BYV54HR

Aerospace 40 A - 200 V fast recovery rectifier

Datasheet - production data

TO-254AA

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

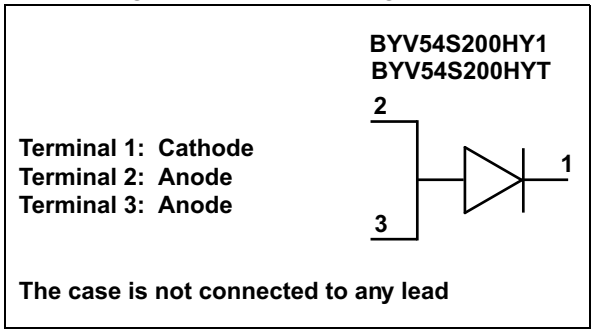


Table 1. Device summary[1]

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				

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)	400	A
V_{RRM}	Repetitive peak reverse voltage(2)	200	V
I_O	Average output rectified current (50% duty cycle):(3)	40	A
$I_{F(RMS)}$	Forward rms current	60	A
T_{OP}	Operating case temperature range(4)	-55 to +150	°C
T_J	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
$R_{th\ (j\text{-}c)}$	Junction to case (1)	1.0	°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(1)	Limits		Units
				Min.	Max.	
I_R	Reverse current	4016	DC method, V_R = 200 V	-	50	µA
V_{F1}(2)	Forward voltage	4011	Pulse method, I_F = 20 A	-	0.95	V
V_{F2}(2)			Pulse method, I_F = 30 A	-	1.1	V
V_{BR}	Breakdown voltage	4021	I_R = 100 µA	200	-	V
C	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	Calculate ΔV_F(4)		°C/W

1. Testing performed with both anode terminals 2 and 3 tied together
2. Pulse width ≤ 680 µs, duty cycle ≤ 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.

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	-	40	mA
V_{F1}(2)	Forward voltage	4011	T_{case} = +125 (+0, -5) °C pulse method, I_F = 20 A	-	0.85	V
			T_{case} = -55 (+0, -5) °C pulse method, I_F = 20 A	-	1.15	V
V_{F2}(2)			T_{case} = +125 (+0, -5) °C pulse method, I_F = 30 A		1.0	

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 ≤ 680 µs, duty cycle ≤ 2%

To evaluate the conduction losses use the following equation:

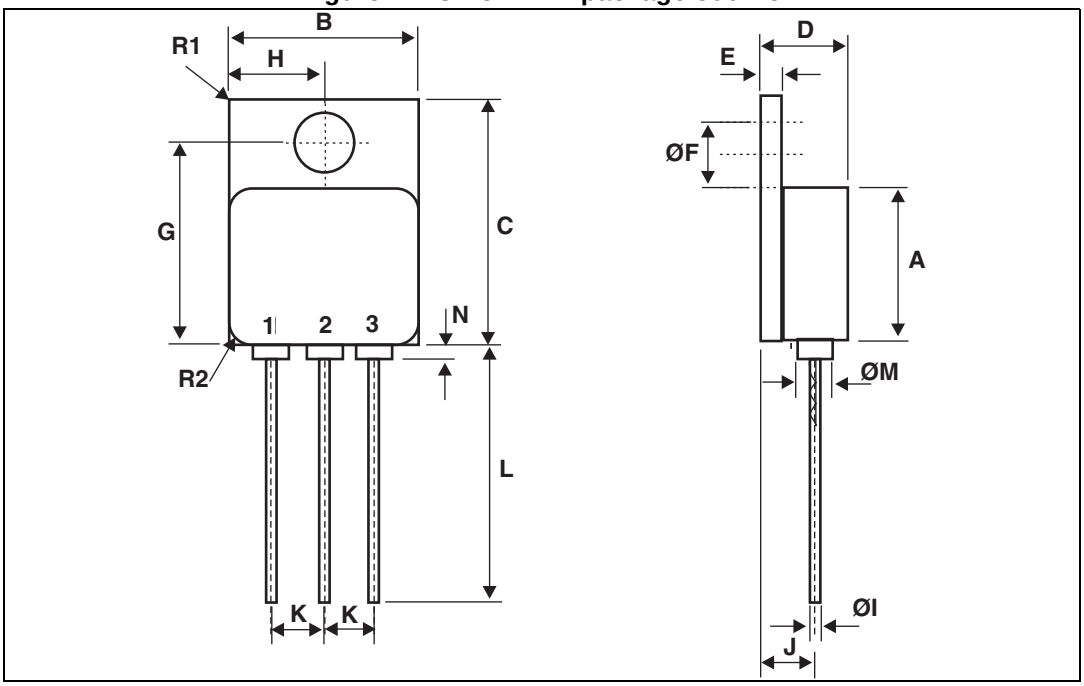
$P = 0.74 \times I_{F(AV)} + 1.00 \times I_{F(RMS)}^2$

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 TO-254AA information

Figure 2. TO-254AA[(a)] package outline



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

Table 6. TO-254AA package mechanical data

Reference	Dimension in millimeters		Dimension in inches	
	Min.	Max.	Min.	Max.
A	13.59	13.84	0.535	0.545
B	13.59	13.84	0.535	0.545
C	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
H	6.86 BSC		0.270 BSC	
ØI(1)	0.89	1.14	0.035	0.045
J	3.81 BSC		0.150 BSC	
K	3.81 BSC		0.150 BSC	
L	12.95	14.5	0.510	0.571
ØM	3.05 Typ.		0.120 Typ.	
N	-	0.71	-	0.028
R1(2)	-	1	-	0.039
R2(3)	1.65 Typ.		0.065	

1. 3 locations
2. Radius of heatsink flange corner - 4 locations
3. Radius of body corner - 4 locations

3 Ordering information

Table 7. Ordering information(1)

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

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

4 Revision history

Table 8. Document 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.