

## 1000V N-Channel POWER MOSFET

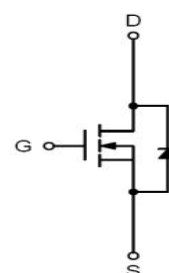
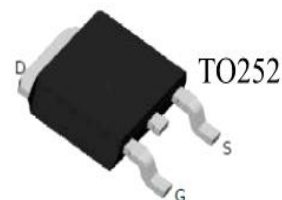
### Features

- $V_{DSS}=1000V$   $I_D=2A$   
 $R_{DS(ON)}=6\Omega(Typ.)@V_{GS}=10V$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

### Applications

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

### PIN DESCRIPTION



Part Number	Package	Marking	ROHS Status	Packing
SI2N100D	TO-252	SI2N100D	Pb-Free	Tape&Reel

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

Symbol	Parameter	Typical	Unit
$V_{DSS}$	Drain-Source Voltage	1000	V
$V_{GSS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	2	A
$I_{DM}$	Pulsed Drain Current	8	A
$P_D$	Power Dissipation ( $T_C=25^\circ C$ )	75	W
$I_{AS}$	Avalanche Current	3	A
$E_{AS}$	Single Pulse Avalanche Energy	45	mJ
$E_{AR}$	Repetitive Avalanche Energy	27	mJ
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ C$

### Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, Junction – Case.	$R_{thJC}$	1.67	$^\circ C/W$
Thermal resistance, Junction – Ambient.	$R_{thJA}$	60	

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-source breakdown voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	1000	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =1000V, V <sub>GS</sub> =0V	-	-	1	uA
I <sub>GSS</sub>	Gate-Source Leakage	V <sub>GS</sub> =±30V	-	-	± 100	nA
V <sub>GS(th)</sub>	Gate-Source Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	3.0	-	4.0	V
R <sub>DS(on)</sub>	Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =1.0A	-	6	7.2	Ω
<b>Dynamic Characteristic</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, f=1.0MHz	-	419	-	pF
C <sub>oss</sub>	Output Capacitance		-	45	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	9	-	
Q <sub>g</sub>	Gate Total Charge	V <sub>DS</sub> =800V, I <sub>D</sub> =2.0A, V <sub>GS</sub> =15V	-	19	-	nC
Q <sub>gs</sub>	Gate-Source charge		-	2	-	
Q <sub>gd</sub>	Gate-Drain charge		-	8	-	
t <sub>d(on)</sub>	Turn-on delay time	V <sub>DD</sub> =500V, I <sub>D</sub> =2.0A, R <sub>G</sub> =25Ω	-	36	-	nS
t <sub>r</sub>	Rise time		-	12	-	
t <sub>d(off)</sub>	Turn-off delay time		-	100	-	
t <sub>f</sub>	Fall time		-	43	-	
<b>Drain-Source Body Diode Characteristics</b>						
V <sub>SD</sub>	Body Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>SD</sub> =1.0A	-	-	1.4	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>S</sub> =2.0A , dI <sub>F</sub> /dt =100A/μs	-	432	-	nS
Q <sub>rr</sub>	Body Diode Reverse Recovery Charge		-	424	-	uC
I <sub>S</sub>	Continuous Drain-Source Diode Forward Current		-	-	2	A
I <sub>SM</sub>	Pulsed Drain-Source Diode Forward Current		-	-	8	A

### Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature
- 2.L=10mH, V<sub>DD</sub>=50V, R<sub>G</sub>= 25 Ω, Starting T<sub>J</sub>= 25 °
- 3.Pulse Test: Pulse width ≤ 350μs, Duty Cycle ≤ 1%

## ■ Switching Time Test Circuit and Wave forms

Figure A: Gate Charge Test Circuit and Waveform

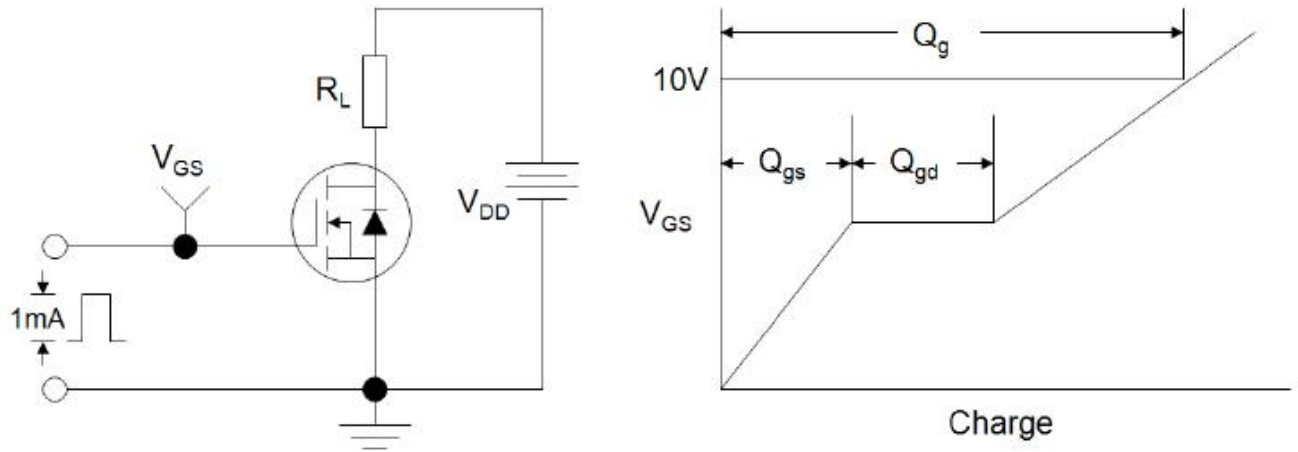


Figure B: Resistive Switching Test Circuit and Waveform

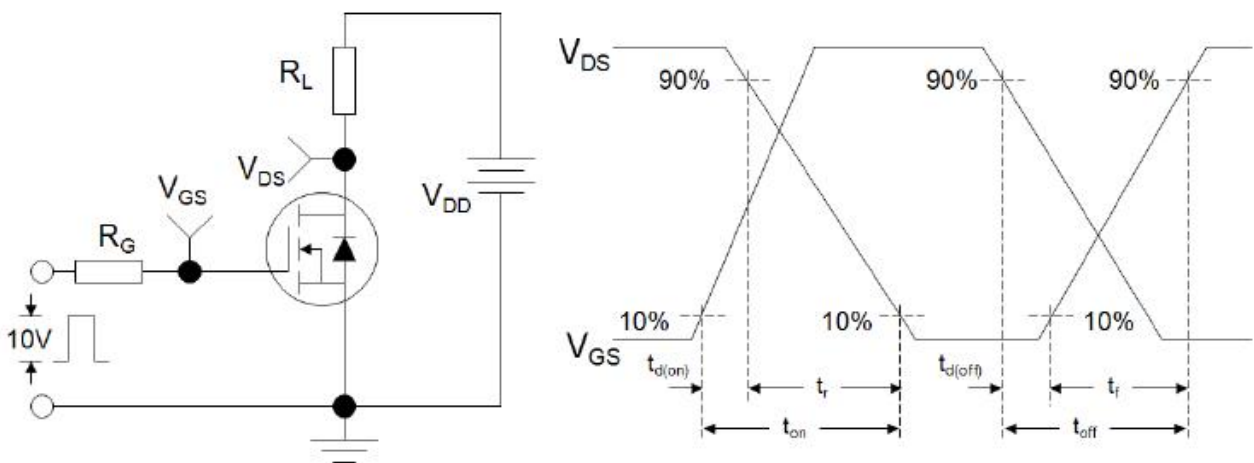
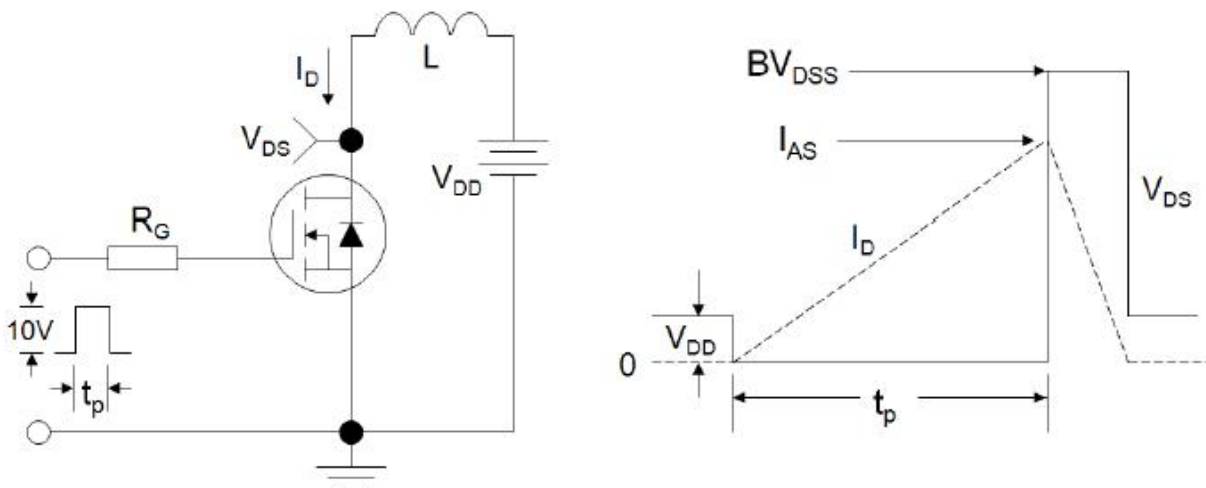


Figure C: Unclamped Inductive Switching Test Circuit and Waveform



## Typical Performance Characteristics

Figure 1. Output Characteristics ( $T_J = 25^\circ\text{C}$ )

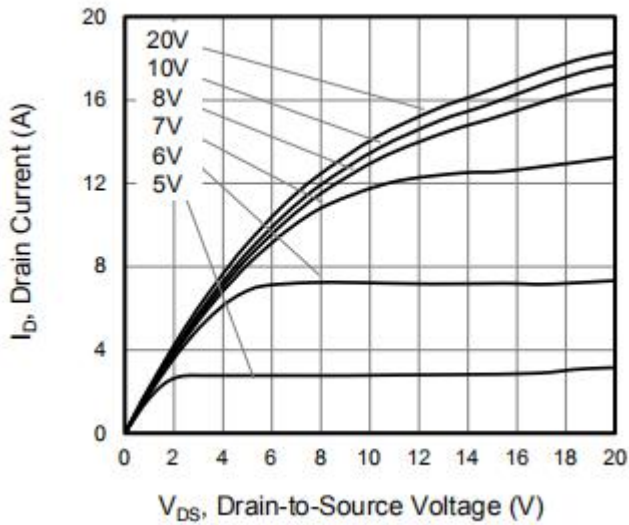


Figure 2. Body Diode Forward Voltage

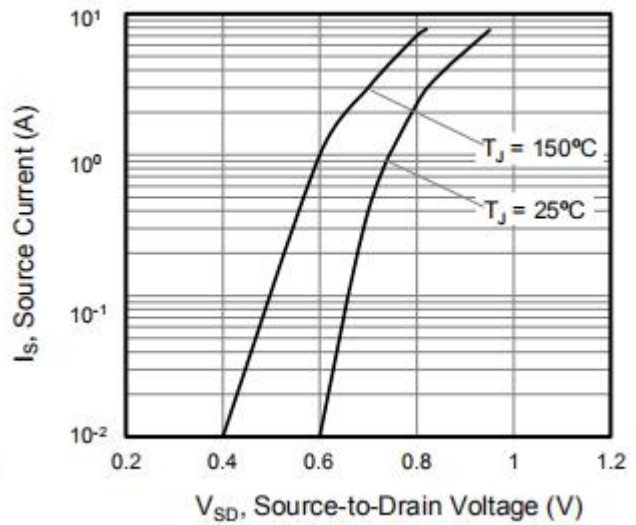


Figure 3. Drain Current vs. Temperature

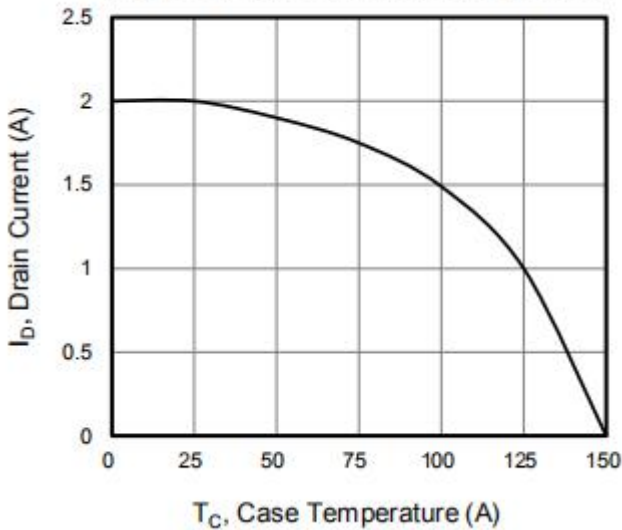


Figure 4.  $BV_{DSS}$  Variation vs. Temperature

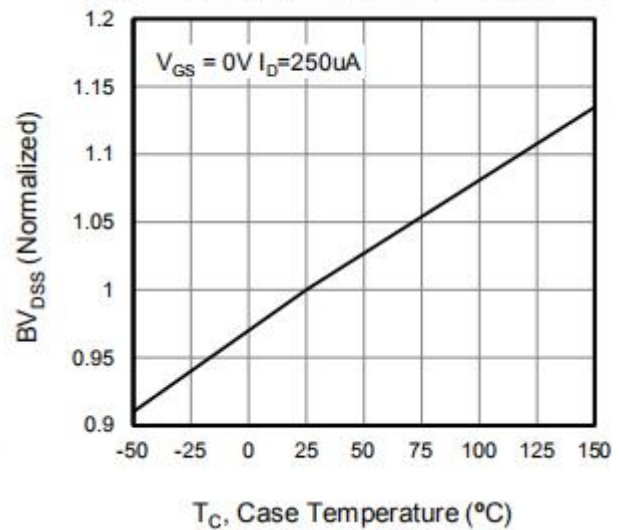


Figure 5. Transfer Characteristics

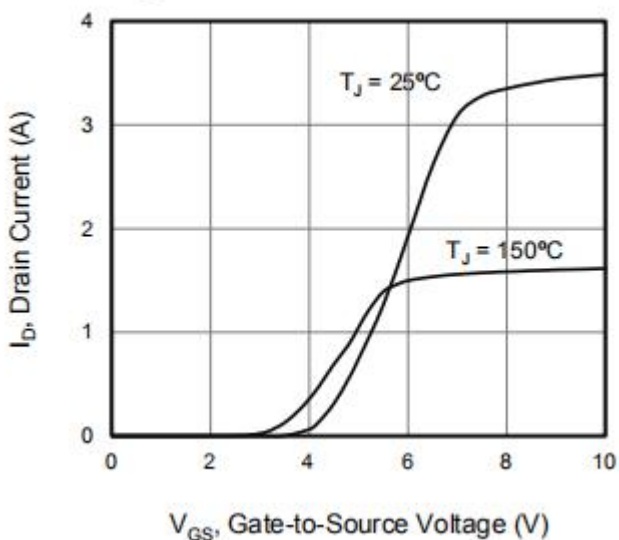
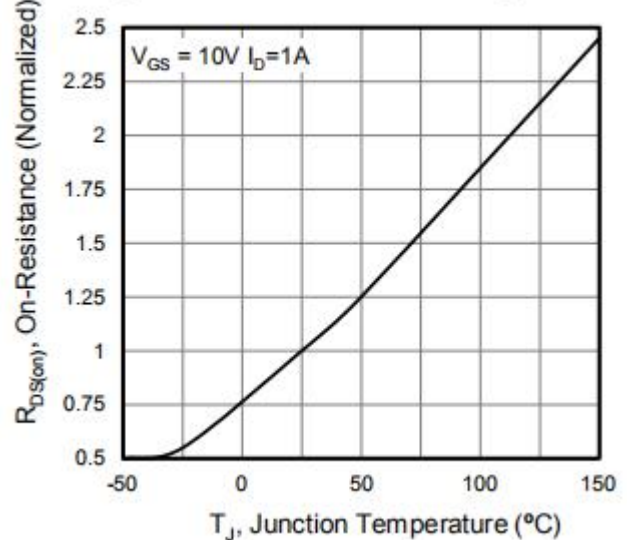
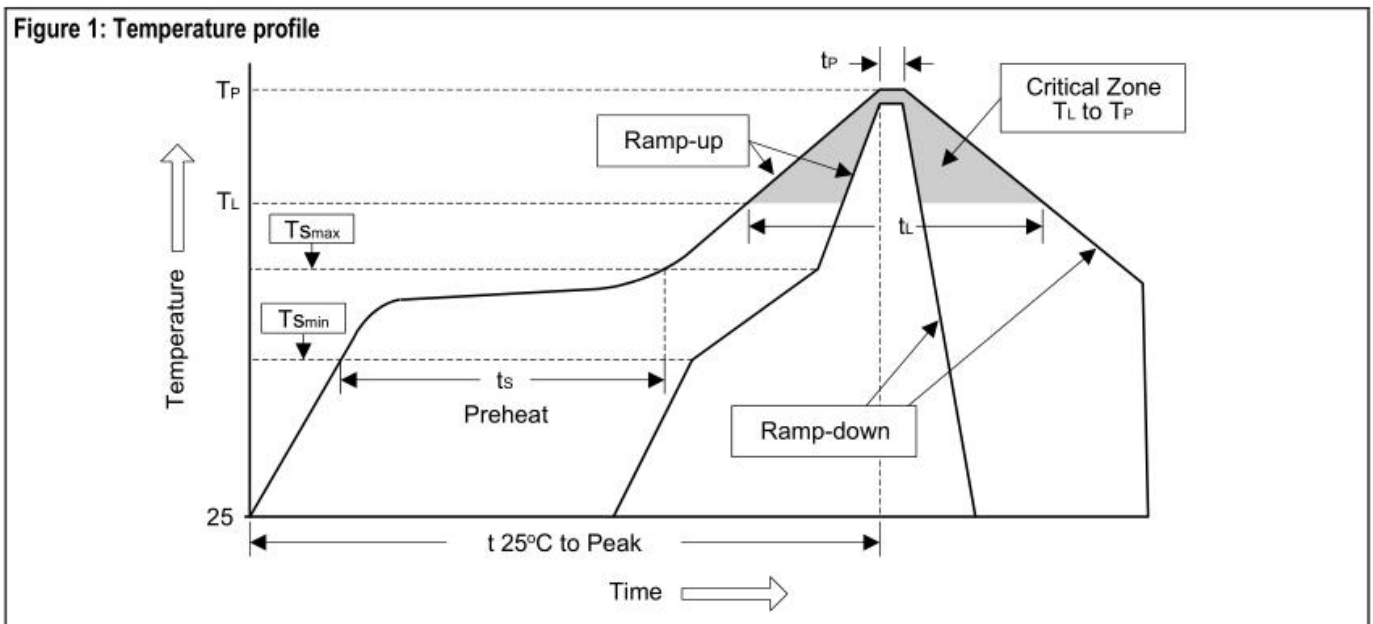


Figure 6. On-Resistance vs. Temperature



## Soldering Methods for Products

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(min to max)(ts)	60 to 120 sec	60 to 180 sec
Tsmax to TL		
- ramp-up rate	<3°C/sec	<3°C/sec
Time maintained above:		
-Temperature(TL)	183°C	217°C
-Time(tL)	60 to 150 sec	60 to 150 sec
Peak Temperature(Tp)	240°C+0/-5°C	250°C+0/-5°C
Time within 5°C of actual Peak Temperature	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25 °C to Peak Temperature	<6 minutes	<8 minutes

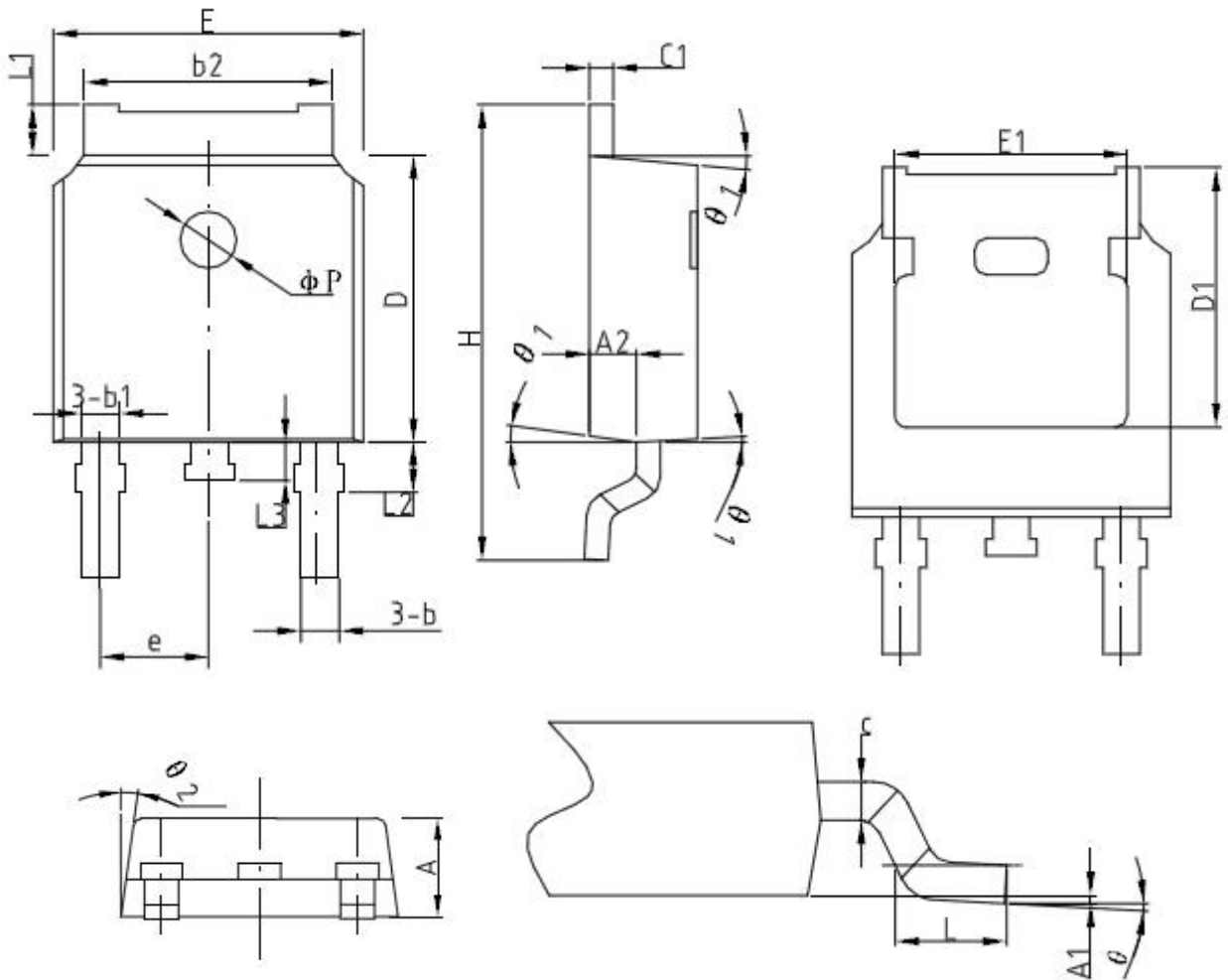


**Note :** 1.Storage environment: Temperature=10°C to 35@Humidity=45%±15%

- 2.Reflow soldering of surface-mount devices
- 3.Flow(wave) soldering(solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices	245°C±5°C	5sec±1sec
Pb-free devices	250°C+0/-5°C	5sec±1sec

## Package Outline



unit: mm					
Symbol	Min	Max	Symbol	Min	Max
A	2.2	2.38	E	6.50	6.70
A1	0	0.10	E1	4.80NOM	
A2	0.90	1.10	e	2.286BSC	
b	0.71	0.86	H	9.70	10.40
b1	0.76NOM		L	1.40	1.70
b2	5.13	5.46	L1	0.90	1.25
c	0.47	0.60	L2	1.05NOM	
C1	0.47	0.60	L3	0.8NOM	
D	6.0	6.20	$\phi P$	1.2NOM	
D1	5.30NOM		$\theta$	0°	8°

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