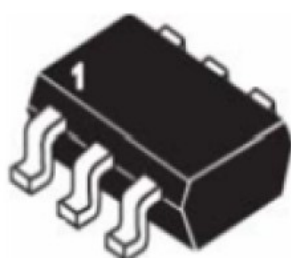
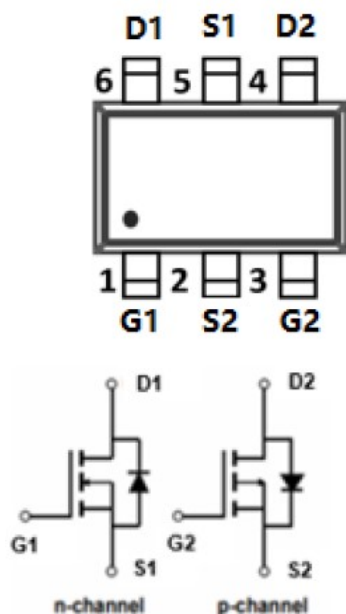


## N-Channel and P-Channel Complementary Power MOSFET

## Product Summary



SOT-23-6L



## NMOS

- $V_{DS}$  20V
- $I_D$  5.6A
- $R_{DS(ON)}$  (at  $V_{GS}=4.5V$ ) <25mohm
- $R_{DS(ON)}$  (at  $V_{GS}=2.5V$ ) <32mohm
- $R_{DS(ON)}$  (at  $V_{GS}=1.8V$ ) <49mohm

## PMOS

- $V_{DS}$  -20V
- $I_D$  -3.7A
- $R_{DS(ON)}$  (at  $V_{GS}=-4.5V$ ) <64mohm
- $R_{DS(ON)}$  (at  $V_{GS}=-2.5V$ ) <80mohm
- $R_{DS(ON)}$  (at  $V_{GS}=-1.8V$ ) <110mohm

- 100%  $\nabla V_{DS}$  Tested

## General Description

- Trench Power LV MOSFET technology
- High density cell design for low  $R_{DS(ON)}$
- High Speed switching

## Applications

- Wireless charger
- Load switch
- Power management

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

| Parameter                                           |                        | Symbol          | N-Channel | P-Channel | Unit                      |
|-----------------------------------------------------|------------------------|-----------------|-----------|-----------|---------------------------|
| Drain-source Voltage                                |                        | $V_{DS}$        | 20        | -20       | V                         |
| Gate-source Voltage                                 |                        | $V_{GS}$        | $\pm 10$  | $\pm 10$  | V                         |
| Drain Current                                       | $T_A=25^\circ\text{C}$ | $I_D$           | 5.6       | -3.7      | A                         |
|                                                     | $T_A=70^\circ\text{C}$ |                 | 4.5       | -3        |                           |
| Pulsed Drain Current <sup>A</sup>                   |                        | $I_{DM}$        | 19        | -15       | A                         |
| Total Power Dissipation                             | $T_A=25^\circ\text{C}$ | $P_D$           | 1.3       | 1.3       | W                         |
|                                                     | $T_A=70^\circ\text{C}$ |                 | 0.8       | 0.8       | W                         |
| Thermal Resistance Junction-to-Ambient <sup>B</sup> |                        | $R_{\theta JA}$ | 96        | 96        | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature Range              |                        | $T_J, T_{STG}$  | -55~+150  | -55~+150  | $^\circ\text{C}$          |

## ■ Ordering Information (Example)

| PREFERRED P/N | PACKING CODE | Marking | MINIMUM PACKAGE(pcs) | INNER BOX QUANTITY(pcs) | OUTER CARTON QUANTITY(pcs) | DELIVERY MODE |
|---------------|--------------|---------|----------------------|-------------------------|----------------------------|---------------|
| SCS2308A      | F2           | 2308    | 3000                 | 30000                   | 120000                     | 7" reel       |

## ■ N-MOS Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                         | Symbol              | Conditions                                                                              | Min | Typ  | Max   | Units |
|-----------------------------------|---------------------|-----------------------------------------------------------------------------------------|-----|------|-------|-------|
| Static Parameter                  |                     |                                                                                         |     |      |       |       |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                              | 20  |      |       | V     |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>    | V <sub>DS</sub> =20V, V <sub>GS</sub> =0V                                               |     |      | 1     | μA    |
| Gate-Body Leakage Current         | I <sub>GSS</sub>    | V <sub>GS</sub> =± 10V, V <sub>DS</sub> =0V                                             |     |      | ± 100 | nA    |
| Gate Threshold Voltage            | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                               | 0.5 | 0.62 | 1.0   | V     |
| Static Drain-Source On-Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4.5A                                             |     | 19.5 | 25    | mΩ    |
|                                   |                     | V <sub>GS</sub> =2.5V, I <sub>D</sub> =3A                                               |     | 25   | 32    |       |
|                                   |                     | V <sub>GS</sub> =1.8V, I <sub>D</sub> =2A                                               |     | 33   | 49    |       |
| Diode Forward Voltage             | V <sub>SD</sub>     | I <sub>S</sub> =5.6A, V <sub>GS</sub> =0V                                               |     |      | 1.2   | V     |
| Dynamic Parameters                |                     |                                                                                         |     |      |       |       |
| Input Capacitance                 | C <sub>iss</sub>    | V <sub>DS</sub> =10V, V <sub>GS</sub> =0V, f=1MHZ                                       |     | 418  |       | pF    |
| Output Capacitance                | C <sub>oss</sub>    |                                                                                         |     | 82   |       |       |
| Reverse Transfer Capacitance      | C <sub>rss</sub>    |                                                                                         |     | 70   |       |       |
| Switching Parameters              |                     |                                                                                         |     |      |       |       |
| Total Gate Charge                 | Q <sub>g</sub>      | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, I <sub>D</sub> =4.5A                       |     | 6.05 |       | nC    |
| Gate-Source Charge                | Q <sub>gs</sub>     |                                                                                         |     | 1.07 |       |       |
| Gate-Drain Charge                 | Q <sub>gd</sub>     |                                                                                         |     | 1.95 |       |       |
| Reverse Recovery Chrage           | Q <sub>rr</sub>     | I <sub>F</sub> =4.5A, di/dt=100A/us                                                     |     | 1.38 |       | ns    |
| Reverse Recovery Time             | t <sub>rr</sub>     |                                                                                         |     | 17.9 |       |       |
| Turn-on Delay Time                | t <sub>D(on)</sub>  | V <sub>GS</sub> =4.5V, V <sub>DS</sub> =10V, R <sub>L</sub> =1Ω<br>R <sub>GEN</sub> =3Ω |     | 4.2  |       |       |
| Turn-on Rise Time                 | t <sub>r</sub>      |                                                                                         |     | 19.8 |       |       |
| Turn-off Delay Time               | t <sub>D(off)</sub> |                                                                                         |     | 22.6 |       |       |
| Turn-off fall Time                | t <sub>f</sub>      |                                                                                         |     | 23.2 |       |       |

A. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

B.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

## ■ P-MOS Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter                         | Symbol              | Conditions                                                                                 | Min  | Typ   | Max   | Units |
|-----------------------------------|---------------------|--------------------------------------------------------------------------------------------|------|-------|-------|-------|
| Static Parameter                  |                     |                                                                                            |      |       |       |       |
| Drain-Source Breakdown Voltage    | BV <sub>DSS</sub>   | V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA                                                | -20  |       |       | V     |
| Zero Gate Voltage Drain Current   | I <sub>DSS</sub>    | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V                                                 |      |       | -1    | μA    |
| Gate-Body Leakage Current         | I <sub>GSS</sub>    | V <sub>GS</sub> =± 10V, V <sub>DS</sub> =0V                                                |      |       | ± 100 | nA    |
| Gate Threshold Voltage            | V <sub>GS(th)</sub> | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =-250μA                                 | -0.4 | -0.62 | -1.0  | V     |
| Static Drain-Source On-Resistance | R <sub>DS(ON)</sub> | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3.5A                                              |      | 49    | 64    | mΩ    |
|                                   |                     | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-3A                                                |      | 59    | 80    |       |
|                                   |                     | V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-2A                                                |      | 79    | 110   |       |
| Diode Forward Voltage             | V <sub>SD</sub>     | I <sub>S</sub> =-3.7A, V <sub>GS</sub> =0V                                                 |      |       | -1.2  | V     |
| Dynamic Parameters                |                     |                                                                                            |      |       |       |       |
| Input Capacitance                 | C <sub>iss</sub>    | V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, f=1MHZ                                         |      | 438   |       | pF    |
| Output Capacitance                | C <sub>oss</sub>    |                                                                                            |      | 76    |       |       |
| Reverse Transfer Capacitance      | C <sub>rss</sub>    |                                                                                            |      | 62    |       |       |
| Switching Parameters              |                     |                                                                                            |      |       |       |       |
| Total Gate Charge                 | Q <sub>g</sub>      | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-15V, I <sub>D</sub> =-3.4A                        |      | 5.41  |       | nC    |
| Gate-Source Charge                | Q <sub>gs</sub>     |                                                                                            |      | 1.17  |       |       |
| Gate-Drain Charge                 | Q <sub>gd</sub>     |                                                                                            |      | 1.24  |       |       |
| Reverse Recovery Chrage           | Q <sub>rr</sub>     | I <sub>F</sub> =-3.4A, di/dt=100A/us                                                       |      | 4     |       | ns    |
| Reverse Recovery Time             | t <sub>rr</sub>     |                                                                                            |      | 24.5  |       |       |
| Turn-on Delay Time                | t <sub>D(on)</sub>  | V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, I <sub>D</sub> =-1A<br>R <sub>GEN</sub> =3Ω |      | 6.4   |       |       |
| Turn-on Rise Time                 | t <sub>r</sub>      |                                                                                            |      | 21.8  |       |       |
| Turn-off Delay Time               | t <sub>D(off)</sub> |                                                                                            |      | 37.4  |       |       |
| Turn-off fall Time                | t <sub>f</sub>      |                                                                                            |      | 34    |       |       |

C. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

D.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance, where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

## ■ N-MOS Typical Performance Characteristics

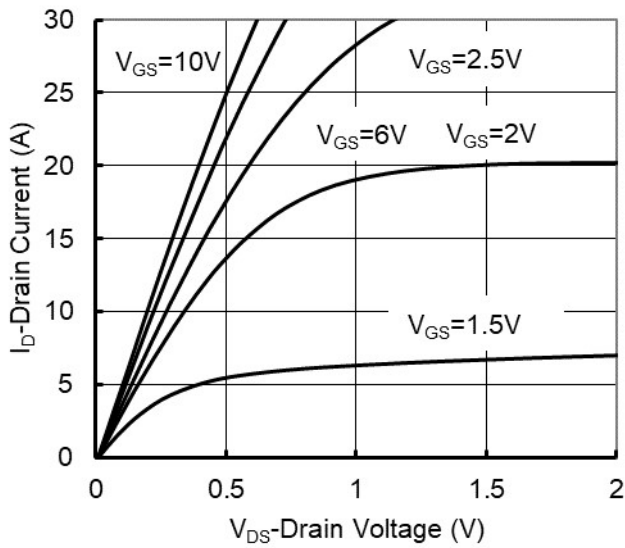


Figure1. Output Characteristics

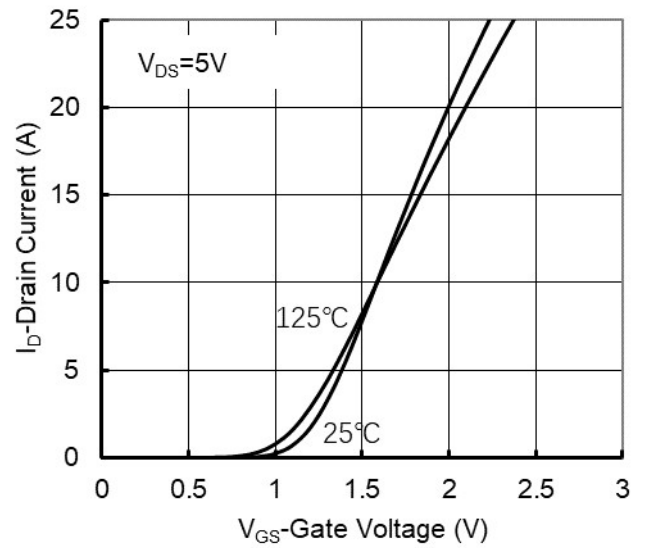


Figure2. Transfer Characteristics

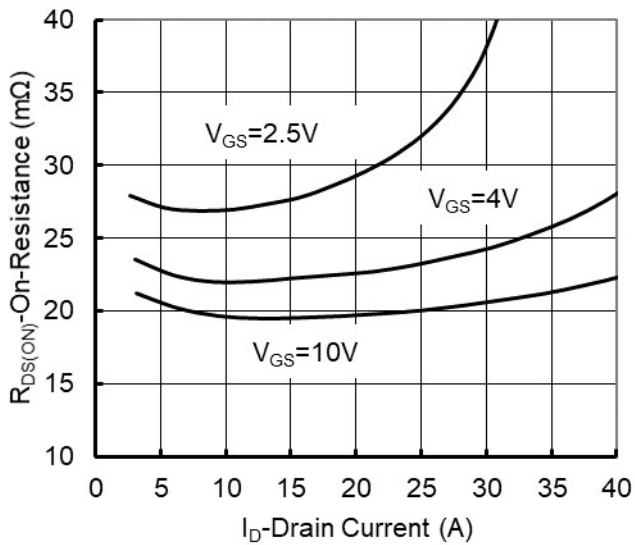


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

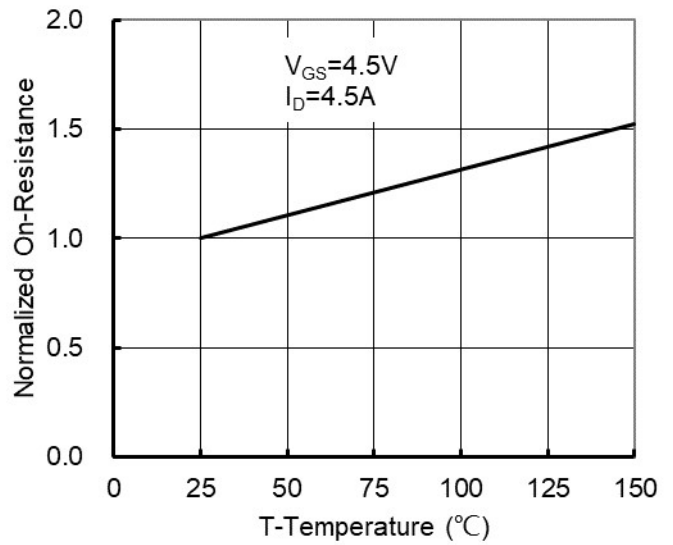


Figure 4: On-Resistance vs. Junction Temperature

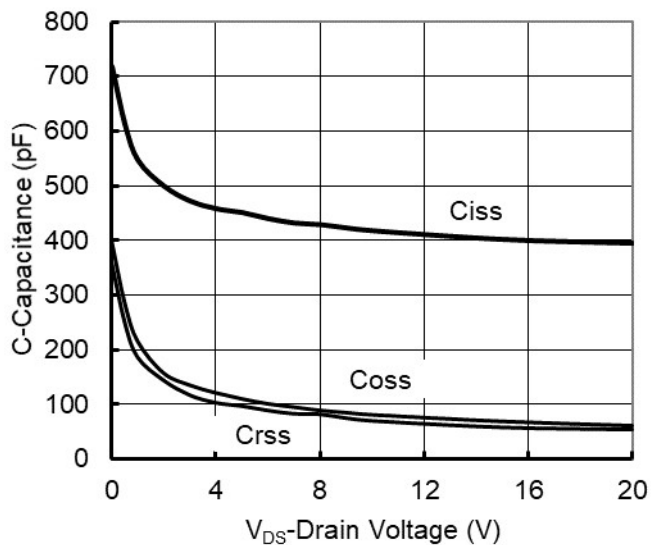


Figure5. Capacitance Characteristics

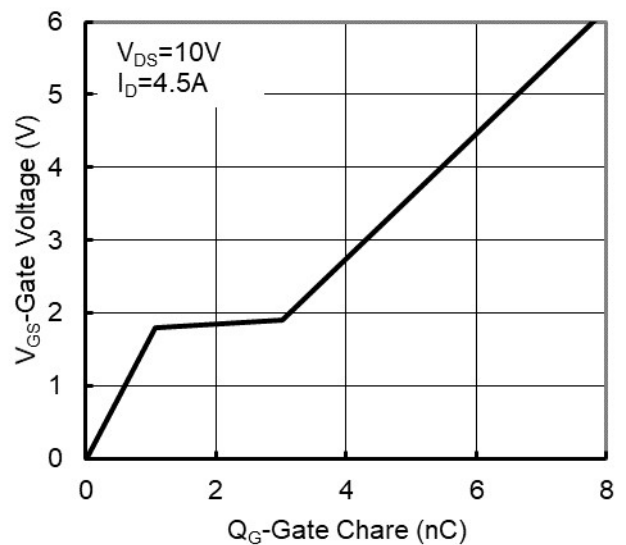


Figure6. Gate Charge

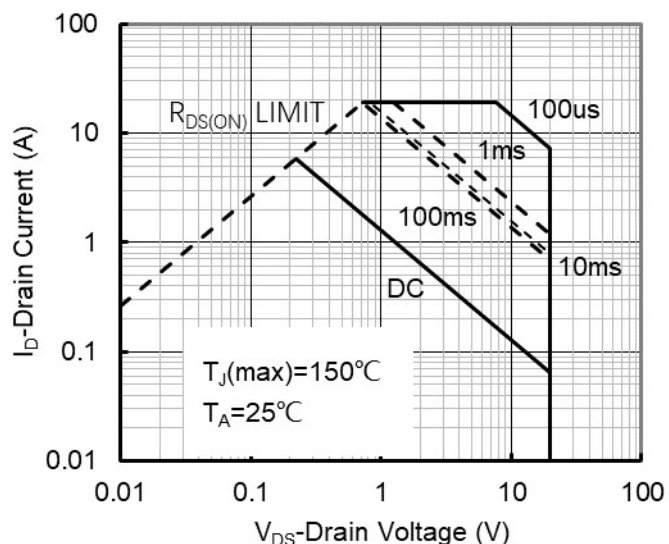


Figure7. Safe Operation Area

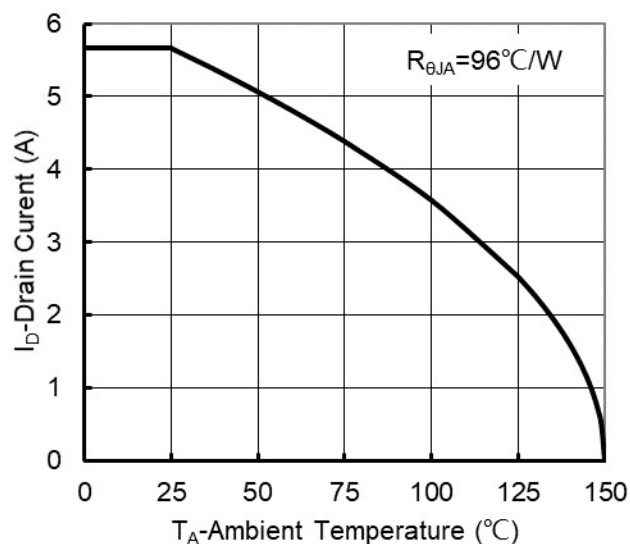


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

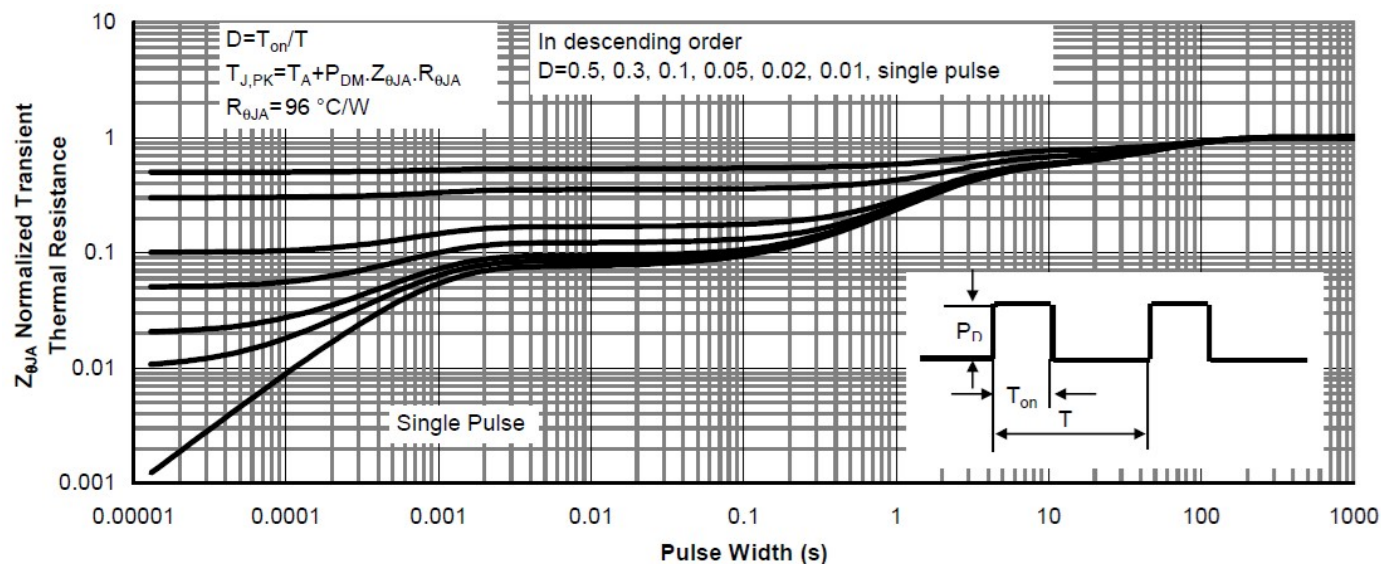


Figure9.Normalized Maximum Transient Thermal Impedance

## ■ P-MOS Typical Performance Characteristics

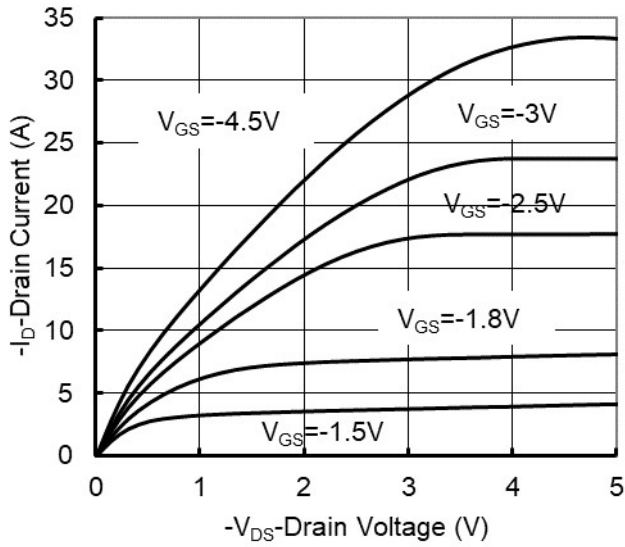


Figure1. Output Characteristics

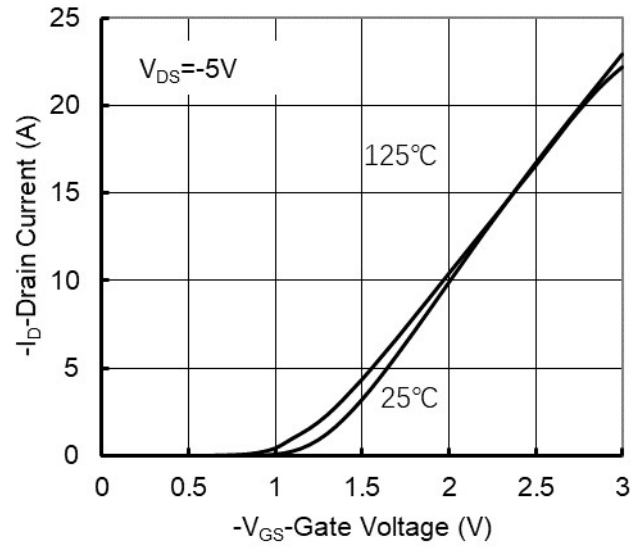


Figure2. Transfer Characteristics

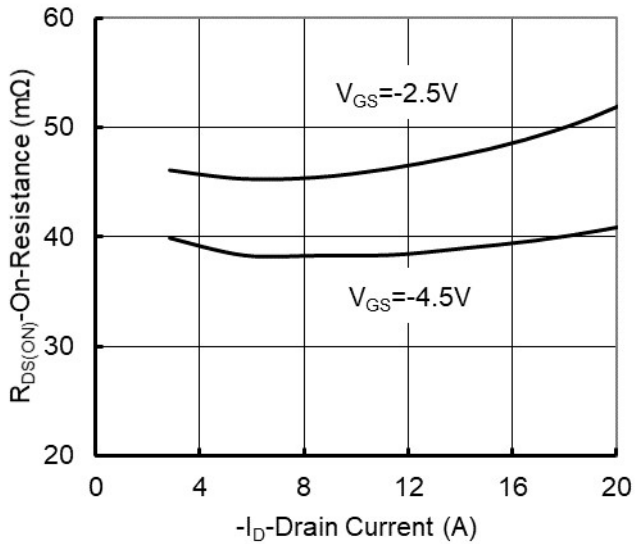


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

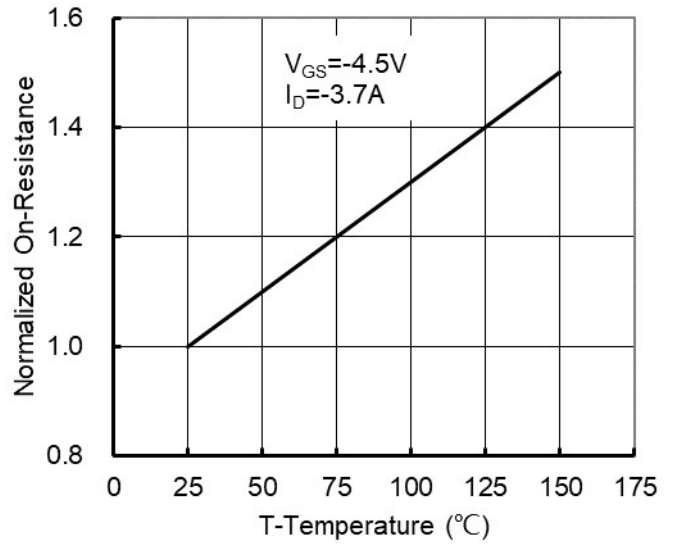


Figure 4: On-Resistance vs. Junction Temperature

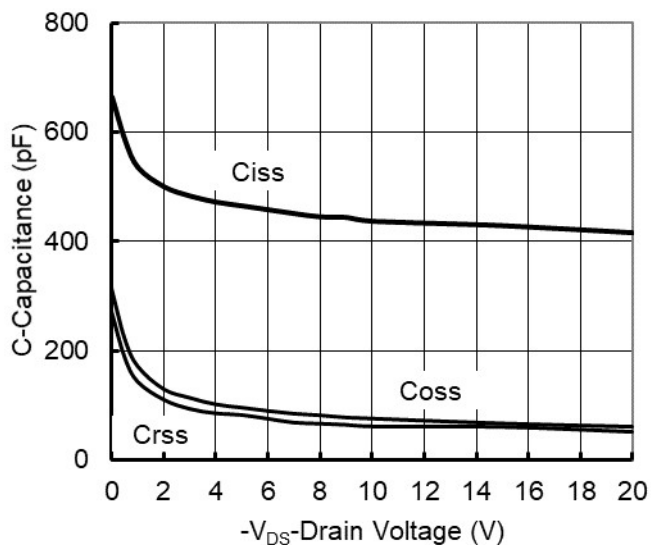


Figure5. Capacitance Characteristics

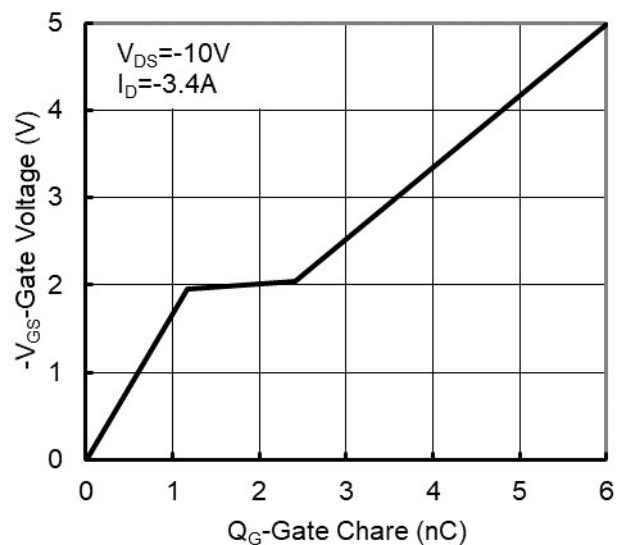


Figure6. Gate Charge



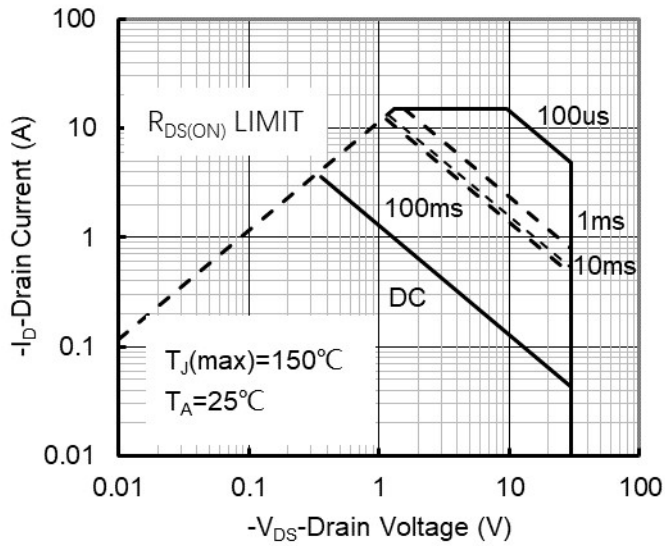


Figure7. Safe Operation Area

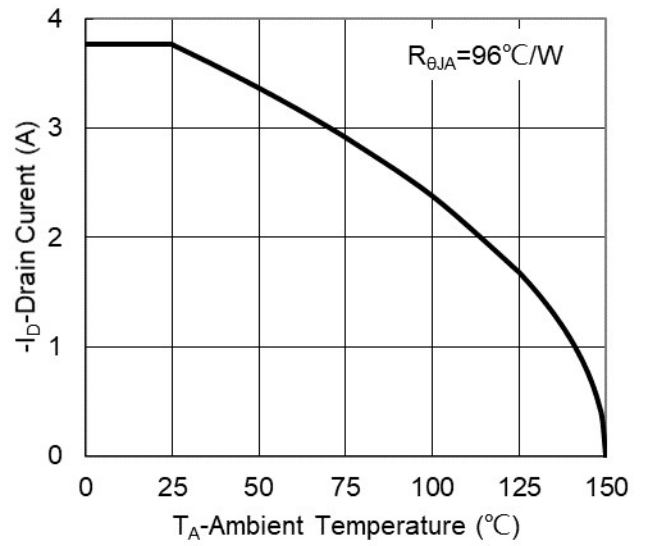


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

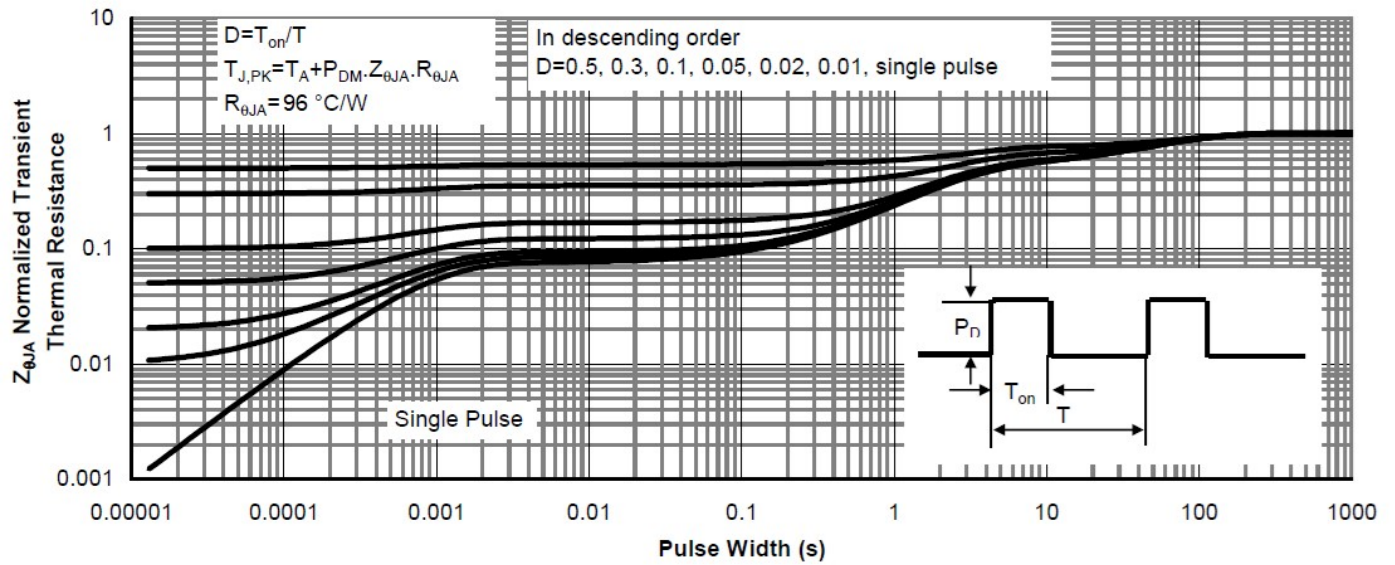
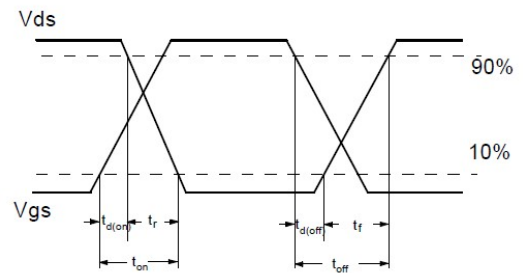
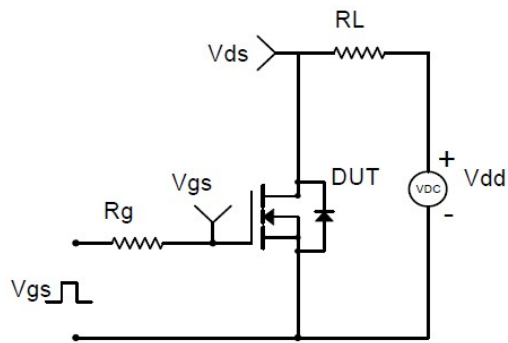
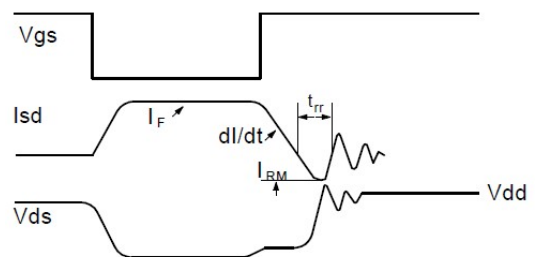
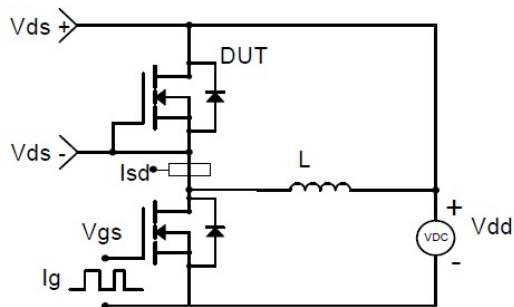


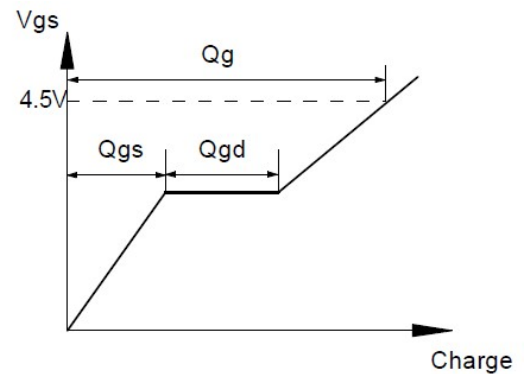
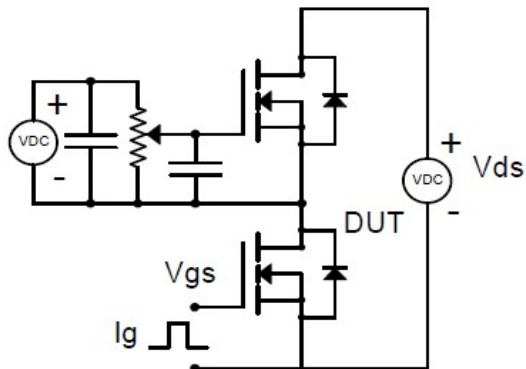
Figure9.Normalized Maximum Transient Thermal Impedance



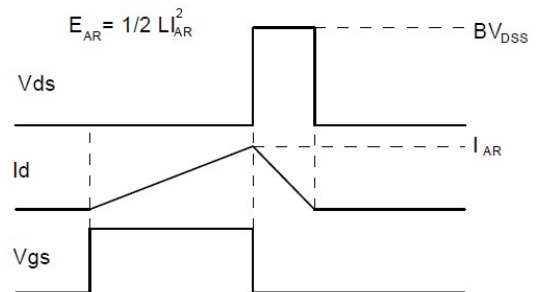
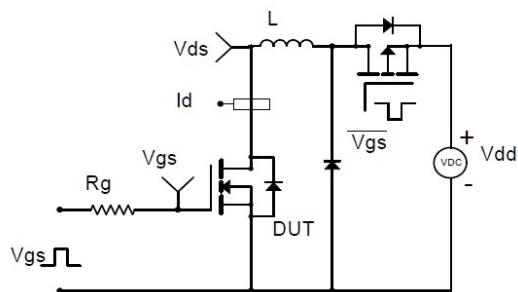
**Resistive Switching Test Circuit & Waveforms**



**Diode Recovery Test Circuit & Waveforms**



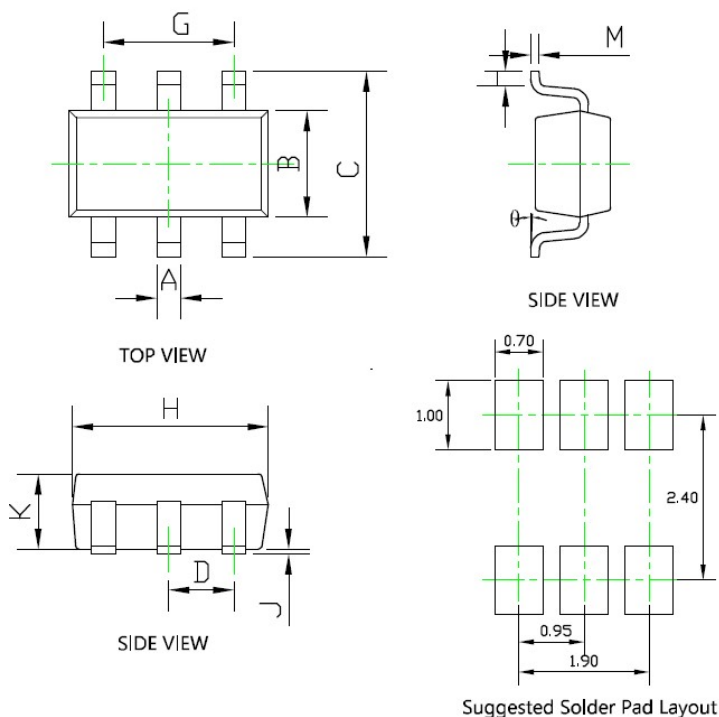
**Gate Charge Test Circuit & Waveform**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



## ■ SOT-23-6L Package information



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance:  $\pm 0.05\text{mm}$ .  
 3. The pad layout is for reference purposes only.

| SYMBOL   | DIMENSIONS |       |            |       |
|----------|------------|-------|------------|-------|
|          | INCHES     |       | Millimeter |       |
|          | MIN.       | MAX.  | MIN.       | MAX.  |
| A        | 0.012      | 0.020 | 0.300      | 0.500 |
| B        | 0.059      | 0.067 | 1.500      | 1.700 |
| C        | 0.104      | 0.116 | 2.650      | 2.950 |
| D        | 0.037BSC   |       | 0.950BSC   |       |
| G        | 0.075BSC   |       | 1.900BSC   |       |
| H        | 0.111      | 0.119 | 2.820      | 3.020 |
| J        | 0.000      | 0.004 | 0.000      | 0.100 |
| K        | 0.041      | 0.045 | 1.050      | 1.150 |
| L        | 0.012      | 0.024 | 0.300      | 0.600 |
| M        | 0.004      | 0.008 | 0.100      | 0.200 |
| $\theta$ | 0°         | 8°    | 0°         | 8°    |

**Disclaimer**

The information presented in this document is for reference only. Shanghai Sunco Electronics Co., Ltd. reserves the right to make changes without notice for the specification of the products displayed herein to improve reliability, function or design or otherwise.

The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Russiansunco or anyone on its behalf, assumes no responsibility or liability for any damages resulting from such improper use of sale.

This publication supersedes & replaces all information previously supplied. For additional information, please visit our website [http:// www.russiansunco.com](http://www.russiansunco.com) , or consult your nearest Russiansunco's sales office for further assistance.