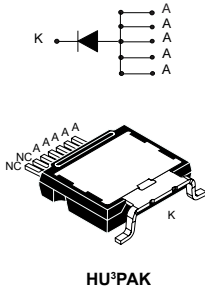



## Automotive 600 V, 30 A ultrafast high voltage rectifier



### Features

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

### Applications

- DC/DC converter
- On board charger
- EV charging station

#### Product status link

[STTH30RQ06L2Y](#)

#### Product summary

$I_{F(AV)}$	30 A
$V_{RRM}$	600 V
$V_F$ (typ.)	1.45 V
$t_{rr}$ (max.)	30 ns
$T_j$	-40 °C to +175 °C

### Description

Housed in a HU<sup>3</sup>PAK package, this 600 V, 30 A device uses ST 600 V technology. [STTH30RQ06L2Y](#) 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 <sub>RRM</sub>	Repetitive peak reverse voltage	T <sub>j</sub> = -40 °C to +175 °C	600 V
I <sub>F(RMS)</sub>	Forward rms current		45 A
I <sub>F(AV)</sub>	Average forward current δ = 0.5, square wave	T <sub>C</sub> = 120 °C	30 A
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	215 A
T <sub>stg</sub>	Storage temperature range		-65 to +175 °C
T <sub>j</sub>	Operating junction temperature range		-40 to +175 °C

**Table 2. Thermal resistance parameters**

Symbol	Parameter	Max. value	Unit
R <sub>th(j-c)</sub>	Junction to case	0.7	°C/W

For more information, please refer to the following technical note:

- TN1378:HU<sup>3</sup>PAK package mounting and thermal behaviour

**Table 3. Static electrical characteristics**

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> = 600 V	-		40	μA
		T <sub>j</sub> = 150 °C		-	80	800	
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 15 A	-		2.45	V
		T <sub>j</sub> = 150 °C		-	1.15	1.45	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 30 A	-	2.25	2.95	
		T <sub>j</sub> = 150 °C		-	1.45	1.85	

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

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

To evaluate the conduction losses, use the following equation:

$$P = 1.05 \times I_{F(AV)} + 0.026 \times I_{F(RMS)}^2$$

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

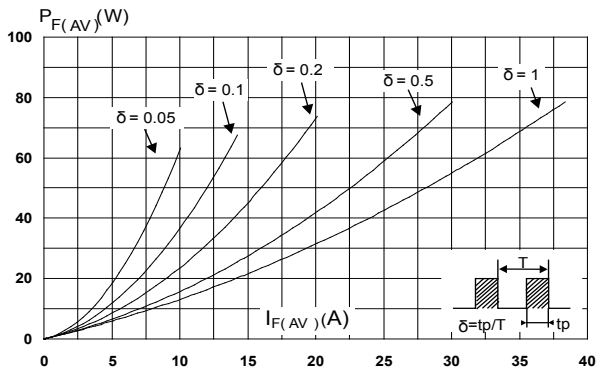
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

**Table 4. Dynamic electrical characteristics**

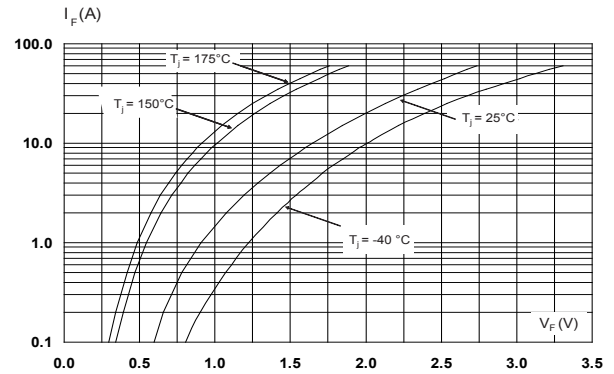
Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
$t_{rr}$	Reverse recovery time	$T_j = 25\text{ °C}$	$I_F = 0.5\text{ A}, I_R = 1\text{ A},$ $I_{rr} = 0.25\text{ A}$	-		30	ns
			$I_F = 1\text{ A}, V_R = 30\text{ V},$ $di_F/dt = -50\text{ A}/\mu\text{s}$	-	40	55	
$I_{RM}$	Reverse recovery current	$T_j = 125\text{ °C}$	$I_F = 30\text{ A}, V_R = 400\text{ V},$ $di_F/dt = -100\text{ A}/\mu\text{s}$	-	5	7	A
$Q_{rr}$	Reverse recovery charge			-	360		nC

## 1.1 Characteristics (curves)

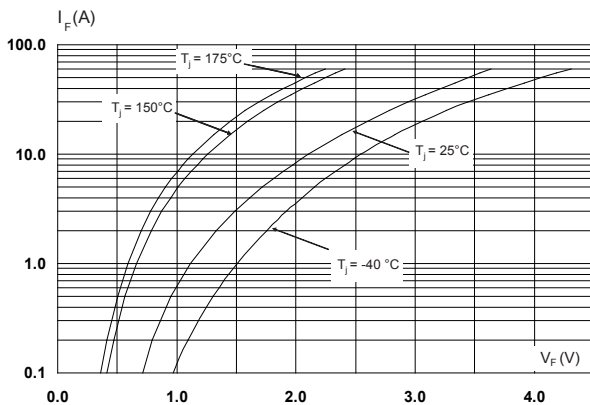
**Figure 1. Average forward power dissipation versus average forward current (square waveform)**



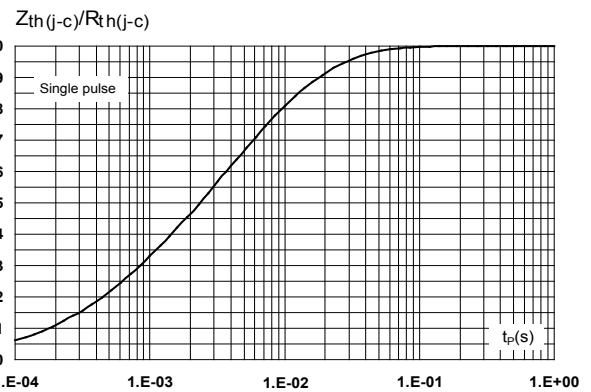
**Figure 2. Forward voltage drop versus forward current (typical values)**



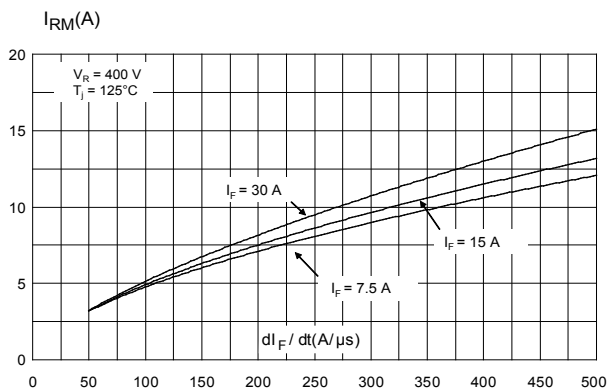
**Figure 3. Forward voltage drop versus forward current (maximum values)**



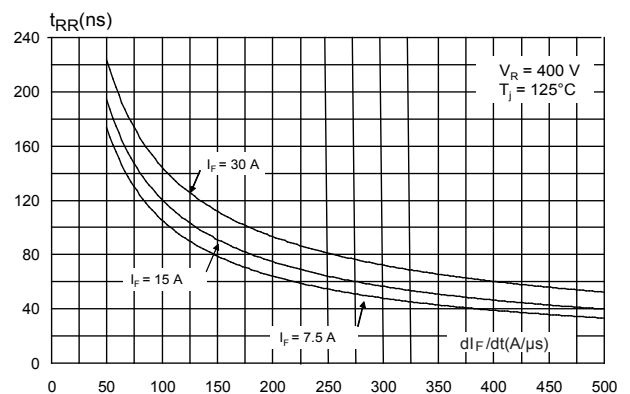
**Figure 4. Relative variation of thermal impedance junction to case versus pulse duration**



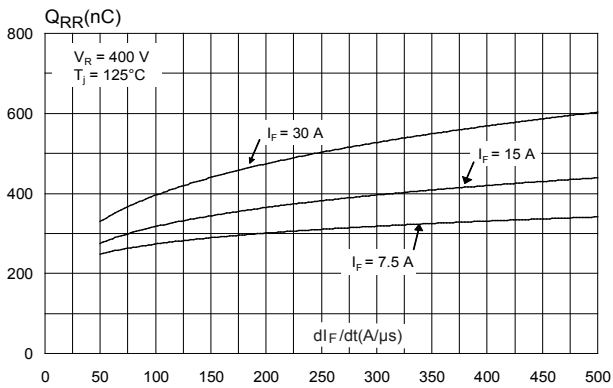
**Figure 5. Peak reverse recovery current versus  $di_F/dt$  (typical values)**



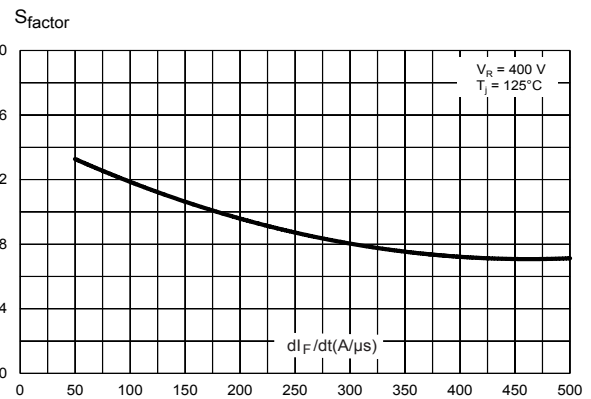
**Figure 6. Reverse recovery time versus  $di_F/dt$  (typical values)**



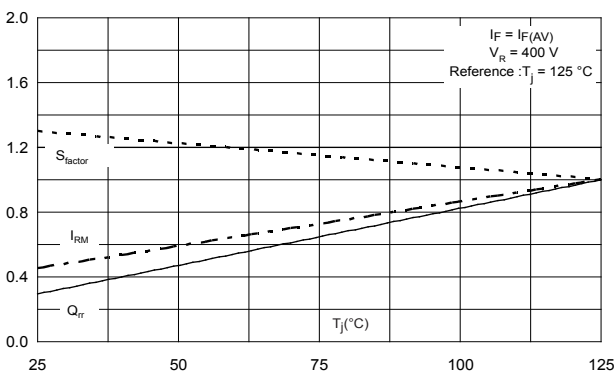
**Figure 7. Reverse recovery charges versus  $di_F/dt$  (typical values)**



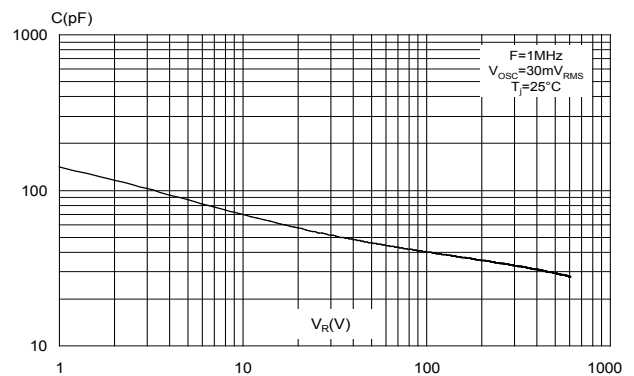
**Figure 8. Reverse recovery softness factor versus  $di_F/dt$  (typical values)**



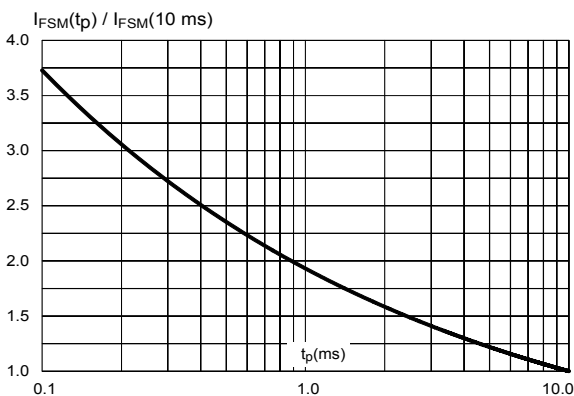
**Figure 9. Relative variation of dynamic parameters versus junction temperature**



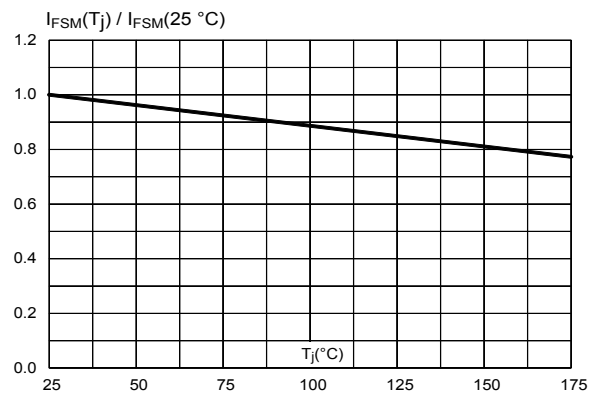
**Figure 10. Junction capacitance versus reverse voltage applied (typical values)**



**Figure 11. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)**



**Figure 12. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)**



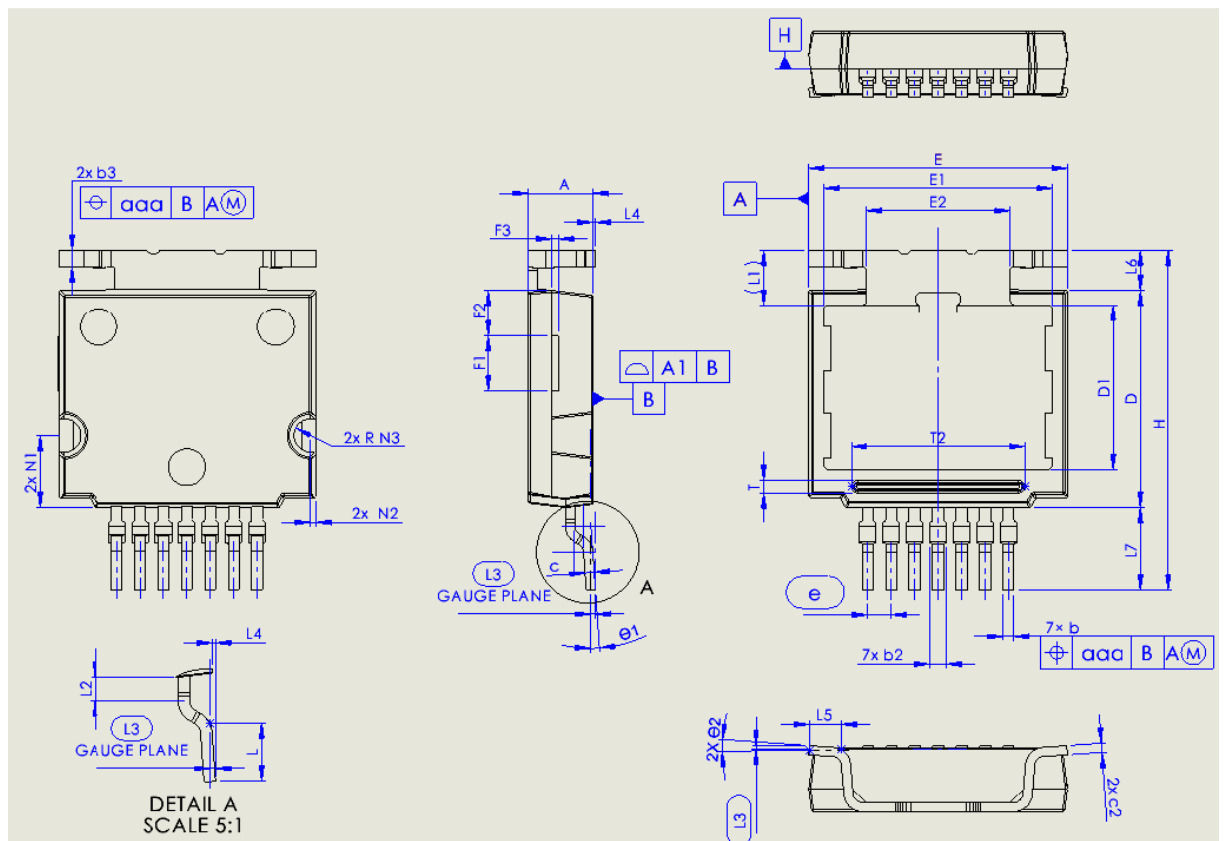
## 2 Package information

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 HU<sup>3</sup>PAK package information

- Epoxy meets UL94, V0

Figure 13. HU<sup>3</sup>PAK package outline

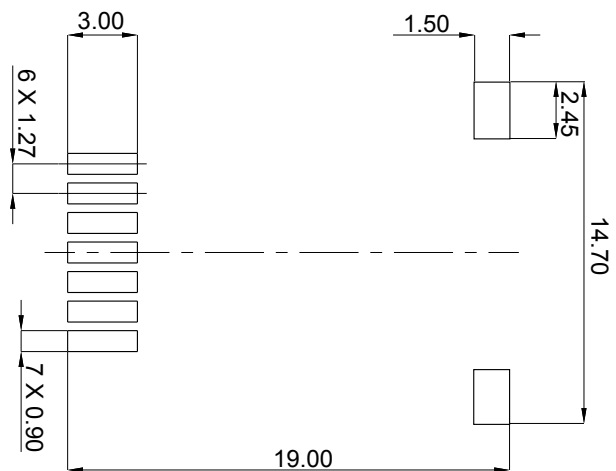


**Table 5. HU<sup>3</sup>PAK package mechanical data**

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°

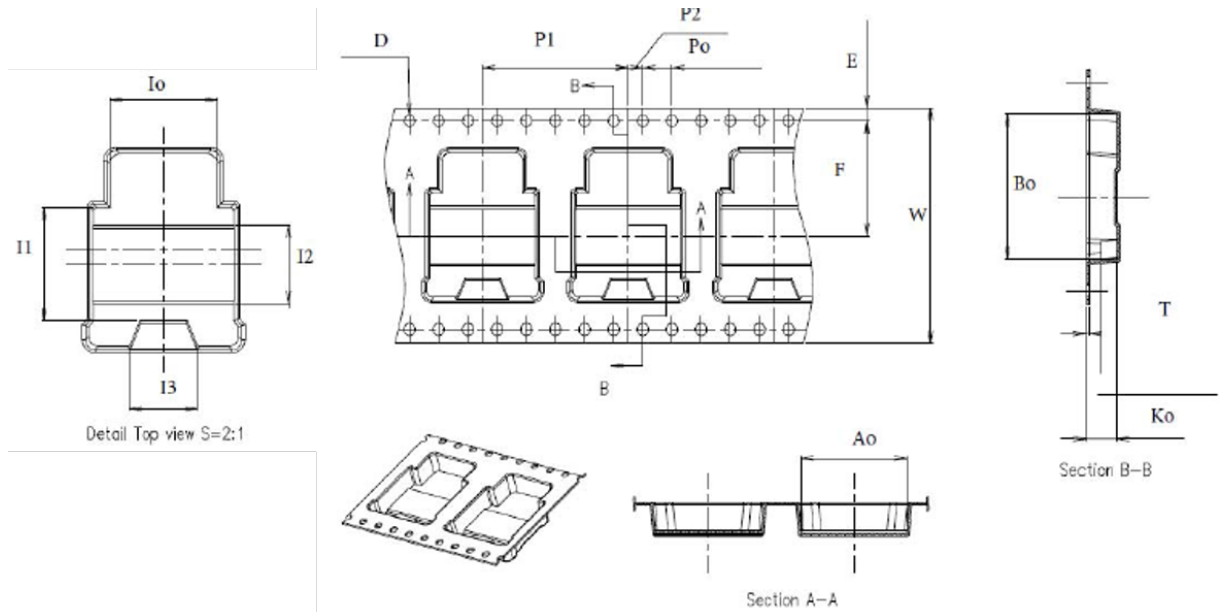
1. Package outline exclusive of any mold flashes dimensions.
2. Package outline exclusive of burr dimensions.
3. Max resin gate protrusion: 0.25 mm.
4. The planarity of the package backside 50 micron max.
5. BSC: basic spacing between centers

Figure 14. HU<sup>3</sup>PAK recommended footprint (dimensions are in mm)



## 2.2 HU<sup>3</sup>PAK packing information

**Figure 15. HU<sup>3</sup>PAK carrier tape outline**



**Table 6. HU<sup>3</sup>PAK carrier tape mechanical data**

Ref.	Dimensions		
	mm		
	Min.	Typ.	Max.
A0	14.30	14.40	14.50
B0		19.70	
D	1.40	1.50	1.60
E	1.65	1.75	1.85
F	15.55	15.65	15.75
I0		11.00	
I1	11.50	11.60	11.70
I2		8.00	
I3		7.00	
K0		4.20	
P0	3.90	4.00	4.10
P1	19.90	20.00	20.10
P2	1.90	2.00	2.10
T	0.00	0.40	0.90
W	31.70	32.00	32.30

### 3 Ordering information

**Table 7. Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STTH30RQ06L2Y-TR	STTH30RQ06L2Y	HU <sup>3</sup> PAK	2.32 g	600	Tape and reel

## Revision history

**Table 8. Document revision history**

Date	Revision	Changes
30-Mar-2020	1	Initial release.
07-Apr-2020	2	Updated <a href="#">Table 3</a> .
17-Dec-2021	3	Inserted more information references on <a href="#">Section 1 Characteristics</a> . Updated <a href="#">Table 5</a> .

**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.

© 2021 STMicroelectronics – All rights reserved