



Data Sheet

Powertip alphanumeric dot matrix liquid crystal displays

Reflective types - RS stock numbers 214-3238, 214-3244, 214-3250, 214-3266, 214-3272, 214-3288, 214-3294, 214-3301, 214-3317, 214-3323, 214-3339, 214-3345, 214-3351

EL types - RS stock numbers 214-3367, 214-3373, 214-3395, 214-3402, 214-3418

LED types - RS stock numbers 214-3424, 214-3430, 214-3452, 214-3468, 214-3474, 214-3480, 214-3496, 214-3519, 214-3525, 214-3531, 214-3547, 214-3553, 214-3569, 214-3575, 215-3617

Intelligent, alphanumeric, dot matrix modules with integral CMOS microprocessor and LCD display drivers. The modules utilise a 5×7 dot matrix format with cursor, and are capable of displaying 189 different alphanumeric characters and symbols. The modules are available in twisted nematic and super twisted nematic grey mode. Reflective types are available in TN and STN, EL backlit types in TN, LED backlit transmissive types in TN LED backlit transreflective types in STN. Inverters are required to drive the EL backlit types.

Applications

- Data terminals
- Medical instruments
- Hand-held instruments
- Hand-held data terminals
- Electronic typewriters
- Point of sale terminals
- Test instruments
- Word processors.

Features

- Single SV power supply (excluding EL types)
- Wide viewing angle (STN)
- High contrast
- Interfaces to 4 or 8-bit data busses
- ASCII compatible
- Chip-on-board technology (COB)
- 189 different characters and symbols
- Compact and lightweight
- Low power consumption
- Surface mounted components (SMT).



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

Absolute maximum rating

Item	Symbol	Value	Unit
Power supply voltage	Vdd - Vss	-0.3 ~ + 7.0	V
Driver supply voltage	Vlcd	Vdd - 13.5 ~ Vdd +0.3	
Input voltage	Vin	-0.3 ~ Vdd +0.3	
Operating temperature range	Top	0 ~ +50	°C
Storage temperature range	Tst	-20 ~ +60	

Description of terminals

Symbol	Input/ Output	External connection	Function	
RS	Input	MPU	Register selection input	
			<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">High</td> <td>Data register (for read and write)</td> </tr> <tr> <td>Low</td> <td>Instruction register (for write), Busy flag, address counter (for read)</td> </tr> </table>	High
High	Data register (for read and write)			
Low	Instruction register (for write), Busy flag, address counter (for read)			
R/W	Input	MPU	R/W signal input is used to select the read/write mode	
			<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">High</td> <td>Read mode</td> </tr> <tr> <td>Low</td> <td>Write mode</td> </tr> </table>	High
High	Read mode			
Low	Write mode			
E	Input	MPU	Start enable signal to read or write the data	
DB4 DB7	Input/ Output	MPU	Four high order bidirectional three-state data bus lines. Used for data transfer between the MPU and the LCD module. DB7 can be used as a busy flag.	
DB0 DB3	Input/ Output	MPU	Four low order bidirectional three-state data bus lines. Used for data transfer between the MPU and the LCD module. These four are not used during 4-bit operation.	
Vdd Vss		Power Supply	Vdd : + 5V Vss : GND	
Vo		Power Supply	Contrast adjustment voltage	

Electrical characteristics

DC characteristics (Vdd = + 5V ± 10%, Vss = 0V, Ta = 25°C)

Parameter	Symbol	Condition	Application PIN	Min.	Type	Max.	Unit
H level input voltage (1)	Vih 1	-	DB0 ~ DB7 RS, R/W, E	2.2	-	Vdd	V
L level input voltage (1)	Vil 1	-		-0.3	-	0.6	V
H level input voltage (2)	Vih 2	-	OSC1	Vdd - 1.0	-	Vdd	V
L level input voltage (2)	Vil 2	-		-0.2	-	1.0	V
H level output voltage (1)	Voh 1	Ioh = -0.205mA	DB0 ~ DB7	2.4	-	-	V
L level output voltage (1)	Vol 1	Iol = 1.2mA		-	-	0.4	V
H level output voltage (2)	Voh 2	Ioh = -40uA	XSC LP DO	0.9Vdd	-	-	V
L level output voltage (2)	Vol 2	Iol = 40uA		-	-	0.1Vdd	V
I/o leakage current	Iil	Vin = 0 to Vdd		-1	-	1	uA
Pull-UP Mos current	-Ip	Vdd = 5V		50	125	250	uA
Supply current	Iop	RF oscillation, from external clock Vdd = 5v fosc = 270kHz	Vdd	-	0.35	0.6	mA

Internal clock operation (Rf oscillation)

Oscillation frequency	fosc	Rf = 91k Ω ± 2%	OSC1 OSC2	190	270	350	kHz
Oscillation frequency	fosc	Ceramic filter	OSC1 OSC2	245	250	255	kHz
LCD driving voltage	Vlcd	Vdd - V5	V1 ~ V5	3.0	-	11.0	V

AC characteristics (Vdd = 5V ± 10%, Vss = 0V, Ta = 25°C)

Read cycle

Parameter	Symbol	Min.	Type	Max.	Unit	Test PIN
Enable cycle time	tc	500	-	-	ns	E
Enable "H" level pulse width	tw	220	-	-	ns	E
Enable rise/fall time	tr,tf	-	-	25	ns	E
RS, R/W setup time	tsu	40	-	-	ns	R/W, RS
RS, R/W address hold time	th	10	-	-	ns	R/W, RS
Read data output delay	td	60	-	120	ns	DB0 ~ DB7
Read data hold time	tdh	20	-	-	ns	DB0 ~ DB7

Write cycle

Parameter	Symbol	Min.	Type	Max.	Unit	Test PIN
Enable cycle time	tc	500	-	-	ns	E
Enable H level pulse width	tw	220	-	-	ns	E
Enable rise/fall time	tr,tf	-	-	25	ns	E
RS, R/W setup time	tsul	40	-	-	ns	R/W, RS
RS, R/W address hold time	th1	10	-	-	ns	R/W, RS
Date setup time	tsu2	60	-	-	ns	DB0 ~ DB7
Write data hold time	th2	10	-	-	ns	DB0 ~ DB7

Optical characteristics

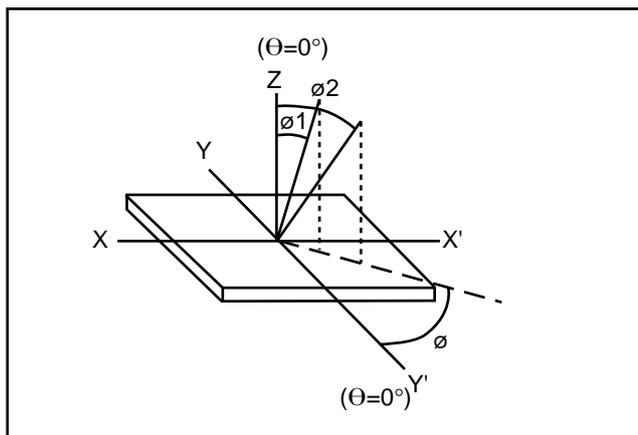
1. STN type

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle	$\phi 2 - \phi 1$	$K = 1.4$	40	-	-	deg.	*1, *2
Contrast ratio	K	$\phi = 10^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	3	-	-	*3
Response time (rise)	tr	$\phi = 10^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	150	250	ms	*4
Response time (fall)	tf	$\phi = 10^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	200	300	ms	*4

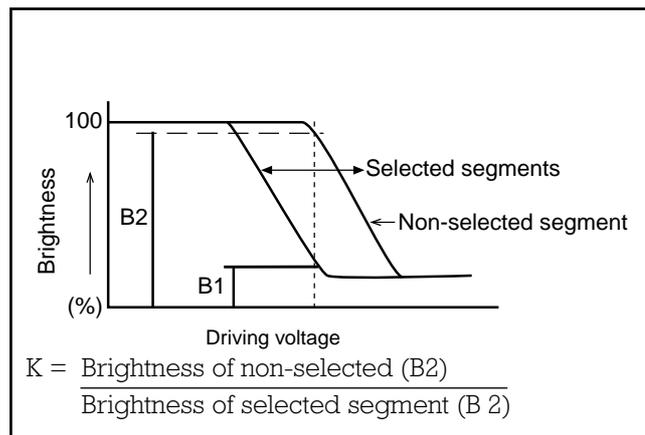
2. TN type

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle	$\phi 2 - \phi 1$	$K = 1.4$	60	-	-	deg.	*1, *2
Contrast ratio	K	$\phi = 25^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	3	-	-	*3
Response time (rise)	tr	$\phi = 25^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	80	120	ms	*4
Response time (fall)	tf	$\phi = 25^\circ\text{C}$ $\theta = 0^\circ\text{C}$	-	60	90	ms	*4

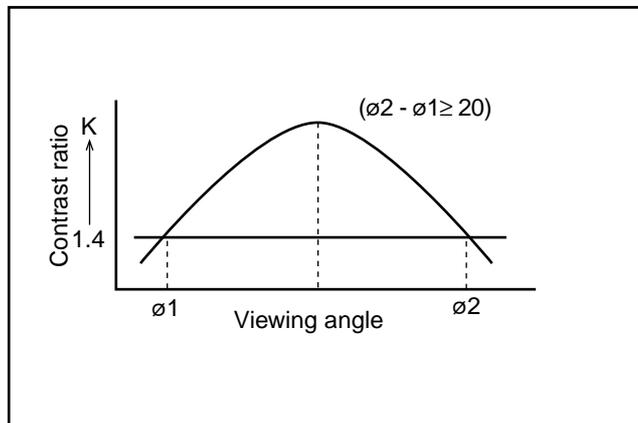
*1. Definition of θ and ϕ



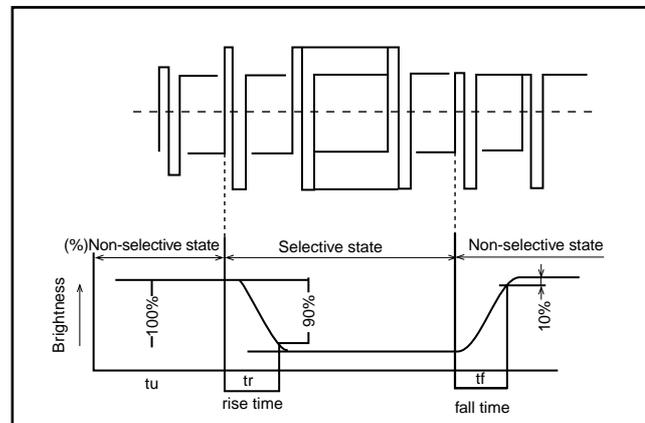
*3. Definition of contrast ratio



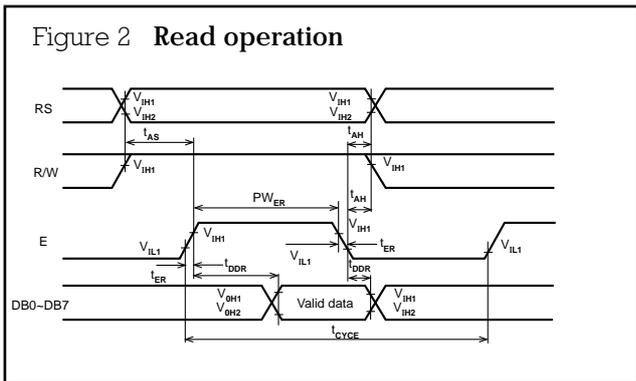
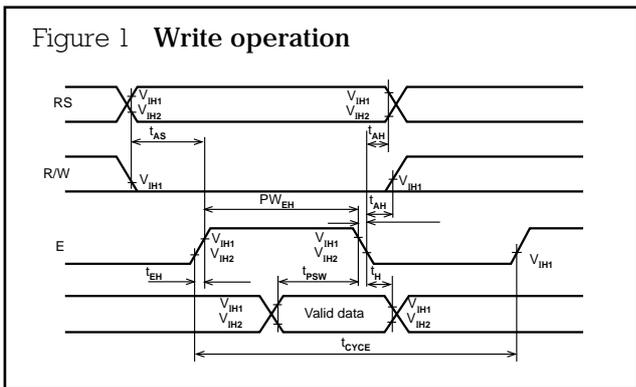
*2. Contrast vs viewing angle



*4 Definition of optical response



Timing characteristics



Interface between data bus line and 4-bit or 8-bit MPU is available. Data transfer is made in twice in case of 4-bit MPU, and once in case of 8-bit MPU.

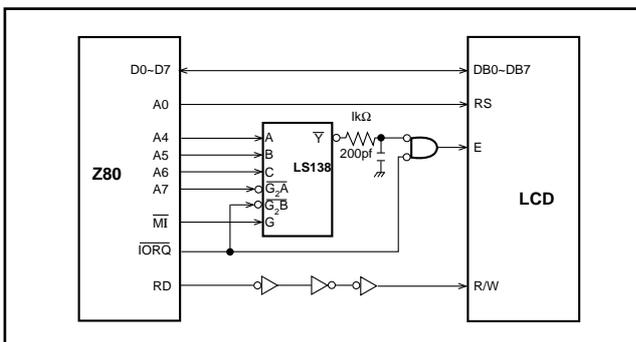
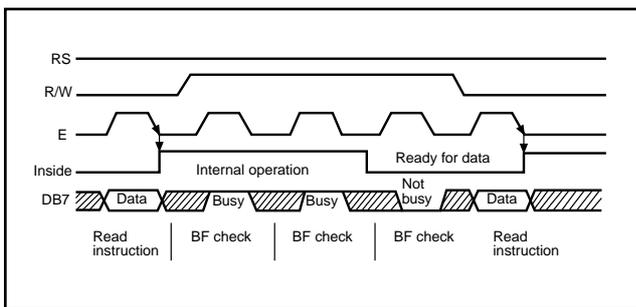
If interface data is 4-bit long

Data transfer is made through 4 bus lines from DB4 to DB7 while the rest of 4 bus lines from DB0 to DB3 are not used. Data transfer with MPU is completed when 4-bit data is transferred in twice, first upper 4-bit data then lower 4-bit data.

If interface data is 8-bit long

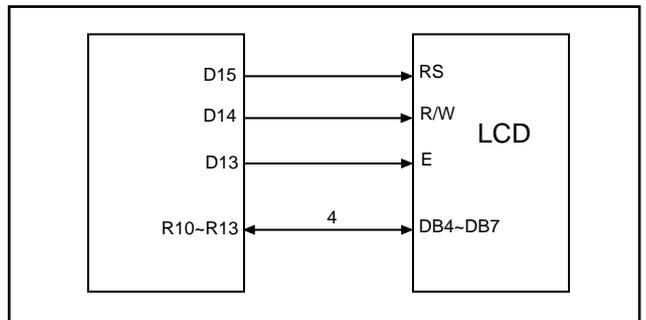
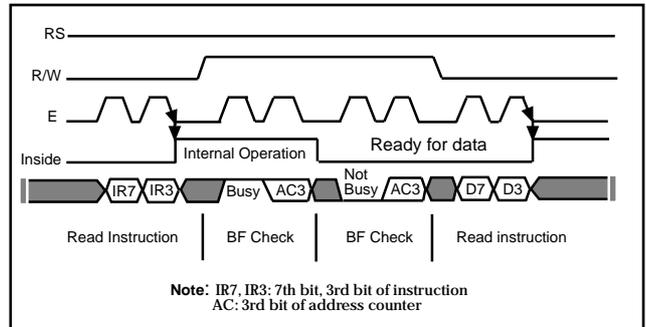
Data transfer is made through all of 8 bus lines from DB0 to DB7.

Example of interface with 8-bit MPU (Z80)



Example of interface with 4-bit MPU

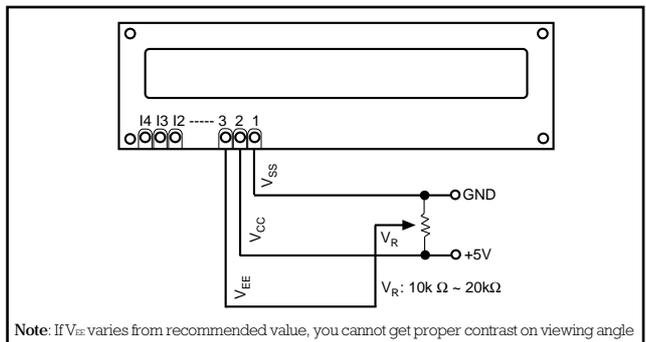
Interface with 4-bit MPU can be made through I/O port of 4-bit MPU. If there are enough I/O ports, data can be transferred by 8-bit, however, if there is not, data transfer can be done by 4-bit in twice (select interface is 4-bit long), and timing sequence will be complicated in this case. Please take into account that 2 cycles of BF check is necessary, while 2 cycles of data transfer are also necessary.



Features

- Interface with 8-bit or 4-bit MPU is available.
- 192 kind of alphabets, numerals, symbols and special characters can be displayed by built-in character generator (ROM).
- Other preferred characters can be displayed by character generator (RAM).
- Various functions of instruction are available by programming.
 - Clear display
 - On/off cursor
 - Shift display
 - Read/write display data etc.
 - Cursor at home
 - Blink character
 - Shift cursor
- Compact and light design which can be easily assembled in devices.
- Single power supply +5V drive
- Low power consumption.

Example of power supply



Instructions

Instructions	Code										Description	Executed Time (max.)	
	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
Clear display	0	0	0	0	0	0	0	0	0	1	Clears all displays and returns the cursor to the home position (Address 0)	1.64mS	
Cursor at home	0	0	0	0	0	0	0	0	0	1	*	Returns the cursor to the home position (address 0). Also returns the display being shifted to the original position. DDRAM contents remain unchanged.	1.64mS
Entry mode set	0	0	0	0	0	0	0	1	I/D	S	Sets the cursor move direction and specifies or not to shift the display. These operations are performed during the data write and read.	40μS	
Display On/off control	0	0	0	0	0	0	1	D	C	B	Sets ON/OFF of all display (D) cursor ON/OFF (C), and blink of cursor position character (B).	40μS	
Cursor/display shift	0	0	0	0	0	1	S/C	R/L	*	*	Moves the cursor and shifts the display without changing DDRAM contents.	40μS	
Function set	0	0	0	0	1	DL	N	F	*	*	Sets interface data length (DL) number of display lines (L) and character font (F).	40μS	
CGRAM address set	0	0	0	1	ACG					Set the CGRAM address. CGRAM data is sent and received after this setting.		40μS	
DDRAM address set	0	0	1	ADD					Sets the DDRAM address. DDRAM data is sent and received after this setting.		40μS		
Busy flag/address read	0	1	BF	AC					Reads busy flag (BF) indicating internal operation is being performed and reads address counter contents.		0μS		
CGRAM/DDRAM data write	1	0	Write data					Writes data into DDRAM or CGRAM.		40μS			
CGRAM/DDRAM Data read	1	1	Read data					Reads data from DDRAM or CGRAM.		40μS			

Code	Description	Executed time (max.)
I/D=1:Increment I/D=0:Decrement S=1:With display shift S/C=1: Display shift S/C=0: Cursor movement R/L=1: Shift to the right R/L=0: Shift to the left DL=1:8-bit DL=0:4-bit N=1:2 lines N=0:1 line F=1:5 x 10dots F=0.5 x 7dots BF=1: Internal operation is being performed BF=0: Instruction acceptable	DDRAM:Display data RAM CGRAM:Character generator RAM ACG:CGRAM address ADD:DDRAM address corresponds to cursor address. AC: Address counter, used for both DDRAM and CGRAM	fcp or fosc=250kHz However, when frequency changes, execution time also changes Ex If fcp or fosc is 270kHz, $40\mu S \times 250/270 = 37\mu S$
	*Invalid	

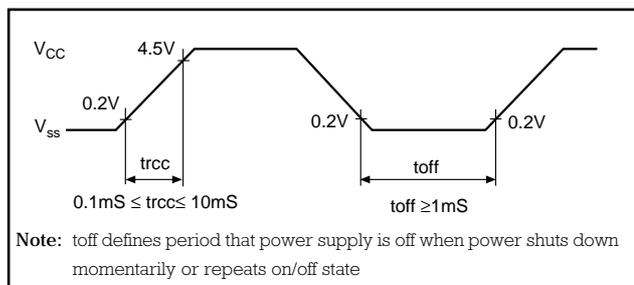
Standard character pattern

		Higher 4-bit (D4 to D7) of Character Code (Hexadecimal)																			
		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F				
Lower 4-bit (D0 to D3) of Character Code (Hexadecimal)	0	CG RAM (1)				0	P`	F							-	9	≡	α	p		
	1	CG RAM (2)				!	1	AQ	a	a						α	7	7	4	α	q
	2	CG RAM (3)				"	2	BR	b	r						Γ	ι	ν	×	β	θ
	3	CG RAM (4)				#	3	CS	c	s						∟	∩	∩	∩	∩	∩
	4	CG RAM (5)				\$	4	DT	d	t						∩	∩	∩	∩	∩	∩
	5	CG RAM (6)				%	5	EU	e	u						∩	∩	∩	∩	∩	∩
	6	CG RAM (7)				&	6	FV	f	v						∩	∩	∩	∩	∩	∩
	7	CG RAM (8)				'	7	GW	g	w						∩	∩	∩	∩	∩	∩
	8	CG RAM (1)				(8	HX	h	x						∩	∩	∩	∩	∩	∩
	9	CG RAM (2))	9	IY	i	y						∩	∩	∩	∩	∩	∩
	A	CG RAM (3)				*	:	JZ	j	z						∩	∩	∩	∩	∩	∩
	B	CG RAM (4)				+	:	KL	k	l						∩	∩	∩	∩	∩	∩
	C	CG RAM (5)				,	<	L#	l	#						∩	∩	∩	∩	∩	∩
	D	CG RAM (6)				-	=	MJ	m	j						∩	∩	∩	∩	∩	∩
	E	CG RAM (7)				.	>	N^	n	^						∩	∩	∩	∩	∩	∩
	F	CG RAM (8)				/	?	O_	o	_						∩	∩	∩	∩	∩	∩

Power supply reset

The internal reset circuit will be operated properly when the following power supply conditions are satisfied. If it is not operated properly, please perform initial setting along with the instruction.

Item	Symbol	Measuring Condition	Standard value			Unit
			min.	typ.	max.	
Power supply rise time	trcc	-	0.1	-	10	mS
Power supply OFF time	toff	-	1	-	-	mS

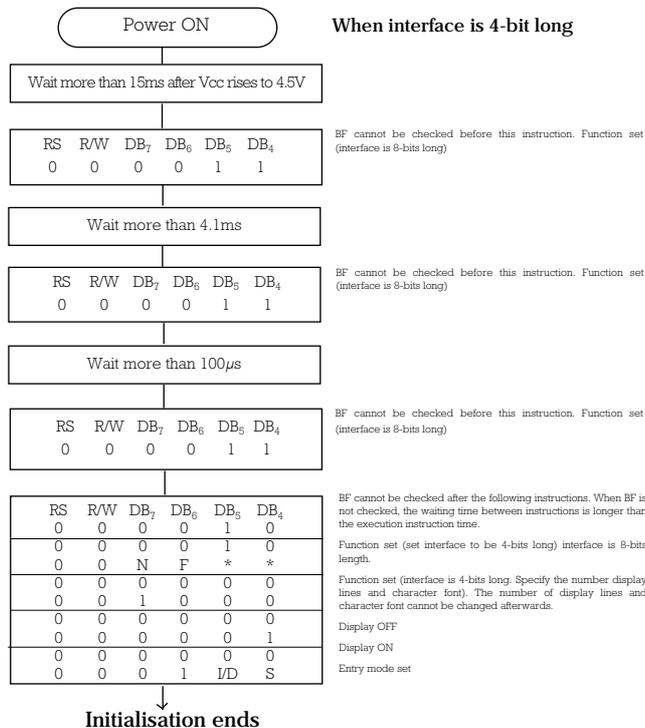


Reset function

● Initialisation made by Internal Rest Circuit
 KS0066 automatically initialises (resets) when power is supplied (built-in internal reset circuit). The following instructions are executed in initialisation. The busy flag (BF) is kept in a busy state until initialisation ends. (BF=1) The busy state is 10ms after Vdd reach to 4.5V.

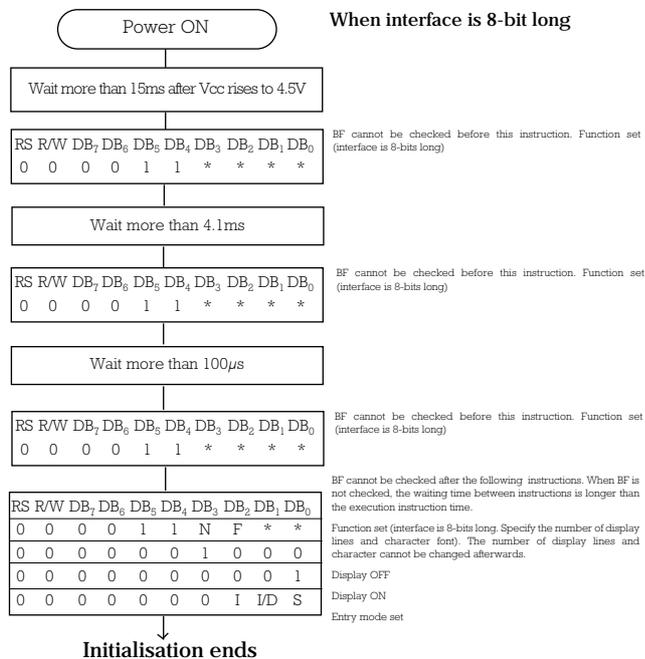
1. Display clear
 DL = 1:8bit long interface data
 DL = 0:4bit F=0:5 x dot character font
 N =1: 2lines
 N =0: 1line
3. Display ON/OFF control
 D=0:display OFF C=0:cursor OFF B=0:blink OFF
4. Entry mode set
 I/D=1: + 1 (increment) S=0:No shift

Note: When conditions stated in Power Supply Conditions Using Internal Reset Circuit are not satisfied, the internal reset circuit will not operate properly and initialisation will not be performed. Please make initialisation using MPU along with instructions.



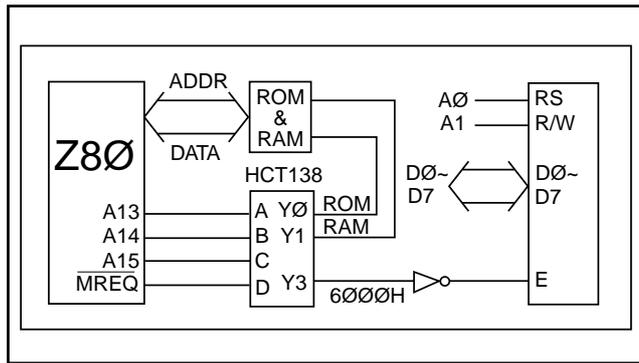
Initialisation along with instructions

If power supply conditions are not satisfied, for proper operation of internal reset circuit, it is required to make initialisation along with instruction. Please make following procedures:-



Application example

All modules except 20 x 4 and 40x4



Example of interfacing to Z80 MPU running at 2 Mhz

A0 is connected to **RS** of module

where A0 = 1: Instruction register is selected

where A0 = 0: Data register is selected

A1 is connected to R/W of module

where A1 = 0: Module in write mode

where A1 = 1: Module in read mode

```
WRINST EQU 6000H ;write instruction
WRDATA EQU 6001H ;write data
RDBUSY EQU 6002H ;read busy
```

Initialisation

```
LD B,0 ;power up delay
DJNZ $
LD SP,27FFH ;stack pointer
LD HL,INITBL ;init table pointer
LD B,15 ;15ms delay
CALL INSTR ;o/p instruction to module
LD B,5 ;5ms delay
CALL INSTR ;o/p instruction to module
LD B,1 ;one ms delay
CALL INSTR ;o/p instruction to module
```

Function set

function set

```
LD B,4 ;four modes
MODSET: CALL BUSY ;check for not busy
INC HL ;inc table pointer
LD A,(HL) ;get data
LD (WRINST),A ;and sent to module
DJNZ MODSET ;next mode
```

Write message to module

```
LD HL,MESSAGE ;get message table
;turn on display, blinking cursor
CALL BUSY
LD A,00001111B ;display on, cursor
LD (WRINST),A ;blink
;set DDRAM address to 00H
LD A,10000000B ;set to 00H
CALL MSG ;o/p message
```

```
;set DDRAM address to 40H
LD A,11000000B ;set to 40H
CALL MSG ;o/p message
HALT ;program stop here.....
```

```
;subroutine to set DDRAM addr and o/p message
```

```
MSG: CALL BUSY
LD (WRINST),A
```

```
;write message to module
```

```
LD B,8 ;no. of byte to be sent
WRITE2: CALL BUSY
LD A,(HL) ;get character
LD (WRDATA),A ;write to module
INC HL ;inc pointer
DJNZ WRITE2 ;next byte
RET
```

```
; subroutine : busy check
```

```
BUSY: PUSH AF
BUSY1: LD A,(RDBUSY)
BIT 7,A
JR NZ,BUSY1
POP AF
RET
```

```
;subroutine: o/p instruction to module
```

```
INSTR: CALL DELAY ;time delay
LD A,(HL) ;get data
LD (WRINST),A ;o/p to module
RET
```

```
; time delay subroutine
```

```
; Total delay time = B* 1mS
```

```
; Register destroyed : DE
```

```
DELAY: PUSH HL
LD DE,-1
LOOP1: LD HL,431/5
LOOP2: ADD HL,DE
JR C,LOOP2
DJNZ LOOP1
POP HL
RET
```

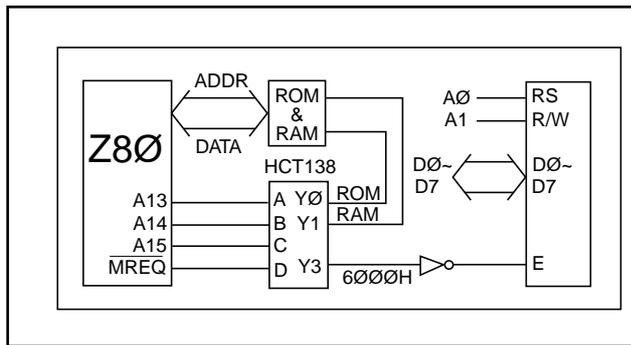
```
; data table for initialisation routine
```

```
INITBL: DEFB 00110000B ;set DL to high
DEFB 00111000B ;8-bit, 2 lines, 5X7 dots
DEFB 00001000B ;display off
DEFB 00000001B ;clear display, return cursor
DEFB 00000110B ;set shift mode (entry mode set)
```

```
; message
```

```
MSG: DEFB 'DISPLAY MODULES'
END
```

Application example for 20 x 4 and 40 x 4 displays



Example of interfacing to Z80 MPU running at 2 Mhz

A0 is connected to RS of module

where A0 = 1: Instruction register is selected

where A0 = 0: Data register is selected

A1 is connected to R/W of module

where A1 = 0: Module in read mode

where A1 = 1: Module in write mode

```
WRINST EQU 6000H ;write instruction
WRDATA EQU 6001H ;write data
RDBUSY EQU 6002H ;read busy
```

Initialisation

```
LD B,0 ;power up delay
DJNZ $
LD SP,27FFH ;stack pointer
LD HL,INITBL ;init table pointer
LD B,15 ;15ms delay
CALL INSTR ;o/p instruction to module
LD B,5 ;5ms delay
CALL INSTR ;o/p instruction to module
```

Function set

```
LD B,1 ; one mS delay
CALL INSTR ;o/p instruction to module
```

Function set

```
; function set
LD B,4 ;four modes
MODSET: CALL BUSY ;check for not busy
INC HL ;inc table pointer
LD A,(HL) ;get data
LD (WRINST),A ;and sent to module
DJNZ MODSET ;next mode
```

Write message to module

```
; turn on display, blinking cursor
CALL BUSY
LD A,00001111B ;display on, cursor
LD (WRINST),A ;blink
;send message to display module
LD HL,MESSGE ;get message table
OUTMSG: LD A,(HL) ;get data from message table
```

```
CP $ ;is end of message ?
; JR Z,ENDMSG ;yes, it is
LD B,A ;no, this is the number
; of byte to be sent
INC HL ;now, get the DDRAM
; addr
LD A,(HL)
CALL BUSY ;check for not busy
SET 7,A ;set bit 7 to 1
LD (WRINST),A ;o/p to module
NXTCHR: INC HL ;get character
LD A,(HL)
CALL BUSY ;check for not busy
LD (WRDATA),A ;o/p to module
DJNZ NXTCHR ;o/p next character
INC HL ;inc pointer
JR OUTMSG ;go and check any
; more message
;
ENDMSG: HALT ;program stop here....
```

subroutine: busy check

```
BUSY: PUSH AF
BUSY1 LD A,(RDBUSY)
BIT 7,A
JR NZ,BUSY1
POP AF
RET
```

; SUBROUTINE : o/p instruction to module

```
INSTR: CALL DELAY ;time delay
LD A,(HL) ;get data
LD (WRINST),A ;o/p to module
RET
```

; time delay subroutine

; Total delay time = B * 1mS

; Register destroyed : DE

```
DELAY: PUSH HL
LD DE,-1
LOOP1: LD HL,431/5
LOOP2: ADD HL,DE
JR C,LOOP2
DJNZ LOOP1
POP HL
RET
```

; data table for initialisation routine

```
INITBL: DEFB 00110000B ;set DL to high
DEFB 00111000B ;8 bit, 2 lines, 5x7 dots
DEFB 00001000B ;display off
DEFB 00000001B ;clear display, return
; cursor
DEFB 00000110B ;set shift mode
```

; message

```

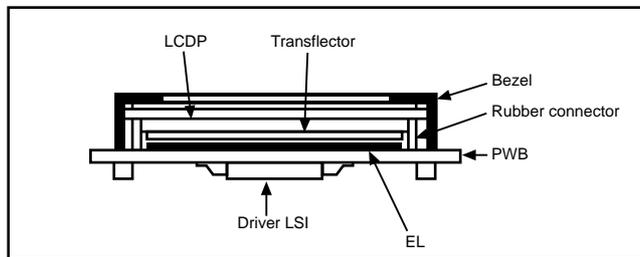
MESSAGE: DEFB 18 ;no. of character to be sent
         DEFB 00H ;ADDR OF DDRAM
         DEFB 'This is first line'
         DEFB 19 ;no. of character to be sent
         DEFB 40H ;addr of DDRAM
         DEFB 'This is second line'
         DEFB 18 ;no. of character to be sent
         DEFB 14H ;addr of DDRAM
         DEFB 'This is third line'
         DEFB 19 ;no. of character to be sent
         DEFB 54H ;addr of DDRAM
         DEFB 'This is fourth line'
         DEFB '$' ;end of message
         END
    
```

EL

Flat surface light source offers simple and even illumination over large area. It has an extremely thin structure type of illumination with little heat up.

Features

- Max. 1.3mm thickness (max. 1.5mm for lead portion)
- Wide driving condition of 60- 1,000Hz and 150Vac max., with inverter, step-up voltage from 1.5V battery is available
- Emitted colour is white
- Temperature range: operating 0°C ~ + 50°C
Storage - 20°C ~ + 60°C

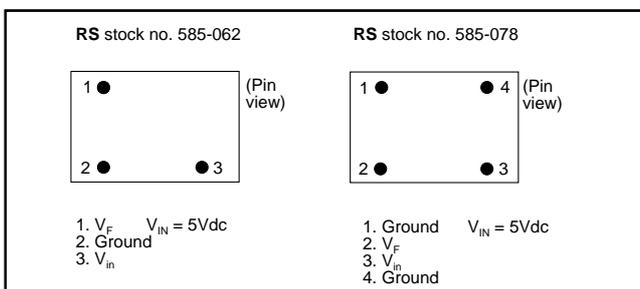


Inverter for EL back light drive

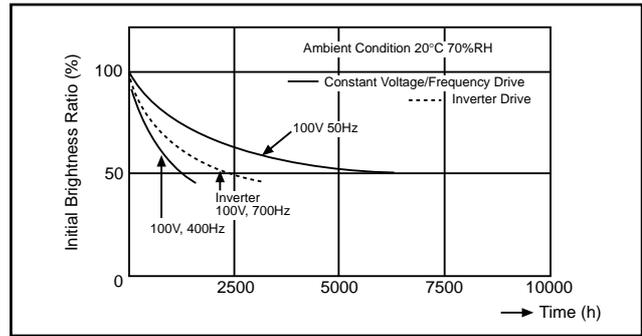
It is necessary to use inverter an when you need to operate EL with battery or a dc power supply.

- Low inverter loss and high light efficiency because it is designed as suitable for EL.
- Less change of power consumption during operation under temperature change or extended hours, which is realised by characteristics of constant supply current, minimises brightness change of EL.

Inverter connections

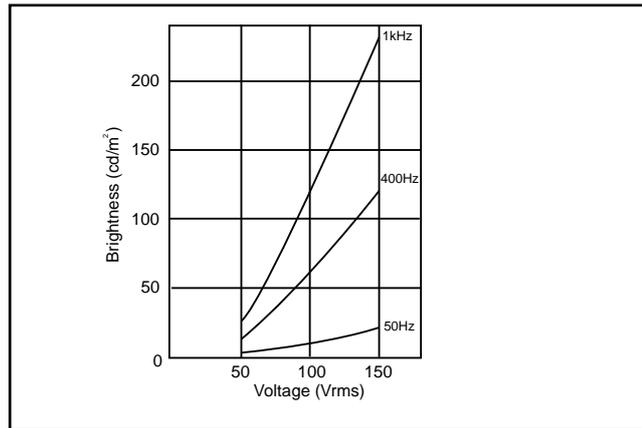


Life characteristics

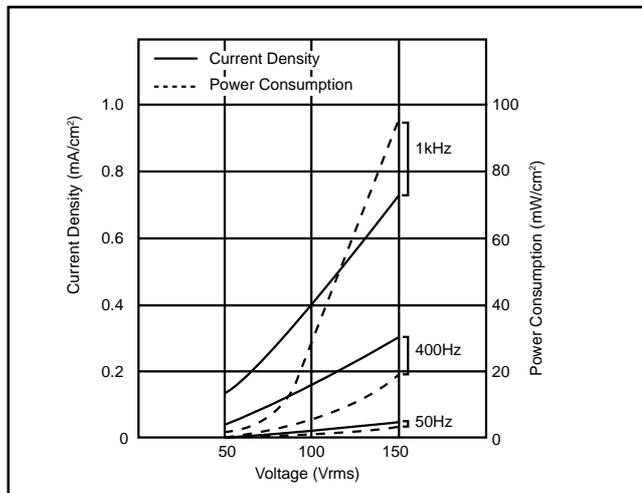


Electrical characteristics (reference data)

● Voltage VS. brightness



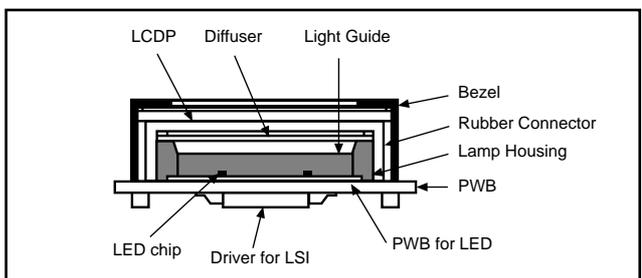
● Voltage VS. current density



LED backlight types

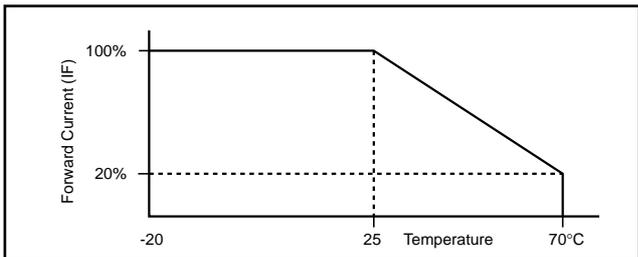
Features

- Low voltage driving (dc) is available without inverter
- Long life time 100,000 hours (average)
- No noise occurrence.



Electrical characteristics (reference data)

- Forward current derating curve



Mechanical dimensions

8 x 2 LCD modules

PIN NO.	SIGNAL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/W
6	E
7	DBO
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7

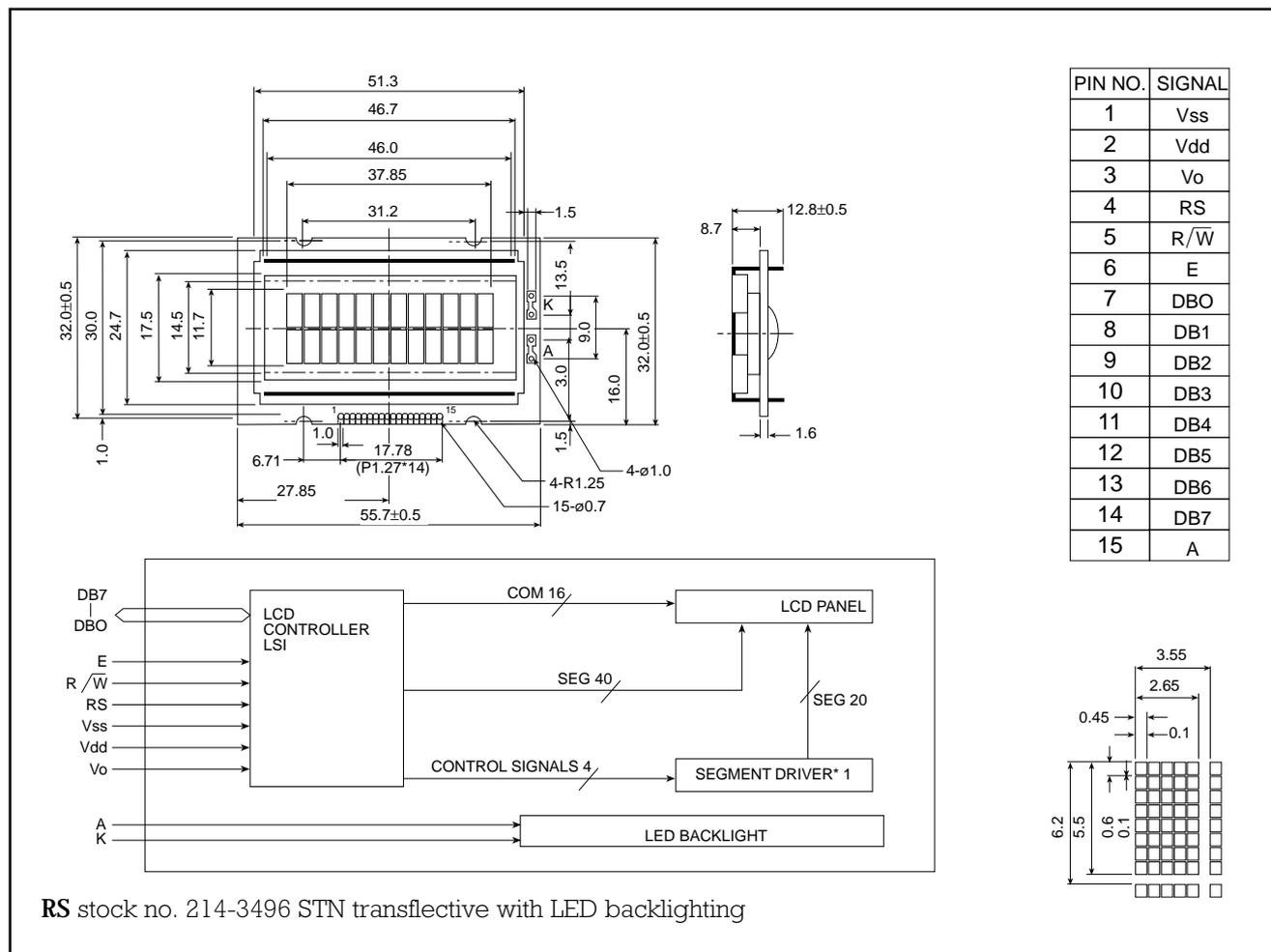
RS stock no. 214-3288 STN reflective

RS stock no. 214-3367 TN with EL backlighting

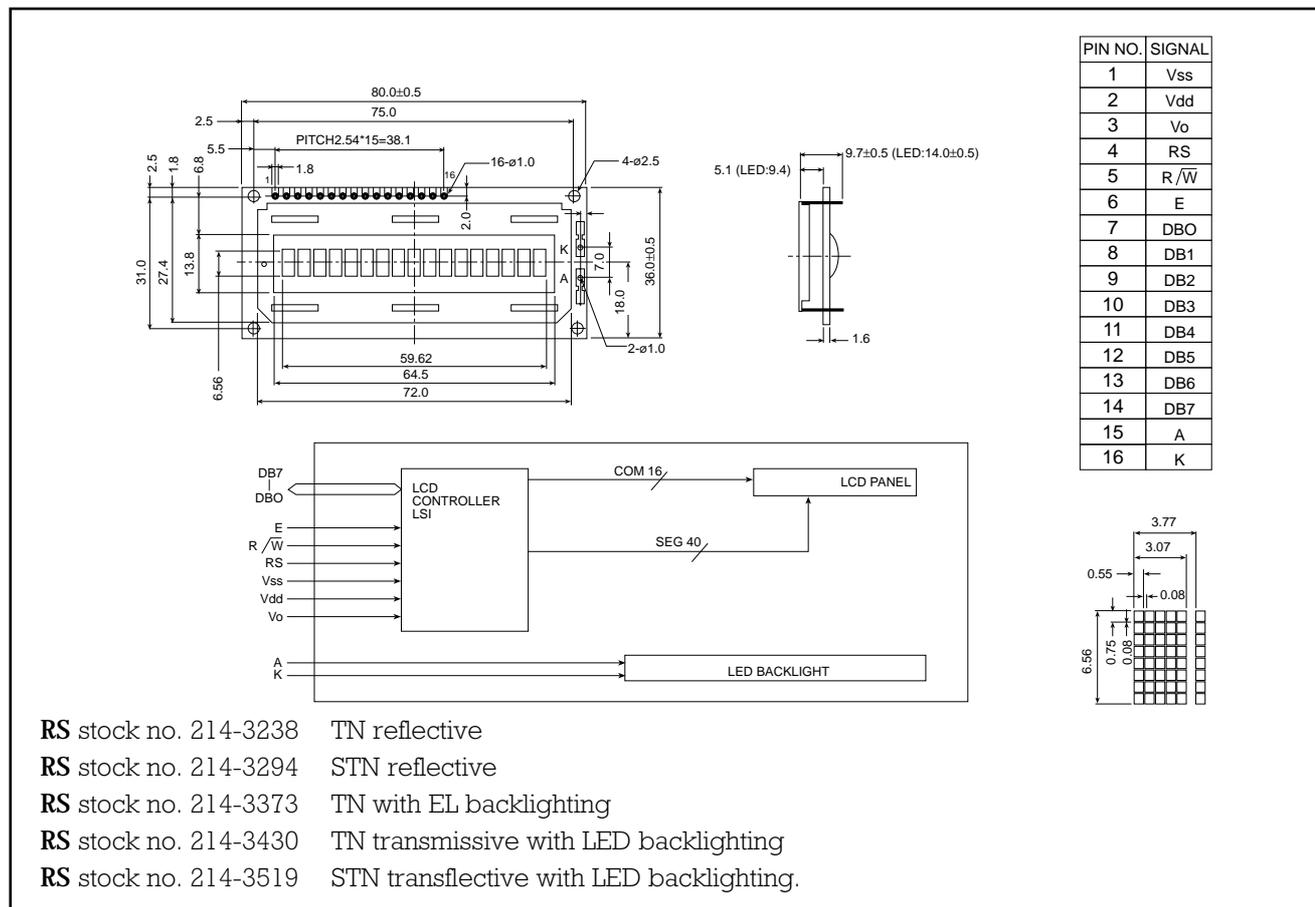
RS stock no. 214-3424 TN transmissive with LED backlighting

RS stock no. 214-3480 STN transfective with LED backlighting.

12 x 2 LCD module



16 x 1 LCD modules



16 x 2 LCD modules

9.32 71.0 66.0 56.21 1.5 5.1 (LED:9.4) 9.7±0.5 (LED:14.0±0.5) 4-ø2.5 31.0 2.5 16.2 20.1 25.0 7.0 11.5 16.0±0.5 17.78 5.34 2.5 2.54 16-ø1.0 45 80.0 4-ø1.0 85.0±0.5

DB7 DBO E R/W RS Vss Vdd Vo A K

LCD CONTROLLER LSI

COM 16

SEG 40

CONTROL SIGNALS 4

SEGMENT DRIVER*1

LED BACKLIGHT

LCD PANEL

PIN NO.	SIGNAL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/W
6	E
7	DBO
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	A
16	K

RS stock no. 214-3244 TN reflective
RS stock no. 214-3301 STN reflective
RS stock no. 214-3395 TN with EL backlighting
RS stock no. 214-3452 TN transmissive with LED backlighting
RS stock no. 214-3525 STN transfective with LED backlighting.

20 x 1 LCD modules

6.0 161.8 149.0 142.8 4-ø3.5 2.5 2.0 9.7±0.5 5.1 7.2 6.0 1.152 0.06 14.54 1.765 0.06 40.0±0.5 16.0 17.78 5.34 2.24 16-ø1.0 90.9 172.0 180.0±0.5 4-ø1.0 5.0 14.54 4.0 23.0 32.0 35.2

DB7 DBO E R/W RS Vss Vdd Vo Vee

LCD CONTROLLER LSI

COM 16

SEG 40

CONTROL SIGNALS 4

SEGMENT DRIVER *1

Voltage Generator Temperature Compensation

TO LSI

LCD PANEL

PIN NO.	SIGNAL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/W
6	E
7	DBO
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	NC/Vee
16	NC

RS stock no. 214-3531 STN transfective with LED backlighting.

20 x 4 LCD modules

Technical drawing of a 20 x 4 LCD module. The top view shows a rectangular module with overall dimensions of 98.0±0.5 mm width and 55.0 mm height. The display area is 93.0 mm wide and 20.8±0.2 mm high. The pitch between segments is 2.54 mm (PITCH 2.54*15=38.1). There are 16 pins on the left side, with a pitch of 1.8 mm. The bottom view shows a 60.0±0.5 mm wide base with 4 mounting holes of diameter 2.5 mm. The side view shows a thickness of 1.6 mm and a height of 9.6±0.5 mm (LED: 14.0±0.5 mm). A detail view shows the segment grid with a pitch of 0.65 mm and a segment width of 0.05 mm.

PIN NO.	SIGNAL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/W
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	A
16	K

Block diagram of the LCD module. The LCD CONTROLLER LSI is connected to the LCD PANEL via COM 16, SEG 40, and SEG 160. It also provides CONTROL SIGNALS 4 to the SEGMENT DRIVER*2. The LCD CONTROLLER LSI receives power and control signals: DB7, DBO, E, R/W, RS, Vss, Vdd, and Vo. The SEGMENT DRIVER*2 is connected to the LCD PANEL. The LED BACKLIGHT is connected to the LCD CONTROLLER LSI via pins A and K.

RS stock no. 214-3323 STN reflective
 RS stock no. 214-3553 STN transfective with LED backlighting.

24 x 2 LCD modules

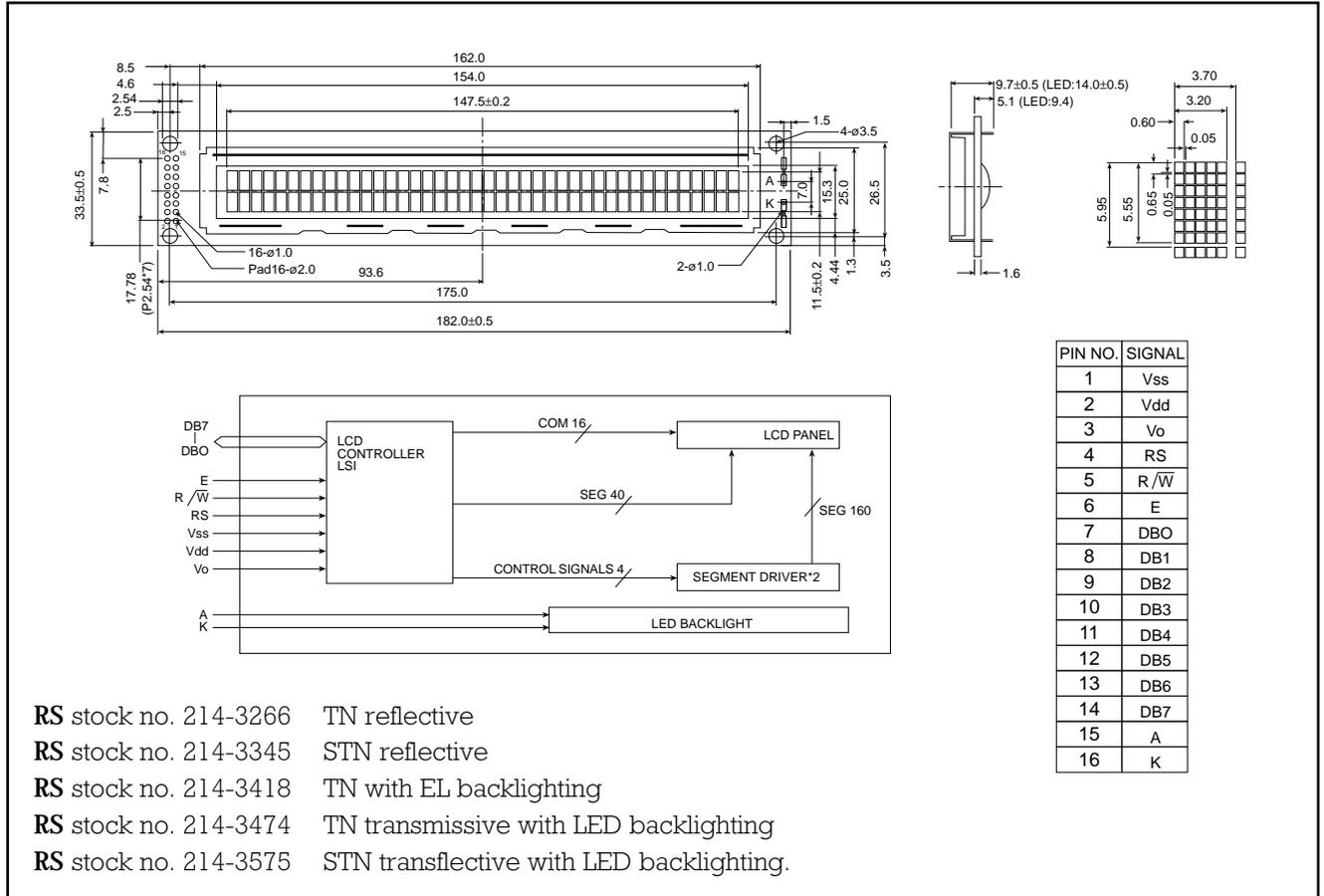
Technical drawing of a 24 x 2 LCD module. The top view shows a rectangular module with overall dimensions of 102.5 mm width and 36.0±0.5 mm height. The display area is 93.5 mm wide and 88.3±0.2 mm high. The pitch between segments is 2.54 mm. There are 14 pins on the left side, with a pitch of 1.8 mm. The bottom view shows a 61.75 mm wide base with 4 mounting holes of diameter 2.5 mm. The side view shows a thickness of 1.6 mm and a height of 5.4 mm (LED: 8.8 mm). A detail view shows the segment grid with a pitch of 0.65 mm and a segment width of 0.05 mm.

PIN NO.	SIGNAL
1	Vss
2	Vdd
3	Vo
4	RS
5	R/W
6	E
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7

Block diagram of the LCD module. The LCD CONTROLLER LSI is connected to the LCD PANEL via COM 16, SEG 40, and SEG 80. It also provides CONTROL SIGNALS 4 to the SEGMENT DRIVER*1. The LCD CONTROLLER LSI receives power and control signals: DB7, DBO, E, R/W, RS, Vss, Vdd, and Vo. The SEGMENT DRIVER*1 is connected to the LCD PANEL. The LED BACKLIGHT is connected to the LCD CONTROLLER LSI via pins A and K.

RS stock no. 214-3250 TN reflective
 RS stock no. 214-3339 STN reflective
 RS stock no. 214-3402 TN with EL backlighting
 RS stock no. 214-3468 TN transmissive with LED backlighting
 RS stock no. 214-3569 STN transfective with LED backlighting.

40 x 2 LCD modules



20 x 2 LCD modules

