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BYR5D-1200P

Ultrafast power diode

Rev.01 - 8 November 2017 Product data sheet

1. General description

EEPP™- Efficiency Enhanced Pt Planar rectifier in a TO-252 (DPAK) surface-mountable plastic package.

2. Features and benefits

- Fast switching
- Reduces switching losses with improved lower reverse recovery charge
- Soft recovery characteristics
- Low thermal resistance
- Low leakage current
- Planar termination structure
- High operating temperature capability ($T_{j\,(max)}$ = 175°C)
- Higher I_{FSM} capability

3. Applications

- Dual mode (DCM and CCM) Power Factor Correction (PFC)
- Power Factor Correction (PFC) for Interleaved Topology
- U-inverter (DC-AC converter for individual solar panels)
- Motor drive and SMPS freewheeling diode

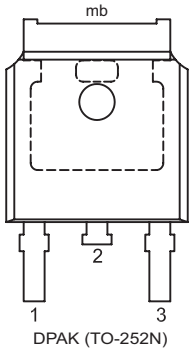
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage		1200				V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 144$ °C; Fig. 1; Fig. 2; Fig. 3	5				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 144$ °C; square-wave pulse	10				A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	55				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	60				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 5 A; T_j = 25 °C; Fig. 6		-	1.70	2.2	V
		I_F = 5 A; T_j = 150 °C; Fig. 6		-	1.55	-	V
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 7		-	50	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	n.c.	no connected	 DPAK (TO-252N)	 001aaa020
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-252 package.

6. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BYR5D-1200P	TO-252	plastic single-ended surface-mounted package (DPAK); 3-leads (one lead cropped)	TO-252N

7. Marking

Table 4. Marking codes

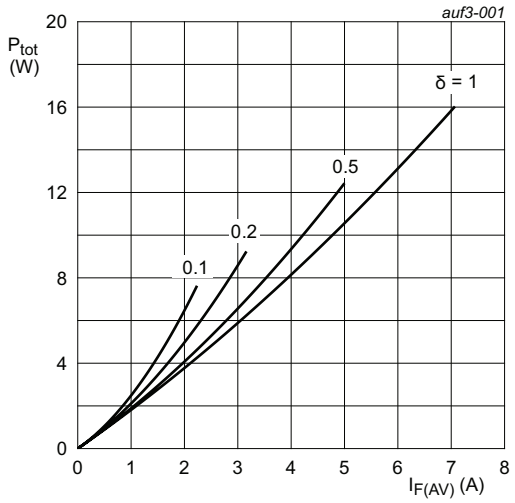
Type number	Marking codes
BYR5D-1200P	BYR5D-1200P

8. Limiting values

Table 5. Limiting values

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

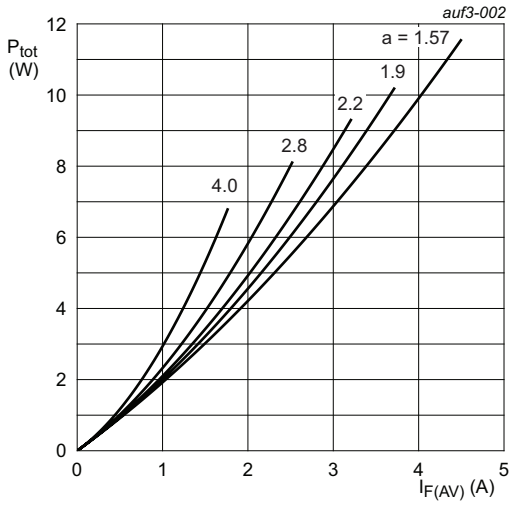
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		1200	V
V_{RWM}	crest working reverse voltage		1200	V
V_R	reverse voltage	DC	1200	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 144$ °C; Fig. 1; Fig. 2; Fig. 3	5	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 144$ °C; square-wave pulse	10	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	55	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	60	A
T_{stg}	storage temperature		-65 to 175	°C
T_j	junction temperature		175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$

V_o = 1.737 V; R_s = 0.0750 Ω

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



a = form factor = $I_{F(RMS)} / I_{F(AV)}$

Vo = 1.737 V; Rs = 0.0750 Ω

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

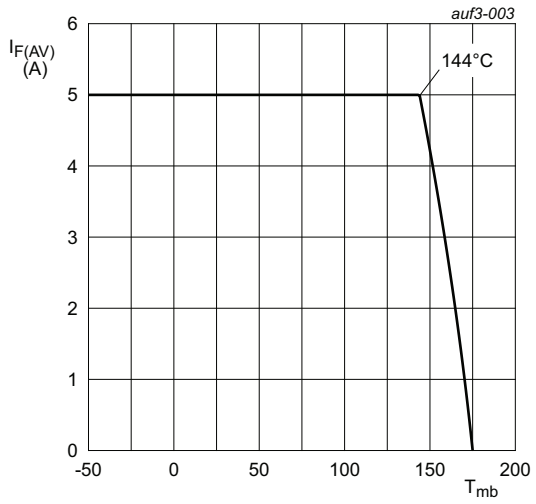


Fig. 3. Forward current as a function of mounting base temperature; maximum values

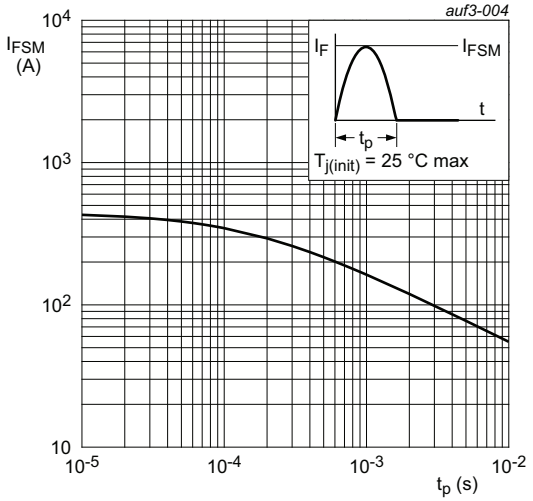


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	2.5	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

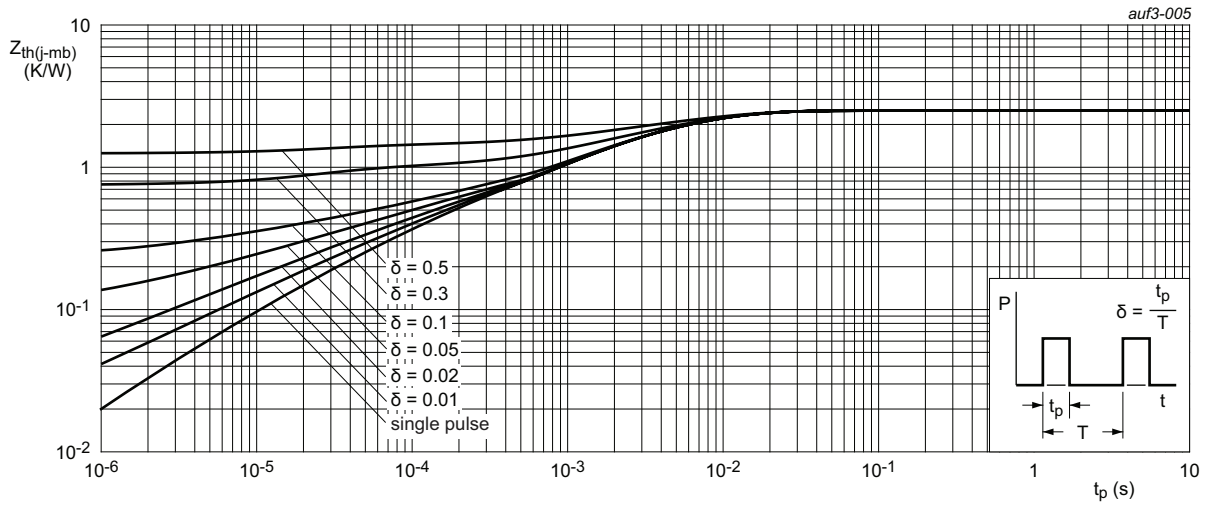
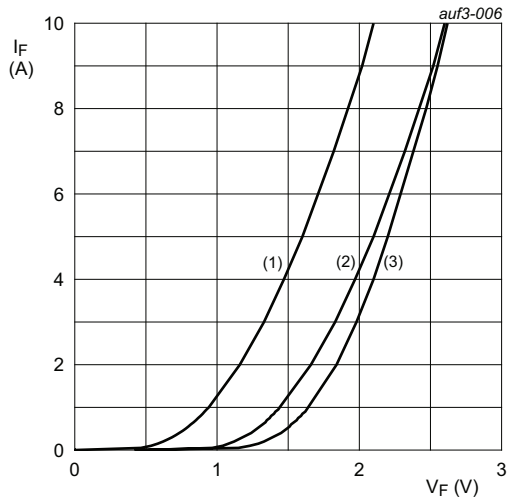


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 5 A; T_j = 25 °C; Fig. 6		-	1.70	2.2	V
		I_F = 5 A; T_j = 150 °C; Fig. 6		-	1.55	-	V
I_R	reverse current	V_R = 1200 V; T_j = 25 °C		-	-	50	µA
		V_R = 1200 V; T_j = 150 °C		-	-	500	µA
Dynamic characteristics							
Q_r	reverse charge	I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	252	-	nC
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	406	-	nC
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	450	-	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 7		-	50	-	ns
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	62	-	ns
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	85	-	ns
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	90	-	ns
I_{RM}	peak reverse recovery current	I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	8.3	-	A
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	9.7	-	A
		I_F = 5 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	10.0	-	A



V_o = 1.737 V; R_s = 0.0750 Ω
(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

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

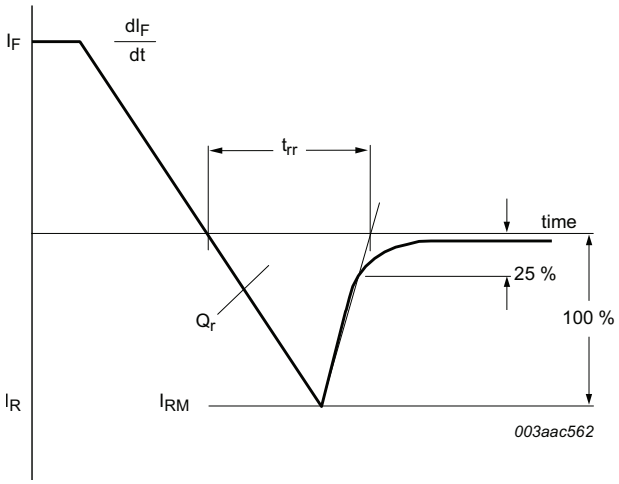
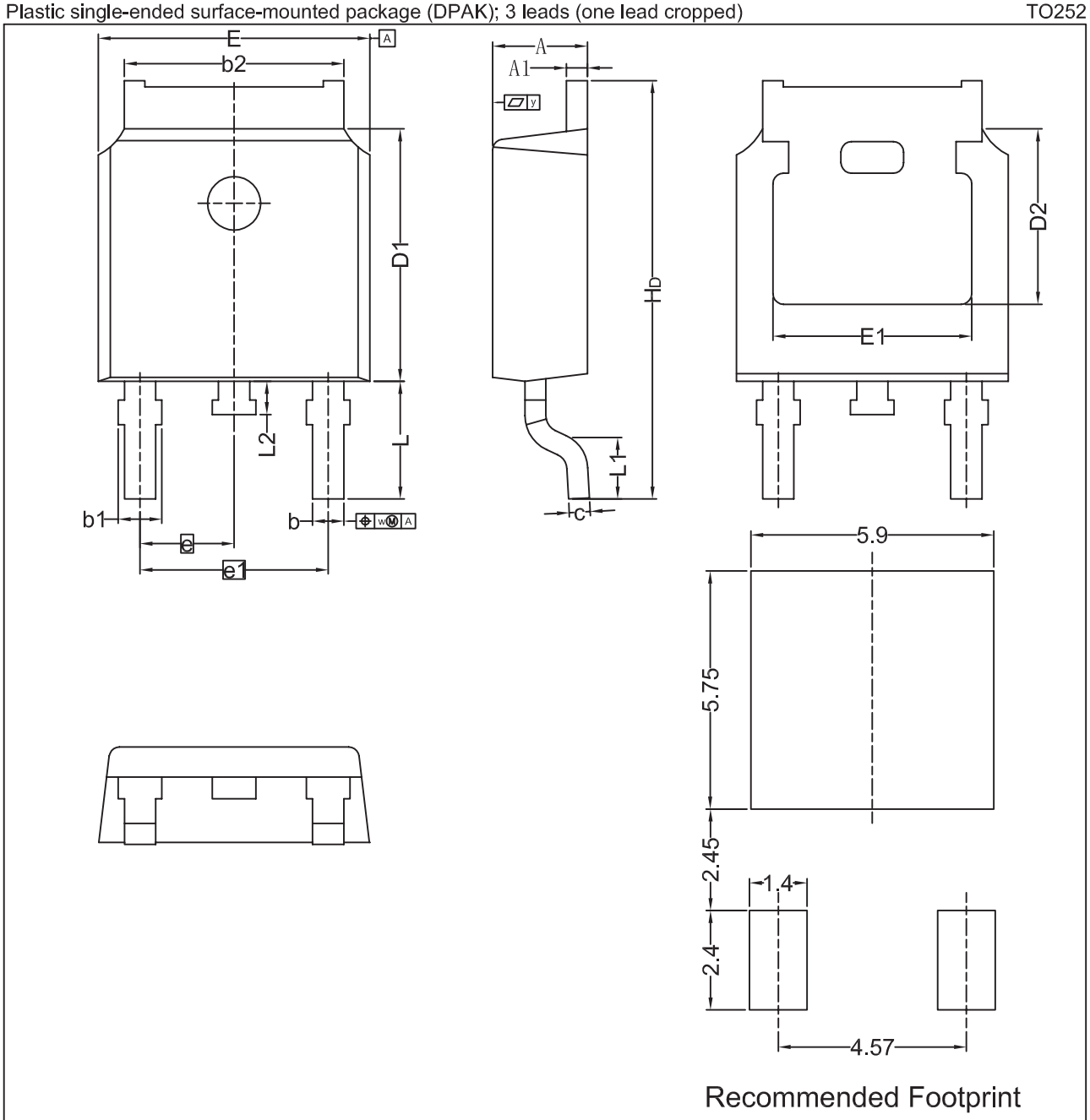


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended surface-mounted package (DPAK); 3 leads (one lead cropped) TO252



Recommended Footprint

Unit	A	A1	b	b1	b2	c	D1	D2	E	E1	e	e1	H_D	L	L1	L2	w	y
min	2.22	0.46	0.71	0.72	5.00	0.20	5.98	4.00	6.47	4.45	2.285	4.57	9.60	2.90 (Ref.)	0.50	0.50	0.20	
mm nom																		
max	2.38	0.93	0.89	1.10	5.46	0.56	6.22	---	6.73	---			10.40		---	0.90		0.20

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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