

UPD1001

Programmable USB Power Delivery Controller

Highlights

- Integrated USB Power Delivery (PD) PHY
- Support for Power Delivery Message Protocol
- Integrated Voltage and Current ADC Inputs
- · Configuration Profile Selection
- · On-chip Microcontroller
- · SPI Interface
- Commercial, Industrial, and Automotive Grade Temperature Support
- Available in 28-TSSOP and 32-SQFN Packages

Target Applications

- · AC Adapters & Chargers
 - Type-A
 - Type-B
 - Micro-A
 - Micro-B
 - Captive cable

Key Benefits

- Integrated USB Power Delivery (PD) PHY
 - Integrated receive termination
 - Requires minimal external components
- Support for Power Delivery Message Protocol
 - Message Generation/Consumption
 - Retry Generation
 - Error Handling
 - State Behavior
- Cable Detect Logic
 - Cable attachment type
- CFG_SEL pins allow selection of multiple profiles
 - Provider
 - Consumer/Provider
- Integrated Voltage (VMON) and Current (IMON) ADC Inputs
- Dead Battery Support
- · On-chip Microcontroller
 - Manages I/Os and other signals
 - Implements power delivery policy engine and device policy manager
- Configuration Programming via OTP, or Vendor Defined Messaging
- Supports Low Power Modes
- Serial Peripheral Interface (SPI) Bus
- Internal 3.3 V and 1.8 V Voltage Regulators
- Integrated Oscillator Reduces BOM Costs
- Package
 - 28-pin TSSOP (9.7 x 6.1 mm)
 - 32-pin SQFN (5 x 5 mm)
- Environmental
 - Commercial temperature range (0°C to +70°C)
 - Industrial temperature range (-40°C to +85°C)
 - Automotive temperature range (-40°C to +105°C)

TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Microchip products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at **docerrors@microchip.com**. We welcome your feedback.

Most Current Documentation

To obtain the most up-to-date version of this documentation, please register at our Worldwide Web site at:

http://www.microchip.com

You can determine the version of a data sheet by examining its literature number found on the bottom outside corner of any page. The last character of the literature number is the version number, (e.g., DS30000000A is version A of document DS30000000).

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Microchip's Worldwide Web site; http://www.microchip.com
- · Your local Microchip sales office (see last page)

When contacting a sales office, please specify which device, revision of silicon and data sheet (include -literature number) you are using.

Customer Notification System

Register on our web site at www.microchip.com to receive the most current information on all of our products.

1.0 INTRODUCTION

1.1 General Description

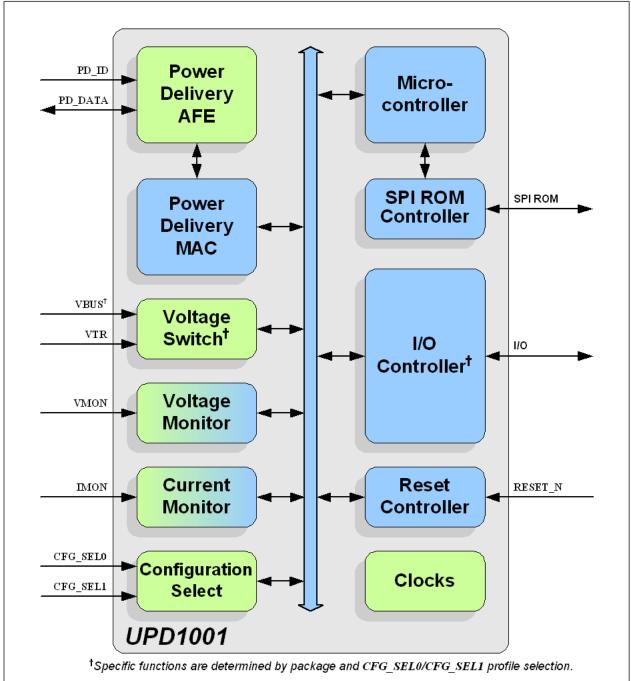
The UPD1001 is a programmable USB Power Delivery (PD) controller designed to adhere to the *USB Power Delivery Specification*. USB Power Delivery allows a host (or device) to provide or consume up to 5 Amps and/or up to 20 Volts of power from a USB PD capable partner device on the other end of the USB cable. USB PD capable standard and custom cables/connectors are supported, which in most cases are backward compatible with standard USB connections.

The UPD1001 provides a complete USB Power Delivery solution for all charger and adapter solutions. The functionality of the UPD1001 is selected via two configuration selection pins, CFG_SEL0 and CFG_SEL1, which can be used to select unique PD and system configurations. Designing the UPD1001 into a system can be as simple as selecting a configuration, with no external EEPROM required. Advanced programmability options exist with an external EEPROM installed.

The integrated USB Power Delivery MAC and PHY support provider and consumer operation via the PD communication protocol, as specified in Revision 1.0 (Version 1.2) of the *USB Power Delivery Specification*. Monitoring of VBUS and battery charging is accomplished via the integrated voltage and current ADC inputs. The PHY supports cable ID detection/identification and loopback modes. The PHY includes a 24MHz FSK modulator/demodulator and provides integrated terminations. The USB PD MAC supports both USB PD insertion detection (cold socket) and dead battery cases.

The on-chip microcontroller manages the IOs and implements the power delivery local policy engine and device manager. The SPI ROM controller is used by the microcontroller for optional external code execution from ROM. A One Time Programmable (OTP) ROM is integrated in the UPD1001. Integrated 3.3 V and 1.8 V regulators allow device operation from a single power supply. The UPD1001 is available in commercial (0°C to +70°C), industrial (-40°C to +85°C), and automotive (-40°C to +105°C) temperature ranges. An internal block diagram of the UPD1001 is shown in Figure 1-1.

FIGURE 1-1: INTERNAL BLOCK DIAGRAM



2.0 PACKAGE OUTLINES

2.1 28-TSSOP

FIGURE 2-1: 28-TSSOP PACKAGE (DRAWING)

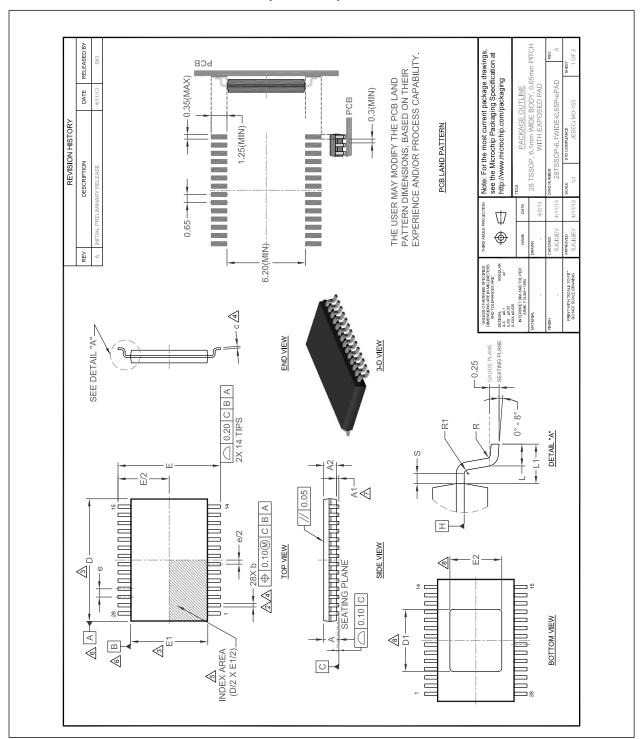


FIGURE 2-2: 28-TSSOP PACKAGE (DIMENSIONS)

	REVISION HISTORY		
REV	DESCRIPTION	DATE	RELEASED BY
<	INITIAL PRELIMINARY RELEASE	4/11/13	SKI

COMMON DIMENSIONS

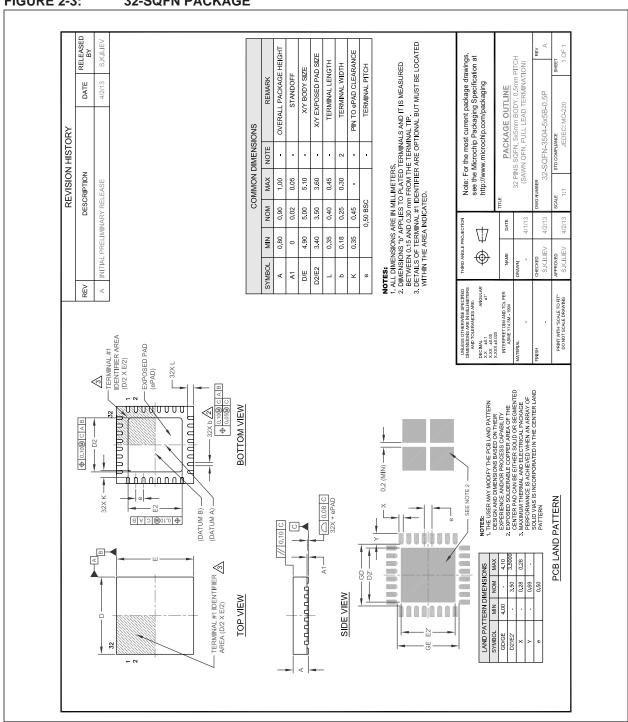
REMARK	OVERALL PACKAGE HEIGHT	STANDOFF	BODY THICKNESS	X BODY SIZE	X EXPOSED PAD	LEAD SPAN	Y BODY SIZE	Y EXPOSED PAD	LEAD FOOT LENGTH	LEAD LENGTH	LEAD WIDTH	LEAD FOOT THICKNESS	LEAD PITCH	LEAD SHOULDER	LEAD FOOT RADIUS	LEAD SHOULDER RADIUS
NOTE	-	2	-	3		1	3				2,4	4	-	1	1	
MAX	1.20	0.15	1.05	9.80	5.00		6.20	4.20	0.75		0:30	0.20				
NOM	1	1	1.00	9.70	4.90	8.10 BSC	6.10	4.10	09.0	1.00 REF	ı	1	0.65 BSC	1	1	
MIN	1	00.00	08.0	9.60	4.80		9.00	4.00	0.45		0.19	60.0		0.20	60.0	60.0
SYMBOL	∢	14	A2	۵	10	ш	E1	E2	٦	L1	q	ပ	Ф	S	œ	LZ

- 1. ALL DIMENSIONS ARE IN MILLIMETERS (ANGLES IN DEGREES). 2. DIMENSION "b" DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR
 - PROTRUSION SHALL BE 0.08 MM TOTAL IN EXCESS OF THE "b" DIMENSION AT MMC. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT MINIMUM SPACE BETWEEN PROTRUSION AND ADJACENT LEAD IS 0.07 MM. DIMENSION "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE
- BURRS. MAXIMUM MOLD FLASH, PROTRUSIONS OR GATE BURRS IS 0.15 MM PER SIDE. DIMENSION "E1" DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. DIMENSIONS ARE DETERMINED AT DATUM PLANE "H". "b" & "c" APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 TO 0.25 MM MAXIMUM INTERLEAD FLASH OR PROTRUSION IS 0.25 MM PER SIDE. "D" & "E1"
 - DETAILS OF THE PIN 1 IDENTIFIER ARE OPTIONAL, BUT MUST BE LOCATED FROM THE LEAD TIP. 5
 - WITHIN THE ZONE INDICATED.
- DATUMS "A" AND "B" TO BE DETERMINED AT DATUM PLANE "H". "A1" IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT ON THE PACKAGE BODY, EXCLUDING ANY THERMAL 9
 - ENHANCEMENT ON CAVITY DOWN PACKAGE CONFIGURATIONS. "D1" AND "E2" DIMENSIONS DO NOT INCLUDE MOLD FLASH

DIMENSIONS ARE IN MILLIMETERS		7.17	see the M http://www	see the Microchip Packaging Specification at http://www.microchip.com/packaging	tion at
INTERPRET DIM AND TOL PER ASME Y14.5M 1994	NAME	DATE	TITLE	PACKAGE OUTLINE	
MATERIAL	DRAWN		28 TSSO	28 TSSOP, 6.1mm WIDE BODY, 0.65mm PITCH	m PITCH
		4/2/13		WITH EXPOSED PAD	
FINISH	CHECKED		DWG NUMBER		REV
	S.K.ILIEV 4/11/13	4/11/13	28TS	28TSSOP-6.1WIDE-0.65P-ePAD	∀
DBINT WITH SCALE TO EIT	APPROVED		SCALE	STD COMPLIANCE	SHEET
DO NOT SCALE DRAWING	S.K.ILIEV 4/11/13 1:1	4/11/13	Ξ	JEDEC: MO-153	2 OF 2

2.2 32-SQFN

FIGURE 2-3: 32-SQFN PACKAGE



UPD1001

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- Product Support Data sheets and errata, application notes and sample programs, design resources, user's
 guides and hardware support documents, latest software releases and archived software
- General Technical Support Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- Business of Microchip Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- · Distributor or Representative
- · Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO Device	[X] - XX / XX Tape and Reel Temperature Package Option Range	Examples: a) UPD1001-A/ST Tray, Commercial temp., 28-pin TSSOP
Device:	UPD1001	b) UPD1001T-Al/MQ Tape & reel, Industrial temp., 32-pin SQFN
Tape and Reel Option:	Blank = Standard packaging (tray) T = Tape and Reel(Note 1)	
Temperature Range:	A = 0° C to +70°C (Commercial) AI = -40°C to +85°C (Industrial) AV = -40°C to +105°C (Automotive)	
Package:	ST = 28-pin TSSOP MQ = 32-pin SQFN	Note 1: Tape and Reel identifier only appears in the catalog part number description. The identifier is used for ordering purposes a is not printed on the device package. Check with your Microchip Sales Office package availability with the Tape and R option.

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our
 knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data
 Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- · Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not
 mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, Keeloq, Keeloq logo, MPLAB, PIC, PICmicro, PICSTART, PIC³² logo, rfPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rfLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

flexPWR, JukeBlox, Kleer, KleerNet, MediaLB, and MOST

The preceding is a non-exhaustive list of trademarks in use in the US and other countries. For a complete list of trademarks, email a request to legal.department@microchip.com. The absence of a trademark (name, logo, etc.) from the list does not constitute a waiver of any intellectual property rights that SMSC has established in any of its trademarks.

All other trademarks mentioned herein are property of their respective companies.

© 2014, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 9781632762238

QUALITY MANAGEMENT SYSTEM CERTIFIED BY DNV = ISO/TS 16949 ==

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.



Worldwide Sales and Service

AMERICAS

Corporate Office 2355 West Chandler Blvd. Chandler, AZ 85224-6199

Tel: 480-792-7200 Fax: 480-792-7277 Technical Support:

http://www.microchip.com/

support
Web Address:
www.microchip.com

Atlanta Duluth, GA

Tel: 678-957-9614 Fax: 678-957-1455

Austin, TX Tel: 512-257-3370

Boston

Westborough, MA Tel: 774-760-0087 Fax: 774-760-0088

Chicago Itasca, IL

Tel: 630-285-0071 Fax: 630-285-0075

Cleveland

Independence, OH Tel: 216-447-0464 Fax: 216-447-0643

Dallas

Addison, TX Tel: 972-818-7423 Fax: 972-818-2924

Detroit Novi, MI

Tel: 248-848-4000

Houston, TX Tel: 281-894-5983

Indianapolis Noblesville, IN Tel: 317-773-8323

Fax: 317-773-5453

Los Angeles

Mission Viejo, CA Tel: 949-462-9523 Fax: 949-462-9608

New York, NY Tel: 631-435-6000

San Jose, CA Tel: 408-735-9110

Canada - Toronto Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office

Suites 3707-14, 37th Floor Tower 6, The Gateway Harbour City, Kowloon Hong Kong

Tel: 852-2943-5100 Fax: 852-2401-3431

Australia - Sydney Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

China - Beijing Tel: 86-10-8569-7000 Fax: 86-10-8528-2104

China - Chengdu Tel: 86-28-8665-5511 Fax: 86-28-8665-7889

China - Chongqing Tel: 86-23-8980-9588 Fax: 86-23-8980-9500

China - Hangzhou Tel: 86-571-8792-8115 Fax: 86-571-8792-8116

China - Hong Kong SAR Tel: 852-2943-5100 Fax: 852-2401-3431

China - Nanjing Tel: 86-25-8473-2460 Fax: 86-25-8473-2470

China - Qingdao Tel: 86-532-8502-7355 Fax: 86-532-8502-7205

China - Shanghai Tel: 86-21-5407-5533 Fax: 86-21-5407-5066

China - Shenyang Tel: 86-24-2334-2829 Fax: 86-24-2334-2393

China - Shenzhen Tel: 86-755-8864-2200 Fax: 86-755-8203-1760

China - Wuhan Tel: 86-27-5980-5300 Fax: 86-27-5980-5118

China - Xian Tel: 86-29-8833-7252 Fax: 86-29-8833-7256

China - Xiamen Tel: 86-592-2388138 Fax: 86-592-2388130

China - Zhuhai Tel: 86-756-3210040 Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore Tel: 91-80-3090-4444 Fax: 91-80-3090-4123

India - New Delhi Tel: 91-11-4160-8631 Fax: 91-11-4160-8632

India - Pune

Tel: 91-20-3019-1500

Japan - Osaka Tel: 81-6-6152-7160 Fax: 81-6-6152-9310

Japan - Tokyo Tel: 81-3-6880- 3770 Fax: 81-3-6880-3771

Korea - Daegu Tel: 82-53-744-4301 Fax: 82-53-744-4302

Korea - Seoul Tel: 82-2-554-7200 Fax: 82-2-558-5932 or 82-2-558-5934

Malaysia - Kuala Lumpur Tel: 60-3-6201-9857 Fax: 60-3-6201-9859

Malaysia - Penang Tel: 60-4-227-8870 Fax: 60-4-227-4068

Philippines - Manila Tel: 63-2-634-9065 Fax: 63-2-634-9069

SingaporeTel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu Tel: 886-3-5778-366 Fax: 886-3-5770-955

Taiwan - Kaohsiung Tel: 886-7-213-7830

Taiwan - Taipei Tel: 886-2-2508-8600 Fax: 886-2-2508-0102 **Thailand - Bangkok**

Tel: 66-2-694-1351 Fax: 66-2-694-1350

EUROPE

Austria - Wels

Tel: 43-7242-2244-39 Fax: 43-7242-2244-393

Denmark - Copenhagen Tel: 45-4450-2828

Fax: 45-4485-2829
France - Paris

Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany - Dusseldorf Tel: 49-2129-3766400

Germany - Munich Tel: 49-89-627-144-0 Fax: 49-89-627-144-44

Germany - Pforzheim Tel: 49-7231-424750

Italy - Milan Tel: 39-0331-742611 Fax: 39-0331-466781

Italy - Venice Tel: 39-049-7625286

Netherlands - Drunen Tel: 31-416-690399 Fax: 31-416-690340

Poland - Warsaw Tel: 48-22-3325737

Spain - Madrid Tel: 34-91-708-08-90 Fax: 34-91-708-08-91

Sweden - Stockholm Tel: 46-8-5090-4654

UK - Wokingham Tel: 44-118-921-5800 Fax: 44-118-921-5820

03/25/14

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for USB Interface IC category:

Click to view products by Microchip manufacturer:

Other Similar products are found below:

CY7C69356-48LTXC USB3319C-GJ-TR USB3370B-EZK-TR CYPD2120-24LQXI CYPD2122-20FNXIT CYPD2122-24LQXIT LIF-UC120-SWG36ITR50 UPD360-A/6HX CP2102NP1174GM DPO2039DABQ-13 CY7C68034-56LTXC TUSB212RWBT TUSB213IRGYT TUSB213RGYT USB3503T-I/ML CY7C63310-SXC USB3316C-CP-TR USB3250-ABZJ MAX3107ETG+ MAX14632EZK+T LAN9514-JZX CYPD2120-24LQXIT MAX3100CEE+T USB5806/KD USB5826-I/KD USB5826/KD USB5906/KD USB5916/KD USB5926/KD TUSB215QRGYTQ1 NB7NPQ701MMTTBG TUSB213RGYR USB5926-I/KD USB5906-I/KD USB4640I-HZH-03 CY7C63813-SXC CY7C63823-SXC CY7C64215-28PVXC CY7C68013A-128AXC CY7C68013A-56LTXI CY7C68013A-56PVXC CY7C68013A-56PVXI CYPD1120-40LQXI AP43771VDKZ-13 AP43771VFBZ-13 DIO32320MP10 HT42B534-2 FT2232HPQ-TRAY FT312D-32L1C-T KTU1001AEVA-TR