

# NHD-4.3-480800EF-CTXP#-T

## TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

NHD-	Newhaven Display
4.3-	4.3" Diagonal
480800-	480 x 800 Pixels (Portrait Mode)
EF-	Model
C-	Built-in Controller
T-	White LED Backlight
X-	TFT
P-	IPS Type, Wide Temperature
#-	<b>RoHS Compliant</b>
T-	4-wire Resistive Touch Panel

### Newhaven Display International, Inc.

2511 Technology Drive, Suite 101

Elgin IL, 60124

Ph: 847-844-8795

Fax: 847-844-8796

[www.newhavendisplay.com](http://www.newhavendisplay.com)

[nhtech@newhavendisplay.com](mailto:nhtech@newhavendisplay.com)

[nhsales@newhavendisplay.com](mailto:nhsales@newhavendisplay.com)

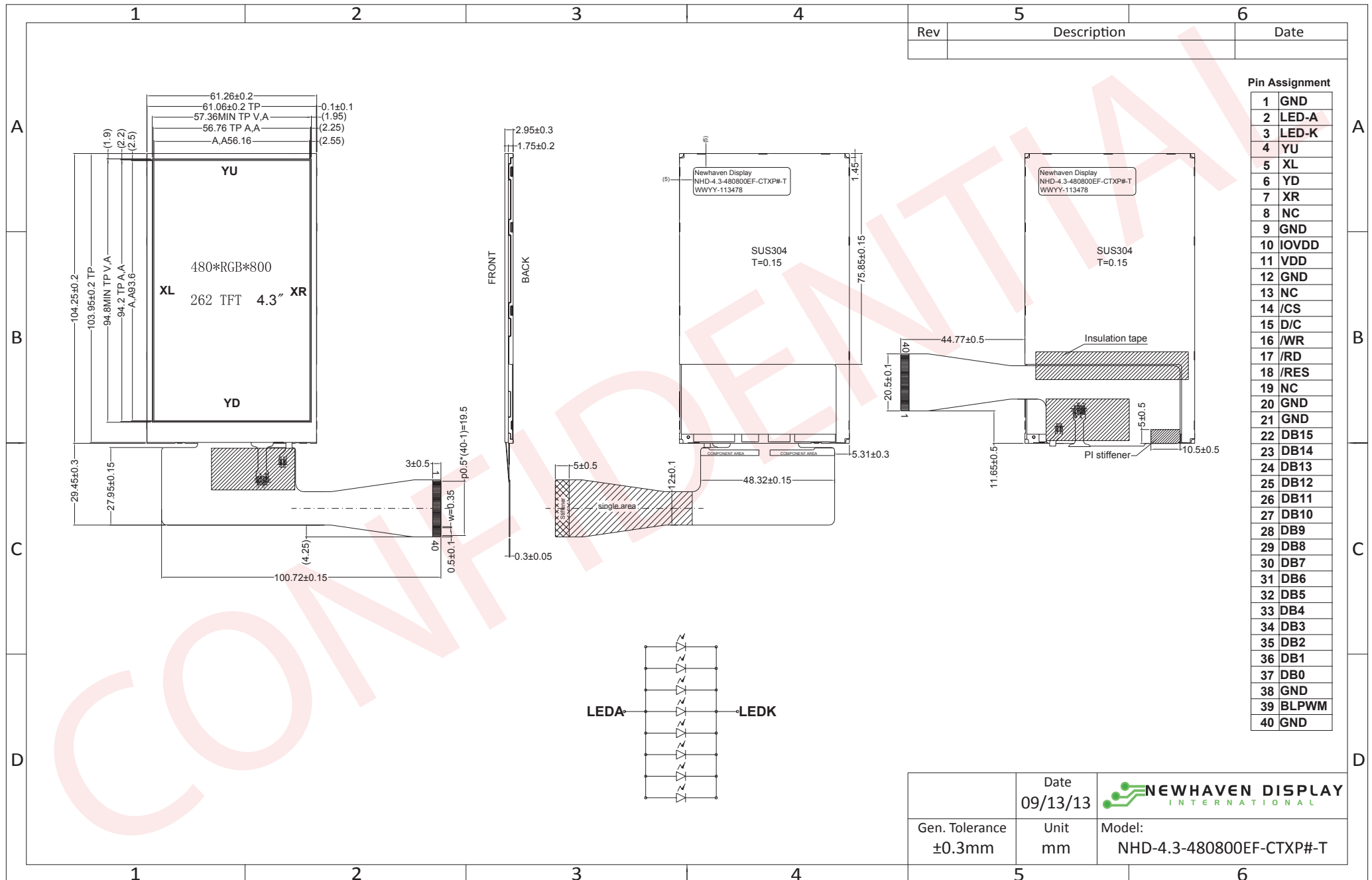
## Document Revision History

Revision	Date	Description	Changed by
0	11/5/2013	Initial Release	ML

## Functions and Features

- 480 x 800 resolution, up to 16.7M colors
- 8-LED backlight
- 16-bit 8080 mode parallel MPU interface
- 4-wire Resistive touch panel
- Extra wide viewing angles

# Mechanical Drawing



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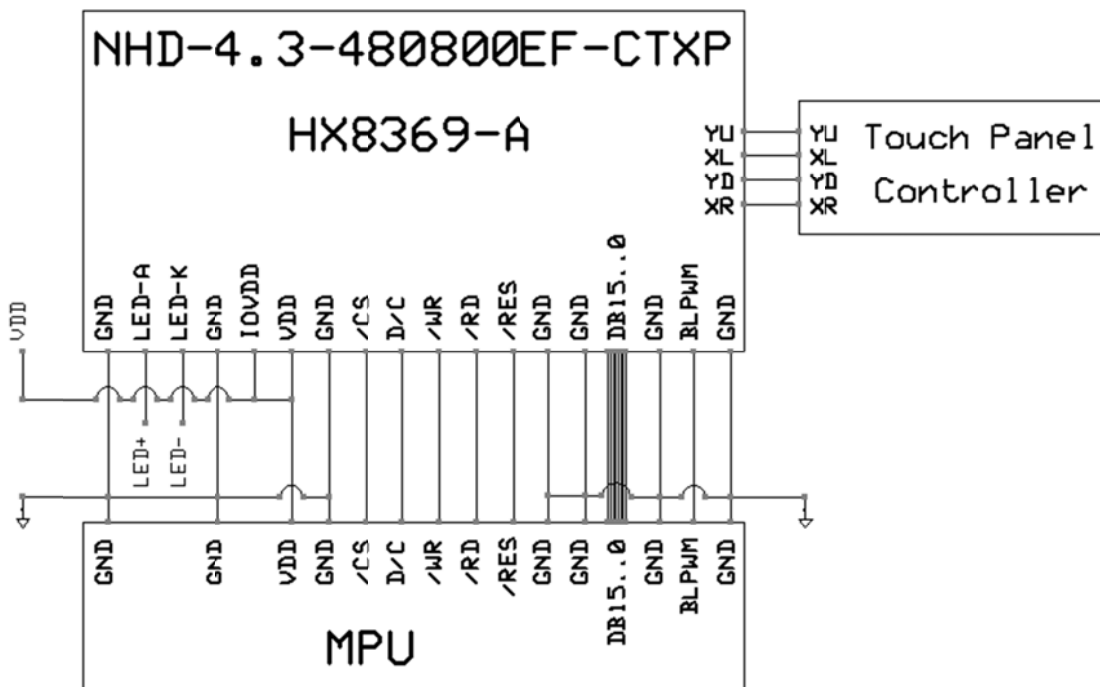
## Pin Description and Wiring Diagram

Pin No.	Symbol	External Connection	Function Description
1	GND	Power Supply	Ground
2	LED-A	Power Supply	Backlight Power Supply (120mA @ 3.2V)
3	LED-K	Power Supply	Ground for Backlight
4	YU	Touch Controller	Touch Panel Up
5	XL	Touch Controller	Touch Panel Left
6	YD	Touch Controller	Touch Panel Down
7	XR	Touch Controller	Touch Panel Right
8	NC	-	No Connect
9	GND	Power Supply	Ground
10	IOVDD	Power Supply	Power Supply for Logic (2.8V) – Can be tied to VDD
11	VDD	Power Supply	Power Supply for LCD (2.8V)
12	GND	Power Supply	Ground
13	NC	-	No Connect
14	/CS	MPU	Active LOW Chip Select signal
15	D/C	MPU	Data / Command selection: '1' = Data ; '0' = Command
16	/WR	MPU	Active LOW Write signal
17	/RD	MPU	Active LOW Read signal
18	/RES	MPU	Active LOW Reset signal
19	NC	-	No Connect
20-21	GND	Power Supply	Ground
22-37	[DB15-DB0]	MPU	16-bit bi-directional data bus
38	GND	Power Supply	Ground
39	BLPWM	MPU	PWM Input for Backlight
40	GND	Power Supply	Ground

**Recommended LCD connector:** 0.5mm pitch 40-Conductor FFC. Molex p/n: 54132-4062

**Backlight connector:** on LCD connector

**Mates with:** ---



## Electrical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Temperature Range	Top	Absolute Max	-20	-	+70	°C
Storage Temperature Range	Tst	Absolute Max	-30	-	+80	°C
Supply Voltage for Logic	IOVDD		1.65	2.8	3.3	V
Supply Voltage for LCD	VDD		2.3	2.8	3.3	V
Supply Current	IDD		-	30	-	mA
"H" Level input	Vih		0.7*IOVDD	-	IOVDD	V
"L" Level input	Vil		0	-	0.3*IOVDD	V
"H" Level output	Voh		0.8*IOVDD	-	IOVDD	V
"L" Level output	Vol		0	-	0.2*IOVDD	V
Backlight Supply Voltage	VLED		-	3.2	-	V
Backlight Supply Current	ILED	VLED=3.2	-	120	-	mA

## Optical Characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Viewing Angle – Top		Cr ≥10	70	80	-	°
Viewing Angle – Bottom			70	80	-	°
Viewing Angle – Left			70	80	-	°
Viewing Angle – Right			70	80	-	°
Contrast Ratio	Cr		640	800	-	
Luminance	YL	ILED=120mA	170	220	-	cd/m <sup>2</sup>
Response Time	Tr+Tf		-	35	70	ms

## Touch Panel Characteristics

Item	Min.	Typ.	Max.	Unit
Linearity	-1.5	-	1.5	%
Circuit Resistance – X-Axis	100	-	450	Ω
Circuit Resistance – Y-Axis	350	-	1050	Ω
Insulation Resistance	20	-	-	MΩ
Operating Voltage	-	-	10	V
Chattering	-	-	10	ms
Activation Force	20	-	100	g
Pen Writing Durability	100,000	-	-	Characters
Pitting Durability	1,000,000	-	-	Touches
Surface Hardness	3	-	-	H

## Controller Information

Built-in Himax HX8369-A

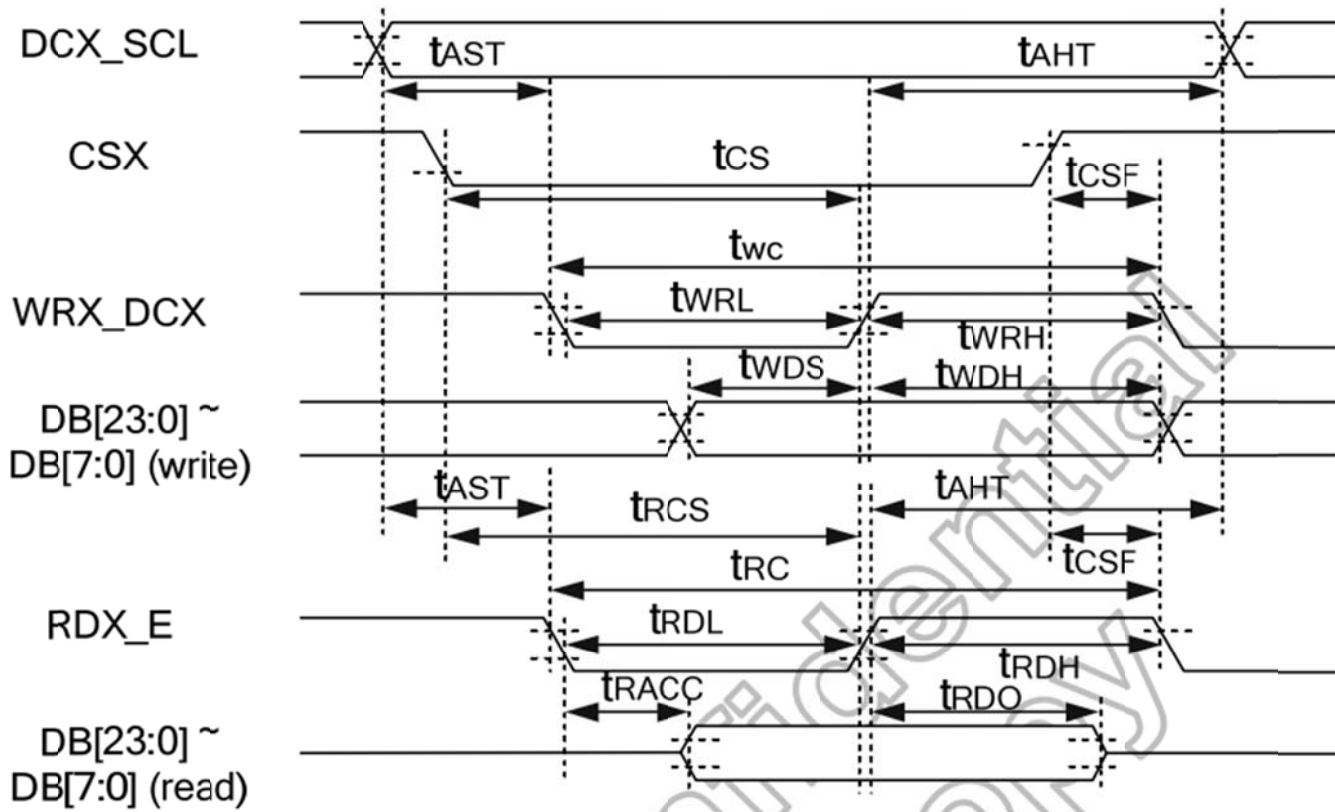
Please download specification at [http://www.newhavendisplay.com/app\\_notes/HX8369.pdf](http://www.newhavendisplay.com/app_notes/HX8369.pdf)

## Table of Commands

Please download specification at [http://www.newhavendisplay.com/app\\_notes/HX8369.pdf](http://www.newhavendisplay.com/app_notes/HX8369.pdf)

# Timing Characteristics

## 16-bit 8080 Mode Parallel MPU Interface

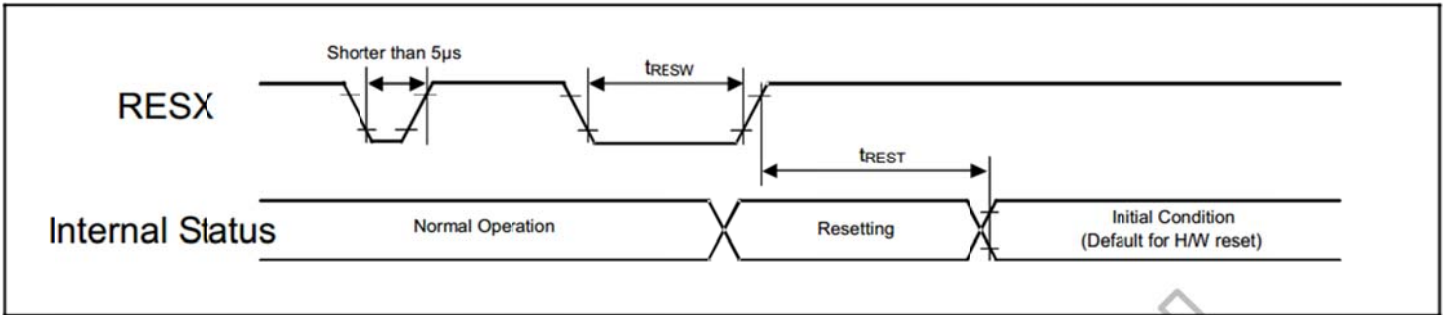


Signal	Symbol	Parameter	Min.	Max.	Unit	Description
DCX_SCL	$t_{AST}$	Address setup time	10	-	ns	-
	$t_{AHT}$	Address hold time (Write/Read)	10	-		
CSX	$t_{cs}$	Chip select setup time (Write)	20	-	ns	-
	$t_{rcs}$	Chip select setup time (Read ID)	45	-		
	$t_{rcsfm}$	Chip Select setup time (Read FM)	355	-		
	$t_{csf}$	Chip select wait time (Write/Read)	20	-		
WRX_DCX	$t_{wc}$	Write cycle (write register)	100	790	ns	-
	$t_{wc}$	Write cycle (write GRAM@SLP <sub>OUT</sub> )	33	790		
	$t_{wc}$	Write cycle (write GRAM@SLP <sub>IN</sub> )	100	790		
	$t_{wrh}$	Control pulse "H" duration	15	630		
RDX_E	$t_{rdl}$	Control pulse "L" duration	15	160	ns	-
	$t_{rdh}$	Read cycle (read register)	100	790		
	$t_{rdh}$	Read cycle (GRAM)	350	790		
	$t_{rdl}$	Control pulse "H" duration	30	630		
DB23-DB0	$t_{rdl}$	Control pulse "L" duration	20	160	ns	For maximum $C_L=30pF$ For minimum $C_L=8pF$
	$t_{wds}$	Data setup time	15	-		
	$t_{wdh}$	Data hold time	25	-		
	$t_{racc}$	Read access time	10	-		
	$t_{rdo}$	Output disable time	10	-		

**Note:** The input signal rise time and fall time ( $t_r$ ,  $t_f$ ) is specified at 15 ns or less.

Logic high and low levels are specified as 30% and 70% of  $V_{DD1}$  for Input signals.

## Reset Input Timing

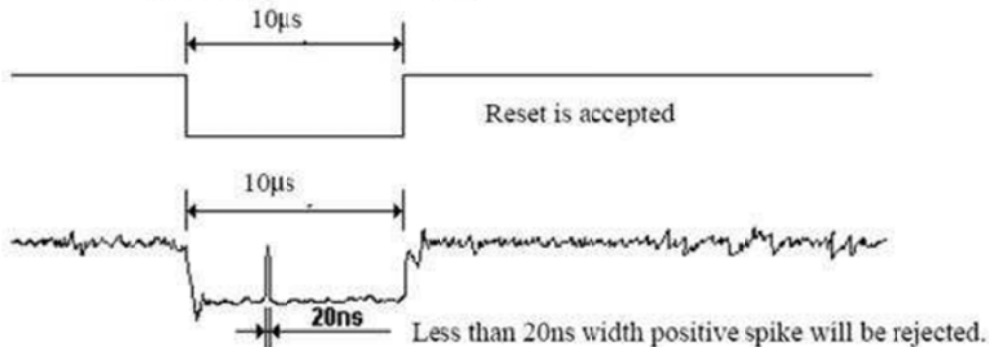


Symbol	Parameter	Related pins	Min.	Typ.	Max.	Note	Unit
$t_{RESW}$	Reset low pulse width <sup>(1)</sup>	RESX	10	-	-	-	µs
$t_{REST}$	Reset complete time <sup>(2)</sup>	-	5	-	-	When reset is applied during Sleep In mode	ms
		-	120	-	-	When reset is applied during Sleep Out mode	ms

**Note:** (1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5 µ	Reset Rejected
Longer than 10 µs	Reset
Between 5 µs and 10 µs	Reset Start

- (2) During the resetting period, the display will be blanked (The display is entering blanking sequence, which maximum time is 120 ms, when Reset Starts in Sleep Out -mode. The display remains the blank state in Sleep In -mode) and then returns to Default condition for H/W reset.
- (3) During Reset Complete Time, ID2 value in OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time ( $t_{REST}$ ) within 5ms after a rising edge of RESX.
- (4) Spike Rejection also applies during a valid reset pulse as shown below:



- (5) When Reset is applied during Sleep In Mode.
- (6) When Reset is applied during Sleep Out Mode.
- (7) It is necessary to wait 5msec after releasing RESX before sending commands. Also Sleep Out command cannot be sent for 120msec.

## Example Initialization Program

```
void TFT_43E_Init(void)
{
    GPIO_ResetBits(GPIOC, CS1);
    GPIO_SetBits(GPIOC, nRD);
    GPIO_ResetBits(GPIOC, nWR);
    GPIO_WriteBit(GPIOC, RES, Bit_RESET);
    delay(5);
    TFT_delay(100);
    GPIO_WriteBit(GPIOC, RES, Bit_SET);
    delay(100);
    TFT_delay(1000);
    TFT_43E_Write_Command(0XB9);//SETEXTC
    TFT_43E_Write_Data(0xFF);
    TFT_43E_Write_Data(0x83);
    TFT_43E_Write_Data(0x69);
    TFT_43E_Write_Command(0XB1);//SETPOWER
    TFT_43E_Write_Data(0x01);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x34);
    TFT_43E_Write_Data(0x06);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x0F);
    TFT_43E_Write_Data(0x0F);
    TFT_43E_Write_Data(0x2A);
    TFT_43E_Write_Data(0x32);
    TFT_43E_Write_Data(0x3F);
    TFT_43E_Write_Data(0x3F);
    TFT_43E_Write_Data(0x07);
    TFT_43E_Write_Data(0x23);
    TFT_43E_Write_Data(0x01);
    TFT_43E_Write_Data(0xE6);
    TFT_43E_Write_Data(0xE6);
    TFT_43E_Write_Data(0xE6);
    TFT_43E_Write_Data(0xE6);
    TFT_43E_Write_Data(0xE6);
    TFT_43E_Write_Command(0XB2);//SETDISP
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x20);
    TFT_43E_Write_Data(0x0A);
    TFT_43E_Write_Data(0x0A);
    TFT_43E_Write_Data(0x70);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0xFF);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x03);
    TFT_43E_Write_Data(0x03);
    TFT_43E_Write_Data(0x00);
    TFT_43E_Write_Data(0x01);
    TFT_43E_Write_Command(0XB4);//SETCYC
    TFT_43E_Write_Data(0x00);
```



```

TFT_43E_Write_Data(0x18);
TFT_43E_Write_Data(0x80);
TFT_43E_Write_Data(0x10);
TFT_43E_Write_Data(0x01);
TFT_43E_Write_Command(0XB6);//SETVCOM
TFT_43E_Write_Data(0x2C);
TFT_43E_Write_Data(0x2C);
TFT_43E_Write_Command(0XD5);//SETGIP
TFT_43E_Write_Data(0x00);
TFT_43E_Write_Data(0x05);
TFT_43E_Write_Data(0x03);
TFT_43E_Write_Data(0x00);
TFT_43E_Write_Data(0x01);
TFT_43E_Write_Data(0x09);
TFT_43E_Write_Data(0x10);
TFT_43E_Write_Data(0x80);
TFT_43E_Write_Data(0x37);
TFT_43E_Write_Data(0x37);
TFT_43E_Write_Data(0x20);
TFT_43E_Write_Data(0x31);
TFT_43E_Write_Data(0x46);
TFT_43E_Write_Data(0x8A);
TFT_43E_Write_Data(0x57);
TFT_43E_Write_Data(0x9B);
TFT_43E_Write_Data(0x20);
TFT_43E_Write_Data(0x31);
TFT_43E_Write_Data(0x46);
TFT_43E_Write_Data(0x8A);
TFT_43E_Write_Data(0x57);
TFT_43E_Write_Data(0x9B);
TFT_43E_Write_Data(0x07);
TFT_43E_Write_Data(0x0F);
TFT_43E_Write_Data(0x02);
TFT_43E_Write_Data(0x00);
TFT_43E_Write_Command(0X3A);//COLMOD
TFT_43E_Write_Data(0x77);
TFT_43E_Write_Command(0X36);//MADCTL
TFT_43E_Write_Data(0x80);
TFT_43E_Write_Command(0X11);//SLPOUT
TFT_delay(1000);
TFT_43E_Write_Command(0X29);//DISPON
}
void TFT_43E_Write_Command(unsigned char command)
{
    GPIO_Write(GPIOB, command);
    GPIO_ResetBits(GPIOC, RS);
    GPIO_ResetBits(GPIOC, nWR);
    GPIO_SetBits(GPIOC, nWR);
}
void TFT_43E_Write_Data(unsigned char data1)
{
    GPIO_SetBits(GPIOC, RS);
    GPIO_Write(GPIOB, data1);
    GPIO_ResetBits(GPIOC, nWR);
    GPIO_SetBits(GPIOC, nWR);
}

```

## Quality Information

Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	+80°C , 96hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C , 96hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (voltage & current) and the high thermal stress for a long time.	+70°C, 96hrs	2
Low Temperature Operation	Endurance test applying the electric stress (voltage & current) and the low thermal stress for a long time.	-20°C , 96hrs	1,2
High Temperature / Humidity Operation	Endurance test applying the electric stress (voltage & current) and the high thermal with high humidity stress for a long time.	+50°C , 90% RH , 96hrs	1,2
Thermal Shock resistance	Endurance test applying the electric stress (voltage & current) during a cycle of low and high thermal stress.	-20°C, 30min -> 70°C, 30min Change time: 5min 10 cycles	
Vibration test	Endurance test applying vibration to simulate transportation and use.	10-55Hz , 1.5mm amplitude. 2hrs in each of 3 directions X,Y,Z	3
Static electricity test	Endurance test applying electric static discharge.	VS=2000V, RS=330Ω, CS=150pF 5 times	

**Note 1:** No condensation to be observed.

**Note 2:** Conducted after 4 hours of storage at 25°C, 0%RH.

**Note 3:** Test performed on product itself, not inside a container.

## Precautions for using LCDs/LCMs

See Precautions at [www.newhavendisplay.com/specs/precautions.pdf](http://www.newhavendisplay.com/specs/precautions.pdf)

## Warranty Information

See Terms and Conditions at [http://www.newhavendisplay.com/index.php?main\\_page=terms](http://www.newhavendisplay.com/index.php?main_page=terms)