



**THE DATASHEET OF  
DMN4030LK3-13**



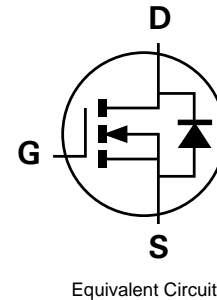
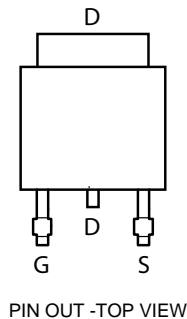
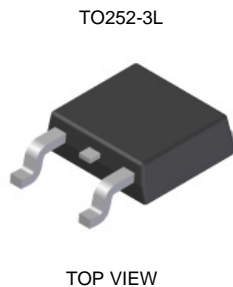
## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)}$                   | $I_D$<br>$T_A = 25^\circ C$ |
|---------------|--------------------------------|-----------------------------|
| 40V           | 30m $\Omega$ @ $V_{GS} = 10V$  | 13.7A                       |
|               | 50m $\Omega$ @ $V_{GS} = 4.5V$ | 10.6A                       |

## Description and Applications

This MOSFET has been designed to minimize the on-state resistance ( $R_{DS(on)}$ ) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- Backlighting
- DC-DC Converters
- Power management functions



## Features and Benefits

- Low on-resistance
- Fast switching speed
- “Green” component and RoHS compliant (Note 1)
- Qualified to AEC-Q101 Standards for High Reliability

## Mechanical Data

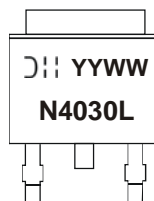
- Case: TO252-3L
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)

## Ordering Information (Note 1)

| Product       | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---------------|---------|--------------------|-----------------|-------------------|
| DMN4030LK3-13 | N4030L  | 13                 | 16              | 2,500             |

Notes: 1. Diodes, Inc. defines “Green” products as those which are RoHS compliant and contain no halogens or antimony compounds; further information about Diodes Inc.’s “Green” Policy can be found on our website. For packaging details, go to our website.

## Marking Information



⑆ = Manufacturer's Marking  
 N4030L = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Year (ex: 09 = 2009)  
 WW = Week (01 - 53)

**Maximum Ratings** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

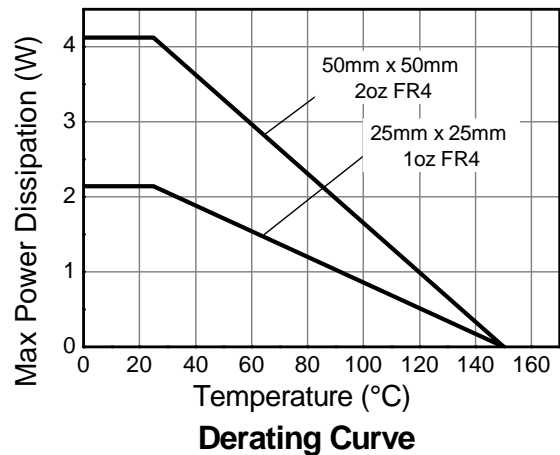
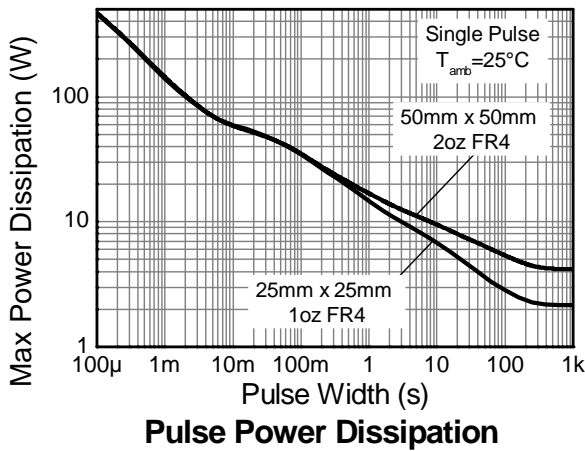
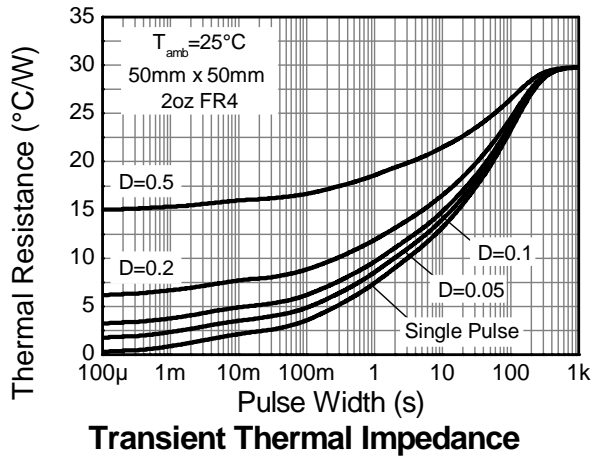
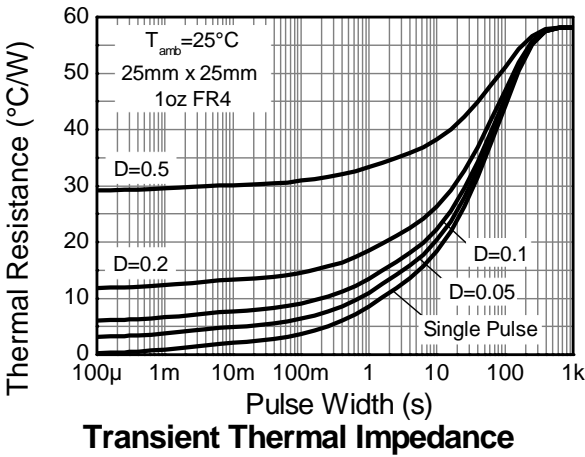
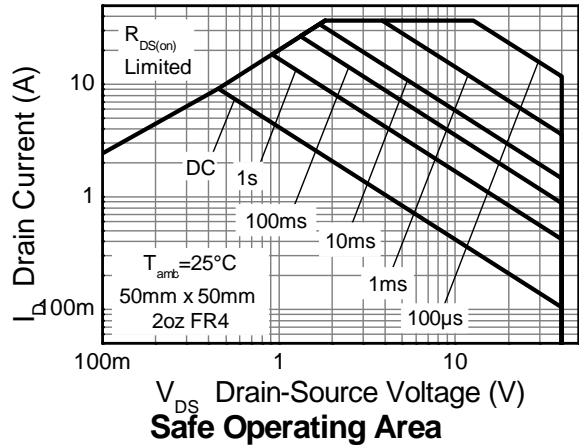
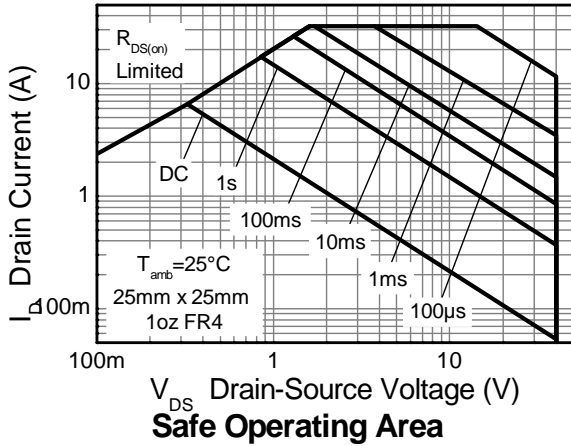
| Characteristic                         |                       |                                   | Symbol    | Value    | Unit |
|----------------------------------------|-----------------------|-----------------------------------|-----------|----------|------|
| Drain-Source voltage                   |                       |                                   | $V_{DSS}$ | 40       | V    |
| Gate-Source voltage                    |                       |                                   | $V_{GS}$  | $\pm 20$ | V    |
| Continuous Drain current               | $V_{GS} = 10\text{V}$ | (Note 2)                          | $I_D$     | 13.7     | A    |
|                                        |                       | $T_A = 70^\circ\text{C}$ (Note 4) |           | 10.9     |      |
|                                        |                       | (Note 3)                          |           | 9.4      |      |
| Pulsed Drain current                   | $V_{GS} = 10\text{V}$ | (Note 5)                          | $I_{DM}$  | 37.7     | A    |
| Continuous Source current (Body diode) |                       |                                   | $I_S$     | 10.7     | A    |
| Pulsed Source current (Body diode)     |                       |                                   | $I_{SM}$  | 37.7     | A    |

**Thermal Characteristics** @ $T_A = 25^\circ\text{C}$  unless otherwise specified

| Characteristic                              |          | Symbol          | Value      | Unit                      |
|---------------------------------------------|----------|-----------------|------------|---------------------------|
| Power dissipation<br>Linear derating factor | (Note 3) | $P_D$           | 4.18       | W<br>mW/ $^\circ\text{C}$ |
|                                             | (Note 4) |                 | 33.4       |                           |
|                                             | (Note 6) |                 | 8.9        |                           |
|                                             |          |                 | 71.4       |                           |
|                                             |          |                 | 2.14       |                           |
| Thermal Resistance, Junction to Ambient     | (Note 3) | $R_{\theta JA}$ | 17.1       | $^\circ\text{C/W}$        |
|                                             | (Note 4) |                 | 29.9       |                           |
|                                             | (Note 6) |                 | 14.0       |                           |
| Thermal Resistance, Junction to Lead        | (Note 7) | $R_{\theta JL}$ | 58.4       |                           |
| Operating and storage temperature range     |          | $T_J, T_{STG}$  | -55 to 150 | $^\circ\text{C}$          |

- Notes:
- AEC-Q101  $V_{GS}$  maximum is  $\pm 16\text{V}$ .
  - For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  - Same as note 3, except the device is measured at  $t \leq 10$  sec.
  - Same as note 3, except the device is pulsed with  $D = 0.02$  and pulse width 300 $\mu\text{s}$ . The pulse current is limited by the maximum junction temperature.
  - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
  - Thermal resistance from junction to solder-point (at the end of the drain lead).

**Thermal Characteristics**

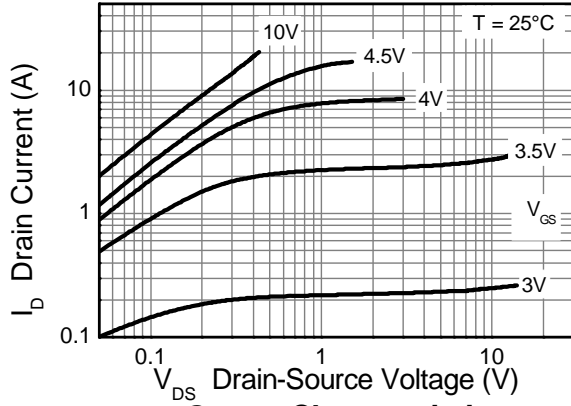


**Electrical Characteristics** @T<sub>A</sub> = 25°C unless otherwise specified

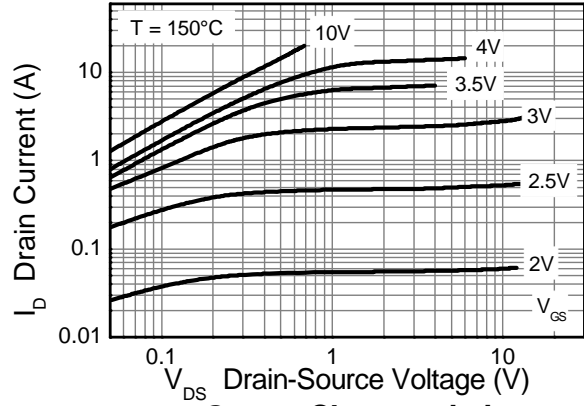
| Characteristic                             | Symbol              | Min | Typ   | Max   | Unit | Test Condition                                                                              |
|--------------------------------------------|---------------------|-----|-------|-------|------|---------------------------------------------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b>                 |                     |     |       |       |      |                                                                                             |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 40  | —     | —     | V    | I <sub>D</sub> = 250μA, V <sub>GS</sub> = 0V                                                |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    | —   | —     | 0.5   | μA   | V <sub>DS</sub> = 40V, 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>                  |                     |     |       |       |      |                                                                                             |
| Gate Threshold Voltage                     | V <sub>GS(th)</sub> | 1.0 | —     | 3.0   | V    | I <sub>D</sub> = 250μA, V <sub>DS</sub> = V <sub>GS</sub>                                   |
| Static Drain-Source On-Resistance (Note 8) | R <sub>DS(on)</sub> | —   | 0.021 | 0.030 | Ω    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A                                                 |
|                                            |                     |     | 0.037 | 0.050 |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A                                                 |
| Forward Transconductance (Notes 8 & 9)     | g <sub>fs</sub>     | —   | 22.8  | —     | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 12A                                                 |
| Diode Forward Voltage (Note 8)             | V <sub>SD</sub>     | —   | 0.95  | 1.1   | V    | I <sub>S</sub> = 12A, V <sub>GS</sub> = 0V                                                  |
| Reverse recovery time (Note 9)             | t <sub>rr</sub>     | —   | 135   | —     | ns   | I <sub>S</sub> = 12A, di/dt = 100A/μs                                                       |
| Reverse recovery charge (Note 9)           | Q <sub>rr</sub>     | —   | 799   | —     | nC   |                                                                                             |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>    |                     |     |       |       |      |                                                                                             |
| Input Capacitance                          | C <sub>iss</sub>    | —   | 604   | —     | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V<br>f = 1MHz                                     |
| Output Capacitance                         | C <sub>oss</sub>    | —   | 106   | —     | pF   |                                                                                             |
| Reverse Transfer Capacitance               | C <sub>rss</sub>    | —   | 59.6  | —     | pF   |                                                                                             |
| Total Gate Charge (Note 10)                | Q <sub>g</sub>      | —   | 6.5   | —     | nC   | V <sub>GS</sub> = 4.5V                                                                      |
| Total Gate Charge (Note 10)                | Q <sub>g</sub>      | —   | 12.9  | —     | nC   | V <sub>GS</sub> = 10V<br>V <sub>DS</sub> = 20V<br>I <sub>D</sub> = 12A                      |
| Gate-Source Charge (Note 10)               | Q <sub>gs</sub>     | —   | 2.3   | —     | nC   |                                                                                             |
| Gate-Drain Charge (Note 10)                | Q <sub>gd</sub>     | —   | 3.6   | —     | nC   |                                                                                             |
| Turn-On Delay Time (Note 10)               | t <sub>D(on)</sub>  | —   | 4.2   | —     | ns   | V <sub>DD</sub> = 20V, V <sub>GS</sub> = 10V<br>I <sub>D</sub> = 12A, R <sub>G</sub> ≅ 6.0Ω |
| Turn-On Rise Time (Note 10)                | t <sub>r</sub>      | —   | 12.4  | —     | ns   |                                                                                             |
| Turn-Off Delay Time (Note 10)              | t <sub>D(off)</sub> | —   | 13.8  | —     | ns   |                                                                                             |
| Turn-Off Fall Time (Note 10)               | t <sub>f</sub>      | —   | 10.7  | —     | ns   |                                                                                             |

- Notes:
8. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
  9. For design aid only, not subject to production testing.
  10. Switching characteristics are independent of operating junction temperatures.

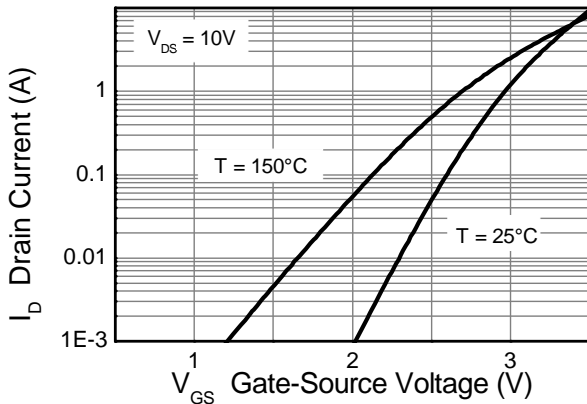
**Typical Characteristics**



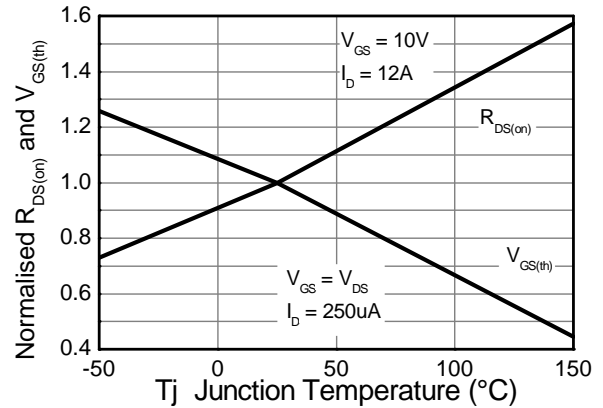
**Output Characteristics**



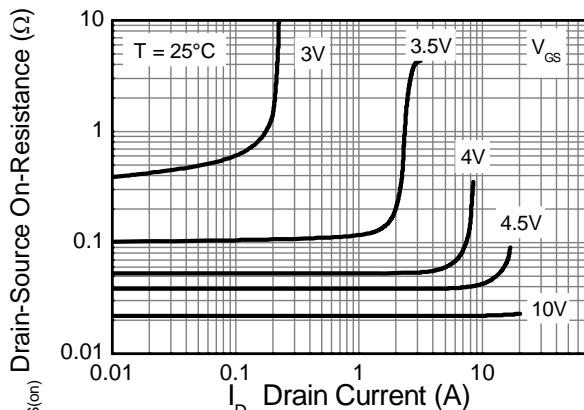
**Output Characteristics**



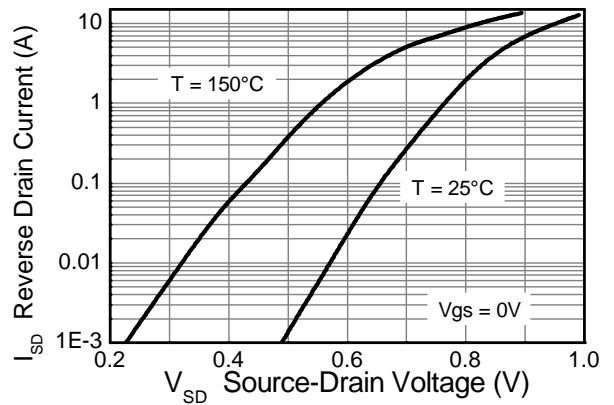
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

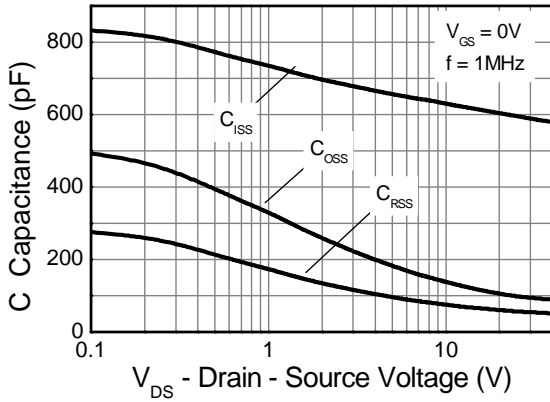


**On-Resistance v Drain Current**

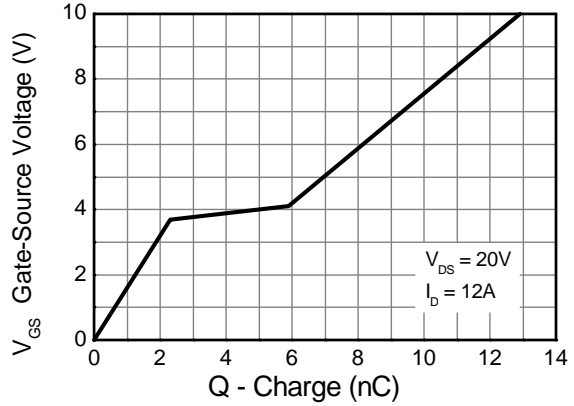


**Source-Drain Diode Forward Voltage**

**Typical Characteristics - continued**

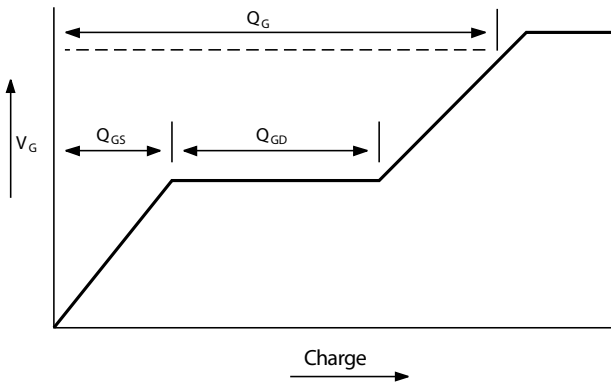


**Capacitance v Drain-Source Voltage**

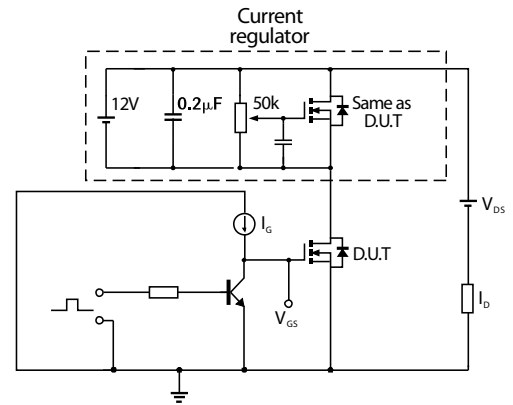


**Gate-Source Voltage v Gate Charge**

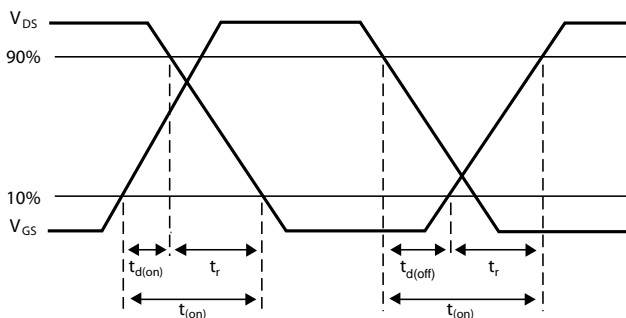
**Test Circuits**



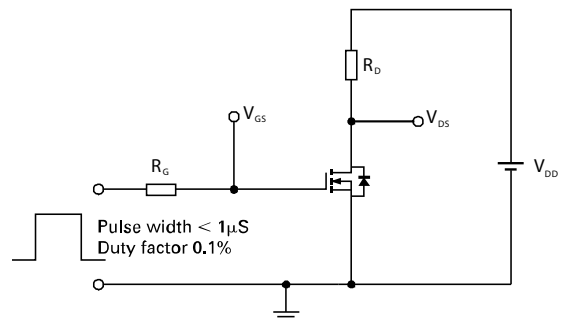
**Basic gate charge waveform**



**Gate charge test circuit**

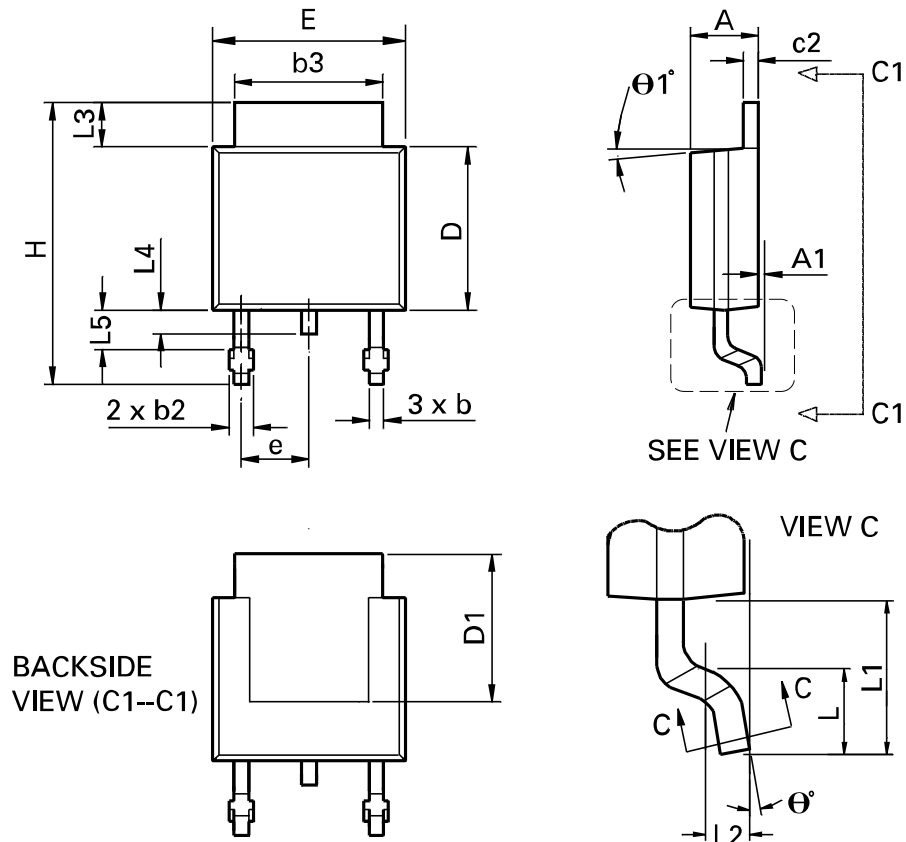


**Switching time waveforms**



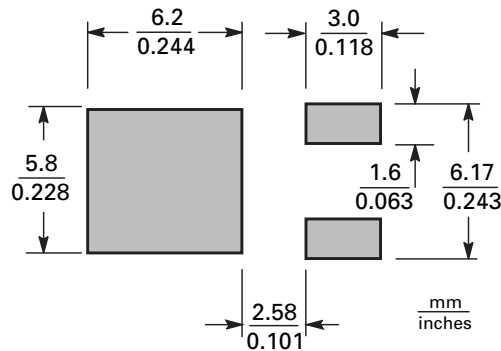
**Switching time test circuit**

**Package Outline Dimensions**



| DIM | Inches |       | Millimeters |       | DIM              | Inches    |       | Millimeters |       |
|-----|--------|-------|-------------|-------|------------------|-----------|-------|-------------|-------|
|     | Min    | Max   | Min         | Max   |                  | Min       | Max   | Min         | Max   |
| A   | 0.086  | 0.094 | 2.18        | 2.39  | e                | 0.090 BSC |       | 2.29 BSC    |       |
| A1  | -      | 0.005 | -           | 0.127 | H                | 0.370     | 0.410 | 9.40        | 10.41 |
| b   | 0.020  | 0.035 | 0.508       | 0.89  | L                | 0.055     | 0.070 | 1.40        | 1.78  |
| b2  | 0.030  | 0.045 | 0.762       | 1.14  | L1               | 0.108 REF |       | 2.74 REF    |       |
| b3  | 0.205  | 0.215 | 5.21        | 5.46  | L2               | 0.020 BSC |       | 0.508 BSC   |       |
| c   | 0.018  | 0.024 | 0.457       | 0.61  | L3               | 0.035     | 0.065 | 0.89        | 1.65  |
| c2  | 0.018  | 0.023 | 0.457       | 0.584 | L4               | 0.025     | 0.040 | 0.635       | 1.016 |
| D   | 0.213  | 0.245 | 5.41        | 6.22  | L5               | 0.045     | 0.060 | 1.14        | 1.52  |
| D1  | 0.205  | -     | 5.21        | -     | $\theta_1^\circ$ | 0°        | 10°   | 0°          | 10°   |
| E   | 0.250  | 0.265 | 6.35        | 6.73  | $\theta^\circ$   | 0°        | 15°   | 0°          | 15°   |
| E1  | 0.170  | -     | 4.32        | -     | -                | -         | -     | -           | -     |

## Suggested Pad Layout



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