Silicon Diode

BYX90G

6kV/550mA

DATASHEET

OEM – Philips

Source: Philips Databook 1999

High-voltage soft-recovery controlled avalanche rectifier

BYX90G

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Soft-recovery switching characteristics
- Guaranteed avalanche energy absorption capability.

APPLICATIONS

- High-voltage rectification at high frequencies
- Sub-component for very high voltage rectifiers, for example, in X-ray and radar equipment.

DESCRIPTION

Rugged glass package, using a high temperature alloyed construction.

This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

The package is designed to be used in an insulating medium such as resin, oil or SF6 gas.

See also the chapter on custom made high-voltage rectifiers in the *"General Part of Handbook SC01"*.

The cathode is marked by a black band on the body.

Fig.1 Simplified outline (SOD83A) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		–	7.5	kV
V_{RWM}	crest working reverse voltage		–	6	kV
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{oil} = 45 °C; see Fig.2; see also Fig.3	–	550	mA
I_{FRM}	repetitive peak forward current		–	5	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWMmax}$; see Fig.4	–	20	A
P_{RSM}	non-repetitive peak reverse power dissipation	t = 10 µs; triangular pulse; $T_j = T_{j\,max}$ prior to surge	–	5	kW
T_{stg}	storage temperature		–65	+165	°C
T_j	junction temperature		–65	+165	°C

High-voltage soft-recovery controlled avalanche rectifier — BYX90G

ELECTRICAL CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 2 A; see Fig.5	–	–	14.5	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA	8	–	–	kV
I_R	reverse current	$V_R = V_{RWMmax}$; $T_j = T_{j\,max}$	–	–	50	µA
t_{rr}	reverse recovery time	when switched from I_F = 0.5 A to I_R = 1 A; measured at I_R = 0.25 A; see Fig.7	–	–	350	ns

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\,j\text{-}o}$	thermal resistance from junction to oil	note 1; see also Fig.6	20	K/W

Note

1. For more information please refer to the *"General Part of Handbook SC01"*.

High-voltage soft-recovery controlled avalanche rectifier

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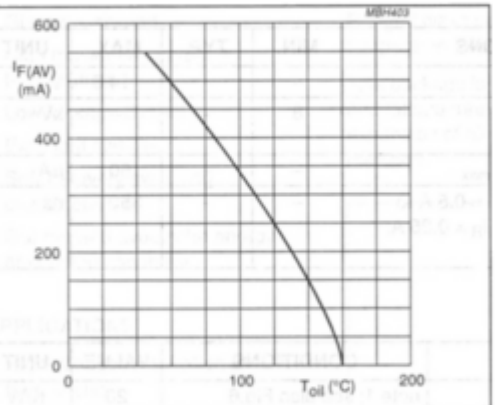
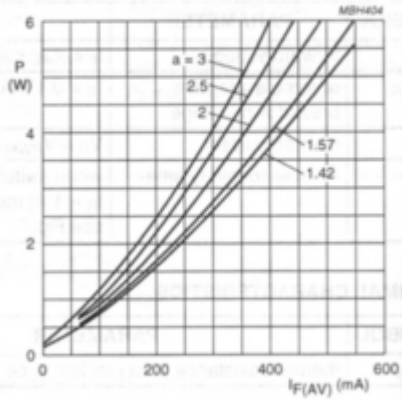
GRAPHICAL DATA



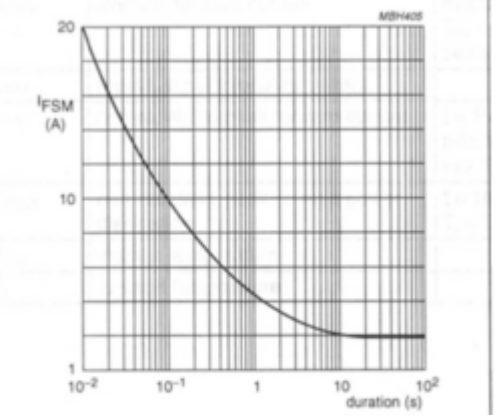
a = 1.57; δ = 0.5; $V_R = V_{RWMmax}$.

Fig.2 Maximum permissible average forward current as a function of oil temperature (including losses due to reverse leakage).



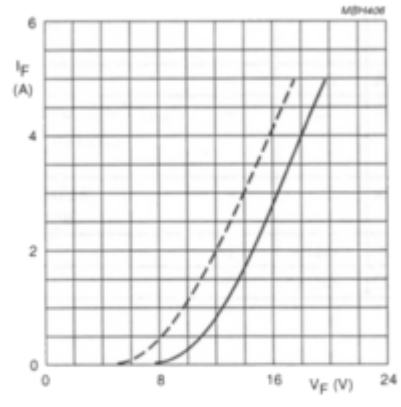
$a = I_{F(RMS)}/I_{F(AV)}$; δ = 0.5; $V_R = V_{RWMmax}$.

Fig.3 Maximum steady state power dissipation (forward plus leakage losses) as a function of average forward current.



50 Hz half sinewave current burst.
T_j = 165 °C prior to surge.
$V_R = V_{RWMmax}$.

Fig.4 Maximum non-repetitive peak forward current as a function of burst duration.



Dotted lines: T_j = 165 °C.
Solid line: T_j = 25 °C.

Fig.5 Forward current as a function of maximum forward voltage.

High-voltage soft-recovery controlled avalanche rectifier BYX90G

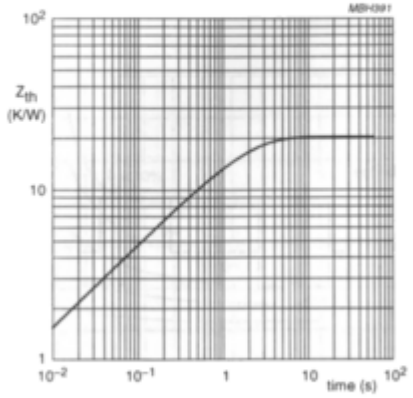
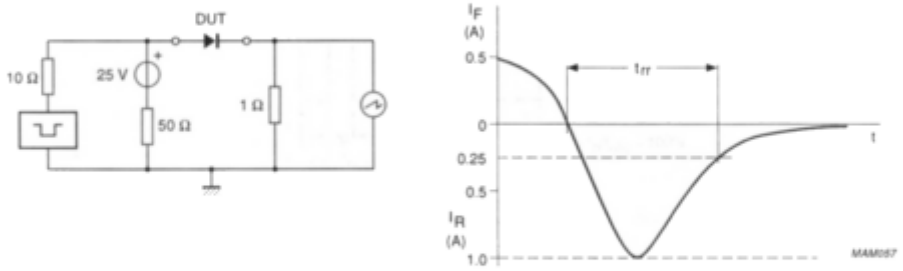


Fig.6 Thermal impedance in oil as a function of time.



Input impedance oscilloscope: 1 MΩ, 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω; $t_r \leq 15$ ns.

Fig.7 Test circuit and reverse recovery time waveform and definition.

High-voltage soft-recovery controlled avalanche rectifier BYX90G

APPLICATION INFORMATION

Typical 3-phase bridge application information

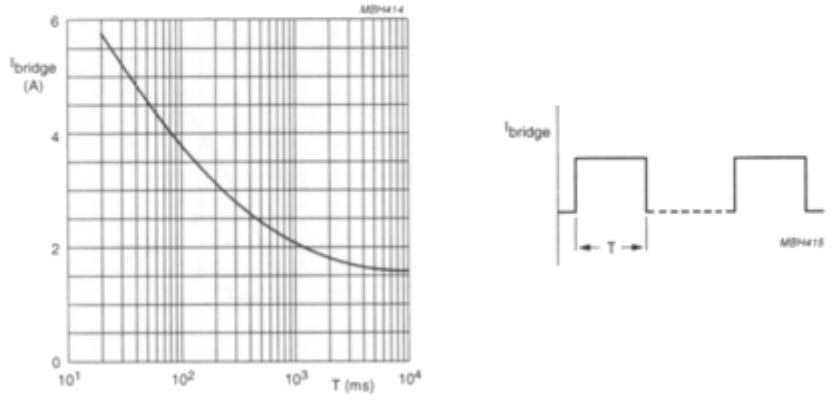


Fig.8 Maximum permissible output current in a 3-phase rectifier bridge with a minimum time between exposures of 20 s; T_{oil} = 50 °C.

High-voltage soft-recovery controlled avalanche rectifier BYX90G

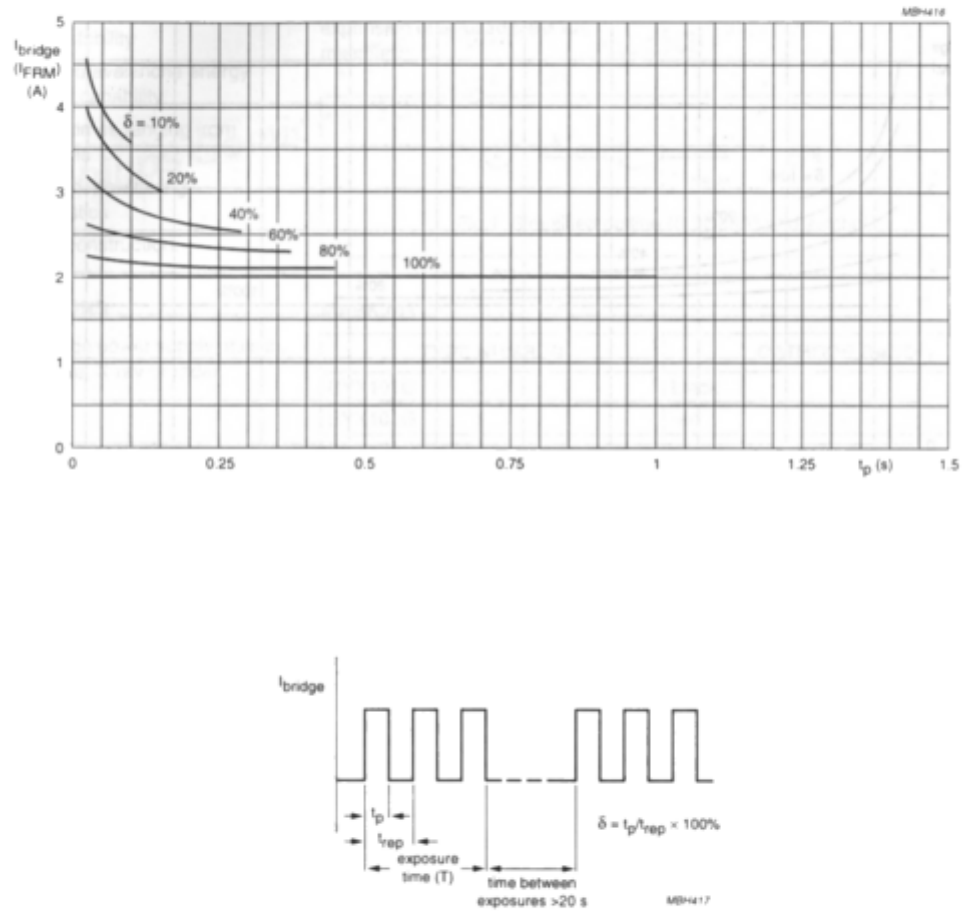


Fig.9 Maximum current through a 3-phase bridge rectifier versus pulse duration; exposure time T = 1 s; T_{oil} = 50 °C.

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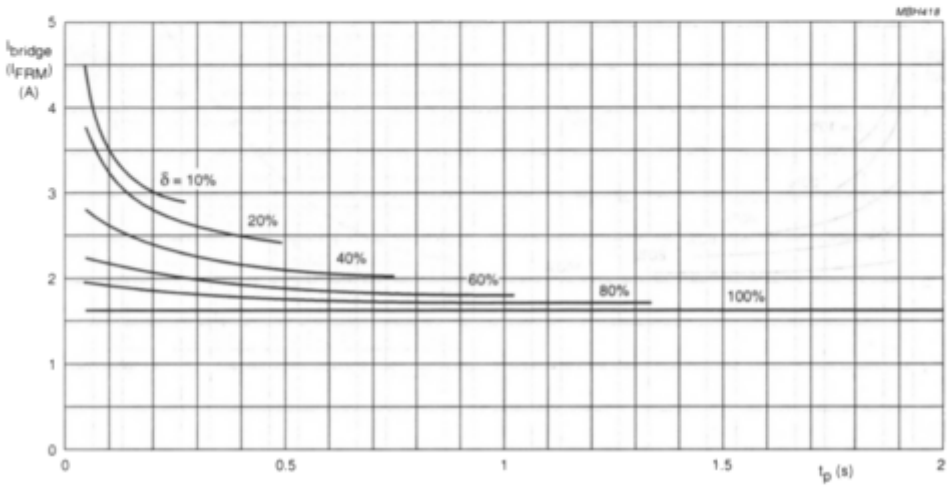

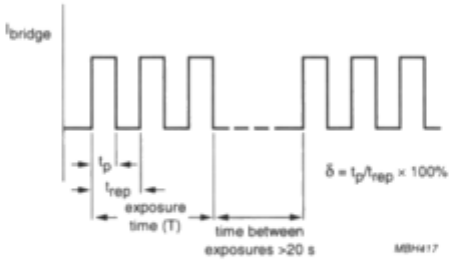

Fig.10 Maximum current through a 3-phase bridge rectifier versus pulse duration; exposure time T = 3 s; T_{oil} = 50 °C.