

# Character OLED

~ NPI ~

WS 智晶光電

<http://www.wisechip.com.tw>

By Product Dept.

❖ **US-2066**

- SHLS command bug (default value)
  - Using LCM code, the display will show as right.
  - WSI provides example code to fix it.
- Directly replace IC will be ready on Dec. '10

❖ **OLED Combination**

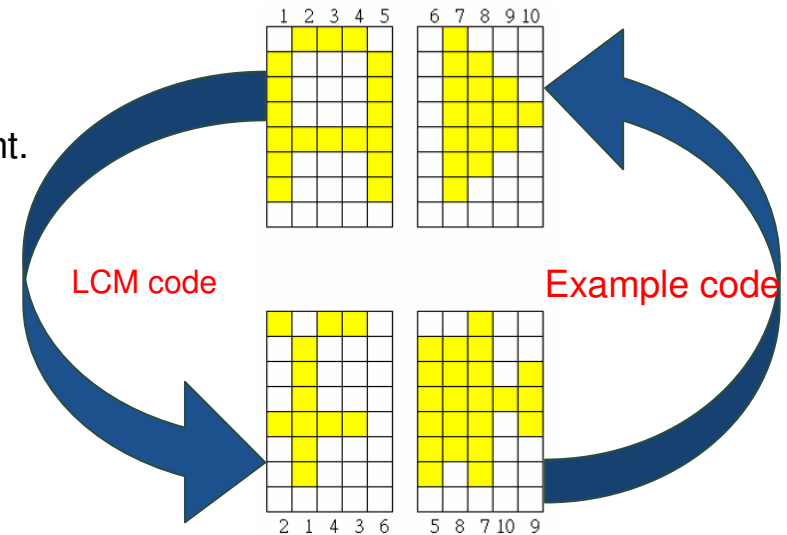
- $16*2 \rightarrow 16*2*(5*8)=1,280$  sub pixels
- $20*2 \rightarrow 20*2*(5*8)=1,600$  sub pixels
- $20*4 \rightarrow 20*4*(5*8)=3,200$  sub pixels

❖ **OLED power consumption**

- Depend on turn on pixel quantity
- Depend on brightness

❖ **Low Power consumption benefit**

- Saving money
- Green product



**❖ Default 12V driving benefit**

- 12V is standard power source for comprehensive system, like,
  - Computer - related
  - Automotive
  - Industrial

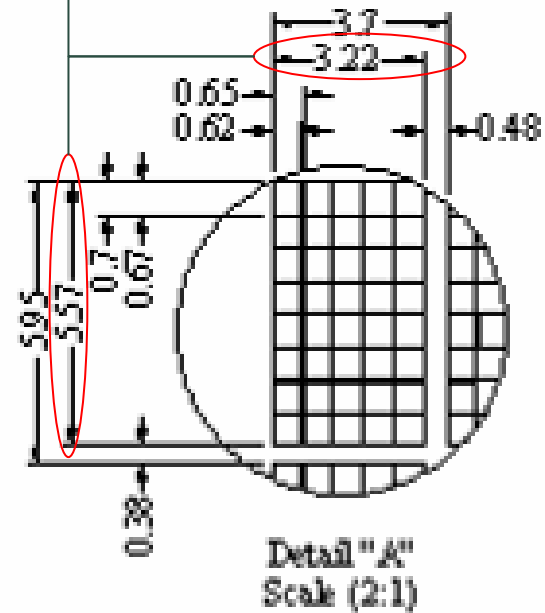
**❖ High contrast ratio/Free viewing angle benefit**

- Easily read
  - No misunderstand
  - Safety
  - Comfortable
- No color distortion

**❖ Wide operating temperature benefit****❖ MCU communication interface**

- COG type
  - 4/8-bit 80xx/68xx parallel, SPI, I<sup>2</sup>C
- Standard PCB type:
  - 4/8-bit 80xx/68xx parallel, SPI, I<sup>2</sup>C
  - By component / circuit select.

- ❖ **Font Size**
  - 16\*02, 2.97mm(W)x 5.57mm(H)
  - 20\*02, 3.22mm(W)x 5.57mm(H)
  
- ❖ **On-chip CGROM ( 5x8 )**
  - English / Japanese / Europe / Russia
    - Hardware Select
  
- ❖ **Programming CGRAM ( 5x8 )**
  - Max. 8 5x8 character
  
- ❖ **Compatible**
  - IC compatible with KS0066
  - PCB version, mechanical and pin are compatible with LCM
  
- ❖ **Operating Temperature Range**
  - -40°C ~ 80°C(better than LCM)



**❖ Driving Voltage**

- 4.4V~5.5V (Standard Mode)
- 2.4V~3.6V (Low Voltage mode)
  - Selected by circuit setting
- COG Module need 12V applied
- PCB Module using built-in boost circuit or extra 12V power

**❖ Brightness ( 12V )**

- There are 256 step brightness between the lowest and max. setting
- Using the max. setting
  - about 200 cd/m<sup>2</sup>
- Using suggested setting
  - about 150 cd/m<sup>2</sup>
- Using IC default setting
  - about 100 cd/m<sup>2</sup>
- Using the lowest setting
  - about 50 cd/m<sup>2</sup>

**❖ Life Time**

- 50,000hrs (Yellow/White)

**❖ Color**

- Standard Product is Yellow / White
  - MOQ is 5k, must be shipped within two month
- Other Color, like Blue / Green..., depend on demand to develop
  - w/o NRE
  - MOQ is 10k (16x2) / 8k (20x2), must be shipped within four month

**❖ MP Schedule**

- 2010 December

**❖ Lead Time**

- COG version: 10 wks
- PCB version: 12 wks
- Sample order below 20 pcs for new project: 1 wks (COG), 3 wks (PCB) for now.

**❖ Customized**

- NRE Charge
  - COG version, USD30,000
  - PCB version, case by case
- Developing schedule
  - 8 wks after NRE Charge paid

## 1) Optical & Electrical Characteristic

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit
Brightness	$L_{br}$		<b>120</b>	<b>150</b>	-	cd/m <sup>2</sup>
C.I.E. (White)	(x)		0.25	<b>0.29</b>	0.33	
	(y)		0.27	<b>0.31</b>	0.35	
C.I.E. (Yellow)	(x)		0.46	<b>0.50</b>	0.54	
	(y)		0.45	<b>0.49</b>	0.53	
Dark Room Contrast	CR		-	>10,000:1	-	
View Angle			-	Free	-	degree

\*Optical measurement taken at  $V_{DD} = 2.8V$ ,  $V_{CC} = 12$ .

## 2) General Electrical Specification

Characteristics	Symbol	Conditions	Min	Typ	Max	Unit	
Supply Voltage for Logic	$V_{DD}$			<b>5</b>		V	
Supply Voltage for Display	$V_{CC}$			<b>12</b>		V	
Operating Current for $V_{DD}$	$I_{DD}$		-	TBD	TBD	$\mu A$	
	$I_{CC}$	<b>16*2</b>	<b>30% on</b>	-	<b>11</b>	<b>15</b>	mA
			100% on	-	30	<b>32</b>	mA
Operating Current for $V_{CC}$	$I_{CC}$	<b>20*2</b>	<b>30% on</b>	-	<b>14</b>	<b>18</b>	mA
			100% on	-	39	<b>45</b>	mA

3) Contents of Reliability Tests

Item	Conditions	Criteria
High Temperature Operation	70°C, 500 hrs	The operational functions work.
Low Temperature Operation	-40°C, 500 hrs	
High Temperature Storage	80°C, 500 hrs	
Low Temperature Storage	-40°C, 500 hrs	
High Temperature/Humidity Operation	60°C, 90% RH, 120 hrs	
Thermal Shock	-40°C ⇔ 85°C, 100 cycles 30 mins dwell	



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**Active Area 2.26" 16 x 2 Character**

**Notes:**

1. Color: White
2. Driver IC: US2056
3. FPC Number: UT-0166-P01
4. Interface: 4-8bit 68XX/80XX Parallel, SPI, P C
5. General Tolerance: ±0.30
6. The total thickness (2.10 Max) is without polarizer protective film & remove tape. The actual assembled total thickness with above materials should be 2.35 Max.

**Customer Approval Signature**

**WiseChip Semiconductor Inc.**

**Title:** UC-1602ASWCG01 Folding Type OEL Display Module  
Pixel Number: Character 16 x 2, Monochrome, COG Package

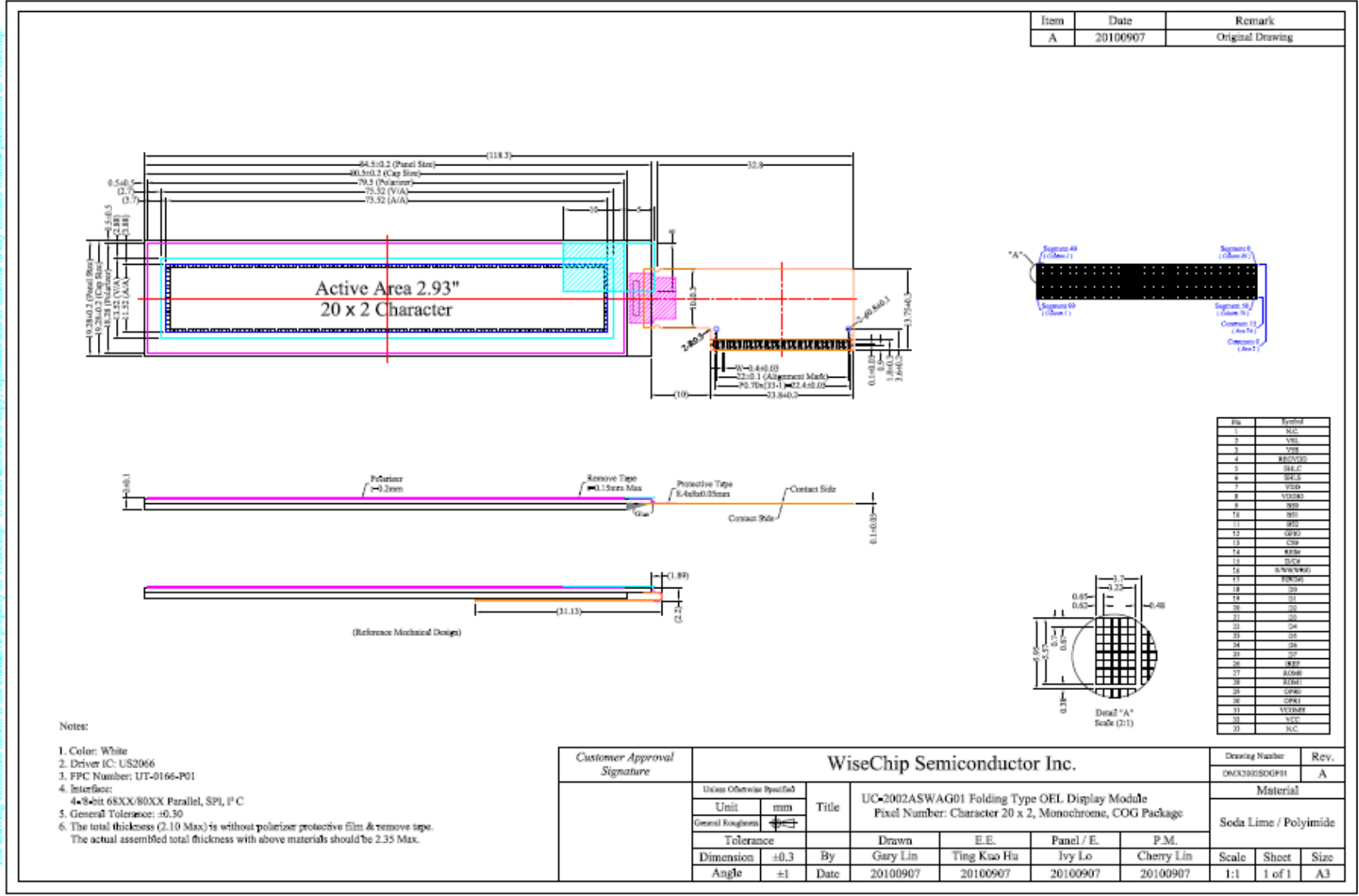
**Material:** Soda Lime / Polyimide

Item	Date	Remark
A	20100907	Original Drawing

No.	Symbol
1	ACC
2	VAL
3	STR
4	REMOVED
5	BLK
6	BLK
7	VAL
8	STR
9	VAL
10	STR
11	VAL
12	STR
13	CON
14	CON
15	CON
16	CON
17	CON
18	CON
19	CON
20	CON
21	CON
22	CON
23	CON
24	CON
25	CON
26	CON
27	CON
28	CON
29	CON
30	CON
31	CON
32	CON

**Detail "A" Scale (2:1)**

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Item	Date	Remark
A	20100907	Original Drawing

No.	Symbol
1	SLC
2	VH1
3	VH2
4	REMOVED
5	SHLC
6	SHLS
7	SHL
8	VH2R0
9	SH
10	SH
11	SH
12	SH
13	SH
14	SH
15	SH
16	SH/SH/SH
17	SH/SH
18	SH
19	SH
20	SH
21	SH
22	SH
23	SH
24	SH
25	SH
26	SH
27	SH/SH
28	SH/SH
29	SH
30	SH
31	VH2R0H
32	VH
33	NC

Notes:

1. Color: White
2. Driver IC: US2066
3. FPC Number: UT-0166-P01
4. Interface: 4\*8-bit 68XX/80XX Parallel, SPI, I<sup>2</sup>C
5. General Tolerance: ±0.30
6. The total thickness (2.10 Max) is without polarizer protective film & remove tape. The actual assembled total thickness with above materials should be 2.35 Max.

Customer Approval Signature	WiseChip Semiconductor Inc.				Drawing Number	Rev.	
	UC-2002ASWAG01 Folding Type OEL Display Module Pixel Number: Character 20 x 2, Monochrome, COG Package				DM6330SD0F01		A
					Material		Soda Lime / Polyimide
	Unit	mm	Title	Drawn	E.E.	Panel / E.	P.M.
Dimension	±0.3	By	Gary Lin	Ting Kuo Hu	Ivy Lo	Cherry Lin	
Angle	±1	Date	20100907	20100907	20100907	20100907	
Tolerance			Scale	Sheet	Size		
			1:1	1 of 1	A3		

### Flexible

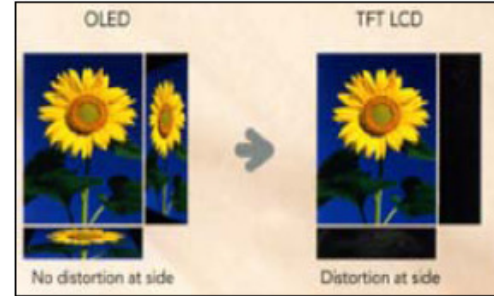


### High Contrast Ratio



OLED 2,000:1  
LCD 10:1

### Free Viewing Angle



### Wide temperature Range

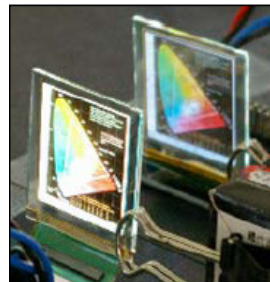
OLED  
-40 ~ 85°C



### Low Power Consumption

OLED  
Base on  
turn on pixel quantity

### Transparent

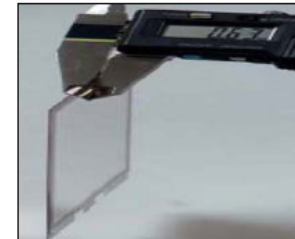


### Faster Response Time



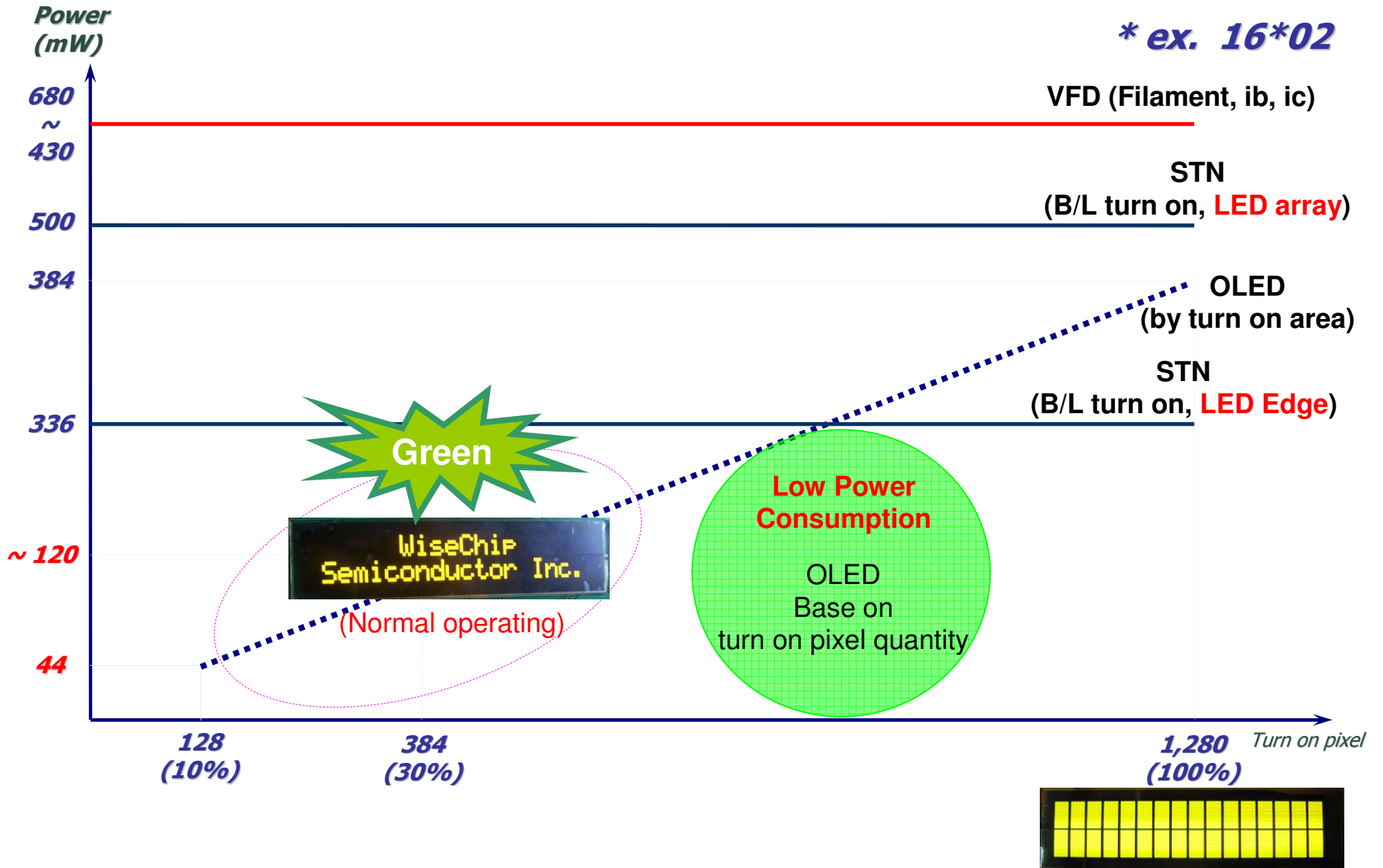
OLED ~us  
LCD ~10ms

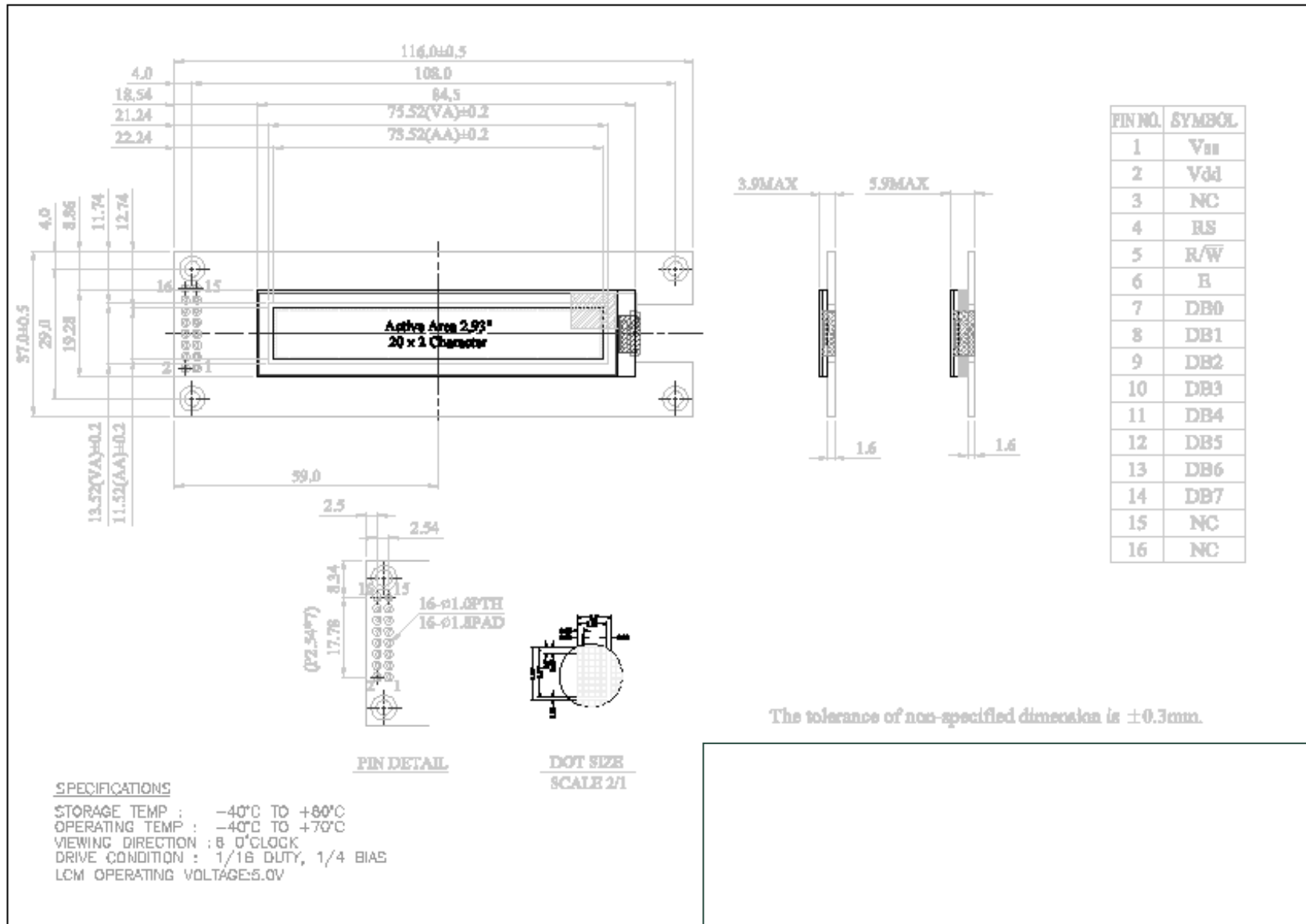
### Thinner



OLED < 2mm

# Low Power Consumption





# Character Product Compare

Character 16*02 Feature	Unit	OLED (COG) WSI	OLED (COB) Winstar	STN LCD	VFD
Display Driving Voltage	(V)	12	??	??	30
Power Consumption @Full Trun-on	( mW )	384	???	500	680
Power Consumption @30% Trun-on	( mW )	~120	???	500	680
Operating Temprature Range	(°C)	-40 ~ 80	-40 ~ 80	0 ~ 60	-40 ~ 85
Luminace @16*02 Size	(nits)	150	???	100	350~500
View Angle	( ° )	Free	175	90	>160
Dark Room Contrast Ratio		10,000 : 1	2,000 : 1	10 : 1	10,000 : 1
Module Weightness	(g)	??		70	130
Same mounting hole as LCD		Yes	Yes	Yes	Yes
Bulid in Fonts ROM		Yes	Yes	Yes	Yes
Life Time to half brightness	(hrs)	50,000(Y)	50,000(Y)	50,000(LED)	50,000(G)

<ul style="list-style-type: none"> <li>❖ COG Type</li> <li>❖ Lead time is better than TCP type</li> <li>❖ Low power · Low voltage</li> <li>❖ High contrast ratio</li> <li>❖ Free viewing angle</li> <li>❖ Debug easily</li> <li>❖ Thin</li> </ul>	<p>Cost</p>				
<ul style="list-style-type: none"> <li>❖ Low contrast ratio (STN)</li> <li>❖ Poor viewing angle (STN)</li> <li>❖ Poor operating temperature (STN)</li> <li>❖ High power (STN/VFD)</li> <li>❖ Pin compatible with STN (<b>PCB Version</b>)</li> <li>❖ Green product is trend (STN/VFD)</li> </ul>	<table border="1" data-bbox="887 759 1368 975" style="margin: auto;"> <tr> <td style="text-align: center; width: 50px; height: 50px;"><b>S</b></td> <td style="text-align: center; width: 50px; height: 50px;"><b>W</b></td> </tr> <tr> <td style="text-align: center; width: 50px; height: 50px;"><b>O</b></td> <td style="text-align: center; width: 50px; height: 50px;"><b>T</b></td> </tr> </table> <ul style="list-style-type: none"> <li>❖ Low Price (STN, USD2 ~6, below 3")</li> <li>❖ 150 LCM, which have panel factory in WW.</li> </ul>	<b>S</b>	<b>W</b>	<b>O</b>	<b>T</b>
<b>S</b>	<b>W</b>				
<b>O</b>	<b>T</b>				



The Trend is **Low-Power, Easy-to-Read**, same as OLED's advantage



## Telephone

```
CALL 2207-1111  
11:28 AM  
MON 31-AUG-2010  
MIC SYS. PIC.
```

## Vending Machine

```
PLEASE INSERT  
COINS  
Coca Cola $8
```

## Printer

```
Processing job  
PLAIN TRAY 2  
For help press ?
```

## Power Meter

```
◀POWER METER▶  
$ 0.89/hour  
1.234kWh  
220V 1.5A 50Hz
```

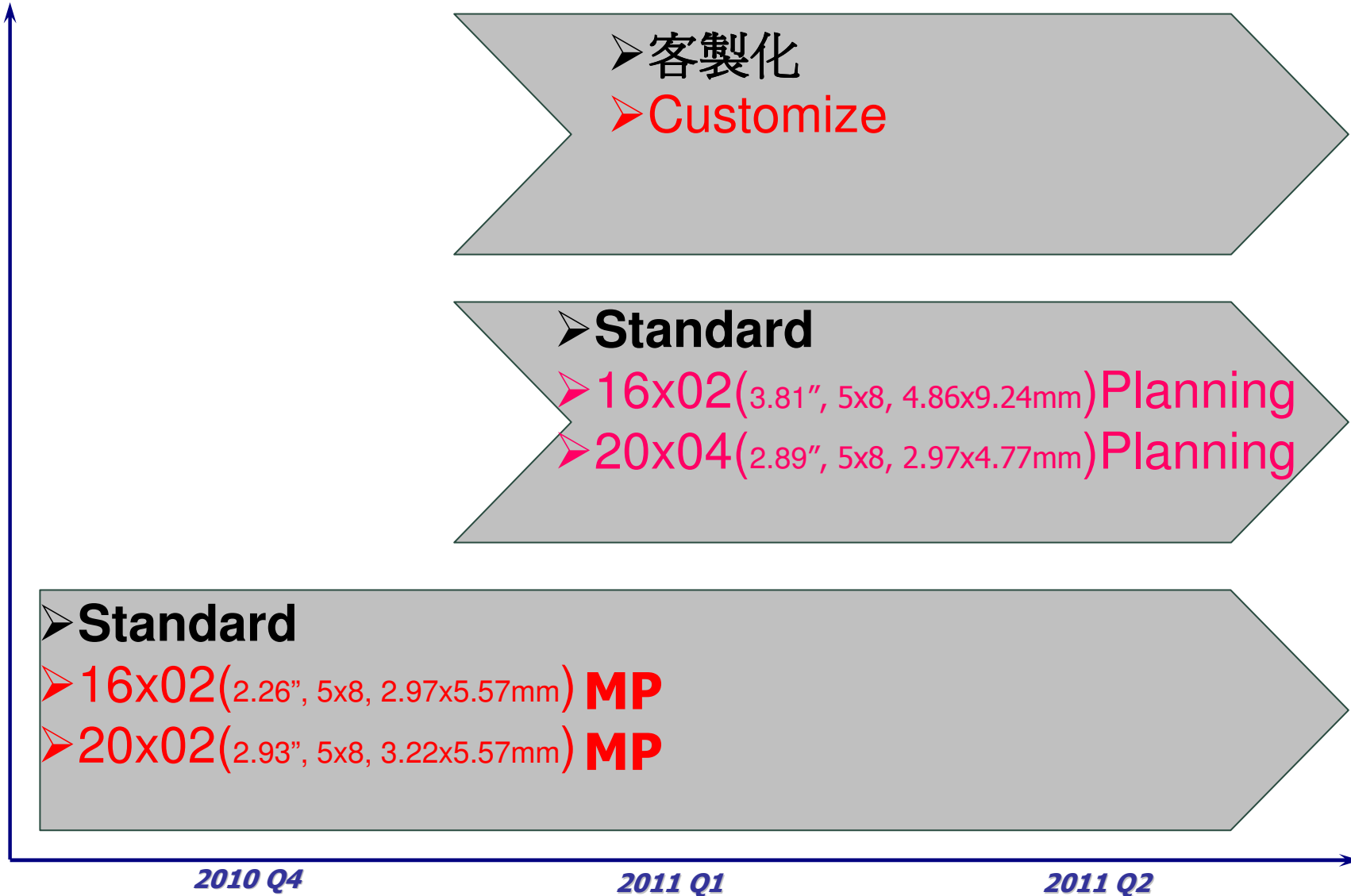
## Others

```
PRESS ANY KEY  
FOR HELP  
NUM UP DOWN >>>
```

## POS

```
Welcome to Gaga  
Supermarket  
Total:$567
```

Product



# Thank You !

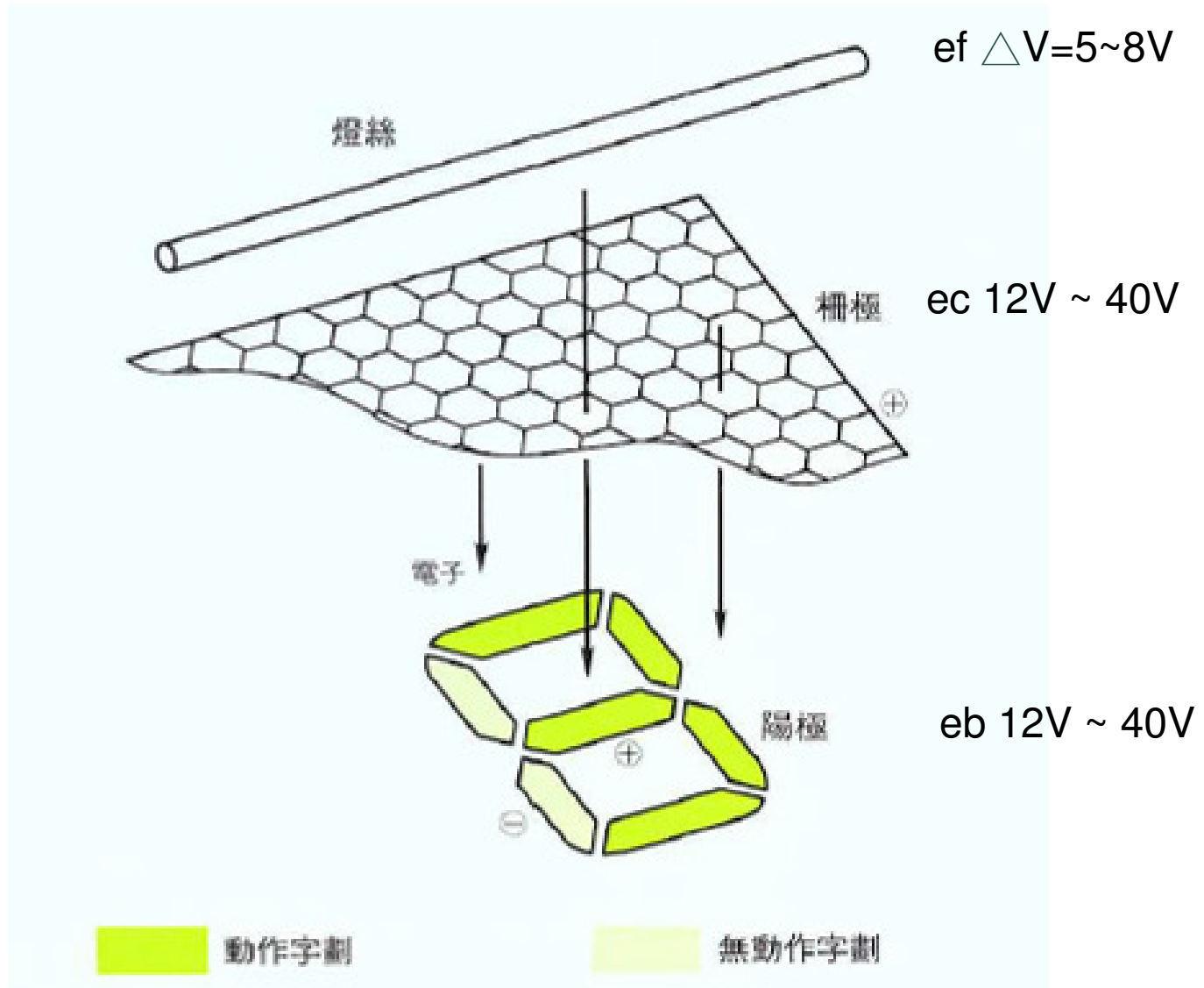
WS  智晶光電

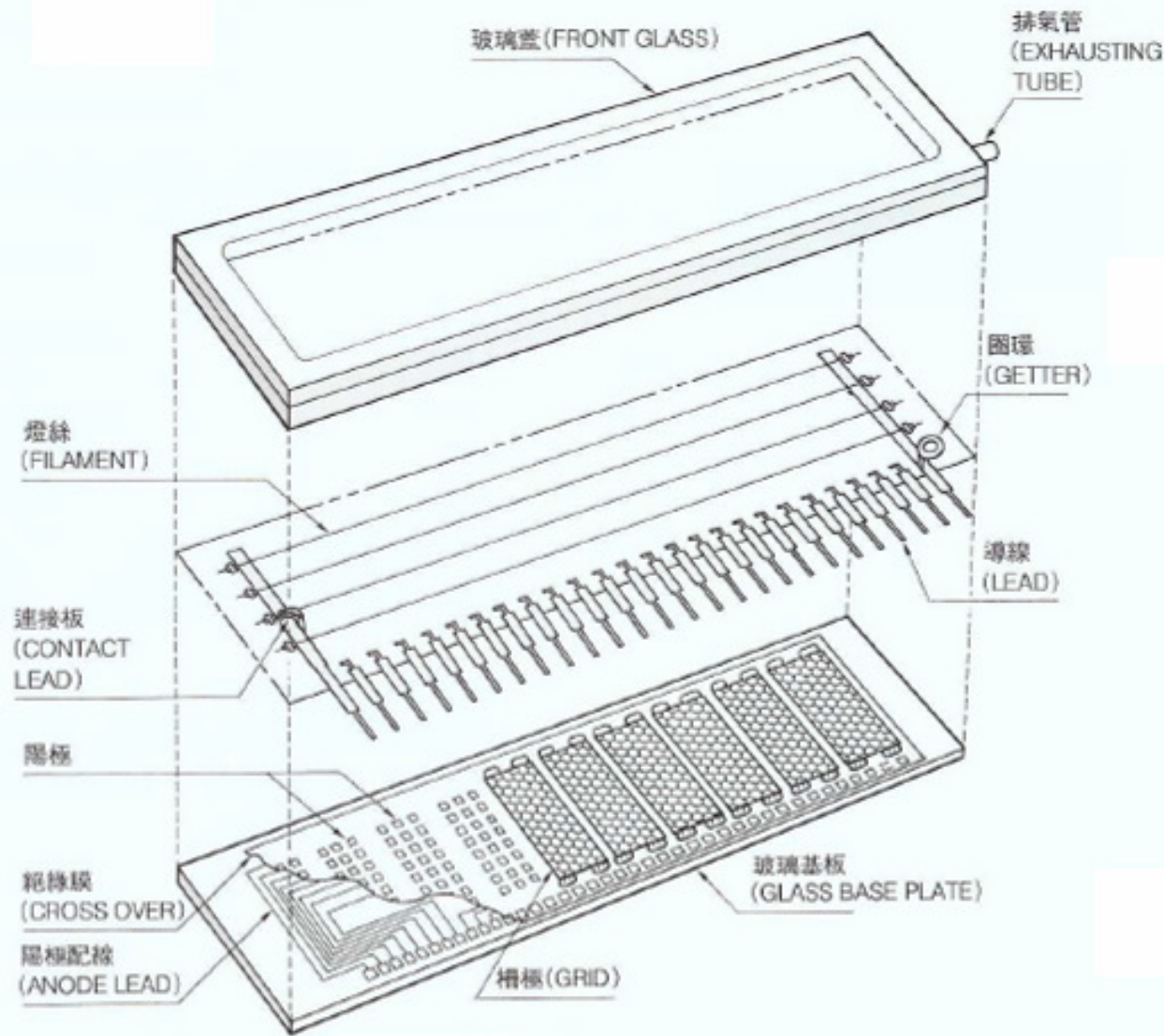
<http://www.wisechip.com.tw>

~ Ref ~

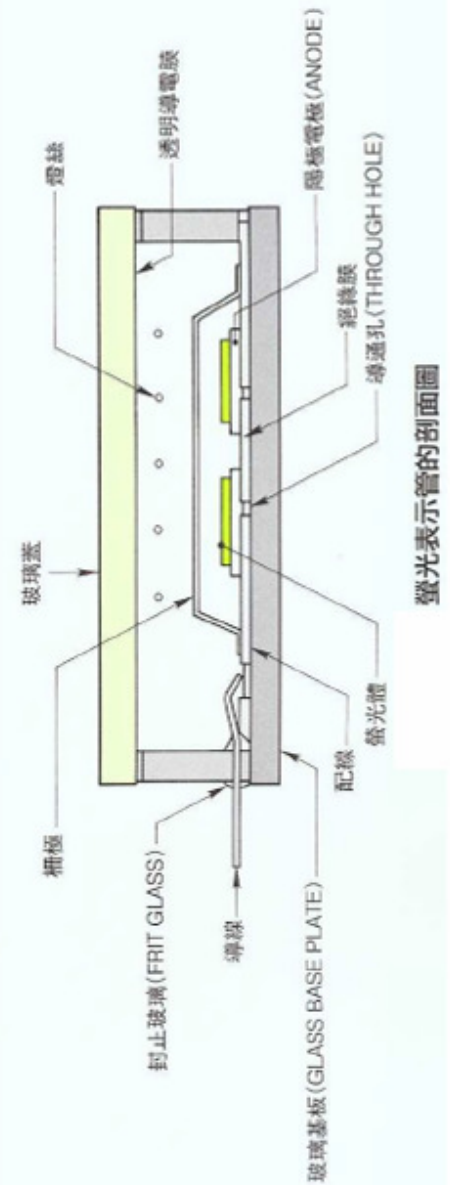
# VFD Analysis

# VFD Display Method





螢光表示管的分解斜視圖



螢光表示管的剖面圖

**SAMSUNG** DISPLAY DEVICES 16T202DA1E (Tentative) Page - 1 / 18

To : \_\_\_\_\_

## SPECIFICATION

Tentative

Application : \_\_\_\_\_

.....

Model No. : 16T202DA1E

Rev No.	Issued Date	Description	Remark
Tentative	Oct. 16, 1998	First Edition	A1 Pages

Issued by C. H. LEE

Checked by J. H. Jang

Approved by Chang

Customer Approval

**FUTABA**

### 蛍光表示管製品規格

VACUUM FLUORESCENT DISPLAY SPECIFICATION

S

形名 Type No. 16-SD-05 GK, 65K, 6AK, 6A1K 6AK 双葉電子工業株式会社  
電子管工場 技術部  
ENGINEERING DEPT.  
ELECTRONIC DISPLAY PLANT  
FUTABA CORPORATION

用途 : Application Character Display

概要 : Features 16 digits 5x7dots with cursor

発光色 : Color of Illumination Green (G. x=0.235, y=0.405)

外形寸法	Panel Length	P.L.	100	mm
Outer Dimension	Panel Height	P.H.	16.2	mm
	Panel Thickness	P.T.	6.1	mm
	Lead Pitch	L.P.	1.5	mm
Lead	Lead Out		SIL	封入

定格: Ratings

項目	Item	Symbol	Min.	Recommended	Max.	Unit
フィラメント電圧	Filament Voltage	*1 Ef	3.6	4.0	4.4	Vac
せん頭グリッド電圧	Peak Grid Voltage	ec	-	34	41	Vp-p
せん頭アノード電圧. Peak Anode Voltage (下記Du条件: At following Du)		ea( )	-	34	41	Vp-p
		ea( )	-	-	-	Vp-p
		ea( )	-	-	-	Vp-p
カットオフバイアス	Cut-off Bias	*2 Ekc	-	5.1	-	Vdc
デューティファクタ	Duty Factor	Du	-	1/8	-	-
パルス幅	Pulse Width	tp	-	100	-	μs
拡散グリッド電圧	Diffusion Grid Voltage	*3 Ecd	-	-	-	Vdc
フィラメントダンパー電圧	Filament Dumper Voltage	*4 Efd	-	-	-	Vdc
動作温度	Operating Temperature	Topr	- 20	-	+ 70	°C
保存温度	Storage Temperature	Tstg	- 55	-	+ 80	°C

\*1. AC 50Hzまたは60Hzの実効値。  
60Hzor 80Hz rms.

\*2. フィラメントトランスのセンタータップに印加する。  
Ekc is applied to the center tap of the filament transformer.

\*3. Ecd = 管の板柱を通して印加する。  
Ecd is supplied through " " resistor to the Gd terminal.

\*4. Efd = 管の板柱を通して印加する。  
Efd is supplied through " " resistor to the filament terminals.

注1. フィラメント電圧は表示管の不良表示品位に大きな影響を及ぼす原因となりますので、必ず定格範囲内で御使用ください。  
Note 1. The filament voltage should be kept within above rating to maintain the expected life and display quality.

注2. 本規格と異なる扱い方をされる場合は、弊社にご相談下さい。  
Note 2. In case of the deriving condition differs from this specification, consult to FUTABA for the proper usage.

