

GYTF018LB35B0M

TFT LCD MODULE
1.77" 128RGB*160 DOTS

MODULE NO.: GYTF018LB35B0M

REVISION: A00

Customer Approval:

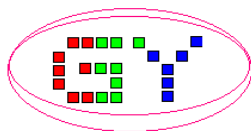
	SIGNATURE
PREPARED BY	ANDY YI
CHECKED BY	
APPROVED BY	



GYTF018LB35B0M

Record of Revision

Rev	Issued Date	Description
0.0	Mar. 20, 2008	New Create



CONTENTS

1.	GENERAL SPECIFICATIONS	-----	3
2.	FEATURES	-----	3
3.	MECHANICAL SPECIFICATIONS	-----	3
4.	OUTLINE DIMENSIONS	-----	4
5.	INTERFACE ASSIGNMENT	-----	5
6.	APPLICATION CUICIRT	-----	5
7.	BLOCK DIAGRAM	-----	5
8.	TIMING CHARACTERISTICS	-----	7
9.	RESET TIMING CHARACTERISTICS	-----	8
10.	POWER ON/OFF SEQUENCE	-----	8
11.	INITIALIZED CODE	-----	9
12.	INSTRUCTION TABLE	-----	10
13.	DDRAM ARRANGMENT	-----	12
14.	ABSOLUTE MAXIMUM RATINGS	-----	13
15.	ELECTRICAL CHARACTERISTICS	-----	13
16.	LED BACKLIGHT CHARACTERISTICS	-----	14
17.	OPTICAL CHARACTERISTICS	-----	15
18.	ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS	-----	18
19.	RELIABILITY	-----	18



GYTF018LB35B0M

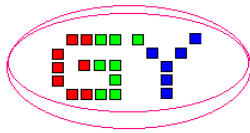
1. FEATURES

The 1.77"(4.487cm) LCD module is an active matrix color TFT LCD module. LTPS (Low Temperature Poly Silicon) TFT technology is used. Vertical drivers are built on the panel.

Built-in Controller: ST7735

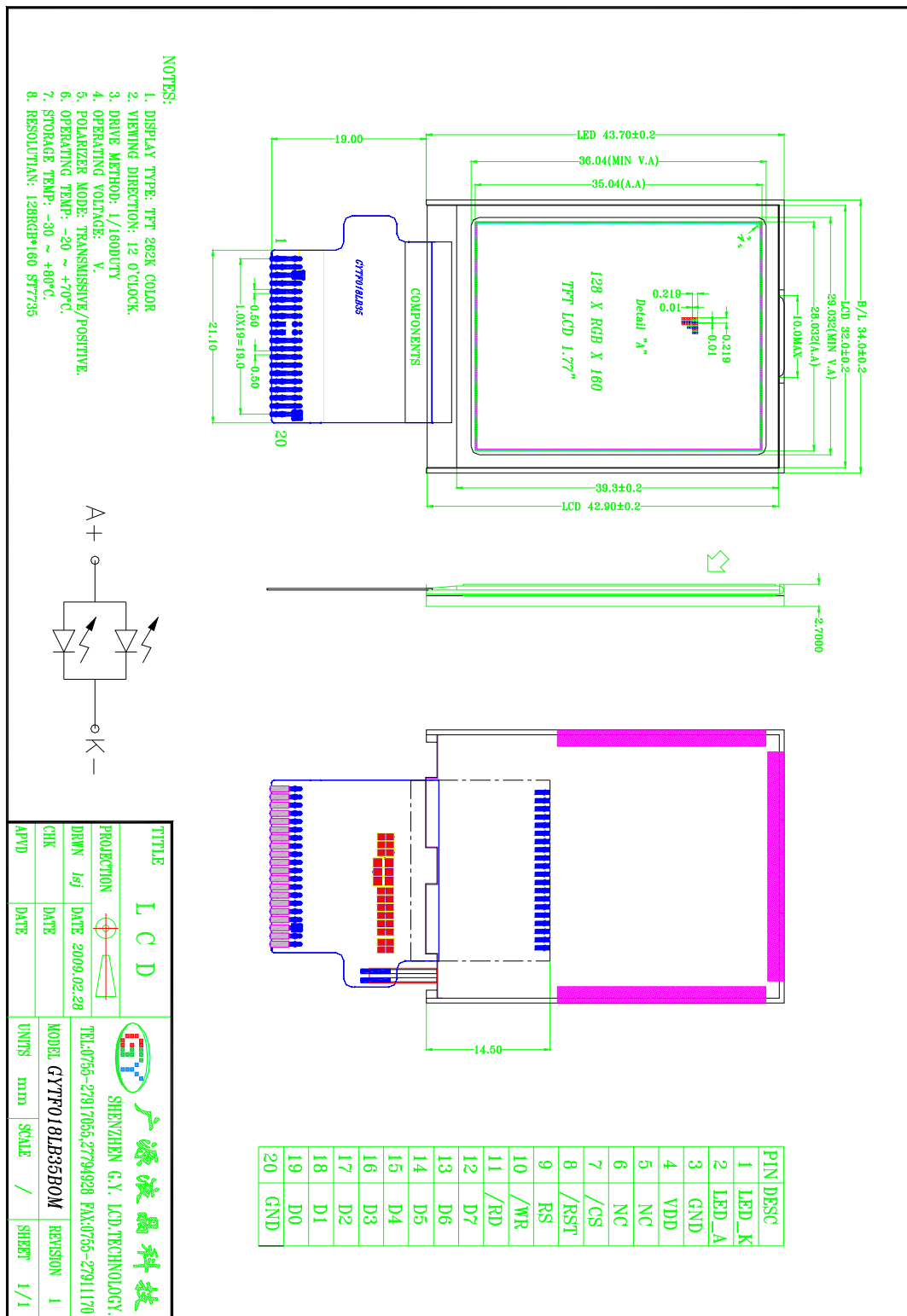
2. GENERAL SPECIFICATIONS

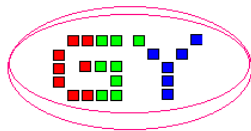
Item	Description	Unit
OUT LINE DIMENSIONS	34(W)x43.78(H)x2.6MAX(T)	mm
ACTIVE AREA	28.03(W) x35.04(H)	mm
DISP.CONSTRUCTION	128*160	---
NUMBER OF DOTS	128*3*160	Dots
DOT SIZE	0.06(W) x 0.18(H)	mm
ASSY.TYPE	COG+FPC+BL	---
BACKLIGHT	WHITE LED Backligh	-
WEIGHT	TBD	g



GYTF018LB35B0M

4.OUTLINE DIMENSIONS

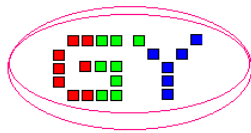




GYTF018LB35B0M

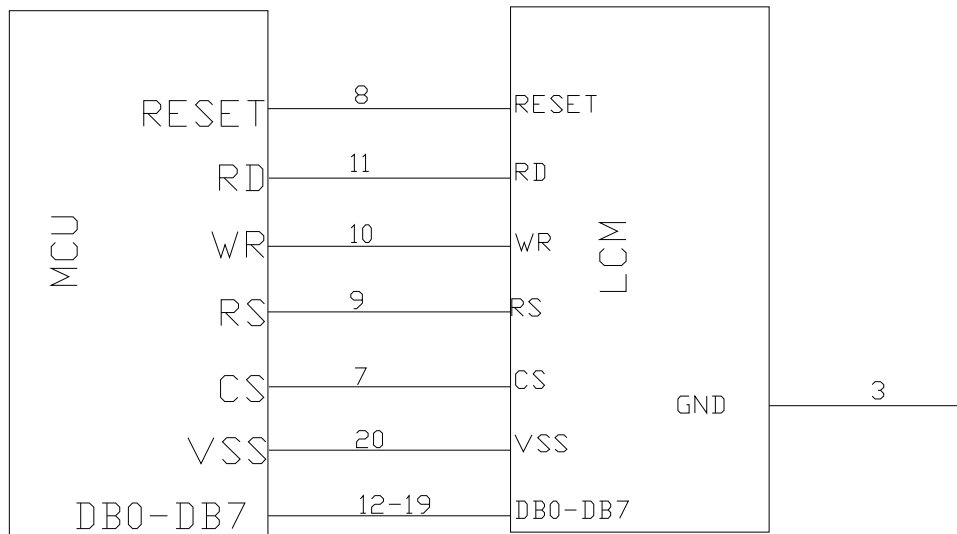
5. INTERFACE ASSIGNMENT

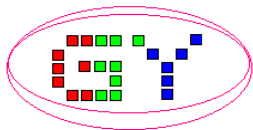
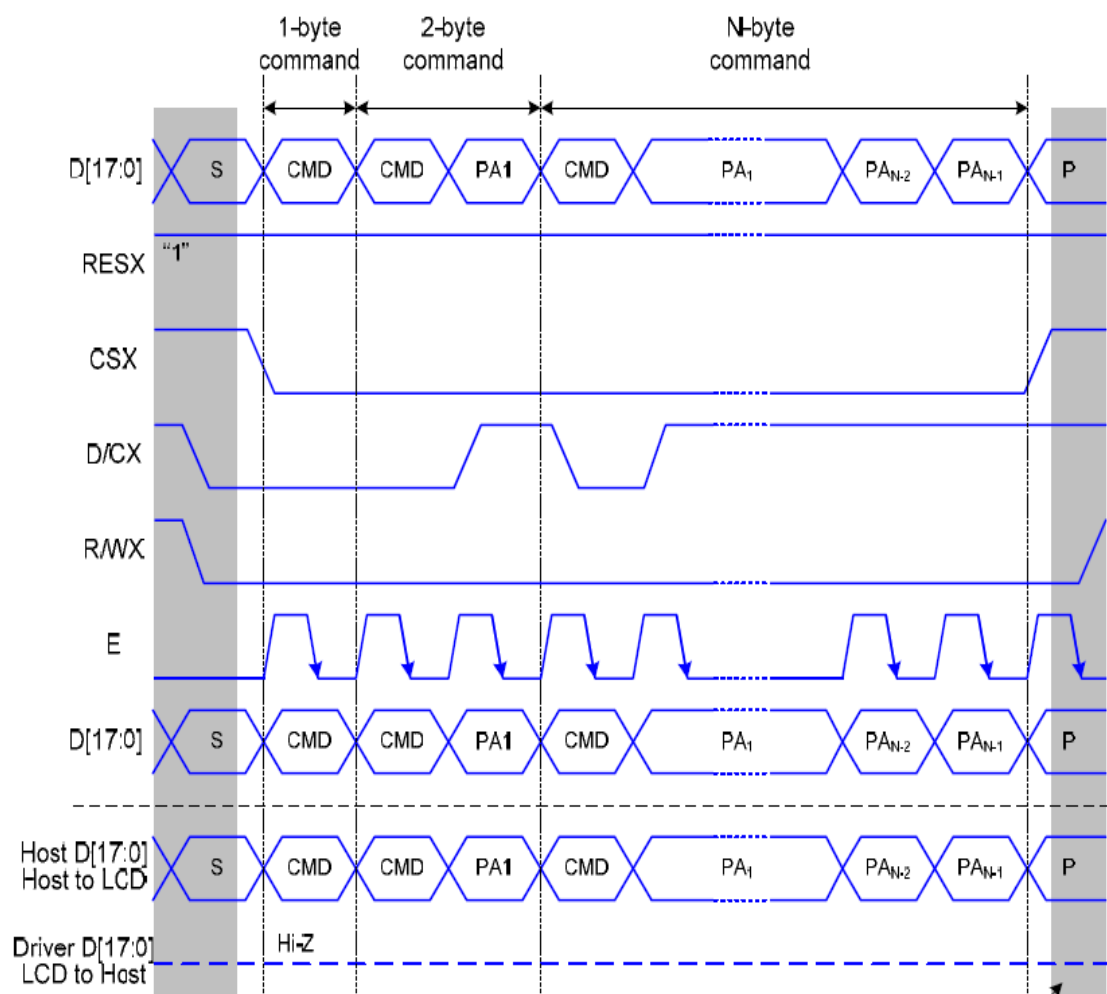
PIN NO.		SYMBOL
1	POWER SUPPLY FOR LED BACKLIGHT CATHODE	LED-
2	POWER SUPPLY FOR LED BACKLIGHT ANODE	LED+
3	GROUND	GND
4	POWER SUPPLY FOR DIGIT	VDD
5	NO CONNECTOR	NC
6	NO CONNECTOR	NC
7	CHIP SELECT SIGNAL	CS
8	RESET SIGNAL PIN	RESET
9	DATA/COMMAND SELECT SIGNAL	RS
10	WRITE SIGNAL PIN	WR
11	READ SIGNAL PIN	RD
12	8 BIT SELECT PIN	RD07
13		RD06
14		RD05
15		RD04
16		RD03
17		RD02
18		RD1
19		DB0
20	GROUND	VSS

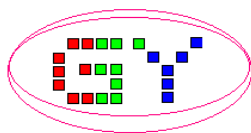
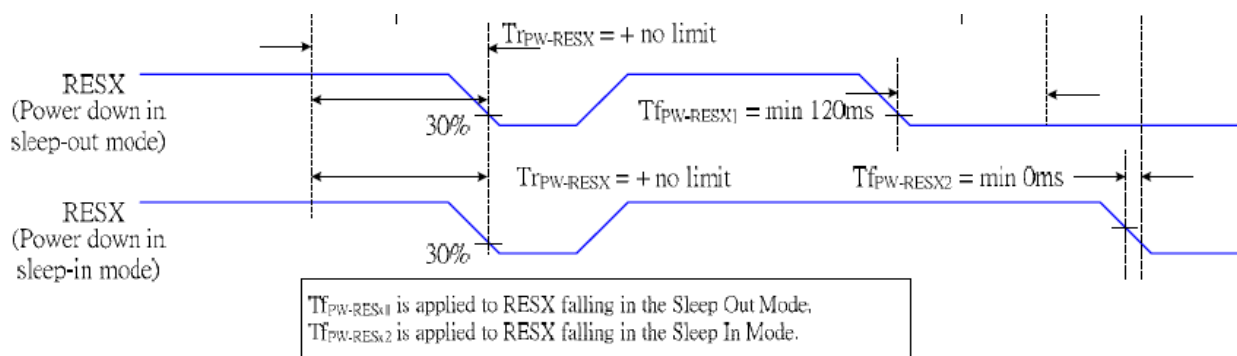
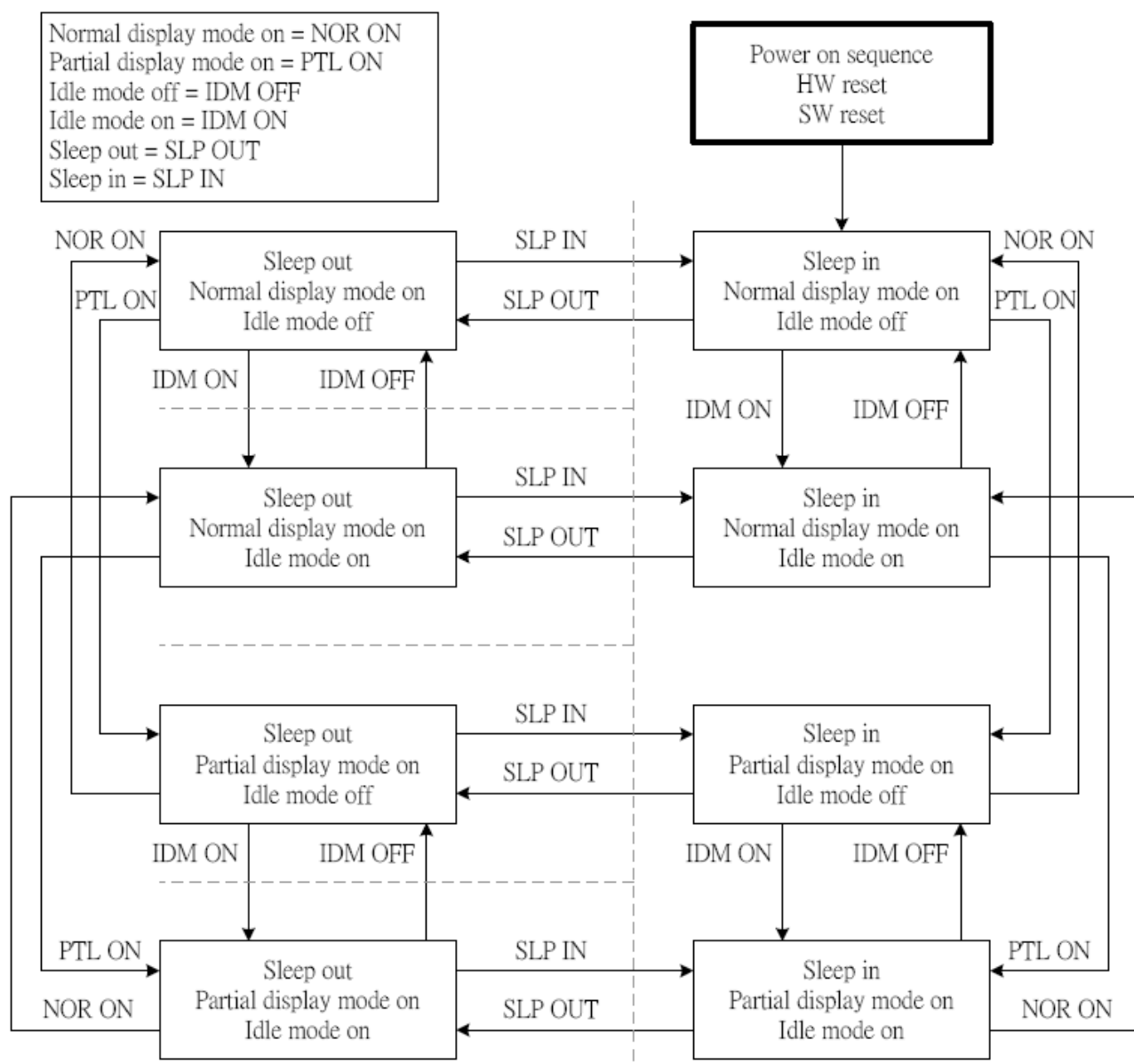


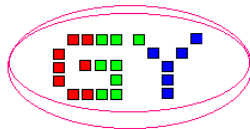
GYTF018LB35B0M

6.APPLICATION CUICIRT



**7.TIMING CHARACTERISTICS**

**8. RESET TIMING CHARACTERISTICS****9. POWER ON/OFF SEQUENCE**



10. Instruction Table

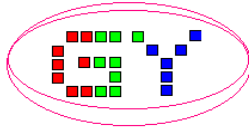
Table 7.4.5 Vertical and Horizontal Timing for RGB I/F

Item	Symbol	Condition	Specification			Unit
			Min	Type.	Max	
Vertical Timing						
Vertical cycle period	TVP	GM="00", "01"	163	164		HS
	TVP	GM="10"	131	132		HS
	TVP	GM="11"	165	166		HS
Vertical low pulse width	TVS		1		4	HS
Vertical front porch	TVFP		1	1	1023	HS
Vertical back porch	TVBP		1		1022	HS
Vertical data start line		TVS + TVBP	2	3	1023	HS
Vertical blanking period	TVBL	TVS + TVBP + TVFP	3	4	1023	HS
Vertical active area	TVDISP	GM="00", "01"		160		HS
	TVDISP	GM="10"		128		
	TVDISP	GM="11"		162		
Vertical refresh rate	TVRR	Frame rate	61.75	65	68.25	Hz
Horizontal Timing						
Horizontal cycle period	THP	GM="00", "10"	131	148	511	PCLK
	THP	GM="01"	123	140	511	PCLK
	THP	GM="11"	135	152	511	PCLK
Horizontal low pulse width	THS		1		63	PCLK
Horizontal front porch	THFP		1		63	PCLK
Horizontal back porch	THBP		1		62	PCLK
		THS + THBP	1	10	63	PCLK
Horizontal data start point		ff HS + fHBP	TBD			μs
Horizontal blanking period	THBL		3	20	256	PCLK
Horizontal active area	THDISP	GM="00", "10"		128		PCLK
		GM="01"		120		PCLK
		GM="11"		132		PCLK
Pixel clock cycle	TPCLKCYC	GM="00"	100	634	720	ns
	IPCLKCYC	TVRR=65Hz	1.39	1.58	10	MHz
	TPCLKCYC	GM="01"	100	670	767	ns
	IPCLKCYC	TVRR=65Hz	1.30	1.49	10	MHz
	TPCLKCYC	GM="10"	100	788	896	ns
	IPCLKCYC	TVRR=65Hz	1.12	1.27	10	MHz
	TPCLKCYC	GM="11"	100	610	691	ns
	IPCLKCYC	TVRR=65Hz	1.45	1.64	10	MHz

Note 1. VDD1=1.6 to 3.3V, VDD=2.6 to 3.3V, AGND=DGND=0V, Ta=-30 to 70 °C (to +85 °C no damage)

Note 2. Data lines can be set to "High" or "Low" during blanking time - Don't care.

Note 3. HP is multiples of eight PCLK.



GYTF018LB35B0M

8.1 Interface Type Selection

The selection of a given interfaces are done by setting P68, IM2, IM1, and IM0 pins as show in Table 8.1.1 and Table 8.1.2.

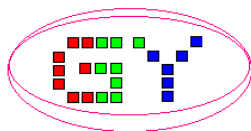
Table 8.1.1 MCU Interface Type Selection

P68	IM2	IM1	IM0	Interface	Read back selection
-	0	-	-	Serial interface	Via the read instruction (12-bit, 16-bit and 18-bit read parameter)
0	1	0	0	8080 MCU 8-bit Parallel	RDX strobe (8-bit read data and 8-bit read parameter)
0	1	0	1	8080 MCU 16-bit Parallel	RDX strobe (16-bit read data and 8-bit read parameter)
0	1	1	0	8080 MCU 9-bit Parallel	RDX strobe (9-bit read data and 8-bit read parameter)
0	1	1	1	8080 MCU 18-bit Parallel	RDX strobe (18-bit read data and 8-bit read parameter)
-	0	-	-	Serial interface	Via the read instruction (12-bit, 16-bit and 18-bit read parameter)
1	1	0	0	6800 MCU 8-bit Parallel	E strobe (8-bit read data and 8-bit read parameter)
1	1	0	1	6800 MCU 16-bit Parallel	E strobe (9-bit read data and 8-bit read parameter)
1	1	1	0	6800 MCU 9-bit Parallel	E strobe (16-bit read data and 8-bit read parameter)
1	1	1	1	6800 MCU 18-bit Parallel	E strobe (18-bit read data and 8-bit read parameter)

Table 8.1.2 Pin connection According to MCU Interface Type Selection

P68	IM2	IM1	IM0	Interface	RDX	WRX	D/CX	Read back selection
-	0	-	-	Serial interface	Note1	Note 1	SCL	D[17:1]: Unused, D0: SDA
0	1	0	0	8080 MCU 8-bit Parallel	RDX	WRX	D/CX	D[17:8]: Unused, D7-D0: 8-bit Data
0	1	0	1	8080 MCU 16-bit Parallel	RDX	WRX	D/CX	D[17:16]: Unused, D15-D0: 16-bit Data
0	1	1	0	8080 MCU 9-bit Parallel	RDX	WRX	D/CX	D[17:9]: Unused, D8-D0: 9-bit Data
0	1	1	1	8080 MCU 18-bit Parallel	RDX	WRX	D/CX	D17-D0: 18-bit Data
-	0	-	-	Serial interface	Note1	D/CX	SCL	D[17:1]: Unused, D0: SDA
1	1	0	0	6800 MCU 8-bit Parallel	E	WRX	RS	D[17:8]: Unused, D7-D0: 8-bit Data
1	1	0	1	6800 MCU 16-bit Parallel	E	WRX	RS	D[17:16]: Unused, D15-D0: 16-bit Data
1	1	1	0	6800 MCU 9-bit Parallel	E	WRX	RS	D[17:9]: Unused, D8-D0: 9-bit Data
1	1	1	1	6800 MCU 18-bit Parallel	E	WRX	RS	D17-D0: 18-bit Data

Note 1. Unused pins connect to DGND or VDDI level.

**11. DDRAM ARRANGEMENT****8.17.1.1 Reset Table (Default Value, GM=00, 128RGB x 160)**

Item	After Power On	After Hardware Reset	After Software Reset
Frame memory	Random	No Change	No Change
Sleep In/Out	In	In	In
Display On/Off	Off	Off	Off
Display mode (normal/partial)	Normal	Normal	Normal
Display Inversion On/Off	Off	Off	Off
Display Idle Mode On/Off	Off	Off	Off
Column: Start Address (XS)	0000h	0000h	0000h
Column: End Address (XE)	007Fh	007Fh	007Fh (127d) (when MV=0) 009Fh (159d) (when MV=1)
Row: Start Address (YS)	0000h	0000h	0000h
Row: End Address (YE)	009Fh	009Fh	009Fh (159d) (when MV=0) 007Fh (127d) (when MV=1)
Gamma setting	GC0	GC0	GC0
Colour Set	See Section 8.18	See Section 8.18	No Change
Partial: Start Address(PSL)	0000h	0000h	0000h
Partial: End Address (PEL)	009Fh	009Fh	009Fh
Scroll: Vertical scrolling	Off	Off	Off
Scroll: Top Fixed Area (TFA)	0000h	0000h	0000h
Scroll: Scroll Area (VSA)	00A0h	00A0h	00A0h
Scroll: Bottom Fixed Area (BFA)	0000h	0000h	0000h
Scroll Start Address (SSA)	0000h	0000h	0000h
Tearing: On/Off	Off	Off	Off
Tearing Effect Mode *3)	0 (Mode1)	0 (Mode1)	0 (Mode1)
Memory Data Access Control (MY/MX/MV/ML/MH/RGB)	0/0/0/0/0/0	0/0/0/0/0/0	No Change
Interface Pixel Color Format	6 (18-Bit/Pixel)	6 (18-Bit/Pixel)	No Change
RDDPM	08h	08h	08h
RDDMADCTR	00h	00h	No Change
RDDCOLMOD	6 (18-Bit/Pixel)	6 (18-Bit/Pixel)	No Change
RDDIM	00h	00h	00h
RDDSM	00h	00h	00h
RDDSDR	00h	00h	00h
ID1	38h	38h	38h
ID2	MTP value	MTP value	MTP value
ID3	MTP value	MTP value	MTP value

Notes 1. There will be no abnormal visible effects on the display when S/W or H/W Reset is applied.

Notes:2. Powered-On Reset finishes within 10 μ s after both VDD & VDDI are applied.

Notes:3. TE Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only.

**GYTF018LB35B0M****12. ABSOLUTE MAXIMUM RATING**

ITEM	SYMBOL	CONDITION	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY FOR LOGIC	VDD - VSS	Ta=25℃	-0.3	-	3.6	V
INPUT VOLTAGE	VIN	Ta=25℃	-0.3	-	VDD+0.3	V
OPERATION TEMPERATURE	TOPR	---	-20	-	70	℃
STORAGE TEMPERATURE	TSTG	---	- 30	-	80	℃

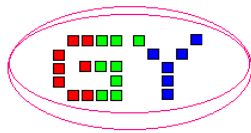
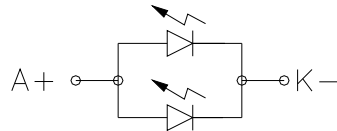
NOTES:

(1) LCM should be grounded during handling LCM.

13. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
POWER SUPPLY VOLTAGE	VDD - VSS	Ta= +25℃	2.8	2.8	3.3	V
POWER SUPPLY FOR LCD DRIVING	VLCD	Ta= +25℃	4.5	---	5.5	V
INPUT VOLTAGE "H" LEVEL	VIH	-	0.8VDD	-	VDD	V
INPUT VOLTAGE "L" LEVEL	VIL	-	VSS	-	0.2VDD	V
OUTPUT VOLTAGE "H" LEVEL	VOH	IOH=-500uA	0.8VDD	-	VDD	V
OUTPUT VOLTAGE "L" LEVEL	VOL	IOL=500uA	VSS	-	0.2VDD	V

Notes: 1. Voltages $V_0 \geq V_1 \geq V_2 \geq V_3 \geq V_4 \geq V_{SS}$ must always be satisfied.

**14.LED BACKLIGHT****14-1 POWER SUPPLY FOR EL BACKLIGHT****14-2 BACKLIGHT LIGHT CHARACTERISTICS**

PARAMETER	SYMBOL	CONDITIONS	STANDARD VALUE			UNIT
			MIN	TYP	MAX	
OPERATOR VOLTAGE	VF	VF=30MA	2.8	3.0	3.2	V
LUMINOUS INTENSITY	Iv		2000	2500	3000	Cd/m2
LUMINOUS TOLERANCE	IV-M		80			%
CHROMATICITY COORDINATES	X		0.27		0.31	
	Y		0.27		0.31	

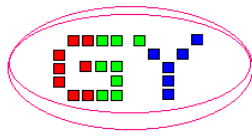


GYTF018LB35B0M

15.OPTICAL CHARACTERISTICS

Ta=25℃

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Contrast Ratio		CR	*1)		300	-	--
Response Time		Tr	*3)	-	10	30	ms
		Tf		-	15	40	ms
Viewing Angle	Vertical	θ*2)	CR≥10	30	(60)	-	°
				10	(55)	-	
	Horizontal	ψ*2)		30	(50)	-	°
				30	(50)	-	
Color Filter Chromaticity	White	x	0.301	(0.290)	(0.310)	(0.330)	--
		y	0.323	(0.321)	(0.341)	(0.361)	
	Red	x	0.615	(0.635)	(0.655)	(0.675)	--
		y	0.326	(0.309)	(0.329)	(0.349)	
	Green	x	0.281	(0.292)	(0.312)	(0.332)	--
		y	0.566	(0.555)	(0.575)	(0.595)	
	Blue	x	0.115	(0.114)	(0.134)	(0.154)	--
		y	0.100	(0.115)	(0.135)	(0.155)	
	Gamut				61.5%	-	



***1) Definition of contrast ratio :**

Measure contrast ratio on the below 5 points and take the average value.

Contrast ratio is calculated with the following formula :

Contrast Ratio (CR) = (White) Luminance of ON + (Black) Luminance of OFF

***2) Definition of Viewing Angle(θ, ψ), refer to Fig.2 as below :**

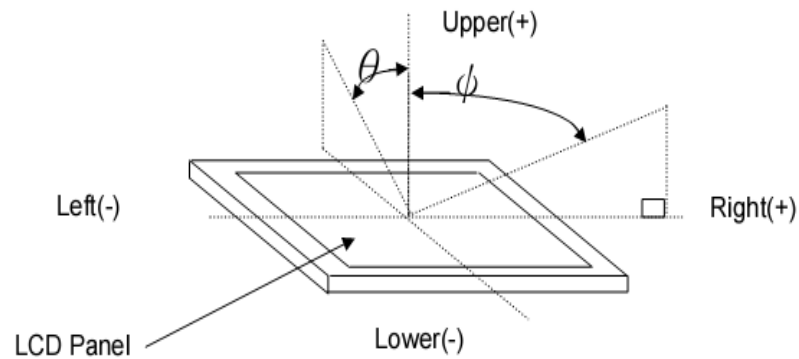
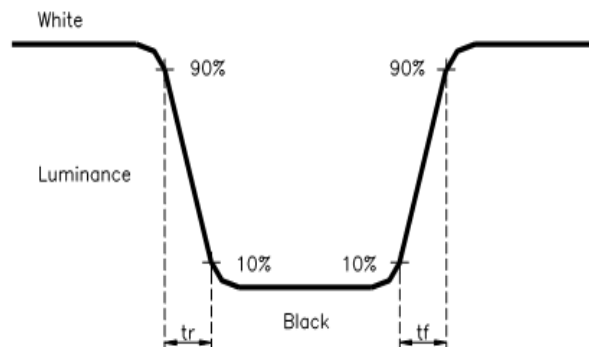
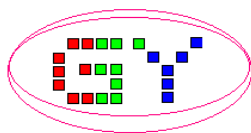


Fig.2 Definition of Viewing Angle

***3) Definition of Response Time.**

The response time is defined as the time interval between the 10% and 90% amplitudes. Refer to figure 3 as below.





GYTF018LB35B0M

16. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃ ~ +70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃ ~ +80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
HUMIDITY	-	--	WITHOUT CONDENSATION

17. RELIABILITY

19-1 RELIABILITY TEST

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERATURE +70℃ 24HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE -20℃ 12HRS	
STORAGE TEMPERATURE	HIGH TEMPERATURE +80℃ 24HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERATURE - 30℃ 12HRS	
HUMIDITY	40℃ 90%RH 12HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	<input type="checkbox"/> Operating Time: thirty minutes exposure for each direction (X,Y,Z) <input type="checkbox"/> Sweep Frequency: 10 ~ 55Hz (1 min) <input type="checkbox"/> Amplitude: 1.5mm	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20℃ (30mins) ↔ +65℃ (30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

*NOTE: TEST CONDITION

(1) TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION, TEMP. SET AT 25±2℃, HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE: SAMPLES SUBJECT TO THE TESTS SHALL BE IN "OPERATING" CONDITION