

V850E2/Fx4 Application Board

User's Manual: Hardware

RENESAS MCU
V850 F Series

AB-050-FX4-MB-L-Q-DEV-V2

AB-050-FX4-MB-L-Q-TCT-V2

AB-050-FX4-MB-X-Q-NONE-V2

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1. Introduction

The V850E2/Fx4 Application Board serves as a simple and easy to use platform for evaluating the features and performance of Renesas Electronics' 32-bit V850E2/Fx4™ microcontrollers. The *Main Board* (AB-050-FX4-MB-x-x-xxx-V2) can be used as a standalone board, or can be mated with one of several *Piggyback Boards* (AB-050-FX4-PB-x-x-xxx-V2) for extended functionality.

Features:

- Connections for on-chip debugging and flash memory programming
- Access to all microcontroller I/O
- User interaction through switches, buttons, and LEDs
- Serial interface connections for RS232, LIN, CAN, and FlexRay
- High density piggyback board connectors
- Multiple, configurable voltage regulators (9V to 12V DC input)
- Blank, through-hole prototyping area

This document will describe the functionality provided by the Application Board and guide the user through its operation. For details regarding the operation of the microcontroller, refer to the V850E2/Fx4 User's Manual.

This document is valid for the following versions of the Application Board:

- AB-050-Fx4-MB-L-Q-TCT-V2
Application Board with populated socket for the V850E2/FL4 device
- AB-050-Fx4-MB-X-Q-DEV-V2
Application Board populated with the V850E2/FL4 device
- AB-050-Fx4-MB-X-Q-NONE-V2
Application board unpopulated device.
AB-050-Fx4-PB-X-XXX-V2 Piggyback Boards can be mounted on this Application Board.

2. Board Overview

Figure 1 provides a top level view of the Main Board. Highlighted in the image are several areas of functionality.

Blue: Microcontroller Area

Red: Power Supply Area

Green: Functional Areas

These areas are described in detail in the following sections.

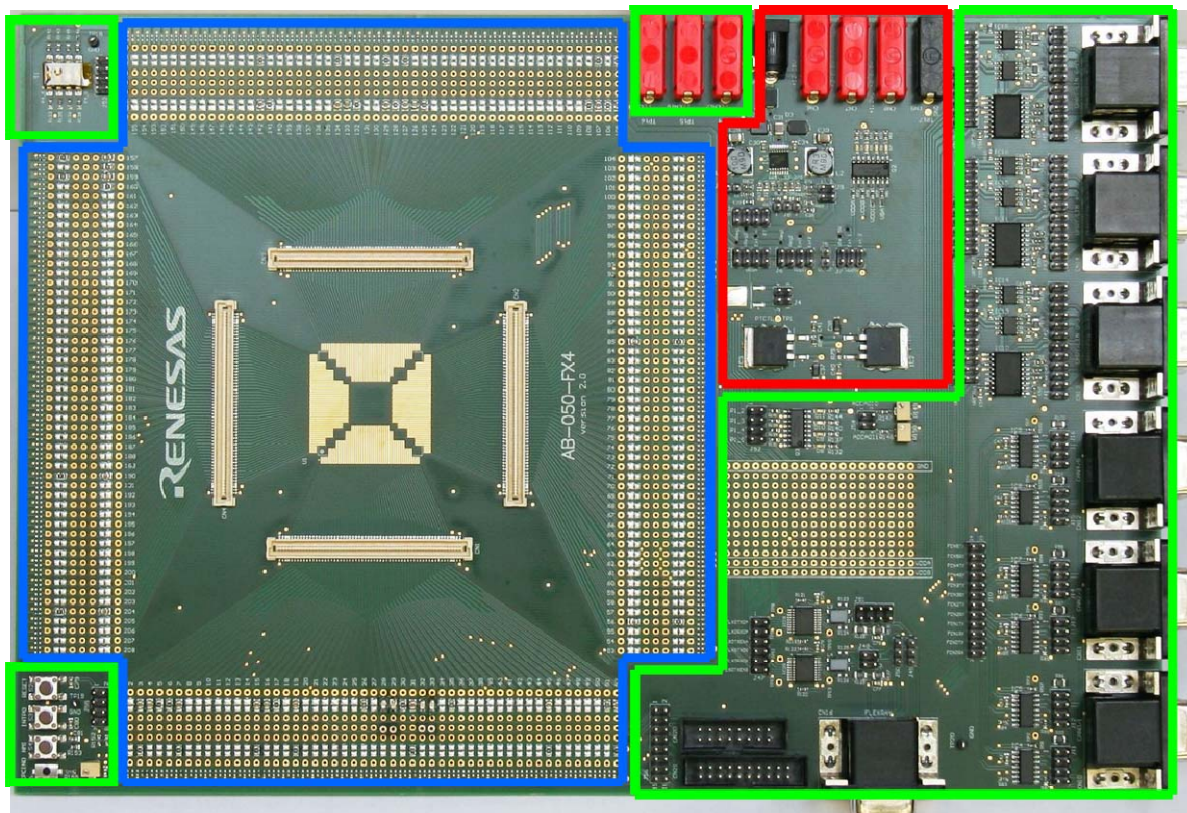


Figure 1. AB-050-Fx4-MB-X-Q-NONE-V2 top view

3. Microcontroller Area

The Microcontroller Area of the Main Board includes the following features:

- Interfaces to all microcontroller I/O pins
- High density piggyback board connectors

3.1 Multi-QFP Footprint

The Main Board provides a multi-QFP footprint that allows for the soldering of any of the Fx4 microcontroller package sizes.

Caution: Refer to the pinout information in the V850E2/Fx4 User's Manual to determine the appropriate Pin Interface connections for each package size.

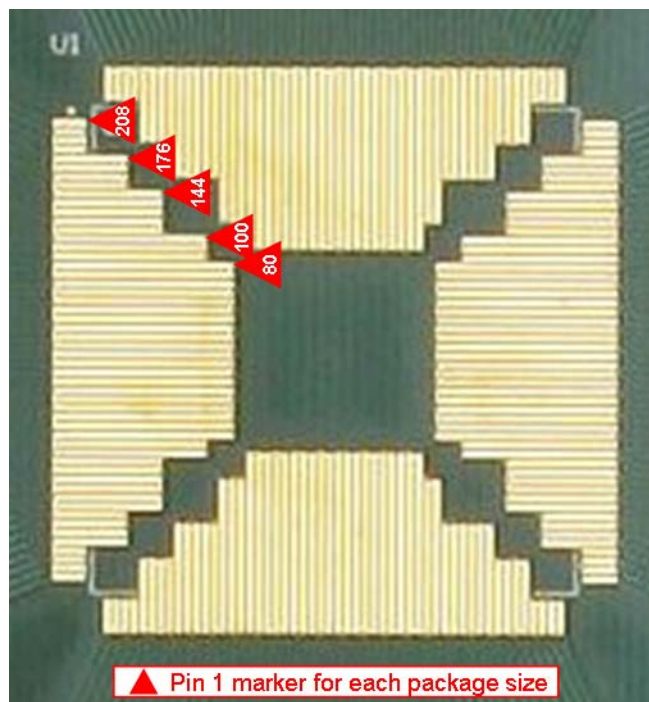


Figure 2. Multi-QFP Footprint

On the following board versions a device or a device socket are assembled:

- AB-050-Fx4-MB-L-Q-TCT-V2 (with socket for V850E2/FL4)
- AB-050-Fx4-MB-X-Q-DEV-V2 (with V850E2/FL4 device)

3.2 Pin Interfaces

Each microcontroller I/O pin is connected to a *Pin Interface*. The Pin Interface is a group of pads that allow easy probing of I/O pins, and provide the ability to selectively connect the I/O pins to power, ground or other signals. Figure 3 shows a picture of unpopulated pin interfaces along with a diagram of the circuit. Through-hole pads with 0.1" spacing are provided for signal probing and connections. These pads can be populated with standard 0.1" headers to facilitate signal probing.

Standard size surface mount pads are also provided. These pads can be populated with standard resistors, capacitors or jumpers to connect the microcontroller I/O pin to ground or one of two voltage rails: VDDA or VDDB. For further details regarding the voltage rails, refer to section 4.3.

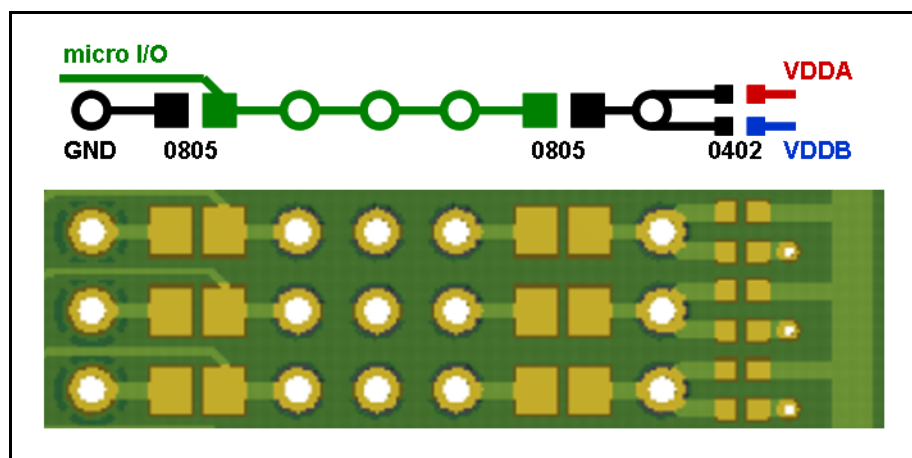


Figure 3. Pin Interfaces

3.3 Piggyback Board Connectors

Surrounding the QFP microcontroller footprints are four high density connectors. These connectors allow the Main Board to be interfaced with *Piggyback Boards* to extend the functionality offered by the Main Board. All microcontroller I/O, as well as power and ground are passed through these connectors to the Piggyback Board. A detailed listing of the connector signals can be found in Table 1.

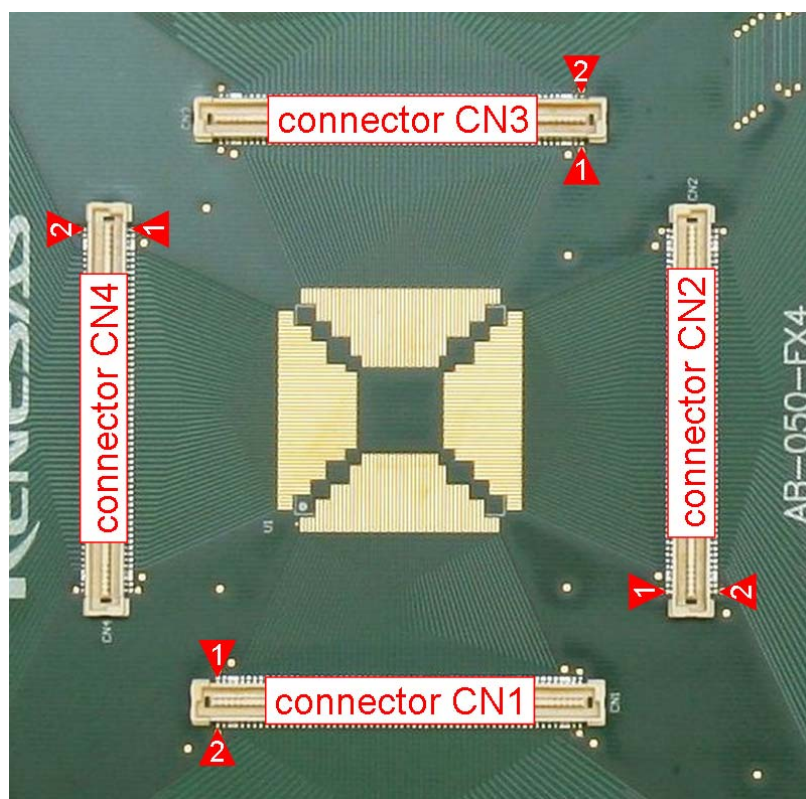


Figure 4. Piggyback Board Connectors

CN1 Pin		Micro Pin / Signal	CN2 Pin		Micro Pin / Signal	CN3 Pin		Micro Pin / Signal	CN4 Pin		Micro Pin / Signal
1	2	VDDA	1	2	VDDA	1	2	VDDA	1	2	VDDA
3	4	VDDA	3	4	VDDA	3	4	VDDA	3	4	VDDA
5	6	GND	5	6	GND	5	6	GND	5	6	GND
7	8	GND	7	8	GND	7	8	GND	7	8	GND
9	10	1	9	10	53	9	10	105	9	10	157
11	12	2	11	12	54	11	12	106	11	12	158
13	14	3	13	14	55	13	14	107	13	14	159
15	16	4	15	16	56	15	16	108	15	16	160
17	18	5	17	18	57	17	18	109	17	18	161
19	20	6	19	20	58	19	20	110	19	20	162
21	22	7	21	22	59	21	22	111	21	22	163
23	24	8	23	24	60	23	24	112	23	24	164
25	26	9	25	26	61	25	26	113	25	26	165
27	28	10	27	28	62	27	28	114	27	28	166
29	30	11	29	30	63	29	30	115	29	30	167
31	32	12	31	32	64	31	32	116	31	32	168
33	34	13	33	34	65	33	34	117	33	34	169
35	36	14	35	36	66	35	36	118	35	36	170
37	38	15	37	38	67	37	38	119	37	38	171
39	40	16	39	40	68	39	40	120	39	40	172

CN1 Pin		Micro Pin / Signal	CN2 Pin		Micro Pin / Signal	CN3 Pin		Micro Pin / Signal	CN4 Pin		Micro Pin / Signal
41	42	17	41	42	69	41	42	121	41	42	173
43	44	18	43	44	70	43	44	122	43	44	174
45	46	19	45	46	71	45	46	123	45	46	175
47	48	20	47	48	72	47	48	124	47	48	176
49	50	21	49	50	73	49	50	125	49	50	177
51	52	22	51	52	74	51	52	126	51	52	178
53	54	23	53	54	75	53	54	127	53	54	179
55	56	24	55	56	76	55	56	128	55	56	180
57	58	25	57	58	77	57	58	129	57	58	181
59	60	26	59	60	78	59	60	130	59	60	182
61	62	27	61	62	79	61	62	131	61	62	183
63	64	28	63	64	80	63	64	132	63	64	184
65	66	29	65	66	81	65	66	133	65	66	185
67	68	30	67	68	82	67	68	134	67	68	186
69	70	31	69	70	83	69	70	135	69	70	187
71	72	32	71	72	84	71	72	136	71	72	188
73	74	33	73	74	85	73	74	137	73	74	189
75	76	34	75	76	86	75	76	138	75	76	190
77	78	35	77	78	87	77	78	139	77	78	191
79	80	36	79	80	88	79	80	140	79	80	192
81	82	37	81	82	89	81	82	141	81	82	193
83	84	38	83	84	90	83	84	142	83	84	194
85	86	39	85	86	91	85	86	143	85	86	195
87	88	40	87	88	92	87	88	144	87	88	196
89	90	41	89	90	93	89	90	145	89	90	197
91	92	42	91	92	94	91	92	146	91	92	198
93	94	43	93	94	95	93	94	147	93	94	199
95	96	44	95	96	96	95	96	148	95	96	200
97	98	45	97	98	97	97	98	149	97	98	201
99	100	46	99	100	98	99	100	150	99	100	202
101	102	47	101	102	99	101	102	151	101	102	203
103	104	48	103	104	100	103	104	152	103	104	204
105	106	49	105	106	101	105	106	153	105	106	205
107	108	50	107	108	102	107	108	154	107	108	206
109	110	51	109	110	103	109	110	155	109	110	207
111	112	52	111	112	104	111	112	156	111	112	208
113	114	GND	113	114	GND	113	114	GND	113	114	GND
115	116	GND	115	116	GND	115	116	GND	115	116	GND
117	118	VDDDB	117	118	VDDDB	117	118	VDDDB	117	118	VDDDB
119	120	VDDDB	119	120	VDDDB	119	120	VDDDB	119	120	VDDDB

Table 1. Piggyback Board Connector Signals

4. Power Supply Area

The power supply area includes multiple connectors for providing a variety of power supply options to the Main Board and Piggyback Boards. On board voltage regulators are available to regulate the board's DC input voltage to the levels required for the integrated circuits. To provide flexible prototyping capabilities, the voltage regulator outputs and IC voltage rails are selectable. Indicator LEDs are provided to easily observe the state of the IC voltage rails.

Caution: See precaution 6.2 for details regarding the voltage rail indicator LEDs.

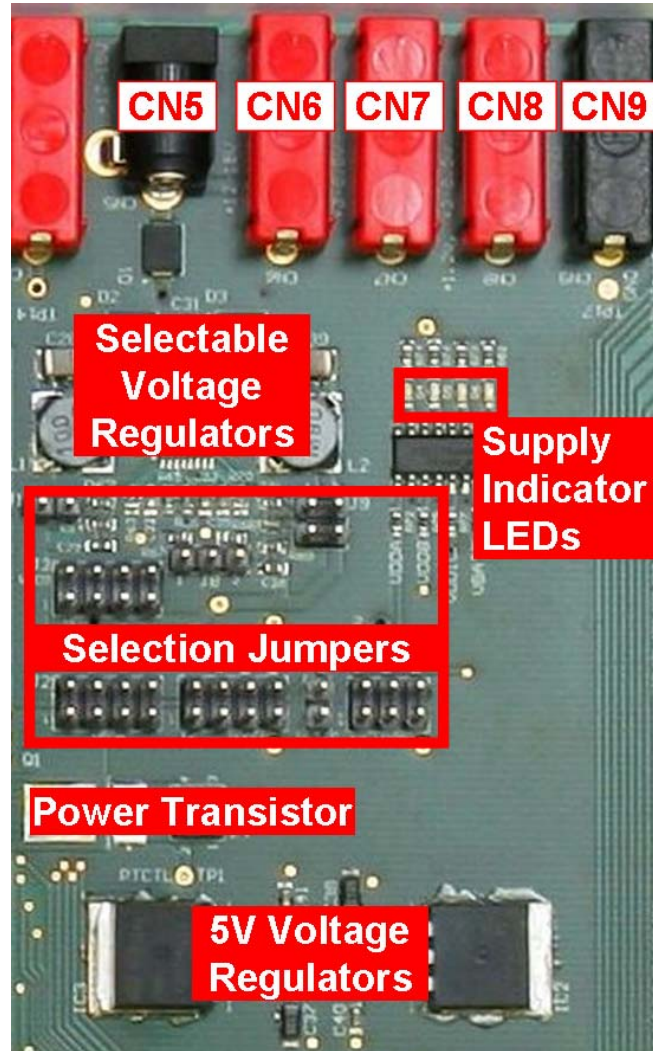


Figure 5. Power Supply Area

4.1 Board Power Supply Connectors

Power is supplied externally to the board using the connectors described in Table 2. If VBAT is supplied using connectors CN5 or CN6, the on-board regulators can be used to regulate the

supply voltages required for the integrated circuits. If desired, connector CN7 and/or connector CN8 can be used to supply the IC voltage rails directly.

In order to achieve LIN or FlexRay bus communication it is necessary to supply VBAT. This supply is used directly by the LIN and FlexRay transceivers, and can be used to generate the 5 volt supply voltage required by the FlexRay transceiver.

In order to achieve CAN bus communication, the 5 volt supply voltage required by the CAN transceiver can either be directly supplied to the board using connectors CN7 or CN8, or it can be generated from VBAT, which is supplied to the board using connectors CN5 or CN6.

Caution: The voltage rails provided by connectors CN7 and CN8 are not regulated and can be directly supplied to the integrated circuits. Damage may occur if a voltage greater than that described in Table 2 is supplied.

Connector	Description	Rail	Input Voltage Range
CN5	DC Power Jack ID=2.1mm, center positive	Ext_VBAT	+9v to +15v
CN6	Red Banana Jack		+9v to +15v
CN7	Red Banana Jack	Ext_VDD1	+3v to +5.5v
CN8	Red Banana Jack	Ext_VDD2	+3v to +5.5v or +1.0v to +1.3v
CN9	Black Banana Jack	GND	0v

Table 2. Power Supply Connectors

4.2 Voltage Regulators

Three on board voltage regulators are provided to regulate the external DC input voltage (Ext_VBAT) to the levels required for the integrated circuits. The voltage level of regulator outputs 1 and 2 are selectable. These regulators can be used to supply the I/O and core voltages to the microcontroller. The output of the third regulator is fixed at 5 volts, and is used to supply the necessary 5 volt rail to the CAN and FlexRay transceivers in the functional areas.

Component	Regulator Output	Jumper	Setting	Output Level
IC1	VReg output 1 (Reg_VDD1)	J1	open	5 volts
			closed	3.3 volts
	VReg output 2 (Reg_VDD2)	J9	open	5 volts
			1 – 2	3.3 volts
			1 – 2 and 3 – 4	1.2 volts
IC2, IC3	VReg 5 volt output (Reg_VDD5V)	–	–	5 volts

Table 3. Voltage Regulators

4.3 IC Voltage Rails

The Main Board provides several options for powering the board's integrated circuits. Jumpers are provided to select from the available voltage sources, or to completely disconnect the rail. Indicator LEDs, D4 to D7, are provided to easily observe the state of the VDDA, VDDDB, VDDIOF and VBATF voltage rails.

Caution: See precaution 6.2 for details regarding the voltage rail indicator LEDs.

Caution: Ensure that only one voltage source is selected for each voltage rail.

Voltage Rail	Description	Jumper	Setting	Source
VDDA	supply voltage to microcontroller	J2	1 – 2	VReg output 1
			3 – 4	VReg output 2
			5 – 6	connector CN7
			7 – 8	connector CN8
VDDDB	supply voltage to microcontroller	J3	1 – 2	VReg output 1
			3 – 4	VReg output 2
			5 – 6	connector CN7
			7 – 8	transistor Q1
VBATF	battery level supply voltage to ICs	J5	1 – 2	connector CN5 or CN6
VDDIOF	I/O level supply voltage to ICs	J6	1 – 2	VReg output 1
			3 – 4	VReg output 2
			5 – 6	connector CN7
			7 – 8	connector CN8
VDD5F	5 volt supply to ICs	J7	1 – 2	VReg 5 volt output
			3 – 4	connector CN7
			5 – 6	connector CN8

Table 4. Voltage Rail Selections

4.4 External Power Transistor

The M2 version of V850E2/Fx4 microcontrollers is capable of controlling an external power transistor to regulate its core logic voltage. Transistor Q1 is provided for use with M2 version microcontrollers. Jumper J4 can be used to connect the control signal and core logic voltage rail (PT_CVDD). Jumper J3, described in Table 4, is used to connect the core logic rail to the microcontroller.

5. Functional Areas

The functional areas provide various circuits and components useful for interacting with the microcontroller's I/O. All microcontroller I/O signals provided to the functional area circuits are connector via jumpers. This allows for isolation of the microcontroller, as well as the opportunity to substitute signals other than the microcontroller I/O routed on the board. The I/O signals selected to be provided to the functional area circuits are based on the pinout of the V850E2/FL4 208-pin microcontroller. When prototyping with other microcontrollers, the appropriate signals may not be routed to each functional area circuit. In this case, wires can be added between the pin interfaces and the jumper headers to supply the correct signals.

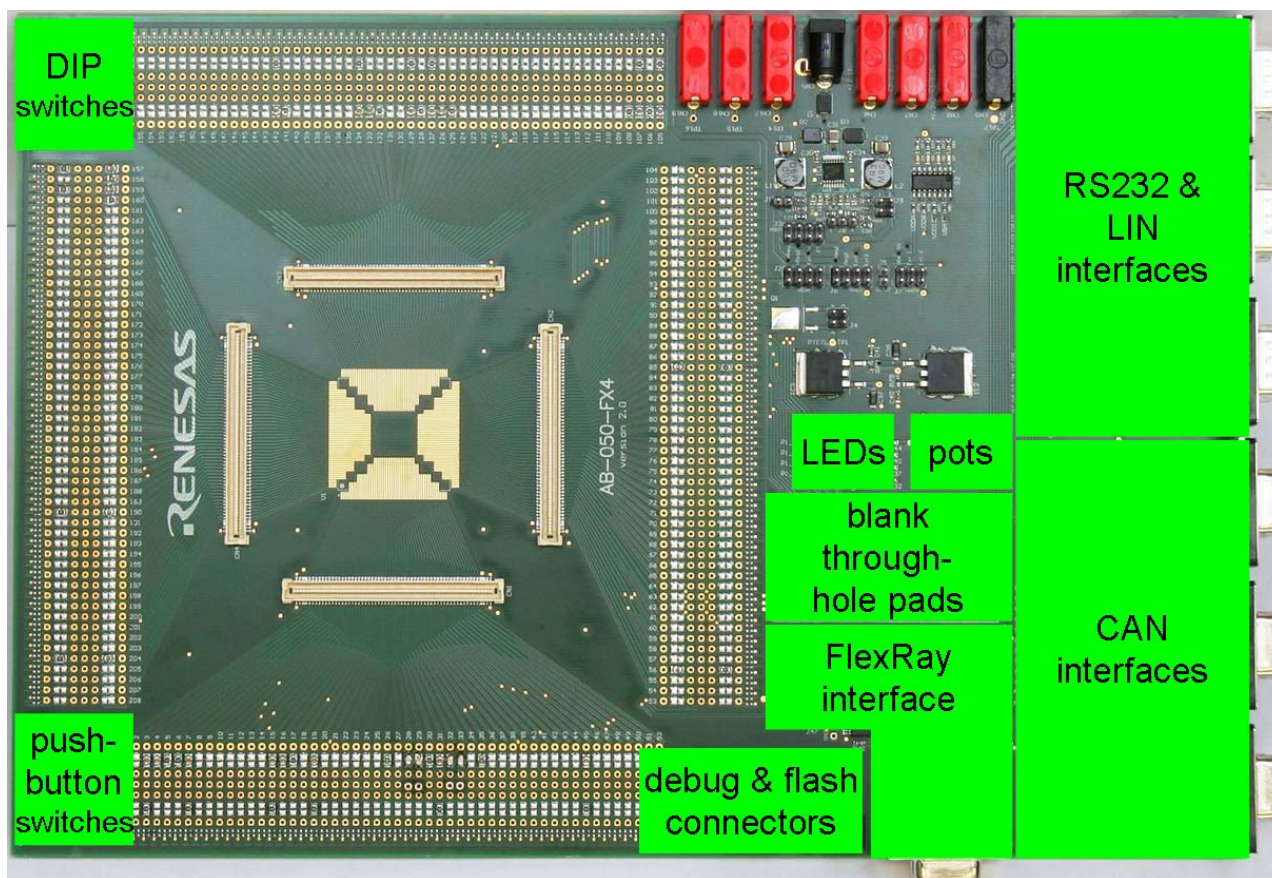


Figure 6. Functional Areas

5.1 LEDs

Four LEDs, D8 to D11, are provided to allow visual observation of microcontroller output port states. The LEDs are connected to the microcontroller via jumper J52. The LED signals are active high.

LED	J52 Setting	Device Port
D8	1 – 2	P1_2
D9	3 – 4	P1_3
D10	5 – 6	P1_4
D11	7 – 8	P1_5

Table 5. LED Signals

Caution: See precaution 6.2 for details of the usage restriction regarding this feature.

5.2 DIP Switches

A four signal DIP switch, S1, is provided to allow the setting of microcontroller input port states. The switches are connected to the microcontroller via jumper J53. The switch signals are active high.

Switch	J53 Setting	Device Port
S1 – 1	1 – 2	P4_5
S1 – 2	3 – 4	P4_6
S1 – 3	5 – 6	P4_7
S1 – 4	7 – 8	P4_8

Table 6. DIP Switch Signals

5.3 Pushbutton Switches

Four pushbutton switches, S2 to S5, are provided to allow the switching of microcontroller input port states. The switches are connected to the microcontroller via jumper J55. Switches S2 and S3 are active low. Switches S4 and S5 are active high. Switches S2, S3 and S4 are normally open switches. Switch S5 is normally closed.

Switch	J55 Setting	Device signal	Active Level	Inactive State
S2	1 – 2	RESET	low	open
S3	3 – 4	INTP0	low	open
S4	5 – 6	NMI	high	open
S5	7 – 8	VCMP0IN	high	closed

Table 7. Pushbutton Switch Signals

5.4 Analog Input Potentiometers

Potentiometers R149 and R150 are provided to generate analog voltages to the microcontroller's analog inputs. The potentiometers are connected to the microcontroller via jumper J54. By adjusting the potentiometer screws, a voltage between GND and VDDIOF can be created.

Potentiometer	J54 Setting	Analog Input
R149	1 – 2	ADCA0I0
R150	3 – 4	ADCA0I1

Table 8. Analog Input Signals

5.5 Serial Communications Interfaces

RS232 transceivers, IC10 to IC12, are supplied to provide up to 6 serial interfaces. Each transceiver can be selectively connected to one of the microcontroller's UART interfaces (URTE) via jumpers J17 to J34. The serial interfaces are connected to the DB9 connectors CN13 to CN15 via jumpers J41 to J46.

Caution: The microcontroller's UART interfaces and the DB9 connectors are shared between the board's RS232 and LIN interfaces. Ensure that each interface is configured for the operation of only one, RS232 or LIN, using jumpers J17 to J47.

Transceiver	UART instance	Jumper Settings	Device signal
IC10	URTE0	J17 1 – 2	URTE0TX
		J18 1 – 2, J19 open	URTE0RX
	URTE2	J17 2 – 3	URTE2TX
		J18 2 – 3, J19 open	URTE2RX
	URTE1	J26 1 – 2	URTE1TX
		J27 1 – 2, J28 open	URTE1RX
	URTE3	J26 2 – 3	URTE3TX
		J27 2 – 3, J28 open	URTE3RX
IC11	URTE4	J20 1 – 2	URTE4TX
		J21 1 – 2, J22 open	URTE4RX
	URTE6	J20 2 – 3	URTE6TX
		J21 2 – 3, J22 open	URTE6RX
	URTE5	J29 1 – 2	URTE5TX
		J30 1 – 2, J31 open	URTE5RX
	URTE7	J29 2 – 3	URTE7TX
		J30 2 – 3, J31 open	URTE7RX
IC12	URTE8	J23 1 – 2	URTE8TX
		J24 1 – 2, J25 open	URTE8RX
	URTE10	J23 2 – 3	URTE10TX
		J24 2 – 3, J25 open	URTE10RX
	URTE9	J32 1 – 2	URTE9TX
		J33 1 – 2, J34 open	URTE9RX
	URTE11	J32 2 – 3	URTE11TX
		J33 2 – 3, J34 open	URTE11RX

Table 9. *Serial Communications Interfaces Signals*

Connector	UART instance	Jumper Settings		Signal
CN13B Lower	URTE0/2	J41	1 – 2	RS232 0 TX
			3 – 4	RS232 0 RX
			5 – 6	GND
			all others open	–
CN13A Upper	URTE1/3	J42	1 – 2	RS232 1 TX
			3 – 4	RS232 1 RX
			5 – 6	GND
			all others open	–
CN14B Lower	URTE4/6	J43	1 – 2	RS232 2 TX
			3 – 4	RS232 2 RX
			5 – 6	GND
			all others open	–
CN14A Upper	URTE5/7	J44	1 – 2	RS232 3 TX
			3 – 4	RS232 3 RX
			5 – 6	GND
			all others open	–
CN15B Lower	URTE8/10	J45	1 – 2	RS232 4 TX
			3 – 4	RS232 4 RX
			5 – 6	GND
			all others open	–
CN15A Upper	URTE9/11	J46	1 – 2	RS232 5 TX
			3 – 4	RS232 5 RX
			5 – 6	GND
			all others open	–

Table 10. Serial Communications Interfaces Connectors

5.6 LIN Interfaces

LIN transceivers, IC13 to IC18, are supplied to provide up to 6 LIN bus interfaces. Each transceiver can be selectively connected to one of the microcontroller's LIN capable UART interfaces (URTE) via jumpers J17 to J34. The LIN bus interfaces are connected to the DB9 connectors CN13 to CN15 via jumpers J41 to J46.

In order to achieve LIN bus communication, it is necessary to supply the transceivers with the VBAT supply voltage in addition to the I/O voltage. See section 4 for board power supply details.

Caution: The microcontroller's UART interfaces and the DB9 connectors are shared between the board's RS232 and LIN interfaces. Ensure that each interface is configured for the operation of only one, RS232 or LIN, using jumpers J17 to J47.

Transceiver	UART instance	Jumper Settings	Device signal
IC13	URTE0	J17 1 – 2	URTE0TX
		J18 open, J19 1 – 2	URTE0RX
	URTE2	see precaution 6.1	URTE2TX
		see precaution 6.1	URTE2RX
IC14	URTE1	J26 1 – 2	URTE1TX
		J27 open, J28 1 – 2	URTE1RX
	URTE3	J26 2 – 3	URTE3TX
		J27 open, J28 2 – 3	URTE3RX
IC15	URTE4	J20 1 – 2	URTE4TX
		J21 open, J22 1 – 2	URTE4RX
	URTE6	J20 2 – 3	URTE6TX
		J21 open, J22 2 – 3	URTE6RX
IC16	URTE5	J29 1 – 2	URTE5TX
		J30 open, J31 1 – 2	URTE5RX
	URTE7	J29 2 – 3	URTE7TX
		J30 open, J31 2 – 3	URTE7RX
IC17	URTE8	J23 1 – 2	URTE8TX
		J24 open, J25 1 – 2	URTE8RX
	URTE10	J23 2 – 3	URTE10TX
		J24 open, J25 2 – 3	URTE10RX
IC18	URTE9	J32 1 – 2	URTE9TX
		J33 open, J34 1 – 2	URTE9RX
	URTE11	J32 2 – 3	URTE11TX
		J33 open, J34 2 – 3	URTE11RX

Table 11. LIN Interfaces Signals

Connector	UART instance	Jumper Settings		Signal
CN13B Lower	URTE0/2	J41	7 – 8	LIN 0
			9 – 10	VBAT
			11 – 12	GND
			all others open	–
CN13A Upper	URTE1/3	J42	7 – 8	LIN 1
			9 – 10	VBAT
			11 – 12	GND
			all others open	–
CN14B Lower	URTE4/6	J43	7 – 8	LIN 2
			9 – 10	VBAT
			11 – 12	GND
			all others open	–
CN14A Upper	URTE5/7	J44	7 – 8	LIN 3
			9 – 10	VBAT
			11 – 12	GND
			all others open	–
CN15B Lower	URTE8/10	J45	7 – 8	LIN 4
			9 – 10	VBAT
			11 – 12	GND
			all others open	–
CN15A Upper	URTE9/11	J46	7 – 8	LIN 5
			9 – 10	VBAT
			11 – 12	GND
			all others open	–

Table 12. LIN Interfaces Connectors

5.7 CAN Interfaces

CAN transceivers, IC4 to IC9, are supplied to provide up to 6 CAN bus interfaces. Each transceiver can be selectively connected to one of the microcontroller's CAN interfaces (FCN, DCN) via jumper J10. The CAN bus interfaces are connected to the DB9 connectors CN10 to CN12. Jumpers J11 to J16 provide additional CAN bus interface configuration options including the ability to selectively interconnect CAN bus interfaces on-board CAN.

In order to achieve CAN bus communication, it is necessary to supply the transceivers with a nominal 5 volt supply voltage in addition to the I/O voltage. An on-board, 5 volt output regulator is provided to generate this voltage. See section 4 for board power supply details.

Transceiver	FCAN instance	J10 Setting	Device signal
IC4 (CAN0)	FCN0	1 – 2	FCN0RX
		3 – 4	FCN0TX
IC5 (CAN1)	FCN1	5 – 6	FCN1RX
		7 – 8	FCN1TX
IC6 (CAN2)	FCN2	9 – 10	FCN2RX
		11 – 12	FCN2TX
IC7 (CAN3)	FCN3	13 – 14	FCN3RX
		15 – 16	FCN3TX
IC8 (CAN4)	FCN4	17 – 18	FCN4RX
		19 – 20	FCN4TX
IC9 (CAN5)	FCN5	21 – 22	FCN5RX
		23 – 24	FCN5TX

Table 13. CAN Interfaces Signals

Connector	FCAN instance	Jumper Settings	Description
CN10B lower	FCN0	J11	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND
CN10A upper	FCN1	J12	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND
CN11B lower	FCN2	J13	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND
CN11A upper	FCN3	J14	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND
CN12B lower	FCN4	J15	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND
CN10A upper	FCN5	J16	1 – 2 enable termination resistor
			3 – 4 connect to on-board CAN bus
			5 – 6 connect to on-board CAN bus
			7 – 8 connect DB9 pin 3 to GND

Table 14. CAN Bus Interface Jumpers

5.8 FlexRay Interfaces

FlexRay transceivers, IC19 and IC20, provide a single FlexRay bus interface. The transceivers can be selectively connected to the microcontroller's FlexRay interface via jumper J47. The FlexRay bus interface is connected to the DB9 connectors CN16A and CN16B. Jumpers J48 to J51 provide additional FlexRay bus interface configuration options.

In order to achieve FlexRay bus communication, it is necessary to supply the transceivers with the VBAT supply voltage and a nominal 5 volt supply voltage in addition to the I/O voltage. See section 4 for board power supply details.

Transceiver	FlexRay instance	J47 Setting	Device signal
IC19	FLX0	1 – 2	FLX0TXDA
		3 – 4	FLX0RXDA
		5 – 6	FLX0TXENA
IC20		7 – 8	FLX0TXDB
		9 – 10	FLX0RXDB
		11 – 12	FLX0TXENB

Table 15. FlexRay Interfaces Signals

Jumper Settings		Description
J51	1 – 2	enable termination resistor
	3 – 4	enable termination resistor
	5 – 6	connect BP A to CN16A pin 7
	7 – 8	connect BM A to CN16A pin 2
J48	1 – 2	enable termination resistor
	3 – 4	enable termination resistor
J49	1 – 2	connect BP B to CN16A pin 7
	2 – 3	connect BP B to CN16A pin 8
J50	1 – 2	connect BM B to CN16A pin 2
	2 – 3	connect BM B to CN16A pin 4

Table 16. FlexRay Bus Interface Jumpers

5.9 On-chip Debug and Flash Programming Connectors

Connectors CN20 and CN21 are provided to allow the connection of microcontroller debug and flash programming tools. The debug and flash programming signals are connected to the microcontroller via jumper J56. Connector CN20 is a 16 pin, 0.1" pin pitch connector. The pinout of this connector allows the connection of the Renesas PG-FP4 and PG-FP5 flash programmers, or the Renesas MINICUBE2 debugger. Connector CN21 is a 20 pin, 0.1" pin pitch connector. The pinout of this connector allows the connection of the Renesas MINICUBE debugger.

J56 Setting	Device signal
1 – 12	DCUTDI/FLCS0SI/FLUR0RX
3 – 10	DCUTDO/FLCS0SO/FLUR0TX
5 – 8	DCUTCK/FLCS0SCI
7 – 6	DCUTMS
9 – 4	DCUTRST
11 – 2	DCURDY
13 – 14	RESET
15 – 16	FLMD0

Table 17. Debug and Flash Programming Signals

CN20 Pin	Device signal	CN21 Pin	Device signal
1	GND	1	GND
2	RESET	2	DCUTCK
3	DCUTDO/FLCS0SO/FLUR0TX	3	GND
4	VDDIOF	4	DCUTMS
5	DCUTDI/FLCS0SI/FLUR0RX	5	GND
6	–	6	DCUTDI
7	DCUTCK/FLCS0SCI	7	GND
8	DCUTRDY	8	DCUTRST
9	DCUTRST	9	GND
10	–	10	–
11	–	11	GND
12	DCUTMS	12	RESET
13	–	13	GND
14	FLMD0	14	FLMD0
15	–	15	GND
16	–	16	DCUTRDY
		17	GND
		18	DCUTDO
		19	GND
		20	VDDIOF

Table 18. Debug and Flash Programming Connectors

6. Precautions

6.1 Limitation of URTE2 for LIN communication

URTE2 cannot be used for LIN communication. The URTE2RX pin is multiplexed with the FLMD1 function, and requires pull-down resistor R60. The RXD pin of the LIN transceiver is an open-drain output, and requires pull-up resistor R107. When URTE2 is connected to LIN0 via jumpers J17 and J19, the resulting receive signal is invalid. As a result, URTE2 cannot be used for LIN communication and pins 2 and 3 of jumper J19 should be left, unconnected.

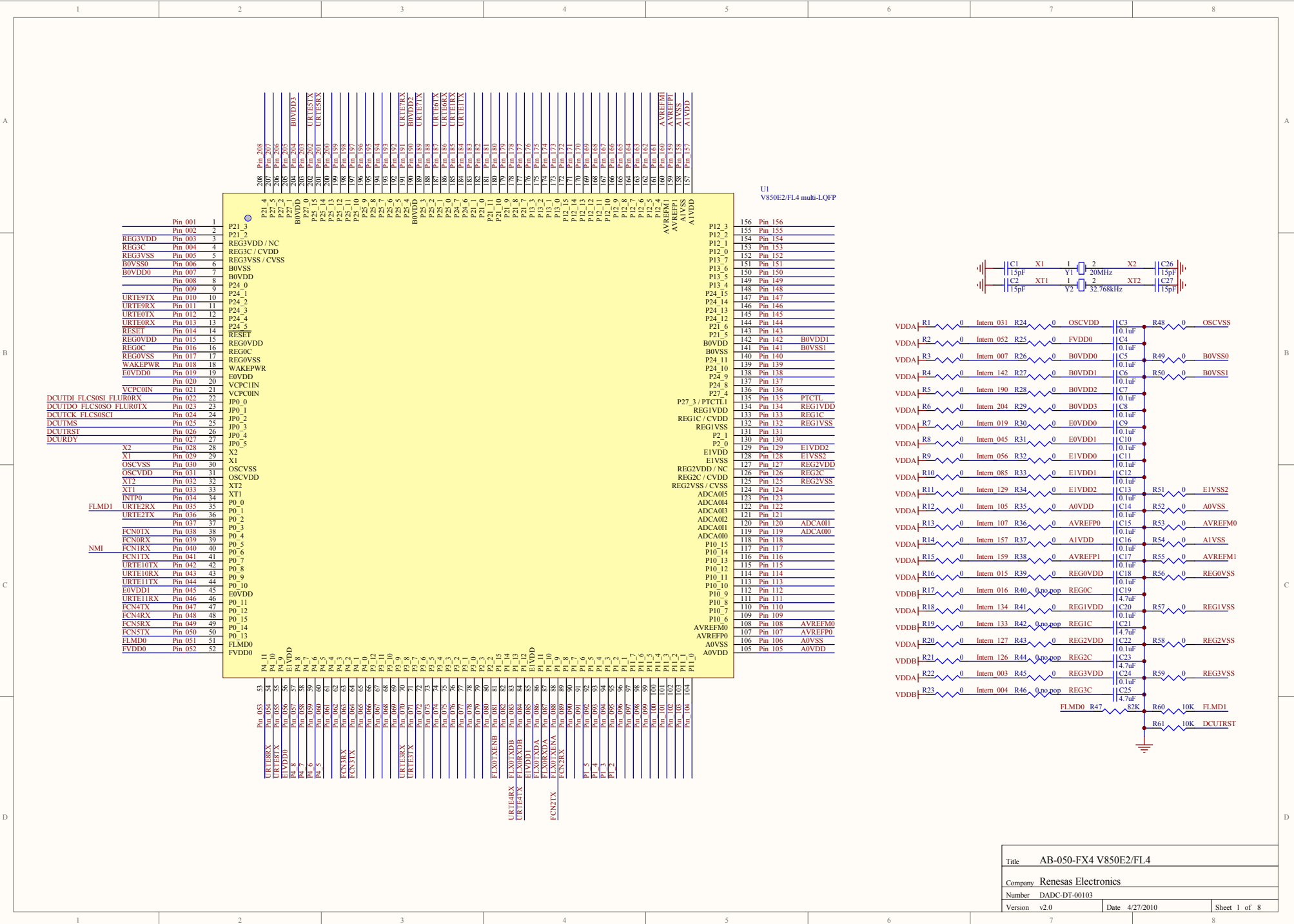
6.2 LEDs will not illuminate

Board Version and Serial Number Applicability

AB-050-Fx4-X-Q-NONE-V2 CA00C0071D - CA00C0100D	other
applicable	not applicable

Components Q2 and Q3 are populated with an incorrect component that prevents LEDs D4, D5, D10 and D11 from illuminating. No damage can occur as a result of an attempt to operate the LEDs. Note that indicator LEDs for power rails VDDA and VDDB (D4 and D5) will not illuminate. There is no workaround for this precaution.

7. Schematic

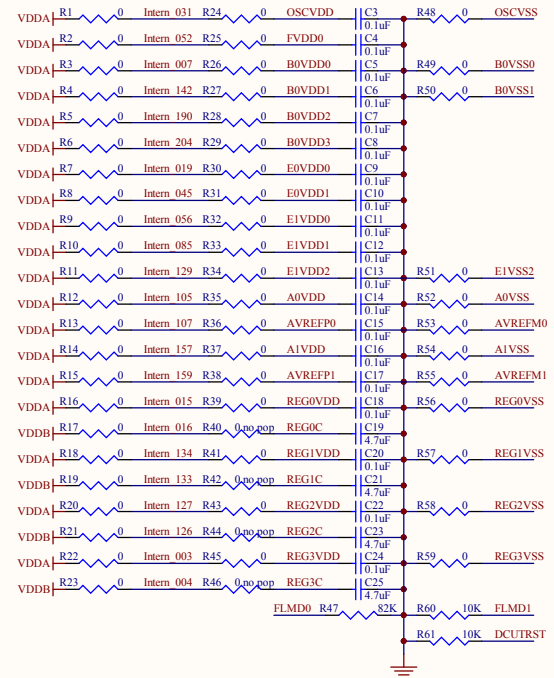
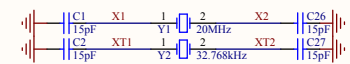


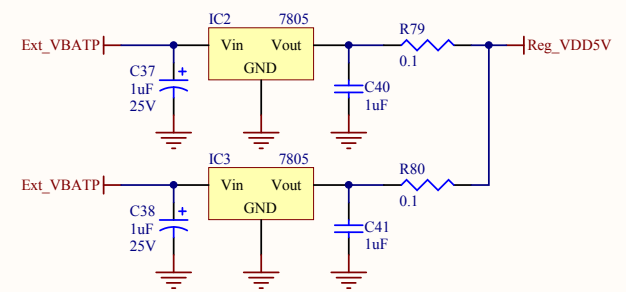
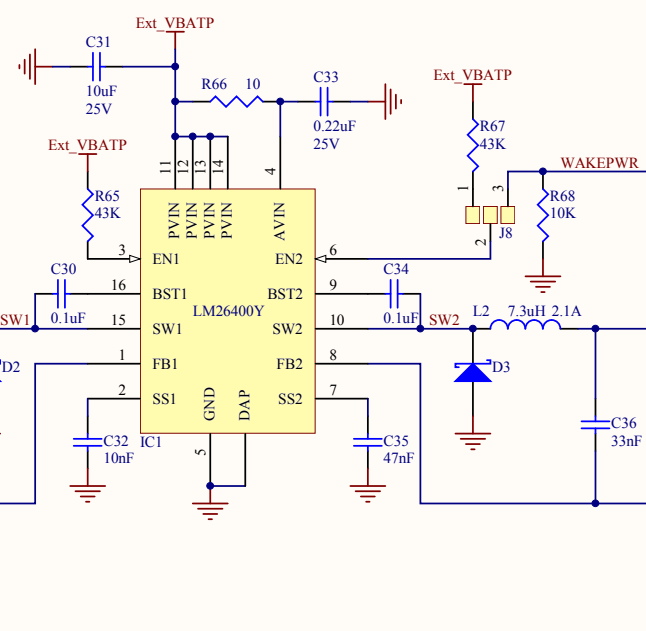
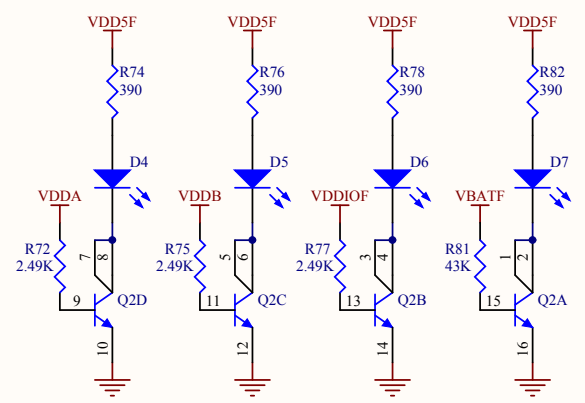
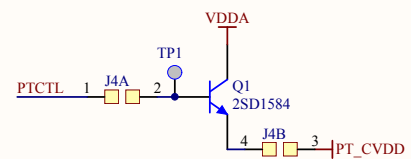
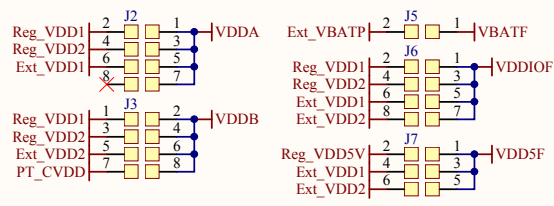
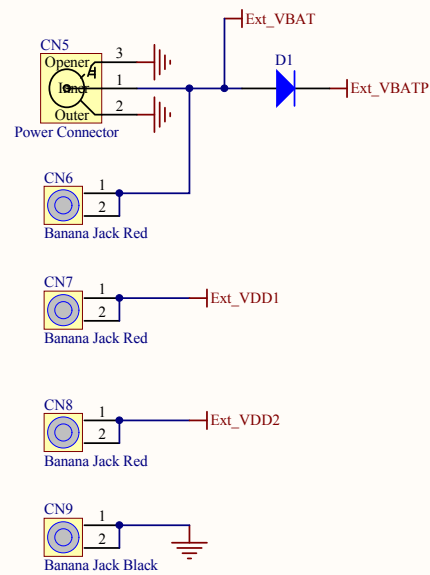
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P21_2	P21_2
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REG3C	Pm 003 3
REG3VSS	Pm 004 4
BOVSS0	Pm 005 5
BOVDD0	Pm 006 6
	Pm 007 7
	Pm 008 8
	Pm 009 9
URTE9TX	Pm 010 10
URTE9RX	Pm 011 11
URTE0TX	Pm 012 12
URTE0RX	Pm 013 13
RESET	Pm 014 14
REG0VDD	Pm 015 15
REG0C	Pm 016 16
REG0VSS	Pm 017 17
WAKEPWR	Pm 018 18
EOVDD0	Pm 019 19
	Pm 020 20
VCPC0IN	Pm 021 21
	Pm 022 22
DCUTDI FLCS0S1 FLUR0RX	Pm 023 23
DCUTDI0 FLCS0S0 FLUR0TX	Pm 024 24
DCUTCK FLCS0S0C1	Pm 025 25
DCUTIMS	Pm 026 26
DCUTRST	Pm 027 27
DCURDY	Pm 028 28
	Pm 029 29
	Pm 030 30
OSCVD0	Pm 031 31
XT2	Pm 032 32
XT1	Pm 033 33
INTP0	Pm 034 34
FLMD1	Pm 035 35
URTE2RX	Pm 036 36
URTE2TX	Pm 037 37
	Pm 038 38
FCN0RX	Pm 039 39
FCN1RX	Pm 040 40
FCN1TX	Pm 041 41
URTE10TX	Pm 042 42
URTE10RX	Pm 043 43
URTE11TX	Pm 044 44
EOVDD1	Pm 045 45
URTE11RX	Pm 046 46
FCN4TX	Pm 047 47
FCN4RX	Pm 048 48
FCN5RX	Pm 049 49
FCN5TX	Pm 050 50
FLMD0	Pm 051 51
FVDD0	Pm 052 52

P21_4	P21_4
P21_3	P21_3
P21_2	P21_2
REG3VDD / NC	Pm 002 2
REG3C / CVDD	Pm 003 3
REG3VSS / CVSS	Pm 004 4
BOVSS	Pm 005 5
BOVDD	Pm 006 6
	Pm 007 7
	Pm 008 8
	Pm 009 9
P24_0	P24_0
P24_1	P24_1
P24_2	P24_2
P24_3	P24_3
P24_4	P24_4
P24_5	P24_5
RESET	Pm 014 14
REG0VDD	Pm 015 15
REG0C	Pm 016 16
REG0VSS	Pm 017 17
WAKEPWR	Pm 018 18
EOVDD	Pm 019 19
VCPC1IN	Pm 021 21
VCPC0IN	Pm 022 22
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JP0_3	JP0_3
JP0_4	JP0_4
JP0_5	JP0_5
	Pm 028 28
	Pm 029 29
	Pm 030 30
OSCVD0	Pm 031 31
XT2	Pm 032 32
XT1	Pm 033 33
INTP0	Pm 034 34
FLMD1	Pm 035 35
URTE2RX	Pm 036 36
URTE2TX	Pm 037 37
	Pm 038 38
FCN0RX	Pm 039 39
FCN1RX	Pm 040 40
FCN1TX	Pm 041 41
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URTE10RX	Pm 043 43
URTE11TX	Pm 044 44
EOVDD1	Pm 045 45
URTE11RX	Pm 046 46
FCN4TX	Pm 047 47
FCN4RX	Pm 048 48
FCN5RX	Pm 049 49
FCN5TX	Pm 050 50
FLMD0	Pm 051 51
FVDD0	Pm 052 52

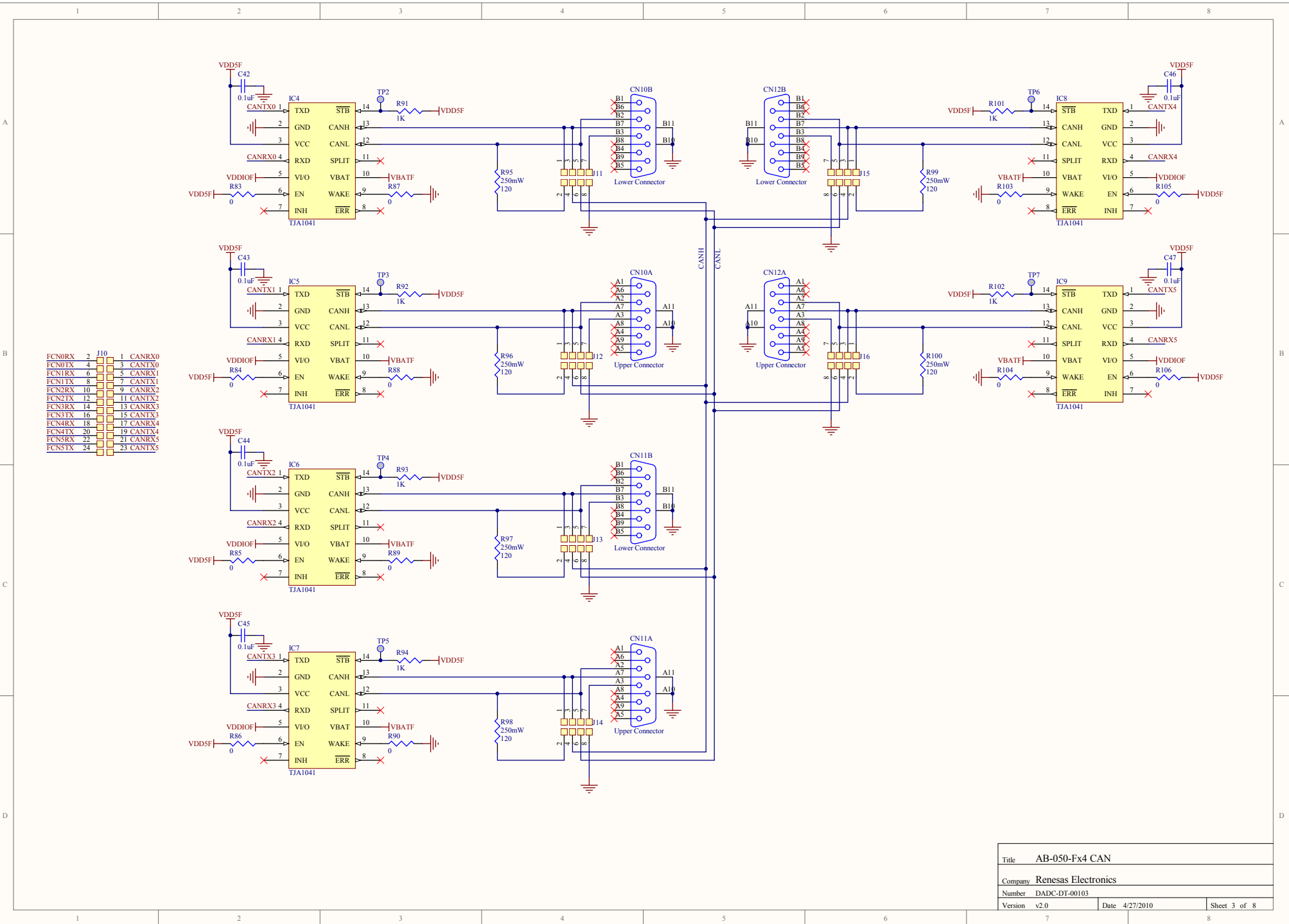
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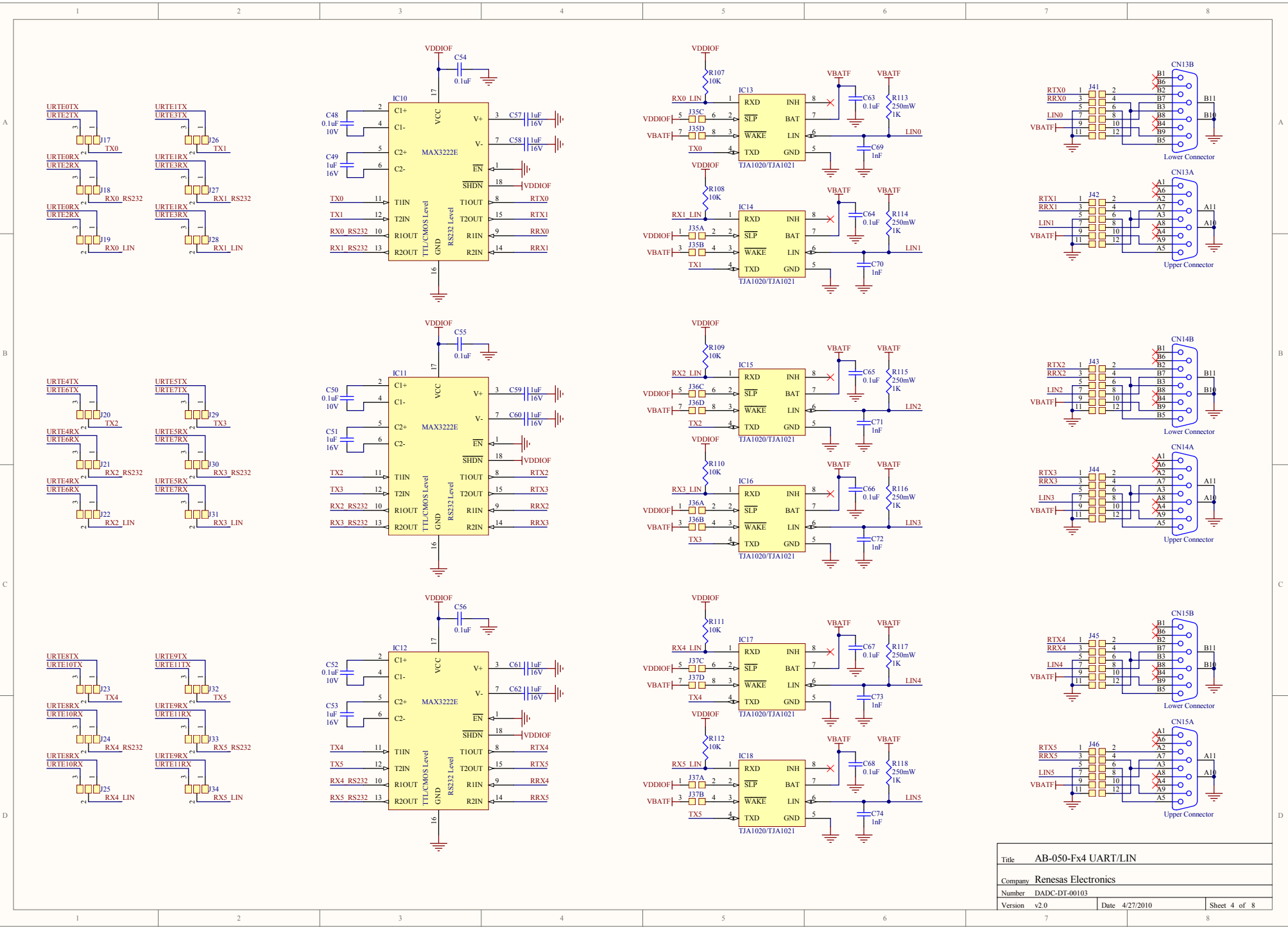
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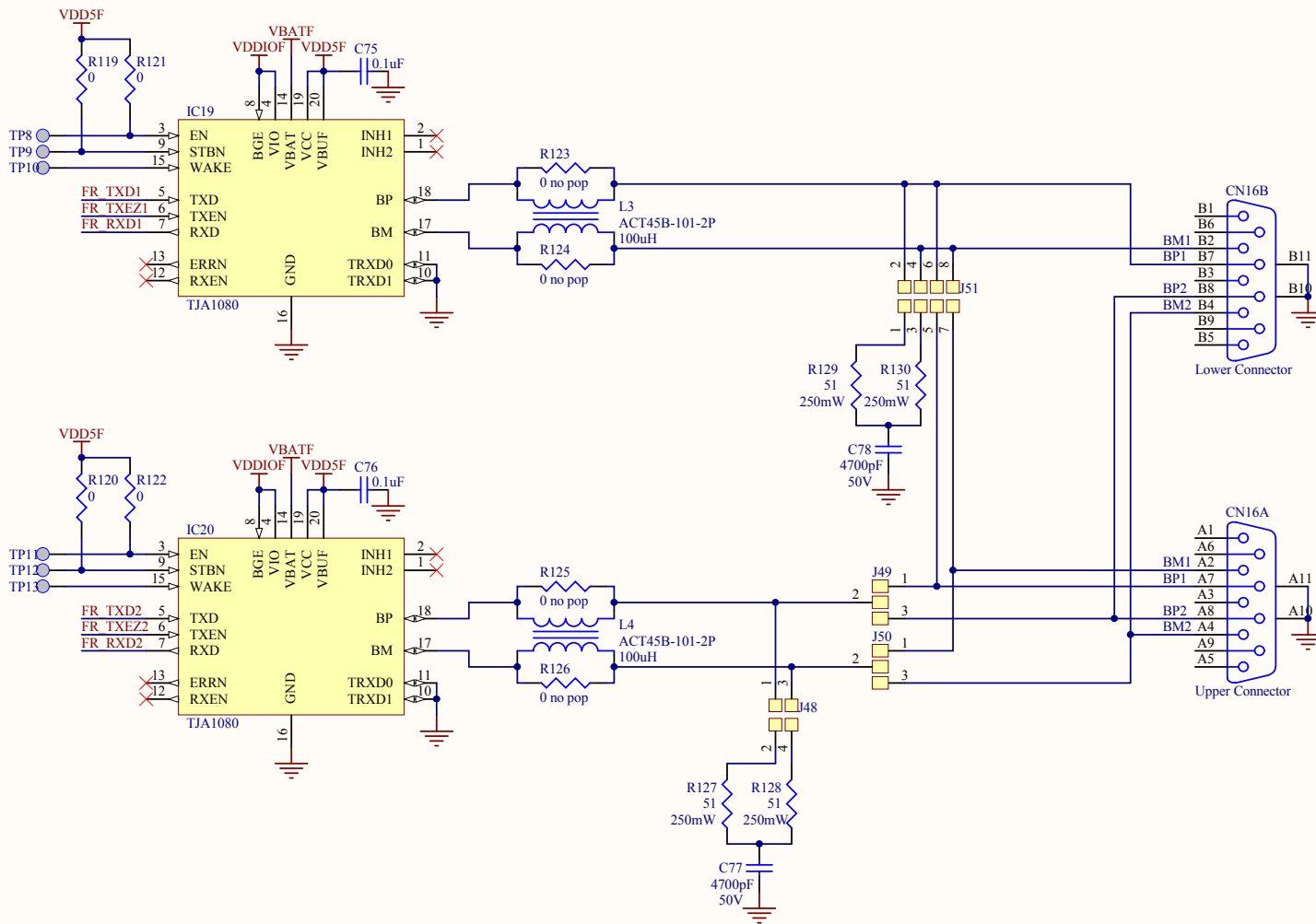
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Company Renesas Electronics		
Number DADC-DT-00103		
Version v2.0	Date 4/27/2010	Sheet 2 of 8



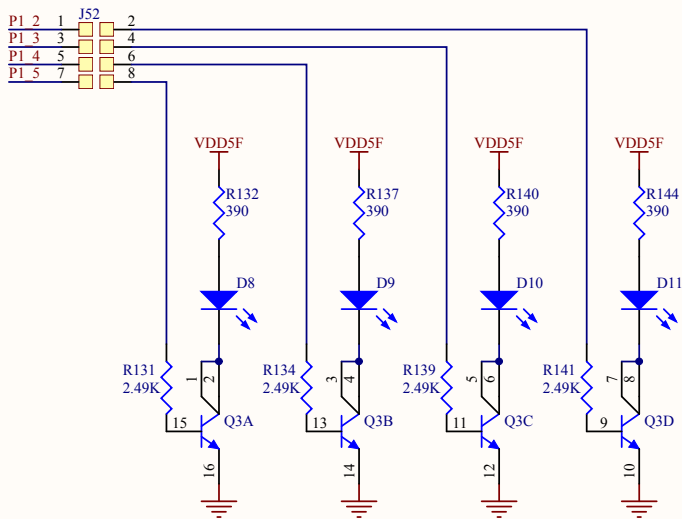


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Company	Renesas Electronics		
Number	DADC-DT-00103		
Version	v2.0	Date	4/27/2010
		Sheet	4 of 8

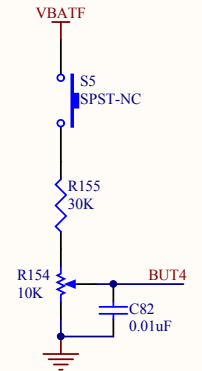
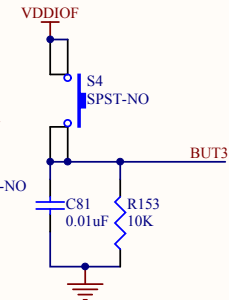
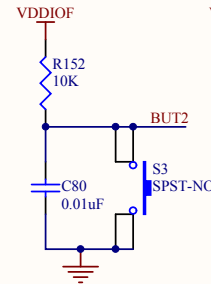
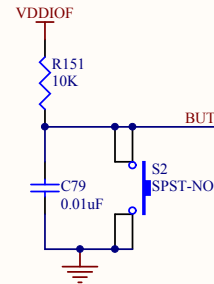
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 FLX0RXDA 3 4 FR RXD1
 FLX0TXENA 5 6 FR TXEZ1
 FLX0TXDB 7 8 FR TXD2
 FLX0RXDB 9 10 FR RXD2
 FLX0TXENB1 11 12 FR TXEZ2



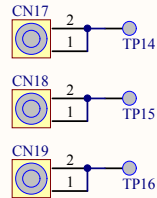
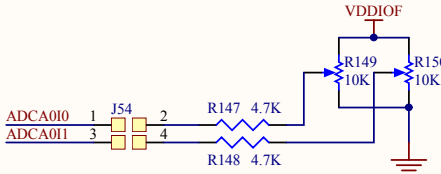
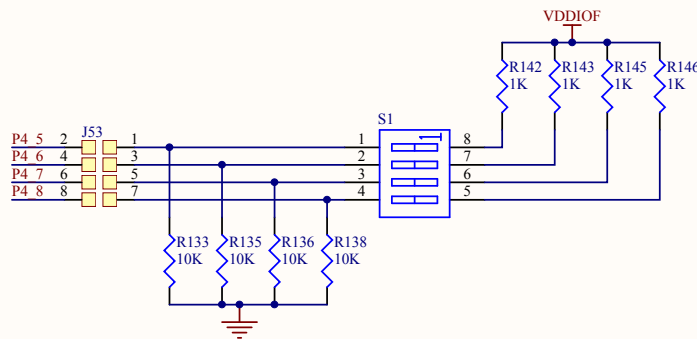
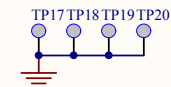
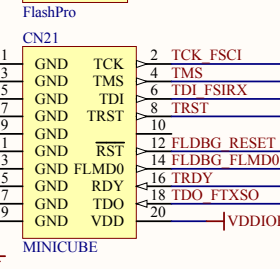
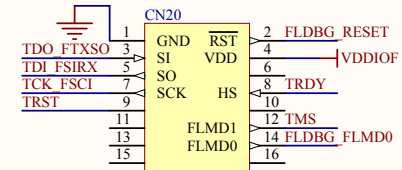
Title AB-050-FX4 FlexRay		
Company Renesas Electronics		
Number DADC-DT-00103		
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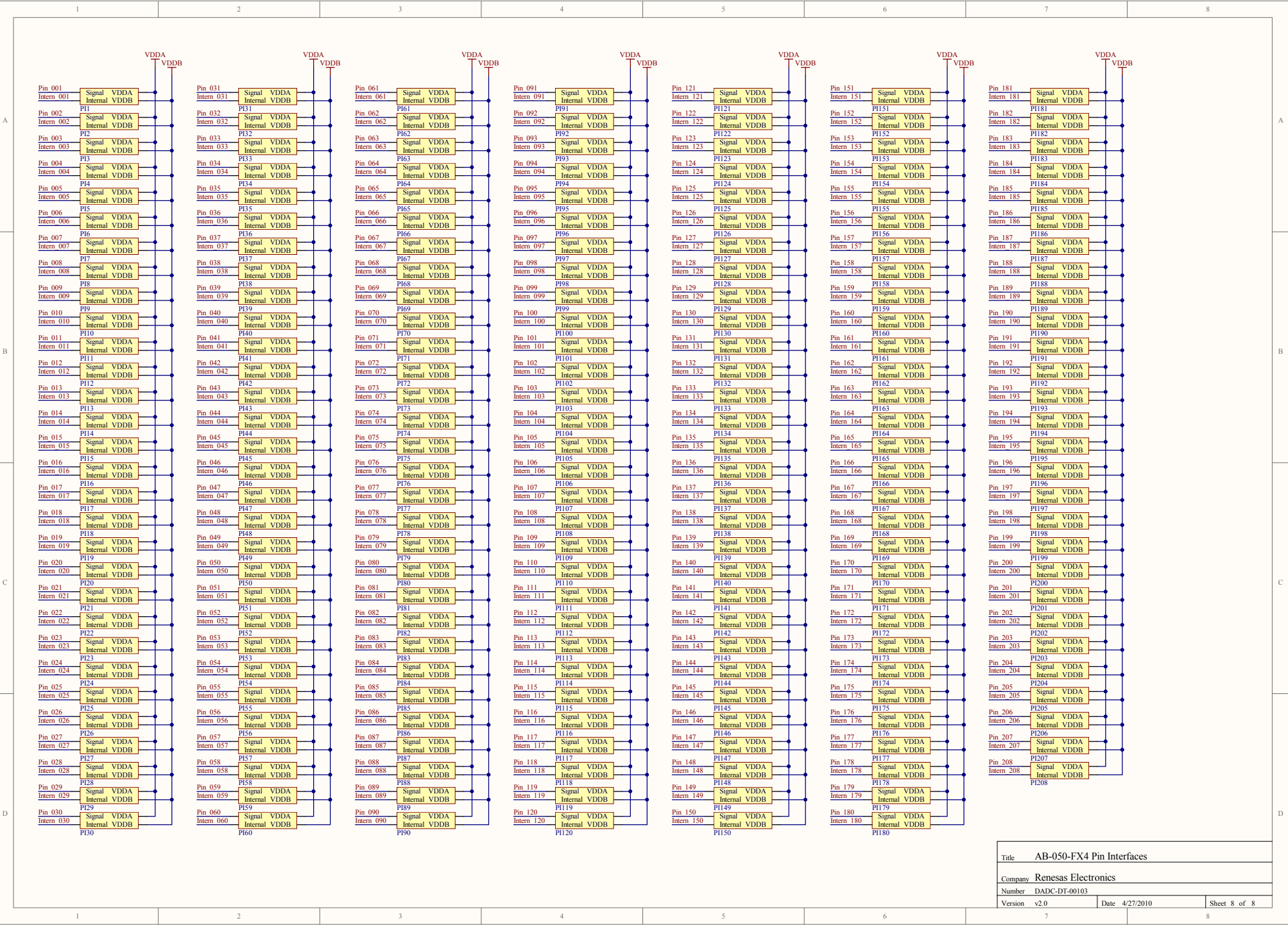
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INTP0	4		3	BUT2
NMI	6		5	BUT3
VCPC0IN	8		7	BUT4



DCUTDI	1	J56	2	TDI FSIRX
FLCS0SI	3		4	TDO FTXSO
FLUR0RX	5		6	TCK FSCI
DCUTDO	7		8	TMS
FLCS0SCI	9		10	TRST
DCUTCK	11		12	TRDY
FLUR0TX	13		14	FLDBG RESET
DCUTTMS	15		16	FLDBG FLMD0
DCUTRST				
DCURDY				
RESET				
FLMD0				



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Company	Renesas Electronics		
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Company				Renesas Electronics	
Number				DADC-DT-00103	
Version				v2.0	
				Date	4/27/2010
				Sheet 8 of 8	

REVISION HISTORY	V850E2/Fx4 Application Board User's Manual: Hardware
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Rev.	Date	Description	
		Page	Summary
1.00	Jun 4, 2010	—	First Edition issued
1.01	Aug 10, 2010	7	Corrected CN4 label in table
		23	Added Precautions Section
1.02	Jan 13, 2010	23	Added precaution 6.2
1.03	May 21, 2012	1, 4, 6	Added board version information

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SALES OFFICES

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.

2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.

Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada

Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K

Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany

Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China

Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China

Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited

Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong

Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.

7F, No. 363 Fu Shing North Road Taipei, Taiwan

Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

1 harbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632

Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.

Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia

Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.

11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea

Tel: +82-2-558-3737, Fax: +82-2-558-5141

V850E2/Fx4 Application Board