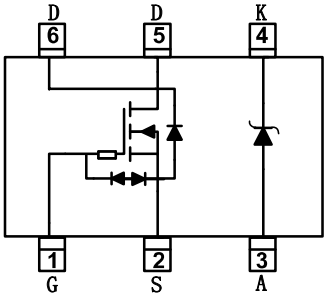
## WNM2310

**Integrated N-Channel Power MOSFET**
**And Schottky Barrier Diode**

Http://www.sh-willsemi.com

**SOT-563B**

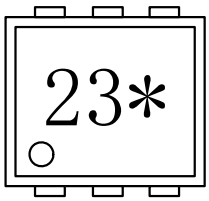
| MOSFET | |
|---|---|
| $V_{DS}$ (V) | Rds(on) (Ω) |
| 20 | 0.380@ $V_{GS}$=4.5V |
| | 0.520@ $V_{GS}$=2.5V |
| | 0.735@ $V_{GS}$=1.8V |
| ESD Protected | |
| **Schoottky Barrier Diode** | |
| $V_R$（V） | Typical $V_F$（V） |
| 30 | 0.37@0.1A |




**Pin configuration (Top view)**

## Descriptions

The WNM2310 is N-Channel enhancement MOS Field Effect Transistor and Schottky Diode as a single package for switching. Uses advanced trench technology and design to provide excellent $R_{DS\ (ON)}$ with low gate charge. Standard Product WNM2310 is Pb-free and Halogen-free.




23= Device Code
* = Month (A~Z)

**Marking**

## Features

- Small package SOT-563B
- Featuring a MOSFET and Schottky Barrier Diode
- Excellent ON resistance for higher DC current
- Low leakage current Schottky Barrier Diode

## Applications

- Driver: Relay, Solenoid, Lamps,Hammers etc.
- Power supply converters circuit
- Load/Power Switching for potable device

## Order information

| Device | Package | Shipping |
|---|---|---|
| WNM2310-6/TR | SOT-563B | 10000/Reel&Tape |

## Absolute Maximum ratings (N-Channel,$T_A$=25°C unless otherwise noted)

| Parameter | | Symbol | 10 S | Steady State | Unit |
|---|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 20 | | V |
| Gate-Source Voltage | | $V_{GS}$ | ±10 | | |
| Continuous Drain Current [a d] | $T_A$=25°C | $I_D$ | 0.59 | 0.54 | A |
| | $T_A$=70°C | | 0.47 | 0.43 | |
| Maximum Power Dissipation [a d] | $T_A$=25°C | $P_D$ | 0.38 | 0.32 | W |
| | $T_A$=70°C | | 0.25 | 0.20 | |
| Continuous Drain Current [b d] | $T_A$=25°C | $I_D$ | 0.51 | 0.46 | A |
| | $T_A$=70°C | | 0.41 | 0.37 | |
| Maximum Power Dissipation [b d] | $T_A$=25°C | $P_D$ | 0.28 | 0.23 | W |
| | $T_A$=70°C | | 0.18 | 0.15 | |
| Pulsed Drain Current [c] | | $I_{DM}$ | 1.00 | | A |
| Operating Junction Temperature | | $T_J$ | -55 to 150 | | °C |
| Lead Temperature | | $T_L$ | 260 | | °C |
| Storage Temperature Range | | $T_{stg}$ | -55 to 150 | | °C |

## Absolute Maximum ratings (Schottky,$T_A$=25°C unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Reverse Voltage (repetitive peak) | $V_{RM}$ | 30 | V |
| Reverse Voltage (DC) | $V_R$ | 30 | V |
| Average Rectified Forward Current | $I_F$ | 0.1 | A |
| Peak Forward Surge Current (8.3ms single sine pluse) | $I_{FSM}$ | 0.5 | A |
| Junction Temperature | $T_J$ | -40 ~ 150 | °C |
| Operating Temperature | $T_{opr}$ | -40 ~ 125 | °C |
| Storage Temperature | $T_{stg}$ | -55 ~150 | °C |

## Thermal resistance ratings

| Parameter | | Symbol | Typical | Maximum | Unit |
|---|---|---|---|---|---|
| Junction-to-Ambient Thermal Resistance [a] | t ≤ 10 s | $R_{\theta JA}$ | 275 | 325 | °C/W |
| | Steady State | | 330 | 395 | |
| Junction-to-Ambient Thermal Resistance [b] | t ≤ 10 s | $R_{\theta JA}$ | 375 | 440 | |
| | Steady State | | 445 | 535 | |
| Junction-to-Case Thermal Resistance | Steady State | $R_{\theta JC}$ | 250 | 290 | |

a Surface mounted on FR-4 Board using 1 square inch pad size, 1oz copper

b Surface mounted on FR-4 board using minimum pad size, 1oz copper

c Pulse width<380μs, Duty Cycle<2%

d Maximum junction temperature $T_J$=150°C.

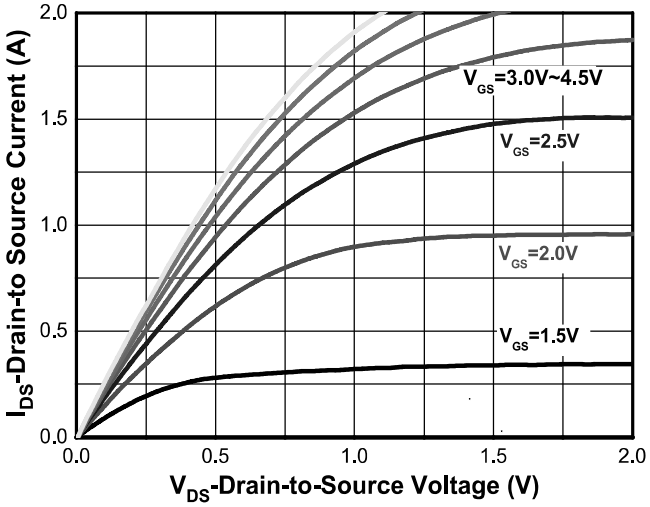
## Electronics Characteristics (Ta=25°C, unless otherwise noted)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Drain-to-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250uA | 20 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$ = 16V, $V_{GS}$ = 0V | | | 1 | uA |
| Gate-to-source Leakage Current | $I_{GSS}$ | $V_{DS}$ = 0 V, $V_{GS}$ = ±10V | | | ±5 | uA |
| **ON CHARACTERISTICS** | | | | | | |
| Gate Threshold Voltage | $V_{GS(TH)}$ | $V_{GS}$ = $V_{DS}$, $I_D$ = 250uA | 0.45 | 0.70 | 1.0 | V |
| Forward Transconductance | $g_{FS}$ | $V_{DS}$ = 10V, $I_D$ = 0.35A | | 1.0 | | S |
| Drain-to-source On-resistance [b, c] | $R_{DS(on)}$ | $V_{GS}$ = 4.5V, $I_D$ = 0.55A | | 380 | 550 | mΩ |
| | | $V_{GS}$ = 2.5V, $I_D$ = 0.20A | | 520 | 700 | |
| | | $V_{GS}$ = 1.8V, $I_D$ = 0.20A | | 735 | 1200 | |
| **CAPACITANCES, CHARGES** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{GS}$ = 0 V, f = 1MHz, $V_{DS}$ = 10 V | | 30 | | pF |
| Output Capacitance | $C_{OSS}$ | | | 7 | | |
| Reverse Transfer Capacitance | $C_{RSS}$ | | | 5 | | |
| Total Gate Charge | $Q_{G(TOT)}$ | $V_{GS}$ = 4.5 V, $V_{DS}$ = 10 V, $I_D$ = 0.54A | | 1.07 | | nC |
| Threshold Gate Charge | $Q_{G(TH)}$ | | | 0.12 | | |
| Gate-to-Source Charge | $Q_{GS}$ | | | 0.32 | | |
| Gate-to-Drain Charge | $Q_{GD}$ | | | 0.14 | | |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Turn-On Delay Time | td(ON) | $V_{GS}$ = 4.5 V, $V_{DD}$ = 10 V, $I_D$= 0.54 A, $R_G$= 6 Ω | | 7.2 | | ns |
| Rise Time | tr | | | 9.5 | | |
| Turn-Off Delay Time | td(OFF) | | | 19.6 | | |
| Fall Time | tf | | | 4.6 | | |
| **BODY DIODE CHARACTERISTICS** | | | | | | |
| Forward Voltage | $V_{SD}$ | $V_{GS}$ = 0 V, $I_S$ = 0.3A | | 0.85 | 1.5 | V |

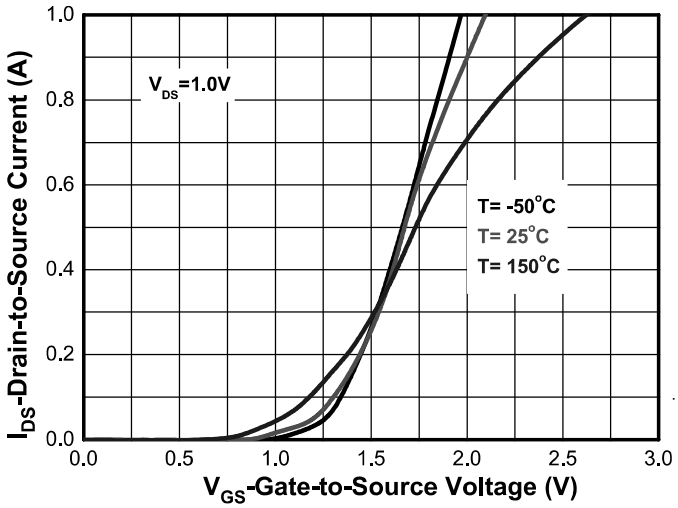
**SCHOTTKY BARRIER DIODE CHARACTERISTICS**

| | | | | | | |
|---|---|---|---|---|---|---|
| Reverse Breakdown Voltage | $V_R$ | $I_R$=100uA | 30 | | | V |
| Forward Voltage | $V_F$ | $I_F$=10mA | | 0.28 | 0.35 | V |
| | | $I_F$=100mA | | 0.37 | 0.42 | V |
| Reverse Current | $I_R$ | $V_R$=10V | | 1.5 | 6 | uA |
| | | $V_R$=30V | | 3.0 | 15 | uA |
| Diode Capacitance | $C_D$ | $V_R$=5V,F=1MHz | | 21 | | pF |

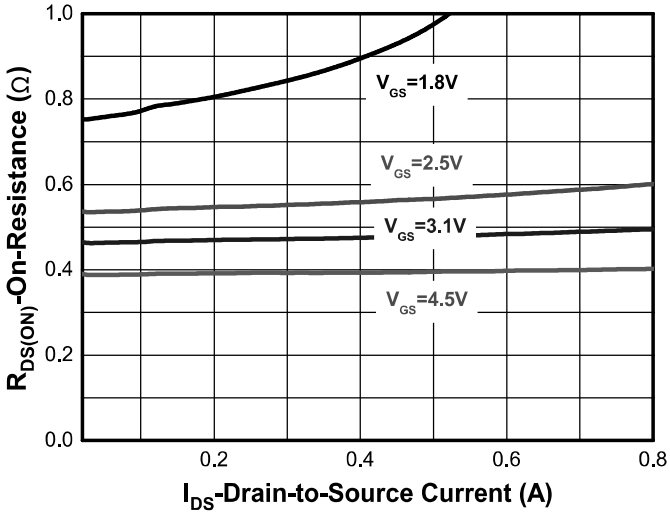
## Typical Characteristics (Ta=25°C, unless otherwise noted)



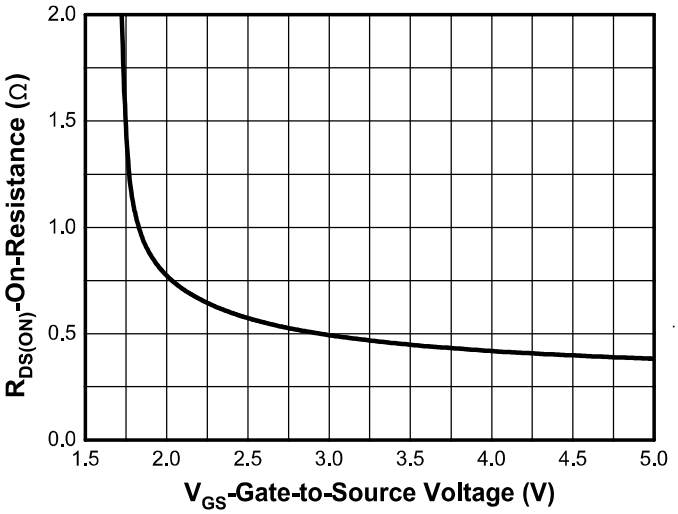

Output Characteristics



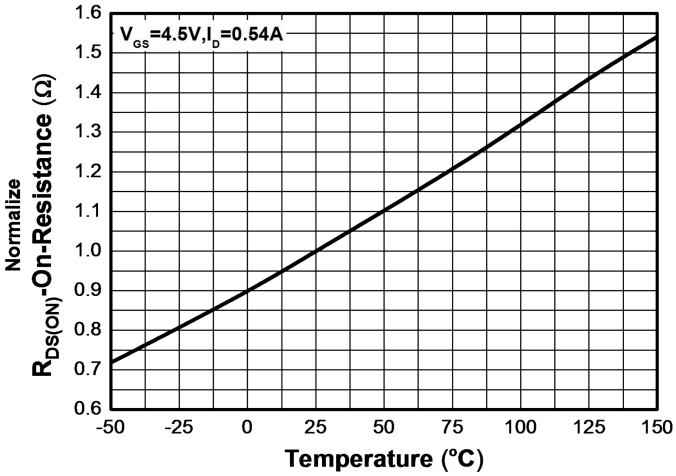

Transfer Characteristics



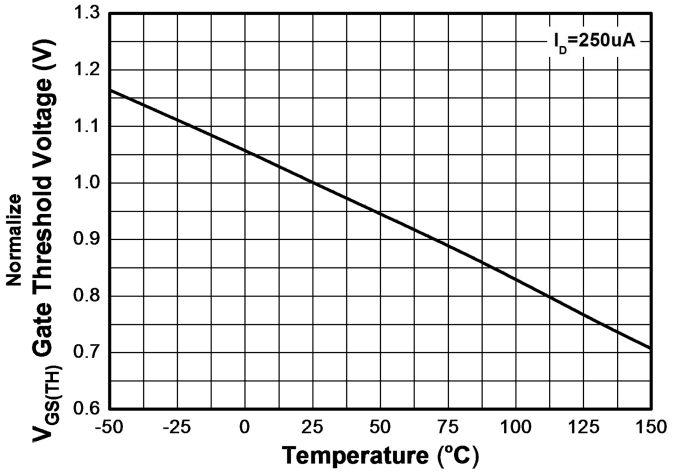

On Resistance vs. Drain Current



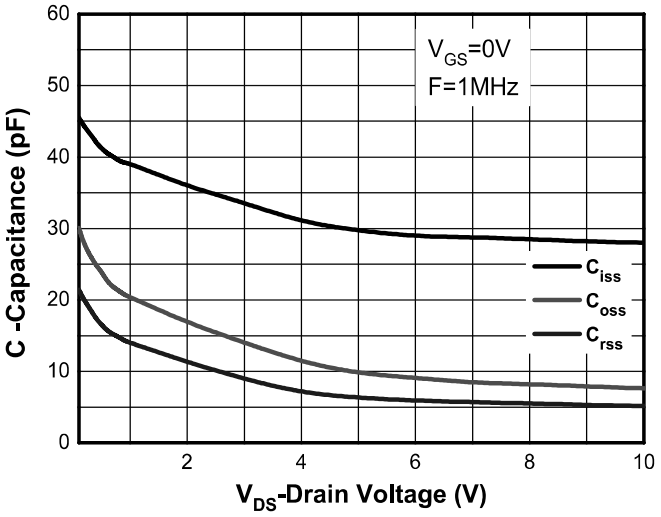

On Resistance vs. Gate-to-Source Voltage



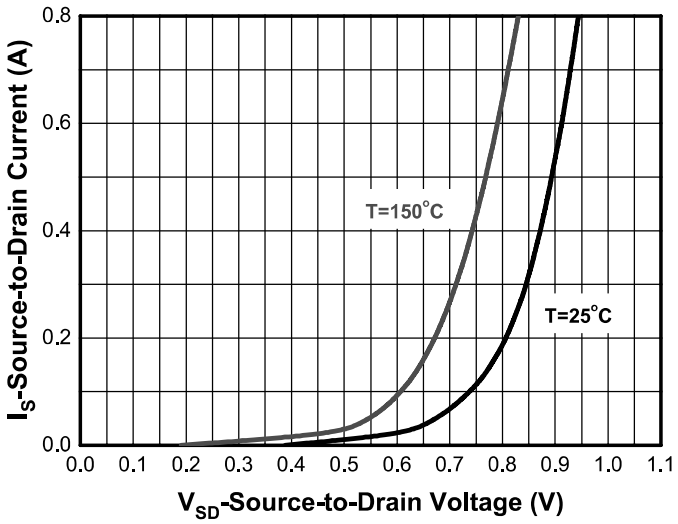

On Resistance vs. Junction Temperature



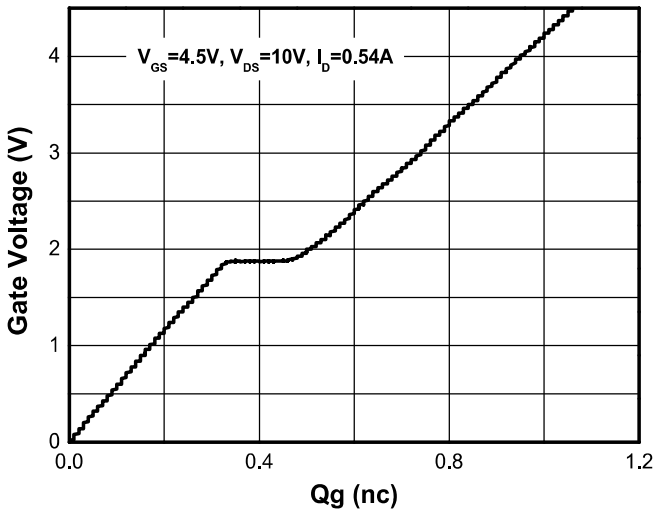

Threshold Voltage vs. Temperature



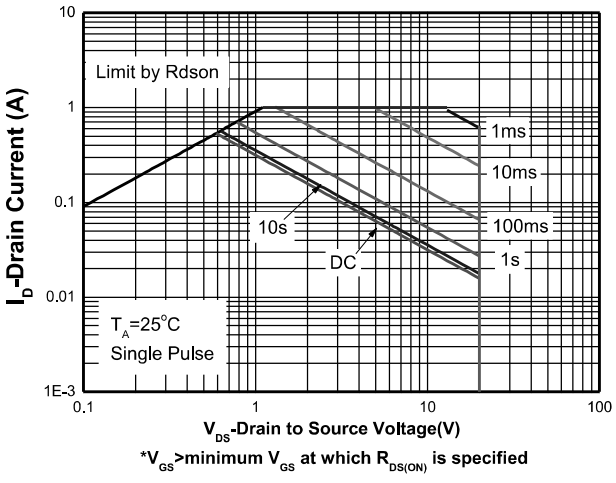

**Capacitance**



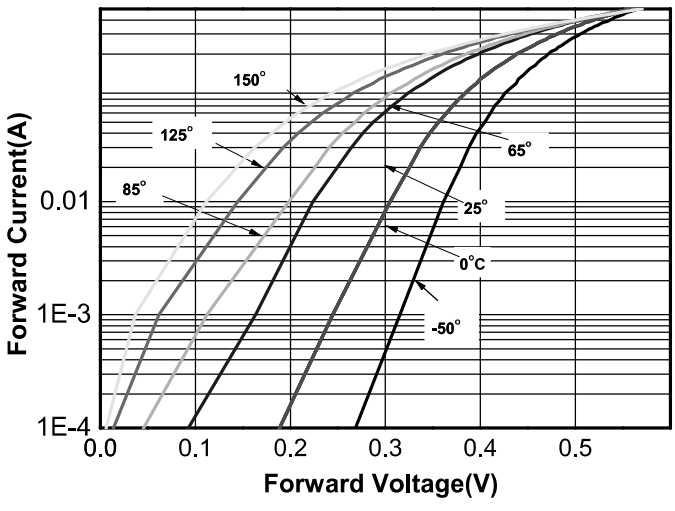

**Body Diode Forward Voltage**



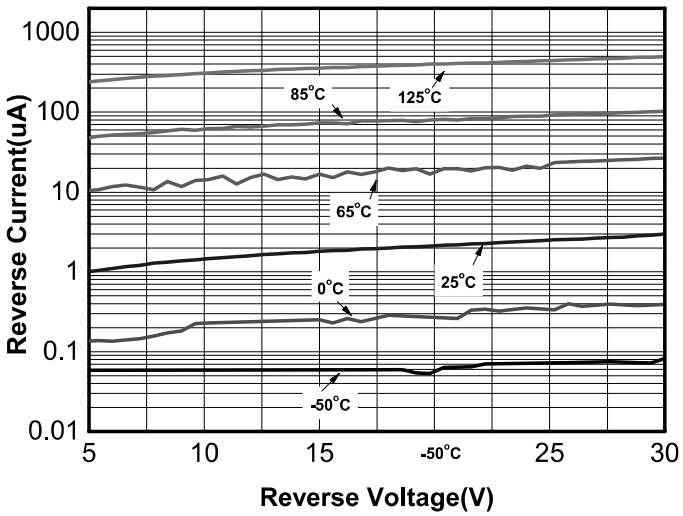

**Gate Charge Characteristics**



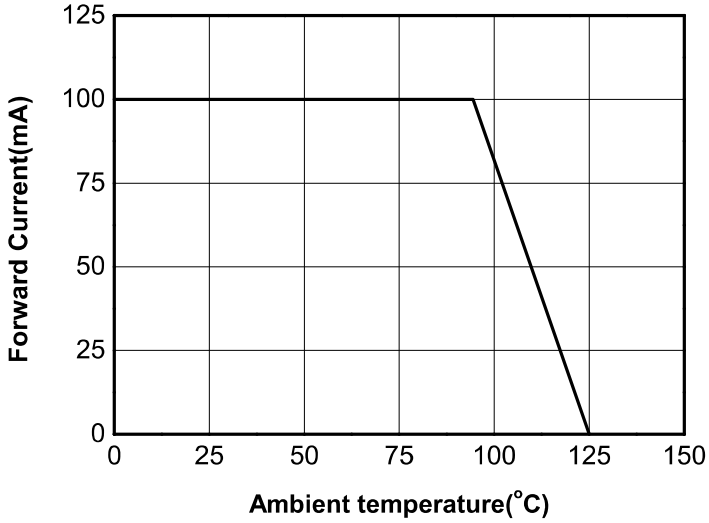

**Safe Operating Power**

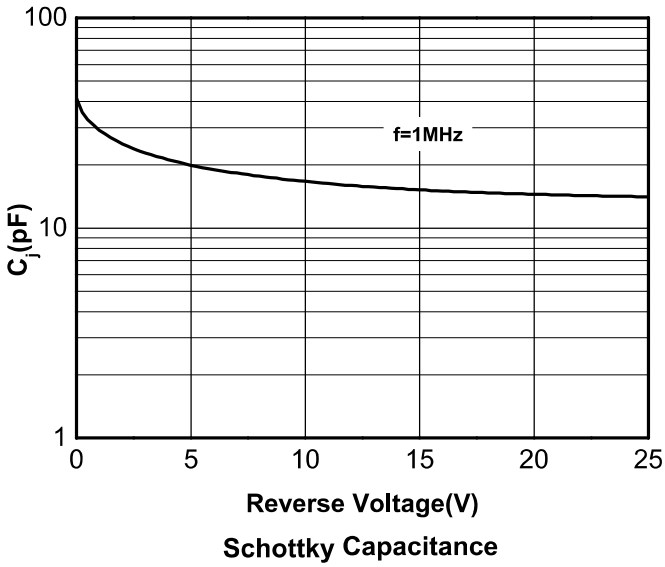



**Schottky Diode Forward current**

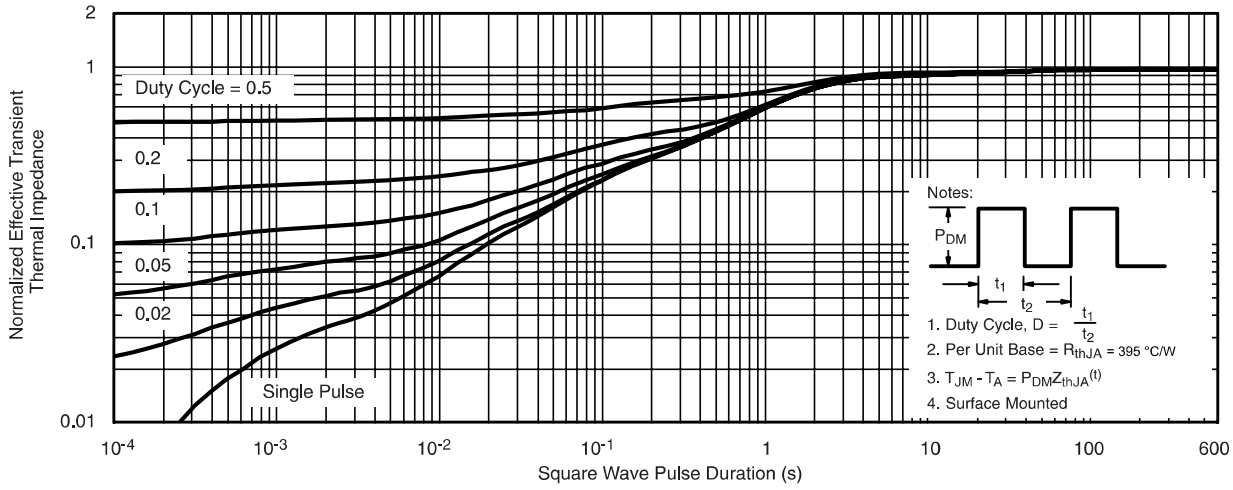



**Schottky Diode Reverse current**




Schottky Capacitance




**Transient thermal response (Junction-to-Ambient)**

## Package outline dimensions

**SOT-563B**