

1. General description

Dual ultrafast power diodes in a TO220 plastic package.

2. Features and benefits

- Low forward voltage drop
- Low leakage current
- Soft reverse recovery characteristics
- High thermal cycling performance

3. Applications

- Home appliance power supply
- Discontinuous Current Mode (DCM) Power Factor Correction (PFC)

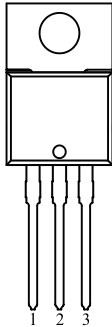
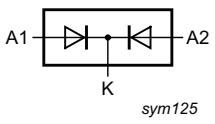
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Values			Unit
Absolute maximum rating						
V_R	repetitive peak reverse voltage	DC	600			V
$I_{O(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 124\text{ °C}$; square-wave pulse; both diodes conducting	20			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 140\text{ °C}$; square-wave pulse; per diode	20			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse; per diode; Fig. 4	120			A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse; per diode	132			A
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V_F	forward voltage	$I_F = 10\text{ A}$; $T_j = 25\text{ °C}$; per diode; Fig. 6	-	1.3	1.7	V
		$I_F = 10\text{ A}$; $T_j = 150\text{ °C}$; per diode; Fig. 6	-	1.0	1.35	V
Dynamic characteristics						
t_{rr}	reverse recovery time	$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 100\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; per diode; Fig. 7	-	30	50	ns
		$I_F = 1\text{ A}$; $V_R = 30\text{ V}$; $dI_F/dt = 50\text{ A}/\mu\text{s}$; $T_j = 25\text{ °C}$; per diode; Fig. 7	-	40	55	ns
		$I_F = 0.5\text{ A}$; $I_{rr} = 0.25\text{ A}$; $I_R = 1\text{ A}$; $T_j = 25\text{ °C}$; per diode	-	-	35	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A1	anode 1		
2	K	cathode		
3	A2	anode 2		
mb	K	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
BYV410-600P	TO220	BYV410-600PQ	Tube	50	TO220E	26-April-2019

7. Marking

Table 4. Marking codes

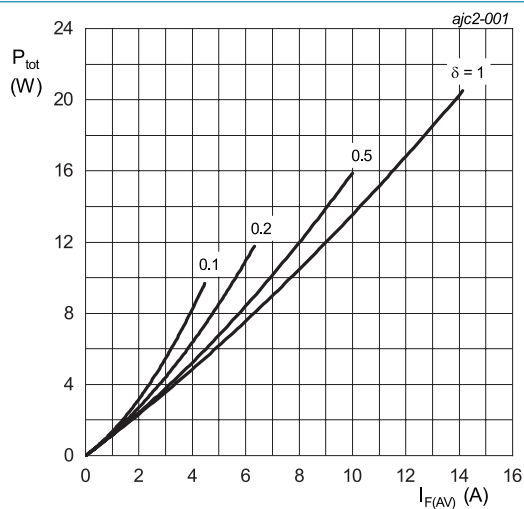
Type number	Marking codes
BYV410-600P	BYV410-600P

8. Limiting values

Table 5. Limiting values

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

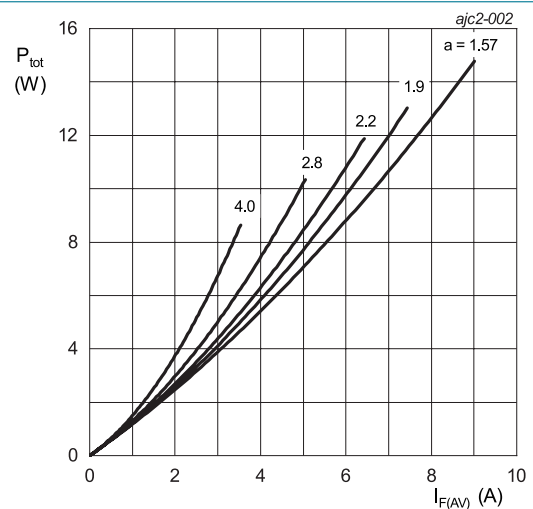
Symbol	Parameter	Conditions	Values	Unit
V_{RRM}	repetitive peak reverse voltage		600	V
V_{RWM}	crest working reverse voltage		600	V
V_R	reverse voltage	DC	600	V
$I_{O(AV)}$	average forward current	$\delta = 0.5$; $T_{mb} \leq 124\text{ }^\circ\text{C}$; square-wave pulse; both diodes conducting; Fig. 1; Fig. 2; Fig. 3	20	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 140\text{ }^\circ\text{C}$; square-wave pulse; per diode	20	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; per diode; Fig. 4	120	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse; per diode	132	A
T_{stg}	storage temperature		-55 to 175	$^\circ\text{C}$
T_j	junction temperature		175	$^\circ\text{C}$



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

$$V_o = 1.119\text{ V}; R_s = 0.0235\text{ }\Omega$$

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



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

$$V_o = 1.119\text{ V}; R_s = 0.0235\text{ }\Omega$$

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

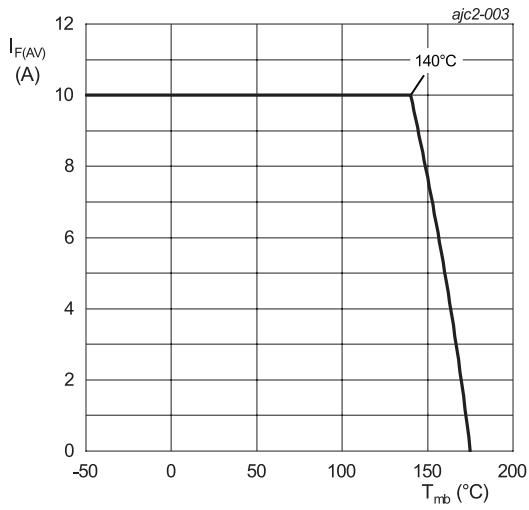


Fig. 3. Current derating as a function of mounting base temperature; per diode

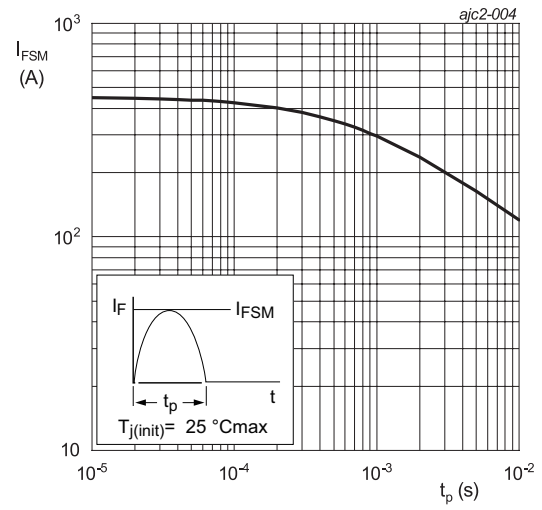


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values; per diode

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	with heatsink compound; per diode; Fig. 5	-	-	2.2	K/W
		with heatsink compound; both diodes conducting; Fig. 5	-	-	1.6	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air	-	55	-	K/W

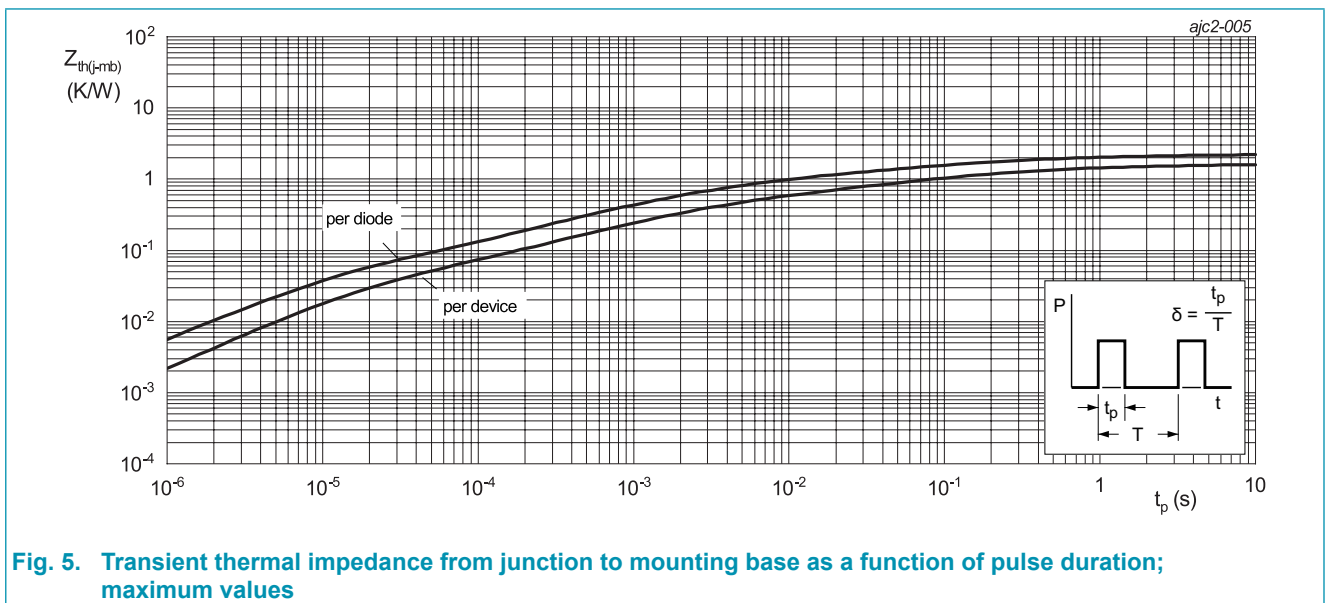
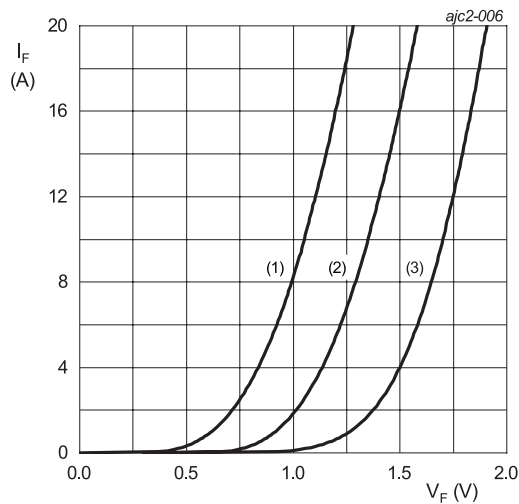


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
V _F	forward voltage	I _F = 10 A; T _J = 25 °C; Fig. 6	-	1.3	1.7	V
		I _F = 10 A; T _J = 150 °C; Fig. 6	-	1.0	1.35	V
I _R	reverse current	V _R = 600 V; T _J = 25 °C	-	1	10	µA
		V _R = 600 V; T _J = 150 °C	-	0.1	0.5	mA
Dynamic characteristics						
Q _r	recovered charge	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/µs; T _J = 25 °C; per diode; Fig. 7	-	22	-	nC
t _{rr}	reverse recovery time	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/µs; T _J = 25 °C; per diode; Fig. 7	-	30	50	ns
		I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/µs; T _J = 25 °C; per diode; Fig. 7	-	40	55	ns
		I _F = 0.5 A; I _{rr} = 0.25 A; I _R = 1 A; T _J = 25 °C; per diode	-	-	35	ns
I _{RM}	peak reverse recovery current	I _F = 1 A; V _R = 30 V; dI _F /dt = 100 A/µs; T _J = 25 °C; per diode; Fig. 7	-	1.6	-	A
		I _F = 1 A; V _R = 30 V; dI _F /dt = 50 A/µs; T _J = 25 °C; per diode; Fig. 7	-	1.1	-	A
E _{as}	non-repetitive avalanche energy	I _R = 4.8 A; T _{J(init)} = 25 °C; L = 15 mH	130	175	-	mJ



(1) T_J = 150 °C; typical values
 (2) T_J = 150 °C; maximum values
 (3) T_J = 25 °C; maximum values
 V₀ = 1.119 V; R_s = 0.0235 Ω

Fig. 6. Forward current as a function of forward voltage, per diode

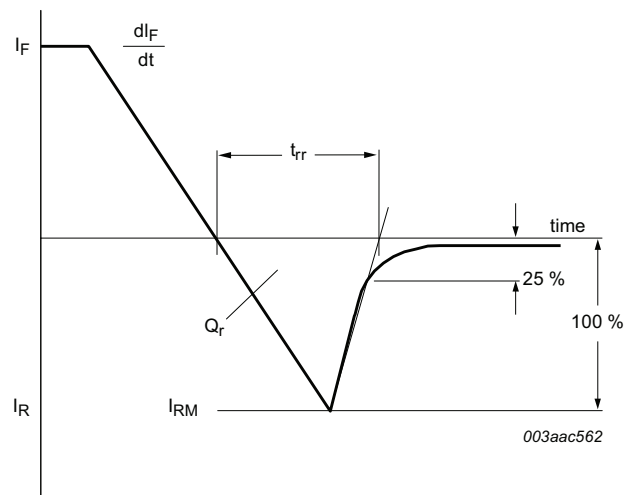
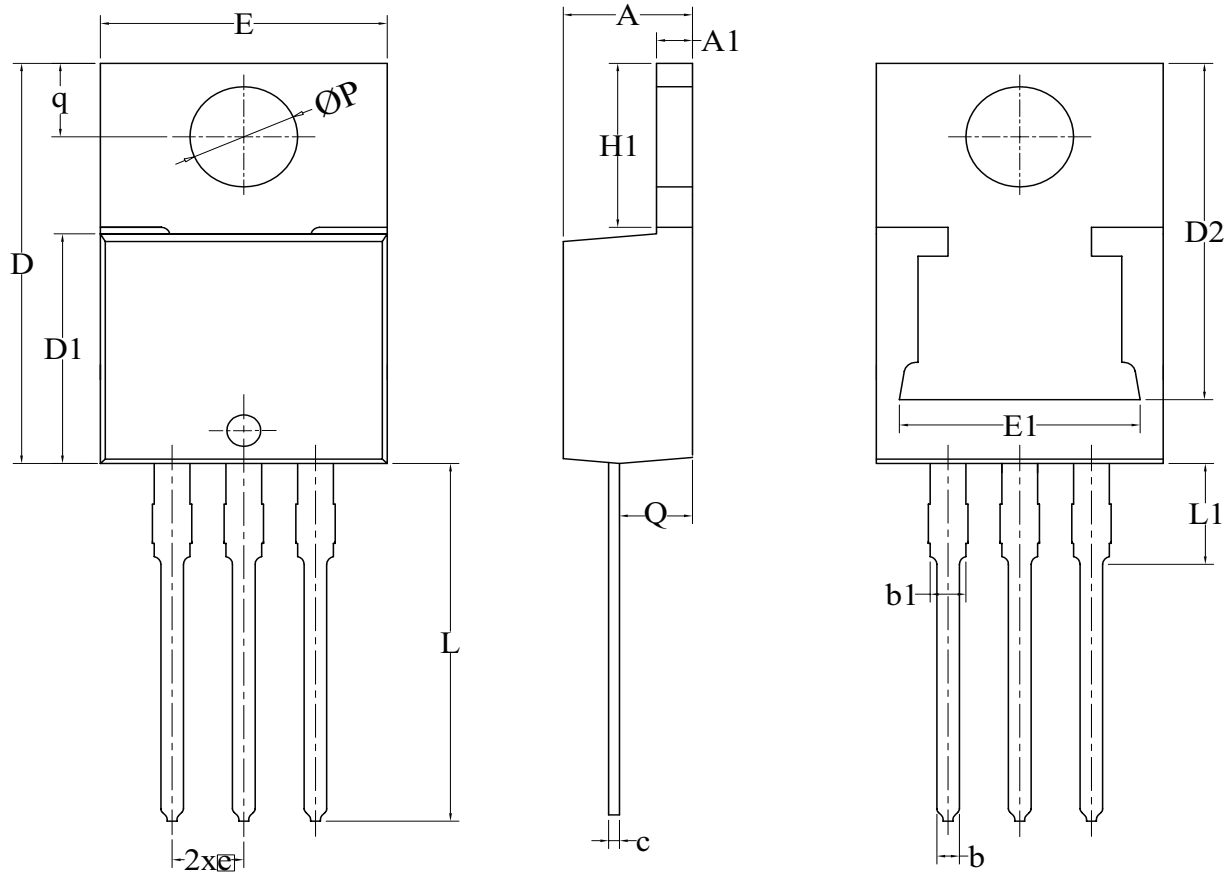


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended package;heatsink mounted;1 mounting hole; 3 leads TO-220AB

TO220



Unit	A	A1	b	b1	c	D	D1	D2	E	E1	e	H1	L	L1	P	Q	q
MM	min	4.35	1.14	0.69	1.20	0.36	14.95	8.50	12.20	10.00	8.25	6.00	13.00	3.40	3.70	2.40	2.60
	max	4.75	1.40	1.01	1.45	0.61	15.55	9.02	12.88	10.40	8.89	6.40	14.00	3.80	3.95	2.80	3.00

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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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