

Enhancement Mode N-Channel Power MOSFET

Features

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

Applications

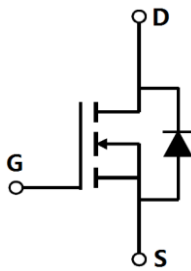

- ◆ Lighting
- ◆ Hard switching PWM
- ◆ Server power supply
- ◆ Charger

■ General Description

OSS70R350DF 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
◆ $I_{D, pulse}$	36 A
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	350 mΩ
◆ Q_g	9.8 nC

■ Schematic and Package Information

Schematic Diagram	Pin Assignment Top View
	 <p>TO252 OSS70R350DF</p>

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

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	700	V
Gate source voltage	V_{GS}	±30	V
Continuous drain current 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}	160	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\dots480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\dots480\text{ V}$, $I_{SD}\leq I_D$	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	$R_{\theta JC}$	1.51	$^{\circ}C/W$
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	62	$^{\circ}C/W$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	700			V	$V_{GS}=0V, I_D=250\mu A$
		750				$V_{GS}=0V, I_D=250\mu A, T_j=150^{\circ}C$
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Drain-source on-state resistance	$R_{DS(on)}$		0.29	0.35	Ω	$V_{GS}=10V, I_D=6A$
			0.75			$V_{GS}=10V, I_D=6A, T_j=150^{\circ}C$
Gate-source leakage current	I_{GSS}			100	nA	$V_{GS}=30V$
				-100		$V_{GS}=-30V$
Drain-source leakage current	I_{DSS}			1	μA	$V_{DS}=700V, V_{GS}=0V$
Gate resistance	R_G		33.3		Ω	$f=1MHz, \text{Open drain}$

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		449		pF	$V_{GS}=0V, V_{DS}=50V, f=100KHz$
Output capacitance	C_{oss}		61.6		pF	
Reverse transfer capacitance	C_{rss}		3.1		pF	
Turn-on delay time	$t_{d(on)}$		24.7		ns	$V_{GS}=10V, V_{DS}=400V, R_G=2\Omega, I_D=6A$
Rise time	t_r		28		ns	
Turn-off delay time	$t_{d(off)}$		44.2		ns	
Fall time	t_f		18.4		ns	

■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		9.8		nC	$V_{GS}=10\text{ V}$ $V_{DS}=400\text{ V}$, $I_D=6\text{ A}$,
Gate-source charge	Q_{gs}		4.5		nC	
Gate-drain charge	Q_{gd}		1.5		nC	
Gate plateau voltage	V_{plateau}		6.2		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=12\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		251		ns	$V_R=400\text{ V}$, $I_S=6\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		2.4		μC	
Peak reverse recovery current	I_{rrm}		19.1		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**

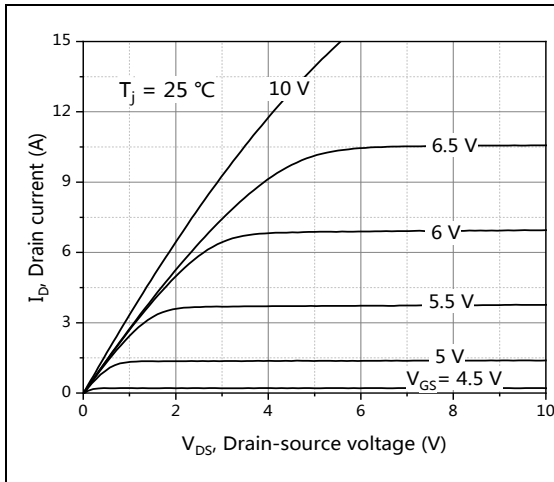


Figure 1, Typ. output characteristics

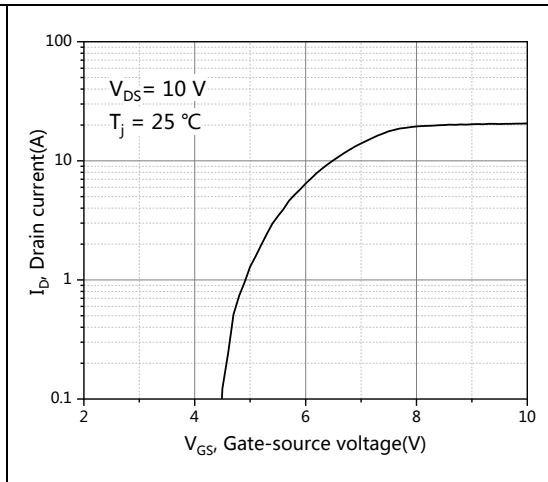


Figure 2, Typ. transfer characteristics

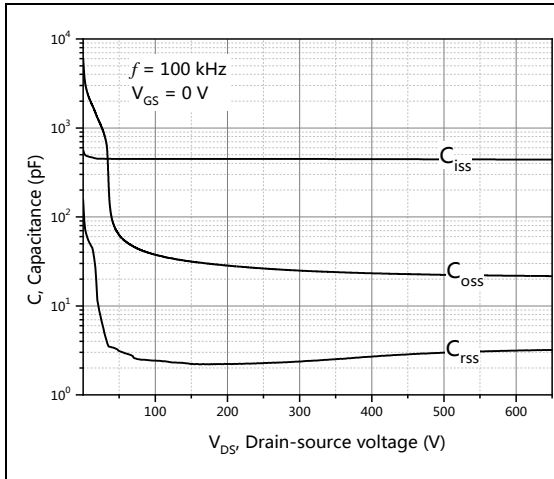


Figure 3, Typ. capacitances

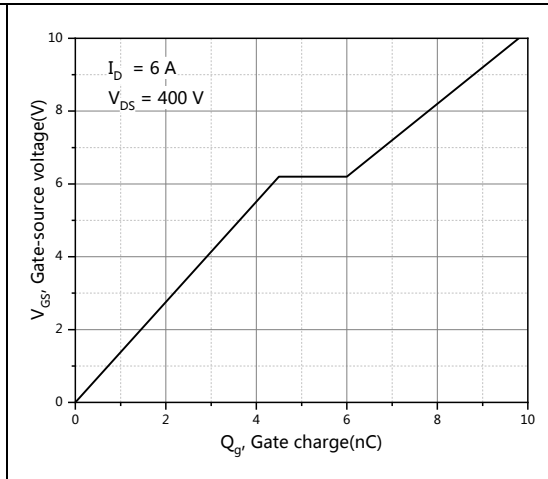


Figure 4, Typ. gate charge

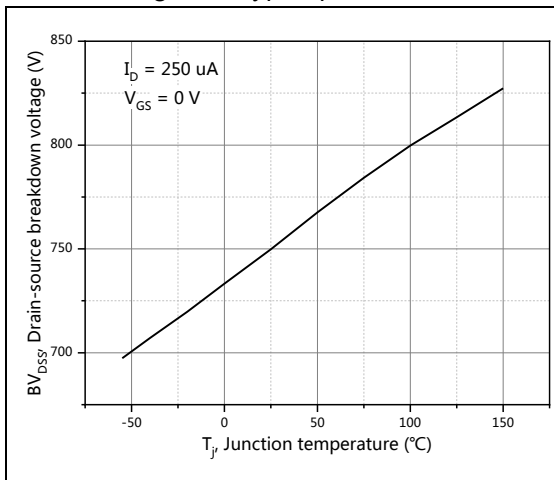


Figure 5, Drain-source breakdown voltage

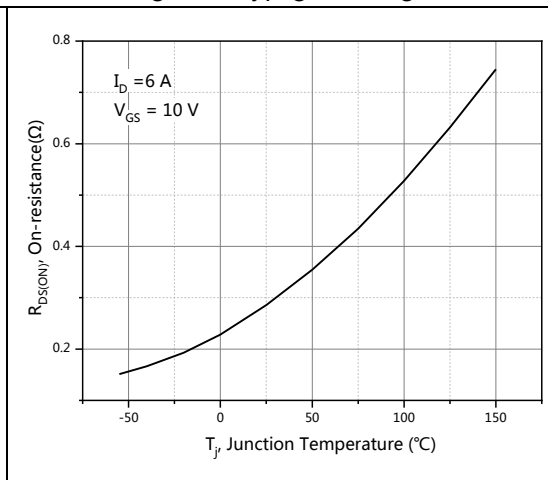


Figure 6, Drain-source on-state resistance

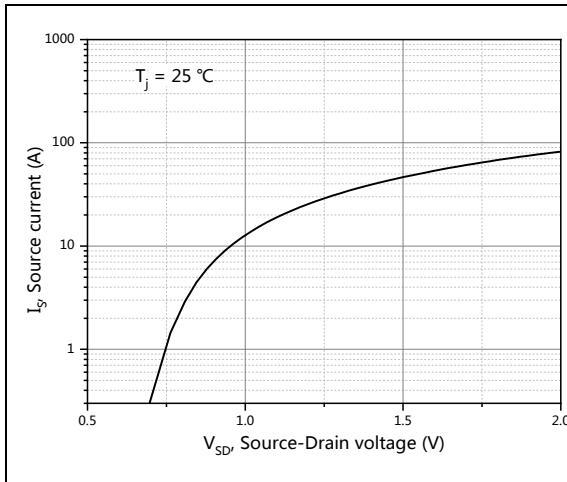


Figure 7, Forward characteristic of body diode

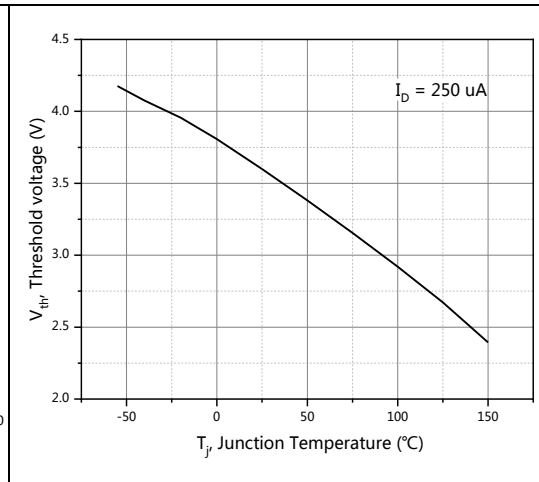


Figure 8, Threshold voltage

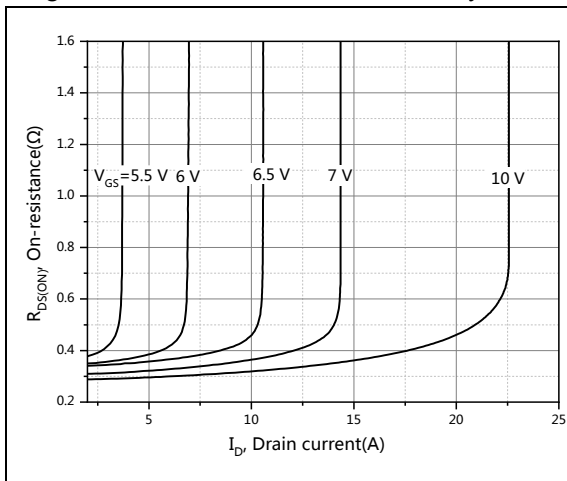


Figure 9, Drain-source on-state resistance

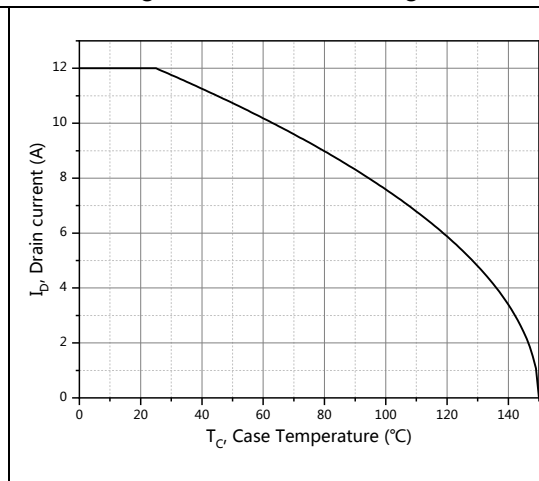


Figure 10, Drain current

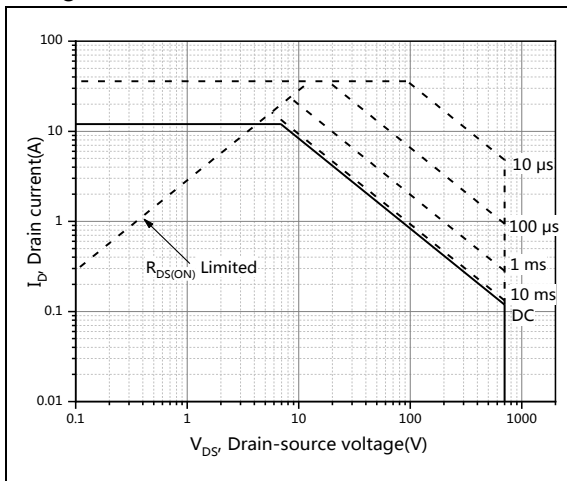


Figure 11, Safe operation area $T_C=25\text{ }^\circ\text{C}$

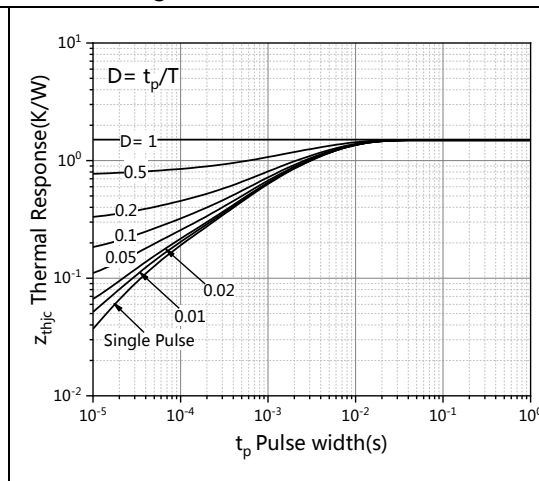


Figure 12, Max. transient thermal impedance

■ Test circuits and waveforms

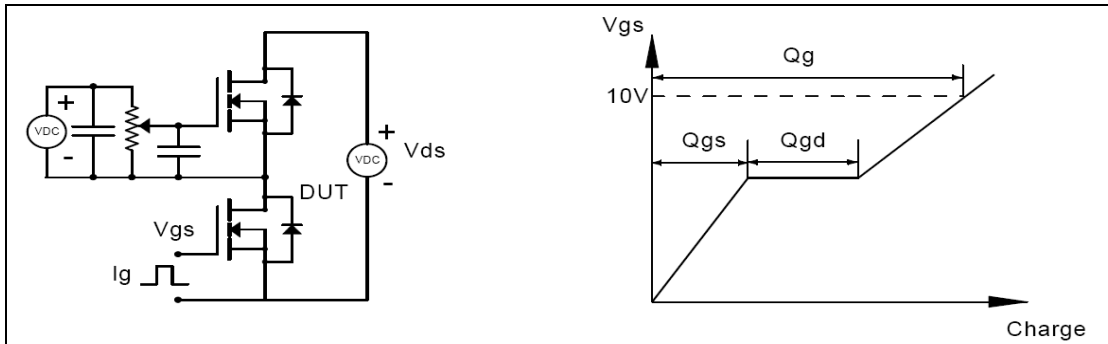


Figure 1, Gate charge test circuit & waveform

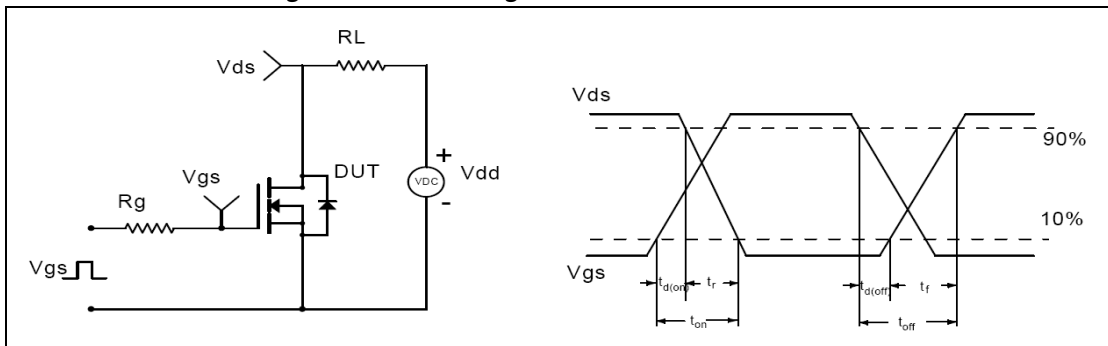


Figure 2, Switching time test circuit & waveforms

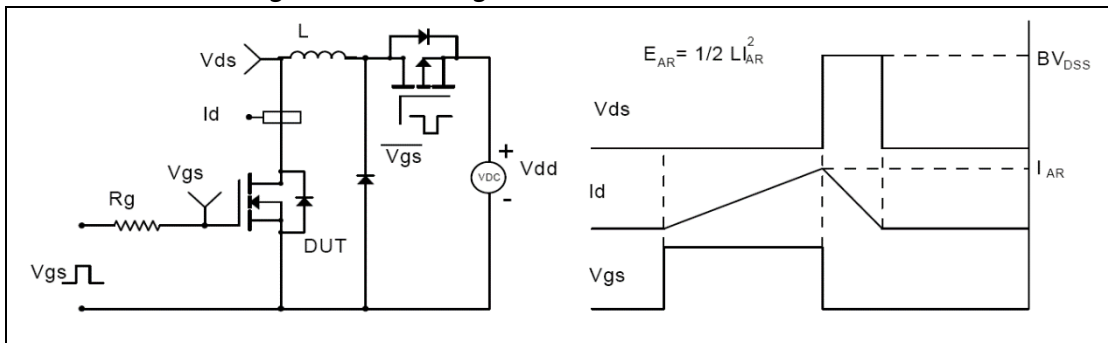


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

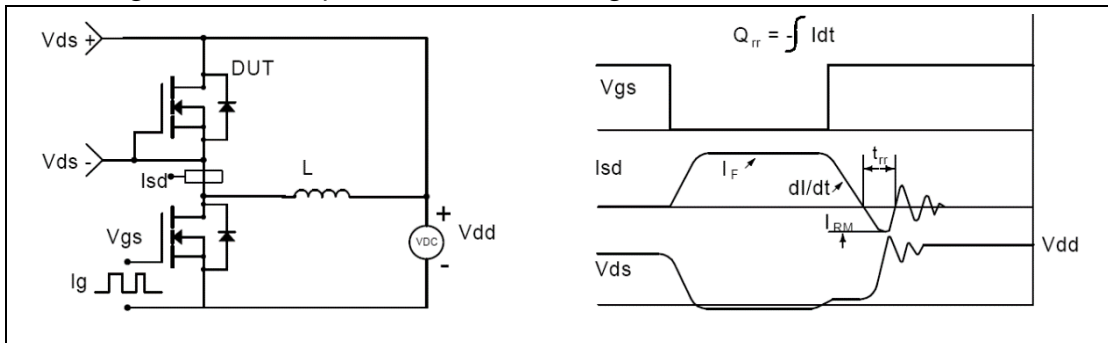
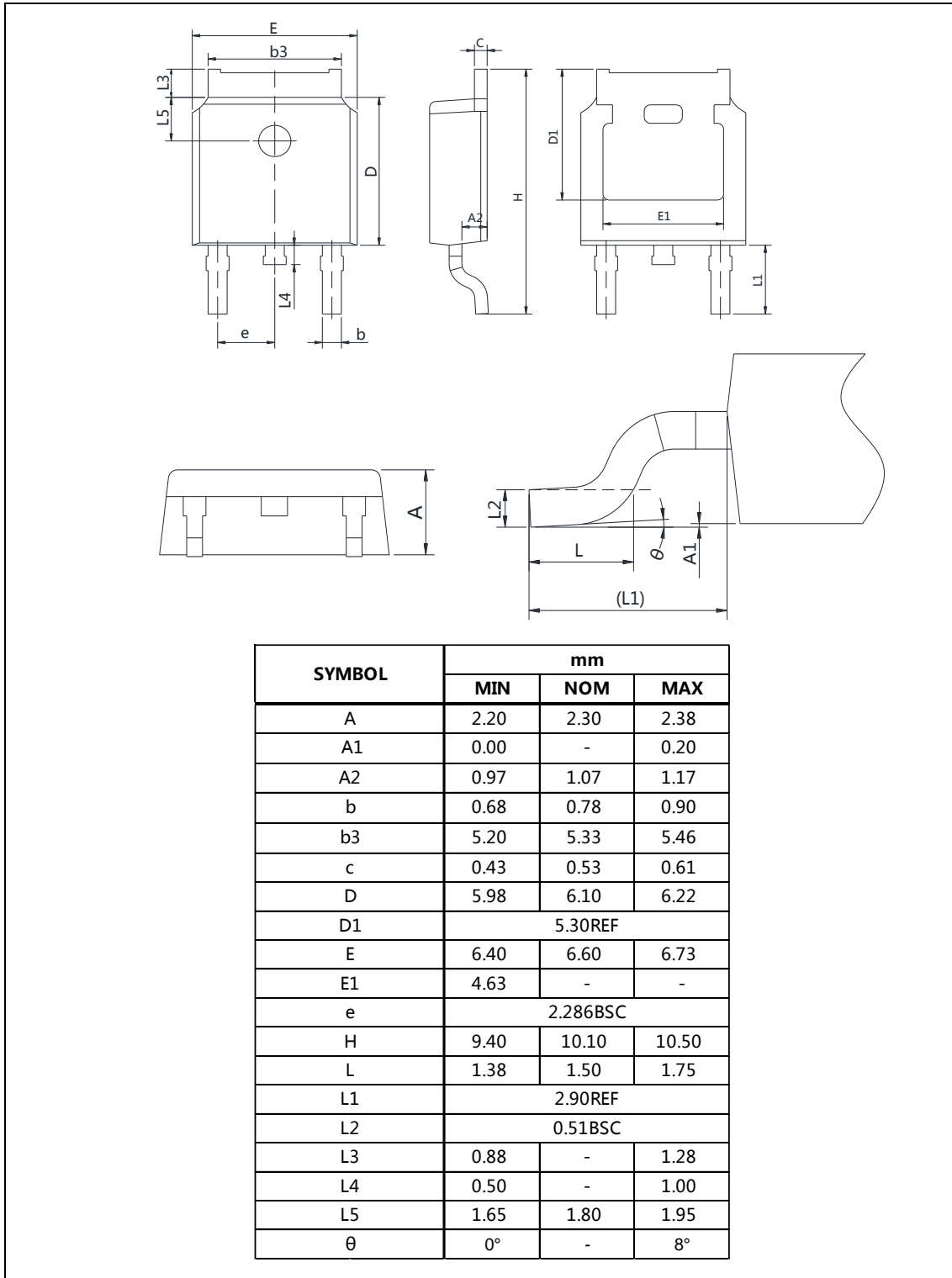


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, TO252 package outline dimension



■ Ordering Information

Package	Units/Tape	Tapes/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
OSS70R350DF	TO252	yes	yes	yes