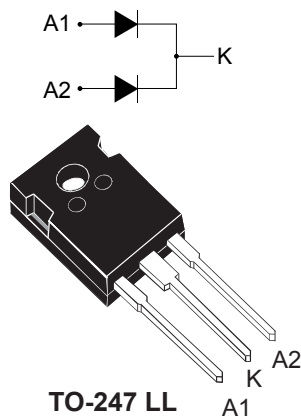


## Automotive 170 V, dual 30 A lowdrop power Schottky rectifier



## Features

- AEC-Q101 qualified 
- Avalanche capability
- 175 °C maximum operating junction temperature
- $V_{RRM}$  guaranteed from -40 °C to +175 °C
- PPAP capable
- ECOPACK2 compliant

## Applications

- DC/DC converter
- Freewheeling diodes
- LLC topology
- Phase shift topology
- Electrical vehicles (EV) and Hybrid electrical vehicles

## Description

The STPS61170C-Y has been developed for applications requiring a high-voltage secondary rectification diode, and in particular for DC/DC converters used in electrical cars.

Product status	
STPS61170C-Y	
Product summary	
$I_{F(AV)}$	2 x 30 A
$V_{RRM}$	170 V
$T_{j(max.)}$	175 °C
$V_F(typ.)$	0.64 V

# 1 Characteristics

**Table 1. Absolute ratings (limiting values per diode 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)	170	V	
I <sub>F(RMS)</sub>	Forward rms current	80	A	
I <sub>F(AV)</sub>	Average forward current, δ = 0.5, square wave	T <sub>c</sub> = 160 °C Per diode	30	A
		T <sub>c</sub> = 160 °C Per device	60	
I <sub>FSM</sub>	Surge non repetitive forward current	t <sub>p</sub> = 10 ms sinusoidal	500	A
P <sub>ARM</sub>	Repetitive peak avalanche power	t <sub>p</sub> = 10 μs, T <sub>j</sub> = 125 °C	2290	W
T <sub>stg</sub>	Storage temperature range	-65 to +175	°C	
T <sub>j</sub>	Maximum operating junction temperature <sup>(1)</sup>	+175	°C	

1. (dP<sub>tot</sub>/dT<sub>j</sub>) < (1/R<sub>th(j-a)</sub>) condition to avoid thermal runaway for a diode on its own heatsink.

**Table 2. Thermal resistance parameters**

Symbol	Parameter	Typ. value	Unit
R <sub>th(j-c)</sub>	Junction to case	Per diode	0.34
		Total	0.17

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

- AN5088 : Rectifiers thermal management, handling and mounting recommendations

**Table 3. Static electrical characteristics (per diode)**

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> = 170 V	-		60	μA
		T <sub>j</sub> = 125 °C		-	16	60	mA
V <sub>F</sub> <sup>(2)</sup>	Forward voltage drop	T <sub>j</sub> = 25 °C	I <sub>F</sub> = 30 A	-		0.84	V
		T <sub>j</sub> = 125 °C		-	0.64	0.69	
		T <sub>j</sub> = 25 °C	I <sub>F</sub> = 60 A	-		0.94	
		T <sub>j</sub> = 125 °C		-	0.76	0.81	

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

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

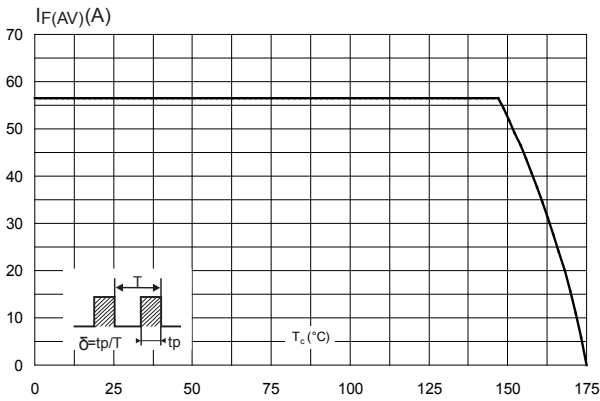
To evaluate the conduction losses, use the following equation: P = 0.57 x I<sub>F(AV)</sub> + 0.004 x I<sub>F</sub><sup>2</sup> (RMS)

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

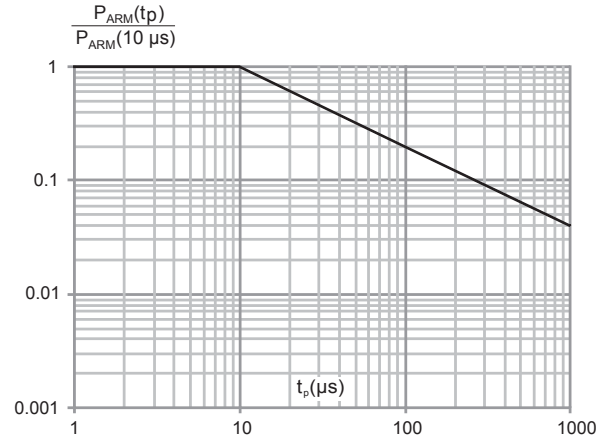
- AN604: Calculation of conduction losses in a power rectifier
- AN4021: Calculation of reverse losses on a power diode

### 1.1 Characteristics (curves)

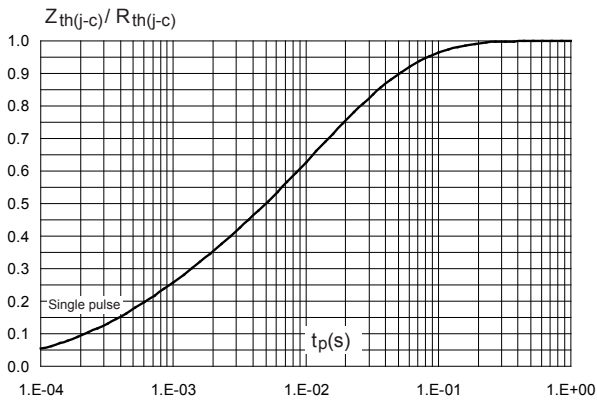
**Figure 1. Average forward current versus case temperature ( $\delta = 0.5$ , per diode)**



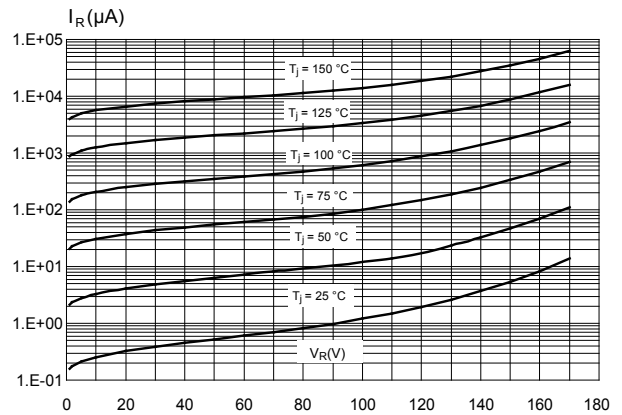
**Figure 2. Normalized avalanche power derating versus pulse duration ( $T_j = 125^\circ\text{C}$ )**



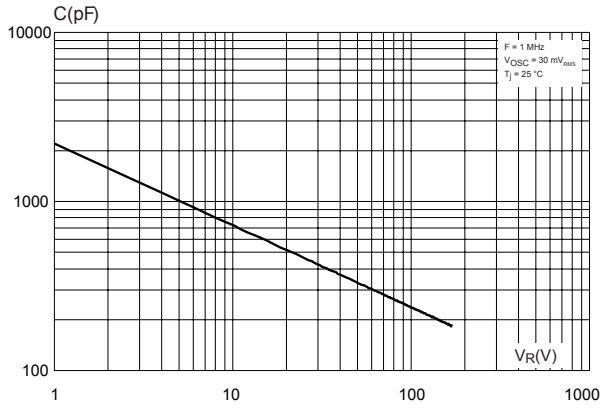
**Figure 3. Relative variation of thermal impedance junction to case versus pulse duration**



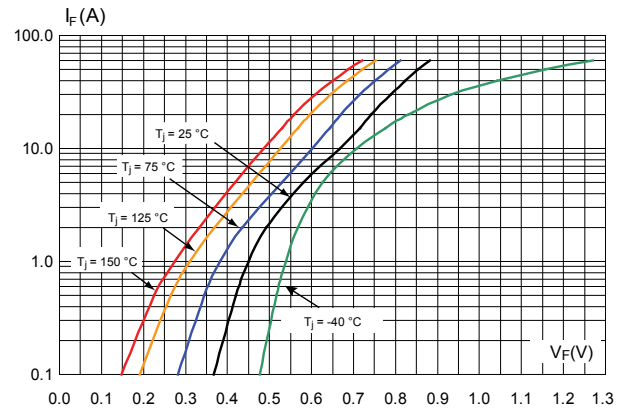
**Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)**



**Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)**



**Figure 6. Forward voltage drop versus forward current (typical values, per diode)**



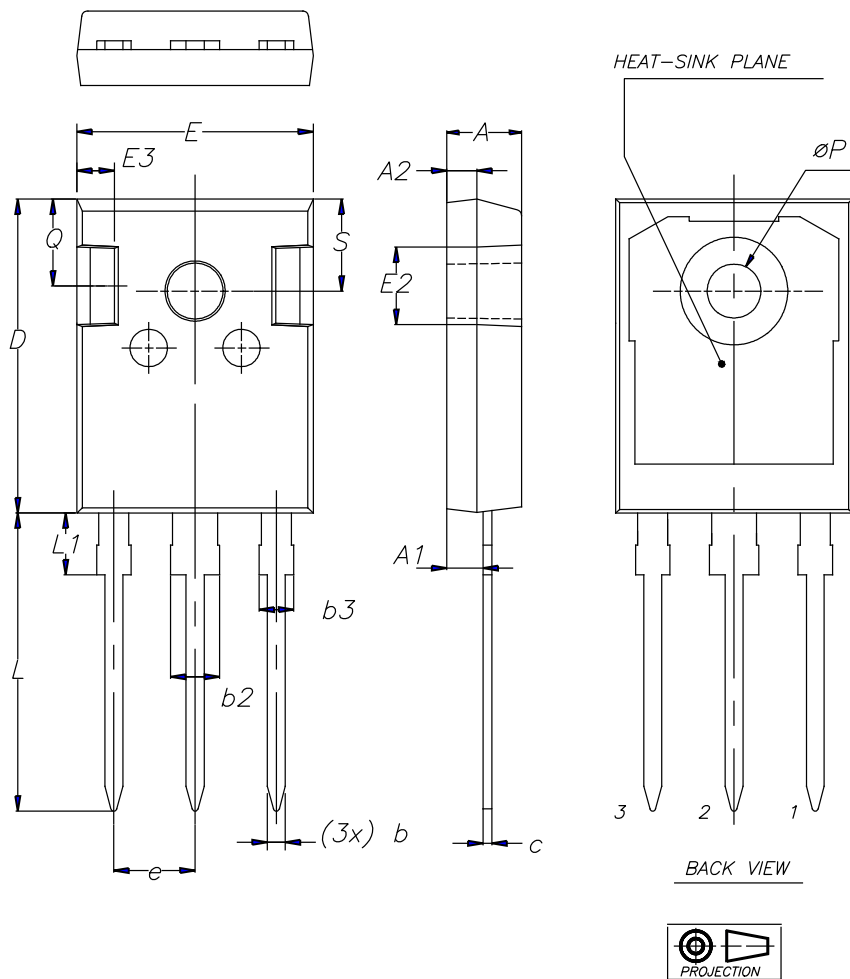
## 2 Package information

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 TO-247 package\_information

- Epoxy meets UL94, V0
- Cooling method: by conduction (C)
- Recommended torque value: 0.8 to 1.0 N·m

Figure 7. TO-247 long leads package outline



**Table 4. TO-247 long leads package mechanical data**

Dim.	mm.			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.90		5.15	0.192		0.203
A1	2.25		2.55	0.088		0.101
A2	1.85		2.10	0.072		0.083
B	1.07		1.32	0.042		0.052
B2	2.87		3.38	0.112		0.134
B3	1.90		2.38	0.074		0.094
C	0.55		0.67	0.021		0.027
D	20.82		21.10	0.819		0.831
E	15.70		16.02	0.618		0.631
E2	4.90		5.10	0.192		0.201
E3	2.40		2.60	0.094		0.103
e	5.34		5.54	0.210		0.219
L	19.80		20.30	0.779		0.800
L1	4.16		4.47	0.163		0.176
P	3.50		3.70	0.137		0.146
Q	5.49		6.00	0.216		0.237
S	6.04		6.29	0.237		0.248

### 3 Ordering information

**Table 5. Order code**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
STPS61170CWLY	STPS61170CWLY	TO-247 LL	4.36 g	30	Tube

## Revision history

**Table 6. Document revision history**

Date	Revision	Changes
20-Nov-2019	1	First issue.

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