

# 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>.**

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

| SYMBOL     | PARAMETER                          | CONDITIONS   | MIN  | TYP | MAX | UNITS       |
|------------|------------------------------------|--|------|-----|-----|-------------|
| $V_{CC}$   | Input Supply Range                 | LTM2881-5  | 4.5  | 5   | 5.5 | V           |
|            |                                    | LTM2881-3  | 3.0  | 3   | 3.6 | V           |
| $V_L$      | Logic Signal Supply Range          |  | 1.62 |     | 5.5 | V           |
| $V_{CC2}$  | Output Voltage                     | $I_{LOAD} = 0\text{mA to }100\text{mA}$ , $DE = 0\text{V}$ | 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)

|             |  |
|-------------|--|
| <b>JP1</b>  | ON   |
| <b>JP2</b>  | $V_{CC}$ (Note: Logic signals referenced to $V_{CC}$ ) |
| <b>JP3</b>  | ON   |
| <b>JP4</b>  | OUT  |
| <b>JP5</b>  | ON   |
| <b>JP6</b>  | EXT  |
| <b>JP7</b>  | ON   |
| <b>JP8</b>  | ON   |
| <b>JP9</b>  | ON   |
| <b>JP10</b> | FAST   |
| <b>JP11</b> | HI   |
| <b>SW1</b>  | 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.

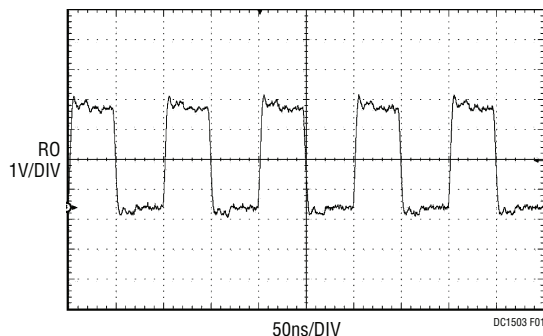


Figure 1. RO Output

**QUICK START PROCEDURE**

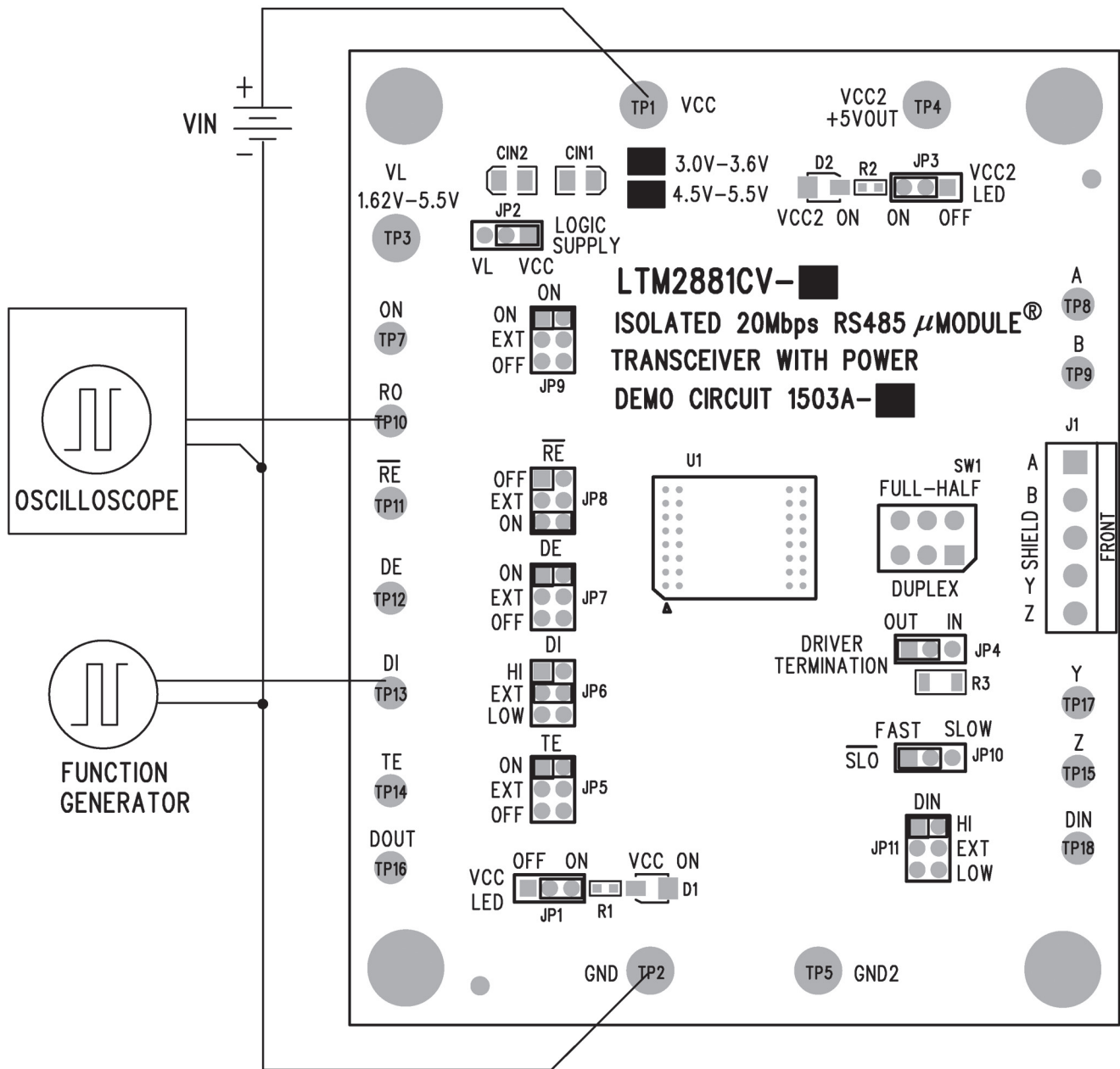


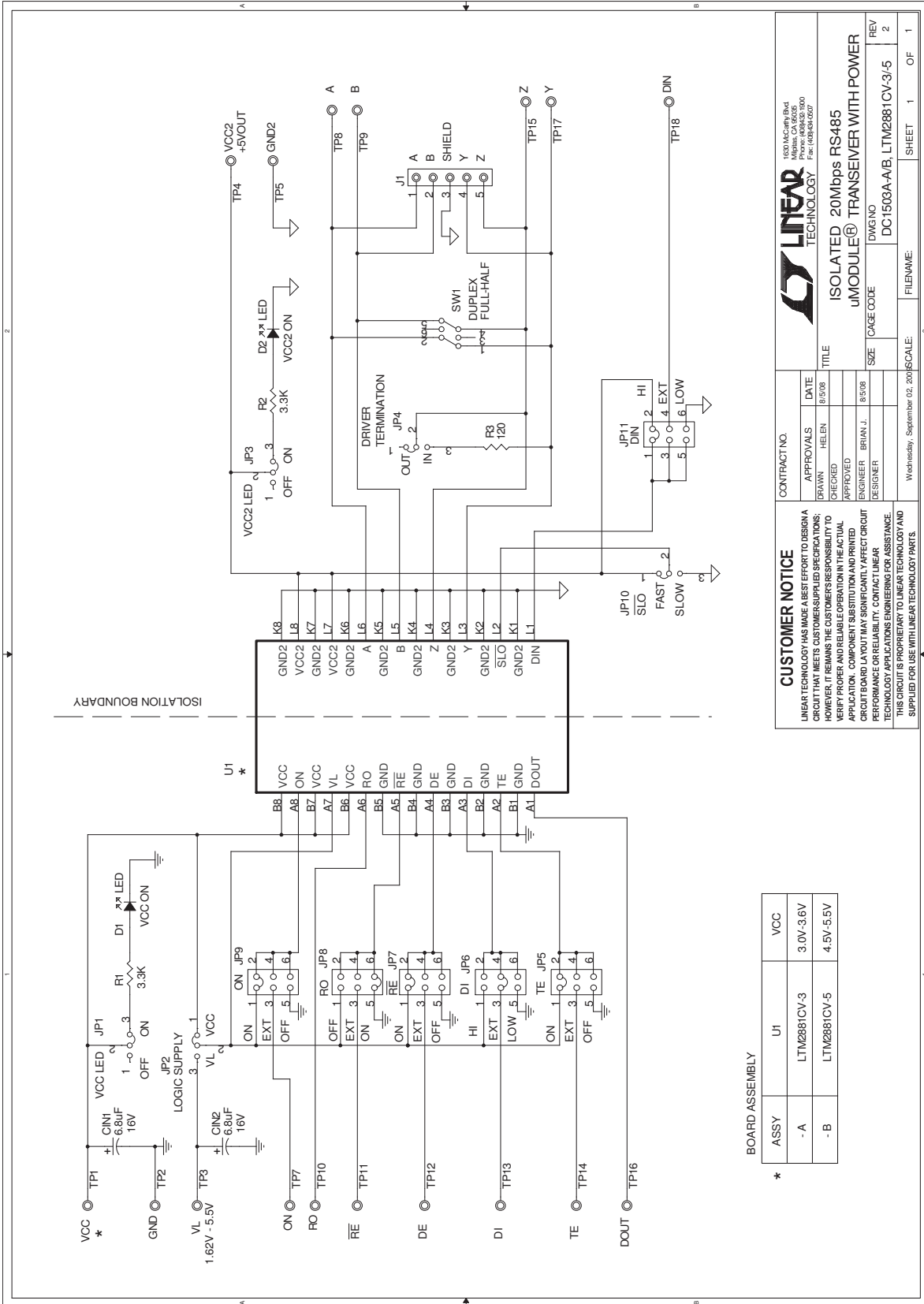
Figure 2. Proper Measurement Equipment Setup

# DEMO MANUAL DC1503A

## PARTS LIST

| ITEM                                  | QTY | REFERENCE     | PART DESCRIPTION                       | MANUFACTURER/PART NUMBER                         |
|---------------------------------------|-----|---------------|--|--|
| <b>REQUIRED CIRCUIT COMPONENTS</b>    |     |               |  |  |
| 1                                     | 1   | U1            | I.C., LTM2881CV-3<br>I.C., LTM2881CV-5 | LINEAR LTM2881CV-3#PBF<br>LINEAR LTM2881CV-5#PBF |
| <b>HARDWARE (FOR DEMO BOARD ONLY)</b> |     |               |  |  |
| 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**



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**ISOLATED 20Mbps RS485**  
**MODULE® TRANSCEIVER WITH POWER**

CONTRACT NO. \_\_\_\_\_ DATE \_\_\_\_\_  
APPROVALS: DRAWN: HELEN, CHECKED: \_\_\_\_\_, APPROVED: \_\_\_\_\_, ENGINEER: BRIAN J., DESIGNER: \_\_\_\_\_

FILENAME: \_\_\_\_\_  
SCALE: \_\_\_\_\_  
SHEET 1 OF 1

REV 1  
REV 2

DWG NO DC1503A-A-B, LTM2881CV-3/5

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**BOARD ASSEMBLY**

| ASSY | U1          | VCC       |
|------|-------------|-----------|
| - A  | LTM2881CV-3 | 3.0V-3.6V |
| - B  | LTM2881CV-5 | 4.5V-5.5V |

\* U1



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