

## 1. General description

Hyperfast power diode in a TO252 (DPAK) plastic package.



## 2. Features and benefits

- Low leakage current
- Low thermal resistance
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT
- Package meets UL94V0 which guaranteed by Epoxy Mold Compound

## 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

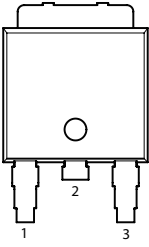
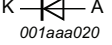
## 4. Quick reference data

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; $T_{mb} \leq 133$ °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		15			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25$ $\mu$ s; $T_{mb} \leq 133$ °C; square-wave pulse		30			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; <a href="#">Fig. 4</a>		140			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		154			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 15$ A; $T_j = 25$ °C; <a href="#">Fig. 6</a>		-	2.50	3.20	V
		$I_F = 15$ A; $T_j = 150$ °C; <a href="#">Fig. 6</a>		-	1.60	2.30	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>		-	14	-	ns

## 5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	not connected		
2	K	cathode [1]		
3	A	anode		
mb	K	mounting base; connected to cathode		

[1] It is not possible to connect to pin 2 of the TO252 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
BYC15MD-650P	TO252	BYC15MD-650PJ	Reel	2500	TO252d	07-Sep-2022

## 7. Marking

Table 4. Marking codes

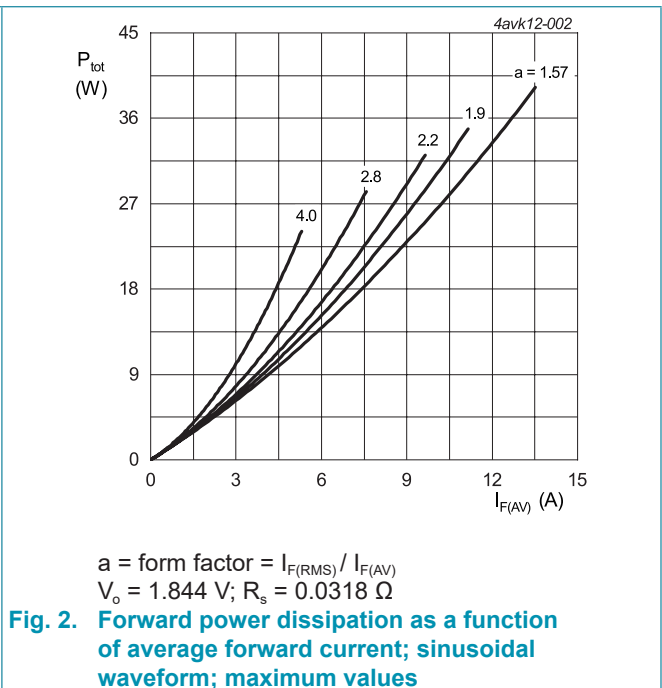
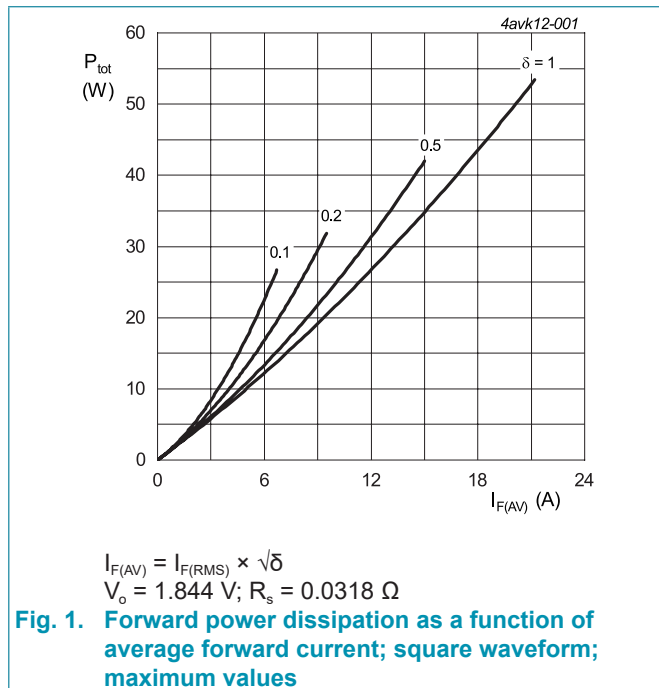
Type number	Marking codes
BYC15MD-650P	BYC15MD 650P

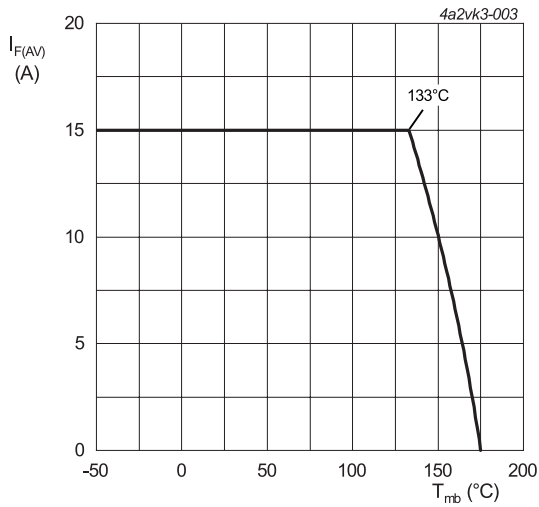
## 8. Limiting values

**Table 5. Limiting values**

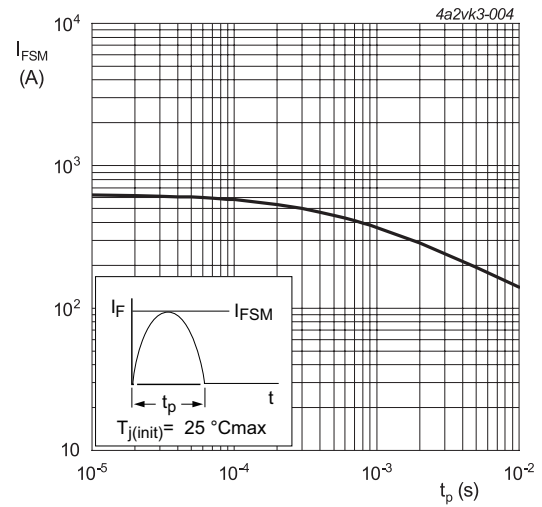
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $T_{mb} \leq 133\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		15	A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25\text{ }\mu\text{s}$ ; $T_{mb} \leq 133\text{ }^\circ\text{C}$ ; square-wave pulse		30	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>		140	A
		$t_p = 8.3\text{ ms}$ ; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$ ; sine-wave pulse		154	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>		-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	50	-	K/W

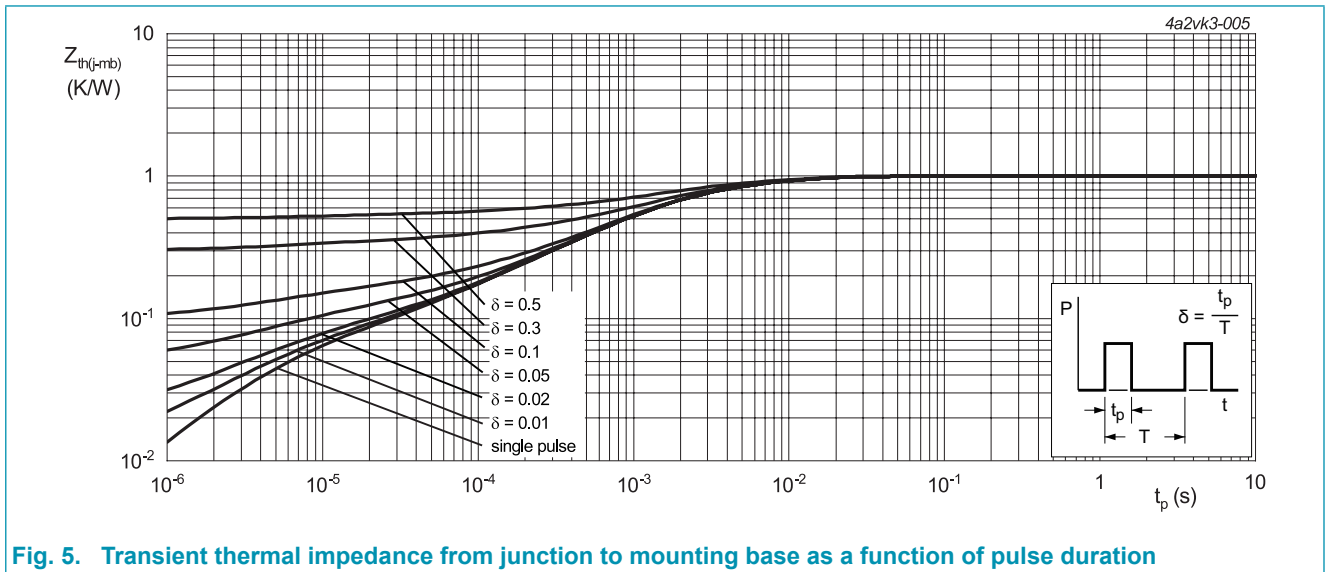
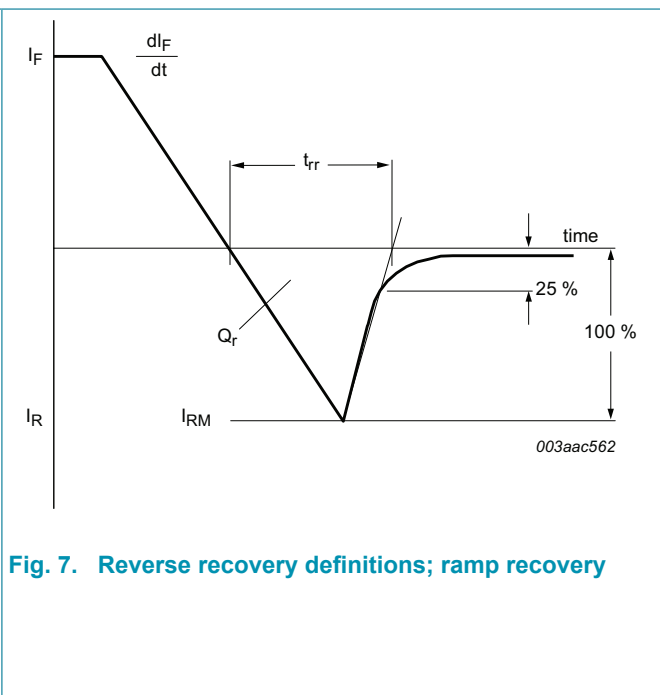
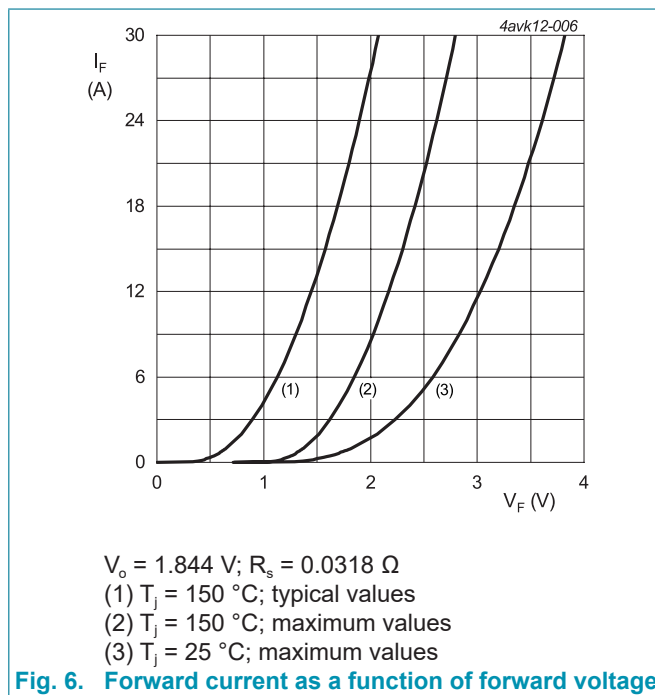


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

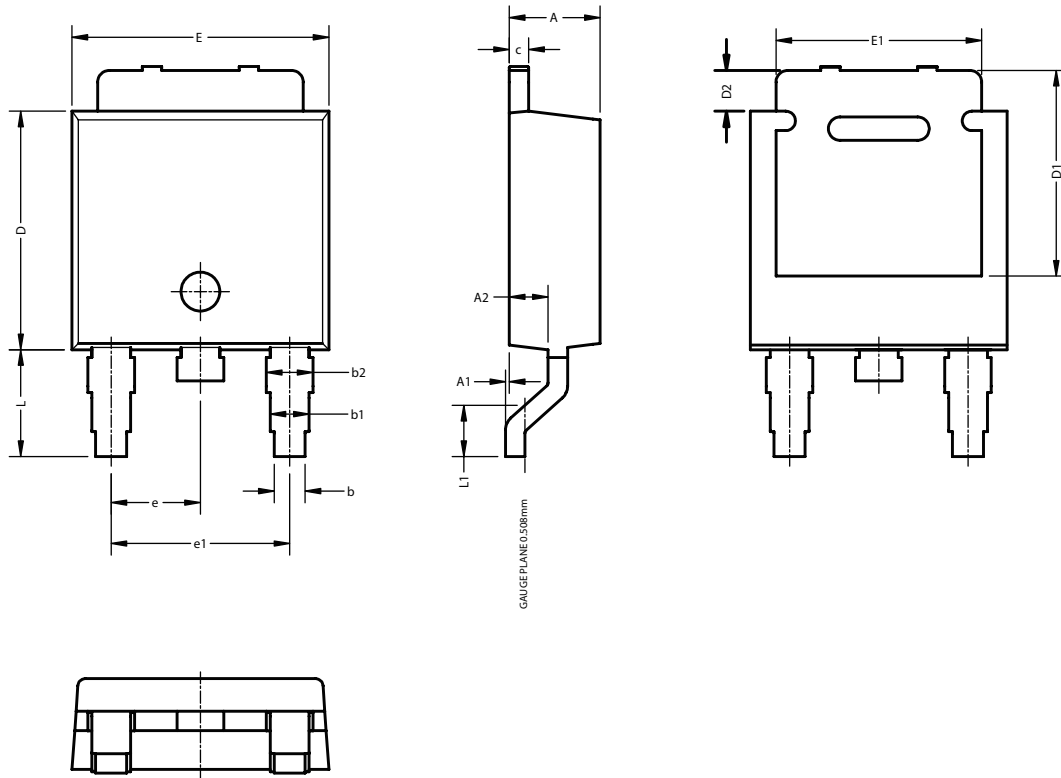
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
<b>Static characteristics</b>							
$V_F$	forward voltage	$I_F = 15 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$		-	2.50	3.20	V
		$I_F = 15 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$		-	1.60	2.30	V
$I_R$	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	0.5	30	$\mu\text{A}$
		$V_R = 650 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$		-	0.15	0.8	mA
<b>Dynamic characteristics</b>							
$Q_r$	reverse charge	$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	42	-	nC
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	190	-	nC
$t_{rr}$	reverse recovery time	$I_F = 0.5 \text{ A}; I_R = 1 \text{ A}; I_{rr} = 0.25 \text{ A}; T_j = 25 \text{ }^\circ\text{C}$		-	20	-	ns
		$I_F = 1 \text{ A}; V_R = 30 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	14	-	ns
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	30	-	ns
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	57	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	2.8	-	A
		$I_F = 15 \text{ A}; V_R = 200 \text{ V}; \text{ d}I_F/\text{d}t = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$		-	6.3	-	A
$E_{as}$	non-repetitive avalanche energy	$T_{j(\text{init})} = 25 \text{ }^\circ\text{C}$		16.8	-	-	mJ



### 11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped)

TO252



**Note:**

1. All dimensions do not include mold flash & gate remain and metal protrusion.

Unit	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	e	e1	L	L1
min	2.16	0.00	0.90	0.70	0.86	1.06	0.46	5.97	5.05	0.98	6.45	5.20	2.30	4.60	2.60	1.25
nom																
max	2.41	0.10	1.10	0.90	1.11	1.32	0.58	6.22	5.35	1.18	6.75	5.40				

## 12. Legal information

### Data sheet status

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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