



## WGU7N65SE/WGD7N65SE

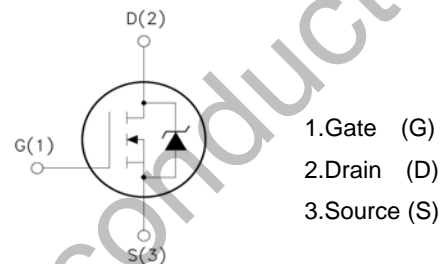
### Features:

- Low Intrinsic Capacitances.
- Excellent Switching Characteristics.
- Extended Safe Operating Area.
- Unrivalled Gate Charge : $Q_g=16nC$  (Typ.).
- $BVDSS=650V, I_D=7A$
- $R_{DS(on)} : 1.35\Omega$  (Max) @  $V_G=10V$
- 100% Avalanche Tested



TO-252

TO-251



### Absolute Maximum Ratings ( $T_a=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Unit
$V_{DSS}$	Drain-Source Voltage	650	V
$I_D$	Drain Current	$T_j=25^\circ C$	7
		$T_j=100^\circ C$	4.9
$V_{GS(TH)}$	Gate Threshold Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy (note1)	300	mJ
$I_{AR}$	Avalanche Current (note2)	7	A
$P_D$	Power Dissipation ( $T_j=25^\circ C$ )	80	W
$T_j$	Junction Temperature(Max)	150	$^\circ C$
$T_{stg}$	Storage Temperature	-55~+150	$^\circ C$
TL	Maximum lead temperature for soldering purpose, 1/8" from case for 5 seconds	300	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	1.56	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	110	$^\circ C/W$

# WGU7N65SE/WGD7N65SE

650V N-Channel MOSFET

## Electrical Characteristics (Ta=25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250μA, V <sub>GS</sub> =0	650	-	-	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	Breakdown Voltage Temperature Coefficient	I <sub>D</sub> =250μA, Reference to 25°C	-	0.6	-	V/°C
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	-	-	1	μA
		V <sub>DS</sub> =480V, T <sub>J</sub> =125°C	-	-	10	
I <sub>GSSF</sub>	Gate-body leakage Current, Forward	V <sub>GS</sub> =+30V, V <sub>DS</sub> =0V	-	-	100	nA
I <sub>GSSR</sub>	Gate-body leakage Current, Reverse	V <sub>GS</sub> =-30V, V <sub>DS</sub> =0V	-	-	-100	
<b>On Characteristics</b>						
V <sub>GS(TH)</sub>	Gate Threshold Voltage	I <sub>D</sub> =250μA, V <sub>DS</sub> =V <sub>GS</sub>	2	-	4	V
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	I <sub>D</sub> =3.5A, V <sub>GS</sub> =10V	-	1.25	1.35	Ω
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0, f=1.0MHz	-	1230	1450	pF
C <sub>oss</sub>	Output Capacitance		-	65	85	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	7	10	
<b>Switching Characteristics</b>						
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V, I <sub>D</sub> =3.5A R <sub>G</sub> =25Ω (Note 3,4)	-	15	40	ns
T <sub>r</sub>	Turn-On Rise Time		-	45	100	
T <sub>d(off)</sub>	Turn-Off Delay Time		-	45	100	
T <sub>f</sub>	Turn-Off Rise Time		-	45	100	
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =7A (Note 3,4)	-	16	20	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.5	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	6.5	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Max. Diode Forward Current	-	-	-	7	A
I <sub>SM</sub>	Max. Pulsed Forward Current	-	-	-	28	
V <sub>SD</sub>	Diode Forward Voltage	I <sub>D</sub> =7A	-	-	1.5	V
T <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =7A, V <sub>GS</sub> =0V diF/dt=100A/μs	-	310	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge	(Note3)	-	2.1	-	μC

Notes : 1, L=34.3mH, I<sub>AS</sub>=7A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C

2, Repetitive Rating : Pulse width limited by maximum junction temperature

3, Pulse Test : Pulse Width ≤ 300μs, Duty Cycle ≤ 2%

4, Essentially Independent of Operating Temperature

## Typical Characteristics

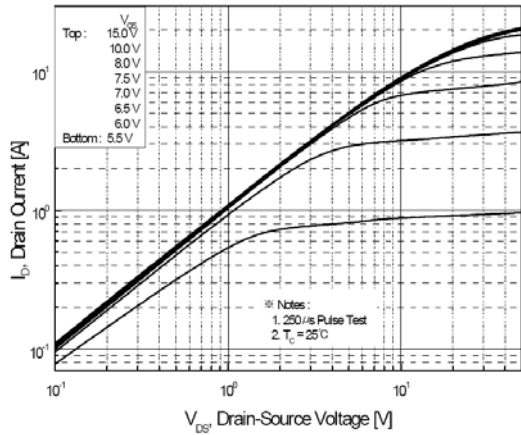


Figure 1. On-Region Characteristics

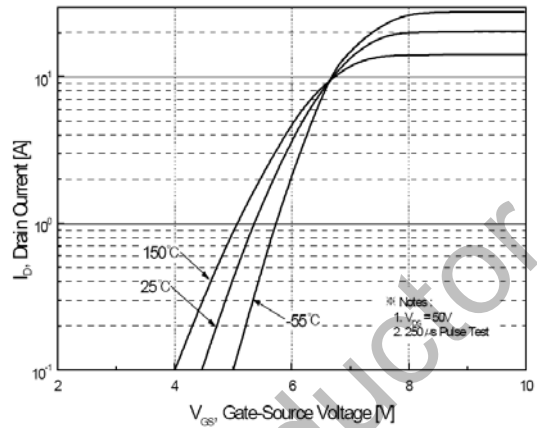


Figure 2. Transfer Characteristics

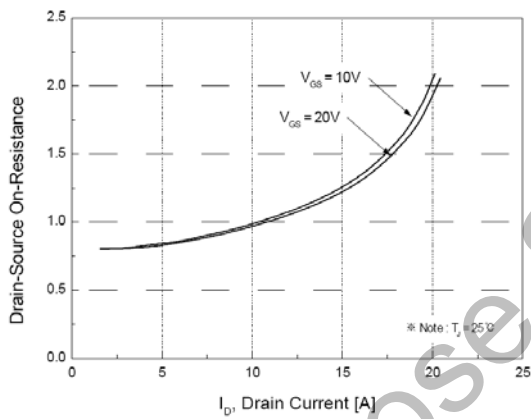


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

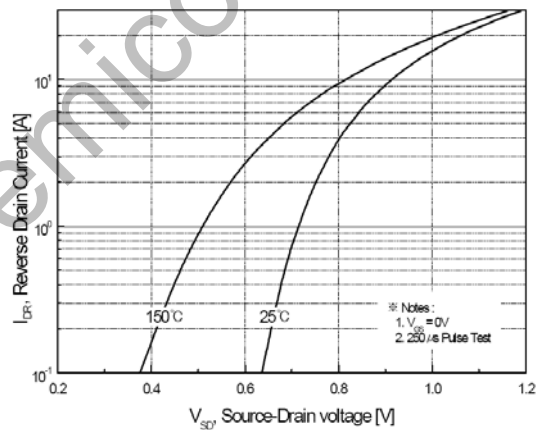


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

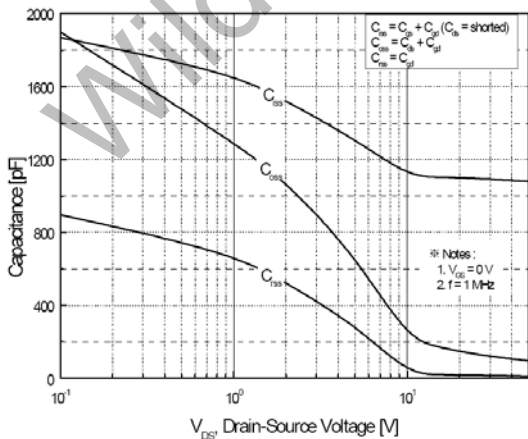


Figure 5. Capacitance Characteristics

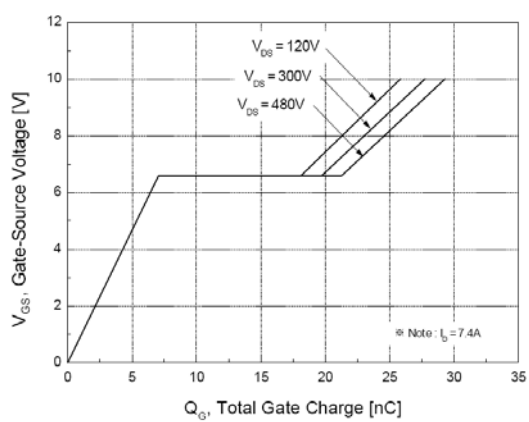


Figure 6. Gate Charge Characteristics

## Typical Characteristics (Continued)

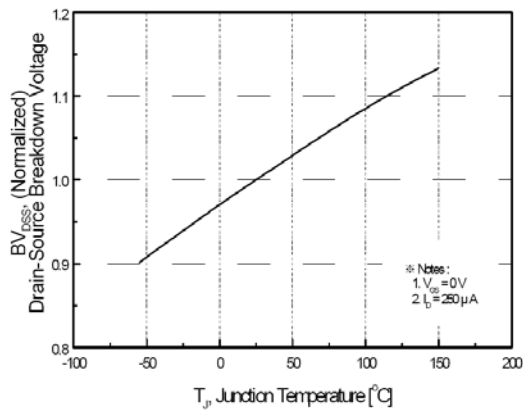


Figure 7. Breakdown Voltage Variation vs Temperature

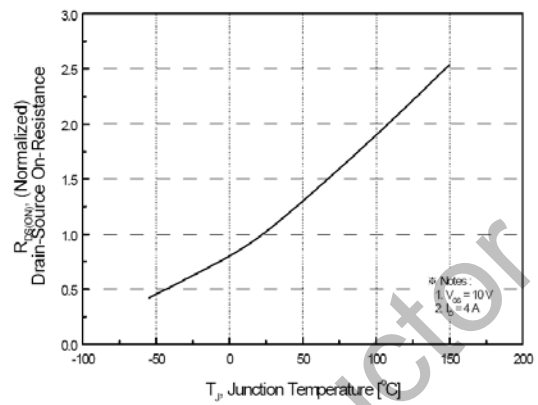


Figure 8. On-Resistance Variation vs Temperature

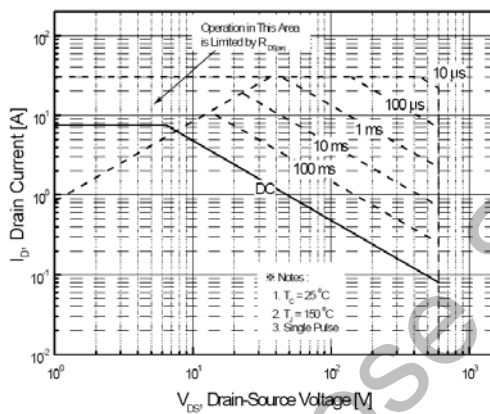


Figure 9-2. Maximum Safe Operating Area

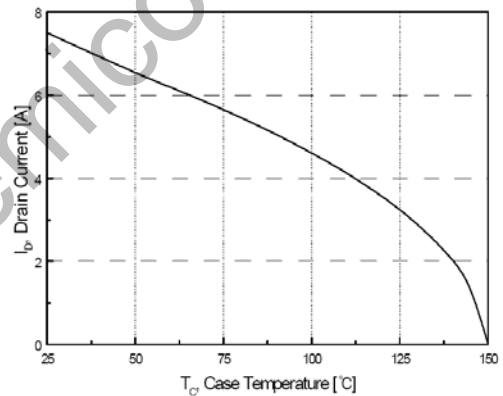


Figure 10. Maximum Drain Current vs Case Temperature

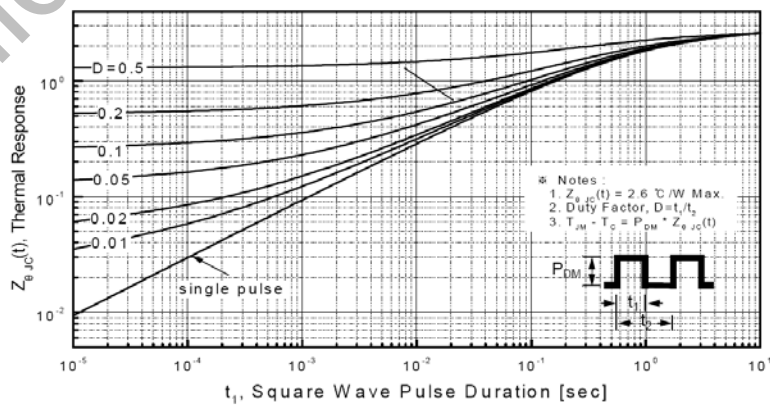
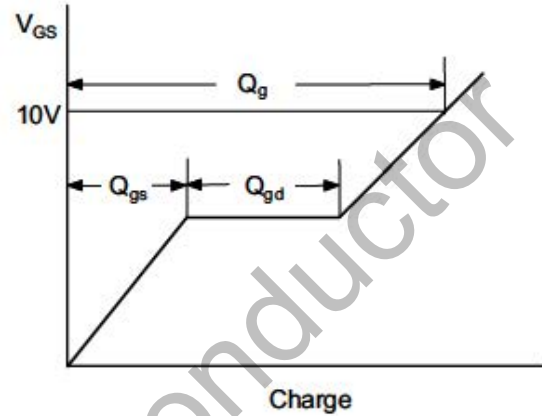
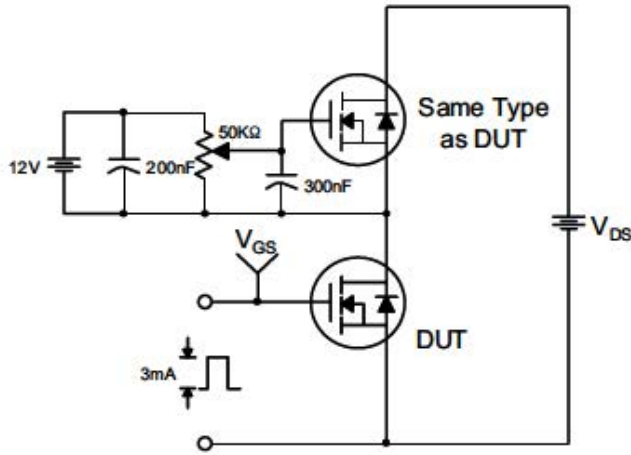
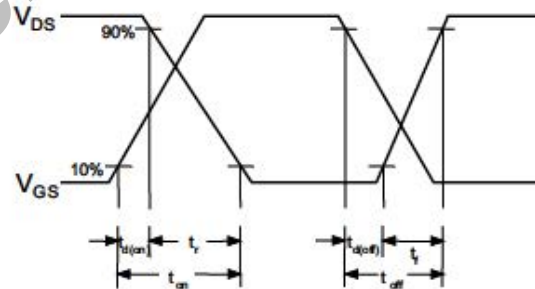
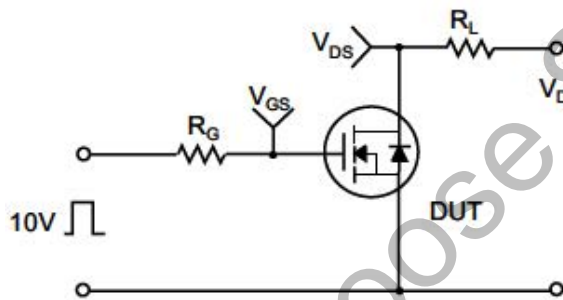


Figure 11-2. Transient Thermal Response Curve

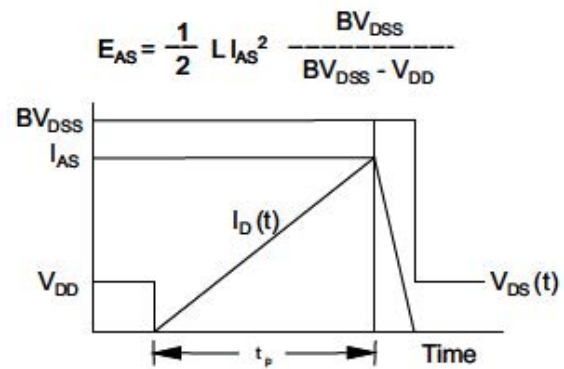
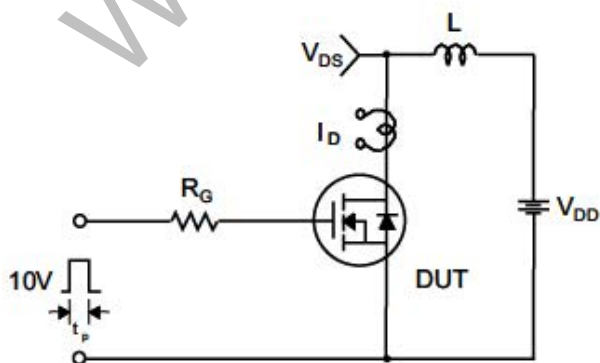
### Gate Charge Test Circuit & Waveform



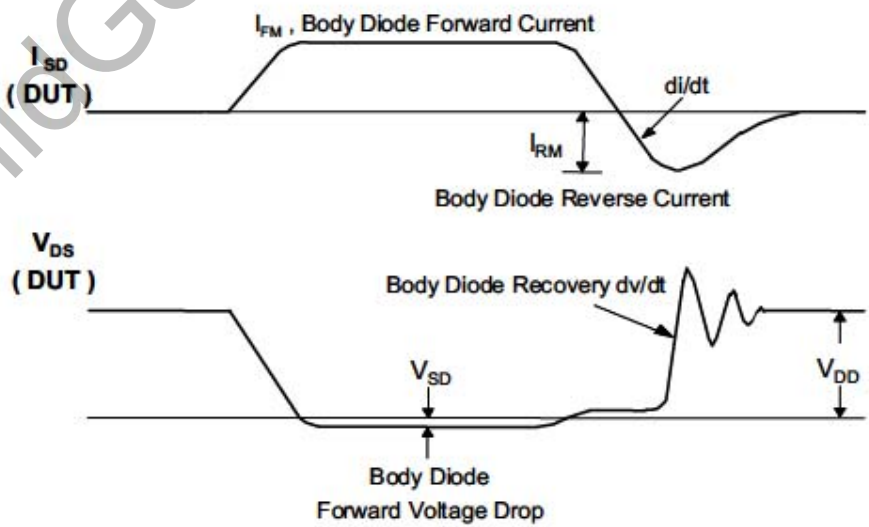
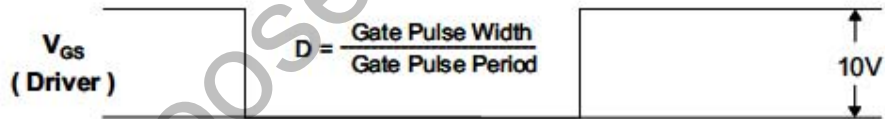
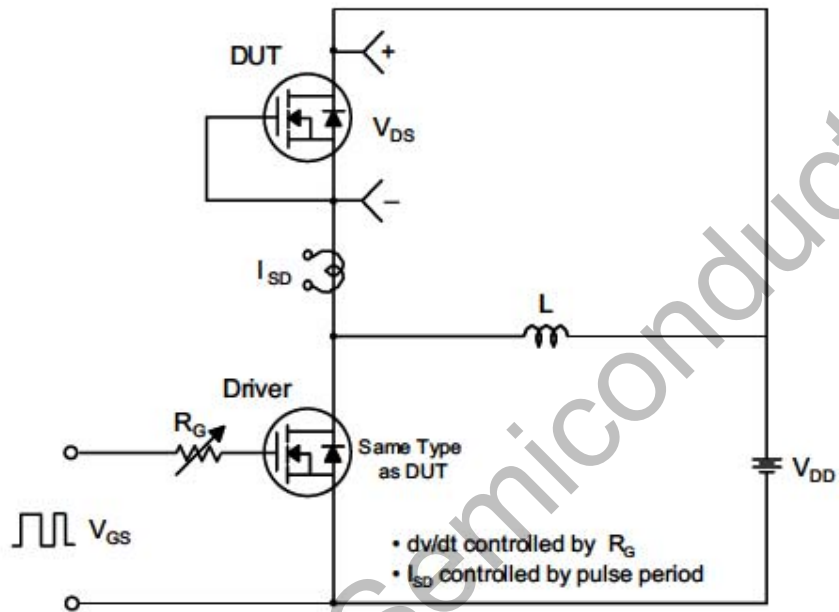
### Resistive Switching Test Circuit & Waveforms



### Unclamped Inductive Switching Test Circuit & Waveforms



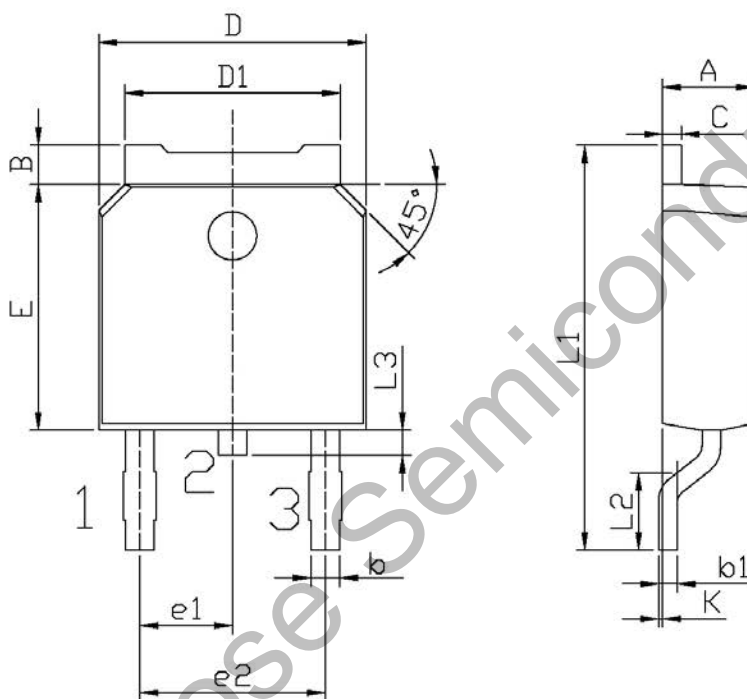
Peak Diode Recovery dv/dt Test Circuit & Waveforms



## Package Dimension

TO-252

Unit: mm



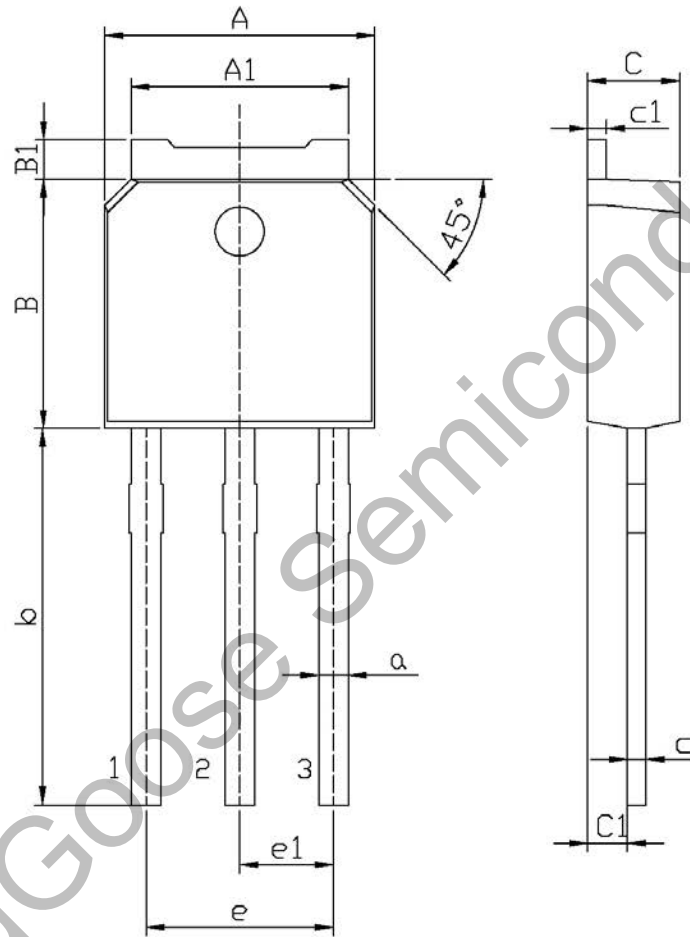
单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	2.20	2.40	E	5.95	6.25
B	0.95	1.25	e1	2.24	2.34
b	0.70	0.90	e2	4.43	4.73
b1	0.45	0.55	L1	9.85	10.35
C	0.45	0.55	L2	1.25	1.75
D	6.45	6.75	L3	0.60	0.90
D1	5.20	5.40	K	0.00	0.10

**Package Dimension**

TO-251

Unit: mm



单位: mm

Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	6.45	6.75	a	0.70	0.90
A1	5.20	5.40	b	9.00	9.40
B	5.95	6.25	c	0.45	0.55
B1	0.95	1.25	c1	0.45	0.55
C	2.20	2.40	e1	2.24	2.34
C1	0.95	1.15	e	4.43	4.73



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