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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

R8A66597FP Utility Board M3A-0040

Instruction Manual

Renesas Electronics
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Rev.1.00 2006.11

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Appendix 1 Parts List

Appendix 2 Circuit Diagram

The product composition is shown below. Please check that all the following products are present before use.

Model Name	Contents	Quantity
M3A-0040	R8A66597FP Utility Board	1
RJJ11F0008	M3A-0040 Instruction Manual (Japanese)	1
REJ11F0007	M3A-0040 Instruction Manual (English)	1
Power Cable	Power cable for VBUS supplying as host function	1

The R8A66597FP comes with “USB Sample Firmware” for evaluation. For details, please contact Renesas Technology, your distributor, or check the information on the homepage below.

Renesas Technology Homepage:

http://www.renesas.com/

Inquiries about This Product

Please contact your distributor for technical support.

1. Summary

The M3A-0040 is an evaluation board for the Renesas Hi-Speed USB ASSP R8A66597FP. Two USB-A receptacles are mounted on the board for evaluation of USB host operations using USB port0 and USB port1 of R8A66597. CN1 can be used for evaluation of USB peripheral operations. Please refer to the data sheet "USB2.0 Dual Function Controller R8A66597FP" for detailed specifications of the R8A66597.

The model name, package and package description of the chip that is mounted on the board is as follows:

Board	Chip Model Name	Package Description
M3A-0040	R8A66597FP	Plastic 80-pin LQFP (0.4mm pitch 10×10mm body)

The board has the following features:

(1) By connecting this board to a control board using the interface connector of this board, it is possible to evaluate the user system.

(2) A solder pattern is prepared on the USB signal lines for chip common mode choke coils. It is possible to do EMI suppression evaluation.

(3) A solder pattern is prepared on the USB signal lines for ESD protection devices. It is possible to do ESD protection evaluation.

(4) It is possible to supply 3.3V or 1.8V to the interface power VIF of R8A66597FP.

(5) It is possible to select separate bus mode or multiplex bus mode for R8A66597FP.

(6) It is possible to test R8A66597FP's functions (excluding split bus) by connecting with M3A-0033 board.
Note: The M3A-0033 board is the Renesas USB ASSP Evaluation Motherboard.

(7) It is possible to supply 5V, 500mA to the VBUS.

2. Outline

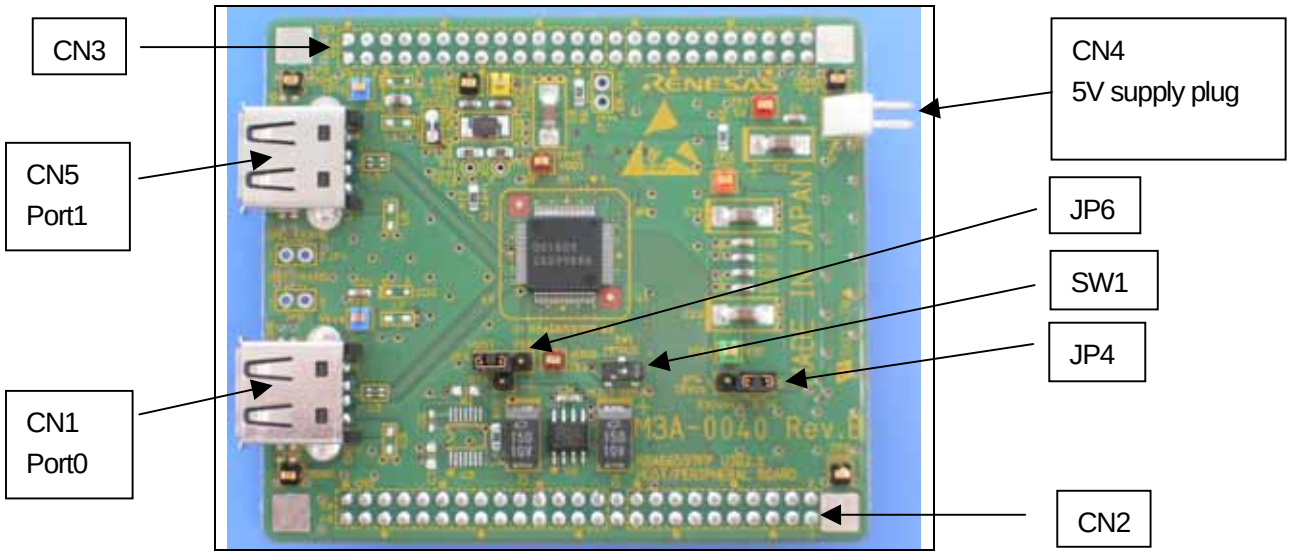


Figure 1. M3A-0040 Board Top View

3. Specification

Board Size	70 mm × 80 mm
Supply power	AVCC, VCC: 3.3V
	VIF: 3.3V or 1.8V
Interface:	50-pin Connector × 2 (2.54 mm pitch, dual straight header, male type)
	USB Receptacle (Type A, DIP, normal) × 2

3.1 Connector Description

Connectors CN2 and CN3 provide all bus interface pins of the chip, such as processor bus interface and DMA interface. Therefore, these pins provide the same pin characteristics of the R8A66597FP such as electric characteristic, I/O direction, and functions except for the signal with *.

The following table shows the pin number and function correspondences.

Pin Description of R8A66597FP	Connector	Pin Number of Connector	Function of R8A66597FP
D15-8	CN2	2-9(D15-8)	Data bus (I/O)
D7/AD7-D1/AD1	CN2	11-17(D7/AD7-D1/AD1)	Multiplex bus (I/O)
D0	CN2	18	Data bus (I/O)
SD7-0	CN2	41-48(SD7-0)	Split bus (DMA Interface) (I/O)
A6-1	CN3	17-12	Address bus (I)
A7/ALE	CN3	21	Address bus or ALE (I/I)
WR0_N*	CN3	1	Write strobe (I)
WR1_N*	CN2	23	Write strobe (I)
RD_N*	CN3	3	Read strobe (I)
CS_N*	CN3	5	Chip select (I)
RST_N***	CN3	6	Reset (I)
Vbus	CN2	24	Vbus (O)
EXIOVcc (VIF)	CN2	25, 26	Interface power supply (I)
DREQ0_N, DREQ1_N	CN3	7, 26	DMA request (O)
DACK0_N **, DACK1_N	CN3	8, 25	DMA acknowledge (I)
SOF_N	CN3	24	SOF pulse output (O)
INT_N	CN3	9	Interrupt (O)
DEND0_N, DEND1_N	CN3	36, 40	End of DMA transfer (I/O)
VDD (EX_VCC)	CN3	19, 20	Power supply (3.3V) (I)
GND	CN2	1, 10, 19, 20, 29, 30, 49, 50	GND
GND	CN3	2, 4, 10, 11, 18, 29, 30, 49, 50	GND
NC	CN2	21, 22	No pin
NC	CN2	27, 28, 31-40	Unused pin
NC	CN3	22, 23, 27, 28, 31-35, 37-39, 41-48	Unused pin

*: Pulled up with 10kΩ

**: Pulled up 1MΩ

***: Connected to GND with 0.1 μF

4. Jumper and Switch Setting

JP Number	Function	Factory Settings
JP1	Connecting between frame ground of CN5 and signal ground. It is necessary to cut JP1's pattern when dividing frame ground and signal ground.	Shorted by pattern

JP Number	Function	Factory Settings
JP2	Jumper for measurement of 3.3V current. It is necessary to cut JP2's pattern when measuring 3.3 V current.	Shorted by pattern

JP Number	Function	Factory Settings
JP3	Connecting between AGND and DGND	Shorted by plated wire
JP5	Connecting between frame ground of CN1 and signal ground. It is necessary to cut JP5's pattern when dividing frame ground and signal ground.	Shorted by pattern

JP Number	Position	Function
JP4 (VIF)	"EXIOVcc"	Power is supplied to VIF through CN2-25 and 26.
	"3.3V"	VCC and VIF of R8A66597 are supplied from same source.

JP Number	Position	Function
JP6 (VBUS)	HOST	CN1-1 (VBUS of USB A receptacle) is connected to VBUS output of U2-5
	OTG	This position is for internal evaluation mode
	PERI	CN1-1 (VBUS of USB A receptacle) is connected to VBUS pin of R8A66597 and CN2-24.

SW Number	Function	
SW1 (MPBUS)	Switch to "SEPA"	Separate bus mode is selected.
	Switch to "MULT"	Multiplex bus mode is selected.

5. Setup

The board combined with this board (M3A-0040) is called a target board in the description below.
This section illustrates how to use this board with a target board to connect to a USB device.

5.1 Using with M3A-0033

M3A-0033 is the Renesas USB ASSP Evaluation Motherboard. It is possible to test the R8A66597FP easily by combining it with this board and the M3A-0033. But, it isn't possible to test the R8A66597FP's split bus.

How to use the M3A-0040 with the M3A-0033 is shown as below.

(1) Setting of switch and jumper
   (a) Set SW1 to "SEPA". ("SEPA" is factory setting)
   (b) Set JP4 to "3.3 V". ("3.3V" is factory setting)

(2) Connecting the M3A-0040 to the M3A-0033
Insert CN2's #1-pin and #2-pin of the M3A-0040 board to CN8's #1-pin and #2-pin of the M3A-0033 to connect the two boards together.

(3) VBUS output for host function
Apply 5V to CN4 of the M3A-0040 board using the power supply cable included. The red wire is 5V and the black one is GND.
   (a) When output VBUS to CN1:
      (i) Set high level output to VBOUT0 pin of the R8A66597 by software.
      (ii) Set JP6 to "HOST".
   (b) When output VBUS to CN5:
      (i) Set high level output to VBOUT1 pin of the R8A66597 by software.

It is possible to operate the R8A66597FP using the remote debugger KD308 that is attached to the M3A-0033. Please refer to the M3A-0033 Instruction Manual".

5.2 Use with other boards

The R8A66597FP corresponds to a separate bus mode and multiplex bus mode. Switch SW1 of the M3A-0040 according to MCU use. Below are notes for target board design.

5.2.1 Notes for target board design

(1) The receptacle of the target board should suit the size of this board (refer to Figure 3 and Figure 4). Make pin arrangement the same as this board (refer to Table 1 and Table 2). Please refer to Appendix 1: the M3A-0040 Part List and Appendix 2: the Circuit Diagram, when selecting connector and pin arrangement. The HKP-50FD2 from Honda Tsushin Kogyo is applicable to the target board.

(2) To prevent misinsertion, please carry out stuffing the pins of target board that correspond to the #21-pin and #22-pin of CN2 of this board. When HKP-50FD2 of Honda Tsushin Kogyo is used as a receptacle, the GM-25K of this company is suitable for stuffing.

(3) The R8A66597FP generates a core power 1.5V from VCC 3.3V. An internal regulator makes 1.5V from 3.3V through the #19-pin and #20-pin of CN3 and outputs 1.5V to VDD pin. On the M3A-0040, 4.7uF and 0.1uF capacitors are mounted as smoothing capacitors for VDD.

(4) The interface power supply VIF is 1.8V or 3.3V.
   (a) Short JP4 to "EXIOVcc" and supply 1.8V by the #25-pin and #26-pin of CN2 , when VIF is 1.8V.
   (b) Short JP4 to "3.3V", when VIF is 3.3V. In this case, power supply to VIF is the same as VCC.

(5) Use SD0-SD7 of CN2 when using split bus for DMA. SD0-SD7 can be used also as a general-purpose port.

(6) Processing for unused pin : Please refer to the R8A66597 datasheet, USB2.0 Dual Function Controller R8A66597FP/DFP, for details.

5.2.2 VBUS control circuit

Note: When the peripheral device that connected to a USB connector is in an unusual state due to a short circuit, or an overcurrent causes an overcurrent in VBUS, the overcurrent protection circuit of a USB power switch IC turns on, and it turns the VBUS power supply off. But after turning off, current around 0.4A continues flowing, and the USB power switch IC runs hot. Remove the unusual state promptly for the sake of safety.

To start/stop supply VBUS to the peripheral device, the MCU should operate the R8A66597 to turn on/off the VBUS output of the USB power switch IC (U2). When the USB power switch IC detects overcurrent, it outputs a low pulse to the FLG output pin connected to the R8A66597FP, and it issues an interrupt to MCU to notice the overcurrent state. Monitor the FLG output pin status and turn off the VBUS output when the overcurrent state is detected by the R8A66597 control software.

Confirm that the USB device is in usual state before connecting.

(1) To supply 5V to VBUS of CN1:
   (a) Apply 5V to CN4.
   (b) Set JP6 to "HOST".
   (c) Output high signal from VBOUT0-pin by a R8A66597 control software.

(2) To supply 5V to VBUS of CN5
   (a) Apply 5V to CN4.
   (b) Output high signal from VBOUT1-pin by a R8A66597 control software.

Note: When the R8A66597 control software turn off VBUS supply from the USB power switch IC, VBUS is not shutdown immediately but slowly because of 150uF capacitor.

5.2.3 Separate bus mode

Switch SW1 of the M3A-0040 board to "SEPA" when using as separate bus mode. Use A1-A6 of CN3 as address bus.

5.2.4 Multiplex bus mode

Switch SW1 of the M3A-0040 board to "MULT" when using as multiplex bus mode. Use D1/AD1-D7/AD7 of CN2 as address line share with data line. Keep open A1-A6 of CN3. Use #21-pin (A7/ALE) of CN3 as ALE.

5.3 Using M3A-0040 as a peripheral

When the M3A-0040 is operated as a peripheral controller, please pay attention to following notes:

(1) Set JP6 to "PERI"
(2) Connect a USB host, such as a PC to CN1
(3) To connect a USB host to CN1, an adapter is needed to convert the A-plug into the B-receptacle.
(4) CN5 is not available as a peripheral.

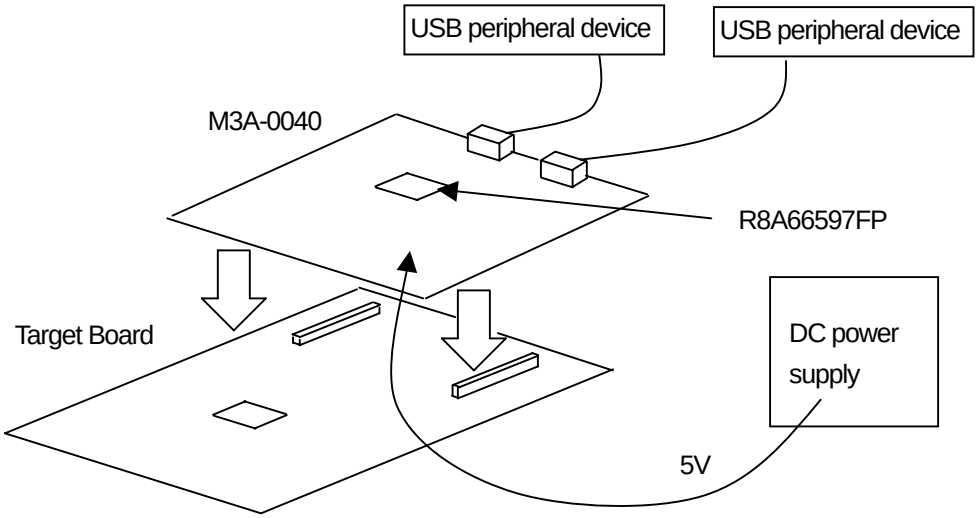


Figure 2. Target Board Connection Illustrator

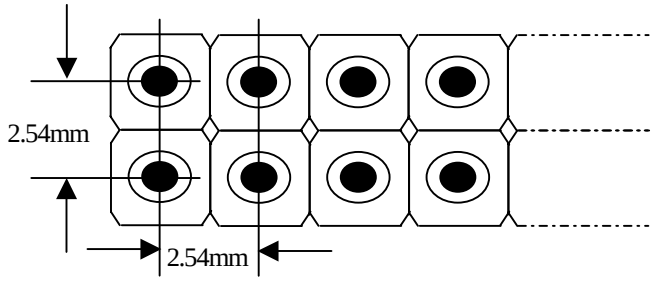


Figure 3. Pin Pitch of Connectors CN2 and CN3

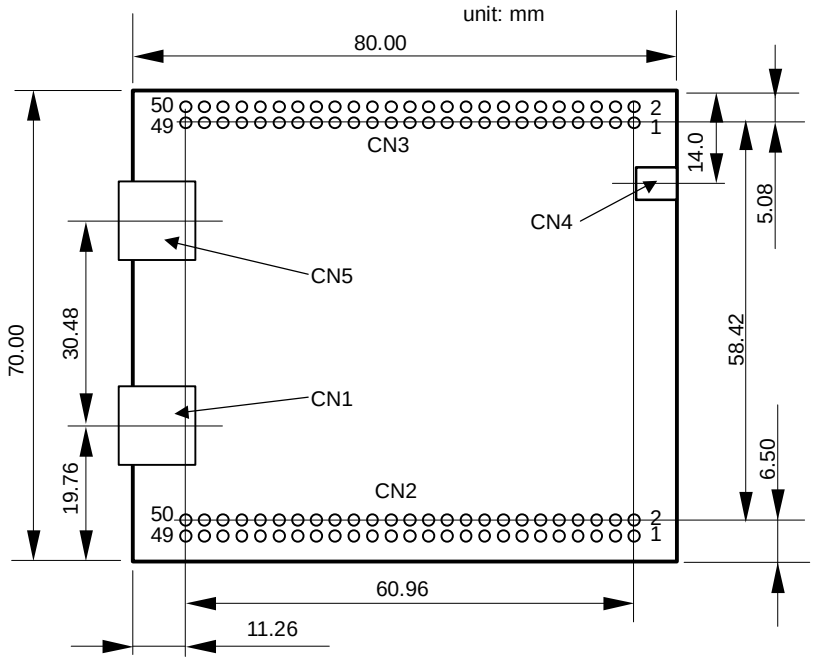


Figure 4. Pin Direction of Connector CN2 and CN3 (Top View)

Table 1. M3A-0040 CN2 Pin Assignment

PIN	16-bit-sepa *1	16-bit-multi *2	PIN	16-bit-sepa *1	16-bit-multi *2
1	GND	GND	2	D15	D15
3	D14	D14	4	D13	D13
5	D12	D12	6	D11	D11
7	D10	D10	8	D9	D9
9	D8	D8	10	GND	GND
11	D7	D7/AD7	12	D6	D6/AD6
13	D5	D5/AD5	14	D4	D4/AD4
15	D3	D3/AD3	16	D2	D2/AD2
17	D1	D1/AD1	18	D0	D0
19	GND	GND	20	GND	GND
21	Not Available	Not Available	22	Not Available	Not Available
23	WR1_N	WR1_N	24	VBUS	VBUS
25	EXIOVcc	EXIOVcc	26	EXIOVcc	EXIOVcc
27			28		
29	GND	GND	30	GND	GND
31			32		
33			34		
35			36		
37			38		
39			40		
41	SD7	SD7	42	SD6	SD6
43	SD5	SD5	44	SD4	SD4
45	SD3	SD3	46	SD2	SD2
47	SD1	SD1	48	SD0	SD0
49	GND	GND	50	GND	GND

Table2. M3A-0040 CN3 Pin Assignment

PIN	16bit-sepa *1	16bit-multi *2	PIN	16bit-sepa *1	16bit-multi *2
1	WR0_N	WR0_N	2	GND	GND
3	RD_N	RD_N	4	GND	GND
5	CS_N	CS_N	6	RST_N	RST_N
7	DREQ0_N	DREQ0_N	8	DACK0_N	DACK0_N
9	INT_N	INT_N	10	GND	GND
11	GND	GND	12	A1	Unused
13	A2	Unused	14	A3	Unused
15	A4	Unused	16	A5	Unused
17	A6	Unused	18	GND	GND
19	EXVcc	EXVcc	20	EXVcc	EXVcc
21	A7	ALE	22		
23			24	SOF_N	SOF_N
25	DACK1_N	DACK1_N	26	DREQ1_N	DREQ1_N
27			28		
29	GND	GND	30	GND	GND
31			32		
33			34		
35			36	DEND0_N	DEND0_N
37			38		
39			40	DEND1_N	DEND1_N
41			42		
43			44		
45			46		
47			48		
49	GND	GND	50	GND	GND

*1: When select 16-bit-Separate Bus mode

*2: When select 16-bit-Multiplex Bus mode

Appendix1: Part List

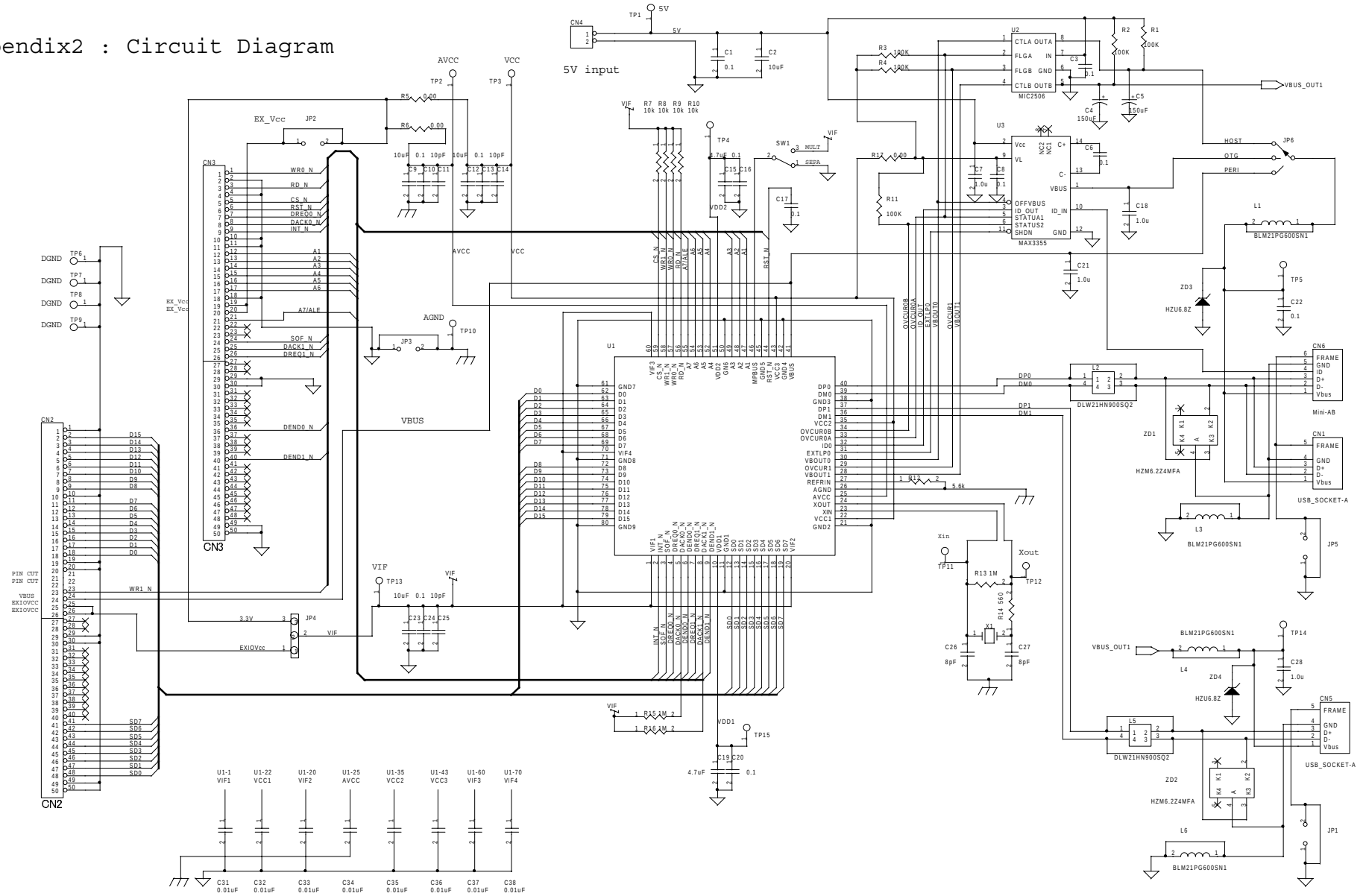
Renesas Solutions Corporation

Drawing No.	PPL-M3A-0040-A	Title	M3A-0040 Rev.B

No.	Component Name		Component Specification			Qty/set	Notes
	Type	Symbol on Board	Product Number (specification)	Manufacture	Mount/ unmount		
1	USB Socket-A	CN1,CN5	UBA-4R-D14T-1(LF)(SN)	JST		2	
2	Header 25X2	CN2,CN3	FFC-50BSM1B	Honda Tsushin Kogyo		2	
3	Header	CN4	BS2P-SHF-1AA(LF)(SN)	JST		1	
4	Mini AB Socket	CN6	CAM-E43SDF	Mitsumi Electric	unmount	0	
5	Chip Monolithic Ceramic Capacitor	C1,3,6,8,10,13,16,17 ,20,22,24	GRM188F11E104ZA01	Murata Manufacturing		9	0.1uF C6 and C8 are unmounted
6	Chip Monolithic Ceramic Capacitor	C2,9,12,23	GRM31CB11A106KA01	Murata Manufacturing		4	10uF(3216)
7	Solid Tantalum Electrolytic Capacitor	C4,5	F931A157MNC	Nichikon		2	150uF
8	Chip Monolithic Ceramic Capacitor	C7,18,21,28	GRM219F11E105ZA01	Murata Manufacturing		2	1.0uF C7 and C18 are unmounted
9	Chip Monolithic Ceramic Capacitor	C11,14,25	GRM1882C1H100JA01	Murata Manufacturing		3	10pF(1608)
10	Chip Monolithic Ceramic Capacitor	C15,19	GRM188F11A475ZE20D	Murata Manufacturing		2	4.7uF 6.3v
11	Chip Monolithic Ceramic Capacitor	C26,27	GRM1882C1H8R0DZ01	Murata Manufacturing		2	8pF(1608)
12	Chip Monolithic Ceramic Capacitor	C31 - 38	GRM188F11H103ZA01	Murata Manufacturing		8	0.01uF
13	Jumper SW 3P	JP4	WL-1	MAC8		1	
14	Jumper SW 4P	JP6	WL-1	MAC8		1	
15	Chip Ferrite Beads	L1,3,4,6	BLM21PG600SN1	Murata Manufacturing	unmount	0	
16	Chip Common Mode Choke Coils	L2.5	DLW21HN900SQ2	Murata Manufacturing	unmount	0	
17	Thick Film Resistors	R1,2,3,4,11	MCR10EZHJ104	Rohm		3	100k±5% R1 and R2 are unmounted
18	Thick Film Resistors	R5,6,17	MCR10EZHJ000	Rohm		3	0ohm
19	Thick Film Resistors	R7,8,9,10	MCR10EZHJ103	Rohm		4	10k±5%
20	Thick Film Resistors	R12	MCR10EZHF5601	Rohm		1	5.6k±1%
21	Thick Film Resistors	R13,15,16	MCR10EZHJ105	Rohm		3	1M±5%

No.	Component Name		Component Specification			Qty/set	Notes
	Type	Symbol on Board	Product Number (specification)	Manufacture	Mount/ unmount		
22	Thick Film Resistors	R14	MCR10EZHF5600	Rohm		1	560±1%
23	Slide Switch	SW1	CAS-120A1	Copal Electronics		1	
24	USB ASSP	U1	R8A66597FP	Renesas Technology		1	80pin LQFP
25	USB Power Switch	U2	MIC2506YM	Micrel		1	
26	USB OTG Charge Pump and Comparators	U3	MAX3355EEUD+	Maxim	unmount	0	
27	Crystal Oscillator	X1 (24MHz)	DSX321G 24.0000MHz	Daishinku		1	
28	Zener Diode	ZD1,2	HZM6.2Z4MFA-E	Renesas Technology	unmount	0	
29	Zener Diode	ZD3,4	HZU6.8Z-E	Renesas Technology	unmount	0	
30	Test Pin (SMD)	TP1(5V)	HK-5-G (red)	MAC8		1	
31	Test Pin (SMD)	TP2(AVCC)	HK-5-G (yellow)	MAC8		1	
32	Test Pin (SMD)	TP3(VCC)	HK-5-G (orange)	MAC8		1	
33	Test Pin (SMD)	TP6,7,8,9,10(GND)	HK-5-G (black)	MAC8		5	
34	Test Pin (SMD)	TP5,14(Vbus_0,_1)	HK-5-G (blue)	MAC8		2	
35	Test Pin (SMD)	TP13(VIF)	HK-5-G (green)	MAC8		1	
36	Test Pin	TP11,12	ST-1-1	MAC8	unmount	0	
37	Test Pin (SMD)	TP4,15(VDD1,2)	HK-5-G (brown)	MAC8		2	
38	Jumper Socket	-	JS-1	MAC8		2	for JP4,6

Appendix2 : Circuit Diagram



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