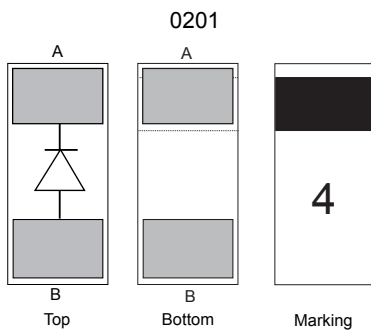
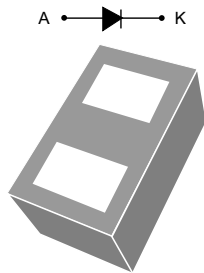


## 30 V signal Schottky diode



### Features

- Very low conduction losses
- Negligible switching losses
- 0201 small package
- Low capacitance diode
- ECOPACK2 and RoHS compliant

### Applications

- Reverse polarity protection
- Fingerprint module
- Camera module
- Bluetooth wireless earbud
- Biometric computer card

### Description

The **BAT30F4** uses 30 V Schottky barrier diodes in a 0201 package. This device is intended to be used in smartphones, and is especially suited for rail to rail protection where its low forward voltage drop will help designers to get an efficient protection of their ICs.

#### Product status link

[BAT30F4](#)

#### Product summary

<b>I<sub>F</sub></b>	300 mA
<b>V<sub>RRM</sub></b>	30 V
<b>V<sub>F</sub> (typ.)</b>	0.55 V
<b>T<sub>j</sub> (max.) operating</b>	105 °C

# 1 Characteristics

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

Symbol	Parameter	Value	Unit
$V_{RRM}$	Repetitive peak reverse voltage	30	V
$I_F$	Continuous forward current	300	mA
$I_{FSM}$	Surge non repetitive forward current	$t_p = 10$ ms sinusoidal 4	A
$P_D^{(1)}$	Power dissipation	200	mW
$T_{stg}$	Storage temperature range	-55 to + 150	°C
$T_{OP}$	Operating junction temperature range	-40 to +105	°C
$T_j$	Maximum junction temperature in DC forward mode	150	°C
$T_L$	Maximum soldering temperature during 10 s	260	°C

1. On epoxy printed circuit board with minimum recommended footprint

**Table 2. Thermal resistance parameter**

Symbol	Parameter	Value (Typ.)	Unit
$R_{th(j-a)}$	Junction to ambient <sup>(1)</sup>	450	°C/W

1. On epoxy printed circuit board with minimum recommended footprint

**Table 3. Static electrical characteristics**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit	
$I_R^{(1)}$	Reverse leakage current	$T_j = 25$ °C	$V_R = 10$ V	-	2.2	6.0	$\mu$ A
		$T_j = 85$ °C		-		300	
		$T_j = 25$ °C	$V_R = 30$ V	-	18		
		$T_j = 85$ °C		-		1600	
$V_F^{(2)}$	Forward voltage drop	$T_j = 25$ °C	$I_F = 5$ mA	-		0.285	V
		$T_j = 85$ °C		-		0.205	
		$T_j = 25$ °C	$I_F = 10$ mA	-	0.27	0.31	
		$T_j = 85$ °C		-		0.24	
		$T_j = 25$ °C	$I_F = 100$ mA	-	0.39	0.44	
		$T_j = 85$ °C		-		0.40	
		$T_j = 25$ °C	$I_F = 300$ mA	-	0.55	0.625	
		$T_j = 85$ °C		-		0.64	

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

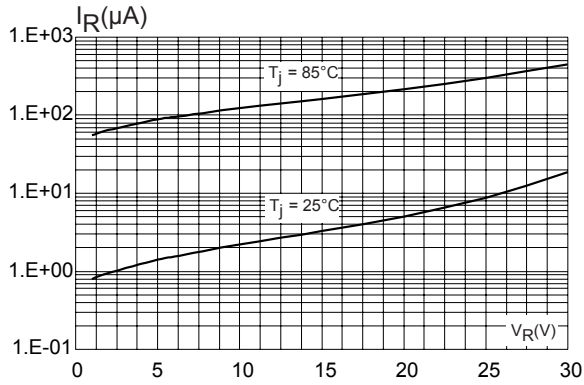
2. Pulse test:  $t_p = 380$   $\mu$ s,  $\delta < 2\%$

**Table 4. Dynamic characteristics**

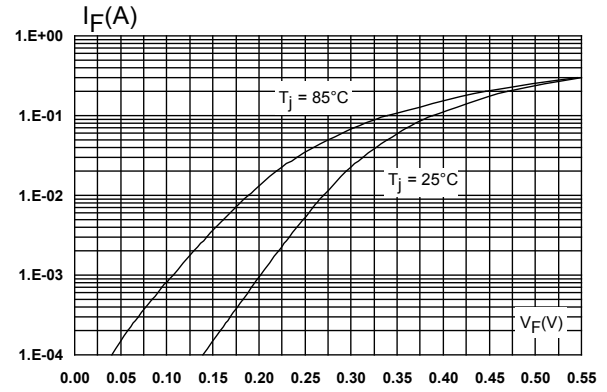
Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C	Diode capacitance	$V_R = 1\text{ V}$ , $F = 1\text{ MHz}$	-	10	14	pF

## 1.1 Characteristics (curves)

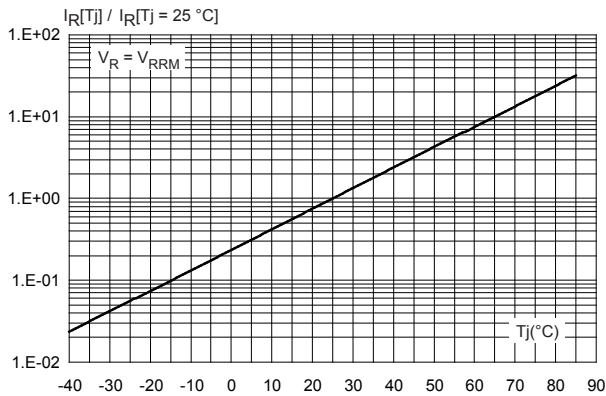
**Figure 1. Reverse leakage current versus reverse applied voltage (typical values)**



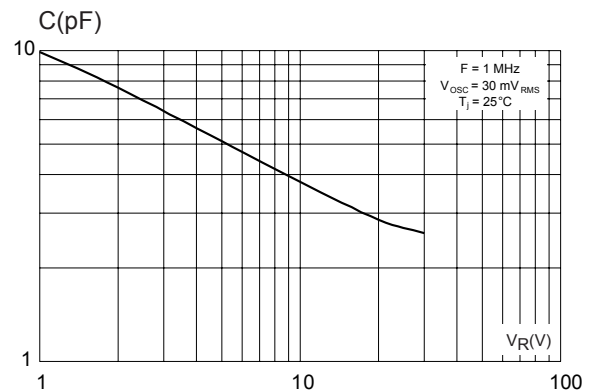
**Figure 2. Forward voltage drop versus forward current (typical values)**



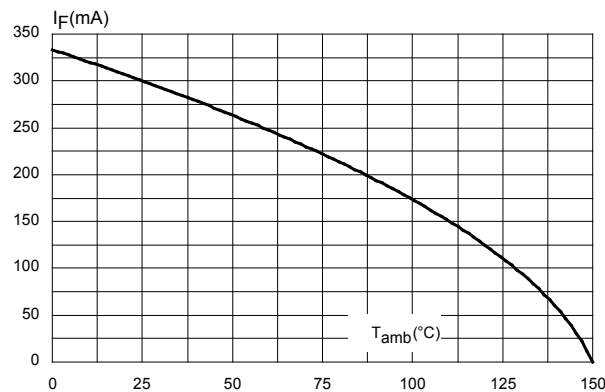
**Figure 3. Relative variation of reverse leakage current versus junction temperature**



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



**Figure 5. Continuous forward current versus ambient temperature**

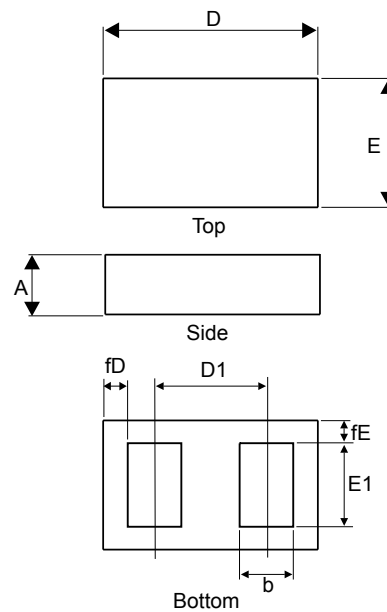


## 2 Package information

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 0201 package information

**Figure 6. 0201 package outline**



**Table 5. 0201 package mechanical data**

Ref.	Dimensions					
	Millimeters			Inches (for reference only)		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.28	0.30	0.32	0.0110	0.0118	0.0126
b	0.125	0.14	0.155	0.0049	0.0055	0.0061
D	0.57	0.60	0.63	0.0224	0.0236	0.0248
D1		0.35			0.0138	
E	0.27	0.30	0.33	0.0106	0.0118	0.0130
E1	0.175	0.19	0.205	0.0069	0.0075	0.0081
fD	0.040	0.055	0.070	0.0015	0.0021	0.0027
fE	0.040	0.055	0.070	0.0015	0.0021	0.0027

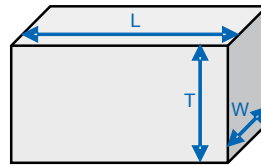


### 3 Recommendation on PCB assembly

#### 3.1 Stencil opening design

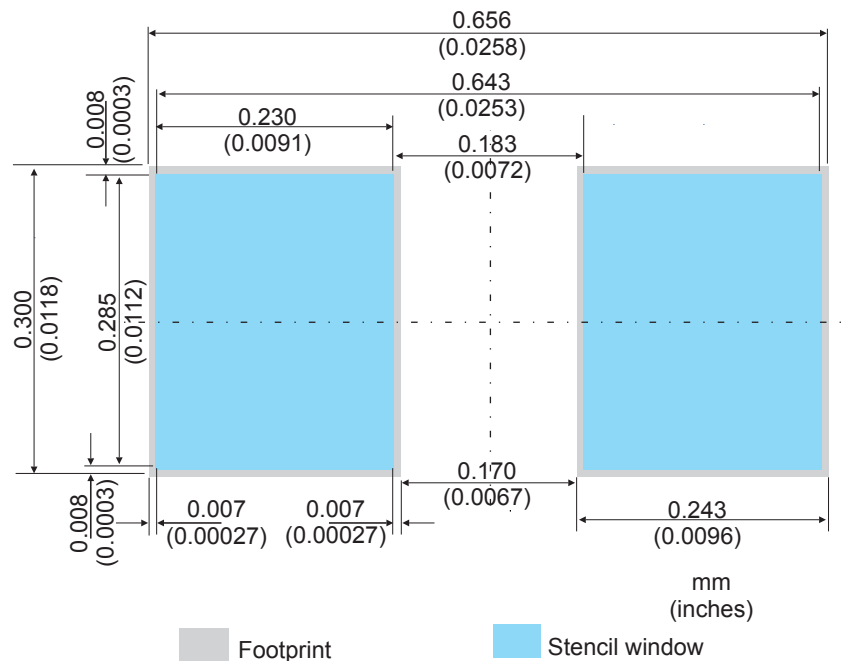
1. General recommendation on stencil opening design
  - a. Stencil opening dimensions: L (Length), W (Width), T (Thickness).

Figure 10. Stencil opening recommendation



- b. General design rule
  - Stencil thickness (T) = 75 ~ 125  $\mu\text{m}$
  - $\frac{W}{T} \geq 1.5$
  - $\frac{L \times W}{2T(L + W)} \geq 0.66$
1. Reference design
  - a. Stencil opening thickness: 80  $\mu\text{m}$
  - b. Other dimensions: see below figure.

Figure 11. Recommended stencil window position, stencil opening thickness: 80  $\mu\text{m}$



### 3.2 Solder paste

1. Halide-free flux qualification ROL0 according to ANSI/J-STD-004.
2. "No clean" solder paste is recommended.
3. Offers a high tack force to resist component displacement during PCB movement.
4. Use solder paste with fine particles: Type 4 (powder particle size 20-48  $\mu\text{m}$  per IPC J STD-005).

### 3.3 Placement

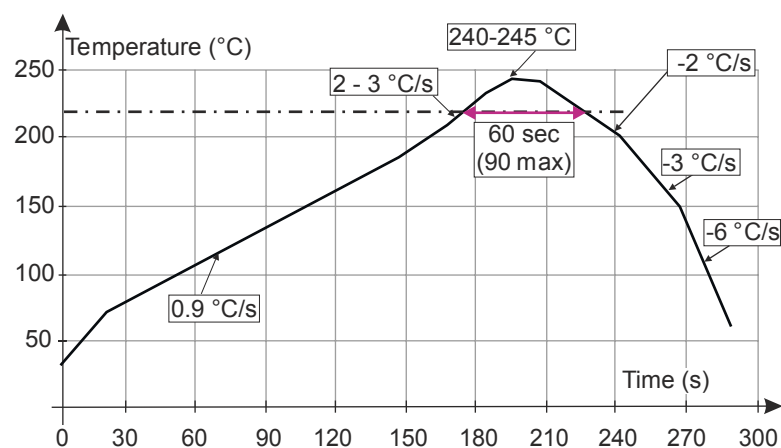
1. Manual positioning is not recommended.
2. It is recommended to use the lead recognition capabilities of the placement system, not the outline centering
3. Standard tolerance of  $\pm 0.05$  mm is recommended.
4. 1.0 N placement force is recommended. Too much placement force can lead to squeezed out solder paste and cause solder joints to short. Too low placement force can lead to insufficient contact between package and solder paste that could cause open solder joints or badly centered packages.
5. To improve the package placement accuracy, a bottom side optical control should be performed with a high resolution tool.
6. For assembly, a perfect supporting of the PCB (all the more on flexible PCB) is recommended during solder paste printing, pick and place and reflow soldering by using optimized tools.

### 3.4 PCB design preference

1. To control the solder paste amount, the closed via is recommended instead of open vias.
2. The position of tracks and open vias in the solder area should be well balanced. A symmetrical layout is recommended, to avoid any tilt phenomena caused by asymmetrical solder paste due to solder flow away.

### 3.5 Reflow profile

Figure 12. ST ECOPACK<sup>®</sup> recommended soldering reflow profile for PCB mounting



Note: Minimize air convection currents in the reflow oven to avoid component movement.



## 4 Ordering information

**Table 6. Ordering information**

Order code	Marking	Package	Weight	Base qty	Delivery mode
BAT30F4	4 <sup>(1)</sup>	Flat CSPS	0.116 mg	15000	Tape and reel

1. The marking codes can be rotated by 90° or 180° to differentiate assembly location

## Revision history

**Table 7. Document revision history**

Date	Revision	Changes
13-May-2014	1	First issue
24-Nov-2014	2	Updated Table 2.
13-Apr-2015	3	Updated Features and Description.
11-Feb-2016	4	Updated Table 3 and Figure 4.
26-Feb-2016	5	Updated Table 2. Added Table 3, Table 5 and Figure 7.
05-Jun-2018	6	Updated Table 3. Static electrical characteristics, Table 5. 0201 package mechanical data and Table 6. Ordering information.
24-Sep-2018	7	Updated Table 3. Static electrical characteristics.
08-Sep-2021	8	Extended Tj operating range in Table 1.

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