

## Product Summary

| $BV_{DSS}$ | $R_{DS(ON)}$ max                      | $I_D$ max<br>$T_A = 25^\circ\text{C}$ |
|------------|---------------------------------------|---------------------------------------|
| 60V        | 8m $\Omega$ @ $V_{GS} = 10\text{V}$   | 14.0A                                 |
|            | 12m $\Omega$ @ $V_{GS} = 4.5\text{V}$ | 11.5A                                 |

## Features and Benefits

- 100% Unclamped Inductive Switch (UIS) Test in Production
- High Conversion Efficiency
- Low  $R_{DS(ON)}$  – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

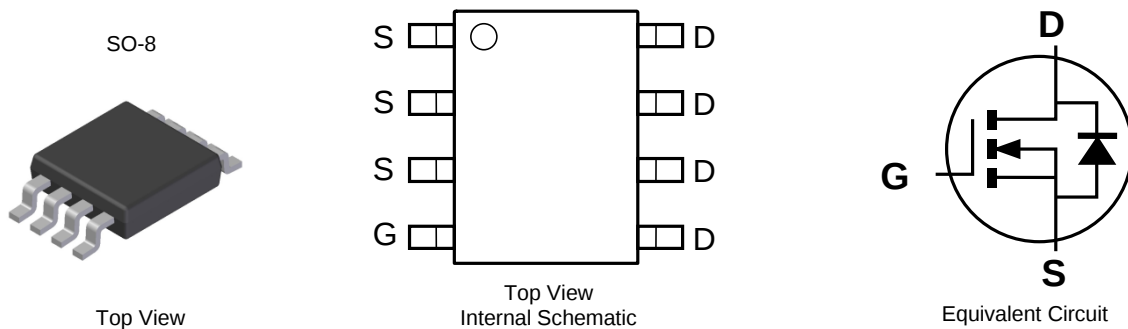
## Description and Applications

This new generation N-Channel Enhancement Mode MOSFET is designed to minimize  $R_{DS(ON)}$ , yet maintain superior switching performance. This device is ideal for use in notebook battery power management and loadswitch.

- Backlighting
- Power Management Functions
- DC-DC Converters

## Mechanical Data

- Case: SO-8
- Case Material: Molded Plastic, "Green" Molding Compound.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Finish - Matte Tin Annealed over Copper Leadframe.  
Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.074 grams (Approximate)

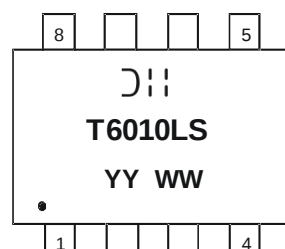


## Ordering Information (Note 4)

| Part Number   | Case | Packaging         |
|---------------|------|-------------------|
| DMT6010LSS-13 | SO-8 | 2,500/Tape & Reel |

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



DII = Manufacturer's Marking  
 T6010LS = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY or YY = Year (ex: 13 = 2013)  
 WW = Week (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                          |              |                                                  | Symbol           | Value        | Units |
|---------------------------------------------------------|--------------|--------------------------------------------------|------------------|--------------|-------|
| Drain-Source Voltage                                    |              |                                                  | V <sub>DSS</sub> | 60           | V     |
| Gate-Source Voltage                                     |              |                                                  | V <sub>GSS</sub> | ±20          | V     |
| Continuous Drain Current (Note 6) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 14.0<br>11.0 | A     |
|                                                         | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 16.7<br>13.5 | A     |
| Maximum Continuous Body Diode Forward Current (Note 6)  |              |                                                  | I <sub>S</sub>   | 3            | A     |
| Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)      |              |                                                  | I <sub>DM</sub>  | 80           | A     |
| Avalanche Current, L = 0.1mH                            |              |                                                  | I <sub>AS</sub>  | 20           | A     |
| Avalanche Energy, L = 0.1mH                             |              |                                                  | E <sub>AS</sub>  | 20           | mJ    |

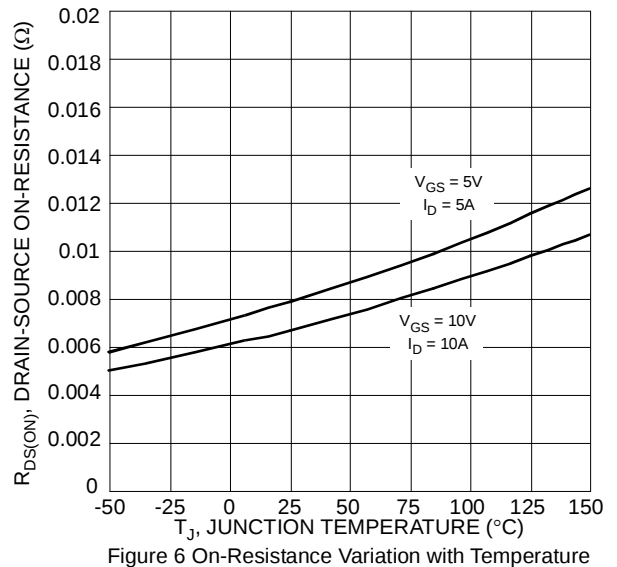
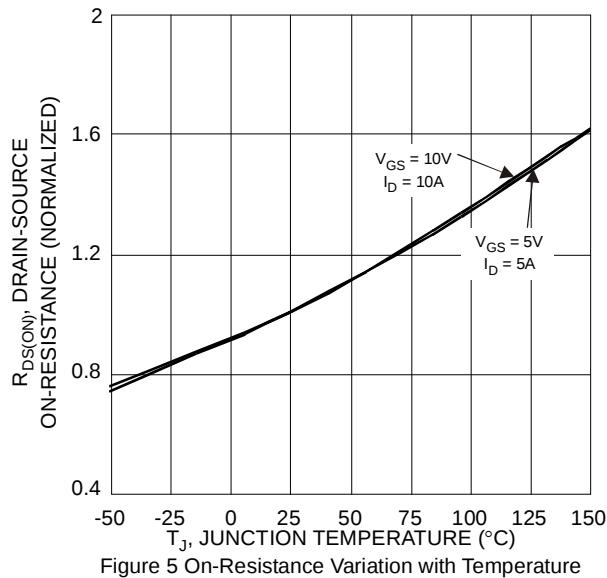
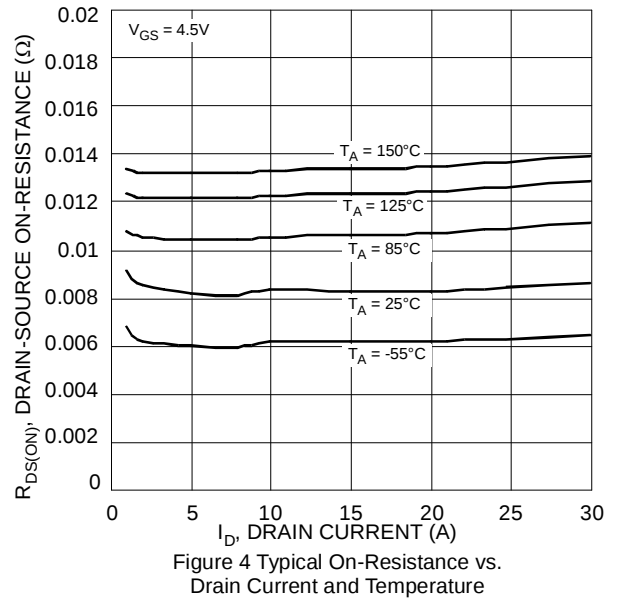
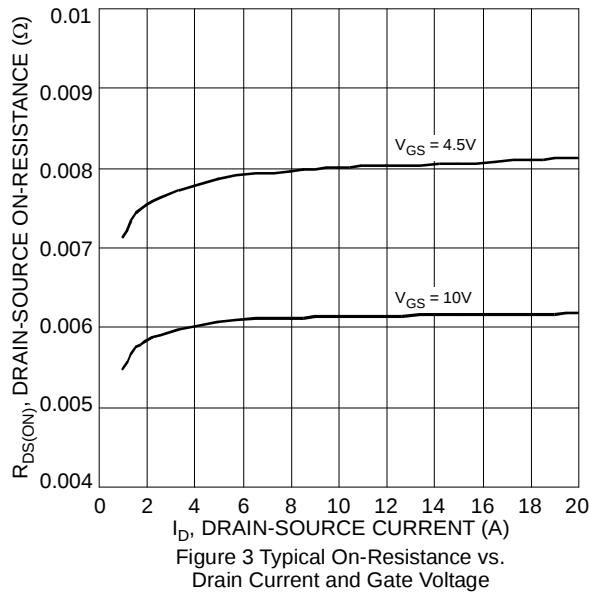
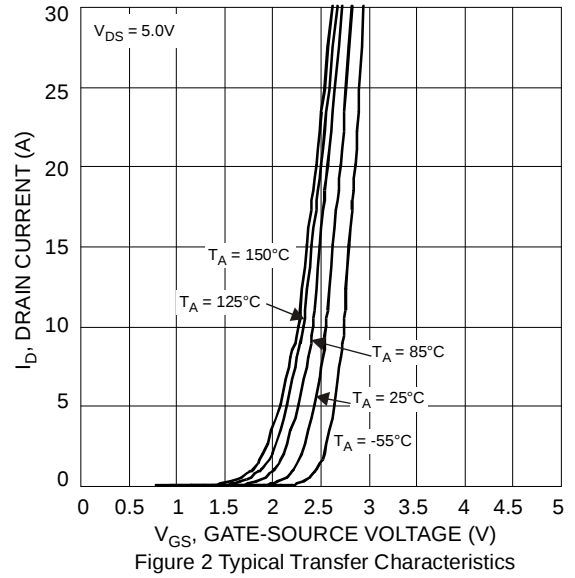
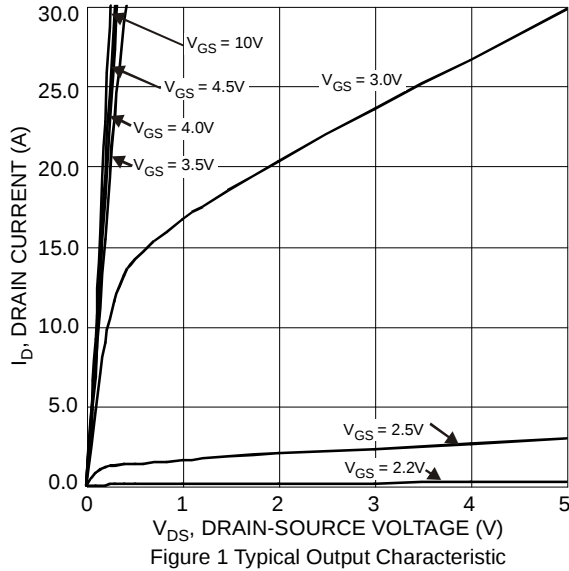
**Thermal Characteristics**

| Characteristic                                   |              |  | Symbol                            | Value       | Units |
|--------------------------------------------------|--------------|--|-----------------------------------|-------------|-------|
| Total Power Dissipation (Note 5)                 |              |  | P <sub>D</sub>                    | 1.5         | W     |
| Thermal Resistance, Junction to Ambient (Note 5) | Steady State |  | R <sub>θJA</sub>                  | 80          | °C/W  |
|                                                  | t < 10s      |  |                                   | 48          | °C/W  |
| Total Power Dissipation (Note 6)                 |              |  | P <sub>D</sub>                    | 2.0         | W     |
| Thermal Resistance, Junction to Ambient (Note 6) | Steady State |  | R <sub>θJA</sub>                  | 53          | °C/W  |
|                                                  | t < 10s      |  |                                   | 37          | °C/W  |
| Thermal Resistance, Junction to Case (Note 6)    |              |  | R <sub>θJC</sub>                  | 6.5         | °C/W  |
| Operating and Storage Temperature Range          |              |  | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                             | Symbol              | Min | Typ   | Max  | Unit | Test Condition                                                                          |
|--------------------------------------------|---------------------|-----|-------|------|------|-----------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b> (Note 7)        |                     |     |       |      |      |                                                                                         |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 60  | —     | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250µA                                            |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 1    | µA   | V <sub>DS</sub> = 48V, V <sub>GS</sub> = 0V                                             |
| Gate-Source Leakage                        | I <sub>GSS</sub>    | —   | —     | ±100 | nA   | V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V                                            |
| <b>ON CHARACTERISTICS</b> (Note 7)         |                     |     |       |      |      |                                                                                         |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 0.8 | —     | 2.0  | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250µA                              |
| Static Drain-Source On-Resistance          | R <sub>DS(ON)</sub> | —   | 6     | 8    | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                             |
|                                            |                     | —   | 8     | 12   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 20A                                            |
| Diode Forward Voltage                      | V <sub>SD</sub>     | —   | 0.9   | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A                                              |
| <b>DYNAMIC CHARACTERISTICS</b> (Note 8)    |                     |     |       |      |      |                                                                                         |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 2,090 | —    | pF   | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V, f = 1MHz                                   |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 746   | —    |      |                                                                                         |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 38.5  | —    |      |                                                                                         |
| Gate resistance                            | R <sub>G</sub>      | —   | 0.59  | —    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz                                    |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | Q <sub>g</sub>      | —   | 19.3  | —    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 20A                                             |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | Q <sub>g</sub>      | —   | 41.3  | —    |      |                                                                                         |
| Gate-Source Charge                         | Q <sub>gs</sub>     | —   | 6.0   | —    |      |                                                                                         |
| Gate-Drain Charge                          | Q <sub>gd</sub>     | —   | 8.8   | —    |      |                                                                                         |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  | —   | 5.7   | —    | ns   | V <sub>DD</sub> = 30V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A, R <sub>G</sub> = 3Ω |
| Turn-On Rise Time                          | t <sub>R</sub>      | —   | 4.3   | —    |      |                                                                                         |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> | —   | 23.4  | —    |      |                                                                                         |
| Turn-Off Fall Time                         | t <sub>F</sub>      | —   | 9.7   | —    |      |                                                                                         |

- Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.  
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.  
7. Short duration pulse test used to minimize self-heating effect.  
8. Guaranteed by design. Not subject to product testing.



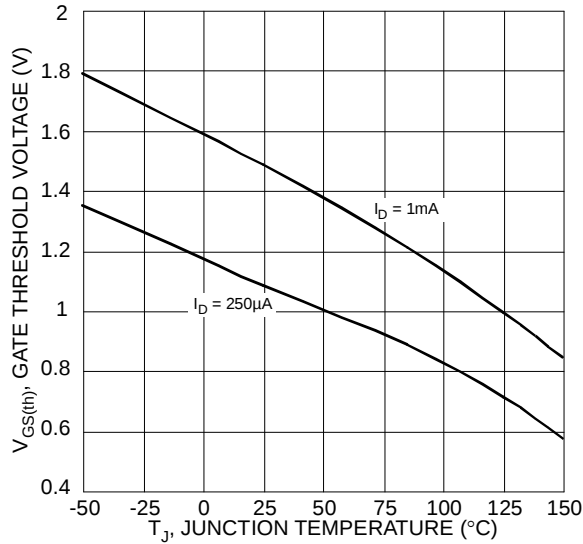


Figure 7 Gate Threshold Variation vs. Ambient Temperature

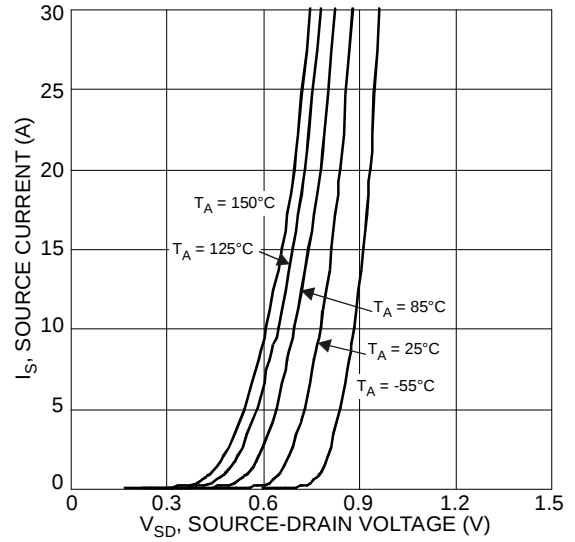


Figure 8 Diode Forward Voltage vs. Current

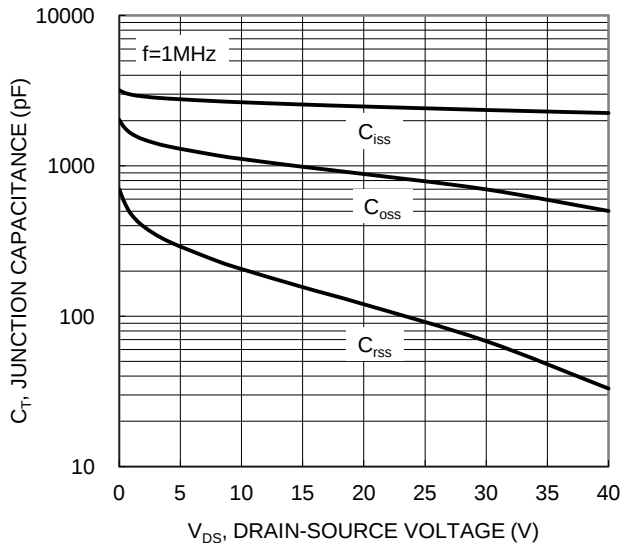


Figure 9 Typical Junction Capacitance

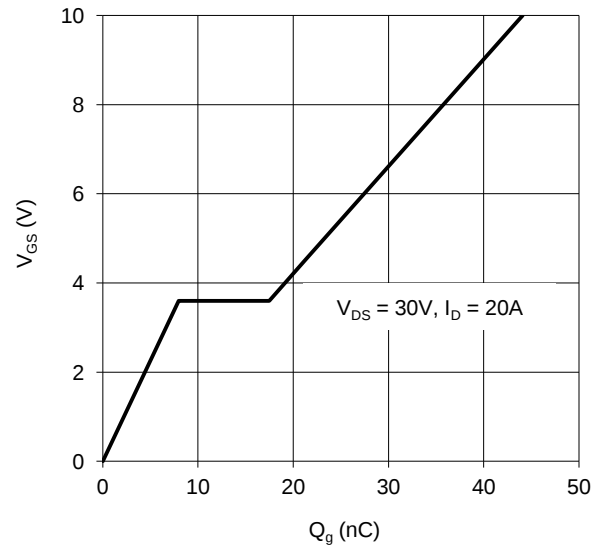


Figure 10 Gate Charge

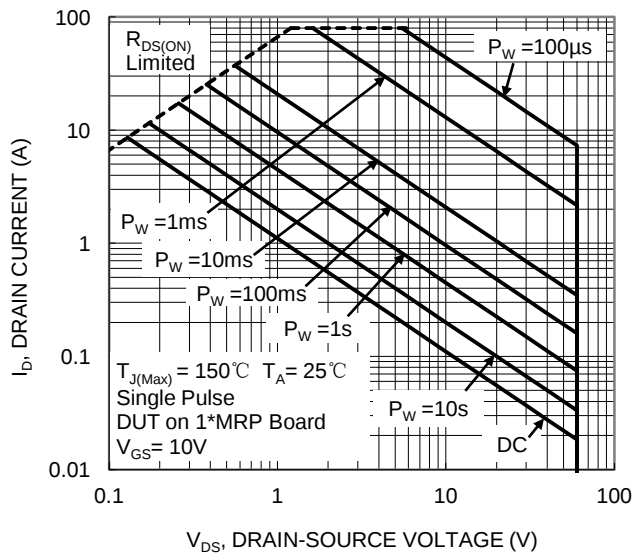


Figure 11 SOA, Safe Operation Area

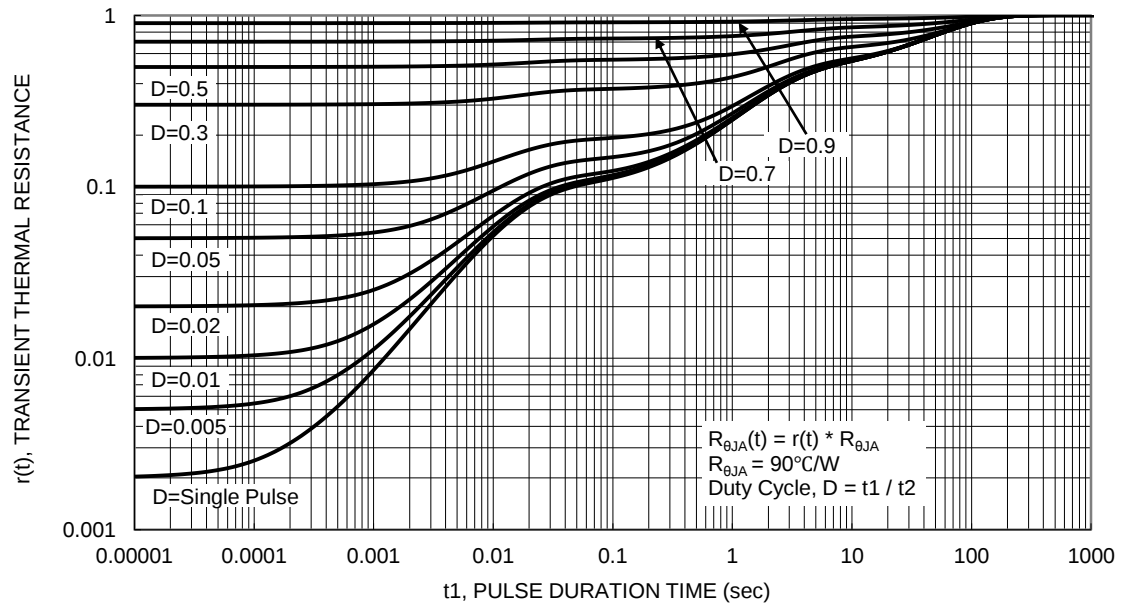
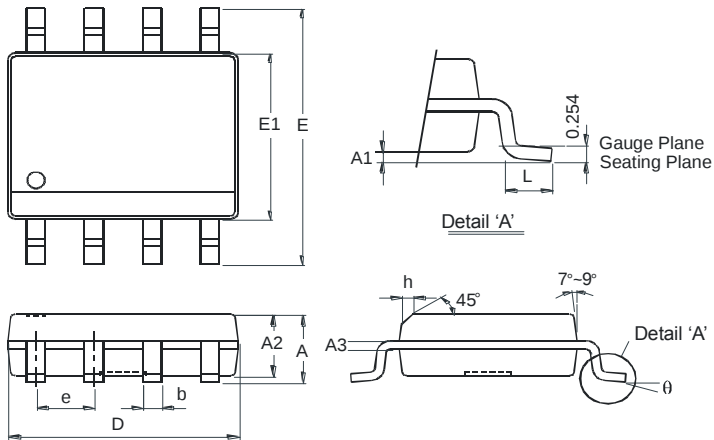


Figure 12 Transient Thermal Resistance

## Package Outline Dimensions

Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version

### SO-8

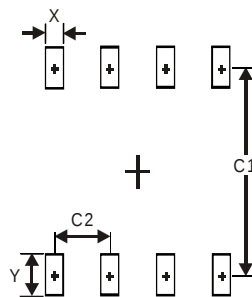


| SO-8                 |          |      |
|----------------------|----------|------|
| Dim                  | Min      | Max  |
| A                    | —        | 1.75 |
| A1                   | 0.10     | 0.20 |
| A2                   | 1.30     | 1.50 |
| A3                   | 0.15     | 0.25 |
| b                    | 0.3      | 0.5  |
| D                    | 4.85     | 4.95 |
| E                    | 5.90     | 6.10 |
| E1                   | 3.85     | 3.95 |
| e                    | 1.27 Typ |      |
| h                    | —        | 0.35 |
| L                    | 0.62     | 0.82 |
| θ                    | 0°       | 8°   |
| All Dimensions in mm |          |      |

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.

### SO-8



| Dimensions | Value (in mm) |
|------------|---------------|
| X          | 0.60          |
| Y          | 1.55          |
| C1         | 5.4           |
| C2         | 1.27          |

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

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