Linear Technology Chronicle

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Product of the Month

Low Power Single Chip DCE/DTE V.35 Transceiver

The **LTC®1346A** is a single chip transceiver that provides the differential clock and data signals for a V.35 interface from ±5V supplies. Combined with an LT®1134A RS232 transceiver for the control signals and the proper termination resistor network, the LTC1346A forms a complete low power DTE or DCE V.35 interface port. Figure 1 shows the LTC1346A used to provide clock and data signals to another LTC1346A peripheral port. The BI Technologies chip shown is a surface mount V.35 termination resistor network IC available from Beckman Industrial Technologies.

The LTC1346A features three current output differential transmitters and three differential receivers. The transmitters can be configured for DTE or DCE operation or shut down using three Select pins. In the shutdown mode, the supply current is reduced to below 1µA. The LTC1346A transceiver operates up to 10Mbaud. All transmitters feature short-circuit protection. Both the transmitter outputs and receiver inputs feature ±10kV ESD protection.

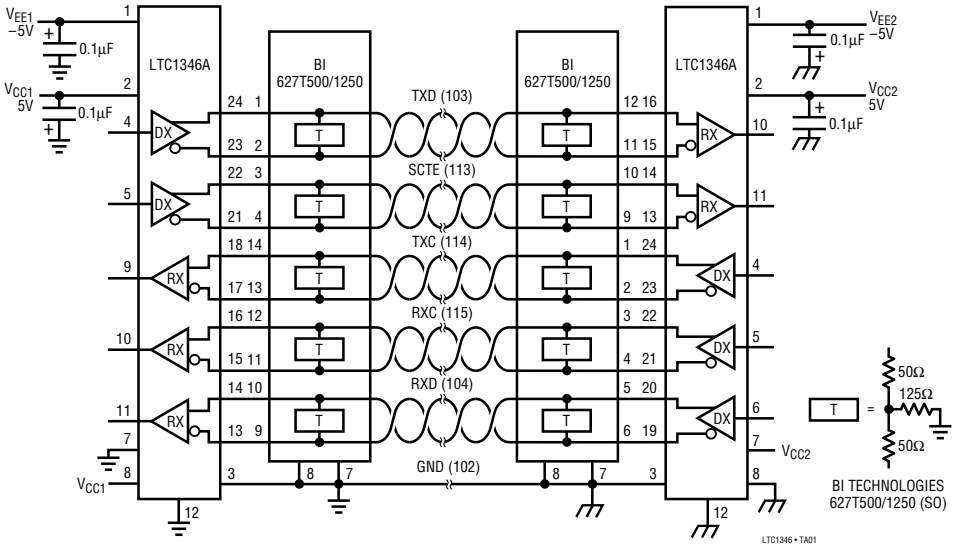

Figure 1. V.35 Clock and Data Signals Are Supplied by a Single LTC1346A IC

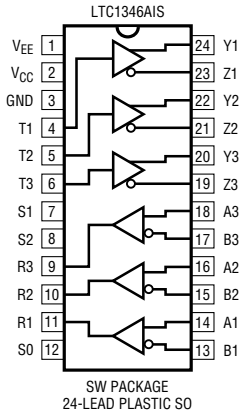

Figure 2. LTC1346A Is Available in a 24-Lead Surface Mount Package for Industrial Temperature Range Applications

The LTC1346A is an ideal V.35 interface chip for modems, data routers and other telecommunications applications with ±5V available. For single 5V applications, the single supply LTC1345 V.35 chip includes a charge pump to generate –5V from 5V.

The LTC1346A is available in the 24-lead plastic surface mount package. Device operating temperature is specified form 0°C to 70°C for the commercial LTC1346ACS and –40°C to 85°C for the industrial version, LTC1346AIS. Contact your local Linear Technology sales office for a data sheet and free evaluation samples of the LTC1346A.

Inside This Issue:

Half-Bridge N-Channel Power MOSFET Driver IC for Power Supply and Motor Control Applications

The **LT1336** is a cost effective half-bridge N-channel power MOSFET driver that can drive a topside N-channel power MOSFET operating with a high voltage

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(HV) rail of up to 60V (absolute maximum). In PWM operation, an on-chip switching regulator maintains charge in the bootstrap capacitor even when approaching and operating at 100% duty cycle.

The LT1336 has unique adaptive protection circuitry that prevents shoot thorough current, eliminating all matching requirements for the two MOSFETs. This greatly eases the design of high efficiency motor control and switching regulator systems. Figure 1 shows the LT1336 providing unidirectional motor control.

During low supply or start-up conditions, the undervoltage lockout actively pulls the driver outputs low to prevent the power MOSFETs from being partially turned on. The 0.5V hysteresis allows reliable operation even with slowly varying supplies.

The LT1336 is an ideal driver for PWM of high current loads, half-bridge and full-bridge motor control, synchronous step-down switching regulators, 3-phase brushless motor drives, high current transducer amplifiers and Class D power amplifiers.

The LT1336 is available in 16-lead plastic dual-in-line and surface mount packages specified for operation from 0°C to 70°C. Industrial grade versions are also available specified for operation from –40°C to 85°C. Please contact your local Linear Technology sales office for a data sheet and free evaluation samples of the LT1336.

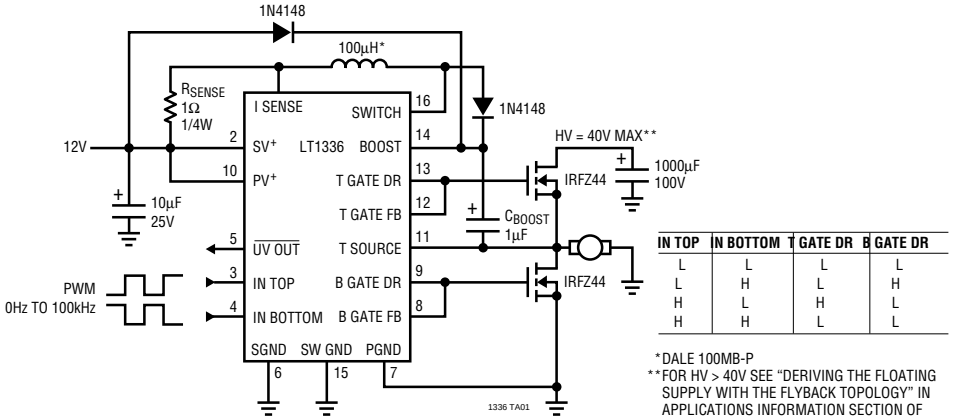

Figure 1. LT1336 Provides Half-Bridge Motor Drive Control with 40V Capability

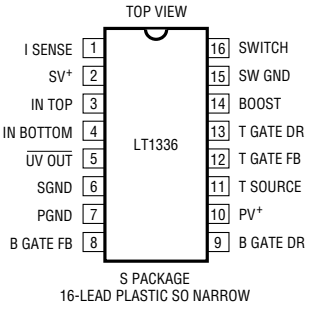

Figure 2. LT1336 Is Available in the 16-Lead Surface Mount Package Specified for Industrial Temperature Range

Single 5V 250kbaud RS232/RS485 Multiprotocol Transceiver Is Software Configurable

The **LTC1334** is a low power CMOS bidirectional transceiver featuring two reconfigurable interface ports. It can be configured as two RS485 differential ports, as two dual RS232 single-ended ports or as one RS485 differential port and one dual RS232 single-ended port. An onboard charge pump requires four 0.1µF capacitors to generate boosted positive and negative supplies, allowing the RS232 drivers to meet the RS232 ±5V output swing requirement with only a single 5V supply. Supply current is typically 8mA and a shutdown mode reduces the supply current to 10µA. Figure 1 shows a typical multimode RS232/RS485 port-to-port connection using LTC1334.

The RS232 transceivers typically operate to 250kBd and are in full compliance with RS232 specifications. All interface drivers feature short-circuit and thermal shutdown protection. An Enable pin allows RS485 driver outputs to be forced into high impedance, which is maintained even when the outputs are forced beyond the supply rail or power is off. Both driver outputs and receiver inputs feature ±10kV ESD protection. A loopback mode allows the driver outputs to be connected back to the receiver inputs for diagnostic self-test. Figure 2 shows various configuration schemes possible with the LTC1334 that enable the loopback feature.

The LTC1334 is an ideal interface device for use in software selectable RS485/RS422/RS232/EIA562 port applications or where multiple protocols need to be implemented simultaneously.

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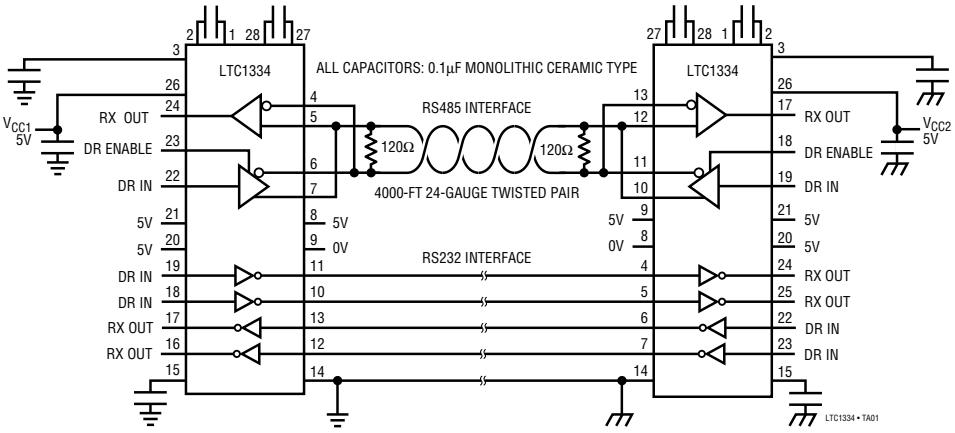

Figure 1. Typical LTC1334 Interface Connection Diagram

Application of the Month

LTC1430 Provides Efficient GTL Supply

A recent trend in computer bus architecture is the move toward GTL (Gunning Transition Logic) for routing high speed signals between the CPU and chipset logic. Buses with speeds in excess of 66MHz are using this technology. Several different GTL supply voltage standards seem to be evolving, with voltages from 1.2V to 1.5V being discussed most often. In some implementations of the logic family, the GTL supply must both source and sink currents of 5A to 10A. This causes a great deal of difficulty for a typical current mode control power supply design that is incapable of controlling negative load currents. The LTC1430 is a voltage mode controller, and as such, does not exhibit any problems with negative load currents.

Most GTL solutions, however, appear not to require current sinking supplies and the LTC1430 is well suited for these applications as well. The circuit shown in Figure 1 switches at 300kHz, regulating a 5V input down to a 1.5V output while maintaining good efficiency (see Figure 2). Figure 3 shows the effects of a fast 4A load transient on the 1.5V output. The initial current was 1A and the final current 5A. The top trace is the output voltage (100mV/Div) and the bottom trace is the regulator's inductor current (5A/Div). In Figure 4, the load resistor is switched from ground to a 3V supply, resulting in bidirectional loading. Current is switched from 5A to –4A. Again, the top trace is the output of the 1.5V supply. The relatively long recovery period is actually a response to the pertubation that appears on the input voltage as a result of the large load change. Voltage mode control suffers from inherently poor line rejection. In this case, the lab supply used for the tests exhibits rather poor dynamics. If a better input supply is used, the overall settling time will be much faster. The LTC1430 also has a very accurate reference and exhibits good static load regulation, as can be seen from the very small offset between the settled light load and heavy load conditions on the output voltage trace.

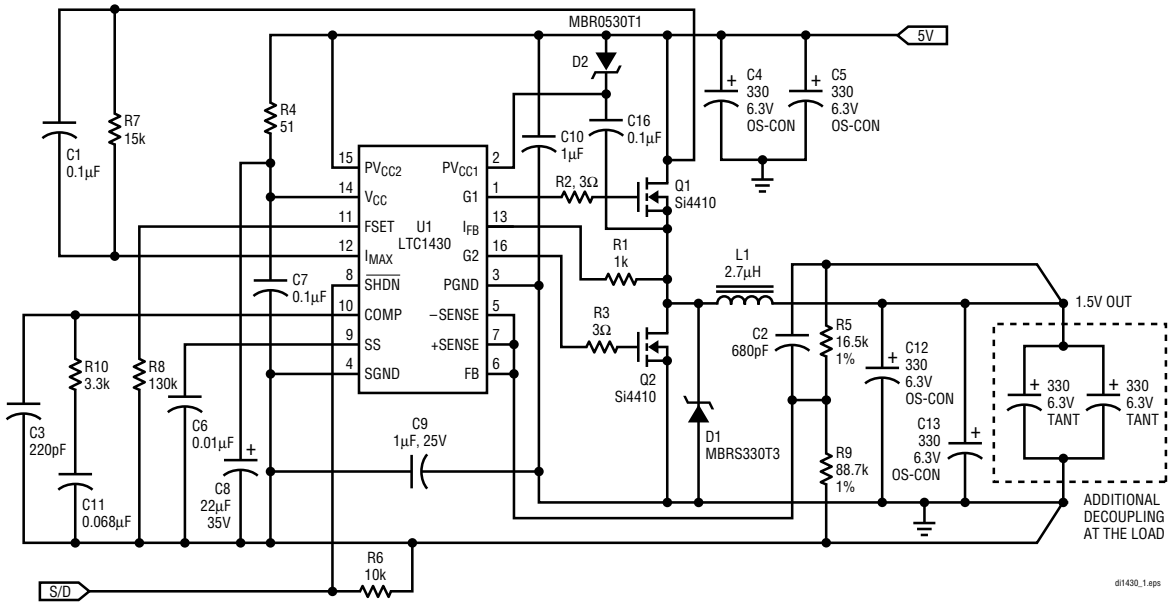

Figure 1. Schematic Diagram of GTL Supply

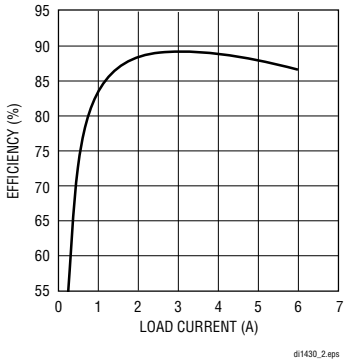

Figure 2. Efficiency Plot of the GTL Supply

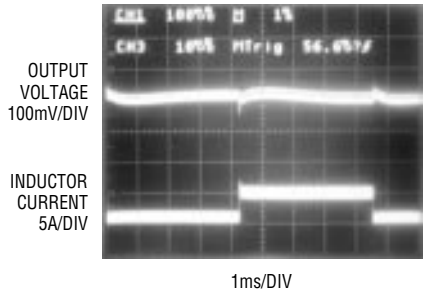

Figure 3. Oscillograph Showing Effects of 4A Load Step on the 1.5V Output

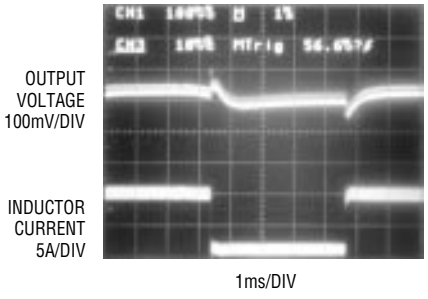

Figure 4. Oscillograph Showing Effects of Bidirectional Loading on the GTL Supply

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Applications for the LTC1334 include cable repeaters, level translators and CSU/DSU interface ports in telecommunications control signal applications. The LTC1334 is available in 28-lead plastic dual-in-line and 28-lead surface mount packages, specified for operation from 0°C to 70°C. Contact your local Linear Technology Corporation sales office for a data sheet and evaluation samples of the LTC1334.

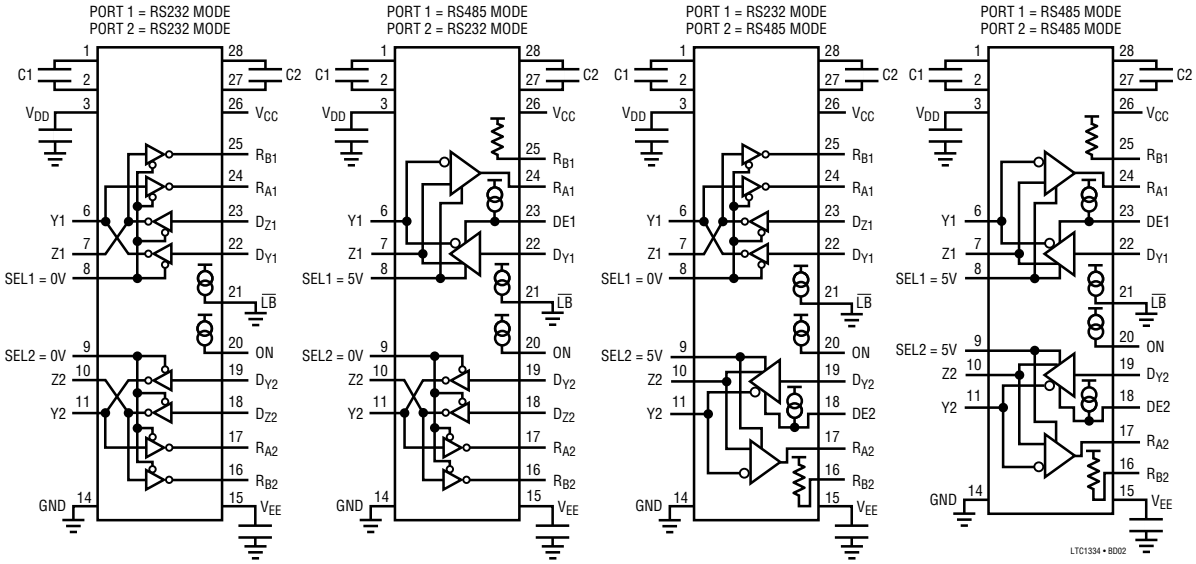

Figure 2. LTC1334 Configurations Using Loopback Self Diagnostics Hookup

5ppm/°C, 0.05% Accurate, Industrial Grade Voltage Reference in 8-Lead Surface Mount Package

The **LT1236** is an industrial grade precision voltage reference in an 8-lead surface mount package. This new reference combines a tight 0.05% maximum initial accuracy with a low 5ppm/°C maximum drift. The drift is guaranteed by measuring the slope of the output voltage vs temperature. Most references are specified using the "box" method, often resulting in a two or more times worse incremental slope. The LT1236 5ppm°C is a worst-case specification over the full temperature range. The reference has a typical 0.1Hz to 10Hz noise level of $3\mu V_{P-P}$ and is 100% production tested for a maximum 10Hz to 1kHz noise level of only $3.5\mu V_{P-P}$.

The LT1236 is available in both the 8-lead dual-in-line and 8-lead surface mount packages in three performance grades. Devices are provided with 5V and 10V output voltages for both the commercial and industrial temperature ranges. The output of the LT1236 sinks and sources 10mA and is almost totally immune to input voltage variations.

As was the case with previous high performance voltage references, no on-chip heater is necessary to reach such accurate performance levels when using the LT1236. The LT1236 references are based on a buried Zener diode structure which eliminates noise and stability problems associated with surface breakdown devices. Further, a subsurface Zener exhibits better temperature drift and time stability than even the best bandgap references. Figure 1 shows the typical distribution of temperature drift with various production runs of the LT1236 devices.

The LT1236 can be used in series or shunt mode. The 10V version can be used as a shunt regulator (2-terminal Zener) with the same precision characteristics as the 3-terminal connection. Special care has been taken to minimize thermal regulation effects and temperature induced hysteresis.

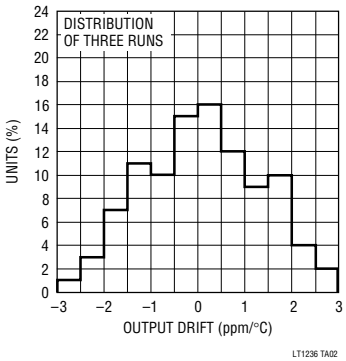

Figure 1. LT1236 Output Temperature Drift

The low power, high accuracy LT1236 is ideal for use in process control, data acquisition and remote sensing applications. The LT1236-5 and LT1236-10 come in three performance grades; A, B and C. All versions are available specified for operation over the 0°C to 70°C (C) range and –40°C to 85°C (I) range in the 8-lead dual-in-line (N8) package as well as the 8-lead surface mount (S8) package. Contact your local Linear Technology Corporation sales office for a data sheet and free evaluation samples of the LT1236.