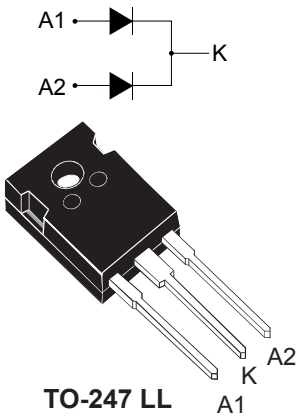
STPS61170C-Y

Datasheet

Automotive 170 V, dual 30 A lowdrop power Schottky rectifier



TO-247 LL

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_{RRM}	Repetitive peak reverse voltage (T_j = -40 °C to +175 °C)			170	V
$I_{F(RMS)}$	Forward rms current			80	A
$I_{F(AV)}$	Average forward current, δ = 0.5, square wave	T_c = 160 °C	Per diode	30	A
		T_c = 160 °C	Per device	60	
I_{FSM}	Surge non repetitive forward current	t_p = 10 ms sinusoidal		500	A
P_{ARM}	Repetitive peak avalanche power	t_p = 10 µs, T_j = 125 °C		2290	W
T_{stg}	Storage temperature range			-65 to +175	°C
T_j	Maximum operating junction temperature(1)			+175	°C

1. *$(dP_{tot}/dT_j) < (1/R_{th(j-a)})$ condition to avoid thermal runaway for a diode on its own heatsink.*

Table 2. Thermal resistance parameters

Symbol	Parameter		Typ. value	Unit
$R_{th(j-c)}$	Junction to case	Per diode	0.34	°C/W
		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_R (1)	Reverse leakage current	T_j = 25 °C	V_R = 170 V	-		60	µA
		T_j = 125 °C		-	16	60	mA
V_F (2)	Forward voltage drop	T_j = 25 °C	I_F = 30 A	-		0.84	V
		T_j = 125 °C		-	0.64	0.69	
		T_j = 25 °C	I_F = 60 A	-		0.94	
		T_j = 125 °C		-	0.76	0.81	

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: $P = 0.57 \times I_{F(AV)} + 0.004 \times I_F{}^2{}_{(RMS)}$

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

1.1 Characteristics (curves)

Figure 1. Average forward current versus case temperature (δ = 0.5, per diode)

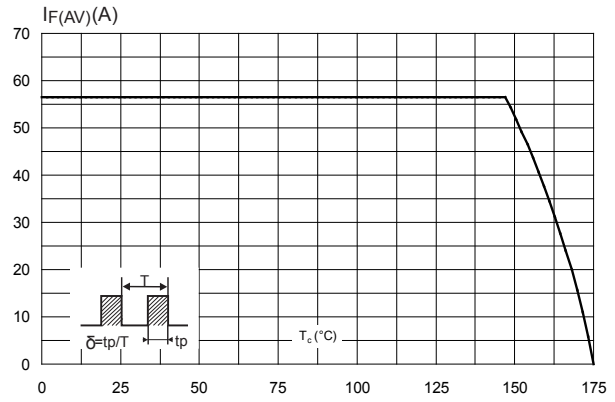


Figure 2. Normalized avalanche power derating versus pulse duration (T_j= 125 °C)

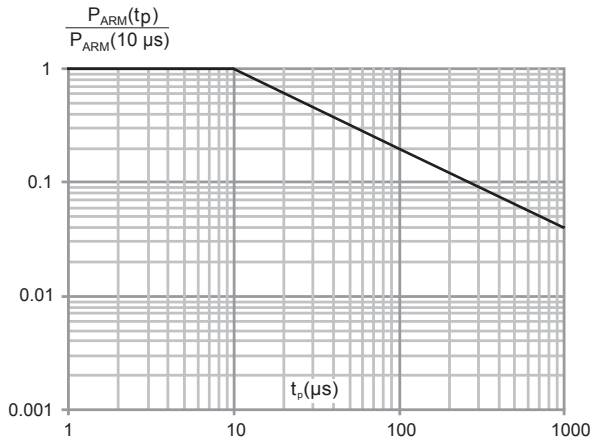


Figure 3. Relative variation of thermal impedance junction to case versus pulse duration

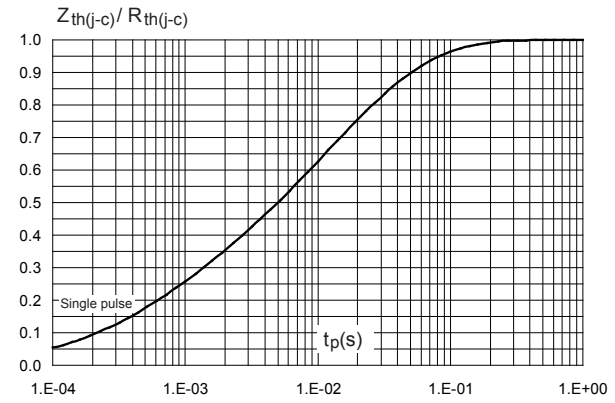


Figure 4. Reverse leakage current versus reverse voltage applied (typical values, per diode)

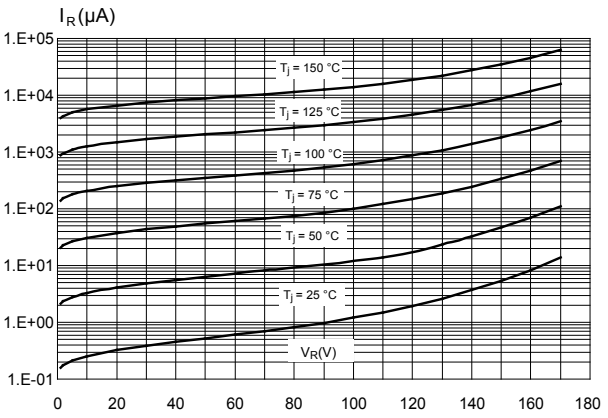


Figure 5. Junction capacitance versus reverse voltage applied (typical values, per diode)

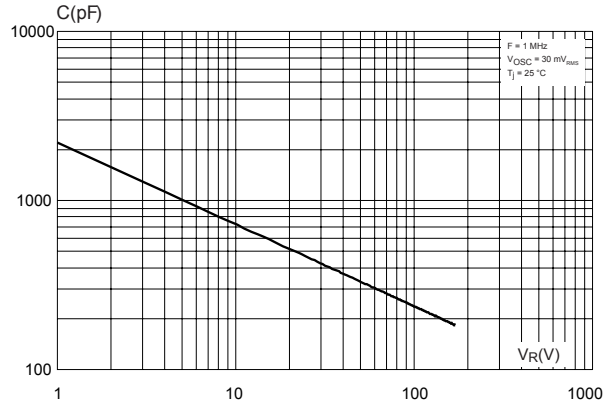
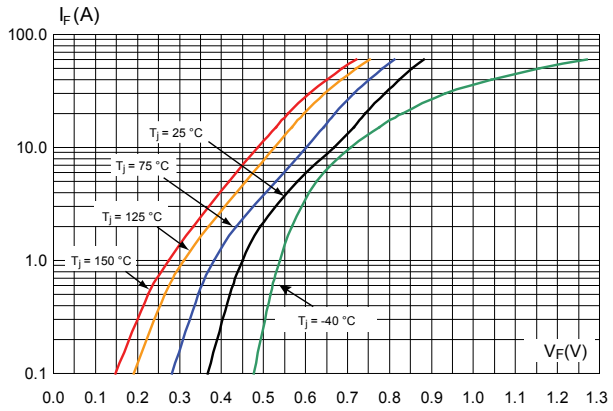


Figure 6. Forward voltage drop versus forward current (typical values, per diode)



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. 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

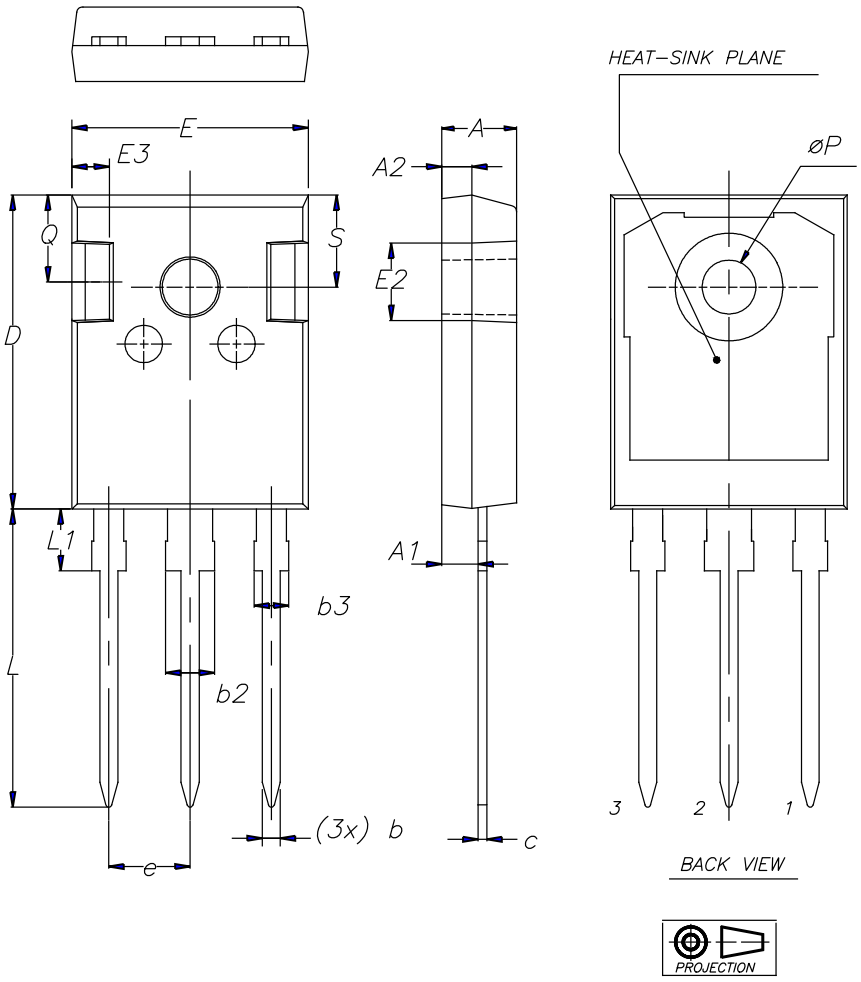


Table 4. **TO-247 long leads package mechanical data**

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.

Mouser Electronics

Authorized Distributor

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STMicroelectronics:
STPS61170CWLY