

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)}$                   | $I_D$<br>$T_A = +25^\circ C$ |
|---------------|--------------------------------|------------------------------|
| 30V           | 20m $\Omega$ @ $V_{GS} = 10V$  | 18.4A                        |
|               | 30m $\Omega$ @ $V_{GS} = 4.5V$ | 15.0A                        |

## Description

This new generation 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.

## Applications

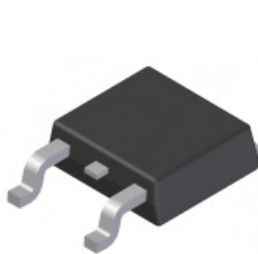
- Backlighting
- DC-DC Converters
- Power Management Functions

## Features

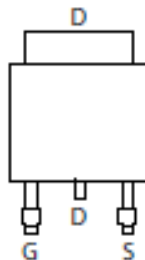
- Low  $R_{DS(ON)}$  – Ensures on State Losses Are Minimized
- Small Form Factor Thermally Efficient Package Enables Higher Density End Products
- **Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

## Mechanical Data

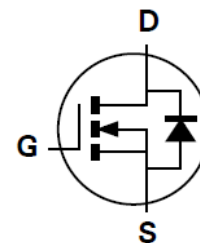
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Weight: 0.33 grams (approximate)



Top View



Pin Out Top View



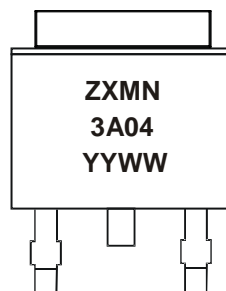
Equivalent Circuit

## Ordering Information (Note 4)

| Part Number | Case  | Packaging        |
|-------------|-------|------------------|
| ZXMN3A04KTC | TO252 | 2500/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  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



ZXMN3A04 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 14 = 2014)  
 WW = Week Code (01 to 53)

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

| Characteristic                                  |              |                                 | Symbol           | Value | Unit |
|---|--------------|---------------------------------|------------------|-------|------|
| Drain-Source Voltage                            |              |                                 | V <sub>DSS</sub> | 30    | V    |
| Gate-Source Voltage                             |              |                                 | V <sub>GSS</sub> | ±20   | V    |
| Continuous Drain Current V <sub>GS</sub> = 10V  | Steady State | T <sub>A</sub> = +25°C (Note 5) | I <sub>D</sub>   | 18.4  | A    |
|   |              | T <sub>A</sub> = +70°C (Note 5) |                  | 14.7  |      |
|   |              | T <sub>A</sub> = +25°C (Note 6) |                  | 12.0  |      |
| Pulsed Drain Current (Note 7)                   |              |                                 | I <sub>DM</sub>  | 66    | A    |
| Continuous Source Current (Body Diode) (Note 5) |              |                                 | I <sub>S</sub>   | 11.5  | A    |
| Pulsed Source Current (Body Diode) (Note 7)     |              |                                 | I <sub>SM</sub>  | 66    | A    |

**Thermal Characteristics**

| Characteristic                                       | Symbol                            | Value       | Units |
|--|-----------------------------------|-------------|-------|
| Power Dissipation at T <sub>A</sub> = +25°C (Note 6) | P <sub>D</sub>                    | 4.3         | W     |
| Linear Derating Factor                               |                                   | 34.4        | mW/°C |
| Power Dissipation at T <sub>A</sub> = +25°C (Note 5) | P <sub>D</sub>                    | 10.1        | W     |
| Linear Derating Factor                               |                                   | 80.8        | mW/°C |
| Power Dissipation at T <sub>A</sub> = +25°C (Note 8) | P <sub>D</sub>                    | 2.15        | W     |
| Linear Derating Factor                               |                                   | 17.2        | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 6)     | R <sub>θJA</sub>                  | 29          | °C/W  |
| Thermal Resistance, Junction to Ambient (Note 5)     | R <sub>θJA</sub>                  | 12.3        | °C/W  |
| Thermal Resistance, Junction to Ambient (Note 8)     | R <sub>θJA</sub>                  | 58          | °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>                         |                     |     |      |      |      |  |
| Drain-Source Breakdown Voltage                     | BV <sub>DSS</sub>   | 30  | —    | —    | V    | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA   |
| Zero Gate Voltage Drain Current                    | I <sub>DSS</sub>    | —   | —    | 0.5  | μA   | V <sub>DS</sub> = 30V, 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 | —    | —    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250mA                               |
| Static Drain-Source On-Resistance (Note 9)         | R <sub>DS(on)</sub> | —   | —    | 20   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A  |
|  |                     | —   | —    | 30   |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 9.8A  |
| Diode Forward Voltage (Note 9)                     | V <sub>SD</sub>     | —   | 0.85 | 0.95 | V    | T <sub>J</sub> = +25°C, I <sub>S</sub> = 6.8A, V <sub>GS</sub> = 0V                      |
| Forward Transconductance (Notes 9 & 11)            | g <sub>fs</sub>     | —   | 22.1 | —    | S    | V <sub>DS</sub> = 15V, I <sub>D</sub> = 12.6A  |
| <b>DYNAMIC CHARACTERISTICS (Notes 10 &amp; 11)</b> |                     |     |      |      |      |  |
| Input Capacitance                                  | C <sub>iss</sub>    | —   | 1890 | —    | pF   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 0V, f = 1.0MHz                                  |
| Output Capacitance                                 | C <sub>oss</sub>    | —   | 349  | —    |      |  |
| Reverse Transfer Capacitance                       | C <sub>rss</sub>    | —   | 218  | —    |      |  |
| Total Gate Charge (V <sub>GS</sub> = 5V)           | Q <sub>g</sub>      | —   | 19.9 | —    | nC   | V <sub>DS</sub> = 15V, I <sub>D</sub> = 6.5A   |
| Total Gate Charge (V <sub>GS</sub> = 10V)          | Q <sub>g</sub>      | —   | 36.8 | —    |      |  |
| Gate-Source Charge                                 | Q <sub>gs</sub>     | —   | 5.8  | —    |      |  |
| Gate-Drain Charge                                  | Q <sub>gd</sub>     | —   | 7.1  | —    |      |  |
| Turn-On Delay Time                                 | t <sub>D(ON)</sub>  | —   | 5.2  | —    | ns   | V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 1A, R <sub>GEN</sub> = 6Ω |
| Turn-On Rise Time                                  | t <sub>R</sub>      | —   | 6.1  | —    |      |  |
| Turn-Off Delay Time                                | t <sub>D(OFF)</sub> | —   | 38.1 | —    |      |  |
| Turn-Off Fall Time                                 | t <sub>F</sub>      | —   | 20.2 | —    |      |  |
| Reverse Recovery Time                              | t <sub>RR</sub>     | —   | 18.4 | —    | ns   | I <sub>S</sub> = 2.3A, di/dt = 100A/μs   |
| Reverse Recovery Charge                            | Q <sub>RR</sub>     | —   | 11   | —    | nC   |  |

- Notes:
- For a device surface mounted on FR4 PCB measured at ≤ 10 sec.
  - 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.
  - Repetitive rating 50mm x 50mm x 1.6mm FR4 PCB, D=0.02 pulse width=300μs - pulse width limited by maximum junction temperature.
  - For a device surface mounted on 50mm x 50mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.
  - Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%.
  - Switching characteristics are independent of operating junction temperature.
  - For design aid only, not subject to production testing.

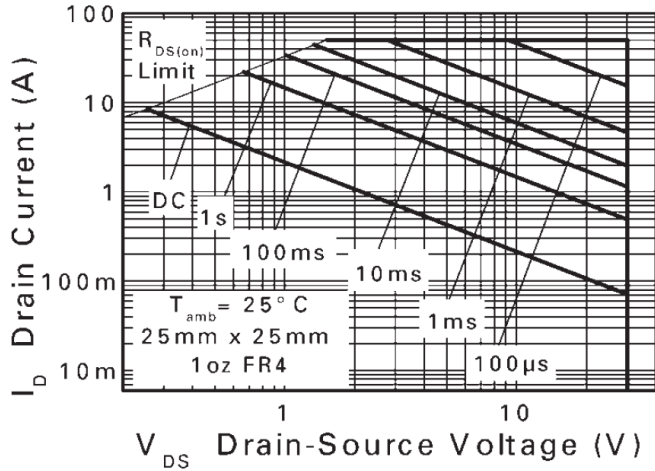


Figure 1. Safe Operating Area

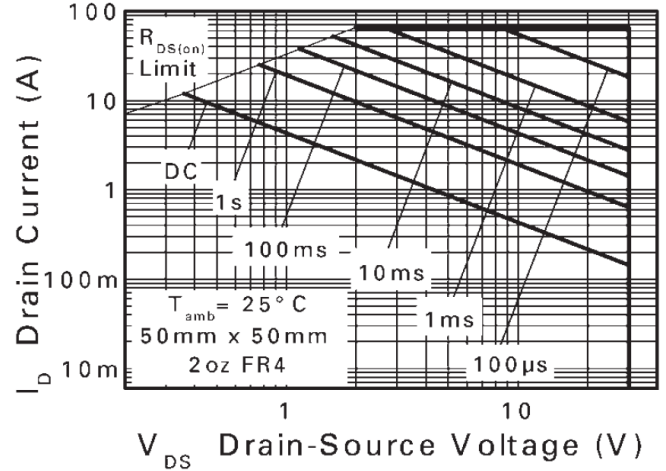


Figure 2. Safe Operating Area

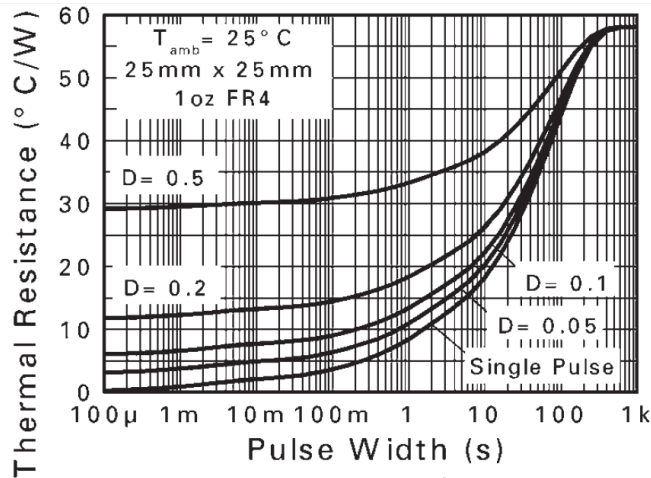


Figure 3. Transient Thermal Impedance

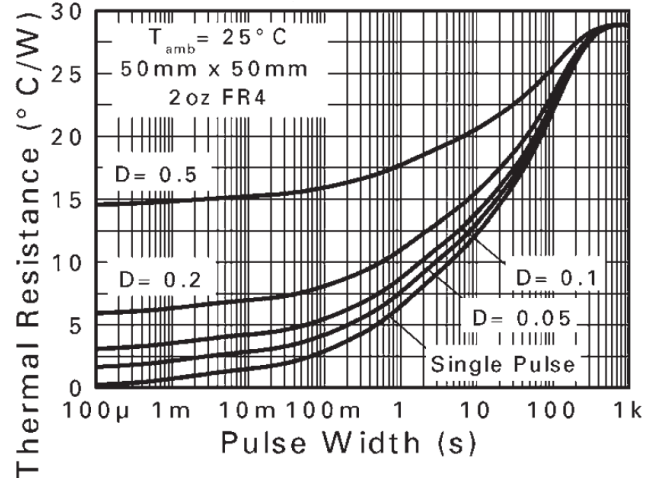


Figure 4. Transient Thermal Impedance

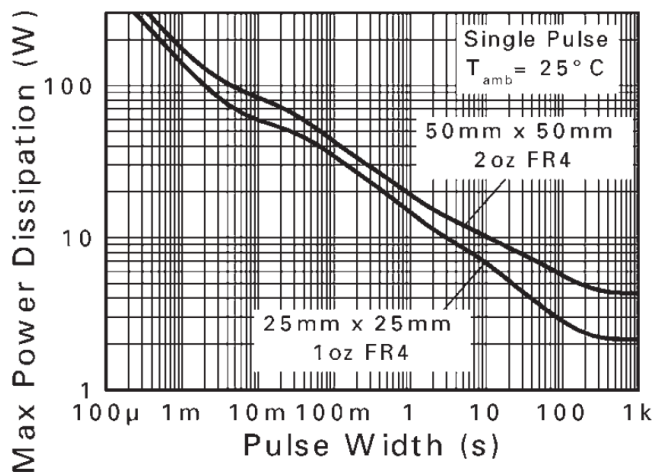


Figure 5. Pulse Power Dissipation

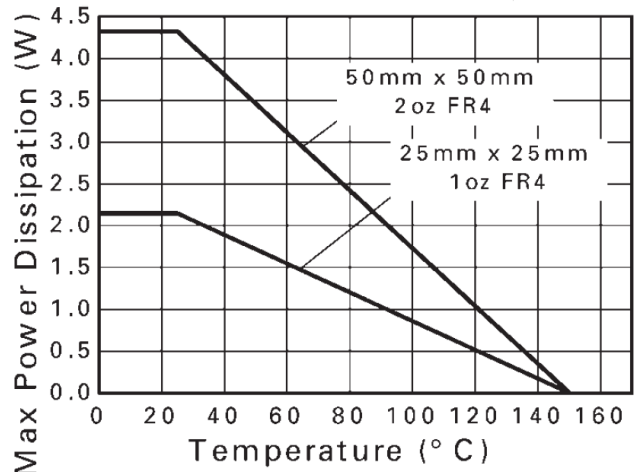


Figure 6. Derating Curve

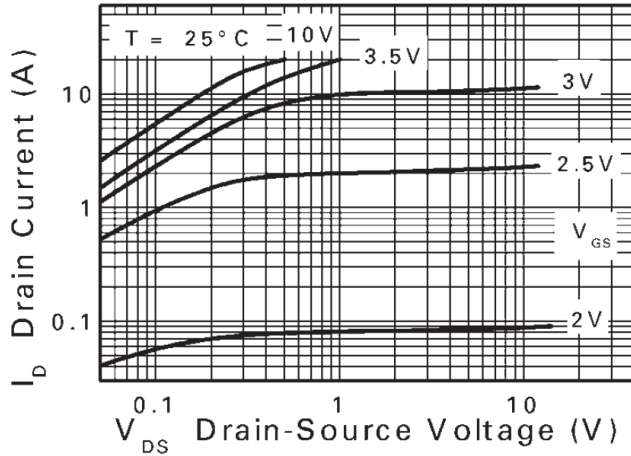


Figure 7. Output Characteristics

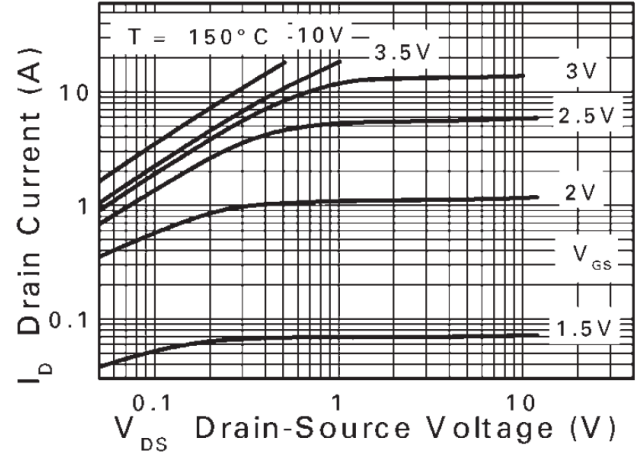


Figure 8. Output Characteristics

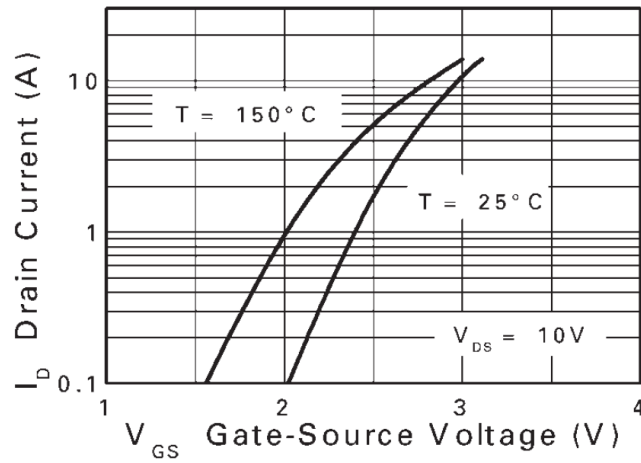


Figure 9. Typical Transfer Characteristics

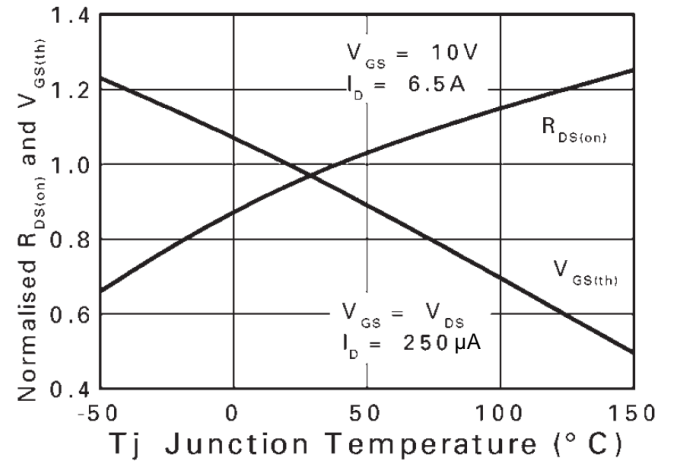


Figure 10. Normalised Curves vs. Temperature

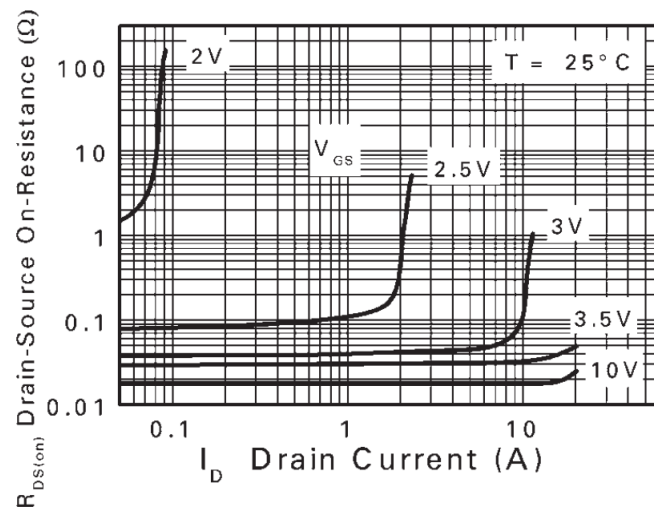


Figure 11. On-Resistance vs. Drain Current

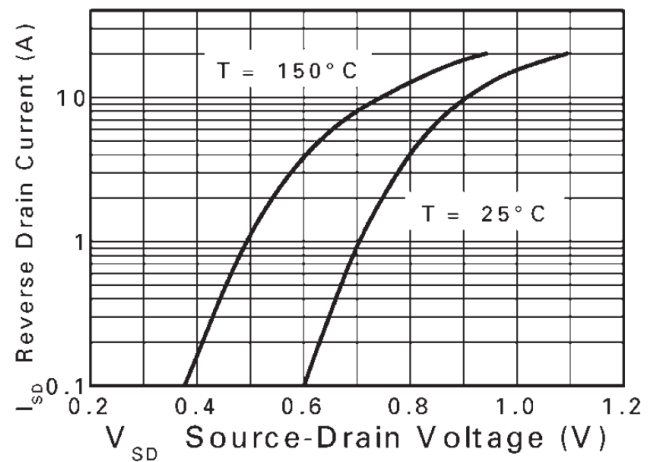


Figure 12. Source-Drain Diode Forward Voltage

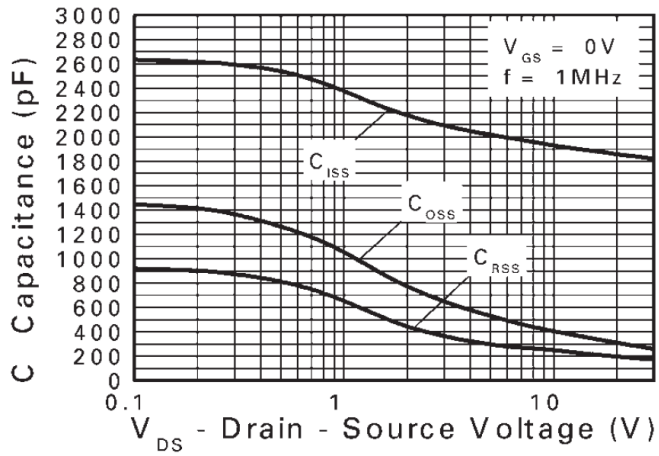


Figure 13. Capacitance vs. Drain-Source Voltage

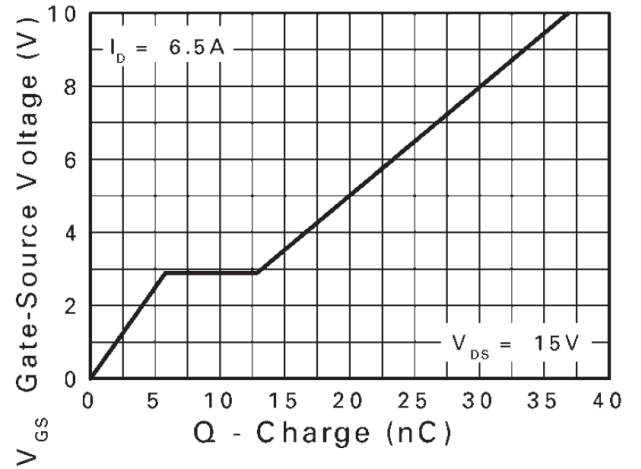
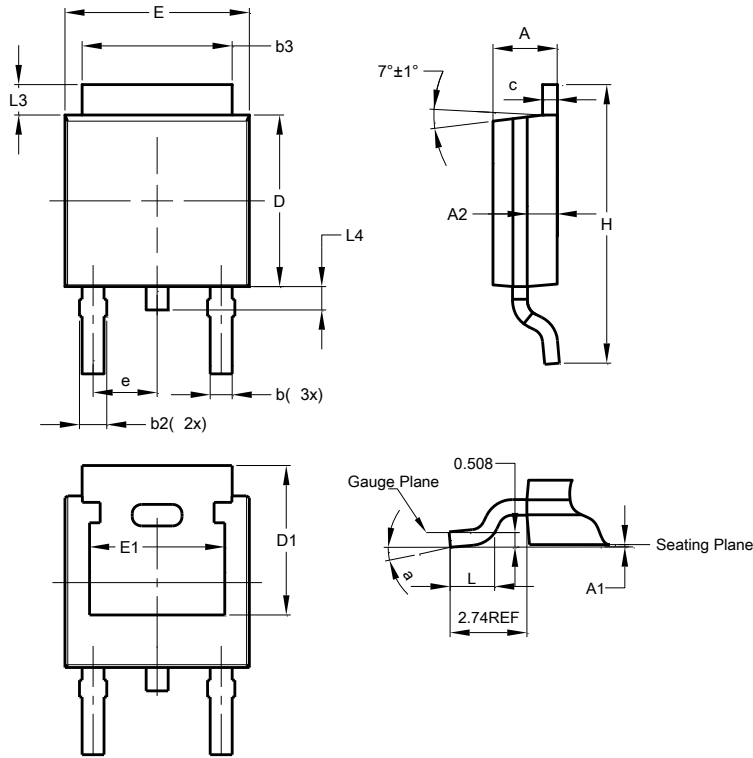


Figure 14. Gate-Source Voltage vs. Gate Charge

## Package Outline Dimensions

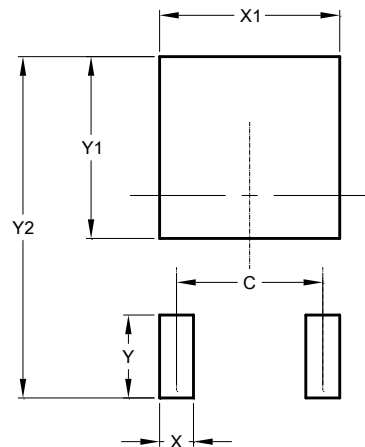
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| TO252 (DPAK)         |      |       |       |
|----------------------|------|-------|-------|
| Dim                  | Min  | Max   | Typ   |
| A                    | 2.19 | 2.39  | 2.29  |
| A1                   | 0.00 | 0.13  | 0.08  |
| A2                   | 0.97 | 1.17  | 1.07  |
| b                    | 0.64 | 0.88  | 0.783 |
| b2                   | 0.76 | 1.14  | 0.95  |
| b3                   | 5.21 | 5.46  | 5.33  |
| c                    | 0.45 | 0.58  | 0.531 |
| D                    | 6.00 | 6.20  | 6.10  |
| D1                   | 5.21 | -     | -     |
| e                    | -    | -     | 2.286 |
| E                    | 6.45 | 6.70  | 6.58  |
| E1                   | 4.32 | -     | -     |
| H                    | 9.40 | 10.41 | 9.91  |
| L                    | 1.40 | 1.78  | 1.59  |
| L3                   | 0.88 | 1.27  | 1.08  |
| L4                   | 0.64 | 1.02  | 0.83  |
| a                    | 0°   | 10°   | -     |
| All Dimensions in mm |      |       |       |

## Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 4.572         |
| X          | 1.060         |
| X1         | 5.632         |
| Y          | 2.600         |
| Y1         | 5.700         |
| Y2         | 10.700        |

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