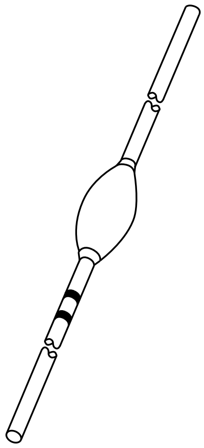
DATA SHEET



BY8000 series
Fast high-voltage soft-recovery controlled avalanche rectifiers

Product specification
Supersedes data of June 1994
File under Discrete Semiconductors, SC01

1996 May 24

Fast high-voltage soft-recovery controlled avalanche rectifiers

BY8000 series

FEATURES

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

APPLICATIONS

- For colour television and monitors up to 25 kHz
- High-voltage applications for:
  - Multipliers
  - Layer-wound diode-split-transformers where controlled avalanche is required.

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.

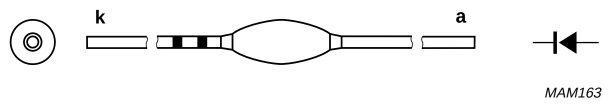


Fig.1 Simplified outline (SOD61) and symbol.

MARKING

Cathode band colour codes

TYPE NUMBER	PACKAGE CODE	INNER BAND	OUTER BAND
BY8004	SOD61AC	violet	black
BY8006	SOD61AD	violet	green
BY8008	SOD61AE	violet	red
BY8010	SOD61AF	violet	violet
BY8012	SOD61AH	violet	orange
BY8014	SOD61AI	violet	lilac
BY8016	SOD61AJ	violet	grey

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BY8004		–	5	kV
	BY8006		–	8	kV
	BY8008		–	10	kV
	BY8010		–	12	kV
	BY8012		–	14	kV
	BY8014		–	17	kV
	BY8016		–	19	kV
V_{RW}	working reverse voltage				
	BY8004		–	4	kV
	BY8006		–	6	kV
	BY8008		–	8	kV
	BY8010		–	10	kV
	BY8012		–	12	kV
	BY8014		–	14	kV
	BY8016		–	16	kV
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; see Figs 2 to 8			
	BY8004		–	20	mA
	BY8006		–	10	mA
	BY8008		–	5	mA
	BY8010		–	5	mA
	BY8012		–	5	mA
	BY8014		–	5	mA
	BY8016		–	3	mA
I_{FRM}	repetitive peak forward current	note 1	–	500	mA
P_{RSM}	non-repetitive peak reverse power dissipation	t = 20 µs half sinewave; $T_j = T_{j\,max}$ prior to surge			
	BY8004		–	2.5	kW
	BY8006		–	3.5	kW
	BY8008		–	4.2	kW
	BY8010		–	5.2	kW
	BY8012		–	7.0	kW
	BY8014		–	7.8	kW
	BY8016		–	9.1	kW
T_{stg}	storage temperature		–65	+120	°C
T_j	junction temperature		–65	+120	°C

Note

1. Withstands peak currents during flash-over in a picture tube.

ELECTRICAL CHARACTERISTICS

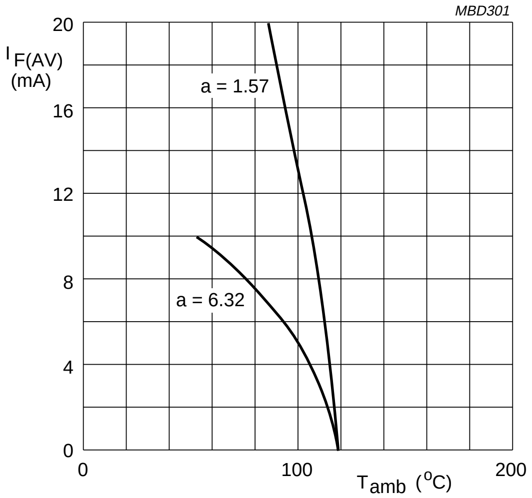
T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 100 mA; $T_j = T_{j\,max}$; see Figs 9 to 15				
	BY8004		–	–	20	V
	BY8006		–	–	25	V
	BY8008		–	–	30	V
	BY8010		–	–	38	V
	BY8012		–	–	50	V
	BY8014		–	–	55	V
	BY8016		–	–	63	V
I_R	reverse current	$V_R = V_{RWmax}$; T_j = 120 °C	–	–	3	µA
Q_r	recovery charge	when switched from I_F = 100 mA to $V_R \geq$ 100 V and dI_F/dt = –200 mA/µs; see Fig.16	–	–	1	nC
t_f	fall time	when switched from I_F = 100 mA to $V_R \geq$ 100 V and dI_F/dt = –200 mA/µs; see Fig.16	80	–	–	ns
t_{rr}	reverse recovery time	when switched from I_F = 2 mA to I_R = 4 mA; measured at I_R = 1 mA; see Fig.17	–	–	100	ns
C_d	diode capacitance	V_R = 0 V; f = 1 MHz				
	BY8004		–	0.90	–	pF
	BY8006		–	0.65	–	pF
	BY8008		–	0.55	–	pF
	BY8010		–	0.45	–	pF
	BY8012		–	0.35	–	pF
	BY8014		–	0.30	–	pF
	BY8016		–	0.25	–	pF

Fast high-voltage soft-recovery controlled avalanche rectifiers

BY8000 series

GRAPHICAL DATA



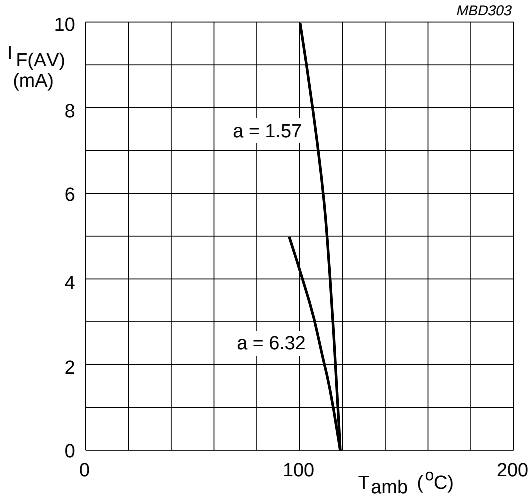
BY8004.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application; see Fig.18.

Fig.2 Maximum permissible average forward current as a function of ambient temperature.



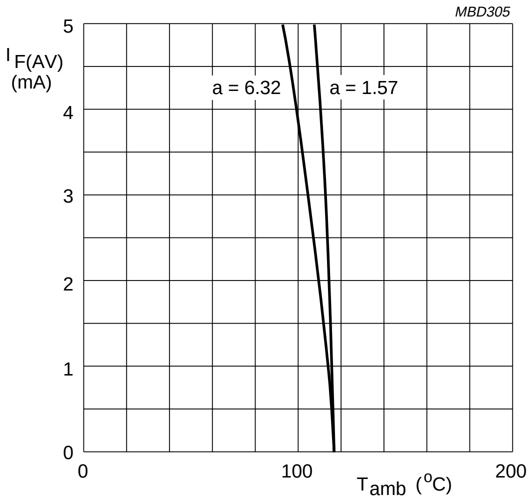
BY8006.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application; see Fig.18.

Fig.3 Maximum permissible average forward current as a function of ambient temperature.



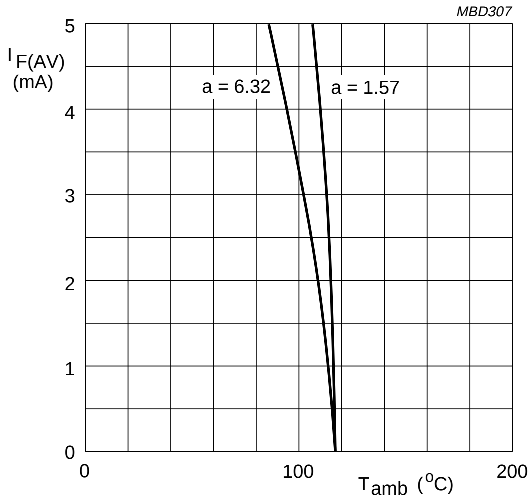
BY8008.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application; see Fig.18.

Fig.4 Maximum permissible average forward current as a function of ambient temperature.



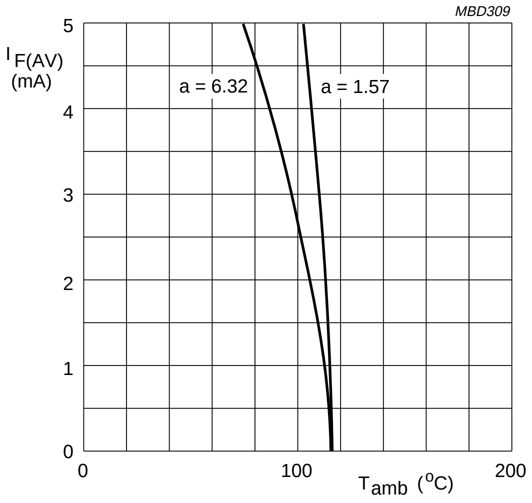
BY8010.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

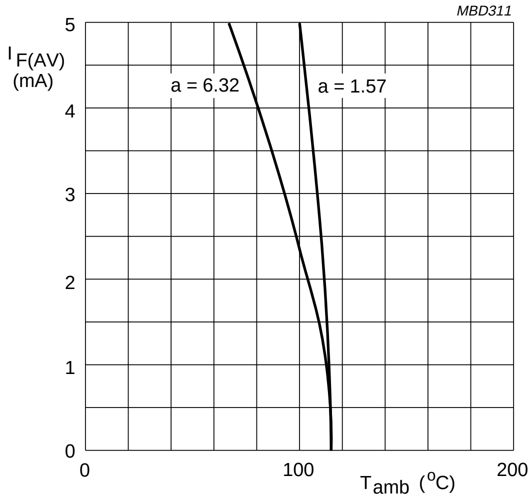
a = 6.32: line output transformer application; see Fig.18.

Fig.5 Maximum permissible average forward current as a function of ambient temperature.



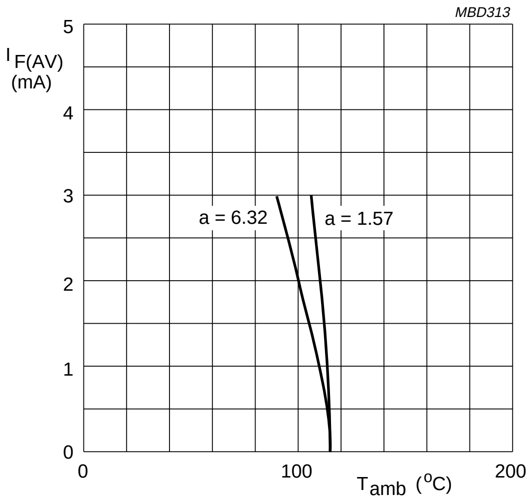
BY8012.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application; see see Fig.18.

Fig.6 Maximum permissible average forward current as a function of ambient temperature.



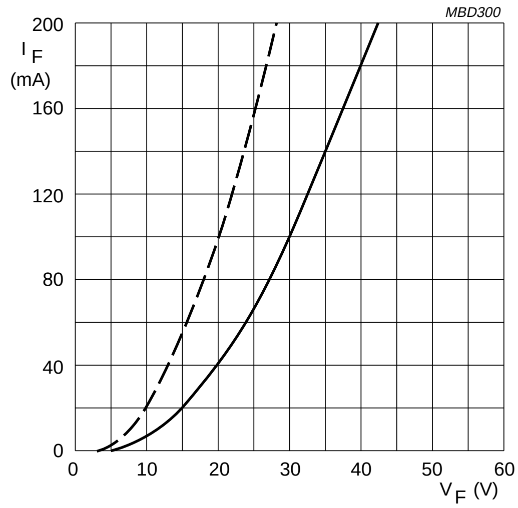
BY8014.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application; see Fig.18.

Fig.7 Maximum permissible average forward current as a function of ambient temperature.



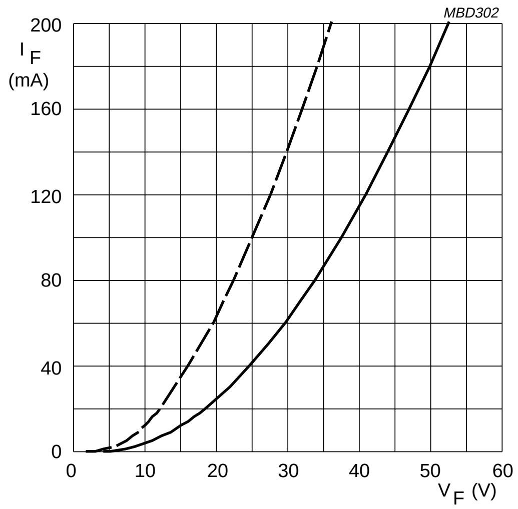
BY8016.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application; see Fig.18.

Fig.8 Maximum permissible average forward current as a function of ambient temperature.



BY8004.
Dotted line: $T_j = 120$ °C.
Solid line: $T_j = 25$ °C.

Fig.9 Forward current as a function of maximum forward voltage.

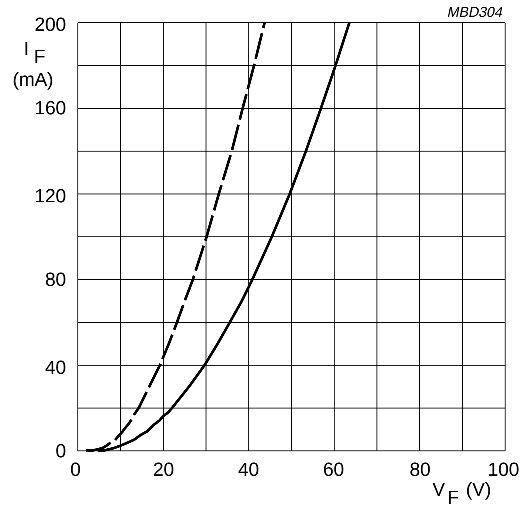


BY8006.

Dotted line: T_j = 120 °C.

Solid line: T_j = 25 °C.

Fig.10 Forward current as a function of maximum forward voltage.

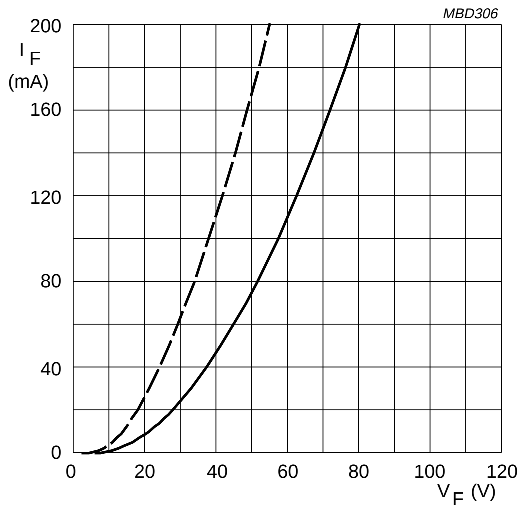


BY8008.

Dotted line: T_j = 120 °C.

Solid line: T_j = 25 °C.

Fig.11 Forward current as a function of maximum forward voltage.

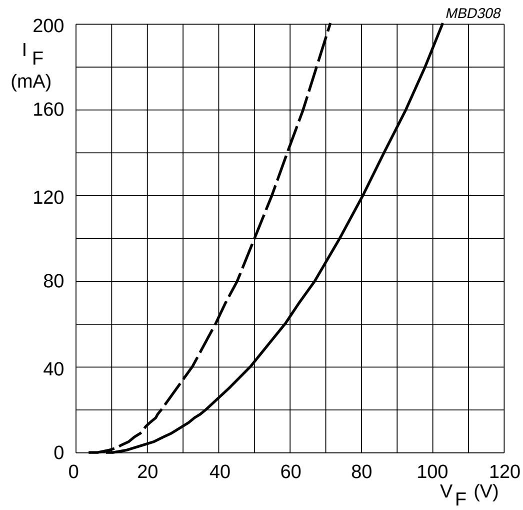


BY8010.

Dotted line: T_j = 120 °C.

Solid line: T_j = 25 °C.

Fig.12 Forward current as a function of maximum forward voltage.

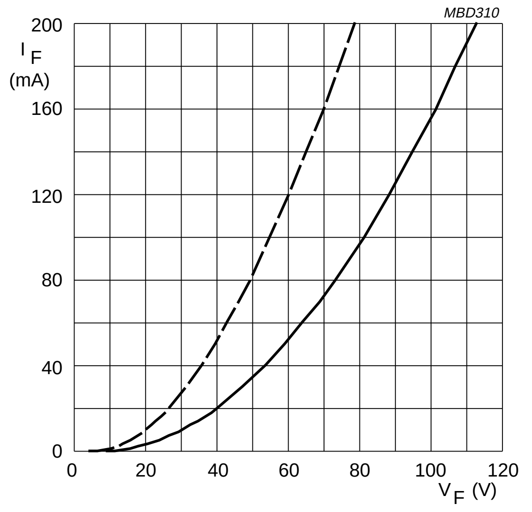


BY8012.

Dotted line: T_j = 120 °C.

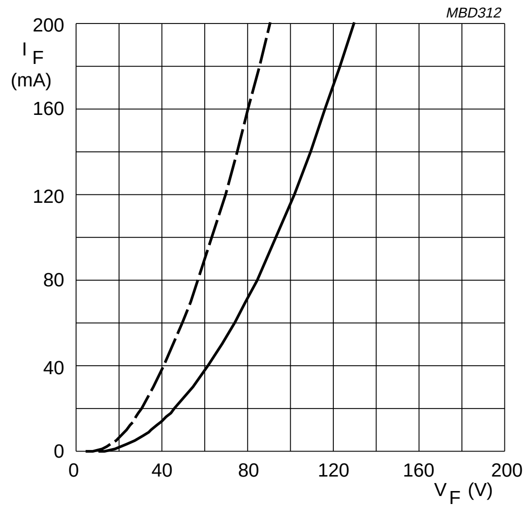
Solid line: T_j = 25 °C.

Fig.13 Forward current as a function of maximum forward voltage.



BY8014.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.14 Forward current as a function of maximum forward voltage.



BY8016.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.15 Forward current as a function of maximum forward voltage.

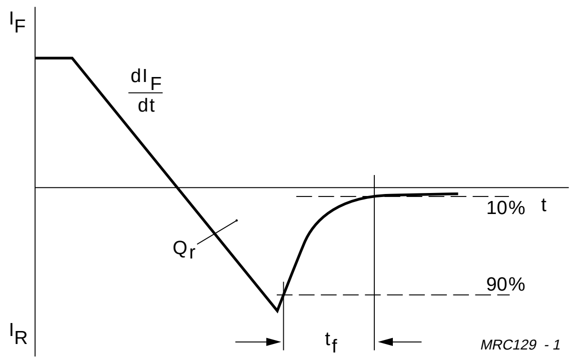
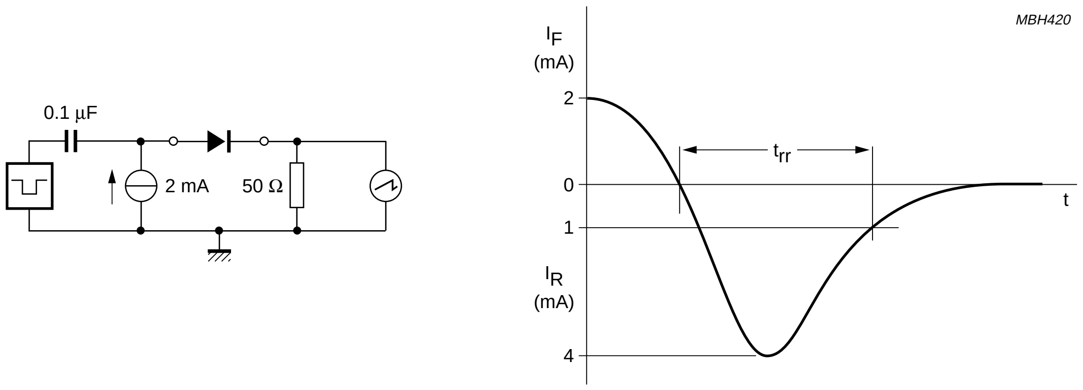


Fig.16 Reverse recovery definitions.



Rise time oscilloscope: t_r < 7 ns.
Generator pulse width: 1.0 µs.

Fig.17 Test circuit and reverse recovery time waveform and definition.

APPLICATION INFORMATION

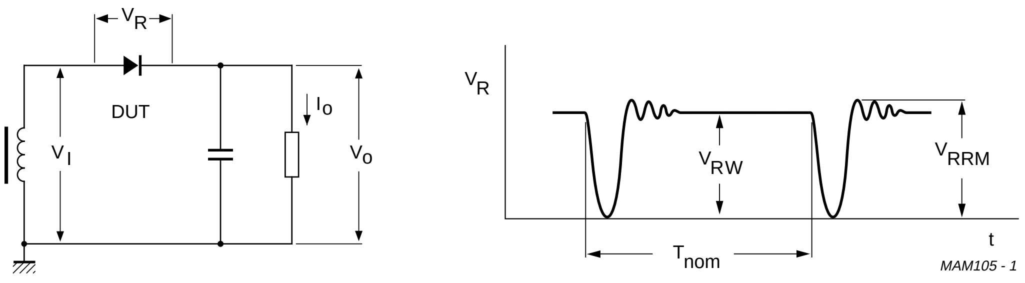
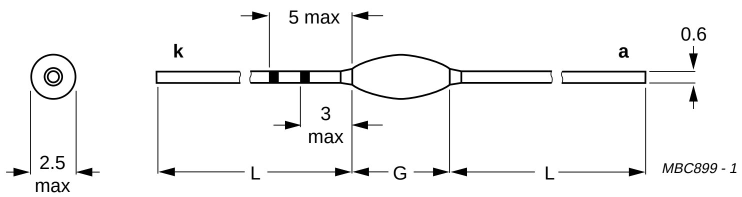


Fig.18 Typical operation circuit and voltage waveform.

PACKAGE OUTLINE



Dimensions in mm.

Fig.19 SOD61.

SOD61 package specification

TYPE NUMBER	PACKAGE CODE	L_{min} (mm)	G_{max} (mm)
BY8004	SOD61AC	30.4	8.3
BY8006	SOD61AD	30.2	8.7
BY8008	SOD61AE	30.0	9.1
BY8010	SOD61AF	29.8	9.5
BY8012	SOD61AH	29.3	10.5
BY8014	SOD61AI	28.8	11.5
BY8016	SOD61AJ	28.3	12.5

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 given are 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 the 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.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.