# N-Channel Power MOSFET

800V, 0.3A, 21.6Ω

## FEATURES

- Advanced planar process
- 100% avalanche tested
- Fast switching

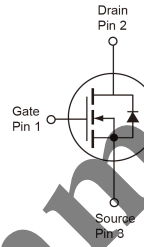
## APPLICATION

- Power Supply
- Lighting

| KEY PERFORMANCE PARAMETERS | | |
|---|---|---|
| **PARAMETER** | **VALUE** | **UNIT** |
| $V_{DS}$ | 800 | V |
| $R_{DS(on)}$ (max) | 21.6 | Ω |
| $Q_g$ | 5 | nC |

Pb-Free RoHS COMPLIANT HALOGEN FREE

**SOT-223**


**Notes:** Moisture sensitivity level: level 3. Per J-STD-020

Not Recommended

| ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C unless otherwise noted) | | | |
|---|---|---|---|
| **PARAMETER** | **SYMBOL** | **LIMIT** | **UNIT** |
| Drain-Source Voltage | $V_{DS}$ | 800 | V |
| Gate-Source Voltage | $V_{GS}$ | ±30 | V |
| Continuous Drain Current | $I_D$ | 0.3 | A |
| Pulsed Drain Current (Note 1) | $I_{DM}$ | 1 | A |
| Single Pulse Avalanche Energy (Note 2) | $E_{AS}$ | 90 | mJ |
| Avalanche Current, Repetitive or Not-Repetitive (Note 1) | $I_{AR}$ | 1 | A |
| Total Power Dissipation @ $T_C$ = 25°C | $P_{DTOT}$ | 2.1 | W |
| 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 Ambient Thermal Resistance | $R_{\Theta JA}$ | 60 | °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 in still air

| ELECTRICAL SPECIFICATIONS ($T_A$ = 25°C unless otherwise noted) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **CONDITIONS** | **SYMBOL** | **MIN** | **TYP** | **MAX** | **UNIT** |
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 1mA | $BV_{DSS}$ | 800 | -- | -- | V |
| Drain-Source On-State Resistance | $V_{GS}$ = 10V, $I_D$ = 0.15A | $R_{DS(ON)}$ | -- | 18 | 21.6 | Ω |
| Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | $V_{GS(TH)}$ | 3 | -- | 5 | V |
| Zero Gate Voltage Drain Current | $V_{DS}$ = 800V, $V_{GS}$ = 0V | $I_{DSS}$ | -- | -- | 25 | μA |
| Gate Body Leakage | $V_{GS}$ = ±30V, $V_{DS}$ = 0V | $I_{GSS}$ | -- | -- | ±10 | μA |
| Forward Transconductance | $V_{DS}$ = 40V, $I_D$ = 0.1A | $g_{fs}$ | -- | 0.36 | -- | S |
| Diode Forward Voltage | $I_S$ = 0.2A, $V_{GS}$ = 0V | $V_{SD}$ | -- | -- | 1.4 | V |
| **Dynamic** (Note 3) | | | | | | |
| Total Gate Charge | $V_{DS}$ = 640V, $I_D$ = 0.3A, $V_{GS}$ = 10V | $Q_g$ | -- | 5 | 6 | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 1 | -- | |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 2 | -- | |
| Input Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1.0MHz | $C_{iss}$ | -- | 155 | 200 | pF |
| Output Capacitance | | $C_{oss}$ | -- | 20 | 26 | |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 2.7 | 4 | |
| **Switching** (Note 4) | | | | | | |
| Turn-On Delay Time | $V_{GS}$ = 10V, $I_D$ = 0.3A, $V_{DS}$ = 400V, $R_G$ = 25Ω | $t_{d(on)}$ | -- | 10 | 30 | ns |
| Turn-On Rise Time | | $t_r$ | -- | 20 | 50 | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 16 | 45 | |
| Turn-Off Fall Time | | $t_f$ | -- | 25 | 60 | |

**Note:**

1. Pulse test: pulse width <=300uS, duty cycle <=2%
2. ($V_{DD}$ = 50V, $I_{AS}$=0.8A, L=170mH, $R_G$=25Ω)
3. For design reference only, not subject to production testing.
4. Switching time is essentially independent of operating temperature.

Not Recommended

## ORDERING INFORMATION

| PART NO. | PACKAGE | PACKING |
|---|---|---|
| TSM1N80CW RPG | SOT-223 | 2,500pcs / 13” Reel |

**Note:**

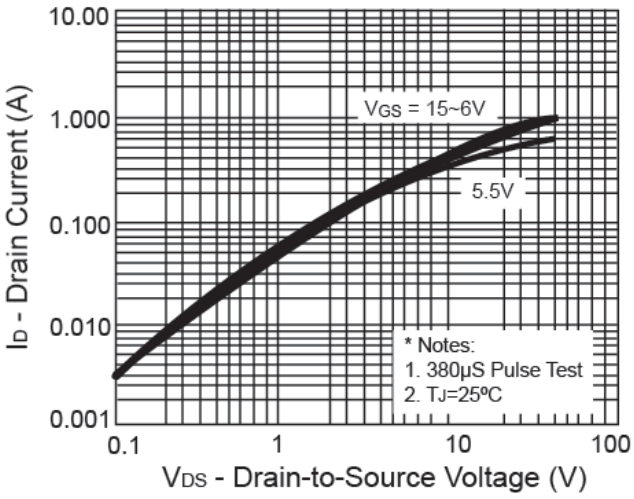
1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

Not Recommended

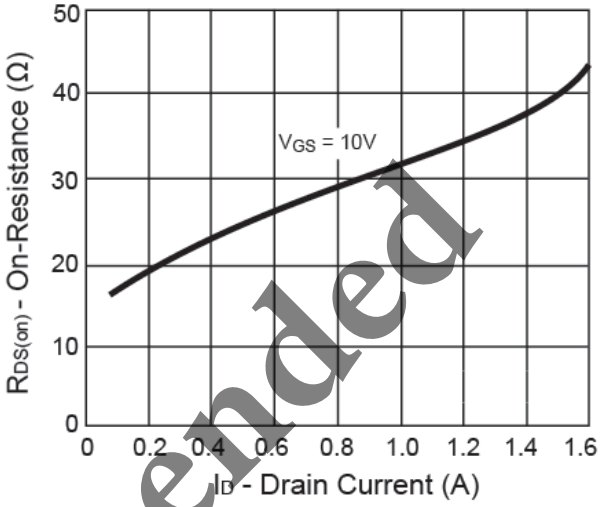
## CHARACTERISTICS CURVES

($T_A$ = 25°C unless otherwise noted)

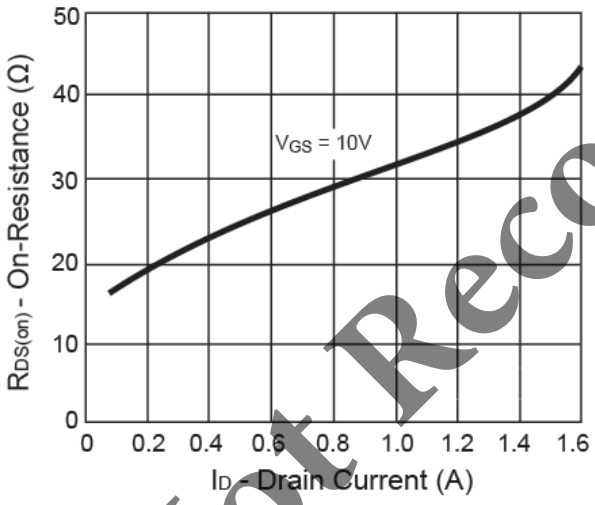
**Output Characteristics**



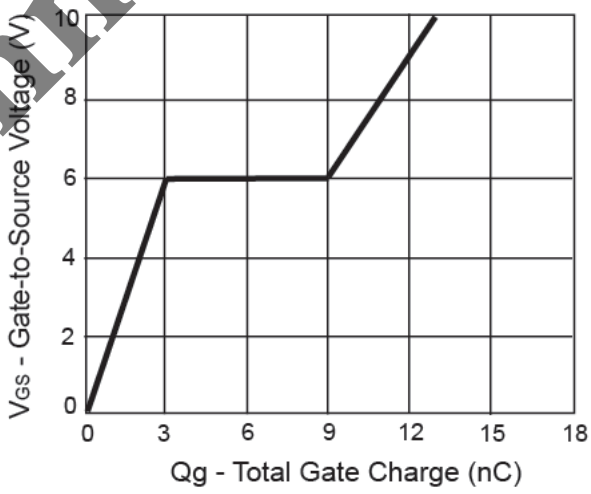

**Transfer Characteristics**



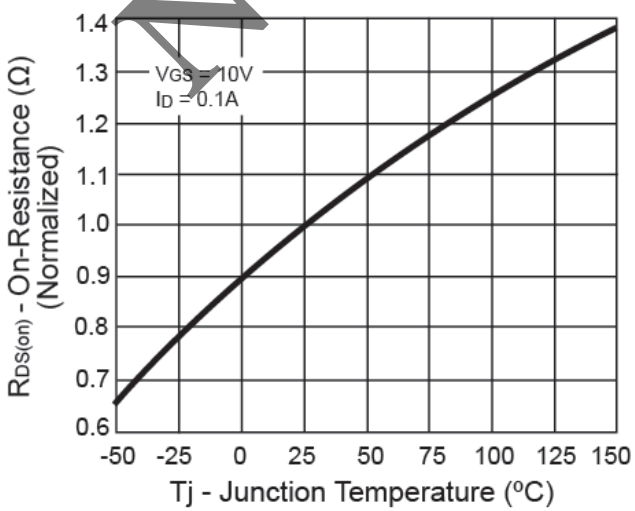

**On-Resistance vs. Drain Current**



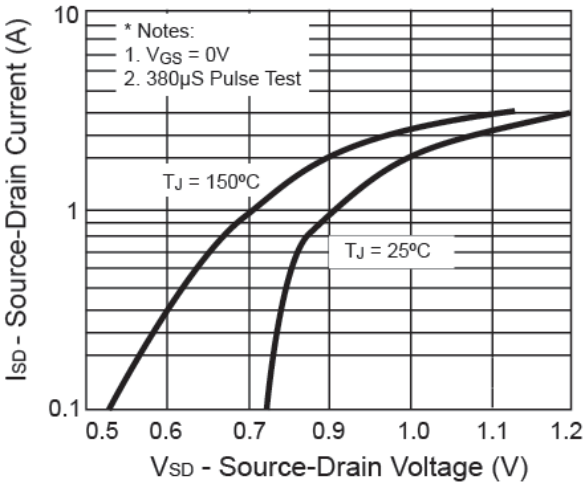

**Gate Charge**




**On-Resistance vs. Junction Temperature**




**Source-Drain Diode Forward Voltage**

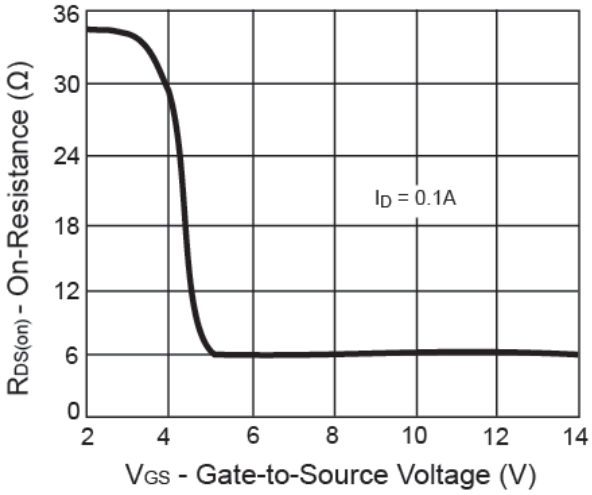



Not Recommended

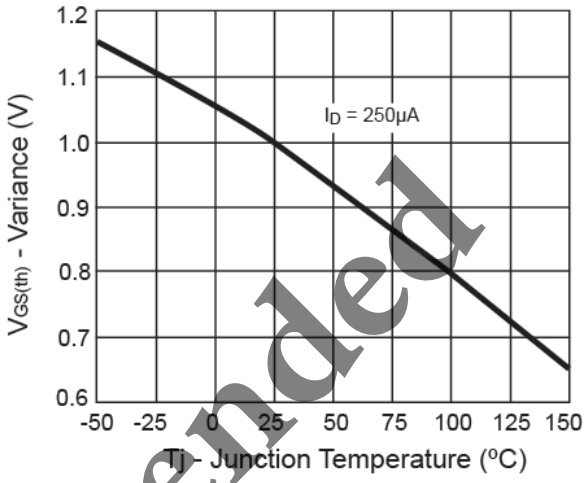
## CHARACTERISTICS CURVES

($T_A$ = 25°C unless otherwise noted)

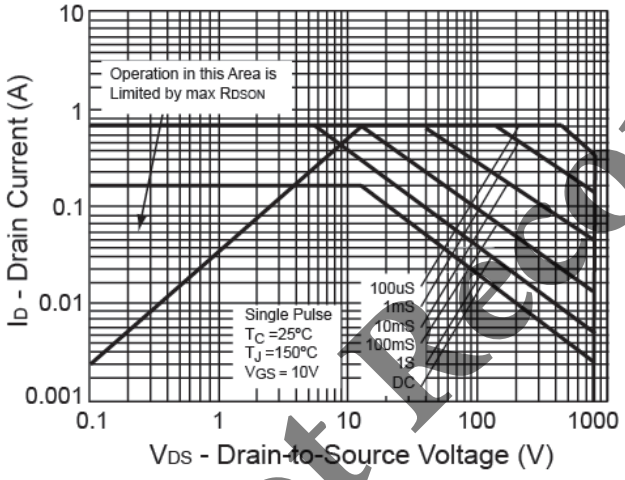
**On-Resistance vs. Gate-Source Voltage**



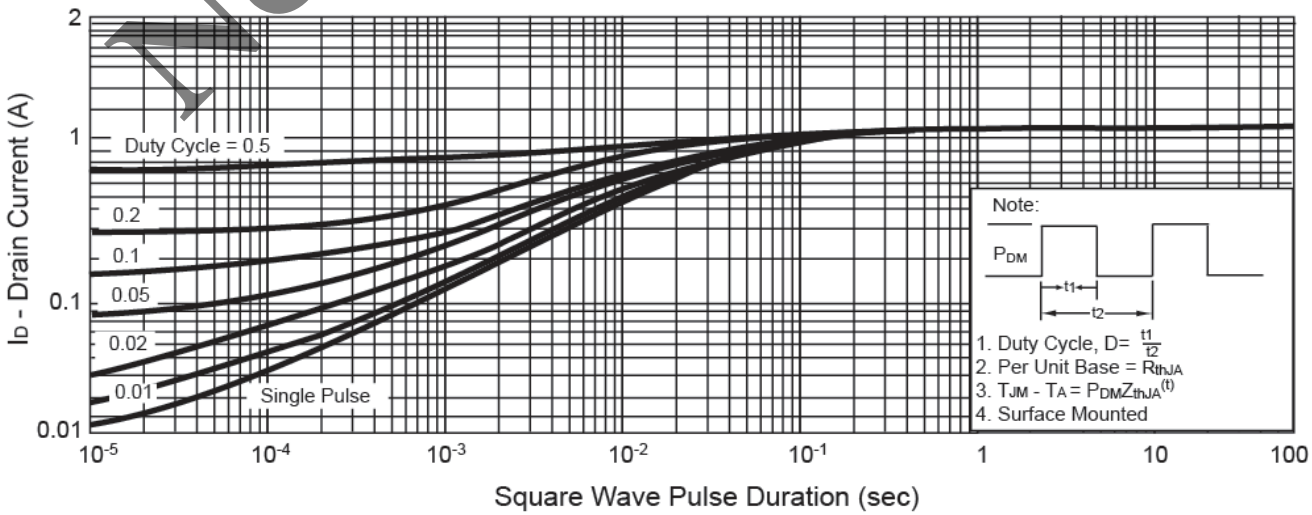

**Threshold Voltage**




**Maximum Safe Operating Area**




**Normalized Thermal Transient Impedance, Junction-to-Ambient**

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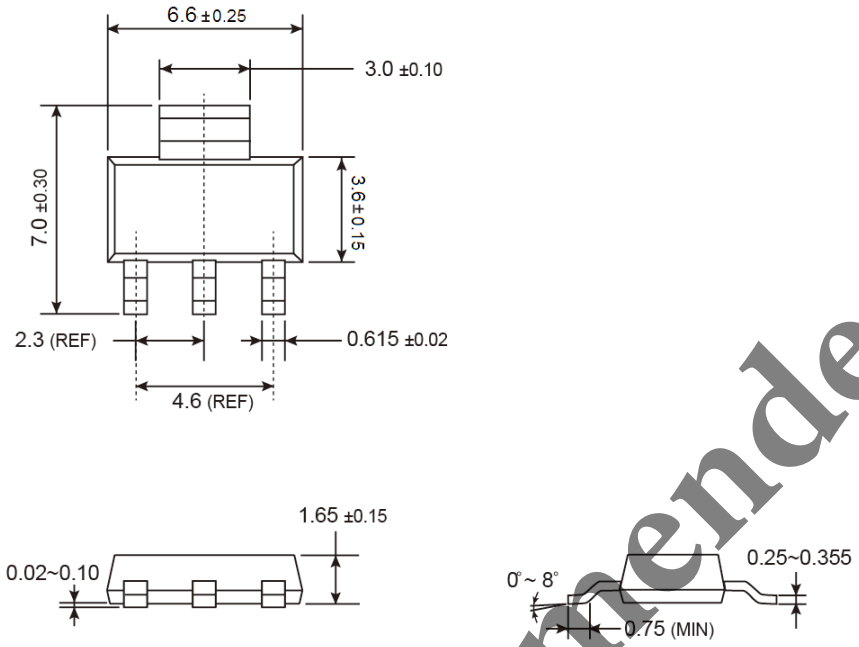
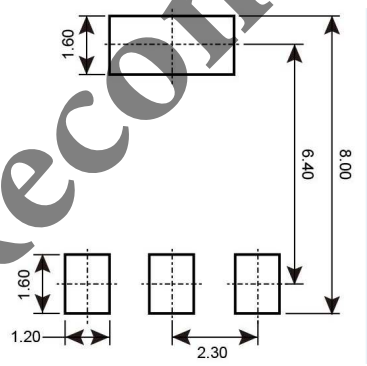
## PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

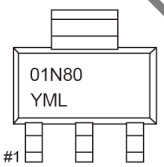
**SOT-223**




## SUGGESTED PAD LAYOUT (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 (1~9, A~Z)

Not Recommended

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