

N-Channel Power MOSFET

600V, 0.6A, 5Ω

FEATURES

- Robust high voltage termination
- Avalanche energy specified
- Diode is characterized for use in bridge circuits
- Source to Drain diode recovery time comparable to a discrete fast recovery diode.

KEY PERFORMANCE PARAMETERS

| PARAMETER | VALUE | UNIT |
|--------------------|-------|------|
| V_{DS} | 600 | V |
| $R_{DS(on)}$ (max) | 5 | Ω |
| Q_g | 13 | nC |

APPLICATION

- Power Supply
- Lighting
- Charger


RoHS
COMPLIANT

HALOGEN
FREE

SOT-223


Notes: MSL 3 (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} | 600 | V |
| Gate-Source Voltage | | V _{GS} | ±30 | V |
| Continuous Drain Current ^(Note 1) | T _C = 25°C | I _D | 0.6 | A |
| | T _C = 100°C | | 0.36 | |
| Pulsed Drain Current ^(Note 2) | | I _{DM} | 1.5 | A |
| Total Power Dissipation @ T _C = 25°C | | P _{DTOT} | 2.5 | W |
| Single Pulsed Avalanche Energy ^(Note 3) | | E _{AS} | 62 | mJ |
| Single Pulsed Avalanche Current ^(Note 3) | | I _{AS} | 2.5 | A |
| 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 |
|--|-----------------|-------|--------------------|
| Junction to Case Thermal Resistance | $R_{\theta JC}$ | 15 | $^\circ\text{C/W}$ |
| Junction to Ambient Thermal Resistance | $R_{\theta JA}$ | 55.8 | $^\circ\text{C/W}$ |

Notes: $R_{\theta JA}$ 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. $R_{\theta JA}$ shown below for single device operation on FR-4 PCB with minimum recommended footprint in still air

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

| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
|----------------------------------|---|--------------|-----|------|-----------|----------|
| Static (Note 4) | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 600 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS} = V_{GS}, I_D = 250\mu A$ | $V_{GS(TH)}$ | 2 | -- | 4 | V |
| Gate Body Leakage | $V_{GS} = \pm 30V, V_{DS} = 0V$ | I_{GSS} | -- | -- | ± 100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS} = 600V, V_{GS} = 0V$ | I_{DSS} | -- | -- | 1 | μA |
| Drain-Source On-State Resistance | $V_{GS} = 10V, I_D = 0.6A$ | $R_{DS(ON)}$ | -- | 3.6 | 5 | Ω |
| Forward Transconductance | $V_{DS} = 10V, I_D = 0.2A$ | g_{fs} | -- | 0.8 | -- | S |
| Dynamic (Note 5) | | | | | | |
| Total Gate Charge | $V_{DS} = 400V, I_D = 0.6A,$ $V_{GS} = 10V$ | Q_g | -- | 13 | -- | nC |
| Gate-Source Charge | | Q_{gs} | -- | 2 | -- | |
| Gate-Drain Charge | | Q_{gd} | -- | 6 | -- | |
| Input Capacitance | $V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$ | C_{iss} | -- | 435 | -- | pF |
| Output Capacitance | | C_{oss} | -- | 56 | -- | |
| Reverse Transfer Capacitance | | C_{rss} | -- | 9.2 | -- | |
| Switching (Note 6) | | | | | | |
| Turn-On Delay Time | $V_{GS} = 10V, I_D = 0.6A,$ $V_{DD} = 300V, R_G = 18\Omega,$ | $t_{d(on)}$ | -- | 12 | -- | ns |
| Turn-On Rise Time | | t_r | -- | 21 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 30 | -- | |
| Turn-Off Fall Time | | t_f | -- | 24 | -- | |
| Source-Drain Diode (Note 4) | | | | | | |
| Forward On Voltage | $I_S = 0.6A, V_{GS} = 0V$ | V_{SD} | -- | 0.85 | 1.15 | V |

Notes:

- Current limited by package
- Pulse width limited by the maximum junction temperature
- $L = 20mH, I_{AS} = 2.5A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|----------------|---------|---------------------|
| TSM2N60SCW RPG | SOT-223 | 2,500pcs / 13" Reel |

Note:

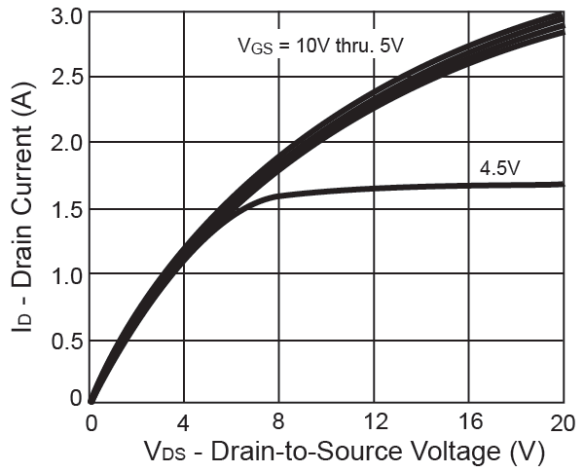
1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

Not Recommended

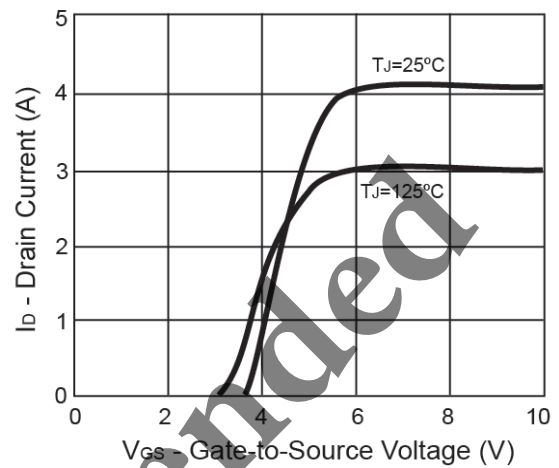
CHARACTERISTICS CURVES

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

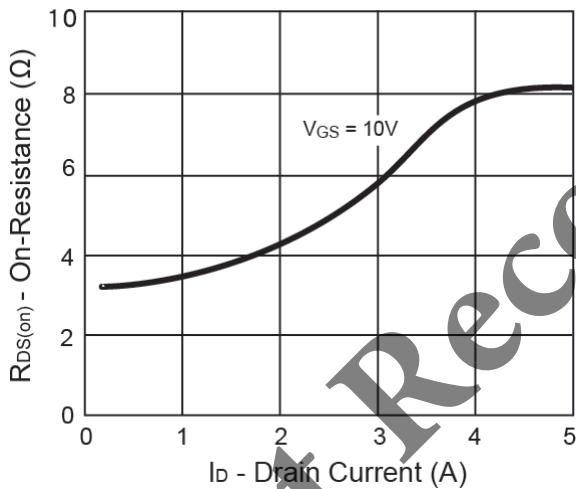
Output Characteristics



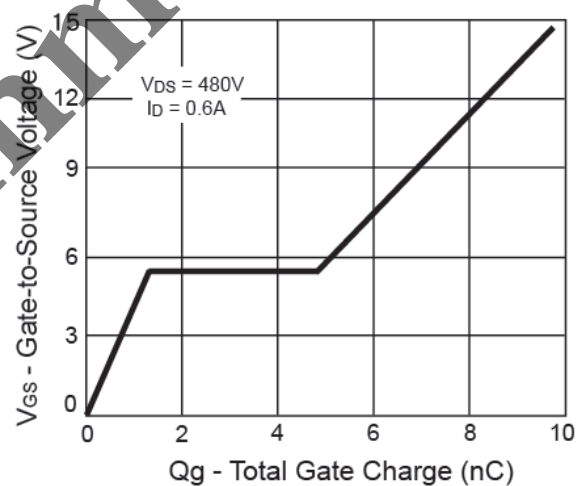
Transfer Characteristics



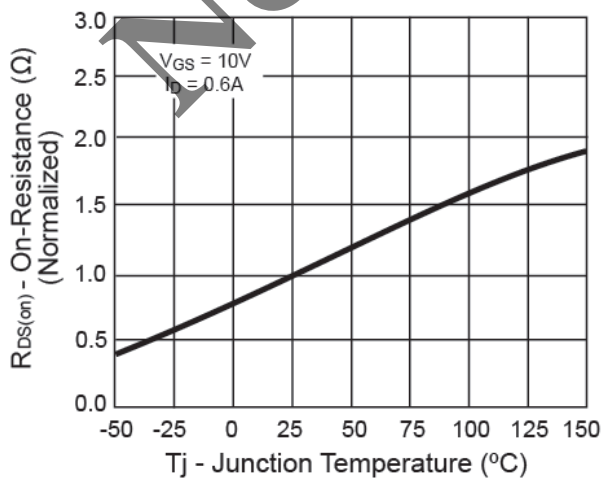
On-Resistance vs. Drain Current



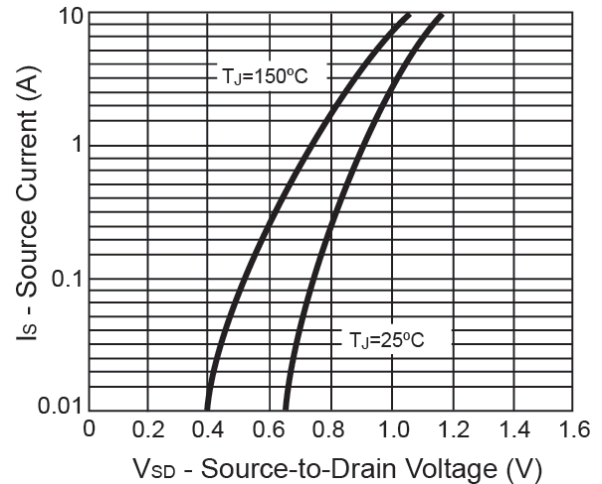
Gate Charge



On-Resistance vs. Junction Temperature



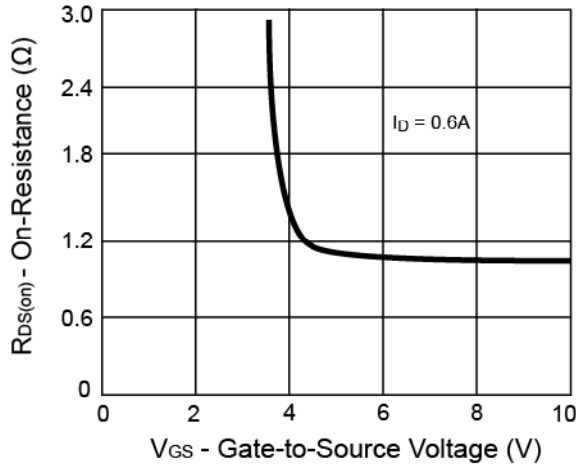
Source-Drain Diode Forward Voltage



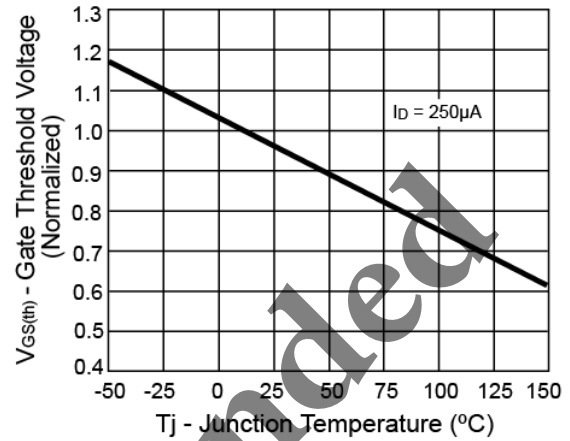
CHARACTERISTICS CURVES

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

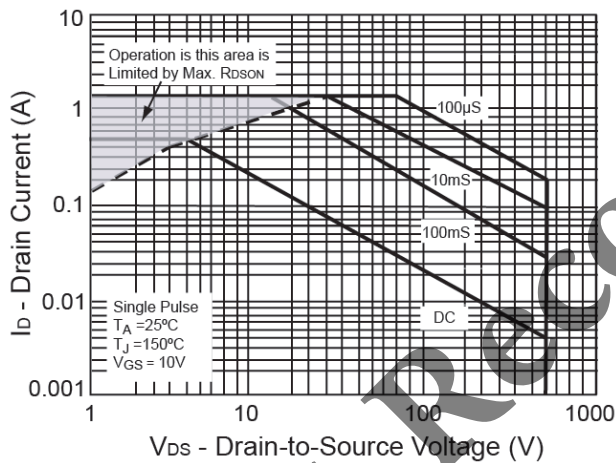
On-Resistance vs. Gate-Source Voltage



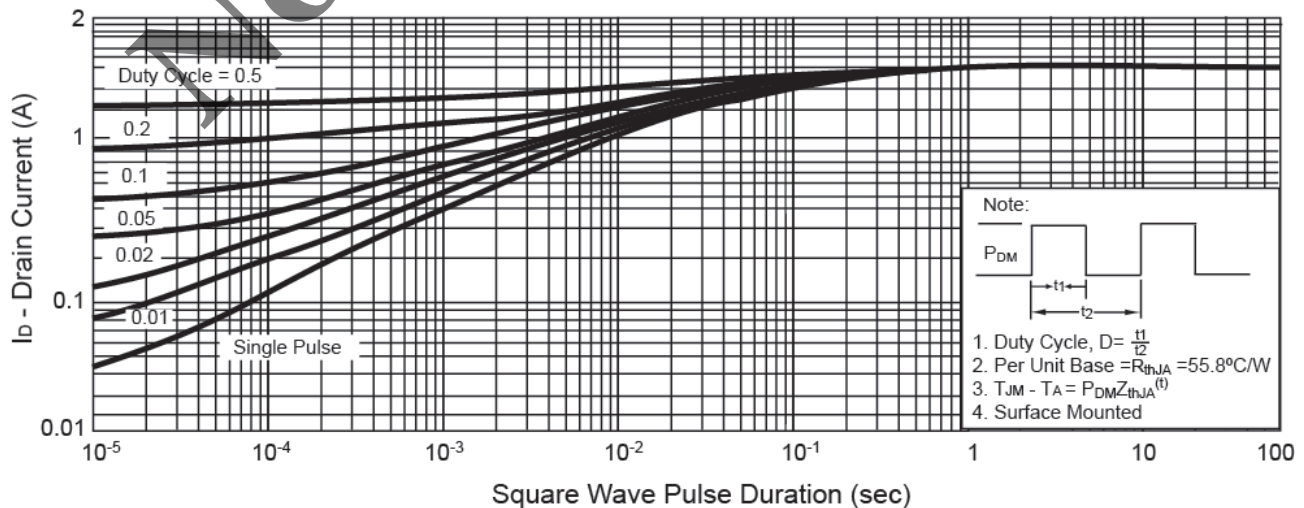
Threshold Voltage



Maximum Safe Operating Area

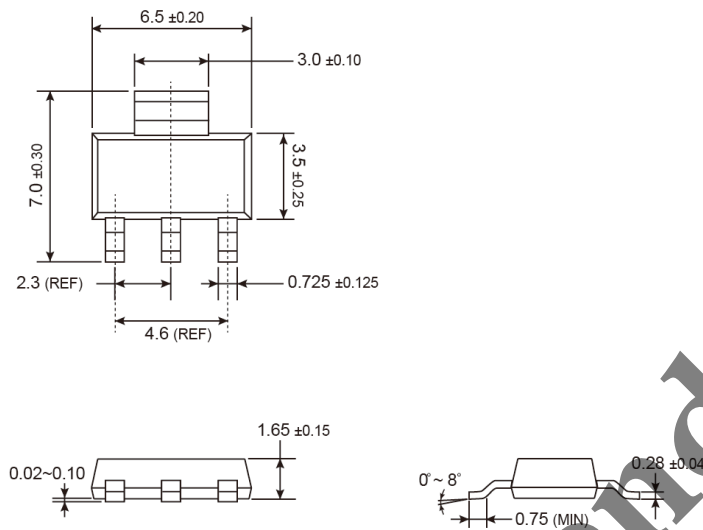


Normalized Thermal Transient Impedance, Junction-to-Ambient

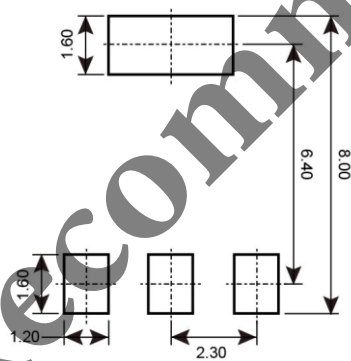


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

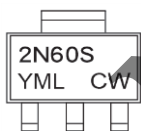
SOT-223



SUGGESTED PAD LAYOUT



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 (1~9, A~Z)

Not Recommended

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