ORIENTAL SEMICONDUCTOR

GreenMOS™

OSG60R108xZF_Datasheet

Green PRODUCT

RoHS compliant

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 invertor

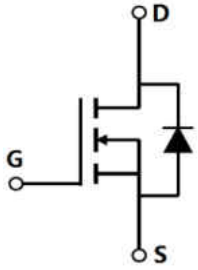
■ General Description

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.

- ◆ $V_{DS,\ min@Tjmax}$ 650 V
- ◆ $I_{D,\ pulse}$ 90 A
- ◆ $R_{DS(ON),\ max\ @\ VGS=10\ V}$ 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℃ 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 ℃		19	
Pulsed drain current[2)] , T_C=25 ℃	$I_{D,\ pulse}$	90	A
Power dissipation[3)] for TO263, TO247, TO220, T_C=25 ℃	P_D	219	W
Power dissipation[3)] for TO220F, T_C=25 ℃		34	
Single pulsed avalanche energy[5)]	E_{AS}	1000	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}≤I_D	dV/dt	50	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	℃

■ Thermal Characteristics

Parameter	Symbol	Value		Unit
		TO247/TO263/TO220	TO220F	
Thermal resistance, junction-case	$R_{\theta JC}$	0.57	3.7	℃/W
Thermal resistance, junction-ambient[4)]	$R_{\theta JA}$	62	62.5	℃/W

■ Electrical Characteristics at T_j=25 ℃ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	600			V	V_{GS}=0 V, I_D=1 mA
		650	735			V_{GS}=0 V, I_D=1 mA, T_j=150 ℃
Gate threshold voltage	$V_{GS(th)}$	3.0		4.5	V	V_{DS}=V_{GS}, I_D=1 mA
Drain-source on-state resistance	$R_{DS(ON)}$		0.085	0.108	Ω	V_{GS}=10 V, I_D=15 A
			0.2			V_{GS}=10 V, I_D=15 A, T_j=150 ℃
Gate-source leakage current	I_{GSS}			100	nA	V_{GS}=30 V
				-100		V_{GS}=-30 V
Drain-source leakage current	I_{DSS}			10	μA	V_{DS}=600 V, V_{GS}=0 V

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		2674.5		pF	V_{GS}=0 V, V_{DS}=50 V, f=100 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 V, V_{DS}=400 V, R_G=2 Ω, I_D=16 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 A, V_{DS}=400 V, V_{GS}=10 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 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		123.0		ns	V_R=400V, I_S=16 A, di/dt=100 A/μs
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) Pd 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 ℃.
5) V_{DD}=100 V, R_G=50 Ω, L=60 mH, starting T_j=25 ℃.

■ Electrical Characteristics Diagrams

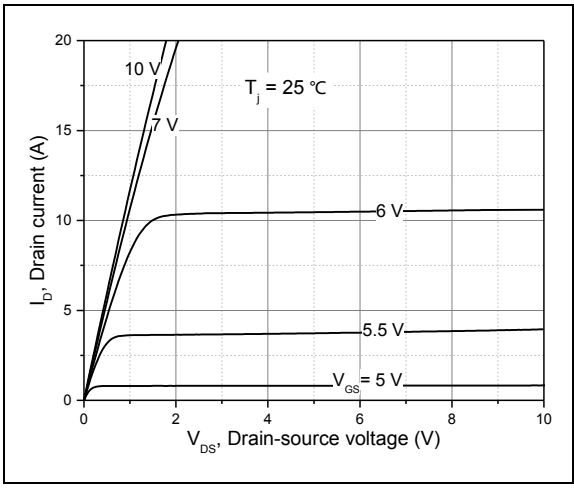


Figure 1, Typ. output characteristics

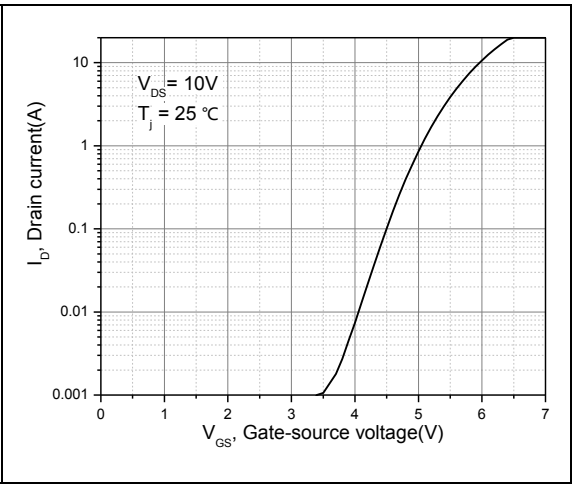


Figure 2, Typ. transfer characteristics

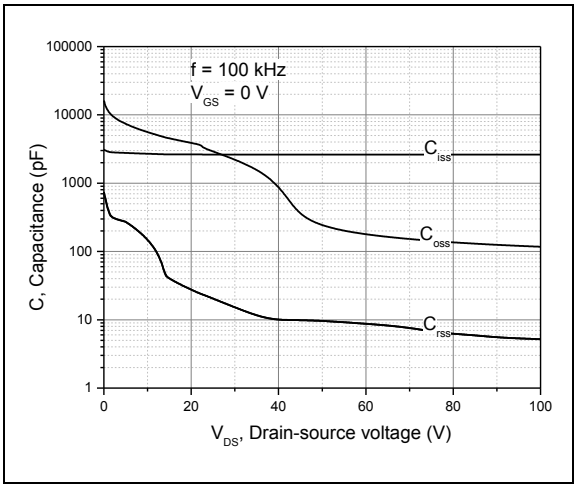


Figure 3, Typ. capacitances

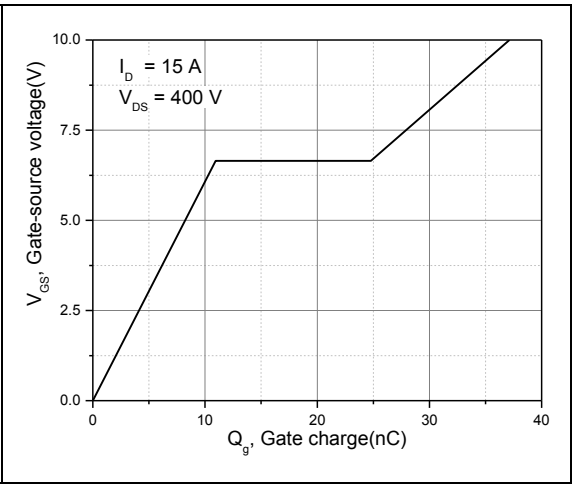


Figure 4, Typ. gate charge

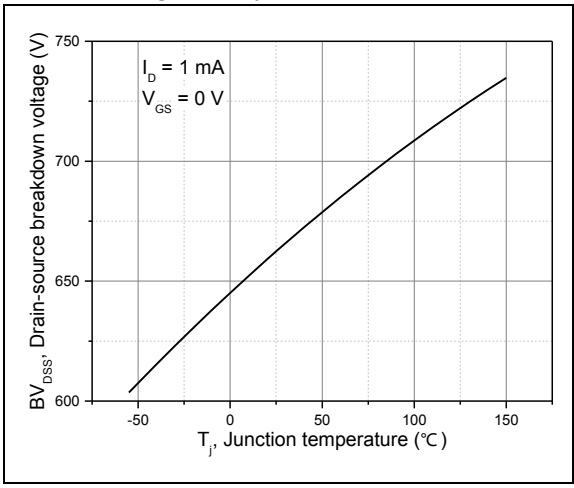


Figure 5, Drain-source breakdown voltage

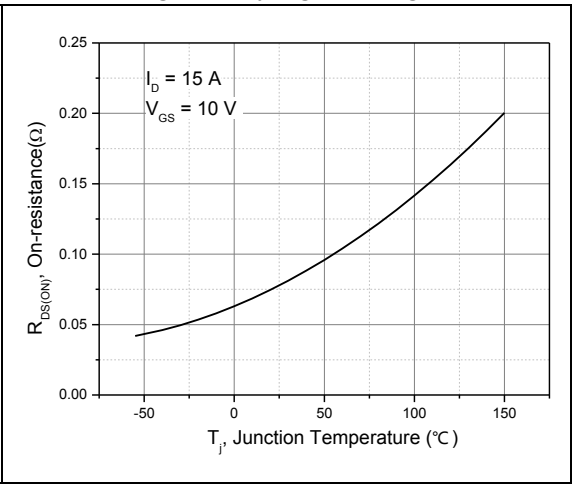


Figure 6, Drain-source on-state resistance

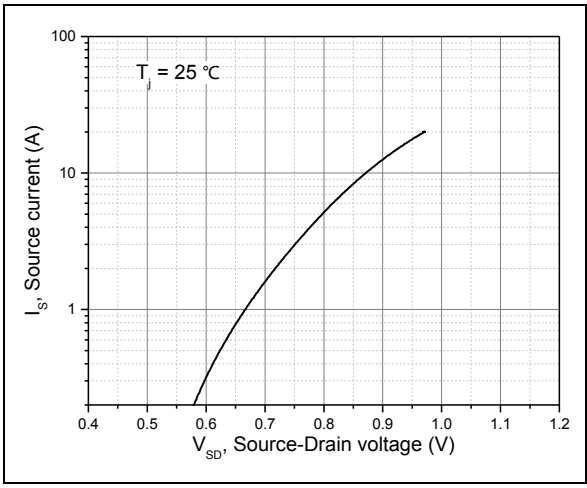


Figure 7, Forward characteristic of body diode

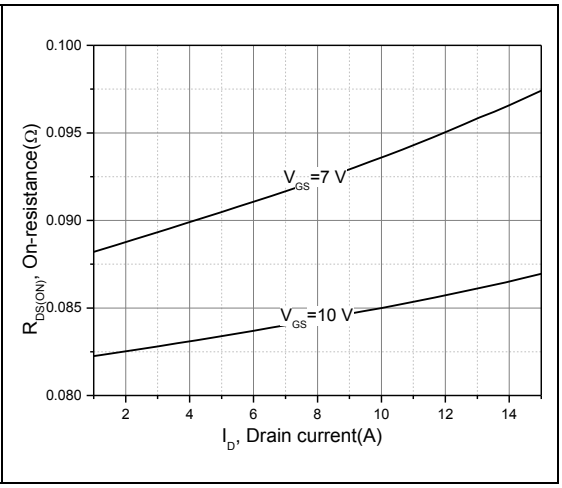


Figure 8, Drain-source on-state resistance

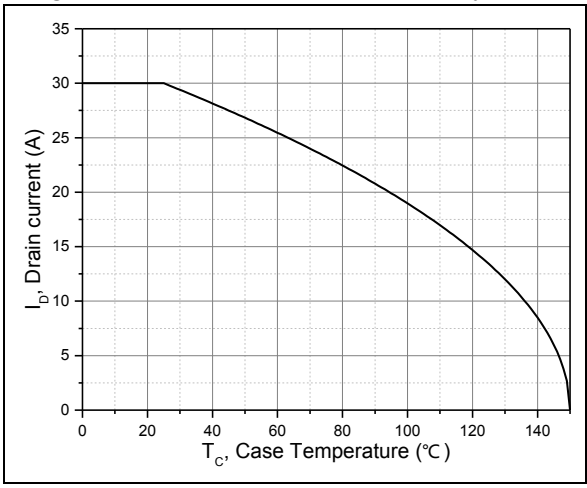


Figure 9, Drain current

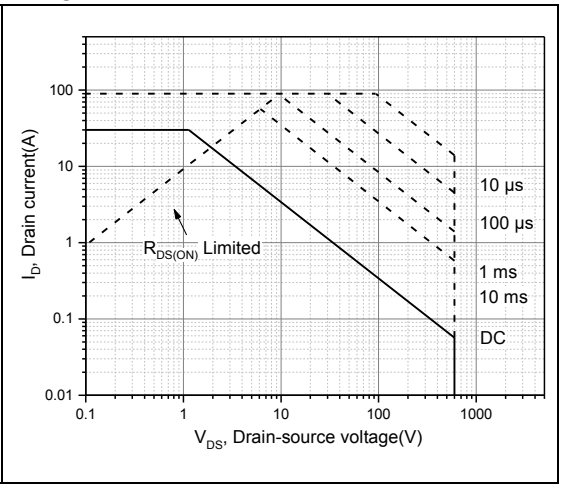


Figure 10, Safe operation area for TO263, TO247, TO220 T_C=25 ℃

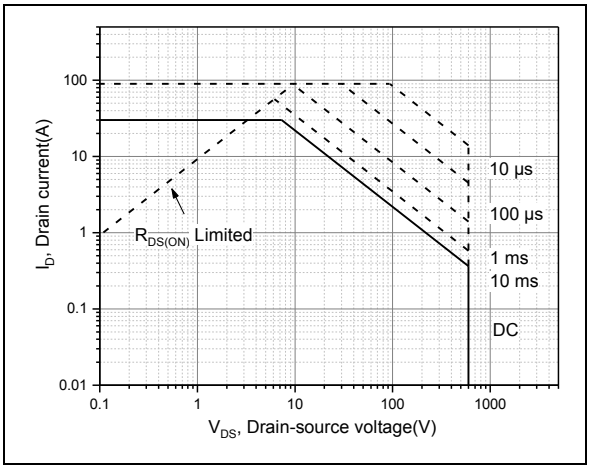


Figure 11, Safe operation area for TO220F T_C=25 ℃

■ Test circuits and waveforms

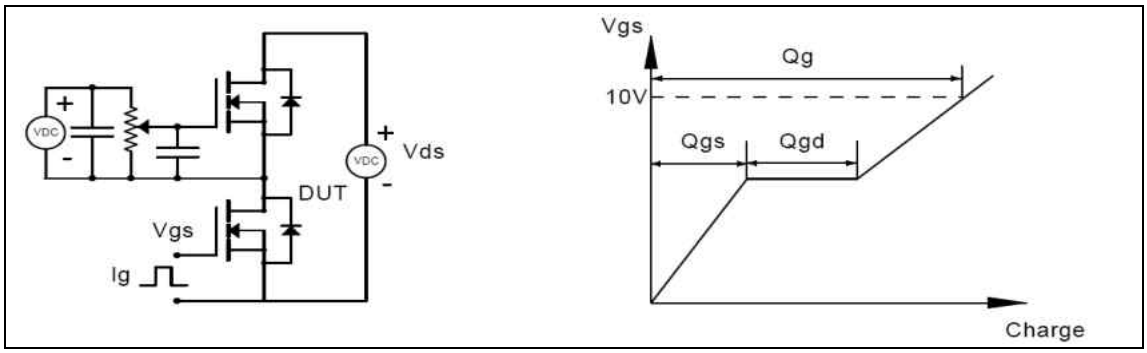


Figure 1, Gate charge test circuit & waveform

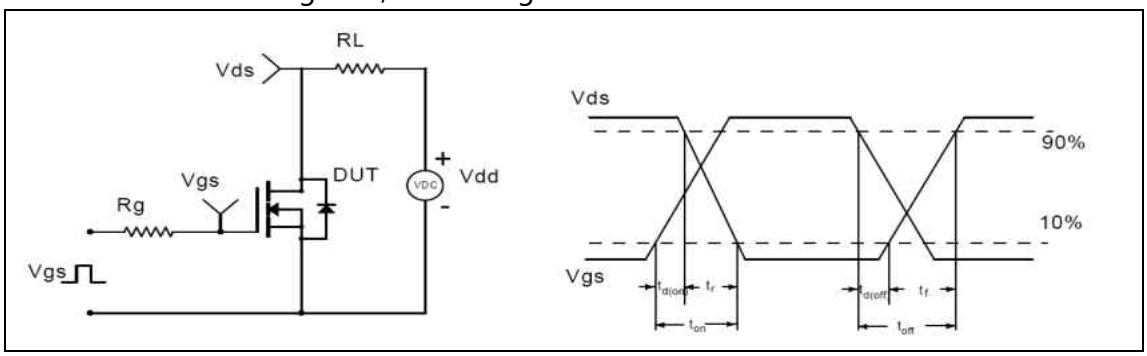


Figure 2, Switching time test circuit & waveforms

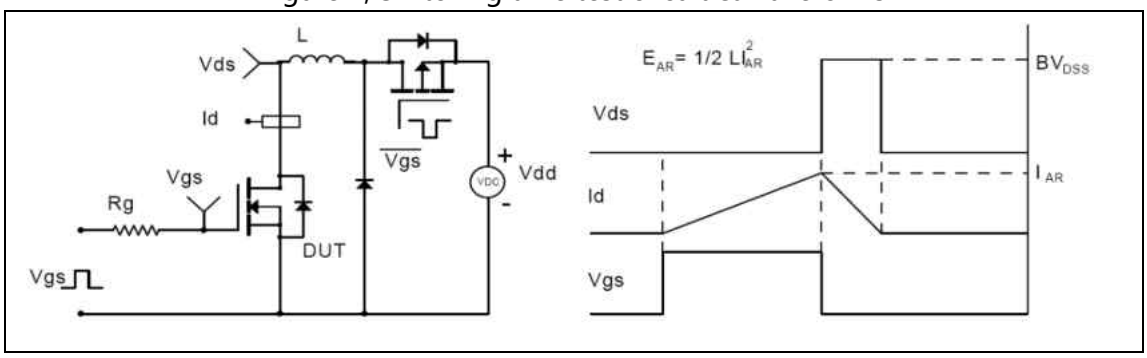


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

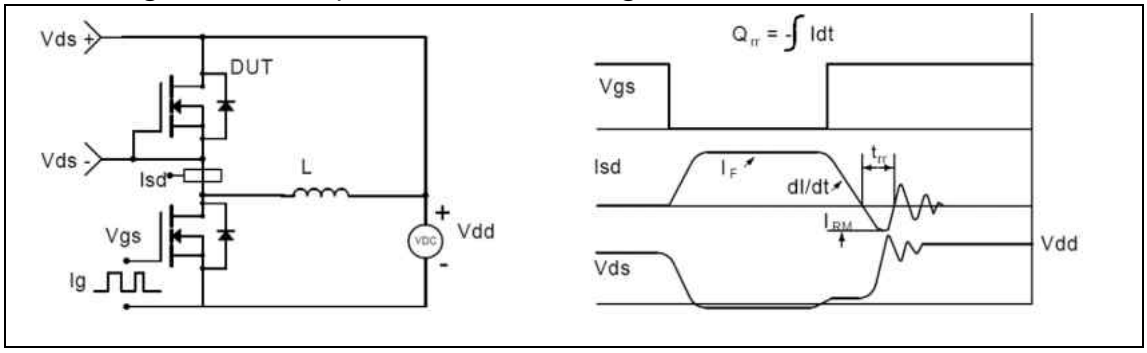
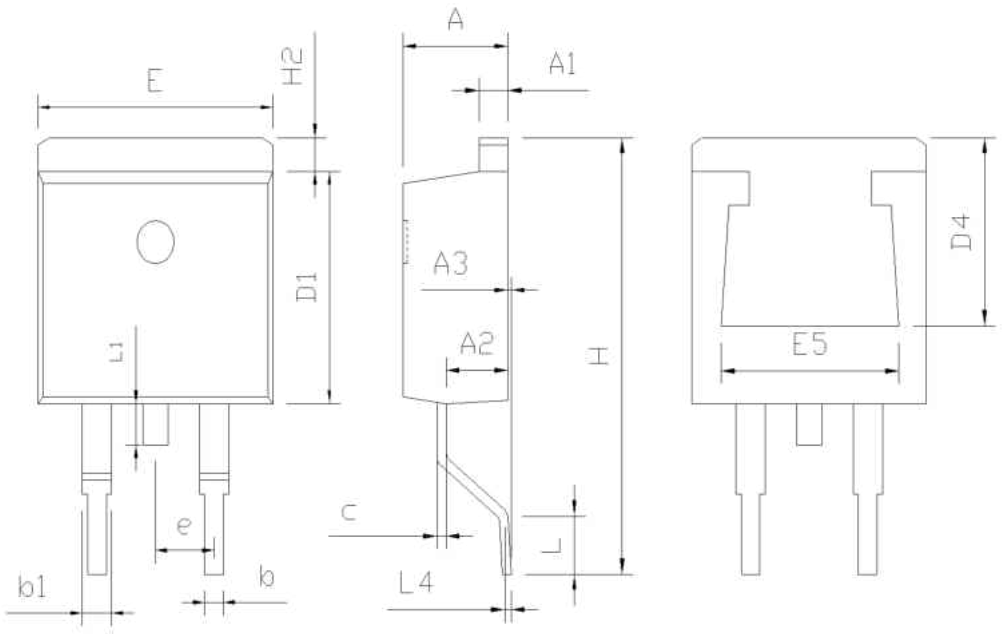


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

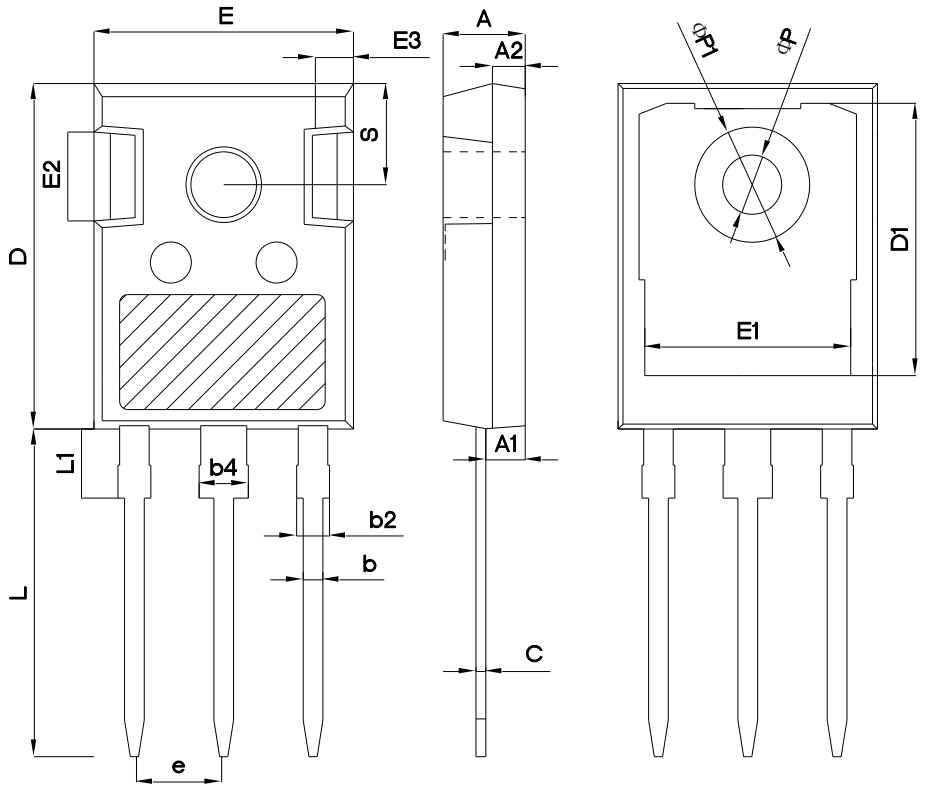
Figure1, TO263 package outline dimension



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

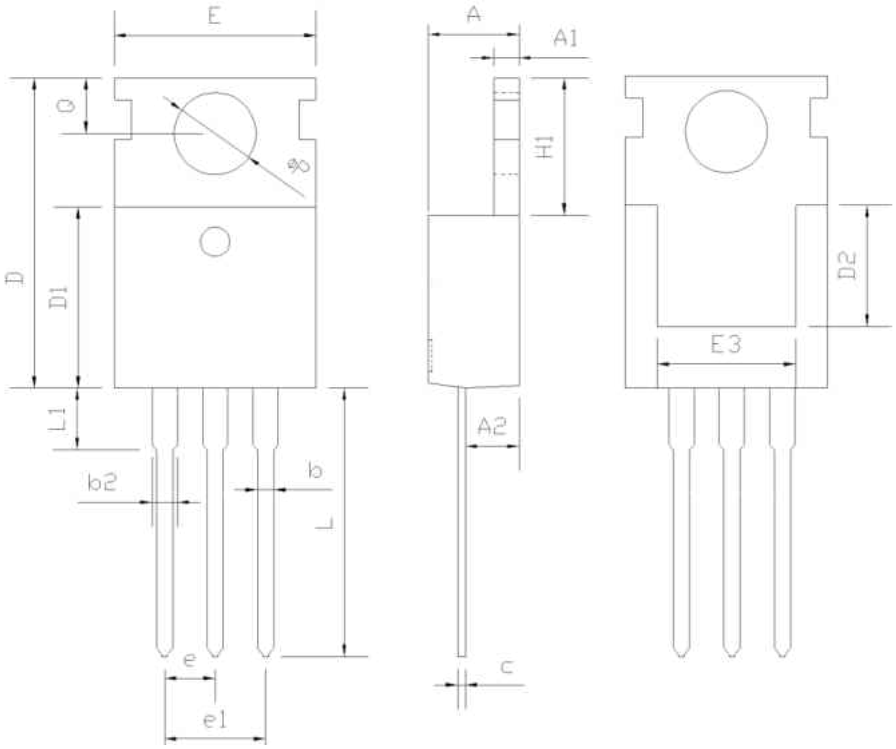
Figure2, TO247 package outline dimension



SYMBOL	mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.80	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.82	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15BSC		

■ Package Information

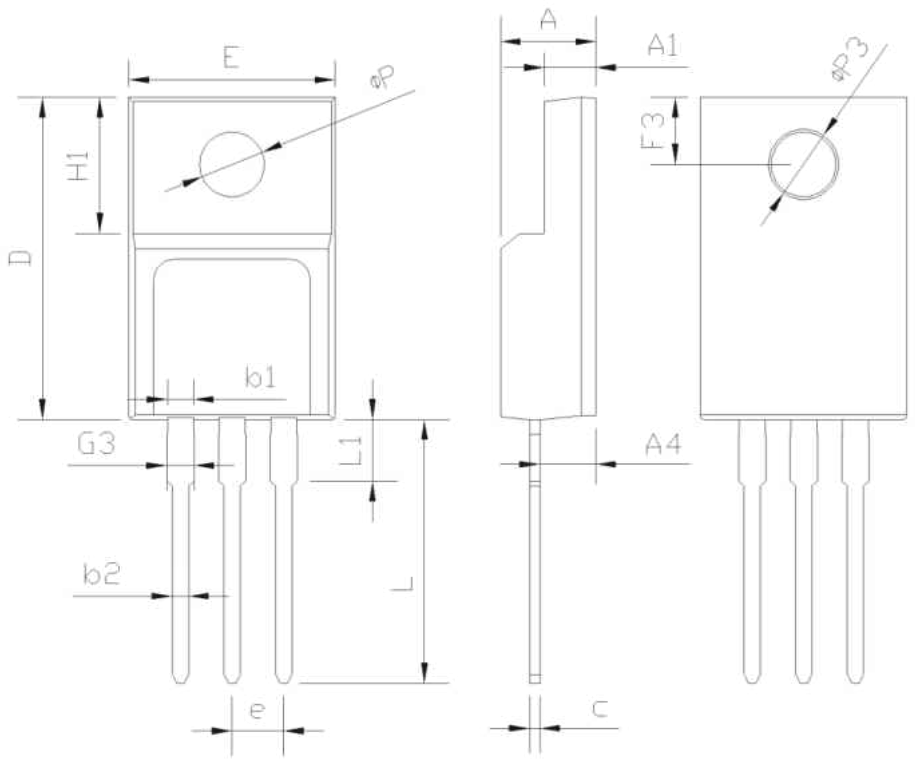
Figure3, TO220 package outline dimension



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