

Semiconductors

Book S8a

1988

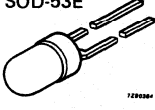
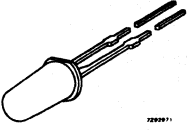
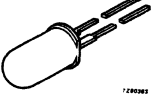


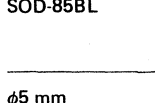
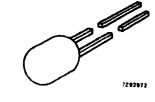
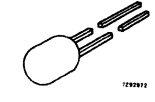
Light emitting diodes

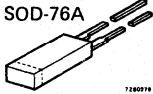
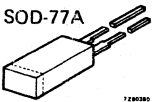
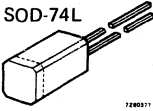
LIGHT EMITTING DIODES

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SELECTION GUIDE

LEDs (visible light) grouped according to shape and encapsulation.

shape /case	type	L	crystal	colour	λ nm	θ ½	V _F (V)	I _{Fmax} mA	plastic	
ϕ 3 mm SOD-53E 	PLED-H313A		GaAlAs	HYPERRED	650	60	1.75	100	CLEAR/RED	
	PLED-G313A		GaP:N	SUPERGREEN	565	60	2.10	60	CLEAR/GREEN	
	PLED-Y313A		GaP:As	YELLOW	590	60	2.10	30	CLEAR/YELLOW	
	PLED-H314A		GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED	
	PLED-G314A		GaP:N	SUPERGREEN	565	70	2.10	60	DIFF/GREEN	
	PLED-Y314A		GaP:As	YELLOW	590	70	2.10	30	DIFF/YELLOW	
ϕ 3 mm SOD-82C 	PLED-0313N		GaAsP	ORANGE	630	40	2.20	30	CLEAR/RED	
	PLED-G313N		GaP:N	SUPERGREEN	565	25	2.20	30	CLEAR/GREEN	
	PLED-P313N		GaP:Zn	ULTRARED	700	60	2.20	30	CLEAR/RED	
	PLED-Y313N		GaP:As	YELLOW	590	25	2.20	30	CLEAR/YELLOW	
	PLED-0314N		GaAsP	ORANGE	630	70	2.20	30	DIFF/RED	
	PLED-G314N	*	GaP:N	SUPERGREEN	565	60	2.20	30	DIFF/GREEN	
	PLED-P314N	*	GaP:Zn	ULTRARED	700	70	2.20	30	DIFF/RED	
	PLED-Y314N	*	GaP:As	YELLOW	590	60	2.20	30	DIFF/YELLOW	
ϕ 5 mm SOD-63A 	PLED-T512B		GaAlAs	HYPERRED	650	70	1.75	100	DIFF/TRANSP.	
			/GaP:N	SUPERGREEN	565	70	2.10	60	DIFF/TRANSP.	
	PLED-H514B	*	GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED	
	PLED-G514B	*	GaP:N	SUPERGREEN	565	70	2.10	60	DIFF/GREEN	
	PLED-Y514B	*	GaP:As	YELLOW	590	70	2.10	30	DIFF/YELLOW	
ϕ 5 mm SOD-63D 	PLED-H511C	*	GaAlAs	HYPERRED	650	20	2.10	60	CLEAR/TRANSP.	
	PLED-G511C	*	GaP:N	SUPERGREEN	565	20	2.10	60	CLEAR/TRANSP.	
	PLED-Y511C	*	GaP:As	YELLOW	590	20	2.10	30	CLEAR/TRANSP.	
	PLED-G513C	*	GaP:N	SUPERGREEN	565	20	2.10	60	CLEAR/GREEN	
	PLED-Y513C	*	GaP:As	YELLOW	590	20	2.10	30	CLEAR/YELLOW	
	ϕ 5 mm SOD-85AL  SOD-85BL 	PLED-H544KL		GaAlAs	HYPERRED	650	70	1.75	100	DIFF/RED
PLED-G544KL			GaP:N	SUPERGREEN	565	70	2.10	60	DIFF/GREEN	
PLED-Y544KL			GaP:As	YELLOW	590	70	2.10	30	DIFF/YELLOW	
PLED-H544LL			GaAlAs	HYPERRED	650	70	1.75	100	DIFF/RED	
PLED-G544LL			GaP:N	SUPERGREEN	565	70	2.10	60	DIFF/GREEN	
PLED-Y544LL			GaP:As	YELLOW	590	70	2.10	30	DIFF/YELLOW	
ϕ 5 mm SOD-90C 		PLED-O513M	*	GaAsP	ORANGE	630	30	2.20	30	CLEAR/RED
		PLED-G513M	*	GaP:N	SUPERGREEN	565	35	2.20	30	CLEAR/GREEN
	PLED-P513M	*	GaP:Zn	ULTRARED	700	30	2.20	30	CLEAR/RED	
	PLED-Y513M	*	GaP:As	YELLOW	590	35	2.20	30	CLEAR/YELLOW	
	PLED-O514M	*	GaAsP	ORANGE	630	40	2.20	30	DIFF/RED	
	PLED-G514M	*	GaP:N	SUPERGREEN	565	50	2.20	30	DIFF/GREEN	
	PLED-P514M	*	GaP:Zn	ULTRARED	700	40	2.20	30	DIFF/RED	
	PLED-Y514M	*	GaP:As	YELLOW	590	40	2.20	30	DIFF/YELLOW	
R5 x 1 SOD-75B 	PLED-TR12E		GaAlAs	HYPERRED	650	100	1.75	100	DIFF/TRANSP.	
			/GaP:N	SUPERGREEN	565	100	2.10	60	DIFF/TRANSP.	
	PLED-HR14E	*	GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED	
	PLED-GR14E	*	GaP:N	SUPERGREEN	565	100	2.10	60	DIFF/GREEN	
	PLED-YR14E	*	GaP:As	YELLOW	590	100	2.10	30	DIFF/YELLOW	

shape /case	type	L	crystal	colour	λ nm	θ ½	V_F (V)	I_{Fmax} mA	plastic
R5 x 2.5 SOD-76A 	PLED-TR12F		GaAlAs /GaP:N	HYPERRED SUPERGREEN	650 565	100 100	1.75 2.10	100 60	DIFF/TRANSP. DIFF/TRANSP.
	PLED-HR14F	*	GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED
	PLED-GR14F	*	GaO:N	SUPERGREEN	565	100	2.10	60	DIFF/GREEN
	PLED-YR14F	*	GaP:As	YELLOW	590	100	2.10	30	DIFF/YELLOW
R5 x 3 SOD-77A 	PLED-TR12G		GaAlAs /GaP:N	HYPERRED SUPERGREEN	650 565	100 100	1.75 2.10	100 60	DIFF/TRANSP. DIFF/TRANSP.
	PLED-HR14G	*	GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED
	PLED-GR14G	*	GaP:N	SUPERGREEN	565	100	2.10	60	DIFF/GREEN
	PLED-YR14G	*	GaP:As	YELLOW	590	100	2.10	30	DIFF/YELLOW
R5 x 5 SOD-74L 	PLED-TR42DL		GaAlAs /GaP:N	HYPERRED SUPERGREEN	650 565	100 100	1.75 2.10	100 60	DIFF/TRANSP. DIFF/TRANSP.
	PLED-HR44DL		GaAlAs	HYPERRED	650	100	1.75	100	DIFF/RED
	PLED-GR44DL		GaP:N	SUPERGREEN	565	100	2.10	60	DIFF/GREEN
	PLED-YR44DL		GaP:As	YELLOW	590	100	2.10	30	DIFF/YELLOW

* Product available in long lead form.

Infrared LEDs and photo-sensitive devices.

package	type	λ_p typ. (nm)	I_F max. (mA)	I_{FRM} max. (mA)	V_R max. (V)	ϕ_e and I_e at typ. (mW/sr)		I_F (mA)	$\phi_{1/2}$ typ. (°)	t_r typ. (ns)	crystal
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Round, 3 mm diameter

SOD-53F	CQW58A-1	830	60	1000	5	1	1 to 5	20	15	30	GaAlAs
	CQW58A-2						>3				
	CQY58A	930	50	200	5	1	>2	20	20	3000	GaAs
	CQY58A-1						1 to 5				
CQY58A-2	>3										

Round, 5 mm diameter

SOD-63D2	CQW89A	830	130	2500	5	8	>9	100	24	30	GaAlAs
	CQW89A-1						>12				
	CQW89A-2						>15				
SOD-94	CQW89B	830	130	2500	5	8	>20	100	12	30	GaAlAs
SOD-63B2	CQY89A	930	130	1000	5	10	>9	100	40	1000	GaAs
	CQY89A-1						>12				
	CQY89A-2						>15				

Rectangular with round end

SOD-93	CQY89F	930	120	1000	5	10	>9	100	30	1000	GaAs
	CQY89F-1						>12				
	CQF89F-2						>15				

(1) Pulse width = $\leq 10 \mu s$; $\delta = 0.01$

(2) Pulse width = $\leq 50 \mu s$; $\delta = 0.05$

(3) Beam width = 30° in the plane of the leads and 25° perpendicular to that plane.

package	type	λ_p^* typ. (nm)	V_R max. (V)	I_L at: max. (μA)	V_R (V)	E_e and λ (mW/cm ²) (nm)		I_R at max. (nA)	V_R (V)	A (mm ²)	crystal
SOD-67	BPW50	930	32	45	5	1	930	30	10	5	Si

package	type	λ_p^* typ. (nm)	V_{CEO} max. (V)	I_C max. (mA)	I_L at: (mA)	V_{CE} (V)	E_e and λ (mW/cm ²) (nm)		I_{CEO} at V_{CE} max. (μA)	V_{CE} (V)	crystal
SOD-53F	BPW22A-1	800	50	25	1,5 to 8	5	1	930	0,1	30	Si
	BPW22A-2				5 to 25						

* Wavelength at which maximum sensitivity occurs.

TYPE NUMBER SURVEY

TYPE NUMBER SURVEY

In this alphanumeric list we present all light emitting diodes mentioned in this handbook.

type		page
BPW22A	Photosensitive transistor, SOD-53F	41
BPW50	Photosensitive PIN diode for remote control, SOD-67	47
CQW58A	LED, IR, for optical coupling and encoding, ϕ 5 mm, SOD-53F	53
CQW89A	LED, IR, for remote control, ϕ 5 mm, SOD-63D2	59
CQW89B	LED, IR, for remote control, ϕ 5 mm, SOD-94	65
CQY58A	LED, IR, for optical coupling and encoding, ϕ 3 mm, SOD-53F	71
CQY89A	LED, IR, for remote control, ϕ 5 mm, SOD-63B2	77
CQY89F	LED, IR, for remote control, FO-147A2	83
PLED-G313A	LED, supergreen, ϕ 3 mm, SOD-53E	89
PLED-G313N	LED, supergreen, ϕ 3 mm, SOD-82C	95
PLED-G314A	LED, supergreen, ϕ 3 mm, SOD-53E	101
PLED-G314N	LED, supergreen, ϕ 3 mm, SOD-82C	107
PLED-G511C	LED, supergreen, ϕ 5 mm, SOD-63C	113
PLED-G513C	LED, supergreen, ϕ 5 mm, SOD-63D	119
PLED-G513M	LED, supergreen, ϕ 5 mm, SOD-90C	125
PLED-G514B	LED, supergreen, ϕ 5 mm, SOD-63A	131
PLED-G514M	LED, supergreen, ϕ 5 mm, SOD-90C	137
PLED-G544KL	LED, supergreen, ϕ 5 mm, SOD-85AL	143
PLED-GR14E	LED, supergreen, 5 x 1 mm, SOD-75B	149
PLED-GR14F	LED, supergreen, 5 x 2,5 mm, SOD-76A	155
PLED-GR14G	LED, supergreen, 5 x 3 mm, SOD-77A	161
PLED-GR44DL	LED, supergreen, 5 x 5 mm, SOD-74L	167
PLED-H313A	LED, hyper-red, ϕ 3 mm, SOD-53E	173
PLED-H314A	LED, hyper-red, ϕ 3 mm, SOD-53E	177
PLED-H511C	LED, hyper-red, ϕ 5 mm, SOD-63D	183
PLED-H514B	LED, hyper-red, ϕ 5 mm, SOD-63A	189
PLED-H544KL	LED, hyper-red, ϕ 5 mm, SOD-85AL	195
PLED-H544LL	LED, hyper-red, ϕ 5 mm, SOD-85BL	201
PLED-HR14E	LED, hyper-red, 5 x 1 mm, SOD-75B	207
PLED-HR14F	LED, hyper-red, 5 x 2.5 mm, SOD-76A	213
PLED-HR14G	LED, hyper-red, 5 x 3 mm, SOD-77A	219
PLED-HR44DL	LED, hyper-red, 5 x 5 mm, SOD-74L	225
PLED-O313N	LED, orange, ϕ 3 mm, SOD-82C	231
PLED-O314N	LED, orange, ϕ 3 mm, SOD-82C	237
PLED-O513M	LED, orange, ϕ 5 mm, SOD-90C	243
PLED-O514M	LED, orange, ϕ 5 mm, SOD-90C	249
PLED-P313N	LED, ultra-red, ϕ 3 mm, SOD-82C	255
PLED-P314N	LED, ultra-red, ϕ 3 mm, SOD-82C	261
PLED-P513M	LED, ultra-red, ϕ 5 mm, SOD-90C	267
PLED-P514M	LED, ultra-red, ϕ 5 mm, SOD-90C	273
PLED-T512B	LED, bi-colour, hyper-red or supergreen, ϕ 5 mm, SOD-63A	279
PLED-TR12E	LED, bi-colour, hyper-red or supergreen, 5 x 1 mm, SOD-75B	285
PLED-TR12F	LED, bi-colour, hyper-red or supergreen, 5 x 2.5 mm, SOD-76A	291

type		page
PLED-TR12G	LED, bi-colour, hyper-red or supergreen, 5 x 3 mm, SOD-77A	297
PLED-TR42DL	LED, bi-colour, hyper-red or supergreen, 5 x 5 mm, SOD-74L	303
PLED-Y313A	LED, yellow, ϕ 3 mm, SOD-53E	309
PLED-Y313N	LED, yellow, ϕ 3 mm, SOD-82C	315
PLED-Y314A	LED, yellow, ϕ 3 mm, SOD-53E	321
PLED-Y314N	LED, yellow, ϕ 3 mm, SOD-82C	327
PLED-Y511C	LED, yellow, ϕ 5 mm, SOD-63D	333
PLED-Y513C	LED, yellow, ϕ 5 mm, SOD-63D	339
PLED-Y513M	LED, yellow, ϕ 5 mm, SOD-90C	345
PLED-Y514B	LED, yellow, ϕ 5 mm, SOD-63A	351
PLED-Y514M	LED, yellow, ϕ 5 mm, SOD-90C	357
PLED-Y544KL	LED, yellow, ϕ 5 mm, SOD-85AL	363
PLED-Y544LL	LED, yellow, ϕ 5 mm, SOD-85BL	369
PLED-YR14E	LED, yellow, 5 x 1 mm, SOD-75B	375
PLED-YR14F	LED, yellow, 5 x 2.5 mm, SOD-76A	381
PLED-YR14G	LED, yellow, 5 x 3 mm, SOD-77A	387
PLED-YR44DL	LED, yellow, 5 x 5 mm, SOD-74L	393

GENERAL

Safety recommendations

Rating system

Letter symbols

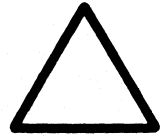
Definitions

Dimensioning

Driving GaAIs LEDs

Tape packaging of LEDs

Soldering and mounting recommendations

GENERAL SAFETY RECOMMENDATIONS
OPTOELECTRONIC DEVICES**1. GENERAL**

When properly used and handled, optoelectronic devices do not constitute a risk to health or environment. Modern high technology materials have been used in the manufacture of these devices to ensure optimum performance. Some of these materials are toxic in certain circumstances. Mechanical or electrical damage is unlikely to give rise to any hazard, but toxic vapours may be generated if the devices are heated to destruction and it is important that the following recommendations are observed.

Care should be taken to ensure that all personnel who may handle, use or dispose of these products are aware of the necessary precautions.

Individual product data sheets will indicate whether any specific hazards are likely to be present.

2. DISPOSAL

These devices should be disposed of in accordance with the relevant legislation; in the United Kingdom disposal should therefore be carried out in accordance with the Deposit of Poisonous Waste Act 1972 and the Control of Pollution Act 1974, or with the latest legislation.

3. FIRE

Optoelectronic devices themselves, when used within the specified limits, do not present a fire hazard.

Devices can contain arsenic, beryllium, cadmium, lead, mercury, selenium, tellurium or similar hazardous materials or compounds, which, if exposed to high temperatures may emit toxic or noxious fumes.

Most packaging materials are flammable and care should be taken in the disposal of such materials, some of which will emit toxic fumes if burned.

4. HANDLING

Care must be exercised with those devices incorporating glass which may have sharp edges. In addition, if these devices are broken, precautions must be taken against the following hazards that may arise:—

Broken glass or ceramic. Protective clothing such as gloves should be worn.

Contamination from toxic materials and vapours. In particular, skin contact and inhalation must be avoided.

Access to live contacts which may be at high potential. Devices must be isolated from the mains supply prior to their removal.

5. BERYLLIUM COMPOUNDS

Beryllium oxide dust is toxic if inhaled or if particles enter a cut or abrasion. At all times avoid handling beryllium oxide ceramics; if they are touched, the hands must be washed thoroughly with soap and water. Do nothing to beryllium oxide ceramics that may produce dust or fumes.

5. BERYLLIUM COMPOUNDS (continued)

Care should be taken upon eventual disposal that they are not thrown out with general industrial waste. Users seeking disposal of devices incorporating beryllium oxide ceramics should first take advice from the manufacturer's service department.

This potential hazard is present at all times from receipt to disposal of devices.

6. CADMIUM COMPOUNDS

Cadmium compounds are toxic. In the event of accidental breakage, cadmium dust may be released. Gloves should be worn and the dust should be mopped up with a damp cloth. Upon disposal, the cloth should be sealed in a plastic bag and the hands washed thoroughly with soap and water.

Controlled disposal of devices containing cadmium compounds should be conducted in the open air or in a well ventilated area.

Inhalation of cadmium dust must be avoided.

This potential hazard is present, if breakage occurs, at all times from receipt to disposal of devices.

7. OTHER COMPOUNDS

Other compounds, such as those containing arsenic, indium, lead, lithium, selenium, tantalum, tellurium etc., may be toxic by ingestion or inhalation.

8. LASER HAZARDS

Laser devices emit radiation which is invisible to the human eye. When in use, do not look directly into the device. Direct viewing of laser emission at close range may cause eye damage, especially in conjunction with collimating lenses.

Safety in the use of laser devices is described in British Standard 4803: 1983, 'Radiation Safety of Laser Products and Systems'. Users of laser devices must observe the procedures and requirements defined in this standard.

The published data for each device, together with the primary packaging, carry the British Standard approved warning symbol, shown below.



The above information and recommendations are given in good faith and are in accordance with the best knowledge and opinion available at the date of the compilation of the data sheets.

RATING SYSTEMS

The rating systems described are those recommended by the International Electrotechnical Commission (IEC) in its Publication 134.

DEFINITIONS OF TERMS USED

Electronic device. An electronic tube or valve, transistor or other semiconductor device.

Note

This definition excludes inductors, capacitors, resistors and similar components.

Characteristic. A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic, or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

Bogey electronic device. An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics which are directly related to the application.

Rating. A value which establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms.

Note

Limiting conditions may be either maxima or minima.

Rating system. The set of principles upon which ratings are established and which determine their interpretation.

Note

The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

ABSOLUTE MAXIMUM RATING SYSTEM

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout life, no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

DESIGN MAXIMUM RATING SYSTEM

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout life, no design maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

DESIGN CENTRE RATING SYSTEM

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.

LETTER SYMBOLS FOR TRANSISTORS AND SIGNAL DIODES

based on IEC Publication 148

LETTER SYMBOLS FOR CURRENTS, VOLTAGES AND POWERS

Basic letters

The basic letters to be used are:

I, i = current
 V, v = voltage
 P, p = power.

Lower-case basic letters shall be used for the representation of instantaneous values which vary with time.

In all other instances upper-case basic letters shall be used.

Subscripts

A, a	Anode terminal
(AV), (av)	Average value
B, b	Base terminal, for MOS devices: Substrate
(BR)	Breakdown
C, c	Collector terminal
D, d	Drain terminal
E, e	Emitter terminal
F, f	Forward
G, g	Gate terminal
K, k	Cathode terminal
M, m	Peak value
O, o	As third subscript: The terminal not mentioned is open circuited
R, r	As first subscript: Reverse. As second subscript: Repetitive. As third subscript: With a specified resistance between the terminal not mentioned and the reference terminal.
(RMS), (rms)	R. M. S. value
S, s	{ As first or second subscript: Source terminal (for FETS only) As second subscript: Non-repetitive (not for FETS) As third subscript: Short circuit between the terminal not mentioned and the reference terminal
X, x	Specified circuit
Z, z	Replaces R to indicate the actual working voltage, current or power of voltage reference and voltage regulator diodes.

Note: No additional subscript is used for d. c. values.

Upper-case subscripts shall be used for the indication of:

- a) continuous (d. c.) values (without signal)
Example I_B
- b) instantaneous total values
Example i_B
- c) average total values
Example $I_{B(AV)}$
- d) peak total values
Example I_{BM}
- e) root-mean-square total values
Example $I_{B(RMS)}$

Lower-case subscripts shall be used for the indication of values applying to the varying component alone:

- a) instantaneous values
Example i_b
- b) root-mean-square values
Example $I_{b(rms)}$
- c) peak values
Example I_{bm}
- d) average values
Example $I_{b(av)}$

Note: If more than one subscript is used, subscript for which both styles exist shall either be all upper-case or all lower-case.

Additional rules for subscripts

Subscripts for currents

Transistors: If it is necessary to indicate the terminal carrying the current, this should be done by the first subscript (conventional current flow from the external circuit into the terminal is positive).

Examples: I_B , i_B , i_b , I_{bm}

Diodes: To indicate a forward current (conventional current flow into the anode terminal) the subscript F or f should be used; for a reverse current (conventional current flow out of the anode terminal) the subscript R or r should be used.

Examples: I_F , I_R , i_F , $I_{f(rms)}$

Subscripts for voltages

Transistors: If it is necessary to indicate the points between which a voltage is measured, this should be done by the first two subscripts. The first subscript indicates the terminal at which the voltage is measured and the second the reference terminal or the circuit node. Where there is no possibility of confusion, the second subscript may be omitted.

Examples: V_{BE} , v_{BE} , v_{be} , V_{bem}

Diodes: To indicate a forward voltage (anode positive with respect to cathode), the subscript F or f should be used; for a reverse voltage (anode negative with respect to cathode) the subscript R or r should be used.

Examples: V_F , V_R , v_F , V_{rm}

Subscripts for supply voltages or supply currents

Supply voltages or supply currents shall be indicated by repeating the appropriate terminal subscript.

Examples: V_{CC} , I_{EE}

Note: If it is necessary to indicate a reference terminal, this should be done by a third subscript

Example: V_{CCE}

Subscripts for devices having more than one terminal of the same kind

If a device has more than one terminal of the same kind, the subscript is formed by the appropriate letter for the terminal followed by a number; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{B2} = continuous (d.c.) current flowing into the second base terminal

V_{B2-E} = continuous (d.c.) voltage between the terminals of second base and emitter

Subscripts for multiple devices

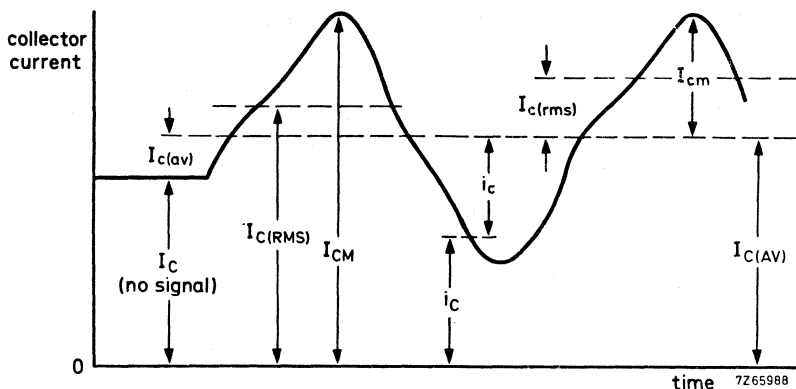
For multiple unit devices, the subscripts are modified by a number preceding the letter subscript; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{2C} = continuous (d.c.) current flowing into the collector terminal of the second unit

V_{1C-2C} = continuous (d.c.) voltage between the collector terminals of the first and the second unit.

Application of the rules

The figure below represents a transistor collector current as a function of time. It consists of a continuous (d.c.) current and a varying component.



LETTER SYMBOLS FOR ELECTRICAL PARAMETER METERS

Definition

For the purpose of this Publication, the term "electrical parameter" applies to four-pole matrix parameters, elements of electrical equivalent circuits, electrical impedances and admittances, inductances and capacitances.

Basic letters

The following is a list of the most important basic letters used for electrical parameters of semiconductor devices.

- B, b = susceptance; imaginary part of an admittance
- C = capacitance
- G, g = conductance; real part of an admittance
- H, h = hybrid parameter
- L = inductance
- R, r = resistance; real part of an impedance
- X, x = reactance; imaginary part of an impedance
- Y, y = admittance;
- Z, z = impedance;

Upper-case letters shall be used for the representation of:

- a) electrical parameters of external circuits and of circuits in which the device forms only a part;
- b) all inductances and capacitances.

Lower-case letters shall be used for the representation of electrical parameters inherent in the device (with the exception of inductances and capacitances).

Subscripts

General subscripts

The following is a list of the most important general subscripts used for electrical parameters of semiconductor devices:

F, f	= forward; forward transfer
I, i (or 1)	= input
L, l	= load
O, o (or 2)	= output
R, r	= reverse; reverse transfer
S, s	= source

Examples: Z_S , h_I , h_F

The upper-case variant of a subscript shall be used for the designation of static (d.c.) values.

Examples : h_{FE} = static value of forward current transfer ratio in common-emitter configuration (d.c. current gain)
 R_E = d.c. value of the external emitter resistance.

Note: The static value is the slope of the line from the origin to the operating point on the appropriate characteristic curve, i.e. the quotient of the appropriate electrical quantities at the operating point.

The lower-case variant of a subscript shall be used for the designation of small-signal values.

Examples: h_{fe} = small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration

$Z_e = R_e + jX_e$ = small-signal value of the external impedance

Note: If more than one subscript is used, subscripts for which both styles exist shall either be all upper-case or all lower-case

Examples: h_{FE} , y_{RE} , h_{fe}

Subscripts for four-pole matrix parameters

The first letter subscript (or double numeric subscript) indicates input, output, forward transfer or reverse transfer

Examples: h_i (or h_{11})
 h_o (or h_{22})
 h_f (or h_{21})
 h_r (or h_{12})

A further subscript is used for the identification of the circuit configuration. When no confusion is possible, this further subscript may be omitted.

Examples: h_{fe} (or h_{21e}), h_{FE} (or h_{21E})

Distinction between real and imaginary parts

If it is necessary to distinguish between real and imaginary parts of electrical parameters, no additional subscripts should be used. If basic symbols for the real and imaginary parts exist, these may be used.

Examples: $Z_i = R_i + jX_i$
 $y_{fe} = g_{fe} + jb_{fe}$

If such symbols do not exist or if they are not suitable, the following notation shall be used:

Examples: $\text{Re}(h_{ib})$ etc. for the real part of h_{ib}
 $\text{Im}(h_{ib})$ etc. for the imaginary part of h_{ib}

DEFINITIONS FOR OPTOELECTRONIC DEVICES ACCORDING TO IEC 306

DEFINITIONS AND UNITS VALID FOR INFRARED RADIATION

Radiant flux, radiant power ϕ , P, (ϕ_e)

This is the power emitted, transferred or received as radiation, i.e. the radiant energy (dQ_e) emitted per second.

$$\phi_e = \frac{dQ_e}{dt} \quad \text{unit: watt, W}$$

Radiant intensity I_e , I

For a source of given direction, the radiant intensity is the radiant power leaving the source, or an element of the source, in an element of solid angle (Ω) containing the given direction, divided by that element of solid angle.

$$I_e = \frac{d\phi_e}{d\Omega} \quad \text{unit: watt per steradian, W/sr}$$

Irradiance E, (E_e)

At a point on a surface, the irradiance is the radiant power incident on an element of the surface containing the point divided by the area (A) of that element.

$$E = \frac{d\phi_e}{dA} \quad \text{unit: watt per square metre, W/m}^2$$

DEFINITIONS AND UNITS VALID FOR VISIBLE LIGHT

This is radiation capable of stimulating the eye. Exceptions to this definition are made where necessary in the data sheets, e.g. dark and light currents of a phototransistor and light rise time of a near-infrared light emitting diode.

Luminous flux ϕ , (ϕ_v)

The luminous flux $d\phi$ of a source of luminous intensity I_v in an element of solid angle of $d\Omega$, is given by:

$$d\phi = I_v \cdot d\Omega \quad \text{unit: lumen, lm}$$

Lumen

This is the luminous flux radiating from a point source of uniform luminous intensity of 1 candela, contained within a solid angle of 1 steradian.

$$1 \text{ lm} = 1 \text{ cd} \cdot \text{sr}$$

Luminous intensity I_v , (I)

For a source of given direction, the luminous intensity is the luminous flux leaving the source, or an element of the source, in an element of solid angle (Ω) containing the given direction, divided by that element of solid angle.

$$I_v = \frac{d\phi_v}{d\Omega} \quad \text{unit: candela, cd}$$

Candela

This is the luminous intensity in a given direction, of a source emitting monochromatic radiation at a frequency of 540×10^{12} Hz*, the radiant intensity of which, in that direction, being 1/683 W/sr.

* Approximately 555 nm.

Illuminance E_v , (E)

At a point on a surface, the illuminance is the luminous flux incident on an element of the surface containing the point, divided by the area (A) of that element.

$$E_v = \frac{d\phi_v}{dA} \quad \text{unit: lux, lx}$$

Lux lx

This is the illumination produced when 1 lumen of flux falls on a surface of area 1 square metre. It will be seen that an illumination of 1 lx is produced on a area of 1 square metre at a distance of 1 metre from a point source of 1 candela.

Distribution temperature T_d

This is the temperature of a black body at which the spectral radiation distribution of the radiator under consideration, in a given wavelength range, is proportional or approximately proportional to the spectral radiation distribution of the black body. If the wavelength range given includes visible radiation, then the distribution temperature corresponds to the colour temperature.

Colour temperature T_c

The colour temperature of a radiator is the temperature of a black body which has the same, or approximately the same, spectral radiation distribution in the visible range as the radiator under consideration.

DEFINITIONS OF ELECTRICAL QUANTITIES

Photocurrent I_{ph}

This is the change in output current from the photocathode due to incident radiation.

Dark current I_d

This is the current flowing in a photoelectric device in the absence of illumination.

Dark current equivalent radiation E_d

This is the incident radiation required to give a d.c. signal output current equal to the dark current.

Quantum efficiency

This is the ratio of the number of emitted photoelectrons to the number of incident photons. Quantum efficiency (Q.E.) at a given wavelength of incident radiation may be calculated as follows:

$$Q.E. = \frac{\text{constant} \times S_k}{\lambda}$$

where S_k = spectral sensitivity (A/W) at wavelength λ
 λ = wavelength of incident radiation (nm)

$$\text{constant} = \frac{hc}{e} = 1,24 \times 10^3 \text{ W.nm/A}$$

h = Planck's constant ($6,6256 \times 10^{-34}$ js)

c = velocity of electromagnetic waves in vacuo = $2,997925 \times 10^8$ m/s

e = elementary charge = $1,60210 \times 10^{-19}$ coulomb or $4,80298 \times 10^{-19}$ e.s.u.

Saturation voltage V_{CEsat}

This is the lowest operating voltage which causes no change in photocurrent when this voltage is increased with constant radiation.

Saturation current I_{CEsat}

This is the output current of a photosensitive device which is not changed by an increase of either:

- a. the irradiance under constant operating conditions, or,
- b. the operating voltage under constant irradiance.

Thermal resistance

This is the ratio of temperature rise to power dissipation or

$$R_{th\ j-a} = \frac{T_j - T_{amb}}{P_{tot}}$$

The thermal resistance is also the reciprocal of the derating factor.

Pulsed operation

Under these conditions higher peak power dissipation is possible. In general, the shorter the pulse and lower the frequency, the lower is the temperature that the junction reaches.

By analogy with thermal resistance:

$$Z_{th\ j-a} = \frac{T_j - T_{amb}}{P_{tot}}$$

DEFINITIONS OF SENSITIVITY

These definitions apply more directly to photocathode sensitivity. For devices in which it is necessary to define the anode (overall) sensitivity, the signal output current should be considered instead of the photocurrent.

Activity of radiation Z

This is the ratio of the sensitivity to a given radiation to the sensitivity to a reference radiation.

Radiant sensitivity S_R

This may be expressed as either:

- a. the ratio of the photocurrent of the device to the incident radiant power, expressed in amperes per watt (A/W), or,
- b. the ratio of the photocurrent of the device to the incident irradiance, expressed in amperes per watt per square metre (A/W/m²).

Absolute spectral sensitivity $s(\lambda)$

This is the radiant sensitivity for monochromatic radiation of a stated wavelength.

Relative spectral sensitivity $s(\lambda)_{rel}$

This is the ratio of the radiant sensitivity at a particular wavelength to the radiant sensitivity at a reference wavelength, usually the wavelength of maximum response.

Note

For non-linear detectors, it is necessary to refer to constant photocurrent at all wavelengths.

Luminous sensitivity S_L

This may be expressed as either:

- a. the ratio of the photocurrent of the device to the incident luminous flux, expressed in amperes per lumen (A/lm), or,
- b. the ratio of the photocurrent of the device to the incident illuminance, expressed in amperes per lux (A/lx).

Dynamic sensitivity S_D

Under stated operating conditions, this is the ratio of the variation of the photocurrent of the device to the initiating small variation in the incident radiant or luminous power.

Note

Distinction is made between luminous dynamic sensitivity and radiant sensitivity.

Spectral sensitivity characteristics

This is the relationship, usually shown in graphical form, between the wavelength and the absolute or relative spectral sensitivity.

Absolute spectral sensitivity characteristics

This is the relationship, usually shown in graphical form, between the wavelength and the absolute spectral sensitivity.

Relative spectral sensitivity characteristics

This is the relationship between wavelength and the relative spectral sensitivity.

Quantum efficiency characteristic

This is the relationship, usually shown in graphical form, between the wavelength and the quantum efficiency.

DEFINITIONS OF TIME QUANTITIES

Rise time t_r

This is the time required for the photocurrent to rise from a stated low percentage to a stated higher percentage of the maximum value when a steady state of radiation is instantaneously applied. It is usual to consider the 10% and 90% levels (see Figs 1 and 2).

Fall time t_f

This is the time required for the photocurrent to fall from a stated high percentage to a stated lower percentage of the maximum value when the steady state of radiation is instantaneously removed.

It is usual to consider the 90% and 10% levels (see Figs 1 and 2).

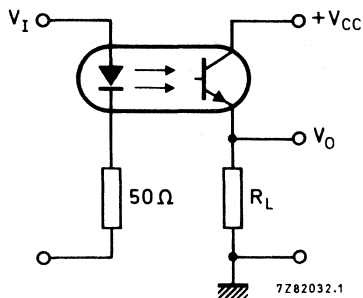


Fig. 1 Switching circuit.

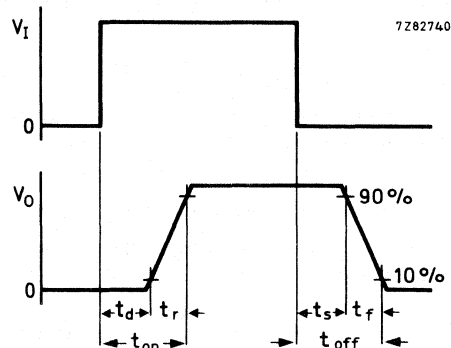


Fig. 2 Waveforms.

DEFINITIONS AND UNITS OF INFRARED SENSITIVE DEVICES

Emissivity

This is the ratio of the radiant exitance of a thermal radiator to that of a black body radiator at the same temperature.

Absolute refractive index n

This is the ratio of the velocity of light in vacuo to that in a particular medium. For most practical purposes the velocity of light in vacuo can be replaced by that in air.

Detectivity

This is the signal-to-noise ratio per unit radiant power. Thus it is the reciprocal of the N.E.P. Care must be exercised when considering detectivity as this term has also been used in the definitions of D^* .

unit: 1/watts (1/W)

D^*

This is an independent figure of merit which is defined as the r.m.s. signal-to-noise ratio in a 1 Hz bandwidth per unit r.m.s. incident radiant power per square root of detector area. Unless otherwise stated, it is assumed that the detector field of view is hemispherical (2π steradian).

unit: $\text{cm}\sqrt{\text{Hz}}/\text{W}$

Wave number

This is the reciprocal of the wavelength in centimetres. ($\frac{1}{\lambda}$)

N.E.P. (Noise Equivalent Power)

This is the r.m.s. value of the incident, chopped, radiant power necessary to produce an r.m.s. signal to r.m.s. noise ratio of unity. The r.m.s. noise refers to the value calculated for unit square root bandwidth $\text{V}/\sqrt{\text{Hz}}$.

unit: $\text{W}/\sqrt{\text{Hz}}$

Responsivity

This is the ratio of the r.m.s. signal in volts to the r.m.s. value of the incident, chopped, radiant power.

unit: V/W

Noise equivalent irradiation

This is the value of incident radiation which, when modulated in a stated manner, produces a signal output power equal to the noise power, both of which are in a stated bandwidth.

Radiance L_e

This is the radiant intensity (I_e) at a point on a surface and in a given direction, of an element of that surface, divided by the area of the orthogonal projection of the element on a plane perpendicular to the given direction.

unit: watt per steradian square metre, $W/sr.m^2$

Radiant exitance (radiant emittance) M_e

At a point on a surface, this is the radiant power leaving an element of that surface, divided by the area of the element.

$$M_e = \frac{d\phi_e}{dA} \quad \text{unit: watt per square metre, } W/m^2$$

Luminous exitance (luminous emittance) M_v

At a point on a surface, this is the luminous flux leaving an element of that surface, divided by the area of that element.

$$M_v = \frac{d\phi_v}{dA} \quad \text{unit: lumen per square metre, } lm/m^2$$

Luminance L_v

This is the luminous intensity (I_v) at a point on a surface and in a given direction, of an element of that surface divided by the area of the orthogonal projection of the element on a plane perpendicular to the given direction.

unit: candela per square metre, cd/m^2

Steradian sr (see Fig. 3)

This is the solid angle subtended at the centre of a sphere by an element of the surface area equal to the square of the radius of the sphere. There are, therefore, 4π steradians in a complete sphere.

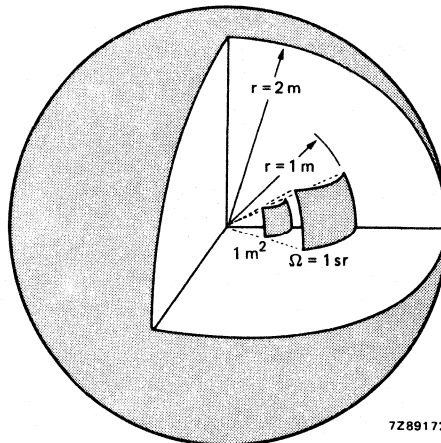


Fig. 3.

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DIMENSIONING OF LED ENVELOPES

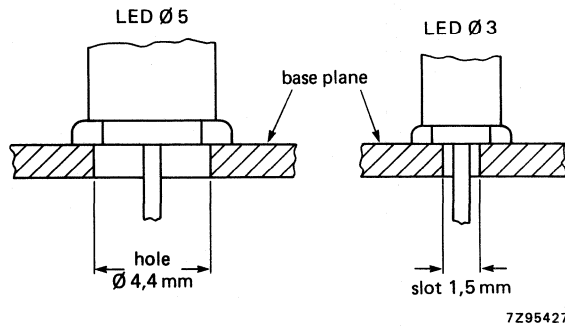
The dimensioning of the envelopes contained in this handbook is in accordance with the I.E.C. publication 191: Mechanical Standardization of Semiconductor devices.

The following section defines the different characteristics of LED dimensions.

The Base Plane

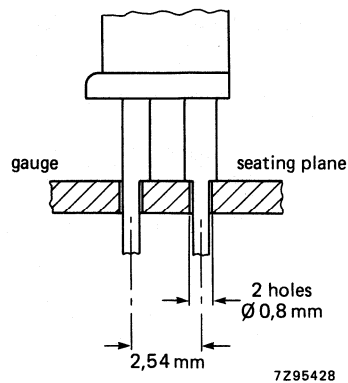
As the base of the plastic body is irregular, due to the manufacturing process, the base plane is defined as:

- for $\varnothing 5$ mm LEDs (or equivalent) a 4,4 mm hole,
- for $\varnothing 3$ mm LEDs (or equivalent) a 1,5 mm slot.



The Seating Plane

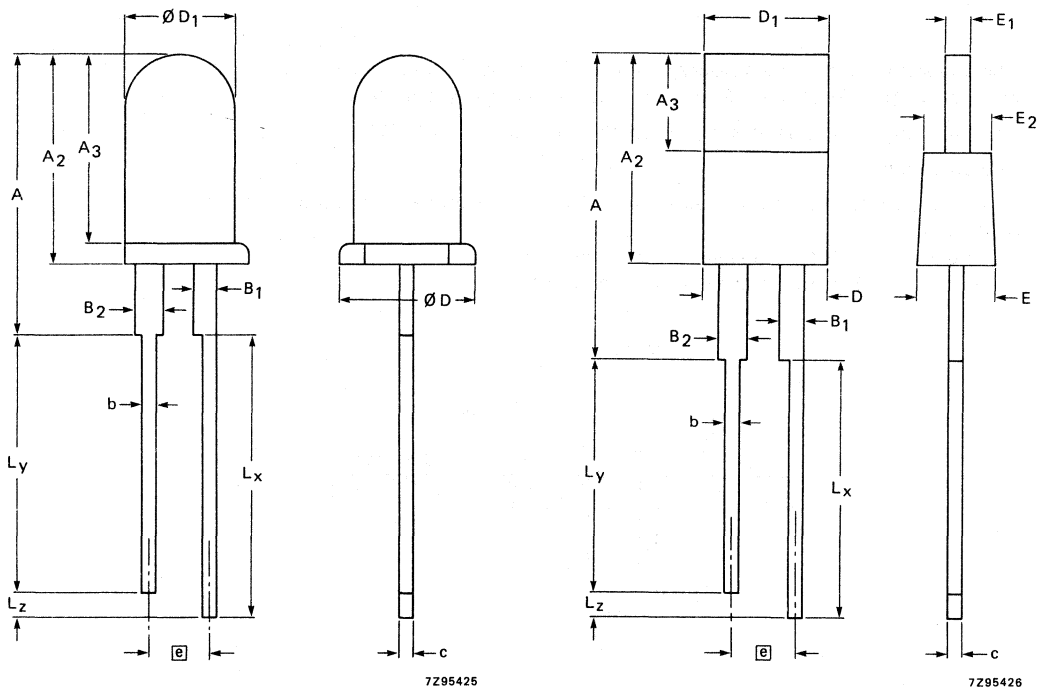
This is defined as when the flanges of the leads are seated on a gauge with 0,8 mm \varnothing holes which are 2,54 mm apart.



GENERAL

The Emission Area

The emission area is defined by top view dimensions such as $\varnothing D1$, $D1$ and $E1$.

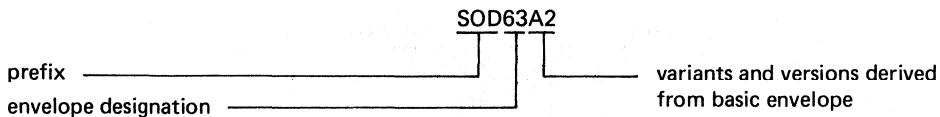


Pinning

The cathode, anode, emitter and collector are indicated on the drawings. Only the flat on the body or the shortest lead are used for pinning reference. The wider part of the lead must not be taken as a reference as different configurations may exist according to version and variant.

Envelope numbering

In the absence of international standards the following numbering system is used:



DRIVING GaAlAs LIGHT EMITTING DIODES

GaAlAs LEDs should be driven from a constant current supply to avoid small changes in forward voltage leading to large current changes. It is, however, possible to pulse the current to increase the efficiency of the LEDs by taking advantage of the non-linear relationship between luminous intensity and forward current (Fig. 1).

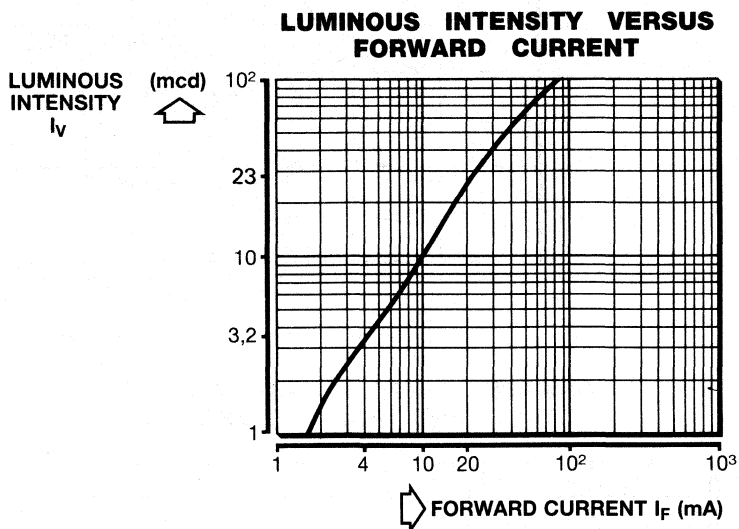


Fig. 1.

As the figure shows, a forward current of 4 mA results in a luminous intensity of 3,2 mcd, while a forward current of 20 mA results in a luminous intensity of 23 mcd. If the 20 mA current is pulsed with a dutyfactor d of 0,2, the average forward current is still 4 mA, and the average luminous intensity becomes 4,6 mcd. Thus the effective luminance intensity is 1,44 times as great with pulsed current as with d.c. of the same average value.

The effect is greatest at low average current; at higher currents the gain diminishes. This is because, at higher peak currents I_{FM} , the average power $P_{(AV)}$ increases as $V_{FM}I_{FM}d$, where V_{FM} is the peak voltage. The increase in $P_{(AV)}$ causes the diode junction temperature T_j to increase by $\Delta T_j = P_{(AV)}R_H$, where R_H is the thermal resistance of the diode junction. Since the luminous intensity is related to the junction temperature by $dI_v/dT_j = -0,7\%$ per $^{\circ}C$, the advantage of pulsed operation is lost if the average current is too high.

Junction temperature is also affected by the pulse duration t_p , since average current increases with increasing duration.

Figure 2 shows the effect of the peak current (I_{FM}) and pulse duration (t_p) on the average luminous intensity, and Fig. 3 shows how the duty factor and pulse duration affect the absolute maximum ratings of I_F .

LUMINOUS INTENSITY VERSUS FORWARD CURRENT AND PULSE DURATION

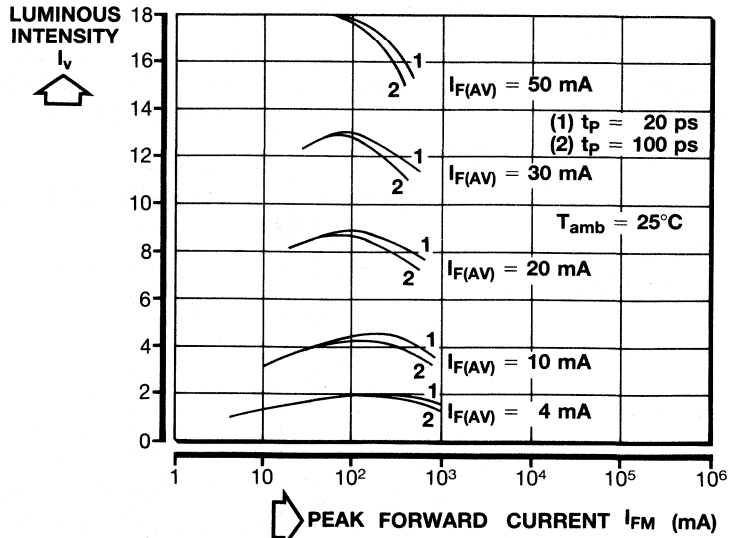


Fig. 2 $T_{amb} = 25^\circ\text{C}$;
 (1) $t_p = 20$ ps
 (2) $t_p = 100$ ps

FORWARD CURRENT VERSUS DUTY CYCLE AND PULSE DURATION

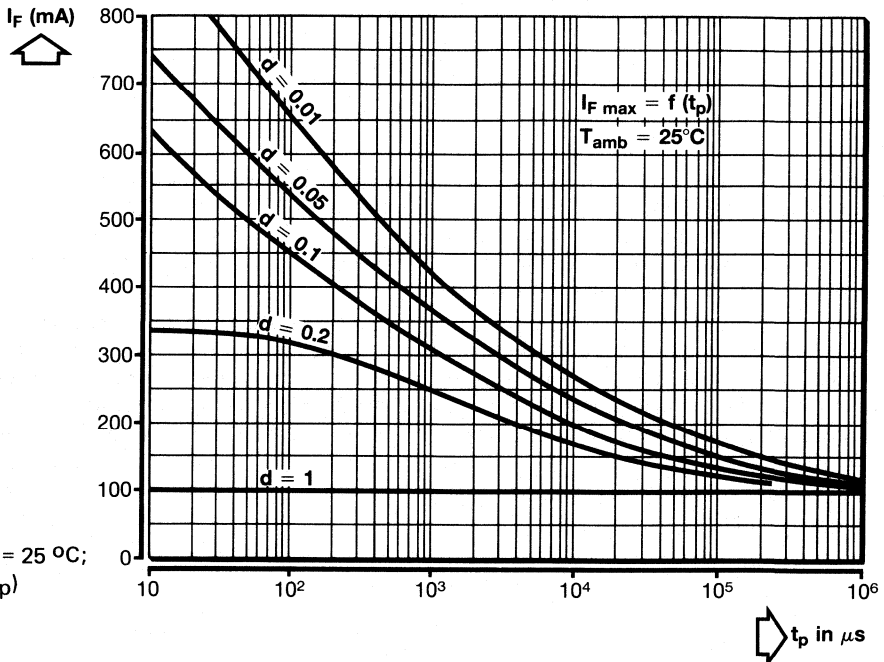


Fig. 3 $T_{amb} = 25^\circ\text{C}$;
 $I_{F \text{ max}} = f(t_p)$

The peak wavelength of the colour emitted by the LED also changes with junction temperature, according to the relation $d\lambda_p/dT_j = +0,15$ to $0,20$ nm/K. Detection of a colour difference between two LEDs depends on the dominant wavelength. Figure 4 shows how the response of the eye varies with wavelength, and Fig. 5, the change in wavelength just detectable by eye as a function of wavelength.

SPECTRAL RESPONSE OF HUMAN EYE

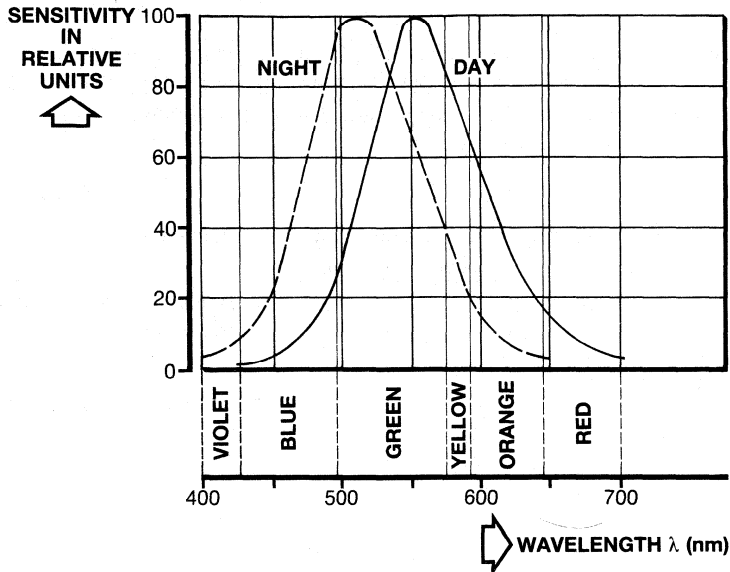


Fig. 4.

CHANGE IN WAVELENGTH JUST DETECTABLE BY HUMAN EYE VERSUS WAVELENGTH

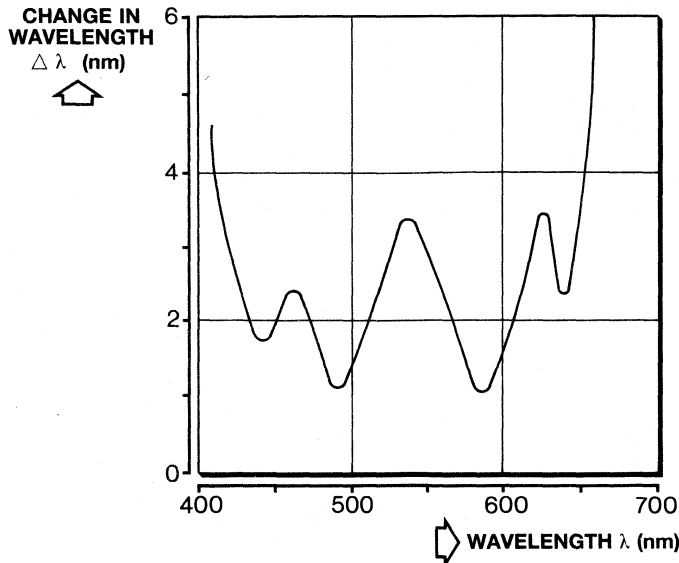


Fig. 5.

TAPE PACKAGING OF LEDs

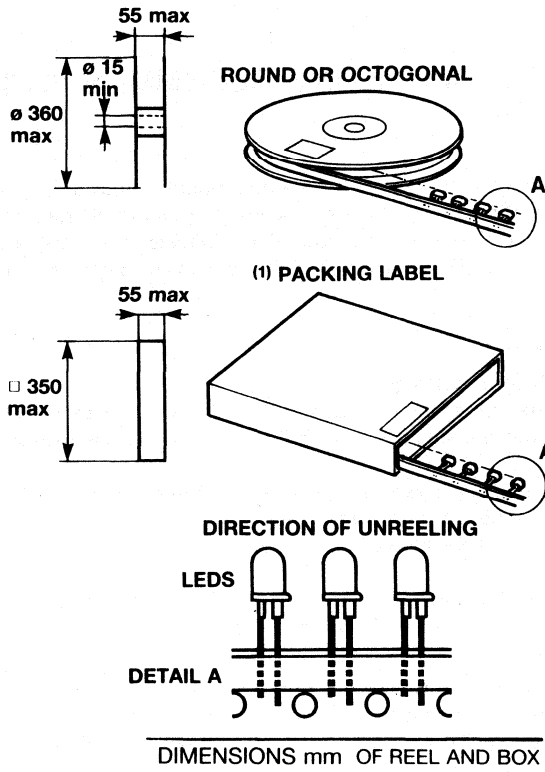
LEDs can be supplied on tape, with unidirectional leads for automatic insertion into PCBs. The tape packaging can be delivered on bandolier/rolls or meander/concertina packing as shown in Fig. 1.

The packaging consists of a carrier tape and a fixing tape as specified by IEC Publication 286. The relevant dimensions are given in Fig. 2 and the table.

MECHANICAL DATA

Dimensions in mm

Item	Symbol	Specification		Remarks
		value	tolerance	
Body width	A ₁			Dimensions derived from relevant comp. spec.
Body height	A			
Body thickness	T			
Lead wire dimensions	b			See Philips envelope spec.
	c			
Pitch of component	P	12,7	±1	Cumulative error 1mm/20 pitch
Feed hole pitch	P ₀	12,7	±0,2	
Feed hole centre to component centre	P ₂	6,35	±0,4	To be measured at 10 mm from feed hole centre
Feed hole centre to lead	P ₁			
Distance between outer leads	F	2,54	±0,2	
Lead to lead distance	F ₁ F ₂			
Component alignment	Δh	±1		At top of body
Component alignment	Δh ₁	±1		At top of body
Lead alignment after cutting	Δ ₂			
Parallelism	Δ ₃			
Tape width	W	18	±0,5	
Hold down tape width	W ₀	6	±0,3	
Hole position	W ₁	9	±0,5	
Hold down tape position	W ₂	0,5	±0,2	
Feed hole diameter	D ₀	4	±0,2	
Total tape thickness	t	0,9	max.	
Height of component from tape centre	H			
Lead wire clinch height	H ₀			
Component height	H ₁	H+A	+0-0,2	
Length of snipped leads	L ₁	11	max.	
Lead wire taped portion	L			
Pull out force	(P)	6N	min.	
Pull out force from tape end/reel		2,5N	max.	



MECHANICAL DATA

Dimensions in mm

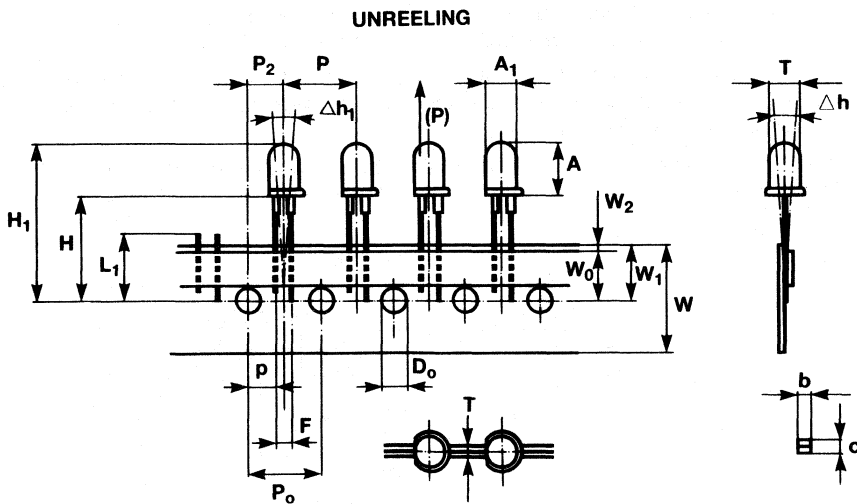


Fig. 2 See table.

SOLDERING AND MOUNTING RECOMMENDATIONS

Because LEDs are encapsulated in cast resin and not in transfer-moulded housings, they tend to soften when heated, as for instance during soldering. If there happens to be any mechanical stresses on the leads at this time, they tend to be displaced in a direction that minimizes the stress, with the result that the internal connections of the LED are fractured. This is one of the major reasons for LED failure.

To overcome the problem, it is essential:

- a) to form and crop the leads before soldering;
- b) to ensure that the holes in the printed circuit board (PCB) are of sufficient size (0,8 mm) to allow the LED to be inserted without stressing the leads while still allowing a good soldered joint to be made;
- c) to ensure that the holes in the PCB are adequately spaced (2,54 mm) so as not to stress the leads;
- d) that any spacers used do not impose stresses on the leads;
- e) that any sockets are able to secure the LED without stress.

If it is necessary to crop the leads after soldering, the LED must first be allowed to cool to room temperature. This may take from 30 seconds to 3 minutes depending upon the circumstances.

Long sockets are particularly hazardous for the LED as they rarely have the same expansion characteristics as the PCB. The resulting distortion can easily be fatal for the LEDs unless great care is taken to ensure that the holes in the sockets and the PCB are not only in perfect alignment, but also that they are of adequate size and spacing. The longer the socket, the greater the care needed.

Soldering should be done with a solder-bath or temperature-controlled iron. In either case, the temperature should be accurately controlled (preferably at 245 °C) and, in the case of the solder-bath, it is useful to record the temperature. The maximum temperature must not exceed 260 °C and the maximum time is 7 seconds. Solder must not be less than 1,5 mm from the seating plane. When using a solder-bath, take care to avoid the pressure of the solder-wave bending the PCB.

The way in which the LED is cast means that the lower surface of the device is not suitable as a reference surface. The top of the device or the top of any flange should therefore be used. A slightly less accurate reference is the seating plane.

Figure 1 shows the effect on the lower surface of the LED of (a) under filling, and (b), over filling the mould. Other dimensions are within 0,1 mm and can be used as reference.

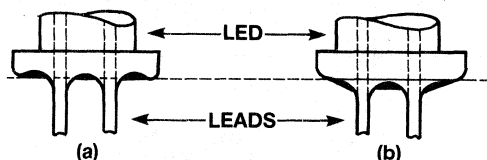


Fig. 1.

When mounting arrays of LEDs, it is preferable to use the top as the reference surface and if possible to use a screen in front of them. The screen not only makes any small differences of position less noticeable but also removes the need for the LEDs to withstand the mechanical tests required by some countries (see Fig. 2).

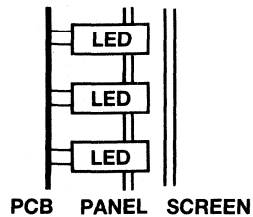


Fig. 2.

Finally, Fig. 3 shows a recommended mounting arrangement using sockets. The LED is held on the PCB by a double-sided adhesive tape and the socket presses the device against it. With the correct hole size and spacing, no stress is imposed on the leads and soldering can be done in complete safety.

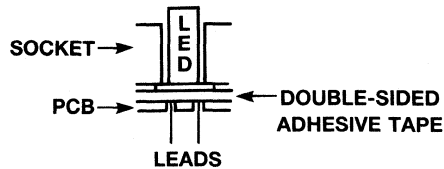


Fig. 3.

SILICON PHOTOTRANSISTOR

N-P-N silicon phototransistor in epoxy resin encapsulation intended for optical coupling and encoding. The base is inaccessible. Combination with IR emitter diode CQY58A is recommended.

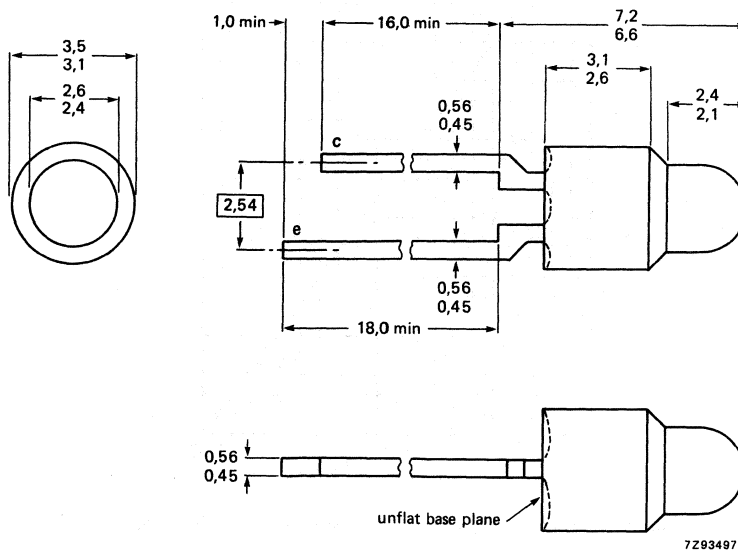
QUICK REFERENCE DATA

Collector-emitter voltage	V_{CEO}	max.	50 V
Collector current (d.c.)	I_C	max.	25 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	100 mW
Collector dark current $V_{CE} = 30\text{ V}; E = 0$	$I_{CEO(D)}$	<	100 nA
Collector light current $V_{CE} = 5\text{ V}; E_e = 1\text{ mW/cm}^2; \lambda_p = 930\text{ nm}$	BPW22A-1 BPW22A-2	$I_{CEO(L)}$ $I_{CEO(L)}$	> 1,5 to 8 mA > 5 to 25 mA
Wavelength at peak response	λ_p	typ.	800 nm

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-53F.



RATINGS

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

Collector-emitter voltage	V_{CE0}	max.	50 V
Emitter-collector voltage	V_{ECO}	max.	7 V
Collector current			
d.c.	I_C	max.	25 mA
peak value	I_{CM}	max.	50 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	100 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1,5 mm from the seating plane; $t_{sld} < 7\text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient,
device mounted on printed-circuit board

$R_{th\ j-a} = 750\text{ K/W}$

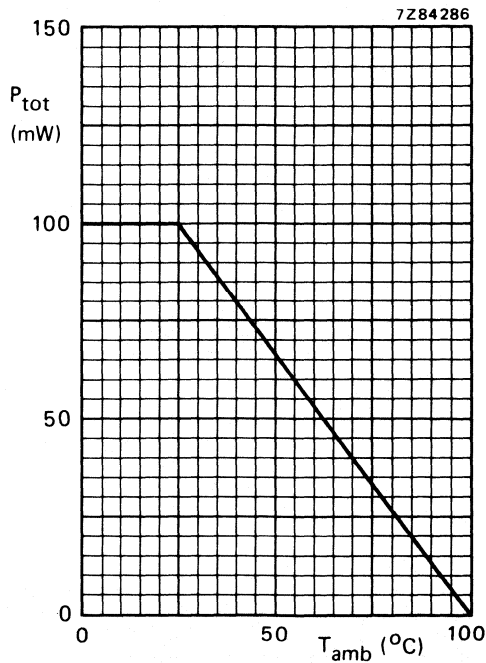


Fig. 2 Power derating curve versus ambient temperature.

CHARACTERISTICS

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

Collector dark current

$$V_{CE} = 30\text{ V}; E = 0$$

$$I_{CEO(D)} < 100\text{ nA}$$

Collector light current

$$V_{CE} = 5\text{ V}; E_e = 1\text{ mW/cm}^2; \lambda_p = 930\text{ nm}$$

BPW22A-1

$$I_{CEO(L)} \quad 1,5\text{ to }8\text{ mA}$$

BPW22A-2

$$I_{CEO(L)} \quad 5\text{ to }25\text{ mA}$$

Collector-emitter saturation voltage

$$I_C = 1\text{ mA}; E_e = 1\text{ mW/cm}^2; \lambda_p = 930\text{ nm}$$

$$V_{CEsat} < 0,4\text{ V}$$

Wavelength at peak response

$$\lambda_p \quad \text{typ. } 800\text{ nm}$$

Bandwidth at half height

$$\Delta\lambda \quad \text{typ. } 400\text{ nm}$$

Half sensitivity angle

$$\theta_{1/2} \quad \text{typ. } 20^\circ$$

Switching times (see Figs 3, 4, 9 and 10)

$$I_{Con} = 2\text{ mA}; V_{CC} = 5\text{ V}; R_E = 100\ \Omega; T_{amb} = 25\text{ }^\circ\text{C}$$

turn-on time

$$t_{on} \quad \text{typ. } 3\ \mu\text{s}$$

turn-off time

$$t_{off} \quad \text{typ. } 3\ \mu\text{s}$$

$$I_{Con} = 2\text{ mA}; V_{CC} = 5\text{ V}; R_E = 1\text{ k}\Omega; T_{amb} = 25\text{ }^\circ\text{C}$$

turn-on time

$$t_{on} \quad \text{typ. } 12,0\ \mu\text{s}$$

turn-off time

$$t_{off} \quad \text{typ. } 12,0\ \mu\text{s}$$

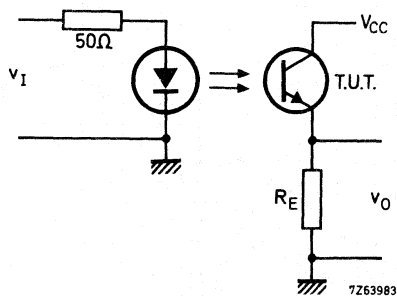


Fig. 3 Switching circuit with light emitting diode CQY58A. T.U.T. = BPW22A.

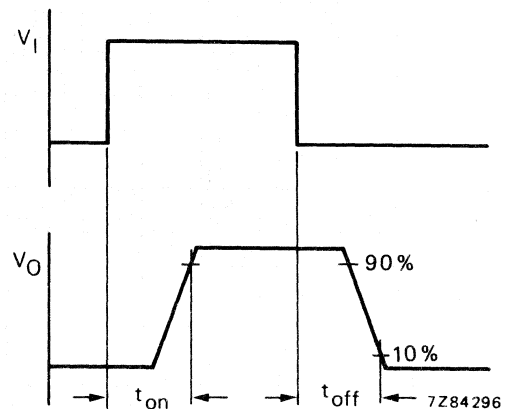


Fig. 4 Input and output switching waveforms.

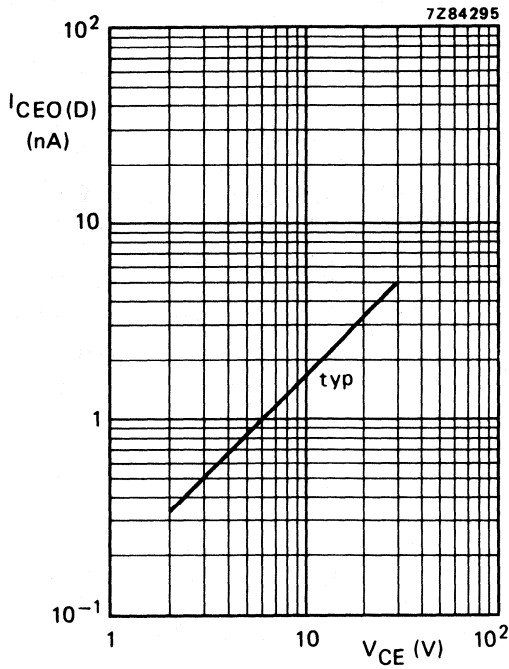


Fig. 5 $E = 0$; $T_j = 25^\circ\text{C}$.

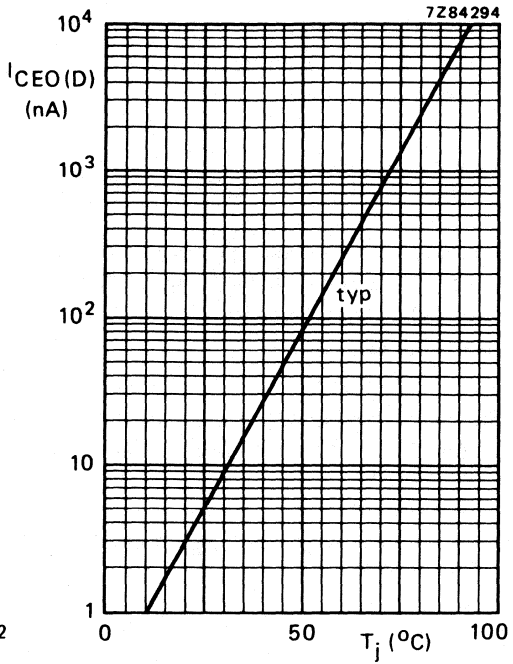


Fig. 6 $E = 0$; $V_{CE} = 30\text{ V}$.

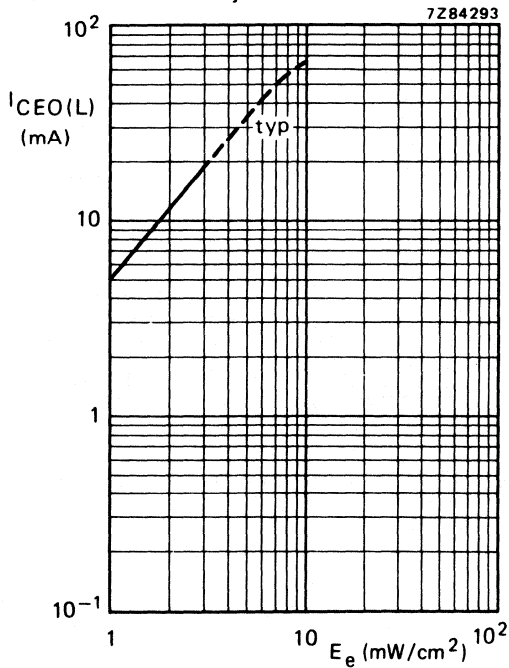


Fig. 7 GaAs source; $\lambda_{pk} = 930\text{ nm}$;
 $V_{CE} = 5\text{ V}$; $T_j = 25^\circ\text{C}$.

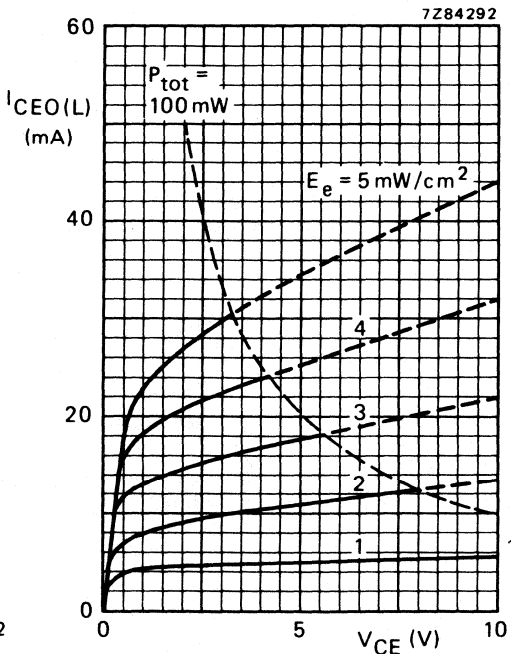


Fig. 8 $\lambda_{pk} = 930\text{ nm}$; $T_j = 25^\circ\text{C}$;
typical values.

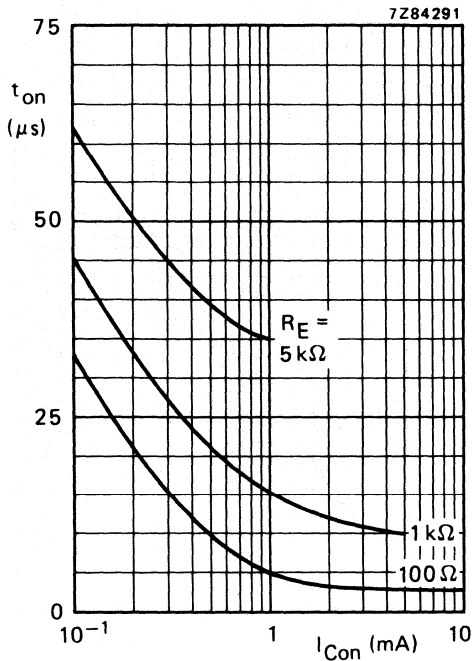


Fig. 9 $V_{CC} = 5\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; typical values; see also Figs 3 and 4.

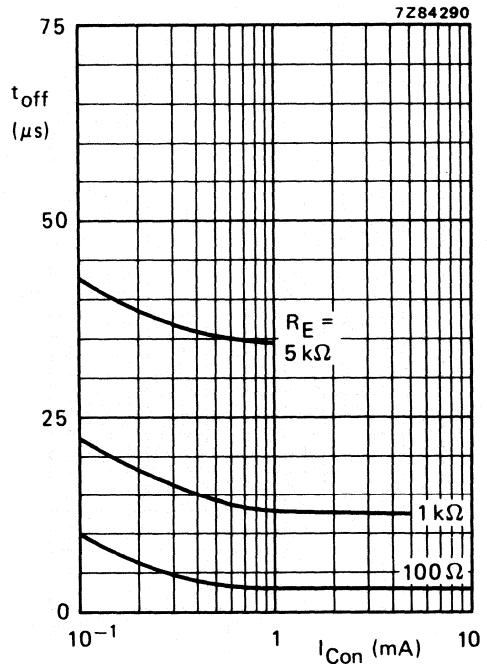


Fig. 10 $V_{CC} = 5\text{ V}$; $T_{amb} = 25\text{ }^\circ\text{C}$; typical values; see also Figs 3 and 4.

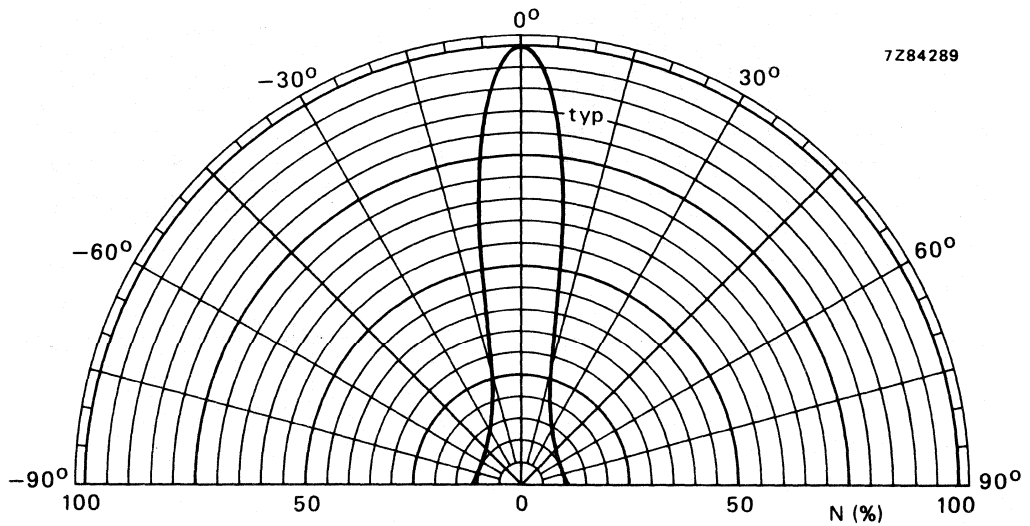


Fig. 11.

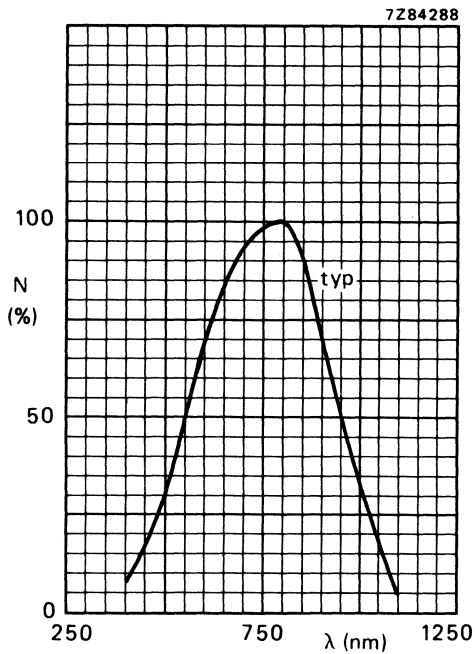


Fig. 12 Spectral response.

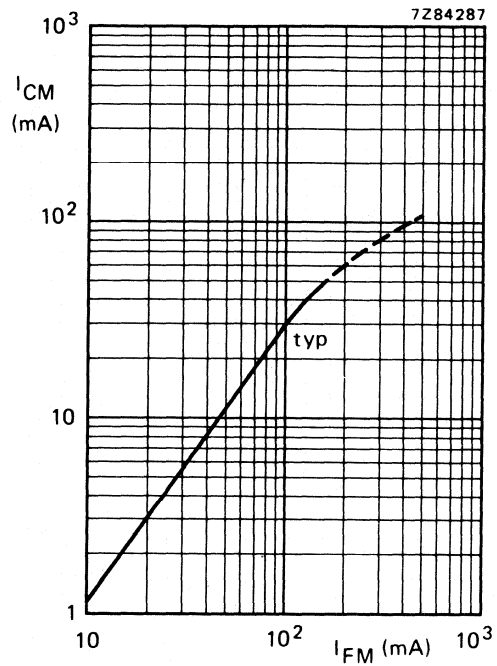


Fig. 13 $V_{CE} = 5$ V; $t_p(I_{FM}) = 10 \mu s$; $T = 1$ ms; $d^* = 10$ mm; $T_{amb} = 25$ °C.

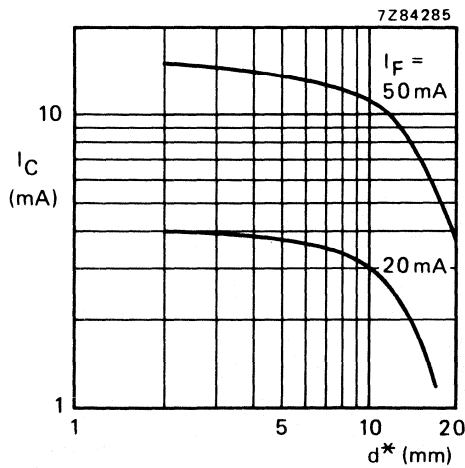


Fig. 14 $V_{CE} = 5$ V; $T_{amb} = 25$ °C; typical values.

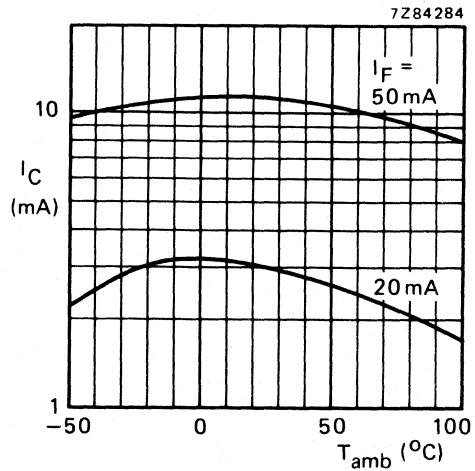


Fig. 15 $V_{CE} = 5$ V; $d^* = 10$ mm; typical values.

* d = shortest free distance of mechanical on-axis when BPW22A is coupled with CQY58A.

HIGH-SPEED SILICON PHOTO P-I-N DIODE

The BPW50 is optimized for applications with remote control systems. Combination with IR emitter diode CQY89A-2 or CQW89A is recommended. If combined with high-speed IR emitting diode CQW89A, carrier frequencies of up to 1 MHz can be applied.

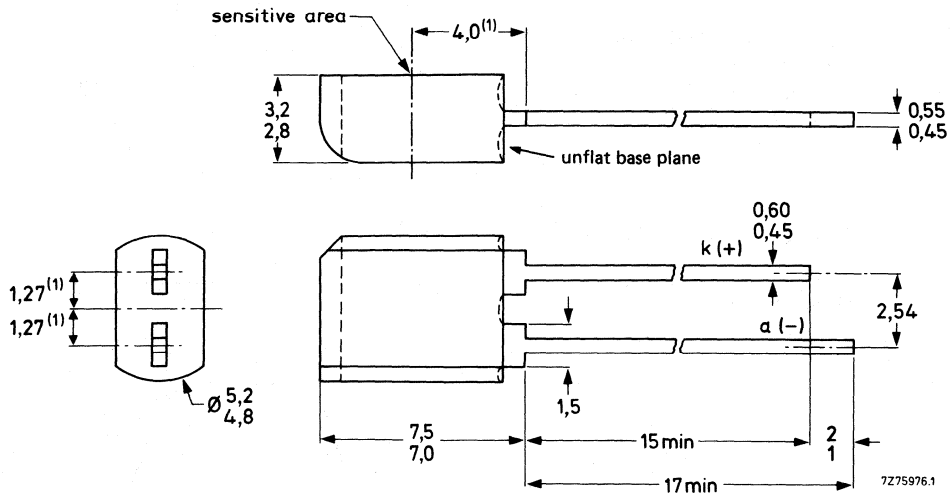
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	32 V
Total power dissipation up to $T_{amb} = 47,5\text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Dark reverse current $V_R = 10\text{ V}; E_e = 0$	$I_{R(D)}$	<	30 nA
Light reverse current $V_R = 5\text{ V}; E_e = 1\text{ mW/cm}^2; \lambda = 930\text{ nm}$	$I_{R(L)}$	>	30 μA
Wavelength at peak response $V_R = 5\text{ V}$	λ_p	typ.	930 nm
Sensitive area	A	typ.	5 mm ²

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-67.



(1) Reference for the positional tolerance of the sensitive area.

RATINGS

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

Continuous reverse voltage	V_R	max.	32 V
Total power dissipation up to $T_{amb} = 47,5\text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Storage temperature	T_{stg}		-30 to + 100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature up to the seating plane; $t_{sld} < 10\text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	350 K/W
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CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$			
Dark reverse current $V_R = 10\text{ V}; E_e = 0$	$I_{R(D)}$	typ.	2 nA
		<	30 nA
Light reverse current $V_R = 5\text{ V}; E_e = 1\text{ mW/cm}^2; \lambda = 930\text{ nm}$	$I_{R(L)}$	>	30 μA
		typ.	45 μA
Reverse voltage $I_R = 0,1\text{ mA}; E_e = 0$	V_R	>	32 V
Wavelength at peak response $V_R = 5\text{ V}$	λ_p	typ.	930 nm
Diode capacitance $V_R = 3\text{ V}$	C_d	typ.	17 pF
		<	30 pF
$V_R = 0$	C_d	typ.	50 pF
Light switching times (see Figs 2 and 3) Rise time and fall time $V_{KK} = 10\text{ V}; R_A = 1\text{ k}\Omega$	t_r, t_f	typ.	50 ns

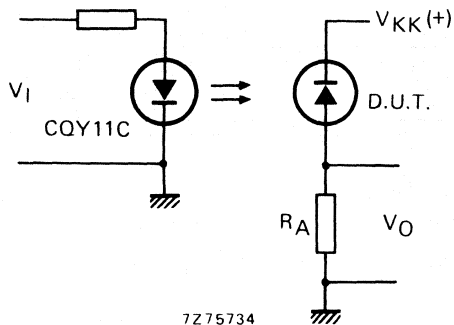


Fig. 2 Switching circuit.

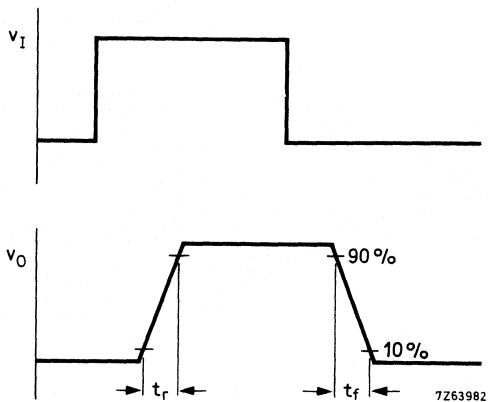


Fig. 3 Input and output switching waveforms.

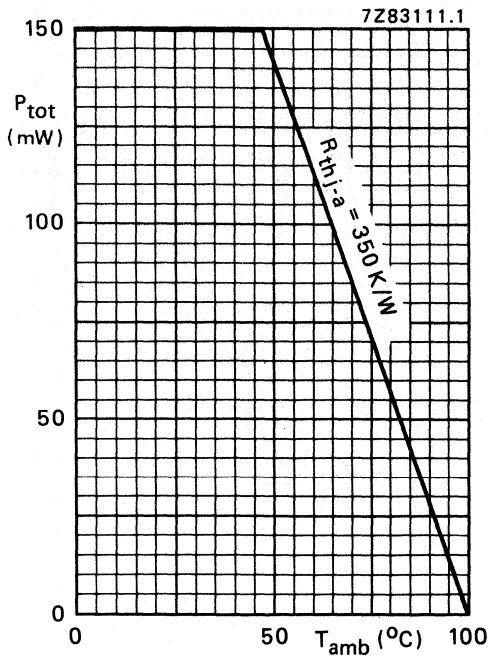


Fig. 4 Maximum permissible power dissipation as a function of temperature.

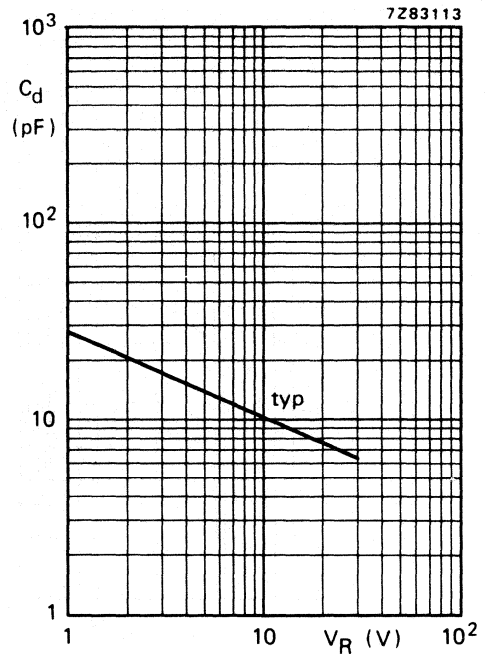


Fig. 5 $T_{amb} = 25^{\circ}C$.

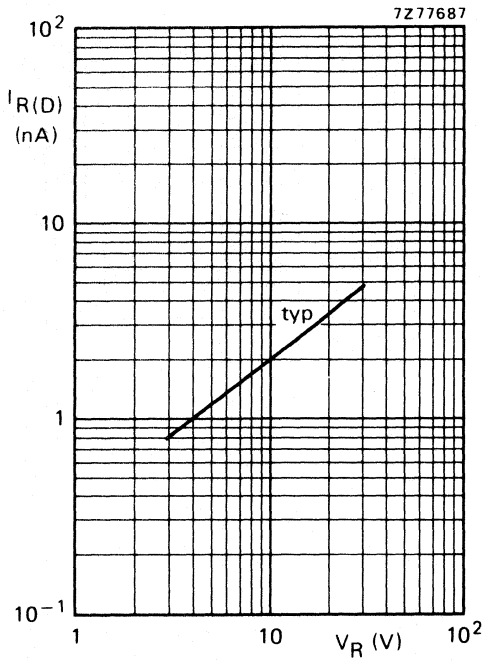


Fig. 6 $E = 0$; $T_{amb} = 25^\circ\text{C}$.

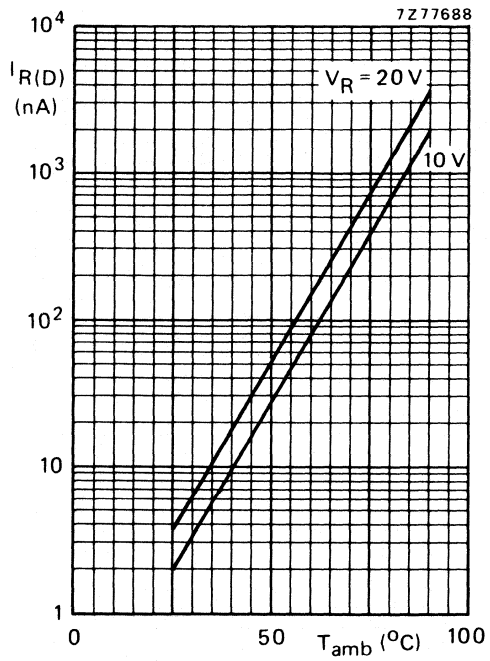


Fig. 7 $E = 0$; typical values.

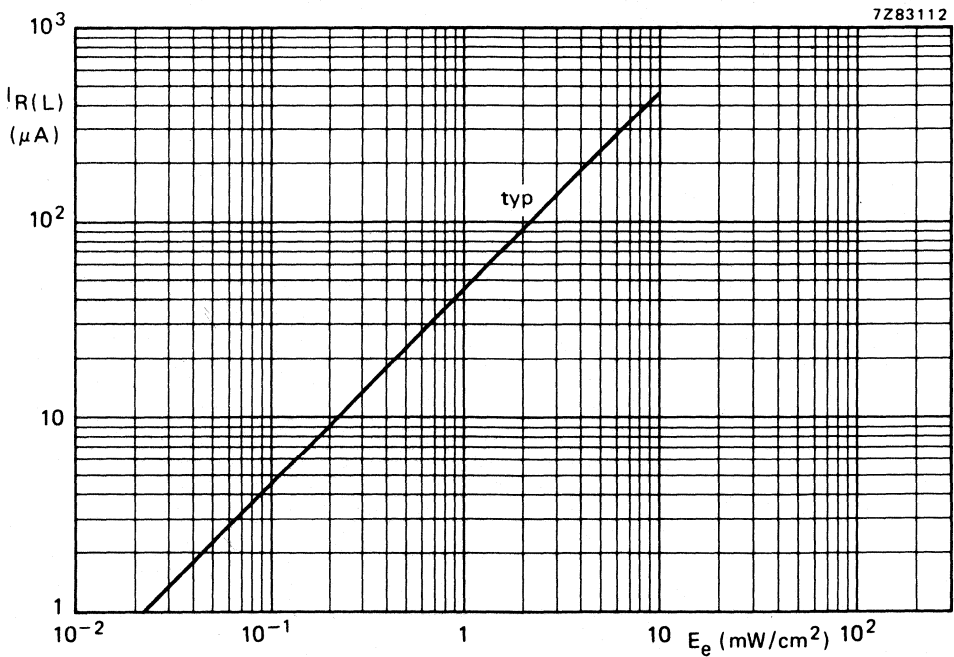


Fig. 8 $V_R = 5\text{ V}$; $\lambda = 930\text{ nm}$; $T_{amb} = 25^\circ\text{C}$.

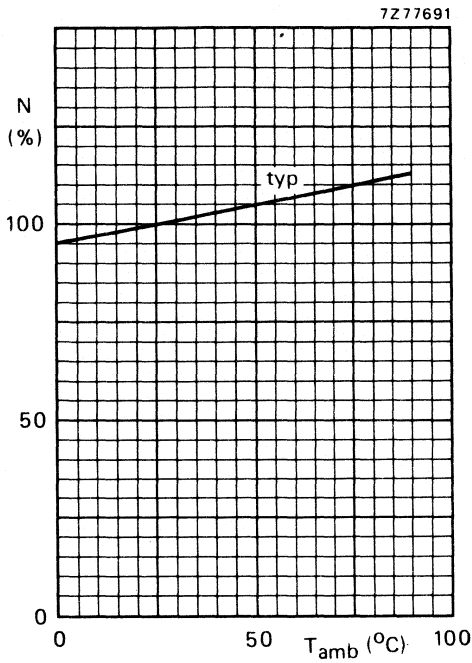


Fig. 9 $E_e = 1 \text{ mW/cm}^2$; $\lambda = 930 \text{ nm}$.

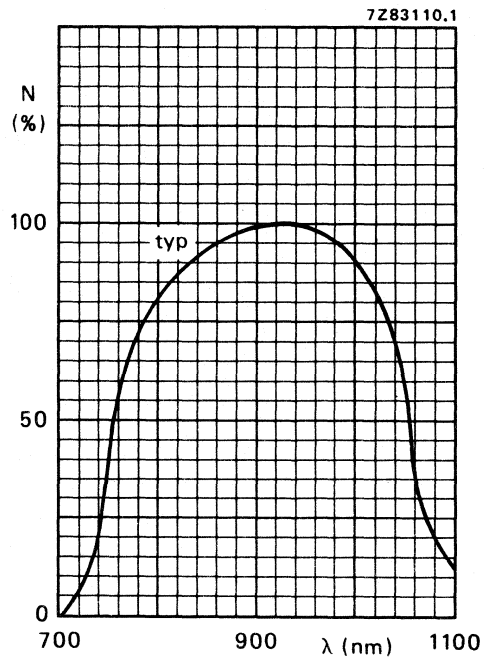


Fig. 10 $V_R = 5 \text{ V}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$.

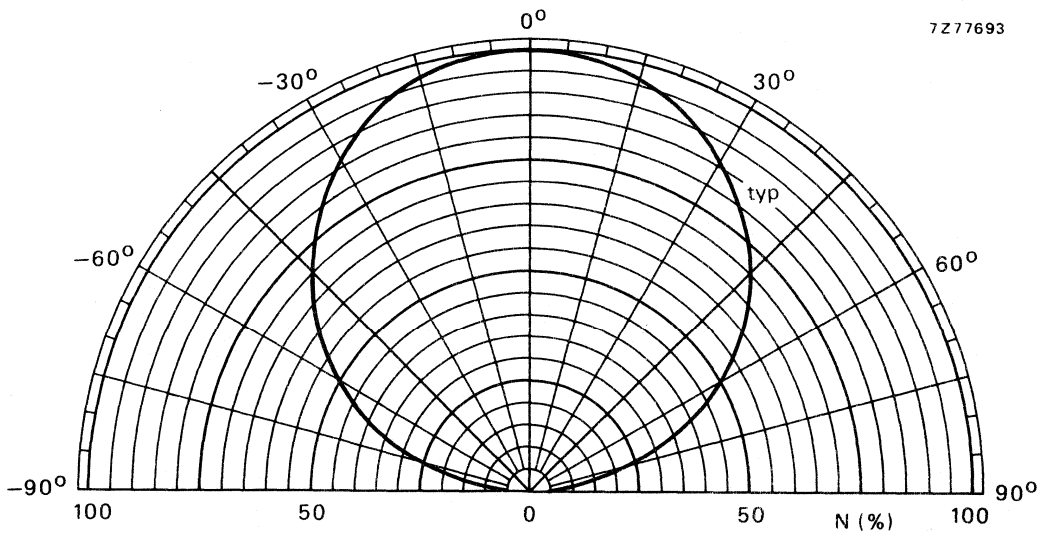


Fig. 11.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

CQW58A

HIGH-SPEED INFRARED EMITTING DIODE

Diffused planar GaAlAs light emitting diode intended for optical coupling and encoding. It emits radiation in the near infrared when forward biased.

The application of special (intrinsic) GaAlAs technology results in perfect linearity at low currents, very high switching speed (30 ns) and low degradation during the devices operating life.

Combination with phototransistor BPW22A is recommended.

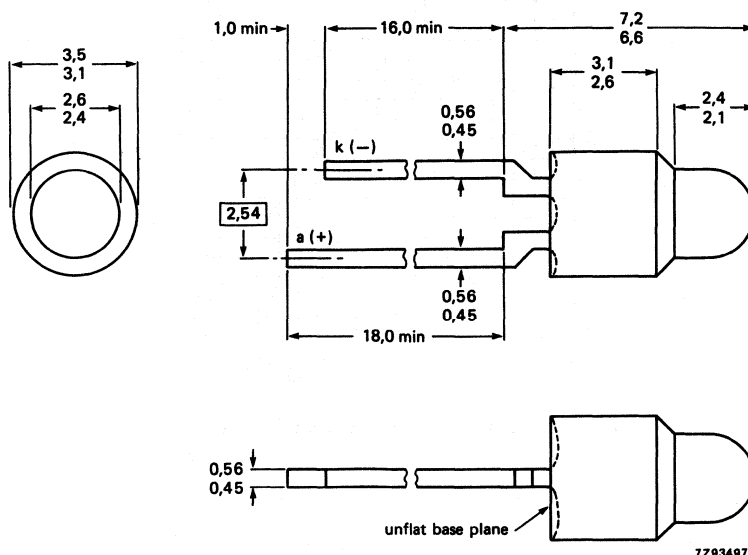
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	100 mW
Radiant intensity (on-axis) at $I_F = 20\text{ mA}$	I_e	min.	1 mW/sr
Wavelength at peak emission	λ_p	typ.	830 nm
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	15 °
Switching times			
$I_{Fon} = 20\text{ mA}$			
Light rise time	t_r	typ.	30 ns
Light fall time	t_f	typ.	30 ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-53F.



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current	I_F	max.	60 mA
d.c.	I_{FRM}	max.	1 A
(peak value); $t_p = 10 \mu s$; $\delta = 0,01$			
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$ (see Fig. 2)	P_{tot}	max.	100 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature	T_{sld}	max.	260 $^\circ\text{C}$
> 1,5 mm from the seating plane; $t_{sld} < 7 \text{ s}$			

THERMAL RESISTANCE

From junction to ambient	$R_{th j-a}$	=	750 K/W
From junction to ambient, device mounted on a printed-circuit board	$R_{th j-a}$	=	500 K/W

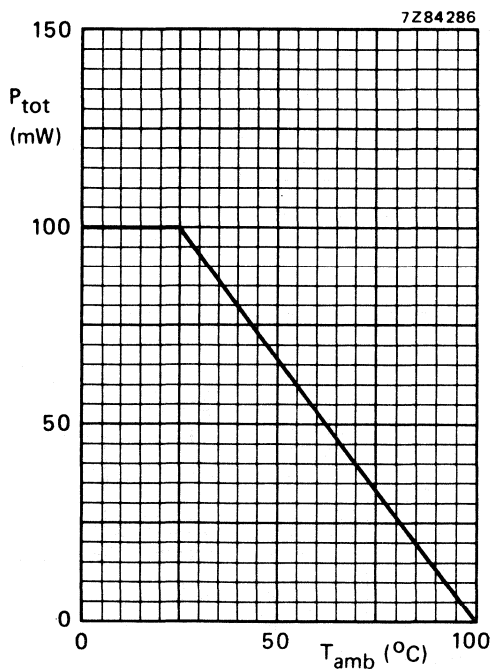


Fig. 2 Power derating curve versus ambient temperature.

CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$

Forward voltage

$I_F = 20\text{ mA}$

V_F typ. 1,5 V
max. 1,8 V

$I_F = 1\text{ A}$ ($t_{on} = 50\text{ }\mu\text{s}$; $\delta = 0,01$)

V_F typ. 3,1 V

Reverse current

$V_R = 5\text{ V}$

I_R max. 10 μA

Diode capacitance

$V_R = 0$; $f = 1\text{ MHz}$

C_d typ. 200 pF

Total radiant power

$I_F = 20\text{ mA}$

ϕ_e typ. 1 mW

Radiant intensity (on-axis)

$I_F = 20\text{ mA}$

CQW58A I_e min. 2 mW/sr

CQW58A-1 I_e min. 1 mW/sr
max. 5 mW/sr

CQW58A-2 I_e min. 3 mW/sr

Wavelength at peak emission

λ_p typ. 830 nm

Bandwidth at half height

$\Delta\lambda$ typ. 35 nm

Beamwidth between half-intensity directions

$I_F = 20\text{ mA}$

$\theta_{1/2}$ typ. 15 $^\circ$

Switching times

$I_{Fon} = 20\text{ mA}$

Light rise time

t_r typ. 30 ns

Light fall time

t_f typ. 30 ns

DEVELOPMENT DATA

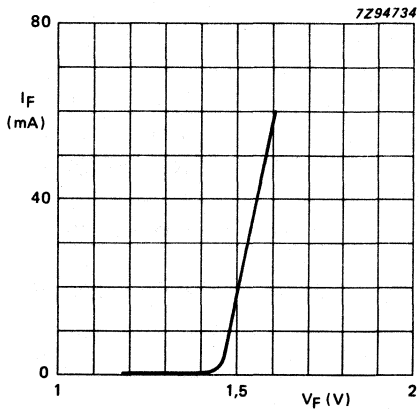


Fig. 3 $T_{amb} = 25\text{ }^\circ\text{C}$; typical values.

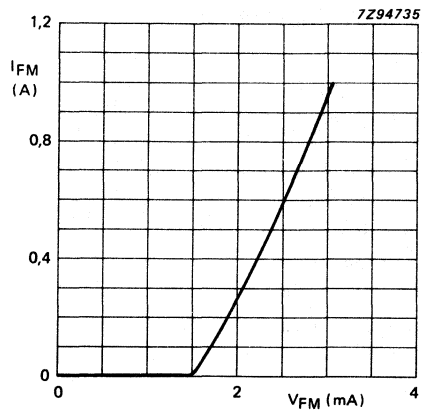


Fig. 4 $t_{on} = 10\text{ }\mu\text{s}$; $T_{amb} = 25\text{ }^\circ\text{C}$; $\delta = 0,01$; typical values.

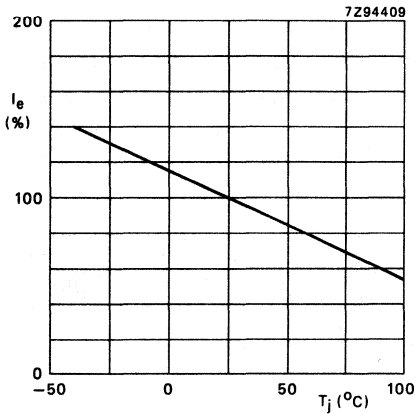


Fig. 5 $I_F = 20\text{ mA}$; typical values.

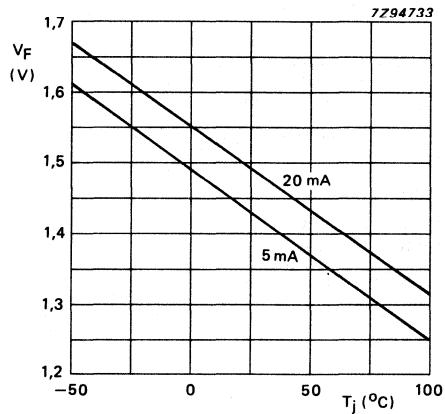


Fig. 6 Typical values.

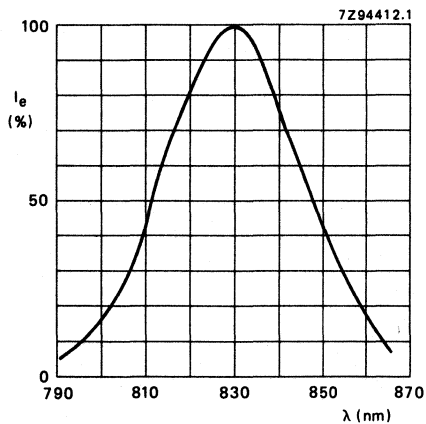


Fig. 7 Spectral response; typical values.

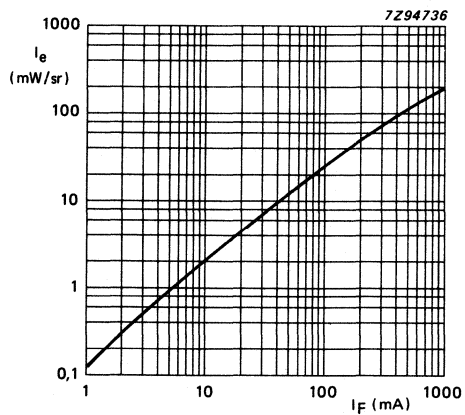


Fig. 8 $t_{on} = 10\text{ }\mu\text{s}$; $\delta = 0,01$; typical values.

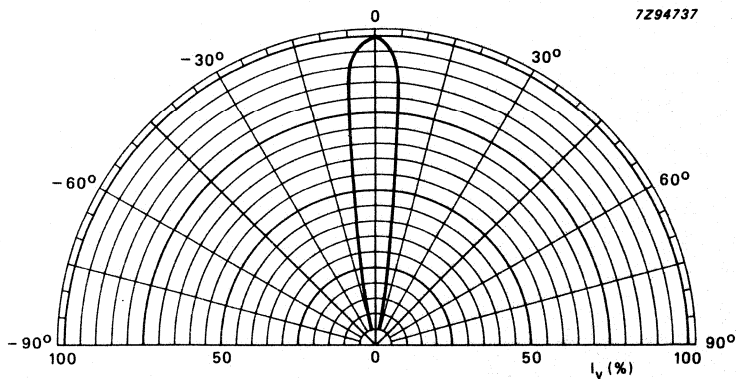


Fig. 9.

DEVELOPMENT DATA

HIGH-SPEED INFRARED EMITTING DIODE

Circular infrared emitting diode with diameter of 5 mm which emits infrared light at a typical peak wavelength of 830 nm (GaAlAs; infrared) when forward biased.

The CQW89A has a SOD-63 outline and is moulded in a light blue encapsulation with long leads.

The application of new GaAlAs (intrinsic) technology results in extremely short switching times and very low degradation during the devices operating life.

It is intended for remote control applications using carrier frequencies up to 1 MHz. Combination with the high-speed photo p-i-n diode BPW50 is recommended.

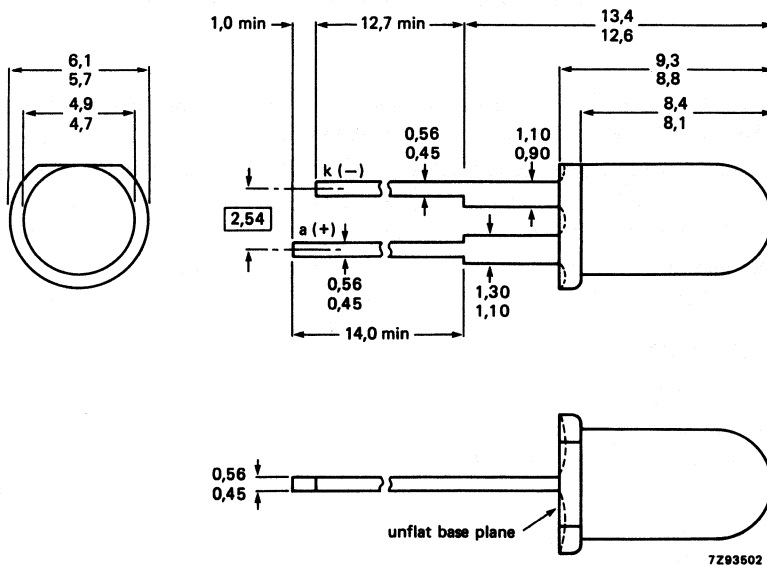
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	130 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	300 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Radiant intensity (on axis) static (at d.c. condition) $I_F = 100\text{ mA}$	CQW89A	I_e	min.	9 mW/sr
	CQW89A-1	I_e	min.	12 mW/sr
	CQW89A-2	I_e	min.	15 mW/sr
dynamic (at pulse condition) $I_{FM} = 100\text{ mA}; t_p = 0,5\text{ }\mu\text{s}; \delta = 0,5$		I_{eD}	typ.	0,8 I_e
Switching times (see Figs 2 and 3) $I_F = 100\text{ mA}$		τ_r	typ.	30 ns
		τ_f	typ.	30 ns
Wavelength at peak emission		λ_p	typ.	830 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	40 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-63D2.

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	130 mA
peak value; $t_p = 10 \mu\text{s}$; $\delta = 0,01$	I_{FM}	max.	2500 mA
peak value; $t_p = 50 \mu\text{s}$; $\delta = 0,01$	I_{FM}	max.	1500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$ with heatsink	P_{tot}	max.	300 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature $t_{sld} < 10 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a printed circuit board	$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 1,5 \text{ A}$; $t_{on} = 50 \mu\text{s}$; $\delta = 0,01$	V_F	typ.	3,7 V
Forward voltage $I_F = 100 \text{ mA}$	V_F	typ. max.	1,7 V 2,2 V
Reverse current $V_R = 5 \text{ V}$	I_R	max.	100 μA
Diode capacitance at $f = 1 \text{ MHz}$ $V_R = 0$	C_d	typ.	200 pF
Total radiant power $I_F = 100 \text{ mA}$	ϕ_e	typ.	8 mW
Radiant intensity (on axis) static (at d.c. condition) $I_F = 100 \text{ mA}$			
	CQW89A	I_e	min. 9 mW/sr
	CQW89A-1	I_e	min. 12 mW/sr
	CQW89A-2	I_e	min. 15 mW/sr
dynamic (at pulse condition)* $I_{FM} = 100 \text{ mA}$; $t_p = 0,5 \mu\text{s}$; $\delta = 0,5$		I_{eD}	typ. 0,8 I_e

* I_{eD} = Dynamic radiant intensity (average radiant intensity level during pulse time).

Radiant power temperature coefficient

Wavelength at peak emission

$I_F = 100 \text{ mA}$

Bandwidth at half-height

$I_F = 100 \text{ mA}$

Beamwidth at half-intensity direction

$I_F = 100 \text{ mA}$

Switching times (see Figs 2 and 3)

$I_F = 100 \text{ mA}$

$k_{\phi e}$ typ. $-0,6 \text{ \%}/\text{K}$

λ_p typ. 830 nm

$\Delta\lambda$ typ. 35 nm

$\theta_{1/2}$ min. 28°
typ. 40°

t_r typ. 30 ns

t_f typ. 30 ns

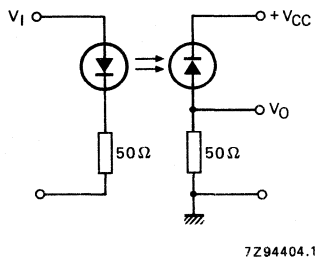


Fig. 2 Measuring circuit.

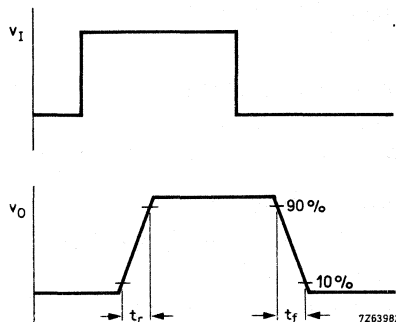


Fig. 3 Waveforms.

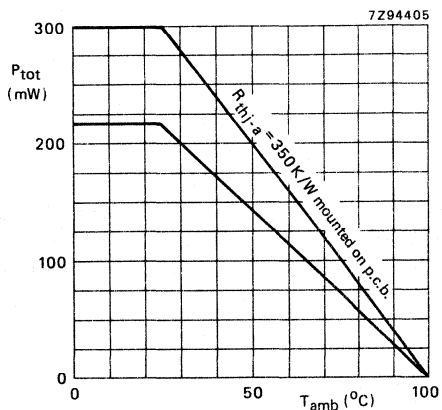


Fig. 4 Typical values.

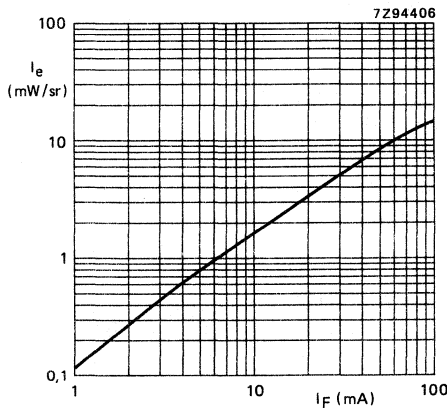


Fig. 5 $t_{on} = 10 \mu\text{s}$; $\delta = 0,01$;
 $T_{amb} = 25^\circ\text{C}$; typical values.

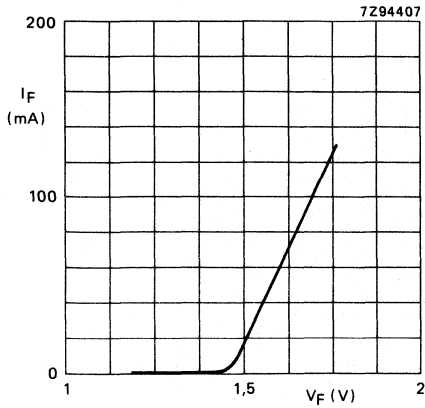


Fig. 6 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values.

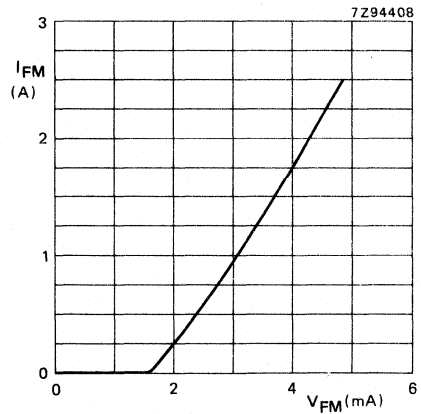


Fig. 7 $t_{on} = 10\text{ }\mu\text{s}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values.

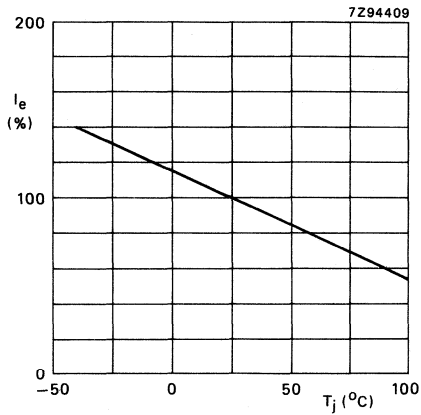


Fig. 8 $I_F = 100\text{ mA}$; typical values.

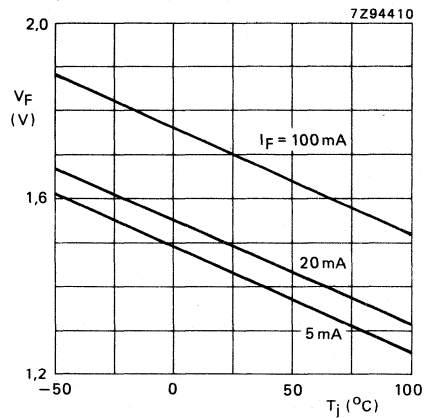


Fig. 9 Typical values.

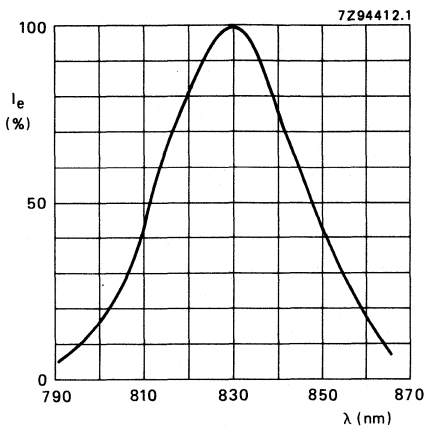


Fig. 10 Spectral response; typical values.

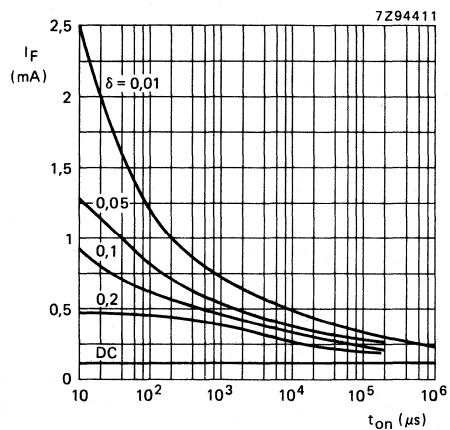


Fig. 11 Typical values.

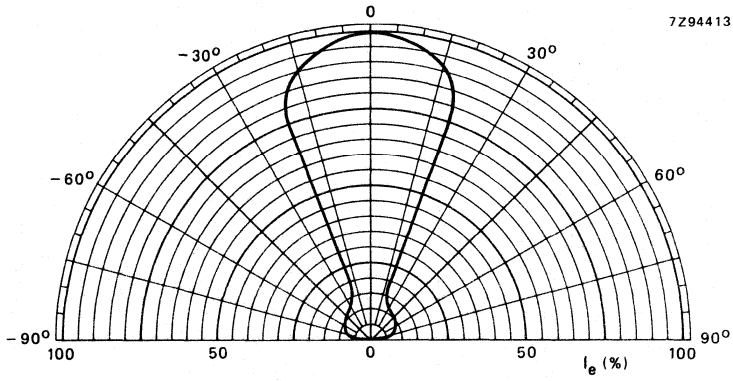


Fig. 12 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

CQW89B

LIGHT EMITTING DIODE

Circular infrared emitting diode with diameter of 5 mm which emits infrared light at a typical peak wavelength of 830 nm (GaAlAs; infrared) when forward biased.

The CQW89B has a SOD-94 outline and is moulded in a light blue encapsulation.

The application of new GaAlAs (intrinsic) technology results in extremely short switching times and very low degradation during the devices' operating life.

It is intended for remote control applications using carrier frequencies up to 1 MHz. Combination with the high-speed photo p-i-n diode BPW50 is recommended.

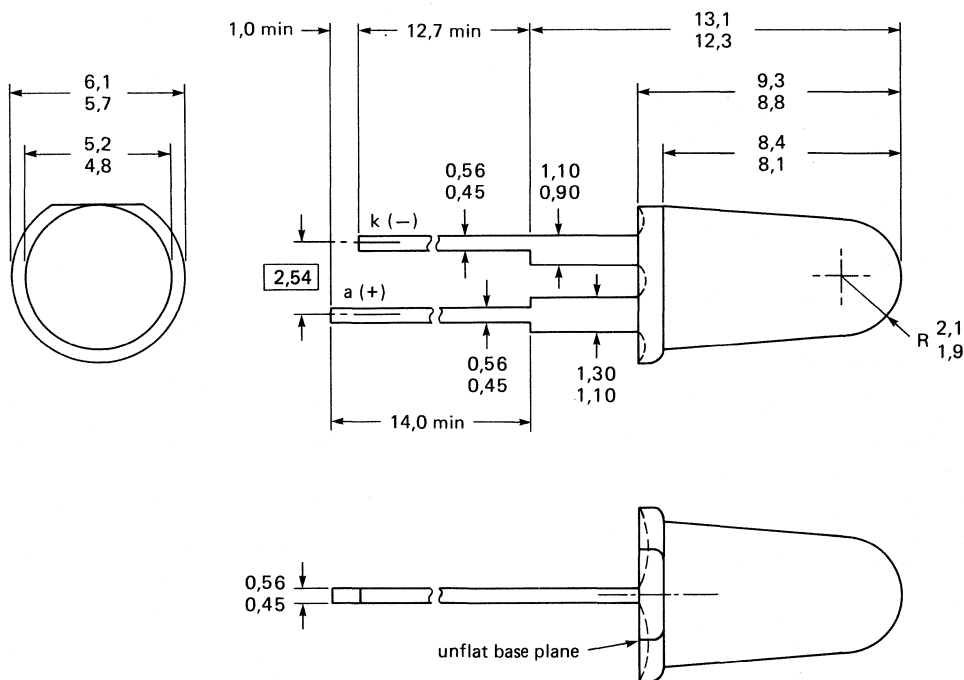
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	130 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	300 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Radiant intensity (on axis) $I_F = 100\text{ mA}$	I_e	min.	20 mW/Sr
Emission angle at half intensity	$\theta_{1/2}$	typ.	12 $^\circ$
Peak wavelength	λ_p	typ.	830 nm

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-94.



7221245

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	130 mA
peak value; $t_{ON} = 10 \mu s$; $\delta = 0,01$	I_{FRM}	max.	2500 mA
peak value; $t_{ON} = 50 \mu s$; $\delta = 0,01$	I_{FRM}	max.	1500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$ with heatsink.	P_{tot}	max.	300 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature $T_{sld} \leq 7 \text{ s.}$ $\geq 1,5 \text{ mm}$ from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a printed circuit board

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage

 $I_F = 1,5 \text{ A}$ ($t_{ON} = 50 \mu s$, $\delta = 0,01$)

V_F	typ.	3,7 V
-------	------	-------

Forward voltage

 $I_F = 100 \text{ mA}$

V_F	typ.	1,7 V
	max.	2,2 V

Reverse current

 $V_R = 5 \text{ V}$

I_R	max.	10 μA
-------	------	------------------

Capacitance

 $V_R = 0 \text{ V}$; $f = 1 \text{ MHz}$

C_d	typ.	200 pF
-------	------	--------

Total radiant power

 $I_F = 100 \text{ mA}$

ϕ_e	typ.	8 mW
----------	------	------

Bandwidth at half height

 $I_F = 100 \text{ mA}$

$\Delta\lambda$	typ.	35 nm
-----------------	------	-------

Wavelength at peak emission

 $I_F = 100 \text{ mA}$

λ_p	typ.	830 nm
-------------	------	--------

Radiant intensity (on axis)

 $I_F = 100 \text{ mA}$

I_e	min.	20 mW/sr
	typ.	35 mW/sr

Radiant power temperature coefficient

$K\phi_e$	typ.	-0,6 %/K
-----------	------	----------

Emission angle at half intensity

and $I_F = 100 \text{ mA}$

$\phi_{1/2}$	typ.	12 $^\circ$
--------------	------	-------------

Switching time (see Figs 2 and 3)

 $I_F = 100 \text{ mA}$

t_r	typ.	30 ns
t_f	typ.	30 ns

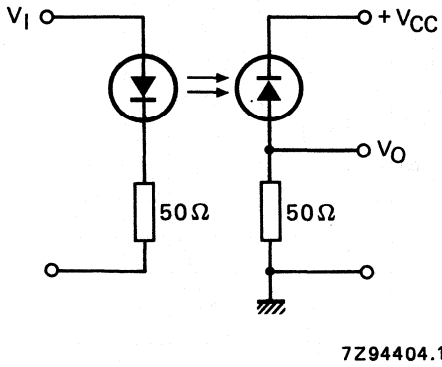


Fig. 2 Measuring circuit.

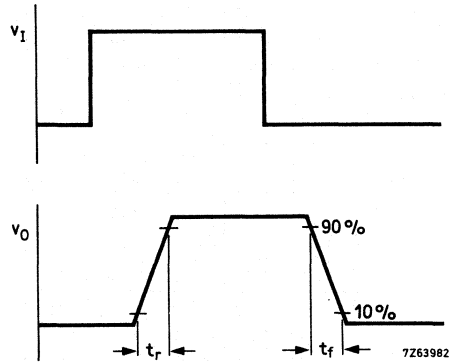


Fig. 3 Waveforms.

DEVELOPMENT DATA

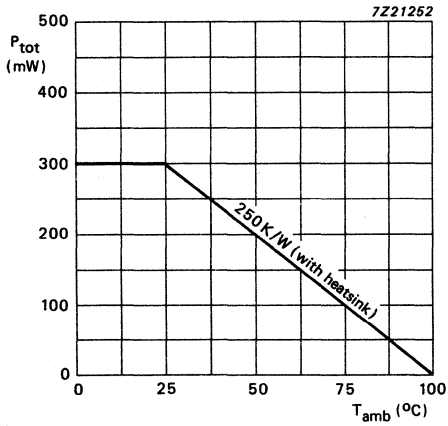


Fig. 4 Power derating curve.

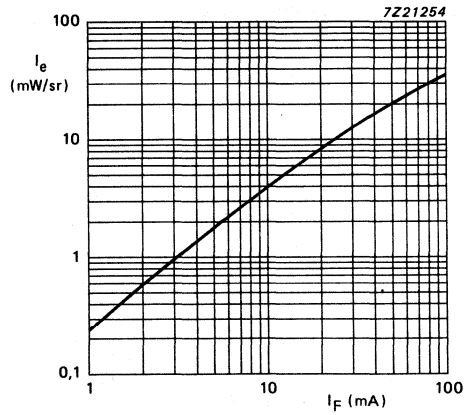


Fig. 5 Radiant intensity as a function of forward current; $t_{on} = 10 \text{ ms}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typical values.

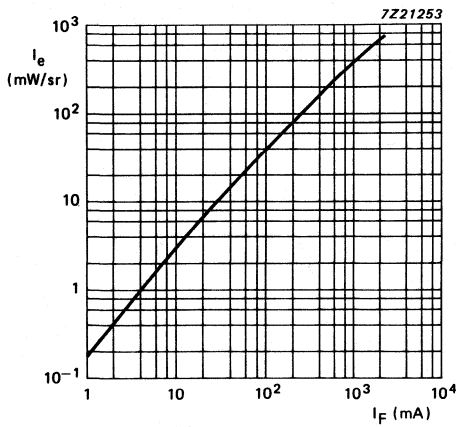


Fig. 6 Radiant intensity as a function of forward current; $t_{on} = 10 \mu s$; $\delta = 0,01$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typical values.

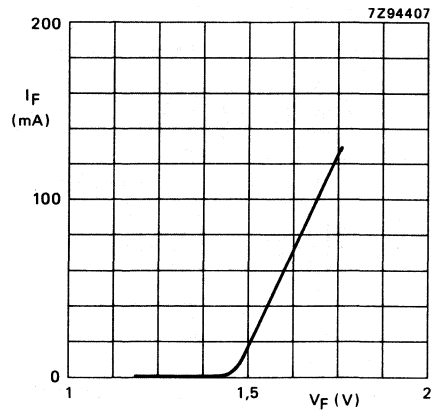


Fig. 7 Forward current as a function of forward voltage; $T_{amb} = 25 \text{ }^\circ\text{C}$; typical values.

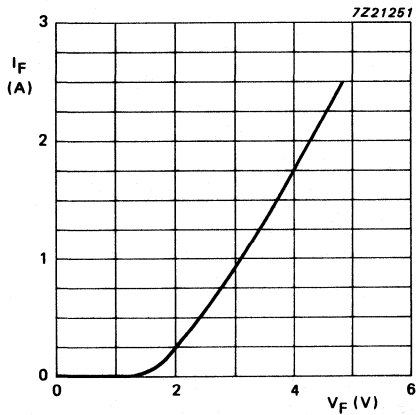


Fig. 8 Forward current as a function of forward voltage; $t_{on} = 10 \mu s$; $\delta = 0,01$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typical values.

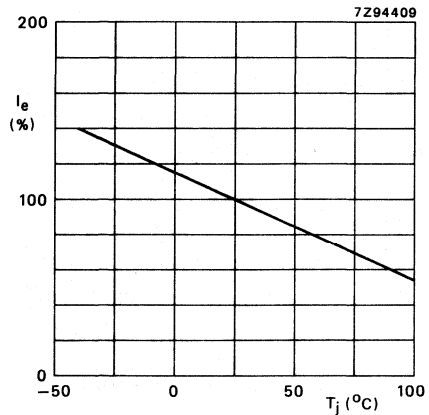


Fig. 9 Radiant intensity as a function of junction temperature; $I_F = 100 \text{ mA}$; typical values.

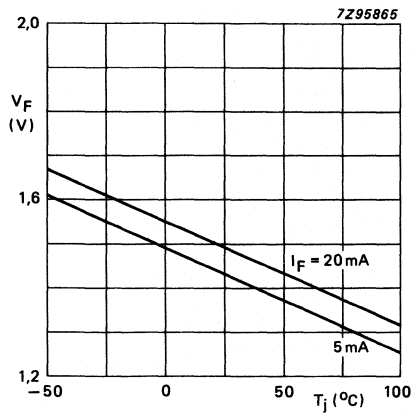


Fig. 10 Forward voltage as a function of junction temperature; typical values.

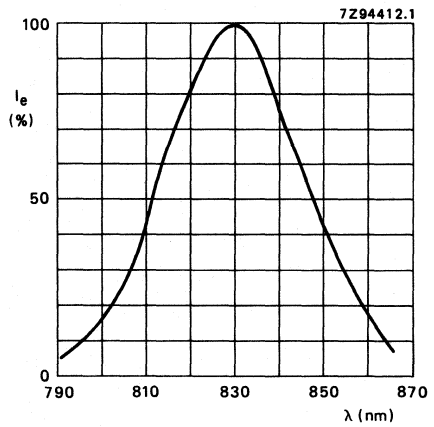


Fig. 11 Spectral response; typical values.

DEVELOPMENT DATA

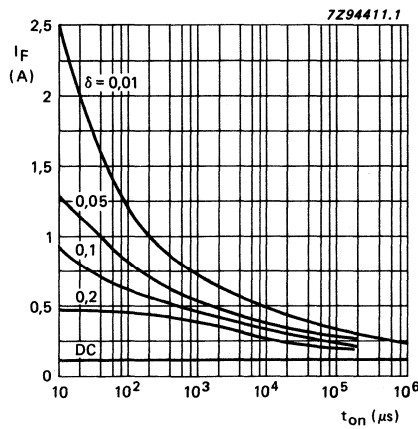


Fig. 12 Forward current as a function of time; typical values.

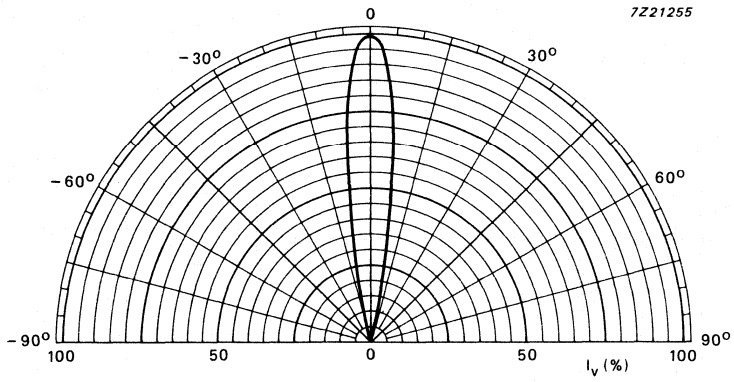


Fig. 13 Polar diagram; typical values.

INFRARED EMITTING DIODE

Diffused planar light emitting diode intended for optical coupling and encoding. It emits radiation in the near infrared when forward biased. Infrared translucent epoxy encapsulation (dark blue). Combination with phototransistor BPW22A is recommended.

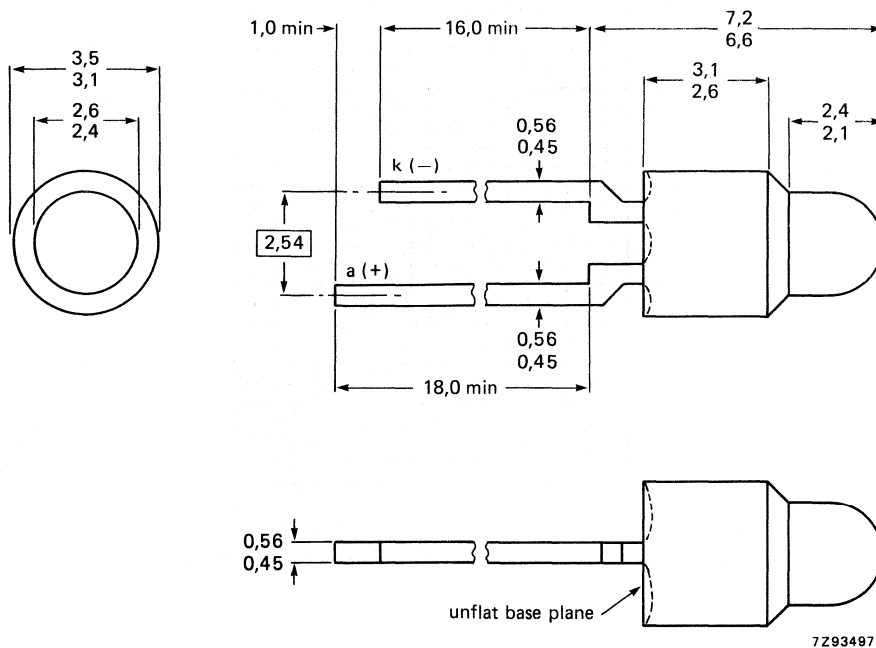
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	50 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	100 mW
Radiant intensity (on-axis) at $I_F = 20\text{ mA}$	I_e	typ.	2 mW/sr
Wavelength at peak emission	λ_p	typ.	930 nm
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	20 °

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-53F.



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current d.c.	I_F	max.	50 mA
(peak value); $t_p = 10 \mu s$; $\delta = 0,01$	I_{FRM}	max.	200 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$ (see Fig. 2)	P_{tot}	max.	100 mW
Storage temperature	T_{stg}		-55 to + 100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature > 1,5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient,
device mounted on a printed-circuit board

$R_{th\ j-a} = 750 \text{ K/W}$

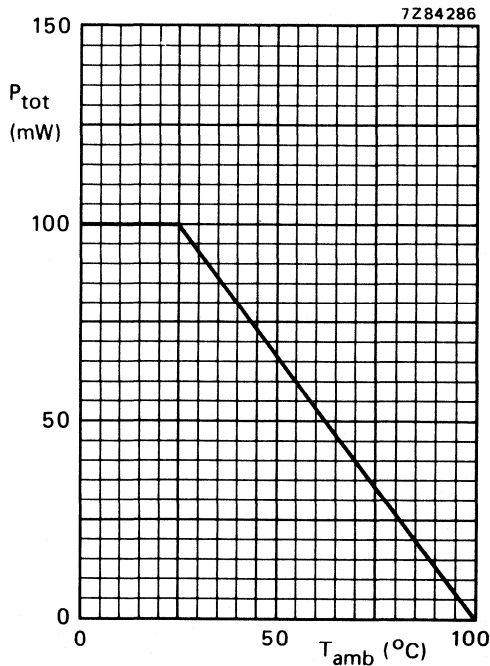


Fig. 2 Power derating curve versus ambient temperature.

CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$

Forward voltage

$I_F = 20\text{ mA}$

V_F	typ.	1,2 V
	max.	1,5 V

Reverse current

$V_R = 5\text{ V}$

I_R	max.	100 μA
-------	------	-------------------

Diode capacitance

$V_R = 0; f = 1\text{ MHz}$

C_d	typ.	40 pF
-------	------	-------

Total radiant power

$I_F = 20\text{ mA}$

CQY58A

ϕ_e	typ.	1 mW
I_e	min.	2 mW/sr

Radiant intensity (on-axis)

$I_F = 20\text{ mA}$

CQY58A-1

I_e	min.	1 mW/sr
	max.	5 mW/sr

CQY58A-2

I_e	min.	3 mW/sr
-------	------	---------

Wavelength at peak emission

λ_p	typ.	930 nm
-------------	------	--------

Bandwidth at half height

$\Delta\lambda$	typ.	50 nm
-----------------	------	-------

Beamwidth between half-intensity directions

$I_F = 20\text{ mA}$

$\theta_{1/2}$	typ.	20 $^\circ$
----------------	------	-------------

Switching times

$I_{Fon} = 20\text{ mA}$

Light rise time

t_r	typ.	3 μs
-------	------	-----------------

Light fall time

t_f	typ.	3 μs
-------	------	-----------------

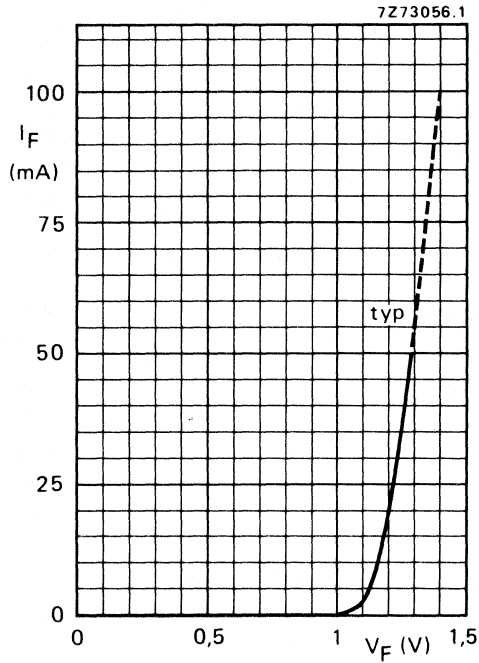


Fig. 3 $T_{amb} = 25\text{ }^{\circ}\text{C}$.

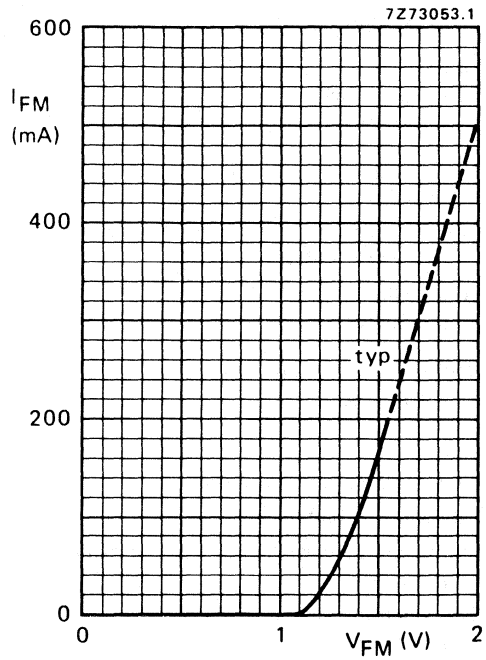


Fig. 4 $t_p = 10\text{ }\mu\text{s}$; $T = 1\text{ ms}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

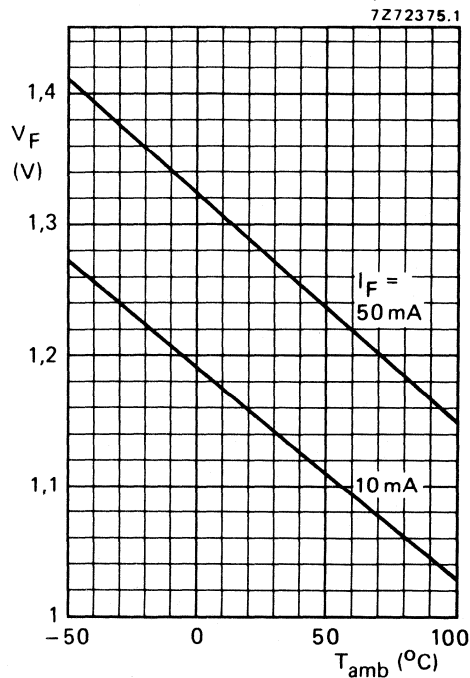


Fig. 5 Typical values.

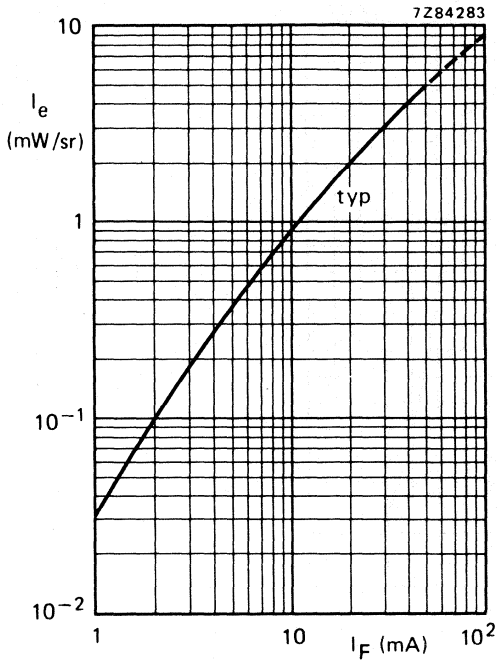


Fig. 6 $T_{amb} = 25\text{ }^{\circ}\text{C}$.

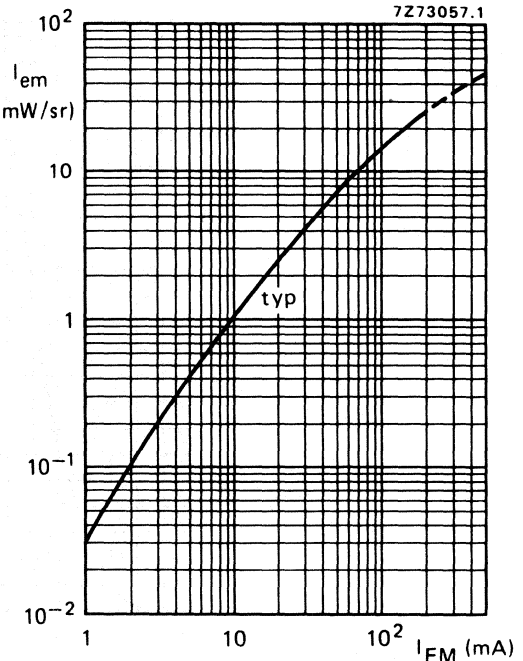


Fig. 7 $t_p = 10\text{ }\mu\text{s}$; $T = 1\text{ ms}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

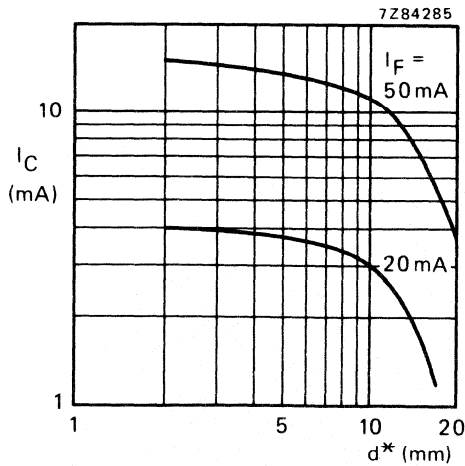


Fig. 8 $V_{CE} = 5\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values.

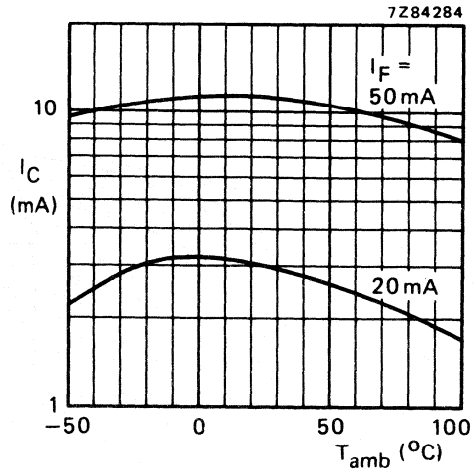


Fig. 9 $V_{CE} = 5\text{ V}$; $d^* = 10\text{ mm}$; typical values.

* d = shortest free distance of mechanical on-axis when BPW22A is coupled with CQY58A.

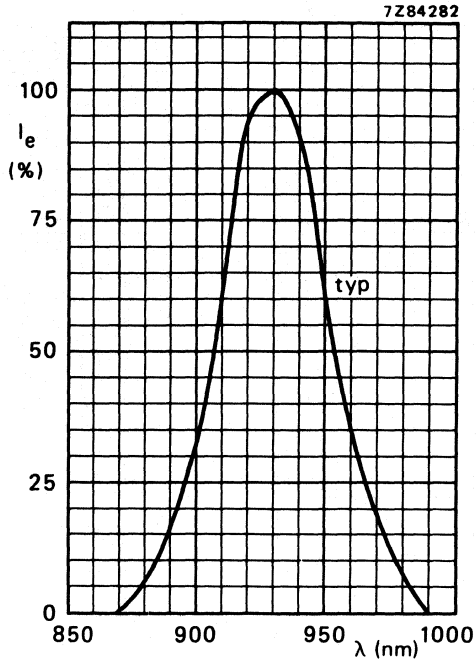


Fig. 10 Spectral response.

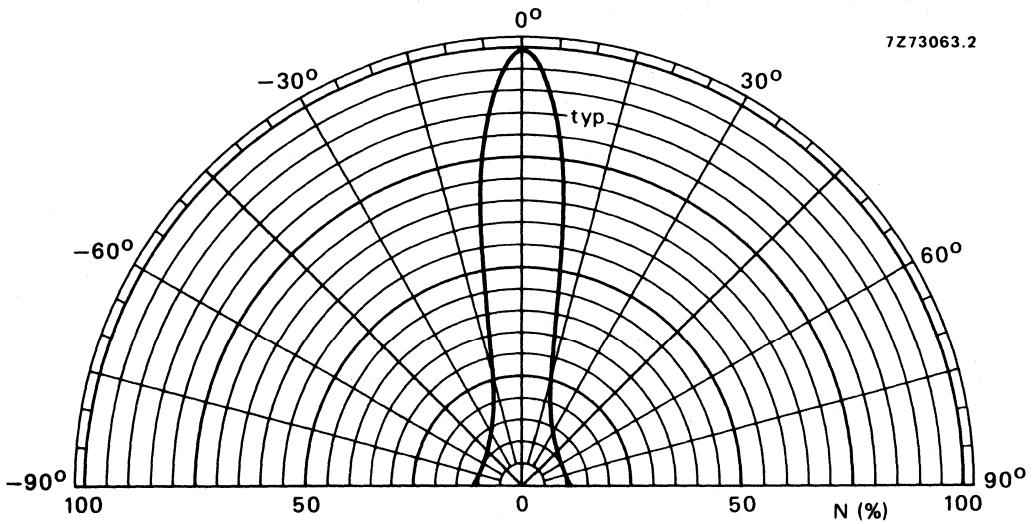


Fig. 11 Typical values.

GaAs LIGHT EMITTING DIODE

Epitaxial gallium arsenide light emitting diode intended for remote-control applications. It emits radiation in the near infrared when forward biased. Infrared translucent epoxy encapsulation (dark blue). Combination with the photo p-i-n diode BPW50 is recommended.

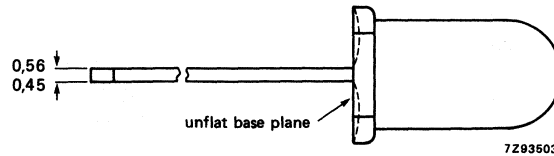
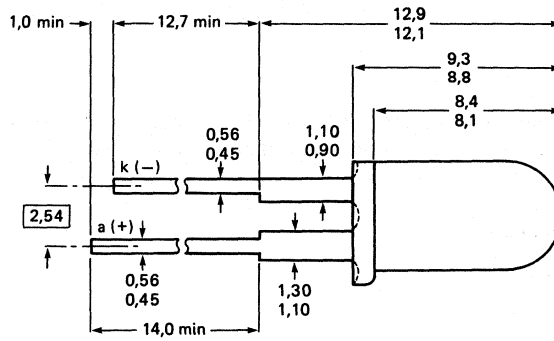
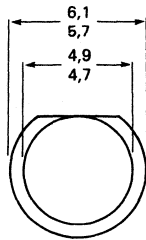
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	130 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Radiant intensity (on-axis) static (at d.c. condition) $I_F = 100\text{ mA}$	CQY89A	I_e	min.	9 mW/sr
	CQY89A-1	I_e	min.	12 mW/sr
	CQY89A-2	I_e	min.	15 mW/sr
dynamic (at pulse condition) $I_{FM} = 100\text{ mA}; t_p = 0,5\text{ }\mu\text{s}; \delta = 0,5$		I_{eD}	typ.	0,3 I_e
Wavelength at peak emission		λ_p	typ.	930 nm

MECHANICAL DATA

Fig. 1 SOD-63B2.

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	130 mA
Forward current (peak value) $t_p \leq 50 \mu\text{s}; \delta = 0,05$	I_{FM}	max.	1000 mA
Non-repetitive peak forward current ($t_p \leq 10 \mu\text{s}$)	I_{FSM}	max.	2500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to + 100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature up to the seating plane; $t_{sld} < 10 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient
mounted on a printed-circuit board

$$R_{th \text{ j-a}} = 350 \text{ K/W}$$

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

Forward voltage $I_F = 100 \text{ mA}$	V_F	typ. <	1,4 V 1,6 V
$I_{FM} = 1500 \text{ mA}; t_p = 20 \mu\text{s}; \delta = 0,033$	V_{FM}	typ.	2,4 V
Reverse current $V_R = 5 \text{ V}$	I_R	<	100 μA
Diode capacitance $V_R = 0; f = 1 \text{ MHz}$	C_d	typ.	40 pF
Total radiant power $I_F = 100 \text{ mA}$	ϕ_e	> typ.	7 mW 12 mW
Decrease of radiant power with temperature $I_F = 100 \text{ mA}$	$\frac{\Delta\phi_e}{\Delta T_j}$	typ.	1 %/K
Radiant intensity (on-axis) static (at d.c. condition) $I_F = 100 \text{ mA}$	CQY89A CQY89A-1 CQY89A-2	I_e I_e I_e	min. min. min.
			9 mW/sr 12 mW/sr 15 mW/sr
dynamic (at pulse condition)* $I_{FM} = 100 \text{ mA}; t_p = 0,5 \mu\text{s}; \delta = 0,5$	I_{eD}	typ.	0,3 I_e

* I_{eD} = Dynamic radiant intensity (average radiant intensity level during pulse time).

Wavelength at peak emission

$I_F = 100$ mA

λ_p typ. 930 nm

Bandwidth at half height

$I_F = 100$ mA

$\Delta\lambda$ typ. 50 nm

Beamwidth between half-intensity directions

$I_F = 100$ mA

$\theta_{1/2}$ typ. 40 °

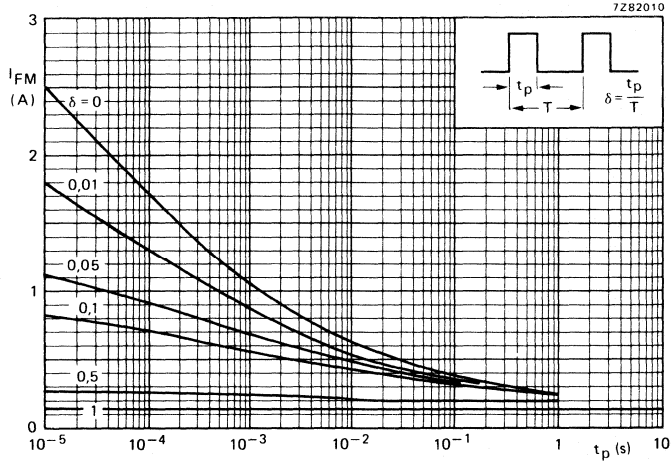


Fig. 2 $T_{amb} = 25$ °C; T_j peak = 100 °C.

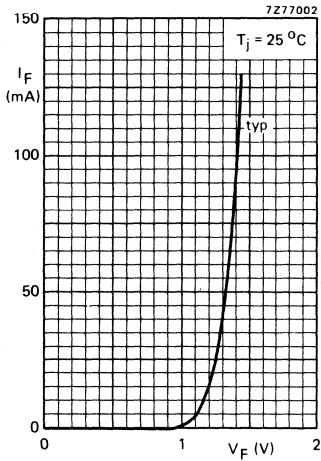


Fig. 3.

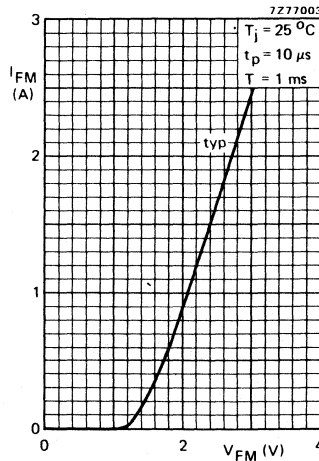


Fig. 4.

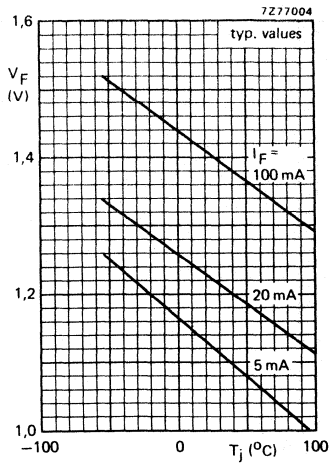


Fig. 5.

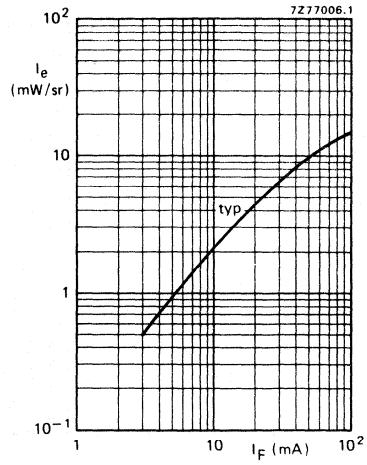


Fig. 6 $T_j = 25 \text{ }^{\circ}\text{C}$.

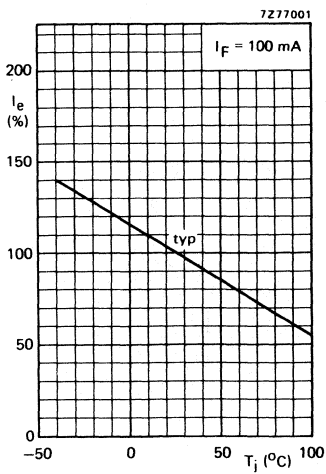


Fig. 7.

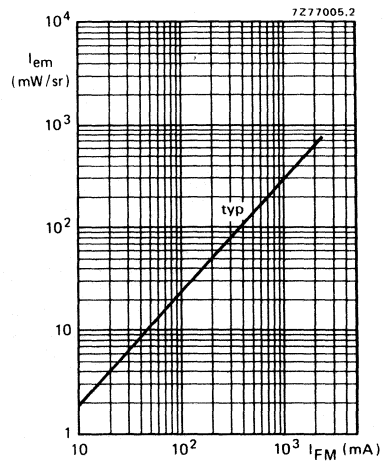


Fig. 8 $T_{amb} = 25 \text{ }^{\circ}\text{C}$; $t_p = 10 \text{ } \mu\text{s}$; $T = 1 \text{ ms}$.

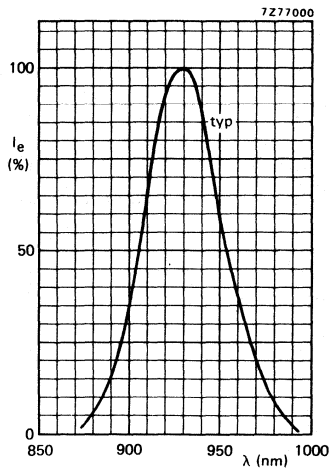


Fig. 9.

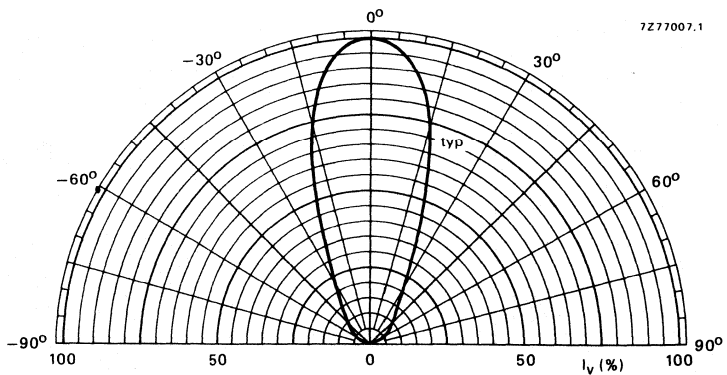


Fig. 10.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

CQY89F

GaAs LIGHT EMITTING DIODE

Epitaxial gallium arsenide light emitting diode intended for remote-control applications. It emits radiation in the near infrared when forward biased.

The special, flat infrared translucent epoxy encapsulation (dark blue) is optimised for mounting in a thin remote control emitter unit.

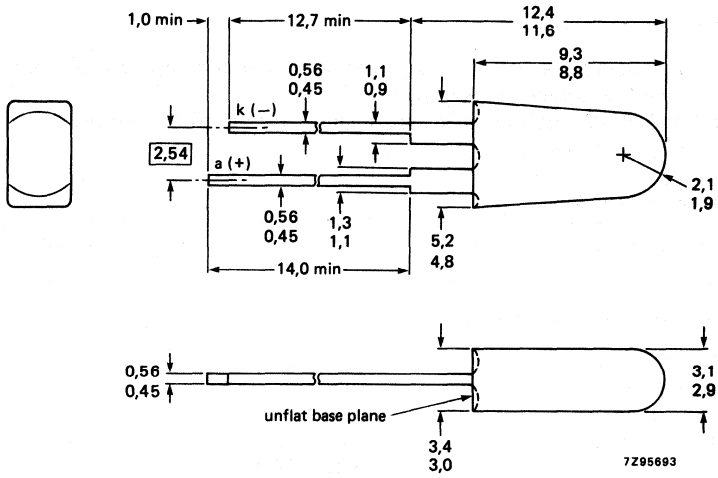
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	130 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Radiant intensity (on-axis) static (at d.c. condition) $I_F = 100\text{ mA}$	CQY89F	I_e	min.	9 mW/sr
	CQY89F-1	I_e	min.	12 mW/sr
	CQY89F-2	I_e	min.	15 mW/sr
dynamic (at pulse condition) $I_{FM} = 100\text{ mA}; t_p = 0,5\text{ }\mu\text{s}; \delta = 0,5$		I_{eD}	typ.	0,3 I_e
Wavelength at peak emission		λ_p	typ.	930 nm

MECHANICAL DATA

Fig. 1 FO-147A2.

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	130 mA
Forward current (peak value) $t_p \leq 50 \mu\text{s}; \delta = 0,05$	I_{FM}	max.	1000 mA
Non-repetitive peak forward current ($t_p \leq 10 \mu\text{s}$)	I_{FSM}	max.	2500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to + 100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature up to the seating plane; $t_{sld} < 10 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient with device mounted on a printed-circuit board

$$R_{th \text{ j-a}} = 350 \text{ K/W}$$

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

Forward voltage

$I_F = 100 \text{ mA}$

$$V_F \begin{matrix} \text{typ.} & 1,4 \text{ V} \\ < & 1,6 \text{ V} \end{matrix}$$

$I_{FM} = 1500 \text{ mA}; t_p = 20 \mu\text{s}; \delta = 0,033$

$$V_{FM} \text{ typ. } 2,4 \text{ V}$$

Reverse current

$V_R = 5 \text{ V}$

$$I_R < 100 \mu\text{A}$$

Diode capacitance

$V_R = 0; f = 1 \text{ MHz}$

$$C_d \text{ typ. } 40 \text{ pF}$$

Total radiant power

$I_F = 100 \text{ mA}$

$$\phi_e \text{ typ. } 12 \text{ mW}$$

Decrease of radiant power with temperature

$I_F = 100 \text{ mA}$

$$\frac{\Delta\phi_e}{\Delta T_j} \text{ typ. } 1 \text{ \% / K}$$

Radiant intensity (on-axis)

static (at d.c. condition)

$I_F = 100 \text{ mA}$

CQY89F	I_e	min.	9 mW/sr
CQY89F-1	I_e	min.	12 mW/sr
CQY89F-2	I_e	min.	15 mW/sr

dynamic (at pulse condition)*

$I_{FM} = 100 \text{ mA}; t_p = 0,5 \mu\text{s}; \delta = 0,5$

$$I_{eD} \text{ typ. } 0,3 I_e$$

DEVELOPMENT DATA

* I_{eD} = Dynamic radiant intensity (average radiant intensity level during pulse time).

Wavelength at peak emission

$I_F = 100 \text{ mA}$

λ_p typ. 930 nm

Bandwidth at half height

$I_F = 100 \text{ mA}$

$\Delta\lambda$ typ. 50 nm

Beamwidth between half-intensity directions

$I_F = 100 \text{ mA}$; in the plane of the leads
perpendicular to the plane of the leads

$\theta_{1/2}$ typ. 40 °

$\theta_{1/2}$ typ. 25 °

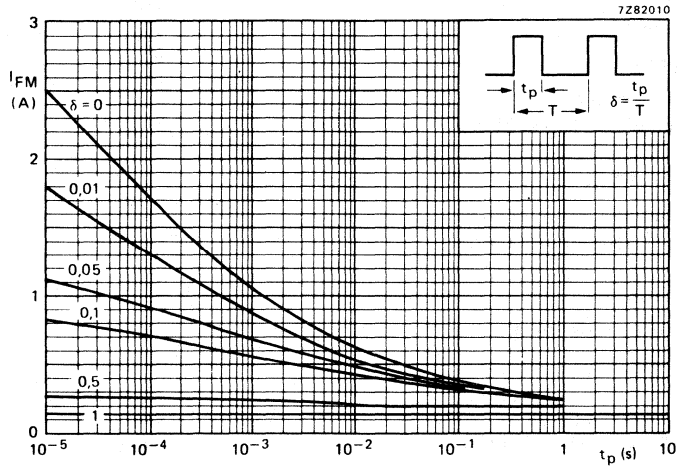


Fig. 2 $T_{amb} = 25 \text{ }^\circ\text{C}$; $T_j \text{ peak} = 100 \text{ }^\circ\text{C}$.

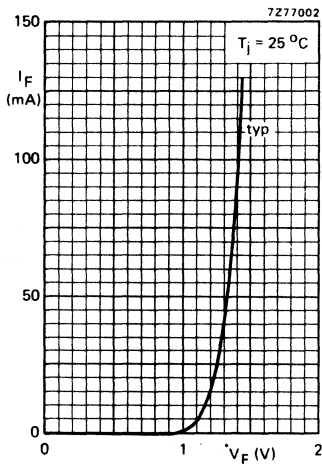


Fig. 3.

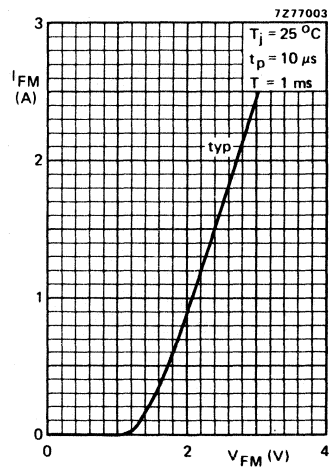


Fig. 4.

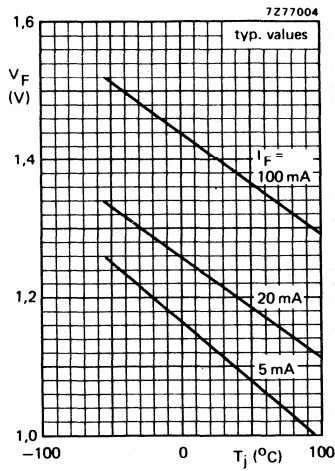


Fig. 5.

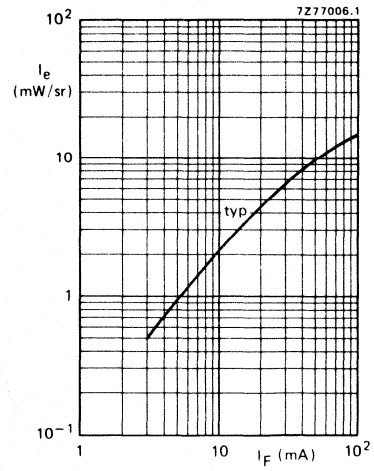


Fig. 6 $T_j = 25^{\circ}\text{C}$.

DEVELOPMENT DATA

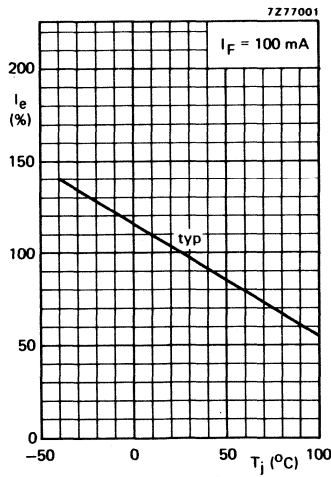


Fig. 7.

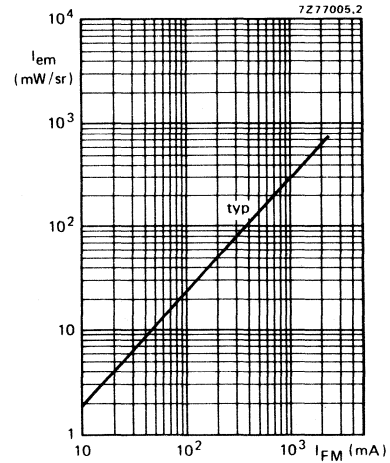


Fig. 8 $T_{amb} = 25^{\circ}\text{C}$; $t_p = 10 \mu\text{s}$; $T = 1 \text{ ms}$.

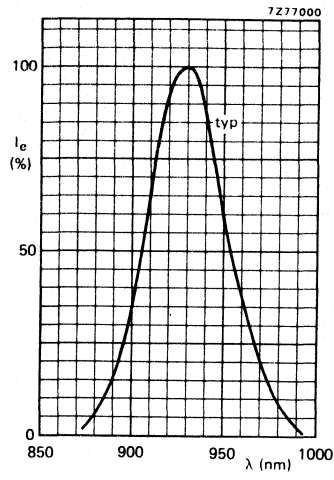


Fig. 9.

LIGHT EMITTING DIODE WITH HIGH LUMINOSITY

Circular light emitting diode with a diameter of 3 mm which emits green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-G313A has a SOD-53 outline and is encapsulated in a green non-diffusing resin.

The PLED-G313A can resist higher forward currents when high luminosity is required. An appropriate device, for example, for the backlighting of push buttons.

Note: This device has to be used behind a diffusing screen.

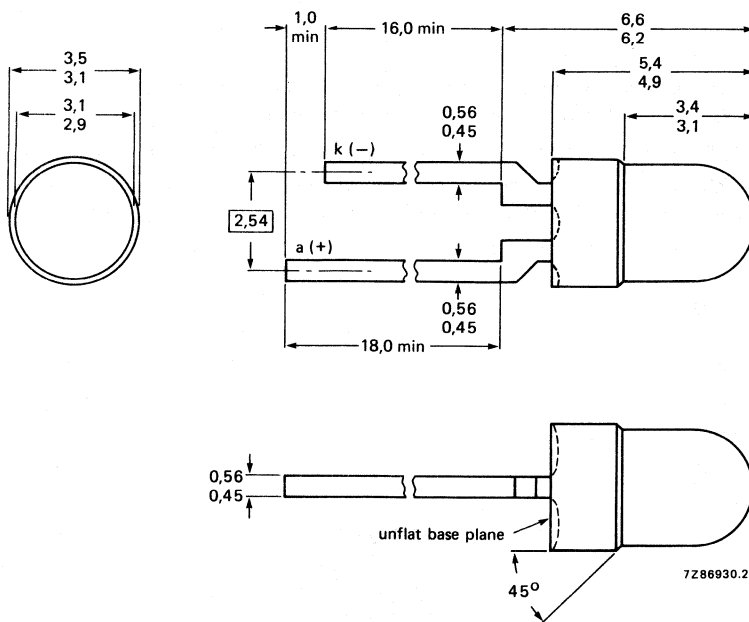
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	150 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G313A	I_v	min.	3 mcd
	PLED-G313A-5	I_v		5 to 12 mcd
	PLED-G313A-6	I_v		10 to 22 mcd
	PLED-G313A-7	I_v	min.	16 mcd
Wavelength at peak emission		λ_p	typ.	565 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	60 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-53E.

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1.5 mm from the seating plane; $t_{slid} < 7 \text{ s}$	T_{slid}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	500 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	60 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-G313A	I_v	min.	3 mcd
	PLED-G313A-5	I_v		5 to 12 mcd
	PLED-G313A-6	I_v		10 to 22 mcd
	PLED-G313A-7	I_v	min.	16 mcd
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

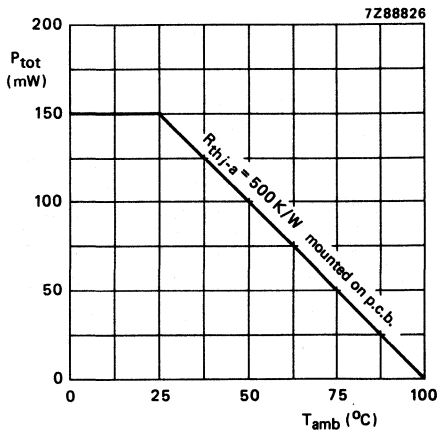


Fig. 2.

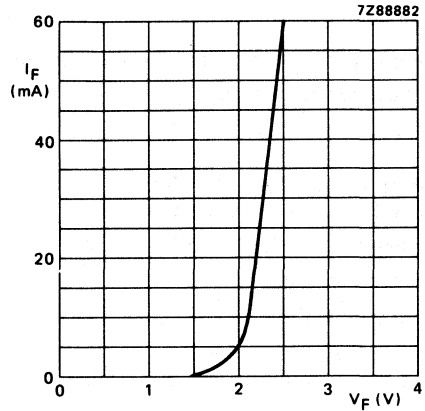


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

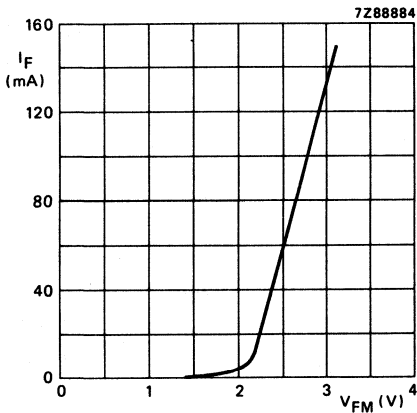


Fig. 4 $t_{on} = 1$ ms; $\delta = 0.33$;
 $T_{amb} = 25^{\circ}C$; typ. values.

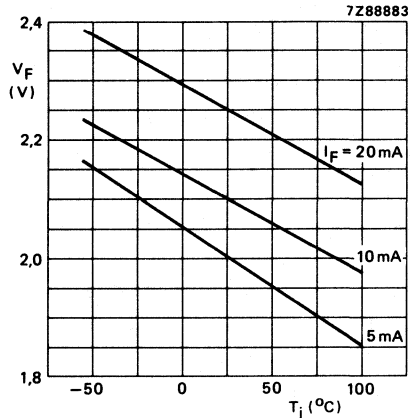


Fig. 5 Typical values.

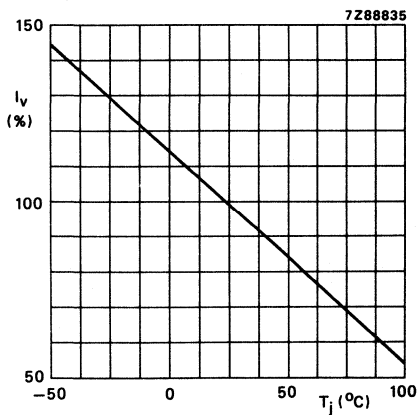


Fig. 6 Typical values.

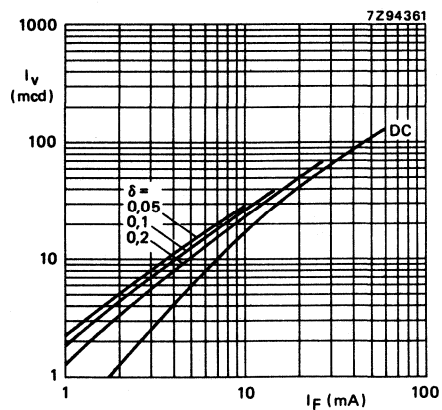


Fig. 7 $t_p = 50 \mu s$; typ. values.

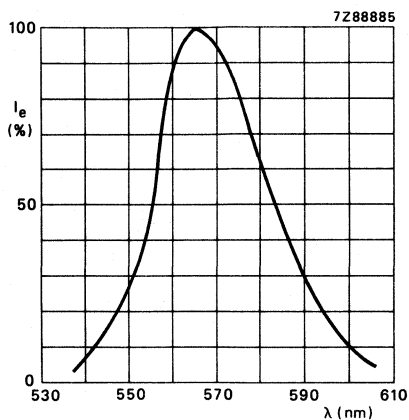


Fig. 8 $I_F = 10$ mA; typ. values.

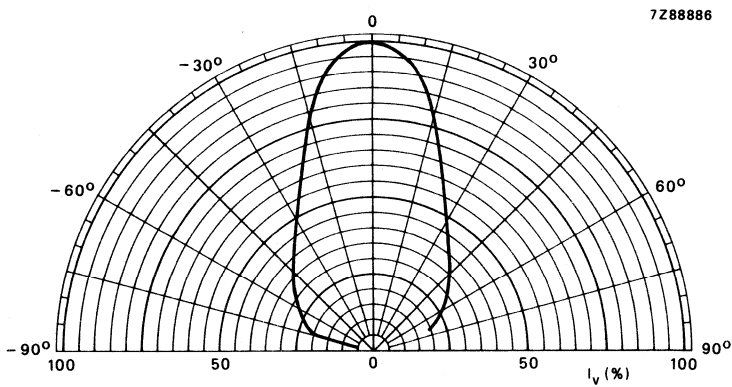


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-G313N

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits green light (GaP; green) at a typical peak wavelength of 565 nm when forward biased.

The PLED-G313N has a SOD-82C1 outline and is encapsulated in a green non-diffusing resin.

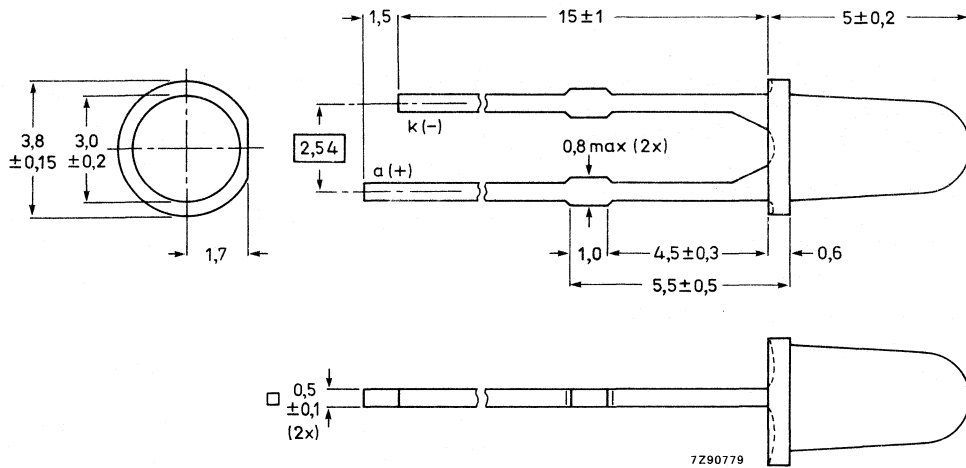
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	1,0 mcd
$I_F = 10\text{ mA}$	PLED-G313N	I_V	typ.	2,5 mcd
	PLED-G313N-3	I_V		1,6 to 3,5 mcd
	PLED-G313N-4	I_V		3,0 to 7,0 mcd
	PLED-G313N-5	I_V		5,0 to 12,0 mcd
	PLED-G313N-56	I_V		5,0 to 22,0 mcd
	PLED-G313N-6	I_V		10,0 to 22,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	565 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	25 deg

MECHANICAL DATA

Fig. 1 SOD-82C1.
PLED-G313N

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to + 100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to + 85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS

 $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA	Forward voltage			
	$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V
			max.	2,8 V
	Reverse current			
	$V_R = 5 \text{ V}$	I_R	max.	10 μA
	Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	25 deg
	Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
	Wavelength at peak emission			
	$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm
	Luminous intensity			
$I_F = 10 \text{ mA}$				
	PLED-G313N	I_v	min.	1,0 mcd
			typ.	2,5 mcd
	PLED-G313N-3	I_v		1,6 to 3,5 mcd
	PLED-G313N-4	I_v		3,0 to 7,0 mcd
	PLED-G313N-5	I_v		5,0 to 12,0 mcd
	PLED-G313N-56	I_v		5,0 to 22,0 mcd
	PLED-G313N-6	I_v		10,0 to 22,0 mcd

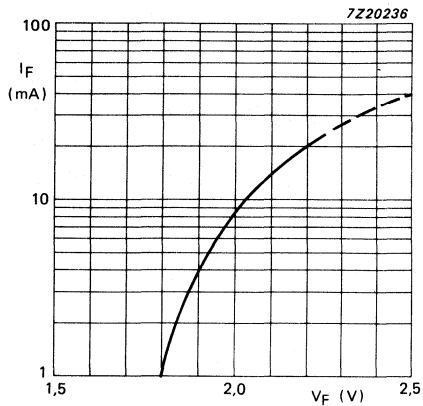


Fig. 2 $I_F = F(V_F)$; typical values.

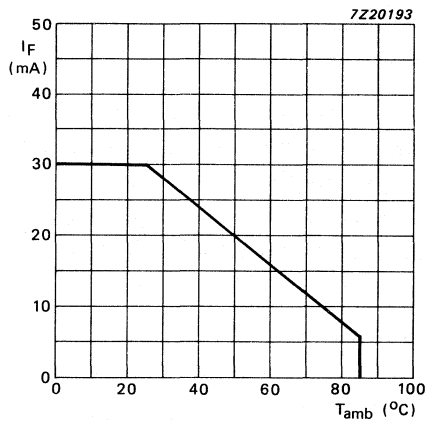


Fig. 3 $I_F = f(T_{amb})$; typical values.

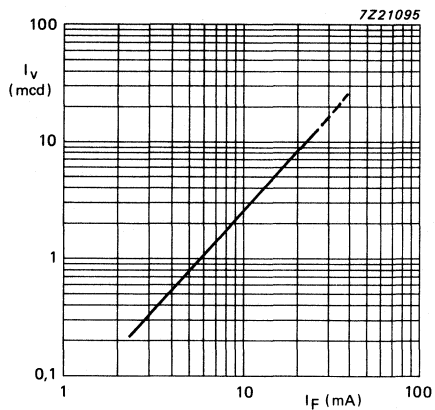


Fig. 4 $I_V = f(I_F)$; typical values.

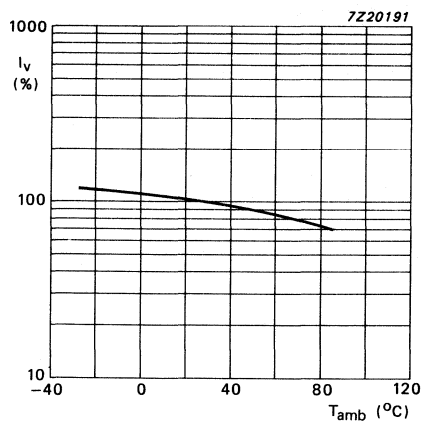


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

DEVELOPMENT DATA

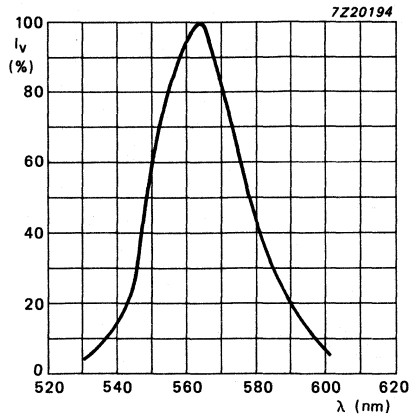


Fig. 6 Spectral response; typical values.

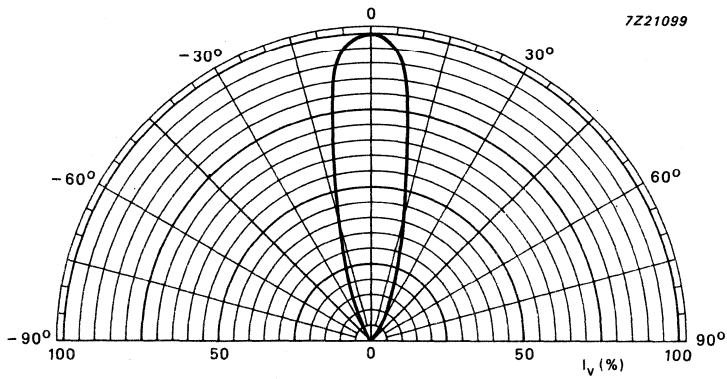


Fig. 7 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-G314A has a SOD-53 outline and is encapsulated in a green diffusing resin.

This LED can resist higher forward currents when a higher lumiosity is required. Because the PLED-G314A is available in high I_V classes, it is suitable for those applications where only low currents are available.

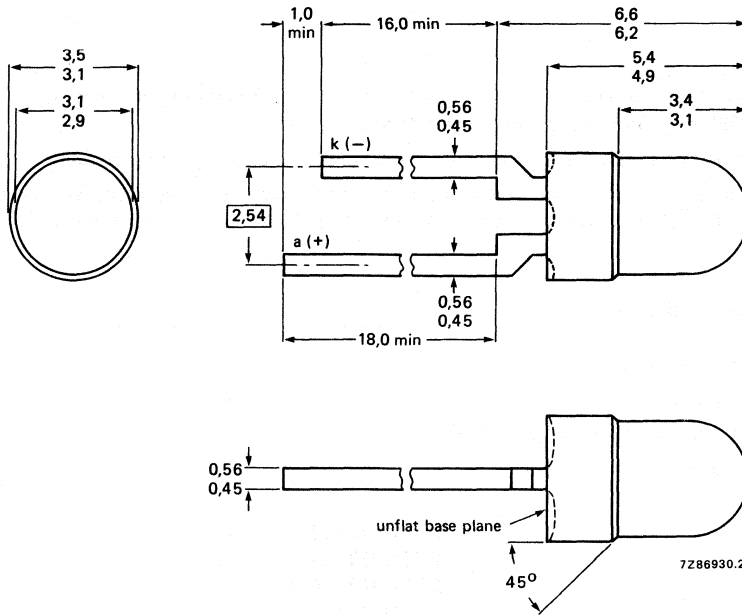
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$		P_{tot}	max.	150 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G314A	I_V	min.	0.7 mcd
	PLED-G314A-3	I_V		1.6 to 3.5 mcd
	PLED-G314A-4	I_V		3.0 to 7.0 mcd
	PLED-G314A-5	I_V	min.	5.0 mcd
Wavelength at peak emission		λ_p	typ.	565 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-53E.

Dimensions in mm



RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1.5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th j-a}$	max.	500 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	70 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$	PLED-G314A	I_v	min. 0.7 mcd	
	PLED-G314A-3	I_v	1.6 to 3.5 mcd	
	PLED-G314A-4	I_v	3.0 to 7.0 mcd	
	PLED-G314A-5	I_v	min. 5.0 mcd	
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

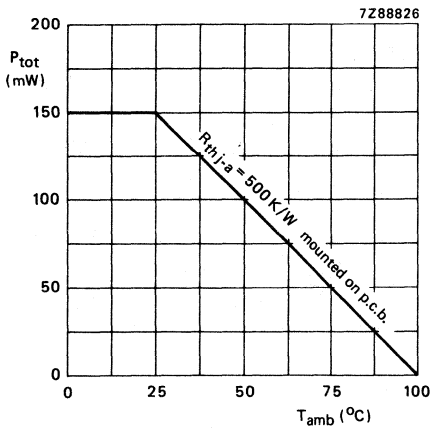


Fig. 2.

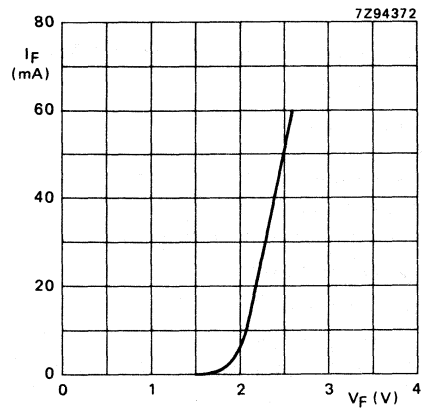


Fig. 3 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

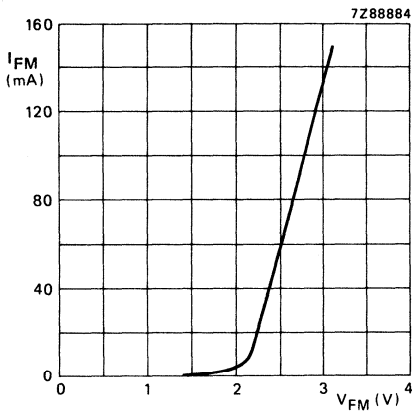


Fig. 4 $t_{on} = 1 \text{ ms}$; $\delta = 0.33$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

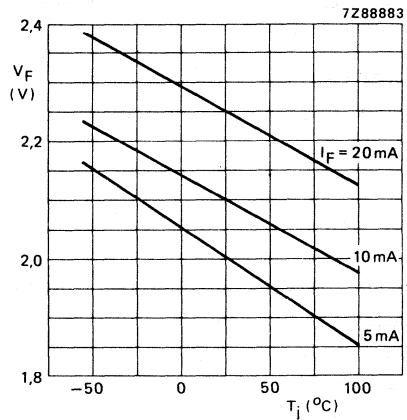


Fig. 5 Typical values.

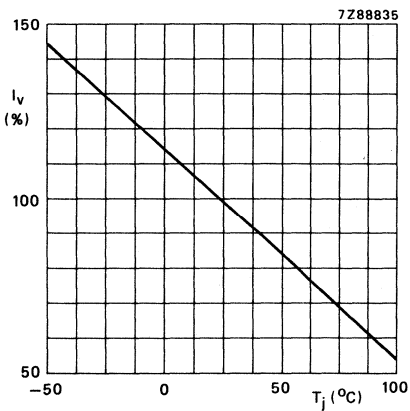


Fig. 6 Typical values.

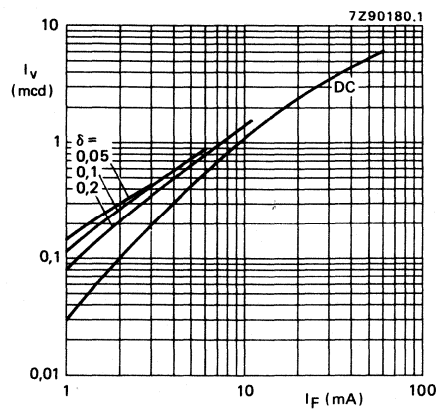


Fig. 7 $t_p = 50 \text{ } \mu\text{s}$; typ. values.

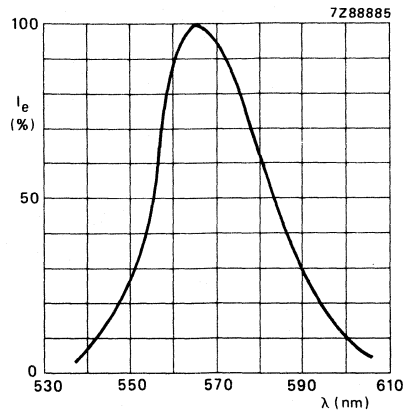


Fig. 8 $I_F = 10$ mA; typ. values.

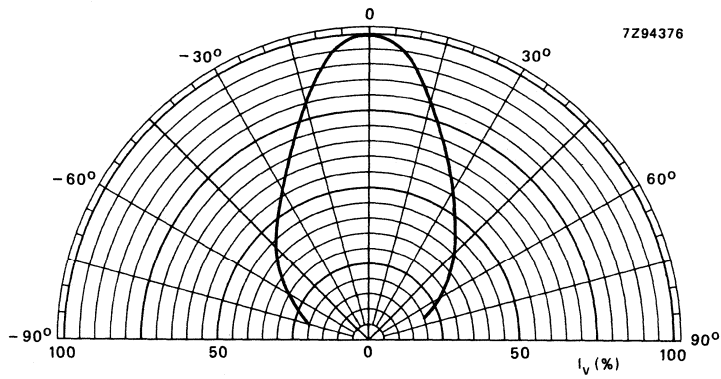


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-G314N
PLED-G334NL

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 3 mm which emit green light (GaP; green) at a typical peak wavelength of 565 nm when forward biased.

The PLED-G314N has a SOD-82C1 outline and is encapsulated in a green diffusing resin.

The PLED-G334NL has a SOD-82A1 outline and is encapsulated in a green diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	1,0 mcd
$I_F = 10\text{ mA}$	PLED-G314N/G334NL	I_v	typ.	2,5 mcd
	PLED-G314N/G334NL-2	I_v		1,0 to 2,2 mcd
	PLED-G314N/G334NL-3	I_v		1,6 to 3,5 mcd
	PLED-G314N/G334NL-34	I_v		1,6 to 7,0 mcd
	PLED-G314N/G334NL-4	I_v		3,0 to 7,0 mcd
	PLED-G314N/G334NL-5	I_v		5,0 to 12,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	565 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	60 deg

PLED-G314N
PLED-G334NL

MECHANICAL DATA

Fig. 1a SOD-82C1.
PLED-G314N

Dimensions in mm

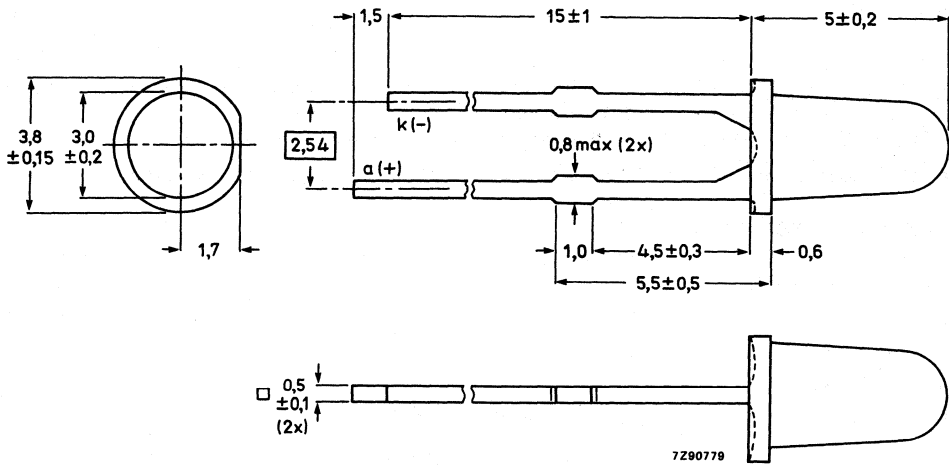
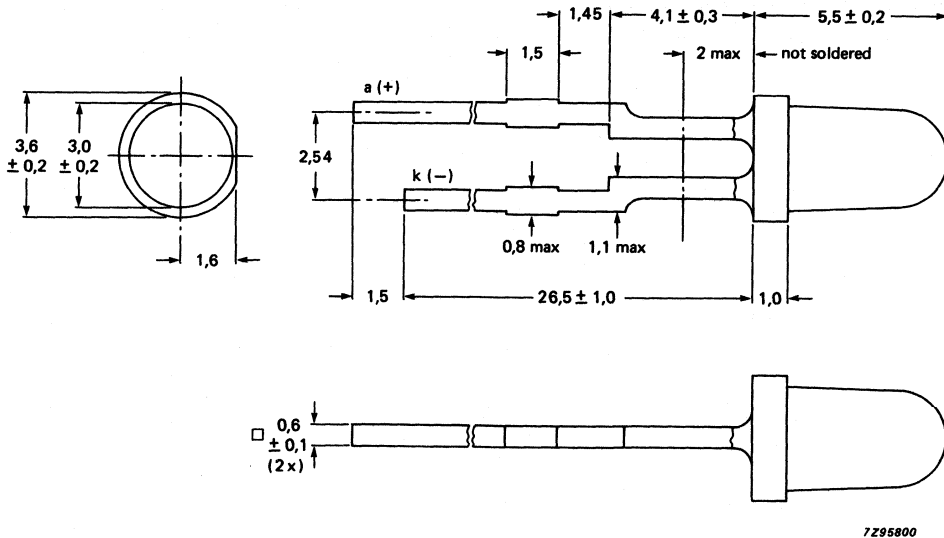


Fig. 1b SOD-82A1.
PLED-G334NL



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to $+100 \text{ }^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to $+85 \text{ }^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; $> 1,5 \text{ mm}$ from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS

 $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	10 μA	
Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	60 deg	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$		min.	1,0 mcd	
	PLED-G314N/G334NL	typ.	2,5 mcd	
	PLED-G314N/G334NL-2	I_V	1,0 to 2,2 mcd	
	PLED-G314N/G334NL-3	I_V	1,6 to 3,5 mcd	
	PLED-G314N/G334NL-34	I_V	1,6 to 7,0 mcd	
	PLED-G314N/G334NL-4	I_V	3,0 to 7,0 mcd	
	PLED-G314N/G334NL-5	I_V	5,0 to 12,0 mcd	

DEVELOPMENT DATA

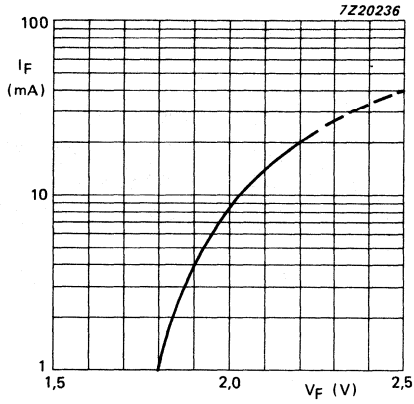


Fig. 2 $I_F = f(V_F)$; typical values.

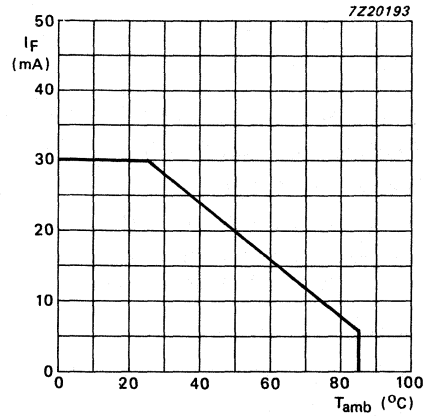


Fig. 3 $I_F = f(T_{amb})$; typical values.

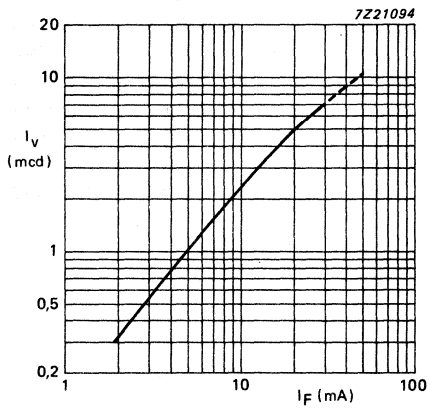


Fig. 4 $I_V = f(I_F)$; typical values.

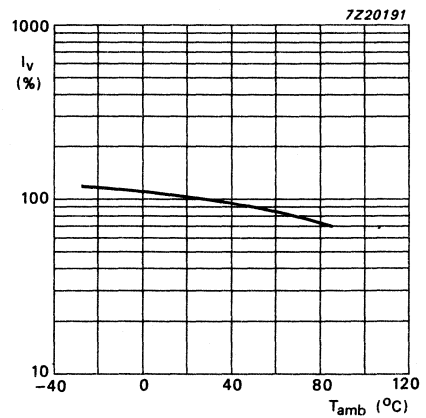


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

DEVELOPMENT DATA

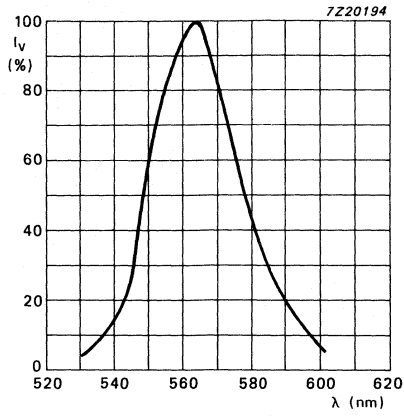


Fig. 6 Spectral response; typical values.

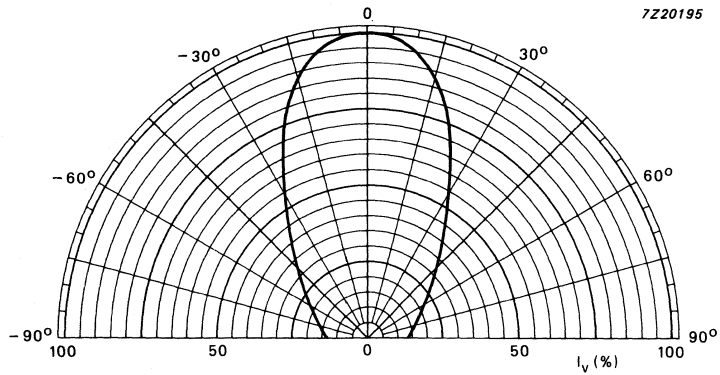


Fig. 7 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit a narrow beam of green light at a typical peak wavelength of 565 nm (GaP, super-green) when forward biased.

The PLED-G511C and PLED-G541CL have a SOD-63 outline and are encapsulated in a clear resin. Because of their resistance to high forward currents, the PLED-G511C and PLED-G541CL are suitable for applications where high luminous intensity is required and applications where only low currents are available.

The PLED-G541CL is the long-lead version of the PLED-G511C and has no seating plane but is in all other respects equal to the PLED-G511C.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G511C(G541CL)	I_v	min.	10 mcd
	PLED-G511C(G541CL)-7	I_v		16 to 35 mcd
	PLED-G511C(G541CL)-8	I_v		30 to 70 mcd
	PLED-G511C(G541CL)-9	I_v	min.	50 mcd
Wavelength at peak emission		λ_p	typ.	565 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	20 $^\circ$

MECHANICAL DATA

Fig. 1a SOD-63D1
PLED-G511C

Dimensions in mm

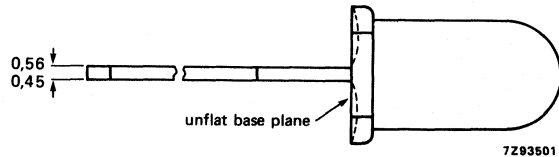
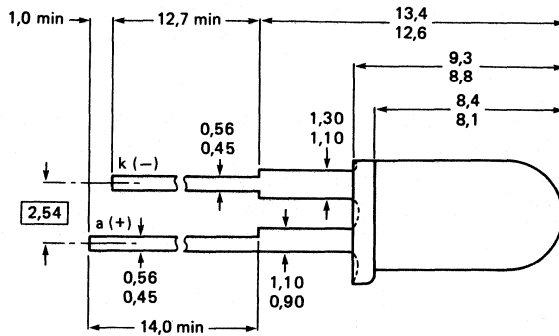
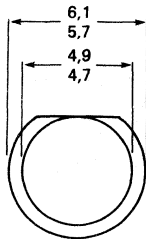
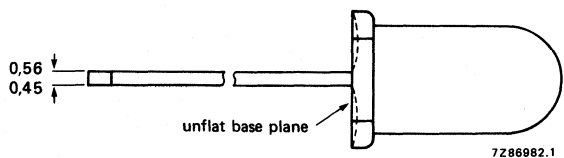
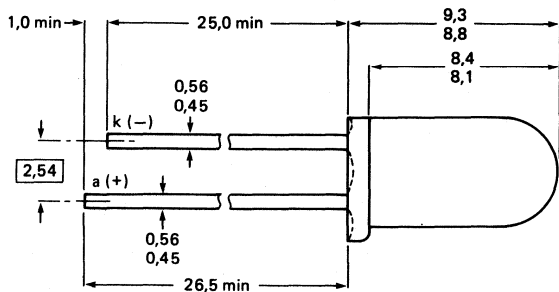
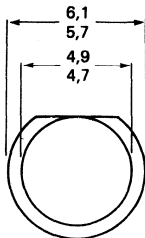


Fig. 1b SOD-63L.
PLED-G541CL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	60 mA
Forward current peak value, $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$ peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max. max.	1 A 150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$ > 1.5 mm from the seating plane for PLED-G511C > 5 mm from the plastic body for PLED-G541CL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB	$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 10 \text{ mA}$	V_F	typ. max.	2.1 V 3.0 V
Reverse current $V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	20 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
Wavelength at peak emission	λ_p	typ.	565 nm
Luminous intensity $I_F = 10 \text{ mA}$	I_v	min.	10 mcd
			16 to 35 mcd
			30 to 70 mcd
		min.	50 mcd
Diode capacitance $V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF

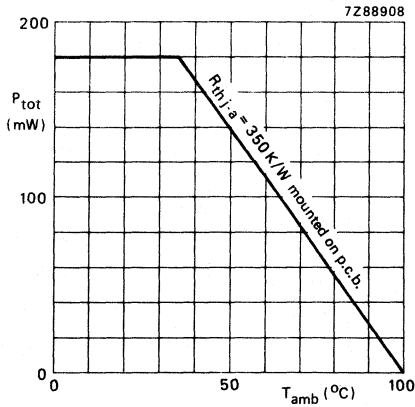


Fig. 2.

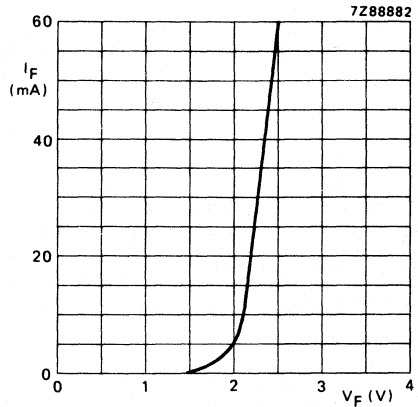


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

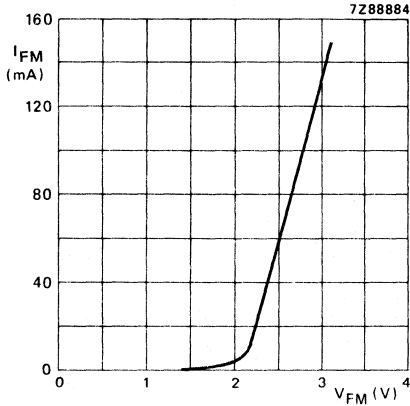


Fig. 4 $t_{on} = 1$ ms; $\delta = 0.33$;
 $T_{amb} = 25^{\circ}C$; typ. values.

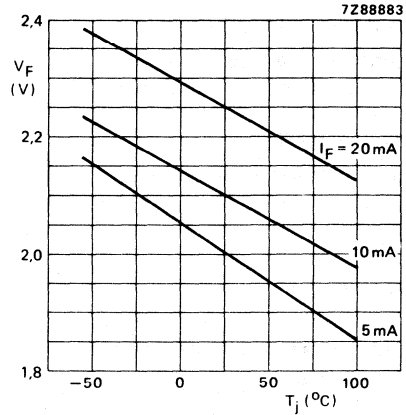


Fig. 5 Typical values.

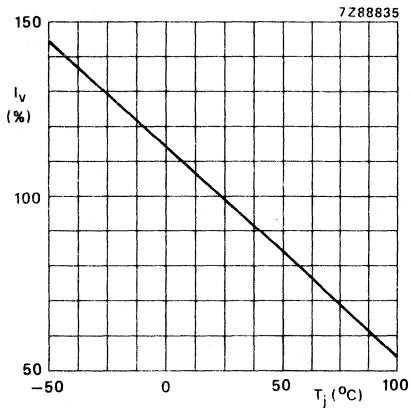


Fig. 6 Typical values.

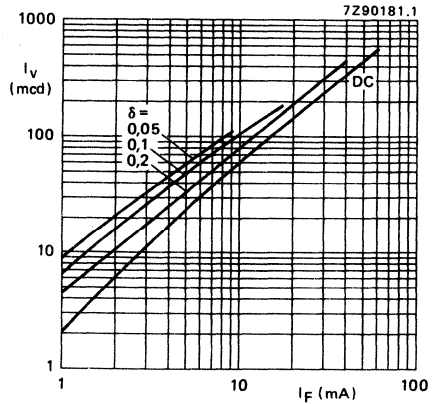


Fig. 7 $t_p = 50 \mu s$; typ. values.

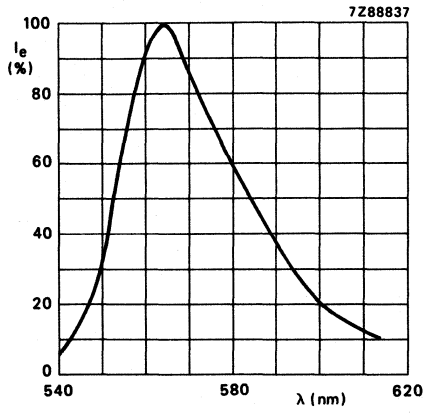


Fig. 8 $I_F = 10$ mA; typ. values.

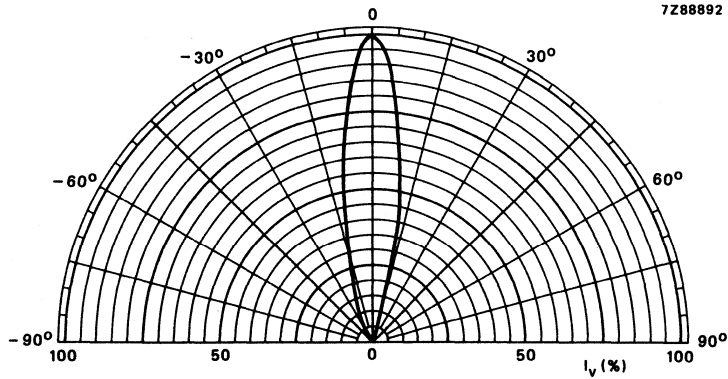


Fig. 9 $I_F = 10$ mA; typ. values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit a narrow beam of green light at a typical peak wavelength of 565 nm (GaP, super-green) when forward biased.

The PLED-G513C and PLED-G543CL have a SOD-63 outline and are encapsulated in a green diffusing resin.

The PLED-G543CL is the long-lead version of the PLED-G513C and has no seating plane but is in all other respects equal to the PLED-G513C.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35\text{ }^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G513C(G543CL)	I_V	min.	10 mcd
	PLED-G513C(G543CL)-6	I_V		10 to 22 mcd
	PLED-G513C(G543CL)-7	I_V		16 to 35 mcd
	PLED-G513C(G543CL)-8	I_V	min.	30 mcd
Wavelength at peak emission		λ_p	typ.	565 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	20 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-63DI.
PLED-G513C

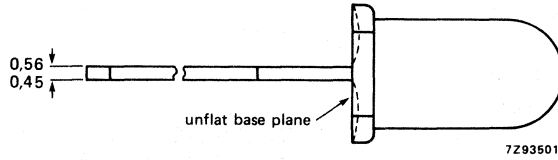
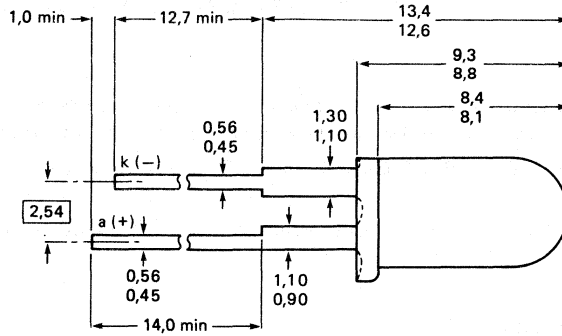
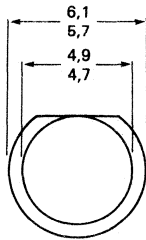
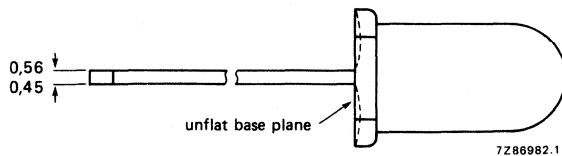
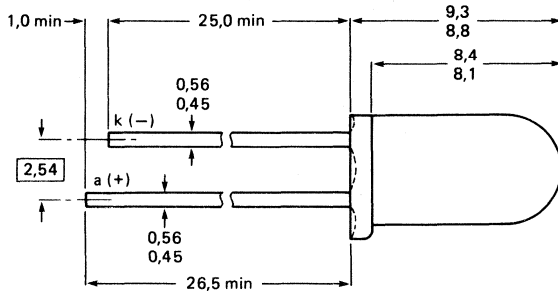
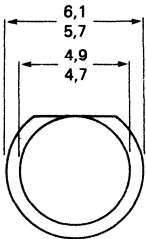


Fig. 1b SOD-63L.
PLED-G543CL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	60 mA
Forward current peak value, $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$ peak value; $t_{\text{ON}} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max. max.	1 A 150 mA
Total power dissipation up to $T_{\text{amb}} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{\text{slid}} < 7 \text{ s}$ > 1,5 mm from the seating plane for PLED-G513C > 5 mm from the plastic body for PLED-G543CL	T_{slid}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB	$R_{\text{th j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 10 \text{ mA}$	V_F	typ. max.	2.1 V 3.0 V
Reverse current $V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	20 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
Wavelength at peak emission	λ_p	typ.	565 nm
Luminous intensity $I_F = 10 \text{ mA}$	I_v	min.	10 mcd
	PLED-G513C(G543CL)	I_v	10 to 22 mcd
	PLED-G513C(G543CL)-6	I_v	16 to 35 mcd
	PLED-G513C(G543CL)-7	I_v	30 mcd
	PLED-G513C(G543CL)-8	I_v	min. 30 mcd
Diode capacitance $V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF

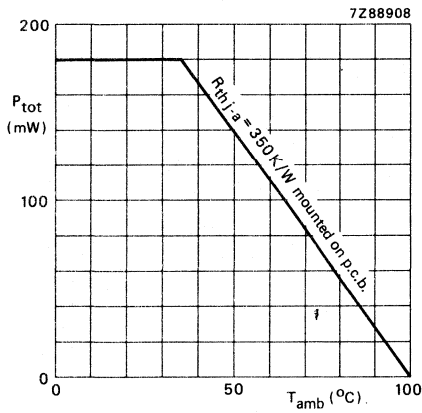


Fig. 2.

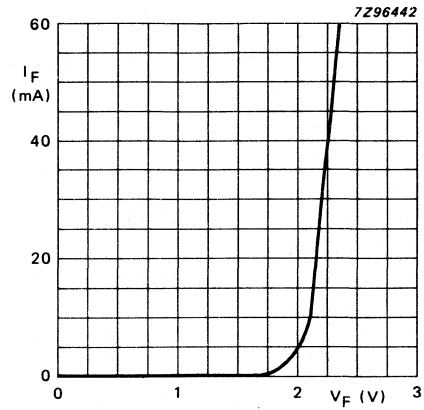


Fig. 3 $T_j = 25^{\circ}C$; typical values.

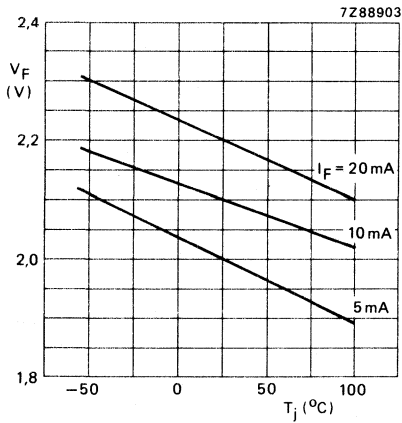


Fig. 4 Typical values.

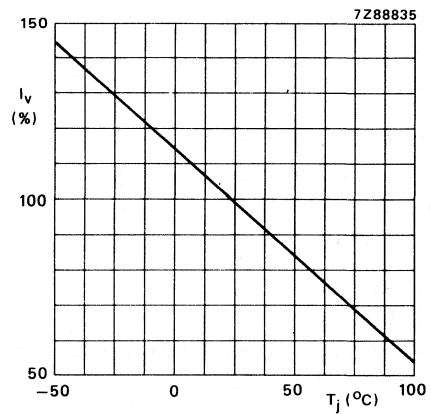


Fig. 5 Typical values.

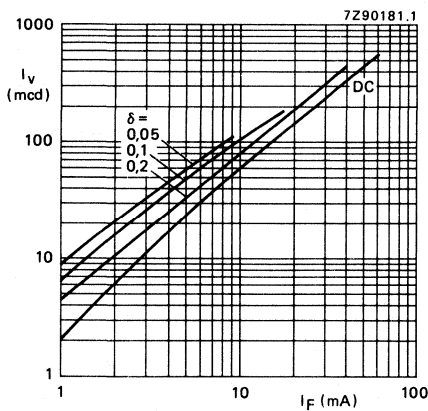


Fig. 6 $t_p = 50 \mu s$; typ. values.

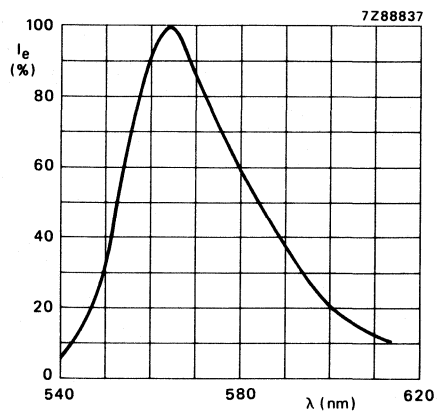


Fig. 7 $I_F = 10$ mA; typ. values.

7Z88892

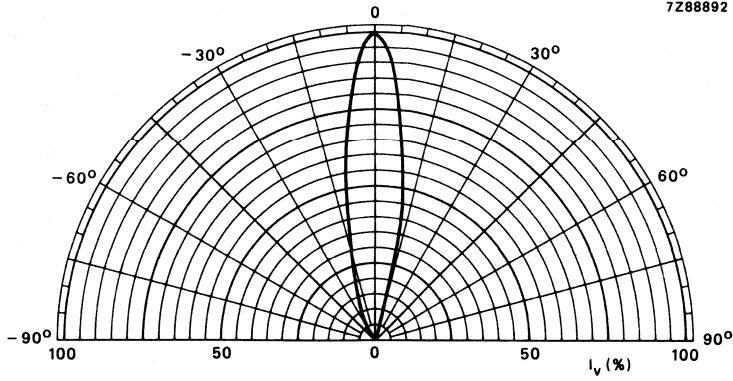


Fig. 8 $I_F = 10 \text{ mA}$; typ. values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-G513M
PLED-G533ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit green light (GaP; green) at a typical peak wavelength of 565 nm when forward biased.

The PLED-G513M has a SOD-90C1 outline and is encapsulated in a green non-diffusing resin.

The PLED-G533ML has a SOD-90A1 outline and is encapsulated in a green non-diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	3,0 mcd
$I_F = 10\text{ mA}$	PLED-G513M/G533ML	I_V	typ.	8,5 mcd
	PLED-G513M/G533ML-4	I_V		3,0 to 7,0 mcd
	PLED-G513M/G533ML-5	I_V		5,0 to 12 mcd
	PLED-G513M/G533ML-6	I_V		10 to 22 mcd
	PLED-G513M/G533ML-7	I_V		15 to 35 mcd
	PLED-G513M/G533ML-78	I_V		15 to 70 mcd
	PLED-G513M/G533ML-8	I_V		30 to 70 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	565 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	35 °

PLED-G513M
PLED-G533ML

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-90C1
PLED-G513M

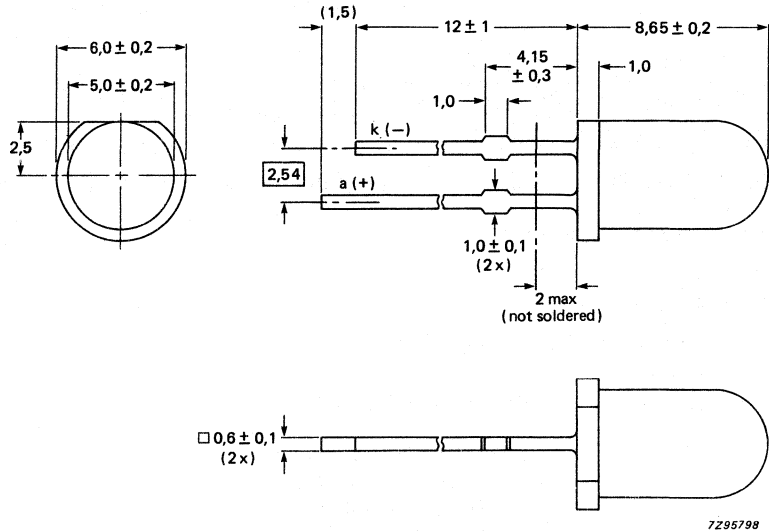
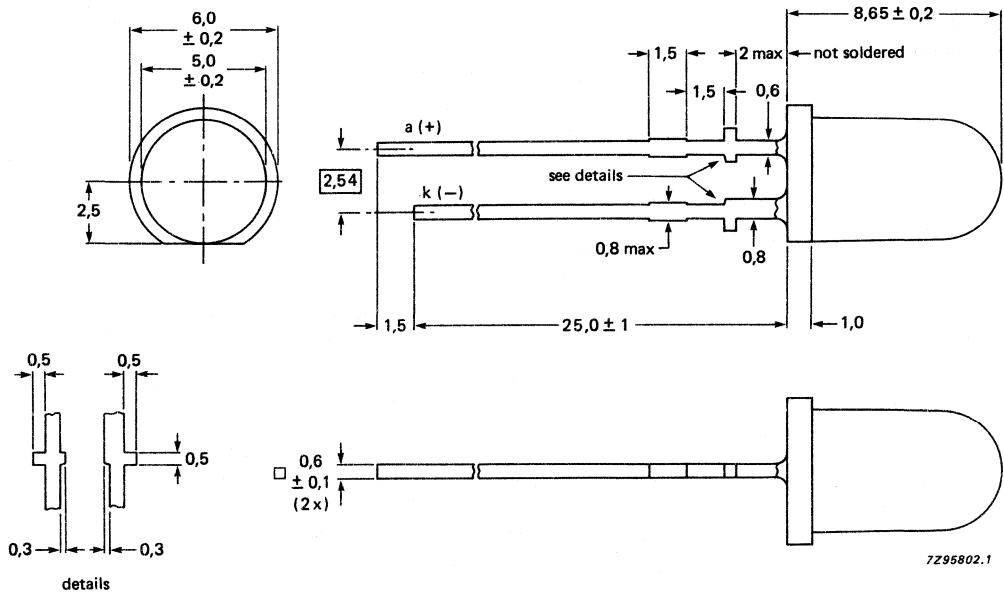


Fig. 1b SOD-90A1
PLED-G533ML



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 °C
Operating ambient temperature	T_{opr}		-25 to +85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS

 $T_{amb} = 25$ °C unless otherwise specified

DEVELOPMENT DATA

Forward voltage				
$I_F = 20$ mA	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5$ V	I_R	max.	10 μ A	
Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	35 °	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10$ mA	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10$ mA		min.	3,0 mcd	
		typ.	8,5 mcd	
	PLED-G513M/G533ML	I_V		
	PLED-G513M/G533ML-4	I_V	3,0 to 7,0 mcd	
	PLED-G513M/G533ML-5	I_V	5,0 to 12 mcd	
	PLED-G513M/G533ML-6	I_V	10 to 22 mcd	
	PLED-G513M/G533ML-7	I_V	15 to 35 mcd	
	PLED-G513M/G533ML-78	I_V	15 to 70 mcd	
	PLED-G513M/G533ML-8	I_V	30 to 70 mcd	

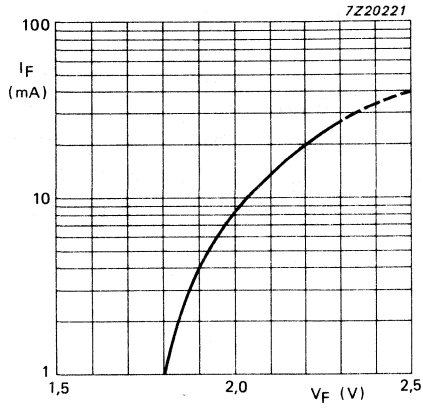


Fig. 2 $I_F = f(V_F)$ typical values.

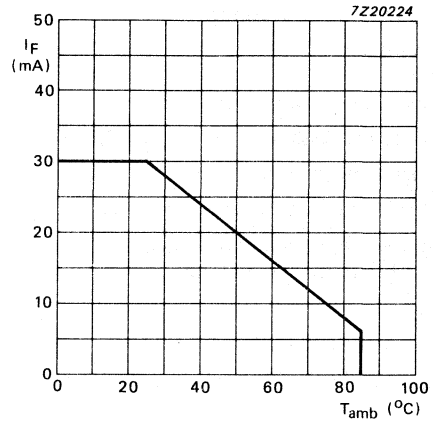


Fig. 3 $I_F = f(T_{amb})$ typical values.

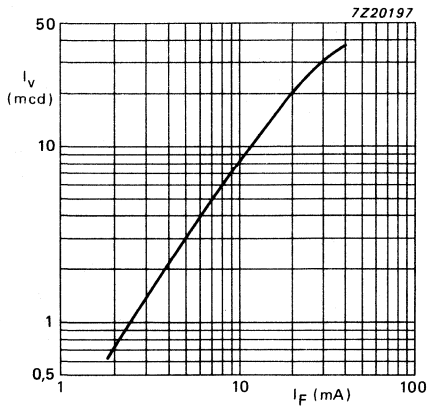


Fig. 4 $I_V = f(I_F)$ typical values.

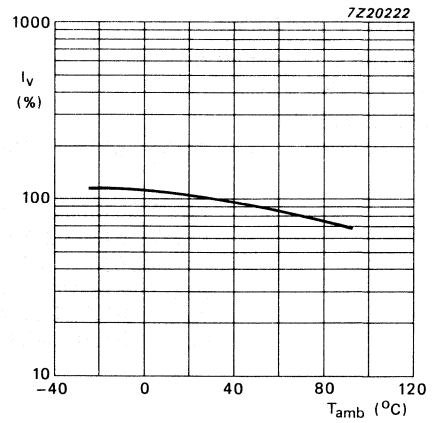


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

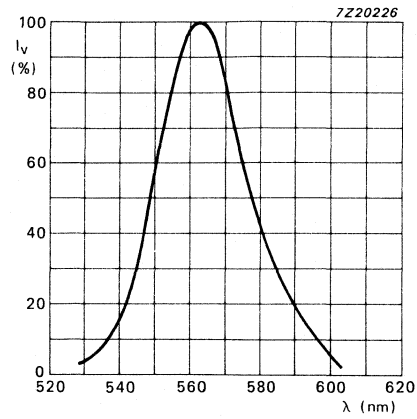


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

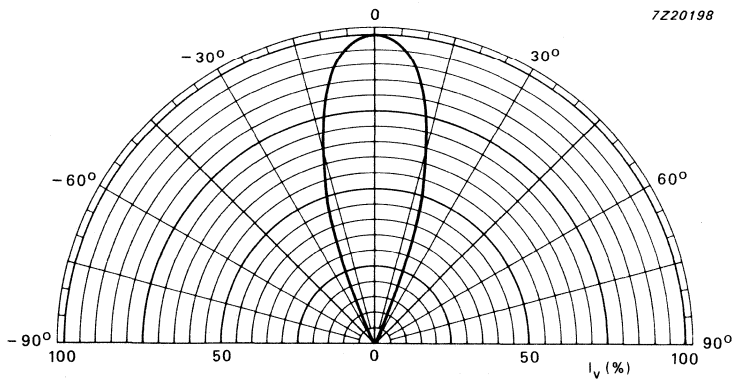


Fig. 7 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-G514B and PLED-G544CL have a SOD-63 outline and are encapsulated in a green diffusing resin. Because of their resistance to high forward currents, the PLED-G514B and PLED-G544CL are suitable for those applications where high lumiosity is required.

The PLED-G544CL is the long-lead version of the PLED-G514B and has no seating plane but is in all other respects equal to the PLED-G514B.

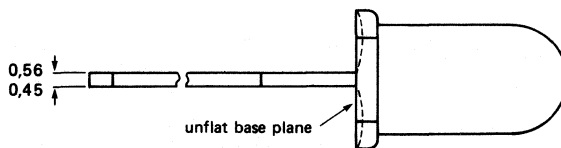
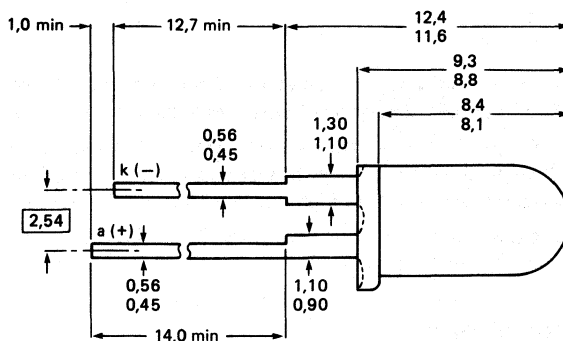
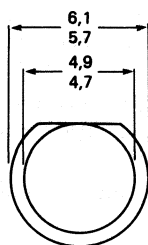
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35\text{ }^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G514B(G544CL)	I_v	min.	0.7 mcd
	PLED-G514B(G544CL)-3	I_v		1.6 to 3.5 mcd
	PLED-G514B(G544CL)-4	I_v		3.0 to 7.0 mcd
	PLED-G514B(G544CL)-5	I_v	min.	5.0 mcd
Wavelength at peak emission		λ_p	typ.	565 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

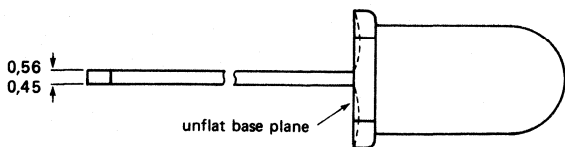
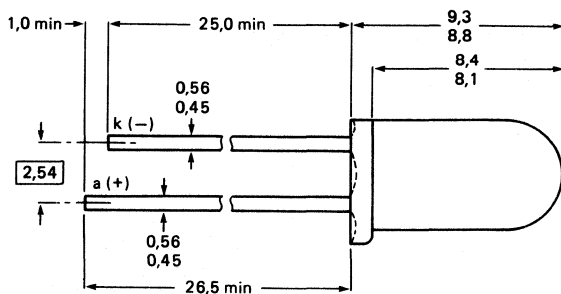
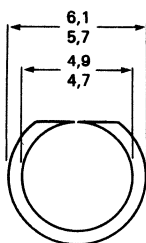
Dimensions in mm

Fig 1a SOD-63Al.
PLED-G514B



7286977.1

Fig. 1b SOD-63L.
PLED-G544CL



7286982.1

Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	60 mA
Forward current peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$ peak value; $t_p = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max. max.	1 A 150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$ > 1.5 mm from the seating plane for PLED-G514B > 5 mm from the plastic body for PLED-G544CL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB	$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 10 \text{ mA}$	V_F	typ. max.	2.1 V 3.0 V
Reverse current $V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	70 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
Wavelength at peak emission $I_F = 10 \text{ mA}$	λ_p	typ.	565 nm
Luminous intensity $I_F = 10 \text{ mA}$			
	PLED-G514B(G544CL)	I_v	min. 0.7 mcd
	PLED-G514B(G544CL)-3	I_v	1.6 to 3.5 mcd
	PLED-G514B(G544CL)-4	I_v	3.0 to 7.0 mcd
	PLED-G514B(G544CL)-5	I_v	min. 5.0 mcd
Diode capacitance $V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF

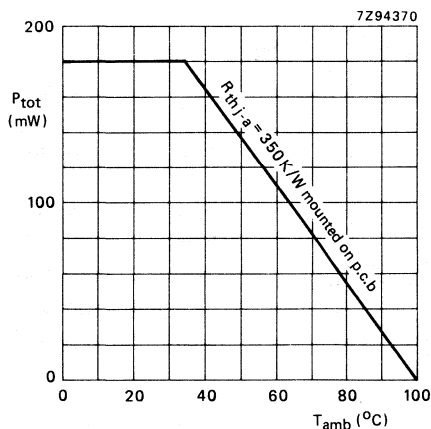


Fig. 2 Typical values.

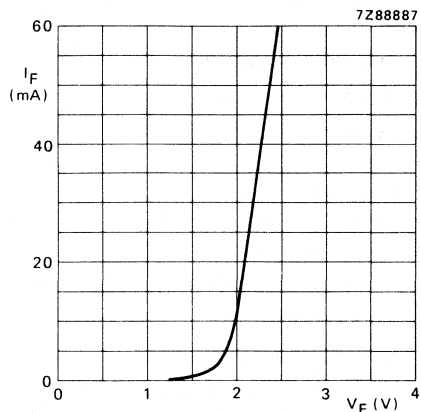


Fig. 3 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

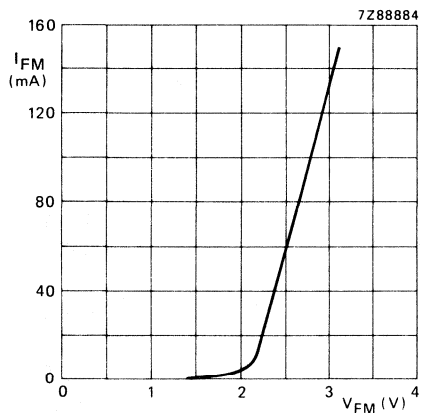


Fig. 4 $t_{on} = 1 \text{ ms}$; $\delta = 0.33$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

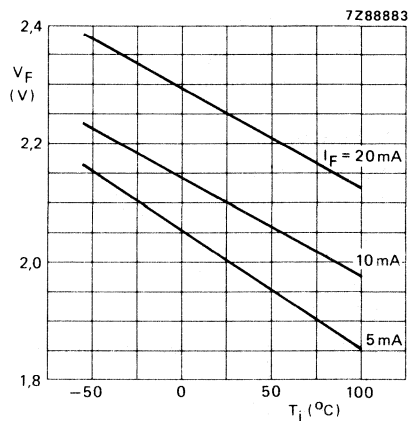


Fig. 5 Typical values.

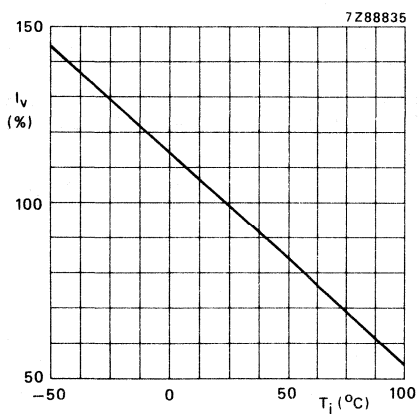


Fig. 6 Typical values.

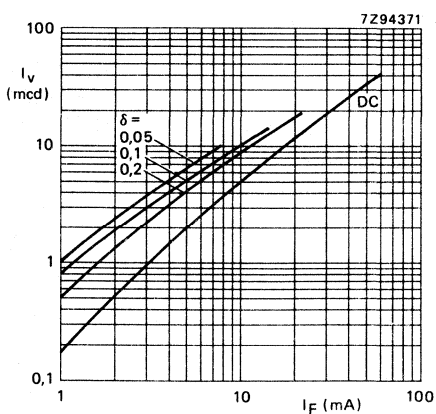


Fig. 7 $t_p = 50 \text{ } \mu\text{s}$.

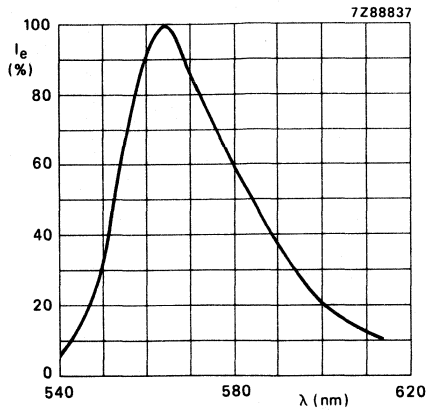


Fig. 8 $I_F = 10$ mA; typ. values.

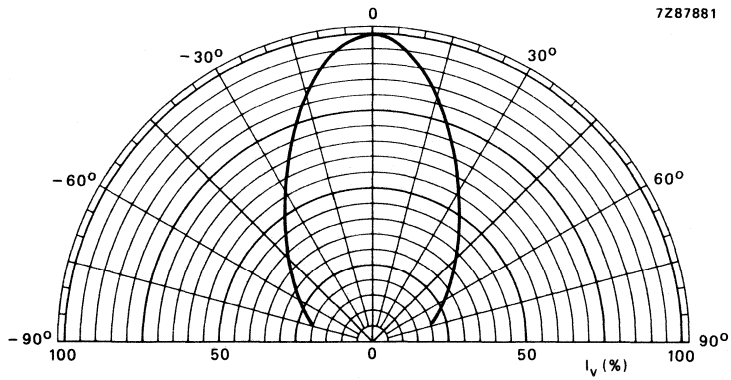


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-G514M
PLED-G534ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit green light (GaP; green) at a typical peak wavelength of 565 nm when forward biased.

The PLED-G514M has a SOD-90C1 outline and is encapsulated in a green coloured diffusing resin.

The PLED-G534ML has a SOD-90A1 outline and is encapsulated in a green coloured diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	1,6 mcd
$I_F = 10\text{ mA}$	PLED-G514M/G534ML	I_V	typ.	5,0 mcd
	PLED-G514M/G534ML-4	I_V		3,0 to 7,0 mcd
	PLED-G514M/G534ML-5	I_V		5,0 to 12 mcd
	PLED-G514M/G534ML-6	I_V		10 to 22 mcd
	PLED-G514M/G534ML-67	I_V		10 to 35 mcd
	PLED-G514M/G534ML-7	I_V		15 to 35 mcd
Wavelength at peak emission			typ.	565 nm
$I_F = 20\text{ mA}$		λ_p		
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	50 °

PLED-G514M
PLED-G534ML

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-90C1
PLED-G514M

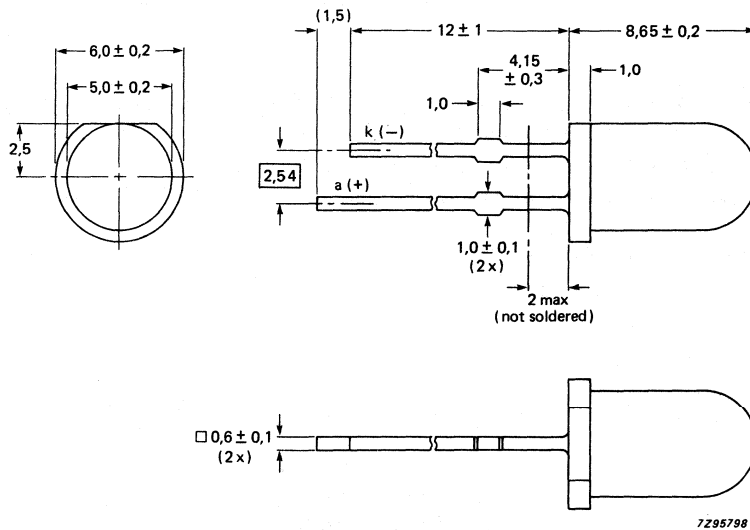
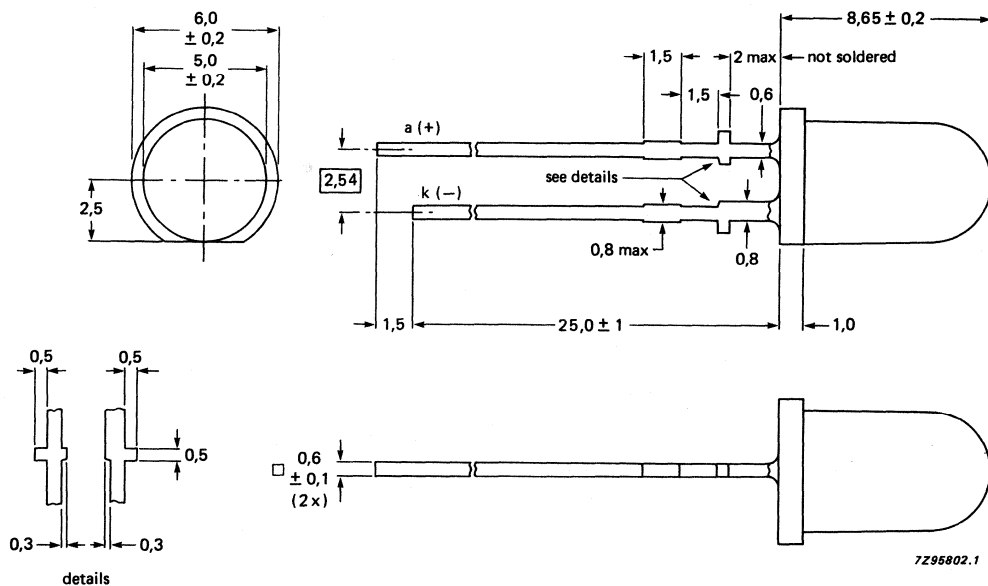


Fig. 1b SOD-90A1
PLED-G534ML



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to +85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA

Forward voltage				
$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	10 μA	
Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	50 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$		min.	1,6 mcd	
		typ.	5,0 mcd	
	PLED-G514M/G534ML	I_V		
	PLED-G514M/G534ML-4	I_V	3,0 to 7,0 mcd	
	PLED-G514M/G534ML-5	I_V	5,0 to 12 mcd	
	PLED-G514M/G534ML-6	I_V	10 to 22 mcd	
	PLED-G514M/G534ML-67	I_V	10 to 35 mcd	
	PLED-G514M/G534ML-7	I_V	15 to 35 mcd	

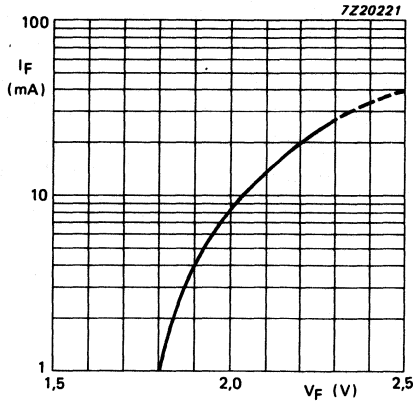


Fig. 2 $I_F = f(V_F)$ typical values.

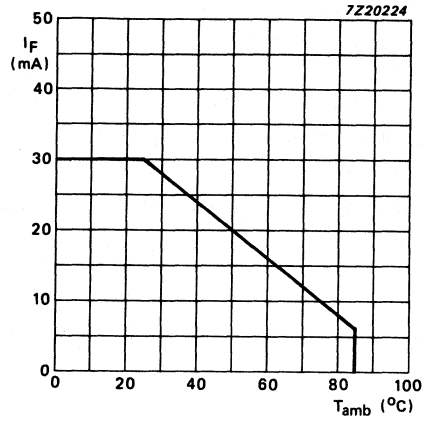


Fig. 3 $I_F = f(T_{amb})$ typical values.

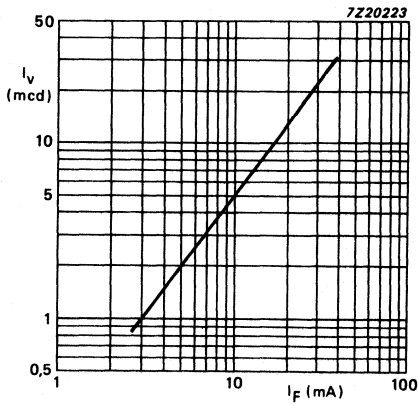


Fig. 4 $I_V = f(I_F)$ typical values.

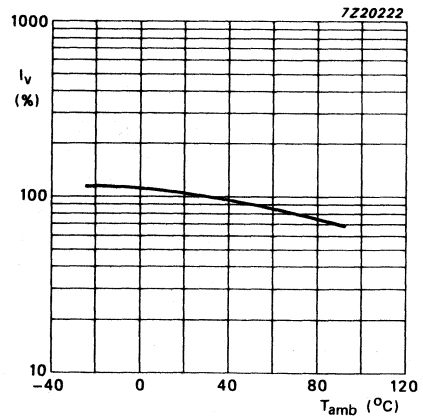


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

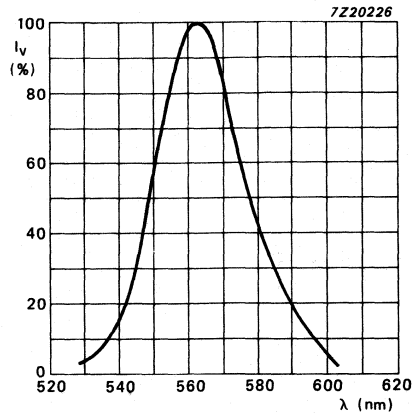


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

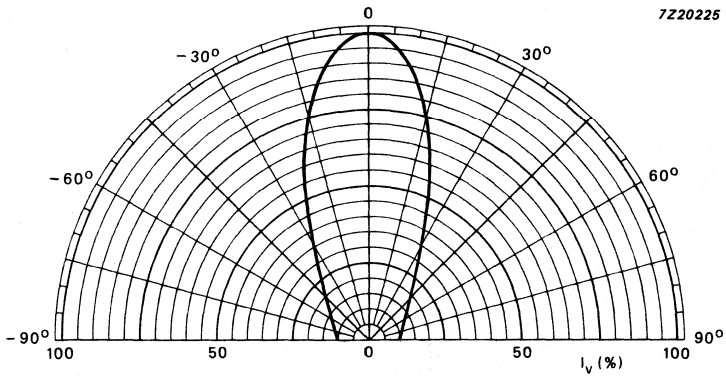


Fig. 7 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode which emits green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-G544KL has a flangeless SOD-85 outline and is encapsulated in a green diffusing resin.

Together with the PLED-H544KL and the PLED-Y544KL, the PLED-G544KL forms one family and is available only in the long lead (L) version.

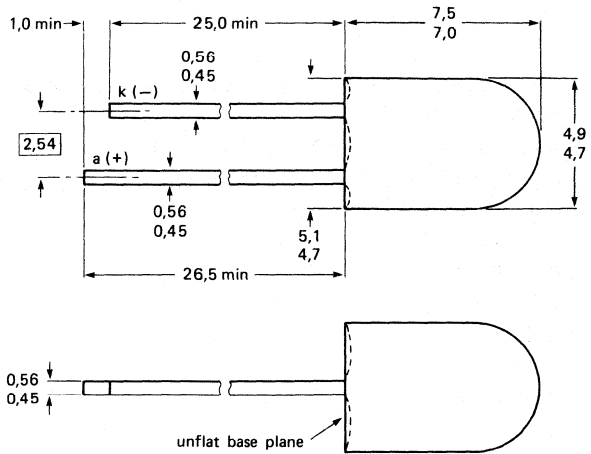
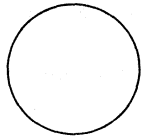
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35\text{ }^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-G544KL	I_v	min.	0.7 mcd
	PLED-G544KL-3	I_v		1.6 to 3.5 mcd
	PLED-G544KL-4	I_v		3.0 to 7.0 mcd
	PLED-G544KL-5	I_v	min.	5.0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	565 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-85AL.

Dimensions in mm



7Z95189.1

Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_p < 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		$-55 \text{ to } +100 \text{ }^\circ\text{C}$
Junction temperature	T_j	max.	$100 \text{ }^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 5 mm from the plastic body	T_{sld}	max.	$260 \text{ }^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when
the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	2.6 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth at half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	70°	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-G544KL	I_v	min.	1.0 mcd
	PLED-G544KL-3	I_v		1.6 to 3.5 mcd
	PLED-G544KL-4	I_v		3.0 to 7.0 mcd
	PLED-G544KL-5	I_v	min.	5.0 mcd
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

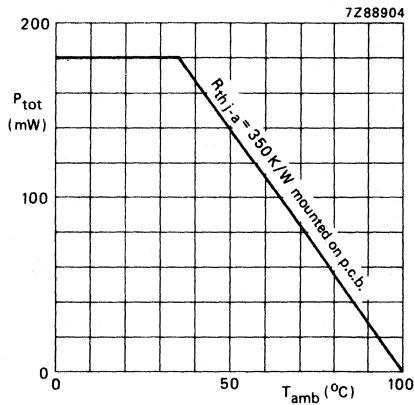


Fig. 2.

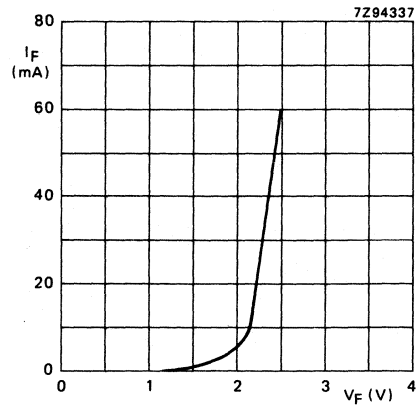


Fig. 3 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

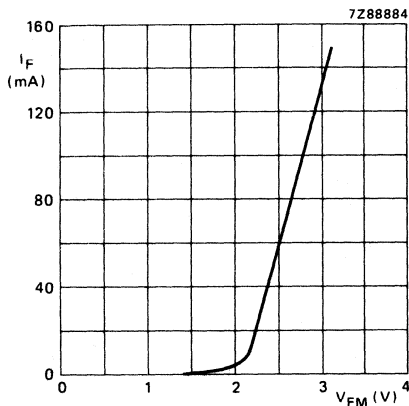


Fig. 4 $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

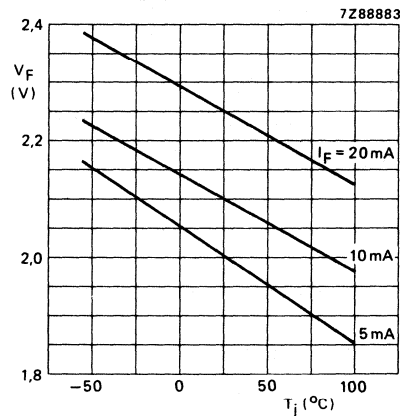


Fig. 5 Typical values.

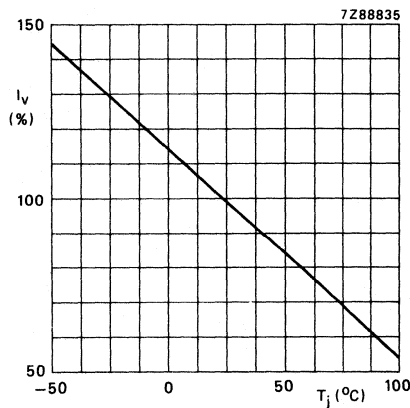


Fig. 6 Typical values.

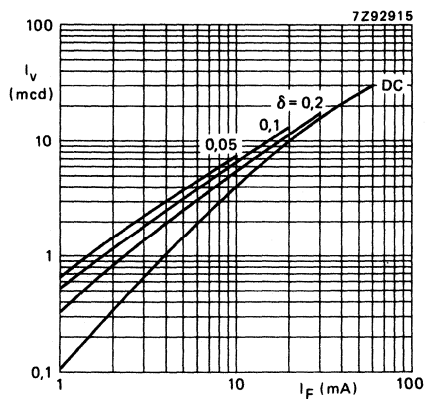


Fig. 7 $t_p = 50 \text{ } \mu\text{s}$; typ. values.

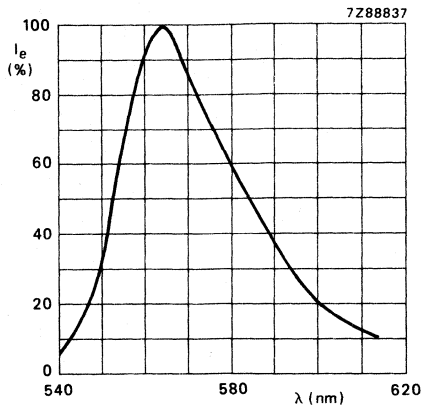


Fig. 8 I_F = 10 mA; typ. values.

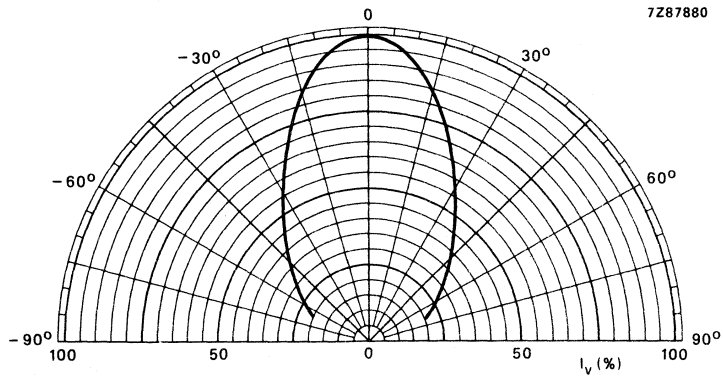


Fig. 9 I_F = 10 mA; typ. values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 1 mm which emit green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-GR14E and PLED-GR44EL have a SOD-75 outline and are encapsulated in a green diffusing resin. These LEDs when stacked in an array (in combination with other SOD-75 LEDs) can be used, for example, as level indicators.

The PLED-GR44EL is equal to the PLED-GR14E but has long leads and no seating plane.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35\text{ }^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-GR14E(GR44EL)	I_v	min.	0.7 mcd
	PLED-GR14E(GR44EL)-2	I_v		1.0 to 2.2 mcd
	PLED-GR14E(GR44EL)-3	I_v	min.	1.6 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	565 nm
Beamwidth between half-intensity directions in the plane of the leads		$\theta_{1/2}$	typ.	110 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-75B1.
PLED-GR14E

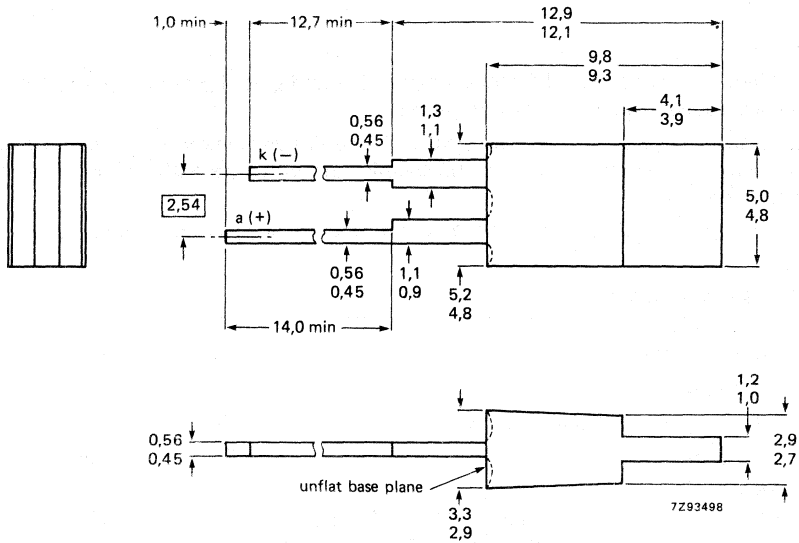
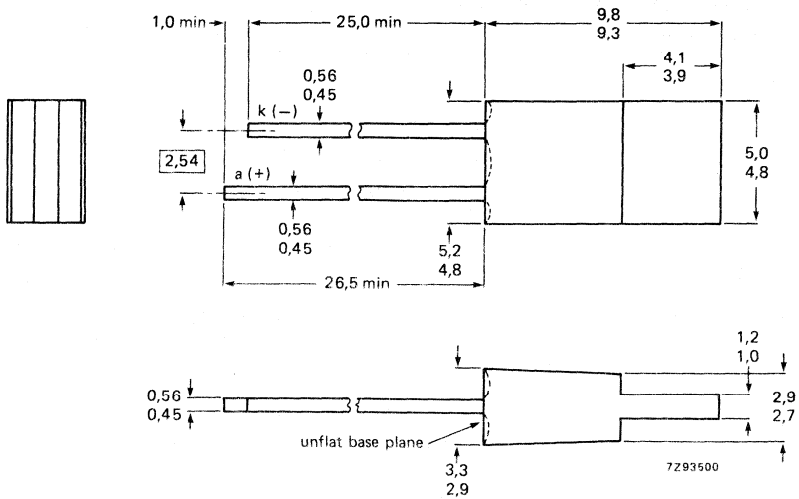


Fig. 1b SOD-75BL.
PLED-GR44EL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$			
> 1.5 mm from the seating plane for PLED-GR14E			
> 5 mm from the plastic body for PLED-GR44EL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	110 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-GR14E(GR44EL)	I_v	min.	0.7 mcd
	PLED-GR14E(GR44EL)-2	I_v		1.0 to 2.2 mcd
	PLED-GR14E(GR44EL)-3	I_v	min.	1.6 mcd
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

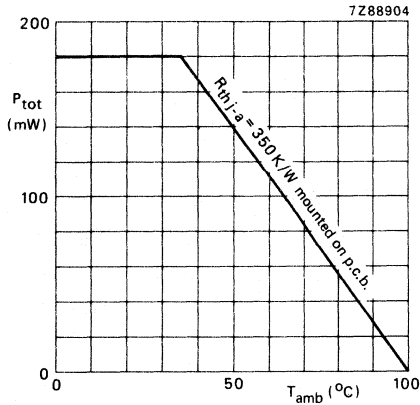


Fig. 2.

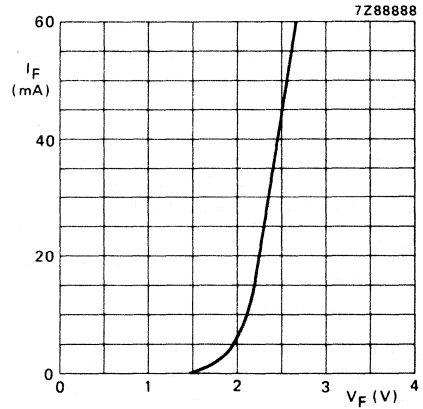


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

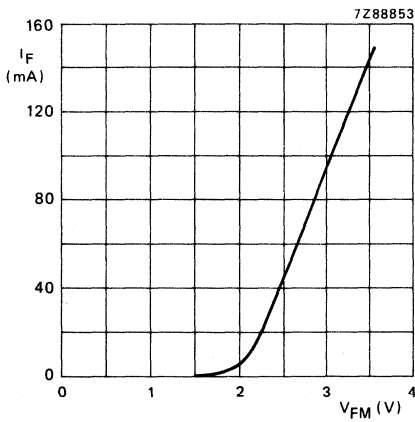


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

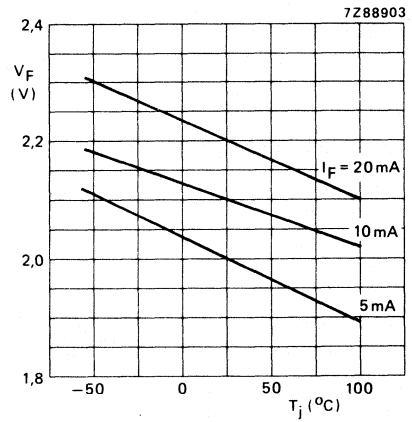


Fig. 5 Typical values.

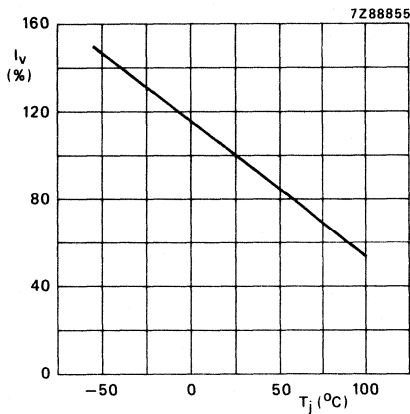


Fig. 6 Typical values.

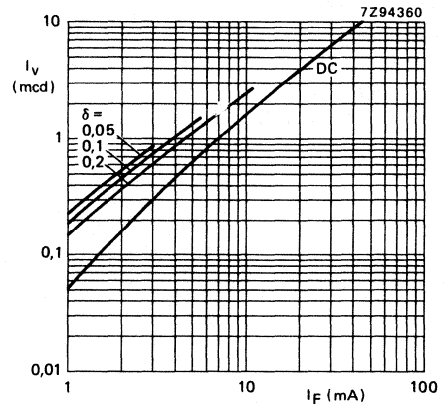


Fig. 7 $t_p = 50 \mu s$; typical values.

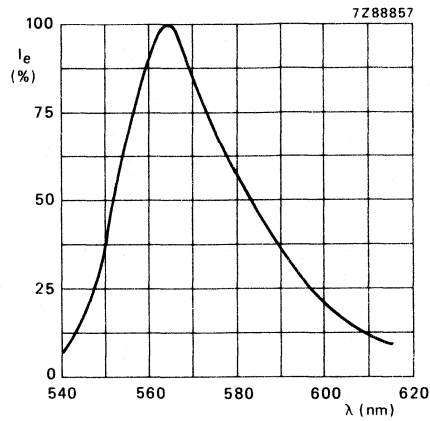


Fig. 8 $I_F = 10$ mA; typical values:

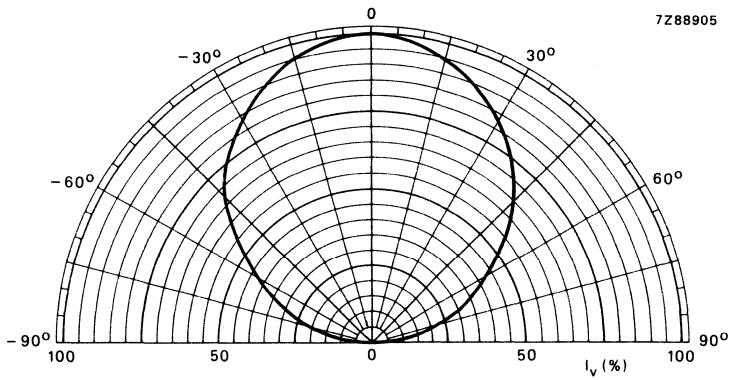


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diode of 5 mm x 2.5 mm which emits green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased.

The PLED-GR14F has a SOD-76 envelope and is encapsulated in a green diffusing resin.

The PLED-GR44FL is the long lead version of the PLED-GR14F without a seating plane, but in all respects similar to the PLED-GR14F.

When stacked in an array these SOD-76 LEDs can be used, for example, as level indicators. Because of its high light intensity the PLED-GR14F is very suitable in applications where only low currents are available and because of its high I_{Fmax} it can be used for high I_V applications.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35^\circ C$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 °C
Luminous intensity				
$I_F = 10$ mA	PLED-GR14F(GR44FL)	I_V	min.	0.7 mcd
	PLED-GR14F(GR44FL)-2	I_V		1.0 to 2.2 mcd
	PLED-GR14F(GR44FL)-3	I_V		1.6 to 3.5 mcd
Wavelength at peak emission				
$I_F = 10$ mA		λ_p	typ.	565 nm
Beamwidth between half-intensity directions				
$I_F = 10$ mA		$\theta_{1/2}$	typ.	100 °

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-76A1.
PLED-GR14F

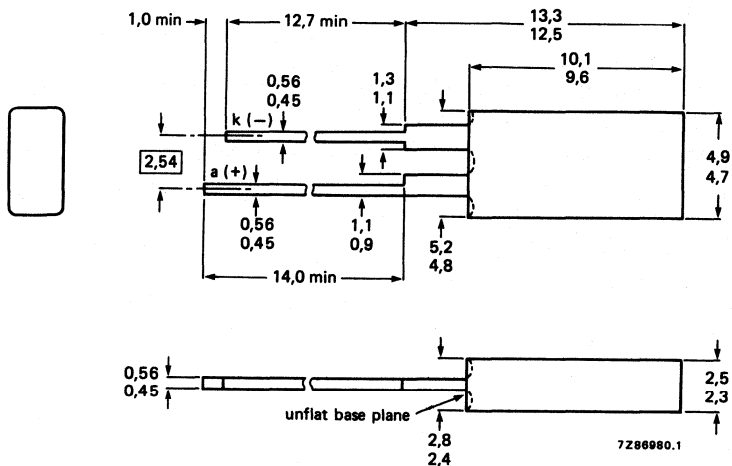
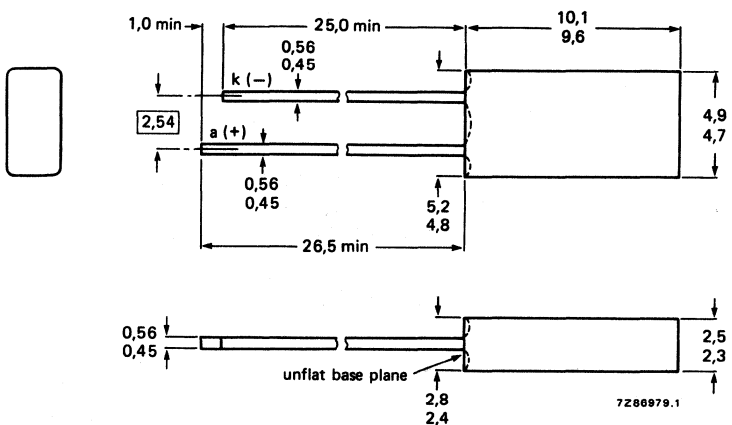


Fig. 1b SOD-76L.
PLED-GR44FL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$			
> 1.5 mm from the seating plane PLED-GR14F			
> 5 mm from the plastic body PLED-GR44FL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-GR14F(GR44FL)	I_v	min. 0.7 mcd	
	PLED-GR14F(GR44FL)-2	I_v	1.0 to 2.2 mcd	
	PLED-GR14F(GR44FL)-3	I_v	1.6 to 3.5 mcd	
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

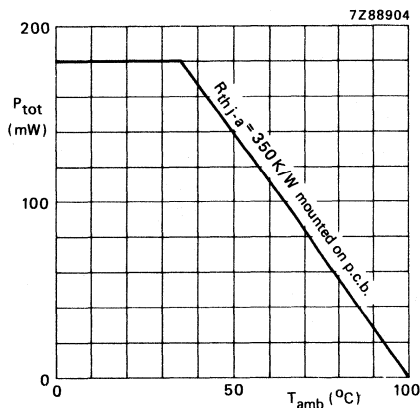


Fig. 2.

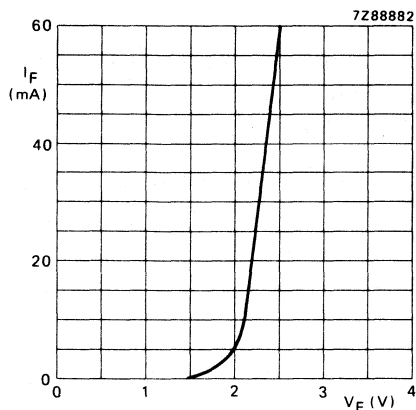


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

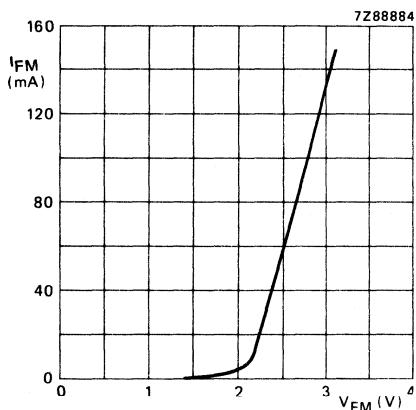


Fig. 4 $t_{on} = 1$ ms; $\delta = 0.33$;
 $T_{amb} = 25^{\circ}C$; typ. values.

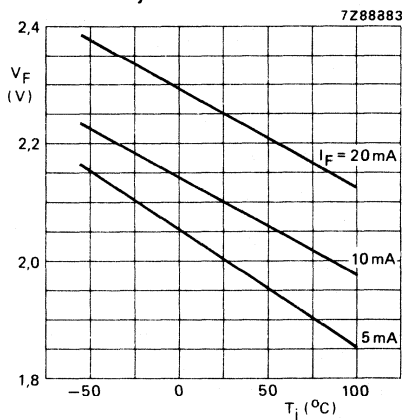


Fig. 5 Typical values.

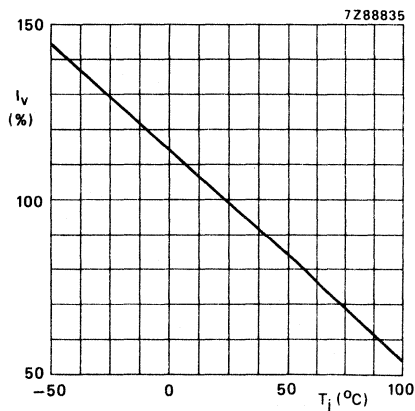


Fig. 6 $I_F = 10$ mA; typ. values.

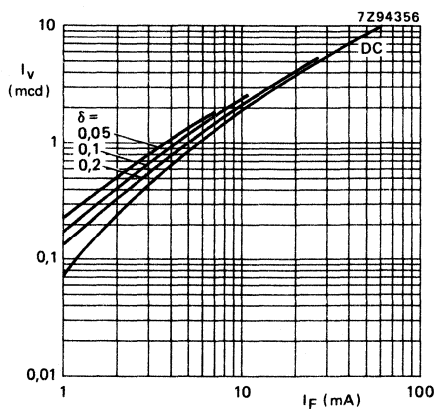


Fig. 7 $t_p = 50 \mu s$; typical values.

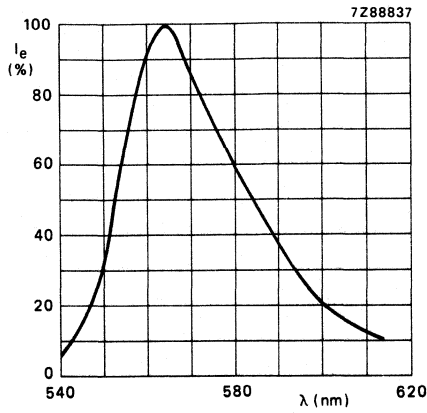


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

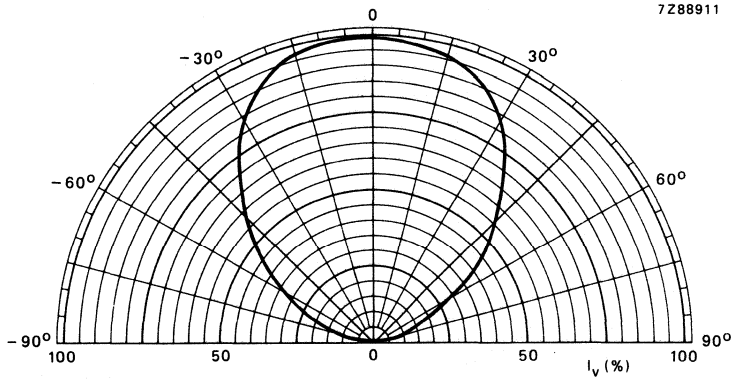


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 3 mm which emit green light at a typical peak wavelength of 565 nm (GaP, super-green) when forward biased. The PLED-GR14G and PLED-GR44GL have SOD-77 envelopes and are encapsulated in a green diffusing resin.

When stacked in an array these SOD-77 LEDs can be used as level indicators.

The PLED-GR44GL is similar to the PLED-GR14G but has long leads and has no seating plane.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35\text{ }^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-GR14G(GR44GL)	I_v	min.	0.7 mcd
	PLED-GR14G(GR44GL)-2	I_v		1.0 to 2.2 mcd
	PLED-GR14G(GR44GL)-3	I_v		1.6 to 3.5 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	565 nm
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

PLED-GR14G
PLED-GR44GL

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-77A1.
PLED-GR14G

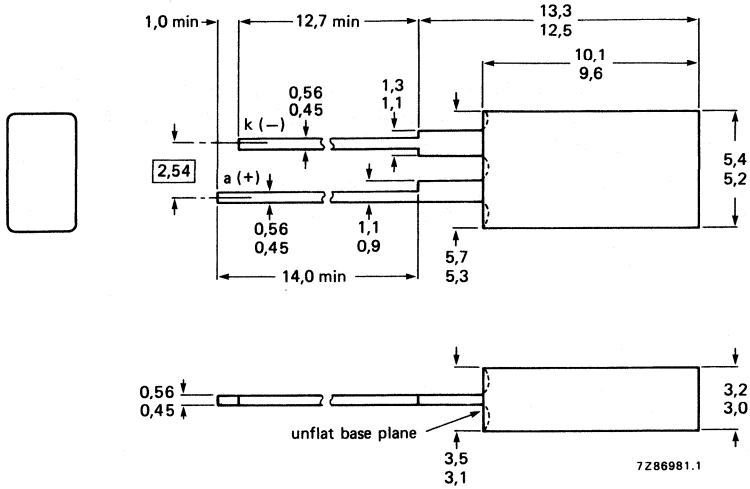
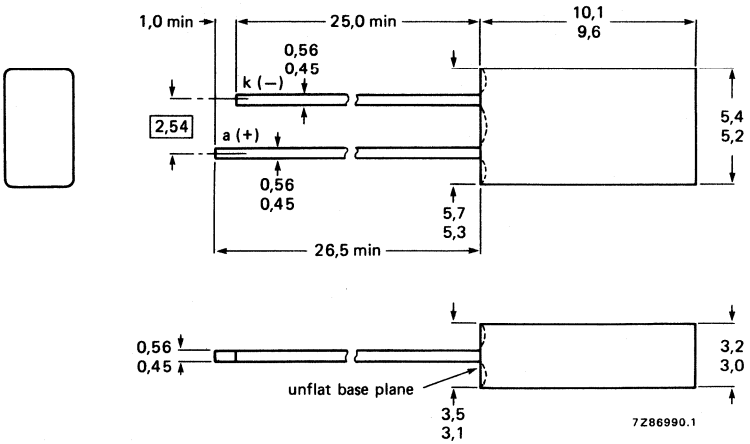


Fig. 1b SOD-77L
PLED-GR44GL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.01$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$			
> 1.5 mm from the seating plane for PLED-GR14G	T_{sld}	max.	260 $^\circ\text{C}$
> 5 mm from the plastic body for PLED-GR44GL			

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-GR14G(GR44GL)	I_v	min. 0.7 mcd	
	PLED-GR14G(GR44GL)-2	I_v	1.0 to 2.2 mcd	
	PLED-GR14G(GR44GL)-3	I_v	1.6 to 3.5 mcd	
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

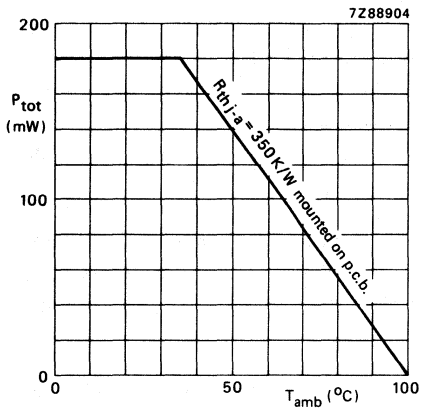


Fig. 2.

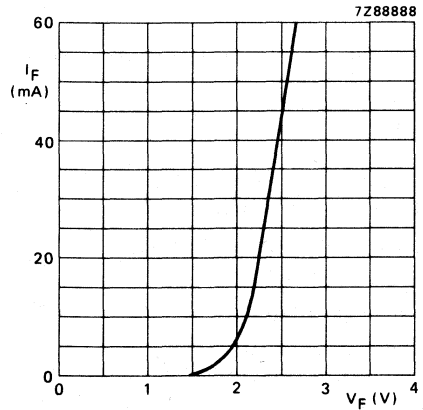


Fig. 3 $T_{amb} = 25^{\circ}C$; typical values.

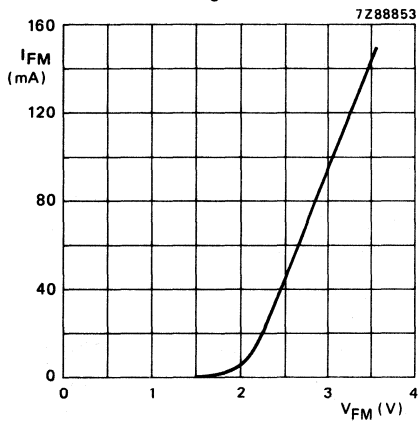


Fig. 4 $t_{on} = 1$ ms; $\delta = 0.01$;
 $T_j = 25^{\circ}C$; typical values.

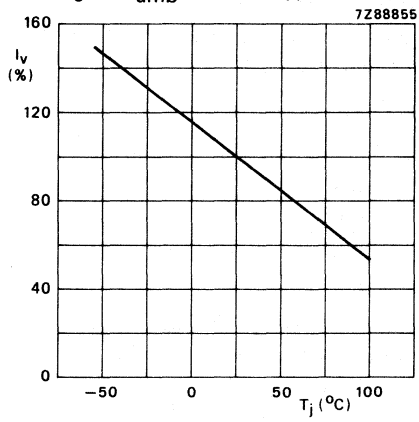


Fig. 5 Typical values.

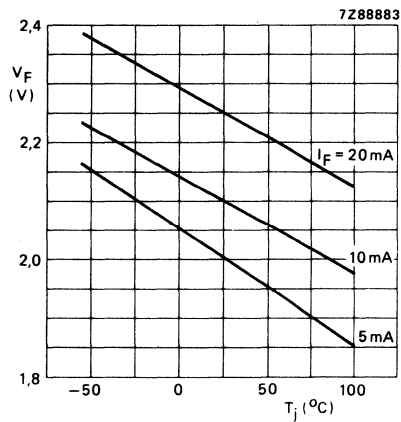


Fig. 6 $I_F = 10$ mA; typ. values.

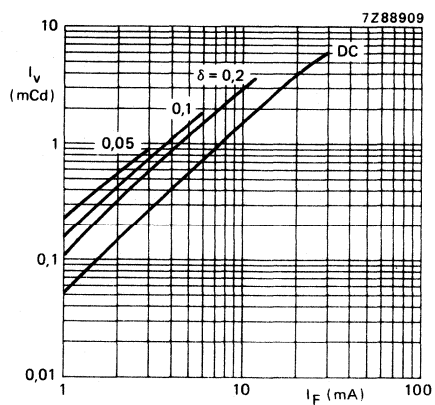


Fig. 7 $t_p = 50 \mu s$; typical values.

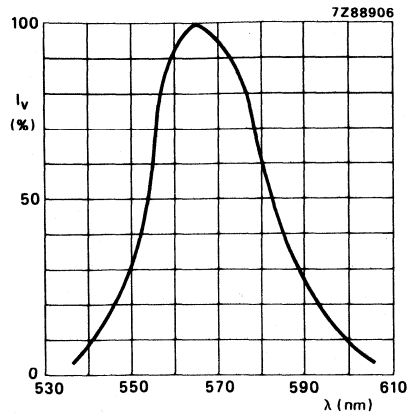


Fig. 8 Typical values.

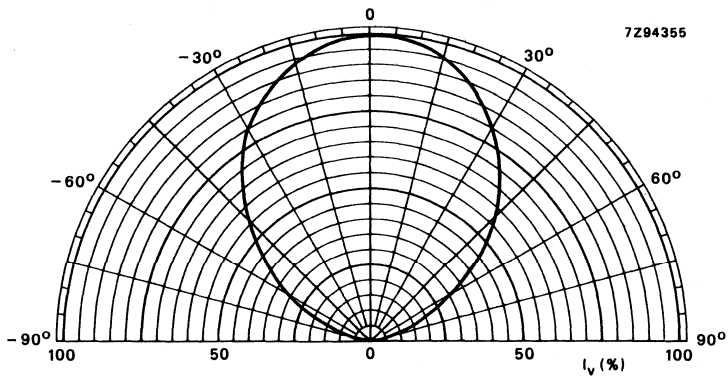


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 5 mm which emits green light at a typical peak wavelength of 565 nm (GaP; super-green) when forward biased. The PLED-GR44DL has SOD-74L envelope and is encapsulated in a green diffusing resin.

These SOD-74 LEDs are suitable for surface illumination, for example in information boards, score boards, moving advertisement and electronic game applications.

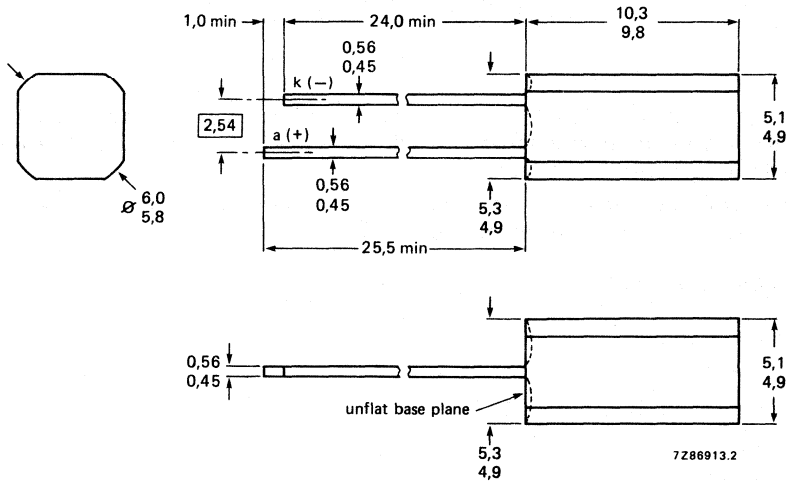
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 35^\circ\text{C}$		P_{tot}	max.	180 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-GR44DL	I_v	min.	0.7 mcd
	PLED-GR44DL-2	I_v		1.0 to 2.2 mcd
	PLED-GR44DL-3	I_v		1.6 to 3.5 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	565 nm
Beamwidth between half-intensity directions				
$I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-74L.

Dimensions in mm



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	60 mA
peak value, $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$	P_{tot}	max.	180 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 5.0 mm from the plastic body; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	565 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-GR44DL	I_v	min.	0.7 mcd
	PLED-GR44DL-2	I_v		1.0 to 2.2 mcd
	PLED-GR44DL-3	I_v		1.6 to 3.5 mcd
Diode capacitance				
$V_R = 0$, $f = 1 \text{ MHz}$	C_d	typ.	20 pF	

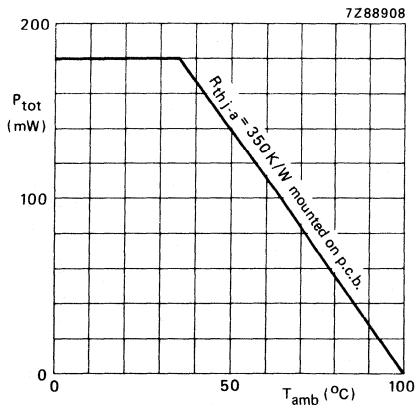


Fig. 2.

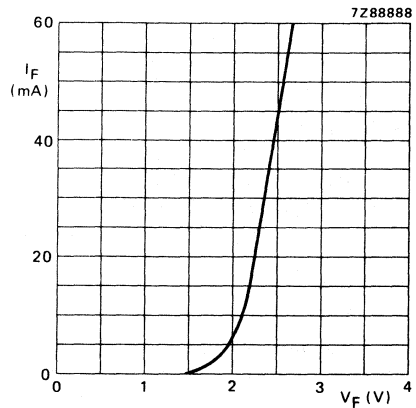


Fig. 3 $T_{amb} = 25^\circ\text{C}$; typical values.

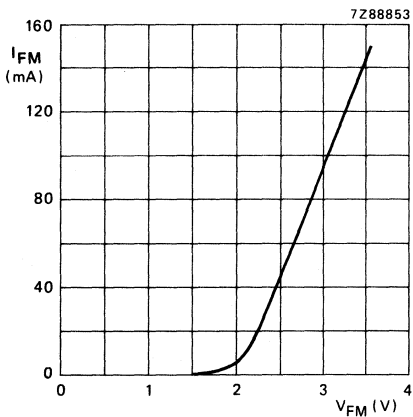


Fig. 4 $t_{on} = 50 \mu\text{s}$; $\delta = 0.01$;
 $T_{amb} = 25^\circ\text{C}$; typical values.

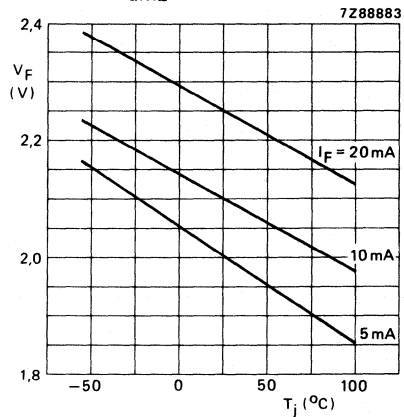


Fig. 5 Typical values.

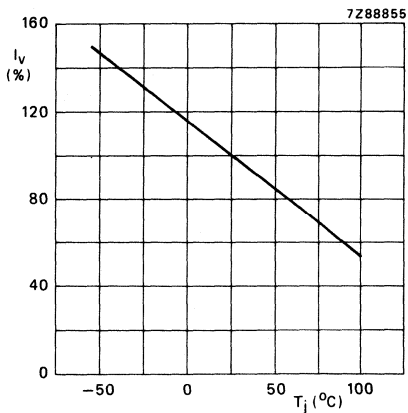


Fig. 6 $I_F = 10 \text{ mA}$; typical values.

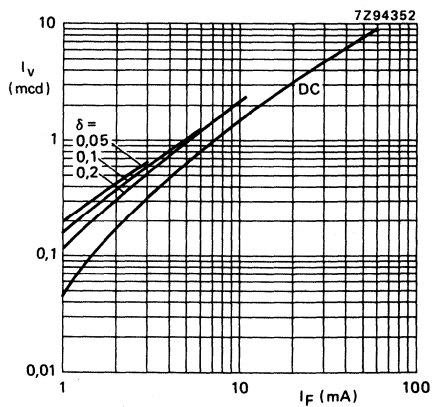


Fig. 7 $t_p = 50 \mu\text{s}$; typical values.

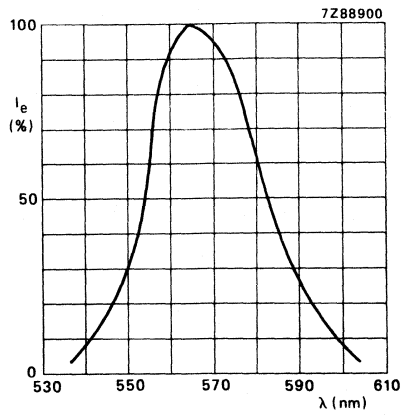


Fig. 8 Typical values.

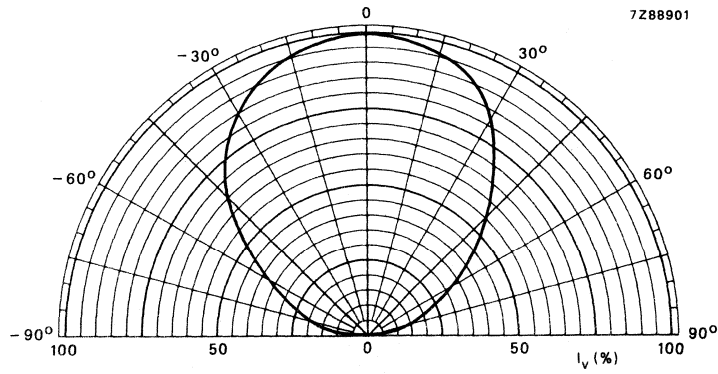


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased. The PLED-H313A has a SOD-53 outline and is encapsulated in a red non-diffusing resin.

Note: This device has to be used behind a diffusing screen.

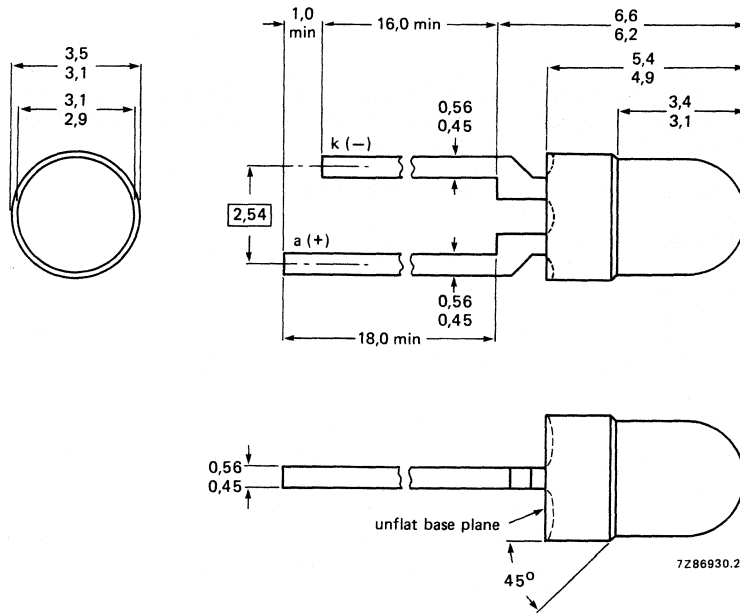
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	150 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H313A	I_v	min.	5 mcd
	PLED-H313A-5	I_v		5 to 12 mcd
	PLED-H313A-6	I_v		10 to 12 mcd
	PLED-H313A-7	I_v		16 to 35 mcd
	PLED-H313A-8	I_v	min.	30 mcd
$I_F = 2\text{ mA}$	PLED-H313A-C	I_v		1,6 to 3,5 mcd
	PLED-H313A-D	I_v		3 to 7 mcd
	PLED-H313A-E	I_v	min.	5 mcd
Wavelength at peak emission		λ_p	typ.	650 nm ←
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	60 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-53E.



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	60 mA
peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{ON} = 20 \mu s$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1,5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a p.c. board

$R_{th \text{ j-a}}$	max.	500 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage		V_F	typ.	1,65 V	←
$I_F = 2 \text{ mA}$			typ.	1,75 V	
$I_F = 10 \text{ mA}$		V_F	max.	2,2 V	
Reverse current					
$V_R = 5 \text{ V}$		I_R	max.	100 μA	
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	60 $^\circ$	
Bandwidth at half height		$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission		λ_p	typ.	650 nm	
Luminous intensity					
$I_F = 10 \text{ mA}$	PLED-H313A	I_v	min.	5 mcd	
	PLED-H313A-5	I_v		5 to 12 mcd	
	PLED-H313A-6	I_v	min.	10 to 12 mcd	
	PLED-H313A-7	I_v		16 to 35 mcd	
	PLED-H313A-8	I_v	min.	30 mcd	
Luminous intensity					
$I_F = 2 \text{ mA}$	PLED-H313A-C	I_v		1,6 to 3,5 mcd	
	PLED-H313A-D	I_v		3 to 7 mcd	
	PLED-H313A-E	I_v	min.	5 mcd	
Diode capacitance					
$V_R = 0$; $f = 1 \text{ MHz}$		C_d	typ.	80 pF	

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-H314A has a SOD-53 outline and is encapsulated in a red coloured diffusing resin.

The high light intensity of the PLED-H314A makes it suitable for applications where only low currents are available.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	150 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H314A	I_v	min.	3 mcd
	PLED-H314A-5	I_v		5 to 12 mcd
	PLED-H314A-6	I_v		10 to 22 mcd
	PLED-H314A-7	I_v	min.	16 mcd
$I_F = 2\text{ mA}$	PLED-H314A-B	I_v		1 to 2,2 mcd ←
	PLED-H314A-C	I_v		1,6 to 3,5 mcd
	PLED-H314A-D	I_v		3 to mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	650 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	100 $^\circ$

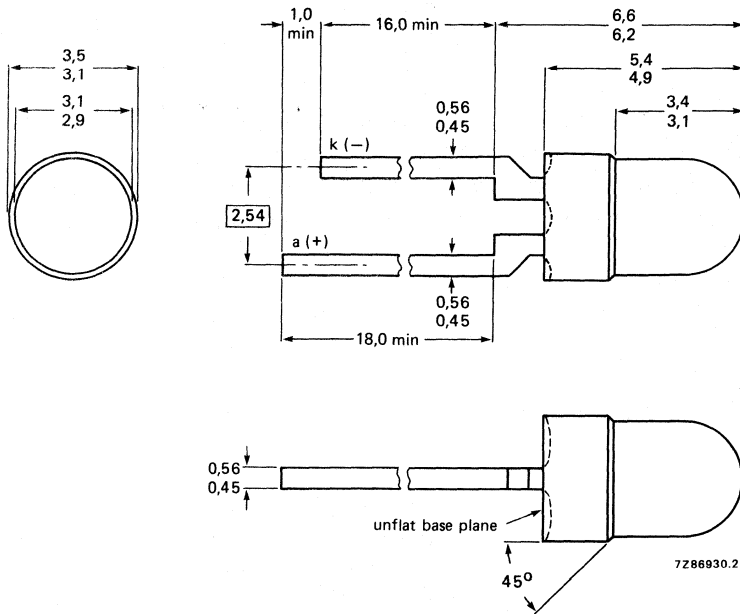
MECHANICAL DATA

SOD-53E (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOD-53E.

Dimensions in mm



RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	60 mA
peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 20 \mu s$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	150 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1,5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient			
when the device is mounted on a p.c. board	$R_{th j-a}$	max.	500 K/W

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

Forward voltage				
$I_F = 4 \text{ mA}$	V_F	typ.	1,65 V	
$I_F = 10 \text{ mA}$	V_F	typ.	1,75 V	
		max.	2,2 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm	
Luminous intensity				
$I_F = 2 \text{ mA}$	PLED-H314A-B	I_v	typ.	1,8 mcd ←
	PLED-H314A-C	I_v	typ.	3 mcd ←
	PLED-H314A-D	I_v	typ.	5 mcd ←
$I_F = 10 \text{ mA}$	PLED-H314A	I_v	min.	3 mcd
		I_v	typ.	5 mcd
	PLED-H314A-5	I_v		5 to 12 mcd
		I_v	typ.	8 mcd
	PLED-H314A-6	I_v		10 to 22 mcd
		I_v	typ.	15 mcd
	PLED-H314A-7	I_v	min.	16 mcd
		I_v	typ.	18 mcd

Diode capacitance
 $V_R = 0$; $f = 1 \text{ MHz}$

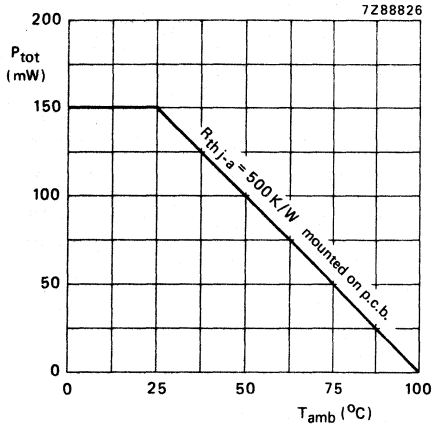


Fig. 2.

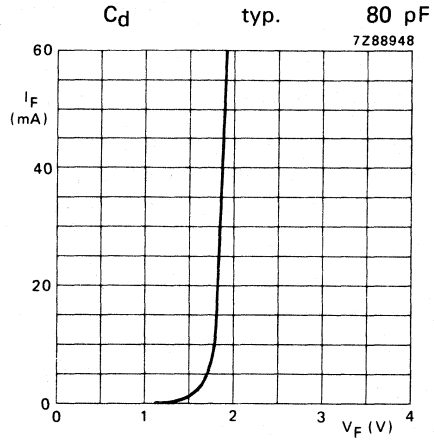


Fig. 3 $T_{amb} = 25 \text{ °C}$; typ. values.

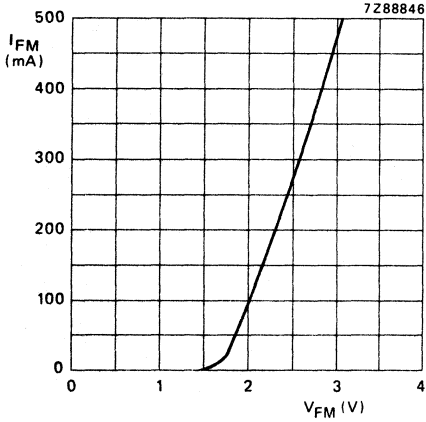


Fig. 4 $t_{on} = 20 \mu\text{s}$; $\delta = 0,01$;
 $T_{amb} = 25 \text{ °C}$; typ. values.

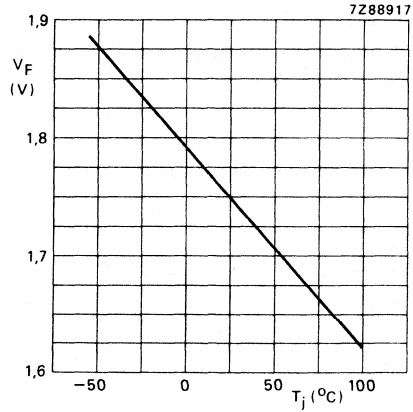


Fig. 5 $I_F = 10 \text{ mA}$; typ. values.

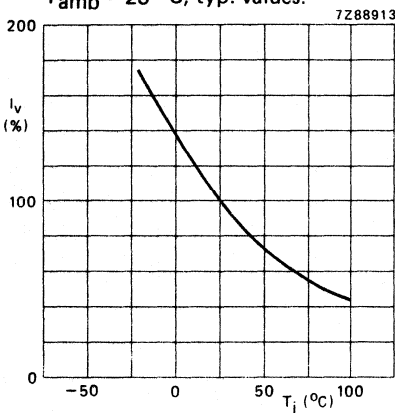


Fig. 6 Typical values.

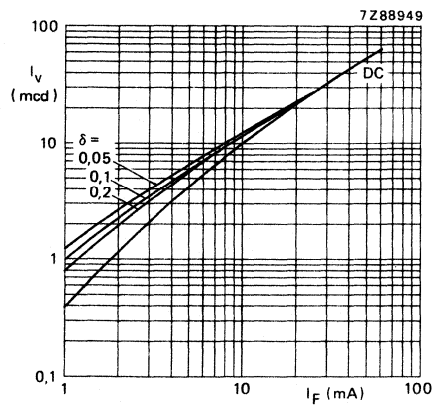


Fig. 7 $t_p = 50 \mu\text{s}$; typ. values.

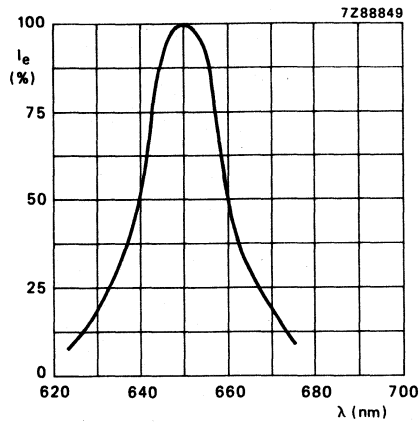


Fig. 8 $I_F = 10$ mA; $T_{amb} = 25$ °C; typ. values.

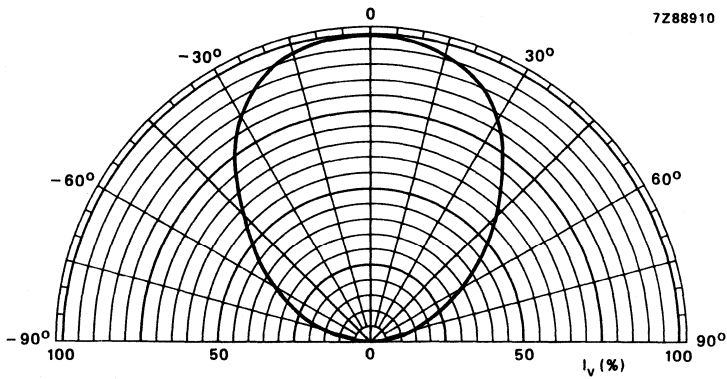


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 3 mm which emit a narrow beam of red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-H511C and PLED-H541CL have a SOD-63 outline and are encapsulated in a clear colourless resin.

The very high light intensity of the PLED-H511C and PLED-H541CL make them suitable for applications where only low currents are available. They are also suited for very high luminous intensity applications because of their ability to withstand high forward currents.

The PLED-H541CL is the long-lead version of the PLED-H511C and has no seating plane but is in all other respects similar to the PLED-H511C.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H511C/H541CL	I_V	min.	16 mcd
	PLED-H511C/H541CL-8	I_V		30 to 70 mcd
	PLED-H511C/H541CL-9	I_V		50 to 120 mcd
	PLED-H511C/H541CL-10	I_V	min.	100 mcd
$I_F = 2\text{ mA}$	PLED-H511C/H541CL-F	I_V		10 to 22 mcd
	PLED-H511C/H541CL-G	I_V	min.	16 mcd
Wavelength at peak emission		λ_p	typ.	650 nm ←
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	20 $^\circ$

MECHANICAL DATA

SOD-63D2 (see Fig. 1a).

PLED-H511C
PLED-H541CL

MECHANICAL DATA

Fig. 1a SOD-63D2.
PLED-H511C

Dimensions in mm

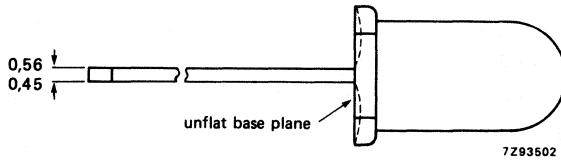
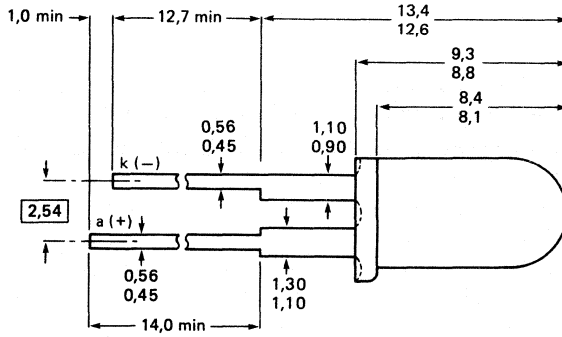
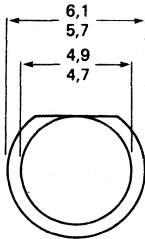
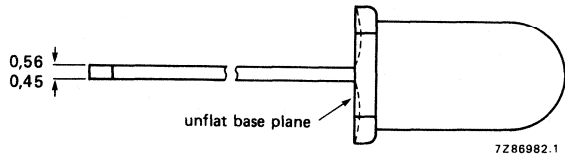
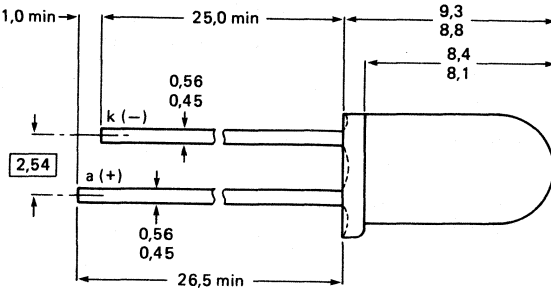
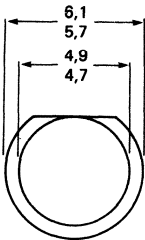


Fig. 1b SOD-63L.
PLED-H541CL



Note. Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current d.c.	I_F	max.	100 mA
Forward current peak value, $t_p = 1 \mu s$; $f = 300$ Hz	I_{FRM}	max.	1 A
peak value, $t_{on} = 20 \mu s$; $\delta = 0,01$		max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7$ s			
> 1,5 mm from the seating plane for PLED-H511C	T_{sld}	max.	260 $^\circ\text{C}$
> 5 mm from the plastic body for PLED-H541CL			

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a p.c. board	$R_{th\ j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 10$ mA	V_F	max.	2,2 V	
		typ.	1,75 V	
$I_F = 2$ mA	V_F	typ.	1,65 V	←
Reverse current $V_R = 5$ V	I_R	max.	100 μA	
Beamwidth between half-intensity directions $I_F = 10$ mA	$\theta_{1/2}$	typ.	20 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission $I_F = 10$ mA; $T_{amb} = 25 \text{ }^\circ\text{C}$	λ_p	typ.	650 nm	
Luminous intensity $I_F = 2$ mA	PLED-H511C/H541CL-F	I_v	typ.	16 mcd ←
	PLED-H511C/H541CL-G	I_v	typ.	35 mcd ←
$I_F = 10$ mA	PLED-H511C/H541CL	I_v	min.	16 mcd
	PLED-H511C/H541CL-8	I_v	typ.	30 to 70 mcd
	PLED-H511C/H541CL-9	I_v	typ.	50 mcd
	PLED-H511C/H541CL-10	I_v	typ.	50 to 120 mcd
				80 mcd
				100 mcd
				120 mcd
$I_F = 50$ mA	PLED-H511C/H541CL-8	I_v	typ.	200 mcd
	PLED-H511C/H541CL-9	I_v	typ.	400 mcd
	PLED-H511C/H541CL-10	I_v	typ.	600 mcd

Diode capacitance
 $V_R = 0$; $f = 1$ MHz

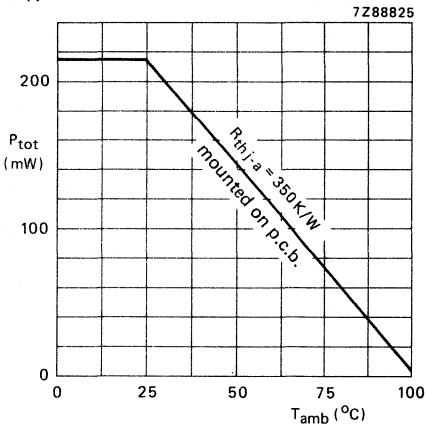


Fig. 2.

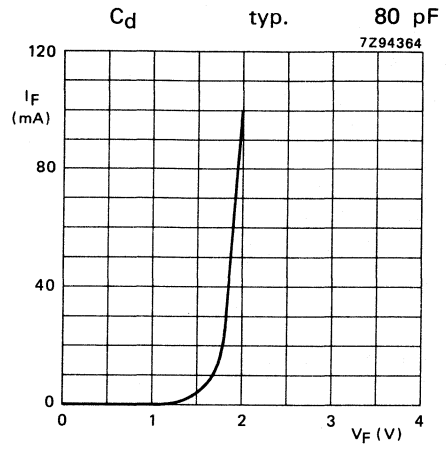


Fig. 3 Typical values; $T_{amb} = 25$ $^{\circ}C$.

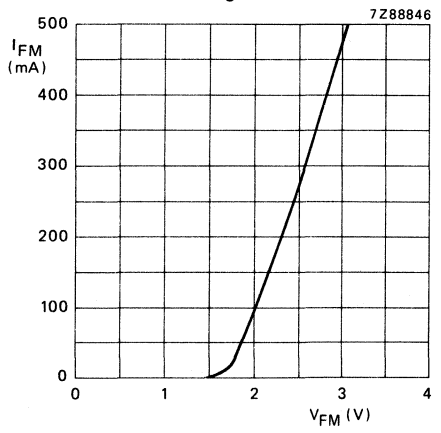


Fig. 4 $t_{on} = 20$ μs ; $\delta = 0,01$;
 $T_{amb} = 25$ $^{\circ}C$; typ. values.

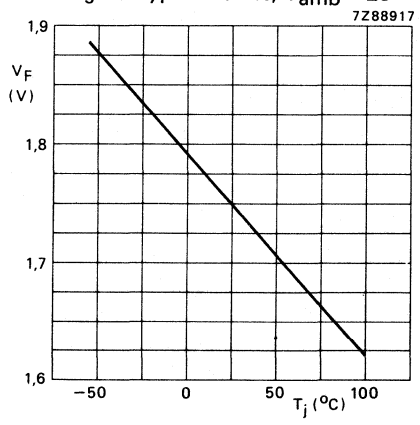


Fig. 5 $I_F = 10$ mA; typ. values.

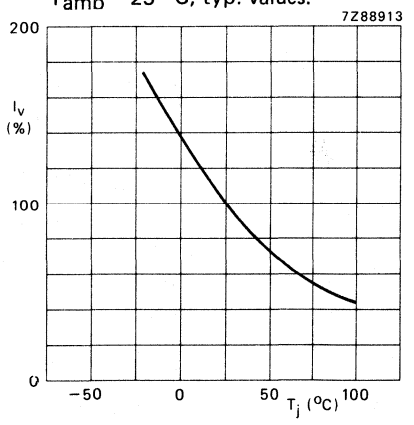


Fig. 6 Typical values.

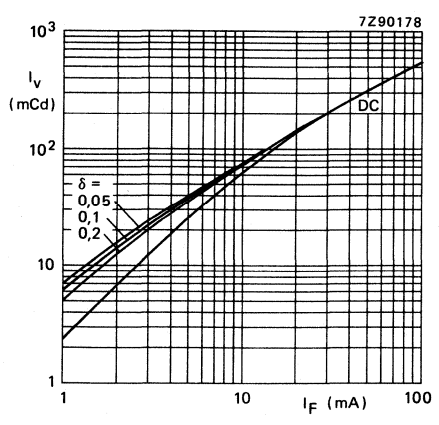


Fig. 7 $t_p = 50$ μs ; typ. values.

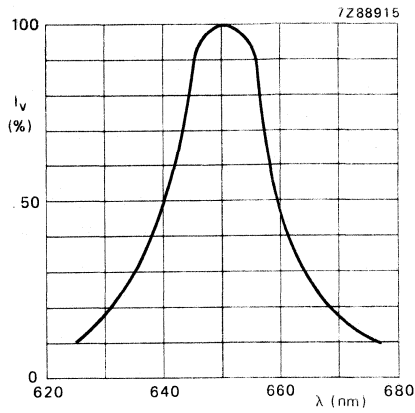


Fig. 8 $I_F = 10 \text{ mA}$; $T_{\text{amb}} = 25 \text{ }^\circ\text{C}$; typ. values.

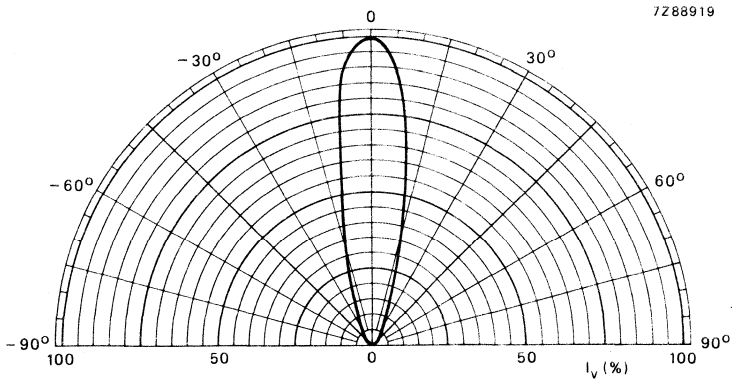


Fig. 9.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-H514B and PLED-H544CL have a SOD-63 outline and are encapsulated in a red diffusing resin.

The PLED-H544CL is the long-lead version of the PLED-H514B and has no seating plane but is in all other respects similar to the PLED-H514B.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H514B/H544CL	I_v	min.	3 mcd
	PLED-H514B/H544CL-4	I_v		3 to 7 mcd
	PLED-H514B/H544CL-5	I_v		5 to 12 mcd
	PLED-H514B/H544CL-6	I_v	min.	10 mcd
$I_F = 2\text{ mA}$	PLED-H514B/H544CL-B	I_v		1 to 2.2 mcd ←
	PLED-H514B/H544CL-C	I_v	min.	1.6 mcd
Wavelength at peak emission		λ_p	typ.	650 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

SOD-63A2 (see Fig. 1a).

MECHANICAL DATA

Fig. 1a SOD-63A2.
PLED-H514B

Dimensions in mm

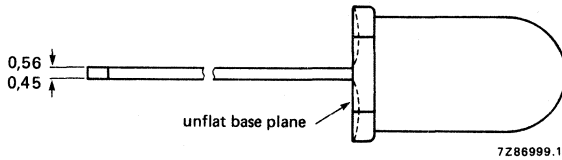
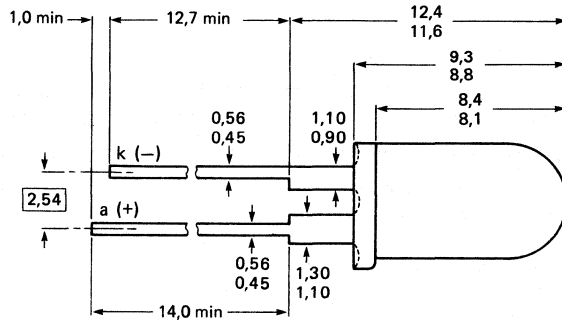
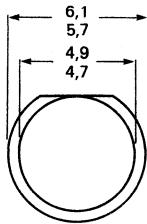
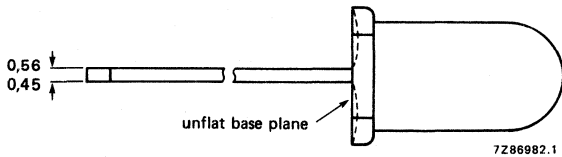
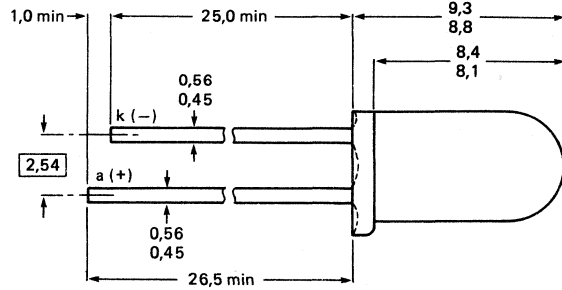
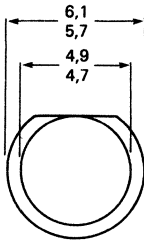


Fig. 1b SOD-63L
PLED-H544CL



Note.: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current d.c.	I_F	max.	100 mA
Forward current peak value, $t_p = 1 \mu s$; $f = 300$ Hz	I_{FRM}	max.	1 A
peak value; $t_{on} = 20 \mu s$; $\delta = 0,01$		max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to $+100 \text{ }^\circ\text{C}$
Junction temperature	T_j	max.	$100 \text{ }^\circ\text{C}$
Lead soldering temperature; $t_{slid} < 7$ s > 1,5 mm from the seating plane for PLED-H514B > 5 mm from the plastic body for PLED-H544CL	T_{slid}	max.	$260 \text{ }^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a p.c. board

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 2$ mA	V_F	typ.	1,65 V	←
$I_F = 10$ mA	V_F	typ.	1,75 V	
		max.	2,2 V	
$I_F = 50$ mA	V_F	typ.	1,9 V	
Reverse current $V_R = 5$ V	I_R	max.	100 μA	
Bandwidth between half-intensity directions $I_F = 10$ mA	$\theta_{1/2}$	typ.	100°	
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission $I_F = 10$ mA, $T_{amb} = 25 \text{ }^\circ\text{C}$	λ_p	typ.	650 nm	
Luminous intensity $I_F = 2$ mA	PLED-H514B/H544CL-B I_v	typ.	1,5 mcd	←
	PLED-H514B/H544CL-C I_v	typ.	3 mcd	←
$I_F = 10$ mA	PLED-H514B/H544CL I_v	min.	4 mcd	
	PLED-H514B/H544CL-4 I_v	typ.	3 to 7 mcd	
			5 mcd	
	PLED-H514B/H544CL-5 I_v	typ.	5 to 12 mcd	
			8 mcd	
	PLED-H514B/H544CL-6 I_v	min.	10 mcd	
		typ.	15 mcd	

Diode capacitance
 $V_R = 0$; $f = 1$ MHz

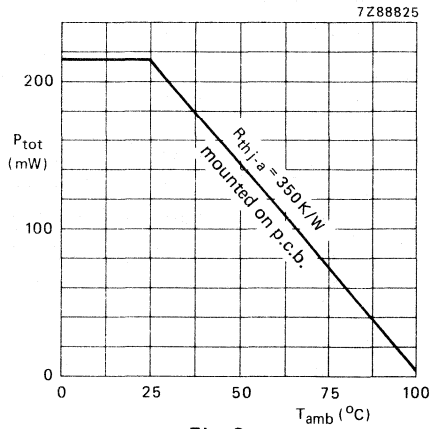


Fig. 2.

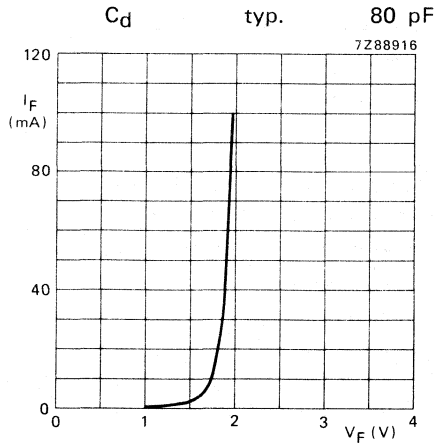


Fig. 3 $T_{amb} = 25$ °C; typ. values.

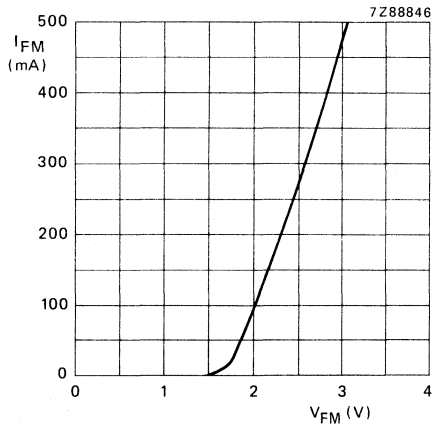


Fig. 4 $t_{on} = 20$ μ s; $\delta = 0,01$;
 $T_{amb} = 25$ °C; typ. values.

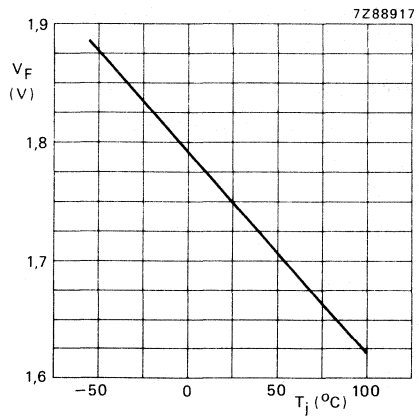


Fig. 5 $I_F = 10$ mA; typ. values.

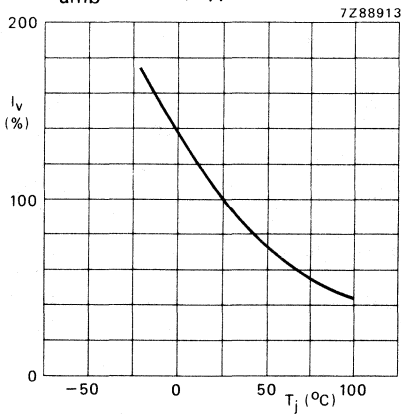


Fig. 6 Typical values.

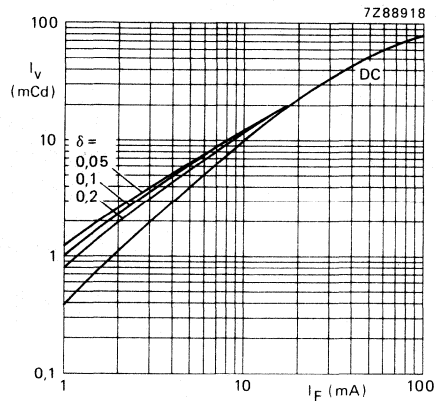


Fig. 7 $t_p = 50$ μ s; typ. values.

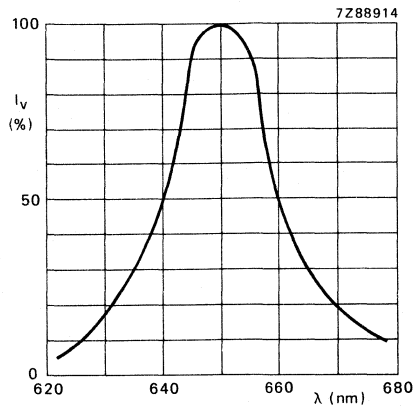


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

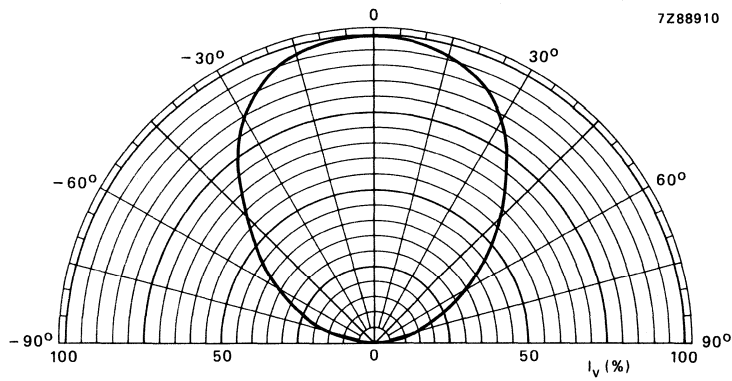


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-H544KL has a flangeless SOD-85 outline and is encapsulated in a red diffusing resin.

Together with the QOS84L and the QOS86L, the PLED-H544KL forms one family and is available only in the long lead (L) version.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H544KL	I_V	min.	1,6 mcd
	PLED-H544KL-4	I_V		3,0 to 7,0 mcd
	PLED-H544KL-5	I_V		5,0 to 12 mcd
	PLED-H544KL-6	I_V	min.	10 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	650 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

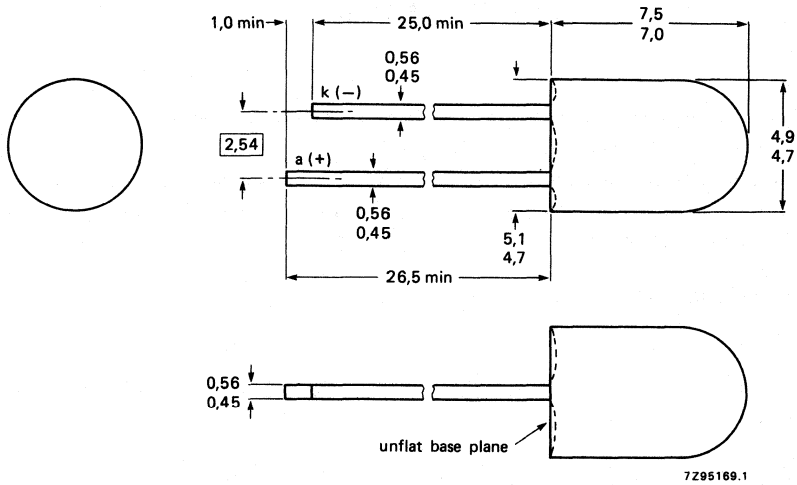
MECHANICAL DATA

SOD-85AL (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOD-85AL.

Dimensions in mm



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	100 mA
peak value; $t = 1 \mu\text{s}$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_{ON} = 20 \mu\text{s}$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; >5 mm from the plastic body	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when
the device is mounted on a p.c. board

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ. max.	1,75 V 2,2 V
$I_F = 100 \text{ mA}$	V_F	typ. max.	2,0 V 2,5 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth at half-intensity directions			
$I_F = 10 \text{ mA}$; in the plane of the leads	$\theta_{1/2}$	typ.	70 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm
Luminous intensity			
$I_F = 10 \text{ mA}$	PLED-H544KL	I_v	min. 1,6 mcd
	PLED-H544KL-4	I_v	3,0 to 7,0 mcd
	PLED-H544KL-5	I_v	5,0 to 12 mcd
	PLED-H544KL-6	I_v	min. 10 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	80 pF

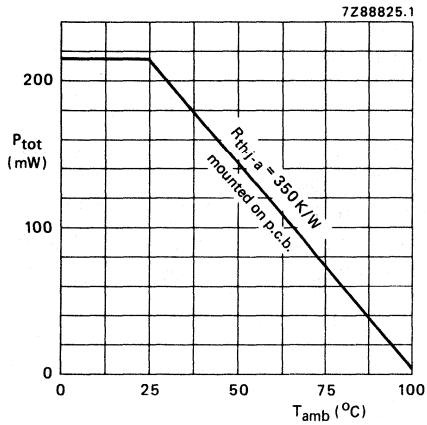


Fig. 2.

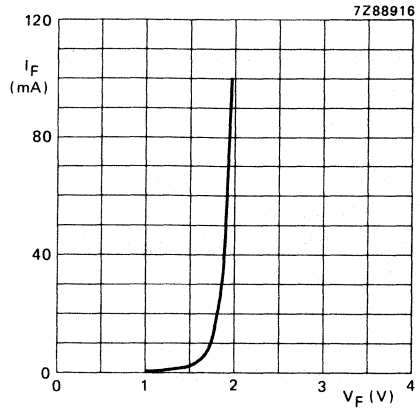


Fig. 3 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

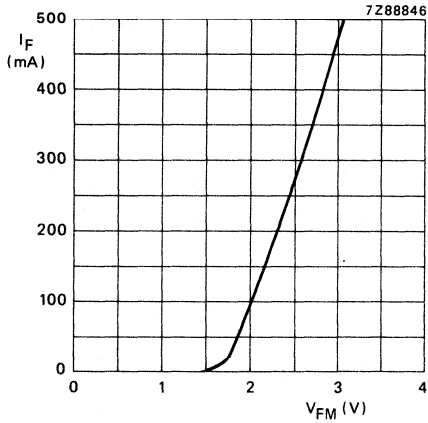


Fig. 4 $t_{on} = 20 \text{ } \mu\text{s}$; $\delta = 0,01$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

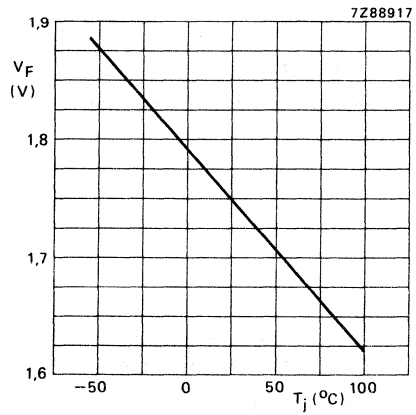


Fig. 5 $I_F = 10 \text{ mA}$; typ. values.

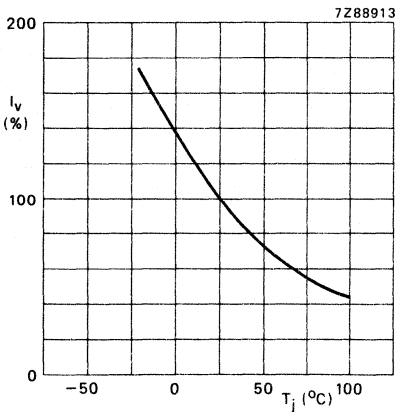


Fig. 6 Typical values.

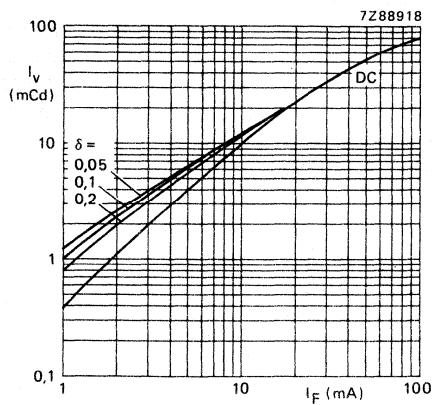


Fig. 7 $t_p = 50 \text{ } \mu\text{s}$; typ. values.

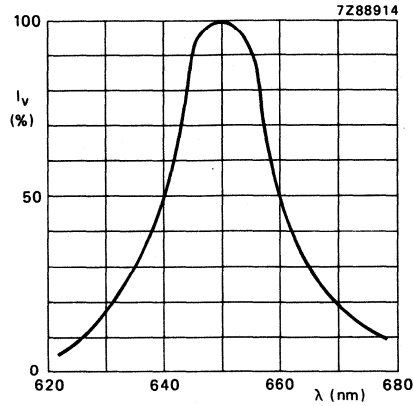


Fig. 8 $I_F = 10$ mA; $T_{amb} = 25$ °C; typ. values.

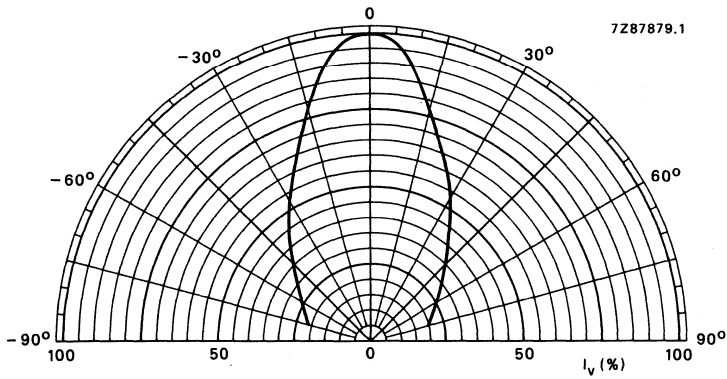


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-H544LL has a flangeless SOD-85 outline and is encapsulated in a red diffusing resin.

Together with the CQS94L and the CQS96L, the PLED-H544LL forms one family and is available only in the long lead (L) version.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-H544LL	I_V	min.	3,0 mcd
	PLED-H544LL-4	I_V		3,0 to 7,0 mcd
	PLED-H544LL-5	I_V		5,0 to 12 mcd
	PLED-H544LL-6	I_V	min.	10 mcd
Wavelength at peak emission		λ_p	typ.	650 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

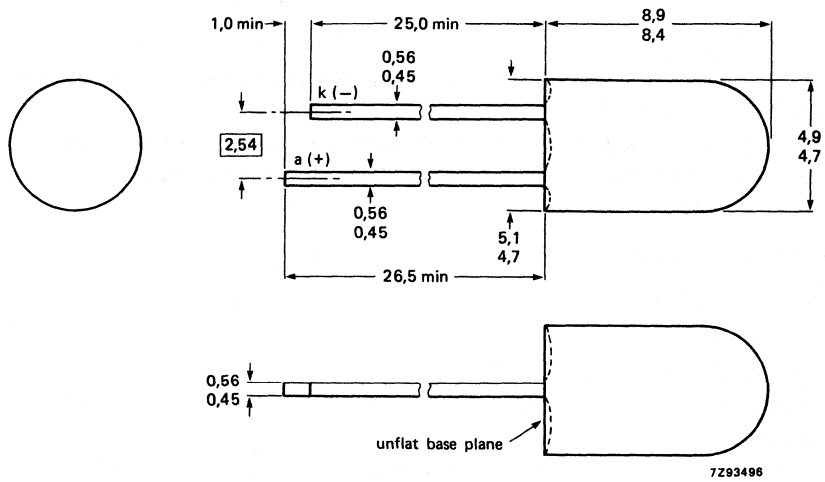
MECHANICAL DATA

SOD-85BL (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOD-85BL.

Dimensions in mm



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	100 mA
peak value; $t = 1 \mu\text{s}$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_{ON} = 20 \mu\text{s}$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		$-55 \text{ to } +100 \text{ }^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{slid} < 7 \text{ s}$; >5 mm from the plastic body	T_{slid}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when
the device is mounted on a p.c. board

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ.	1,75 V
		max.	2,2 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth at half-intensity directions			
$I_F = 10 \text{ mA}$; in the plane of the leads	$\theta_{1/2}$	typ.	70 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-H544LL	I_v	min. 3,0 mcd
	PLED-H544LL-4	I_v	3,0 to 7,0 mcd
	PLED-H544LL-5	I_v	5,0 to 12 mcd
	PLED-H544LL-6	I_v	min. 10 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	80 pF

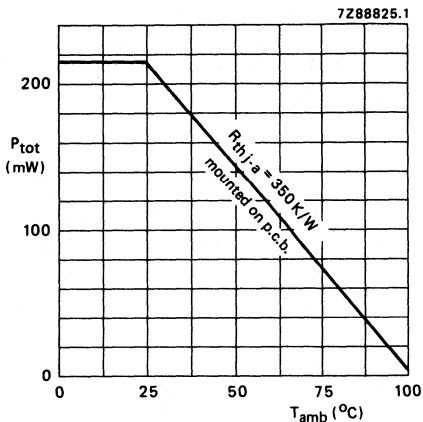


Fig. 2.

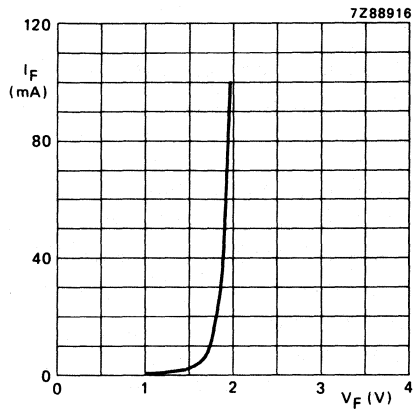


Fig. 3 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typ. values.

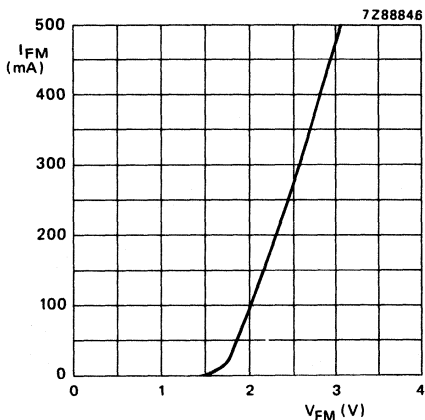


Fig. 4 $t_{on} = 20\text{ }\mu\text{s}$; $\delta = 0,01$;
 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typ. values.

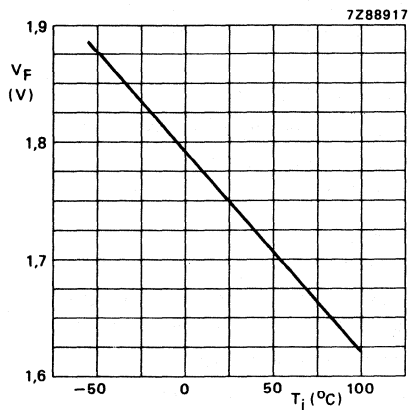


Fig. 5 $I_F = 10\text{ mA}$; typ. values.

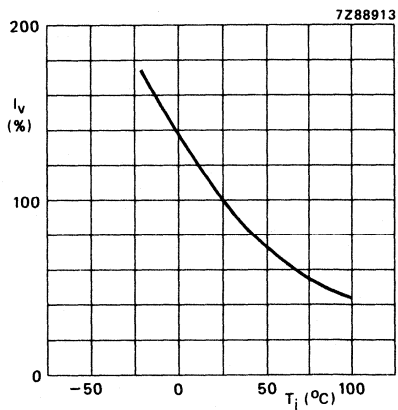


Fig. 6 Typical values.

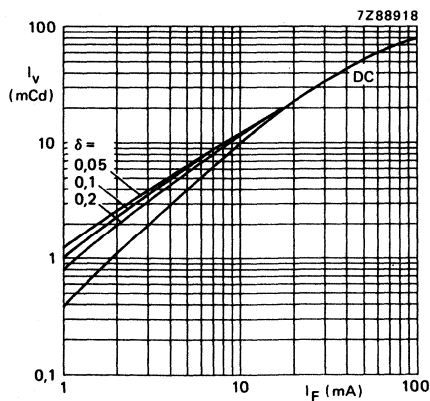


Fig. 7 $t_p = 50\text{ }\mu\text{s}$; typ. values; $T_{amb} = 25\text{ }^{\circ}\text{C}$.

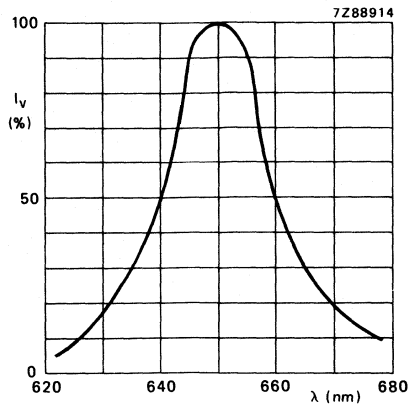


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

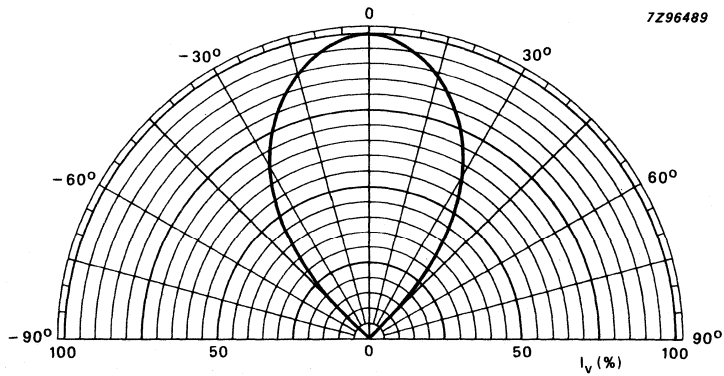


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 1 mm which emit red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-HR14E and PLED-HR44EL have a SOD-75 outline and are encapsulated in a red diffusing resin. These LEDs when stacked in an array (in combination with other SOD-75 LEDs) can be used, for example, as level indicators.

The PLED-HR44EL is equal to the PLED-HR14E but has long leads and no seating plane.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-HR14E/HR44EL	I_v	min.	0,7 mcd
	PLED-HR14E/HR44EL-3	I_v		1,6 to 3,5 mcd
	PLED-HR14E/HR44EL-4	I_v	min.	3,0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	650 nm
Beamwidth between half-intensity directions in the plane of the leads		$\theta_{1/2}$	typ.	110 $^\circ$

MECHANICAL DATA

SOD-75B2 (see Fig. 1a).

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-75B2.
PLED-HR14E

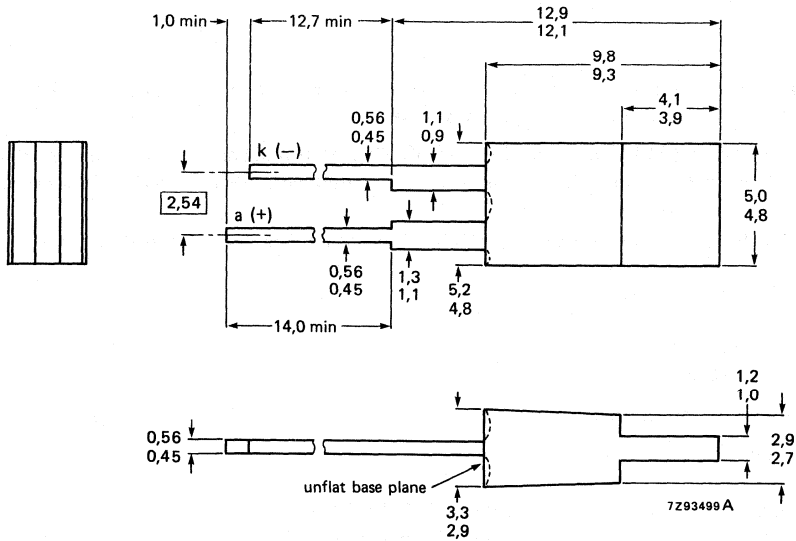
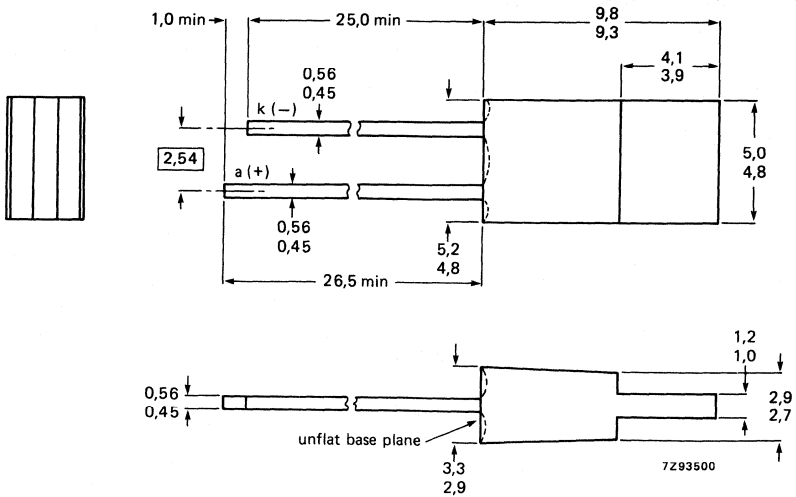


Fig. 1b SOD-75BL.
PLED-HR44EL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	100 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 20 \mu\text{s}$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$			
> 1,5 mm from the seating plane for PLED-HR14E			
> 5 mm from the plastic body for PLED-HR44EL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a p.c. board

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	1,75 V	
		max.	2,20 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions in the plane of the leads	$\theta_{1/2}$	typ.	110 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-HR14E/HR44EL	I_v	min. 0,7 mcd	
	PLED-HR14E/HR44EL-3	I_v	1,6 to 3,5 mcd	
	PLED-HR14E/HR44EL-4	I_v	min. 3,0 mcd	
Diode capacitance				
$V_R = 0$, $f = 1 \text{ MHz}$	C_d	typ.	80 pF	

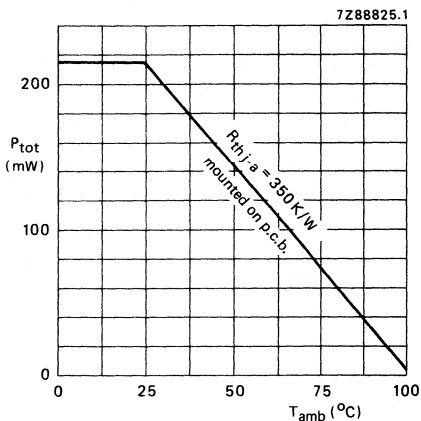


Fig. 2.

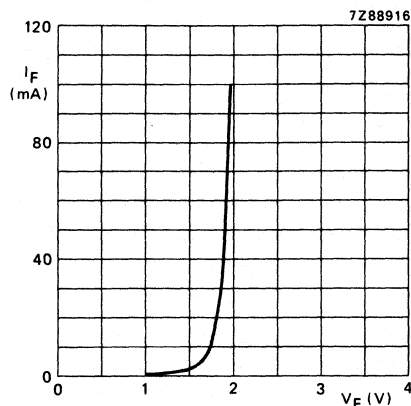


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

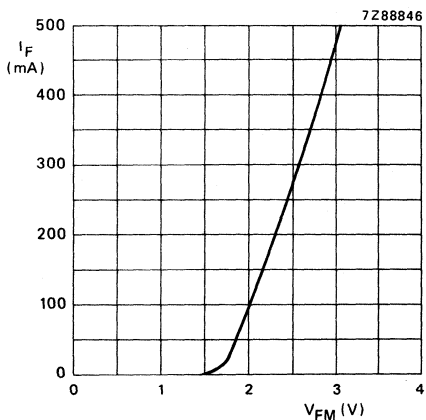


Fig. 4 $t_{ON} = 20 \mu s$; $\delta = 0,01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

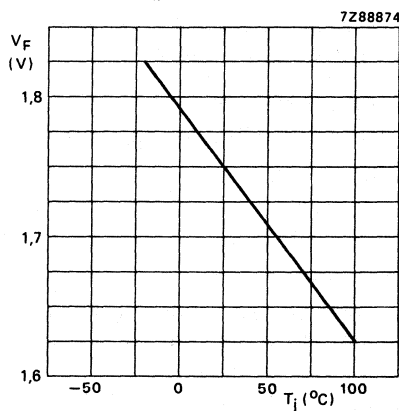


Fig. 5 $I_F = 10$ mA; typical values.

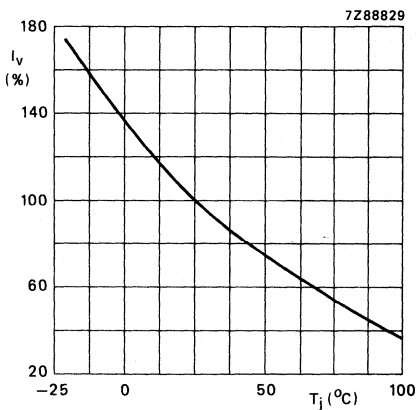


Fig. 6 Typical values.

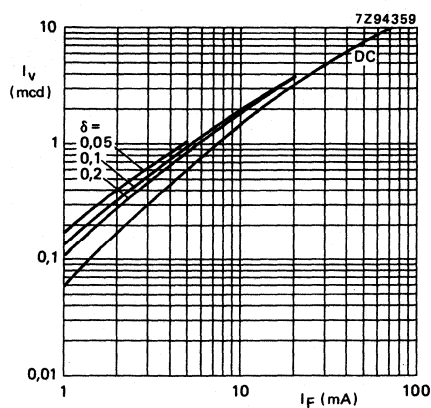


Fig. 7 $t_p = 50 \mu s$; typical values.

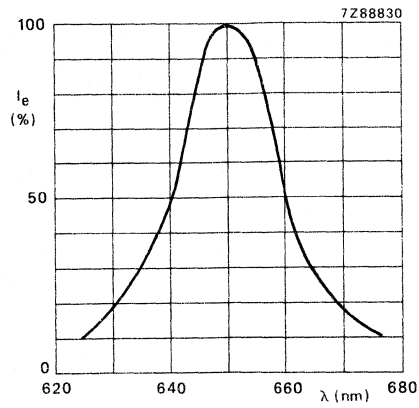


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

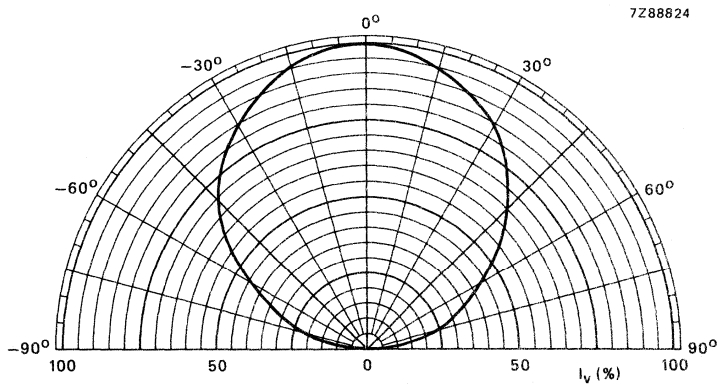


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diode of 5 mm x 2,5 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased.

The PLED-HR14F has a SOD-76 envelope and is encapsulated in a red diffusing resin.

The PLED-HR44FL is the long lead version of the PLED-HR14F without a seating plane but is in all other respects similar to the PLED-HR14F.

When stacked in an array these SOD-76 LEDs can be used, for example, as level indicators. Because of its high light intensity the PLED-HR14F (and PLED-HR44FL) is suitable in applications where only low currents are available and because of its high I_{Fmax} it can be used for high I_V applications.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-HR14F/HR44FL	I_V	min.	0,7 mcd
	PLED-HR14F/HR44FL-3	I_V		1,6 to 3,5 mcd
	PLED-HR14F/HR44FL-4	I_V		3,0 to 7,0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	650 nm
Beamwidth between half-intensity directions				
$I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

SOD-76A2 (see Fig. 1).

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-76A2.
PLED-HR14F

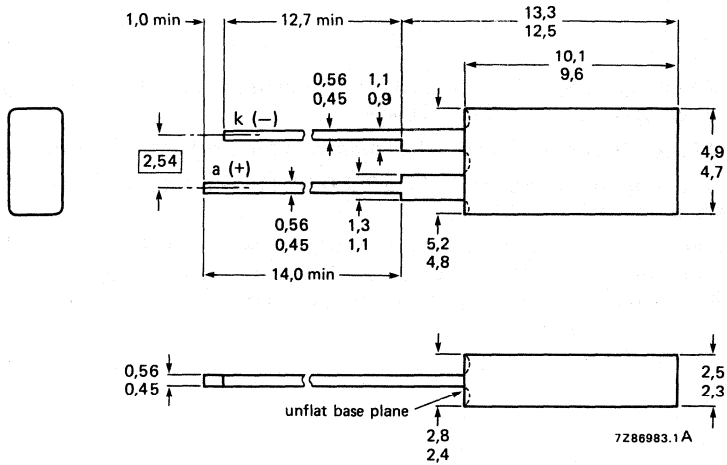
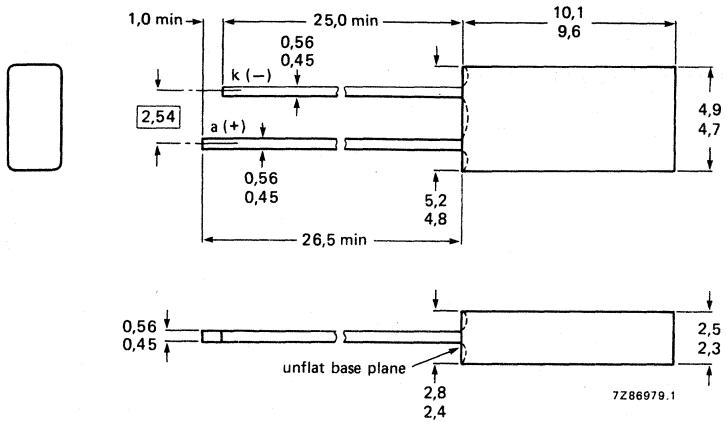


Fig. 1b SOD-76L.
PLED-HR44FL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
d.c.	I_F	max.	100 mA
peak value; $t_p = 1 \mu s$; $f = 300$ Hz		max.	1 A
peak value; $t_{ON} = 20 \mu s$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7$ s			
> 1,5 mm from the seating plane for PLED-HR14F			
> 5 mm from the plastic body for PLED-HR44FL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a p.c. board

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10$ mA	V_F	typ.	1,75 V	
		max.	2,2 V	
Reverse current				
$V_R = 5$ V	I_R	max.	100 μA	
Beamwidth between half-intensity directions				
$I_F = 10$ mA	$\theta_{1/2}$	typ.	100 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm	
Wavelength at peak emission				
$I_F = 10$ mA	λ_p	typ.	650 nm	
Luminous intensity				
$I_F = 10$ mA	PLED-HR14F/HR44FL	I_v	min.	0,7 mcd
	PLED-HR14F/HR44FL-3	I_v		1,6 to 3,5 mcd
	PLED-HR14F/HR44FL-4	I_v		3,0 to 7,0 mcd
Diode capacitance				
$V_R = 0$, $f = 1$ MHz	C_d	typ.	80 pF	

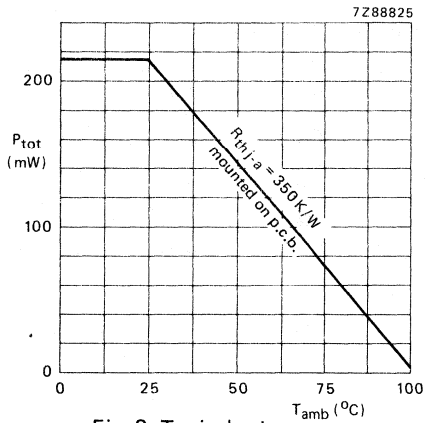


Fig. 2 Typical values.

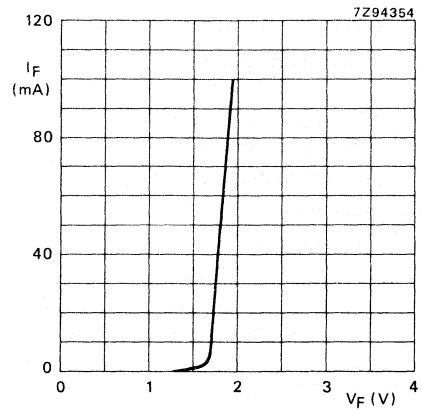


Fig. 3 $T_{amb} = 25^\circ\text{C}$; typ. values.

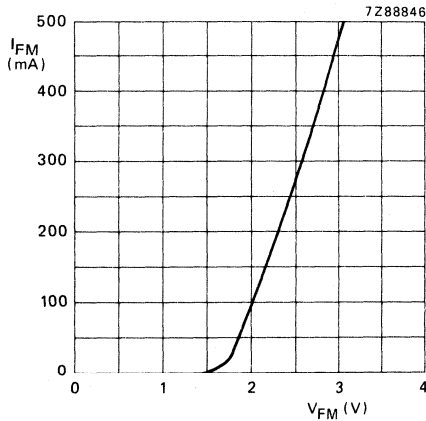


Fig. 4 $t_{on} = 20 \mu\text{s}$; $\delta = 0,01$; typ. values.

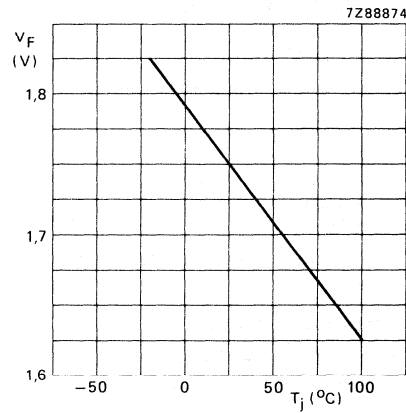


Fig. 5 $I_F = 10 \text{ mA}$; typ. values.

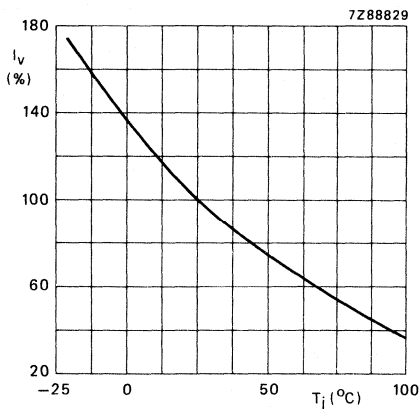


Fig. 6 Typical values.

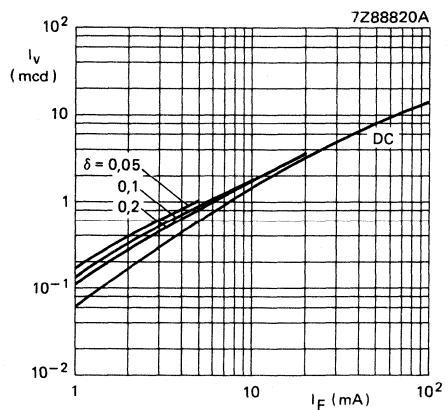


Fig. 7 $t_p = 50 \mu\text{s}$; typ. values.

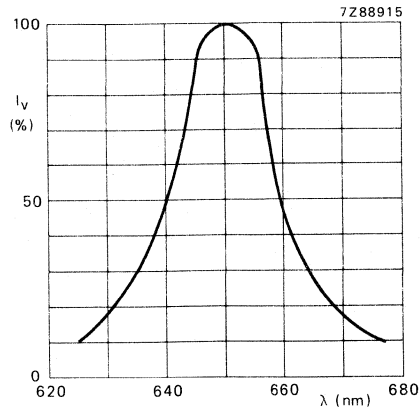


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

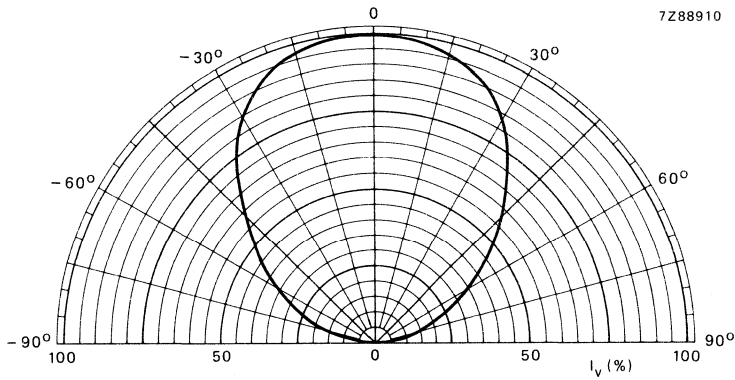


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 3 mm which emit red light at a typical peak wavelength of 650nm (GaAlAs, hyper-red) when forward biased. The PLED-HR14G and PLED-HR44GL have SOD-77 envelopes and are encapsulated in a red diffusing resin. Its high luminosity enables the PLED-HR14G to be used in applications where only low currents are available and because of its high I_{Fmax} it can be used in high I_V applications.

These SOD-77 LEDs, when stacked in an array, can be used as level indicators.

The PLED-HR44GL is similar to the PLED-HR14G but has long leads and has no seating plane.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Luminous intensity			
$I_F = 10\text{ mA}$	PLED-HR14G/HR44GL	I_V	min. 0,7 mcd
	PLED-HR14G/HR44GL-3	I_V	1,6 to 3,5 mcd
	PLED-HR14G/HR44GL-4	I_V	3,0 to 7,0 mcd
Wavelength at peak emission			
$I_F = 10\text{ mA}$		λ_p	typ. 650 nm
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10\text{ mA}$		$\theta_{1/2}$	typ. 100 $^\circ$

MECHANICAL DATA

SOD-77A2 (see Fig. 1a).

PLED-HR14G
PLED-HR44GL

MECHANICAL DATA

Fig. 1a SOD-77A2.
PLED-HR14G

Dimensions in mm

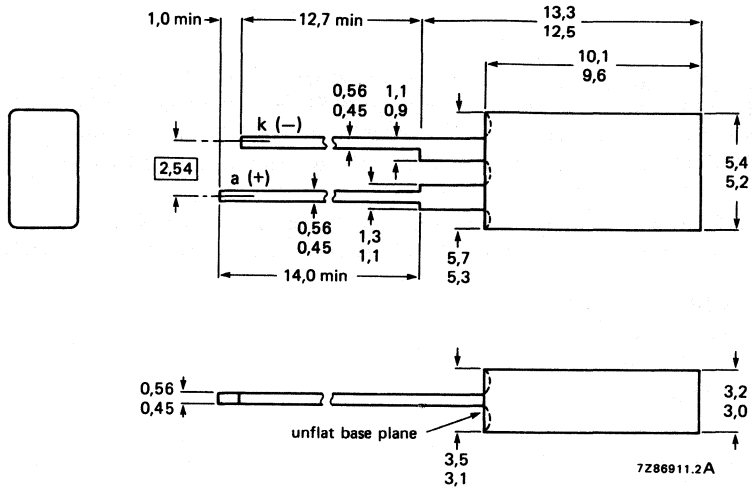
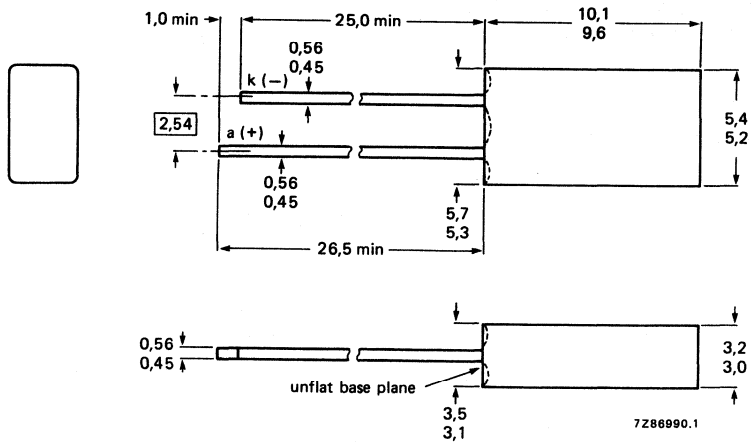


Fig. 1b SOD-77L.
PLED-HR44GL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	100 mA
peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 20 \mu s$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$			
> 1,5 mm from the seating plane for PLED-HR14G			
> 5 mm from the plastic body for PLED-HR44GL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a p.c. board

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_f	typ.	1,75 V
		max.	2,2 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions			
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-HR14G/HR44GL	I_v	min. 0,7 mcd
	PLED-HR14G/HR44GL-3	I_v	1,6 to 3,5 mcd
	PLED-HR14G/HR44GL-4	I_v	3,0 to 7,0 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	80 pF

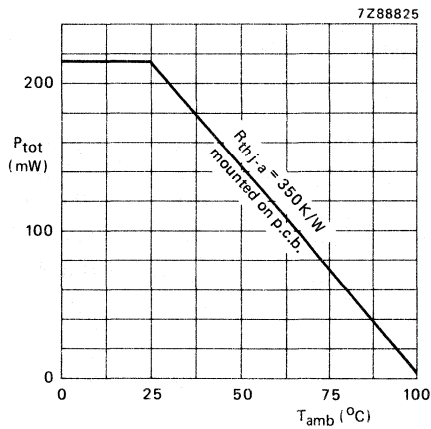


Fig. 2.

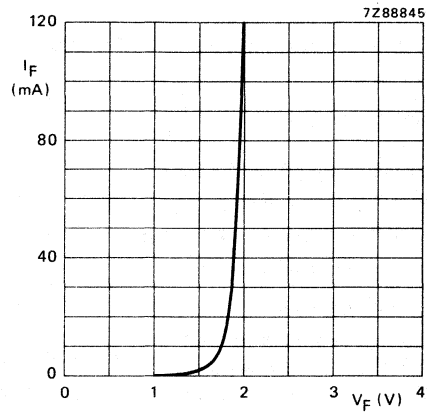


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

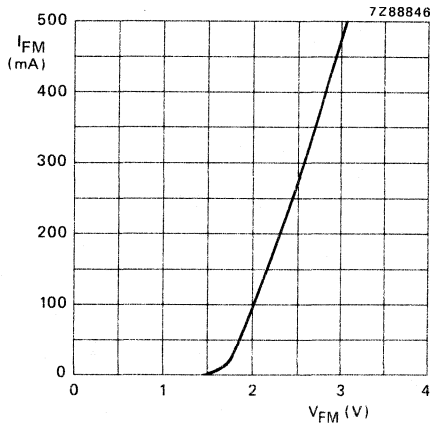


Fig. 4 $t_{on} = 20 \mu s$; $\delta = 0,01$; typ. values.

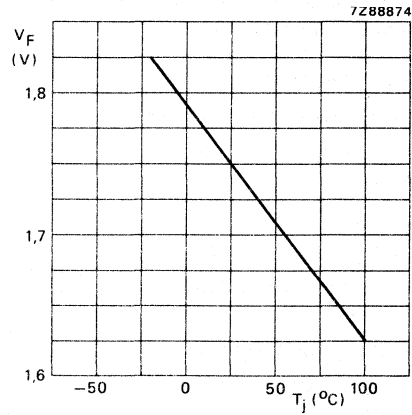


Fig. 5 $I_F = 10 mA$; typ. values.

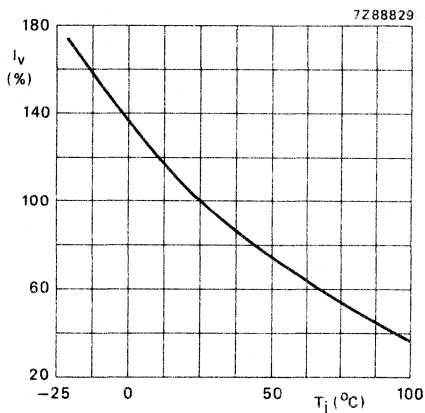


Fig. 6 Typical values.

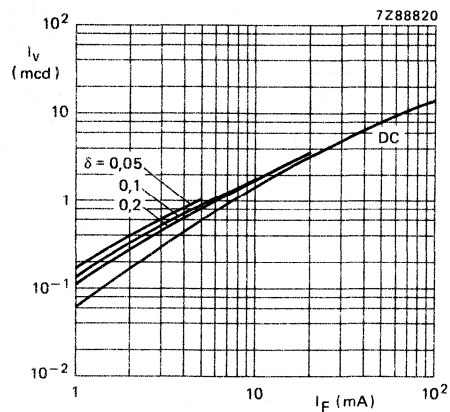


Fig. 7 $t_p = 50 \mu s$; typ. values.

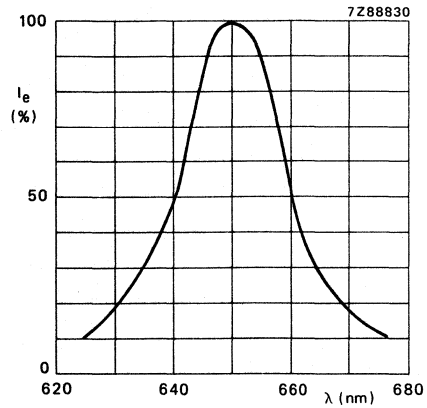


Fig. 8 $I_F = 10 \text{ mA}$; $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

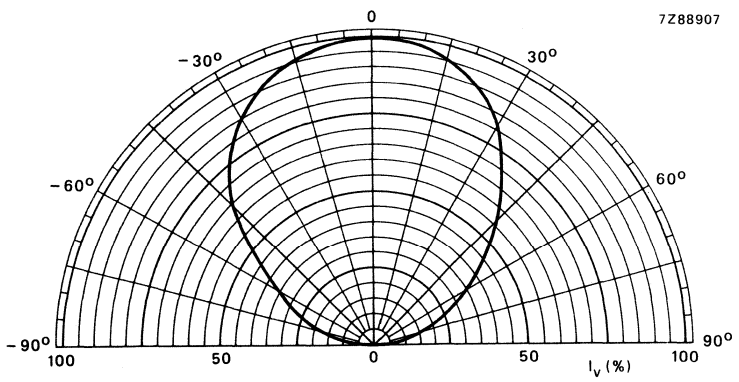


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 5 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) when forward biased. The PLED-HR44DL has a SOD-74L envelope and is encapsulated in a red diffusing resin. The PLED-HR44DL has long leads but no seating plane.

This LED is suitable for surface illumination, for example in information boards, score boards, moving advertisements and electronic games applications. Because of its high light intensity the PLED-HR44DL is also suitable in applications where only very low currents are available and because of its high I_{Fmax} it can be used in high I_V applications.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	100 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity $I_F = 10\text{ mA}$	PLED-HR44DL	I_V	min.	0,7 mcd
	PLED-HR44DL-3	I_V		1,6 to 3,5 mcd
	PLED-HR44DL-4	I_V		3,0 to 7,0 mcd
Wavelength at peak emission $I_F = 10\text{ mA}$		λ_p	typ.	650 nm
Beamwidth between half-intensity directions $I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

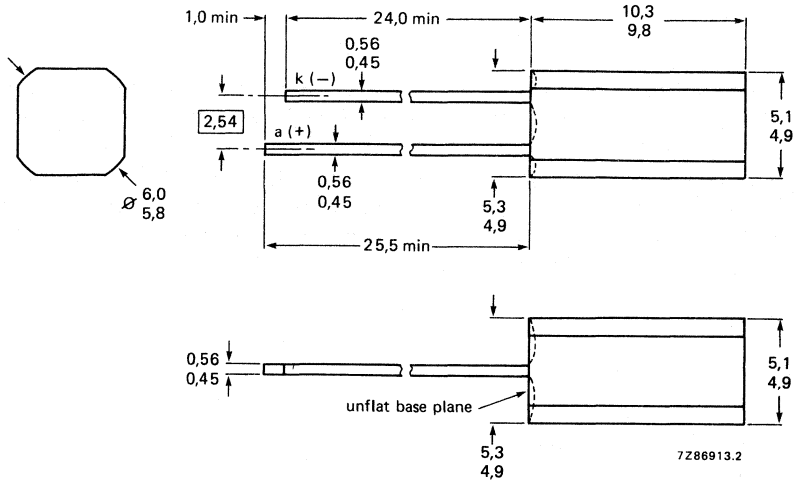
MECHANICAL DATA

SOD-74L (see Fig. 1).

MECHANICAL DATA

Fig. 1 SOD-74L.

Dimensions in mm



Note. Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	100 mA
peak value, $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 20 \mu\text{s}$; $\delta = 0,01$	I_{FRM}	max.	500 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 5,0 mm from the plastic body; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a p.c. board

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ.	1,75 V
		max.	2,2 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions			
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	20 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	650 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-HR44DL	I_v	min. 1,0 mcd
	PLED-HR44DL-3	I_v	1,6 to 3,5 mcd
	PLED-HR44DL-4	I_v	3,0 to 7,0 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	80 pF

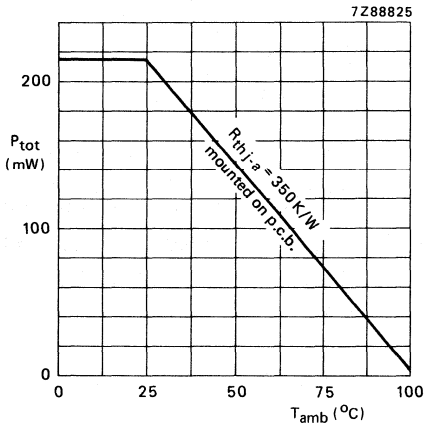


Fig. 2.

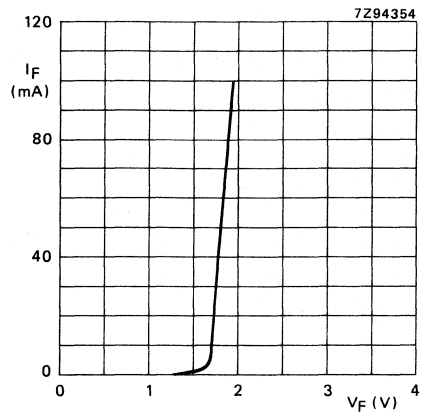


Fig. 3 $T_{amb} = 25^\circ\text{C}$; typ. values.

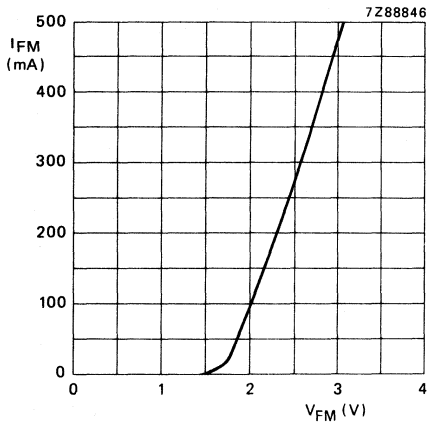


Fig. 4 $t_{on} = 20 \mu\text{s}$; $\delta = 0,01$;
 $T_{amb} = 25^\circ\text{C}$; typ. values.

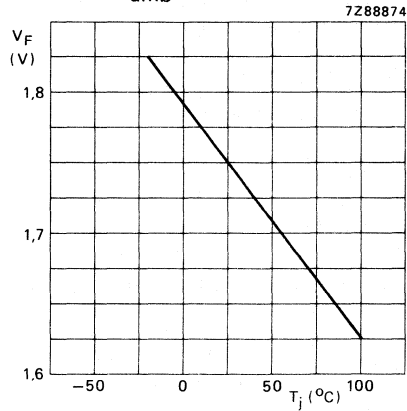


Fig. 5 $I_F = 10 \text{ mA}$; typ. values.

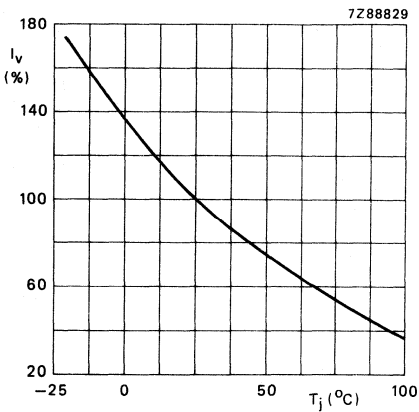


Fig. 6 Typical values.

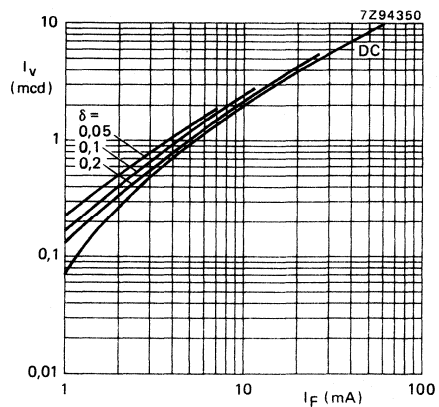


Fig. 7 $t_p = 50 \mu\text{s}$; typical values.

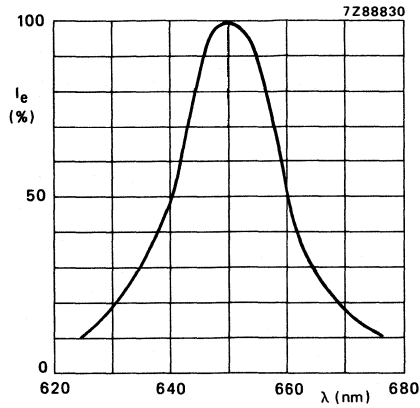


Fig. 8 $I_F = 10$ mA; $T_{amb} = 25$ °C; typ. values.

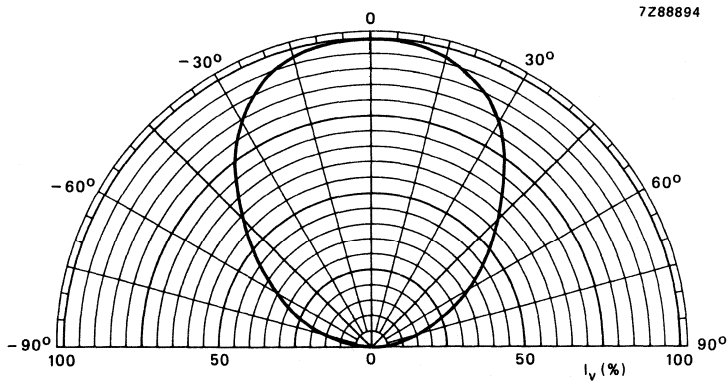


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-O313N

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits orange light (GaAsP; orange) at a typical peak wavelength of 630 nm when forward biased.

The PLED-O313N has a SOD-82C1 outline and is encapsulated in a red non-diffusing resin.

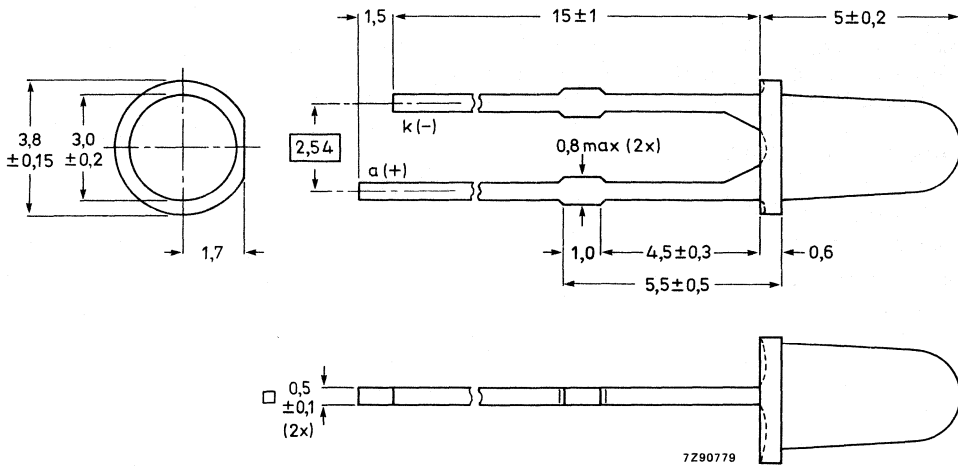
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	3,0 mcd
$I_F = 10\text{ mA}$	PLED-O313N	I_v	typ.	8,0 mcd
	PLED-O313N-4	I_v		3,0 to 7,0 mcd
	PLED-O313N-5	I_v		5,0 to 12,0 mcd
	PLED-O313N-56	I_v		5,0 to 22,0 mcd
	PLED-O313N-6	I_v		10,0 to 22,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	630 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	40 deg

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-82C1.
PLED-O313N



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to + 100 °C
Operating ambient temperature	T_{opr}		-25 to + 85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS $T_{amb} = 25$ °C unless otherwise specified

Forward voltage				
$I_F = 20$ mA	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5$ V	I_R	max.	10 μ A	
Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	40 deg	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10$ mA	λ_p	typ.	630 nm	
Luminous intensity				
$I_F = 10$ mA		min.	3,0 mcd	
	PLED-O313N	typ.	8,0 mcd	
	PLED-O313N-4	I_v	3,0 to 7,0 mcd	
	PLED-O313N-5	I_v	5,0 to 22,0 mcd	
	PLED-O313N-56	I_v	5,0 to 22,0 mcd	
	PLED-O313N-6	I_v	10,0 to 22,0 mcd	

DEVELOPMENT DATA

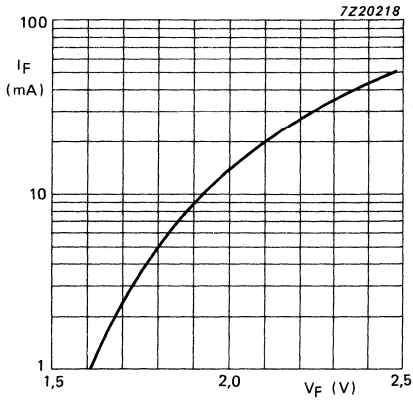


Fig. 2 $I_F = f(V_F)$; typical values.

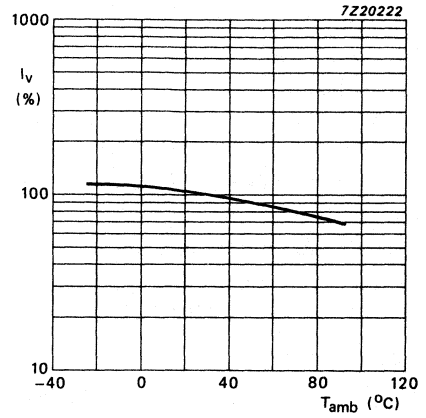


Fig. 3 $I_F = f(T_{amb})$; typical values.

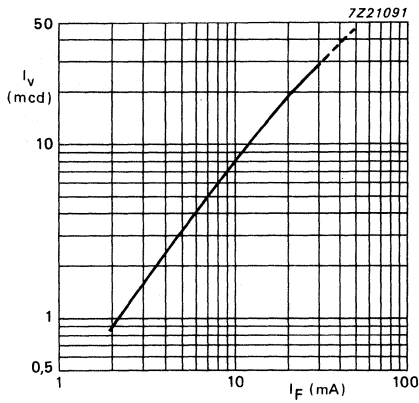


Fig. 4 $I_V = f(I_F)$; typical values.

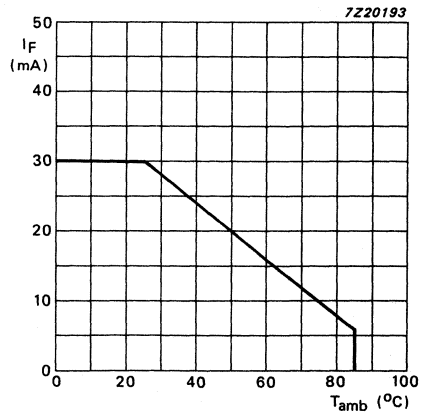


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

DEVELOPMENT DATA

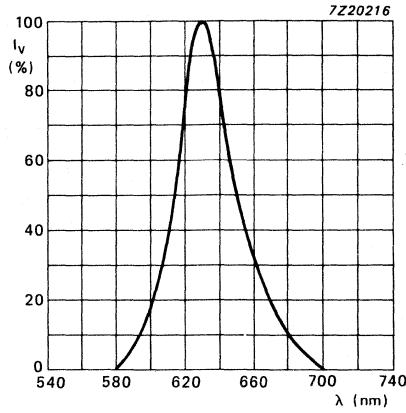


Fig. 6 Spectral response; typical values.

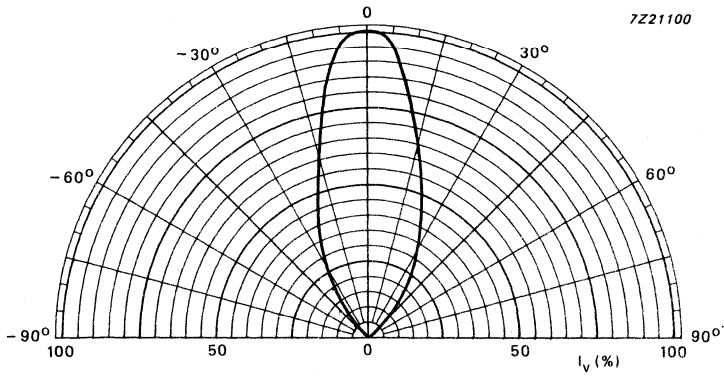


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-0314N

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits orange light (GaAsP; orange) at a typical peak wavelength of 630 nm when forward biased.

The PLED-0314N has a SOD-82C1 outline and is encapsulated in a red diffusing resin.

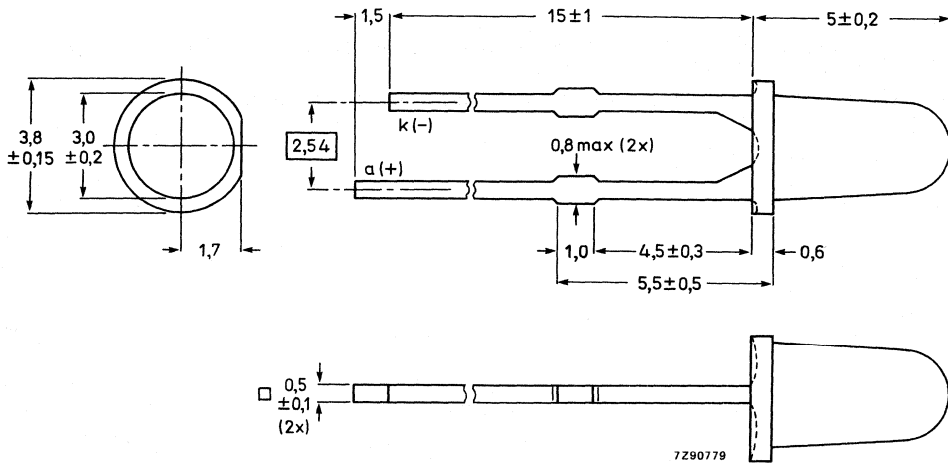
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	1,0 mcd
$I_F = 10\text{ mA}$	PLED-0314N	I_v	typ.	2,5 mcd
	PLED-0314N-3	I_v		1,6 to 3,5 mcd
	PLED-0314N-4	I_v		3,0 to 7,0 mcd
	PLED-0314N-45	I_v		3,0 to 12,0 mcd
	PLED-0314N-5	I_v		5,0 to 12,0 mcd
	PLED-0314N-6	I_v		10,0 to 22,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	630 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	70 deg

MECHANICAL DATA

Fig. 1 SOD-82C1.
PLED-O314N

Dimensions in mm



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to + 100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to + 85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS

 $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA	Forward voltage			
	$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V
			max.	2,8 V
	Reverse current			
	$V_R = 5 \text{ V}$	I_R	max.	10 μA
	Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	70 deg
	Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
	Wavelength at peak emission			
	$I_F = 10 \text{ mA}$	λ_p	typ.	630 nm
	Luminous intensity			
$I_F = 10 \text{ mA}$				
	PLED-O314N	I_V	min.	1,0 mcd
			typ.	2,5 mcd
	PLED-O314N-3	I_V		1,6 to 3,5 mcd
	PLED-O314N-4	I_V		3,0 to 7,0 mcd
	PLED-O314N-45	I_V		3,0 to 12,0 mcd
	PLED-O314N-5	I_V		5,0 to 12,0 mcd
	PLED-O314N-6	I_V		10,0 to 22,0 mcd

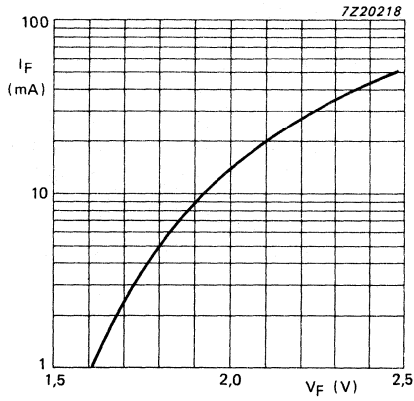


Fig. 2 $I_F = f(V_F)$; typical values.

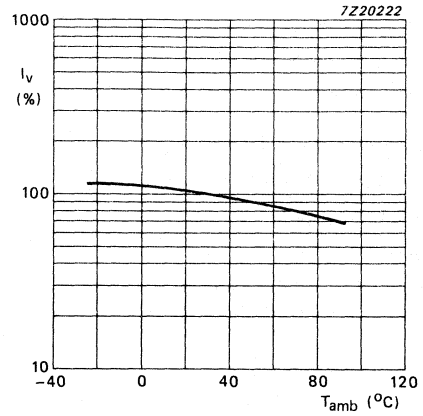


Fig. 3 $I_V = f(T_{amb})$; typical values.

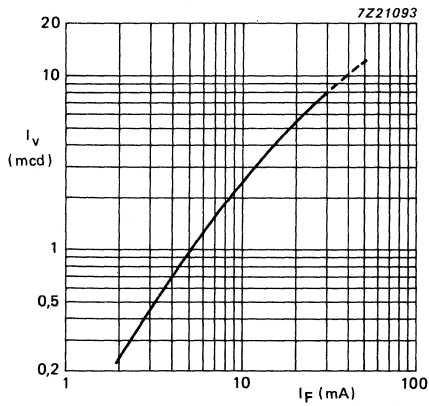


Fig. 4 $I_V = f(I_F)$; typical values.

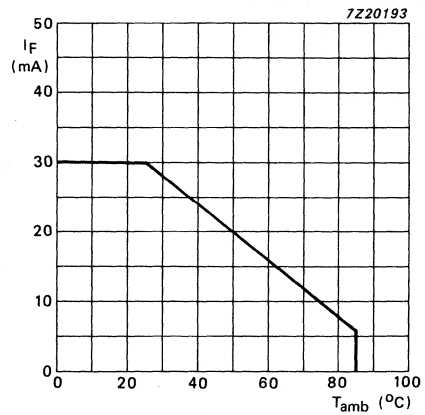


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

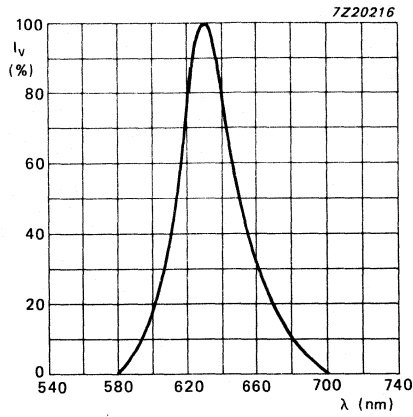


Fig. 6 Spectral response; typical values.

DEVELOPMENT DATA

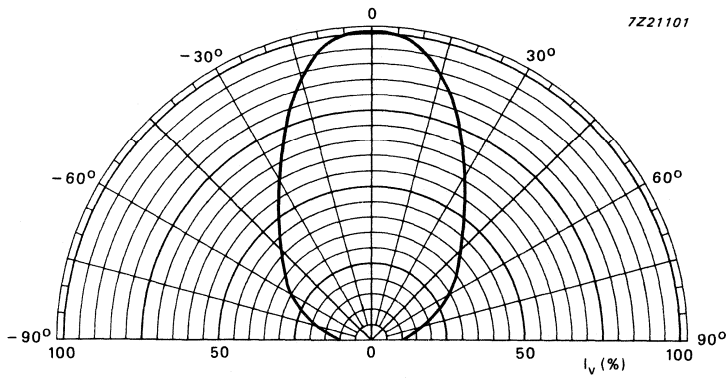


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-O513M
PLED-O533ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit orange light (GaAsP; orange) at a typical peak wavelength of 630 nm when forward biased.

The PLED-O513M has a SOD-90C1 outline and is encapsulated in a red non-diffusing resin.

The PLED-O533ML has a SOD-90A1 outline and is encapsulated in a red non-diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity		I_V	min.	3,0 mcd
$I_F = 10\text{ mA}$	PLED-O513M/O533ML		typ.	8,5 mcd
	PLED-O513M/O533ML-5	I_V		5,0 to 12 mcd
	PLED-O513M/O533ML-6	I_V		10 to 22 mcd
	PLED-O513M/O533ML-7	I_V		15 to 35 mcd
	PLED-O513M/O533ML-78	I_V		15 to 70 mcd
	PLED-O513M/O533ML-8	I_V		30 to 70 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	630 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	30 °

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-90C1
PLED-O513M

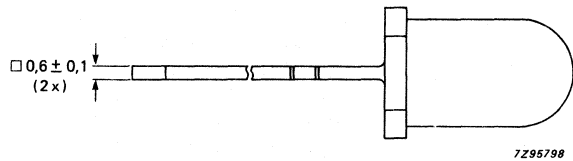
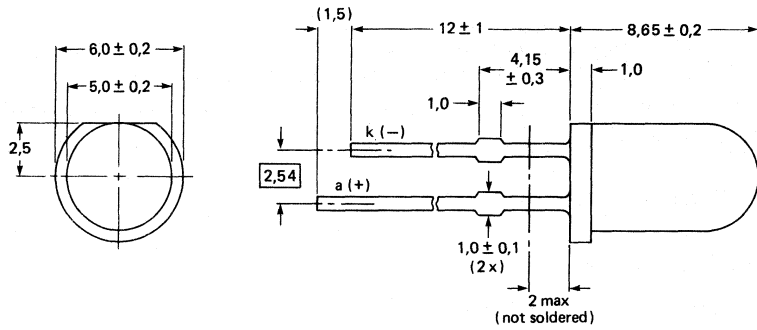
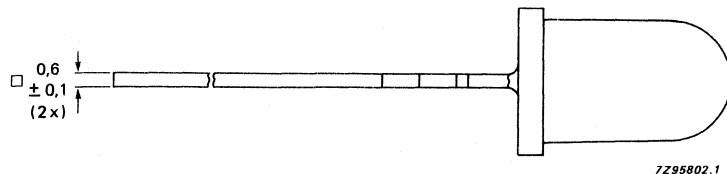
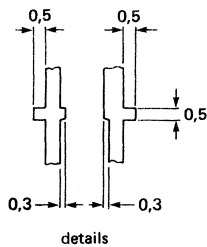
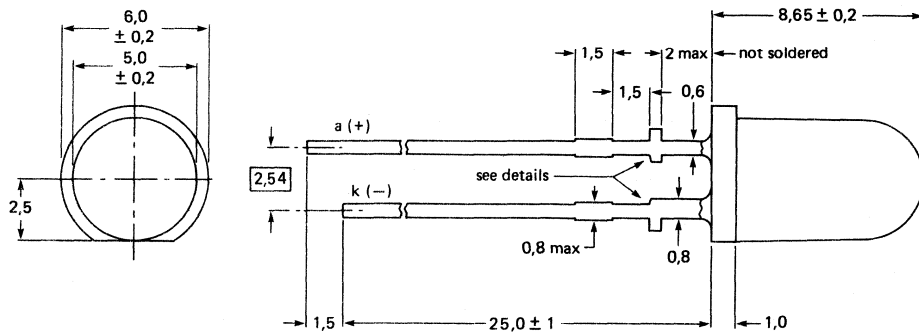


Fig. 1b SOD-90A1
PLED-O533ML



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to +85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA	Forward voltage	V_F	typ.	2,2 V
	$I_F = 20 \text{ mA}$		max.	2,8 V
	Reverse current	I_R	max.	10 μA
	$V_R = 5 \text{ V}$			
	Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	30 $^\circ$
	Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
	Wavelength at peak emission	λ_p	typ.	630 nm
	$I_F = 10 \text{ mA}$			
	Luminous intensity	I_v	min.	3,0 mcd
	$I_F = 10 \text{ mA}$		typ.	8,5 mcd
PLED-O513M/O533ML				
PLED-O513M/O533ML-5			5,0 to 12 mcd	
PLED-O513M/O533ML-6			10 to 22 mcd	
PLED-O513M/O533ML-7		15 to 35 mcd		
PLED-O513M/O533ML-78		15 to 70 mcd		
PLED-O513M/O533ML-8		30 to 70 mcd		

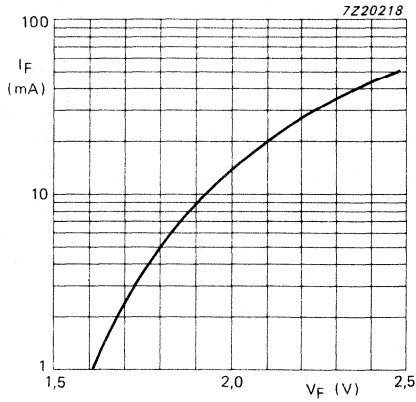


Fig. 2 $I_F = f(V_F)$ typical values.

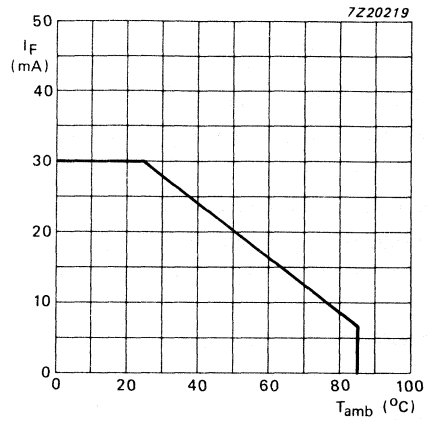


Fig. 3 $I_F = f(T_{amb})$ typical values.

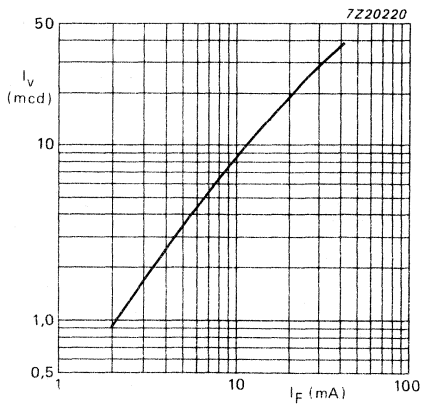


Fig. 4 $I_V = f(I_F)$ typical values.

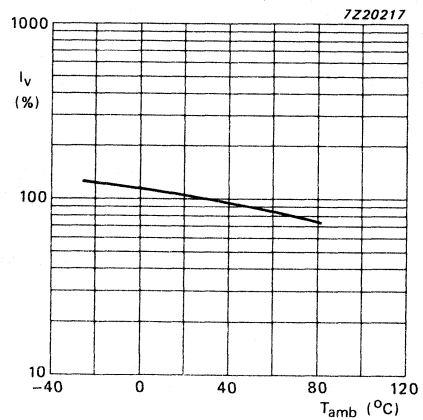


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

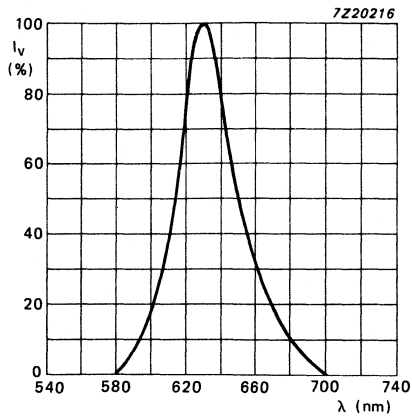


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

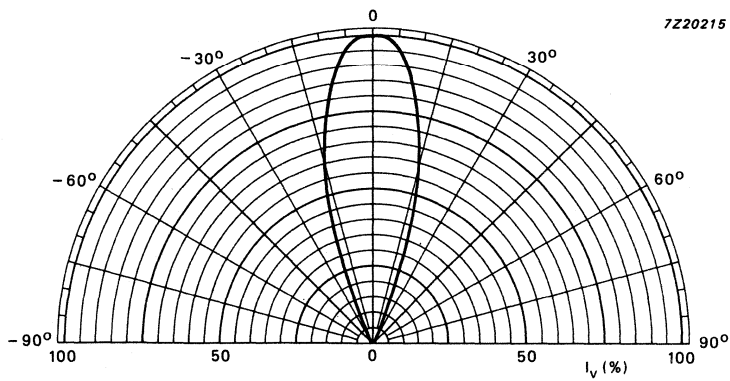


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-O514M
PLED-O534ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit orange light (GaAsP; orange) at a typical peak wavelength of 630 nm when forward biased.

The PLED-O514M has a SOD-90C1 outline and is encapsulated in a red diffusing resin.

The PLED-O534ML has a SOD-90A1 outline and is encapsulated in a red diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Luminous intensity		min.	3,0 mcd
$I_F = 10\text{ mA}$	PLED-O514M/O534ML	typ.	8,5 mcd
	PLED-O514M/O534ML-5	I_V	5,0 to 12,0 mcd
	PLED-O514M/O534ML-6	I_V	10 to 22 mcd
	PLED-O514M/O534ML-67	I_V	10 to 35 mcd
	PLED-O514M/O534ML-7	I_V	15 to 35 mcd
Wavelength at peak emission			
$I_F = 20\text{ mA}$	λ_p	typ.	630 nm
Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	40 °

PLED-O514M
PLED-O534ML

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-90C1
PLED-O514M

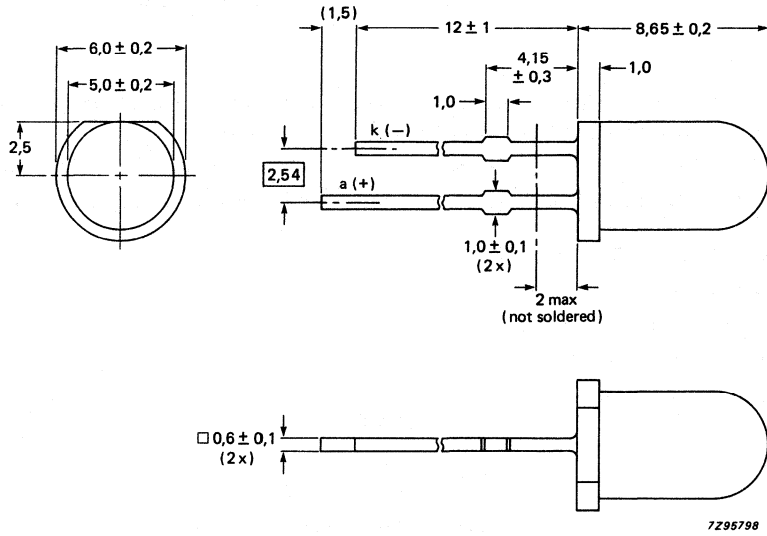
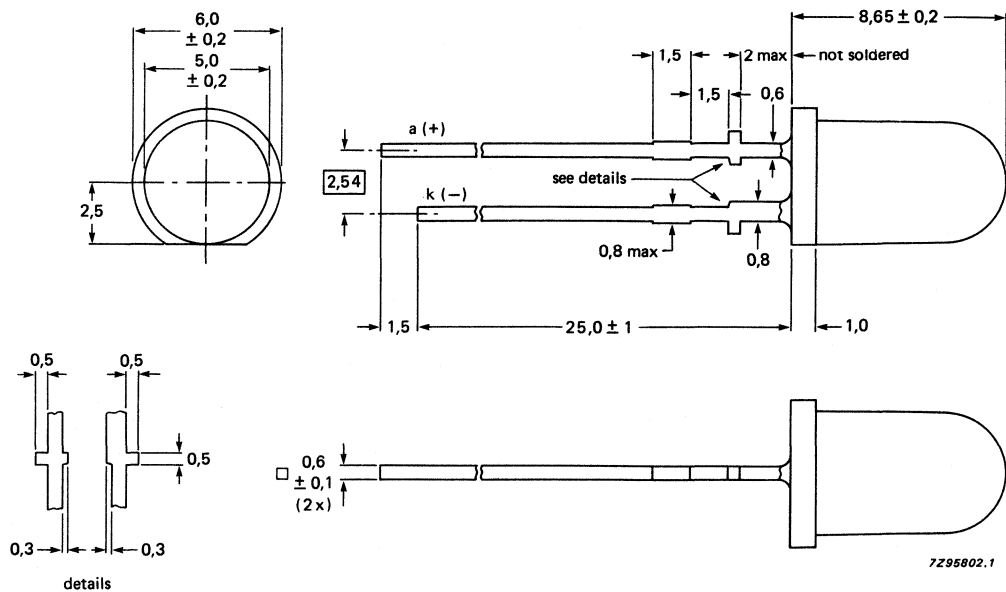


Fig. 1b SOD-90A1
PLED-O534ML



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to +85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA

Forward voltage				
$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	10 μA	
Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	40 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	630 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$		min.	3,0 mcd	
	PLED-O514M/O534ML	typ.	8,5 mcd	
	PLED-O514M/O534ML-5	I_v	5,0 to 12,0 mcd	
	PLED-O514M/O534ML-6	I_v	10 to 22 mcd	
	PLED-O514M/O534ML-67	I_v	10 to 35 mcd	
	PLED-O514M/O534ML-7	I_v	15 to 35 mcd	

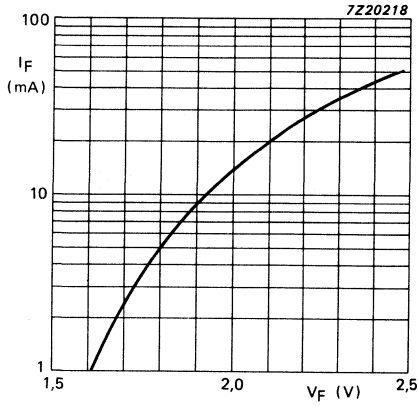


Fig. 2 $I_F = f(V_F)$ typical values.

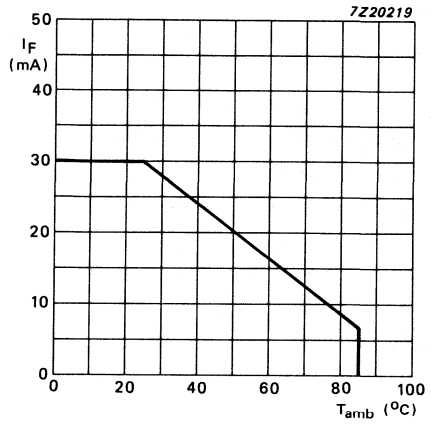


Fig. 3 $I_F = f(T_{amb})$ typical values.

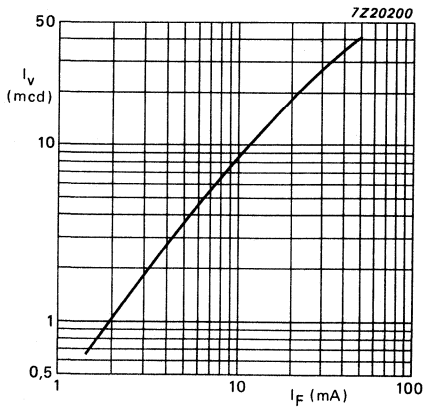


Fig. 4 $I_V = f(I_F)$ typical values.

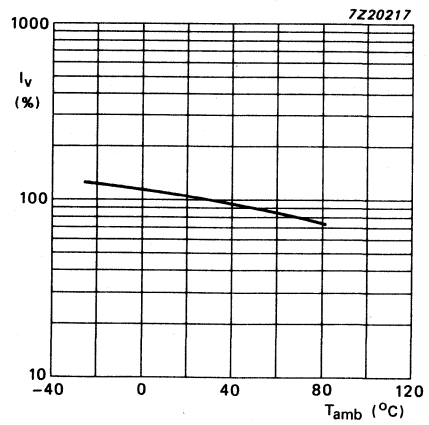


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

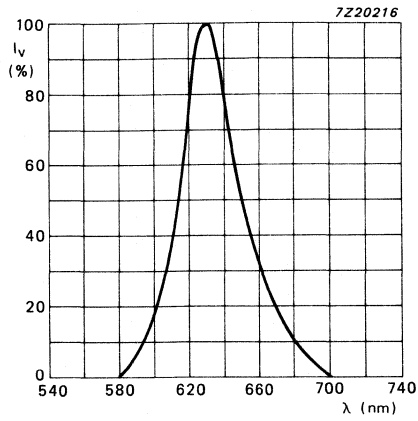


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

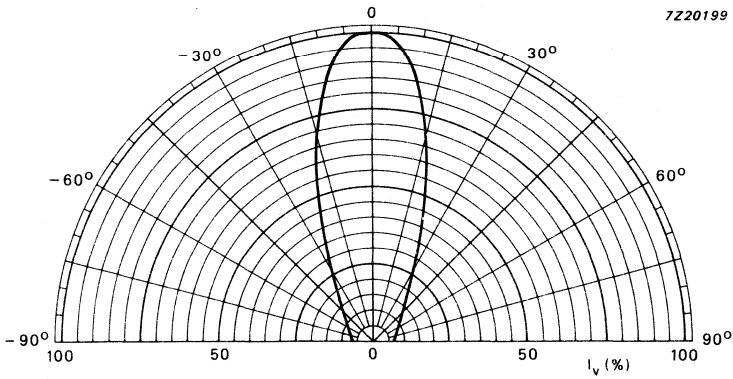


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-P313N

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits red light (GaP:ZnO; ultra-red) at a typical peak wavelength of 700 nm when forward biased.

The PLED-P313N has a SOD-82C1 outline and is encapsulated in a red non-diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	25 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	70 mW
Luminous intensity			min.	1,6 mcd
$I_F = 10\text{ mA}$	PLED-P313N	I_V	typ.	5,0 mcd
	PLED-P313N-3	I_V		1,6 to 3,5 mcd
	PLED-P313N-34	I_V		1,6 to 7,0 mcd
	PLED-P313N-4	I_V		3,0 to 7,0 mcd
	PLED-P313N-5	I_V		5,0 to 12,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	700 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	25 deg

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	25 mA
peak value; $t_{ON} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	70 mW
Storage temperature	T_{stg}		-30 to +100 °C
Operating ambient temperature	T_{opr}		-25 to +85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS $T_{amb} = 25$ °C unless otherwise specified

Forward voltage			
$I_F = 20$ mA	V_F	typ.	2,2 V
		max.	2,8 V
Reverse current			
$V_R = 5$ V	I_R	max.	5 μ A
Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	25 deg
Bandwidth at half height	$\Delta\lambda$	typ.	100 nm
Wavelength at peak emission			
$I_F = 20$ mA	λ_p	typ.	700 nm
Luminous intensity			
$I_F = 10$ mA		min.	1,6 mcd
	PLED-P313N	typ.	5,0 mcd
	PLED-P313N-3	I_V	1,6 to 3,5 mcd
	PLED-P313N-34	I_V	1,6 to 7,0 mcd
	PLED-P313N-4	I_V	3,0 to 7,0 mcd
	PLED-P313N-5	I_V	5,0 to 12,0 mcd

DEVELOPMENT DATA

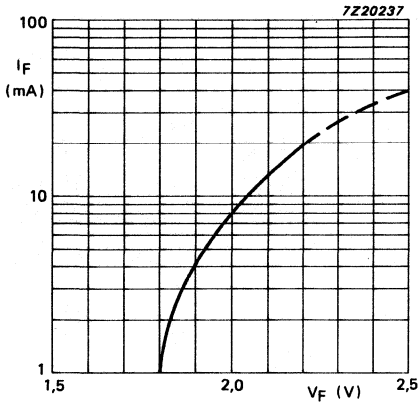


Fig. 2 $I_F = f(V_F)$; typical values.

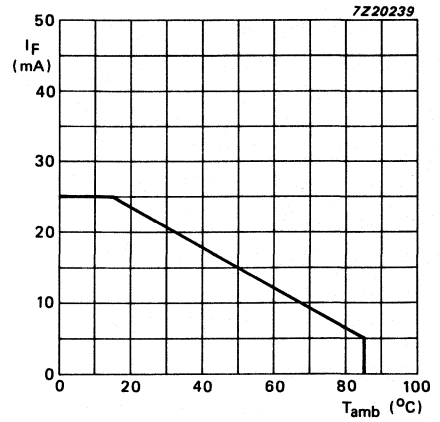


Fig. 3 $I_F = f(T_{amb})$; typical values.

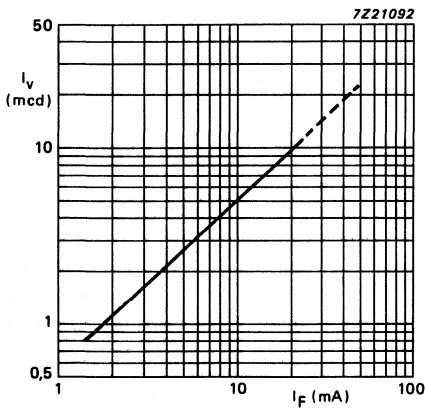


Fig. 4 $I_V = f(I_F)$; typical values.

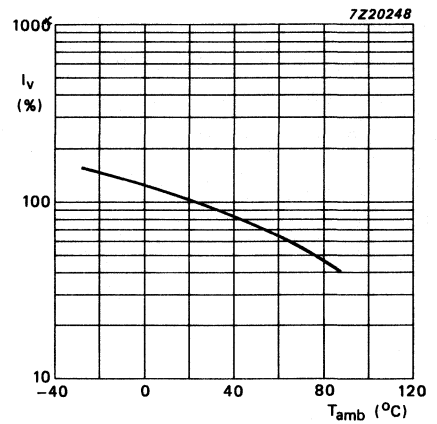


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

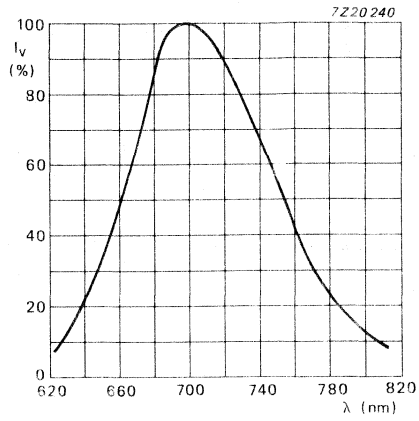


Fig. 6 Spectral response; typical values.

DEVELOPMENT DATA

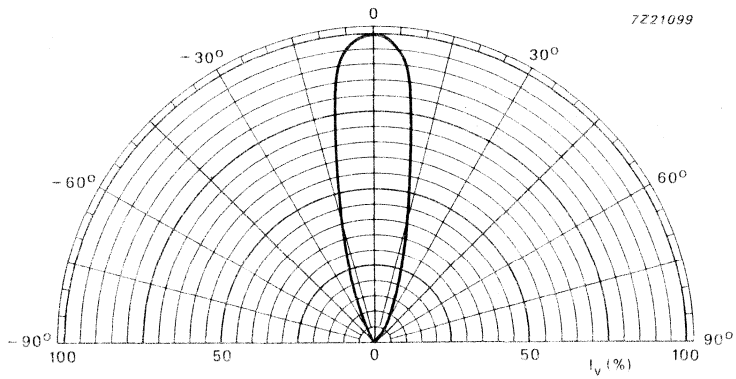


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-P314N
PLED-P334NL

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 3 mm which emit red light (GaP:ZnO; ultra-red) at a typical peak wavelength of 700 nm when forward biased.

The PLED-P314N has a SOD-82C1 outline and is encapsulated in a red diffusing resin.

The PLED-P334NL has a SOD-82A1 outline and is encapsulated in a red diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	25 mA
Total power dissipation at $T_{amb} = 25^\circ C$		P_{tot}	max.	70 mW
Luminous intensity			min.	0,7 mcd
$I_F = 10$ mA	PLED-P314N/P334NL	I_v	typ.	1,6 mcd
	PLED-P314N/P334NL-1	I_v		0,7 to 1,6 mcd
	PLED-P314N/P334NL-2	I_v		1,0 to 2,2 mcd
	PLED-P314N/P334NL-23	I_v		1,0 to 3,5 mcd
	PLED-P314N/P334NL-3	I_v		1,6 to 3,5 mcd
	PLED-P314N/P334NL-4	I_v		3,0 to 7,0 mcd
Wavelength at peak emission				
$I_F = 20$ mA		λ_p	typ.	700 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	60 deg

PLED-P314N
PLED-P334NL

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-82C1.
PLED-P314N

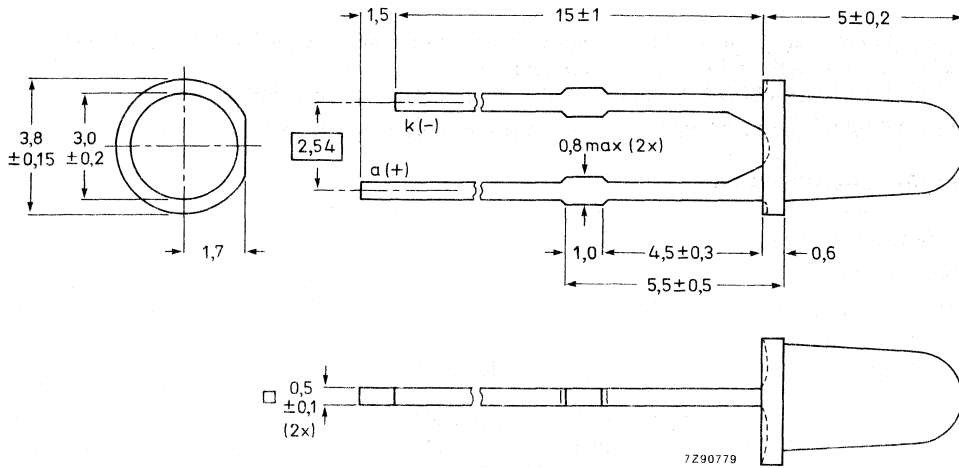
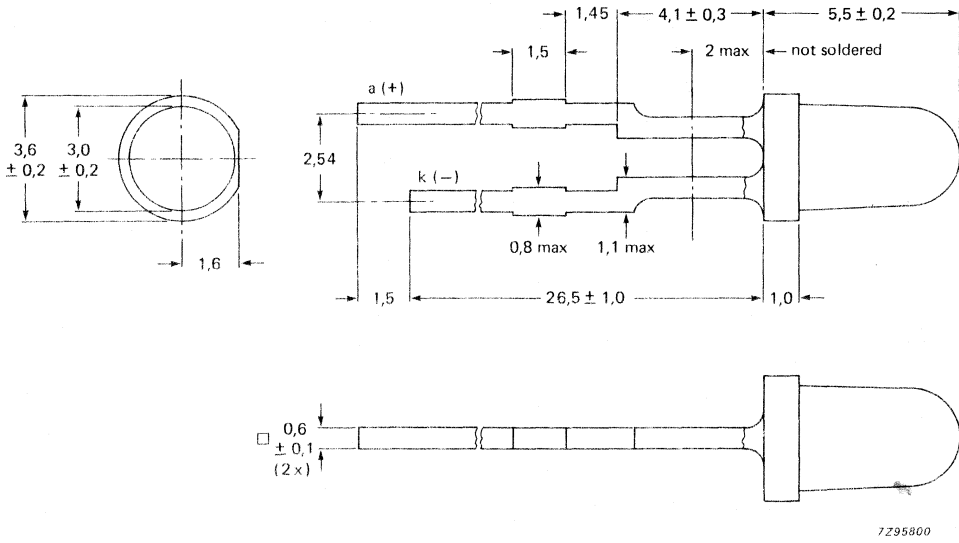


Fig. 1b SOD-82A1.
PLED-P334NL



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	25 mA
peak value; $t_{ON} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	70 mW
Storage temperature	T_{stg}		-30 to +100 °C
Operating ambient temperature	T_{opr}		-24 to +85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS $T_{amb} = 25$ °C unless otherwise specified

Forward voltage				
$I_F = 20$ mA	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5$ V	I_R	max.	5 μ A	
Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	60 deg	
Bandwidth at half height	$\Delta\lambda$	typ.	100 nm	
Wavelength at peak emission				
$I_F = 10$ mA	λ_p	typ.	700 nm	
Luminous intensity				
$I_F = 10$ mA		min.	0,7 mcd	
	PLED-P314N/P334NL	typ.	1,6 mcd	
	PLED-P314N/P334NL-1	I_V	0,7 to 1,6 mcd	
	PLED-P314N/P334NL-2	I_V	1,0 to 2,2 mcd	
	PLED-P314N/P334NL-23	I_V	1,0 to 3,5 mcd	
	PLED-P314N/P334NL-3	I_V	1,6 to 3,5 mcd	
	PLED-P314N/P334NL-4	I_V	3,0 to 7,0 mcd	

DEVELOPMENT DATA

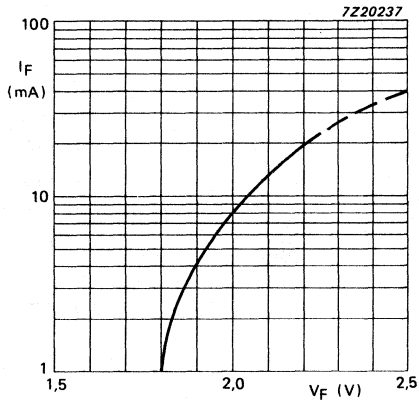


Fig. 2 $I_F = f(V_F)$; typical values.

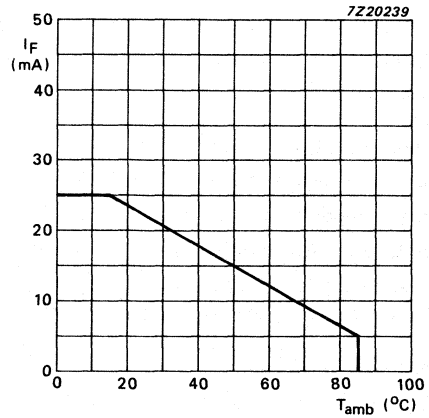


Fig. 3 $I_F = f(T_{amb})$; typical values.

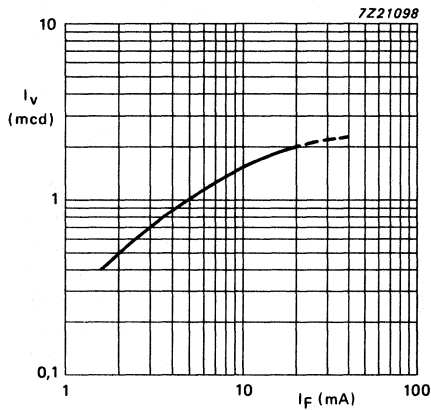


Fig. 4 $I_V = f(I_F)$; typical values.

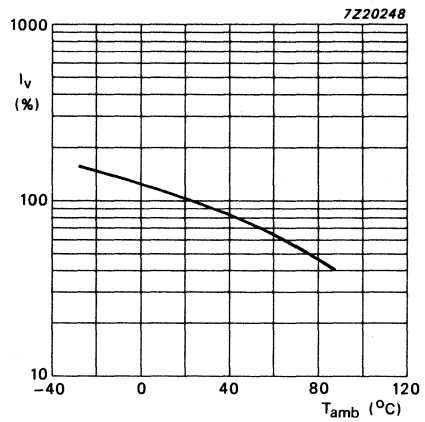


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

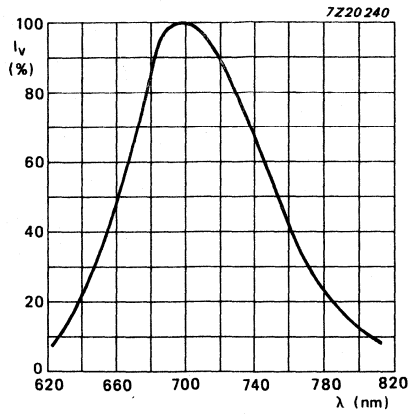


Fig. 6 Spectral response; typical values.

DEVELOPMENT DATA

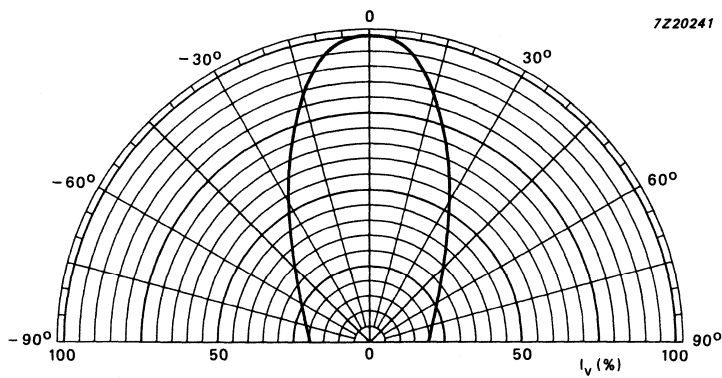


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-P513M
PLED-P533ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit red light (GaP:ZnO; ultra-red) at a typical peak wavelength of 700 nm when forward biased.

The PLED-P513M has a SOD-90C1 outline and is encapsulated in a red non-diffusing resin.

The PLED-P533ML has a SOD-90A1 outline and is encapsulated in a red non-diffusing resin.

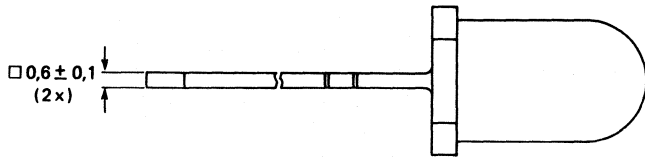
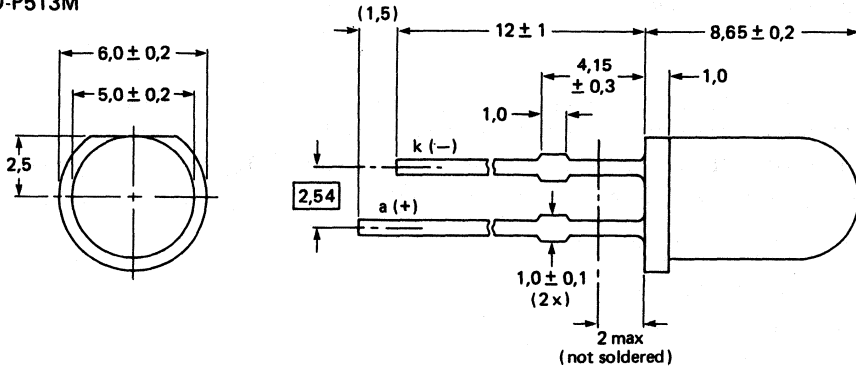
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	25 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	70 mW
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-P513M/P533ML	I_V	min.	1,6 mcd
			typ.	5,0 mcd
	PLED-P513M/P533ML-4	I_V		3,0 to 7,0 mcd
	PLED-P513M/P533ML-5	I_V		5,0 to 12 mcd
	PLED-P513M/P533ML-6	I_V		10 to 22 mcd
	PLED-P513M/P533ML-67	I_V		10 to 35 mcd
	PLED-P513M/P533ML-7	I_V		15 to 35 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	700 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	30 °

MECHANICAL DATA

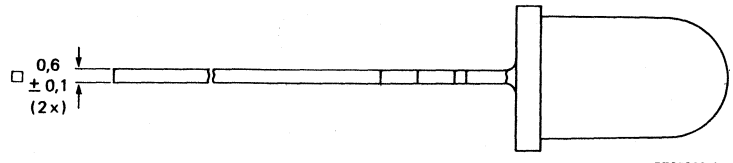
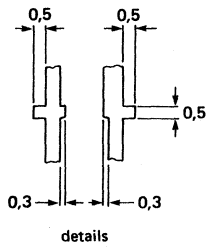
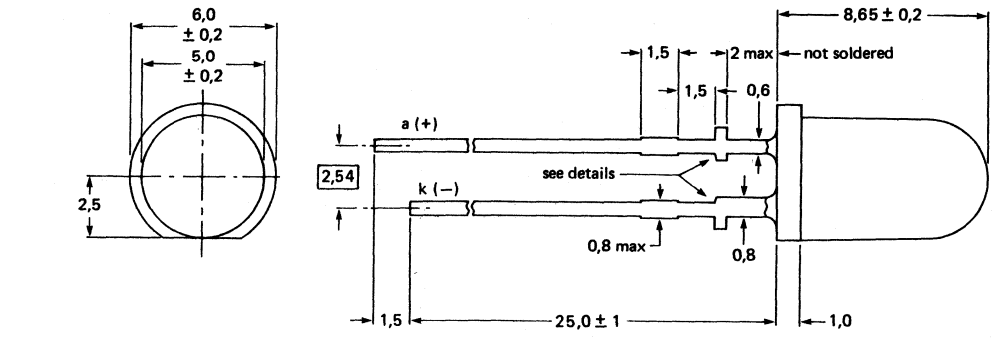
Dimensions in mm

Fig. 1a SOD-90C1
PLED-P513M



7295798

Fig. 1b SOD-90A1
PLED-P533ML



7295802.1

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	25 mA
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	70 mW
Storage temperature	T_{stg}		-30 to +100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to +85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA

Forward voltage				
$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V	
		max.	2,8 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	5 μA	
Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	30 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	100 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	700 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$		min.	1,6 mcd	
		typ.	5,0 mcd	
	PLED-P513M/P533ML	I_V		
	PLED-P513M/P533ML-4	I_V	3,0 to 7,0 mcd	
	PLED-P513M/P533ML-5	I_V	5,0 to 12 mcd	
	PLED-P513M/P533ML-6	I_V	10 to 22 mcd	
	PLED-P513M/P533ML-67	I_V	10 to 35 mcd	
	PLED-P513M/P533ML-7	I_V	15 to 35 mcd	

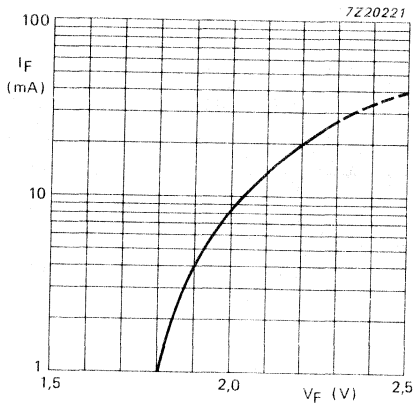


Fig. 2 $I_F = f(V_F)$ typical values.

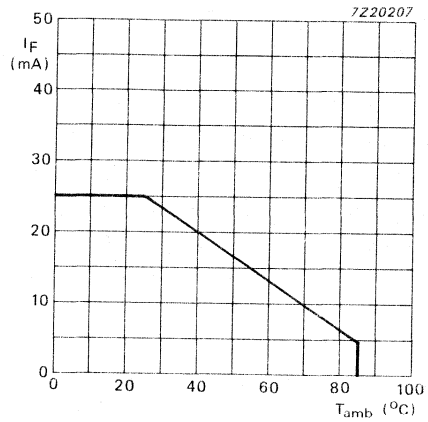


Fig. 3 $I_F = f(T_{amb})$ typical values.

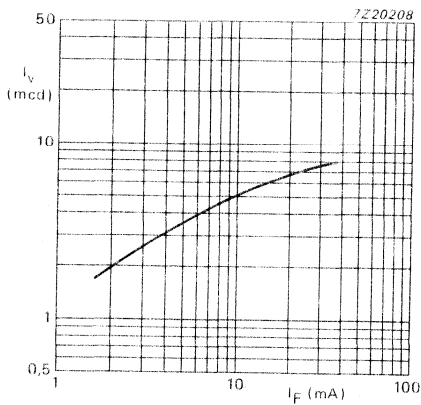


Fig. 4 $I_V = f(I_F)$ typical values.

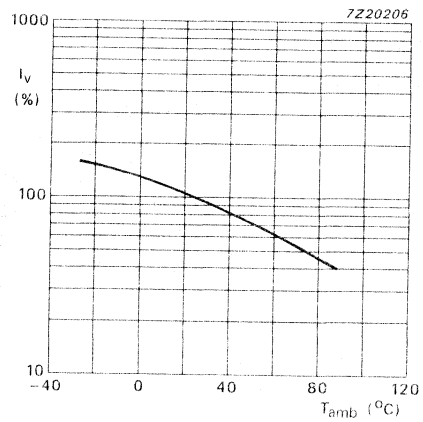


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

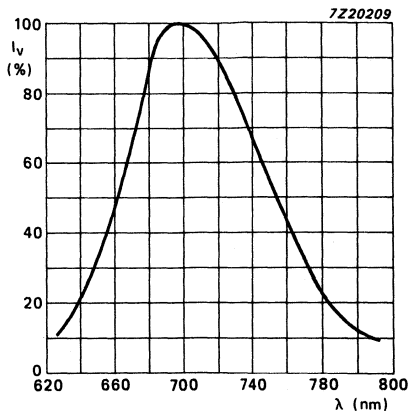


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

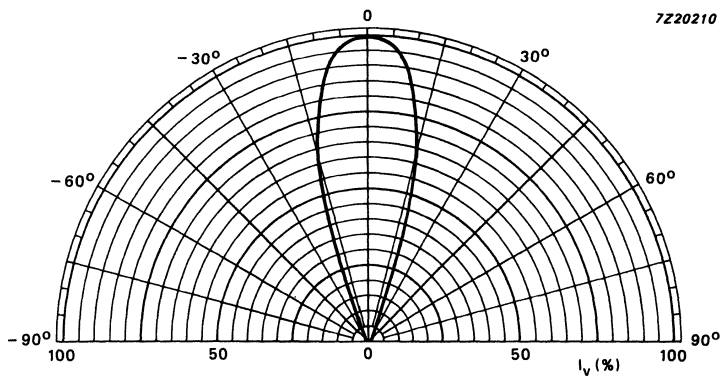


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-P514M
PLED-P534ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit red light (GaP:ZnO; ultra-red) at a typical peak wavelength of 700 nm when forward biased.

The PLED-P514M has a SOD-90C1 outline and is encapsulated in a red coloured diffusing resin.

The PLED-P534ML has a SOD-90A1 outline and is encapsulated in a red coloured diffusing resin.

QUICK REFERENCE DATA

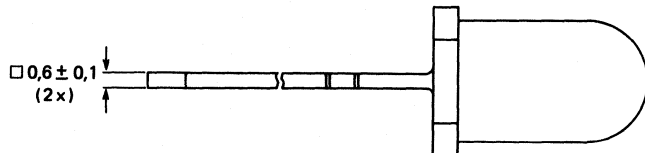
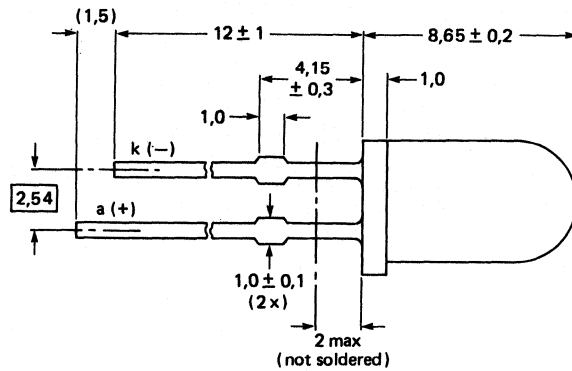
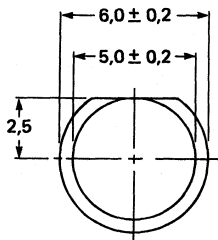
Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	25 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	70 mW
Luminous intensity			min.	0,7 mcd
$I_F = 10\text{ mA}$	PLED-P514M/P534ML	I_V	typ.	1,6 mcd
	PLED-P514M/P534ML-3	I_V		1,6 to 3,5 mcd
	PLED-P514M/P534ML-4	I_V		3,0 to 7,0 mcd
	PLED-P514M/P534ML-45	I_V		3,0 to 12 mcd
	PLED-P514M/P534ML-5	I_V		5,0 to 12 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	700 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	40 °

PLED-P514M
PLED-P534ML

MECHANICAL DATA

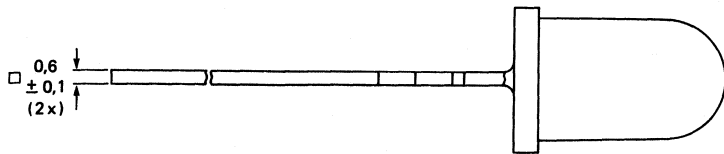
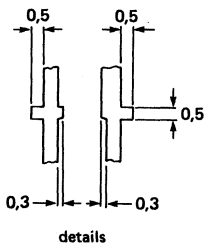
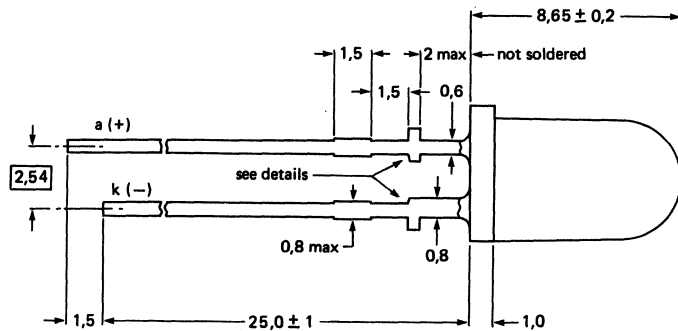
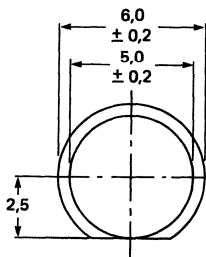
Dimensions in mm

Fig. 1a SOD-90C1
PLED-P514M



7295798

Fig. 1b SOD-90A1
PLED-P534ML



7295802.1

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current	I_F	max.	25 mA
d.c.	I_{FRM}	max.	150 mA
peak value; $t_{on} = 1$ ms; $\delta = 0,1$	P_{tot}	max.	70 mW
Total power dissipation at $T_{amb} = 25$ °C	T_{stg}		-30 to +100 °C
Storage temperature	T_{opr}		-25 to +85 °C
Operating ambient temperature	T_{sld}	max.	260 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane			

CHARACTERISTICS

 $T_{amb} = 25$ °C unless otherwise specified

DEVELOPMENT DATA	Forward voltage	V_F	typ.	2,2 V
	$I_F = 20$ mA		max.	2,8 V
	Reverse current	I_R	max.	5 μ A
	$V_R = 5$ V	$\theta_{\frac{1}{2}}$	typ.	40 °
	Beamwidth at half-intensity directions	$\Delta\lambda$	typ.	100 nm
	Bandwidth at half height	λ_p	typ.	700 nm
	Wavelength at peak emission	I_v	min.	0,7 mcd
	$I_F = 10$ mA		typ.	1,6 mcd
	Luminous intensity			
	$I_F = 10$ mA	PLED-P514M/P534ML		
	PLED-P514M/P534ML-3	I_v	1,6 to 3,5 mcd	
	PLED-P514M/P534ML-4	I_v	3,0 to 7,0 mcd	
	PLED-P514M/P534ML-45	I_v	3,0 to 12 mcd	
	PLED-P514M/P534ML-5	I_v	5,0 to 12 mcd	

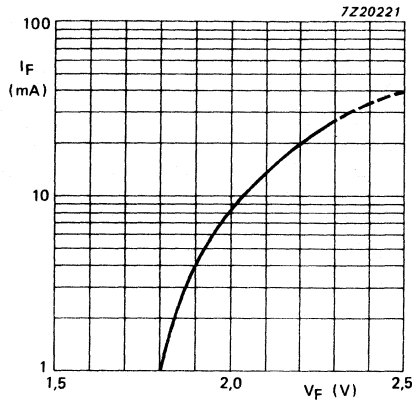


Fig. 2 $I_F = f(V_F)$ typical values.

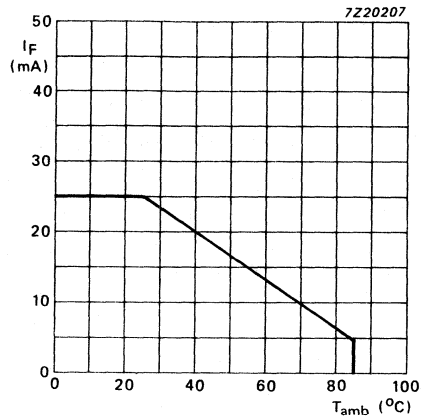


Fig. 3 $I_F = f(T_{amb})$ typical values.

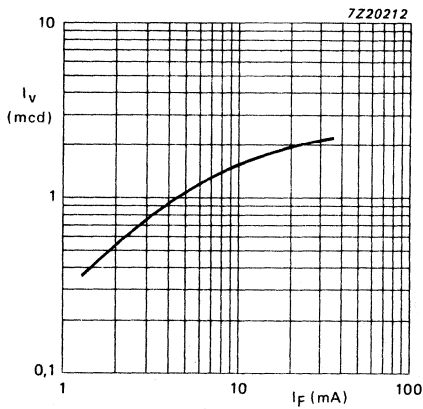


Fig. 4 $I_V = f(I_F)$ typical values.

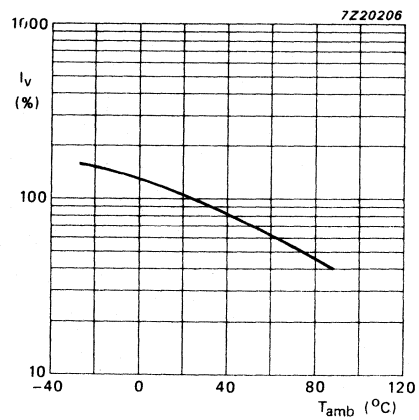


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

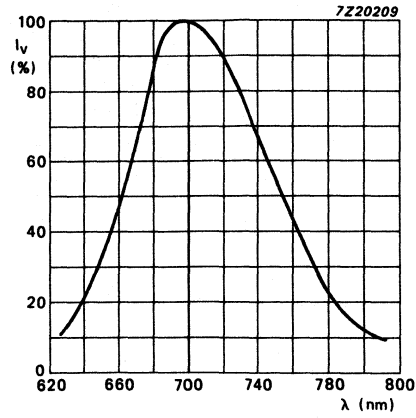


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

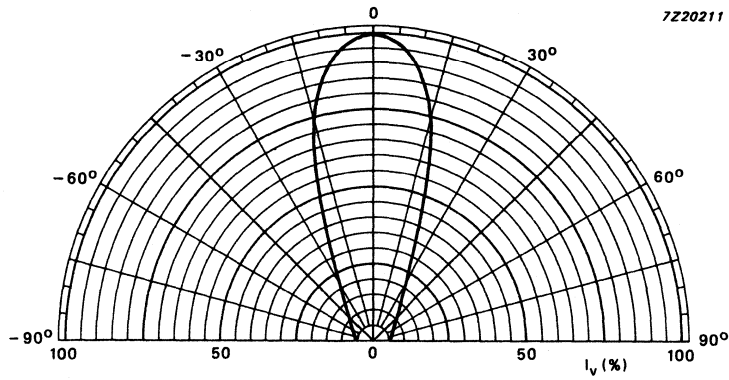


Fig. 7 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-T512B

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 5 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) or green light at a typical peak wavelength of 565 nm (GaP; super-green) depending on the polarity of the current.

The PLED-T512B has a SOD-63 outline and is encapsulated in a clear diffusing resin. Because of its resistance to high forward currents, the PLED-T512B is suitable for high I_V applications, for example, moving information display panels.

Other applications are:

- mains indicator
- temperature indicator
- motor control indicator

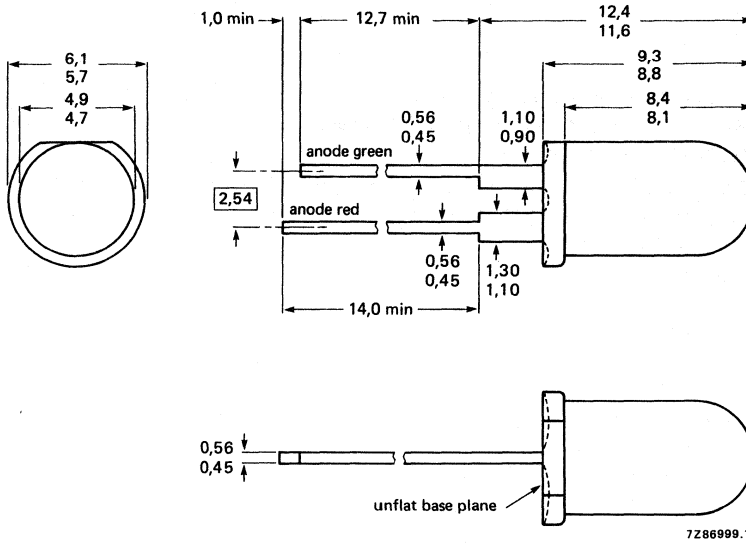
QUICK REFERENCE DATA

Continuous reverse current	V_R	max.	5 V
Forward current (DC)			
red	I_F	max.	100 mA
green			60 mA
Total power dissipation up to $T_{amb} = 25^\circ\text{C}$	P_{tot}	max.	215 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Luminous intensity			
red at $I_F = 10\text{ mA}$	I_V	min.	3 mcd
		typ.	10 mcd
green at $I_F = 20\text{ mA}$	I_V	min.	3 mcd
		typ.	10 mcd
Wavelength at peak emission			
red			650 nm
green	λ_p	typ.	565 nm
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-63A2.

Dimensions in mm



RATINGS

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

Forward current (DC)

red	I _F	max.	100 mA
green			60 mA

Forward current

peak value; t _p = 1 μs; f = 300 Hz	I _{FRM}	max.	1 A
peak value; t _{on} = 1 ms; δ = 0.33			150 mA

Total power dissipation up to T_{amb} = 25 °C

P _{tot}	max.	215 mW
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Junction temperature

T _j	max.	100 °C
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Storage temperature

T _{stg}		-55 to +100 °C
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Lead soldering temperature

> 1.5 mm from the seating plane; t _{slid} < 7 s	T _{slid}	max.	260 °C
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THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

R _{th j-a}	max.	350 K/W
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CHARACTERISTICST_{amb} = 25 °C unless otherwise specified

Forward voltage

red at I _F = 10 mA	V _F	typ.	1.75 V
			max.
green at I _F = 20 mA	V _F	typ.	2.1 V
			max.

Beamwidth between half-intensity directions

at I _F = 10 mA (in the plane of the leads)	θ _½	typ.	70 °
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Wavelength at peak emissions

at I _F = 10 mA	λ _p	typ.	650 nm
red			565 nm
green			

Diode capacitance

at V _R = 0; f = 1 MHz	C _d	typ.	160 pF
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Luminous intensity

red at I _F = 10 mA	I _v	min.	3 mcd
		typ.	10 mcd
green at I _F = 20 mA	I _v	min.	3 mcd
		typ.	10 mcd

DEVELOPMENT DATA

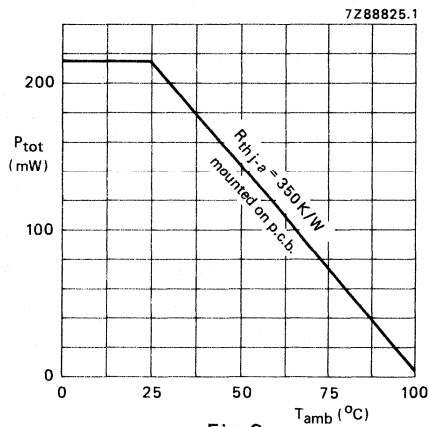


Fig. 2.

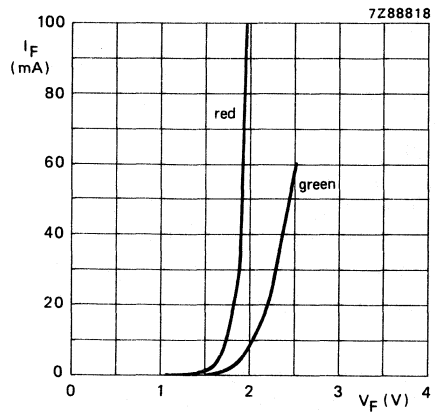


Fig. 3 $T_{amb} = 25^{\circ}C$; typical values.

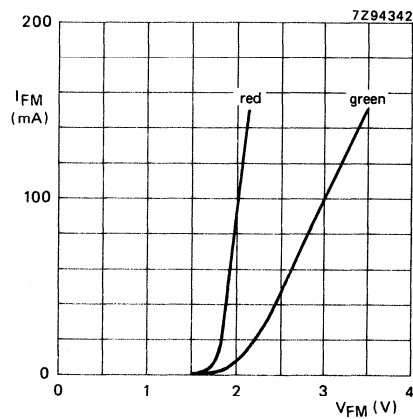


Fig. 4 $t_{on} = 20 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typical values.

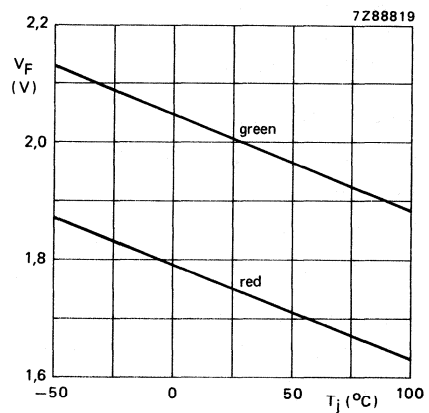


Fig. 5 $I_F = 10 mA$; typical values.

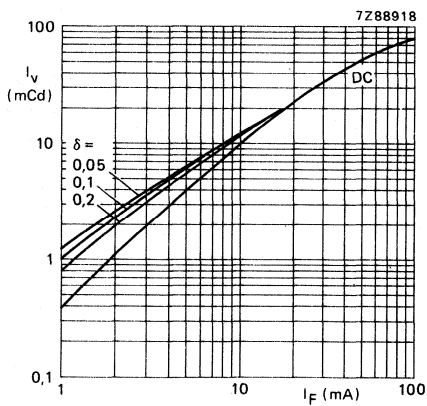


Fig. 6 $t_p = 50 \mu s$; typical values.

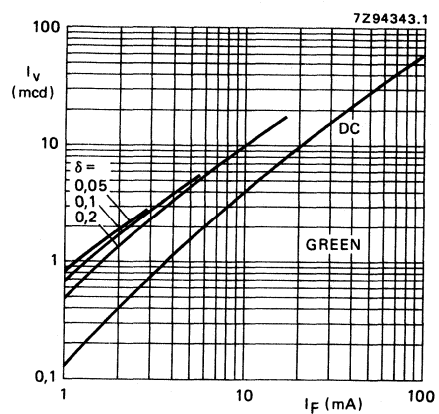


Fig. 7 $t = 50 \mu s$; typical values.

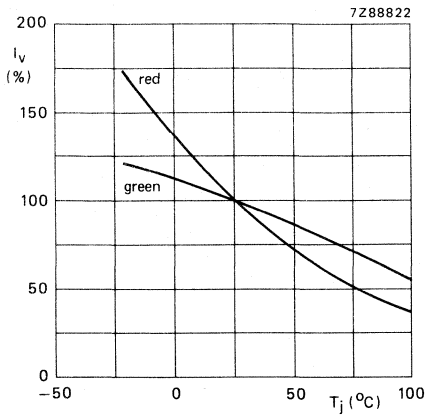


Fig. 8 Typical values.

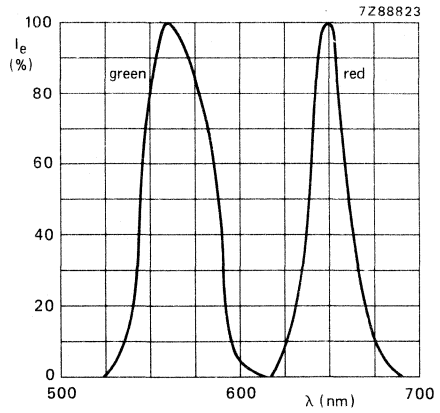


Fig. 9 $I_F = 10$ mA; typical values.

DEVELOPMENT DATA

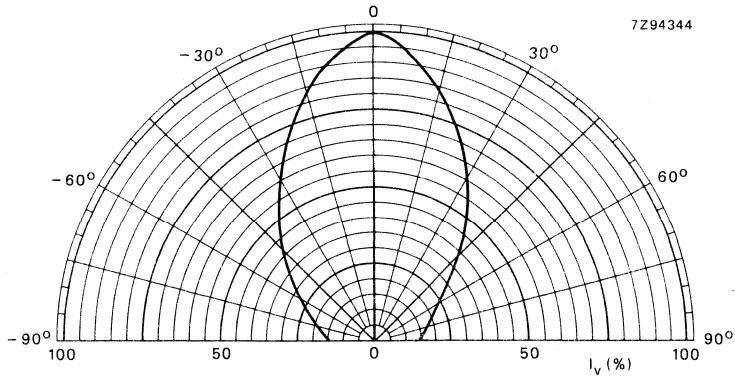


Fig 10 $I_F = 10$ mA; typical values.

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 1 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) or green light at a typical peak wavelength of 565 nm (GaP; super-green) depending on the polarity of the current.

The PLED-TR12E has a SOD-75 outline and is encapsulated in a colourless diffusing resin. Because of its SOD-75 envelope, the PLED-TR12E can be used in configurations together with the PLED-HR14 family.

The bicolour function gives this light emitting device special application possibilities, e.g.:

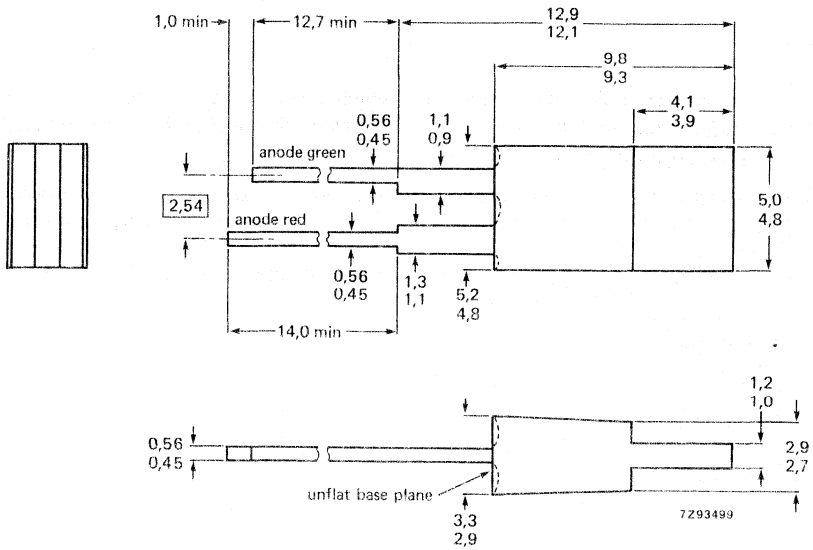
- as level sensor overdrive indicator
- as zero point indicator
- as tuning indicator

QUICK REFERENCE DATA

Forward current (DC)			
red	I_F	max.	100 mA
green			60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Luminous intensity			
red at $I_F = 10\text{ mA}$	I_v	min.	1.0 mcd
green at $I_F = 20\text{ mA}$		typ.	1.5 mcd
Wavelength at peak emission			
red	λ_p	typ.	650 nm
green			565 nm
Beamwidth between half-intensity directions in the plane of the leads	$\theta_{1/2}$	typ.	110 $^\circ$

MECHANICAL DATA
Fig. 1 SOD-75B2

Dimensions in mm



RATINGS

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

Forward current

red

green

I_F	max.	100 mA
		60 mA

Forward currentpeak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$ peak value, $t_{on} = 1 \text{ ms}$; $\delta = 0.33$

I_{FRM}	max.	1 A
		150 mA

Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$

P_{tot}	max.	215 mW
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Junction temperature

T_j	max.	100 $^\circ\text{C}$
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Storage temperature

T_{stg}		-55 to +100 $^\circ\text{C}$
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Lead soldering temperature

> 1.5 mm from the seating plane; $t_{slid} < 7 \text{ s}$

T_{slid}	max.	260 $^\circ\text{C}$
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THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified**Forward voltage**red at $I_F = 10 \text{ mA}$

V_F	typ.	1.75 V
	max.	2.2 V

green at $I_F = 20 \text{ mA}$

V_F	typ.	2.1 V
	max.	3.0 V

Beamwidth between half-intensity directions

at $I_F = 10 \text{ mA}$

$\theta_{1/2}$	typ.	110 $^\circ$
----------------	------	--------------

Wavelength at peak emission

at $I_F = 10 \text{ mA}$

red

green

λ_p	typ.	650 nm
		565 nm

Luminous intensity

red at $I_F = 10 \text{ mA}$ green at $I_F = 20 \text{ mA}$

I_v	min.	1.0 mcd
	typ.	1.5 mcd

Diode capacitance

at $V_R = 0$; $f = 1 \text{ MHz}$

C_d	typ.	100 pF
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DEVELOPMENT DATA

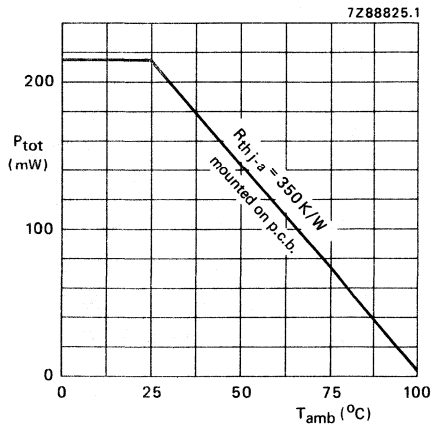


Fig. 2.

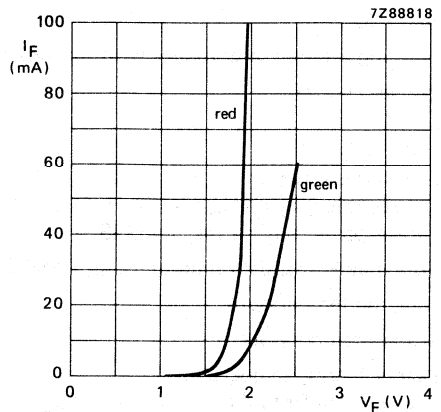


Fig. 3 $T_{amb} = 25^{\circ}C$; typical values.

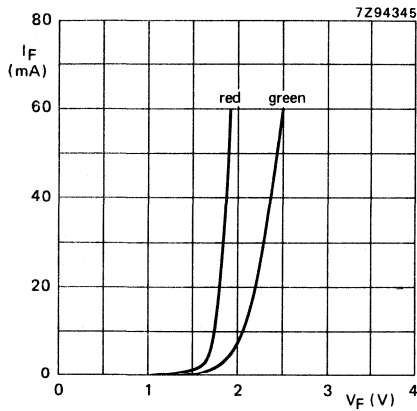


Fig. 4 $t_{on} = 20 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typical values.

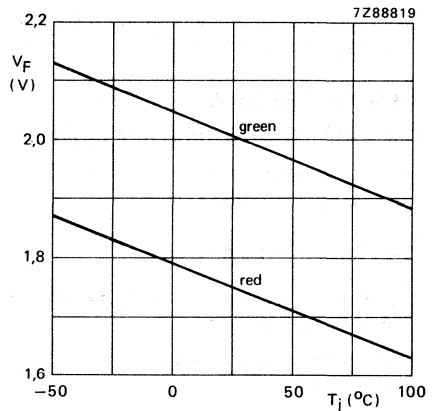


Fig. 5 $I_F = 10 mA$; typical values.

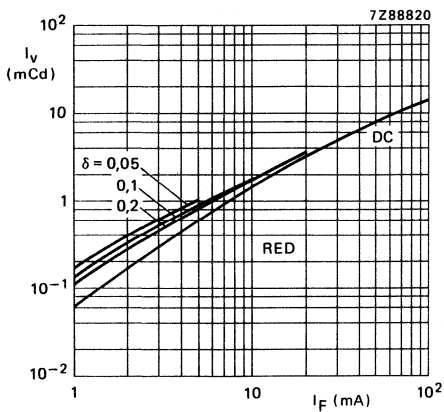


Fig. 6 $t_p = 50 \mu s$; typical values.

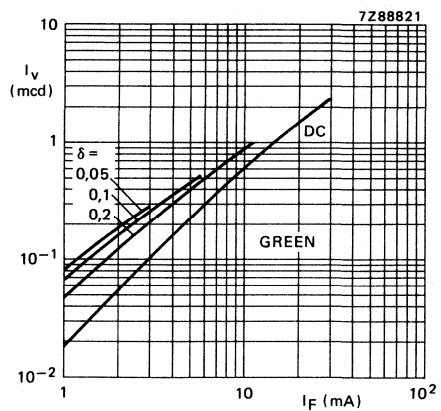


Fig. 7 $t_p = 50 \mu s$; typical values.

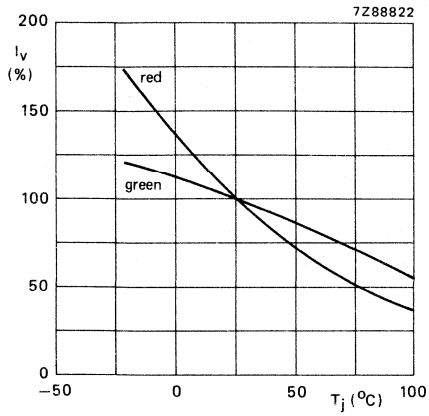


Fig. 8 Typical values.

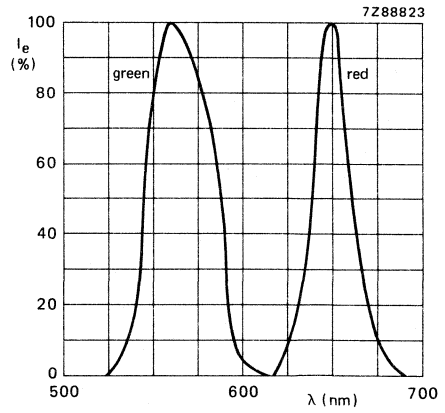


Fig. 9 $I_F = 10 \text{ mA}$; typical values.

DEVELOPMENT DATA

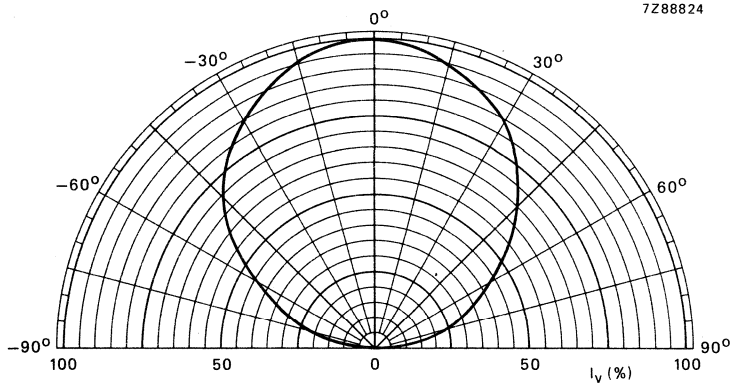


Fig. 10 $I_F = 10 \text{ mA}$; typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-TR12F

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 2,5 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) or green light at a typical peak wavelength of 565 nm (GaP; super-green) depending on the polarity of the current.

The PLED-TR12F has a SOD-76 outline and is encapsulated in a colourless diffusing resin. The SOD-76 envelope enables the PLED-TR12F to be used in configurations together with the PLED-HR14 family.

The bicolour function gives this light emitting block special possibilities e.g.

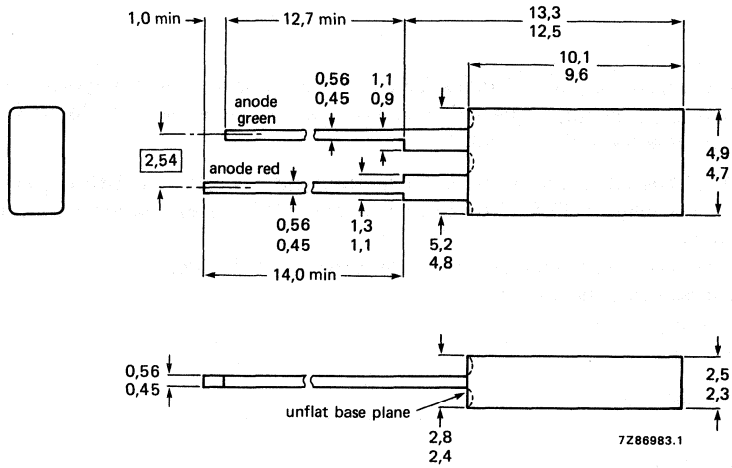
- as level sensor overdrive indicator or
- as zero point indicator or
- as tuning indicator

QUICK REFERENCE DATA

Forward current (DC)	red green	I_F	max.	100 mA 60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
red at $I_F = 10\text{ mA}$		I_v	min.	1.0 mcd
green at $I_F = 20\text{ mA}$			typ.	1.5 mcd
Wave length at peak emission	red green	λ_p	typ.	650 nm 565 nm
Beamwidth between half-intensity directions in the plane of the leads		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA
Fig. 1 SOD-76A2

Dimensions in mm



RATINGS

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

Forward current				
DC	red	I_F	max.	100 mA
	green			60 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$			max.	1 A
peak value, $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$		I_{FRM}	max.	150 mA
Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$		P_{tot}	max.	215 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Storage temperature		T_{stg}		-55 to +100 $^\circ\text{C}$
Lead soldering temperature				
> 1,5 mm from the seating plane; $t_{sld} < 7 \text{ s}$		T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th j-a}$	max.	350 K/W
--------------	------	---------

CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage

red at $I_F = 10 \text{ mA}$

V_F	typ.	1.75 V
	max.	2.2 V

green at $I_F = 20 \text{ mA}$

V_F	typ.	2.1 V
	max.	3.0 V

Beamwidth between half-intensity directions

at $I_F = 10 \text{ mA}$

$\theta_{1/2}$	typ.	100 $^\circ$
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Wavelength at peak emissions

at $I_F = 10 \text{ mA}$

red	λ_p	typ.	650 nm
green		typ.	565 nm

Capacitance

at $V_R = 0$; $f = 1 \text{ MHz}$

C_d	typ.	100 pF
-------	------	--------

Luminous intensity

red at $I_F = 10 \text{ mA}$ green at $I_F = 20 \text{ mA}$

I_v	min.	1.0 mcd
	typ.	1.5 mcd

DEVELOPMENT DATA

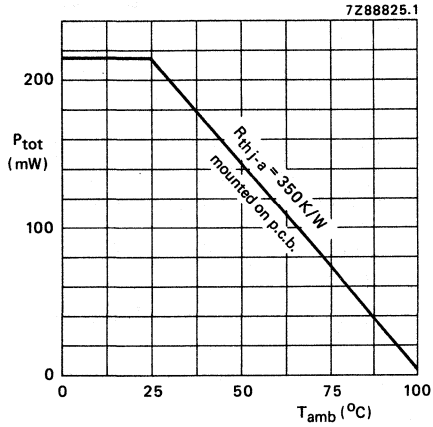


Fig. 2.

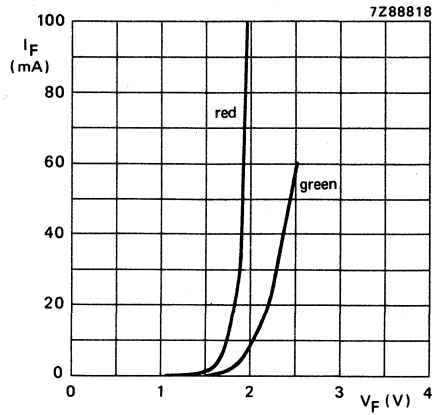


Fig. 3 $T_{amb} = 25^{\circ}C$; typical values.

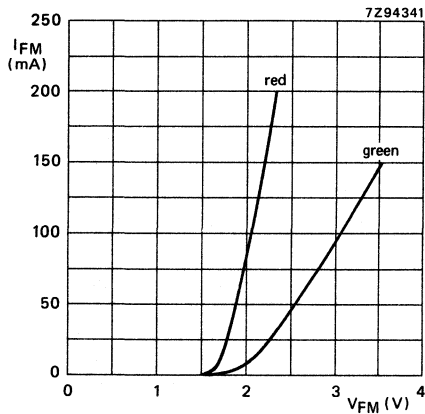


Fig. 4 $t_{on} = 20 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typical values.

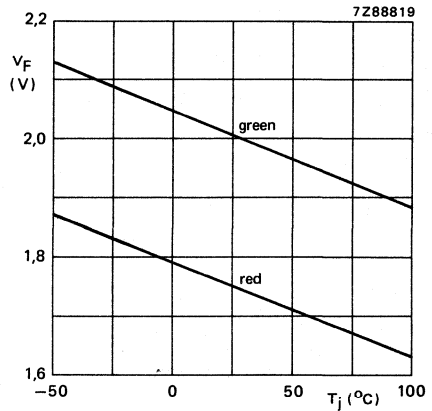


Fig. 5 $I_F = 10 mA$; typical values.

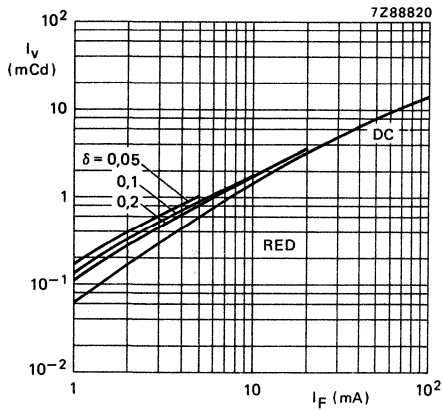


Fig. 6 $t_p = 50 \mu s$; typical values.

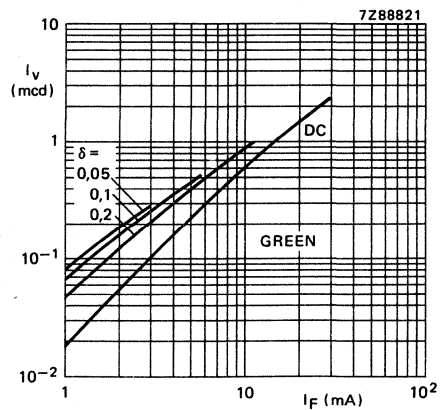


Fig. 7 $t_p = 50 \mu s$; typical values.

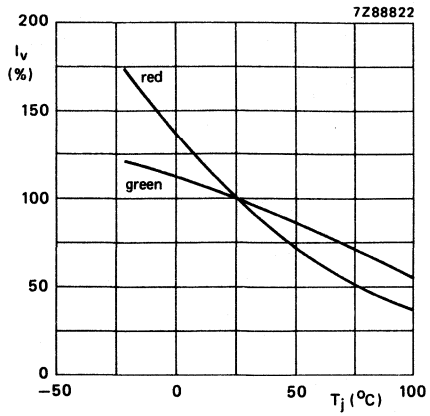


Fig. 8 Typical values.

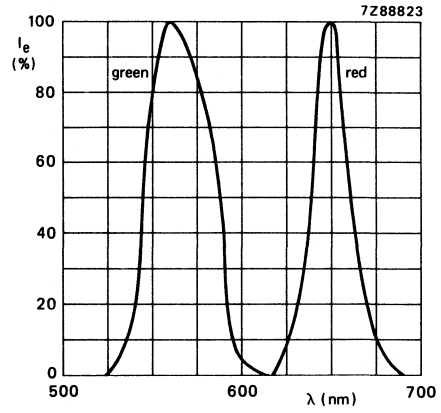


Fig. 9 $I_F = 10$ mA; typical values.

DEVELOPMENT DATA

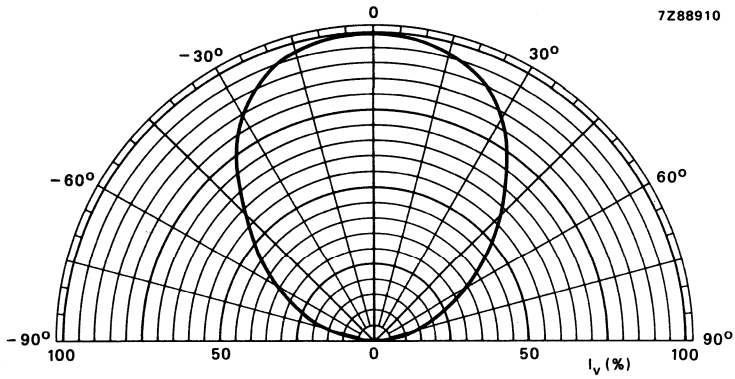


Fig. 10 Typical values.

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 3 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) or green light at a typical peak wavelength of 565 nm (GaP; super-green) depending on the polarity of the current.

The PLED-TR12G has a SOD-77 outline and is encapsulated in a colourless diffusing resin. Because of its SOD-77 envelope, the PLED-TR12G can be used in configurations together with the PLED-HR14 family.

The bicolour function gives this light emitting device special application possibilities, e.g.

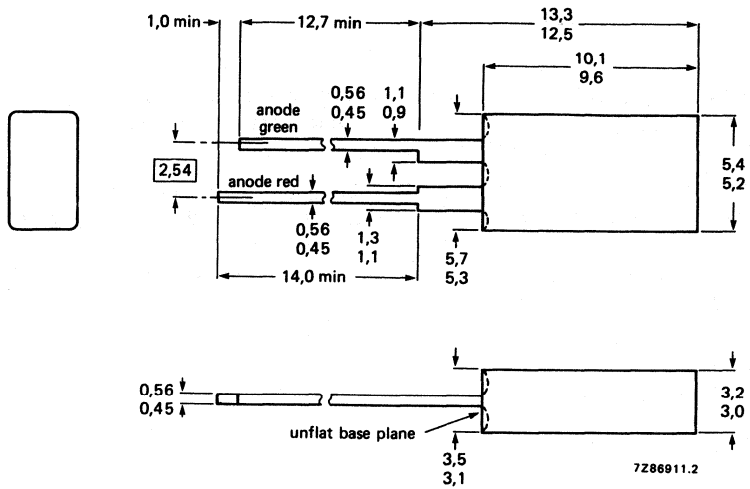
- as level sensor overdrive indicator
- as zero point indicator
- as tuning indicator
- as temperature indicator
- for motor control
- in bicolour information panels

QUICK REFERENCE DATA

Forward current (DC)			
red	I_F	max.	100 mA
green			60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max. 215 mW
Junction temperature		T_j	max. 100 $^\circ\text{C}$
Luminous intensity			
red at $I_F = 20\text{ mA}$	I_v	min.	1.0 mcd
green at $I_F = 20\text{ mA}$			typ. 1.5 mcd
Wavelength at peak emission			
red	λ_p	typ.	650 nm
green			565 nm
Beamwidth between half-intensity directions in the plane of the leads		$\theta_{1/2}$	typ. 110 $^\circ$

MECHANICAL DATA
Fig. 1 SOD-77A2.

Dimensions in mm



RATINGS

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

Forward current (DC)

red	I_F	max.	100 mA
green			60 mA

Forward current

peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$			150 mA

Total power dissipation up to $T_{amb} = 35 \text{ }^\circ\text{C}$

P_{tot}	max.	215 mW
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Junction temperature

T_j	max.	100 $^\circ\text{C}$
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Storage temperature

T_{stg}		-55 to +100 $^\circ\text{C}$
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Lead soldering temperature

> 1.5 mm from the seating plane; $t_{sld} < 7 \text{ s}$

T_{sld}	max.	260 $^\circ\text{C}$
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THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified**Forward voltage**

red at $I_F = 10 \text{ mA}$	V_F	typ.	1.75 V
		max.	2.2 V
green at $I_F = 20 \text{ mA}$	V_F	typ.	2.1 V
		max.	3.0 V

Beamwidth between half-intensity directions

at $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	110 $^\circ$
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Wavelength at peak emission

at $I_F = 10 \text{ mA}$			
red	λ_p	typ.	650 nm
green			565 nm

Luminous intensity

red at $I_F = 10 \text{ mA}$	I_v	min.	1.0 mcd
green at $I_v = 20 \text{ mA}$	I_v	typ.	1.5 mcd

Diode capacitance

at $V_R = 0$; $f = 1 \text{ MHz}$	C_d		100 pF
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DEVELOPMENT DATA

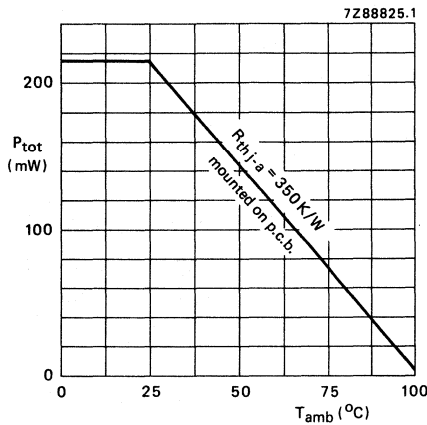


Fig. 2.

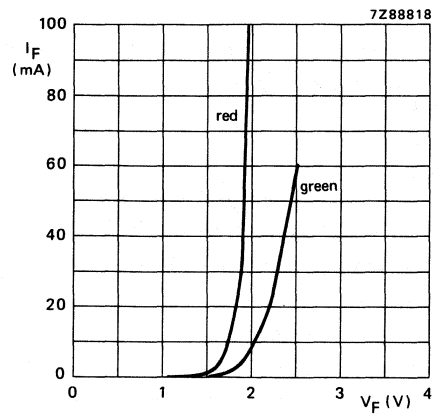


Fig. 3 $T_{amb} = 25^{\circ}C$; typical values.

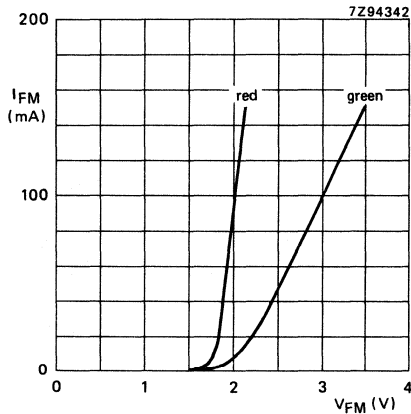


Fig. 4 $t_{on} = 20 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$, typical values.

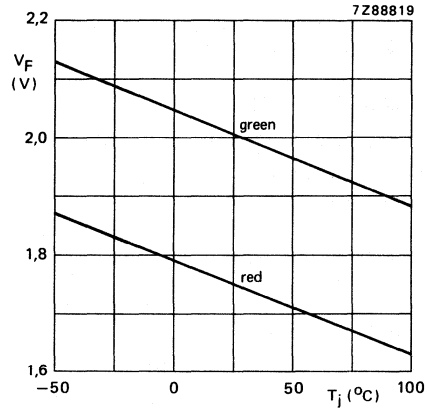


Fig. 5 $I_F = 10 mA$; typical values.

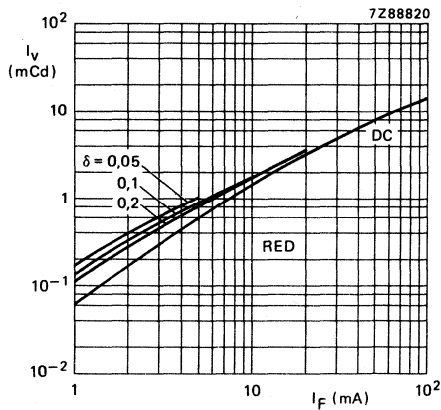


Fig. 6 $t_p = 50 \mu s$; typical values.

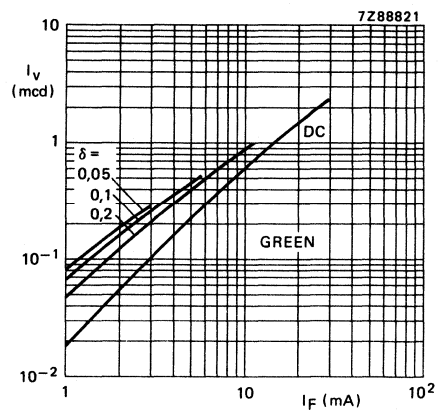


Fig. 7 $t_p = 50 \mu s$; typical values.

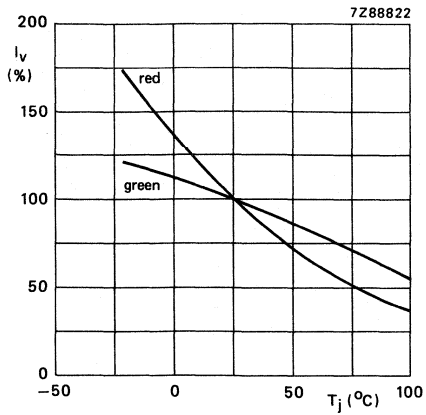


Fig. 8 Typical values.

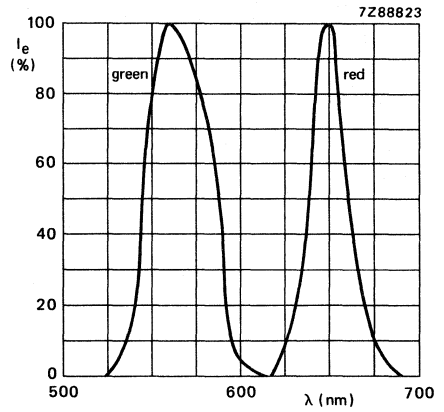


Fig. 9 $I_F = 10$ mA; typical values.

DEVELOPMENT DATA

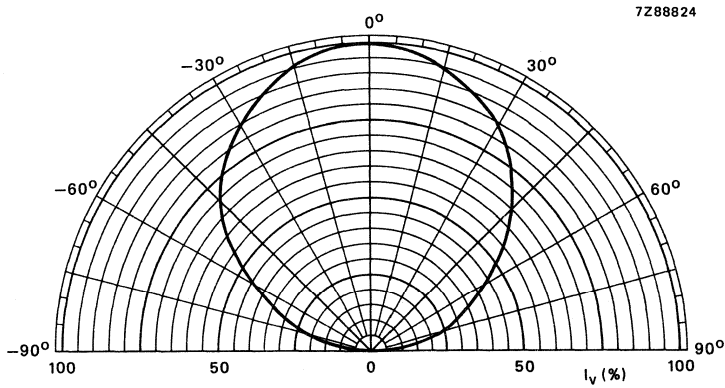


Fig. 10 $I_F = 10$ mA; typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-TR42DL

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 5 mm which emits red light at a typical peak wavelength of 650 nm (GaAlAs; hyper-red) or green light at a typical peak wavelength of 565 nm (GaP; super-green) depending on the polarity of the current. The PLED-TR42DL has a SOD-74L envelope and is encapsulated in a clear diffusing resin.

Because of its high I_V the PLED-TR42DL is suitable for applications where only low currents are available.

The PLED-TR42DL is suitable for surface illumination such as announcing boards, score boards, moving advertisements and electronic games applications. A third colour (orange) is available when an alternating current is applied.

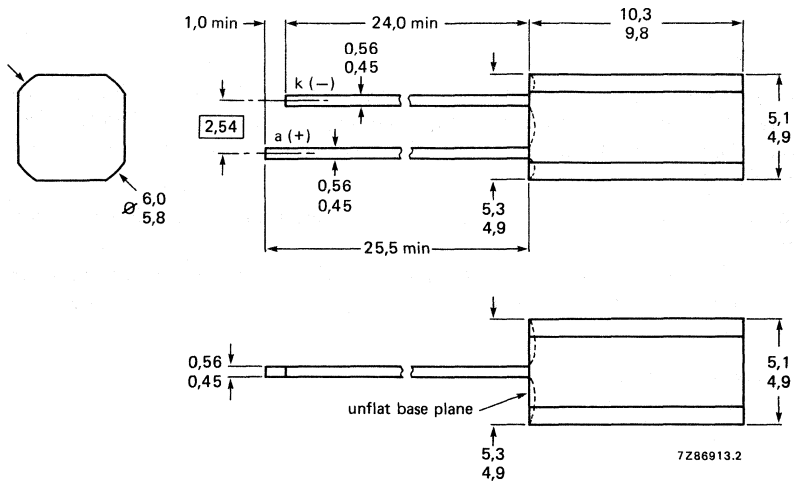
QUICK REFERENCE DATA

Forward current (DC)			
red			100 mA
green	I_F	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	215 mW
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Luminous intensity			
red at $I_F = 10\text{ mA}$		min.	1.0 mcd
green at $I_F = 20\text{ mA}$	I_V	typ.	2.0 mcd
Wavelength at peak emission			
red			650 nm
green	λ_p	typ.	565 nm
Beamwidth between half-intensity directions	$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-74L.

Dimensions in mm



Note. Solderability not guaranteed in tie-bar zone.

RATINGS

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

Forward current (DC)

red	I_F	max.	100 mA
green			60 mA

Forward current

peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$		max.	150 mA

Total power dissipation up to $T_{amb} = 25 \text{ }^\circ\text{C}$

P_{tot}	max.	215 mW
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Storage temperature

T_{stg}		-55 to +100 $^\circ\text{C}$
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Junction temperature

T_j	max.	100 $^\circ\text{C}$
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Lead soldering temperature

> 5.0 mm from the plastic body; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$
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THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage

red at $I_F = 10 \text{ mA}$	V_F	typ.	1.75 V
		max.	2.2 V
green at $I_F = 20 \text{ mA}$	V_F	typ.	2.1 V
		max.	3.0 V

Beamwidth between half-intensity directions

$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
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Wavelength at peak emission at $I_F = 10 \text{ mA}$

red	λ_p	typ.	650 nm
green			565 nm

Luminous intensity

red at $I_F = 10 \text{ mA}$	I_v	min.	1.0 mcd
green at $I_F = 20 \text{ mA}$		typ.	2.0 mcd

Diode capacitance

$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	100 pF
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DEVELOPMENT DATA

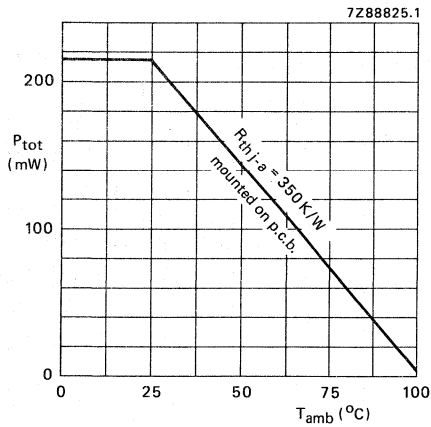


Fig. 2.

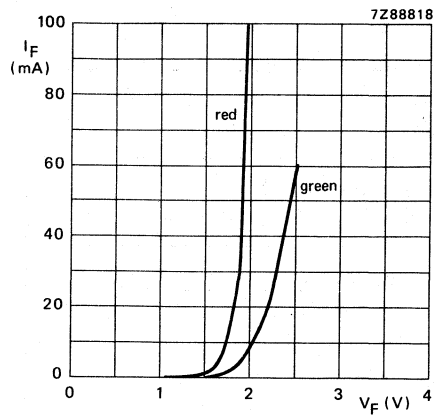


Fig. 3 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values.

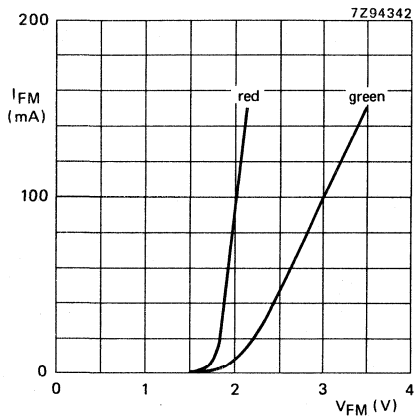


Fig. 4 $t_{on} = 20\text{ }\mu\text{s}$; $\delta = 0.01$;
 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typical values.

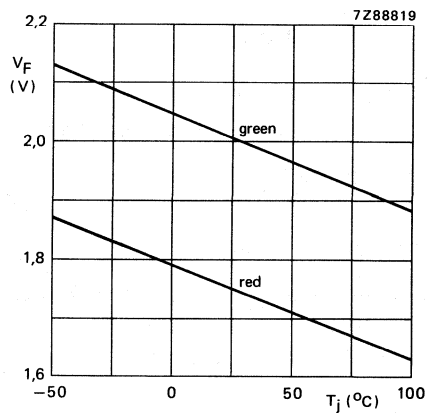


Fig. 5 $I_F = 10\text{ mA}$; typical values.

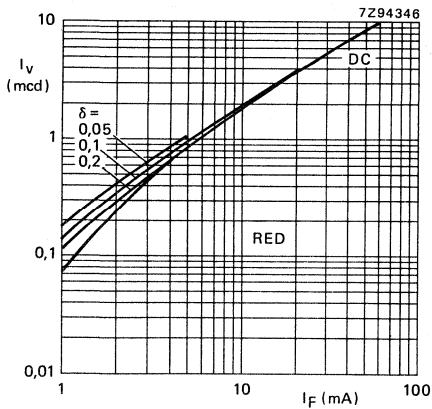


Fig. 6 $t_p = 50\text{ }\mu\text{s}$; typical values.

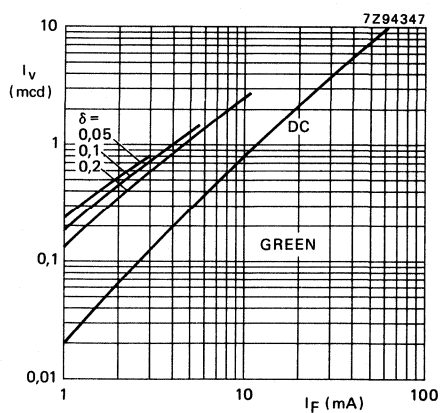


Fig. 7 $t_p = 50\text{ }\mu\text{s}$; typical values.

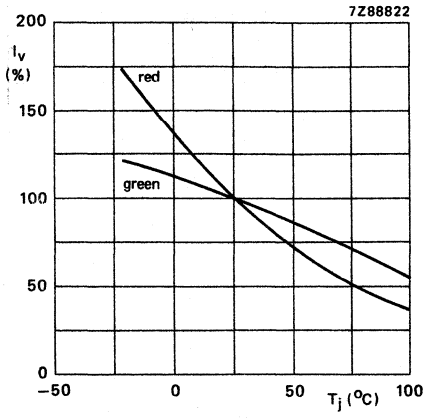


Fig. 8 Typical values.

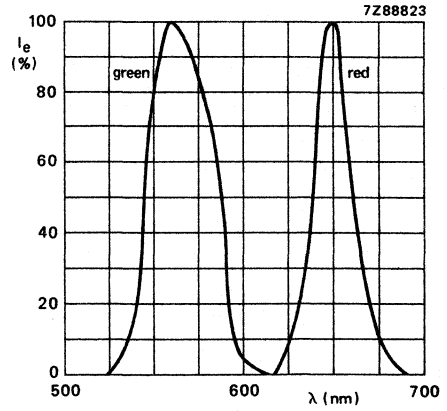


Fig. 9 $I_F = 10$ mA; typical values.

DEVELOPMENT DATA

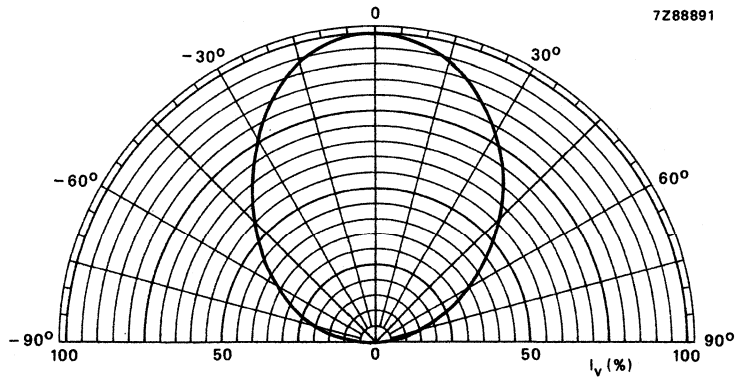


Fig. 10 Typical values.

LIGHT EMITTING DIODE WITH HIGH LUMINOSITY

Circular light emitting diode with a diameter of 3 mm which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y313A has a SOD-53 outline and is mounted in a yellow non-diffusing resin. An appropriate device, for example, backlighting push button indicators.

Note: This device has to be used behind a diffusing screen.

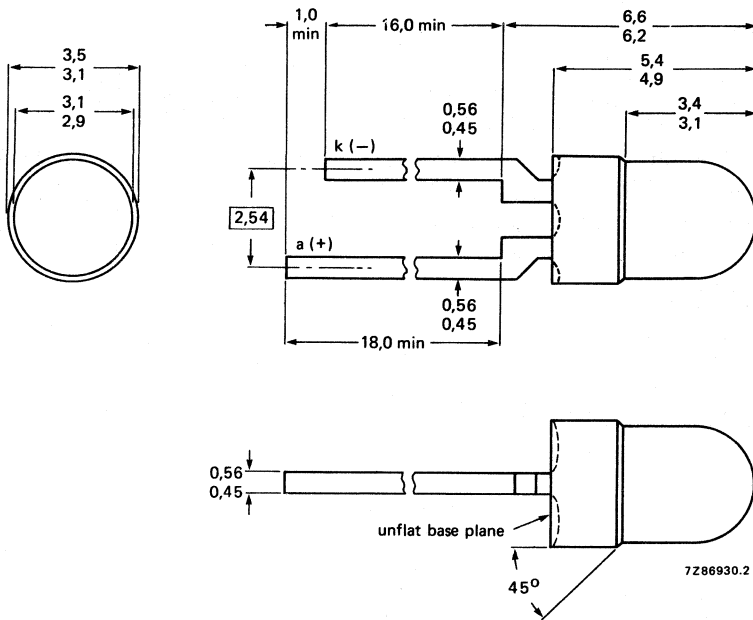
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 55\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y313A	I_v	min.	3 mcd
	PLED-Y313A-5	I_v		5 to 12 mcd
	PLED-Y313A-6	I_v		10 to 22 mcd
	PLED-Y313A-7	I_v	min.	16 mcd
Wavelength at peak emission		λ_p	typ.	590 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	60 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-53E.

Dimensions in mm



RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$		max.	60 mA
Total power dissipation up to $T_{amb} = 55 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1.5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th j-a}$	max.	500 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	60 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-Y313A	I_v	min.	3 mcd
	PLED-Y313A-5	I_v		5 to 12 mcd
	PLED-Y313A-6	I_v		10 to 22 mcd
	PLED-Y313A-7	I_v	min.	16 mcd
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF	

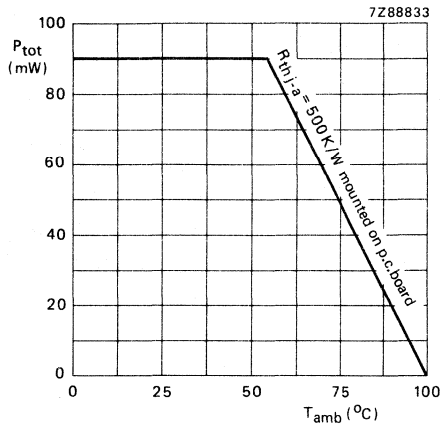


Fig. 2.

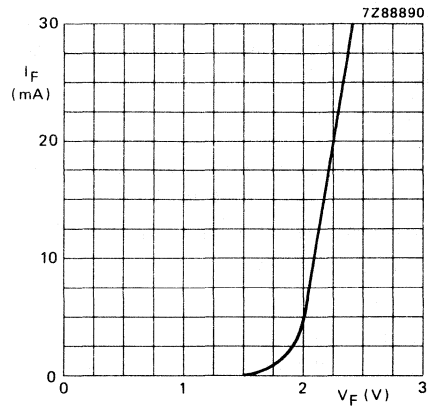


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

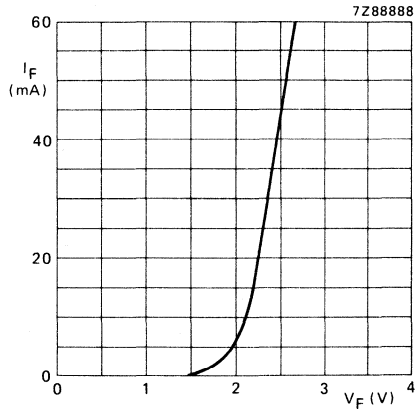


Fig. 4 $t_p = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

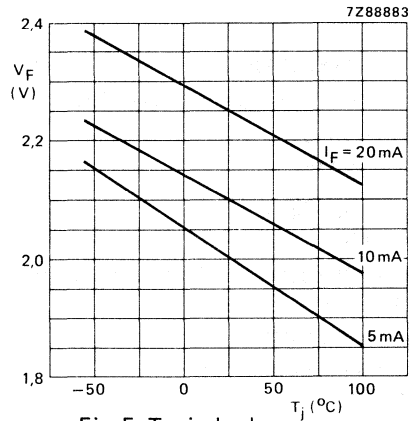


Fig. 5 Typical values.

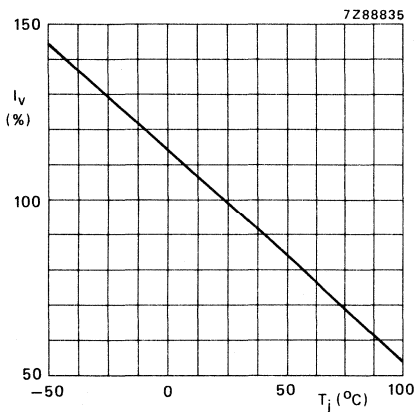


Fig. 6 Typical values.

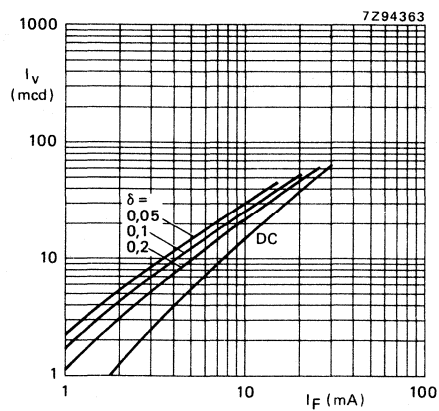


Fig. 7 $T_j = 25^{\circ}C$; typ. values.

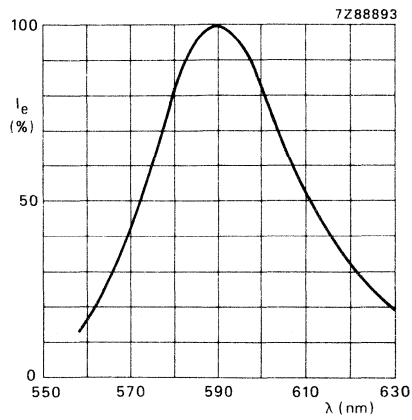


Fig. 8 Typical values.

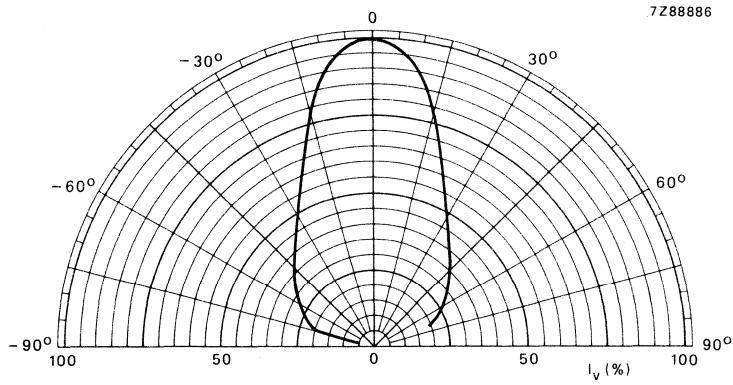


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-Y313N

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits yellow light (GaAsP; yellow) at a typical peak wavelength of 590 nm when forward biased.

The PLED-Y313N has a SOD-82C1 outline and is encapsulated in a yellow non-diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	0,7 mcd
$I_F = 10\text{ mA}$	PLED-Y313N	I_v	typ.	1,6 mcd
	PLED-Y313N-3	I_v		1,6 to 3,5 mcd
	PLED-Y313N-4	I_v		3,0 to 7,0 mcd
	PLED-Y313N-45	I_v		3,0 to 12,0 mcd
	PLED-Y313N-5	I_v		5,0 to 12,0 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	590 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	25 deg

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{on} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to + 100 °C
Operating ambient temperature	T_{opr}		-25 to + 85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS $T_{amb} = 25$ °C unless otherwise specified

Forward voltage			
$I_F = 20$ mA	V_F	typ.	2,2 V
		max.	2,8 V
Reverse current			
$V_R = 5$ V	I_R	max.	10 μ A
Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	25 deg
Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
Wavelength at peak emission			
$I_F = 10$ mA	λ_p	typ.	590 nm
Luminous intensity			
$I_F = 10$ mA		min.	0,7 mcd
	PLED-Y313N	typ.	1,6 mcd
	PLED-Y313N-3		1,6 to 3,5 mcd
	PLED-Y313N-4		3,0 to 7,0 mcd
	PLED-Y313N-45		3,0 to 12,0 mcd
	PLED-Y313N-5		5,0 to 12,0 mcd

DEVELOPMENT DATA

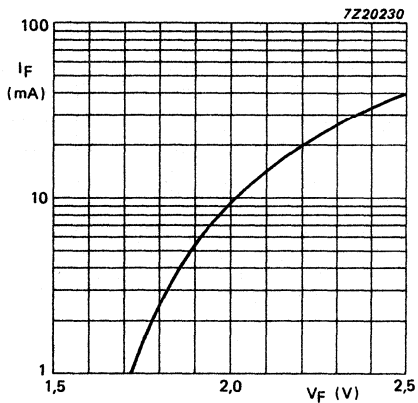


Fig. 2 $I_F = f(V_F)$; typical values.

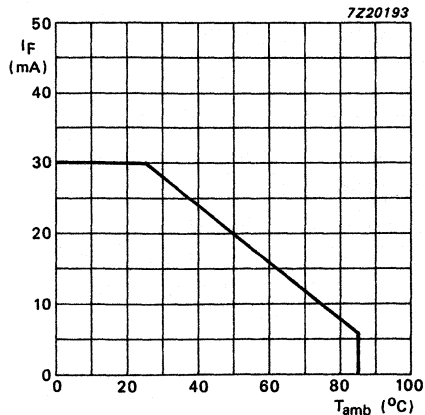


Fig. 3 $I_F = f(T_{amb})$; typical values.

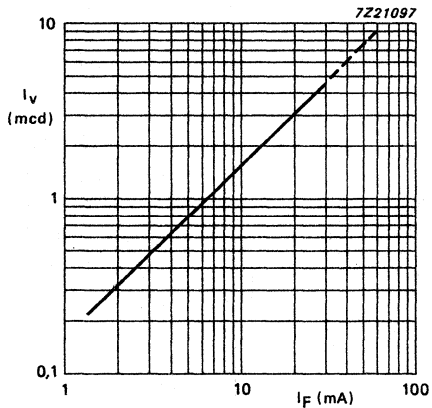


Fig. 4 $I_V = f(I_F)$; typical values.

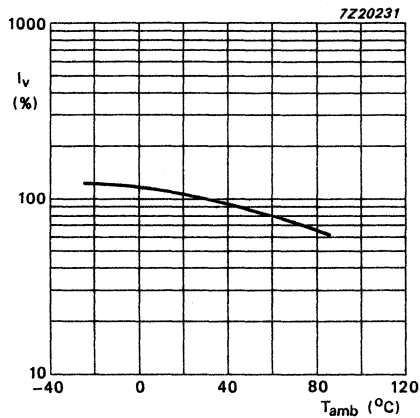


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

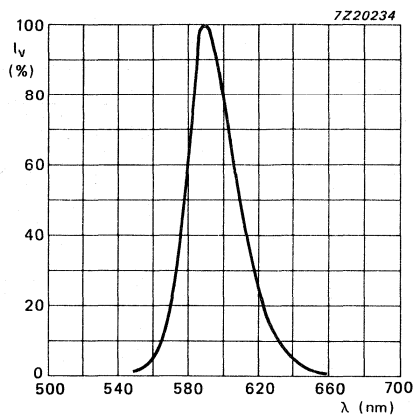


Fig. 6 Spectral response; typical values.

DEVELOPMENT DATA

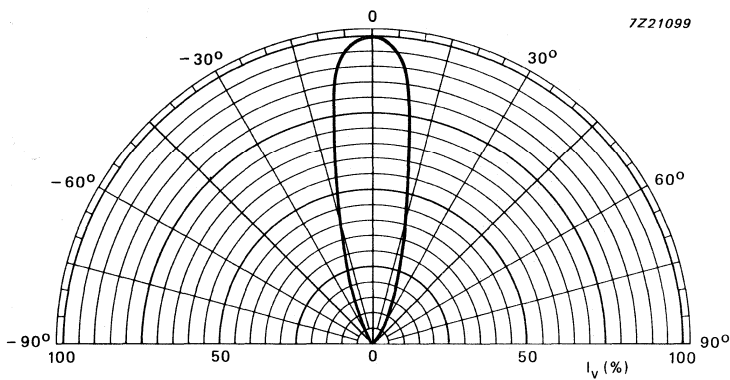


Fig. 7 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode with a diameter of 3 mm which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y314A has a SOD-53 envelope and is encapsulated in a yellow coloured resin.

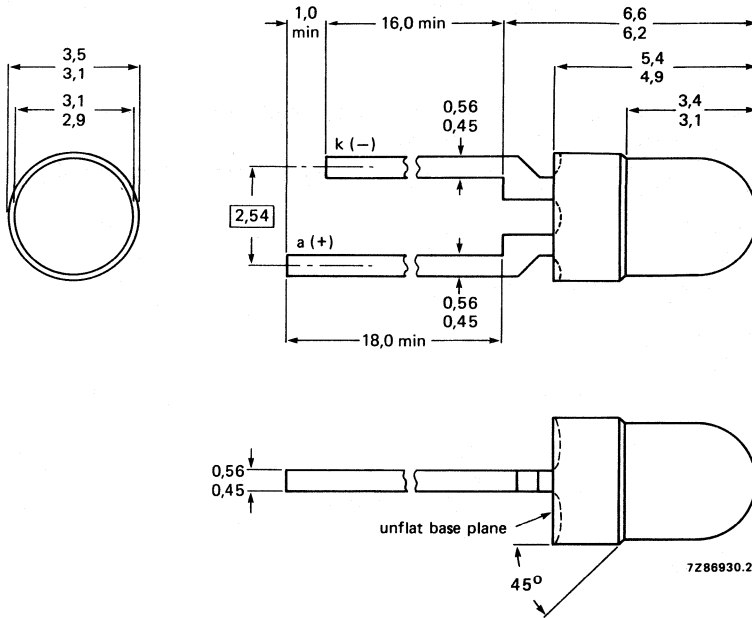
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 55\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y314A	I_V	min.	0.7 mcd
	PLED-Y314A-3	I_V		1.6 to 3.5 mcd
	PLED-Y314A-4	I_V		3.0 to 7.0 mcd
	PLED-Y314A-5	I_V	min.	5.0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-53E.

Dimensions in mm



RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value, $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{amb} = 55 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 1.5 mm from the seating plane; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient

when the device is mounted on a PCB

$R_{th j-a}$	max.	500 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V
		max.	3.0 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions			
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	70 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm
Luminous intensity (class division)			
$I_F = 10 \text{ mA}$			
	PLED-Y314A	I_v	min. 0.7 mcd
	PLED-Y314A-3	I_v	1.6 to 3.5 mcd
	PLED-Y314A-4	I_v	3.0 to 7.0 mcd
	PLED-Y314A-5	I_v	min. 5.0 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF

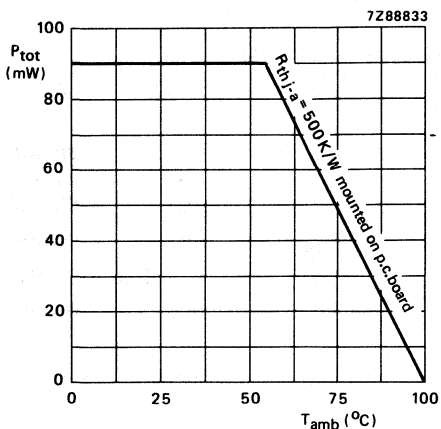


Fig. 2.

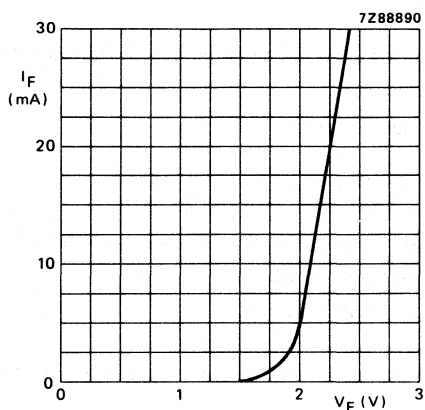


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

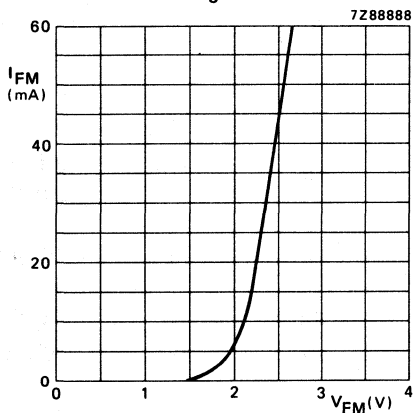


Fig. 4 $t_p = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

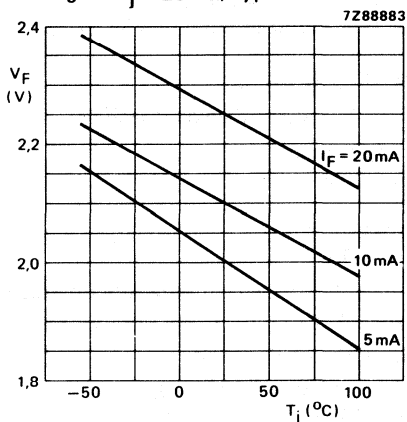


Fig. 5 Typical values.

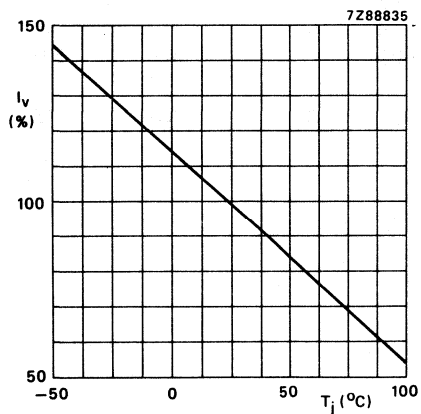


Fig. 6 Typical values.

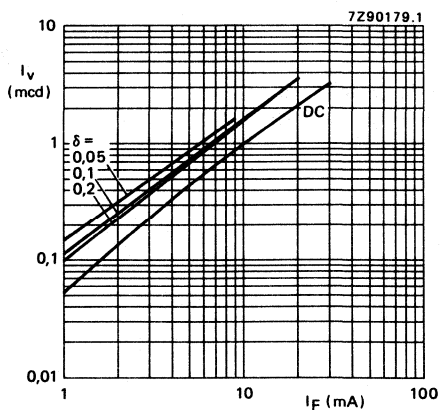


Fig. 7 $T_j = 25^{\circ}C$, typ. values.

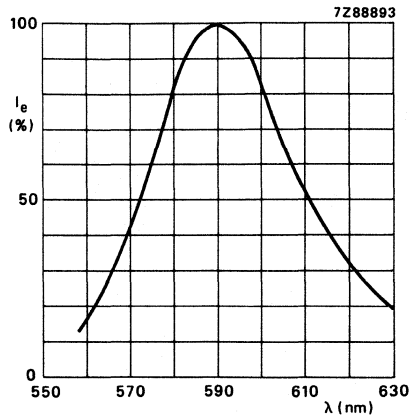


Fig. 8 Typical values.

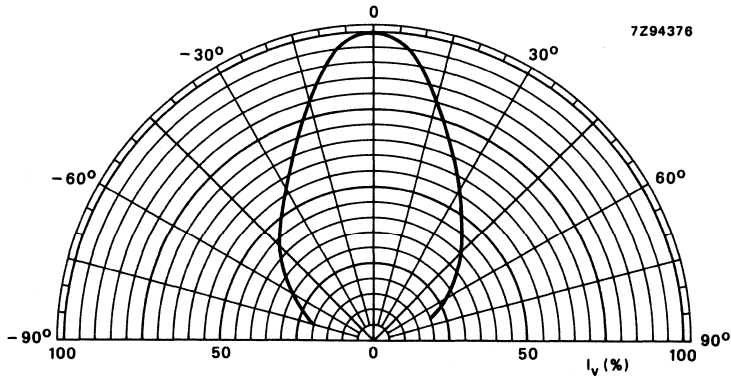


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-Y314N
PLED-Y334NL

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 3 mm which emit yellow light (GaAsP; yellow) at a typical peak wavelength of 590 nm when forward biased.

The PLED-Y314N has a SOD-82C1 outline and is encapsulated in a yellow diffusing resin.

The PLED-Y334NL has a SOD-82A1 outline and is encapsulated in a yellow diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	5 V
Forward current (d.c.)	I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Luminous intensity			
$I_F = 10\text{ mA}$	PLED-Y314N/Y334NL	I_v	min. 0,7 mcd typ. 1,6 mcd
	PLED-Y314N/Y334NL-2	I_v	1,0 to 2,2 mcd
	PLED-Y314N/Y334NL-3	I_v	1,6 to 3,5 mcd
	PLED-Y314N/Y334NL-4	I_v	3,0 to 7,0 mcd
	PLED-Y314N/Y334NL-45	I_v	3,0 to 12,0 mcd
	PLED-Y314N/Y334NL-5	I_v	5,0 to 12,0 mcd
Wavelength at peak emission			
$I_F = 20\text{ mA}$		λ_p	typ. 590 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ. 60 deg

PLED-Y314N
PLED-Y334NL

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-82C1.
PLED-Y314N

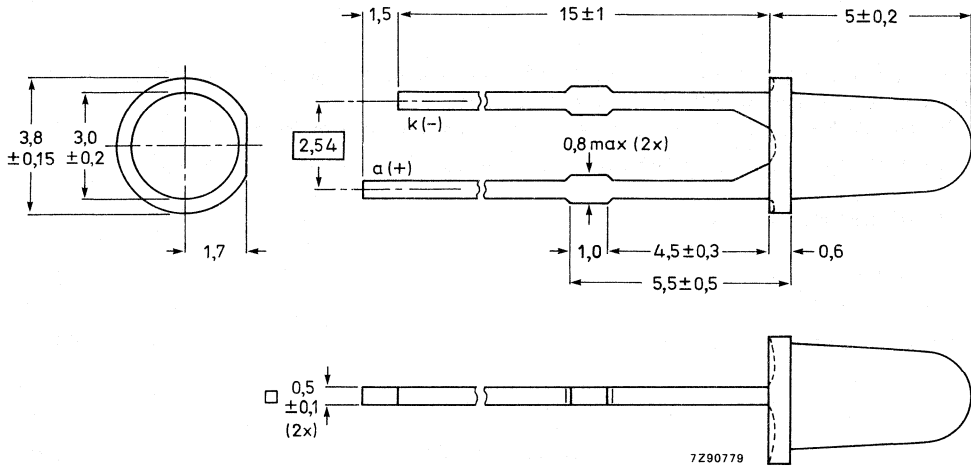
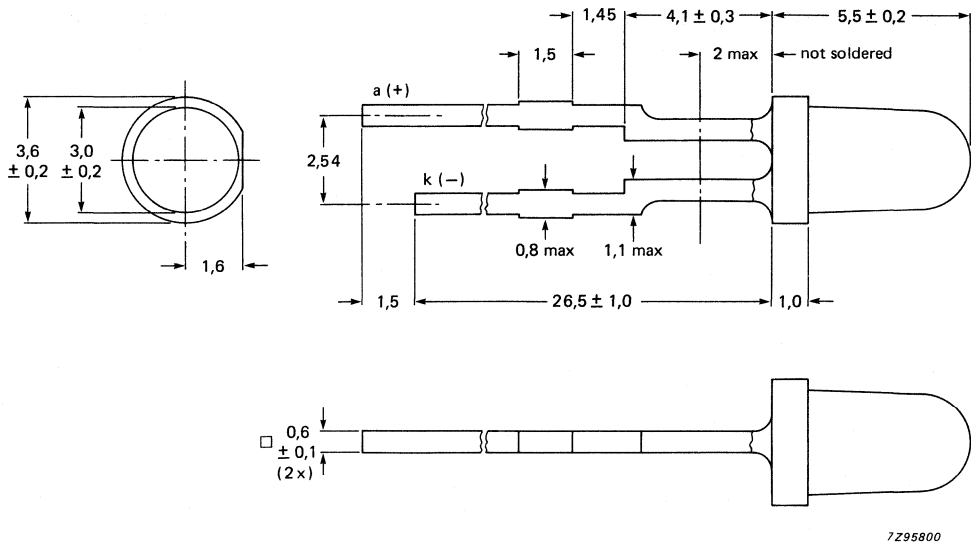


Fig. 1b SOD-82A1.
PLED-Y334NL



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{on} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to + 100 °C
Operating ambient temperature	T_{opr}		-25 to + 85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS $T_{amb} = 25$ °C unless otherwise specified

DEVELOPMENT DATA	Forward voltage			
	$I_F = 20$ mA	V_F	typ.	2,2 V
			max.	2,8 V
	Reverse current			
	$V_R = 5$ V	I_R	max.	10 μ A
	Beamwidth at half-intensity directions	$\theta_{1/2}$	typ.	60 deg
	Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
	Wavelength at peak emission			
	$I_F = 10$ mA	λ_p	typ.	590 nm
	Luminous intensity			
$I_F = 10$ mA		min.	0,7 mcd	
	PLED-Y314N/Y334NL	I_v	typ.	1,6 mcd
	PLED-Y314N/Y334NL-2	I_v		1,0 to 2,2 mcd
	PLED-Y314N/Y334NL-3	I_v		1,6 to 3,5 mcd
	PLED-Y314N/Y334NL-4	I_v		3,0 to 7,0 mcd
	PLED-Y314N/Y334NL-45	I_v		3,0 to 12,0 mcd
	PLED-Y314N/Y334NL-5	I_v		5,0 to 12,0 mcd

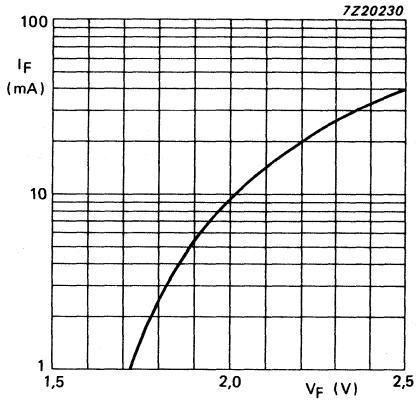


Fig. 2 $I_F = f(V_F)$; typical values.

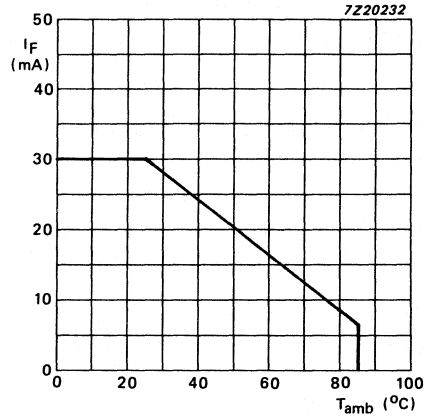


Fig. 3 $I_F = f(T_{amb})$; typical values.

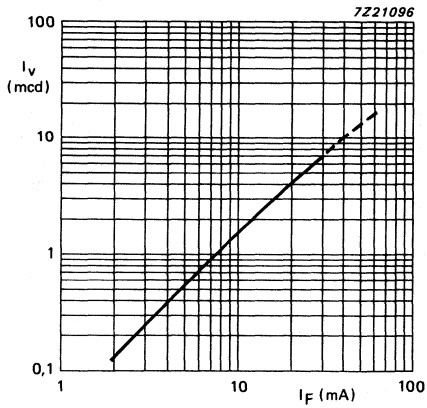


Fig. 4 $I_V = f(I_F)$; typical values.

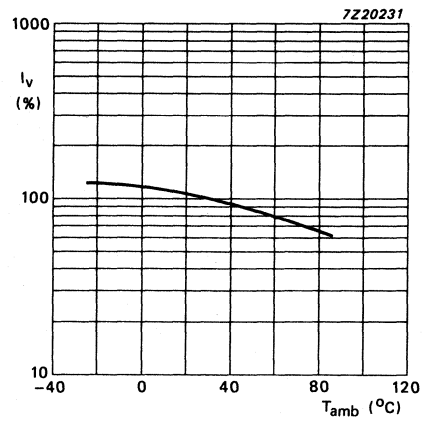


Fig. 5 $I_V(\%) = f(T_{amb})$; typical values.

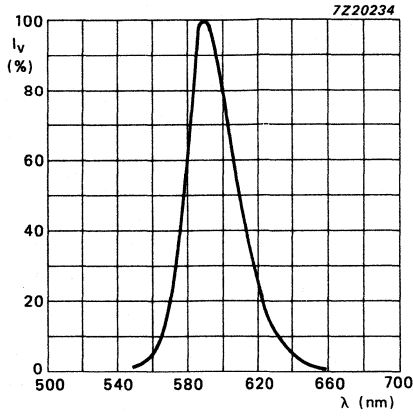


Fig. 6 Spectral response; typical values.

DEVELOPMENT DATA

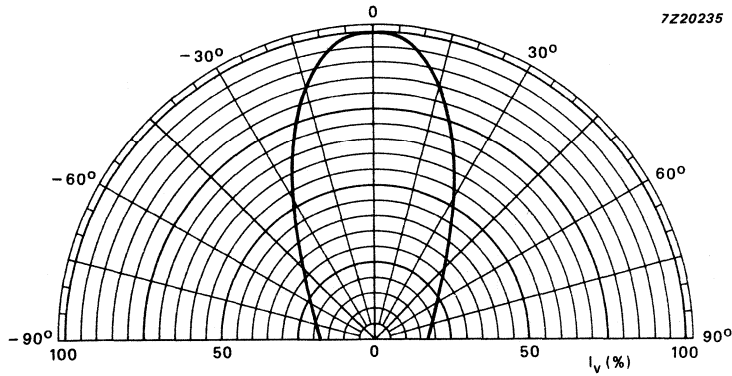


Fig. 7 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit a narrow beam of yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y511C and PLED-Y541CL have a SOD-63 outline and are encapsulated in a clear resin.

The PLED-Y541CL is the long-lead version of the PLED-Y511C and has no seating plane but is in all other respects equal to the PLED-Y511C.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y511C(Y541CL)	I_v	min.	10 mcd
	PLED-Y511C(Y541CL)-7	I_v		16 to 35 mcd
	PLED-Y511C(Y541CL)-8	I_v		30 to 70 mcd
	PLED-Y511C(Y541CL)-9	I_v	min.	50 mcd
Wavelength at peak emission		λ_p	typ.	590 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	20 $^\circ$

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	30 mA
Forward current peak value; $t_p = 1 \mu s$; $f = 300$ Hz	I_{FRM}	max.	1 A
peak value; $t_{ON} = 1$ ms; $\delta = 0.33$		max.	60 mA
Total power dissipation up to $T_{amb} = 65$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 °C
Junction temperature	T_j	max.	100 °C
Lead soldering temperature; $t_{sld} < 7$ s > 1.5 mm from the seating plane for PLED-Y511C > 5 mm from the plastic body for PLED-Y541CL	T_{sld}	max.	260 °C

THERMAL RESISTANCE

From junction to ambient	$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25$ °C unless otherwise specified

Forward voltage $I_F = 10$ mA	V_F	typ.	2.1 V
		max.	3.0 V
Reverse current $V_R = 5$ V	I_R	max.	100 μA
Beamwidth between half-intensity directions $I_F = 10$ mA	$\theta_{1/2}$	typ.	20 °
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission $I_F = 10$ mA	λ_p	typ.	590 nm
Luminous intensity $I_F = 10$ mA			
	PLED-Y511C(Y541CL)	I_v	min. 10 mcd
	PLED-Y511C(Y541CL)-7	I_v	16 to 35 mcd
	PLED-Y511C(Y541CL)-8	I_v	30 to 70 mcd
	PLED-Y511C(Y541CL)-9	I_v	min. 50 mcd
Diode capacitance $V_R = 0$; $f = 1$ MHz	C_d	typ.	15 pF

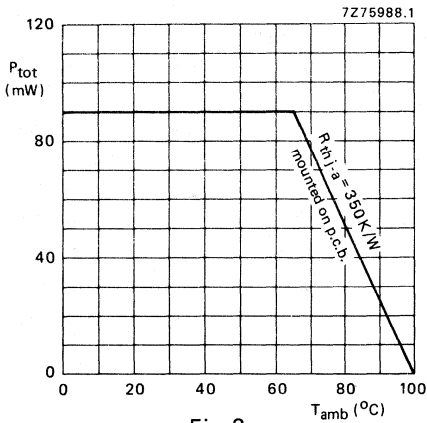


Fig. 2.

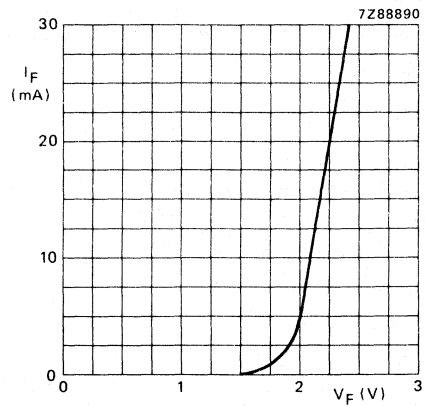


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

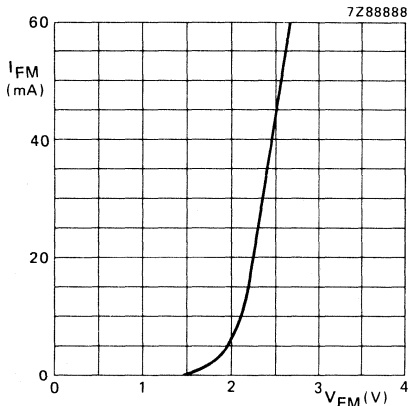


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

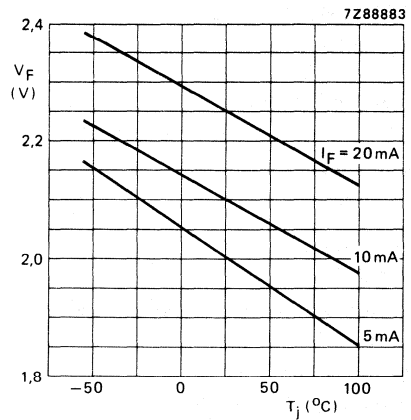


Fig. 5 Typical values.

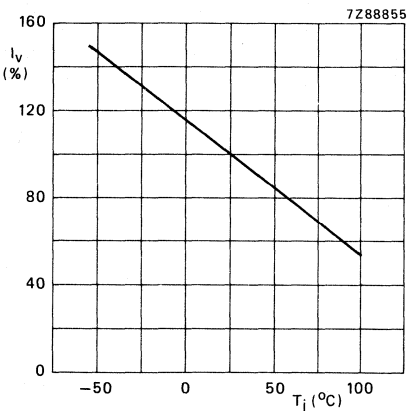


Fig. 6 $I_F = 10 mA$; typ. values.

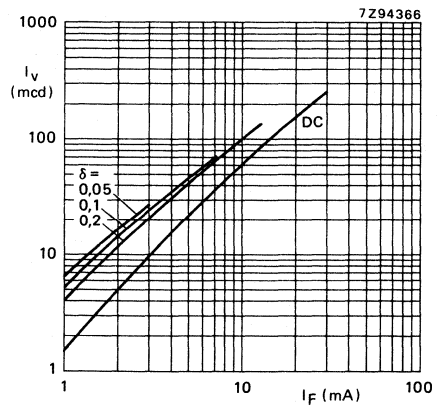


Fig. 7 $t_p = 50 \mu s$; typ. values.

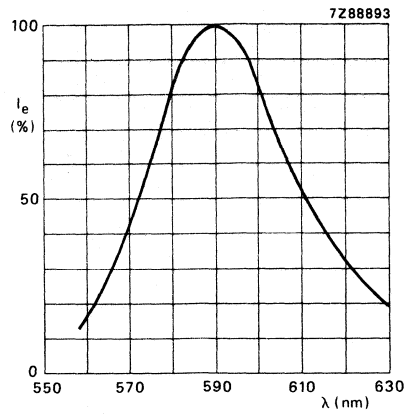


Fig. 8 Typical values.

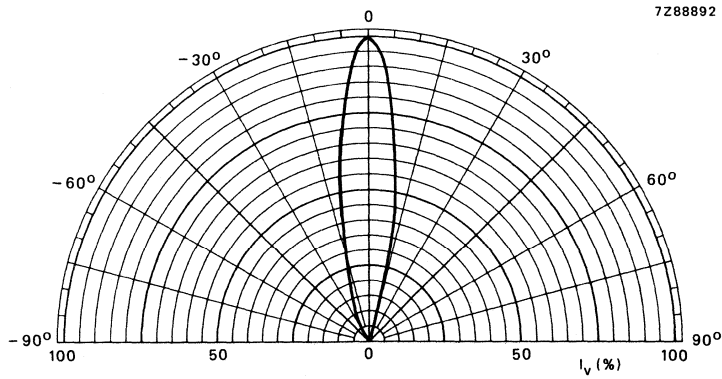


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit a narrow beam of yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y513C and PLED-Y543CL have a SOD-63 outline and are encapsulated in a yellow diffusing resin.

The PLED-Y543CL is the long-lead version of the PLED-Y513C and has no seating plane but is in all other respects equal to the PLED-Y513C.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 °C
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y513C(Y543CL)	I_v	min.	10 mcd
	PLED-Y513C(Y543CL)-6	I_v		10 to 22 mcd
	PLED-Y513C(Y543CL)-7	I_v		16 to 35 mcd
	PLED-Y513C(Y543CL)-8	I_v	min.	30 mcd
Wavelength at peak emission		λ_p	typ.	590 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	20 °

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-63DI.
PLED-Y513C

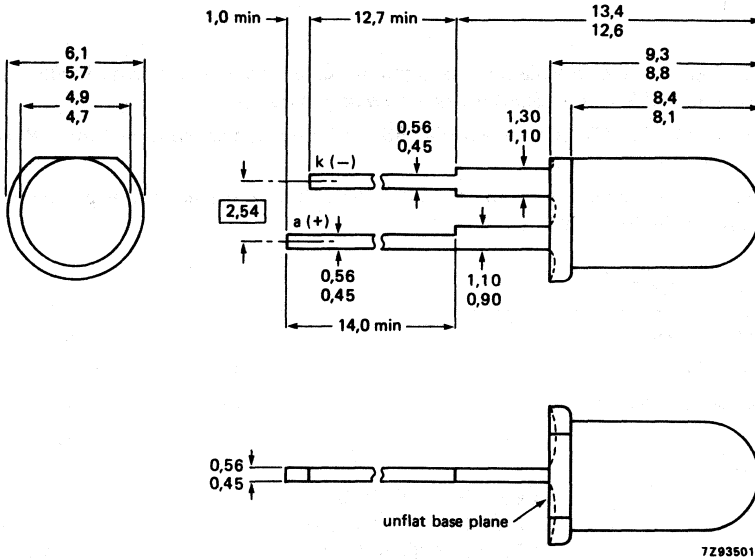
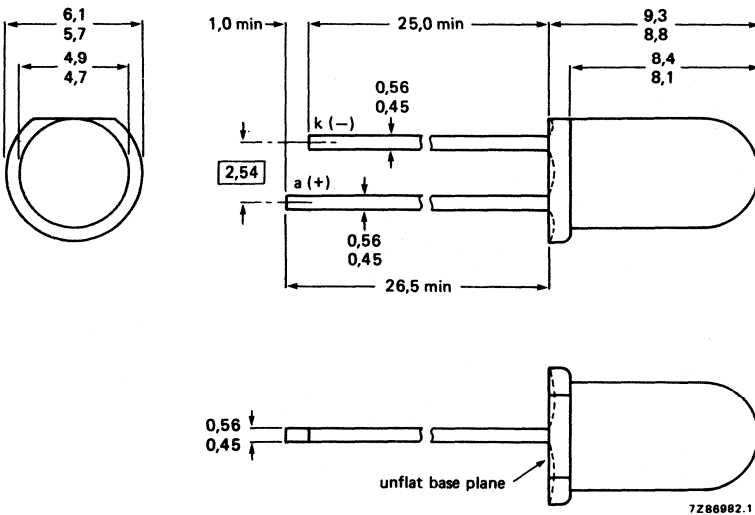


Fig. 1b SOD-63L.
PLED-Y543CL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	30 mA
Forward current peak value; $t_p = 1 \mu s$; $f = 300$ Hz	I_{FRM}	max.	1 A
peak value; $t_{ON} = 1$ ms; $\delta = 0.33$		max.	60 mA
Total power dissipation up to $T_{amb} = 65$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 °C
Junction temperature	T_j	max.	100 °C
Lead soldering temperature; $t_{sld} < 7$ s > 1.5 mm from the seating plane for PLED-Y513C > 5 mm from the plastic body for PLED-Y543CL	T_{sld}	max.	260 °C

THERMAL RESISTANCE

From junction to ambient	$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25$ °C unless otherwise specified

Forward voltage $I_F = 10$ mA	V_F	typ. max.	2.1 V 3.0 V
Reverse current $V_R = 5$ V	I_R	max.	100 μA
Beamwidth between half-intensity directions $I_F = 10$ mA	$\theta_{1/2}$	typ.	20 °
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission $I_F = 10$ mA	λ_p	typ.	590 nm
Luminous intensity $I_F = 10$ mA	PLED-Y513C(Y543CL) PLED-Y513C(Y543CL)-6 PLED-Y513C(Y543CL)-7 PLED-Y513C(Y543CL)-8	I_v I_v I_v I_v	min. 10 to 22 mcd 16 to 35 mcd min. 30 mcd
Diode capacitance $V_R = 0$; $f = 1$ MHz	C_d	typ.	15 pF

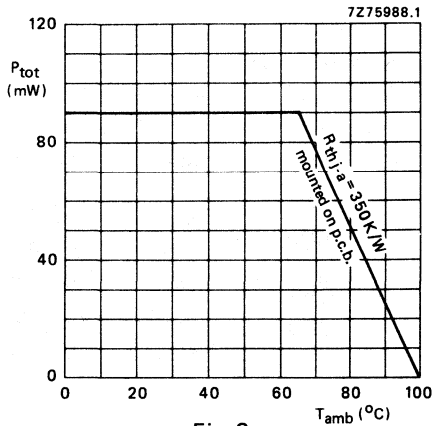


Fig. 2.

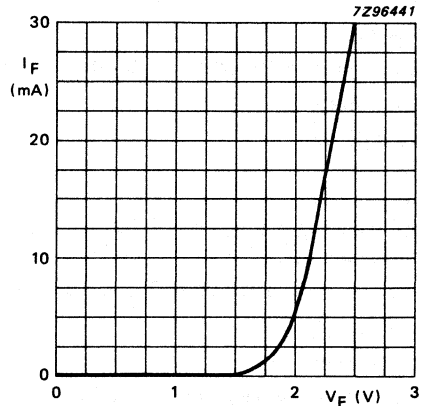


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

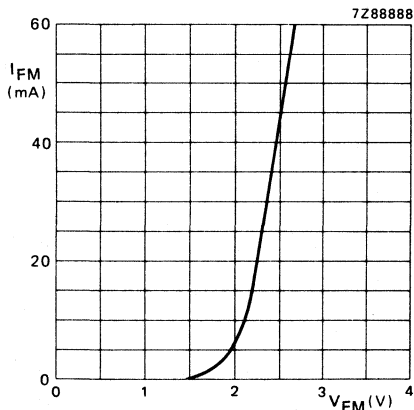


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$,
 $T_{amb} = 25^{\circ}C$; typ. values.

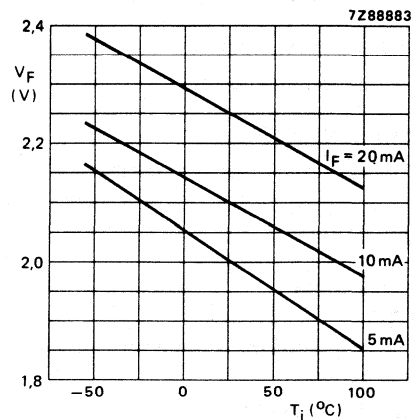


Fig. 5 Typical values.

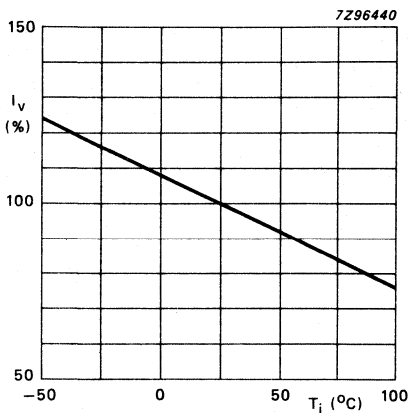


Fig. 6 Typical values; $I_F = 10 mA$.

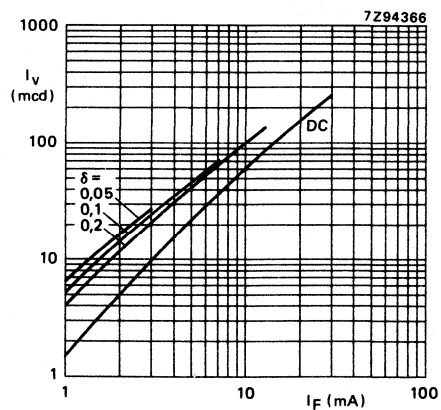


Fig. 7 $t_p = 50 \mu s$; typ. values.

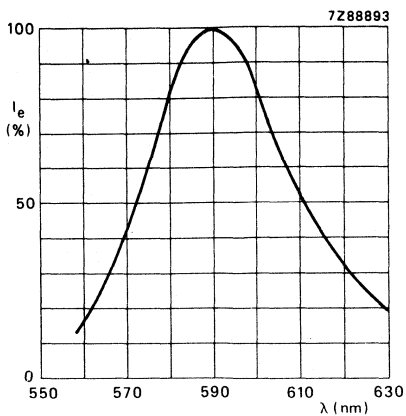


Fig. 8 Typical values.

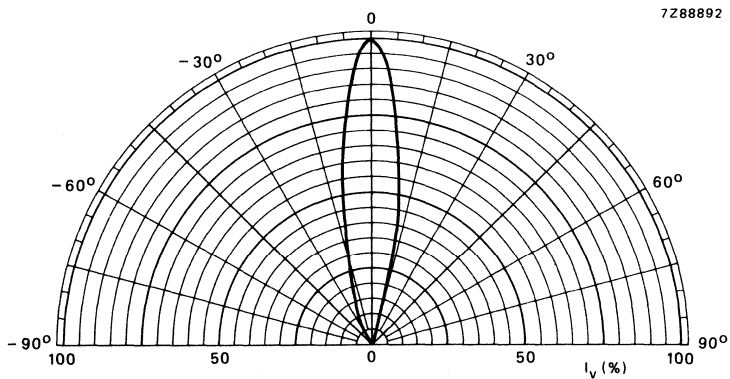


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-Y513M
PLED-Y533ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit yellow light (GaAsP; yellow) at a typical peak wavelength of 590 nm when forward biased.

The PLED-Y513M has a SOD-90C1 outline and is encapsulated in an yellow non-diffusing resin.

The PLED-Y533ML has a SOD-90A1 outline and is encapsulated in an yellow non-diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Luminous intensity			min.	1,6 mcd
$I_F = 10\text{ mA}$	PLED-Y513M/Y533ML	I_v	typ.	5,0 mcd
	PLED-Y513M/Y533ML-4	I_v		3,0 to 7,0 mcd
	PLED-Y513M/Y533ML-5	I_v		5,0 to 12 mcd
	PLED-Y513M/Y533ML-56	I_v		5,0 to 22 mcd
	PLED-Y513M/Y533ML-6	I_v		10 to 22 mcd
	PLED-Y513M/Y533ML-7	I_v		15 to 35 mcd
Wavelength at peak emission				
$I_F = 20\text{ mA}$		λ_p	typ.	590 nm
Beamwidth at half-intensity directions		$\theta_{\frac{1}{2}}$	typ.	35 °

PLED-Y513M
PLED-Y533ML

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-90C1
PLED-Y513M

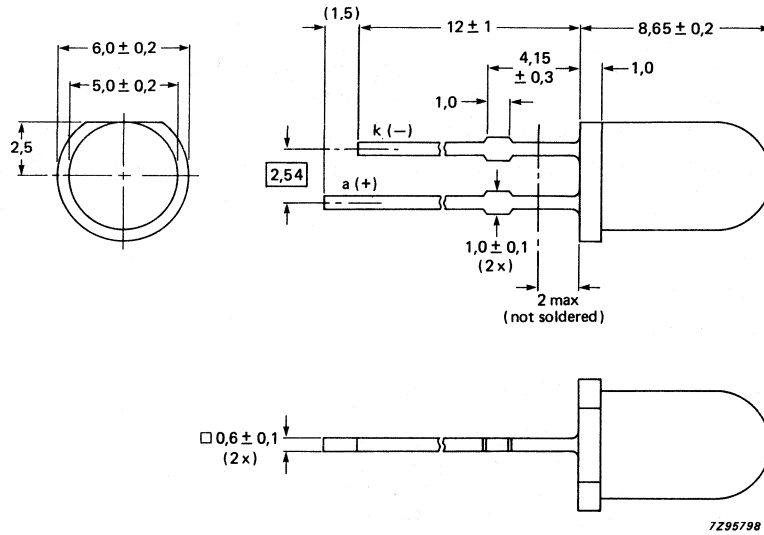
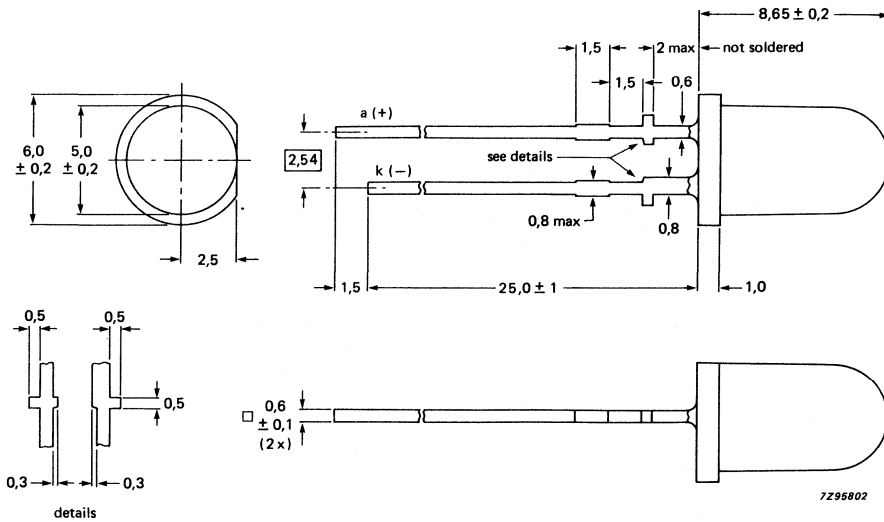


Fig. 1b SOD-90A1
PLED-Y533ML



RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 $^\circ\text{C}$
Operating ambient temperature	T_{opr}		-25 to +85 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 1,5 mm from the seating plane	T_{sld}	max.	260 $^\circ\text{C}$

CHARACTERISTICS

 $T_{amb} = 25 \text{ }^\circ\text{C}$ unless otherwise specified

DEVELOPMENT DATA	Forward voltage			
	$I_F = 20 \text{ mA}$	V_F	typ.	2,2 V
			max.	2,8 V
	Reverse current			
	$V_R = 5 \text{ V}$	I_R	max.	10 μA
	Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	35 $^\circ$
	Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
	Wavelength at peak emission			
	$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm
	Luminous intensity			
$I_F = 10 \text{ mA}$		min.	1,6 mcd	
		typ.	5,0 mcd	
	PLED-Y513M/Y533ML	I_v		
	PLED-Y513M/Y533ML-4	I_v	3,0 to 7,0 mcd	
	PLED-Y513M/Y534ML-5	I_v	5,0 to 12 mcd	
	PLED-Y513M/Y534ML-56	I_v	5,0 to 22 mcd	
	PLED-Y513M/Y534ML-6	I_v	10 to 22 mcd	
	PLED-Y513M/Y534ML-7	I_v	15 to 35 mcd	

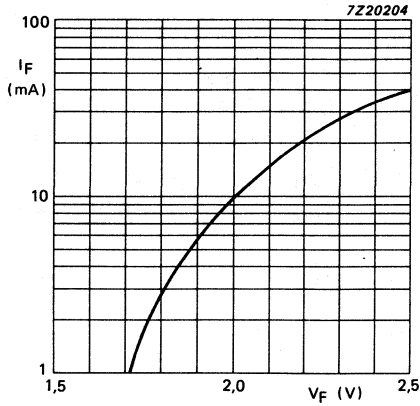


Fig. 2 $I_F = f(V_F)$ typical values.

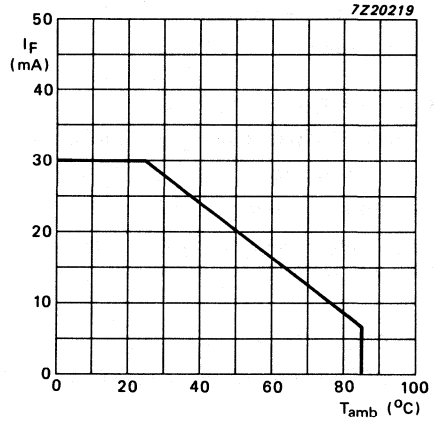


Fig. 3 $I_F = f(T_{amb})$ typical values.

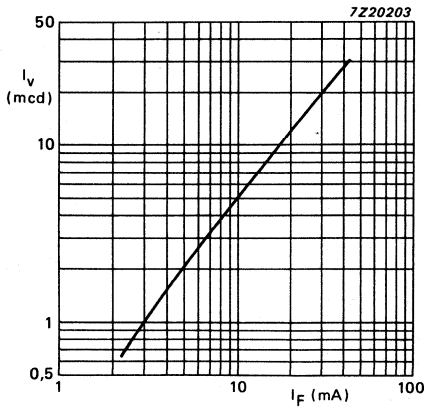


Fig. 4 $I_V = f(I_F)$ typical values.

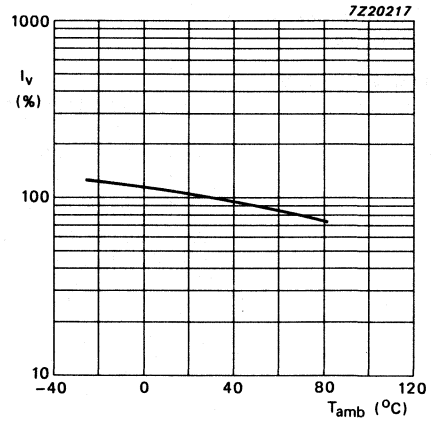


Fig. 5 $I_V(\%) = f(T_{amb})$ typical values.

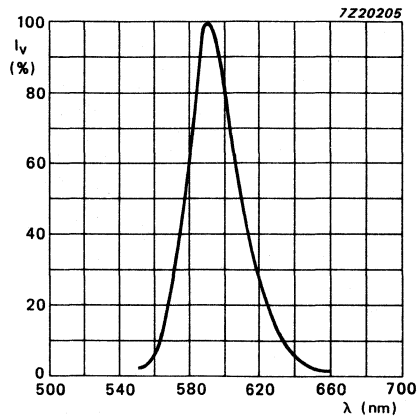


Fig. 6 Spectral response typical values.

DEVELOPMENT DATA

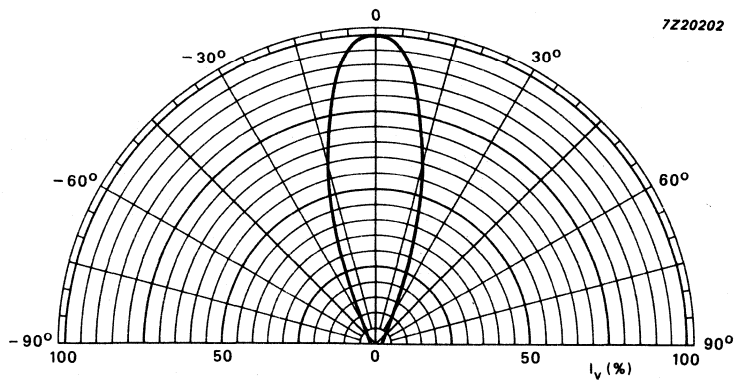


Fig. 7 Typical values.

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y514B and PLED-Y544CL have a SOD-63 outline and are encapsulated in a yellow diffusing resin.

The PLED-Y544CL is the long-lead version of the PLED-Y514B and has no seating plane but is in all other respects equal to the PLED-Y514B.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity (on-axis) $I_F = 10\text{ mA}$	PLED-Y514B(Y544CL)	I_v	min.	0.7 mcd
	PLED-Y514B(Y544CL)-3	I_v		1.6 to 3.5 mcd
	PLED-Y514B(Y544CL)-4	I_v		3.0 to 7.0 mcd
	PLED-Y514B(Y544CL)-5	I_v		5.0 to 12 mcd
Wavelength at peak emission		λ_p	typ.	590 nm
Beamwidth between half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-63A1.
PLED-Y514B

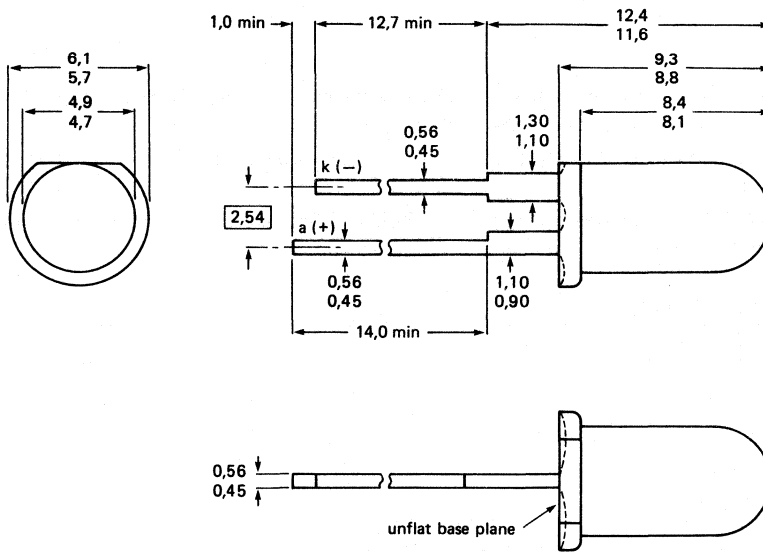
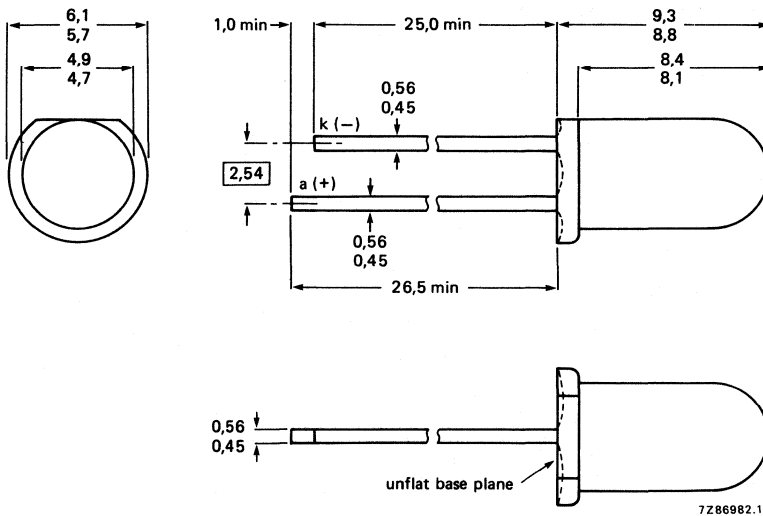


Fig. 1b SOD-63L.
PLED-Y544CL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current DC	I_F	max.	30 mA
Forward current peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$ peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max. max.	1 A 60 mA
Total power dissipation up to $T_{amb} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		$-55 \text{ to } +100 \text{ }^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{sld} < 7 \text{ s}$ > 1.5 mm from the seating plane for PLED-Y514B > 5 mm from the plastic body for PLED-Y544CL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient mounted on a printed board	$R_{th \text{ j-a}}$	=	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage $I_F = 10 \text{ mA}$	V_F	typ. max.	2.1 V 3 V
Reverse current $V_R = 5 \text{ V}$	I_R	max.	100 μA
Diode capacitance $V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF
Luminous intensity (on-axis) $I_F = 10 \text{ mA}$	I_v	min.	0.7 mcd
	I_v		1.6 to 3.5 mcd
	I_v		3.0 to 7.0 mcd
	I_v		5.0 to 12 mcd
Wavelength at peak emission	λ_p	typ.	590 nm
Bandwidth at half height	$\theta_{1/2}$	typ.	40 nm
Beamwidth between half-intensity directions	$\Delta\lambda$	typ.	70 $^\circ$

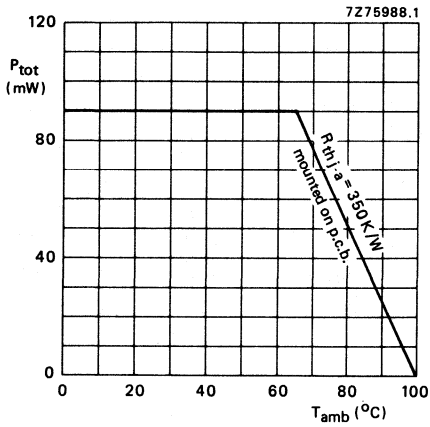


Fig. 2.

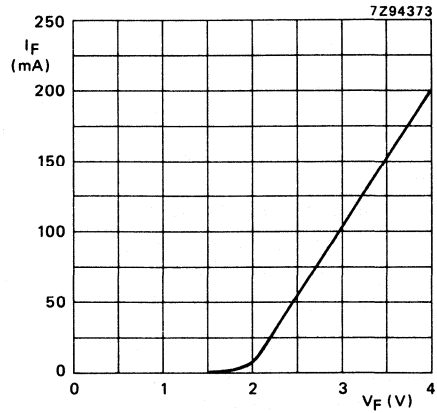


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

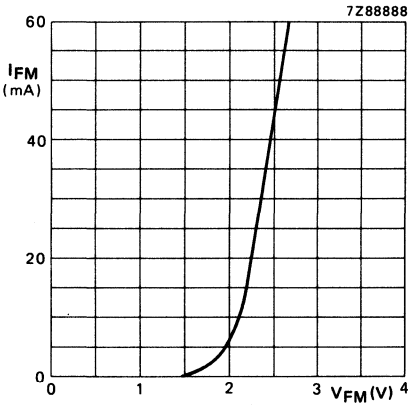


Fig. 4 $t_{on} = 1$ ms; $\delta = 0.33$;
 $T_{amb} = 25^{\circ}C$; typ. values.

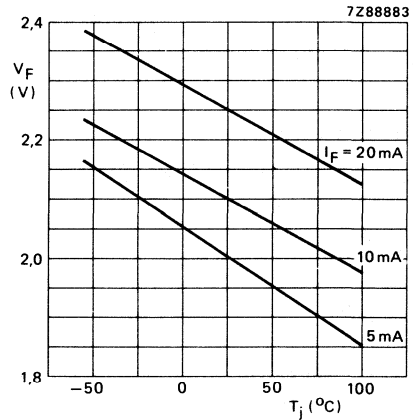


Fig. 5 Typical values.

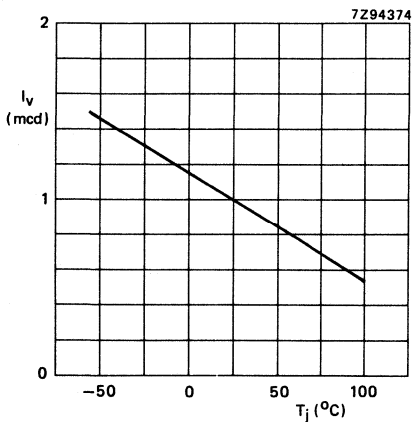


Fig. 6 Typical values.

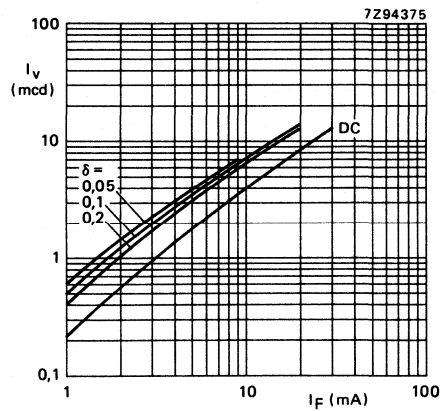


Fig. 7 $t_p = 50 \mu s$.

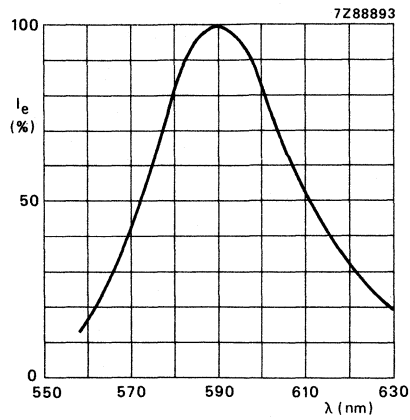


Fig. 8 Typical values.

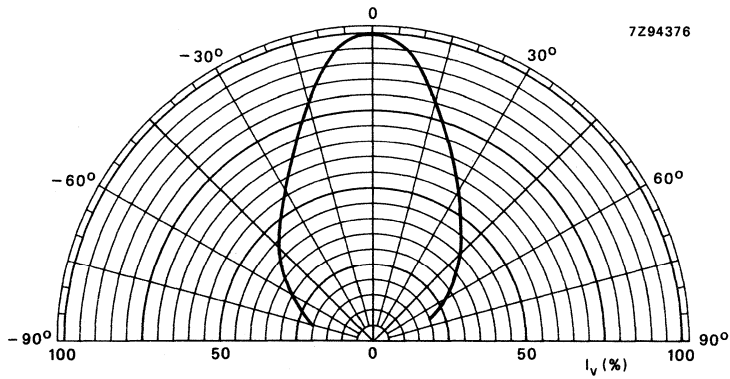


Fig. 9 Typical values.

DEVELOPMENT DATA

This data sheet contains advance information and specifications are subject to change without notice.

PLED-Y514M
PLED-Y534ML

LIGHT EMITTING DIODES

Circular light emitting diodes with a diameter of 5 mm which emit yellow light (GaAsP; yellow) at a typical peak wavelength of 590 nm when forward biased.

The PLED-Y514M has a SOD-90C1 outline and is encapsulated in an yellow diffusing resin.

The PLED-Y534ML has a SOD-90A1 outline and is encapsulated in an yellow diffusing resin.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (d.c.)		I_F	max.	30 mA
Total power dissipation at $T_{amb} = 25^\circ C$		P_{tot}	max.	90 mW
Luminous intensity $I_F = 10\text{ mA}$	PLED-Y514M/Y534ML	I_V	min.	1,6 mcd
			typ.	5,0 mcd
	PLED-Y514M/Y534ML-4	I_V		3,0 to 7,0 mcd
	PLED-Y514M/Y534ML-5	I_V		5,0 to 12 mcd
	PLED-Y514M/Y534ML-56	I_V		5,0 to 22 mcd
	PLED-Y514M/Y534ML-6	I_V		10 to 22 mcd
Wavelength at peak emission $I_F = 20\text{ mA}$		λ_p	typ.	590 nm
		$\theta_{\frac{1}{2}}$	typ.	40 °

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
d.c.	I_F	max.	30 mA
peak value; $t_{ON} = 1$ ms; $\delta = 0,1$	I_{FRM}	max.	150 mA
Total power dissipation at $T_{amb} = 25$ °C	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-30 to +100 °C
Operating ambient temperature	T_{opr}		-25 to +85 °C
Lead soldering temperature; $t_{sld} < 7$ s; > 1,5 mm from the seating plane	T_{sld}	max.	260 °C

CHARACTERISTICS

 $T_{amb} = 25$ °C unless otherwise specified

DEVELOPMENT DATA	Forward voltage			
	$I_F = 20$ mA	V_F	typ. max.	2,2 V 2,8 V
	Reverse current			
	$V_R = 5$ V	I_R	max.	10 μ A
	Beamwidth at half-intensity directions	$\theta_{\frac{1}{2}}$	typ.	40 °
	Bandwidth at half height	$\Delta\lambda$	typ.	30 nm
	Wavelength at peak emission			
	$I_F = 10$ mA	λ_p	typ.	590 nm
	Luminous intensity			
	$I_F = 10$ mA			
	PLED-Y514M	I_v	min. typ.	1,6 mcd 5,0 mcd
	PLED-Y534ML	I_v	min. typ.	mcd mcd
	PLED-Y514M/Y534ML-4	I_v		3,0 to 7,0 mcd
	PLED-Y514M/Y534ML-5	I_v		5,0 to 12 mcd
	PLED-Y514M/Y534ML-56	I_v		5,0 to 22 mcd
	PLED-Y514M/Y534ML-6	I_v		10 to 22 mcd

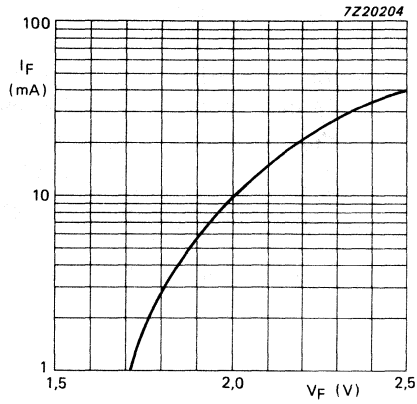


Fig. 2 $I_F = f(V_F)$.

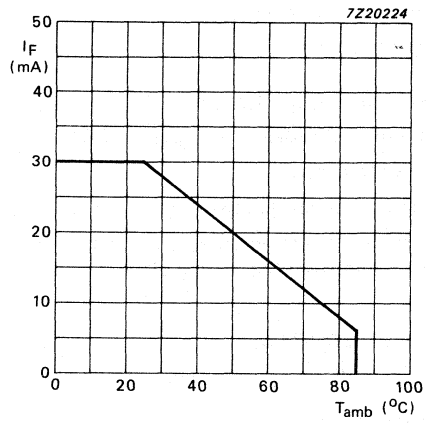


Fig. 3 $I_F = f(T_{amb})$.

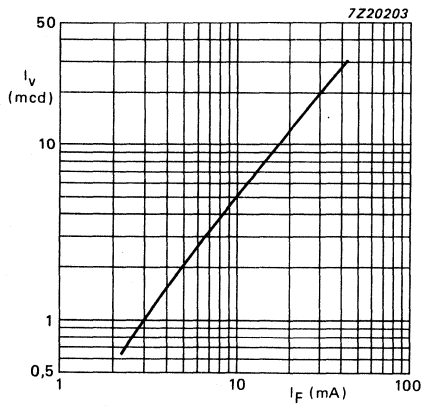


Fig. 4 $I_V = f(I_F)$.

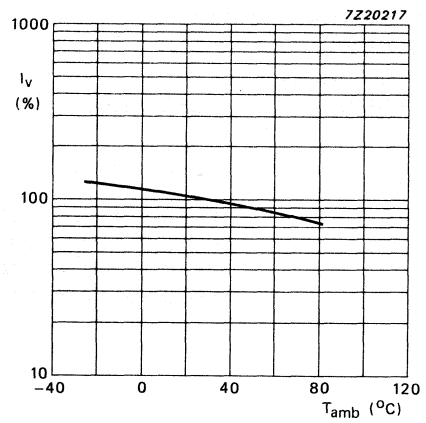


Fig. 5 $I_V(\%) = f(T_{amb})$.

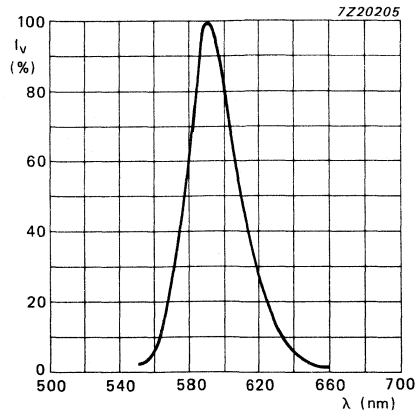


Fig. 6 Spectral response.

DEVELOPMENT DATA

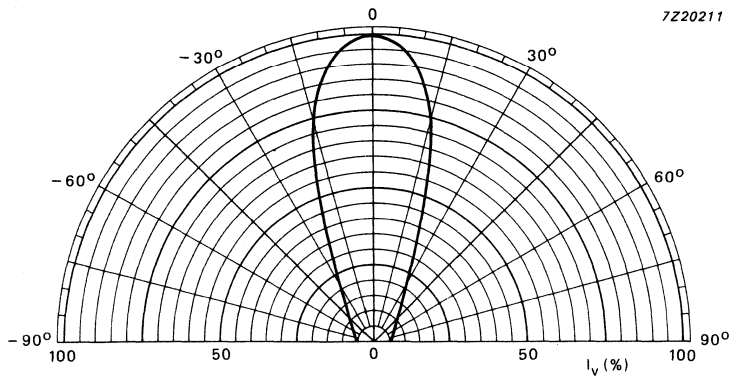


Fig. 7 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y544KL has a flangeless SOD-85 outline and is encapsulated in a yellow diffusing resin.

Together with the PLED-H544KL and the PLED-G544KL, the PLED-Y544KL forms one family and is available only in the long lead (L) version.

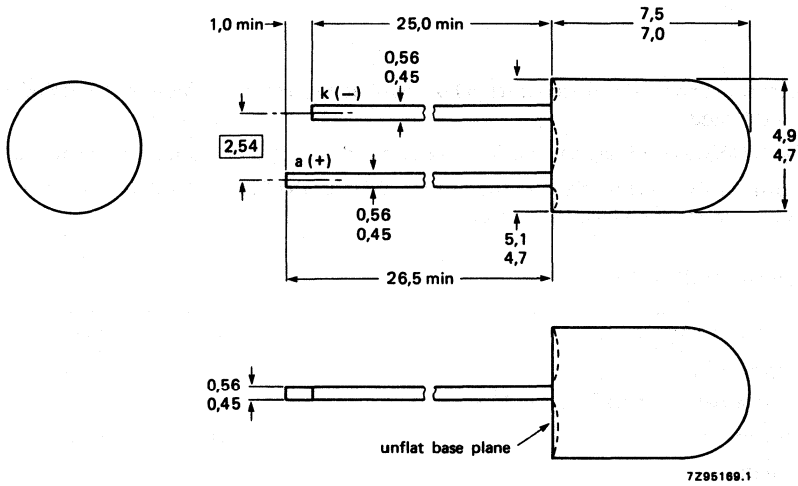
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y544KL	I_v	min.	0.7 mcd
	PLED-Y544KL-3	I_v		1.6 to 3.5 mcd
	PLED-Y544KL-4	I_v		3.0 to 7.0 mcd
	PLED-Y544KL-5	I_v	min.	5.0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

Fig. 1 SOD-85AL

Dimensions in mm



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_p < 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{amb} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$; > 5 mm from the plastic body	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when
the device is mounted on a PCB

R_{th-j-a}	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	2.6 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth at half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	70 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-Y544KL	I_v	min.	0.7 mcd
	PLED-Y544KL-3	I_v		1.6 to 3.5 mcd
	PLED-Y544KL-4	I_v		3.0 to 7.0 mcd
	PLED-Y544KL-5	I_v	min.	5.0 mcd
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF	

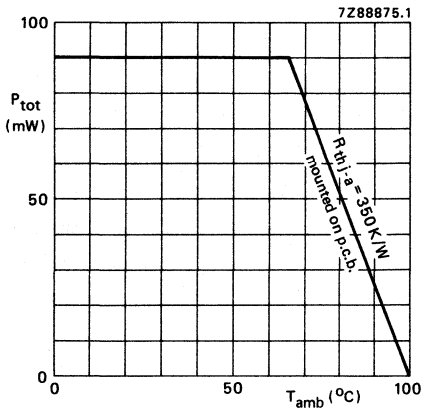


Fig. 2.

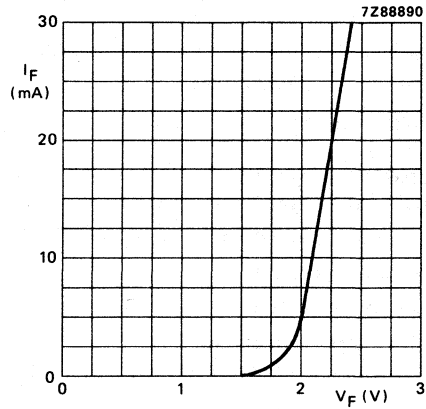


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

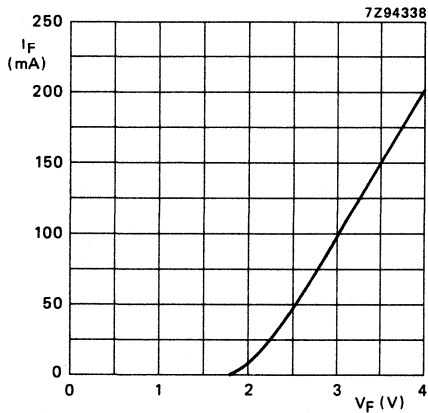


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.33$;
 $T_{amb} = 25^{\circ}C$; typ. values.

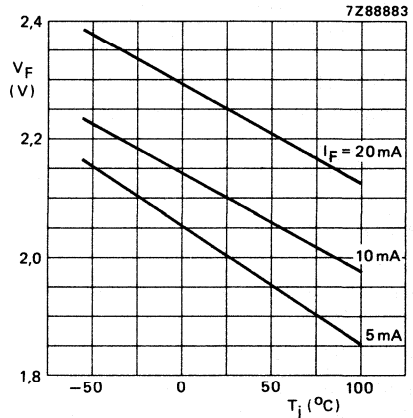


Fig. 5 Typical values.

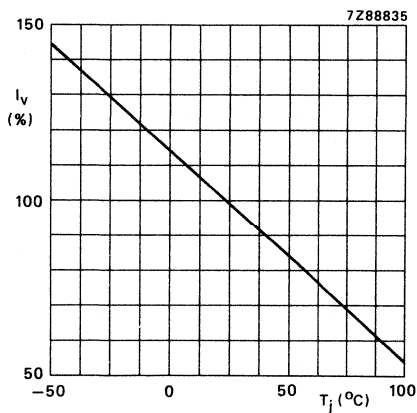


Fig. 6 Typical values.

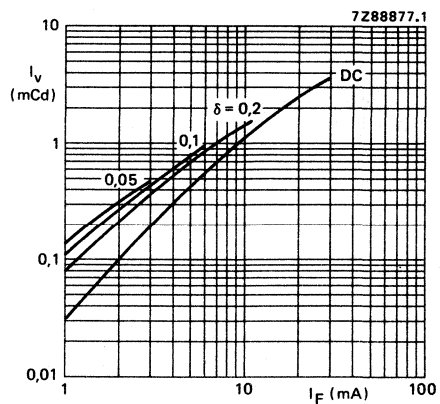


Fig. 7 $t_p = 50 \mu s$; typ. values.

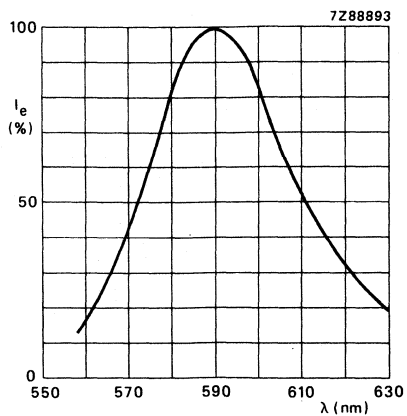


Fig. 8 Typical values.

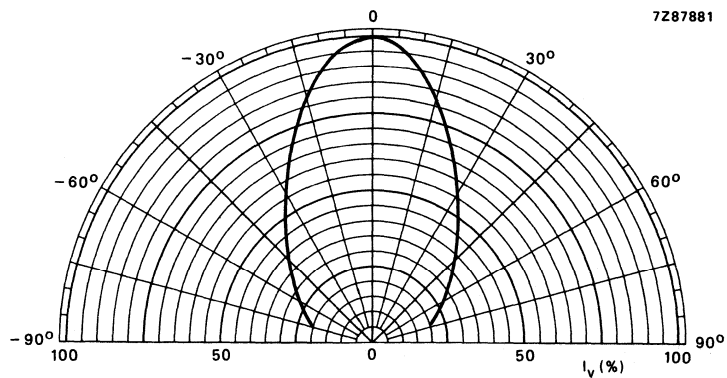


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Circular light emitting diode which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-Y544LL has a flangeless SOD-85 outline and is encapsulated in a yellow diffusing resin.

Together with the PLED-H544LL and the PLED-G544LL, the PLED-Y544LL forms one family and is available only in the long lead (L) version.

QUICK REFERENCE DATA

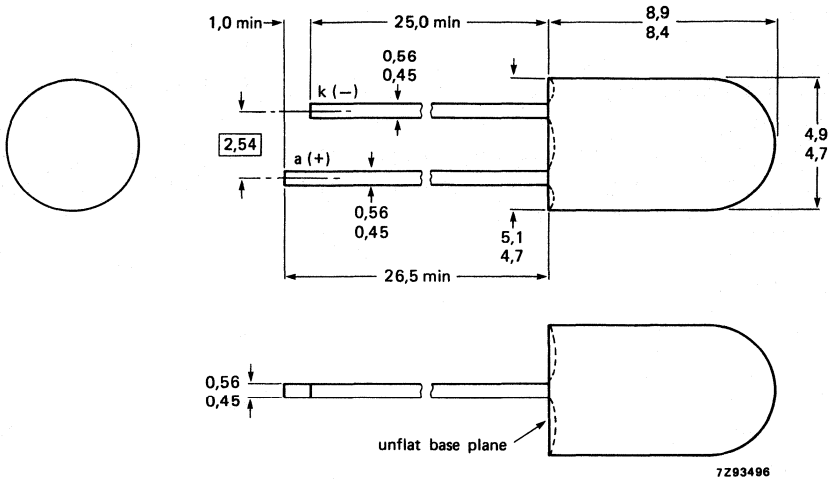
Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-Y544LL	I_v	min.	1.0 mcd
	PLED-Y544LL-3	I_v		1.6 to 3.5 mcd
	PLED-Y544LL-4	I_v		3.0 to 7.0 mcd
	PLED-Y544LL-5	I_v	min.	5.0 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth at half-intensity directions		$\theta_{1/2}$	typ.	70 $^\circ$

MECHANICAL DATA

SOD-85BL (see Fig. 1).

MECHANICAL DATA
Fig. 1 SOD-85BL.

Dimensions in mm



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$	I_{FRM}	max.	1 A
peak value; $t_p = 1 \text{ ms}$; $\delta = 0.33$		max.	60 mA
Total power dissipation up to $T_{amb} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{slid} < 7 \text{ s}$; > 5 mm from the plastic body	T_{slid}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when
the device is mounted on a PCB

$R_{th \text{ j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth at half-intensity directions				
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	70 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-Y544LL	I_v	min. 0.7 mcd	
	PLED-Y544LL-3	I_v	1.6 to 3.5 mcd	
	PLED-Y544LL-4	I_v	3.0 to 7.0 mcd	
	PLED-Y544LL-5	I_v	min. 5.0 mcd	
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF	

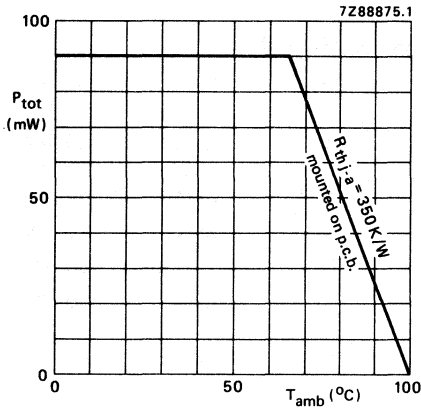


Fig. 2.

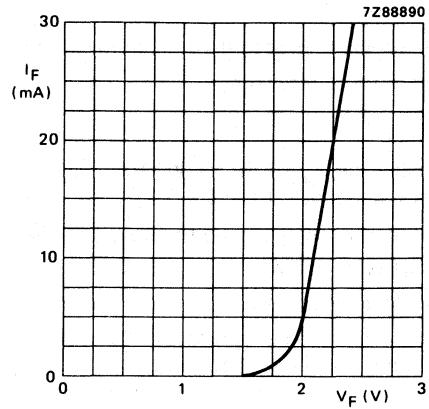


Fig. 3 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

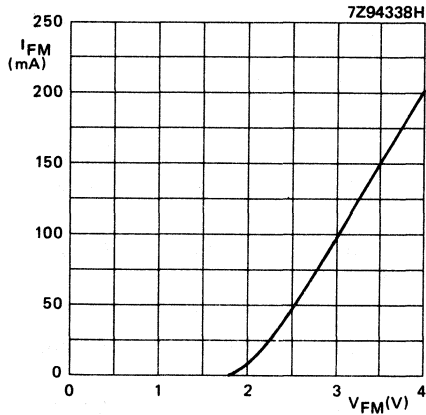


Fig. 4 $t_{on} = 50 \mu\text{s}$; $\delta = 0.01$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

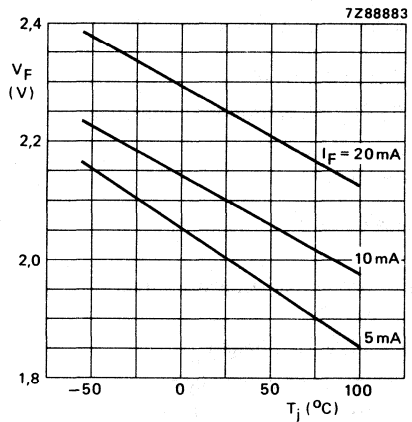


Fig. 5 Typical values.

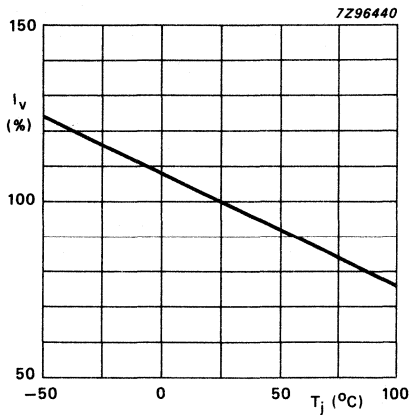


Fig. 6 Typical values; $I_F = 10 \text{ mA}$.

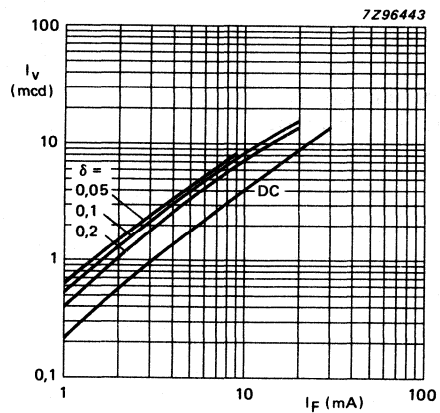


Fig. 7 $t_p = 50 \mu\text{s}$; typ. values.

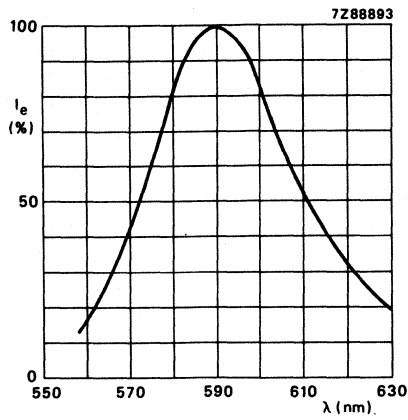


Fig. 8 Typical values.

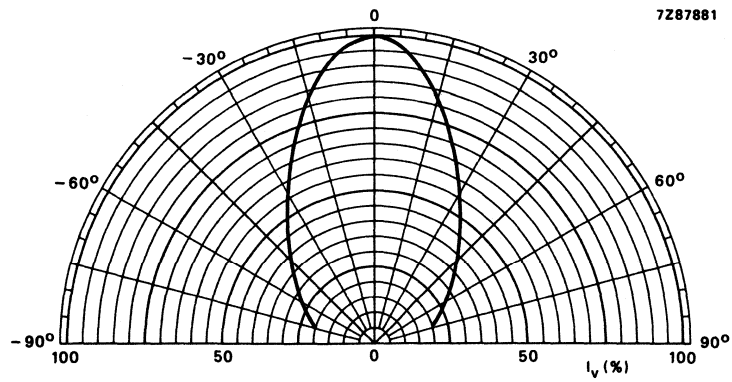


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 1 mm which emit yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-YR14E and PLED-YR44EL have a SOD-75 outline and are encapsulated in a yellow diffusing resin. These LEDs when stacked in an array (in combination with other SOD-75 LEDs) can be used, for example, as level indicators.

The PLED-YR14E is equal to the PLED-YR44EL but has long leads and no seating plane.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-YR14E(YR44EL)	I_v	min.	0.7 mcd
	PLED-YR14E(YR44EL)-2	I_v		1.0 to 2.2 mcd
	PLED-YR14E(YR44EL)-3	I_v	min.	1.6 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth between half-intensity directions in the plane of the leads		$\theta_{1/2}$	typ.	110 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-75B1.
PLED-YR14E

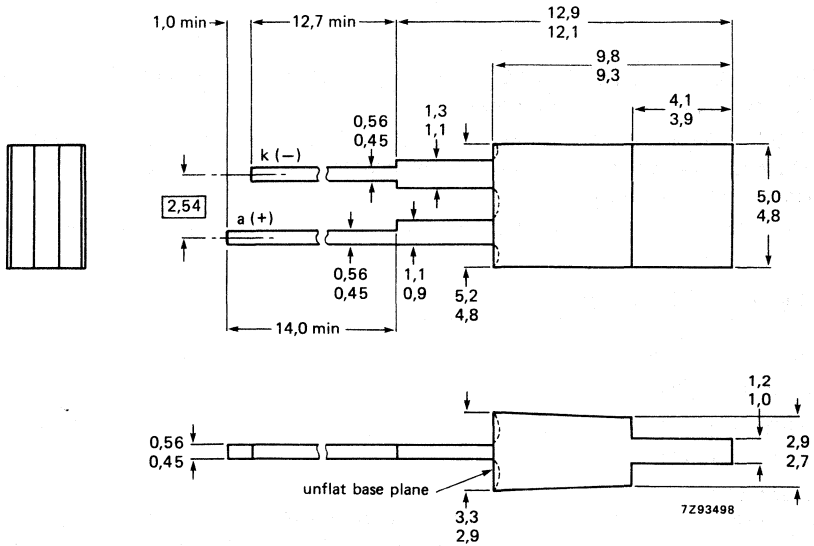
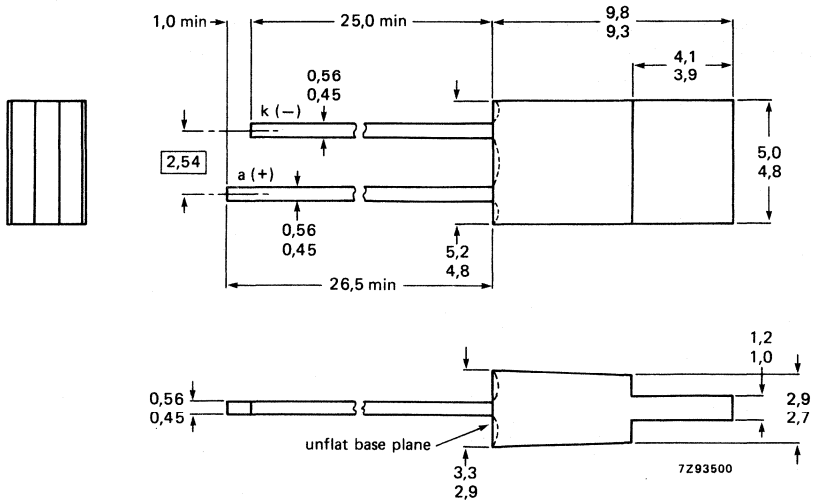


Fig. 1b SOD-75BL.
PLED-YR44EL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{\text{on}} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{\text{amb}} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{\text{sld}} < 7 \text{ s}$			
> 1.5 mm from the seating plane for PLED-YR14E			
> 5 mm from the plastic body for PLED-YR44EL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{\text{th j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage				
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V	
		max.	3.0 V	
Reverse current				
$V_R = 5 \text{ V}$	I_R	max.	100 μA	
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	110 $^\circ$	
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm	
Wavelength at peak emission				
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm	
Luminous intensity				
$I_F = 10 \text{ mA}$				
	PLED-YR14E(YR44EL)	I_v	min. 0.7 mcd	
	PLED-YR14E(YR44EL)-2	I_v	1.0 to 2.2 mcd	
	PLED-YR14E(YR44EL)-3	I_v	min. 1.6 mcd	
Diode capacitance				
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF	

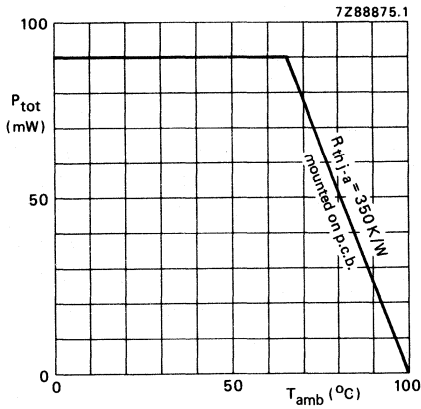


Fig. 2.

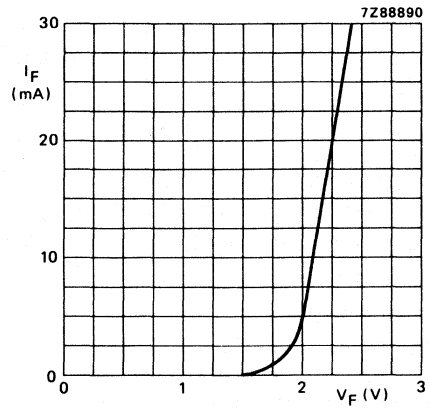


Fig. 3 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typ. values.

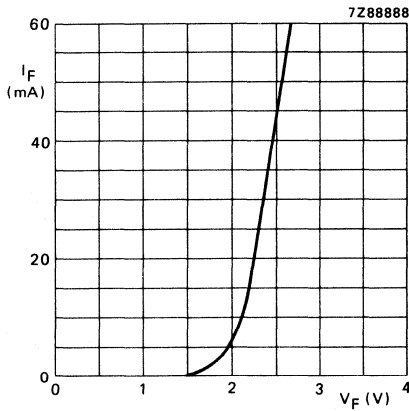


Fig. 4 $t_{on} = 50\text{ }\mu\text{s}$; $\delta = 0.01$;
 $T_{amb} = 25\text{ }^{\circ}\text{C}$; typ. values.

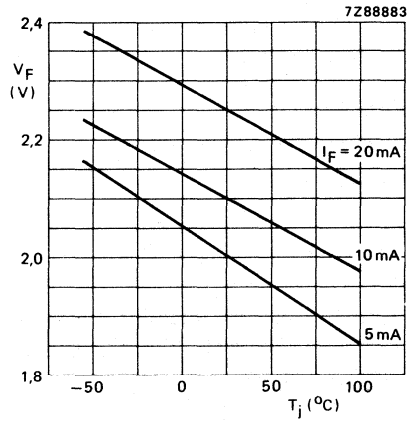


Fig. 5 Typical values.

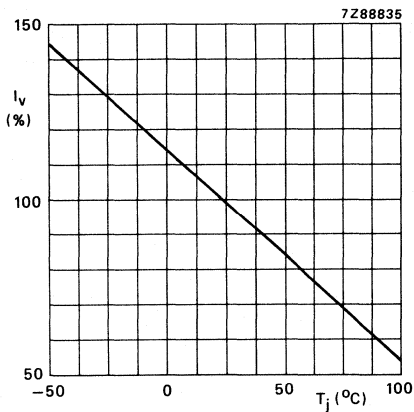


Fig. 6 $I_F = 10\text{ mA}$; typ. values.

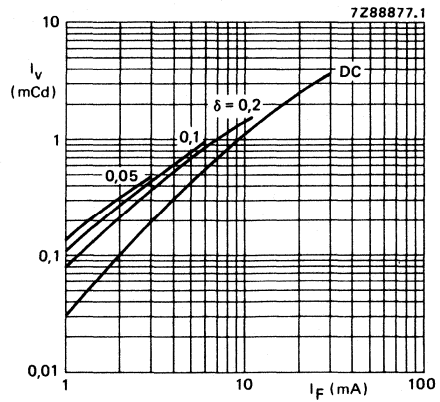


Fig. 7 $t_p = 50\text{ }\mu\text{s}$; typical values.

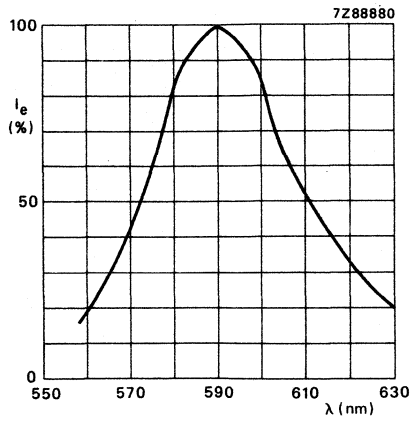


Fig. 8 Typical values.

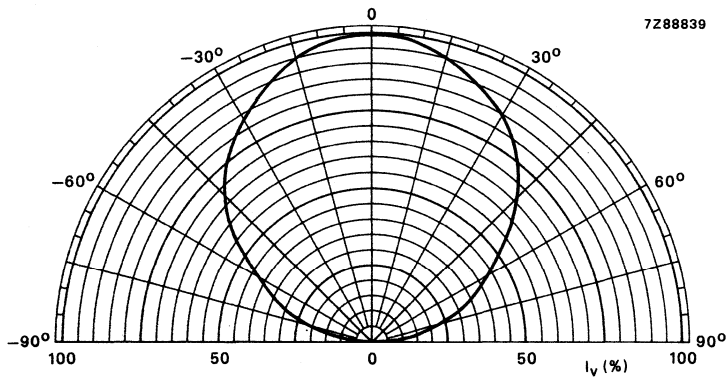


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diode of 5 mm x 2.5 mm which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased.

The PLED-YR14F has a SOD-76 envelope and is encapsulated in a yellow diffusing resin.

The PLED-YR44FL is similar to the PLED-YR14F but has long leads and no seating plane.

When stacked as an array these SOD-76 LEDs can be used, for example, as level indicators.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity $I_F = 10\text{ mA}$	PLED-YR14F(YR44FL)	I_v	min.	0.7 mcd
	PLED-YR14F(YR44FL)-2	I_v		1.0 to 2.2 mcd
	PLED-YR14F(YR44FL)-3	I_v		1.6 to 3.5 mcd
Wavelength at peak emission $I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth between half-intensity directions $I_F = 10\text{ mA}$; in the plane of the leads		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1a SOD-76A.1.
PLED-YR14F

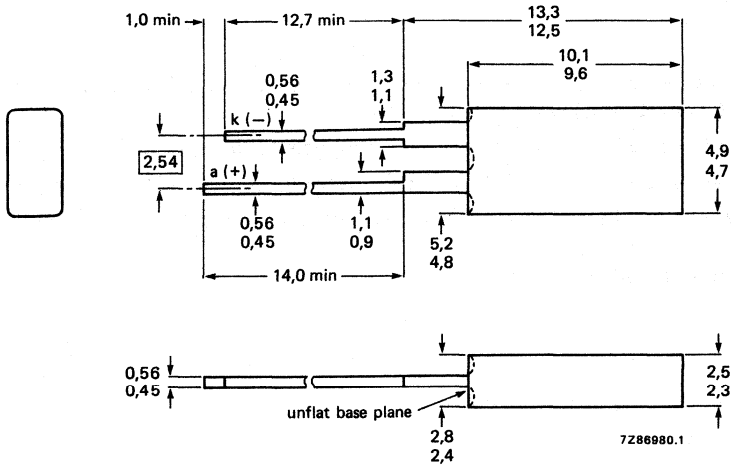
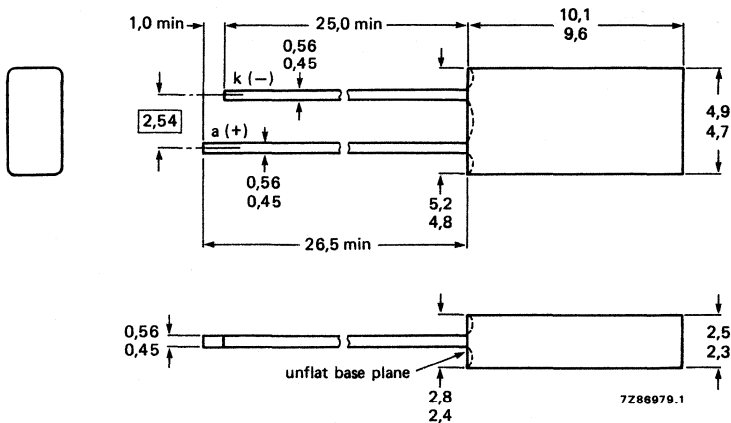


Fig. 1b SOD-76L.
PLED-YR44FL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Continuous reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value, $t_{ON} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{amb} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature; $t_{sld} < 7 \text{ s}$			
> 1.5 mm from the seating plane for PLED-YR14F			
> 5 mm from the plastic body for PLED-YR44FL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V
		max.	3.0 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions			
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-YR14F(YR44FL)	I_v	min. 0.7 mcd
	PLED-YR14F(YR44FL)-2	I_v	1.0 to 2.2 mcd
	PLED-YR14F(YR44FL)-3	I_v	1.6 to 3.5 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF

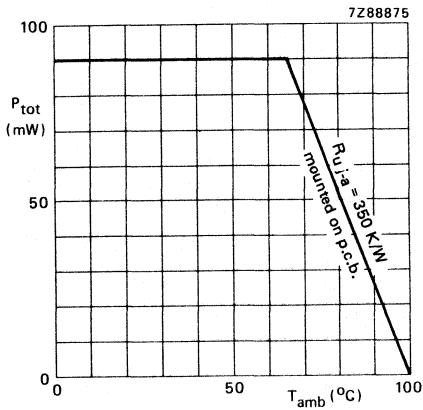


Fig. 2.

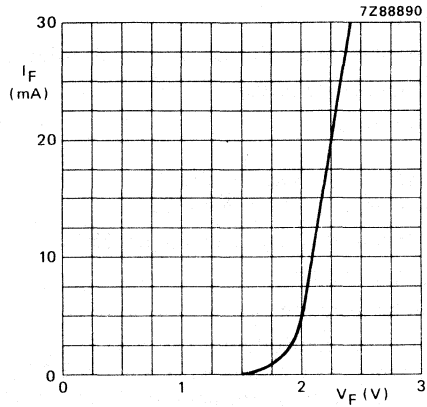


Fig. 3 $T_j = 25^{\circ}C$; typ. values.

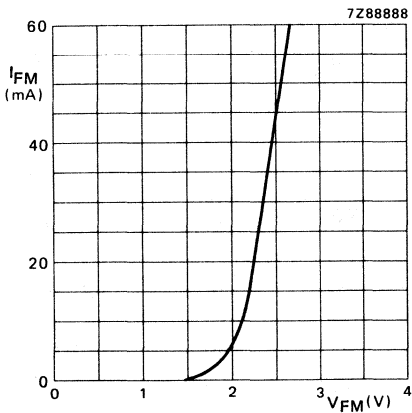


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$;
 $T_j = 25^{\circ}C$; typ. values.

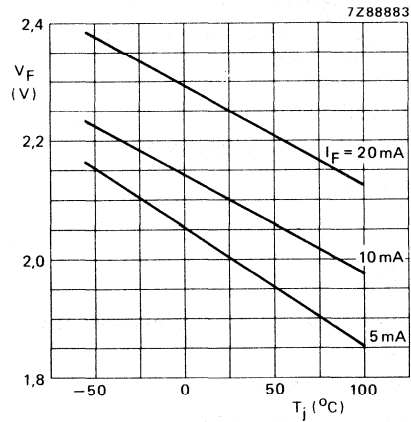


Fig. 5 Typical values.

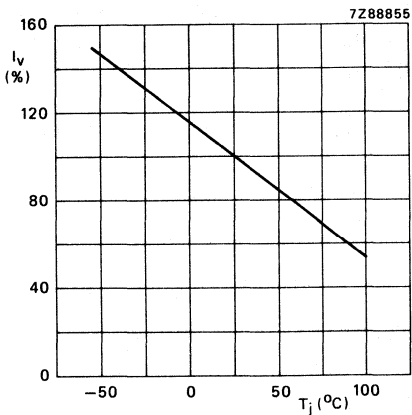


Fig. 6 $I_F = 10 mA$; typ. values.

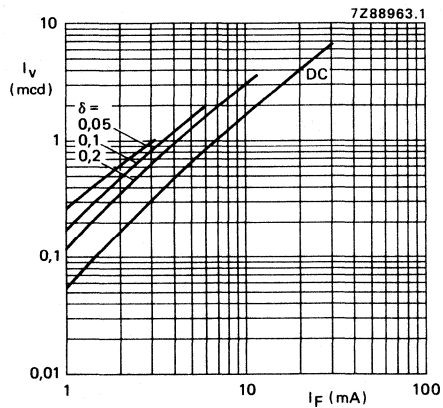


Fig. 7 $t_p = 50 \mu s$; typical values.

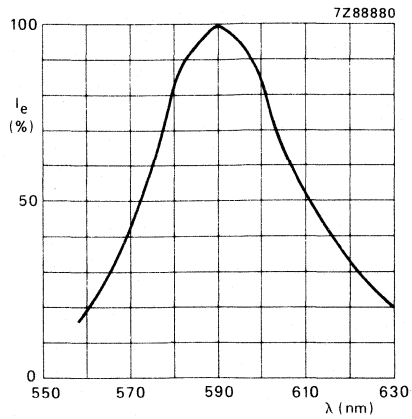


Fig. 8 Typical values.

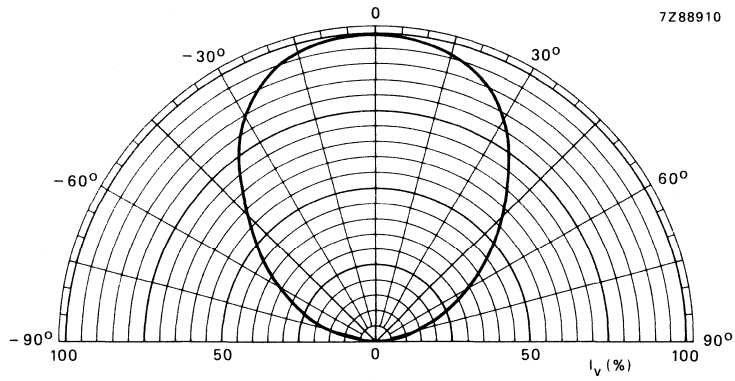


Fig. 9 Typical values.

LIGHT EMITTING DIODES

Rectangular light emitting diodes of 5 mm x 3 mm which emit yellow light at a typical wavelength of 590 nm (GaPAs) when forward biased. The PLED-YR14G and PLED-YR44GL have a SOD-77 envelope and are encapsulated in a yellow diffusing resin.

The PLED-YR44GL is the long lead version (26 mm) and has no seating plane but is in all other respects equal to the PLED-YR14G.

When stacked in an array these LEDs can be used as level indicators etc.

QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-YR14G(YR44GL)	I_v	min.	0.7 mcd
	PLED-YR14G(YR44GL)-2	I_v		1.0 to 2.2 mcd
	PLED-YR14G(YR44GL)-3	I_v		1.6 to 3.5 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig 1a SOD-77A1.
PLED-YR14G

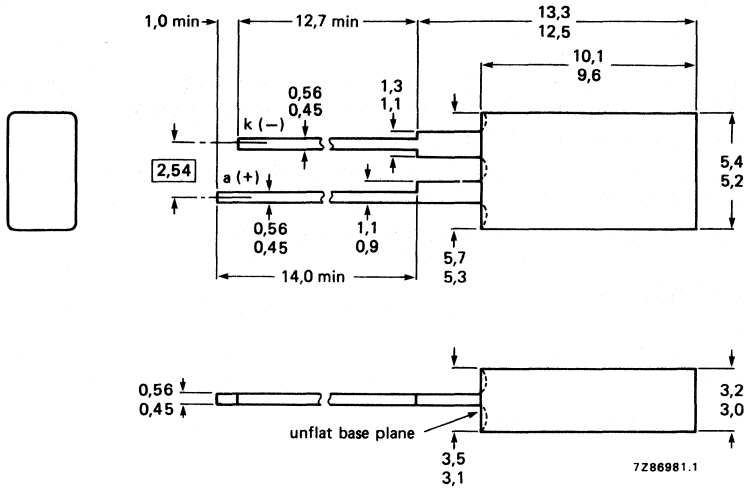
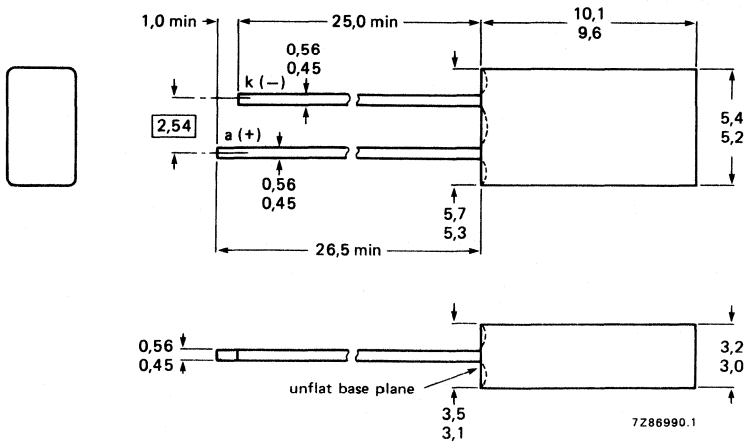


Fig 1b SOD-77L.
PLED-YR44GL



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu\text{s}$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{\text{ON}} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{\text{amb}} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature at $t_{\text{sld}} < 7 \text{ s}$			
> 1.5 mm from the seating plane for PLED-YR14G			
> 5 mm from the plastic body for PLED-YR44GL	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCEFrom junction to ambient when the device
is mounted on a PCB

$R_{\text{th j-a}}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage			
$I_F = 10 \text{ mA}$	V_F	typ.	2.1 V
		max.	3.0 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions in the plane of the leads; $I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-YR14G(YR44GL)	I_v	min. 0.7 mcd
	PLED-YR14G(YR44GL)-2	I_v	1.0 to 2.2 mcd
	PLED-YR14G(YR44GL)-3	I_v	1.6 to 3.5 mcd
Diode capacitance			
$V_R = 0$, $f = 1 \text{ MHz}$	C_d	typ.	15 pF

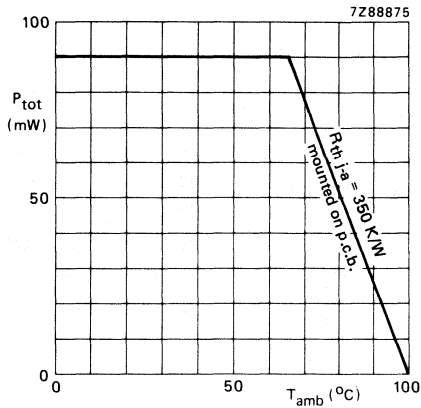


Fig. 2.

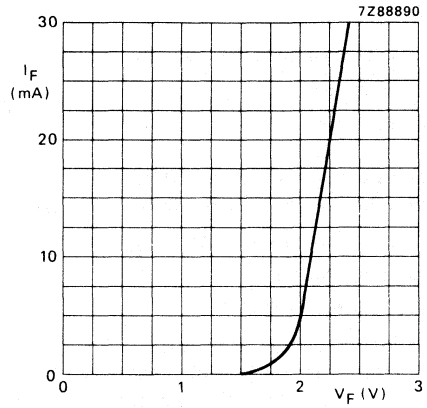


Fig. 3 $T_{amb} = 25^{\circ}C$; typ. values.

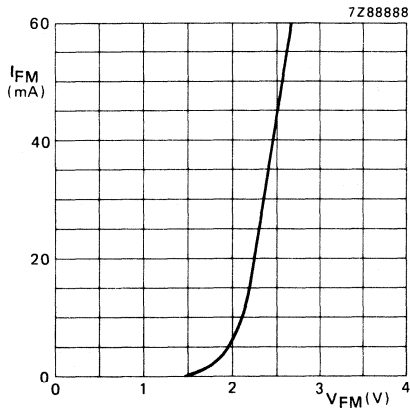


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25^{\circ}C$; typ. values.

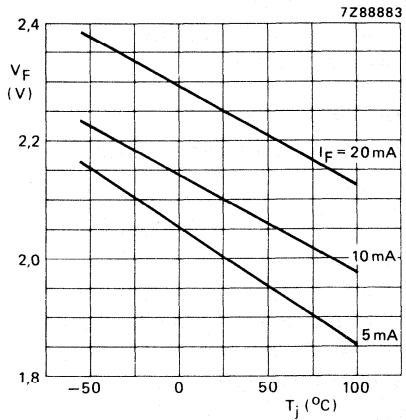


Fig. 5 Typical values.

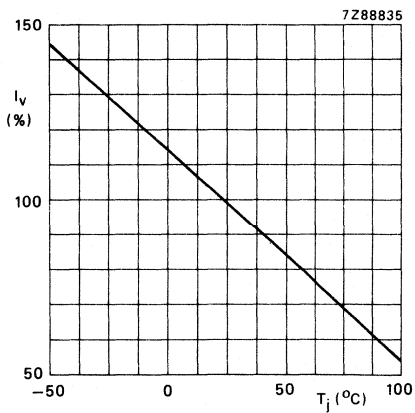


Fig. 6 $I_F = 10$ mA; typ. values.

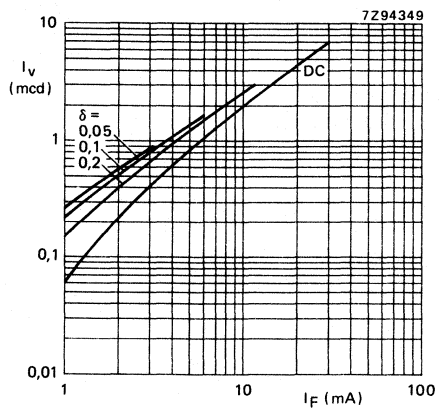


Fig. 7 $t_p = 50 \mu s$; typical values.

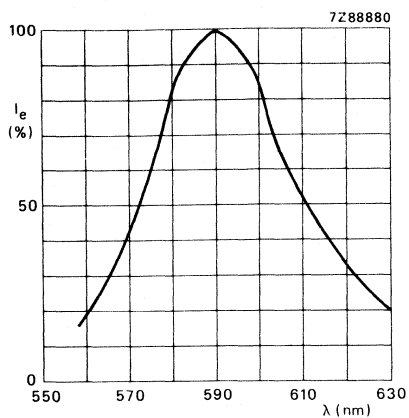


Fig. 8 Typical values.

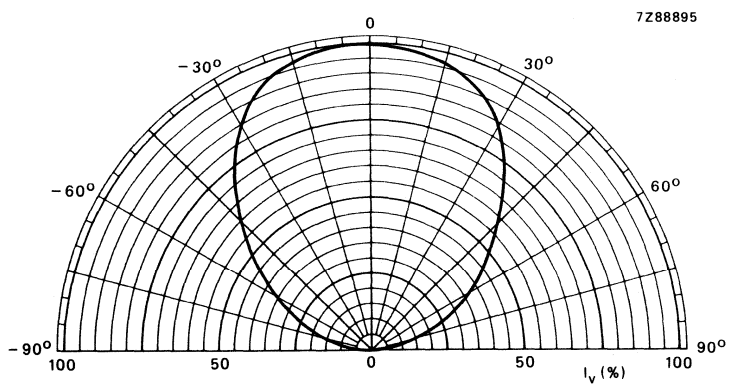


Fig. 9 Typical values.

LIGHT EMITTING DIODE

Rectangular light emitting diode of 5 mm x 5 mm which emits yellow light at a typical peak wavelength of 590 nm (GaPAs) when forward biased. The PLED-YR44DL has a SOD-74L envelope and is encapsulated in a yellow diffusing resin.

The PLED-YR44DL is suitable for surface illumination, for example, information boards, score boards, moving advertisements and electronic game applications.

The PLED-YR44DL has long leads and has no seating plane.

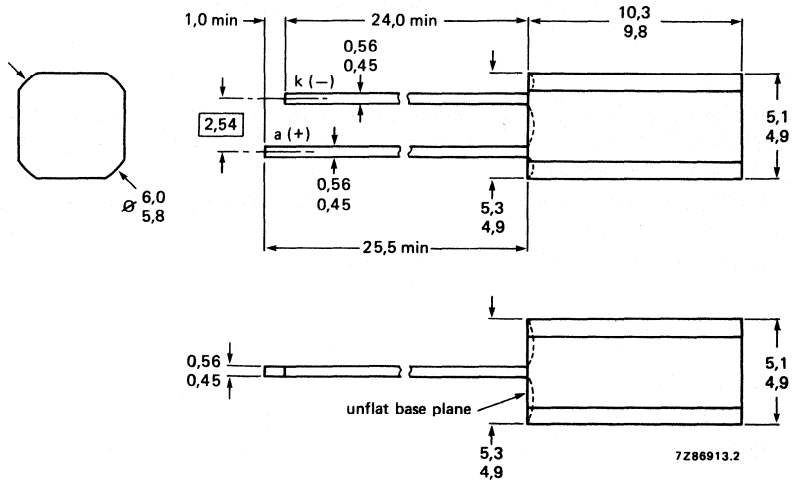
QUICK REFERENCE DATA

Continuous reverse voltage		V_R	max.	5 V
Forward current (DC)		I_F	max.	30 mA
Total power dissipation up to $T_{amb} = 65\text{ }^\circ\text{C}$		P_{tot}	max.	90 mW
Junction temperature		T_j	max.	100 $^\circ\text{C}$
Luminous intensity				
$I_F = 10\text{ mA}$	PLED-YR44DL	I_v	min.	0.7 mcd
	PLED-YR44DL-2	I_v		1.0 to 2.2 mcd
	PLED-YR44DL-3	I_v		1.6 to 3.5 mcd
Wavelength at peak emission				
$I_F = 10\text{ mA}$		λ_p	typ.	590 nm
Beamwidth between half-intensity directions				
$I_F = 10\text{ mA}$		$\theta_{1/2}$	typ.	100 $^\circ$

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-74L.



Note: Solderability not guaranteed in tie-bar zone.

RATINGS

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

Reverse voltage	V_R	max.	5 V
Forward current			
DC	I_F	max.	30 mA
peak value; $t_p = 1 \mu s$; $f = 300 \text{ Hz}$		max.	1 A
peak value; $t_{on} = 1 \text{ ms}$; $\delta = 0.33$	I_{FRM}	max.	60 mA
Total power dissipation up to $T_{amb} = 65 \text{ }^\circ\text{C}$	P_{tot}	max.	90 mW
Storage temperature	T_{stg}		-55 to +100 $^\circ\text{C}$
Junction temperature	T_j	max.	100 $^\circ\text{C}$
Lead soldering temperature			
> 5.0 mm from the plastic body; $t_{sld} < 7 \text{ s}$	T_{sld}	max.	260 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient when the device is mounted on a PCB

$R_{th j-a}$	max.	350 K/W
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CHARACTERISTICS $T_j = 25 \text{ }^\circ\text{C}$ unless otherwise specified

Forward voltage	V_F	typ.	2.1 V
		max.	3.0 V
Reverse current			
$V_R = 5 \text{ V}$	I_R	max.	100 μA
Beamwidth between half-intensity directions			
$I_F = 10 \text{ mA}$	$\theta_{1/2}$	typ.	100 $^\circ$
Bandwidth at half height	$\Delta\lambda$	typ.	40 nm
Wavelength at peak emission			
$I_F = 10 \text{ mA}$	λ_p	typ.	590 nm
Luminous intensity			
$I_F = 10 \text{ mA}$			
	PLED-YR44DL	I_v	min. 0.7 mcd
	PLED-YR44DL-2	I_v	1.0 to 2.2 mcd
	PLED-YR44DL-3	I_v	1.6 to 3.5 mcd
Diode capacitance			
$V_R = 0$; $f = 1 \text{ MHz}$	C_d	typ.	15 pF

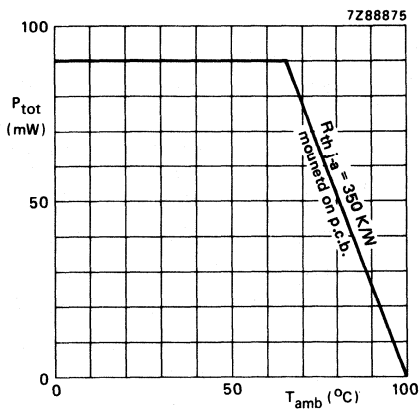


Fig. 2.

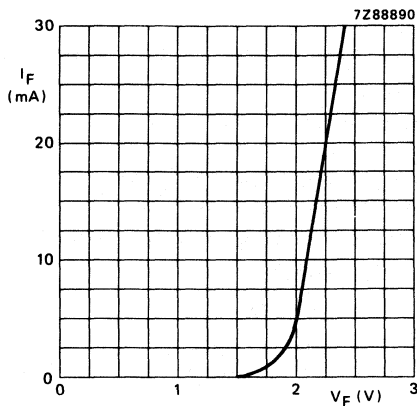


Fig. 3 Typical values.

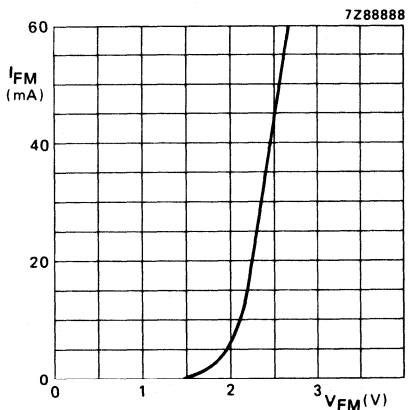


Fig. 4 $t_{on} = 50 \mu s$; $\delta = 0.01$;
 $T_{amb} = 25 \text{ }^\circ\text{C}$; typ. values.

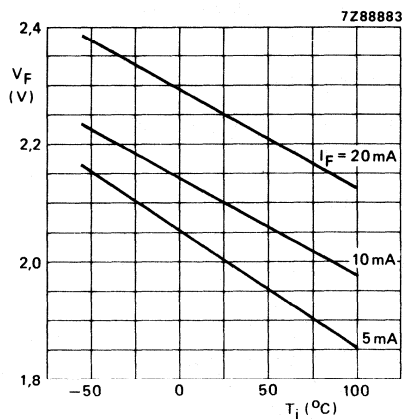


Fig. 5 Typical values.

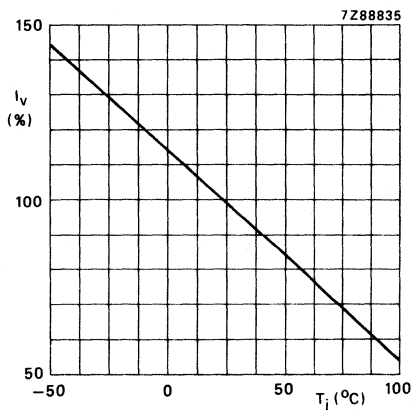


Fig. 6 $I_F = 10 \text{ mA}$; typ. values.

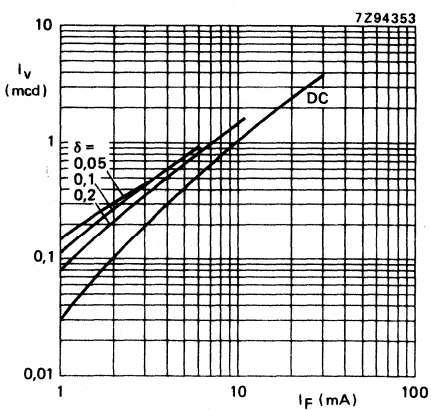


Fig. 7 $t_p = 50 \mu s$; typical values.

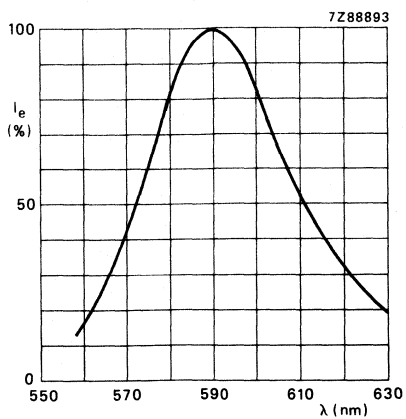


Fig. 8 Typical values.

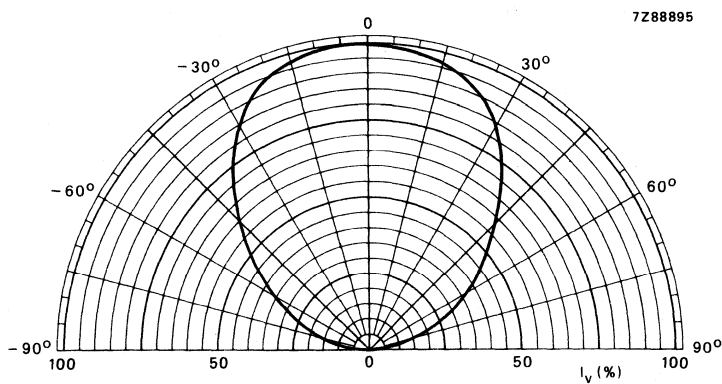


Fig. 9 Typical values.

INDEX OF TYPE NUMBERS

The inclusion of a type number in this publication does not necessarily imply its availability.

type no.	book	section	type no.	book	section	type no.	book	section
BA220	S1	SD	BAS29	S7/S1	SD/Mm	BAV99	S1/S7	SD/Mm
BA221	S1	SD	BAS31	S7/S1	SD/Mm	BAV100	S1/S7	SD/Mm
BA223	S1	T	BAS32	S7/S1	SD/Mm	BAV101	S1/S7	SD/Mm
BA281	S1	SD	BAS35	S7/S1	SD/Mm	BAV102	S1/S7	SD/Mm
BA314	S1	Vrg	BAS45	S1	SD	BAV103	S1/S7	SD/Mm
BA315	S1	Vrg	BAS56	S1/S7	SD/Mm	BAW56	S1/S7	SD/Mm
BA316	S1	SD	BAT17	S7/S1	T/Mm	BAW62	S1	SD
BA317	S1	SD	BAT18	S7/S1	T/Mm	BAX12	S1	SD
BA318	S1	SD	BAT54	S1/S7	SD/Mm	BAX14	S1	SD
BA423	S1	T	BAT74	S1/S7	SD/Mm	BAX18	S1	SD
BA480	S1	T	BAT81	S1	T	BAY80	S1	SD
BA481	S1	T	BAT82	S1	T	BB112	S1	T
BA482	S1	T	BAT83	S1	T	BB119	S1	T
BA483	S1	T	BAT85	S1	T	BB130	S1	T
BA484	S1	T	BAT86	S1	T	BB204B	S1	T
BA682	S1/S7	T/Mm	BAV10	S1	SD	BB204G	S1	T
BA683	S1/S7	T/Mm	BAV18	S1	SD	BB212	S1	T
BAS11	S1	SD	BAV19	S1	SD	BB215	S1/S7	SD/Mm
BAS15	S1	SD	BAV20	S1	SD	BB219	S1/S7	SD/Mm
BAS16	S7/S1	SD/Mm	BAV21	S1	SD	BB405B	S1	T
BAS17	S7/S1	Vrg/Mm	BAV23	S1/S7	SD/Mm	BB417	S1	T
BAS19	S7/S1	SD/Mm	BAV45	S1	Sp	BB809	S1	T
BAS20	S7/S1	SD/Mm	BAV45A	S1	Sp	BB909A	S1	T
BAS21	S7/S1	SD/Mm	BAV70	S1/S7	SD/Mm	BB909B	S1	T
BAS28	S7/S1	SD/Mm	BAV74	S1	SD	BBY31	S1/S7	T/Mm

Mm = Microminiature semiconductors
for hybrid circuits
SD = Small-signal diodes

Sp = Special diodes
T = Tuner diodes
Vrg = Voltage regulator diodes

INDEX

type no.	book	section	type no.	book	section	type no.	book	section
BBY39	S1	T	BC639	S3	Sm	BCW69;R	S7	Mm
BBY40	S1/S7	T/Mm	BC640	S3	Sm	BCW70;R	S7	Mm
BC107	S3	Sm	BC807	S7	Mm	BCW71;R	S7	Mm
BC108	S3	Sm	BC808	S7	Mm	BCW72;R	S7	Mm
BC109	S3	Sm	BC817	S7	Mm	BCW81;R	S7	Mm
BC140	S3	Sm	BC818	S7	Mm	BCW89;R	S7	Mm
BC141	S3	Sm	BC846	S7	Mm	BCX17;R	S7	Mm
BC160	S3	Sm	BC847	S7	Mm	BCX18;R	S7	Mm
BC161	S3	Sm	BC848	S7	Mm	BCX19;R	S7	Mm
BC177	S3	Sm	BC849	S7	Mm	BCX20;R	S7	Mm
BC178	S3	Sm	BC850	S7	Mm	BCX51	S7	Mm
BC179	S3	Sm	BC856	S7	Mm	BCX52	S7	Mm
BC264A	S5	FET	BC857	S7	Mm	BCX53	S7	Mm
BC264B	S5	FET	BC858	S7	Mm	BCX54	S7	Mm
BC264C	S5	FET	BC859	S7	Mm	BCX55	S7	Mm
BC264D	S5	FET	BC860	S7	Mm	BCX56	S7	Mm
BC327;A	S3	Sm	BC868	S7	Mm	BCX58	S3	Sm
BC328	S3	Sm	BC869	S7	Mm	BCX59	S3	Sm
BC337;A	S3	Sm	BCF29;R	S7	Mm	BCX70*	S7	Mm
BC338	S3	Sm	BCF30;R	S7	Mm	BCX71*	S7	Mm
BC368	S3	Sm	BCF32;R	S7	Mm	BCX78	S3	Sm
BC369	S3	Sm	BCF33;R	S7	Mm	BCX79	S3	Sm
BC375	S3	Sm	BCF70;R	S7	Mm	BCY56	S3	Sm
BC376	S3	Sm	BCF81;R	S7	Mm	BCY57	S3	Sm
BC516	S3	Sm	BCV26	S7	Mm	BCY58	S3	Sm
BC517	S3	Sm	BCV27	S7	Mm	BCY59	S3	Sm
BC546	S3	Sm	BCV61	S7	Mm	BCY65	S3	Sm
BC547	S3	Sm	BCV62	S7	Mm	BCY70	S3	Sm
BC548	S3	Sm	BCV63	S7	Mm	BCY71	S3	Sm
BC549	S3	Sm	BCV64	S7	Mm	BCY72	S3	Sm
BC550	S3	Sm	BCV65	S7	Mm	BCY78	S3	Sm
BC556	S3	Sm	BCV71;R	S7	Mm	BCY79	S3	Sm
BC557	S3	Sm	BCV72;R	S7	Mm	BCY87	S3	Sm
BC558	S3	Sm	BCW29;R	S7	Mm	BCY88	S3	Sm
BC559	S3	Sm	BCW30;R	S7	Mm	BCY89	S3	Sm
BC560	S3	Sm	BCW31;R	S7	Mm	BD131	S4a	P
BC635	S3	Sm	BCW32;R	S7	Mm	BD132	S4a	P
BC636	S3	Sm	BCW33;R	S7	Mm	BD135	S4a	P
BC637	S3	Sm	BCW60*	S7	Mm	BD136	S4a	P
BC638	S3	Sm	BCW61*	S7	Mm	BD137	S4a	P

* = series

FET = Field-effect transistors

Mm = Microminiature semiconductors
for hybrid circuits

P = Low-frequency power transistors

Sm = Small-signal transistors

T = Tuner diodes

type no.	book	section	type no.	book	section	type no.	book	section
BD138	S4a	P	BD244A	S4a	P	BD816	S4a	P
BD139	S4a	P	BD244B	S4a	P	BD817	S4a	P
BD140	S4a	P	BD244C	S4a	P	BD818	S4a	P
BD201	S4a	P	BD329	S4a	P	BD825	S4a	P
BD202	S4a	P	BD330	S4a	P	BD826	S4a	P
BD203	S4a	P	BD331	S4a	P	BD827	S4a	P
BD204	S4a	P	BD332	S4a	P	BD828	S4a	P
BD226	S4a	P	BD333	S4a	P	BD829	S4a	P
BD227	S4a	P	BD334	S4a	P	BD830	S4a	P
BD228	S4a	P	BD335	S4a	P	BD839	S4a	P
BD229	S4a	P	BD336	S4a	P	BD840	S4a	P
BD230	S4a	P	BD337	S4a	P	BD841	S4a	P
BD231	S4a	P	BD338	S4a	P	BD842	S4a	P
BD233	S4a	P	BD433	S4a	P	BD843	S4a	P
BD234	S4a	P	BD434	S4a	P	BD844	S4a	P
BD235	S4a	P	BD435	S4a	P	BD845	S4a	P
BD236	S4a	P	BD436	S4a	P	BD846	S4a	P
BD237	S4a	P	BD437	S4a	P	BD847	S4a	P
BD238	S4a	P	BD438	S4a	P	BD848	S4a	P
BD239	S4a	P	BD645	S4a	P	BD849	S4a	P
BD239A	S4a	P	BD646	S4a	P	BD850	S4a	P
BD239B	S4a	P	BD647	S4a	P	BD933	S4a	P
BD239C	S4a	P	BD648	S4a	P	BD934	S4a	P
BD240	S4a	P	BD649	S4a	P	BD935	S4a	P
BD240A	S4a	P	BD650	S4a	P	BD936	S4a	P
BD240B	S4a	P	BD651	S4a	P	BD937	S4a	P
BD240C	S4a	P	BD652	S4a	P	BD938	S4a	P
BD241	S4a	P	BD675	S4a	P	BD939	S4a	P
BD241A	S4a	P	BD676	S4a	P	BD940	S4a	P
BD241B	S4a	P	BD677	S4a	P	BD941	S4a	P
BD241C	S4a	P	BD678	S4a	P	BD942	S4a	P
BD242	S4a	P	BD679	S4a	P	BD943	S4a	P
BD242A	S4a	P	BD680	S4a	P	BD944	S4a	P
BD242B	S4a	P	BD681	S4a	P	BD945	S4a	P
BD242C	S4a	P	BD682	S4a	P	BD946	S4a	P
BD243	S4a	P	BD683	S4a	P	BD947	S4a	P
BD243A	S4a	P	BD684	S4a	P	BD948	S4a	P
BD243B	S4a	P	BD813	S4a	P	BD949	S4a	P
BD243C	S4a	P	BD814	S4a	P	BD950	S4a	P
BD244	S4a	P	BD815	S4a	P	BD951	S4a	P

P = Low-frequency power transistors

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type no.	book	section	type no.	book	section	type no.	book	section
BD952	S4a	P	BDT60A	S4a	P	BDV64C	S4a	P
BD953	S4a	P	BDT60B	S4a	P	BDV65	S4a	P
BD954	S4a	P	BDT60C	S4a	P	BDV65A	S4a	P
BD955	S4a	P	BDT61	S4a	P	BDV65B	S4a	P
BD956	S4a	P	BDT61A	S4a	P	BDV65C	S4a	P
BDT20	S4a	P	BDT61B	S4a	P	BDV66A	S4a	P
BDT21	S4a	P	BDT61C	S4a	P	BDV66B	S4a	P
BDT29	S4a	P	BDT62	S4a	P	BDV66C	S4a	P
BDT29A	S4a	P	BDT62A	S4a	P	BDV66D	S4a	P
BDT29B	S4a	P	BDT62B	S4a	P	BDV67A	S4a	P
BDT29C	S4a	P	BDT62C	S4a	P	BDV67B	S4a	P
BDT30	S4a	P	BDT63	S4a	P	BDV67C	S4a	P
BDT30A	S4a	P	BDT63A	S4a	P	BDV67D	S4a	P
BDT30B	S4a	P	BDT63B	S4a	P	BDV91	S4a	P
BDT30C	S4a	P	BDT63C	S4a	P	BDV92	S4a	P
BDT31	S4a	P	BDT64	S4a	P	BDV93	S4a	P
BDT31A	S4a	P	BDT64A	S4a	P	BDV94	S4a	P
BDT31B	S4a	P	BDT64B	S4a	P	BDV95	S4a	P
BDT31C	S4a	P	BDT64C	S4a	P	BDV96	S4a	P
BDT32	S4a	P	BDT65	S4a	P	BDW55	S4a	P
BDT32A	S4a	P	BDT65A	S4a	P	BDW56	S4a	P
BDT32B	S4a	P	BDT65B	S4a	P	BDW57	S4a	P
BDT32C	S4a	P	BDT65C	S4a	P	BDW58	S4a	P
BDT41	S4a	P	BDT81	S4a	P	BDW59	S4a	P
BDT41A	S4a	P	BDT82	S4a	P	BDW60	S4a	P
BDT41B	S4a	P	BDT83	S4a	P	BDX35	S4a	P
BDT41C	S4a	P	BDT84	S4a	P	BDX36	S4a	P
BDT42	S4a	P	BDT85	S4a	P	BDX37	S4a	P
BDT42A	S4a	P	BDT86	S4a	P	BDX42	S4a	P
BDT42B	S4a	P	BDT87	S4a	P	BDX43	S4a	P
BDT42C	S4a	P	BDT88	S4a	P	BDX44	S4a	P
BDT51	S4a	P	BDT91	S4a	P	BDX45	S4a	P
BDT52	S4a	P	BDT92	S4a	P	BDX46	S4a	P
BDT53	S4a	P	BDT93	S4a	P	BDX47	S4a	P
BDT54	S4a	P	BDT94	S4a	P	BDX62	S4a	P
BDT55	S4a	P	BDT95	S4a	P	BDX62A	S4a	P
BDT56	S4a	P	BDT96	S4a	P	BDX62B	S4a	P
BDT57	S4a	P	BDV64	S4a	P	BDX62C	S4a	P
BDT58	S4a	P	BDV64A	S4a	P	BDX63	S4a	P
BDT60	S4a	P	BDV64B	S4a	P	BDX63A	S4a	P

P = Low-frequency power transistors

type no.	book	section	type no.	book	section	type no.	book	section
BDX63B	S4a	P	BF240	S3	Sm	BF513	S5/S7	FET/Mm
BDX63C	S4a	P	BF241	S3	Sm	BF536	S7	Mm
BDX64	S4a	P	BF245A	S5	FET	BF550;R	S7	Mm
BDX64A	S4a	P	BF245B	S5	FET	BF569	S7	Mm
BDX64B	S4a	P	BF245C	S5	FET	BF570	S7	Mm
BDX64C	S4a	P	BF247A	S5	FET	BF579	S7	Mm
BDX65	S4a	P	BF247B	S5	FET	BF583	S4b	HVP
BDX65A	S4a	P	BF247C	S5	FET	BF585	S4b	HVP
BDX65B	S4a	P	BF256A	S5	FET	BF587	S4b	HVP
BDX65C	S4a	P	BF256B	S5	FET	BF591	S4b	HVP
BDX66	S4a	P	BF256C	S5	FET	BF593	S4b	HVP
BDX66A	S4a	P	BF324	S3	Sm	BF620	S7	Mm
BDX66B	S4a	P	BF370	S3	Sm	BF621	S7	Mm
BDX66C	S4a	P	BF410A	S5	FET	BF622	S7	Mm
BDX67	S4a	P	BF410B	S5	FET	BF623	S7	Mm
BDX67A	S4a	P	BF410C	S5	FET	BF660;R	S7	Mm
BDX67B	S4a	P	BF410D	S5	FET	BF689K	S10	WBT
BDX67C	S4a	P	BF419	S4b	HVP	BF763	S10	WBT
BDX68	S4a	P	BF420	S3	Sm	BF767	S7	Mm
BDX68A	S4a	P	BF421	S3	Sm	BF819	S4b	HVP
BDX68B	S4a	P	BF422	S3	Sm	BF820	S7	Mm
BDX68C	S4a	P	BF423	S3	Sm	BF821	S7	Mm
BDX69	S4a	P	BF450	S3	Sm	BF822	S7	Mm
BDX69A	S4a	P	BF451	S3	Sm	BF823	S7	Mm
BDX69B	S4a	P	BF457	S4b	HVP	BF824	S7	Mm
BDX69C	S4a	P	BF458	S4b	HVP	BF840	S7	Mm
BDX77	S4a	P	BF459	S4b	HVP	BF841	S7	Mm
BDX78	S4a	P	BF469	S4b	HVP	BF857	S4b	HVP
BDX91	S4a	P	BF470	S4b	HVP	BF858	S4b	HVP
BDX92	S4a	P	BF471	S4b	HVP	BF859	S4b	HVP
BDX93	S4a	P	BF472	S4b	HVP	BF869	S4b	HVP
BDX94	S4a	P	BF483	S3	Sm	BF870	S4b	HVP
BDX95	S4a	P	BF485	S3	Sm	BF871	S4b	HVP
BDX96	S4a	P	BF487	S3	Sm	BF872	S4b	HVP
BDY90	S4a	P	BF494	S3	Sm	BF926	S3	Sm
BDY90A	S4a	P	BF495	S3	Sm	BF936	S3	Sm
BDY91	S4a	P	BF496	S3	Sm	BF939	S3	Sm
BDY92	S4a	P	BF510	S5/S7	FET/Mm	BF960	S5	FET
BF198	S3	Sm	BF511	S5/S7	FET/Mm	BF964	S5	FET
BF199	S3	Sm	BF512	S5/S7	FET/Mm	BF966	S5	FET

FET = Field-effect transistors
 HVP = High-voltage power transistors
 Mm = Micronature semiconductors
 for hybrid circuits

P = Low-frequency power transistors
 Sm = Small-signal transistors
 WBT = Wideband transistors

INDEX

type no.	book	section	type no.	book	section	type no.	book	section
BF967	S3	Sm	BFQ19	S10/S7	WBT/Mm	BFR92A	S10/S7	WBT/Mm
BF970	S3	Sm	BFQ22S	S10	WBT	BFR93	S10/S7	WBT/Mm
BF970A	S3	Sm	BFQ23	S10	WBT	BFR93A	S10/S7	WBT/Mm
BF979	S3	Sm	BFQ23C	S10	WBT	BFR94	S10	WBT
BF980	S5	FET	BFQ24	S10	WBT	BFR95	S10	WBT
BF981	S5	FET	BFQ32	S10	WBT	BFR96	S10	WBT
BF982	S5	FET	BFQ32C	S10	WBT	BFR96S	S10	WBT
BF989	S5/S7	FET/Mm	BFQ32M	S10	WBT	BFR101A;B	S5/S7	FET/Mm
BF990	S5/S7	FET/Mm	BFQ32S	S10	WBT	BFS17	S10/S7	WBT/Mm
BF991	S5/S7	FET/Mm	BFQ33	S10	WBT	BFS17A	S10	WBT
BF992	S5/S7	FET/Mm	BFQ33C	S10	WBT	BFS18;R	S7	Mm
BF994	S5/S7	FET/Mm	BFQ34	S10	WBT	BFS19;R	S7	Mm
BF994S	S5/S7	FET/Mm	BFQ34T	S10	WBT	BFS20;R	S7	Mm
BF996	S5/S7	FET/Mm	BFQ42	S6	RFP	BFS21	S5	FET
BF996S	S5/S7	FET/Mm	BFQ43	S6	RFP	BFS21A	S5	FET
BF997	S5/S7	FET/Mm	BFQ43S	S6	RFP	BFS22A	S6	RFP
BFG23	S10	WBT	BFQ51	S10	WBT	BFS23A	S6	RFP
BFG32	S10	WBT	BFQ51C	S10	WBT	BFT24	S10	WBT
BFG34	S10	WBT	BFQ52	S10	WBT	BFT25	S10/S7	WBT/Mm
BFG51	S10	WBT	BFQ53	S10	WBT	BFT44	S3	Sm
BFG65	S10	WBT	BFQ63	S10	WBT	BFT45	S3	Sm
BFG67	S10/S7	WBT/Mm	BFQ65	S10	WBT	BFT46	S5/S7	FET/Mm
BFG90A	S10	WBT	BFQ66	S10	WBT	BFT92	S10/S7	WBT/Mm
BFG91A	S10	WBT	BFQ67	S10/S7	WBT/Mm	BFT93	S10/S7	WBT/Mm
BFG92A	S10	WBT	BFQ68	S10	WBT	BFW10	S5	FET
BFG93A	S10	WBT	BFQ136	S10	WBT	BFW11	S5	FET
BFG96	S10	WBT	BFR29	S5	FET	BFW12	S5	FET
BFG195	S10	WBT	BFR30	S5/S7	FET/Mm	BFW13	S5	FET
BFP90A	S10	WBT	BFR31	S5/S7	FET/Mm	BFW16A	S10	WBT
BFP91A	S10	WBT	BFR49	S10	WBT	BFW17A	S10	WBT
BFP96	S10	WBT	BFR53	S10/S7	WBT/Mm	BFW30	S10	WBT
BFQ10	S5	FET	BFR54	S3	Sm	BFW61	S5	FET
BFQ11	S5	FET	BFR64	S10	WBT	BFW92	S10	WBT
BFQ12	S5	FET	BFR65	S10	WBT	BFW92A	S10	WBT
BFQ13	S5	FET	BFR84	S5	FET	BFW93	S10	WBT
BFQ14	S5	FET	BFR90	S10	WBT	BFX34	S3	Sm
BFQ15	S5	FET	BFR90A	S10	WBT	BFX89	S10	WBT
BFQ16	S5	FET	BFR91	S10	WBT	BFY50	S3	Sm
BFQ17	S10/S7	WBT/Mm	BFR91A	S10	WBT	BFY51	S3	Sm
BFQ18A	S10/S7	WBT/Mm	BFR92	S10/S7	WBT/Mm	BFY52	S3	Sm

* = series

FET = Field-effect transistors

Mm = Microminiature semiconductors
for hybrid circuits

RFP = R.F. power transistors and modules

RT = Tripler

Sm = Small-signal transistors

ThM = Thyristor modules

WBM = Wideband hybrid IC modules

WBT = Wideband transistors

type no.	book	section	type no.	book	section	type no.	book	section
BFY55	S3	Sm	BGY59	S10	WBM	BLU50	S6	RFP
BFY90	S10	WBT	BGY60	S10	WBM	BLU51	S6	RFP
BG2000	S1	RT	BGY61	S10	WBM	BLU52	S6	RFP
BG2097	S1	RT	BGY65	S10	WBM	BLU53	S6	RFP
BGD102	S10	WBM	BGY67	S10	WBM	BLU60/12	S6	RFP
BGD102E	S10	WBM	BGY67A	S10	WBM	BLU97	S6	RFP
BGD104	S10	WBM	BGY70	S10	WBM	BLU98	S6	RFP
BGD104E	S10	WBM	BGY71	S10	WBM	BLU99	S6	RFP
BGD502.	S10	WBM	BGY74	S10	WBM	BLV10	S6	RFP
BGD504	S10	WBM	BGY75	S10	WBM	BLV11	S6	RFP
BGX885	S10	WBM	BGY78	S10	WBM	BLV20	S6	RFP
BGY22	S6	RFP	BGY84	S10	WBM	BLV21	S6	RFP
BGY22A	S6	RFP	BGY84A	S10	WBM	BLV25	S6	RFP
BGY23	S6	RFP	BGY85	S10	WBM	BLV30	S6	RFP
BGY23A	S6	RFP	BGY85A	S10	WBM	BLV30/12	S6	RFP
BGY32	S6	RFP	BGY86	S10	WBM	BLV31	S6	RFP
BGY33	S6	RFP	BGY87	S10	WBM	BLV32F	S6	RFP
BGY35	S6	RFP	BGY88	S10	WBM	BLV33	S6	RFP
BGY36	S6	RFP	BGY90A	S6	RFP	BLV33F	S6	RFP
BGY40A	S6	RFP	BGY90B	S6	RFP	BLV36	S6	RFP
BGY40B	S6	RFP	BGY93 *	S6	RFP	BLV45/12	S6	RFP
BGY41A	S6	RFP	BGY94 *	S6	RFP	BLV57	S6	RFP
BGY41B	S6	RFP	BGY95A	S6	RFP	BLV59	S6	RFP
BGY43	S6	RFP	BGY95B	S6	RFP	BLV75/12	S6	RFP
BGY45A	S6	RFP	BGY96A	S6	RFP	BLV80/28	S6	RFP
BGY45B	S6	RFP	BGY96B	S6	RFP	BLV90	S6	RFP
BGY46A	S6	RFP	BGY584A	S10	WBM	BLV90/SL	S6	RFP
BGY46B	S6	RFP	BGY585A	S10	WBM	BLV91	S6	RFP
BGY47 *	S6	RFP	BGY586	S10	WBM	BLV91/SL	S6	RFP
BGY48 *	S6	RFP	BGY587	S10	WBM	BLV92	S6	RFP
BGY50	S10	WBM	BLF146	S6	RFP/FET	BLV93	S6	RFP
BGY51	S10	WBM	BLF242	S6	RFP/FET	BLV94	S6	RFP
BGY52	S10	WBM	BLF244	S6	RFP/FET	BLV95	S6	RFP
BGY53	S10	WBM	BLF245	S6	RFP/FET	BLV97	S6	RFP
BGY54	S10	WBM	BLT90/SL	S6	RFP	BLV98	S6	RFP
BGY55	S10	WBM	BLT91/SL	S6	RFP	BLV99	S6	RFP
BGY56	S10	WBM	BLT92/SL	S6	RFP	BLW29	S6	RFP
BGY57	S10	WBM	BLU20/12	S6	RFP	BLW31	S6	RFP
BGY58	S10	WBM	BLU30/12	S6	RFP	BLW32	S6	RFP
BGY58A	S10	WBM	BLU45/12	S6	RFP	BLW33	S6	RFP

* = series

FET = Field-effect transistors

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type no.	book	section	type no.	book	section	type no.	book	section
BLW34	S6	RFP	BLX95	S6	RFP	BS107	S5	FET
BLW50F	S6	RFP	BLX96	S6	RFP	BS170	S5	FET
BLW60	S6	RFP	BLX97	S6	RFP	BSD10	S5	FET
BLW60C	S6	RFP	BLX98	S6	RFP	BSD12	S5	FET
BLW76	S6	RFP	BLY87A	S6	RFP	BSD20	S5/S7	FET/Mm
BLW77	S6	RFP	BLY87C	S6	RFP	BSD22	S5/S7	FET/Mm
BLW78	S6	RFP	BLY88A	S6	RFP	BSD212	S5	FET
BLW79	S6	RFP	BLY88C	S6	RFP	BSD213	S5	FET
BLW80	S6	RFP	BLY89A	S6	RFP	BSD214	S5	FET
BLW81	S6	RFP	BLY89C	S6	RFP	BSD215	S5	FET
BLW83	S6	RFP	BLY90	S6	RFP	BSR12;R	S7	Mm
BLW84	S6	RFP	BLY91A	S6	RFP	BSR13;R	S7	Mm
BLW85	S6	RFP	BLY91C	S6	RFP	BSR14;R	S7	Mm
BLW86	S6	RFP	BLY92A	S6	RFP	BSR15;R	S7	Mm
BLW87	S6	RFP	BLY92C	S6	RFP	BSR16;R	S7	Mm
BLW89	S6	RFP	BLY93A	S6	RFP	BSR17;R	S7	Mm
BLW90	S6	RFP	BLY93C	S6	RFP	BSR17A;R	S7	Mm
BLW91	S6	RFP	BLY94	S6	RFP	BSR18;R	S7	Mm
BLW95	S6	RFP	BPF24	S8b	PDT	BSR18A;R	S7	Mm
BLW96	S6	RFP	BPW22A	S8a/b	PDT	BSR19;A	S7	Mm
BLW97	S6	RFP	BPW50	S8a/b	PDT	BSR20;A	S7	Mm
BLW98	S6	RFP	BPW71	S8b	PDT	BSR30	S7	Mm
BLW99	S6	RFP	BPX25	S8b	PDT	BSR31	S7	Mm
BLX13	S6	RFP	BPX29	S8b	PDT	BSR32	S7	Mm
BLX13C	S6	RFP	BPX40	S8b	PDT	BSR33	S7	Mm
BLX14	S6	RFP	BPX41	S8b	PDT	BSR40	S7	Mm
BLX15	S6	RFP	BPX42	S8b	PDT	BSR41	S7	Mm
BLX39	S6	RFP	BPX61	S8b	PDT	BSR42	S7	Mm
BLX65	S6	RFP	BPX61P	S8b	PDT	BSR43	S7	Mm
BLX65E	S6	RFP	BPX71	S8b	PDT	BSR50	S3	Sm
BLX65ES	S6	RFP	BPX72	S8b	PDT	BSR51	S3	Sm
BLX67	S6	RFP	BR100/03	S2b	Th	BSR52	S3	Sm
BLX68	S6	RFP	BR101	S3	Sm	BSR56	S5/S7	FET/Mm
BLX69A	S6	RFP	BR210*	S2a	Th	BSR57	S5/S7	FET/Mm
BLX91A	S6	RFP	BR216*	S2a	Th	BSR58	S5/S7	FET/Mm
BLX91CB	S6	RFP	BR220*	S2a	Th	BSR60	S3	Sm
BLX92A	S6	RFP	BRY39	S3	Sm	BSR61	S3	Sm
BLX93A	S6	RFP	BRY56	S3	Sm	BSR62	S3	Sm
BLX94A	S6	RFP	BRY61	S7	Mm	BSS38	S3	Sm
BLX94C	S6	RFP	BRY62	S7	Mm	BSS50	S3	Sm

FET = Field-effect transistors
Mm = Microminiature semiconductors
for hybrid circuits
PDT = Photodiodes or transistors

RFP = R.F. power transistors and modules
Sm = Small-signal transistors
Th = Thyristors

type no.	book	section	type no.	book	section	type no.	book	section
BSS51	S3	Sm	BSV79	S5	FET	BTV70*	S2b	Th
BSS52	S3	Sm	BSV80	S5	FET	BTV70D*	S2b	Th
BSS60	S3	Sm	BSV81	S5	FET	BTW23*	S2b	Th
BSS61	S3	Sm	BSW66A	S3	Sm	BTW38*	S2b	Th
BSS62	S3	Sm	BSW67A	S3	Sm	BTW40*	S2b	Th
BSS63;R	S7	Mm	BSW68A	S3	Sm	BTW42*	S2b	Th
BSS64;R	S7	Mm	BSX19	S3	Sm	BTW43*	S2b	Tri
BSS68	S3	Sm	BSX20	S3	Sm	BTW45*	S2b	Th
BSS83	S5/S7	FET/Mm	BSX32	S3	Sm	BTW58*	S2b	Th
BST15	S7	Mm	BSX45	S3	Sm	BTW62*	S2b	Th
BST16	S7	Mm	BSX46	S3	Sm	BTW62D*	S2b	Th
BST39	S7	Mm	BSX47	S3	Sm	BTW63*	S2b	Th
BST40	S7	Mm	BSX59	S3	Sm	BTY79*	S2b	Th
BST50	S7	Mm	BSX60	S3	Sm	BTY91*	S2b	Th
BST51	S7	Mm	BSX61	S3	Sm	BU426	S4b	SP
BST52	S7	Mm	BT136*	S2b	Tri	BU426A	S4b	SP
BST60	S7	Mm	BT136F*	S2b	Tri	BU433	S4b	SP
BST61	S7	Mm	BT137*	S2b	Tri	BU505	S4b	SP
BST62	S7	Mm	BT137F*	S2b	Tri	BU506	S4b	SP
BST70A	S5	FET	BT138*	S2b	Tri	BU506D	S4b	SP
BST72A	S5	FET	BT138F*	S2b	Tri	BU508A	S4b	SP
BST74A	S5	FET	BT139*	S2b	Tri	BU508D	S4b	SP
BST76A	S5	FET	BT139F*	S2b	Tri	BU705	S4b	SP
BST78	S5	FET	BT145*	S2b	Tri	BU706	S4b	SP
BST80	S5/S7	FET/Mm	BT149*	S2b	Th	BU706D	S4b	SP
BST82	S5/S7	FET/Mm	BT150	S2b	Th	BU806	S4b	SP
BST84	S5/S7	FET/Mm	BT151*	S2b	Th	BU807	S4b	SP
BST86	S5/S7	FET/Mm	BT151F*	S2b	Th	BU808	S4b	SP
BST90	S5	FET	BT152*	S2b	Th	BU824	S4b	SP
BST97	S5	FET	BT153	S2b	Th	BU826	S4b	SP
BST100	S5	FET	BT157*	S2b	Th	BUP22*	S4b	SP
BST110	S5	FET	BT169*	S2b	Th	BUP23*	S4b	SP
BST120	S5/S7	FET/Mm	BTA140*	S2b	Tri	BUS11;A	S4b	SP
BST122	S5/S7	FET/Mm	BTR59*	S2b	Tri	BUS12;A	S4b	SP
BSV15	S3	Sm	BTS59*	S2b	Tri	BUS13;A	S4b	SP
BSV16	S3	Sm	BTV58*	S2b	Th	BUS14;A	S4b	SP
BSV17	S3	Sm	BTV59*	S2b	Th	BUS21*	S4b	SP
BSV52;R	S7	Mm	BTV59D*	S2b	Th	BUS22*	S4b	SP
BSV64	S3	Sm	BTV60*	S2b	Th	BUS23*	S4b	SP
BSV78	S5	FET	BTV60D*	S2b	Th	BUS24*	S4b	SP

* = series

FET = Field-effect transistors

Mm = Microminiature semiconductors
for hybrid circuits

Sm = Small-signal transistors

SP = Low-frequency switching power transistors

Th = Thyristors

Tri = Triacs

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type no.	book	section	type no.	book	section	type no.	book	section
BUT11;A	S4b	SP	BUZ32	S9	PM	BUZ308	S9	PM
BUT11F;AF	S4b	SP	BUZ34	S9	PM	BUZ310	S9	PM
BUV82	S4b	SP	BUZ35	S9	PM	BUZ311	S9	PM
BUV83	S4b	SP	BUZ36	S9	PM	BUZ326	S9	PM
BUV89	S4b	SP	BUZ41A	S9	PM	BUZ330	S9	PM
BUV90;A	S4b	SP	BUZ42	S9	PM	BUZ331	S9	PM
BUW11;A	S4b	SP	BUZ45	S9	PM	BUZ347	S9	PM
BUW12;A	S4b	SP	BUZ45A	S9	PM	BUZ348	S9	PM
BUW13;A	S4b	SP	BUZ45B	S9	PM	BUZ349	S9	PM
BUW84	S4b	SP	BUZ50A	S9	PM	BUZ350	S9	PM
BUW85	S4b	SP	BUZ50B	S9	PM	BUZ351	S9	PM
BUX46;A	S4b	SP	BUZ50C	S9	PM	BUZ355	S9	PM
BUX47;A	S4b	SP	BUZ53A	S9	PM	BUZ356	S9	PM
BUX48;A	S4b	SP	BUZ54	S9	PM	BUZ357	S9	PM
BUX80	S4b	SP	BUZ54A	S9	PM	BUZ358	S9	PM
BUX81	S4b	SP	BUZ60	S9	PM	BUZ384	S9	PM
BUX82	S4b	SP	BUZ63	S9	PM	BUZ385	S9	PM
BUX83	S4b	SP	BUZ64	S9	PM	BY224*	S2a	R
BUX84	S4b	SP	BUZ71	S9	PM	BY225*	S2a	R
BUX84F	S4b	SP	BUZ71A	S9	PM	BY228	S1	R
BUX85	S4b	SP	BUZ72	S9	PM	BY229*	S2a	R
BUX85F	S4b	SP	BUZ72A	S9	PM	BY229F*	S2a	R
BUX86	S4b	SP	BUZ73	S9	PM	BY249*	S2a	R
BUX87	S4b	SP	BUZ73A	S9	PM	BY260*	S2a	R
BUX88	S4b	SP	BUZ74	S9	PM	BY261*	S2a	R
BUX90	S4b	SP	BUZ74A	S9	PM	BY329*	S2a	R
BUX98;A	S4b	SP	BUZ76	S9	PM	BY359*	S2a	R
BUX99	S4b	SP	BUZ76A	S9	PM	BY438	S1	R
BUY89	S4b	SP	BUZ78	S9	PM	BY448	S1	R
BUZ10	S9	PM	BUZ80	S9	PM	BY458	S1	R
BUZ11	S9	PM	BUZ80A	S9	PM	BY505	S1	R
BUZ11A	S9	PM	BUZ83	S9	PM	BY509	S1	R
BUZ14	S9	PM	BUZ83A	S9	PM	BY527	S1	R
BUZ15	S9	PM	BUZ84	S9	PM	BY584	S1	R
BUZ20	S9	PM	BUZ84A	S9	PM	BY588	S1	R
BUZ21	S9	PM	BUZ90	S9	PM	BY609	S1	R
BUZ23	S9	PM	BUZ90A	S9	PM	BY610	S1	R
BUZ24	S9	PM	BUZ94	S9	PM	BY614	S1	R
BUZ25	S9	PM	BUZ211	S9	PM	BY619	S1	R
BUZ31	S9	PM	BUZ307	S9	PM	BY620	S1	R

* = series

PM = Power MOS transistors

R = Rectifier diodes

SP = Low-frequency switching power transistors

type no.	book	section	type no.	book	section	type no.	book	section
BY627	S1	R	BYV29F*	S2a	R	BYX10G	S1	R
BY707	S1	R	BYV30*	S2a	R	BYX25*	S2a	R
BY708	S1	R	BYV31*	S2a	R	BYX30*	S2a	R
BY709	S1	R	BYV32*	S2a	R	BYX32*	S2a	R
BY710	S1	R	BYV32F*	S2a	R	BYX38*	S2a	R
BY711	S1	R	BYV33*	S2a	R	BYX39*	S2a	R
BY712	S1	R	BYV33F*	S2a	R	BYX42*	S2a	R
BY713	S1	R	BYV34*	S2a	R	BYX46*	S2a	R
BY714	S1	R	BYV36 *	S1	R	BYX50*	S2a	R
BYD13 *	S1	R	BYV39*	S2a	R	BYX52*	S2a	R
BYD14 *	S1	R	BYV42*	S2a	R	BYX56*	S2a	R
BYD17 *	S1/S7	R/Mm	BYV43*	S2a	R	BYX90G	S1	R
BYD33 *	S1	R	BYV43F*	S2a	R	BYX96*	S2a	R
BYD37 *	S1/S7	R/Mm	BYV44*	S2a	R	BYX97*	S2a	R
BYD73 *	S1	R	BYV60*	S2a	R	BYX98*	S2a	R
BYD74 *	S1	R	BYV72*	S2a	R	BYX99*	S2a	R
BYD77 *	S1	R	BYV73*	S2a	R	BZD23	S1	Vrg
BYM26 *	S1	R	BYV74*	S2a	R	BZD27	S1/S7	Vrg/Mm
BYM36 *	S1	R	BYV79*	S2a	R	BZT03	S1	Vrg
BYM56 *	S1	R	BYV92*	S2a	R	BZV10	S1	Vrf
BYP21*	S2a	R	BYV95A	S1	R	BZV11	S1	Vrf
BYP22*	S2a	R	BYV95B	S1	R	BZV12	S1	Vrf
BYP59*	S2a	R	BYV95C	S1	R	BZV13	S1	Vrf
BYQ28*	S2a	R	BYV96D	S1	R	BZV14	S1	Vrf
BYR29*	S2a	R	BYV96E	S1	R	BZV37	S1	Vrf
BYR29F*	S2a	R	BYW25*	S2a	R	BZV46	S1	Vrg
BYT28*	S2a	R	BYW29*	S2a	R	BZV49*	S1/S7	Vrg/Mm
BYT79*	S2a	R	BYW29F*	S2a	R	BZV55*	S7	Mm
BYV10	S1	R	BYW30*	S2a	R	BZV80	S1	Vrf
BYV18*	S2a	R	BYW31*	S2a	R	BZV81	S1	Vrf
BYV19*	S2a	R	BYW54	S1	R	BZV85 *	S1	Vrg
BYV20*	S2a	R	BYW55	S1	R	BZW03 *	S1	Vrg
BYV21*	S2a	R	BYW56	S1	R	BZW14	S1	Vrg
BYV22*	S2a	R	BYW92*	S2a	R	BZW86*	S2a	TS
BYV23*	S2a	R	BYW93*	S2a	R	BZX55 *	S1	Vrg
BYV24*	S2a	R	BYW95A	S1	R	BZX70*	S2a	Vrg
BYV26 *	S1/S2a	R	BYW95B	S1	R	BZX75 *	S1	Vrg
BYV27*	S1/S2a	R	BYW95C	S1	R	BZX79*	S1	Vrg
BYV28*	S1/S2a	R	BYW96D	S1	R	BZX84*	S1/S7	Vrg/Mm
BYV29*	S2a	R	BYW96E	S1	R	BZY91*	S2a	Vrg

* = series

LED = Light-emitting diodes

M = Microwave transistors

Mm = Microminiature semiconductors
for hybrid circuits

Ph = Photoconductive devices

PhC = Photocouplers

R = Rectifier diodes

TS = Transient suppressor diodes

Vrf = Voltage reference diodes

Vrg = Voltage regulator diodes

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type no.	book	section	type no.	book	section	type no.	book	section
BZY93*	S2a	Vrg	CQW89B	S8a	I	LCE2009S	S11	M
CNG35	S8b	PhC	CQY58A	S8a	I	LJE42002T	S11	M
CNG36	S8b	PhC	CQY89A	S8a	I	LKE1004R	S11	M
CNR36	S8b	PhC	CQY89F	S8a	I	LKE2002T	S11	M
CNX21	S8b	PhC	Fresnel- lens	S8b	A	LKE2004T	S11	M
CNX35	S8b	PhC				LKE2015T	S11	M
CNX35U	S8b	PhC	H11A1	S8b	PhC	LKE21004R	S11	M
CNX36	S8b	PhC	H11A2	S8b	PhC	LKE21015T	S11	M
CNX36U	S8b	PhC	H11A3	S8b	PhC	LKE21050T	S11	M
CNX38	S8b	PhC	H11A4	S8b	PhC	LKE27010R	S11	M
			H11A5	S8b	PhC			
CNX38U	S8b	PhC				LKE27025R	S11	M
CNX39	S8b	PhC	H11B1	S8b	PhC	LKE32002T	S11	M
CNX39U	S8b	PhC	H11B2	S8b	PhC	LKE32004T	S11	M
CNX44	S8b	PhC	H11B3	S8b	PhC	LTE21009R	S11	M
CNX44A	S8b	PhC	H11B255	S8b	PhC	LTE21015R	S11	M
			KMZ10A	S13	SEN			
CNX46	S8b	PhC	KMZ10B	S13	SEN	LTE21025R	S11	M
CNX48	S8b	PhC	KMZ10C	S13	SEN	LTE42002S	S11	M
CNX48U	S8b	PhC	KP100A	S13	SEN	LTE42005S	S11	M
CNX62	S8b	PhC	KP101A	S13	SEN	LTE42008R	S11	M
CNX72	S8b	PhC	KPZ20G	S13	SEN	LTE42012R	S11	M
CNX82	S8b	PhC				LUE2003S	S11	M
CNX83	S8b	PhC	KPZ21G	S13	SEN	LUE2009S	S11	M
CNX91	S8b	PhC	KTY81-100*	S13	SEN	LV1721E50R	S11	M
CNX92	S8b	PhC	KTY81-200*	S13	SEN	LV2024E45R	S11	M
CNY17-1	S8b	PhC	KTY83-100*	S13	SEN	LV2327E40R	S11	M
			KTY84-100*	S13	SEN			
CNY17-2	S8b	PhC	LAE2001R	S11	M	LV2931E50S	S11	M
CNY17-3	S8b	PhC	LAE4000Q	S11	M	LV3742E16R	S11	M
CNY50	S8b	PhC	LAE4001R	S11	M	LV3742E24R	S11	M
CNY57	S8b	PhC	LAE4002S	S11	M	LVE21050R	S11	M
CNY57A	S8b	PhC	LAE6000Q	S11	M	LWE2015R	S11	M
CNY57AU	S8b	PhC	LBE1004R	S11	M	LWE2025R	S11	M
CNY57U	S8b	PhC	LBE1010R	S11	M	LZ1418E100R	S11	M
CNY62	S8b	PhC	LBE2003S	S11	M	MCA230	S8b	PhC
CNY63	S8b	PhC	LBE2005Q	S11	M	MCA231	S8b	PhC
CQF24	S8b	Ph	LBE2008T	S11	M	MCA255	S8b	PhC
CQL10A	S8b	Ph	LBE2009S	S11	M	MCT2	S8b	PhC
CQL13A	S8b	Ph	LCE1010R	S11	M	MCT26	S8b	PhC
CQL16	S8b	Ph	LCE2003S	S11	M	MKB12040WS	S11	M
CQW58A	S8a	I	LCE2005Q	S11	M	MKR12100WS	S11	M
CQW89A	S8a	I	LCE2008T	S11	M	MKB12140W	S11	M

* = series

A = Accessories

I = Infrared devices

LED = Light-emitting diodes

M = Microwave transistors

PhC = Photocouplers

SEN = Sensors

type no.	book	section	type no.	book	section	type no.	book	section
MO6075B200Z	S11	M	OM323	S10	WBM	PEE1001U	S11	M
MO6075B400Z	S11	M	OM323A	S10	WBM	PEE1003U	S11	M
MPS6513	S3	Sm	OM335	S10	WBM	PEE1005U	S11	M
MPS6514	S3	Sm	OM336	S10	WBM	PEE1010U	S11	M
MPS6515	S3	Sm	OM337	S10	WBM	PH2222/A	S3	Sm
MPS6517	S3	Sm	OM337A	S10	WBM	PH2369	S3	Sm
MPS6518	S3	Sm	OM339	S10	WBM	PH2907	S3	Sm
MPS6519	S3	Sm	OM345	S10	WBM	PH2907A	S3	Sm
MPS6520	S3	Sm	OM350	S10	WBM	PH2955T	S4a	P
MPS6521	S3	Sm	OM360	S10	WBM	PH3055T	S4a	P
MPS6522	S3	Sm	OM361	S10	WBM	PH5415	S3	Sm
MPS6523	S3	Sm	OM370	S10	WBM	PH5416	S3	Sm
MPSA05	S3	Sm	OM386B	S13	SEN	PH13002	S4b	SP
MPSA06	S3	Sm	OM386M	S13	SEN	PH13003	S4b	SP
MPSA13	S3	Sm	OM387B	S13	SEN	PHSD51	S2a	R
MPSA14	S3	Sm	OM387M	S13	SEN	PKB3001U	S11	M
MPSA42	S3	Sm	OM388B	S13	SEN	PKB3003U	S11	M
MPSA43	S3	Sm	OM389B	S13	SEN	PKB3005U	S11	M
MPSA55	S3	Sm	OM931	S4a	P	PKB12005U	S11	M
MPSA56	S3	Sm	OM961	S4a	P	PKB20010U	S11	M
MPSA63	S3	Sm	OSB9115	S2a	St	PKB23001U	S11	M
MPSA64	S3	Sm	OSB9215	S2a	St	PKB23003U	S11	M
MPSA92	S3	Sm	OSB9415	S2a	St	PKB23005U	S11	M
MPSA93	S3	Sm	OSM9115	S2a	St	PKB25006T	S11	M
MRB11080Y	S11	M	OSM9215	S2a	St	PKB32001U	S11	M
MRB11175Y	S11	M	OSM9415	S2a	St	PKB32003U	S11	M
MRB11350Y	S11	M	OSM9510	S2a	St	PKB32005U	S11	M
MRB12175YR	S11	M	OSM9511	S2a	St	PLED-G313A	S8a	LED
MRB12350YR	S11	M	OSM9512	S2a	St	PLED-G313N	S8a	LED
MS1011B700Y	S11	M	OSS9115	S2a	St	PLED-G314A	S8a	LED
MS6075B800Z	S11	M	OSS9215	S2a	St	PLED-G314N	S8a	LED
MSB11900Y	S11	M	OSS9415	S2a	St	PLED-G511C	S8a	LED
MSB12900Y	S11	M	P2105	S8b	I	PLED-G513C	S8a	LED
MZ0912B75Y	S11	M	PBMF4391	S5	FET	PLED-G513M	S8a	LED
MZ0912B150Y	S11	M	PBMF4392	S5	FET	PLED-G514B	S8a	LED
OM286; M	S13	SEN	PBMF4393	S5	FET	PLED-G514M	S8a	LED
OM287; M	S13	SEN	PDE1001U	S11	M	PLED-G544KL	S8a	LED
OM320	S10	WBM	PDE1003U	S11	M	PLED-G544LL	S8a	LED
OM321	S10	WBM	PDE1005U	S11	M	PLED-GR14E	S8a	LED
OM322	S10	WBM	PDE1010U	S11	M	PLED-GR14F	S8a	LED

FET = Field-effect transistors
 I = Infrared devices
 M = Microwave transistors
 Mm = Microminiature semiconductors
 for hybrid circuits
 P = Low-frequency power transistors
 PhC = Photocouplers

R = Rectifier diodes
 SD = Small-signal diodes
 SEN = Sensors
 Sm = Small-signal transistors
 SP = Low-frequency switching power transistors
 St = Rectifier stacks
 WBM = Wideband hybrid IC modules

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PLED-GR44DL	S8a	LED	PMBF4392	S7	Mm	PTB32003X	S11	M
PLED-H313A	S8a	LED	PMBF4393	S7	Mm	PTB32005X	S11	M
PLED-H314A	S8a	LED	PMBT2222/A	S7	Mm	PTB42001X	S11	M
PLED-H511C	S8a	LED	PMBT2907/A	S7	Mm	PTB42002X	S11	M
PLED-H514B	S8a	LED	PMBT3903/4	S7	Mm	PTB42003X	S11	M
PLED-H544KL	S8a	LED	PMBT3906	S7	Mm	PV3742B4X	S11	M
PLED-H544LL	S8a	LED	PMBT6428/9	S7	Mm	PVB42004X	S11	M
PLED-HR14E	S8a	LED	PMBTA05/06	S7	Mm	PXT3904	S7	Mm
PLED-HR14F	S8a	LED	PMBTA13/14	S7	Mm	PXT3906	S7	Mm
PLED-HR14G	S8a	LED	PMBTA42/43	S7	Mm	PZ1418B15U	S11	M
PLED-HR44DL	S8a	LED	PMBTA55/56	S7	Mm	PZ1418B30U	S11	M
PLED-O313N	S8a	LED	PMBTA63/64	S7	Mm	PZ1721B12U	S11	M
PLED-O314N	S8a	LED	PMBTA92/93	S7	Mm	PZ1721B25U	S11	M
PLED-O513M	S8a	LED	PMLL4148	S1	SD	PZ2024B10U	S11	M
PLED-O514M	S8a	LED	PMLL4150	S1	SD	PZ2024B20U	S11	M
PLED-P313N	S8a	LED	PMLL4151	S1	SD	PZ2327B15U	S11	M
PLED-P314N	S8a	LED	PMLL4153	S1	SD	PZB16035U	S11	M
PLED-P513M	S8a	LED	PMLL4446	S1	SD	PZB16040U	S11	M
PLED-P514M	S8a	LED	PMLL4448	S1	SD	PZB27020U	S11	M
PLED-T512B	S8a	LED	PMLL5225B			RPY97	S8b	I
PLED-TR12E	S8a	LED	to	S1/S7	SD	RPY100	S8b	I
PLED-TR12F	S8a	LED	PMLL5267B			RPY101	S8b	I
PLED-TR12G	S8a	LED	PN2222	S3	Sm	RPY102	S8b	I
PLED-TR42DL	S8a	LED	PN2222A	S3	Sm	RPY103	S8b	I
PLED-Y313A	S8a	LED	PN2369	S3	Sm	RPY107	S8b	I
PLED-Y313N	S8a	LED	PN2369A	S3	Sm	RPY109	S8b	I
PLED-Y314A	S8a	LED	PN2907	S3	Sm	RV2833B5X	S11	M
PLED-Y314N	S8a	LED	PN2907A	S3	Sm	RV3135B5X	S11	M
PLED-Y511C	S8a	LED	PN3439	S3	Sm	RX1011B250Y	S11	M
PLED-Y513C	S8a	LED	PN3440	S3	Sm	RX1011B350Y	S11	M
PLED-Y513M	S8a	LED	PN5415	S3	Sm	RX1214B150Y	S11	M
PLED-Y514B	S8a	LED	PN5416	S3	Sm	RX1214B300Y	S11	M
PLED-Y514M	S8a	LED	PO44	S8b	PhC	RX2731B90W	S11	M
PLED-Y544KL	S8a	LED	PO44A	S8b	PhC	RX3034B70W	S11	M
PLED-Y544LL	S8a	LED	PPC5001T	S11	M	RXB12350Y	S11	M
PLED-YR14E	S8a	LED	PQC5001T	S11	M	RZ1214B35Y	S11	M
PLED-YR14F	S8a	LED	PTB23001X	S11	M	RZ1214B60W	S11	M
PLED-YR14G	S8a	LED	PTB23003X	S11	M	RZ1214B65Y	S11	M
PLED-YR44DL	S8a	LED	PTB23005X	S11	M	RZ1214B125W	S11	M

* = series

I = Infrared devices

M = Microwave transistors

P = Low-frequency power transistors

PhC = Photocouplers

R = Rectifier diodes

SD = Small-signal diodes

Vrf = Voltage reference diodes

type no.	book	section	type no.	book	section	type no.	book	section
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RZ1214B150Y	S11	M	TIP121	S4a	P	1N4001G	S1	R
RZ2731B45W	S11	M	TIP122	S4a	P	1N4002G	S1	R
RZ2731B60W	S11	M	TIP125	S4a	P	1N4003G	S1	R
RZ2833B15W	S11	M	TIP126	S4a	P	1N4004G	S1	R
RZ2833B30W	S11	M	TIP127	S4a	P	1N4005G	S1	R
RZ2833B45W	S11	M	TIP130	S4a	P	1N4006G	S1	R
RZ2833B60W	S11	M	TIP131	S4a	P	1N4007G	S1	R
RZ3135B15W	S11	M	TIP132	S4a	P	1N4148	S1	SD
RZ3135B30W	S11	M	TIP135	S4a	P	1N4150	S1	SD
RZ3135B40W	S11	M	TIP136	S4a	P	1N4151	S1	SD
RZ3135B50W	S11	M	TIP137	S4a	P	1N4153	S1	SD
RZB12050Y	S11	M	TIP140	S4a	P	1N4446	S1	SD
RZB12100Y	S11	M	TIP141	S4a	P	1N4448	S1	SD
RZB12250Y	S11	M	TIP145	S4a	P	1N4531	S1	SD
SL5500	S8b	PhC	TIP146	S4a	P	1N4532	S1	SD
SL5501	S8b	PhC	TIP147	S4a	P	1N5059	S1	R
SL5502R	S8b	PhC	TIP2955	S4a	P	1N5060	S1	R
SL5504	S8b	PhC	TIP3055	S4a	P	1N5061	S1	R
SL5504S	S8b	PhC	1N821;A	S1	Vrf	1N5062	S1	R
SL5505S	S8b	PhC	1N823;A	S1	Vrf	1N5225B		
SL5511	S8b	PhC	1N825;A	S1	Vrf	to	S1	R
TIP29*	S4a	P	1N827;A	S1	Vrf	1N5267B		
TIP30*	S4a	P	1N829;A	S1	Vrf	2N918	S10	WBT
TIP31*	S4a	P	1N914	S1	SD	2N930	S3	Sm
TIP32*	S4a	P	1N916	S1	SD	2N1613	S3	Sm
TIP33*	S4a	P	1N3879	S2a	R	2N1711	S3	Sm
TIP34*	S4a	P	1N3880	S2a	R	2N1893	S3	Sm
TIP41*	S4a	P	1N3881	S2a	R	2N2219	S3	Sm
TIP42*	S4a	P	1N3882	S2a	R	2N2219A	S3	Sm
TIP47	S4b	P	1N3883	S2a	R	2N2222	S3	Sm
TIP48	S4b	P	1N3889	S2a	R	2N2222A	S3	Sm
TIP49	S4b	P	1N3890	S2a	R	2N2297	S3	Sm
TIP50	S4b	P	1N3891	S2a	R	2N2369	S3	Sm
TIP110	S4a	P	1N3892	S2a	R	2N2369A	S3	Sm
TIP111	S4a	P	1N3893	S2a	R	2N2483	S3	Sm
TIP112	S4a	P	1N3909	S2a	R	2N2484	S3	Sm
TIP115	S4a	P	1N3910	S2a	R	2N2904	S3	Sm
TIP116	S4a	P	1N3911	S2a	R	2N2904A	S3	Sm
TIP117	S4a	P	1N3912	S2a	R	2N2905	S3	Sm

A = Accessories
 FET = Field-effect transistors
 Ph = Photoconductive devices
 PhC = Photocouplers
 R = Rectifier diodes

RFP = R.F. power transistors and modules
 SD = Small-signal diodes
 Sm = Small-signal transistors
 WBT = Wideband transistors

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2N2905A	S3	Sm	2N4427	S6	RFP	56295	S2a/b	A
2N2906	S3	Sm	2N4856	S5	FET	56326	S4b	A
2N2906A	S3	Sm	2N4857	S5	FET	56339	S4b	A
2N2907	S3	Sm	2N4858	S5	FET	56352	S4b	A
2N2907A	S3	Sm	2N4859	S5	FET	56353	S4b	A
2N3019	S3	Sm	2N4860	S5	FET	56354	S4b	A
2N3020	S3	Sm	2N4861	S5	FET	56359b	S2/4	A
2N3053	S3	Sm	2N5086	S3	Sm	56359c	S2/4	A
2N3375	S6	RFP	2N5087	S3	Sm	56359d	S2/4	A
2N3553	S6	RFP	2N5088	S3	Sm	56360a	S2/4	A
2N3632	S6	RFP	2N5089	S3	Sm	56363	S2/4	A
2N3822	S5	FET	2N5400	S3	Sm	56364	S2/4	A
2N3823	S5	FET	2N5401	S3	Sm	56367	S2/4	A
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2N3905	S3	Sm	2N5551	S3	Sm			
2N3906	S3	Sm	2N6659	S5	FET			
2N3924	S6	RFP	2N6660	S5	FET			
2N3926	S6	RFP	2N6661	S5	FET			
2N3927	S6	RFP	4N25	S8b	PhC			
2N3966	S5	FET	4N25A	S8b	PhC			
2N4030	S3	Sm	4N26	S8b	PhC			
2N4031	S3	Sm	4N27	S8b	PhC			
2N4032	S3	Sm	4N28	S8b	PhC			
2N4033	S3	Sm	4N35	S8b	PhC			
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2N4093	S5	FET	4N38	S8b	PhC			
2N4123	S3	Sm	4N38A	S8b	PhC			
2N4124	S3	Sm	502CQF	S8b	Ph			
2N4125	S3	Sm	503CQF	S8b	Ph			
2N4126	S3	Sm	504CQL	S8b	Ph			
2N4391	S5	FET	516CQF-B	S8b	Ph			
2N4392	S5	FET	56201d	S4b	A			
2N4393	S5	FET	56201j	S4b	A			
2N4400	S3	Sm	56245	S3, 10	A			
2N4401	S3	Sm	56246	S3, 10	A			
2N4402	S3	Sm	56261a	S4b	A			
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A = Accessories
 FET = Field-effect transistors
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DATA HANDBOOK SYSTEM

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of four series of handbooks:

ELECTRON TUBES	BLUE
SEMICONDUCTORS	RED
INTEGRATED CIRCUITS	PURPLE
COMPONENTS AND MATERIALS	GREEN

The contents of each series are listed on pages iv to vii.

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- T2a** **Transmitting tubes for communications, glass types**
- T2b** **Transmitting tubes for communications, ceramic types**
- T3** **Klystrons**
- T4** **Magnetrons for microwave heating**
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Instrument tubes, monitor and display tubes, C.R. tubes for special applications
- T6** **Geiger-Müller tubes**
- T8** **Colour display systems**
Colour TV picture tubes, colour data graphic display tube assemblies, deflection units
- T9** **Photo and electron multipliers**
- T10** **Plumbicon camera tubes and accessories**
- T11** **Microwave semiconductors and components**
- T12** **Vidicon and Newvicon camera tubes**
- T13** **Image intensifiers and infrared detectors**
- T15** **Dry reed switches**
- T16** **Monochrome tubes and deflection units**
Black and white TV picture tubes, monochrome data graphic display tubes, deflection units

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The red series of data handbooks comprises:

- S1 Diodes**
Small-signal silicon diodes, voltage regulator diodes (< 1,5 W), voltage reference diodes, tuner diodes, rectifier diodes
- S2a Power diodes**
- S2b Thyristors and triacs**
- S3 Small-signal transistors**
- S4a Low-frequency power transistors and hybrid modules**
- S4b High-voltage and switching power transistors**
- S5 Field-effect transistors**
- S6 R.F. power transistors and modules**
- S7 Surface mounted semiconductors**
- S8a Light-emitting diodes**
- S8b Devices for optoelectronics**
Optocouplers, photosensitive diodes and transistors, infrared light-emitting diodes and infrared sensitive devices, laser and fibre-optic components
- S9 PowerMos transistors**
- S10 Wideband transistors and wideband hybrid IC modules**
- S11 Microwave transistors**
- S12 Surface acoustic wave devices**
- S13 Semiconductor sensors**
- S14 Liquid Crystal Displays**

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IC05N	HE4000B logic family – uncased ICs CMOS	
IC06	High-speed CMOS; PC74HC/HCT/HCU Logic family	
IC08	ECL 10K and 100K logic families	
IC09N	TTL logic series	
IC10	Memories MOS, TTL, ECL	
IC11	Linear Products	
Supplement to IC11	Linear Products	
IC12	I²C-bus compatible ICs	
IC13	Semi-custom Programmable Logic Devices (PLD)	
IC14	Microcontrollers and peripherals Bipolar, MOS	
IC15	FAST TTL logic series	
IC16	CMOS integrated circuits for clocks and watches	
IC17	Integrated Services Digital Networks (ISDN)	not yet issued
IC18	Microprocessors and peripherals	
IC19	Data communication products	

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- C7** Variable capacitors
- C8** Variable mains transformers
- C9** Piezoelectric quartz devices
- C11** Varistors, thermistors and sensors
- C12** Potentiometers, encoders and switches
- C13** Fixed resistors
- C14** Electrolytic and solid capacitors
- C15** Ceramic capacitors
- C16** Permanent magnet materials
- C17** Stepping motors and associated electronics
- C18** Direct current motors
- C19** Piezoelectric ceramics
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