Product Specification

NVK- 128SC008F- S

Note : This product specification is subject to change without any notice.

Prepared by : Sales Engineering Group

NeoView KOLON Co., Ltd.

REVISION RECORD

REV. NO.	REV. DATE	DESCRIPTION OF REVISION	PAGE	REMARK
0	2005.06.15	INITIAL RELEASE	ALL	

REVISION INDEX

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Contents

1. Features

Display Format : 128(W) x R.G.B. x 128(H) dots

Display Color : 65K colors

Driver Element : passive matrix OLED(Organic Light Emitting Diode)

Interface : 8bit parallel data with MPU(8080−series MPU)

Multiplexing Ratio : 1/128 Duty

Control IC / Drive IC : LD50T5128M (Manufacturer : LDT)

Polarizer : Anti−glare Pol.

Applications : Display terminal for MP3

2. Mechanical Data

Item	Specification	Unit	Note
Outline Dimension	35.1(W) x 50.45(H) x 1.74(T)	mm	(1)
Number of dots	128(W) x(R.G.B) x 128(H)	dot	
Viewing area	29.24(W) x 29.238(H)	mm	
Active area	27.24(W) x 27.238(H)	mm	
Pixel pitch	0.213(W) x 0.213(H)	mm	
Dot pitch	0.071(W) x 0.213(H)	mm	
Dot size	0.047(W) x 0.187(H)	mm	
Weight	4.0 Max.	g	
Glass thickness	0.7 ±0.07	mm	

Note (1) : COF folded.

Refer to the Outline Dimension at the page 19.

3. Absolute Maximum Ratings
(Ta=23±5℃, Vss=GND=0)

Item		Symbol	Min.	Max.	Unit	Note
Supply Volatge	Logic	VDD	−0.3	4.0	V	(2)
	OLED	VCC	−0.3	20.0	V	(2)
Input Voltage		VIN	−0.3	VDD+0.3	V	
Operating Temp.		TOPT	−20	60	℃	
Storage Temp.		TSTG	−30	80	℃	
Humidity		−	−	90	%RH	(3)

Note (2) : Voltage relationship VCC > VDD > VSS must always be satisfied.

Note (3) : Wet bulb temperature should be 29℃ max. and no condensation of water.

4. Electrical Characteristics
(Ta=23±5℃, Vss=GND=0)

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Volatge	Logic	VDD	2.25	2.8	3.3	V	
	OLED	VCC	−	16.0	−	V	
Input Voltage	High	VIH	0.7VDD	−	VDD	V	
	Low	VIL	VSS	−	0.8	V	
Current Consumption	Logic	IDD		2.0		mA	
	OLED	ICC	−	22.1	−		(4) (5)

Note (4) : VDD=2.8[V], VCC=16[V]

Dot Current(40h,1Ah,31h) Precharge Select = 01h , Precharge Width = 02h

Peak Pulse Delay=01h, Peak Pulse Width=03h,0Fh,0Ch, Row overlap:00h Test Command=0Eh

Frame Frequency =02h

Note (5) : 100% White Pattern

5. Electro-optical Characteristics (Ta=23±5℃, Vss=GND=0)

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Luminance	White	Lw	−	70		cd/㎡	(6) (7) (9)
Color Chromaticity (CIE1931)	White	CIEWx	0.240	0.290	0.340		(6) (7) (9)
		CIEWy	0.305	0.355	0.405		(6) (7) (9)
	Red	CIERx	0.539	0.589	0.639		(6) (7) (9)
		CIERy	0.357	0.407	0.457		(6) (7) (9)
	Green	CIEGx	0.225	0.275	0.325		(6) (7) (9)
		CIEGy	0.599	0.649	0.699		(6) (7) (9)
	Blue	CIEBx	0.100	0.150	0.200		(6) (7) (9)
		CIEBy	0.150	0.200	0.250		(6) (7) (9)
Area in CIE diagram			54			%	(6) (7) (9)
LifeTime	White	LFw	3,000		−	Hr	(6) (7) (8) (9)

Note (6) : VDD=2.8[V], VCC=16[V]

Dot Current(40h, 1Ah, 31h) Precharge Select = 01h , Precharge Width = 02h

Peak Pulse Delay=01h, Peak Pulse Width=03h, 0Fh, 0Ch, Row overlap: 00h Test Command=0Eh
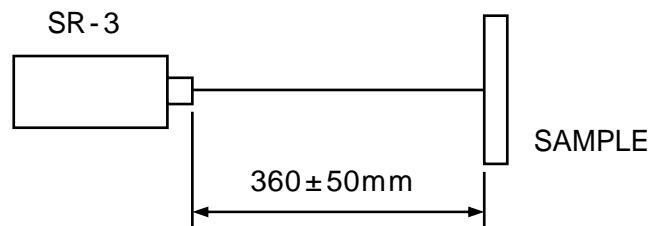
Frame Frequency =02h

Note (7) : 100% White Pattern

Note (8) : Half value of initial luminance
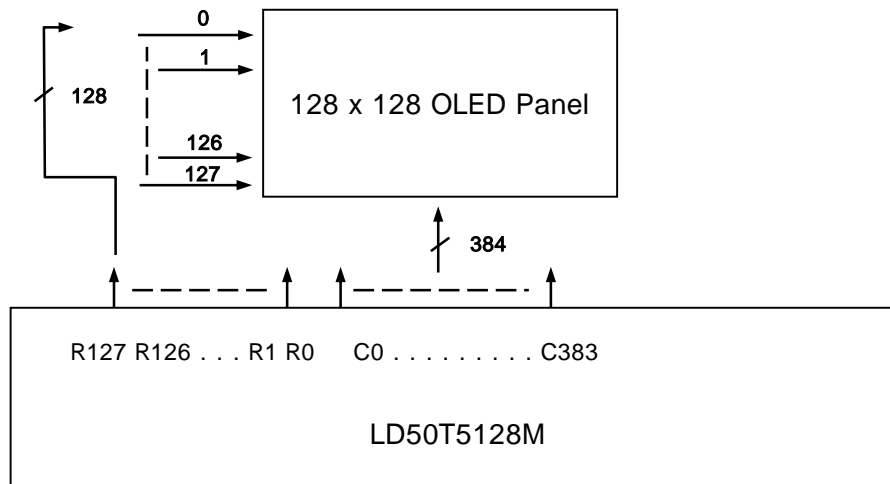
Note (9) : Measurement System

Measuring Instrument : SR-3
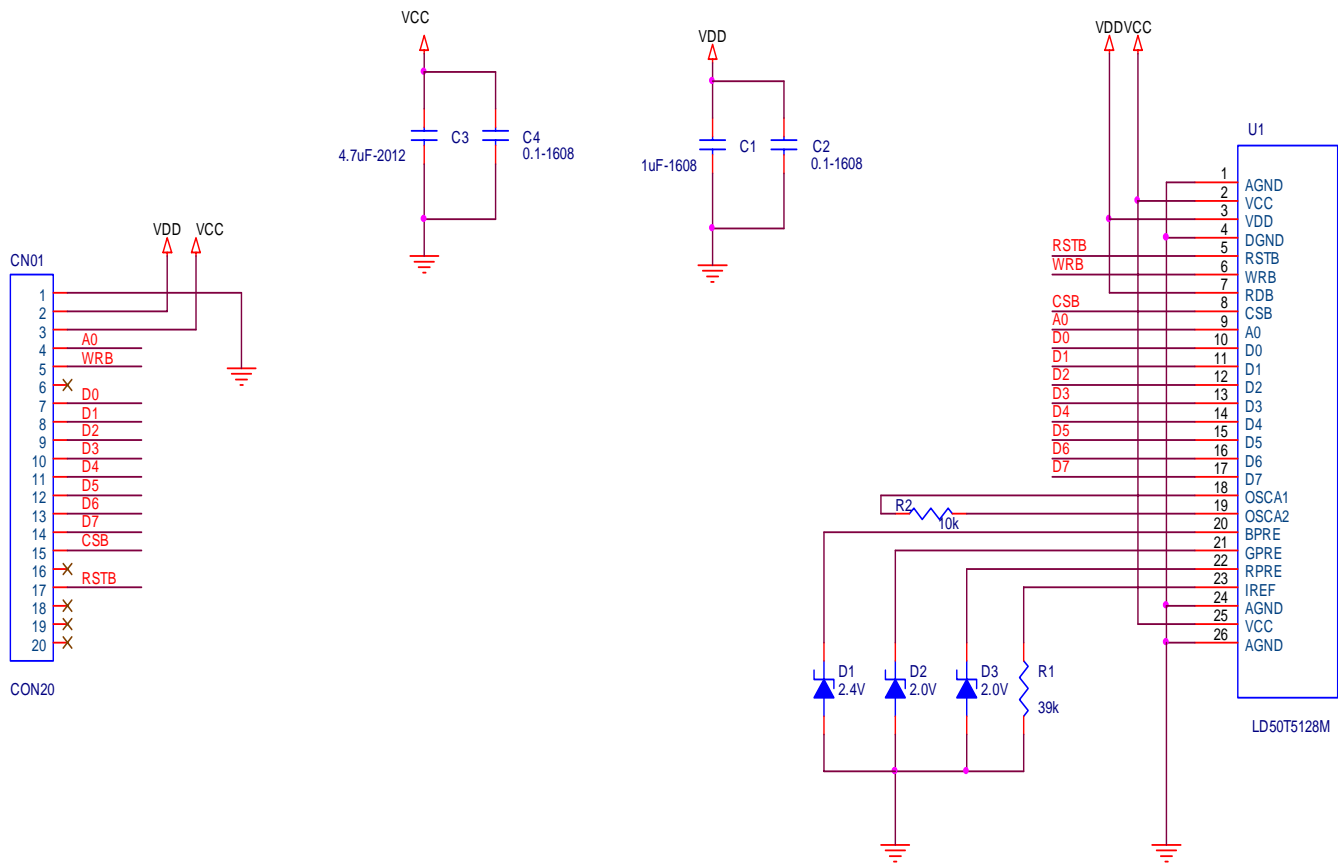
Environment : Inside a darkroom

SR-3

SAMPLE

360± 50mm

6. Circuit Block Diagram

7. Application Circuit

8. Instruction Desciption (Refer to the data sheet of LD50T5128M)

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Software Reset															
SOFTRES	W	L	01h	W	L	–	–	–	–	–	–	–	–		–
Dot Matrix Display ON/OFF															
DDISPON/OFF	W	L	02h	W	H	–	–	–	–	–	–	–	P0		00h
Dot Matrix Display Stand-by ON/OFF															
DSTBYON/OFF	W	L	14h	W	H	–	–	–	–	–	–	–	P0		01h
Dot Matrix Frame Rate															
DFRAME	W	L	1Ah	W	H	–	–	–	–	–	F2	F1	F0		02h
Graphics Memory Display Driection															
ScanDirector	W	L	09h	W	H	–	–	–	–	–	–	P1	P0		00h
Display Size															
DispSizeX	W	L	30h	W	H	–	FX6	FX5	FX4	FX3	FX2	FX1	FX0	Start Column Output	00h
				W	H	–	TX6	TX5	TX4	TX3	TX2	TX1	TX0	End Column Output	7Fh
DispSizeY	W	L	32h	W	H	–	FY6	FY5	FY4	FY3	FY2	FY1	FY0	Start Row Output	00h
				W	H	–	TY6	TY5	TY4	TY3	TY2	TY1	TY0	End Row Output	7Fh
Memory Reading Start Address Set															
XDispStrart	W	L	38h	W	H	–	DX6	DX5	DX4	DX3	DX2	DX1	DX0	Column Display Start Address	00h
YDispStrart	W	L	39h	W	H	–	DY6	DY5	DY4	DY3	DY2	DY1	DY0	Row Display Start Address	00h
CPU Interface select															
Interface6/8/16	W	L	0Dh	W	H	–	–	–	–	–	–	P1	P0	0:8bit Interface 1:16bit Interface 2:6bit Interface(RGB) 3:6bit Interface(BGR)	00h
Data Masking															
Data_Masking	W	L	IEh	W	H	–	–	–	RV	–	R	G	B	RV=0: Data 0:Data Mask RV=1:Data Reverse 1:Data Output	07h
Data Reading/Writing Box															
XBoxAdrrStart	W	L	34h	W	H	–	XS6	XS5	XS4	XS3	XS2	XS1	XS0	Writes Box Column Start Address	00h
XBoxAdrrEnd	W	L	35h	W	H	–	XE6	XE5	XE4	XE3	XE2	XE1	XE0	Writes Box Column End Address	7Fh

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
YBoxAdrrStart	W	L	36h	W	H	–	YS6	YS5	YS4	YS3	YS2	YS1	YS0	Writes Box Row Start Address	00h
YBoxAdrrEnd	W	L	37h	W	H	–	YE6	YE5	YE4	YE3	YE2	YE1	YE0	Writes Box Row End Address	7Fh
Graphics Memory Writing Driection															
WriteDirection	W	L	1Dh	W	H	–	–	–	–	–	VH	D1	D0	Graphics Memory Writing Driection	00h
Dot Matrix Dislpay Data Read/Write															
DataWrite/Read	W	L	08h	W	H	–	–	–	–	–	–	–	–		–
16Bit Data Write	W	H	R4 R3 R2 R1 R0 G5	W	H	G4	G3	G2	G1	G0	B4	B3	B2 B1 B0		
16Bit Data Read	R	H	R4 R3 R2 R1 R0 G5		H	G4	G3	G2	G1	G0	B4	B3	B2 B1 B0		
8Bit Data Write				W	H	R4	R3	R2	R1	R0	G5	G4	G3		
8Bit Data Write				W	H	G2	G1	G0	B4	B3	B2	B1	B0		
8Bit Data Read				R	H	R4	R3	R2	R1	R0	G5	G4	G3		
8Bit Data Read				R	H	G2	G1	G0	B4	B3	B2	B1	B0		
5Bit Data Read				W	H	–	–	R4	R3	R2	R1	R0	–		
6Bit Data Read				W	H	–	–	G5	G4	G3	G2	G1	G0		
5Bit Data Read				W	H	–	–	B4	B3	B2	B1	B0	–		
Register Read															
ReadREG	W	L	20h	R	H	D7	D6	D5	D4	D3	D2	D1	D0	1'ST Paraneter	–
				:	:	:	:	:	:	:	:	:	:	:	–
				R	H	D7	D6	D5	D4	D3	D2	D1	D0	N'ST Paraneter	–
Peak Pulse Width Set															
PeakWidthR	W	L	3Ah	W	H	–	–	–	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width(0~31)	05h
PeakWidthG	W	L	3Bh	W	H	–	–	–	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width(0~31)	05h
PeakWidthB	W	L	3Ch	W	H	–	–	–	W4	W3	W2	W1	W0	Peak Pulse Width Set D=Width(0~31)	05h
Peak Pulse Delay Set															
PeakDelay	W	L	16h	W	H	–	–	–	–	P3	P2	P1	P0	Sets Peak Pulse Delay(0~15)	05h
Dot Matrix current Level Set															
DotCurrentR	W	L	40h	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix current 0~255uA	00h
DotCurrentG	W	L	41h	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix current 0~255uA	00h
DotCurrentB	W	L	42h	W	H	I7	I6	I5	I4	I3	I2	I1	I0	Dot Matrix current 0~255uA	00h
Pre-Charge Width Set															
PreC_Width	W	L	18h	W	H	T7	T6	T5	T4	T3	T2	T1	T0	Pre-Charge Width 0~255uA	08h

INSTRUCTION	Command			Parameter										Parameter Definition	Default
	WR	A0	D[7:0]	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0		
Pre-Charge Mode Set															
PreC_Select	W	L	44h	W	H	–	–	–	–	–	–	S1	S0	D=0 None D=1 Selecction (All Data) D=2 All Pre-Charge D=3 Selection (Max Data)	02h
Row overlap Set															
Row_overlap	W	L	48h	W	H	–	–	–	–	–	–	R1	R0	Row Overlap Timing	00h
Row Scan															
Row_Scan	W	L	17h	W	H	–	–	–	–	–	–	–	P0	0: Narmal Row Scan 1: All Row in GND	00h
IC TEST															
TESTCNT	W	L		W	H		F				0~F				

9. DDRAM Address

C0 to C383	C0	C1	C2	C3	C4	C5	. . .	C381	C382	C383
COL		0			1		. . .		127	
ROW	R[4:0]	G[5:0]	B[4:0]	R[4:0]	G[5:0]	B[4:0]	. . .	R[4:0]	G[5:0]	B[4:0]
0							. . .			
1							. . .			
2							. . .			
3							. . .			
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
:	:	:	:	:	:	:	:	:	:	:
124							. . .			
125							. . .			
126							. . .			
127							. . .			

10. Initialization Example

VDD=2.8[V], VCC=16[V]

Column A:

Reset(01h)
⇩
DISPOFF(02h) Parameter(00h)
⇩
DISPON(14h) Parameter(00h)
⇩
*DFRAME(1Ah) Parameter(02h)
⇩
*WRDIR(1Dh) Parameter(00h)
⇩
*DISPDIR(09h) Parameter(00h)
⇩
*XDispStart(38h) 1'st par.(00h) *YDispStart(39h) 1'st par.(00h)
⇩
A

Column B (A):

A
⇩
*DISPSIZEX(30h) 1'st par.(00h) 2'nd par.(7fh)
⇩
*DISPSIZEY(32h) 1'st par.(00h) 2'nd par.(7fh)
⇩
*Interface8(0Dh) Parameter(00h)
⇩
*Data_mask(1Eh) Parameter(07h)
⇩
PeakDelay(16h) Parameter(00h)
⇩
PeakWidth(3Ah) 1'st par.(03h) PeakWidth(3Bh) 2'nd par.(0Fh) PeakWidth(3Ch) 3'rd par.(05h)
⇩
B

Column C (B):

B
⇩
DotCurrent(40h) 1'st par.(40h) DotCurrent(41h) 2'nd par.(1Ah) DotCurrent(42h) 3'rd par.(31h)
⇩
PreC_Width(18h) Parameter(02h)
⇩
PreC_Select(44h) Parameter(01h)
⇩
VROW_SCAN(17h) Parameter(00h)
⇩
Row_Overlap(48h) Parameter(00h)
⇩
C

Column D (C):

C
⇩
*XBoxStart(34h) 1'st par.(00h) *XBoxEnd(35h) 1'st par.(7fh)
⇩
*YBoxStart(36h) 1'st par.(00h) *YBoxEnd(37h) 1'st par.(7fh)
⇩
*IC TEST(F3h) Parameter(0Eh)
⇩
Datawrite(08h) 1'st display data 2'nd display data . .

11. Pin Connections

Pin No	Symbol	I/O	Description	Remark
1	AGND	P	Analog (Driver) GND	
2	VCC	P	OLED Dot Matrix Power Supply	
3	VDD	P	Logic Power Supply	
4	DGND	P	Logic GND	
5	RSTB	I	Reset(Active Low)	
6	WRB	I	Write (Active Low, 80 interface) H : Read L : Write	
7	RDB	I	Read(Active Low, 80 Interface)	
8	CSB	I	Chip Select (Active Low)	
9	A0	I	Address (L: Command, H: Parameter)	
10	D0	I/O	8-bit bi-directional data bus	
11	D1	I/O	8-bit bi-directional data bus	
12	D2	I/O	8-bit bi-directional data bus	
13	D3	I/O	8-bit bi-directional data bus	
14	D4	I/O	8-bit bi-directional data bus	
15	D5	I/O	8-bit bi-directional data bus	
16	D6	I/O	8-bit bi-directional data bus	
17	D7	I/O	8-bit bi-directional data bus	
18	OSCA1	I	Oscillator for Dot Matrix	
19	OSCA2	O		
20	BPRE	I/O	Pre-charge Voltage for Blue	
21	GPRE	I/O	Pre-charge Voltage for Green	
22	RPRE	I/O	Pre-charge Voltage for Red	
23	IREF	I	Current Setting.	
24	AGND	P	Analog (Driver) GND	
25	VCC	P	OLED Dot Matrix Power Supply	
26	AGND	P	Analog (Driver) GND	

12. AC Characteristics

12-1 Write Input Timing

$(V_{DD} = 2.4 \sim 3.3V, Ta = -40 \sim 85℃)$

Items	Signal	Symbol	Min	Typ	Max	Unit
Write cycle time	WRB	Tcyc	100	-	-	ns
Address and Select setup time Address and Select hold time	CSB,A0	Tcads Tcadh	0 0	-	-	ns
Address setup time Address hold time	A0	Twads Twadh	50 20	-	-	ns
Select setup time Select hold time	CSB	Tcws Tcwh	10 10	-	-	ns
Write Low pulse width	WRB	Twrbl	30	-	-	ns
Select High pulse width	CSB	Tcsbh	10	-	-	ns
Data setup time (CL=100 헷) Data hold time (CL=100 헷)	D7 to D0	Twrts Twrth	10 20	-	-	ns

12-2 Read Input Timing
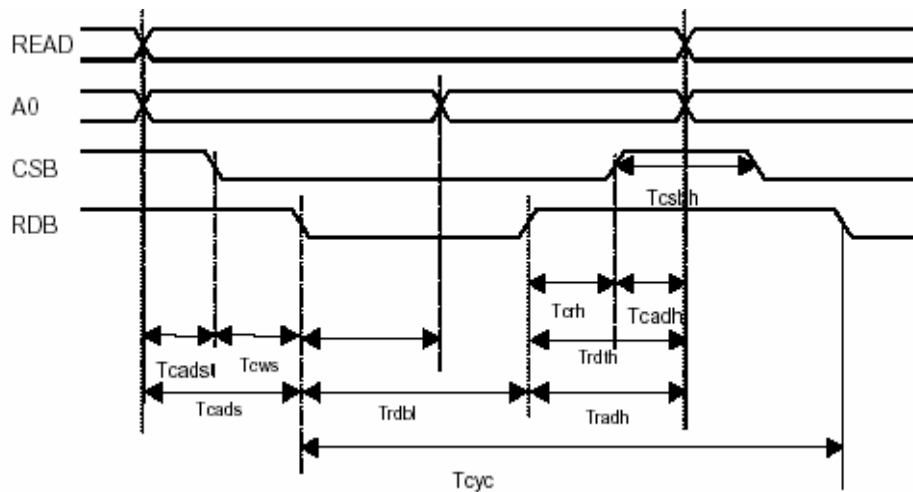
$(V_{DD}= 2.4 \sim 3.3V, Ta = -40 \sim 85℃)$

Items	Signal	Symbol	Min.	Typ	Max	Unit
Read cycle time	RDB	Trcyc	500	-	-	ns
Address and Select setup time Address and Select hold time	CSB,A0	Tcads Tcadh	0 0	-	-	ns
Address setup time Address hold time	A0	Trads Tradh	50 20	-	-	ns
Select setup time Select hold time	CSB	Tcrs Tcrh	10 10	-	-	ns
Read Low pulse width	RDB	Trdbl	250	-	-	ns
Select High pulse width	CSB	Tcsbh	10	-	-	ns
Read data delay time (CL=100헷) Read data hold time (CL=100 헷)	D7 toD0	Trdtd Trdth	- 5	- -	200 -	ns

12-3 Driver OUTPUT
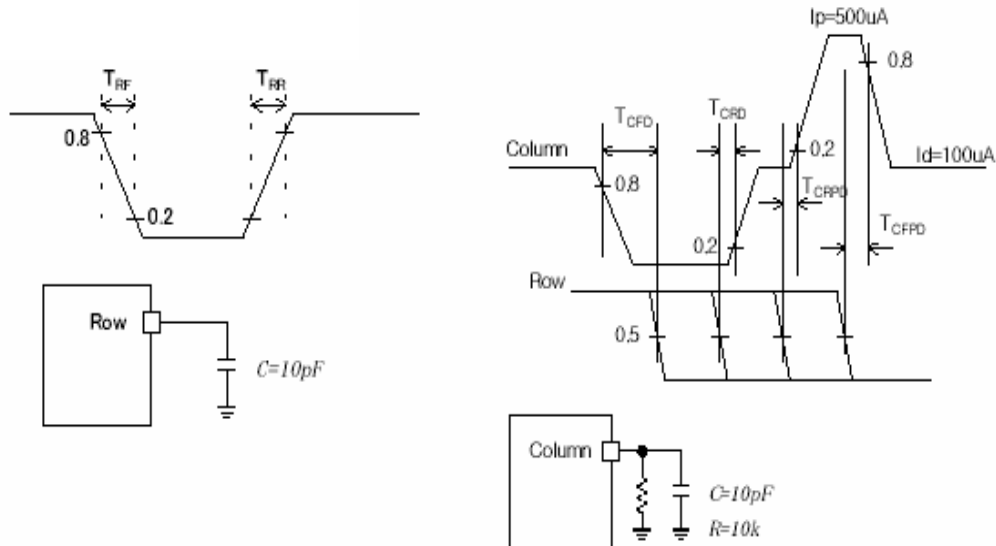
※ RowOverlap command changes Row falling timing.

(IOUT=100 uA, V_{DD}= 2.4∼3.3V , Vcc = 15V, Ta = 25℃)

Item	Signal	Symbol	Min	Typ	Max	Unit
Row Falling Time	R0-R127	T_{RF}	-	-	10	ns
Row Rising Time	R0-R127	T_{RR}	-	-	100	ns
Column falling time until Row falling	C0-C383 (to R)	T_{CFD}	0.8	-	1.2	us
Column Drive Start Delay Time	C0-C383 (to R)	T_{CRD}	0	-	200	ns
Column Peak Delay Time	C0-C383 (to R)	T_{CRPD}	0	-	200	ns
Column Peak Falling Delay Time	C0-C383 (to R)	T_{CFPD}	0	-	200	ns

13. Reliability

13-1 Test Items and Conditions

Item	Test Condition	Criteria for Pass/Fail
High Temp. Operation	60 ± 2℃, 96hrs	(10) (11)
Low Temp. Operation	−20 ± 2℃, 96hrs	(10) (11)
High Temp. Storage	80 ± 2℃, 96hrs	(10)
Low Temp. Storage	−30 ± 2℃, 96hrs	(10)
High Temp. & High Humi. Storage	60 ± 2℃,90 ± 2%RH, 96hrs	(10)
Temperature Cycle	25℃(0.5h) → −20℃(3h)→ 25℃(1h) → 60℃(3h)→ 25℃(0.5h), 10cycles	(10)
Thermal Shock	25℃(5m) → −30℃(30m) → 25℃(5m) → 80℃(30m), 20cycles	(10)
Mechanical	Frequency = 10~55Hz Amplitude : 2mm Sweep : 1min(sine curve) Each 20 min for X/Y/Z	3 box

Note(10) After the above reliability test, the samples should be left under room temperature for
2 hours and then should be inspected for normal operation.

Note(11) The conditions for driving at operation tests shall be the same as indicated on the above
description except for the temperature and humidity conditions.

13-2 Criteria for Reliability Test

(1) There shall be no abnormality in the functions and the display.

(2) No irregularities shall be found for the appearance and structure.

(3) The luminance change should be within 50% of initial value(based on white).

14. Quality Specifications

14-1 Acceptance Quality Level(AQL)

Inspection Item	Sampling Procedures	AQL
Major	KS A 3109 Inspection level II Normal inspection Single sampling plan	0.65
Minor	KS A 3109 Inspection level II Normal inspection Single sampling plan	1.5

(1) Major defect :

Defects which influence display function or reliability issues.

(2) Minor defect :

Defects which satisfy all functions, but no impact to reliability issues.

14-2 Inspection Conditions

The environmental conditions for inspection shall be as follows,

- Room Temperature : 23±5℃   - Brightness   : 300~500 [lux]
- Humidity   : 60±20%RH

14-3 Definition of Area

"C" Zone : Out of Viewing

"A" Zone: Active Area

"B" Zone : Viewing Area

14-4 Inspection Standards

Items	Criteria of defects		Defect type
Display on inspection	1) No display 2) Abnormal Operation 3) Vertical Line defects 4) Horizontal line defects	5) Cross line defects 6) Short Circuit 7) Pattern Open	Major
Bright/Dark spot	Size Φ(mm)	Acceptable number	Minor
	Φ≤ 0.15	Ignore	
	0.15<Φ≤0.25	4	
	0.25<Φ≤0.30	2	
	Φ>0.30	0	
Glass Contamination	Size Φ(mm)	Acceptable number	Minor
	Φ≤ 0.10	Ignore	
	0.10<Φ≤0.15	1	
	Φ>0.15	0	
Polarizer bubble	Size Φ(mm)	Acceptable number	Minor
	Φ≤ 0.20	Ignore	
	0.20<Φ≤0.50	3	
	0.50<Φ≤0.80	2	
	Φ>0.80	0	
Dents	Size (mm)	Acceptable number	Minor
	L≤0.15,W≤0.15	3	
	L>0.15,W>0.15	0	
Pin holes	Size (mm)	Acceptable number	Minor
	Φ≤0.2	3	
	Φ>0.2	0	
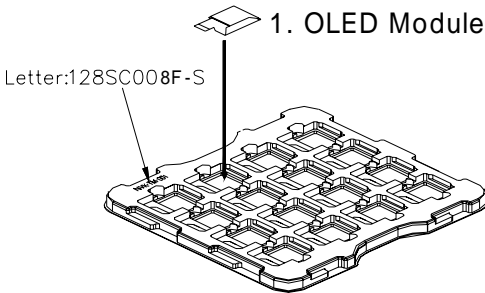
15. Outline Dimension
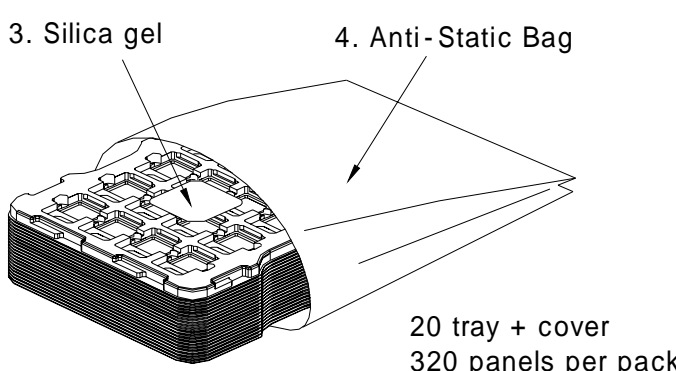
16. Packing

1. OLED Module
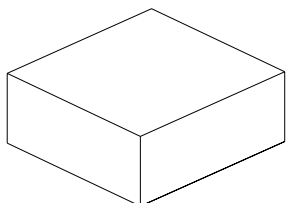
3. Silica gel

4. Anti- Static Bag

Letter:128SC008F- S

2. Tray(16 panels)
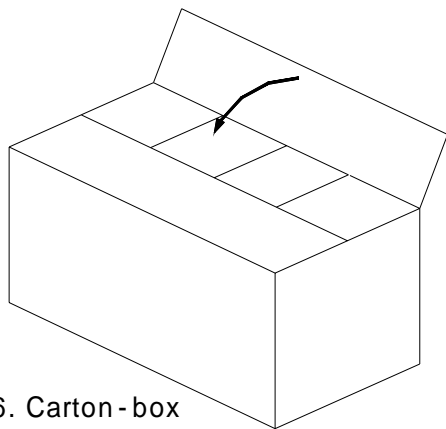
20 tray + cover
320 panels per pack
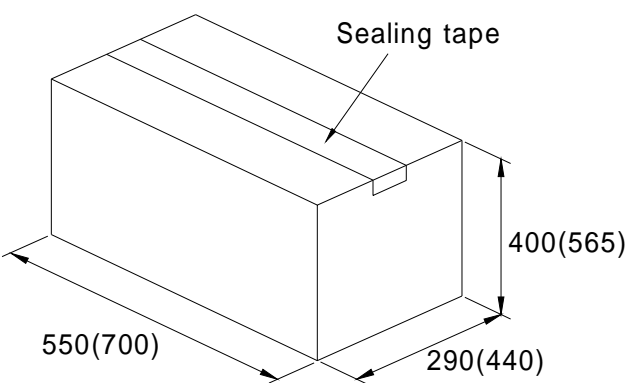
5. in- box(320 panels)

No.	DESCRIPTION	SIZE(mm)	W/T(g)	Q'ty
1	NVK−128SC008F−S	35.1x50.45x1.74	4(max)	1920
2	Tray : 128SC008F−S	253x242x10	42	126
3	Silica gel	105x83x8	32	6
4	Anti−Static bag	273x603	34	6
5	In−Box	260x260x130	225	6
6	Carton(domestic)	550x290x400	1260	1
	Carton(over seas)	700x440x565	2460	1

6. Carton- box
Contains 6 in- box

Sealing tape

400(565)

550(700)

290(440)

17. Marking & Others

One & Only

NeoView KOLON Co.,

NVK- 128SC008F- S - 0000 - 05B06 - FFFF

OOO   EA   FFFF

QA : 200506S (   )

MADE IN KOREA

※Label(138x95mm) description

ⓐ : Product name

ⓑ : Manufacture date

ⓒ : Serial number of box

ⓓ : Quantity

ⓔ : Unit

ⓕ : Customer

ⓖ : Inspector signature

18. General Precautions

    18-1 Handling

        (1) When the module is assembled, it should be attached to the system firmly.
            Be careful not to twist and bend the module.

        (2) Refrain from strong mechanical shock and / or any force to the module. Do not
            twist and bend because it may cause improper operation or damage to the module.

        (3) Note that polarizers are very fragile and can be easily damaged. Do not press
            or scratch the surface more than a B pencil lead.

        (4) Wipe off water droplets or oil immediately. If you leave the droplets for a long time,
            staining and discoloration may occur.

        (5) If the surface of the polarizer is dirty, clean it with some absorbent cotton or
            soft cloth.

        (6) The desirable cleaner is water, IPA(Isopropyl Alcohol) or Hexane.
            Do not use Ketone type materials(ex, Acetone), Ethyl alcohol, Toluene, Ethyl
            acid or Methyl chloride. It can cause permanent damage to the polarizer due to
            chemical reaction.

        (7) Protect the module from electro-static, otherwise it may damage to the C-MOS LSI.

        (8) Use finger-stalls with soft gloves in order to keep clean display during the
            incoming inspection and assembly process.

        (9) Do not disassemble the module.

        (10) Protection film for polarizer on the module shall be slowly peeled off just before use
            so that the electrostatic charge can be minimized.

   (11) Pins of I/F connector shall not be touched directly with bare hands.

18-2 Storage

(1) Do not leave the panel under high temperature, and high humidity for a long time. It is recommended to store the module at 0 to 35℃ of temperature and less than 70% of relative humidity.

(2) Do not store the OLED module under direct sunlight.

(3) The module shall be stored in a dark place. It is prohibited to apply to sunlight or fluorescent light during the storage.

18-3 Operation

(1) Do not connect, disconnect the module under the "Power On" condition.

(2) Power supply should always be turned on/off by the following diagram.
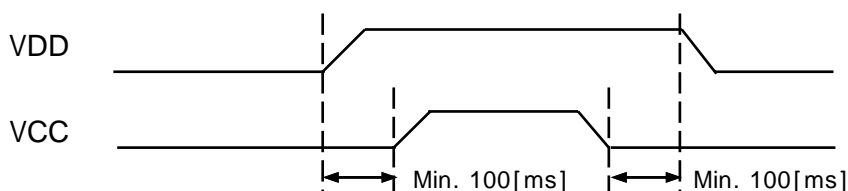
18-4 Caution

(1) The OLED is deteriorated by ultraviolet, therefore do not leave it under direct sunlight and strong ultraviolet ray for a long time.

(2) If the panel displays the same pattern continuously for a long period of time, it can be attributed to the image "Sticks" to screen.

18-5 Others

(1) Avoid condensation of water because it may result in improper operation or disconnection of electrode.

(2) Do not exceed the absolute maximum rating value(the supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on). Otherwise, the panel may be damaged.