

1. General description

Ultrafast power diode in a TO252 (DPAK) plastic package



2. Features and benefits

- Fast switching
- Low leakage current
- Low reverse recovery current
- Low thermal resistance
- Reduces switching losses in associated MOSFET or IGBT
- Package meets UL94 V0 which guaranteed by Epoxy Mold Compound

3. Applications

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

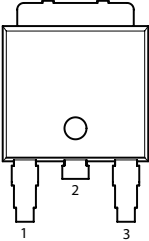
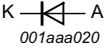
4. Quick reference data

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; $T_{mb} \leq 132$ °C; Fig. 1 ; Fig. 2 ; Fig. 3		8			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 132$ °C; square-wave pulse		16			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse; Fig. 4		95			A
		$t_p = 8.3$ ms; $T_{j(init)} = 25$ °C; sine-wave pulse		104.5			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 8$ A; $T_j = 25$ °C; Fig. 6		-	1.37	1.70	V
		$I_F = 8$ A; $T_j = 150$ °C; Fig. 6		-	1.13	1.46	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 100$ 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	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
BYV8MD-650P	TO252	BYV8MD-650PJ	Reel	2500	TO252d	07-Sep-2022

7. Marking

Table 4. Marking codes

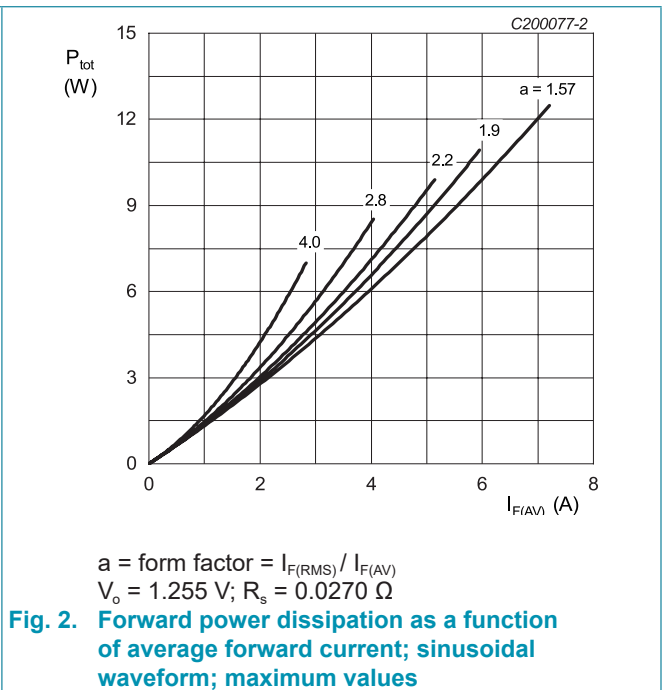
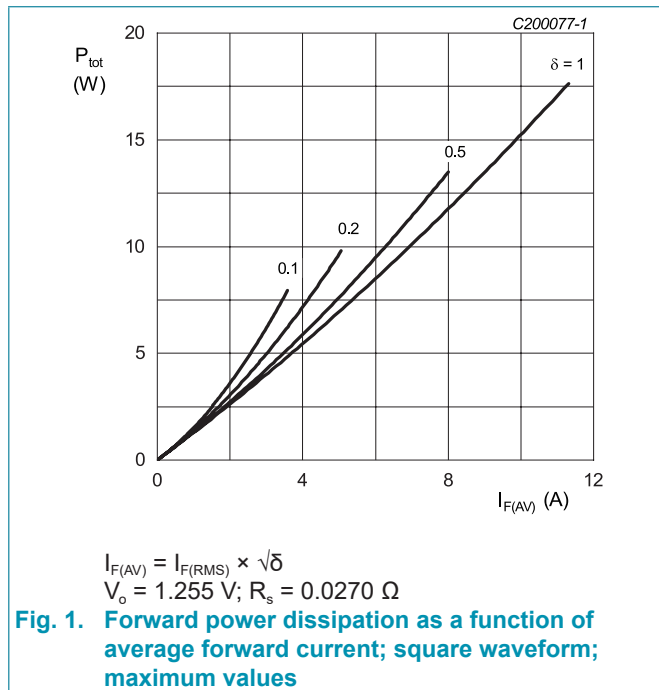
Type number	Marking codes
BYV8MD-650P	BYV8MD 650P

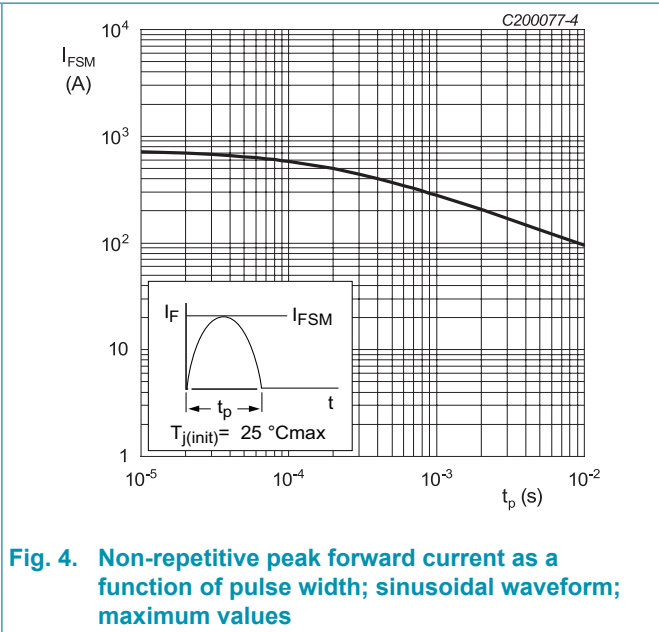
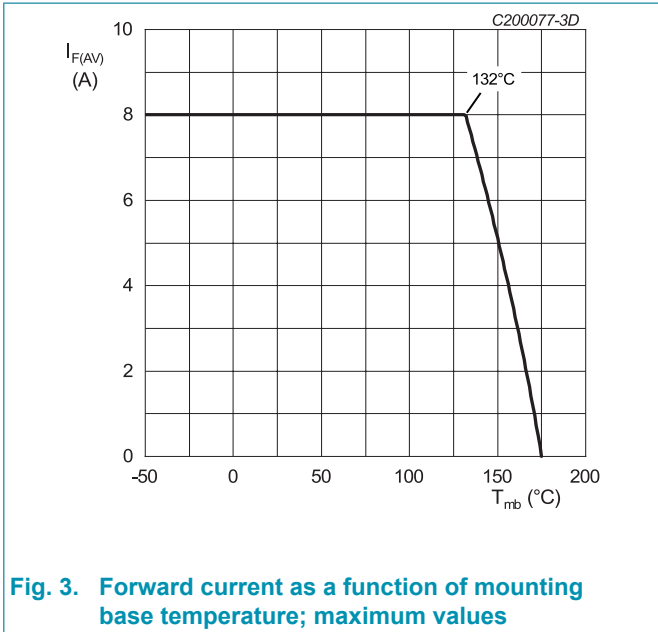
8. Limiting values

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; $T_{mb} \leq 132\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		8	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 132\text{ }^\circ\text{C}$; square-wave pulse		16	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; Fig. 4		95	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse		104.5	A
T_{stg}	storage temperature			-65 to 175	$^\circ\text{C}$
T_j	junction temperature			-65 to 175	$^\circ\text{C}$





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		-	-	3.2	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	[2]	-	50	-	K/W

[2] Device mounted on an FR4 PCB, single-sided copper, tin plated and standard footprint.

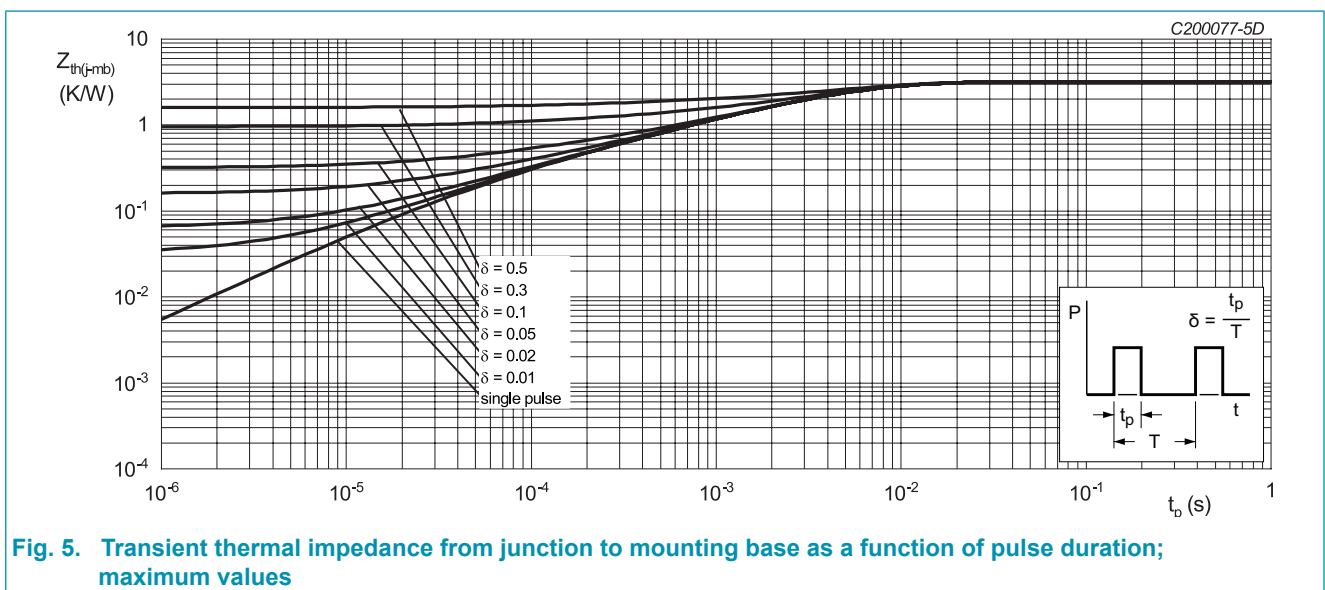


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 8\text{ A}; T_j = 25\text{ °C}; \text{Fig. 6}$		-	1.37	1.70	V
		$I_F = 8\text{ A}; T_j = 150\text{ °C}; \text{Fig. 6}$		-	1.13	1.46	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ °C}$		-	0.27	30	μA
		$V_R = 650\text{ V}; T_j = 150\text{ °C}$		-	-	0.5	mA
Dynamic characteristics							
Q_r	reverse charge	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$		-	151	-	nC
		$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$		-	360	-	nC
t_{rr}	reverse recovery time	$I_F = 0.5\text{ A}; I_R = 1\text{ A}; I_{rr} = 0.25\text{ A}; T_j = 25\text{ °C}$		-	30	-	ns
		$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 100\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$		-	27	-	ns
		$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$		-	56	-	ns
		$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$		-	85	-	ns
I_{RM}	peak reverse recovery current	$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ °C}; \text{Fig. 7}$		-	5.5	-	A
		$I_F = 8\text{ A}; V_R = 400\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ °C}; \text{Fig. 7}$		-	8.6	-	A
E_{as}	non-repetitive ananache energy	$T_{j(\text{init})} = 25\text{ °C}$		20	-	-	mJ

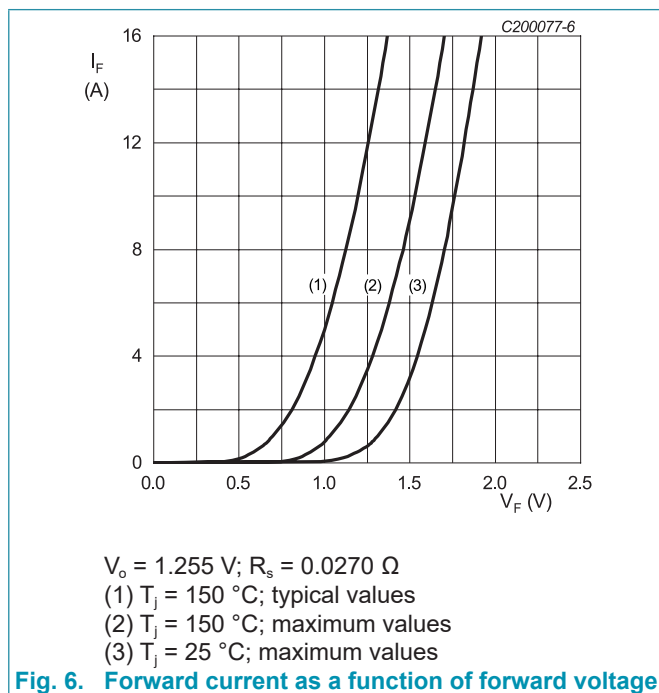


Fig. 6. Forward current as a function of forward voltage

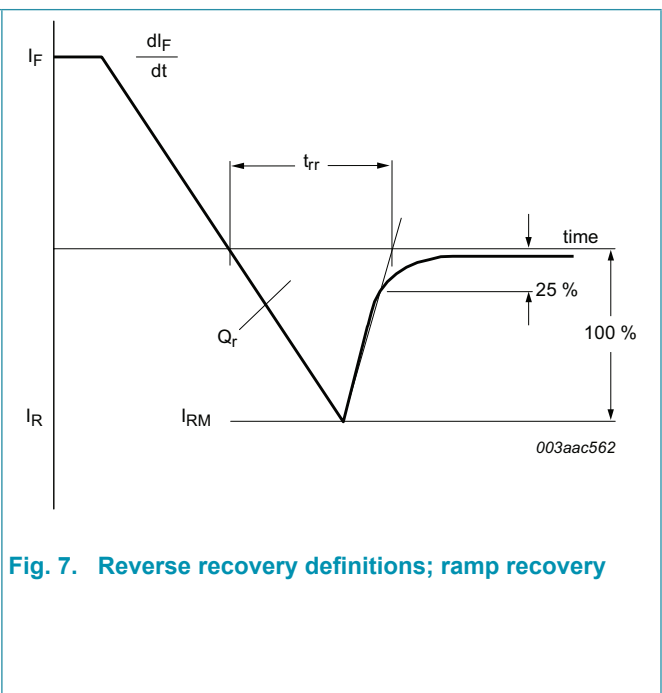
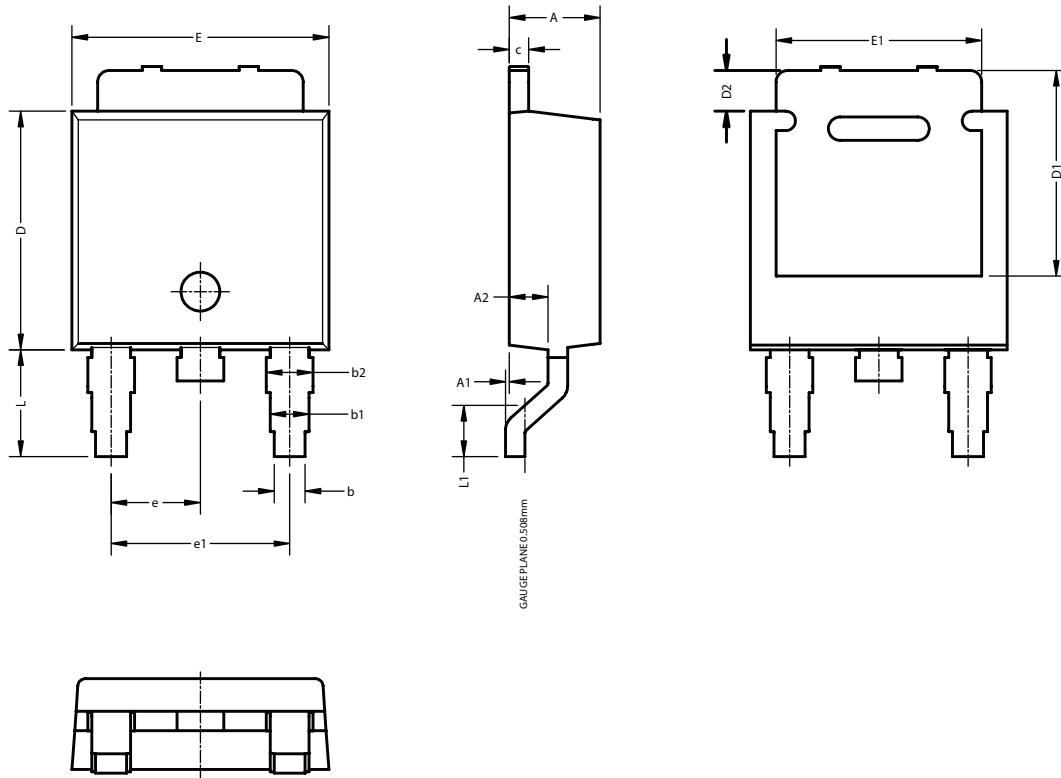


Fig. 7. Reverse recovery definitions; ramp recovery

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
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				

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

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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