

# 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

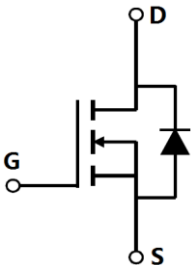

- ◆ Lighting
- ◆ Server power supply
- ◆ Telecom
- ◆ Solar inverter

## ■ General Description

OSG60R108KZF uses 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
◆ $R_{DS(ON), max @ V_{GS}=10 V}$	108 mΩ
◆ $Q_g$	37.1 nC

## ■ Schematic and Package Information

<b>Schematic Diagram</b> 	<b>Pin Assignment-Top View</b>  <b>TO263</b> <b>OSG60R108KZF</b>
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## ■ Absolute Maximum Ratings at $T_j=25^{\circ}C$ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	$V_{DS}$	600	V
Gate source voltage	$V_{GS}$	±30	V
Continuous drain current <sup>1)</sup>	$I_D$	30	A
Continuous drain current <sup>1)</sup> $T_j=100^{\circ}C$		19	
Pulsed drain current <sup>2)</sup>	$I_{D, pulse}$	90	A
Power dissipation <sup>3)</sup>	$P_D$	101	W
Single pulsed avalanche energy <sup>5)</sup>	$E_{AS}$	1000	mJ
MOSFET dV/dt ruggedness, $V_{DS}=0...480 V$	dV/dt	50	V/ns
Reverse diode dV/dt, $V_{DS}=0...480 V, I_{SD} \leq I_D$	dV/dt	50	V/ns
Operation and storage temperature	$T_{stg}, T_j$	-55 to 150	°C

## ■ Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	1.24	$^{\circ}\text{C}/\text{W}$
Thermal resistance, junction-ambient <sup>4)</sup>	$R_{\theta JA}$	62.5	$^{\circ}\text{C}/\text{W}$

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	$BV_{DSS}$	600			V	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$
		650	735			$V_{GS}=0\text{ V}, I_D=1\text{ mA}, T_j=150^{\circ}\text{C}$
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	$\Omega$	$V_{GS}=10\text{ V}, I_D=15\text{ A}$
			0.2			$V_{GS}=10\text{ V}, I_D=15\text{ A}, T_j=150^{\circ}\text{C}$
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	$\mu\text{A}$	$V_{DS}=600\text{ V}, V_{GS}=0\text{ V}$

## ■ 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	$V_{GS}=10\text{ V}, V_{DS}=400\text{ V}, R_G=2\ \Omega, I_D=16\text{ A}$
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	$V_{\text{plateau}}$		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		$\mu\text{C}$	
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**

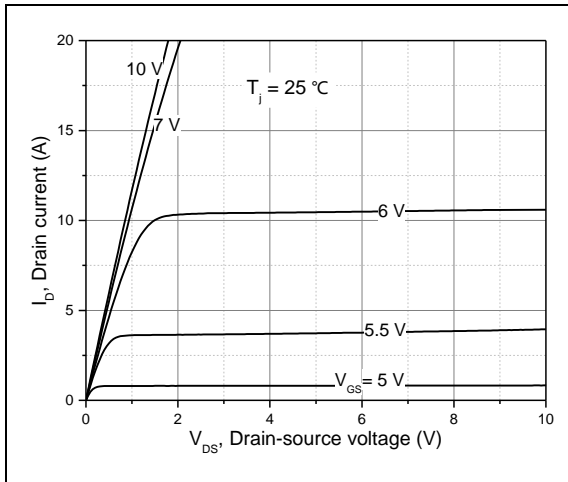


Figure 1, Typ. output characteristics

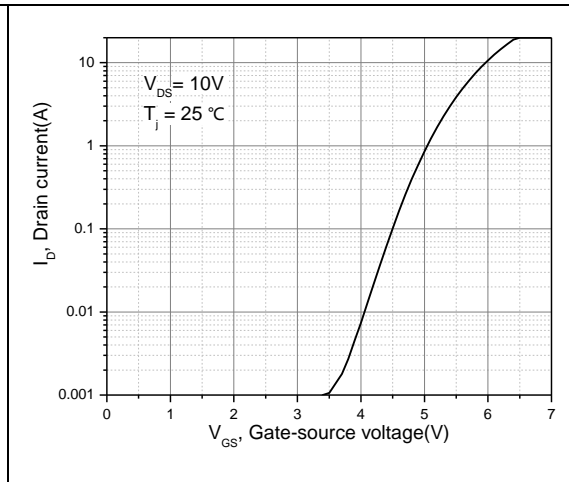


Figure 2, Typ. transfer characteristics

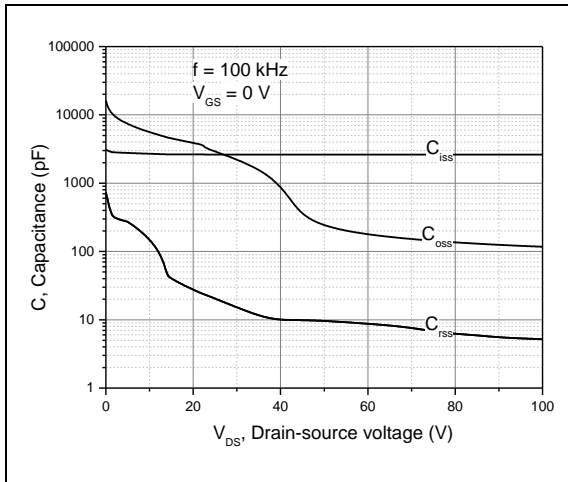


Figure 3, Typ. capacitances

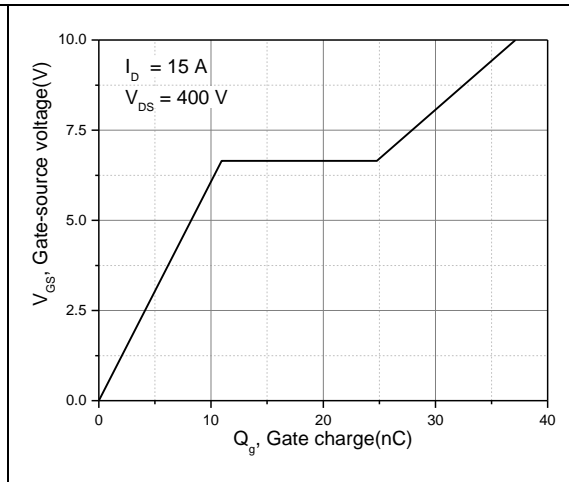


Figure 4, Typ. gate charge

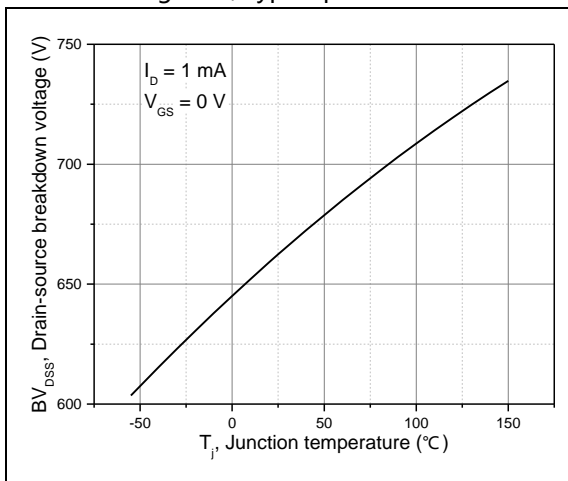


Figure 5, Drain-source breakdown voltage

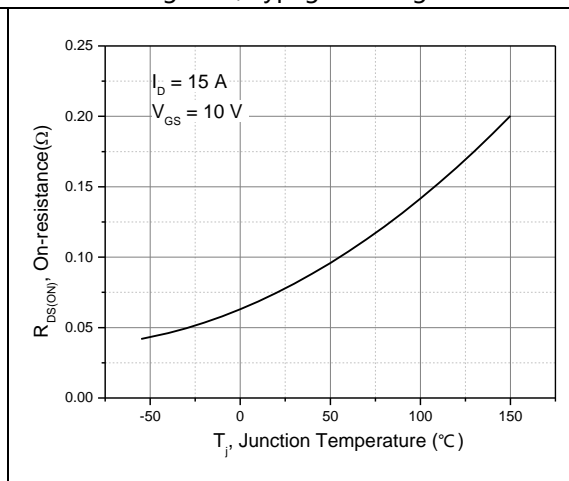


Figure 6, Drain-source on-state resistance

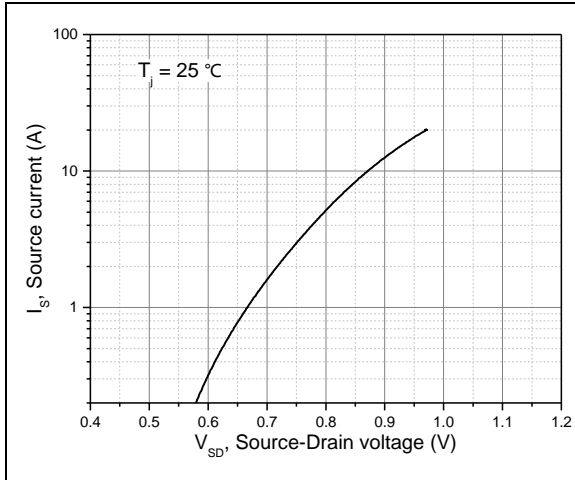


Figure 7, Forward characteristic of body diode

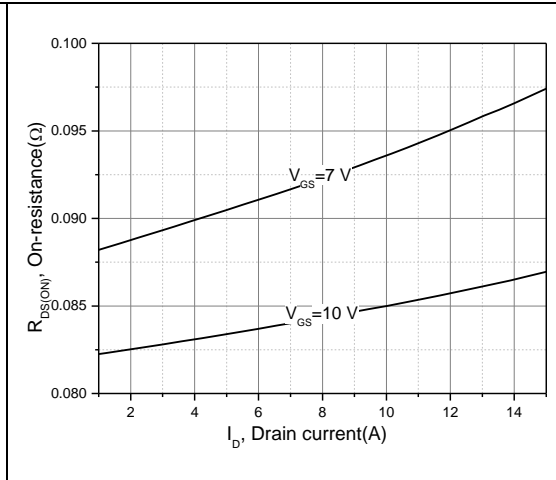


Figure 8, Drain-source on-state resistance

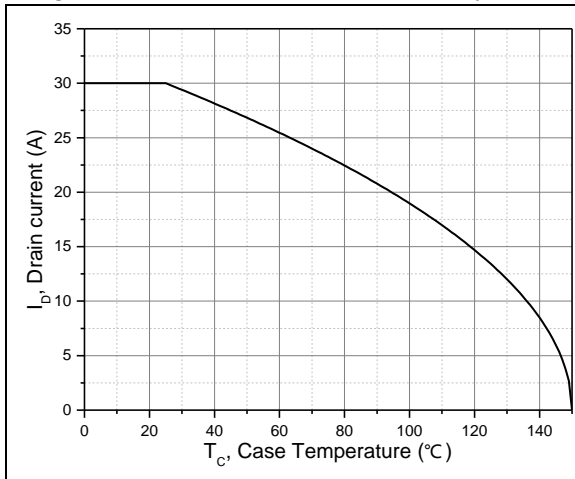


Figure 9, Drain current

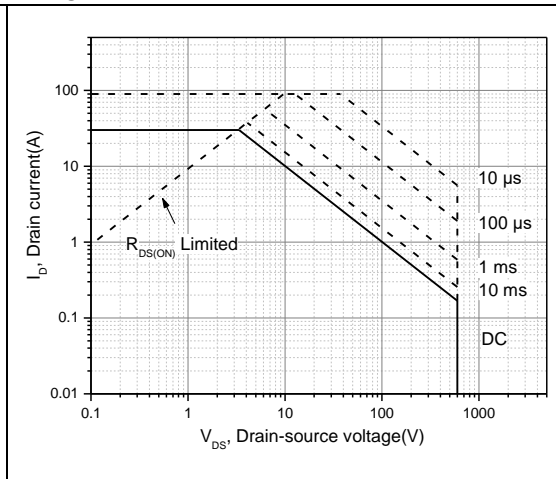


Figure 10, Safe operation area  $T_C=25\text{ }^\circ\text{C}$

■ Test circuits and waveforms

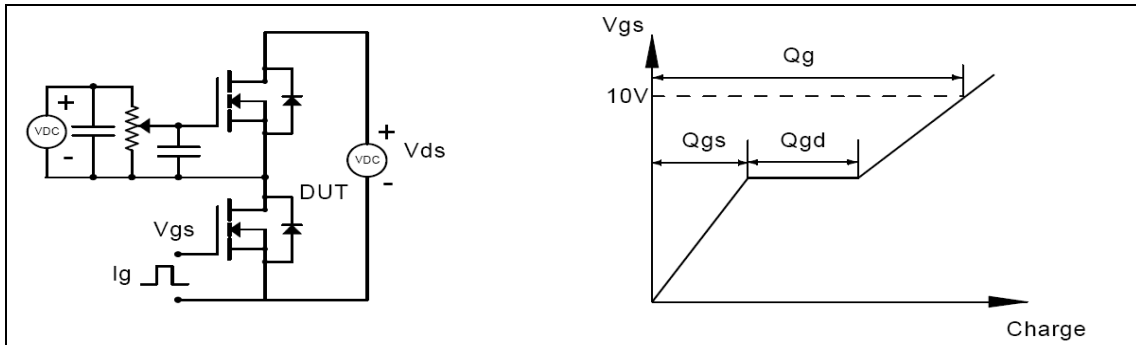


Figure 1, Gate charge test circuit & waveform

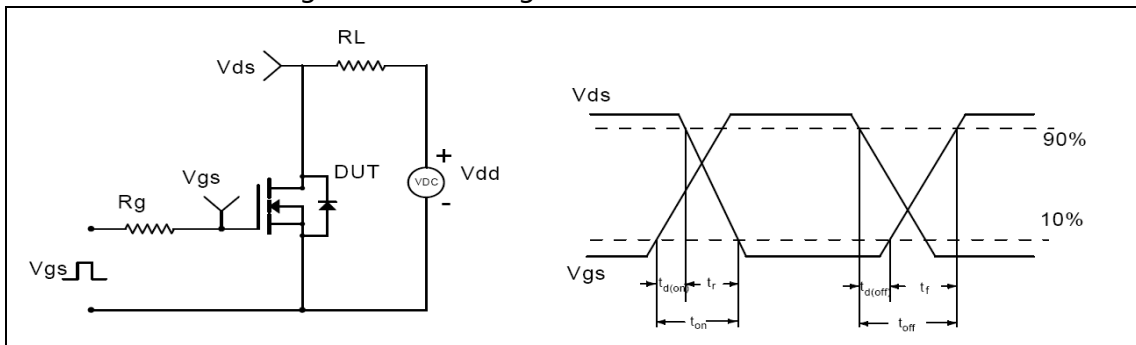


Figure 2, Switching time test circuit & waveforms

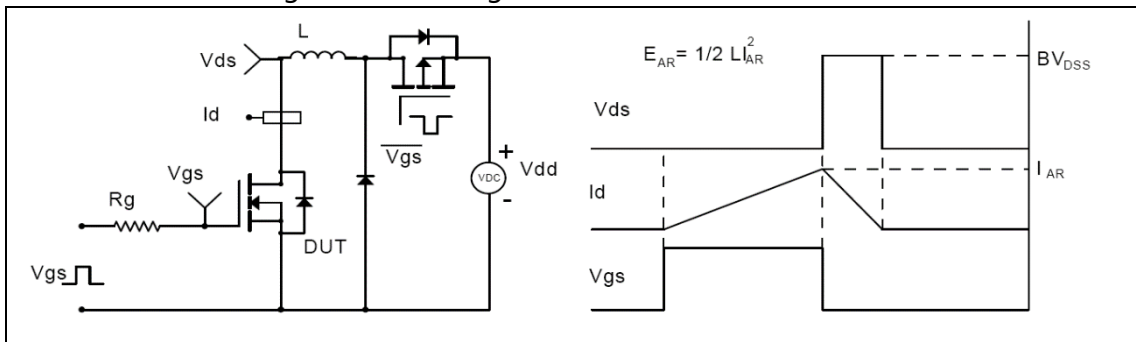


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

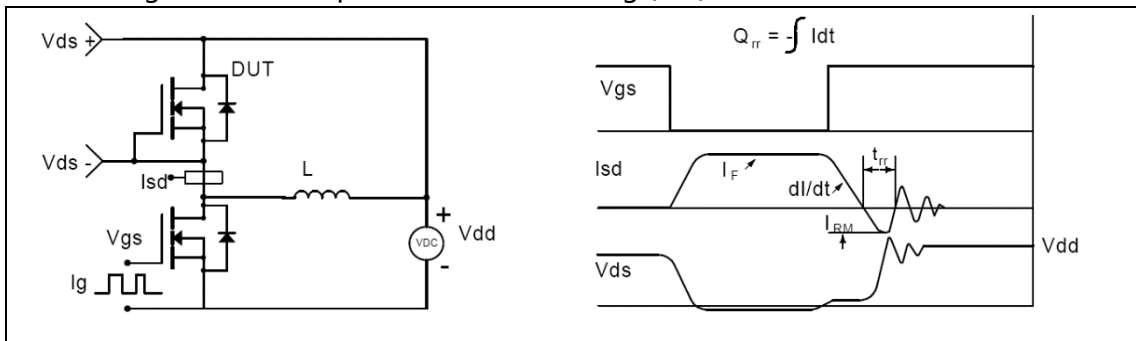
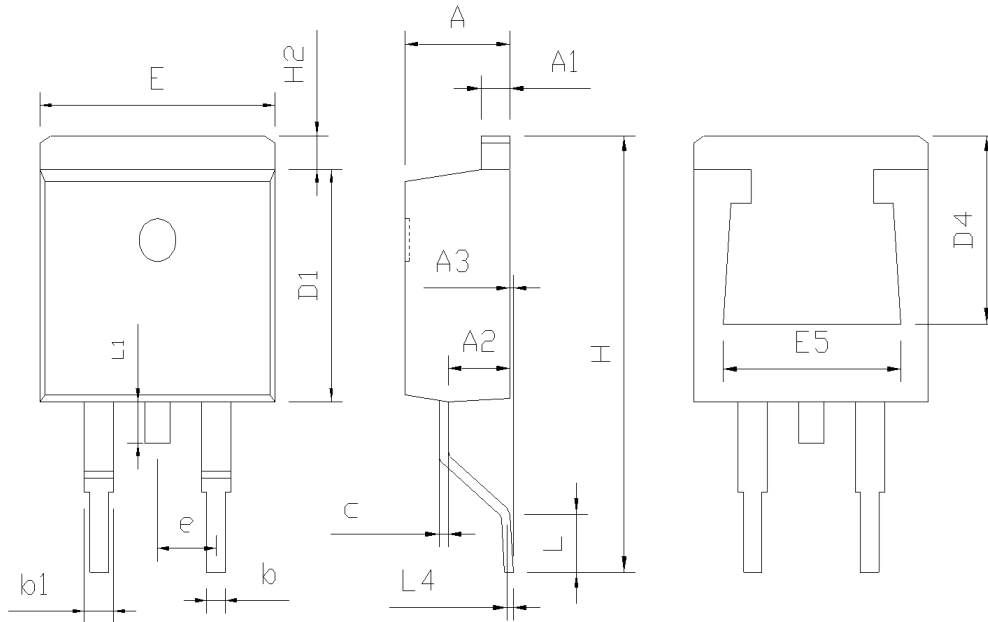


Figure 4, Diode reverse recovery test circuit & waveforms

**■ 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		



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**■ Ordering Information**

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

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**■ Product Information**

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Product	Package	Pb Free	RoHS	Halogen Free
OSG60R108KZF	TO263	yes	yes	yes