

DATA SHEET

BYV40E series
Rectifier diodes
ultrafast, rugged

Product specification

September 1998



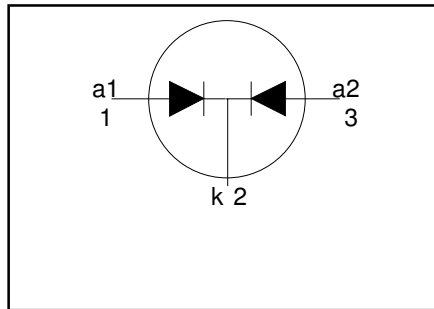
Rectifier diodes ultrafast, rugged

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FEATURES

- Low forward volt drop
- Fast switching
- Soft recovery characteristic
- Reverse surge capability
- High thermal cycling performance
- low profile surface mounting package

SYMBOL



QUICK REFERENCE DATA

$V_R = 150\text{ V} / 200\text{ V}$
$V_F \leq 0.7\text{ V}$
$I_{O(AV)} = 1.5\text{ A}$
$I_{RRM} = 0.1\text{ A}$
$t_{tr} \leq 25\text{ ns}$

GENERAL DESCRIPTION

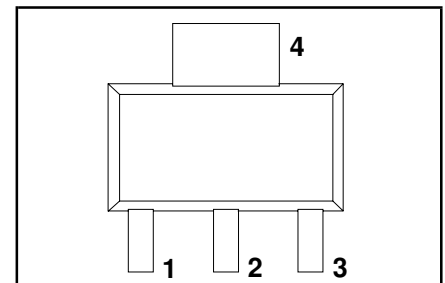
Dual, common cathode, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

The BYV40E series is supplied in the SOT223 surface mounting package.

PINNING

PIN	DESCRIPTION
1	anode 1
2	cathode
3	anode 2
tab	cathode

SOT223



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
				BYV40E		
V_{RRM}	Peak repetitive reverse voltage	$T_{sp} \leq 120^\circ\text{C}$	-	-150	-200	V
V_{RWM}	Crest working reverse voltage		-	150	200	V
V_R	Continuous reverse voltage		-	150	200	V
$I_{O(AV)}$	Average rectified output current (both diodes conducting) ¹	square wave; $\delta = 0.5$; $T_{sp} \leq 132^\circ\text{C}$	-	1.5		A
I_{FRM}	Repetitive peak forward current per diode	$t = 25\ \mu\text{s}$; $\delta = 0.5$; $T_{sp} \leq 132^\circ\text{C}$	-	1.5		A
I_{FSM}	Non-repetitive peak forward current per diode	$t_p = 10\text{ ms}$	-	6		A
		$t_p = 8.3\text{ ms}$ sinusoidal; $T_j = 150^\circ\text{C}$ prior to surge; with reapplied $V_{RWM(max)}$	-	6.6		A
I_{RRM}	Repetitive peak reverse current per diode	$t_p = 2\ \mu\text{s}$; $\delta = 0.001$	-	0.1		A
I_{RSM}	Non-repetitive peak reverse current per diode	$t_p = 100\ \mu\text{s}$	-	0.1		A
T_{stg}	Storage temperature		-65	150		$^\circ\text{C}$
T_j	Operating junction temperature		-	150		$^\circ\text{C}$

¹ Neglecting switching and reverse current losses

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ESD LIMITING VALUE

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_C	Electrostatic discharge capacitor voltage	Human body model; $C = 250 \text{ pF}$; $R = 1.5 \text{ k}\Omega$	-	8	kV

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-sp}$	Thermal resistance junction to solder point	one or both diodes conducting	-	-	15	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	pcb mounted; minimum footprint pcb mounted; pad area as in fig:11	-	156 70	-	K/W K/W

ELECTRICAL CHARACTERISTICS

characteristics are per diode at $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	Forward voltage	$I_F = 0.5 \text{ A}$; $T_j = 150 \text{ }^\circ\text{C}$	-	0.50	0.7	V
		$I_F = 1.5 \text{ A}$	-	0.82	1.0	V
I_R	Reverse current	$V_R = V_{RWM}$; $T_j = 100 \text{ }^\circ\text{C}$	-	100	300	μA
		$V_R = V_{RWM}$	-	5	10	μA
Q_s	Reverse recovery charge	$I_F = 2 \text{ A}$; $V_R \geq 30 \text{ V}$; $-di_F/dt = 20 \text{ A}/\mu\text{s}$	-	-	11	nC
t_{rr1}	Reverse recovery time	$I_F = 1 \text{ A}$; $V_R \geq 30 \text{ V}$; $-di_F/dt = 100 \text{ A}/\mu\text{s}$	-	-	25	ns
t_{rr2}	Reverse recovery time	$I_F = 0.5 \text{ A}$ to $I_R = 1 \text{ A}$; $I_{rec} = 0.25 \text{ A}$	-	10	20	ns
V_{fr}	Forward recovery voltage	$I_F = 2 \text{ A}$; $di_F/dt = 20 \text{ A}/\mu\text{s}$	-	3	-	V

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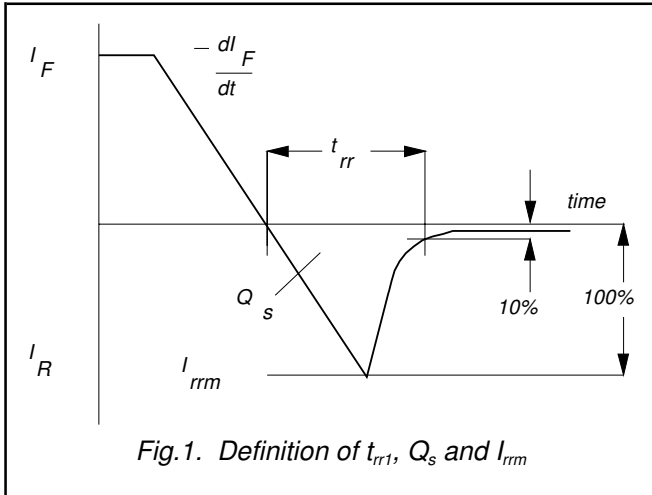


Fig.1. Definition of t_{rr1} , Q_s and I_{rm}

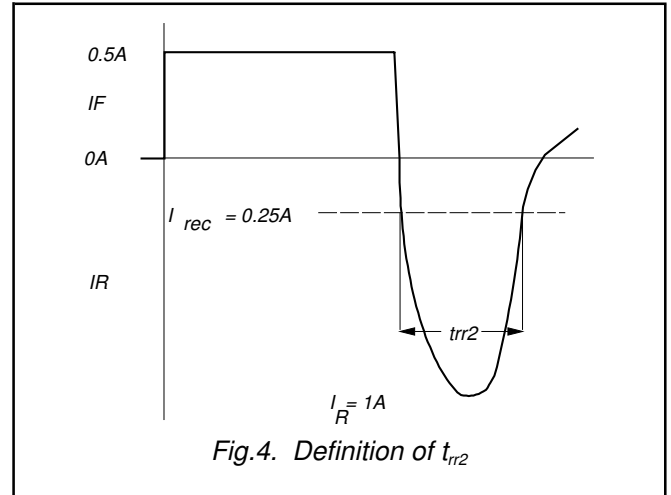


Fig.4. Definition of t_{rr2}

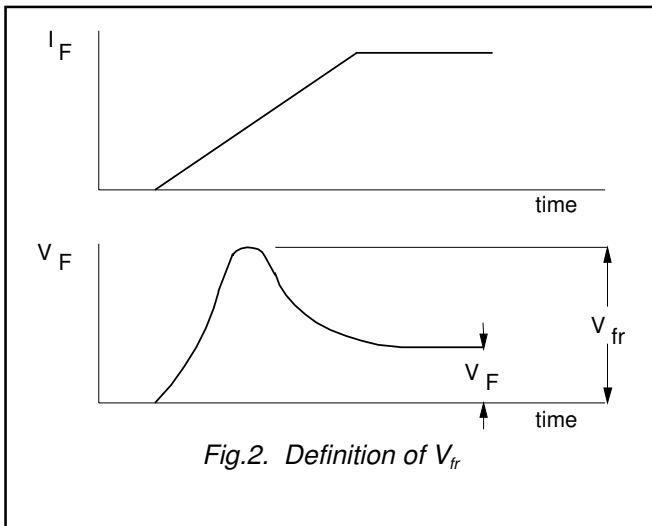


Fig.2. Definition of V_{fr}

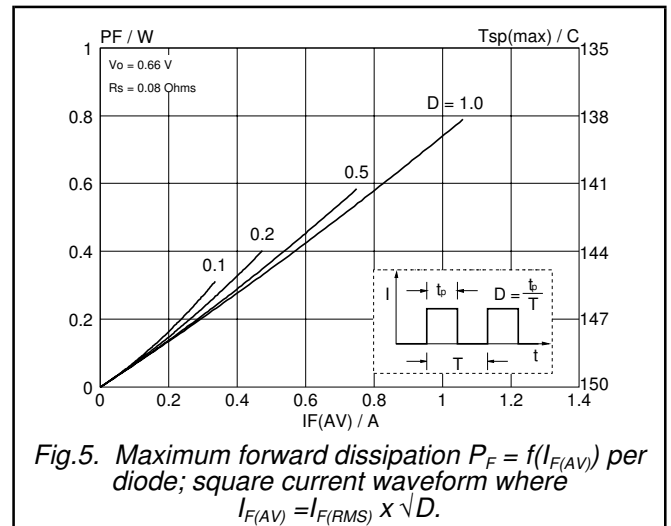


Fig.5. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; square current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.

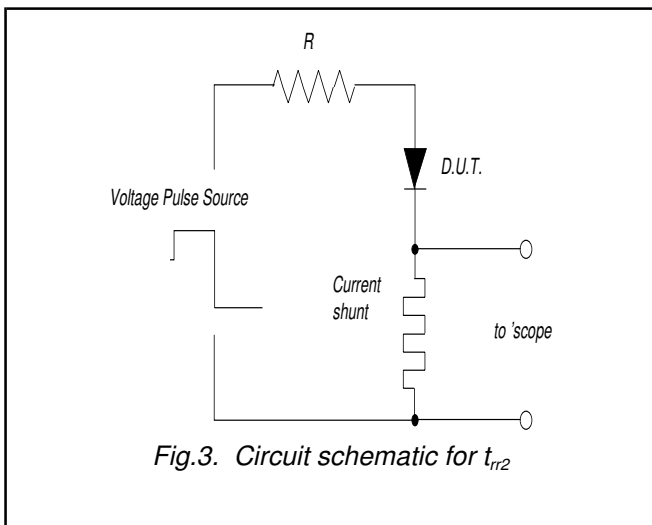


Fig.3. Circuit schematic for t_{rr2}

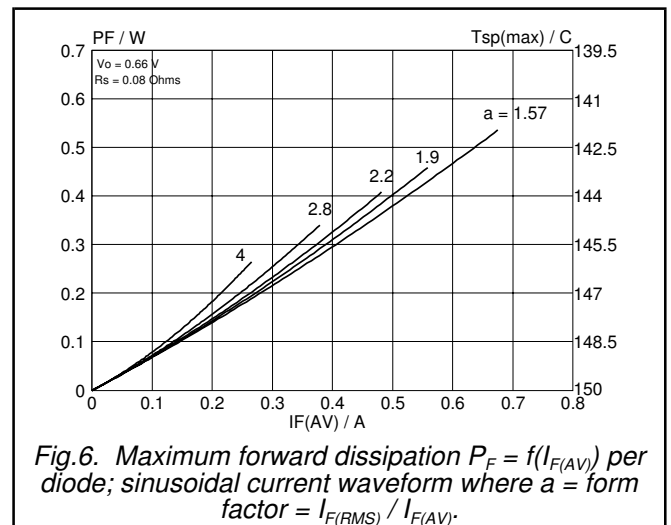


Fig.6. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where $a = \text{form factor} = I_{F(RMS)} / I_{F(AV)}$.

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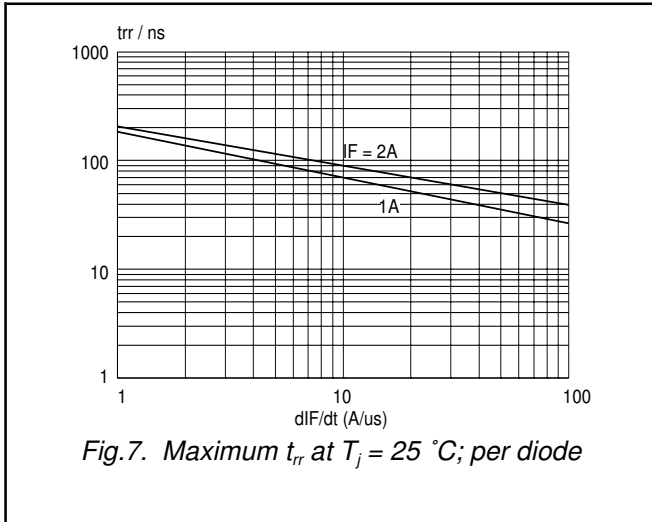


Fig.7. Maximum t_{rr} at $T_j = 25\text{ }^\circ\text{C}$; per diode

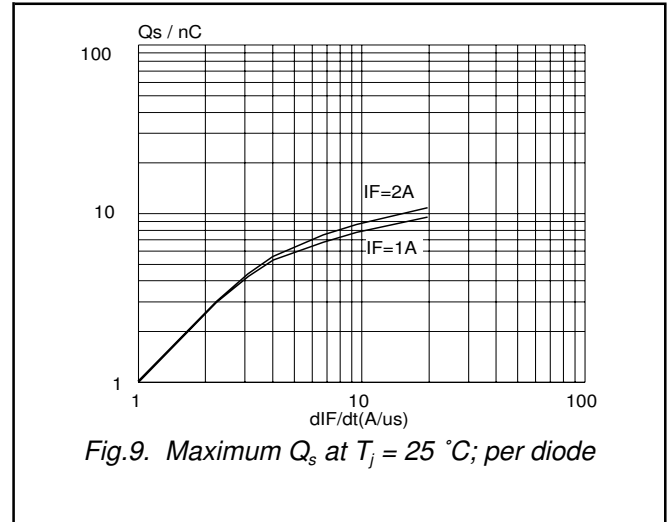


Fig.9. Maximum Q_s at $T_j = 25\text{ }^\circ\text{C}$; per diode

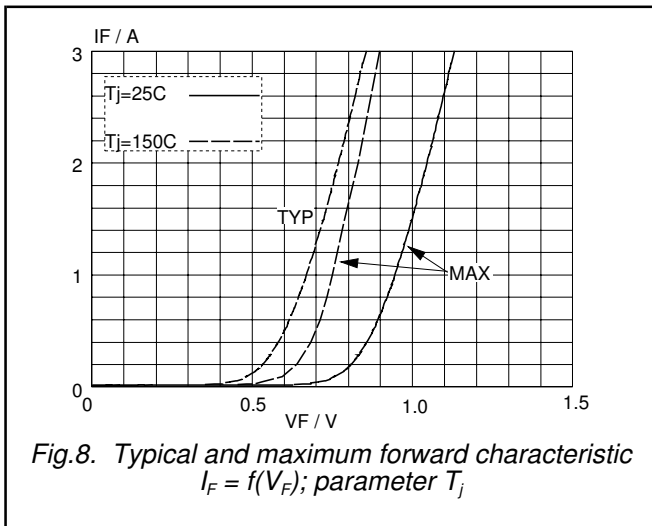


Fig.8. Typical and maximum forward characteristic $I_F = f(V_F)$; parameter T_j

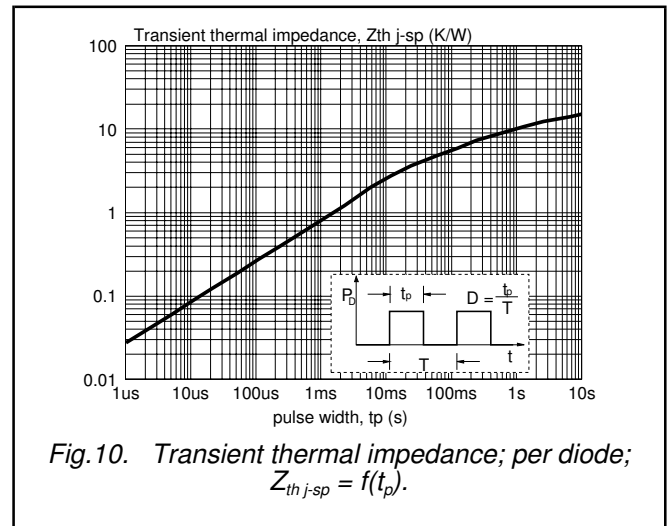
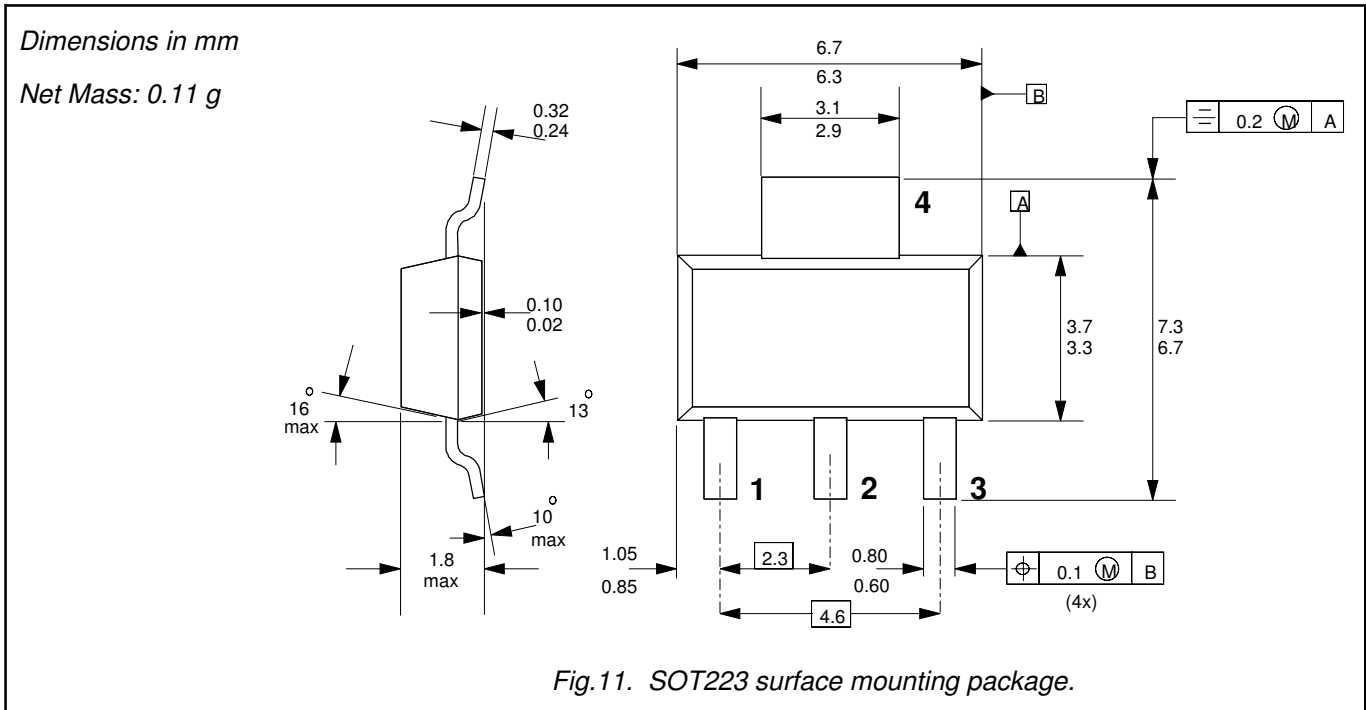


Fig.10. Transient thermal impedance; per diode; $Z_{th\ j-sp} = f(t_p)$.

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MECHANICAL DATA



Notes

1. For further information, refer to Philips publication SC18 "SMD Footprint Design and Soldering Guidelines".
Order code: 9397 750 00505.
2. Epoxy meets UL94 V0 at 1/8".

Legal information

DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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