Quick Start Guide for DC718

DESCRIPTION

PScope™ software along with demonstration circuit DC718 provides a USB based Windows PC hosted digital data acquisition system supporting CMOS/LVTTL output ADCs up to 135Msps. The DC718 can be powered from either the USB port or from an external 6VDC to 9VDC power supply (for lower noise operation). The Linear Technology supplied PScope evaluation software automatically detects the DC718 and in select cases can also detect the ADC demonstration circuit under evaluation. This system provides for fast and easy performance evaluation of high speed ADCs by collecting up to 128k word samples and then performing various analyses on the data including calculating SNR, SINAD, THD, SFDR, ENOB and displaying the digitized input, an FFT of the data, the primitive wave of the sample set or a IFFT of modified frequency domain data to facilitate analyzing distortion products and sources. Figure 1 shows a block diagram of the DC718. The DC718 is connected to the ADC demonstration circuit via a 40-pin edge connector, to the PC by a USB A-B cable and to an optional power supply by a 5mm plug.

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

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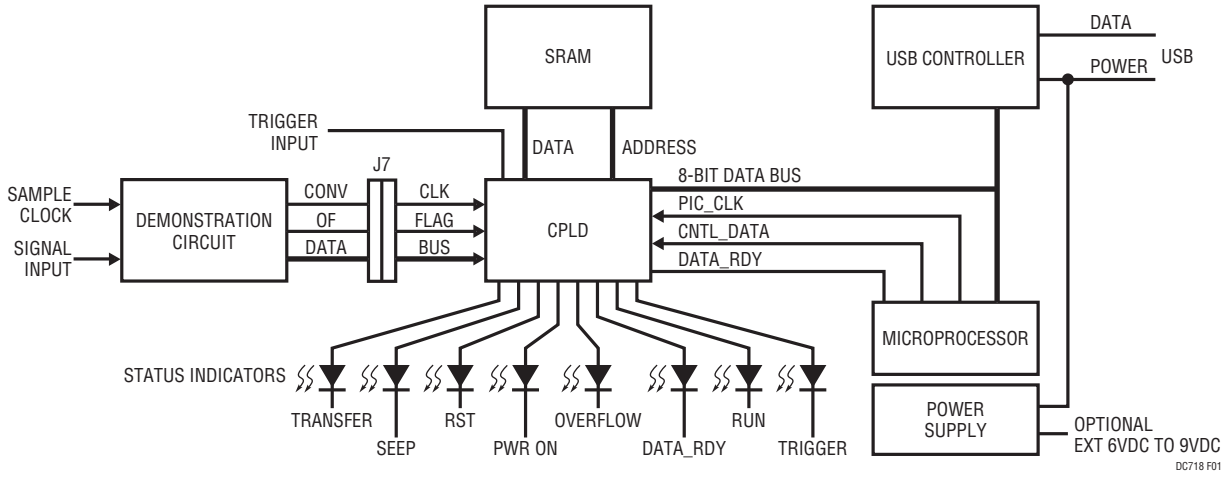


Figure 1. DC718 Block Diagram

OPERATING PRINCIPLES

The DC718 is capable of collecting a block of data samples from an ADC demonstration circuit initiated either by an internal generated trigger or an externally supplied trigger of user-selected polarity. The external trigger is TTL or 3.3V CMOS compatible. Refer to the PScope software help for information on the various operating modes and options. The conversion clock to the DC718 is supplied via the ADC demonstration circuit either from an optional on board oscillator or an external signal generator connected to the ADC demonstration circuit.

QUICK START PROCEDURE

To prevent damage to the DC718, it is important to follow the equipment setup procedure outlined below:

1. Do not plug the DC718 into the PC USB port before running the installation program.
2. Download the PScope installation program from http://www.linear.com/software/.
3. Run the PScope installation program and follow the on-screen instructions.

   NOTE: The PScope evaluation software requires a PC running Windows98, 2000, XP, or later, with an available USB port.
4. Connect the DC718 to the USB port and supply external power to the DC718, if desired.
5. Connect the ADC demonstration circuit to the DC718 via the 40-pin edge connector.
6. Apply power to the ADC demonstration circuit.
7. Apply an appropriate conversion clock and analog input signal to the ADC demonstration board.
8. ADC board will be automatically detected and configured.
9. Enter the sample rate and select the sample size in the provided fields in PScope.
10. Initiate a data collection cycle via the evaluation software. See online help for specific guidance on using the PScope software.
11. Each demonstration board also comes with a quick start guide similar to this one and should be referred to for specific usage details relevant to the demonstration circuit being evaluated.

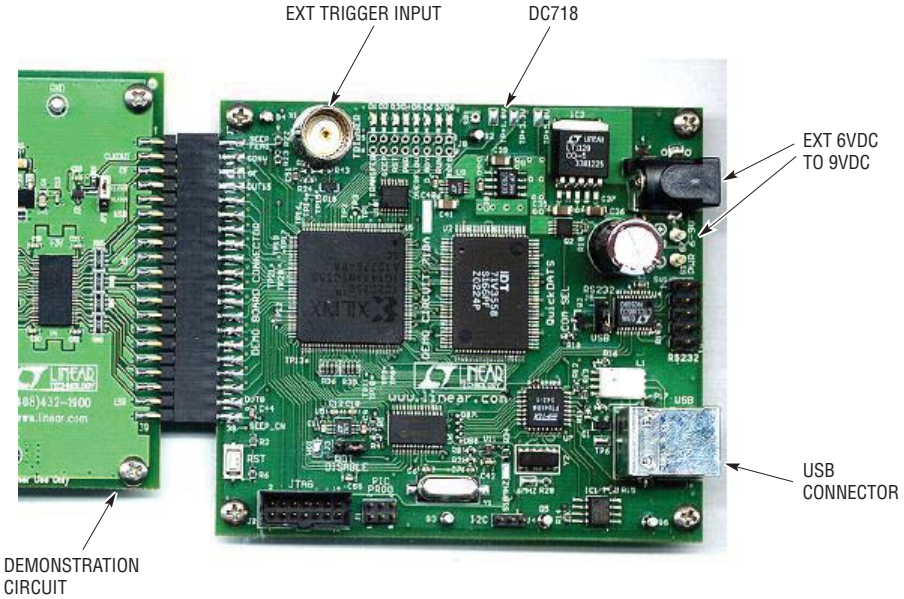


Figure 2. Basic Connection Locations

USEFUL SOFTWARE TOOLS

The PScope software includes tools for automatic software updates and for quickly retrieving documentation from the world wide web.

NOTE: Adobe Acrobat reader is required to view the documents and is available at http://www.adobe.com.

To update the PScope software (requires an internet connection):

- Choose Update Program from the tools menu.

This automatically updates the main program and drivers for individual demo circuits.

OPTIONAL CONNECTIONS TO THE DC718

In most cases the DC718 can operate from the USB power except were very high speed operation exceeds the power limits of the USB port or extremely noise sensitive measurements require laboratory grade power. Adding a ferrite common mode filter to the USB cable may reduce noise in these cases. The DC718 provides a connector for a 5mm power plug at 6V to 9V. Inserting this connector into the 5mm power jack automatically disconnects USB power from the board.

The DC718 has provisions for an external trigger input, polarity selectable by software. This permits initiating data block capture by an external event.

Do not connect anything to J1, J2, J3 or SV1.

J4 is an I^2C port. J8 is a test port for CPLD software development and is not populated.

LED INDICATORS

The DC718 provides system status via 8 LEDs:

LED-1. TRANSFER – Indicates a data transfer from the PScope to the PC.

LED-2. SEEP – Indicates presence/access of the optional demonstration circuit serial electrically erasable PROM on select demonstration boards permitting PScope software to automatically identify the device being evaluated.

LED-3. RST – Indicates assertion of either a hard or soft reset.

LED-4. POWER – Power on indicator.

LED-5. OVERFLOW – Indicates an overflow occurred during the last block acquisition.

LED-6. D_RDY – Indicates completion of data block acquisition.

LED-7. RUN – Indicates the board is ARMED to collect a block of data.

LED-8. TRIG – Indicates that a trigger was received and data collection has started.

CIRCUIT DETAILS

A schematic is attached to the end of this quick start guide for reference only.

TROUBLE SHOOTING GUIDE

Problem: DC718 is plugged in, but PScope software still does not recognize DC718 board.

Solution: Assuming that the USB hardware in your computer is operational (try verifying an operational USB port with another USB device such as a USB Memory stick, printer or scanner if available.), the likely cause is improper installation of the USB drivers, which results in Windows recognizing the DC718 as an *unknown device*. If this is the case, the problem can be corrected by the following procedure:

1) Unplug the DC718 board from the USB port.

2) Reinstall the PScope Software. **Carefully** following the on-screen instructions. This **may** require a reboot of your computer. The in-screen instructions will inform you if that is the case.

3) If the problem persists, please choose *contact software support* from the tools menu for assistance from the LTC staff.

Problem: Demonstration circuit software loads properly, but will not run or gives *device not accessible* errors.

Solution: Verify that the demonstration circuit is properly powered up and that a correct (signal level and frequency) conversion clock is applied. (The DC718 is powered from the USB port. If an external USB port expansion unit which does not provide power is used to connect the DC718 to the PC, an external 6V to 9V must be provided to the DC718.) Set the sample rate for the applied conversion clock as PScope software uses the sample size and rate to determine the time out period for resetting the DC718 if the USB should hang. Refer to the appropriate demonstration circuit quick start guide for details.

Problem: Collected data samples look like noise or appear corrupted.

Solution: Make sure the proper device has been selected in the PScope software otherwise the captured data will not be properly interpreted.

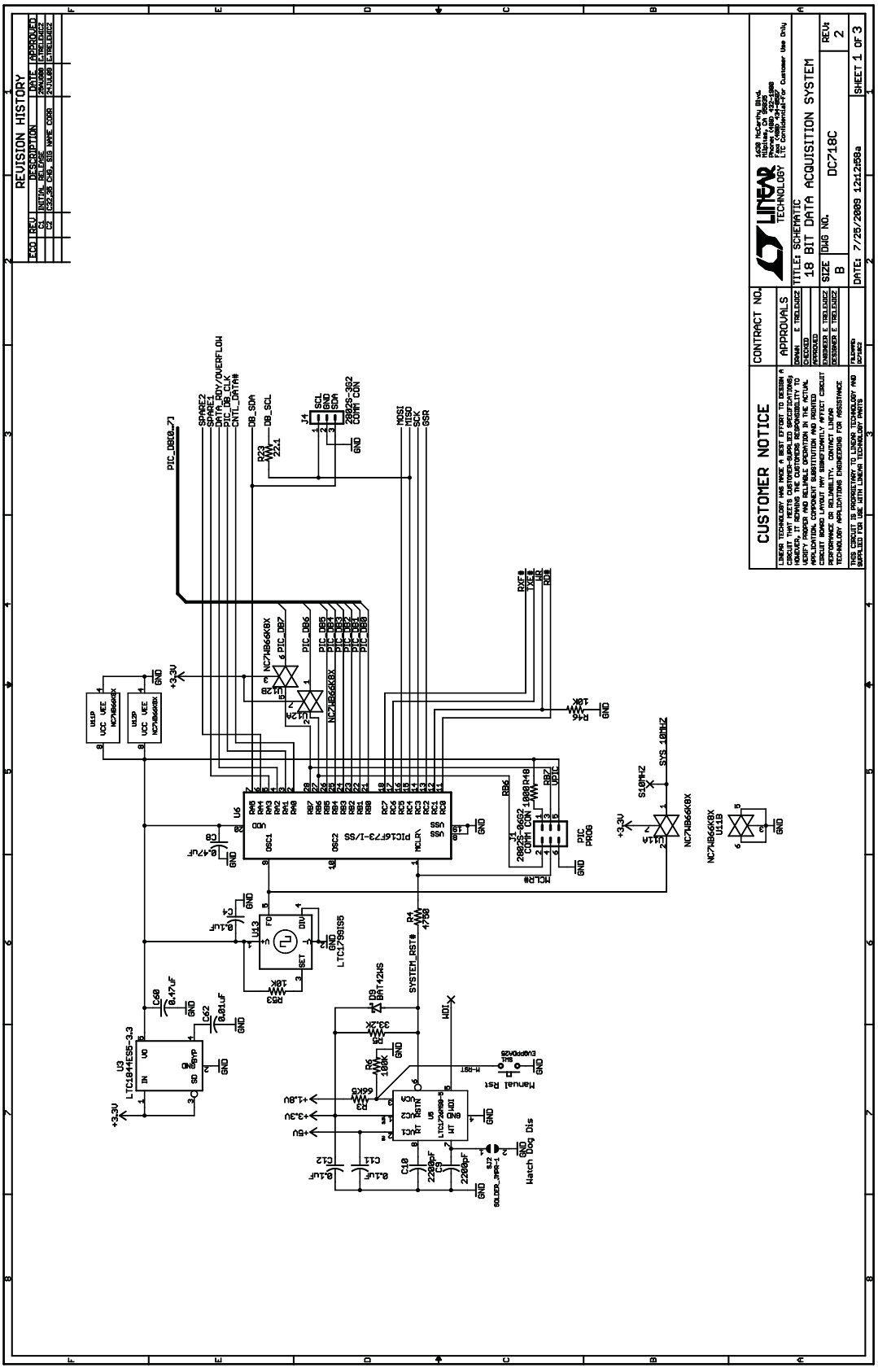
PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
1	2	C32, C35	CAP, X7R 2.2µF 10V 10% 1206	TAIYO YUDEN LMK316B7225KL-T
2	2	C39, C41	CAP, X5R 10µF 6.3V 20% 1206	TAIYO YUDEN JMK316BJ106ML-T
3	4	C33, C38, C40, C62	CAP, X7R 0.01µF 16V 10% 0603	AVX 0603YC103KAT
4	1	C36	CAP, 330µF 16V 20PCT	NICHICON UPL1C331MPH6
5	1	C37	CAP, X5R 1µF 16V 20% 1206	TAIYO YUDEN EMK316BJ105MF-T
6	1	C44	CAP, X7R 1000pF 25V 10% 0603	AVX 06033C102KAT2A
7	38	C3, C4, C11 TO C31, C34, C45 TO C50, C52 TO C59	CAP, X7R 0.1µF 16V 10% 0603	AVX 0603YC104KAT
8	1	C51	CAP, X7R, 100pF 25V 10% 0603	AVX 06033C101KAT
9	2	C1, C2	CAP, NPO 22pF 50V 10% 0603	AVX 06035A220KAT
10	2	C8, C60	CAP, X5R 0.47µF 16V 20% 0603	AVX 0603YD474MAT
11	2	C9, C10	CAP, X7R 2200pF 25V 10% 0603	AVX 06033C222KAT2A
12	1	D10	DIODE, BAT54S SCHOTTKY SOT23	DIODES INC BAT54S
13	8	D1 TO D8	LED, GRN 0603	LITE ON LTST-C190KGKT
14	1	D9	DIODE, BAT54WS SCHOTTKY SOD323	DIODES INC BAT54WS-7
15	5	G1 TO G3, G5, G7	TURRET	MILL MAX 2308-2
16	1	J1	HEADER, 3×2, 2mm	COMM CON 2202S-06G2
17	1	J2	HEADER, 2×7, 2mm	MOLEX, 87331-1420
18	1	J6	CON, USB-B, 4 PINS, SINGLE THR. HOLE	MILL-MAX, 897-30-004-90-000
19	1	J7	CONNECTOR, 20×2, 0.100	COMM CON 1116-40-G2
20	1	J9	CONNECTOR, POWER 5mm	CUI INC PJ-002A-SMT
21	1	L1	CHOKE, COMMON MODE, QUAD, 5µH	COILCRAFT TTDLF4500
22	1	Q1	XSTR, NPN,GP, SOT23	DIODES INC MMBT3904
23	1	Q2	XSTR, MOSFET, 8-PIN MSOP	ZETEX ZXM64P02XTA
24	6	R7, R15, R16, R46, R51, R53	RES, 10k 1% 1/16W 0603	AAC CR16-1002FM
25	2	R11, R52	RES, 1.5k 1% 1/16W 0603	AAC CR16-1501FM
26	3	R12, R13, R23	RES, 22.1Ω 1% 1/16W 0603	AAC CR16-22R1FM
27	2	R14, R50	RES, 2.21k 1% 1/16W 0603	AAC CR16-2211FM
28	1	R18	RES, 47.5k 1% 1/16W 0603	AAC CR16-4752FM
29	1	R47	RES, 100Ω 1% 1/16W 0603	AAC CR16-1000FM
30	2	R20, R24	RES, 49.9Ω 1% 1/16W 0603	AAC CR16-49R9FM
31	1	R3	RES, 66.5k 1% 1/16W 0603	AAC CR16-6652FM
32	3	R33, R42, R49	RES, 33.2Ω 1% 1/16W 0603	AAC CR16-33R2FM
33	2	R35, R36	RES 2×4 ARRAY, CHIP, 100Ω, ISO	ROHM MNR14E0ABJ101
34	5	R37, TO R41	RES 2×4 ARRAY, CHIP, 33Ω, ISO	ROHM MNR14E0ABJ330
35	3	R4, R19, R21	RES, 4.75k 1% 1/16W 0603	AAC CR16-4751FM
36	1	R43	RES, 499Ω 1% 1/16W 0603	AAC CR16-4990FM
37	1	R5	RES, 33.2k 1% 1/16W 0603	AAC CR16-3322FM
38	3	R6, R17, R22	RES, 100k 1% 1/16W 0603	AAC CR16-1003FM
39	3	R44, R45, R48	RES, 1.00k 1% 1/16W 0603	AAC CR16-1001FM
40	10	R9 TO R10, R25 TO R32	RES, 475Ω 1% 1/16W 0603	AAC CR16-4750FM

PARTS LIST

ITEM	QTY	REFERENCE	PART DESCRIPTION	MANUFACTURER/PART NUMBER
41	1	SW1	SWITCH, LIGHT TOUCH, 2 PINS	PANASONIC, EVQPPDA25
42	1	X1	CONN, BNC 50Ω	CONNEX 112404
43	1	U10	IC, EEPROM,1k, MICROWIRE, SOT6	MICROCHIP, 93C46BT-I/OT
44	1	U14	IC, VREG, LIN, 5V	LINEAR TECHNOLOGY LT1129CQ-5
45	2	U11, U12	IC, ANALOG SW, SPST, DUAL	FAIRCHILD NC7WB66K8X
46	1	U1	IC, CPLD, 256 MACROCELL,TQPF144	XILINX XC2C256-6TQG144C
47	1	U6	IC, MICROCNTLR, 4KFLASH, 192RAM	MICROPCHIP PIC16F73-I/SS
48	1	U4	IC, SI-OSC, 96/48/24MHZ, SOT5	LINEAR TECHNOLOGY LTC6905IS5-96#PBF
49	1	U13	IC, SI-OSC, ADJ, SOT5	LINEAR TECHNOLOGY LTC1799IS5#PBF
49a	1	U2	IC, SYNC-SRAM, 18X256K	IDT, IDT71V3558S166PF
50	0	U2 (ALTERNATE PART NUMBER)	IC, SYNC-SRAM, 18X512K	IDT, IDT71V65803S150PF
51	1	U7	IC, USB CNTLR, LQFP32	FUTURE TECH, (FTDICHIP) FT245BM
52	1	U5	IC, VMONITOR, TRIPLE, 5V/3.3V/ADJ	LINEAR TECHNOLOGY LTC1726EMS8-5#PBF
53	1	U9	IC, VREG, LIN, 1.8V, MS8	LINEAR TECHNOLOGY LT1962EMS8-1.8#PBF
54	1	U8	IC, VREG, LIN, 3.3V, SO8	LINEAR TECHNOLOGY LT1763CS8-3.3#PBF
55	1	U3	IC, VREG, LIN, 3.3V, SOT5	LINEAR TECHNOLOGY LTC1844ES5-3.3#PBF
56	4		STAND OFF, 1/4 × 4-40	MICROPLASTIC
57	4		SCREW, 4-40- 1/4"	SCREW
58	1		FAB, PRINTED CIRCUIT BOARD	DEMO CIRCUIT #718C2
59	2		STENCIL	STENCIL #718C2

SCHEMATIC DIAGRAM



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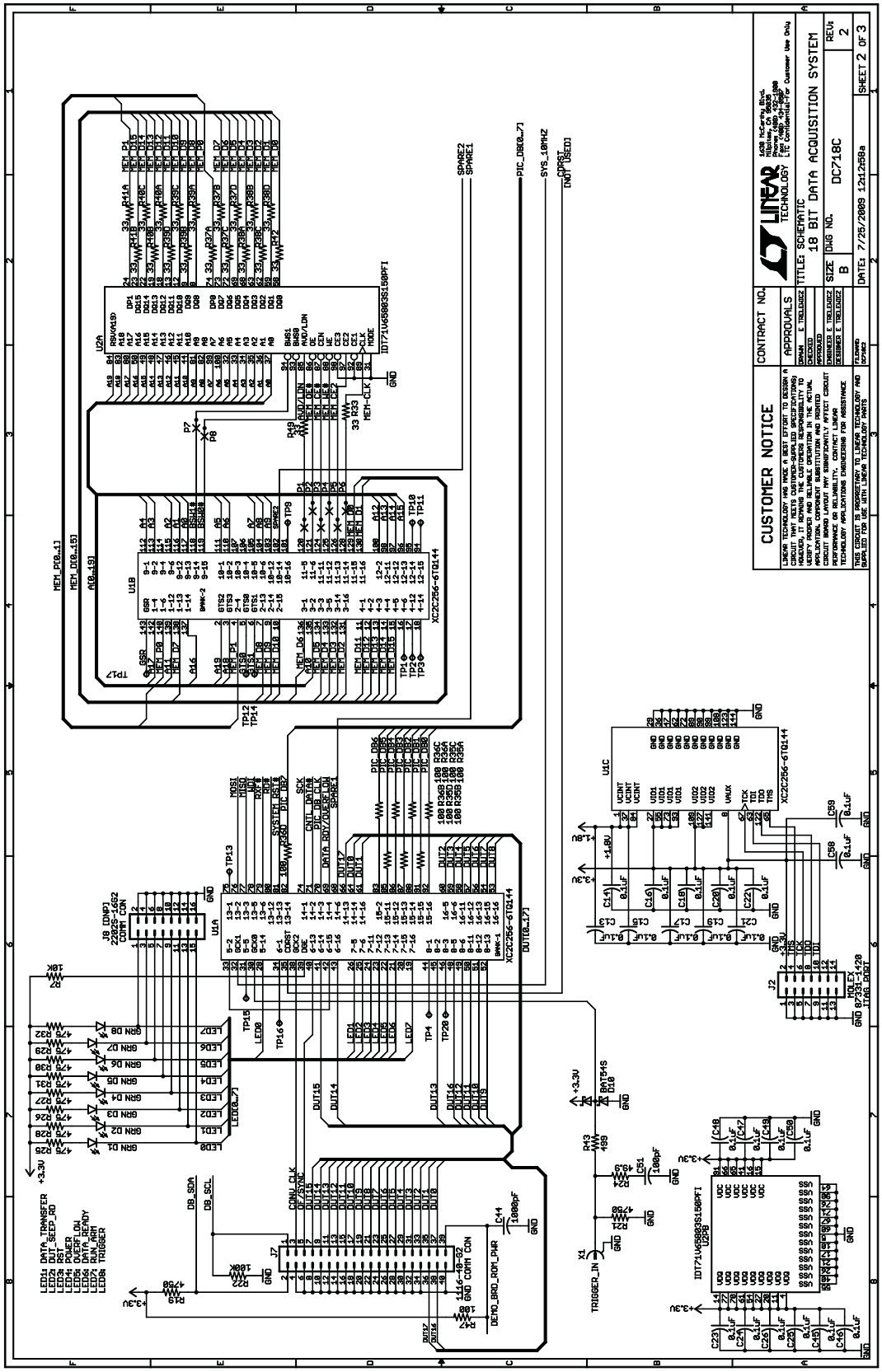

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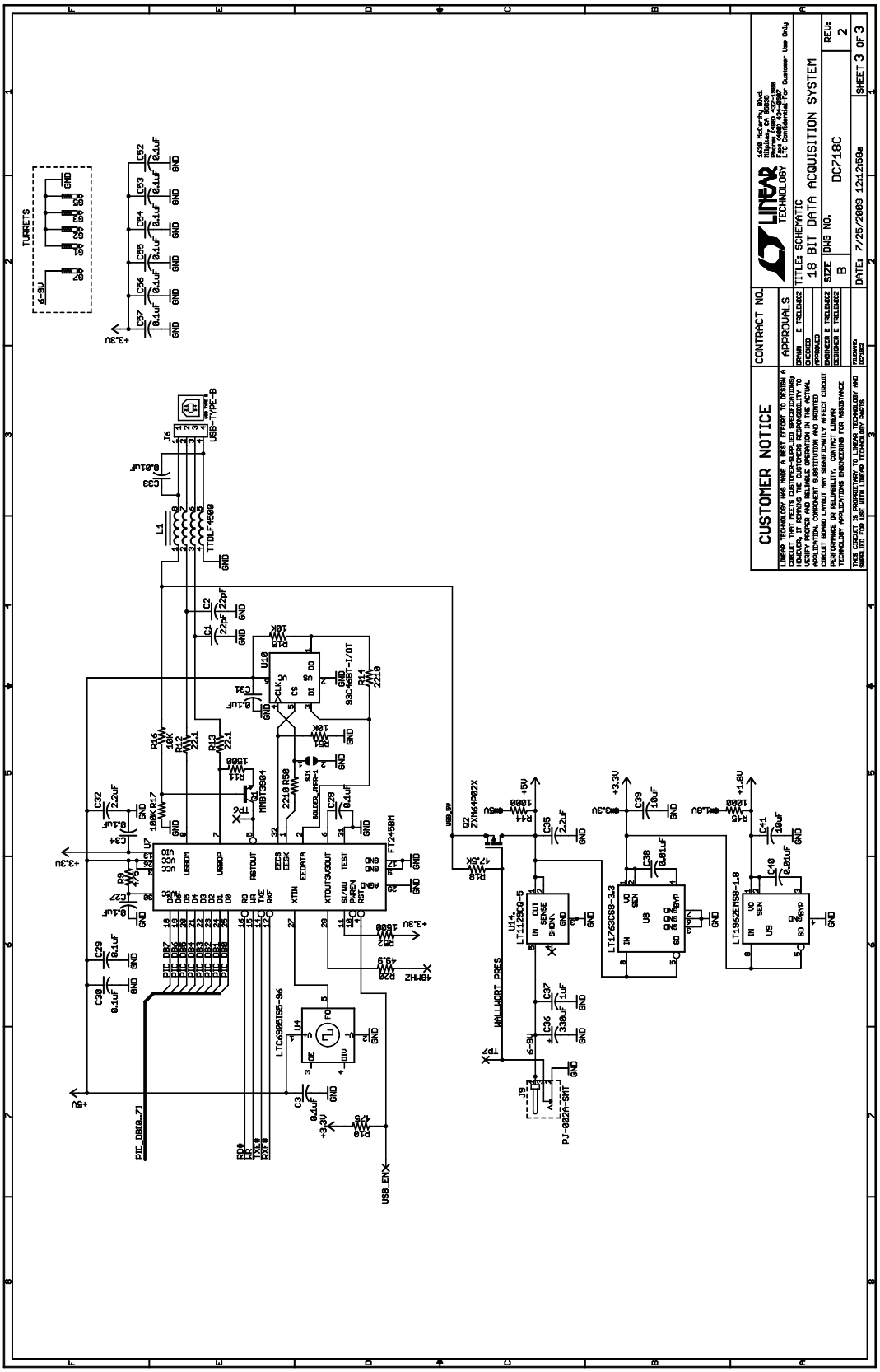

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