

OSG60R108xZF_Datasheet

Enhancement Mode N-Channel Power MOSFET

Features

- ◆ Ultra-fast and robust body diode
- ◆ Low $R_{DS(on)}$ & FOM
- ◆ Excellent low switching loss
- ◆ Excellent stability and uniformity
- ◆ Easy to drive

Applications

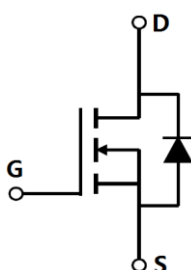




- ◆ Lighting
- ◆ Server power supply
- ◆ Telecom
- ◆ Solar inverter

■ General Description

OSG60R108xZF use advanced GreenMOS™ technology to provide low $R_{DS(ON)}$, low gate charge, fast switching and excellent avalanche characteristics. This device offers extremely fast and robust body diode, and is suitable for telecom and power supplies.

◆ $V_{DS, min@T_{jmax}}$	650 V
◆ $I_{D, pulse}$	90 A
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	108 mΩ
◆ Q_g	37.1 nC

■ Schematic and Package Information

Schematic Diagram	Pin Assignment-Top View			
	 TO263	 TO247	 TO220	 TO220F

■ Absolute Maximum Ratings at $T_j=25^\circ\text{C}$ 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⁾	I_D	30	A
Continuous drain current ¹⁾ $T_j=100^\circ\text{C}$		19	
Pulsed drain current ²⁾ , $T_C=25^\circ\text{C}$	$I_{D, pulse}$	90	A
Power dissipation ³⁾ for TO263, TO247, TO220, $T_C=25^\circ\text{C}$	P_D	219	W
Power dissipation ³⁾ for TO220F, $T_C=25^\circ\text{C}$		34	
Single pulsed avalanche energy ⁵⁾	E_{AS}	1000	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	50	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	$^\circ\text{C}$

■ Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO247/TO263/TO220	TO220F	
Thermal resistance, junction-case	$R_{\theta JC}$	0.57	3.7	°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}	600			V	$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$
		650	735			$V_{GS}=0\text{ V}$, $I_D=1\text{ mA}$, $T_j=150\text{ }^\circ\text{C}$
Gate threshold voltage	$V_{GS(th)}$	3.0		4.5	V	$V_{DS}=V_{GS}$, $I_D=1\text{ mA}$
Drain-source on-state resistance	$R_{DS(on)}$		0.085	0.108	Ω	$V_{GS}=10\text{ V}$, $I_D=15\text{ A}$
			0.2			$V_{GS}=10\text{ V}$, $I_D=15\text{ A}$, $T_j=150\text{ }^\circ\text{C}$
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}			10	μA	$V_{DS}=600\text{ V}$, $V_{GS}=0\text{ V}$

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		2674.5		pF	$V_{GS}=0\text{ V}$, $V_{DS}=50\text{ V}$, $f=100\text{ kHz}$
Output capacitance	C_{oss}		246.0		pF	
Reverse transfer capacitance	C_{rss}		9.6		pF	
Turn-on delay time	$t_{d(on)}$		67.4		ns	$V_{GS}=10\text{ V}$, $V_{DS}=400\text{ V}$, $R_G=2\text{ }\Omega$, $I_D=16\text{ A}$
Rise time	t_r		71.1		ns	
Turn-off delay time	$t_{d(off)}$		103.9		ns	
Fall time	t_f		33.4		ns	



■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		37.1		nC	$I_D=16\text{ A}$, $V_{DS}=400\text{ V}$, $V_{GS}=10\text{ V}$
Gate-source charge	Q_{gs}		11.0		nC	
Gate-drain charge	Q_{gd}		13.8		nC	
Gate plateau voltage	V_{plateau}		6.7		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward current	I_S			30	A	$V_{GS} < V_{th}$
Pulsed source current	I_{SP}			90		
Diode forward voltage	V_{SD}			1.3	V	$I_S=30\text{ A}$, $V_{GS}=0\text{ V}$
Reverse recovery time	t_{rr}		123.0		ns	$V_R=400\text{ V}$, $I_S=16\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$
Reverse recovery charge	Q_{rr}		0.73		μC	
Peak reverse recovery current	I_{rrm}		11.0		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) $V_{DD}=100\text{ V}$, $R_G=50\text{ }\Omega$, $L=60\text{ mH}$, starting $T_j=25\text{ }^\circ\text{C}$.



Electrical Characteristics Diagrams

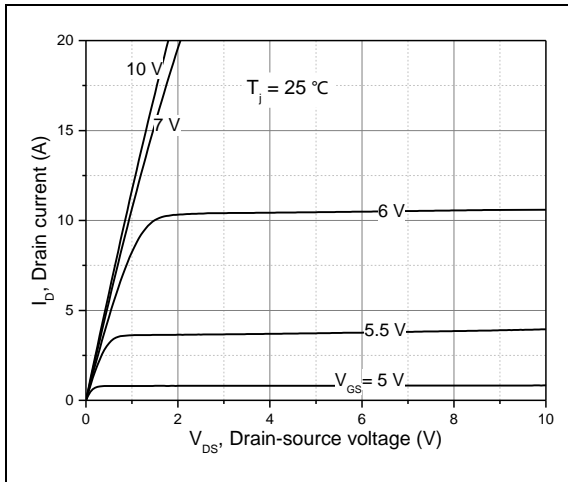


Figure 1, Typ. output characteristics

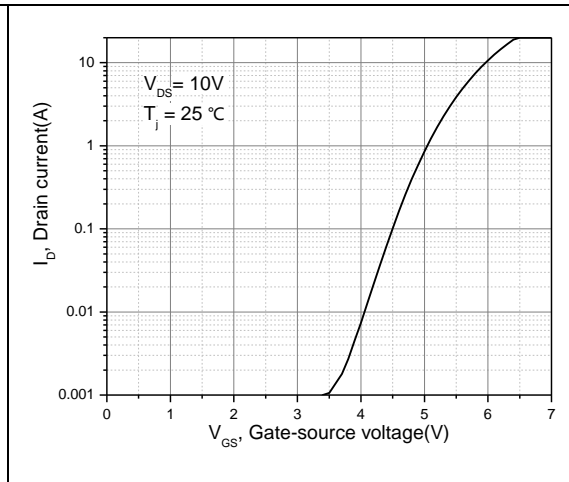


Figure 2, Typ. transfer characteristics

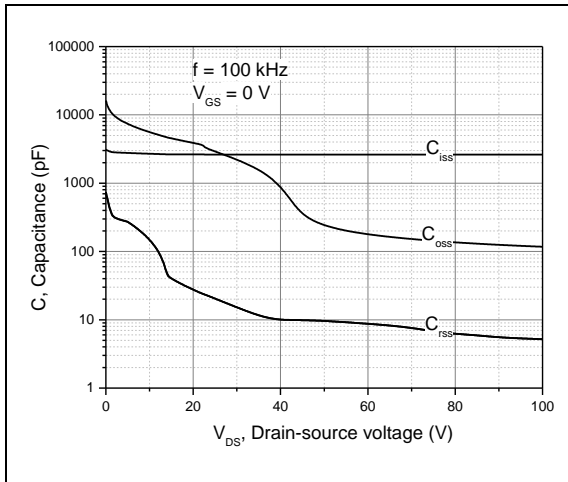


Figure 3, Typ. capacitances

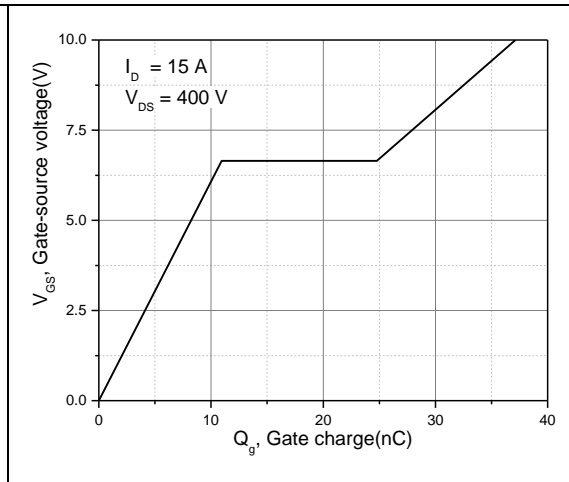


Figure 4, Typ. gate charge

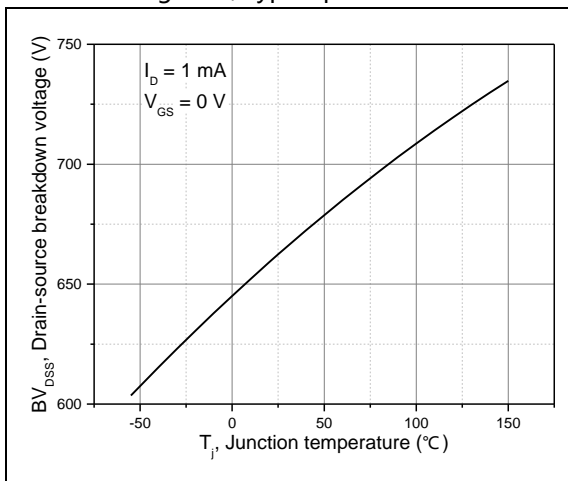


Figure 5, Drain-source breakdown voltage

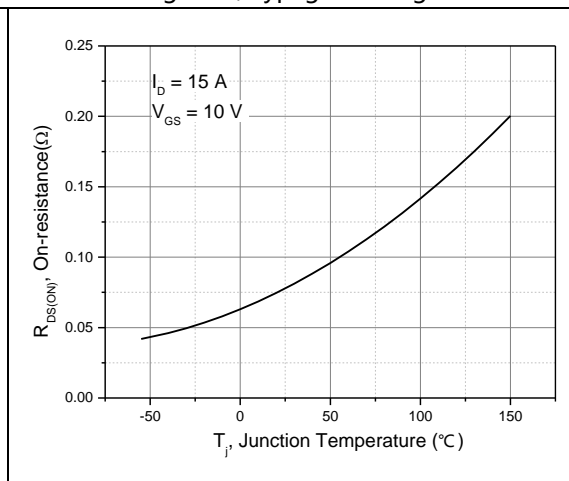


Figure 6, Drain-source on-state resistance

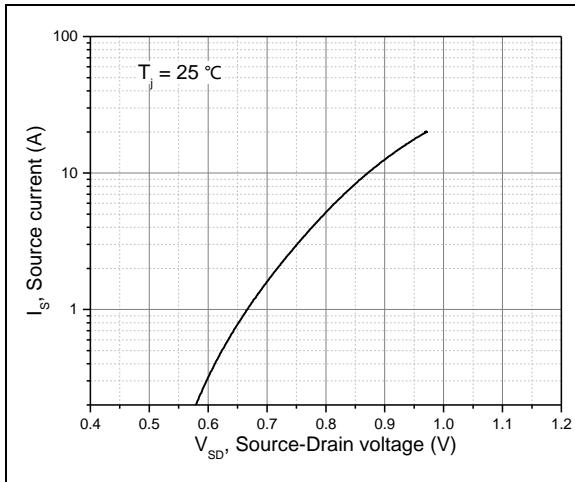


Figure 7, Forward characteristic of body diode

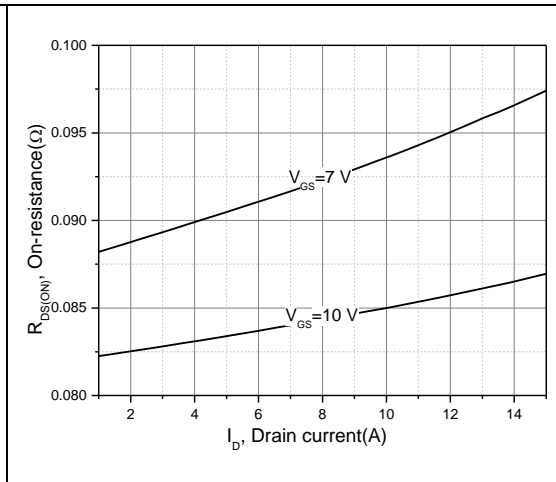


Figure 8, Drain-source on-state resistance

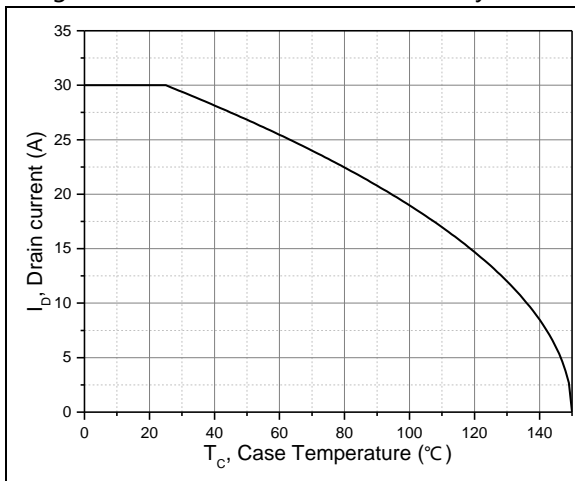


Figure 9, Drain current

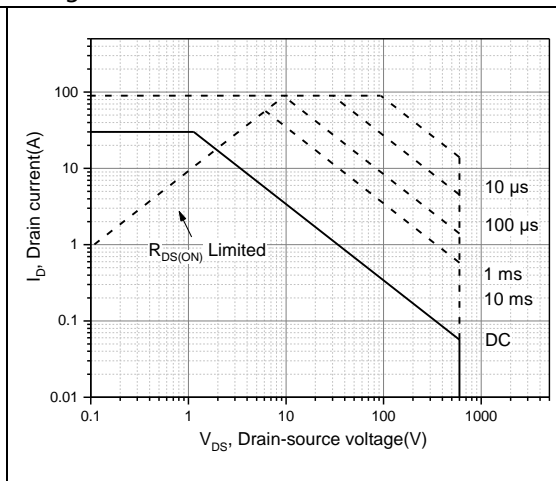


Figure 10, Safe operation area for TO263,
TO247, TO220 $T_C=25\text{ }^\circ\text{C}$

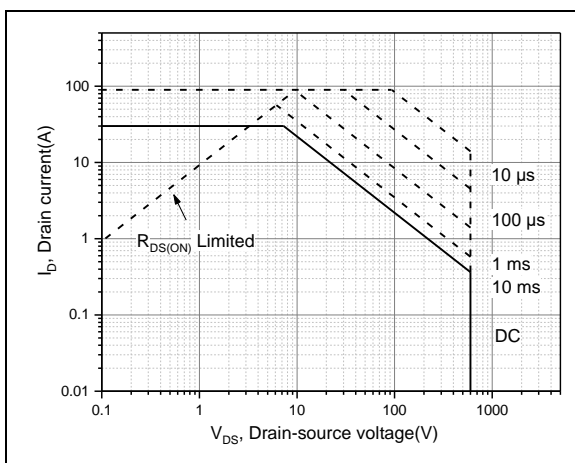


Figure 11, Safe operation area for TO220F
 $T_C=25\text{ }^\circ\text{C}$



■ Test circuits and waveforms

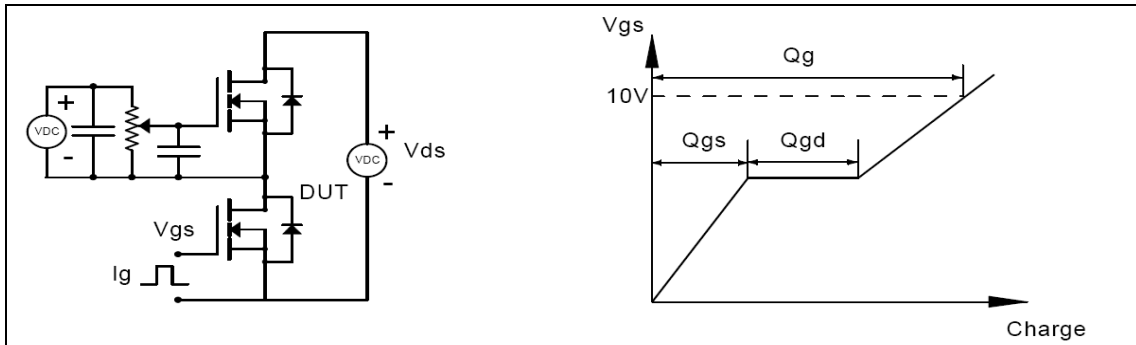


Figure 1, Gate charge test circuit & waveform

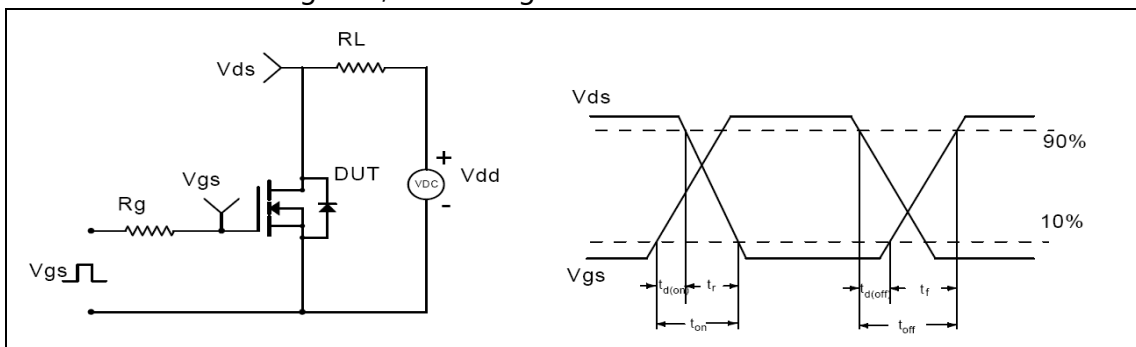


Figure 2, Switching time test circuit & waveforms

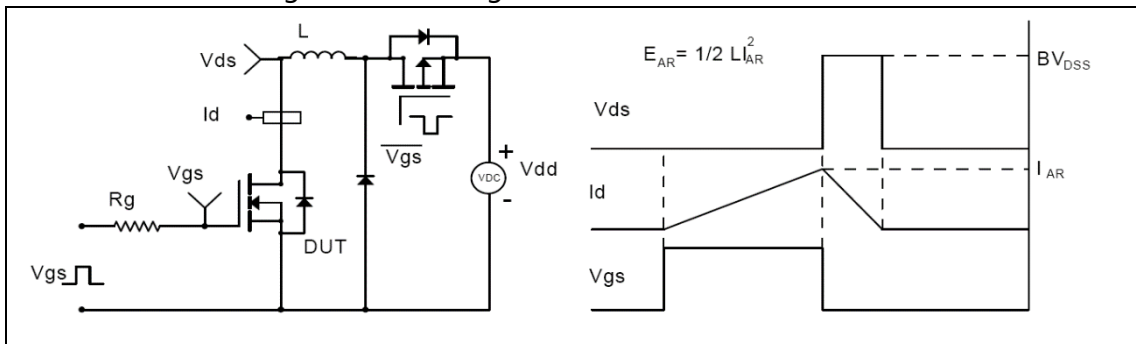


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

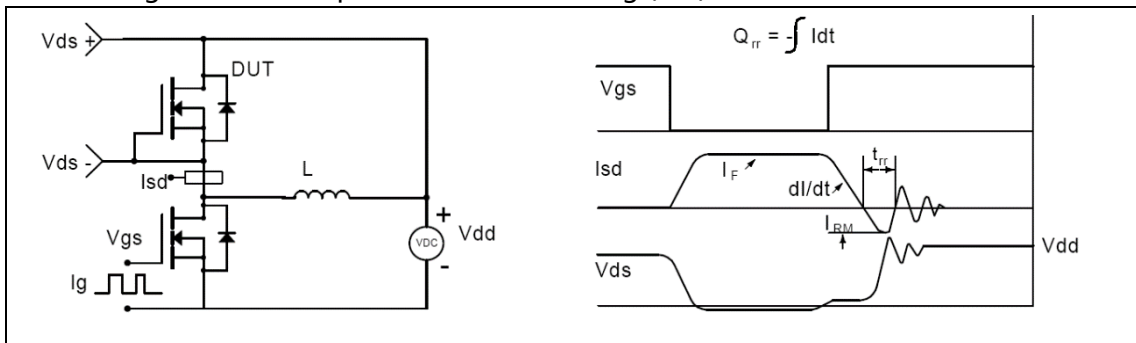
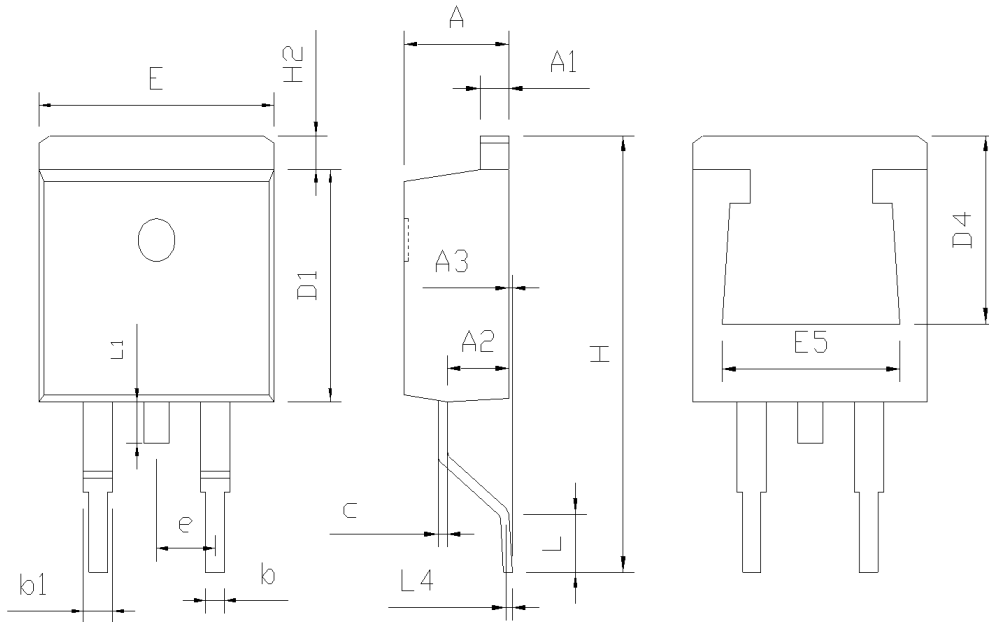


Figure 4, Diode reverse recovery test circuit & waveforms



■ Package Information

Figure1, TO263 package outline dimension

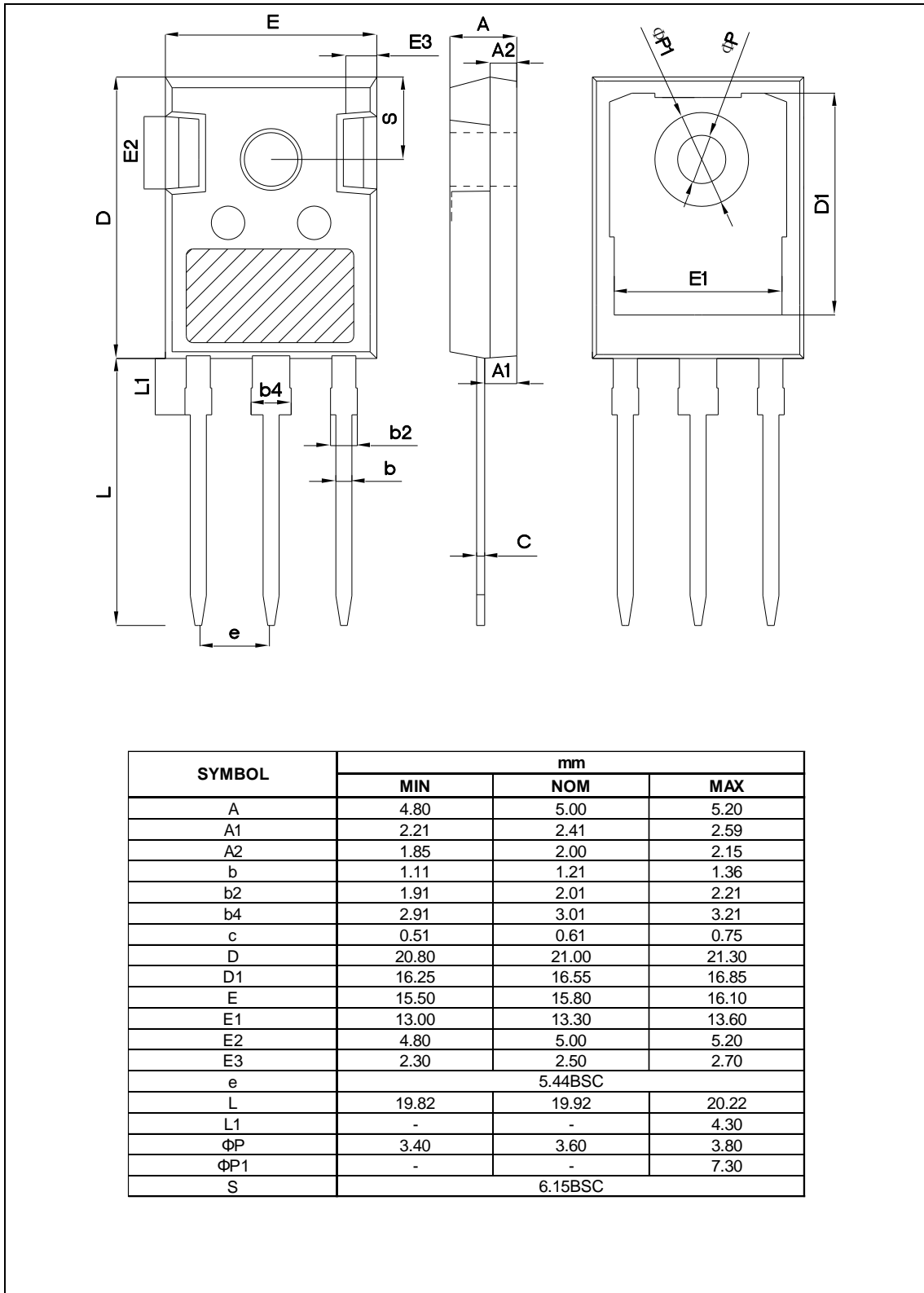


SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0.00	0.13	0.25
b	0.70	0.81	0.96
b1	1.17	1.27	1.47
c	0.30	0.38	0.53
D1	8.50	8.70	8.90
D4	6.60	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.70	15.10	15.50
H2	1.07	1.27	1.47
L	2.00	2.30	2.60
L1	1.40	1.55	1.70
L4	0.25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



■ Package Information

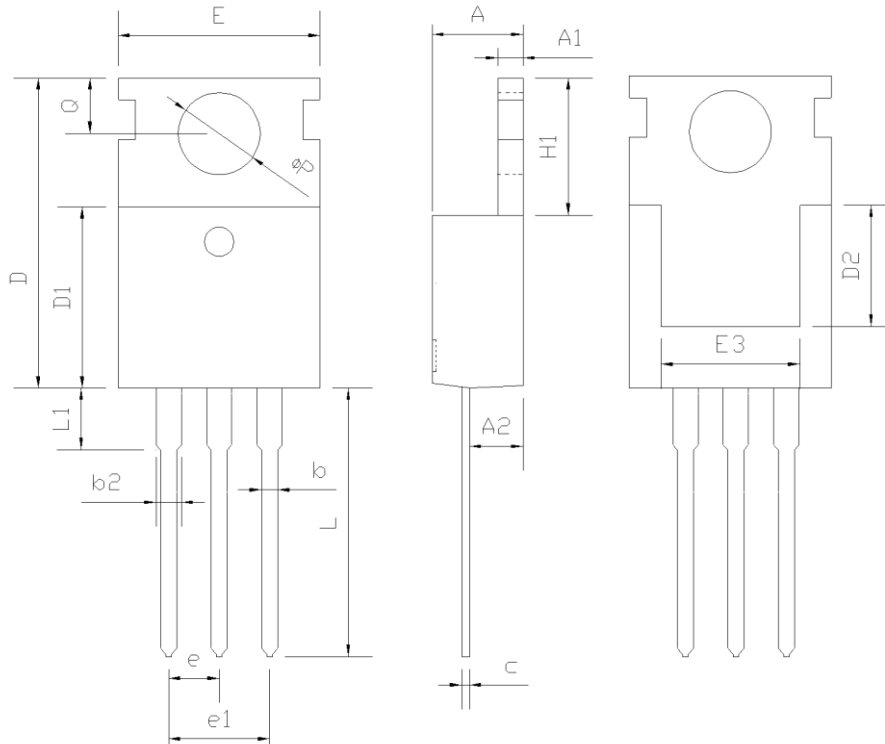
Figure2, TO247 package outline dimension





■ Package Information

Figure3, TO220 package outline dimension

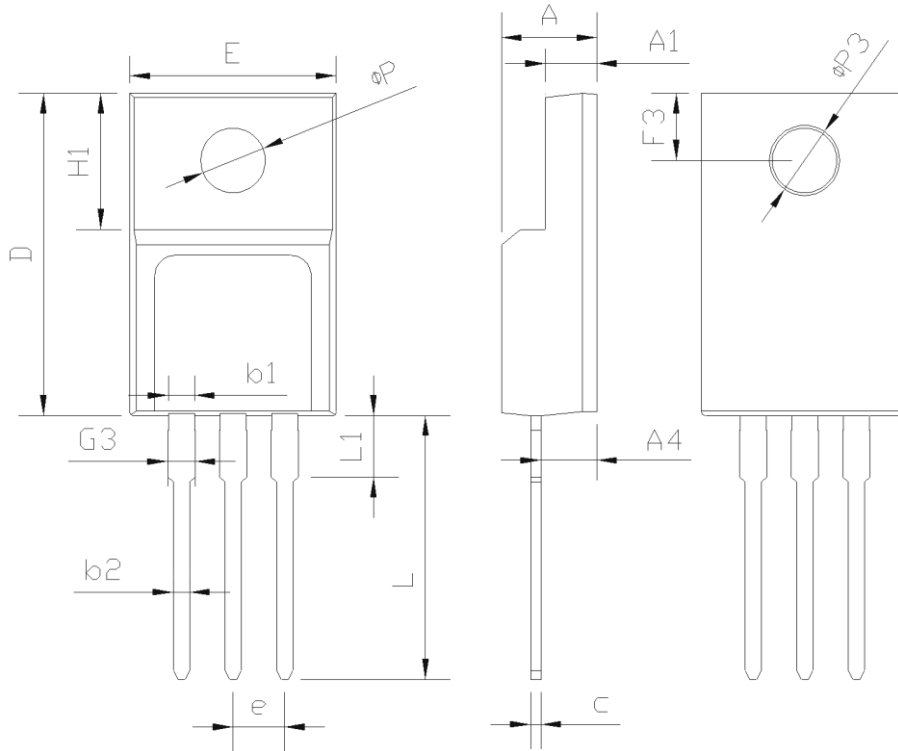


SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.70
A1	1.25	1.30	1.40
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.45	0.50	0.60
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
ΦP	3.40	3.60	3.80
Q	2.60	2.80	3.00



■ Package Information

Figure4, TO220F package outline dimension



SYMBOL	mm		
	MIN	NOM	MAX
E	9.96	10.16	10.36
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A4	2.56	2.76	2.96
c	0.40	0.50	0.65
D	15.57	15.87	16.17
H1	6.70REF		
e	2.54BSC		
L	12.68	12.98	13.28
L1	2.88	3.03	3.18
ΦP	3.03	3.18	3.38
ΦP3	3.15	3.45	3.65
F3	3.15	3.30	3.45
G3	1.25	1.35	1.55
b1	1.18	1.28	1.43
b2	0.70	0.80	0.95



■ Ordering Information

Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO263	50	20	1000	6	6000
TO247	30	11	330	6	1980
TO220	50	20	1000	6	6000
TO220F	50	20	1000	6	6000

■ Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG60R108KZF	TO263	yes	yes	yes
OSG60R108HZF	TO247	yes	yes	yes
OSG60R108PZF	TO220	yes	yes	yes
OSG60R108FZF	TO220F	yes	yes	yes