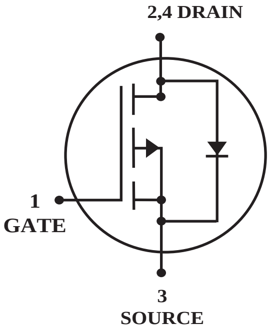
# WTN9575

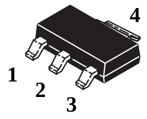
## Surface Mount P-Channel Enhancement Mode Power MOSFET

**Lead(Pb)-Free**



**DRAIN CURRENT**
**-4.0 AMPERES**
**DRAIN SOURCE VOLTAGE**
**-60 VOLTAGE**

**1. GATE**
**2. DRAIN**
**3. SOURCE**
**4. DRAIN**



**SOT-223**

## Features:

- * Super high dense cell design for low $R_{DS}$(ON) $R_{DS}$(ON) < 90mΩ @ $V_{GS}$ = -10V
- * Simple Drive Requirement
- * Lower On-Resistance
- * Fast Switching

## Maximum Ratings (TA=25°C Unless Otherwise Specified)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -60 | V |
| Gate-Source Voltage | $V_{GS}$ | ±25 | V |
| Continuous Drain Current[3] ,VGS@10V($T_A$=25°C)<br>,VGS@10V($T_A$=70°C) | $I_D$ | -4.0<br>-3.2 | A |
| Pulsed Drain Current[1] | $I_{DM}$ | -20 | A |
| Total Power Dissipation($T_A$=25°C) | $P_D$ | 3.0 | W |
| Maximum Junction-ambient[3] | $R_{\theta JA}$ | 45 | °C/W |
| Operating Junction Temperature Range | $T_J$ | +150 | °C |
| Storage Temperature Range | $T_{stg}$ | -55 ~ +150 | °C |

## Device Marking

WTN9575 = 9575

## Electrical Characteristics ($T_A$ = 25°C Unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|

## Static

| | | | | | |
|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage<br>$V_{GS}$ = 0, $I_D$ = -250μA | $V_{(BR)DSS}$ | -60 | - | - | V |
| Gate-Source Threshold Voltage<br>$V_{DS}$ = $V_{GS,}$ $I_D$ = -250μA | $V_{GS(Th)}$ | -1.0 | - | -3.0 | V |
| Gate-Source Leakage Current<br>$V_{GS}$ = ± 25V | $I_{GSS}$ | - | - | ±100 | nA |
| Drain-Source Leakage Current($T_j$=25°C)<br>$V_{DS}$ = -60A, $V_{GS}$ = 0<br>Drain-Source Leakage Current($T_j$=70°C)<br>$V_{DS}$ = -48V, $V_{GS}$ = 0 | $I_{DSS}$ | -<br>- | -<br>- | -1<br>-25 | μA |
| Drain-Source On-Resistance[2]<br>$V_{GS}$ = -10A, $I_D$ = -4.0A<br>$V_{DS}$ = -4.5A, $I_D$ = -3.0A | $R_{DS(ON)}$ | -<br>- | -<br>- | 90<br>120 | mΩ |
| Forward Transconductance<br>$V_{DS}$ = -10A, $I_D$ = -4.0A | $g_{fs}$ | - | 7 | - | S |

## Dynamic

| | | | | | |
|---|---|---|---|---|---|
| Input Capacitance<br>$V_{GS}$ = 0V, $V_{DS}$ = -25V, f = 1.0MHz | $C_{iss}$ | - | 1745 | 2790 | pF |
| Output Capacitance<br>$V_{GS}$ = 0V, $V_{DS}$ = -25V, f = 1.0MHz | $C_{oss}$ | - | 165 | - | |
| Reverse Transfer Capacitance<br>$V_{GS}$ = 0V, $V_{DS}$ = -25V, f = 1.0MHz | $C_{rss}$ | - | 125 | - | |

## Switching

| | | | | | |
|---|---|---|---|---|---|
| Turn-on Delay Time[2]<br>$V_{DS}$=-30V,$V_{GS}$=-10V,$I_D$=-1A,$R_D$=30Ω,$R_G$=3.3Ω | $t_{d(on)}$ | - | 12 | - | ns |
| Rise Time<br>$V_{DS}$=-30V,$V_{GS}$=-10V,$I_D$=-1A,$R_D$=30Ω,$R_G$=3.3Ω | $t_r$ | - | 5 | - | |
| Turn-off Delay Time<br>$V_{DS}$=-30V,$V_{GS}$=-10V,$I_D$=-1A,$R_D$=30Ω,$R_G$=3.3Ω | $t_{d(off)}$ | - | 68 | - | |
| Fall Time<br>$V_{DS}$=-30V,$V_{GS}$=-10V,$I_D$=-1A,$R_D$=30Ω,$R_G$=3.3Ω | $t_f$ | - | 32 | - | |
| Total Gate Charge[2]<br>$V_{DS}$=-48V,$V_{GS}$=-4.5V,$I_D$=-4.0A | $Q_g$ | - | 18 | 28 | nC |
| Gate-Source Charge<br>$V_{DS}$=-48V,$V_{GS}$=-4.5V,$I_D$=-4.0A | $Q_{gs}$ | - | 5.0 | - | |
| Gate-Drain Change<br>$V_{DS}$=-48V,$V_{GS}$=-4.5V,$I_D$=-4.0A | $Q_{gd}$ | - | 7.0 | - | |

## Source-Drain Diode Characteristics

| | | | | | |
|---|---|---|---|---|---|
| Forward On Voltage[2]<br>$V_{GS}$=0V, $I_S$=-2.0A | $V_{SD}$ | - | - | -1.2 | V |
| Reverse Recovery Time<br>$V_{GS}$=0V, $I_S$=-4.0A, dI/dt=100A/µs | $T_{rr}$ | - | 56 | - | ns |
| Reverse Recovery Charge<br>$V_{GS}$=0V, $I_S$=-4.0A, dI/dt=100A/µs | $Q_{rr}$ | - | 146 | - | nC |

Note:
1. Pulse width limited by max, junction temperature.
2. Pulse width ≤ 300µs, duty cycle ≤ 2%.
3. Surface mounted on 1 $in^2$ copper pad of FR4 board; 125°C/W when mounted on Min, copper pad.

## Characteristics Curve

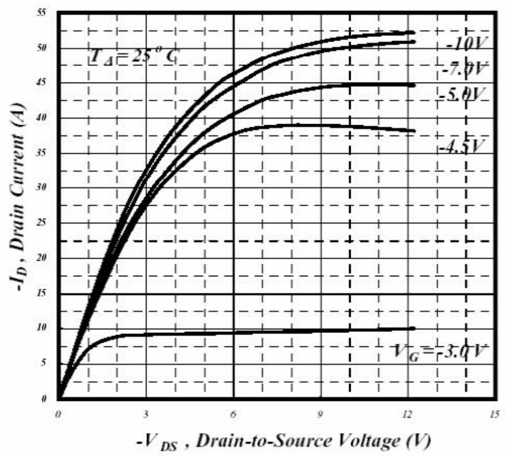


Fig 1. Typical Output Characteristics

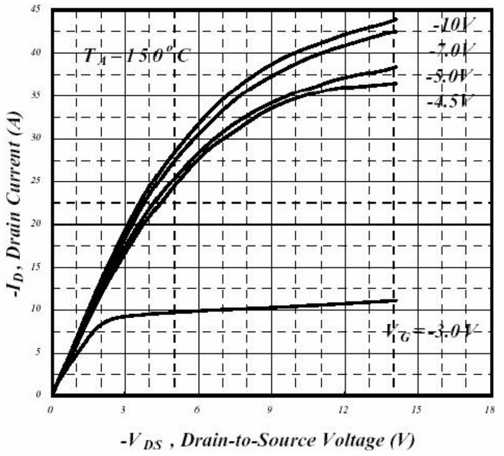


Fig 2. Typical Output Characteristics

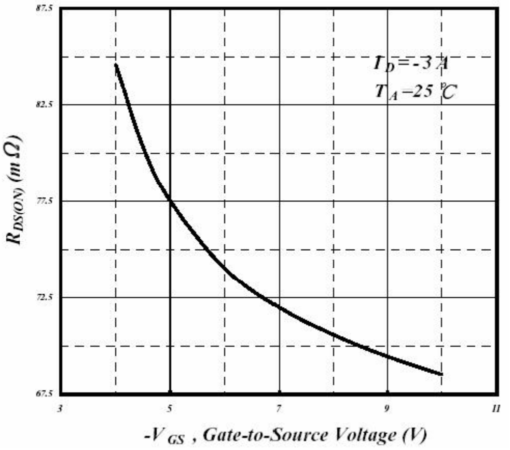


Fig 3. On-Resistance v.s. Gate Voltage

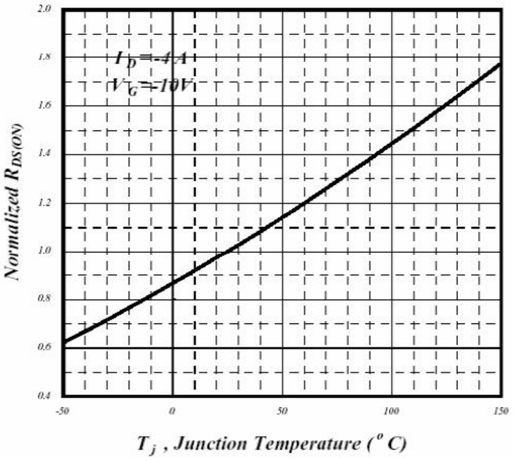


Fig 4. Normalized On-Resistance v.s. Junction Temperature

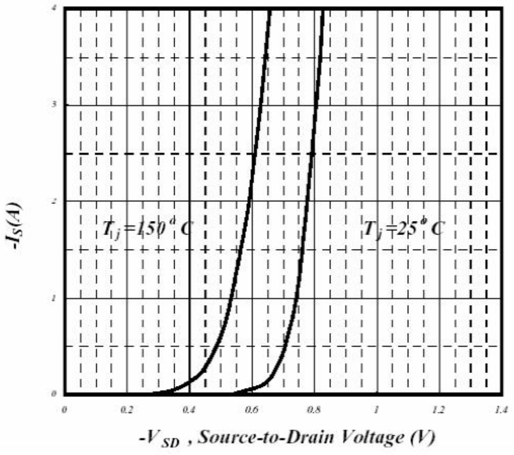


Fig 5. Forward Characteristics of Reverse Diode

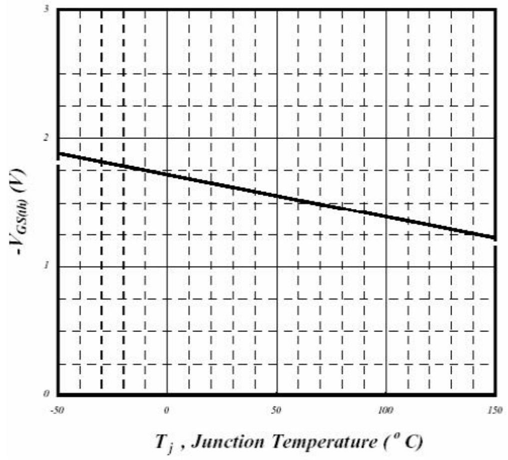


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

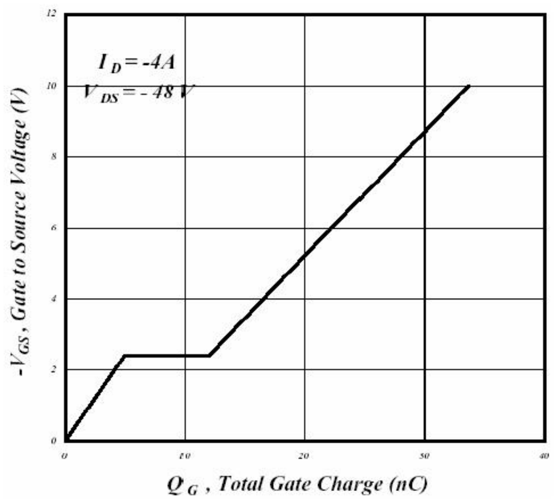


Fig 7. Gate Charge Characteristics

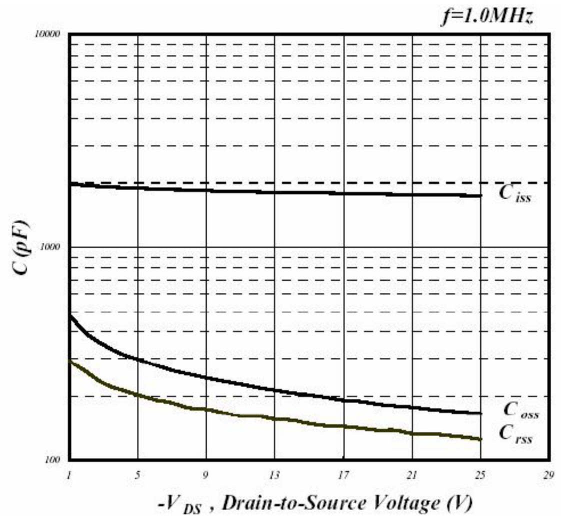


Fig 8. Typical Capacitance Characteristics

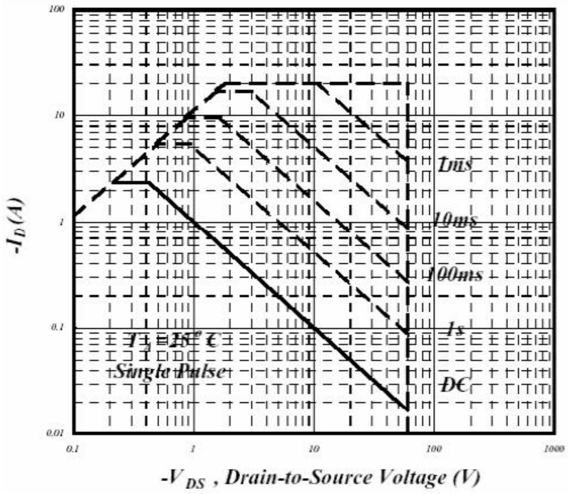


Fig 9. Maximum Safe Operating Area

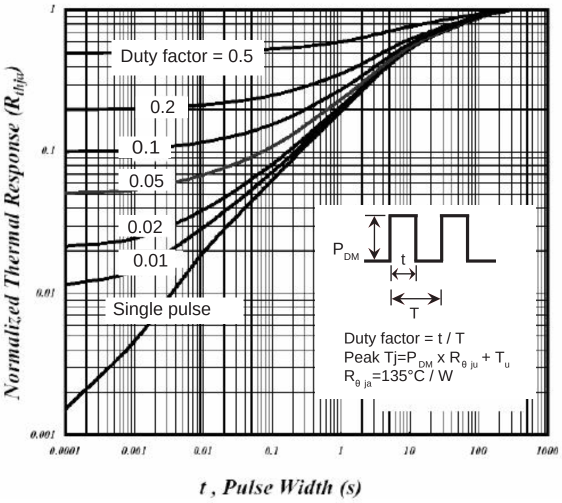


Fig 10. Effective Transient Thermal Impedance

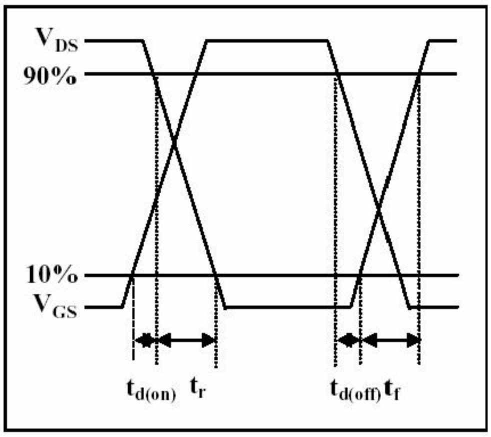


Fig 11. Switching Time Circuit

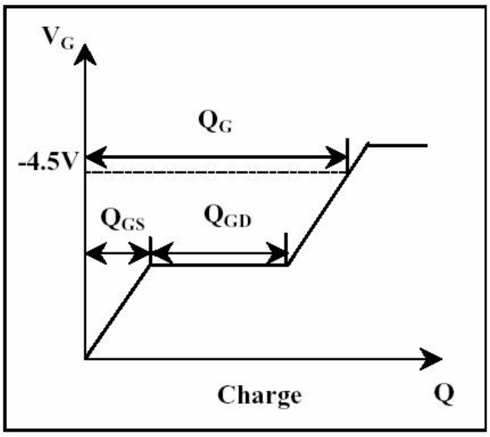
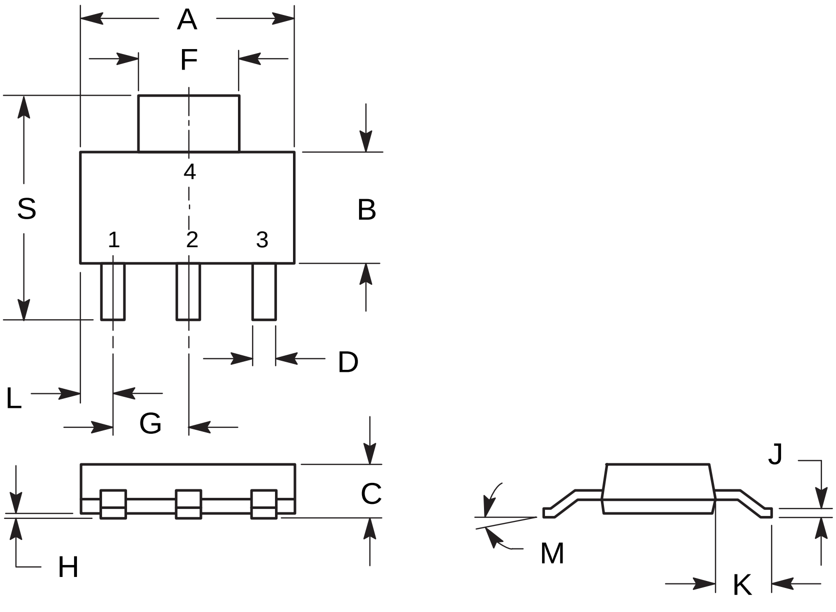


Fig 12. Gate Charge Waveform

## SOT-223 Outline Dimensions

unit:mm



| DIM | MILLIMETERS | |
|---|---|---|
| | MIN | MAX |
| A | 6.30 | 6.70 |
| B | 3.30 | 3.70 |
| C | 1.50 | 1.75 |
| D | 0.60 | 0.89 |
| F | 2.90 | 3.20 |
| G | 2.20 | 2.40 |
| H | 0.020 | 0.100 |
| J | 0.24 | 0.35 |
| K | 1.50 | 2.00 |
| L | 0.85 | 1.05 |
| M | 0° | 10° |
| S | 6.70 | 7.30 |