

# 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.

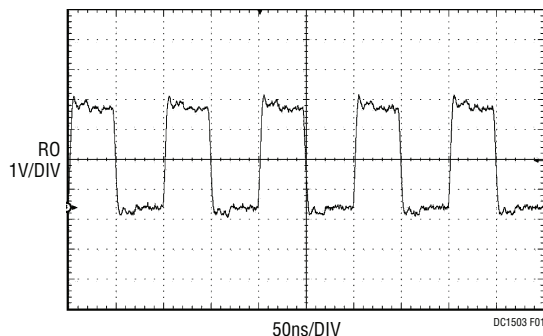


Figure 1. RO Output

**QUICK START PROCEDURE**

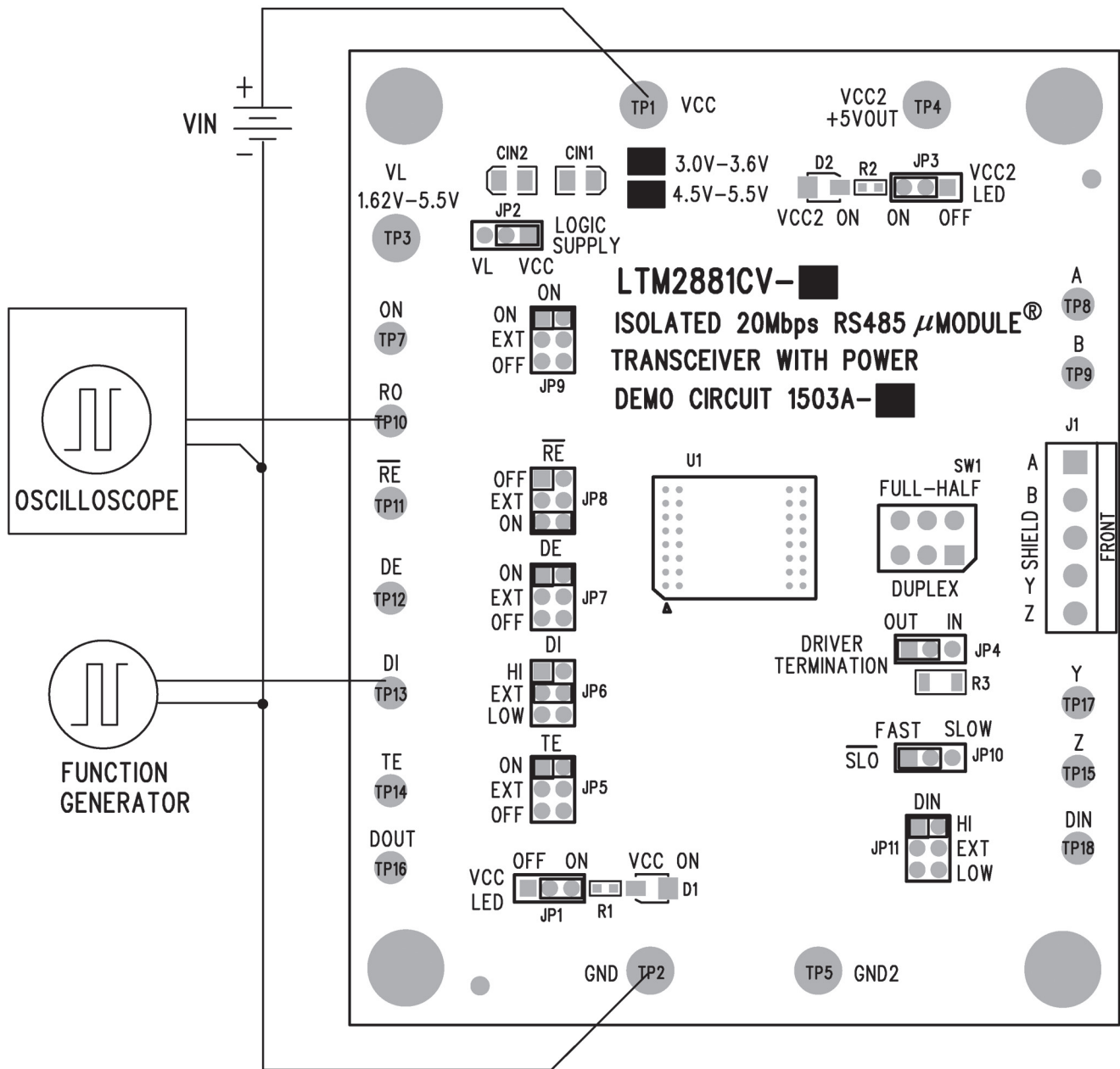


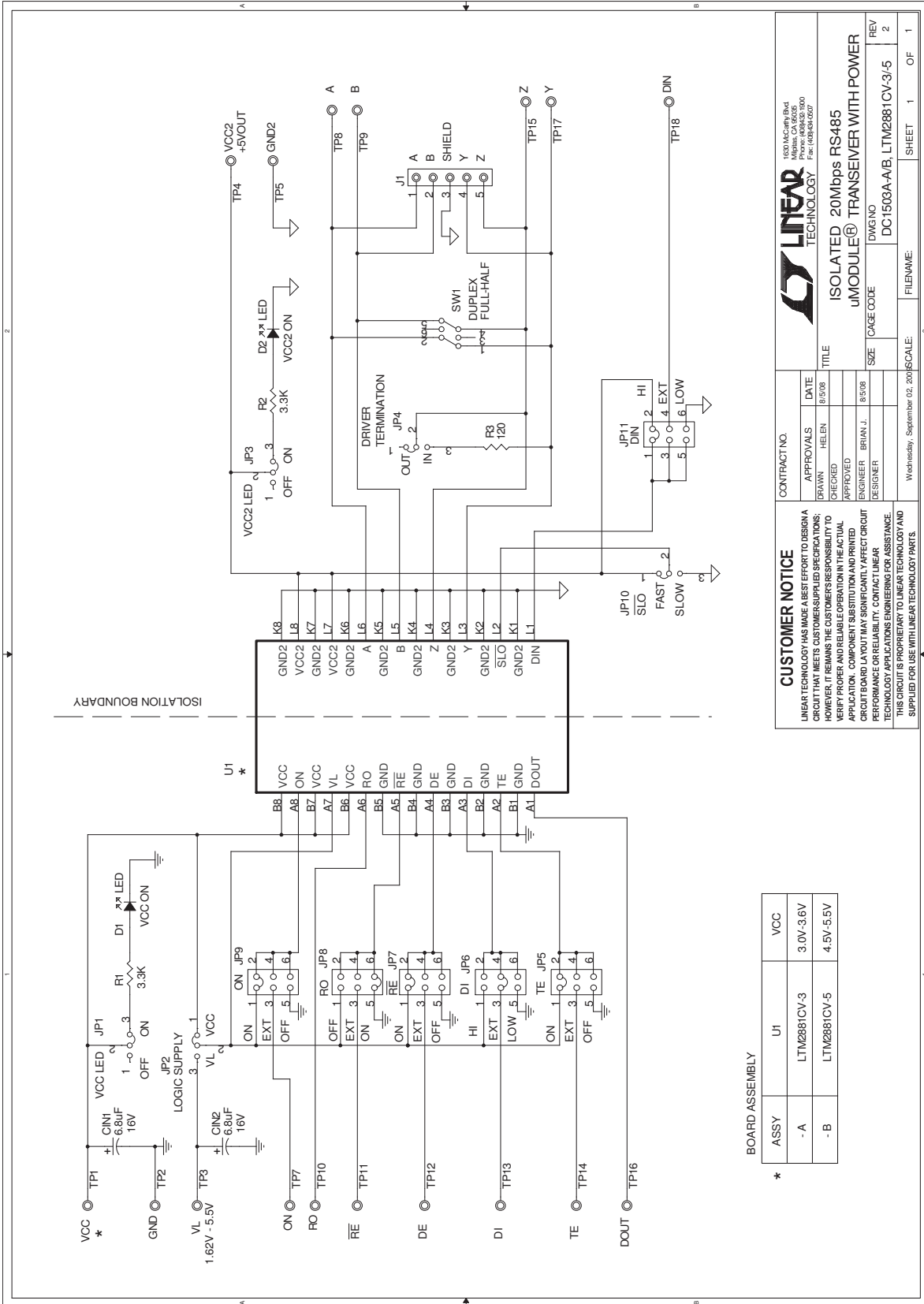
Figure 2. Proper Measurement Equipment Setup

# 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 I.C., LTM2881CV-5	LINEAR LTM2881CV-3#PBF 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**



		1650 McCarty Blvd Fremont, CA 94538-2800 Phone: (415) 941-2800 Fax: (415) 941-0607	
<b>CONTRACT NO.</b>		<b>FILENAME:</b>	
<b>APPROVALS</b> DRAWN: HELEN CHECKED: APPROVED: ENGINEER: BRIAN J. DESIGNER:	<b>DATE</b> 8/5/08	<b>TITLE</b> ISOLATED 20Mbps RS485 MODULE <sup>®</sup> TRANSCEIVER WITH POWER	
<b>CUSTOMER NOTICE</b> LINEAR TECHNOLOGY HAS MADE A BEST EFFORT TO DESIGN A CIRCUIT THAT MEETS CUSTOMER SUPPLIED SPECIFICATIONS. HOWEVER, IT REMAINS THE CUSTOMER'S RESPONSIBILITY TO VERIFY PROPER AND RELIABLE OPERATION IN THE ACTUAL APPLICATION. COMPONENT SUBSTITUTION AND PRINTED CIRCUIT BOARD LAYOUT MAY SIGNIFICANTLY AFFECT CIRCUIT PERFORMANCE OR RELIABILITY. CONTACT LINEAR TECHNOLOGY APPLICATIONS ENGINEERING FOR ASSISTANCE. THIS CIRCUIT IS PROPRIETARY TO LINEAR TECHNOLOGY AND SUPPLIED FOR USE WITH LINEAR TECHNOLOGY PARTS.		<b>SIZE</b> 2	<b>REV</b> 2
<b>BOARD ASSEMBLY</b>		<b>DWG NO</b> DC1503A-A-B, LTM2881CV-3/5	<b>SHEET</b> 1 OF 1
*		<b>SCALE</b> 2	<b>DATE</b> Wednesday, September 02, 2008

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

# DEMO MANUAL DC1503A

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