

# EA T120-5N

Issue 6.2020

## LCD GRAPHIC MODULE 120x32 INCL. CONTROLLER



### FEATURES

- \* CONTRASTY SUPERTWIST DISPLAY STN YELLOW/GREEN
- \* CONTROLLER PT6520 OR COMPATIBLE INTEGRATED
- \* 8-BIT DATA BUS INTERFACE
- \* POWER SUPPLY +5V / about -0.9V max. 800µA
- \* POWER SUPPLY ±3.3V max. 800µA
- \* INTEGRATED RESET CONTROLLER SUPPORTS PERFECT POWER-ON
- \* POWER SAVE MODE
- \* OPERATING TEMPERATURE RANGE -20 ... +70°C

### OPTIONS

- \* TOUCH PANEL 5x2, ANTI GLARE
- \* DRIVING CIRCUIT WITH RS-232 (DOES NOT SUPPORT TP)
- \* LED BACKLIGHT.(YELLOW/GREEN, typ.90mA)
- \* LED BACKLIGHT (BLUE-WHITE, typ.45mA)
- \* FRONTAL BEZEL EA 017-8UKE (60.8x24.2mm)



### ORDERING CODES

LCD GRAPHIC DISPLAY 120x32 PIXEL  
 LCD GRAPHIC DISPLAY 120x32 WITH LED BACKLIGHT  
 LCD GRAPHIC DISPLAY WITH TOUCH PANEL 5X2  
 LCD GRAPHIC DISPLAY 120x32, BLUE-WHITE  
 LCD GRAPHIC DISPLAY BLUE-WHITE WITH TOUCH PANEL  
 HIGH-LEVEL-GRAPHIC CONTROLLER W. RS-232C (NOT FOR TOUCH)  
 FRONTAL BEZEL (VIEWING AREA 60.8 x 24.2 mm)

EA T120L-53  
 EA T120A-54LED  
 EA T120A-54LEDTP  
 EA T120B-54LW  
 EA T120B-54LWTP  
 EA IC1520-2PGH  
 EA 017-8UKE

**TOUCH PANEL**

All backlighted displays are optionally available with touchpanel (ordering code xxTP). The touchpanel surface is antiglare and scratch resistant.

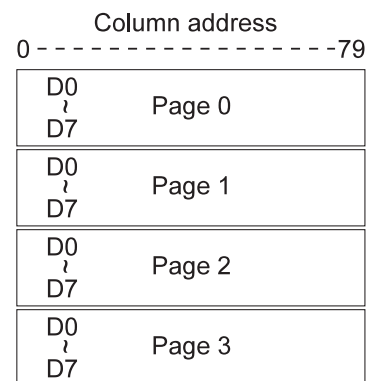
Construction: resistive matrix touch with 5x2 fixed fields. Driving hardware is similar to rubber keypad scanning lines or columns.

To improve readability we suggest to switch on backlight of display.

Technische Daten				
Spezifikation	min	typ	max	Einheit
On-Widerstand	300		10.000	Ω
Spannung	0,5		5	V
Schaltstrom	10u		10m	A
Betätigungskraft	150		200	g
Kontaktprellen		10		ms
Temperaturbereich	-30		+75	°C
Lebensdauer	1.000.000			Schaltspiele

**ONBOARD CONTROLLER - INSTRUCTION TABLE**

Below an overview of all built-in commands. For more information and hardware characteristics please refer to the data sheet PT6520<sup>\*)</sup>. Each display supporting 2 controller PT6520 (or compatible): one for the left half and the other one for the right half. Connected are columns 0..59. Addressing a byte via Page Address and Column Address allows to write or read 8 dots (vertically oriented) in display.



Instructions	Code											Function	
	A0	RD	WR	D7	D6	D5	D4	D3	D2	D1	D0		
Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0/1	Turns Display on or off. 0=OFF; 1=ON;	
Display start line	0	1	0	1	1	0	Display start address (0 - 31)				0	Specifies RAM line corresponding to top of display.	
Set page address	0	1	0	1	0	1	1	1	0	Page (0-3)		Sets display RAM page.	
Set Column address	0	1	0	0	Column address (0 - 79)								Sets display RAM column address.
Read Status	0	0	1	B U S Y	A D C	O N / O F F	R E S E T	0	0	0	0	Read the following status: BUSY: 1=Busy; 0=Ready; ADC: 1=CW output; 0=CCW output; ON/OFF: 1=Display off; 0=Display on; RESET: 1=Being reset; 0=Normal;	
Write display data	1	1	0	Write data									Writes data into display RAM.
Read display data	1	0	1	Read data									Reads data from display RAM.
Select ADC	0	1	0	1	0	1	0	0	0	0	0/1	0=CCW output; 1=CW output;	
Static drive ON/OFF	0	1	0	1	0	1	0	0	1	0	0/1	Selects static driving operation. 0=Normal driving; 1=Static drive;	
Select duty	0	1	0	1	0	1	0	1	0	0	0/1	Select duty cycle. 0=1/16; 1=1/32;	
Read-Modify-Write	0	1	0	1	1	1	0	0	0	0	0	Read-modify-write ON	
End	0	1	0	1	1	1	0	1	1	1	0	Read-modify-write OFF	
Reset	0	1	0	1	1	1	0	0	0	1	0	Software reset.	

\*) on our website <https://www.lcd-module.de/eng/pdf/zu-behoer/pt6520.pdf>

## EA T120-5N

### EA T120L-53

The EA T120L-53 is the reflective, non backlighted version for 5V supply voltage. This display provides lowest power consumption which make it perfect fit for mobile application. It provides ideal readability even at direct sunlight. Interface is made for  $\mu$ C system and supports 8 bit data bus interface (6800). For more information and hardware characteristics please refer to the data sheet PT6520<sup>\*)</sup>.



#### Factory set

The built-in reset controller provides perfect power on sequence. Threshold incl.hysteresis is typ. 4.55 / 4.65V. As threshold is fixed, it supports 5V systems only. An external reset can be applied via pin 8 (there's an internal pull-up with 10k $\Omega$  built-in).

For contrast there's a need of about -0.9V at pin 3.

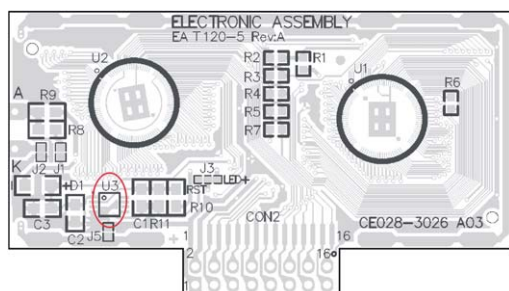
EA T120L-53, Factory Set, 5V Operation			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +5V
3	VEE	-	Contrast Voltage (about -1 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	RESET	L	int. Reset controller (L=Reset)
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB

#### Running at 3.3V systems

Connecting the display at 3.3V system (power supply and data bus), requires unsoldering the reset controller (U3). In this case an external reset at pin 8 is required (built-in 10k $\Omega$  pull-up).

For contrast there's a need of about -2.6V at pin 3.

EA T120L-53, 3.3V Operation, U3 dis-assembled			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +3.3V
3	VEE	-	Contrast Voltage (about -3 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	RESET	L	L=Reset, int. 10k pull-up
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB



<sup>\*)</sup> on our website <https://www.lcd-module.de/eng/pdf/zubehoer/pt6520.pdf>

**EA T120A-54LED**

The yellow/green backlighted beleuchtete version EA T120A-54LED is equipped with a LED backlight that can be switched off. Thanks to the positive, transfective STN technology, the display is perfectly readable both in direct sunlight or totally darkness. It's desgned for 5V operation. Interface to a uC system is 8 bit data bus (6800). For more information and hardware characteristics please refer to the data sheet PT6520<sup>\*)</sup>.



Switchable backlight - Factory set

The built-in reset controller provides pefect power on sequence. Threshold incl.hysteresis is typ. 4.55 / 4.65V. As threshold is fixed, it supports 5V systems only. For 3.3Vsupply the internal reset controller U3 need to be disassembled.

Pin 8 activates LED backlight (external connection to VDD). LED series resistor is built-in (R9). The LED backlight draws typ. 90mA. Life time of backlight is 100,000 hours..

For contrast there's a need of about -0.9V at pin 3 (respectively -2.6V at VDD=3.3V).

EA T120A-54LED, Factory Set, 5V Operation			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +5V
3	VEE	-	Contrast Voltage (about -1 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	LED+	-	Anode LED backlight
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB

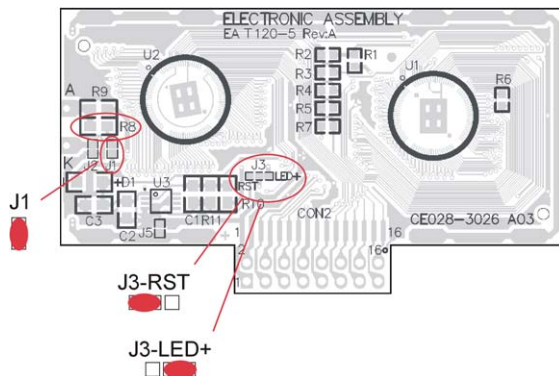
External Reset

The built-in reset controller provides perfect Power-On-Reset behaviour. To achieve an external reset, change solder link J3 to „J3-RST“ position. Then a low level at pin 8 generates a reset; note that there's an internal pull-up with 10kΩ.

In this case the LED backlight need to be activated with a shortage at solder link J1. The backlight is switched on permanently then.(anode is connected to VDD via R8).

Life time for backlight is 100,000 hours.

EA T120A-54LED, 5V Operation, ext. Reset			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +5V
3	VEE	-	Contrast Voltage (about -1 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	RESET	L	int. Reset controller, (L=Reset)
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB



*\*) on our website <https://www.lcd-module.de/eng/pdf/zubehoer/pt6520.pdf>*

## EA T120-5N

### EA T120B-54LW

The blue version EA T120B-54LW (STN blue-white negative, transmissive) is equipped with a white LED backlight.

The display is designed for 5V operation. Interface to a uC system is 8 bit data bus (6800). For more information and hardware characteristics please refer to the data sheet PT6520<sup>\*)</sup>.



#### Switchable backlight - Factory set

The built-in reset controller provides perfect power on sequence. Threshold incl.hysteresis is typ. 4.55 / 4.65V. As threshold is fixed, it supports 5V systems only. For 3.3Vsupply the internal reset controller U3 need to be disassembled.

Pin 8 activates LED backlight (external connection to VDD). LED series resistor is built-in (R9). The LED backlight draws typ. 45mA. Life time of backlight is 50,000 hours.

Note that if backlight is off, display cannot be read anymore.

For contrast there's a need of about -0.9V at pin 3 (respectively -2.6V at VDD=3.3V).

EA T120B-54LW, Factory Set, 5V Operation			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +5V
3	VEE	-	Contrast Voltage (about -1 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	LED+	-	Anode LED backlight
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB

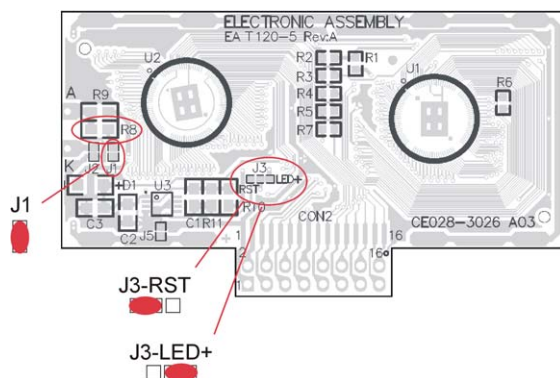
#### External Reset

The built-in reset controller provides perfect Power-On-Reset behaviour. To achieve an external reset, change solder link J3 to „J3-RST“ position. Then a low level at pin 8 generates a reset; note that there's an internal pull-up with 10kΩ.

In this case the LED backlight need to be activated with a shortage at solder link J1. The backlight is switched on permanently then.(anode is connected to VDD via R8).

Life time for backlight is 50,000 hours, brightness decreases slowly over lifetime.

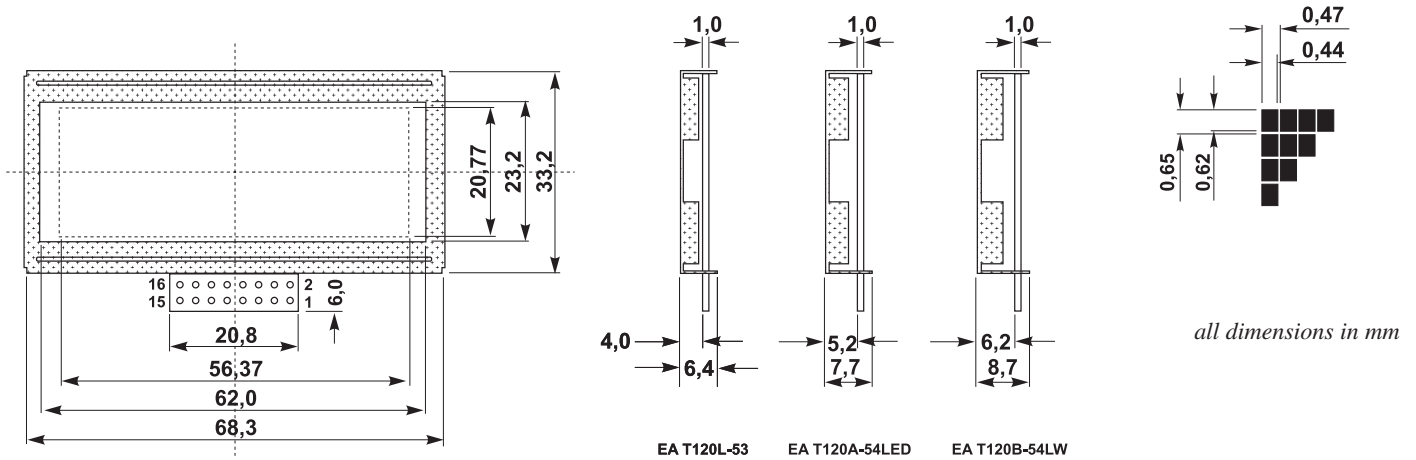
EA T120B-54LW, 5V Operation, ext. Reset			
Pin	Symbol	Level	Function
1	VSS	L	Power Supply 0V (GND)
2	VDD	H	Power Supply +5V
3	VEE	-	Contrast Voltage (about -1 V)
4	A0	H / L	H=Data, L=Command
5	R/W	H / L	H=Read, L=Write
6	E1	H	Enable left display half
7	E2	H	Enable right display half
8	RESET	L	int. Reset controller, (L=Reset)
9	D0	H / L	Display Data, LSB
10	D1	H / L	Display Data
11	D2	H / L	Display Data
12	D3	H / L	Display Data
13	D4	H / L	Display Data
14	D5	H / L	Display Data
15	D6	H / L	Display Data
16	D7	H / L	Display Data, MSB



<sup>\*)</sup> on our website <https://www.lcd-module.de/eng/pdf/zubehoer/pt6520.pdf>

**DIMENSION**

w./o. Touchpanel



with Touchpanel

