

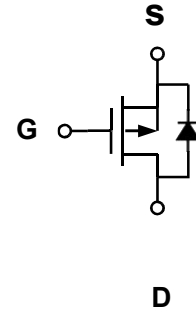


P-Channel Enhancement Mode Power MOSFET

Description

The MX3401A uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V.

This device is suitable for use as a load switch or in PWM applications.



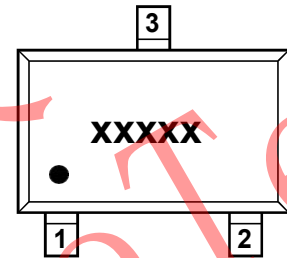
Schematic diagram

General Features

- ◆ $V_{DS} = -30V$, $I_D = -4.2A$
- ◆ @ $V_{GS} = -10V$ $R_{DS(ON)}$ (Typ.)=45m Ω
- ◆ @ $V_{GS} = -4.5V$ $R_{DS(ON)}$ (Typ.)=52m Ω
- ◆ @ $V_{GS} = -2.5V$ $R_{DS(ON)}$ (Typ.)=70m Ω
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

Application

- ◆ PWM applications
- ◆ Load switch
- ◆ Power management



Marking and pin assignment



SOT-23 (TOP VIEW)

Absolute Maximum Ratings (TA=25°C unless otherwise noted)

| parameter | symbol | limit | unit |
|------------------------------------------------------------------------|----------|----------|------|
| Drain-source voltage | V_{DS} | -30 | V |
| Gate-source voltage | V_{GS} | ± 12 | V |
| Drain current-continuous ^a @Tj=125°C -pulse ^b | I_D | -4.2 | A |
| | I_{DM} | -30 | A |
| Maximum power dissipation | P_D | 1.2 | W |
| Operating junction Temperature range | T_j | -55—150 | °C |



Electrical Characteristics (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-------------------------------------------|--------------|------------------------------------------------------------------|------|-----|-----------|------------|
| OFF Characteristics | | | | | | |
| Drain-source breakdown voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -30 | - | - | V |
| Zero gate voltage drain current | I_{DSS} | $V_{DS}=-24V, V_{GS}=0V$ | - | - | -1 | μA |
| Gate-body leakage | I_{GSS} | $V_{DS}=0V, V_{GS}=\pm 10V$ | - | - | ± 100 | nA |
| ON Characteristics | | | | | | |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.7 | -1 | -1.3 | V |
| Drain-source on-state resistance | $R_{DS(ON)}$ | $V_{GS}=-10V, I_D=-4.2A$ | | 40 | 50 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-4A$ | - | 52 | 65 | |
| | | $V_{GS}=-2.5V, I_D=-1A$ | - | 70 | 100 | |
| Forward transconductance | g_{fs} | $V_{GS}=-5V, I_D=-4.2A$ | - | 10 | - | S |
| Dynamic Characteristics | | | | | | |
| Input capacitance | C_{iss} | $V_{DS}=-15V, V_{GS}=0V$ $f=1.0MHz$ | - | 950 | - | pF |
| Output capacitance | C_{oss} | | - | 115 | - | |
| Reverse transfer capacitance | C_{rss} | | - | 75 | - | |
| Switching Characteristics | | | | | | |
| Turn-on delay time | $t_{D(ON)}$ | $V_{DD}=-15V$ $I_D=-3.2A$ $V_{GEN}=-10V$ $R_{GEN}=6ohm$ | - | 7 | - | ns |
| Rise time | t_r | | - | 3 | - | |
| Turn-off delay time | $t_{D(OFF)}$ | | - | 30 | - | |
| Fall time | t_f | | - | 12 | - | |
| Total gate charge | Q_g | $V_{DS}=-15V, I_D=-4.0A$ $V_{GS}=-4.5V$ | - | 9.5 | - | nC |
| Gate-source charge | Q_{gs} | | - | 2 | - | |
| Gate-drain charge | Q_{gd} | | - | 3 | - | |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode forward voltage | V_{SD} | $V_{GS}=0V, I_s=-1A$ | - | - | -1.2 | V |

Notes:

- surface mounted on FR4 board, $t \leq 10sec$
- pulse test: pulse width $\leq 300\mu s$, duty $\leq 2\%$
- guaranteed by design, not subject to production testing

Thermal Characteristics

| | | | |
|----------------------------------------|--------|-----|---------------|
| Thermal Resistance junction-to ambient | Rth JA | 104 | $^{\circ}C/W$ |
|----------------------------------------|--------|-----|---------------|



Typical Electrical and Thermal Characteristics

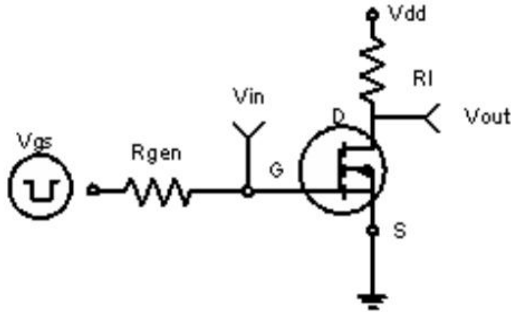


Figure 1: Switching Test Circuit

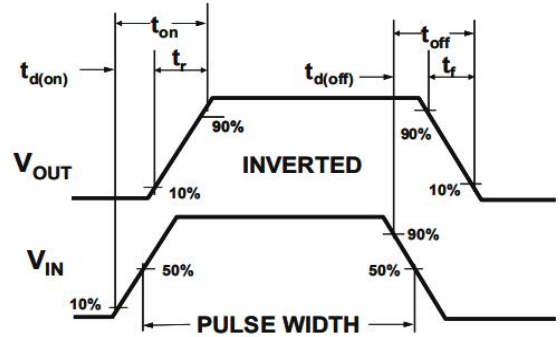


Figure 2: Switching Waveforms

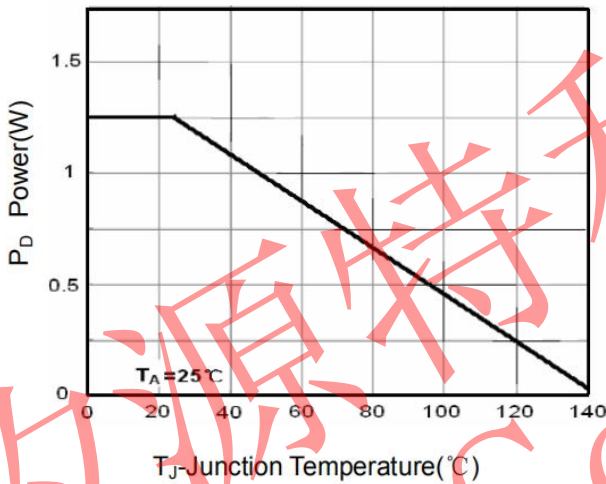


Figure 3 Power Dissipation

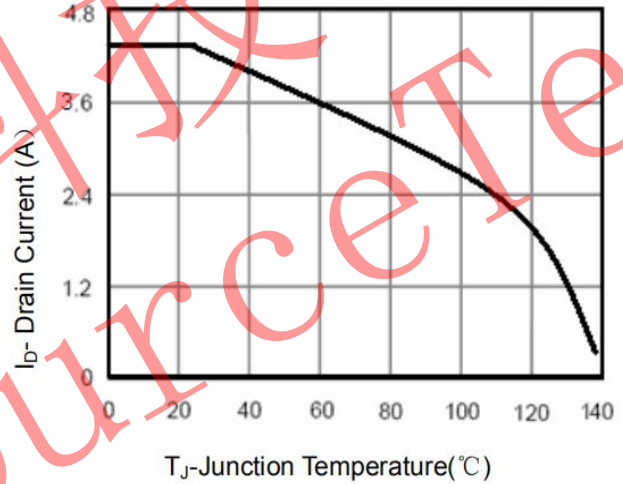


Figure 4 Drain Current

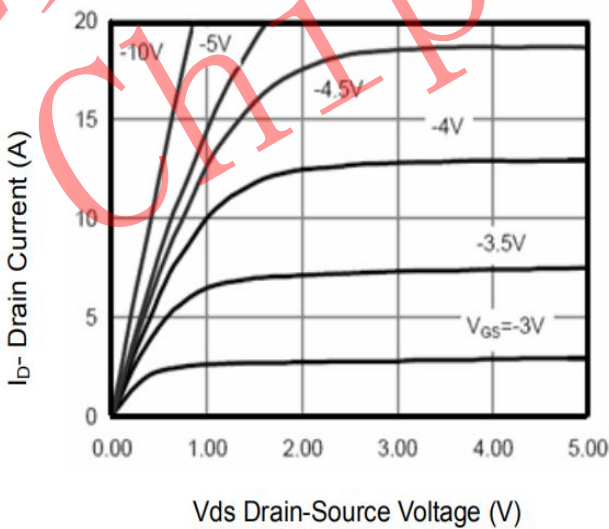


Figure 5 Output Characteristics

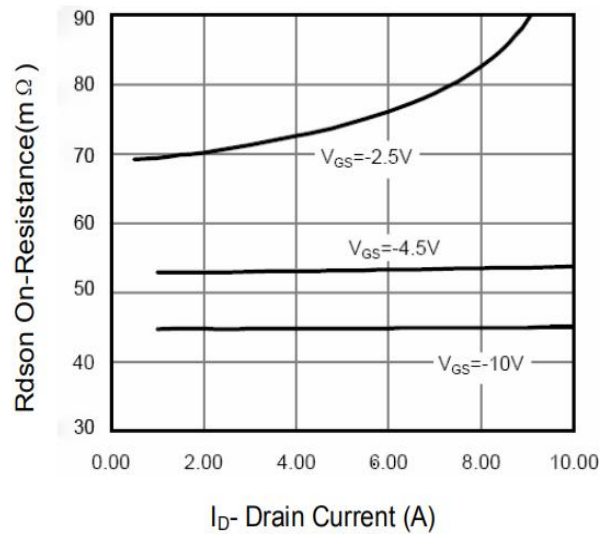


Figure 6 Drain-Source On-Resistance

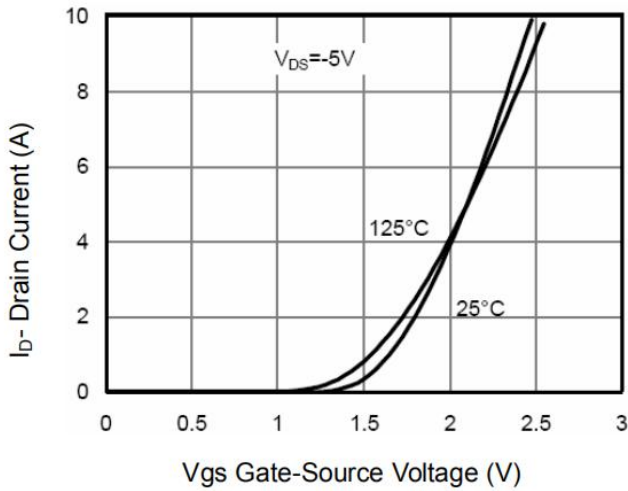


Figure 7 Transfer Characteristics

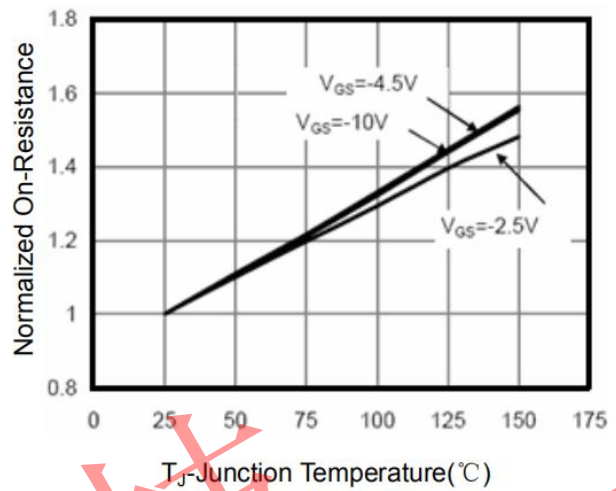


Figure 8 Drain-Source On-Resistance

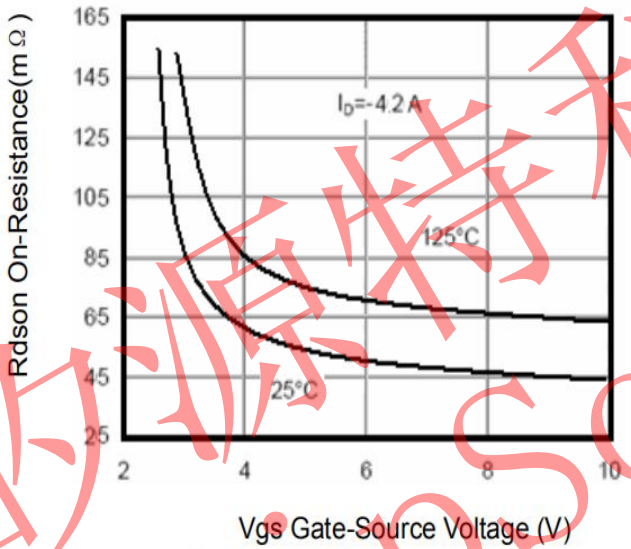


Figure 9 Rdson vs Vgs

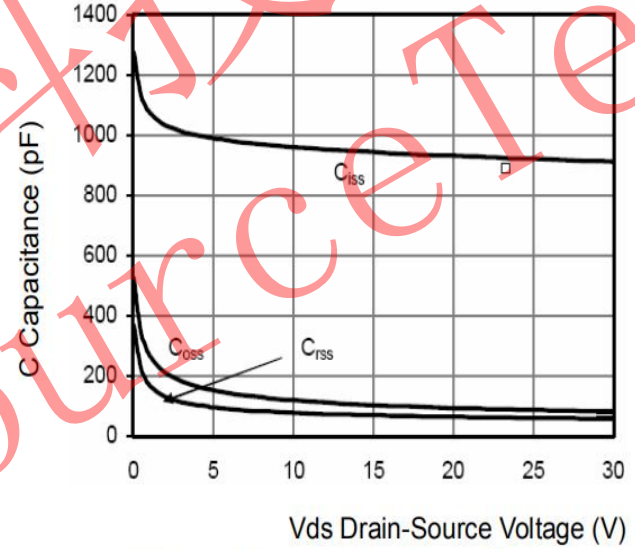


Figure 10 Capacitance vs Vds

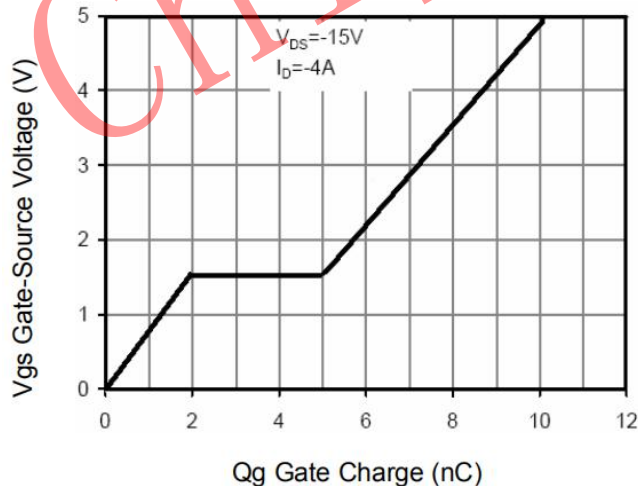


Figure 11 Gate Charge

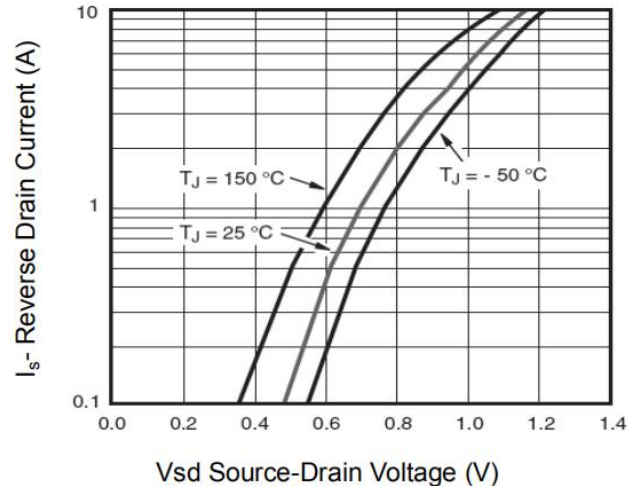


Figure 12 Source- Drain Diode Forward

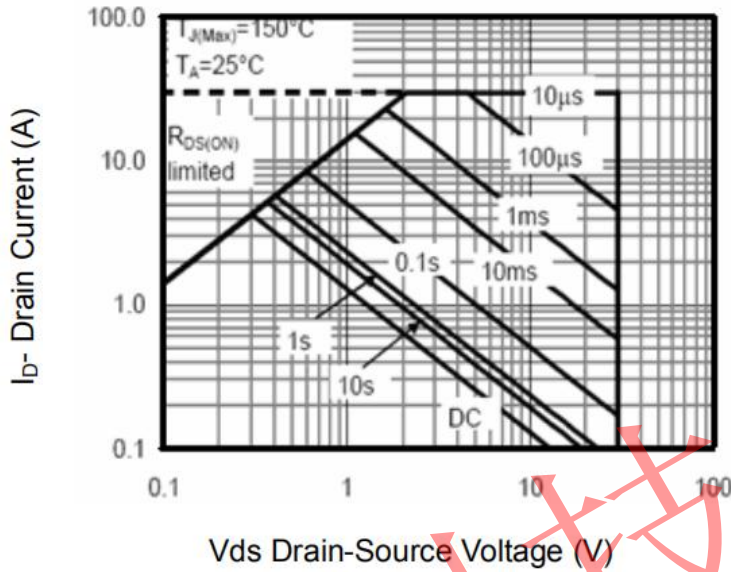


Figure 13 Safe Operation Area

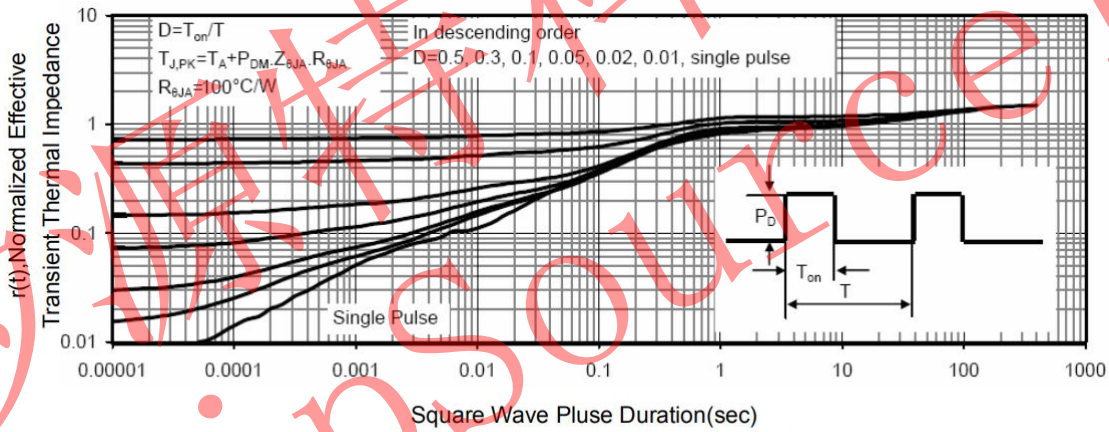
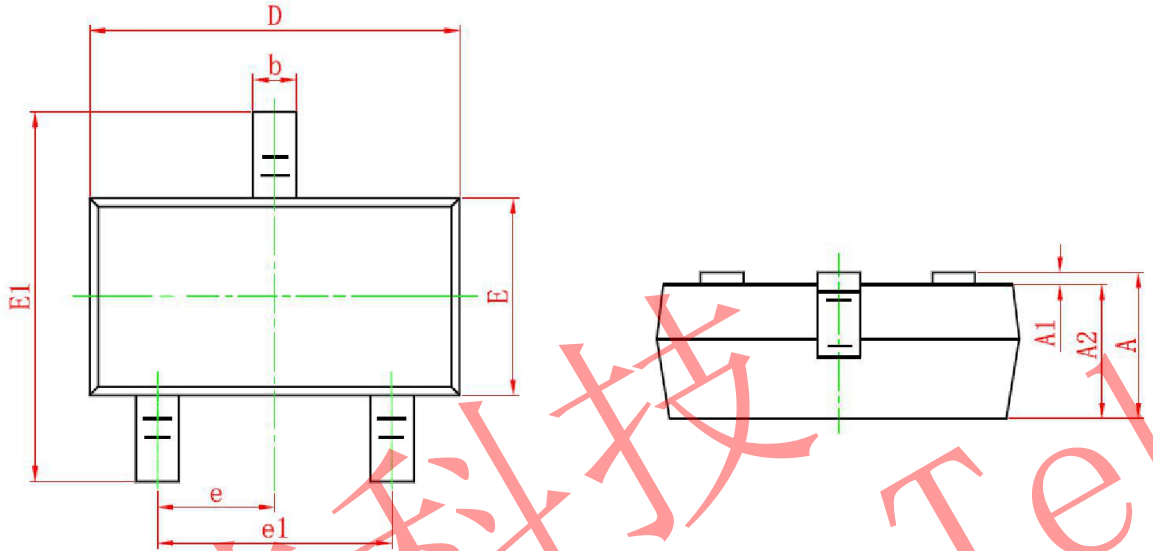


Figure 14 Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



| Symbol | Dimensions in Millimeters | |
|----------|---------------------------|-------|
| | MIN. | MAX. |
| A | 0.900 | 1.150 |
| A1 | 0.000 | 0.100 |
| A2 | 0.900 | 1.050 |
| b | 0.300 | 0.500 |
| c | 0.080 | 0.150 |
| D | 2.800 | 3.000 |
| E | 1.200 | 1.400 |
| E1 | 2.250 | 2.550 |
| e | 0.950TYP | |
| e1 | 1.800 | 2.000 |
| L | 0.550REF | |
| L1 | 0.300 | 0.500 |
| θ | 0° | 8° |