BYV60W-600P

Ultrafast power diode

Rev.02 - 18 May 2023 Product data sheet

1. General description

Ultrafast power diode in a 2-lead TO247 plastic package.

2. Features and benefits

- Fast switching and soft reverse recovery characteristics
- Low forward voltage drop
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT
- High operating temperature capability ($T_{j\ (max)}$ = 175°C)

3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

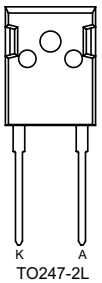
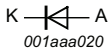
4. Quick reference data

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; $T_{mb} \leq 129$ °C; Fig. 1; Fig. 2; Fig. 3	60				A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 129$ °C; square-wave pulse	120				A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	600				A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	660				A
Symbol	**Parameter**	**Conditions**		**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 60 A; T_j = 25 °C; Fig. 6		-	1.55	2	V
		I_F = 60 A; T_j = 150 °C; Fig. 6		-	1.2	1.6	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. 7		-	-	55	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO247-2L	 *001aaa020*
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
BYV60W-600P	TO247-2L	BYV60W-600PQ	Tube	30	TO247L-2L (L)	12-Nov-2020
					TO247P-2L (P)	31-Mar-2023

7. Marking

Table 4. Marking codes

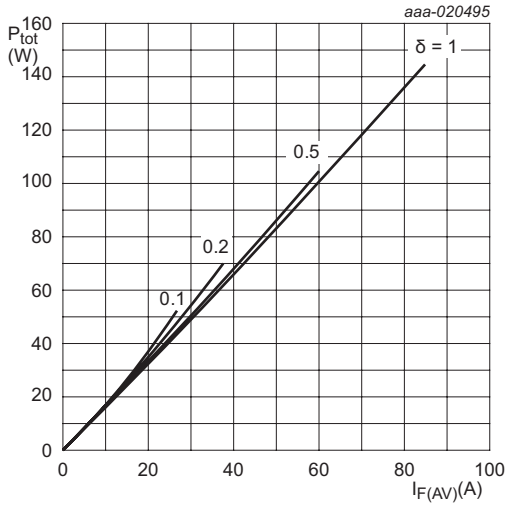
Type number	Marking codes	
	Assembly factory: L	Assembly factory: P
BYV60W-600P	BYV60W 600P PJLxxxx xx	BYV60W 600P PJPxxxx xx

8. Limiting values

Table 5. Limiting values

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

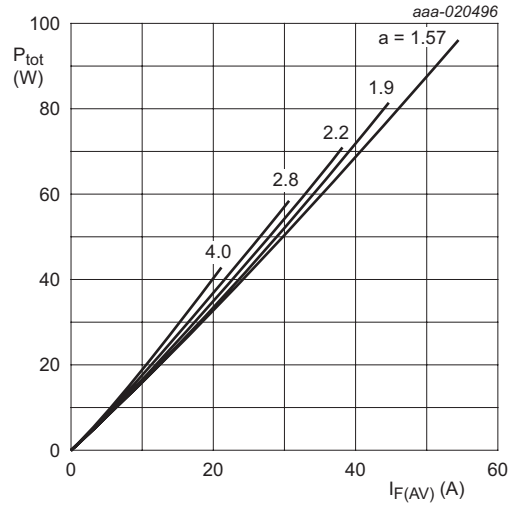
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 129$ °C; Fig. 1; Fig. 2; Fig. 3	60	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 129$ °C; square-wave pulse	120	A
I_{FSM}	non-repetitive peak forward current	t_p = 10 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse; Fig. 4	600	A
		t_p = 8.3 ms; $T_{j(init)}$ = 25 °C; sine-wave pulse	660	A
I^2t	limiting Joule-integral	SIN; t_p = 10 ms	1800	A^2s
T_{stg}	storage temperature		-55 to 175	°C
T_j	junction temperature		175	°C



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

V_o = 1.6 V; R_s = 0.0013 Ω

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



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

V_o = 1.6 V; R_s = 0.0013 Ω

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

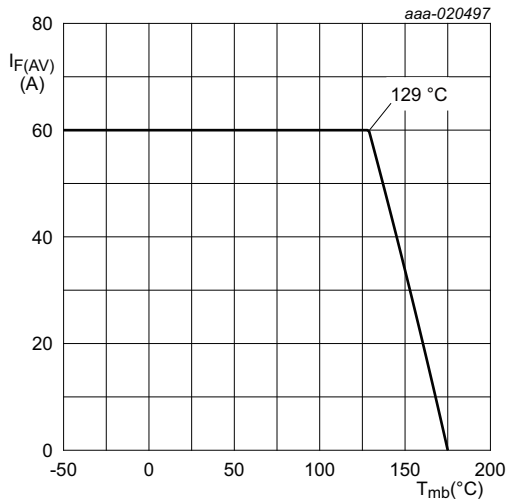


Fig. 3. Forward current as a function of mounting base temperature; maximum values

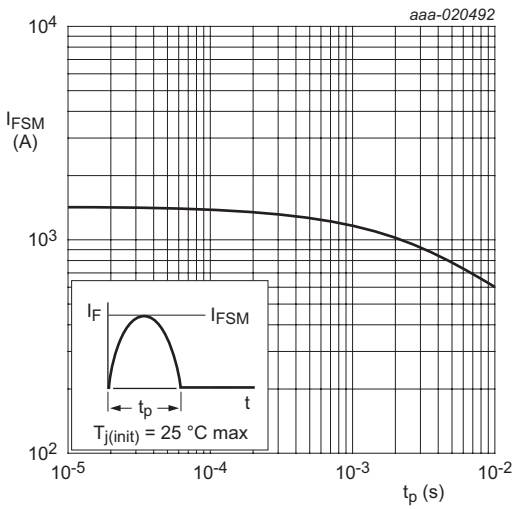


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

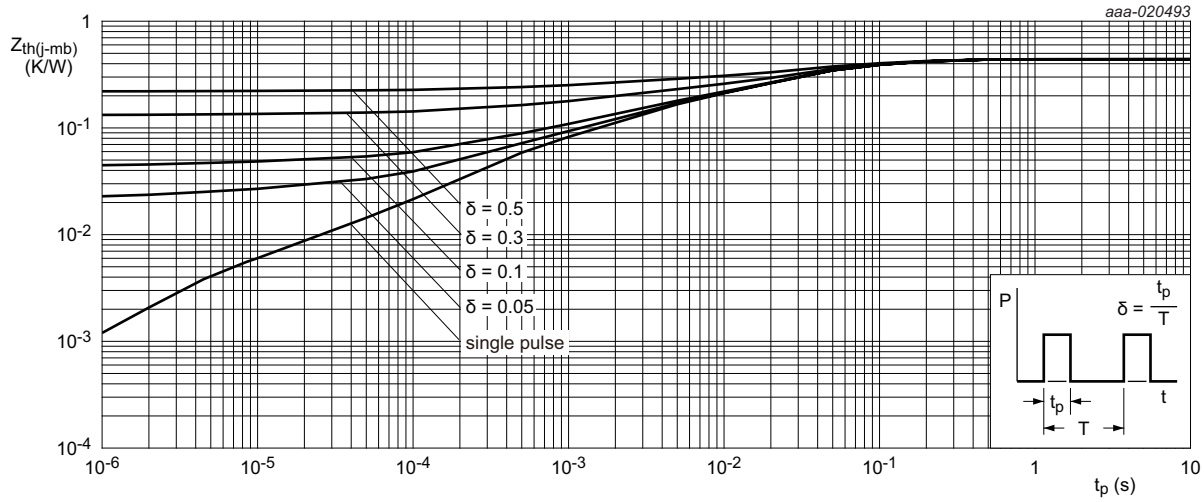
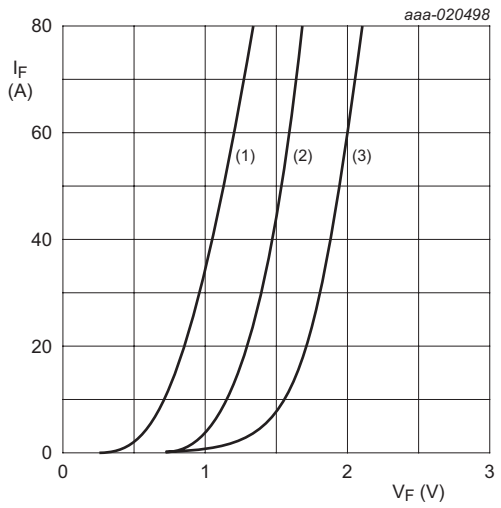


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
V_F	forward current	I_F = 60 A; T_j = 25 °C; Fig. 6		-	1.55	2	V
		I_F = 60 A; T_j = 150 °C; Fig. 6		-	1.2	1.6	V
I_R	reverse current	V_R = 600 V; T_j = 25 °C		-	-	10	µA
		V_R = 600 V; T_j = 125 °C		-	-	500	µA
Dynamic characteristics							
Q_r	reverse charge	I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	143	-	nC
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	876	-	nC
t_{rr}	reverse recovery time	I_F = 1 A; V_R = 30 V; dI_F/dt = 50 A/µs; T_j = 25 °C; Fig. 7		-	-	55	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	53	-	ns
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	120	-	ns
I_{RM}	peak reverse recovery current	I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	5.4	-	A
		I_F = 60 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	14.5	-	A
E_{as}	non-repetitive avalanche energy	I_R = 2.2 A; $T_{j(init)}$ = 25 °C; L = 40 mH		-	97	-	mJ



V_o = 1.6 V; R_s = 0.0013 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

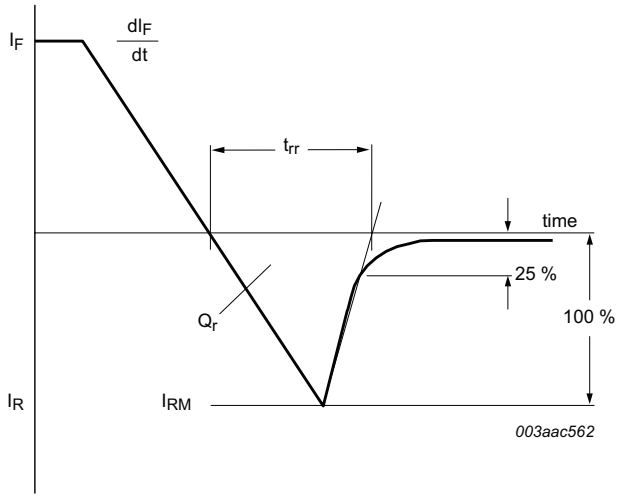
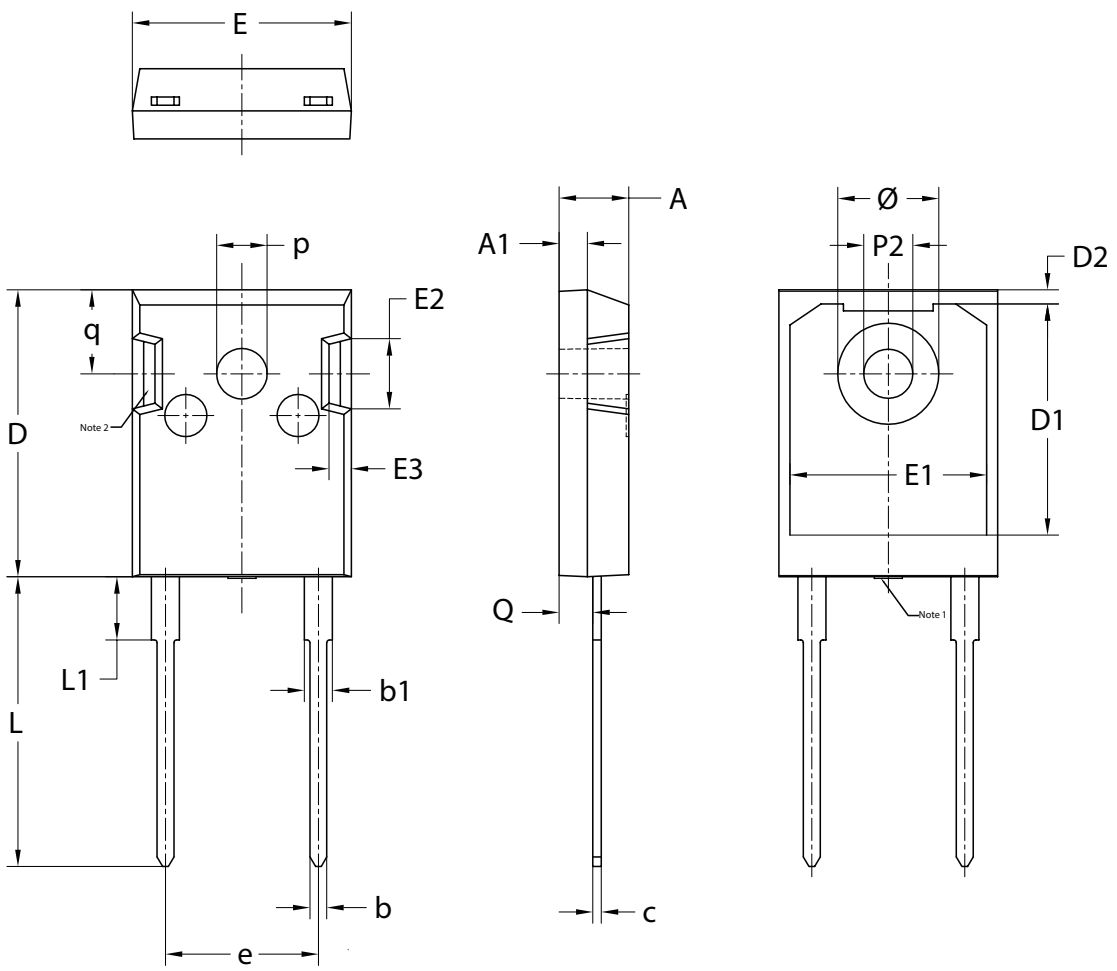


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Assembly factory: L

Plastic single-ended through-hole package; heatsink mounted;1 mounting hole; 2 leads TO-247 TO247-2L

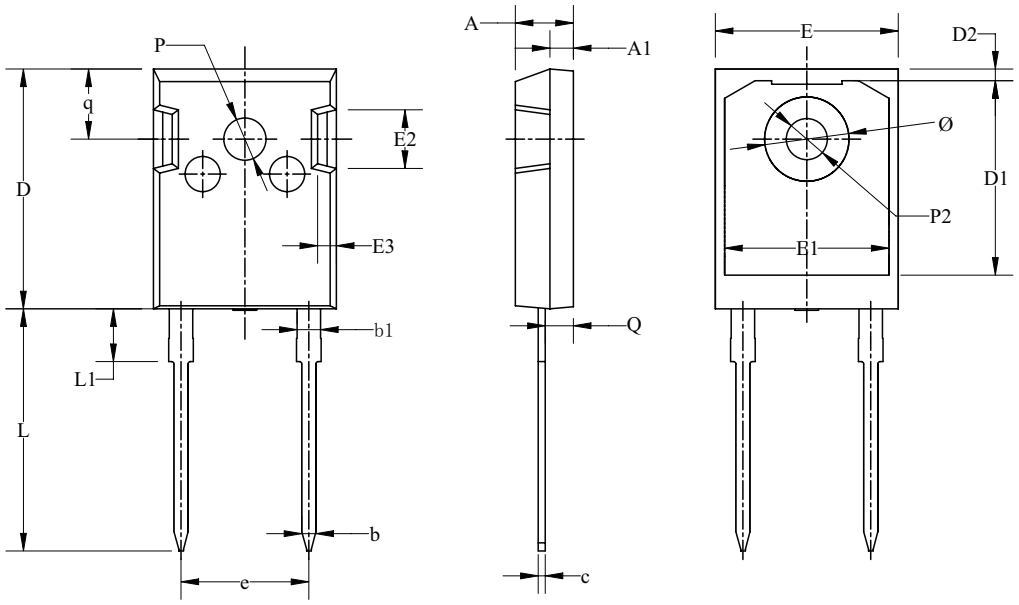


UNIT	A	A_1	b	b_1	c	D	D_1 (2)	D_2	E	E_1	E_2	E_3	e	L	L_1	P_2	p	Q	q	Ø
mm	5.20 4.70	2.10 1.90	1.40 1.00	2.20 1.80	0.70 0.50	20.60 20.30	16.20 16.87	1.20 0.80	15.75 15.45	14.22 13.82	5.20 4.80	1.80 1.40	10.90 BSC	20.72 20.22	4.75 4.25	3.60 3.40	3.70 3.50	2.60 2.20	6.18 5.78	7.30 7.10

Note:
1. Mold resin protrusion max 0.127mm.
2. Metal exposed with Sn plating.

Assembly factory: P

Plastic single-ended through-hole pack age; headsink mounted; 1 mounting hole; 2 leads TO-247 TO247-2L



Dim	All Dimensions in Millimeters		
	Min	Typ	Max
A	4.70	4.95	5.20
A1	1.90	2.00	2.10
b	1.00	1.20	1.40
b1	1.80	2.00	2.20
c	0.50	0.60	0.70
D	20.30	20.45	20.60
D1	16.20	16.58	16.87
D2	0.80	1.00	1.20
E	15.45	15.60	15.75
E1	13.82	14.02	14.22
E2	4.80	5.00	5.20
E3	1.40	1.60	1.80
e	10.90 BSC		
L	20.40	20.65	20.90
L1	4.25	4.50	4.75
P2	3.40	3.50	3.60
P	3.50	3.60	3.70
Q	2.20	2.40	2.60
q	5.78	5.98	6.18
Ø	7.10	7.19	7.30

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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13. Contents

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