## Other Information

To obtain the most recent and complete documentation for this demonstration board, including:

- User's Guide

- Board Description
- Board Schematics

- Source Code
- Application Examples
- Links to Web Seminars

please refer to the Microchip web site: www.microchip.com/usb

#### **Americas**

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01/02/08



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# **USB PICtail™ Plus Daughter Board**

### Overview

The USB PICtail™ Plus Daughter Board is a USB demonstration board for evaluating Microchip Technology's 16 and 32-bit USB product lines using the Explorer 16 development board.

### **Features**

- Example circuits for USB device, embedded host and On-The-Go (OTG)
- · Both horizontal and vertical PICtail Plus Daughter Board connection interfaces

# Getting Started

To get started, an Explorer 16 Development Board is required. The USB PICtail Plus Daughter Board can be attached to the Explorer 16 Development Board, either through the J5 connector, or by attaching to the edge of the Explorer 16 via the horizontal PICtail Plus Daughter Board connection interface. The USB PICtail Plus Daughter Board is capable of sourcing 100 mA to VBUS when operating as an embedded host or in OTG mode. If the desired application requires more than 100 mA for an embedded host application, then a +5V power supply must be attached to the +5V rail of the Explorer 16. OTG applications are limited to sourcing 100 mA on VBUS.

# **Board Configurations**

There are four jumpers on the board to select the operational mode and optional features.

JP1 connects a resistor divider from the output of the current limiting fuse to the OVERCURRENT pin of the PICtail Plus Daughter Board connection interface. This allows embedded host applications to determine if the attached device has tripped the 500 mA fuse.

Jumpers 2, 3 and 4 are used to select between Device, Embedded Host and OTG modes, respectively. Only one of the three jumpers should be shorted at any point of time. Any other combinations can result in contention in the VBUS power rail.

Application	JP2	JP3	JP4	Current Sourcing Limit
Device	Short	Open	Open	N/A
Embedded Host (5V from Explorer 16 rail – no additional power supply attached)	Open	Short	Open	100 mA <sup>(1)</sup>
Embedded Host (5V from Explorer 16 rail – additional power supply attached to 5V rail)	Open	Short	Open	500 mA
Embedded Host (5V generated from boosting Explorer 16 3.3V rail)	Open	Open	Short	100 mA
OTG (dual role)	Open	Open	Short	100 mA

Note 1: The actual current source limit will vary depending on any additional load from the Explorer 16 or attached circuitry on the 5V rail. Caution should be used when drawing more than this limit of current from the 5V rail as the voltage regulator on the Explorer 16 may become hot and eventually enable its thermal shutdown feature.

The Microchip USB Stack and application examples can be found at www.microchip.com/usb

# Signal Interface

Function	I/O	Pin	Description	
VBUS	ı	65	VBus voltage level input for level detection	
USBID	ı	68	ID detection for OTG applications	
PGOOD	1	66	Power good out of MCP1253	
SHDN	0	67	Shutdown signal for MCP1253	
OVERCURRENT	- 1	43	Overcurrent detection for embedded host applications (optional)	
D+	I/O	27	Data + line	
D-	I/O	29	Data - line	

# **USB PICtail™ Plus Daughter Board**

#### **Board Schematic** RB2/SS1/AN2 (RF2) RB2/SS1/AN2 RF6/SCK1 RF6/SCK1 RF7/SDI1 (RF7/SDI1 RG2/SCL1 RF8/SD01 RF8/SD01 Mini B 12 (RB1/AN1) (RB0/ANO) RB1/AN1 (RBO/ANO 14 (RB4/AN4) (RB3/AN3) (RB3/AN3) 14 (RB4/AN4) C28 √R31 ≨ <sub>150K</sub> RE9/INT2 RE8/INT1 RE9/INT2 18 (RE8/INT1) 2uF卡 RD14/U1CTS RD15/U1RTS) RD14/U1CTS 20 (RD15/U1RTS) +3.3V +3.3V +3.3V +3.3V **⊢** +5∨ +50 +5V +50 +9V +9V +97 +9٧ -{RFO} **USB** Device D+ D-30\_\_\_(RF1) RG9/PMPA2/SS2 RF4/PMPA9/U2RX (RG9/PMPA2/SS2) RF4/PMPA9/U2RX RG6/PMPA5/SCK2 RF5/PMPA8/U2TX) 36 (RF5/PMPA8/U2TX) RG6/PMPA5/SCK2 RG7/PMPA4/SDI2 MICROSMD050F-2 RA3/SDA2 RA3/SDA2 RG8/PMPA3/SD02 √R24 220uF OVERCURRENT 44 (RB9/AN9) 44 (RB9/AN9) OVERCURRENT 46 RA10/PMPA6 (RA9/PMPA7) RA10/PMPA6 (RA9/PMPA7) OVERCURRENT RA14/INT3 RA14/INT3 (RA15/INT4) (RF12/U2CTS RF13/U2RTS **Embedded** RF13/U2RTS R25 +3.3V 54 +3.3V +3.3V +3.3V 2K Host +5V +5V +5V +50 +9∨ 📙 +9V -D+ -D-+97 +9V <del>-</del> P59 P61 PGOOD - USBID - RA1/TCK (VBUS) 66 PGOOD 68 USBID (VBUS) SHDN +<u>3.3</u>V RA1/TCK (RAO/TMS) RAO/TMS **OTG** 72 RA5/TDO RA5/TDO (RA6) (RA6) -(RA7) (RA7) R26 (RB7) (RB7) 10K₹ RB5/AN5 -MCLR (RB5/AN5 78 MCLR 80 (RB11/PMPA12) (RB10/PMPA13) (RB10/PMPA13) 82 RB13/PMPA10 RB12/PMPA11 RB12/PMPA11 82 (RB13/PMPA10) 84 (RB15/PMPA0) RB14/PMPA1 RB14/PMPA1 84 RB15/PMPA0 C20 C21 1.5uF 10uP MCP1253 P92 RD1 RD3/PMPBE -P92 P91 94 RD1 (RD2) 96 RD3/PMPBE 98 RD5/PMPRD 98 RD5/PMPRD (RD4/PMPWR) (RD4/PMPWR) 100 RD7 102 RD9 104 RD11/PMPCS1 106 RD13 100 (RD7) (RD6) (RD6) 102 RD9 104 RD11/PMPCS1 (RD10/PMPCS2) 103 (RD10/PMPCS2) 106 (RD13) (RD12) +3.3V +3.3V 110 (RE1/PMPD1) 110 RE1/PMPD1 (REO/PMPDO) 112 RE3/PMPD3 112 RE3/PMPD3 (RE2/PMPD2) RE2/PMPD2 114 RE5/PMPD5 (RE4/PMPD4) 113 114 RE5/PMPD5 (RE4/PMPD4) 113 116 (RE7/PMPD7) 116 (RE7/PMPD7) (RE6/PMPD6) RE6/PMPD6 118 P118 118 P118 P117 117 Connector Board Edge from Explorer 16 Connector DS39909A