STPS40100HR

Aerospace 2 x 20 A - 100 V Schottky rectifier

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



TO-254

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	Configuration	Package	Mass	EPPL
STPS40100C2FSY1	-	Engineering model	Double die, common cathode pin 2	T0-254	10.0 g	-
STPS40100C2FSYHR	5106/019/01	ESCC flight				Y

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 40	A
$I_{F(RMS)}$	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 $T_{case} \geq +132°C$ per device and $T_{case} \geq +148°C$ 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 $T_{amb} > +125$ °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 per device	 1.5 1.2	°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	Values		Units
				Min.	Max.	
I_{R1}	Reverse current	4016	DC method, V_R = 100 V	-	30	µA
I_{R2}			DC method, V_R = 50 V	-	5	µA
V_{F1}(1)	Forward voltage	4011	Pulse method, I_F = 5 A	-	610	mV
V_{F2}(1)			Pulse method, I_F = 10 A	-	730	mV
V_{F3}(1)			Pulse method, I_F = 20 A	-	900	mV
C	Capacitance	4001	V_R = 10 V, F = 1 MHz	-	1	nF
$Z_{th(j-c)}$(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.

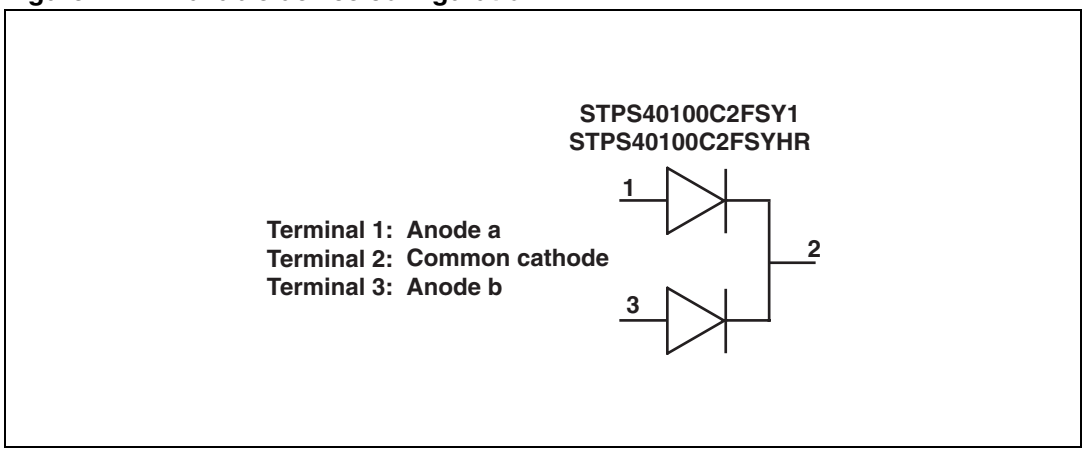
Table 5. Electrical measurements at high and low temperatures (per diode)

Symbol	Characteristic	MIL-STD-750 test method	Test conditions(1)	Values		Units
				Min.	Max.	
I_{R1}	Reverse current	4016	T_{case} = +125 (+0, -5) °C DC method, V_R = 100 V	-	20	mA
I_{R2}			T_{case} = +125 (+0, -5) °C DC method, V_R = 50 V	-	7.5	mA
V_{F2}(2)	Forward voltage	4011	T_{case} = +125 (+0, -5) °C pulse method, I_F = 10 A	-	660	mV
V_{F3}(2)			T_{case} = +125 (+0, -5) °C pulse method, I_F = 20 A	-	850	mV
			T_{case} = -55 (+5, -0) °C pulse method, I_F = 20 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 ≤ 300µs, duty cycle ≤ 2%

2 Configurations

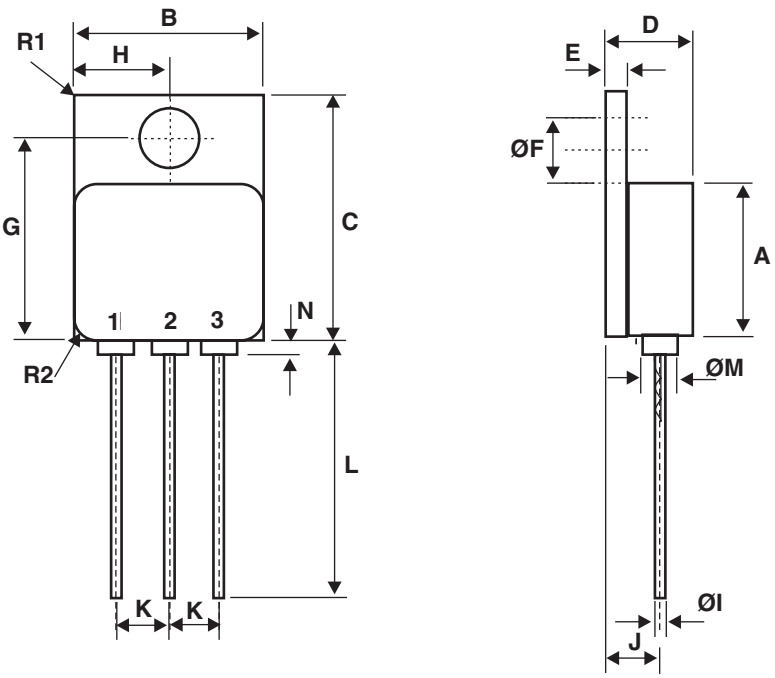
Figure 1. Available device configuration



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	Marking	EPPL	Mass (g)	Packing
STPS40100C2FSY1	-	TO-254	Gold	STPS40100C2FSY1 + BeO	-	10.0	Strip pack
STPS40100C2FSYHR	5106/019/01		Solder dip	510601901 + BeO	Y		

5 Revision history

Table 8. Document revision history

Date	Revision	Changes
26-Mar-2010	1	Initial release.

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