



深圳市拓普微科技开发有限公司
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LMT018DNBFWD-1

LCD Module User Manual

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Rev.	Descriptions	Release Date
0.1	Preliminary New release	2014-07-14
0.2	Update LED Backlight Circuit Characteristics	2021-07-08

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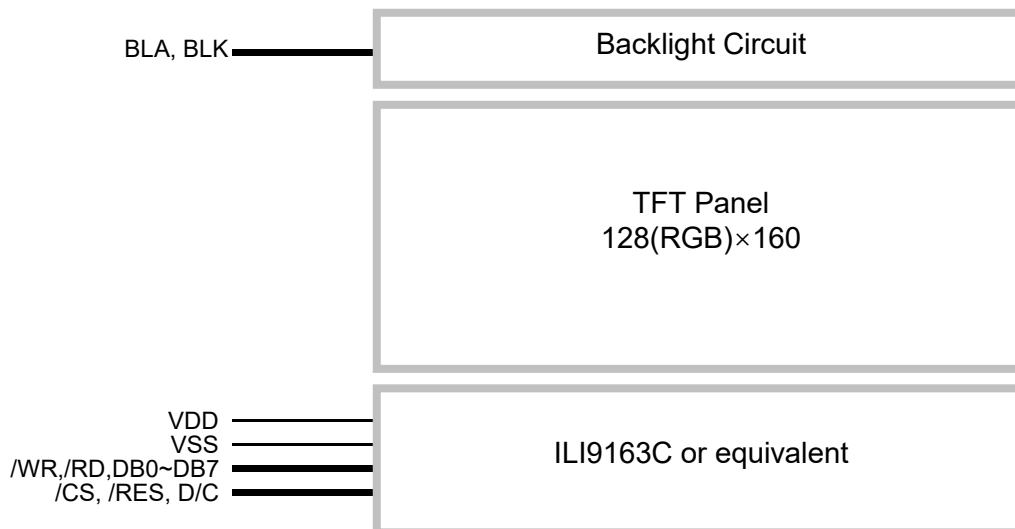
1. Basic Specifications

Screen Size(Diagonal) :	1.8"
Color Depth:	65k / 262k color
Number of dots :	128 x 160
Active Area :	28.03x35.04 mm
Dot Pitch :	0.219x0.219 mm
Display Technology :	a-Si TFT active matrix
Display Mode :	Transmissive / Positive
Pixel Configuration :	RGB Stripe
Viewing Direction :	6H (*1) (gray scale inverse) 12H (*2)
Polarizer Surface Treatment:	Glare
Backlight Type:	LEDs
Outline Dimension :	34.0 x 45.83 x 2.75mm (exclude FPC , see dwg for details)
Operating Temperature :	-20 ~ +70°C (No Condensation)
Storage Temperature :	-30 ~ +80°C (No Condensation)

Note:

- *1. For saturated color display content (eg. pure-red, pure-green, pure-blue or pure-colors-combinations).
- *2. For "color scales" display content.
- *3. Color tone may slightly change by temperature and driving condition.

1.1 Block Diagram



1.2 Terminal Functions

Pin No.	PIN Name	I/O	Descriptions
1	BLK	Power	Negative power for LED backlight
2	BLA	Power	Positive power for LED backlight
3	VSS	Power	Negative power supply,0V
4	VDD	Power	Positive power supply
5	NC	-	No connection leave open
6	NC	-	No connection leave open
7	/CS	Input	Chip Select /CS=L, enable access to the LCD module /CS=H, disable access to the LCD module
8	/RES	Input	Reset signal /RES = L, Initialization is executed /RES = H, Normal running.
9	D/C	Input	Register Select D/C = H, Transferring the Display Data D/C = L, Transferring the Control Data
10	/WR	Input	Write enable input, active LOW
11	/RD	Input	Read enable input, active LOW
12	DB7	IO	Bi-directional tri-state Data bus
:	:	:	
19	DB0	IO	
20	VSS	Power	
			Negative power supply,0V

2. Absolute Maximum Ratings

Items	Symbol	Min.	Max.	Unit	Condition
Supply Voltage	V_{DD}	-0.3	+4.6	V	$V_{SS} = 0V$
Input Voltage	V_{IN}	-0.3	+4.6	V	$V_{SS} = 0V$
Operating Temperature	T_{OP}	-20	+70	°C	No Condensation
Storage Temperature	T_{ST}	-30	+80	°C	No Condensation

Cautions:

Any Stresses exceeding the Absolute Maximum Ratings may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

3. Electrical Characteristics

3.1 DC Characteristics

$V_{SS}=0V, T_{OP}=25^{\circ}C$

Items	Symbol	MIN.	TYP.	MAX.	Unit	Condition / Application Pin
Operating Voltage	V_{DD}	2.6	2.8	3.3	V	VDD
Input High Voltage	V_{IH}	$0.8 \times V_{DD}$	-	V_{DD}	V	/RES, /CS, D/C,
Input Low Voltage	V_{IL}	V_{SS}	-	$0.2 \times V_{DD}$	V	DB0~DB7, /WR, /RD
Operating Current	I_{DD}	-	0.6	2.5	mA	VDD (*1)

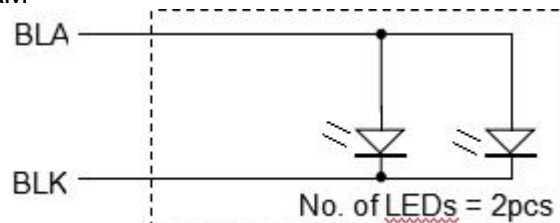
Note: *1. $V_{DD}=2.8V$

3.2 LED Backlight Circuit Characteristics

$T_{OP} = 25^{\circ}C$

Items	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Forward Voltage	V_f	-	3.2	-	V	For each LED
Forward Current	I_f	-	15	-	mA	For each LED
LED lifetime	-	-	20000	-	Hours	

Note1: LED CIRCUIT DIAGRAM



Note 2: LED: $V_F = 3.2V, I_F = 15mA$ (TYP)

Note 3: I_F is defined for one LED.

Optical performance should be evaluated at $T_a=25^{\circ}C$ only.

If LED is driven by high current, high ambient temperature & humidity condition.

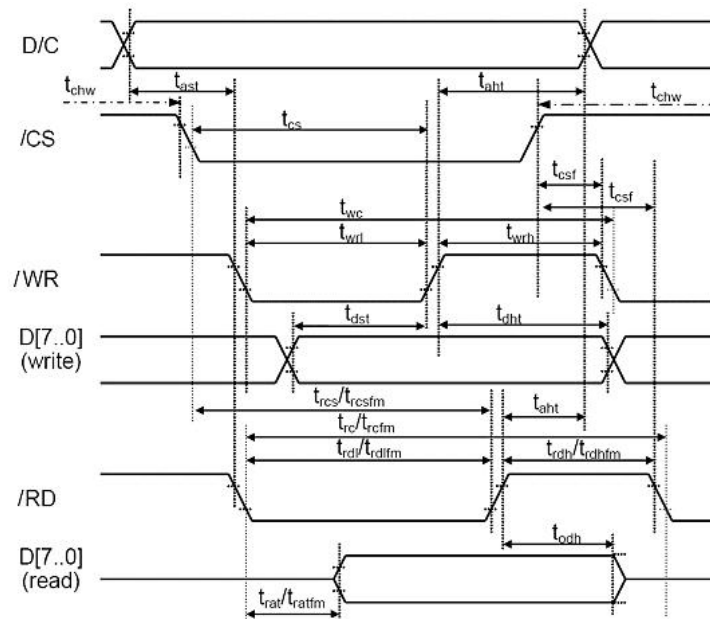
The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness.

Typical operating life time is estimated data.

Note 4: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

3.3 AC Characteristics

8080 Mode System Bus Timing



Signal	Symbol	Parameter	min	max	unit	description
D/C	t _{ast}	Address setup time	0		ns	
	t _{ah}	Address hold time(Write/Read)	10		ns	
/CS	t _{chw}	"S""H" Pulse Width	0		ns	
	t _{cs}	Chip Select setup time (Write)	10		ns	
	t _{rcs}	Chip Select setup time (Read ID)	45		ns	
	t _{rcsfm}	Chip Select setup time (Read FM)	355		ns	
	t _{csf}	Chip Select Wait time(Write/read)	10		ns	
/WR	t _{wc}	Write cycle	66		ns	
	t _{wrh}	Control pulse H duration	15		ns	
	t _{wrl}	Control pulse L duration	15		ns	
/RD	t _{rc}	Read cycle (ID)	160		ns	When read ID data
	t _{rdh}	Control pulse H duration(ID)	90		ns	
	t _{rdl}	Control pulse L duration(ID)	45		ns	
/RD	t _{rcfm}	Read cycle (FM)	450		ns	When read from frame memory
	t _{rdhfm}	Control pulse H duration (FM)	90		ns	
	t _{rdlfm}	Control pulse L duration (FM)	355		ns	
D[7..0]	t _{dst}	Data setup time	10		ns	For maximum CL = 30pF For minimum CL = 8pF
	t _{dht}	Data hold time	10		ns	
	t _{rat}	Read access time (ID)		40	ns	
	t _{ratfm}	Read access time (FM)		340	ns	
	t _{odh}	Output disable time	20	80	ns	

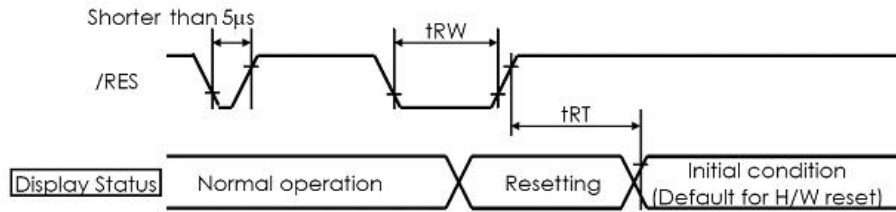
Note:

*1. Input signal rise/fall time should be less than 15ns .

*2. All timing is using 20% and 80% of VDD as the reference.

*3. Please refer to ILI9163B datasheet for details

3.4 Reset Timing



Item	Symbol	MIN.	TYP.	MAX.	Unit
Reset LOW pulse width	t_{RW}	1.0	-	-	us
Reset time	T_{RT}	-	-	120	ms

4. Optical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note/ Condition
Brightness	Bp	190	-	-	Cd/m ²	$\theta=0^\circ, \Phi=0^\circ$ (*1,*2)
Uniformity	ΔBp	80%	-	-	-	
Viewing Angle	$\theta 1 (\Phi=90^\circ \text{ or } 270^\circ)$	-50~+40			Deg	(*3)
	$\theta 2 (\Phi=0^\circ \text{ or } 180^\circ)$	-50~+50			deg	
Contrast Ratio	Cr	-	350	-	-	$\theta=0^\circ, \Phi=0^\circ$ (*4)
Response Time	$T_{r+}+T_f$	-	30	-	Ms	$\theta=0^\circ, \Phi=0^\circ$ (*5)
Color of CIE Coordinate	W	X	0.246	0.296	0.346	$\theta=0^\circ, \Phi=0^\circ$ (*1,*6)
		Y	0.265	0.315	0.365	
NTSC Ratio	S	42%	-	-	-	$\theta=0^\circ, \Phi=0^\circ$ (*1,*6)

Note:

*1. Measurement

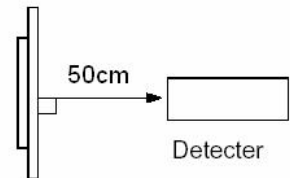
The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots.

Measurement equipment PR-705 (Φ8mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: $T_a=25^\circ\text{C}$.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.



*2. The luminance uniformity

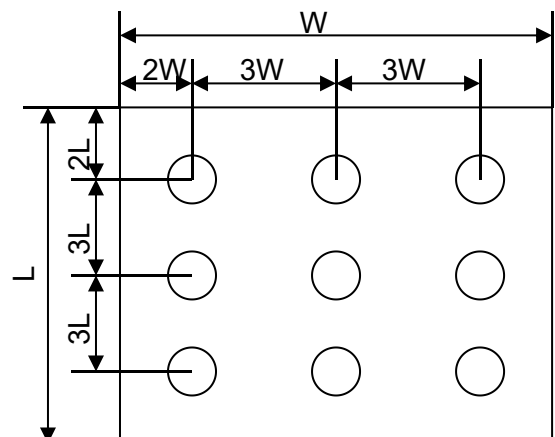
It is calculated by using following formula.

$$\Delta Bp = Bp (\text{Min.}) / Bp (\text{Max.}) \times 100 (\%)$$

Bp (Max.) = Maximum brightness in 9 measured spots

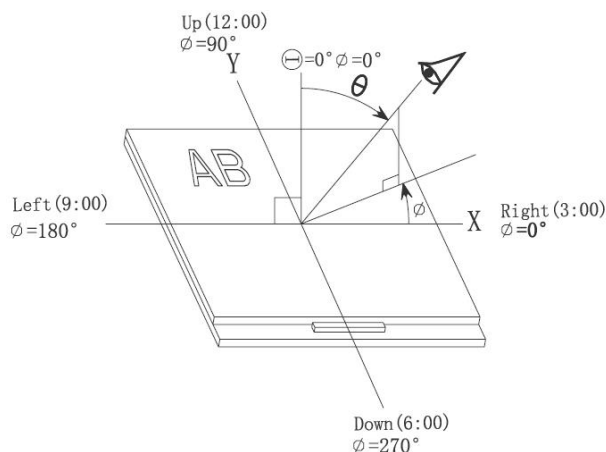
Bp (Min.) = Minimum brightness in 9 measured spots.

Measurement equipment PR-705 (Φ8mm)



***3. The definition of viewing angle:**

Refer to the graph below marked by θ and ϕ

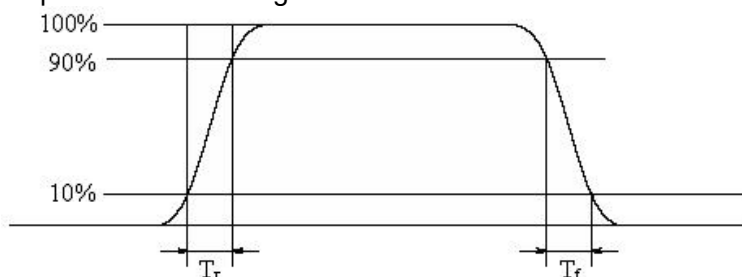


***4. The definition of contrast ratio (Test LCM using PR-705):**

Contrast Ratio(CR)= $\frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$
 (Contrast Ratio is measured in optimum common electrode voltage)

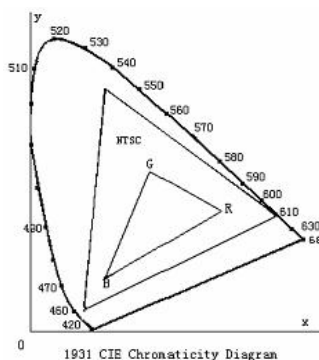
***5. Definition of Response time.(Test LCD using DMS501):**

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



***6: Definition of Color of CIE Coordinate and NTSC Ratio.**

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



5. Functions

5.1 Display Commands

Code	Command	D17-D8	D7	D6	D5	D4	D3	D2	D1	D0	hex
00H	NOP (No Operation)	X	0	0	0	0	0	0	0	0	00h
01H	SoftwareReset	X	0	0	0	0	0	0	0	1	01h
04H	Read Display Id. Info	x	0	0	0	0	0	1	0	0	04h
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	ID17	ID16	ID15	ID14	ID13	ID12	ID11	ID10	54h
	3 rd Parameter	x	ID27	ID26	ID25	ID24	ID23	ID22	ID21	ID20	80h
	4 th Parameter	x	ID37	ID36	ID35	ID34	ID33	ID32	ID31	ID30	66h
09H	Read Display Status	x	0	0	0	0	1	0	0	1	09h
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	BOTSON	MY	MX	MV	ML	RGB	MH	ST24	00h
	3 rd Parameter	x	ST23	IFPF2	IFPF1	IFPF0	IDMON	PTLON	SLOUT	NORON	61h
	4 th Parameter	x	VSSON	ST14	INVON	ST12	ST11	DISON	TEON	GCS2	00h
	5 th Parameter	x	GCS1	GCS0	TELOM	HSOON	VSON	PCKON	DEON	ST0	00h
0AH	Read Display Power Mode	x	0	0	0	0	1	0	1	0	0Ah
	1 st Parameter	x	x	x	x	x	x	x	x	x	X
	2 nd Parameter	x	BSTON	IDMON	PLTON	SLPOUT	NORON	DISON	D1	D0	08h
0BH	Read Display MADCTL	x	0	0	0	0	1	0	1	1	0Bh
	1 st Parameter	x	x	x	x	x	x	x	x	x	X
	2 nd Parameter	x	MY	MX	MV	ML	RGB	MH	D1	D0	00h
0CH	Read Display Pixel Format	x	0	0	0	0	1	1	0	0	0Ch
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	VIPF3	VIPF2	VIPF1	VIPF0	D3	IFPF2	IFPF1	IFPF0	06h
0DH	Read Display Image Mode	x	0	0	0	0	1	1	0	1	0Dh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	VSSON	D6	INVON	D4	D3	GCS2	GCS1	GCS0	00h
0EH	Read Display Signal Mode	x	0	0	0	0	1	1	1	0	0Eh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	D7	D6	HSOON	VSON	PCKON	DEON	D1	D0	00h
0FH	Read Display Signal Mode	x	0	0	0	0	1	1	1	1	0Fh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	RELD	FUND	D5	D4	D3	D2	D1	D0	00h
10H	Sleep In	x	0	0	0	1	0	0	0	0	10h
11H	Sleep Out	x	0	0	0	1	0	0	0	1	11h
12H	Partial Mode On	x	0	0	0	1	0	0	1	0	12h
13H	Normal Display Mode On	x	0	0	0	1	0	0	1	1	13h
20H	Display Inversion Off	x	0	0	1	0	0	0	0	0	20h
21H	Display Inversion On	x	0	0	1	0	0	0	0	1	21h
26H	Gamma Set	x	0	0	1	0	0	1	1	0	26h
	1 st Parameter	x	GC7	GC6	GC5	GC4	GC3	GC2	GC1	GC0	01h
28H	Display Off		0	0	1	0	1	0	0	0	28h
29H	Display On	x	0	0	1	0	1	0	0	1	29h
2AH	Column Address Set	x	0	0	1	0	1	0	1	0	2Ah
	1 st Parameter	x	XS15	XS14	XS13	XS12	XS11	XS10	XS9	XS8	-
	2 nd Parameter	x	XS7	XS6	XS5	XS4	XS3	XS2	XS1	XS0	-
	3 rd Parameter	x	XE15	XE14	XE13	XE12	XE11	XE10	XE9	XE8	-
	4 th Parameter	x	XE7	XE6	XE5	XE4	XE3	XE2	XE1	XE0	-
2BH	Page Address Set	x	0	0	1	0	1	0	1	1	2Bh
	1 st Parameter	x	YS15	YS14	YS13	YS12	YS11	YS10	YS9	YS8	-
	2 nd Parameter	x	YS7	YS6	YS5	YS4	YS3	YS2	YS1	YS0	-
	3 rd Parameter	x	YE15	YE14	YE13	YE12	YE11	YE10	YE9	YE8	-
	4 th Parameter	x	YE7	YE6	YE5	YE4	YE3	YE2	YE1	YE0	-

Code	Command	D17-D8	D7	D6	D5	D4	D3	D2	D1	D0	hex
2CH	Memory Write	x	0	0	1	0	1	1	0	0	2Ch
	1 st Parameter	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	-
	:	x	:	:	:	:	:	:	:	:	:
	N th Parameter	D17-8	D7	D6	D5	D4	D3	D2	D1	D0	-
2DH	Color Setting for 4K, 65K and 262K	x	0	0	1	0	1	1	0	1	2Dh
	1 st Parameter	x	x	x	R005	R004	R003	R002	R001	R000	-
	:	x	x	x	Rnn5	Rnn4	Rnn3	Rnn2	Rnn1	Rnn0	-
	32 nd parameter	x	x	x	R315	R314	R313	R312	R311	R310	-
	33 rd Parameter	x	x	x	G005	G004	G003	G002	G001	G000	-
	:	x	x	x	Gnn5	Gnn4	Gnn3	Gnn2	Gnn1	Gnn0	-
	96 th Parameter	x	x	x	G635	G634	G633	G632	G631	G630	-
	97 th Parameter	x	x	x	B005	B004	B003	B002	B001	B000	-
	:	x	x	x	Bnn5	Bnn4	Bnn3	Bnn2	Bnn1	Bnn0	-
	128 th Parameter	x	x	x	B315	B314	B313	B312	B311	B310	-
	:	x	:	:	:	:	:	:	:	:	:
	N th Parameter	x	Dn7	Dn6	Dn5	Dn4	Dn3	Dn2	Dn1	Dn0	-
2EH	Memory Read	x	0	0	1	0	1	1	1	0	2Eh
	1 st Parameter	x	x	x	x	x	x	x	x	x	-
	2 nd Parameter	x	D17	D16	D15	D14	D13	D12	D11	D10	-
	:	x	:	:	:	:	:	:	:	:	-
30H	Partial Area	x	0	0	1	1	0	0	0	0	30h
	1 st Parameter	x	PSL15	PSL14	PSL13	PSL12	PSL11	PSL10	PSL9	PSL8	-
	2 nd Parameter	x	PSL7	PSL6	PSL5	PSL4	PSL3	PSL2	PSL1	PSL0	-
	3 rd Parameter	x	PEL15	PEL14	PEL13	PEL12	PEL11	PEL10	PEL9	PEL8	-
	4 th Parameter	x	PEL7	PEL6	PEL5	PEL4	PEL3	PEL2	PEL1	PEL0	-
33H	Vertical Scrolling Definition	x	0	0	1	1	0	0	1	1	33h
	1 st Parameter	x	TFA15	TFA14	TFA13	TFA12	TFA11	TFA10	TFA9	TFA8	-
	2 nd Parameter	x	TFA7	TFA6	TFA5	TFA4	TFA3	TFA2	TFA1	TFA0	-
	3 rd Parameter	x	VSA15	VSA14	VSA13	VSA12	VSA11	VSA10	VSA9	VSA8	-
	4 th Parameter	x	VSA7	VSA6	VSA5	VSA4	VSA3	VSA2	VSA1	VSA0	-
	5 th Parameter	x	BFA15	BFA14	BFA13	BFA12	BFA11	BFA10	BFA9	BFA8	-
	6 th Parameter	x	BFA7	BFA6	BFA5	BFA4	BFA3	BFA2	BFA1	BFA0	-
34H	Tearing EffectLine Off	x	0	0	1	1	0	1	0	0	34h
35H	Tearing EffectLine On	x	0	0	1	1	0	1	0	1	35h
	1 st Parameter	x	x	x	x	x	x	x	x	M	00h
36H	Memory Access Control	x	0	0	1	1	0	1	1	0	36h
	1 st Parameter	x	MY	MX	MV	ML	RGB	MH	x	x	00h
37H	Vertical Scrolling StartAddress	x	0	0	1	1	0	1	1	1	37h
	1 st Parameter	x	SSA15	SSA14	SSA13	SSA12	SSA11	SSA10	SSA9	SSA8	00h
	2 nd Parameter	x	SSA7	SSA6	SSA5	SSA4	SSA3	SSA2	SSA1	SSA0	00h
38H	Idle Mode Off	x	0	0	1	1	1	0	0	0	38h
39H	Idle Mode On	x	0	0	1	1	1	0	0	1	39h
3AH	Interface PixelFormat	x	0	0	1	1	1	0	1	0	3Ah
	1 st Parameter	x	VIPF3	VIPF2	VIPF1	VIPF0	D3	IFPF2	IFPF1	IFPF0	66h
B1H	Frame Rate Control (In normal mode/Full colors)		1	0	1	1	0	0	0	1	B1h
	1 st Parameter		x	x	x	DIVA4	DIVA3	DIVA2	DIVA1	DIVA0	x
	2 nd Parameter		x	x	VPA5	VPA4	VPA3	VPA2	VPA1	VPA0	x
B2H	Frame Rate Control (In Idle mode/8-colors)		1	0	1	1	0	0	1	0	B2h
	1 st Parameter		x	x	x	DIVB4	DIVB3	DIVB2	DIVB1	DIVB0	x
	2 nd Parameter		x	x	VPB5	VPB4	VPB3	VPB2	VPB1	VPB0	x

Code	Command	D17-D8	D7	D6	D5	D4	D3	D2	D1	D0	hex
B3H	Frame Rate Control (In Partial mode/full colors)		1	0	1	1	0	0	1	1	B3h
	1 st Parameter		x	x	x	DIVC4	DIVC3	DIVC2	DIVC1	DIVC0	x
	2 nd Parameter		x	x	VPC5	VPC4	VPC3	VPC2	VPC1	VPC0	x
B4H	Display Inversion Control	x	1	0	1	1	0	1	0	0	B4h
	1 st Parameter	x	0	0	0	0	0	NLA	NLB	NLC	02H
B5H	RGB Interface Blanking Porch setting	x	1	0	1	1	0	1	0	1	B5h
	1 st Parameter	x	x	x	HBP5	HBP4	HBP3	HBP2	HBP1	HBP0	08h
	2 nd Parameter	x	VBP7	VBP6	VBP5	VBP4	VBP3	VBP2	VBP1	VBP0	03h
	3 rd Parameter	x	x	x	x	x	x	x	VBP9	VBP8	00h
B6H	Display Function Set	x	1	0	1	1	0	1	1	0	B6h
	1 st Parameter		x	x	NO1	NO0	SDT1	SDT0	EQ1	EQ2	06h
	2 nd Parameter		x	x	x	X	x	PTG0	PT1	PT0	02h
B7H	Source Driver Direction Control	x	1	0	1	1	0	1	1	1	B7h
	1 st Parameter	x	0	0	0	0	0	0	0	CRL	00h
B8H	Gate Driver Direction Control	x	1	0	1	1	1	0	0	0	B8h
	1 st Parameter	x	0	0	0	0	0	0	0	CTB	00h
C0H	Power_ Control1	x	1	1	0	0	0	0	0	0	C0h
	1 st Parameter	x	0	0	0	VRH4	VRH3	VRH2	VRH1	VRH0	x
	2 nd Parameter	x	0	0	0	0	0	VC2	VC1	VC0	02h
C1H	Power_ Control2	x	1	1	0	0	0	0	0	1	C1h
	1 st Parameter	x	0	0	0	0	0	BT2	BT1	BT0	07h
C2H	Power_ Control3	x	1	1	0	0	0	0	1	0	C2h
	1 st Parameter	x	0	0	0	0	0	APA2	APA1	APA0	00h
C3H	Power_ Control4	x	1	1	0	0	0	0	1	1	C3h
	1 st Parameter	x	0	0	0	0	0	APB2	APB1	APB0	00h
C4H	Power_ Control 5	x	1	1	0	0	0	1	0	0	C4h
	1 st Parameter	x	0	0	0	0	0	APC2	APC1	APC1	01h
C5H	VCOM_ Control 1	x	1	1	0	0	0	1	0	1	C5h
	1 st Parameter	x	x	VMH6	VMH5	VMH4	VMH3	VMH2	VMH1	VMH0	-
	2 nd Parameter	x	0	VML6	VML5	VML4	VML3	VML2	VML1	VML0	-
C6H	VCOM_ Control 2	x	1	1	0	0	0	1	1	0	C6h
	1 st Parameter	x	0	0	VMA5	VMA4	VMA3	VMA2	VMA1	VMA0	13h/06h
C7H	VCOM OffsetControl	x	1	1	0	0	0	1	1	1	C7h
	1 st Parameter	0	nVM*	VMF6	VMF5	VMF4	VMF3	VMF2	VMF1	VMF0	40h
D3H	Write ID4Value	x	1	1	0	1	0	0	1	1	D3h
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	ID417	ID416	ID415	ID414	ID413	ID412	ID411	ID410	91h
	3 rd Parameter	x	ID427	ID426	ID425	ID424	ID423	ID422	ID421	ID420	63h
	4 th Parameter	x	x	x	x	x	ID433	ID432	ID431	ID430	00h
	5 th Parameter	x	x	x	x	x	x	x	x	x	x
D5H	NV Memory Function Controller(1)	x	1	1	0	1	1	0	1	0	D5h
	1 st Parameter	x	ID33	ID32	ID31	ID30	ID23	ID22	ID21	ID20	00h
	2 nd Parameter	x	OTP_ BS	0	0	0	OTP_ VMF3	OTP_ VMF2	OTP_ VMF1	OTP_ VMF0	00h
D6H	NV Memory Function Controller(2)	x	1	1	0	1	1	0	1	0	D6h
	1 st Parameter	x	OTP_ D[7]	OTP_ D[6]	OTP_ D[5]	OTP_ D[4]	OTP_ D[3]	OTP_ D[2]	OTP_ D[1]	OTP_ D[0]	00h
	2 nd Parameter	x	0	0	0	0	0	0	OTP_ TP[1]	OTP_ TP[0]	00h
D7H	NV Memory Function Controller(3)	x	1	1	0	1	1	0	1	0	D7h
	1 st Parameter	x	0	1	0	1	0	1	0	1	55h
	2 nd Parameter	x	1	0	1	0	1	0	1	0	AAh
	3 rd Parameter	x	0	1	1	0	0	1	1	0	66h

Code	Command	D17-D8	D7	D6	D5	D4	D3	D2	D1	D0	hex
DAH	Read ID1	x	1	1	0	1	1	0	1	0	DAh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	ID17	ID16	ID15	ID14	ID13	ID12	ID11	ID10	54h
DBH	Read ID2	x	1	1	0	1	1	0	1	1	DBh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	1	ID26	ID25	ID24	ID23	ID22	ID21	ID20	80h
DCH	Read ID3	x	1	1	0	1	1	1	0	0	DCh
	1 st Parameter	x	x	x	x	x	x	x	x	x	x
	2 nd Parameter	x	ID37	ID36	ID35	ID34	ID33	ID32	ID31	ID30	66h
E0H	Positive Gamma Correction Setting		1	1	1	0	0	0	0	0	E0h
	1 st Parameter		x	x	VP0[5:0]						-
	2 nd Parameter		x	x	VP1[5:0]						-
	3 rd Parameter		x	x	VP2[5:0]						-
	4 th Parameter		x	x	VP4[5:0]						-
	5 th Parameter		x	x	VP6[5:0]						-
	6 th Parameter		x	x	x	VP13[4:0]					-
	7 th Parameter		x	VP20[6:0]						-	
	8 th Parameter		VP36[3:0]				VP27[3:0]				-
	9 th Parameter		x	VP43[6:0]						-	
	10 th Parameter		x		VP50[5:0]						-
	11 st Parameter		x	x	VP57[5:0]						-
	12 nd arameter		x	x	VP59[5:0]						-
	13 rd Parameter		x	x	VP61[5:0]						-
	14 th Parameter		x	x	VP62[5:0]						-
	15 th Parameter		x	x	VP63[5:0]						-
E1H	Negative Gamma Correction Setting		1	1	1	0	0	0	0	1	E1h
	1 st Parameter		x	x	VN63[5:0]						-
	2 nd Parameter		x	x	VN62[5:0]						-
	3 rd Parameter		x	x	VN61[5:0]						-
	4 th Parameter		x	x	V59[5:0]						-
	5 th Parameter		x	x	VN57[5:0]						-
	6 th Parameter		x	x	x	VN50[4:0]					
	7 th Parameter		x	x	VN43[6:0]						-
	8 th Parameter		VN27[3:0]				VN36[3:0]				-
	9 th Parameter		x	VN20[6:0]						-	
	10 th Parameter		x	x	VN13[5:0]						-
	11 st Parameter		x	x	VN6[5:0]						-
	12 nd arameter		x	x	VN4[5:0]						-
	13 rd Parameter		x	x	VN2[5:0]						-
	14 th Parameter		x	x	VN1[5:0]						-
	15 th Parameter		x	x	VN0[5:0]						-
F2H	GAM_R_SEL		1	1	1	1	0	0	1	0	F2h
	1 st Parameter		x	x	x	x	x	x	x	GAM_R_SEL	Write

Notes:

1. There will be no abnormal visible effects on the display when S/W or H/W Reset are applied.
2. After Powered-On Reset finishes within 10% after both VDD & VDDI are applied.
3. Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only.
4. Please refer to ILI9163C datasheet for details

5.2 Power off the LCD Module

It recommends that enter Sleep Mode before power off the LCD module.

5.3 Refreshing The LCD Module

It recommends that the operating modes and display contents be refreshed periodically to prevent the effect of unexpected noise.

6. LCD Module Design and Handling Precautions

- Please ensure V0, VCOM is adjustable, to enable LCD module get the best contrast ratio under different temperatures, view angles and positions.
- Normally display quality should be judged under the best contrast ratio within viewable area. Unexpected display pattern may come out under abnormal contrast ratio.
- Never operate the LCD module exceed the absolute maximum ratings.
- Never apply signal to the LCD module without power supply.
- Keep signal line as short as possible to reduce external noise interference.
- IC chip (e.g. TAB or COG) is sensitive to light. Strong light might cause malfunction. Light sealing structure casing is recommended.
- Make sure there is enough space (with cushion) between case and LCD panel, to prevent external force passed on to the panel; otherwise that may cause damage to the LCD and degrade its display result.
- Avoid showing a display pattern on screen for a long time (continuous ON segment).
- LCD module reliability may be reduced by temperature shock.
- When storing and operating LCD module, avoids exposure to direct sunlight, high humidity, high or low temperature. They may damage or degrade the LCD module.
- Never leave LCD module in extreme condition (max./min storage/operate temperature) for more than 48hr.
- Recommend LCD module storage conditions is 0 C~40 C <80%RH.
- LCD module should be stored in the room without acid, alkali and harmful gas.
- Avoid dropping & violent shocking during transportation, and no excessive pressure press, moisture and sunlight.
- LCD module can be easily damaged by static electricity. Please maintain an optimum anti-static working environment to protect the LCD module. (eg. ground the soldering irons properly)
- Be sure to ground the body when handling LCD module.
- Only hold LCD module by its sides. Never hold LCD module by applying force on the heat seal or TAB.
- When soldering, control the temperature and duration avoid damaging the backlight guide or diffuser which might degrade the display result such as uneven display.
- Never let LCD module contact with corrosive liquids, which might cause damage to the backlight guide or the electric circuit of LCD module.
- Only clean LCD with a soft dry cloth, Isopropyl Alcohol or Ethyl Alcohol. Other solvents (e.g. water) may damage the LCD.
- Never add force to components of LCD module. It may cause invisible damage or degrade the module's reliability.
- When mounting LCD module, please make sure it is free from twisting, warping and bending.
- Do not add excessive force on surface of LCD, which may

6. 液晶显示模块设计和使用须知

- 请注意 V0, VCOM 的设定, 以确保液晶显示模块在不同的使用温度下以及在不同的视角和位置观察模块显示, 均能达到最佳对比度, 请务必将应用电路上设置为对比度可调。
- 请注意液晶显示模块的显示品质判定是指在正常对比度下以及视窗 (V. A) 范围内进行的, 非正常对比度下液晶可能会出现非预期的显示不良, 应注意区分。
- 请勿在最大额定值以外使用液晶显示模块。
- 请勿在没有接通电源的条件下, 给液晶显示模块输送信号。
- 请尽可能缩短信号线的连接, 以避免对液晶显示模块的信号干扰。
- 集成电路因 IC 芯片 (如 TAB 或 COG) 对紫外线极为敏感, 强光环境下可能会引起液晶显示模块功能失效, 故应采用不透光的外壳。
- 请在液晶显示模块与外壳之间保留足够的空间 (可使用衬垫), 以缓冲外力对液晶显示模块的损坏或因受力不均而产生的显示不均等异常现象。
- 避免液晶显示屏在某一画面下长时间点亮, 否则有出现残影的风险; 请通过软件每隔一段时间改变一次画面。
- 液晶显示模块的可靠性可能因温度冲击而降低。
- 请勿在阳光直射、高湿、高温或低温下储存和使用液晶显示模块, 这将造成液晶显示模块的损坏或失效。
- 请勿在极限环境 (最大/最小存储/工作温度) 下使用或放置液晶显示模块超过 48 小时以上。
- 液晶显示模块建议存储条件为: 0 C~40 C <80%RH。
- 请勿让液晶显示模块存储于带有 酸性, 碱性, 有害气体环境之中。
- 在运输过程中, 请勿让液晶显示模块跌落与猛烈震动, 同时避免 异常挤压, 高湿度, 与阳光照射。
- 液晶显示模块极易受静电损坏, 请务必保证液晶显示模块在防静电的工作环境中使用或保存。(如: 烙铁正确接地, 等)
- 拿取液晶显示模块时需注意操作人员的接地情况。
- 请手持液晶显示模块的边沿取放模块, 防止热压纸或 TAB 部位受力。
- 焊接液晶模块时, 请注意控制烙铁的温度、焊接时间, 以免烫坏导光板或偏光片, 导致显示不均等不良现象发生。
- 请勿使用洗板水等腐蚀性液体接触液晶模块, 以免腐蚀导光板或模块电路。
- 仅可使用柔软的干布, 异丙醇或乙醇清洁液晶屏表面, 其他任何溶剂 (如: 水) 都有可能损坏液晶模块。
- 请勿挤压液晶显示模块上的元器件, 以避免产生潜在的损坏或失效而影响产品可靠性。
- 装配液晶显示模块时, 请务必注意避免液晶显示模块的扭曲或变形。

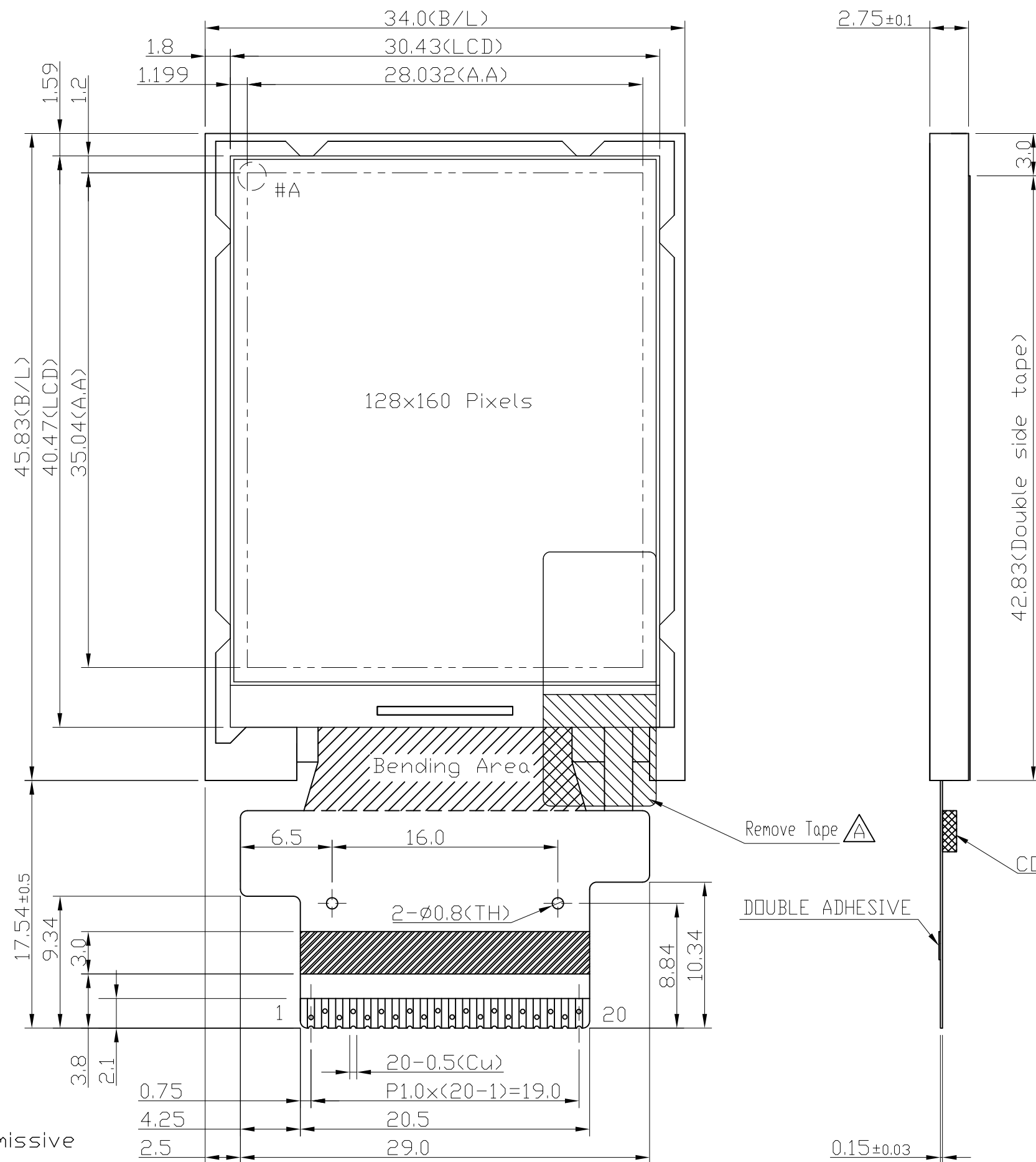
- cause the display color change abnormally.
 - LCD panel is made with glass. Any mechanical shock (e.g. dropping from high place) will damage the LCD module.
 - Protective film is attached on LCD screen. Be careful when peeling off this protective film, since static electricity may be generated.
 - Polarizer on LCD gets scratched easily. If possible, do not remove LCD protective film until the last step of installation.
 - When peeling off protective film from LCD, static charge may cause abnormal display pattern. The symptom is normal, and it will turn back to normal in a short while.
 - LCD panel has sharp edges, please handle with care.
 - Never attempt to disassemble or rework LCD module.
 - If display panel is damaged and liquid crystal substance leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes promptly wash it off using soap and water.
- 请勿挤压液晶显示屏表面，这将导致显示颜色的异常。
 - 液晶屏由玻璃制作而成，任何机械碰撞（如从高处跌落）均有可能损坏液晶显示模块。
 - 液晶屏表面带有保护膜，揭除保护膜时需要注意可能产生的静电。
 - 因液晶显示屏表面的偏光片极易划伤，安装完成之前请尽量不要揭下保护膜。
 - 请缓慢揭除保护膜，在此过程中液晶显示屏上可能会产生静电，此为正常情况，可在短时间内消失。
 - 请注意避免被液晶显示屏的边缘割伤。
 - 请不要试图拆卸或改造液晶显示模块。
 - 当液晶显示屏出现破裂，内部液晶液体可能流出；相关液体不可吞吃，绝对不可接触嘴巴，如接触到皮肤或衣服，请使用肥皂与清水彻底清洗。

Warranty

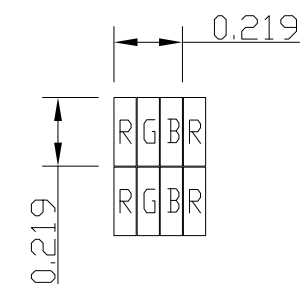
This product has been manufactured to our company's specifications as a part for use in your company's general electronic products. It is guaranteed to perform according to delivery specifications. For any other use apart from general electronic equipment, we cannot take responsibility if the product is used in medical devices, nuclear power control equipment, aerospace equipment, fire and security systems, or any other applications in which there is a direct risk to human life and where extremely high levels of reliability are required. If the product is to be used in any of the above applications, we will need to enter into a separate product liability agreement.

- We cannot accept responsibility for any defect, which may arise from additional manufacturing of the product (including disassembly and reassembly), after product delivery.
- We cannot accept responsibility for any defect, which may arise after the application of strong external force to the product.
- We cannot accept responsibility for any defect, which may arise due to the application of static electricity after the product has passed our company's acceptance inspection procedures.
- When the product is in CCFL models, CCFL service life and brightness will vary according to the performance of the inverter used, leaks, etc. We cannot accept responsibility for product performance, reliability, or defect, which may arise.

We cannot accept responsibility for intellectual property of a third party, which may arise through the application of our product to our assembly with exception to those issues relating directly to the structure or method of manufacturing of our product.



Terminal	
No.	Pin Name
1	BLK
2	BLA
3	VSS
4	VDD
5	NC
6	NC
7	/CS
8	/RES
9	D/C
10	/WR
11	/RD
12	DB7
13	DB6
14	DB5
15	DB4
16	DB3
17	DB2
18	DB1
19	DB0
20	VSS



#A Details
Scale = 40/1

Note: $\triangle A$

- *1. LCD Display Type : TFT , Transmissive
- *2. Pixel Arrangment : RGB-STRIPE
- *3. Color Depth : 65k/262k Colors
- *4. Operating Voltage : 2.8V
- *5. Backlight Color: White LEDs
- *6. Backlight Supply : 30mA (Constant Current 3.0V Typ)
- *7. Operating Temperature : -20°C~70°C
- *8. Storage Temperature : -30°C~80°C

C		
B		
A	-Refine Outline	Luo Lin 2018-01-24
Rev	Note	Date
Dwg	Title	
	LMT018DNBFW-1 Outline Dwg	
Dwg No.	MK-004873a-1-1	Date 2014-06-19
Scale	Tol.	Unit
3/1	± 0.2	mm
Approved	Checked	Paper Size A3
		Drawn Deng Junjie
TOPWAY		