

## 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

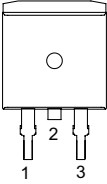
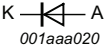
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
<b>Absolute maximum rating</b>							
$V_{RRM}$	repetitive peak reverse voltage			650			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 105$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		30			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 105$ °C; square-wave pulse		60			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(initial)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>		270			A
		$t_p = 8.3$ ms; $T_{j(initial)} = 25$ °C; sine-wave pulse		297			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>		-	2.10	2.60	V
		$I_F = 30$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>		-	1.45	1.90	V
<b>Dynamic characteristics</b>							
$t_{rr}$	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 200$ A/ $\mu$ s; $T_j = 25$ °C; <a href="#">Fig. 7</a>		-	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

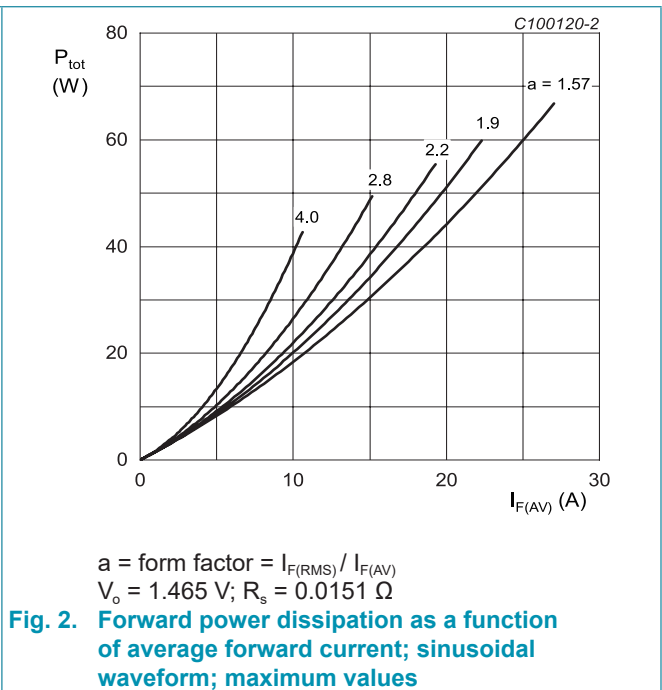
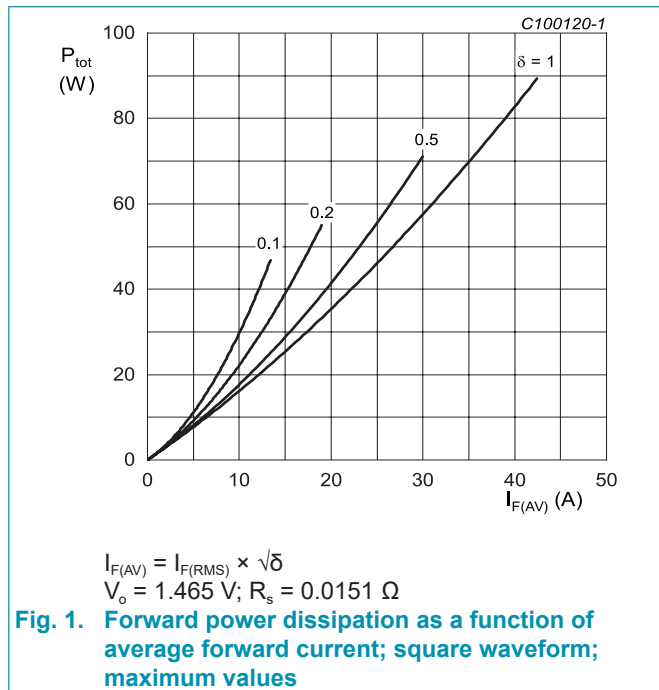
Type number	Marking codes
BYC30MB-650PS	BYC30MB 650PS

## 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; $T_{mb} \leq 105\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		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; <a href="#">Fig. 4</a>		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	$^\circ\text{C}$



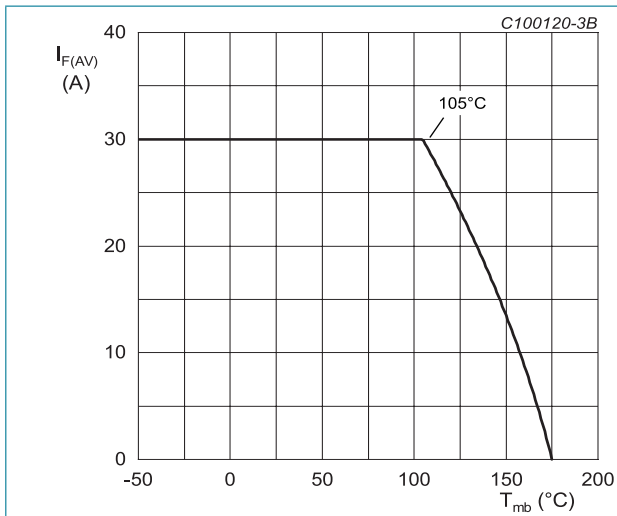


Fig. 3. Forward current as a function of mounting base temperature; maximum values

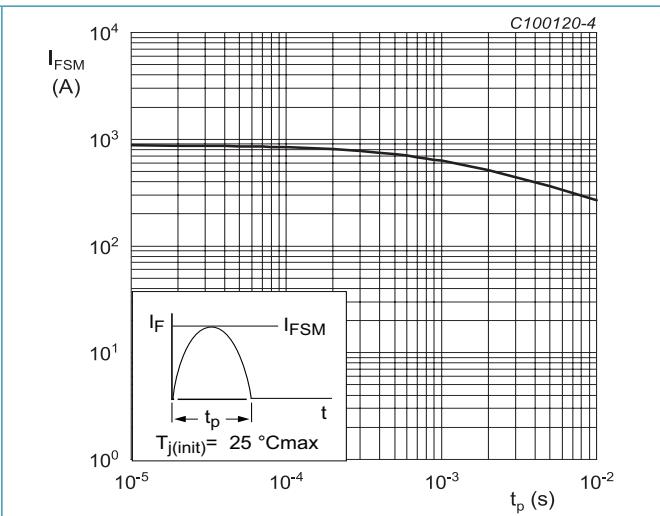


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

## 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	<a href="#">Fig. 5</a>		-	-	0.99	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

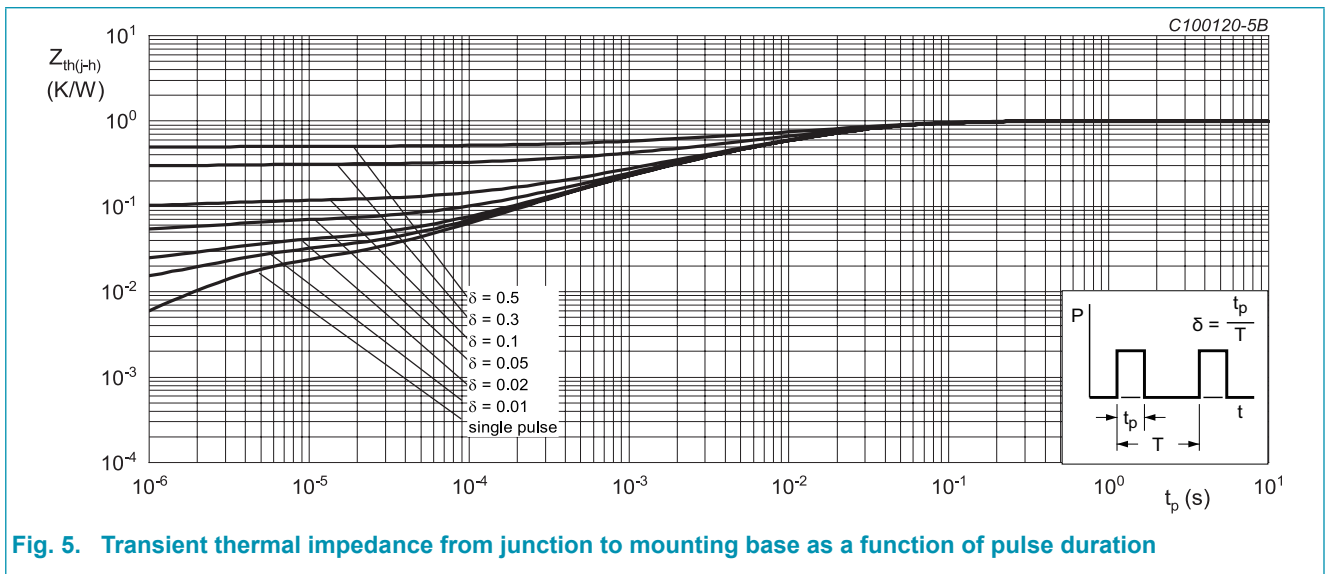
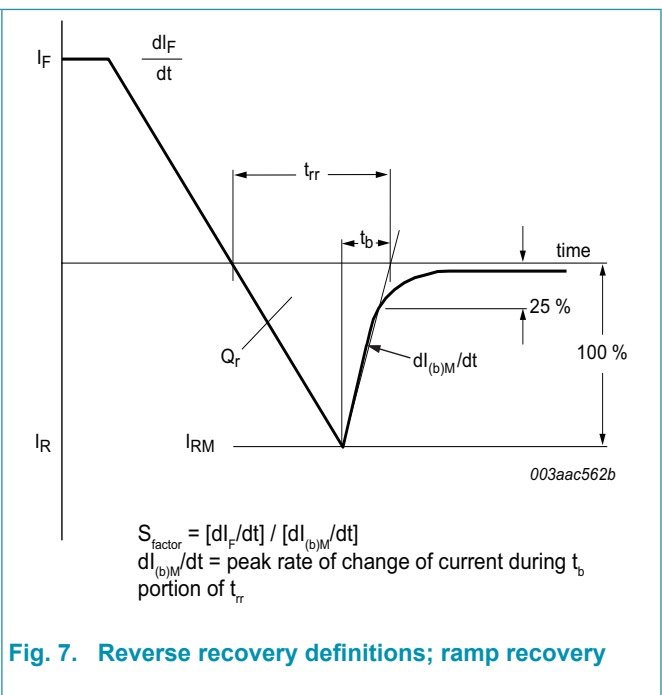
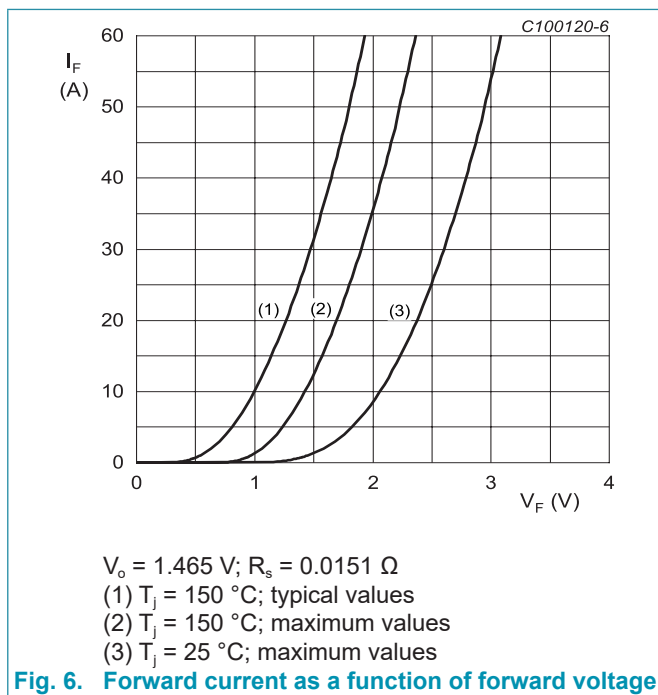


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

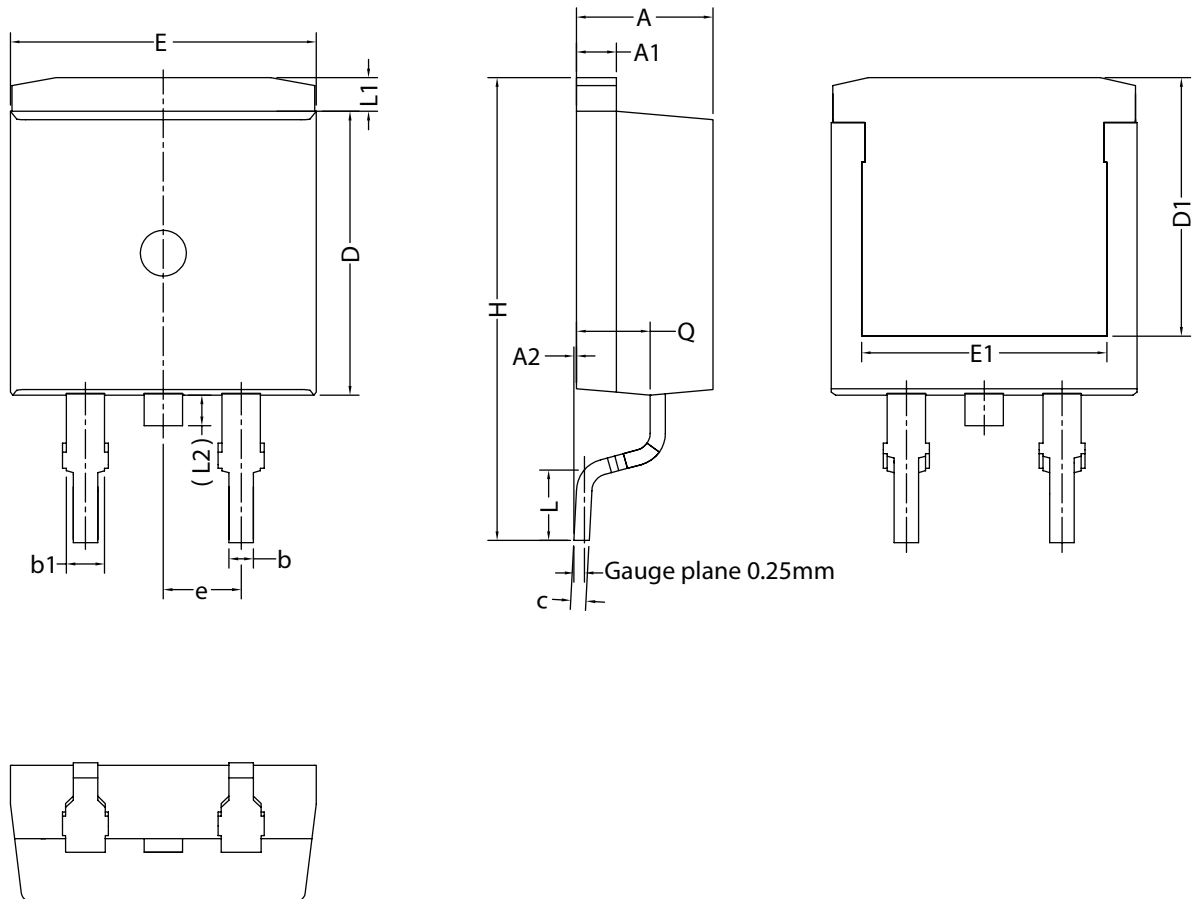
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 30 A; T <sub>j</sub> = 25 °C; <a href="#">Fig. 6</a>		-	2.10	2.60	V
		I <sub>F</sub> = 30 A; T <sub>j</sub> = 150 °C; <a href="#">Fig. 6</a>		-	1.45	1.90	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 650 V; T <sub>j</sub> = 25 °C		-	0.43	30	μA
		V <sub>R</sub> = 650 V; T <sub>j</sub> = 150 °C		-	0.08	0.5	mA
<b>Dynamic characteristics</b>							
Q <sub>r</sub>	reverse charge	I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	126	-	nC
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>		-	505	-	nC
T <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	20	24	ns
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	67	-	ns
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>		-	105	-	ns
I <sub>RM</sub>	peak reverse recovery current	I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 25 °C; <a href="#">Fig. 7</a>		-	3.8	-	A
		I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>		-	9.3	-	A
S <sub>factor</sub>	softness factor	I <sub>F</sub> = 30 A; V <sub>R</sub> = 400 V; di <sub>F</sub> /dt = 200 A/μs; T <sub>j</sub> = 125 °C; <a href="#">Fig. 7</a>		-	0.61	-	
E <sub>as</sub>	non-repetitive avalanche energy	T <sub>j(init)</sub> = 25 °C		40	-	-	mJ



### 11. Package outline

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

TO263



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	0.75	1.20	0.45	9.00	7.65	2.54 (BSC)	9.85	7.80	14.84	1.90	0.90	--	2.20
	max	4.60	1.37	0.25	0.90	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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