ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *EKF CB3-1-TONE* at our website: *Click HERE*

Technical Information

CB3-TONE • *CompactPCI®*

USB 3.0 SuperSpeed Controller

Document No. 6860 • Ed. 4 • 31 August 2015



CB3-TONE

Contents

About this Manual . . . 3
Edition History . . . 3
Related Documents . . . 4
Nomenclature . . . 4
Trade Marks . . . 4
Legal Disclaimer - Liability Exclusion . . . 4
Standards . . . 5
Feature Summary . . . 6
Short Description . . . 7
Theory of Operation . . . 8
Hardware . . . 8
Performance Considerations . . . 8
Block Diagram . . . 9
Front Panel . . . 10
System Integration . . . 11

Installing and Replacing Components . . . 12
Before You Begin . . . 12
Warnings . . . 12
Caution . . . 12
Installing the Board Assembly . . . 13
Removing the Board Assembly . . . 14
EMC Recommendations . . . 16

Technical Reference - Connectors . . . 17
USB 3.0 Connectors . . . 17
J1 Backplane Connector . . . 18

Drivers . . . 20

Schematics . . . 20

About this Manual

This manual is a short form description of the technical aspects of the CB3-TONE, required for installation and system integration. It is intended for the advanced user only.

Edition History

Ed.	Contents/*Changes*	Author	Date
1	Technical Information CB3-TONE, english, preliminary edition Text #6860, File: cb3_ti.wpd	jj	11 October 2012
2	Added photos	jj	15 February 2013
3	Augmented table 'Feature Summary' (reference to PXI)	jj	11 April 2014
4	Revision 1 PCB - added illustration front panel (indicator LEDs), added table 'Similar Products', added photo of sample hybrid system	jj	31 August 2015

Related Documents

Related Information	
CB3-TONE Home	www.ekf.com/c/cusb/cb3/cb3.html

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

- CompactPCI, CompactPCI PlusIO, CompactPCI Serial: ® PICMG
- Windows: ® Microsoft
- EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This document has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

Standards

Reference Documents		
Term	Document	Origin
CompactPCI®	CompactPCI Specification, PICMG® 2.0 R3.0, Oct. 1, 1999	www.picmg.org
CompactPCI® PlusIO	CompactPCI PlusIO Specification, PICMG® 2.30 R1.0, November 11, 2009	www.picmg.org
CompactPCI® Serial	CompactPCI Serial Specification, PICMG® CPCI-S.0 R1.0, March 2, 2011	www.picmg.org
PCI Express®	PCI Express® Base Specification 3.0	www.pcisig.com
PCI Local Bus	PCI 2.2/2.3/3.0 Standards PCI SIG	www.pcisig.com
PXI®	PCI eXtensions for Instrumentation PXI Hardware Specification Rev. 2.2	www.pxisa.org/
USB	Universal Serial Bus Specification 3.0 & 2.0	www.usb.org
xHCI	eXtensible Host Controller Interface for Universal Serial Bus (xHCI) Rev. 1.0 2010-05-21	www.intel.com

Technical Features

Feature Summary

Feature Summary
▸ *CompactPCI*® Peripheral Card 3U 4HP (single size Eurocard)
▸ Backplane connector J1 32-bit PCI 33/66MHz, +5V or +3.3V V_{IO} (J1 w/o key)
▸ Internally based on PCI Express® technology (PCI to PCIe bridge)
▸ +5V only design
▸ Ready for usage within PXI® systems
▸ PCIe to quad-port USB 3.0 controller
▸ USB 3.0 xHCI (eXtensible host controller interface) SuperSpeed
▸ WHQL drivers available
▸ USB 2.0 high-speed, full-speed, low-speed supported
▸ 4 x front panel USB 3.0 type A receptacles for attachment of external devices
▸ +5V/1.5A USB power switches
▸ Designed & manufactured in Germany
▸ ISO 9001 certified quality management
▸ Long term availability
▸ Coating, sealing, underfilling on request
▸ RoHS compliant
▸ Operating temperature: 0°C to +70°C • industrial temperature range on request
▸ Storage temperature: -40°C to +85°C, max. gradient 5°C/min
▸ Humidity 5% ... 95% RH non condensing
▸ Altitude -300m ... +3000m
▸ Shock 15g 0.33ms, 6g 6ms
▸ Vibration 1g 5-2000Hz
▸ MTBF tbd
▸ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)



Short Description

The CB3-TONE is a CompacPCI® peripheral card, equipped with a PCI Express® to USB 3.0 quad-port controller. Four USB 3.0 receptacles are available via the front panel for attachment of external USB 3.0 and USB 2.0 compliant devices. Electronic power switches are provided, for up to +5V/1.5A load at any USB connector.

The USB controller supports all data transfer protocols on any connector, SuperSpeed (USB 3.0 xHCI) as well as high-speed, full-speed, and low-speed. The CB3-TONE is provided with a PCI® to PCI Express® bridge, as interface between the USB controller and the *CompacPCI*® backplane.



Theory of Operation

Hardware

The CB3-TONE is equipped with the TI TUSB7340 single chip PCI Express® to USB 3.0 bridge. The xHCI (SuperSpeed) compliant host controller supports up to four downstream ports. Each downstream port may be independently enabled and has individual power control and overcurrent detection.

SuperSpeed USB 3.0 offers ten times the data speed of USB 2.0 (5 Gbit/s compared to 480 Mbit/s). The bandwidth of the xHCI controller is shared over all TUSB7340 downstream ports. Texas Instruments provides xHCI compliant Windows® drivers for download at www.ti.com/product/tusb7340#toolssoftware.

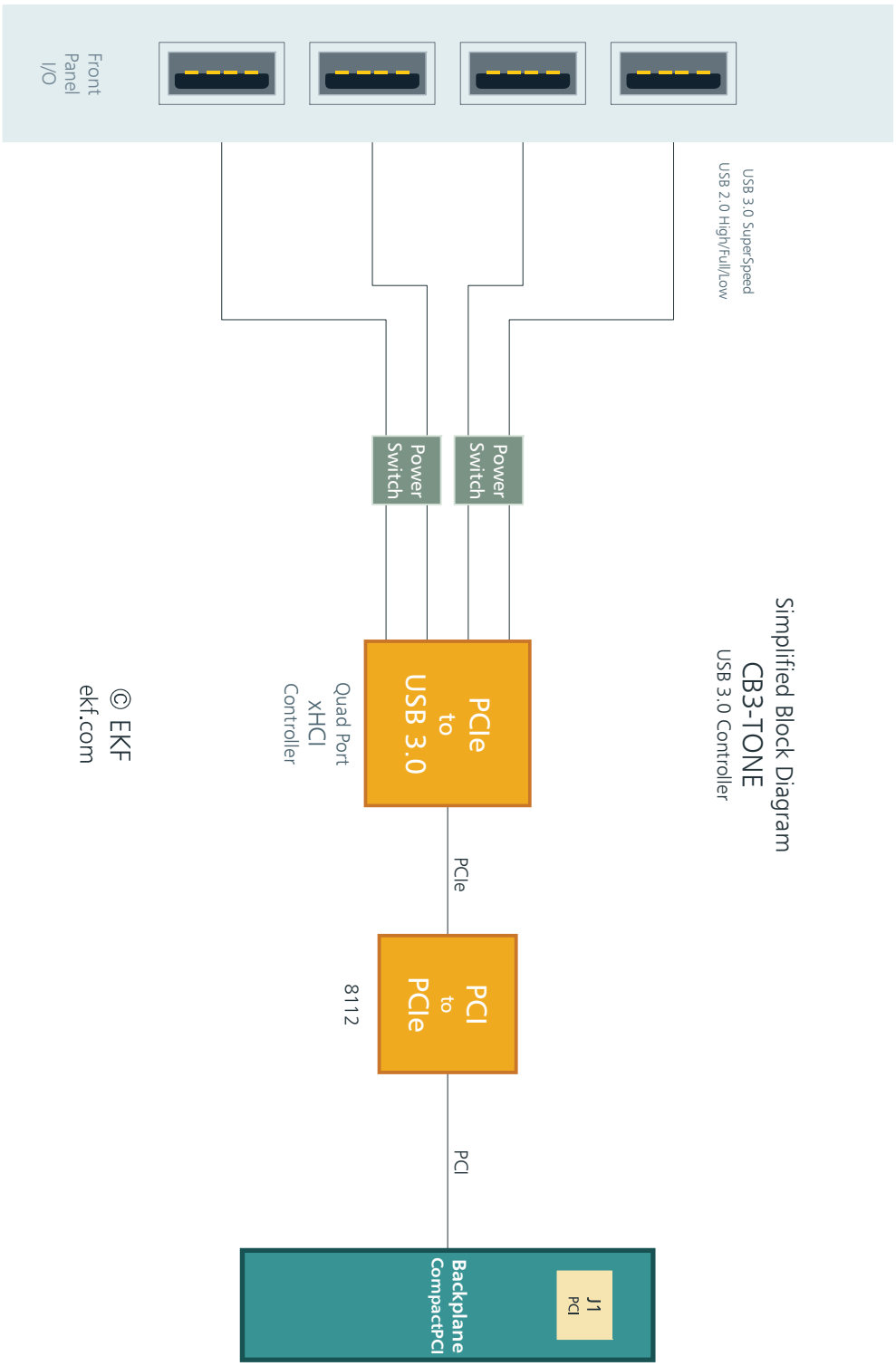
Performance Considerations

As with any *CompactPCI® Classic* peripheral card, the backplane bandwidth is the limiting parameter if performance is discussed. Up to ~2Gbps data throughput is available across a 32-bit CompactPCI® backplane @66MHz. The data rate of a SuperSpeed USB port however is rated at 5Gbps. As a result, the maximum performance which can be achieved with the CB3-TONE is significantly higher than with previous USB 2.0 solutions, but considerably below the USB 3.0 maximum.

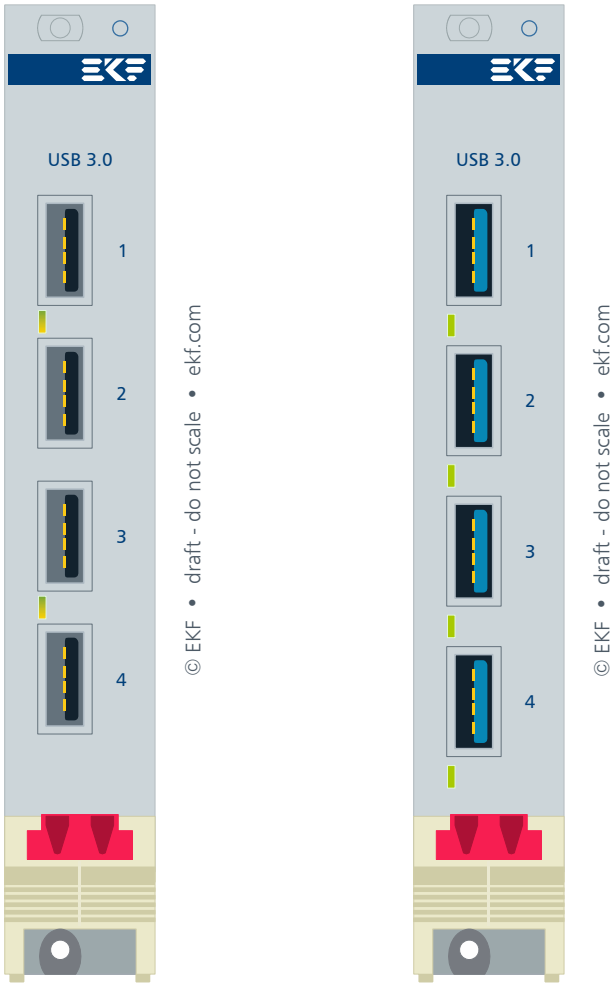
As an alternate for applications which require optimum performance, you might consider a similar peripheral card based on *CompactPCI® Serial* (www.ekf.com/s/serial.html).

Beyond the bandwidth discussion, the CB3-TONE is a reliable and economic USB 3.0 controller card, which can be simply integrated in any industrial CompactPCI® system.

Block Diagram



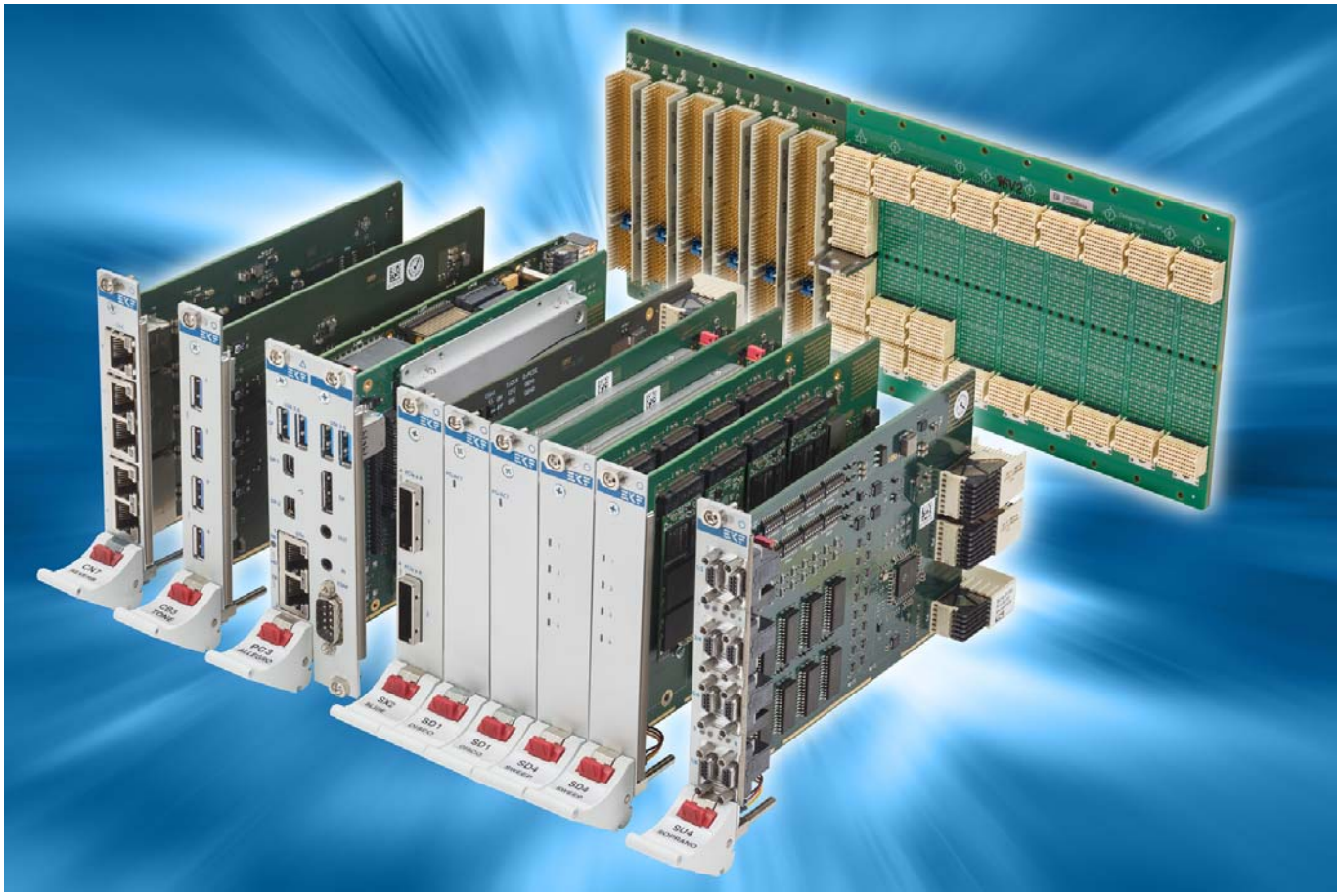
Front Panel



CB3-TONE CB3-TONE R.1

Two bicolour LED indicators (PCB Rev. 0) or 4 green LEDs (Rev. 1 PCB) are provided as USB V_{BUS} (+5V) indicator, associated to the particular receptacles. Since V_{BUS} is controlled by the USB driver software, the LEDs are lit when a connector is ready for use. Vice versa, a LED is off if the respective USB port is not initialized, intentionally switched off, or a short-circuit situation is detected, presented by the connected device.

System Integration



CB3-TONE (2nd from left) in a Sample Hybrid System

Similar Products	
SB3-TONE CompactPCI® Serial USB Controller	www.ekf.com/s/sb3/sb3.html
EB3-TONE CompactPCI® Express USB Controller	www.ekf.com/e/eb3/eb3.html

Installing and Replacing Components

Before You Begin

Warnings

The procedures in this chapter assume familiarity with the general terminology associated with industrial electronics and with safety practices and regulatory compliance required for using and modifying electronic equipment. Disconnect the system from its power source and from any telecommunication links, networks or modems before performing any of the procedures described in this chapter. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage. Some parts of the system can continue to operate even though the power switch is in its off state.



Caution

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis or board front panel. Store the board only in its original ESD protected packaging. Retain the original packaging (antistatic bag and antistatic box) in case of returning the board to EKF for repair.



Installing the Board Assembly

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system



- Remove the board packaging, be sure to touch the board only at the front panel
- Identify the related CompactPCI slot (peripheral slot for I/O boards, system slot for CPU boards, with the system slot typically most right or most left to the backplane)
- Insert card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- A card with onboard connectors requires attachment of associated cabling now
- Lock the ejector lever, fix screws at the front panel (top/bottom)
- Retain original packaging in case of return

Removing the Board Assembly

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:



- Switch off the system, remove the AC power cord
- Attach your antistatic wrist strap to a metallic part of the system
- Identify the board, be sure to touch the board only at the front panel
- unfasten both front panel screws (top/bottom), unlock the ejector lever
- Remove any onboard cabling assembly
- Activate the ejector lever
- Remove the card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)
- Store board in the original packaging, do not touch any components, hold the board at the front panel only

Warning



Do not expose the card to fire. Battery cells and other components could explode and cause personal injury.

EMC Recommendations

CE

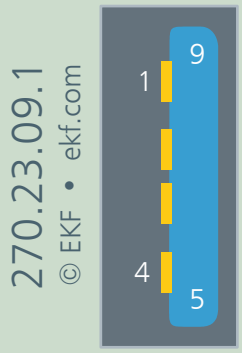
In order to comply with the CE regulations for EMC, it is mandatory to observe the following rules:

- The chassis or rack including other boards in use must comply entirely with CE
- Close all board slots not in use with a blind front panel
- Front panels must be fastened by built-in screws
- Cover any unused front panel mounted connector with a shielding cap
- External communications cable assemblies must be shielded (shield connected only at one end of the cable)
- Use ferrite beads for cabling wherever appropriate
- Some connectors may require additional isolating parts

Technical Reference - Connectors

USB 3.0 Connectors

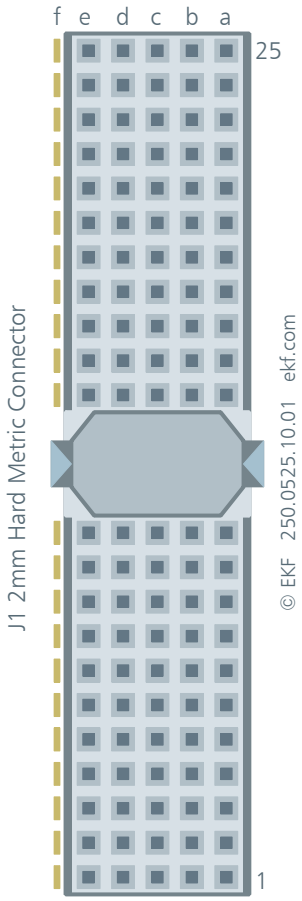
The CB3-TONE is equipped with four front panel receptacles for USB 3.0 or USB 2.0 type A cable connectors (USB root hub). When connected to USB 2.0 compliant devices, only the classic 4 contacts (data pair, +5V and GND) are in use. USB 3.0 devices in addition communicate via the SuperSpeed differential transmit and receive signal pairs, available across another 5 contact pins.

USB 3.0 Receptacles		
	1	V_{BUS} +5V 1.5Amax
	2	USB D-
	3	USB D+
	4	GND
	5	SS RX-
	6	SS RX+
	7	GND
	8	SS TX-
	9	SS TX+

Each connector provides +5V (V_{BUS}) for powering external devices. Electronic switches limit the maximum output current of each individual USB connector to a safe level. The V_{BUS} power has been derived from the CompactPCI® +5V power rail via the backplane connector J1 and must be supplied by the system power supply.

J1 Backplane Connector

A hard metric J1/P1 backplane connector is specified as by the PICMG® CompactPCI 2.0. A mechanical key defines the V_{IO} Voltage. The CE3-GIG is suitable for either +5V and +3.3V V_{IO}, which results in a 'no key' J1 connector. J1 conveys prominently the 32-bit PCI parallel bus.



J1	A	B	C	D	E
25	5V	*REQ64#*	*ENUM#*	3.3V	5V
24	AD1	5V	V(I/O)	AD0	*ACK64#*
23	3.3V	AD4	AD3	5V	AD2
22	AD7	GND	3.3V	AD6	AD5
21	3.3V	AD9	AD8	M66EN	C/BE0#
20	AD12	GND	V(I/O)	AD11	AD10
19	3.3V	AD15	AD14	GND	AD13
18	SERR#	GND	3.3V	PAR	C/BE1#
17	3.3V	*IPMB SCL*	*IPMB SDA*	GND	PERR#
16	DEVSEL#	GND	V(I/O)	STOP#	LOCK#
15	3.3V	FRAME#	IRDY#	*BD_SEL#*	TRDY#
14	KEY AREA - No Key				
13					
12					
11	AD18	AD17	AD16	GND	C/BE2#
10	AD21	GND	3.3V	AD20	AD19
9	C/BE3#	GND	AD23	GND	AD22
8	AD26	GND	V(I/O)	AD25	AD24
7	AD30	AD29	AD28	GND	AD27
6	REQ#	GND	3.3V	CLK	AD31
5	*BRSVP1A5*	*BRSVP1B5*	RST#	GND	GNT#
4	*IPMB PWR*	*HEALTHY#*	V(I/O)	*INTP*	*INTS*
3	INTA#	INTB#	INTC#	5V	INTD#
2	*TCK* [5)]	5V	*TMS*	*TDO 1)*	*TDI 1)*
1	5V	*-12V*	*TRST#*	*+12V*	5V

1) TDO - TDI internally connected

The CB3-TONE been designed for +5V only operation. Neither the +3.3V power pins nor +12V/-12V are in use.

Drivers

For legacy operating systems such as Windows® 7 drivers must be installed first before taking the advantage of SuperSpeed USB. Texas Instruments provides xHCI compliant Windows® drivers for download at

www.ti.com/product/tusb7340#toolssoftware

The CB3-TONE does not support booting from an attached USB device. No TUSB7340 expansion BIOS ROM is provided on-board. EKF offers boot code as part of the CPU UEFI firmware on request.

Schematics

Complete circuit diagrams for this product are available for customers on request. Signing of a non-disclosure agreement would be needed. Please contact sales@ekf.de for details.

EKF reserves the right to refuse distribution of confidential information material for any reason that EKF may consider substantial.

Industrial Computers Made in Germany

boards. systems. solutions.

EKF Elektronik GmbH
Philipp-Reis-Str. 4 (Haus 1)
Lilienthalstr. 2 (Haus 2)
59065 HAMM
Germany





Phone +49 (0)2381/6890-0
Fax +49 (0)2381/6890-90
Internet www.ekf.com
E-Mail sales@ekf.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP