BYW81HR

Aerospace 1 x 15 A - 200 V fast recovery rectifier

Datasheet - production data

SMD.5

Features

- Very small conduction losses
- Negligible switching losses
- High surge current capability
- High avalanche energy capability
- Hermetic packages
- ESCC qualified

Description

Packaged in hermetic SMD.5, this device is intended for use in medium voltage, high frequency switching mode power supplies, high frequency DC to DC converters, and other aerospace applications.

The complete ESCC specification for this device is available from the European Space Agency web site. ST guarantees full compliance of qualified parts with such ESCC detailed specifications.

Figure 1. Device configuration

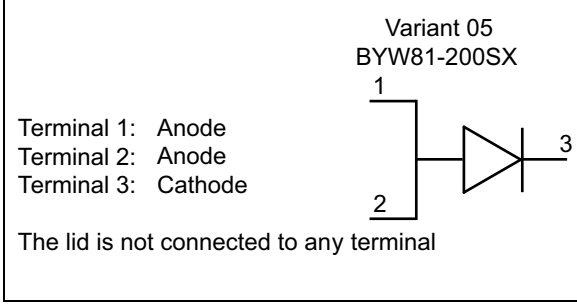

Table 1. Device summary(1)

Order code	ESCC part number	Quality level	EPPL	Package	$I_{F(AV)}$	V_{RRM}	$V_{F\ (max)}$	$T_{j(max)}$
BYW81-200S1		Engineering model		SMD.5	15 A	200 V	1.15 V	150 °C
BYW81-200SG	5103/029/05	ESCC flight	Y	SMD.5	15 A			

1. Contact ST sales office for information about the specific conditions for products in die form.

1 Characteristics

Table 2. Absolute maximum ratings

Symbol	Characteristic	Value	Unit
I_{FSM}	Forward surge current (1), variant 05	250	A
V_{RRM}	Repetitive peak reverse voltage(2)	200	V
I_O	Average output rectified current (50% duty cycle)(3), variant 05	15	A
$I_{F(RMS)}$	Forward rms current (per diode), variant 05	30	A
T_{OP}	Operating case temperature range	-55 to +150	°C
T_J	Junction temperature	+150	°C
T_{STG}	Storage temperature range	-55 to +150	°C
T_{SOL}	Soldering temperature SMD.5(4)	+245	°C

1. Sinusoidal pulse of 10 ms duration
2. Pulsed, duration 5 ms, F = 50 Hz
3. For $T_{case} \geq +110°C$, derate linearly to 0 A at +150°C.
4. Duration 5 seconds maximum the same package shall not be re-soldered until 3 minutes have elapsed.

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th\ (j\text{-}c)}$ (1)	Junction to case, all variants (per diode)	2.3	°C/W

1. Package mounted on infinite heatsink.

Table 4. Electrical measurements at ambient temperature (per diode), T_{amb} = 22 ±3 °C

Symbol	Characteristic	MIL-STD-750 test method	Test conditions	Limits		Units
				Min.	Max.	
I_R	Reverse current	4016	DC method, V_R = 200 V	-	20	µA
V_{F1}(1)	Forward voltage	4011	Pulse method, I_F = 10 A	-	1.0	V
V_{F2}(1)			Pulse method, I_F = 20 A	-	1.2	V
V_{BR}	Breakdown voltage	4021	I_R = 100 µA	200	-	V
C	Capacitance	4001	V_R = 10 V, F = 1 MHz	-	220	pF
t_{rr}	Reverse recovery time	4031	I_F = 1 A, V_R = 30 V, dI_F/dt = -50 A/µs	-	40	ns
$Z_{th(j\text{-}c)}$(2)	Relative thermal impedance, junction to case	3101	I_H = 15 to 40 A, t_H = 50 ms I_M = 50 mA, t_{md} = 100 µs	Calculate ΔV_F(3)		°C/W

1. Pulse width ≤ 680µs, duty cycle ≤ 2%
2. Performed only during screening tests parameter drift values (initial measurements), go-no-go.
3. The limits for ΔVF shall be defined by the manufacturer on every lot in accordance with MIL-STD-750 Method 3101 and shall guarantee the $R_{th(j\text{-}c)}$ limits specified in maximum ratings.

Table 5. Electrical measurements at high and low temperatures (per diode)

Symbol	Characteristic	MIL-STD-750 test method	Test conditions(1)	Limits		Units
				Min.	Max.	
I_R	Reverse current	4016	T_{case} = +125 (+0, -5) °C DC method, V_R = 200 V	-	10	mA
V_{F1}(2)	Forward voltage	4011	T_{case} = +125 (+0, -5) °C pulse method, I_F = 10 A	-	0.85	V
			T_{case} = +55 (+0, -5) °C pulse method, I_F = 10 A	-	1.15	V

1. Read and record measurements shall be performed on a sample of 5 components with 0 failures allowed. Alternatively a 100% inspection may be performed.
2. Pulse width ≤ 300µs, duty cycle ≤ 2%

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 SMD.5 package information

Figure 2. SMD.5 package outline

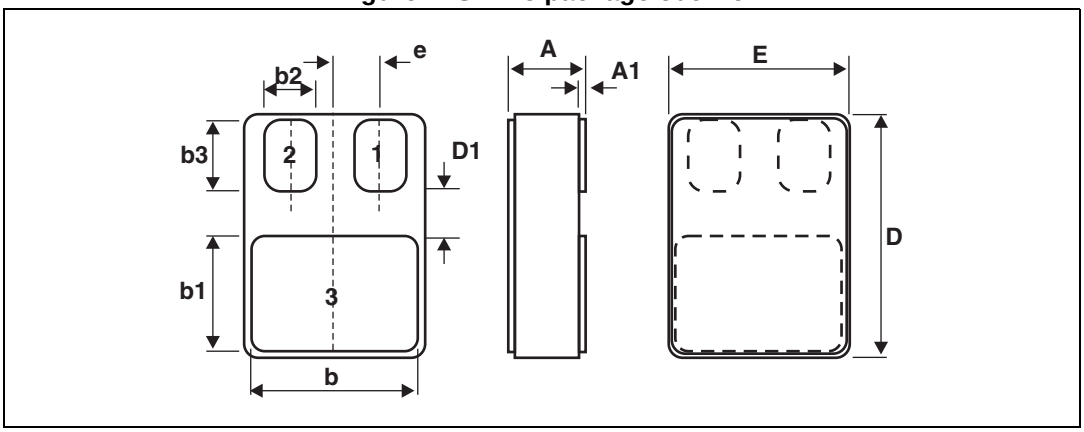

Table 6. SMD.5 package mechanical data

Reference	Dimension in millimeters		Dimension in inches	
	Min.	Max.	Min.	Max.
A	2.84	3.15	0.112	0.124
A1	0.25	0.51	0.010	0.20
b	7.13	7.39	0.281	0.291
b1	5.58	5.84	0.220	0.230
b2(1)	2.28	2.54	0.090	0.100
b3(1)	2.92	3.18	0.115	0.125
D	10.03	10.28	0.395	0.405
D1(1)	0.76	-	0.030	-
E	7.39	7.64	0.291	0.301
e(1)	1.91 BSC		0.075	

1. 2 locations

3 Ordering information

Table 7. Ordering information(1)

Order code	ESCC part number	Quality level	Package	Lead finish	Marking(2)	Mass	Packing
BYW81-200S1		Engineering model	SMD.5	Gold	BYW81-200S1	2.0 g	Strip pack
BYW81-200SG	5103/029/05	ESCC flight			510302905		

1. Contact ST sales office for information about the specific conditions for products in die form.
2. Specific marking only. The full marking includes in addition:

For the engineering models: ST logo, date code, country of origin (FR).

For ESCC flight parts: ST logo, date code, country of origin (FR), ESA logo, serial number of the part within the assembly lot.

4 Other information

4.1 Date code

Date code is structured as describe below:

- EM xyywwz
- ESCC flight yywwz

Where:

- x (EM only): 3, assembly location Rennes (France)
- yy: last two digits year
- ww: week digits
- z: lot index in the week

4.2 Documentation

In *Table 8* is a summary of the documentation provided with each type of products.

Table 8. Documentation provided with each type of products

Quality level	Documentation
Engineering model	
ESCC flight	Certificate of conformance

5 Revision history

Table 9. Document revision history

Date	Revision	Changes
3-Nov-2010	1	First issue.
8-Nov-2013	2	Inserted *Ordering information*.
10-Sep-2015	3	Updated *Features*. Removed TO-254 package and information and reformatted to current standards.