

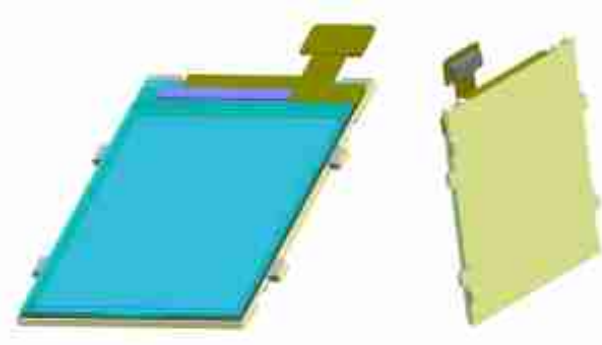
P9144

1.8"/2.0"/2.2"/2.6" QVGA 240 x RGB x320

LTPS Transflective Display Module

This high-performance display, the first Philips solution to use transflective technology with QVGA (240 x RGB x 320) resolution as supported by the Symbian Series 60 Platform, delivers superior LTPS TFT LCD performance, has built-in low-power features, and combines excellent color quality with a backlight to produce images that are readable in all conditions, even in direct sunlight.

Designed for longevity, the display offers 16.7 million colors and is available in four sizes: 1.8", 2.0", 2.2", and 2.6". Embedded RAM memory presents images during power standby mode, and there are two embedded LifePix™ algorithms - Smart Color Mapping and Dynamic Contrast Boosting - that improve contrast and color performance. The result is email, pictures, videos, and games that are always ultra-sharp.

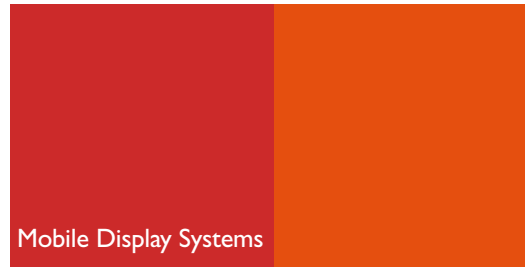


APPLICATION INFORMATION

- Mobile Phones, PDA's / Smart Phones, Mobile Video Players

PRODUCT ADVANTAGES

- Superior transflective performance for sparkling colors
- Always readable, even in direct sunlight
- Embedded RAM for image display during power standby mode
- Embedded LifePix algorithms: Smart Color Mapping, Dynamic Contrast Boosting
- 16.7 million colors
- Sizes: 1.8", 2.0", 2.2", and 2.6"



SPECIFICATIONS

General

Technology	LTPS Active Matrix LCD Transflective
Resolution	240 x RGB x 320
Image Mode	Normally Black
Interface	18/16 and 8/9-bit parallel CPU I/F (i80/M60), 24/18/16-bit RGB I/F
Color	262k/16.7M
Viewing Direction	6 o'clock
Pixel Configuration	RGB Vertical Stripe
IC	LDS320
Logic Supply Voltage	0.3 to 3.8V
Analogue Supply Voltage	0.3 to 3.8V
Backlight	4 LEDs

Temperature Condition

Operating	-30°C to +70°C
Storage	-40°C to +85°C

1.8"

Mechanical

Module (WxH)	32.6 x 48.1mm
Module Thickness	2.35 mm
Panel (WxH)	31.36 x 45.68 mm
Active Area	27.36 x 36.48 mm
Dot Pitch	0.114

FoS performance

Backlight ON

Contrast Ratio	150:1
NTSC (u',v')	60%
Viewing Direction, CR>5	130°
Luminance	200Nit(20mA)

Backlight OFF

Reflectance Diffuse	5.5%
NTSC (u',v')	5%

Power Consumption

Normal Mode	lvdd=4.8mA, lvdd=0.2mA
Idle Mode	lvdd=1.1mA, lvdd=0.06mA

PHILIPS

P9144

1.8"/2.0"/2.2"/2.6" QVGA 240 x RGB x 320, LTPS Transflective Display Module

SPECIFICATIONS

2.0"

Mechanical

Panel (WxH)	34.6 x 50.0 mm
Active Area	30.6 x 40.8 mm
Dot Pitch	0.1275

FoS Performance

Backlight ON

Contrast Ratio	150:1
NTSC(u',v')	60%
Viewing Direction, CR>5	130°
Luminance	200Nit(20mA)

Backlight OFF

Reflectance Diffuse	5%
NTSC (u',v')	5%

2.2"

Mechanical

Module (WxH)	40.14 x 56.4 mm
Module Thickness	2.3 mm
Panel (WxH)	37.48 x 53.84 mm
Active Area	33.48 x 44.64 mm
Dot Pitch	0.1395

FoS Performance

Backlight ON

Contrast Ratio	150:1
NTSC(u',v')	60%
Viewing Direction, CR>5	130°
Luminance	215Nit(20mA)

Backlight OFF

Reflectance Diffuse	5%
NTSC (u',v')	5%

2.6"

Mechanical

Panel (WxH)	43.6 x 62.0 mm
Active Area	39.6 x 52.8 mm
Dot Pitch	0.165

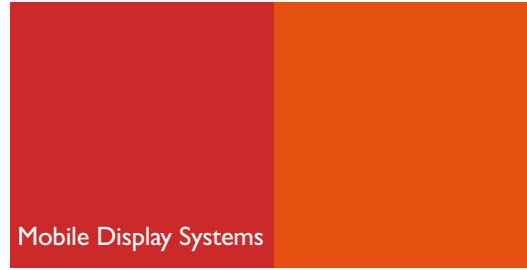
FoS Performance

Backlight ON

Contrast Ratio	150:1
NTSC(u',v')	60%
Viewing Direction, CR>5	130°
Luminance	220Nit(20mA)

Backlight OFF

Reflectance Diffuse	5%
NTSC (u',v')	4%



CPU I/F Pinning

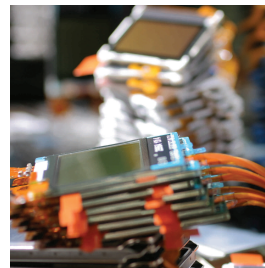
PIN	SYMBOL	I/O	FUNCTION	REMARK
1	VSS2	-	Analog GND	
2	VDD2	-	Analog Power Supply	
3	VDD2	-	Analog Power Supply	
4	VSS2	-	Analog GND	
5	VDD1	-	Logic Power Supply	
6	VDD1	-	Logic Power Supply	
7	VSS1	-	Logic GND	
8	/RES	I	Reset Signal	
9	/RD (E)	I	Read (Enable) Signal	
10	/WR (R, /W)	I	Write (Enable) Signal (Serial Clock)	
11	TE	O	Tearing Effect signal	
12	D0 (SDA)	I/O	Data Bit 0 (Serial Data Input/Output)	Only for CPU Data Bus
13	D1	I/O	Data Bit 1	Only for CPU Data Bus
14	D2	I/O	Data Bit 2	Only for CPU Data Bus
15	D3	I/O	Data Bit 3	Only for CPU Data Bus
16	D4	I/O	Data Bit 4	Only for CPU Data Bus
17	D5	I/O	Data Bit 5	Only for CPU Data Bus
18	D6	I/O	Data Bit 6	Only for CPU Data Bus
19	D7	I/O	Data Bit 7	Only for CPU Data Bus
20	D8	I	Data Bit 8	Only for CPU Data Bus
21	D9	I	Data Bit 9	Only for CPU Data Bus
22	D10	I	Data Bit 10	Only for CPU Data Bus
23	D11	I	Data Bit 11	Only for CPU Data Bus
24	D12	I	Data Bit 12	Only for CPU Data Bus
25	D13	I	Data Bit 13	Only for CPU Data Bus
26	D14	I	Data Bit 14	Only for CPU Data Bus
27	D15	I	Data Bit 15	Only for CPU Data Bus
28	D16	I	Data Bit 16	Only for CPU Data Bus
29	D17	I	Data Bit 17	Only for CPU Data Bus
30	VSS1	-	Logic GND	
31	D, /C (RS)	I	Data or Command control signal	
32	/CS (/SCE)	I	Chip Select	
33	BS3	I	Interface Mode Select Pin 3	
34	BS2	I	Interface Mode Select Pin 2	
35	BS1	I	Interface Mode Select Pin 1	
36	BS0	I	Interface Mode Select Pin 0	
37	CMODE	I	Color Mode Select	1: 262k colors ; 0: 65k colors
38	LED+	-	LED Power Supply Anode	
39	LED-	-	LED Power Supply Cathode	

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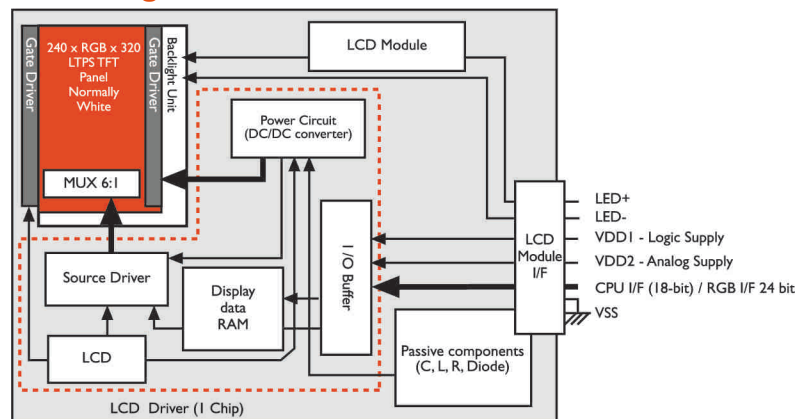
RGB I/F Pinning

PIN	SYMBOL	I/O	FUNCTION	REMARK
1	VSS2	-	Analog GND	
2	VDD2	-	Analog Power Supply	
3	VDD2	-	Analog Power Supply	
4	VSS2	-	Analog GND	
5	VDD1	-	Logic Power Supply	
6	VDD1	-	Logic Power Supply	
7	VSS1	-	Logic GND	
8	D _i /C (RS)	I	Data or Command control signal	For Serial Interface
9	/WR (R _i /W _i)	I	Write (Enable) Signal (Serial Clock)	For Serial Interface (SCL)
10	/CS (/SCE)	I	Chip Select	For Serial Interface
11	D0 (SDA)	I/O	Data Bit 0 (Serial Data Input/Output)	For Serial Interface
12	VD0	I	Data Bit 0	Only for RGB Data Bus
13	VD1	I	Data Bit 1	Only for RGB Data Bus
14	VD2	I	Data Bit 2	Only for RGB Data Bus
15	VD3	I	Data Bit 3	Only for RGB Data Bus
16	VD4	I	Data Bit 4	Only for RGB Data Bus
17	VD5	I	Data Bit 5	Only for RGB Data Bus
18	VD6	I	Data Bit 6	Only for RGB Data Bus
19	VD7	I	Data Bit 7	Only for RGB Data Bus
20	VD8	I	Data Bit 8	Only for RGB Data Bus
21	VD9	I	Data Bit 9	Only for RGB Data Bus
22	VD10	I	Data Bit 10	Only for RGB Data Bus
23	VD11	I	Data Bit 11	Only for RGB Data Bus
24	VSS1	-	Logic GND	
25	VD12	I	Data Bit 12	Only for RGB Data Bus
26	VD13	I	Data Bit 13	Only for RGB Data Bus
27	VD14	I	Data Bit 14	Only for RGB Data Bus
28	VD15	I	Data Bit 15	Only for RGB Data Bus
29	VD16	I	Data Bit 16	Only for RGB Data Bus
30	VD17	I	Data Bit 17	Only for RGB Data Bus
31	VD18	I	Data Bit 18	Only for RGB Data Bus
32	VD19	I	Data Bit 19	Only for RGB Data Bus
33	VD20	I	Data Bit 20	Only for RGB Data Bus
34	VD21	I	Data Bit 21	Only for RGB Data Bus
35	VD22	I	Data Bit 22	Only for RGB Data Bus
36	VD23	I	Data Bit 23	Only for RGB Data Bus
37	/RES	I	Reset Signal	
38	VSYNCO	O	Vertical Sync Pulse Output	Output to controller
39	VSYNC	I	Vertical Sync Pulse (Frame Sync)	Input from controller
40	HSYNC	I	Horizontal Sync Pulse (Line Sync)	Input from controller
41	ENABLE	I	Data Enable Signal	Input from controller
42	DCK	I	Pixel Clock	Input from controller
43	VSS1	-	Logic GND	
44	SD	I	Shutdown Control Pin	
45	TB_RL	I	Scan Direction Select Pin	
46	IFMODE	I	Data Stream Interface Mode Select Pin	Bypass DDRAM or not
47	CMODE	I	Color Mode Select	1: 262k colors ; 0: 65k colors
48	LED+	-	LED Power Supply Anode	
49	LED-	-	LED Power Supply Cathode	
50	NC	-		
51	NC	-		



www.mds.philips.com

Block Diagram



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