HIGHNESS™

One of a kind

HM043WQ201TV

4.3" Color TFT-LCD

Release Date
15th Feb 2020

HIGHNESS MICROELECTRONICS LTD.
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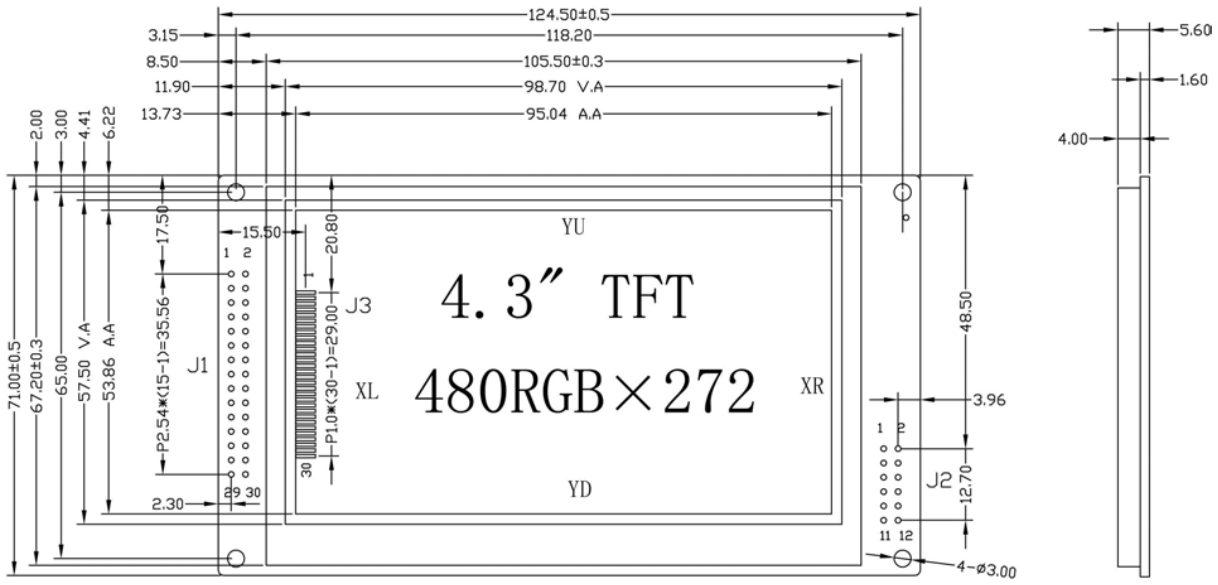
1. General Specifications

ITEM	Standard Value	UNIT
Size	4.3	Inch
Display Type	480×RGB × 272 (TFT)	Dots
Module Dimension	124.5(L) ×71.0(W) ×5.6/10.2(T)	mm
Viewing Area	98.7(L) × 57.5(W)	mm
Active Area	95.04 (L) × 53.86(W)	mm
Pixel pitch	0.066(L) × 0.198 (W)	mm
LCD Type	TFT, Positive, Transmissive	
Viewing Direction	12 O’clock or 6 O’clock	
Backlight Type	7 White LEDs In Series	
Controller IC	RA8875	
Font Rom IC	GT30L32S4W	
MPU Interface	8080/6800 8bit/16-bit Parallel,3-wire,4-wire SPI,IIC	
With/Without TP	With RTP	
Surface	Anti-Glare	

Note：Color tone slight changed by temperature and driving voltage

2. EXTERNAL DIMENSIONS



3. Interface Pin Description（J1,J3 PIN:）

8080 (Default Mode):(R21 R80 R15 R12 R3 USE, R22 R68 R14 R13 R2 R4 R5 NO USE)

Pin No	SYMBOL	LEVEL	FUNCTION
1	CS	L	Parallel Mode Chip select Input. Active "L".
2	RS	H/L	Data or command selection H: Command L: Display data
3	WR(R/W)	H/L	Write signal for 8080 MCU.
4	RD(E)	H/L	Read signal for 8080 MCU.
5	/RESET	L	Reset Signal. Active "L". （RC Reset circuit on board.）
6~13	DB0~DB7	H/L	Data bus for 8-bit data bus mode. Low order data bus for 16-bit data bus mode.
14~21	DB8~DB15	H/L	High order data bus for 16-bit data bus mode. Keep DB8 to DB15 open when 8-bit data bus mode is used.
22	WAIT	L	Wait Signal Output. Active "L".
23~26	NC	—	No connection
27	INT	L	Interrupt signal output. Active "L".
28	LEDA	3.3V/5.0V	LED Backlight Anode
29	VSS	0V	Power Ground
30	VDD	3.3V/5.0V	Power Supply For Logic

6800 Parallel Mode:(R21 R68 R15 R12 R2 USE, R22 R80 R14 R13 R3 R4 R5 NO USE)

Pin No	SYMBOL	LEVEL	FUNCTION
1	CS	L	Parallel Mode Chip select Input. Active "L".
2	RS	H/L	Data or command selection H: Command L: Display data
3	WR(R/W)	H/L	R/W signal for 6800 MCU.
4	RD(E)	H/L	Enable signal for 6800 MCU.
5	/RESET	L	Reset Signal. Active "L". （RC Reset circuit on board.）
6~13	DB0~DB7	H/L	Data bus for 8-bit data bus mode. Low order data bus for 16-bit data bus mode.
14~21	DB8~DB15	H/L	High order data bus for 16-bit data bus mode. Keep DB8 to DB15 open when 8-bit data bus mode is used.
22	WAIT	L	Wait Signal Output. Active "L".
23~26	NC	—	No connection
27	INT	L	Interrupt signal output. Active "L".
28	LEDA	3.3V/5.0V	LED Backlight Anode
29	VSS	0V	Power Ground
30	VDD	3.3V/5.0V	Power Supply For Logic

3- SPI Mode:(R22 R15 R13 USE, R21 R14 R12 R2 R3 R4 R5 NO USE)

Pin No	SYMBOL	LEVEL	FUNCTION
1~4	NC	—	No connection
5	/RESET	L	Reset Signal. Active "L". （RC Reset circuit on board.）
6~21	NC	—	No connection
22	WAIT	L	Wait Signal Output. Active "L".
23	SCS	L	SPI Chip Select
24	SCL	H/L	SPI Clock
25	SDO	H/L	3-wire SPI Data
26	NC	—	No connection
27	INT	L	Interrupt signal output. Active "L".
28	LEDA	3.3V/5.0V	LED Backlight Anode
29	VSS	0V	Power Ground
30	VDD	3.3V/5.0V	Power Supply For Logic

4- SPI Mode:(R22 R14 R12 USE, R21 R15 R13 R2 R3 R4 R5 NO USE)

Pin No	SYMBOL	LEVEL	FUNCTION
1~4	NC	—	No connection
5	/RESET	L	Reset Signal. Active "L". （RC Reset circuit on board.）
6~21	NC	—	No connection
22	WAIT	L	Wait Signal Output. Active "L".
23	SCS	L	SPI Chip Select
24	SCL	H/L	SPI Clock
25	SDO	H/L	4-wire SPI Data Output
26	SDI	H/L	4-wire SPI Data Input
27	INT	L	Interrupt signal output. Active "L".
28	LEDA	3.3V/5.0V	LED Backlight Anode
29	VSS	0V	Power Ground
30	VDD	3.3V/5.0V	Power Supply For Logic

IIC Mode: (R22 R14 R13 R2 R4 USE, R21 R15 R12 R3 R5 NO USE)

Pin No	SYMBOL	LEVEL	FUNCTION
1~4	NC	—	No connection
5	/RESET	L	Reset Signal. Active "L". （RC Reset circuit on board.）
6~21	NC	—	No connection

22	WAIT	L	Wait Signal Output. Active "L".
23	NC	—	No connection
24	SCL	H/L	SPI Clock
25	NC	—	No connection
26	SDI	H/L	IIC data
27	INT	L	Interrupt signal output. Active "L".
28	LEDA	3.3V/5.0V	LED Backlight Anode
29	VSS	0V	Power Ground
30	VDD	3.3V/5.0V	Power Supply For Logic

Note: VDD=3.3V(Default Mode): R39=0R, NO Use U3 ;
VDD=5.0V: NO Use R39, U3=LM1117-3.3.

4. KEYSCAN Interface(4x5 keyboard Interface)

J2 PIN:

ITEM	SYMBOL	LEVEL	FUNCTION
1	VDD	3.3V	Power Supply For Logic
2	VSS	0V	Power Ground
3	GPIX	H/L	Extra GPI (General Purpose Input) Additional GPI signal, if don't use, please connect it to GND.
4,6,8, 10,12	KIN4~KIN0 (GPI4~GPI0)	H/L	Keypad Data Line or GPIs (General Purpose Input) Keypad data inputs (Default), please add pull-up resister. They could be programmed as GPIs by register setting, if don't use, please connect it to GND.
5,7,9, 11	KOUT3~KOUT0 (GPO3~GPO0)	H/L	Keypad Strobe Line or GPOs (General Purpose Output) Keypad matrix strobe lines outputs with open-drain. (Default). They could be programmed as GPOs by register setting, if don't use, please keep floating.

5. Absolute Maximum Ratings

Item	Symbol	Min	Typ.	Max.	Unit
Power Supply Voltage	VDD	-0.5	-	+5.5	V
Logic Signal Voltage	VDDIO	-0.5	-	+3.3	V
Operating Temperature	T_{OP}	-20	-	+70	℃
Storage Temperature.	T_{ST}	-30	-	+80	℃
Humidity	RH	-		90%(MAX60℃)	RH

6. Electrical Characteristics

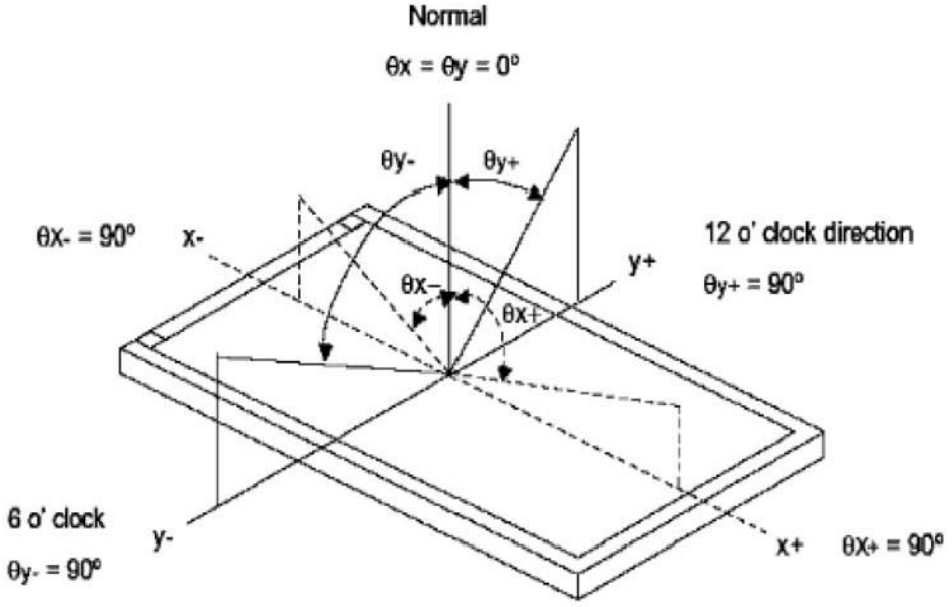
Item	Symbol	Min.	Type	Max.	Unit
Power Supply Voltage(*1)	VDD	3.0	3.3	3.6	V
		4.8	5.0	5.2	V
Logic Signal I/O Supply Voltage	VDDIO	3.0	3.3	3.6	V
Input Voltage “H” level	V_{IH}	0.8 VDDIO	-	VDDIO	V
Input Voltage “L” level	V_{IL}	VSS	-	0.2 VDDIO	V
Output Voltage “H” level	V_{OH}	VDDIO-0.4	-	VDDIO	V
Output Voltage “L” level	V_{OL}	VSS	-	VSS+0.4	V
Schmitt-Trigger input(*2)					
Input Voltage “H” level	V_{IH}	0.7VDDIO	-	VDDIO	V
Input Voltage “L” level	V_{IL}	VSS	-	0.3 VDDIO	V
Input leakage current 1(*3)	IH	-	+	+2	μA
Input leakage current 2(*3)	IL	-		-2	μA
Model Current	IDD(3.3V)	-	-	230	mA
	IDD(5.0V)	-	-	180	mA
Sleep Mode(*3)	ISLP	-	320	-	μA

Note1: Use R39 if VDD=3.3V.
Note2: Singnals RD,WR CS,RS, RST are input of Schmitt-Trigger.
Note3: Oscillator Clock=20MHZ,System Clock=20~60Mhz,VSYNC=45~65HZ,Ta = 25℃

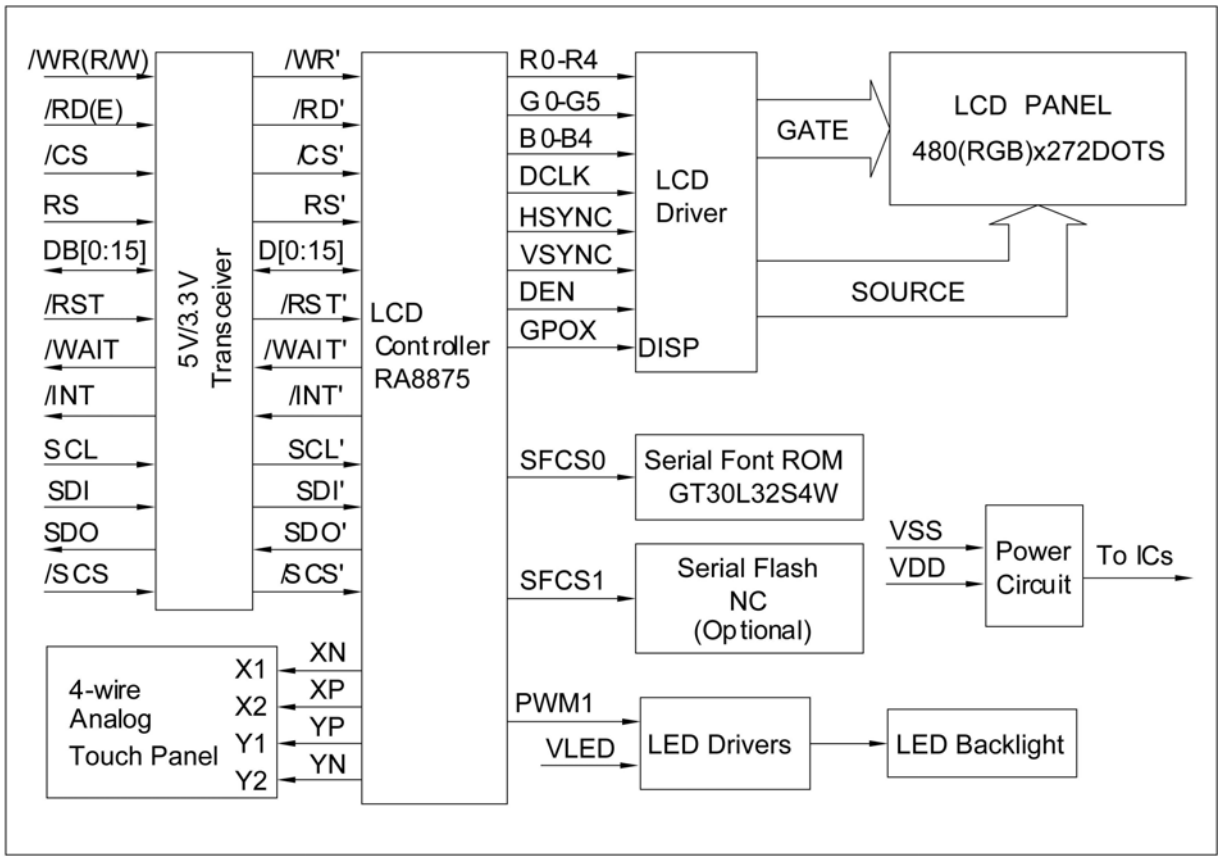
6.1 Optical Characteristics

ITEM		SYMBOL	CONDITIONS	SPECIFICATIONS			UNIT	NOTE
				MIN.	TYP.	MAX		
Brightness		B	Viewing normal angle	300	350	-	Cd/㎡	
Contrast Ratio		CR		400	500	--	—	
Response Time		Tr+Tf		—	25	30	ms	
Chromaticity Coordinate (Transmissive)	Red	X		0.551	0.591	0.631		
		Y		0.270	0.310	0.350		
	Green	X		0.302	0.342	0.382		
		Y		0.516	0.561	0.601		
	Blue	X		0.105	0.145	0.185		
		Y		0.047	0.087	0.127		
	White	X		0.250	0.300	0.350		
		Y		0.270	0.320	0.370		
Viewing Angle	Hor.	θ_{X+}	Center CR>=10	60	70	--	Deg.	
		θ_{X-}		60	70	--		
	Ver.	θ_{Y+}		40	50	--		
		θ_{Y-}		60	70			
Uniformity	Un			80	--		%	

Note 1 : Definition of Viewing Angle θ_x and θ_y :



7. BLOCK DIAGRAM



8. Backlight Driving Conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Voltage for LED Backlight	VL	23.2	25.6	27.2	V	Note 2
Current for LED Backlight	IL	36	40	44	mA	
LED life time	-	20,000	-	-	Hr	Note 1

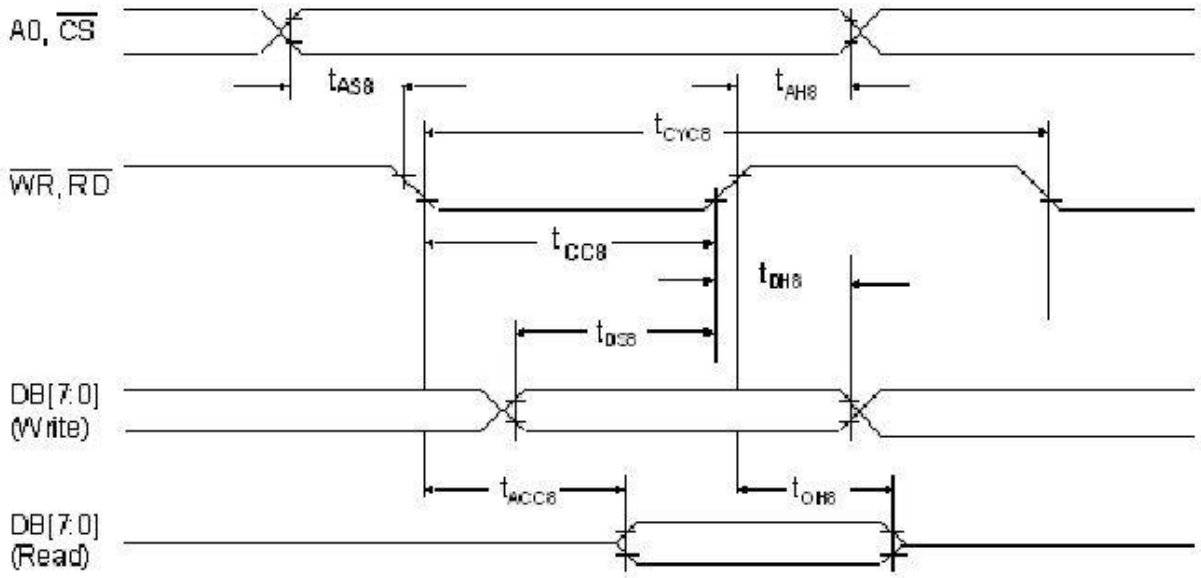
Note 1: The “LED life time” is defined as the module brightness decrease to 50% original brightness that the ambient temperature is 25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is lager than 40 mA.

Note 2: The LED Supply Voltage is defined by the number of LED at Ta=25℃ and IL=40mA.

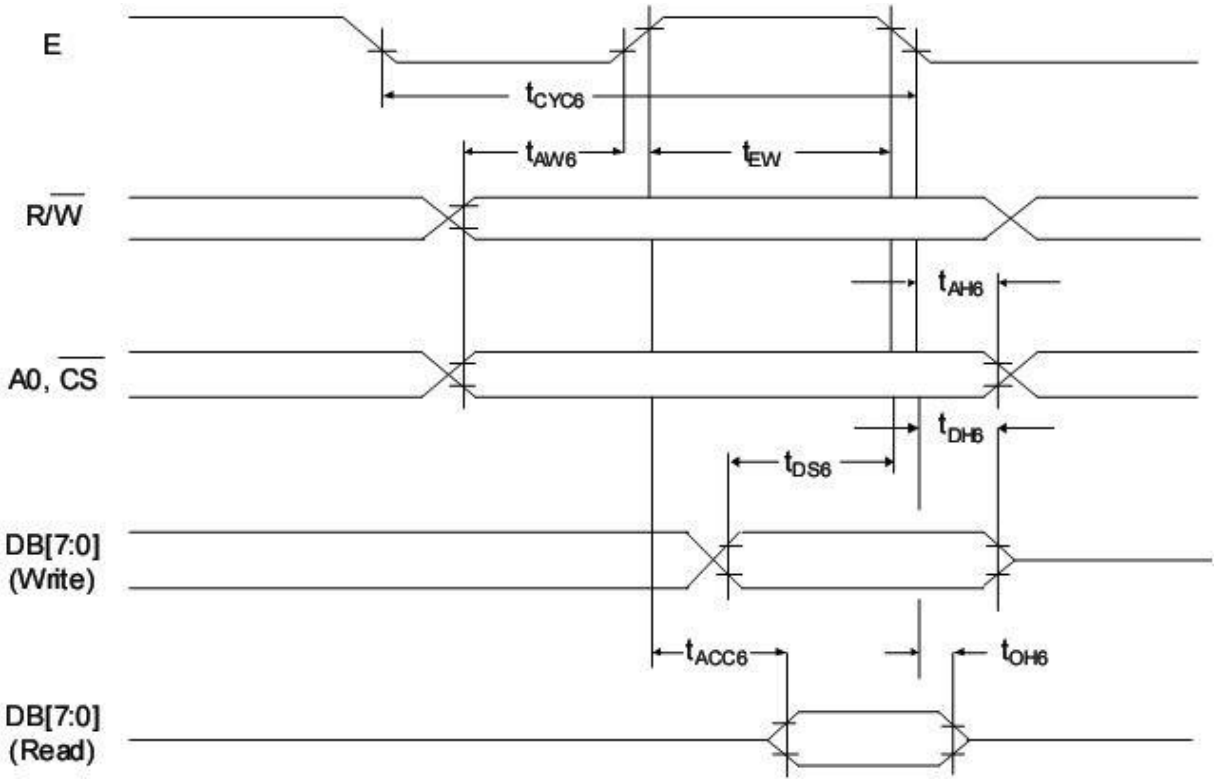
9. RA8875 DATASHEET

9.1 Timing Characteristics

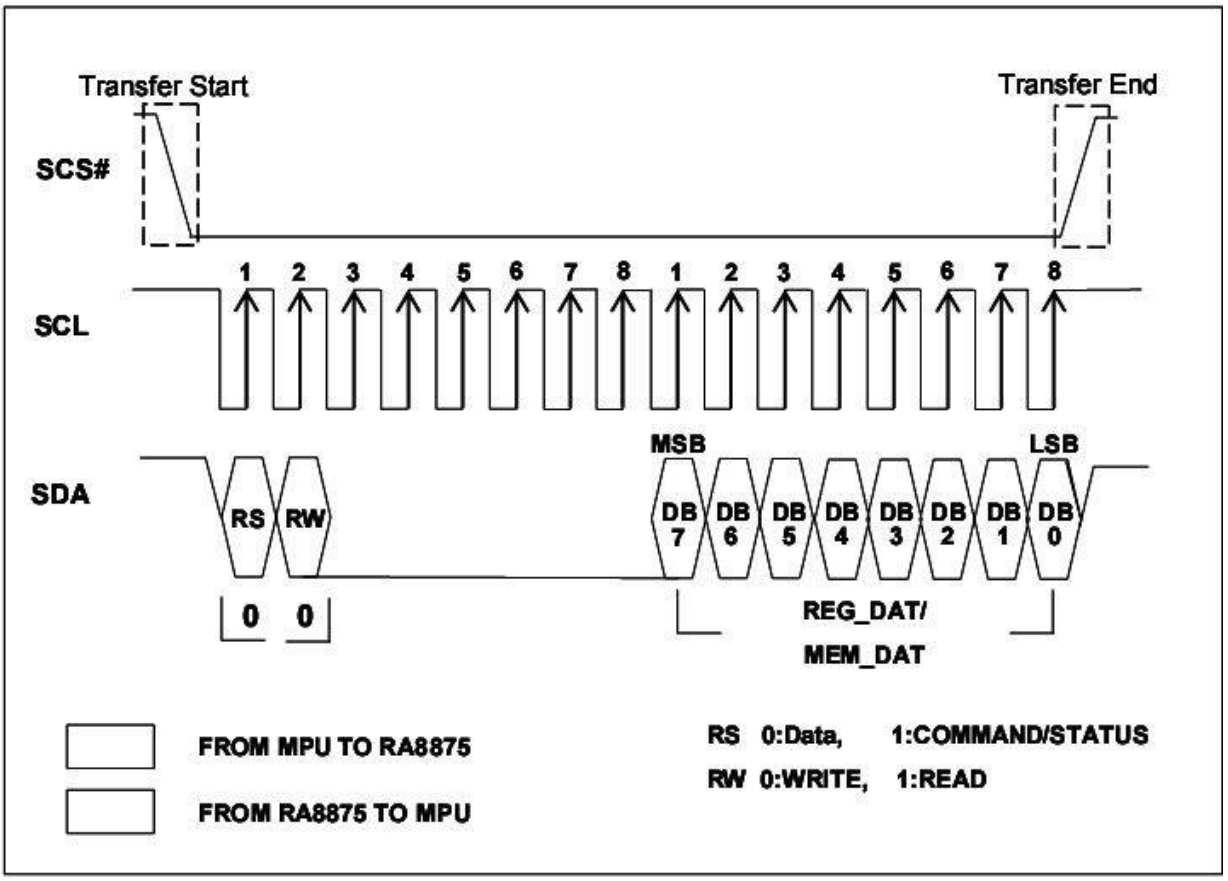
8080 family Interface Timing



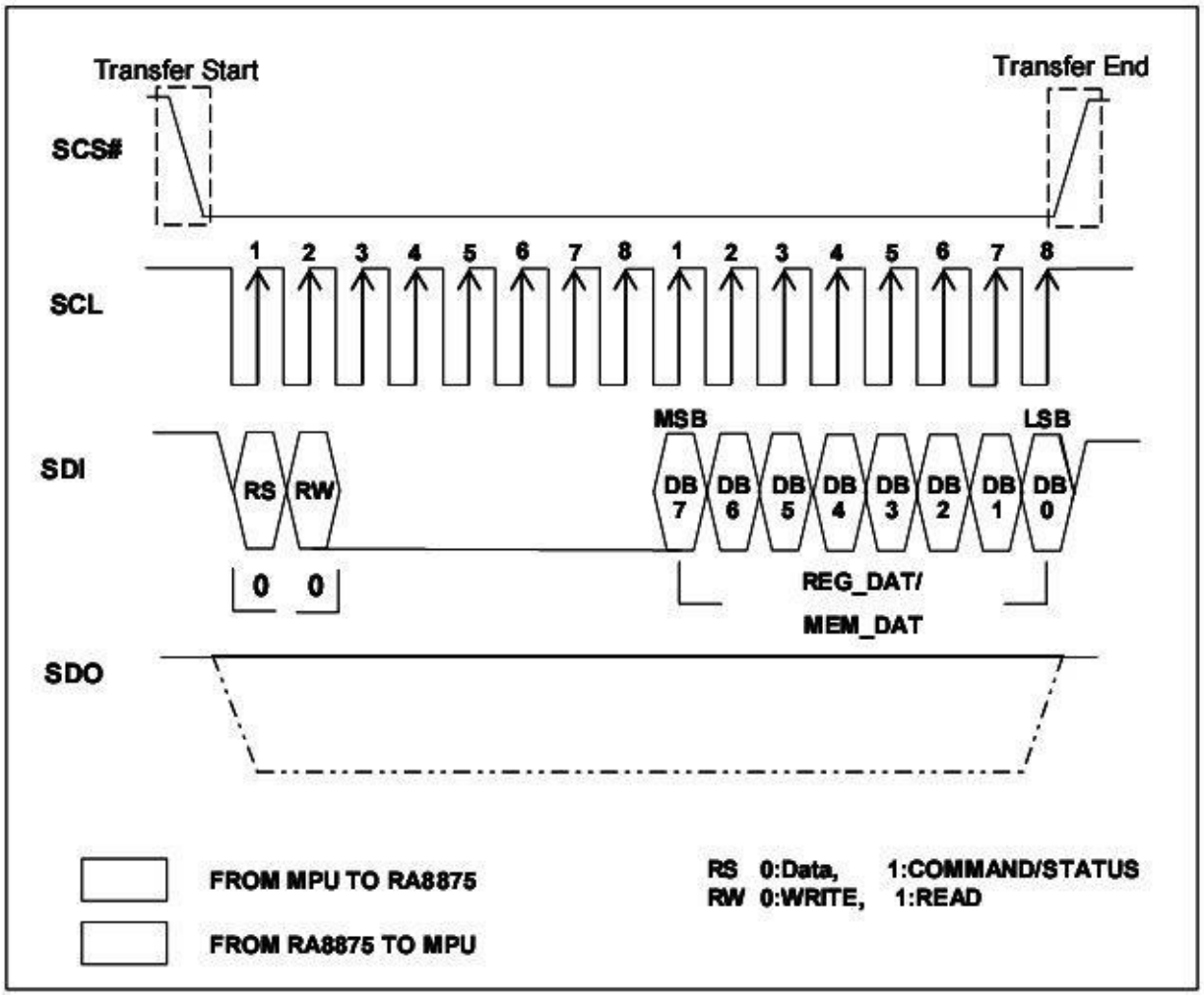
6800 family Interface Timing



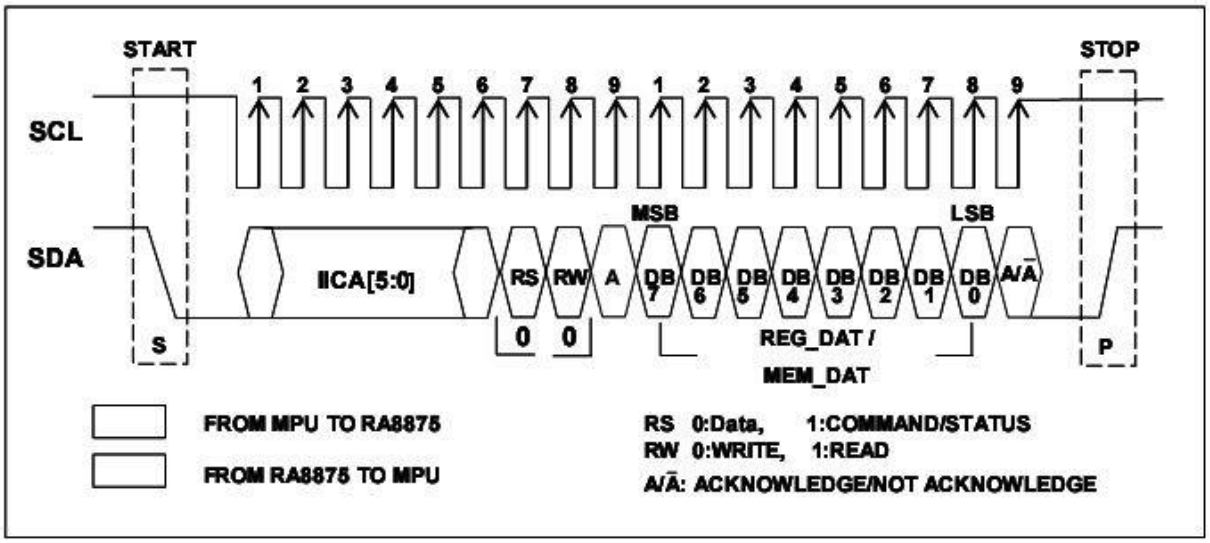
SPI3 Interface Timing



SPI4 Interface Timing



I2C Interface Timing



*Please refer to RA8875 DATASHEET.

9.2 Command List

The Categories of the Instruction Registers

No.	Command Registers	Address
1	System and Configuration Registers	01h], [02h], [04h], [10h] ~ [1Fh]
2	LCD Display Control Registers	[20h] ~ [29h]
3	Active Window Setting Registers	[30h] ~ [3Fh]
4	Cursor Setting Registers	[40h] ~ [4Eh]
5	BTE Control Registers	[50h] ~ [67h]
6	Touch Panel Control Registers	[70h] ~ [74h]
7	Graphic Cursor Setting Registers	[80h] ~ [85h]
8	PLL Setting Registers	[88h], [89h]
9	PWM Control Registers	[8Ah] ~ [8Eh]
10	Drawing Control Registers	[90h] ~ [ACh]
11	DMA Control Registers	[B0h] ~ [BFh]
12	KEY & IO Control Registers	[C0h] ~ [C7h]
13	Floating Window Control Registers	[D0h] ~ [DBh]
14	Serial Flash Control Registers	[E0h] ~ [E2h]
15	Interrupt Control Registers	[F0h] ~ [F1h]

Please refer to RA8875 DATASHEET.

10. DESIGN AND HANDING PRECAUTION

10.1. The LCD panel is made by glass. Any mechanical shock (eg. Dropping form high place) will damage the LCD module. Do not add excessive force on the surface of the display, which may cause the Display color change abnormally.

10.2. The polarizer on the LCD is easily get scratched. If possible, do not remove the LCD protective film until the last step of installation.

10.3. Never attempt to disassemble or rework the LCD module.

10.4. Only Clean the LCD with Isopropyl Alcohol or Ethyl Alcohol. Other solvents (eg. water) may damage the LCD.

10.5. When mounting the LCD module, make sure that it is free form twisting, warping and distortion.

10.6. Ensure to provide enough space (with cushion) between case and LCD panel to prevent external force adding on it, or it may cause damage to the LCD or degrade the display result

10.7. Only hold the LCD module by its side. Never hold LCD module by add force on the heat seal or TAB.

10.8. Never add force to component of the LCD module. It may cause invisible damage or degrade of the reliability.

10.9. LCD module could be easily damaged by static electricity. Be careful to maintain an optimum anti-static work environment to protect the LCD module.

10.10. When peeling of the protective film form LCD, static charge may cause abnormal display pattern. It is normal and will resume to normal in a short while.

10.11. Take care and prevent get hurt by the LCD panel edge.

10.12. Never operate the LCD module exceed the absolute maximum ratings.

10.13. Keep the signal line as short as possible to prevent noisy signal applying to LCD module.

10.14. Never apply signal to the LCD module without power supply.

10.15. IC chip (eg. TAB or COG) is sensitive to the light. Strong lighting environment could possibly cause malfunction. Light sealing structure casing is recommend.

10.16. LCD module reliability may be reduced by temperature shock.

10.17. When storing the LCD module, avoid exposure to the direct sunlight, high humidity, high temperature or low temperature. They may damage or degrade the LCD module