

## Technical Term of Delivery

Product: Pegasus X75 Platform CSTN Display Module  
 Siemens Part No.: V24851-Z1508-A121  
 SAP Material No.: A5B00075395851  
 SAP MPN No.: A5BHTN00169517

Manufacturer: Philips Mobile Display System  
 Manufacturer Part No.: LPH9135

### Accompanying documents:

Drawing LCD Panel  
 Drawing Display Module Assembled See Appendix 1



Philips\_2D  
 Drawing.pdf

Specification LCD-Controller LDS 183



LDS183\_spec\_0.43\_  
 pdf.pdf

SN 72500 Part 1 (General technical terms of delivery)  
 SN 29065 Part 8  
 ETSI EN 301 489 – 1; - 7; - 25 (EMI/ESD)  
 ISO 13406-2 (Flat panel display requirements)

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\*2. Backlight Operation Life ends when the backlight luminance is reduced to 0.7 of the original value

### 1.3.2. Temperature Ranges

Storage Temperature	-30 ... +80	°C
Reduced Function	-25 ... +65	°C *
Operating Temperature	-20 ... +55	°C

\* Display is operating and readable. A reduced optical performance is accepted, if it is completely reversible at operating temperature.

### 1.3.3. Relative Air Humidity/Temperature Under Operation

Temperature	40°C ± 2°C
Relative humidity	93% ± 2%
Time	500h

## 2. Optical Specification

## 2.4. Measurement Conditions

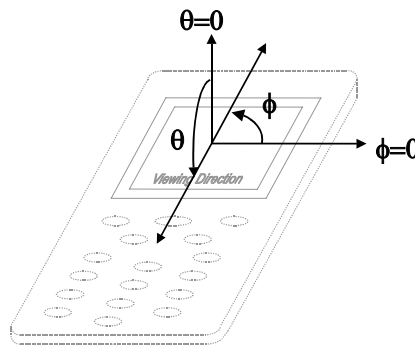
### 2.4.1. General Measurement Conditions

**Unless specified, the following test conditions are valid:**

Room Temperature	23 (+/-4)	°C
Air Pressure	70 ... 110	kPa
Relative Humidity	10 ... 85	%RH
Hard- and Software-Settings	as specified in chapter 3.4.1	
Main Viewing Angle	$\Theta=\Phi=0^\circ$	
Contrast Setting	Maximum, as determined by Contrast Ratio Measurement	

### 2.4.2. Viewing Angles

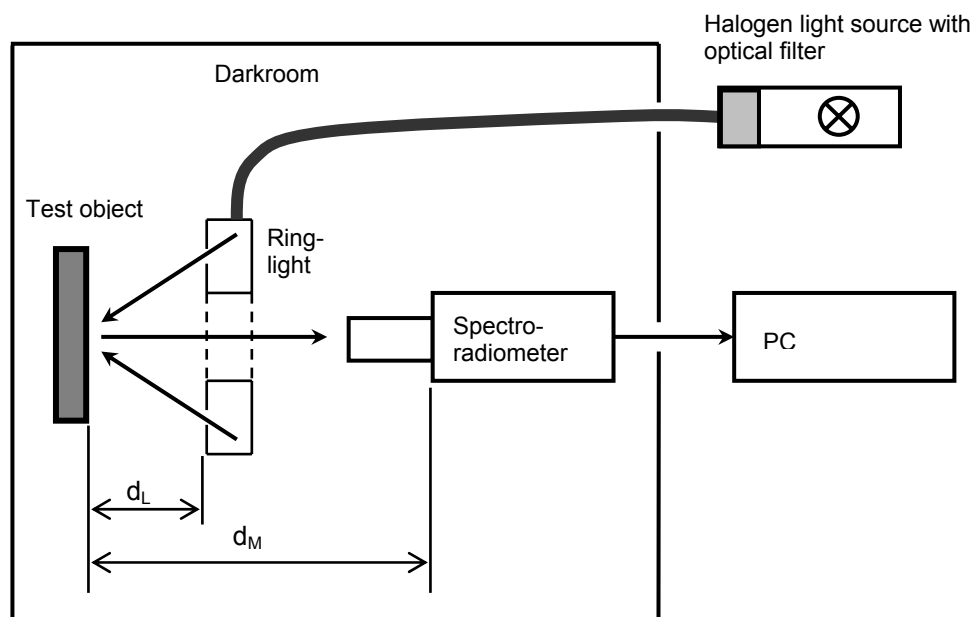
Azimuth Angle :  $\Phi$   
Tilt Angle :  $\Theta$



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### 2.4.3. Siemens Optical Measurement Equipment



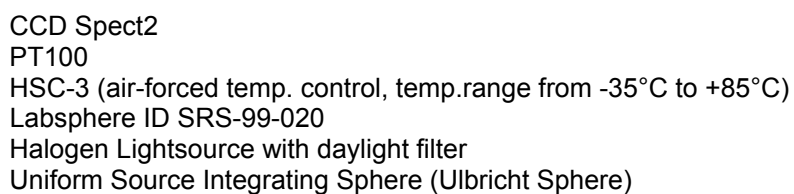
## Specification

Spectroradiometer	Minolta CS-1000
Objective	Standard (50mm, f:1.4), Macro (50mm, f:2.8)
Ring light optical diameter	80mm
Reflectance Standard	Gigahertz Optik BN-0201-01 (calibrated) {or}
White light source	Halogen Ring Light with optical daylight filter. Diameter=80mm. Light source equivalent Type C (colour temperature=6774K)

Measuring Distance $d_M$ [mm]	155	225	450
Lighting Distance $d_L$ [mm]	55	125	350
Objective type	Macro	Macro	Standard
Measuring point diameter [mm]	1.15	3	8

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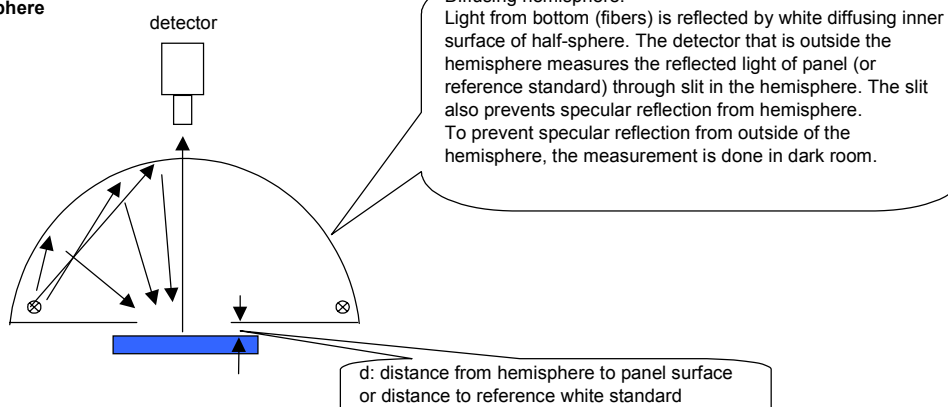


#### 2.4.4. Philips Optical Measurement Equipment

**Elop:**

### ELOP (electro-optical) measurement set-up.

**Reflective set-up:**  
diffuse illumination with hemi-sphere



In case of Colour and Contrast Ratio measurements a spectrometer is used as detector.  
In case of Switching Time measurements a photomultiplier is used as detector.

**In case of emissive measurements, the hemi-sphere is removed.**

Lightsource type	D65
Measurement spot diameter	3mm
Distance detector/surface	80mm
Distance panel surface to hemisphere d	3mm
Spectrometer/Photomultiplier type	Autronic DMS 501, 703, 803
Hemisphere	HCS3 Temperature hemisphere

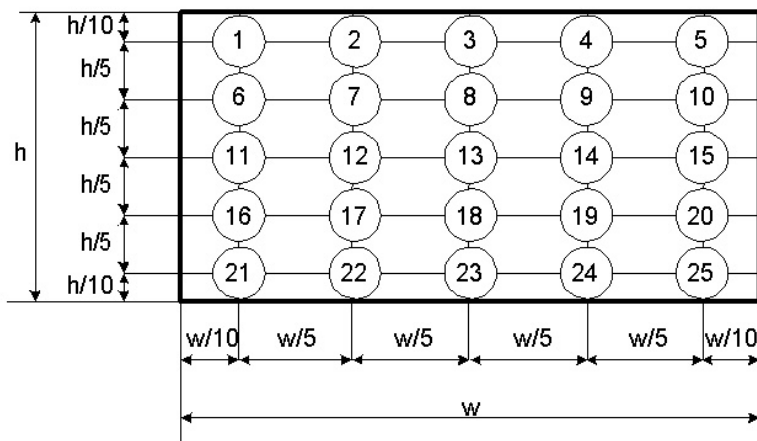
### Luminance variation & mean luminance

Measuring equipment	CS100
Measurement spot diameter	3.5 mm
Lens	Close up lens 122

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#### 2.4.5. Measuring Points



h: height of active area

w: width of active area

Active Area Centre Point:

If otherwise not specified, the measuring point is in the centre of the active area.

## 2.5. Optical Characteristics

### 2.5.1. Contrast

## Introduction

Contrast is measured perpendicular to display surface in reflective and transmissive mode.

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro
Measuring Distance $d_M$	
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	Active Area Centre point (No. 13)
Light Source	Reflective Mode: Ring Light Transmissive Mode: Internal (Backlight)
Test pattern	A: All Pixels White B: All Pixels Black
Contrast setting	Maximum

## Definitions

**Contrast ratio (according ISO/FDIS 13406-2)**

$$CR = L_A/L_B$$

where

$L_A$ : Luminance measured with test pattern A

$L_B$ : Luminance measured with test pattern B

## Characteristics

Item	Symbol	Condition	Rating		
			Min.	Typ.	Max
Contrast Ratio	CR	Reflective Mode	4	6	-
Contrast Ratio	CR	Transmissive Mode	18	30	-

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## Characteristics

Contrast Ratio in reflective mode:

Θ	Φ	Contrast Ratio (reflective)					
		-20°C		25°C		55°C	
		Min.	Typ.	Min.	Typ.	Min.	Typ.
0°	0°	(1.5)	2.5	(4)	6	(2.5)	(5)
15°	270°	-	2	-	(6)	-	(5)
30°	0°	-	(1)	-	(3)	-	(2)
	90°	-	(1)	-	(5)	-	(3)
	180°	-	(1)	-	(3)	-	(2)
	270°	-	(2)	-	(5)	-	(3)

Contrast Ratio in transmissive mode:

Θ	Φ	Contrast Ratio (transmissive)					
		-20°C		25°C		55°C	
		Min.	Typ.	Min.	Typ.	Min.	Typ.
0°	0°	(9)	13	18	30	10	13
15°	270°	-	10	-	(17)	-	10
30°	0°	-	(5)	-	(10)	-	(6)
	90°	-	(5)	-	(9)	-	(6)
	180°	-	(5)	-	(10)	-	(7)
	270°	-	(2)	-	(5)	-	(7)

Viewing angle:

Item	Symbol	Condition	Rating		
			Min.	Typ.	Max
Viewing angle with max. contrast (Main Viewing Direction)	$\Theta_{CR \max}$	Transmissive Mode	-5	0	+5



2.5.3. Spatial Contrast Variation

Introduction

The Contrast Ratio variation inside the active area is defined as Spatial Contrast Variation

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro
Measuring Distance d <sub>M</sub>	
Measurement Point Diameter	3mm//1mm
Measurement Point Location	No.: 1 to 25
Light Source	Reflective Mode: Ring Light Transmissive Mode: Internal (Backlight)
Test pattern	A: All Pixels White B: All Pixels Black
Contrast setting	Maximum

Definitions

Spatial Contrast Variation ΔCRS

$$\Delta CRS = ((CR_{max} - CR_{min}) / CR_{max} * 100\%)$$

where

$$CR_{max} = \text{MAX} (CR_i); \quad CR_{min} = \text{MIN} (CR_i);$$

CR<sub>i</sub> is the Contrast Ratio at the defined measuring points.

Characteristics



Item	Symbol	Condition	Rating		
			Min.	Typ.	Max
Spatial Contrast Variation	ΔCRS	Transmissive Mode	-	22%	40%

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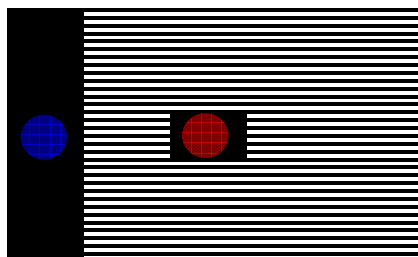


### Contrast ratio variation under load

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro // Standard
Measuring Distance $d_M$	
Measurement Point Diameter	3mm//1mm
Measurement Point Location	Point 1 (Center point ):  Point 2 (Border point): 
Light Source	Transmissive Mode: Internal (Backlight)
Test pattern	see *1)
Contrast setting	Maximum // visible best contrast // all grey level
Viewing angles	$\Theta = \Phi = 0$ deg
Other conditions	

\*1) Test Pattern:



## Definitions

( $\Delta CRL$ ):

$$\Delta CRL = \text{Luminance at measurement point 1} / \text{Luminance at measurement point}$$

## Characteristics

Item	Symbol	Rating		
		Min.	Typ.	Max
Contrast ratio variation under load	$\Delta\text{CRL}$	-	-	1.25



### 2.5.5. Colour

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Standard
Measuring Distance $d_M$	
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	No.: 13
Light Source	Reflective Mode: Integrating Sphere Transmissive Mode: Internal (Backlight)
Test pattern	Red, Green, Blue, White: maximum colour saturation (maximum gradation level)
Contrast setting	Maximum

## Definitions

Panel colour coordinate according the CIE colour system (CIE 1976). In general, it is always requested to measure the X, Y and Z values.

Here  $u'$ ,  $v'$  and  $L^*$  are according CIE 1976:

$$u' = \frac{4 \cdot X}{X + 15 \cdot Y + 3 \cdot Z}$$

$$v' = \frac{9 \cdot Y}{X + 15 \cdot Y + 3 \cdot Z}$$

$$L^* = 116 \cdot \left( \frac{Y}{Y_n} \right)^{1/3} - 16$$

Colour distance definition (maximum allowed colour distance to specified typical colour coordinate):

$$\Delta u' v' = \sqrt{\Delta u'^2 + \Delta v'^2}$$

where:

$$\Delta u' = \text{Max} \left\{ \left| u'_{typ} - u'_{\max} \right|, \left| u'_{typ} - u'_{\min} \right| \right\}$$

$$\Delta v' = \text{Max} \left\{ \left| v'_{typ} - v'_{\max} \right|, \left| v'_{typ} - v'_{\min} \right| \right\}$$

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Colour Gamut definition:

$$F = \sqrt{s(s-a)(s-b)(s-c)} * 1000$$

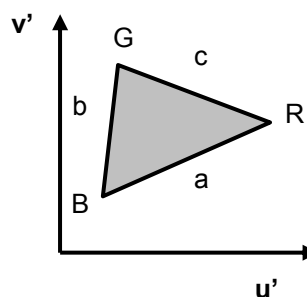
where

$$s = \frac{(a + b + c)}{2}$$

$$a = \sqrt{(u'_{blue} - u'_{red})^2 + (v'_{blue} - v'_{red})^2}$$

$$b = \sqrt{(u'_{blue} - u'_{green})^2 + (v'_{blue} - v'_{green})^2}$$

$$c = \sqrt{(u'_{red} - u'_{green})^2 + (v'_{red} - v'_{green})^2}$$



Colour Gamut Ratio related to NTSC:

$$\text{CGR} := F(\text{Display}) / F(\text{NTSC})$$

NTSC primaries:

	u'	v'
Red	<b>0,4769</b>	<b>0,5285</b>
Green	<b>0,0757</b>	<b>0,5757</b>
Blue	<b>0.1522</b>	<b>0.1957</b>

$$F(\text{NTSC})=74,42$$

## Distance White Point to the Red, Green, Blue Point:

Colour distance White-Red:

$$\Delta CWR = \sqrt{(u'_{white} - u'_{red})^2 + (v'_{white} - v'_{red})^2}$$

Colour distance White-Green:

$$\Delta CWG = \sqrt{(u'_{white} - u'_{green})^2 + (v'_{white} - v'_{green})^2}$$

Colour distance White-Blue:

$$\Delta CWB = \sqrt{(u'_{white} - u'_{blue})^2 + (v'_{white} - v'_{blue})^2}$$

Reflectance factor:

as defined in chapter 2.5.8 “Reflectance, Transmittance”

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Characteristics

Mode	Item		Symbol	Min.	Typ.	Max.	Unit
Reflective	Colour coordinate	Red	u'	(*1)	0.285	(*1)	
			v'	(*1)	0.465	(*1)	
		Green	u'	(*1)	0.164	(*1)	
			v'	(*1)	0.494	(*1)	
		Blue	u'	(*1)	0.171	(*1)	
			v'	(*1)	0.367	(*1)	
		White	u'	(*1)	(0.200)	(*1)	
			v'	(*1)	(0.473)	(*1)	
	Colour Gamut		F	3	5	-	
	Colour Gamut Ratio related to NSTC		CGR	5	8	-	%
Transmissive	Colour coordinate	Red	u'	(*1)	0.307	(*1)	
			v'	(*1)	0.483	(*1)	
		Green	u'	(*1)	0.170	(*1)	
			v'	(*1)	0.504	(*1)	
		Blue	u'	(*1)	0.151	(*1)	
			v'	(*1)	0.347	(*1)	
		White	u'	(*1)	0.197	(*1)	
			v'	(*1)	0.464	(*1)	
	Colour Gamut		F	10.4	11.2	-	
	Colour Gamut Ratio related to NSTC		CGR	14	15.3	-	%

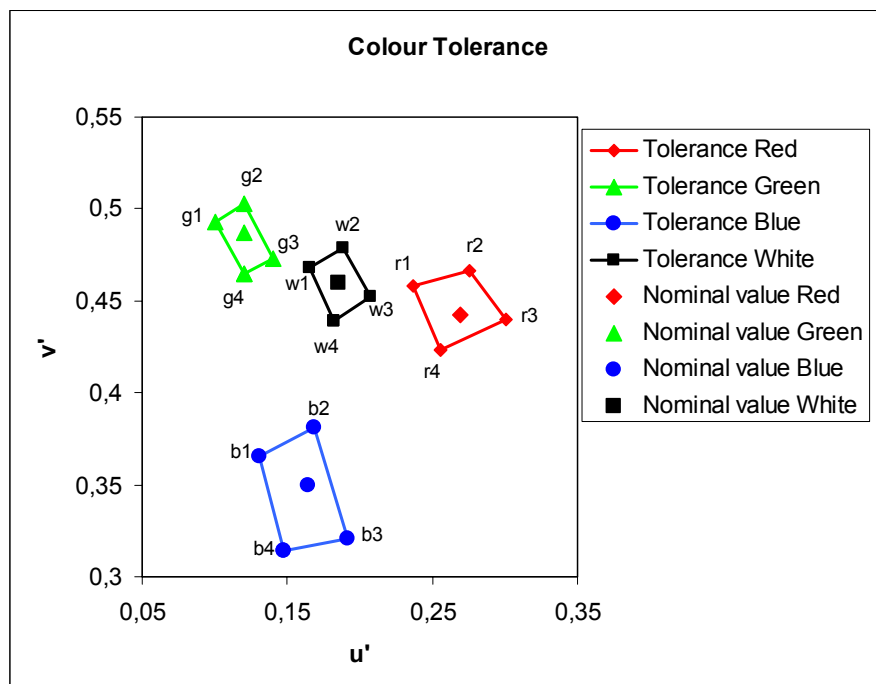
(\*1) Refer to Colour Tolerance Table

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## Colour Tolerance Table



Mode	Colour	Point 1		Point 2		Point 3		Point 4	
		u'	v'	u'	v'	u'	v'	u'	v'
Reflective	Red	0.265	0.465	0.285	0.497	0.305	0.465	0.285	0.433
	Green	0.156	0.494	0.164	0.522	0.172	0.494	0.164	0.466
	Blue	0.159	0.367	0.171	0.387	0.183	0.367	0.171	0.347
	White	0.196	0.470	0.200	0.482	0.204	0.470	0.200	0.458
Transmissive	Red	0.272	0.473	0.286	0.506	0.324	0.495	0.306	0.457
	Green	0.130	0.508	0.136	0.531	0.158	0.534	0.150	0.510
	Blue	0.122	0.287	0.118	0.364	0.184	0.310	0.169	0.246
	White	0.160	0.419	0.165	0.473	0.197	0.448	0.187	0.400

### Colour gamut shape

Mode	Item		Symbol	Min.	Typ.	Max
Reflective	Colour distance	Red-Green	c	-	0.13	-
		Red-Blue	a	-	0.15	-
		Blue-Green	b	-	0.13	-
		White-Red	$\Delta$ CWR	-	0.09	-
		White-Blue	$\Delta$ CWB	-	0.11	-
		White-Green	$\Delta$ CWG	-	0.04	-
Transmissive	Colour distance	Red-Green	c	-	(0.15)	-
		Red-Blue	a	-	(0.23)	-
		Blue-Green	b	-	(0.20)	-
		White-Red	$\Delta$ CWR	-	0.11	-
		White-Blue	$\Delta$ CWB	-	(0.12)	-
		White-Green	$\Delta$ CWG	-	(0.09)	-



### 2.5.6. Spatial Colour And Brightness Uniformity

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro
Measuring Distance $d_M$	
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	No.: 1 to 25
Light Source	Reflective Mode: Ring Light Transmissive Mode: Internal (Backlight)
Test pattern	All Pixels White
Contrast setting	Maximum

## Definitions

### Spatial Colour Uniformity:

All spatial colour variation are defined relative to the colour coordinate values in the centre of the active area

$$\Delta u'_i = u'_i - u'_{13}$$

$$\Delta v'_i = v'_i - v'_{13}$$

$$\Delta SCU = \text{Max} \sqrt{(\Delta u'_i)^2 + (\Delta v'_i)^2}$$

where

$u'_i; v'_i$  are the colour coordinates at measuring points 1 ... 25

### Luminance variation

$$\Delta Lv_{13} = Max \left| \frac{Lv_{13} - Lv_i}{Lv_{13}} \right| * 100\%$$

where

$L_{v_i}$  is the luminance at measuring points 1 ... 25

## Mean Luminance on panel surface

$$Lv_{\text{mean}} = \text{AVG} (Lv_1 \dots Lv_{25})$$

where

$L_{v_1} \dots L_{v_{25}}$  is luminance at measuring points 1 ... 25

Following LED's for the main display are used:

Types of main LED	OSRAM LW Y1SG
Current per main LED	19mA
Colour of LEDs	White; colour rank A1&A2

## Characteristics

Mode	Item	Symbol	Min.	Typ.	Max.	Unit
Reflective (CIE UCS1976)	Spatial Colour Uniformity	$\Delta SCU$		0.007	0.015	
Transmissive (CIE UCS1976)	Spatial Colour Uniformity	$\Delta SCU$		0.01	0.017	
	Luminance variation	$\Delta L_{v13}$		20	40	%
	Mean Luminance	$L_{vmean}$	50	80	-	cd/m <sup>2</sup>

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### 2.5.7. Crosstalk

## Introduction

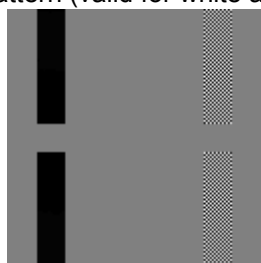
Crosstalk is an effect where the contrast of a display pixel is influenced by the state of the related pixels. A measure for this Effect is the Cross Talk Value (CTV)

In the OFF-state pixel could be slightly darker as if the LCD-Module is switched off. The ratio of both luminance values is defined as Off-pixel Lighting Ratio (OLR)

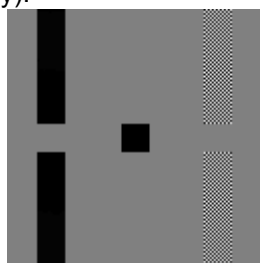
Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro
Measuring Distance $d_M$	
Measurement Point Diameter	3mm // 1mm
Measurement Point Location	Active Area center point (No. 13)
Light Source	Reflective Mode: Ring Light Transmissive Mode: Internal (Backlight)
Contrast setting	Maximum

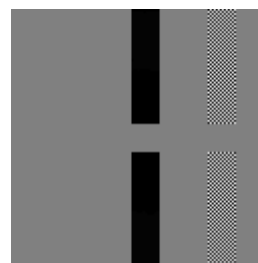
Test Pattern (valid for white and 50% grey):



### Pattern A



### Pattern B



Pattern C

## Definitions

### Cross Talk Value

$$CTV = |Lv_A - Lv_C| / Lv_A * 100\%$$

where

$L_{vA}$ : Luminance measured with test pattern A

$Lv_B$ : Luminance measured with test pattern B

Lv<sub>C</sub>: Luminance measured with test pattern C

### Measuring procedure for Crosstalk measurement:

1. Adaptation of the display to the highest contrast ratio ( $CR = L_{vA}/L_{vB}$ ) as defined by the test patterns and a test area of 14 x 14 dots
2. Measurement of Luminance with test pattern A, B, C
3. Determination of Crosstalk value (CTV)
4. Repeat measurements at all grey scale levels

## Characteristics

Mode	Item	Symbol	Min.	Typ.	Max.	Unit
Transmissive	Crosstalk	CTV			7	%

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### 2.5.8. Reflectance, Transmittance

## Introduction

Reflectance (diffuse reflection factor) of the LCD module is determined as factor to a standard white reference calibration plate. It is measured with the whole LCD module (including reflectance foils,...).

Transmittance (diffuse transmission factor) is a measure for the LCD panel transparency. The Light Source for this measurement is the accompanying LCD-module backlight system (LEDs, Lightguide, ...).

Measurement conditions:

Measuring Equipment	Minolta // Autronic
Objective	Macro // Standard
Measuring Distance $d_M$	
Measurement Point Diameter	3mm//1mm
Measurement Point Location	No.: 13
Light source	Reflectance: Integrating Sphere Transmittance: LCD module backlight
Reflectance Plate	Reflectance Standard (Cal. plate)
Test pattern	All Pixels White
Contrast setting	Maximum

Measuring procedure:

Reflectance:

1. Measure the luminance of the Reflectance Plate
2. Replace the calibration plate with the LCD module.  
Backlight: OFF.  
Negative mode displays: Display ON, maximum contrast.  
Measure the luminance on the LCD panel surface.

## Transmittance:

The light source is located at the backside of the panel.

1. Measure the light source
2. Place the LCD panel in front of the light source. Measure the luminance on the LCD panel surface

## Definitions

$$R = \frac{Lv_{LCD-Module}}{Lv_{ReflectionPlate}} * 100\%$$

$$\tau = \frac{Lv_{LCD-Panel}}{Lv_{LightSource}} * 100\%$$

## Characteristics

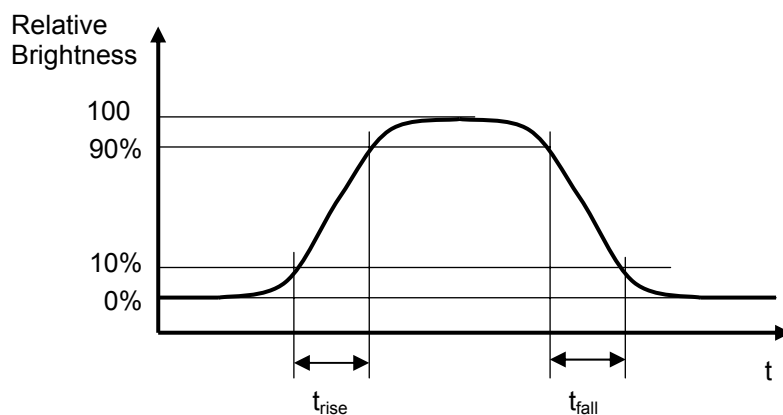
Item	Symbol	Condition	Rating		
			Min.	Typ.	Max
LCD-module Reflectance	R		-	4.0%	-

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### 2.5.9. Response Times

## Definitions



## Characteristics

Item	Symbol	Temperature	Min	Typ.	Max	Units
Rise time	$t_r$	-20°C	-	2130	4260	ms
		0°C	-	470	705	ms
		+25°C	-	125	155	ms
		+55°C	-	50	100	ms
Fall time	$t_f$	-20°C	-	1150	2300	ms
		0°C	-	240	360	ms
		+25°C	-	85	105	ms
		+55°C	-	40	80	ms

## Total

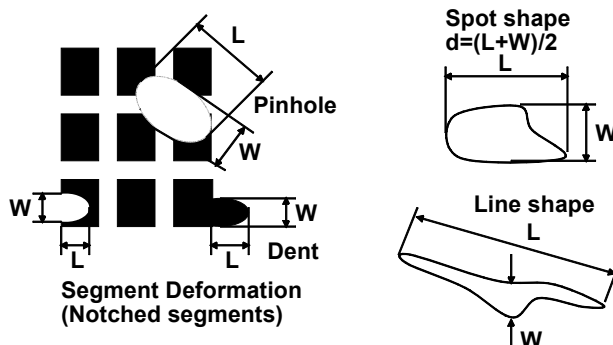
Item	Symbol	Temperature	Min	Typ.	Max	Units
Rise time + Fall time	$t_r + t_f$	-20°C	-	3280	6560	ms
		0°C	-	710	1065	ms
		+25°C	-	210	260	ms
		+55°C	-	90	180	ms

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### 2.5.10. Cosmetic Defects

### Definitions: Cosmetic Defects



**Maximum allowed defect quantity:**

ITEMS (Class)	INSPECTION CRITERIA		
Display Function (Major)	The specified area is displayed. Inspection area: visible area No malfunction.		
Black Spot (Minor)	<u>Average Diameter [mm]</u>	<u>Acceptable Qty.</u>	
White Spot	0.20<d	0	
Red Spot, Blue Spot, Green spot	0.15<d<=0.20	1	
Dent	0.10<d<=0.15	2	
Foreign material (circular)	d<=0.10	Ignored	
Black Line (Minor)	<u>Width [mm]</u>	<u>Length [mm]</u>	<u>Acceptable Qty</u>
White Line	0.03<W	-	0
Scratch	-	2.0<L	0
Foreign material (linear)	0.02<W<=0.03	L<=2.0	1
	0.01<W<=0.02	L<=1.0	2
	W<=0.01	Ignored	Ignored
Minimum Distance (Minor)	<u>Acceptable Distance: L [mm]</u>		
Between Allowable Defects Marked	L>=5		
Polarizer Bubble (circular)	<u>Average Diameter [mm]</u>	<u>Acceptable Qty.</u>	
(Minor)	0.50<d	0	
	0.20<d<=0.50	1	
	d<=0.20	Ignored	

No cosmetic defects as defined above shall appear, when the display is placed on a flat block with the size of the active area and is pressed against that flat block with a force between 10N to 20N

The maximum force will generate a maximum pressure within the cushion surface area as defined below.



cushion\_Pegasus\_2  
30305. pdf

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### 3. Electrical Characteristics

### 3.4.1. Display Controller

For the main Display the Controller LDS183 is used.

See also Display Controller Specification for the main display: LDS183\_spec\_0.43\_pdf

#### 3.4.1.1. Hardware-Settings

Operating mode, fixed by hardware coding on the FPC:

Pin Number	FPC	Coding
1	CS	100k Ohm Pull-Up
4	LCD_CLK	100k Ohm Pull-Down
5	LCD_DAT	100k Ohm Pull-Down

#### 3.4.1.2. Software-Settings



SWSeting\_InitSeq\_  
Philips.xls

See Appendix 2

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### 3.4.3. Electronic Volume (Contrast setting)

**Definition:**

The contrast is measured in Philips's fab. Process variation will be influenced by fast procedure ( LEDs are not fully wake-up) and protection foil is kept on

Maximum contrast value ( $EV_{CR-max}$ ):

This is the maximum contrast EV value measured by photometer. (see also 2.4.3)

Optimum contrast value ( $EV_{CR-opt}$ ):

For human eye a reduced contrast from contrast from measured maximum is optimal.

Tolerance of optimum contrast value  
( $\Delta EV_{CR-opt}$ )

This figure defines the deviation of the optimum contrast value and must not differ more than the specified tolerance.

Contrast Correction Value (CCV)

This is the number of hex steps, which are subtracted from maximum contrast value.

$$EV_{CR-opt} = EV_{CR-max} - CCV$$

Item	Symbol	Condition	Rating	Unit
Tolerance optimum contrast value	$\Delta EV_{CR-opt}$	In automatic camera system	Max +/-3 steps	Hex

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### 3.4.4. Interface

### Pin description:

Siemens Side				Supplier Side	
Pin Number	Pin Name	Description	I/O	FPC/PCB	Controller
1	LCD_CS	Chip select main display (low active)	O	!CS	!CS
2	LCD_RESET	Reset (low active)	O	!RES	!RES
3	LCD_RS	Control /display data flat	O	DB1	D1 (D/IC
4	LCD_CLK	Serial clock	O	SCL	D/IC (SCL)
5	LCD_DAT	Serial data	O	SDA	D0 (SDA)
6	VDD=2.9V	Power supply V <sub>DD</sub>	O	VDD	VDD1,VDD2
7	LCD_GND	Power supply GND	O	GND	VSS
8	LCD_ID	Module ID by coding resistors	I	n.c.	
9	LCD_LED_A	Anode LED	O	LEDA	
10	Light C	Cathode LED	O	LEDC	

**Coding:**

Pin Number	FPC	Coding
1	/CS	100k Ohm Pull-Up
4	D/C	100k Ohm Pull-Down
5	DB0	100k Ohm Pull-Down

## Interface

Item	Symbol	Condition	Rating			Unit
			Min.	Typ.	Max	
Contact Resistance	Rc	Operating Force = 0,5 N	-	-	50	mΩ
VDD, RESET\	T <sub>int</sub> <sup>VDD</sup>	All electrical parameters on typical values, interruption of Vdd pin	-	-	8	ms
Contact Interruption Time (mech. shock)	T <sub>int</sub> <sup>VDD</sup>	All electrical parameters on typical values, interruption of Reset pin	-	-	8	ms

### Circuit Diagram



CircuitDiagram.pdf

See Appendix 3

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#### 4.4.1. FPC to Panel Interconnection Peel Off Profile Test

Peel forces  $F \geq 6 \text{ N/cm}$   
95% of the peeling off profile  $\geq 6 \text{ N/cm}$

Peel strength/length

6 N/cm

95% of contact width

Way

Gold plated for interconnection to spring connector.

#### 4.4.3. ITO Corrosion Protection

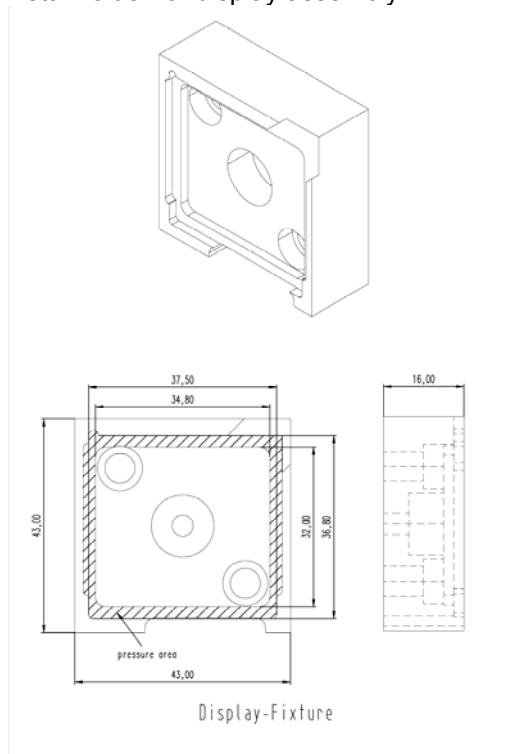
#### 4.4.4. Module Assembly On Siemens PCB

The complete display module will be automatically assembled on the Siemens PCB. In order to click the display module in the metal frame, the display module is placed in a metal holder as shown below and pressed with a maximum force of 180 N in the metal frame for a maximum time of 1 sec. No influence on module functionality allowed during assembly.

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Metal holder for display assembly:



#### 4.4.5. Dangerous Substances (according SN36350 Part 2)

The component must not contain any dangerous substances e.g.:

- Cadmium
- Chloroflourcarbons
- Organic compounds that are harmful for handy and user
- Asbestos or asbestos materials
- Acid materials

#### 4.4.6. Tensile Strength (EN 843-1 or JIS for ceramic bending measurement)

Tensile Strength (EN 843-1 or JIS for ceramic bending measurement)

Test has to be done with a complete LCD-panel!

This test is not subject for rejection of materials

### Measurement conditions

Tensile strength (max. fracture load):

by Supplier Study (depends on material, thickness...)

proposal for test conditions for 4-point-bending-test:

- notice temperature (20-30°C) and humidity (40-60 %),
- distance of the lower cylinders: 20 mm
- distance of the upper cylinders: 10 mm
- adjust sample centred like seen in PICTURE 1 below
- adjust sample centred like seen in PICTURE 2 below is optional test setup upon request
- pre load max. 2 N (for external displacement measurement),
- traverse speed (loading speed): 1.7 mm/min,
- fracture force: first drop (> 10 N) in the force-displacement-diagram,
- document fracture force and displacement at this point for each sample,
- for statistical reasons use a minimum of 40 samples per test
- Sample frequency (how many, and when test samples taken out from mass production): 5  
**(when in mass production 5 samples per shift)**
- The detailed test specification, as the test is conducted by supplier, should be provided upon request.

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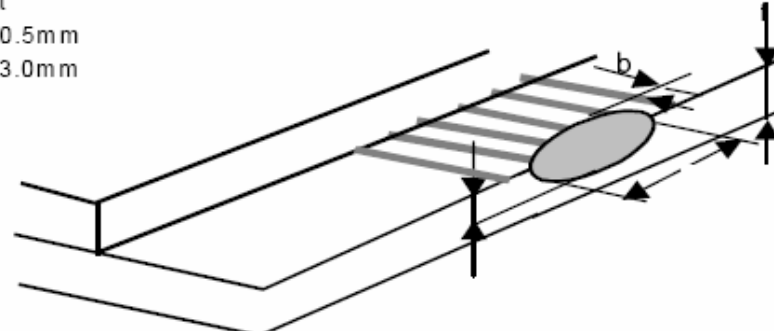
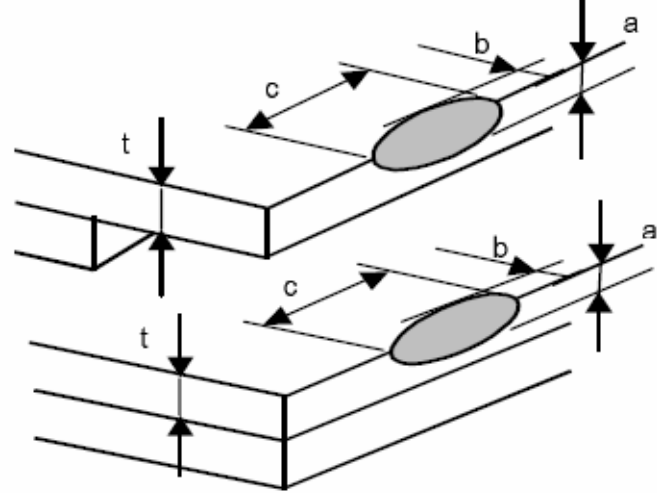
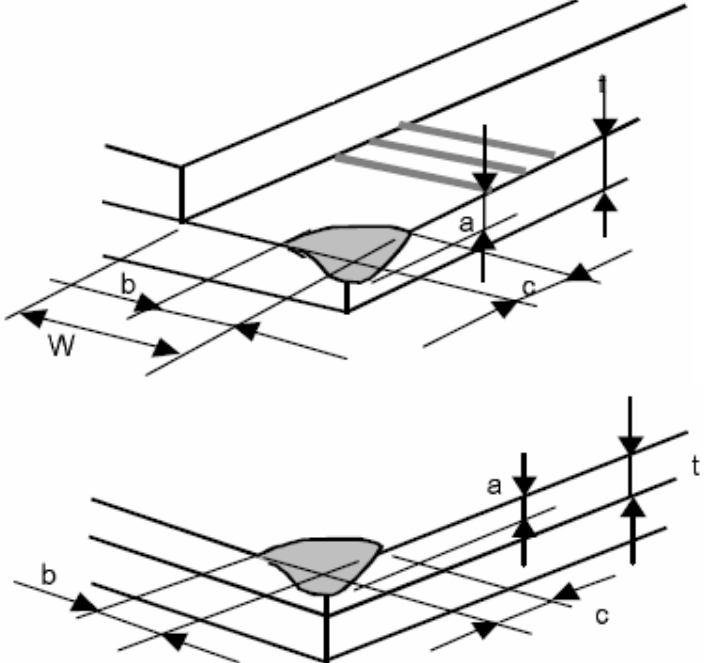




#### 4.4.8. Chipped glass edges (of LCD-panel)

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ITO electrode (minor)	$a \leq t$ $b \leq 0.5 \text{ mm}$ $c \leq 3.0 \text{ mm}$  <p>A 3D perspective diagram showing a rectangular substrate with a central oval-shaped ITO electrode. The electrode is surrounded by a shaded rectangular seal area. Dimension lines indicate: 'a' as the width of the seal area, 'b' as the width of the electrode, and 'c' as the length of the seal area. Arrows indicate the thickness 't' of the substrate.</p>
General (minor)	$a \leq t$ $b \leq 0.5 \text{ mm}$ $c \leq 3.0 \text{ mm}$  <p>A 3D perspective diagram showing a rectangular substrate with a central oval-shaped seal. The seal is surrounded by a shaded rectangular area. Dimension lines indicate: 'a' as the width of the seal area, 'b' as the width of the seal, and 'c' as the length of the seal. Arrows indicate the thickness 't' of the substrate.</p> <p>*Effective width of seal area shall be more than 0.3mm.</p>
Corner portion (minor)	 <p>Two 3D perspective diagrams showing corner seals. The top diagram shows a corner seal with a shaded area. Dimension lines indicate: 'a' as the width of the seal area, 'b' as the width of the seal, and 'c' as the length of the seal. The bottom diagram shows a corner seal with a shaded area. Dimension lines indicate: 'a' as the width of the seal area, 'b' as the width of the seal, and 'c' as the length of the seal. Arrows indicate the thickness 't' of the substrate.</p>
Chipping with progress and crack (minor)	Not allowed

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### Step 3: Shock

Type	semi-sinusoidal shape
Acceleration	500 g
Shock duration	1 ms
Number of shocks	1 shock / axis
Test	3 axes = 6 positions ( $\pm X, Y, Z$ )
Phone	ON

#### Step 4: Shock (continuous shock test)

Acceleration	25 g
Shock duration	6 ms
Number of shocks	1000 shocks per position
Test	3 axes = 6 positions ( $\pm X, Y, Z$ )
Phone	ON

### 5.2.2. Vibration With Temperature

Valid standard	DIN EN 300019-2-2
Type	vibration

Frequency range	10 to 20 Hz	20 to 500 Hz
Acceleration	3.1 mm amplitude	5 g

Temperature range	-25°C and +65°C
Duration	2 h / axis and temperature
Test	3 axes
Phone	OFF

### 5.3. Climatic Stress Tests

### 5.3.1. Climatic Test Sequence

The climatic test sequence is an arrangement of single tests described below. The specimen has to go through all the tests in the given order. The specimen has to be checked after each test.

### Step 1: Dry heat

Complete test procedure	See Chap. 5.3.2
-------------------------	-----------------

### Step 2: Temperature shock

Complete test procedure See Chap. 5.3.3

### Step 3: Damp heat

**Complete test procedure** See Chap. 5.3.4

exception:

Number of repetitions 1 of 6

### Step 4: Constant cold

Complete test procedure	See Chap. 5.3.5
-------------------------	-----------------

### Step 5: Damp heat

See Chap. 5.3.4

## Complete test procedure

exception:

Number of repetitions 5 of 6

## Product requirements

No changes on the test sample

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NO<sub>2</sub> 0.20 ppm  
 CL<sub>2</sub> 0.01 ppm  
 Temperature 25°C ± 2°C  
 Humidity 75% ± 3% (rel)  
 Test duration 5 days  
 Phone OFF

**Step 3:** vibration See Step 1

**Step 4:** mixed gases

#### Product requirements

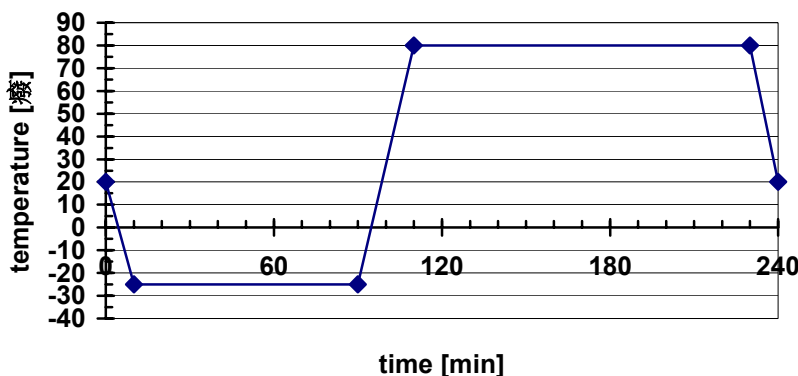
Corrosion is not allowed which may lead to a malfunction.  
 No material migration is accepted.

#### 5.4.2. Vibration At Extreme Temperatures

Valid standard ETS 300019-2-2  
 Type random vibration  
 Frequency range 10 - 20 Hz 20 - 500 Hz

Frequency range	10 to 20 Hz	20 to 500 Hz
Acceleration	0.96 m <sup>2</sup> /s <sup>3</sup> = 0.01g <sup>2</sup> /Hz	-3 db/oct.
Effective	0.9 g max. 3 sec.	2.6 g

Temperature range -25°C to +80°C periodic exposure  
 Test duration 8h / axis  
 Test all 3 axes (X, Y, Z)  
 Phone OFF



#### Product requirements

The function of the device may not be impaired or affected in any way.  
 The test device may not evidence any mechanical damage (no loose parts).

#### 5.4.3. Aging By Temperature

Temperature 85°C  
 Test duration 1000 h  
 Phone OFF  
 Half the number of the devices are to be evaluated after the stress duration of 500 h.

#### Product Requirements

No damages on the test sample

#### 5.4.4. Aging By Damp Heat Constant

Valid standard DIN EN 60068-2-78  
 ETS 300019-2-7  
 Temperature 40°C ± 3°C  
 Humidity 93% ± 2%

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Test duration 42 days  
Phone OFF  
Half the number of the devices are to be evaluated after the stress duration of 500 h.

## Product requirements

The function of the test device may not be impaired or affected in any way.  
The test device may not evidence any mechanical damage (no loose parts).

#### 5.4.5. Mixed Gases And Damp Heat (Cyclic)

### Step 1: Concentration of gases

Valid standards	EN 60068-2-60, Method 4
SO <sub>2</sub>	0.20 ppm
H <sub>2</sub> S	0.01 ppm
NO <sub>2</sub>	0.20 ppm
Cl <sub>2</sub>	0.01 ppm
Temperature	25°C ± 2°C
Humidity	75% ± 3% (rel)
Test duration	10 days
Phone	OFF

**Step 2:** Damp heat cycle See Chap. 5.3.4

Step 2: Temporarily	OFF
Phone	OFF

## Product requirements

Corrosion is not allowed  
No changes on the device

## 5.5. Other Tests

### 5.5.1. ESD

## Test Of Device

Measuring condition: Test according IEC 1000-4-2, test level 4.

Human Body Model

Contact discharge	1 kV
-------------------	------

### Test Within Mobile Phone

Measuring condition: Test according ETSI EN301 489,.

The test is only applied to the complete assembled mobile phone.

Test severity levels has to be:

Contact discharge:	8KV
Air discharge:	15kV

### 5.5.2. Ambient Light Insensitiveness

Full functional under sunlight exposure with an illumination of 100.000 Lx

(Exposure to sunlight)

The test is only applied to complete assembled mobile phones.

### 5.5.3. Resistance to EMI / EMC

The LCD module is functional under all GSM conditions. It has to pass the Siemens EMI test. The test is only applied to complete assembled mobile phones.

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## 6. Packaging And Handling Items

## 6.4. Protection Foil Panel

All display panels are delivered with a protection foil on the panel. The protection foil is easily removable without remains of glue. A coloured (blue) pull-up tape foil is placed in the lower left corner on top of the panel protection foil.

## 6.5. Package

The package must prevent damage to the components during transport and must be suitable for electrostatic-sensitive devices.

No poly vinyl chloride is allowed in the package.

Tray definition (according the Siemens Specification SN72500-1):

- Maximum tray dimensions : 260 x 360 mm<sup>2</sup>
- Gripping trough on long side, width: 20-25mm
- Surface resistance:  $10^5 \leq R_s \leq 10^{10} \text{ M}\Omega$   
(Measurement according IEC 1340-5-1)
- All modules should be delivered with the display cover downside (see also tray drawing in appendix 1)
- No alternating tray stack allowed (all modules in one direction)
- The tray pack must be wrapped with one tape to fix the tray stack
- The top tray of the tray pack should be covered always with an empty tray
- Max. dimension of tray pack is 253 x 356 x 15.6mm<sup>3</sup>
- Number of modules per tray: 20 ( depends on Module size)
- Number of Tray per cardboard box: 9 (160 display modules per box)
- Recommended box dimensions: 380 x 280 x H 100 mm<sup>3</sup>

## 6.6. Module And Package Labelling

### 6.6.1. Module Labelling

Manufacturer component identification: LPH-9135-1 001 Gywwwxxxx :

00x = last 3 digits of the technical productnumber

G = location SZ

y = year

ww = weeknumber

xxxx = Lotcode

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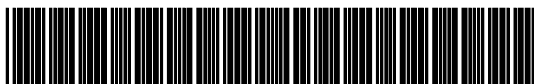
### 6.6.2. Product Package Labelling

As defined in Logistic Agreement (Appendix of LSA) with

- Siemens Part No. (Siemens SNR, see page 1)
- SAP Material No. (see page 1)
- Manufacturer Name
- Production-date

### 6.6.3. Product Package Labelling

SAP- Mat.-Nr., & quantity



\* A 5 B 0 0 0 7 5 395851 Q 0 0 0 0 1 0 0 \*

**V 24851 – Z1508 – A 121**

[manufacturer]

[production - date]

Attention:

Barcode 39 has a (\*) as control sign to recognize the beginning and the end of the net data.

The supplier must print this as Barcode Sign in front and into the end of the barcode as defined by CODE 39.

The \* must not being print under the barcode in front and into the end of the part number

### Barcode – Content

Data		Origin	No. of Symbols	Remarks
Control sign	start code	given	1	*
Barcode net data	SAP – Mat.- Nr.	Siemens order	14	A5B00075395851
	Q	given	1	
	quantity	supplier	7	0000100 (7 digits)
Control sign	end code	given	1	*

The barcode label has to be written in „CODE 39.

### Barcode – Description

- Bar Height (inches) 0,25
- Narrow Bar Width (mils) 9
- To Wide Ratio 2,3
- Label size (mm) 100 x 60 (length x height)

### Label - Content

Data	Origin	No. of Symbols	Remarks
Barcode			
Siemens SNR	Siemens order	max 25	e.g. V24851-Z15-.... Arial 16
manufacturer	supplier	max 20	e.g. Supplier Arial 8
production - date	supplier	10	e.g. 19.06.2004 Arial 8

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See quality assurance agreement document. The acceptance criteria for the delivery like delivery lot, test criteria, test procedures and test reports, are fixed in separate quality assurance agreements (QAA).

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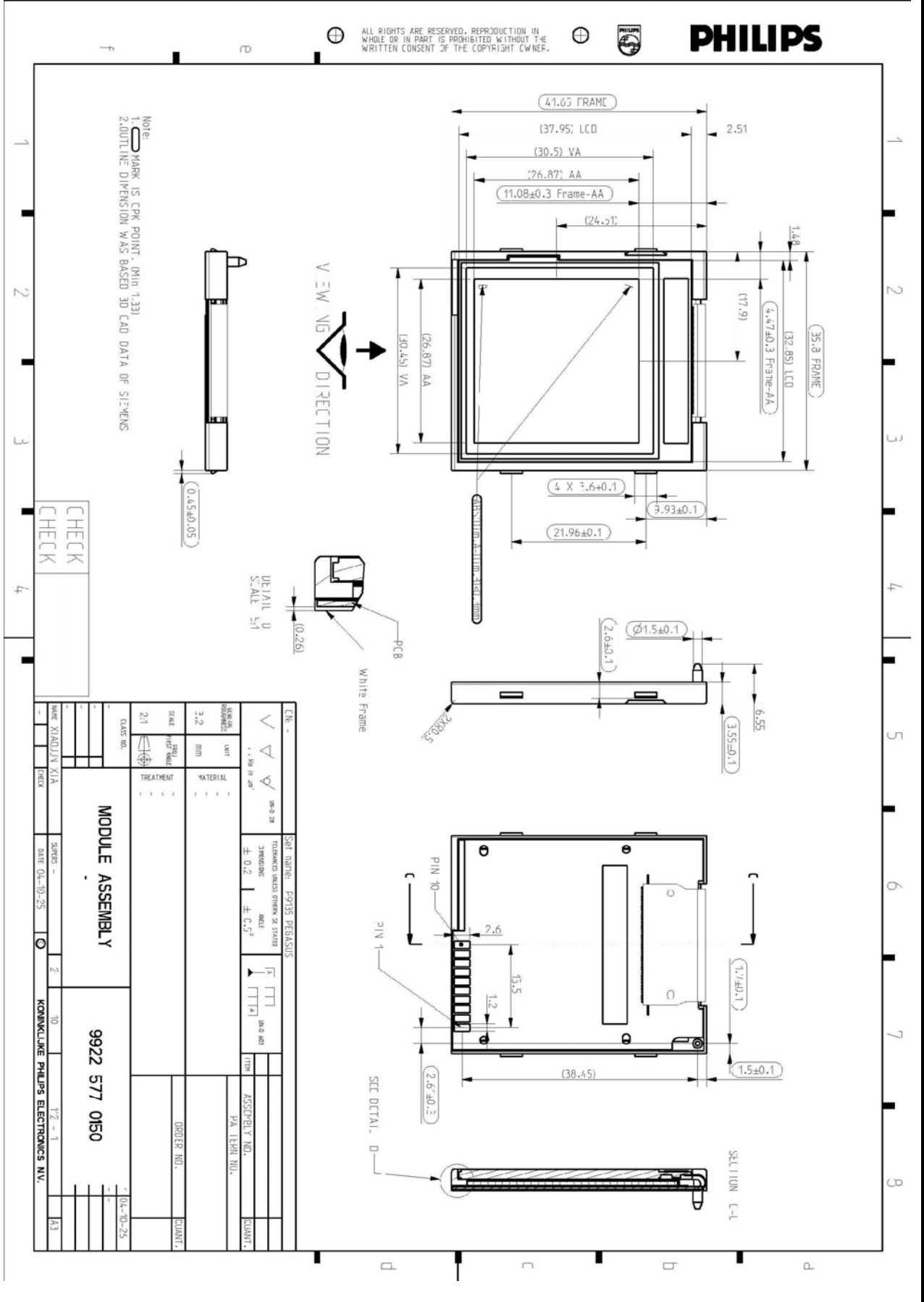
We accept the present technical specification

SIEMENS AG

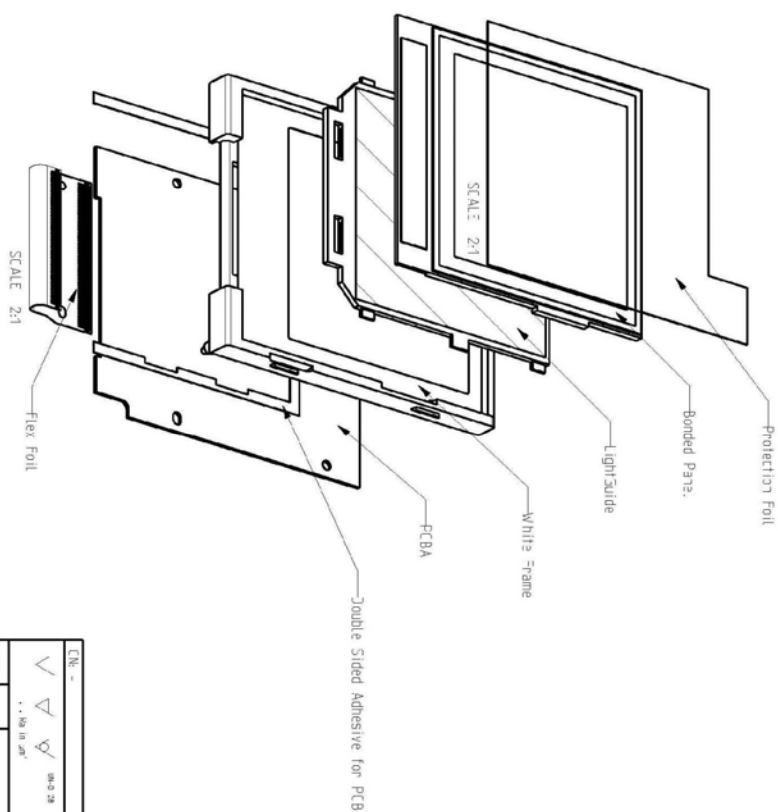
MANUFACTURER


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**PHILIPS**

CH - ✓ <input checked="" type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>		Set number: P9335 PEGASUS	
IN-B-28 TOLERANCES UNLESS SPECIFIED AS FOLLOWS ± 0.2 mm ± 0.3°		IN-B-400 3 DIMENSIONS 100%	
3.2 mm LIFT SCALE 2:1 		MATERIAL TREATMENT CLASS NO.	
9922 577 0150		MODULE ASSEMBLY	
DATE: 04-10-25		DATE: 04-10-25	
172 - 2		10	
ASSOCIATED NO.		ORDER NO.	
PA. ITEM NO.		QUANT.	
13		13	

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**Philips**



Appendix 2  
Normal Mode SW Setting

Instruction	Command	Value	Comment
SWRESET	01		Software Reset
WRCNTR	25		Write Contrast
		XXX	
SLPOUT	11		Sleep Out
INVOFF	20		Display Inversion off
IDMOFF	38		Idle Mode off
NORON	13		Normal Mode On
MADCTR	36		Memory Data Access Control
		00	
COLMOD	3A		Interface Format
		05	
RGBSET	2D		Color Set
		XXX	
CASET	2A		X_Address Area
		0	
		127	
FRMSEL	B4		Frame Frequency Select
		03	Frame frequency in Temp range A
		08	Frame frequency in Temp range B
		0b	Frame frequency in Temp range C
		0e	Frame frequency in Temp range D
DISCTR	BA		Display Control
		07	F1/F2 patern
		0D	FR inversion-set value
RASET	2B		Page address set
		XXX	
		XXX	
RAMWR	2C		Begin the data transfer

Partial Mode SW Setting

Instruction	Command	Value	Comment
SWRESET	01		Software Reset
WRCNTR	25		Write Contrast
		XXX	
SLPOUT	11		Sleep Out
INVOFF	20		Display Inversion off
IDMON	39		Idle Mode On
PTLAR	30		Partial Start End Address Set
		00	
		16	
PRLON	12		Partial Mode On
MADCTR	36		Memory Data Access Control
		00	
COLMOD	3A		Interface Format
		05	

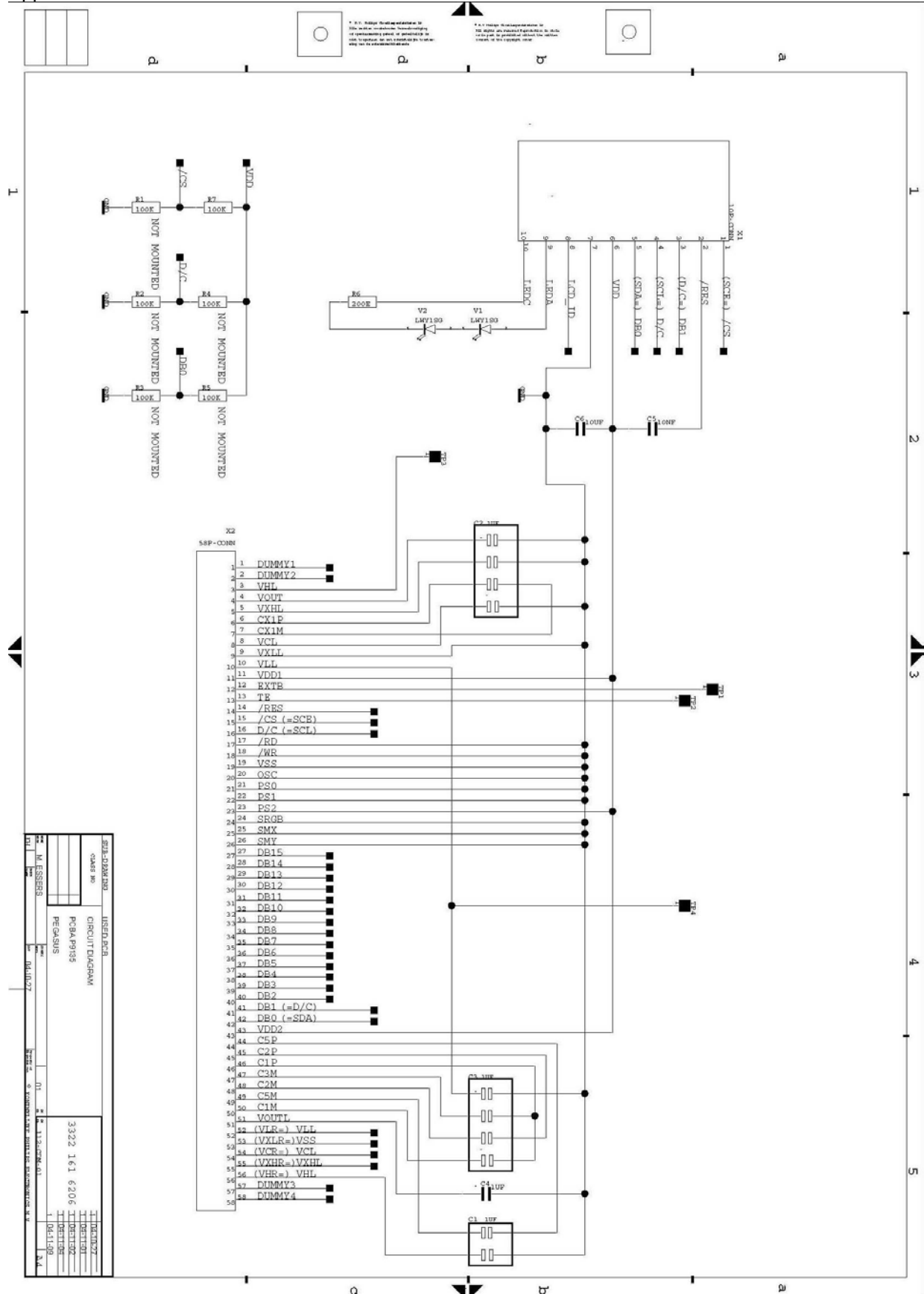
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## Appendix 3



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### 6.5. Acceptance Of Technical Delta Specification

**We accept the present Delta Technical Terms of Delivery**

**SIEMENS AG**

MANUFACTURER

— 2005.6.30  
ER Cees Miltenburg  
Philips MDS

0.7		13.05.05		DATE: 2004-10-26	<b>X75-Pegasus-128x128 C-STN LCD Colour Module</b> <b>Platform Display</b> <b>Delta TECHNICAL TERMS OF DELIVERY</b> <b>Philips</b>	Page 41 of 41
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0.5		21.12.04		COM MD PD HW2 BJ		
0.4	TBD	24.11.04	TBD			
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