



#### 30V 175°C N-CHANNEL ENHANCEMENT MODE MOSFET

## **Product Summary**

| BV <sub>DSS</sub> | R <sub>DS(ON)</sub> Max   | I <sub>D</sub> Max<br>T <sub>C</sub> = +25°C |  |  |
|-------------------|---------------------------|--|--|--|
| 30V               | $4m\Omega @V_{GS} = 10V$  | 75A  |  |  |
|                   | $7m\Omega @V_{GS} = 4.5V$ | 75A  |  |  |

## **Features**

- Rated to +175°C Ideal for High Ambient Temperature Environments
- High Conversion Efficiency
- Low R<sub>DS(ON)</sub> Minimizes On-State Losses
- Low Input Capacitance
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)
- Halogen and Antimony Free. "Green" Device (Note 3)
- Qualified to AEC-Q101 Standards for High Reliability
- PPAP Capable (Note 4)

## **Description and Applications**

This MOSFET is designed to meet the stringent requirements of automotive applications. It is qualified to AECQ101, supported by a PPAP and is ideal for use in:

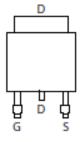
- Power Management Functions
- DC-DC Converters
- BLDC Motor control
- Reverse Polarity Protection

#### **Mechanical Data**

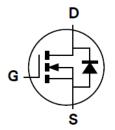
- Case: TO252 (DPAK)
- Case Material: Molded Plastic, "Green" Molding Compound.
   UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Matte Tin Finish. Solderable per MIL-STD-202, Method 208 (3)
- Weight: 0.315 grams (Approximate)







Pin Out Top View



**Equivalent Circuit** 

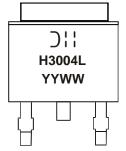
### Ordering Information (Note 5)

| Part Number     | Case         | Packaging         |
|-----------------|--------------|-------------------|
| DMTH3004LK3Q-13 | TO252 (DPAK) | 2,500/Tape & Reel |

Notes:

- 1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
- See 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to http://www.diodes.com/product\_compliance\_definitions.html.
- 5. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

## **Marking Information**



Dili=Manufacturer's Marking
H3004L = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 16 = 2016)
WW = Week Code (01 to 53)



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

| Characteristic                                   | Symbol                   | Value   | Unit            |          |    |
|--|--------------------------|---|-----------------|----------|----|
| Drain-Source Voltage                             | $V_{DSS}$                | 30  | V               |          |    |
| Gate-Source Voltage                              | $V_{GSS}$                | +20<br>-16  | V               |          |    |
| Continuous Dusin Courset V 40V                   | Steady State<br>(Note 7) | $T_{C} = +25^{\circ}C$<br>$T_{C} = +100^{\circ}C$ | I <sub>D</sub>  | 75<br>75 | А  |
| Continuous Drain Current V <sub>GS</sub> = 10V   | Steady State<br>(Note 6) | $T_A = +25^{\circ}C$<br>$T_A = +100^{\circ}C$     | I <sub>D</sub>  | 21<br>15 | А  |
| Pulsed Drain Current (10µs Pulse, Duty Cycle=1%) | I <sub>DM</sub>          | 105   | Α               |          |    |
| Maximum Continuous Body Diode Forward Current    | Is                       | 75  | Α               |          |    |
| Avalanche Current L=5mH                          |                          |   | I <sub>AS</sub> | 10.7     | Α  |
| Avalanche Energy L=5mH                           |                          |   | E <sub>AS</sub> | 287      | mJ |

## Thermal Characteristics (@TA = +25°C, unless otherwise specified.)

| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 7)                 | $P_{D}$                           | 107         | W    |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 50          | °C/W |
| Thermal Resistance, Junction to Case (Note 7)    | R <sub>0JC</sub>                  | 1.4         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +175 | °C   |

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

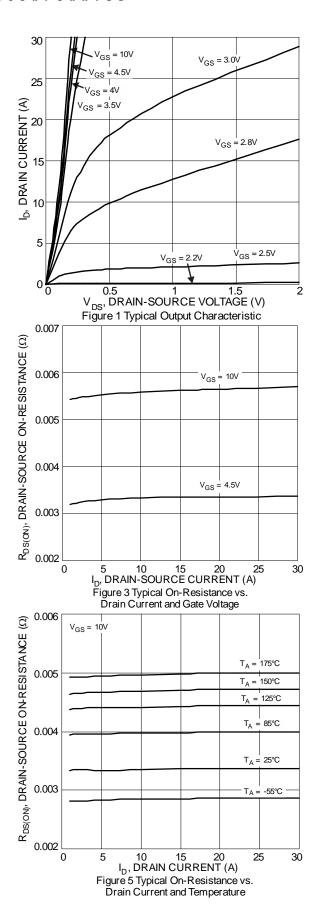
| Characteristic                             | Symbol              | Min  | Тур   | Max  | Unit     | Test Condition   |  |
|--|---------------------|------|-------|------|----------|--|--|
| OFF CHARACTERISTICS (Note 8)               |                     |      |       |      |          |  |  |
| Drain-Source Breakdown Voltage             | BV <sub>DSS</sub>   | 30   | l     |      | <b>V</b> | $V_{GS} = 0V$ , $I_D = 1mA$  |  |
| Zero Gate Voltage Drain Current            | I <sub>DSS</sub>    |      | 1     | 1    | μΑ       | $V_{DS} = 24V, V_{GS} = 0V$  |  |
| Zero Gate Voltage Drain Current (Note 9)   | I <sub>DSS</sub>    | 1    | 1     | 10   | μΑ       | $V_{DS} = 24V, V_{GS} = 0V$<br>$T_A = +125$ °C                                   |  |
| Gate-Source Leakage                        | I <sub>GSS</sub>    |      | ı     | ±100 | nA       | $V_{GS} = +20V, V_{DS} = 0V$<br>$V_{GS} = -16V, V_{DS} = 0V$                     |  |
| ON CHARACTERISTICS (Note 8)                |                     |      |       |      |          |  |  |
| Gate Threshold Voltage                     | V <sub>GS(TH)</sub> | 1    | 1.7   | 3    | V        | $V_{DS} = V_{GS}$ , $I_D = 250\mu A$   |  |
| Static Drain-Source On-Resistance          | D                   | _    | 3.3   | 4    | mΩ       | $V_{GS} = 10V, I_D = 20A$  |  |
| Static Drain-Source On-Nesistance          | R <sub>DS(ON)</sub> |      | 5.5   | 7    | 11122    | $V_{GS} = 4.5V, I_D = 7A$  |  |
| Diode Forward Voltage                      | $V_{SD}$            | _    | 0.75  | 1    | V        | $V_{GS} = 0V, I_{S} = 1A$  |  |
| DYNAMIC CHARACTERISTICS (Note 9)           |                     |      |       |      |          |  |  |
| Input Capacitance                          | C <sub>ISS</sub>    |      | 2,370 | _    | pF       | $V_{DS} = 15V, V_{GS} = 0V,$   |  |
| Output Capacitance                         | Coss                | _    | 1,360 | -    | pF       | V <sub>DS</sub> = 15V, V <sub>GS</sub> = UV,<br>  f = 1MHz                       |  |
| Reverse Transfer Capacitance               | C <sub>RSS</sub>    | _    | 240   | _    | pF       |  |  |
| Gate Resistance                            | $R_G$               | 0.15 | 0.6   | 1.5  | Ω        | $V_{DS} = 0V$ , $V_{GS} = 0V$ , $f = 1MHz$                                       |  |
| Total Gate Charge (V <sub>GS</sub> = 4.5V) | $Q_G$               | _    | 20    | _    | nC       |  |  |
| Total Gate Charge (V <sub>GS</sub> = 10V)  | $Q_G$               | _    | 44    |      | nC       | \/ 15\/  20\   |  |
| Gate-Source Charge                         | Q <sub>GS</sub>     |      | 7     |      | nC       | $V_{DS} = 15V, I_{D} = 20A$  |  |
| Gate-Drain Charge                          | $Q_{GD}$            |      | 8     |      | nC       |  |  |
| Turn-On Delay Time                         | t <sub>D(ON)</sub>  |      | 6.2   |      | ns       |  |  |
| Turn-On Rise Time                          | t <sub>R</sub>      |      | 4.3   |      | ns       | $V_{DD} = 15V, V_{GS} = 10V,$ $R_{L} = 0.75\Omega, R_{G} = 3\Omega, I_{D} = 20A$ |  |
| Turn-Off Delay Time                        | t <sub>D(OFF)</sub> |      | 21    |      | ns       |  |  |
| Turn-Off Fall Time                         | t <sub>F</sub>      | _    | 8     |      | ns       |  |  |
| Reverse Recovery Time                      | t <sub>RR</sub>     | _    | 25    |      | ns       | 454 41/4 5004/   |  |
| Reverse Recovery Charge                    | Q <sub>RR</sub>     |      | 37    |      | nC       | I <sub>F</sub> =15A, di/dt=500A/μs   |  |

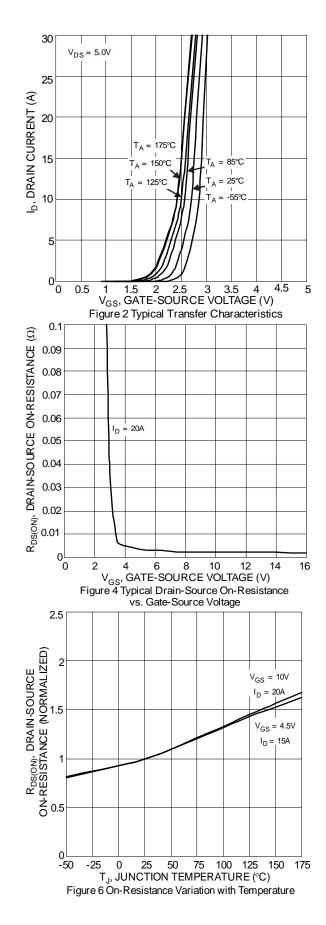
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. 7. Thermal resistance from junction to soldering point (on the exposed drain pad)

<sup>8.</sup> Short duration pulse test used to minimize self-heating effect.

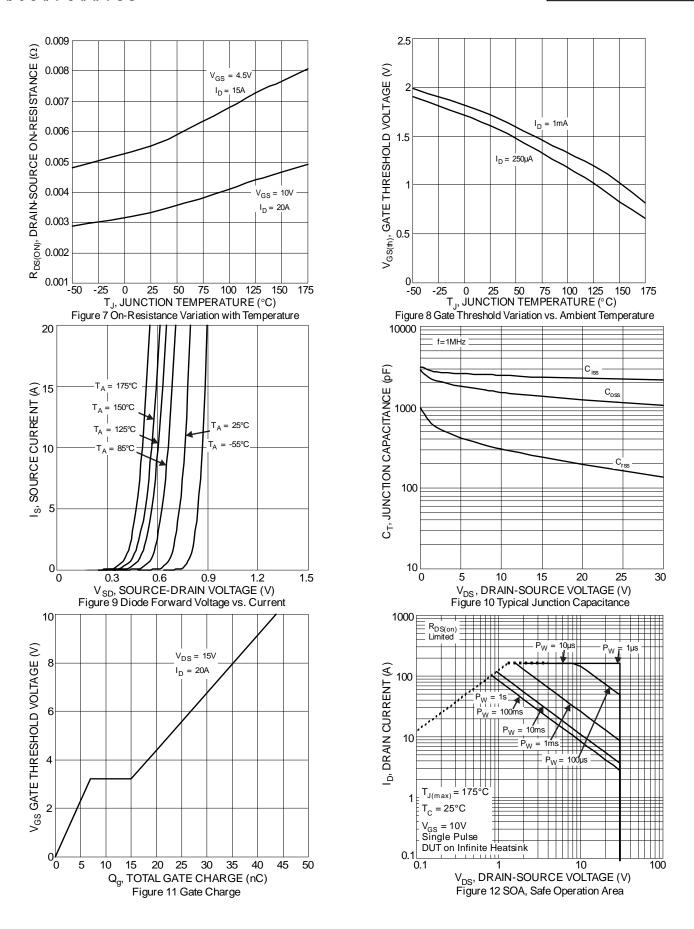
<sup>9.</sup> Guaranteed by design. Not subject to product testing.



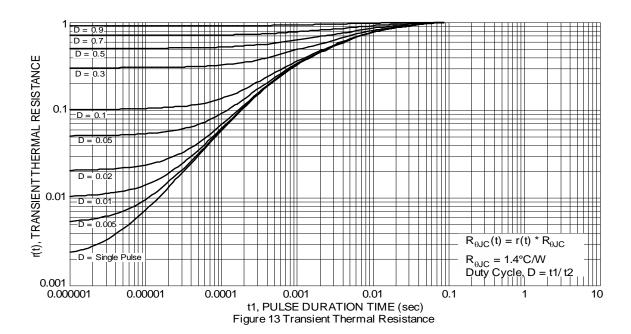










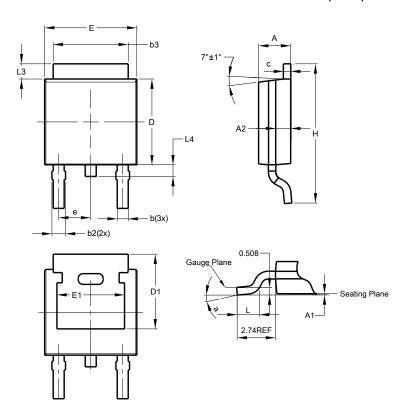




# **Package Outline Dimensions**

Please see http://www.diodes.com/package-outlines.html for the latest version.

### **TO252 (DPAK)**

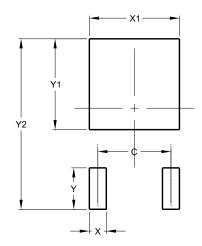


| TO252 (DPAK)         |      |       |       |  |  |
|----------------------|------|-------|-------|--|--|
| Dim                  | Min  | Max   | Тур   |  |  |
| Α                    | 2.19 | 2.39  | 2.29  |  |  |
| A1                   | 0.00 | 0.13  | 0.08  |  |  |
| A2                   | 0.97 | 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  |  |  |
| С                    | 0.45 | 0.58  | 0.531 |  |  |
| D                    | 6.00 | 6.20  | 6.10  |  |  |
| D1                   | 5.21 | -     | -     |  |  |
| е                    | -    | -     | 2.286 |  |  |
| Е                    | 6.45 | 6.70  | 6.58  |  |  |
| E1                   | 4.32 | -     | -     |  |  |
| Н                    | 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  |  |  |
| а                    | 0°   | 10°   | -     |  |  |
| All Dimensions in mm |      |       |       |  |  |

## **Suggested Pad Layout**

Please see http://www.diodes.com/package-outlines.html for the latest version.

#### TO252 (DPAK)



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



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