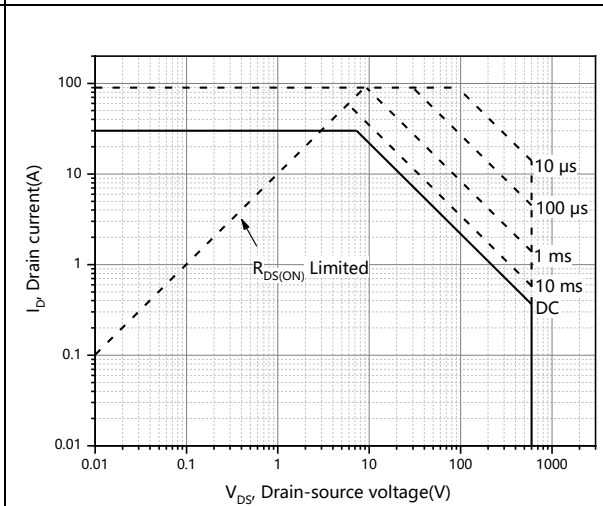
Figure 9. Drain current

Figure 10. Safe operation area T$_C$=25 °C
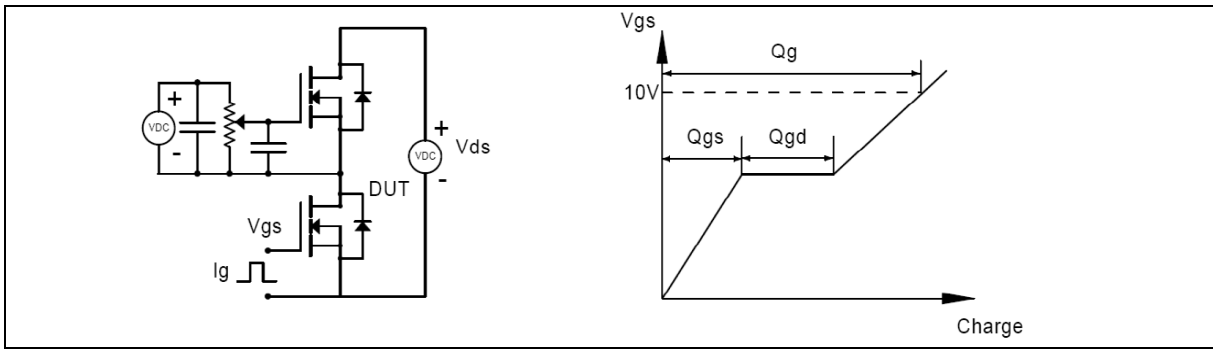
Test circuits and waveforms

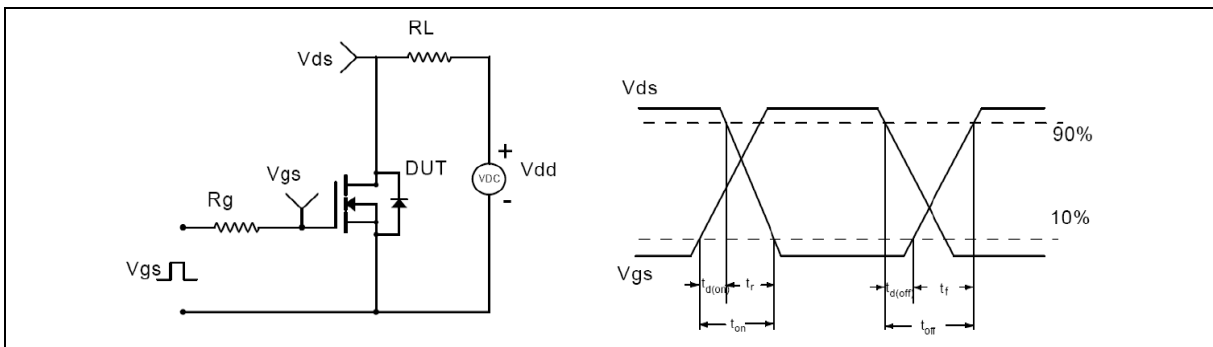**Figure 1. Gate charge test circuit & waveform**

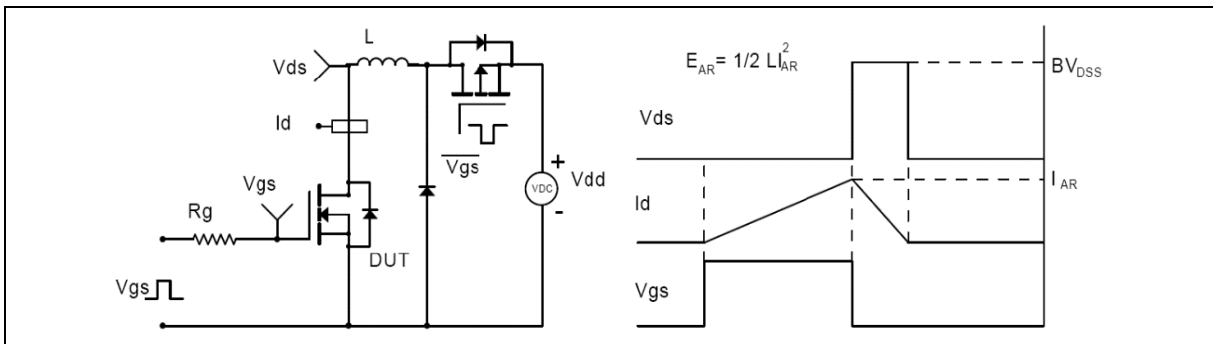**Figure 2. Switching time test circuit & waveforms**

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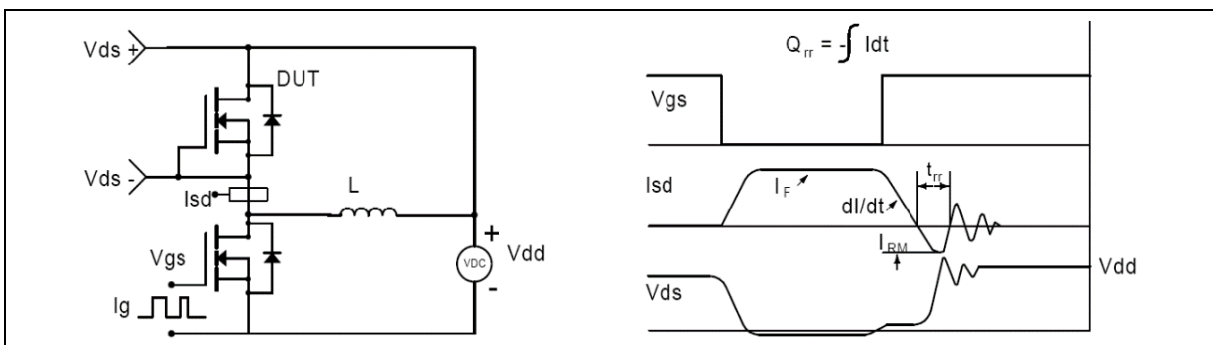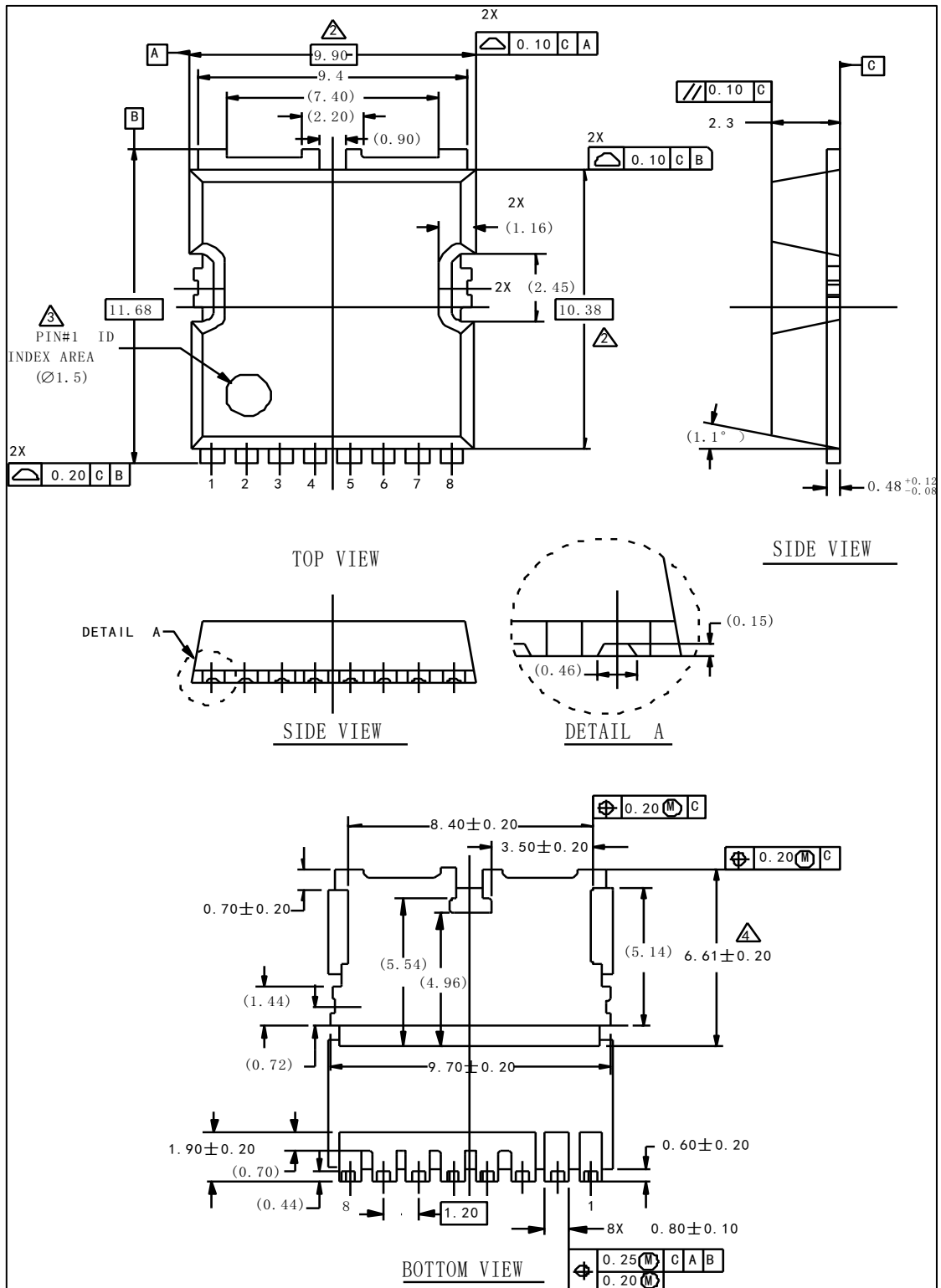

Figure 4. Diode reverse recovery test circuit & waveforms

Package Information

Version 1: TOLL-A package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TOLL-A	2500	1	2500	10	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSS60R099TF	TOLL	yes	yes	yes

Legal Disclaimer

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