DRIVECABLE04EVK

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1. Introduction

The Texas Instruments DRIVECABLE04EVK evaluation kit (EVK) helps designers evaluate the operation and performance of the cable extender chipset consisting of the DS30EA101 adaptive cable equalizer and the DS30BA101 differential buffer. The kit enables evaluation of this chipset with 75Ω coaxial cables.

The EVK includes separate evaluation boards for the two devices – one board for the transmitter and the other board for the receiver (see Table 1 and Figure 1).

Table 1: EVK Contents

EVALUATION BOARD	IC	FUNCTION
DRIVECABLE04-TX	DS30BA101	Cable Driver (Transmitter)
DRIVECABLE04-RX	DS30EA101	Cable Equalizer (Receiver)

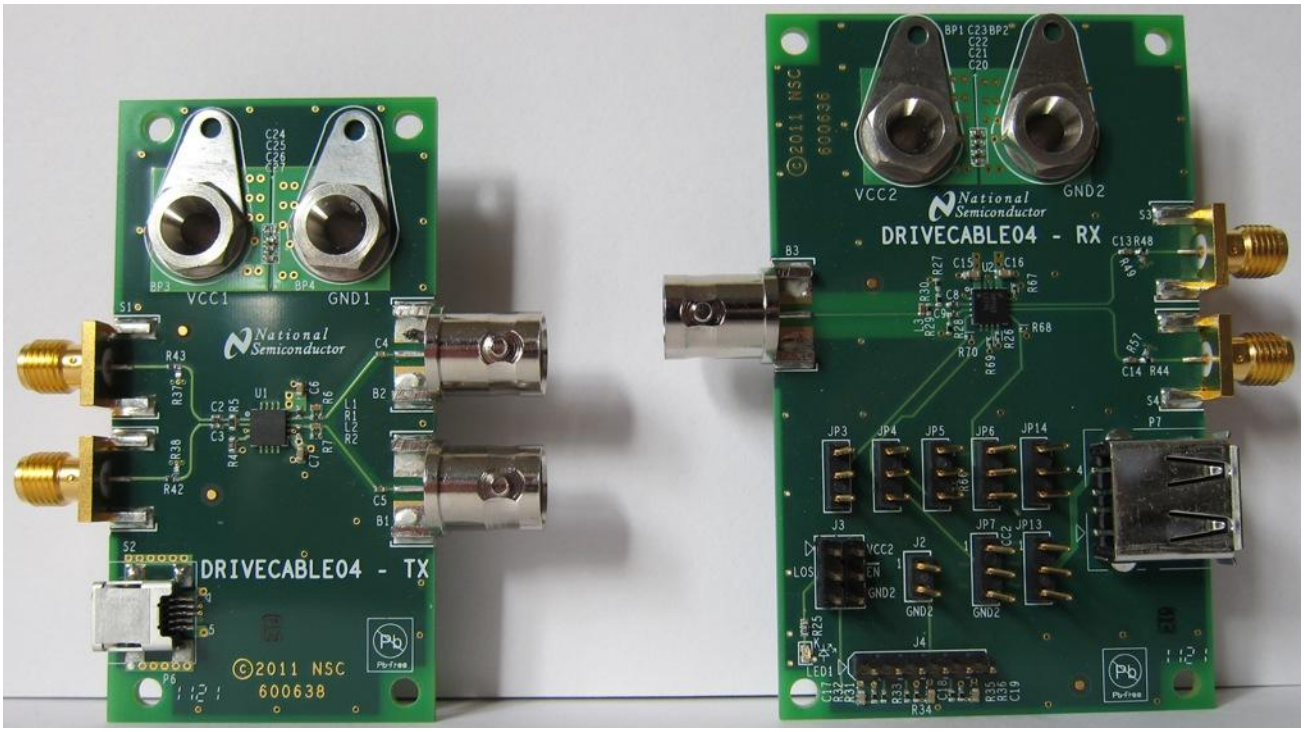

Figure 1: DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

2. Setup

This section describes the connectors and jumpers on the boards as well as how to properly connect, set up, and use the DRIVECABLE04-TX and DRIVECABLE04-RX boards.

2.1. DRIVECABLE04-TX Setup

BP3, BP4 – VCC, GND are the DC power banana jacks. BP3 and BP4 should be powered with a DC voltage of 3.3V ± 5%.

S1, S2 – IN+, IN- are the 50Ω SMA input connectors for the DS30BA101 data inputs. These inputs have onboard 1 μF AC-coupling capacitors (C2 and C3), and are intended to receive a differential input signal via a pair of 50Ω SMA cables.

B2, B1 – OUT+, OUT- are the 75Ω BNC output connectors for the DS30BA101 data outputs. These outputs are intended to drive 75Ω coaxial cable. The DS30BA101 is a differential driver, and when using only one output (one half of the differential pair), the unused output should be terminated with a 75Ω BNC termination.

2.2. DRIVECABLE04-RX Setup

BP1, BP2 – VCC, GND are the DC power banana jacks. BP3 and BP4 should be powered with a DC voltage of 2.5V ± 5%.

B3 – IN+ is the 75Ω BNC input connector for the DS30EA101 data input. This input is intended to receive a single-ended input signal via a 75Ω coaxial cable.

S3, S4 – OUT+, OUT- are the 50Ω SMA output connectors for the DS30EA101 data outputs. These outputs have onboard 4.7 μF AC-coupling capacitors (C13 and C14). The DS30EA101 has a differential output driver, and when using only one output (one half of the differential pair), the unused output should be terminated with a 50Ω SMA termination.

J3 – LOS, $\overline{\text{EN}}$ is the jumper for monitoring LOS and controlling $\overline{\text{EN}}$. LOS is asserted high when no signal is present at the DS30EA101 input. $\overline{\text{EN}}$ may be used to force the DS30EA101 outputs on or off, or tied to LOS to allow automatic output enable operation. To force the outputs off, set the jumper to tie $\overline{\text{EN}}$ to VCC. To force the outputs to be always on, set the jumper to tie $\overline{\text{EN}}$ to GND. For normal operation, set the jumper to tie LOS to $\overline{\text{EN}}$ for automatic output enable control.

LED1 – LOS is the LED for the LOS status. This LED is GREEN when an input signal has been detected at the DS30EA101 input, and OFF when no input signal is detected.

2.3. Operation

DRIVECABLE04-TX is the transmitter board and DRIVECABLE04-RX is the receiver board. To test these boards, begin by applying the appropriate DC power to each board (3.3V for DRIVECABLE-TX and 2.5V for DRIVECABLE-RX).

Apply a test signal within the DS30BA101 input specifications to the S1 and S2 50Ω SMA input connectors on the DRIVECABLE04-TX board via a matched pair of 50Ω SMA cables.

The DS30BA101 on the DRIVECABLE04-TX board is configured to drive 75Ω coaxial cable. Connect this cable to either the B1 or B2 75Ω BNC output connector. The other output may be sent to an oscilloscope or other test equipment for monitoring, but if it is not used, it should be terminated with a 75Ω BNC termination.

Connect the other end of the 75Ω coaxial cable to the B3 75Ω BNC input connector on the DRIVECABLE04-RX board. The equalized output may be observed via the S3 or S4 50Ω SMA output connector. Connect a matched pair of 50Ω SMA cables to S3 and S4 to observe the differential output, or connect the cable to either S3 or S4 to view the single-ended output. If only one output is used, the other output should be terminated with a 50Ω SMA termination.

3. Board Layout

Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, and Figure 7 show the board layout for the DRIVECABLE04-TX and DRIVECABLE04-RX boards.

The DRIVECABLE04-TX and DRIVECABLE04-RX are 6-layer boards (TOP / GND1 / GND2 / VCC / GND3 / BOTTOM). The 75Ω microstrip traces on the top layer of the boards are referenced to GND2, and the 100Ω differential traces are referenced to GND1.

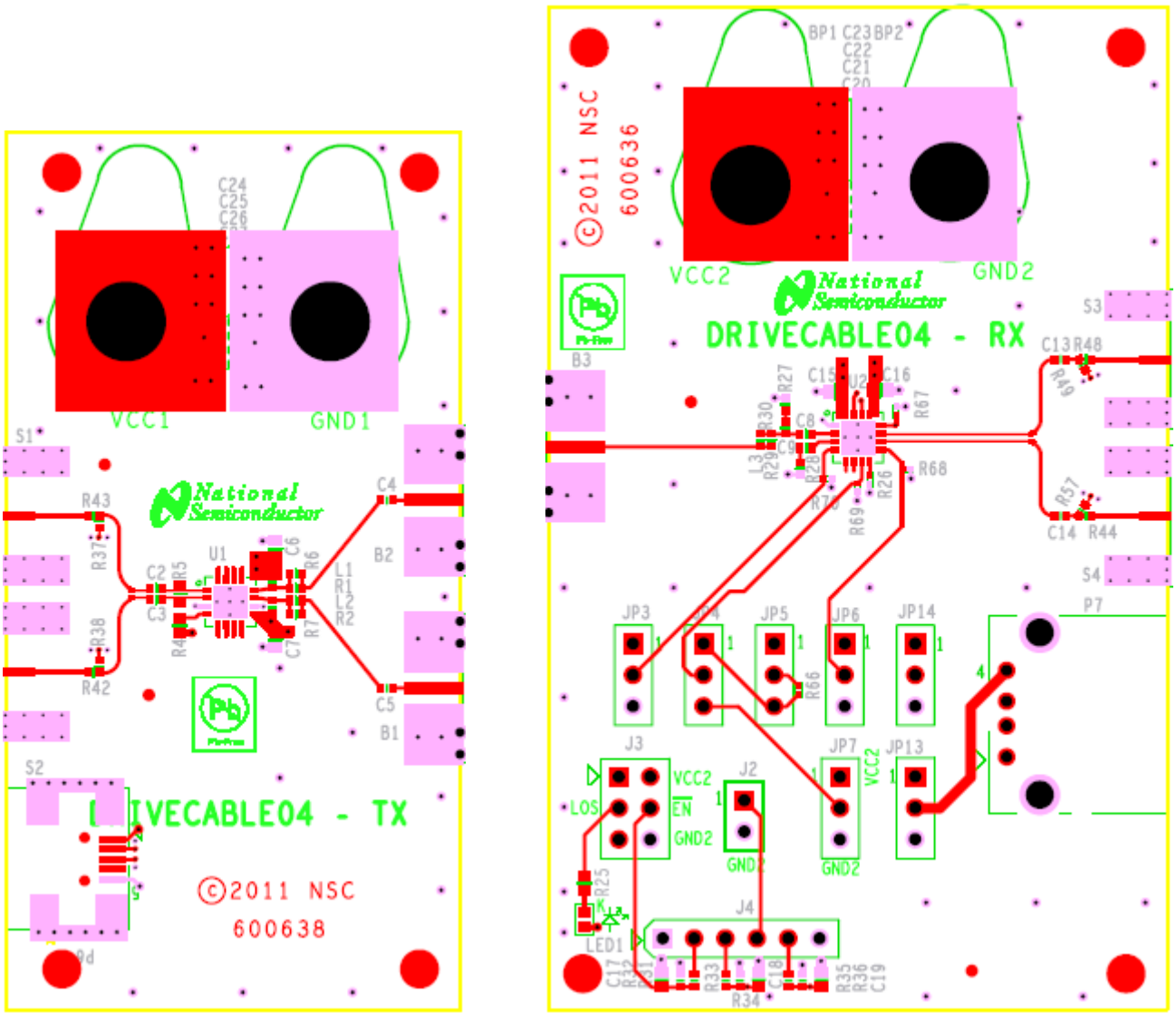

Figure 2: TOP Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

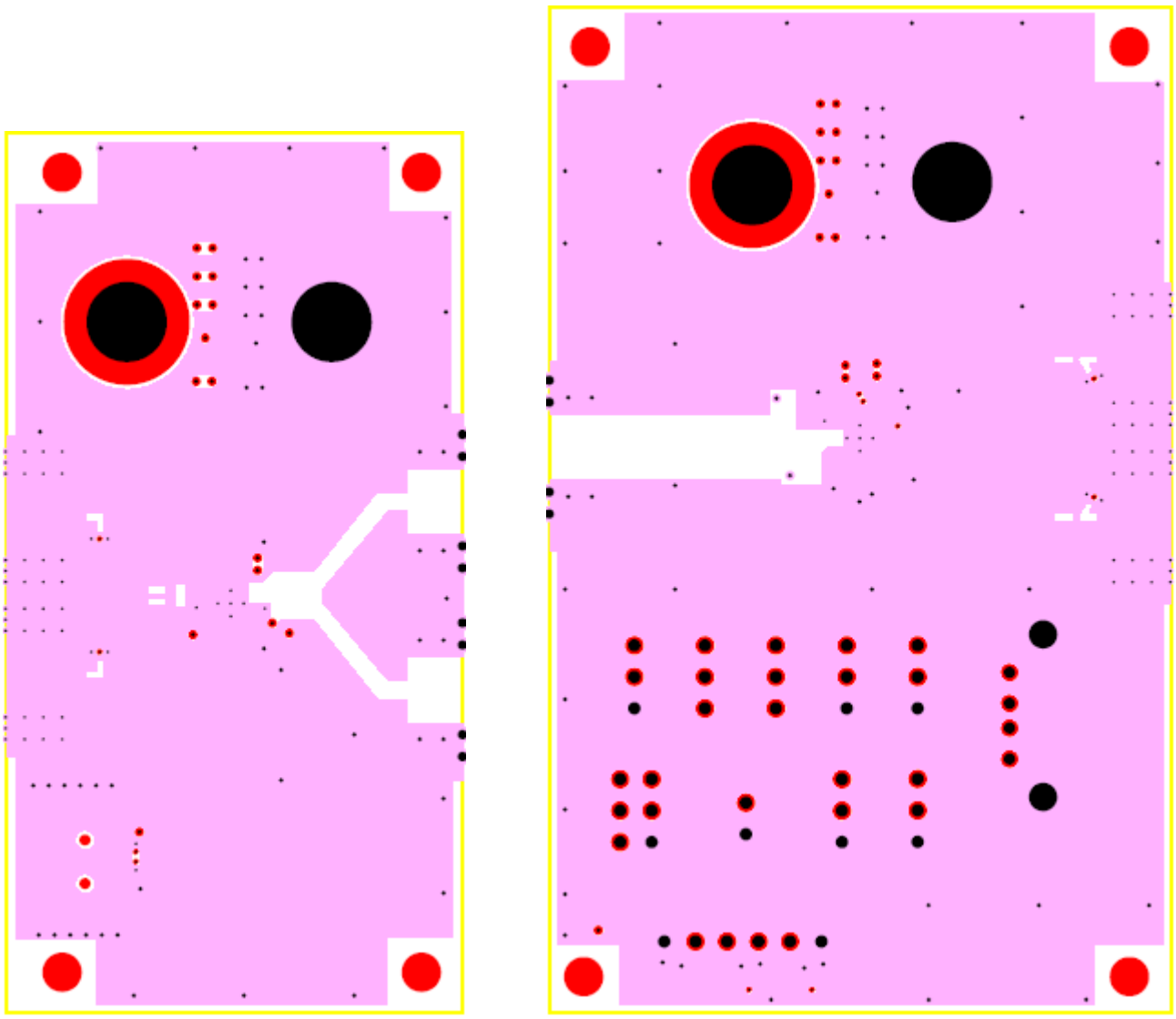

Figure 3: GND1 Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

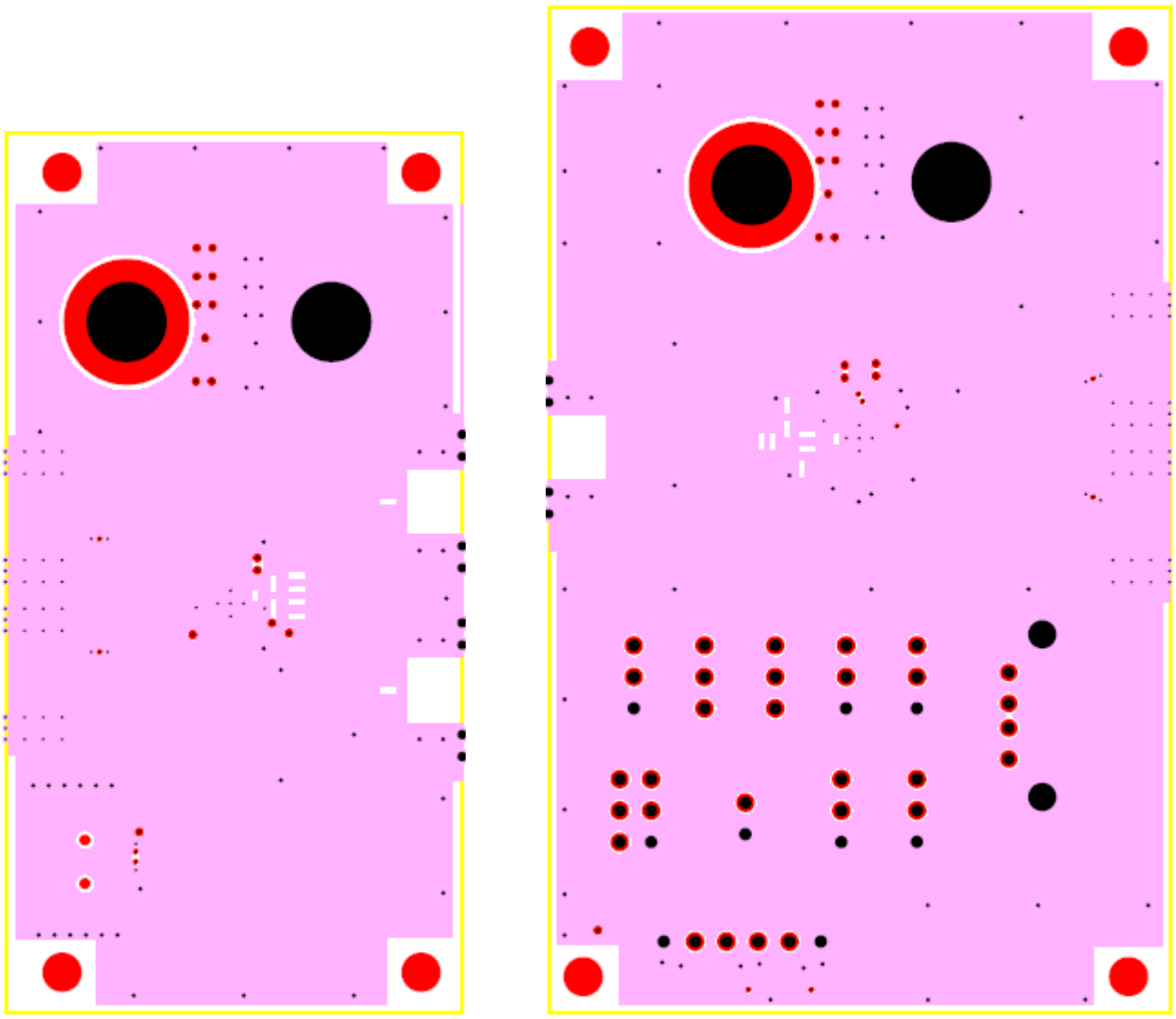

Figure 4: GND2 Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

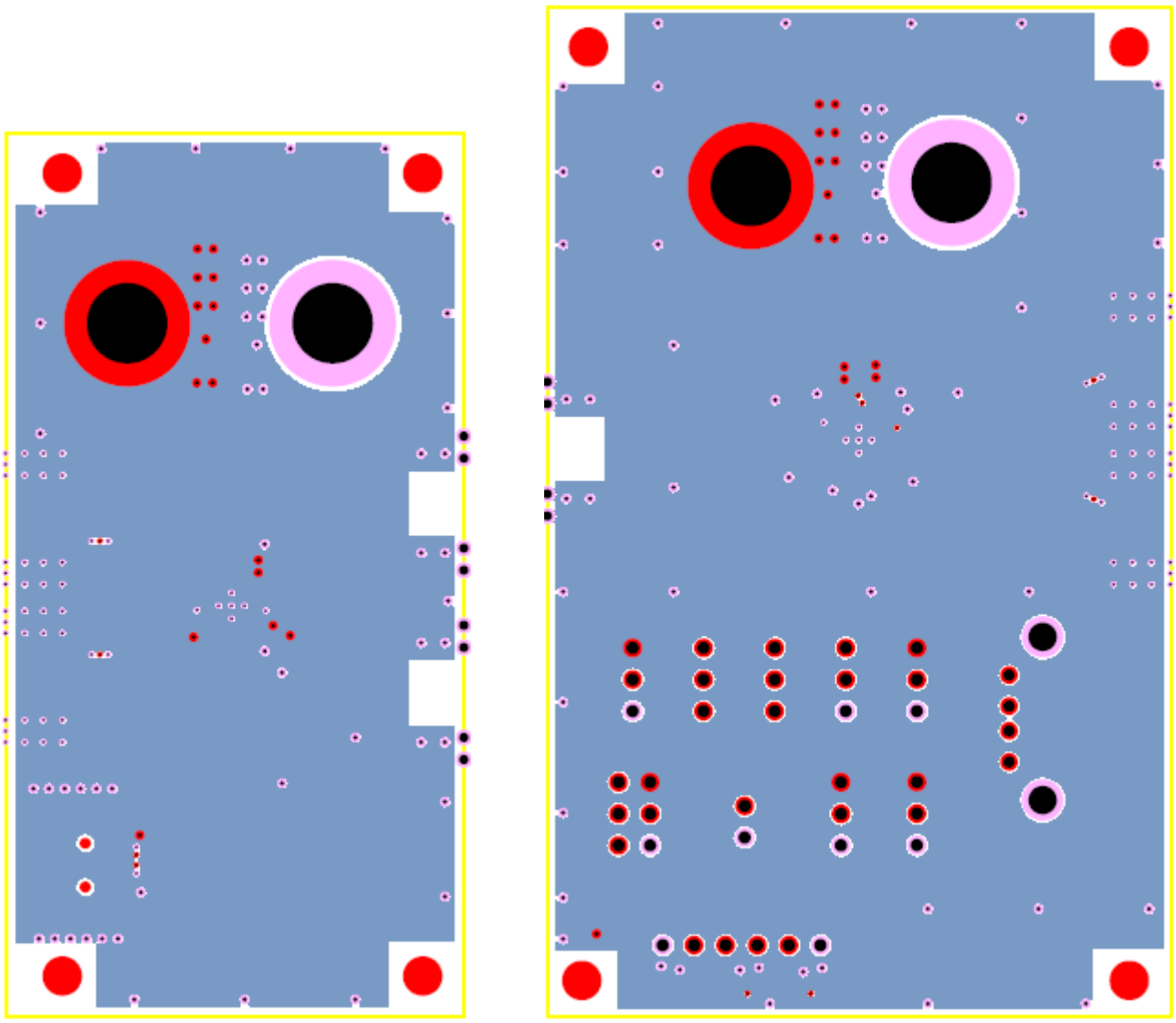

Figure 5: VCC Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

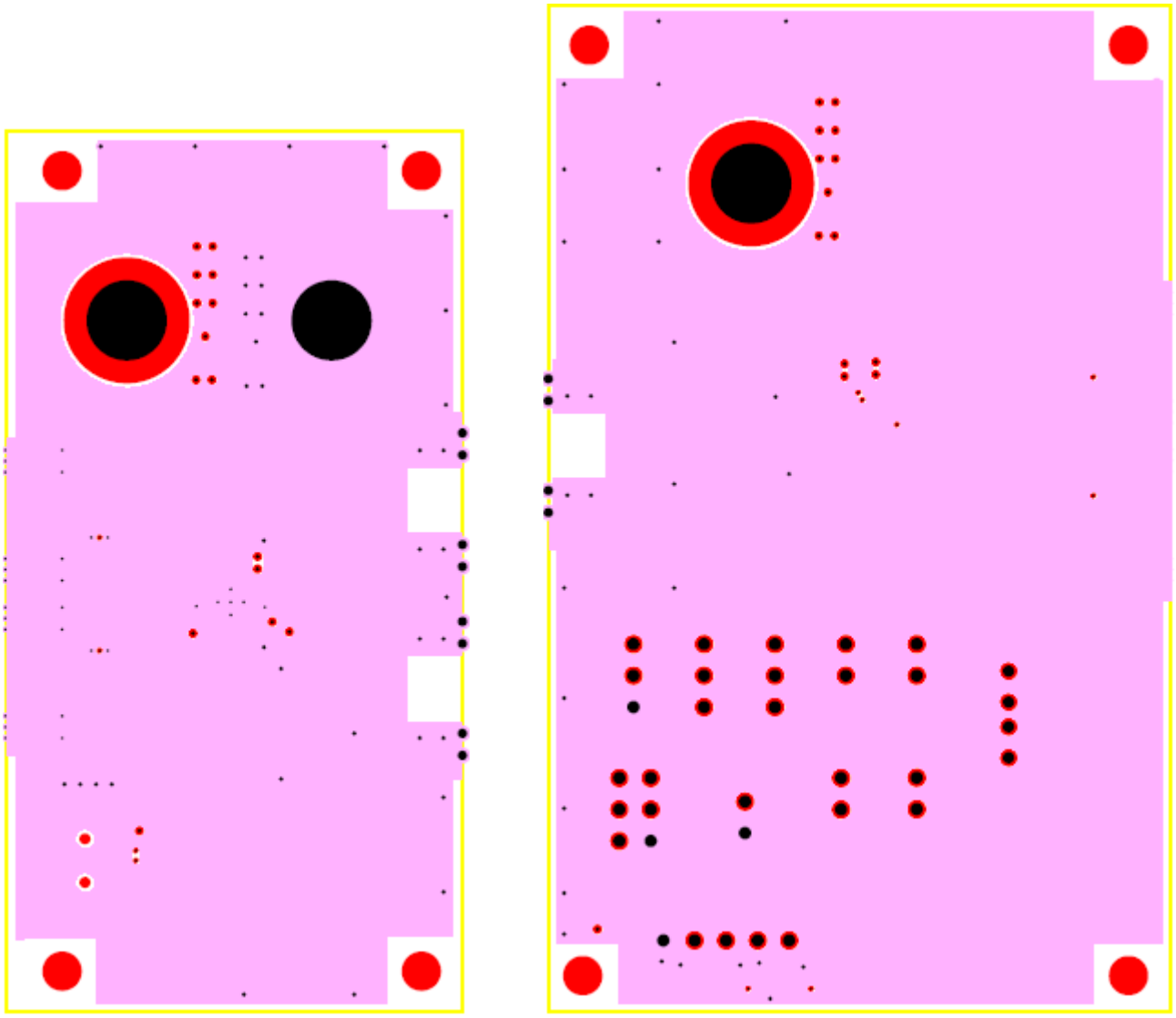

Figure 6: GND3 Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

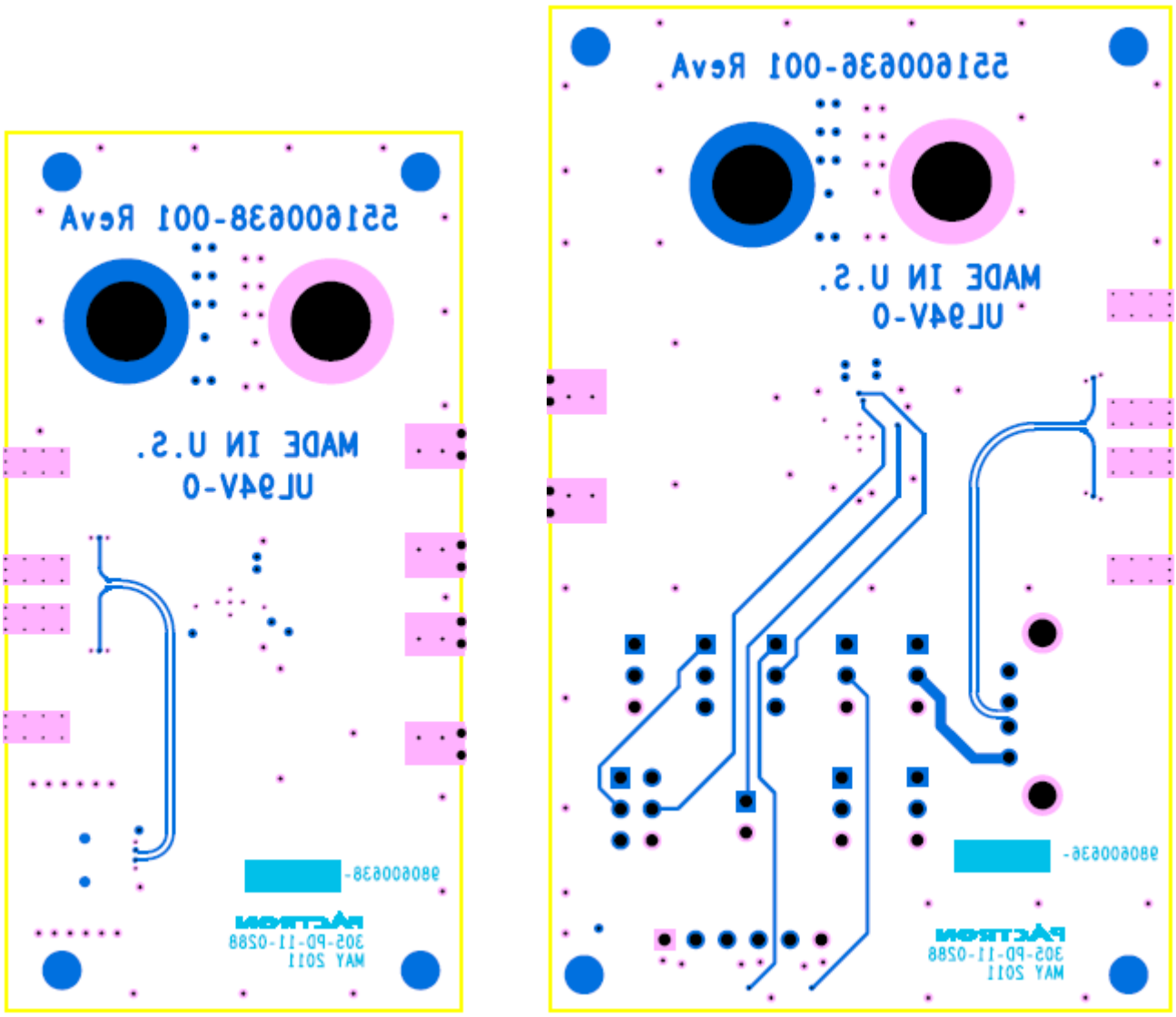

Figure 7: BOTTOM Layer for DRIVECABLE04-TX *(left)* and DRIVECABLE04-RX *(right)*

4. Schematics

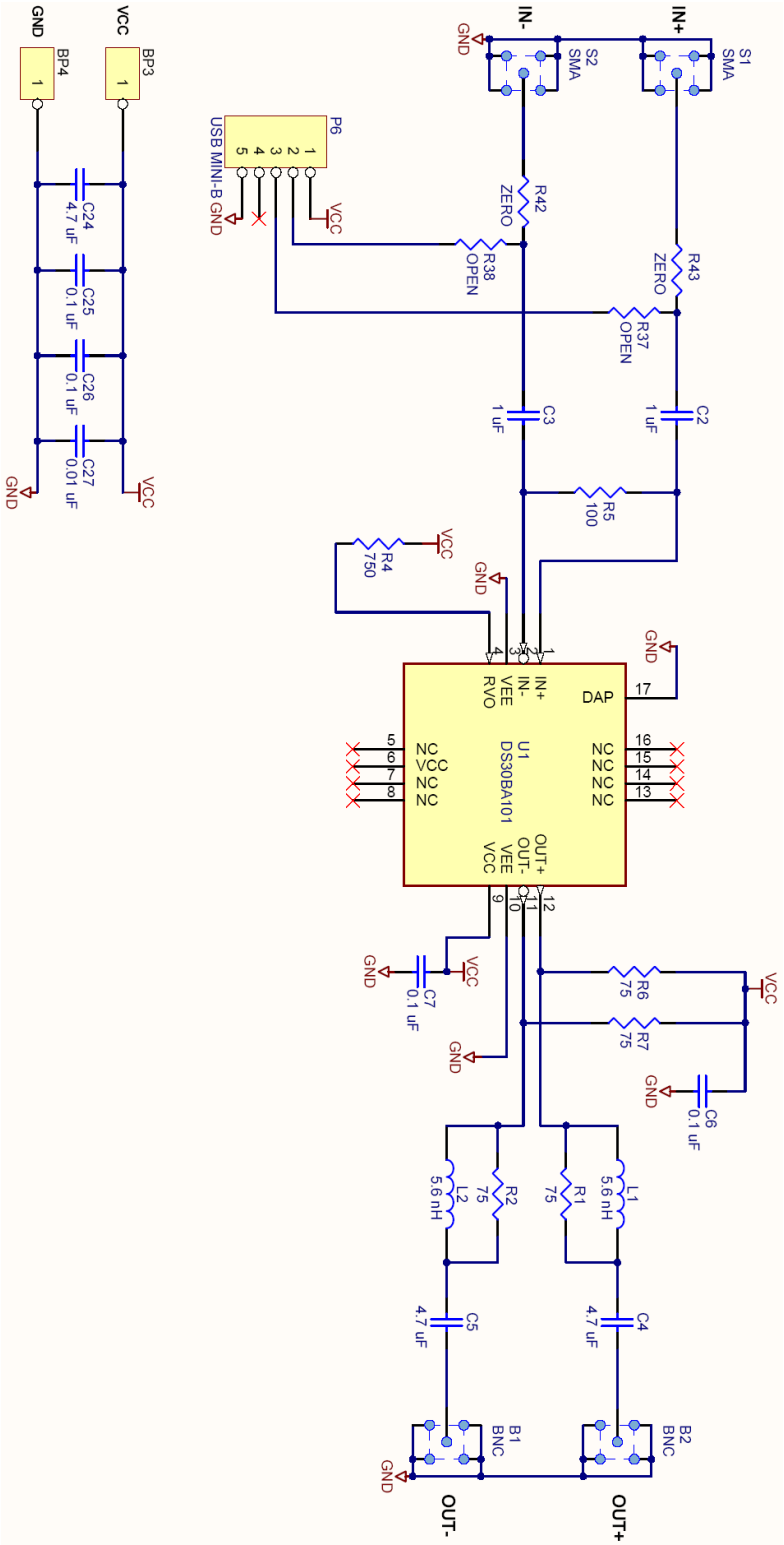

Figure 8: DRIVECABLE04-TX Schematic

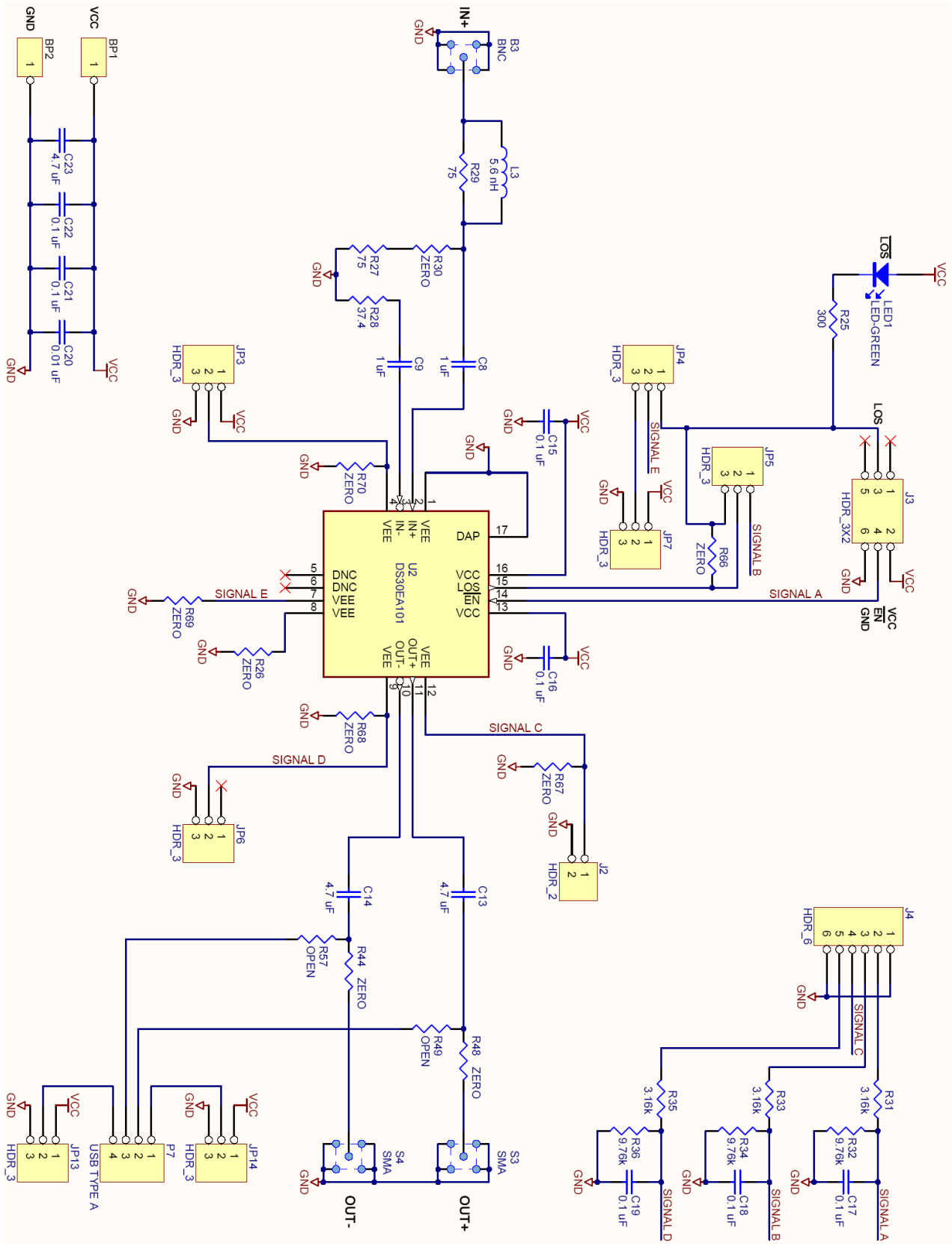

Figure 9: DRIVECABLE04-RX Schematic

5. Bill of Materials

Table 2: DRIVECABLE04-TX Bill of Materials

REF DES	QTY	DESCRIPTION	MFR	PART NUMBER
BP3, BP4	2	Banana Jack, uninsulated	Emerson	108-0740-001
B1, B2	2	BNC, 75-ohm, edge launch	Amphenol	31-6009
C2, C3	2	Capacitor, 1uF, 6.3V, X5R, 0402	Panasonic	ECJ-0EB0J105M
C4, C5, C24	3	Capacitor, 4.7uF, 6.3V, X5R, 0402	Panasonic	ECJ-0EB0J475M
C6, C7	2	Capacitor, 0.1uF, 25V, X7R, 0603	Panasonic	ECJ-1VB1E104K
C25, C26	2	Capacitor, 0.1uF, 6.3V, X7R, 0402	Kemet	C0402C104K9RACTU
C27	1	Capacitor, 0.01uF, 25V, X7R, 0402	Kemet	C0402C103J3RACTU
L1, L2	2	Inductor, 5.6nH, 0402	Murata	LQP15MN5N6B02D
R1, R2, R6, R7	4	Resistor, 75-ohm, 1/16W, 1%, 0402	Yageo	RC0402FR-0775RL
R4	1	Resistor, 750-ohm, 1/10W, 1%, 0603	Panasonic	ERJ-3EKF7500V
R5	1	Resistor, 100-ohm, 1/10W, 1%, 0603	Panasonic	ERJ-3EKF1000V
R42, R43	2	Resistor, 0-ohm, 1/16W, 5%, 0402	Panasonic	ERJ-2GEJ0R00X
S1, S2	2	SMA, 50-ohm, edge launch	Emerson	142-0701-851
U1	1	DS30BA101	Texas Instruments	DS30BA101SQ

Table 3: DRIVECABLE04-RX Bill of Materials

REF DES	QTY	DESCRIPTION	MFR	PART NUMBER
BP1, BP2	2	Banana Jack, uninsulated	Emerson	108-0740-001
B3	1	BNC, 75-ohm, edge launch	Amphenol	31-6009
C8, C9	2	Capacitor, 1uF, 6.3V, X5R, 0402	Panasonic	ECJ-0EB0J105M
C13, C14, C23	3	Capacitor, 4.7uF, 6.3V, X5R, 0402	Panasonic	ECJ-0EB0J475M
C15, C16	2	Capacitor, 0.1uF, 25V, X7R, 0603	Panasonic	ECJ-1VB1E104K
C20	1	Capacitor, 0.01uF, 25V, X7R, 0402	Kemet	C0402C103J3RACTU
C21, C22	2	Capacitor, 0.1uF, 6.3V, X7R, 0402	Kemet	C0402C104K9RACTU
J3	1	Header, 3x2, 0.1"	3M	929665-01-03-I
LED1	1	LED, Green, 0603	Lite-On	LTST-C190GKT
L3	1	Inductor, 5.6nH, 0402	Murata	LQP15MN5N6B02D
R27, R29	2	Resistor, 75-ohm, 1/16W, 1%, 0402	Yageo	RC0402FR-0775RL
R25	1	Resistor, 300-ohm, 1/10W, 5%, 0603	Panasonic	ERJ-3GEYJ301V
R26, R66, R67, R68, R69, R70	6	Resistor, 0-ohm, 1/20W, 0201	Panasonic	ERJ-1GE0R00C
R28	1	Resistor, 37.4-ohm, 1/16W, 1%, 0402	Vishay/Dale	CRCW040237R4FKED
R30, R44, R48	3	Resistor, 0-ohm, 1/16W, 5%, 0402	Panasonic	ERJ-2GEJ0R00X
S3, S4	2	SMA, 50-ohm, edge launch	Emerson	142-0701-851
U2	1	DS30EA101	Texas Instruments	DS30EA101SQ

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