

DATA SHEET

BYC10-600

Rectifier diode

Freewheeling and power factor
correction

Product specification
File under Discrete Semiconductors, SC02

October 1997

Rectifier diode

Freewheeling and power factor correction

BYC10-600

GENERAL DESCRIPTION

Glass passivated, epitaxial rectifier diode in a plastic envelope. This diode has extremely fast reverse recovery time and low reverse recovery current and is designed specifically for use in forced commutation applications, for example: - as the output rectifier diode in power factor correction circuits operating in continuous conduction mode; or as a freewheeling diode in half-bridge and full-bridge switched mode power supplies.

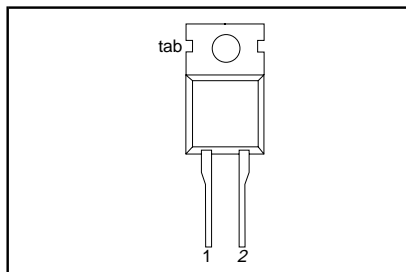
QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
$I_{F(AV)}$	Average forward current		10	A
V_{RRM}	Repetitive peak reverse voltage		600	V
V_F	Forward voltage		1.8	V
t_{rr}	Reverse recovery time	19		ns
I_{rrm}	Reverse recovery current		12	A

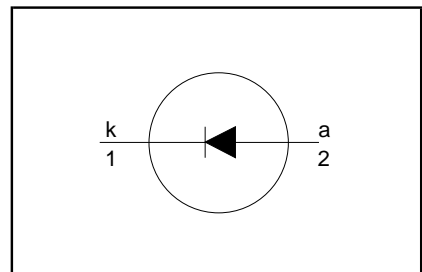
PINNING - TO220AC

PIN	DESCRIPTION
1	cathode (k)
2	anode (a)
tab	cathode (k)

PIN CONFIGURATION



SYMBOL



LIMITING VALUES

Limiting values in accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	Repetitive peak reverse voltage		-	600	V
V_{RWM}	Crest working reverse voltage		-	600	V
V_R	Continuous reverse voltage		-	500	V
$I_{F(AV)}$	Average forward current	$T_{mb} \leq 114\text{ °C}^1$ $\delta = 0.5$; with reappplied $V_{RRM(max)}$; $T_{mb} \leq 78\text{ °C}^1$	-	10	A
$I_{F(RMS)}$	RMS forward current		-	14	A
I_{FRM}	Repetitive peak forward current	$\delta = 0.5$; with reappplied $V_{RRM(max)}$; $T_{mb} \leq 78\text{ °C}^1$	-	20	A
I_{FSM}	Non-repetitive peak forward current.	$t = 10\text{ ms}$ $t = 8.3\text{ ms}$ sinusoidal; $T_j = 150\text{ °C}$ prior to surge with reappplied $V_{RWM(max)}$	-	65 71	A A
I^2t	I^2t for fusing	$t = 10\text{ ms}$	-	21	A ² s
T_{stg}	Storage temperature		-40	150	°C
T_j	Operating junction temperature		-	150	°C

¹ Maximum mounting base temperature limited by thermal runaway.

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THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-mb}$	Thermal resistance junction to mounting base		-	-	2	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	in free air.	-	60	-	K/W

STATIC CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	Forward voltage	$I_F = 10\text{ A}; T_j = 150\text{ }^\circ\text{C}$ $I_F = 20\text{ A}; T_j = 150\text{ }^\circ\text{C}$	-	1.4 1.7	1.8 2.3	V V
I_R	Reverse current	$I_F = 10\text{ A}; V_R = 600\text{ V}$ $V_R = 500\text{ V}; T_j = 100\text{ }^\circ\text{C}$	-	9 1.1	200 3.0	μA mA

DYNAMIC CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
t_{rr}	Reverse recovery time	$I_F = 10\text{ A to } V_R = 400\text{ V};$ $di_F/dt = 500\text{ A}/\mu\text{s}$	-	19	-	ns
t_{rr}	Reverse recovery time	$I_F = 10\text{ A to } V_R = 400\text{ V};$ $di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}$	-	32	40	ns
I_{rrm}	Peak reverse recovery current	$I_F = 10\text{ A to } V_R = 400\text{ V};$ $di_F/dt = 500\text{ A}/\mu\text{s}; T_j = 125\text{ }^\circ\text{C}$	-	9.5	12	A
V_{fr}	Forward recovery voltage	$I_F = 10\text{ A}; di_F/dt = 100\text{ A}/\mu\text{s}$	-	8	11	V

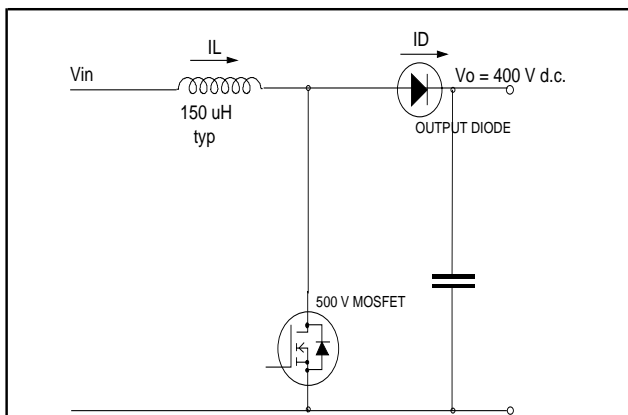


Fig.1. Typical application, output rectifier in boost converter power factor correction circuit. Continuous conduction, mode where the transistor turns on whilst forward current is still flowing in the diode.

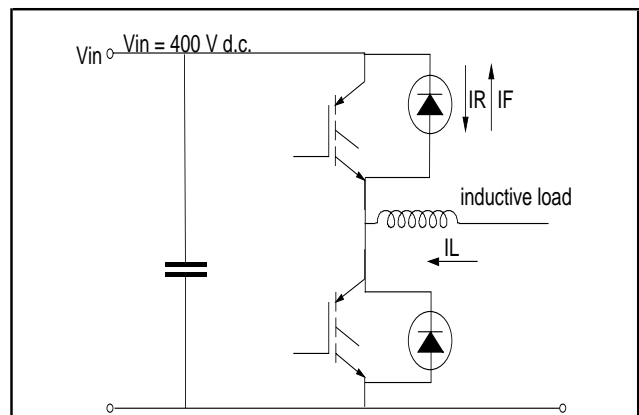
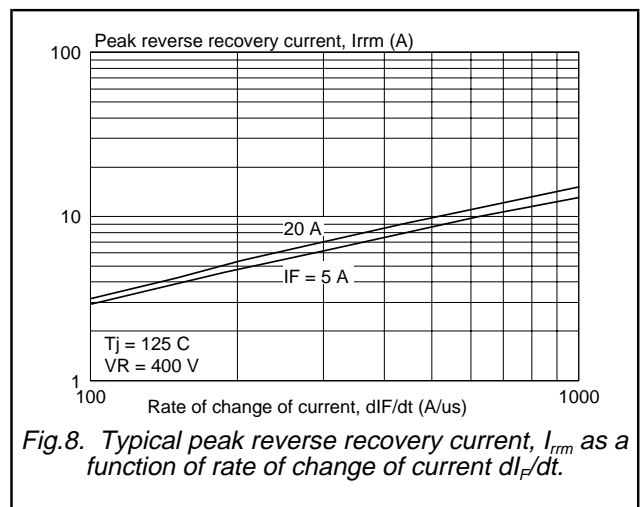
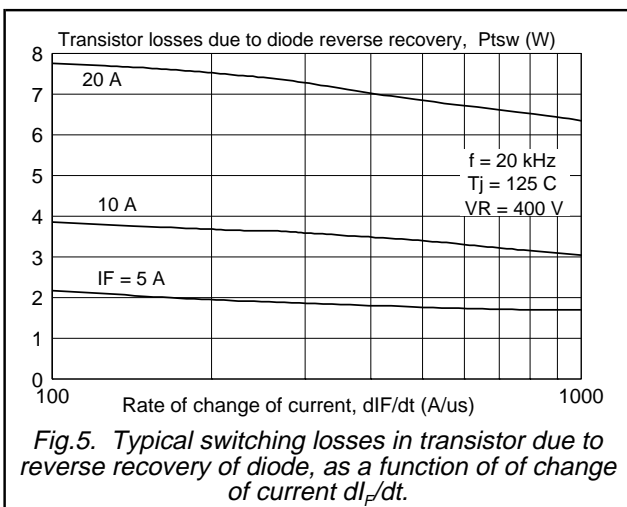
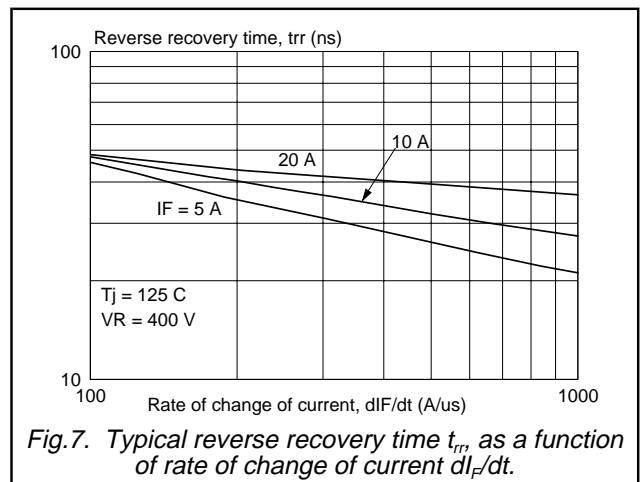
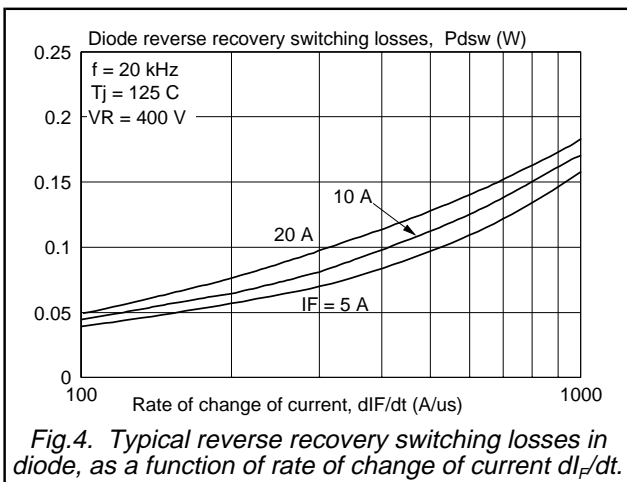
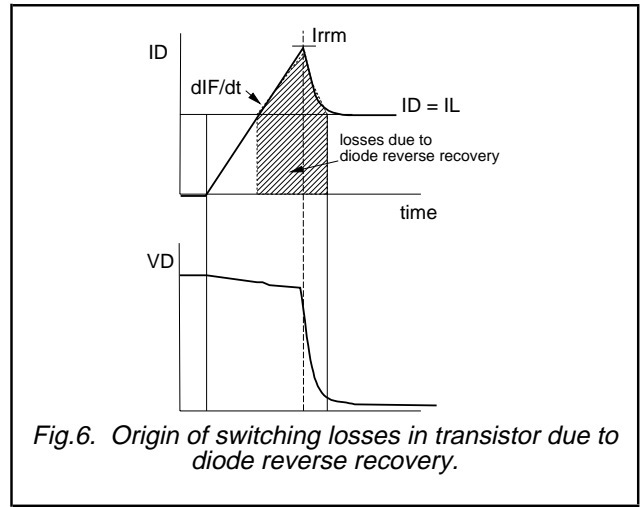
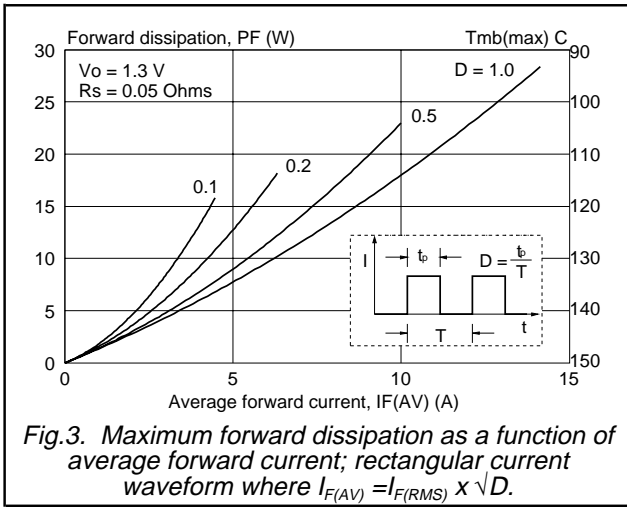


Fig.2. Typical application, freewheeling diode in half bridge converter. Continuous conduction mode, where each transistor turns on whilst forward current is still flowing in the other bridge leg diode.

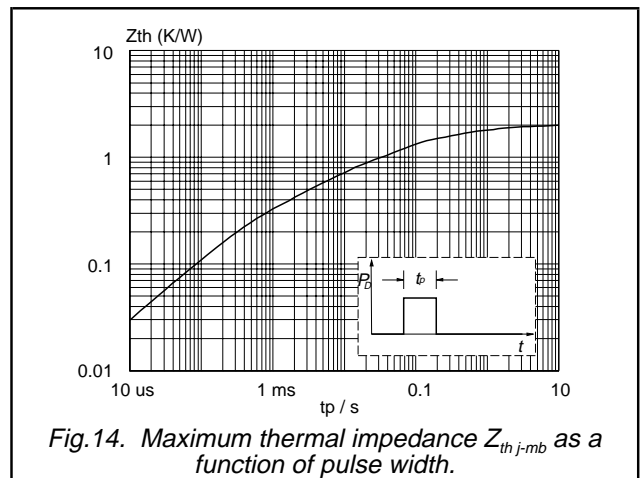
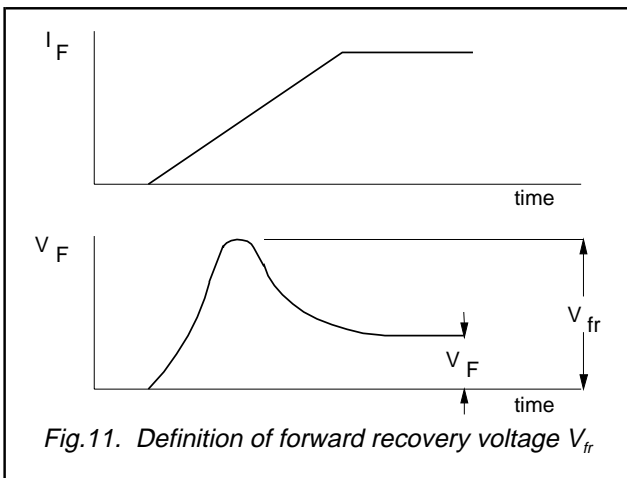
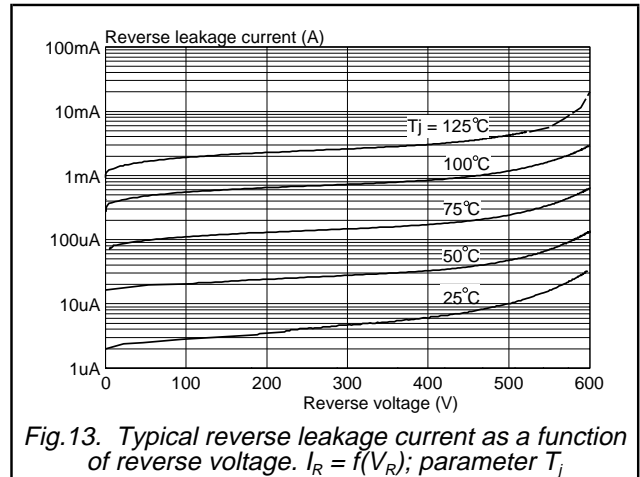
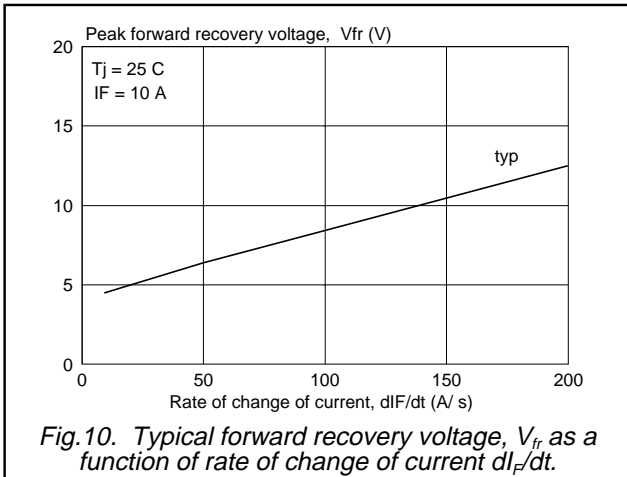
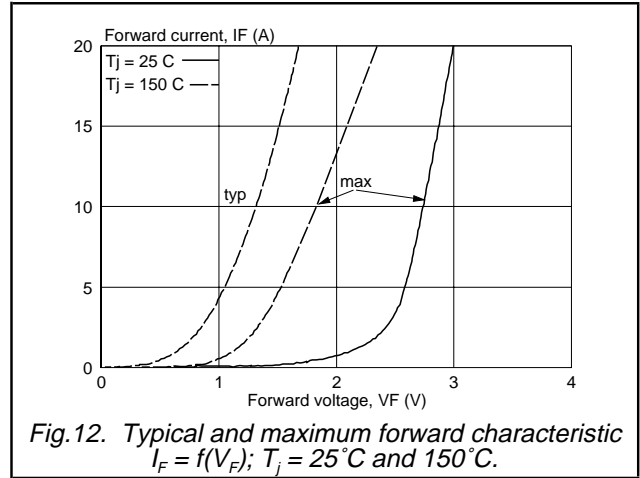
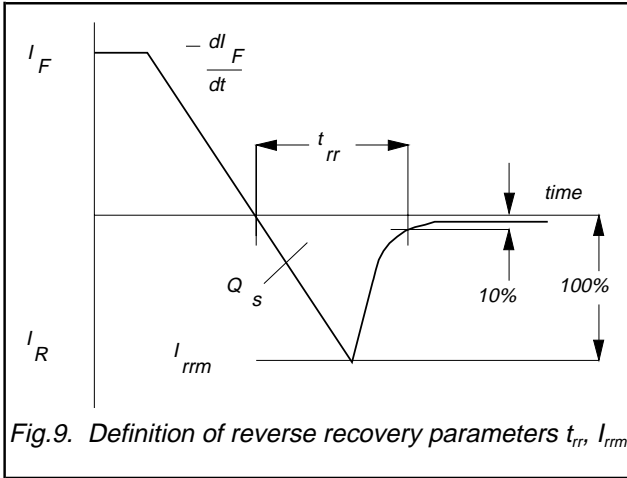
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MECHANICAL DATA

Dimensions in mm

Net Mass: 2 g

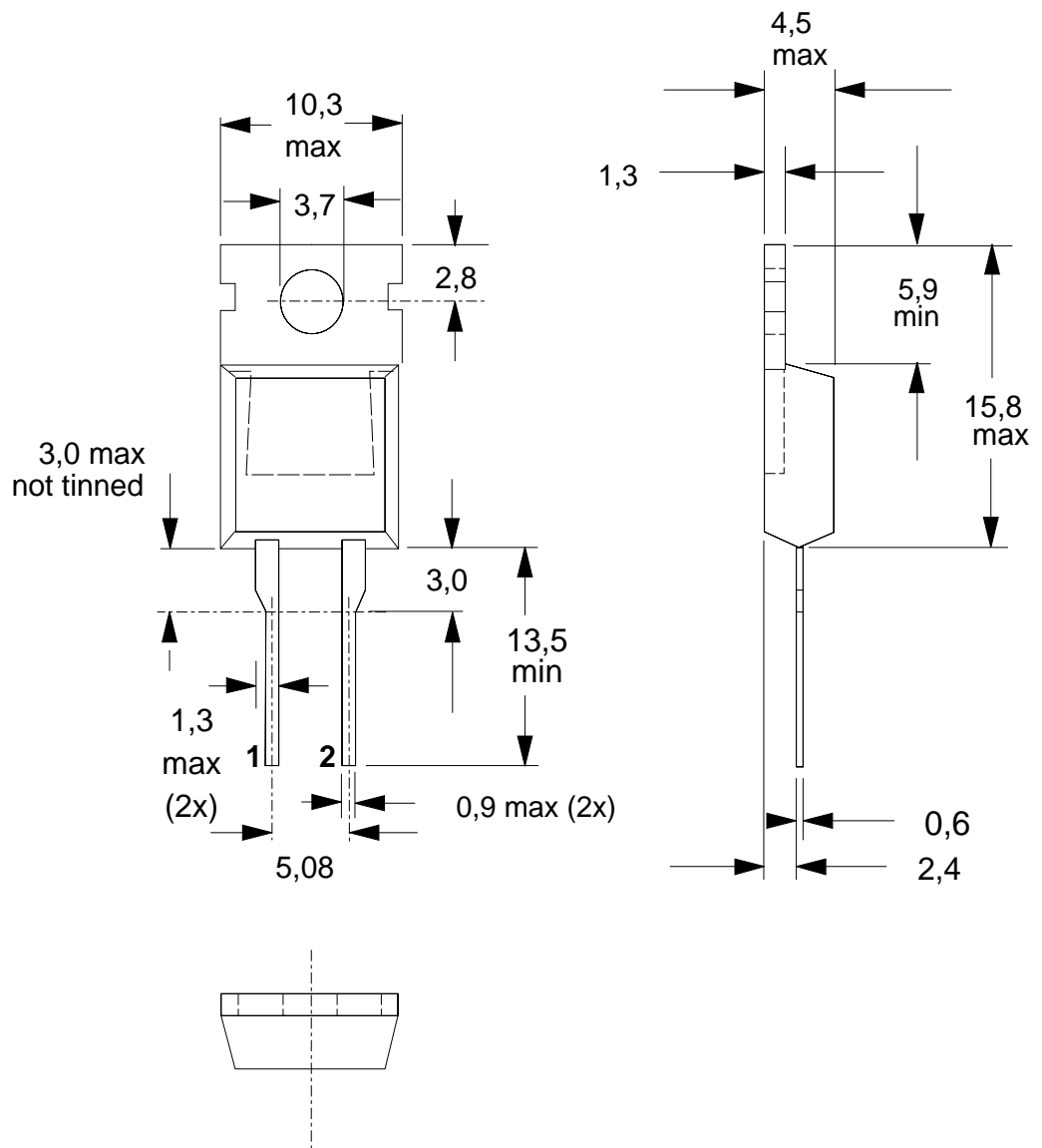


Fig.15. TO220AC; pin 1 connected to mounting base.

Notes

1. Refer to mounting instructions for TO220 envelopes.
2. Epoxy meets UL94 V0 at 1/8".

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values are given in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of this specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	
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