

FEATURES

- 2.5kV_{RMS} Rated Dielectric Isolation Voltage for One Minute
- USB 2.0 Full Speed and Low Speed Support
- Bus Powered with Optional External Supply
- Hot Plug Protection
- No Drivers or Software Required
- 400V_{RMS} Continuous Working Voltage
- ±20kV ESD Protection
- High Common Mode Transient Immunity
- Small Rugged Enclosure
- LED Status and Warning Indicators
- High Retention USB Connectors



DESCRIPTION

The LTP2884 is a complete USB isolator solution, ideal for any application requiring ground isolation, protection from large common mode voltage variations, or protection from spikes and surges. Built with convenience in mind, this robust isolator brings comprehensive protection to a wide variety of applications without the need for any configuration or additional software.

At the heart of the LTP2884 is the [LTM2884](#), an isolated USB 2.0 compatible μ Module[®] transceiver with isolated power and automatic USB bus speed selection. Isolator μ Module technology uses coupled inductors and an isolated power transformer to provide 2500V_{RMS} of isolation between the upstream and downstream USB interface. All accessible lines on the LTP2884 carry additional surge protection and ESD protection up to ±20kV. Uninterrupted communication is guaranteed for common mode transients greater than 30kV/ μ s.

The LTP2884 is compatible with USB 2.0 full speed (12Mbps) and low speed (1.5Mbps) operation. Automatic

speed selection configures integrated pull-up resistors on the upstream port to match those sensed on the downstream device. By default, downstream devices are powered (up to 1W) by the upstream bus through an isolated DC/DC converter. Optionally, a wall adapter can be used, increasing available power to downstream devices to 2.5W.

The LTP2884 has additional features which help to ensure reliable operation. Status LEDs indicate the presence of auxiliary and USB bus power. Warning LEDs indicate overcurrent on the upstream bus and undervoltage on the downstream bus, making it clear when an application requires auxiliary power. High retention USB connectors protect against accidental unplugging during operation.

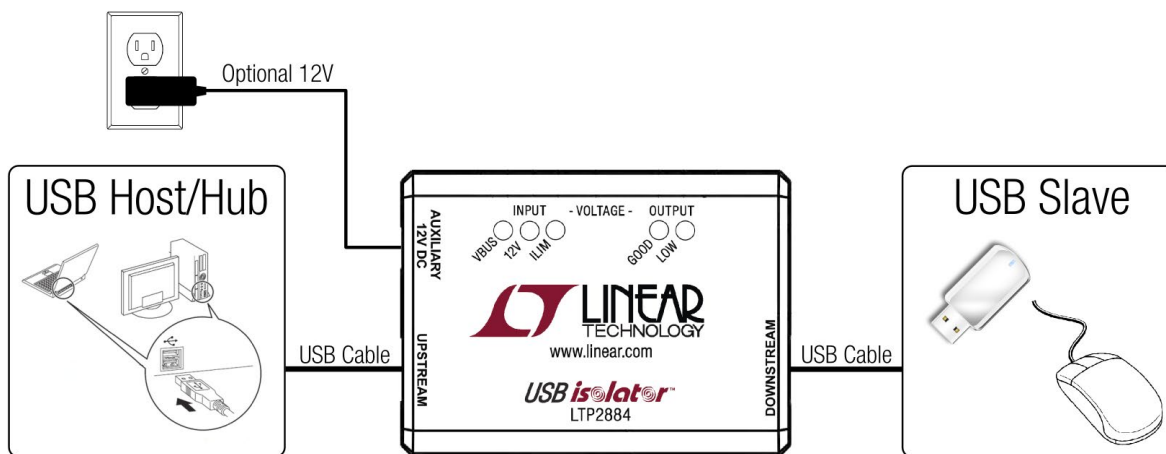
Design files for this circuit board are available at <http://www.linear.com/demo>

LT, LT, LTC, LTM, Linear Technology, μ Module and the Linear logo are registered trademarks of Linear Technology Corporation. All other trademarks are the property of their respective owners.

PRODUCT MANUAL LTP2884

SPECIFICATIONS

	MIN	TYP	MAX	UNITS
Power				
Operating Supply Range (Bus Power Mode)	4.4	5	5.5	V
Operating Supply Range (Auxiliary Power Mode)	9.6	12	14.4	V
Regulated Output Voltage	4.75	5	5.25	V
Downstream V_{BUS} Source Current (Bus Power Mode)	200			mA
Downstream V_{BUS} Source Current (Auxiliary Power Mode)	500			mA
USB Interface				
Low Speed Data Rate		1.5		Mbps
Full Speed Data Rate		12		Mbps
Protection				
Rated Dielectric Insulation Voltage	2500			V_{RMS}
Maximum Continuous Working Voltage (Upstream to Downstream)	560 400			V_{PEAK} V_{RMS}
Common Mode Transient Immunity	30			kV/ μ s
ESD Immunity		± 20		kV
Mechanical				
Dimensions		$3.1 \times 2.2 \times 0.8$		in
Weight		51		grams



CONNECTIONS AND INDICATORS

Auxiliary 12V DC: Power supply input for support of >200mA downstream load applications. Power connector is standard 4mm type with positive center pin. Input voltage range is 9.6V to 14.4V.

Upstream: High retention USB type B connector. Connect with a standard USB cable to a computer or USB host.

Downstream: High retention USB type A connector. Connect with a standard USB cable to any USB 2.0 full speed or low speed peripheral.

LED Indicators

VBUS: Green LED indicates the presence of V_{BUS} voltage on the upstream bus.

12V: Green LED indicates the presence of voltage on the 12V Auxiliary power input.

ILIM: Red LED shows when current on the up-stream V_{BUS} is near or exceeds the maximum allowed to guarantee proper regulation of the downstream V_{BUS} . If this LED is on, the LTP2884 needs to be powered from the 12V wall adapter for the current application, increasing available downstream power.

GOOD: This green LED indicates that the downstream V_{BUS} is above the minimum operating voltage of 4.75V.

LOW: This red LED indicates that downstream V_{BUS} has dropped below 4.75V. If on, it is an indicator that the current load of the downstream device is too high for the current configuration: >200mA for bus powered applications or >500mA for 12V powered applications.

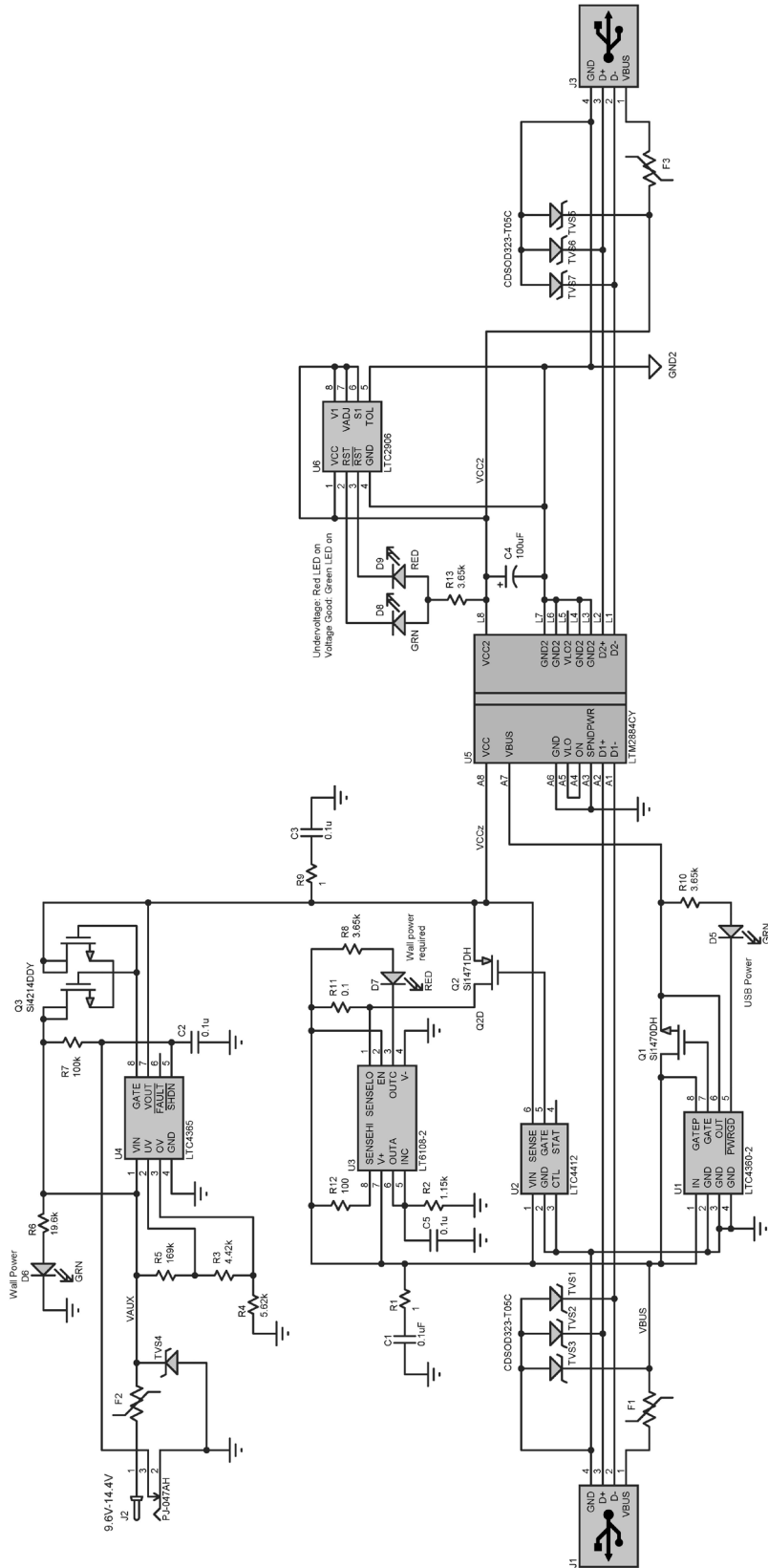
Note: 1. In bus powered hub applications the available downstream current is limited to 100mA. The LTP2884 would only be able to supply a few mA on its downstream side if connected to a bus powered hub.

PRODUCT MANUAL LTP2884

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	4	C1, C2, C3, C5	CAP, CHIP, X7R, 0.1 μ F, 5% , 50V, 0603	AVX, 06035C104JAT2A
2	1	C4	CAP, TANT, 100 μ F, 10V, 20%, C	AVX, TPSC107M010R0150
3	3	D5, D6, D8	LED, GREEN, SMD, 0805	KINGBRIGHT, APT2012ZGC
4	2	D7, D9	LED, RED, SMD, 0805	KINGBRIGHT, CRCW06031R00JNEA
5	3	F1, F2, F3	PTC RESETABLE FUSE, 1.10A, 6V, 1206	BOURNS, MF-NSMF110-2
6	1	J1	USB-B RECEPTACLE, HIGH RETENTION	SAMTEC, USBR-B-S-S-O-TH
7	1	J2	POWER RECEPTACLE, 2mm x 6mm	CUI INC, PJ-047AH
8	1	J3	USB-A RECEPTACLE, HIGH RETENTION	SAMTEC, USBR-A-S-S-O-TH
9	1	Q1	MOSFET, N-CH 30V 5.1A SC70-6	VISHAY, SI1470DH-T1-E3
10	1	Q2	MOSFET, P-CH 30V 2.7A SC70-6	VISHAY, SI1471DH-T1-E3
11	1	Q3	MOSFET, N-CH D-S 30V 8-SOIC	VISHAY, SI4214DDY-T1-GE3
12	2	R1, R9	RES, CHIP, 1 Ω , 5%, 1/10W, 0603	VISHAY, CRCW06031R00JNEA
13	1	R2	RES, CHIP, 1.15k, 1%, 1/10W, 0603	VISHAY, CRCW06031K15FKEA
14	1	R3	RES, CHIP, 4.42k, 1%, 1/10W, 0603	VISHAY, CRCW06034K42FKEA
15	1	R4	RES, CHIP, 5.62k, 1%, 1/10W, 0603	VISHAY, CRCW06035K62FKEA
16	1	R5	RES, CHIP, 169k, 1%, 1/10W, 0603	VISHAY, CRCW0603169KFKEA
17	1	R6	RES, CHIP, 19.6k, 1%, 1/10W, 0603	VISHAY, CRCW060319K6FKEA
18	1	R7	RES, CHIP, 100k, 1%, 1/10W, 0603	VISHAY, CRCW0603100KFKEA
19	3	R8, R10, R13	RES, CHIP, 3.65k, 1%, 1/10W, 0603	VISHAY, CRCW06033K65FKEA
20	1	R11	RES, CHIP, 0.1 Ω , 1%, 1/4W, 0805	VISHAY, WSL0805R1000FEA18
21	1	R12	RES, CHIP, 100 Ω , 1%, 1/10W, 0603	VISHAY, CRCW0603100RFKEA
22	6	TVS1 TO 3, 5 TO 7	DIODE TVS ARRAY, 5V, SOD323	BOURNS, CDSOD323-T05
23	1	TVS4	DIODE TVS ARRAY, 12V, SOD323	BOURNS, CDSOD323-T12
24	1	U1	IC, LTC4360-2	LINEAR LTC4360ISC8-2#PBF
25	1	U2	IC, LTC4412	LINEAR LTC4412IS6#PBF
26	1	U3	IC, LTC6108-2	LINEAR LT6108IMS8-2#PBF
27	1	U4	IC, LTC4365	LINEAR LTC4365ITS8-2#PBF
28	1	U5	IC, LTM2884	LINEAR LTM2884IY
29	1	U6	IC, LTC2906	LINEAR LTC2906ITS8#PBF
30	1		LIGHTPIPE	LUMEX, LPA-C081301S-10
Optional Components				
31	1		WALL ADAPTER, 12VDC. 7.2W	VOLGEN, KTPS05-12006U

SCHEMATIC DIAGRAM



CUSTOMER NOTICE

LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO PROVIDE THIS SCHEMATIC DIAGRAM TO REFLECT THE SUPPLIED SPECIFICATIONS. HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY THE ACTUAL APPLICATION, COMPONENT SUBSTITUTION, AND PERFORMANCE OF THE SCHEMATIC. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE WITH ANY QUESTIONS REGARDING THIS SCHEMATIC.

THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.

PRODUCT MANUAL LTP2884

DEMONSTRATION BOARD IMPORTANT NOTICE

Linear Technology Corporation (LTC) provides the enclosed product(s) under the following **AS IS** conditions:

This demonstration board (DEMO BOARD) kit being sold or provided by Linear Technology is intended for use for **ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY** and is not provided by LTC for commercial use. As such, the DEMO BOARD herein may not be complete in terms of required design-, marketing-, and/or manufacturing-related protective considerations, including but not limited to product safety measures typically found in finished commercial goods. As a prototype, this product does not fall within the scope of the European Union directive on electromagnetic compatibility and therefore may or may not meet the technical requirements of the directive, or other regulations.

If this evaluation kit does not meet the specifications recited in the DEMO BOARD manual the kit may be returned within 30 days from the date of delivery for a full refund. **THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY THE SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THIS INDEMNITY, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.**

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user releases LTC from all claims arising from the handling or use of the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. Also be aware that the products herein may not be regulatory compliant or agency certified (FCC, UL, CE, etc.).

No License is granted under any patent right or other intellectual property whatsoever. **LTC assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or any other intellectual property rights of any kind.**

LTC currently services a variety of customers for products around the world, and therefore this transaction **is not exclusive**.

Please read the DEMO BOARD manual prior to handling the product. Persons handling this product must have electronics training and observe good laboratory practice standards. **Common sense is encouraged.**

This notice contains important safety information about temperatures and voltages. For further safety concerns, please contact a LTC application engineer.

Mailing Address:

Linear Technology
1630 McCarthy Blvd.
Milpitas, CA 95035

Copyright © 2004, Linear Technology Corporation