

Enhancement Mode N-Channel Power MOSFET

Features

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

Applications

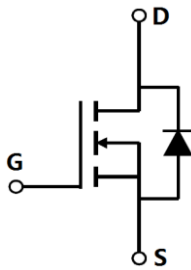
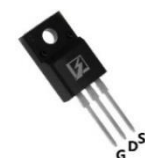
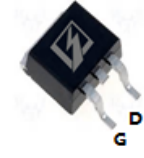
- ◆ Lighting
- ◆ Hard switching PWM
- ◆ Server power supply
- ◆ Charger

■ General Description

OSG80R300xF use 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.

◆ $V_{DS, min@T_{jmax}}$	850 V
◆ $I_{D, pulse}$	45 A
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	300 mΩ
◆ Q_g	23.3 nC

■ Schematic and Package Information

Schematic Diagram	Pin Assignment Top View
	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  TO220F OSG80R300FF </div> <div style="text-align: center;">  TO263 OSG80R300KF </div> </div>

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

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	800	V
Gate source voltage	V_{GS}	± 30	V
Continuous drain current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_D	15	A
Continuous drain current ¹⁾ , $T_C=100^{\circ}\text{C}$		9.5	
Pulsed drain current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{D, pulse}$	45	A
Continuous diode forward current ¹⁾ , $T_C=25^{\circ}\text{C}$	I_S	15	A
Diode pulsed current ²⁾ , $T_C=25^{\circ}\text{C}$	$I_{S, Pulse}$	45	A
Power dissipation ³⁾ for TO263, $T_C=25^{\circ}\text{C}$	P_D	151	W
Power dissipation ³⁾ for TO220F, $T_C=25^{\circ}\text{C}$		34	
Single pulsed avalanche energy ⁵⁾	E_{AS}	410	mJ
MOSFET dv/dt ruggedness, $V_{DS}=0\text{...}480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt, $V_{DS}=0\text{...}480\text{ V}$, $I_{SD}\leq I_D$	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
		TO263	TO220F	
Thermal resistance, junction-case	$R_{\theta JC}$	0.83	3.68	°C/W
Thermal resistance, junction-ambient ⁴⁾	$R_{\theta JA}$	62	62.5	°C/W

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	800			V	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$
		850				$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$, $T_j=150\text{ }^\circ\text{C}$
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	$V_{DS}=V_{GS}$, $I_D=250\text{ }\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$		0.24	0.3	Ω	$V_{GS}=10\text{ V}$, $I_D=7.5\text{ A}$
			0.64			$V_{GS}=10\text{ V}$, $I_D=7.5\text{ A}$, $T_j=150\text{ }^\circ\text{C}$
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}			5	μA	$V_{DS}=800\text{ V}$, $V_{GS}=0\text{ V}$
Gate resistance	R_G		18.2		Ω	$f=1\text{ MHz}$, Open drain

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		1552		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ KHz}$
Output capacitance	C_{oss}		80.1		pF	
Reverse transfer capacitance	C_{rss}		2.1		pF	
Turn-on delay time	$t_{d(on)}$		33.6		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\text{ }\Omega$, $I_D=7.5\text{ A}$
Rise time	t_r		20.3		ns	
Turn-off delay time	$t_{d(off)}$		57.9		ns	
Fall time	t_f		4.5		ns	

■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		22.7		nC	$V_{GS}=10\text{ V}$ $V_{DS}=400\text{ V}$, $I_D=7.5\text{ A}$,
Gate-source charge	Q_{gs}		8.6		nC	
Gate-drain charge	Q_{gd}		2.3		nC	
Gate plateau voltage	V_{plateau}		5.5		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward voltage	V_{SD}			1.3	V	$I_S=15\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		313.7		ns	$V_R=400\text{ V}$, $I_S=7.5\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		4.2		μC	
Peak reverse recovery current	I_{rrm}		25.2		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**

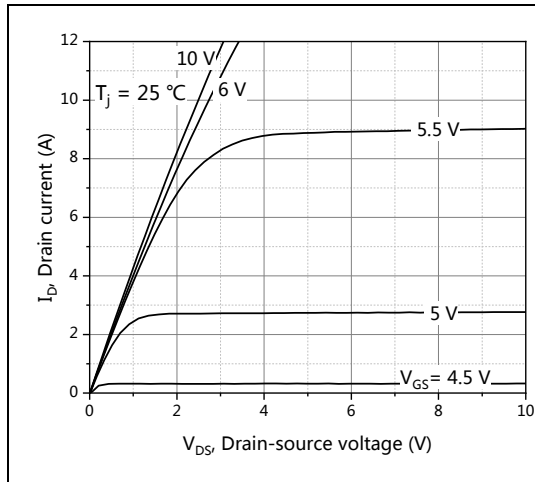


Figure 1, Typ. output characteristics

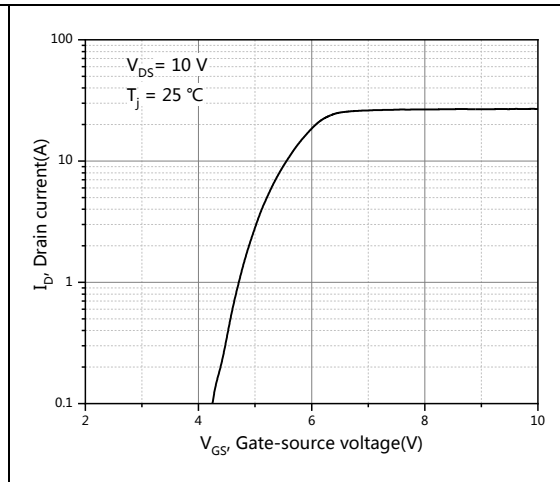


Figure 2, Typ. transfer characteristics

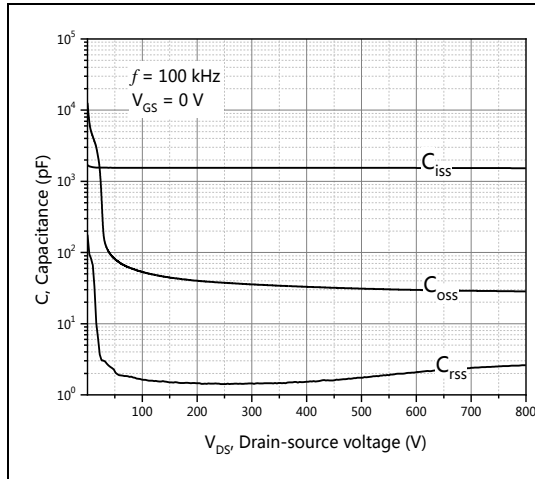


Figure 3, Typ. capacitances

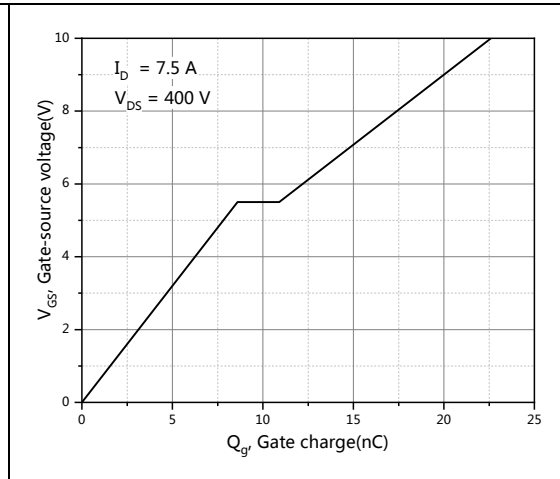


Figure 4, Typ. gate charge

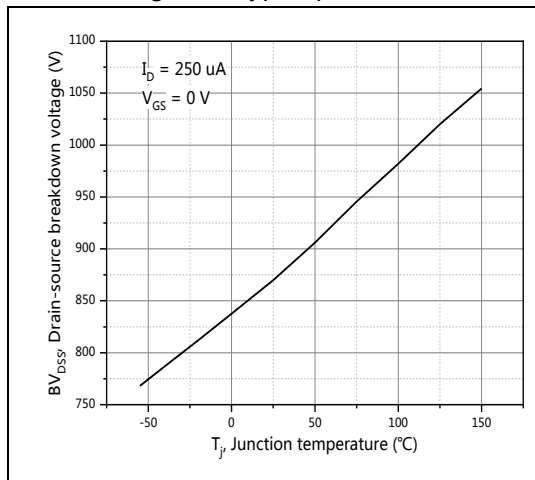


Figure 5, Drain-source breakdown voltage

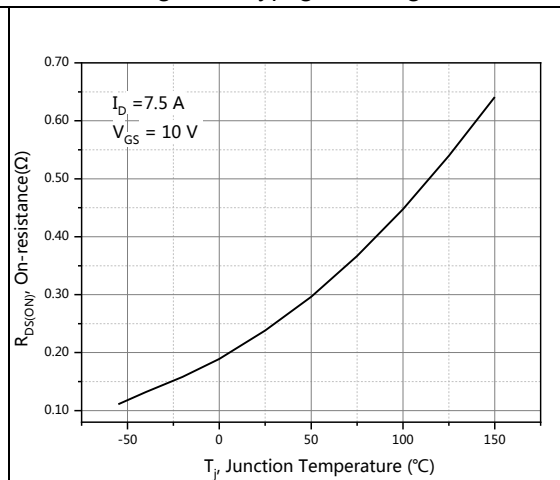


Figure 6, Drain-source on-state resistance

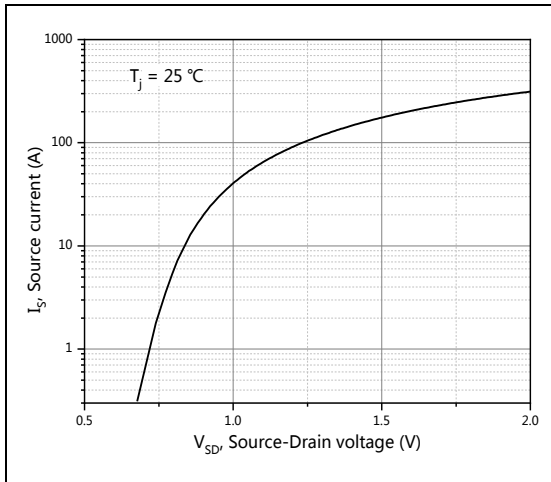


Figure 7, Forward characteristic of body diode

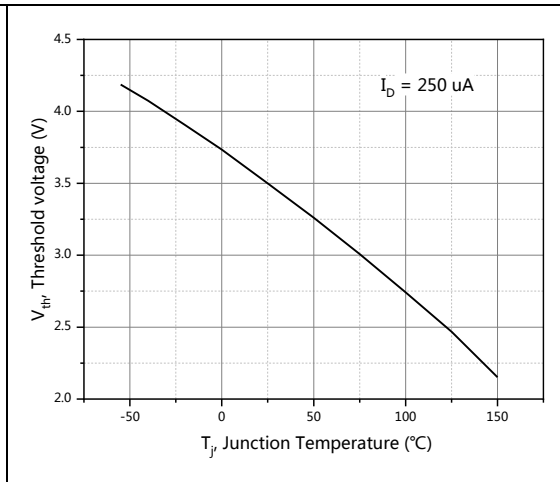


Figure 8, Threshold voltage

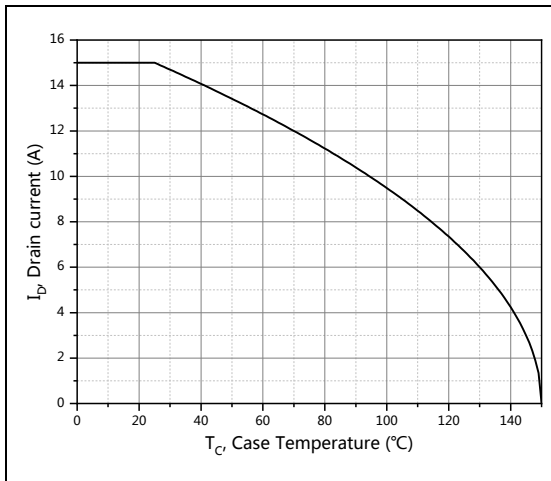


Figure 9, Drain current

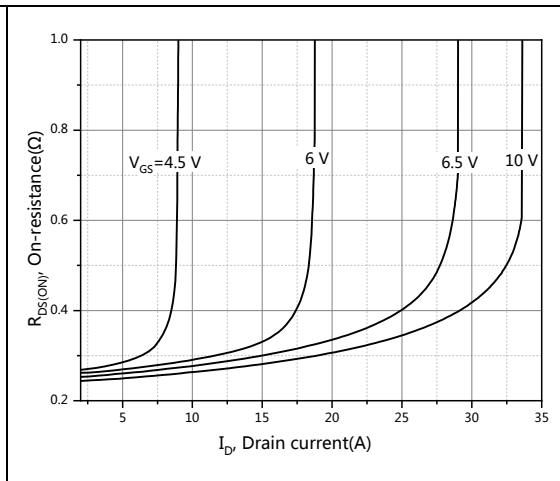


Figure 10, Drain-source on-state resistance

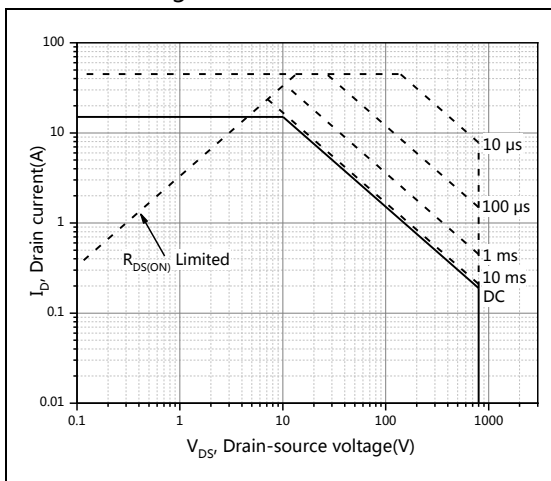


Figure 11, Safe operation area for TO263
 $T_C = 25\text{ °C}$

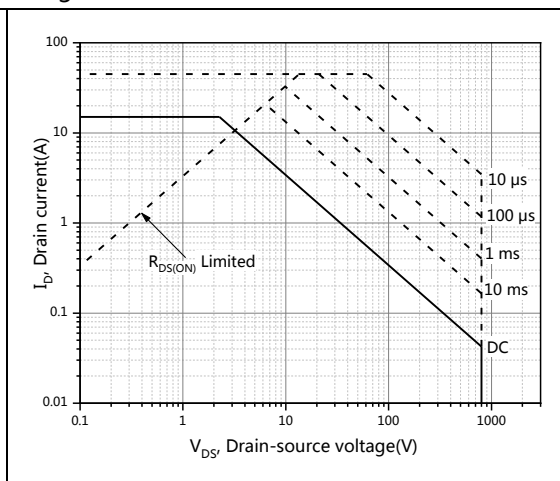


Figure 12, Safe operation area for TO220F
 $T_C = 25\text{ °C}$

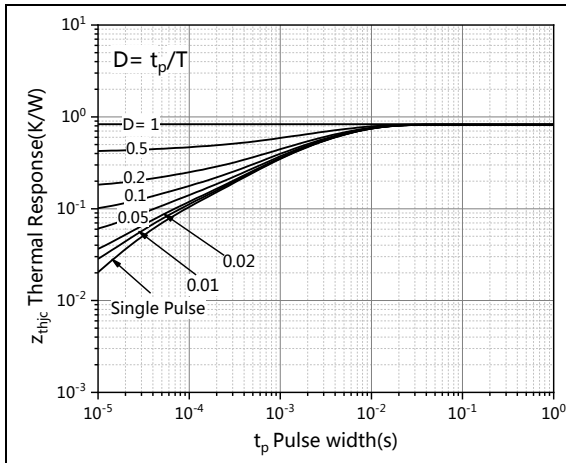


Figure 13, Max. transient thermal impedance for TO263

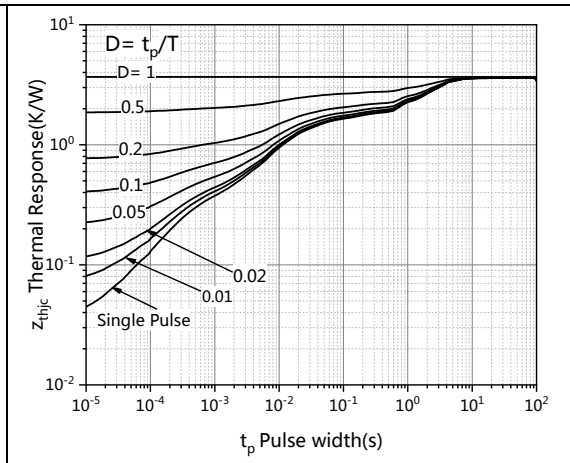


Figure 14, Max. transient thermal impedance for TO220F

■ Test circuits and waveforms

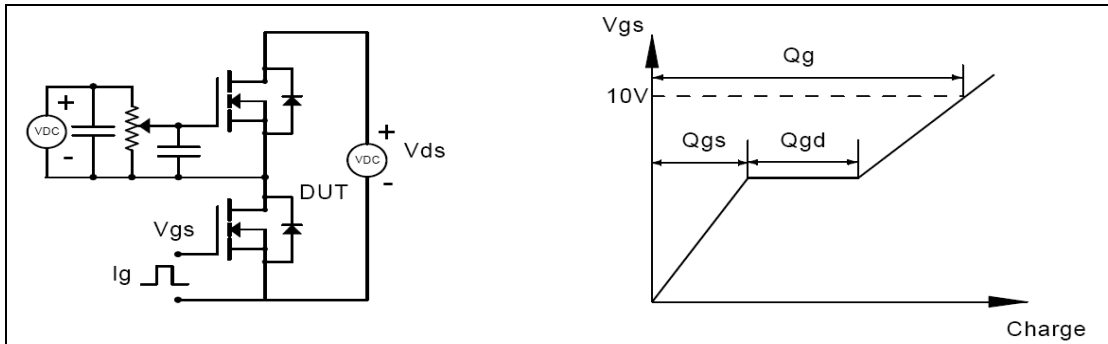


Figure 1, Gate charge test circuit & waveform

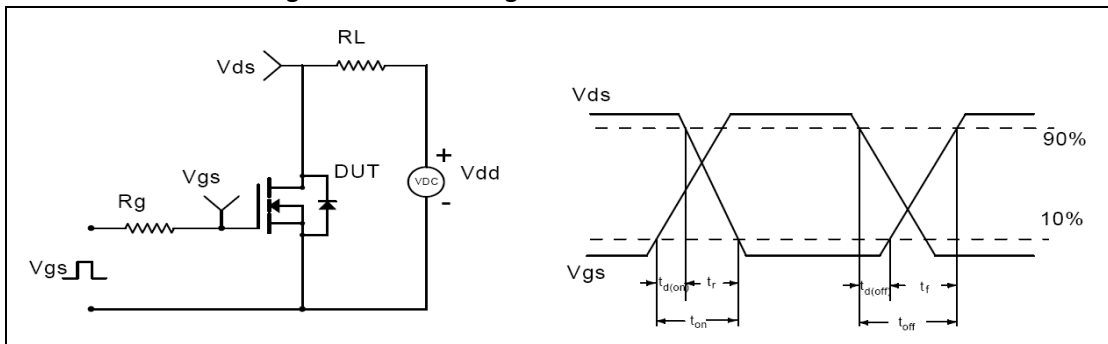


Figure 2, Switching time test circuit & waveforms

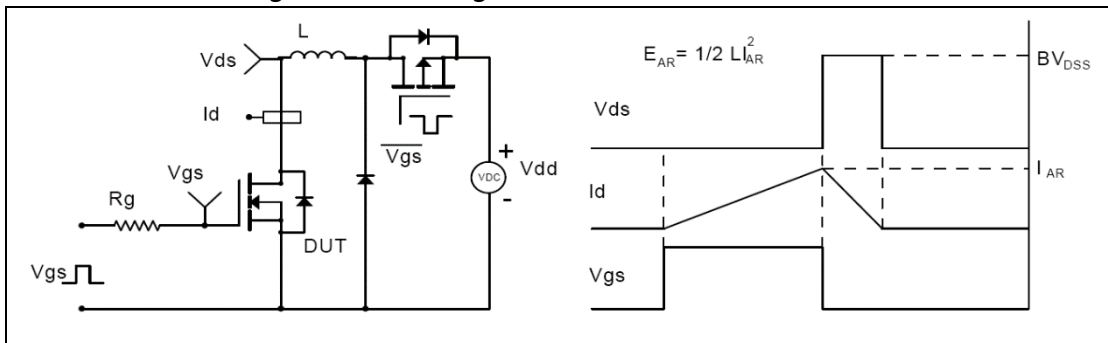


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

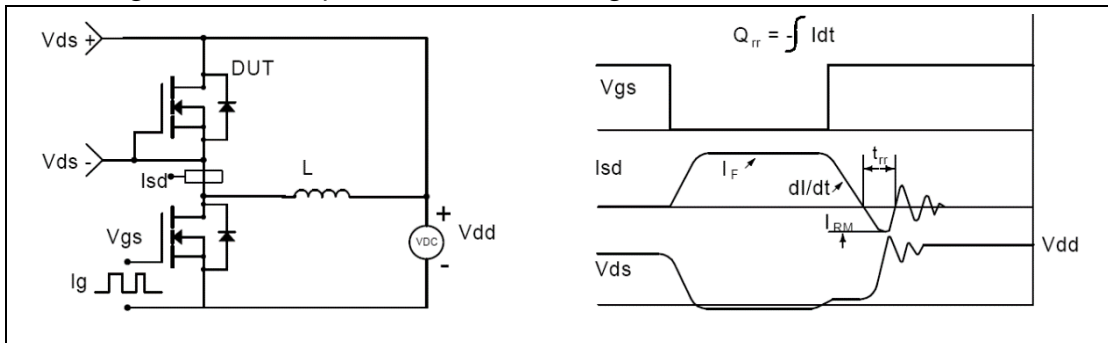


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

Figure1, TO220F package outline dimension

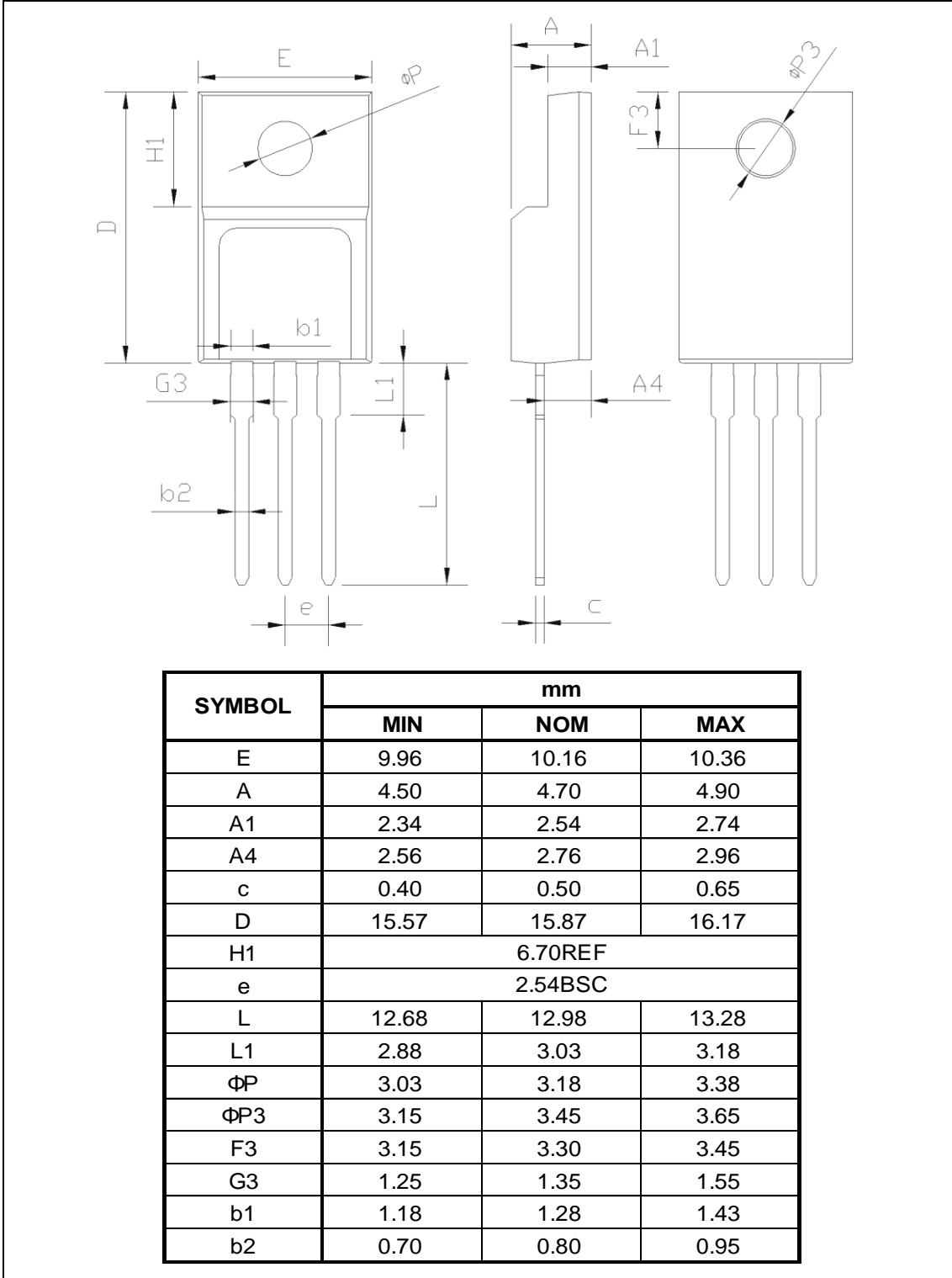
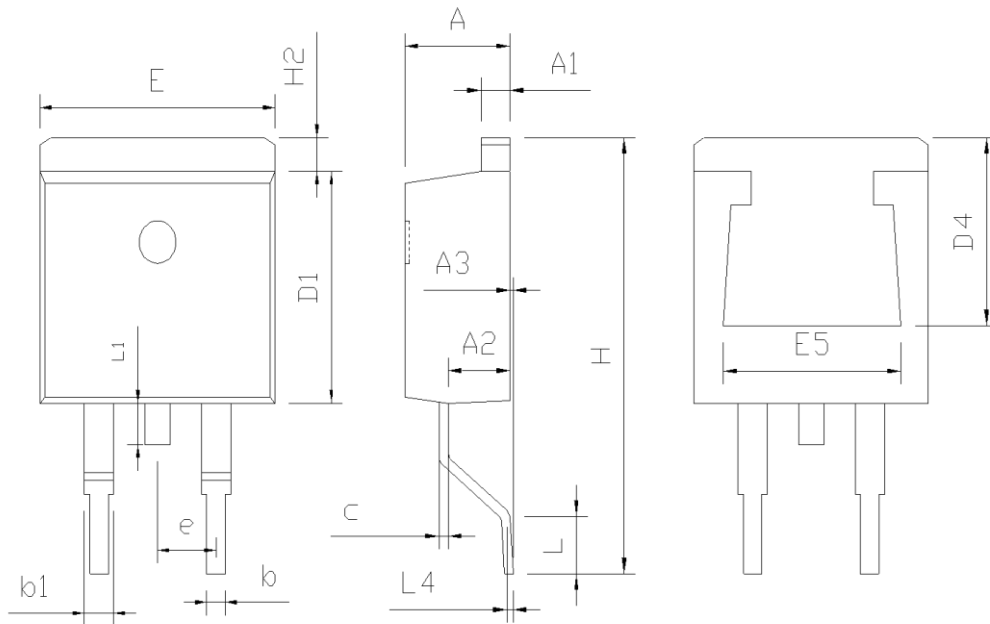


Figure2, TO263 package outline dimension



SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25 BSC		

■ Ordering Information

Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO220F	50	20	1000	6	6000
TO263	50	20	1000	6	6000

■ Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG80R300FF	TO220F	yes	yes	yes
OSG80R300KF	TO263	yes	yes	yes