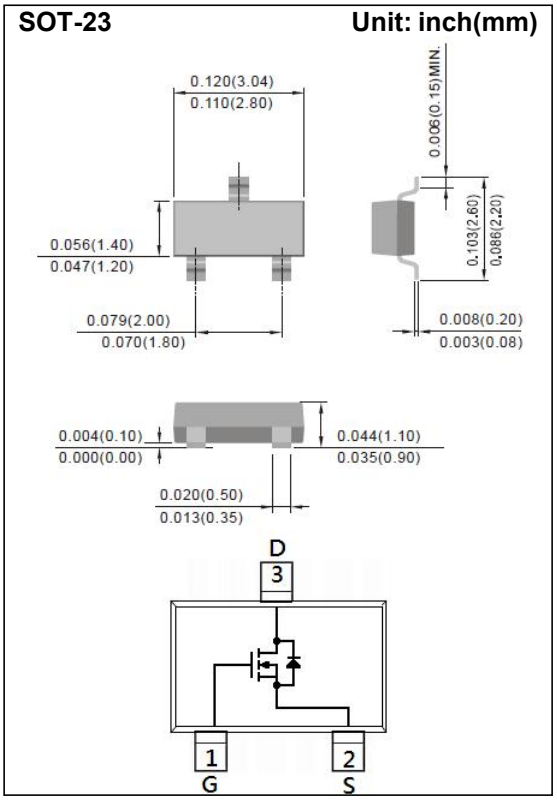
CAN CIRCLE SEMI

# CSM312N4S23

## 30V N-Channel Enhancement Mode MOSFET

| Voltage | 30 V | Current | 4 A |
|---|---|---|---|




## Features

- $R_{DS(ON)}$ , $V_{GS}$@10V, $I_D$@4.0A<45mΩ
- $R_{DS(ON)}$ , $V_{GS}$@4.5V, $I_D$@3.6A<53mΩ
- $R_{DS(ON)}$ , $V_{GS}$@2.5V, $I_D$@2.5A<66mΩ
- $R_{DS(ON)}$ , $V_{GS}$@1.8V, $I_D$@1.5A<92mΩ
- Advanced Trench Process Technology
- Specially Designed for Switch Load, PWM Application, etc

## Mechanical Data

- Case : SOT-23 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.0003 ounces, 0.0084 grams

## Maximum Ratings and Thermal Characteristics ($T_A$=25°C unless otherwise noted)

| PARAMETER | | SYMBOL | LIMIT | UNITS |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±12 | V |
| Continuous Drain Current | | $I_D$ | 4.0 | A |
| Pulsed Drain Current | | $I_{DM}$ | 16.0 | A |
| Power Dissipation | $T_a$=25°C | $P_D$ | 1.25 | W |
| | Derate above 25°C | | 10 | mW/ °C |
| Operating Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55~150 | °C |
| Typical Thermal resistance<br>- Junction to Ambient (Note 3) | | $R_{\theta JA}$ | 100 | °C/W |

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

| PARAMETER | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=250uA | 30 | - | - | V |
| Gate Threshold Voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 0.4 | 0.72 | 1.2 | V |
| Drain-Source On-State Resistance | $R_{DS(on)}$ | $V_{GS}$=10V, $I_D$=4.0A | - | 37 | 45 | mΩ |
| | | $V_{GS}$=4.5V, $I_D$=3.6A | - | 40 | 53 | |
| | | $V_{GS}$=2.5V, $I_D$=2.5A | - | 48 | 66 | |
| | | $V_{GS}$=1.8V, $I_D$=1.5A | - | 62 | 92 | |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | $V_{DS}$=30V, $V_{GS}$=0V | - | 0.01 | 1 | uA |
| Gate-Source Leakage Current | $I_{GSS}$ | $V_{GS}$=±12V, $V_{DS}$=0V | - | ±10 | ±100 | nA |
| **Dynamic** | | | | | | |
| Total Gate Charge | $Q_g$ | $V_{DS}$=15V, $I_D$=4.0A, $V_{GS}$=10V (Note 1,2) | - | 11.3 | - | nC |
| Gate-Source Charge | $Q_{gs}$ | | - | 1 | - | |
| Gate-Drain Charge | $Q_{gd}$ | | - | 1.2 | - | |
| Input Capacitance | Ciss | $V_{DS}$=15V, $V_{GS}$=0V, f=1.0MHZ | - | 447 | - | pF |
| Output Capacitance | Coss | | - | 34 | - | |
| Reverse Transfer Capacitance | Crss | | - | 22 | - | |
| **Switching** | | | | | | |
| Turn-On Delay Time | $td_{(on)}$ | $V_{DD}$=15V, $I_D$=4.0A, $V_{GS}$=10V, $R_G$=3Ω (Note 1,2) | - | 1.7 | - | ns |
| Turn-On Rise Time | tr | | | 38 | - | |
| Turn-Off Delay Time | $td_{(off)}$ | | | 82 | - | |
| Turn-Off Fall Time | tf | | - | 64 | - | |
| **Drain-Source Diode** | | | | | | |
| Maximum Continuous Drain-Source Diode Forward Current | $I_S$ | --- | - | - | 1.5 | A |
| Diode Forward Voltage | $V_{SD}$ | $I_S$=1.0A, $V_{GS}$=0V | | 0.77 | 1.2 | V |

NOTES :

1. Pulse width≤300us, Duty cycle≤2%
2. Essentially independent of operating temperature typical characteristics.
3. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins mounted on a 1 inch FR-4 with 2oz. square pad of copper
4. The maximum current rating is package limited

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## TYPICAL CHARACTERISTIC CURVES

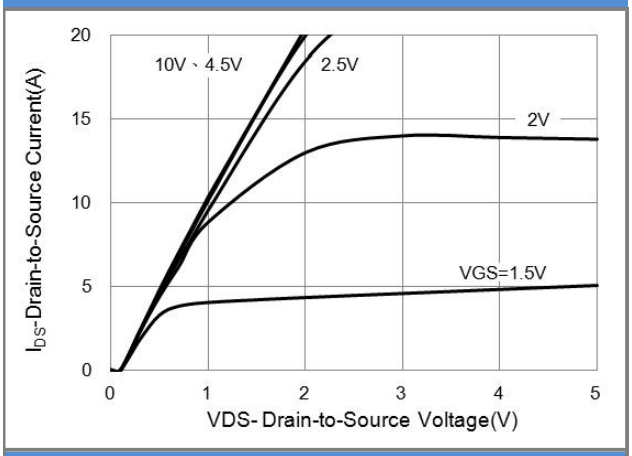


Fig.1 On-Region Characteristics

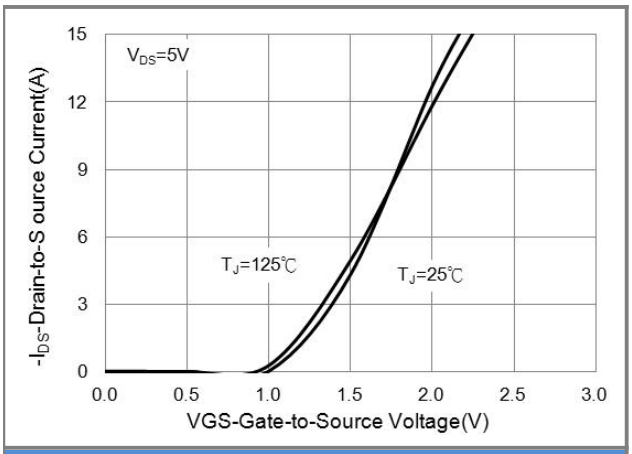


Fig.2 Transfer Characteristics

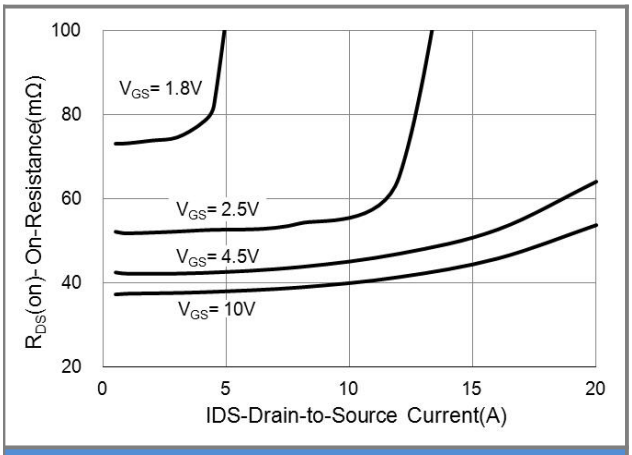


Fig.3 On-Resistance vs. Drain Current

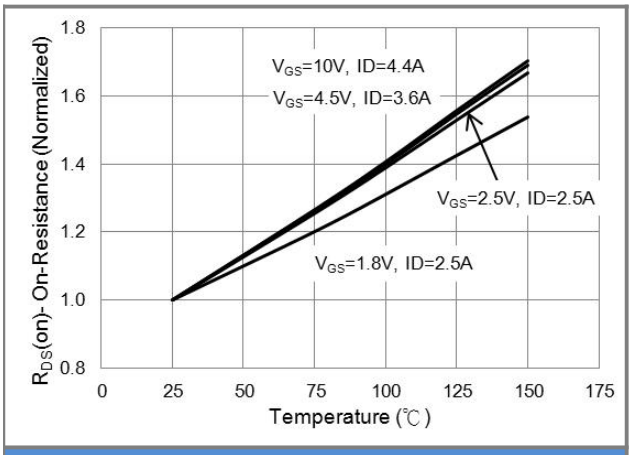


Fig.4 On-Resistance vs. Junction temperature

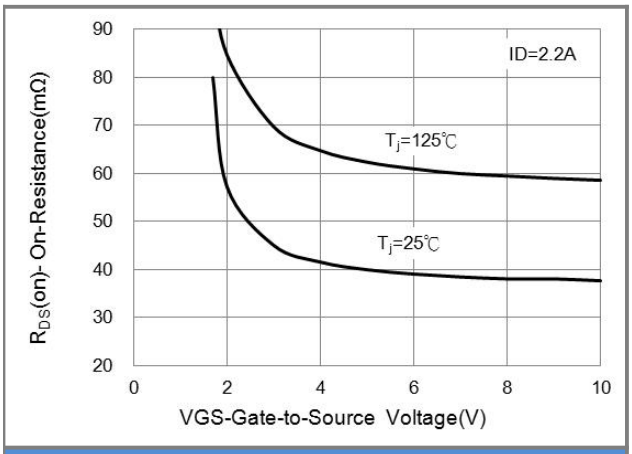


Fig.5 On-Resistance Variation with VGS.

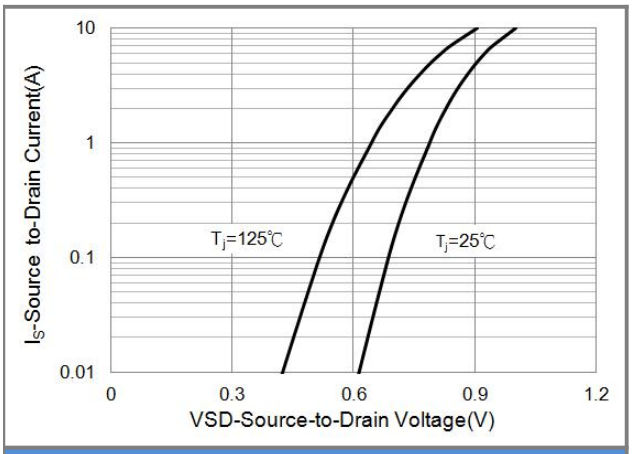


Fig.6 Body Diode Characteristics

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## TYPICAL CHARACTERISTIC CURVES

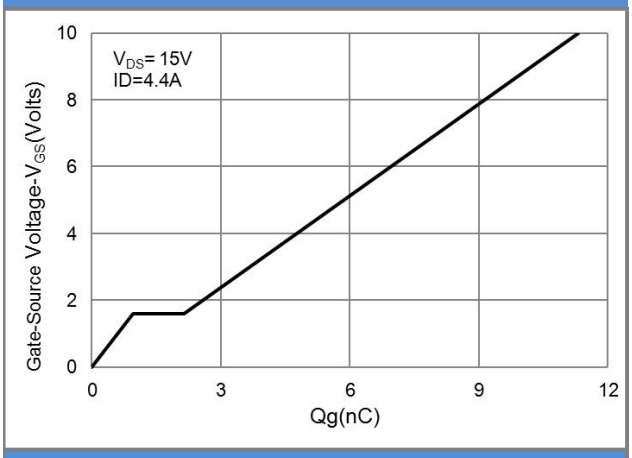



Fig.7 Gate-Charge Characteristics

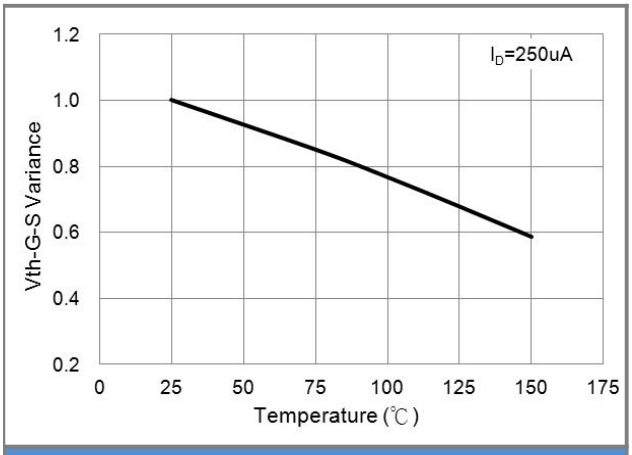



Fig.8 Threshold Voltage Variation with Temperature.

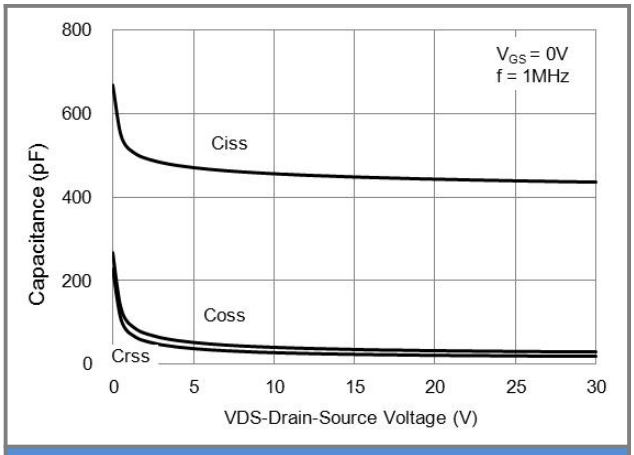


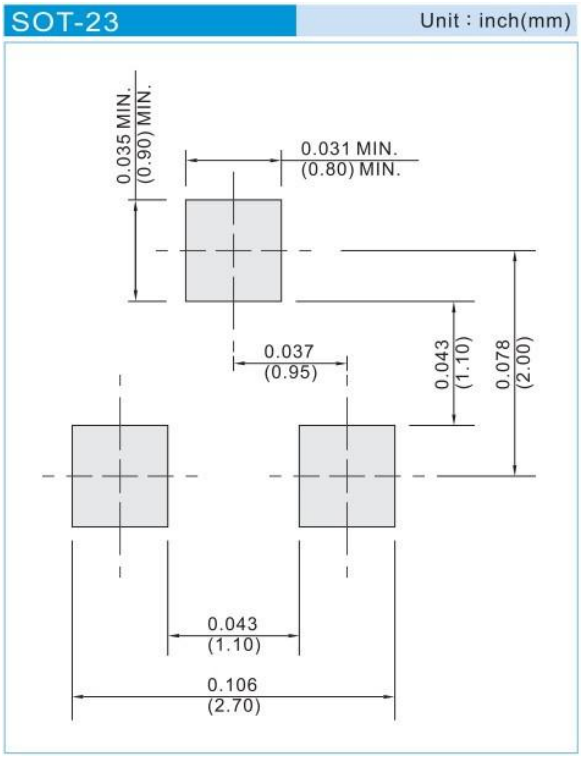

Fig.9 Capacitance vs. Drain-Source Voltage.

# CSM312N4S23

## PART NO PACKING CODE VERSION

| Part No Packing Code | Package Type | Packing type | Marking | Version |
|---|---|---|---|---|
| CSM312N4S23 | SOT-23 | 3K pcs / 7” reel | | Halogen free |
| | | | | |

## MOUNTING PAD LAYOUT



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