

## Features

- $BV_{DSS} = 500V$
- $R_{DS(ON,MAX)} = 1.5\Omega @ V_{GS}=10V, I_D = 2.2A$
- Low input capacitance and gate charge
- 100% avalanche tested
- dv/dt improved
- ESD protection
- RoHS and green compliant packages
- TO-252 package

## Applications

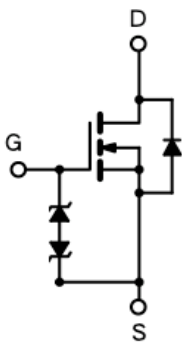
- High voltage SMPS power supply switch
- High efficiency power converter

## General Description

The LD7915 is an N-channel power MOSFET for high input voltage. It provides very low  $R_{DS(ON)}$  resistance and low input capacitance of gate charging.

The typical application of LD7915 is used to be a high efficiency power converter.

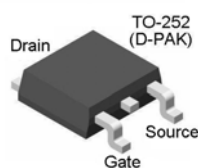
## Equivalent Block Diagram



## Ordering Information

| Part No. | Package  | Packing Options |                  |
|----------|----------|-----------------|------------------|
|          |          | Tube (TU)       | Tape & Reel (TR) |
| LD7915   | TO-252-3 | LD7915T6-TU     | LD7915T6-TR      |

## Package Pin Out



## Product Marking

|          |                                      |
|----------|--------------------------------------|
| LD8888   | ◇ Line 1 – “LD” is a fixed character |
| SSSSS... | 8888: product name                   |
| .        | ◇ Line 2 – SSSSS...: lot number      |

## Thermal Characteristics

| Symbol          | Parameter                             | Value | Unit          |
|-----------------|---------------------------------------|-------|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction-Case Max | 1.78  | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-Ambient  | 62.5  | $^{\circ}C/W$ |

**Notes:** Surface mounted on FR4 board  $t \leq 10\text{sec}$

## Absolute Maximum Ratings

| Symbol         | Parameter  | Limit      | Unit             |
|----------------|--|------------|------------------|
| $V_{DS}$       | Drain-Source Voltage                                 | 500        | V                |
| $V_{GS}$       | Gate-Source Voltage                                  | $\pm 30$   | V                |
| $I_D$          | Drain Current-Continuous, $T_C = 25^\circ\text{C}$   | 4.4        | A                |
| $I_{DM}$       | Drain Current-Pulsed <sup>*1</sup>                   | 17.8       | A                |
| $E_{AS}$       | Single Pulsed Avalanche Energy <sup>*2</sup>         | 130        | mJ               |
| $I_{AS}$       | Single Avalanche Energy <sup>*3</sup>                | 4.4        | A                |
| $P_D$          | Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$ | 70         | W                |
| $T_J, T_{STG}$ | Operating and Store Temperature Range                | -55 to 150 | $^\circ\text{C}$ |

The values beyond the boundaries of absolute maximum rating may cause the damage to the device. Functional operation in this context is not implied. Continuous use of the device at the absolute rating level might influence device reliability. All voltages have their reference to device ground.

## Electrical Characteristics

$T_A = 25^\circ\text{C}$  unless specified, otherwise minimum and maximum values are guaranteed by production testing requirements.

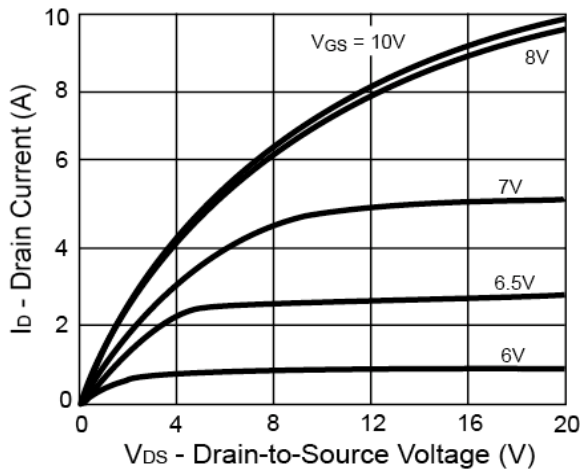
| Parameter                                 | Symbol       | Test Condition   | Min. | Typ. | Max.     | Unit          |
|---|--------------|--|------|------|----------|---------------|
| <b>Static Characteristics</b>             |              |  |      |      |          |               |
| Drain-Source Breakdown Voltage            | $BV_{DSS}$   | $V_{GS} = 0V, I_D = 250\mu\text{A}$  | 500  | –    | –        | V             |
| Drain-Source On-State Resistance          | $R_{DS(ON)}$ | $V_{GS} = 10V, I_D = 2.2A$   | –    | 1.2  | 1.5      | $\Omega$      |
| Gate Threshold Voltage                    | $V_{GS(TH)}$ | $V_{DS} = V_{GS}, I_D = 50\mu\text{A}$   | 3.0  | –    | 4.8      | V             |
| Zero Gate Voltage Drain Current           | $I_{DSS}$    | $V_{DS} = 500V, V_{GS} = 0V$   | –    | –    | 1        | $\mu\text{A}$ |
| Gate Body Leakage                         | $I_{GSS}$    | $V_{GS} = \pm 20V, V_{DS} = 0V$  | –    | –    | $\pm 10$ | $\mu\text{A}$ |
| Forward Transfer Conductance              | $g_{fs}$     | $V_{DS} = 8V, I_D = 1A$  | –    | 3.1  | –        | S             |
| <b>Dynamic Characteristics</b>            |              |  |      |      |          |               |
| Total Gate Charge                         | $Q_g$        | $V_{DS} = 250V, I_D = 4.4A,$<br>$V_{GS} = 10V$ <sup>*4*5</sup>                 | –    | 20   | –        | nC            |
| Gate-Source Charge                        | $Q_{gs}$     |  | –    | 4.3  | –        |               |
| Gate-Drain Charge                         | $Q_{gd}$     |  | –    | 10   | –        |               |
| Input Capacitance                         | $C_{iss}$    | $V_{DS} = 25V, V_{GS} = 0V,$<br>$f = 1.0\text{MHz}$                            | –    | 537  | –        | pF            |
| Output Capacitance                        | $C_{oss}$    |  | –    | 77   | –        |               |
| Reverse Transfer Capacitance              | $C_{rss}$    |  | –    | 17   | –        |               |
| <b>Switching Characteristics</b>          |              |  |      |      |          |               |
| Turn-On Delay Time                        | $t_{d(on)}$  | $V_{GS} = 10V, I_D = 4.4A,$<br>$V_{DD} = 250V, R_G = 25\Omega$ <sup>*4*5</sup> | –    | 21.9 | –        | nS            |
| Turn-On Rise Time                         | $t_r$        |  | –    | 11.8 | –        | nS            |
| Turn-Off Delay Time                       | $t_{d(off)}$ |  | –    | 14.8 | –        | nS            |
| Turn-Off Fall Time                        | $t_f$        |  | –    | 4.5  | –        | nS            |
| <b>Drain-Source Diode Characteristics</b> |              |  |      |      |          |               |
| Source Current                            | $I_S$        | Integral reverse diode in the MOSFET   | –    | –    | 4.4      | A             |
| Source Current (Pulse)                    | $I_{SM}$     |  | –    | –    | 17.8     | A             |
| Diode Forward Voltage                     | $V_{SD}$     | $I_S = 4.4A, V_{GS} = 0V$  | –    | 0.82 | 1.2      | V             |
| Reverse Recovery Time                     | $t_{fr}$     | $V_{DD} = 30V, I_S = 4.4A,$  | –    | 315  | –        | nS            |
| Reverse Recovery Charge                   | $Q_{fr}$     | $dI_e/dt = 100A/\mu\text{S}$ <sup>*4</sup>                                     | –    | 1430 | –        | $\mu\text{C}$ |

### Notes :

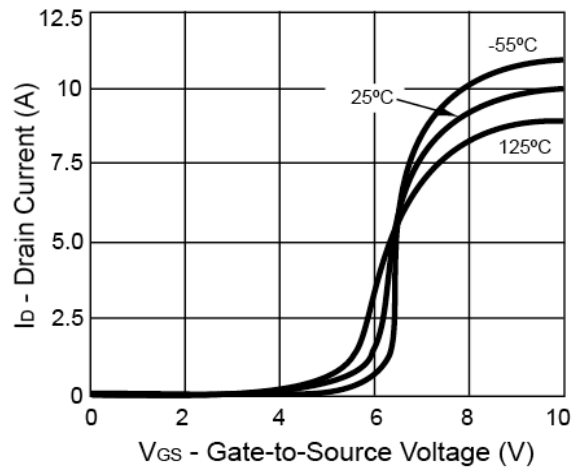
- Limited by maximum junction temperature
- Starting  $V_{DD} = 50V, I_{AS} = 4.4A, L = 100\mu\text{H}, T_J = 25^\circ\text{C}$
- Repetitive rating: pulse width limited by maximum junction temperature
- Pulse test: pulse width  $\leq 300\mu\text{S}$ , duty cycle  $\leq 2\%$
- Essentially Independent of Operating Temperature

**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

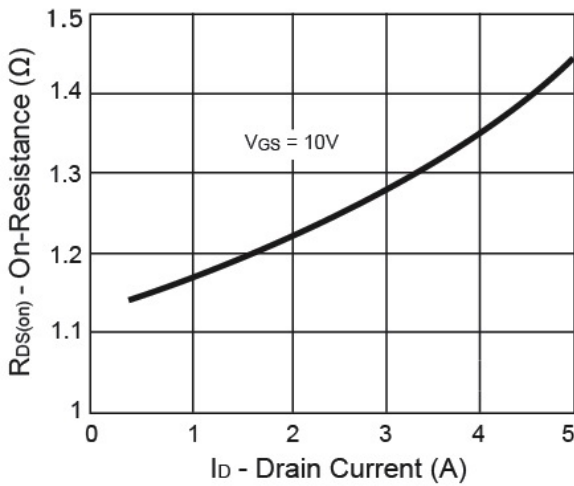
**Output Characteristics**



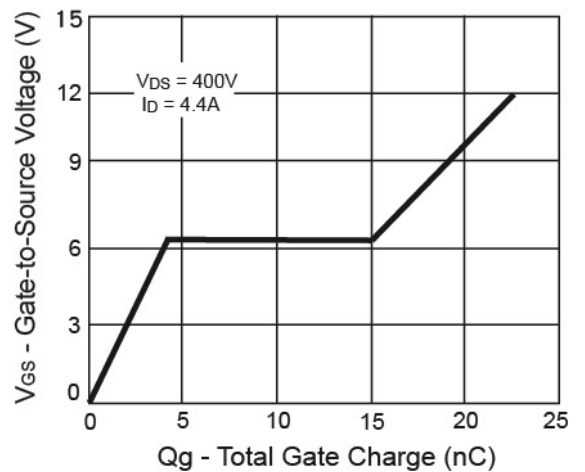
**Transfer Characteristics**



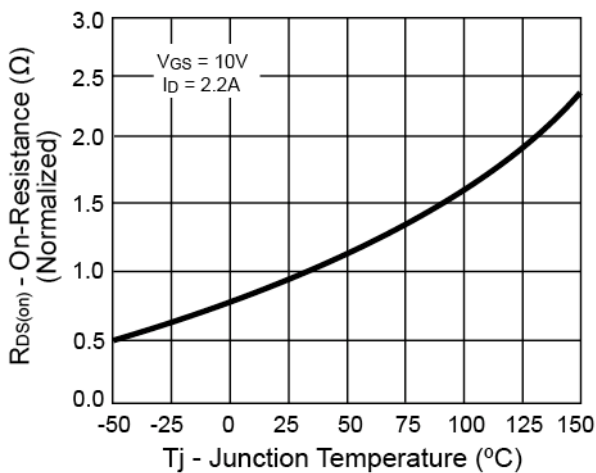
**On-Resistance vs. Drain Current**



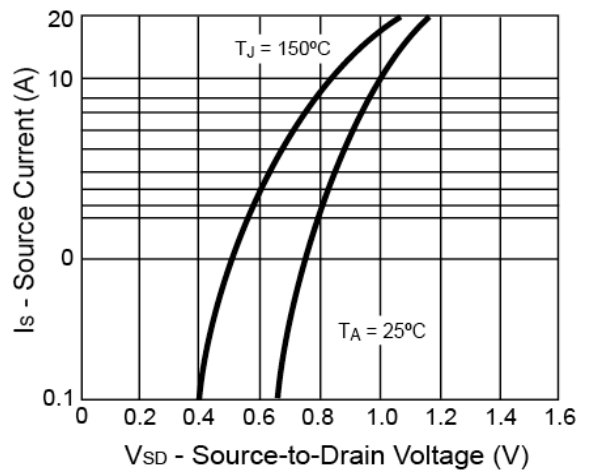
**Gate Charge**



**On-Resistance vs. Junction Temperature**

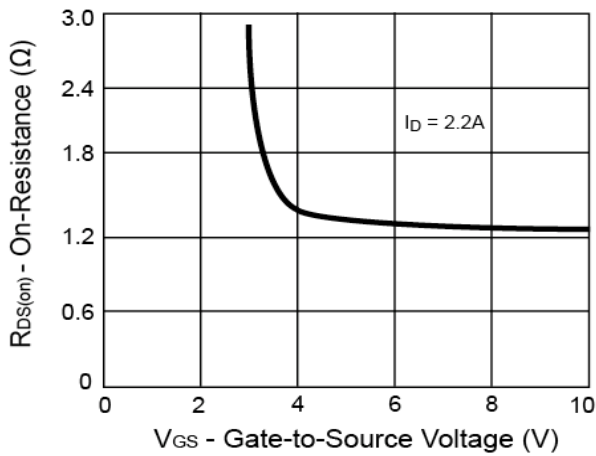


**Source-Drain Diode Forward Voltage**

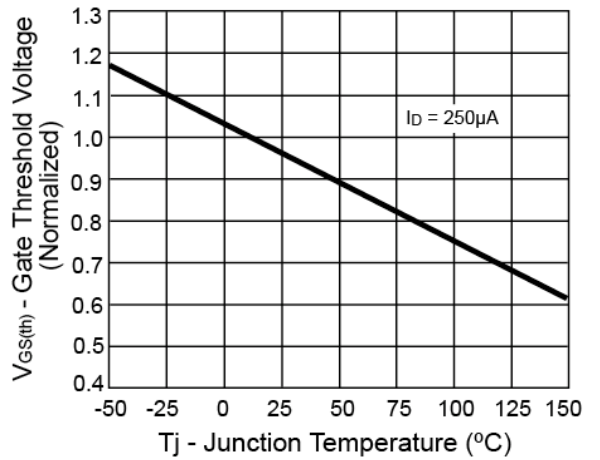


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

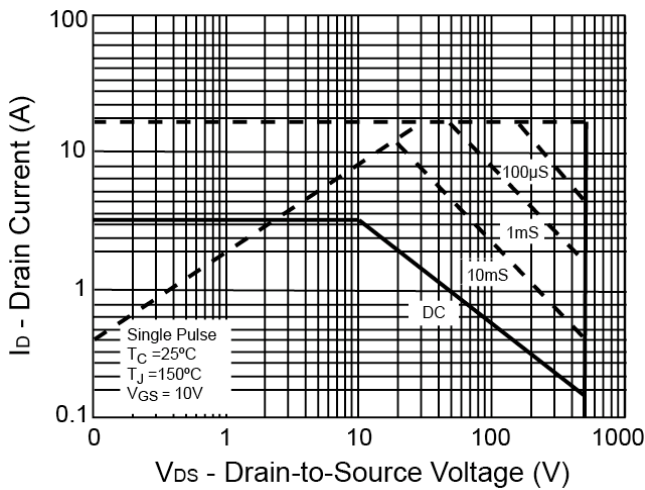
**On-Resistance vs. Gate-Source Voltage**



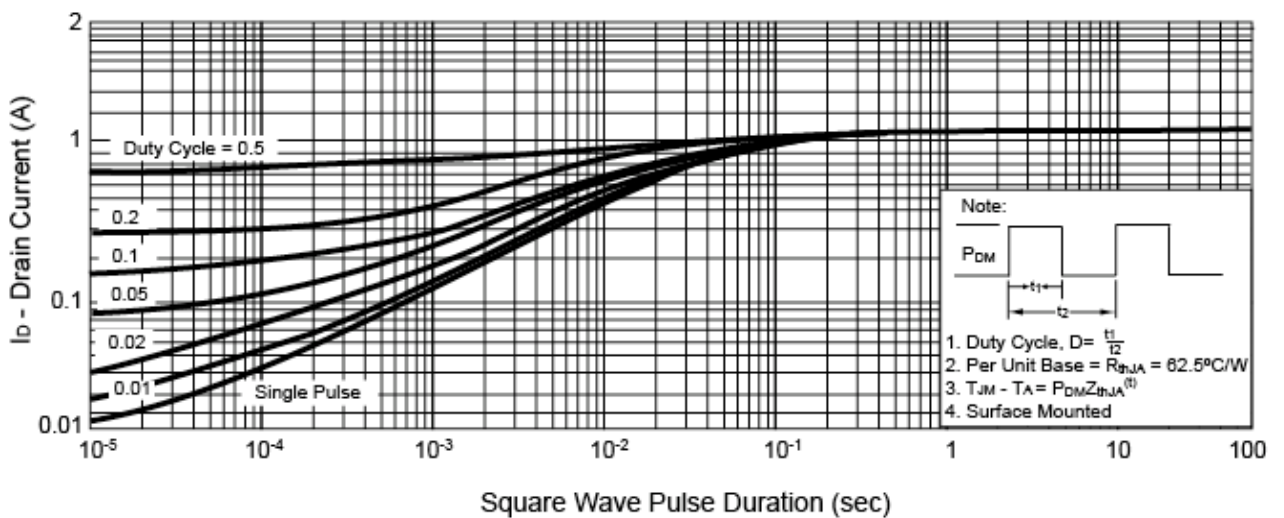
**Threshold Voltage**



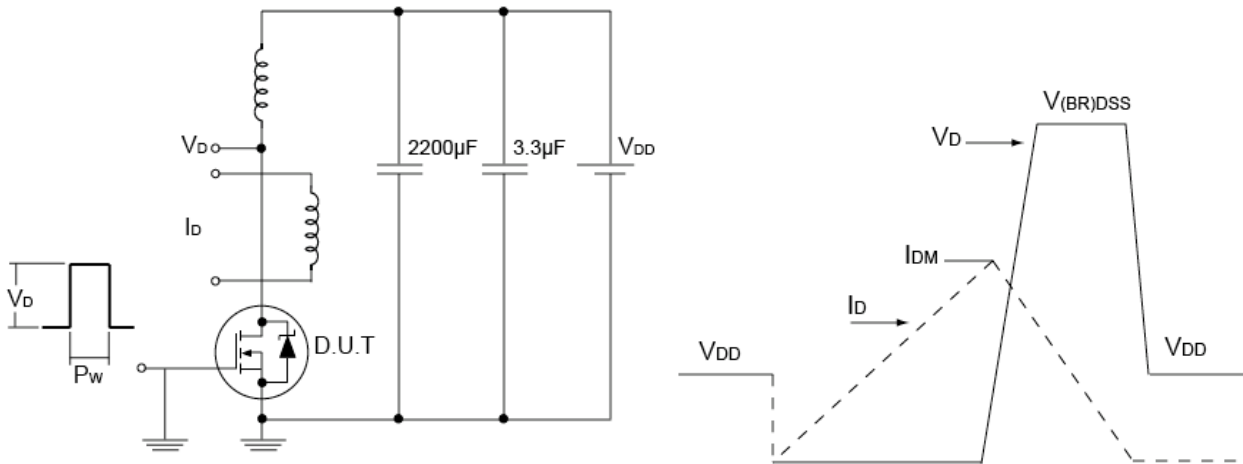
**Maximum Safe Operating Area**



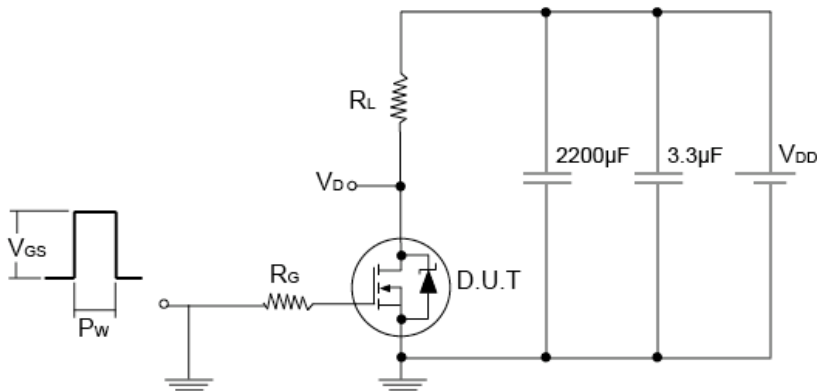
**Normalized Thermal Transient Impedance, Junction-to-Ambient**



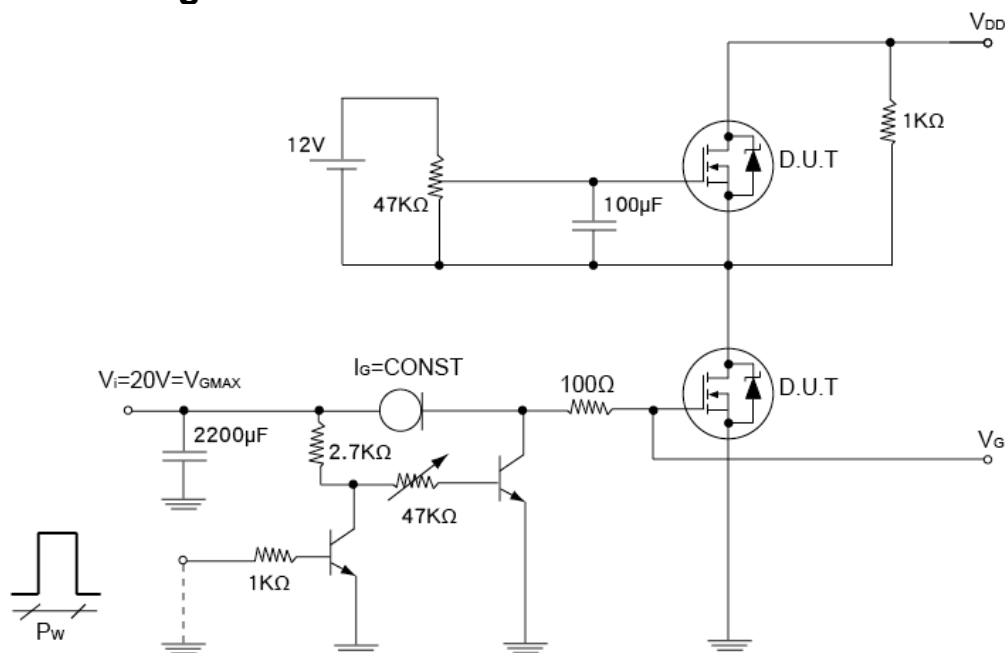
### Unclamped Inductive Load Test Circuit & Waveform



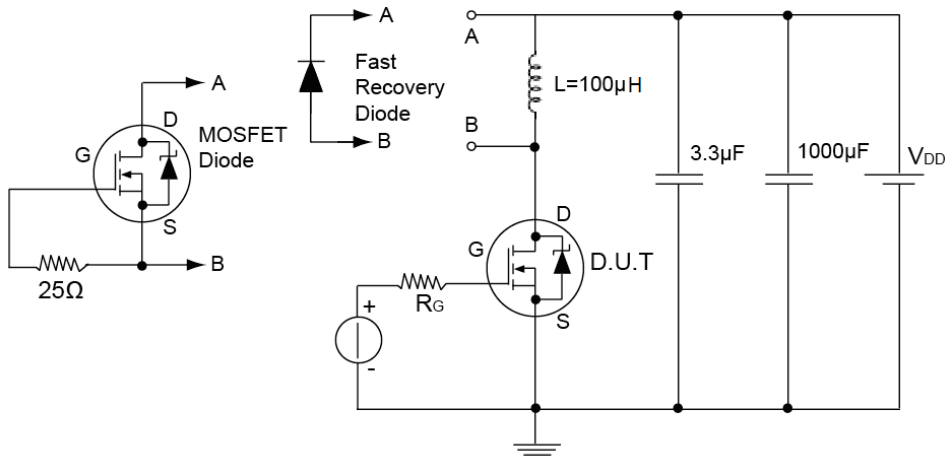
### Switching Test Circuit for Resistive Load



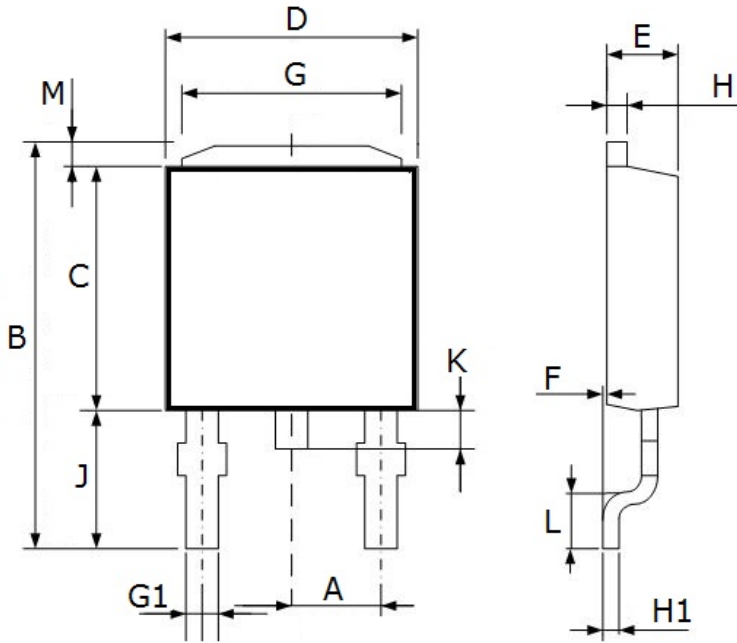
### Gate Charge Test Circuit



### Test Circuit for Inductive Load Switching and Diode Recovery Times



**Package Outline**



| TO-252 DIMENSION |             |       |           |       |
|------------------|-------------|-------|-----------|-------|
| DIM              | MILLIMETERS |       | INCHES    |       |
|                  | MIN         | MAX   | MIN       | MAX   |
| A                | 2.30 BSC    |       | 0.090 BSC |       |
| B                | 10.20       | 10.80 | 0.402     | 0.425 |
| C                | 5.30        | 5.70  | 0.209     | 0.224 |
| D                | 6.30        | 6.70  | 0.248     | 0.264 |
| E                | 2.10        | 2.50  | 0.083     | 0.098 |
| F                | 0.00        | 0.20  | 0.000     | 0.008 |
| G                | 4.80        | 5.20  | 0.189     | 0.205 |
| G1               | 0.40        | 0.80  | 0.016     | 0.031 |
| H                | 0.40        | 0.60  | 0.016     | 0.024 |
| H1               | 0.35        | 0.65  | 0.014     | 0.026 |
| J                | 3.35        | 3.65  | 0.132     | 0.144 |
| K                | 0.50        | 1.10  | 0.020     | 0.043 |
| L                | 0.90        | 1.50  | 0.035     | 0.059 |
| M                | 1.30        | 1.70  | 0.051     | 0.067 |

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