

## 500V N-Channel MOSFET

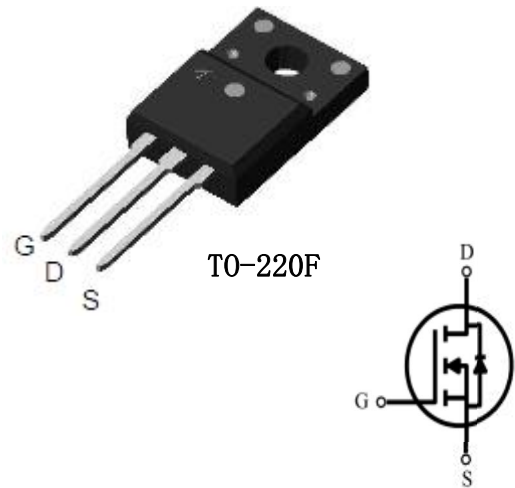
### Features

- $V_{DS}=500V$   $I_D=16A$
- $R_{DS(ON)}=0.3\Omega(Typ.)@V_{GS}=10V$
- Low On-Resistance
- Excellent  $CdV/dt$  effect decline
- Super Low Gate Charge
- 100% EAS Guaranteed
- Fast switching speed

### Applications

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

### PIN DESCRIPTION



Part Number	Package	Marking	ROHS Status	Packing
SI16N50F	TO-220F	SI16N50F	Pd-Free	Box(Tube)

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

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	500	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	16	A
$I_{DM}$	Pulsed Drain Current	64	A
$I_{AR}$	Avalanche Current	6	A
$E_{AS}$	Single Pulse Avalanche Energy	1080	mJ
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ C$
$P_D$	Total Power Dissipation	$T_c=25^\circ C$ 50	W

### THERMAL RESISTANCE RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient	65	$^\circ C/W$
$R_{\theta JC}$	Maximum Junction-to-Case	2.5	

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

Symbol	Parameter	Test Conditions	Min.	TYP.	Max.	Unit
<b>Static Characteristics</b>						
B <sub>V</sub> DSS	Drain-source breakdown voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> = 250uA	500	-	-	V
V <sub>GS(th)</sub>	Gate threshold voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	2	-	4	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V	-	-	1	uA
		V <sub>DS</sub> =400V, V <sub>GS</sub> =0V, T <sub>c</sub> =125°C	-	-	10	uA
I <sub>GSS</sub>	Gate-source leakage current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V	-	-	±100	nA
R <sub>DS(on)</sub>	Drain-source on-state resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8A	-	-	0.35	Ω
<b>Dynamic Characteristic</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =10V, V <sub>DD</sub> =400V I <sub>D</sub> =16A	-	42.8	51	nC
Q <sub>gs</sub>	Gate-Source Charge		-	9.3	11	nC
Q <sub>gd</sub>	Gate-Drain Charge		-	20.3	24	nC
T <sub>d(on)</sub>	Turn-on delay time	I <sub>D</sub> =16A, V <sub>DD</sub> =250V, R <sub>G</sub> =25Ω, V <sub>GS</sub> =10V	-	44	-	nS
T <sub>r</sub>	Rise time		-	84	-	nS
T <sub>d(off)</sub>	Turn-off delay time		-	92	-	nS
T <sub>f</sub>	Fall time		-	50	-	nS
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V f=1.0MHz	-	1914	2297	pF
C <sub>oss</sub>	Output Capacitance		-	191	229	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	16	20	pF
<b>Source-Drain Diode</b>						
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>SD</sub> =1A	-	-	1	V
I <sub>SM</sub>	Pulsed Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, T <sub>C</sub> =25°C	-	-	64	A
I <sub>S</sub>	Continuous Source Current		-	-	16	A
T <sub>rr</sub>	Reverse Recovery Time	V <sub>GS</sub> =0V, I <sub>F</sub> =16A, diF/dt=100A/μs	-	334	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	6	-	uC

### Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤ 2% .

## Typical Performance Characteristics

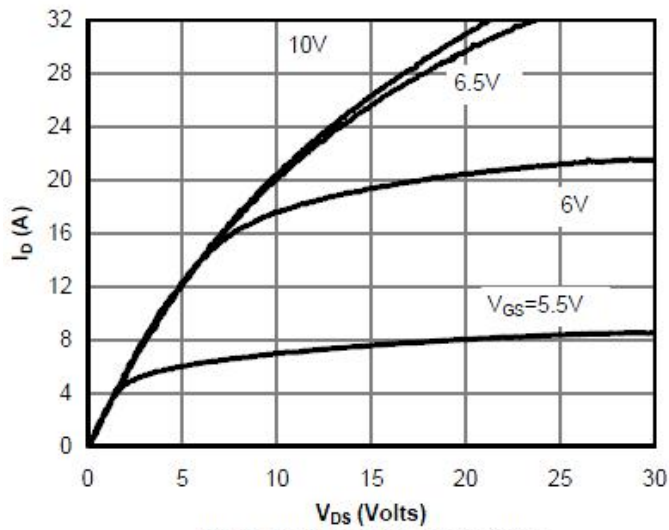


Fig 1: On-Region Characteristics

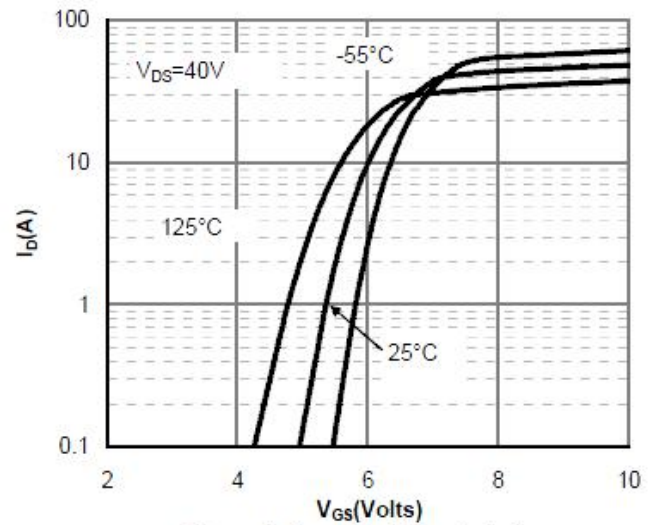


Figure 2: Transfer Characteristics

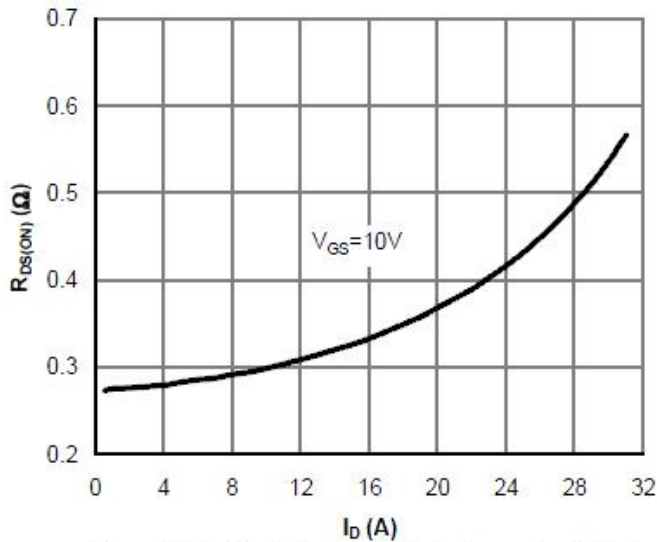


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

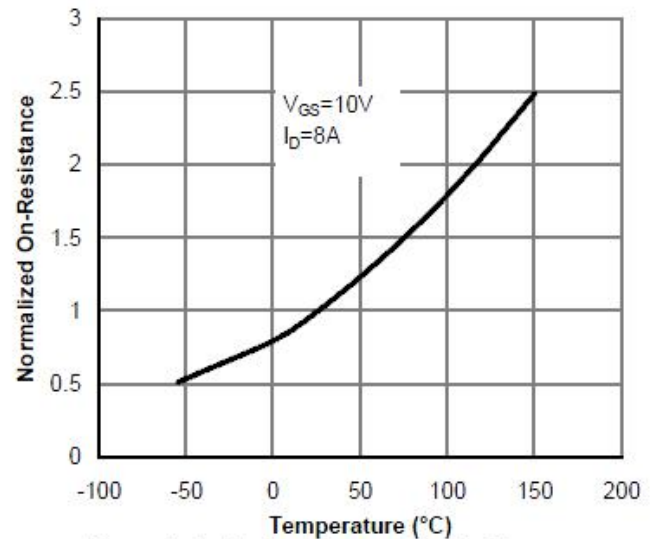


Figure 4: On-Resistance vs. Junction Temperature

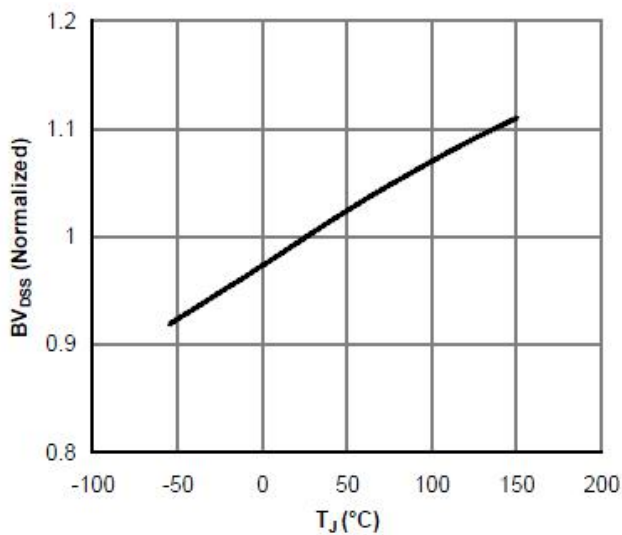


Figure 5: Break Down vs. Junction Temperature

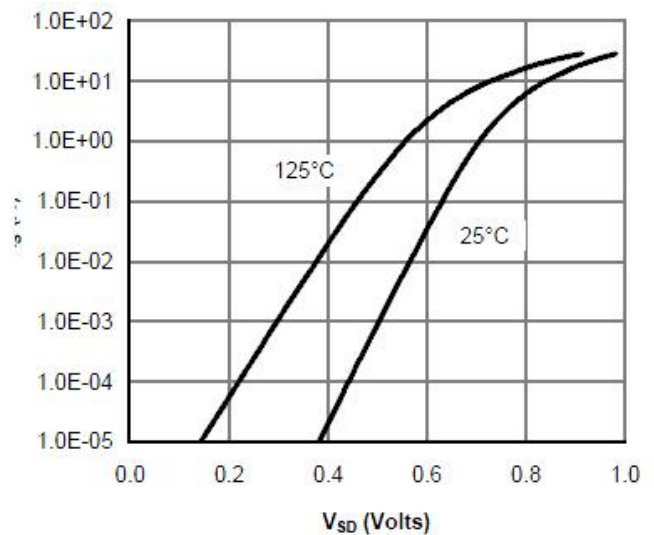


Figure 6: Body-Diode Characteristics (Note E)

## Typical Performance Characteristics (Cont.)

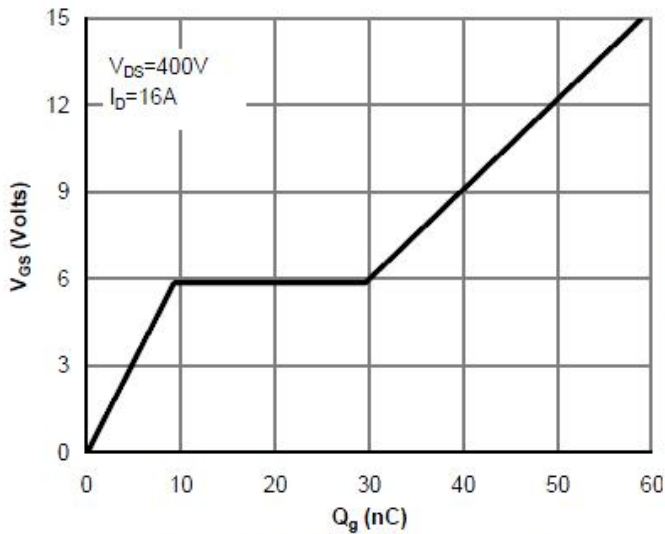


Figure 7: Gate-Charge Characteristics

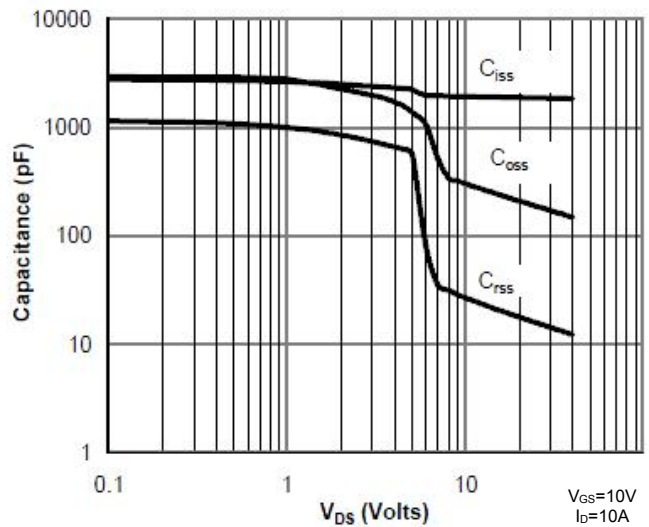


Figure 8: Capacitance Characteristic

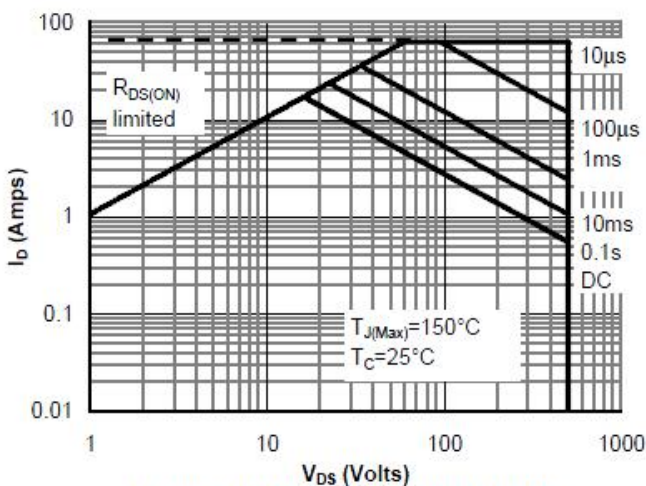


Figure 9: Maximum Forward Biased Safe Operating Area for AOT16N50 (Note F)

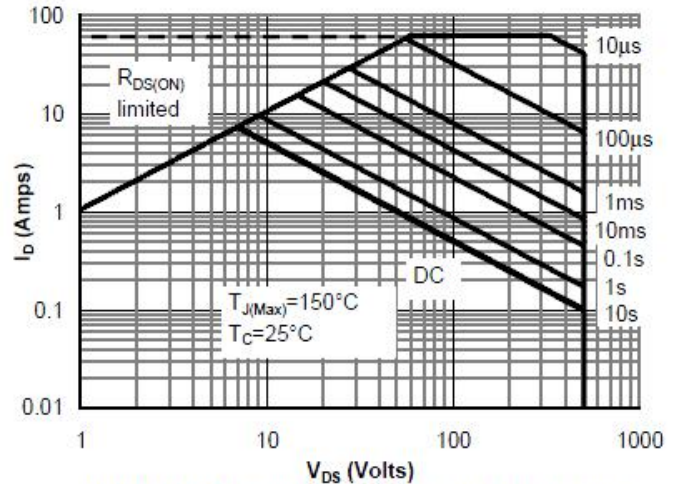


Figure 10: Maximum Forward Biased Safe Operating Area for AOTF16N50 (Note F)

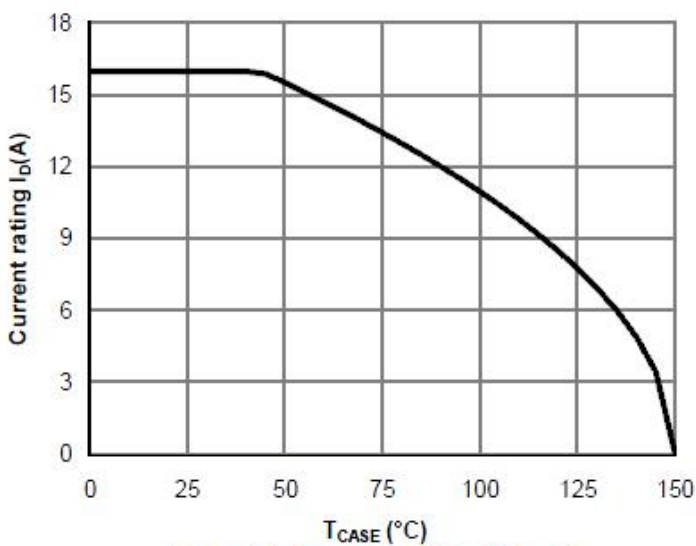
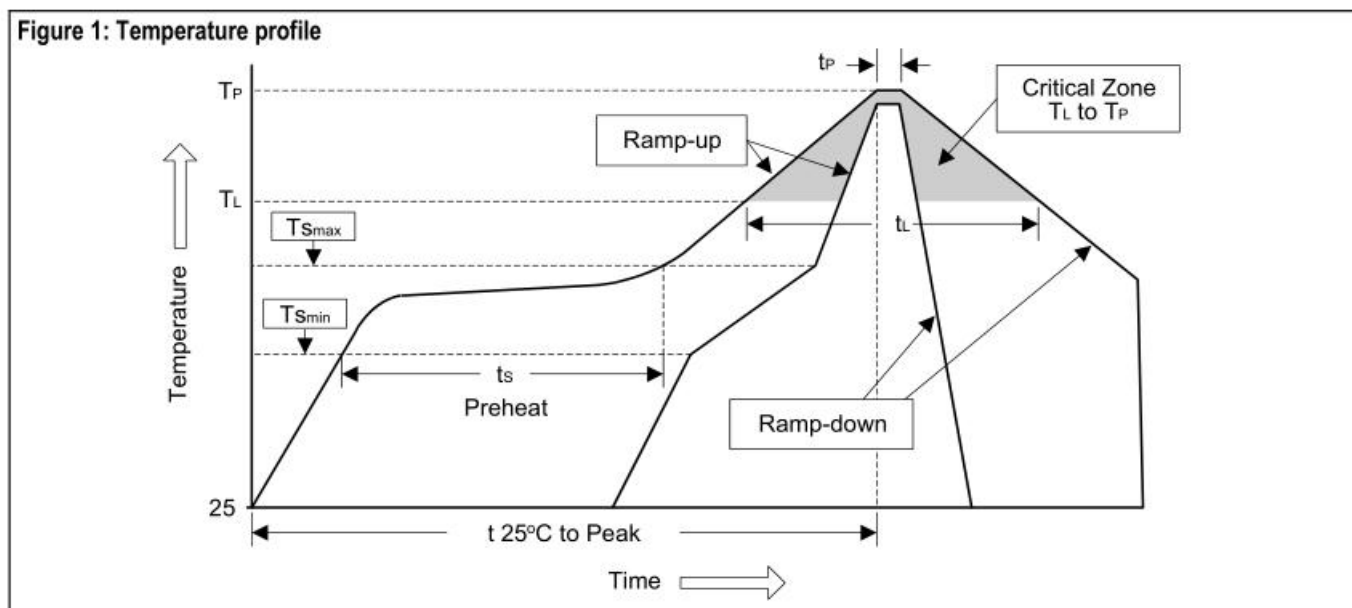


Figure 11: Current De-rating (Note B)

## Soldering Methods for Products

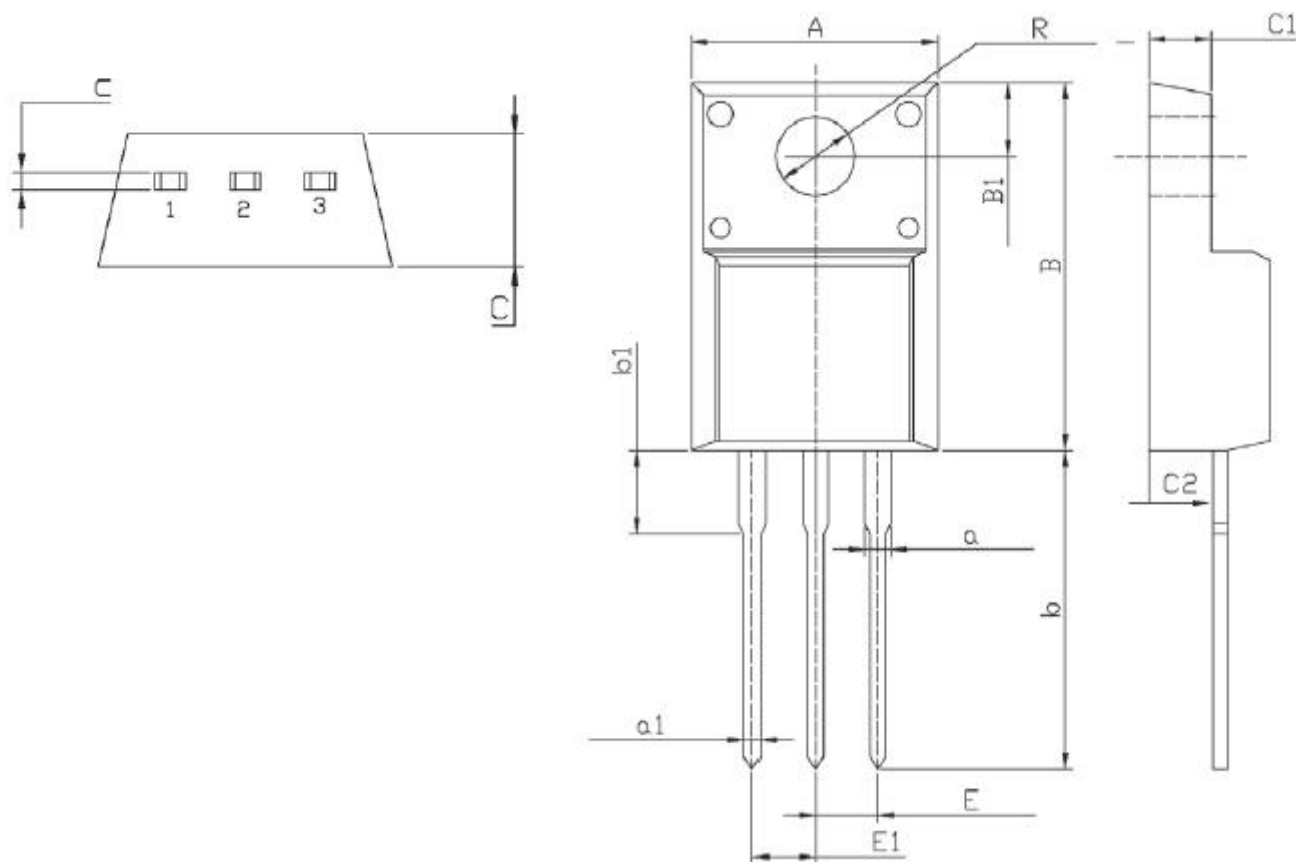
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(min to max)(ts)	- 100°C 150°C 60 to 120 sec	- 150°C 200°C 60 to 180 sec
Ts max to TL - ramp-up rate	<3°C/sec	<3°C/sec
Time maintained above: -Temperature(TL) -Time(TL)	183°C 60 to 150 sec	217°C 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



Millimeter					
Symbol	Min	Max	Symbol	Min	Max
C	4.5	4.9	b1	2.90	3.90
c	0.4	0.6	a	1.08	1.48
A	9.96	10.36	a1	0.70	0.90
B	15.67	16.07	E	2.34	2.74
B1	3.30	3.50	E1	2.34	2.74
R	3.08	3.28	C1	2.34	2.74
b	12.48	13.48	C2	2.56	2.96



**■ Important Notice**

Si-Trend reserves the right to change all product 、 product specifications and data without prior notice ; Our customer Please confirm to place an order confirmation before make the integrity of information complete and up-to-date ◦

Any semiconductor under specific conditions are possible to certain failure or malfunction rate ; Customers are responsible in the use of Si-Trend products to system design and manufacturing in compliance with safety standards and adopting safety measures , To avoid the potential risk of failure may cause the personal safety and property loss ◦

Si-Trend Always refine on to provide more excellent products

**■ Modify record**

Date	Version	Description	Pagination
20170215	A.0	original	7