PRODUCT MANUAL LTP2884

USB Isolator

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 µModule® transceiver with isolated power and automatic USB bus speed selection. Isolator µModule 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/µs.

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

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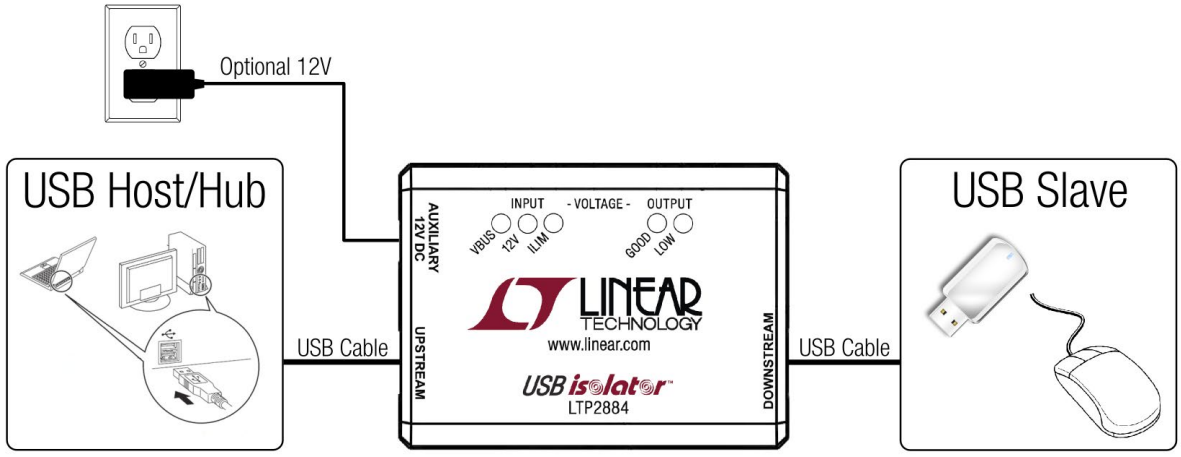
SPECIFICATIONS

	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/µs
ESD Immunity		±20		kV
Mechanical				
Dimensions		3.1 × 2.2 × 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.

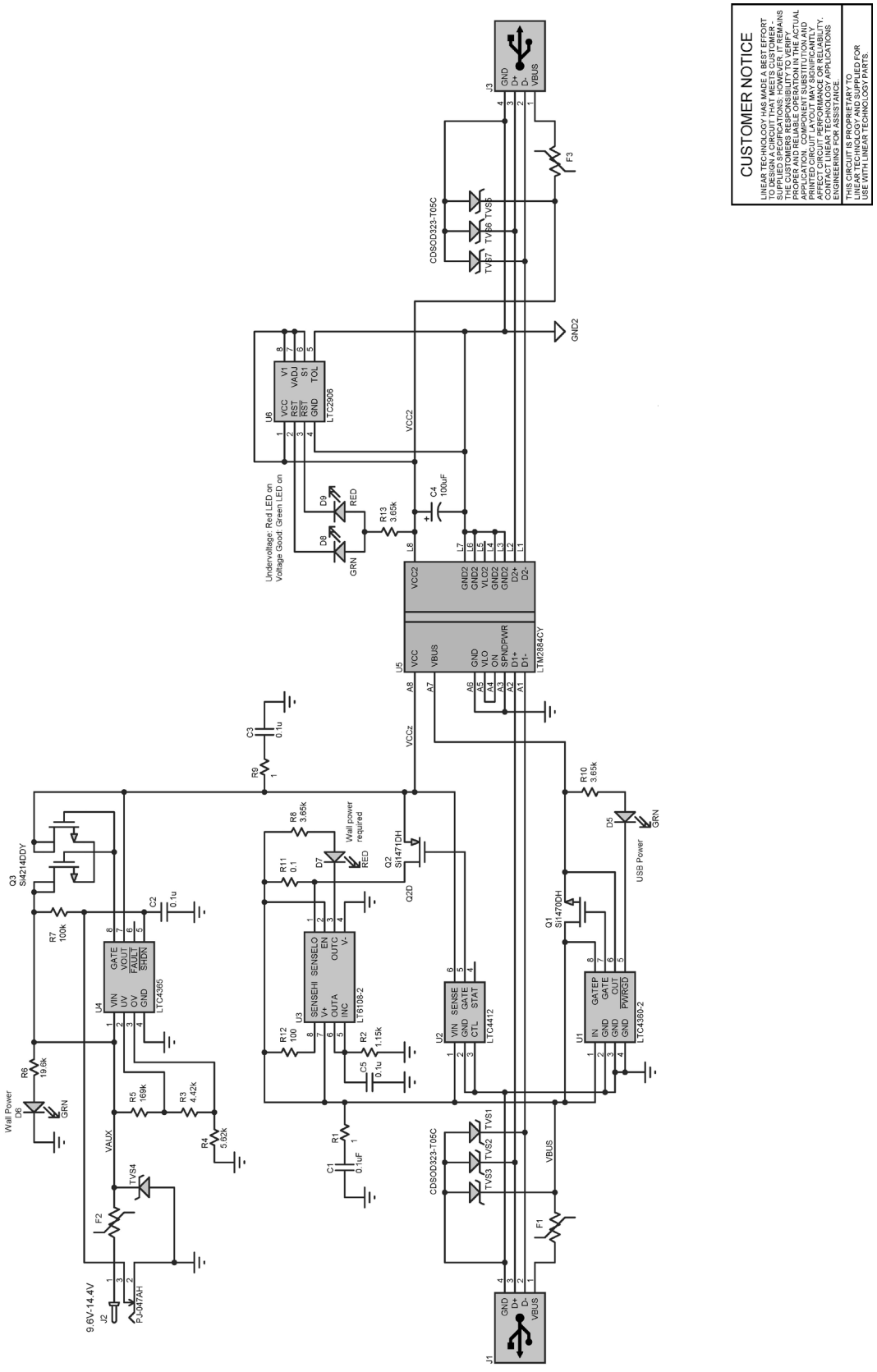
LOW: This red LED indicates that downstream V_{BUS} has dropped below 4.75V. If on, it is an indicator that the current load of the downstream device is too high for the current configuration: >200mA for bus powered applications or >500mA for 12V powered applications.

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.

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	4	C1, C2, C3, C5	CAP, CHIP, X7R, 0.1µF, 5% , 50V, 0603	AVX, 06035C104JAT2A
2	1	C4	CAP, TANT, 100µF, 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 RECEPTABLE, 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, 1Ω, 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, 0.1Ω, 1%, 1/4W, 0805	VISHAY, WSL0805R1000FEA18
21	1	R12	RES, CHIP, 100Ω, 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



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