BYC30B-600P

Hyperfast power diode

31 May 2017 Product data sheet

1. General description

Hyperfast power diode in a TO263 (D2PAK) plastic package.

2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET

3. Applications

- Server power supplies
- Telecom power supplies
- EV charger
- Air conditioner
- Continuous Current Mode (CCM) Power Factor Correction (PFC)

4. Quick reference data

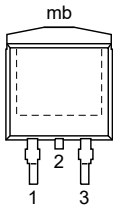
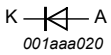
Table 1. Quick reference data

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
V_R	reverse voltage	DC		-	-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 101$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	-	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 101$ °C; square-wave pulse		-	-	60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	-	270	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	-	300	A
Static characteristics							
V_F	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; Fig. 6		-	2	2.75	V
		$I_F = 30$ A; $T_j = 150$ °C; Fig. 6		-	1.38	-	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 50$ A/µs; $T_j = 25$ °C; Fig. 7		-	26	35	ns
		$I_F = 30$ A; $V_R = 200$ V; $dI_F/dt = 200$ A/µs; $T_j = 25$ °C; Fig. 7		-	35	-	ns

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	70	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	nc	no connection	 TO263	
2	K	cathode[1]		
3	A	anode		
mb	mb	mounting base; connected to cathode		

[1] it is not possible to make connection to Pin 2 of the TO263 package

6. Ordering information

Table 3. Ordering information

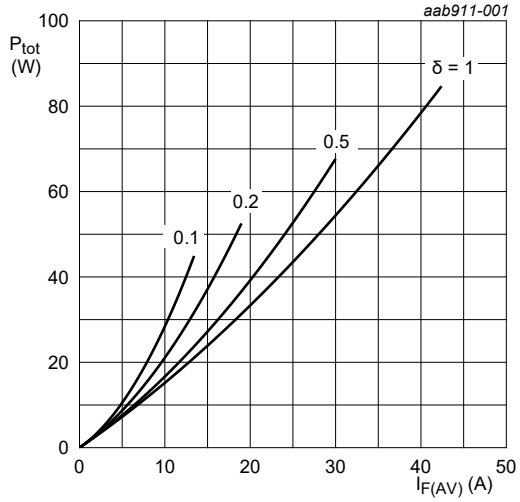
Type number	Package		
	Name	Description	Version
BYC30B-600P	-	Plastic single-ended surface-mounted packaged (D2PAK); 3 leads (one lead cropped) TO263	TO263

7. Limiting values

Table 4. Limiting values

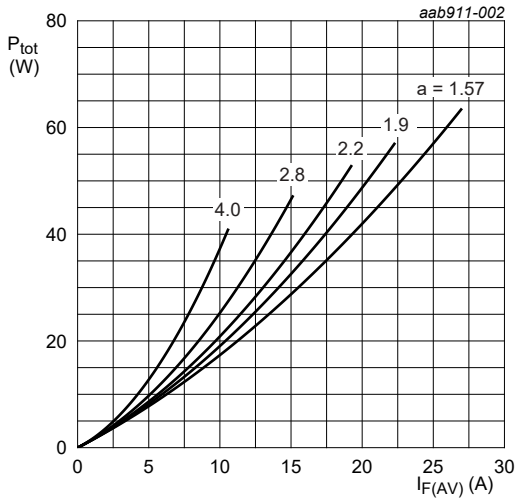
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions		Min	Max	Unit
V_{RRM}	repetitive peak reverse voltage			-	600	V
V_{RWM}	crest working reverse voltage			-	600	V
V_R	reverse voltage	DC		-	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 101$ °C; square-wave pulse; Fig. 1; Fig. 2; Fig. 3		-	30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ µs; $T_{mb} \leq 101$ °C; square-wave pulse		-	60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		-	270	A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		-	300	A
T_{stg}	storage temperature			-55	175	°C
T_j	junction temperature			-	175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
$V_o = 1.371$ V; $R_s = 0.0147$ Ω

Fig. 1. Forward power dissipation as a function of average forward current; square waveform; maximum values



a = form factor = $I_{F(RMS)} / I_{F(AV)}$
$V_o = 1.371$ V; $R_s = 0.0147$ Ω

Fig. 2. Forward power dissipation as a function of average forward current; sinusoidal waveform; maximum values

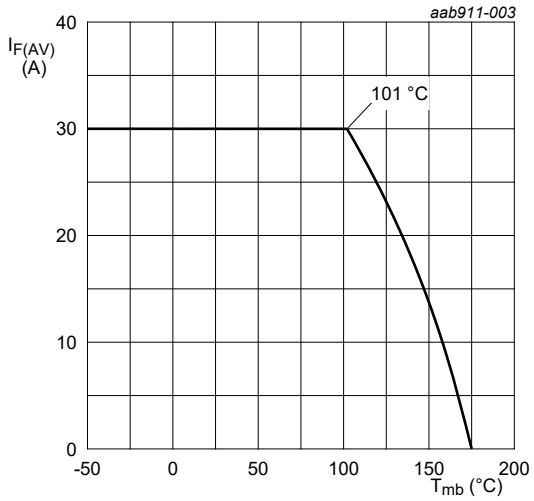


Fig. 3. Forward current as a function of mounting base temperature; maximum values

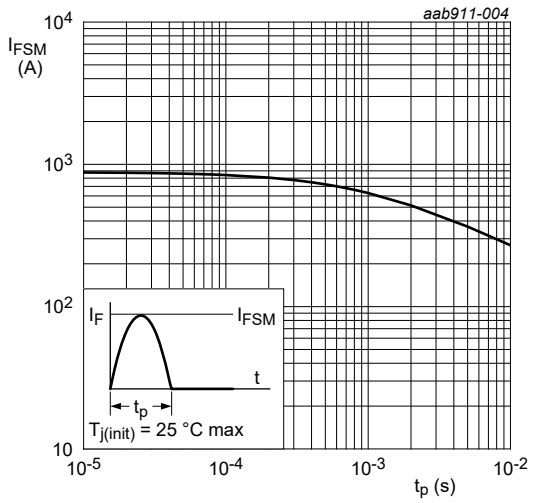


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

8. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	1.1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

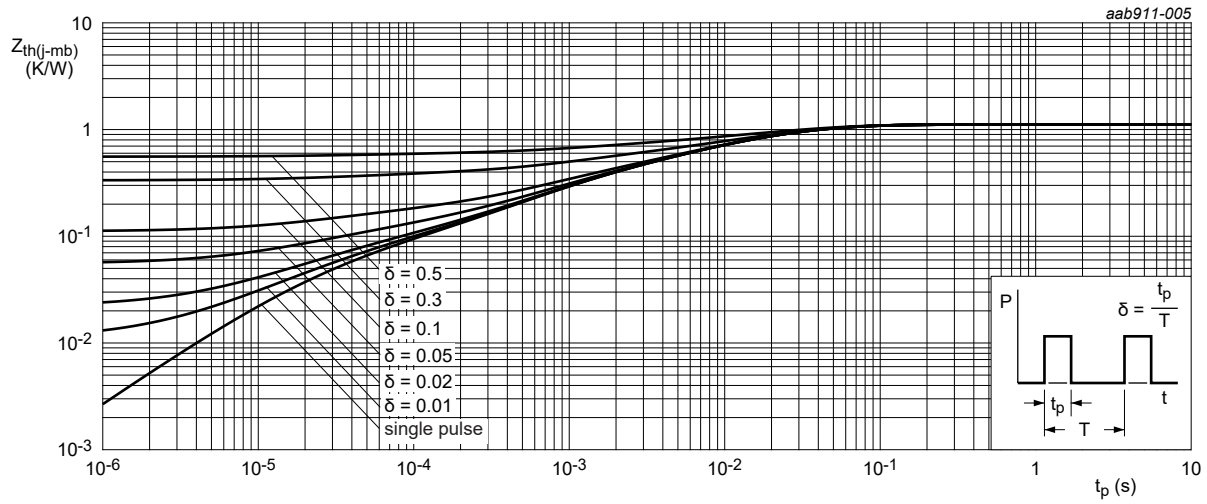
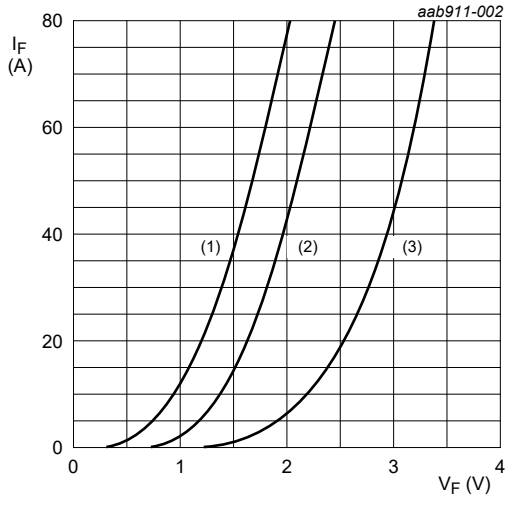


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

9. Characteristics

Table 6. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 30 A; T_j = 25 °C; Fig. 6		-	2	2.75	V
		I_F = 30 A; T_j = 150 °C; Fig. 6		-	1.38	-	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	-	10	µA
		V_R = 600 V; T_j = 125 °C		-	-	500	µA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	26	35	ns
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	35	-	ns
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	70	-	ns
I_{RM}	peak reverse recovery current	I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C		-	3.5	-	A
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C		-	7.6	-	A
Q_r	recovered charge	I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	50	-	nC
		I_F = 30 A; V_R = 200 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	280	-	nC



V_o = 1.371 V; R_s = 0.0147 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 6. Forward current as a function of forward voltage

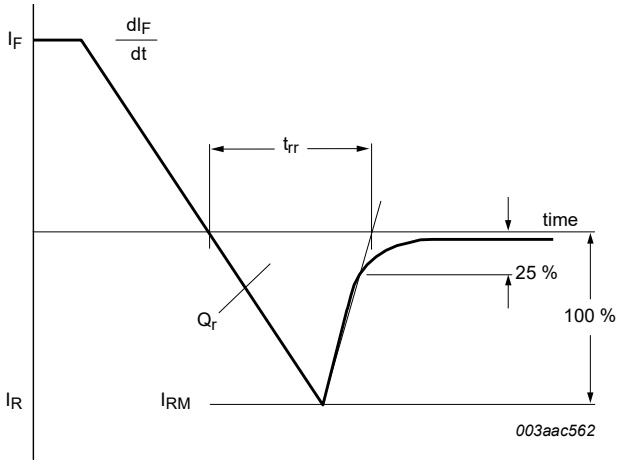
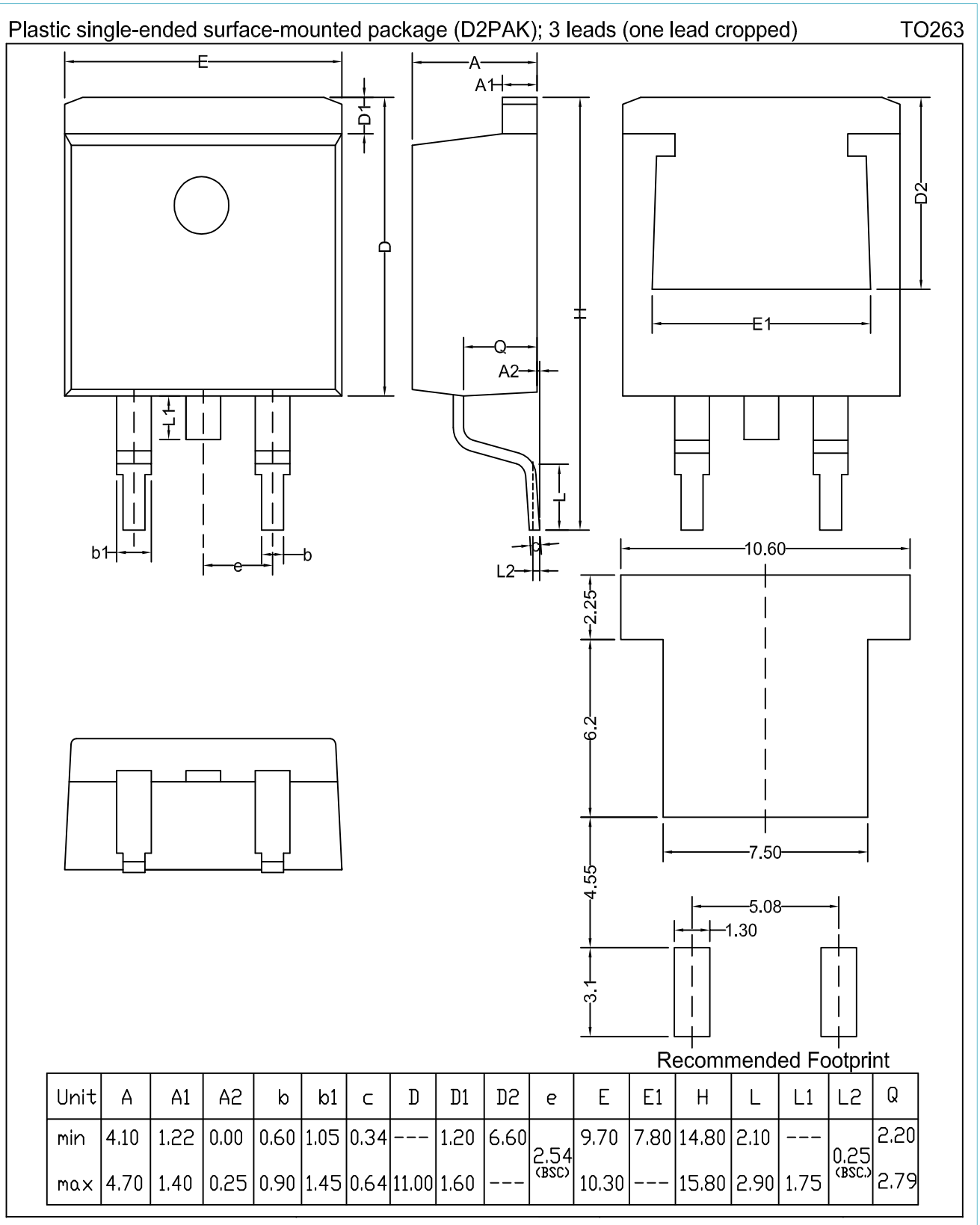


Fig. 7. Reverse recovery definitions; ramp recovery

10. Package outline



Unit	A	A1	A2	b	b1	c	D	D1	D2	e	E	E1	H	L	L1	L2	Q
min	4.10	1.22	0.00	0.60	1.05	0.34	---	1.20	6.60	2.54 (BSC)	9.70	7.80	14.80	2.10	---	0.25 (BSC)	2.20
max	4.70	1.40	0.25	0.90	1.45	0.64	11.00	1.60	---		10.30	---	15.80	2.90	1.75		2.79

Fig. 8. Package outline TO263

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Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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