

Aerospace 2 x 20 A - 100 V Schottky rectifier

Datasheet - production data



Features

- Forward current: 2 x 20 A
- Repetitive peak voltage: 100 V
- Low forward voltage drop: 0.9 V
- Maximum junction temperature: 175 °C
- Negligible switching losses
- Low capacitance
- High reverse avalanche surge capability
- Hermetic packages
- Target radiation qualification:
 - 150 krad (Si) low dose rate
 - 1 Mrad high dose rate
- ESCC qualified

Description

This power Schottky rectifier is designed and packaged to comply with the ESCC5000 specification for aerospace products. Housed in hermetically sealed packages both surface mount and through hole, it is ideal for use in applications for aerospace and other harsh environments.

The STPS40100HR is intended for use in medium voltage application and particularly, in high frequency circuits where low switching losses and low noise are required.

Table 1. Device summary

Order code	ESCC detailed specification	Quality level	Package	I_F (AV)	V_{RRM}	T_j (max)	V_F (max)
STPS40100C2FY1	-	Engineering model	TO-254	2 x 20	100	175	0.9
STPS40100C2FYT	5106/019/01	ESCC flight					

1 Characteristics

Table 2. Absolute maximum ratings

Symbol	Characteristic	Value	Unit
I_{FSM}	Forward surge current (per diode) ⁽¹⁾	300	A
V_{RRM}	Repetitive peak reverse voltage ⁽²⁾	100	V
I_{RRM}	Repetitive peak reverse current ⁽³⁾	1	A
I_O	Average output rectified current (50% duty cycle): ^{(4), (5)} per diode per device	20	A
		40	
$I_{F(RMS)}$	Forward rms current (per diode)	30	A
T_{OP}	Operating temperature range ⁽⁶⁾ (case temperature)	-65 to +175	°C
T_J	Junction temperature	+175	°C
T_{STG}	Storage temperature range ⁽⁶⁾	-65 to +175	°C
T_{SOL}	Soldering temperature: For TO-254 ⁽⁷⁾	+260	°C
dV/dt	Critical rate of rise of reverse voltage	10000	V/μs

1. Sinusoidal pulse of 10 ms duration
2. Pulsed, duration 5 ms, F = 50 Hz
3. Pulsed, duration 2 μs, F = 1 kHz
4. For $T_{case} \geq +132^\circ\text{C}$ per device and $T_{case} \geq +148^\circ\text{C}$ per diode, derate linearly to 0 A at +175°C.
5. The "per device" ratings apply only when both anode terminals are tied together.
6. For devices with hot solder dip lead finish all testing performed at $T_{amb} > +125^\circ\text{C}$ are carried out in a 100% inert atmosphere.
7. 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	Characteristic	Value	Unit
$R_{th(j-c)}$ ⁽¹⁾	Thermal resistance, junction to case per diode	1.5	°C/W
	per device	1.2	

1. Package mounted on infinite heatsink

Table 4. Electrical measurements at ambient temperature (per diode), $T_{amb} = 22 \pm 3 \text{ }^\circ\text{C}$

Symbol	Characteristic	MIL-STD-750 test method	Test conditions	Values		Units
				Min.	Max.	
I_{R1}	Reverse current	4016	DC method, $V_R = 100 \text{ V}$	-	30	μA
I_{R2}			DC method, $V_R = 50 \text{ V}$	-	5	μA
$V_{F1}^{(1)}$	Forward voltage	4011	Pulse method, $I_F = 5 \text{ A}$	-	610	mV
$V_{F2}^{(1)}$			Pulse method, $I_F = 10 \text{ A}$	-	730	mV
$V_{F3}^{(1)}$			Pulse method, $I_F = 20 \text{ A}$	-	900	mV
C	Capacitance	4001	$V_R = 10 \text{ V}$, $F = 1 \text{ MHz}$	-	1	nF
$Z_{th(j-c)}^{(2)}$	Relative thermal impedance, junction to case	3101	$I_H = 15 \text{ to } 40 \text{ A}$, $t_H = 50 \text{ ms}$ $I_M = 50 \text{ mA}$, $t_{md} = 100 \text{ }\mu\text{s}$	Calculate $\Delta V_F^{(3)}$		$^\circ\text{C/W}$

1. Pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
2. Performed only during screening tests parameter drift values (initial measurements for HTRB), go-no-go.
3. The limits for ΔV_F 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.

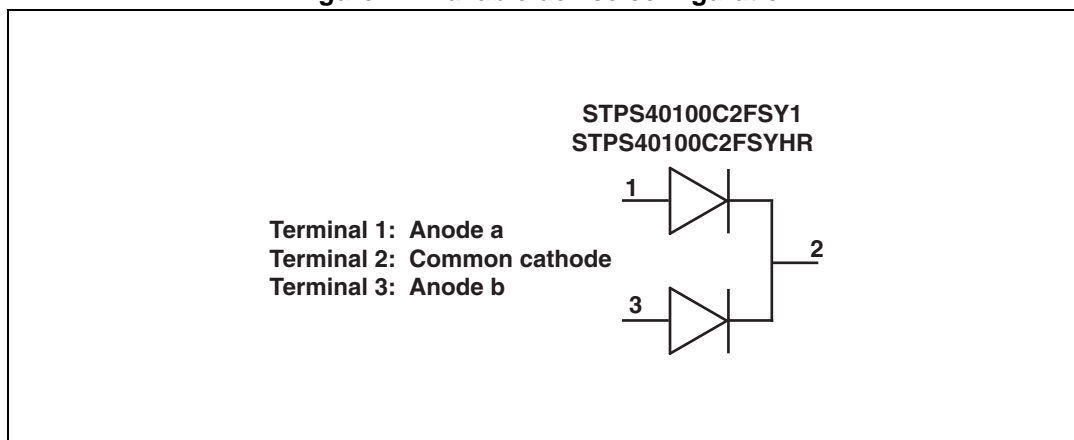
Table 5. Electrical measurements at high and low temperatures (per diode)

Symbol	Characteristic	MIL-STD-750 test method	Test conditions ⁽¹⁾	Values		Units
				Min.	Max.	
I_{R1}	Reverse current	4016	$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ DC method, $V_R = 100 \text{ V}$	-	20	mA
I_{R2}			$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ DC method, $V_R = 50 \text{ V}$	-	7.5	mA
$V_{F2}^{(2)}$	Forward voltage	4011	$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 10 \text{ A}$	-	660	mV
$V_{F3}^{(2)}$			$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 20 \text{ A}$	-	850	mV
			$T_{case} = -55 (+5, -0) \text{ }^\circ\text{C}$ pulse method, $I_F = 20 \text{ A}$	-	950	mV

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 $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$

2 Configurations

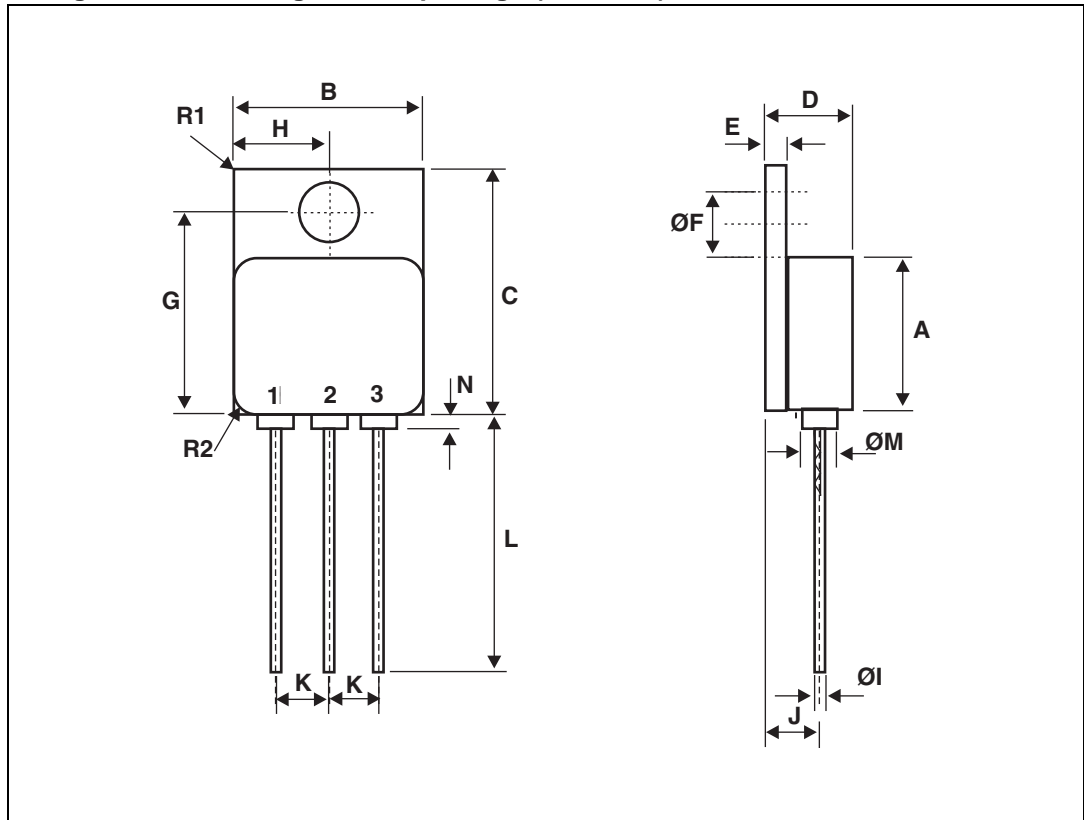
Figure 1. Available device configuration



3 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



4

Ordering Information

Table 7. Ordering information

Order code	ESCC detailed specification	Package	Lead finish	Comment	Marking ⁽¹⁾	Mass	EPPL	Packing
STPS40100C2FY1	-	TO-254	Gold	Double die - common cathode pin 2	STPS40100C2FY1 + BeO	10	-	Strip pack
STPS40100C2FYT	5106/019/01		Solder Dip	Double die - common cathode pin 2	510601901+BeO		-	

1. 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.

Contact ST sales office for information about the specific conditions for tape and reel packing and for products in die form.

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
26-Mar-2010	1	Initial release.
19-Mar-2014	2	Updated Table 1: Device summary and Table 7: Ordering information .

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

ST PRODUCTS ARE NOT DESIGNED OR AUTHORIZED FOR USE IN: (A) SAFETY CRITICAL APPLICATIONS SUCH AS LIFE SUPPORTING, ACTIVE IMPLANTED DEVICES OR SYSTEMS WITH PRODUCT FUNCTIONAL SAFETY REQUIREMENTS; (B) AERONAUTIC APPLICATIONS; (C) AUTOMOTIVE APPLICATIONS OR ENVIRONMENTS, AND/OR (D) AEROSPACE APPLICATIONS OR ENVIRONMENTS. WHERE ST PRODUCTS ARE NOT DESIGNED FOR SUCH USE, THE PURCHASER SHALL USE PRODUCTS AT PURCHASER'S SOLE RISK, EVEN IF ST HAS BEEN INFORMED IN WRITING OF SUCH USAGE, UNLESS A PRODUCT IS EXPRESSLY DESIGNATED BY ST AS BEING INTENDED FOR "AUTOMOTIVE, AUTOMOTIVE SAFETY OR MEDICAL" INDUSTRY DOMAINS ACCORDING TO ST PRODUCT DESIGN SPECIFICATIONS. PRODUCTS FORMALLY ESCC, QML OR JAN QUALIFIED ARE DEEMED SUITABLE FOR USE IN AEROSPACE BY THE CORRESPONDING GOVERNMENTAL AGENCY.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2014 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

