

BYV54HR

Aerospace 40 A - 200 V fast recovery rectifier

Datasheet - production data



Features

- Very small conduction losses
- Negligible switching losses
- High surge current capability
- High avalanche energy capability
- Hermetic package
- Package mass: 10 g
- ESCC qualified

Description

Packaged in a hermetic TO-254AA, 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 detailed specification | Quality level | Lead finish | EPPL | I _F (AV) | V _{RRM} | Tj (max) | V _F (max) |
|--------------|-----------------------------------|----------------------|----------------|------|---------------------|------------------|----------|-------------------------|
| BYV54S200HY1 | - | Engineering model | Gold | - | 40 | 200 | 150 | 1.10 |
| BYV54S200HYT | 5103/031/05 | Flight part | Solder dip | Y | 40 | 200 | 150 | 1.10 |

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

1 Characteristics

| Table 2. | Absolute | maximum | ratings |
|----------|----------|---------|---------------|
| | / | | · a · · · g o |

| Symbol | Characteristic | Value | Unit |
|---------------------|---|-------------|------|
| I _{FSM} | Forward surge current ⁽¹⁾ | 400 | А |
| V _{RRM} | Repetitive peak reverse voltage ⁽²⁾ | 200 | V |
| I _o | Average output rectified current (50% duty cycle): ⁽³⁾ | 40 | А |
| I _{F(RMS)} | Forward rms current | 60 | А |
| T _{OP} | Operating case temperature range ⁽⁴⁾ | -55 to +150 | °C |
| TJ | Junction temperature | +150 | °C |
| T _{STG} | Storage temperature range ⁽⁴⁾ | -55 to +150 | °C |
| T _{SOL} | Soldering temperature ⁽⁵⁾ | +260 | °C |

1. Sinusoidal pulse of 10 ms duration

2. Pulsed, duration 5 ms, F = 50 Hz

3. For $T_{case} > +99$ °C, derate linearly to 0 A at +150°C.

4. For devices with hot solder dip lead finish all testing performed at T_{amb} > +125 °C are carried out in a 100% inert atmosphere.

5. Duration 10 seconds maximum at a distance of not less than 1.5 mm from the device body and the same lead shall not be re-soldered until 3 minutes have elapsed.

Table 3. Thermal resistance

| Symbol | Parameter | Value | Unit |
|-----------------------|---------------------------------|-------|------|
| R _{th (j-c)} | Junction to case ⁽¹⁾ | 1.0 | °C/W |

1. Package mounted on infinite heatsink.



| Symbol | Chanactariatia | MIL-STD-750 | Test conditions ⁽¹⁾ | Lin | Units | |
|--------------------------------|--|----------------------|---|------|---------------------------|-------|
| | Characteristic | test method | lest conditions " | Min. | Max. | Units |
| I _R | Reverse current | 4016 | DC method, $V_R = 200 V$ | - | 50 | μA |
| V _{F1} ⁽²⁾ | Forward voltage | Forward voltage 4011 | | - | 0.95 | V |
| $V_{F2}^{(2)}$ | Forward vollage | 4011 | Pulse method, I _F = 30 A | - | 1.1 | V |
| V_{BR} | Breakdown voltage | 4021 | I _R = 100 μA | 200 | - | V |
| С | Capacitance | 4001 | V _R = 10 V, F = 1 MHz | - | 400 | pF |
| t _{rr} | Reverse recovery time | 4031 | I _F = 1 A, V _R = 30 V, dI _F /dt = -50 A/μs | - | 60 | ns |
| $Z_{th(j-c)}^{(3)}$ | 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 | | ulate F ⁽⁴⁾ | °C/W |

1. Testing performed with both anode terminals 2 and 3 tied together

2. Pulse width \leq 680 µs, duty cycle \leq 2%

3. Performed only during screening tests parameter drift values (initial measurements for HTRB), go-no-go.

4. 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 $R_{th(j-c)}$ limits specified in maximum ratings.

| Symbol | | MIL-STD-750 | Test conditions ⁽¹⁾ | Limits | | 11 |
|--------------------------------|--------------------------------|-------------|---|--------|------|-------|
| | Characteristic | test method | lest conditions " | Min. | Max. | Units |
| I _R | Reverse current | 4016 | T _{case} = +125 (+0, -5) °C DC method, V _R = 200 V | - | 40 | mA |
| V _{F1} ⁽²⁾ | | 4011 | $T_{case} = +125 (+0, -5) °C$ pulse method, I _F = 20 A | - | 0.85 | V |
| V F1 | Forward voltage | | $T_{case} = -55 (+0, -5) °C$ pulse method, I _F = 20 A | - | 1.15 | V |
| V _{F2} ⁽²⁾ | V _{F2} ⁽²⁾ | | $T_{case} = +125 (+0, -5) °C$ pulse method, I _F = 30 A | | 1.0 | |

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

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 \leq 680 µs, duty cycle \leq 2%

To evaluate the conduction losses use the following equation:

 $P = 0.74 \text{ x }_{\text{IF}(\text{AV})} + 1.00 \text{ x }_{\text{F}^{2}(\text{RMS})}$



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-254AA information



a. The terminal identification is specified by the device configuration. See *Figure 1* for terminal connections



| Defense | Dimension ir | n millimeters | Dimension in inches | | |
|-------------------|--------------|---------------|---------------------|-------|--|
| Reference - | Min. | Max. | Min. | Max. | |
| A | 13.59 | 13.84 | 0.535 | 0.545 | |
| В | 13.59 | 13.84 | 0.535 | 0.545 | |
| С | 20.07 | 20.32 | 0.790 | 0.800 | |
| D | 6.3 | 6.7 | 0.248 | 0.264 | |
| E | 1 | 3.9 | 0.039 | 0.154 | |
| ØF | 3.5 | 3.9 | 0.138 | 0.154 | |
| G | 16.89 | 17.4 | 0.665 | 0.685 | |
| Н | 6.86 | BSC | 0.270 BSC | | |
| ØI ⁽¹⁾ | 0.89 | 1.14 | 0.035 | 0.045 | |
| J | 3.81 | BSC | 0.150 BSC | | |
| К | 3.81 | BSC | 0.150 BSC | | |
| L | 12.95 | 14.5 | 0.510 | 0.571 | |
| ØM | 3.05 | Тур. | 0.120 Тур. | | |
| Ν | - | 0.71 | - | 0.028 | |
| R1 ⁽²⁾ | - | 1 | - | 0.039 | |
| R2 ⁽³⁾ | 1.65 | Тур. | 0.0 | 65 | |

Table 6. TO-254AA package mechanical data

1. 3 locations

2. Radius of heatsink flange corner - 4 locations

3. Radius of body corner - 4 locations



3 Ordering information

| Order code | ESCC detailed specification | Package | Lead finish | Comment | Marking | Mass | EPPL | Packing |
|--------------|-----------------------------------|----------|----------------|------------|--------------------|------|------|---------|
| BYV54S200HY1 | | | Gold | | BYV54S200HY1 | | | Strip |
| BYV54S200HYT | 5103/031/05 | TO-254AA | Solder dip | Single die | 510303105 + BeO | 10 g | Y | pack |

Table 7. Ordering information⁽¹⁾

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

4 Revision history

| Date | Revision | Changes |
|-------------|----------|--|
| 08-Jul-2010 | 1 | First issue. |
| 19-Mar-2014 | 2 | Updated Table 1: Device summary and Table 7: Ordering information. |
| 10-Sep-2015 | 3 | Update Features. Reformatted to current standards. |

Table 8. Document revision history



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