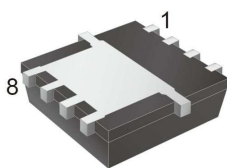


PDFN56



Pin Definition:

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

Key Parameter Performance

| Parameter | Value | Unit |
|--------------------|-----------------|------|
| V_{DS} | 30 | V |
| $R_{DS(on)}$ (max) | $V_{GS} = 10V$ | 2 |
| | $V_{GS} = 4.5V$ | 3 |
| Q_g | 82 | nC |

Features

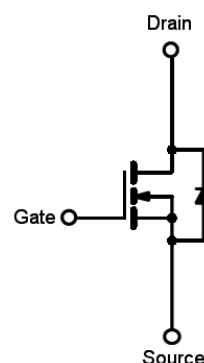
- Low On-Resistance
- Low Input Capacitance
- Low Gate Charge

Ordering Information

| Part No. | Package | Packing |
|-------------------|---------|--------------------|
| TSM020N03PQ56 RLG | PDFN56 | 2.5kpcs / 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



N-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} | ± 20 | V |
| Continuous Drain Current ^(Note 3) | I_D | $T_C=25^\circ\text{C}$ | 130 |
| | | $T_A=25^\circ\text{C}$ | 38 |
| Drain Current-Pulsed ^(Note 1) | I_{DM} | 500 | A |
| Single Pulse Avalanche Energy: L=0.1mH | E_{AS} | 151 | mJ |
| Maximum Power Dissipation ^(Note 2) | P_D | $T_C=25^\circ\text{C}$ | 83 |
| | | $T_A=25^\circ\text{C}$ | 3.6 |
| Storage Temperature Range | T_{STG} | -55 to +150 | $^\circ\text{C}$ |
| Operating Junction Temperature Range | T_J | -55 to +150 | $^\circ\text{C}$ |

Thermal Performance

| Parameter | Symbol | Limit | Unit |
|--|-----------------|-------|--------------------|
| Thermal Resistance - Junction to Case | $R_{\theta JC}$ | 1.5 | $^\circ\text{C/W}$ |
| Thermal Resistance - Junction to Ambient | $R_{\theta JA}$ | 35 | $^\circ\text{C/W}$ |

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

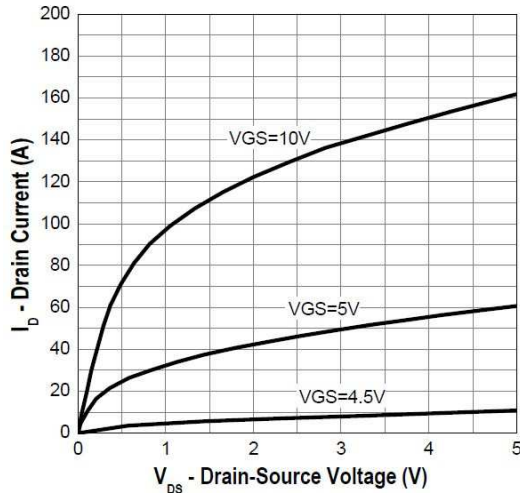
| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|--|--|---------------------|-----|------|------|------|
| Static | | | | | | |
| Drain-Source Breakdown Voltage | V _{GS} = 0V, I _D = 250μA | BV _{DSS} | 30 | -- | -- | V |
| Drain-Source On-State Resistance | V _{GS} = 10V, I _D = 30A | R _{DS(ON)} | -- | 1.5 | 2 | mΩ |
| | V _{GS} = 4.5V, I _D = 15A | | -- | 2.3 | 3 | |
| Gate Threshold Voltage | V _{DS} = V _{GS} , I _D = 250μA | V _{GS(TH)} | 1.2 | -- | 2.5 | V |
| Zero Gate Voltage Drain Current | V _{DS} = 24V, V _{GS} = 0V | I _{DSS} | -- | -- | 1 | μA |
| Gate Body Leakage | V _{GS} = ±20V, V _{DS} = 0V | I _{GSS} | -- | -- | ±100 | nA |
| Dynamic | | | | | | |
| Total Gate Charge | V _{DD} = 15V, I _D = 30A, V _{GS} = 10V | Q _g | -- | 82 | -- | nC |
| Gate-Source Charge | | Q _{gs} | -- | 24 | -- | |
| Gate-Drain Charge | | Q _{gd} | -- | 5 | -- | |
| Input Capacitance | V _{DS} = 15V, V _{GS} = 0V, f = 1.0MHz | C _{iss} | -- | 4222 | -- | pF |
| Output Capacitance | | C _{oss} | -- | 889 | -- | |
| Reverse Transfer Capacitance | | C _{rss} | -- | 398 | -- | |
| Switching | | | | | | |
| Turn-On Delay Time | V _{GS} = 10V, V _{DS} = 15V, R _G = 3Ω, I _D = 30A | t _{d(on)} | -- | 22 | -- | ns |
| Turn-On Rise Time | | t _r | -- | 7 | -- | |
| Turn-Off Delay Time | | t _{d(off)} | -- | 100 | -- | |
| Turn-Off Fall Time | | t _f | -- | 18 | -- | |
| Drain-Source Diode Characteristics and Maximum Rating | | | | | | |
| Drain-Source Diode Forward Voltage | V _{GS} =0V, I _S =30A | V _{SD} | -- | -- | 1.3 | V |
| Reverse Recovery Time | I _S = 30A, dI/dt = 100A/μs | t _{rr} | -- | 32 | -- | ns |
| Reverse Recovery Charge | | Q _{rr} | -- | 120 | -- | nC |

Notes:

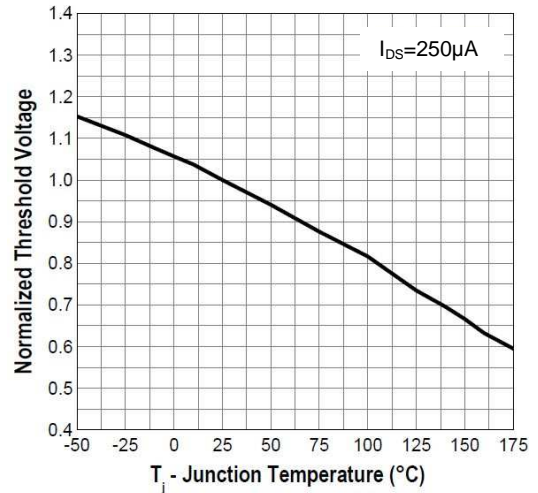
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. R_{θJA} is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. R_{θJA} is guaranteed by design while R_{θCA} is determined by the user's board design. R_{θJA} shown below for single device operation on FR-4 PCB in still air.
3. The maximum current rating is limited by package.

Electrical Characteristics Curves

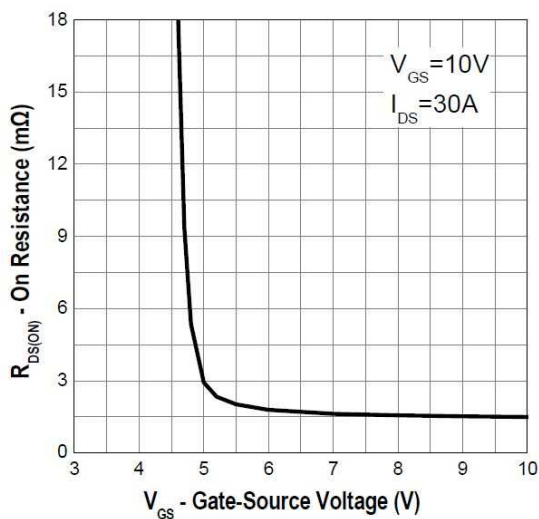
Output Characteristics



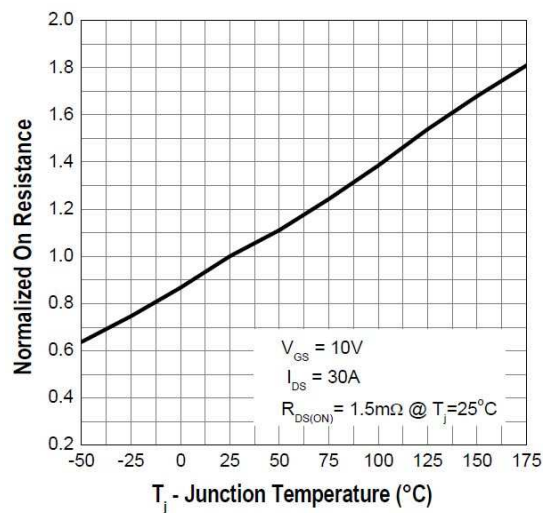
Gate Threshold Voltage



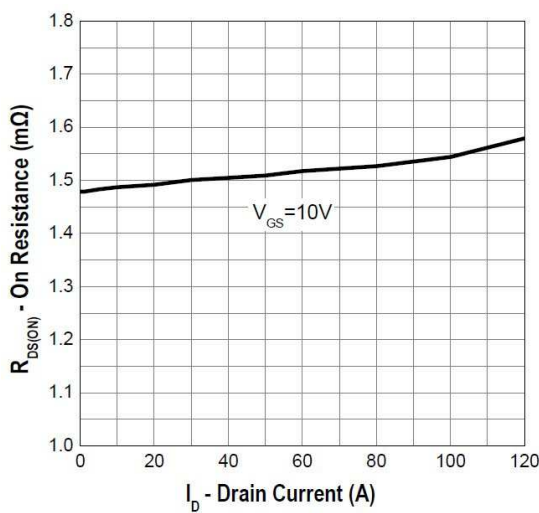
Gate Source On Resistance



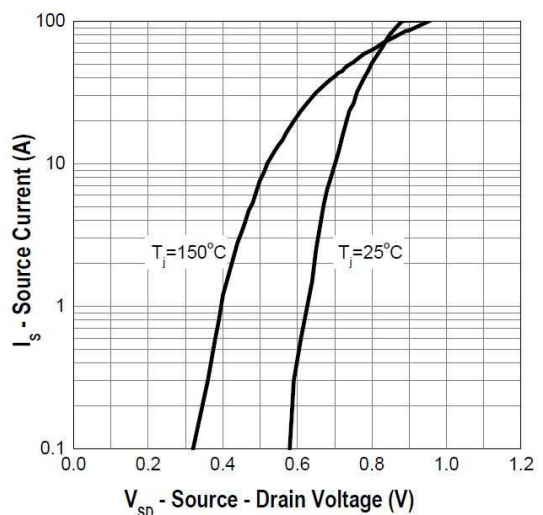
Drain-Source On Resistance



Drain-Source On-Resistance

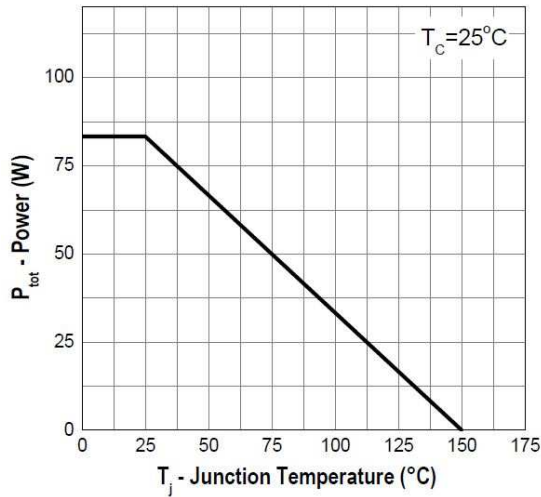


Source-Drain Diode Forward Voltage

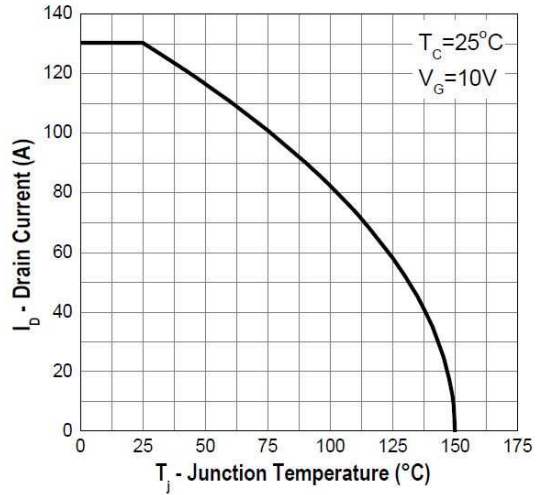


Electrical Characteristics Curves

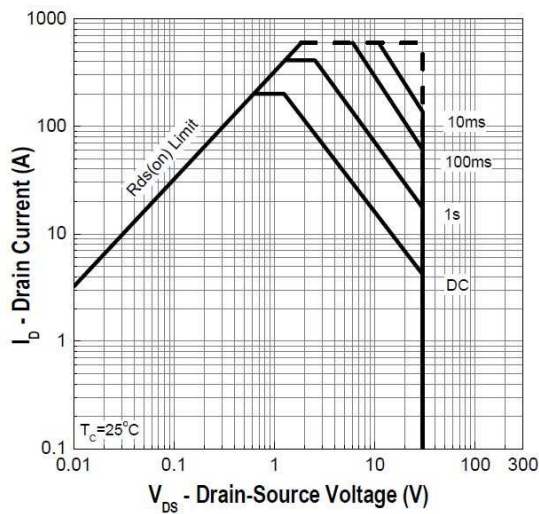
Power Derating



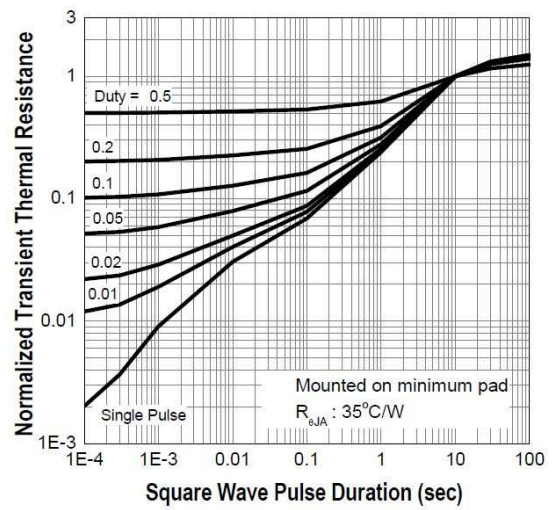
Drain Current vs. Junction Temperature



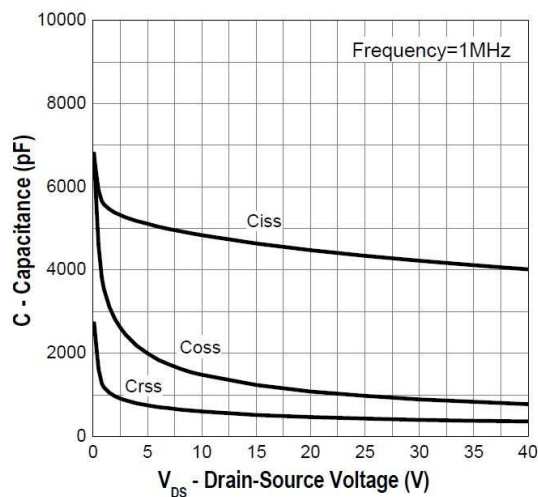
Safe Operation Area



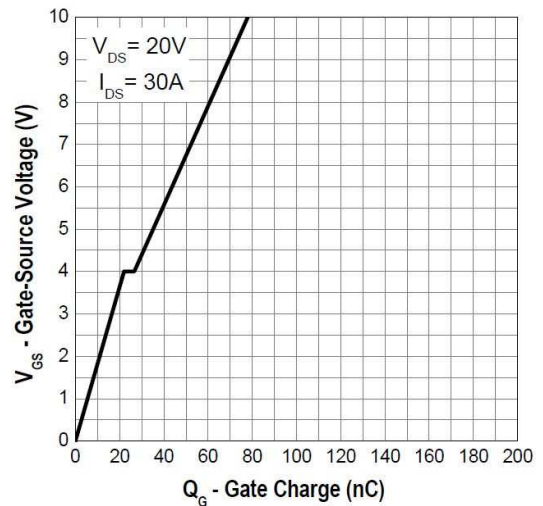
Transient Thermal Impedance



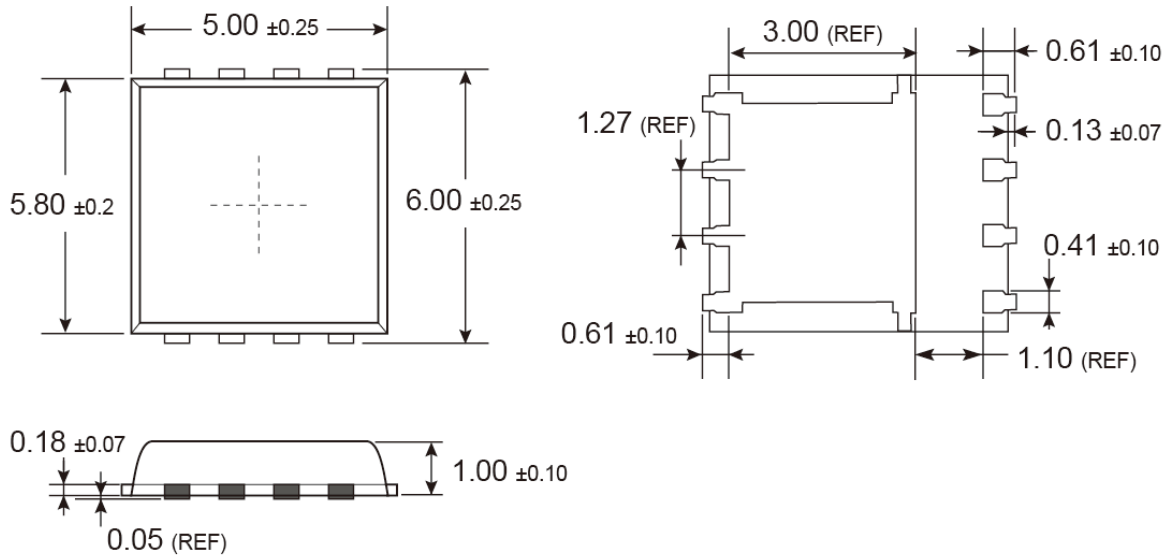
Capacitance



Gate Charge

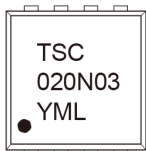


PDFN56 Mechanical Drawing



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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