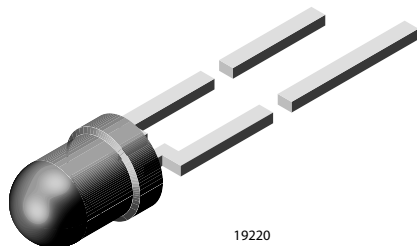


**1309 Low Current LED in Ø 3 mm Tinted Diffused Package****FEATURES**

- Low power consumption
- High brightness
- CMOS/MOS compatible
- Specified at $I_F = 2$ mA
- Luminous intensity categorized
- Yellow and green color categorized
- Material categorization:
For definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

PRODUCT GROUP AND PACKAGE DATA

- Product group: LED
- Package: 3 mm
- Product series: low current
- Angle of half intensity: $\pm 25^\circ$

APPLICATIONS

- Low power DC circuits

PARTS TABLE

PART	COLOR	LUMINOUS INTENSITY (mcd)			at I_F (mA)	WAVELENGTH (nm)			at I_F (mA)	FORWARD VOLTAGE (V)			at I_F (mA)	TECHNOLOGY
		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		MIN.	TYP.	MAX.		
TLLR4400	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4400-AS12Z	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4400-BT12Z	Red	0.63	1.2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-AS12	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLR4401-AS12Z	Red	1	2	-	2	612	-	625	2	-	1.9	2.4	2	GaAsP on GaP
TLLY4400	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4400-BT12Z	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4400-MS12	Yellow	0.63	1.2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-AS12	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-AS12Z	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLY4401-MS12	Yellow	1	2	-	2	581	-	594	2	-	2.4	2.9	2	GaAsP on GaP
TLLG4400	Green	0.63	1.2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4400-AS12	Green	0.63	1.2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-AS12	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP
TLLG4401-AS12Z	Green	1	2	-	2	562	-	575	2	-	1.9	2.4	2	GaP on GaP

**ABSOLUTE MAXIMUM RATINGS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
TLLG440., TLLR440., TLLY440.

PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Reverse voltage		V_R	6	V
DC forward current		I_F	7	mA
Surge forward current	$t_p \leq 10\text{ }\mu\text{s}$	I_{FSM}	0.15	A
Power dissipation	$T_{amb} \leq 84\text{ }^{\circ}\text{C}$	P_V	20	mW
Junction temperature		T_j	100	$^{\circ}\text{C}$
Operating temperature range		T_{amb}	-40 to +100	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-55 to +100	$^{\circ}\text{C}$
Soldering temperature	$t \leq 5\text{ s}$, 2 mm from body	T_{sd}	260	$^{\circ}\text{C}$
Thermal resistance junction/ambient		R_{thJA}	800	K/W

OPTICAL AND ELECTRICAL CHARACTERISTICS ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
TLLR440., RED

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 2\text{ mA}$	TLLR4400	I_V	0.63	1.2	-	mcd
		TLLR4401	I_V	1	2	-	mcd
Dominant wavelength	$I_F = 2\text{ mA}$		λ_d	612	-	625	nm
Peak wavelength	$I_F = 2\text{ mA}$		λ_p	-	635	-	nm
Angle of half intensity	$I_F = 2\text{ mA}$		ϕ	-	± 25	-	deg
Forward voltage	$I_F = 2\text{ mA}$		V_F	-	1.9	2.4	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		V_R	6	20	-	V
Junction capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_j	-	50	-	pF

Note⁽¹⁾ In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$ **OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified)
TLLY440., YELLOW

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 2\text{ mA}$	TLLY4400	I_V	0.63	1.2	-	mcd
		TLLY4401	I_V	1	2	-	mcd
Dominant wavelength	$I_F = 2\text{ mA}$		λ_d	581	-	594	nm
Peak wavelength	$I_F = 2\text{ mA}$		λ_p	-	585	-	nm
Angle of half intensity	$I_F = 2\text{ mA}$		ϕ	-	± 25	-	deg
Forward voltage	$I_F = 2\text{ mA}$		V_F	-	2.4	2.9	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		V_R	6	20	-	V
Junction capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_j	-	50	-	pF

Note⁽¹⁾ In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

**OPTICAL AND ELECTRICAL CHARACTERISTICS** ($T_{amb} = 25^{\circ}\text{C}$, unless otherwise specified)
TLLG440., GREEN

PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Luminous intensity ⁽¹⁾	$I_F = 2\text{ mA}$	TLLG4400	I_V	0.63	1.2	-	mcd
		TLLG4401	I_V	1	2	-	mcd
Dominant wavelength	$I_F = 2\text{ mA}$		λ_d	562	-	575	nm
Peak wavelength	$I_F = 2\text{ mA}$		λ_p	-	565	-	nm
Angle of half intensity	$I_F = 2\text{ mA}$		ϕ	-	± 25	-	deg
Forward voltage	$I_F = 2\text{ mA}$		V_F	-	1.9	2.4	V
Reverse voltage	$I_R = 10\text{ }\mu\text{A}$		V_R	6	20	-	V
Junction capacitance	$V_R = 0\text{ V}$, $f = 1\text{ MHz}$		C_j	-	50	-	pF

Note

⁽¹⁾ In one packing unit $I_{Vmin.}/I_{Vmax.} \leq 0.5$

LUMINOUS INTENSITY CLASSIFICATION

GROUP	LIGHT INTENSITY (mcd)	
	MIN.	MAX.
K	0.63	1.25
L	1	2
M	1.6	3.2
N	2.5	5
P	4	8
Q	6.3	12.5
R	10	20
S	16	32
T	25	50
U	40	80

Note

- Luminous intensity is tested at a current pulse duration of 25 ms. The above type numbers represent the order groups which include only a few brightness groups. Only one group will be shipped on each bag (there will be no mixing of two groups on each bag). In order to ensure availability, single brightness groups will not be orderable. In a similar manner for colors where wavelength groups are measured and binned, single wavelength groups will be shipped on any one bag. In order to ensure availability, single wavelength groups will not be orderable.

COLOR CLASSIFICATION

GROUP	DOM. WAVELENGTH (nm)			
	YELLOW		GREEN	
	MIN.	MAX.	MIN.	MAX.
0	-	-	-	-
1	581	584	-	-
2	583	586	-	-
3	585	588	562	565
4	587	590	564	567
5	589	592	566	569
6	591	594	568	571
7	-	-	570	573
8	-	-	572	575

Note

- Wavelengths are tested at a current pulse duration of 25 ms.



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

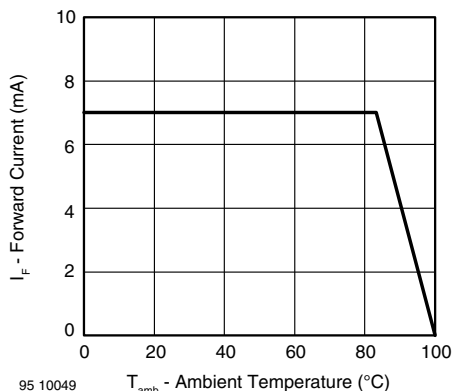


Fig. 1 - Forward Current vs. Ambient Temperature

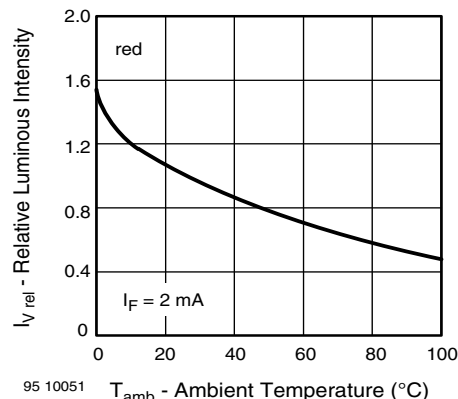


Fig. 4 - Relative Luminous Intensity vs. Ambient Temperature

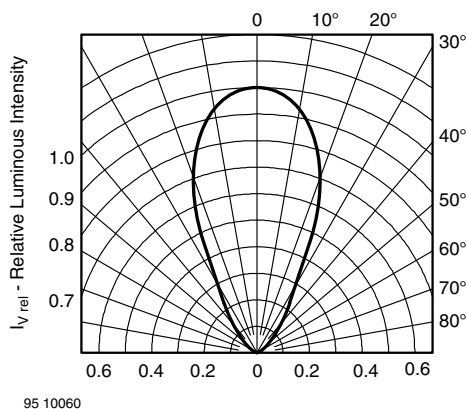


Fig. 2 - Relative Luminous Intensity vs. Angular Displacement

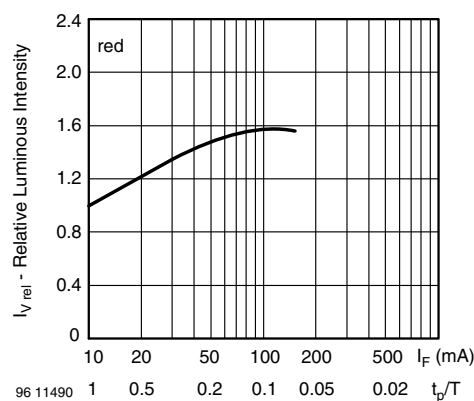


Fig. 5 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

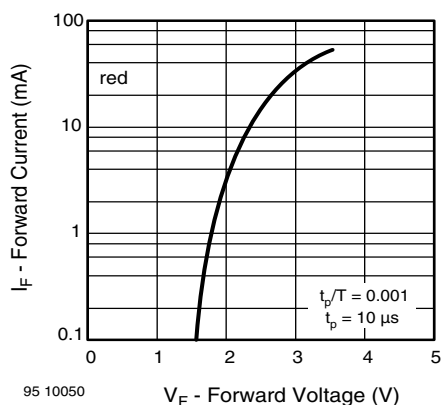


Fig. 3 - Forward Current vs. Forward Voltage

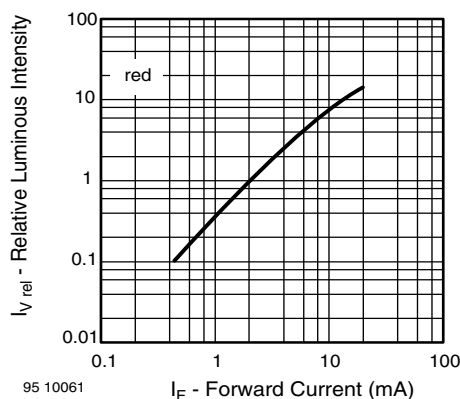


Fig. 6 - Relative Luminous Intensity vs. Forward Current

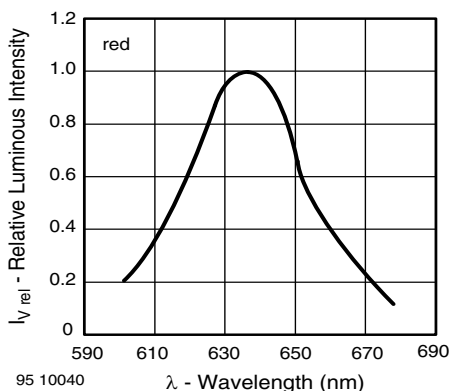


Fig. 7 - Relative Intensity vs. Wavelength

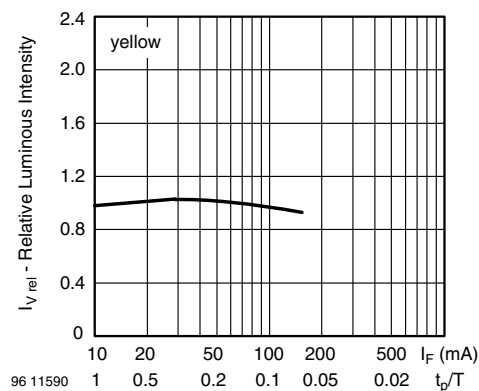


Fig. 10 - Relative Luminous Intensity vs. Forward Current/Duty Cycle

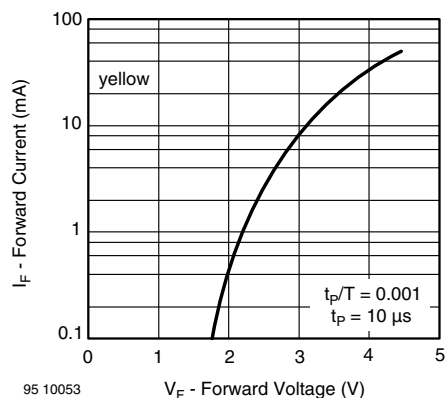


Fig. 8 - Forward Current vs. Forward Voltage

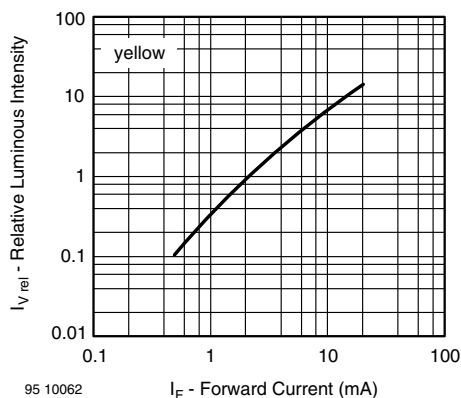


Fig. 11 - Relative Luminous Intensity vs. Forward Current

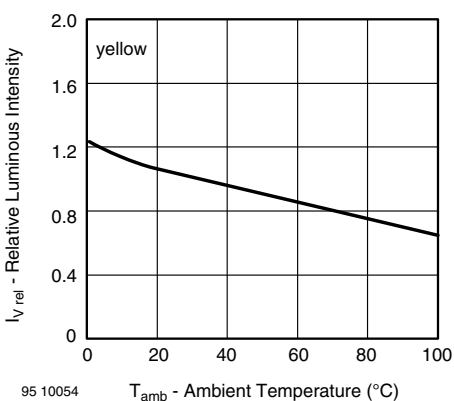


Fig. 9 - Relative Luminous Intensity vs. Ambient Temperature

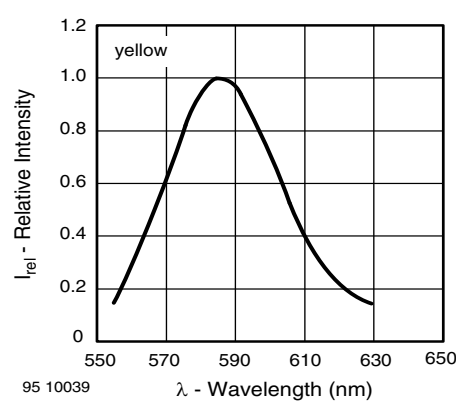


Fig. 12 - Relative Intensity vs. Wavelength

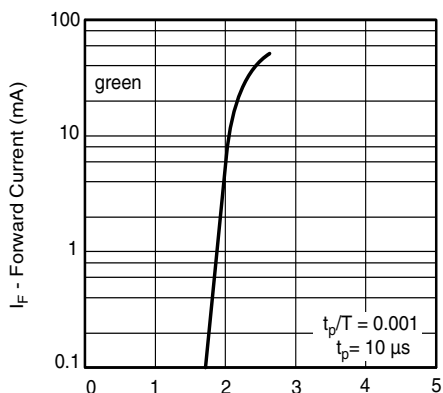


Fig. 13 - Forward Current vs. Forward Voltage

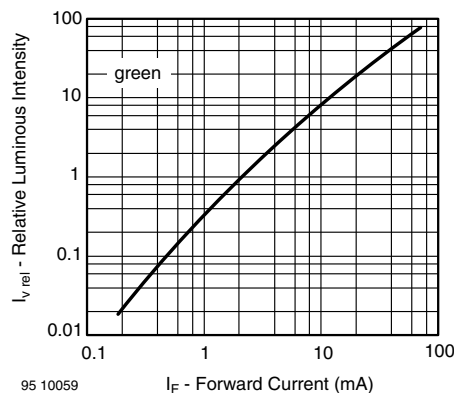


Fig. 16 - Relative Luminous Intensity vs. Forward Current

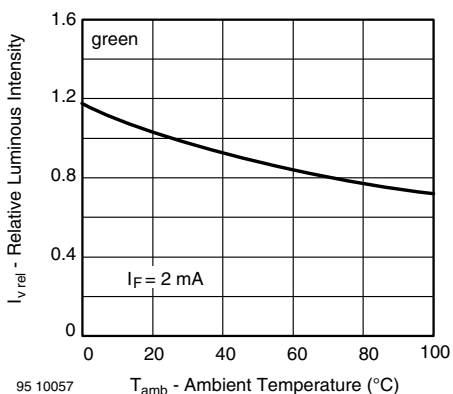


Fig. 14 - Relative Luminous Intensity vs. Ambient Temperature

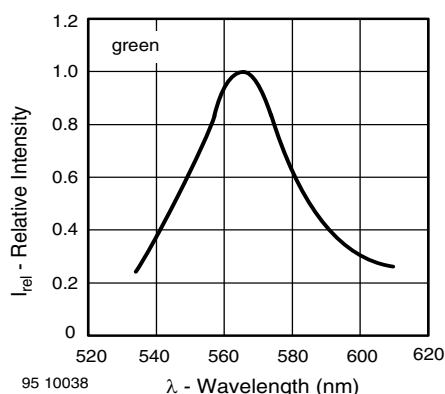


Fig. 17 - Relative Intensity vs. Wavelength

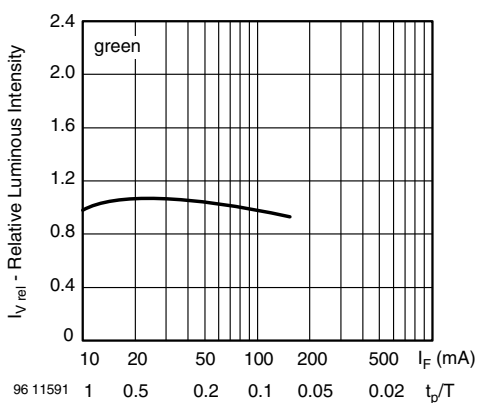
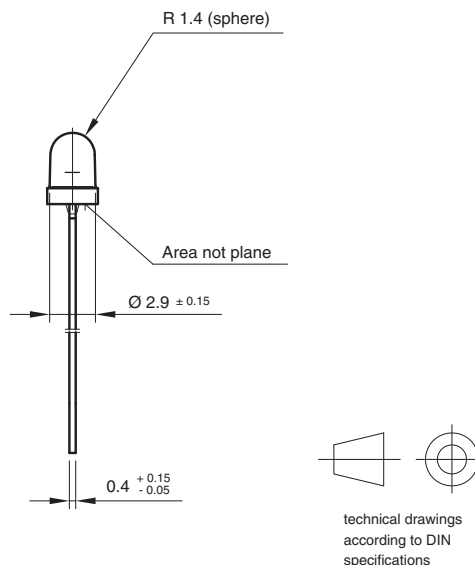
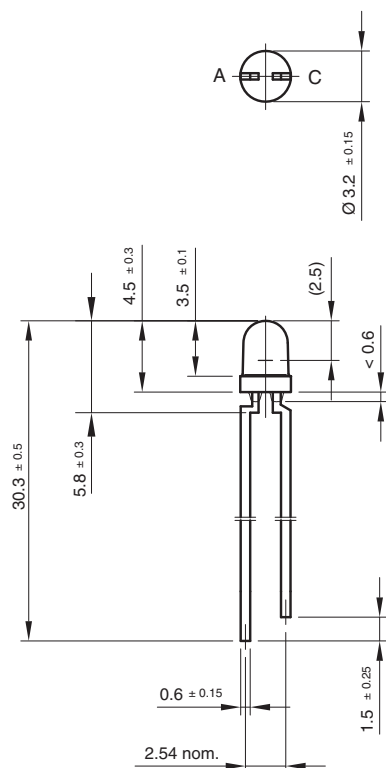


Fig. 15 - Relative Luminous Intensity vs. Forward Current/Duty Cycle



PACKAGE DIMENSIONS in millimeters



Drawing-No.: 6.544-5255.01-4
Issue: 7; 25.09.08
95 10913

REEL DIMENSIONS in millimeters

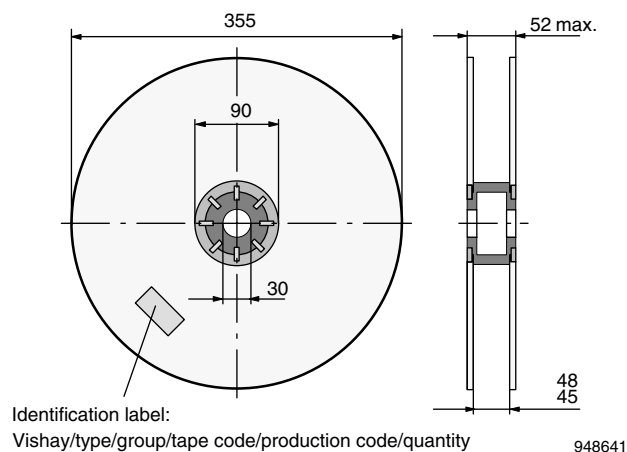


Fig. 18 - Reel

AS12 = cathode leaves tape first

AS21 = anode leaves tape first

TAPE

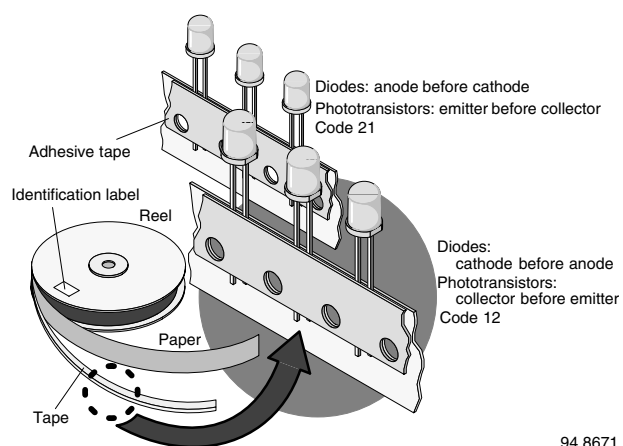


Fig. 19 - LED in Tape

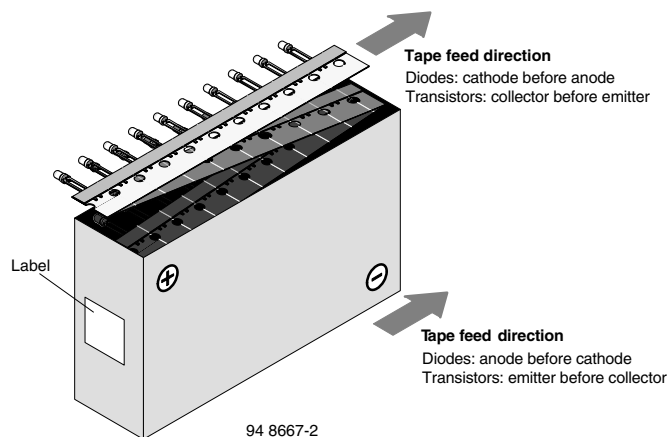
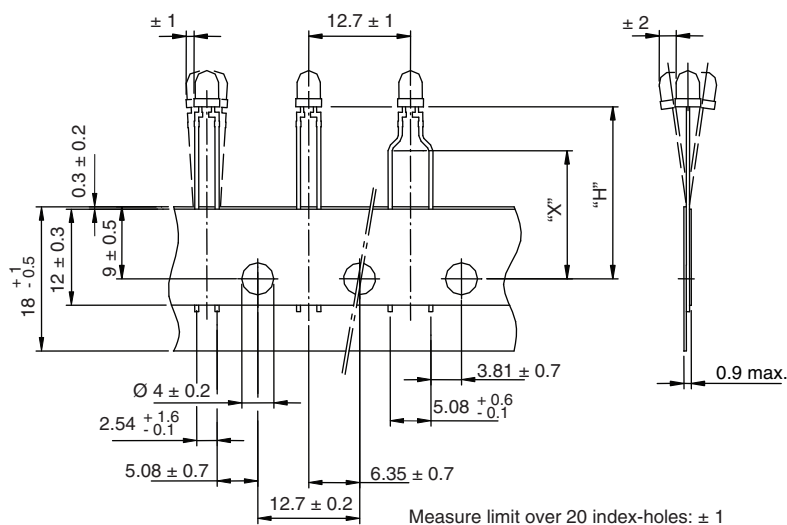
AMMOPACK


Fig. 20 - Tape Direction

Note

- The new nomenclature for ammopack is ASZ only, without suffix for the LED orientation. The carton box has to be turned to the desired position: "+" for anode first, or "-" for cathode first. AS12Z and AS21Z are still valid for already existing types, BUT NOT FOR NEW DESIGN.

TAPE DIMENSIONS in millimeters


Quantity per:	Reel (Mat.-no. 1764)
	2000

21885

OPTION	DIMENSION "H" ± 0.5 mm	DIMENSION "X" ± 0.5 mm
AS	17.3	-
MS	25.5	-
BT	20.0	16.0



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