

# Enhancement Mode N-Channel Power MOSFET

## Features

- ◆ Low  $R_{DS(on)}$  & FOM
- ◆ Extremely low switching loss
- ◆ Excellent stability and uniformity
- ◆ Easy to drive

## Applications

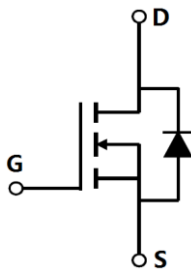

- ◆ Lighting
- ◆ Hard switching PWM
- ◆ Server power supply
- ◆ Charger

## ■ General Description

OSG70R900DTF uses advanced GreenMOS™ technology to provide low  $R_{DS(ON)}$ , low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for active power factor correction and switching mode power supply applications.

◆ $V_{DS, min@T_{jmax}}$	750 V
◆ $I_{D, pulse}$	13.5 A
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	900 mΩ
◆ $Q_g$	7.9 nC

## ■ Schematic and Package Information

Schematic Diagram	Pin Assignment Top View
	 <p><b>TO252</b> <b>OSG70R900DTF</b></p>

## ■ Absolute Maximum Ratings at $T_j=25^{\circ}C$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	$V_{DS}$	700	V
Gate source voltage	$V_{GS}$	±30	V
Continuous drain current <sup>1)</sup> , $T_C=25^{\circ}C$	$I_D$	4.5	A
Continuous drain current <sup>1)</sup> , $T_C=100^{\circ}C$		2.9	
Pulsed drain current <sup>2)</sup> , $T_C=25^{\circ}C$	$I_{D, pulse}$	13.5	A
Continuous diode forward current <sup>1)</sup> , $T_C=25^{\circ}C$	$I_S$	4.5	A
Diode pulsed current <sup>2)</sup> , $T_C=25^{\circ}C$	$I_{S, pulse}$	13.5	A
Power dissipation <sup>3)</sup> , $T_C=25^{\circ}C$	$P_D$	32	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	90	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	$R_{\theta JC}$	3.91	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$

## ■ Electrical Characteristics at $T_j=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	700			V	$V_{GS}=0\text{ V}$ , $I_D=250\ \mu\text{A}$
		750				$V_{GS}=0\text{ V}$ , $I_D=250\ \mu\text{A}$ , $T_j=150^{\circ}\text{C}$
Gate threshold voltage	$V_{GS(th)}$	3.0		4.0	V	$V_{DS}=V_{GS}$ , $I_D=250\ \mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		0.77	0.90	$\Omega$	$V_{GS}=10\text{ V}$ , $I_D=2\text{ A}$
			2.0			$V_{GS}=10\text{ V}$ , $I_D=2\text{ A}$ , $T_j=150^{\circ}\text{C}$
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	$\mu\text{A}$	$V_{DS}=700\text{ V}$ , $V_{GS}=0\text{ V}$
Gate resistance	$R_G$		49.6		$\Omega$	$f=1\text{ MHz}$ , Open drain

## ■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	$C_{iss}$		328		pF	$V_{GS}=0\text{ V}$ , $V_{DS}=50\text{ V}$ , $f=100\text{ KHz}$
Output capacitance	$C_{oss}$		24.4		pF	
Reverse transfer capacitance	$C_{rss}$		1.2		pF	
Turn-on delay time	$t_{d(on)}$		23.5		ns	$V_{GS}=10\text{ V}$ , $V_{DS}=400\text{ V}$ , $R_G=2\ \Omega$ , $I_D=4.5\text{ A}$
Rise time	$t_r$		18		ns	
Turn-off delay time	$t_{d(off)}$		43.5		ns	
Fall time	$t_f$		13		ns	

## ■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	$Q_g$		7.9		nC	$V_{GS}=10\text{ V}$ $V_{DS}=400\text{ V}$ , $I_D=4.5\text{ A}$ ,
Gate-source charge	$Q_{gs}$		2		nC	
Gate-drain charge	$Q_{gd}$		2.9		nC	
Gate plateau voltage	$V_{\text{plateau}}$		6.2		V	

## ■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	$V_{SD}$			1.3	V	$I_S=4.5\text{ A}$ , $V_{GS}=0\text{ V}$
Reverse recovery time	$t_{rr}$		206		ns	$V_R=400\text{ V}$ , $I_S=4.5\text{ A}$ , $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	$Q_{rr}$		1.6		$\mu\text{C}$	
Peak reverse recovery current	$I_{rrm}$		14.6		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)  $V_{DD}=100\text{ V}$ ,  $R_G=50\text{ }\Omega$ ,  $L=79.9\text{ mH}$ , starting  $T_j=25\text{ }^\circ\text{C}$ .

■ **Electrical Characteristics Diagrams**

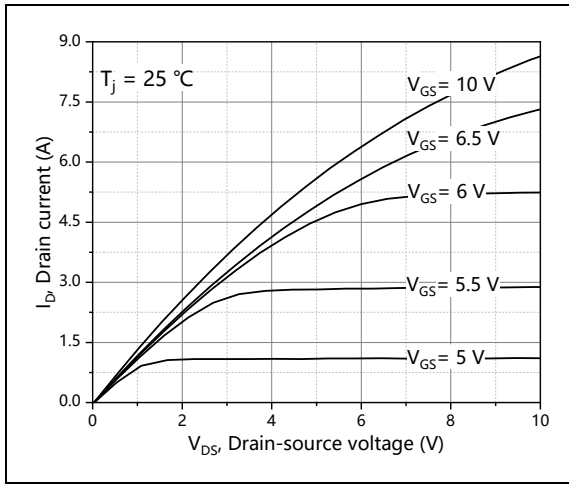


Figure 1, Typ. output characteristics

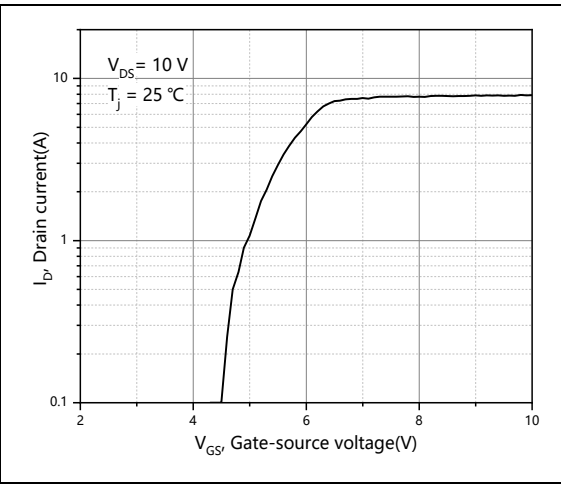


Figure 2, Typ. transfer characteristics

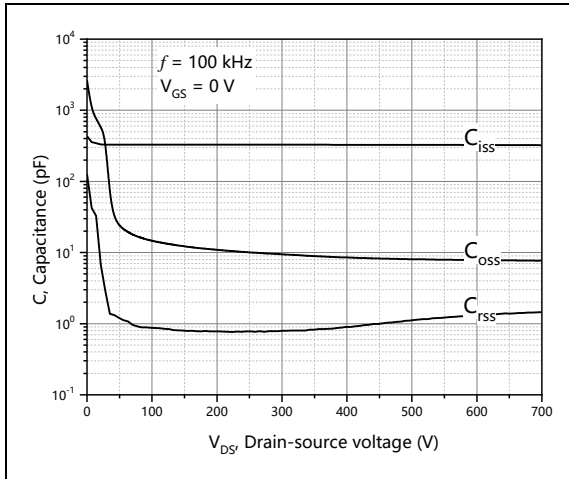


Figure 3, Typ. capacitances

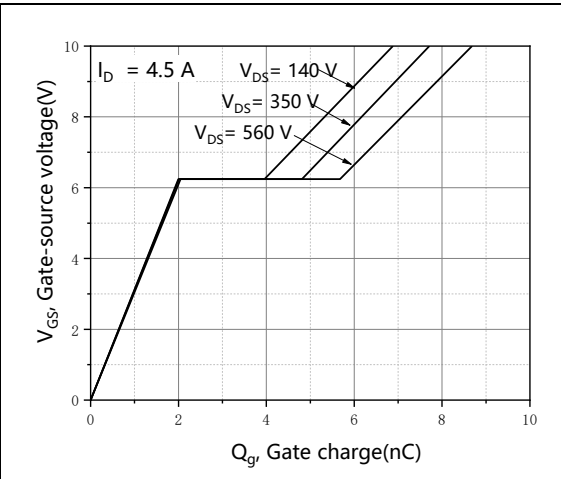


Figure 4, Typ. gate charge

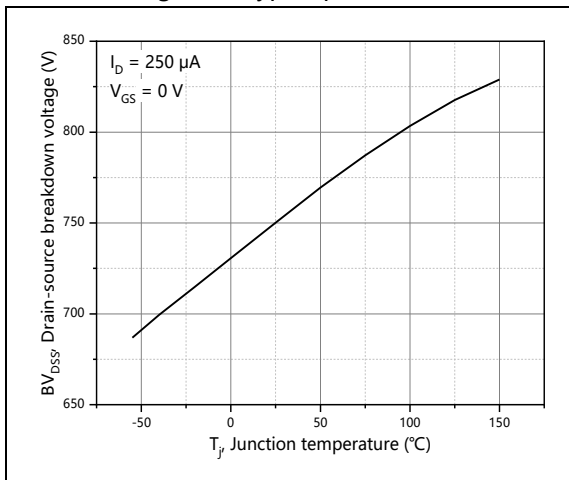


Figure 5, Drain-source breakdown voltage

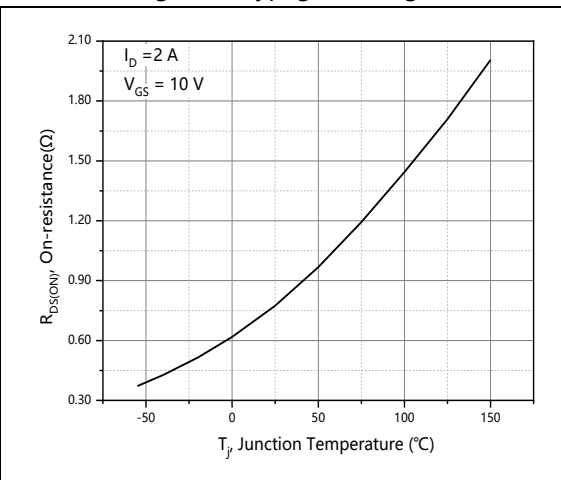


Figure 6, Drain-source on-state resistance

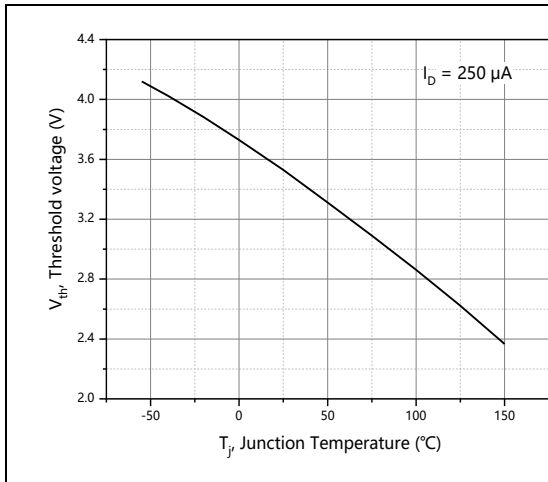


Figure 7, Threshold voltage

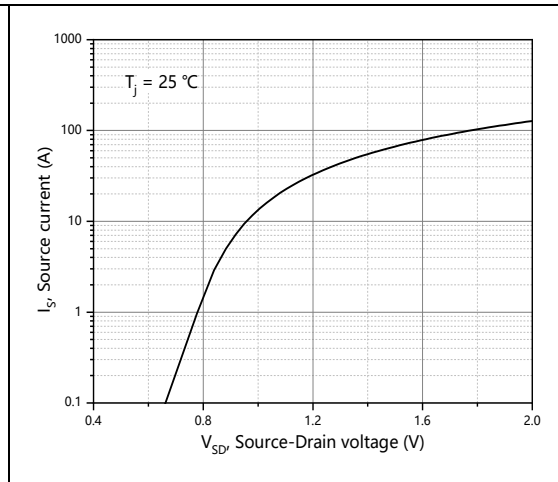


Figure 8, Forward characteristic of body diode

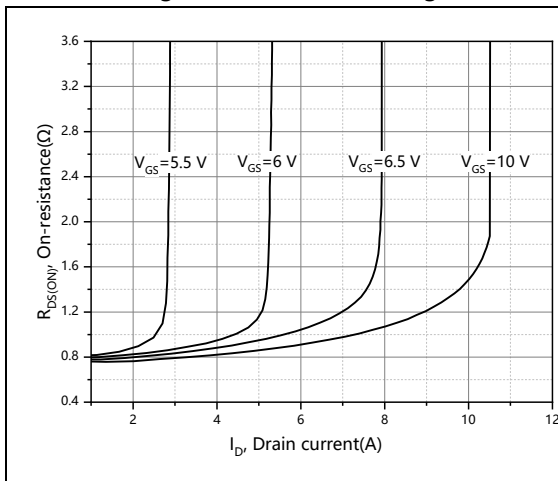


Figure 9, Drain-source on-state resistance

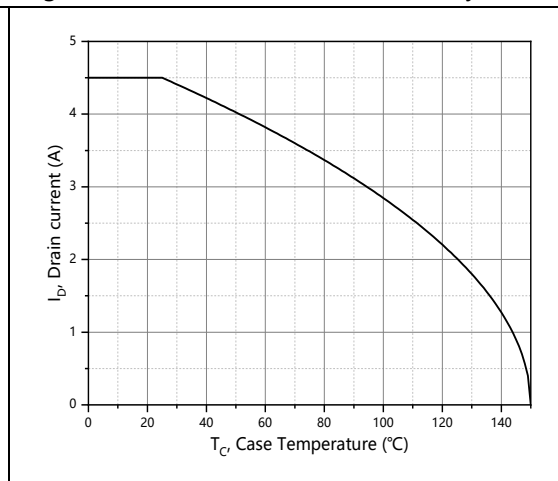


Figure 10, Drain current

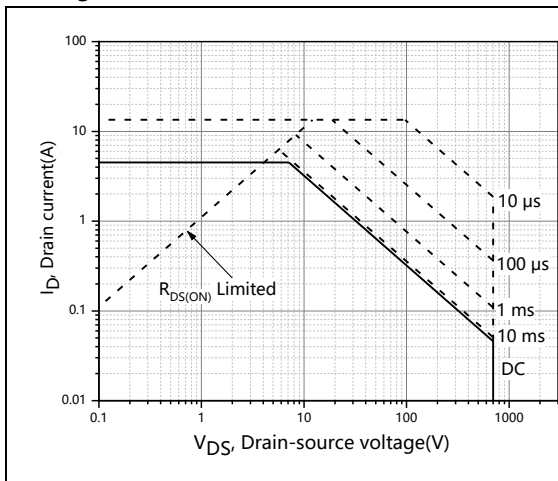


Figure 11, Safe operation area for  $T_C = 25\text{ °C}$

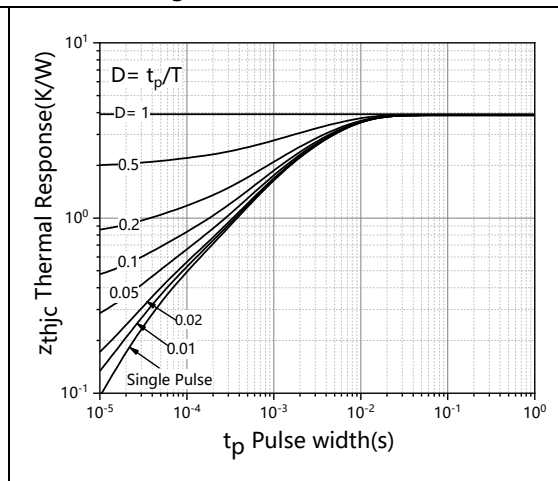
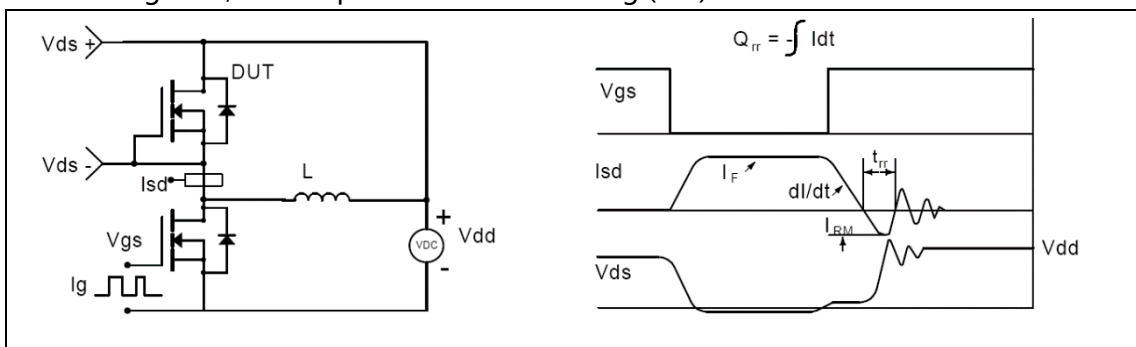
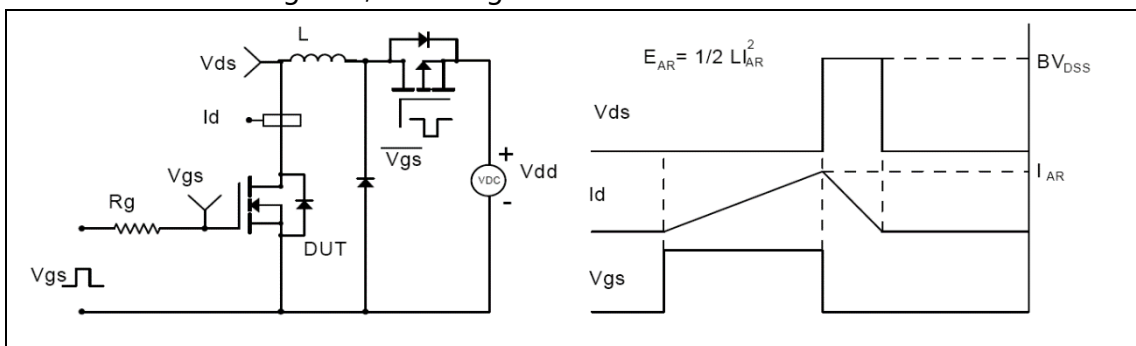
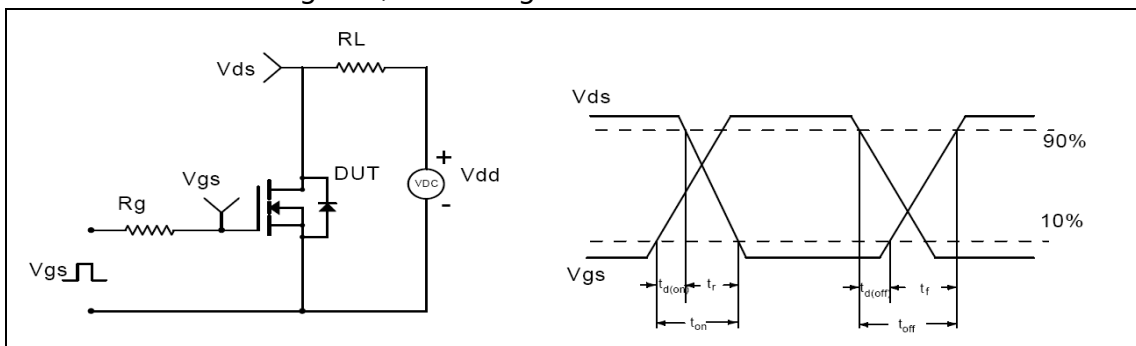
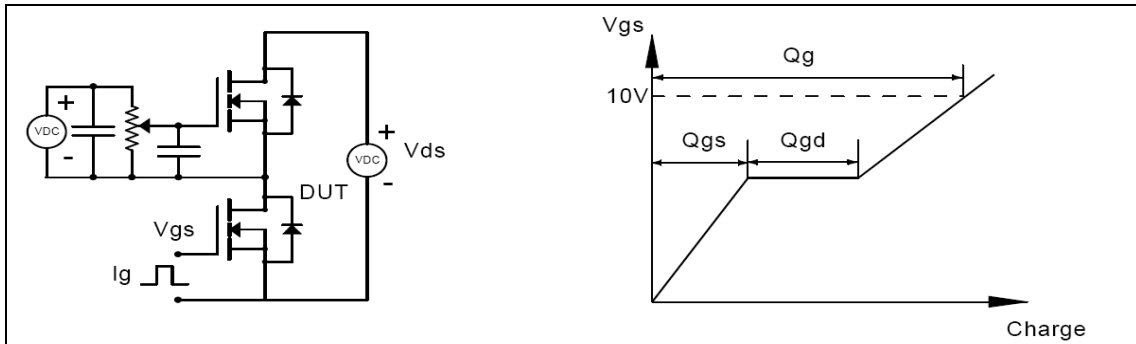


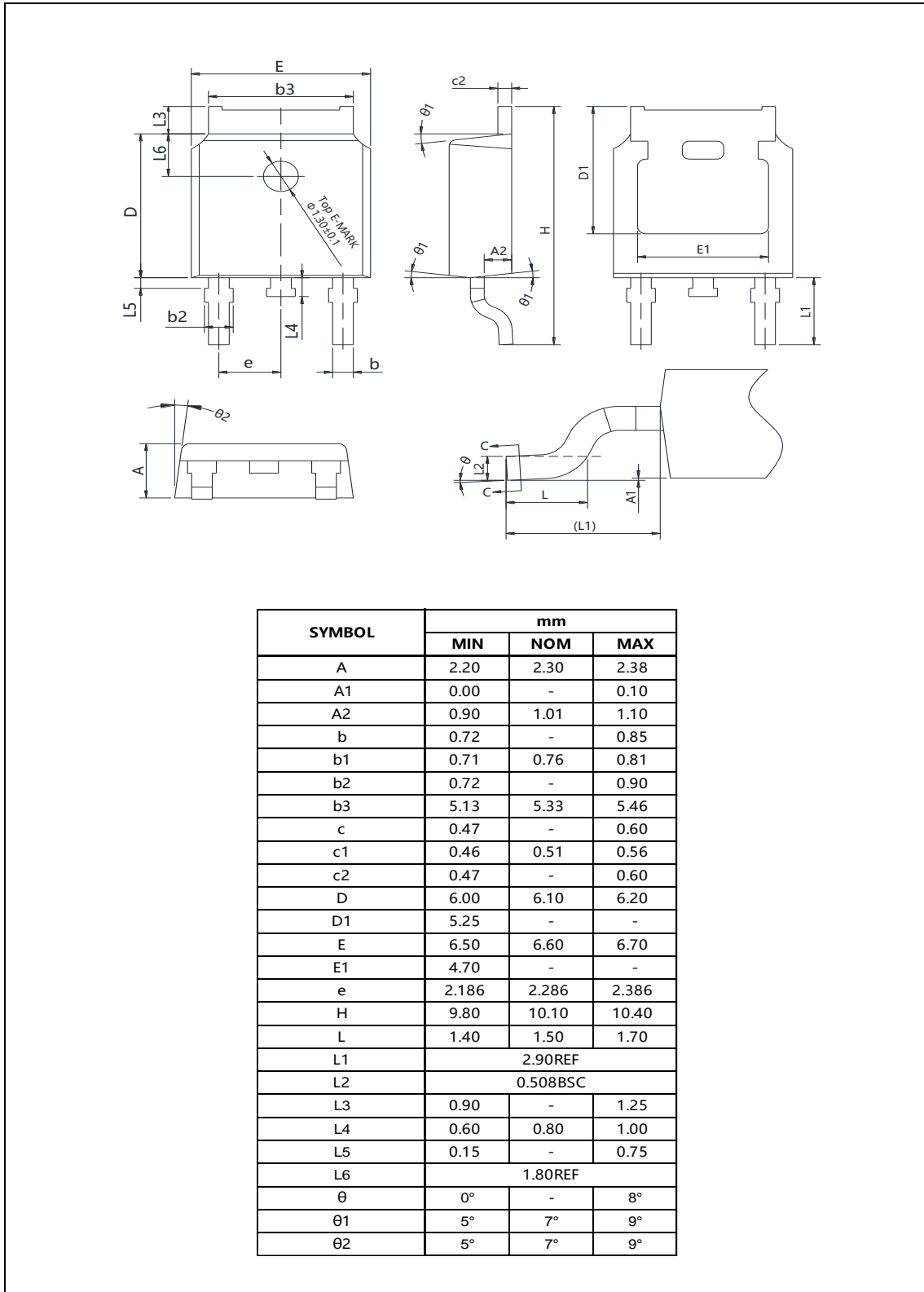
Figure 12, Max. transient thermal impedance

■ Test circuits and waveforms



**■ Package Information**

Figure1, TO252 package outline dimension





---

**■ Ordering Information**

---

Package	Units/Reel	Reels/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO252	2500	2	5000	5	25000

---

**■ Product Information**

---

Product	Package	Pb Free	RoHS	Halogen Free
OSG70R900DTF	TO252	yes	yes	yes