

DESCRIPTION

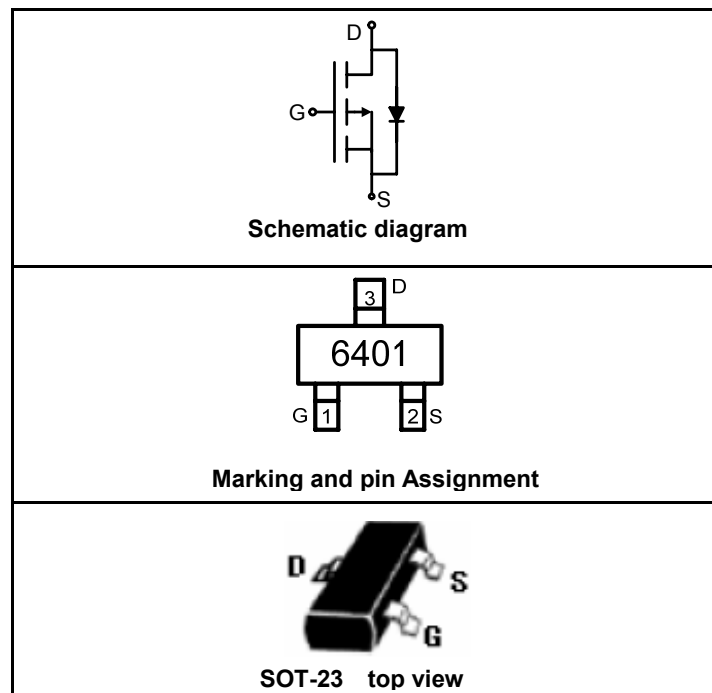
The SSF6401 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- $V_{DS} = -12V, I_D = -4.3A$
 $R_{DS(ON)} < 85m\Omega @ V_{GS} = -2.5V$
 $R_{DS(ON)} < 50m\Omega @ V_{GS} = -4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

Application

- PWM applications
- Load switch
- Power management



PACKAGE MARKING AND ORDERING INFORMATION

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity |
|----------------|---------|----------------|-----------|------------|------------|
| 6401 | SSF6401 | SOT-23 | Ø180mm | 8 mm | 3000 units |

ABSOLUTE MAXIMUM RATINGS(TA=25°C unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|---|----------------|------------|------|
| Drain-Source Voltage | V_{DS} | -12 | V |
| Gate-Source Voltage | V_{GS} | ±8 | V |
| Drain Current-Continuous@ Current-Pulsed (Note 1) | I_D | -4.3 | A |
| | I_{DM} | -34 | A |
| Maximum Power Dissipation | P_D | 1.3 | W |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 To 150 | °C |

THERMAL CHARACTERISTICS

| | | | |
|--|-----------------|-----|------|
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 100 | °C/W |
|--|-----------------|-----|------|

ELECTRICAL CHARACTERISTICS (TA=25°C unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------------------|------------|----------------------------|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Drain-Source Breakdown Voltage | BV_{DSS} | $V_{GS}=0V, I_D=-250\mu A$ | -12 | | | V |
| Zero Gate Voltage Drain Current | I_{DSS} | $V_{DS}=-12V, V_{GS}=0V$ | | | -1 | µA |
| Gate-Body Leakage Current | I_{GSS} | $V_{GS}=\pm 8V, V_{DS}=0V$ | | | ±100 | nA |

| ON CHARACTERISTICS (Note 3) | | | | | | |
|------------------------------------|--------------|--|------|-----|------|----|
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}=V_{GS}, I_D=-250\mu A$ | -0.4 | | -1 | V |
| Drain-Source On-State Resistance | $R_{DS(ON)}$ | $V_{GS}=-4.5V, I_D=-4.3A$ | | | 50 | mΩ |
| | | $V_{GS}=-2.5V, I_D=-2.5A$ | | | 85 | |
| Forward Transconductance | g_{FS} | $V_{DS}=-5V, I_D=-4.3A$ | | 7 | | S |
| DYNAMIC CHARACTERISTICS (Note4) | | | | | | |
| Input Capacitance | C_{iss} | $V_{DS}=-4V, V_{GS}=0V,$ $F=1.0MHz$ | | 740 | | PF |
| Output Capacitance | C_{oss} | | | 290 | | PF |
| Reverse Transfer Capacitance | C_{rss} | | | 190 | | PF |
| SWITCHING CHARACTERISTICS (Note 4) | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}=-10V, I_D=-1A, R_L=10\Omega,$ $R_{GEN}=6\Omega$ | | 27 | | nS |
| Turn-on Rise Time | t_r | | | 60 | | nS |
| Turn-Off Delay Time | $t_{d(off)}$ | | | 110 | | nS |
| Turn-Off Fall Time | t_f | | | 80 | | nS |
| Total Gate Charge | Q_g | $V_{DS}=-4V, I_D=-4.3A, V_{GS}=-4.5V$ | | 7.8 | 15 | nC |
| Gate-Source Charge | Q_{gs} | | | 1.2 | | nC |
| Gate-Drain Charge | Q_{gd} | | | 1.6 | | nC |
| DRAIN-SOURCE DIODE CHARACTERISTICS | | | | | | |
| Diode Forward Voltage (Note 3) | V_{SD} | $V_{GS}=0V, I_S=-3.3A$ | | | -1.2 | V |
| Diode Forward Current (Note 2) | I_S | | | | -1.4 | A |

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production testing.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

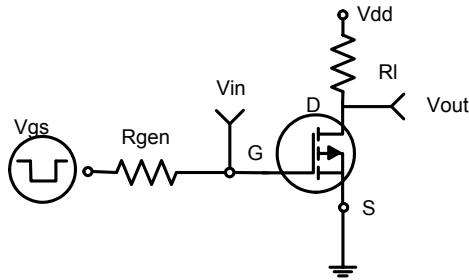


Figure 1: Switching Test Circuit

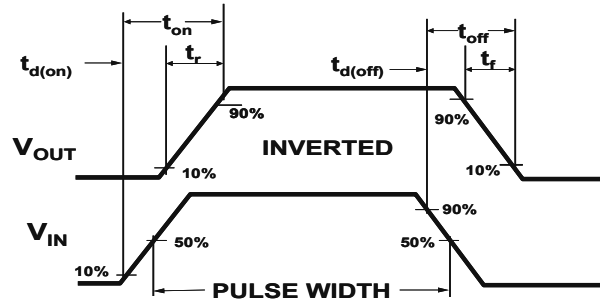


Figure 2: Switching Waveforms

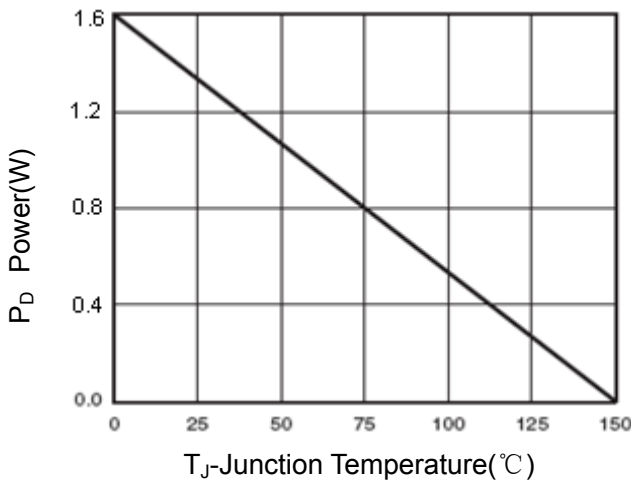


Figure 3 Power Dissipation

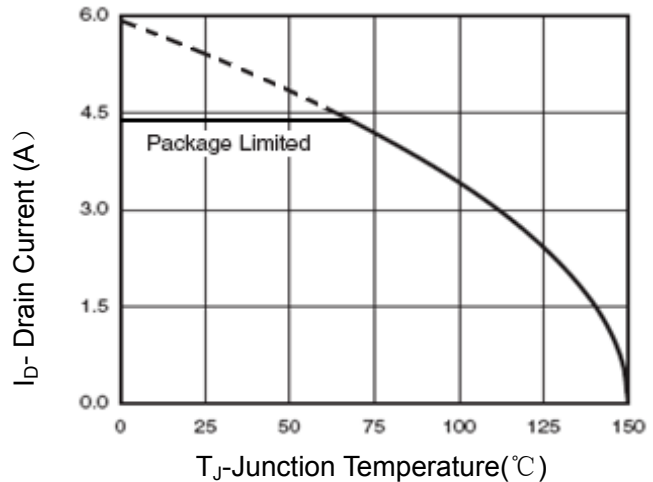


Figure 4 Drain Current

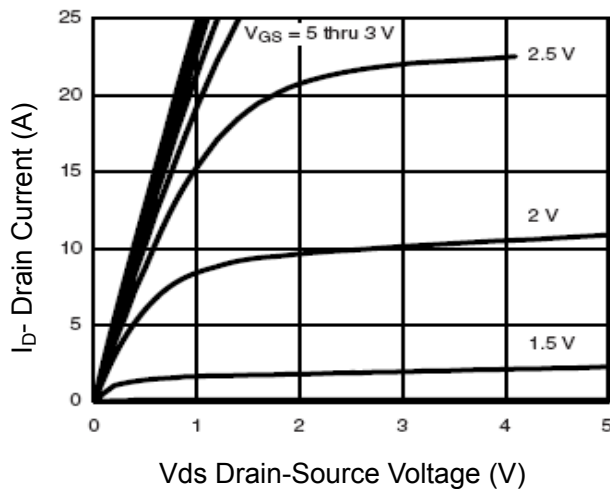


Figure 5 Output CHARACTERISTICS

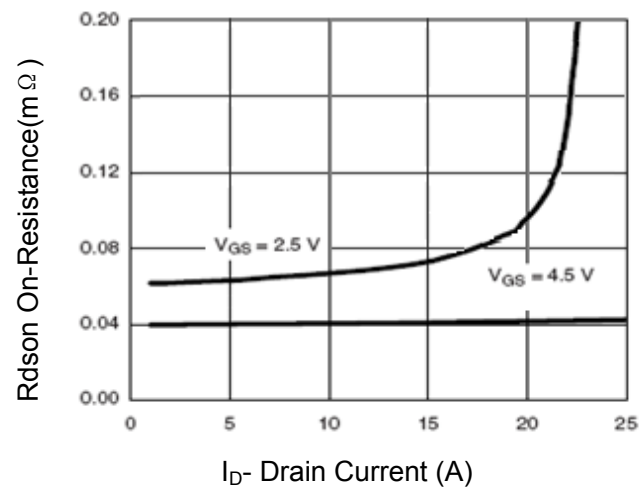


Figure 6 Drain-Source On-Resistance

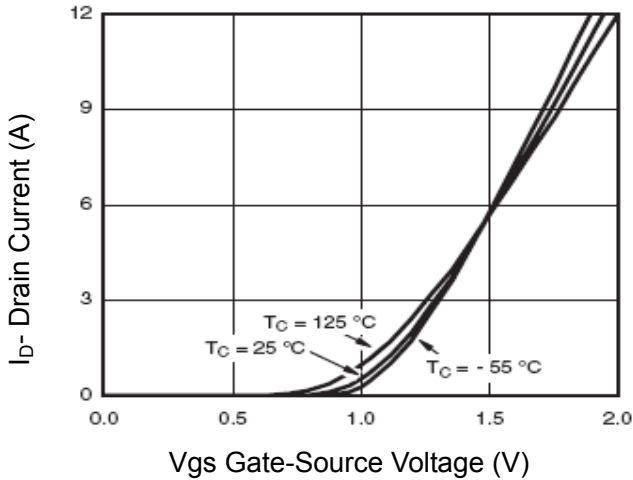


Figure 7 Transfer Characteristics

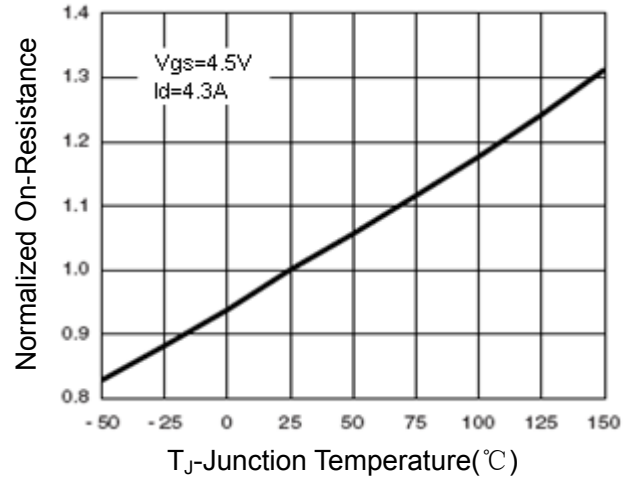


Figure 8 Drain-Source On-Resistance

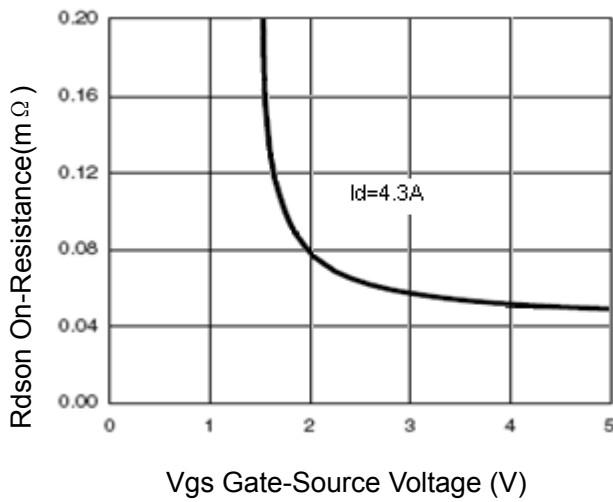


Figure 9 Rdson vs Vgs

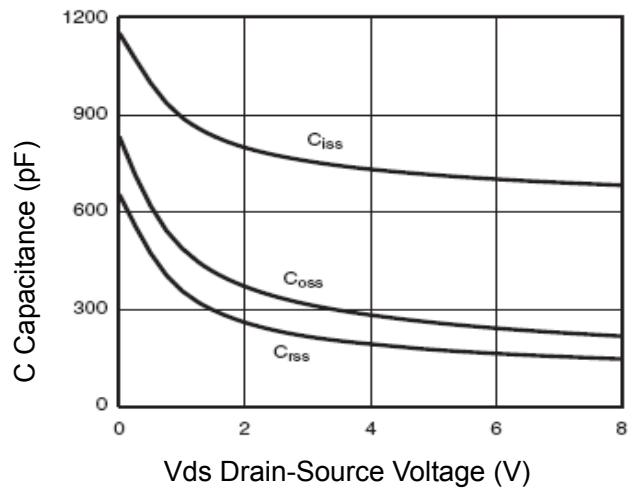


Figure 10 Capacitance vs Vds

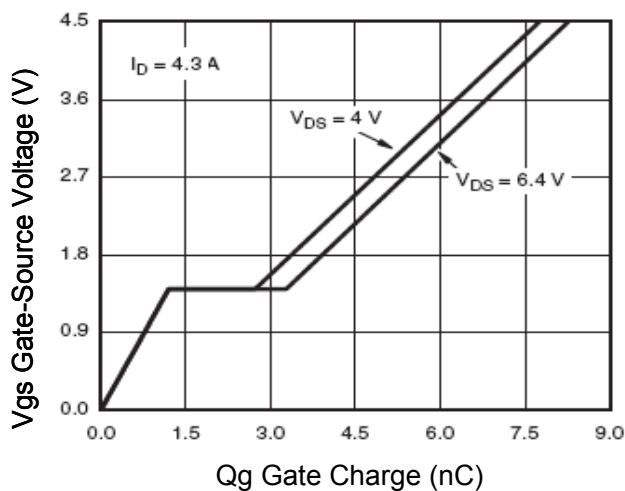


Figure 11 Gate Charge

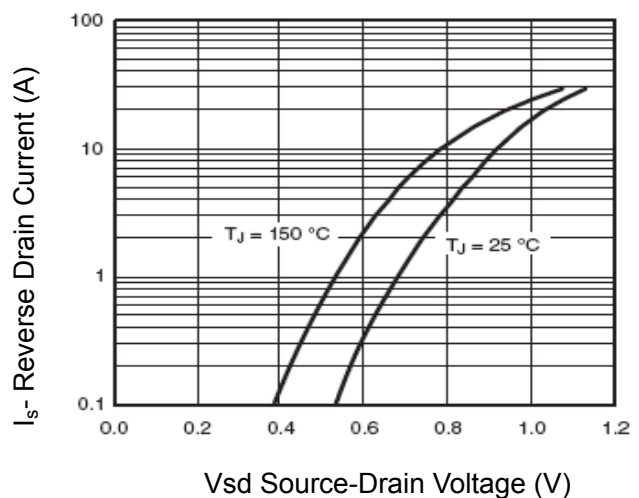


Figure 12 Source- Drain Diode Forward

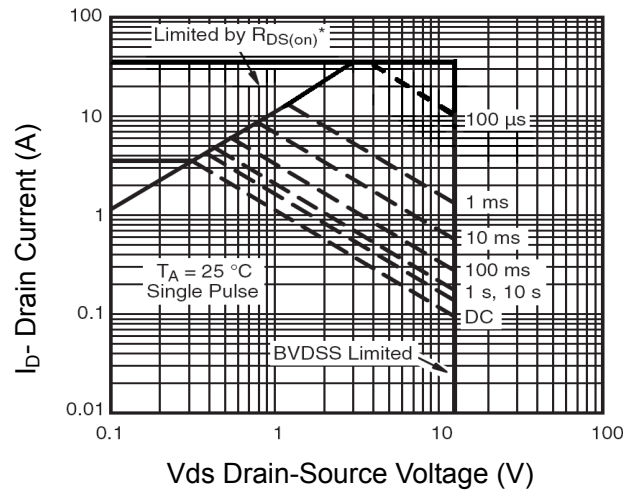


Figure 13 Safe Operation Area

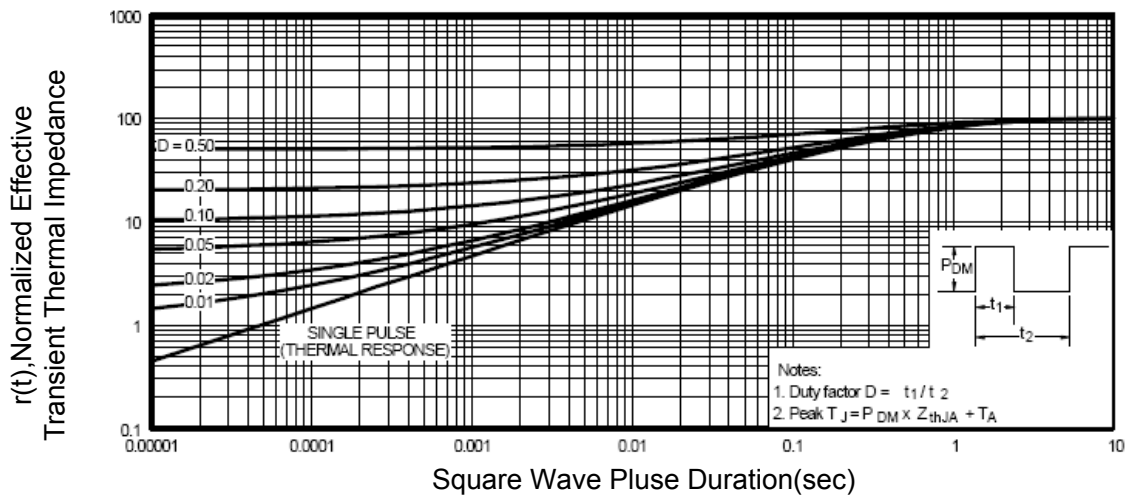
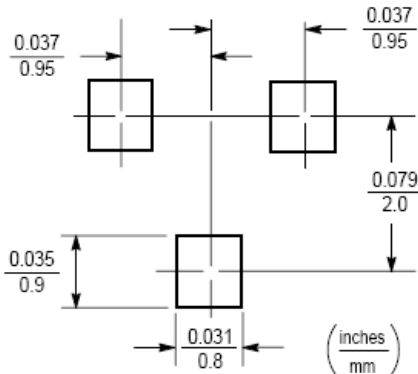
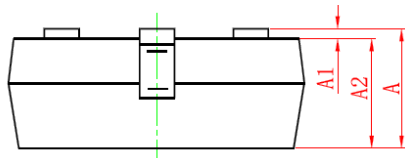
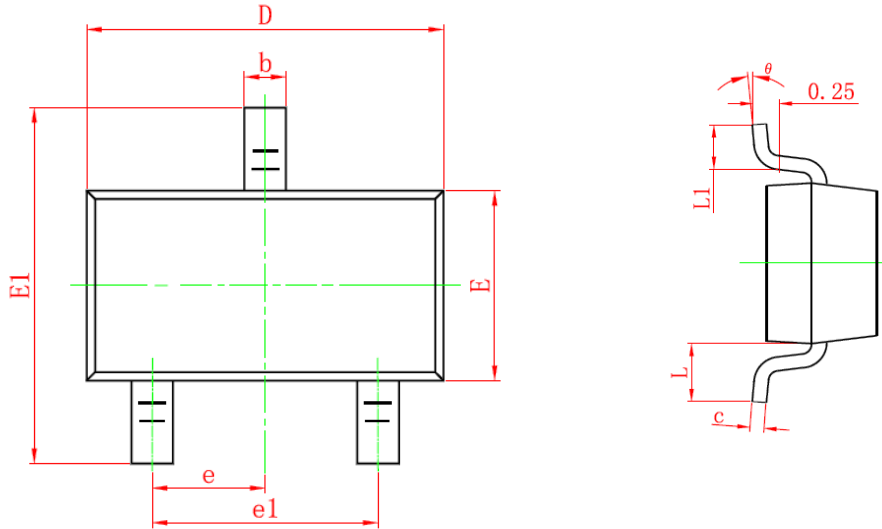


Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23 PACKAGE INFORMATION

Dimensions in Millimeters (UNIT:mm)



| 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° |

NOTES

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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