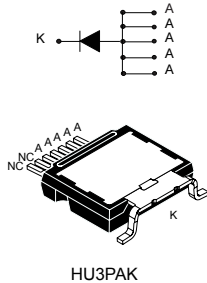


## Automotive 600 V, 60 A ultrafast high voltage rectifier



HU3PAK



### Product status link

[STTH60RQ06L2Y](#)

### Product summary

|                 |                   |
|-----------------|-------------------|
| $I_{F(AV)}$     | 60 A              |
| $V_{RRM}$       | 600 V             |
| $V_F$ (typ.)    | 1.45 V            |
| $t_{rr}$ (max.) | 35 ns             |
| $T_j$           | -40 °C to +175 °C |

### Features

- AEC-Q101 qualified 
- High junction temperature capability
- Ultrafast switching
- Low reverse current
- Low thermal resistance
- Reduce switching and conduction losses
- PPAP capable

### Applications

- On board charger (OBC)
- Secondary LLC rectification
- DC/DC converters
- EV Charging station

### Description

Housed in a HU<sup>3</sup>PAK package, this 600 V, 60 A device uses ST 600 V rapid quiet (RQ) diode technology.

[STTH60RQ06L2Y](#) is ideal for automotive application use as secondary rectification diode.

# 1 Characteristics

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

| Symbol       | Parameter                                            |                                         | Value       | Unit |
|--------------|------------------------------------------------------|-----------------------------------------|-------------|------|
| $V_{RRM}$    | Repetitive peak reverse voltage                      | $T_j = -40\text{ °C to }+175\text{ °C}$ | 600         | V    |
| $I_{F(RMS)}$ | Forward rms current                                  |                                         | 90          | A    |
| $I_{F(AV)}$  | Average forward current $\delta = 0.5$ , square wave | $T_C = 125\text{ °C}$                   | 60          | A    |
| $I_{FSM}$    | Surge non repetitive forward current                 | $t_p = 10\text{ ms sinusoidal}$         | 340         | A    |
| $T_{stg}$    | Storage temperature range                            |                                         | -65 to +175 | °C   |
| $T_j$        | Operating junction temperature range                 |                                         | -40 to +175 | °C   |

**Table 2. Thermal resistance parameters**

| Symbol        | Parameter        | Max. value | Unit |
|---------------|------------------|------------|------|
| $R_{th(j-c)}$ | Junction to case | 0.32       | °C/W |

For more information, refer to the following technical note:

- [TN1378](#): HU<sup>3</sup>PAK package mounting and thermal behaviour
- [AN5088](#): Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics**

| Symbol      | Parameter               | Test conditions       |                      | Min. | Typ. | Max. | Unit          |
|-------------|-------------------------|-----------------------|----------------------|------|------|------|---------------|
| $I_R^{(1)}$ | Reverse leakage current | $T_j = 25\text{ °C}$  | $V_R = 600\text{ V}$ | -    |      | 80   | $\mu\text{A}$ |
|             |                         | $T_j = 150\text{ °C}$ |                      | -    | 160  | 1600 |               |
| $V_F^{(2)}$ | Forward voltage drop    | $T_j = 25\text{ °C}$  | $I_F = 60\text{ A}$  | -    |      | 2.95 | V             |
|             |                         | $T_j = 150\text{ °C}$ |                      | -    | 1.45 | 1.85 |               |

1. Pulse test:  $t_p = 5\text{ ms}$ ,  $\delta < 2\%$

2. Pulse test:  $t_p = 380\text{ }\mu\text{s}$ ,  $\delta < 2\%$

To evaluate the conduction losses, use the following equation:

$$P = 1.05 \times I_{F(AV)} + 0.013 \times I_F^2 (RMS)$$

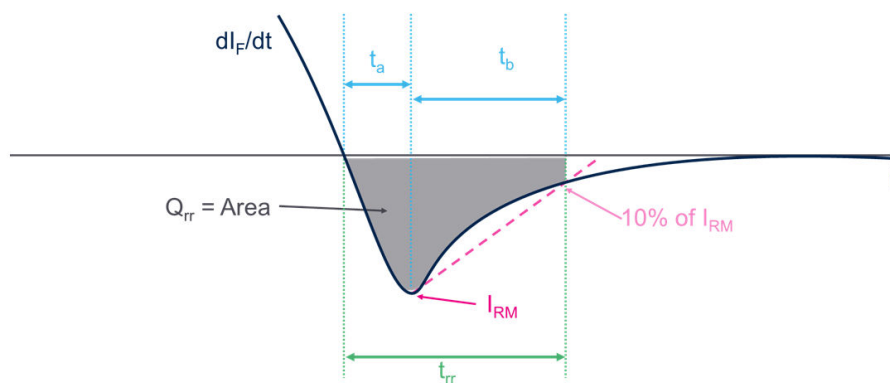
For more information, refer to the following application notes related to the power losses :

- [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       |                                                                                    | Min. | Typ. | Max. | Unit |
|----------|--------------------------|-----------------------|------------------------------------------------------------------------------------|------|------|------|------|
| $t_{rr}$ | Reverse recovery time    | $T_j = 25\text{ °C}$  | $I_F = 0.5\text{ A}$ , $I_{rr} = 0.25\text{ A}$ , $I_R = 1\text{ A}$               | -    |      | 35   | ns   |
|          |                          |                       | $I_F = 1\text{ A}$ , $V_R = 30\text{ V}$ , $di_F/dt = -50\text{ A}/\mu\text{s}$    | -    | 50   | 65   |      |
| $I_{RM}$ | Reverse recovery current | $T_j = 125\text{ °C}$ | $I_F = 60\text{ A}$ , $V_R = 400\text{ V}$ , $di_F/dt = -200\text{ A}/\mu\text{s}$ | -    | 12   | 16   | A    |
| $Q_{rr}$ | Reverse recovery charge  |                       |                                                                                    | -    | 660  |      | nC   |
| $t_{rr}$ | Reverse recovery time    |                       |                                                                                    | -    | 92   |      | ns   |

Figure 1.

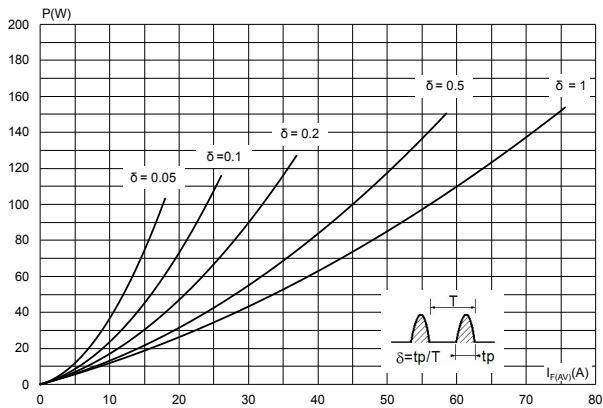


For more information, refer to the following application notes related to the power losses:

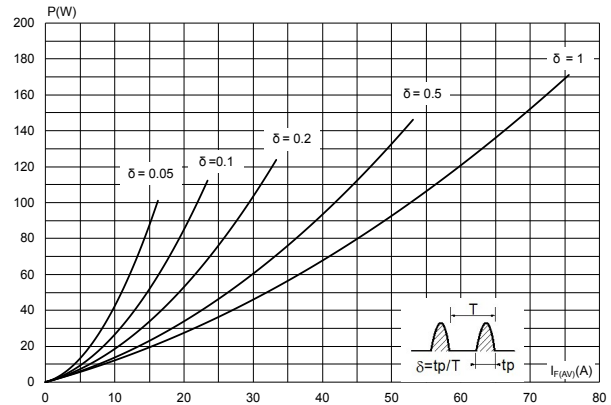
- [AN5028](#): Calculation of turn-off power losses generated by an ultrafast diode

## 1.1 Characteristics (curves)

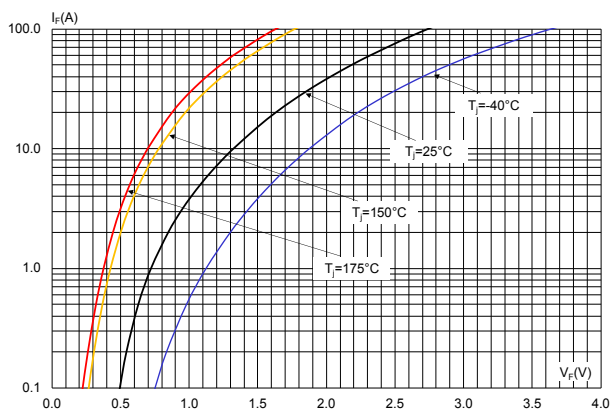
**Figure 2. Average forward power dissipation versus average forward current (square waveform)**



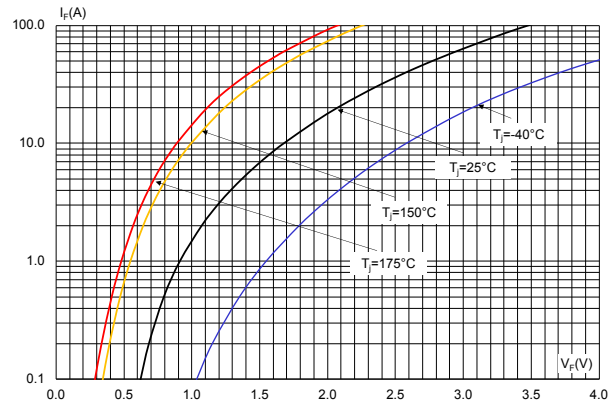
**Figure 3. Average forward power dissipation versus average forward current (sinus waveform)**



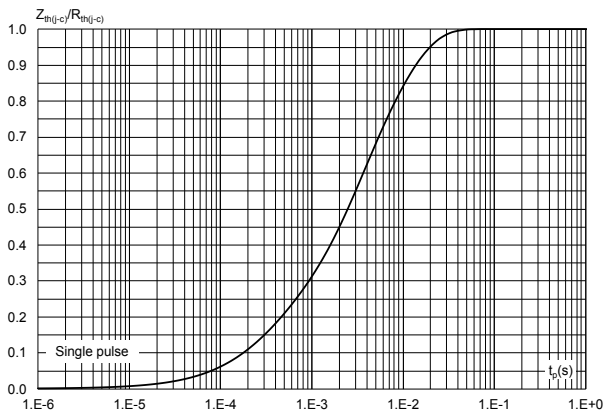
**Figure 4. Forward voltage drop versus forward current (typical values)**



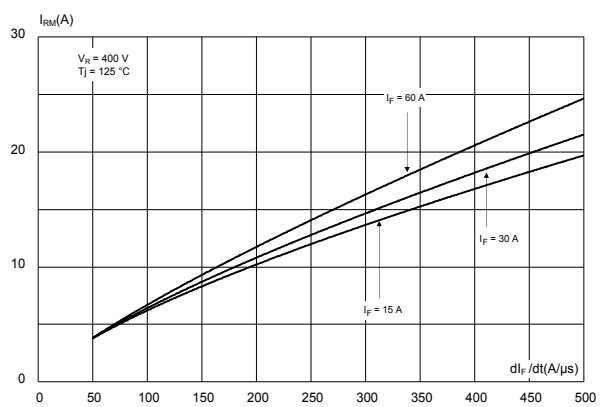
**Figure 5. Forward voltage drop versus forward current (maximum values)**

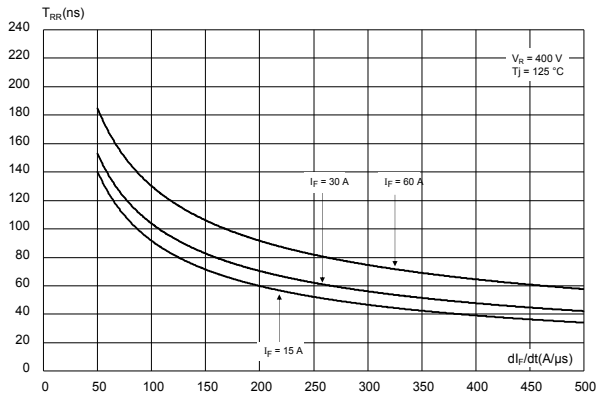
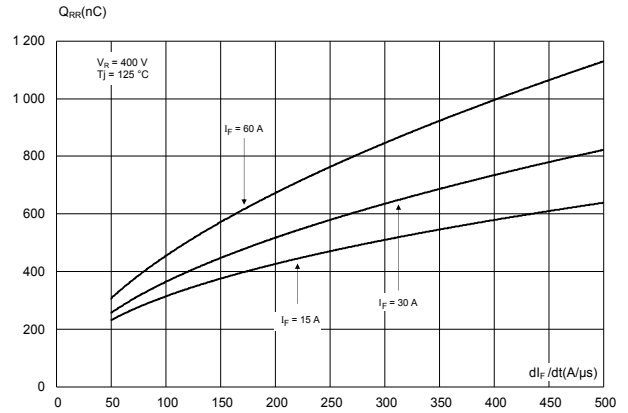
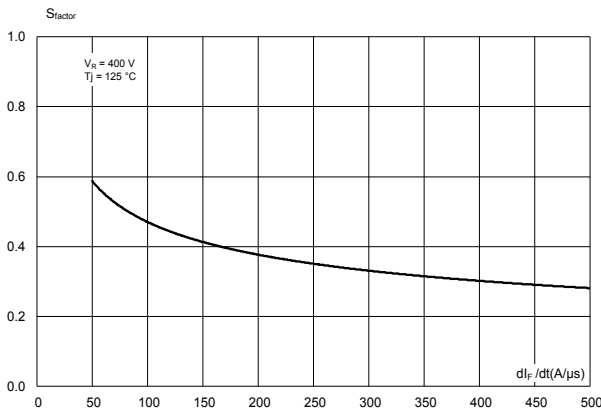
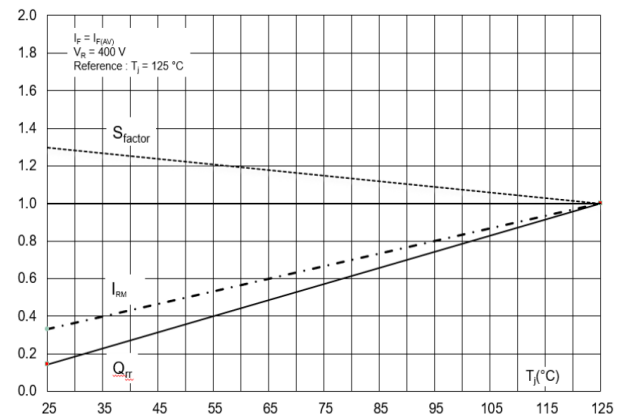
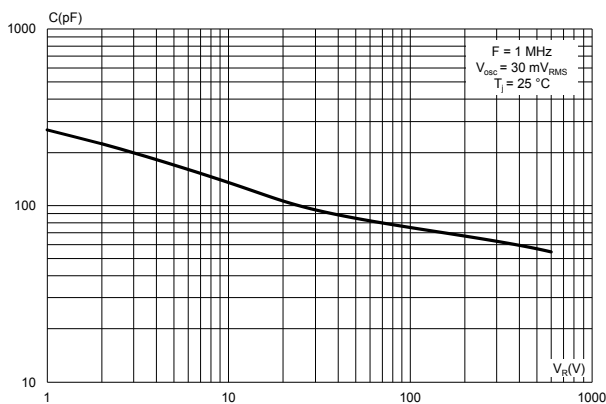
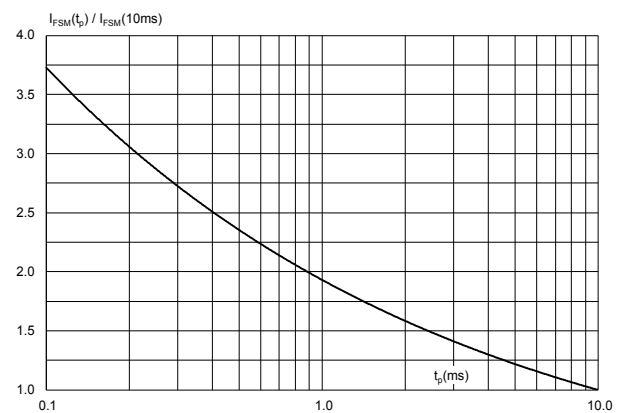


**Figure 6. Relative variation of thermal impedance junction to case versus pulse duration**

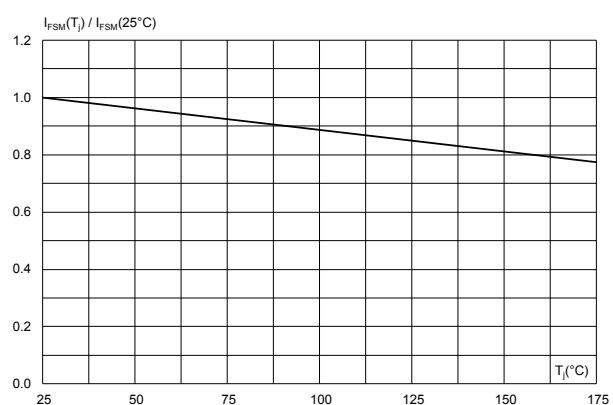


**Figure 7. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



**Figure 8. Reverse recovery time versus  $dl_F/dt$  (typical values)**

**Figure 9. Reverse recovery charges versus  $dl_F/dt$  (typical values)**

**Figure 10. Reverse recovery softness factor versus  $dl_F/dt$  (typical values)**

**Figure 11. Relative variation of dynamic parameters versus junction temperature**

**Figure 12. Junction capacitance versus reverse voltage applied (typical values)**

**Figure 13. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**


**Figure 14. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)**



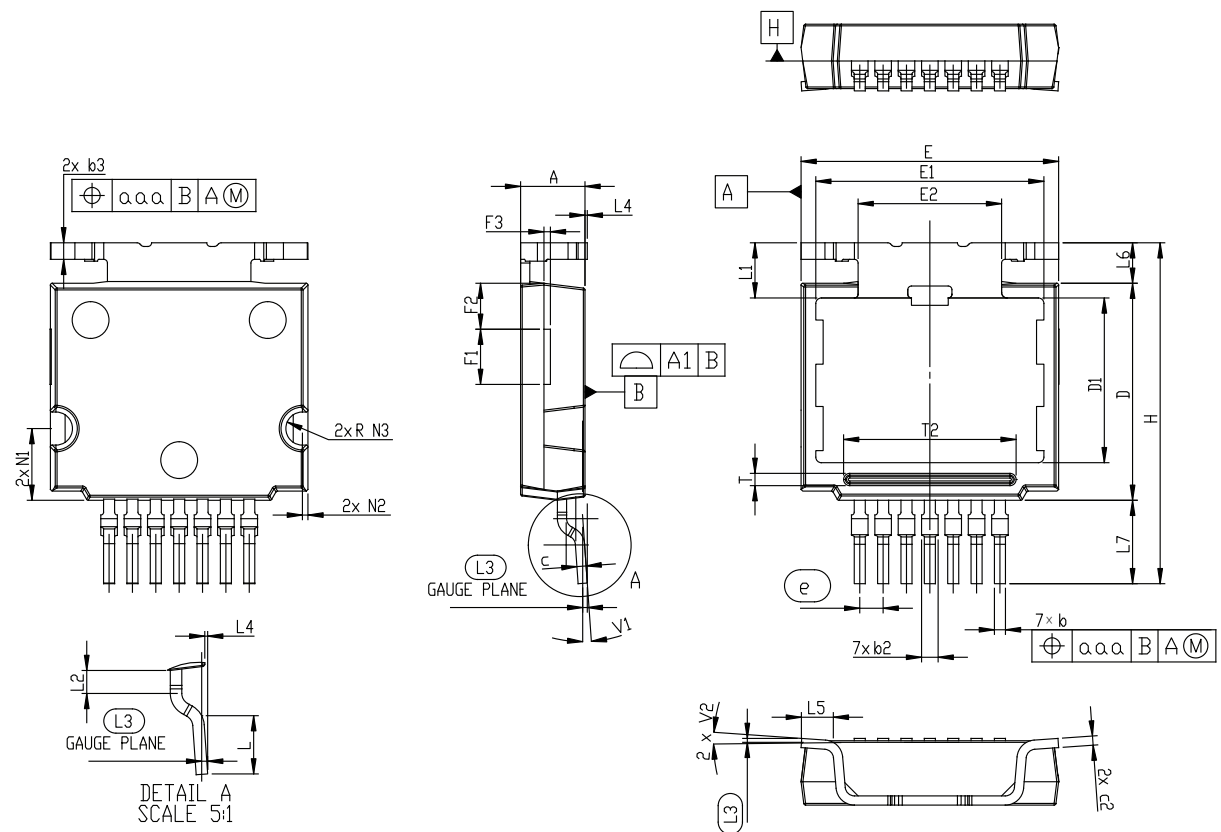
## 2 Package information

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 HU3PAK package information

- Epoxy meets UL94, V0

**Figure 15. HU3PAK package outline**



DM00674007\_2

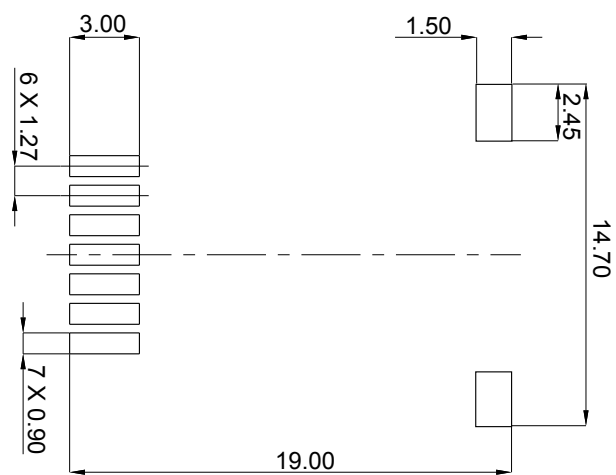
**Note:** This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

**Table 5. HU3PAK package mechanical data**

| Ref. | Dimensions |       |       |
|------|------------|-------|-------|
|      | mm         |       |       |
|      | Min.       | Typ.  | Max.  |
| A    | 3.40       | 3.50  | 3.60  |
| A1   |            | 0.05  |       |
| b    | 0.50       | 0.60  | 0.70  |
| b2   | 0.50       | 0.70  | 1.00  |
| b3   | 0.80       | 0.90  | 1.00  |
| c    | 0.40       | 0.50  | 0.60  |
| c2   | 0.40       | 0.50  | 0.60  |
| D    | 11.70      | 11.80 | 11.90 |
| D1   | 8.80       | 8.955 | 9.10  |
| E    | 13.90      | 14.00 | 14.10 |
| E1   | 12.30      | 12.40 | 12.50 |
| E2   | 7.75       | 7.80  | 7.85  |
| e    | BSC 1.27   |       |       |
| H    | 18.00      | 18.58 | 19.00 |
| L    | 2.40       | 2.52  | 2.60  |
| L1   |            | 3.05  |       |
| L2   | 0.90       | 1.00  | 1.10  |
| L3   | BSC 0.26   |       |       |
| L4   | 0.075      | 0.125 | 0.175 |
| L5   | 1.83       | 1.93  | 2.03  |
| L6   | 2.14       | 2.24  | 2.34  |
| L7   | 4.44       | 4.54  | 4.64  |
| aaa  |            | 0.10  |       |
| F1   | 2.90       | 3.00  | 3.10  |
| F2   | 2.40       | 2.50  | 2.60  |
| F3   | 0.25       | 0.35  | 0.45  |
| N1   | 3.80       | 3.90  | 4.00  |
| N2   | 0.25       | 0.30  | 0.45  |
| N3   | 0.80       | 0.90  | 1.00  |
| T    | 0.50       | 0.67  | 0.70  |
| T2   | 9.18       | 9.38  | 9.43  |
| θ1   |            | 0°    | 8°    |
| θ2   |            | 0°    | 8°    |

1. Package outline exclusive of any mold flashes dimensions.
2. Package outline exclusive of burr dimensions.
3. Max resin gate protrusion: 0.25 mm.
4. The planarity of the package backside 50 micron max.
5. BSC: basic spacing between centers

**Figure 16. HU3PAK recommended footprint (dimensions are in mm)**



DM00674007\_2

**Note:** For packing details you can see technical note [TN1173: Packing information for IPAD, protection, rectifiers, thyristors and AC Switches](#).

### 3 Ordering information

**Table 6. Ordering information**

| Order code    | Marking     | Package             | Weight | Base qty. | Delivery mode |
|---------------|-------------|---------------------|--------|-----------|---------------|
| STTH60RQ06L2Y | YTH60RQ06L2 | HU <sup>3</sup> PAK | 2.32 g | 600       | Tape and reel |

## Revision history

**Table 7. Document revision history**

| Date        | Revision | Changes          |
|-------------|----------|------------------|
| 20-Nov-2025 | 1        | Initial release. |

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