

# DNSS138K

## DNSS138K N-Channel MOSFET

### General description

N-Channel MOSFET

### FEATURES

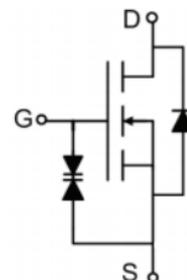
- $V_{DS}=50V$
- $I_D=0.22A$
- $R_{DS(ON)}$ ( at  $V_{GS}=10V$ ) $<3.5 \Omega$
- $R_{DS(ON)}$ ( at  $V_{GS}=4.5V$ ) $<6\Omega$
- Trench Power MOSFET technology
- High density cell design for low  $R_{DS(ON)}$

### APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Battery Operated Systems
- Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Display, Memories, Transistors, etc.



SOT-23 Package



### Device Marking Code:

| Device Type | Device Marking |
|-------------|----------------|
| DNSS138K    | SS*            |

### Maximum Ratings & Thermal Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified.)

| Parameters                                  | Symbol          | Value    | Unit |
|---|-----------------|----------|------|
| Drain-Source Voltage                        | $V_{DS}$        | 50       | V    |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$ | V    |
| Continuous Drain Current                    | $I_D$           | 0.22     | A    |
| Power Dissipation                           | $P_D$           | 350      | mW   |
| Junction Temperature                        | $T_j$           | 150      | °C   |
| Storage Temperature                         | $T_{stg}$       | -50-+150 | °C   |
| Thermal Resistance From Junction to Ambient | $R_{\theta JA}$ | 357      | °C/W |

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## Electrical Characteristics

(Ratings at 25°C ambient temperature unless otherwise specified.)

| Parameter                          | Symbols       | Test Condition   | Limits |     |           | Unit     |
|------------------------------------|---------------|--|--------|-----|-----------|----------|
|                                    |               |  | Min    | Typ | Max       |          |
| Static                             |               |  |        |     |           |          |
| Drain-Source Breakdown Voltage     | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                                    | 50     |     |           | V        |
| Gate-Threshold voltage(note1)      | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=1mA$                                     | 0.8    |     | 1.5       | V        |
| Gate-body Leakage                  | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                                  |        |     | $\pm 100$ | nA       |
| Zero Gate Voltage Drain current    | $I_{DSS}$     | $V_{DS}=50V, V_{GS}=0V$                                      |        |     | 0.5       | uA       |
|                                    |               | $V_{DS}=30V, V_{GS}=0V$                                      |        |     | 0.1       |          |
| Drain-Source On-Resistance (note1) | $R_{DS(ON)}$  | $V_{GS}=10V, I_D=0.22A$                                      |        |     | 3.5       | $\Omega$ |
|                                    |               | $V_{GS}=4.5V, I_C=0.22A$                                     |        |     | 6         |          |
| Forward trans conductance (note1)  | $g_{fs}$      | $V_{DS}=10V, I_D=0.22A$                                      | 0.12   |     |           | S        |
| Diode forward voltage(note1)       | $V_{SD}$      | $I_S=0.44A, V_{GS}=0V$                                       |        |     | 1.4       | V        |
| Dynamic(note2)                     |               |  |        |     |           |          |
| Input capacitance                  | $C_{iss}$     | $V_{DS}=25V, V_{GS}=0V, f=1MHz$                              |        | 27  |           | pF       |
| Output capacitance                 | $C_{oss}$     |  |        | 13  |           |          |
| Reverse Transfer capacitance       | $C_{rss}$     |  |        | 6   |           |          |
| Switching(note1,2)                 |               |  |        |     |           |          |
| Turn-on Time                       | $t_{d(on)}$   | $V_{DD}=30V, R_{GEN}=6\Omega, V_{DS}=10V, I_D\approx 0.29A,$ |        | 5   |           | ns       |
| Rise time                          | $t_r$         |  |        | 18  |           |          |
| Turn-off Time                      | $t_{d(off)}$  |  |        |     | 36        |          |
| Fall time                          | $t_f$         |  |        |     | 14        |          |

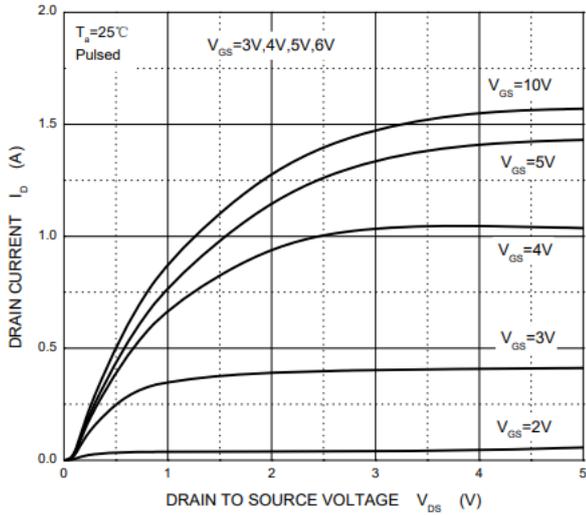
Notes: 1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycles  $\leq 2\%$ .  
 2. These parameters have no way to verify



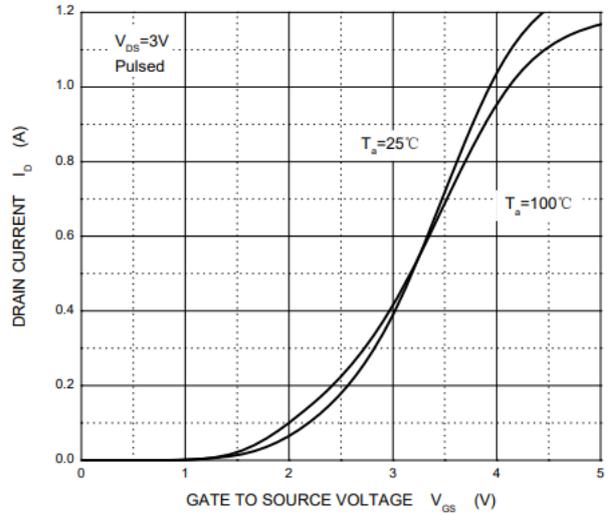
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## Typical Characteristics

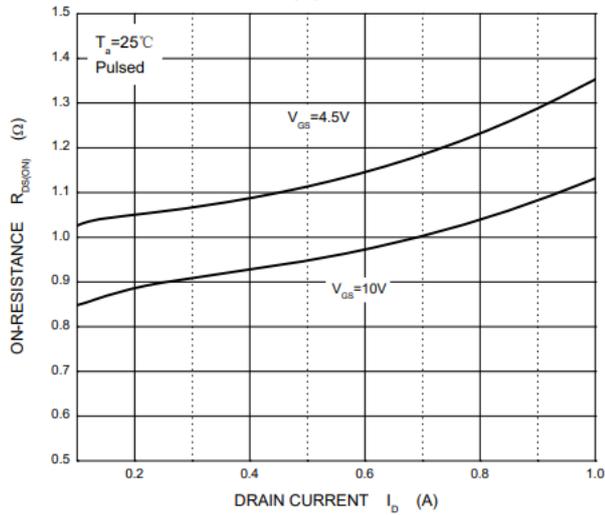
### Output Characteristics



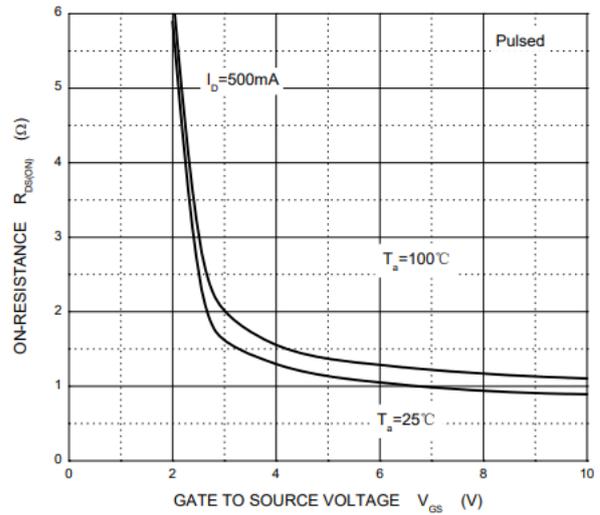
### Transfer Characteristics



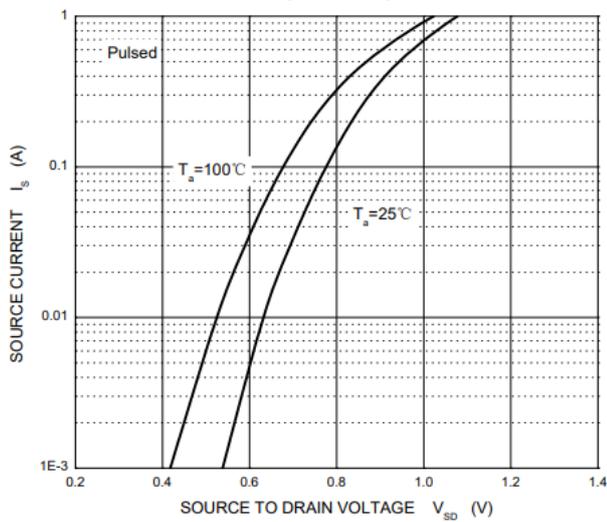
### $R_{DS(ON)}$ — $I_D$



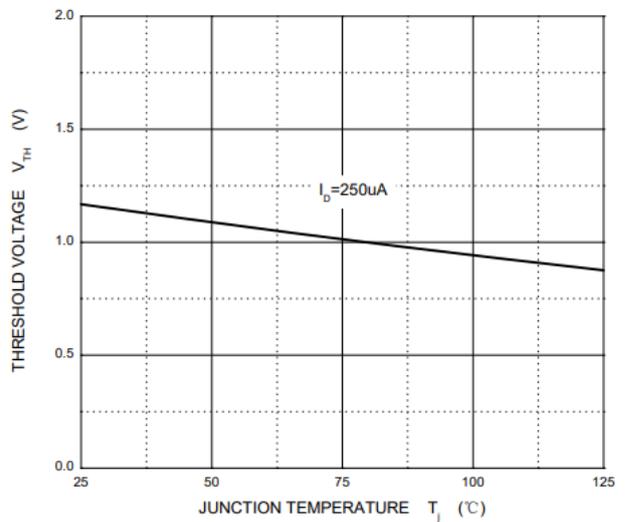
### $R_{DS(ON)}$ — $V_{GS}$



### $I_S$ — $V_{SD}$

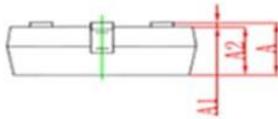
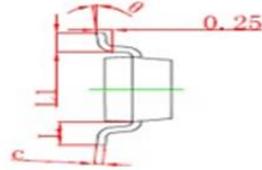
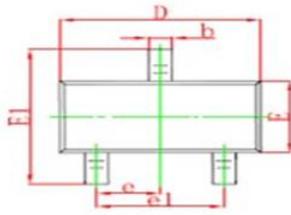


### Threshold Voltage



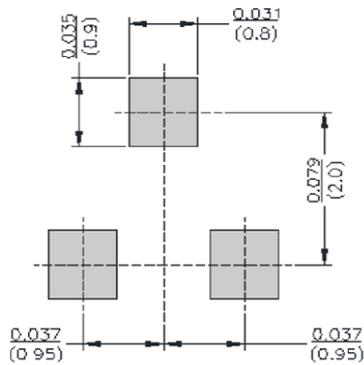
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## SOT-23 Package information



| Symbol | Dimensions in Millimeter |       | Dimensions in Inches |       |
|--------|--------------------------|-------|----------------------|-------|
|        | Min                      | Max   | Min                  | Max   |
| A      | 0.900                    | 1.150 | 0.035                | 0.045 |
| A1     | 0.000                    | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                    | 1.050 | 0.035                | 0.041 |
| b      | 0.300                    | 0.500 | 0.012                | 0.020 |
| c      | 0.100                    | 0.200 | 0.004                | 0.008 |
| D      | 2.800                    | 3.000 | 0.110                | 0.118 |
| E      | 1.200                    | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                    | 2.550 | 0.089                | 0.100 |
| e      | 0.950Type                |       | 0.037Type            |       |
| e1     | 1.800                    | 2.000 | 0.071                | 0.079 |
| L      | 0.550REF                 |       | 0.220REF             |       |
| L1     | 0.300                    | 0.500 | 0.012                | 0.020 |
| θ      | 0°                       | 8°    | 0°                   | 8°    |

## SOT-23 Suggested Pad Layout



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