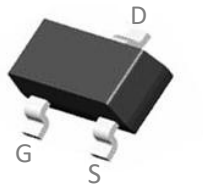
## Description：

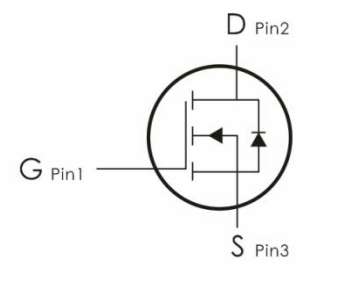
This N-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.




## Features：

1) $V_{DS}$=30V,$I_D$=5A,$R_{DS(ON)}$<30m Ω @$V_{GS}$=10V
2) Low gate charge.
3) Green device available.
4) Advanced high cell denity trench technology for ultra $R_{DS(ON)}$.
5) Excellent package for good heat dissipation.




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

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±12 | V |
| $I_D$ | Continuous Drain Current-$T_A$=25℃[1] | 5 | A |
| | Continuous Drain Current-$T_A$=70℃[1] | 3.6 | |
| $I_{DM}$ | Pulse Drain Current Tested[2] | 16 | A |
| $P_D$ | Power Dissipation-$T_A$=25℃[3] | 1 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance,Junction to Ambient[1] | 125 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case[1] | 80 | ℃/W |

## Package Marking and Ordering Information：

| Part NO. | Marking | Package |
|---|---|---|
| **DO3400D** | A09T: | SOT-23 |

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

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | 30 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=24V,$T_j$=25℃ | --- | --- | 1 | μA |
| | | $V_{GS}$=0V, $V_{DS}$=24V,$T_j$=55℃ | --- | --- | 5 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±12V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | GATE-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 0.5 | 0.7 | 1.2 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[2] | $V_{GS}$=10V,$I_D$=4A | --- | 25 | 30 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=3A | --- | 28 | 40 | |
| | | $V_{GS}$=2.5V,$I_D$=2A | --- | 35 | 47 | |
| $G_{FS}$ | Forward Transconductance | $V_{DS}$=5V,$I_D$=3A | --- | 19 | --- | S |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1MHz | --- | 660 | 920 | pF |
| $C_{oss}$ | Output Capacitance | | --- | 50 | 70 | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 42 | 60 | |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$=15V,$I_D$=3A, $V_{GS}$=4.5V,$R_G$=3.3Ω | --- | 3.2 | 6.4 | ns |
| $t_r$ | Rise Time | | --- | 41.8 | 75 | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 21.2 | 42 | ns |
| $t_f$ | Fall Time | | --- | 6.4 | 12.8 | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=4.5V, $V_{DS}$=15V, $I_D$=3A | --- | 8.34 | 11.7 | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 1.26 | 1.8 | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 1.88 | 2.6 | nC |

| | | | | | | |
|---|---|---|---|---|---|---|
| $R_G$ | Gate Resistance | $V_{DS}$=0V , $V_{GS}$=0V , f=1MHz | --- | 1.5 | 3 | Ω |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Forward Voltage[2] | $V_{GS}$=0V , $I_S$=1A , $T_J$=25℃ | --- | --- | 1.2 | V |
| $I_S$ | Source drain current[1,4] | $V_G$=$V_D$=0V , Force Current | --- | --- | 5 | A |
| $I_{SM}$ | Pulsed Source Current[2,4] | | --- | --- | 16 | A |
| Trr | Reverse Recovery Time | $I_F$=3A , dI/dt=100A/μs , $T_J$=25℃ | --- | 6.8 | --- | ns |
| Qrr | Reverse Recovery Charge | | --- | 2.3 | --- | nC |

## Notes:

1.The data tested by surface mounted on a 1 inch$^2$ FR-4 board with 2OZ copper.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.The power dissipation is limited by 150℃ junction temperature
4.The data is theoretically the same as $I_D$ and $I_{DM}$ , in real applications , should be limited by total power dissipation.

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

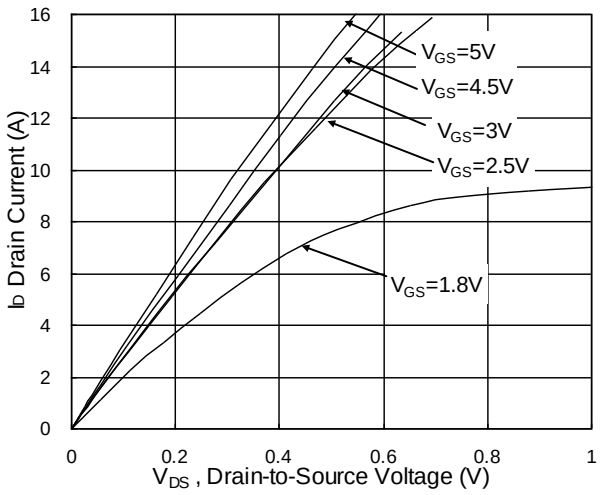



**Fig.1 Typical Output Characteristics**

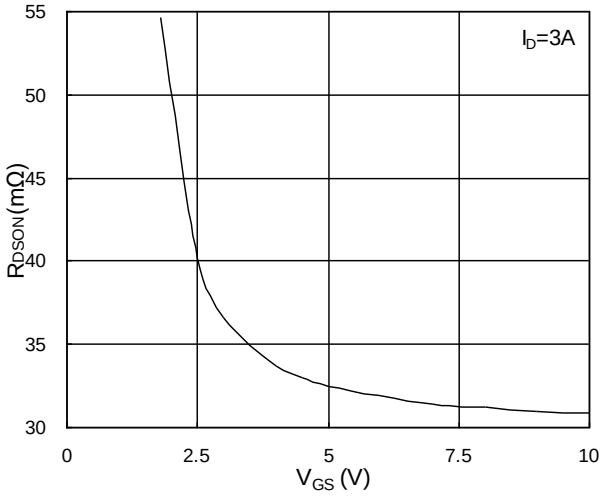



**Fig.2 On-Resistance vs G-S Voltage**

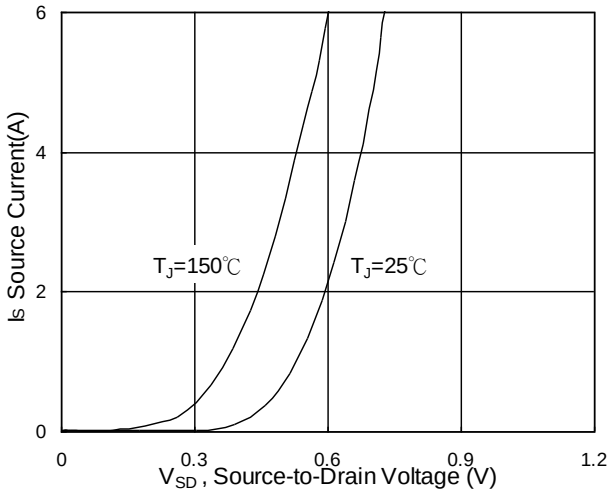



**Fig.3 Source Drain Forward Characteristics**

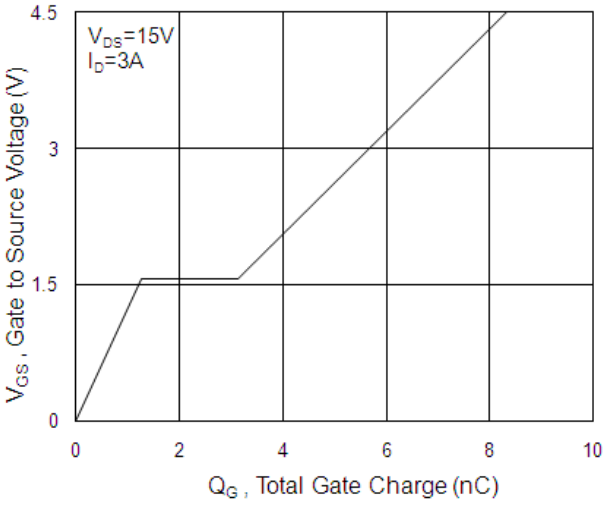



**Fig.4 Gate-Charge Characteristics**

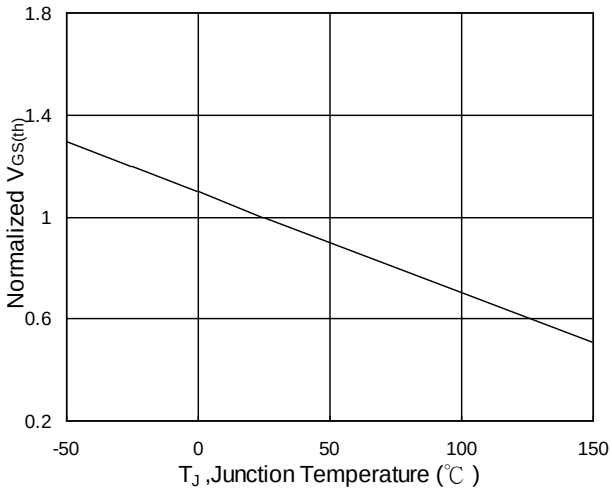



**Fig.5 Normalized $V_{GS(th)}$ vs $T_J$**

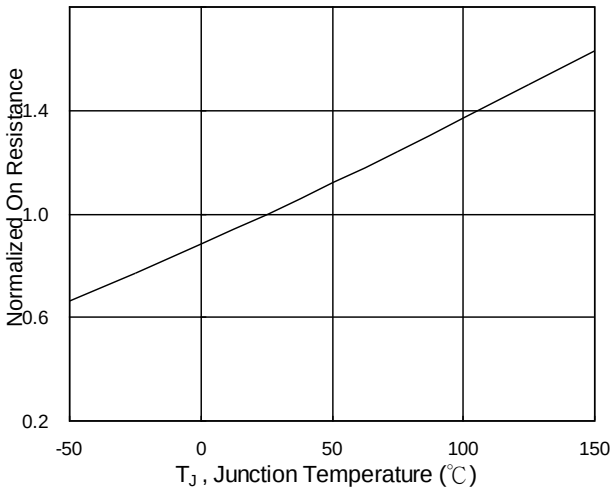



**Fig.6 Normalized $R_{DSON}$ vs $T_J$**

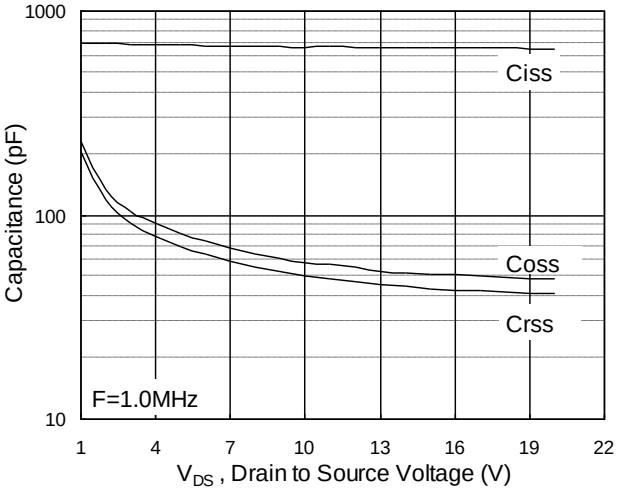



**Fig.7 Capacitance**

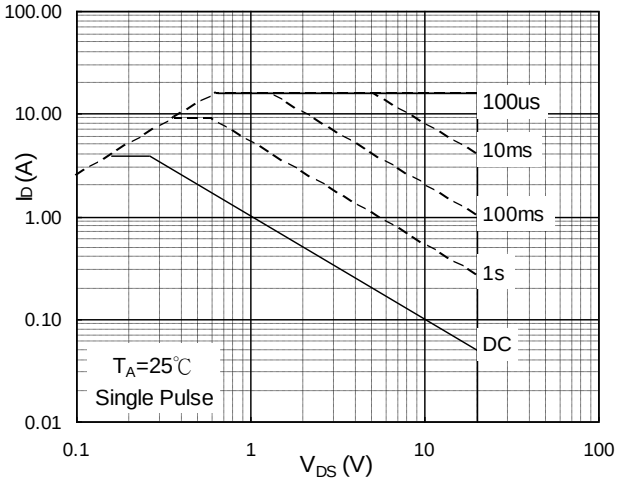



**Fig.8 Safe Operating Area**

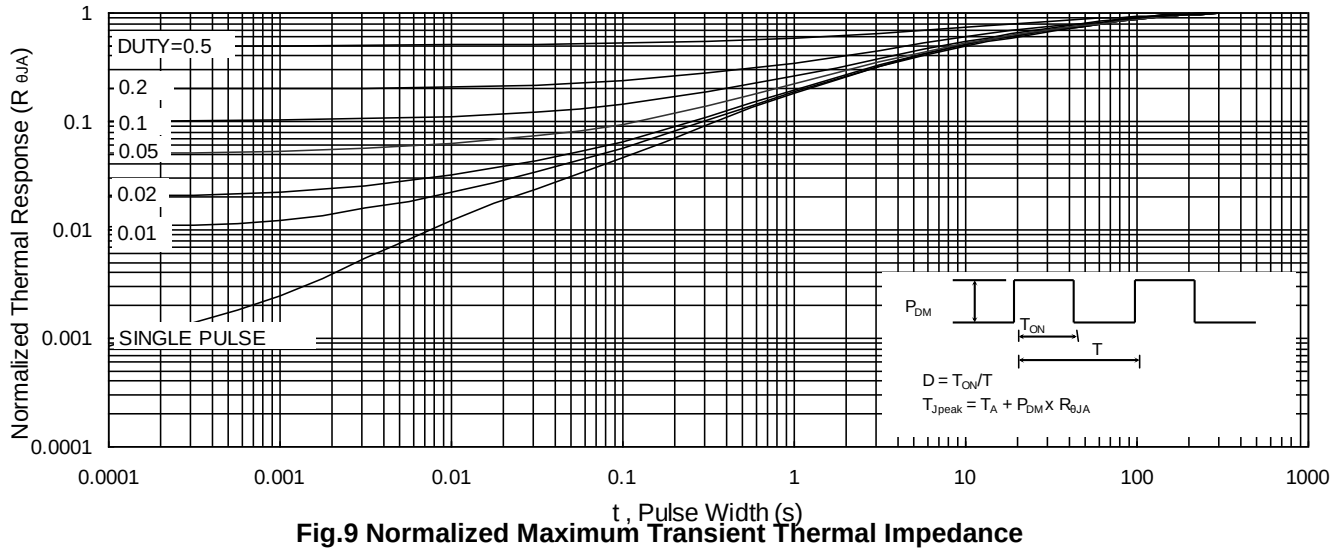



**Fig.9 Normalized Maximum Transient Thermal Impedance**

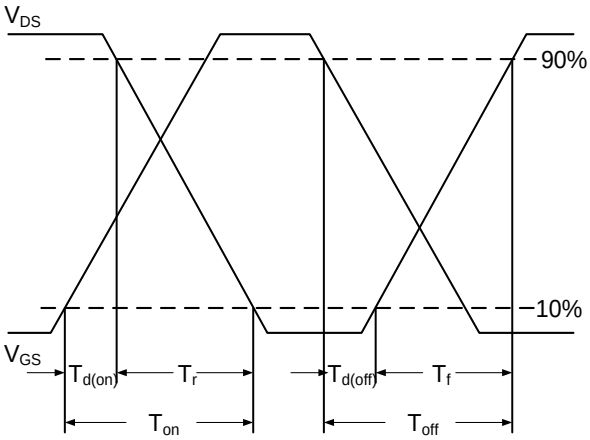



Fig.10 Switching Time Waveform

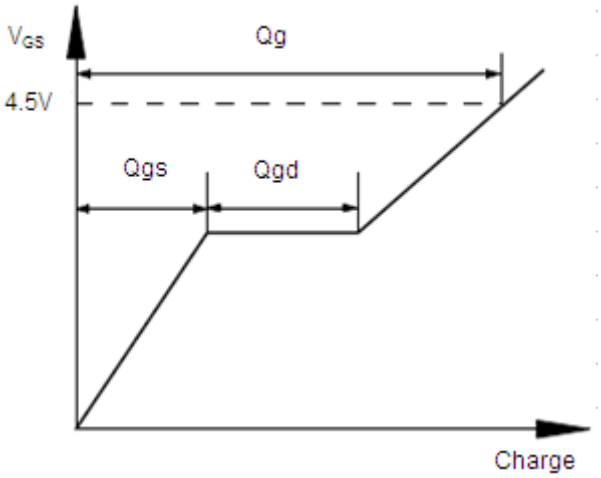



Fig.11 Gate Charge Waveform