

# TSM2307CX

## 30V P-Channel MOSFET

### SOT-23



### Pin Definition:

1. Gate
2. Source
3. Drain

### Key Parameter Performance

| Parameter          |                  | Value | Unit       |
|--------------------|------------------|-------|------------|
| $V_{DS}$           |                  | -30   | V          |
| $R_{DS(on)}$ (max) | $V_{GS} = -10V$  | 95    | m $\Omega$ |
|                    | $V_{GS} = -4.5V$ | 140   |            |
| $Q_g$              |                  | 10    | nC         |

### Features

- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance

### Application

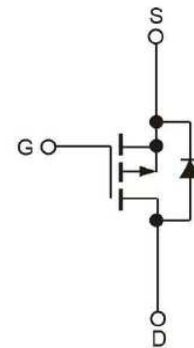
- Load Switch
- PA Switch

### Ordering Information

| Part No.      | Package | Packing         |
|---------------|---------|-----------------|
| TSM2307CX RFG | SOT-23  | 3kpcs / 7" Reel |

**Note:** "G" denotes for Halogen- and Antimony-free as those which contain  
 <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and  
 <1000ppm antimony compounds

### Block Diagram



P-Channel MOSFET

### Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ 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> |                          | $I_D$     | -3          | A                |
| Pulsed Drain Current <sup>(Note 2)</sup>     |                          | $I_{DM}$  | -20         | A                |
| Continuous Source Current (Diode Conduction) |                          | $I_S$     | -1.7        | A                |
| Power Dissipation                            | $T_a = 25^\circ\text{C}$ | $P_D$     | 1.25        | W                |
|                                              | $T_a = 75^\circ\text{C}$ |           | 0.8         |                  |
| Operating Junction Temperature               |                          | $T_J$     | +150        | $^\circ\text{C}$ |
| Storage Temperature Range                    |                          | $T_{STG}$ | -50 to +150 | $^\circ\text{C}$ |

### Thermal Performance

| Parameter                                | Symbol          | Limit | Unit                 |
|------------------------------------------|-----------------|-------|----------------------|
| Thermal Resistance - Junction to Case    | $R_{\theta JC}$ | 75    | $^{\circ}\text{C/W}$ |
| Thermal Resistance - Junction to Ambient | $R_{\theta JA}$ | 130   | $^{\circ}\text{C/W}$ |

### Electrical Specifications ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

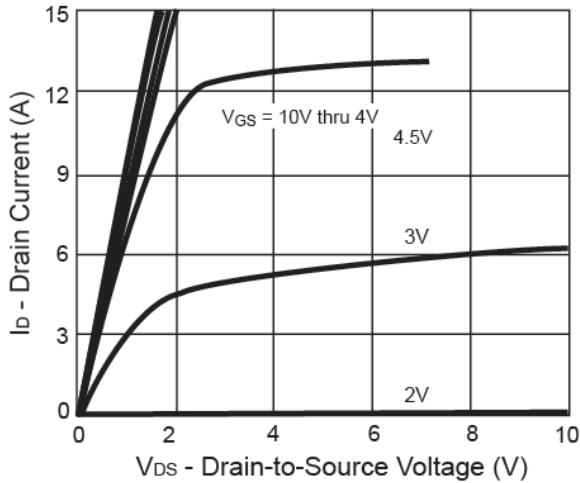
| Parameter                         | Conditions                                                                          | Symbol       | Min | Typ | Max  | Unit |
|-----------------------------------|-------------------------------------------------------------------------------------|--------------|-----|-----|------|------|
| Static                            |                                                                                     |              |     |     |      |      |
| Drain-Source Breakdown Voltage    | $V_{GS} = 0V, I_D = -250\mu A$                                                      | $BV_{DSS}$   | -30 | --  | --   | V    |
| Drain-Source On-State Resistance  | $V_{GS} = -10V, I_D = -3A$                                                          | $R_{DS(ON)}$ | --  | 76  | 95   | mΩ   |
|                                   | $V_{GS} = -4.5V, I_D = -2A$                                                         |              | --  | 103 | 140  | mΩ   |
| Gate Threshold Voltage            | $V_{DS} = V_{GS}, I_D = -250\mu A$                                                  | $V_{GS(TH)}$ | -1  | --  | -3   | V    |
| Zero Gate Voltage Drain Current   | $V_{DS} = -30V, V_{GS} = 0V$                                                        | $I_{DSS}$    | --  | --  | -1.0 | μA   |
| Gate Body Leakage                 | $V_{GS} = \pm 20V, V_{DS} = 0V$                                                     | $I_{GSS}$    | --  | --  | ±100 | nA   |
| Forward Transconductance (Note 4) | $V_{DS} = -10V, I_D = -6A$                                                          | $g_{fs}$     | --  | 5   | --   | S    |
| Diode Forward Voltage             | $I_S = -1.7V, V_{GS} = 0V$                                                          | $V_{SD}$     |     |     | -1.2 | V    |
| Dynamic                           |                                                                                     |              |     |     |      |      |
| Total Gate Charge (Note 3,4)      | $V_{DS} = -15V, I_D = -3A,$<br>$V_{GS} = -10V$                                      | $Q_g$        | --  | 10  | 15   | nC   |
| Gate-Source Charge (Note 3,4)     |                                                                                     | $Q_{gs}$     | --  | 1.9 | --   |      |
| Gate-Drain Charge (Note 3,4)      |                                                                                     | $Q_{gd}$     | --  | 2   | --   |      |
| Input Capacitance                 | $V_{DS} = -30V, V_{GS} = 0V,$<br>$f = 1.0MHz$                                       | $C_{iss}$    | --  | 565 | --   | pF   |
| Output Capacitance                |                                                                                     | $C_{oss}$    | --  | 126 | --   |      |
| Reverse Transfer Capacitance      |                                                                                     | $C_{rss}$    | --  | 75  | --   |      |
| Switching                         |                                                                                     |              |     |     |      |      |
| Turn-On Delay Time (Note 3,4)     | $V_{DD} = -15V, R_L = 15\Omega,$<br>$I_D = -1A, V_{GEN} = -10V,$<br>$R_G = 6\Omega$ | $t_{d(on)}$  | --  | 10  | 20   | ns   |
| Turn-On Rise Time (Note 3,4)      |                                                                                     | $t_r$        | --  | 9   | 20   |      |
| Turn-Off Delay Time (Note 3,4)    |                                                                                     | $t_{d(off)}$ | --  | 27  | 50   |      |
| Turn-Off Fall Time (Note 3,4)     |                                                                                     | $t_f$        | --  | 7   | 16   |      |

#### Note:

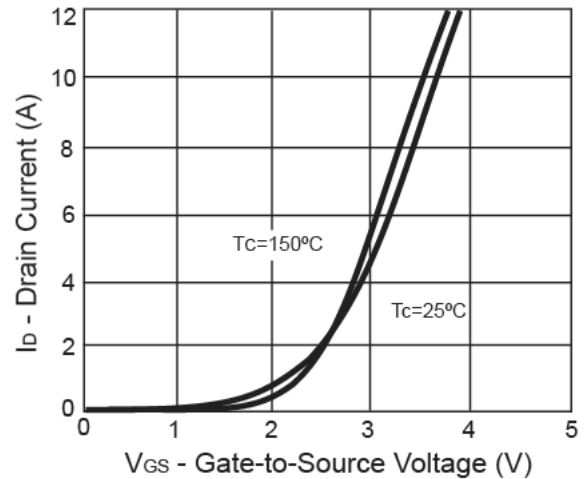
- Limited by maximum junction temperature
- Pulse width limited by safe operating area
- Pulse test: pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curve

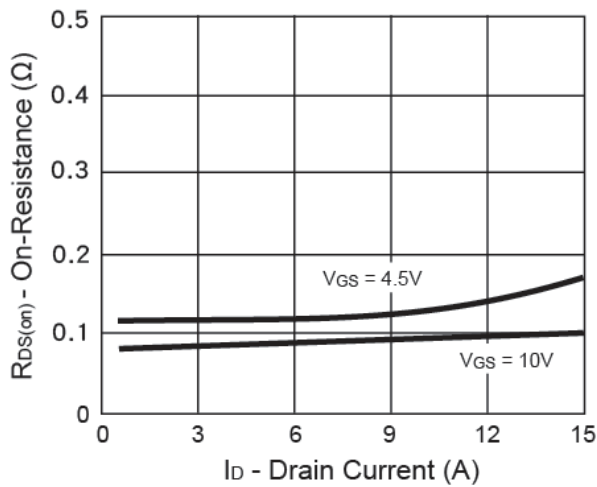
**Output Characteristics**



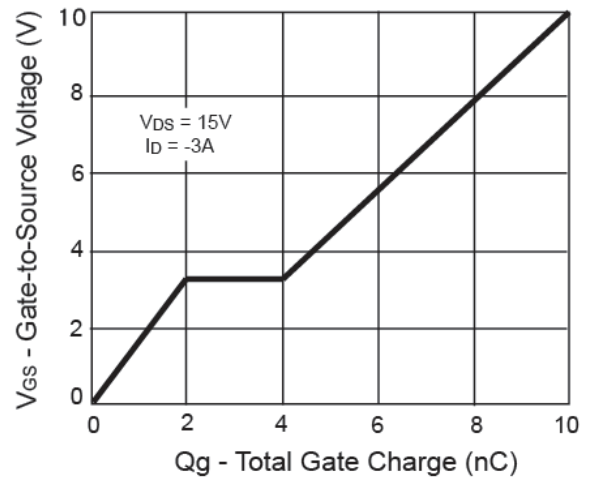
**Transfer Characteristics**



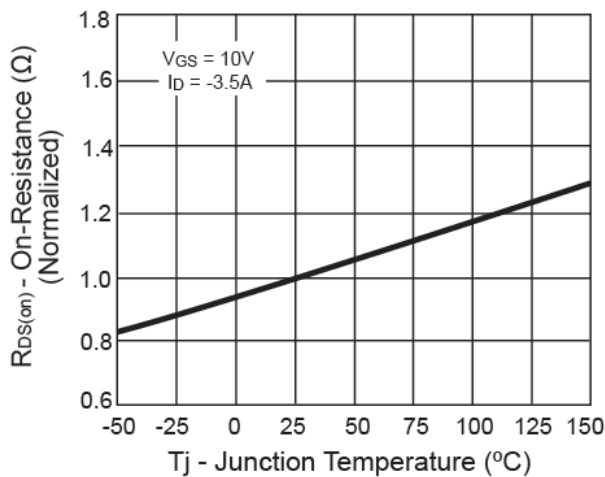
**On-Resistance vs. Drain Current**



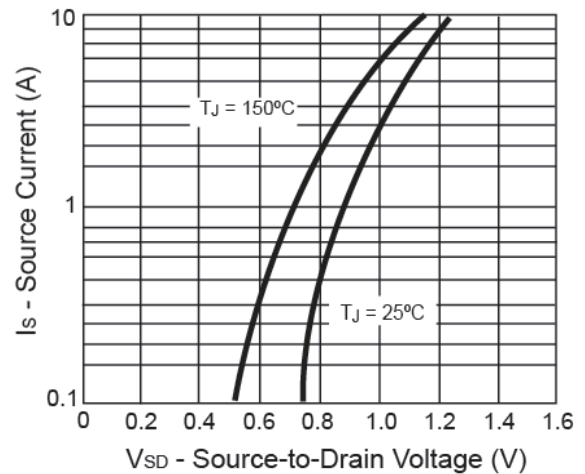
**Gate Charge**



**On-Resistance vs. Junction Temperature**

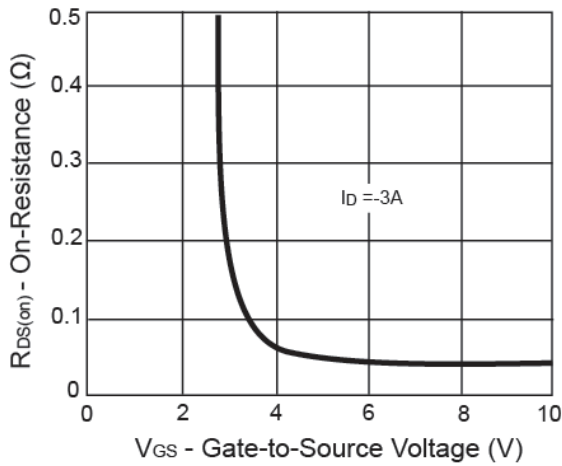


**Source-Drain Diode Forward Voltage**

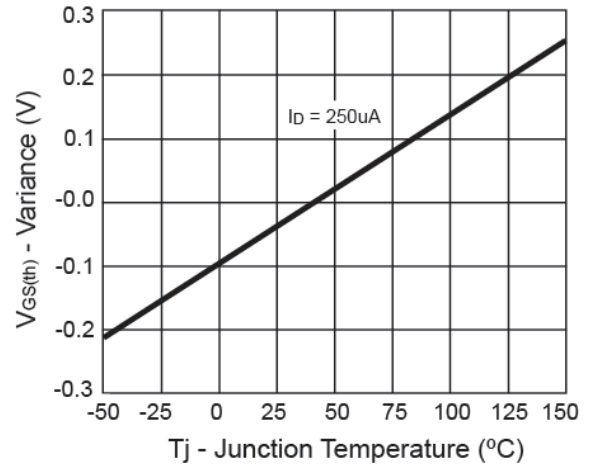


### Electrical Characteristics Curve

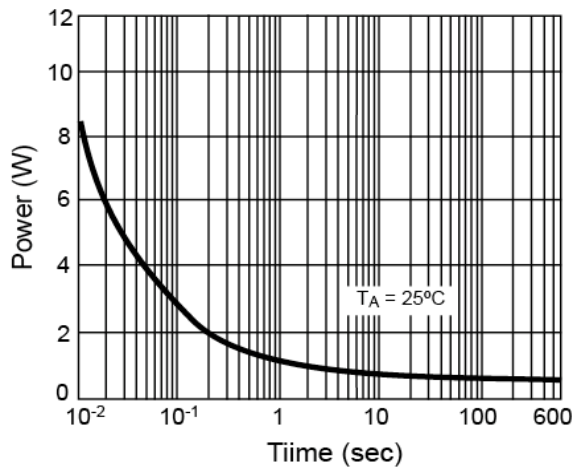
**On-Resistance vs. Gate-Source Voltage**



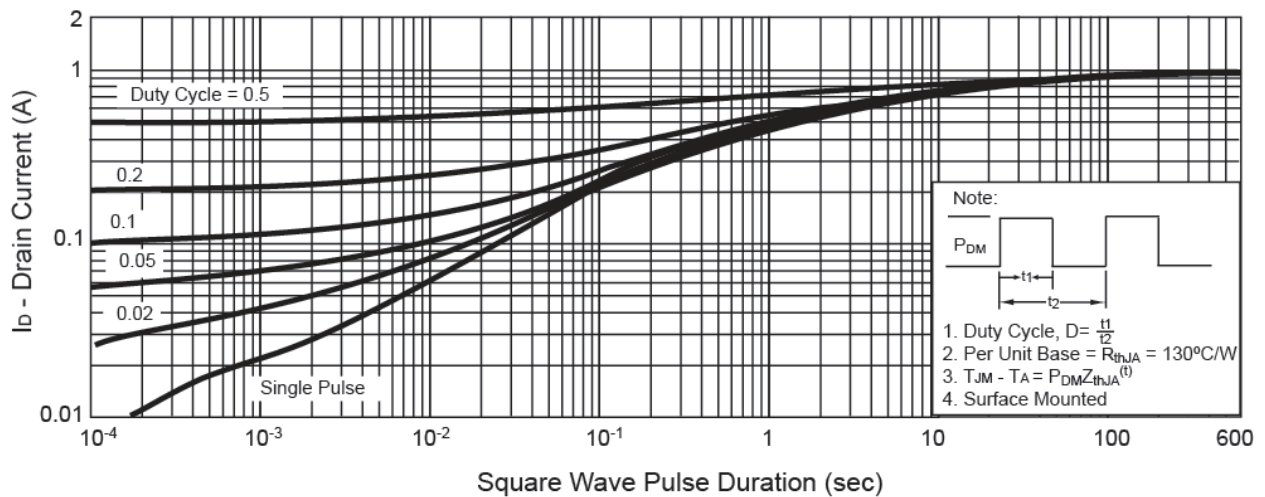
**Threshold Voltage**



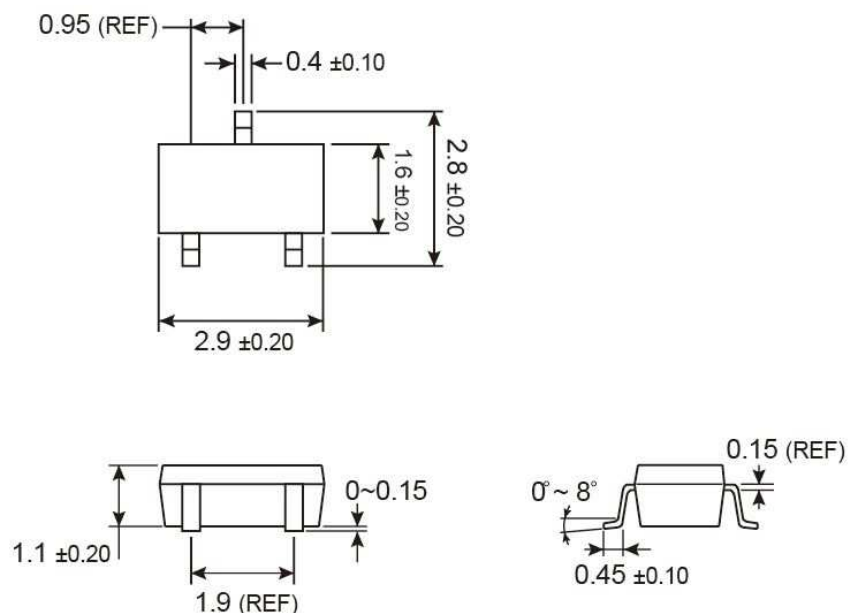
**Single Pulse Power**



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

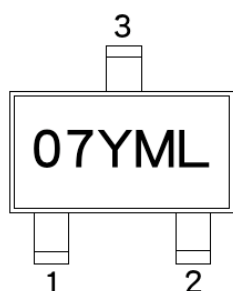


## SOT-23 Mechanical Drawing



Unit: Millimeters

## Marking Diagram



**07** = Device Code

**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

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