BYV52HR

Aerospace 30 A - 200 V fast recovery rectifier

Features

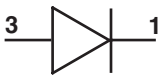
- Very small conduction losses
- Negligible switching losses
- High surge current capability
- High avalanche energy capability
- Hermetic package
- Target radiation qualification:
  - 150 krad (Si) low dose rate
  - 3 Mrad high dose rate
- Package mass: 10 g
- ESCC qualified

TO-254

Figure 1. Device configuration

BYV52-200FSY1
BYV52-200FSYHRB

Terminal 1: Cathode
Terminal 2: No connection
Terminal 3: Anode
The case is not connected to any lead



Description

Packaged in an hermetic TO-254 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.

Table 1. Device summary[1]

Order code	ESCC detailed specification	Quality level	Lead finish	EPPL	$I_{F(AV)}$	V_{RRM}	$T_{j(max)}$	$V_{F\,(max)}$
BYV52-200FSY1	-	Engineering model	Gold	-	30 A	200 V	150 °C	1.15 V
BYV52-200FSYHRB	5103/030/01	Flight part	Solder dip	Y				

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

1 Characteristics

Table 2. Absolute maximum ratings

Symbol	Characteristic	Value	Unit
I_{FSM}	Forward surge current (per diode)(1)	400	A
V_{RRM}	Repetitive peak reverse voltage(2)	200	V
I_O	Average output rectified current (50% duty cycle):(3)	30	A
$I_{F(RMS)}$	Forward rms current (per diode)	30	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 $T_{case} \geq +120°C$, 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 resoldered until 3 minutes have elapsed.

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{th\ (j\text{-}c)}$	Junction to case (1)	0.9	°C/W

1. Package mounted on infinite heatsink.

Table 4. Electrical measurements at ambiant 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	-	25	µA
V_{F1}(1)	Forward voltage	4011	Pulse method, I_F = 20 A	-	1.01	V
V_{F2}(1)			Pulse method, I_F = 30 A	-	1.15	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	-	55	ns
$Z_{th(j-c)}$(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 ≤ 300µs, duty cycle ≤ 2%
2. Performed only during screening tests parameter drift values (initial measurements for HTRB), 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 $R_{th(j-c)}$ 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	-	15	mA
V_{F2}(2)	Forward voltage	4011	T_{case} = +125 (+0, -5) °C pulse method, I_F = 20 A	-	0.95	V
			T_{case} = +55 (+0, -5) °C pulse method, I_F = 20 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%

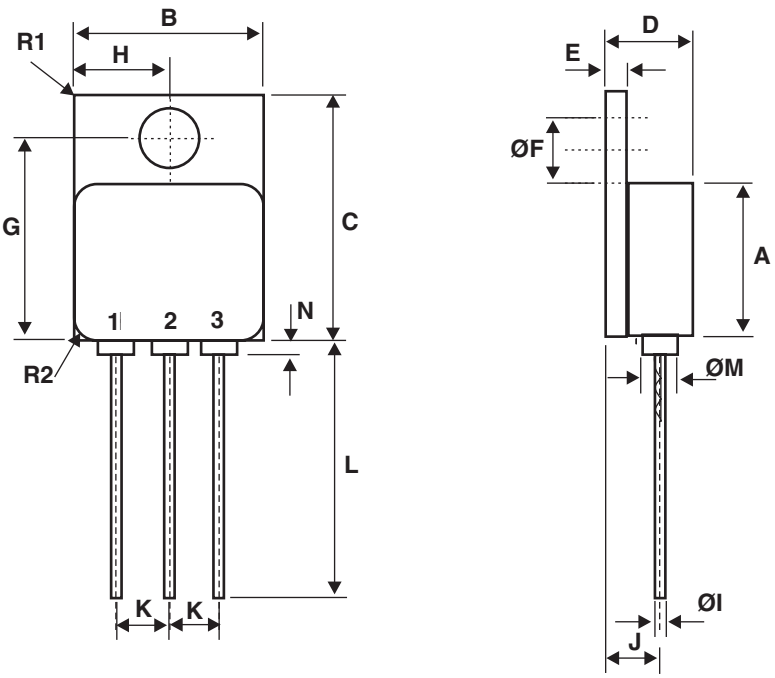
To evaluate the conduction losses use the following equation:

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

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.

Figure 2. Metal flange mount package (TO-254[(a)]), 3 lead dimension definitions



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

Table 6. Metal flange mount package (TO-254), 3-lead dimension values

Reference	Dimension in millimetres		Dimlension 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
BYV52-200FSY1	-	TO-254	Gold	Single die	BYV52200FSY1 + BeO	10 g	-	Strip pack
BYV52-200FSYHRB	5103/030/01		Solder dip		510303001 + BeO		Y	

1. Contact ST sales office for information about the specific conditions for products in die form and QML-Q versions.

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
14-Apr-2010	1	First issue.