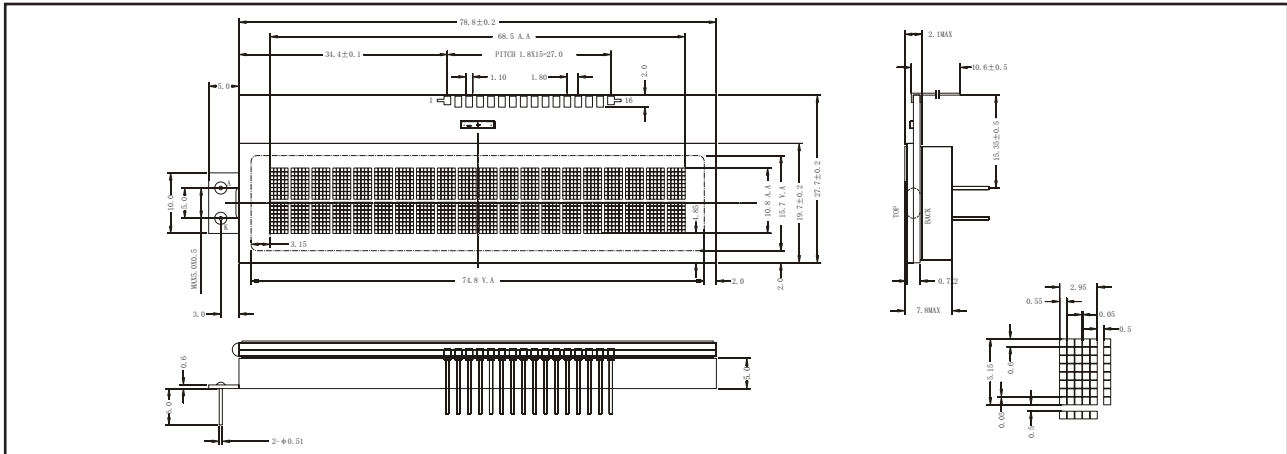


STANDARD COG MODULES

YMS 202-04

20 CHAR x 2 LINE, 1/16 DUTY, 1/5 BIAS

EXTERNAL DIMENSION AND DISPLAY PATTERN



MECHANICAL DATA

ITEM	SPECIFICATION	UNIT
Module Size (W x H x T)	78.8 x 27.7 x 7.8	mm
Viewing Area (W x H)	74.8 x 15.7	mm
Number of Dots	20 x 2	dots
Character Size (W x H)	2.95 x 5.15	mm
Dot Size (W x H)	0.55 x 0.60	mm

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Supply Voltage Logic	V_{DD}	-0.3	7.0	V
Supply Voltage Drive	$V_1 - V_5$	GND	$V_{DD} + 0.3$	V
Input Voltage	V_{IN}	-0.3	$V_{DD} + 0.3$	V
Operating Temperature		See page 8		
Storage Temperature				

PIN CONFIGURATION

PIN	SYMBOL	SIGNAL DESCRIPTION
1	NC	No Connection
2	V_{SS}	GND (0V)
3	V_L	Voltage Control for LCD
4	V_{DD}	Power Supply (5V)
5	RS	Register Select - LOW = Instruction, HIGH = DATA
6	R/W	Read / Write LOW = MPU to LCM, HIGH = LCM to MPU
7	E	Enable R/W = LOW: Data are talking over at falling edge R/W = HIGH: Data can be read at E = 1
8 to 15	DB ₀ to DB ₇	Data Bus - Software selectable 4 or 8 bit Mode
16	NC	No Connection

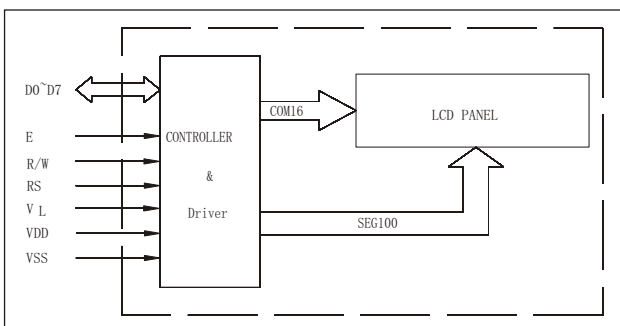
ELECTRICAL CHARACTERISTICS, $T_a = 25^\circ\text{C}$

ITEM	SYMBOL	CONDITION	SPEC. VALUE			UNIT
			MIN.	TYP.	MAX.	
Supply Voltage (Logic)	$V_{DD} - V_{SS}$		4.5	5.0	5.5	V
Supply Current (Logic)	I_{DD}	$V_{DD} = 5V$		1.0	2.0	mA
Input Voltage	HIGH	V_{IH}	$0.8 V_{DD}$		V_{DD}	V
	LOW	V_{IL}	-0.3		$0.2 V_{DD}$	V
Output Voltage	HIGH	V_{OH}	$I_{OH} = 1.2\text{mA}$	$V_{DD} - 0.6$		V
	LOW	V_{OL}	$I_{OL} = 1.2\text{mA}$		$GND + 0.6$	V
LCD Operating Voltage	$V_{DD} - V_{EE}$	$V_{DD} = 5V$ $T_a = +25^\circ\text{C}$		4.7	5.0	V
Supply Current LCD Drive	I_{EE}			1.0	1.5	mA

Note (1): Value is high reliability type.

Note (2): Electro-Optical Characteristics: See page 5.

BLOCK DIAGRAM



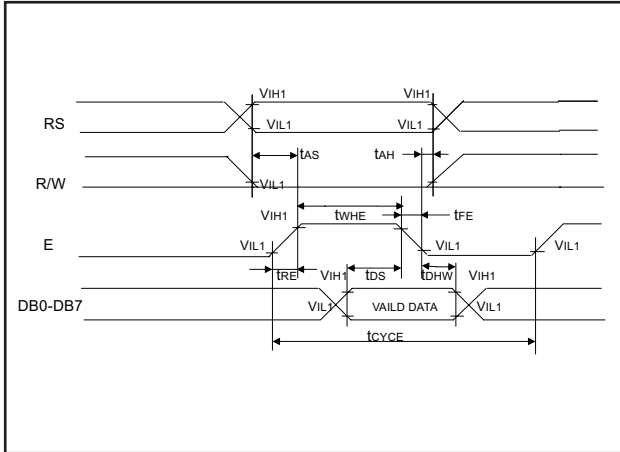
STANDARD COG MODULES

YMS 202-04

20 CHAR x 2 LINE, 1/16 DUTY, 1/5 BIAS

INTERFACE TIMING CHARACTERISTICS : WRITE CYCLE

$V_{DD}=+5.0V$



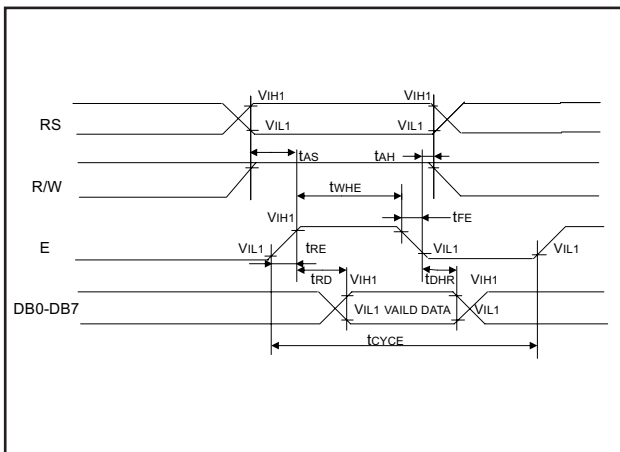
PARAMETER	SYMBOL	MIN.	MAX.	UNIT
E Cycle Time	t_{CYCE}	500		ns
Enable High Level Pulse Width	t_{WHE}	300		ns
Enable Rise Time	t_{RE}		25	ns
Enable Fall Time	t_{FE}		25	ns
RS,R/W Address Setup Time	t_{AS}	$60^{(1)}$ $100^{(2)}$		ns
RS,R/W Address Hold Time	t_{AH}	10		ns
Data Output Delay	t_{DS}	100		ns
Data Hold Time	t_{DHW}	100		ns

Note (1): 8-bit operation mode.

Note (2): 4-bit operation mode

INTERFACE TIMING CHARACTERISTICS : READ CYCLE

$V_{DD}=+5.0V$



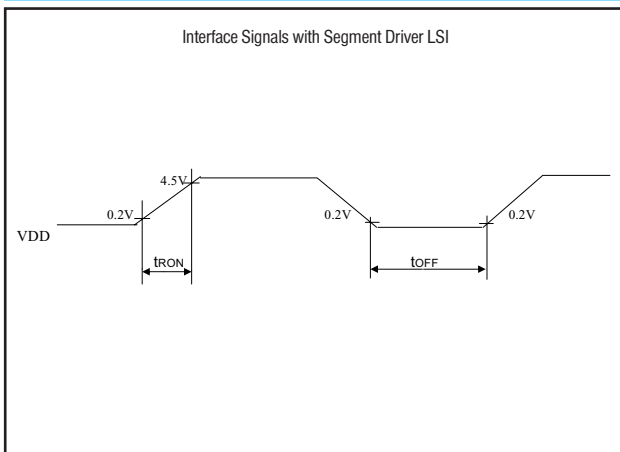
PARAMETER	SYMBOL	MIN.	MAX.	UNIT
E Cycle Time	t_{CYCE}	500		ns
Enable High Level Pulse Width	t_{WHE}	300		ns
Enable Rise Time	t_{RE}		25	ns
Enable Fall Time	t_{FE}		25	ns
RS,R/W Address Setup Time	t_{AS}	$60^{(1)}$ $100^{(2)}$		ns
RS,R/W Address Hold Time	t_{AH}	10		ns
Data Output Delay	t_{RD}		190	ns
Data Hold Time	t_{DHR}	20		ns

Note (1): 8-bit operation mode.

Note (2): 4-bit operation mode

POWER SUPPLY CONDITIONS USING INTERNAL RESET CIRCUIT

$V_{DD}=+5.0V$



PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Power Supply Rise Time	t_{RON}	0.1	10	ms
Power Supply OFF Time	t_{OFF}	1.0		ms

Note (3): t_{OFF} stipulates the time of power OFF for instantaneous power supply to or when power supply repeats ON and OFF.