

## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(ON)} \text{ max}$               | $I_D \text{ max}$<br>$T_A = +25^\circ\text{C}$ |
|---------------|----------------------------------------|------------------------------------------------|
| -16V          | 39m $\Omega$ @ $V_{GS} = -4.5\text{V}$ | -2.5A                                          |
|               | 52m $\Omega$ @ $V_{GS} = -2.5\text{V}$ | -2.1A                                          |
|               | 65m $\Omega$ @ $V_{GS} = -1.8\text{V}$ | -1.8A                                          |

## Description and Applications

This MOSFET is 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.

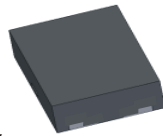
- Backlighting
- Power Management Functions
- DC-DC Converters

## Features and Benefits

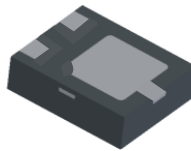
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage
- ESD Protected Up To 3kV
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

## Mechanical Data

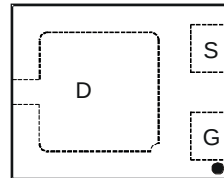
- Case: X2-DFN2015-3
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu over Copper Leadframe. Solderable per MIL-STD-202, Method 208 <sup>(4)</sup>
- Terminals Connections: See Diagram Below
- Weight: 0.008 grams (Approximate)



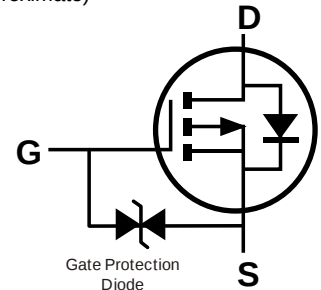
Top View



Bottom View



Internal Schematic  
(Top View)



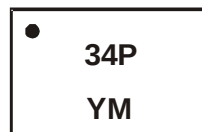
Equivalent Circuit

## Ordering Information (Note 5)

| Part Number    | Case         | Packaging         |
|----------------|--------------|-------------------|
| DMG3415UFY4Q-7 | X2-DFN2015-3 | 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/product\\_compliance\\_definitions.html](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



34P = Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: C = 2015)  
 M = Month (ex: 9 = September)

### Date Code Key

| Year | 2009 | ~ | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|------|------|---|------|------|------|------|------|------|------|
| Code | W    | ~ | C    | D    | E    | F    | G    | H    | I    |

| Month | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

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

| Characteristic                                            |              |                        | Symbol           | Value | Unit |
|-----------------------------------------------------------|--------------|------------------------|------------------|-------|------|
| Drain-Source Voltage                                      |              |                        | V <sub>DSS</sub> | -16   | V    |
| Gate-Source Voltage                                       |              |                        | V <sub>GSS</sub> | ±8    | V    |
| Continuous Drain Current (Note 7) V <sub>GS</sub> = -4.5V | Steady State | T <sub>A</sub> = +25°C | I <sub>D</sub>   | -2.5  | A    |
|                                                           |              | T <sub>A</sub> = +70°C |                  | -2.2  |      |
| Pulsed Drain Current (Note 7)                             |              |                        | I <sub>DM</sub>  | -12   | A    |

**Thermal Characteristics**

| Characteristic                                   |  |              | Symbol                            | Value       | Unit |
|--------------------------------------------------|--|--------------|-----------------------------------|-------------|------|
| Total Power Dissipation (Note 6)                 |  |              | P <sub>D</sub>                    | 0.65        | W    |
| Thermal Resistance, Junction to Ambient (Note 6) |  | Steady State | R <sub>θJA</sub>                  | 197         | °C/W |
| Total Power Dissipation (Note 7)                 |  |              | P <sub>D</sub>                    | 1.35        | W    |
| Thermal Resistance, Junction to Ambient (Note 7) |  | Steady State | R <sub>θJA</sub>                  | 95          | °C/W |
| Thermal Resistance, Junction to Case (Note 7)    |  |              | R <sub>θJC</sub>                  | 22          |      |
| 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                                                                                   |
|-----------------------------------------------------------|---------------------|------|-------|-------------|----------|--------------------------------------------------------------------------------------------------|
| OFF CHARACTERISTICS (Note 8)                              |                     |      |       |             |          |                                                                                                  |
| Drain-Source Breakdown Voltage                            | BV <sub>DSS</sub>   | -16  | —     | —           | V        | V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA                                                    |
| Zero Gate Voltage Drain Current<br>T <sub>J</sub> = +25°C | I <sub>DSS</sub>    | —    | —     | -1.0        | μA       | V <sub>DS</sub> = -16V, V <sub>GS</sub> = 0V                                                     |
| Gate-Source Leakage                                       | I <sub>GSS</sub>    | —    | —     | ±10<br>±500 | μA<br>nA | V <sub>GS</sub> = ±8V, V <sub>DS</sub> = 0V<br>V <sub>GS</sub> = ±5V, V <sub>DS</sub> = 0V       |
| ON CHARACTERISTICS (Note 8)                               |                     |      |       |             |          |                                                                                                  |
| Gate Threshold Voltage                                    | V <sub>GS(TH)</sub> | -0.3 | -0.55 | -1.0        | V        | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA                                      |
| Static Drain-Source On-Resistance                         | R <sub>DS(ON)</sub> | —    | 31    | 39          | mΩ       | V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -4.0A                                                  |
|                                                           |                     |      | 40    | 52          |          | V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -3.5A                                                  |
|                                                           |                     |      | 51    | 65          |          | V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -2.0A                                                  |
| Forward Transfer Admittance                               | Y <sub>fs</sub>     | —    | 7.9   | —           | S        | V <sub>DS</sub> = -5V, I <sub>D</sub> = -2.5A                                                    |
| DYNAMIC CHARACTERISTICS (Note 9)                          |                     |      |       |             |          |                                                                                                  |
| Input Capacitance                                         | C <sub>iSS</sub>    | —    | 282   | —           | pF       | V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V<br>f = 1.0MHz                                       |
| Output Capacitance                                        | C <sub>oSS</sub>    | —    | 152   | —           | pF       |                                                                                                  |
| Reverse Transfer Capacitance                              | C <sub>rSS</sub>    | —    | 38    | —           | pF       |                                                                                                  |
| Gate Resistance                                           | R <sub>g</sub>      | —    | 250   | —           | Ω        | V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1.0MHz                                           |
| Total Gate Charge                                         | Q <sub>g</sub>      | —    | 10    | —           | nC       | V <sub>GS</sub> = -4.5V, V <sub>DS</sub> = -10V, I <sub>D</sub> = -4A                            |
| Gate-Source Charge                                        | Q <sub>gs</sub>     | —    | 1.5   | —           | nC       |                                                                                                  |
| Gate-Drain Charge                                         | Q <sub>gd</sub>     | —    | 2.4   | —           | nC       |                                                                                                  |
| Turn-On Delay Time                                        | t <sub>D(ON)</sub>  | —    | 79    | —           | ns       | V <sub>DS</sub> = -10V, V <sub>GS</sub> = -4.5V,<br>R <sub>D</sub> = 2.5Ω, R <sub>G</sub> = 3.0Ω |
| Turn-On Rise Time                                         | t <sub>R</sub>      | —    | 175   | —           | ns       |                                                                                                  |
| Turn-Off Delay Time                                       | t <sub>D(OFF)</sub> | —    | 885   | —           | ns       |                                                                                                  |
| Turn-Off Fall Time                                        | t <sub>F</sub>      | —    | 568   | —           | ns       |                                                                                                  |

- Notes:
6. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
  7. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.
  8. Short duration pulse test used to minimize self-heating effect.
  9. Guaranteed by design. Not subject to product testing.

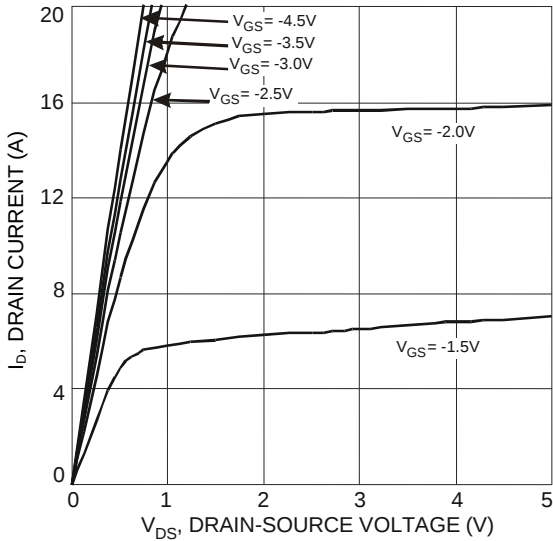


Fig. 1 Typical Output Characteristic

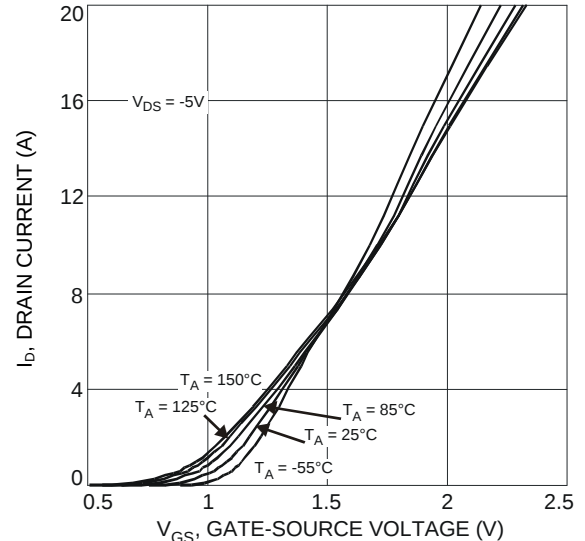


Fig. 2 Typical Transfer Characteristic

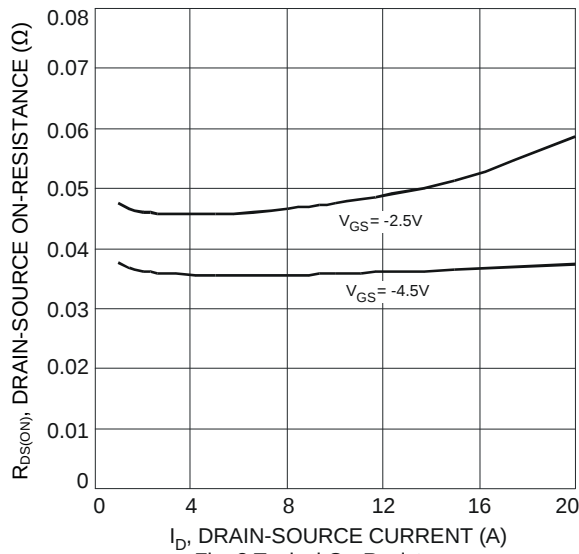


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

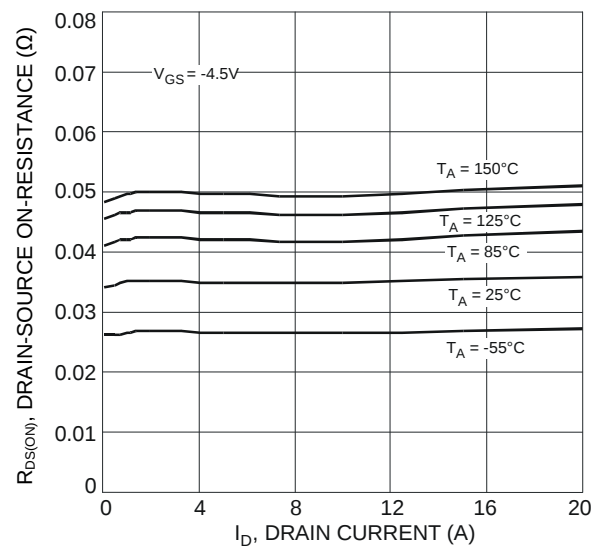


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

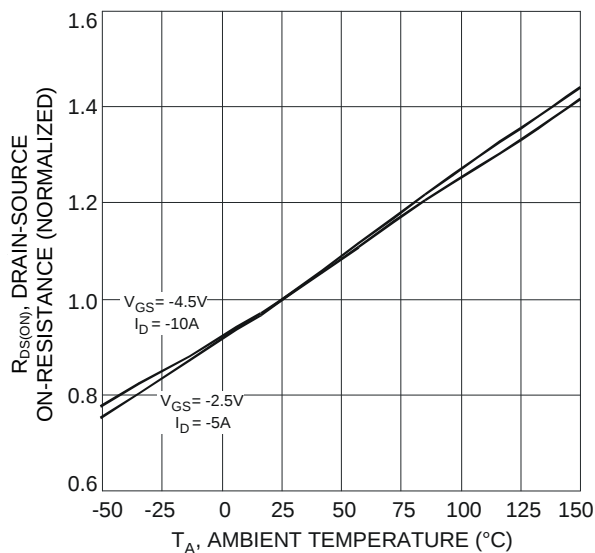


Fig. 5 On-Resistance Variation with Temperature

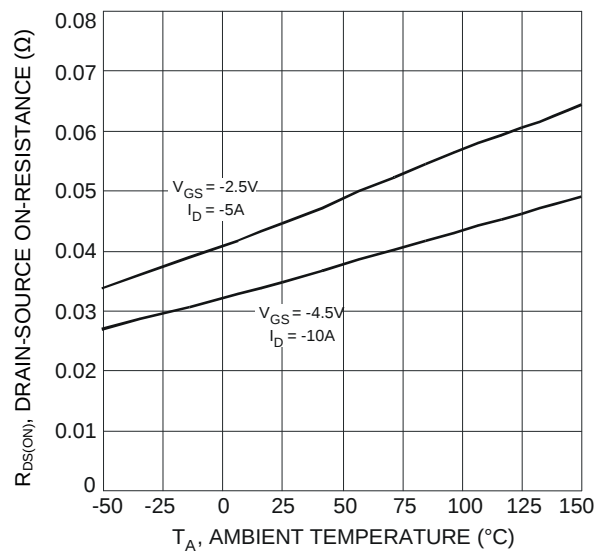


Fig. 6 On-Resistance Variation with Temperature

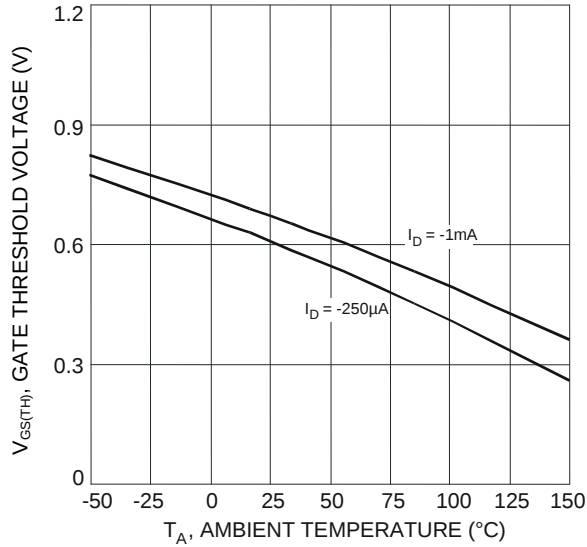


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

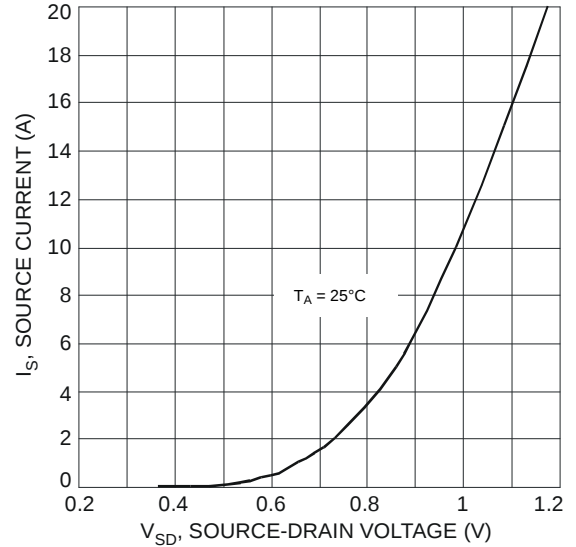


Fig. 8 Diode Forward Voltage vs. Current

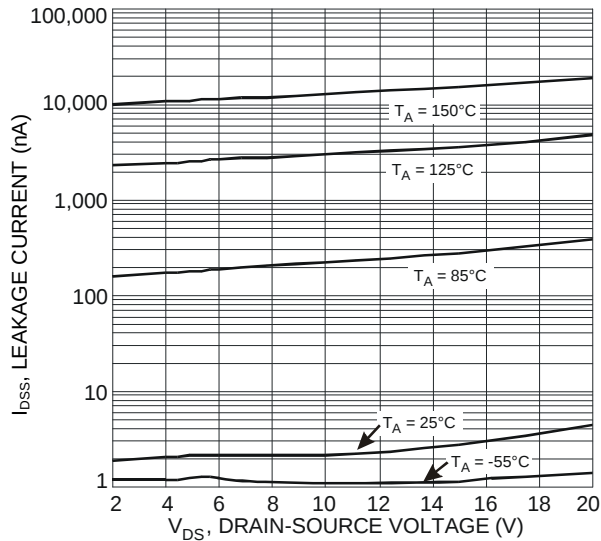


Fig. 9 Typical Leakage Current vs. Drain-Source Voltage

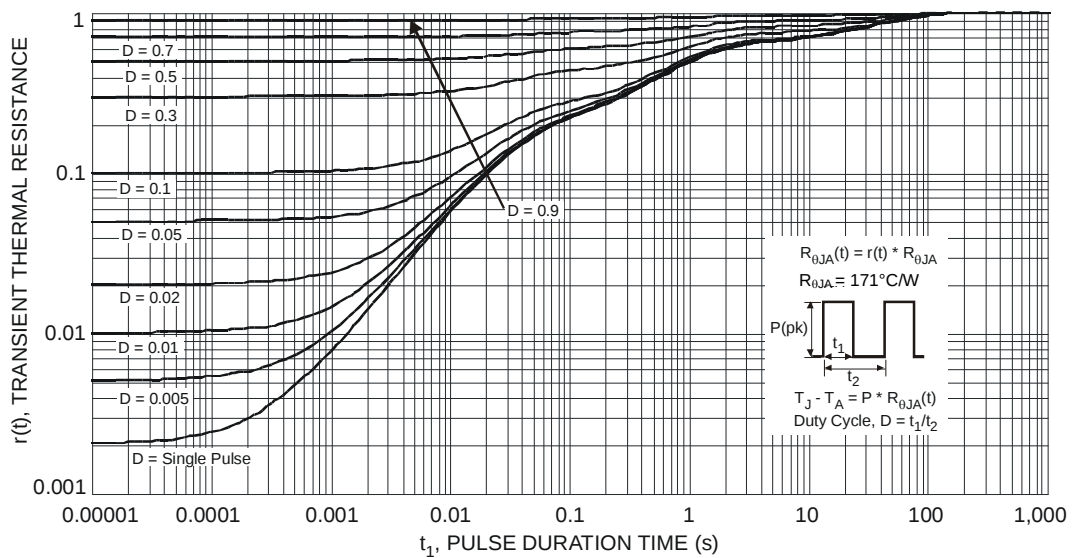
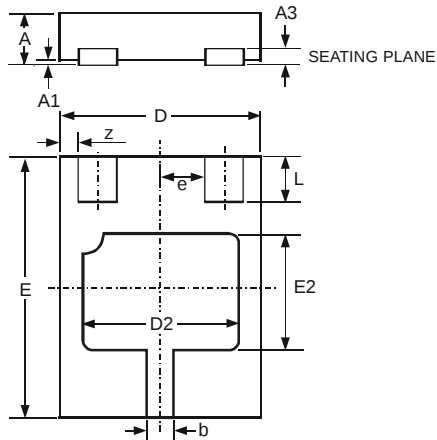


Fig. 10 Transient Thermal Response

## Package Outline Dimensions

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

### X2-DFN2015-3

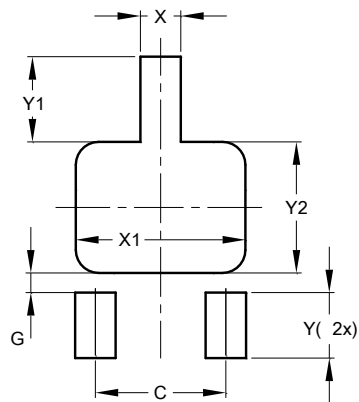


| X2-DFN2015-3         |      |       |       |
|----------------------|------|-------|-------|
| Dim                  | Min  | Max   | Typ   |
| A                    | -    | 0.40  | -     |
| A1                   | 0    | 0.05  | 0.02  |
| A3                   | -    | -     | 0.13  |
| b                    | 0.20 | 0.30  | 0.25  |
| D                    | 1.45 | 1.575 | 1.5   |
| D2                   | 1.00 | 1.20  | 1.10  |
| e                    | -    | -     | 0.50  |
| E                    | 1.95 | 2.075 | 2.00  |
| E2                   | 0.70 | 0.90  | 0.80  |
| L                    | 0.25 | 0.35  | 0.30  |
| z                    | -    | -     | 0.125 |
| All Dimensions in mm |      |       |       |

## Suggested Pad Layout

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.

### X2-DFN2015-3



| X2-DFN2015-3 |               |
|--------------|---------------|
| Dimensions   | Value (in mm) |
| C            | 1.000         |
| G            | 0.150         |
| X            | 0.310         |
| X1           | 1.300         |
| Y            | 0.500         |
| Y1           | 0.650         |
| Y2           | 1.000         |

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