Silicon Dual Diode

BYV42F-150

150V/20A

DATASHEET

OEM – Philips

Source: Philips Databook 1999

Datasheet Rev. 1.3 – 04/19 – data without warranty / liability

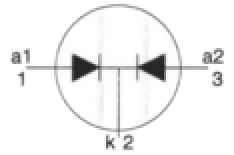
Rectifier diodes ultrafast, rugged

BYV42F, BYV42EX series

FEATURES

- Low forward volt drop
- Fast switching
- Soft recovery characteristic
- Reverse surge capability
- High thermal cycling performance
- Isolated mounting tab

SYMBOL



QUICK REFERENCE DATA

V_R = 150 V/ 200 V

$V_F \leq$ 0.9 V

$I_{O(AV)}$ = 20 A

I_{RRM} = 0.2 A

$t_{rr} \leq$ 28 ns

GENERAL DESCRIPTION

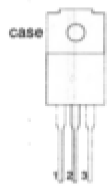
Dual, ultra-fast, epitaxial rectifier diodes intended for use as output rectifiers in high frequency switched mode power supplies.

The BYV42F series is supplied in the SOT186 package.
The BYV42EX series is supplied in the SOT186A package.

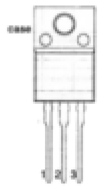
PINNING

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

SOT186



SOT186A



LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.		UNIT
		BYV42F / BYV42EX		-150	-200	
V_{RRM}	Peak repetitive reverse voltage		-	150	200	V
V_{RWM}	Crest working reverse voltage		-	150	200	V
V_R	Continuous reverse voltage	$T_{hs} \leq 125$ ˚C	-	150	200	V
$I_{O(AV)}$	Average rectified output current (both diodes conducting)[1]	square wave $\delta = 0.5$; $T_{hs} \leq 78$ ˚C	-	20		A
I_{FRM}	Repetitive peak forward current per diode	$t = 25$ µs; $\delta = 0.5$; $T_{hs} \leq 78$ ˚C	-	30		A
I_{FSM}	Non-repetitive peak forward current per diode	t = 10 ms	-	150		A
		t = 8.3 ms sinusoidal; with reapplied $V_{RWM(max)}$	-	160		A
I_{RRM}	Repetitive peak reverse current per diode	$t_p = 2$ µs; $\delta = 0.001$	-	0.2		A
I_{RSM}	Non-repetitive peak reverse current per diode	$t_p = 100$ µs	-	0.2		A
T_{stg}	Storage temperature		-40	150		˚C
T_j	Operating junction temperature		-	150		˚C

1 Neglecting switching and reverse current losses.

ESD LIMITING VALUE

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_C	Electrostatic discharge capacitor voltage	Human body model; C = 250 pF; R = 1.5 kΩ	-	8	kV

ISOLATION LIMITING VALUE & CHARACTERISTIC

T_{hs} = 25 ˚C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{isol}	R.M.S. isolation voltage from all three terminals to external heatsink	SOT186A package; f = 50-60 Hz; sinusoidal waveform; R.H. ≤ 65%; clean and dustfree	-		2500	V
V_{isol}	Repetitive peak voltage from all three terminals to external heatsink	SOT186 package; R.H. ≤ 65%; clean and dustfree	-		1500	V
C_{isol}	Capacitance from pin 2 to external heatsink	f = 1 MHz	-	10	-	pF

THERMAL RESISTANCES

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$R_{th\ j-hs}$	Thermal resistance junction to heatsink	both diodes conducting				
		with heatsink compound	-	-	4.0	K/W
		without heatsink compound	-	-	8.0	K/W
		per diode				
		with heatsink compound	-	-	5.0	K/W
		without heatsink compound	-	-	9.0	K/W
$R_{th\ j-a}$	Thermal resistance junction to ambient	in free air	-	55	-	K/W

ELECTRICAL CHARACTERISTICS

characteristics are per diode at T_j = 25 ˚C unless otherwise stated

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	Forward voltage	I_F = 15 A; T_j = 150˚C	-	0.83	0.90	V
		I_F = 15 A	-	0.95	1.05	V
		I_F = 30 A	-	1.00	1.20	V
I_R	Reverse current	$V_R = V_{RWM}$; T_j = 100 ˚C	-	0.5	1	mA
		$V_R = V_{RWM}$	-	10	100	µA
Q_s	Reverse recovery charge	I_F = 2 A; V_R ≥ 30 V; $-dI_F/dt$ = 20 A/µs	-	6	15	nC
t_{rr1}	Reverse recovery time	I_F = 1 A; V_R ≥ 30 V; $-dI_F/dt$ = 100 A/µs	-	20	28	ns
t_{rr2}	Reverse recovery time	I_F = 0.5 A to I_R = 1 A; I_{rec} = 0.25 A	-	13	22	ns
I_{rrm}	Peak reverse recovery current	I_F = 10 A; V_R ≥ 30 V; $-dI_F/dt$ = 50 A/µs; T_j = 100˚C	-	2	2.4	A
V_{fr}	Forward recovery voltage	I_F = 1 A; dI_F/dt = 10 A/µs	-	1	-	V

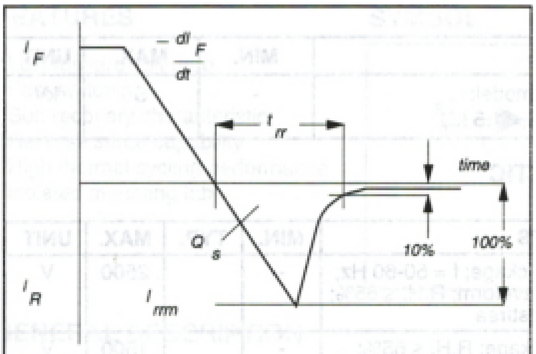


Fig.1. Definition of t_{rr1}, Q_s and I_{rrm}

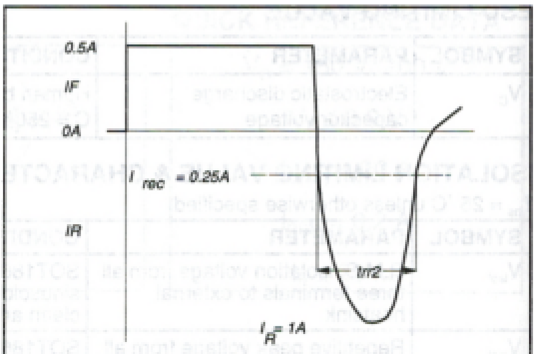


Fig.4. Definition of t_{rr2}

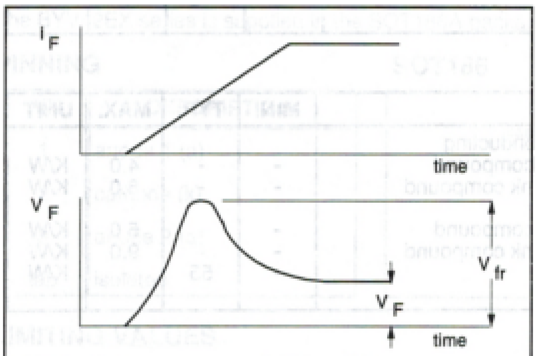


Fig.2. Definition of V_{fr}

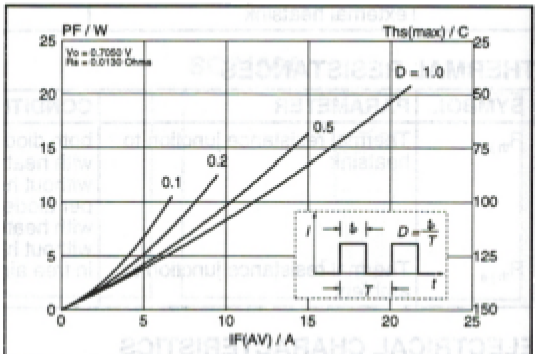


Fig.5. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; square current waveform where $I_{F(AV)} = I_{F(RMS)} \times \sqrt{D}$.

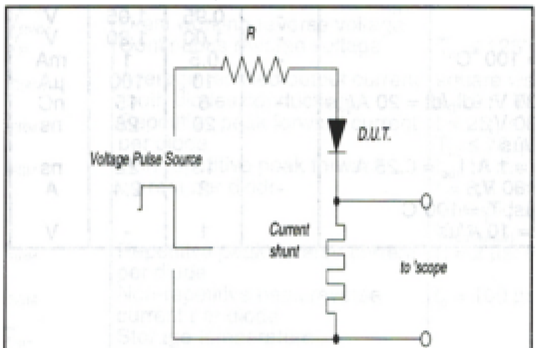


Fig.3. Circuit schematic for t_{rr2}

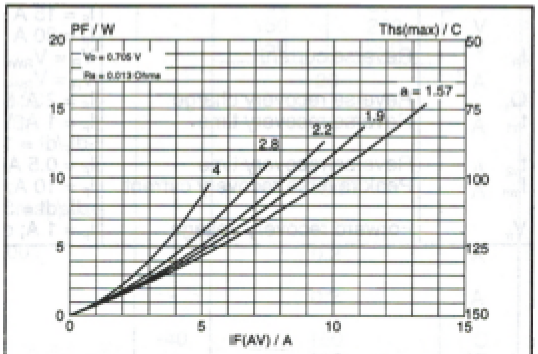


Fig.6. Maximum forward dissipation $P_F = f(I_{F(AV)})$ per diode; sinusoidal current waveform where a = form factor = $I_{F(RMS)} / I_{F(AV)}$.

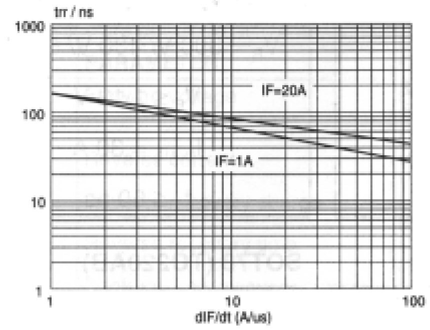


Fig.7. Maximum t_{rr} at $T_j = 25$ °C; per diode

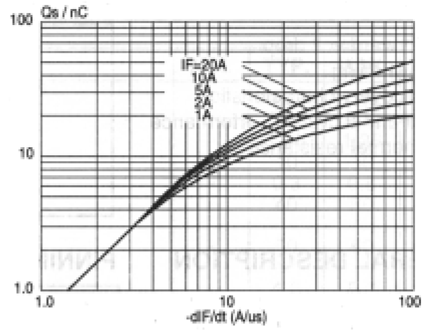


Fig.10. Maximum Q_s at $T_j = 25$ °C; per diode

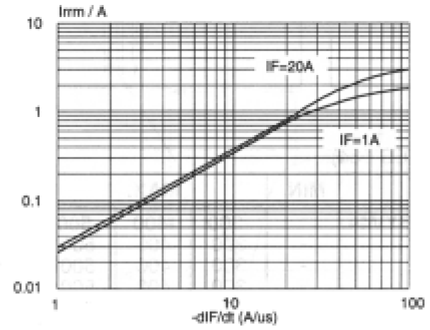


Fig.8. Maximum I_{rrm} at $T_j = 25$ °C; per diode

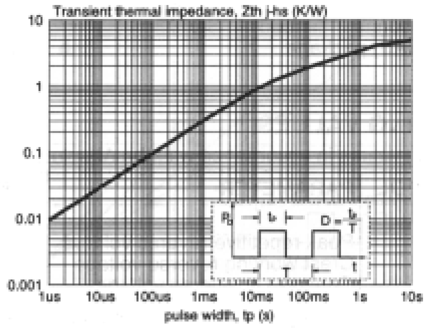


Fig.11. Transient thermal impedance; per diode; $Z_{th\ j\text{-}hs} = f(t_p)$.

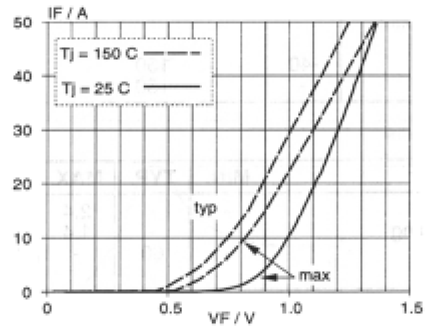


Fig.9. Typical and maximum forward characteristic $I_F = f(V_F)$; parameter T_j