

1. General description

Hyperfast power diode in a 3-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

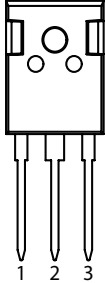
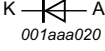
4. Quick reference data

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	$\delta = 0.5$; $T_{mb} \leq 113\text{ °C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3		80			A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 113\text{ °C}$; square-wave pulse		160			A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse; Fig. 4		500			A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse		550			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 80\ \text{A}$; $T_j = 25\text{ °C}$; Fig. 6		-	2.20	2.70	V
		$I_F = 80\ \text{A}$; $T_j = 150\text{ °C}$; Fig. 6		-	1.60	2.10	V
Dynamic characteristics							
t_{rr}	reverse recovery time	$I_F = 1\ \text{A}$; $V_R = 30\ \text{V}$; $di_F/dt = 50\ \text{A}/\mu\text{s}$; $T_j = 25\text{ °C}$; Fig. 7		-	39	-	ns

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	A	anode		
2	K	cathode		
3	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
BYC80WT-650PS	TO247	BYC80WT-650PSQ	Tube	30	TO247N	20-Jul-2016

7. Marking

Table 4. Marking codes

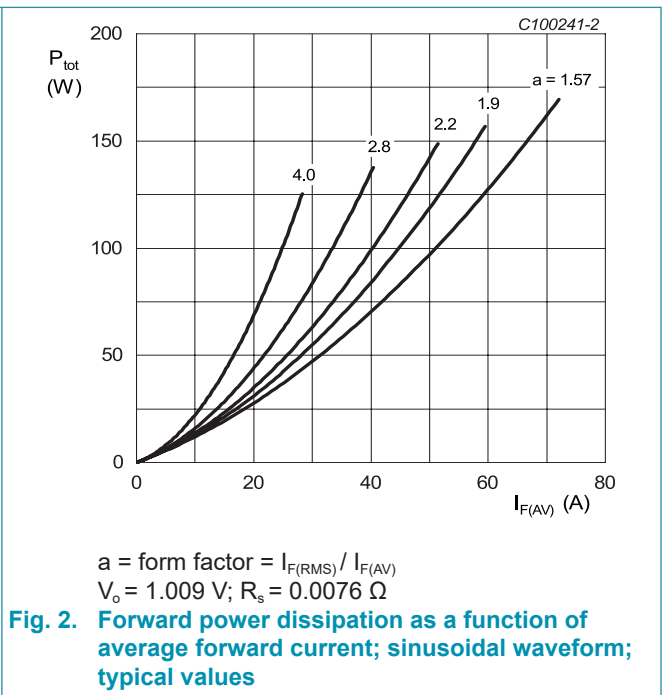
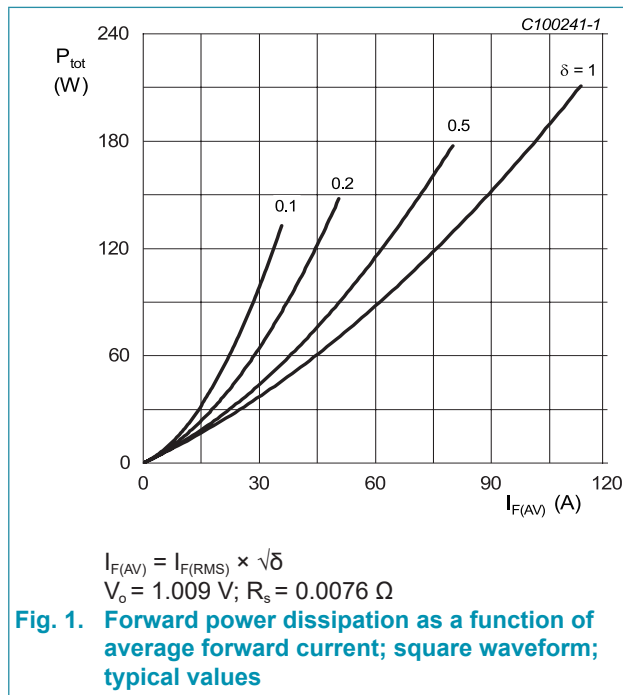
Type number	Marking codes
BYC80WT-650PS	BYC80WT 650PS

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	$\delta = 0.5$; $T_{mb} \leq 113\text{ °C}$; square-wave pulse; Fig. 1 ; Fig. 2 ; Fig. 3		80	A
I_{FRM}	repetitive peak forward current	$\delta = 0.5$; $t_p = 25\ \mu\text{s}$; $T_{mb} \leq 113\text{ °C}$; square-wave pulse		160	A
I_{FSM}	non-repetitive peak forward current	$t_p = 10\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse; Fig. 4		500	A
		$t_p = 8.3\ \text{ms}$; $T_{j(\text{init})} = 25\text{ °C}$; sine-wave pulse		550	A
T_{stg}	storage temperature			-65 to 175	°C
T_j	junction temperature			-65 to 175	°C



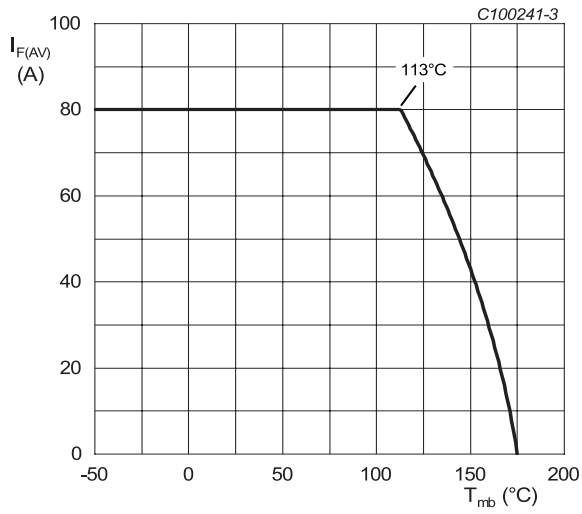


Fig. 3. Average forward current as a function of mounting base temperature; typical values

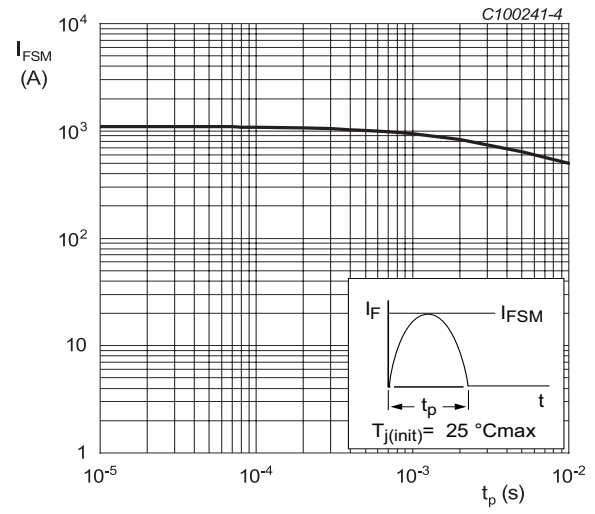


Fig. 4. Non-repetitive peak forward current as a function of pulse width; sinusoidal waveform; maximum values

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

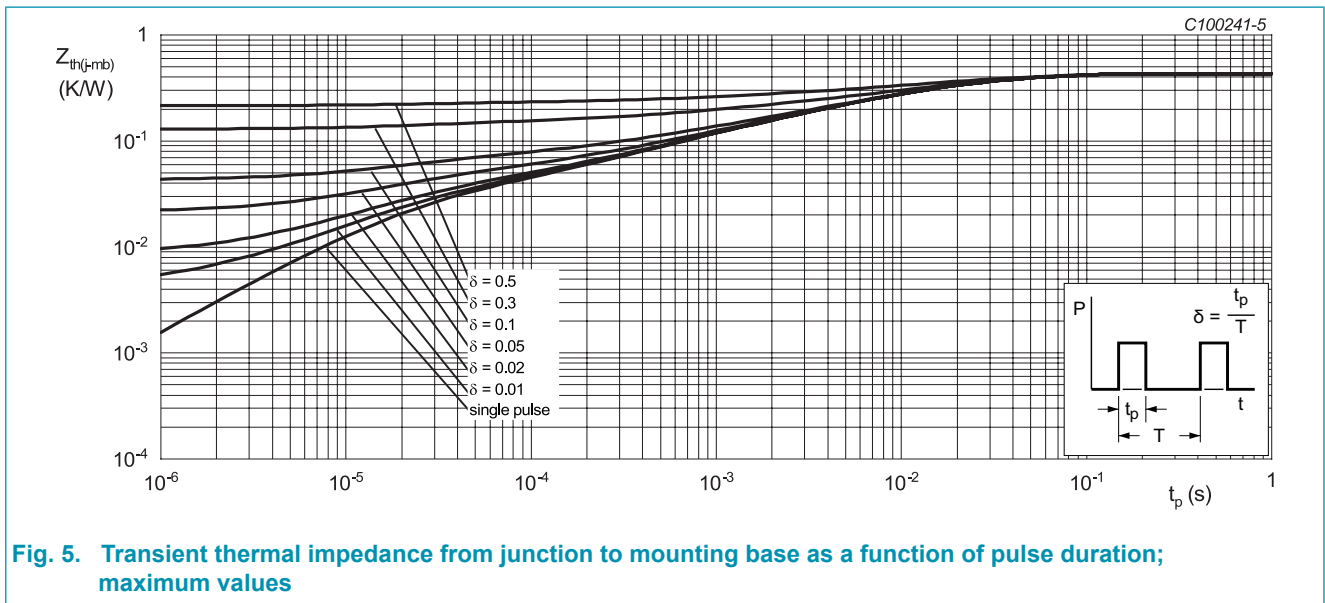
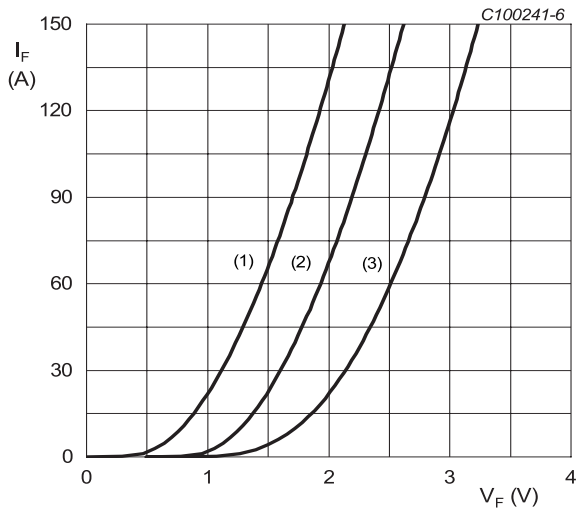


Fig. 5. Transient thermal impedance from junction to mounting base as a function of pulse duration; maximum values

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 75 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ Fig. 6		-	2.05	2.50	V
		$I_F = 75 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ Fig. 6		-	1.55	2.00	V
		$I_F = 80 \text{ A}; T_j = 25 \text{ }^\circ\text{C};$ Fig. 6		-	2.20	2.70	V
		$I_F = 80 \text{ A}; T_j = 150 \text{ }^\circ\text{C};$ Fig. 6		-	1.60	2.10	V
I_R	reverse current	$V_R = 650 \text{ V}; T_j = 25 \text{ }^\circ\text{C}$		-	0.8	30	μA
		$V_R = 650 \text{ V}; T_j = 150 \text{ }^\circ\text{C}$		-	0.2	5	mA
Dynamic characteristics							
Q_r	recovered charge	$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	299	-	nC
		$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	1140	-	nC
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	411	-	nC
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	1622	-	nC
t_{rr}	reverse recovery time	$I_F = 1 \text{ A}; V_R = 30 \text{ V}; dI_F/dt = 50 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	39	-	ns
		$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	63	-	ns
		$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	108	-	ns
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	55	-	ns
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	84	-	ns
I_{RM}	peak reverse recovery current	$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	9.5	-	A
		$I_F = 50 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 500 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	21	-	A
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 25 \text{ }^\circ\text{C};$ Fig. 7		-	14.4	-	A
		$I_F = 80 \text{ A}; V_R = 400 \text{ V}; dI_F/dt = 1000 \text{ A}/\mu\text{s};$ $T_j = 125 \text{ }^\circ\text{C};$ Fig. 7		-	28	-	A



$V_o = 1.009 \text{ V}; R_s = 0.0076 \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 6. Forward current as a function of forward voltage

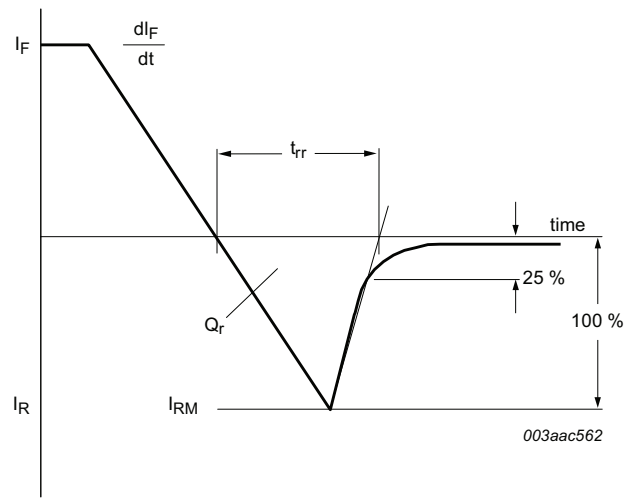
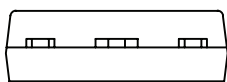
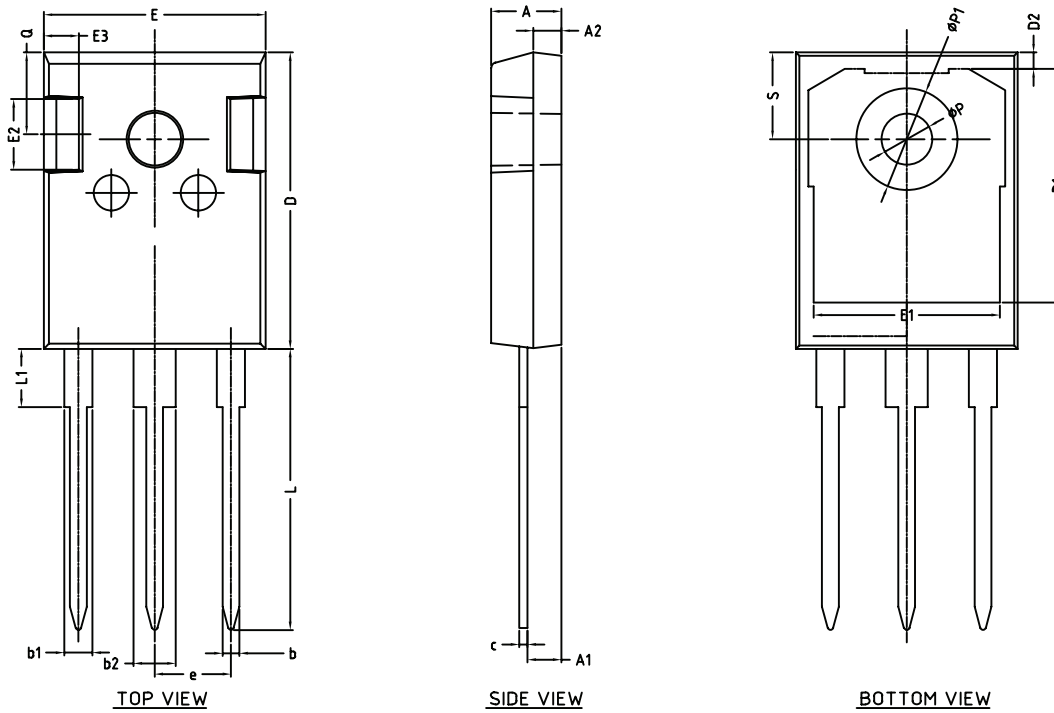


Fig. 7. Reverse recovery definitions; ramp recovery

11. Package outline

Plastic single-ended through-hole package; heatsink mounted; 1 mounting hole; 3-lead TO-247

SOT429N



SIDE VIEW

UNIT	A	A1	A2	b	b1	b2	c	D	D1	D2	E	E1	E2	E3	e	L	L1	P	P1	Q	S
mm	MAX	5.20	2.60	2.10	1.40	2.20	3.20	0.70	21.10	16.85	1.35	15.90	13.50	5.20	2.60	20.10	4.75	3.70	7.40	6.00	6.25
	NOM															5.45					
	MIN	4.70	2.20	1.90	1.00	1.80	2.80	0.50	20.90	16.25	1.05	15.70	13.10	4.80	2.40	19.80	-	3.50	-	5.60	6.05

OUTLINE VERSION	REFERENCES			PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT429N		TO-247			

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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