

1. General description

Ultrafast power diode in a 2-lead TO263 plastic package



2. Features and benefits

- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT

3. Applications

- Active PFC in air conditioner
- High frequency switched-mode power supplies
- Power Factor Correction (PFC)

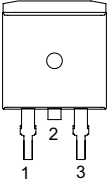
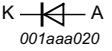
4. Quick reference data

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	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 133$ °C; Fig. 1 ; Fig. 2 ; Fig. 3		30			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 133$ °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; Fig. 4		350			A
		$t_p = 8.3$ ms; $T_{j(initial)} = 25$ °C; sine-wave pulse		385			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		-	1.34	1.55	V
		$I_F = 30$ A; $T_j = 150$ °C; Fig. 6		-	1.06	1.27	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7		-	27	-	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
BYV30MB-650P	TO263	BYV30MB-650PJ	Reel	800	TO263d	17-Mar-2023

7. Marking

Table 4. Marking codes

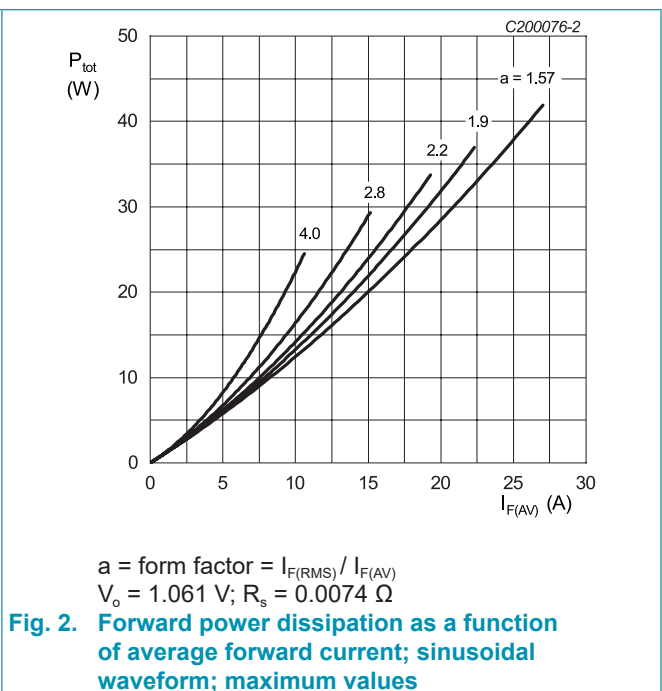
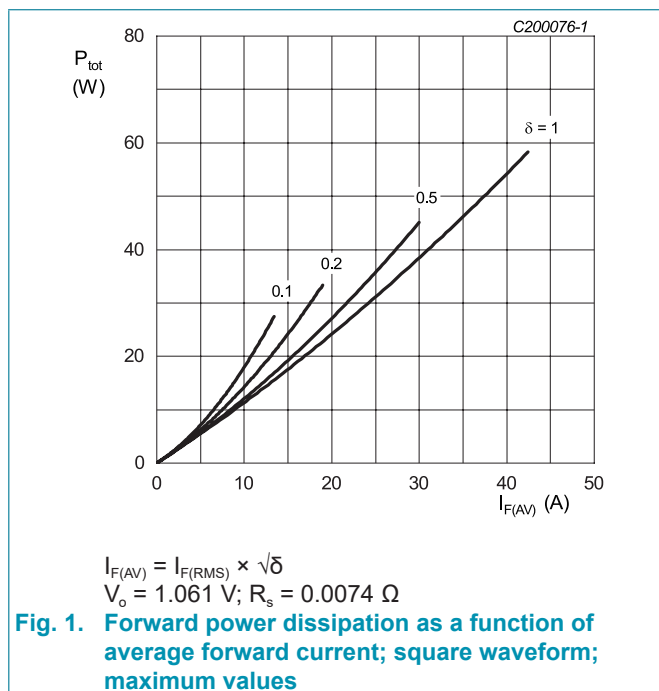
Type number	Marking codes
BYV30MB-650P	BYV30MB 650P

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; $T_{mb} \leq 133\text{ °C}$; Fig. 1 ; Fig. 2 ; Fig. 3		30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 133\text{ °C}$; square-wave pulse		60	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse; Fig. 4		350	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse		385	A
T_{stg}	storage temperature			-65 to 175	°C
T_j	junction temperature			-65 to 175	°C



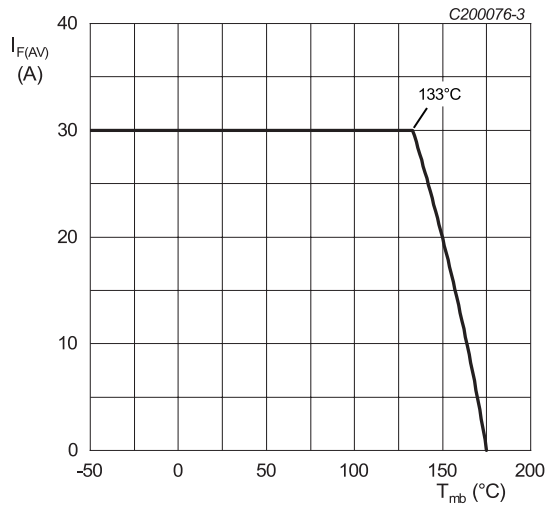


Fig. 3. Forward current as a function of mounting base temperature; maximum values

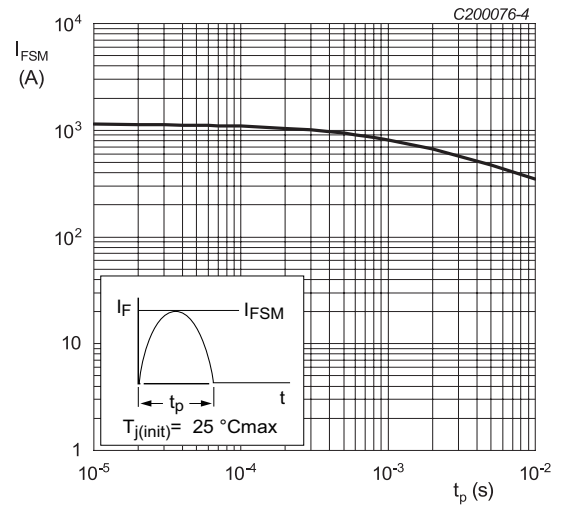


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	Fig. 5		-	-	0.93	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

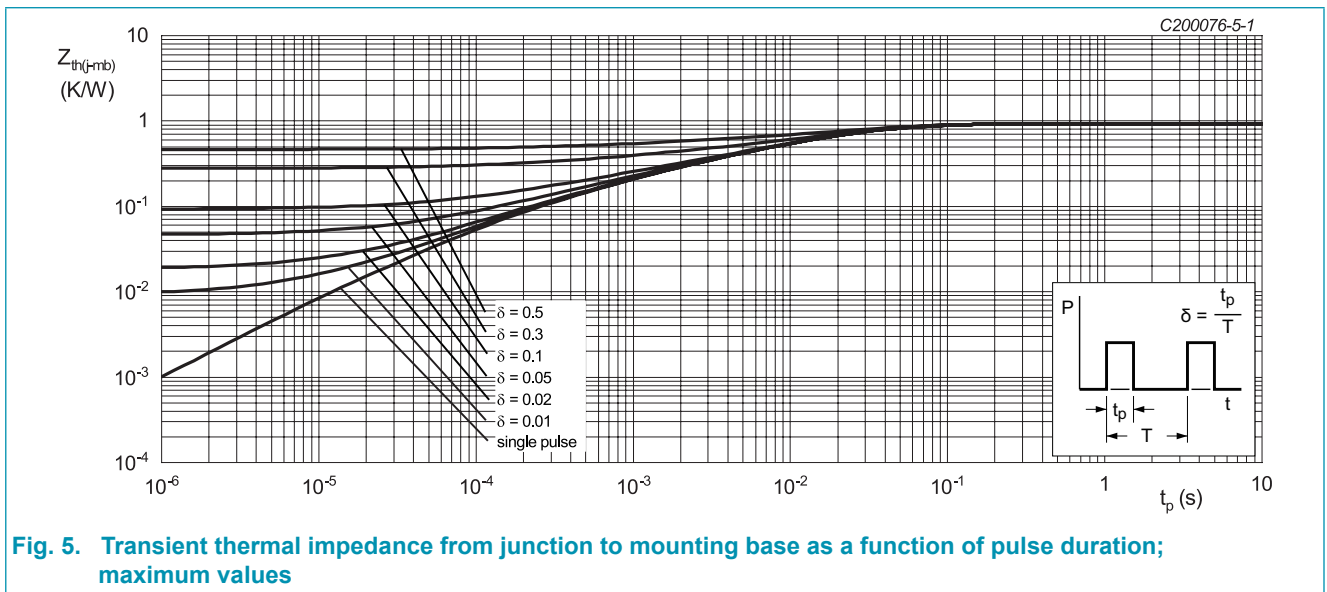
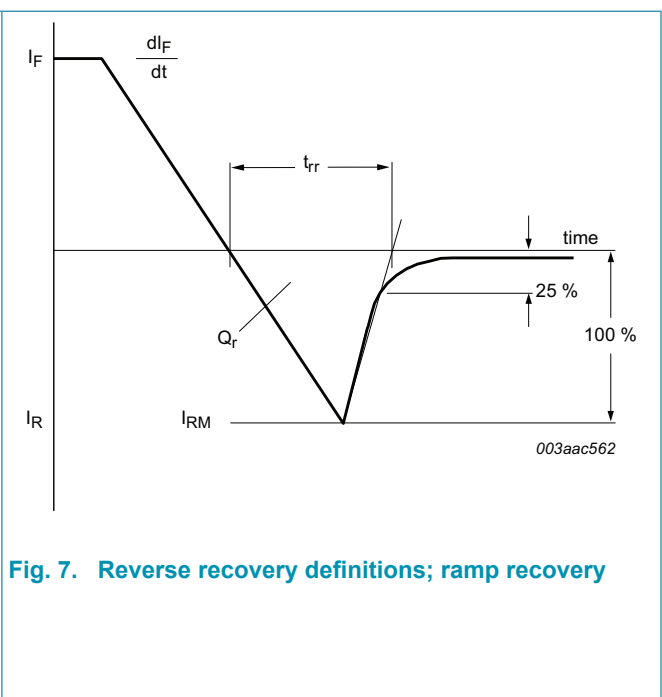
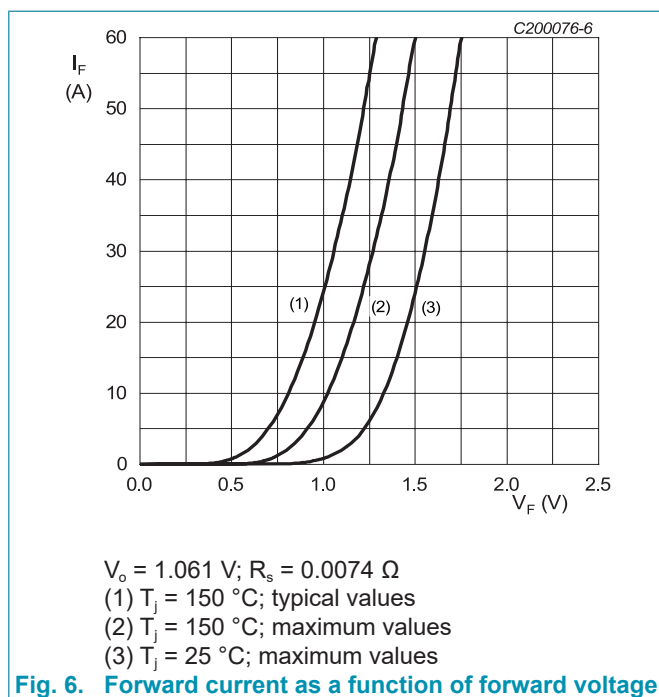


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

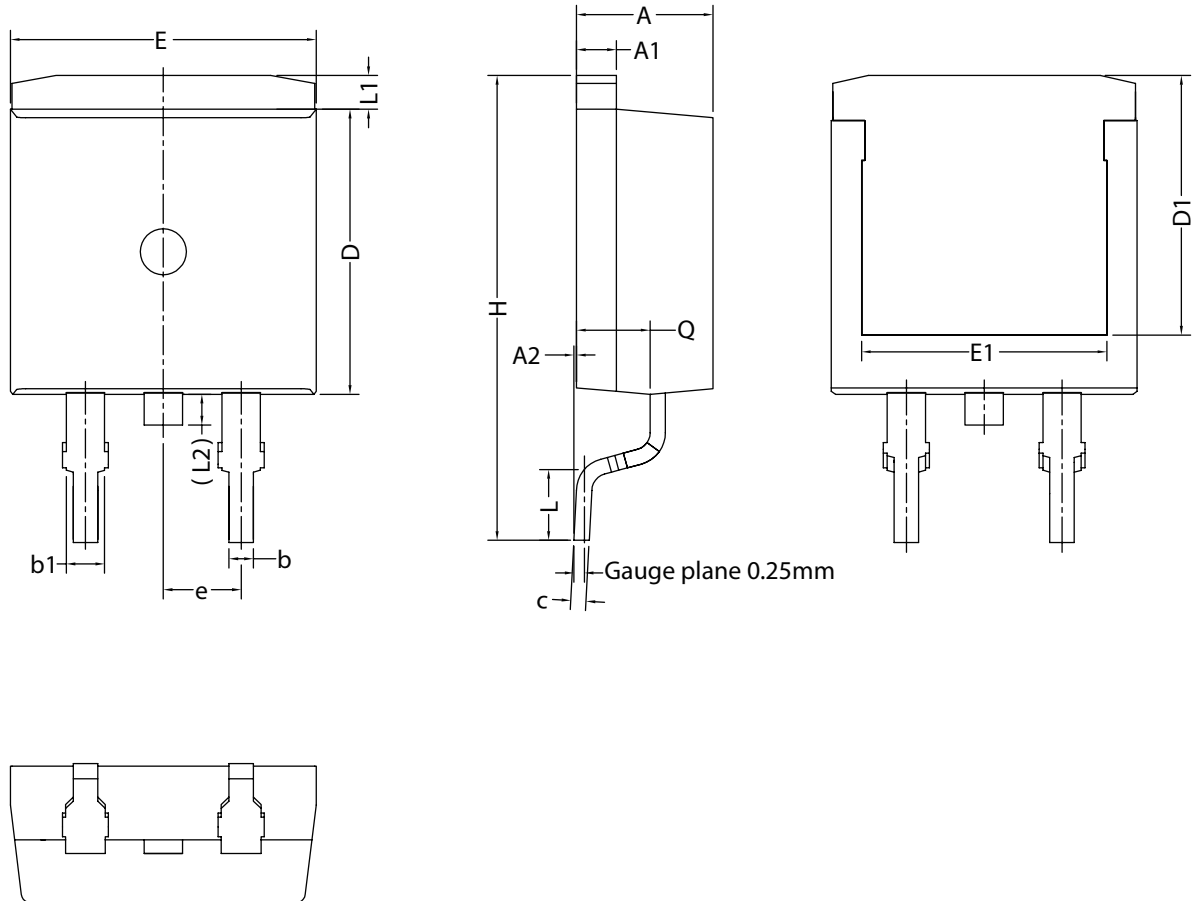
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V _F	forward voltage	I _F = 30 A; T _j = 25 °C; Fig. 6		-	1.34	1.55	V
		I _F = 30 A; T _j = 150 °C; Fig. 6		-	1.06	1.27	V
I _R	reverse current	V _R = 650 V; T _j = 25 °C		-	0.67	30	μA
		V _R = 650 V; T _j = 150 °C		-	-	1	mA
Dynamic characteristics							
Q _r	reverse charge	I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7		-	159.3	-	nC
		I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 125 °C; Fig. 7		-	599.3	-	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		-	27	-	ns
		I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7		-	78	-	ns
		I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 125 °C; Fig. 7		-	133	-	ns
I _{RM}	peak reverse recovery current	I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 25 °C; Fig. 7		-	4.1	-	A
		I _F = 30 A; V _R = 400 V; di _F /dt = 100 A/μs; T _j = 125 °C; Fig. 7		-	9.1	-	A
E _{as}	non-repetitive avalanche energy	T _{j(initial)} = 25 °C		30	-	-	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	0.00	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	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

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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For sales office addresses, please send an email to: salesaddresses@ween-semi.com
Date of release: 27 November 2023
