

500V N-Channel MOSFET

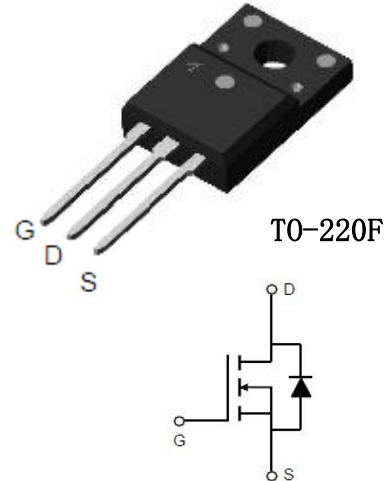
Features

- $V_{DS}=500V$ $I_D=18A$
- $R_{DS(ON)}=0.34\Omega(\text{max.})@V_{GS}=10V$
- 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
SI18N50AF	TO-220F	SI18N50AF	ROHS	Box(Tube)

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Continuous Drain Current	18	A
I_{DM}	Pulsed Drain Current	76	A
I_{AR}	Avalanche Current	19	A
E_{AS}	Single Pulse Avalanche Energy	945	mJ
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
P_D	Total Power Dissipation	$T_c=25^\circ\text{C}$ 239	W

THERMAL RESISTANCE RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Maximum Junction-to-Ambient	40	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Maximum Junction-to-Case	0.52	

Electrical Characteristics (T_J=25°C unless otherwise Ratings)

Symbol	Parameter	Test Conditions	Min.	TYP.	Max.	Unit
Static Characteristics						
B _{VDSS}	Drain-source breakdown voltage	V _{GS} =0V, I _{DS} = 250uA	500	-	-	V
V _{GS(th)}	Gate threshold voltage	V _{DS} =V _{GS} , I _{DS} =250uA	3	-	4	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =500V, V _{GS} =0V	-	-	1	uA
I _{GSS}	Gate-source leakage current	V _{DS} =0V, V _{GS} =±30V	-	-	±100	nA
R _{DS(on)}	Drain-source on-state resistance	V _{GS} =10V, I _D =9A	-	-	0.34	Ω
Dynamic Characteristic						
Q _g	Total Gate Charge	V _{GS} =10V, V _{DD} =400V I _D =18A	-	45.5	-	nC
Q _{gs}	Gate-Source Charge		-	15.8	-	nC
Q _{gd}	Gate-Drain Charge		-	21.6	-	nC
T _{d(on)}	Turn-on delay time	I _D =18A, V _{DD} =250V, R _G =25Ω	-	55	-	nS
T _r	Rise time		-	165	-	nS
T _{d(off)}	Turn-off delay time		-	95	-	nS
T _f	Fall time		-	90	-	nS
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =25V f=1.0MHz	-	2200	-	pF
C _{oss}	Output Capacitance		-	330	-	pF
C _{rss}	Reverse Transfer Capacitance		-	25	-	pF
Source-Drain Diode						
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =18A	-	-	1.4	V
I _{SM}	Pulsed Source Current	V _G =V _D =0V, T _C =25°C	-	-	76	A
I _S	Continuous Source Current		-	-	18	A
T _{rr}	Reverse Recovery Time	V _{GS} =0V, I _S =18A, diF/dt=100A /μs	-	500	-	ns
Q _{rr}	Reverse Recovery Charge		-	5.4	-	uC

Notes:

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

Typical Performance Characteristics

Figure 1. On-Region Characteristics

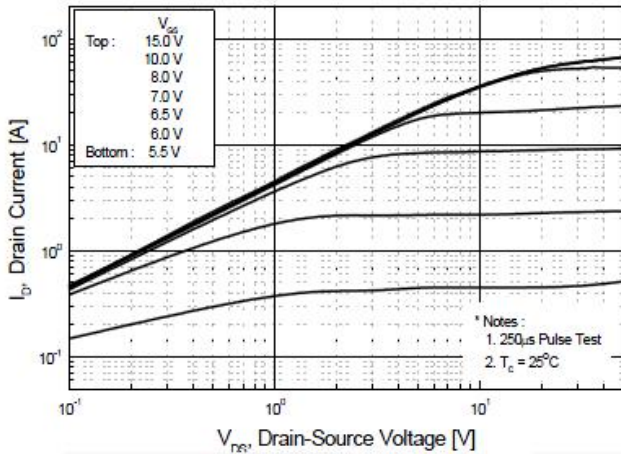


Figure 2. Transfer Characteristics

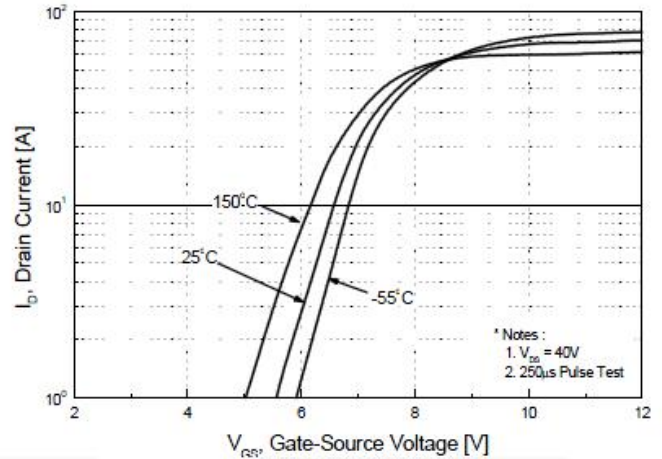


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

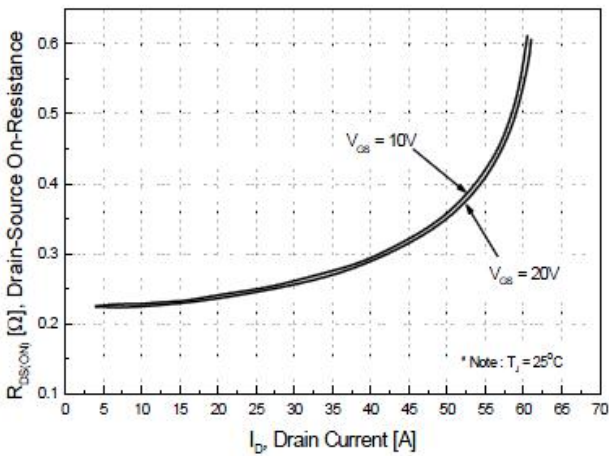


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

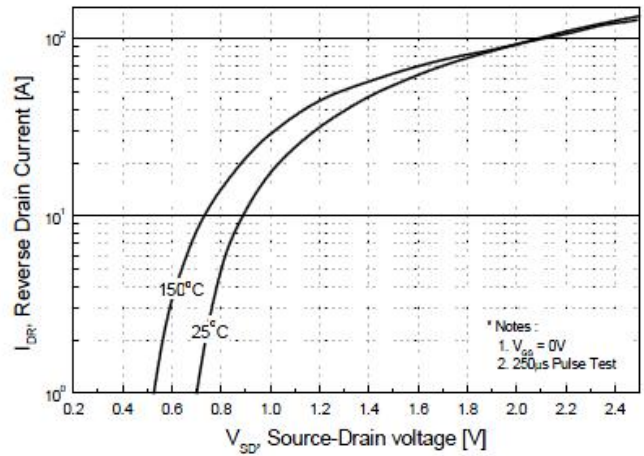


Figure 5. Capacitance Characteristics

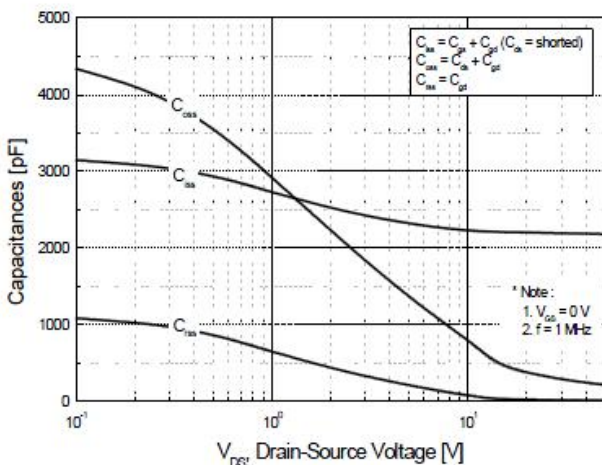
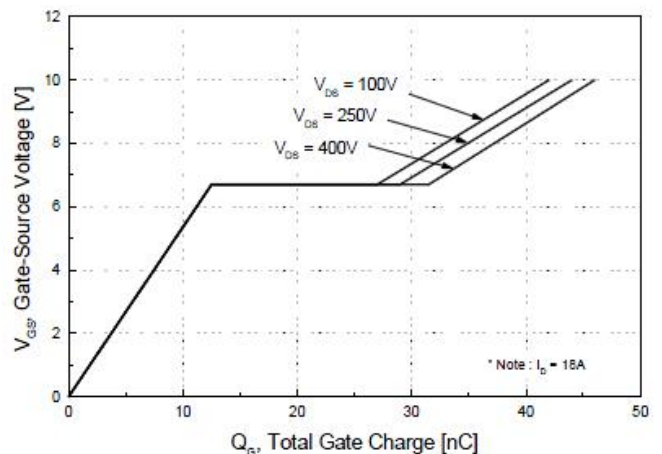


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Cont.)

Figure 7. Breakdown Voltage Variation vs. Temperature

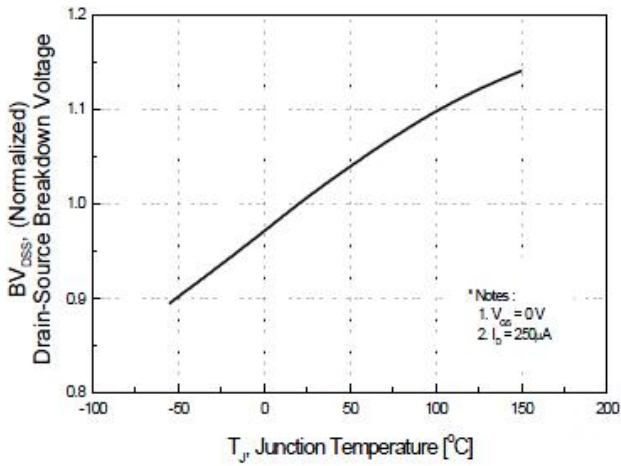


Figure 8. On-Resistance Variation vs. Temperature

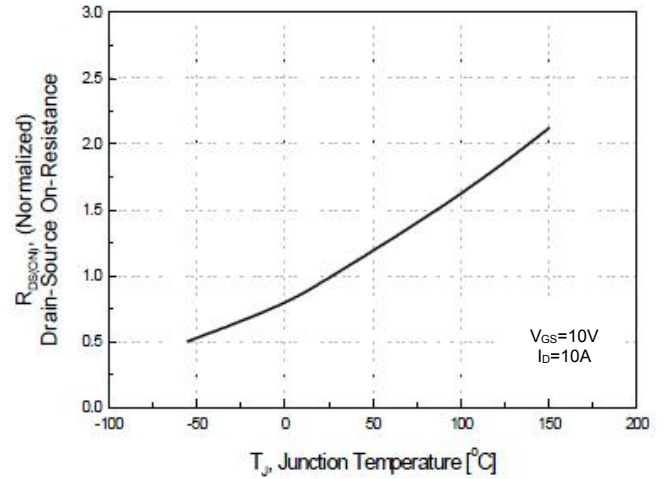
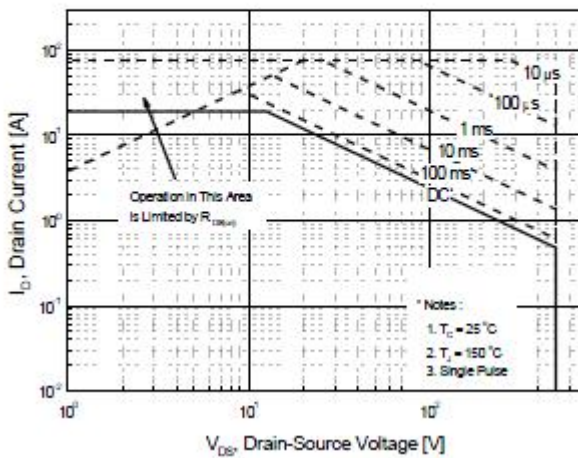
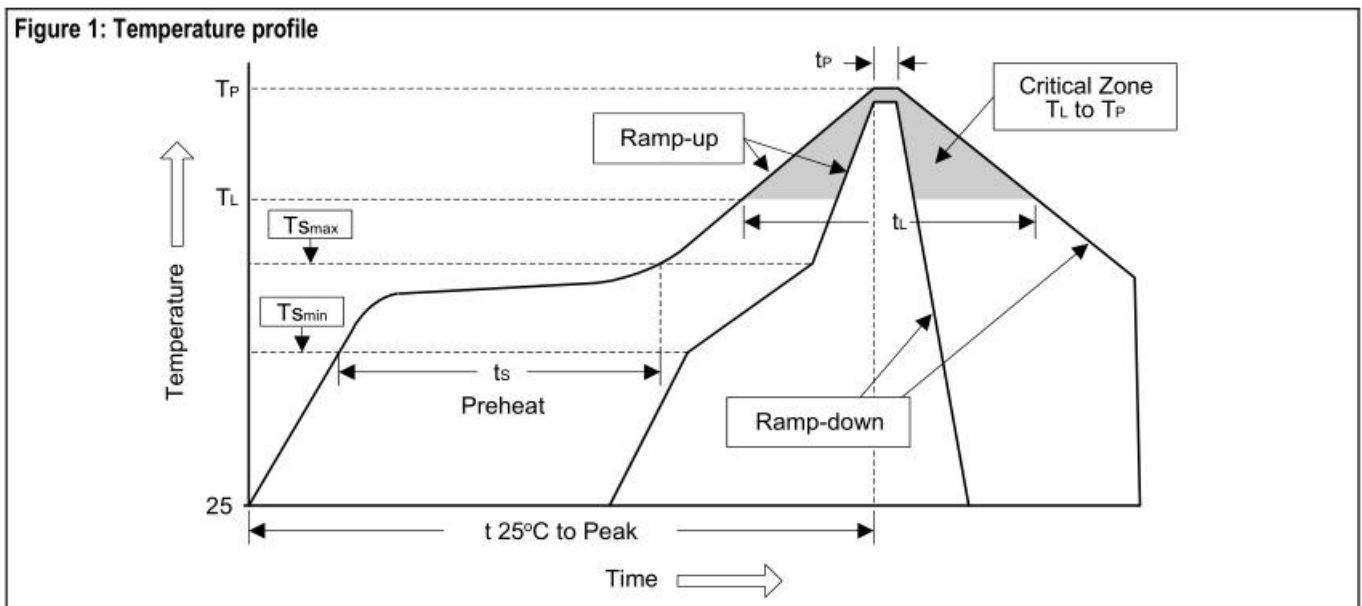


Figure 9. Maximum Safe Operating Area



Soldering Methods for Products

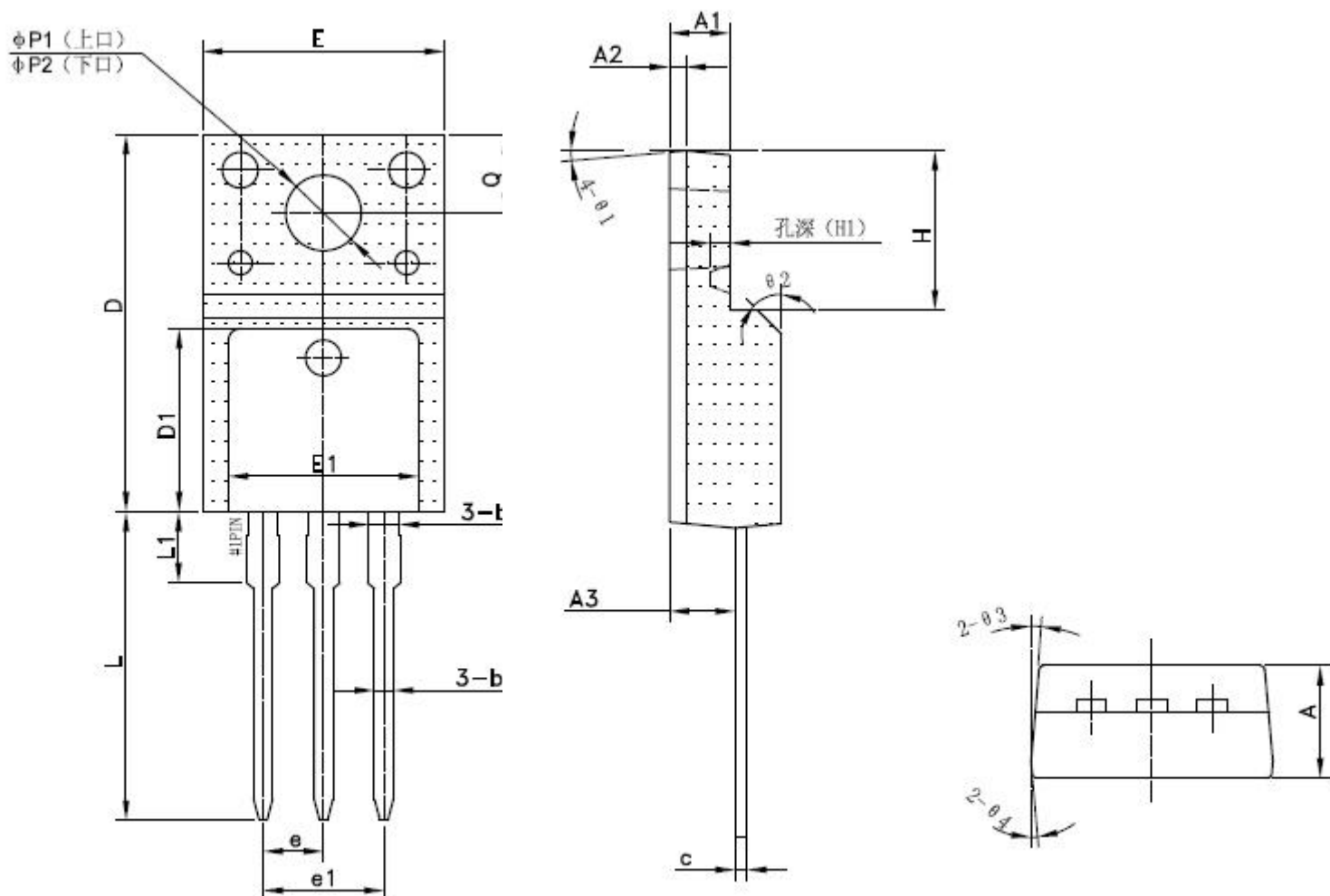
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate(TL to TP)	<3°C/sec	<3°C/sec
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(min to max)(ts)	- 100°C 150°C 60 to 120 sec	- 150°C 200°C 60 to 180 sec
Ts max to TL - ramp-up rate	<3°C/sec	<3°C/sec
Time maintained 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(mm)					
Symbol	Min	Max	Symbol	Min	Max
A	4.50	4.90	E	9.96	10.36
A1	2.44	2.64	E1	8.00TYP	
A2	0.60	0.80	e	2.54TYP	
A3	2.56	2.96	e1	5.08TYP	
b	0.70	0.95	H	6.50	6.90
b1	1.28TYP		L	12.48	13.20
c	0.45	0.65	L1	2.93TYP	
D	15.67	16.07	P1	2.98	3.38
D1	7.70TYP		P2	3.20	3.60

■ 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
20170315	A.0	original	7