ORIENTAL SEMICONDUCTOR

GreenMOS™

OSG65R360xEF_Datasheet

Green PRODUCT

RoHS compliant

Enhancement Mode N-Channel Power MOSFET

Features

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

Applications

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

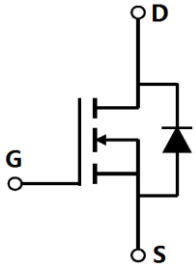
■ General Description

OSG65R360xEF 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.

- ◆ $V_{DS,\ min@Tjmax}$ 700 V
- ◆ $I_{D,\ pulse}$ 36 A
- ◆ $R_{DS(ON),\ max\ @\ VGS=10\ V}$ 360 mΩ
- ◆ Q_g 15.2 nC

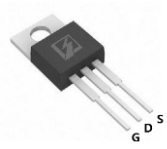
■ Schematic and Package Information

Schematic Diagram

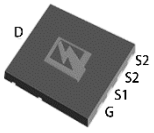


Pin Assignment Top View

TO252
OSG65R360DEF



TO220
OSG65R360PEF



PDFN8×8
OSG65R360JEF

■ Absolute Maximum Ratings at T_j=25℃ unless otherwise noted

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DS}	650	V
Gate source voltage	V_{GS}	±30	V
Continuous drain current[1], T_C=25 ℃	I_D	12	A
Continuous drain current[1], T_C=100 ℃		7.6	
Pulsed drain current[2], T_C=25 ℃	$I_{D,\ pulse}$	36	A
Power dissipation[3] , T_C=25 ℃	P_D	83	W
Single pulsed avalanche energy[5]	E_{AS}	200	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	15	V/ns
Operation and storage temperature	T_{stg}, T_j	-55 to 150	℃

■ Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case	$R_{\theta JC}$	1.5	°C/W
Thermal resistance, junction-ambient[4)]	$R_{\theta JA}$	62	°C/W

■ Electrical Characteristics at T_j=25 ℃ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Drain-source breakdown voltage	BV_{DSS}	650			V	V_{GS}=0 V, I_D=250 μA
		700	770			V_{GS}=0 V, I_D=250 μA, T_j=150 ℃
Gate threshold voltage	$V_{GS(th)}$	2.9		3.9	V	V_{DS}=V_{GS}, I_D=250 μA
Drain-source on-state resistance	$R_{DS(ON)}$		0.30	0.36	Ω	V_{GS}=10 V, I_D=3 A
			0.76			V_{GS}=10 V, I_D=3 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}			1	μA	V_{DS}=650 V, V_{GS}=0 V

■ Dynamic Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Input capacitance	C_{iss}		815.1		pF	V_{GS}=0 V, V_{DS}=50 V, f=1 MHz
Output capacitance	C_{oss}		59.6		pF	
Reverse transfer capacitance	C_{rss}		2.9		pF	
Turn-on delay time	$t_{d(on)}$		30.8		ns	V_{GS}=10 V, V_{DS}=400 V, R_G=2 Ω, I_D=6 A
Rise time	t_r		18.6		ns	
Turn-off delay time	$t_{d(off)}$		71.1		ns	
Fall time	t_f		14.0		ns	

■ Gate Charge Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Total gate charge	Q_g		15.2		nC	I_D=6 A, V_{DS}=400 V, V_{GS}=10 V
Gate-source charge	Q_{gs}		3.3		nC	
Gate-drain charge	Q_{gd}		5.9		nC	
Gate plateau voltage	$V_{plateau}$		6.3		V	

■ Body Diode Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test condition
Diode forward current	I_S			12	A	V_{GS}<V_{th}
Pulsed source current	I_{SP}			36		
Diode forward voltage	V_{SD}			1.3	V	I_S=12 A, V_{GS}=0 V
Reverse recovery time	t_{rr}		232.0		ns	V_R=400 V, I_S=6 A, di/dt=100 A/μs
Reverse recovery charge	Q_{rr}		2.1		μC	
Peak reverse recovery current	I_{rrm}		19.5		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 °C.
5) V_{DD}=100 V, R_G=50 Ω, L=60 mH, starting T_j=25 °C.

■ Electrical Characteristics Diagrams

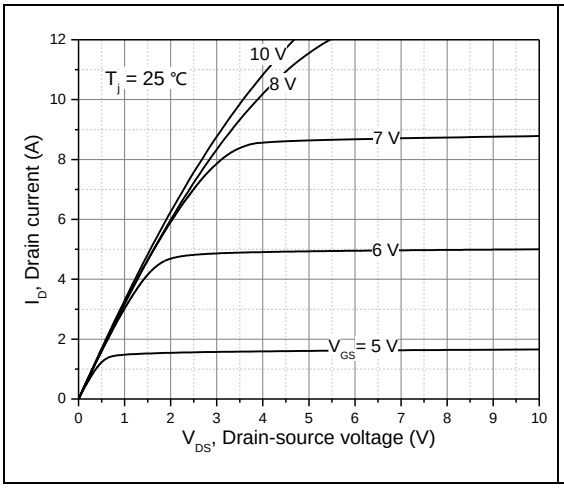


Figure 1, Typ. output characteristics

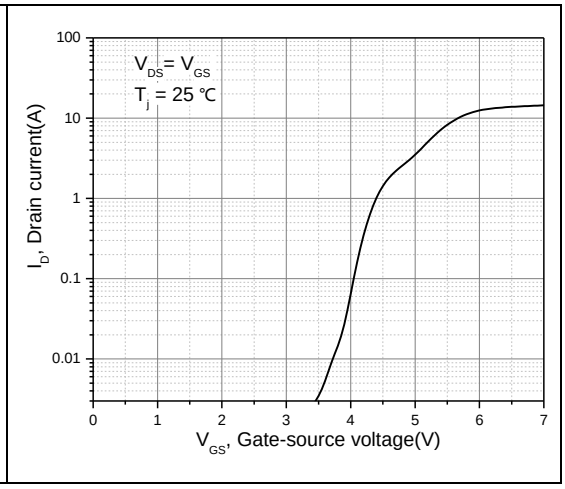


Figure 2, Typ. transfer characteristics

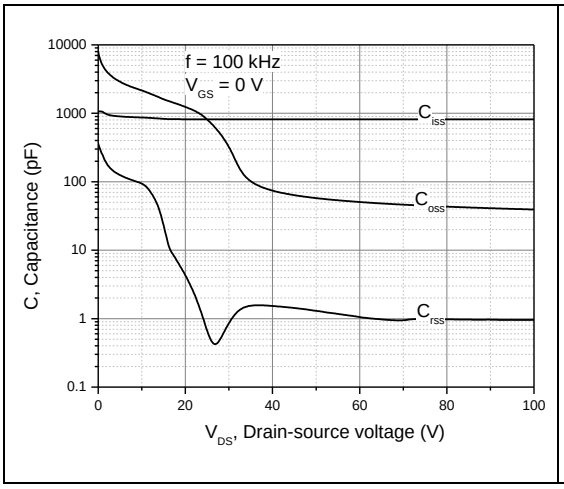


Figure 3, Typ. capacitances

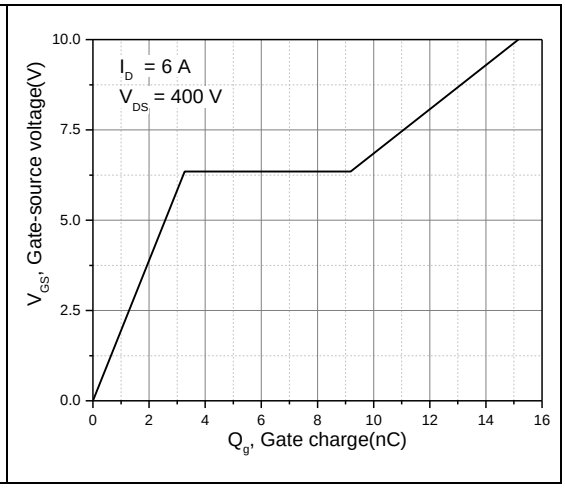


Figure 4, Typ. gate charge

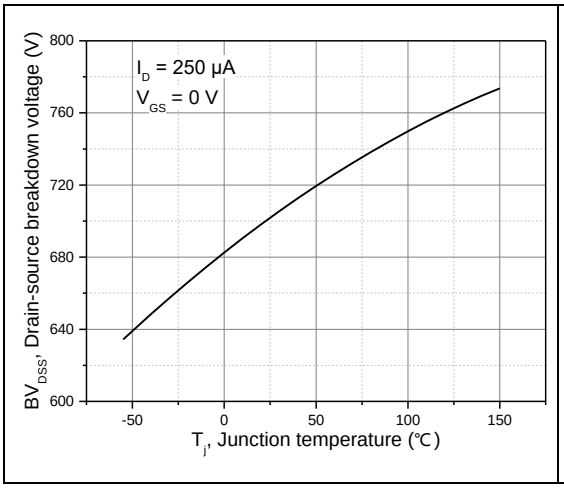


Figure 5, Drain-source breakdown voltage

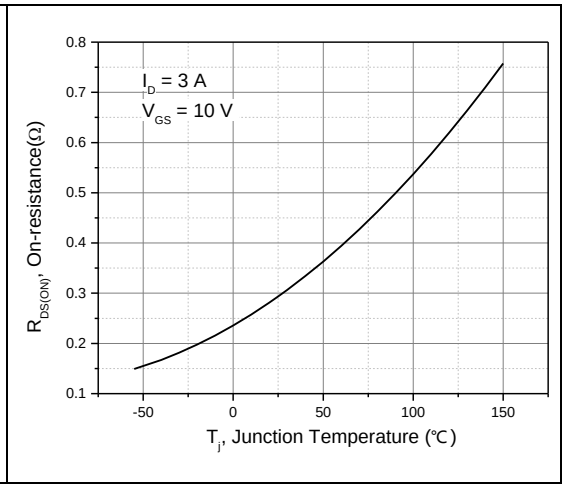


Figure 6, Drain-source on-state resistance

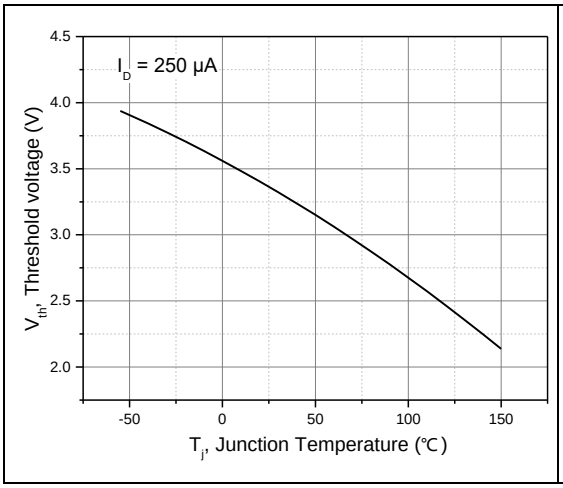


Figure 7, Threshold voltage

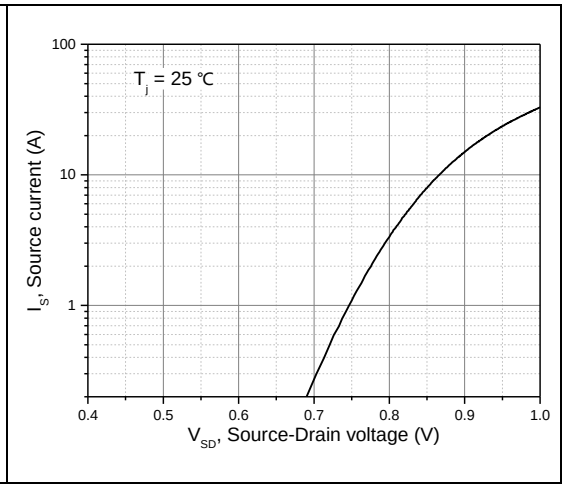


Figure 8, Forward characteristic of body diode

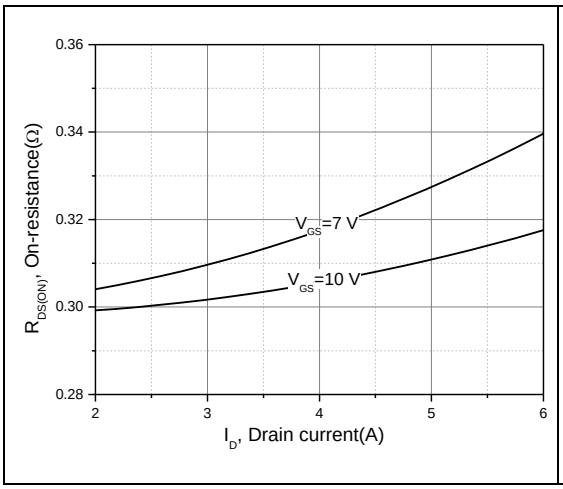


Figure 9, Drain-source on-state resistance

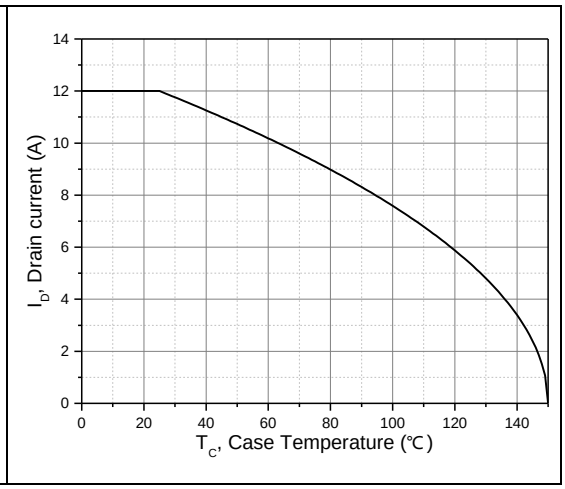


Figure 10, Drain current

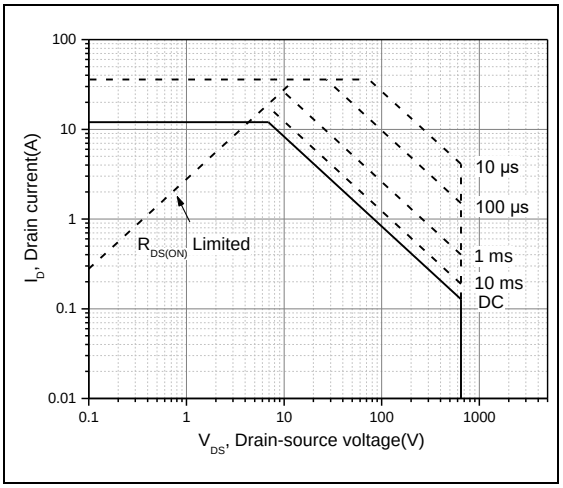


Figure 11, Safe operation area for T_C=25 ℃

■ Test circuits and waveforms

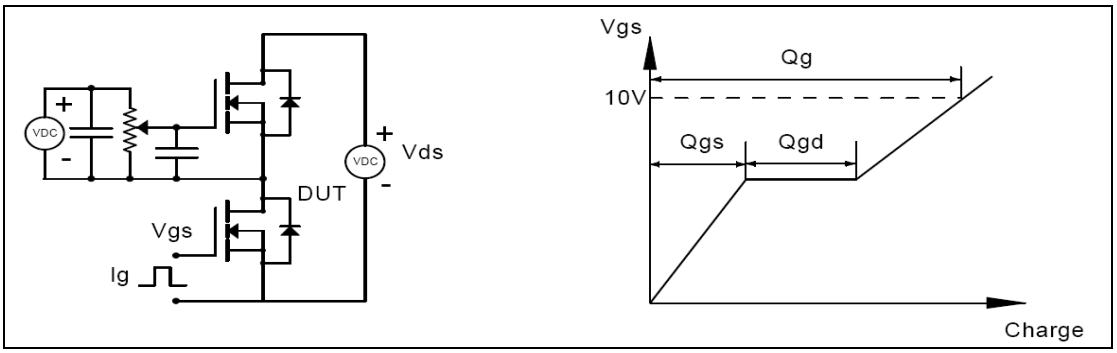


Figure 1, Gate charge test circuit & waveform

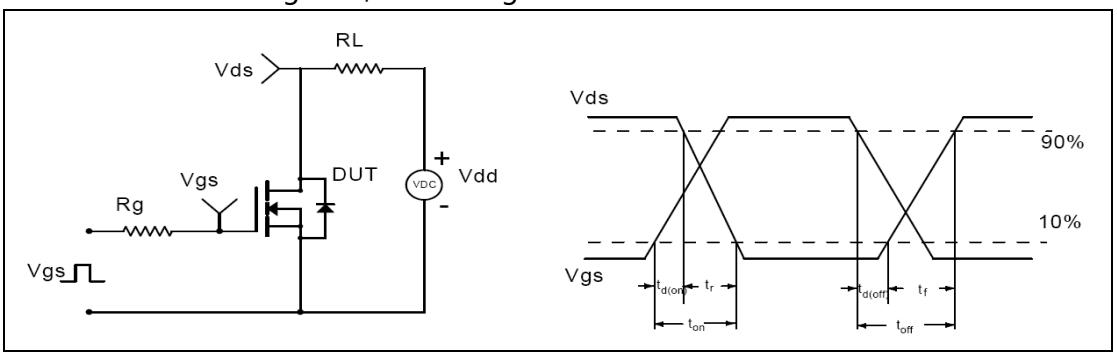


Figure 2, Switching time test circuit & waveforms

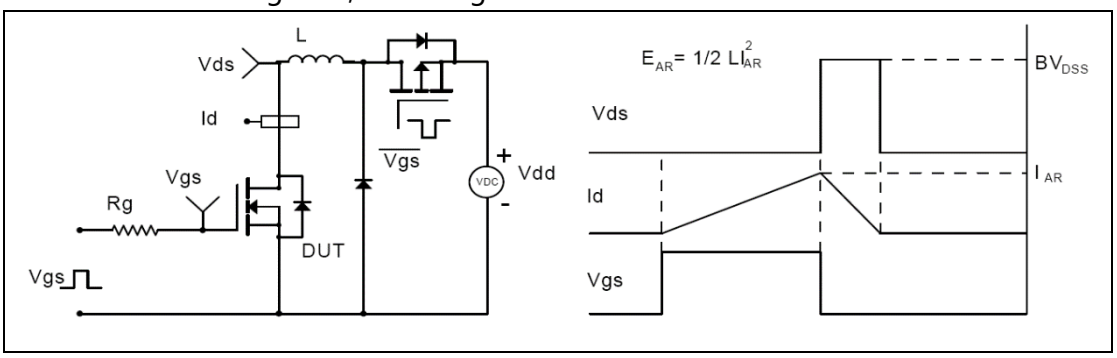


Figure 3, Unclamped inductive switching (UIS) test circuit & waveforms

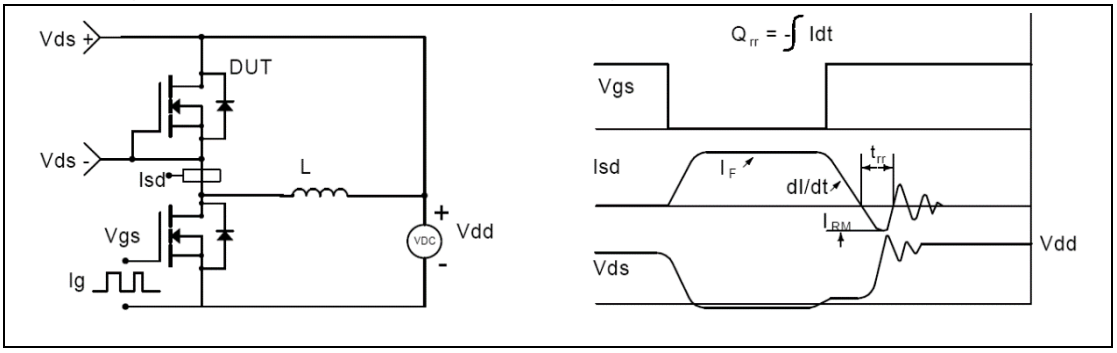
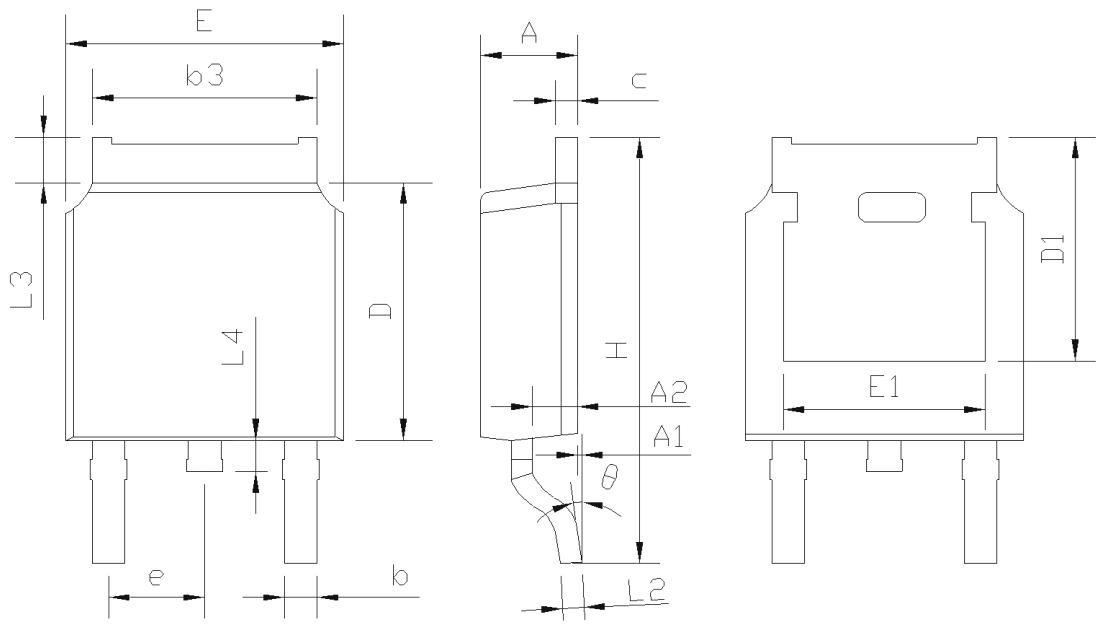


Figure 4, Diode reverse recovery test circuit & waveforms

■ Package Information

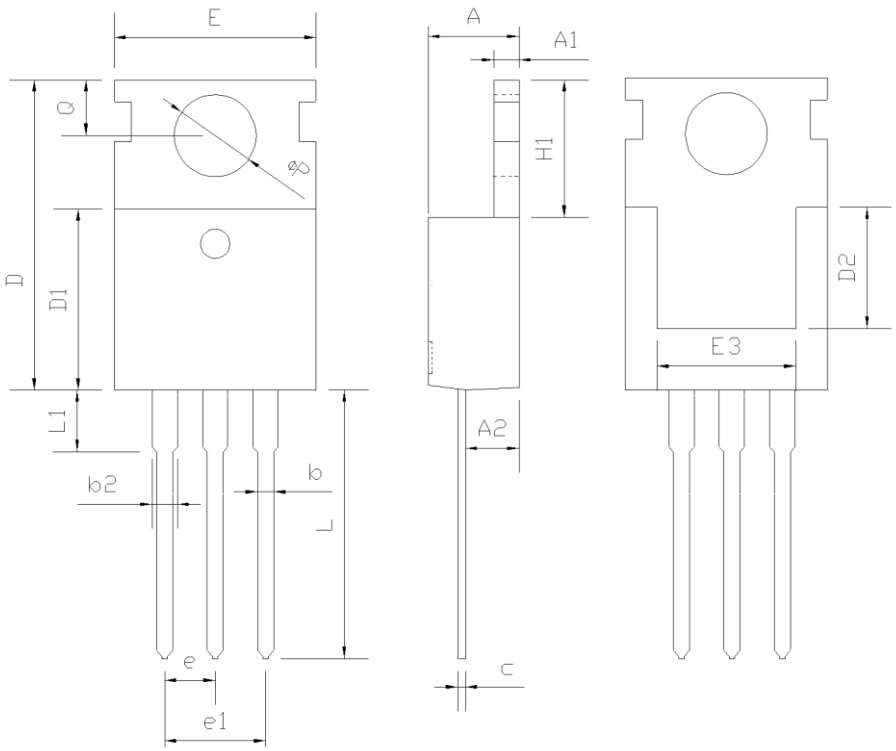
Figure1, TO252 package outline dimension



SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1		5.30REF	
E	6.40	6.60	6.73
E1	4.63	-	-
e		2.286BSC	
H	9.40	10.10	10.50
L2		0.51BSC	
L3	0.88	-	1.28
L4	0.50	-	1.00
θ	0°	-	8°

■ Package Information

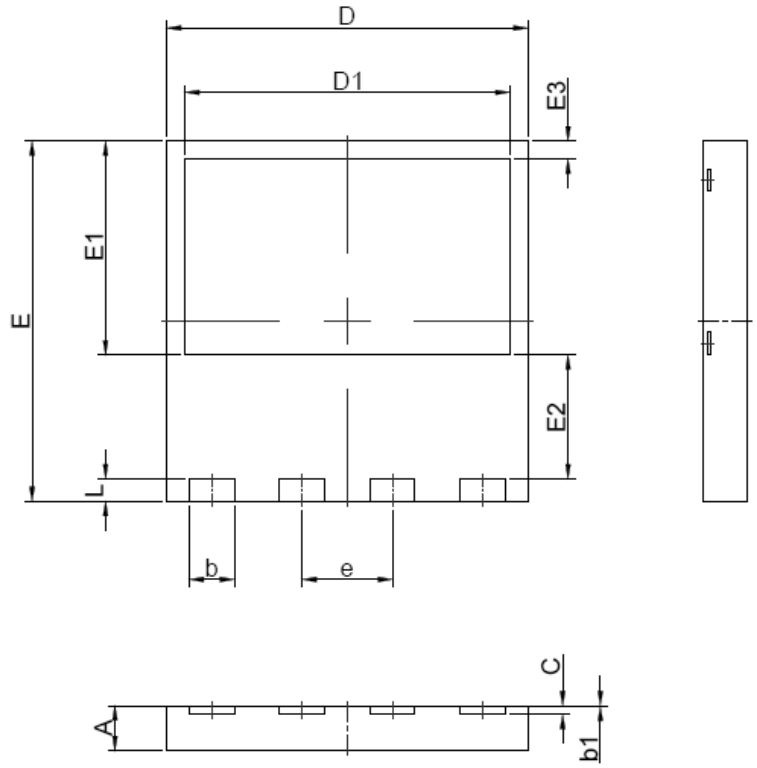
Figure2, TO220 package outline dimension



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

Figure3, PDFN8×8 package outline dimension



DIM	MIN	MAX	TYP
A	0.90	1.10	1.00
b	0.90	1.10	1.00
b1	0.00	0.05	0.02
C		0.2 REF	
D	7.90	8.10	8.00
D1	7.10	7.30	7.20
E	7.90	8.10	8.00
E1	4.65	4.85	4.75
E2	2.65	2.85	2.75
E3	0.30	0.50	0.40
e		2.0 BSC	
L	0.40	0.60	0.50

■ Ordering Information

Package	Units/Reel	Reels/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO252	2500	2	5000	5	25000
PDFN8×8	2500	1	2500	10	25000

Package	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Box/Carton Box	Units/Carton Box
TO220	50	20	1000	6	6000

■ Product Information

Product	Package	Pb Free	RoHS	Halogen Free
OSG65R360DEF	TO252	yes	yes	yes
OSG65R360PEF	TO220	yes	yes	yes
OSG65R360JEF	PDFN8×8	yes	yes	yes