

Displaytech Ltd.

Website: www.displaytech.com.hk

LCD Module Product Specification

Product: 4.3" TFT Display Module (480RGBx272DOTS)

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23 October 2007.

REVISION RECORD

VERSION	CHANGES	DATE
1.0	Initial revision	3 August 2007
2.0	P.4 module size changed; P.5 mechanical drawing changed; P.6 interface pin assignment table changed.	23 October 2007

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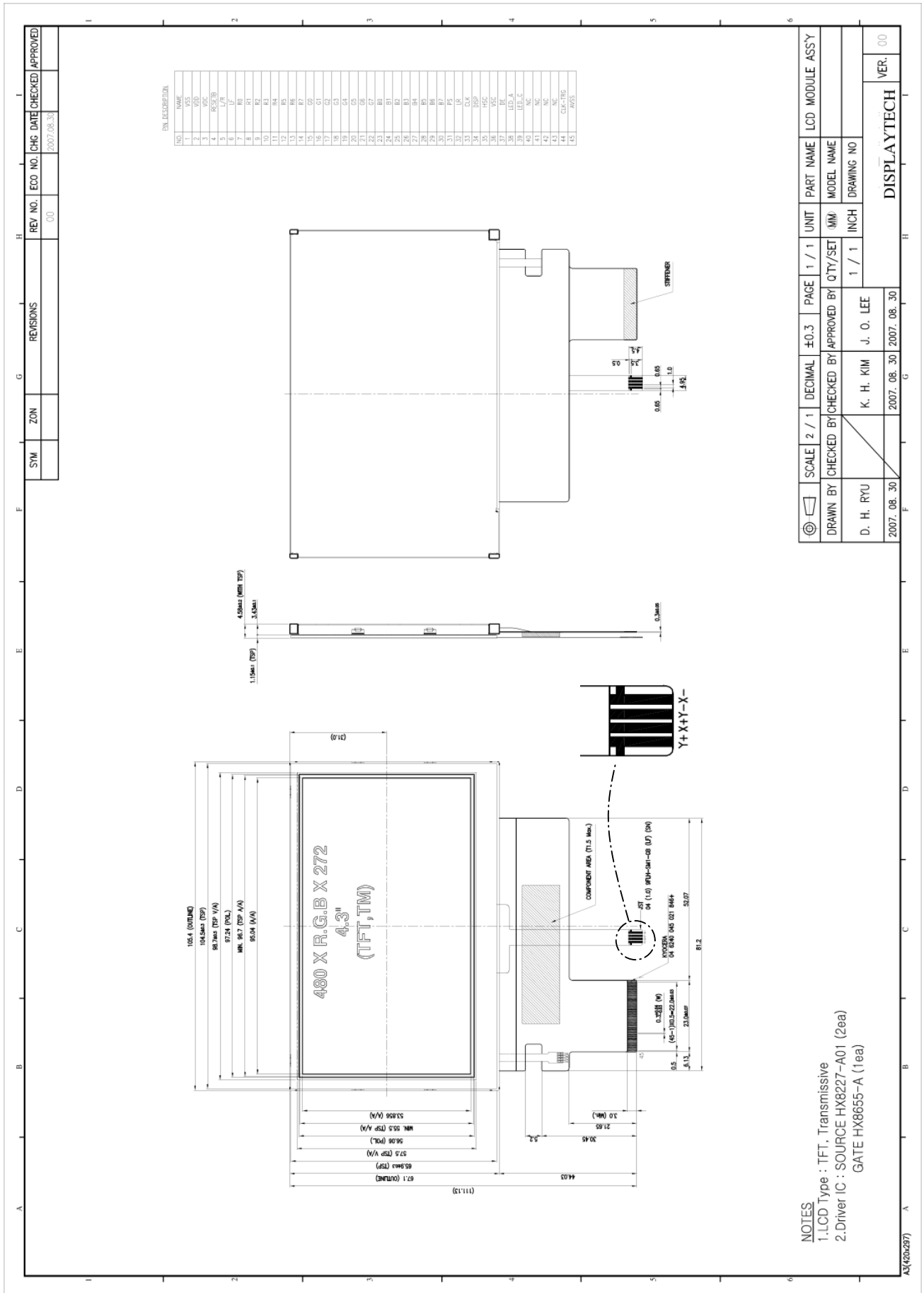
1. Introduction

DT043TFT and **DT043TFT-TS** (touch screen version) are display modules that contain a TFT display with a 480RGB x 272 resolution. The drivers used for this project are the **HX8655 & HX8227** or **compatible** and can display 16M colours. The drivers are mounted on the glass and the interconnection to FPC including components to drive the display module.

2. General specifications of Panel

Item	Specification		Unit
LCD type	TFT		---
Resolution	H	1440 (480*3)	Line
	V	272	Line
Module size	H	105.4	mm
	V	67.1	mm
	T	3.58 / 4.58 (with touch screen)	mm
Active area	H	95.04	mm
	V	53.856	mm
Pixel size	198 x 198		Um
Viewing direction	6		o'clock
Drive IC	HX8655-HX8227		---
Interface	8Bit RGB Parallel /series RGB		---
Display colour	16M		---
Operation temperature range	-20~70		°C
Storage temperature range	-30~80		°C

3. Mechanical drawing ~ DT043TFT-TS (with touch screen)



4. Interface Pin Assignment

Pin NO	Symbol	Level	Description
1	VSS	0V	Ground
2	VDD	2.5V	Power supply voltage
3	VDC	5V	Power supply voltage
4	RESETB	H/V	Low reset: initialize the IC when low. It must be reset after power-on
5	L/R	H/V	This pin controls the output shifting direction as listed below. L/R=H STV OUT1 OUT2 OUT272 L/R=L STV OUT272 OUT1 OUT1
6	LF	H/V	(1) LF=H: Line inversion (2) LF=L: Frame inversion
7	R0	H/V	RED Data Signal 0 (LSB)
8~13	R1~R6	H/V	RED Data Signal 1~ RED Data Signal 6
14	R7	H/V	RED Data Signal 7 (MSB)
15	G0	H/V	GREEN Data Signal 0 (LSB)
16~21	G1~G6	H/V	GREEN Data Signal 1~ GREEN Data Signal 6
22	G7	H/V	GREEN Data Signal 7 (MSB)
23	B0	H/V	BLUE Data Signal 0 (LSB)
24~29	B1~B6	H/V	BLUE Data Signal 1~ BLUE Data Signal 6
30	B7	H/V	BLUE Data Signal 7 (MSB)
31	PS	H/V	This is the parallel data input/serial data input switch terminal
32	LR	H/V	Shift direction selection signal. LR=H: S1->S2->.....->S720 LR=L: S720->S719->.....->S1
33	CLK	H/V	Clock signal for data latching and internal counter of the timing controller.
34	DISP	H/V	Display on/off mode control. Internally pulled high. When DISP=L, input data are invalid and blank data are written to Data register automatically.
35	HSC	H/V	Horizontal sync input with negative polarity.
36	VSC	H/V	Vertical sync input with negative polarity.
37	DE	H/V	Input data enable control. Internally pulled low.
38	LED_A	-	LED light anode
39	LED_C	-	LED light cathode
40	NC		No connection
41	NC		No connection
42	NC		No connection
43	NC		No connection
44	CLK-TRG		
45	AVSS		

5. Absolute maximum ratings

5.1 TFT Module

(Ta = 25°C±2°C, GND = 0V)

ITEM	Symbol	Min.	Max.	Unit
Power supply Voltage1	VDD	-0.3	8.0	V
Power supply Voltage2	VDc	-0.3	8.0	V
Power supply Voltage3	VGH-VGL	-0.3	45	V
Power supply Voltage4	VDD-VCL	-0.3	10	V
Input Voltage	VIN	-0.5	VDD+0.5	V

5.2 LED Backlight

(Ta = 25°C±2°C)

ITEM	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Voltage	Vf	12.0	12.6	13.2	V	15X 2mA
Luminance	Lv	1200	---	---	cd/m2	

6. Electrical characteristics

6.1 TFT Module

ITEM	Symbol	Min.	Typ.	Max.	Unit
Power supply Voltage1	VDD	2.25	2.5	3.6	V
Power supply Voltage2	VDc	4.75	5	5.5	V
Power supply Voltage3	VGH-VGL	28.5	30	33	V
Power supply Voltage4	VDD-VCL	7.0	7.5	8.25	V
Input Current	IDD		T.B.D		mA
Operation Voltage for LCD	VLCd		T.B.D		V

6.2 LED Backlight

ITEM	Specification	Unit
Number of LED	4 X 2	PCS
Connection mode	Series	

7. Optical characteristics

Parameter	Symbol	Values			Unit	Remark	Note
		Min.	Typ.	Max.			
Luminance uniformity		80		---	%	Fig.4	2
Contrast ratio	C/R		T.B.D.			Fig.3	1
Response time	Tr+Tf		T.B.D.		Msec	Fig.3	3
CIE (x,y) Chromaticity	Red	XR	T.B.D.			Fig.4	4
		YR	T.B.D.				
	Green	XG	T.B.D.				
		YG	T.B.D.				
	Blue	XB	T.B.D.				
		YB	T.B.D.				
White	XW	T.B.D.					
	YW	T.B.D.					

Note 1: Contrast Ratio (CR) is defined mathematically as (For more information see FIG 4.):

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P}_1, P_2, P_3, P_4, P_5)}{\text{Average Surface Luminance with all black pixels (P}_1, P_2, P_3, P_4, P_5)}$$

Note 2: The uniformity in surface luminance, WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 4.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}{\text{Maximum Surface Luminance with all white pixels (P}_1, \text{P}_2, \text{P}_3, \text{P}_4, \text{P}_5)}$$

Note 3: Response time is the time required for the display to transition from White to black (Rise Time, Tr) and from black to white (Decay Time, Tf). For additional information see FIG 3.

Note 4: CIE (x, y) chromaticity, The x,y value is determined by measuring luminance at each test position 1 through 5, and then make average value

Fig.1 Optical Characteristic Measurement Equipment and Method

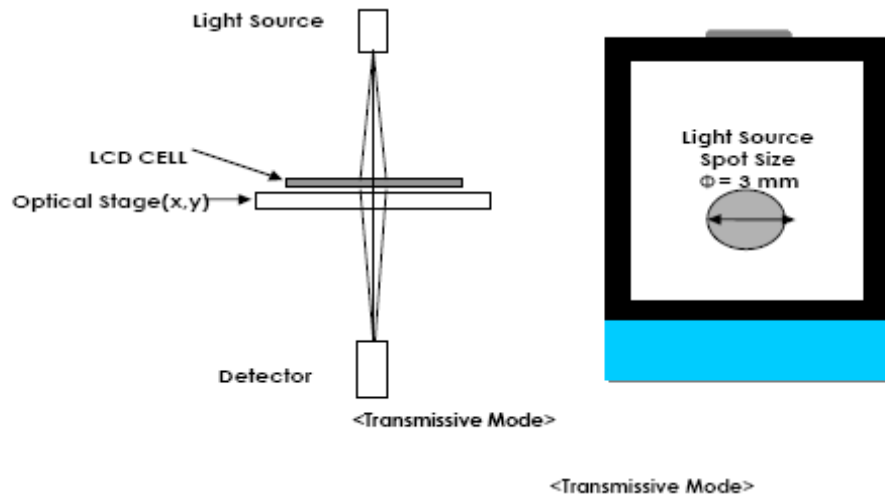


Fig.2 Measuring method for optical characteristics in Reflective mode

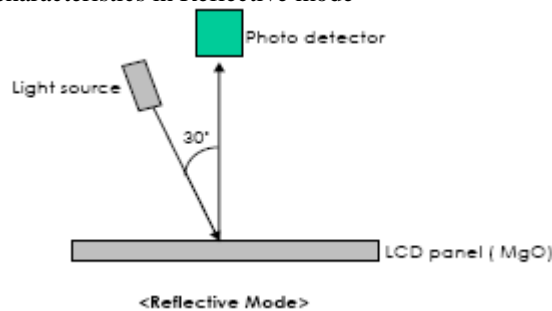
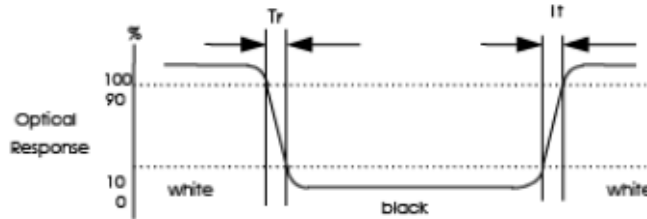


Fig.3 The definition of Response Time

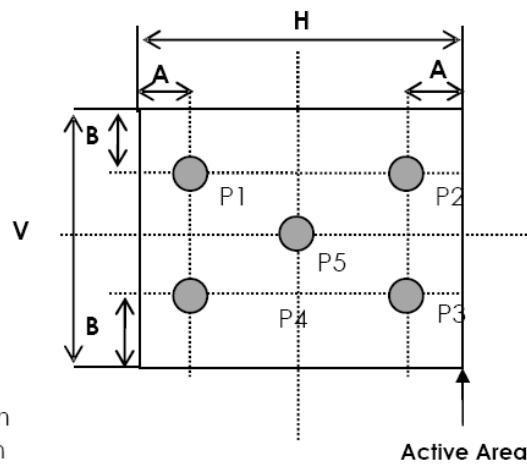
- The response time is defined as the following figure and shall be measured by switching the input signal for “black” and “white”.



The values specified are at an approximate distance 500 mm from the LCD surface at a viewing angle of F and q equal to 0° .
 Measurement condition: Refer to next pages (B - light source , Halogen Lamp, with polarizer)

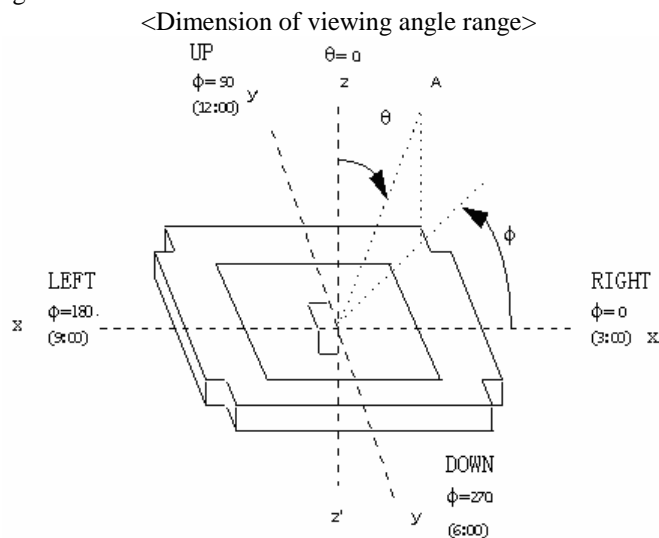
Fig.4 Measuring method for Contrast ratio, surface luminance, Luminance uniformity CIE (x, y) Chromaticity

<measuring point for luminance variation> <measuring point for surface luminance>



A : 5mm
 B : 5mm
 Light source spot size $\varnothing=2\text{mm}$
 H,V : Active Area
 measurement device is TOPCON luminance meter BM-7

Fig.5 The definition of viewing angle



8. Quality Specification

8.1 Acceptable Quality Level

Rank	Item	A.Q.L.
MAJOR	Sampling plan according to GB/T2828.1-2003/ISO 2859-1: 1999 and ANSI/ASQC Z1.4-1993, Normal level 2 and based on:	0.4
MINOR	Sampling plan according to GB/T2828.1-2003/ISO 2859-1: 1999 and ANSI/ASQC Z1.4-1993, Normal level 2 and based on:	1.5

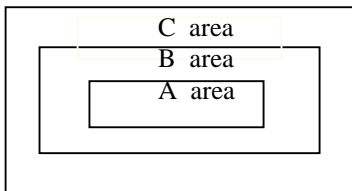
8.2 Inspection Conditions

- Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an Environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line. (Normal temperature 20<25°C and normal humidity 60±15%RH).

- Driving voltage

The Vop value from which the most optimal contrast can be obtained near the specified Vop in the specification (Within ±0.5V of the typical value at 25°C).

- Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (ZoneA + ZoneB = minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer’s product)

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer’s product.

8.3 Inspection Standards

- Major Defect

Items to be inspected	Inspection Standard	Classification of defects
All functional defects	1. No display 2. Display abnormally 3. Open or missing segment 4. Short circuit 5. Excess power consumption 6. Backlight no lighting, flickering and abnormal lighting.	Major
Missing	Missing component	
Outline dimension	Overall outline dimension beyond the drawing is not allowed.	

9. Reliability Test

Test Item	Test Conditions	Remark
Temperature Operation	70°C, 120 hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects:
Temperature Storage	80°C, 200 hours	
Temperature Cycle	-20°C ~ 25 ~ 70°C; 10cycles	
Low Temperature Operation	-20°C, 120 hours	
Low Temperature Storage	-30°C, 200 hours	1.Air bubble in the LCD; 2.Sealleak;
Damp Proof Test	50°C, 90%RH; 120 hours	

Vibration test	<ul style="list-style-type: none"> - Operating time: Thirty minutes exposure in each direction (x,y.z) - Sweep frequency (1 min) 10Hz -> 55hz -> 10hz - Amplitude: 1.5mm double amplitude 	<ul style="list-style-type: none"> 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
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10. Precautions for Using LCD Module

10.1 HANDLING

- Refrain from storing mechanical shock and from applying any force to LCD MODULE. It may cause disoperation or damage of LCD.
- Do not touch, press or rub the display panel with a hard, stiff tool or object as the polarizers in the panel are easily scratched.
- If LCD is broken and liquid crystal material flow out, ingestion, inhalation, or contact with skin should be avoided.
- If liquid crystal material contact with skin, wash immediately with alcohol and rinse thoroughly with water.
- Never use organic solvents to clear the display panel as these solvent may adversely affect the polarizer. To clean the display panel dampen a bit of absorbent cotton with petroleum benzene and gently wipe the panel, or contaminations by using a scotch tape.
- Refrain from discharge of high electro-static voltage, it will damage C-MOS LSI in the MODULE.
- Do not leave the MODULE in high temperature, especially in high humidity for a long time.
- It is recommended to store the MODULE where the temperature is in the range of 0°C to 35°C and the humidity is lower than 70%.
- Ultra violet cut filter is necessary for outdoor operation.
- Avoid condensation of water, it may cause disoperation or disconnection of electrode.

10.2 OPERATION

- Never connect or disconnect the LCD MODULE from the main system while power is being supplied.
- When supplying the M signal from the external unit to a GRAPHIC MODULE, set the duty to 50%±1%.
- If the duty deviates too greatly from the value, a DC voltage will be applied to the duty to 50%±1%.
- If the duty deviates too greatly from the value, a DC voltage will be applied to the liquid crystal, which could induce an electrochemical reaction and reduce the life of the MODULE.
- Do not exceed the maximum rating values under the worst conditions taking account of the supply voltage variation, input voltage variation, and environmental temperature, etc. Otherwise LCD module may be damaged.

11. Warranty

11.1 Limited Warranty

Unless agreed between DISPLAYTECH and customer, DISPLAYTECH will replace or repair any of its LCD modules which are found to be functionally defective when inspected in accordance with DISPLAYTECH LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects must be returned to DISPLAYTECH within 90 days of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DISPLAYTECH limited to repair and/or replacement on the terms set forth above. DISPLAYTECH will not be responsible for any subsequent or consequential events.

11.2 Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are:

- Broken LCD glass.
- PCB eyelet's damaged or modified.
- PCB conductors damaged.
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's, conductors and terminals.