



SPECIFICATION



TN0181ANVNANN-GN00

1.81" - MIP - SPI

Version:
Date: 24.08.2020

Note: This specification is subject to change without prior notice

www.data-modul.com

SPEC for Mass production

Spec No.	TQ3C-8EAF0-E1YBS08-00
Date	August 24, 2020

TYPE : TN0181ANVNANN-GN00
< 1.81 inch Reflective Dot Matrix Memory LC Display >

CONTENTS

1. Application
2. Construction and Outline
3. Mechanical Specifications
4. Absolute Maximum Ratings
5. Optical Characteristics
6. Electrical Characteristics
7. Address Mapping
8. Interface Signals
9. Input Timing Characteristics
10. Warranty
11. Precautions for Use
12. Reliability test data
13. Outline drawing



KYOCERA CORPORATION

Original Issue Date	Designed by: Engineering dept.			Confirmed by: QA dept.	
	Prepared	Checked	Approved	Checked	Approved
Aug. 24, 2020	<i>M. Yamada</i>	<i>Y. Adachi</i>	<i>A. Iwasaki</i>	<i>N. Tsuruta</i>	<i>O. Sato</i>

Spec No. TQ3C-8EAF0-E1YBS08-00	Part No. TN0181ANVNANN-GN00	Page -
-----------------------------------	--------------------------------	-----------

Warning

1. This Kyocera LCD module has been specifically designed for use only in electronic devices and industrial machines in the area of audio control, office automation, industrial control, home appliances, etc. The module should not be used in applications where the highest level of safety and reliability are required and module failure or malfunction of such module results in physical harm or loss of life, as well as enormous damage or loss.
Such fields of applications include, without limitation, medical, aerospace, communications infrastructure, atomic energy control. Kyocera expressly disclaims any and all liability resulting in any way to the use of the module in such applications.
2. Customer agrees to indemnify, defend and hold Kyocera harmless from and against any and all actions, claims, damages, liabilities, awards, costs, and expenses, including legal expenses, resulting from or arising out of Customer's use, or sale for use, or Kyocera modules in applications.

Caution

1. Kyocera shall have the right, which Customer hereby acknowledges, to immediately scrap or destroy tooling for Kyocera modules for which no Purchase Orders have been received from the Customer in a two-year period.

Spec No. TQ3C-8EAF0-E1YBS08-00	Part No. TN0181ANVNANN-GN00	Page -
-----------------------------------	--------------------------------	-----------

Revision record

Date		Designed by : Engineering dept.			Confirmed by : QA dept.	
		Prepared	Checked	Approved	Checked	Approved
Rev.No.	Date	Page	Descriptions			

SPEC No. TQ3C-8EAF0-E1YBS08-00	Part No. TN0181ANVNANN-GN00	ページ 1
-----------------------------------	--------------------------------	----------

1. Application

This document defines the specification of TN0181ANVNANN-GN00 (RoHS Compliant)

2. Construction and Outline

LCD : Low power consumption / Reflective dot matrix memory LC display
 Backlight System : None
 Polarizer : Glare type
 Additional circuit : 1-bit pixel memory function in LCD

3. Mechanical Specifications

Item	Specification	Unit
Outline dimensions 1)	35.91(W) × 38.21(H)	mm
Glass thickness	0.5 + 0.5	mm
Active area	32.51(W) × 32.51(H) (Diagonal 1.81 inch)	mm
Dot format	256(W) × 256(H)	Dot
Dot pitch	127(W) × 127(H)	μm
Color 2)	Black-and-White (Binary) (Normally black)	-
LC Mode	ECB mode	-
Weight	4.5	g

1) Gasket and FPC are not included. Please refer to the drawing for details.

2) The tone of display depends on ambient temperature.

4. Absolute Maximum Ratings

4-1. Electrical absolute maximum ratings

Item	Symbol	Min.	Max.	Unit
Supply voltage	V _{DD}	-0.3	4.0	V
Input signal voltage 1)	V _{IN}	-0.3	4.0	V

1) Input signals : SCLK, SI, SCS, RST, VCOM

4-2. Environmental absolute maximum ratings

Item	Symbol	Min.	Max.	Unit
Operating temperature 1)	T _{OP}	-20	70	°C
Storage temperature 2)	T _{STO}	-30	80	°C
Operating humidity 3)	H _{OP}	10	4)	%RH
Storage humidity 3)	H _{STO}	10	4)	%RH

- 1) Operating temperature means a temperature which operation shall be guaranteed. Since display performance is evaluated at 25°C, another temperature range should be confirmed.
- 2) Store LCD at normal temperature/humidity. Keep them free from vibration and shock. An LCD that is kept at a low or a high temperature for a long time can be defective due to other conditions, even if the low or high temperature satisfies the standard. (Please refer to "Precautions for Use" for details.)
- 3) Non-condensing
- 4) Temp. ≤40°C , 85%RH Max.
Temp. >40°C, Absolute humidity shall be less than 85%RH at 40°C

5. Optical Characteristics

$V_{DD}=3.3V, V_{COM}=1Hz, Temp. = 25^{\circ}C$

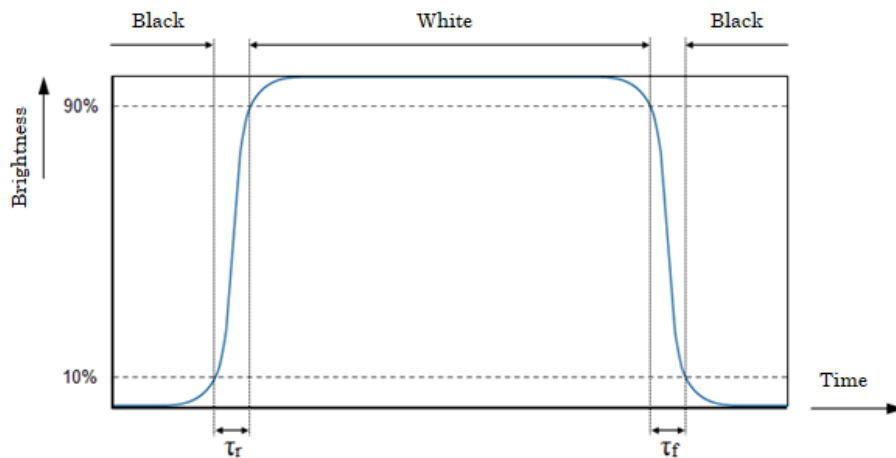
Item	Symbol	Temp.	Min.	Typ.	Max.	Unit	
Contrast ratio 1)	CR	-	-	40	-	-	
Reflectance 2)	-	-	-	20	-	%	
Response time 3)4)	Rise	τ_r	-20°C	-	16	-	msec
			25°C	-	12	-	
			40°C	-	11	-	
	Fall	τ_f	-20°C	-	36	-	
			25°C	-	13	-	
			40°C	-	12	-	
Viewing angle CR \geq 2 5)6)	θ_{upper}	-	-	60	-	deg.	
	θ_{lower}		-	60	-		
	θ_{left}		-	60	-		
	θ_{right}		-	60	-		
Chromaticity coordinates 2)	Wx	-	-	0.31	-	-	
	Wy	-	-	0.34	-		

1) Definition of contrast ratio

$$CR(\text{Contrast ratio}) = \frac{\text{Brightness with all pixels "White"}}{\text{Brightness with all pixels "Black"}}$$

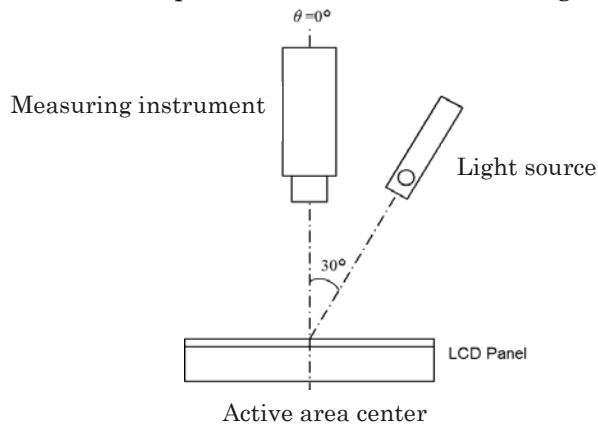
2) Reflectance and Chromaticity coordinates
The measuring instrument is CM-2600d.

3) Definition of response time

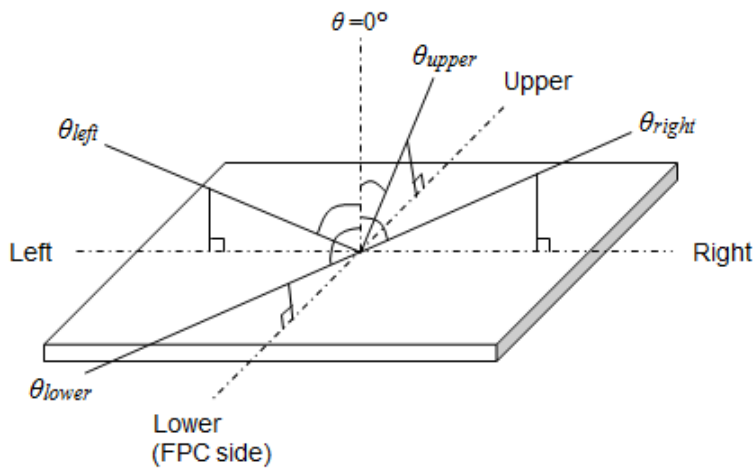


4) Measurement of response time

The measurement is performed under the following conditions on LCD-5200.

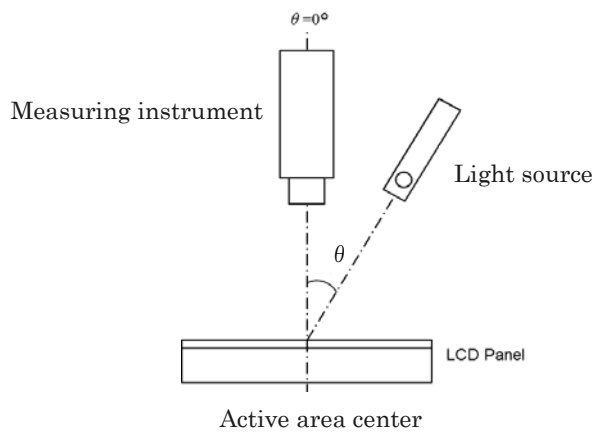


5) Definition of viewing angle



6) Measurement of viewing angle

The measurement is performed by changing the angle of the light source on LCD-5200.



6. Electrical Characteristics

6-1. LCD driving characteristics

Temp. = 25°C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V _{DD}	—	3.0	3.3	3.6	V
LCD common voltage 5)	V _{COM}	“Low” level	GND	—	GND+0.1	V
		“High” level	V _{DD} -0.1	—	V _{DD}	V
Input signal voltage 1), 4)	V _{IL}	“Low” level	GND - 0.2V	—	V _{DD} * 0.25	V
	V _{IH}	“High” level	V _{DD} * 0.75	—	V _{DD} + 0.2V	V
Input leak current 1)	I _{IN}	T _{OP} =25°C	—	5	10	nA
Current consumption	I _{DD_opr}	2)	—	23	46	μA
	I _{DD_stb}	3)	—	1.8	6.5	μA
Input capacitance 1)	C _{IN1}	—	—	5	10	pF
VCOM terminal capacitance	C _{VCOM}	—	—	80	120	nF

1) SCLK, SI, SCS, RST

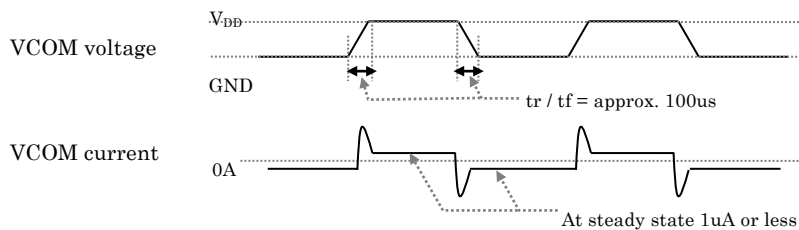
2) 1Hz full display rewriting

3) Keeping static image, and polarity inversion of VCOM with a period of 1 sec.

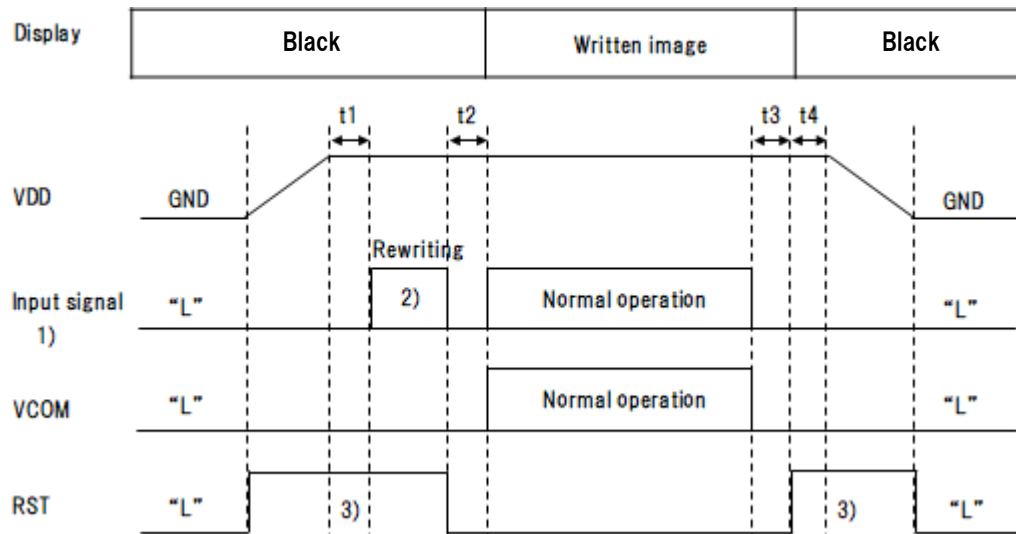
*Value of the current consumption is without smoothing capacitor.

4) Since input leakage current is less than 10 nA, please control voltage so that V_{IL}=GND and V_{IH}=V_{DD} in static state.

5) At 1μA VCOM load, VCOM supply voltage should be set as “Low” level = GND and “High” level = V_{DD}. VCOM terminal capacitance is approximately 120nF. VCOM inversion time should be approximately 100us.



6-2. Power ON-OFF sequence



Item	Symbol	Min.	Typ.	Max.	Unit
Power ON-OFF sequence	t1	0	—	—	μsec
	t2	1	10	—	msec
	t3	1	10	—	msec
	t4	1	10	—	msec

1) SCLK, SI, SCS

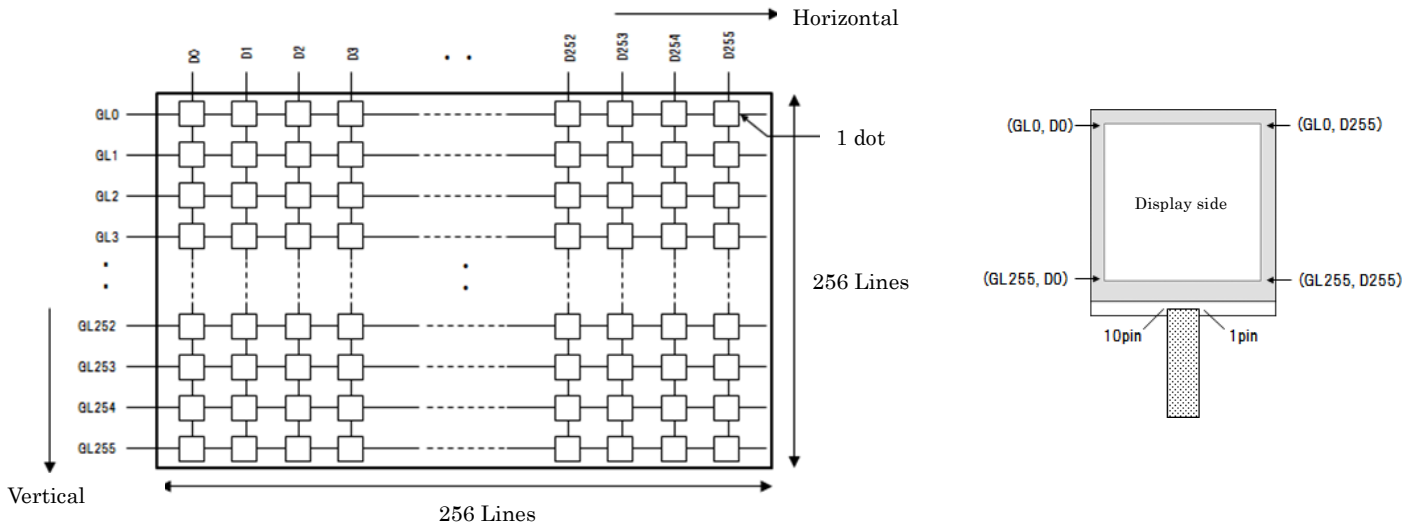
2) Rewriting to black for all addresses.

3) Display OFF when RST = "H". VCOM = "L" is necessary when RST = "H". Black display when display is OFF.

Data in pixel memory is random with black or white at power ON.

Possible to prevent black-white random data display by black display when RST = "H".

7. Address Mapping



Addressing of Gate line (GL*) to be selected is necessary for vertical direction.
 Rewriting data for one line is necessary for horizontal direction due to rewriting one line at once.

-Addressing table for vertical direction

AG7	AG6	AG5	AG4	AG3	AG2	AG1	AG0	Selected GL
0	0	0	0	0	0	0	0	GL0
0	0	0	0	0	0	0	1	GL1
0	0	0	0	0	0	1	0	GL2
0	0	0	0	0	0	1	1	GL3
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
1	1	1	1	1	1	0	0	GL252
1	1	1	1	1	1	0	1	GL253
1	1	1	1	1	1	1	0	GL254
1	1	1	1	1	1	1	1	GL255

8. Interface Signals

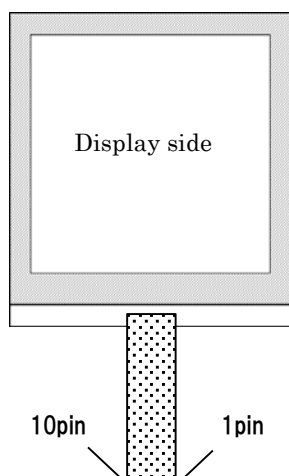
No.	Symbol	Description	I/O 1)	Voltage	Unit	Note
1	VDD	Power supply (3.3 V)	P	3.3	V	
2	VSS	GND	P	0.0	V	
3	SCLK	Clock signal for serial input	I	0.0/3.3	V	3)
4	SCS	Chip select signal	I	0.0/3.3	V	3)
5	SI	Serial input signal	I	0.0/3.3	V	
6	RST	Display ON/OFF signal	I	0.0/3.3	V	2) 3)
7	VSS	GND	P	0.0	V	
8	VDD	Power supply (3.3 V)	P	3.3	V	
9	VCOM	Common power supply control	I	0.0/3.3	V	
10	NC	NC	-	-	-	

Matching connector: 04 6824 610 000 846+ (KYOCERA)

1) P: Power supply
I: Input

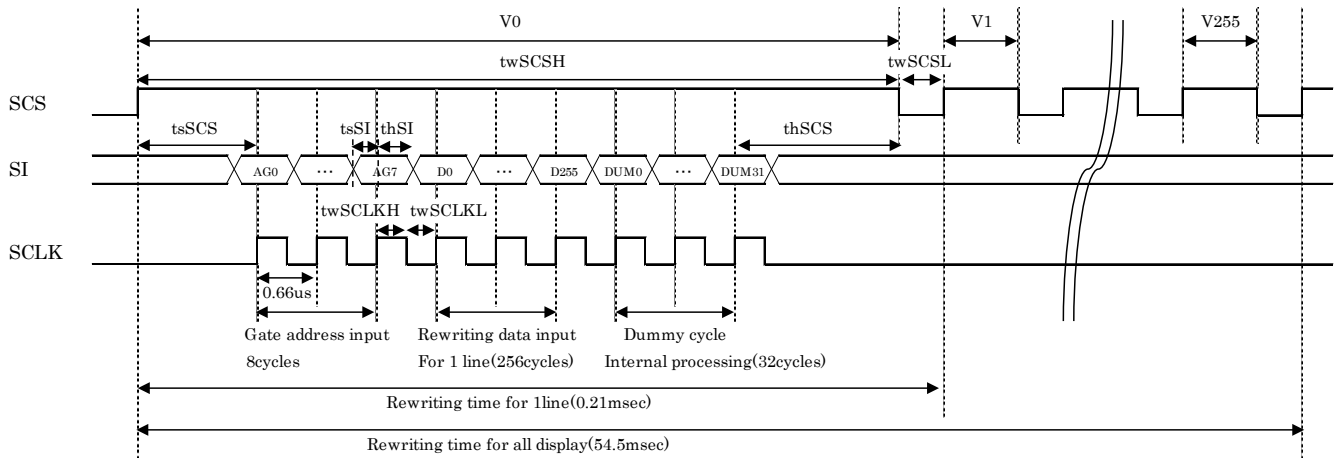
2) RST = "L": Display ON
RST = "H": Display OFF (Black display keeping pixel memory)
VCOM = "L" is necessary when RST = "H"
(When VCOM="H", Display does not turn to white, and current consumption increases by shoot-through-current in panel. (several mA))

3) Need to guard from signal noise
If there is an abnormal signal not described in the timing chart on these signals, display may be distorted. Please carefully guard these signals since even if signal noise with small pulse width may cause malfunction.



9. Input Timing Characteristics

9-1-1. Rewriting timing <SCS activating period: 1 line>



- 3 lines (SCS, SCLK, and SI) are control signals to rewrite.
- Rewriting 1 gate line by 1 gate line.
- Input order of serial data
 1. Input gate address
 2. Input rewriting data for 1 horizontal line
 3. Dummy cycle (internal processing for rewriting)

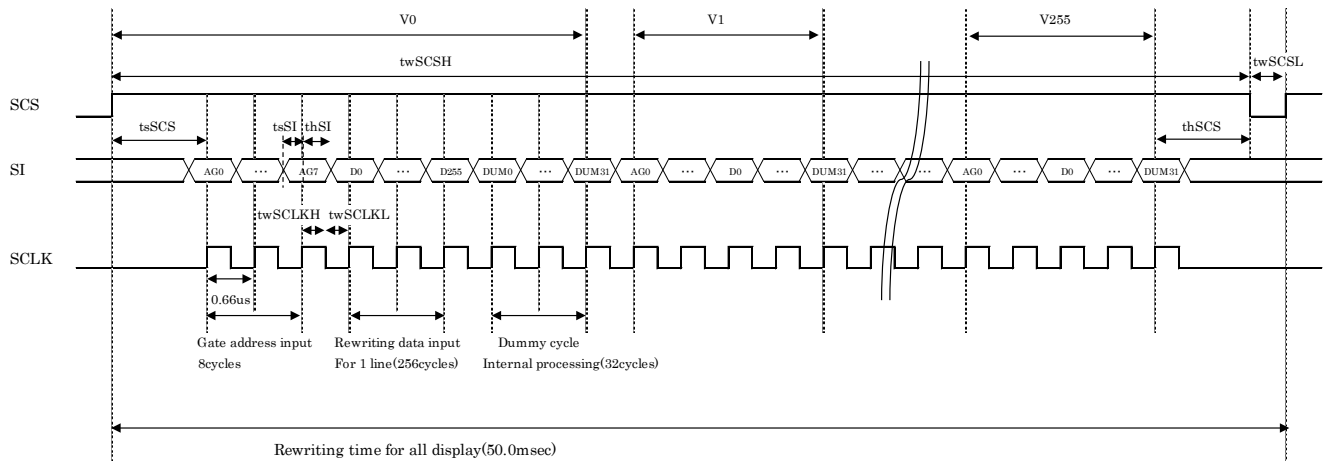
Time to rewrite

No.	Item	Parameters
Serial data input (1 line)	Gate address	$AG_0 \sim AG_7$
	Rewriting data	$D_0 \sim D_{255}$
	Dummy cycle	$DUM_0 \sim DUM_{31}$
Total cycle for 1line		296 cycles
Time to rewrite 1 line 1)		0.21 msec
Number of gate line		256 lines
Time to rewrite full display 1)		54.5 msec

1) SCLK frequency: 1.5MHz ($tw_{SCLKH} = tw_{SCLKL} = 0.33\mu s$)

9-1-2. Rewriting timing <SCS activating period: 1 frame>

Rewriting V_0 to V max continuously during SCS activating period



- 3 lines (SCS, SCLK, and SI) are control signals to rewrite.
- Rewriting 1 gate line by 1 gate line.
- Input order of serial data
 1. Input gate address
 2. Input rewriting data for 1 horizontal line
 3. Dummy cycle (internal processing for rewriting)

Possible to rewrite numerous lines continuously during SCS activating period.
Gate addresses for continuous rewriting of numerous lines can be set in any order.

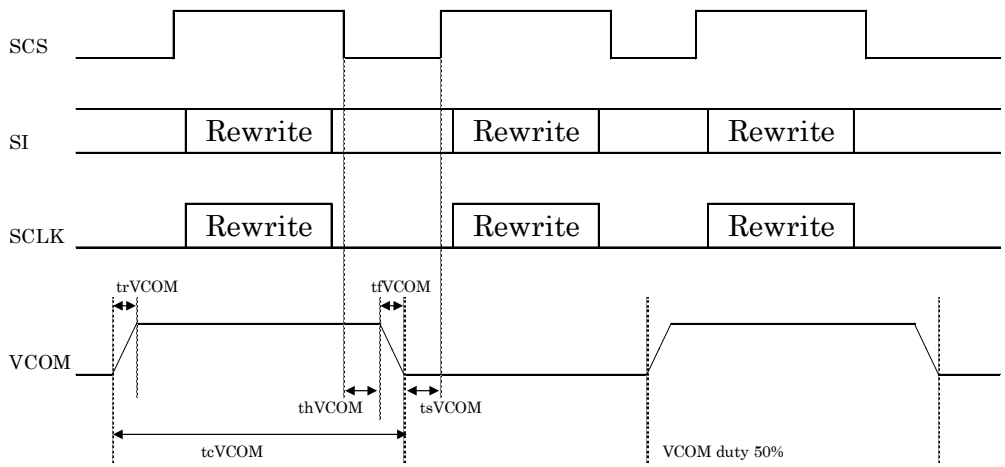
Time to rewrite in case of SCLK period = 2 µsec.

No.	Item	Parameters
Serial data input (1 line)	Gate address	AG0~AG7
	Rewriting data	D0~D255
	Dummy cycle	DUM0~DUM31
Total cycle for 1line		296 cycles
Number of gate line		256 lines
Time to rewrite full display		50.0 msec

9-2 Relationship between rewriting data and display

Rewriting data	Display
0	BLACK
1	WHITE

9-3. VCOM AC driving



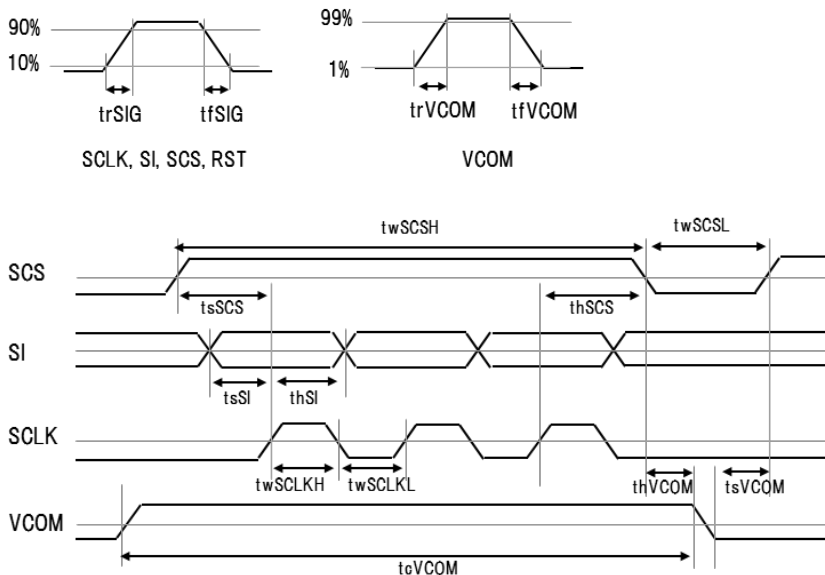
AC drive between 0 V and 3.3 V is required for VCOM signal.
 VCOM switching is performed during the period when the rewriting operation is not performed.
 (SCS="L")

9-4. Timing characteristics

Item		Symbol	Min.	Typ.	Max.	Unit	Note
1 line writing time		-	0.21	—	—	ms	
1 frame writing time		-	50.0	—	—	ms	
Input signal 1)	Signal rise time	trSIG	—	—	50	ns	2)
	Signal fall time	tfSIG	—	—	50	ns	2)
SCLK	SCLK high width	twSCLKH	0.33	—	—	μs	4)
	SCLK low width	twSCLKL	0.33	—	—	μs	4)
SI	SI set-up time	tsSI	0.33	—	—	μs	4)
	SI hold time	thSI	0.33	—	—	μs	4)
SCS	SCS high width	twSCSH	203	—	—	μs	4)
	SCS low width	twSCSL	10	—	—	μs	4)
	SCS set-up time	tsSCS	4	—	—	μs	4)
	SCS hold time	thSCS	4	—	—	μs	4)
VCOM	VCOM duty	—	—	50	—	%	
	VCOM rise time	trVCOM	—	100	200	μs	3)
	VCOM fall time	tfVCOM	—	100	200	μs	3)
	VCOM cycle time	teVCOM	—	1000	—	ms	5)
	VCOM rise/fall→SCS rise	tsVCOM	4	4	—	ms	5)
	SCS fall→VCOM rise/fall	thVCOM	1	1	—	ms	5)

- 1) SCLK, SI, SCS, RST
- 2) Transition time of 10%↔90% level of signal
- 3) Transition time of 1%↔99% level of signal
- 4) Timing is defined at 50% level of signal
- 5) VCOM timing is defined at 1%↔99% level of signal. Other timing is defined at 50% level of signal.

-Timing charts



SPEC No. TQ3C-8EAF0-E1YBS08-00	Part No. TN0181ANVNANN-GN00	ページ 13
-----------------------------------	--------------------------------	-----------

10. Warranty

10-1. Incoming inspection

Please inspect the LCD within one month after your receipt.

10-2. Production warranty

Kyocera warrants its LCD's for a period of 12 months from the ship date. Kyocera shall, by mutual agreement, replace or re-work defective LCD's that are shown to be Kyocera's responsibility.

SPEC No. TQ3C-8EAF0-E1YBS08-00	Part No. TN0181ANVNANN-GN00	ページ 14
-----------------------------------	--------------------------------	-----------

11. Precautions for Use

11-1. Installation of the LCD

- 1) A transparent protection plate shall be added to protect the LCD and its polarizer.
- 2) The LCD shall be installed flat, without twisting or bending.
- 3) A transparent protection sheet is attached to the polarizer. Please remove the protection film slowly before use, paying attention to static electricity.

11-2. Static electricity

- 1) Protect the LCD from static electricity.
- 2) Workers should use body grounding. Operator should wear ground straps.

11-3. LCD operation

- 1) The LCD shall be operated within the limits specified. Operation at values outside of these limits may shorten life, and/or harm display images.

11-4. Storage

- 1) The LCD shall be stored within the temperature and humidity limits specified.
Store in a dark area, and protect the LCD from direct sunlight or fluorescent light.
- 2) Always store the LCD so that it is free from external pressure onto it.

11-5. Usage

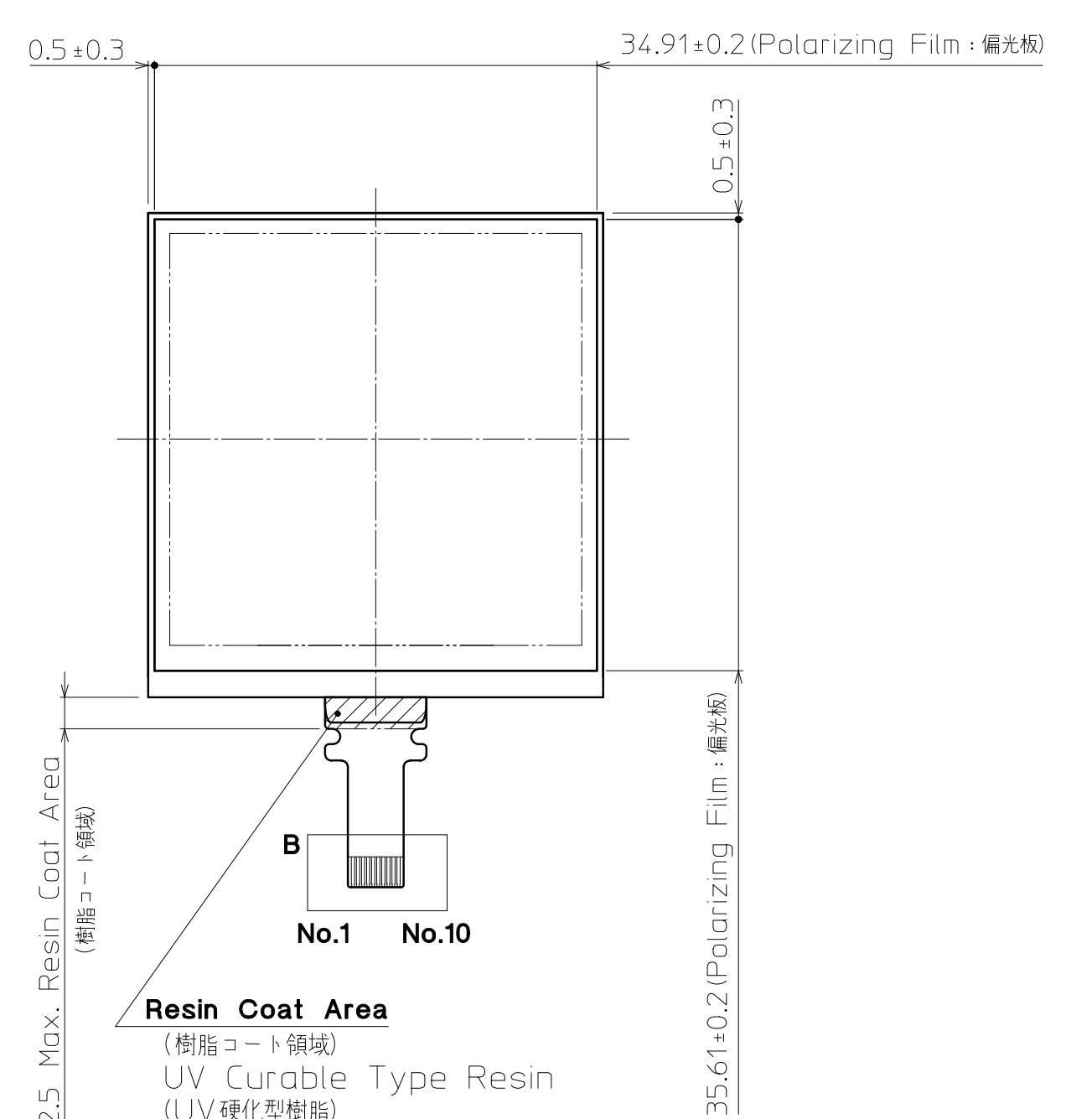
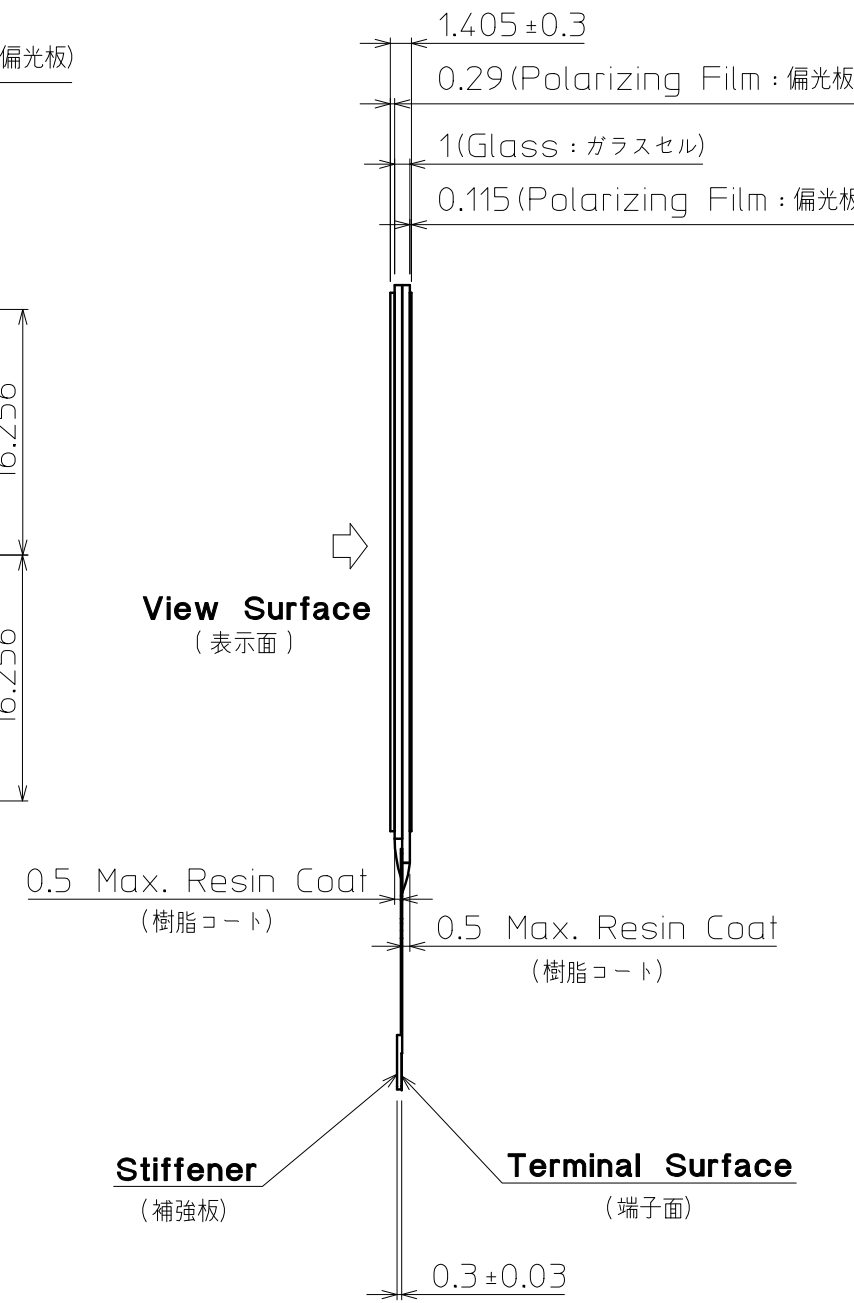
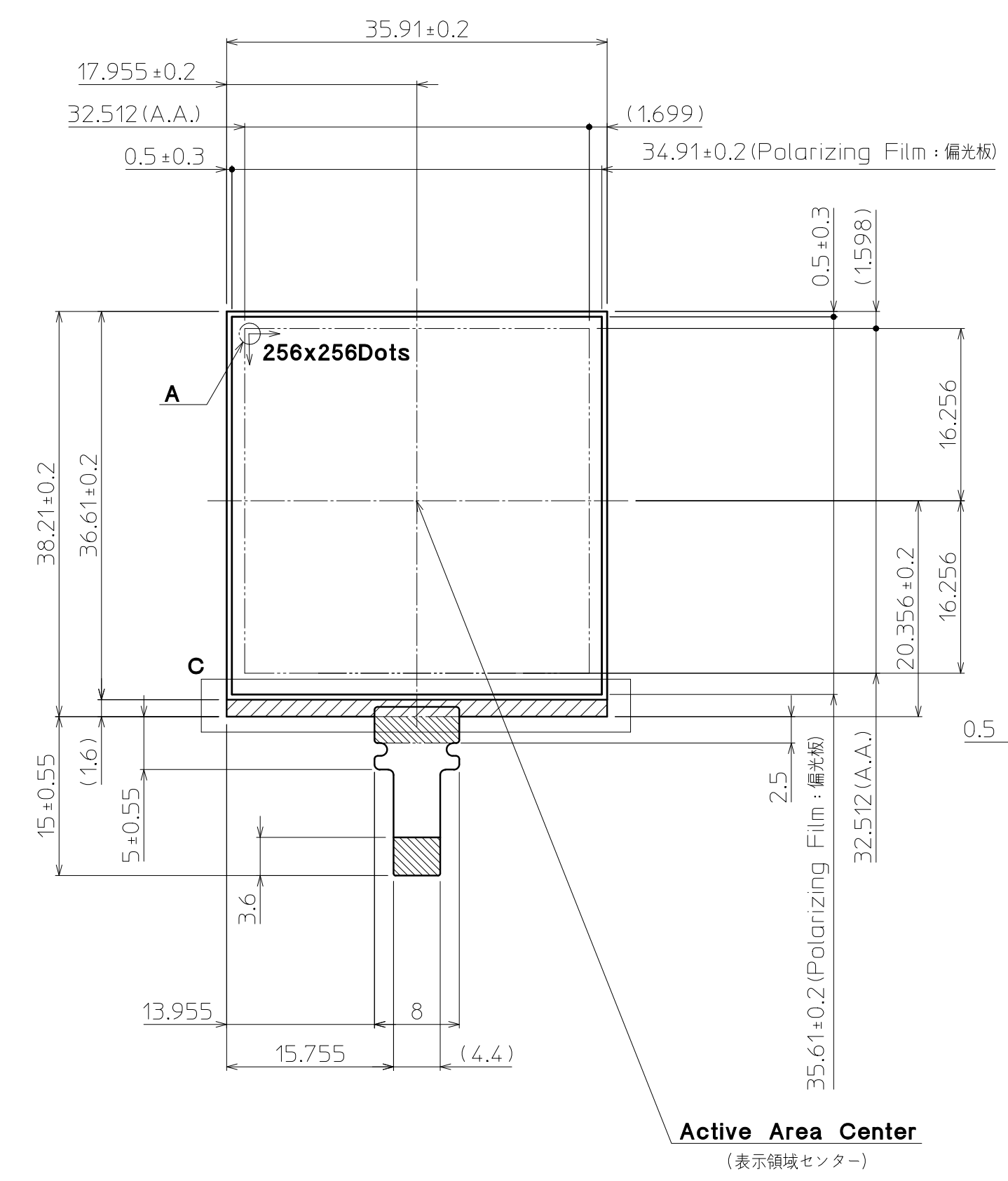
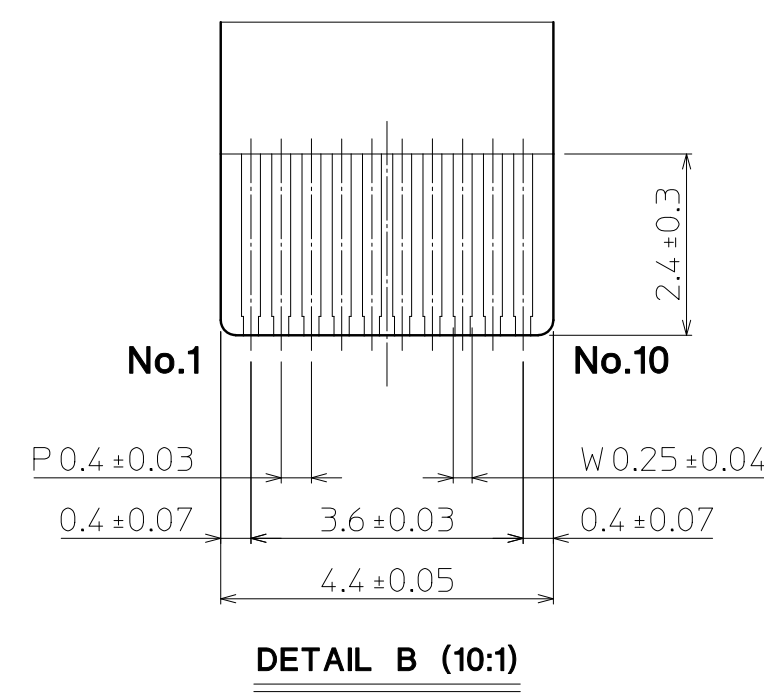
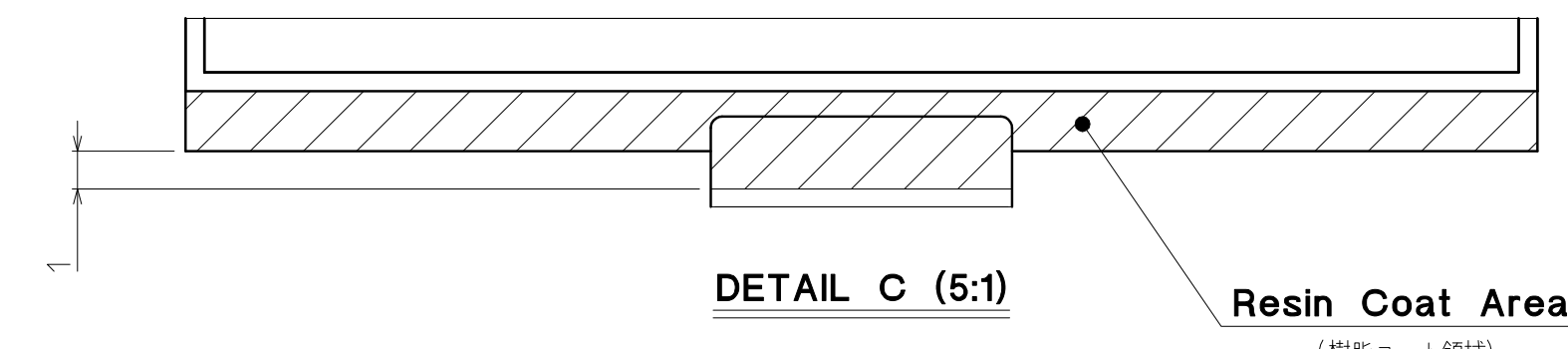
- 1) **DO NOT** store in a high humidity environment for extended periods. Polarizer degradation bubbles, and/or peeling off of the polarizer may result.
- 2) The front polarizer is easily scratched or damaged. Prevent touching it with any hard material, and from being pushed or rubbed.
- 3) The LCD screen may be cleaned by wiping the screen surface with a soft cloth or cotton pad using a little Ethanol
- 4) Water may cause damage or discoloration of the polarizer. Clean condensation or moisture from any source immediately.
- 5) Always keep the LCD free from condensation during testing. Condensation may permanently spot or stain the polarizer.
- 6) Do not disassemble LCD because it will result in damage.
- 7) This Kyocera LCD has been specifically designed for use in general electronic devices, but not for use in a special environment such as usage in an active gas. Hence, when the LCD is supposed to be used in a special environment, evaluate the LCD thoroughly beforehand and do not expose the LCD to chemicals such as an active gas.
- 8) Please do not use solid-base image pattern for long hours because a temporary afterimage may appear. We recommend using screen saver etc. in cases where a solid-base image pattern must be used.
- 9) Liquid crystal may leak when the LCD is broken. Be careful not to let the fluid go into your eyes and mouth. In the case the fluid touches your body; rinse it off right away with water and soap.

12. Reliability Test Data

Test item	Test condition	Test time	Judgement
High temp. atmosphere	80°C	240h	Function/Display : No defect Current consumption : No defect
Low temp. atmosphere	-30°C	240h	Function/Display : No defect Current consumption : No defect
High temp. humidity atmosphere	40°C 90%RH	240h	Function/Display : No defect Current consumption : No defect
Temp. cycle	-30°C 0.5h R.T. 0.5h 80°C 0.5h	10cycles	Function/Display : No defect Current consumption : No defect
High temp. operation	70°C	240h	Function/Display : No defect Current consumption : No defect

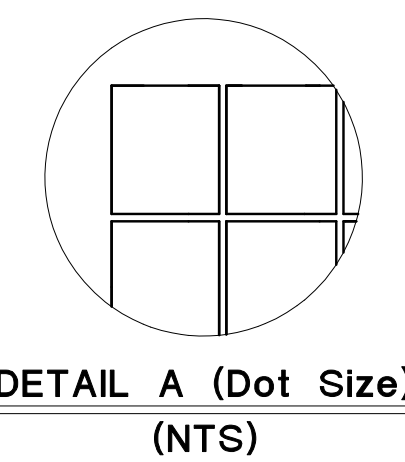
- 1) Each test item uses a test LCD only once. The tested LCD is not used in any other tests.
- 2) The LCD is tested in circumstances in which there is no condensation.
- 3) The reliability test is not an out-going inspection.
- 4) The result of the reliability test is for your reference purpose only.
The reliability test is conducted only to examine the LCD's capability.

No	Description	Drawn	Checked	Checked	Approved



UV curable type resin must be coated on FPC beyond the edges of the FPC's terminals.
(UV硬化型樹脂はFPCの端子の端を越えてFPC上に塗られていること)

- Note. (注記)
1. Tolerance without indication : ±0.5
(指示無き公差)
 2. FPC Bend radius(R) must be 2mm or larger.
(FPCの曲げはR2以上とする)
 3. There is a possibility that in-plane unevenness will be occurred by over twist, stress giving by attaching to LCD, and over pressure to touch panel. Please be careful of stress when designing the housing.
(過度な捻じり(ひずみ)、LCD固定時での応力発生、タッチパネルでの過度な押し圧によっては、パネル面内にムラが発生することがありますので、筐体設計において、事前に十分確認願います。)



FPC Bending Prohibited Area (FPC折り曲げ禁止領域)

Material 材質	Treatment 処理	Approved '20.06.01	Checked '20.06.01	Checked '20.05.29	Drawn 伊原	Scale 2:1(10:1,NTS)	Title TN0181ANVNANN	KYOCERA Drawing No. 121A9012500	Year-Month-Day '20.05.29	Size 2
Quantity 製作数	Description; 備考	RoHS 17133-02525-2	宇佐美	小紫	倉元		Outline Dimensions			

Spec No.	TQ3C-8EAF0-E2YBS08-00
Date	August 24, 2020

KYOCERA INSPECTION STANDARD

TYPE : TN0181ANVNANN-GN00

KYOCERA CORPORATION

Original Issue Date	Designed by : Engineering dept.			Confirmed by : QA dept.	
	Prepared	Checked	Approved	Checked	Approved
Aug. 24 ,2020	<i>M. Yamada</i>	<i>Y. Adachi</i>	<i>A. Iwaki</i>	<i>N. Tsuruda</i>	<i>O. Sato</i>

Spec No.
TQ3C-8EAF0-E2YBS08-00

Part No.
TN0181ANVNANN-GN00

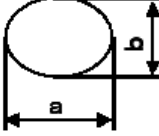
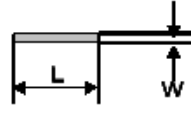
Page
-

Revision record

Date		Designed by : Engineering dept.			Confirmed by : QA dept.	
		Prepared	Checked	Approved	Checked	Approved
Rev.No.	Date	Page	Descriptions			

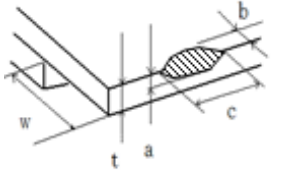
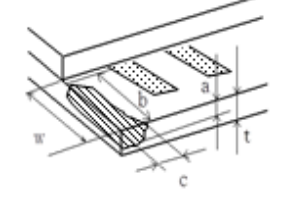
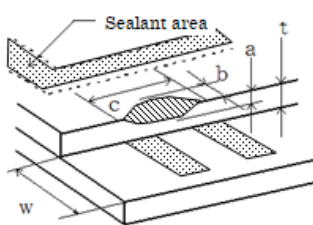
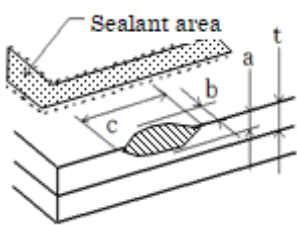
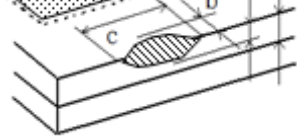

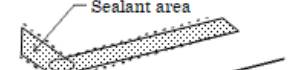
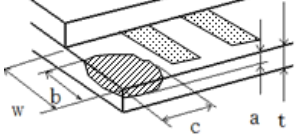
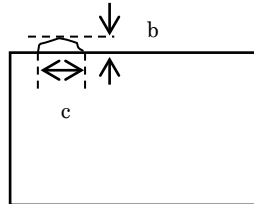
Visuals specification

1) Note

		Note																
General	<p>1. Customer identified anomalies not defined within this inspection standard shall be reviewed by Kyocera, and an additional standard shall be determined by mutual consent.</p> <p>2. Dot defect and external inspection about the image quality shall be applied to any defect within the active area and shall not be applicable to outside of the active area.</p> <p>3. Inspection conditions Luminance : 500 Lux min. Inspection distance : 300 mm. Temperature : 25 ± 5°C Direction : Directly above</p>																	
Definition of inspection item	Dot defect	Bright dot defect	<p>The dot is constantly “on” when power applied to the LCD, even when all “Black” data sent to the screen.</p> <p>Inspection tool: 5% Transparency neutral density filter. Count dot: If the dot is visible through the filter. Don't count dot: If the dot is not visible through the filter.</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>D(1,1)</td><td>D(2,1)</td><td>D(3,1)</td><td>D(4,1)</td><td>D(5,1)</td></tr> <tr><td>D(1,2)</td><td>D(2,2)</td><td>D(3,2)</td><td style="background-color: #cccccc;">D(4,2)</td><td>D(5,2)</td></tr> <tr><td>D(1,3)</td><td>D(2,3)</td><td>D(3,3)</td><td>D(4,3)</td><td>D(5,3)</td></tr> </table> <div style="display: inline-block; vertical-align: middle; margin-left: 10px;"> dot defect </div>	D(1,1)	D(2,1)	D(3,1)	D(4,1)	D(5,1)	D(1,2)	D(2,2)	D(3,2)	D(4,2)	D(5,2)	D(1,3)	D(2,3)	D(3,3)	D(4,3)	D(5,3)
	D(1,1)	D(2,1)	D(3,1)	D(4,1)	D(5,1)													
	D(1,2)	D(2,2)	D(3,2)	D(4,2)	D(5,2)													
	D(1,3)	D(2,3)	D(3,3)	D(4,3)	D(5,3)													
		Black dot defect (Included circular shape)	<p>The dot is constantly “off” when power applied to the LCD, even when all “White” data sent to the screen. Similar size compared to bright dot. For circular shape black dot, refer to inspection item of White dot, Black dot (Circular shape).</p>															
	White dot (Circular shape)	<p>Pixel works electrically, however, circular/foreign particle makes dot appear to be “on” even when all “Black” data is sent to the screen.</p>																
External inspection	Bubble, Scratch, Foreign particle	Visible operating (all pixels “Black” or “White”) and non-operating.																
	Appearance inspection	Does not satisfy the value at the spec.																
Definition of size	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Definition of circle size</p>  <p>$d = (a + b) / 2$</p> </div> <div style="text-align: center;"> <p>Definition of linear size</p>  </div> </div>																	

2) Standard

Classification		Inspection item	Judgement standard																	
Defect (In LCD glass)	Dot defect	Bright dot defect	Acceptable number : 0																	
		Black dot defect	Acceptable number : 0																	
		Total dot defects	Acceptable number : 0																	
	Others	White dot, Black dot (Circular shape)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th colspan="2">Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td colspan="2">Neglected</td> </tr> <tr> <td>$0.1 < d \leq 0.15$</td> <td colspan="2">2</td> </tr> <tr> <td>$0.15 < d$</td> <td colspan="2">0</td> </tr> </tbody> </table>			Size (mm)	Acceptable number		$d \leq 0.1$	Neglected		$0.1 < d \leq 0.15$	2		$0.15 < d$	0				
Size (mm)	Acceptable number																			
$d \leq 0.1$	Neglected																			
$0.1 < d \leq 0.15$	2																			
$0.15 < d$	0																			
External inspection (Defect on Polarizer or between Polarizer and LCD glass)		Foreign particle Scratch (Linear shape)	<table border="1"> <thead> <tr> <th>Width (mm)</th> <th>Length (mm)</th> <th>Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$W \leq 0.02$</td> <td>—</td> <td>Neglected</td> </tr> <tr> <td>$W \leq 0.03$</td> <td>$L \leq 2.0$</td> <td>2</td> </tr> <tr> <td>$W \leq 0.05$</td> <td>$L \leq 0.5$</td> <td>1</td> </tr> <tr> <td>$0.05 < W$</td> <td>—</td> <td>0</td> </tr> </tbody> </table>			Width (mm)	Length (mm)	Acceptable number	$W \leq 0.02$	—	Neglected	$W \leq 0.03$	$L \leq 2.0$	2	$W \leq 0.05$	$L \leq 0.5$	1	$0.05 < W$	—	0
			Width (mm)	Length (mm)	Acceptable number															
			$W \leq 0.02$	—	Neglected															
			$W \leq 0.03$	$L \leq 2.0$	2															
$W \leq 0.05$	$L \leq 0.5$	1																		
$0.05 < W$	—	0																		
		Foreign particle Bubble Scratch (Circular shape)	<table border="1"> <thead> <tr> <th>Size (mm)</th> <th colspan="2">Acceptable number</th> </tr> </thead> <tbody> <tr> <td>$d \leq 0.1$</td> <td colspan="2">Neglected</td> </tr> <tr> <td>$0.1 < d \leq 0.2$</td> <td colspan="2">2</td> </tr> <tr> <td>$0.2 < d$</td> <td colspan="2">0</td> </tr> </tbody> </table>			Size (mm)	Acceptable number		$d \leq 0.1$	Neglected		$0.1 < d \leq 0.2$	2		$0.2 < d$	0				
			Size (mm)	Acceptable number																
			$d \leq 0.1$	Neglected																
			$0.1 < d \leq 0.2$	2																
$0.2 < d$	0																			
		Color variation (Mura)	<p>Determination of color variation: Invisible with ND 5% filter Distance between LCD and ND filter: 150mm Inspection time: 1 second Consultation shall be held as necessary.</p>																	

Inspection item	Judgement standard					
Glass crack	(t = Glass Thickness)					
	Item	Size (mm)	a	b	c	Judgement
	Back side of the terminal		$\leq t$	$\leq w$	≤ 2.0	Neglected
	Terminal		$\leq t$	$\leq w$	≤ 2.0	Neglected
	Display side glass		$\leq t$	< Sealant area inner boundary	≤ 3.0	Neglected
	Double glass		a	b	c	Neglected
			-	-	≤ 0.2	
			$\leq t$	< Sealant area inner boundary	≤ 3.0	
Corner		a	b	c	Neglected	
		$\leq t$	$\leq w$	≤ 2.0		
Projection	<p>a:Thickness</p> 	a	b	c	Neglected	
		$\leq t$	≤ 0.3	-		



ALL TECHNOLOGIES. ALL COMPETENCIES. ONE SPECIALIST.



DATA MODUL AG
Landsberger Straße 322
DE-80687 Munich
Phone: +49-89-56017-0

DATA MODUL WEIKERSHEIM GMBH
Lindenstraße 8
DE-97990 Weikersheim
Phone: +49-7934-101-0



More information and worldwide locations can be found at

www.data-modul.com