

**TM10H03S**

**N+N-Channel Enhancement Mode Mosfet**

**General Description**

- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

**Applications**

- Load switch
- PWM

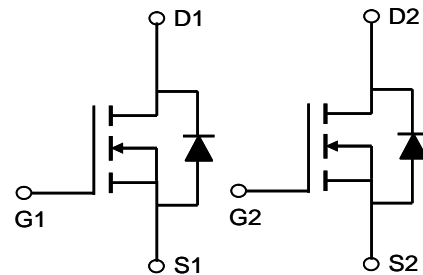
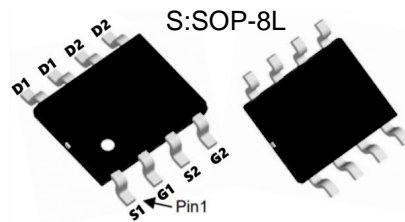
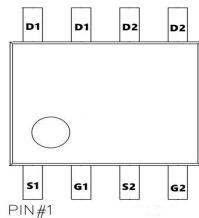
**Product Summary**

$V_{DS} = 30V$   $I_D = 9.6A$

$R_{DS(ON)} = 15m\Omega$  (typ.) @  $V_{GS} = 10V$

100% UIS Tested

100%  $R_g$  Tested



Marking: 10V03 OR 4822

**Absolute Maximum Ratings** ( $T_A=25^\circ C$  unless otherwise specified)

| Symbol                 | Parameter                                  | Rating     | Units      |
|------------------------|--------------------------------------------|------------|------------|
| $V_{DS}$               | Drain-Source Voltage                       | 30         | V          |
| $V_{GS}$               | Gate-Source Voltage                        | $\pm 20$   | V          |
| $I_D @ T_A=25^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 9.6        | A          |
| $I_D @ T_A=70^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V^1$ | 5.8        | A          |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>          | 37         | A          |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup> | 12.1       | mJ         |
| $I_{AS}$               | Avalanche Current                          | --         | A          |
| $P_D @ T_A=25^\circ C$ | Total Power Dissipation <sup>4</sup>       | 2.8        | W          |
| $T_{STG}$              | Storage Temperature Range                  | -55 to 150 | $^\circ C$ |
| $T_J$                  | Operating Junction Temperature Range       | -55 to 150 | $^\circ C$ |

**Thermal Data**

| Symbol          | Parameter                                        | Typ. | Max. | Unit         |
|-----------------|--------------------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient <sup>1</sup> | ---  | ---  | $^\circ C/W$ |
| R               | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 46   | $^\circ C/W$ |

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**Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise specified)

| Symbol                                                        | Parameter                                                | Test Condition                                         | Min. | Typ. | Max.      | Units      |
|---------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|------|------|-----------|------------|
| <b>Off Characteristic</b>                                     |                                                          |                                                        |      |      |           |            |
| $V_{(BR)DSS}$                                                 | Drain-Source Breakdown Voltage                           | $V_{GS}=0V, I_D=250\mu A$                              | 30   | -    | -         | V          |
| $I_{DSS}$                                                     | Zero Gate Voltage Drain Current                          | $V_{DS}=30V, V_{GS}=0V,$                               | -    | -    | 1.0       | $\mu A$    |
| $I_{GSS}$                                                     | Gate to Body Leakage Current                             | $V_{DS}=0V, V_{GS}=\pm 20V$                            | -    | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b>                                     |                                                          |                                                        |      |      |           |            |
| $V_{GS(th)}$                                                  | Gate Threshold Voltage                                   | $V_{DS}=V_{GS}, I_D=250\mu A$                          | 1.0  | 1.5  | 2.5       | V          |
| $R_{DS(on)}$                                                  | Static Drain-Source on-Resistance<br>note3               | $V_{GS}=10V, I_D=5A$                                   | -    | 15   | 20        | m $\Omega$ |
|                                                               |                                                          | $V_{GS}=4.5V, I_D=3A$                                  | -    | 21   | 29        |            |
| <b>Dynamic Characteristics</b>                                |                                                          |                                                        |      |      |           |            |
| $C_{iss}$                                                     | Input Capacitance                                        | $V_{DS}=15V, V_{GS}=0V,$<br>$f=1.0\text{MHz}$          | -    | 490  | -         | pF         |
| $C_{oss}$                                                     | Output Capacitance                                       |                                                        | -    | 79   | -         | pF         |
| $C_{rss}$                                                     | Reverse Transfer Capacitance                             |                                                        | -    | 61   | -         | pF         |
| $Q_g$                                                         | Total Gate Charge                                        | $V_{DS}=15V, I_D=5.8A,$<br>$V_{GS}=10V$                | -    | 10   | -         | nC         |
| $Q_{gs}$                                                      | Gate-Source Charge                                       |                                                        | -    | 1.7  | -         | nC         |
| $Q_{gd}$                                                      | Gate-Drain("Miller") Charge                              |                                                        | -    | 2.5  | -         | nC         |
| <b>Switching Characteristics</b>                              |                                                          |                                                        |      |      |           |            |
| $t_{d(on)}$                                                   | Turn-on Delay Time                                       | $V_{DS}=15V, I_D=3A,$<br>$V_{GS}=10V, R_{REN}=3\Omega$ | -    | 6    | -         | ns         |
| $t_r$                                                         | Turn-on Rise Time                                        |                                                        | -    | 15   | -         | ns         |
| $t_{d(off)}$                                                  | Turn-off Delay Time                                      |                                                        | -    | 17   | -         | ns         |
| $t_f$                                                         | Turn-off Fall Time                                       |                                                        | -    | 17   | -         | ns         |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |                                                          |                                                        |      |      |           |            |
| $I_S$                                                         | Maximum Continuous Drain to Source Diode Forward Current |                                                        | -    | -    | 9.6       | A          |
| $I_{SM}$                                                      | Maximum Pulsed Drain to Source Diode Forward Current     |                                                        | -    | -    | 36        | A          |
| $V_{SD}$                                                      | Drain to Source Diode Forward Voltage                    | $V_{GS}=0V, I_S=9A$                                    | -    | -    | 1.2       | V          |
| $t_{rr}$                                                      | Body Diode Reverse Recovery Time                         | $I_F=5A, di/dt=100A/\mu s$                             | -    | 7    | -         | ns         |
| $Q_{rr}$                                                      | Body Diode Reverse Recovery Charge                       |                                                        | -    | 2    | -         | nC         |

- Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature  
 2. EAS condition :  $T_J=25^{\circ}\text{C}, V_{DD}=15V, V_G=10V, L=0.5\text{mH}, R_g=25\Omega, I_{AS}=6A$   
 3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

Figure 1: Output Characteristics

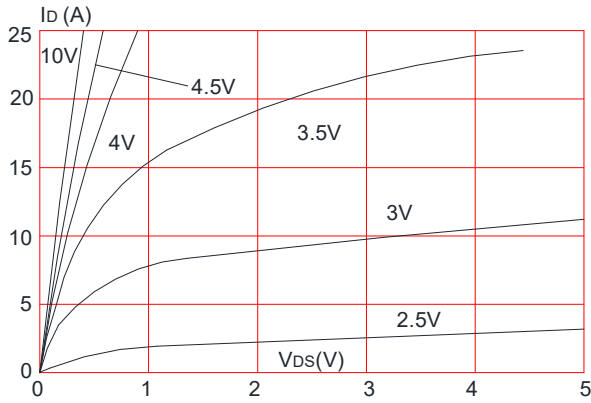


Figure 2: Typical Transfer Characteristics

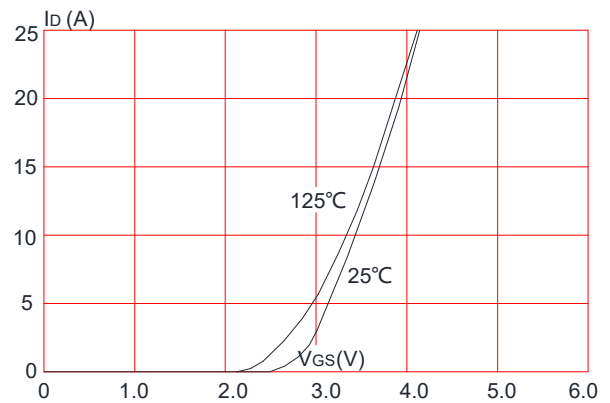


Figure 3: On-resistance vs. Drain Current

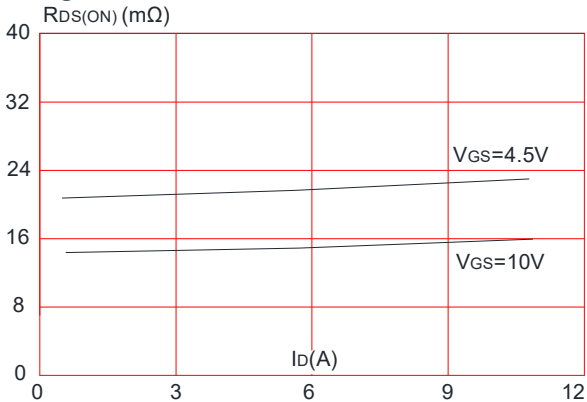


Figure 4: Body Diode Characteristics

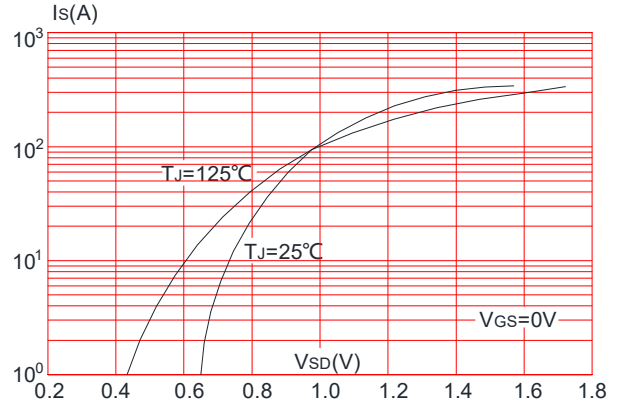


Figure 5: Gate Charge Characteristics

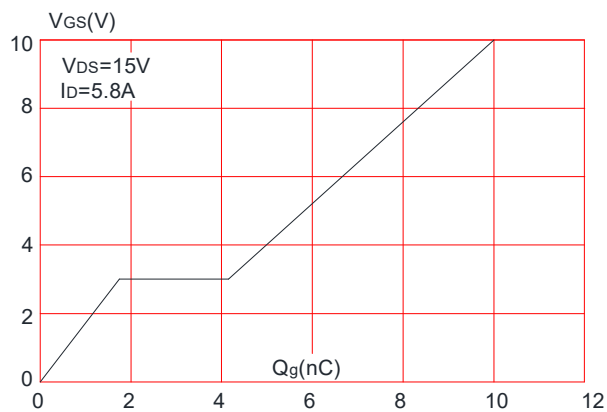
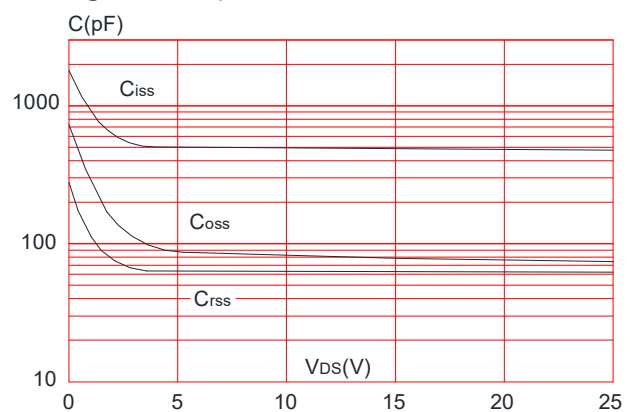


Figure 6: Capacitance Characteristics



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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

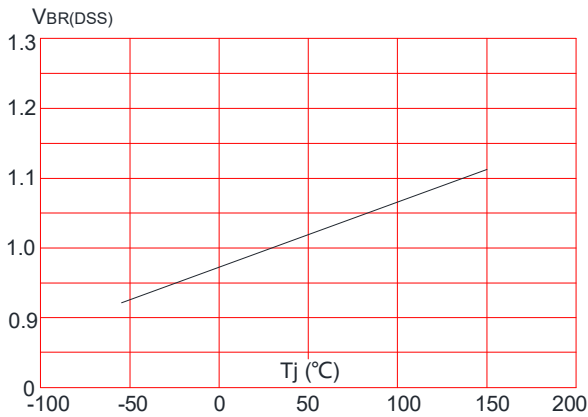


Figure 8: Normalized on Resistance vs. Junction Temperature

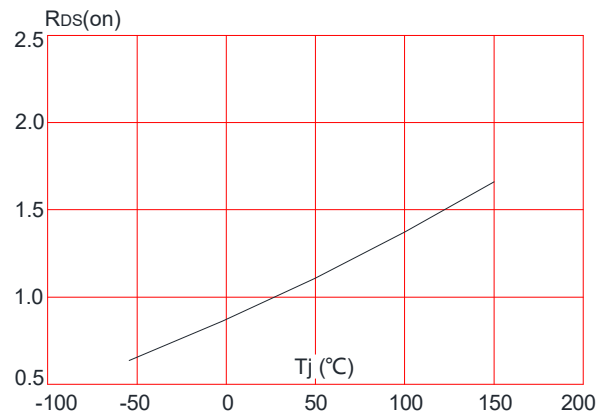


Figure 9: Maximum Safe Operating Area

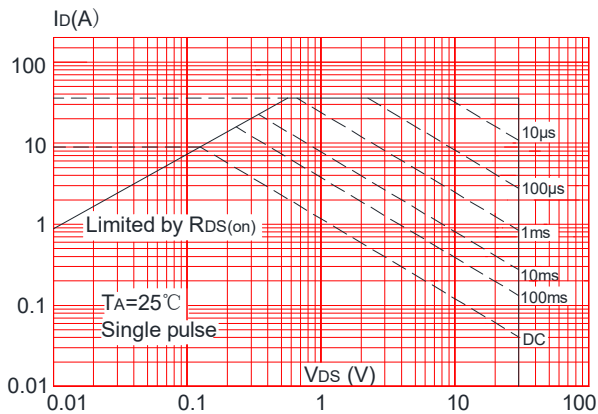


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

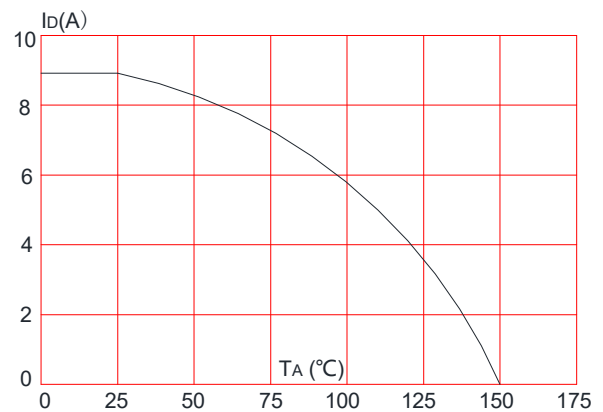
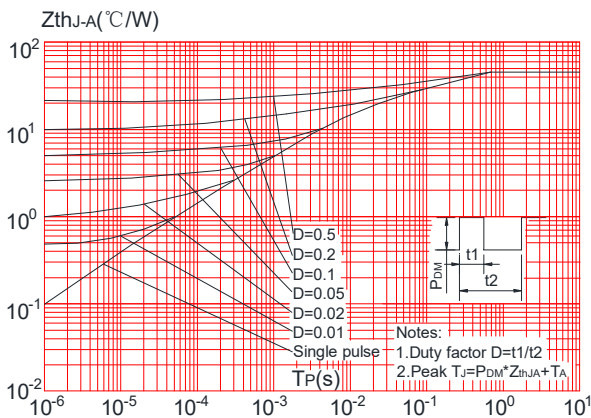
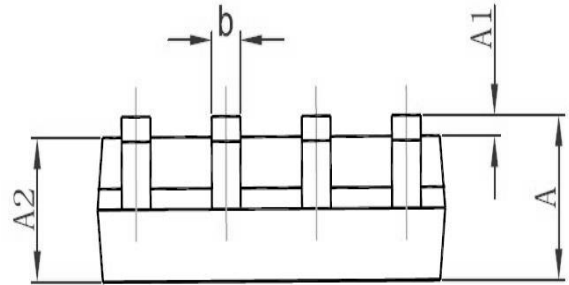
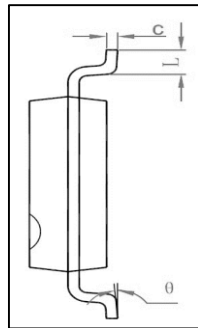
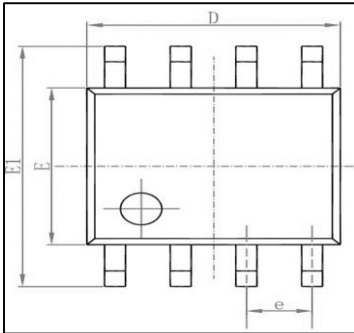


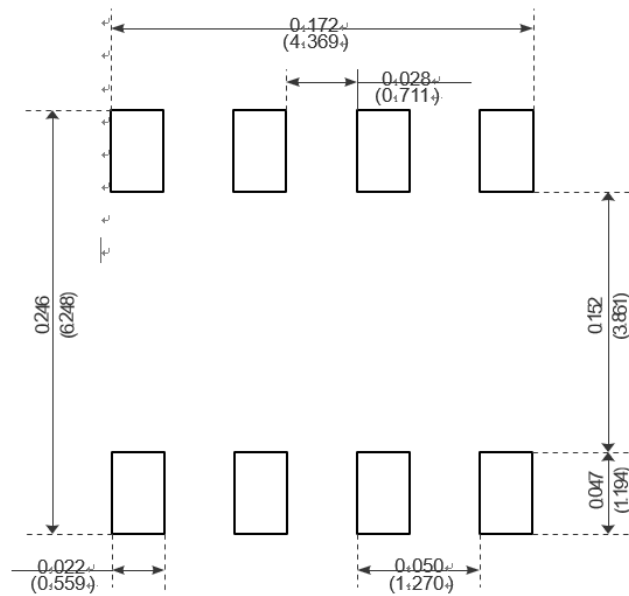
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



# Package Mechanical Data:SOP-8L



| 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        | 0.170                     | 0.250 | 0.006                | 0.010 |
| D        | 4.700                     | 5.100 | 0.185                | 0.200 |
| E        | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1       | 5.800                     | 6.200 | 0.228                | 0.244 |
| e        | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| L        | 0.400                     | 1.270 | 0.016                | 0.050 |
| $\theta$ | 0°                        | 8°    | 0°                   | 8°    |



Recommended Minimum Pads