Website: www.displaytech-us.com

Embedded Development Board Product Datasheet

EMB028TFTDEV

2.8" TFT Development Board for Microchip Development Tools

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1. Product Description

The Displaytech EMB028TFTDEV is a development board for the Displaytech DT028ATFT TFT display module. The EMB028TFTDEV interfaces with any Microchip PICtail Plus or Display Connector V1 capable development board, such as the Explorer16, Starter Kit I/O Expansion Board, PIC24FJ256DA210 Development Board, or Graphics PICtail Plus 3 Controller Board.

2. External Interfaces

The EMB028TFTDEV supports driving the DT028ATFT's COG Ilitek ILI9341 TFT controller via either a 16-bit parallel or 16-bit RGB interface. When connected to the PICtail Plus connector, the 16-bit parallel connection is automatically selected. When connected to the Display Connector V1, the 16-bit RGB connection is automatically selected. The ILI9341 is configured for each interface via the IM[3:0] pins, which are connected to logic high or logic low depending on which interface is connected. Please see the DT028ATFT Datasheet and the Pin Connection Table for more information.

> *Caution: Do not connect development boards to both the PICtail Plus and Display Connector V1 connectors at the same time.*

2.1. Display Connector V1 (16-bit RGB) Interface

When connected to the Display Connector V1 connection (RGB interface), the ILI9341 configuration registers are manipulated via a 3-wire SPI interface. The 3-wire SPI interface uses a 9-bit data length. Because of this requirement, the MCU must be programmed to bit-bang this SPI connection as the Microchip SPI peripheral does not support a 9-bit SPI interface.

The ILI9341 accepts an 18-bit RGB interface, but all Microchip graphics development tools output a 16-bit RGB signal. This 16-bit RGB interface is connected to the ILI9341 18-bit RGB interface by tying the MSBs of the red and blue channels to the LSBs of the red and blue channels in order to achieve maximum brightness of each channel. Please see the PIC24FJ256DA210 Development Board Datasheet for more information.

To configure the ILI9341 for RGB mode, please set registers 0xB0, 0xF6 and 0x3A. Please see the ILI9341 Datasheet for more information.

2.2. PICtail Plus (16-bit Parallel) Interface

When using the parallel interface, all ILI9341 configuration registers are configured via the lowest 8 bits of the parallel interface. The ILI9341 must be configured to accept a 16-bit parallel input via register 0x3A (see the ILI9341 Datasheet).

3. Backlight Power

An on-board CAT4104V LED driver powers the backlight of the DT018ATFT and can be controlled via a PWM signal (CN1-93 [RD0] or CN2-B11 [RD0]). See the DT028ATFT Datasheet and the Schematic for more information.

> *Note: The backlight power supply requires a 5V supply on the attached Microchip development board. Please power your Microchip development board from the 5V input.*
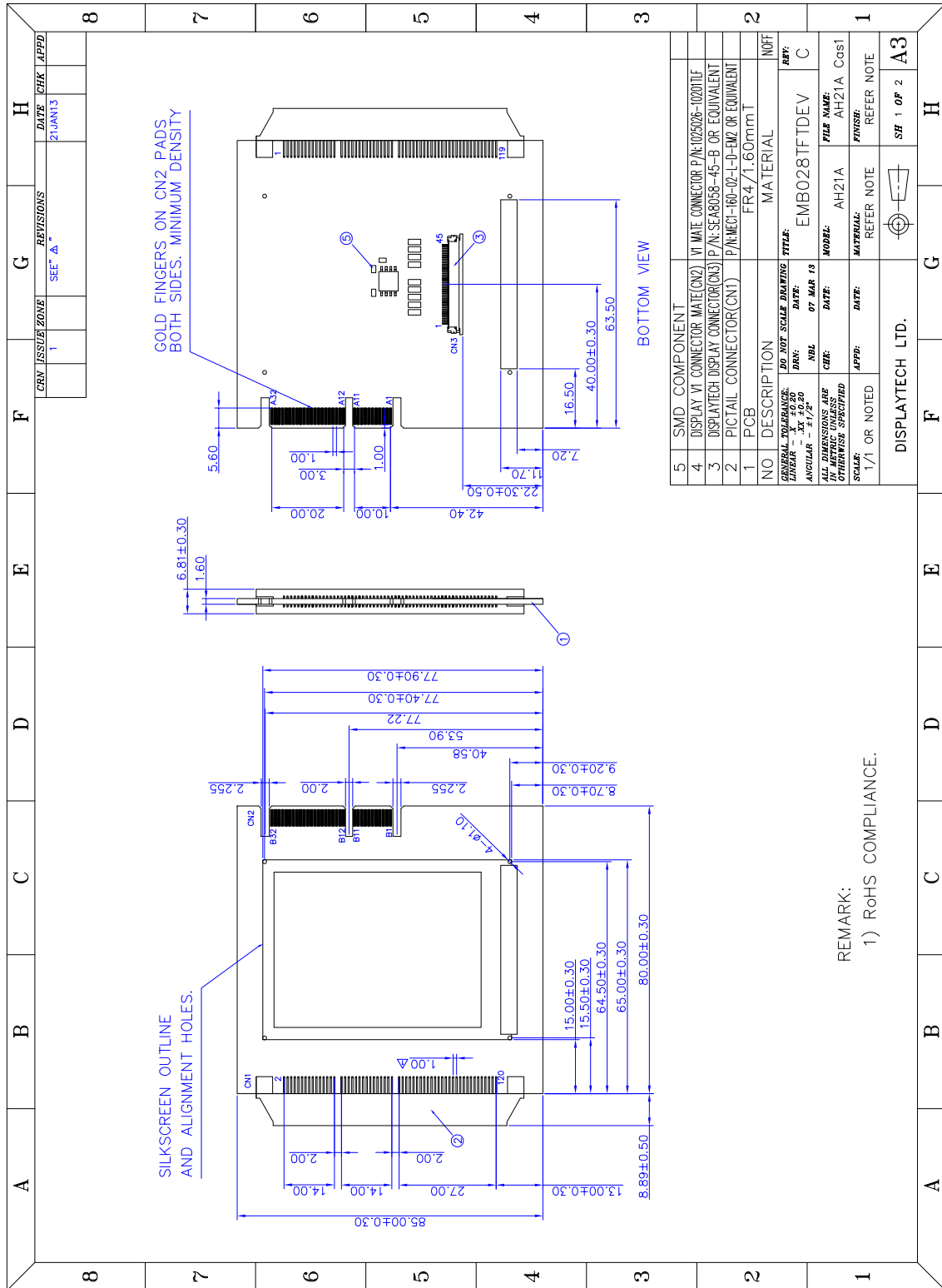
4. Example Software

Example software is available from Displaytech upon request. Please contact Displaytech at sales@displaytech-us.com.
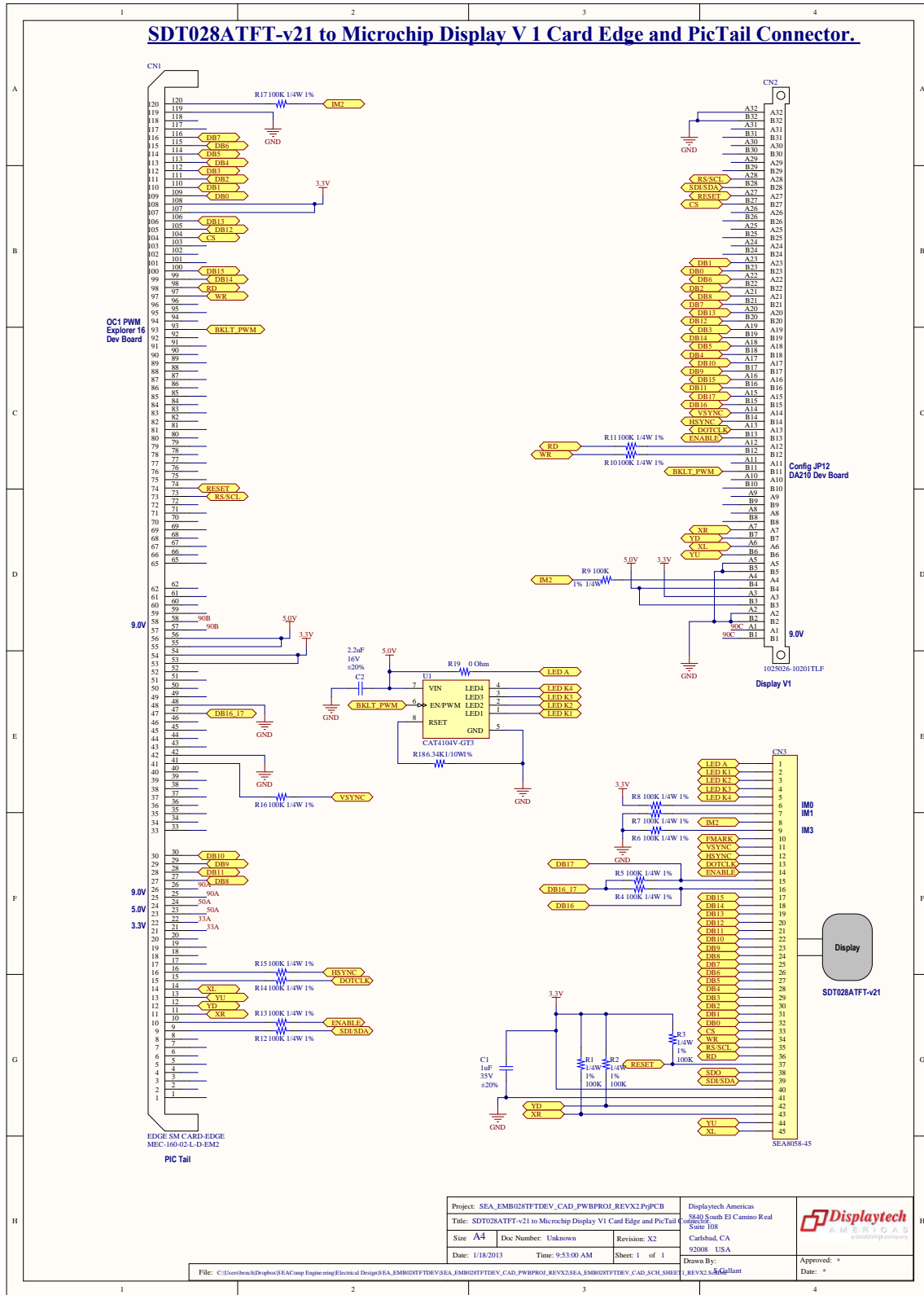
5. Pin Connection Table

DT028ATFT-TS	PICtail Plus	Display Connector V1
10 (FMARK)	-	-
11 (VSYNC)	-	A14 (VSYNC)
12 (HSYNC)	-	B14 (HSYNC)
13 (DOTCLK)	-	A13 (GCLK)
14 (ENABLE)	-	B13 (GEN)
15 (DB17)	-	A15 (GD15)
16 (DB16)	-	B15 (GD14)
17 (DB15)	100 (PMD15)	A16 (GD13)
18 (DB14)	99 (PMD14)	B19 (GD12)
19 (DB13)	106 (PMD13)	A20 (GD11)
20 (DB12)	105 (PMD12)	B20 (GD15)
21 (DB11)	28 (PMD11)	B16 (GD10)
22 (DB10)	30 (PMD10)	A17 (GD9)
23 (DB9)	29 (PMD9)	B17 (GD8)
24 (DB8)	27 (PMD8)	A21 (GD7)
25 (DB7)	116 (PMD7)	B21 (GD6)
26 (DB6)	115 (PMD6)	A22 (GD5)
27 (DB5)	114 (PMD5)	A18 (GD4)
28 (DB4)	113 (PMD4)	B18 (GD3)
29 (DB3)	112 (PMD3)	A19 (GD2)
30 (DB2)	111 (PMD2)	B22 (GD1)
31 (DB1)	110 (PMD1)	A23 (GD0)
32 (DB0)	109 (PMD0)	B23 (GD4)
33 (CS)	104 (PMDCS1)	B27 (RA0)
34 (WR)	97 (PMWR)	-
35 (RS/SCL)	73 (RA6)	A28 (RD8)
36 (RD)	98 (PMRD)	-
37 (RESET)	74 (RA7)	A27 (RA5)
38 (SDO)	-	-
39 (SDI/SDA)	-	B28 (RB1)
42 (YD)	12 (AN1)	B7 (AN18)
43 (XR)	11 (AN0)	A7 (AN16)
44 (YU)	13 (RB3)	B6 (RA1)
45 (XL)	14 (RB4)	A6 (RA2)

6. Mechanical Drawing

7. Schematic

SDT028ATFT-v21 to Microchip Display V 1 Card Edge and PicTail Connector.

8. Bill of Materials

Manufacturer	Part Number	Package	Qty	Value	Designator	Description
TDK	C1608X7R1V105M	0603	1	1uF	C1	Ceramic Capacitor
TDK	C1608X6S1C225M	0603	1	2.2uF	C2	Ceramic Capacitor
Samtec	MEC-160-02-L-D-EM2	-	1	-	CN1	120 PIN CARD-EDGE CONNECTOR
FCI	10025026-10201TLF	-	1	-	CN2	FCI 64 PAD PWB CARD-EDGE
Displaytech	SEA8058-45	-	1	-	CN3	Displaytech FFC/FPC ZIF 45 Position
Vishay	CRCW0603100KFKEAHP	0603	17	100K	R1-R17	Resistor
Vishay	CRCW06036R34FKEA	0603	1	6.34K	R18	Resistor
Yageo	RC0603JR-070RL	0603	1	0 Ohm	R19	Resistor
OnSemi	CAT4104V-GT3	SOIJ-SM8	1	-	U1	LED Driver LDO, 700mA, SOIC8

9. Component Datasheets

Displaytech DT028ATFT	[Link](#)
Ilitek ILI9341 COG TFT Controller/Driver	[Link](#)
ON Semiconductor CAT4104 LED Driver	[Link](#)
Microchip Explorer 16 Development Board	[Link](#)
Microchip Starter Kit I/O Expansion Board	[Link](#)
Microchip PIC24FJ256DA210 Development Board	[Link](#)
On Semiconductor CAT4104	[Link](#)