

# Display Solutions for Smartphones and Tablets

**CF Lee** 

**Solomon Systech Limited** 

















- Smartphones (up to 6") / Tablets (6" to 10")
  - Low Power Consumption
  - High Display Resolution
  - In-cell Touch Control





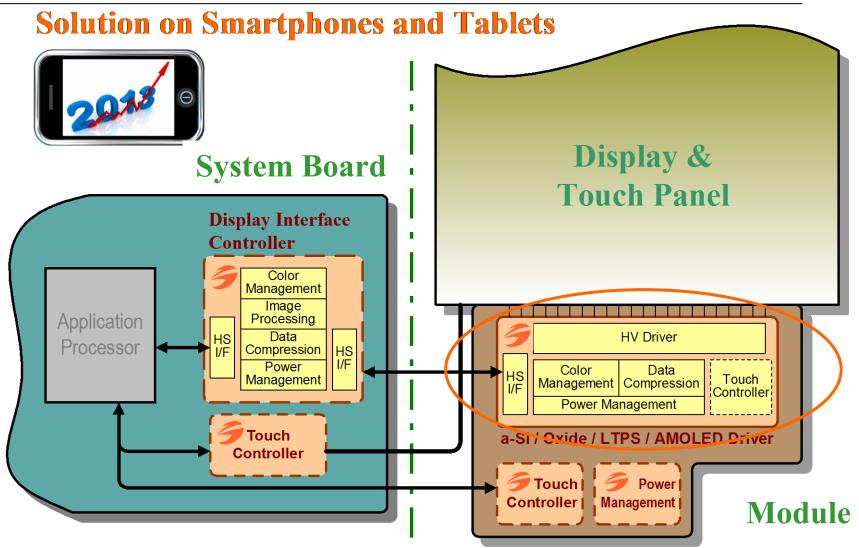








### Part 1 – Display Driver IC





# Key Technology – HD720/WXGA Series

- Low Power Solution Metal Oxide
- Low Power Solution with Memory
- Low Power Solution MIPI 2 to 3 lanes
- In-cell Mutual Cap Touch Display Driver IC

## Low Power Solution – Metal Oxide





#### Oct 2004

E-Paper Driver Controller IC drives the world's 1st e-paper watch

#### 2004

World's 1st single chip Mobile TFT Driver with built-in cap

2002



#### May 2006

World's 1st MIPI Master Bridge Chip

#### Nov 2006

Bistable Display Driver drives the world's 1st epaper mobile phone

2005



#### May 2009

Single Chip Capacitive Multi-Touch IC



#### **Sep 2011**

4-lane MIPI Master **Bridge Chip** for Full HD display



2013

2012

2011

2010

2009

2008

2007



#### Jul 2008

**MagusCore**<sup>TM</sup> Multimedia System Solution



#### Aug 2010

**DSP** Integrated Dimmable



**TFT Display Driver IC** 

**LED Driver IC** 



2001 2000

1999

#### Oct 1999

World's 1st grayscale 32 MUX LCD Driver/ Controller

SYSTECH

Oct 2001

**OLED Driver IC** 

with Controller

World's 1st

single chip



2003

World's 1st single chip 2D **GIGA CSTN** LCD Driver Controller IC



2004

#### Oct 2005

2006

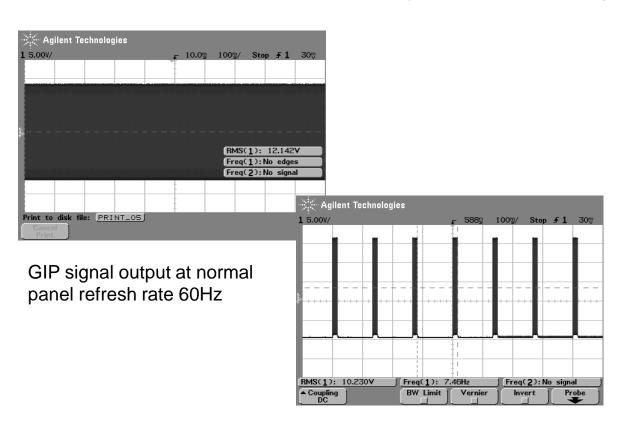
Microdisplay Controller for binocular display module products





### Low Power Solution – Metal Oxide

- Silicon Proven HD720 Ramless Driver IC
- Panel Refresh Rate down to 7.5Hz with Power Save of 30mW



GIP signal output at panel refresh rate 7.5Hz





## Low Power Solution – with Memory

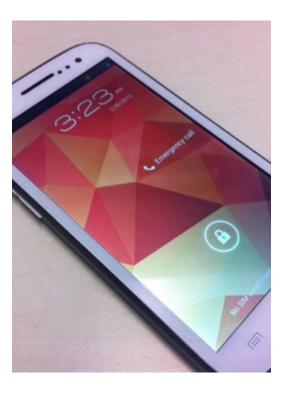
- Silicon Proven HD720 w/Ram Driver IC for Metal Oxide
- With Half-RAM Data Compression in Command Mode, Power Save of 40mW could be achieved
- Panel Refresh Rate further down to 2Hz with extra Power Save of 20mW



# Low Power Solution – with MIPI 2 or 3 Lanes



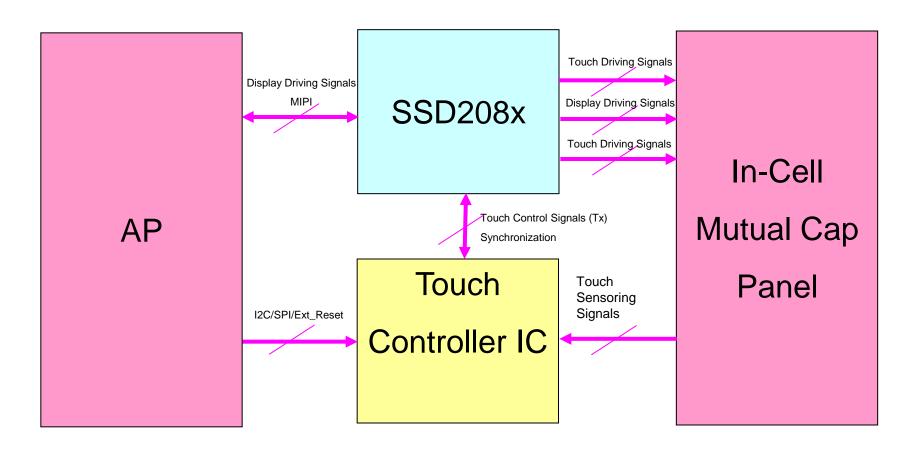
- Silicon Proven HD720 Driver IC
- With MIPI 3-Lane operation, Power Save of 12mW could be achieved
- With MIPI 2-Lane operation, further 8mW power save could be achieved



SSD2075 with 5" a-Si Module

# In-Cell Mutual-Cap Touch Control Display Driver IC

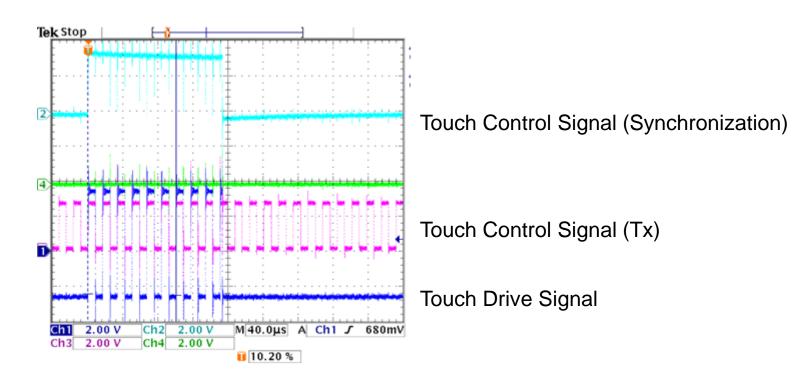






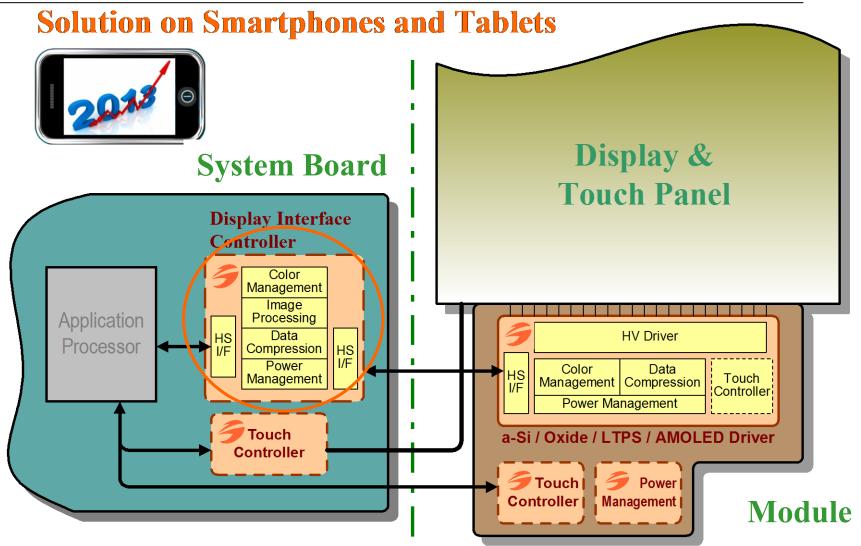
### Touch Drive Signal from SSD208x

Silicon Proven for 5" Panel with Touch Control IC





### Part 2 – Display Interface Controller





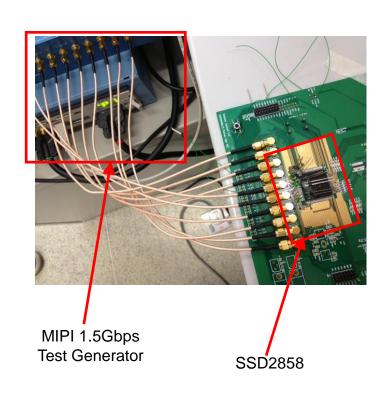


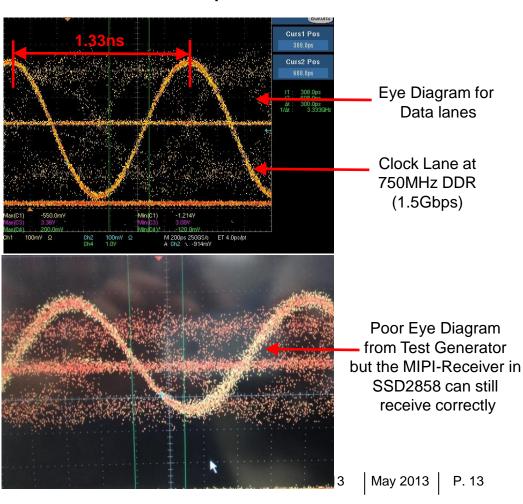
- Silicon Proven MIPI DPHY @ 1.5Gbps
- Scaler and Rotation for Low System Power
- Up to 3-DSI MIPI Transmitter (Split or Broadcast)

# 1.5Gbps MIPI-Receiver



- Silicon Proven 1.5Gbps MIPI performance
- Low Power Performance 23mA for 4 x 1.5Gbps MIPI receiver module



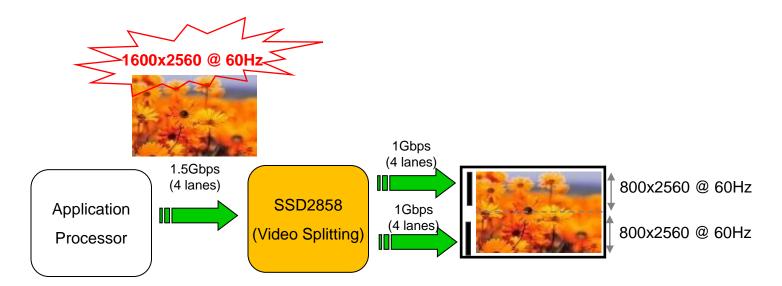






### Application

Bridge 1.5Gbps x 4 Lanes Application Processor with 2 x 1Gbps x 4 lanes (dual-LCD drivers), to support Display of WQXGA resolution (1600 x 2560)



# Scaler and Rotation for Low System Power



### High Quality Fractional Scaler



qHD - 540 x 960



Scaled FHD - 1080 x 1920



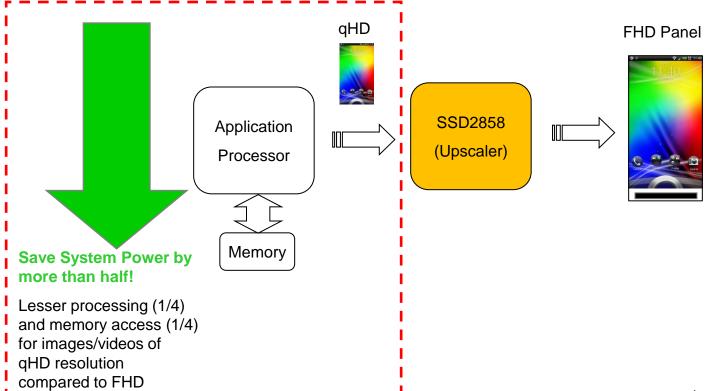
qHD -> FHD Demo

# Scaler and Rotation for Low System Power



### Low System Power

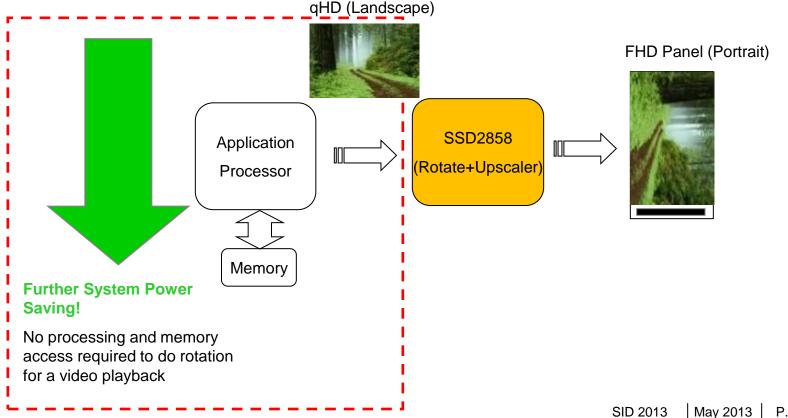
 Application Processor processes images/videos at low resolution (e.g. UI or YouTube Video), and let SSD2858 do the up-scaling



# Scaler and Rotation for Low System Power



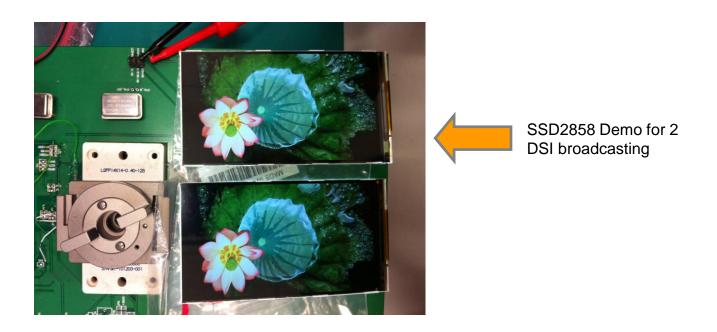
- Further System Power Reduction: Display Rotation
  - Application Processor needs not spend expensive memory bandwidth for rotating the landscape display to match a portrait panel



# Up to 3-DSI MIPI Transmitter (Split or Broadcast)



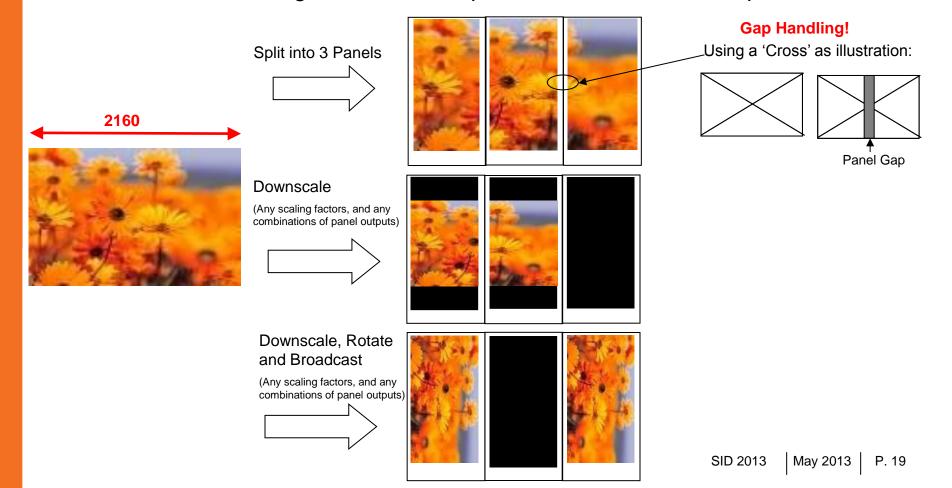
Concurrent Display Output (Broadcast) for 2 DSI output



# Up to 3-DSI MIPI Transmitter (Split or Broadcast)



- Foldable Smart Phone Display
  - Simplify Application Processor Image Processing
  - Illustration using 2160 x 1280 input with three 720 x 1280 panels



# Up to 3-DSI MIPI Transmitter (Split or Broadcast)



SSD2858 Demo for 2 DSI splitting



## Solomon Systech – Product Portfolio



**Mobile System** 

**Green Power** 

# SSL - Your Best Display Technology Partner for Smartphones & Tablets





#### **Touch Controller** Single Layer **Double Layers** On Cell / 1-5" 2-13.6" In Cell SSD2542 SSD2531 Developing IΡ SSD2532 SSD2533 SSD2541 SSD2542 SSD2543

#### **Display Interface Controller**

SSD209X

**FHD** 

| Part    | Resolution | MIPI    | IN      | OUT    |
|---------|------------|---------|---------|--------|
| SSD2805 | WVGA       | 350Mbps | MCU/RGB | 2-Lane |
| SSD2825 | WXGA       | 600Mbps | RGB/MCU | 4-Lane |
| SSD2828 | WUXGA      | 1Gbps   | RGB/MCU | 4-Lane |
| SSD2848 | WUXGA      | 1Gbps   | 4-Lane  | 4-Lane |
| SSD2858 | WQXGA      | 1.5Gbps | 4-Lane  | 8-Lane |

#### System IP

| Peripheral              | IP                   | S/W             |
|-------------------------|----------------------|-----------------|
| Graphics                | Low Power            | Apps            |
| Memory<br>Compression   | Image<br>Enhancement | Software Driver |
| High Speed<br>Interface | 3D<br>Backlight      | Firmware        |
| Controller              | Control              |                 |



# Thank You

http://www.solomon-systech.com

Email: sales@solomon-systech.com

Phone: 852-2207 1111 Fax: 852-2267 0800