

Pin Definition:

- | | |
|-------------|------------|
| 1. Source 1 | 8. Drain 1 |
| 2. Gate 1 | 7. Drain 1 |
| 3. Source 2 | 6. Drain 2 |
| 4. Gate 2 | 5. Drain 2 |

Key Parameter Performance

| Parameter | Value | Unit |
|--------------------|------------------|------|
| V_{DS} | -20 | V |
| $R_{DS(on)}$ (max) | $V_{GS} = -4.5V$ | 60 |
| | $V_{GS} = -2.7V$ | 78 |
| | $V_{GS} = -2.5V$ | 85 |
| Q_g | 6 | nC |

Features

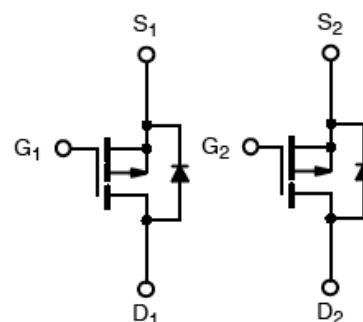
- Advance Trench Process Technology
- High Density Cell Design for Ultra Low On-resistance

Ordering Information

| Part No. | Package | Packing |
|----------------|---------|-------------------|
| TSM9933DCS RLG | SOP-8 | 2.5kps / 13" 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



Dual P-Channel MOSFET

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

| Parameter | Symbol | Limit | Unit |
|--|----------------|-------------------|-------------|
| Drain-Source Voltage | V_{DS} | -20 | V |
| Gate-Source Voltage | V_{GS} | ± 12 | V |
| Continuous Drain Current, V_{GS} @ 4.5V. | I_D | -4.7 | A |
| Pulsed Drain Current, V_{GS} @ 4.5V | I_{DM} | -20 | A |
| Continuous Source Current (Diode Conduction) ^(Note 1,2) | I_S | -2.5 | A |
| Maximum Power Dissipation | P_D | $T_A=25^{\circ}C$ | 2 |
| | | $T_A=70^{\circ}C$ | 1.3 |
| Operating Junction Temperature | T_J | +150 | $^{\circ}C$ |
| 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 | $R_{\theta JC}$ | 30 | $^{\circ}C/W$ |
| Junction to Ambient Thermal Resistance (PCB mounted) | $R_{\theta JA}$ | 62.5 | $^{\circ}C/W$ |

Electrical Specifications (T_J=25°C unless otherwise noted)

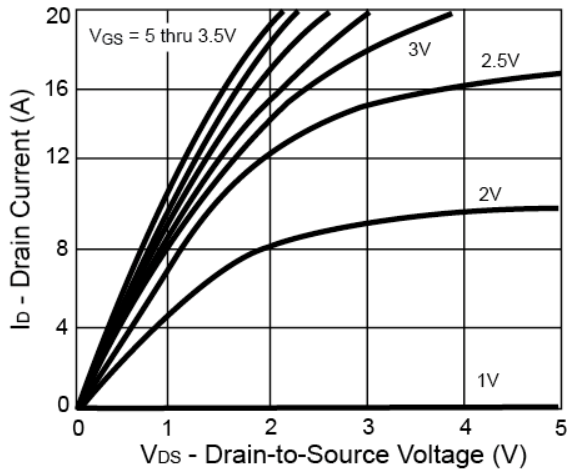
| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|----------------------------------|---|---------------------|------|------|------|------|
| Static (Note 3) | | | | | | |
| Drain-Source Breakdown Voltage | V _{GS} = 0V, I _D = -250μA | BV _{DSS} | -20 | -- | -- | V |
| Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = -250μA | V _{GS(TH)} | -0.6 | -- | -1.4 | V |
| Gate Body Leakage | V _{GS} = ±12V, V _{DS} = 0V | I _{GSS} | -- | -- | ±100 | nA |
| Zero Gate Voltage Drain Current | V _{DS} = -20V, V _{GS} = 0V | I _{DSS} | -- | -- | -1.0 | μA |
| On-State Drain Current | V _{DS} = -5V, V _{GS} = -4.5V | I _{D(ON)} | -15 | -- | -- | A |
| Drain-Source On-State Resistance | V _{GS} = -4.5V, I _D = -4.7A | R _{DS(ON)} | -- | 48 | 60 | mΩ |
| | V _{GS} = -4.5V, I _D = -2.9A | | -- | 47 | 58 | |
| | V _{GS} = -2.7V, I _D = -1.5A | | -- | 60 | 78 | |
| | V _{GS} = -2.5V, I _D = -3.8A | | -- | 65 | 85 | |
| Forward Transconductance | V _{DS} = -10V, I _D = -4.7A | g _{fs} | -- | 11 | -- | S |
| Diode Forward Voltage | I _S = -1.7A, V _{GS} = 0V | V _{SD} | -- | -0.8 | -1.2 | V |
| Dynamic (Note 4,5) | | | | | | |
| Total Gate Charge | V _{DS} = -10V, I _D = -4.7A, V _{GS} = -4.5V | Q _g | -- | 6 | 9 | nC |
| Gate-Source Charge | | Q _{gs} | -- | 1.4 | -- | |
| Gate-Drain Charge | | Q _{gd} | -- | 1.9 | -- | |
| Input Capacitance | V _{DS} = -10V, V _{GS} = 0V, f = 1.0MHz | C _{iss} | -- | 640 | -- | pF |
| Output Capacitance | | C _{oss} | -- | 180 | -- | |
| Reverse Transfer Capacitance | | C _{rss} | -- | 90 | -- | |
| Switching (Note 4,5) | | | | | | |
| Turn-On Delay Time | V _{DD} = -10V, R _L = 10Ω, I _D = -1A, V _{GEN} = -4.5V, R _G = 6Ω | t _{d(on)} | -- | 22 | 35 | ns |
| Turn-On Rise Time | | t _r | -- | 35 | 55 | |
| Turn-Off Delay Time | | t _{d(off)} | -- | 45 | 70 | |
| Turn-Off Fall Time | | t _f | -- | 25 | 50 | |

Notes:

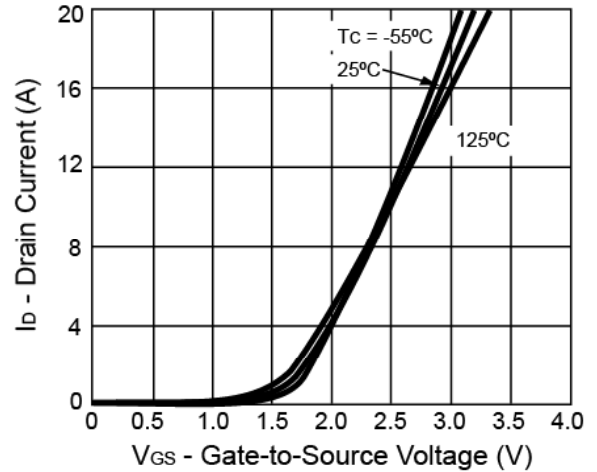
1. Pulse width limited by the Maximum junction temperature
2. Surface Mounted on FR4 Board, t ≤ 5 sec.
3. pulse test: PW ≤ 300μs, duty cycle ≤ 2%
4. For DESIGN AID ONLY, not subject to production testing.
5. Switching time is essentially independent of operating temperature.

Electrical Characteristics Curves

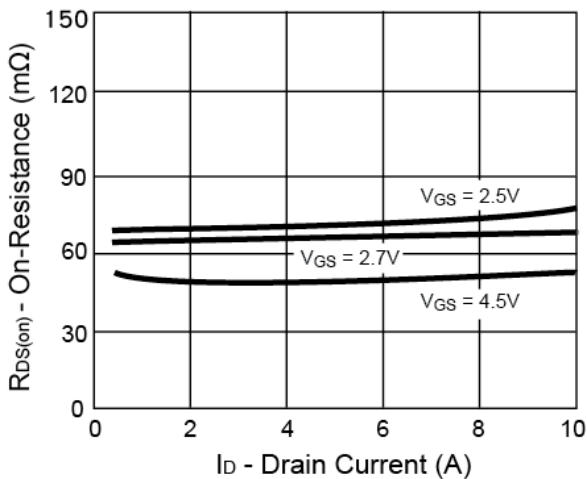
Output Characteristics



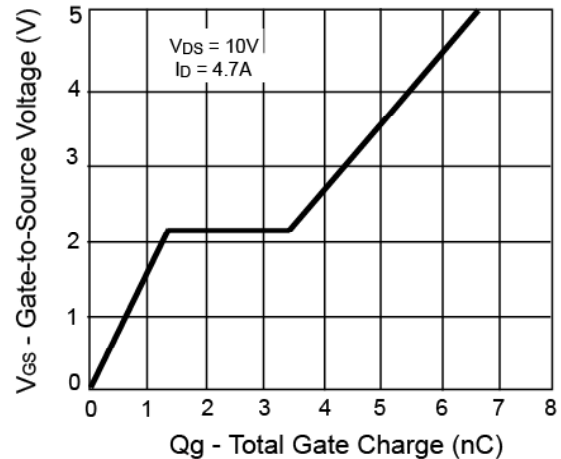
Transfer Characteristics



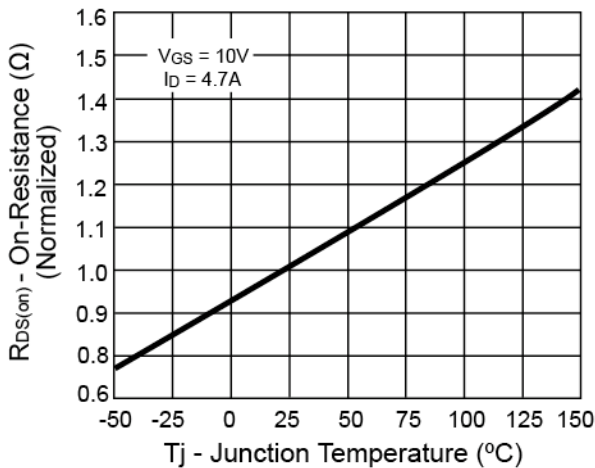
On-Resistance vs. Drain Current



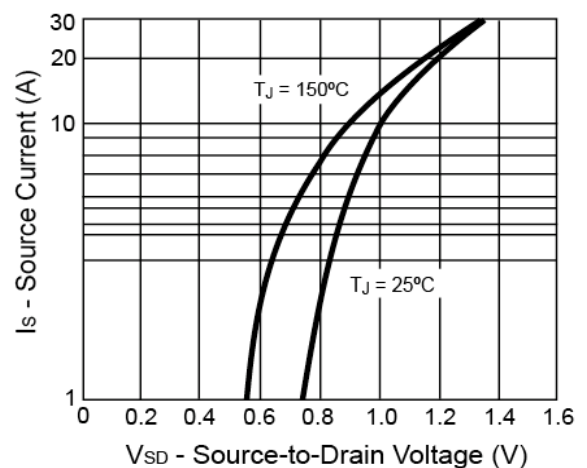
Gate Charge



On-Resistance vs. Junction Temperature

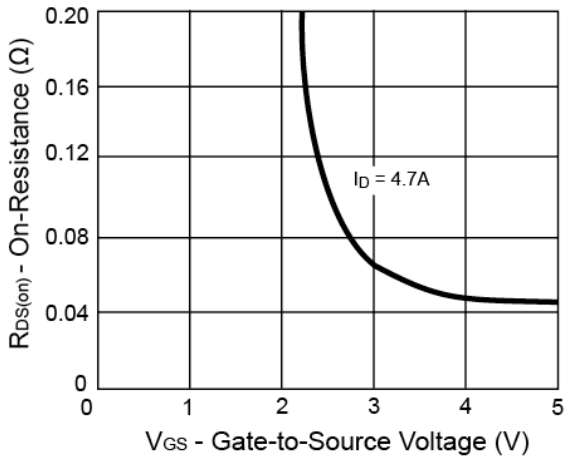


Source-Drain Diode Forward Voltage

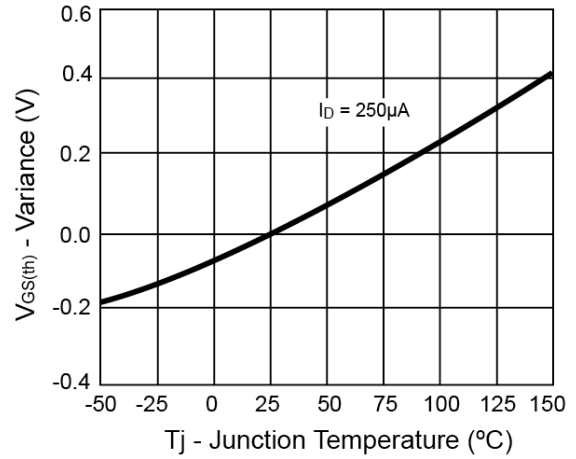


Electrical Characteristics Curves

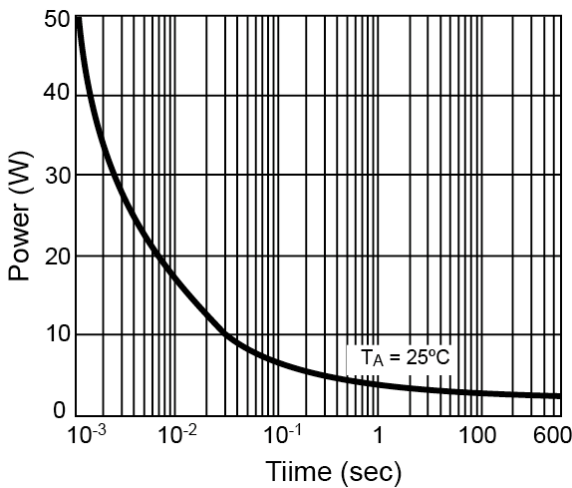
On-Resistance vs. Gate-Source Voltage



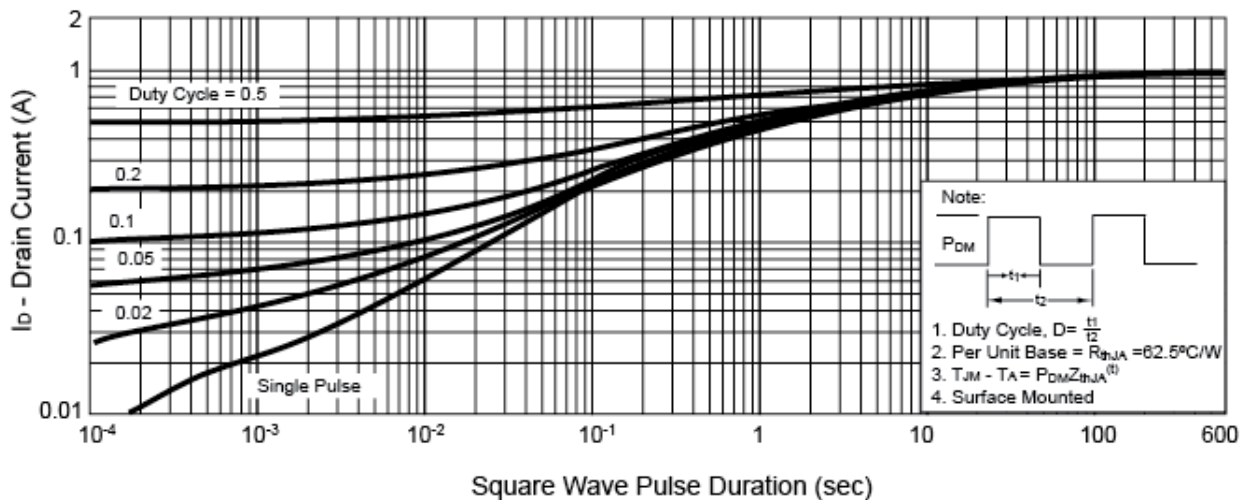
Threshold Voltage



Single Pulse Power

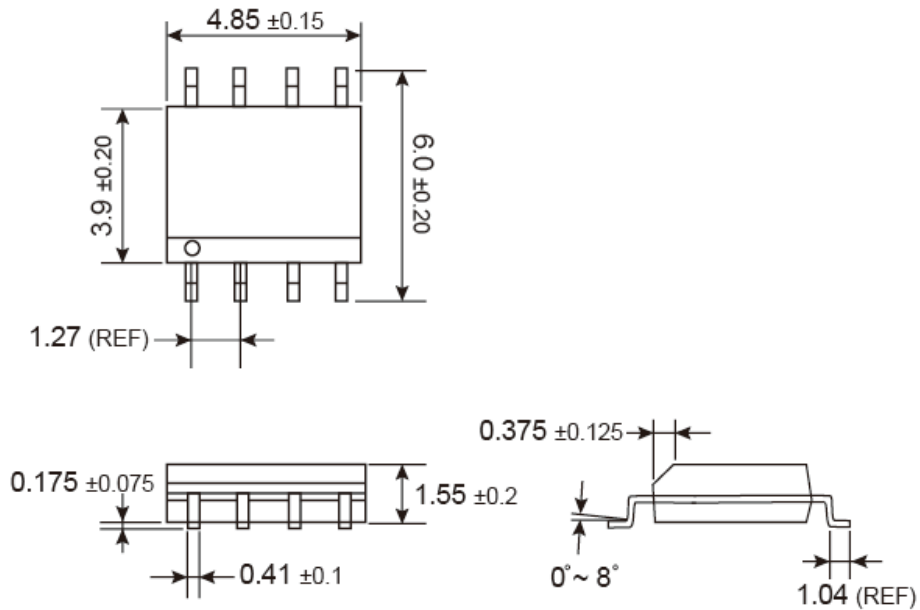


Normalized Thermal Transient Impedance, Junction-to-Ambient



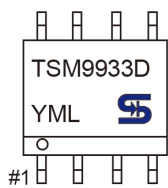


SOP-8 Mechanical Drawing



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

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