LTC6820
isoSPI/Isolated CAN
Arduino Shield

DESCRIPTION

Demonstration circuit 2617A implements the isoSPI and isolated CAN interface hardware on a single Arduino shield. It allows Arduino-compatible controller boards to communicate with isoSPI and/or CAN bus networks.

DC2617A is compatible with both 5V or 3.3V logic controller boards. DC2617A derives its power directly from the Arduino controller board via the 3.3V output.

isoSPI is a robust 2-wire isolated interface popularized by Analog Device's family of high voltage battery stack monitors. DC2617A includes the LTC®6820 and associated transformers to translate between the Arduino's SPI port and the RJ45 isoSPI connector.

CAN bus is a robust standards-based communications method used in automotive and industrial settings. DC2617A includes the LTM2889 isolated CAN transceiver to connect to a CAN bus on the standard 9-pin sub-D connector. An onboard controller (MCP2515) provides the logic interface between the Arduino's SPI and CAN. Alternatively, DC2617A can be connected directly to controller boards which include CAN functionality.

Design files for this circuit board are available at http://www.linear.com/demo/DC2617A

QUICK START PROCEDURE

(Throughout this document, any controller board with Arduino-Uno compatible sockets will be referred to simply as Arduino. An example of this can be the DC2026C Linduino® One)

1. Plug the DC2617A into the Arduino.

2. Provide power to the Arduino. This will also power-up the DC2617A through the 3.3V power pin of the sockets. (Do not apply power to the turret labeled V_{CC} 3.3V to 5V)

3. Connect J6 isoSPI to the isoSPI network using a RJ45 cable.

   (Alternatively, isoSPI can be accessed using the test points labeled isoIP and isoIM)

4. Connect J1 CAN to the CAN bus using a DB9 cable.

   (Alternatively, CAN may be accessed using pins labeled CH and CL. It is also possible to connect a USB CAN dongle directly to J1 by removing the DB9 gender changer that is plugged into J1.)

   Table 1 lists the connections that the shield pins establish between the Arduino and the DC2617A.

Table 1

LOGIC SIGNAL	ARDUINO LABEL	DC2617A SCHEMATIC	COMMENTS
SCK	13	J2 – Pin 6	SPI Serial Clock to MCP2515 and LTC6820
SO	12	J2 – Pin 5	SPI Serial Data Out from MCP2515 and LTC6820
SI	11	J2 – Pin 4	SPI Serial Data in to MCP2515 and LTC6820
CS_6820	10	J2 – Pin 3	SPI Chip Select for LTC6820
CS_2515	9	J2 – Pin 2	SPI Chip Select for MCP2515
IOREF	IOREF	J4 – Pin 2	Logic Supply Level for SPI
3V3	3V3	J4 – Pin 4	3.3V Supply from Arduino to LTM2889
INT	2	J3 – Pin 3	Connects to INT of MCP2515
SCL/CAN1_RX	SCL	J2 – Pin 10	Connects to LTM2889 CAN RXD if JP1 set to Nuc
SDA/CAN1_TX	SDA	J2 – Pin 9	Connects to LTM2889 CAN TXD if JP1 set to Nuc

Table 1. Connections

JUMPER SETTINGS

Use the following jumper settings to further configure the DC2617A:

JUMPER JP1	FUNCTION
Set JP1 to ARD	Establish SPI communication between Arduino and MCP2515. In this setting, MCP2515 handles the logic communication between SPI and CAN. LTM2889 is the physical layer CAN transceiver.
Set JP1 to NUC	Establish communication directly from pins CAN1_RX/CAN1_TX (J2) to LTM2889. This can be useful in some controller boards such as Nucleo, which have built-in CAN functionality which comes out on these pins. LTM2889 is the physical layer CAN transceiver.

JUMPER JP2	FUNCTION
Set JP2 to ON	Termination to LTM2889 is turned on. See LTM2889 data sheet for details.
Set JP2 to OFF	Termination of LTM2889 is turned off. See LTM2889 data sheet for details.

CAN BUS POWER

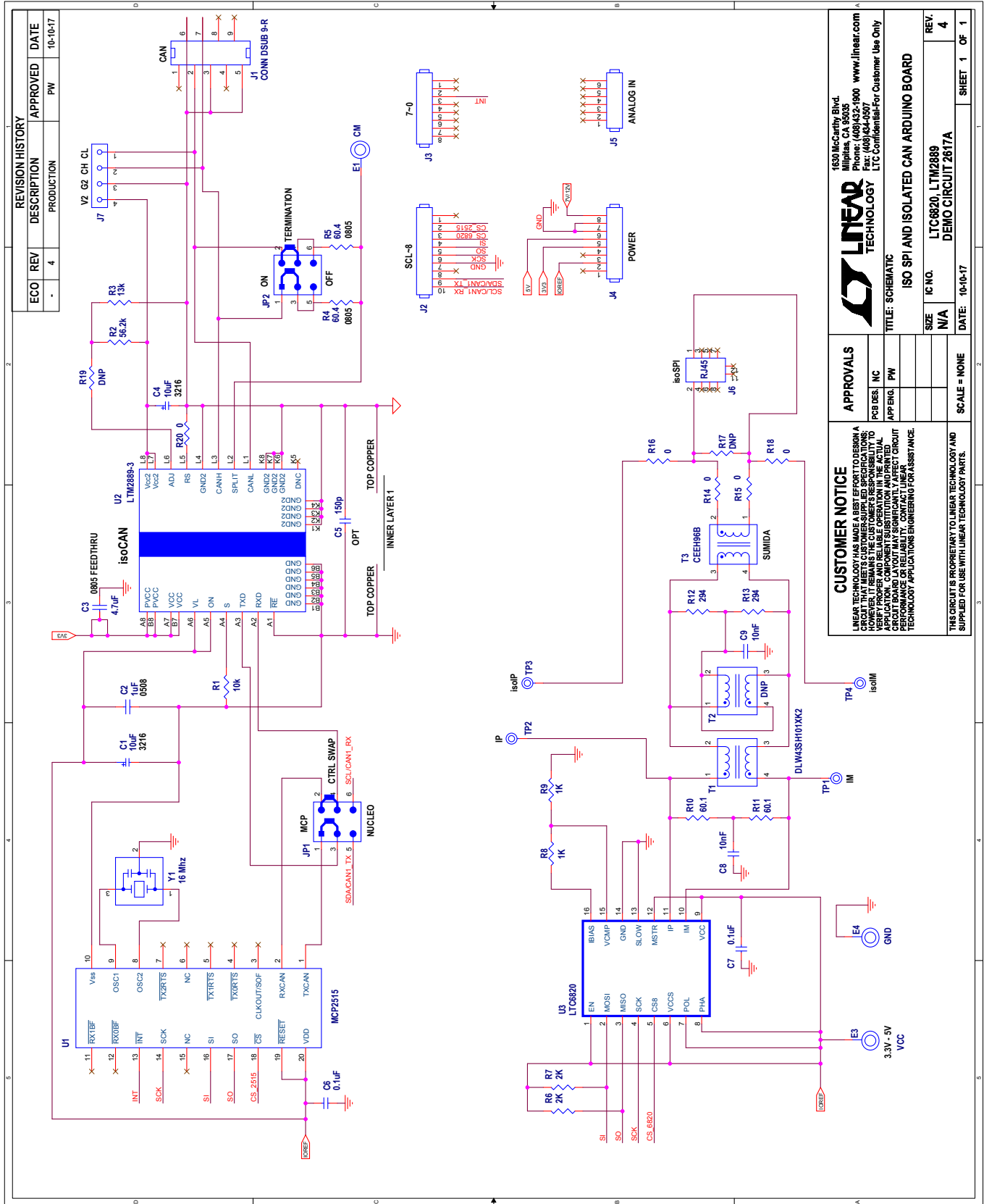LTM®2889 includes a built-in isolated power supply that provides an isolated power output (5V) on the same ground domain as the isolated CAN bus. This output can be accessed using pins V2/G2 on connector J7. See LTM2889 data sheet for details.

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	2	C1, C4	Capacitor, Tantalum, 10µF 'A' 10V	AVX, TAJA106M010RNJ
2	1	C2	Capacitor, 1µF 20% 0508 10V X7R	Murata, LLL219R71A105MA01L
3	1	C3	Capacitor Feedthru 4.7µF 20% 10V 0805	Murata, NFM21PC475B1A3D
4	0	C5	Optional, Capacitor, X1Y1, 150pF 10% 760VAC	Vishay/VY1151K31Y5SQ63V0
5	2	C6, C7	Capacitor, 0.1µF, X7R, 25V, 10%, 0603, Automotive	Murata, GCM188R71E104KA57D
6	2	C8, C9	Capacitor, 0.01µF, X7R, 25V, 10%, 0603	Murata, GRM188R71E103KA01D
7	3	E1, E3, E5	Testpoint, Turret, 0.063"	Mill-Max, 2308-2-00-80-00-00-07-0
8	1	J1	9 Position D-Sub Receptacle, Female Sockets Connector	Assmann, A-DF 09 A/KG-T4S
9	1	J2	Conn. Header. 10POS 0.100"	Adam Tech., RS1-10-G-.561-A11596
10	2	J3, J4	Conn. Header. 8POS 0.100"	Adam Tech., RS1-08-G-.561-A11596
11	1	J5	Conn. Header. 6POS 0.100"	Adam Tech., RS1-06-G-.561-A11596
12	1	J6	Connector RJ45, CACE Code 00779	Tyco, 5406298-1
13	1	J7	Conn Header 4POS, 0.1"	Samtec, TSW-104-07-L-S
14	1	J8	Gender Changer, D-Sub9, Metal Housing, M/M, with Hex Screws	Assmann, AK-610505-000-I
15	2	JP1, JP2	Header, 0.1", 2x3 Pin	Wurth Elektronik 61300621121
16	2	JP1, JP2	Connector Shunt, 0.1", 4POS (2x2)	Samtec, MNT-102-BK-G
17	1	R1	Resistor, 10k 1% 0603 1/10W	Vishay, CRCW060310K0FKEA
18	2	R10, R11	Resistor, 60.4Ω, 1/10W, 1% 0603	Vishay, CRCW060360R4FKEA
19	2	R12, R13	Resistor, 294Ω, 1/10W, 1% 0603	Vishay, CRCW0603294RFKEA
20	5	R14, R15, R16, R18, R20	Resistor, 0Ω 1% 0603	Vishay, CRCW06030000Z0EA
21	0	R17	Resistor, 0603, DNP	
22	0	R19	Resistor, DNP	
23	1	R2	Resistor, 56.2k 1% 0603 1/10W	Vishay, CRCW060356K2FKEA
24	1	R3	Resistor, 13k 1% 0603 1/10W	Vishay, CRCW060313K0FKEA
25	2	R4, R5	Resistor, 60.4Ω 1% 0805 1/8W	Vishay, CRCW080560R4FKEA
26	2	R6, R7	Resistor, 2k, 1/10W, 1% 0603	Vishay, CRCW06032K00FKEA
27	2	R8, R9	Resistor, 1k, 1/10W, 1% 0603	Vishay, CRCW06031K00FKEA
28	1	T1	CHOKE, Common Mode Choke Coil for Automotive, 100µH, −30%/+50% (at 1MHz)	Murata, DLW43SH101XK2L
29	0	T2	CHOKE, Trans, DNP	
30	1	T3	Transformer, Pulse, Hi Isolation	Sumida, CEEH96B
31	1	U1	CAN controller	Microchip, MCP2515-E/ST
32	1	U2	Isolated CAN Transceiver w/Isolated Power, 3.3V	Linear Tech., LTM2889HY-3#PBF
33	1	U3	isoSPI Isolated Communications Interface	Linear Tech., LTC6820HMS#PBF
34	1	Y1	Resonator 16.0MHz Ceramic	Murata, CSTCE16M0V53-R0

SCHEMATIC DIAGRAM

ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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