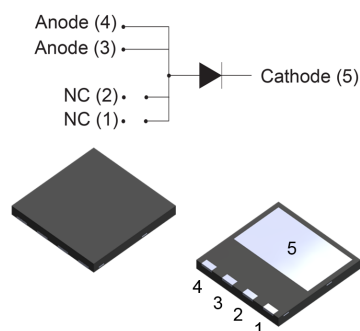


## 650 V, 10 A power Schottky silicon carbide diode



PowerFLAT™ 8x8 HV

### Features

- Less-than-1mm height package
- High creepage package
- No or negligible reverse recovery
- Temperature independent switching behavior
- High forward surge capability
- Very low drop forward voltage
- Power efficient product
- ECOPACK2 compliant component

### Applications

- Boost PFC
- Bootstrap diode
- LLC clamping function
- High frequency inverter applications

### Description

This 10 A, 650 V, SiC diode is an ultra-high performance power Schottky diode. It is manufactured using a silicon carbide substrate. The wide band gap material allows the design of a Schottky diode structure with a 650 V rating. Due to the Schottky construction, no recovery is shown at turn-off and ringing patterns are negligible. The minimal capacitive turn-off behavior is independent of temperature.

Qualified in low profile package, the STPSC10065DLF in PowerFLAT™ 8x8 HV, enables low drop forward voltage associated to high surge capabilities in low space environment such as telecom and network, industrial or renewable energy domains.

#### Product status link

[STPSC10065DLF](#)

#### Product summary

| Symbol        | Value  |
|---------------|--------|
| $I_{F(AV)}$   | 10 A   |
| $V_{RRM}$     | 650 V  |
| $V_{F(typ.)}$ | 1.30 V |
| $T_{j(max.)}$ | 175 °C |

#### Product label



# 1 Characteristics

**Table 1. Absolute ratings (limiting values at 25 °C unless otherwise specified)**

| Symbol       | Parameter                            |                                                                                              | Value       | Unit |
|--------------|--------------------------------------|----------------------------------------------------------------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage      | $T_j = -40\text{ °C to } +175\text{ °C}$                                                     | 650         | V    |
| $I_{F(RMS)}$ | Forward rms current                  |                                                                                              | 18          | A    |
| $I_{F(AV)}$  | Average forward current              | $T_c = 140\text{ °C}^{(1)}$ , DC                                                             | 10          | A    |
| $I_{FSM}$    | Surge non repetitive forward current | $t_p = 10\text{ ms sinusoidal}$ , $T_c = 25\text{ °C}$                                       | 48          | A    |
|              |                                      | $t_p = 10\text{ ms sinusoidal}$ , $T_c = 125\text{ °C}$                                      | 39          |      |
|              |                                      | $t_p = 10\text{ }\mu\text{s square}$ , $T_c = 25\text{ °C}$                                  | 210         |      |
| $I_{FRM}$    | Repetitive peak forward current      | $T_c = 140\text{ °C}^{(1)}$ , $T_j = 175\text{ °C}$ , $\delta = 0.1$ , $f_W > 10\text{ kHz}$ | 44          | A    |
| $T_{stg}$    | Storage temperature range            |                                                                                              | -55 to +175 | °C   |
| $T_j$        | Operating junction temperature range |                                                                                              | -40 to +175 | °C   |

1. Value based on  $R_{th(j-c)}$  max.

**Table 2. Thermal resistance parameters**

| Symbol        | Parameter        | Typ. value | Max. value | Unit |
|---------------|------------------|------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | 1.4        | 2.0        | °C/W |

**Table 3. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                     | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|---------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = V_{RRM}$     | -    | 7    | 130  | $\mu\text{A}$ |
|             |                         | $T_j = 150\text{ °C}$ |                     | -    | 53   | 900  |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 10\text{ A}$ | -    | 1.30 | 1.45 | V             |
|             |                         | $T_j = 150\text{ °C}$ |                     | -    | 1.45 | 1.65 |               |

1.  $t_p = 10\text{ ms}$ ,  $\delta < 2\%$

2.  $t_p = 500\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 0.97 \times I_{F(AV)} + 0.068 \times I_{F(RMS)}^2$$

For more information, please refer to the following application notes related to the power losses:

- AN604 : Calculation of conduction losses in a power rectifier
- AN4021 : Calculation of reverse losses on a power diode

**Table 4. Dynamic electrical characteristics**

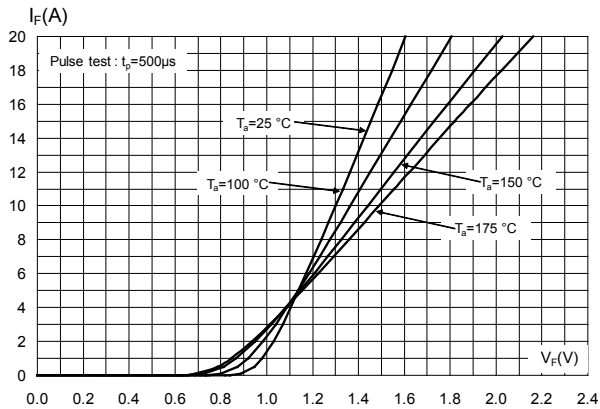
| Symbol         | Parameter               | Test conditions                                            | Typ. | Unit |
|----------------|-------------------------|------------------------------------------------------------|------|------|
| $Q_{cj}^{(1)}$ | Total capacitive charge | $V_R = 400\text{ V}$                                       | 34   | nC   |
| $C_j$          | Total capacitance       | $V_R = 0\text{ V}, T_c = 25\text{ °C}, F = 1\text{ MHz}$   | 670  | pF   |
|                |                         | $V_R = 400\text{ V}, T_c = 25\text{ °C}, F = 1\text{ MHz}$ | 55   |      |

1. Most accurate value for the capacitive charge:

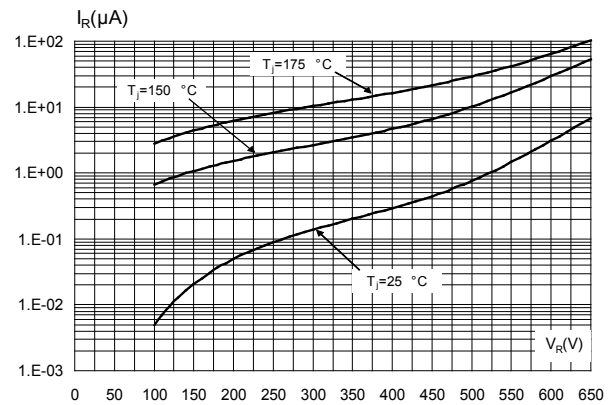
$$Q_{cj}(V_R) = \int_0^{V_R} C_j(V) dV$$

## 1.1 Characteristics (curves)

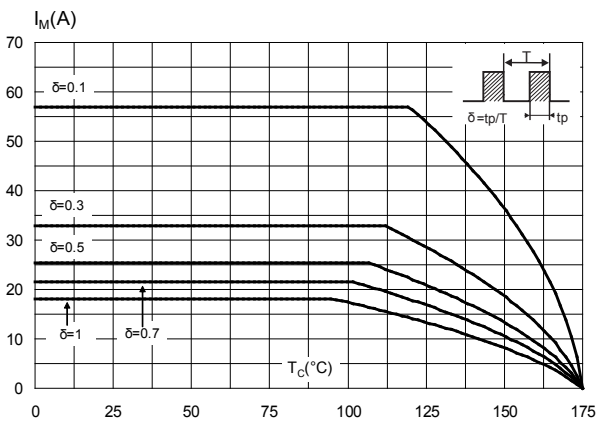
**Figure 1. Forward voltage drop versus forward current (typical values)**



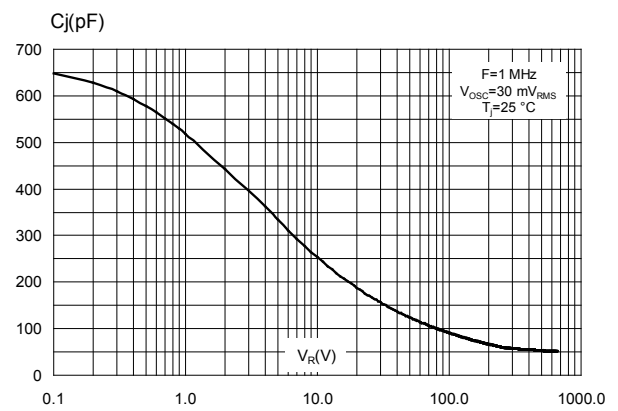
**Figure 2. Reverse leakage current versus reverse voltage applied (typical values)**

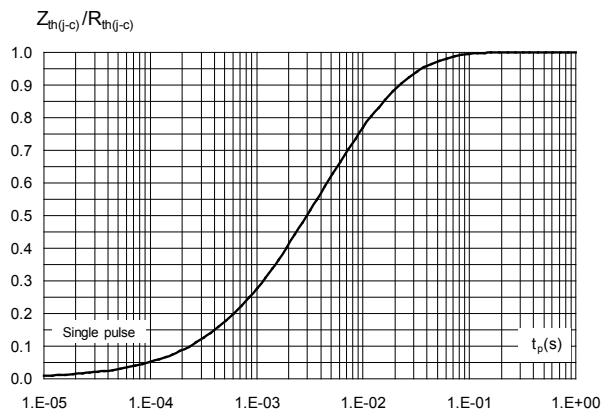
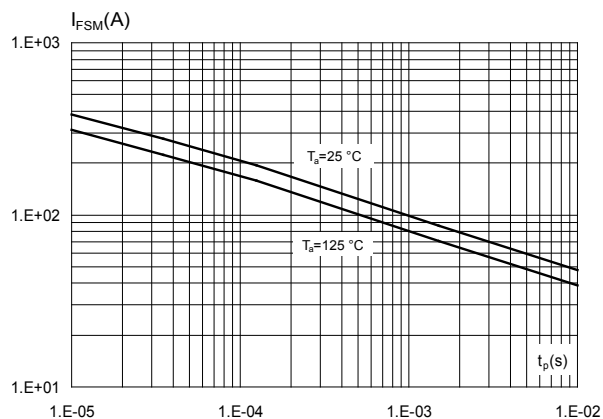
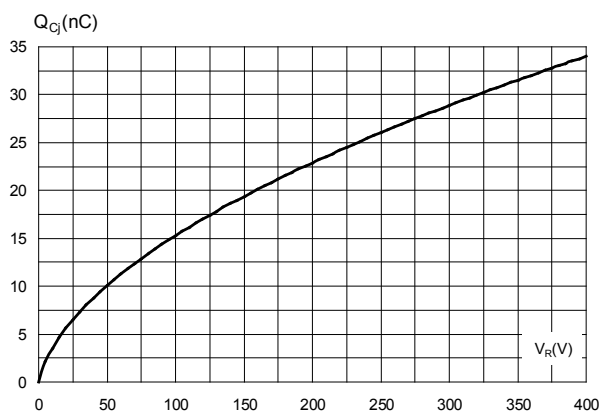


**Figure 3. Peak forward current versus case temperature (fw > 10 kHz)**



**Figure 4. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 5. Relative variation of thermal impedance junction to case versus pulse duration**

**Figure 6. Non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**

**Figure 7. Total capacitive charges versus reverse voltage applied (typical values)**


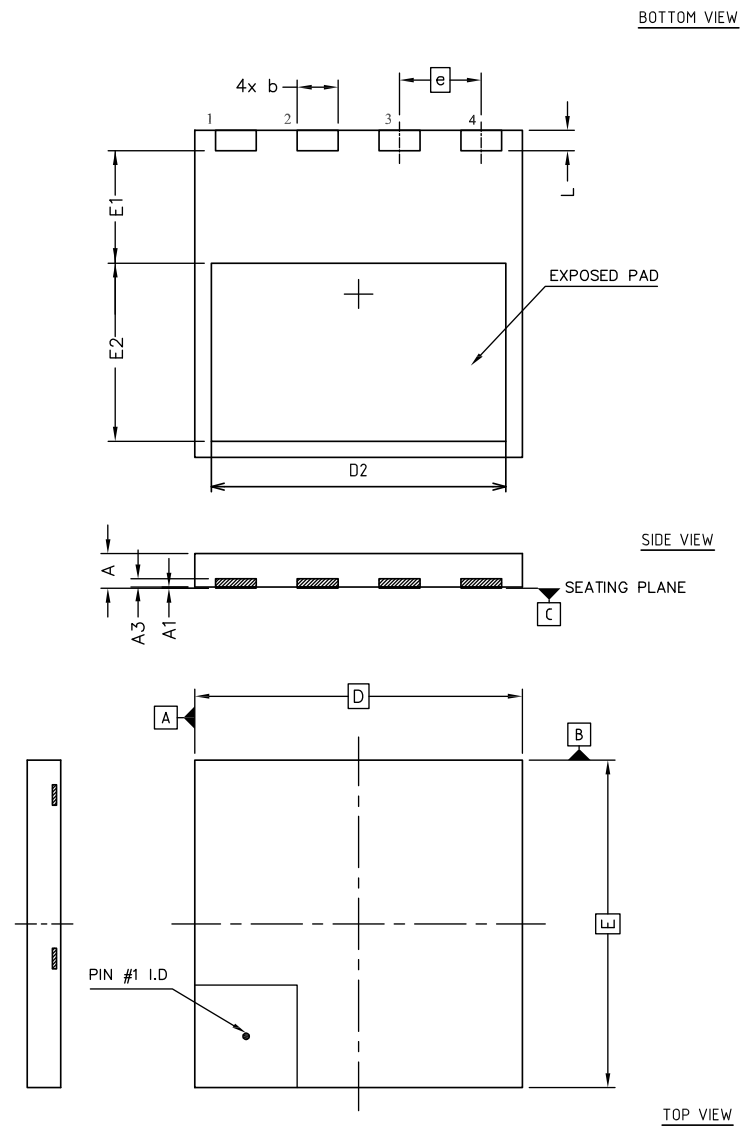
## 2 Package information

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.

### 2.1 PowerFLAT™ 8x8 HV package information

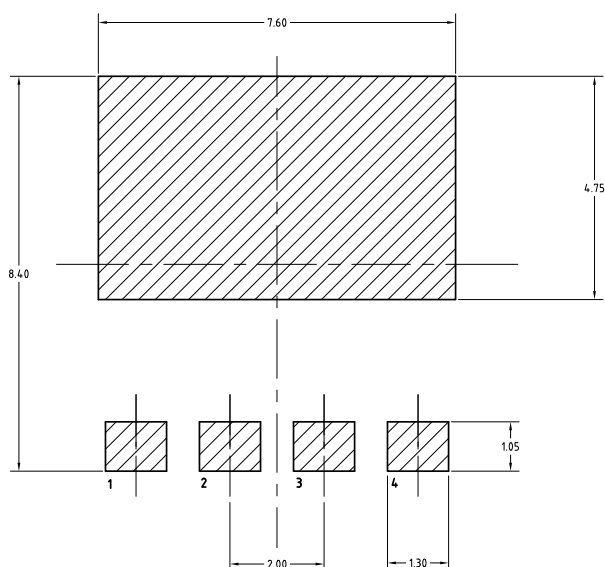
- Epoxy meets UL94, V0
- Lead-free Package

**Figure 8. PowerFLAT™ 8x8 HV package outline**



**Table 5. PowerFLAT™ 8x8 HV mechanical data**

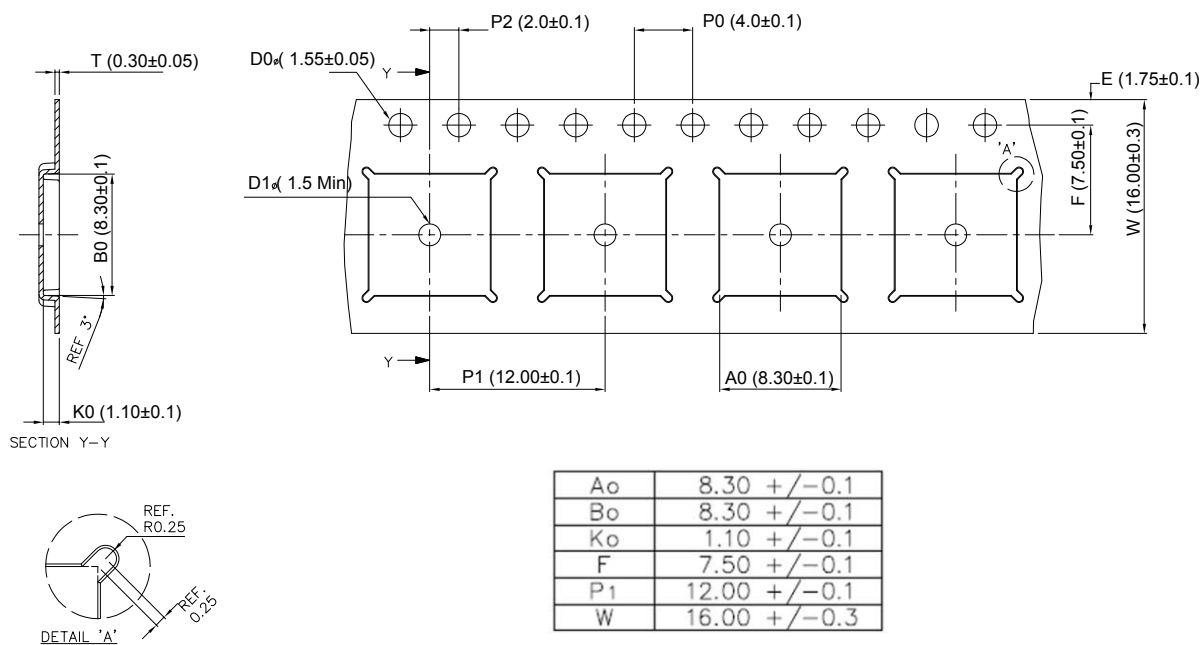
| Ref. | Dimensions (in mm) |      |      |
|------|--------------------|------|------|
|      | Min.               | Typ. | Max. |
| A    | 0.75               | 0.85 | 0.95 |
| A1   | 0.00               |      | 0.05 |
| A3   | 0.10               | 0.20 | 0.30 |
| b    | 0.90               | 1.00 | 1.10 |
| D    | 7.90               | 8.00 | 8.10 |
| E    | 7.90               | 8.00 | 8.10 |
| D2   | 7.10               | 7.20 | 7.30 |
| E1   | 2.65               | 2.75 | 2.85 |
| E2   | 4.25               | 4.35 | 4.45 |
| e    | 2.00               |      |      |
| L    | 0.40               | 0.50 | 0.60 |

**Figure 9. PowerFLAT™ 8x8 HV footprint**


**Note:** All dimensions are in millimeters.

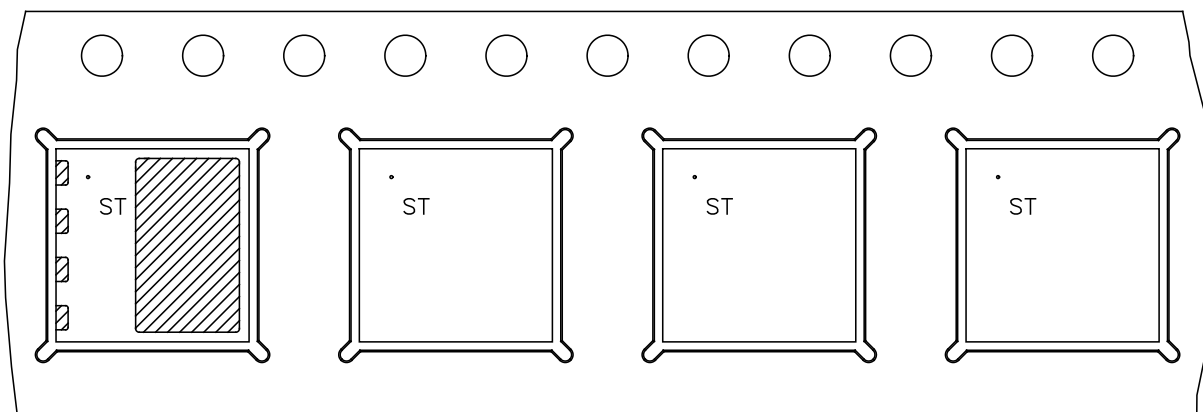
## 2.2 PowerFLAT™ 8x8 HV packing information

Figure 10. PowerFLAT™ 8x8 HV tape

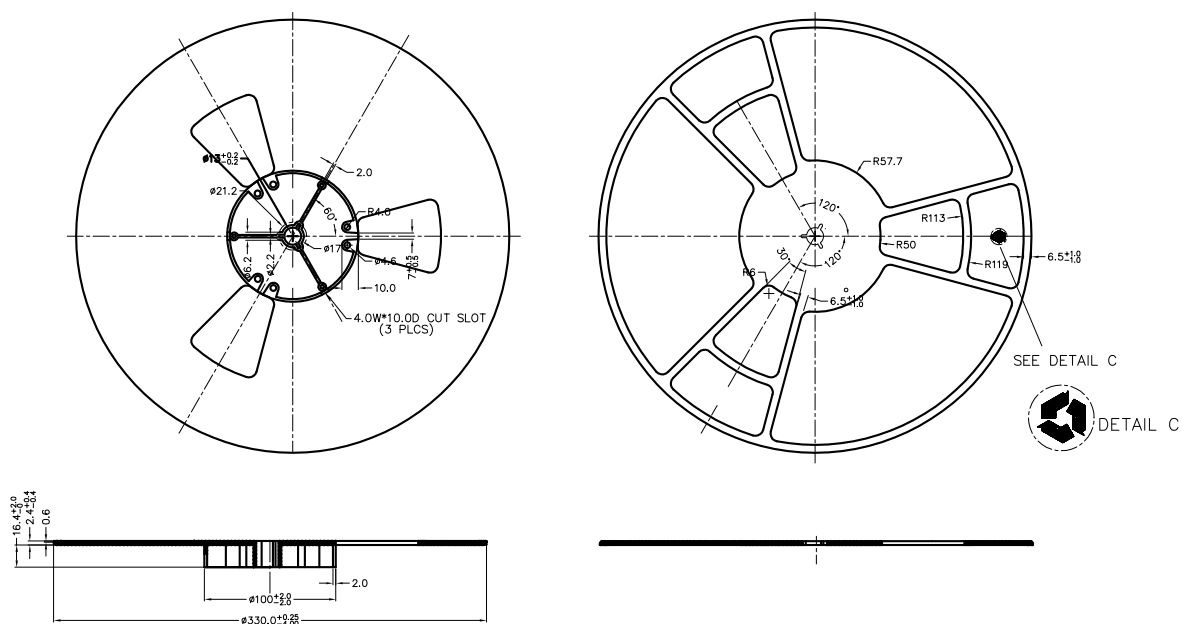


Note: All dimensions are in millimeters.

Figure 11. PowerFLAT™ 8x8 HV package orientation in carrier tape



**Figure 12. PowerFLAT™ 8x8 HV reel**



*Note: All dimensions are in millimeters.*

### 3 Ordering Information

**Table 6. Ordering information**

| Order code       | Marking  | Package          | Weight | Base qty. | Delivery mode |
|------------------|----------|------------------|--------|-----------|---------------|
| STPSC10065DLF-TR | PSC10065 | PowerFLAT 8x8 HV | 170 mg | 3000      | Reel          |

## Revision history

**Table 7. Document revision history**

| Date        | Version | Changes          |
|-------------|---------|------------------|
| 04-Nov-2019 | 1       | Initial release. |

**IMPORTANT NOTICE – PLEASE READ CAREFULLY**

STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, enhancements, modifications, and improvements to ST products and/or to this document at any time without notice. Purchasers should obtain the latest relevant information on ST products before placing orders. ST products are sold pursuant to ST's terms and conditions of sale in place at the time of order acknowledgement.

Purchasers are solely responsible for the choice, selection, and use of ST products and ST assumes no liability for application assistance or the design of Purchasers' products.

No license, express or implied, to any intellectual property right is granted by ST herein.

Resale of ST products with provisions different from the information set forth herein shall void any warranty granted by ST for such product.

ST and the ST logo are trademarks of ST. For additional information about ST trademarks, please refer to [www.st.com/trademarks](http://www.st.com/trademarks). All other product or service names are the property of their respective owners.

Information in this document supersedes and replaces information previously supplied in any prior versions of this document.

© 2019 STMicroelectronics – All rights reserved

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[STMicroelectronics:](#)

[STPSC10065DLF](#)