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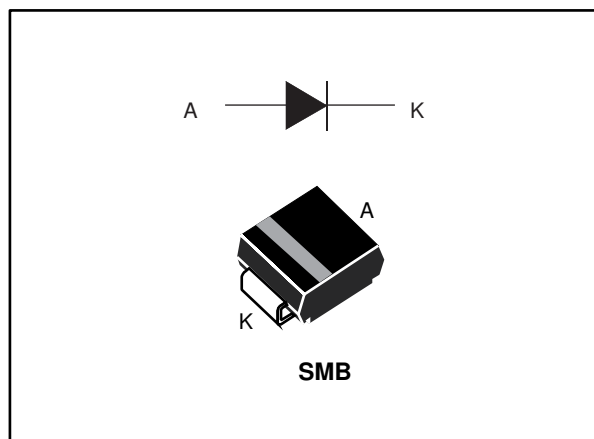
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## Automotive ultrafast recovery diode

Datasheet - production data



### Description

This device uses ST's new 200 V planar Pt doping technology, and is specially suited for switching mode base drive and transistor circuits.

Packaged in SMB, it is intended for use in low voltage, high frequency inverters, freewheeling and polarity protection in automotive applications.

**Table 1: Device summary**

| Symbol          | Value  |
|-----------------|--------|
| $I_{F(AV)}$     | 2 A    |
| $V_{RRM}$       | 200 V  |
| $T_j$ (max.)    | 175 °C |
| $V_F$ (typ.)    | 0.7 V  |
| $t_{rr}$ (typ.) | 15 ns  |

### Features

- AEC-Q101 qualified
- Very low conduction losses
- Negligible switching losses
- Low forward and reverse recovery times
- High junction temperature
- PPAP capable



# 1 Characteristics

**Table 2: Absolute ratings (limiting values per diode at 25 °C, unless otherwise specified)**

| Symbol              | Parameter   |                                   | Value       | Unit |
|---------------------|---|-----------------------------------|-------------|------|
| V <sub>RRM</sub>    | Repetitive peak reverse voltage                       |                                   | 200         | V    |
| I <sub>FRM</sub>    | Repetitive peak forward current                       | t <sub>p</sub> = 5 μs, f = 5 kHz  | 60          | A    |
| I <sub>F(RMS)</sub> | Forward rms current                                   |                                   | 60          | A    |
| I <sub>F(AV)</sub>  | Average forward current<br>δ = 0.5, square wave       | T <sub>lead</sub> = 90 °C         | 2           | A    |
| I <sub>FSM</sub>    | Surge non repetitive forward current                  | t <sub>p</sub> = 10 ms sinusoidal | 75          | A    |
| T <sub>stg</sub>    | Storage temperature range                             |                                   | -65 to +175 | °C   |
| T <sub>j</sub>      | Maximum operating junction temperature <sup>(1)</sup> |                                   | -40 to +175 | °C   |

**Notes:**

<sup>(1)</sup>(dP<sub>tot</sub>/dT<sub>j</sub>) < (1/R<sub>th(j-a)</sub>) condition to avoid thermal runaway for a diode on its own heatsink.

**Table 3: Thermal parameters**

| Symbol               | Parameter        | Maximum | Unit |
|----------------------|------------------|---------|------|
| R <sub>th(j-l)</sub> | Junction to lead | 30      | °C/W |

**Table 4: Static electrical characteristics (per diode)**

| Symbol                        | Parameter               | Test conditions         |                                   | Min. | Typ. | Max. | Unit |
|-------------------------------|-------------------------|-------------------------|-----------------------------------|------|------|------|------|
| I <sub>R</sub> <sup>(1)</sup> | Reverse leakage current | T <sub>j</sub> = 25 °C  | V <sub>R</sub> = V <sub>RRM</sub> | -    |      | 3    | μA   |
|                               |                         | T <sub>j</sub> = 125 °C |                                   | -    | 2    | 20   |      |
| V <sub>F</sub> <sup>(2)</sup> | Forward voltage drop    | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 6 A              | -    |      | 1.20 | V    |
|                               |                         | T <sub>j</sub> = 25 °C  | I <sub>F</sub> = 2 A              | -    | 0.89 | 1.0  |      |
|                               |                         | T <sub>j</sub> = 100 °C |                                   | -    | 0.76 | 0.85 |      |
|                               |                         | T <sub>j</sub> = 150 °C |                                   | -    | 0.70 | 0.80 |      |

**Notes:**

<sup>(1)</sup>Pulse test: t<sub>p</sub> = 5 ms, δ < 2%

<sup>(2)</sup>Pulse test: t<sub>p</sub> = 380 μs, δ < 2 %

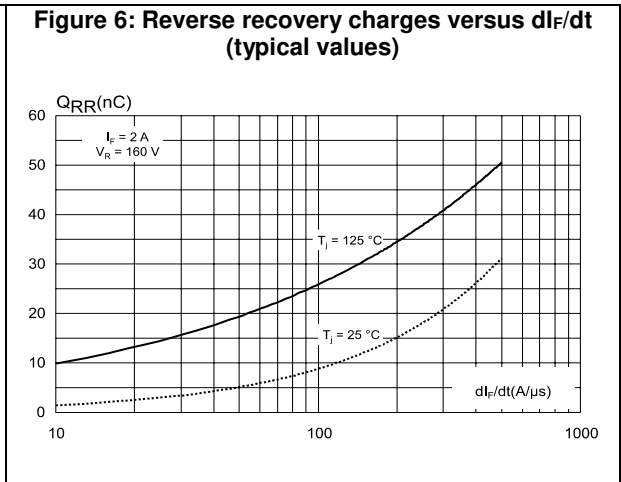
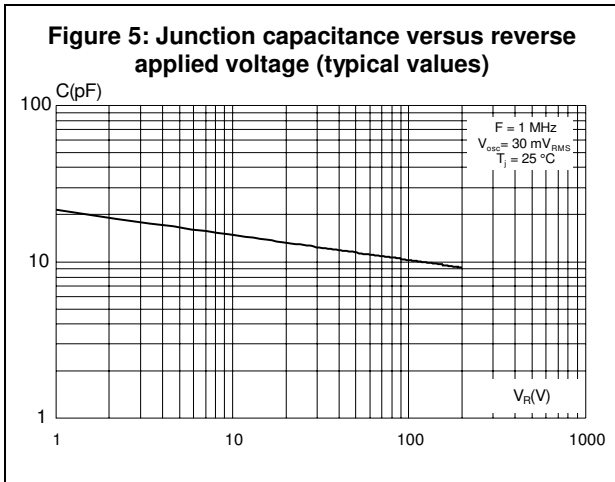
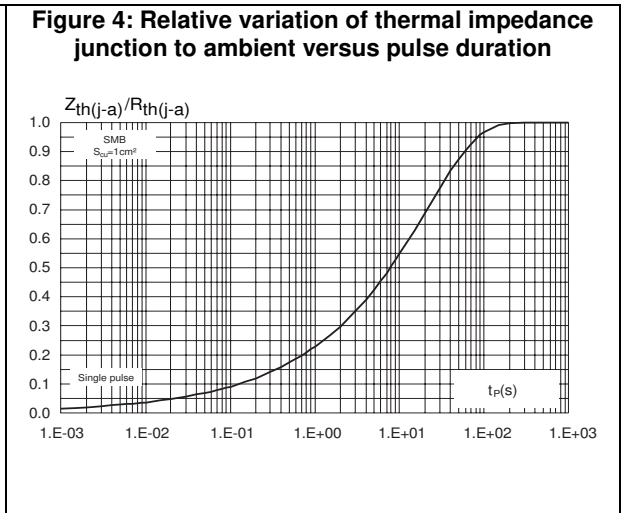
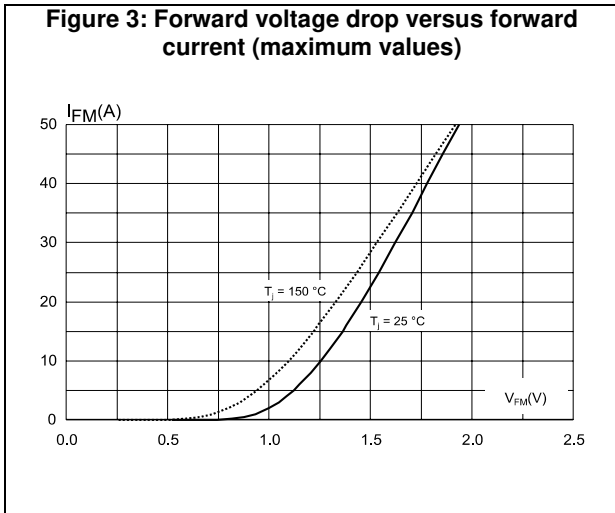
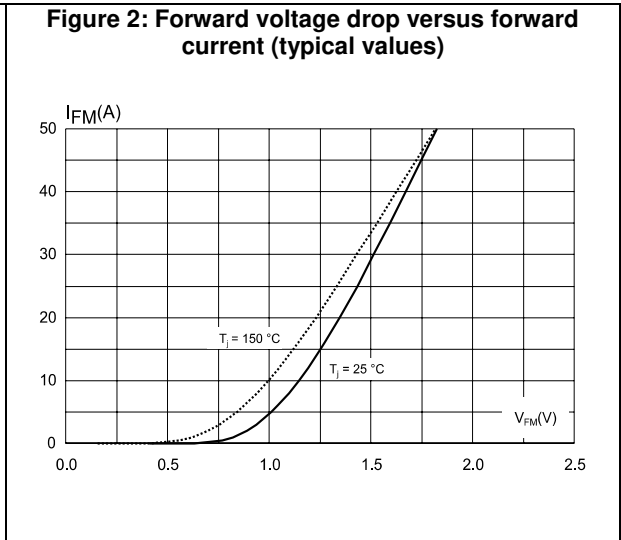
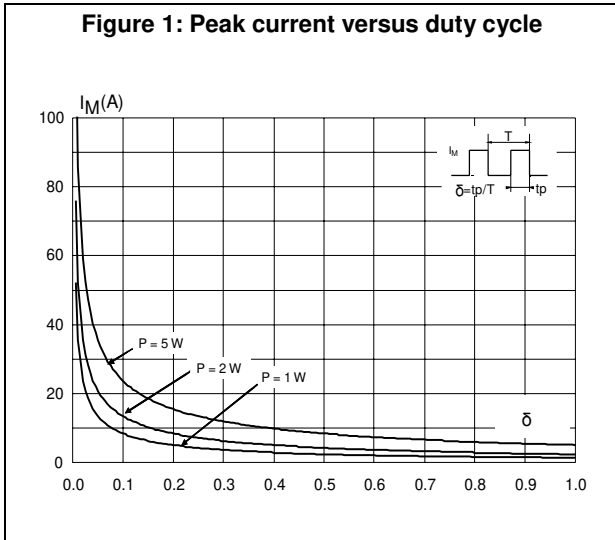
To evaluate the conduction losses, use the following equation:

$$P = 0.68 \times I_{F(AV)} + 0.06 \times I_{F(RMS)}^2$$

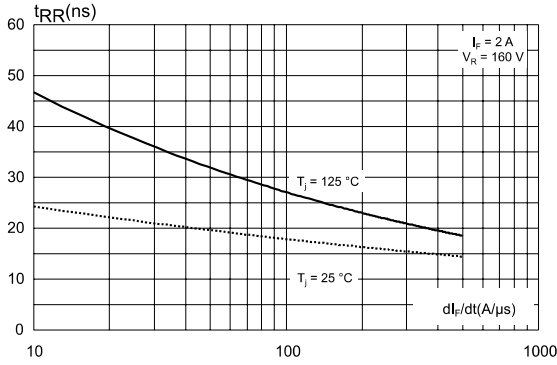
Table 5: Dynamic characteristics

| Symbol   | Parameters               | Test conditions       | Min.   | Typ. | Max. | Unit |    |
|----------|--------------------------|-----------------------|--|------|------|------|----|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$  | $I_F = 1\text{ A};$<br>$di_F/dt = -50\text{ A}/\mu\text{s};$<br>$V_R = 30\text{ V}$            | -    | 23   | 30   | ns |
|          |                          |                       | $I_F = 1\text{ A};$<br>$di_F/dt = -100\text{ A}/\mu\text{s};$<br>$V_R = 30\text{ V}$           | -    | 15   | 20   |    |
| $t_{fr}$ | Forward recovery time    | $T_j = 25\text{ °C}$  | $I_F = 2\text{ A};$<br>$di_F/dt = 100\text{ A}/\mu\text{s};$<br>$V_{FR} = 1.1 \times V_{Fmax}$ | -    | 40   |      |    |
| $V_{FP}$ | Forward recovery voltage |                       | $I_F = 2\text{ A};$<br>$di_F/dt = 100\text{ A}/\mu\text{s}$                                    | -    | 2.0  |      | V  |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 2\text{ A};$<br>$di_F/dt = -200\text{ A}/\mu\text{s};$<br>$V_R = 160\text{ V}$          | -    | 3    | 4    | A  |

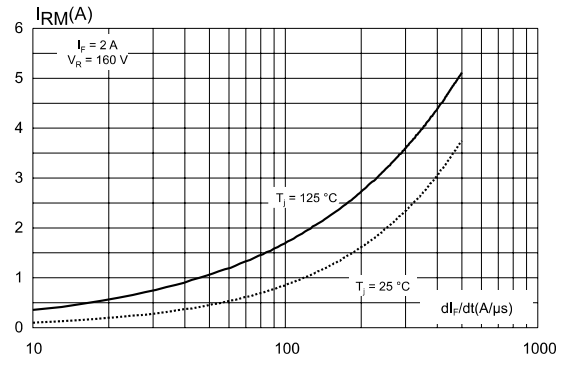
# 1.1 Characteristics (curves)



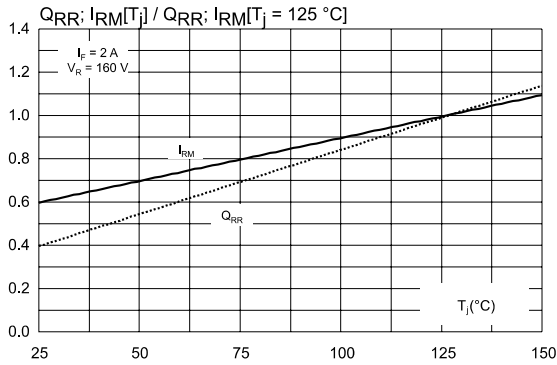
**Figure 7: Reverse recovery time versus  $di_F/dt$  (typical values)**



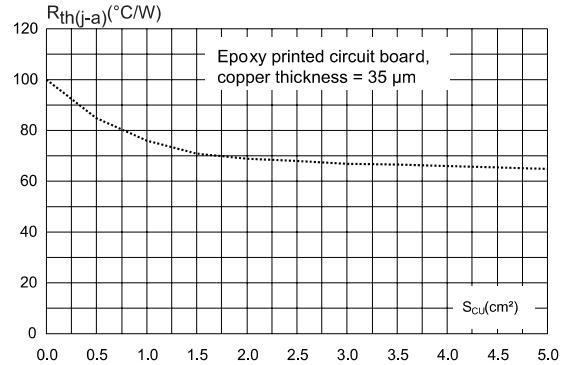
**Figure 8: Peak reverse recovery current versus  $di_F/dt$  (typical values)**



**Figure 9: Dynamic parameters versus junction temperature**



**Figure 10: Thermal resistance, junction to ambient, versus copper surface under each lead**



## 2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com). ECOPACK® is an ST trademark.

- Epoxy meets UL94, V0
- Lead-free package

### 2.1 SMB package information

Figure 11: SMB package outline

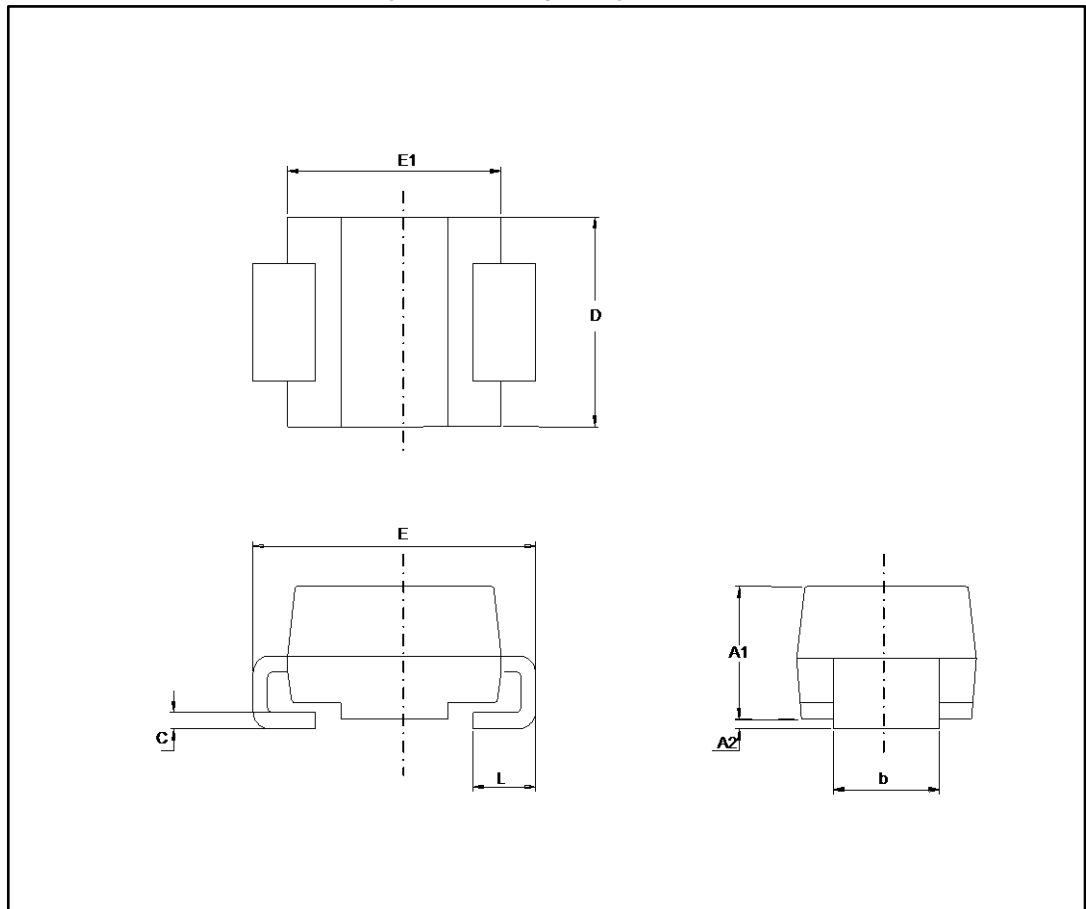
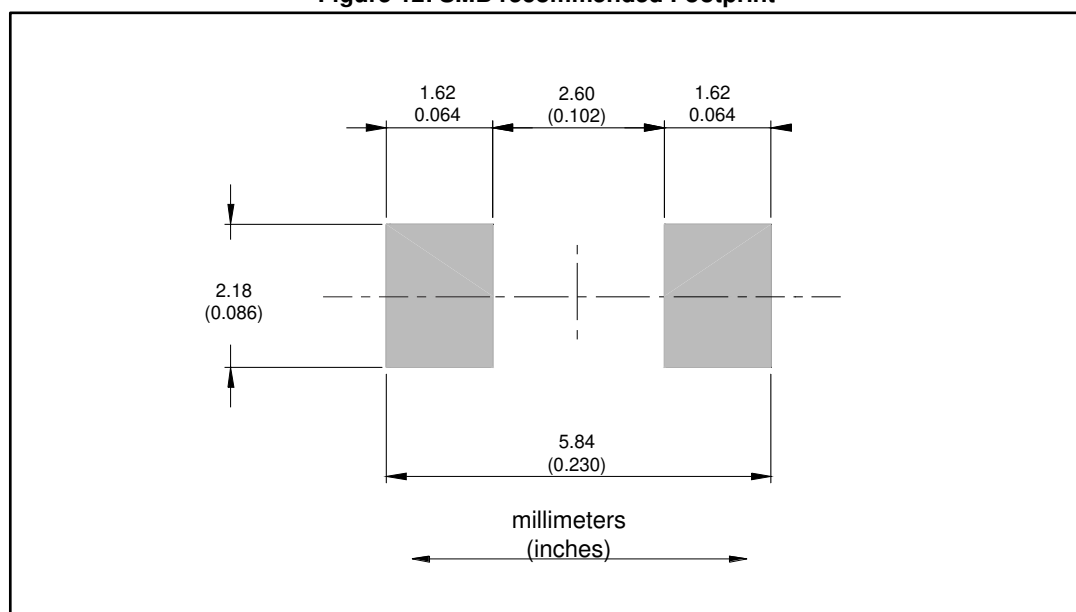


Table 6: SMB package mechanical data

| Ref. | Dimensions  |      |        |        |
|------|-------------|------|--------|--------|
|      | Millimeters |      | Inches |        |
|      | Min.        | Max. | Min.   | Max.   |
| A1   | 1.90        | 2.45 | 0.0748 | 0.0965 |
| A2   | 0.05        | 0.20 | 0.0020 | 0.0079 |
| b    | 1.95        | 2.20 | 0.0768 | 0.0867 |
| c    | 0.15        | 0.40 | 0.0059 | 0.0157 |
| D    | 3.30        | 3.95 | 0.1299 | 0.1556 |
| E    | 5.10        | 5.60 | 0.2008 | 0.2205 |
| E1   | 4.05        | 4.60 | 0.1594 | 0.1811 |
| L    | 0.75        | 1.50 | 0.0295 | 0.0591 |

Figure 12: SMB recommended Footprint



### 3 Ordering information

Figure 13: Ordering information scheme

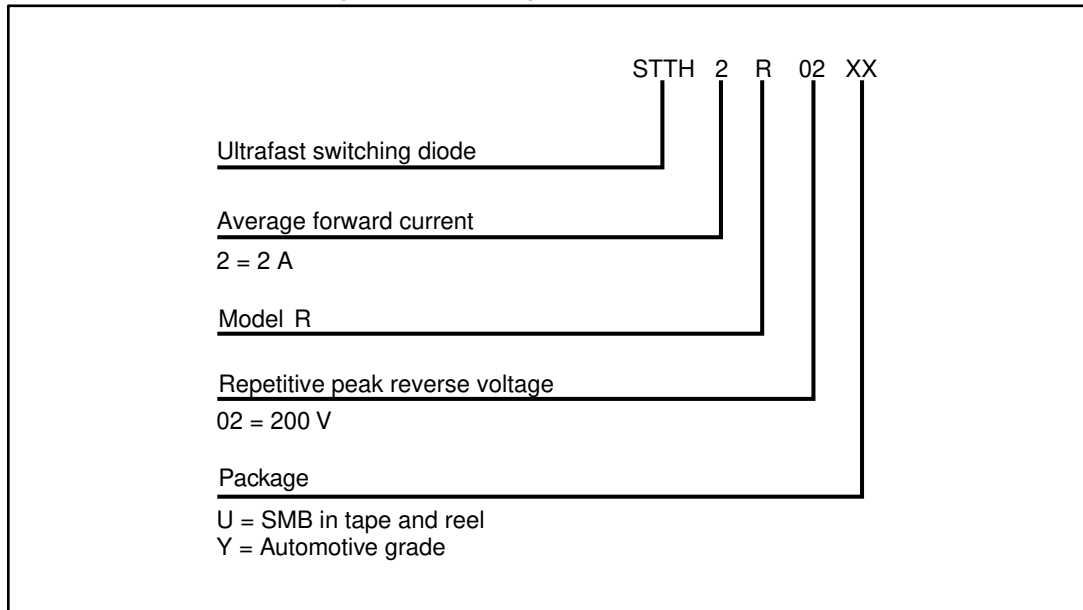


Table 7: Ordering information

| Order code | Marking | Package | Weight  | Base qty. | Delivery mode |
|------------|---------|---------|---------|-----------|---------------|
| STTH2R02UY | R2UY    | SMB     | 0.110 g | 2500      | Tape and reel |

### 4 Revision history

Table 8: Document revision history

| Date        | Revision | Changes  |
|-------------|----------|--|
| 20-Oct-2010 | 1        | Initial release.   |
| 02-Feb-2017 | 2        | Updated <a href="#">Figure 4</a> : "Relative variation of thermal impedance junction to case versus pulse duration". |

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