BYC10X-600

Rectifier diode, hyperfast

Rev.04 - 09 October 2021 Product data sheet

1. General description

Hyperfast, epitaxial rectifier diode in a TO220F plastic package.

2. Features and benefits

- Extremely fast switching
- Low thermal resistance
- Low reverse recovery current
- Isolated package
- Reduces switching loss in associated MOSFET

3. Applications

- Half-bridge or full-bridge switched-mode power supplies
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge lighting ballasts

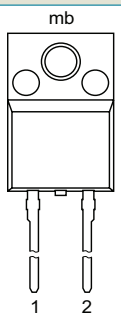
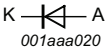
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values				Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage		600				V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_h \leq 37$ °C; Fig. 1; Fig. 2	10				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 37$ °C; square-wave pulse	20				A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	91				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	100				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; Fig. 4		-	1.89	2.9	V
		I_F = 10 A; T_j = 150 °C; Fig. 4		-	1.32	2.03	V
		I_F = 20 A; T_j = 150 °C; Fig. 4		-	1.64	2.34	V
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 5		-	35	55	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 SOD113 (2-lead TO-220F)	 *001aaa020*
2	A	anode		
mb	n.c.	mounting base; isolated		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYC10X-600	TO220F	BYC10X-600,127	Tube	50	SOD113	28-Aug-2015

7. Marking

Table 4. Marking codes

Type number	Marking codes	
	Assembly factory: d	Assembly factory: A
BYC10X-600	BYC10X 600 PJdxxxx xx	BYC10X 600 PJAxxxx xx

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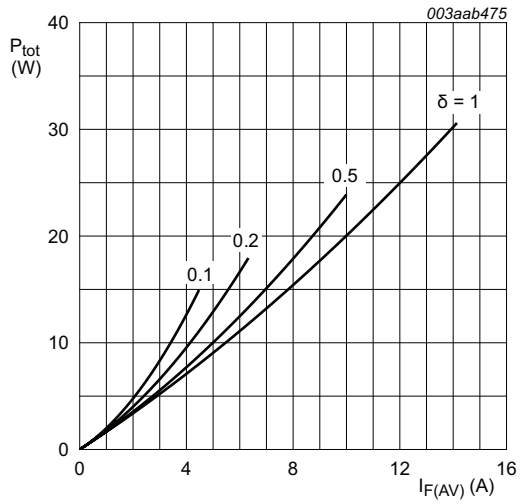
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8. Limiting values

Table 5. Limiting values

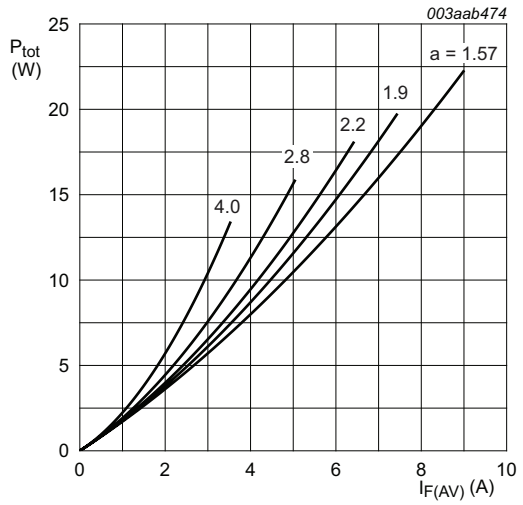
In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	δ = 1.0 ; square-wave pulse; $T_h \leq 100$ °C;	500	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_h \leq 37$ °C; Fig. 1; Fig. 2	10	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_h \leq 37$ °C; square-wave pulse	20	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	91	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	100	A
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		150	°C



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

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



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

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

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9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-h)}$	thermal resistance from junction to heatsink	with heatsink compound; Fig 3		-	-	4.8	K/W
		without heatsink compound		-	-	5.9	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	60	-	K/W

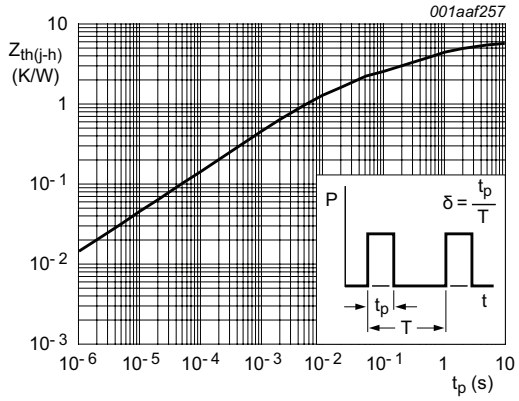


Fig. 3. Transient thermal impedance from junction to heatsink as a function of pulse duration

10. Isolation characteristics

Table 7. Isolation characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$V_{isol(RMS)}$	RMS isolation voltage	50 Hz ≤ f ≤ 60 Hz; RH ≤ 65 %; from all pins to external heatsink; sinusoidal waveform; clean and dust free		-	-	2500	V
C_{isol}	isolation capacitance	from cathode to external heatsink; f = 1 MHz		-	10	-	PF

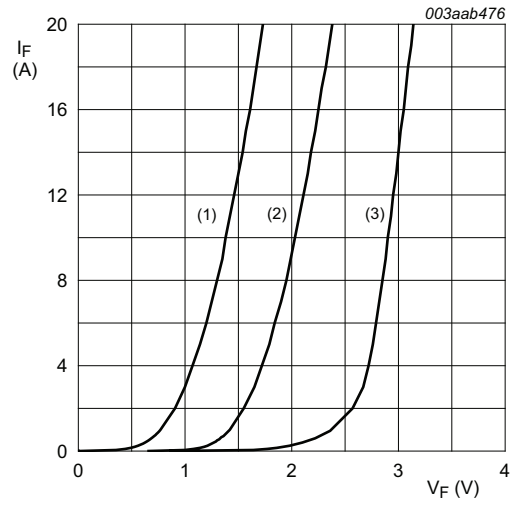
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11. Characteristics

Table 8. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 10 A; T_j = 25 °C; Fig. 4		-	1.89	2.9	V
		I_F = 10 A; T_j = 150 °C; Fig. 4		-	1.32	2.03	V
		I_F = 20 A; T_j = 150 °C; Fig. 4		-	1.64	2.34	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	9	200	µA
		V_R = 500 V; T_j = 100 °C		-	1.1	3	mA
Dynamic characteristics							
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 5		-	35	55	ns
		I_F = 10 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 5			19	-	ns
		I_F = 10 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; Fig. 5		-	32	40	ns
I_{RM}	peak reverse recovery current	I_F = 10 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 100 °C; Fig. 5		-	9.5	12	A
		I_F = 10 A; V_R = 400 V; dI_F/dt = 50 A/µs; T_j = 125 °C; Fig. 5		-	3	7.5	A
V_{FR}	forward recovery voltage	I_F = 10 A; dI_F/dt = 100 A/µs; T_j = 25 °C; Fig. 6		-	8	11	V



(1) T_j = 150 °C; typical values
(2) T_j = 150 °C; maximum values
(3) T_j = 25 °C; maximum values

Fig. 4. Forward current as a function of forward voltage

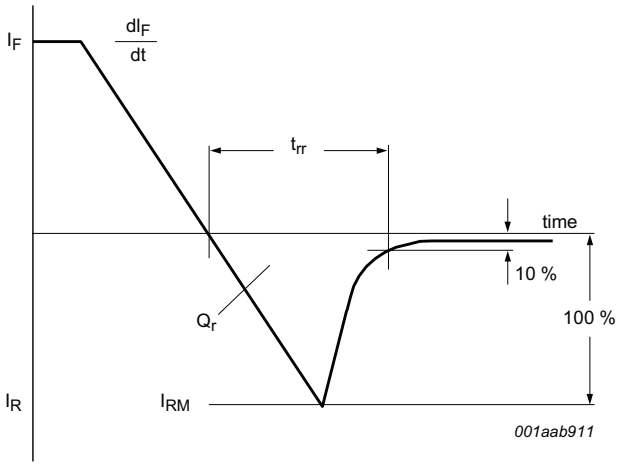


Fig. 5. Reverse recovery definitions; ramp recovery

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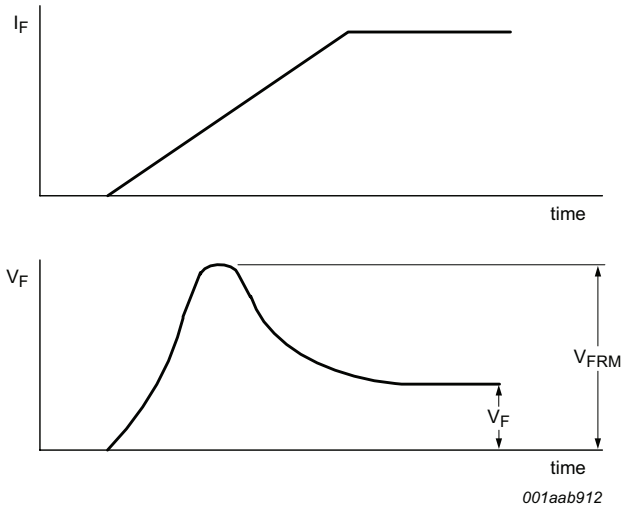


Fig. 6. Forward recovery definitions

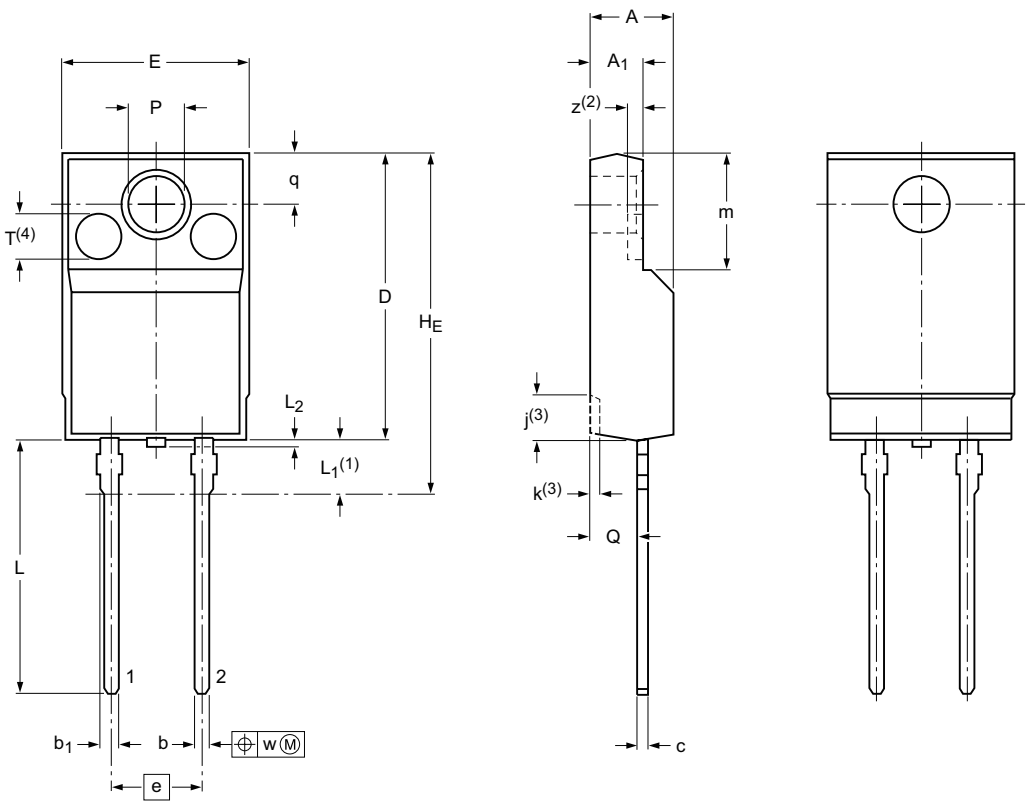
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12. Package outline

Assembly factory: d & A

Plastic single-ended package; isolated heatsink mounted;
1 mounting hole; 2-lead TO-220 `full pack' **SOD113**



Dimensions (mm are the original dimensions)

Unit		A	A_1	b	b_1	c	D	E	e	H_E max	$j^{(3)}$	$k^{(3)}$	L	$L_1{}^{(1)}$	L_2 max	m	P	Q	q	$T^{(4)}$	w	$z^{(2)}$
mm	max	4.6	2.9	0.9	1.1	0.7	15.8	10.3			2.7	0.6	14.4	3.3		6.5	3.2	2.6				
	nom								5.08	19.0					0.5				2.6	2.55	0.4	0.8
	min	4.0	2.5	0.7	0.9	0.4	15.2	9.7			1.7	0.4	13.5	2.8		6.3	3.0	2.3				

Notes
1. Terminals are uncontrolled within zone L1.
2. z is depth of T.
3. Dot line area (j & k) design for factory A.
4. Eject pin mark is for reference only.

sod113_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOD113		2-lead TO-220F				~~07-06-08~~ 15-08-28

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14. Contents

1. General description 1
2. Features and benefits 1
3. Applications 1
4. Quick reference data 1
5. Pinning information 2
6. Ordering information 2
7. Marking 2
8. Limiting values 3
9. Thermal characteristics 4
10. Isolation characteristics 4
11. Characteristics 5
12. Package outline 7
13. Legal information 8
14. Contents 10

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