

**COMPLEMENTARY PAIR ENHANCEMENT MODE MOSFET**

**Product Summary**

| Device | $V_{(BR)DSS}$ | $R_{DS(ON)}$ max                  | $I_D$ max<br>$T_A = +25^\circ C$ |
|--------|---------------|-----------------------------------|----------------------------------|
| Q1     | 60V           | 85 m $\Omega$ @ $V_{GS} = 10V$    | 3.1A                             |
|        |               | 120 m $\Omega$ @ $V_{GS} = 4.5V$  | 2.7A                             |
| Q2     | -60V          | 150 m $\Omega$ @ $V_{GS} = -10V$  | -2.4A                            |
|        |               | 250 m $\Omega$ @ $V_{GS} = -4.5V$ | -1.8A                            |

**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**

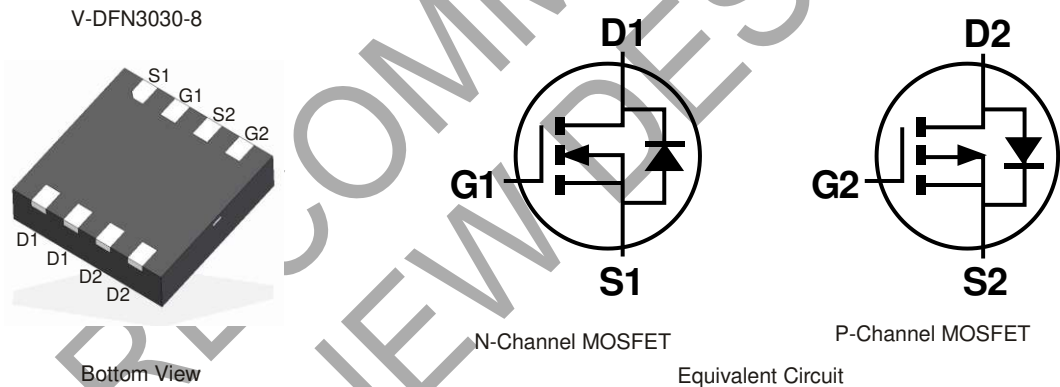
- Power Management Functions
- Analog Switch

**Features**

- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- Complementary Pair MOSFET
- **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**

**Mechanical Data**

- Case: V-DFN3030-8
- 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: 0.02 grams (approximate)

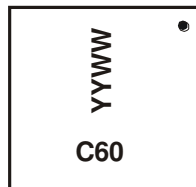


**Ordering Information** (Note 4)

| Part Number   | Case        | Packaging         |
|---------------|-------------|-------------------|
| DMC6070LFDH-7 | V-DFN3030-8 | 3,000/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**



C60 = Product Type Marking Code  
 YYWW = Date Code Marking  
 YY = Last Digit of Year (ex: 12 for 2012)  
 WW = Week Code (01 ~ 53)

**Maximum Ratings Q1 N-CHANNEL** (@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 5) V <sub>GS</sub> = 10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 3.1<br>2.5 | A     |
|   | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | 3.9<br>3.1 | A     |
| Maximum Body Diode Forward Current (Note 5)             |              |  | I <sub>S</sub>   | 2          | A     |
| Pulsed Drain Current (10µs pulse, Duty cycle = 1%)      |              |  | I <sub>DM</sub>  | 15         | A     |

**Maximum Ratings Q2 P-CHANNEL** (@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 5) V <sub>GS</sub> = -10V | Steady State | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -2.4<br>-1.9 | A     |
|  | t < 10s      | T <sub>A</sub> = +25°C<br>T <sub>A</sub> = +70°C | I <sub>D</sub>   | -2.9<br>-2.3 | A     |
| Maximum Body Diode Forward Current (Note 5)              |              |  | I <sub>S</sub>   | -2           | A     |
| Pulsed Drain Current (10µs pulse, Duty cycle = 1%)       |              |  | I <sub>DM</sub>  | -12          | A     |

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

| Characteristic                                   | Symbol                            | Value        | Units |
|--|-----------------------------------|--------------|-------|
| Total Power Dissipation (Note 5)                 | P <sub>D</sub>                    | 1.4          | W     |
| Thermal Resistance, Junction to Ambient (Note 5) | R <sub>θJA</sub>                  | Steady state | 91    |
|  |                                   | t < 10s      | 60    |
| Thermal Resistance, Junction to Case (Note 5)    | R <sub>θJC</sub>                  | 32           | °C/W  |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150  | °C    |

Note: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1 inch square copper plate

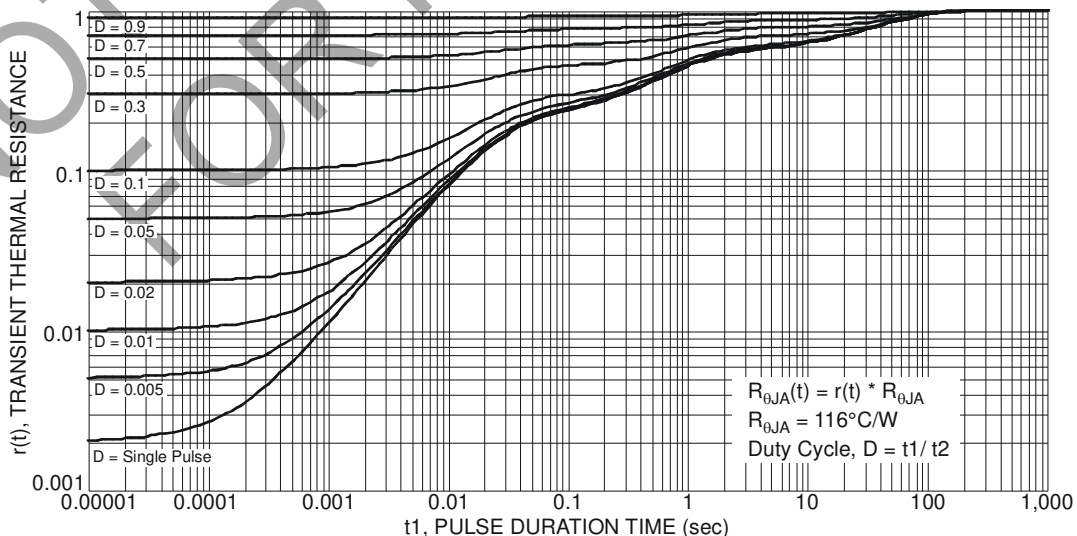
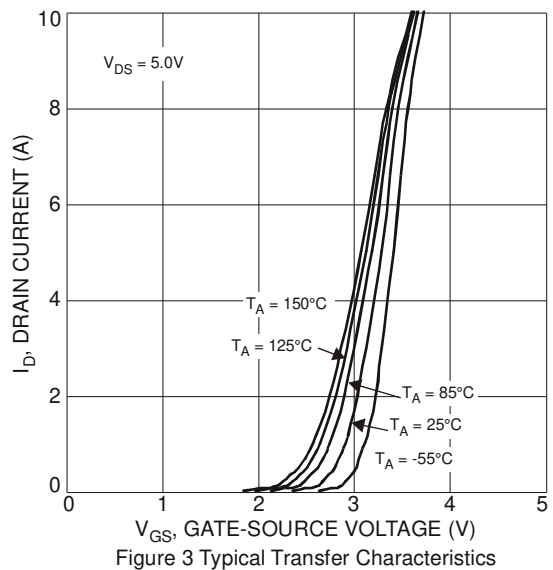
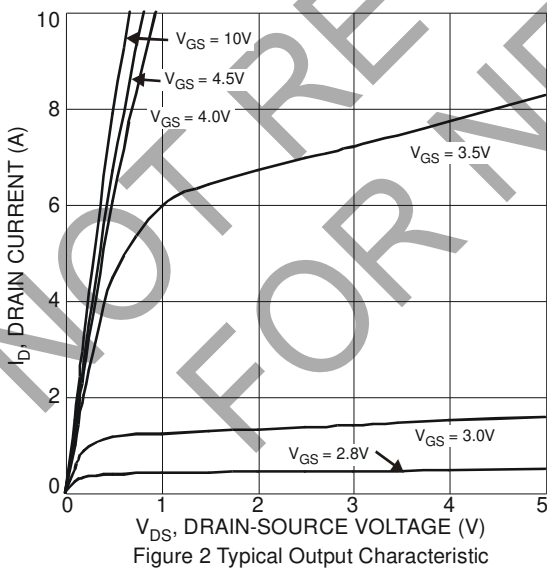


Figure 1 Transient Thermal Resistance

**Electrical Characteristics N-CHANNEL – Q1** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol              | Min | Typ  | Max  | Unit | Test Condition  |
|--|---------------------|-----|------|------|------|---|
| <b>OFF CHARACTERISTICS (Note 6)</b>                    |                     |     |      |      |      |   |
| 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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | –   | –    | 1    | μA   | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V   |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | –   | –    | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 6)</b>                     |                     |     |      |      |      |   |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | 1   | –    | 3    | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA                                  |
| Static Drain-Source On-Resistance                      | R <sub>DS(on)</sub> | –   | 60   | 85   | mΩ   | V <sub>GS</sub> = 10V, I <sub>D</sub> = 1.5A  |
|  |                     |     | 72   | 120  |      | V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 0.5A   |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | –   | 3.7  | –    | S    | V <sub>DS</sub> = 5V, I <sub>D</sub> = 1.5A   |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | –   | 0.7  | 1.2  | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = 3A   |
| <b>DYNAMIC CHARACTERISTICS (Note 7)</b>                |                     |     |      |      |      |   |
| Input Capacitance                                      | C <sub>iss</sub>    | –   | 731  | –    | pF   | V <sub>DS</sub> = 20V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                    |
| Output Capacitance                                     | C <sub>oss</sub>    | –   | 34   | –    | pF   |   |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | –   | 23   | –    | pF   |   |
| Gate Resistance  | R <sub>g</sub>      | –   | 1.3  | –    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz  |
| Total Gate Charge (V <sub>GS</sub> = 10V)              | Q <sub>g</sub>      | –   | 11.5 | –    | nC   | V <sub>DS</sub> = 30V, I <sub>D</sub> = 3A  |
| Total Gate Charge (V <sub>GS</sub> = 4.5V)             | Q <sub>g</sub>      | –   | 5.2  | –    | nC   |   |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | –   | 2.1  | –    | nC   |   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | –   | 1.5  | –    | nC   |   |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | –   | 9.6  | –    | ns   | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 30V,<br>R <sub>G</sub> = 50Ω, R <sub>L</sub> = 20V |
| Turn-On Rise Time                                      | t <sub>r</sub>      | –   | 11   | –    | ns   |   |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | –   | 61   | –    | ns   |   |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | –   | 21   | –    | ns   |   |

Notes: 6. Short duration pulse test used to minimize self-heating effect  
7. Guaranteed by design. Not subject to production testing



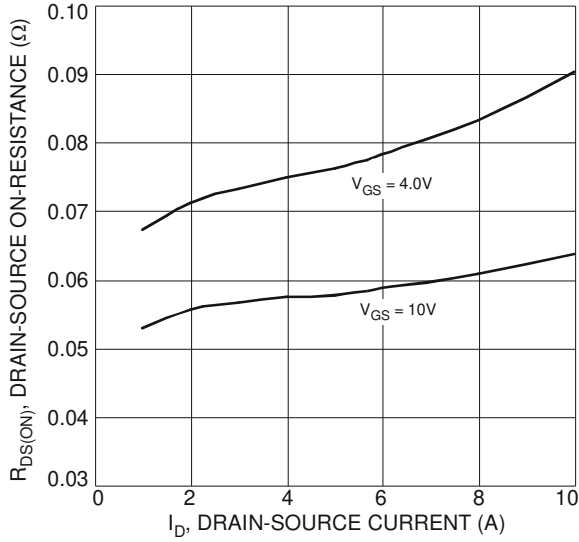


Figure 4 Typical On-Resistance vs. Drain Current and Gate Voltage

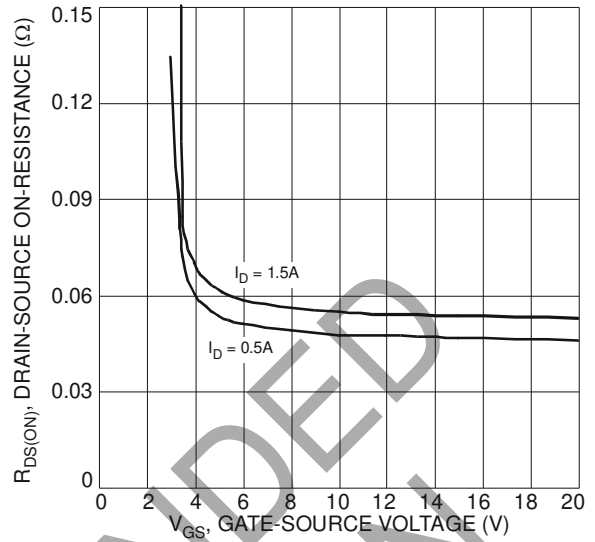


Figure 5 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

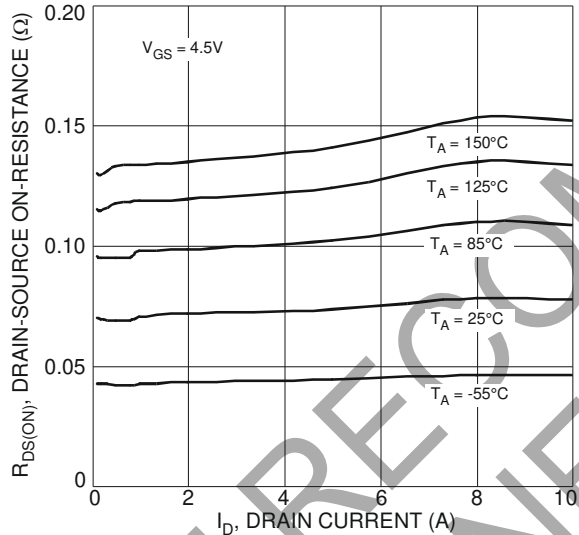


Figure 6 Typical On-Resistance vs. Drain Current and Temperature

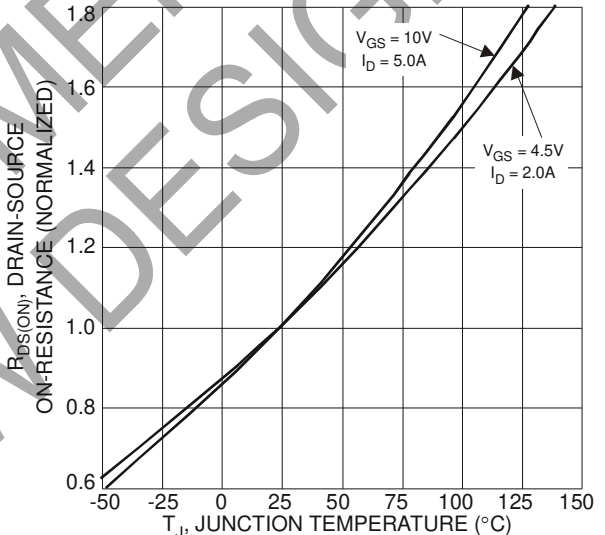


Figure 7 On-Resistance Variation with Temperature

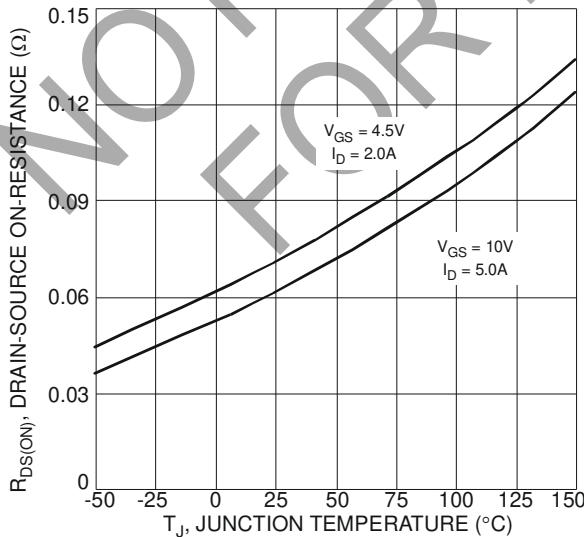


Figure 8 On-Resistance Variation with Temperature

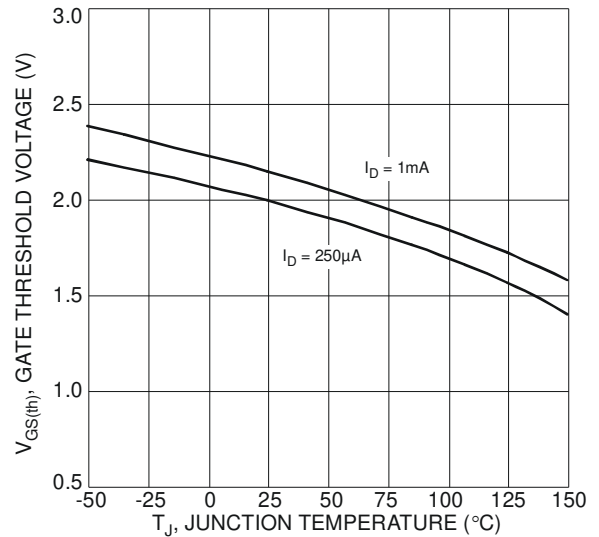


Figure 9 Gate Threshold Variation vs. Ambient Temperature

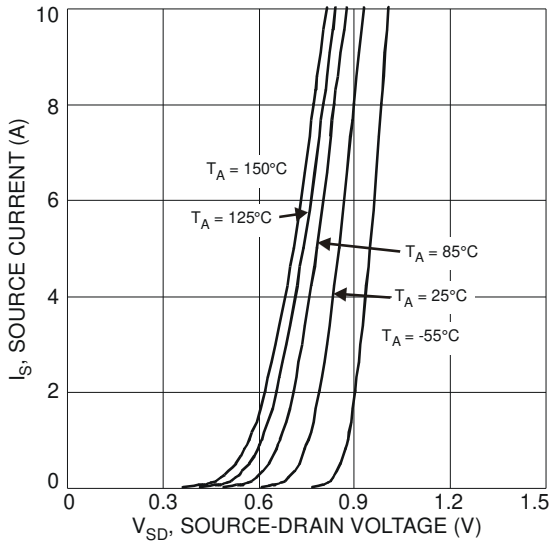


Figure 10 Diode Forward Voltage vs. Current

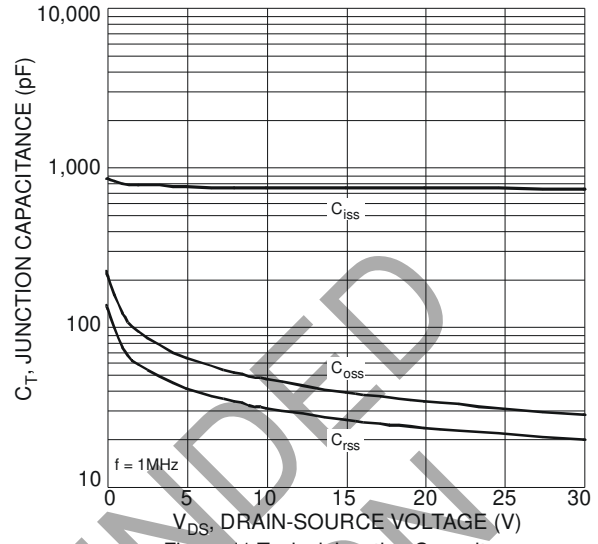


Figure 11 Typical Junction Capacitance

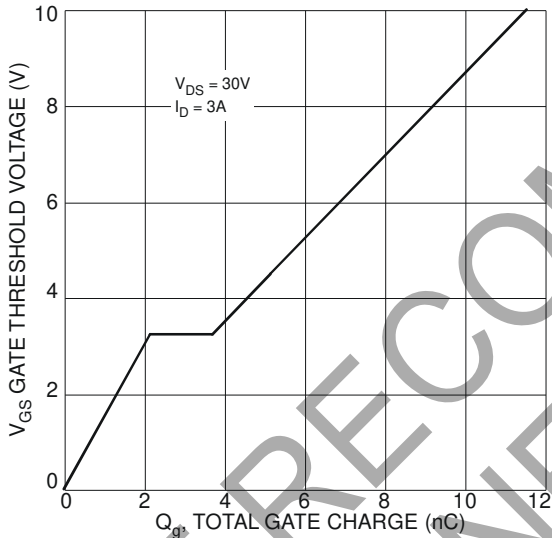


Figure 12 Gate Charge

NOT RECOMMENDED FOR NEW DESIGN

**Electrical Characteristics P-CHANNEL – Q2** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic   | Symbol              | Min | Typ  | Max  | Unit | Test Condition  |
|--|---------------------|-----|------|------|------|---|
| <b>OFF CHARACTERISTICS (Note 8)</b>                    |                     |     |      |      |      |   |
| 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 T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | -   | -    | -1   | μA   | V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V  |
| Gate-Source Leakage                                    | I <sub>GSS</sub>    | -   | -    | ±100 | nA   | V <sub>GS</sub> = ±16V, V <sub>DS</sub> = 0V  |
| <b>ON CHARACTERISTICS (Note 8)</b>                     |                     |     |      |      |      |   |
| Gate Threshold Voltage                                 | V <sub>GS(th)</sub> | -1  | -    | -3   | V    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                   |
| Static Drain-Source On-Resistance                      | R <sub>DS(ON)</sub> | -   | 115  | 150  | mΩ   | V <sub>GS</sub> = -10V, I <sub>D</sub> = -1A  |
|  |                     |     | 170  | 250  |      | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -0.5A   |
| Forward Transfer Admittance                            | Y <sub>fs</sub>     | -   | 2.8  | -    | S    | V <sub>DS</sub> = -5V, I <sub>D</sub> = -1A   |
| Diode Forward Voltage                                  | V <sub>SD</sub>     | -   | -0.7 | -1.2 | V    | V <sub>GS</sub> = 0V, I <sub>S</sub> = -2A  |
| <b>DYNAMIC CHARACTERISTICS (Note 9)</b>                |                     |     |      |      |      |   |
| Input Capacitance                                      | C <sub>iss</sub>    | -   | 612  | -    | pF   | V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V,<br>f = 1MHz                                     |
| Output Capacitance                                     | C <sub>oss</sub>    | -   | 36   | -    | pF   |   |
| Reverse Transfer Capacitance                           | C <sub>rss</sub>    | -   | 26   | -    | pF   |   |
| Gate Resistance  | R <sub>g</sub>      | -   | 13   | -    | Ω    | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz  |
| Total Gate Charge (V <sub>GS</sub> = -10V)             | Q <sub>g</sub>      | -   | 8.9  | -    | nC   | V <sub>DS</sub> = -30V, I <sub>D</sub> = -2A  |
| Total Gate Charge (V <sub>GS</sub> = -4.5V)            | Q <sub>g</sub>      | -   | 4.3  | -    | nC   |   |
| Gate-Source Charge                                     | Q <sub>gs</sub>     | -   | 1.4  | -    | nC   |   |
| Gate-Drain Charge                                      | Q <sub>gd</sub>     | -   | 1.7  | -    | nC   |   |
| Turn-On Delay Time                                     | t <sub>D(on)</sub>  | -   | 7.6  | -    | ns   |   |
| Turn-On Rise Time                                      | t <sub>r</sub>      | -   | 11.6 | -    | ns   | V <sub>GS</sub> = -10V, V <sub>DS</sub> = -30V,<br>R <sub>G</sub> = 50Ω, I <sub>D</sub> = -1A |
| Turn-Off Delay Time                                    | t <sub>D(off)</sub> | -   | 79.8 | -    | ns   |   |
| Turn-Off Fall Time                                     | t <sub>f</sub>      | -   | 37.8 | -    | ns   |   |

Notes: 8. Short duration pulse test used to minimize self-heating effect  
 9. Guaranteed by design. Not subject to production testing

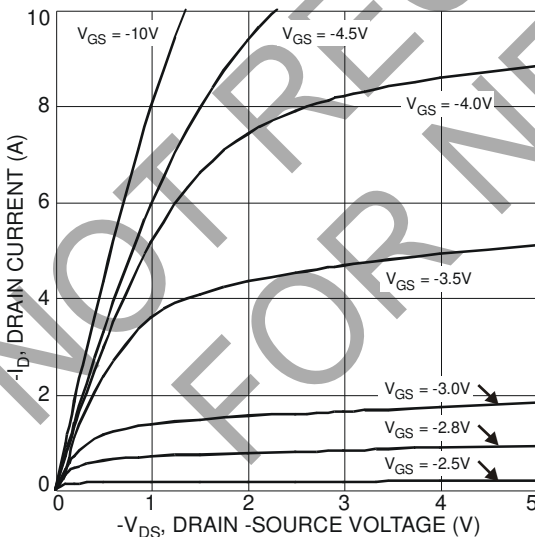


Figure 13 Typical Output Characteristics

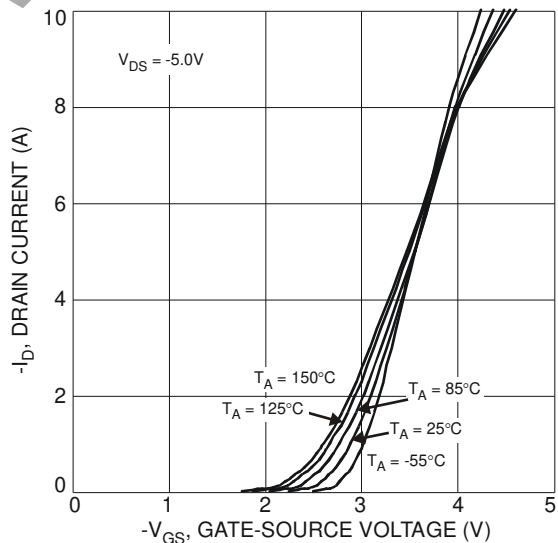


Figure 14 Typical Transfer Characteristics

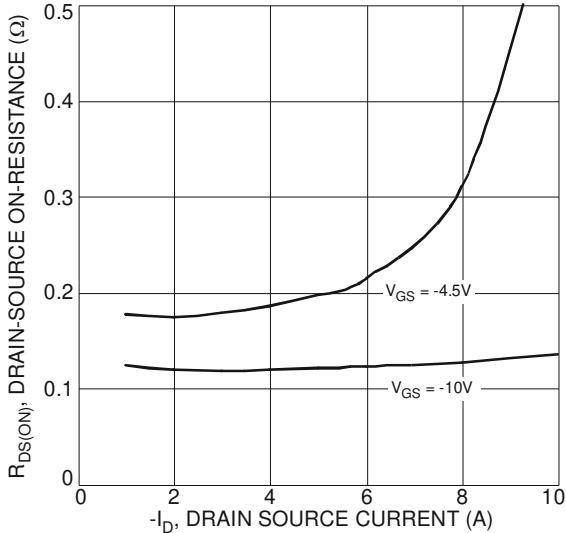


Figure 15 Typical On-Resistance vs. Drain Current and Gate Voltage

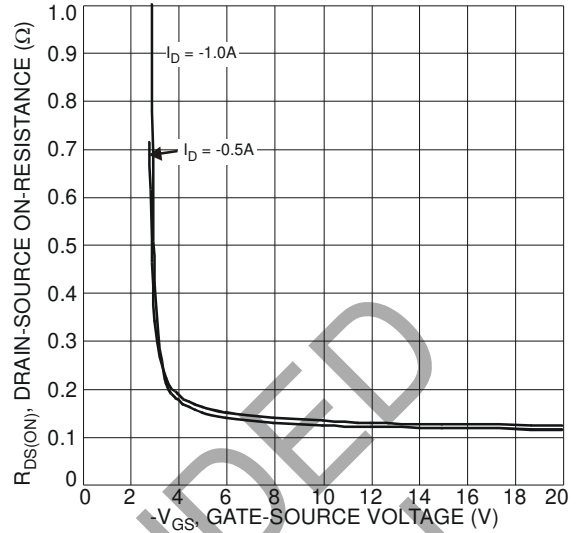


Figure 16 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

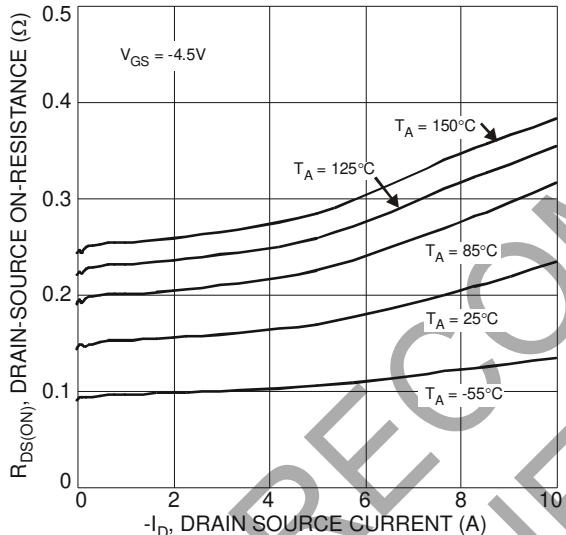


Figure 17 Typical On-Resistance vs. Drain Current and Temperature

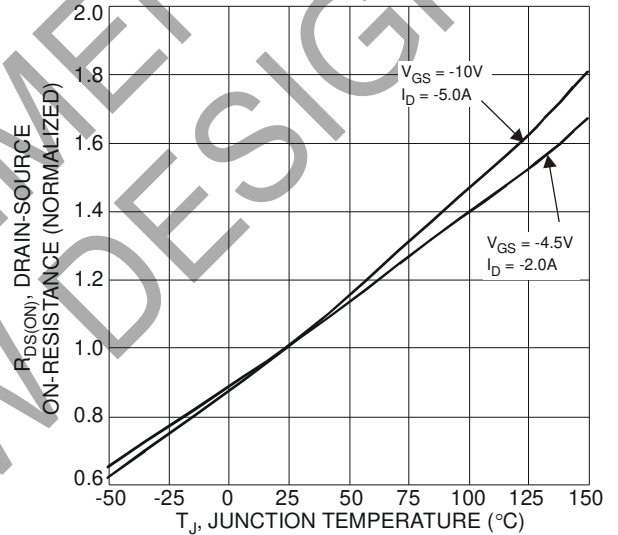


Figure 18 On-Resistance Variation with Temperature

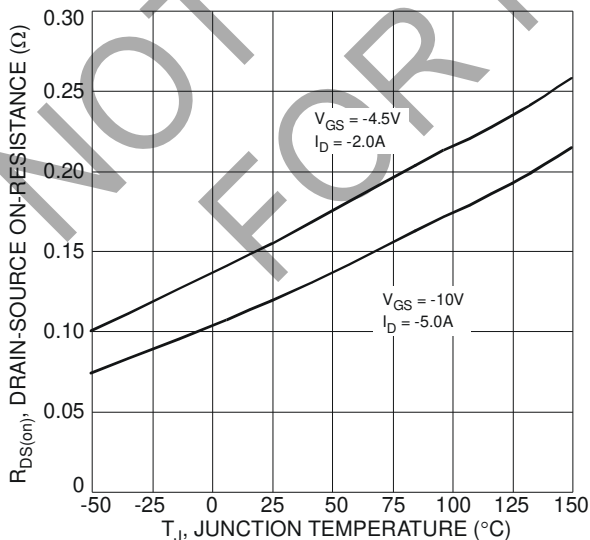


Figure 19 On-Resistance Variation with Temperature

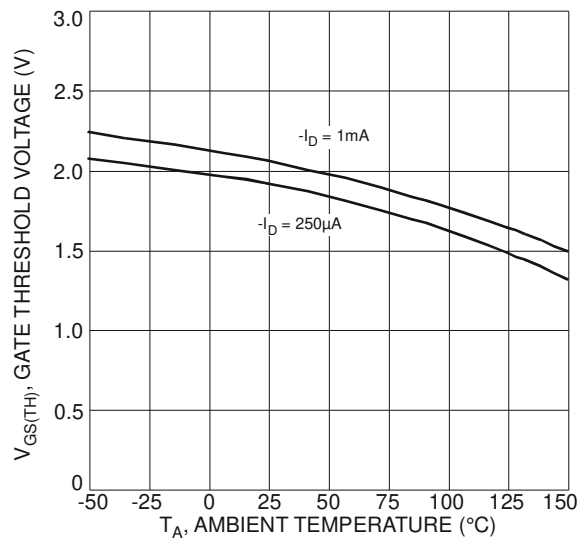


Figure 20 Gate Threshold Variation vs. Ambient Temperature

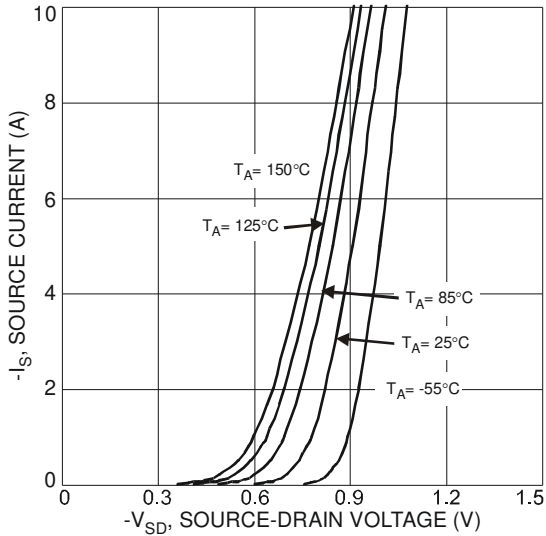


Figure 21 Diode Forward Voltage vs. Current

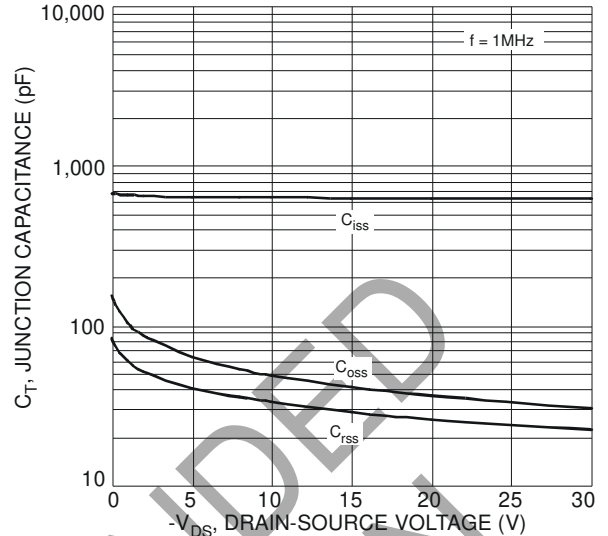


Figure 22 Typical Junction Capacitance

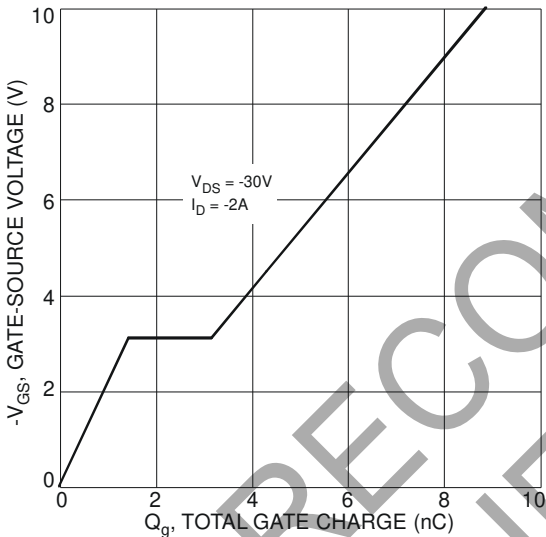


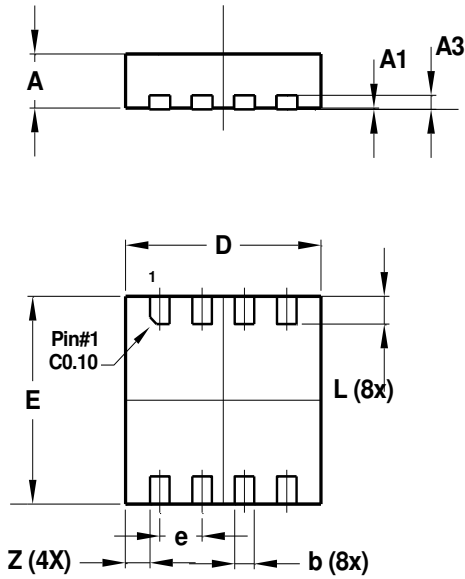
Figure 23 Gate-Charge Characteristics

NOT RECOMMENDED FOR NEW DESIGN



## Package Outline Dimensions

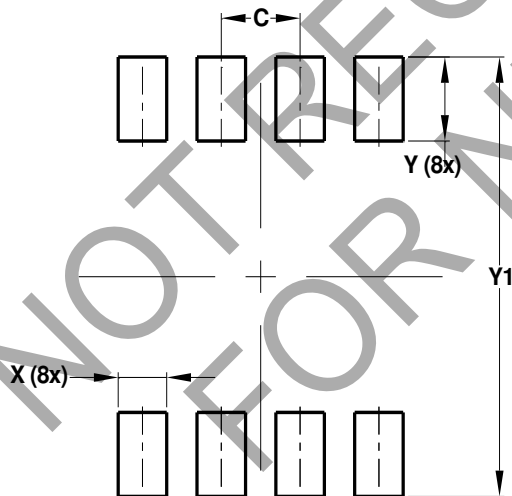
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| V-DFN3030-8          |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 0.75 | 0.85 | 0.80  |
| A1                   | 0    | 0.05 | 0.02  |
| A3                   | -    | -    | 0.203 |
| b                    | 0.25 | 0.35 | 0.30  |
| D                    | 2.95 | 3.05 | 3.00  |
| E                    | 2.95 | 3.05 | 3.00  |
| e                    | -    | -    | 0.65  |
| L                    | 0.55 | 0.65 | 0.60  |
| Z                    | -    | -    | 0.375 |
| 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          | 0.650         |
| X          | 0.400         |
| Y          | 0.850         |
| Y1         | 3.400         |

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