LTC2875
±60V Fault Protected 3.3V or 5V High Speed CAN Transceiver

DESCRIPTION

Demonstration circuit 2063A is a robust high speed, low power, ISO 11898-2 compliant CAN transceiver featuring the LTC®2875. The demo circuit operates on 3.3V or 5V supplies and features ±60V overvoltage fault protection on the data transmission lines during all modes of operation. The demo circuit contains all the components necessary to demonstrate the features of the LTC2875 in a CAN network, including a terminated SMB jack for TXD data input, jumper selectable CAN bus termination (supporting either single or split termination configurations), and a jumper selectable variable slew rate control.

Design files for this circuit board are available at http://www.linear.com/demo/DC2063A

PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
V_{CC}	Input Supply Range	3.3V V_{CC} Range	3.0	3.3	3.6	V
		5V V_{CC} Range	4.5	5.0	5.5	V
f_{MAX}	Maximum Data Rate	JP3 in 'MAX' position	4			Mbps
	Interface I/O: CANH, CANL		–60		60	V
	Bus Differential Voltage (CANH-CANL)	JP2 in 'SINGLE' or 'SPLIT' position			10	V

OPERATING PRINCIPLES

The LTC2875 is enabled by pulling the RS pin low. The slew rate of the transmitter can be controlled by pulling RS low with a resistor ≤ 200kΩ, with the slew rate decreasing with increasing resistor value. The DC2063A provides two jumper positions to enable the LTC2875. With a jumper in the JP3:MAX position, the RS pin is grounded and the LTC2875 operates at its maximum slew rate. With a jumper in the JP3:ADJ position, the transmitter slew rate can be varied from its minimum to maximum using 200kΩ variable resistor RV1. When no jumper is placed on JP3, the RS pin in the LTC2875 is pulled up by an internal 250kΩ resistor, putting the chip in the shut-down state.

The data input signal can be applied to the LTC2875 TXD pin through either the TXD turret or the SMB jack J1. To apply the TXD signal through the SMB jack J1, place a jumper on the JP1:SMB position. The SMB input is terminated to GND by a 50Ω resistor. To apply the TXD signal through the TXD turret, place a jumper on the JP1:TURRET position. The TXD turret input contains a 100Ω series resistor but is not terminated. Jumpers may be applied to both JP1:SMB and JP1:TURRET to enable applying a signal from a pulse generator through the SMB jack J1 and monitoring the signal with a scope probe on the TXD turret.

OPERATING PRINCIPLES

When TXD is low, the LTC2875 drives the dominant state onto the CANH and CANL bus lines, with CANH pulled high and CANL pulled low. When TXD is high, the LTC2875 is in the recessive state, with both CANH and CANL drivers in the high impedance state, and the differential voltage on the CAN bus lines is returned to near zero by the termination resistors. The TXD pin is pulled high by an internal 500kΩ resistor when it is left floating.

The CAN bus must be terminated at both ends by resistors matched to the impedance of the bus cable, typically 120Ω, while all other nodes on the CAN bus must be unterminated. The DC2063A provides three jumper selectable termination configurations: split termination, single termination, and no termination. The split termination is selected by placing two jumpers on JP2 in the SPLIT (vertical) configuration. This provides 120Ω termination consisting of two series 60Ω resistors with the LTC2875 SPLIT pin and a 4.7nF decoupling capacitor biasing the termination center point. This configuration lowers the EME of the transmitted signal by reducing common mode voltage fluctuations. The single termination is selected by placing two jumpers on JP2 in the SINGLE (horizontal) configuration. This provides 120Ω termination consisting of two series 60Ω resistors with no biasing of the center point. No termination may be selected by removing both jumpers from JP2.

The LTC2875 receiver senses the differential voltage on the CAN bus lines and produces a digital output on the RXD pin. When a dominant state is sensed on the bus lines, the RXD output will pull low. When a recessive state is sensed on the bus lines, the RXD output will pull high. When the LTC2875 is in the shutdown state, the RXD pin is pulled high by an internal 500kΩ resistor. The LTC2875 RXD pin is connected directly to the DC2063A RXD turret.

QUICK START PROCEDURE

Demonstration circuit 2063A is easy to set up and evaluate the performance of the LTC2875.

1. Verify the jumpers are in the following default positions:

   JP1:SMB ON; **JP1:TURRET** OFF

   JP2: SPLIT

   JP3:MAX ON; **JP3:ADJ** OFF

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

3. Turn on the power at the input.

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

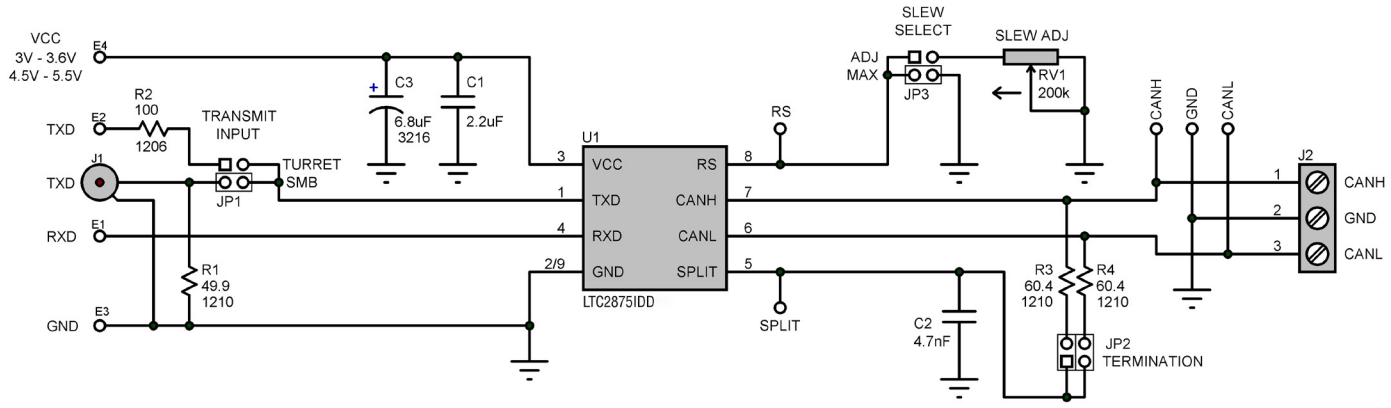
4. Connect a function generator to SMB jack J1 and set to square wave with a low of 0V, high = V_{CC}. Set frequency to 100kHz (200kbps). Enable output of function generator.

5. Connect oscilloscope to pin RXD and observe 100kHz waveform. This demonstration shows that data applied to TXD is transmitted to the CAN bus, looped back through the receiver, and outputted on RXD.

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	U1	IC, CAN Transceiver	LINEAR LTC2875IDD
Hardware/Components (For Demo Board Only)				
2	1	C1	Capacitor, 2.2µF, 10%, 0603, 10V, X7R	Murata/GRM188R71A225KE15D
3	1	C2	Capacitor, 4700pF 20% 0603, 100V, X7R	AVX/06031C472MAT2A
4	1	C3	Capacitor, Tantalum, 6.8µF, 10%, 3216, 16V	AVX/TAJA685K016RNJ
5	2	E1, E2	Turret	Mill Max/2308-2-00-80-00-00-07-0
6	2	E3, E4	Turret	Mill Max/2501-2-00-80-00-00-07-0
7	1	J1	Connector, SMB Male Jack, Straight, 50Ω	Amphenol/142138
8	1	J2	Terminal Block, 3 Position, Side Entry 3.5mm	TE Connectivity/284391-3
9	3	JP1-3	Header, 2 x 2 0.1"	Samtec/TSW-102-07-G-D
10	1	R1	Resistor, 49.9Ω, 1%, 1210	Panasonic/ERJ-14NF49R9U
11	1	R2	Resistor, 100Ω, 5%, 1206	AAC/CR10-101JM
12	2	R3, R4	Resistor 60.4Ω, 1%, 1210	Vishay/CRCW121060R4FKEA
13	1	RV1	Trimmer, 200kΩ, 1-Turn	Panasonic/EVM-3VSX50B25
14	4		Standoff, Snap-on	Keystone/8833

SCHEMATIC DIAGRAM



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