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With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## P-Channel Power MOSFET

-30V, -3A, 60mΩ

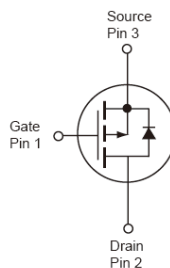
### Features

- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance
- Pb-free plating
- RoHS compliant
- Halogen-free package

### Application

- Load Switch
- PA Switch

| KEY PERFORMANCE PARAMETERS |                  |       |      |
|----------------------------|------------------|-------|------|
| PARAMETER                  |                  | VALUE | UNIT |
| $V_{DS}$                   |                  | -30   | V    |
| $R_{DS(on)}$ (max)         | $V_{GS} = -10V$  | 60    | mΩ   |
|                            | $V_{GS} = -4.5V$ | 90    |      |
| $Q_g$                      |                  | 9.52  | nC   |



P-Channel MOSFET

**Notes:** Moisture sensitivity level: level 3. Per J-STD-020

| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ C$ unless otherwise noted) |                    |                |              |            |
|---|--------------------|----------------|--------------|------------|
| PARAMETER   |                    | SYMBOL         | LIMIT        | UNIT       |
| Drain-Source Voltage  |                    | $V_{DS}$       | -30          | V          |
| Gate-Source Voltage   |                    | $V_{GS}$       | $\pm 20$     | V          |
| Continuous Drain Current <sup>(Note 1)</sup>                          | $T_A = 25^\circ C$ | $I_D$          | -3           | A          |
| Pulsed Drain Current <sup>(Note 2)</sup>                              |                    | $I_{DM}$       | -10          | A          |
| Continuous Source Current (Diode Conduction)                          |                    | $I_S$          | -1.9         | A          |
| Total Power Dissipation   | $T_A = 25^\circ C$ | $P_{TOT}$      | 1.25         | W          |
|   | $T_A = 70^\circ C$ |                | 0.8          |            |
| Operating Junction and Storage Temperature Range                      |                    | $T_J, T_{STG}$ | - 55 to +150 | $^\circ C$ |

| THERMAL PERFORMANCE                    |                 |       |              |
|--|-----------------|-------|--------------|
| PARAMETER                              | SYMBOL          | LIMIT | UNIT         |
| Junction to Case Thermal Resistance    | $R_{\theta JC}$ | 75    | $^\circ C/W$ |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 100   | $^\circ C/W$ |

**Notes:**  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins.  $R_{\theta JA}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 PCB in still air.

| <b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |   |              |      |        |           |            |
|---|---|--------------|------|--------|-----------|------------|
| PARAMETER   | CONDITIONS  | SYMBOL       | MIN  | TYP    | MAX       | UNIT       |
| <b>Static</b> <sup>(Note 3)</sup>   |   |              |      |        |           |            |
| Drain-Source Breakdown Voltage  | $V_{GS} = 0V, I_D = -250\mu A$  | $BV_{DSS}$   | -30  | --     | --        | V          |
| Gate Threshold Voltage  | $V_{DS} = V_{GS}, I_D = -250\mu A$                                      | $V_{GS(TH)}$ | -1.0 | -1.5   | -3.0      | V          |
| Gate Body Leakage   | $V_{GS} = \pm 20V, V_{DS} = 0V$   | $I_{GSS}$    | --   | --     | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current   | $V_{DS} = -24V, V_{GS} = 0V$  | $I_{DSS}$    | --   | --     | -1        | $\mu A$    |
| On-State Drain Current  | $V_{DS} = -5V, V_{GS} = -10V$   | $I_{D(ON)}$  | -6   | --     | --        | A          |
| Drain-Source On-State Resistance  | $V_{GS} = -10V, I_D = -3A$  | $R_{DS(ON)}$ | --   | 50     | 60        | m $\Omega$ |
|   | $V_{GS} = -4.5V, I_D = -2A$   |              | --   | 75     | 90        |            |
| Forward Transconductance  | $V_{DS} = -15V, I_D = -5A$  | $g_{fs}$     | 4    | 7      | --        | S          |
| <b>Dynamic</b> <sup>(Note 4)</sup>  |   |              |      |        |           |            |
| Total Gate Charge   | $V_{DS} = -15V, I_D = -3A,$<br>$V_{GS} = -10V$                          | $Q_g$        | --   | 9.52   | --        | nC         |
| Gate-Source Charge  |   | $Q_{gs}$     | --   | 3.43   | --        |            |
| Gate-Drain Charge   |   | $Q_{gd}$     | --   | 1.71   | --        |            |
| Input Capacitance   | $V_{DS} = -15V, V_{GS} = 0V,$<br>$f = 1.0\text{MHz}$                    | $C_{iss}$    | --   | 551.57 | --        | pF         |
| Output Capacitance  |   | $C_{oss}$    | --   | 90.96  | --        |            |
| Reverse Transfer Capacitance  |   | $C_{rss}$    |      |        | 60.79     |            |
| <b>Switching</b> <sup>(Note 5)</sup>  |   |              |      |        |           |            |
| Turn-On Delay Time  | $V_{DD} = -15V,$<br>$R_{GEN} = 6\Omega,$<br>$I_D = -1A, V_{GS} = -10V,$ | $t_{d(on)}$  | --   | 10.8   | --        | ns         |
| Turn-On Rise Time   |   | $t_r$        | --   | 2.33   | --        |            |
| Turn-Off Delay Time   |   | $t_{d(off)}$ | --   | 22.53  | --        |            |
| Turn-Off Fall Time  |   | $t_f$        | --   | 3.87   | --        |            |
| <b>Source-Drain Diode</b> <sup>(Note 3)</sup>                                       |   |              |      |        |           |            |
| Forward On Voltage  | $I_S = -1.9 A, V_{GS} = 0V$   | $V_{SD}$     | --   | -0.8   | -1.3      | V          |

**Notes:**

1. Pulse width limited by the maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 5$  sec.
3. Pulse test:  $PW \leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. For DESIGN AID ONLY, not subject to production testing.
5. Switching time is essentially independent of operating temperature.

**ORDERING INFORMATION**

| <b>PART NO.</b> | <b>PACKAGE</b> | <b>PACKING</b>     |
|-----------------|----------------|--------------------|
| TSM3401CX RFG   | SOT-23         | 3,000pcs / 7" Reel |

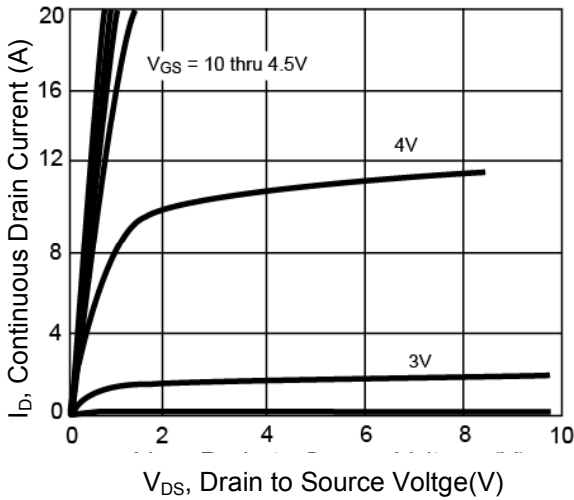
**Note:**

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

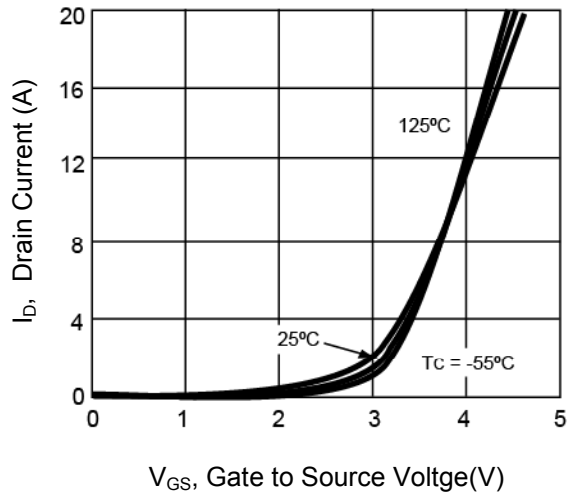
**CHARACTERISTICS CURVES**

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

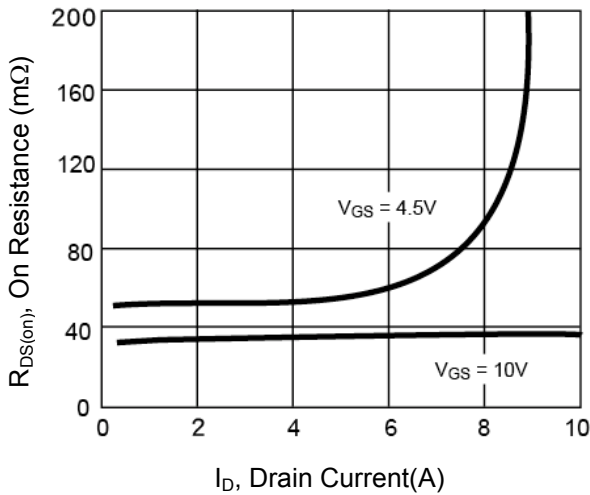
**Output Characteristics**



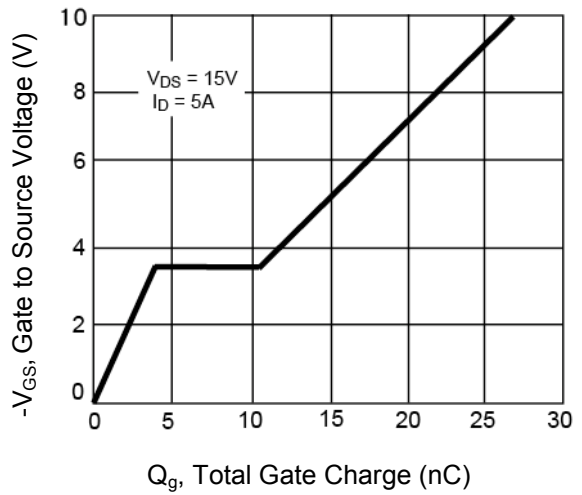
**Transfer Characteristics**



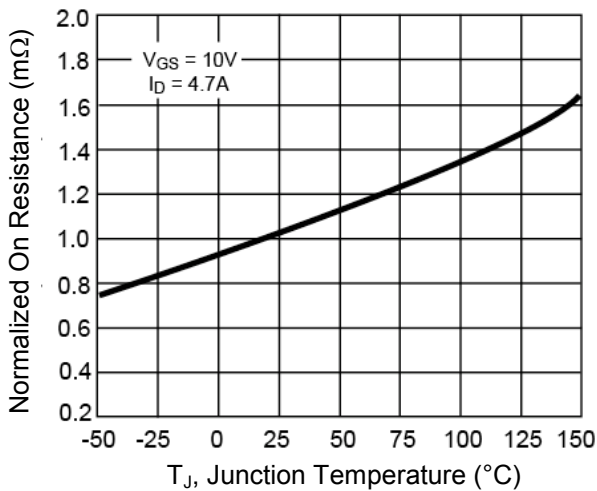
**On-Resistance vs. Drain Current**



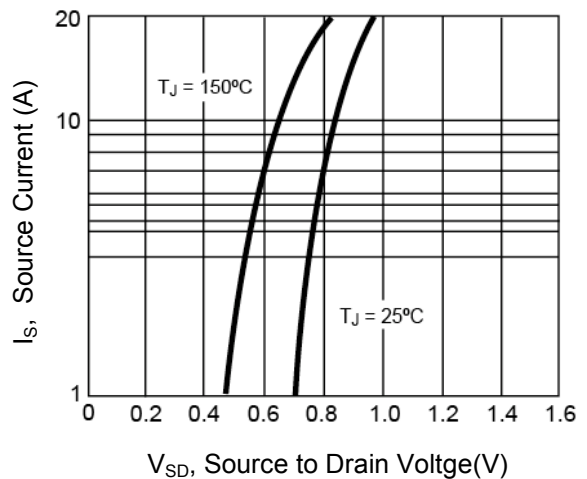
**Gate Charge**



**On-Resistance vs. Junction Temperature**



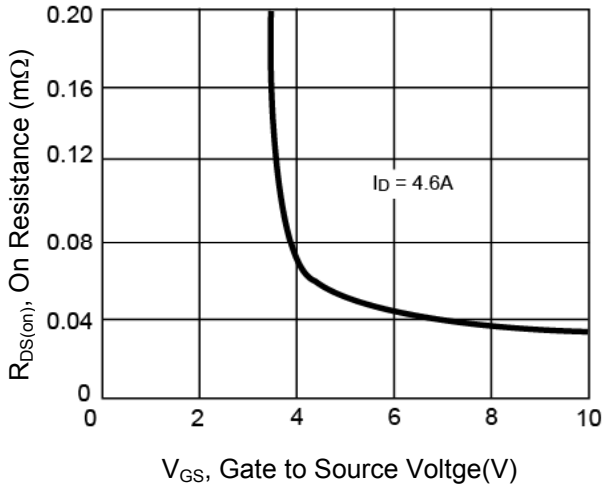
**Source-Drain Diode Forward Voltage**



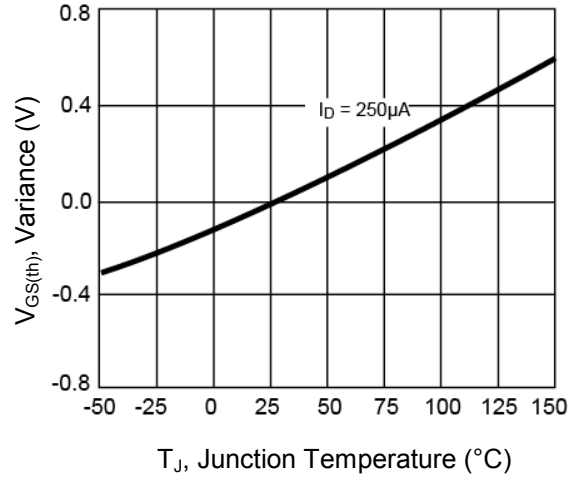
**CHARACTERISTICS CURVES**

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

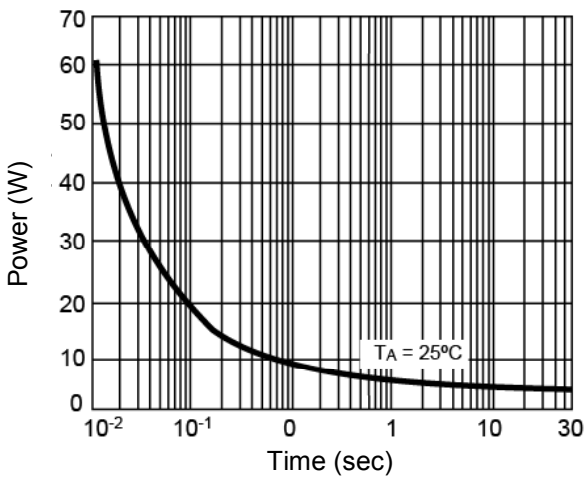
**On-Resistance vs. Gate-Source Voltage**



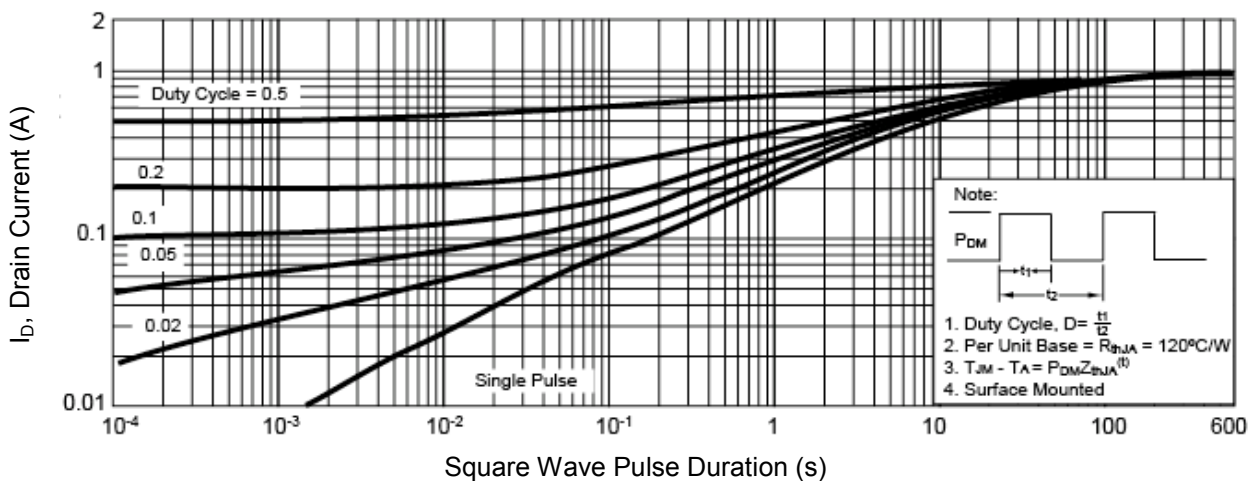
**Threshold Voltage**



**Single Pulse Power**

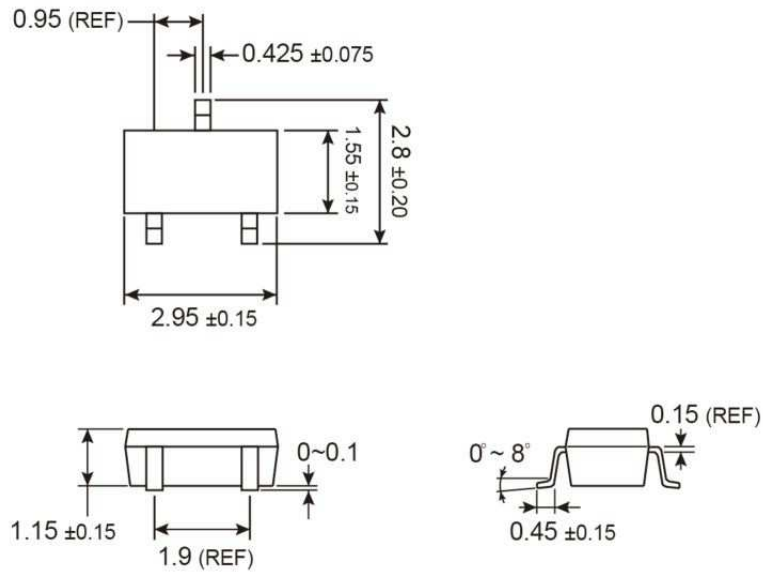


**Normalized Thermal Transient Impedance Curve**

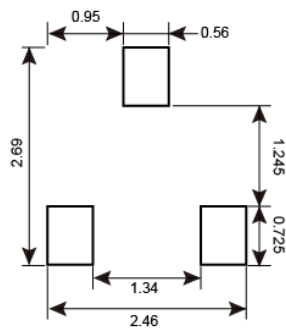


**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

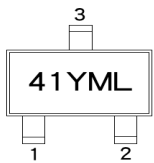
**SOT-23**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



**MARKING DIAGRAM**



- Y** = Year Code
- M** = Month Code for Halogen Free Product
  - O** =Jan   **P** =Feb   **Q** =Mar   **R** =Apr
  - S** =May   **T** =Jun   **U** =Jul   **V** =Aug
  - W** =Sep   **X** =Oct   **Y** =Nov   **Z** =Dec
- L** = Lot Code (1~9, A~Z)

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