

1. General description

Hyperfast 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

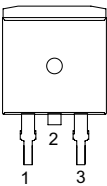
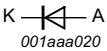
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V _{RRM}	repetitive peak reverse voltage			650			V
I _{F(AV)}	average forward current	δ = 0.5 ; square-wave pulse; T _{mb} ≤ 120 °C; Fig. 1 ; Fig. 2 ; Fig. 3		15			A
I _{FRM}	repetitive peak forward current	δ = 0.5 ; t _p = 25 μs; T _{mb} ≤ 120 °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; Fig. 4		180			A
		t _p = 8.3 ms; T _{j(init)} = 25 °C; sine-wave pulse		198			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 15 A; T _j = 25 °C; Fig. 6		-	2.50	3.20	V
		I _F = 15 A; T _j = 150 °C; Fig. 6		-	1.60	2.30	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		-	14	-	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
BYC15MB-650P	TO263	BYC15MB-650PJ	Reel	800	TO263d	17-Mar-2023

7. Marking

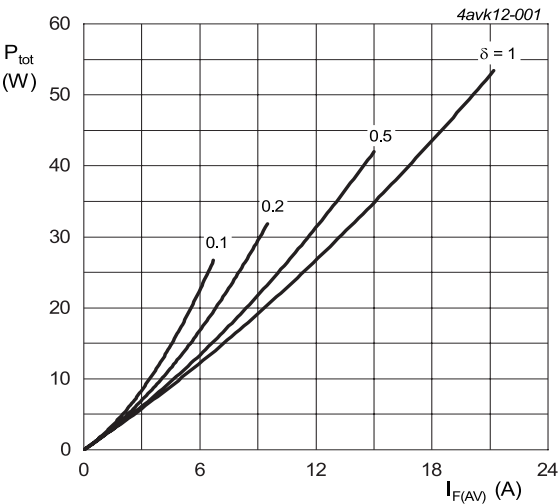
Table 4. Marking codes

Type number	Marking codes
BYC15MB-650P	BYC15MB 650P

8. Limiting values

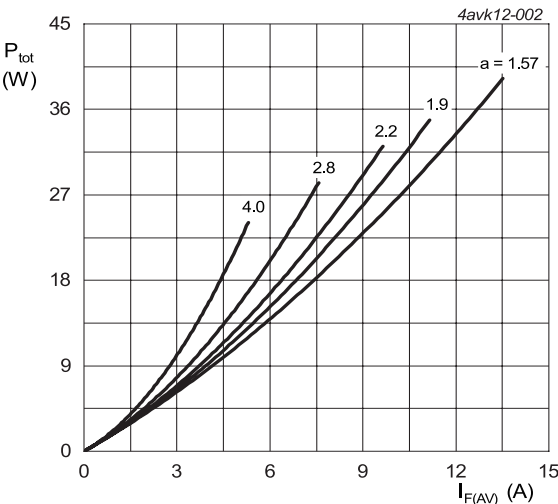
Table 5. Limiting values
In accordance with the Absolute Maximum Rating System (IEC 60134).

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; $T_{mb} \leq 120\text{ }^{\circ}\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		15	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 120\text{ }^{\circ}\text{C}$; square-wave pulse		30	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse; Fig. 4		180	A
		$t_p = 8.3\text{ ms}$; $T_{j(init)} = 25\text{ }^{\circ}\text{C}$; sine-wave pulse		198	A
T_{stg}	storage temperature			-65 to 175	$^{\circ}\text{C}$
T_j	junction temperature			-65 to 175	$^{\circ}\text{C}$



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
 $V_o = 1.844\text{ V}$; $R_s = 0.0318\text{ }\Omega$

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



$a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$
 $V_o = 1.844\text{ V}$; $R_s = 0.0318\text{ }\Omega$

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

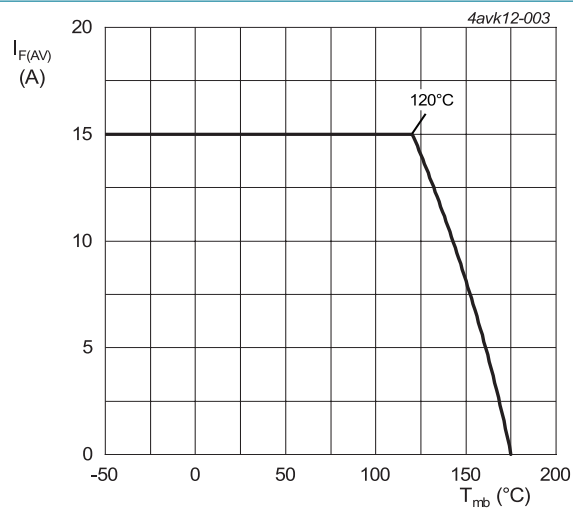


Fig. 3. Forward current as a function of mounting base temperature; maximum values

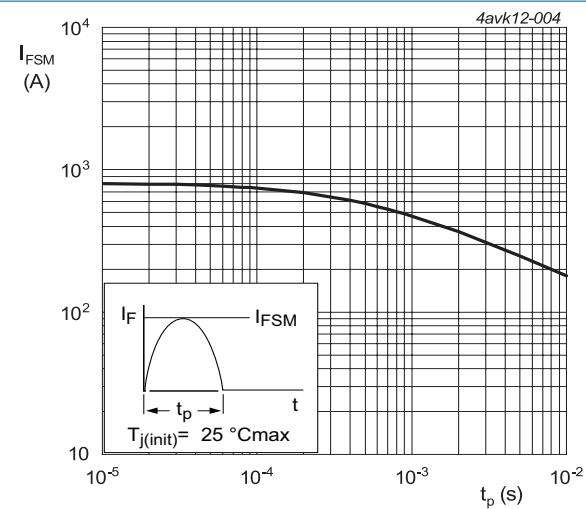


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

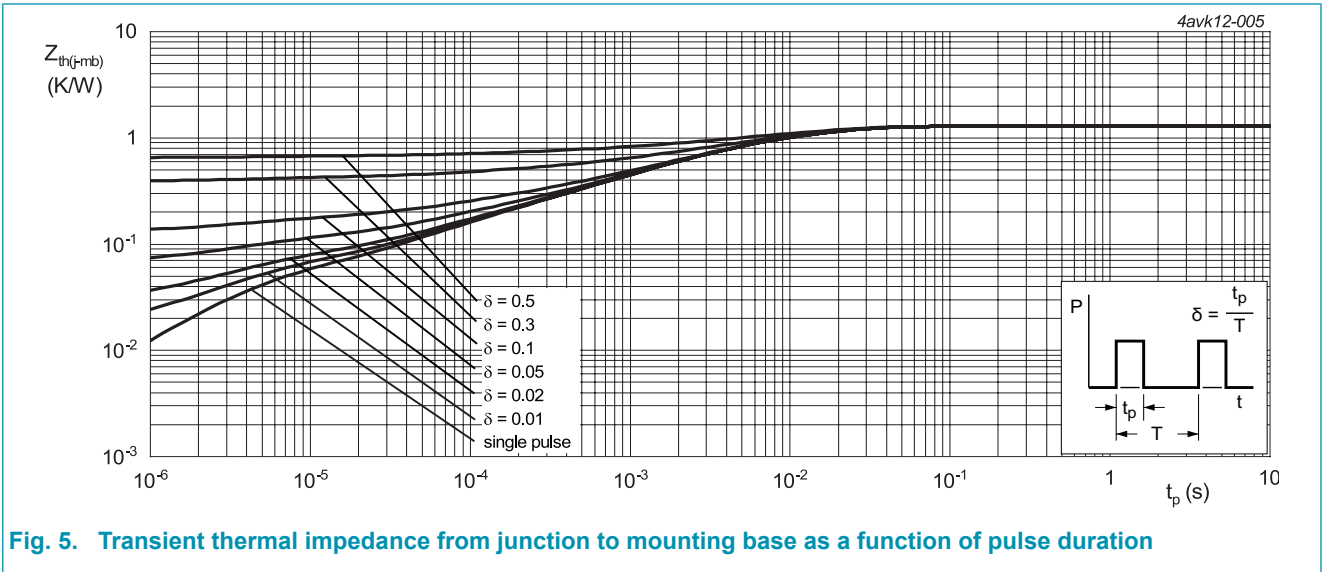
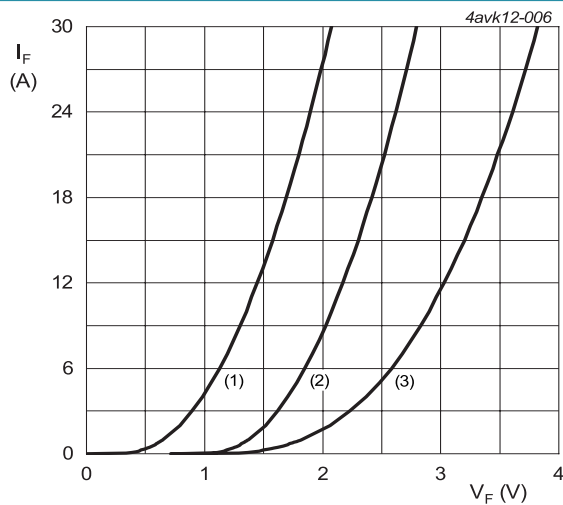


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 15 A; T _j = 25 °C; Fig. 6		-	2.50	3.20	V
		I _F = 15 A; T _j = 150 °C; Fig. 6		-	1.60	2.30	V
I _R	reverse current	V _R = 650 V; T _j = 25 °C		-	0.5	30	μA
		V _R = 650 V; T _j = 150 °C		-	0.15	0.8	mA
Dynamic characteristics							
Q _r	reverse charge	I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	42	-	nC
		I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	190	-	nC
T _{rr}	reverse recovery time	I _F = 0.5 A; I _R = 1 A; I _{rr} = 0.25 A; T _j = 25 °C		-	20	-	ns
		I _F = 1 A; V _R = 30 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	14	-	ns
		I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	30	-	ns
		I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	57	-	ns
I _{RM}	peak reverse recovery currentnon-repetitive avalanche energy	I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7		-	2.8	-	A
		I _F = 15 A; V _R = 200 V; dI _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7		-	6.3	-	A
E _{as}	non-repetitive avalanche energy	T _{j(init)} = 25 °C		16.8	-	-	mJ



$V_o = 1.844\text{ V}$; $R_s = 0.0318\text{ }\Omega$

(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

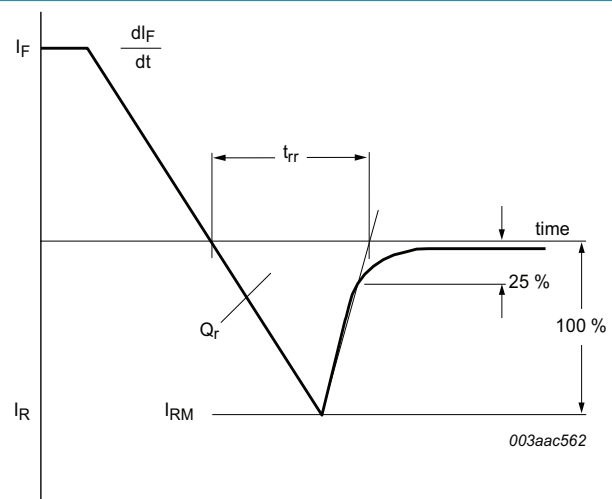
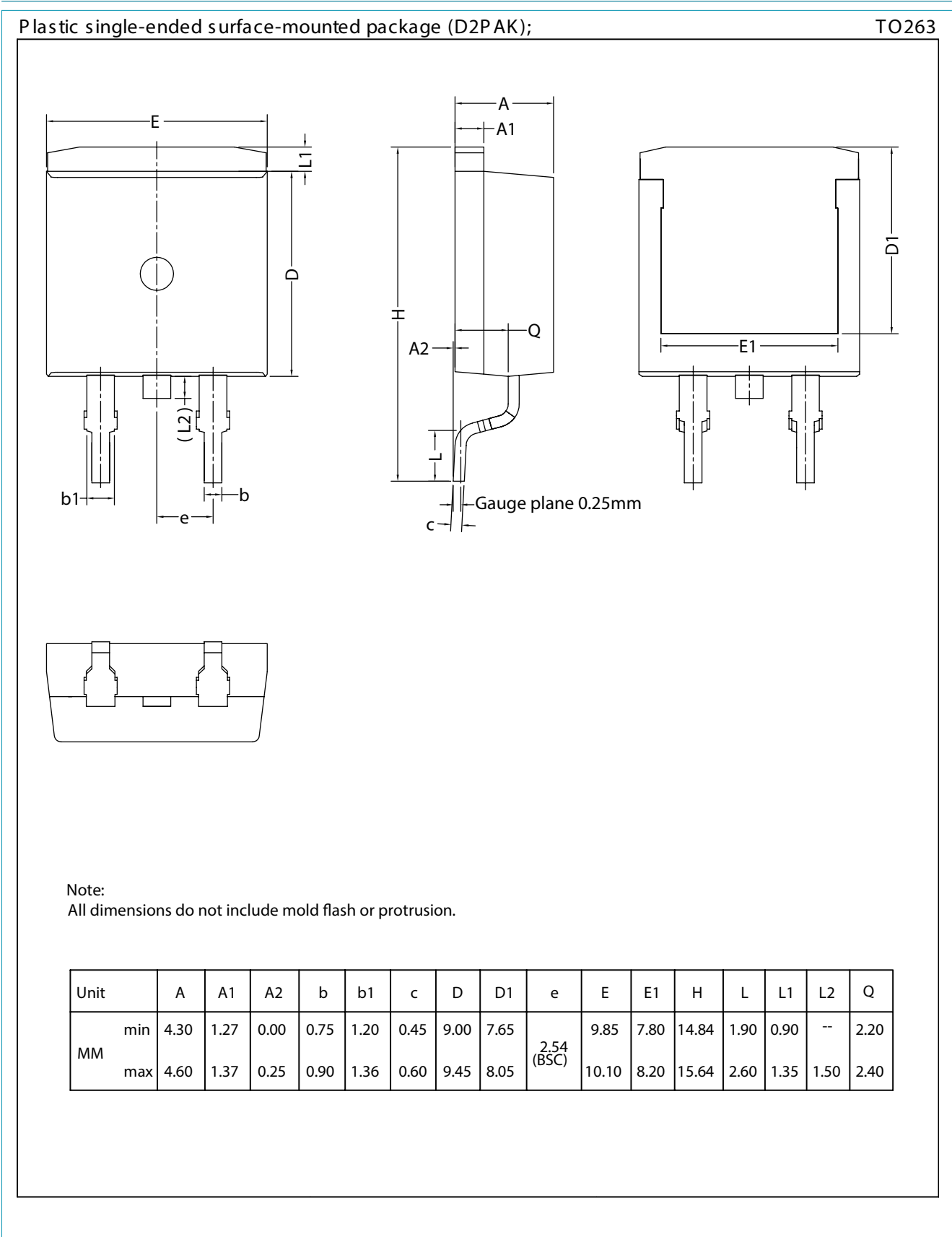


Fig. 7. Reverse recovery definitions; ramp recovery

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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- [2] The term 'short data sheet' is explained in section "Definitions".
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