

### SOT-23



#### Pin Definition:

1. Gate
2. Source
3. Drain

### PRODUCT SUMMARY

| $V_{DS}$ (V) | $R_{DS(on)}$ ( $\Omega$ )(max) | $I_D$ (A) |
|--------------|--------------------------------|-----------|
| 600          | 700 @ $V_{GS} = 0V$            | 0.03      |

### Features

- Depletion Mode
- Low Gate Charge

### Application

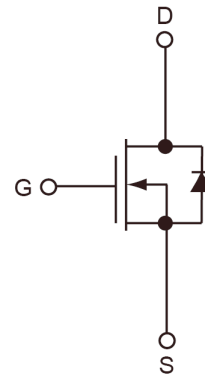
- Converters
- Telecom

### Ordering Information

| Part No.     | Package | Packing         |
|--------------|---------|-----------------|
| TSM126CX RFG | SOT-23  | 3kpcs / 7" Reel |

Note: "G" denotes Halogen Free Product.

### Block Diagram



N-Channel MOSFET

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

| Parameter  | Symbol         | Limit            | Unit  |
|--|----------------|------------------|-------|
| Drain-Source Voltage                             | $V_{DS}$       | 600              | V     |
| Gate-Source Voltage                              | $V_{GS}$       | $\pm 20$         | V     |
| Continuous Drain Current                         | $I_D$          | $T_c=25^\circ C$ | 0.030 |
| Continuous Drain Current                         |                | $T_c=70^\circ C$ | 0.024 |
| Pulsed Drain Current <sup>a</sup>                | $I_{DM}$       | 0.120            | A     |
| Maximum Power Dissipation                        | $P_D$          | 0.5              | W     |
| Soldering Temperature <sup>b</sup>               | $T_L$          | 300              | °C    |
| Operating Junction Temperature                   | $T_J$          | +150             | °C    |
| Operating Junction and Storage Temperature Range | $T_J, T_{STG}$ | -55 to +150      | °C    |

### Thermal Performance

| Parameter                               | Symbol         | Limit | Unit |
|---|----------------|-------|------|
| Thermal Resistance, Junction to Ambient | $R\theta_{JA}$ | 250   | °C/W |

#### Notes:

- a. Pulse width limited by the Maximum junction temperature
- b. Distance of 1.6mm from case for 10 seconds.

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

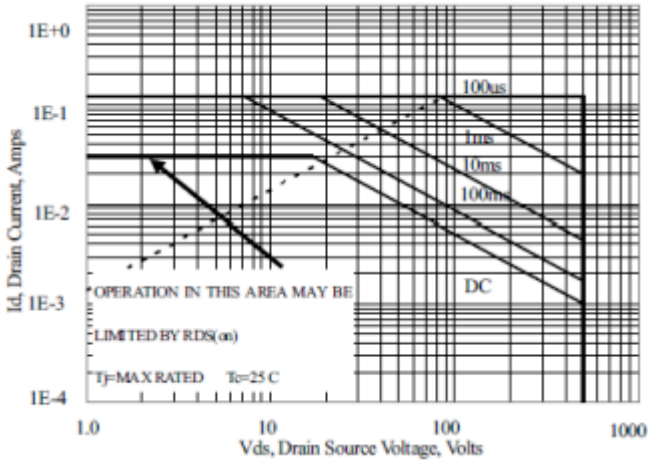
| Parameter                        | Conditions   | Symbol        | Min   | Typ           | Max      | Unit          |
|----------------------------------|--|---------------|-------|---------------|----------|---------------|
| <b>Static<sup>a</sup></b>        |  |               |       |               |          |               |
| Drain-Source Breakdown Voltage   | $V_{GS} = -5\text{V}, I_D = 250\mu\text{A}$  | $BV_{DSS}$    | 600   | --            | --       | V             |
| Gate Threshold Voltage           | $V_{DS} = 3\text{V}, I_D = 8\mu\text{A}$   | $V_{GS(TH)}$  | -2.7  | -1.8          | -1.0     | V             |
| Drain-Source cutoff current      | $V_{DS} = 600\text{V}, V_{GS} = -5\text{V},$<br>$T_a = 25^\circ\text{C}$                               | $I_{DS(OFF)}$ | --    | --            | 0.1      | $\mu\text{A}$ |
| Drain-Source cutoff current      | $V_{DS} = 480\text{V}, V_{GS} = -5\text{V},$<br>$T_a = 125^\circ\text{C}$                              |               | 10    | $\mu\text{A}$ |          |               |
| Gate-Source Leakage Current      | $V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$  | $I_{GSS}$     | --    | --            | $\pm 10$ | $\mu\text{A}$ |
| On-state Drain Current           | $V_{DS} = 25\text{V}, V_{GS} = 0\text{V}$  | $I_{DSS}$     | 12    | --            | --       | mA            |
| Drain-Source On-State Resistance | $V_{GS} = 0\text{V}, I_D = 3\text{mA}$   | $R_{DS(ON)}$  | --    | 350           | 700      | $\Omega$      |
|                                  | $V_{GS} = 10\text{V}, I_D = 16\text{mA}$   |               | 400   | 800           | $\Omega$ |               |
| Forward Transconductance         | $ V_{DS}  > 2 I_D \cdot R_{DS(ON)max},$<br>$I_D = 0.01\text{A}$  | $g_{fs}$      | 0.008 | 0.017         | --       | S             |
| <b>Dynamic</b>                   |  |               |       |               |          |               |
| Input Capacitance                | $V_{DS} = 25\text{V}, V_{GS} = -5\text{V},$<br>$f = 1.0\text{MHz}$                                     | $C_{iss}$     | --    | 51.42         | --       | pF            |
| Output Capacitance               |  | $C_{oss}$     | --    | 4.48          | --       |               |
| Reverse Transfer Capacitance     |  | $C_{rss}$     | --    | 1.12          | --       |               |
| Total Gate Charge                | $V_{DS} = 400\text{V}, I_D = 0.01\text{A},$<br>$V_{GS} = -5\text{V to } 5\text{V}$                     | $Q_g$         | --    | 1.18          | --       | nC            |
| Gate-Source Charge               |  | $Q_{gs}$      | --    | 0.49          | --       |               |
| Gate-Drain Charge                |  | $Q_{gd}$      | --    | 0.365         | --       |               |
| <b>Switching</b>                 |  |               |       |               |          |               |
| Turn-On Delay Time               | $V_{DD} = 300\text{V}, I_D = 0.01\text{A},$<br>$V_{GS} = -5\text{V to } 7\text{V},$<br>$R_G = 6\Omega$ | $t_{d(on)}$   | --    | 10.01         | --       | ns            |
| Turn-On Rise Time                |  | $t_r$         | --    | 55.7          | --       |               |
| Turn-Off Delay Time              |  | $t_{d(off)}$  | --    | 57.2          | --       |               |
| Turn-Off Fall Time               |  | $t_f$         | --    | 135.5         | --       |               |
| <b>Source-Drain Diode</b>        |  |               |       |               |          |               |
| Diode forward Current            | Continuous   | $I_S$         | --    | --            | 0.025    | A             |
| Diode Pulse Current              |  | $I_{SM}$      | --    | --            | 0.100    | A             |
| Diode Forward Voltage            | $I_{SD} = 16\text{mA}, V_{GS} = -5\text{V}$  | $V_{SD}$      | --    | --            | 1.2      | V             |
| Reverse Recovery Time            | $I_F = 0.01\text{A}, V_{GS} = -10\text{V}$   | $t_{rr}$      | --    | 243.1         | --       | ns            |
| Reverse Recovery Charge          | $dI_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$  | $Q_{rr}$      | --    | 639           | --       | nC            |

**Notes:**

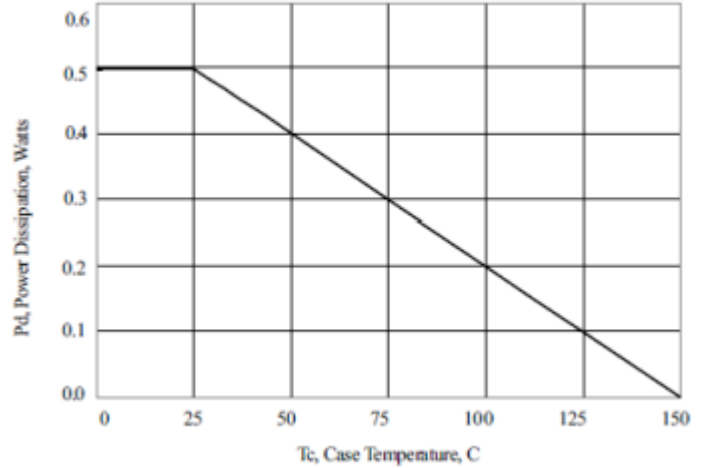
a. pulse test:  $PW \leq 380\mu\text{s}$ , duty cycle  $\leq 2\%$

### Electrical Characteristics Curves (Ta = 25°C, unless otherwise noted)

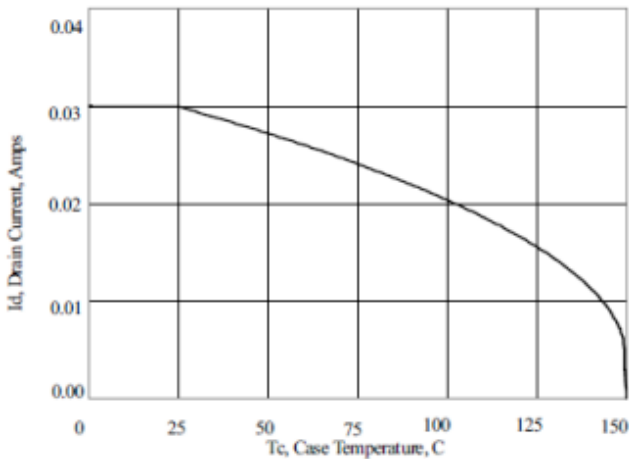
**Maximum Forward Bias Safe Operation Area**



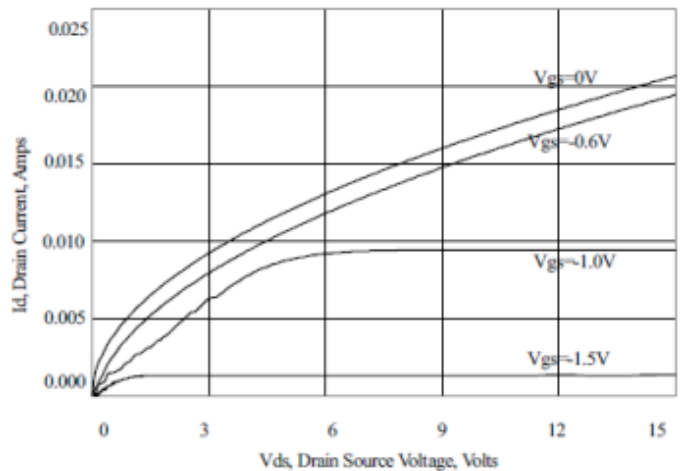
**Maximum Power Dissipation vs. Case Temperature**



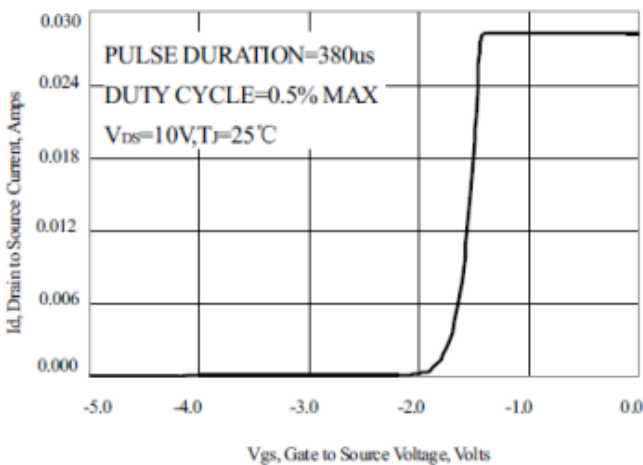
**Maximum Continuous Drain Current vs. Case Temperature**



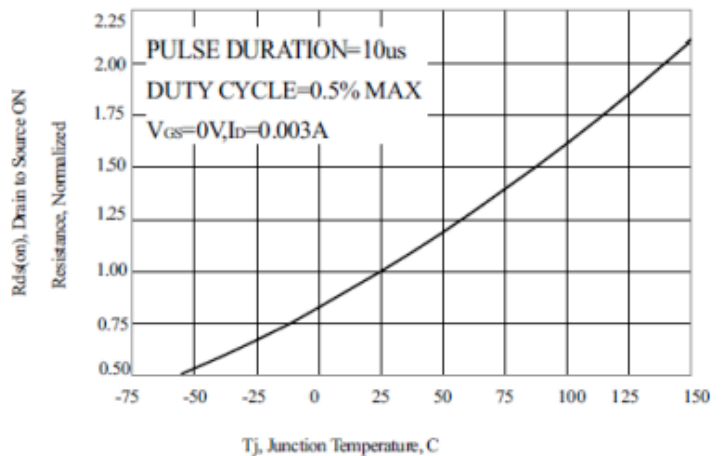
**Typical Output Characteristics**



**Typical Transfer Characteristics**

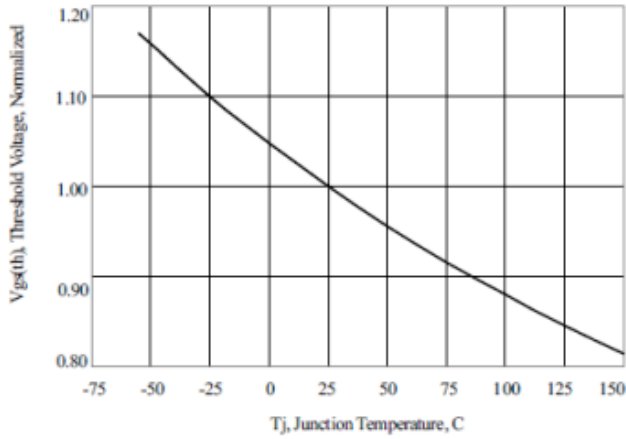


**Drain to Source ON Resistance vs. Junction Temperature**

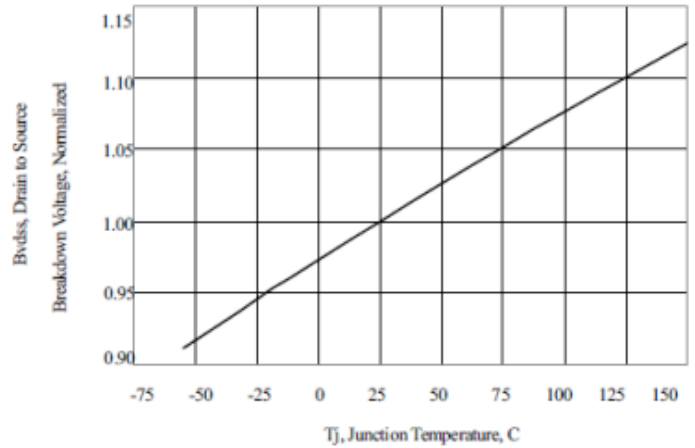


### Electrical Characteristics Curves (Ta = 25°C, unless otherwise noted)

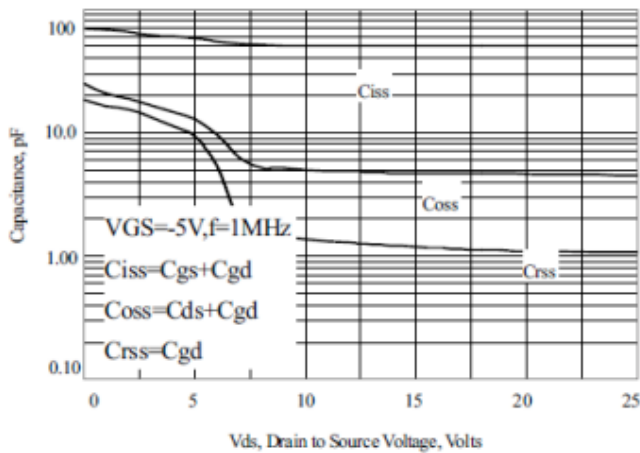
**Threshold Voltage vs. Junction Temperature**



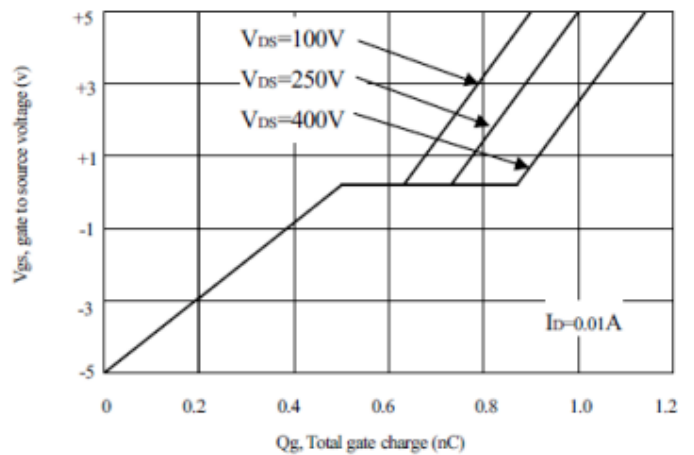
**Breakdown Voltage vs. Junction Temperature**



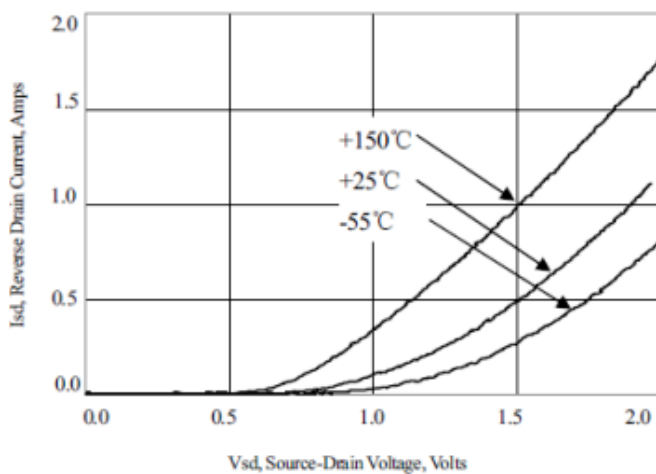
**Typical Capacitance vs. Drain to source Voltage**



**Typical Gate Charge vs. Gate to Source Voltage**

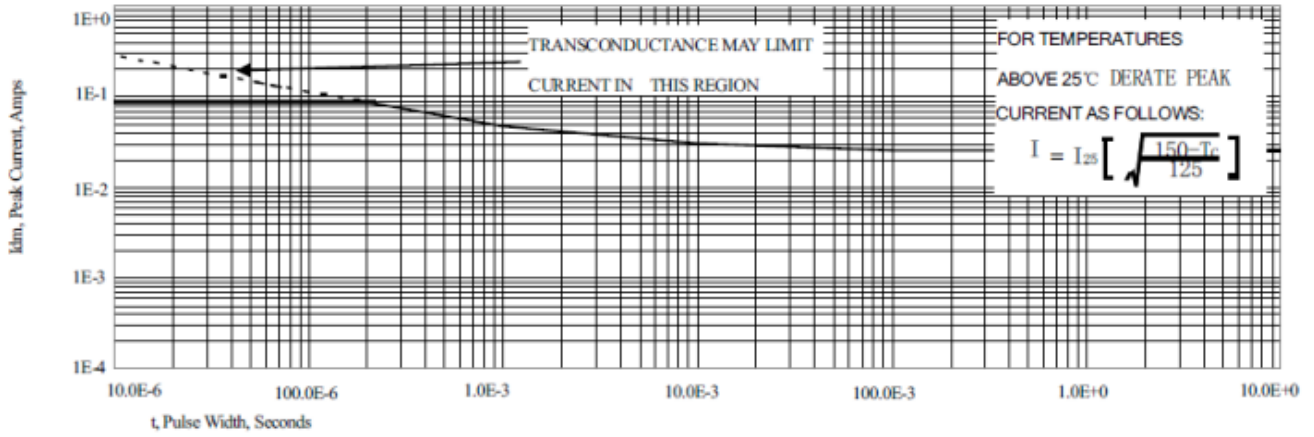


**Typical Body Diode Transfer Characteristics**

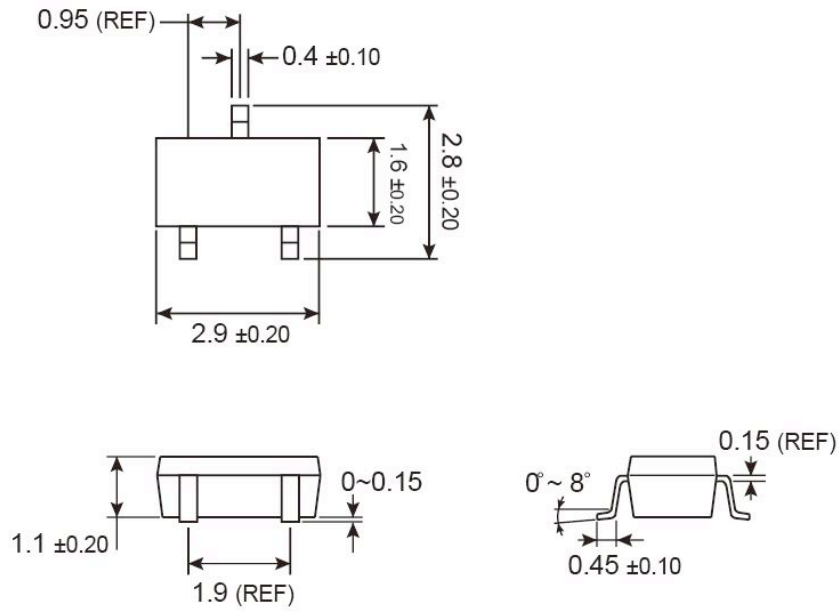


**Electrical Characteristics Curves** (Ta = 25°C, unless otherwise noted)

**Maximum Peak Current Capability**



### SOT-23 Mechanical Drawing



Unit: Millimeters

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