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Embedded Development Board Product Datasheet

EMB035TFTDEV

3.5" TFT Development Board for Microchip
Development Tools

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1. Product Description

The Displaytech EMB035TFTDEV is a development board for the Displaytech DT035TFT TFT display module. The EMB035TFTDEV interfaces with any Microchip Display Connector V1 capable development board, such as the, PIC24FJ256DA210 Development Board, and the Graphics PICtail Plus Boards.

2. External Interfaces

The EMB035TFTDEV supports driving the DT035TFT's Novatek NT39016D TFT or compatible controller via three data formats. The formats are 8 bit digital image data, 8-bit serial RGB data, and 24-bit parallel RGB data. The parallel RGB data interface can be implemented with reduced bit counts. The operation mode is configure via a 3-Wire serial interface. The 3-Wire command structure is given in the NT39016D datasheet. Please see the [DT035TFT datasheet](#) and the [NT39016D datasheet](#) for more information.

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

When connected to the Display Connector V1 connection (RGB interface), the NT39016D configuration registers are manipulated via the Microchip SPI interface. However, the NT39016D 3-Wire interface uses a 16-bit read/write, with a 6-bit address, and an 8-bit data. Bit D9 is the Read/Write bit and Bit D8 must be tristated during the Read. Because of this requirement, the Microchip MCU must be programmed to bit-bang this SPI connection as most Microchip SPI peripherals do not support tristating or 9-bit SPI interfacing.

The NT39016D accepts an 24-bit RGB interface, but all Microchip graphics development tools output a 16-bit RGB signal. This 16-bit RGB interface is connected to the NT39016D by tying the two LSB of R, G, and B dat to ground and tying the next LSB and the MSB of the R and Blue. This creates a standard 16-bit 565 RGB interface from the original 24-bit interface leading to maximum brightness of each channel. Please see the [PIC24FJ256DA210 Development Board Datasheet](#) for more information.

To configure the NT39016D for RGB mode, please set register SEL[3:1] = 6h. Please see the [NT39016D Datasheet](#) for more information.

2.2. PICtail Plus Interface

The EMB035TFTDEV does not support the PICtail Plus Interface.

3. Backlight Power

An on-board CAT4139 LED driver powers the backlight of the DT035TFT and can be controlled via a PWM signal (CN1-B11). See the [DT035TFT Datasheet](#) and the [Schematic](#) for more information. The backlight of the NT39016D is, therefore, not implemented.

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

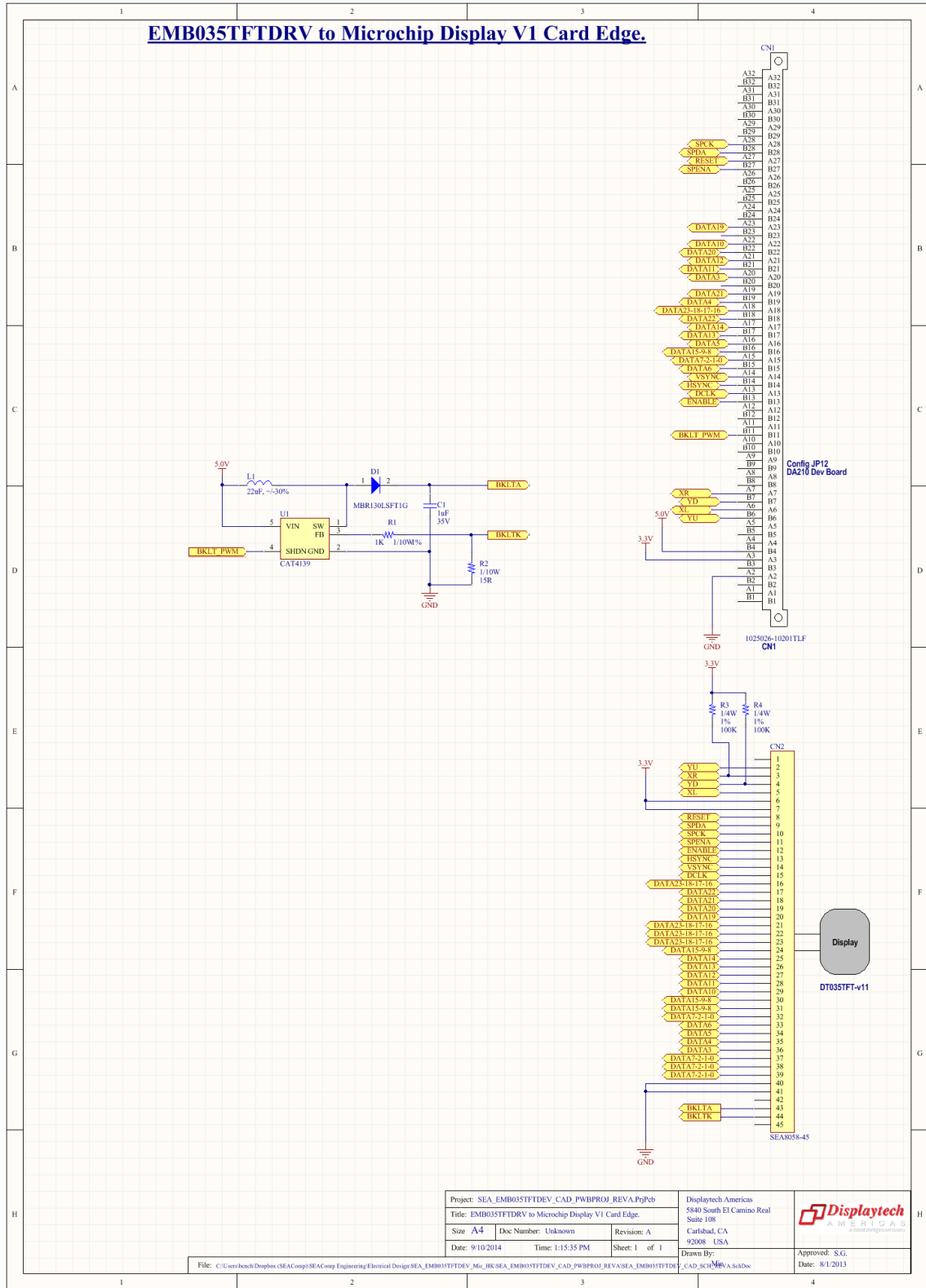
Example software is available from Displaytech upon request. Please contact Displaytech at sales@displaytech-us.com.

5. Pin Connection Table

DT035TFT-TS		Display Connector V1		DT035TFT-TS		Display Connector V1	
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	NC	--	--	24	DATA15-9-8	B16	DATA15-9-8
2	YU	B6	YU	25	DATA14	A17	DATA14
3	XR	A7	XR	26	DATA13	B17	DATA13
4	YD	B7	YD	27	DATA12	A21	DATA12
5	XL	A6	XL	28	DATA11	B21	DATA11
6	3.3V	A3	3.3V	29	DATA10	A22	DATA10
7	3.3V	A3	3.3V	30	DATA15-9-8	B16	DATA15-9-8
8	RESET	A27	RESET	31	DATA15-9-8	B16	DATA15-9-8
9	SPDA	B28	SPDA	32	DATA7-2-1-0	A15	DATA7-2-1-0
10	SPCK	A28	SPCK	33	DATA6	B15	DATA6
11	SPENA	B27	SPENA	34	DATA5	A16	DATA5
12	ENABLE	B13	ENABLE	35	DATA4	B19	DATA4
13	HSYNC	B14	HSYNC	36	DATA3	A20	DATA3
14	VSYNC	A14	VSYNC	37	DATA7-2-1-0	A15	DATA7-2-1-0
15	DCLK	A13	DCLK	38	DATA7-2-1-0	A15	DATA7-2-1-0
16	DATA23-18-17-16	A18	DATA23-18-17-16	39	DATA7-2-1-0	A15	DATA7-2-1-0
17	DATA22	B18	DATA22	40	GND	A2	GND
18	DATA21	A19	DATA21	41	GND	A2	GND
19	DATA20	B22	DATA20	42	NC	--	--
20	DATA19	A23	DATA19	43	BKLTA	From B11 BKLT_PWM through BKL driver.	
21	DATA23-18-17-16	A18	DATA23-18-17-16	44	BKLTK		
22	DATA23-18-17-16	A18	DATA23-18-17-16	45	NC	--	--
23	DATA23-18-17-16	A18	DATA23-18-17-16	--	--	--	--
--	--	--	--	--	--	--	--
--	--	--	--	--	--	B4	5.0V
--	--	--	--	--	--	--	--

Display Connector V1 No Connects (NC):
A32 B32 A31 B31 A30 B30 A29 B29 A26 B26 A25 B25 A24 B24 B23 B20 A12 B12 A11 A10 B10 A9 B9 A8 B8 A5 B5 A4 B3 B2 A1 B1

7. Schematic



8. Bill of Materials

Manufacturer	Part Number	Package	Qty	Value	Designator	Description
TDK	C1608X7R1V105M	0603	1	1uF	C1	Capacitor
Displaytech	SEA8058-45	-	1	-	CN1	Displaytech FFC/FPC ZIF 45 Position
ON Semiconductor	MBR130LSFT1G	SOD-123FL	1	-	D1	Diode
Sumida	CDRH6D28NP-220NC	-	1	22uH 1.2A	L1	Inductor
Vishay	CRCW06031K00FKEA	0603	1	1K	R1	Resistor
Vishay	CRCW060315R0JNEA	0603	1	15	R2	Resistor
Vishay	CRCW0603100KFKEAHP	0603	2	100K	R3, R4	Resistor
ON Semiconductor	CAT4139TD-GT3	TSOT-23-5	1	-	U1	Switch-Mode LED Driver

9. Component Datasheets

Displaytech DT035TFT	Link
Novatek NT39016D TFT LCD Controller/Driver	Link
ON Semiconductor CAT4139 LED Driver	Link
Microchip Explorer 16 Development Board	Link
Microchip Starter Kit I/O Expansion Board	Link
Microchip PIC24FJ256DA210 Development Board	Link