BYC60MW-650PT2

Hyperfast power diode

Rev.02 - 25 January 2024 Product data sheet

1. General description

Hyperfast 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
- Package meets UL94V0 which guaranteed by Epoxy Mold Compound

3. Applications

- UPS
- EV Charger
- Welding Machine
- Air Conditioner

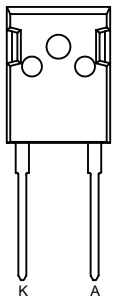
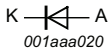
4. Quick reference data

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	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 120$ °C; Fig. 1; Fig. 2; Fig. 3		60			A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 120$ °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**	**Notes**	**Min**	**Typ**	**Max**	**Unit**
Static characteristics							
V_F	forward voltage	I_F = 60 A; T_j = 25 °C; Fig. 6		-	1.75	2.20	V
		I_F = 60 A; T_j = 150 °C; Fig. 6		-	1.33	1.75	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		-	40	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	K	cathode	 TO247-2L	
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
BYC60MW-650PT2	TO247-2L	BYC60MW-650PT2Q	Tube	30	TO247L-2L (L)	10-Nov-2020
					TO247P-2L (P)	31-Mar-2023

7. Marking

Table 4. Marking codes

Type number	Marking codes	
	Assembly factory: L	Assembly factory: P
BYC60MW-650PT2	BYC60MW 650PT2 PJLxxxx xx	BYC60MW 650PT2 PJPxxxx xx

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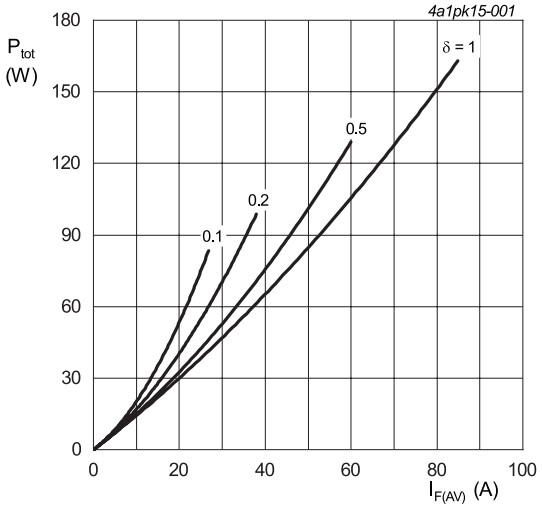
8. Limiting values

Table 5. Limiting values

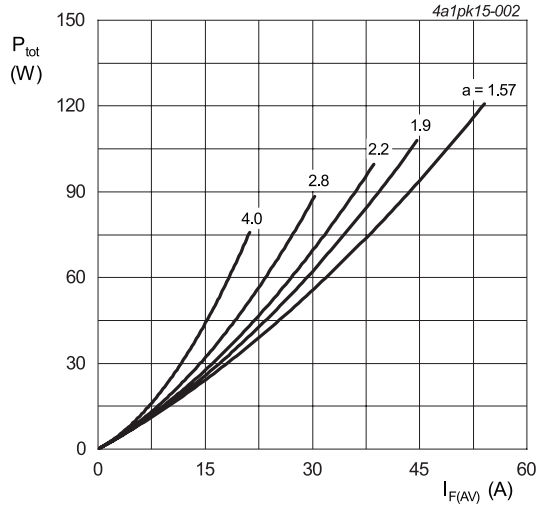
In accordance with the Absolute Maximum Rating System (IEC 60134).

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	δ = 0.5 ; square-wave pulse; $T_{mb} \leq 120$ °C; Fig. 1; Fig. 2; Fig. 3		60	A
I_{FRM}	repetitive peak forward current	δ = 0.5 ; t_p = 25 µs; $T_{mb} \leq 120$ °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			A^2s
T_{stg}	storage temperature			-65 to 175	°C
T_j	junction temperature			-65 to 175	°C



$I_{F(AV)} = I_{F(RMS)} \times \sqrt{\delta}$
V_o = 1.369 V; R_s = 0.0065 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 = 1.369 V; R_s = 0.0065 Ω

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

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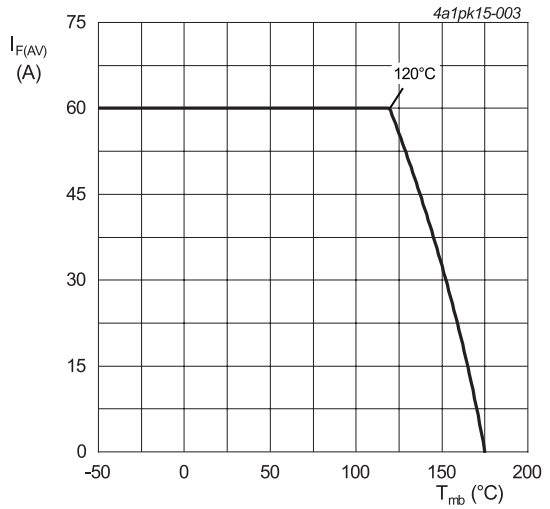

Fig. 3. Forward current as a function of mounting base temperature; maximum values

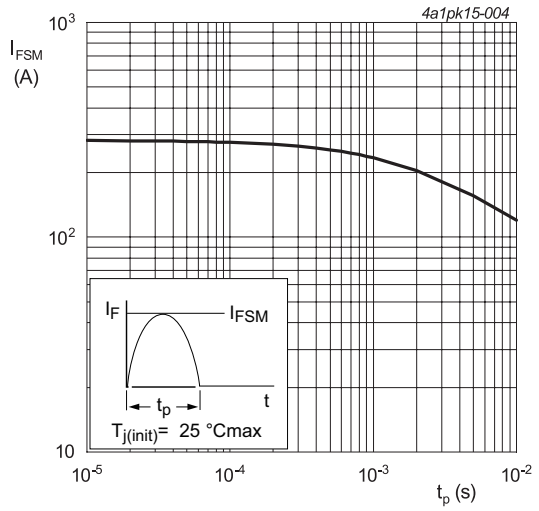

Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

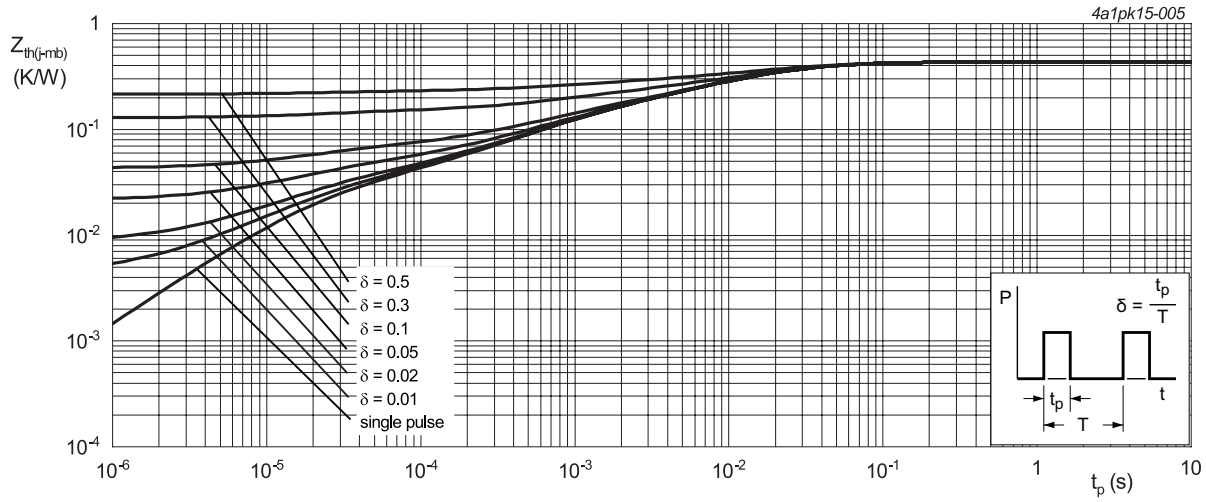

Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration

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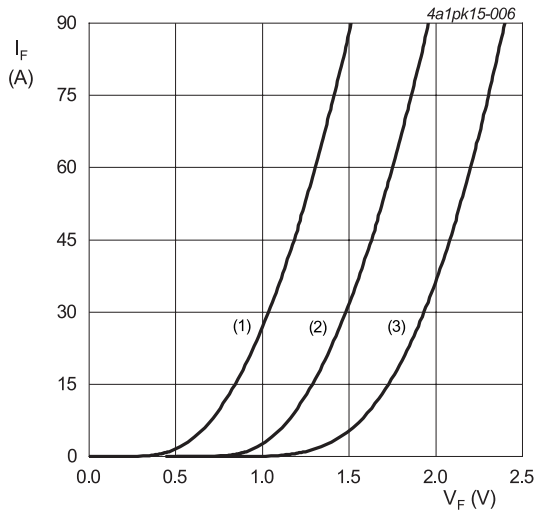
10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	I_F = 60 A; T_j = 25 °C; Fig. 6		-	1.75	2.20	V
		I_F = 60 A; T_j = 150 °C; Fig. 6		-	1.33	1.75	V
I_R	reverse current	V_R = 650 V; T_j = 25 °C		-	0.8	30	µA
		V_R = 650 V; T_j = 150 °C		-	0.2	2	mA
Dynamic characteristics							
Q_r	reverse charge	I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	215	-	nC
		I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	1100	-	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		-	40	-	ns
		I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	74	-	ns
		I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	145	-	ns
I_{RM}	peak reverse recovery current	I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 25 °C; Fig. 7		-	5.8	-	A
		I_F = 50 A; V_R = 400 V; dI_F/dt = 200 A/µs; T_j = 125 °C; Fig. 7		-	15.3	-	A
E_{as}	non-repetitive avalanche energy	$T_{j(init)}$ = 25 °C		30	-	-	mJ



V_o = 1.369 V; R_s = 0.0065 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

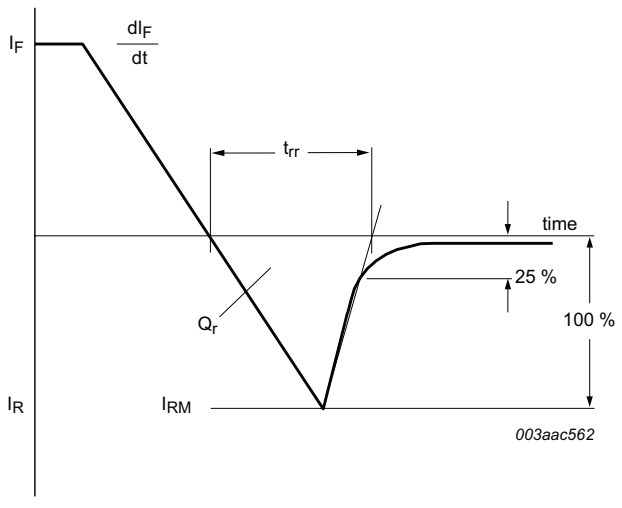


Fig. 7. Reverse recovery definitions; ramp recovery

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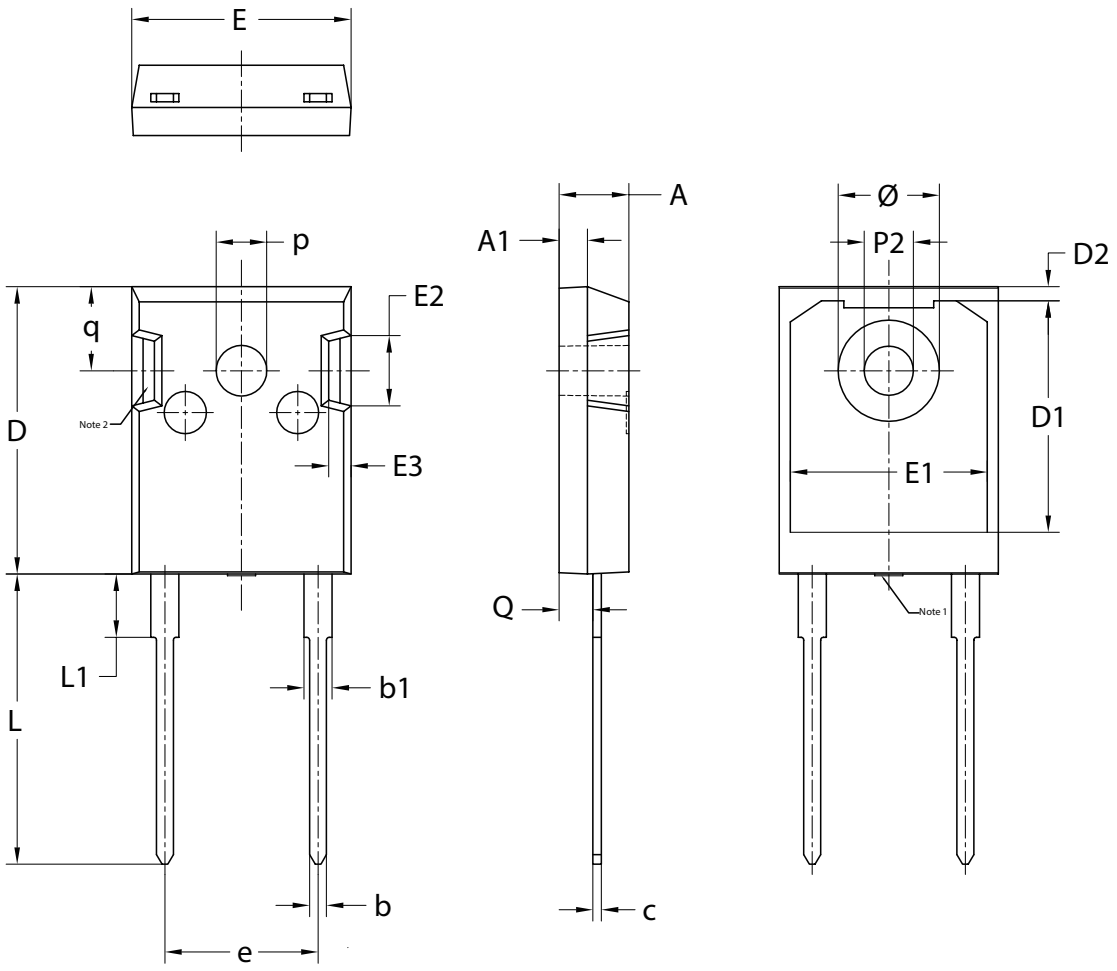
11. Package outline

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.

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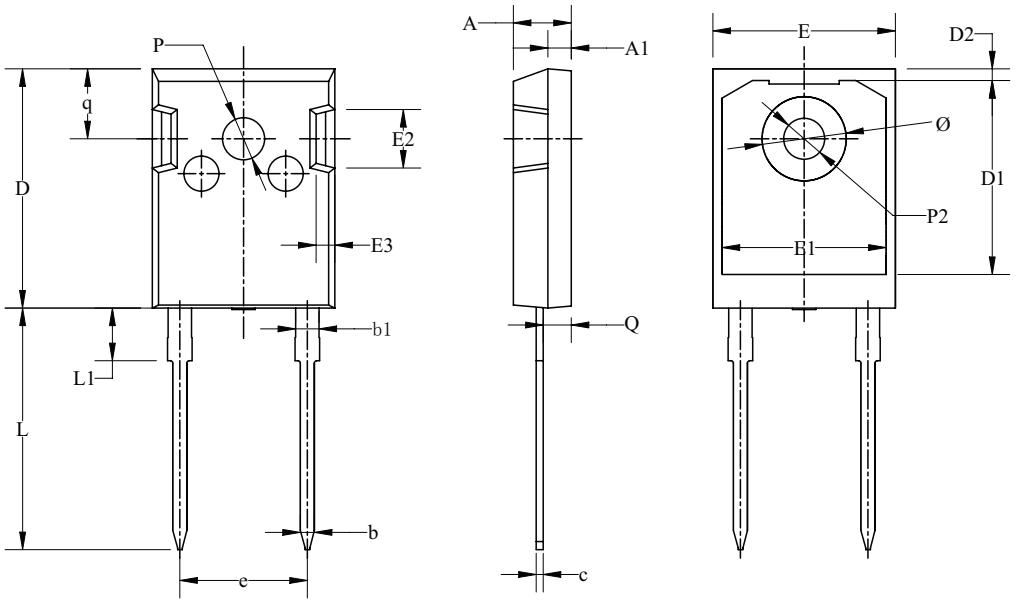
Assembly factory: P

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

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Product [short] data sheet	Production	This document contains the product specification.

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