Evaluates: USB2GPIOISO

General Description

The USB2GPIOISO# adapter board, shown in Figure 1, is designed to work with Maxim's USB2GPIO# adapter board to provide galvanic isolation between the 'master' USB adapter board and a 'slave' EV kit or PmodTM board. Four MAX14483 6-channel digital isolators are used to provide 3.75kV_{RMS} isolation.

USB2GPIOISO# block diagram is shown in Figure 2. The two power domains are on the 'master' side (VDD_M and GNDM), and the 'slave' side (VDD_S and GNDS). The two independent power supplies are provided from the master board and the slave board with each VDD_ between 1.71V and 5.5V. The two connectors on the 'master' side are male connectors and plug into the female connectors on the USB2GPIO# adapter, as shown in Figure 3.

USB2GPIOISO# is also designed to work with legacy USB2PMB1# and USM2PMB2# adapters; connectors XMA and XSA are 12-pin connectors which support either SPI with 4 GPIO pins and are fully compatible with previous adapters and low-pin count EV kit or Pmod boards. These connectors are controlled from the Munich GUI or relevant EV kit GUIs. Note that the isolator ICs have unidirectional channels (in or out). Full bidirectional I²C communication is not supported by this board.

The other connectors, XMB and XSB, are 20-pin connectors supporting extra GPIO connections. These 20-pin connectors are NOT controlled by the Munich GUI but are for use with future EV kits and will be controlled by the relevant EV kit GUIs.

USB2GPIOISO# adapter board can be used to enable isolated USB-to-SPI/GPIO interface for any Pmod-compatible plug-in peripheral modules such as the Maxim MAX14001PMB, and MAXREFDES12-Corona reference design.

Features

- 24 Isolated Channels with 3.75kV_{RMS} Robust Galvanic Isolation
- Low Propagation Delay 10ns, Typical
- Flexible System Design with Wide 1.71V to 5.5V Voltage Range on Each Side
- Small PCB area
- Pmod-Compatible Form Factor

Ordering Information appears at end of data sheet.



Figure 1. USB2GPIOISO# Board

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Detailed Description of Hardware

Figure 2 shows the USB2GPIOISO# connector block diagram (taken from the schematic). Note that the 'arrow' on each connector indicates the flow of data. For example, pin 1 on XMA shows that the signal (CS_AM) comes from the master, passes through the male connector, and onto USB2GPIOISO# board to the isolator channel for CS. Then, on the slave side of the isolator, this signal routes to pin 1 on XSA connector (CS_AS) and the 'arrow' shows the direction is from the isolator, through the female connector and to the slave board.

The two power domains are on the 'master' side (VDD_M and GNDM), and the 'slave' side (VDD_S and GNDS). The two independent power supplies are provided from the master board and the slave board with each VDD_between 1.71V and 5.5V. The two connectors on the 'master' side are male connectors and plug into the female connectors on the USB2GPIO# adapter, as shown in Figure 3.

MAX14483 has unidirectional data channels and USB2GPIOISO# is configured in a 14/10 mode rather than a bidirectional I/O mode, meaning there are 14 channels communicating from the master to the slave, and 10 channels communicating from the slave to the master. Refer to the <u>USB2GPIOISO# Adapter Board Schematic</u> for each channel's communication direction. The digital channels on the slave Pmods or EV kits should follow the same communication directions as on the USB2GPIOISO# board. The Munich GUI and the EV kit GUI automatically configure the channel directions based on this and no jumpers are required for configuration.



Figure 2. USB2GPIOISO# Subsystem Block Diagram



Figure 3. USB2GPIOISO# Board Connected with USB2GPIO# Adapter

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Master and Slave Connectors

The USB2GPIOISO# is designed to receive power (VDD_M, GNDM and VDD_S, GNDS) from external boards through the connectors XMA, XMB, XSA and XSB. VDD_S is defined by the type of board connected to the slave connectors. When the user selects certain tab in the Munich GUI, VDD_M is automatically set to certain level, either 1.8V, 2.5V, 3.3V, or 5.0V. Note that USB2GPIOISO# does NOT provide power using VDD_S to the Pmod or EV kit board, but instead expects to receive power from those boards. Test points VDD_S and GND are provided to allow powering the USB2GPIOISO# slave side and Pmod or EV kit boards with external power supply.

Figure 4 shows the top view of the USB2GPIOISO# board, with the different connectors and the pin 1 identifiers. Note there are no jumpers or shunts on this board, all configuration is done under software control. Care should be taken to only insert the boards in the correct way as the connectors are not keyed to avoid false insertions. Reversing the connections (by turning the Pmod board upside down for example) may result in damage to the USB2GPIOISO# Pmod or EV kit board. Two LEDs are included to indicate if VDD_M and VDD_S are powered.



Figure 4. USB2GPIOISO# Orientation and Pinouts

Ordering Information

PART	ТҮРЕ
USB2GPIOISO#	Adapter Board

#Denotes RoHS compliant

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Evaluates: USB2GPIOISO

USB2GPIOISO# Adapter Board Bill of Materials

C1, C3, C5, C7, C10, - 8 CL2:B106KCQNNN ELECTRONICS 10UF 1 C2, C4, C6, C3, C9, - 8 C2.188R71H104KA12; GCM188R71H104K; 10UF 2 C11, C13, C15 - 8 GCJ188R71H104K080AA 5001 KEYSTONE 10UF 2 C11, C13, C15 - 8 CGJ188R71H104K080AA 5001 KEYSTONE NIA 2 C11, C13, C15 - 8 CG3022X7R1H104K080AA 5001 KEYSTONE NIA 3 GND - 1 TDPW040210K0FK; RC0402FR-0710K VAGEO PHICOMP 10K 5 FS - 1 TDPW04021K00BE VISHAY NIA 5 FS - 1 TDPW04021K00BE VISHAY NIA 6 FS - 1 TDW04021K00BE VISHAY NISHAY 4 7 U1-U1 - 1 TDW04021K00BE VISHAY A 4 7 U1-U1 - 2 RCW04021	ITEM	REF DES	DNI/ DNP	ατγ	QTY MFG PART #	MANUFACTURER	VALUE	DESCRIPTION
GCJ188R71H104KA12; GCM188R71H104K, MURATA; TDK 0.1UF 1 CGA3E2X7R1H104K080AA 5001 KEYSTONE N/A 4 CCA3E2X1R1H104K080AA 5001 KEYSTONE N/A 1 TNPW040210K0FK; RC0402FR-0710K VISHAY DALE; N/A 2 CRCW0603470FFK; ERJ-3EKF4700 VISHAY DALE 1/K 4 MAX14483AAP+ MAXIM + 2 SMLP12BC7T MAXIM + 1 MAX14483AAP+ MAXIM + 2 SMLP12BC7T 5000 KEYSTONE 88021-212HF 1 68021-212HF AMPHENOLICC 68021-212HF 1 68021-22HF AMPHENOLICC 68021-220HF 1 B8021-220HF ELECTRONICS RC 1 PPPC062LJBN-RC CORP RC 1 USB2GFI0_ISO_APPS_B MAXIM PCB 36 USB2GFI0_ISO_APPS_B MAXIM RC 1 USB2GFI0_ISO_APPS_B MAXIM PCB		C1, C3, C5, C7, C10, 1 C12, C14, C16		∞	QNNN	lics	10UF	CAPACITOR; SMT (0805); CERAMIC CHIP; 10UF; 16V; TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R
1 5001 KEYSTONE NVA 4 CRCW040210K0FK; RC0402FR-0710K VISHAY DALE; 10K 1 TNPW04021K00BE VISHAY DALE; 10K 2 CRCW0603470FRK; ERJ-3EKF4700 VISHAY DALE 17 4 MAX14483AAP+ MAXIM 470 2 SMLP12BC7T VISHAY DALE 17 3 SMLP12BC7T AAXIM 470 4 MAX14483AAP+ MAXIM 470 5 SMLP12BC7T B8021-221HE 80021-212HE 68021-220HLF FOOM N/A 470 1 68021-220HLF AMPHEONICT 68021-220HE 1 68021-220HLF CORP N/A 1 B8021-220HLF CORP RC 1 DFPC062LJBN-RC CORP RC 1 USB2GFPIO_ISO_APPS_B RC RC 36 USB2GFPIO_ISO_APPS_B MAXIM PCB 1 USB2GFPIO_ISO_APPS_B RC RC 36 ND> DO		C2, C4, C6, C8, C9, 2 C11, C13, C15		8	M188R71H104K;			TOL=10%; TG=-55 DEGC TO +125 DEGC; TC=X7R; AUTO
4 CRCW040210K0FK; RC0402FR-0710K VISHAY DALE; YAGE O PHICOMP 10K 1 TNPW04021K00BE VISHAY 11K 2 CRCW0603470RFK; ERJ-3EKF4700 VISHAY 470 4 MAX14483AAP+ MAXIM 470 2 SMLP12BC7T VISHAY OND 470 1 VISHAY NAXIM 4 1 68021-21HF ROHM SMLP12BC7T 1 68021-220HLF FCI CONNECT 68021-212HLF 1 68021-220HLF FCI CONNECT 68021-220HLF 1 68021-220HLF FCI CONNECT 68021-220HLF 1 B0201-220HLF FCI CONNECT 68021-220HLF 1 PPPC062LJBN-RC CORP RC 1 USB2GFIO_ISO_APPS_B MAXIM PCB 36 USB2GFIO_ISO_APPS_B MAXIM PCB		3 GND	,	~	5001		N/A	BOARD HOLE=0.04IN; BLACK; PHOSPHOR BRONZE
1 TNPW04021K00BE VISHAY DALE 2 CRCW0603470FK; ERJ-3EKF4700 DALEIPANASONIC 4 MAX14483AAP+ MAXIM 2 SMLP12BC7T ROHM 1 E0021-212HLF ROHM 1 68021-212HLF AMPHENOLICC 1 68021-220HLF AMPHENOLICC 1 B021-220HLF CONNECT 1 B021-220HLF CONNECT 1 B021-220HLF CONNECT 1 DS226PI0_ISO_APPS_B ELECTRONICS 1 USB2GPI0_ISO_APPS_B MAXIM 36 MAXIM CORP COUTI : DNP> DO NOT PROCURE AMATIM		4 R1-R4		4	CRCW040210K0FK; RC0402FR-0710K			RESISTOR; 0402; 10K; 1%; 100PPM; 0.0625W; THICK FILM
2 CRCW0603470RFK; ERJ-3EKF4700 DALE/PANASONIC 4 MAX14483AAP+ MAXIM 2 SMLP12BC7T MAXIM 1 B6021-212HLF ROHM 1 68021-212HLF FCI CONNECT 1 68021-212HLF AMPHENOL ICC 1 B8021-220HLF AMPHENOL ICC 1 B8021-220HLF CORP. 1 PPPC062LJBN-RC CORP. 1 USB2GPIO_ISO_APPS_B MAXIM 36 CORP CORP. A0011; DNP> DO NOT PROCURE ACON		5 R5	,	-			1K	FILM
4 MAX14483AAP+ MAXIM 2 SMLP12BC7T ROHM 1 68021-221HLF ROHNECT 1 68021-220HLF ARDHENOLICC 1 B8021-220HLF ARDHENOLICC 1 PPPC062LJBN-RC CORP. 1 PPPC062LJBN-RC CORP. 1 USB2GPIO_ISO_APPS_B MAXIM 36 CORP_ CORP 40UT1; DNP> DO NOT PROCURE ANDH->		6 RP1, RP2	,	2	CRCW0603470RFK; ERJ-3EKF4700		470	RESISTOR, 0603, 470 OHM, 1%, 100PPM, 0.10W, THICK FILM
2 SMLP12BC7T ROHM 1 60021-212HLF 5000 KEYSTONE 1 68021-220HLF AMPHENOLICC 1 PPPC062LJBN-RC CORP. 1 PPPC062LJBN-RC ELECTRONICS 1 USB2GPI0_ISO_APPS_B MAXIM 36 KOUT1 ; DNP> DO NOT PROCURE AND> DO NOT PROCURE		7 U1-U4		4	MAX14483AAP+	MAXIM	+	POWER; 3.75KVRMS; SPI DIGITAL ISOLATOR;
E Direct (2001) S000 KEYTONE 1 68021-212HLF 5000 KEYTONE 1 68021-220HLF AMPHENOL ICC 1 68021-220HLF AMPHENOL ICC 1 68021-220HLF ELECTRONICS 1 PPPC062LJBN-RC CORP. 1 PPTC102LJBN-RC CORP. 3 MAXIM MAXIM 36 MOUTI : DNP> DO NOT PROCURE MAXIM				ç	SMI D12RC7T	MHOC		DIODE; LED; SML-P1 SERIES; PICOLED; BLUE; SMT
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1 68021-220HLF AMPHENOL ICC 1 PPPC062LJBN-RC ELECTRONICS 1 PPTC102LJBN-RC CORP. 1 USB2GPI0_ISO_APPS_B MAXIM 36 MAXIM KOUT1 ; DNP> D0 NOT PROCURE		10 XMA	,	· -		CT	68021-212HLF	BREAKAWAY HEADER: RIGHT ANGLE: 12PINS:
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1 PPTC102LJBN-RC ELECTRONICS PPTC102LJBN- 1 USB2GPI0_ISO_APPS_B MAXIM PCB 36 MAXIM PCB A0UT) : DNP> D0 NOT PROCURE MAXIM	-	12 XSA		-	PPPC062LJBN-RC		PPPC062LJBN- RC	CONNECTOR; FEMALE; THROUGH HOLE; 0.1IN CC; HEADER; 2 ROW; RIGHT ANGLE; 12PINS
1 USB2GPIO_ISO_APPS_B 36 MAXIM PCB 36 MAXIM PCB 36 MAXIM PCB 80 MAXIM PCB 80 MAXIM PCB	-	13 XSB		Ł			PPTC102LJBN- RC	CONNECTOR; FEMALE; THROUGH HOLE; BREAKAWAY HEADER; RIGHT ANGLE; 20PINS
		14 PCB		~			PCB	PCB:USB2GPI0_IS0_APPS_B
	TOTAI			36				
	NOTE	: DNI> DO NOT INSTAL	.L(PAC		T); DNP> DO NOT PROCURE			

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USB2GPIOISO# Adapter Board Schematic

Evaluates: USB2GPIOISO



USB2GPIOISO# Adapter Board PCB Layout Diagrams





USB2GPIOISO# Adapter Board—Top



USB2GPIOISO# Adapter Board—Internal 2



USB2GPIOISO# Adapter Board—Internal 3

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USB2GPIOISO# Adapter Board PCB Layout Diagrams (continued)

USB2GPIOISO# Adapter Board—Bottom Silkscreen



USB2GPIOISO# Adapter Board—Bottom

Evaluates: USB2GPIOISO

Revision History

REVISION	REVISION	DESCRIPTION	PAGES
NUMBER	DATE		CHANGED
0	04/18	Initial release	—

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