

Aerospace 2 x 30 A - 45 V Schottky rectifier

Features

- Forward current: 2 x 30 A
- Repetitive peak voltage: 45 V
- Low forward voltage drop: 0.75 V
- Maximum junction temperature: 175 °C
- Negligible switching losses
- Low capacitance
- High reverse avalanche surge capability
- Hermetic package
- 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 a hermetically sealed surface mount package, it is ideal for use in applications for aerospace and other harsh environments.

The STPS6045HR is intended for use in medium voltage applications and in high frequency circuits where low switching losses and low noise are required.



Figure 1. Device configuration

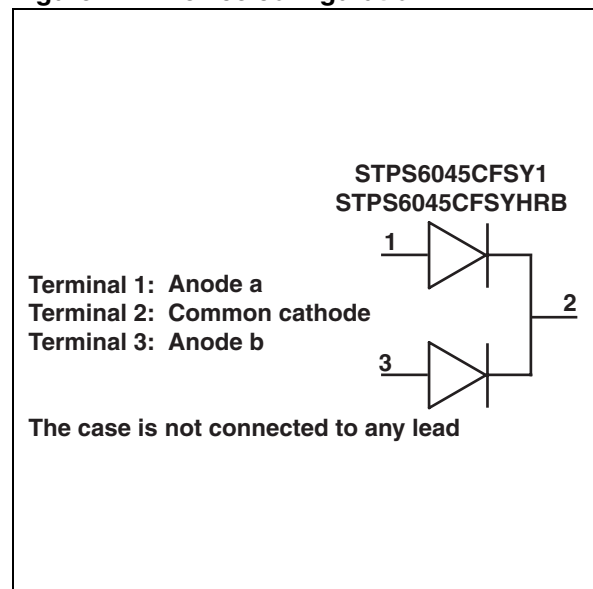


Table 1. Device summary

Order code	ESCC part number	Quality level	EPPL	Comment	Package	Lead finish
STPS6045CFSY1	-	Engineering model	-	Single die	TO-254	Gold
STPS6045CFSYHRB	5106/018/01	ESCC flight	-			Solder dip

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⁾	45	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	30	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 ⁽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 $T_{case} > +138$ °C per device and $T_{case} > +144$ °C per device, derate linearly to 0 A at +175 °C.
5. The per device ratings apply only when both anode terminals are tied together.
6. For solder dip lead finish devices all testing performed at $T_{amb} > +125$ °C shall be 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 ⁽²⁾	1.7	°C/W
		1.2	

1. Package mounted on infinite heatsink
2. The per device ratings apply only when both anode terminals are tied together.

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_R	Reverse current	4016	DC method, $V_R = 45\text{V}$	-	500	μA
$V_{F1}^{(1)}$	Forward voltage	4011	Pulse method, $I_F = 5 \text{ A}$	-	520	mV
$V_{F2}^{(1)}$			Pulse method, $I_F = 10 \text{ A}$	-	590	mV
$V_{F3}^{(1)}$			Pulse method, $I_F = 20 \text{ A}$		650	mV
$V_{F4}^{(1)}$			Pulse method, $I_F = 35 \text{ A}$		820	
C	Capacitance	4001	$V_R = 5 \text{ V}$, $F = 1 \text{ MHz}$	-	1.3	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 $\leq 300 \text{ } \mu\text{s}$, Duty Cycle $\leq 2\%$
2. Performed only during screening tests parameter drift values (initial measurements), 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)

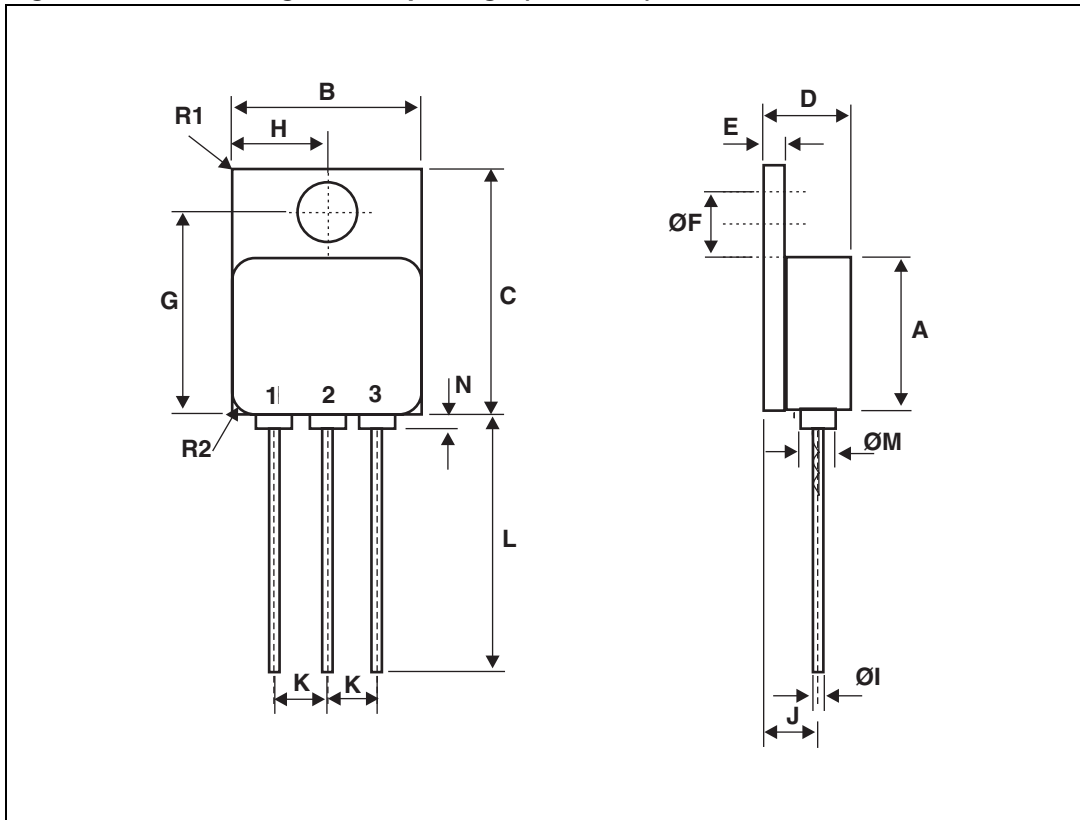
Symbol	Characteristic	MIL-STD-750 test method	Test conditions ⁽¹⁾	Values		Units
				Min.	Max.	
I_R	Reverse current	4016	$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ DC method, $V_R = 45 \text{ V}$	-	40	mA
$V_{F2}^{(2)}$	Forward voltage	4011	$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 10 \text{ A}$	-	530	mV
$V_{F3}^{(2)}$			$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 20 \text{ A}$	-	610	mV
$V_{F4}^{(2)}$			$T_{case} = -55 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 20 \text{ A}$	-	800	mV
			$T_{case} = +125 (+0, -5) \text{ }^\circ\text{C}$ pulse method, $I_F = 35 \text{ A}$	-	790	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 $\leq 300 \text{ } \mu\text{s}$, duty cycle $\leq 2\%$

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.

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		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

Order code	ESCC part number	EPPL	Package	Lead finish	Marking	Mass (g)	Packing
STPS6045CFSY1	-	-	TO-254	Gold	STPS6045CFSY1 + BeO	10.0	Strip pack
STPS6045CFSYHRB	5106/018/01	-		Solder dip	510601801 + BeO		

4 Revision history

Table 8. Document revision history

Date	Revision	Changes
03-Nov-2010	1	Initial release.

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