

1. General description

Hyperfast power diode in a TO263 plastic package



2. Features and benefits

- Soft reverse recovery
- Excellent avalanche energy robustness
- Low leakage current
- Low thermal resistance
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT

3. Applications

- Active PFC in air conditioner/EV charger/PV
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge/full-bridge switched-mode power supplies

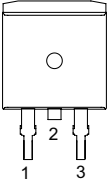
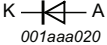
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V _{RRM}	repetitive peak reverse voltage			650			V
I _{F(AV)}	average forward current	δ = 0.5 ; square-wave pulse; T _{mb} ≤ 105 °C; Fig. 1 ; Fig. 2 ; Fig. 3		30			A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 105 °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		297			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 30 A; T _j = 25 °C; Fig. 6		-	2.10	2.60	V
		I _F = 30 A; T _j = 150 °C; Fig. 6		-	1.45	1.90	V
Dynamic characteristics							
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	20	24	ns

5. Pinning information

Table 2. Pinning information

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

[1] It is not possible to connect to pin 2 of the TO-263 package.

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYC30MB-650PS	TO263	BYC30MB-650PSJ	Reel	800	TO263d	17-Mar-2023

7. Marking

Table 4. Marking codes

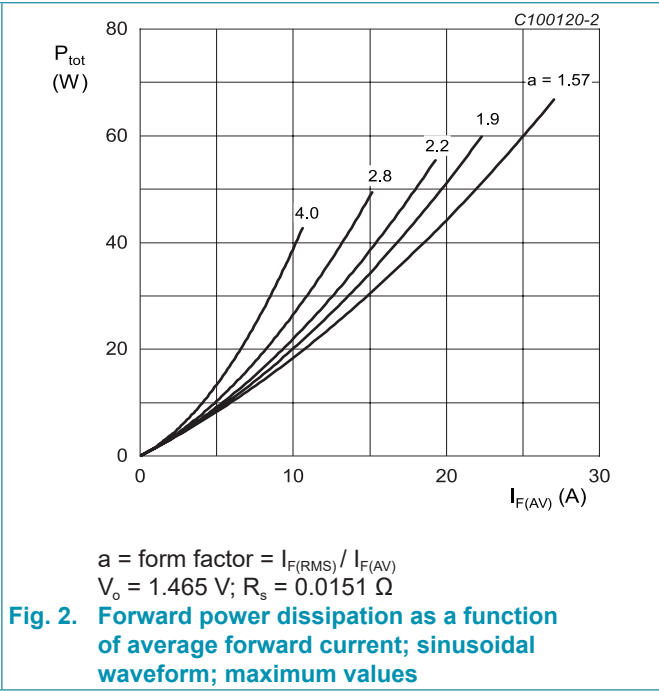
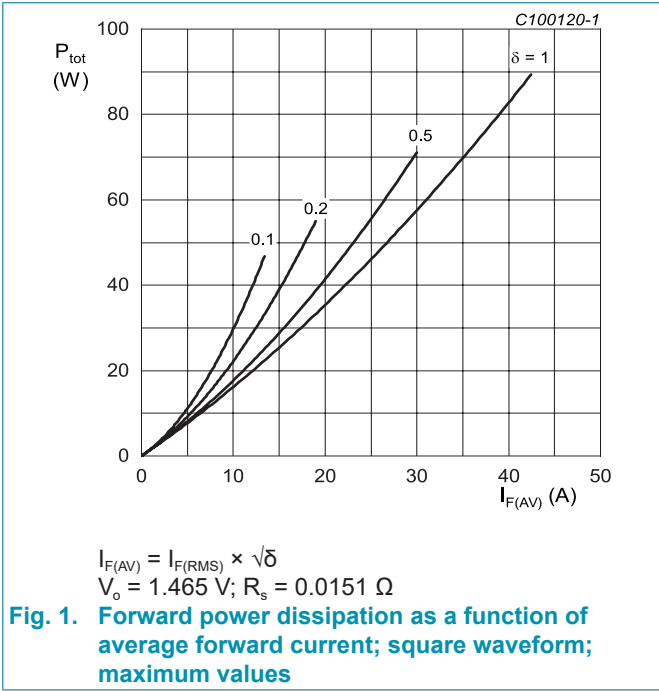
Type number	Marking codes
BYC30MB-650PS	BYC30MB 650PS

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{RRM}	repetitive peak reverse voltage			650	V
V_{RWM}	crest working reverse voltage			650	V
V_R	reverse voltage	DC		650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 105\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 105\text{ }^{\circ}\text{C}$; square-wave pulse		60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse; Fig. 4		270	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse		297	A
T_{stg}	storage temperature			-65 to 175	$^{\circ}\text{C}$
T_j	junction temperature			-65 to 175	$^{\circ}\text{C}$



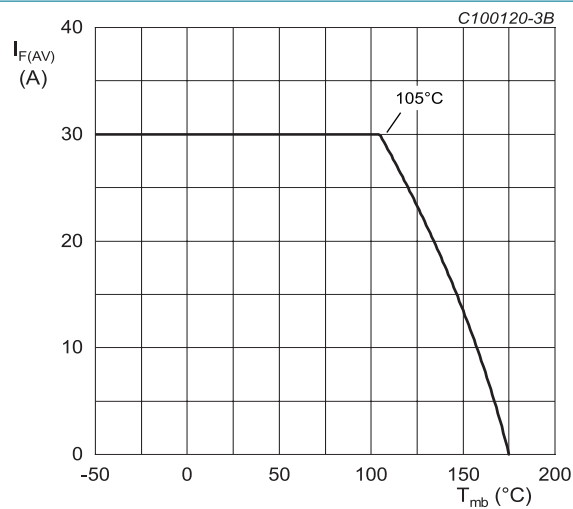


Fig. 3. Forward current as a function of mounting base temperature; maximum values

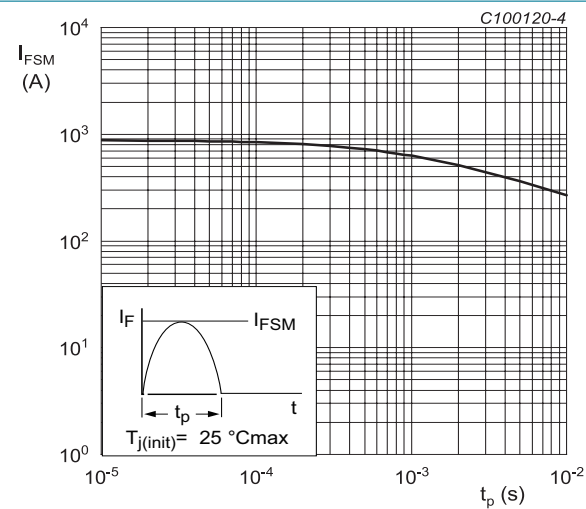


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	0.99	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

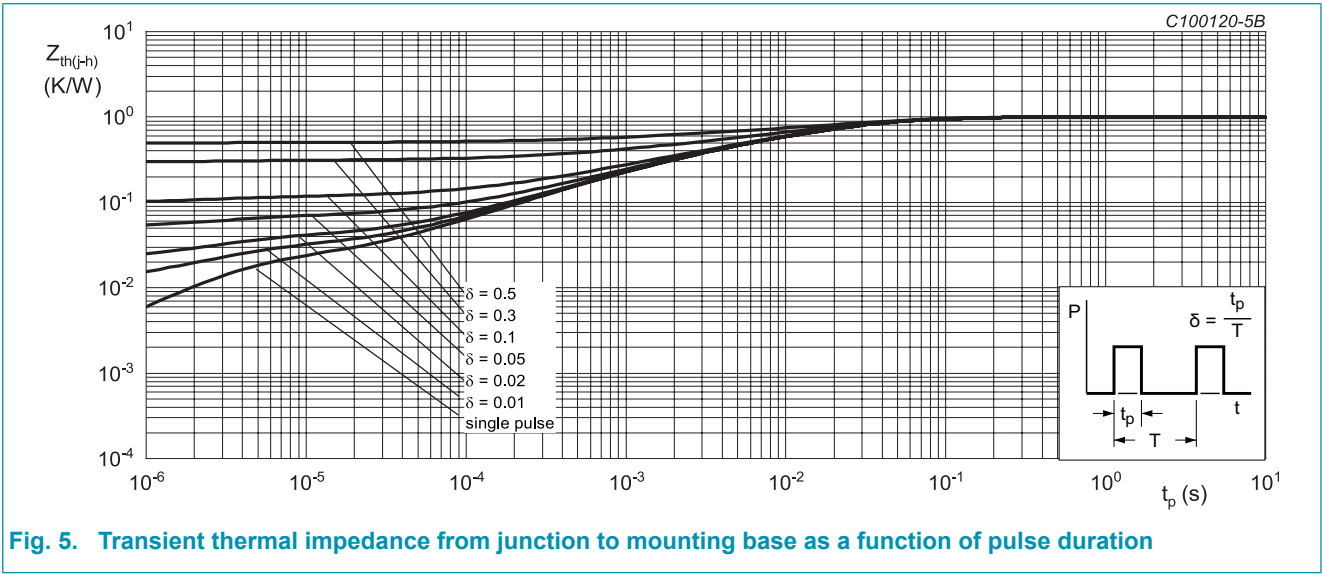


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 30 A; T _J = 25 °C; Fig. 6		-	2.10	2.60	V
		I _F = 30 A; T _J = 150 °C; Fig. 6		-	1.45	1.90	V
I _R	reverse current	V _R = 650 V; T _J = 25 °C		-	0.43	30	μA
		V _R = 650 V; T _J = 150 °C		-	0.08	0.5	mA
Dynamic characteristics							
Q _r	reverse charge	I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 25 °C; Fig. 7		-	126	-	nC
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 125 °C; Fig. 7		-	505	-	nC
T _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 200 A/μs; T _J = 25 °C; Fig. 7		-	20	24	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 25 °C; Fig. 7		-	67	-	ns
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 125 °C; Fig. 7		-	105	-	ns
I _{RM}	peak reverse recovery current	I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 25 °C; Fig. 7		-	3.8	-	A
		I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 125 °C; Fig. 7		-	9.3	-	A
S _{factor}	softness factor	I _F = 30 A; V _R = 400 V; dI _F /dt = 200 A/μs; T _J = 125 °C; Fig. 7		-	0.61	-	
E _{as}	non-repetitive avalanche energy	T _J (init) = 25 °C		40	-	-	mJ

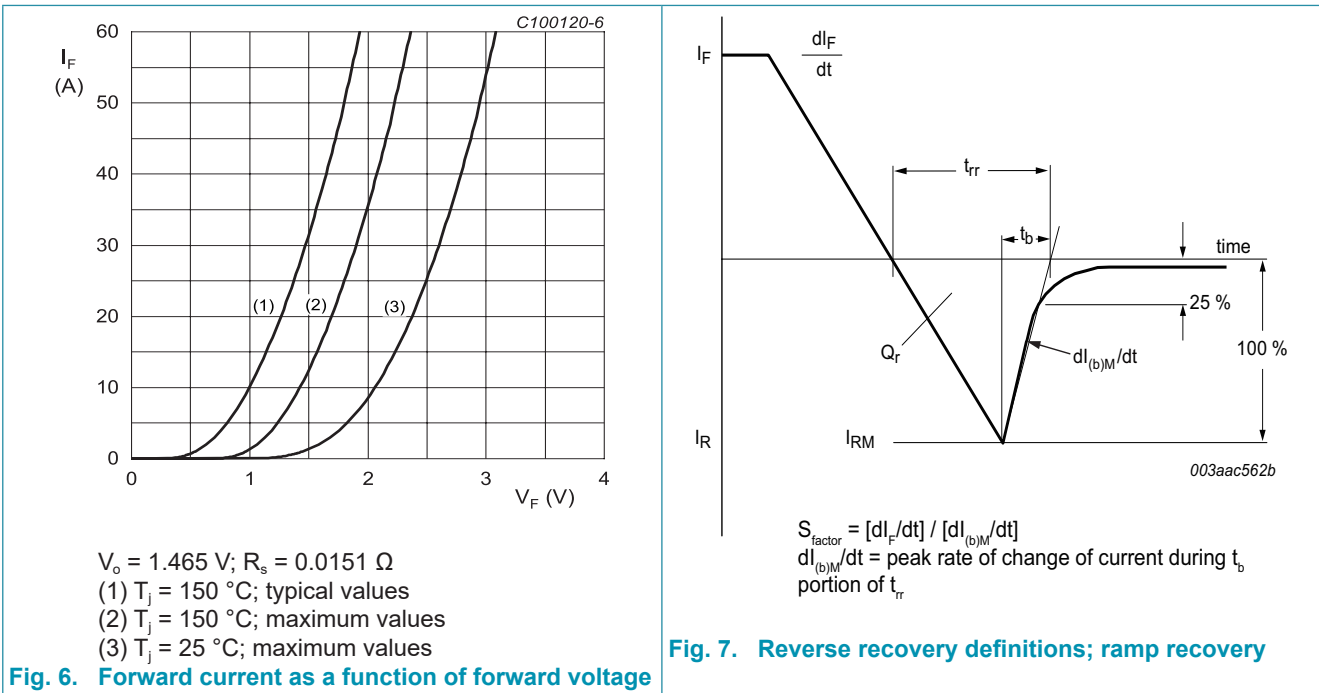


Fig. 6. Forward current as a function of forward voltage

Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended surface-mounted package (D2PAK);

TO263

The technical drawing illustrates the package outline for the BYC30MB-650PS diode. It includes three views: a top view, a side view, and a bottom view. The top view shows the overall dimensions E (width) and D (height), with a central circular feature. The side view shows the profile with dimensions A (total width), A1 (lead width), A2 (lead height), H (total height), L (lead length), L1 (lead thickness), L2 (lead width), and Q (lead angle). The bottom view shows the mounting pads with dimensions b1 (pad width), b (pad thickness), e (pad spacing), and E1 (pad width). A gauge plane is indicated at 0.25mm. A note specifies that all dimensions do not include mold flash or protrusion.

Note:

All dimensions do not include mold flash or protrusion.

Unit	A	A1	A2	b	b1	c	D	D1	e	E	E1	H	L	L1	L2	Q
MM	min	4.30	1.27	0.00	0.75	1.20	0.45	9.00	7.65	9.85	7.80	14.84	1.90	0.90	--	2.20
	max	4.60	1.37	0.25	0.90	1.36	0.60	9.45	8.05	10.10	8.20	15.64	2.60	1.35	1.50	2.40

12. Legal information

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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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Product [short] data sheet	Production	This document contains the product specification.

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