BYC40W-1200P

Hyperfast power diode

Rev.01 - 14 November 2018 Product data sheet

1. General description

EEPP™- Efficiency Enhanced Pt Planar rectifier in a TO247-2L 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

- Switched-Mode Power Supplies
- Power factor correction diode
- Uninterrupted Power Supply

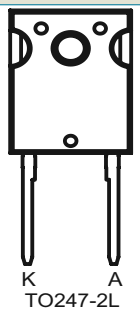
4. Quick reference data

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; $T_{mb} \leq 96$ °C; Fig. 1; Fig. 2; Fig. 3	40				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 96$ °C; square-wave pulse	80				A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	300				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse;	330				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 40 A; T_j = 25 °C; Fig. 6		-	2.8	3.3	V
		I_F = 40 A; T_j = 150 °C; Fig. 6		-	2.2	-	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		-	52	-	ns
Avalanche energy							
E_{AS}	non-repetitive avalanche energy	$T_{j(init)}$ = 25 °C		30	-	-	mJ

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode		
2	A	anode		
mb	mb	mounting base; connected to cathod		

6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYC40W-1200P	TO247-2L	BYC40W-1200PQ	Tube	30	TO247A-2L	23-Jun-2017

7. Marking

Table 4. Marking codes

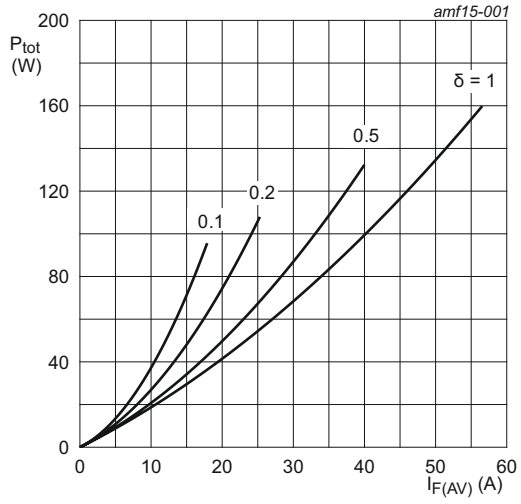
Type number	Marking codes
BYC40W-1200P	BYC40W-1200P

8. Limiting values

Table 5. Limiting values

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

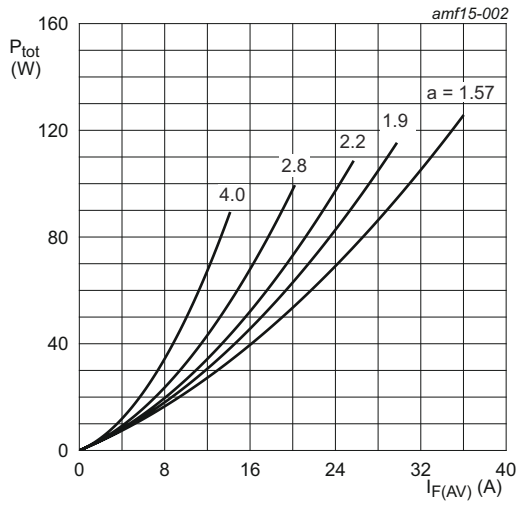
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		1200	V
V_{RWM}	crest working reverse voltage		1200	V
V_R	reverse voltage	DC	1200	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 96$ °C; Fig. 1; Fig. 2; Fig. 3	40	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 96$ °C; square-wave pulse	80	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	300	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse;	330	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 = 1.661 V; R_s = 0.0206 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 = 1.661 V; Rs = 0.0206 Ω

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

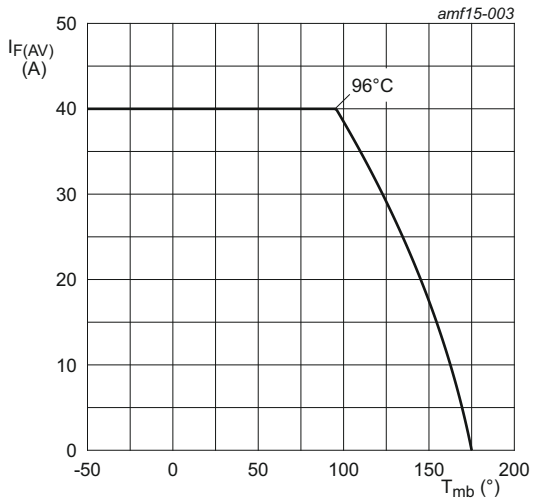


Fig. 3. Forward current as a function of mounting base temperature; maximum values

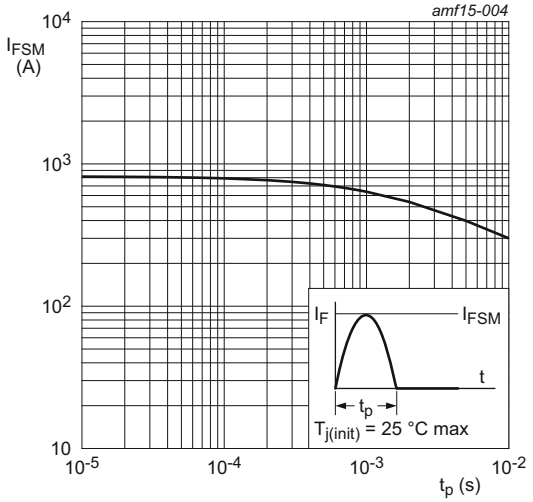


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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		-	-	0.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	45	-	K/W

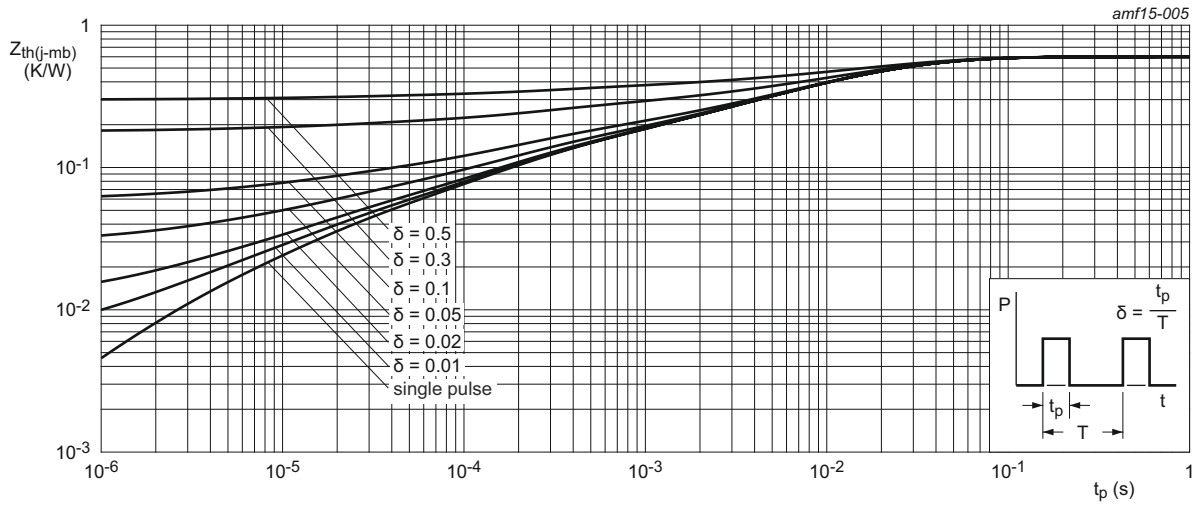
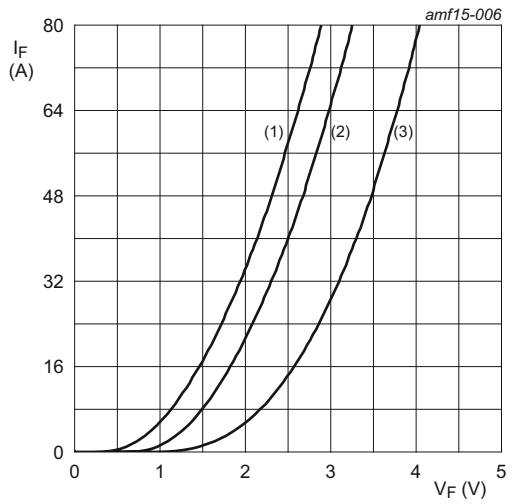


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 40 A; T_j = 25 °C; Fig. 6		-	2.8	3.3	V
		I_F = 40 A; T_j = 150 °C; Fig. 6		-	2.2	-	V
I_R	reverse current	V_R = 1200 V; T_j = 25 °C		-	-	250	µA
		V_R = 1200 V; T_j = 150 °C		-	-	2	mA
Dynamic characteristics							
Q_r	reverse charge	I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	863	-	nC
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	2314	-	nC
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	2637	-	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		-	52	-	ns
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	91	-	ns
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	172	-	ns
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	186	-	ns
I_{RM}	peak reverse recovery current	I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 25 °C; Fig. 7		-	19	-	A
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 125 °C; Fig. 7		-	27	-	A
		I_F = 40 A; V_R = 400 V; dI_F/dt = 500 A/µs; T_j = 150 °C; Fig. 7		-	28.4	-	A
Avalanche energy							
E_{AS}	non-repetitive avalanche energy	$T_{j(init)}$ = 25 °C		30	-	-	mJ



V_o = 1.661 V; R_s = 0.0206 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

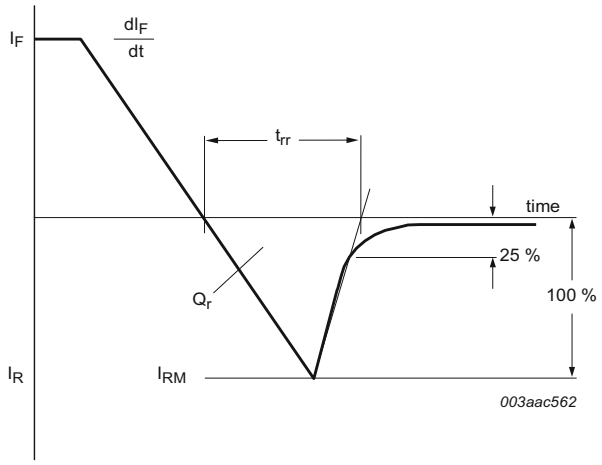
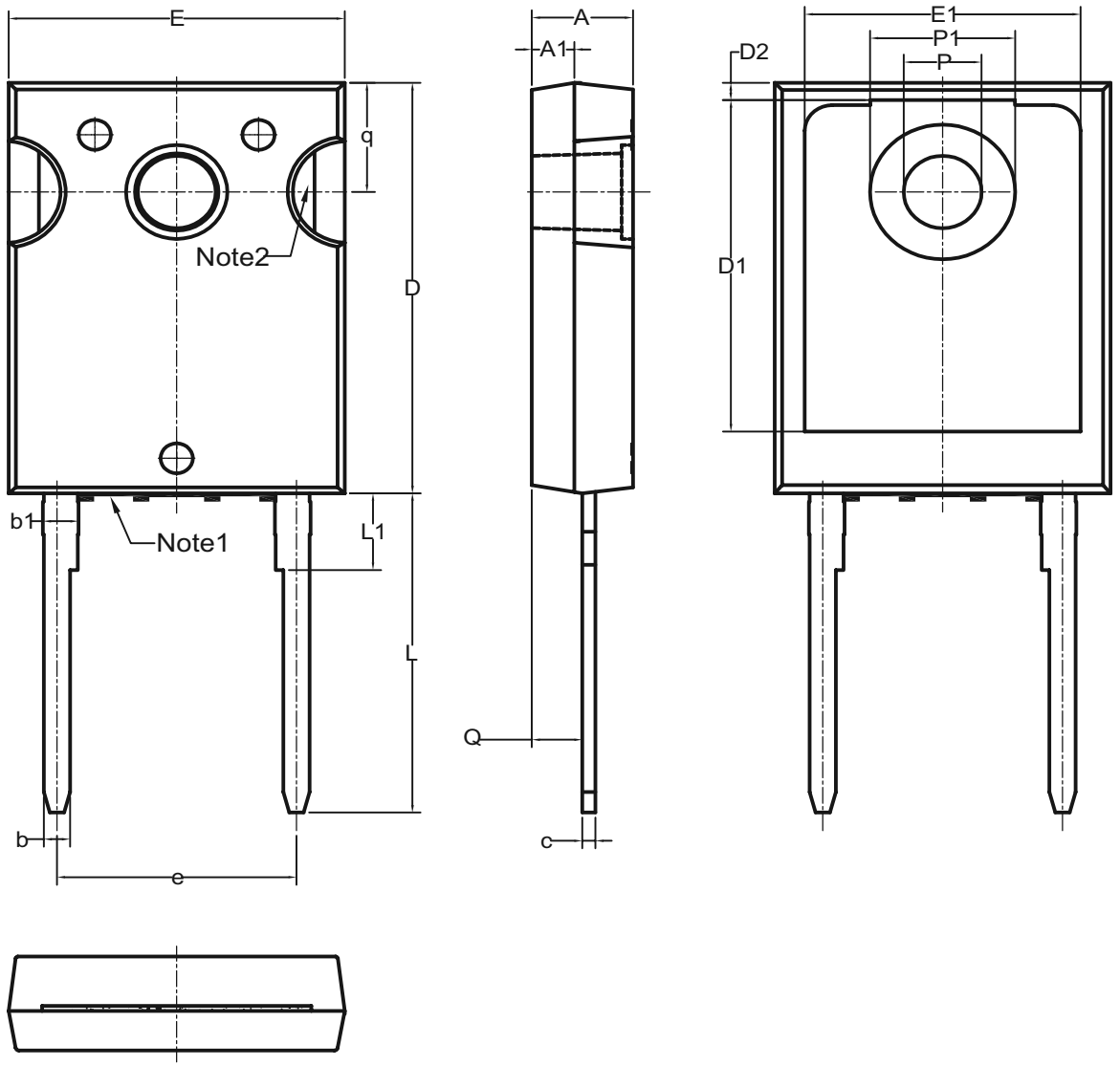


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended through-hole package; heatsink mounted;1 mounting hole; 2 leads TO-247

TO247-2L



Unit		A	A1	b	b1	c	D	D1	D2	E	E1	e	L	L1	P	P1	Q	q
MM	min	4.58	1.83	1.17	1.53	0.51	20.32	13.08	0.51	15.37	12.81	11.126 (BSC)	15.75	3.69	3.51	6.61	2.29	5.34
	max	4.82	2.13	1.35	1.77	0.71	20.82	---	1.35	15.87	---		16.25	3.93	3.65	6.85	2.66	5.58

Note:
1. Mold resin protrusion.
2. Metal exposed with Sn plating.

12. Legal information

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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.
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13. Contents

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