

## 1. General description

Ultrafast power diode in a TO263 plastic package.



## 2. Features and benefits

- 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

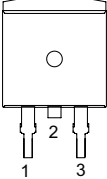
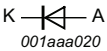
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V <sub>RRM</sub>	repetitive peak reverse voltage			650			V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; square-wave pulse; T <sub>mb</sub> ≤ 128 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		15			A
I <sub>FRM</sub>	repetitive peak forward current	δ = 0.5 ; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 128 °C; square-wave pulse		30			A
I <sub>FSM</sub>	non-repetitive peak forward current	t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse; <a href="#">Fig. 4</a>		180			A
		t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse		198			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 15 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 6</a>		-	1.75	2.40	V
		I <sub>F</sub> = 15 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 6</a>		-	1.35	2.00	V
Dynamic characteristics							
t <sub>rr</sub>	reverse recovery time	I <sub>F</sub> = 1 A; V <sub>R</sub> = 30 V; dI <sub>F</sub> /dt = 100 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	26	-	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
BYV15MB-650P	TO263	BYV15MB-650PJ	Reel	800	TO263d	17-Mar-2023

7. Marking

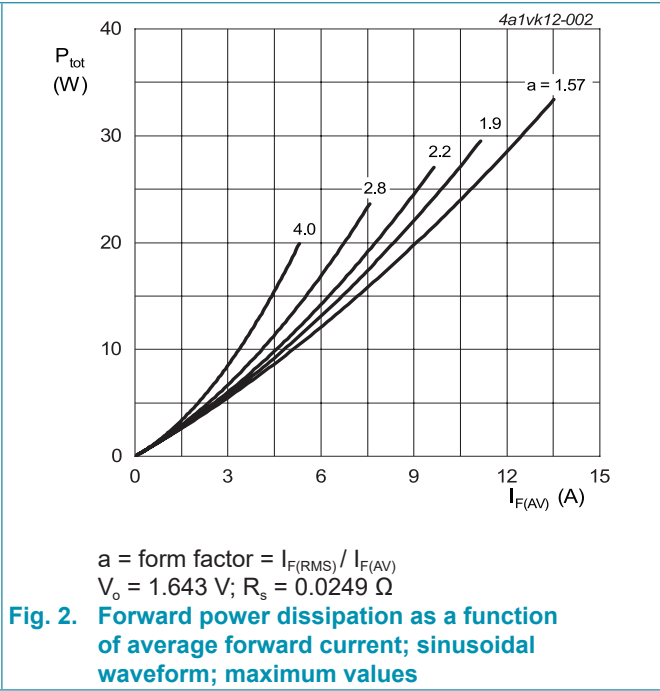
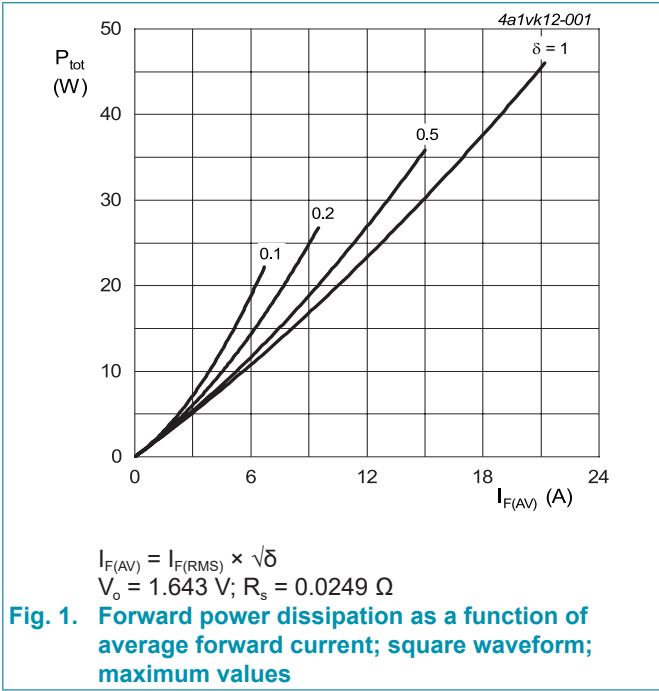
Table 4. Marking codes

Type number	Marking codes
BYV15MB-650P	BYV15MB 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 <sub>RRM</sub>	repetitive peak reverse voltage			650	V
V <sub>RWM</sub>	crest working reverse voltage			650	V
V <sub>R</sub>	reverse voltage	DC		650	V
I <sub>F(AV)</sub>	average forward current	δ = 0.5 ; square-wave pulse; T <sub>mb</sub> ≤ 128 °C; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>		15	A
I <sub>FRM</sub>	repetitive peak forward current	δ = 0.5 ; t <sub>p</sub> = 25 μs; T <sub>mb</sub> ≤ 128 °C; square-wave pulse		30	A
I <sub>FSM</sub>	non-repetitive peak forward current	t <sub>p</sub> = 10 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse; <a href="#">Fig. 4</a>		180	A
		t <sub>p</sub> = 8.3 ms; T <sub>j(init)</sub> = 25 °C; sine-wave pulse		198	A
T <sub>stg</sub>	storage temperature			-65 to 175	°C
T <sub>j</sub>	junction temperature			-65 to 175	°C



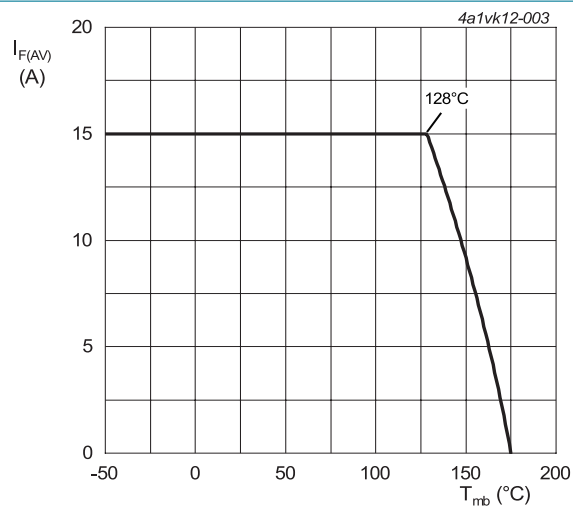


Fig. 3. Forward current as a function of mounting base temperature; maximum values

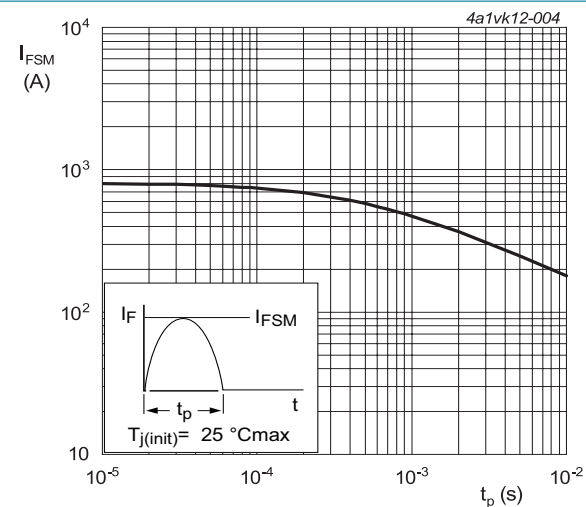


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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>		-	-	1.3	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

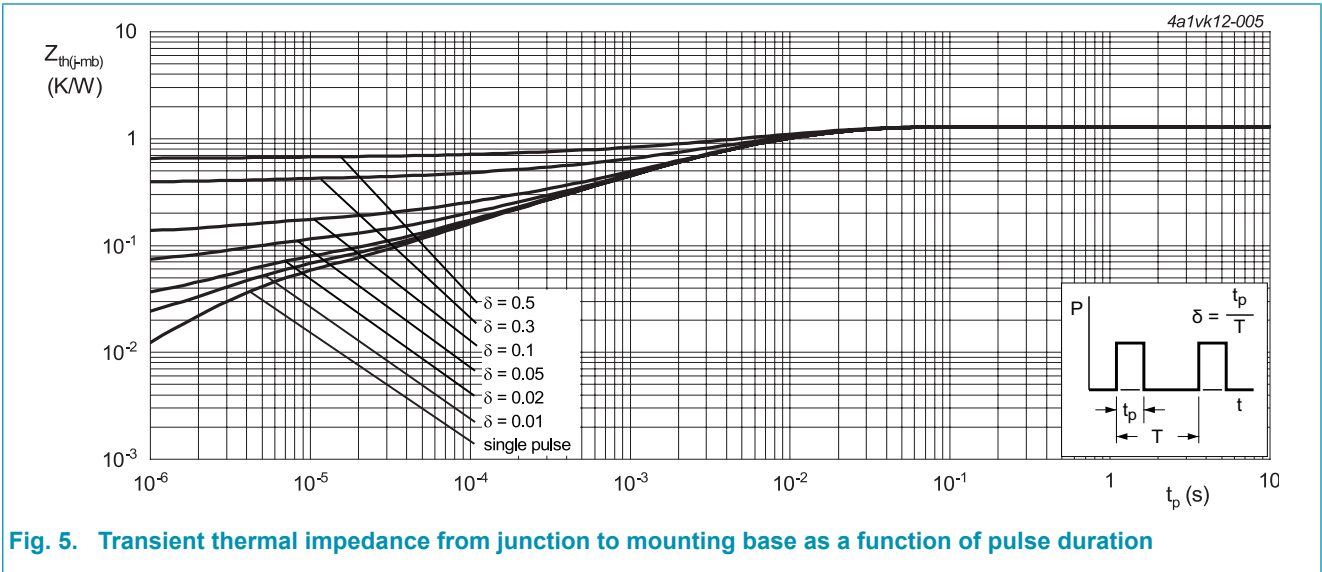
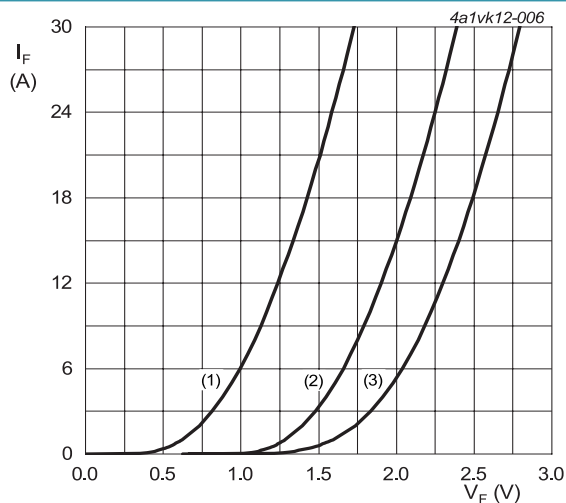


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

## 10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V <sub>F</sub>	forward voltage	I <sub>F</sub> = 15 A; T <sub>J</sub> = 25 °C; <a href="#">Fig. 6</a>		-	1.75	2.40	V
		I <sub>F</sub> = 15 A; T <sub>J</sub> = 150 °C; <a href="#">Fig. 6</a>		-	1.35	2.00	V
I <sub>R</sub>	reverse current	V <sub>R</sub> = 650 V; T <sub>J</sub> = 25 °C		-	0.5	30	μA
		V <sub>R</sub> = 650 V; T <sub>J</sub> = 150 °C		-	-	0.8	mA
Dynamic characteristics							
Q <sub>r</sub>	reverse charge	I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	80	-	nC
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 125 °C; <a href="#">Fig. 7</a>		-	330	-	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 = 100 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	26	-	ns
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	45	-	ns
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 125 °C; <a href="#">Fig. 7</a>		-	85	-	ns
I <sub>RM</sub>	peak reverse recovery currentnon-repetitive avalanche energy	I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 25 °C; <a href="#">Fig. 7</a>		-	3.5	-	A
		I <sub>F</sub> = 15 A; V <sub>R</sub> = 200 V; dI <sub>F</sub> /dt = 200 A/μs; T <sub>J</sub> = 125 °C; <a href="#">Fig. 7</a>		-	7.2	-	A
E <sub>as</sub>	non-repetitive avalanche energy	T <sub>J</sub> (init) = 25 °C		16.8	-	-	mJ



$V_o = 1.643\text{ V}$ ;  $R_s = 0.0249\text{ }\Omega$

(1)  $T_J = 150\text{ °C}$ ; typical values

(2)  $T_J = 150\text{ °C}$ ; maximum values

(3)  $T_J = 25\text{ °C}$ ; maximum values

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

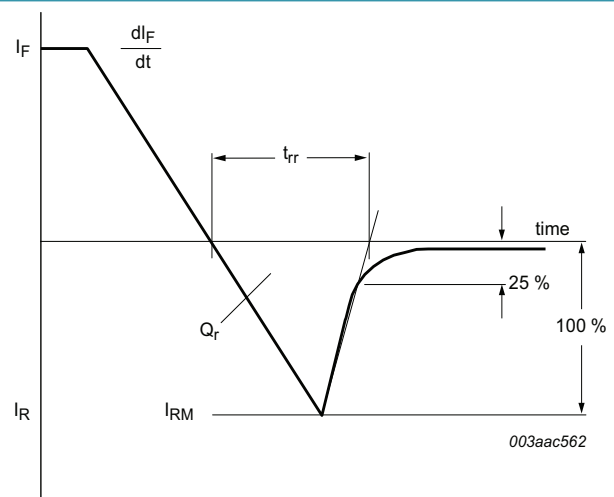
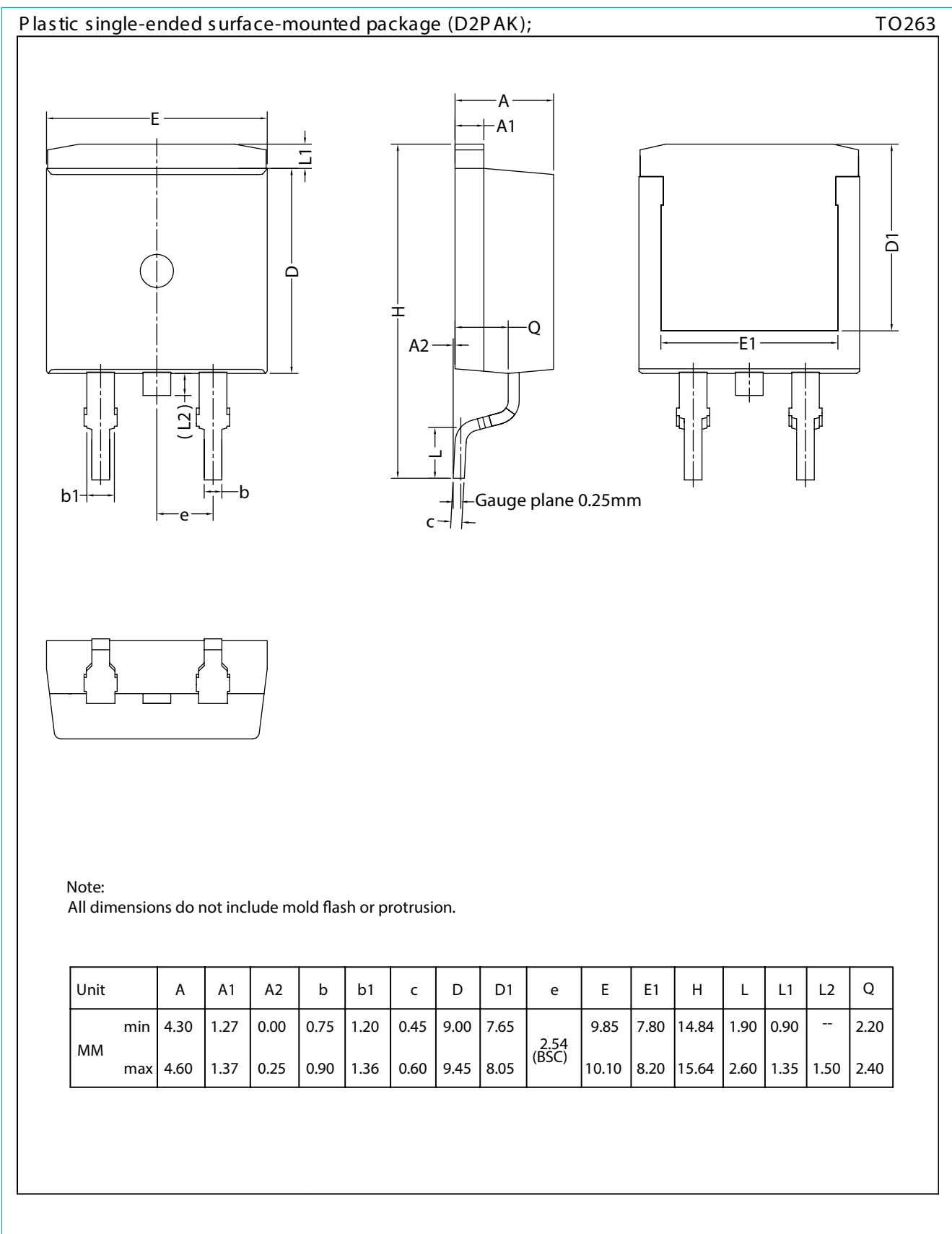


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline



## 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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