

1. General description

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



2. Features and benefits

- Excellent avalanche energy robustness
- Low leakage current
- Low thermal resistance
- Low reverse recovery current
- Reduces switching losses in associated MOSFET or IGBT

3. Applications

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

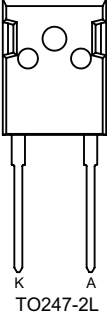
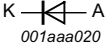
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{RRM}	repetitive peak reverse voltage			650			V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 109$ °C; Fig. 1 ; Fig. 2 ; Fig. 3		30			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25$ μ s; $T_{mb} \leq 109$ °C; square-wave pulse		60			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10$ ms; $T_{j(imit)} = 25$ °C; sine-wave pulse; Fig. 4		270			A
		$t_p = 8.3$ ms; $T_{j(imit)} = 25$ °C; sine-wave pulse		297			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 30$ A; $T_j = 25$ °C; Fig. 6		-	2.05	2.75	V
		$I_F = 30$ A; $T_j = 150$ °C; Fig. 6		-	1.38	1.80	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1$ A; $V_R = 30$ V; $dI_F/dt = 200$ A/ μ s; $T_j = 25$ °C; Fig. 7		-	20	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 <p style="text-align: center;">TO247-2L</p>	
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
BYC30MW-650PT2	TO247-2L	BYC30MW-650PT2Q	Tube	30	TO247L-2L	10-Nov-2020

7. Marking

Table 4. Marking codes

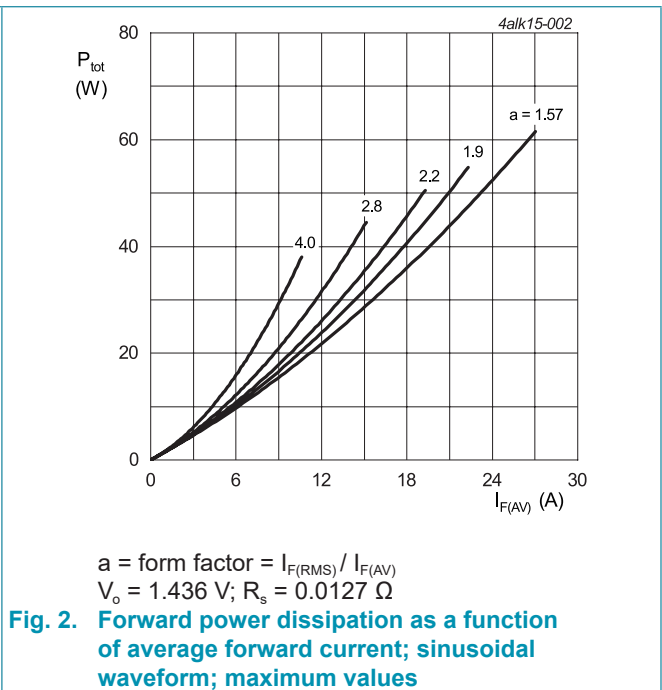
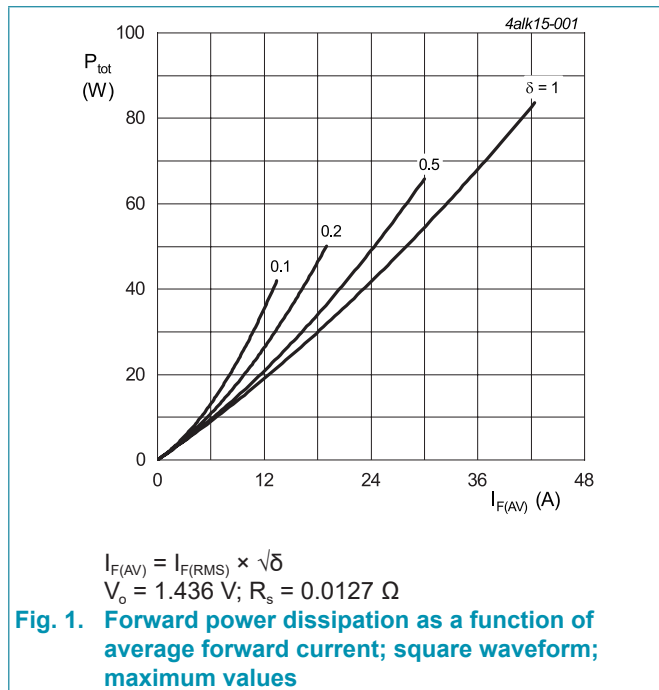
Type number	Marking codes
BYC30MW-650PT2	BYC30MW 650PT2

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{RRM}	repetitive peak reverse voltage			650	V
V_{RWM}	crest working reverse voltage			650	V
V_R	reverse voltage	DC		650	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse; $T_{mb} \leq 109\text{ }^\circ\text{C}$; Fig. 1 ; Fig. 2 ; Fig. 3		30	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\text{ }\mu\text{s}$; $T_{mb} \leq 109\text{ }^\circ\text{C}$; square-wave pulse		60	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		270	A
		$t_p = 8.3\text{ ms}$; $T_{j(\text{init})} = 25\text{ }^\circ\text{C}$; sine-wave pulse		297	A
T_{stg}	storage temperature			-65 to 175	$^\circ\text{C}$
T_j	junction temperature			-65 to 175	$^\circ\text{C}$



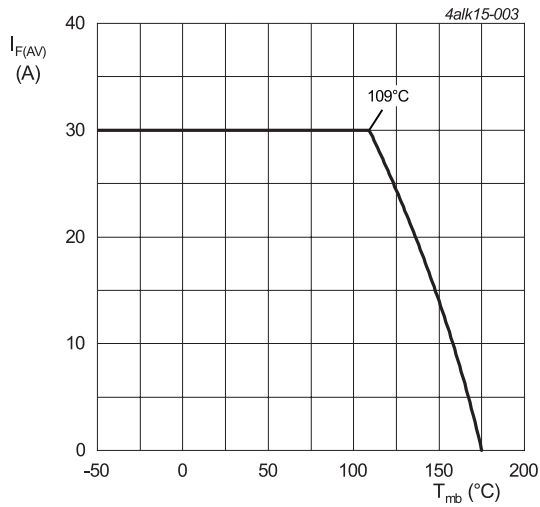


Fig. 3. Forward current as a function of mounting base temperature; maximum values

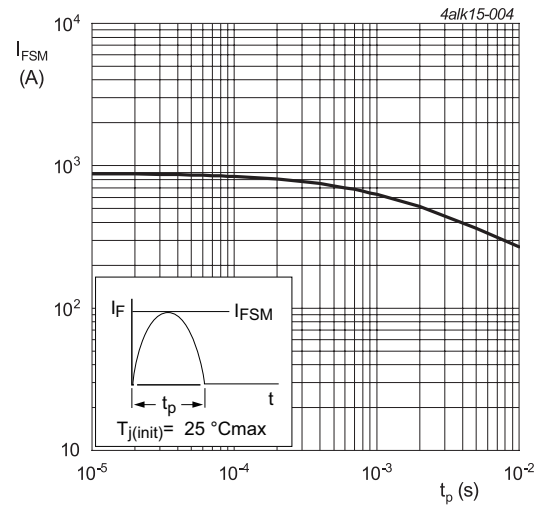


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	Fig. 5		-	-	1	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	45	-	K/W

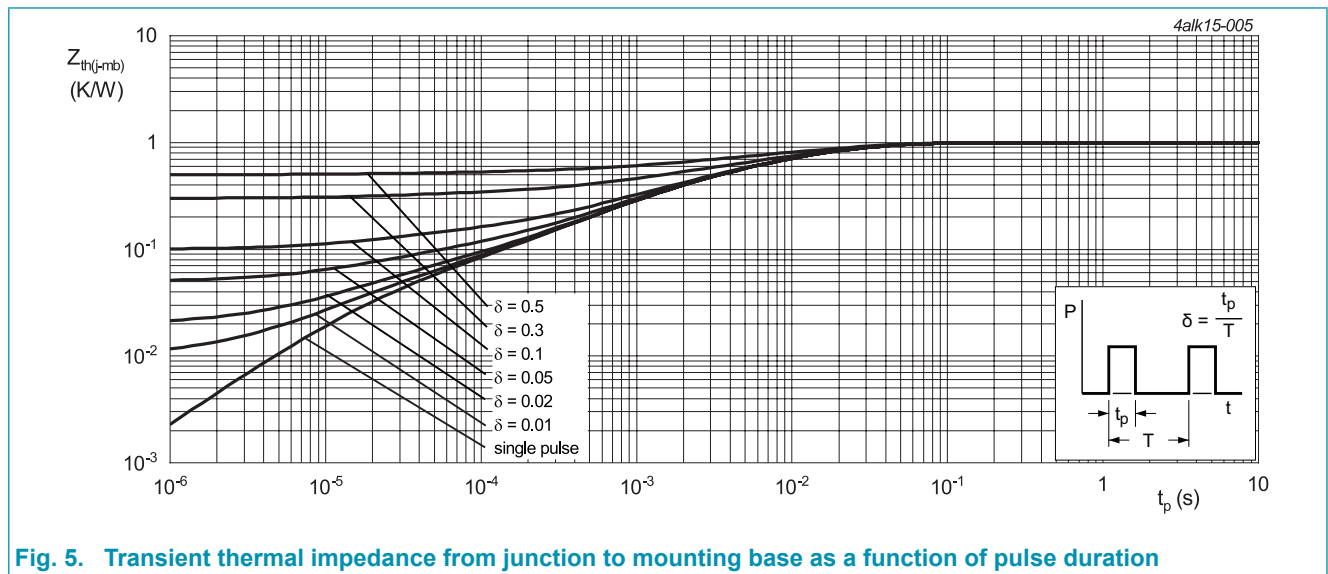
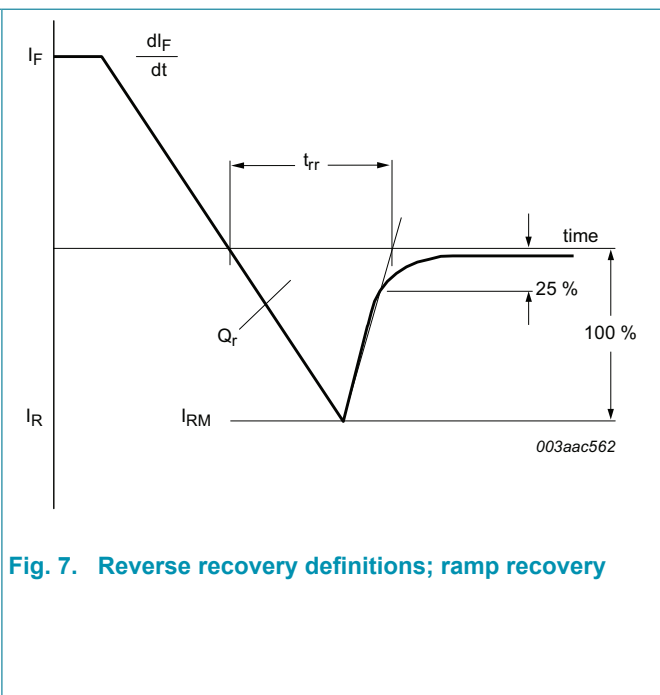
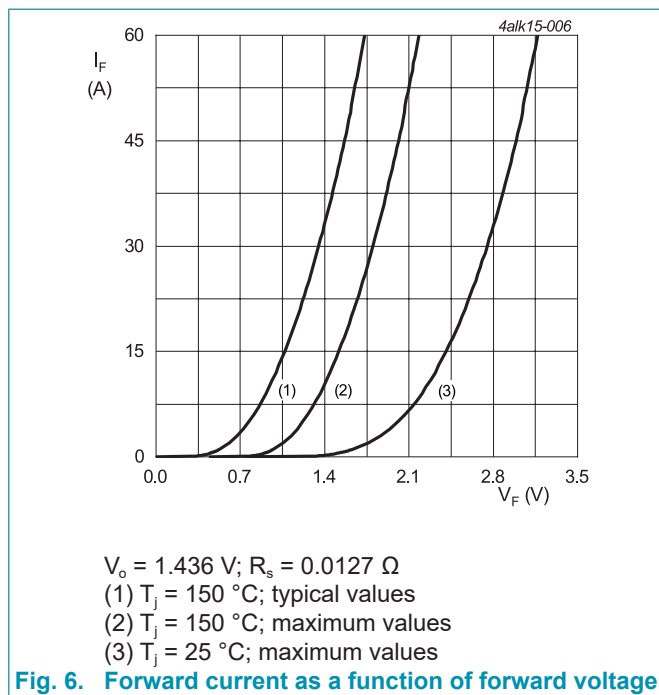


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

10. Characteristics

Table 7. Characteristics

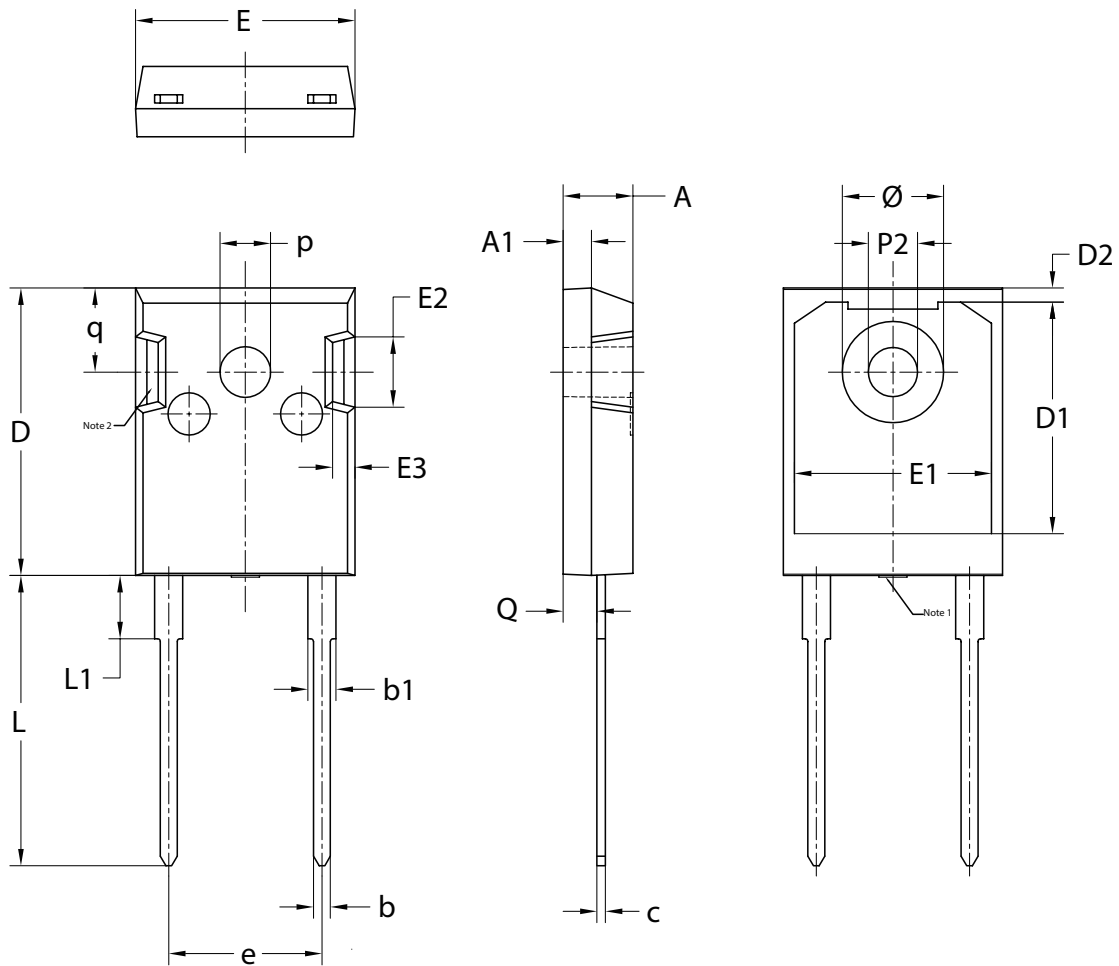
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 30\text{ A}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 6}$		-	2.05	2.75	V
		$I_F = 30\text{ A}; T_j = 150\text{ }^\circ\text{C}; \text{Fig. 6}$		-	1.38	1.80	V
I_R	reverse current	$V_R = 650\text{ V}; T_j = 25\text{ }^\circ\text{C}$		-	0.6	30	μA
		$V_R = 650\text{ V}; T_j = 150\text{ }^\circ\text{C}$		-	0.25	1	mA
Dynamic characteristics							
Q_r	reverse charge	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	68	-	nC
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 7}$		-	330	-	nC
t_{rr}	reverse recovery time	$I_F = 1\text{ A}; V_R = 30\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	20	-	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	38	-	ns
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 7}$		-	73	-	ns
I_{RM}	peak reverse recovery currentnon-repetitive avalanche energy	$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 25\text{ }^\circ\text{C}; \text{Fig. 7}$		-	3.7	-	A
		$I_F = 30\text{ A}; V_R = 200\text{ V}; dI_F/dt = 200\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}; \text{Fig. 7}$		-	9.1	-	A
E_{as}	non-repetitive avalanche energy	$T_{j(\text{init})} = 25\text{ }^\circ\text{C}$		30	-	-	mJ



11. Package outline

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 ⊕	D ₂	E	E ₁	E ₂	E ₃	e	L	L ₁	P ₂	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

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.
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- [2] The term 'short data sheet' is explained in section "Definitions".
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13. Contents

1. General description.....	1
2. Features and benefits	1
3. Applications	1
4. Quick reference data.....	1
5. Pinning information.....	2
6. Ordering information.....	2
7. Marking.....	2
8. Limiting values	3
9. Thermal characteristics	5
10. Characteristics.....	6
11. Package outline	7
12. Legal information	8
13. Contents	10

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