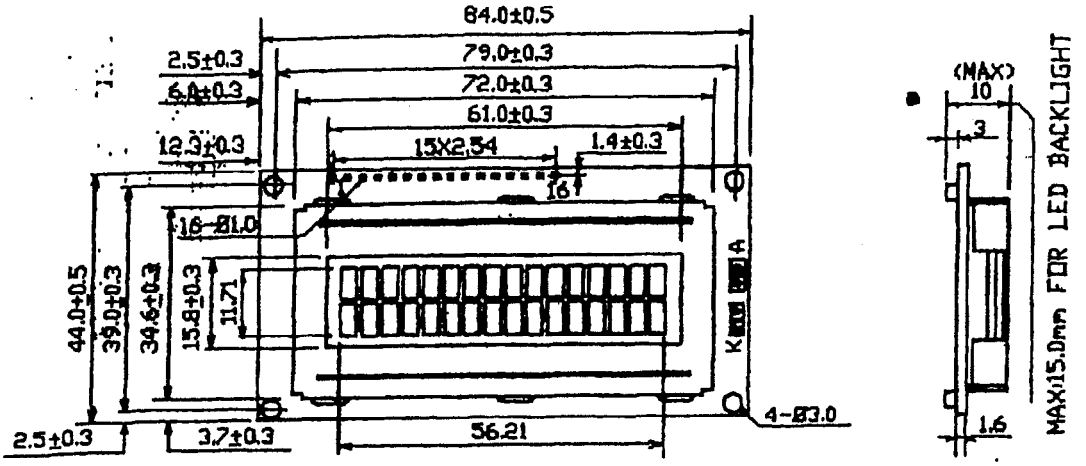
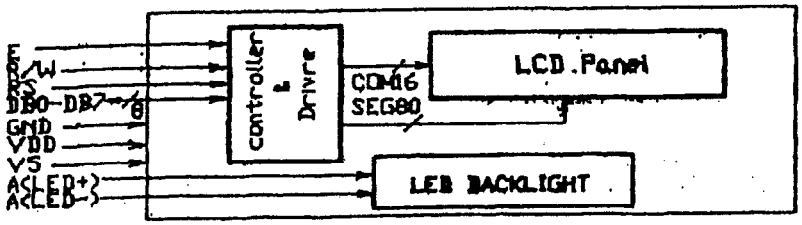
142.554

TRI MODS-1535 TN NON B/L

16 X 2 CHARACTER MODULE



Block Diagram & DD RAM Address

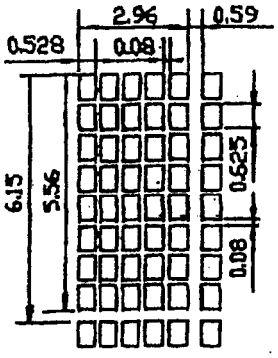


	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Line1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
Line2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

RAM area : 00H — 27H and 40H — 67H

Note : Please select 2 line display

Display Pattern



Interface Pin Function

Pin No.	Symbol	Level	Function
1	Vss		Power Supply — 0V
2	Vdd		Power Supply — +5V
3	Vee		Power Supply — for Liquid Crystal driving
4	Rs	H/L	Register select H:Data Input L:Instruction Input
5	R/W	H/L	Read/Write select H:Data Read(Module→MPU) L:Data Write(Module←MPU)
6	E	H,H→L	Operation start singal for data read/write
7	DB0	H/L	Lower order 4 line data bus with bidirectional three-state. Used for data transfer between the MPU and the module. These four are not used during 4-bit operation.
8	DB1	H/L	
9	DB2	H/L	
10	DB3	H/L	
11	DB4	H/L	Highter order 4 lines data bus with bidirectional three-state. Used for data transfer between the MPU and the module. DB7 can be used as a BUSY flag
12	DB5	H/L	
13	DB6	H/L	
14	DB7	H/L	
15	A(LED+)		Supply Voltage for LED Backlighting
16	K(LED-)		0V(GND)

Note : # marked pin are only for LED backlighting type

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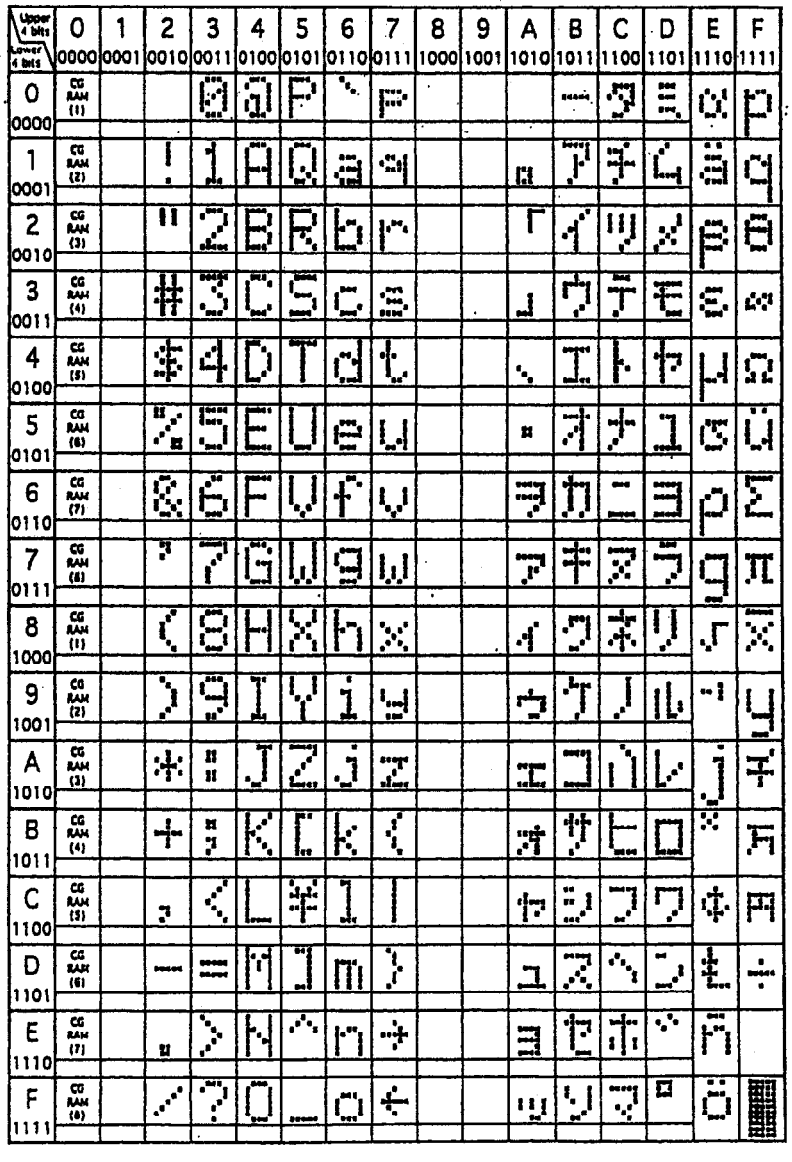
Table 2. The Command Control Codes.

Command	Binary								Hex
	D7	D6	D5	D4	D3	D2	D1	D0	
Clear Display	0	0	0	0	0	0	0	1	01
Display & Cursor Home	0	0	0	0	0	0	1	x	02 or 03
Character Entry Mode	0	0	0	0	0	1	I/D	S	04 to 07
Display On/Off & Cursor	0	0	0	0	1	D	U	B	08 to 0F
Display/Cursor Shift	0	0	0	1	D/C	R/L	x	x	10 to 1F
Function Set	0	0	1	8/4	2/1	10/7	x	x	20 to 3F
Set CGRAM Address	0	1	A	A	A	A	A	A	40 to 7F
Set Display Address	1	A	A	A	A	A	A	A	80 to FF

I/D: 1=Increment*, 0=Decrement
S: 1=Display shift on, 0=Display shift off*
D: 1=Display On, 0=Display Off*
U: 1=Cursor underline on, 0=Underline off*
B: 1=Cursor blink on, 0=Cursor blink off*
D/C: 1=Display shift, 0=Cursor move

R/L: 1=Right shift, 0=Left shift
8/4: 1=8 bit interface*, 0=4 bit interface
2/1: 1=2 line mode, 0=1 line mode*
10/7: 1=5x10 dot format, 0=5x7 dot format*
x = Don't care
* = initialisation settings

Table 3. Standard l.c.d. character table.



CONTROL and DISPLAY COMMAND

Command	RS	R/W	DB_7	DB_6	DB_5	DB_4	DB_3	DB_2	DB_1	DB_0	Execution time (fosc=250KHz)	Remark
DISPLAY CLEAR	L	L	L	L	L	L	L	L	L	H	1.64ms	
RETURN HOME	L	L	L	L	L	L	L	L	H	X	1.64ms	cursor move to first digit
ENTRY MODE SET	L	L	L	L	L	L	L	H	I/D	SH	42μs	•I/D: set cursor move direction I/D: H Increase; L Decrease •SH: Specifies shift of display SH: H display is shifted; L display is not shifted
DISPLAY ON/OFF	L	L	L	L	L	L	H	D	C	B	42μs	•Display D: H Display on; L Display off •Cursor C: H Cursor on; L Cursor off •Blinking B: H Blinking on; L Blinking off
SHIFT	L	L	L	L	L	H	S/C	R/L	X	X	42μs	SC: H Display shift; L Cursor move R/L: H Right shift; L Left shift
SET FUNCTION	L	L	L	L	H	DL	N	F	X	X	42μs	DL: H 8 bits interface; L 4 bits interface N: H 2 line display; L 1 line display F: H 5×10 dots; L 5×7 dots

Table 1.

CONTROL and DISPLAY COMMAND (continued)

Command	RS	R/W	DB_7	DB_6	DB_5	DB_4	DB_3	DB_2	DB_1	DB_0	Excution time (fosc=250KHz)	Remark
SET CG RAM ADDRESS	L	L	L	H	CG RAM address (corresponds to cursor address)						42μs	CG RAM Data is sent and received after this setting
SET DD RAM ADDRESS	L	L	H	DD RAM address							42μs	DD RAM Data is sent and received after this setting
READ BUSY FLAG & ADDRESS	L	H	BF	Address Counter used for Both DD & CG RAM address							0μs	BF: H = Busy, L = Ready - Reads BF indication internal operating is being performed. - reads address counter contents
WRITE DATA	H	L	Read Data								46	Write data into DD or CGRAM
READ DATA	H	H	Write Data								46μs	Read data from DD or CGRAM

X: Don't care

Table 1