

# LTM2881: Isolated 20Mbps RS485/RS422 $\mu$ Module Transceiver with Power

## DESCRIPTION

Demonstration circuit DC1503A is an Isolated RS485/RS422  $\mu$ Module<sup>®</sup> transceiver + power featuring the LTM<sup>®</sup>2881. The demo circuit is a 2500V<sub>RMS</sub> galvanically isolated RS485/RS422 transceiver interface. All components are integrated into the  $\mu$ Module transceiver. The demo circuit operates from a supply on  $V_{CC}$  and a logic

supply on  $V_L$ . The part generates the output voltage  $V_{CC2}$  and communicates all necessary signaling across the isolation barrier using isolation  $\mu$ Module technology.

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

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

**Table 1. Performance Summary ( $T_A = 25^\circ\text{C}$ )**

| SYMBOL     | PARAMETER                          | CONDITIONS   | MIN        | TYP    | MAX        | UNITS       |
|------------|------------------------------------|--|------------|--------|------------|-------------|
| $V_{CC}$   | Input Supply Range                 | LTM2881-5<br>LTM2881-3                               | 4.5<br>3.0 | 5<br>3 | 5.5<br>3.6 | V<br>V      |
| $V_L$      | Logic Signal Supply Range          |  | 1.62       |        | 5.5        | V           |
| $V_{CC2}$  | Output Voltage                     | $I_{LOAD} = 0\text{mA to } 100\text{mA}$ , $DE = 0V$ | 4.7        | 5      |            | V           |
| $f_{MAX}$  | Maximum Data rate                  | $\overline{SLO} = V_{CC2}$                           | 20         |        |            | Mbps        |
| $V_{IORM}$ | Maximum Working Insulation Voltage | GND to GND2  | 560        |        |            | V           |
|            | Common Mode Transient Immunity     | GND to GND2  | 30         |        |            | kV/ $\mu$ s |

## OPERATING PRINCIPLES

The LTM2881 contains an isolated DC/DC converter, delivering power to  $V_{CC2}$  at 5V from the input supply  $V_{CC}$ . Isolation is maintained by the separation of GND and GND2 where significant operating voltages and transients can exist without affecting the operation of the LTM2881. The logic side ON pin enables or shuts down the LTM2881. RS485/RS422 signaling is controlled by the logic inputs DE, DI, TE and RE. Connection to the transceiver pins (A, B, Y and Z) allows full- or half-duplex operation on the isolated side of the demo circuit. A full-/half-duplex switch is included on the demo circuit to ease setting the system

configuration. A driver termination resistor is included on the demo circuit to allow master termination in full-duplex configurations. Additional logic signaling from the isolated side to the logic side is available with the  $D_{IN}$  to  $D_{OUT}$  pins. The  $\overline{SLO}$  pin configures the slew rate of the driver output pins Y and Z.

Data is transmitted out the driver pins Y and Z from the input DI with the input DE set high. Data is received through the difference in A and B to the output RO with the input  $\overline{RE}$  set low.

## QUICK START PROCEDURE

Demonstration circuit DC1503A is easy to set up to evaluate the performance of the LTM2881. Refer to Figure 2 for proper measurement equipment setup and follow the procedure below:

Use a short ground lead on the oscilloscope probe when measuring input or output voltage ripple or high speed signals.

1. Place jumpers in the following positions: (all are default except JP1, JP2, JP6 and JP8)

**JP1** ON  
**JP2**  $V_{CC}$  (Note: Logic signals referenced to  $V_{CC}$ )  
**JP3** ON  
**JP4** OUT  
**JP5** ON  
**JP6** EXT  
**JP7** ON  
**JP8** ON  
**JP9** ON  
**JP10** FAST  
**JP11** HI  
**SW1** HALF DUPLEX

2. With power off, connect the input power supply to  $V_{CC}$  and GND.

3. Turn on the power at the input.

Note: Make sure that the input voltage does not exceed 6V.

4. Check for the proper output voltages.  $V_{CC2} = 5V$ , LED D1 is On, LED D2 is On.

5. Once the proper output voltages are established, connect a function generator to terminal DI and set to square wave with a low of 0V, high =  $V_{CC}$ , termination is Hi-Z. Set Frequency to 10MHz (20Mbps). Enable output of function generator.

6. Connect oscilloscope to terminal RO and observe waveform at 10MHz. This demonstration shows data that transmits from DI, loops back through the half-duplex configuration, and out of RO.

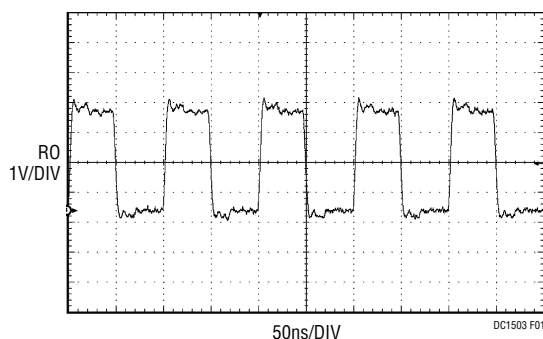


Figure 1. RO Output

# QUICK START PROCEDURE

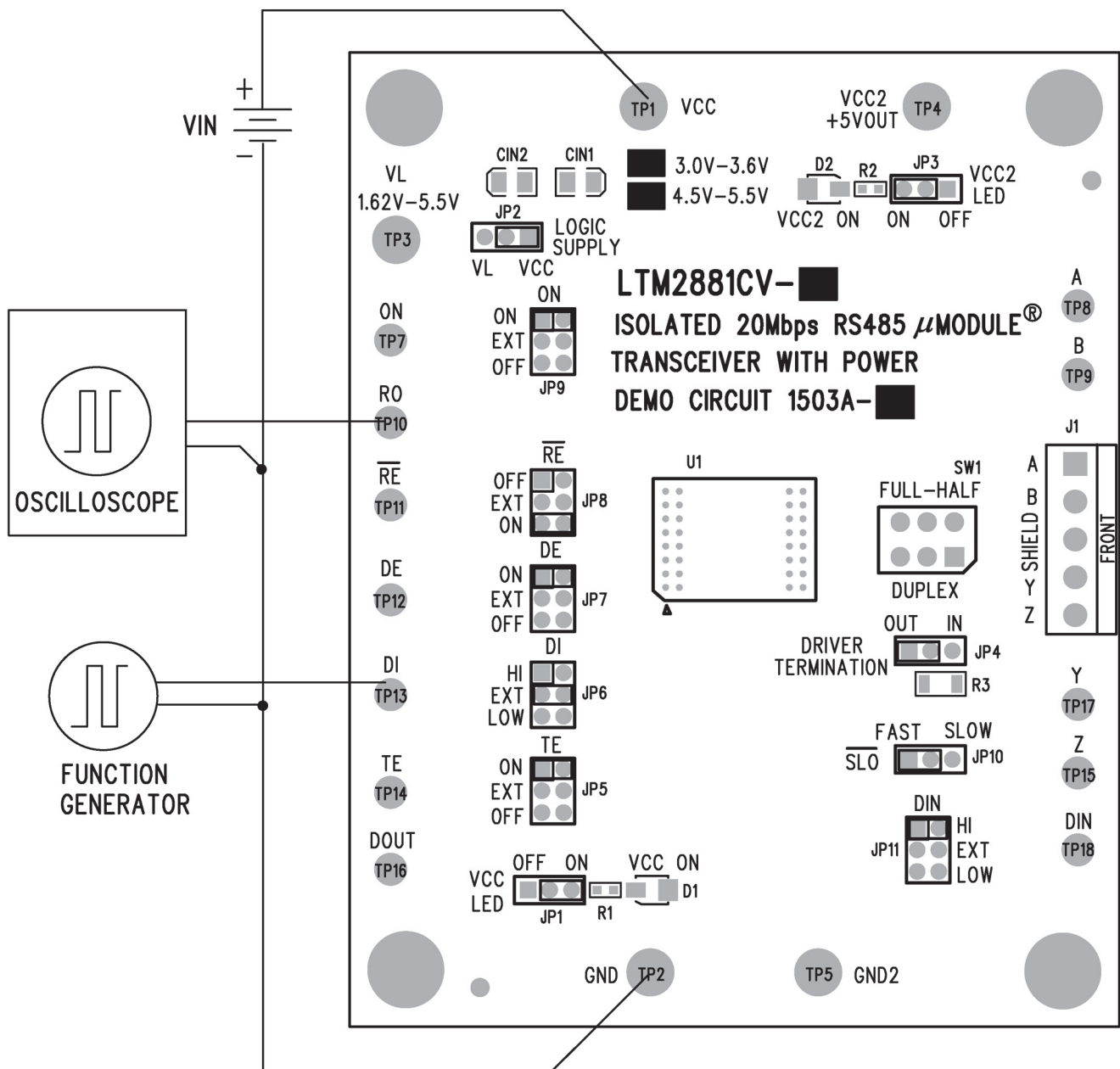


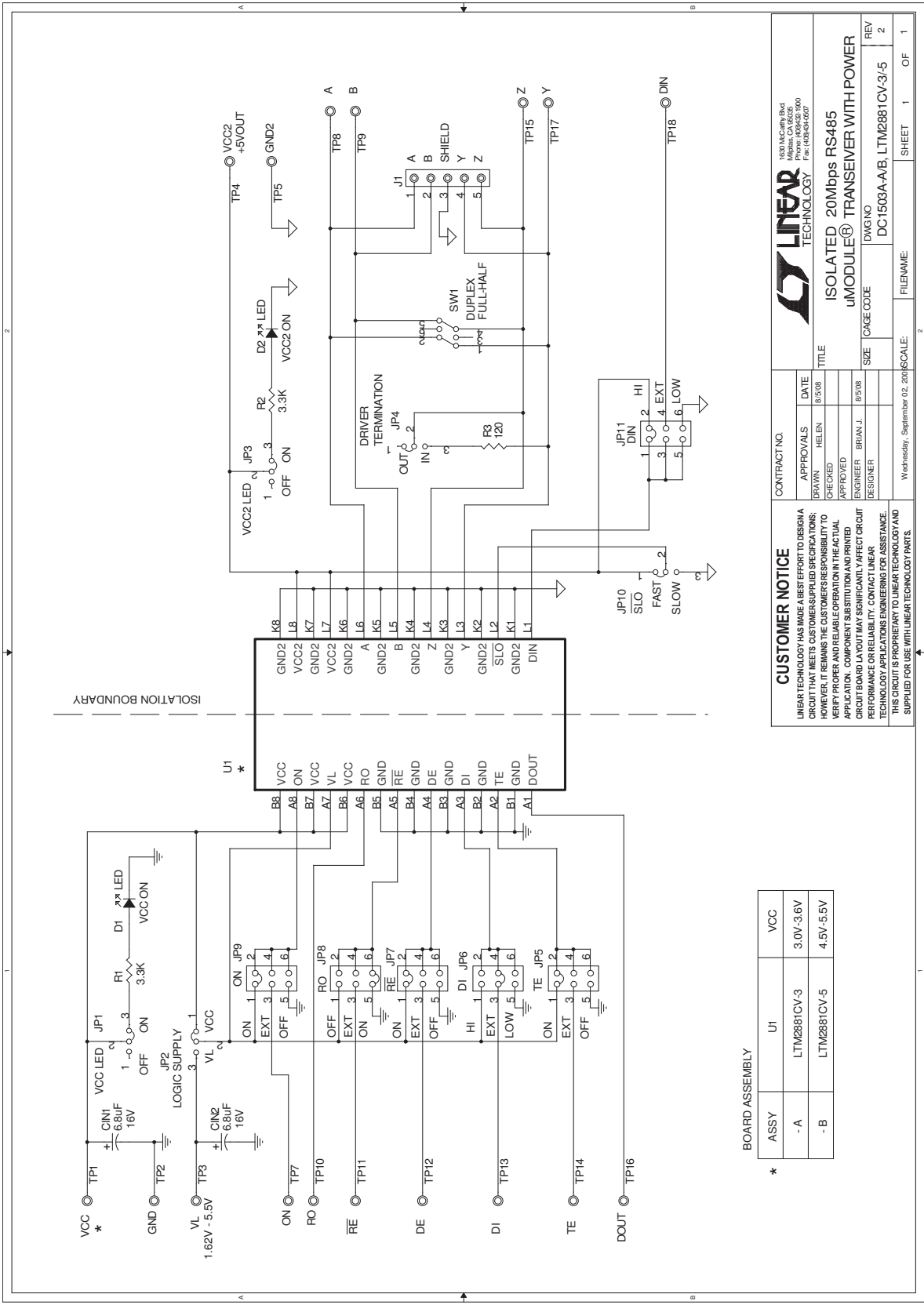
Figure 2. Proper Measurement Equipment Setup

# DEMO MANUAL DC1503A

## PARTS LIST

| ITEM                           | QTY | REFERENCE     | PART DESCRIPTION                       | MANUFACTURER/PART NUMBER                         |
|--------------------------------|-----|---------------|--|--|
| REQUIRED CIRCUIT COMPONENTS    |     |               |  |  |
| 1                              | 1   | U1            | I.C., LTM2881CV-3<br>I.C., LTM2881CV-5 | LINEAR LTM2881CV-3#PBF<br>LINEAR LTM2881CV-5#PBF |
| HARDWARE (FOR DEMO BOARD ONLY) |     |               |  |  |
| 2                              | 2   | CIN1, CIN2    | CAP, TANT 6.8 $\mu$ F 16V 10% TAJA     | AVX TAJA685K016R                                 |
| 3                              | 2   | D1, D2        | LED, SMT, GREEN, 2.1V 15mA             | PANASONIC LN1351C-(TR)                           |
| 4                              | 1   | R1            | RES., CHIP 1k 1/16W, 5%, 0603          | VISHAY, CRCW06031K00JNEA                         |
| 5                              | 1   | R2            | RES., CHIP 3.3k 1/16W, 5%, 0603        | VISHAY, CRCW06033K30JNEA                         |
| 6                              | 1   | R3            | RES., CHIP 120 $\Omega$ 1/4W, 5%, 1206 | VISHAY, CRCW1206120RJNEA                         |
| 7                              | 1   | SW1           | SWITCH, SLIDE, DPDT                    | E-SWITCH, EG2271                                 |
| 8                              | 1   | J1            | TERMINAL BLOCK, 5-PIN 3.5mm            | ON-SHORE TECH ED555/5DS                          |
| 9                              | 5   | JP1-JP4, JP10 | 2mm SINGLE ROW HEADER, 3 PIN           | SAMTEC, TMM-103-02-L-S                           |
| 10                             | 6   | JP5-JP9, JP11 | 2mm DOUBLE ROW HEADER, 6 PIN           | SAMTEC, TMM-103-02-L-D                           |
| 11                             | 11  | JP1-JP11      | SHUNT                                  | SAMTEC, 2SN-BK-G                                 |
| 12                             | 5   | TP1-TP5       | TEST POINT, TURRET, 0.095              | MILL-MAX, 2501-2-00-80-00-00-07-0                |
| 13                             | 12  | TP7-TP18      | TEST POINT, TURRET, 0.065              | MILL-MAX, 2308-2-00-80-00-00-07-0                |
| 14                             | 4   | (Stand-Off)   | STAND-OFF, NYLON 0.375" tall           | KEYSTONE, 8832 (SNAP ON)                         |

SCHEMATIC DIAGRAM



# DEMO MANUAL DC1503A

---

## 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

dc1503fa