

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[®] E series is optimized for its switching characteristics to achieve balance between EMI and efficiency. It is designed to enable power supply systems to reach the highest efficiency while still meeting EMI standards.

Features

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





Applications

- LED lighting
- Charger
- Adapter
- TV power
- Telecom power
- Server power
- Solar/UPS

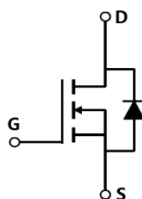
Key Performance Parameters

Parameter	Value	Unit
$V_{DS, min} @ T_{j(max)}$	700	V
$I_{D, pulse}$	36	A
$R_{DS(ON), max} @ V_{GS}=10V$	360	m Ω
Q_g	18.8	nC

Marking Information

Product Name	Package	Marking
OSG65R360DEF	TO252	OSG65R360DE

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	12	A
Continuous drain current ¹⁾ , $T_C=100^\circ\text{C}$		7.6	
Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	36	A
Continuous diode forward current ¹⁾ , $T_C=25^\circ\text{C}$	I_S	12	A
Diode pulsed current ²⁾ , $T_C=25^\circ\text{C}$	$I_{S, pulse}$	36	A
Power dissipation ³⁾ , $T_C=25^\circ\text{C}$	P_D	83	W
Single pulsed avalanche energy ⁵⁾	E_{AS}	216	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\dots 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots 480\text{ V}$, $I_{SD}\leq I_D$	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	$R_{\theta JC}$	1.51	$^\circ\text{C/W}$
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	$V_{GS}=0\text{ V}$, $I_D=250\ \mu\text{A}$
		700				$V_{GS}=0\text{ V}$, $I_D=250\ \mu\text{A}$, $T_j=150^\circ\text{C}$
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}$, $I_D=250\ \mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		0.30	0.36	Ω	$V_{GS}=10\text{ V}$, $I_D=3\text{ A}$
			0.77			$V_{GS}=10\text{ V}$, $I_D=3\text{ A}$, $T_j=150^\circ\text{C}$
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		30		Ω	$f=1\text{ MHz}$, Open drain

Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		901		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		52		pF	
Reverse transfer capacitance	C_{rss}		0.9		pF	
Effective output capacitance, energy related	$C_{o(er)}$		31.2		pF	$V_{GS}=0\text{ V}$, $V_{DS}=0\text{ V}-400\text{ V}$
Effective output capacitance, time related	$C_{o(tr)}$		160		pF	
Turn-on delay time	$t_{d(on)}$		30.4		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\ \Omega$, $I_D=8\text{ A}$
Rise time	t_r		24.8		ns	
Turn-off delay time	$t_{d(off)}$		59.6		ns	
Fall time	t_f		15		ns	

Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		18.7		nC	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $I_D=8\text{ A}$
Gate-source charge	Q_{gs}		6.4		nC	
Gate-drain charge	Q_{gd}		5.7		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	$I_S=12\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		257		ns	$V_R=400\text{ V}$, $I_S=8\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		2.6		μC	
Peak reverse recovery current	I_{rrm}		18		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 square 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

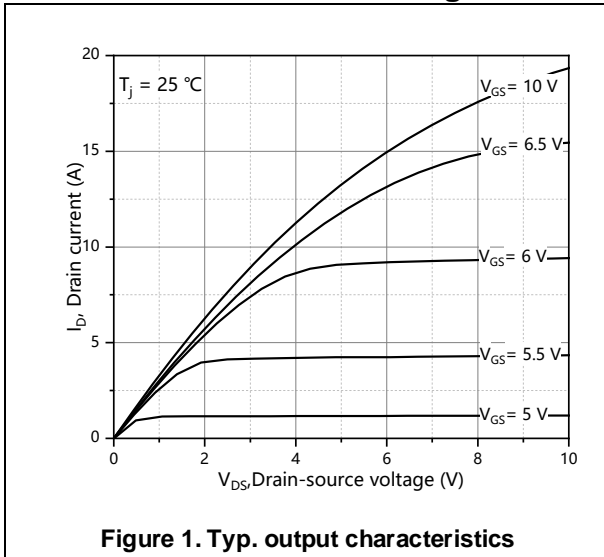


Figure 1. Typ. output characteristics

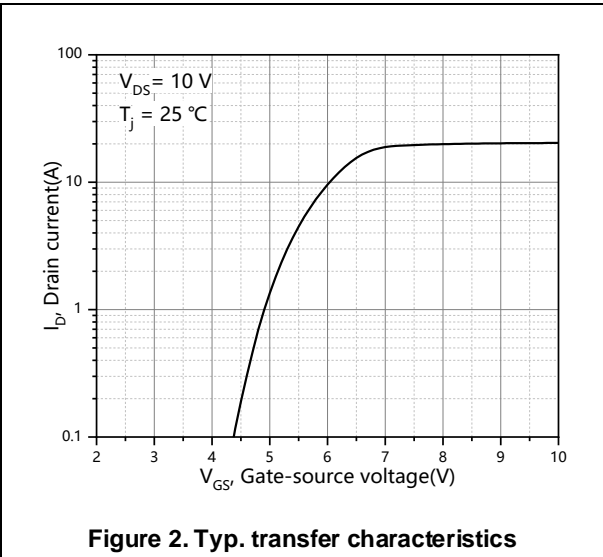


Figure 2. Typ. transfer characteristics

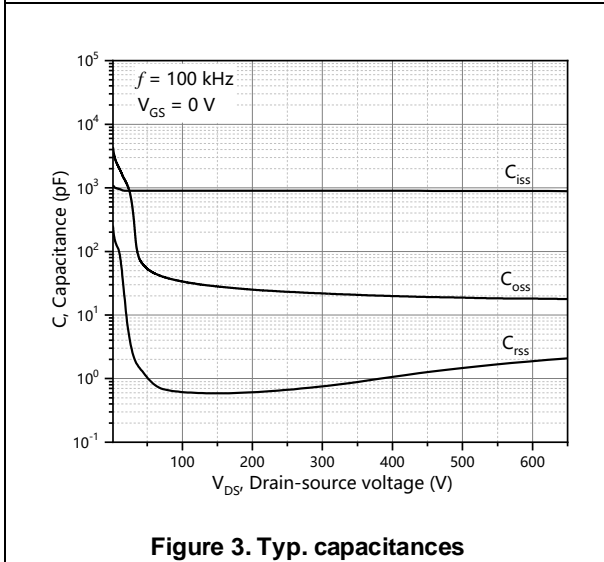


Figure 3. Typ. capacitances

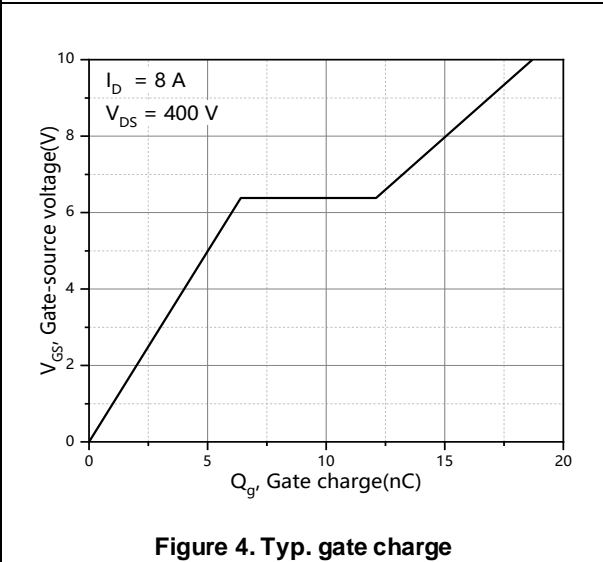


Figure 4. Typ. gate charge

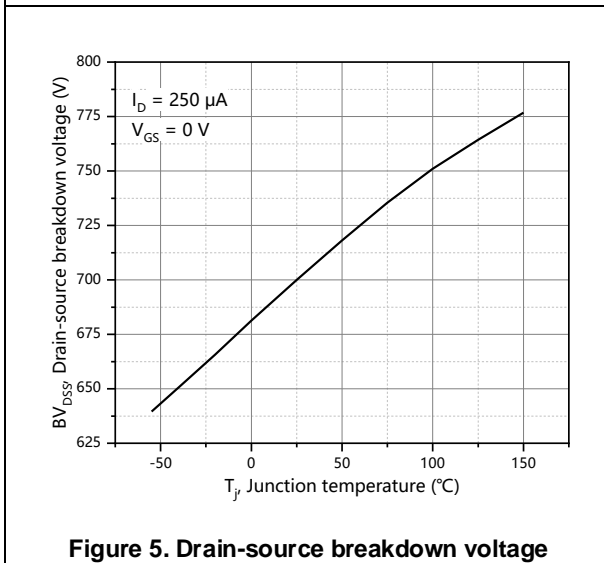


Figure 5. Drain-source breakdown voltage

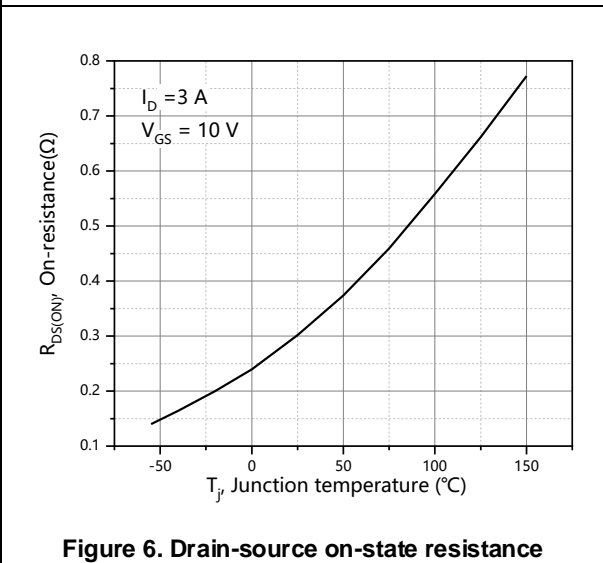
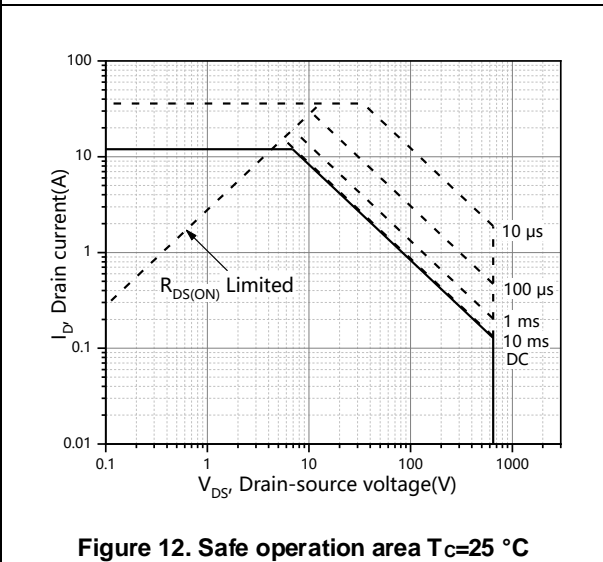
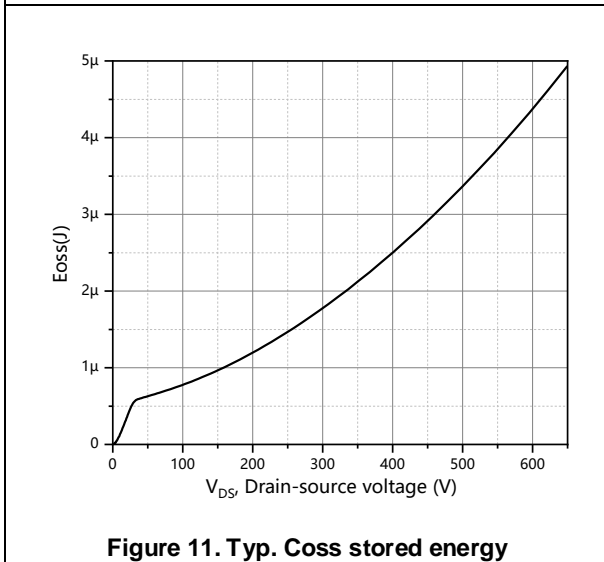
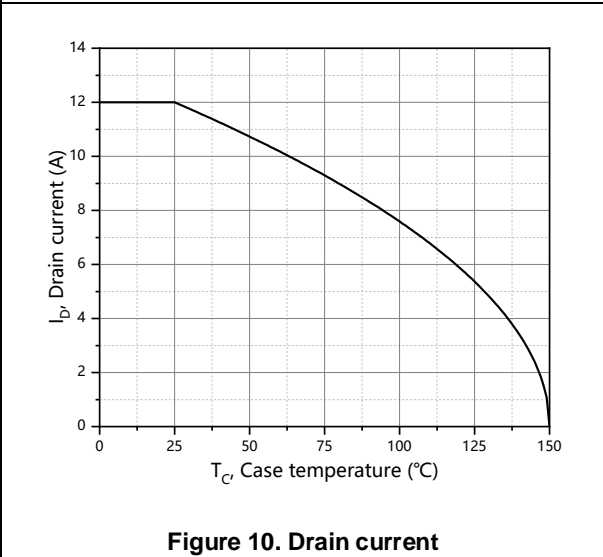
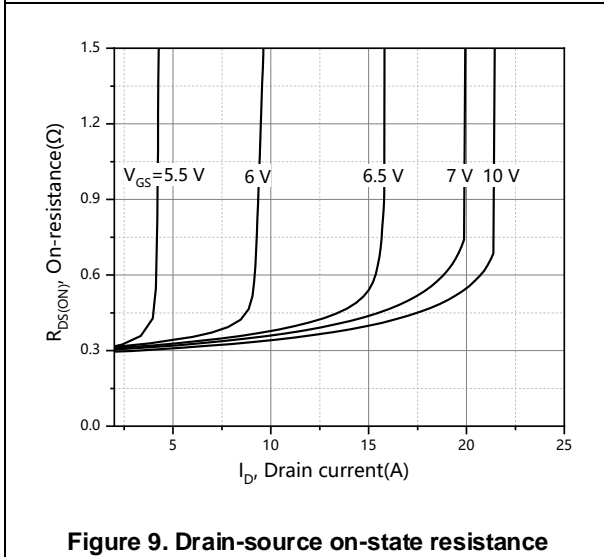
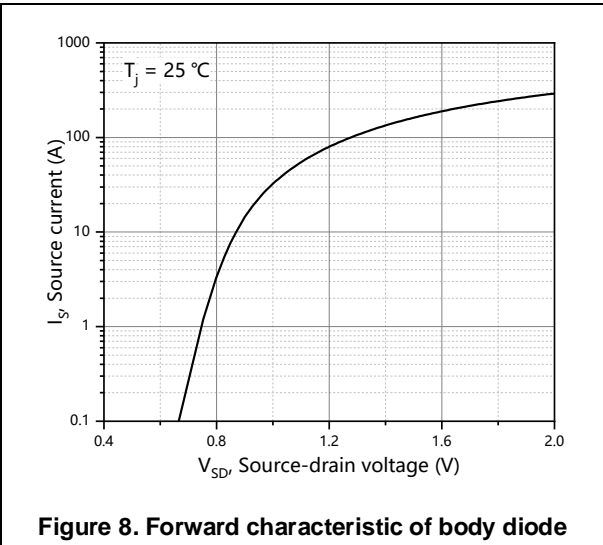
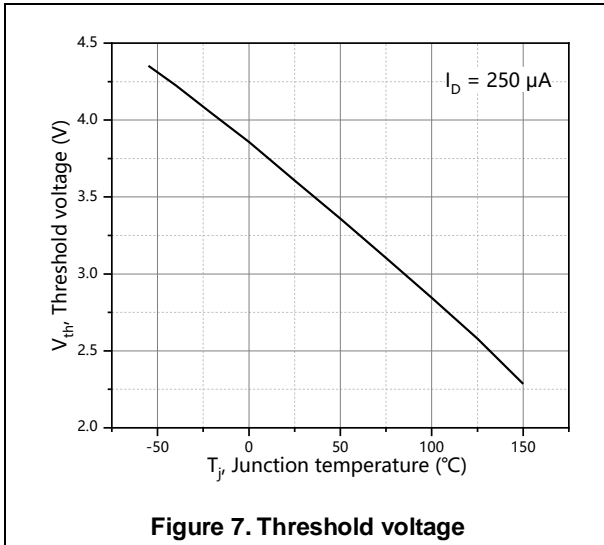


Figure 6. Drain-source on-state resistance



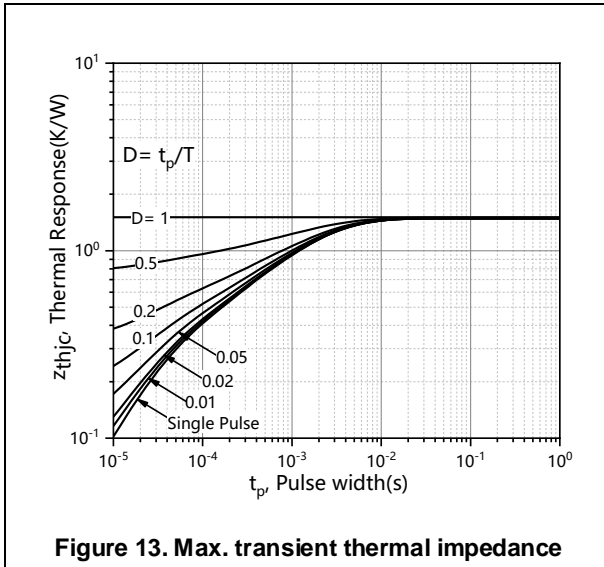


Figure 13. Max. transient thermal impedance

Test circuits and waveforms

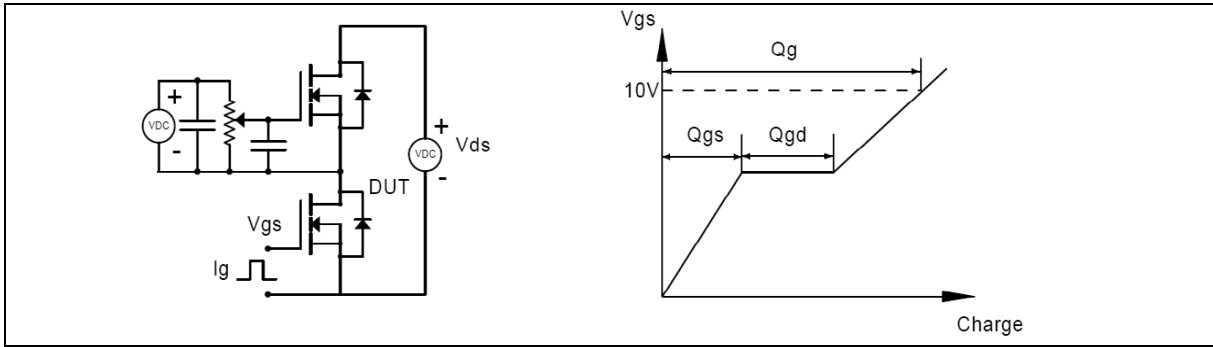


Figure 1. Gate charge test circuit & waveform

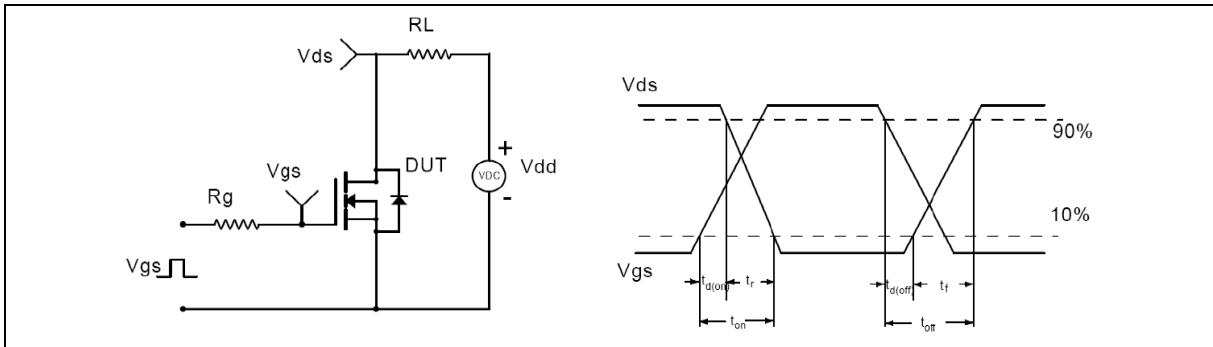


Figure 2. Switching time test circuit & waveforms

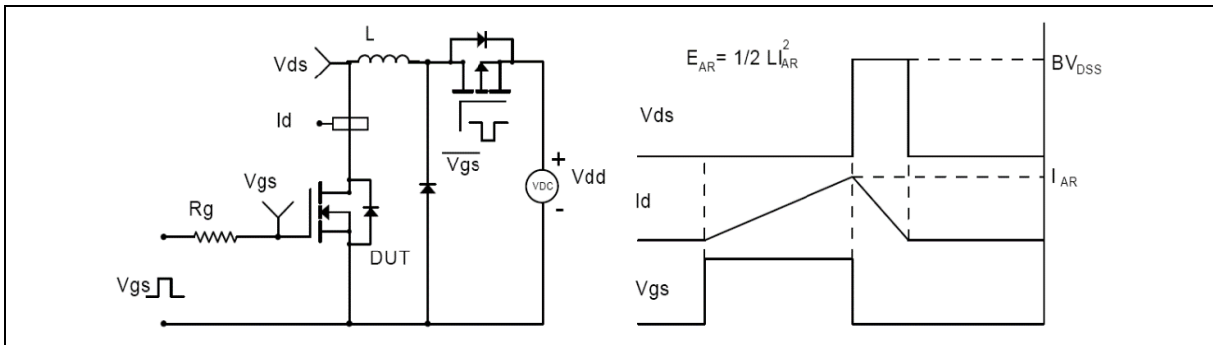


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

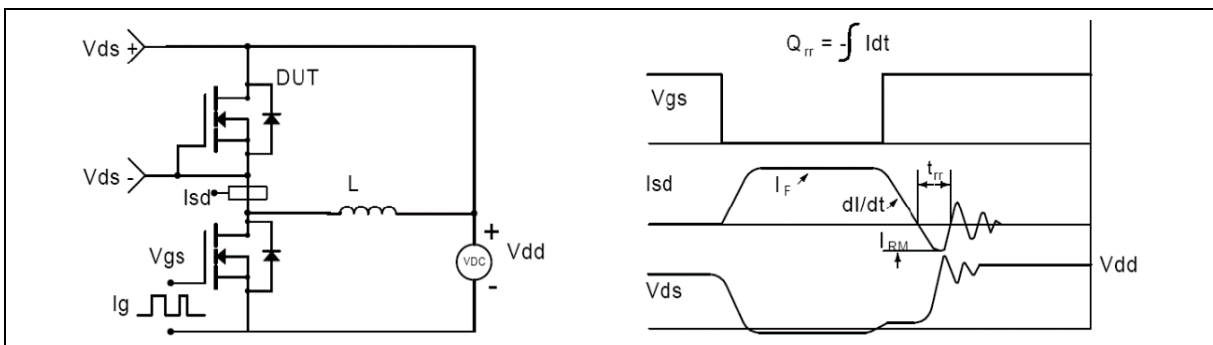
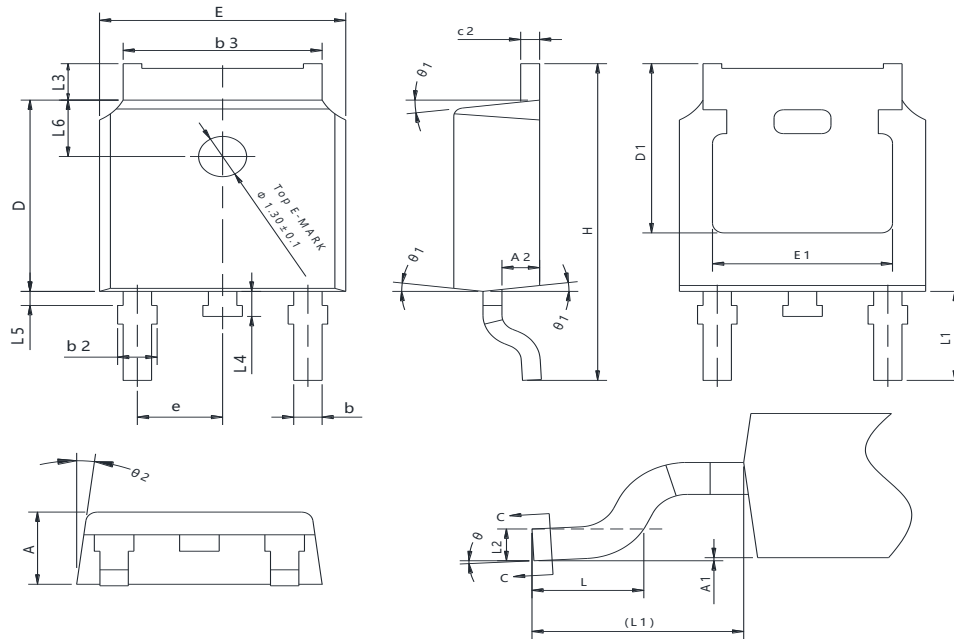


Figure 4. Diode reverse recovery test circuit & waveforms

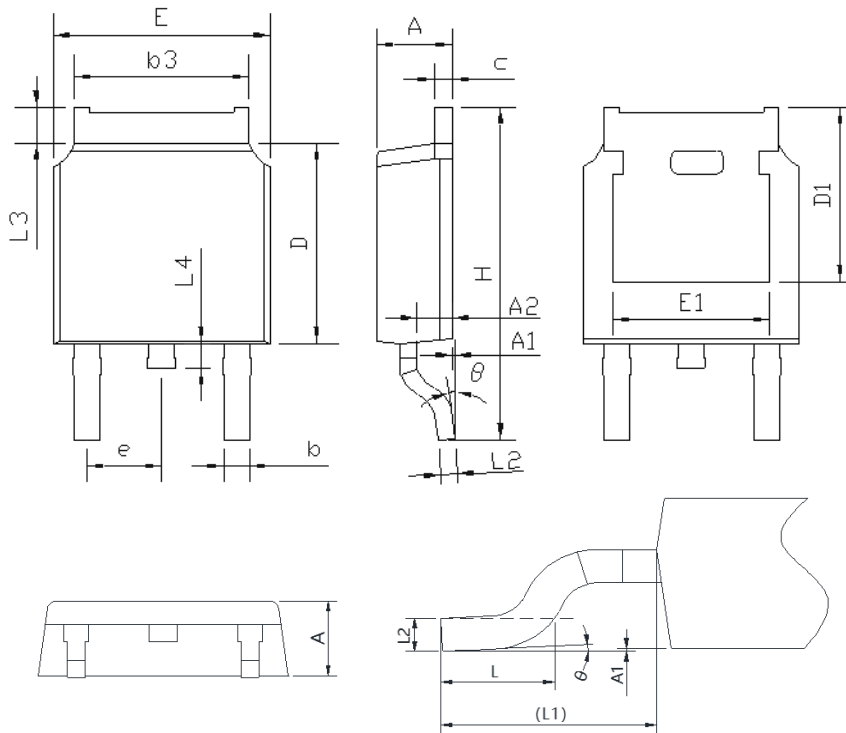
Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	0.47	-	0.60
D	6.00	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80 REF		
θ	0°	-	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

Version 1: TO252-J package outline dimension

Package Information



Symbol	mm		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30 REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286 BSC		
H	9.40	10.10	10.50
L	1.38	1.50	1.75
L1	2.90 REF		
L2	0.51 BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
θ	0°	-	8°

Version 2: TO252-P package outline dimension

Ordering Information

Package Type	Units/ Reel	Reels/ Inner Box	Units/ Inner Box	Inner Boxes/ Carton Box	Units/ Carton Box
TO252-J	2500	2	5000	5	25000
TO252-P	2500	2	5000	5	25000

Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R360DEF	TO252	yes	yes	yes

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