### General Description
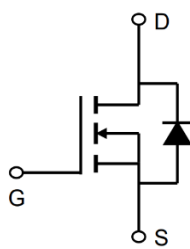• Low $R_{DS(ON)}$
• RoHS and Halogen-Free Compliant

### Applications
• Load switch
• PWM

### General Features

$V_{DS}$ = 100V  $I_D$ =10A

$R_{DS(ON)}$ =75 mΩ (typ.) @ $V_{GS}$=10V

100% UIS Tested
100%  $R_g$ Tested

Green
Product

MSI:SOT-223-3L

Marking:10N10

## Absolute Maximum Ratings：  ($T_A$=25℃  unless otherwise noted)

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 100 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Continuous Drain Curren[1] | 10 | A |
| | Continuous Drain Current-$T_A$=70℃[1] | 4 | |
| $I_{DM}$ | Pulsed Drain Current[2] | 24 | |
| $P_D$ | Power Dissipation[4] | 2.5 | W |
| $E_{AS}$ | Single pulse avalanche energy[3] | 10.1 | mJ |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55-+150 | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance,Junction to ambien | 50 | ℃/W |

## Electrical Characteristics： (T$_A$=25℃ unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|--------|-----------|------------|-----|-----|-----|-------|
| **Off Characteristics** | | | | | | |
| BV$_{DSS}$ | Drain-Sourtce Breakdown Voltage | V$_{GS}$=0V,I$_D$=250 μA | 100 | --- | --- | V |
| I$_{DSS}$ | Zero Gate Voltage Drain Current | V$_{GS}$=0V, V$_{DS}$=80V | --- | --- | 10 | μA |
| I$_{GSS}$ | Gate-Source Leakage Current | V$_{GS}$=±20V, V$_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| V$_{GS(th)}$ | GATE-Source Threshold Voltage | V$_{GS}$=V$_{DS}$, I$_D$=250 μA | 1.2 | --- | 2.9 | V |
| R$_{DS(ON)}$ | Drain-Source On Resistance[2] | V$_{GS}$=10V,I$_D$=5A | --- | 75 | 90 | mΩ |
| | | V$_{GS}$=4.5V,I$_D$=3A | --- | 95 | 110 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| C$_{iss}$ | Input Capacitance | | --- | 1008 | --- | |
| C$_{oss}$ | Output Capacitance | V$_{DS}$=50V, V$_{GS}$=0V, f=1MHz | --- | 31 | -- | pF |
| C$_{rss}$ | Reverse Transfer Capacitance | | --- | 22 | --- | |
| **Switching Characteristics** | | | | | | |
| t$_{d(on)}$ | Turn-On Delay Time | | --- | 37 | --- | ns |
| t$_r$ | Rise Time | V$_{DS}$=50V, I$_D$=5A, | --- | 25.7 | --- | ns |
| t$_{d(off)}$ | Turn-Off Delay Time | R$_{ENG}$=3Ω ,V$_{GS}$=10V | --- | 15 | --- | ns |
| t$_f$ | Fall Time | | --- | 8.7 | --- | ns |
| Q$_{gs}$ | Total Gate Charge | | --- | 16.3 | --- | nC |
| Q$_{gd}$ | Gate-Source Charge | V$_{GS}$=10V, V$_{DS}$=50V, | --- | 3.67 | --- | nC |
| Q$_g$ | Gate-Drain "Miller" Charge | I$_D$=5A | --- | 2.96 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| V$_{SD}$ | Diode Forward Voltage[2] | V$_{GS}$=0V, I$_{SD}$=1A | --- | --- | 1.2 | V |
| I$_S$ | Continuous Drain Curren[1,5] | | --- | --- | 10 | A |
| I$_{SM}$ | Pulsed Drain Current[2,5] | VD=VG=0V | --- | --- | 24 | A |

### Notes:
1.The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦300us , duty cycle ≦ 2%
3.The EAS data shows Max. rating . The test condition is V$_{DD}$=25V,V$_{GS}$=10V,L=1mH,I$_{AS}$=4.5A
4.The power dissipation is limited by 150℃ junction temperature
5.The data is theoretically the same as I$_D$ and I$_{DM}$ , in real applications , should be limited by total power dissipation.

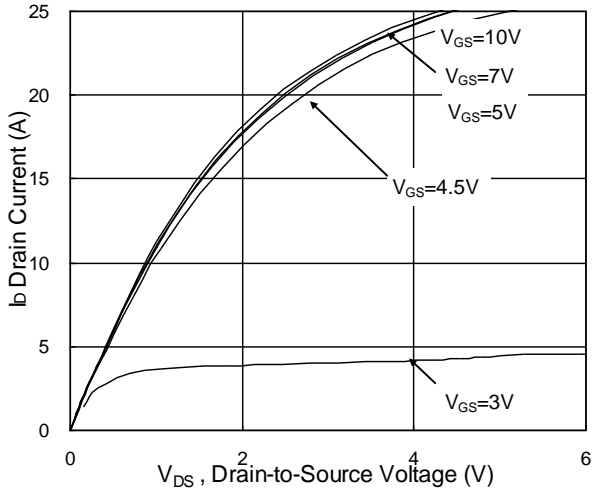## Typical Characteristics： (T$_A$=25℃  unless otherwise noted)
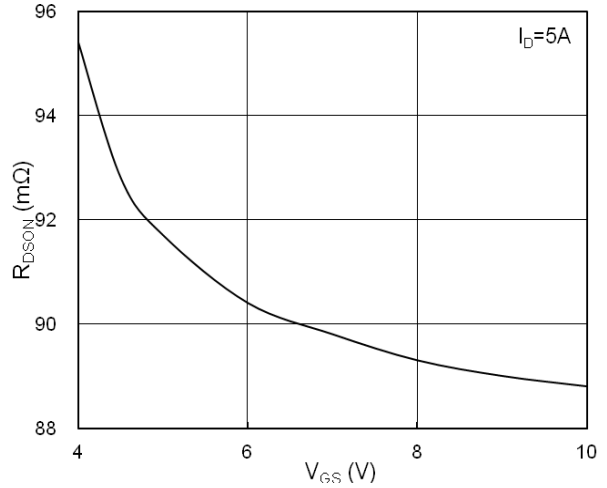


**Fig.1 Typical Output Characteristics**
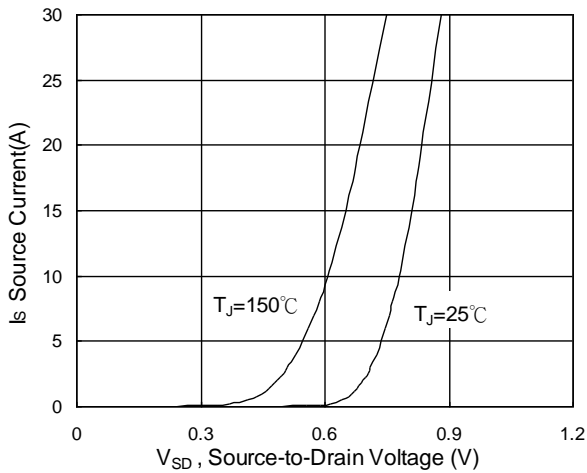


**Fig.2 On-Resistance vs G-S Voltage**



**Fig.3 Source Drain Forward Characteristics**
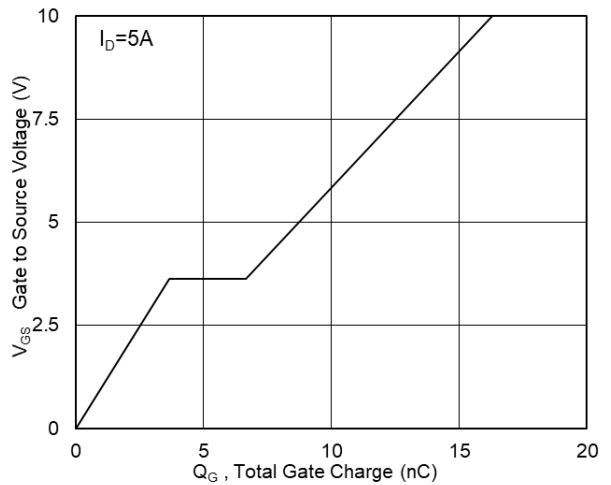


**Fig.4 Gate-Charge Characteristics**
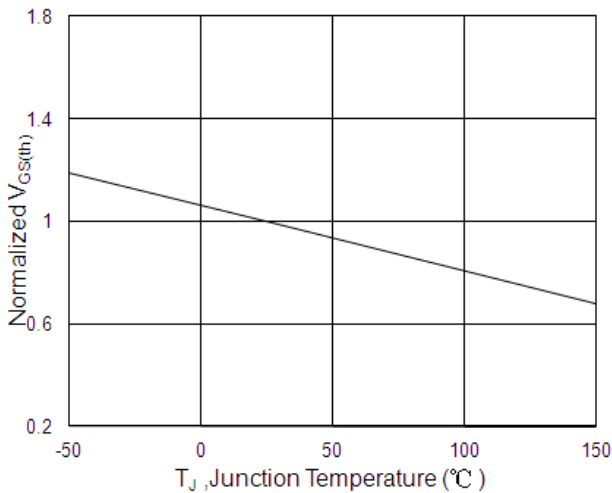


**Fig.5 Normalized V$_{GS(th)}$ vs T$_J$**
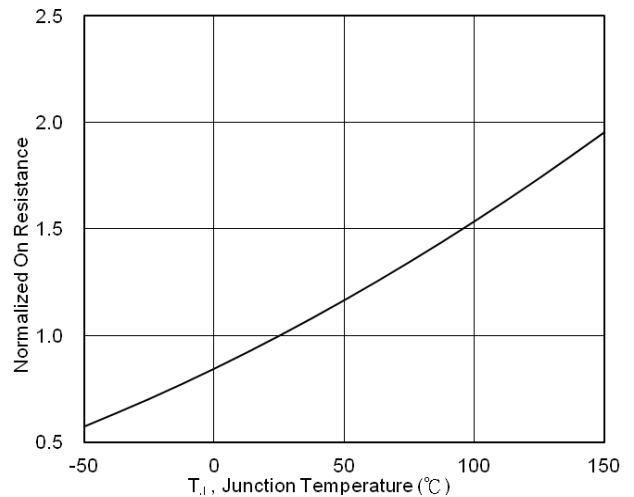


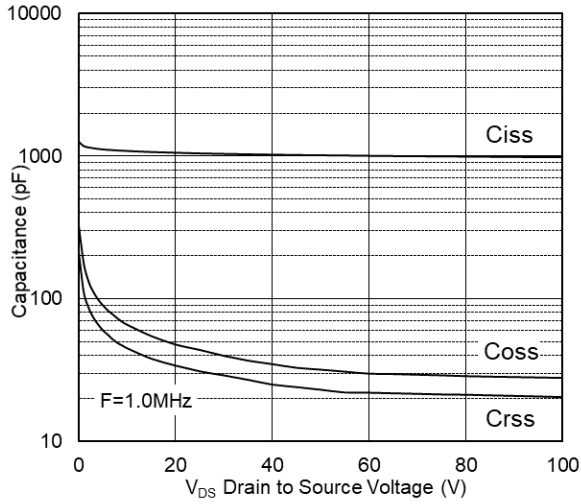**Fig.6 Normalized R$_{DSON}$ vs T$_J$**

https://www.tmc.com.tw
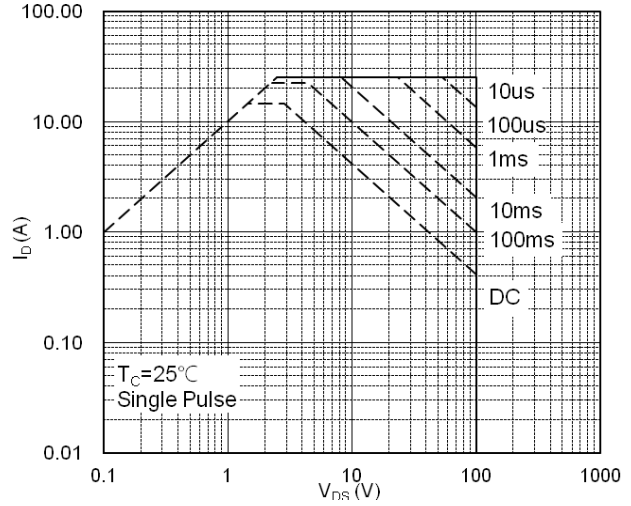
**Fig.7 Capacitance**
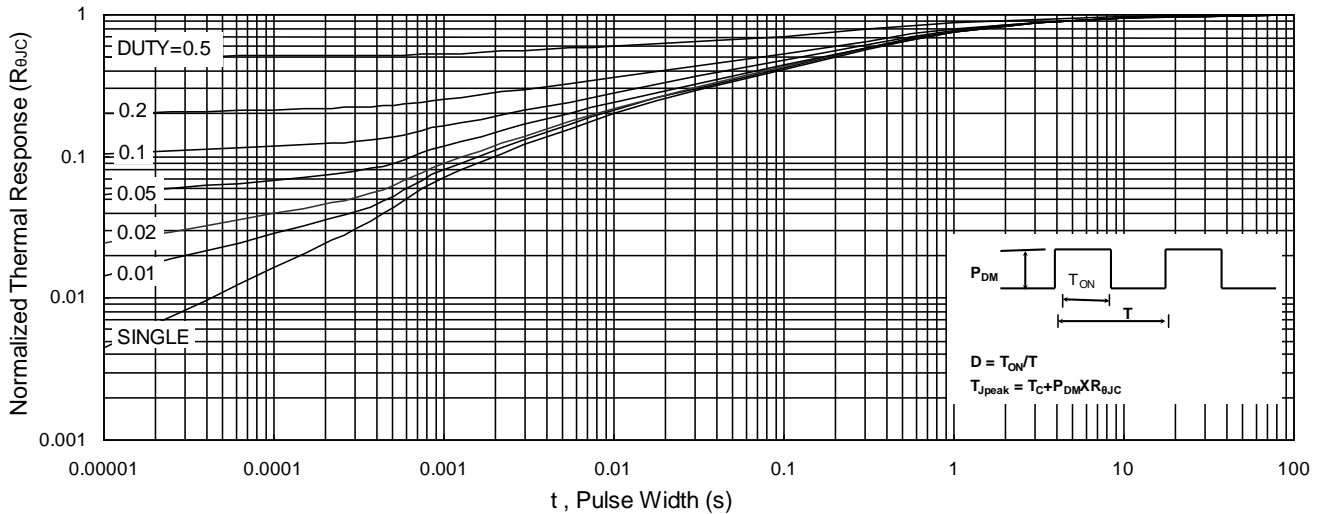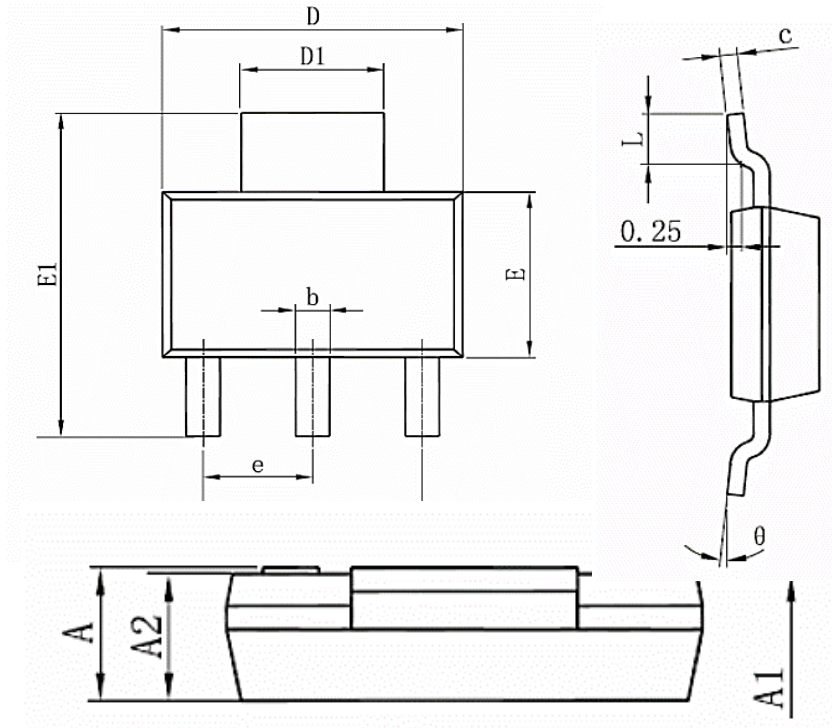
**Fig.8 Safe Operating Area**

**Fig.9 Normalized Maximum Transient Thermal Impedance**

## Package Mechanical Data:SOT-223-3L



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.52 | 1.8 | 0.06 | 0.049 |
| A1 | 0.000 | 0.100 | 0.000 | 0.004 |
| A2 | 1.5 | 1.7 | 0.059 | 0.045 |
| b | 0.66 | 0.82 | 0.026 | 0.032 |
| c | 0.25 | 0.35 | 0.010 | 0.014 |
| D | 6.2 | 6.4 | 0.244 | 0.252 |
| D1 | 2.9 | 3.1 | 0.114 | 0.122 |
| E | 3.3 | 3.7 | 0.130 | 0.146 |
| E1 | 6.83 | 7.07 | 0.269 | 0.278 |
| e | 2.300(BSC) | | 0.037(BSC) | |
| e1 | 4.500 | 4.700 | 0.177 | 0.185 |
| L | 0.900 | 1.15 | 0.035 | 0.045 |
| θ | 0° | 10° | 0° | 10° |

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