# VUSA010R390NA

# Datasheet

# 39mΩ, 100V, N-Channel Power MOSFET VUSA010R390NA

## General Description

| $V_{(BR)DSS}$ | $R_{DS(ON)\_max}$ | $I_D$ |
|---|---|---|
| 100V | 39mΩ@10V | 7A |
| | 42mΩ@6V | |
| | 46mΩ@4.5V | |

## Symbol

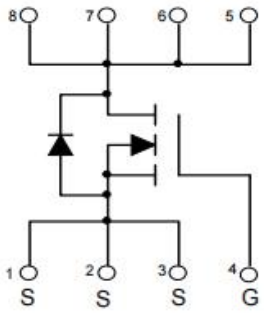
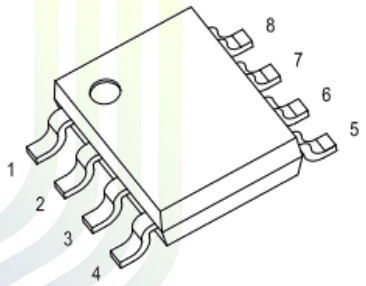



Figure 1 Symbol of VUSA010R390NA

## Features

- High density cell design for ultra low $R_{DS(ON)}$
- Excellent package for good heat dissipation

## Package Type




SOP8

Figure 2 Package Type of VUSA010R390NA

## Application

- Power Switch Application
- Hard switched and high frequency circuits
- Uninterruptible power supply

## Ordering Information

| Product Name | Package |
|---|---|
| VUSA010R390NA | SOP8 |

## Absolute Maximum Ratings ($T_A$= 25 ºC, unless otherwise specified)

| Parameter | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 100 | V |
| Gate-Source Voltage | $V_{GSS}$ | ±20 | V |
| Continuous Drain Current[Note1] | $I_D$ | 7 | A |
| Pulsed Drain Current [Note2] | $I_{DM}$ | 28 | |
| Avalanche Current[Note3] | $I_{AS}$ | 35 | |
| Single Pulsed Avalanche Energy[Note3] | $E_{AS}$ | 306 | mJ |
| Total Power Dissipation[Note5] | $P_D$ | 1.7 | W |
| Junction Temperature | $T_J$ | 150 | ºC |
| Storage Temperature | $T_{STG}$ | -55 to 150 | ºC |

## Thermal Resistance

| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Thermal Resistance, Junction-to-Ambient[Note6] | $R_{\theta JA}$ | | 75 | | ºC/W |

## Electrical Characteristics ($T_J$= 25 ºC, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Statistic Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$= 250uA | 100 | | | V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$= 100V, $V_{GS}$=0V | | | 1 | uA |
| Gate-Body Leakage Current | $I_{GSS}$ | $V_{GS}$ = ±20V, $V_{DS}$= 0V | | | ±100 | nA |
| Gate Threshold Voltage[Note4] | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1.0 | 1.7 | 2.5 | V |
| Static Drain-Source On-Resistance[Note4] | $R_{DS(ON)}$ | $V_{GS}$=10V, $I_D$= 6A | | 26 | 39 | mΩ |
| | | $V_{GS}$=6V, $I_D$= 5A | | 28 | 42 | |
| | | $V_{GS}$=4.5V, $I_D$= 4A | | 31 | 46 | |
| Forward Transconductance[Note4] | $g_{FS}$ | $V_{DS}$=5V, $I_D$= 6A | | 35 | | S |
| **Dynamic Characteristics** | | | | | | |
| Input Capacitance | $C_{ISS}$ | $V_{DS}$=20V | | 2249 | | pF |
| Output Capacitance | $C_{OSS}$ | $V_{GS}$=0V | | 87.7 | | pF |
| Reverse Transfer Capacitance | $C_{RSS}$ | f=1MHz | | 82.8 | | pF |
| Total Gate Charge | $Q_g$ | $V_{DS}$=50V | | 57.7 | | nC |
| Gate-Source Charge | $Q_{gs}$ | $V_{GS}$=10V | | 16.7 | | |
| Gate-Drain Charge | $Q_{gd}$ | $I_D$= 6A | | 6.0 | | |
| Gate Resistance | Rg | f = 1MHz, Open drain | | 1.6 | | Ω |
| **Switching Parameters** | | | | | | |
| Turn-on Delay Time | $t_{d(on)}$ | $V_{DD}$= 50V | | 7 | | ns |
| Turn-on Rise Time | $t_r$ | $V_{GS}$= 10V | | 7 | | |
| Turn-off Delay Time | $t_{d(off)}$ | $R_L$=3Ω | | 28 | | |
| Turn-off Fall Time | $t_f$ | $R_G$=8.3Ω | | 7 | | |
| **Diode Characteristics** | | | | | | |
| Diode Forward Voltage [Note4] | $V_{SD}$ | $V_{GS}$=0V, $I_S$= 6A | | | 1.2 | V |

Notes :

1.The maximum current rating is limited by package.And device mounted on a large heatsink.

2.Pulse Test : Pulse Width ≤ 10μs, duty cycle ≤ 1%.

3.$E_{AS}$ condition: $V_{DD}$ = 50V, $V_{GS}$ = 10V, L = 0.5mH, $R_G$=25Ω Starting $T_J$ = 25°C.

4.Pulse Test : Pulse Width ≤ 380μs, duty cycle ≤ 2%.

5.The power dissipation $P_D$ is limited by $T_{J(MAX)}$ = 150°C.And device mounted on a large heatsink

6.Device mounted on 1in2 FR-4 board with 1oz. Copper, in a still air environment with $T_A$ =25°C.

# Typical Performance Characteristics

Figure 3: Transfer Characteristics

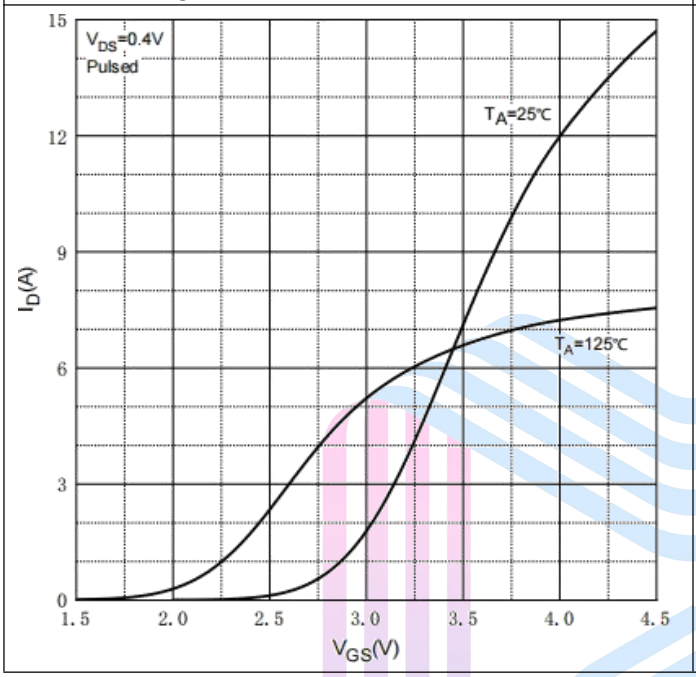



Figure 4: Output Characteristics

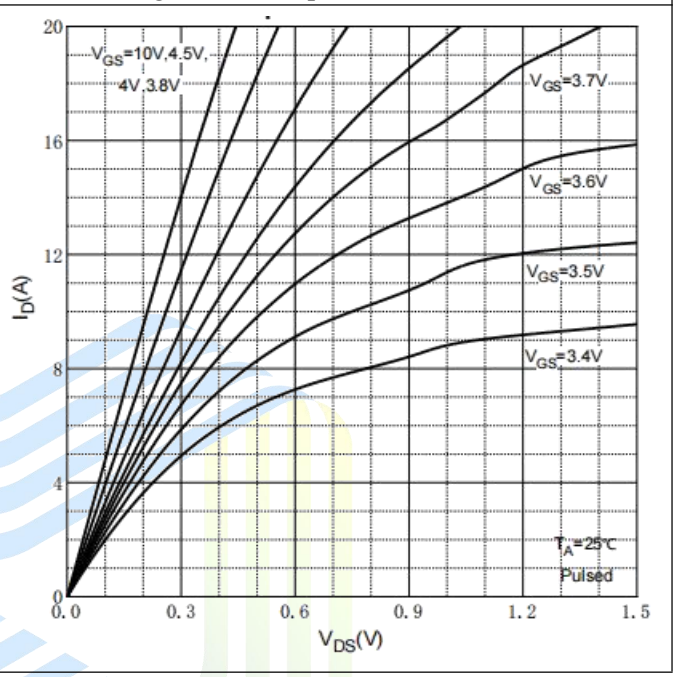



Figure 5: On-Resistance vs. Drain Current

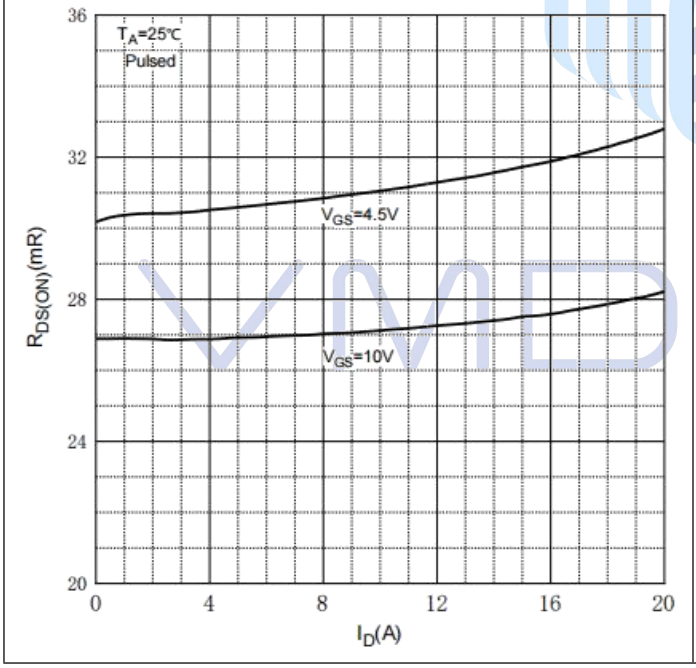



Figure 6: On-Resistance vs. Gate Voltage

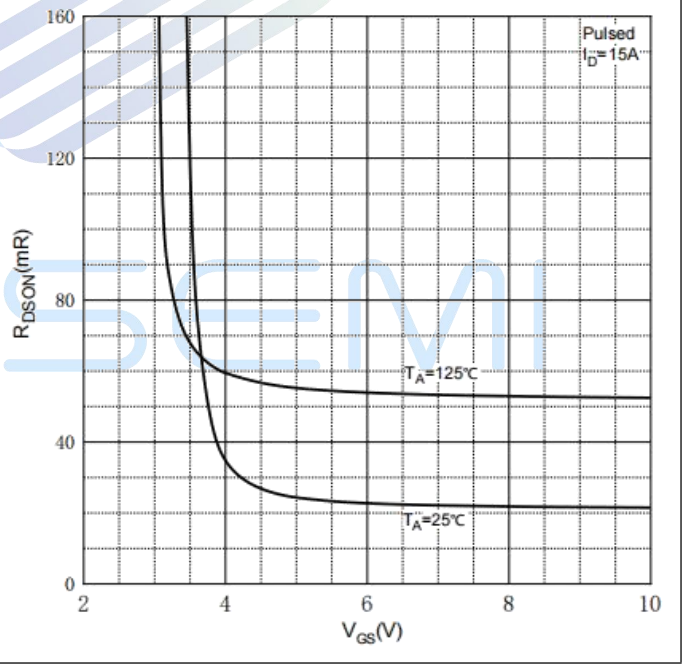


Figure 7: Body Diode Characteristics

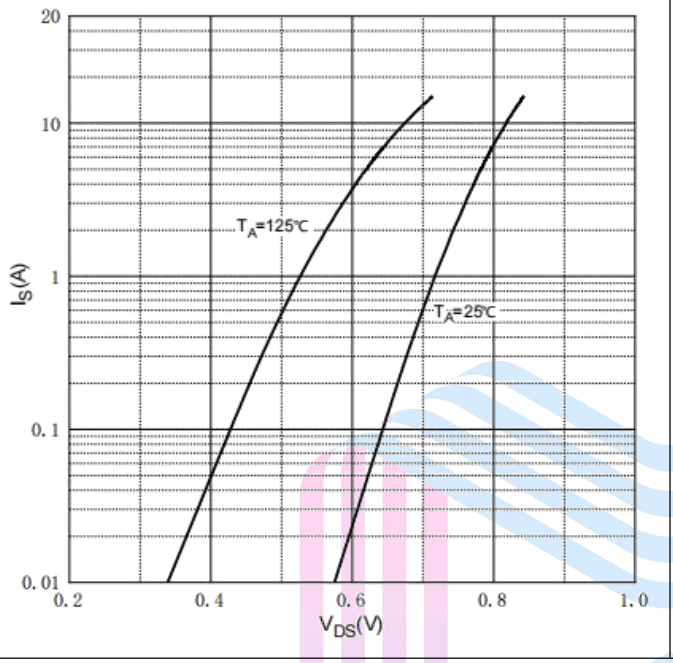
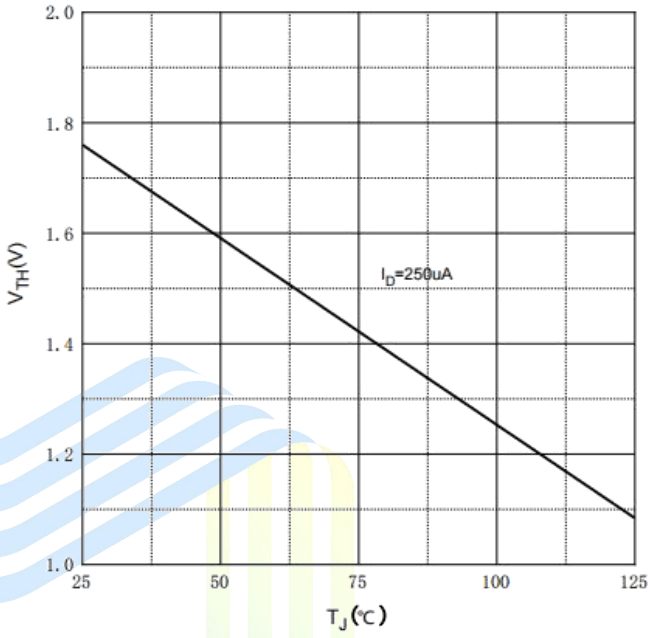
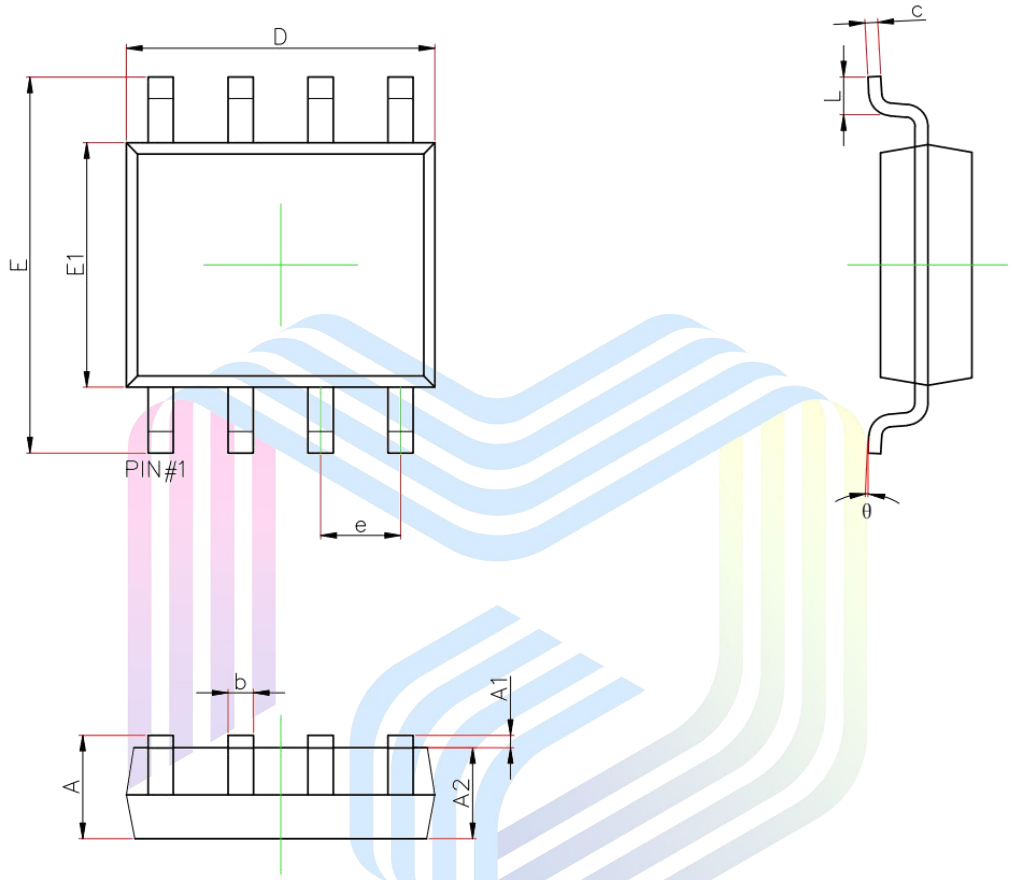



Figure 8: Threshold Voltage



# Mechanical Dimensions:

**SOP8 Package Information**




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.156 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.201 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.700 | 4.100 | 0.146 | 0.161 |
| L | 0.400 | 1.270 | 0.016 | 0.05 |
| θ | 0° | 8° | 0° | 8° |

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