



SPECIFICATIONS

Description: Character LCM

Model Name: PC- 160205PYL

POLYTRONIX, INC.

TEL:972-238-7045

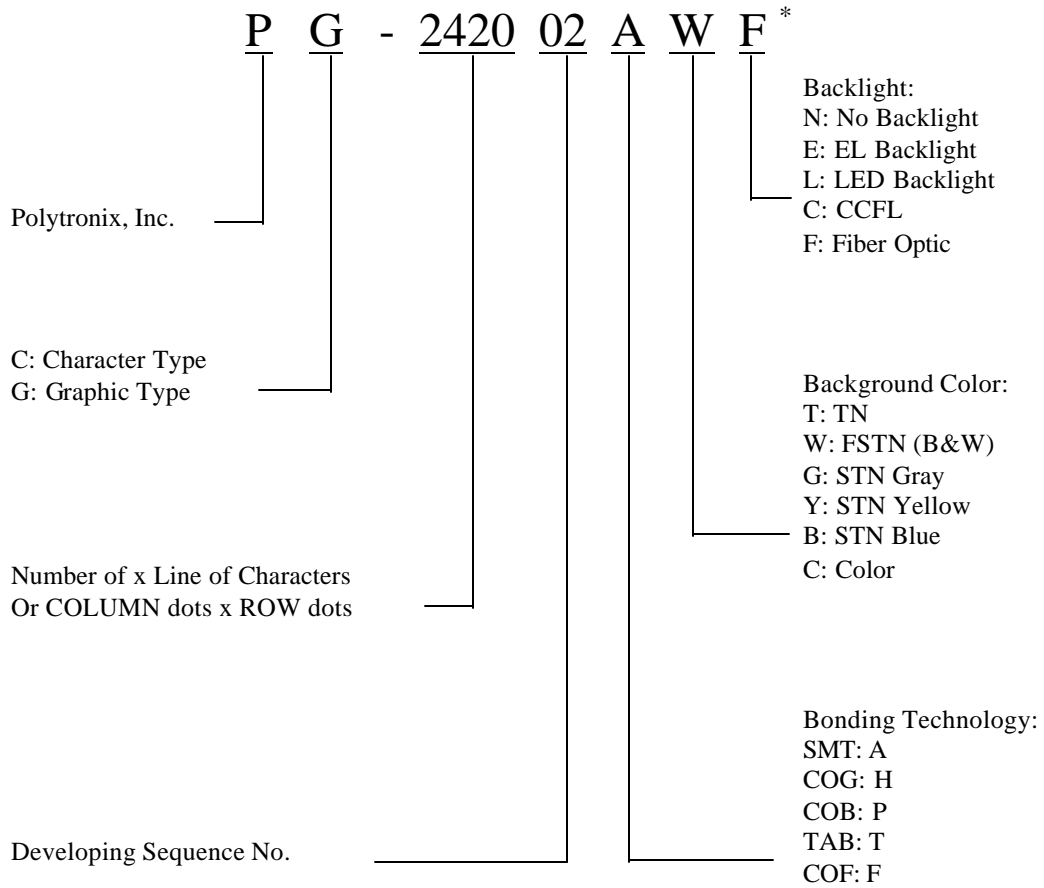
FAX:972-644-0805

805 Alpha Drive,

Richardson, Texas 75081-2850

www.polytronix.com

Standard LCD Module Numbering System



* Not all options are available, please contact with Polytronix for availability.

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1. Feature

Display Mode:	STN TRANSFLECTIVE POSITIVE
Display Format:	16 X 2
Driving Method:	1/16 DUTY
Viewing Direction:	6 O'CLOCK
Driver IC:	KS0066U/KS0065B
Others:	--

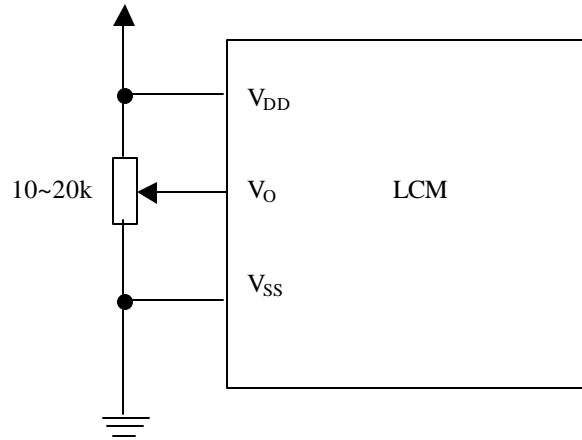
2. Mechanical Specifications:

Item	Specification	Unit
Dimensional Outline	122.0(W)X44.0(H)X13.0(T)	mm
Display Format	16CHARACTERSX2LINES	—
Viewing Area	99.0(W)X24.0(H)	mm
Active Area	94.84(W)X20.0(H)	mm
Dot Pitch	0.98(W)X1.16(H)	mm
Dot Size	0.92(W)X1.10(H)	mm
Weight	60	g

3. Interface Pin Connections

PIN NO	SYMBOL	LEVEL	DESCRIPTION
1	V _{SS}	-	GROUND
2	V _{DD}	-	POWER SUPPLY FOR LOGIC
3	V _O	-	POWER SUPPLY FOR LCD
4	RS	H/L	REGISTER SELECTION
5	R/W	H/L	READ/WRITE
6	E	H, H/L	ENABLE SIGNAL
7	DB0	H/L	DATA BIT0
8	DB1	H/L	DATA BIT1
9	DB2	H/L	DATA BIT2
10	DB3	H/L	DATA BIT3
11	DB4	H/L	DATA BIT4
12	DB5	H/L	DATA BIT5
13	DB6	H/L	DATA BIT6
14	DB7	H/L	DATA BIT7

4. Power Supply Circuit Diagram



5. Electrical Characteristics

Item		Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	Logic	Vdd	--	4.7	5.0	5.3	V
	LCD drive	Vled	--	--	0.5	--	
Input Voltage	"H" Level	Vih	--	0.8Vdd	--	Vdd	
	"L" Level	Vil	--	0	--	0.2Vdd	
Frame Frequency		Fflm	--	--	--	--	Hz
Current Consumption	Logic	Idd	(Vdd=5V)	--	1.6	2.5	mA

6. Absolute Maximum Ratings

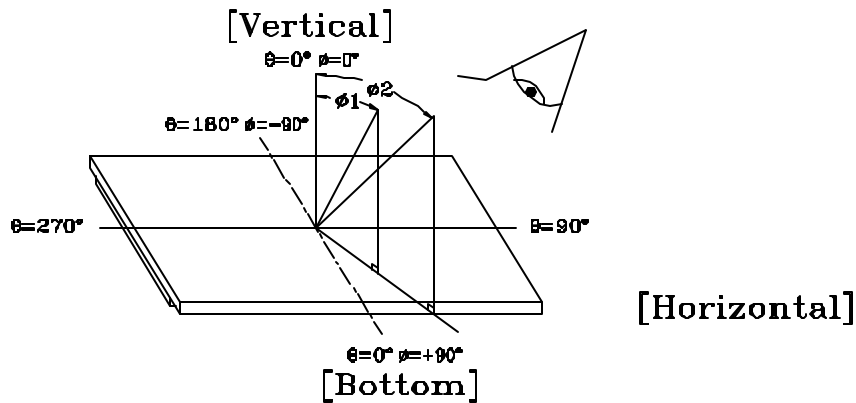
Item		Symbol	Min.	Max.	Unit	Note
Supply Voltage	Logic	Vdd	-0.3	7.0	V	--
	LCD drive	Vdd - V0	-0.3	6.5	V	--
Input voltage		Vi	Vss-0.3	Vdd+0.3	V	--
Operating Temperature		Top	0	50	°C	--
Storage Temperature		Tstg	-20	70	°C	--
Humidity		—	--	--	%RH	--

7. Electro-Optical Characteristics

Item		Symbol	Temp.	Conditions	Min.	Typ.	Max.	Unit
Response Time	Rise Time	tr	Ta=25°C	6 O'CLOCK $\phi=--$, $\theta=--$	--	65	110	ms
	Decay Time	td	Ta=25°C		--	125	220	
Viewing Angle		$\Delta\phi$	Ta=25°C	$\theta=--$ ($K \geq 2$) $0^\circ < \phi 1$, $\phi 2 < 90^\circ$	--	30	--	Deg
Contrast Ratio		K	Ta=25°C	6 O'CLOCK $\phi=--$, $\theta=--$	6	10	--	--

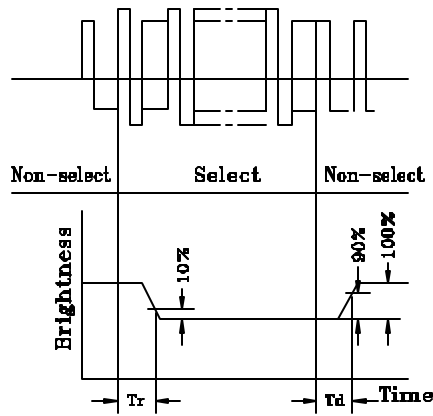
NOTE:

Definition of ϕ and θ

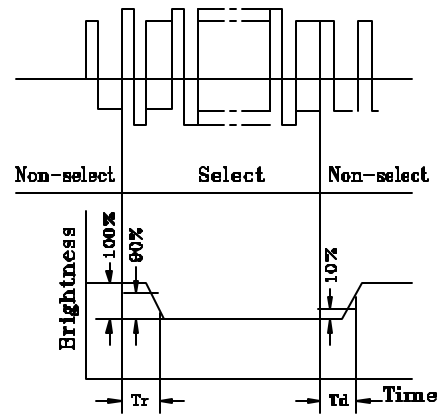


Definition of response time waveform

Positive Display

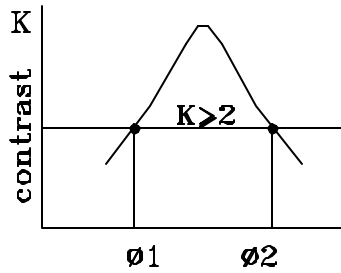


Negative Display



Definition of viewing angle

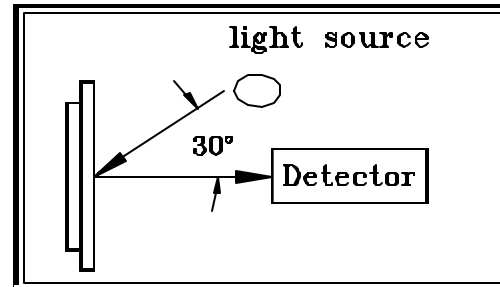
$$(\Delta\Phi)\Delta\Phi = |\Phi 1 - \Phi 2|$$



Viewing angle

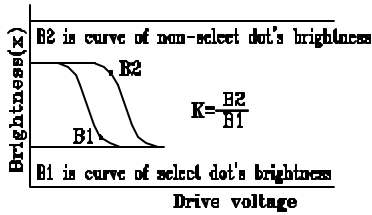
Optical measuring system

temperature regulated chamber

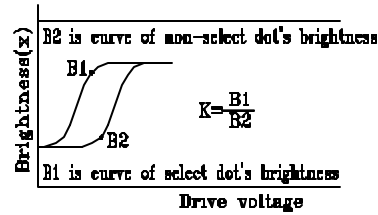


Definition of Contrast Ratio (K)

Positive Display



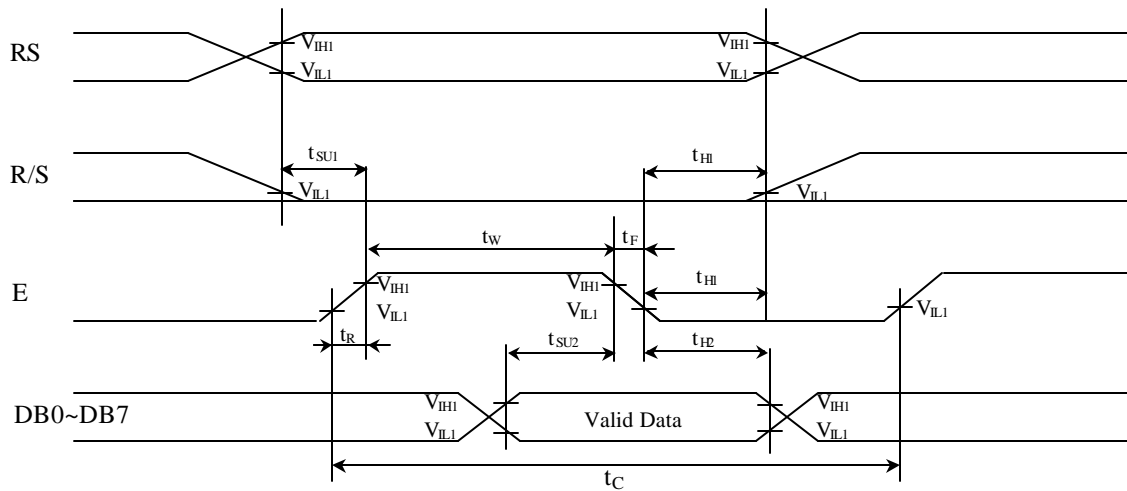
Negative Display



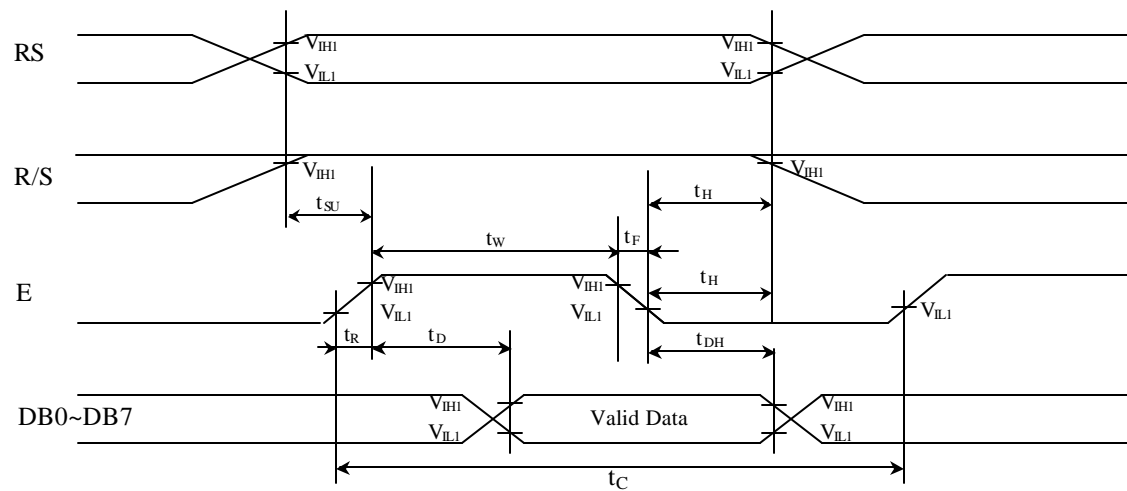
8. Timing and Timing Diagram

ITEM	SYMBOL	WRITE		READ		UNIT
		MIN	MAX	MIN	MAX	
ENABLE CYCLE TIME	t_C	500	--	500	--	ns
ENABLE PULSE WIDTH	t_W	300	--	300	--	
ENABLE RISE/FALL TIME	t_R, t_F	--	25	--	25	
RS, R/W SETUP TIME	t_{SU1}/t_{SU}	60	--	60	--	
RS, R/W HOLD TIME	t_{H1}/t_H	10	--	10	--	
DATA SETUP DELAY TIME	t_{SU2}/t_D	100	--	--	190	
DATA HOLD/HOLD TIME	t_{H2}/t_{DH}	10	--	20	--	

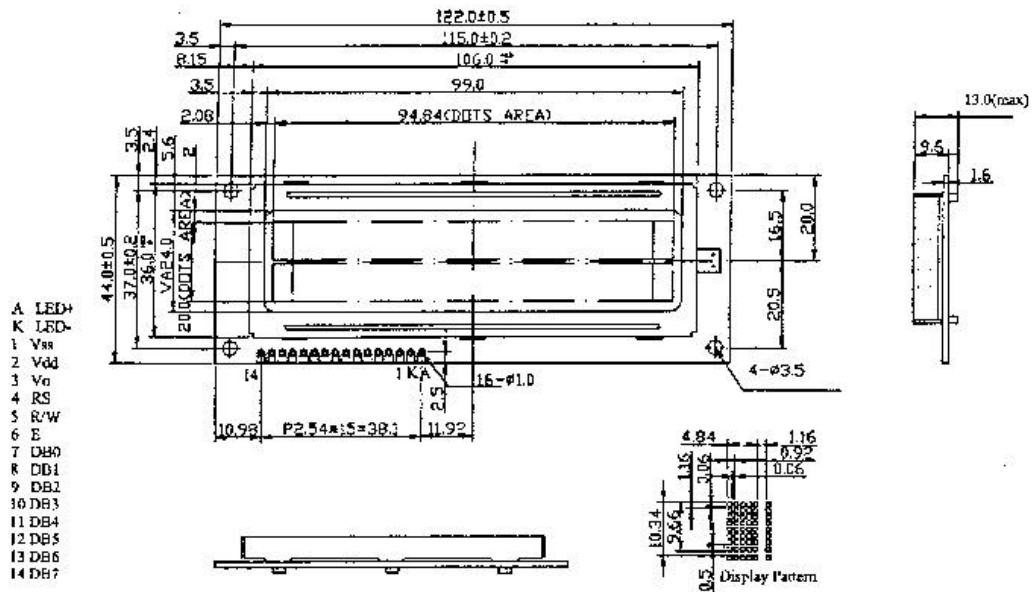
WRITE OPERATION



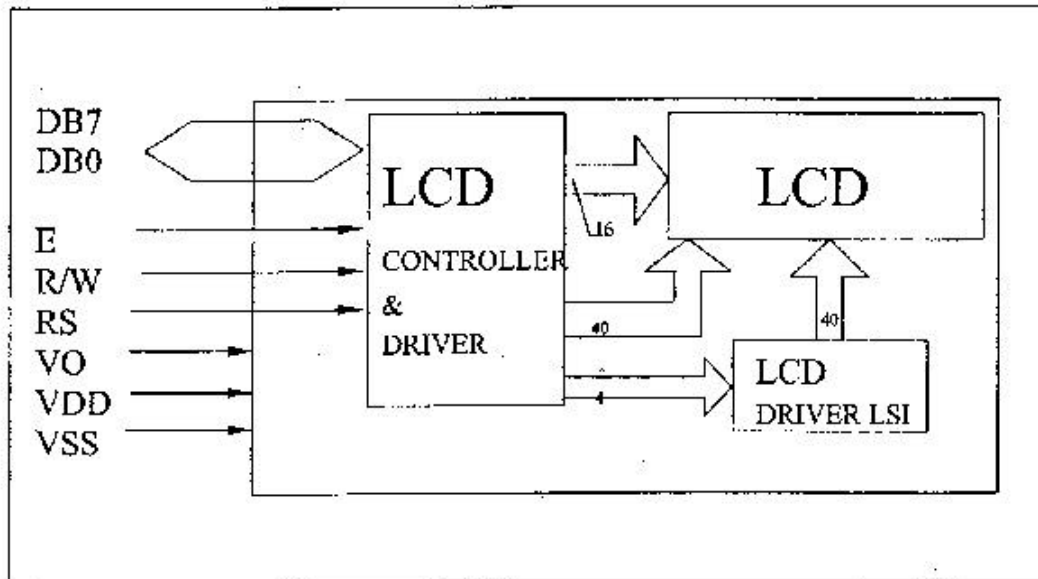
READ OPERATION



9. Dimension Diagram



10. Block Diagram



11. Standard Terms & Conditions

ANY TERM, CONDITION AND/OR PROVISION (HEREAFTER TERMS) OF BUYER'S ORDER WHICH IS IN ANY WAY INCONSISTENT WITH OR IN ADDITION TO THESE TERMS SHALL NOT BE APPLICABLE HERETO OR BINDING UPON SELLER IF BUYER OBJECTS TO ANY TERMS HEREIN, SUCH OBJECTION MUST BE IN WRITING AND RECEIVED BY SELLER AT THE ADDRESS STATED ABOVE PRIOR TO COMMENCEMENT BY SELLER. RETENTION BY BUYER OF ANY ITEMS DELIVERED BY SELLER HEREUNDER SHALL BE CONCLUSIVELY DEEMED ACCEPTANCE OF THE TERMS HEREOF. SELLER'S FAILURE TO OBJECT TO TERMS CONTAINED IN ANY COMMUNICATION FROM BUYER WILL NOT BE A WAIVER OF THE TERMS HEREOF.

11-1. TAXES:

Prices do not include any taxes, now or hereafter enacted, applicable to the goods sold or this transaction, which taxes will be added by Seller to the sales price where Seller is required by law to collect the same, and will be paid by Buyer unless Buyer provides seller a proper tax exemption certificate.

11-2. PRICES AND RELEASES:

Prices apply only if the quantity ordered hereunder is released within twelve (12) months and shipments scheduled no more than eighteen (18) months from the date Seller received Buyer's order, otherwise, Seller's standard prices in effect on such receipt date for the quantity actually shipped shall apply, and Buyer shall pay the difference in price, if any.

In the event of extraordinary increases in the market price of fuels, metals, raw materials equipment and other production costs, Seller shall have the right and Buyer shall have the obligation to renegotiate in good faith the price of the goods hereunder not yet shipped, and if, in good faith, agreement is not reached, Seller shall have the right to cancel this contract without liability.

Prices shown herein are subject to a surcharge to be assessed on the date of shipment to reflect increase (if any) in the market price of Gold and Silver, or other identified materials between a reference market price and the market price on date of shipment.

11-3. TITLE AND DELIVERY:

All shipments of goods shall be delivered F.O.B. Seller's plant, and title and liability for loss or damage thereto shall pass to Buyer upon Seller's tender of delivery of the goods to a carrier for shipment to Buyer, and any loss or damage thereafter shall not relieve Buyer from any obligation hereunder. Buyer shall reimburse Seller for cost of insurance and transportation on international shipments and shall be responsible for all import duties, taxes and any other expenses incurred or licenses or clearances required at port of entry and destination. Seller may deliver the goods in installments. Shipping dates are approximate only. Seller shall not be liable for any loss or expense (consequential or otherwise) incurred by Buyer if Seller fails to meet the specified delivery schedule because of unavoidable production or other delays.

11-4. QUANTITIES:

Any variation in quantities of Electronic Components shipped over or under the quantities ordered (not to exceed 3%) shall constitute compliance with Buyer's order and the unit price will continue to apply. Any claims for alleged shortages must be given to Seller in writing within thirty (30) days of shipment or such claim is deemed waived by Buyer.

11-5. TERMS AND METHOD OF PAYMENT:

Where Seller has extended credit to Buyer, terms of payment shall be net thirty (30) days from date of invoice. The amount of credit or terms of payment may be changed or credit withdrawn by Seller at any time. If the goods are delivered in installments, Buyer shall pay for each installment in accordance with the terms of payment hereof. When Buyer fails to make each payment when it is due, Seller reserves the right to withdraw credit and thereby suspend performance under any or all purchase orders or agreements in which Seller has extended credit to Buyer until payment is made. Seller's suspension of performance may result in a rescheduling delay contingent on current product availability.

In the event of default by Buyer in the payment of the purchase price or otherwise, of this or any other order, Seller, at its option, without prejudice to any other of Seller's lawful remedies, may defer delivery, cancel this Contract, or sell any undelivered products on hand for the account of Buyer and apply such proceeds as a credit, without set-off or deduction of any kind, against the contract purchase price, and Buyer agrees to pay the balance then due to Seller on demand. Buyer agrees to pay all costs, including, but not limited to, reasonable attorney and accounting fees and other expenses of collection resulting from any default by Buyer in any of the terms hereof.

11-6. CONTINGENCIES:

Seller shall be excused from performance and shall not be liable for any delay in delivery or for non-delivery, in whole or in part, caused by the occurrence of any contingency beyond the control either of Seller or Seller's supplier's, including but not limited to, war (whether an actual declaration thereof is made or not), sabotage, insurrection, riot or other act of civil disobedience, act of a public enemy, failure or delay in transportation, act of any government or any agency or subdivision thereof affecting the terms of this contract or otherwise, judicial action, labor dispute, accident, fire, explosion, flood, storm or other act of God, shortage of labor, fuel, raw material or machinery or technical or yield failure where Seller has exercised ordinary care in the prevention thereof. If any contingency occurs, Seller may allocate production and deliveries among Seller's customers.

11-7. SUBSTITUTIONS AND MODIFICATIONS OF GOODS:

Seller may modify the specifications of goods designed by Seller and substitute goods manufactured to such modified specifications for those specified herein provided such goods substantially conform to this contract.

11-8. WARRANTIES:

THE FOLLOWING ARE IN LIEU OF ALL WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY, OF FITNESS FOR A PARTICULAR PURPOSE AND/OR ANY OTHER WARRANTY OBLIGATION ON THE PART OF SELLER.

Seller, except as otherwise hereinafter provided, warrants the goods against faulty workmanship or the use of defective materials and that such goods will conform to mutually agreed upon written specifications, drawings, and other description for a period set forth in the schedule below. Seller warrants that at the time of delivery Seller has title to the goods free and clear of any and all liens and encumbrances. These warranties are the only warranties made by Seller and can be amended only by a written instrument signed by an officer of Seller. In all claims by the Buyer of any claim of breach of warranty or defect in the materials, whether of design or construction, Seller shall be the sole judge of the: (a) suitability or appropriateness of testing methods, procedures, or protocols; and (b) applicability of standards.

Seller's warranties shall be for the following periods from date of shipment.

ELECTRONIC COMPONENTS: A. Processed Semiconductor Chips and Slices - thirty (30) days. B. All other Electronic Components - one (1) year.

Continued use or possession of the goods after expiration of the applicable warranty period stated above shall be conclusive evidence that the warranty is fulfilled to the full satisfaction of Buyer.

Seller makes NO WARRANTY as to experimental or developmental goods or good not manufactured by Seller. Seller, to the extent permitted by Seller's contract with its supplier, shall assign to Buyer any rights Seller may have under any warranty of the supplier thereof.

Seller's warranties as hereinabove set forth shall not be enlarged, diminished or affected by, and no obligation or liability shall arise or grow out of, Seller's rendering of technical advice or service in connection with Buyer's order of the goods furnished hereunder.

11-9. LEGAL COMPLIANCE:

Buyer at all times shall comply with all applicable federal, state and local laws and regulations. THE PRODUCTS COVERED BY THIS CONTRACT MAY FALL WITHIN THE GROUP OF "STRATEGIC" ELECTRONIC PRODUCTS THAT ARE WHOLLY OR PARTLY OF U.S. ORIGIN OF TECHNOLOGY, THE EXPORT OF WHICH IS SUBJECT TO EXPORT LICENSE CONTROL BY THE U.S. GOVERNMENT. THEREFORE, PRIOR TO EXPORTATION, YOU (BUYER) ARE REQUIRED TO OBTAIN ANY LICENSE WHICH MAY BE REQUIRED UNDER THE APPLICABLE LAWS OF THE U.S. INCLUDING THE EXPORT ADMINISTRATION ACT AND REGULATIONS.

11-10. PATENT INDEMNITY: Should a suit or proceeding be brought against Buyer insofar as such suit or proceeding is based on a claim that any goods manufactured and supplied by Seller to Buyer constitute direct infringement of any duly issued United States patent, Seller shall join Buyer to defend or settle said suit or proceeding. Seller shall not be obligated to defend or be liable for cost and damages if the infringement arises out of compliance with Buyer's specifications, or from a combination with, an addition to, or a modification of the goods after delivery by Seller, or from use of the goods, or any part thereof, in the practice of a process. If the infringement by Buyer is alleged prior to completion of delivery of the goods under this contract, Seller may decline to make further shipment without being in breach of this contract, and provided Seller has not been enjoined from selling said goods to Buyer, Seller agrees to supply said goods to Buyer at Buyer's option, whereupon the patent indemnity obligation herein stated with respect to Seller shall reciprocally apply with respect to Buyer. If any suit or proceeding is brought against Seller based on a claim that the goods manufactured by Seller in compliance with Buyer's specifications and supplied to Buyer directly infringe any duly issued United States patent, then the patent indemnity obligation herein stated with respect the Seller shall reciprocally apply with respect to Buyer. The sale by Seller's of the items ordered hereunder does not grant to, convey or confer upon Buyer or Buyer's customer or upon any claiming under Buyer, a license, express or implied, under any patent rights of Seller covering or relating to any combinations, machine or process in which said items might be or are used. THE FOREGOING STATES THE SOLE AND EXCLUSIVE LIABILITY OF THE PARTIES HERETO FOR PATENT INFRINGEMENT AND IS IN LIEU OF ALL WARRANTIES, EXPRESS, IMPLIED OR STATUTORY IN REGARD THERETO.

11-11. REMEDIES:

If Seller breaches its warranties as contained in Paragraph 8 herein, Seller's sole and exclusive liability shall be (at Seller's option) to repair, replace or credit Buyer's account for any such goods which are returned by Buyer during the applicable warranty period set forth above, provided that (I) Seller is promptly notified in writing upon discovery by Buyer that such goods failed to conform to this contract with a detailed explanation of any alleged deficiencies, (II) such goods are returned to Seller, F.O.B. Seller's plant from which goods were shipped, and (III) Seller's examination of such goods shall disclose that such alleged deficiencies actually exist and were not caused by accident, misuse, neglect, alteration, improper installation, unauthorized repair or improper testing. If such goods fail to conform to the warranty Seller shall reimburse Buyer for the transportation charges paid by Buyer for such goods. If Seller elects to repair or replace such goods, Seller shall have a reasonable time to make such repairs or replace such goods.

11-12. DAMAGES:

If Seller breaches any other provisions of this contract, other than its warranties as contained in Paragraph 8 herein, Seller's sole and exclusive maximum liability shall not in any event exceed the total contract price specified herein less the purchase price for any items delivered and accepted hereunder.

IN NO EVENT SHALL SELLER BE LIABLE TO ANYONE FOR SPECIAL, COLLATERAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY OF THE PROVISIONS OF THIS CONTRACT, INCLUDING WITHOUT LIMITATION, PROVISIONS REGARDING WARRANTIES, GUARANTEES, INDEMNITIES AND PATENT INFRINGEMENT, SUCH DAMAGES TO INCLUDE BUT NOT BE LIMITED TO COSTS OF REMOVAL AND REINSTALLATION OF ITEMS, LOSS OF GOODWILL, LOSS OF PROFITS, OR LOSS OF USE.

11-13. TERMINATION AND CANCELLATION:

A. Buyer may terminate this contract in whole or, from time to time, in part upon sixty (60) days advance written notice to Seller. In such event Buyer shall be liable for termination charges which shall include a price adjustment based on the quantity of goods actually delivered, and all costs, direct and indirectly incurred and committed for this contract together with a reasonable allowance for prorated expense and anticipated profits. Any such termination shall be subject to a minimum termination charge of fifteen percent (15%) of the dollar amount of sales terminated.

B. Unless otherwise specified on the face hereof, all quantities must be released no more than twelve (12) months and shipments scheduled no more than eighteen (18) months from the date of Seller's receipt of Buyer's purchase order, otherwise this contract may be cancelled by Seller and Buyer shall be liable for termination charge as provided herein.

C. If in Seller's judgment, Buyer's Financial condition does not justify the terms of payment specified herein, Seller may cancel this contract unless Buyer shall immediately pay for all goods which have been delivered and pay in advance for all goods to be delivered.

11-14. NON-WAIVER OF DEFAULT:

In the event of any default by Buyer, Seller may decline to make further shipments. If Seller elects to continue to make shipments, Seller's actions shall not constitute a waiver of any default of Buyer.

11-15. APPLICABLE LAW:

The validity, performance and construction of this contract shall be governed by and under the laws of the State of Texas. Buyer agrees that the venue of any action involving the performance under this contract by either party shall be in Dallas County, Texas, or in the event of an action maintained in the Federal Courts of the United States, the district court wherein the city of Richardson, Texas, is located (currently the Northern District of Texas). To the fullest extent allowed by law, the buyer consents to the State of Texas having exclusive jurisdiction of any action involving the validity, performance or construction of this contract, including any action maintained for the purpose of collection by Seller against the Buyer of sums due under this contract. For the purpose of this contract only, the buyer stipulates that it maintains minimum jurisdictional contacts with the State of Texas.

11-16. U.S. GOVERNMENT CONTRACTS:

If the goods to be furnished under this contract are to be used in the performance of a U.S. Government contract or subcontract and a U.S. Government contract number shall appear on Buyer's purchase order, those clauses of the applicable U.S. Government procurement regulation which are mandatorily required by Federal Statute to be included in U.S. Government subcontracts shall be incorporated herein by reference.

11-17. ASSIGNMENT:

This contract shall be binding upon and inure to the benefit of the parties and the successors and assigns of the entire business and good will of either Seller or Buyer or of that part of the business of either used in the performance of the contract, but shall not be otherwise assignable.

11-18. INTEREST

Interest at the maximum rate permitted by law shall be charged on overdue accounts. Payments shall be made at Seller's office, Richardson, Dallas County, Texas. If default is made in payment of any amounts due hereunder, then the same shall be collectible together with reasonable attorney's fees and cost of collection, which shall be paid hereon if incurred.

12. Handling Precautions

12-1 Mounting method

A panel of LCD module made by our company consists of two thin glass plates with polarizers that can easily be damaged; extreme care should be used when handling the LCD modules.

12-2 Cautions of LCD handling and cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

Isopropyl alcohol

Ethyl alcohol

Trichlorotrifluoroethane

Do not wipe the display surface with dry or hard materials this will damage the polarizer surface.

Do not use the following solvent:

Water

Ketene

Aromatics

12-3 Caution against static charge

The LCD module use C-MOS LSI drivers. So we recommend that you:

Connect any unused input terminal to V_{DD} or V_{SS} . Do not input any signals before power is turned on, and ground your body, work/assembly areas, and assembly equipment to protect against static electricity.

12-4 Packaging

Module employs LCD elements, and must be treated as such.

Avoid intense shock and falls from a height.

To prevent modules from degradation, do not operate or store them exposed directly to sunshine or high temperature/humidity.

12-5 Caution for operation

It is an indispensable condition to drive LCD module within the limits of the specified voltage since a higher voltage over the limits may cause a shorter life of LCD module. An electrochemical reaction due to DC (direct current) causes LCD undesirable deterioration. So the use of DC (direct current) drive should be avoided.

Response time will be extremely delayed at lower temperature than the normal operating temperature range a higher temperature LCD module may show dark color in them. However those phenomena do not mean malfunction or out of order of LCD the module, this will clear in the specified operating temperature.

12-6 Storage

In the case of storing for a long period of time, the following ways are recommended:

Storage in polyethylene bag with the opening sealed so as not to let fresh air enter. And no desiccant.

Placing in a dark place where there is no exposure to direct sunlight, keeping the storage temperature range.

Store with nothing touching the polarizer surface.

12-7 Safety

It is recommendable to break damaged LCD into pieces and to wash off liquid crystal by solvents such as acetone and ethanol.

If any liquid from a damaged glass cell comes in contact with your hands, please wash it off at once with soap and water.