LT3669
Industrial Transceiver with Integrated Step-Down Regulator and LDO

DESCRIPTION

Demonstration circuit 1733A is an industrial transceiver with integrated step-down regulator and LDO featuring the LT®3669. The board operates from 7.5V to 40V when JP7 is set to L^+. When the JP7 is set to RES, the minimum input voltage is 16.5V. The board withstands transients up to 60V. The step-down regulator output is 5V. The LDO output is 3.3V. There are two assembly versions. DC1733A-A is for the LT3669 and DC1733A-B is for the LT3669-2. The difference is the LT3669 has an integrated catch diode. The LT3669-2 requires an external catch diode. Table 1 shows the differences between the two versions.

The board also provides various interfaces for line drivers and receivers. JP8 to JP11 set the signal sources or levels for TXEN1, TXEN2, TXD1 and TXD2.

The LT3669 data sheet gives complete descriptions of the part, operation and application information. The data sheet must be read in conjunction with this quick start guide for working on or modifying the demo circuit 1733A.

Design files for this circuit board are available. Call the LTC Factory.

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PERFORMANCE SUMMARY

Specifications are at T_A = 25°C

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
L^+	Input Supply		7.5		40	V
V_{BUCK}	Output Voltage	Step-Down Regulator	4.75	5	5.25	V
V_{LDO}	Output Voltage	LDO	3.135	3.3	3.465	V
I_{BUCK}	Maximum Buck Output Current	LT3669, Step-Down Regulator V_{BUCK} = 5V	100			mA
		LT3669-2, Step-Down Regulator V_{BUCK} = 5V	300			mA
I_{LDO}	Maximum LDO Output Current	LT3669, VLDO = 3.3V	100			mA
		LT3669-2, VLDO = 3.3V	150			mA
FSW	Switching Frequency			600		kHz
EFF	Efficiency	LT3669, L^+ = 12V, V_{BUCK} = 5V, I_{BUCK} = 100mA		65		%
		LT3669-2, L^+ = 12V, V_{BUCK} = 5V, I_{BUCK} = 300mA		76		%
TRST	Reset Timeout Period	C5=100nF		12.5		ms

Table 1. Version Table

ASSY TYPE	U1	I_{LDO}	I_{BUCK}	C8	C9	D6	L1
DC1733A-A	LT3669EUFD	0.1A	0.1A	10µF	0.1µF	OPEN	82µH, CDRH4D22HPNP-820MC
DC1733A-B	LT3669EUFD-2	0.15A	0.3A	22µF	0.22µF	DFLS160	33µH, CDRH50D28RNP-330MC

QUICK START PROCEDURE

Demonstration circuit 1733A is easy to set up to evaluate the performance of the LT3669 or the LT3669-2. Refer to Figure 1 for proper measurement equipment setup and follow the procedure below:

NOTE. When measuring the input or output voltage ripple, care must be taken to avoid a long ground lead on the oscilloscope probe. Measure the input or output voltage ripple by touching the probe tip directly across the terminals of the input or output capacitors. See Figure 2 for proper scope probe technique.

1. Place jumpers in the proper positions.
2. With power off, connect an input power supply to L^+ and L^-/GND. The input supply can be a bench power supply or can be from the respective output from a master controller.
3. With power off, connect the load to V_{BUCK} and GND.
4. With power off, connect another load to V_{LDO} and GND.
5. Turn on the power at the input.
6. Check for the proper output voltages.

   NOTE. If there is no output, temporarily disconnect the load to make sure that the load is not set too high or is shorted.
7. Once the proper output voltage is established, adjust the loads within the operating range and observe the output voltage regulation, ripple voltage, efficiency and other parameters.
8. To test driver and receiver functions, use JP8 to JP11 to set up the proper signal sources or levels for TXEN1, TXEN2, TXD1, and TXD2.
9. Set up or monitor other signals as needed.
10. Once the above signals are set up, observe driver's outputs and receiver's inputs and outputs.

QUICK START PROCEDURE

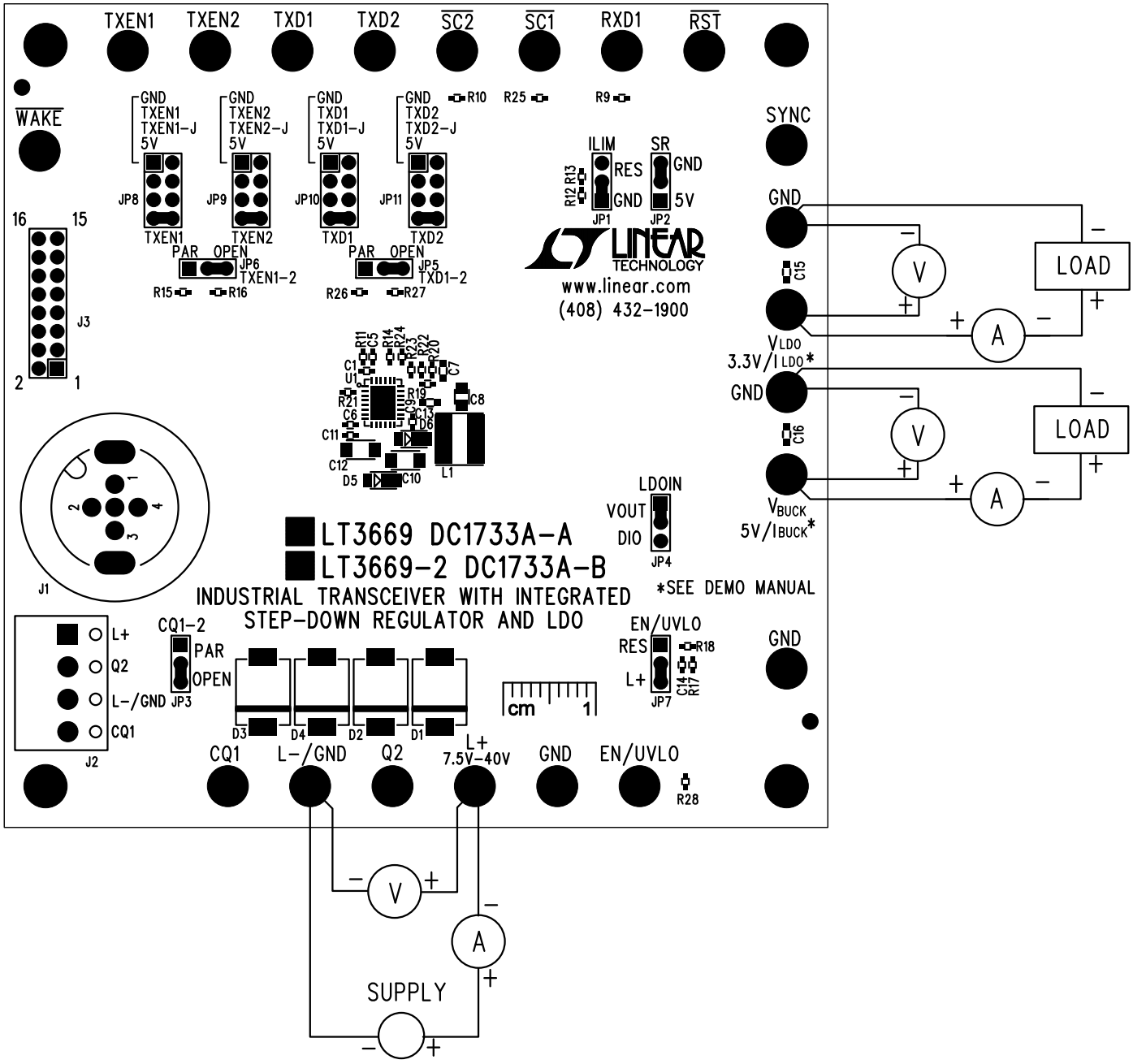

Figure 1. Proper Measurement Equipment Setup

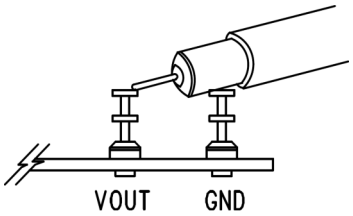

Figure 2. Measuring Input or Output Ripple

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
Required Circuit Components				
1	1	C1	CAP., C0G, 10pF, 25V, 5% 0402	AVX, 04023A100JAT2A
2	1	C5	CAP., X7R, 100nF, 25V, 10% 0402	AVX, 04023C104KAT2A
3	2	C6, C11	CAP., C0G, 470pF, 50V, 5% 0402	AVX, 04025A471JAT2A
4	1	C7	CAP., X7R, 1µF, 6.3V, 10% 0603	AVX, 06036C105KAT2A
5	1	C12	CAP., X7R, 4.7µF, 50V, 10% 1206	MURATA, GRM31CR71H475KA88L
6	3	C13, C15, C16	CAP., X5R, 0.1µF, 25V, 10% 0603	AVX, 06033D104KAT2A
7	4	D1, D2, D3, D4	TVS, SMCJ36A SMC	Diodes Inc., SMCJ36A
8	2	R9, R21	RES., CHIP, 10K, 1/16W, 1% 0402	VISHAY, CRCW040210K0FKED
9	5	R10, R11, R14, R18, R25	RES., CHIP, 100K, 1/16W, 1% 0402	VISHAY, CRCW0402100KFKED
10	1	R12	RES., CHIP, 42.2K, 1/16W, 1% 0402	VISHAY, CRCW040242K2FKED
11	1	R13	RES., CHIP, 0Ω, 1/16W, 0402	VISHAY, CRCW04020000Z0ED
12	5	R15, R16, R26, R27, R28	RES., CHIP, 1K, 1/16W, 5% 0402	VISHAY, CRCW04021K00JKED
13	1	R17	RES., CHIP, 1M, 1/16W, 1% 0402	VISHAY, CRCW04021M00FKED
14	1	R19	RES., CHIP, 14K, 1/16W, 1% 0402	VISHAY, CRCW040214K0FKED
15	1	R20	RES., CHIP, 4.42K, 1/16W, 1% 0402	VISHAY, CRCW04024K42FKED
16	1	R22	RES., CHIP, 53.6K, 1/16W, 1% 0402	VISHAY, CRCW040253K6FKED
17	1	R23	RES., CHIP, 10.2K, 1/16W, 1% 0402	VISHAY, CRCW040210K2FKED
18	1	R24	RES., CHIP, 38.3K, 1/16W, 1% 0402	VISHAY, CRCW040238K3FKED
DC1733A-A Version Specific Components				
1	1	C8	CAP., X5R, 10µF, 6.3V, 10% 0805	MURATA, GRM219R60J106KE19D
2	1	C9	CAP., X7R, 0.1µF, 10V, 10% 0402	TDK, C1005X7R1A104K
3	0	D6(OPEN)	DIODE, POWER-DI-123	
4	1	L1	INDUCTOR, 82µH	SUMIDA, CDRH4D22HPNP-820MC
5	1	U1	IC., LT3669EUFD QFN 4X5, 29 PIN	LINEAR TECH., LT3669EUFD#PBF
DC1733A-B Version Specific Components				
1	1	C8	CAP., X5R, 22µF, 6.3V, 10% 0805	MURATA, GRM21BR60J226M
2	1	C9	CAP., X7R, 0.22µF, 10V, 10% 0402	TDK, C1005X7R1A224K
3	1	D6	DIODE, POWER-DI-123	Diodes Inc., DFLS160-7
4	1	L1	INDUCTOR, 33µH	SUMIDA, CDRH50D28RNP-330MC
5	1	U1	IC., LT3669EUFD-2 QFN 4X5, 29 PIN	LINEAR TECHNOLOGY CORPORATION, LT3669EUFD-2#PBF
Additional Demo Board Circuit Components				
1	0	C10(OPT)	CAP., 1206	
2	0	C14(OPT)	CAP., 0402	
3	0	D5(OPT)	DIODE, POWER-DI-123	
Hardware: For Demo Board Only				
1	21	E1-E21	TESTPOINT, TURRET, .094" pbf	MILL-MAX, 2501-2-00-80-00-00-07-0
2	7	JP1-JP7	3 PIN 0.079 SINGLE ROW HEADER	SULLINS, NRPN031PAEN-RC
3	4	JP8-JP11	2X4, 0.079 DOUBLE ROW HEADER	SULLINS, NRPN042PAEN-RC
4	11	xJP1-xJP11	SHUNT, 0.079" CENTER	SAMTEC, 2SN-BK-G
5	1	J1	M12 CONNECTOR, 5 PIN	BINDER, 09 3441 500 05
6	1	J2	CONNECTOR, OSTTV041150	On shore tech., OSTTV041150
7	1	J3	2X8, 0.079 DOUBLE ROW HEADER	SULLINS, NRPN082PAEN-RC
8	4	(STAND-OFF)	STAND-OFF, NYLON 0.25"	KEYSTONE, 8831(SNAP ON)

SCHEMATIC DIAGRAM

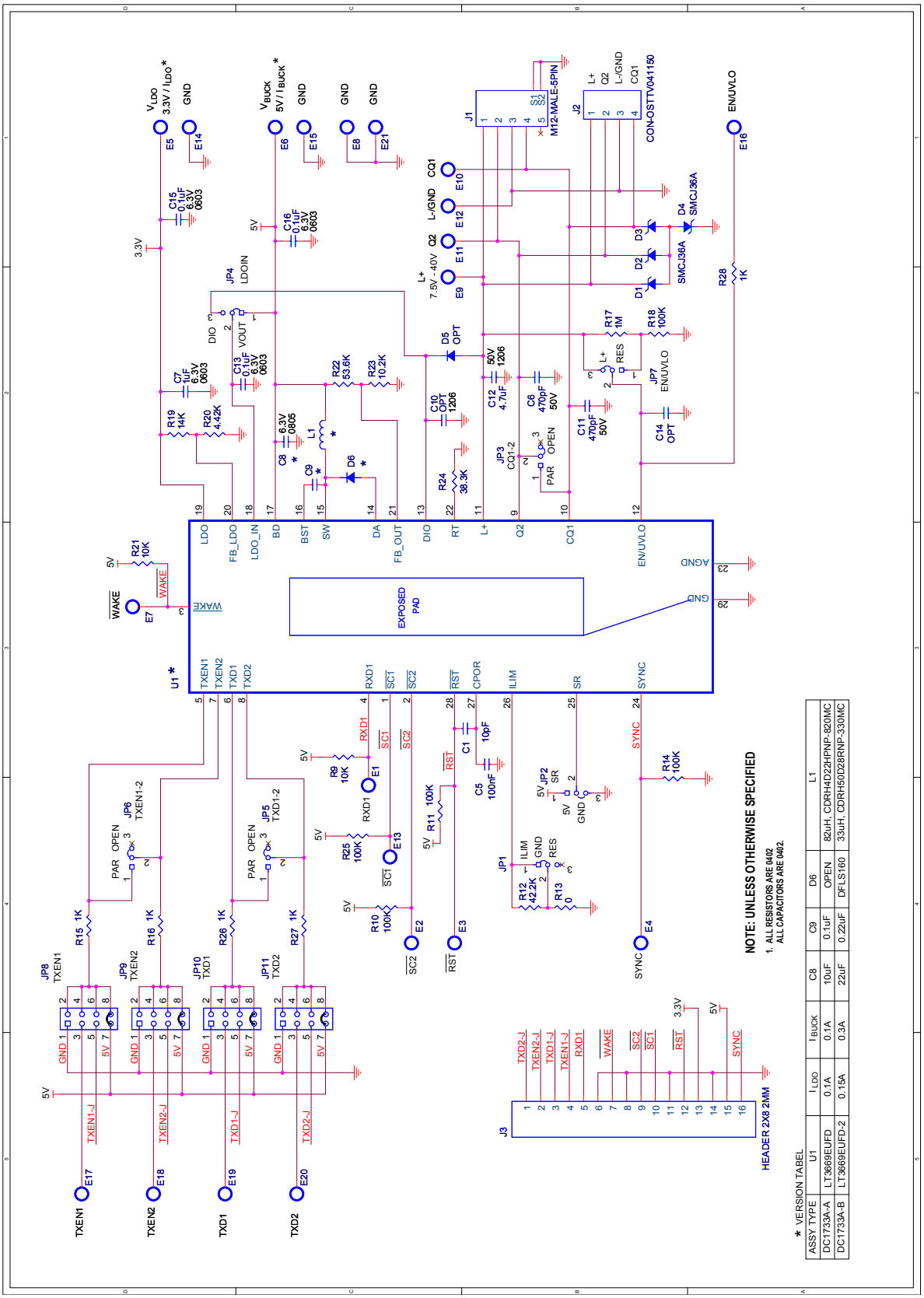

Figure 3. DC1733A Demo Circuit Schematic

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