

## 1. General description

Ultrafast power diode in a TO247-2L 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 ( $T_{j(max)} = 175^{\circ}\text{C}$ )

## 3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

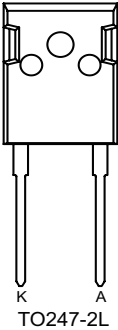
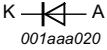
## 4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
<b>Absolute maximum rating</b>						
$V_{RRM}$	repetitive peak reverse voltage		600			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 129^{\circ}\text{C}$ ; <a href="#">Fig. 1</a> ; <a href="#">Fig. 2</a> ; <a href="#">Fig. 3</a>	60			A
$I_{FRM}$	repetitive peak forward current	$\delta = 0.5$ ; $t_p = 25 \mu\text{s}$ ; $T_{mb} \leq 129^{\circ}\text{C}$ ; square-wave pulse	120			A
$I_{FSM}$	non-repetitive peak forward current	$t_p = 10 \text{ ms}$ ; $T_{j(init)} = 25^{\circ}\text{C}$ ; sine-wave pulse; <a href="#">Fig. 4</a>	600			A
		$t_p = 8.3 \text{ ms}$ ; $T_{j(init)} = 25^{\circ}\text{C}$ ; sine-wave pulse	660			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward voltage	$I_F = 60 \text{ A}$ ; $T_j = 25^{\circ}\text{C}$ ; <a href="#">Fig. 6</a>	-	1.55	2	V
		$I_F = 60 \text{ A}$ ; $T_j = 150^{\circ}\text{C}$ ; <a href="#">Fig. 6</a>	-	1.2	1.6	V
<b>Dynamic characteristics</b>						
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}$ ; $V_R = 30 \text{ V}$ ; $dI_F/dt = 50 \text{ A}/\mu\text{s}$ ; $T_j = 25^{\circ}\text{C}$ ; <a href="#">Fig. 7</a>	-	-	55	ns

## 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 cathode		

## 6. Ordering information

Table 3. Ordering information

Type number	Package name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
BYQ60W-600PT2	TO247-2L	BYQ60W-600PT2Q	Tube	30	TO247L-2L	10-Nov-2020

## 7. Marking

Table 4. Marking codes

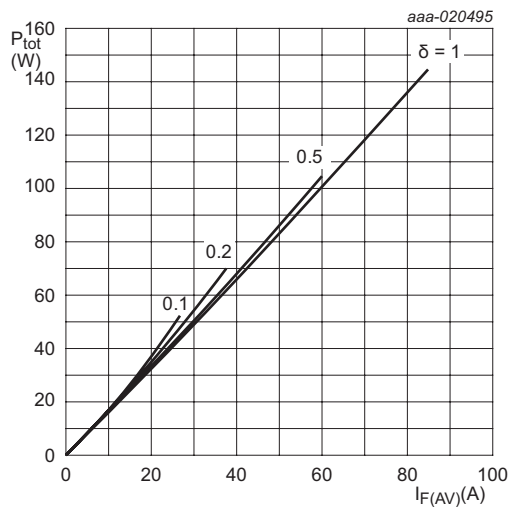
Type number	Marking codes
BYQ60W-600PT2	BYQ60W 600PT2

## 8. Limiting values

**Table 5. Limiting values**

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

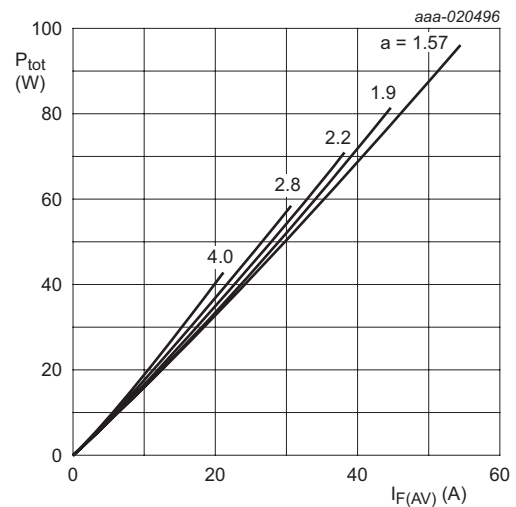
Symbol	Parameter	Conditions	Values	Unit
$V_{RRM}$	repetitive peak reverse voltage		600	V
$V_{RWM}$	crest working reverse voltage		600	V
$V_R$	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$ ; square-wave pulse; $T_{mb} \leq 129\text{ }^\circ\text{C}$ ; <a href="#">Fig. 1</a>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



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

$$V_o = 1.600\text{ V}; R_s = 0.0013\text{ }\Omega$$

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



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

$$V_o = 1.600\text{ V}; R_s = 0.0013\text{ }\Omega$$

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

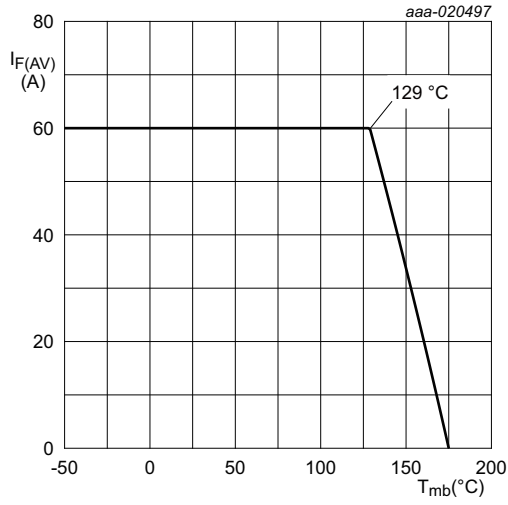


Fig. 3. Forward current as a function of mounting base temperature; maximum values

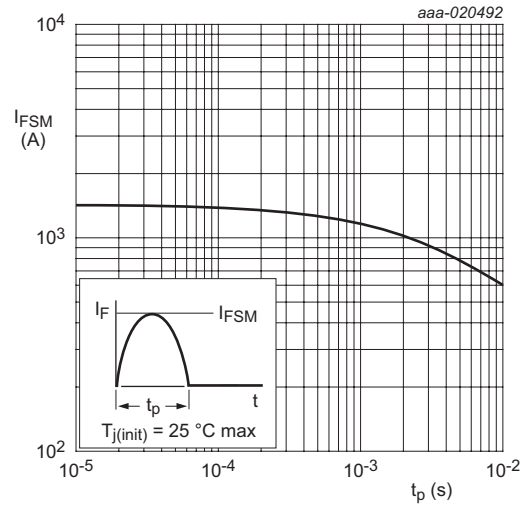


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

### 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	<a href="#">Fig. 5</a>	-	-	0.44	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	45	-	K/W

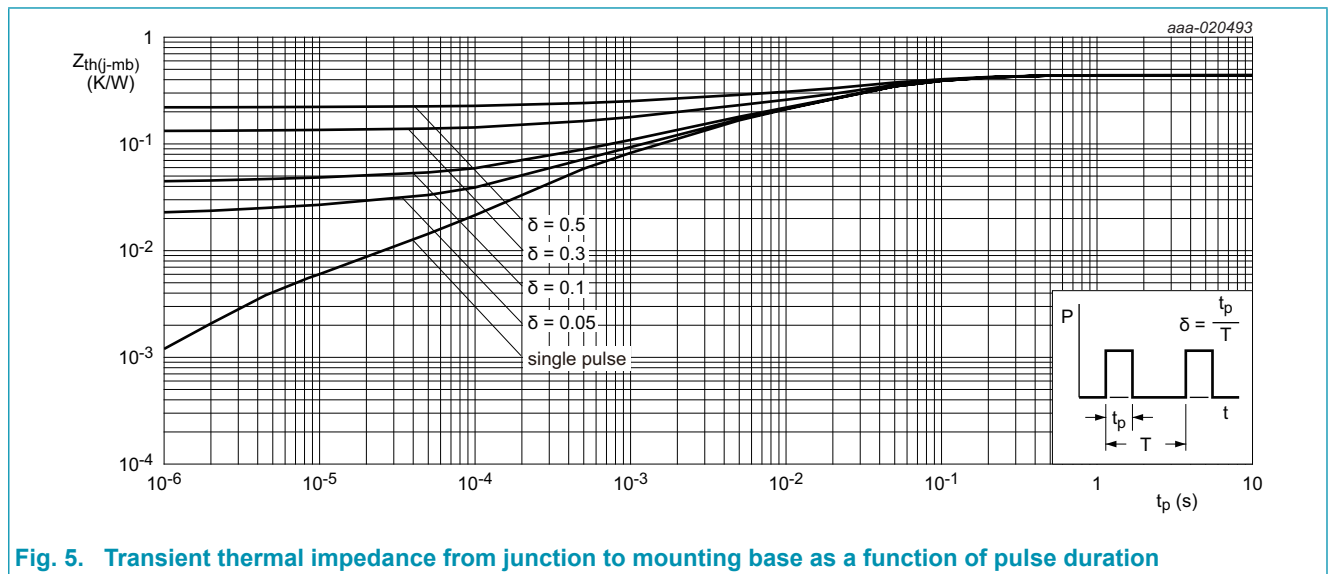
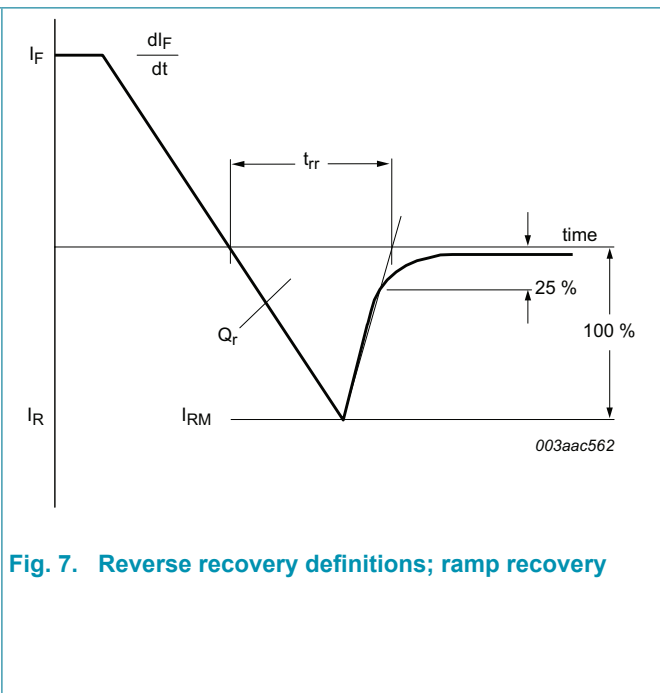
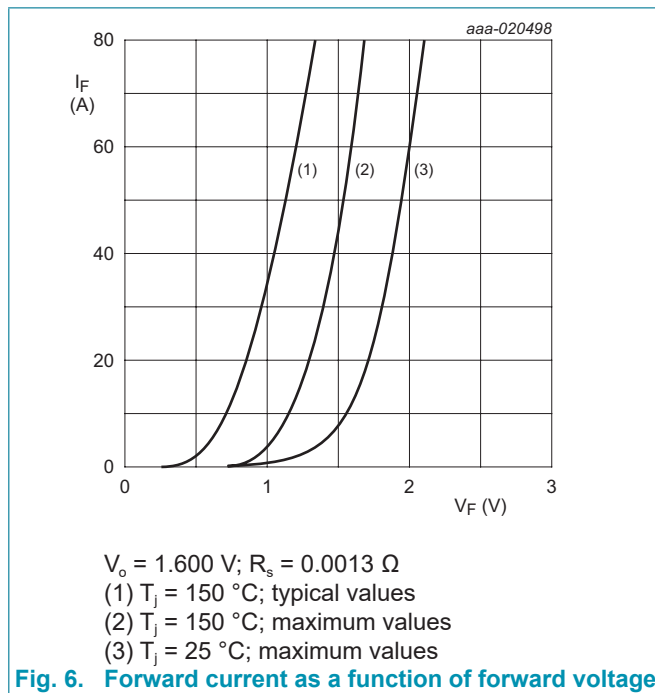


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

### 10. Characteristics

Table 7. Characteristics

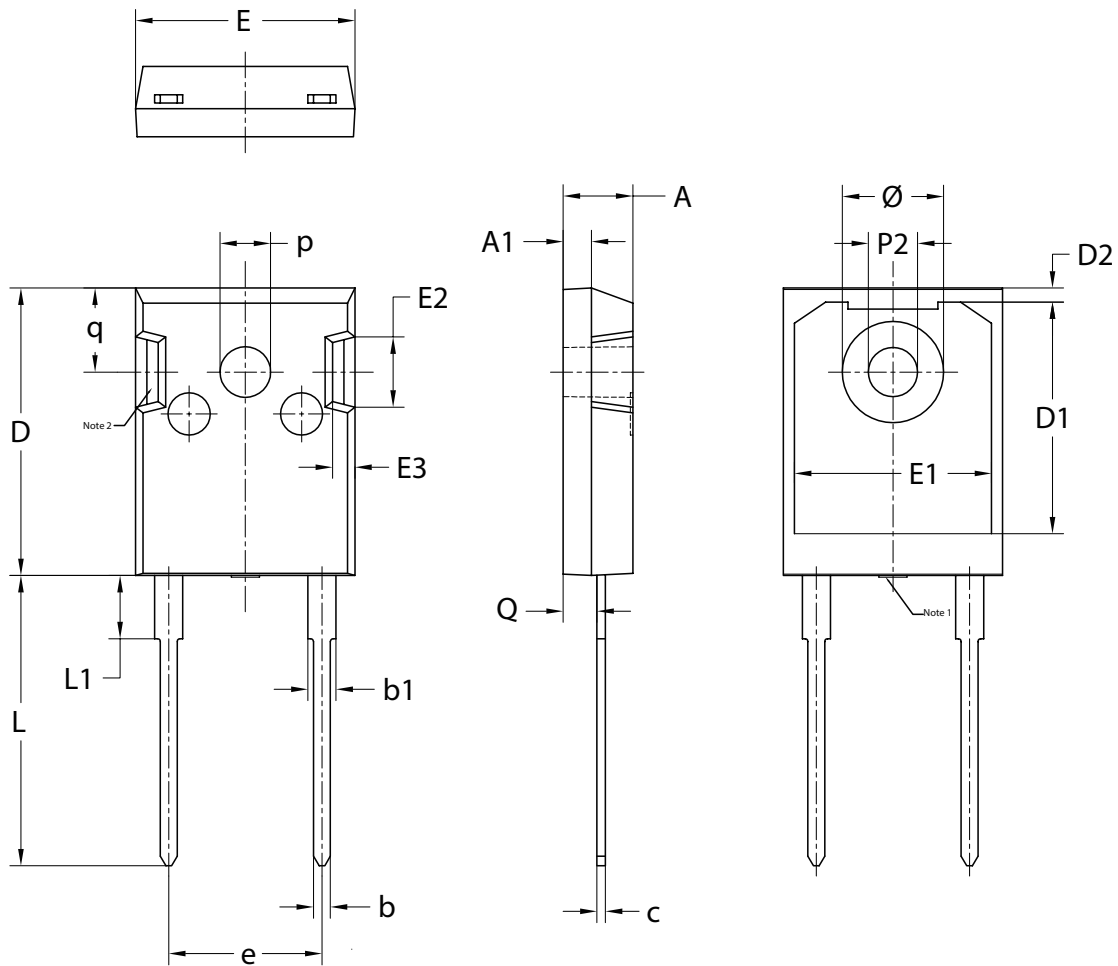
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static characteristics</b>						
$V_F$	forward current	$I_F = 60 \text{ A}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.55	2	V
		$I_F = 60 \text{ A}; T_j = 150 \text{ }^\circ\text{C}; \text{ Fig. 6}$	-	1.2	1.6	V
$I_R$	reverse current	$V_R = 600 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600 \text{ V}; T_j = 125 \text{ }^\circ\text{C}$	-	-	500	$\mu\text{A}$
<b>Dynamic characteristics</b>						
$Q_r$	reverse charge	$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	143	-	nC
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	876	-	nC
$t_{rr}$	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	-	55	ns
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	53	-	ns
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	120	-	ns
$I_{RM}$	peak reverse recovery current	$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 25 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	5.4	-	A
		$I_F = 60 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 200 \text{ A}/\mu\text{s}; T_j = 125 \text{ }^\circ\text{C}; \text{ Fig. 7}$	-	14.5	-	A



### 11. Package outline

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

TO247-2L



UNIT	A	A <sub>1</sub>	b	b <sub>1</sub>	c	D	D <sub>1</sub> ⊕	D <sub>2</sub>	E	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	e	L	L <sub>1</sub>	P <sub>2</sub>	p	Q	q	Ø
mm	5.20	2.10	1.40	2.20	0.70	20.60	16.20	1.20	15.75	14.22	5.20	1.80	10.90	20.72	4.75	3.60	3.70	2.60	6.18	7.30
	4.70	1.90	1.00	1.80	0.50	20.30	16.87	0.80	15.45	13.82	4.80	1.40	BSC	20.22	4.25	3.40	3.50	2.20	5.78	7.10

Note:

1. Mold resin protrusion max 0.127mm.
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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