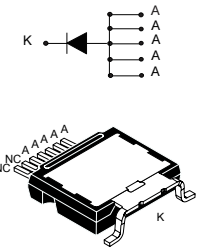
STTH30RQ06L2Y

Datasheet

Automotive 600 V, 30 A ultrafast high voltage rectifier



HU³PAK

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 HU³PAK 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_{RRM}	Repetitive peak reverse voltage	T_j = -40 °C to +175 °C	600	V
$I_{F(RMS)}$	Forward rms current		45	A
$I_{F(AV)}$	Average forward current δ = 0.5, square wave	T_C = 120 °C	30	A
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal	215	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	0.7	°C/W

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

- TN1378:HU^{3}PAK package mounting and thermal behaviour

Table 3. Static electrical characteristics

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
I_R (1)	Reverse leakage current	T_j = 25 °C	V_R = 600 V	-		40	µA
		T_j = 150 °C		-	80	800	
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 15 A	-		2.45	V
		T_j = 150 °C		-	1.15	1.45	
		T_j = 25 °C	I_F = 30 A	-	2.25	2.95	
		T_j = 150 °C		-	1.45	1.85	

1. *Pulse test: t_p = 5 ms, δ < 2%*
2. *Pulse test: t_p = 380 µs, δ < 2%*

To evaluate the conduction losses, use the following equation:

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

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 °C	I_F = 0.5 A, I_R = 1 A, I_{rr} = 0.25 A	-		30	ns
			I_F = 1 A, V_R = 30 V, dI_F/dt = -50 A/µs	-	40	55	
I_{RM}	Reverse recovery current	T_j = 125 °C	I_F = 30 A, V_R = 400 V, dI_F/dt = -100 A/µs	-	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)

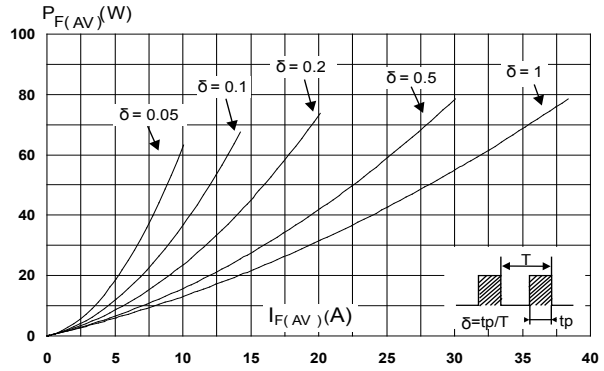


Figure 2. Forward voltage drop versus forward current (typical values)

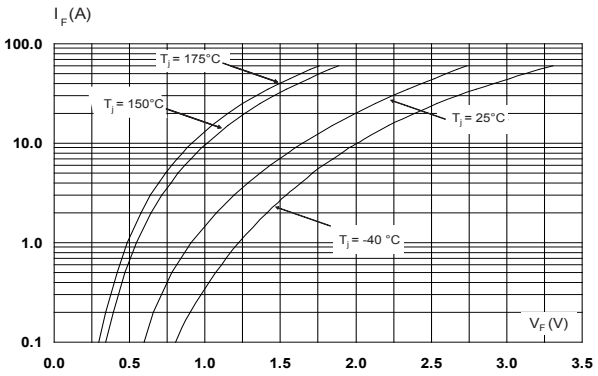


Figure 3. Forward voltage drop versus forward current (maximum values)

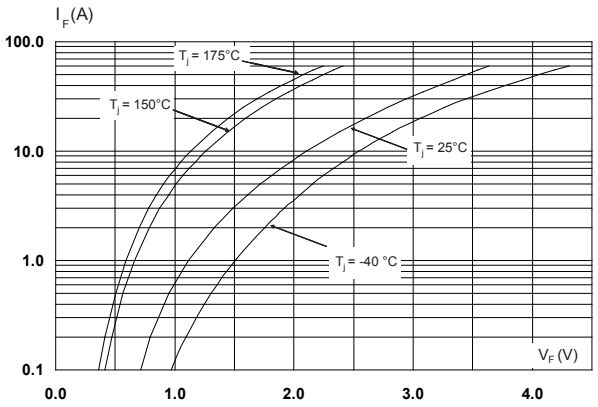


Figure 4. Relative variation of thermal impedance junction to case versus pulse duration

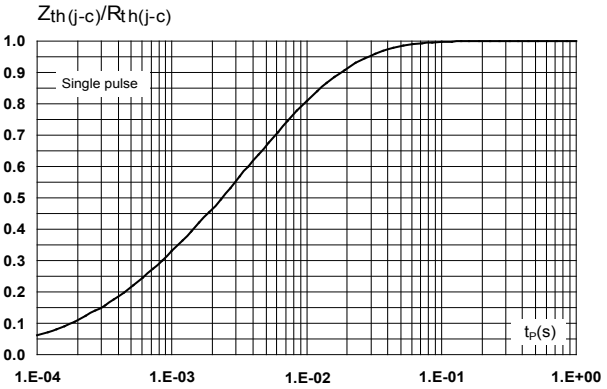


Figure 5. Peak reverse recovery current versus dI_F/dt (typical values)

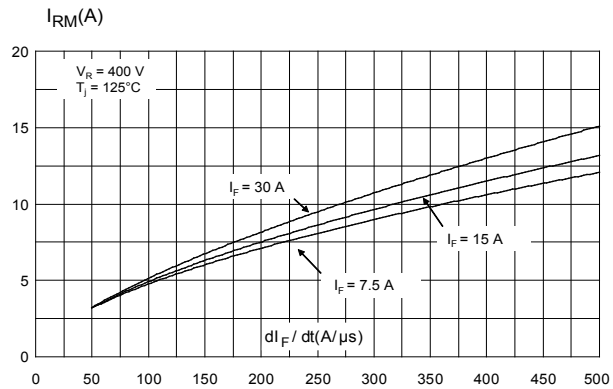


Figure 6. Reverse recovery time versus dI_F/dt (typical values)

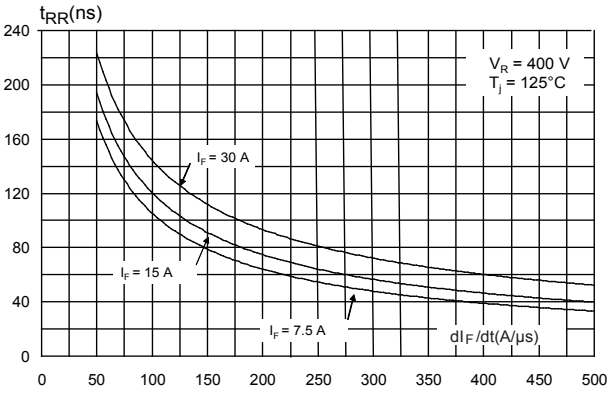


Figure 7. Reverse recovery charges versus dI_F/dt (typical values)

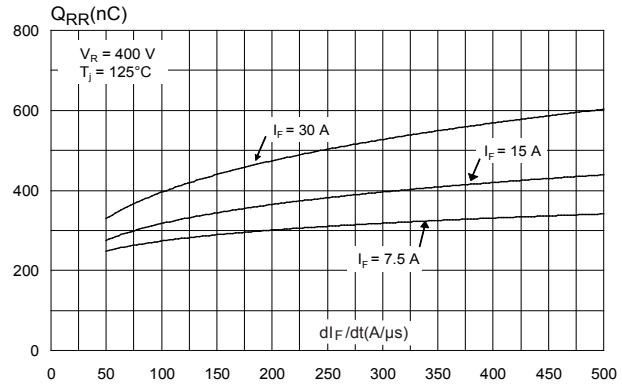


Figure 8. Reverse recovery softness factor versus dI_F/dt (typical values)

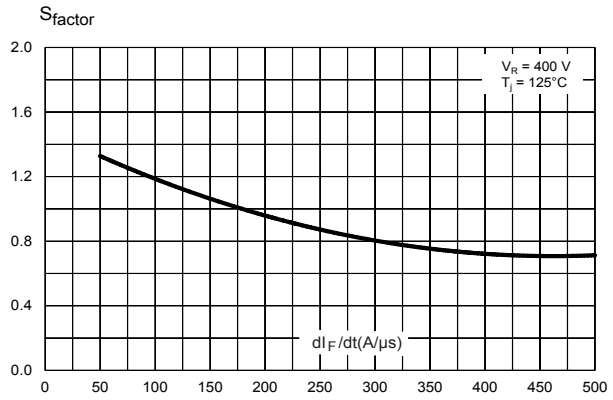


Figure 9. Relative variation of dynamic parameters versus junction temperature

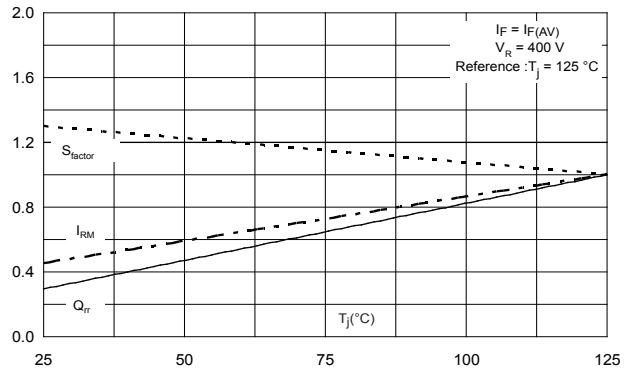


Figure 10. Junction capacitance versus reverse voltage applied (typical values)

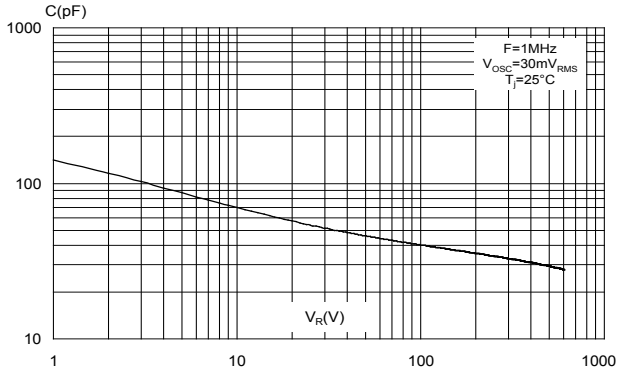


Figure 11. Relative variation of non-repetitive peak surge forward current versus pulse duration (sinusoidal waveform)

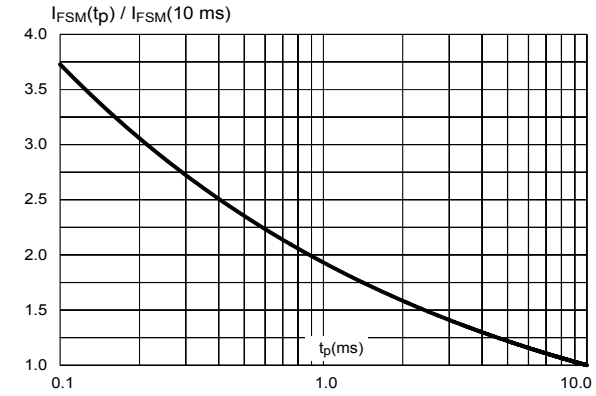
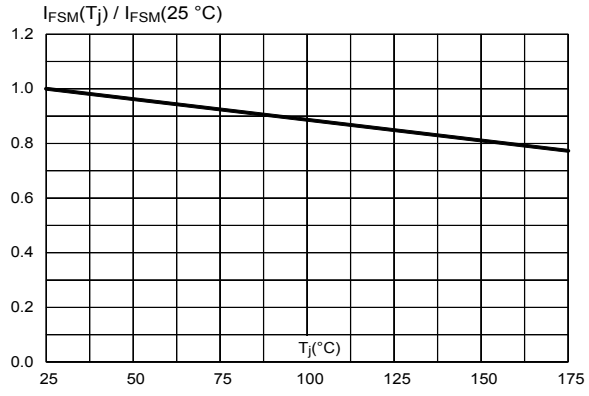


Figure 12. Relative variation of non-repetitive peak surge forward current versus initial junction temperature (sinusoidal waveform)



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. ECOPACK is an ST trademark.

2.1 HU^{3}PAK package information

- Epoxy meets UL94, V0

Figure 13. **HU^{3}PAK package outline**

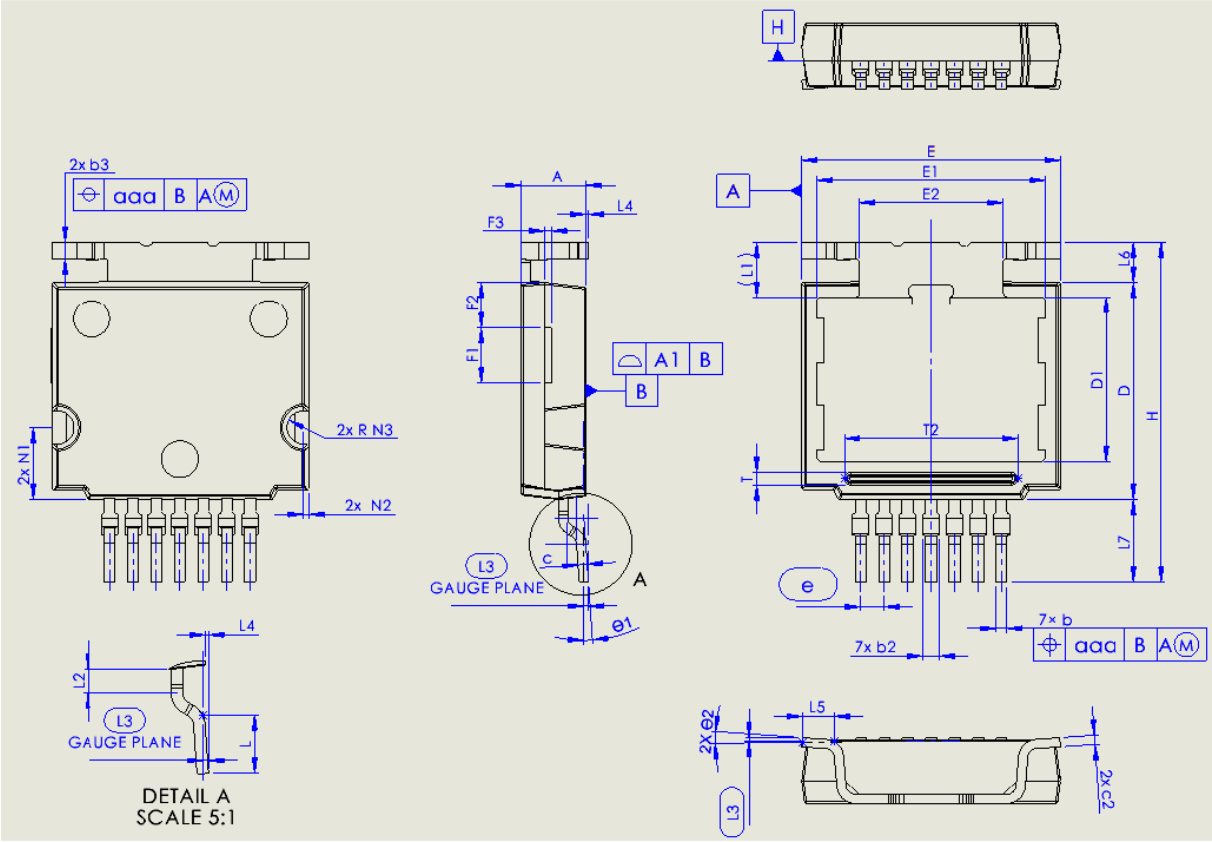
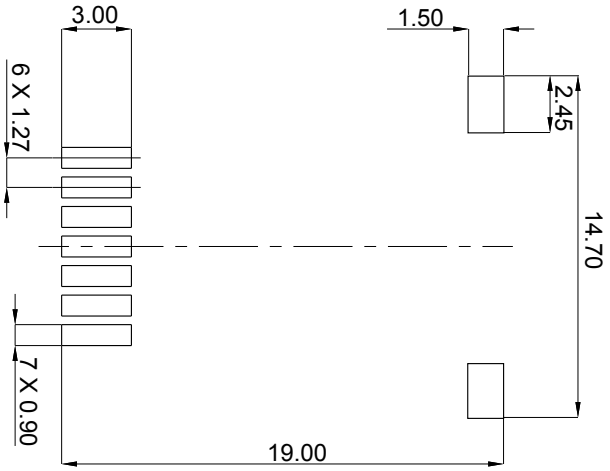


Table 5. HU^{3}PAK package mechanical data

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^{3}PAK recommended footprint (dimensions are in mm)



2.2 HU^{3}PAK packing information

Figure 15. HU^{3}PAK carrier tape outline

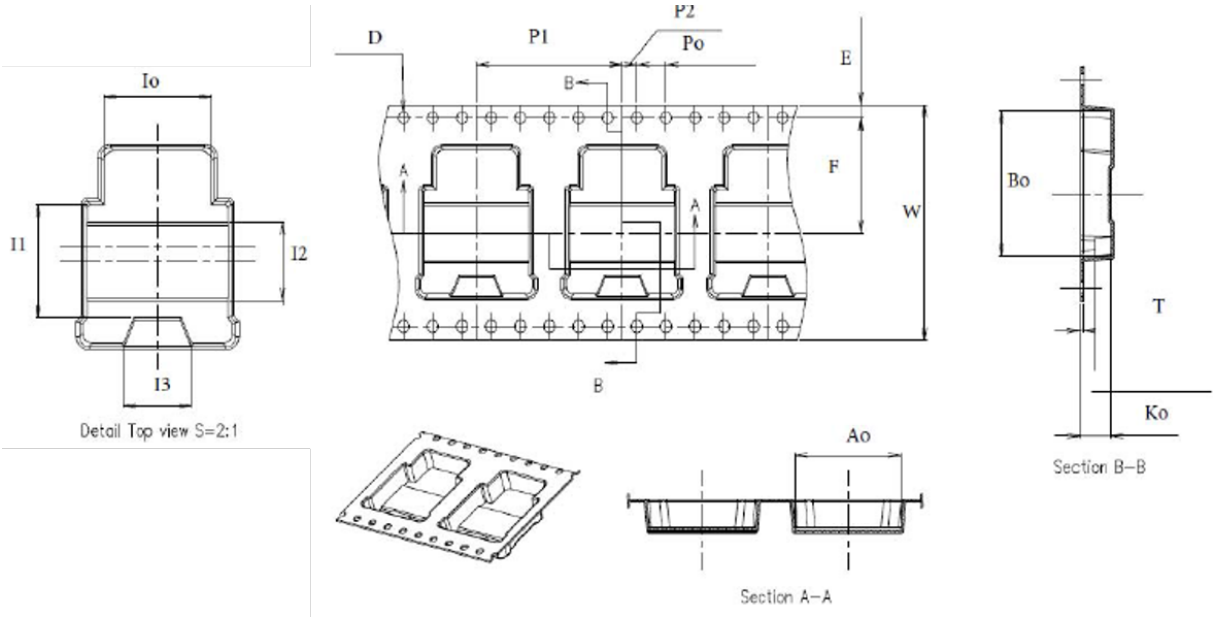


Table 6. HU^{3}PAK carrier tape mechanical data

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^3PAK	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 Table 3.
17-Dec-2021	3	Inserted more information references on Section 1 Characteristics. Updated Table 5.