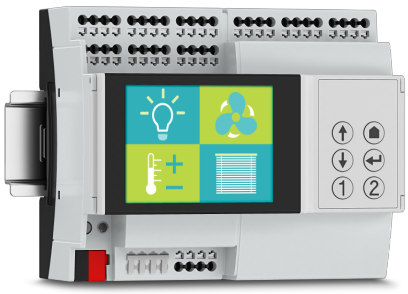
BC ... DKL R D2,4 ...

Housing cover with industrial-grade touch display for control cabinet applications



Data sheet
110461_en_01

1 Description

The touch display is installed available for electronics housings from the BC series for building automation. It is suitable for stationary electronics housing applications.

- 2.4 inch screen size
- High-contrast TFT touch display
- Can be used in temperature ranges from -20°C to +70°C
- Capacitive touch technology for operation with a finger (or a conductive input device)

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This document is valid for the products listed in Section “Ordering data” on page 2.

2 Ordering data

Touch display installed in the BC series housing

Description		Type	Item No.	Pcs./Pkt.
	Housing cover, 71.6 mm overall width, color: black	BC 71,6 DKL R D2,4 TCG BK	1335856	10
	Housing cover, 71.6 mm overall width, color: gray	BC 71,6 DKL R D2,4 TCG KMGY	1335811	10
	Housing cover, 107.6 mm overall width, color: black	BC 107,6 DKL R D2,4 TCG BK	1335861	10
	Housing cover, 107.6 mm overall width, color: gray	BC 107,6 DKL R D2,4 TCG KMGY	1335858	10
		BC 107,6 DKL R D2,4 TCG KMGY VPE1	1335865	1
	Housing cover, 107.6 mm overall width, color: gray Prepared for integration of a membrane keypad: – KP BC K6 C2 P7, 1337344 – KP BC K4 C2 P5, 1337341	BC 107,6 DKL R D2,4 KPG KMGY	1335860	10
	Housing cover, 161.6 mm overall width, color: black	BC 161,6 DKL R D2,4 TCG BK	1335862	10
	Housing cover, 161.6 mm overall width, color: gray	BC 161,6 DKL R D2,4 TCG KMGY	1335863	10
	Housing cover, 161.6 mm overall width, color: gray Prepared for integration of a membrane keypad: – KP BC K6 C2 P7, 1337344 – KP BC K4 C2 P5, 1337341	BC 161,6 DKL R D2,4 KPG KMGY	1335864	10

3 Technical data

3.1 General data

Display data		
Display size		6.1 cm / 2.4″
Screen resolution		320 x 240 pixels (QVGA)
Backlight		LED, white
Dot pitch		0.153 mm x 0.153 mm
Weight		26 g (without electronics housing)
LCD display	Type	TFT, IPS
	Controller	ST7789V (Sitronix)
	Interface	4-wire SPI
Touch panel	Type	Capacitive touch panel (CTP)
	Controller	GT911 (Goodix)
	Interface	I2C
	Material	Glass
	Number of fingers	1

Dimensions	
Dimensions of the cover lens (W x H x D)	66.0 mm x 45.0 mm x 10.2 mm
Viewing area (W x H)	49.96 mm x 37.72 mm
Active area (W x H)	48.96 mm x 36.72 mm

Ambient conditions	
Ambient temperature (operation)	-20°C … +70°C
Ambient temperature (storage)	-30°C … +70°C

The background color may vary slightly depending on the ambient temperature. This procedure can be reversed.

NOTE: Electrostatic discharge

Electrostatic discharge can damage or destroy components. When handling the device, observe the necessary safety precautions against electrostatic discharge (ESD) in accordance with EN 61340-5-1 and IEC 61340-5-1.

3.2 Maximum electrical values

In this specification, all voltages are in reference to ground (GND).
Permanent damage will be caused to the device if the maximum values are exceeded. Furthermore, this device may not function properly at the maximum values.

At an ambient temperature of +25°C

Description		Min.	Max.
Power supply TFT logic	V_{CC}	-0.3 V	5 V
Input voltage	V_I	-0.3 V	V_{CC} +0.5 V
Power supply CPT logic	V_{CTP}	-0.3 V	3.5 V

The LCM (liquid crystal module) must be grounded during handling.

4 Electrical properties

Proper operation of the device is only ensured in accordance with the specifications provided in the table.

4.1 Electrical properties of LC display

At an ambient temperature of +25°C

Condition		Min.	Typ.	Max.
Power supply logic				
V_{CC}		2.4 V	2.8 V	3.3 V
Input voltage				
V_{IH}	High level	0.7 x V_{CC}	–	1 x V_{CC}
V_{IL}	Low level	GND	–	0.3 x V_{CC}
Current consumption logic				
I_{CC}	V_{CC} = 2.8 V	–	7 mA	15 mA

4.2 Electrical properties of touch panel

At an ambient temperature of +25°C

Condition		Min.	Typ.	Max.
Power supply				
V_{CTP}		2.8 V	3.3 V	3.4 V
Current consumption				
I_{CTP}		2.1 mA	2.3 mA	2.4 mA

The I2C address of the CTP controller depends on the status of the RST and INT pins during the start-up sequence. The address is either 0x28/0x29 or 0xBA/0xBB. For detailed information, please refer to specification GT911.

4.3 LED backlight

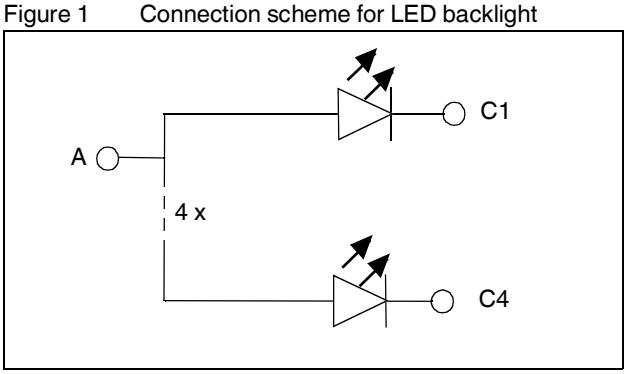
Electrical data

At an ambient temperature of +25°C

Description	
Applied forward voltage V_{AC}	Minimum 2.4 V Typically 2.8 V Maximum 3.4 V
Applied forward current I_{AC}	Typically 80 mA
LED service life L_L	20,000 h at I_{AC} = 80 mA

The service life is an estimate. The LED service life is defined as follows: The end brightness is 50% of the original brightness.

Figure 1 Connection scheme for LED backlight



5 Optical characteristics

At an ambient temperature of +25°C

Description	Condition	
Viewing angle Θ (Cr ≥ 10)	φ = 0°	Typically 80°
	φ = 180°	Typically 80°
	φ = 90°	Typically 80°
	φ = 270°	Typically 80°
Contrast ratio Cr	640–800	
Response time Tf, Tr	–	Typically 35 ms, maximum 45 ms
Surface luminance L_I at I_{AC} = 80 mA	–	Minimum 340 cd/m² Typically 425 cd/m²

Figure 2 Definition of the viewing angle Θ(φ)

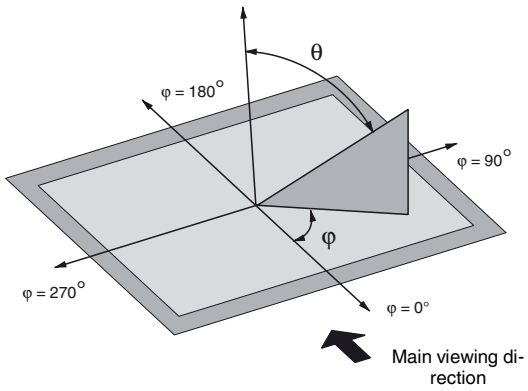


Figure 3 Definition of the contrast ratio Cr (positive type)

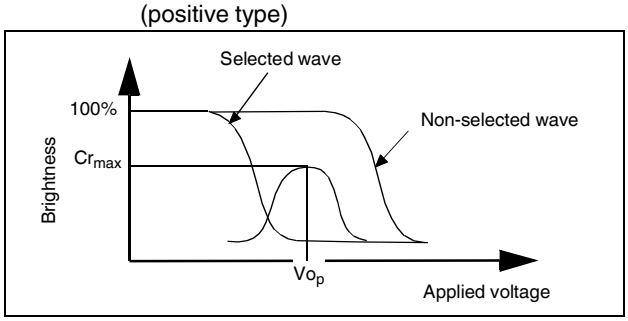


Figure 4 Definition of the contrast ratio Cr (negative type)

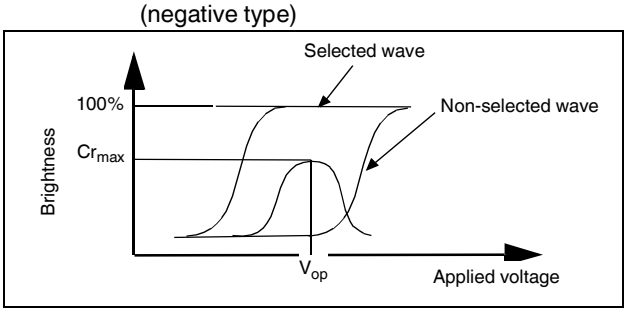


Figure 5 Definition of the response time Tr, Tf (positive type)

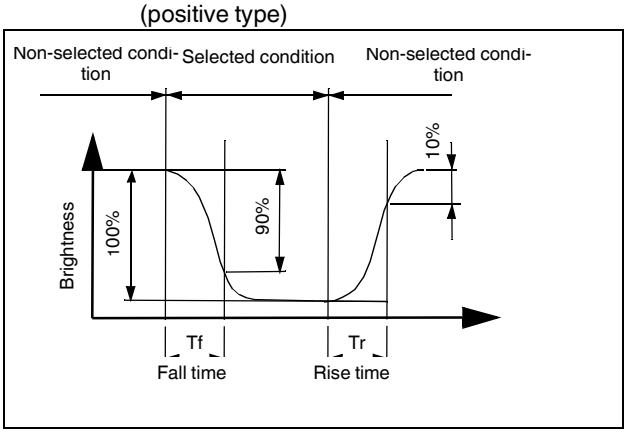
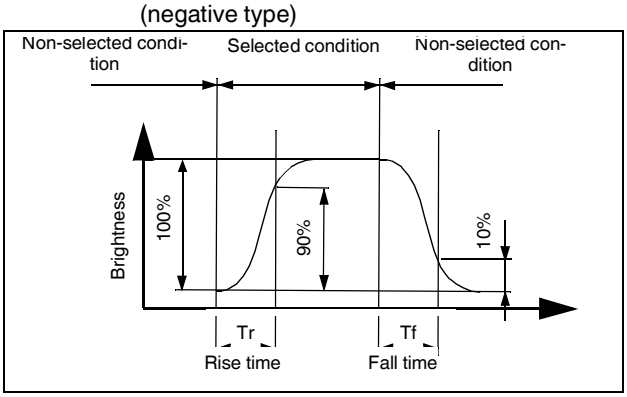


Figure 6 Definition of the response time Tr, Tf (negative type)



6 Display

Description of the LCD interface

Connection method: FFC/FPC connector, 16-pos., pitch: 0.5 mm

Symbol	Pin	I/O	Function
V_{CC}	1	PWR	Power supply logic
GND	2	–	Ground
/CS	3	I	Chip selection
/RST	4	I	Reset input
RS	5	I	Register selection: “L” ≙ command data “H” ≙ parameter data
TFT_SCL	6	I	Serial clock
TFT_SDA	7	I	Serial data
GND	8	PWR	Ground
A	9	PWR	LED backlight, anode
C	10	PWR	LED backlight, cathode
CTP_V_{CC}	11	PWR	CTP power supply
CTP_INT	12	O	Interrupt CTP
CTP_/RST	13	I	CTP reset input
CTP_SCL	14	I/O	CTP serial clock
CTP_SDA	15	I/O	CTP serial data
GND	16	–	Ground

7 Reliability test

Test conditions in accordance with DIN EN 60068-2

No.	Task	Condition	
1.	Ambient temperature (storage), maximum	+80°C	240 h
2.	Ambient temperature (storage), minimum	-30°C	240 h
3.	Humidity (storage)	90% RH (+60°C)	240 h
4.	Ambient temperature (operation), maximum	+70°C	240 h
5.	Ambient temperature (operation), minimum	-20°C	240 h
6.	Vibration	Duration: 2 h depending on X-Y-Z direction; 10 Hz ~55 Hz ~10 Hz; Acceleration 2G	
7.	Thermal shock	100 cycles (1 cycle = 30 min at -30°C, 30 min at +80°C)	

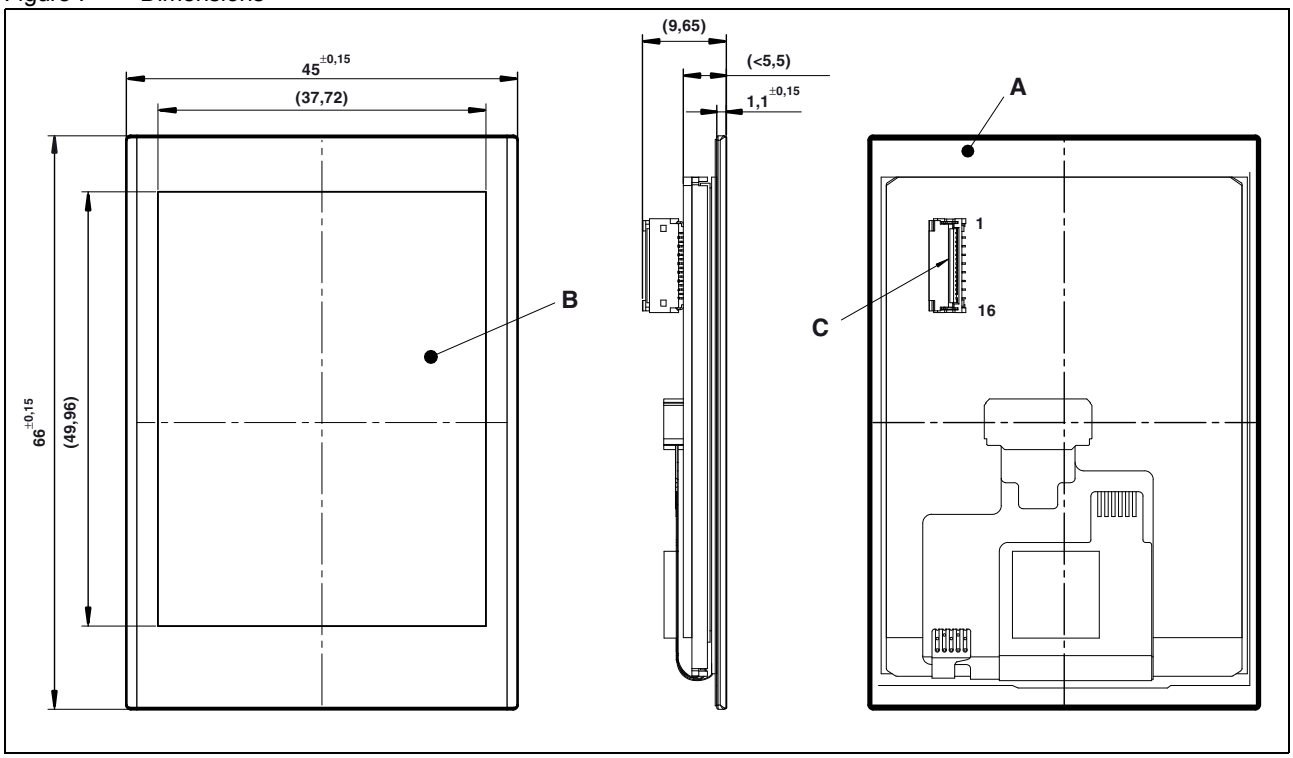
After the reliability test, only the function is confirmed. The image properties will only be achieved again after a sufficiently long rest period of at least twelve hours at room temperature.

8 Software

For detailed information on the register and timing features, refer to the specification for the TFT controller (ST7789V2) and for the CTP controller (GT911).

9 Dimensional drawings

Figure 7 Dimensions



Item	Description
A	Adhesive tape
B	Visible area
C	LCD interface, connection method: FPC/FPC connector 16-pos., pitch 0.5