Sharp 640 x 480 512 Color TFT (Thin Film Transistor) panel specification (extracted)

FEATURES

Display Diagonal: 10.4"

Display Format: 640 480

Overall Dimensions:
283.0 (W) 217.0 (H) 25.0 (D) mm

Active Area: 211.2 (W) 158.4 (D) mm

Dot Pitch: 0.33 (W) 0.33 (H) mm

Viewing Angle: 6 O'Clock

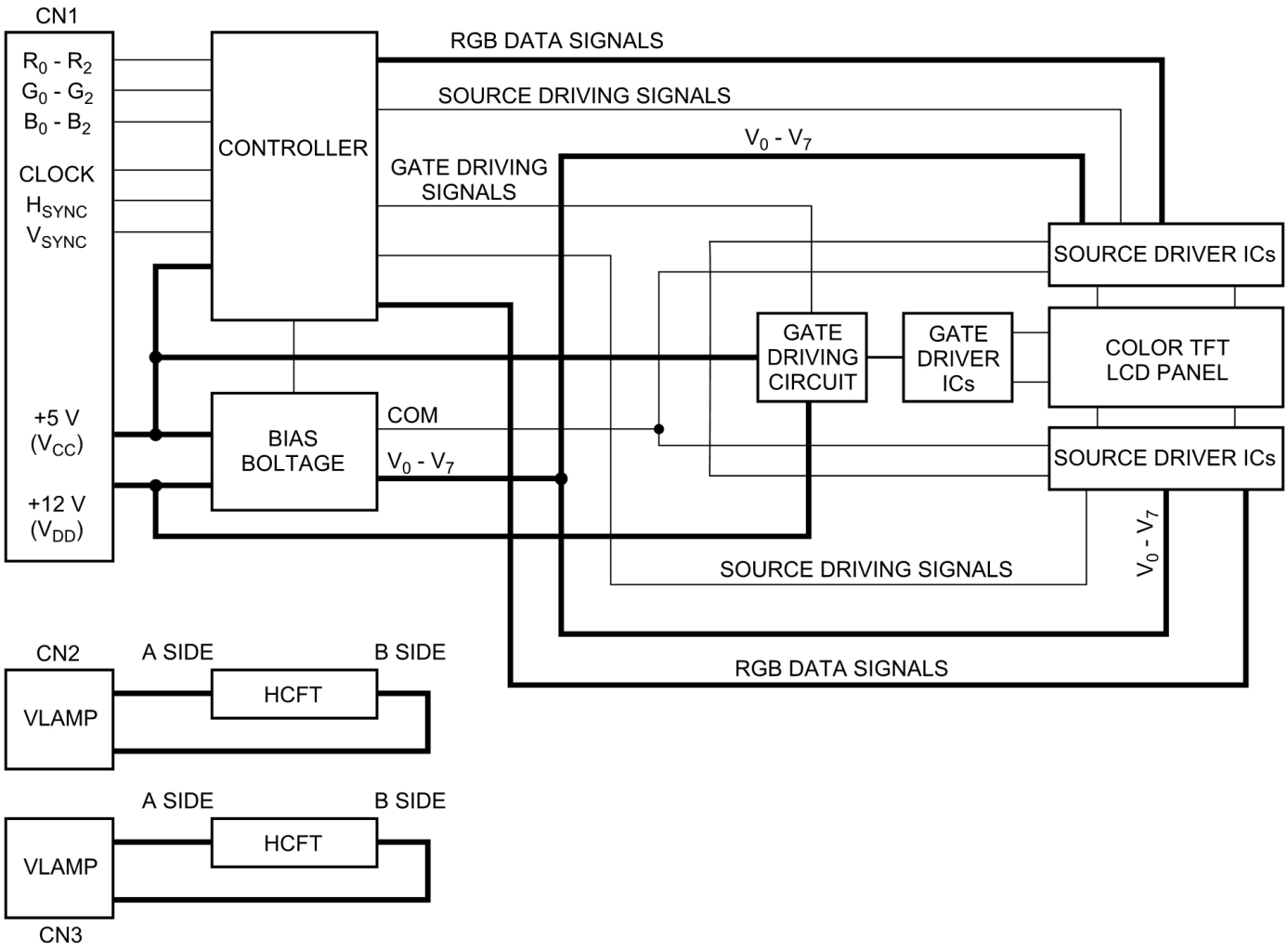
Bits Per Color: 3

Backlight: HCFT Dual Backlit

DESCRIPTION

The SHARP LQ10DH11 Color TFT-LCD module is an active matrix Liquid Crystal Display (LCD) incorporating amorphous silicon Thin Film Transistor (TFT). The module is composed of a color TFT-LCD panel, driver ICs, control circuit, and a power supply circuit. Graphics and text can be displayed on a 640 480 pixel panel in 512 colors by supplying a 9-bit data signal, three kinds of timing signals, +5 VDC and +12 VDC supply voltages, and supply voltage for the backlight. The detachable backlight case design allows easy replacement of backlight for user's convenience.

NOTE: A backlight-driving DC/AC inverter is not built into this module.



MECHANICAL SPECIFICATIONS

PARAMETER	SPECIFICATIONS	UNIT
Screen Size	10.4 (Diagonal)	inch
Active Area	211.2 (W) 158.4 (H)	mm
Display Pixels	640 480 (1 Pixel = R + G + B Dots)	pixel
Pixel Pitch	0.33 (W) 0.33 (H)	mm
Pixel Configuration	RGB Vertical Stripe	–
Display Mode	Normally White	–
Outline Dimensions	283 (W) 217 (H) 25 (D)	mm
Weight	960	g
Surface Treatment	Anti-Glare and Hard-Coating 2H	–

ABSOLUTE MAXIMUM RATINGS

SYMBOL	PARAMETER	CONDITION	RATINGS	UNIT	NOTE
V_I	Input Voltage	tA = 25 C	–0.3 to V_{CC} +0.3	V	1
V_{CC}	+5 V Supply Voltage		–0.3 to +7	V	
V_{DD}	+12 V Supply Voltage		–0.3 to +14	V	
Tstg	Storage Temperature	–	–25 to +60	C	2
Topp	Operating Panel Temperature	–	0 to +60	C	2, 3

NOTES:

1. CK, R0 to R2, G0 to G2, B0 to B2, Hsync, Vsync.
2. Humidity: 95% RH maximum at t_A 40 C. Maximum wet-bulb temperature 39 C at t_A >40 C. No condensation.
3. Maximum panel surface temperature. Top heated by backlight should be maintained below +60 C. The recommended maximum ambient operating temperature with backlight should be +40 C.

PIN NUMBER	SYMBOL	FUNCTION	POLARITY
1	GND	–	–
2	CK	Clock Signal for Sampling Each Data Signal	–
3	R1	RED Data Signal	Positive
4	R0	RED Data Signal (LSB)	Positive
5	GND	–	–
6	R2	RED Data Signal (MSB)	Positive
7	G1	GREEN Data Signal	Positive
8	G0	GREEN Data Signal (LSB)	Positive
9	GND	–	–
10	G2	GREEN Data Signal (MSB)	Positive
11	B1	BLUE Data Signal	Positive
12	B0	BLUE Data Signal (LSB)	Positive
13	GND	–	–
14	B2	BLUE Data Signal (MSB)	Positive
15	GND	–	–
16	Hsync	Horizontal Sync Signal	Negative
17	V_{CC}	+5 V Power Supply (for Logic LCD Drive)	–
18	Vsync	Vertical Sync Signal	Negative
19	V_{DD}	+12 V Power Supply (for LCD Drive)	–
20	GND	–	–
21	–	This Shall be Electrically Opened During Operation	–
22	–	This Shall be Electrically Opened During Operation	–

ELECTRICAL CHARACTERISTICS AND CURRENT DISSIPATION TFT-LCD PANEL DRIVING (t_A = 25 C)

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
V_{CC}	+5 V Supply Voltage	–	+4.75	+5.0	+5.25	V	–
I_{CC}	+5 V Current Dissipation	–	–	–	150	mA	1
V_{DD}	+12 V Supply Voltage	–	+11.4	+12.0	+12.6	V	–
I_{DD}	+12 V Current Dissipation	–	–	–	420	mA	2
V_{IL}	Input Voltage (Low)	–	–	–	+0.8	V	–
V_{IH}	Input Voltage (High)	–	+2.0	–	–	V	–
I_{OL}	Input Leakage Current	V_I = 0 V	–10	–	0	A	–
I_{OH}		$V_I = V_{CC}$	0	–	+10	A	–

NOTES:

1. Maximum current situation produced with every two vertical-line ‘on’ pattern.
2. Maximum current situation produced with an all-black pattern.

ELECTRICAL CHARACTERISTICS – BACKLIGHT (t_A = 25 C)

Backlight unit is composed with 2 HCFTs.

SYMBOL	PARAMETER	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
V_L	Lamp Voltage	Just for reference	51	61	71	V_{RMS}	–
I_L	Lamp Current	Just for reference	90	100	110	mARMS	–
P_L	Lamp Power Consumption	–	–	6.1	7.8	W	1
V_F	Filament Voltage	–	6.5	7.5	8.5	V_{RMS}	2
I_F	Filament Current	–	95	105	115	mA_{RMS}	2
F_L	Frequency	–	20	–	60	kHz	3
V_S	Kick-Off Voltage	–	–	–	360	V_{RMS}	–
T_L	Lamp Lifetime	–	–	5000	–	Hour	4

NOTES:

1. Calculated value for reference (I_L V_L).
2. Before turning on the lamp, preheat the filament for at least three seconds.
3. Lamp frequency may produce interference with horizontal sync frequency, causing heat on the display. Therefore, make lamp frequency as different as possible from the ones of horizontal sync and harmonics horizontal sync to avoid interference.
4. The definition of lifetime is the period it takes the lamp to meet one or both of the following conditions (in rating continuous lighting at t_A = 25 C):
   a. Brightness becomes 50% of the original brightness at standard condition.
   b. It becomes abnormal lighting conditions.

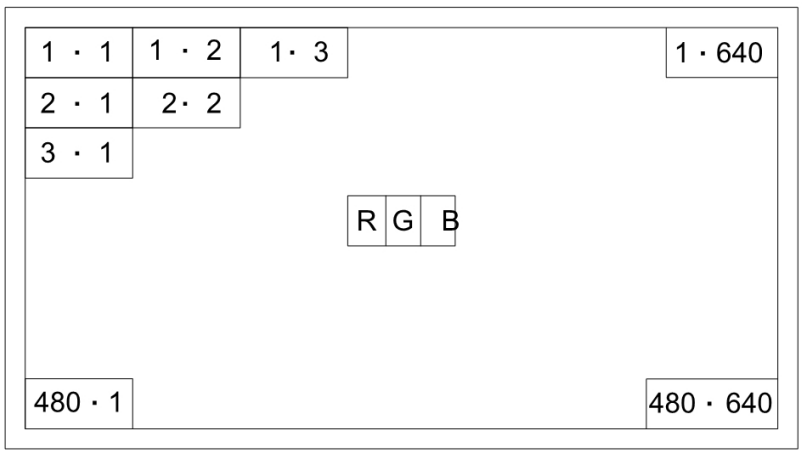
TIMING CHARACTERISTICS OF INPUT SIGNALS

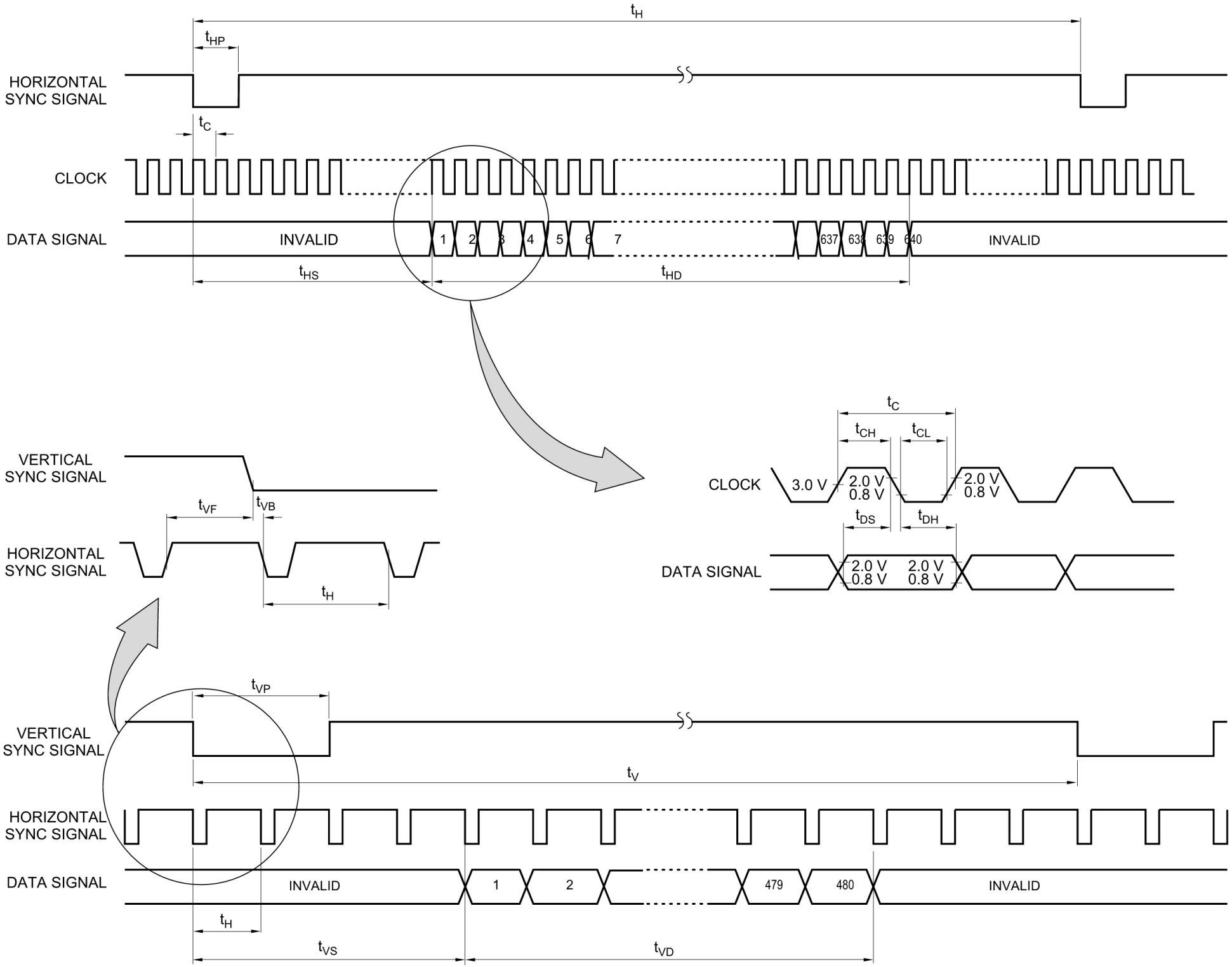
SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
$1/t_C$	Clock Frequency	–	25.175	28.322	MHz
t_{CH}	Clock High Time	5	–	–	ns
t_{CL}	Clock Low Time	10	–	–	ns
t_{DS}	Data Setup Time	0	–	–	ns
t_{DH}	Data Hold Time	10	–	–	ns
t_H	Horizontal Sync Signal Cycle	–	31.78	–	s
		770	800	900	Clock
t_{HP}	Horizontal Sync Signal Pulse Width	–	96	–	Clock
t_V	Vertical Sync Signal Cycle	–	16.7	–	ms
		–	525	–	Line
t_{VP}	Vertical Sync Signal Pulse Width	–	2	–	Line
t_{HS}	Horizontal Signal Display Start	–	144	–	Clock
t_{HD}	Horizontal Signal Display Period	–	640	–	Clock
t_{VS}	Vertical Sync Signal Display Start	–	34	–	Line
t_{VD}	Vertical Sync Signal Display Period	–	480	–	Line
t_{VF}	Hsync-Vsync Phase Difference – Front	0	–	–	ns
t_{VB}	Hsync-Vsync Phase Difference – Back	–10	–	–	ns

NOTE:

1. Make sure that timing of the signals are above data (standard VGA) to ensure right display position and display quality.

DISPLAY POSITION OF INPUT DATA (H, W)




t_H
t_{HP}
HORIZONTAL SYNC SIGNAL
t_C
CLOCK
DATA SIGNAL
INVALID
1
2
3
4
5
6
7
637
638
639
640
INVALID
t_{HS}
t_{HD}
t_C
t_{CH}
t_{CL}
CLOCK
3.0 V
2.0 V
0.8 V
2.0 V
0.8 V
t_{DS}
t_{DH}
DATA SIGNAL
2.0 V
0.8 V
2.0 V
0.8 V
VERTICAL SYNC SIGNAL
t_{VF}
t_{VB}
HORIZONTAL SYNC SIGNAL
t_H
t_{VP}
VERTICAL SYNC SIGNAL
t_V
HORIZONTAL SYNC SIGNAL
DATA SIGNAL
INVALID
1
2
479
480
INVALID
t_H
t_{VS}
t_{VD}

INPUT SIGNALS, BASIC DISPLAY COLORS, AND GRAY SCALE OF EACH COLOR

COLOR AND GRAY SCALE		DATA SIGNAL [2]								
		R_0	R_1	R_2	G_0	G_1	G_2	B_0	B_1	B_2
Basic Color	Black	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	1	1	1
	Green	0	0	0	1	1	1	0	0	0
	Light Blue	0	0	0	1	1	1	1	1	1
	Red	1	1	1	0	0	0	0	0	0
	Purple	1	1	1	0	0	0	1	1	1
	Yellow	1	1	1	1	1	1	0	0	0
	White	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0
	Darker	1	0	0	0	0	0	0	0	0
		0	1	0	0	0	0	0	0	0
		1	1	0	0	0	0	0	0	0
	Brighter	0	0	1	0	0	0	0	0	0
		1	0	1	0	0	0	0	0	0
		0	1	1	0	0	0	0	0	0
	Red	1	1	1	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	1	0	0	0	0	0
		0	0	0	0	1	0	0	0	0
		0	0	0	1	1	0	0	0	0
	Brighter	0	0	0	0	0	1	0	0	0
		0	0	0	1	0	1	0	0	0
		0	0	0	0	1	1	0	0	0
	Green	0	0	0	1	1	1	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0
		0	0	0	0	0	0	0	1	0
		0	0	0	0	0	0	1	1	0
	Brighter	0	0	0	0	0	0	0	0	1
		0	0	0	0	0	0	1	0	1
		0	0	0	0	0	0	0	1	1
	Blue	0	0	0	0	0	0	1	1	1

NOTES:

1. Each color is displayed in eight gray scales from 3-bit data signal input. According to the combination of the total 9-bit data, 512 colors are displayed.
2. 0 = Low-Level Voltage
   1 = High-Level Voltage