Increased LITELINK™ II Transmit Power

Application Note AN-149

1. Introduction

Some applications, such as voice computer telephony, require higher power transmission from the host equipment to the telephone network. This application note describes changes to the standard LITELINK II application circuits to provide the transmit gain needed for a particular application.

Note: The recommended maximum drive level into the line from LITELINK II is 6 mA peak, which is equivalent to about +10 dBm into a 600 Ω load. Datasheet specifications for maximum current (I_{DDL}) do not apply with higher than specified output power. LITELINK II will draw more current with higher output power.

2. Transmit Gain Design Procedure

1. Determine the peak transmit level needed for the application.
2. If necessary, convert the required peak transmit power into a voltage level. For example, 0 dBm into 600 Ω = 1.1 V_P.
3. Calculate the required linear voltage gain A_V by dividing the peak transmit voltage level from step 2 by 1.1.
4. Modify the following application circuit component vales:

$$Z_{ZTX} \leftarrow Z_{ZTX} / A_V$$

$$Z_{ZNT} \leftarrow Z_{ZNT} / A_V$$

$$R_{NTF} \leftarrow \frac{R_{NTF}}{((A_V - 1)(R_{NTF}/R_{NTS}) + A_V)}$$

These calculations result in a transmit (4-wire to 2-wire) gain of A_V, and a receive gain (2-wire to 4-wire) of $1/A_V$. If necessary, the receive loss can be compensated with either the programmable input gain of a CODEC or with a discrete op-amp gain stage between the LITELINK RX output and the host system.

3. Examples

3.1 PBX Example

To meet +3.18 dBm into 900 Ω, use the following calculations:

+3.18 dBm into 900 Ω = 1.935 V_P
1.935 V/1.1 V = 1.76.
The calculations work out as follows:

$$R_{ZTX} = 226/1.76 = 128.4$$

$$R_{ZNT} = 453/1.76 = 257.0$$

$$R_{NTF} = 1M/2.53 = 396683$$

The closest standard resistor values are 127 Ω for R_{ZTX}, 255 Ω for R_{ZNT}, and 392 kΩ for R_{NTF}.

3.2 +3 dBm into 600 Ohm Transmit Power Example

The following application circuit uses component values determined by the design procedure above for +3 dBm transmit power into 600 Ω.

Peak transmit power of +3 dBm into 600 Ω = 1.55 V_P.
1.55/1.1 = 1.41. The calculations work out as follows:

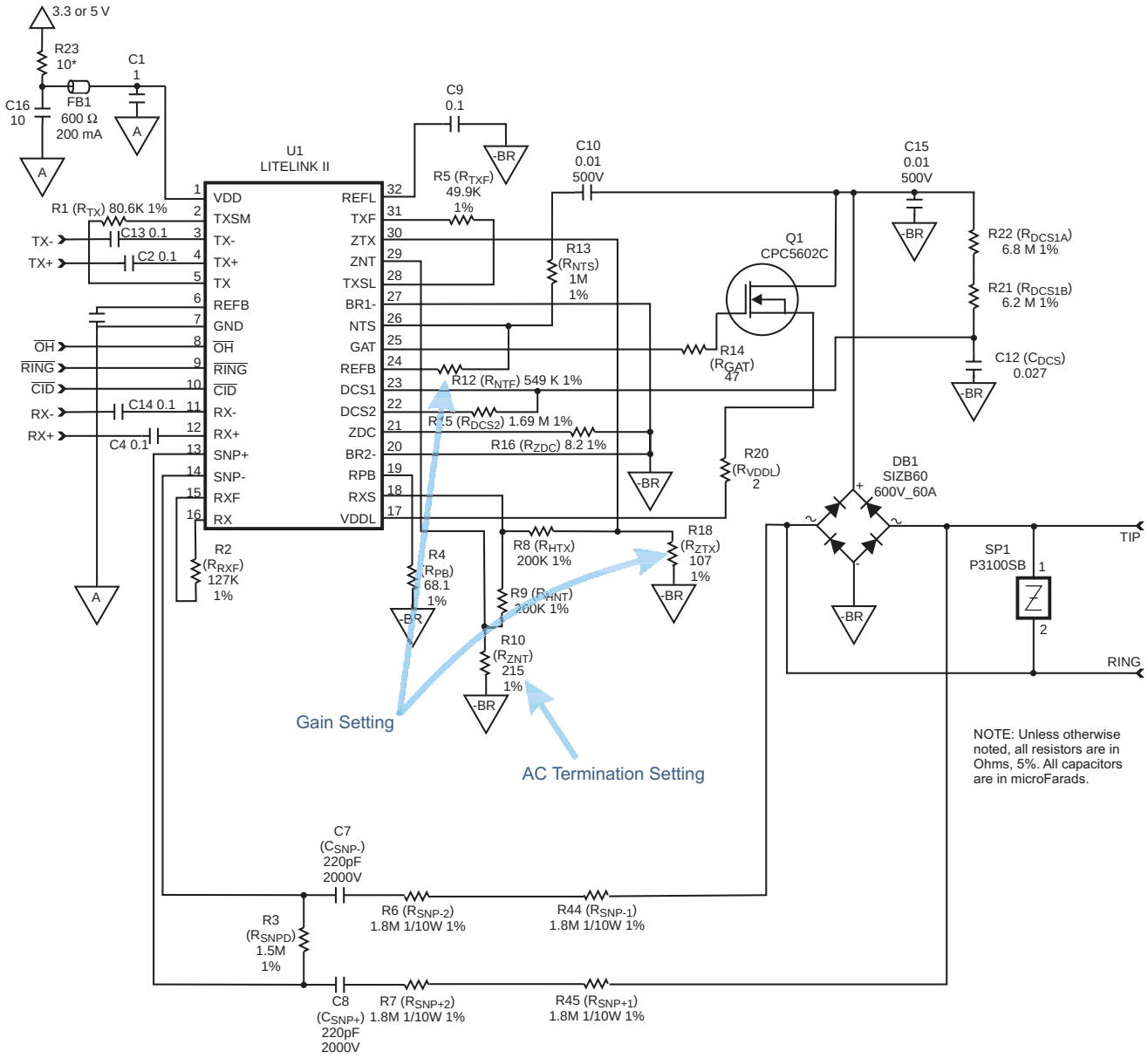
$$R_{ZTX} = 150/1.41 = 106.4$$

$$R_{ZNT} = 301/1.41 = 213.5$$

$$R_{NTF} = 1M/1.82 = 549000$$

Standard resistor values have been substituted in the circuit in Figure 1.

Figure 1. +3 dBm Application Circuit



4. LITELINK Design Resources

4.1 Clare, Inc. Design Resources

The Clare, Inc. web site has a wealth of information useful for designing with LITELINK, including application notes and reference designs that already meet all applicable regulatory requirements. LITELINK data sheets also contains additional application and design information. See the following links:

LITELINK datasheets and reference designs

Application note AN-107 **LOCxx Series - Isolated Amplifier Design Principles**

Application note AN-114 **ITC117P**

Application note AN-117 **Customize Caller-ID Gain and Ring Detect Voltage Threshold for CPC5610/11**

Application note AN-140, **Understanding LITELINK**

Application note AN-141, **Enhanced Pulse Dialing with LITELINK**

Application note AN-143, **Loop Reversal Detection with LITELINK**

Application note AN-146, **Guidelines for Effective LITELINK Designs**

Application note AN-147, **Worldwide Application of LITELINK**

Application note AN-150, **Ground-start Supervision Circuit Using IAA110**

4.2 Third Party Design Resources

The following also contain information useful for DAA designs. All of the books are available on amazon.com.

Understanding Telephone Electronics, Stephen J. Bigelow, et. al., Butterworth-Heinemann; ISBN: 0750671750

Newton's Telecom Dictionary, Harry Newton, CMP Books; ISBN: 1578200695

Photodiode Amplifiers: Op Amp Solutions, Jerald Graeme, McGraw-Hill Professional Publishing; ISBN: 007024247X

Teccor, Inc. Surge Protection Products

United States Code of Federal Regulations, CFR 47 Part 68.3

For additional information please visit www.clare.com