

N-Channel Power MOSFET

30V, 124A, 3.6mΩ

FEATURES

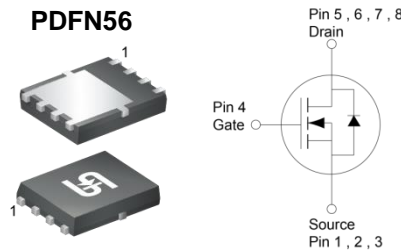
- Low $R_{DS(ON)}$ to minimize conductive losses
- Low gate charge for fast power switching
- 100% UIS and R_g tested
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS

| PARAMETER | VALUE | UNIT |
|--------------------|-----------------|------|
| V_{DS} | 30 | V |
| $R_{DS(on)}$ (max) | $V_{GS} = 10V$ | 3.6 |
| | $V_{GS} = 4.5V$ | 5.5 |
| Q_g | 25 | nC |

APPLICATIONS

- DC-DC Converters
- Battery Power Management
- ORing FET/Load Switch



Note: MSL 1 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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 1) | I_D | $T_C = 25^\circ\text{C}$ | 124 |
| | | $T_A = 25^\circ\text{C}$ | 22 |
| Pulsed Drain Current | I_{DM} | 496 | A |
| Single Pulse Avalanche Current ^(Note 2) | I_{AS} | 27 | A |
| Single Pulse Avalanche Energy ^(Note 2) | E_{AS} | 109 | mJ |
| Total Power Dissipation | P_D | $T_C = 25^\circ\text{C}$ | 83 |
| | | $T_C = 125^\circ\text{C}$ | 17 |
| Total Power Dissipation | P_D | $T_A = 25^\circ\text{C}$ | 2.6 |
| | | $T_A = 125^\circ\text{C}$ | 0.5 |
| 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 | $R_{\theta JC}$ | 1.5 | $^\circ\text{C/W}$ |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 48 | $^\circ\text{C/W}$ |

Thermal Performance Note: $R_{\theta JA}$ 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. $R_{\theta JA}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.

| ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ 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} | 30 | -- | -- | V |
| Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 1.2 | 1.6 | 2.5 | V |
| Gate-Source Leakage Current | $V_{GS} = \pm 20V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Drain-Source Leakage Current | $V_{GS} = 0V, V_{DS} = 30V$ | I_{DSS} | -- | -- | 1 | μA |
| | $V_{GS} = 0V, V_{DS} = 30V$ $T_J = 125^\circ\text{C}$ | | -- | -- | 100 | |
| Drain-Source On-State Resistance (Note 3) | $V_{GS} = 10V, I_D = 22A$ | $R_{DS(on)}$ | -- | 3 | 3.6 | m Ω |
| | $V_{GS} = 4.5V, I_D = 22A$ | | -- | 4 | 5.5 | |
| Forward Transconductance (Note 3) | $V_{DS} = 5V, I_D = 22A$ | g_{fs} | -- | 44 | -- | S |
| Dynamic (Note 4) | | | | | | |
| Total Gate Charge | $V_{GS} = 10V, V_{DS} = 15V,$ $I_D = 22A$ | Q_g | -- | 50 | -- | nC |
| Total Gate Charge | $V_{GS} = 4.5V, V_{DS} = 15V,$ $I_D = 22A$ | Q_g | -- | 25 | -- | |
| Gate-Source Charge | | Q_{gs} | -- | 7.3 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 12 | -- | |
| Input Capacitance | $V_{GS} = 0V, V_{DS} = 15V$ $f = 1.0\text{MHz}$ | C_{iss} | -- | 2530 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 376 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 249 | -- | |
| Gate Resistance | $f = 1.0\text{MHz}, \text{open drain}$ | R_g | 0.4 | 1.3 | 2.6 | Ω |
| Switching (Note 4) | | | | | | |
| Turn-On Delay Time | $V_{GS} = 10V, V_{DS} = 15V,$ $I_D = 22A, R_G = 2\Omega,$ | $t_{d(on)}$ | -- | 4.8 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 10.4 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 25.2 | -- | |
| Turn-Off Fall Time | | t_f | -- | 10.6 | -- | |
| Source-Drain Diode | | | | | | |
| Forward Voltage (Note 3) | $V_{GS} = 0V, I_S = 22A$ | V_{SD} | -- | -- | 1 | V |
| Reverse Recovery Time | $I_S = 22A,$ $di/dt = 100A/\mu s$ | t_{rr} | -- | 30 | -- | ns |
| Reverse Recovery Charge | | Q_{rr} | -- | 13 | -- | nC |

Notes:

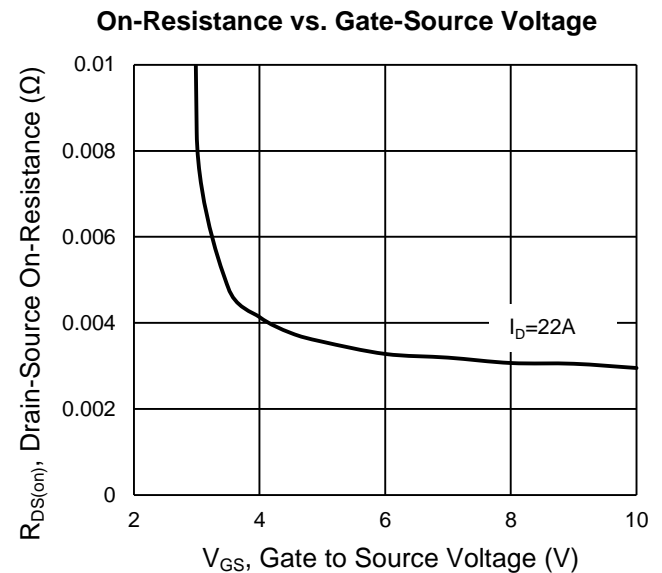
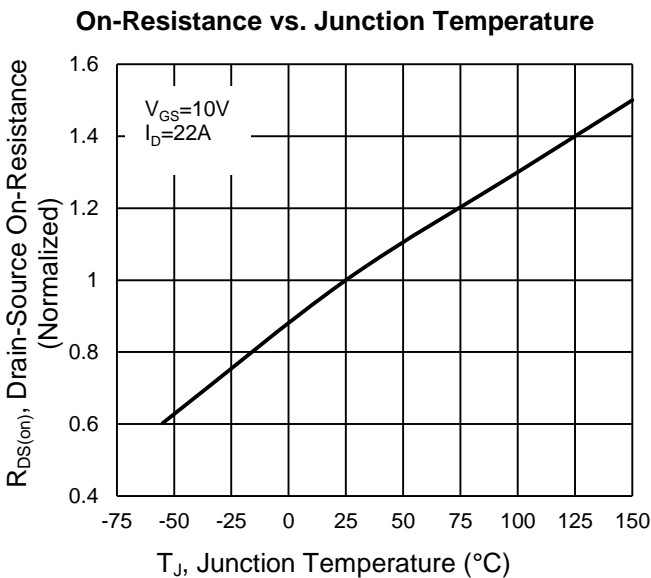
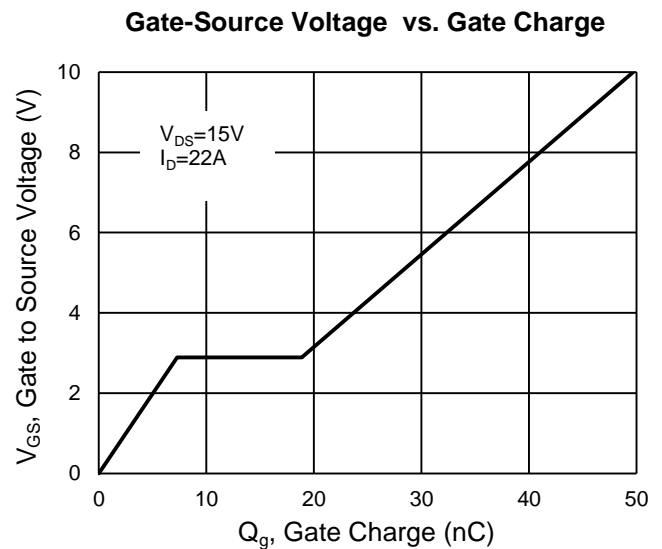
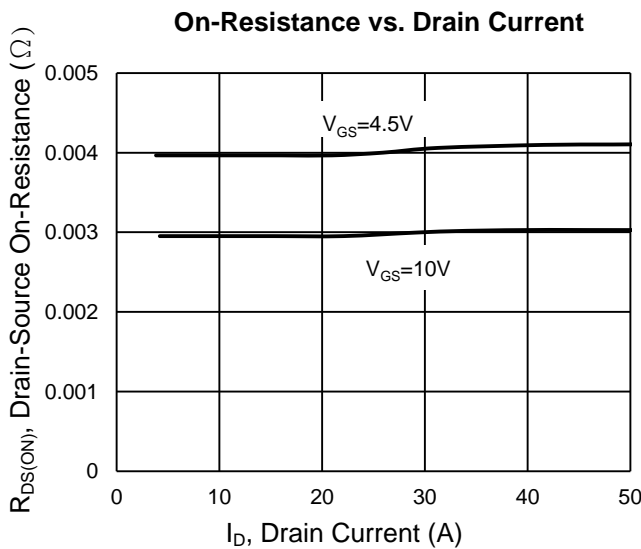
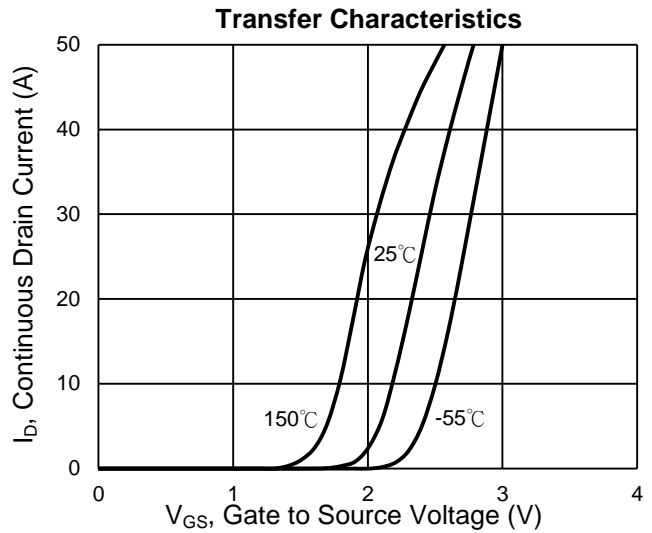
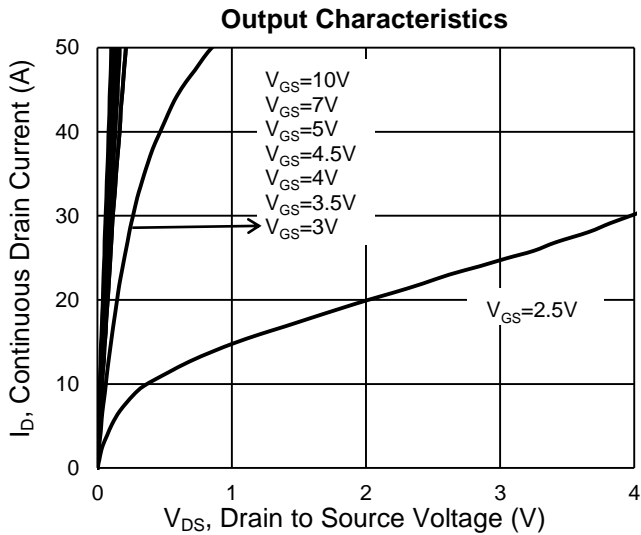
1. Silicon limited current only.
2. $L = 0.3\text{mH}, V_{GS} = 10V, V_{DD} = 25V, R_G = 25\Omega, I_{AS} = 27A,$ Starting $T_J = 25^\circ\text{C}$
3. Pulse test: Pulse Width $\leq 300\mu s,$ duty cycle $\leq 2\%$.
4. Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|-------------------|----------------|---------------------|
| TSM036N03PQ56 RLG | PDFN56 | 2,500pcs / 13" Reel |

CHARACTERISTICS CURVES

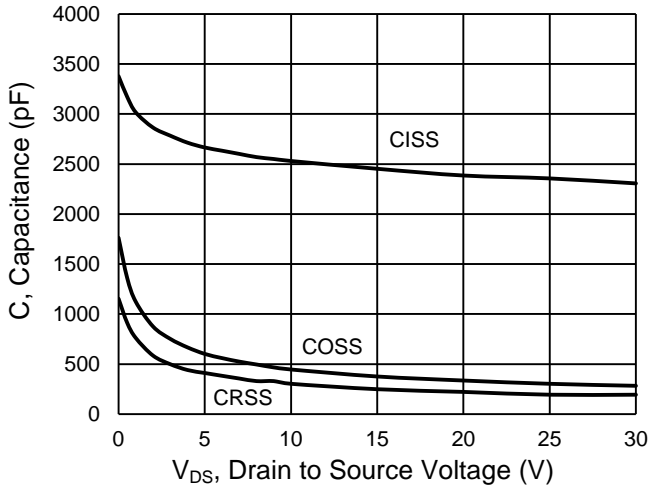
($T_A = 25^\circ\text{C}$ unless otherwise noted)



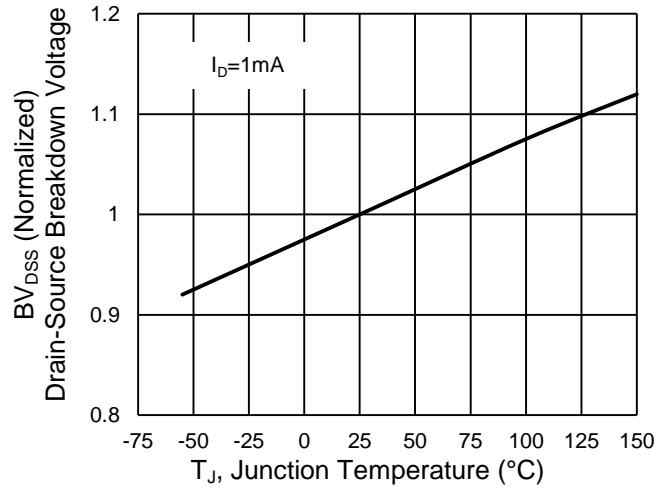
CHARACTERISTICS CURVES

($T_A = 25^\circ\text{C}$ unless otherwise noted)

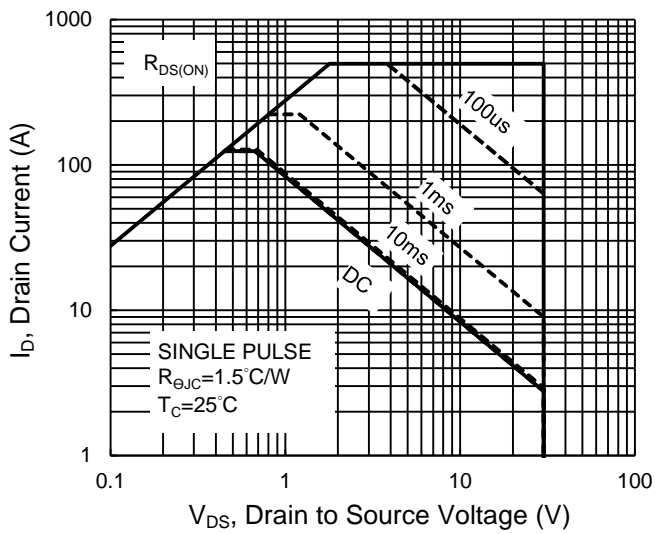
Capacitance vs. Drain-Source Voltage



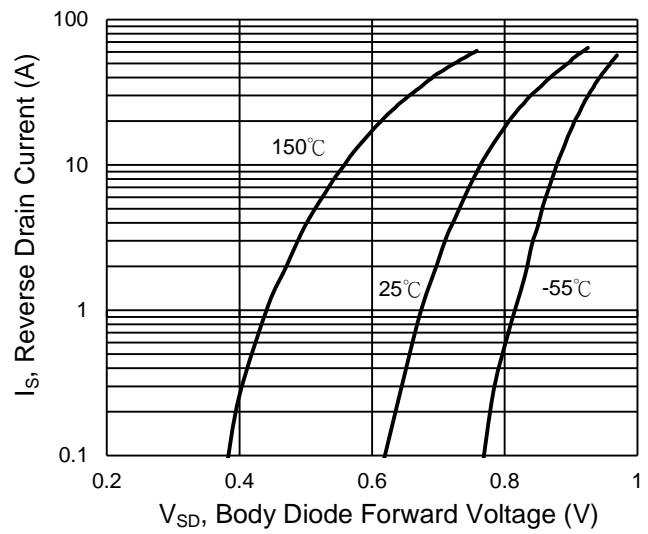
BV_{DSS} vs. Junction Temperature



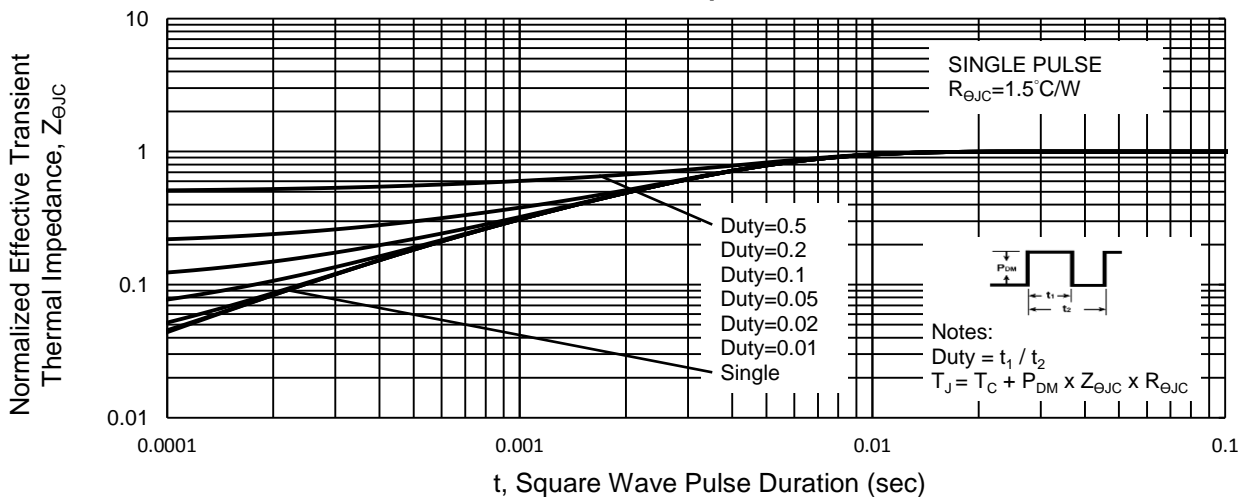
Maximum Safe Operating Area, Junction-to-Case



Source-Drain Diode Forward Current vs. Voltage

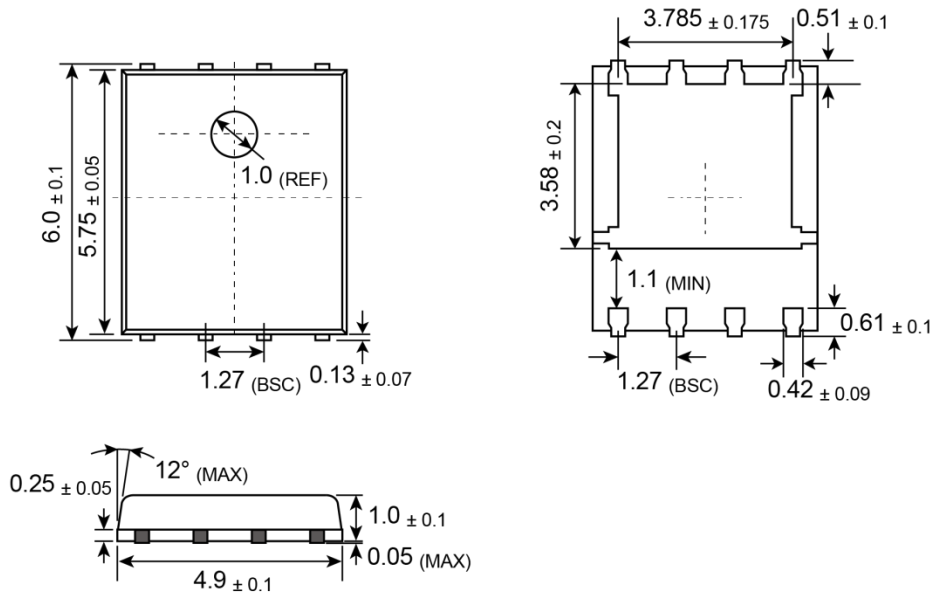


Normalized Thermal Transient Impedance, Junction-to-Case

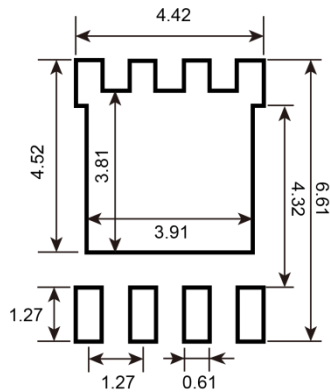


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

PDFN56



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

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- Поставка образцов и прототипов;
- Техническая поддержка проекта;
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