

**DISPLAY Elektronik GmbH**

# DATA SHEET

**LCD MODULE**

**DEM 122032C FGH-PW- 12**

*Product specification*

*Version: 7*

**23/Dec/2010**

# GENERAL SPECIFICATION

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MODULE NO. :

# DEM 12203C FGH-PW-12

CUSTOMER P/N

Version NO.	Change Description	Date
0	Original Version	07.05.2008
1	Add Version	16.05.2008
2	Update Module Drawing	26.05.2008
3	Update Module Drawing And Backlight Drawing	08.09.2008
4	Update PCB Description	18.12.2008
5	Add Change Pin 3 To Reset Signal	18.01.2010
6	Add version	25.01.2010
7	Change metal frame	23.12.2010

**PREPARED BY:** LX

**DATE:** 23.12.2010

**APPROVED BY:** MHO

**DATE:** 23.12.2010

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**1. FUNCTIONS & FEATURES**

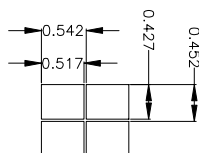
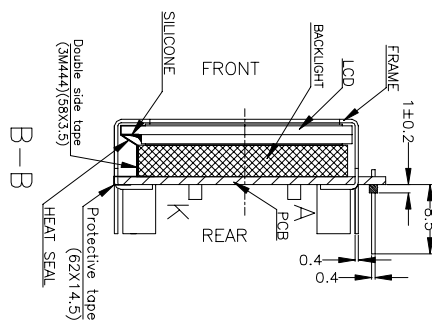
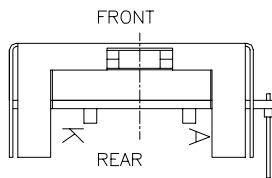
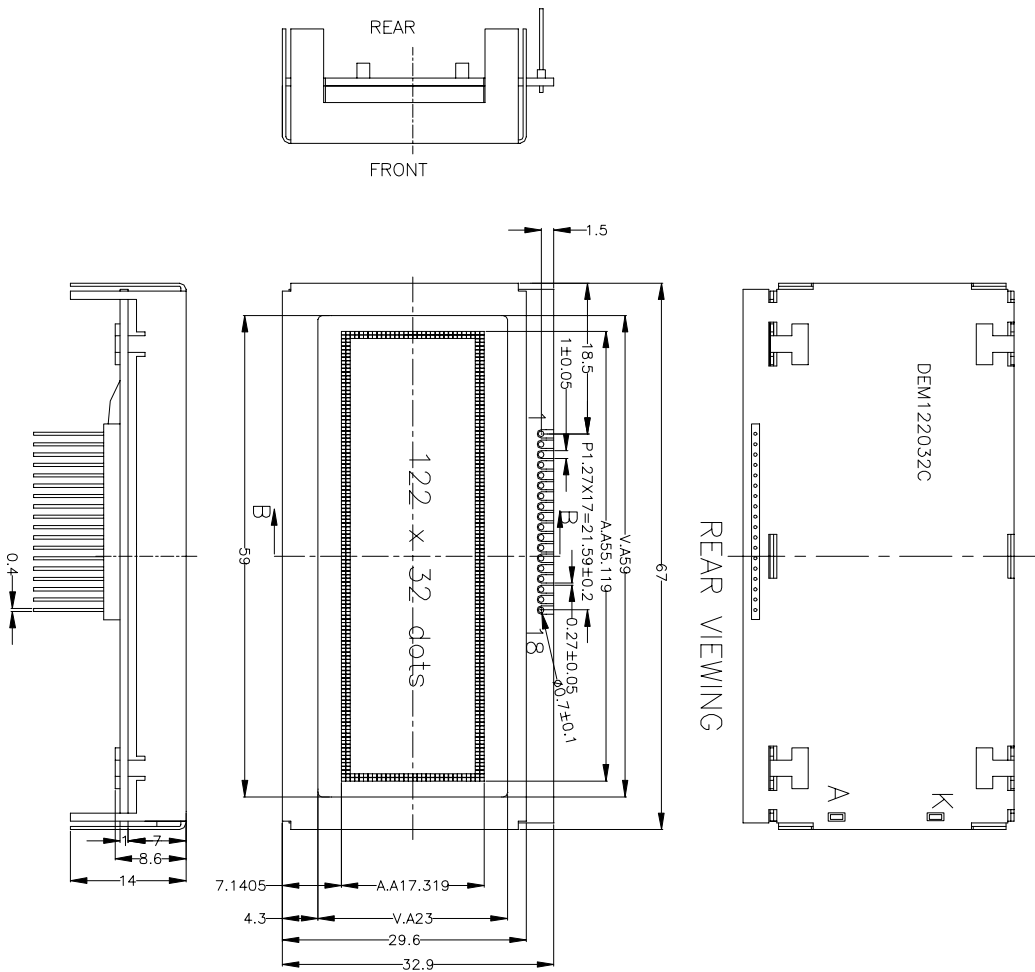
<b>MODULE NAME</b>	<b>LCD Type</b>
DEM 122032C FGH-PW-12	FSTN Transflective Positive Mode

- Viewing Direction : 12 O'clock
- Driving Scheme : 1/32 Duty Cycle, 1/6 Bias
- Power Supply Voltage : 5.0Volt (typ.)
- $V_{LCD}$  : 5.0Volt (typ.)
- Display contents : 122 x 32 dots
- Interface : Parallel
- Driver IC : PT6520 (PTC – Princeton Technology Corp.)
- Operating Temperature : -20°C to +70°C
- Storage Temperature : -30°C to +80°C
- LED – Backlight : White, LED, Long-Lifetime
- RoHS : Compliant

**2. MECHANICAL SPECIFICATIONS**

- Module Size : 67.00 x 32.90 x 14.00 mm
- Viewing Area : 59.00 x 23.00 mm
- Active Area : 55.119 x 17.319 mm
- Dot Size : 0.427 x 0.517 mm
- Dot Gap : 0.025 mm

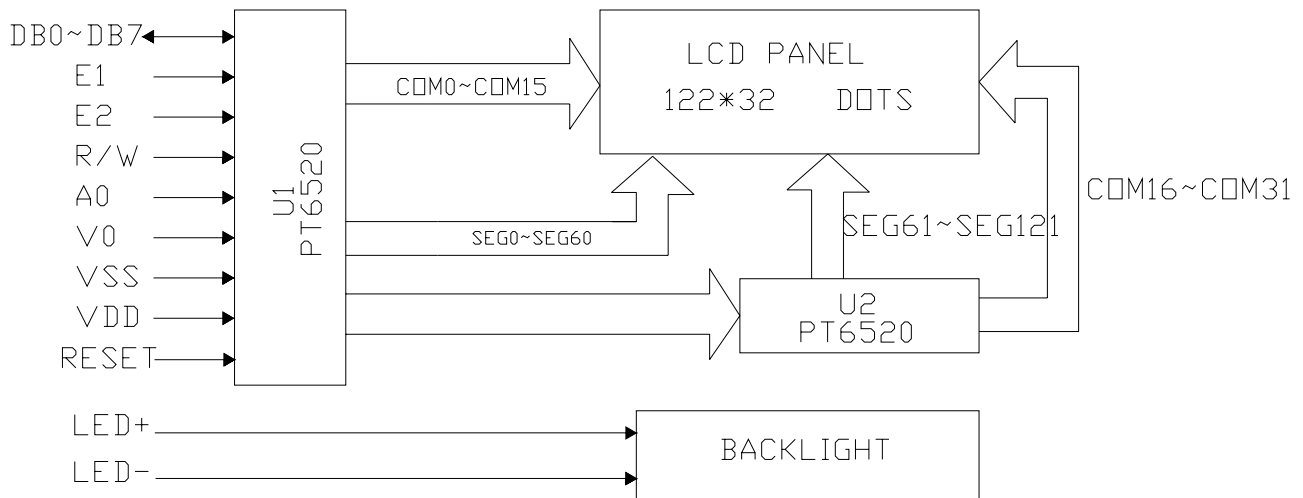
3. EXTERNAL DIMENSIONS



DETAIL DOTS  
SC:10:1

Remarks:  
 1, Unmarked tolerance is ±0.3,  
 2, The material comply with RoHS,  
 3, The metal frame thickness is 0.4mm.

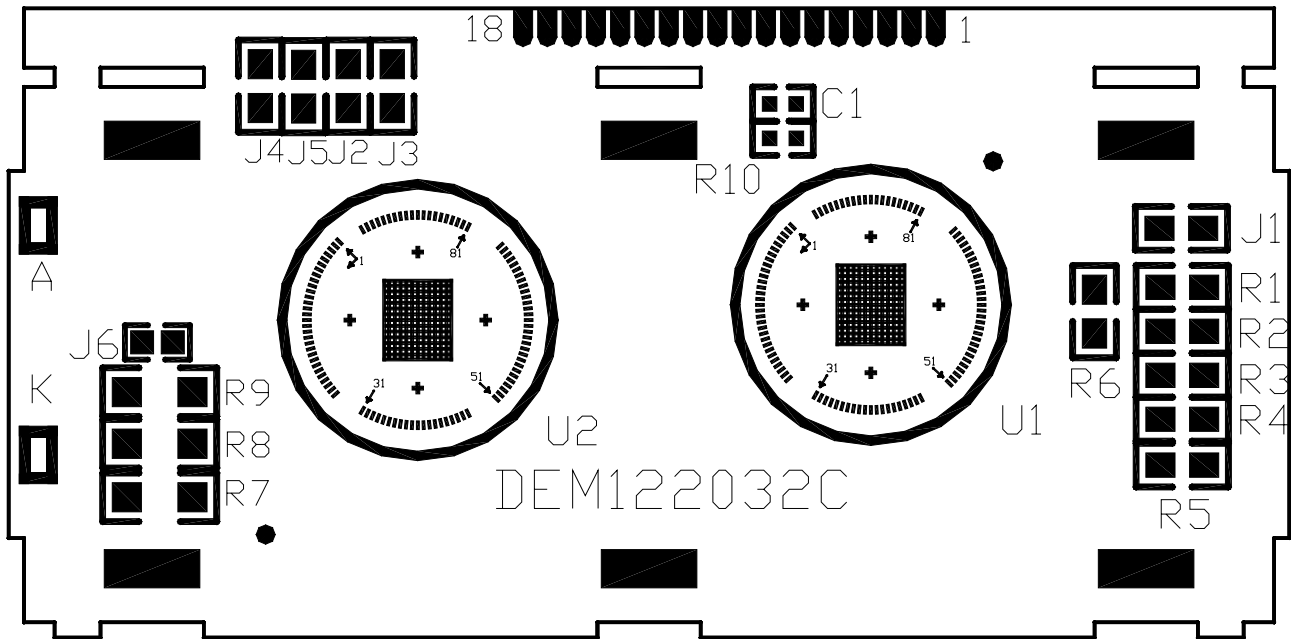
**4. BLOCK DIAGRAM**



**5. PIN ASSIGNMENT**

Pin No.	Symbol	Function
1	VLED-	Control the BL to GND
2	VLED+	Control the BL to power supply
	RESET	Reset the system and selects the interface type for a 68 port/80 port MPU. High: 68 port MPU interface. Low: 80 port MPU interface. (edge trigger)
4	VSS	Signal ground for LCM(GND)
5	VDD	Power supply for logic(+5V) for LCM
6	V0	Contrast adjust
7	A0	Selection display data or instructions. High: Display data. Low: instruction
8	R/W	Read/write select signal
9	E1	Operation (data read/write) enable signal ( U1 )
10	E2	Operation (data read/write) enable signal ( U2 )
11~14	DB0~DB3	Four low order bi-directional three-state data bus lines. Used for data transfer between the MPU and the LCM. These four are not used during 4-bit operation.
15~18	DB4~DB7	Four high order bi-directional three-state data bus lines. Used for data transfer between the MPU.

**6. PCB DRAWING AND DESCRIPTION**



**DESCRIPTION:**

**6-1-1. The polarity of the pin 1 and the pin 2:**

J3,J5	J2,J4	LED Polarity	
		1 Pin	2 Pin
Each open	Each closed	Anode	Cathode
Each closed	Each open	Cathode	Anode

Note: In application module, J3=J5=closed and J2=J4=open

**6-1. The metal-bezel is set to be ground when the J1 is closed.**

Note: In application module, J1=closed.

**6-2. The LED resistor should be bridged when the J6 is open**

Note: In application module, J6=open.

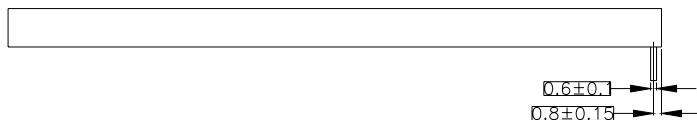
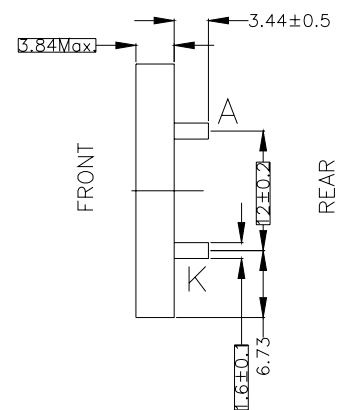
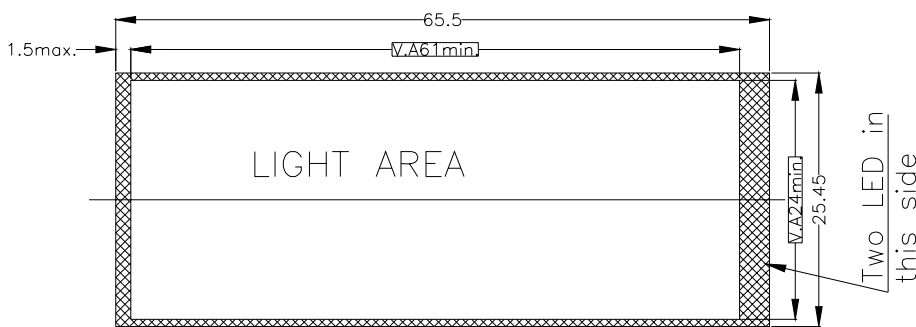
**6-3. The R7, R8 and R9 is the LED resistor.**

Note: In application module, R8=68 Ω, R7=R9=open.

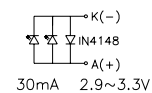
**7. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS**

ELECTRICAL / OPTICAL SPECIFICATIONS

PARAMETER	STMBOL	Min	Typ.	Max	Unit	Test condition
AVERAGE LUMINOUS INTENSITY	$I_v$	170	220		cd/m <sup>2</sup>	Ta=25°C If= 30 mA
LUMINOUS TOLERANCE / PCS		70			%	
FORWARD VOLTAGE	Vf	2.9		3.3	V	
PEAK EMISSION WAVELENGTH	$\lambda_P$				nm	
CHROMATICITY COORDINATES	X Y	0.24 0.24	0.27 0.27	0.30 0.30		
ITEM	STMBOL	ABS. MAXIMUM RATING			TEST CONDITION	
FORWARD CURRENT	If	40mA			Ta=25°C	
REVERSE VOLTAGE	Vr	5V				
POWER DISSIPATION	Pd	132mW				
OPERATING TEMPERATURE	Topr	-20 ~ +70°C				
STORAGE TEMPERATURE	Tstg	-30 ~ +80°C				



INTERNAL CIRCUIT DIAGRAM



- Remarks:
- 1.Unmarked tolerance is ±0.3;
  - 2.The material comply with RoHS;
  - 3.Color:White;
  - 4.Lifetime>50000hours.

**8. MAXIMUM ABSOLUTE POWER RATINGS**

Item	Symbol	Standard value	Unit
Power supply voltage	VDD	-0.3V to +5.5V	V
LCD Driver voltage	VLCD	-0.3V to +7.0V	V
Input voltage	VIN	-0.3V to VDD+0.3V	V
Operating temperature	Topr	-20°C to + 70°C	°C
Storage temperature	Tsto	-30°C to + 80°C	°C



**9. ELECTRICAL CHARACTERISTICS**

**9.1 DC Characteristics**

Item	Symbol	Standard Value			Test Condition	Unit
		Min.	Typ.	Max.		
Operating Voltage	VDD	4.7	5.0	5.3	--	V
LCD Voltage	VLCD	4.7	5.0	5.3	V0 – VSS	V
Supply Current	IDD	--	TBD	--		mA

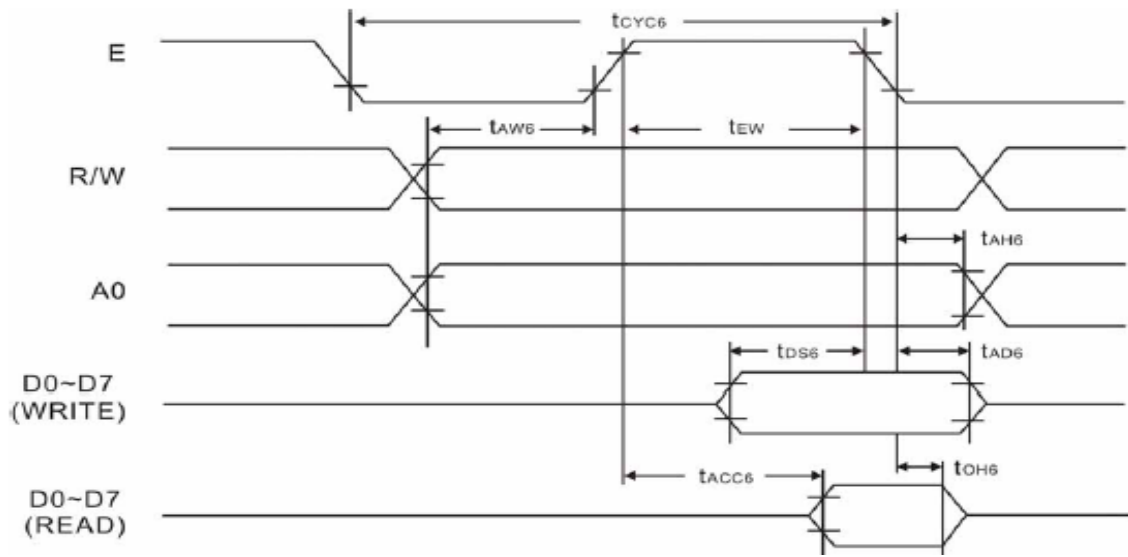
**9.2 AC Characteristics**

**READ/WRITE TIMING FOR THE 68-PORT MPU**

(V<sub>SS</sub>=0V, T<sub>a</sub>=-20 ~ +70°C)

Parameter	Signal	Symbol	Condition	Min.	Typ.	Max	Unit	
System cycle time	A0, CS R/W	tCYC6	VSS=-5V	1000	-	-	ns	
			VSS=-3V	2000	-	-	ns	
Address set-up time		tAW6	VSS=-5V	20	-	-	ns	
			VSS=-3V	40	-	-	ns	
Address hold time		tAH6	VSS=-5V	10	-	-	ns	
			VSS=-3V	30	-	-	ns	
Control pulse width	D0~D7	tDS6	VSS=-5V	80	-	-	ns	
			VSS=-3V	160	-	-	ns	
Data set-up time		tDH6	VSS=-5V	10	-	-	ns	
			VSS=-3V	20	-	-	ns	
Data hold time		tOH6	CL=100pF VSS=-5V	10	-	60	ns	
			CL=100pF VSS=-3V	20	-	120	ns	
RD access time	tACC6	CL=100pF VSS=-5V	-	-	200	ns		
		CL=100pF VSS=-3V	-	-	400	ns		
Enable disable time	READ	E	tew	VSS=-5V	250	-	-	ns
				VSS=-3V	400	-	-	ns
	WRITE			VSS=-5V	150	-	-	ns
				VSS=-3V	250	-	-	ns

**READ/WRITE TIMING FOR THE 68-PORT MPU**



10. CONTROL AND DISPLAY COMMAND

Command		RD	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0	Function
1	Display ON/OFF	1	0	0	1	0	1	0	1	1	1	0/1	Switches the entire display ON or OFF, regardless of the Display RAM's data or the internal status. *
2	Display START Line	1	0	0	1	1	0	Display START address (0-31)				Determines the line of RAM data to be displayed at the display's top line (COM0)	
3	Page Address Set	1	0	0	1	0	1	1	1	0	Page (0-3)		Sets the page of the Display RAM in the page address register.
4	Column (segment) Address Set	1	0	0	0	Column address (0-79)						Sets the column address of the Display RAM in the column address register.	
5	Status Read	0	1	0	BUSY	ACC	ON/OFF	RESET	0	0	0	0	Read the status. Busy 1: Busy (internal processing) 0: Ready status ADC 1: Rightward (forward) output 0: Leftward (reverse) output ON/OFF 1: Display OFF 0: Display ON RESET 1: Resetting. 0: Normal
6	Write Display Data	1	0	1	Write Data						Writes the data on the data bus to RAM	These commands access a previously-specified address of the Display RAM, after which the column address is incremented by one.	
7	Read Display Data	0	1	1	Read Data						Reads data from the Display RAM onto the data bus.		
8	ADC Select	1	0	0	1	0	1	0	0	0	0	0/1	Used to reverse the correspondence between the Display RAM's column address and segment driver output ports 0: Rightward (forward) output 1: Leftward (reverse) output
9	Static Drive ON/OFF	1	0	0	1	0	1	0	0	1	0	0/1	Selects normal display operation or static all-lit drive display operation. 1: Static drive (power save)* 0: Normal display operation
10	Duty Select	1	0	0	1	0	1	0	1	0	0	0/1	Selects the duty factor for driving LCD cells. 1: 1/32 duty, 0: 1/16 duty
11	Read Modify Write	1	0	0	1	1	1	0	0	0	0	0	Increments column address counter by 1 when display is written. (This is not done when data is read)
12	End	1	0	0	1	1	1	0	1	1	1	0	Cancels the Ready Modify Write mode.
13	Reset	1	0	0	1	1	1	0	0	0	1	0	Resets the display START line to the 1st line in the register. Resets the column address counter to 0 and page address to 0.

**11. LCD MODULES HANDLING PRECAUTIONS**

- Please remove the protection foil of polarizer before using.
- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  - Be sure to ground the body when handling the LCD module.
  - Tools required for assembly, such as soldering irons, must be properly grounded.
  - To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
  - The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions  
When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C).Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

**12. OTHERS**

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
  - Exposed area of the printed circuit board
  - Terminal electrode sections