

**30V N-CHANNEL ENHANCEMENT MODE MOSFET**
**Product Summary**

| BV <sub>DSS</sub> | Max R <sub>DS(on)</sub> MAX   | Max I <sub>D</sub> MAX<br>T <sub>A</sub> = 25°C |
|-------------------|-------------------------------|-------------------------------------------------|
| 30V               | 65mΩ @ V <sub>GS</sub> = 10V  | 3.2A                                            |
|                   | 95mΩ @ V <sub>GS</sub> = 4.5V | 2.6A                                            |

**Description and Applications**

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- DC - DC Converters
- Power Management Functions
- Disconnect Switches
- Motor Control

**Features and Benefits**

- Low on-resistance
- Fast switching speed
- Low gate charge
- Low threshold
- **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)**

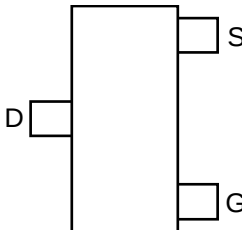
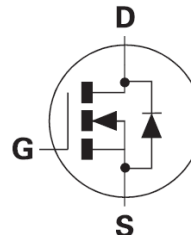
**Mechanical Data**

- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound.  
UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish —Matte Tin Annealed over Copper Leadframe.  
Solderable per MIL-STD-202, Method 208 (E3)
- Terminals Connections: See Diagram Below
- Weight: 0.009 grams (Approximate)

SOT23



Top View

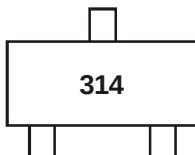

 Top View  
Pin Out


Equivalent Circuit

**Ordering Information** (Note 5)

| Product      | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|--------------|---------|--------------------|-----------------|-------------------|
| ZXMN3A14FQTA | 314     | 7                  | 8               | 3,000 Units       |

- 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**


314 = Product Type Marking Code

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

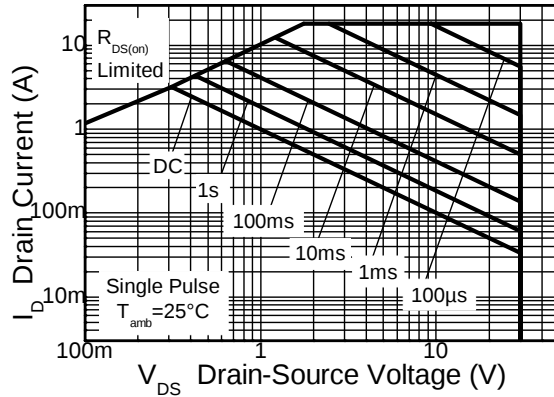
| Characteristic                                  |                       |                                                        | Symbol           | Value             | Units |
|-------------------------------------------------|-----------------------|--------------------------------------------------------|------------------|-------------------|-------|
| Drain-Source Voltage                            |                       |                                                        | V <sub>DSS</sub> | 30                | V     |
| Gate-Source Voltage                             |                       |                                                        | V <sub>GS</sub>  | ±20               | V     |
| Continuous Drain Current                        | V <sub>GS</sub> = 10V | T <sub>A</sub> = 70°C (Note 7)<br>(Note 7)<br>(Note 6) | I <sub>D</sub>   | 3.9<br>3.2<br>3.2 | A     |
| Pulsed Drain Current (Note 8)                   |                       |                                                        | I <sub>DM</sub>  | 18                | A     |
| Continuous Source Current (Body Diode) (Note 7) |                       |                                                        | I <sub>S</sub>   | 2.3               | A     |
| Pulsed Source Current (Body Diode) (Note 8)     |                       |                                                        | I <sub>SM</sub>  | 18                | A     |

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

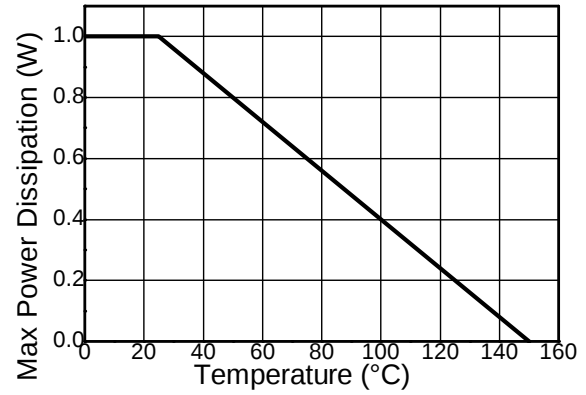
| Characteristic                                   | Symbol                            | Value       | Unit  |
|--------------------------------------------------|-----------------------------------|-------------|-------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 1           | W     |
| Linear Derating Factor                           |                                   | 8           | mW/°C |
| Power Dissipation (Note 7)                       | P <sub>D</sub>                    | 1.5         | W     |
| Linear Derating Factor                           |                                   | 12          | mW/°C |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 125         | °C/W  |
| Thermal Resistance, Junction to Ambient (Note 7) | R <sub>θJA</sub>                  | 83          | °C/W  |
| Thermal Resistance, Junction to Leads (Note 9)   | R <sub>θJL</sub>                  | 70.44       | °C/W  |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C    |

- Notes:
6. For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions
  7. For a device surface mounted on FR4 PCB measured at t ≤ 5 secs.
  8. Repetitive rating 25mm x 25mm FR4 PCB, D=0.02 pulse width=300μs - pulse current limited by maximum junction temperature.
  9. Thermal resistance from junction to solder-point (at the end of the drain lead).

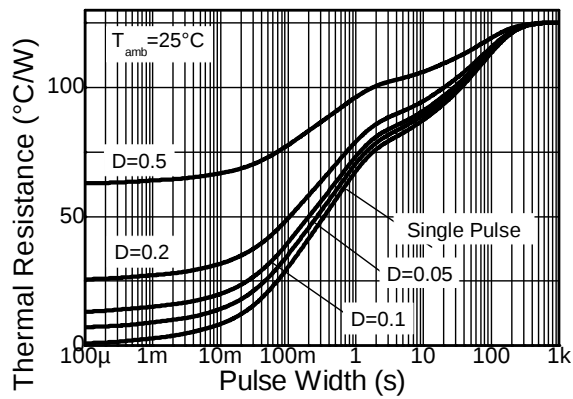
## Thermal Characteristics



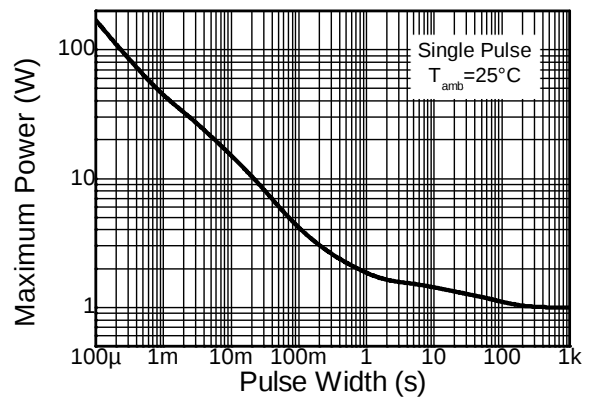
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



**Pulse Power Dissipation**

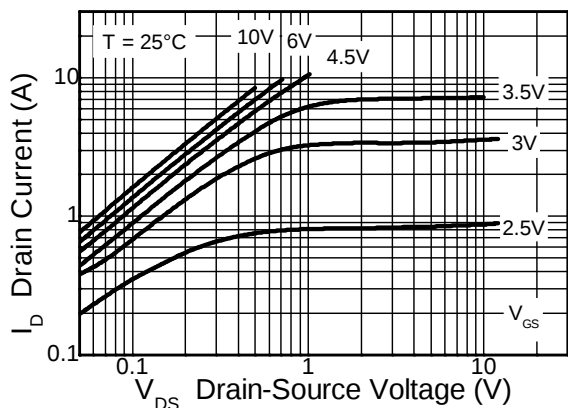
**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                              | Symbol       | Min | Typ  | Max       | Unit       | Test Condition                                                     |
|---------------------------------------------|--------------|-----|------|-----------|------------|--------------------------------------------------------------------|
| OFF CHARACTERISTICS                         |              |     |      |           |            |                                                                    |
| Drain-Source Breakdown Voltage              | $BV_{DSS}$   | 30  | —    | —         | V          | $I_D = 250\mu A, V_{GS} = 0V$                                      |
| Zero Gate Voltage Drain Current             | $I_{DSS}$    | —   | —    | 1         | $\mu A$    | $V_{DS} = 30V, V_{GS} = 0V$                                        |
| Gate-Source Leakage                         | $I_{GSS}$    | —   | —    | $\pm 100$ | nA         | $V_{GS} = \pm 12V, V_{DS} = 0V$                                    |
| ON CHARACTERISTICS                          |              |     |      |           |            |                                                                    |
| Gate Threshold Voltage                      | $V_{GS(th)}$ | 1.0 | —    | 2.2       | V          | $I_D = 250\mu A, V_{DS} = V_{GS}$                                  |
| Static Drain-Source On-Resistance (Note 10) | $R_{DS(ON)}$ | —   | 48   | 65        | m $\Omega$ | $V_{GS} = 10V, I_D = 3.2A$                                         |
|                                             |              |     | 69   | 95        |            | $V_{GS} = 4.5V, I_D = 2.6A$                                        |
| Forward Transconductance (Notes 10 and 12)  | $g_{fs}$     | —   | 7.1  | —         | S          | $V_{DS} = 15V, I_D = 3.2A$                                         |
| Diode Forward Voltage (Note 10)             | $V_{SD}$     | —   | 0.85 | 0.95      | V          | $T_J = 25^{\circ}C, I_S = 2.5A, V_{GS} = 0V$                       |
| Reverse Recovery Time (Note 12)             | $t_{rr}$     | —   | 13   | —         | ns         | $T_J = 25^{\circ}C, I_F = 1.6A,$<br>$di/dt = 100A/\mu s$           |
| Reverse Recovery Charge (Note 12)           | $Q_{rr}$     | —   | 7    | —         | nC         |                                                                    |
| DYNAMIC CHARACTERISTICS (Note 12)           |              |     |      |           |            |                                                                    |
| Input Capacitance                           | $C_{iss}$    | —   | 448  | —         | pF         | $V_{DS} = 15V, V_{GS} = 0V$<br>$f = 1.0MHz$                        |
| Output Capacitance                          | $C_{oss}$    | —   | 82   | —         |            |                                                                    |
| Reverse Transfer Capacitance                | $C_{rss}$    | —   | 49   | —         |            |                                                                    |
| Turn-On Delay Time (Note 11)                | $t_{D(on)}$  | —   | 2.4  | —         | ns         | $V_{DD} = 15V, I_D = 1A,$<br>$R_G \approx 6.0\Omega, V_{GS} = 10V$ |
| Turn-On Rise Time (Note 11)                 | $t_r$        | —   | 2.5  | —         |            |                                                                    |
| Turn-Off Delay Time (Note 11)               | $t_{D(off)}$ | —   | 13.1 | —         |            |                                                                    |
| Turn-Off Fall Time (Note 11)                | $t_f$        | —   | 5.3  | —         |            |                                                                    |
| Total Gate Charge (Note 11)                 | $Q_g$        | —   | 8.6  | —         | nC         | $V_{DS} = 15V, V_{GS} = 10V,$<br>$I_D = 3.2A$                      |
| Gate-Source Charge (Note 11)                | $Q_{gs}$     | —   | 1.4  | —         |            |                                                                    |
| Gate-Drain Charge (Note 11)                 | $Q_{gd}$     | —   | 1.8  | —         |            |                                                                    |

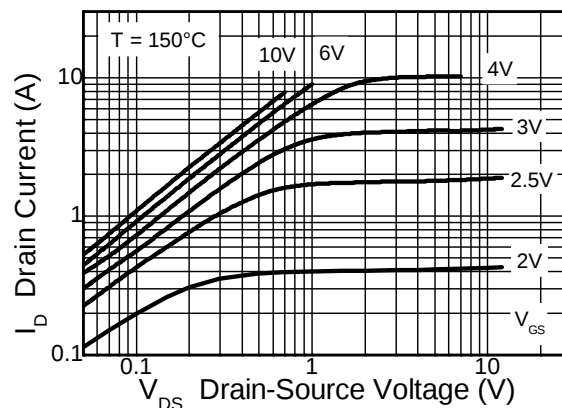
Notes:

- 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
- 11. Switching characteristics are independent of operating junction temperature.
- 12. For design aid only, not subject to production testing.

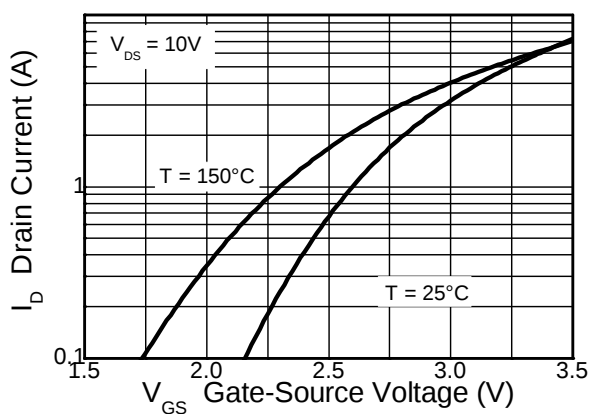
## Typical Characteristics



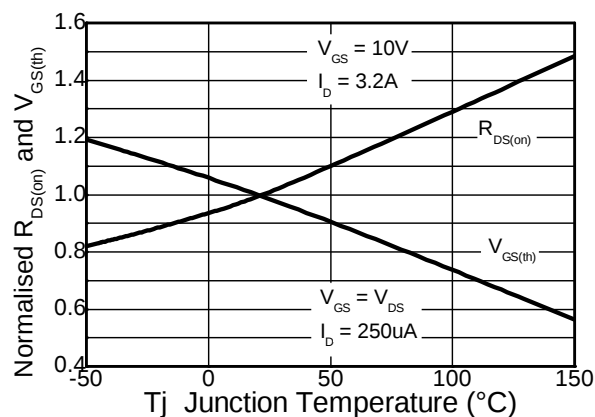
**Output Characteristics**



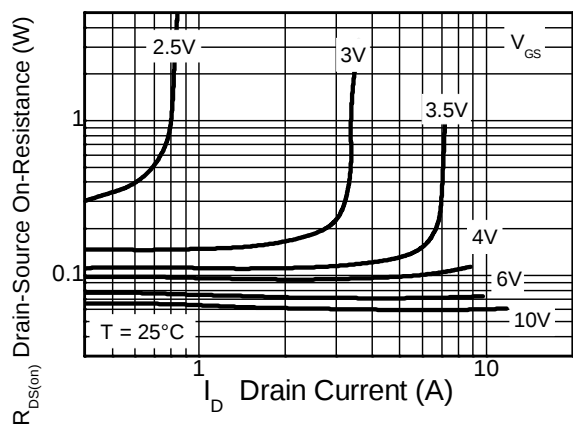
**Output Characteristics**



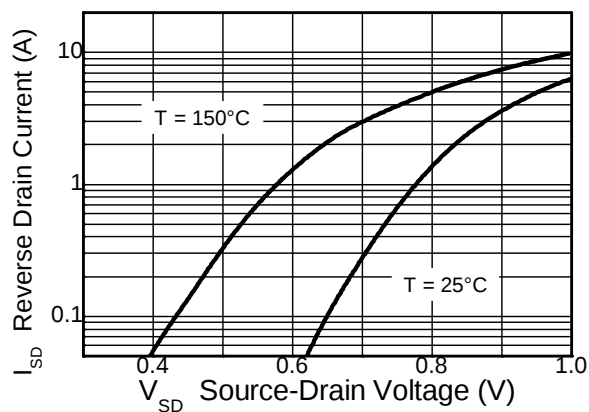
**Typical Transfer Characteristics**



**Normalised Curves v Temperature**

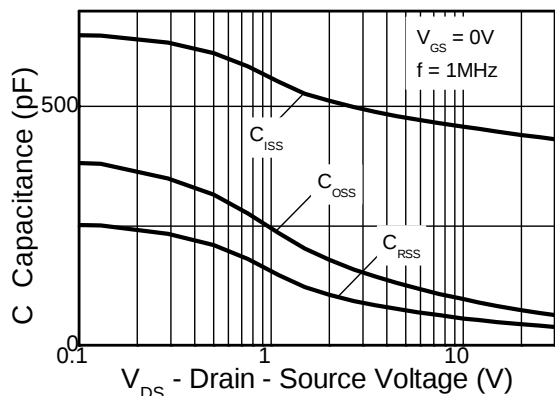


**On-Resistance v Drain Current**

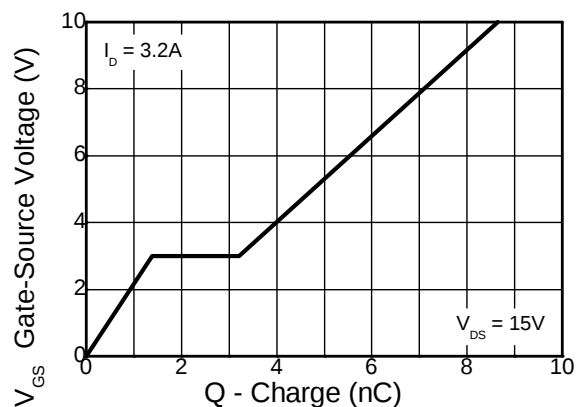


**Source-Drain Diode Forward Voltage**

## Typical Characteristics (continued)

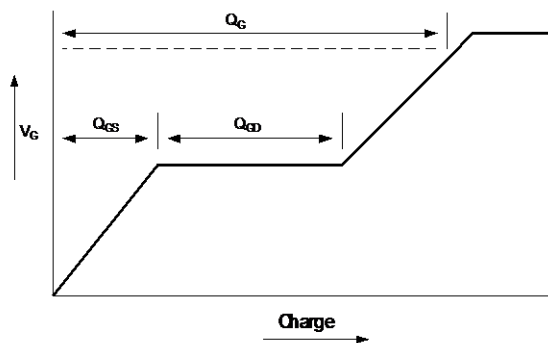


**Capacitance v Drain-Source Voltage**

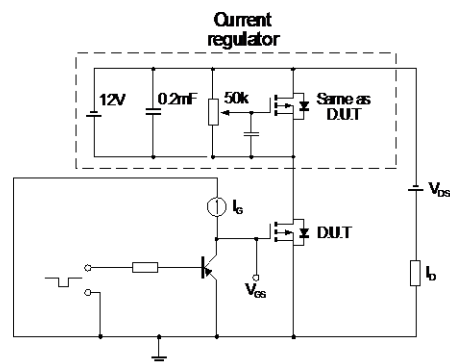


**Gate-Source Voltage v Gate Charge**

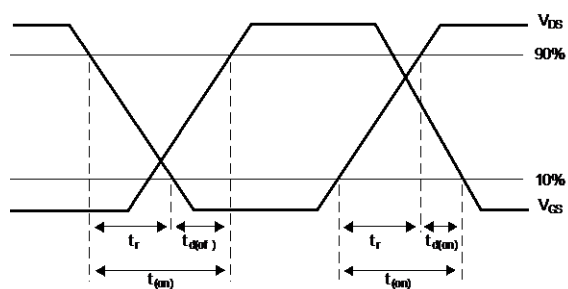
## Test Circuits



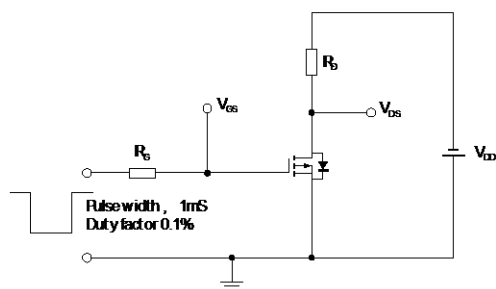
**Basic gate charge waveform**



**Gate charge test circuit**



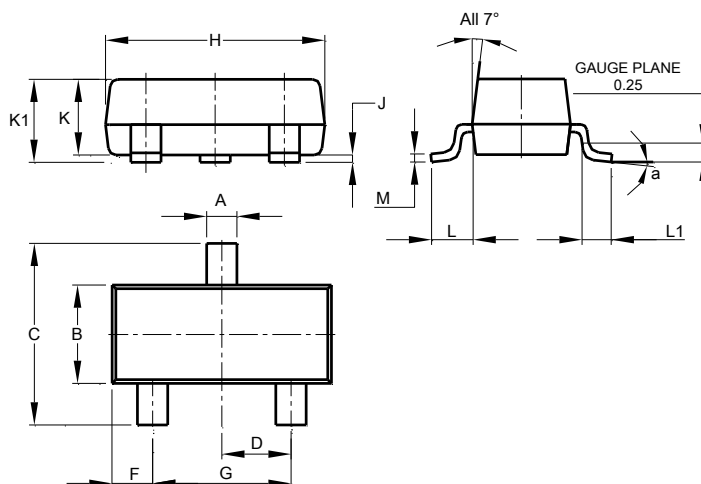
**Switching time waveforms**



**Switching time test circuit**

## Package Outline Dimensions

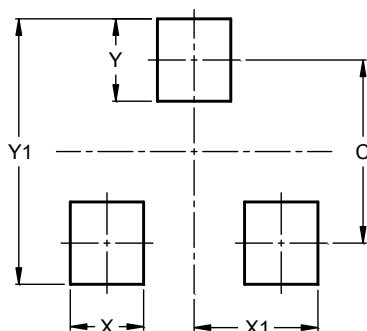
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



| SOT23                |       |       |       |
|----------------------|-------|-------|-------|
| Dim                  | Min   | Max   | Typ   |
| A                    | 0.37  | 0.51  | 0.40  |
| B                    | 1.20  | 1.40  | 1.30  |
| C                    | 2.30  | 2.50  | 2.40  |
| D                    | 0.89  | 1.03  | 0.915 |
| F                    | 0.45  | 0.60  | 0.535 |
| G                    | 1.78  | 2.05  | 1.83  |
| H                    | 2.80  | 3.00  | 2.90  |
| J                    | 0.013 | 0.10  | 0.05  |
| K                    | 0.890 | 1.00  | 0.975 |
| K1                   | 0.903 | 1.10  | 1.025 |
| L                    | 0.45  | 0.61  | 0.55  |
| L1                   | 0.25  | 0.55  | 0.40  |
| M                    | 0.085 | 0.150 | 0.110 |
| a                    | 0°    | 8°    | --    |
| All Dimensions in mm |       |       |       |

## Suggested Pad Layout

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



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 2.0           |
| X          | 0.8           |
| X1         | 1.35          |
| Y          | 0.9           |
| Y1         | 2.9           |

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