



SC1601A (16 CHARACTERS X 1 LINES)

FEATURES

1. 5 X 7 DOTS WITH CURSOR
2. BUILT IN CONTROLLER (HD44780U OR EQUIVALENT)
3. 5V POWER SUPPLY
4. 1/16 DUTY CYCLE
5. 4.2V LED FORWARD VOLTAGE

MECHANICAL DATA

ITEM	DIMENSIONS	UNIT
Module Size (W x H x T)	80.0 x 36.0 x 8.8 (12.7 LED)	mm
Viewing Area (W x H)	65.0 x 16.0	mm
Character Size (W x H)	3.07 x 6.56	mm
Character Pitch (W x H)	3.77 x 6.56	mm
Dot Size (W x H)	0.55 x 0.75	mm
Dot Pitch (W x H)	0.63 x 0.83	mm

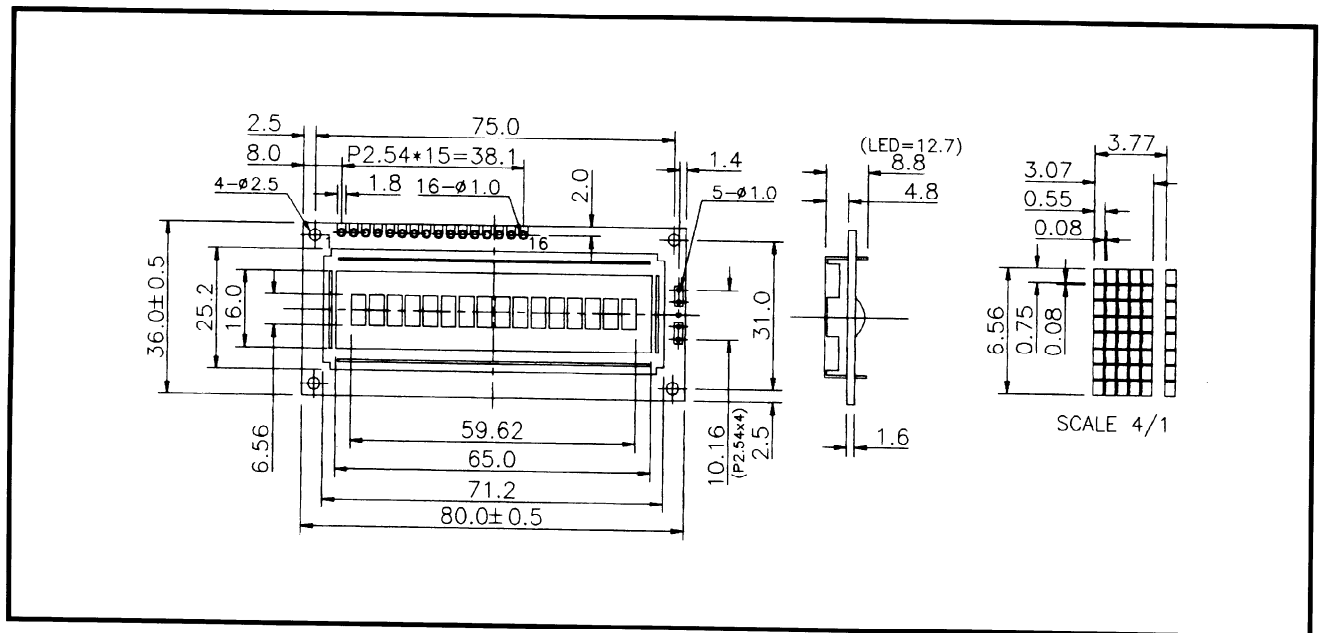
INTERFACE PIN CONNECTIONS

NO.	SYMBOL	FUNCTION	NO.	SYMBOL	FUNCTION
1	V _{SS}	0V	9	DB2	DATA BIT2
2	V _{RI}	5V	10	DB3	DATA BIT3
3	V _O	Contrast Adj.	11	DB4	DATA BIT4
4	RS	Register Select	12	DB5	DATA BIT5
5	R/W	Read/Write	13	DB6	DATA BIT6
6	E	Enable Signal	14	DB7	DATA BIT /
7	DB0	Data Bit0	15	A	LED POWER
8	DB1	Data Bit1	16	K	LED POWER

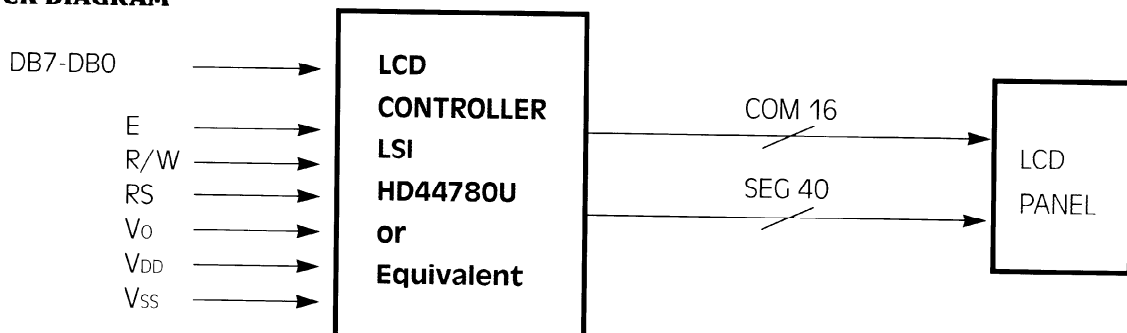
ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	TYP.	UNIT
LCD Operating Voltage	V _{DD-V_O}	Ta = 0°C		4.8		V
		Ta = -25°C		4.5		V
		Ta = 50°C		4.2		V
Supply Voltage	V _{DD-V_{SS}}		4.7	5	5.3	V
Input Voltage	"High" Level	V _{HI}	2.2		V _{DD}	V
	"Low" Level	V _{LI}	0		0.6	V
Output Voltage	"High" Level	V _{OH}	2.4			V
	"Low" Level	V _{OL}			0.4	V

EXTERNAL DIMENSIONS



BLOCK DIAGRAM





SC1602A (16 CHARACTERS X 2 LINES)

FEATURES

1. 5 X 7 DOTS WITH CURSOR
2. BUILT IN CONTROLLER (HD44780U OR EQUIVALENT)
3. 5V POWER SUPPLY
4. 1/16 DUTY CYCLE
5. 4.2V LED FORWARD VOLTAGE

MECHANICAL DATA

ITEM	DIMENSIONS	UNIT
Module Size (W x H x T)	80.0 x 36.0 x 8.8 (12.7 LED)	mm
Viewing Area (W x H)	65.0 x 16.0	mm
Character Size (W x H)	2.96 x 5.56	mm
Character Pitch (W x H)	3.55 x 5.94	mm
Dot Size (W x H)	0.56 x 0.66	mm
Dot Pitch (W x H)	0.60 x 0.70	mm

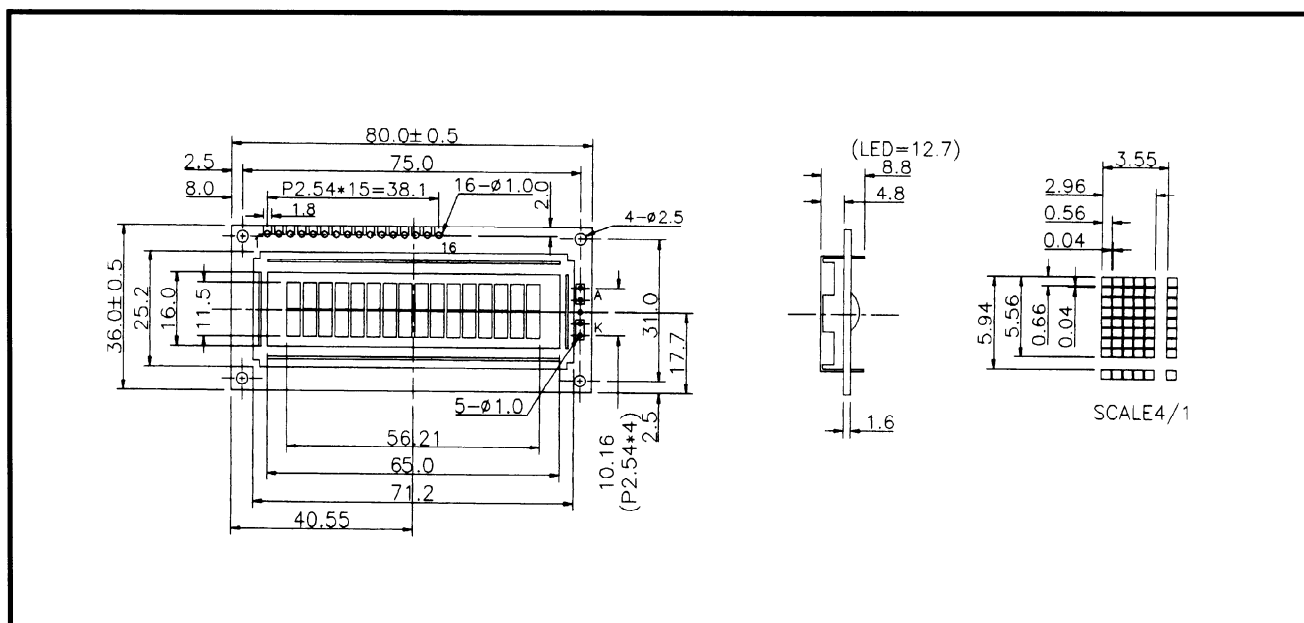
INTERFACE PIN CONNECTIONS

NO	SYMBOL	FUNCTION	NO.	SYMBOL	FUNCTION
1	V _{SS}	0V	9	DB2	DATA BIT2
2	V _{DD}	5V	10	DB3	DATA BIT3
3	V ₀	Contrast Adj.	11	DB4	DATA BIT4
4	RS	Register Select	12	DB5	DATA BIT5
5	R/W	Read/Write	13	DB6	DATA BIT6
6	E	Enable Signal	14	DB7	DATA BIT7
7	DB0	Data Bit0	15	A	LED POWER
8	DB1	Data Bit1	16	K	LED POWER

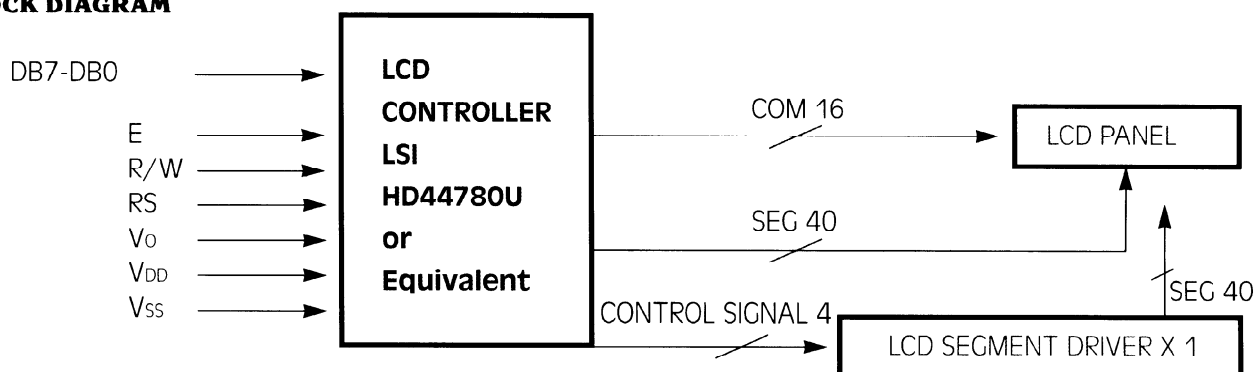
ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	TYP.	UNIT
LCD Operating Voltage	V _{DD} -V ₀	Ta = 0 °C	—	4.8	—	V
		Ta = 25 °C	—	4.5	—	V
		Ta = 50 °C	—	4.2	—	V
Supply Voltage	V _{DD} -V _{SS}		4.7	5	5.3	V
Input Voltage	"High" Level	V _{IH}	—	2.2	—	V _{DD} V
	"Low" Level	V _{IL}	—	0	—	0.6 V
Output Voltage	"High" Level	V _{OH}	—	2.4	—	V
	"Low" Level	V _{OL}	—	—	—	0.4 V

EXTERNAL DIMENSIONS



BLOCK DIAGRAM





Pin Assignment

Pin no.	Symbol	Level	Function
1	V_{SS}	—	Power supply
2	V_{DD}	—	
3	V_0	—	
			0V (GND)
			+5V
			Contrast adjustment voltage
4	RS	H/L	Selects Registers H: Data register (when writing and reading) L: Instruction register (writing) Busy flag and address counter (reading)
5	R/W	H/L	Read/write select signal H: Data read (Module→MPU) L: Data write (Module←MPU)
6	E	H,H→L	Enable signal
7~14	$DB_0 \sim DB_7$	H/L	Data bus lines, see description below $DB_4 \sim DB_7$: High-order lines of data bus with three-state, bi-directional function for use in data transfer with the MPU. DB_7 may also be used to check the busy flag. $DB_0 \sim DB_3$: Low-order lines of data bus with three-state, bi-directional function for use in data transfer with the MPU. These lines are not used when interfacing with a 4-bit microprocessor.

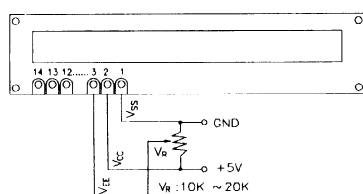
Electric Maximum Ratings

Item	Symbol	Min	Max	Unit	Remarks
Power supply for logic	$V_{DD} - V_{SS}$	- 0.3	+7	V	
Signal input voltage	V_{IN}	$-0.3 \leq V_{IN} \leq V_{DD} + 0.3$		V	
Static electricity	—	—	100	V	See Note

Note : Electro-static discharge resistance is tested by charging a 200 pf capacitor and discharging it by contact with a interface connector pin.

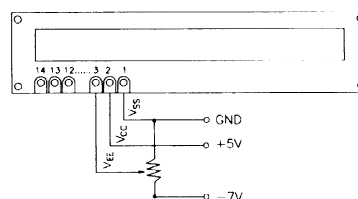
Example Of Power Supply

FIG.1 Normal Temperature Type

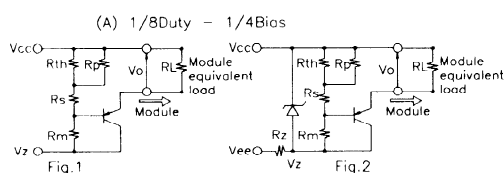


*Note: If V vary from recommended value, you cannot get proper contrast or viewing angle.

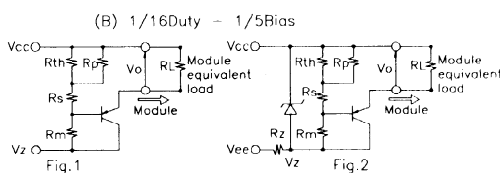
FIG.2 Extended Temperature Type



■ Examples of Temperature Compensation Circuits for Extended Temp Type. (Only for reference)



Thermistor: $R_{th}(25^\circ C) = 15[k\text{-ohm}]$, $B = 4200[K]$
 Resistors: $R_p = 30[k\text{-ohm}]$, $R_s = 6.8[k\text{-ohm}]$, $R_m = 3.3[k\text{-ohm}]$
 Transistors: PNP Type
 $V_{CC} = +5V$, $V_{SS} = 0V$ (Logic Supply)
 $V_Z = -8V(-7.8 \sim -8.2V)$
 $V_{EE} < V_Z$, $R_Z = (V_Z - V_{EE})/5 [k\text{-ohm}]$



Thermistor: $R_{th}(25^\circ C) = 15[k\text{-ohm}]$, $B = 4200[K]$
 Resistors: $R_p = 150[k\text{-ohm}]$, $R_s = 8.2[k\text{-ohm}]$, $R_m = 3.9[k\text{-ohm}]$
 Transistors: PNP Type
 $V_{CC} = +5V$, $V_{SS} = 0V$ (Logic Supply)
 $V_Z = -11V(-10.725 \sim -11.275V)$
 $V_{EE} < V_Z$, $R_Z = (V_Z - V_{EE})/5 [k\text{-ohm}]$



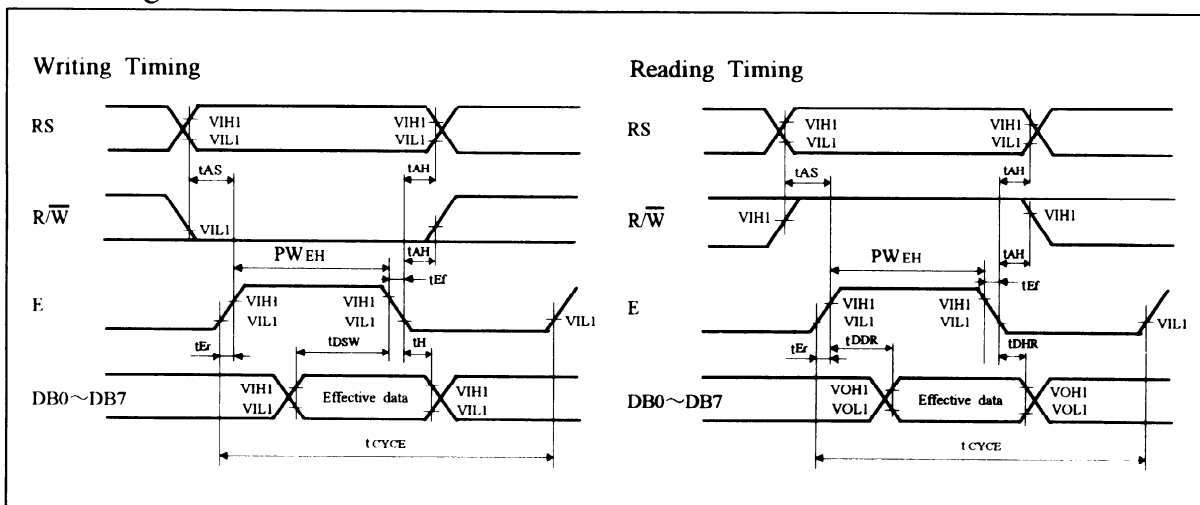
■ DC Characteristics

Item	Symbol	Condition	Standard value			Unit	Applicable terminal
			Min	Typ	Max		
Power supply voltage	V_{DD}		4.5	5.00	5.5	V	V_{DD}
Input "H" level voltage	V_{IH1}		2.2	—	V_{DD}	V	RS, R/W, E, DB ₀ ~DB ₇
Input "L" level voltage	V_{IL1}		-0.3	—	0.6	V	
Output "H" level voltage	V_{OH}	$-I_{OH} = 0.205\text{mA}$	2.4	—	—	V	DB ₀ ~DB ₇
Output "L" level voltage	V_{OL}	$I_{OL} = 1.2\text{mA}$	—	—	0.4	V	
Input leakage current	I_{L1}	$V_{IN} = 0 \sim V_{DD}$	-1	—	1.0	μA	RS, R/W, E, DB ₀ ~DB ₇
Power supply current	I_{DD}	$V_{DD} = 5\text{V}$	—	—	3.0	mA	V_{DD}
LCD Power supply voltage	V_{LCD}	$V_{DD} - V_0$	3.0	—	11.0	V	V_0

■ AC Characteristics

Item		Symbol	Min	Max	Unit
Enable cycle time		t_{CYCE}	500	—	ns
Enable pulse width	"High level"	PW_{EH}	230	—	ns
Enable rise/fall time		t_{Er}, t_{Ef}	—	20	ns
Address set-up time	RS, R/W to E	t_{AS}	40	—	ns
Address hold time		t_{AH}	10	—	ns
Data set-up time		t_{DSW}	80	—	ns
Data delay time		t_{DDR}	—	160	ns
Data hold time (writing)		t_H	10	—	ns
Data hold time (reading)		t_{DHR}	5	—	ns
Clock oscillation frequency		f_{OSC}	270 (TYP.)		KHz

■ Timing Characteristics



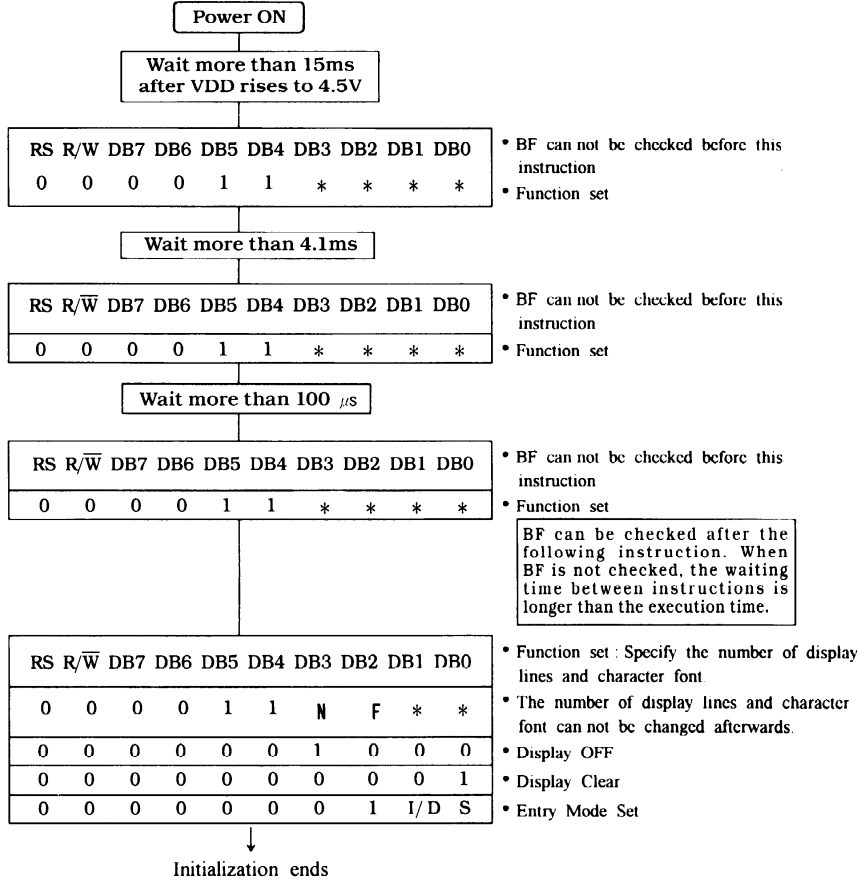
■ Display Commands

[illegible]

■ Initializing by instruction

If the power supply conditions for correctly operating the internal reset circuit are not met, initialization by instruction is required.

(1) When interface is 8 bits



(1) When interface is 4 bits

