

1. General description

Ultrafast power diode in a TO-247 (True 2- pin) plastic package.

2. Features and benefits

- Low thermal resistance
- Low leakage current
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT
- Increased creepage distance

3. Applications

- Active PFC in air conditioner
- Continuous Current Mode (CCM) Power Factor Correction (PFC)
- Half-bridge / full-bridge switched-mode power supplies

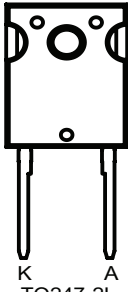

4. Quick reference data

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	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 122$ °C; Fig. 1 ; Fig. 2 ; Fig. 3	40			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 122$ °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	290			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	-	1.13	1.6	V
		$I_F = 40$ A; $T_j = 150$ °C; Fig. 6	-	0.97	1.45	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $di_F/dt = 50$ A/ μ s; $T_j = 25$ °C; Fig. 7	-	52	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p>K A TO247-2L</p>	 <p>K — <— A 001aaa020</p>
2	A	anode		
mb	mb	mounting base; connected to cathode		

6. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BYV40W-600P	TO247-2L	Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 2 leads TO-247	TO247A-2L

7. Marking

Table 4. Marking codes

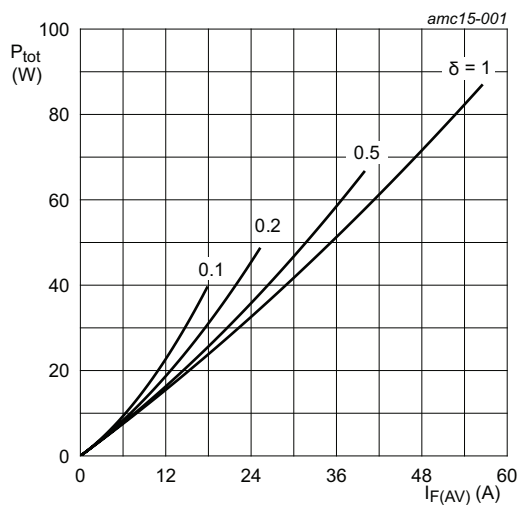
Type number	Marking codes
BYV40W-600P	BYV40W-600P

8. Limiting values

Table 5. Limiting values

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

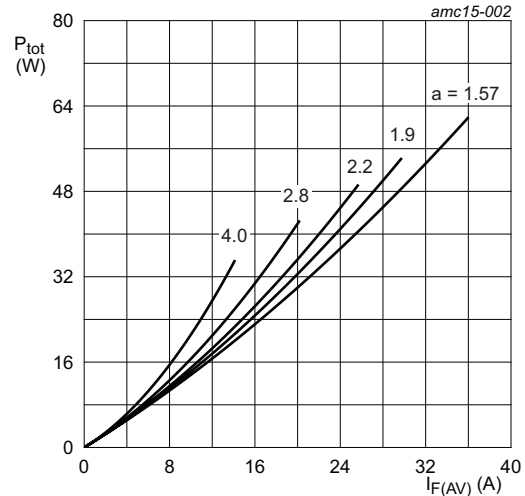
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 122\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3	40	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 122\text{ }^\circ\text{C}$; square-wave pulse	80	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; Fig. 4	290	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse;	330	A
T_{stg}	storage temperature		-55 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.224\text{ V}; R_s = 0.0056\text{ }\Omega$$

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



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

$$V_o = 1.224\text{ V}; R_s = 0.0056\text{ }\Omega$$

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

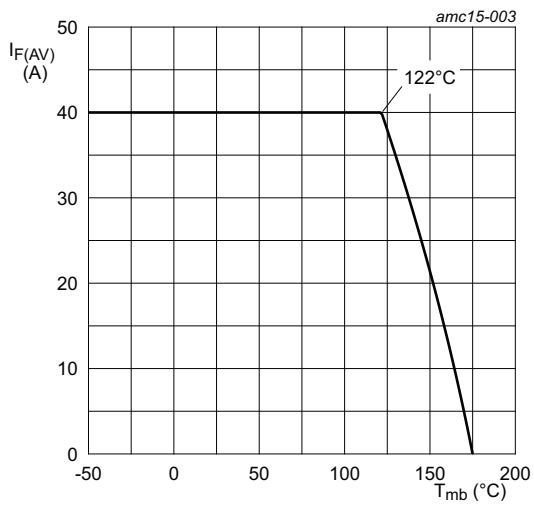


Fig. 3. Forward current as a function of mounting base temperature; maximum values

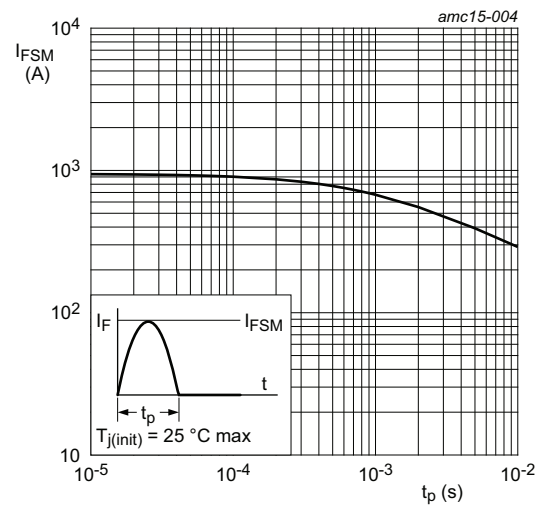


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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	Fig. 5	-	-	0.8	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	40	-	K/W

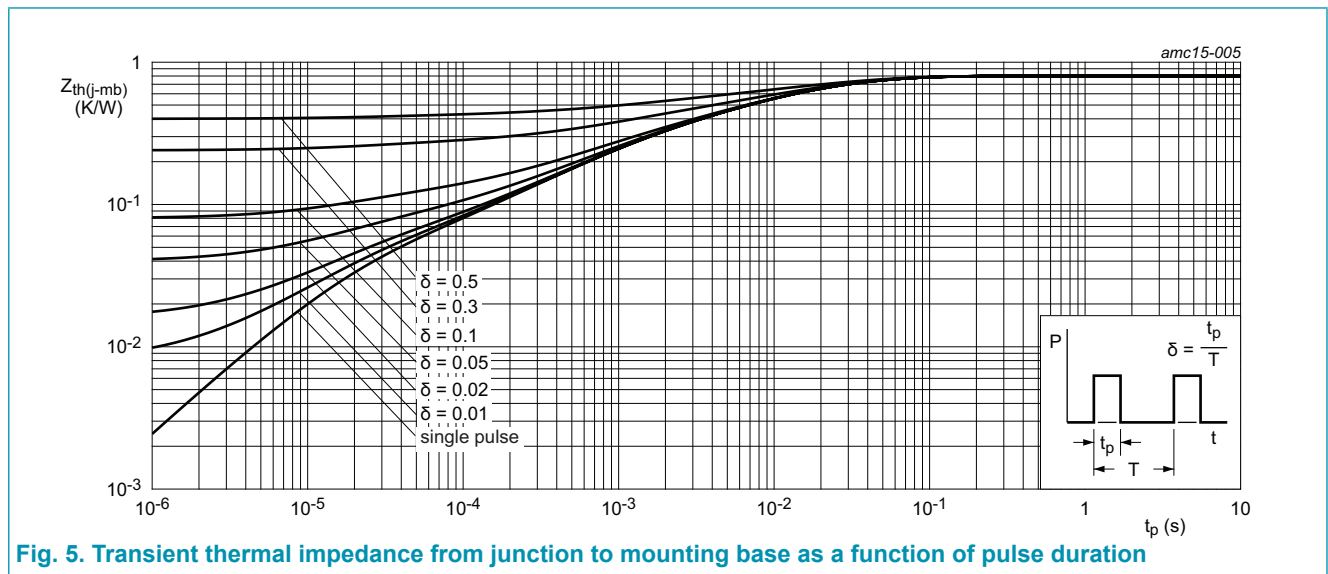
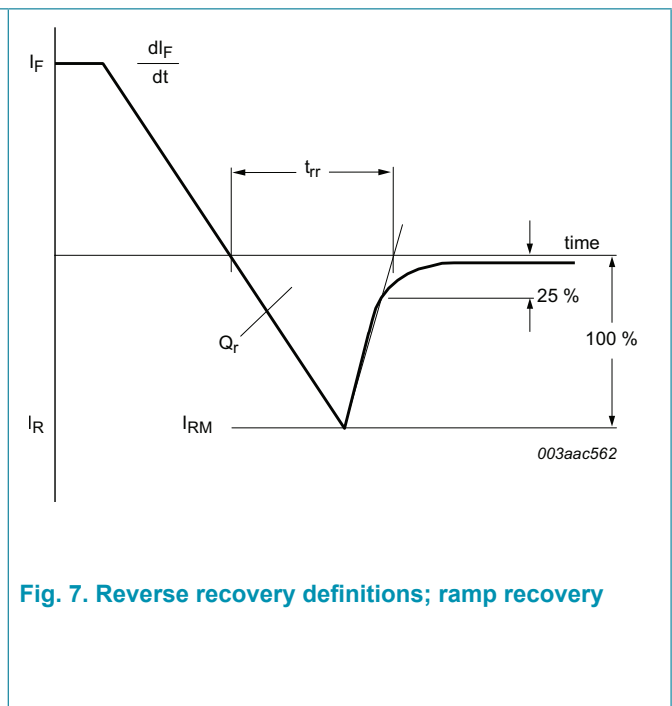
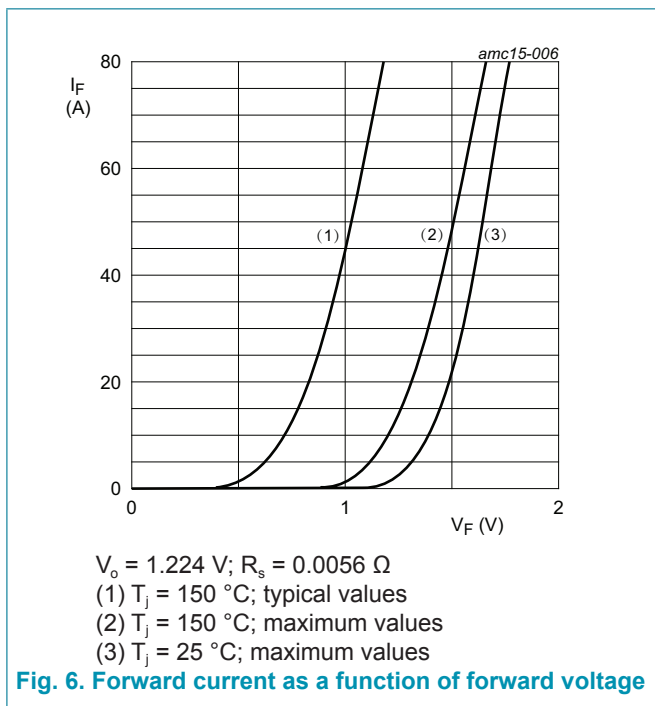


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

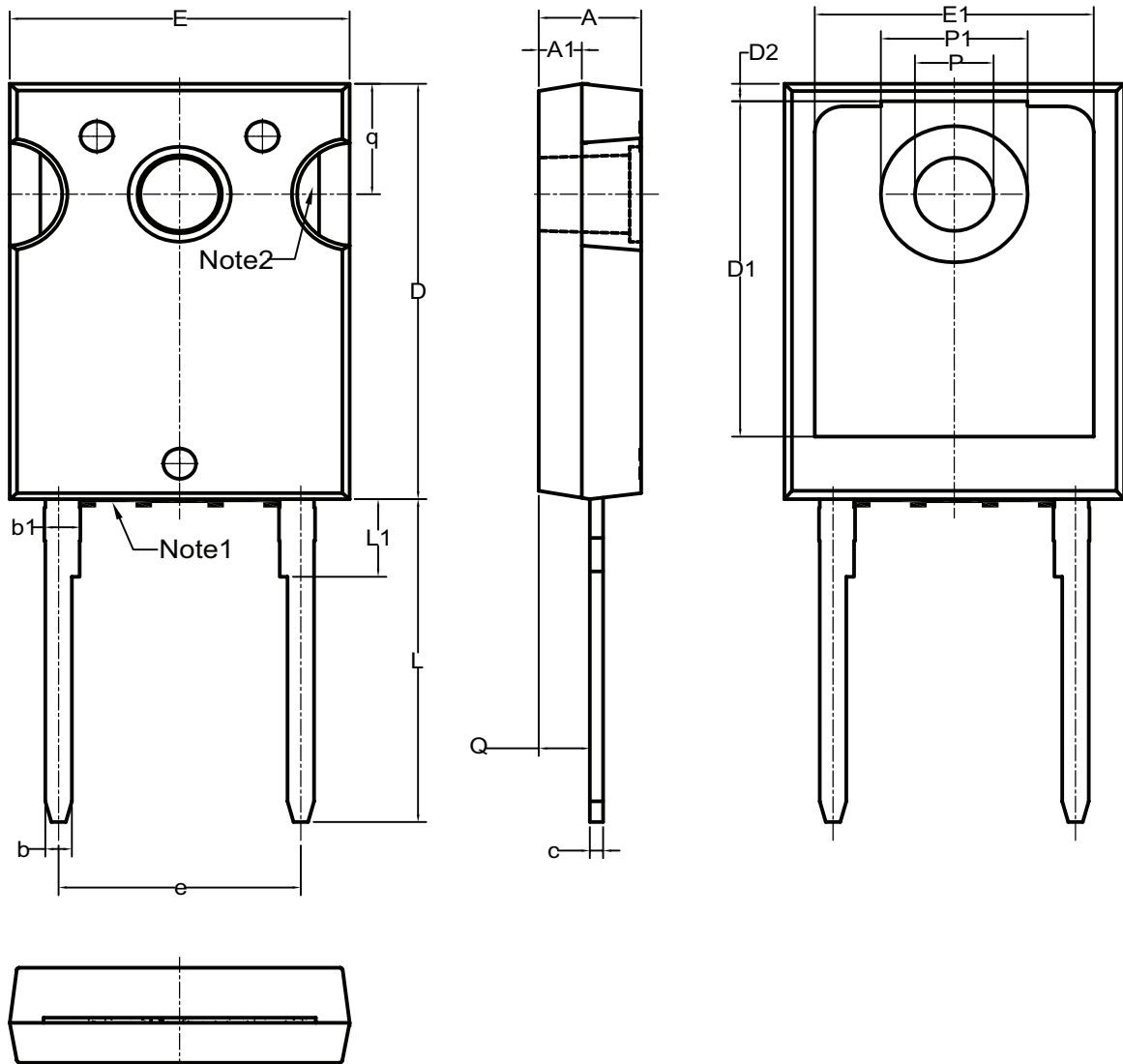
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward current	I _F = 40 A; T _j = 25 °C; Fig. 6	-	1.13	1.6	V
		I _F = 40 A; T _j = 150 °C; Fig. 6	-	0.97	1.45	V
I _R	reverse current	V _R = 600 V; T _j = 25 °C	-	-	10	μA
		V _R = 600 V; T _j = 150 °C	-	-	1	mA
Dynamic characteristics						
Q _r	reverse charge	I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7	-	416	-	nC
		I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7	-	1208	-	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	-	52	-	ns
		I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7	-	79	-	ns
		I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7	-	136	-	ns
		I _F = 40 A; V _R = 400 V; di _F /dt = 500 A/μs; T _j = 25 °C; Fig. 7	-	74	-	ns
I _{RM}	peak reverse recovery current	I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 25 °C; Fig. 7	-	11	-	A
		I _F = 40 A; V _R = 400 V; di _F /dt = 200 A/μs; T _j = 125 °C; Fig. 7	-	18	-	A



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	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

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.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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Date of release: 8 September 2017
