

Pin Definition:
 1. Gate
 2. Source
 3. Drain

Key Parameter Performance

| Parameter | Value | Unit |
|--------------------|-----------------|------|
| V_{DS} | 20 | V |
| $R_{DS(on)}$ (max) | $V_{GS} = 4.5V$ | 33 |
| | $V_{GS} = 2.5V$ | 40 |
| | $V_{GS} = 1.8V$ | 51 |
| Q_g | 11 | nC |

Features

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

Application

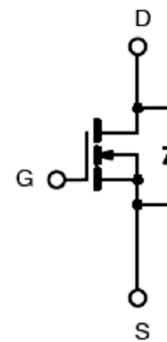
Load Switch
 PA Switch

Ordering Information

| Part No. | Package | Packing |
|---------------|---------|----------------|
| TSM2312CX RF | SOT-23 | 3kpcs / 7+Reel |
| TSM2312CX 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



N-Channel MOSFET

Absolute Maximum Ratings ($T_C = 25^\circ C$, unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|----------------|--------------------|------------|
| Drain-Source Voltage | V_{DS} | 20 | V |
| Gate-Source Voltage | V_{GS} | ± 8 | V |
| Continuous Drain Current | I_D | 4.9 | A |
| Pulsed Drain Current ^(Note 1) | I_{DM} | 15 | A |
| Continuous Source Current (Diode Conduction) ^(Note 2) | I_S | 1.0 | A |
| Maximum Power Dissipation | P_D | $T_a = 25^\circ C$ | 0.75 |
| | | $T_a = 75^\circ C$ | 0.48 |
| Operating Junction and Storage Temperature Range | T_J, T_{STG} | -55 to +150 | $^\circ C$ |

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|----------|-------|--------------|
| Thermal Resistance Junction to Foot | R_{JF} | 75 | $^\circ C/W$ |
| Thermal Resistance Junction to Ambient | R_{JA} | 140 | $^\circ C/W$ |

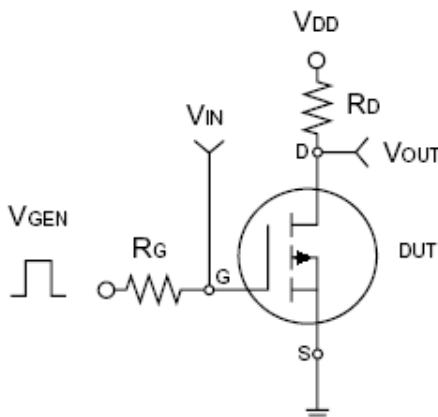


Electrical Specifications

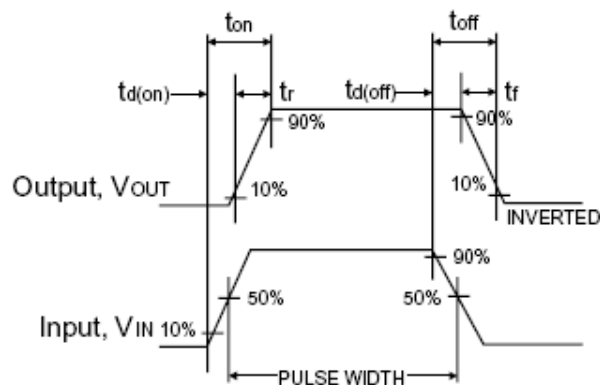
| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|--------------------------------------|---|--------------|------|------|-----------|---------|
| Static ^(Note 3) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 20 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 0.45 | 0.65 | 1.0 | V |
| Gate Body Leakage | $V_{GS} = \pm 8V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 16V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 1.0 | μA |
| On-State Drain Current | $V_{DS} = 10V, V_{GS} = 4.5V$ | $I_{D(ON)}$ | 15 | -- | -- | A |
| Drain-Source On-State Resistance | $V_{GS} = 4.5V, I_D = 4.9A$ | $R_{DS(ON)}$ | -- | 27 | 33 | m |
| | $V_{GS} = 2.5V, I_D = 4.4A$ | | -- | 33 | 40 | |
| | $V_{GS} = 1.8V, I_D = 3.9A$ | | -- | 42 | 51 | |
| Forward Transconductance | $V_{DS} = 15V, I_D = 5.0A$ | g_{fs} | -- | 40 | -- | S |
| Diode Forward Voltage | $I_S = 1.0A, V_{GS} = 0V$ | V_{SD} | -- | 0.8 | 1.2 | V |
| Dynamic ^(Note 4) | | | | | | |
| Total Gate Charge | $V_{DS} = 10V, I_D = 5.0A,$ $V_{GS} = 4.5V$ | Q_g | -- | 11 | 14 | nC |
| Gate-Source Charge | | Q_{gs} | -- | 1.5 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 2.1 | -- | |
| Input Capacitance | $V_{DS} = 10V, V_{GS} = 0V,$ $f = 1.0MHz$ | C_{iss} | -- | 500 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 300 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 140 | -- | |
| Switching ^(Note 5) | | | | | | |
| Turn-On Delay Time | $V_{DD} = 10V, R_L = 10 \Omega,$ $I_D = 1A, V_{GEN} = 4.5V,$ $R_G = 6 \Omega$ | $t_{d(on)}$ | -- | 15 | 25 | ns |
| Turn-On Rise Time | | t_r | -- | 40 | 60 | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 48 | 70 | |
| Turn-Off Fall Time | | t_f | -- | 31 | 45 | |

Notes:

1. Pulse width limited by the maximum junction temperature
2. Surface Mounted on FR4 Board t m5 sec.
3. Pulse test: PW m300 μ s, duty cycle m2%
4. For DESIGN AID ONLY, not subject to production testing.
5. Switching time is essentially independent of operating temperature.



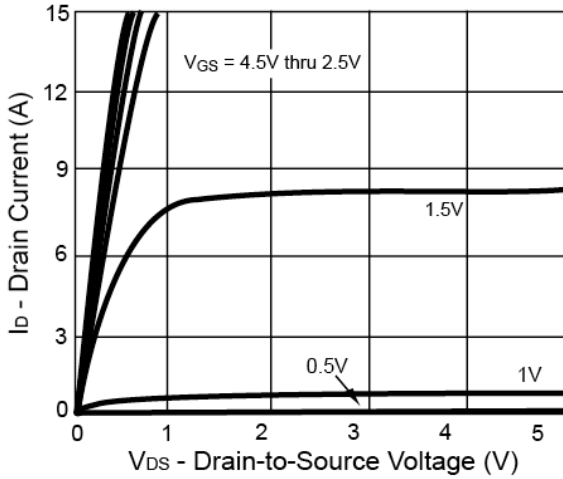
Switching Test Circuit



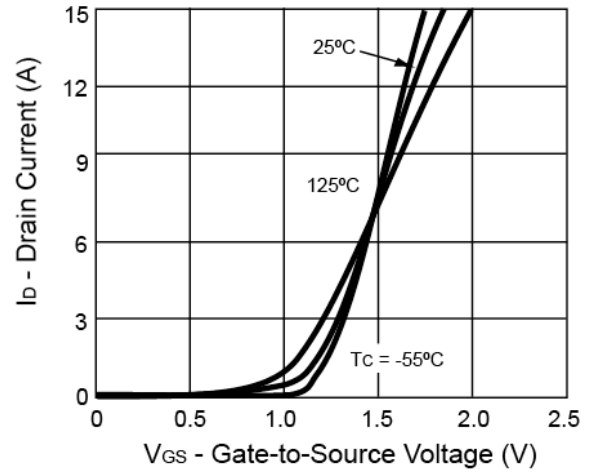
Switchin Waveforms

Electrical Characteristics Curve

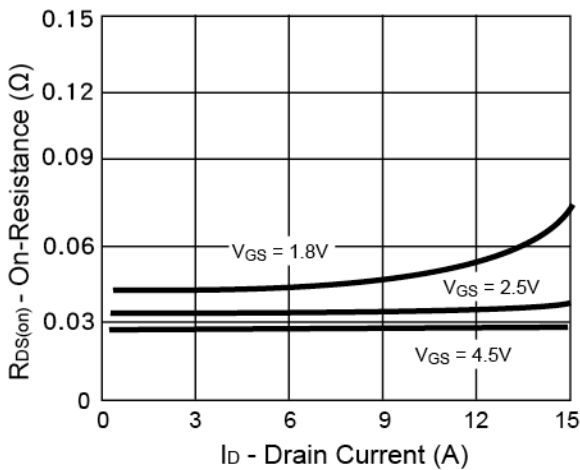
Output Characteristics



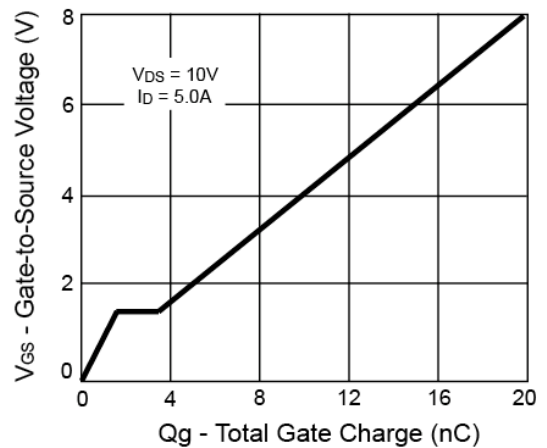
Transfer Characteristics



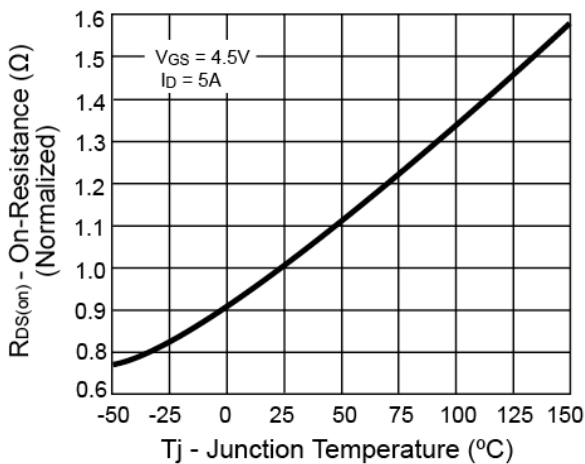
On-Resistance vs. Drain Current



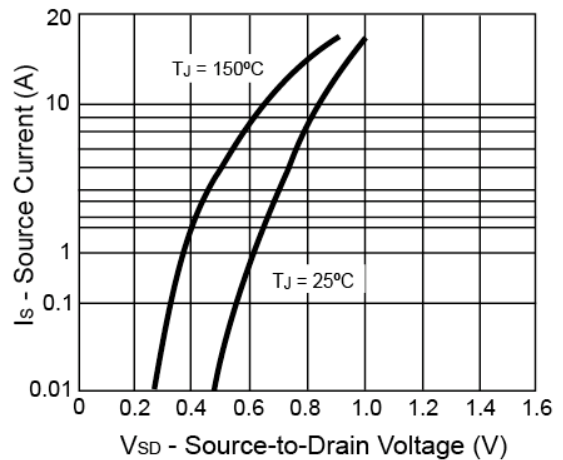
Gate Charge



On-Resistance vs. Junction Temperature

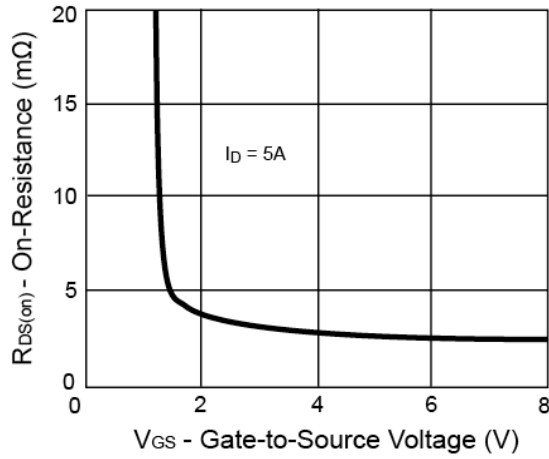


Source-Drain Diode Forward Voltage

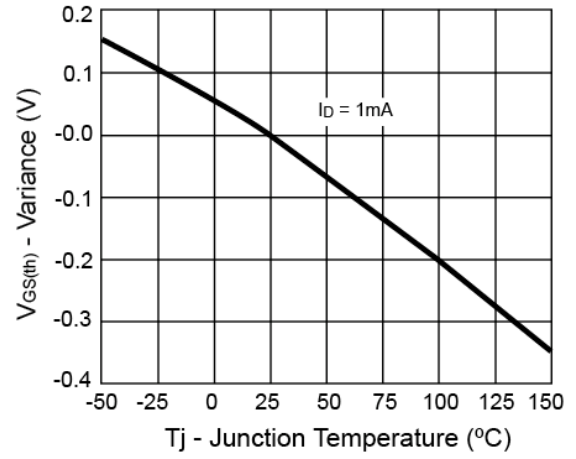


Electrical Characteristics Curve

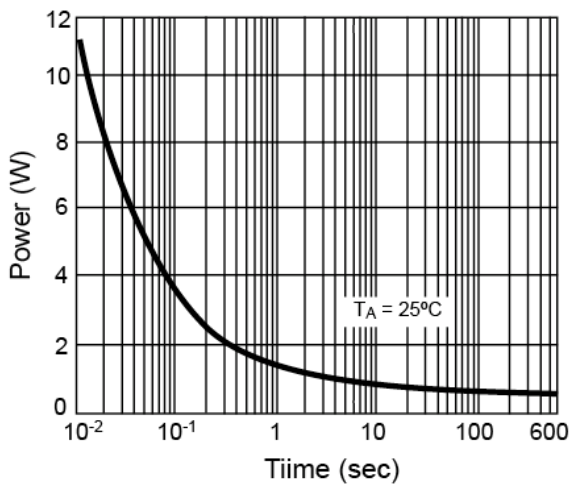
On-Resistance vs. Gate-Source Voltage



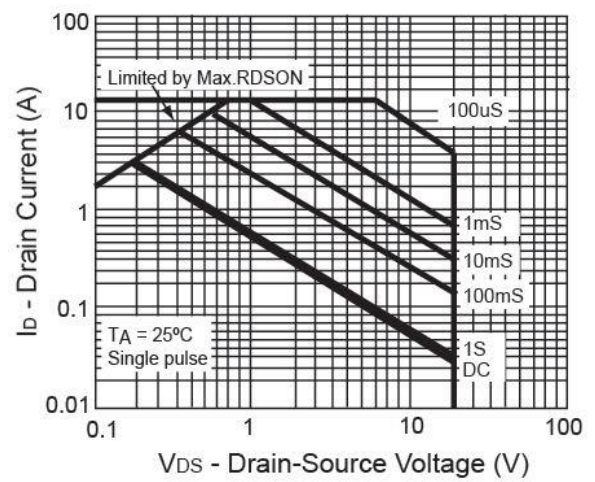
Threshold Voltage



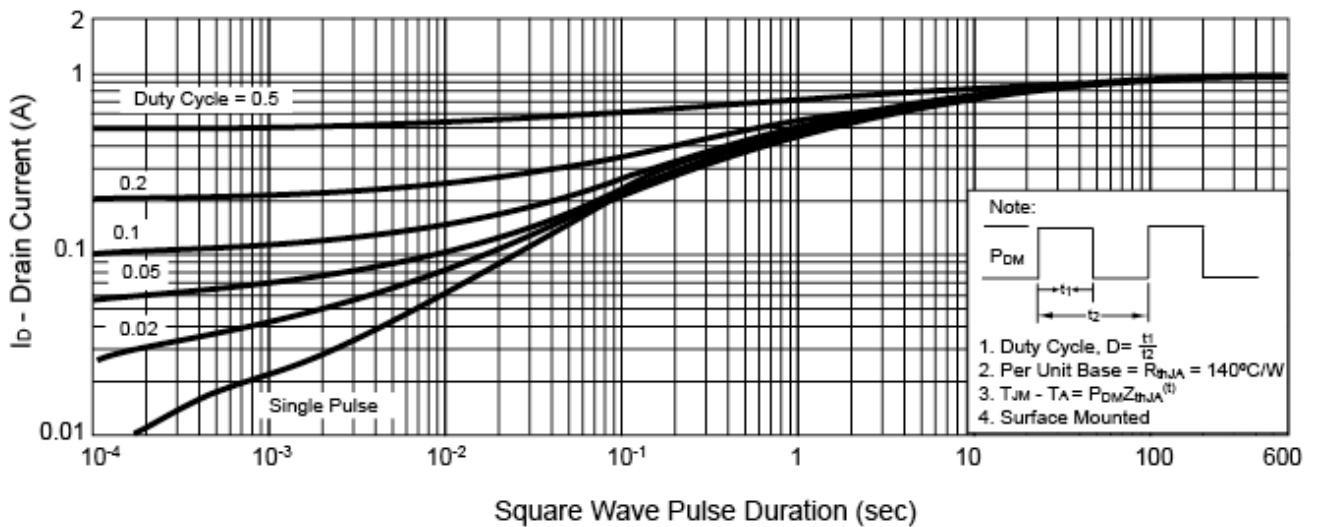
Single Pulse Power



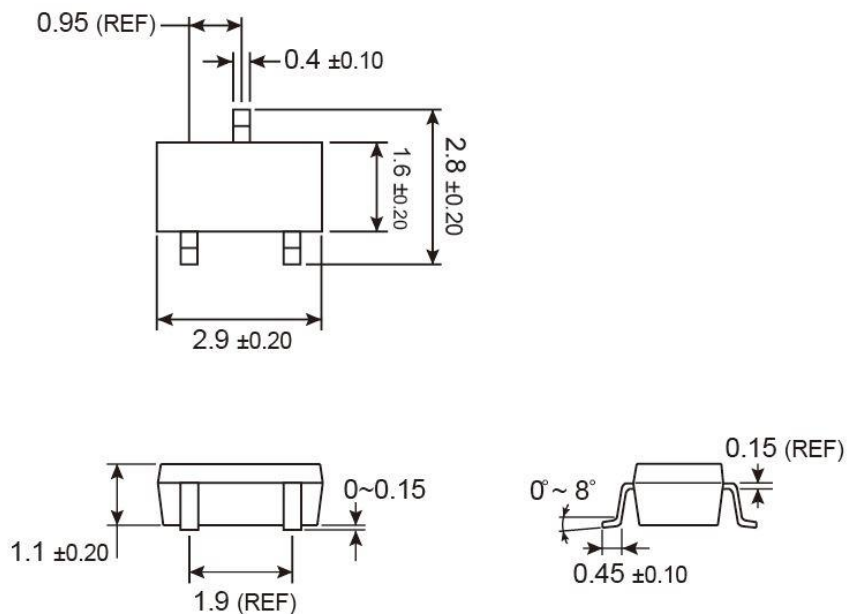
Safety Operation Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

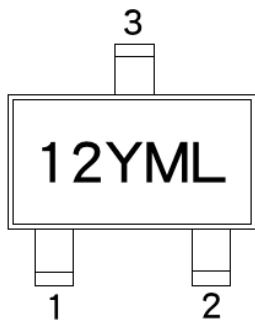


SOT-23 Mechanical Drawing



Unit: Millimeters

Marking Diagram



- 12** = 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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