

**SOT-23**

**Pin Definition:**

1. Gate
2. Source
3. Drain

**PRODUCT SUMMARY**

| $V_{DS}$ (V) | $R_{DS(on)}$ (m $\Omega$ ) | $I_D$ (A) |
|--------------|----------------------------|-----------|
| 40           | 45 @ $V_{GS} = 10V$        | 3.9       |
|              | 62.5 @ $V_{GS} = 4.5V$     | 3.5       |

**Features**

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

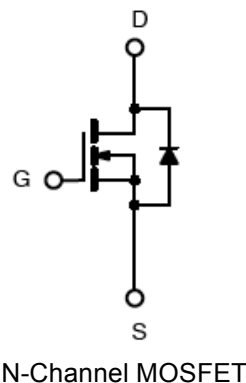
**Application**

- Load Switch
- Stepper Motors

**Ordering Information**

| Part No.      | Package | Packing         |
|---------------|---------|-----------------|
| TSM2318CX RF  | SOT-23  | 3Kpcs / 7" Reel |
| TSM2318CX RFG | SOT-23  | 3Kpcs / 7" Reel |

Note: "G" denote for Halogen Free Product

**Block Diagram**

**Absolute Maximum Rating** ( $T_a = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                                                   | Symbol         | Limit       | Unit             |
|-------------------------------------------------------------|----------------|-------------|------------------|
| Drain-Source Voltage                                        | $V_{DS}$       | 40          | V                |
| Gate-Source Voltage                                         | $V_{GS}$       | $\pm 20$    | V                |
| Continuous Drain Current                                    | $I_D$          | 3.9         | A                |
| Pulsed Drain Current                                        | $I_{DM}$       | $\pm 16$    | A                |
| Continuous Source Current (Diode Conduction) <sup>a,b</sup> | $I_S$          | 0.8         | A                |
| Maximum Power Dissipation                                   | $P_D$          | 1.25        | W                |
|                                                             |                | 0.8         |                  |
| Operating Junction Temperature                              | $T_J$          | +150        | $^\circ\text{C}$ |
| Operating Junction and Storage Temperature Range            | $T_J, T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |

**Thermal Performance**

| Parameter                                            | Symbol            | Limit | Unit               |
|------------------------------------------------------|-------------------|-------|--------------------|
| Junction to Case Thermal Resistance                  | $R_{\theta_{JF}}$ | 50    | $^\circ\text{C/W}$ |
| Junction to Ambient Thermal Resistance (PCB mounted) | $R_{\theta_{JA}}$ | 100   | $^\circ\text{C/W}$ |

Notes:

- a. Pulse width limited by the Maximum junction temperature
- b. Surface Mounted on FR4 Board,  $t \leq 5$  sec.

**Electrical Specifications** (Ta = 25°C unless otherwise noted)

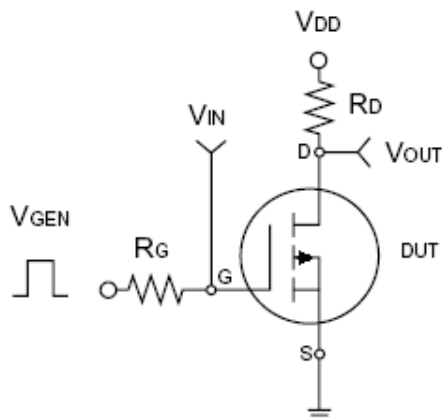
| Parameter                        | Conditions                                                                       | Symbol       | Min | Typ | Max       | Unit       |
|----------------------------------|----------------------------------------------------------------------------------|--------------|-----|-----|-----------|------------|
| Static                           |                                                                                  |              |     |     |           |            |
| Drain-Source Breakdown Voltage   | $V_{GS} = 0V, I_D = 250\mu A$                                                    | $BV_{DSS}$   | 40  | --  | --        | V          |
| Gate Threshold Voltage           | $V_{DS} = V_{GS}, I_D = 250\mu A$                                                | $V_{GS(TH)}$ | 1   | --  | 3         | V          |
| Gate Body Leakage                | $V_{GS} = \pm 20V, V_{DS} = 0V$                                                  | $I_{GSS}$    | --  | --  | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current  | $V_{DS} = 32V, V_{GS} = 0V$                                                      | $I_{DSS}$    | --  | --  | 1.0       | $\mu A$    |
| On-State Drain Current           | $V_{DS} \geq 4.5V, V_{GS} = 10V$                                                 | $I_{D(ON)}$  | 6   | --  | --        | A          |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 3.9A$                                                       | $R_{DS(ON)}$ | --  | 36  | 45        | m $\Omega$ |
|                                  | $V_{GS} = 4.5V, I_D = 3.5A$                                                      |              | --  | 50  | 62.5      |            |
| Forward Transconductance         | $V_{DS} = 10V, I_D = 3.9A$                                                       | $g_{fs}$     | --  | 11  | --        | S          |
| Diode Forward Voltage            | $I_S = 1.25A, V_{GS} = 0V$                                                       | $V_{SD}$     | --  | 0.8 | 1.2       | V          |
| Dynamic <sup>b</sup>             |                                                                                  |              |     |     |           |            |
| Total Gate Charge                | $V_{DS} = 20V, I_D = 3.9A,$<br>$V_{GS} = 10V$                                    | $Q_g$        | --  | 10  | --        | nC         |
| Gate-Source Charge               |                                                                                  | $Q_{gs}$     | --  | 1.6 | --        |            |
| Gate-Drain Charge                |                                                                                  | $Q_{gd}$     | --  | 2.1 | --        |            |
| Input Capacitance                | $V_{DS} = 20V, V_{GS} = 0V,$<br>$f = 1.0MHz$                                     | $C_{iss}$    | --  | 540 | --        | pF         |
| Output Capacitance               |                                                                                  | $C_{oss}$    | --  | 80  | --        |            |
| Reverse Transfer Capacitance     |                                                                                  | $C_{rss}$    | --  | 45  | --        |            |
| Switching <sup>c</sup>           |                                                                                  |              |     |     |           |            |
| Turn-On Delay Time               | $V_{DD} = 20V, R_L = 20\Omega,$<br>$I_D = 1A, V_{GEN} = 10V,$<br>$R_G = 6\Omega$ | $t_{d(on)}$  | --  | 5   | --        | nS         |
| Turn-On Rise Time                |                                                                                  | $t_r$        | --  | 12  | --        |            |
| Turn-Off Delay Time              |                                                                                  | $t_{d(off)}$ | --  | 20  | --        |            |
| Turn-Off Fall Time               |                                                                                  | $t_f$        | --  | 15  | --        |            |

Notes:

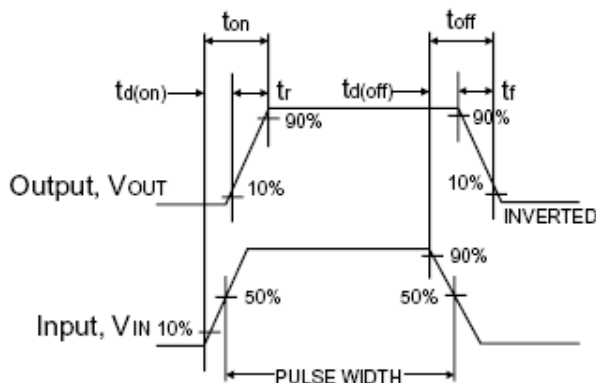
a. pulse test: PW ≤ 300μS, duty cycle ≤ 2%

b. For DESIGN AID ONLY, not subject to production testing.

c. Switching time is essentially independent of operating temperature.



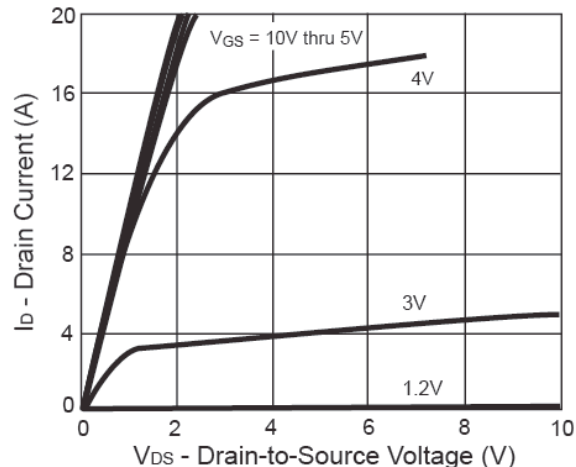
**Switching Test Circuit**



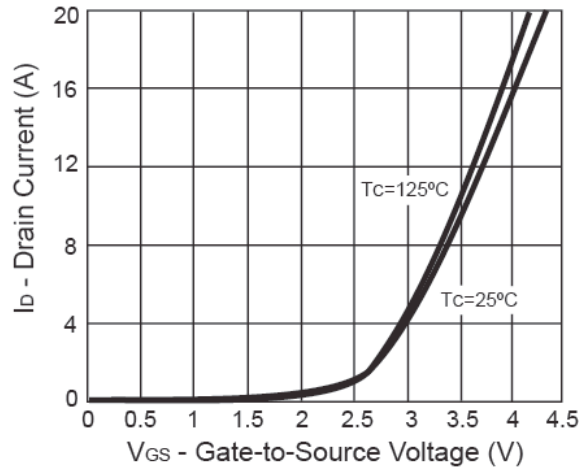
**Switchin Waveforms**

**Electrical Characteristics Curve** (Ta = 25°C, unless otherwise noted)

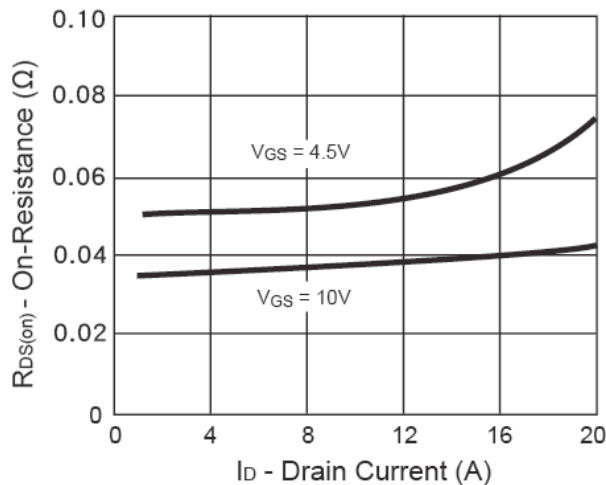
**Output Characteristics**



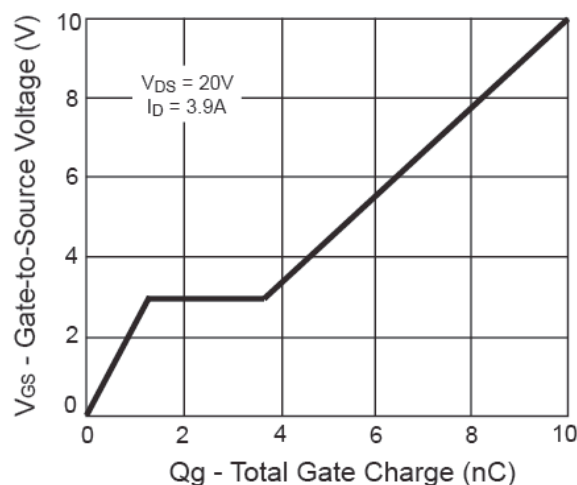
**Transfer Characteristics**



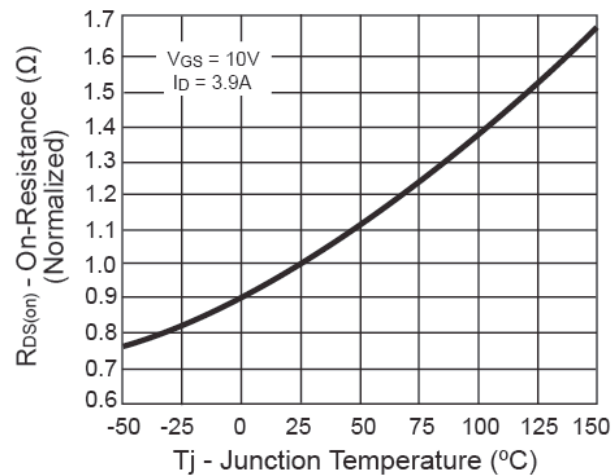
**On-Resistance vs. Drain Current**



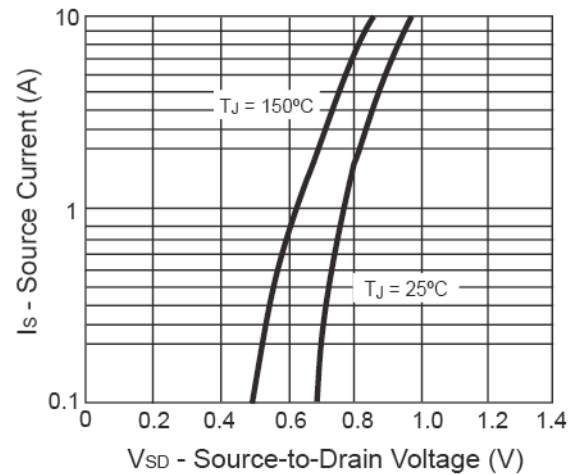
**Gate Charge**



**On-Resistance vs. Junction Temperature**

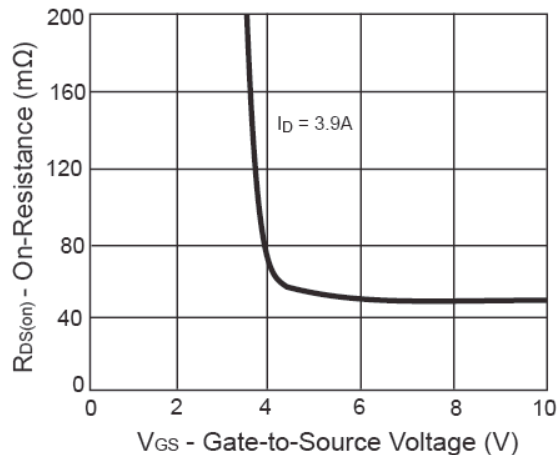


**Source-Drain Diode Forward Voltage**

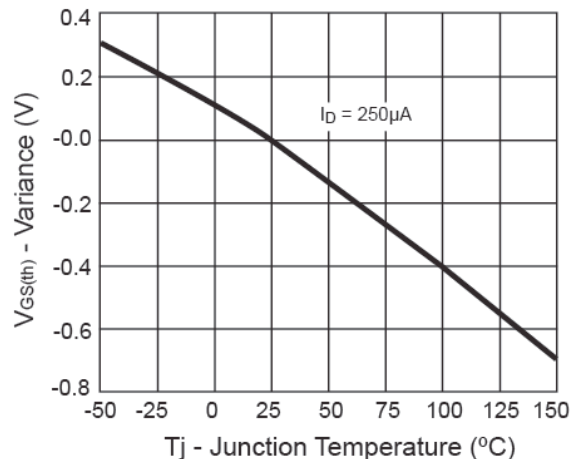


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

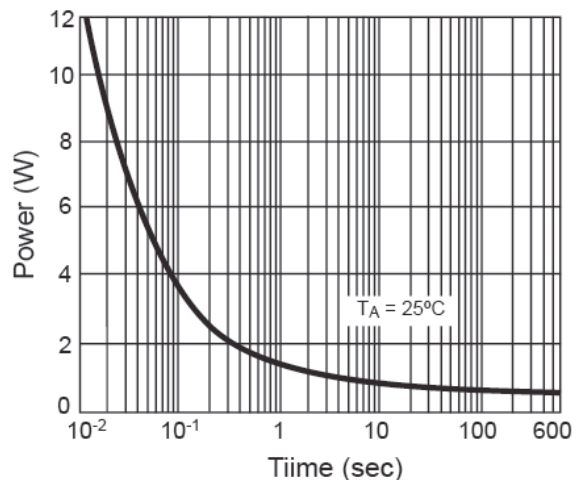
**On-Resistance vs. Gate-Source Voltage**



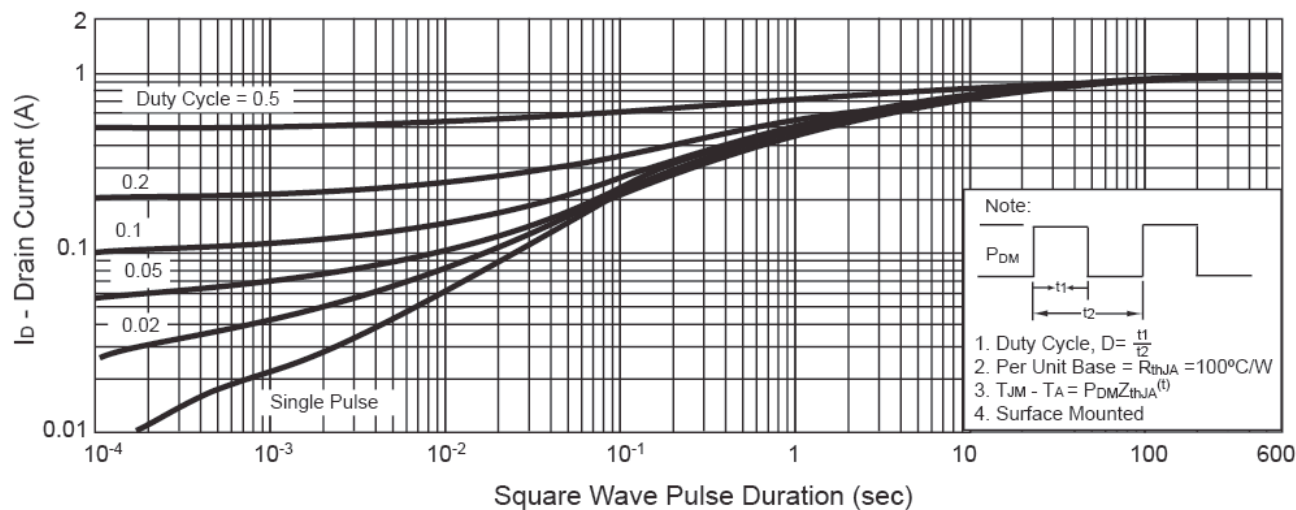
**Threshold Voltage**



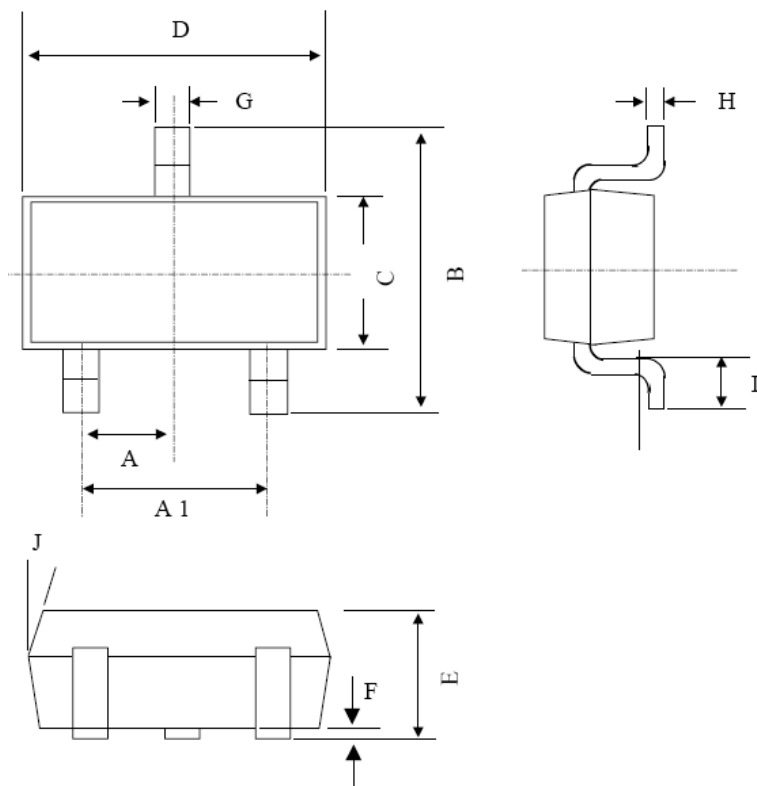
**Single Pulse Power**



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

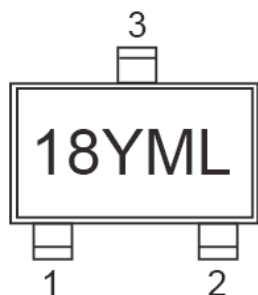


## SOT-23 Mechanical Drawing



| DIM | MILLIMETERS |      | INCHES    |       |
|-----|-------------|------|-----------|-------|
|     | MIN         | MAX  | MIN       | MAX.  |
| A   | 0.95 BSC    |      | 0.037 BSC |       |
| A1  | 1.9 BSC     |      | 0.074 BSC |       |
| B   | 2.60        | 3.00 | 0.102     | 0.118 |
| C   | 1.40        | 1.70 | 0.055     | 0.067 |
| D   | 2.80        | 3.10 | 0.110     | 0.122 |
| E   | 1.00        | 1.30 | 0.039     | 0.051 |
| F   | 0.00        | 0.10 | 0.000     | 0.004 |
| G   | 0.35        | 0.50 | 0.014     | 0.020 |
| H   | 0.10        | 0.20 | 0.004     | 0.008 |
| I   | 0.30        | 0.60 | 0.012     | 0.024 |
| J   | 5°          | 10°  | 5°        | 10°   |

## Marking Diagram



**18** = Device Code

**Y** = Year Code

**M** = Month Code

(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)

= 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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