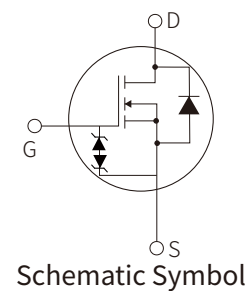


## FEATURES

- | High Density Cell Design For Low  $R_{DS(On)}$
- | Voltage Controlled Small Signal Switch
- | Rugged and Reliable
- | High Saturation Current Capability
- | ESD Protected

## APPLICATION

- | Direct logic-level interface: TTL/CMOS
- | Drivers: relays, solenoids, lamps
- | hammers, display, memories, etc.
- | Battery operated systems
- | Solid-state relays



## APPROVALS

|      |                                    |
|------|------------------------------------|
| RoHS | Compliance with 2011/65/EU         |
| HF   | Compliance with IEC61249-2-21:2003 |

## ABSOLUTE MAXIMUM RATINGS

| Parameter                                                   | Symbol            | Value      | Unit                 |
|-------------------------------------------------------------|-------------------|------------|----------------------|
| Drain-Source Voltage                                        | $V_{DSS}$         | 60         | V                    |
| Drain Current- Pulsed                                       | $I_{DM}^{**}$     | 1.6        | A                    |
| Maximum Drain Current - Continuous $T_A=25^{\circ}\text{C}$ | $I_D^*$           | 0.5        | A                    |
| Gate Threshold Voltage                                      | $V_{GSS}$         | $\pm 20$   | V                    |
| Power Dissipation                                           | $P_{tot}$         | 0.43       | W                    |
| Diode Forward Current $T_A=25^{\circ}\text{C}$              | $I_S$             | 0.5        | A                    |
| Maximum Junction Temperature                                | $T_J$             | 150        | $^{\circ}\text{C}$   |
| Storage Temperature Range                                   | $T_{STG}$         | -55 to 150 | $^{\circ}\text{C}$   |
| Maximum Resistance - Junction to Ambient                    | $R_{\theta JA}^*$ | 290        | $^{\circ}\text{C/W}$ |

Notes:

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec

\*\* Pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

| Parameter                                    | Symbol                           | Test Conditions                                                                                                      | Min. | Typ. | Max. | Unit |
|----------------------------------------------|----------------------------------|----------------------------------------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                       |                                  |                                                                                                                      |      |      |      |      |
| Drain-source Breakdown Voltage               | V <sub>(BR)DSS</sub>             | V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA                                                                          | 60   |      |      | V    |
| Gate Threshold Voltage                       | V <sub>GS(th)</sub>              | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA                                                            | 0.5  |      | 1.5  | V    |
| Drain Leakage Current                        | I <sub>DSS</sub>                 | V <sub>DS</sub> =48V, V <sub>GS</sub> =0V                                                                            |      |      | 1    | μA   |
| Drain Leakage Current (T <sub>J</sub> =85°C) |                                  |                                                                                                                      |      |      | 30   | μA   |
| Gate Leakage Current                         | I <sub>GSS</sub>                 | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                           |      |      | ±10  | μA   |
| On-State Resistance                          | R <sub>DS(on)</sub> <sup>a</sup> | V <sub>GS</sub> =10V, I <sub>DS</sub> =0.2A                                                                          |      | 1    | 1.2  | Ω    |
|                                              |                                  | V <sub>GS</sub> =5V, I <sub>DS</sub> =0.1A                                                                           |      | 1.1  | 1.5  | Ω    |
| Diode Characteristics                        |                                  |                                                                                                                      |      |      |      |      |
| Diode Forward Voltage                        | V <sub>SD</sub> <sup>a</sup>     | I <sub>SD</sub> =0.2A, V <sub>GS</sub> =0V                                                                           |      |      | 1    | V    |
| Dynamic Characteristics <sup>b</sup>         |                                  |                                                                                                                      |      |      |      |      |
| Input capacitance                            | C <sub>iss</sub>                 | V <sub>GS</sub> =0V, V <sub>DS</sub> =25V,<br>Frequency = 1 MHz                                                      |      | 34   |      | pF   |
| Output capacitance                           | C <sub>oss</sub>                 |                                                                                                                      |      | 3.6  |      | pF   |
| Reverse transfer capacitance                 | C <sub>rss</sub>                 |                                                                                                                      |      | 2.3  |      | pF   |
| Turn-on Delay Time                           | t <sub>d(on)</sub>               | V <sub>DS</sub> =30V, V <sub>GEN</sub> =10V<br>R <sub>G</sub> = 4.5Ω, R <sub>L</sub> =150Ω,<br>I <sub>DS</sub> =0.2A |      | 2.7  |      | nS   |
| Turn-on Rise Time                            | t <sub>r</sub>                   |                                                                                                                      |      | 2.7  |      | nS   |
| Turn-Off Delay Time                          | t <sub>d(off)</sub>              |                                                                                                                      |      | 9.9  |      | nS   |
| Turn-Off Fall Time                           | t <sub>f</sub>                   |                                                                                                                      |      | 10.8 |      | nS   |
| Gate Charge Characteristics <sup>b</sup>     |                                  |                                                                                                                      |      |      |      |      |
| Total Gate Charge                            | Q <sub>g</sub>                   | V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, I <sub>DS</sub> =0.2A                                                    |      | 1.4  |      | nC   |
| Gate-Source Charge                           | Q <sub>gs</sub>                  |                                                                                                                      |      | 0.4  |      | nC   |
| Gate-Drain Charge                            | Q <sub>gd</sub>                  |                                                                                                                      |      | 0.2  |      | nC   |

Notes:

a : Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2 %

b : Guaranteed by design, not subject to production testing

## PARAMETER CHARACTERISTIC CURVE

Figure1: Power Dissipation

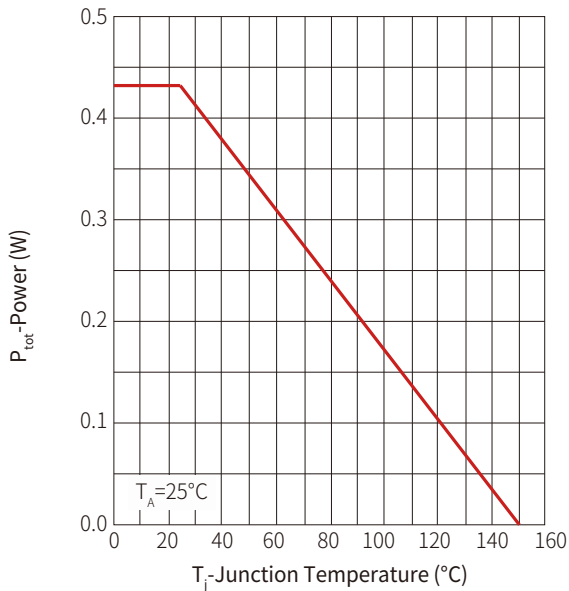


Figure2: Drain Current

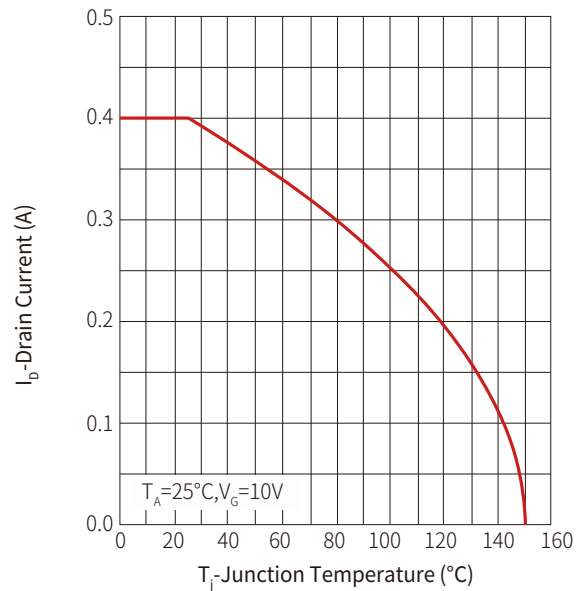


Figure3: Safe Operation Area

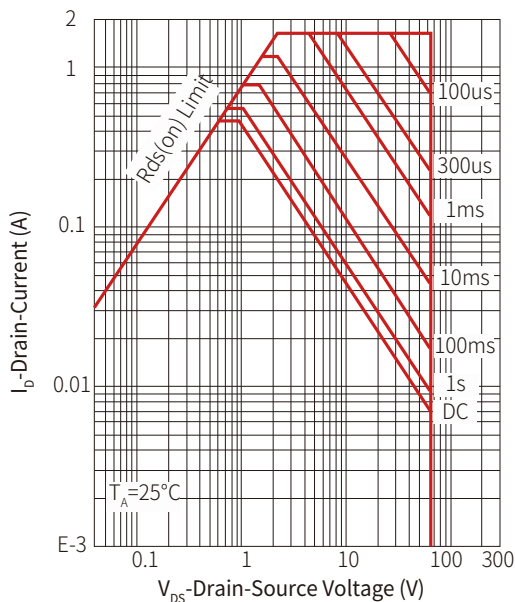
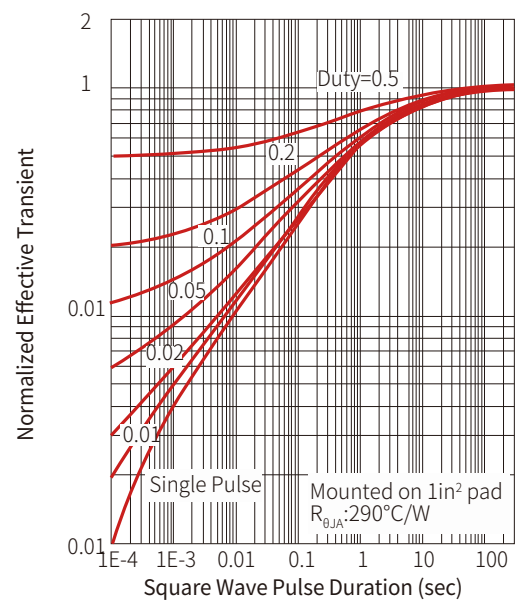
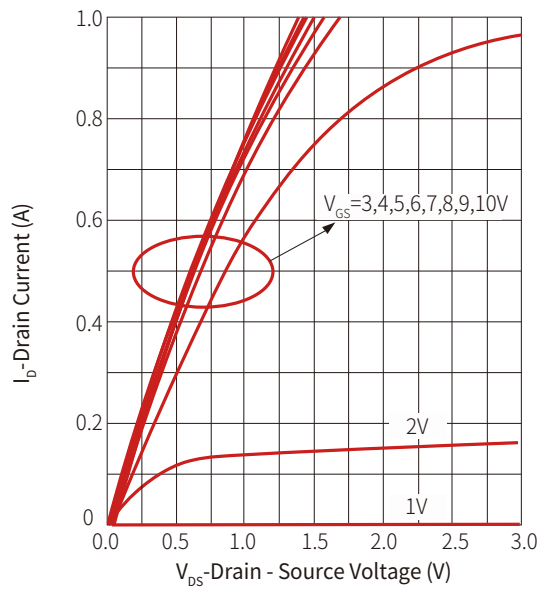
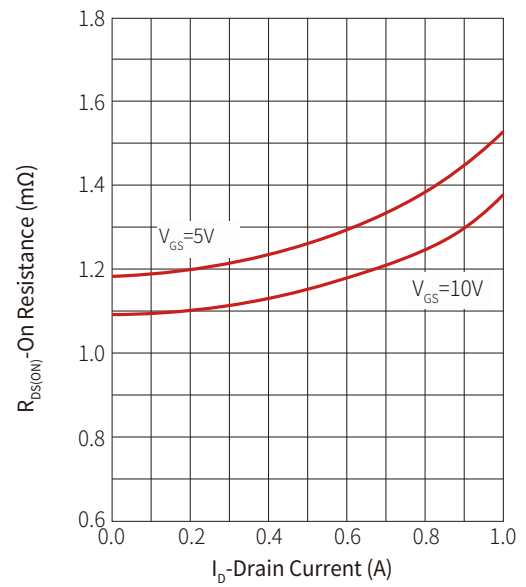
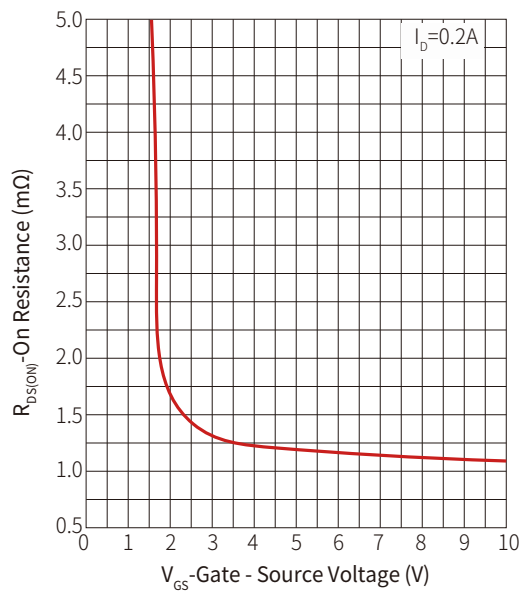
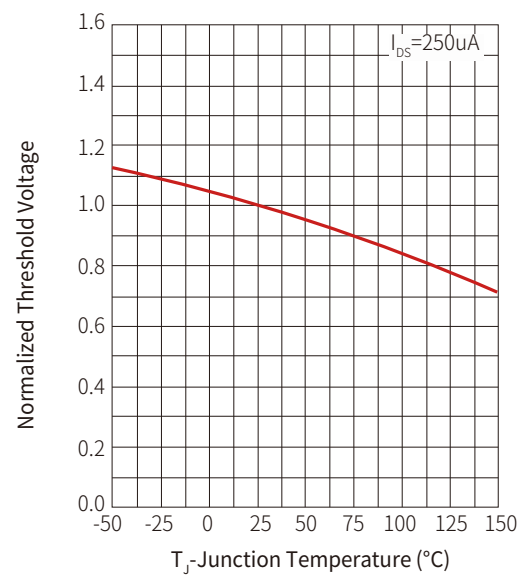
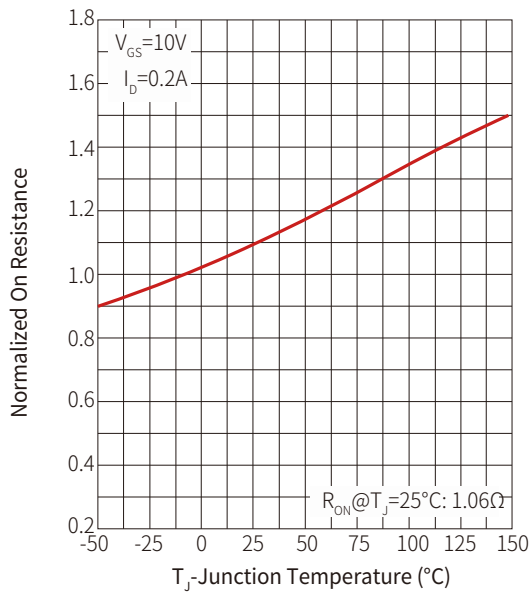
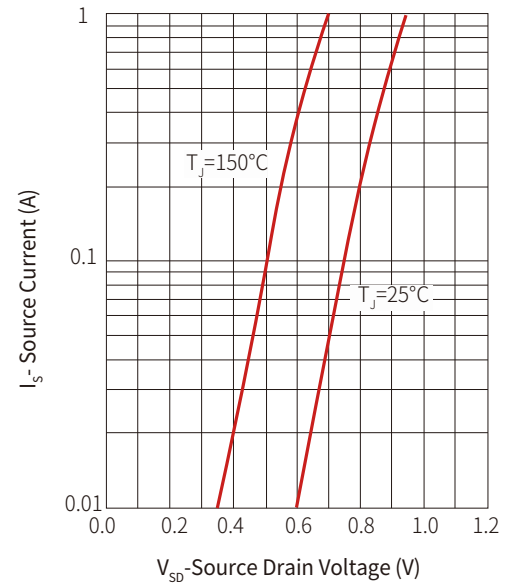
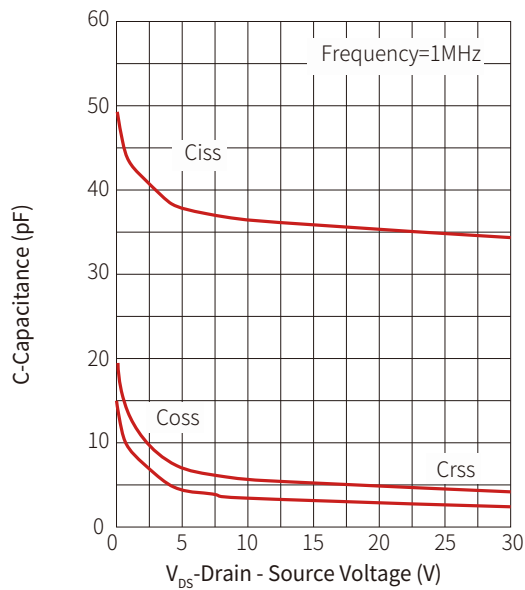
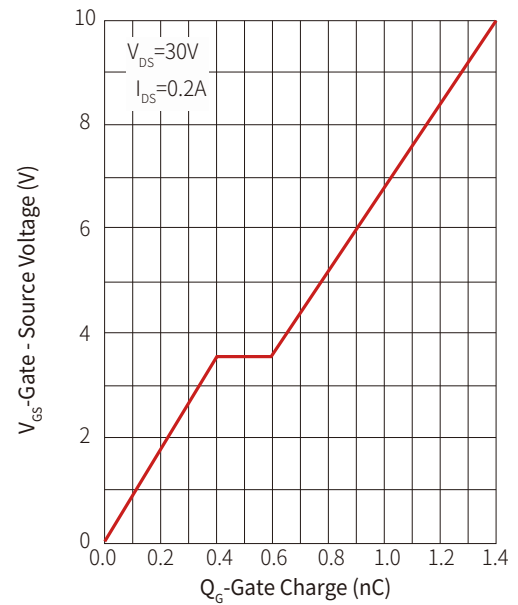


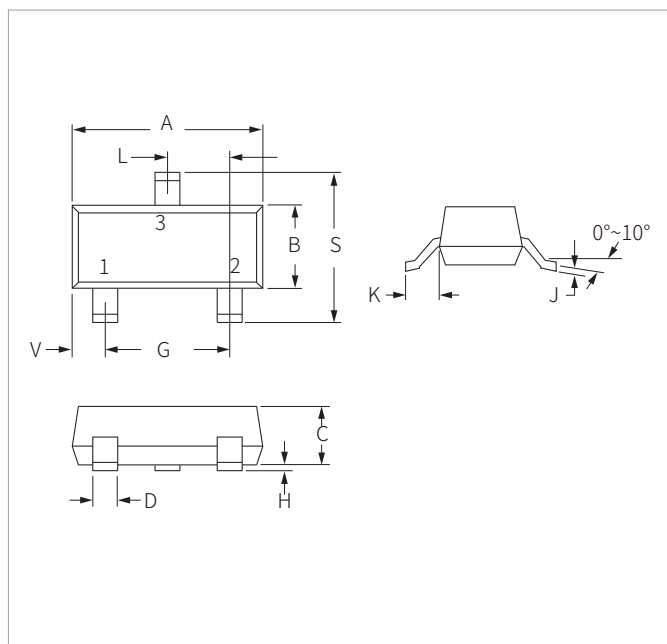
Figure 4: Transient Thermal Impedance



**Figure 5: Output Characteristics****Figure 6: Drain-Source On Resistance****Figure 7: Transfer Characteristics****Figure 8: Gate Threshold Voltage**

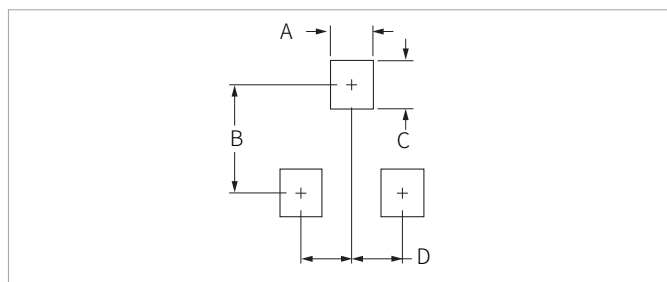
**Figure 9: Drain-Source On Resistance**

**Figure 10: Source-Drain Diode Forward**

**Figure 11: Capacitance**

**Figure 12: Gate Charge**


## SOT-23-3L PACKAGE INFORMATION



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 2.80        | 3.15 | 0.110  | 0.124 |
| B    | 1.50        | 1.70 | 0.060  | 0.070 |
| C    | 1.00        | 1.30 | 0.039  | 0.051 |
| D    | 0.37        | 0.50 | 0.015  | 0.020 |
| G    | 1.78        | 2.10 | 0.070  | 0.083 |
| H    | 0.01        | 0.15 | 0.001  | 0.006 |
| J    | 0.08        | 0.18 | 0.003  | 0.007 |
| K    | 0.35        | 0.69 | 0.014  | 0.029 |
| L    | 0.89        | 1.02 | 0.035  | 0.040 |
| S    | 2.60        | 3.00 | 0.102  | 0.118 |
| V    | 0.45        | 0.60 | 0.018  | 0.024 |

## RECOMMENDED PAD LAYOUT DIMENSIONS



| Ref. | Millimeters |      | Inches |       |
|------|-------------|------|--------|-------|
|      | Min.        | Max. | Min.   | Max.  |
| A    | 0.70        | 1.00 | 0.028  | 0.039 |
| B    | 2.30        | 2.50 | 0.090  | 0.098 |
| C    | 0.70        | 1.00 | 0.028  | 0.039 |
| D    | 0.80        | 1.10 | 0.032  | 0.043 |

## ORDERING INFORMATION

| Part Number | Component Package | QTY/Reel | Reel Size |
|-------------|-------------------|----------|-----------|
| SNM23T02N05 | SOT-23-3L         | 3000PCS  | 7"        |

**Headquarters**

No.3387 Shendu Road  
Pujiang I&E Park  
Minhang Shanghai China  
201000

**Hotline**

400-021-5756

**Web**

<https://www.semiware.com>

**Sales Center**

Tel: 86-21-3463-7458  
Email: [sales18@semiware.com](mailto:sales18@semiware.com)

**Customer Service**

Tel: 86-21-5484-1001  
Email: [sales17@semiware.com](mailto:sales17@semiware.com)

**Technical Support**

Tel: 86-21-3463-7654  
Email: [fae01@semiware.com](mailto:fae01@semiware.com)

**Complaint & Suggestions**

Tel: 86-21-3463-7172  
Ext: 8868  
Email: [cs03@semiware.com](mailto:cs03@semiware.com)

**By QR Code**

Website



Wechat

To find your local partner within Semiware's global website: [www.semiware.com](http://www.semiware.com)

© 2022 Semiware Semiconductor Inc.

The content of this document has been carefully checked and understood. However, neither Semiware nor its subsidiaries assume any liability whatsoever for any errors or inaccuracies of this document and the consequences thereof. Published specifications are subject to change without notice. Product suitability for any area of application must ultimately be determined by the customer. In all cases, products must never be operated outside their published specifications. Semiware does not guarantee the availability of all published products. This disclaimer shall be governed by substantive Chinese law and resulting disputes shall be settled by the courts at the place of business of Semiware. Latest publications and a complete disclaimer can be downloaded from the Semiware website. All trademarks recognized.