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SHENZHEN ZJH DISPLAYER TECHNOLOGYCO., LTD
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SPECIFICATION

LCD MODULE

P028B052-IPS

REVISION RECORD

DESIGN	CHECK	REVIEW
VERSION	DATE	CONTENTS
A	2016-03-18	First Release

CUSTOMER

Customer company:

Date:

Customer signature:

Date:



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GENERAL INFORMATION

Item	Contents	Unit
Driver element	a-Si 2.8 TFT active matrix	---
Viewing direction	IPS	O' Clock
LCM OUTLINE DIMENSIONS	50(W) x 69.2(H) x 2.3(T)	mm
Active area (W×H)	43.2(H) × 57.6(V)MM	mm
Number of Dots	240RGB(H)×320(V)	Pixel
Driver IC	ST7789V	---
Colors	262K	---
Weight	TBD	g
Backlight Type	LED	---
Interface Type	3线/4线 SPI串口 MCU 8/9/16/ 18 BIT RGB 6/16/18BIT	---
Input voltage	2.8/3.3V	V

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
Supply voltage for analog	V _{DD}	-0.3	3.3	V
Input voltage	V _{IN}	-0.3	V _{DD} +0.3	V
Operating temperature	T _{OP}	-20	70	°C
Storage temperature	T _{ST}	-30	80	°C
Humidity	RH		90% (Max60°C)	RH

ELECTRICAL CHARACTERISTICS

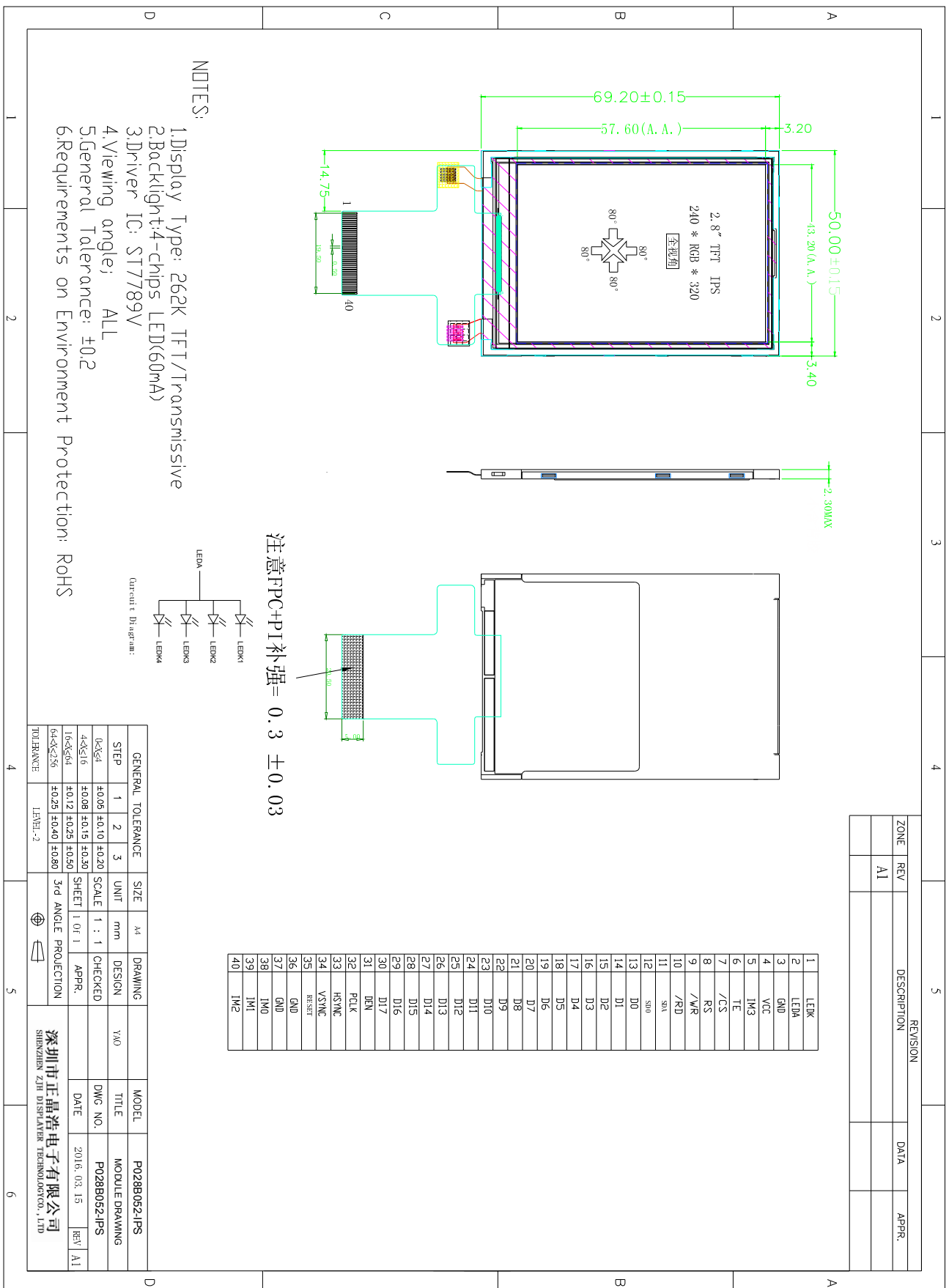
DC CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Supply voltage for analog	V _{DD}	2.3	2.8	3.3	V
Input Current	I _{dd}	—	—	—	mA
Supply voltage for I/O circuit	I _{OVCC}	1.65	1.8	3.3	V
Input voltage 'H' level	V _{IH}	0.7 I _{OVCC}	—	—	V
Input voltage 'L' level	V _{IL}	—	—	0.3 I _{OVCC}	V
Output voltage 'H' level	V _{OH}	0.8 I _{OVCC}	—	—	V
Output voltage 'L' level	V _{OL}	—	—	0.2 I _{OVCC}	V

BACKLIGHT CHARACTERISTICS

Item	Symbol	Min	Typ	Max	Unit	Condition
Forward voltage	V _f	2.8	3.2	3.3	V	If=60 mA
Luminance	L _v	5000		—	cd/m²	
Number of LED	—	4			Piece	—
Connection mode	p	Parallel			—	—

EXTERNAL DIMENSION



Interface Signals

Pin No.	Symbol	Description
1	LEDK	LED Negative
2	LEDA	LED Positive
3	GND	Groud
4	VCC	Power supply (2.8/3.3V)
5	IM3	interface mode Select
6	FMARK	Tearing effect output pin
7	CS/SPI CS	Chip select input pin
8	RS/SPI SCL	Data/Command Write Select pin, serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial datainterface.
9	WR/RS(4 线)	Write execution control pin, 4-line system (D/CX): Serves as command or parameter select.
10	RD	Read execution control pin
11	SPI SDI/SDA	Serial input signal.
12	SPI SDO	Serial output signal.
13-30	D0-D17	Data Bus
31	DE	Data enable signal for RGB interface operation.
32	PCLK	Dot clock signal for RGB interface operation.
33	HSYNC	Line synchronizing signal for RGB interface operation.
34	VSNC	Frame synchronizing signal for RGB interface operation.
35	RESET	Reset pin
36	GND	Groud
37	GND	Groud
38	IM0	interface mode Select
39	IM1	interface mode Select
40	IM2	interface mode Select

- Select the MCU interface mode

IM3	IM2	IM1	IM0	MCU-Interface Mode	DB Pin in use	
					Register/Content	GRAM
0	0	0	0	80 MCU 8-bit bus interface I	D[7:0]	D[7:0]
0	0	0	1	80 MCU 16-bit bus interface I	D[7:0]	D[15:0]
0	0	1	0	80 MCU 9-bit bus interface I	D[7:0]	D[8:0]
0	0	1	1	80 MCU 18-bit bus interface I	D[7:0]	D[17:0]
0	1	0	1	3-wire 9-bit data serial interface I	SDA: In/OUT	
0	1	1	0	4-wire 8-bit data serial interface I	SDA: In/OUT	
1	0	0	0	80 MCU 16-bit bus interface II	D[8:1]	D[17:10], D[8:1]
1	0	0	1	80 MCU 8-bit bus interface II	D[17:10]	D[17:10]
1	0	1	0	80 MCU 18-bit bus interface II	D[8:1]	D[17:0]
1	0	1	1	80 MCU 9-bit bus interface II	D[17:10]	D[17:9]
1	1	0	1	3-wire 9-bit data serial interface II	SDI: In SDO: Out	
1	1	1	0	4-wire 8-bit data serial interface II	SDI: In SDO: Out	

APPLICATION CIRCUIT

Please consult our technical department for detail information.

INITIAL CODE

Please consult our technical department for detail information.

ELECTRO-OPTICAL CHARACTERISTICS

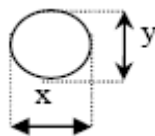
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time		Tr+Tf	$\theta = 0^\circ$ $\varnothing = 0^\circ$ Ta=25°C	—	20	30	ms	FIG 1.	4
Contrast ratio		Cr		—	400	500	—	FIG 2.	1
Luminance uniformity		δ WHITE		—	—	—	%	FIG 2.	3
Surface Luminance		Lv		300	—	—	cd/m ²	FIG 2.	2
Viewing angle range		CR>10	$\varnothing 3$	—	80	—	deg	FIG 3.	6
			$\varnothing 9$	—	80	—	deg	FIG 3.	
			$\varnothing 12$	—	80	—	deg	FIG 3.	
			$\varnothing 6$	—	80	—	deg	FIG 3.	
CIE(x, y) chromaticity	Red	x	$\theta = 0^\circ$ $\varnothing = 0^\circ$ Ta=25°C	0.586	0.636	0.686		FIG 2.	5
		y		0.273	0.323	0.373			
	Green	x		0.252	0.277	0.297			
		y		0.529	0.549	0.569			
	Blue	x		0.122	0.142	0.162			
		y		0.102	0.122	0.142			
	White	x		0.283	0.303	0.323			
		y		0.305	0.325	0.345			

4. Standards of inspection items

4.1 Major Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1.1	All functional defects	1.No display 2.Display abnormally 3.Missing vertical, horizontal segment 4.Short circuit 5. Back-light no lighting, flickering and abnormal lighting.	Major
4.1.2	Missing	Missing component	
4.1.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.1.4	linearity	No more than 1.5%	

4.2 Cosmetic Defect

Item No	Items to be inspected	Inspection Standard				Classification of defects	
4.21	Clear Spots Black and white Spot defect Pinhole, Foreign Particle, polarizer Dirt	For dark/white spot, size Φ is defined as $\Phi = \frac{(x + y)}{2}$				Minor	
		1					
		Zone Size(mm)	Acceptable Qty				Ignore
			A	B	C		
		$\Phi \leq 0.15$	Ignore				
		$0.15 < \Phi \leq 0.20$	2				
		$0.20 < \Phi \leq 0.30$	1				
		$\Phi > 0.30$	0				
	Clear Spots TP Dirt	2				Minor	
		Zone Size(mm)	Acceptable Qty				Ignore
			A	B	C		
		$\Phi \leq 0.15$	Ignore				
		$0.15 < \Phi \leq 0.20$	2				
		$0.20 < \Phi \leq 0.30$	1				
		$\Phi > 0.30$	0				
		Dim Spots Circle shaped and dim edged defects	3				Minor
	Zone Size(mm)		Acceptable Qty			Ignore	
			A	B	C		
	$\Phi \leq 0.2$		Ignore				
	$0.20 < \Phi \leq 0.40$		2				
	$0.40 < \Phi \leq 0.60$		1				
$\Phi > 0.60$	0						

2 Cosmetic Defect

Item No	Items to be inspected	Inspection Standard					Classification of defects
4.2.2	Line defect Black line, White line, Foreign material on polarizer	Size (mm)		Acceptable Qty			Minor
		L (Length)	W (Width)	Zone			
				A	B	C	
		Ignore	$W \leq 0.01$	Ignore		Ignore	
		$L \leq 3.0$	$0.01 < W \leq 0.03$	2			
		$L \leq 3.0$	$0.03 < W \leq 0.05$	1			
			$W > 0.05$	0			
	Foreign material on TP film	The line can be seen after mobile phone in the operating condition:					Minor
		Size (mm)		Acceptable Qty			
		L (Length)	W (Width)	Zone			
				A	B	C	
		Ignore	$W \leq 0.03$	Ignore		Ignore	
		$L \leq 5.0$	$0.03 < W \leq 0.05$	3			
			$W > 0.05$	0			
4.2.3	Dim line defect Polarizer scratch TP film scratch	If the scratch can be seen after mobile phone cover assembling or in the operating condition, judge by the line defect of 4.2.2. If the scratch can be seen only in non-operating condition or some special angle, judge by the following.					Minor
		Size (mm)		Acceptable Qty			
		L (Length)	W (Width)	Zone			
				A	B	C	
		Ignore	$W \leq 0.03$	Ignore		Ignore	
		$5.0 < L \leq 10.0$	$0.03 < W \leq 0.05$	2			
		$L \leq 5.0$	$0.05 < W \leq 0.08$	1			
			$W > 0.08$	0			
4.2.4	Polarize Air bubble	Air bubbles between glass & polarizer					Minor
		Zone Size(mm)	Acceptable Qty				
			A	B	C		
		$\Phi \leq 0.25$	Ignore		Ignore		
		$0.25 < \Phi \leq 0.5$	2				
		$\Phi > 0.50$	0				

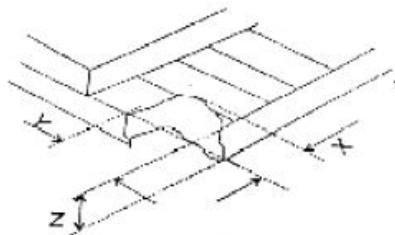
Item No	Items to be inspected	Inspection Standard	Classification of defects
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4.35

Glass defect

Minor

(i) Chips on corner
A:LCD Glass defect

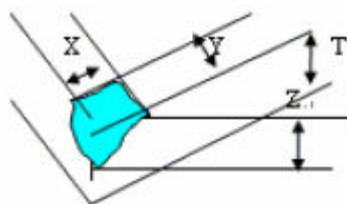


X (mm)	Y (mm)	Z (mm)
≤ 2.0	$\leq S$	Disregard

Notes: S=contact pad length

Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.

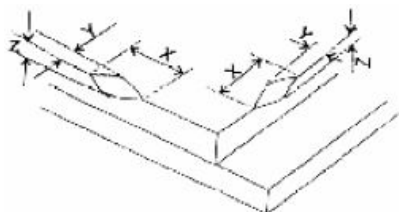
B:TP Glass defect



X (mm)	Y (mm)	Z (mm)
≤ 3.0	≤ 3.0	Disregard

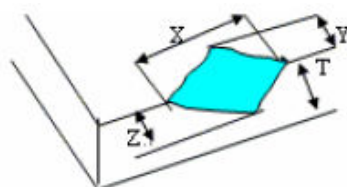
(ii) Usual surface cracks

A:LCD Glass defect



X (mm)	Y (mm)	Z (mm)
≤ 3.0	< Inner border line of the seal	Disregard

B:TP Glass defect



X (mm)	Y (mm)	Z (mm)
≤ 6.0	< 2.0	Disregard

(iii) Crack

Cracks tend to break are not allowed.

