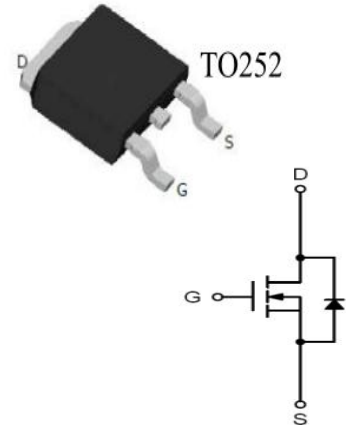


## N-Channel Enhancement Mode MOSFET

### Features

- 100V/60A  $R_{DS(ON)}=14.5m\Omega(Typ.)@V_{GS}=10V$
- Super High Dense Cell Design
- Reliable and Rugged
- Advanced trench process technology
- High Density Cell Design For Ultra Low On-Resistance

### PIN DESCRIPTION



### Applications

- Power Management in Inverter System
- Synchronous Rectification

Part Number	Package	Marking	ROHS Status	Packing
SI100N02D	TO-252	SI100N02D	Pb-Free	2.5K/Reel

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

Symbol	Parameter	Typical	Unit
$BV_{DSS}$	Drain-Source Voltage	100	V
$V_{GS}$	Gate –Source Voltage	$\pm 25$	V
$I_D$	Continuous Drain Current	$T_C=25^\circ C$	60
		$T_C=100^\circ C$	40
$I_{DM}$	Pulsed Drain Current Tested	230	A
$P_D$	Power Dissipation	$T_C=25^\circ C$	200
$E_{AR}$	Repetitive Avalanche Energy	20	mJ
$I_{AR}$	Avalanche Current	28	A
$T_J$	Operating Junction Temperature	-55 ~ 150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-55 ~ 150	$^\circ C$

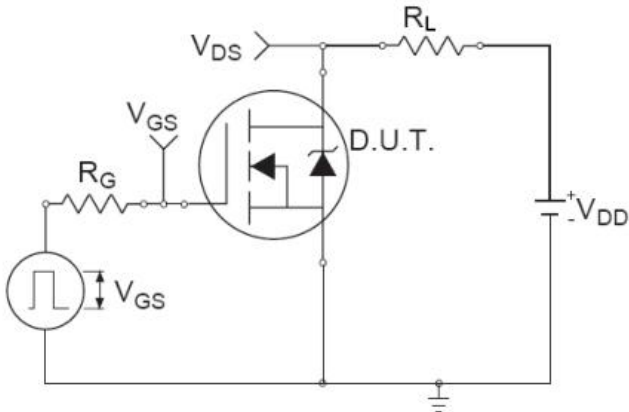
### Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case.	$R_{\theta JC}$	0.75	$^\circ C/W$
Thermal resistance, junction – ambient.	$R_{\theta JA}$	62	

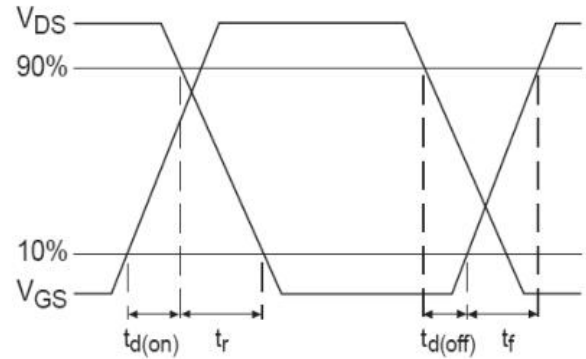
**Electrical Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	TYP	Max	Unit
<b>Static Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=80V, V_{GS}=0V$	-	-	1	UA
		$T_J=85^\circ\text{C}$	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	2	-	4	V
$I_{GSS}$	Gate Leakage Current	$V_{GS}=\pm 25V, V_{DS}=0V$	-	-	$\pm 100$	nA
$R_{DS(on)}^1$	Drain-Source On-Resistance	$V_{GS}=10V, I_D=30A$	-	14.5	18	m $\Omega$
<b>Diode Characteristics</b>						
$V_{SD1}$	Diode Forward Voltage	$I_{SD}=30A, V_{GS}=0V$	-	0.85	-	V
$t_{rr}$	Reverse Recovery Time	$I_{SD}=30A,$ $di_{SD}/dt=100A/\mu s$	-	65	-	nS
$Q_{rr}$	Reverse Recovery Charge		-	90	-	nC
<b>Dynamic Characteristics <sup>2</sup></b>						
$R_G$	Gate Resistance	$V_{GS}=0V, V_{DS}=0V,$ Frequency=1MHz	-	1.3	-	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=30V$ Frequency=1MHz	-	4250	-	pF
$C_{oss}$	Output Capacitance		-	260	-	
$C_{rss}$	Reverse Transfer Capacitance		-	175	-	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=50V, R_L=30\Omega$ $I_D=1.0A, V_{GEN}=10V$ $R_G=6\Omega$	-	21	-	nS
$T_r$	Turn-On Rise Time		-	17	-	
$T_{d(off)}$	Turn-Off Delay Time		-	66	-	
$T_f$	Turn-Off Fall Time		-	35	-	
<b>Gate Charge Characteristics<sup>2</sup></b>						
$Q_g$	Total Gate Charge	$V_{DS}=50V, V_{GS}=10V$ $I_D=30A$	-	87	-	nC
$Q_{gs}$	Gate-Source Charge		-	21	-	
$Q_{gd}$	Gate-Drain Charge		-	29	-	

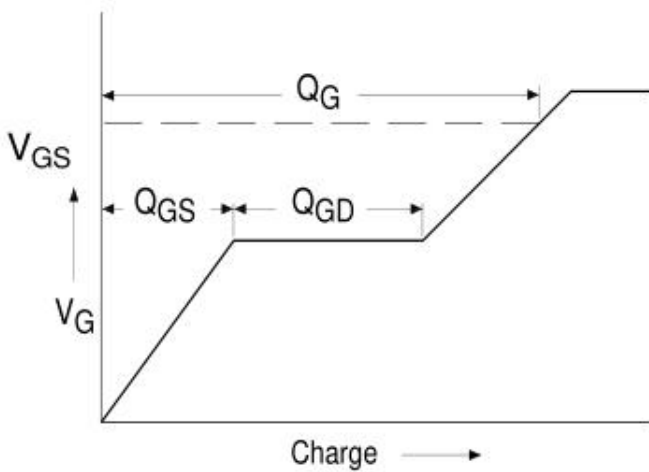
## Switching Time Test Circuit and Wave forms



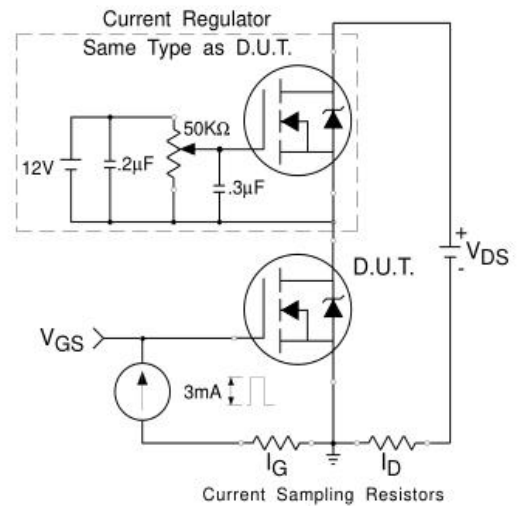
1. Switching Time Test Circuit



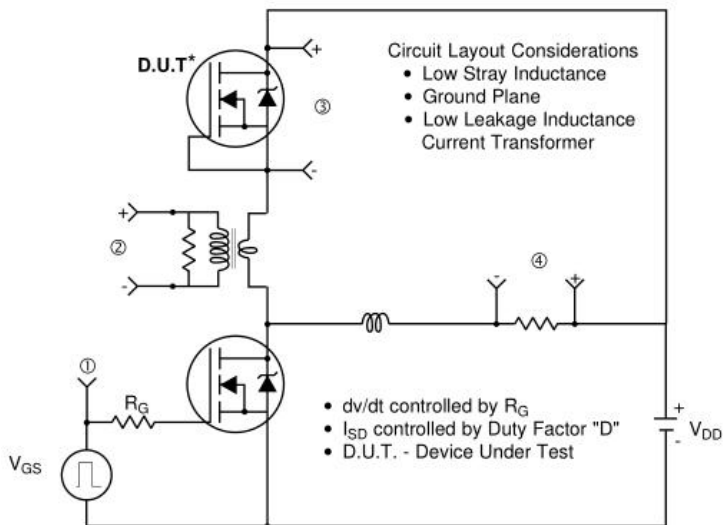
2. Switching Time Waveforms



3. Basic Gate Charge Waveform



4. Gate Charge Test Circuit



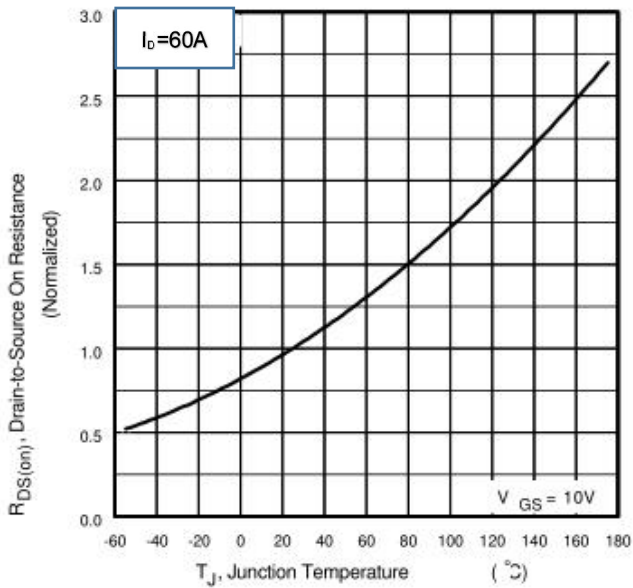
\* Reverse Polarity of D.U.T for P-Channel

5. Peak Diode Recovery  $dv/dt$  Test Circuit

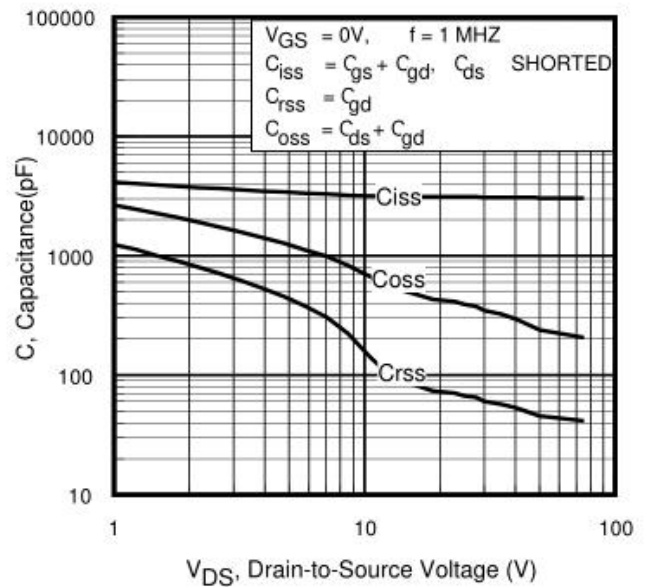
- Circuit Layout Considerations
- Low Stray Inductance
  - Ground Plane
  - Low Leakage Inductance
  - Current Transformer

- $dv/dt$  controlled by  $R_G$
- $I_{SD}$  controlled by Duty Factor "D"
- D.U.T. - Device Under Test

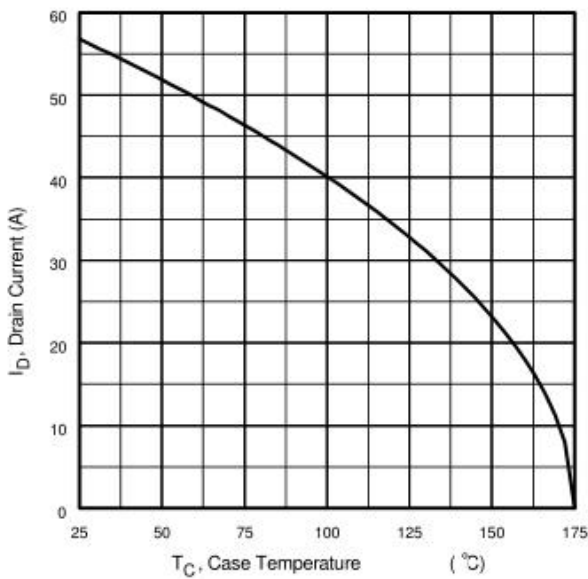
## Typical Performance Characteristics



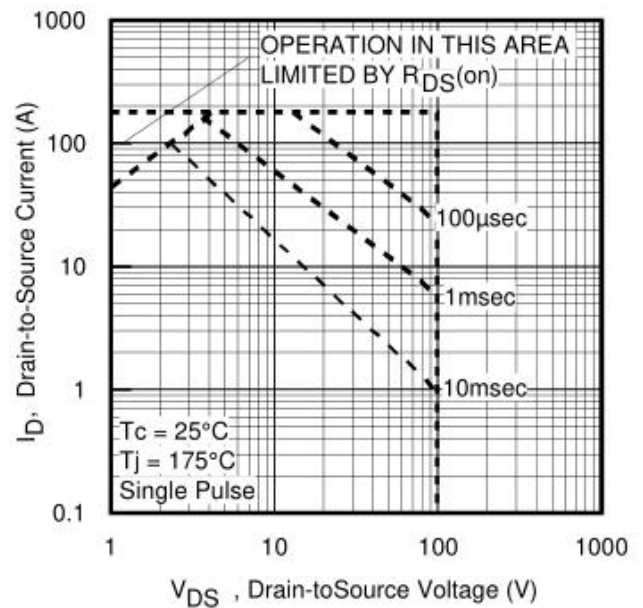
**Fig1. Normalized On-Resistance Vs. Temperature**



**Fig2. Typical Capacitance Vs. Drain-to-Source Voltage**



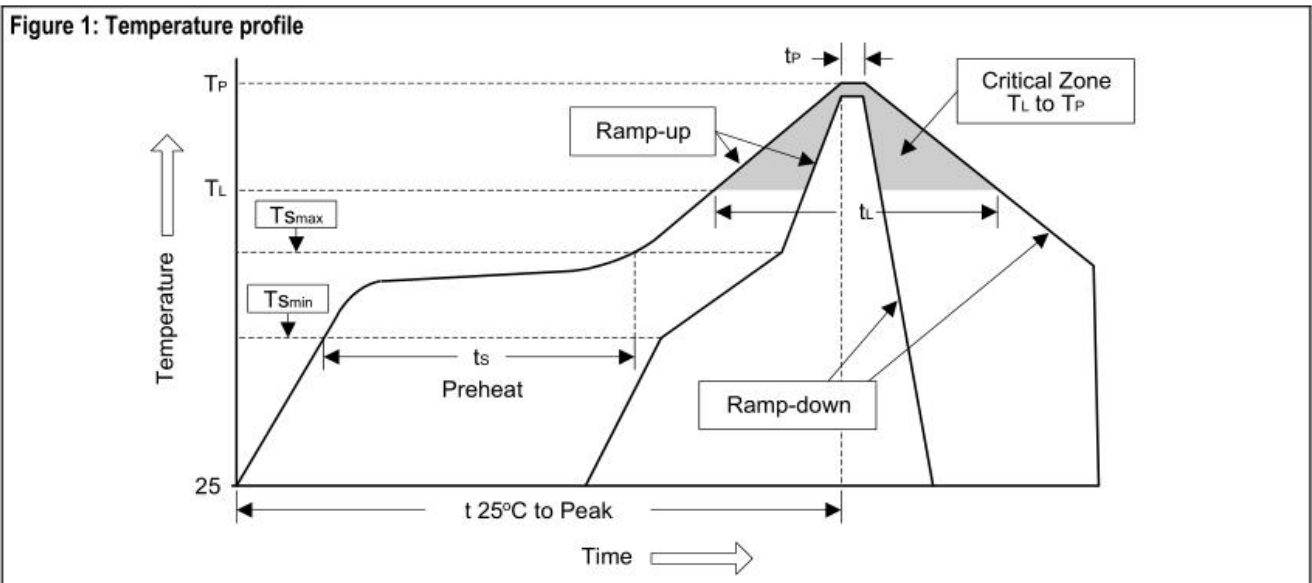
**Fig3. Maximum Drain Current Vs. Case Temperature**



**Fig4. Maximum Safe Operating Area**

## Soldering Methods for Products

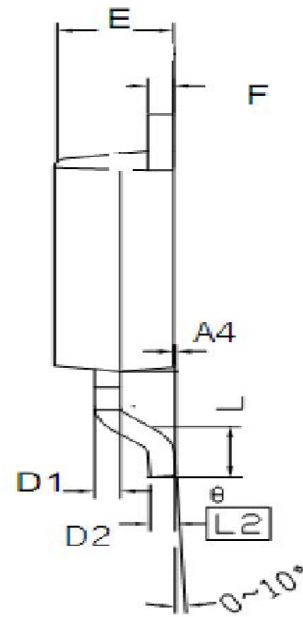
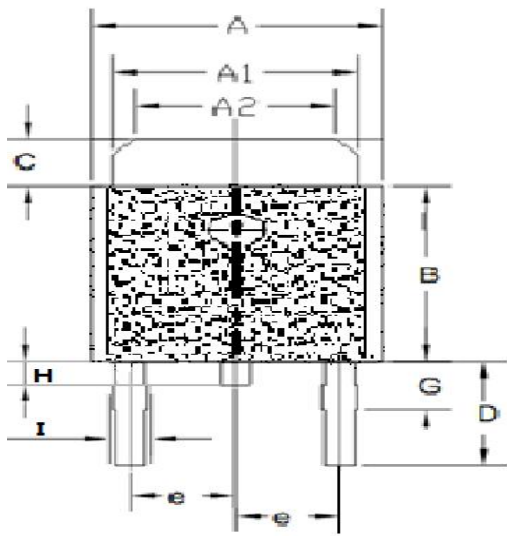
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (TL to TP)	<3°C/sec	<3°C/sec
Preheat -Temperature Min(Ts min) -Temperature Max(Ts max) -Time(min to max)(ts)	100°C 150°C 60 to 120 sec	150°C 200°C 60 to 180 sec
Ts max to TL - ramp-up rate	<3°C/sec	<3°C/sec
Time maintained 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	260°C+0/-5°C
Time within 5°C of actual Peak Temperature	10 to 30 sec	20 to 40sec
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 device
  - 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	6.40	6.60	D	2.90	3.10
A1	5.20	5.40	D1	0.45	0.55
A2	4.40	4.60	D2	0.45	0.55
A3	4.40	4.60	e	2.30	
A4	0.00	0.15	E	2.20	2.40
A5	4.65	4.95	F	0.49	0.59
B	6.00	6.20	G	1.70	
B1	1.57	1.77	L	1.40	1.60
C	0.90	0.96	$\theta$ (度)	0.00	10.00
I	0.80	0.85	H	0.49	0.52

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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。

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**■ Modify record**

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