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MSD-M3A-8K02-UE

**RENESAS** USB Full-Speed Microcomputers  
**38K0/38K2 Group**  
**Development Board M3A-8K02**  
**Instruction Manual**  
**VER.1.0**



**RENESAS** TECHNOLOGY CORPORATION

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2003.07.07

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Revision History	38K0/38K2 Group Development Board <b>M3A-8K02</b>
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<b>Rev. No.</b>	<b>Date</b>	<b>Contents</b>
<b>0.0</b>	<b>2003/2/1</b>	<b>Draft version</b>
<b>1.0</b>	<b>2003/7/7</b>	<b>First Edition of PDF Version</b>

\* Related Materials

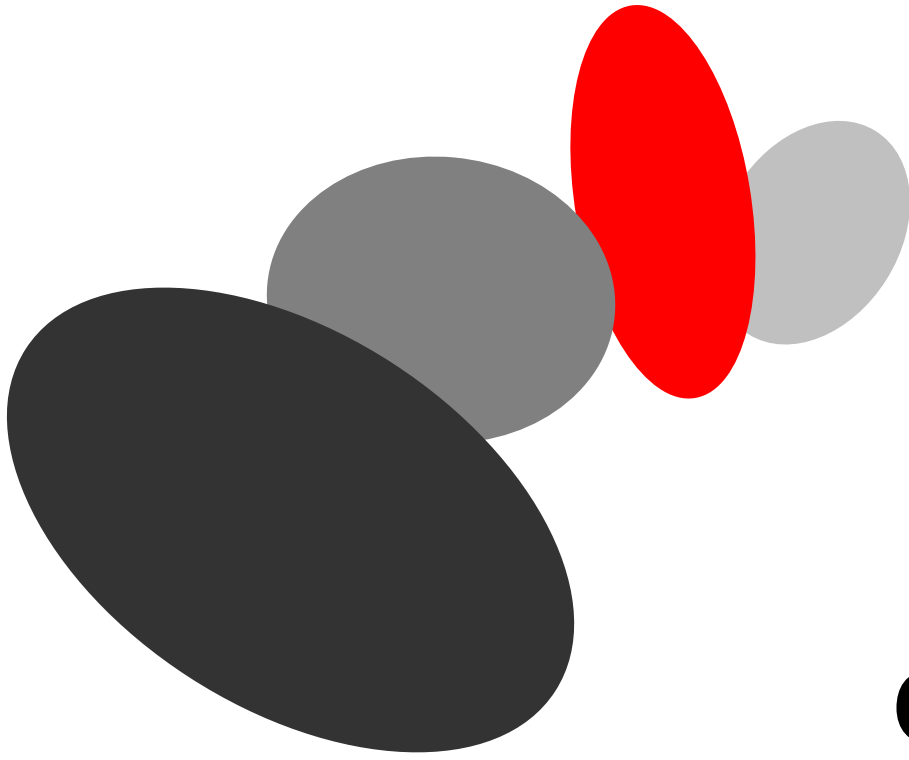
RENESAS Microcomputers: 38K0 (38K2) Group Data Sheet

\* Home page of **RENESAS** Semiconductors.

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# Chapter 1

## M3A-8K02



## 1.0 Introduction

M3A-8K02 is a development board for the Renesas USB Full-Speed MCU 38K0/38K2 Group (8-bit)<sup>Note 1</sup>. M3A-8K02 comes with the USB function, USB hub, and many key peripheral circuits enabling faster and more efficient application development.

Note 1: 38K0 Group devices come with the USB Function; 38K2 Group devices come with the USB function as well as the USB hub.

M3A-8K02 consists of 4 boards: G01/G02/G03/G04. Each board is described in detail below.

### \* G01

This is the main M3A-8K02 board. It provides the USB hub and other peripheral circuits necessary for the development process.

### \* G02

This is the RFS top board ("RFS board" hereon) with built-in sockets for mounting the debugger (M38K09RS/M38K29RFS). G02 is mostly used for program evaluation with the debugger.

### \* G03

This is the Flash Chip (M38K29F8HP) top board ("Flash-chip board" hereon), and is normally used for program verification with flash chips.

### \* G04

This is the external universal board, which enables circuit expansions for G01. This can be used for integrating circuits not included on G01.

The M3A-8K02 comes bundled with all four boards. Each board can also be purchased separately under the corresponding part number (M3A-8K02G02/G03/G04).

M3A-8K02 -> M3A-8K02 { G01 (Main Board)  
G02 (RFS Board)  
G03 (Flash-chip Board)  
G04 (External Universal Board)

## 1.1 Package Contents

\* **M3A-8K02G01** ----- **1 board**



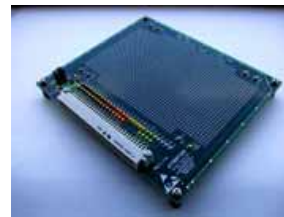
\* **M3A-8K02G02** ----- **1 board**



\* **M3A-8K02G03** ----- **1 board**



\* **M3A-8K02G04** ----- **1 board**



\* **DC Plug** ----- **1 piece**



\* **Accessories** ----- **4 pcs.**

Oscillators ----- 6MHz (1), 12MHz (1)

Capacitor ----- 30pF (2)

\* **Instruction Manual (Japanese)** ----- **1**

\* **Instruction Manual (English)** ----- **1**

## 1.2 Top View

Figure 1.2 shows the top view of M3A-8K02 with detailed component names.

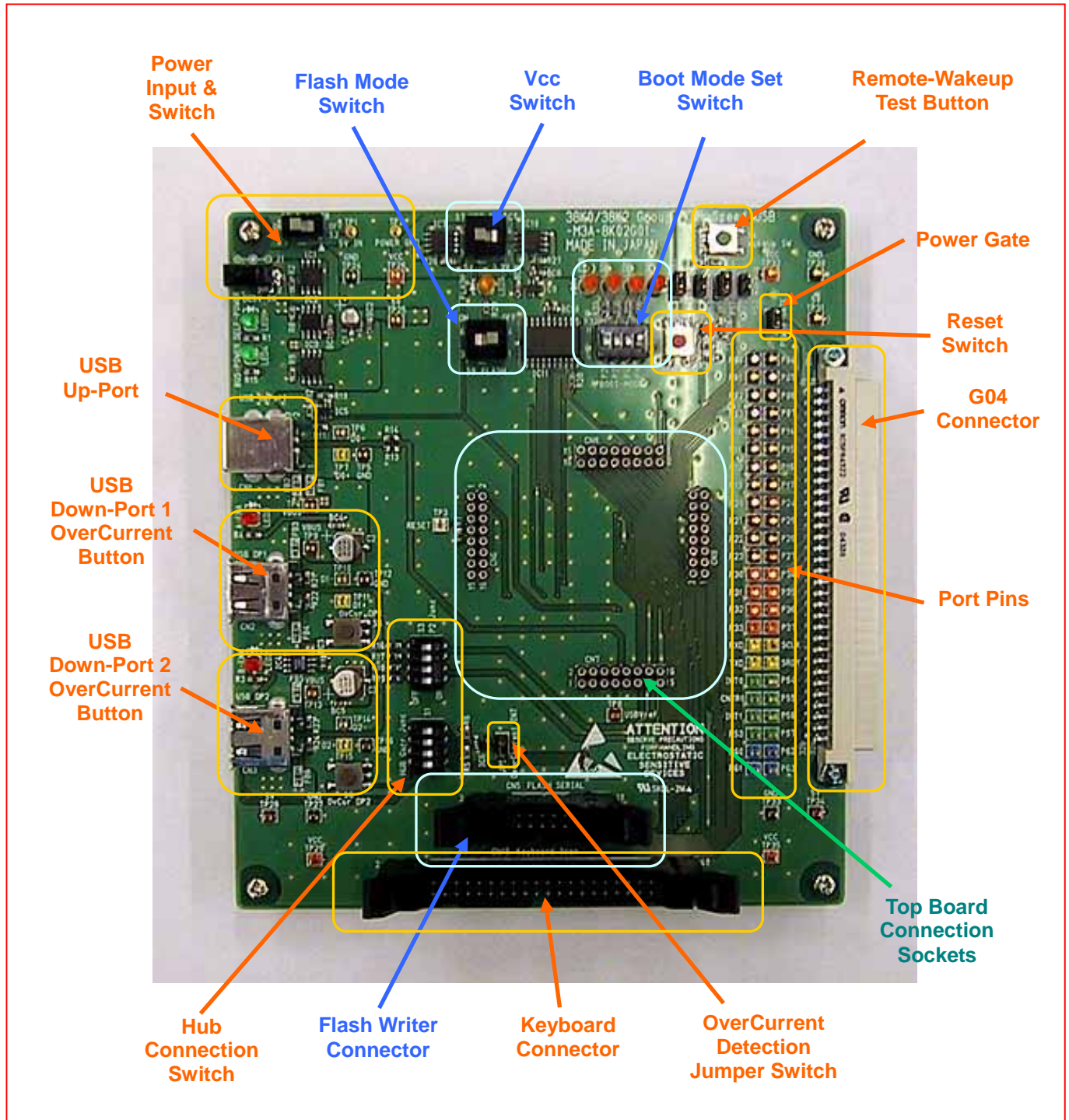


Figure 1.2 Top View and Component Names



### 1.3 Top Boards G02/G03

Top boards G02 and G03 allow the user to perform either debug evaluations or chip testing with a simple switch of a board. Attach G02 (RFS board) to the main board in order to connect a debugger, or attach G03 (Flash-chip board) for chip testing.

G02 (RFS board) provides an RFS socket in the center of the board for attachment of the emulation chip for debug evaluations. To perform an evaluation, insert either M38K29RFS or M38K09RFS into the socket and connect the debugger (see Figure 1.3(2)).

G03 (Flash-chip board) provides a socket in the center of the board for attachment of M38K29F8HPL for Flash chip operational verification. Because the Flash chip already contains the rewriting control program, the application software can be directly downloaded to the Flash-chip board and operational verification performed (for more details concerning Flash-chip reprogramming, see “1.11 Flash-Chip Reprogramming”). M38K29F8HPL can also run 38K0 application software.

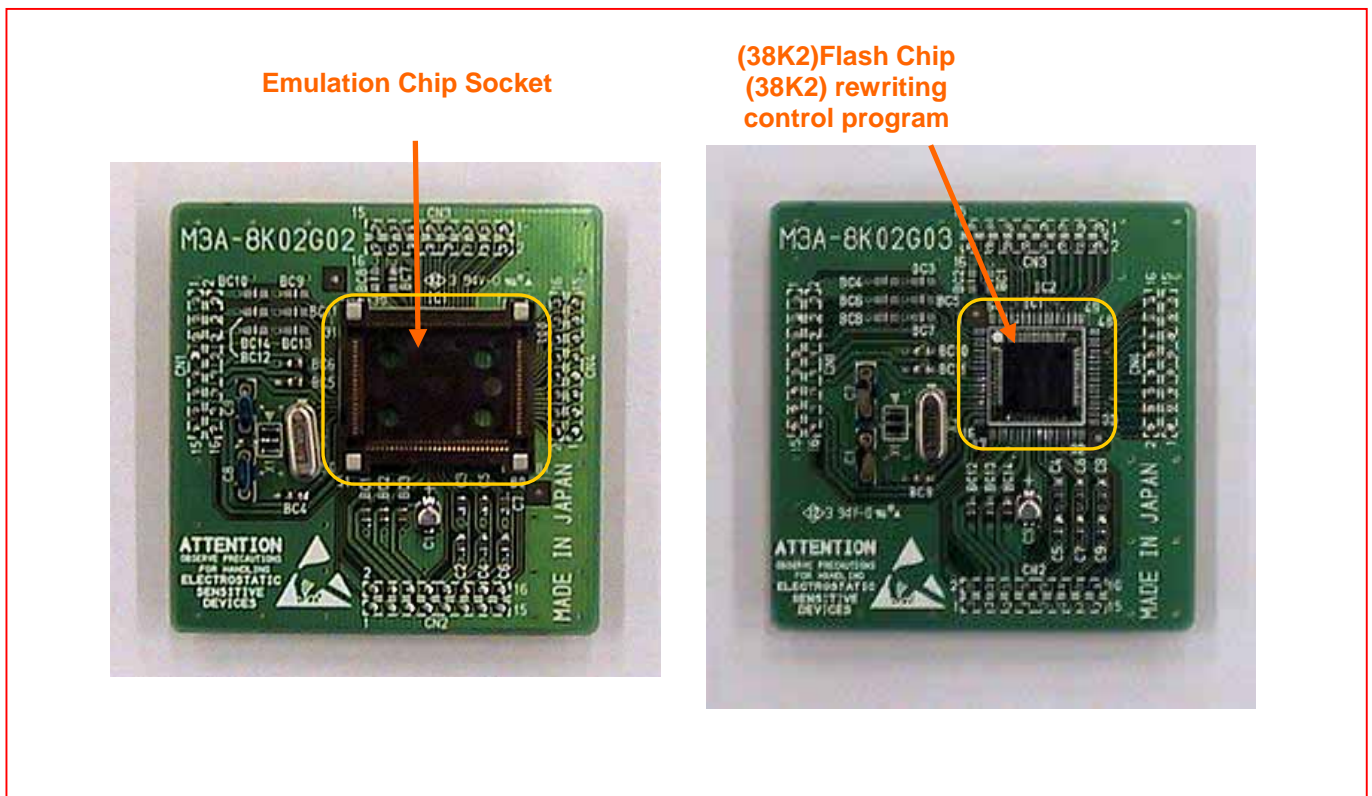


Figure 1.3(1) Top Views of G02 and G03

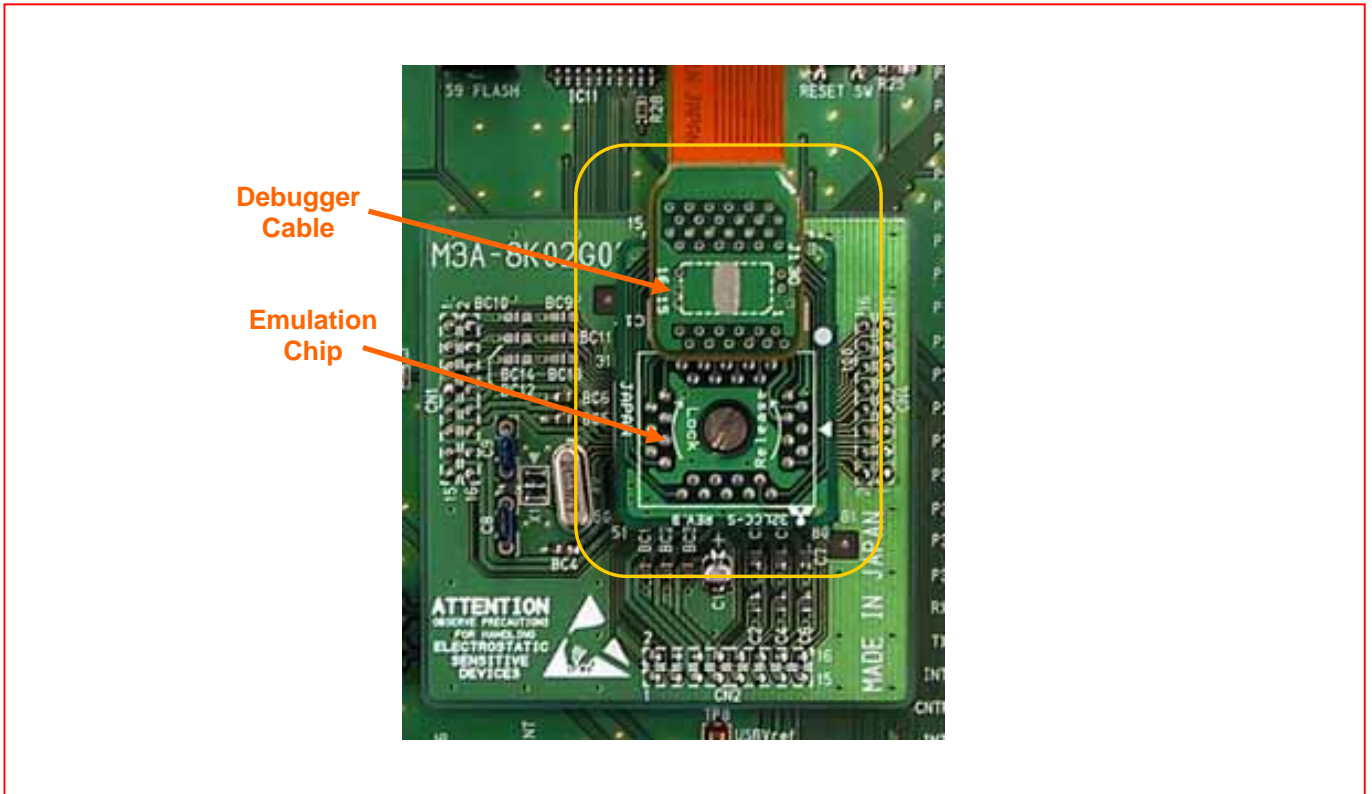


Figure 1.3(2) G02 and Debugger Connection

## 1.4 Mounting AD Conversion Capacitors and Oscillators

The capacitor pattern for 38K0/38K2 AD conversion is located on the upper left side of both G02 and G03 (1). To evaluate AD conversion, mount 0.1 $\mu$ F chip capacitors (size “1608”) here.

The 38K0/38K2 oscillator sockets are located on the left side of both G02 and G03 (2). Insert the bundled oscillator (6MHz or 12MHz, as required)<sub>(Note 1)</sub>, and a 30pF oscillator capacitor.

Note 1: The margin of error for the USB Full-speed data rate is 0.25% (2,500ppm) at 12MB/s. Select a crystal oscillator that can guarantee the same.

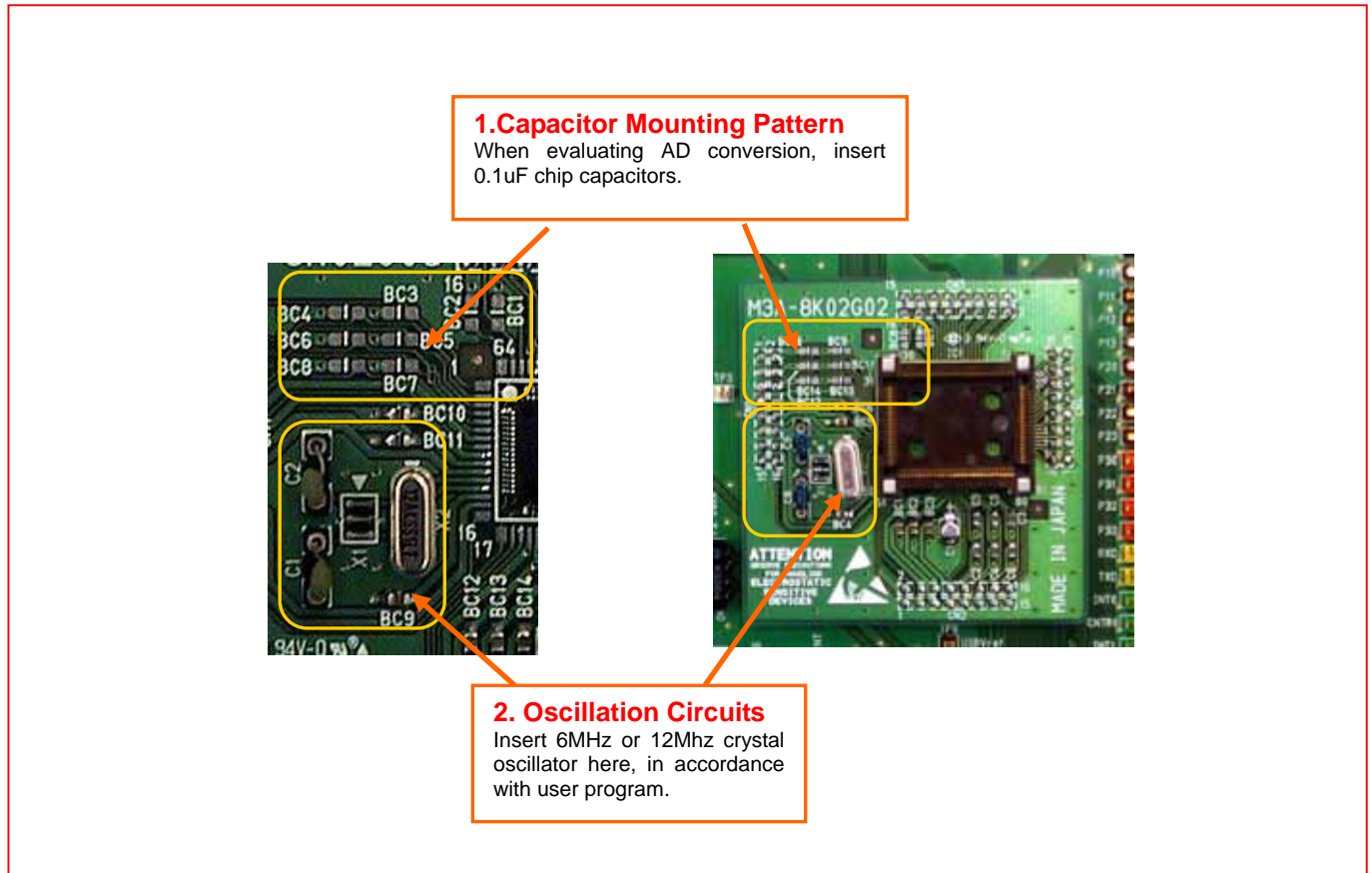
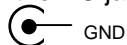


Figure 1.4 Oscillator and Capacitor Mounting Patterns

## 1.5 Power Supply

M3A-8K02 can run on either self-power (external supply of 5V) or bus-power (VBUS power from USB up-port).

### \* Self-Power

To run M3A-8K02 on self-power, connect the external supply through TP1 (1) or the DC jack (2), as shown in Figure 1.5. The polarity of the DC jack is “GND” internally and “+” externally. + 

The SELF-POWER switch (S2 in 3) turns the self-power ON/OFF. When switched to ON, the SELF-POWER lamp (LED1 in 4) goes on, and voltage is supplied to the board from the external source (Note 1). In addition, by connecting Jumper PowerINT (JP1 in 5), ON/OFF events can be assigned to the INTO pin.

**Note 1: This board is not protected against counter power supply.**

### \* Bus-Power

If there is no external power supply, the board goes to the bus-power mode and receives power from the USB. If the board is connected to a PC without external power supply, the USB-POWER lamp (LED4 in 6) will go on and power will be supplied via the USB VBUS.

\* Receiving power from self-power and bus-power ports:

If power is supplied from both self-power and bus-power ports, the board will automatically connect to the self-power supply.

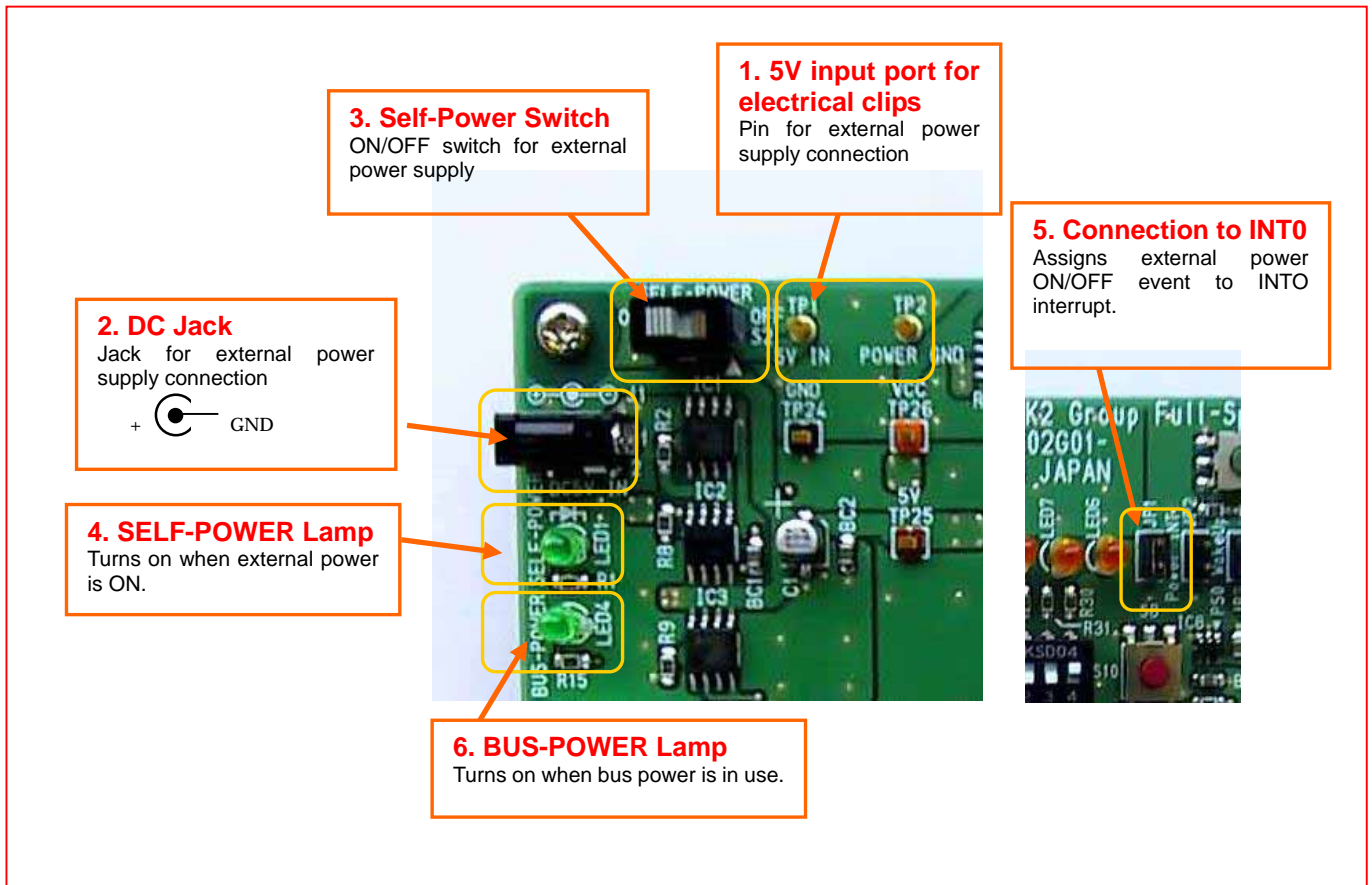


Figure 1.5 Power Supply Areas

## 1.6 Switching Vcc Voltage (5V, 3.3V)

M3A-8K02 has two power lines: 5V and Vcc. The 5V line depends on the operating voltage of the board and the Vcc line depends on the 38K0/38K2 operating voltage. The user must switch the Vcc line between 5V and 3.3V, according to the 38K0/38K2 operating voltage. Select the voltage value with the VCC SELECT Switch (S7 in 1) as shown in Fig. 1.6. Set the Vcc to either 5V (left side) or 3.3V (right side).

**In the 38K0/38K2 USB sample firmware, processing differs according to the Vcc value. Please confirm the firmware settings before setting the Vcc. Using a board with differing voltage than the firmware for an extended period may result in damage to the chip.**

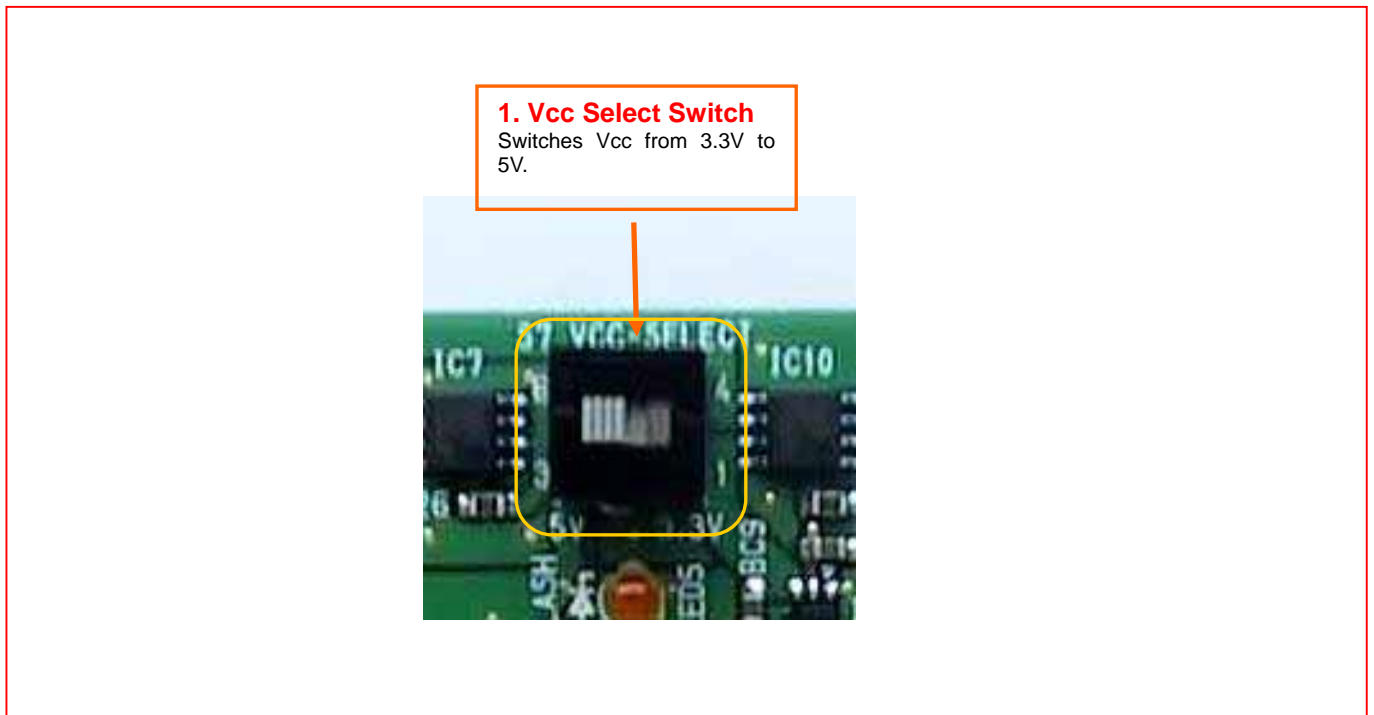


Figure 1.6 Vcc (5V, 3.3V) Switch

## 1.7 USB Function

This board comes with one USB up-port (1) and two USB down-ports (2). Please review the usage conditions described below before setting each port.

To enable detection of the self-power mode (external power supply) on 38K0/38K2, insert a header link to the Power INT jumper (3). The detection signal is assigned to port P50/INT0.

To initiate an external remote wake-up interrupt on 38K0/38K2, insert a header link to one of the wake-up jumpers (Wake-up 1 to 3 in 4). The detection signal will be assigned to either P50, P51, or P52, accordingly, and an external interrupt can be generated to 38K0/38K2 using the remote wake-up button (5).

### \* USB Hub Function

To use the USB hub, switch both the hub circuit connection switch and the down-port connection switch (6) to ON. This will assign the necessary circuits to the USB hub, and the hub will be enabled for operation. Keep these switches OFF at all other times.

To test the generation of an over-current on the down-port of the USB hub, insert a header link to the Current INT jumper (7). The test signal will be assigned to Port P51/CNTR0, and the over-current test button will be enabled (although a real over-current will not be generated).

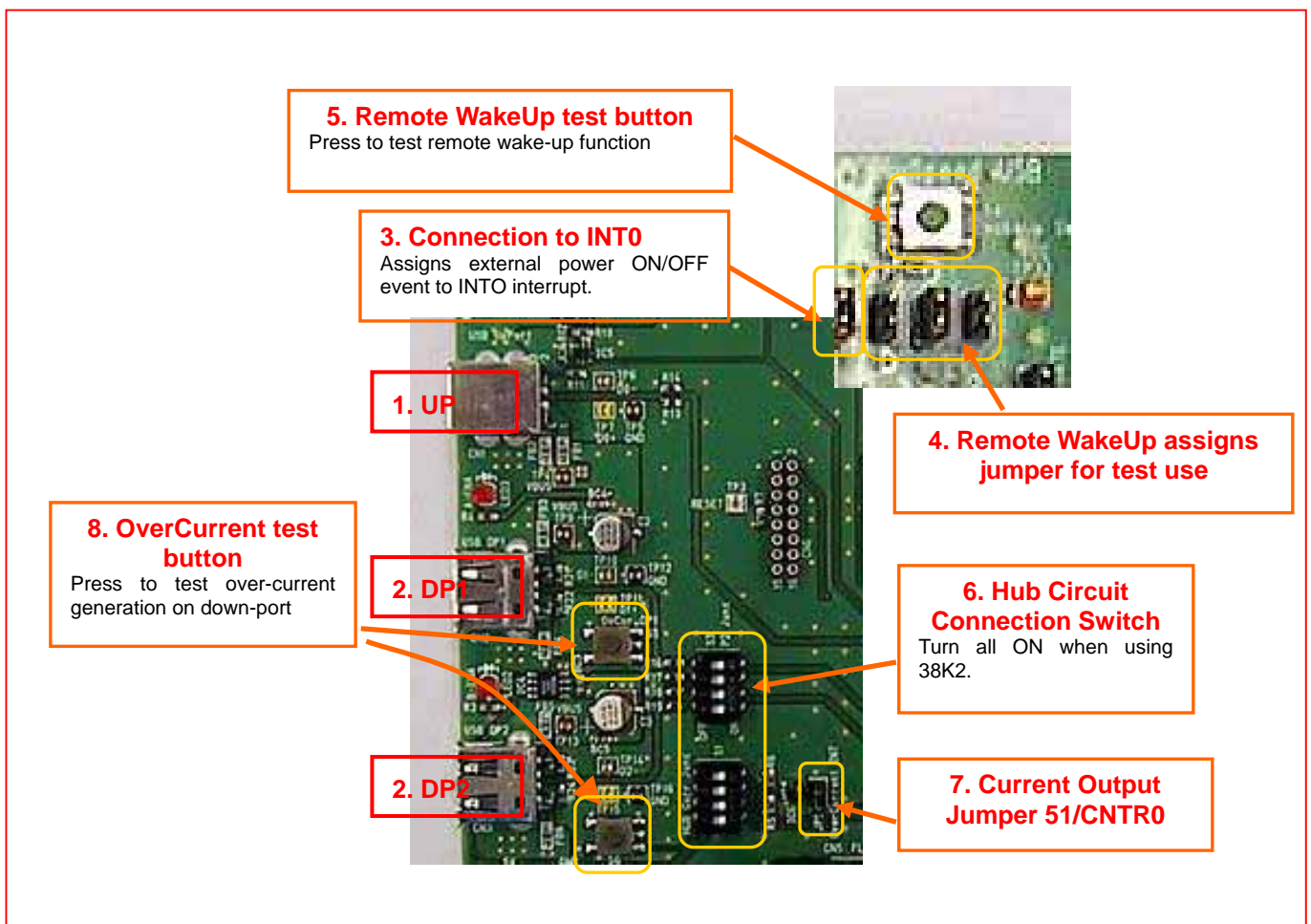


Figure 1.7 USB Peripheral Circuits Setup Areas

## 1.8 Keyboard Connection

M3A-8K02 has a built-in keyboard connector. Pins P00-P07, P10-P13, P24-P27, P30-P37, and P53-P57 are assigned to the keyboard connection. Figure 1.8 shows the pin configuration for the connector.

USB hub keyboard firmware is available separately.

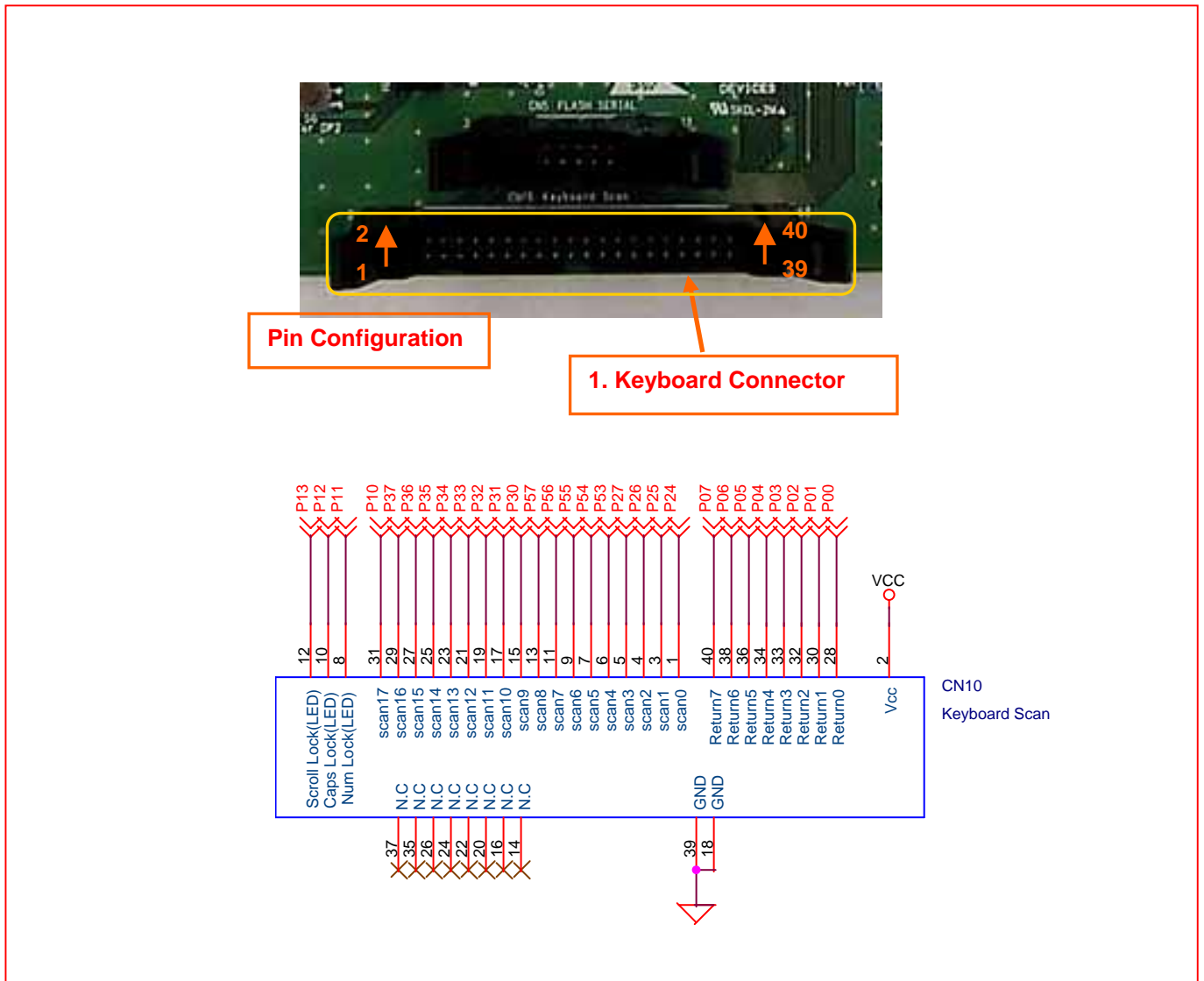


Figure 1.8 Connection Diagram for Keyboard Connector

## 1.9 Jumper Functions

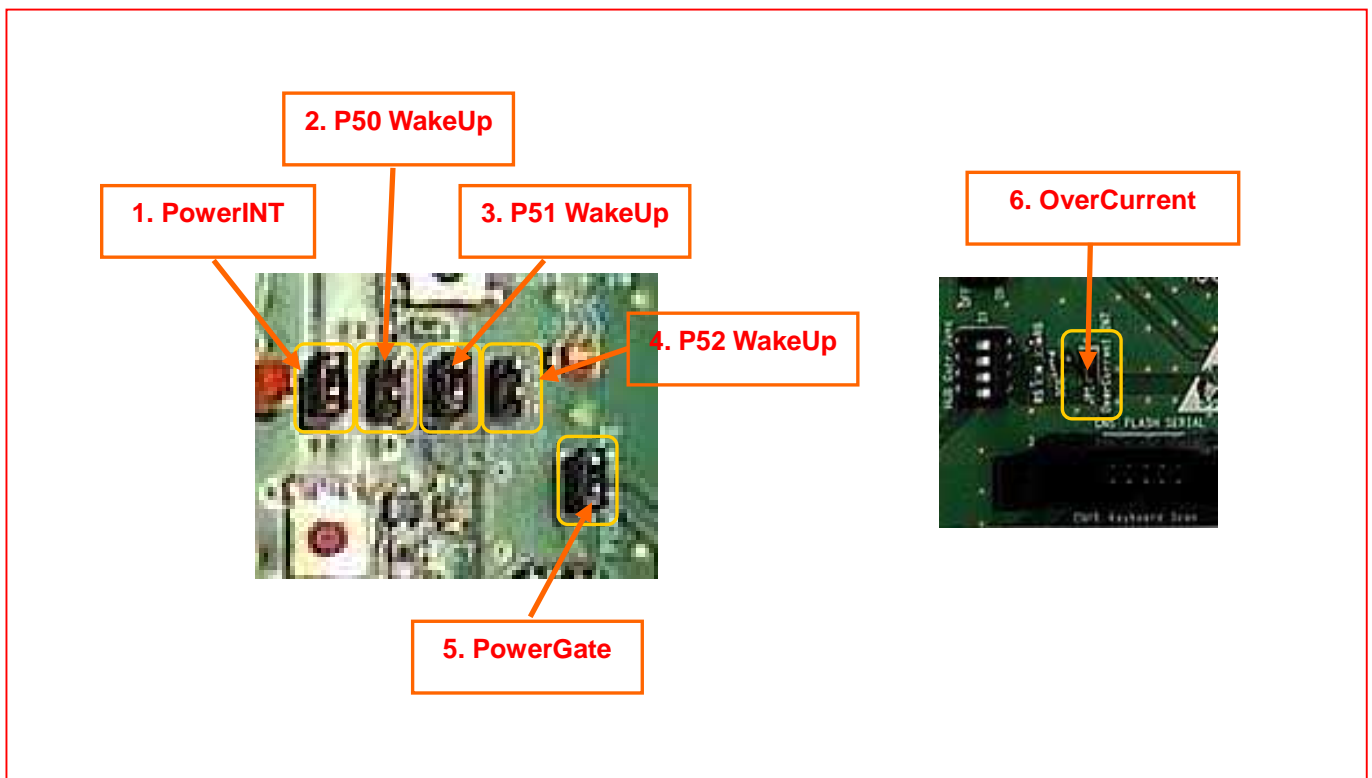
As described previously, the jumpers equipped on this board can be set for specific functions. Table 1.9 shows the jumper number and corresponding function.

**Table 1.9 Jumper Number and Function**

JP No.	Name	Function	Attached state	Detached state
JP1(1)	PowerINT	Assigned to INTO pin for self-power ON/OFF events	connected	floating
JP2(2)	P50 WakeUp	Connected to pin P50 of WakeUp switch <sup>Note 1</sup>	connected	floating
JP3(3)	P51 WakeUp	Connected to pin P51 of WakeUp switch <sup>Note 2</sup>	connected	floating
JP4(4)	P52 WakeUp	Connected to pin P52 of WakeUp switch	connected	floating
JP6(5)	PowerGate	Connected to G04 Vcc	connected	floating
JP5(6)	OverCurrent	Assigned to CNTR0 pin for detection signal of down-port over-current	connected	floating

Note 1: Do not connect P50 WakeUp (JP2) when PowerINT (JP1) is connected.

Note 2: Do not connect P51 WakeUp (JP3) when OverCurrent (JP5) is connected.



**Figure 1.9 Jumper Settings**



## 1.10 Flash Chip Reprogramming (G03)

M3A-8K02 enables the user to reprogram the Flash chip (G03) on board. As M38K29F8HPL, bundled with this board, has been pre-programmed with the Flash rewriting control program, operational verification with the Flash chip can be done immediately after debug. This rewriting control program can be reprogrammed with either serial or USB interfacing: Flashwriter MFW-1 (Sunny Labs) or Flash-Over-USB (FOUSB).

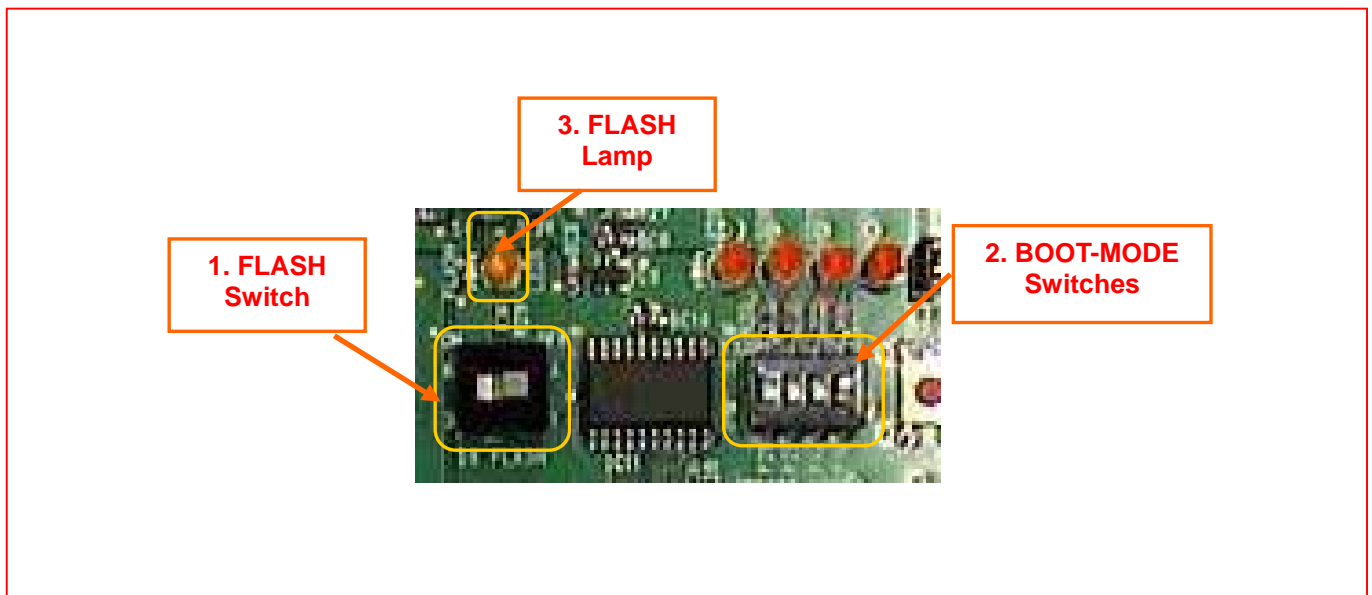
As shown in Figure 1.10, the Flash rewriting control program can be selected using the BOOT-MODE switch (S10 in 2) Table 1.10 shows the setup conditions for the BOOT-MODE switch. By setting the FLASH switch (S9 in 1) to ON and supplying power to the board (Note 2), the FLASH lamp (LED5 in 3) will go on and 38K0/38K2 will be in the Flash reprogramming mode. **However, if the board Vcc is different than the firmware voltage when processing the Flash rewriting control program, the chip may be damaged. Make sure the VCC-SELECT switch (S7) is set to the same voltage as the firmware.** Finally, make sure the oscillator is compatible with the system as well.

**Note 1: Do not set the BOOT-MODE switches while power is being supplied to the board.**

**Table 1.10 Selecting Flash Rewriting Control Program with BOOT-MODE Switches**

P26	P27	P42	P16	Vcc	Mode
*	*	H	H	5V	Serial Mode (use Flash writer)
*	H	L	H	<b>3.3V</b>	FOUSB 3V/6MHz
H	L	L	H	5V	FOUSB 5V/12MHz
L	L	L	H	5V	FOUSB 5V/6MHz

\*: Either setting



**Figure 1.10 Selecting the Flash Program**

### 1.10.1 Serial Reprogramming (Flash Writer)

The M3A-8K02 board allows the user to reprogram the 38K0/38K2 Flash chip on board (serial reprogramming of F/W) using a flash writer.

To perform serial reprogramming, insert the flash writer cable in the flash writer connector (1), set the VCC-SELECT switch (S7) to 5V, the BOOT-MODE switch (S10 in 2) to P42 = "H" and P16 = "H", the FLASH switch (S9 in 3) to ON, and then apply external power (or USB up-port VBUS power). Follow instructions for the Flash writer to continue with the reprogramming process.

Note 1: Multi-Flashwriter = MFW-1 (Sunny Labs)

Note 2: A separate flash writer and reprogramming adapter is necessary for parallel programming new firmware in the 38K0/38K2 boot ROM area.

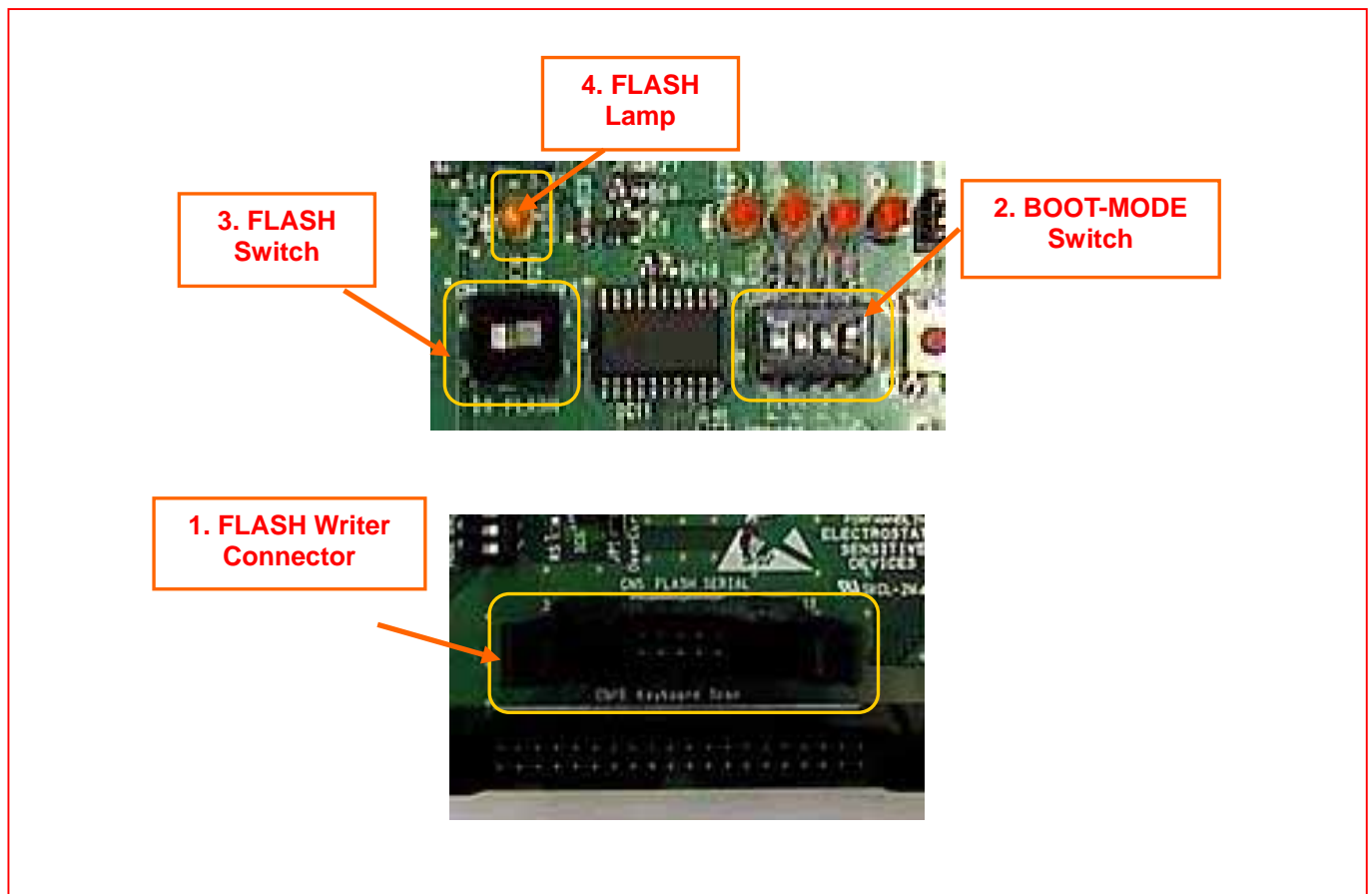


Figure 1.10.1 Serial Reprogramming

## 1.10.2 Flash Over USB Reprogramming (FOUSB)

M3A-8K02 enables “Flash Over USB” on-board programming of 38K0/38K2 Flash chips using the USB function. To perform FOUSB (always make sure external power supply is disconnected), set the VCC-SELECT switch (S7) and the BOOT-MODE switch appropriately, set the FLASH switch (S9) to ON, and then connect the up-port to your computer. The FLASH lamp (4) will go on and the host will recognize operations with “RENESAS Flash-Over USB.” After the host PC is connected, run the application program bundled with the M3A-8K02 on the PC and follow the instructions for reprogramming the application firmware.



Note: This screen appears in versions 2.00. Screens may differ slightly between product versions.

Figure 1.10.2 Flash Over USB Reprogramming for 38K0/38K2 Flash chips

## 1.11 Peripheral Circuits

Additional external circuits can be used with the main board via the external universal board (G04 in 1).

### \* Power Supply

Power is supplied to external universal board G04 from the main board (G01) or an external source. When using an external power source, connect the source to power supply input pin TP9 (2). When supplying power from the main board, connect G04 to the main board through the JP6 POWERGATE (3) (make sure nothing is connected to JP6 on G01 before connecting the external source to TP9). After making the appropriate connection, set the power supply switch (S2 in 4) on G04 to ON. LED1 will light up and external power or Vcc from G01 will be supplied to Vcc pins TP10, TP11, TP12, and TP13.

### \* System RESET Pin

The main board RESET signal can be used for the external universal board as well. To reset external circuits in the same manner as 38K0/38K2, use RESET pin TP8 (5).

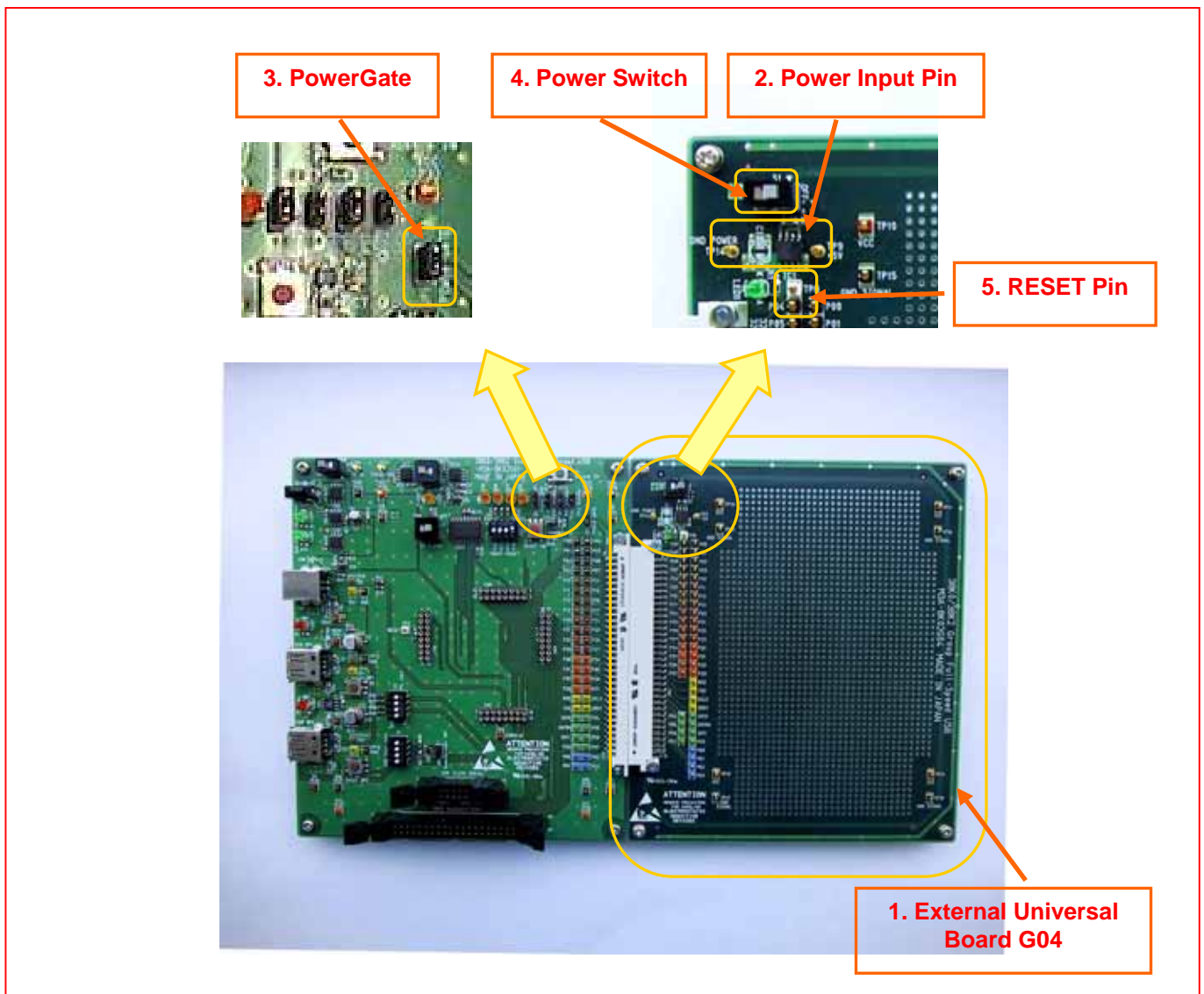


Figure 1.11(1) External Universal Board G04

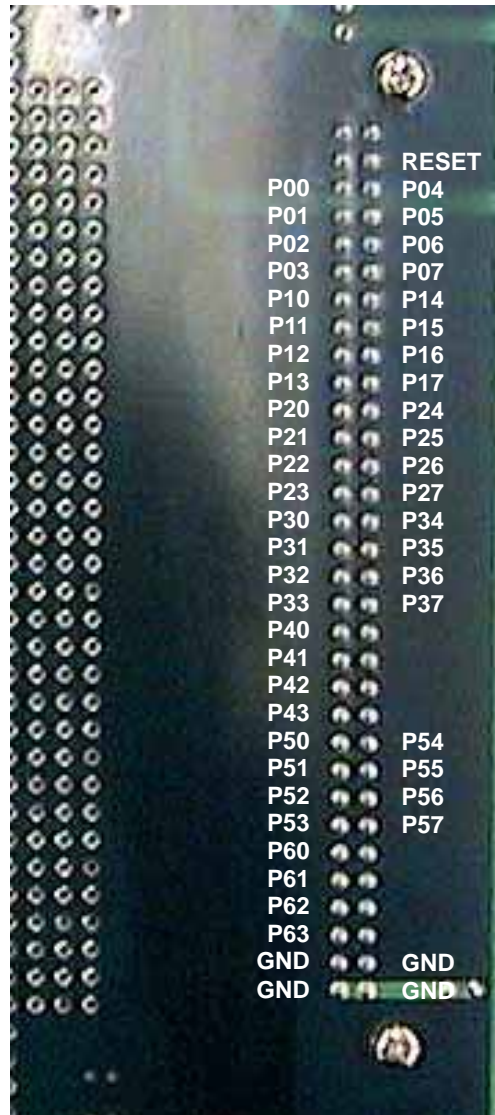


Figure 1.11(2) Board Pin Numbers

## 1.12 Components Table

Table 1.12 shows the various components of the M3A-8K02 main board G01 (the same information applies to G02, G03, and G04). Note that the components listed here are not guaranteed for operation in the users' system.

\* Please confirm the correct component symbol in the schematics and on the board itself.

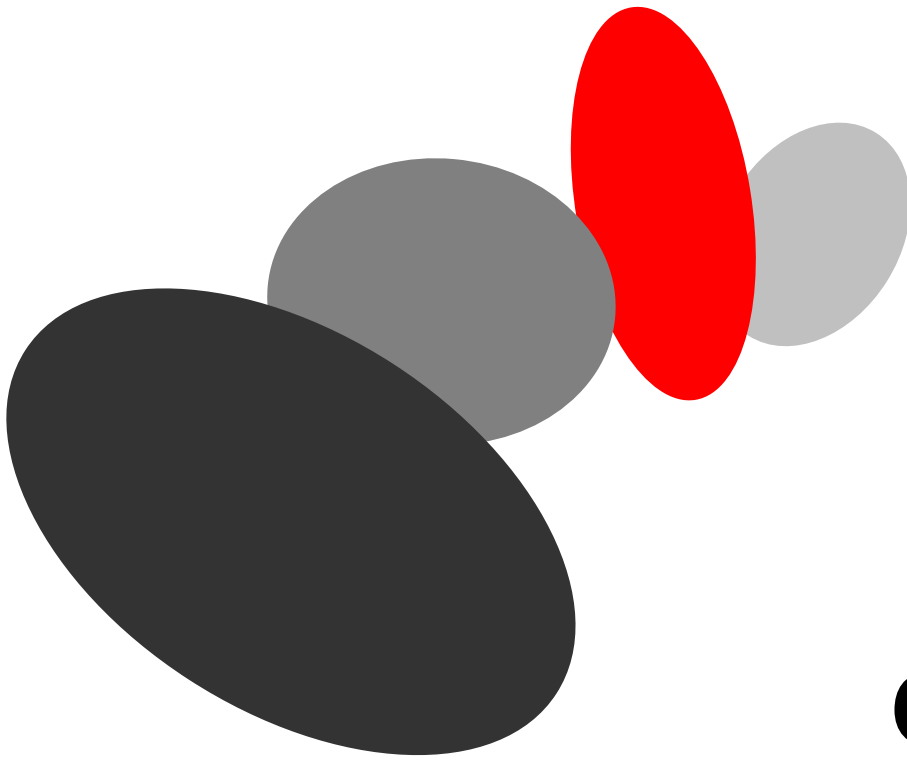
**Table 1.12 Main Board G01 Components**

Component Name		Spec.		Qty per set	Notes
Name	Symbol	Component No. (Schematic No., Prod. Spec.)	Maker		
MOS FET	IC1, IC3, IC7, IC10	FY4ADJ-03A	Renesas	4	2 p-ch included
	IC2	RK4936	Rohm	1	2 n-ch included
USBOVer-current protection IC	IC4	MIC2026-2BM	Micrel	1	
Analog Switch	IC5	MAX4644EUT-T	Maxim	1	1pc.
	IC11	MAX394CWP		1	4 pcs.
AND Logic	IC6	TC7SH08FU	Toshiba	1	
RESET IC	IC8	PST9140N	Mitsumi	1	4.0V reset
Regulator	IC9	RN5RT33A	RICOH	1	3.3V (150mA)
USB Up-port Connector	CN1	UBB-4R-D14T-1	JST	1	
	CN2, CN3	UBA-4R-D14T-1		2	
Option Board Connector	CN4	XC5F-6432-2	OMRON	1	64 pins
MF/W1 Connector	CN5	XG4A-1031		1	10 pins
Top board socket pin	CN6-CN9	MF-3-1	MAC8	8	8 coupled
Keyboard Connector	CN10	XG4A-4031	OMRON	1	40 pins
Electrolyte Capacitor	C1	UUT1C100MCR1G S	Nichicon	1	10uF (16V withstand)
	C2, C3	UWT1C221MCR1G S		2	220uF (16V withstand)
Chip Capacitor	BC1-BC10	GRM40F104Z50	Murata Works	10	0.1uF (precision unspecified)
Chip Resistor	R1, R3, R4, R15, R29-R33	MCR10EZHZJ301	Rohm	9	300, 1/16W or greater (precision unspecified)
	R2, R8-R10, R12, R20, R25-R28	MCR10EZHZJ104		10	100k(precision unspecified)
	R5-R7	MCR10EZHZJ103	Rohm	3	10k(precision unspecified)
Chip Resistor	R11	MCR10EZHZJ152		1	1.5k(precision unspecified)
	R13, R14, R16-R19	MCR10EZHF33R0		6	33+-1%
	R21-R24	MCR10EZHZJ153	Murata Works	4	15k(precision unspecified)
Ferrite Beads	FB1-FB6	BLM21PG221SN1 D	Sharp	6	
LED	LED1, LED4 (green)	GL3KG8		2	forward voltage 2.1V
	LED2, LED3 (red)	GL3HD8		2	forward voltage 2.0V
	LED5 (yellow)	GL3HY8		1	forward voltage 2.0V
	LED6-LED9 (orange)	GL3HS8	OTAX	4	forward voltage 2.0V
Switch	S1, S3, S10	KSD04	Nikkai Kaiheiki	3	4-unipolar, single-throw (DIP)
	S2	AS-12AP		1	unipolar
	S7, S9	AS-22AP	Alps	2	bipolar
	S4	SKHMPWE010		1	green
	S5, S6	SKHMPSE010		2	brown
	S8	SKHMPUE010	Marushin Musen	1	red
DC Socket	J1	MJ-25N1		1	1.3mm diameter
DC Lamp		MP-121WH	Honda Tsushin Kogyo	1	1.3mm diameter bundled with board
Lapping Pin	JP1-JP6	FFC-6BSM1B	MAC8	6/34	2 coupled
Jumper Socket	JP1, JP3, JP5, JP6	JS-1		4	Insert lapping pin
Check Pin	TP1, TP2	ST-1-1		2	
	TP5, TP12, TP16, TP24, TP27, TP30, TP33, P00-P07	HK-5-G black		15	Surface mount (black)
Check Pin	P10-P17	HK-5-G brown		8	Surface mount (brown)
	TP4, TP8, TP9, TP13, TP25,	HK-5-G red		16	Surface mount (red)

**RENESAS** USB Full-Speed Microcomputers  
**38K0/38K2** Group **M3A-8K02**

Component Name		Spec.		Qty per set	Notes
Name	Symbol	Component No. (Schematic No., Prod. Spec.)	Maker		
	TP28, TP31, TP34, P20-P27 TP26, TP29, TP32, TP35, P30-P37	HK-5-G orange	MAC8	12	Surface mount (orange)
	TP7, TP11, TP15, RXD, TXD, SCLK, SRDY	HK-5-G yellow		7	Surface mount (yellow)
	INT0, CNTR0, INT1, P53-P57	HK-5-G green		8	Surface mount (green)
	P60-P63	HK-5-G blue		4	Surface mount (blue)
	TP6, TP10, TP14	HK-5-G gray		3	Surface mount (gray)
	TP3	HK-5-G white		1	Surface mount (white)
Spacer		AP-13		4	13mm long
		M3,depth - 6mm		4	

\* USB Connector (JST Mfg Co., Ltd.) meets the USB 2.0 compliance test.



## Chapter 2

# Other Development Boards

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## 2.1 G02,G03,G04 Options

G02/G03/G04 can also be purchased separately. Please order using the corresponding product number: M3A-8K02G02, M3A-8K02G03, or M3A-8K02G04.

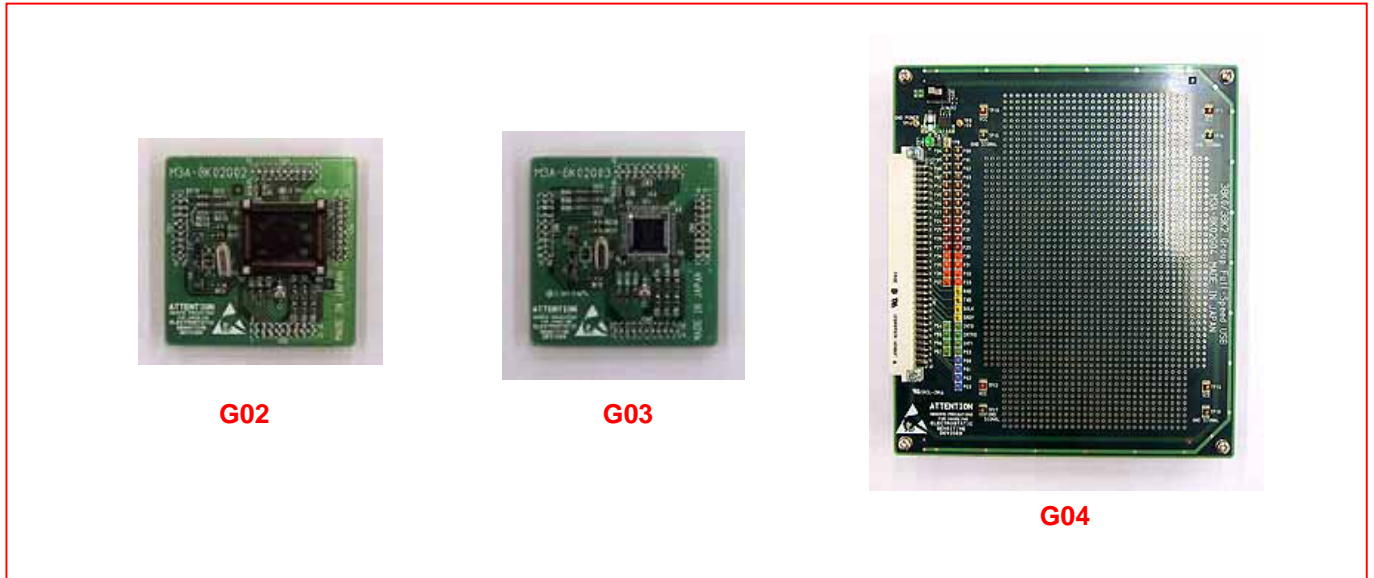


Figure 2.1 G02, G03, G04 Options

## 2.2 M3A-8K10 (COM Class Demo Board)

M3A-8K10G01, a COM Class demonstration board, is also available for the 38K0 Group. Please contact your local representative for more details.



Figure 2.2 COM Class Demo Board M3A-8K10G01

## 2.3 M38C29T-64FPD

M38C29T-64FPD is a package conversion board for connecting the emulation chip to the HP package foot pattern (64P6Q-A). Use this board when the emulation chip 100-pin socket (100P6S\_A) foot pattern does not fit the trial board.

100-pin RFS-type Emulator MCU

-> 64-pin 0.55mm pitch LQFP (HP package)

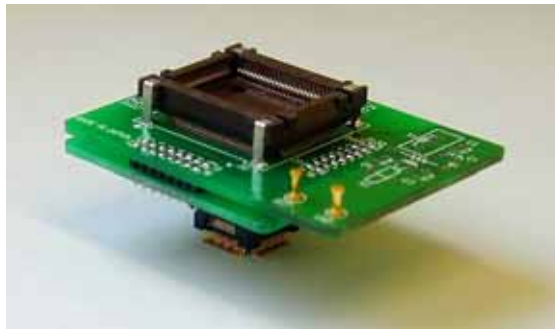


Figure 2.3 M38C29T-64FPD

## 2.4 M38C29T-64LCA

M38C29T-64LCA is a package conversion board for connecting the emulation chip to the FP package foot pattern (64P6U-A). Use this board when the emulation chip 100-pin socket (100P6S\_A) foot pattern does not fit the trial board.

When using this conversion board, you will also need to purchase 64-pin socket [IC61-0644-052](#) or [IC61-0644-053](#) for the system board. (Note1)

Note 1: The 64-pin socket foot pattern is slightly bigger than the FP package foot pattern.

100-pin RFS-type Emulator MCU

-> 64-pin 0.8mm pitch LQFP (FP package)

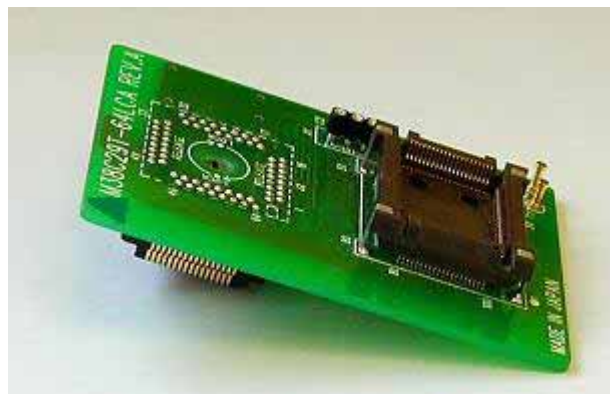
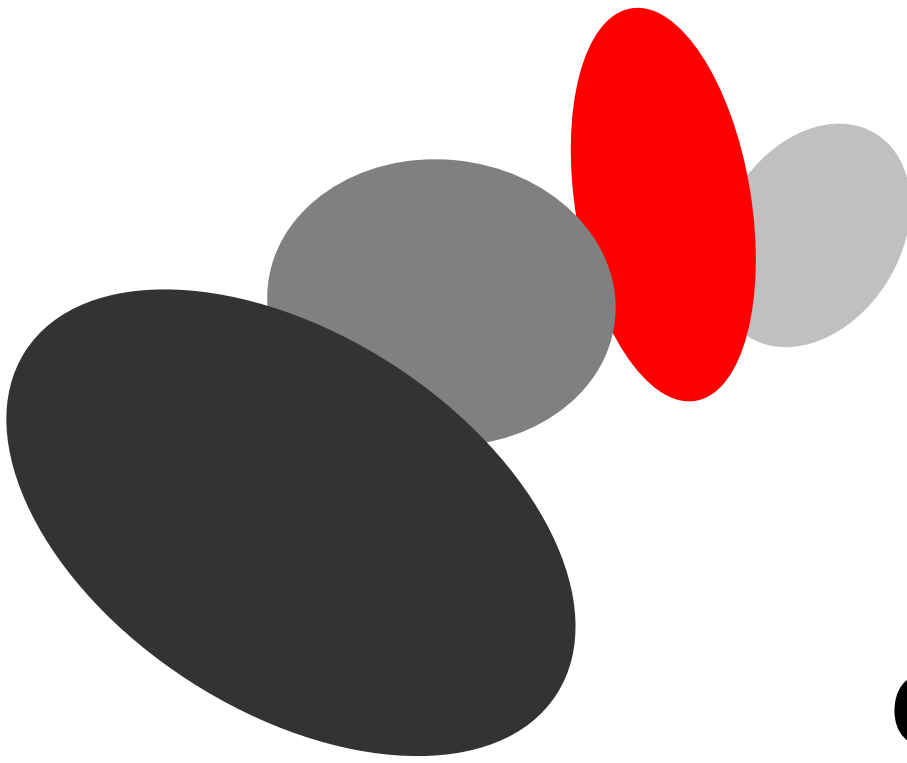


Figure 2.4 M38C29T-64LCA



## **Chapter 3**

# **Development Environment**

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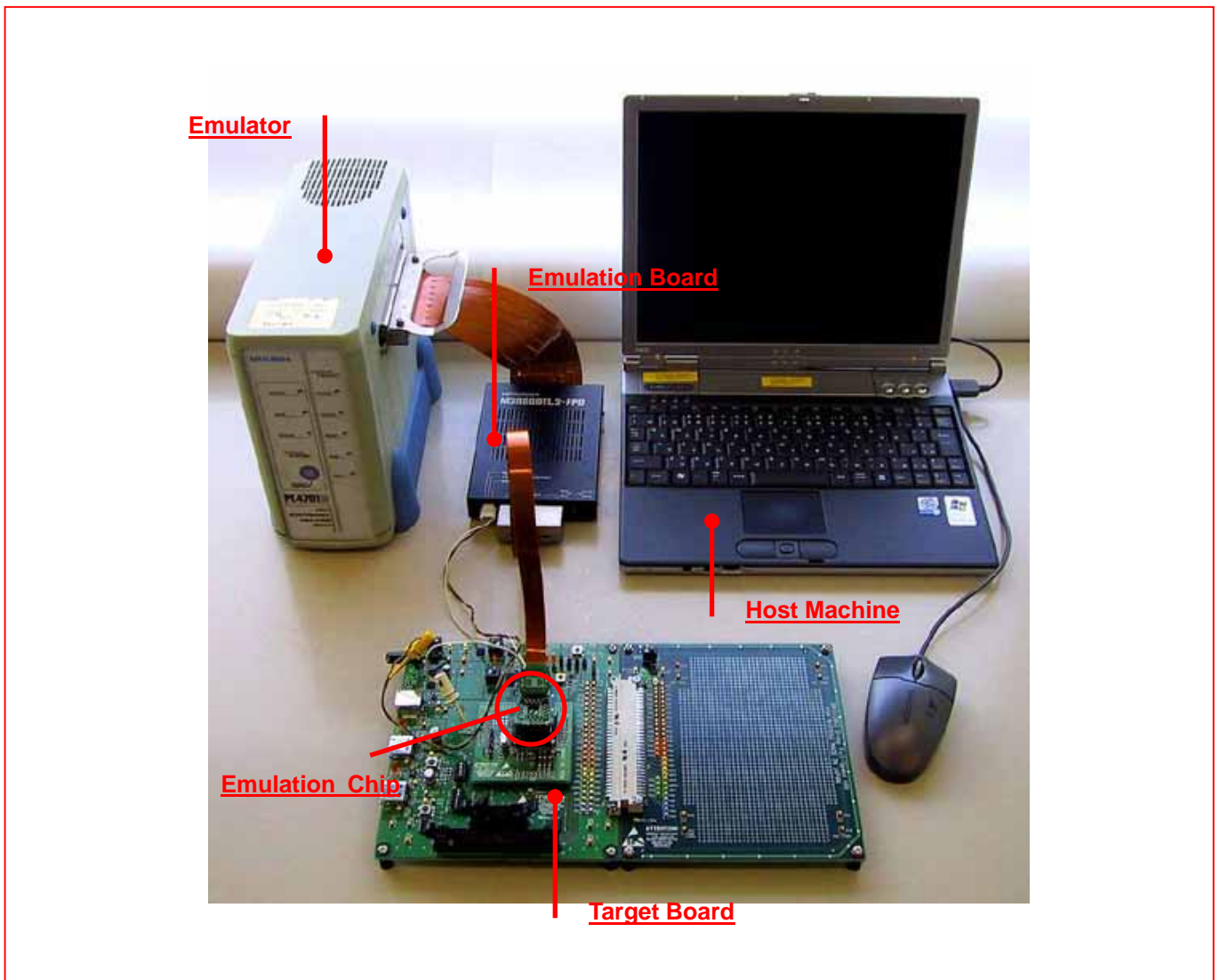


### 3.1 Development Environment Example

Table 3.1 shows the types of tools required for the firmware development environment of the M38K0/38K2 Group.

**Table 3.1 Development Environment Example**

	Product Number
Host Machine	PC/AT compatible (with LPT parallel, USB interface)
Emulator	PC4701U
Emulator Debugger	PD38
Emulator Pod	M38000TL2-FPD
Emulation Chip	M38K09RFS,M38K29RFS
Target Board	M3A-8K02



**Figure 3.1 Development Environment Example**

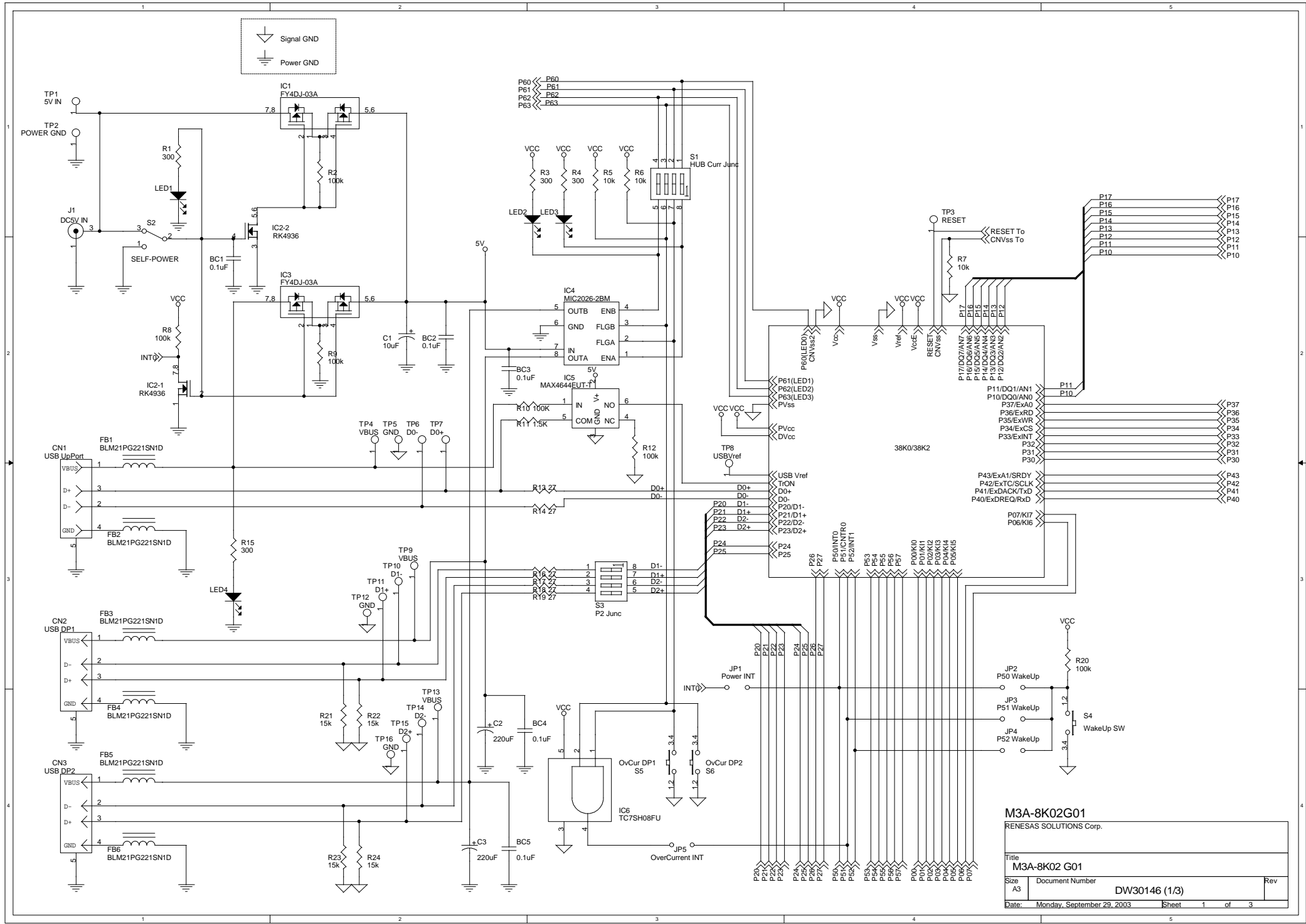


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RENESAS USB Full-Speed Microcomputer  
38K0/38K2 Group  
Development Board **M3A-8K02** Instruction Manual VER.1.0  
RENESAS TECHNOLOGY CORPORATION.  
RENESAS SOLUTIONS CORPORATION.

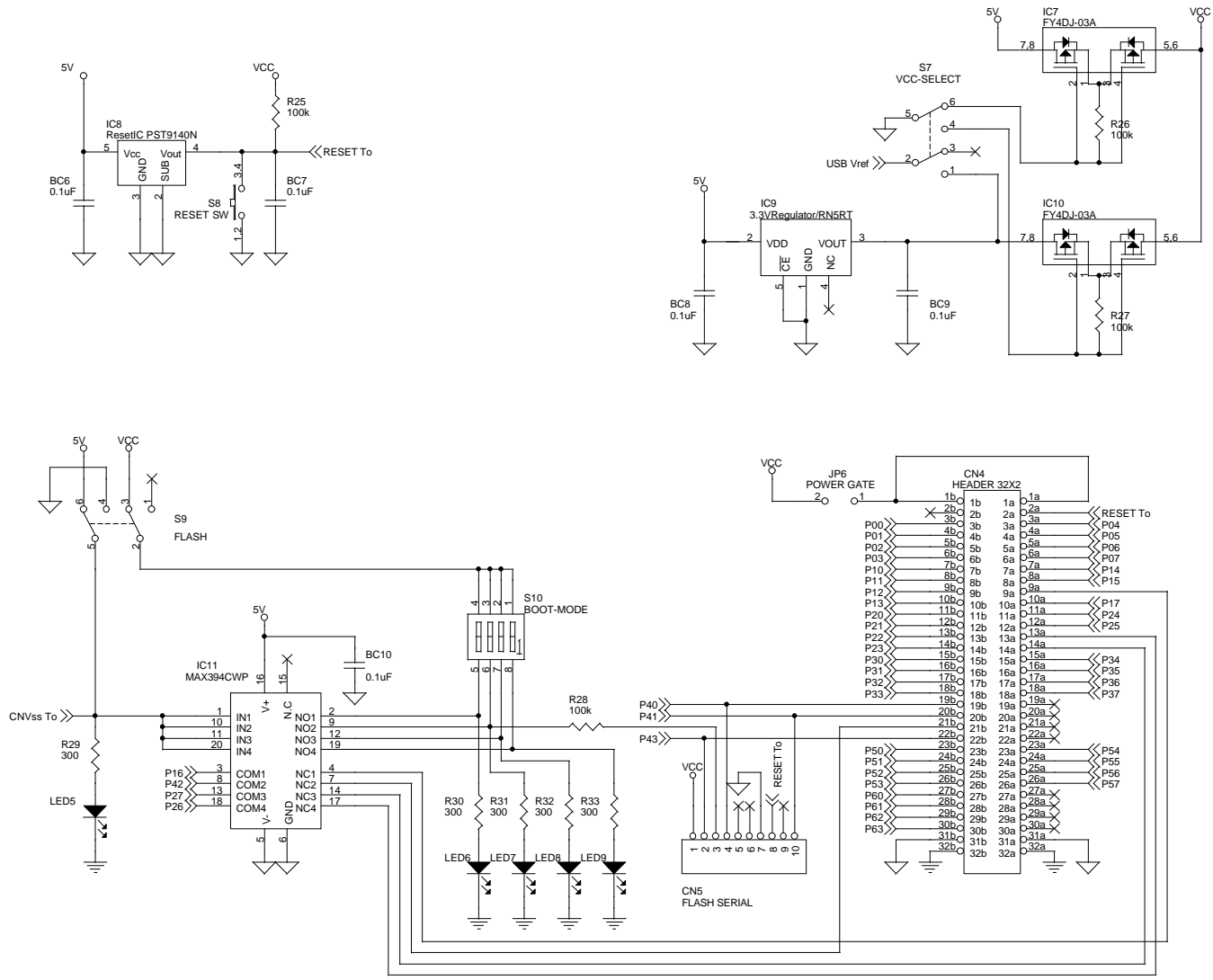
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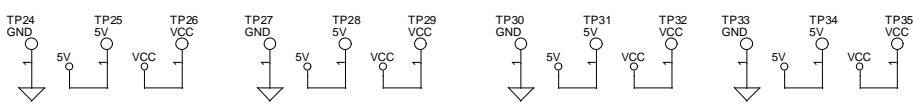
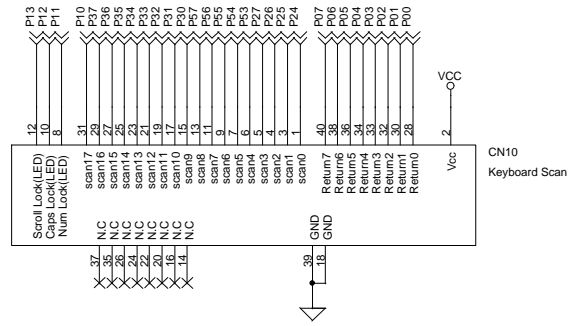
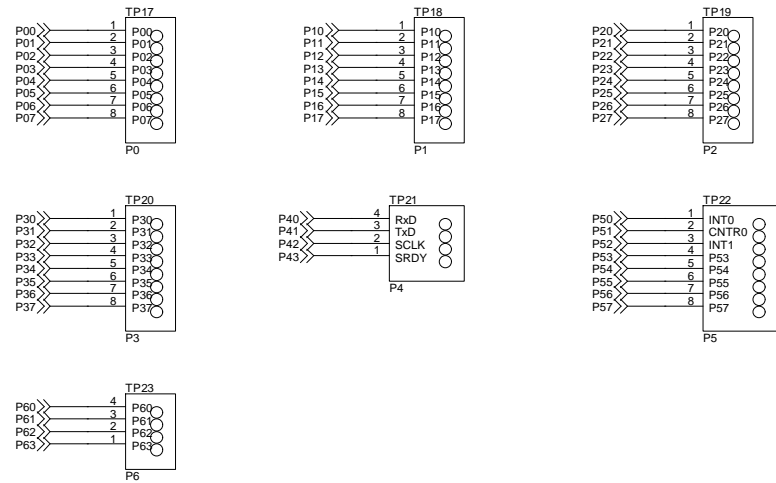
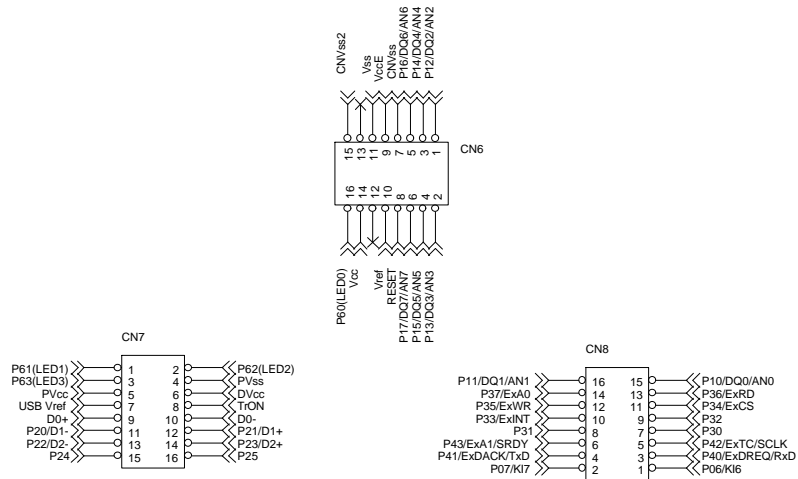
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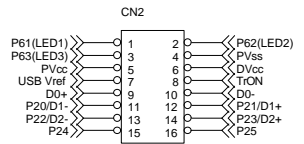
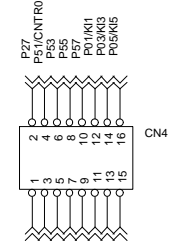
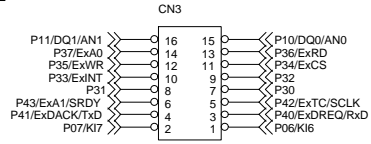
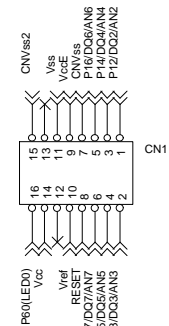
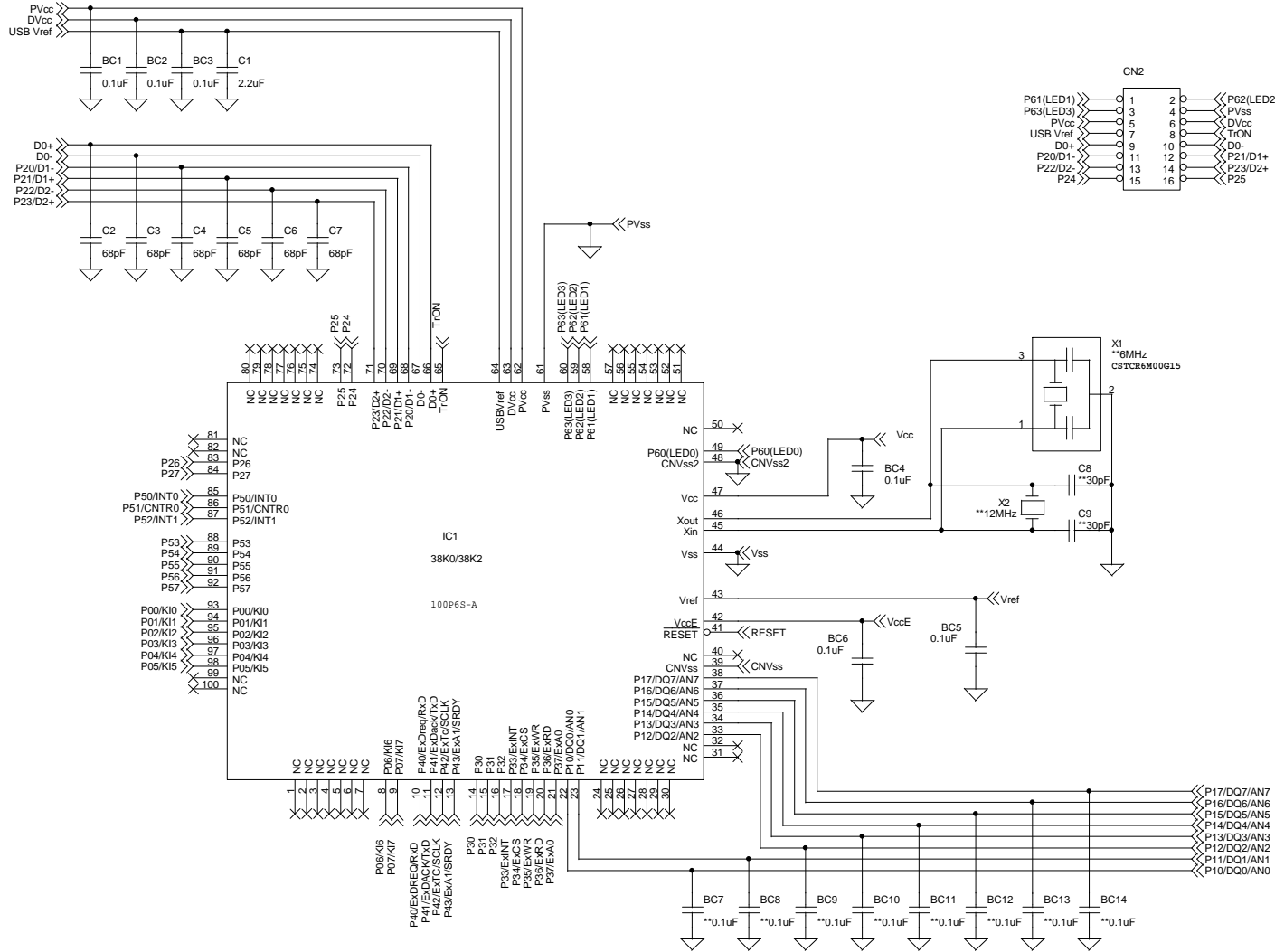
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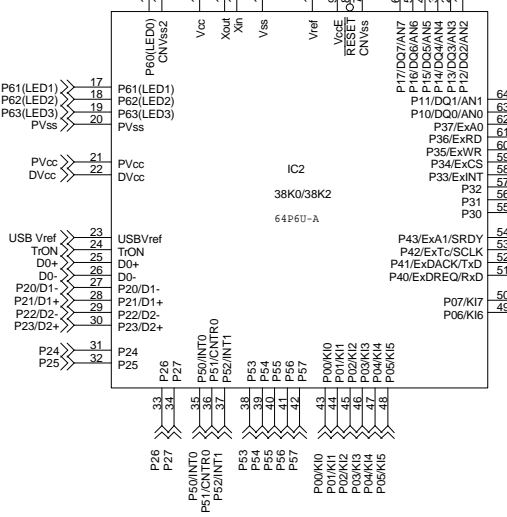
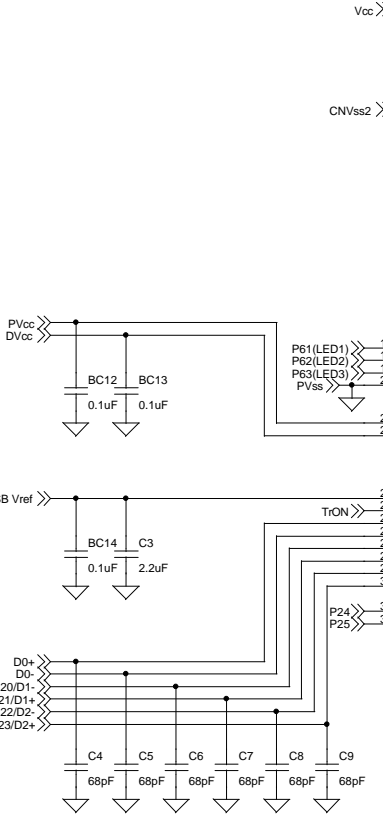
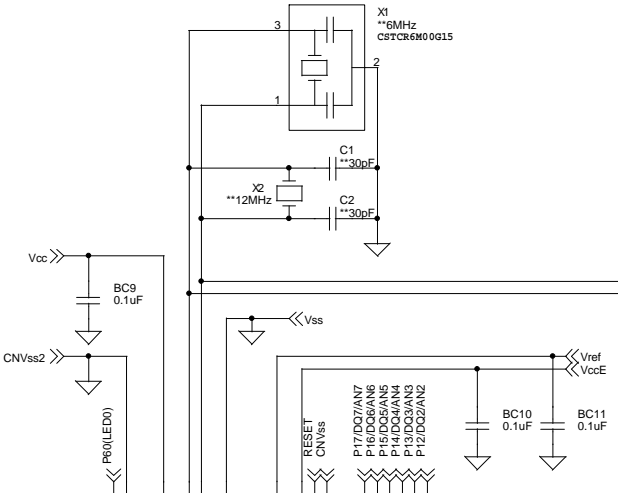
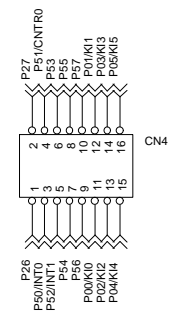
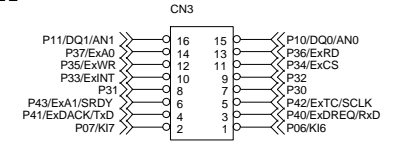
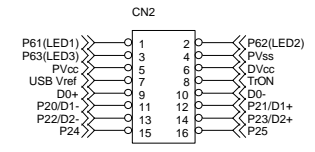
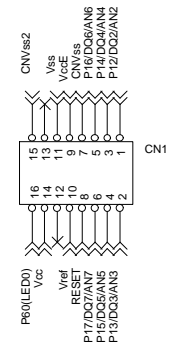
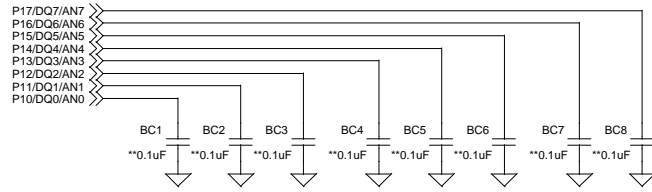




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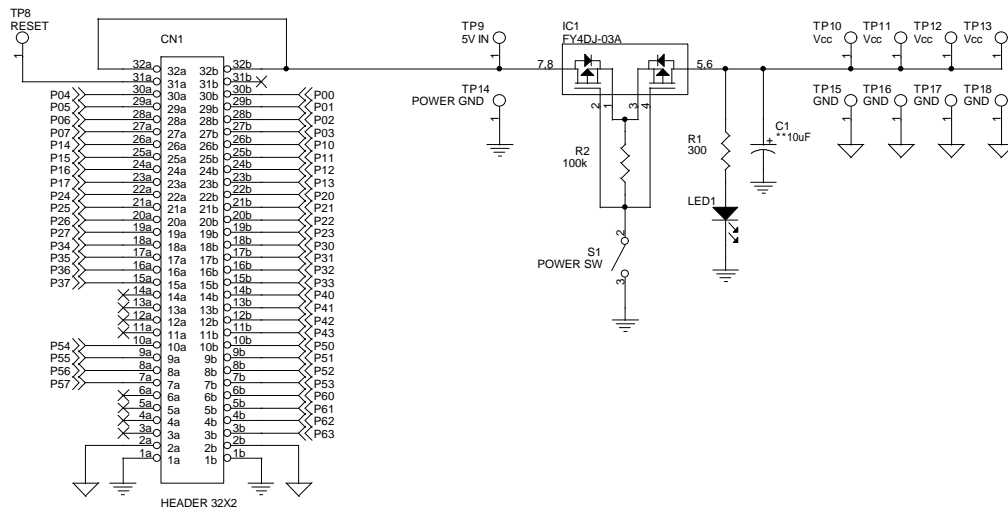
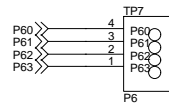
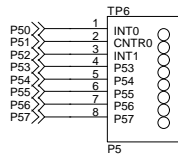
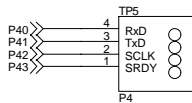
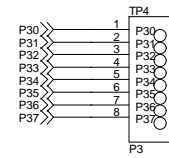
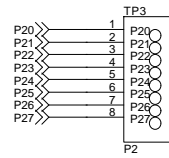
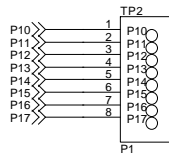
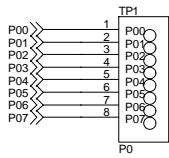
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