OLED Driver Controller

Innovative, High Resolution and Energy Efficient Solutions for Smart Display Applications

As OLED display technology and its manufacturing process become mature, more and more applications have adopted OLED as a smart display. In addition, as self-emissive OLED display comes with a wide range of operating temperatures, it is suitable for outdoor applications even under severe weather conditions. Solomon Systech offers a wide range of OLED driver IC for various kinds of applications.

Passive Matrix OLED Driver Controller

Solomon Systech continues to be the market leader of the Passive Matrix OLED ("PMOLED") display IC, with a competitive edge in small size mobile display applications. Besides providing a full range of PMOLED driver IC from icon, mono and gray scale to full color with highly integrated features, Solomon Systech further expands its product portfolio by launching new PMOLED display IC with built-in Character ROMs and support high panel display brightness to replace power consuming VFD display panel.

Solomon Systech's PMOLED drivers employ a proprietary driving scheme to reduce system power consumption and enhance display performance. They are the ideal display solutions for devices which require high display brightness and low power consumption.

Applications: Smartphones, Portable Gadgets, MP3, Health Care Products, Smart Power Meters, Industrial Instruments, Automotive Display, Consumer Appliances, Remote Controls, Keypads, Switches, etc.

Active Matrix OLED Driver Controller

Nowadays, Active Matrix OLED ("AMOLED") display is very popular for high resolution handheld devices. Solomon Systech has rich experience in both amorphous and LTPS driver design, and we also own numerous state-of-the-art AMOLED display IPs. To capitalize on the surging demand for AMOLED displays, Solomon Systech provides innovative AMOLED custom display IC design solutions to meet the needs of our customers.

Applications: Smartphones, Tablet PC, PMP, Digital Cameras, Consumer Appliances, Portable Game Consoles, etc.

Solomon Systech Limited welcomes enquiries on the development of custom OLED IC.

SOLOMON SYSTECH
solutions in silicon

Key Features

Character
• Up to 20 Char x 4 Lines

Icon
• Up to 256 Icon Lines

Character with Icon
• 120 SEG x 16 COM, up to 32 Icon Lines

Full Range of Resolution (Dot Matrix Panel)
• 160RGB x 128
• 128RGB x 160
• 128RGB x 128
• 128RGB x 96
• 128RGB x 68
• 96RGB x 96
• 96RGB x 64
• 480 x 128 16 Gray Scale
• 256 x 64 16 Gray Scale
• 128 x 128 16 Gray Scale
• 128 x 80 16 Gray Scale

• 128 x 64 Mono Color
• 128 x 39 Mono Color
• 128 x 32 Mono Color
• 120 x 16 Mono Color
• 96 x 16 Mono Color

Support Low Voltage MCU Interface 256 Steps Brightness Current Control Pin Selectable MCU Interfaces
• 4/8/9/16/18 Bits 6800-series Parallel Interface
• 4/8/9/16/18 Bits 8080-series Parallel Interface
• 3-wire and 4-wire Serial Peripheral Interface
• I²C Interface

Support Various Color Depths
• 262K Color (6:6:6)
• 65K Color (5:6:5)
• 16 Gray Scale
• Mono Color

Programmable Gamma Look Up Tables

RAM Write Synchronization Signal to Avoid Flickering When Updating New Image

On-chip Charge Pump

Content Scrolling for Infinite Content Update

Non-volatile Memory (OTP) for Panel Calibration

Row Re-mapping and Column Re-mapping

Horizontal and Vertical Scrolling

Programmable Frame Rate and Multiplexing Ratio
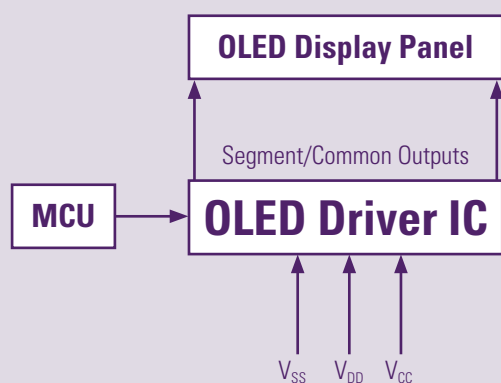
On-chip Oscillator

Slim Chip Layout for COF and COG

OLED Driver Controller

Application Diagram

Dot Matrix Panel

```
                    OLED Display Panel

                    Segment/Common Outputs

MCU  ──►            OLED Driver IC

                     V_SS   V_DD   V_CC
```

256 Icon Mode Connections

```
              ICS0   CS1   CS2  -------  ICS125 ICS126 ICS127

ICCA1
              OLED Icon Driver IC                      ICCB1
ICCA0                                                  ICCB0

              MCU            V_SS  V_DD  V_CC
```
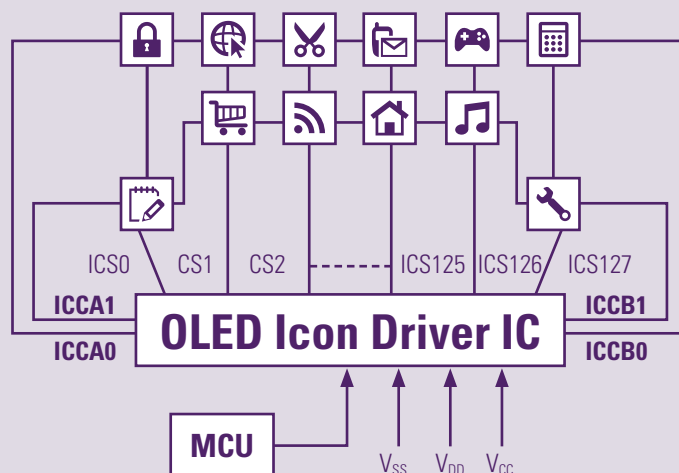
Dot Matrix Panel With Icon Display Connections

```
                                    ICON
                                    Segment/
                                    Common
                                    Outputs

                                                          ◄── V_CC

                    OLED Display Panel    Dot Matrix
                                          Segment/       ◄── V_DD
                                          Common
                                          Outputs
                                                          ◄── V_SS

                                    ICON
                                    Segment/       MCU
                                    Common
                                    Outputs
```
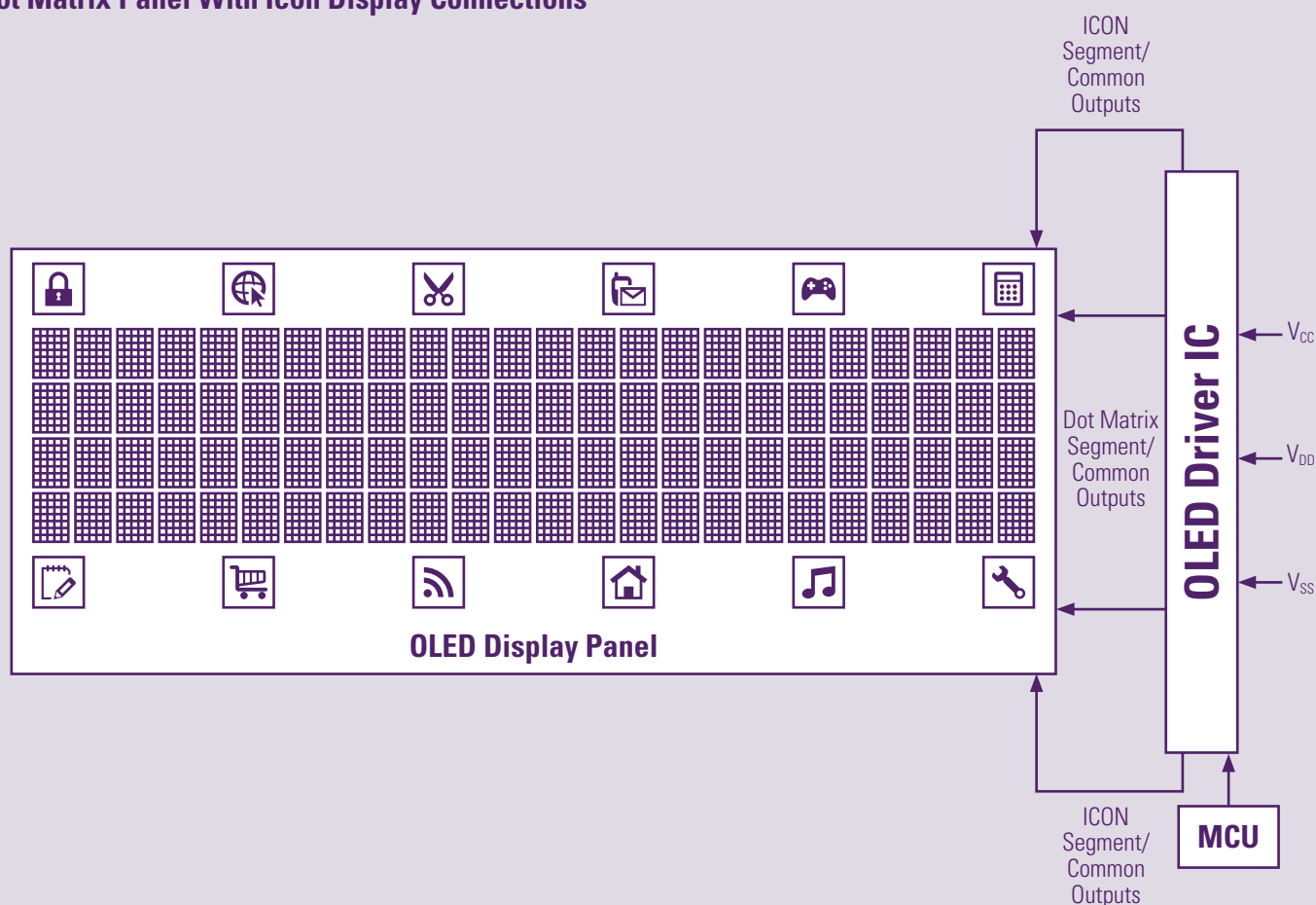
OLED Driver IC

OLED Driver Controller

Selection Guide - Mono/Area Color

Part Number	SSD1305	SSD1306	SSD1307	SSD1308	SSD1309	SSD1311	SSD1313	SSD1316	SSD1360
Display Features									
Maximum panel resolution	132 x 64	128 x 64	128 x 39	128 x 64	128 x 64	20 Char x 4 Lines	128 / 256 Icon Lines	128 x 39	120 x 17 + 32 icons
Embedded SRAM display buffer	132 x 64 bits	128 x 64 bits	128 x 39 bits	128 x 64 bits	128 x 64 bits	80 x 8 bits	–	128 x 39 bits	120 x 16 bits
Display color	Mono and 4 color selections for area color	Mono	Mono	Mono	Mono	Mono	Mono	Mono	Mono
Contrast control	256 steps	256 steps	256 steps	256 steps	256 steps	256 steps	256 steps	256 steps	256 steps
DC Characteristics									
Segment maximum source current	320uA	240uA	320uA	150uA	320uA	450uA	320uA	160uA	600uA
Common maximum sink current	45mA	30mA	40mA	20mA	40mA	45mA	40mA	20mA	80mA
MCU interface Voltage Supply (V_{DDIO})	1.6V - V_{DD}	–	–	–	–	2.4V - 3.6V / 4.4V - 5.5V	–	–	2.4V - 3.6V / 4.4V - 5.5V
Core V_{DD} power supply (V_{DD})	2.4V - 3.5V	1.65V - 3.3V	1.65V - 3.3V	1.65V - 3.3V	1.65V - 3.3V	2.4V - V_{DDIO} / internally regulated	1.65V - 3.3V	1.65V - 3.3V	2.4V - V_{DDIO} / internally regulated
High Voltage Supply (V_{CC})	7.0V - 15.0V	7.0V - 15.0V	7.0V - 15.0V	7.0V - 15.0V	7.0V - 16.0V	8.0V - 15.0V	7.0V - 16.0V	7.0V - 15.0V	8.0V - 15.0V
MCU Host Interface Supported									
4-bit parallel interface	–	–	–	–	–	✓	–	–	✓
8-bit parallel interface	✓	✓	✓	✓	✓	✓	✓	✓	✓
Serial peripheral interface	✓	✓	✓	✓	✓	✓	✓	✓	✓
I²C interface	✓	✓	✓	✓	✓	✓	✓	✓	✓
Package Information									
TAB	T7(132x64)	–	–	U(128x64)	–	–	–	–	–
COG	Z(132x64), Z3(132x64)	BZ(128x64)	Z2(128x39)	Z2(128x64)	Z(128x64)	M1Z8(100x32)	Z(128x4)	Z(128x39)	Z(120x17)
High Integration Controller Function									
On-chip oscillator	✓	✓	✓	✓	✓	✓	✓	✓	✓
Programmable frame rate	✓	✓	✓	✓	✓	✓	✓	✓	✓
Programmable display MUX	✓	✓	✓	✓	✓	✓	–	✓	✓
Row/Column re-mapping	✓	✓	✓	✓	✓	✓	–	✓	✓
Horizontal scrolling	✓	✓	✓	✓	✓	✓	–	✓	✓
Vertical scrolling by RAM	✓	✓	✓	✓	✓	✓	–	✓	✓
Content scrolling	–	–	–	–	✓	–	–	✓	✓
Internal charge pump regulator	–	✓	–	–	–	–	–	✓	–
Internal IREF selection	–	–	–	✓	–	–	–	✓	–
On-chip Character ROM	–	–	–	–	–	✓	–	–	✓
Graphic mode	–	–	–	–	–	–	–	–	✓

Selection Guide - Gray Scale

Part Number	SSD1322	SSD1326	SSD1327	SSD1329
Display Features				
Maximum panel resolution	480 x 128	256 x 32	128 x 128	128 x 128, 64 hard icons
Embedded SRAM display buffer	480 x 128 x 4 bits	256 x 32 x 4 bits	128 x 128 x 4 bits	128 x 128 x 4 bits
Display color	16 gray scale	16 gray scale	16 gray scale	16 gray scale
Contrast control	256 steps	256 steps	256 steps	256 steps
DC Characteristics				
Segment maximum source current	300uA	100uA	300uA	350uA
Common maximum sink current	80mA	25mA	40mA	40mA
MCU interface Voltage Supply (V_{DDIO})	1.65V - V_{CI}	1.7V - V_{DD}	–	1.7V - V_{DD}
Core VDD power supply (V_{DD})	2.4V - 2.6V	2.4V - 3.5V	1.65V - 2.6V	2.4V - 3.5V
Logic Voltage Supply (V_{CI})	2.4V - 3.5V	–	1.65V - 3.5V	3.2V - 4.2V (for icon)
High Voltage Supply (V_{CC})	10.0V - 20.0V	9.0V - 15.0V	8.0V - 18.0V	9.0V - 18.0V
MCU Host Interface Supported				
8-bit parallel interface	✓	✓	✓	✓
Serial peripheral interface	✓	✓	✓	✓
I2C interface	–	✓	✓	–
Package Information				
COF	(256x64)	–	–	–
COG	–	Z(256x32)	ZB(128x128)	Z(128x128, 64 icon)
High Integration Controller Function				
On-chip oscillator	✓	✓	✓	✓
On-chip DC-DC booster	–	–	–	for hard icon
On chip V_{DD} regulator	✓	–	✓	–
Programmable frame rate	✓	✓	✓	✓
Programmable display MUX	✓	✓	✓	✓
Row/Column re-mapping	✓	✓	✓	✓
Horizontal scrolling	–	✓	✓	✓
Vertical scrolling by RAM	✓	✓	✓	✓
Graphic acceleration command set: e.g. draw rectangle & copy	–	–	–	✓

OLED Driver Controller

Selection Guide - Color

Part Number	SSD1330	SSD1331	SSD1351	SSD1352	SSD1353	SSD1355
Display Features						
Maximum panel resolution	96RGB x 96	96RGB x 64	128RGB x 128	160RGB x 128	160RGB x 132	128RGB x 160
Embedded SRAM display buffer	96 x 96 x 16 bits	96 x 64 x 16 bits	128 x 128 x 18 bits	160 x 128 x 18 bits	160 x 132 x 18 bits	128 x 160 x 18 bits
Display color	65k colors	65k colors	262k colors	262k colors	262k colors	262k colors
Contrast control	256 steps	256 steps 256 steps	256 steps	256 steps	256 steps	256 steps
DC Characteristics						
Segment maximum source current	200uA	200uA	200uA	300uA	160uA	200uA
Common maximum sink current	60mA	60mA	70mA	80mA	60mA	80mA
MCU interface Voltage Supply (V_{DDIO})	1.8V - V_{DD}	1.6V - V_{DD}	1.65V - V_{CI}	1.65V - V_{CI}	1.6V - V_{CI}	1.6V - V_{CI}
Core VDD power supply (V_{DD})	1.8V - 3.5V	2.4V - 3.5V	–	–	2.4V - 2.6V	2.4V -2.6V
Logic Voltage Supply (V_{CI})	–	–	2.4V - 3.5V	2.4V - 3.5V	2.4V - 3.5V	2.4V - 3.5V
High Voltage Supply (V_{CC})	8.0V - 18.0V	8.0V - 18.0V	10.0V - 18.0V	10.0V - 18.0V	10.0V - 21.0V	10.0V-21.0V
MCU Host Interface Supported						
8-bit parallel interface	✔	✔	✔	✔	✔	✔
9-bit parallel interface	✔	–	–	✔	✔	–
16-bit parallel interface	✔	✔	✔	✔	✔	✔
18-bit parallel interface	–	–	✔	✔	✔	✔
Serial peripheral interface	✔	✔	✔	✔	✔	✔
I2C interface	✔	–	–	–	–	–
Package Information						
COF	–	–	U(128x128)	–	U7(160x128)	U8(128x128)
COG	ZB(96x96)	Z(96x64)	Z(128x128)	Z(160x128)	Z(160x132)	Z(128x160)
High Integration Controller Function						
On-chip oscillator	✔	✔	✔	✔	✔	✔
On chip V_{DD} regulator	–	–	✔	✔	✔	✔
Non-Volatile Memory (OTP) for calibration	–	–	–	✔	✔	✔
Programmable frame rate	✔	✔	✔	✔	✔	✔
Programmable display MUX	✔	✔	✔	✔	✔	✔
Row/Column re-mapping	✔	✔	✔	✔	✔	✔
Horizontal scrolling	✔	✔	✔	–	✔	✔
Vertical scrolling by RAM	✔	✔	✔	✔	✔	✔
Color swapping function	✔	✔	✔	✔	✔	✔
Graphic acceleration command set: draw line & rectangle, copy & dim window, clear window, etc	✔	✔	–	–	✔	–
Content Scrolling	✔	–	–	–	–	–
Mono Mode	✔	–	–	–	–	–

Solomon Systech Limited

Solomon Systech (International) Limited is a leading semiconductor company providing IC products and system solutions that enable a wide range of display applications for smartphones, smart TVs, smart projectors and other smart devices including consumer electronics products, portable devices, industrial appliances and green energy applications such as LED lighting.
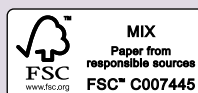
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