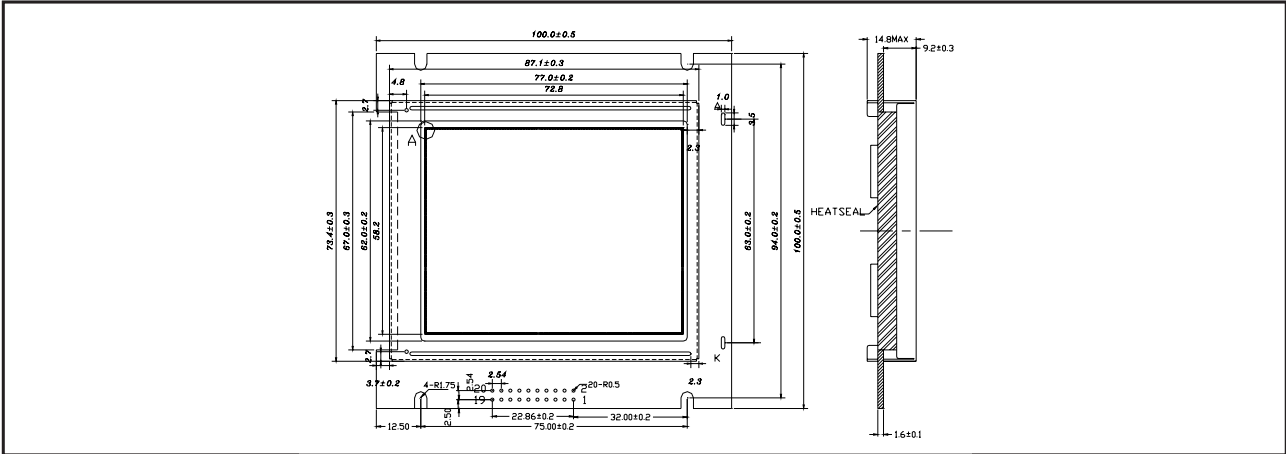


## STANDARD GRAPHIC MODULES

### YMC 160128-01

160 CHAR x 128 DOTS, 1/128 DUTY, 1/12 BIAS

#### EXTERNAL DIMENSION AND DISPLAY PATTERN



#### MECHANICAL DATA

ITEM	SPECIFICATION	UNIT
Module Size (W x H x T)	100.0 x 73.4 x 14.8	mm
Viewing Area (W x H)	77.0 x 62.0	mm
Number of Dots	160 x 128	dots
Character Pitch (W x H)	0.455 x 0.455	mm
Dot Size (W x H)	0.425 x 0.425	mm

#### ABSOLUTE MAXIMUM RATINGS

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

#### PIN CONFIGURATION

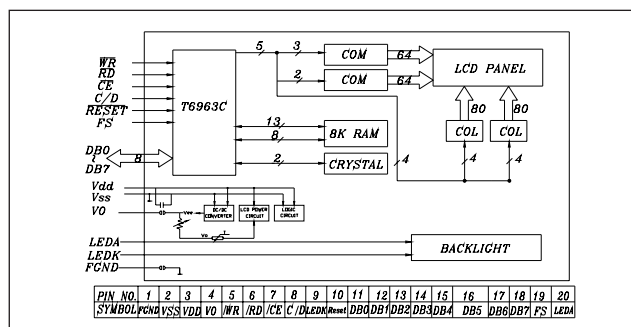
PIN	SYMBOL	SIGNAL DESCRIPTION
1	FGND	Frame Ground
2	$V_{SS}$	Ground
3	$V_{DD}$	Supply Voltage for Logic and LCD
4	$V_0$	Contrast Adjust for LCD Driving
5	WR	Write Signal
6	RD	Read Signal
7	CE	Chip Enable Signal
8	C/D	H: Instruction Code; L: Data
9	LEDK	LED Backlight
10	RESET	Reset Signal
11-18	DB <sub>0</sub> -DB <sub>7</sub>	Data Bus Line
19	FS	Pins for Selection of Font
20	LEDA	LED Backlight

#### ELECTRICAL CHARACTERISTICS, $V_{SS}=0V$ , $V_{DD}=5.0V \pm 10\%$

ITEM	SYMBOL	CONDITION	SPEC. VALUE			UNIT	
			MIN.	TYP.	MAX.		
Supply Voltage (Logic)	$V_{DD} - V_{SS}$		4.5	5.0	5.5	V	
Input Voltage	HIGH	$V_{IH}$	$V_{DD} - 2.2V$		$V_{DD}$	V	
	LOW	$V_{IL}$			0.8	V	
Output Voltage	HIGH	$V_{OH}$	$V_{DD} - 0.3V$		$V_{DD}$	V	
	LOW	$V_{OL}$			0.3	V	
	HIGH	$R_{OH}$	$V_{OUT} = V_{DD} - 0.5V$			400	$\Omega$
	LOW	$R_{OL}$	$V_{OUT} = 0.5V$			400	$\Omega$
Input Pull-Up Resistance	$R_{PU}$		50	100	200	K $\Omega$	
Operating Frequency	$F_{OSC}$		0.4		5.5	MHz	

Note (1): Applied / T1 / T2 / RESET  
 MD<sub>0</sub>=L, MD<sub>1</sub>=L, MD<sub>2</sub>=H, MD<sub>3</sub>=H, FS<sub>0</sub>=L, FS<sub>1</sub>=L, /SDSEL=L, /DUL=H, D<sub>7</sub> to D<sub>0</sub>=LHLHLHLH

#### BLOCK DIAGRAM

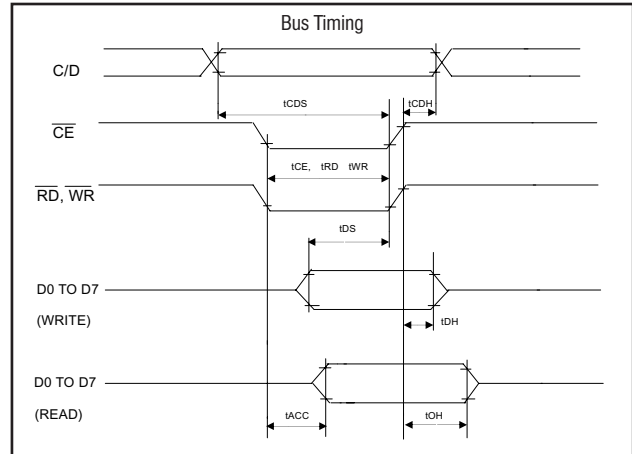
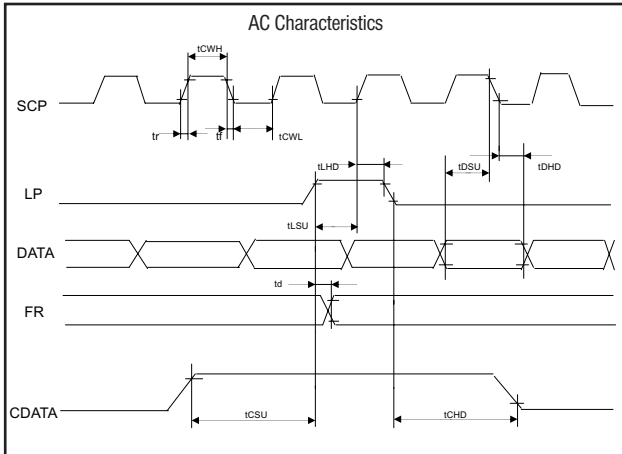


# STANDARD GRAPHIC MODULES

## YMC 160128-01

160 CHAR x 128 DOTS, 1/128 DUTY, 1/12 BIAS

### SWITCHING TIMING CHARACTERISTICS



PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Operating Frequency	$f_{SCP}$		2.75	MHz
SCP Pulse Width	$t_{CWH}, t_{CWL}$	150		ns
SCP Rise/Fall Time	$t_r, t_f$		30	ns
LP Setup Time	$t_{LSU}$	150	290	ns
LP Hold Time	$t_{LHD}$	5	40	ns
Data Setup Time	$t_{DSU}$	170		ns
Data Hold Time	$t_{DHD}$	80		ns
FR Delay Time	$t_d$	0	90	ns
CData Setup Time	$t_{CSU}$	450	850	ns
CData Hold Time	$t_{CHD}$	450	950	ns

Condition:  $V_{DD}=+5.0, V_{SS}=0V, T_a=+25^\circ C$

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
C/D Setup Time	$t_{CDS}$	100		ns
C/D Hold Time	$t_{CDH}$	10		ns
/CE, /RD, /WR Pulse Width	$t_{CE}, t_{RD}, t_{WR}$	80		ns
Data Setup Time	$t_{DS}$	80		ns
Data Hold Time	$t_{DH}$	40		ns
Access Time	$t_{ACC}$		150	ns
Output Hold Time	$t_{OH}$	10	50	ns

Condition:  $V_{DD}=+5.0, V_{SS}=0V, T_a=+25^\circ C$

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Address Delay Time	$t_{d1}$		250	ns
CE Fall Delay Time (Read)	$t_{d2}$		180	ns
CE Rise Delay Time (Read)	$t_{d3}$		180	ns
Data Setup Time	$t_{DS}$	0		ns
Data Hold Time	$t_{DH}$	30		ns
CE Fall Delay Time (Write)	$t_{d4}$		200	ns
CE Rise Delay Time (Write)	$t_{d5}$		200	ns
R/W Fall Delay Time	$t_{d6}$		180	ns
R/W Rise Delay Time	$t_{d7}$		180	ns
Data Stable Time	$t_{d8}$		450	ns
Data Hold Time	$t_{d9}$		200	ns

Condition:  $V_{DD}=+5.0, V_{SS}=0V, T_a=+25^\circ C$

