

REV	REF	DATE	DRAWN BY
1.00	Release	01.10.2019	KOS

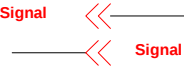
Renesas Starter Kit+ for RX72M CPU Board Schematics

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4	RX72M Microcontroller-3
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19	Ethernet PHY(1)
20	Ethernet Connector

Note:

C : Capacitor
D : Diode
J : Connector, Jumper
L : Inductor
LED : Light Emitting Diode
MR : Resistor Array
PWR : Power Jack
R : Fixed Resistor
RES : Reset Switch
RV : Potentiometer
SW : Switch
T : Test Point
U : Integrated Circuit
X : Crystal, Oscillator

* "DNF" marking means that component is not fitted by default.
**The following off-page connectors used in this schematics do not indicate the signal direction.



Board Code:

RTK5572MNDC00000BE : RSK+RX72M MP Board
RTK5572MNH000000BE : RSK+RX72M MP Board (Encryption version)

Abbreviations:

CAN : Contoller Area Network
IIC : Philips(TM) Inter-Integrated Circuit Connection Bus
LED : Light Emitting Diode
MCU : Microcontroller Unit
PSU : Power Supply Unit
RSK : Renesas Starter Kit
USB : Universal Serial Bus
SDHI : SD (Secure Digital) Host Interface
DSMIF : Delta Sigma Modurator Interface

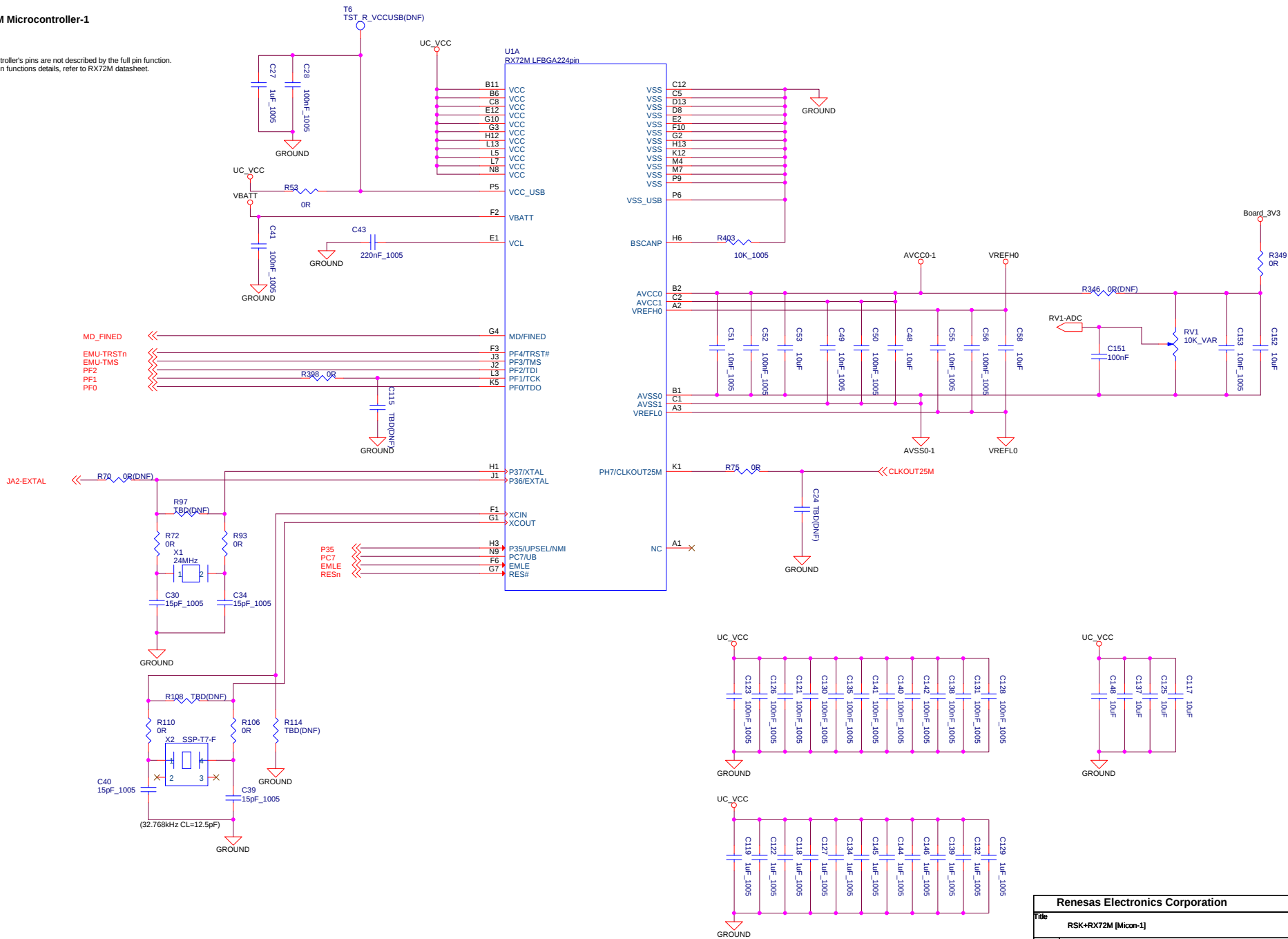
REE Drawing No. D016462_04

Renesas Electronics Corporation			
Title		RSK+RX72M [Index]	
Size	Document Number	Rev	
	R20UT4390EG0100	1.00	
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RX72M Microcontroller-1

Note:

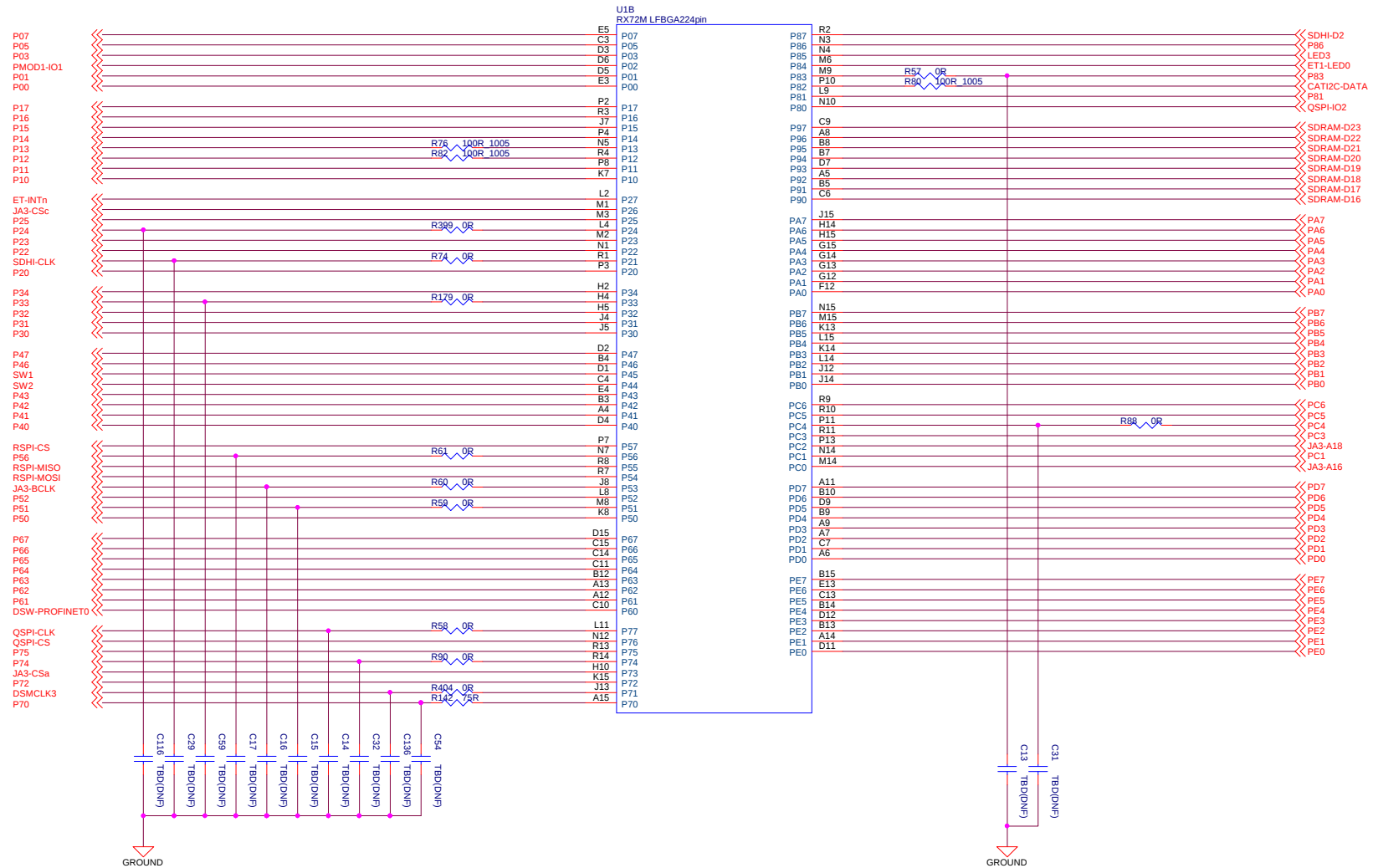
Microcontroller's pins are not described by the full pin function.
For full pin functions details, refer to RX72M datasheet.



RX72M Microcontroller-2

Note:

Microcontroller's pins are not described by the full pin function.
For full pin functions details, refer to RX72M datasheet.



Note:

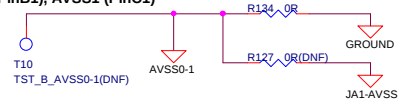


MCU Pin Function Select-1

AVCC0 (PinB2), AVCC1 (PinC2)



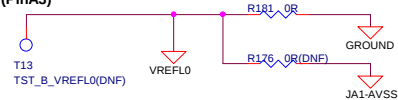
AVSS0 (PinB1), AVSS1 (PinC1)



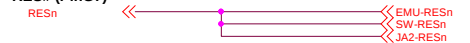
VREFH0 (PinA2)



VREFL0 (PinA3)



RES# (PinG7)



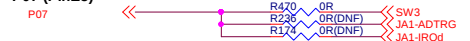
EMLE (PinF6)



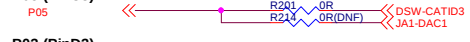
MD_FINED (PinG4)



P07 (PinE5)



P05 (PinC3)



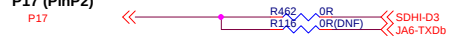
P03 (PinD3)



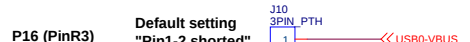
P01 (PinD5)



P00 (PinE3)



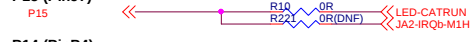
P17 (PinP2)



P16 (PinR3)



P15 (PinJ7)



P14 (PinP4)



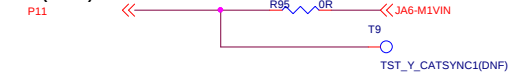
P13 (PinN5)



P12 (PinR4)



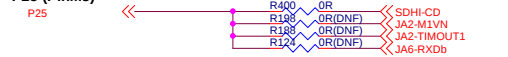
P11 (PinP8)



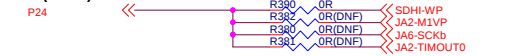
P10 (PinK7)



P25 (PinM3)



P24 (PinL4)



P23 (PinM2)



P22 (PinN1)



P20 (PinP3)



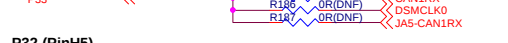
P35 (PinH3)



P34 (PinH2)



P33 (PinH4)



P32 (PinH5)



P31 (PinJ4)



P30 (PinJ5)



P47 (PinD2)



P46 (PinB4)



P43 (PinE4)



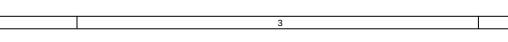
P42 (PinB3)



P41 (PinA4)



P40 (PinD4)



P56 (PinN7)



P52 (PinL8)



P51 (PinM8)



P50 (PinK8)



P67 (PinD15)



P66 (PinC15)



P65 (PinC14)



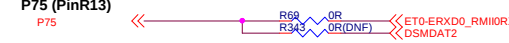
P64 (PinC11)



P63 (PinB12)



P62 (PinA13)



P61 (PinA12)



P75 (PinR13)



P74 (PinR14)



P72 (PinK15)



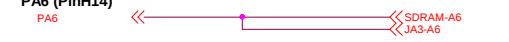
P70 (PinA15)



P86 (PinN3)



P83 (PinM9)



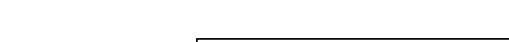
P81 (PinL9)



PA7 (PinJ15)



PA6 (PinH14)



PA5 (PinH15)



MCU Pin Function Select-2

PA4 (PinG15)

PA4 << SDRAM-A4
JA3-A4

PA3 (PinG14)

PA3 << SDRAM-A3
JA3-A3

PA2 (PinG13)

PA2 << SDRAM-A2
JA3-A2

PA1 (PinG12)

PA1 << SDRAM-DQM3
JA3-A1

PA0 (PinF12)

PA0 << SDRAM-DQM2
JA3-A0

PB7 (PinN15)

PB7 << SDRAM-A15
JA3-A15

PB6 (PinM15)

PB6 << SDRAM-A14
JA3-A14

PB5 (PinK13)

PB5 << SDRAM-A13
JA3-A13

PB4 (PinL15)

PB4 << SDRAM-A12
JA3-A12

PB3 (PinK14)

PB3 << SDRAM-A11
JA3-A11

PB2 (PinL14)

PB2 << SDRAM-A10
JA3-A10

PB1 (PinJ12)

PB1 << SDRAM-A9
JA3-A9

PB0 (PinJ14)

PB0 << SDRAM-A8
JA3-A8

PC7 (PinN9)

PC7 << RS485-TXD
EMU-UB
DSW-UB
JA2-M1TRDCLK
JA6-TXdc

Default setting
"Pin1-2 shorted"

PC6 (PinR9)

PC6 << JA3-A22
PMOD1-MISO

PC5 (PinR10)

PC5 << JA3-A21
PMOD1-CS

PC4 (PinP11)

PC4 << QSPI-IO1
JA3-A20
JA2-M1POE

PC3 (PinR11)

PC3 << QSPI-IO0
JA3-A19

PC1 (PinN14)

PC1 << JA3-A17
DSW-CATID6
JA6-M1TOGGLE

PD7 (PinA11)

PD7 << SDRAM-D7
JA3-D7

PD6 (PinB10)

PD6 << SDRAM-D6
JA3-D6

PD5 (PinD9)

PD5 << SDRAM-D5
JA3-D5

PD4 (PinB9)

PD4 << SDRAM-D4
JA3-D4

PD3 (PinA9)

PD3 << SDRAM-D3
JA3-D3

PD2 (PinA7)

PD2 << SDRAM-D2
JA3-D2

PD1 (PinC7)

PD1 << SDRAM-D1
JA3-D1

PD0 (PinA6)

PD0 << SDRAM-D0
JA3-D0

PE7 (PinB15)

PE7 << SDRAM-D15
JA3-D15

PE6 (PinE13)

PE6 << SDRAM-D14
JA3-D14

PE5 (PinC13)

PE5 << SDRAM-D13
JA3-D13
JA5-ADC7

PE4 (PinB14)

PE4 << SDRAM-D12
JA3-D12
JA5-ADC6

PE3 (PinD12)

PE3 << SDRAM-D11
JA3-D11
JA5-ADC5

PE2 (PinB13)

PE2 << SDRAM-D10
JA3-D10
JA5-ADC4

PE1 (PinA14)

PE1 << SDRAM-D9
JA3-D9

PE0 (PinD11)

PE0 << SDRAM-D8
JA3-D8

PF5 (PinG6)

PF5 << SDHI-PE
JA3-WAIT
JA1-IO4

PF2 (PinJ2)

PF2 << EMU-TDI_RXD
SERIAL_RXD
JA2-RXD_a

PF1 (PinL3)

PF1 << EMU-TCK
JA2-SCK_a

PF0 (PinK5)

PF0 << EMU-TDO_TXD
SERIAL_TXD
JA2-TXD_a

PH5 (PinK4)

PH5 << JA1-IO2
T26
TST_Y_CATLATCH0(DNF)

PJ5 (PinG5)

PJ5 << PMOD2-CS
JA1-IO3
T18
TST_Y_CATSYNCO(DNF)

PK3 (PinJ9)

PK3 << DSW-PROFINET1
JA1-IO1

PL0 (PinH11)

PL0 << RS485-DE
JA1-IO7

PN5 (PinJ11)

PN5 << DSW-CATID7
JA1-IO0

PQ3 (PinE9)

PQ3 << DSW-CATID2
PMOD2-IO2

PM7 (PinM13)

PM7 << ET0-RXD_v RMII0CRSDV

PK2 (PinN11)

PK2 << ET0-RXD_v

PQ0 (PinE7)

PQ0 << ET1-RXD_v RMII1CRSDV

PQ2 (PinG8)

PQ2 << ET1-RXD_v

Application Header Function Select

JA2-23PIN << JA2-IRQC_M1HSIN2
JA2-M1ENC

JA3-26PIN << JA3-WEn
JA3-WRn

JA3-44PIN << JA3-BCLK
JA3-SDCLK

JA3-45PIN << JA3-CS_c
JA3-WAIT

JA3-46PIN << JA3-ALE
JA3-CKE

JA3-47PIN << JA3-WRPh
JA3-DQMh

JA3-48PIN << JA3-WRLn
JA3-DQML

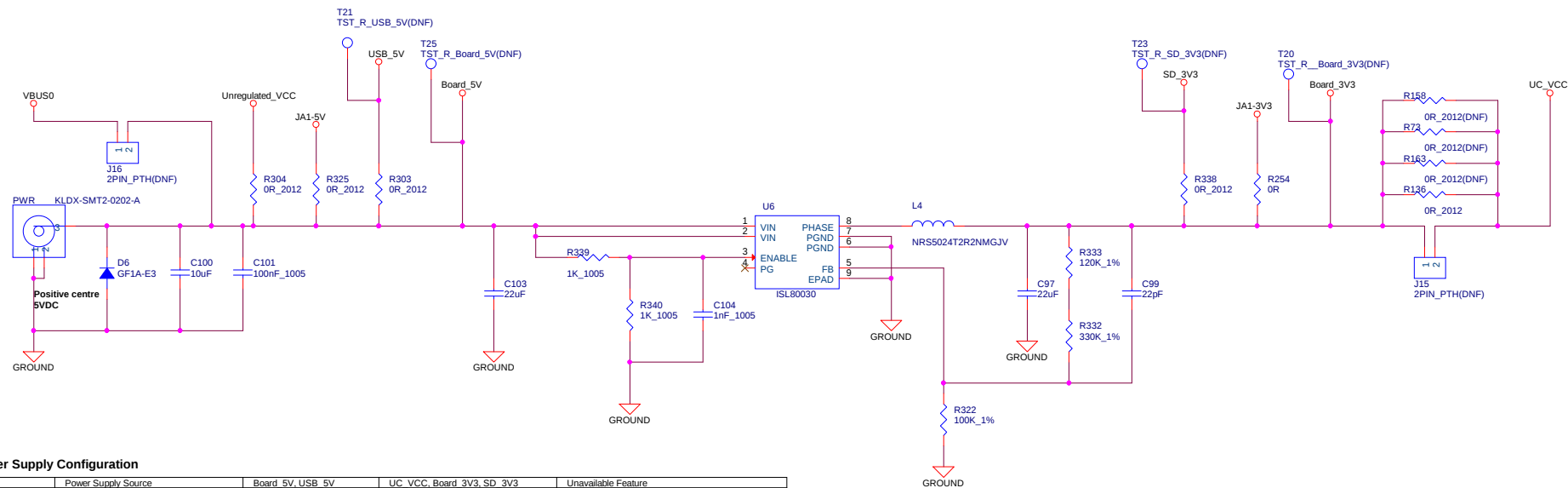
JA6-RS232TX << SERIAL-TXD

JA6-RS232RX << SERIAL-RXD

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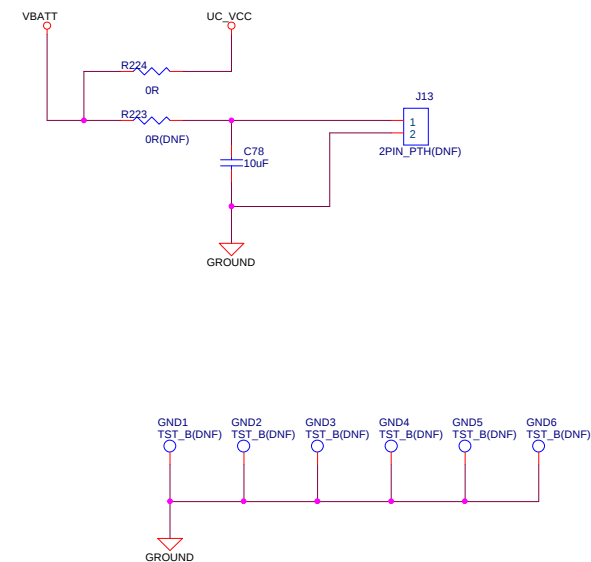
Title			RSK+RX72M [MCU Pin Function Select-2]
Size	Document Number	Rev	
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Power Supply Unit

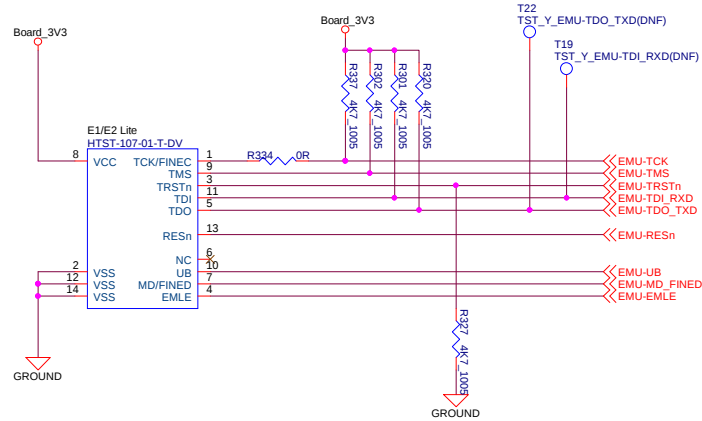


Power Supply Configuration

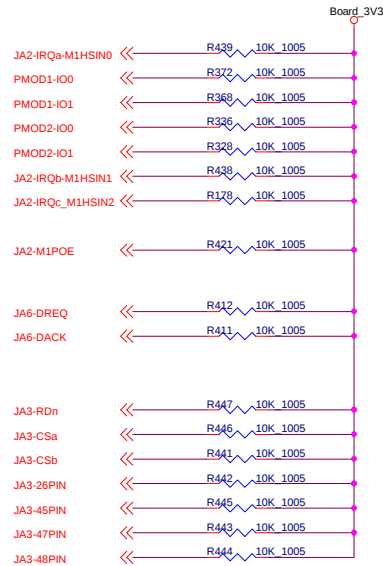
J16	Power Supply Source	Board_5V_USB_5V	UC_VCC_Board_3V3_SD_3V3	Unavailable Feature
open	PWR / Unregulated_VCC / JA1-5V	5V	3.3V	USB (Function-Buspowered)
shorted pin	VBUS	5V	3.3V	USB (Host), USB (Function-Selfpowered)



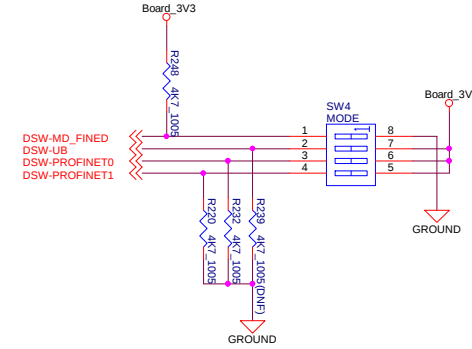
E1/E2 Lite Emulator Interface



Option pull-up resistor



MCU & Emulator Mode Setting



MCU Operating Mode Configuration

SW4 Pin1	SW4 Pin2	J14	Operating Mode
OFF	Don't care	Don't care	Single Chip Mode
ON	OFF	Don't care	SCI Boot Mode
ON	ON	Open	USB Boot Mode (Bus Powered)
ON	ON	Shorted Pin	USB Boot Mode (Self Powered)

Default setting of SW4.

SW4	Default
Pin1	OFF
Pin2	OFF
Pin3	OFF
Pin4	OFF

Emulator Configuration

J17	Emulator Configuration
Shorted Pin1-2	E1/E2 Lite normal debugging
	Microcontroller single operation (without emulator)
Shorted Pin2-3	E1/E2 Lite debugging with Hot plug-in
All open	DO NOT SET

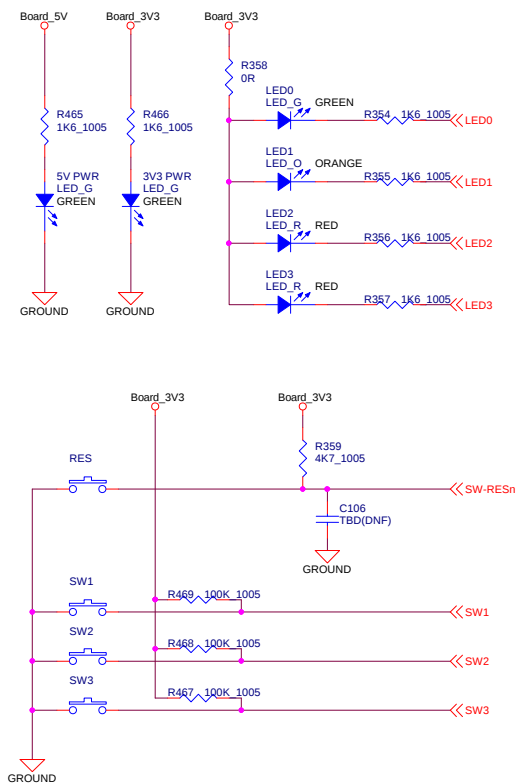
Power Configuration for USB Boot Mode

J14	Power Configuration
Open	Bus Powered
Shorted	Self Powered

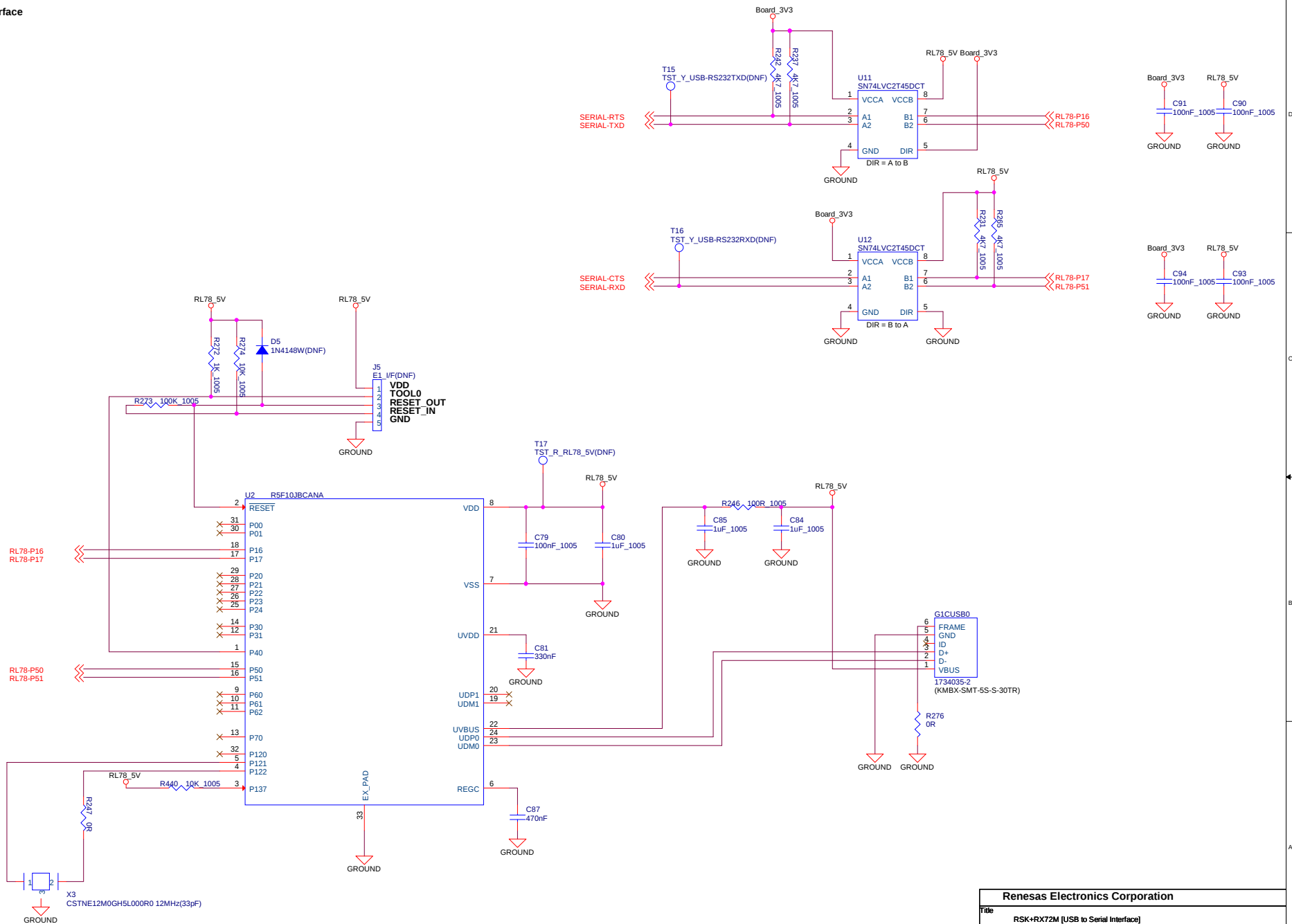
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Title			RSK+RX72M [E1/E2 Lite, MCU & Emulator Mode Setting, Pull-up resistors]
Size	Document Number	Rev	
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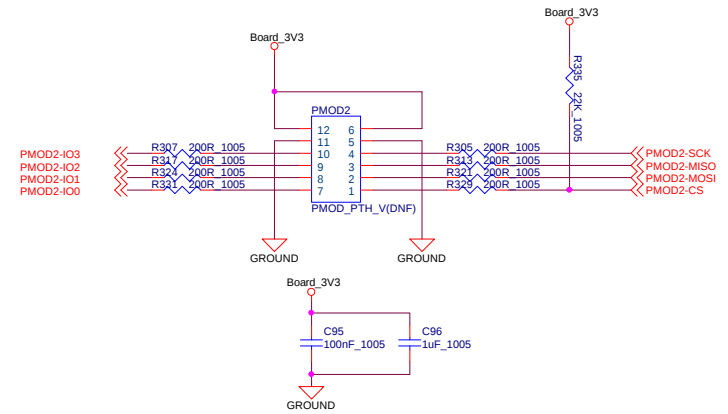
Switches, LEDs, RESET



USB to Serial Interface



PMOD1: Angle type connector
PMOD2: Vertical type connector (spare)



Warning:

Device address

A6	A5	A4
1	0	1

A6	A5	A4	A3	A2	A1	A0
1	0	1	0	0	1	1

Application Headers

JA1 Pinout

Pin	Signal	Pin	Signal
1	5V	2	0V
3	3V3	4	0V
5	AVREF	6	AVSS
7	AD0	8	ADTRG
9	AD1	10	AD0
11	AD2	12	AD1
13	AD3	14	AD2
15	AD4	16	AD3
17	AD5	18	AD4
19	AD6	20	AD5
21	AD7	22	AD6
23	AD8	24	AD7
25	AD9	26	AD8

JA2 Pinout

Pin	Signal	Pin	Signal
1	EXTAL	2	EXTAL
3	Vss1	4	SClaTX
5	SClaRX	6	SClaTX
7	SClaRX	8	SClaTX
9	SClaRX	10	SClaTX
11	SClaRX	12	SClaTX
13	SClaRX	14	SClaTX
15	SClaRX	16	SClaTX
17	SClaRX	18	SClaTX
19	SClaRX	20	SClaTX
21	SClaRX	22	SClaTX
23	SClaRX	24	SClaTX
25	SClaRX	26	SClaTX

JA5 Pinout

Pin	Signal	Pin	Signal
1	ADC4	2	ADC5
3	ADC6	4	ADC7
5	CAN1TX	6	CAN1RX
7	CAN2TX	8	CAN2RX
9	IRQm2_EncZ/M2_Hsin1	10	IRQm2_Hsin2
11	M2_UD	12	M2_Win
13	M2_Vin	14	M2_POE
15	M2_Toggle	16	M2_TRCLK
17	M2_UP	18	M2_UN
19	M2_VP	20	M2_VN
21	M2_WP	22	M2_WN
23		24	

JA6 Pinout

Pin	Signal	Pin	Signal
1	DREQ	2	DACK
3	TEND	4	STBYn
5	RS232TX	6	RS232RX
7	SClaTX	8	SClaTX
9	SClaRX	10	SClaRX
11	SClaTX	12	SClaRX
13	SClaTX	14	SClaRX
15	SClaTX	16	SClaRX
17	SClaTX	18	SClaRX
19	SClaTX	20	SClaRX
21	SClaTX	22	SClaRX
23	SClaTX	24	SClaRX

JA3 Pinout

Pin	Signal	Pin	Signal
1	A0	2	A1
3	A2	4	A3
5	A4	6	A5
7	A6	8	A7
9	A8	10	A9
11	A10	12	A11
13	A12	14	A13
15	A14	16	A15
17	A16	18	A17
19	A18	20	A19
21	A20	22	A21
23	A22	24	A23
25	A24	26	A25
27	A26	28	A27
29	A28	30	A29
31	A30	32	A31
33	A32	34	A33
35	A34	36	A35
37	A36	38	A37
39	A38	40	A39
41	A40	42	A41
43	A42	44	A43
45	A44	46	A45
47	A46	48	A47
49	A48	50	A49

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RSK+RX72M [Application Headers]

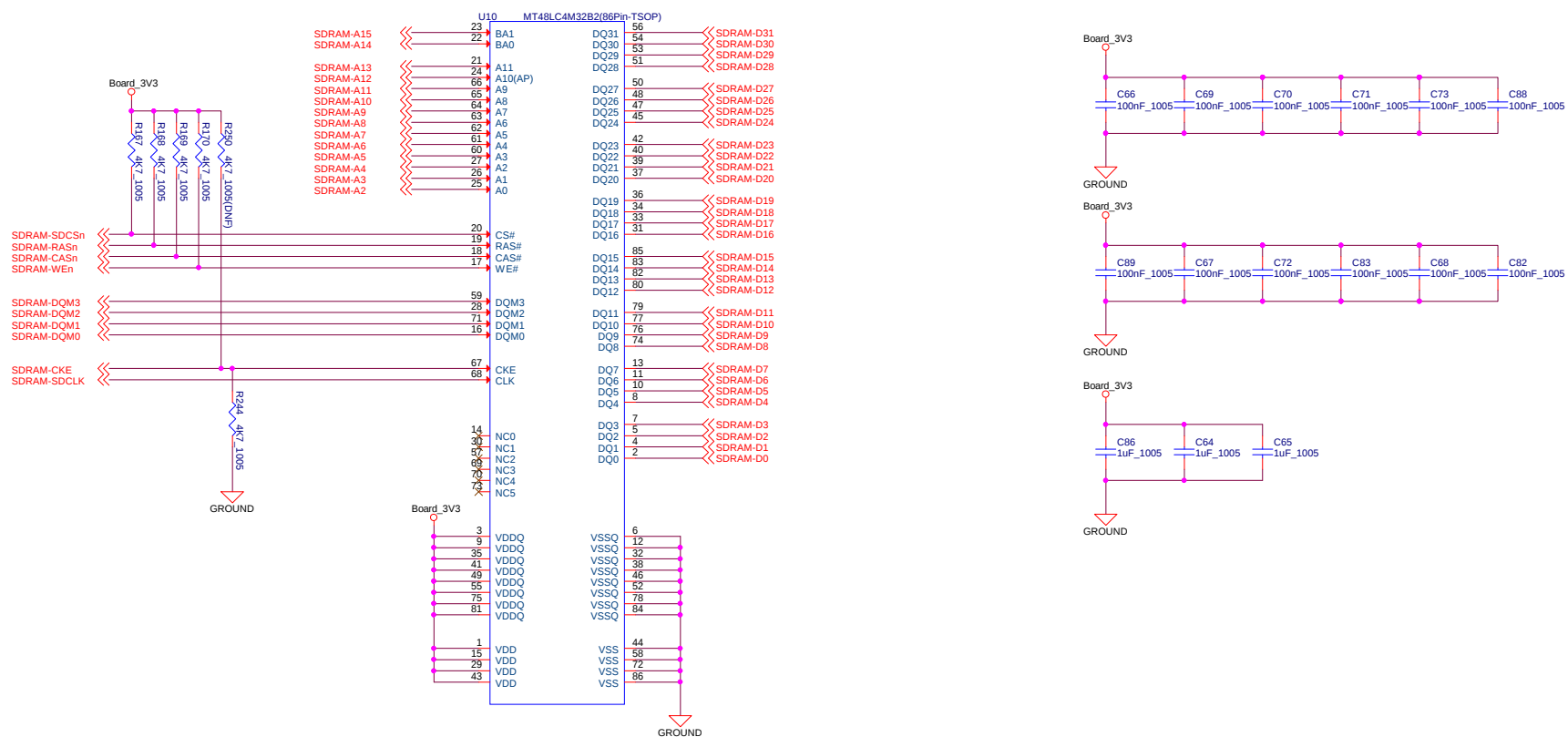
Document Number: R20UT4390E0100

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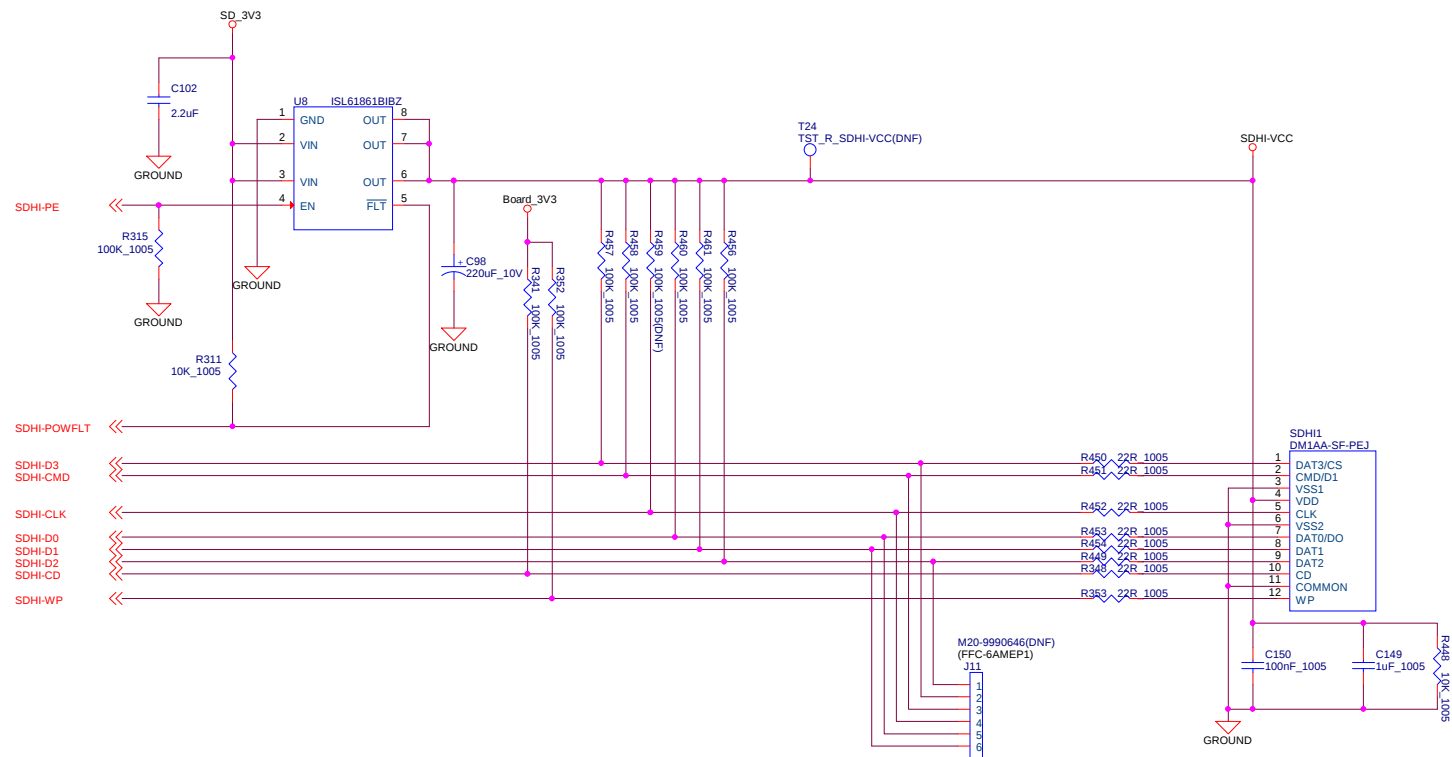
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Rev 1.00

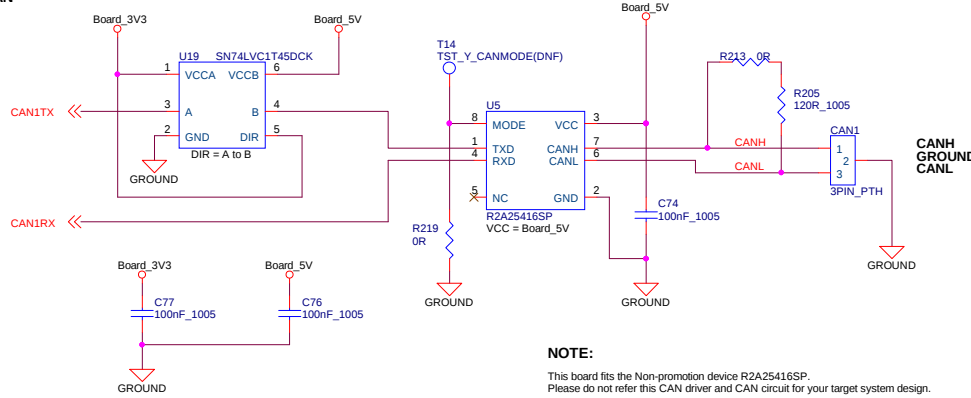
SDRAM(128Mbits)



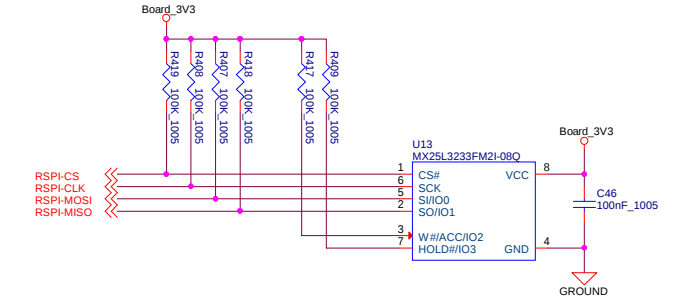
SDHI



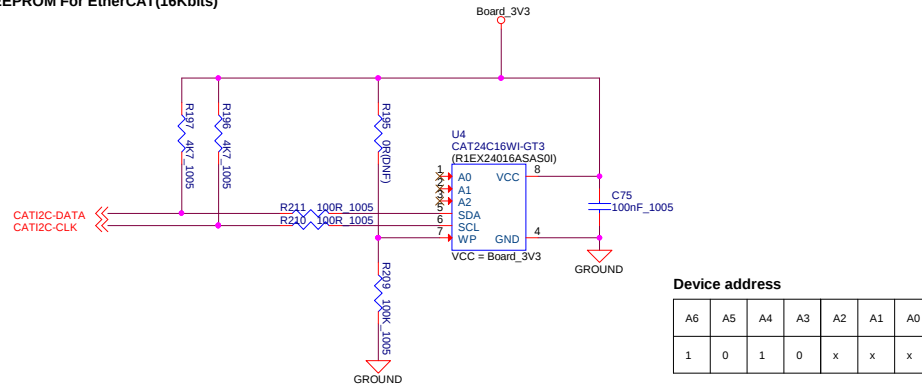
CAN



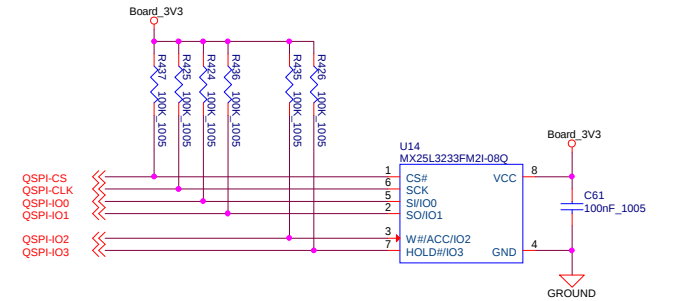
RSPI- SPI Serial Flash(32Mbits)



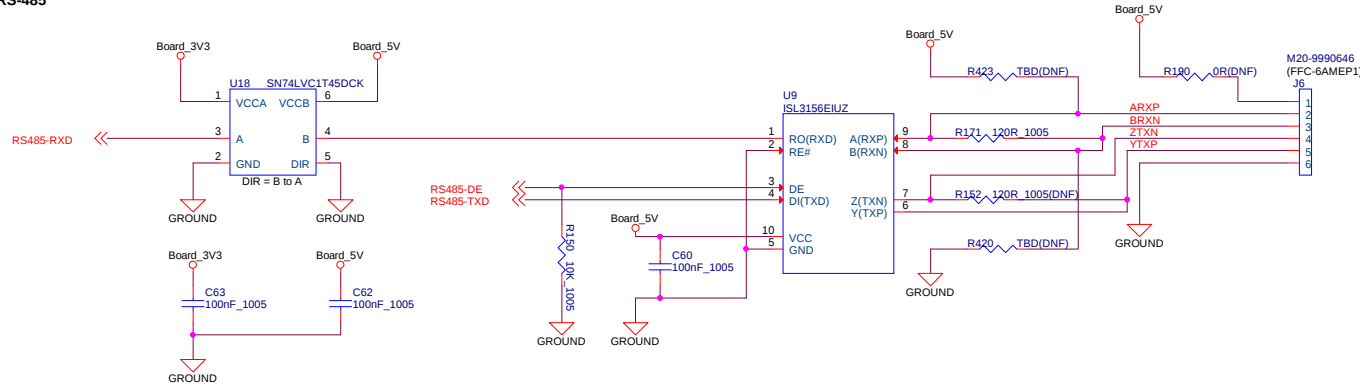
Serial EEPROM For EtherCAT(16Kbits)



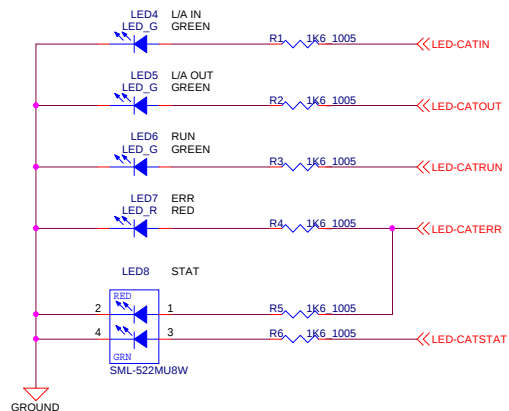
QSPI- SPI Serial Flash(32Mbits)



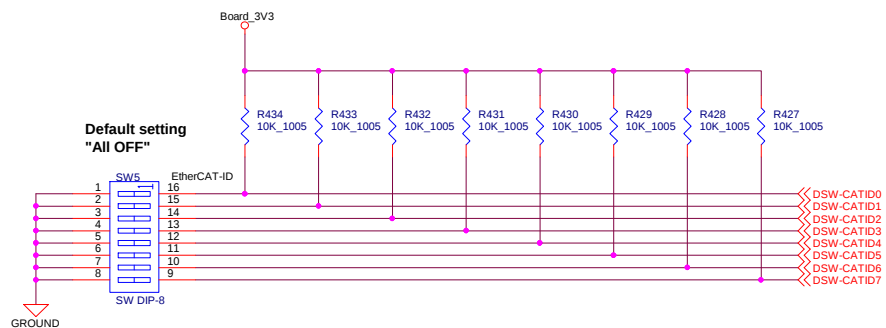
RS-485



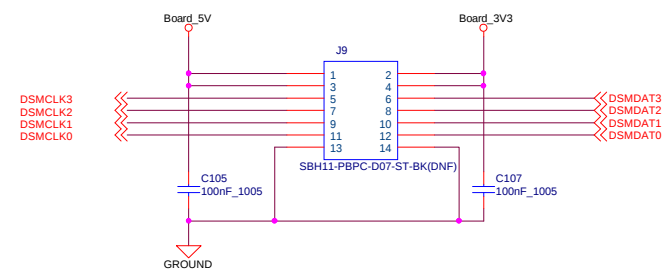
EtherCAT-LEDs, EtherCAT-ID



Default setting "All OFF"



DSMIF



PHY Mode

PHY Mode	R35, R374, R103, R13, R78, R46, R415	R9, R39, R373, R109, R55, R377, R123, R401
MII (Default)	DNF	Fit
RMII	Fit	DNF

NOTE1: R103, R109, R78 Refers to page 19.
NOTE2: R46, R55, R377, R115, R123, R401 Refers to page 6.

NOTE3
The PHY interrupt is connected to IRQ1 and CATIRQ.
IRQ1 and CATIRQ can't be locked exclusively by hardware.
Therefore only enable one of the interrupts.

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Title
RSK+RX72M [Ethernet PHY0]

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RSK+RX72M [Ethernet PHY(0)]			
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Ethernet (PHY1)

ET1-TXCLK
ET1-TXEN_RMII1TXD0
ET1-ETXD0_RMII1TXD0
ET1-ETXD1_RMII1TXD1
ET1-ETXD2
ET1-ETXD3

ET1-RXCLK
ET1-RXDV_RMII1CRSDV
ET1-ERXD0_RMII1RXD0
ET1-ERXD1_RMII1RXD1
ET1-ERXD2
ET1-ERXD3
ET1-RXER_RMII1RXER
ET1-COL
ET1-CRS

ET-MDC
ET-MDIO
ET-INTn
See NOTE

ET-RESn

ET1-REFCLK

ET1-XICLK

PHYAD[2-0]=010
CONFIG[2-0]=000 -> MII(Default), 001 -> RMII
ISOLATE=0 -> Disable
SPEED=1 -> 100Mbps
DUPLEX=0 -> Full Duplex
NWAY=1 -> Auto-nego Enable

U16

TXC
TXEN/TX_EN
TXD0/TXD[0]
TXD1/TXD[1]
TXD2
TXD3

RXC
RXDV/CRSDV/CONFIG2
RXD0/RXD[0]/DUPLEX
RXD1/RXD[1]/PHYAD2
RXD2/PHYAD1
RXD3/PHYAD0
RXER/RX_ER/ISO
COL/CONFIG0
CRS/CONFIG1

MDC
MDIO

INTRP#

RST#

LED0/NWAYEN
LED1/SPEED

XI/REFCLK
XO

KSZ8041NL

LED0:Link With ACT(Default) / Link

LED1:Speed(Default) / ACT

TX+

TX-

RX+

RX-

VDDPLL_1.8

VDDA_3.3

VDD_IO3.3

REXT

GND

GND_PAD

TXC

TXEN/TX_EN

TXD0/TXD[0]

TXD1/TXD[1]

TXD2

TXD3

RXC

RXDV/CRSDV/CONFIG2

ISOLATE=0 -> Disable

SPEED=1 -> 100Mbps

DUPLEX=0 -> Full Duplex

NWAY=1 -> Auto-nego Enable

TXC

TXEN/TX_EN

TXD0/TXD[0]

TXD1/TXD[1]

TXD2

TXD3

RXC

RXDV/CRSDV/CONFIG2

RXD0/RXD[0]/DUPLEX

RXD1/RXD[1]/PHYAD2

RXD2/PHYAD1

RXD3/PHYAD0

RXER/RX_ER/ISO

COL/CONFIG0

CRS/CONFIG1

MDC

MDIO

INTRP#

RST#

LED0/NWAYEN

LED1/SPEED

XI/REFCLK

XO

KSZ8041NL

LED0:Link With ACT(Default) / Link

LED1:Speed(Default) / ACT

TXC

TXEN/TX_EN

TXD0/TXD[0]

TXD1/TXD[1]

TXD2

TXD3

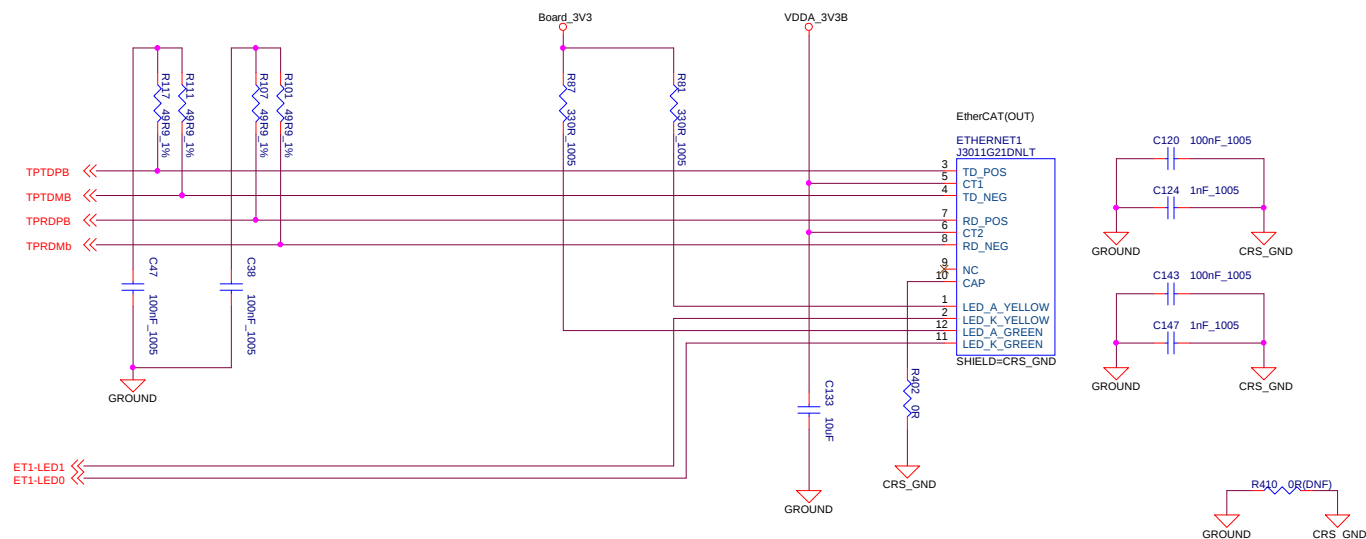
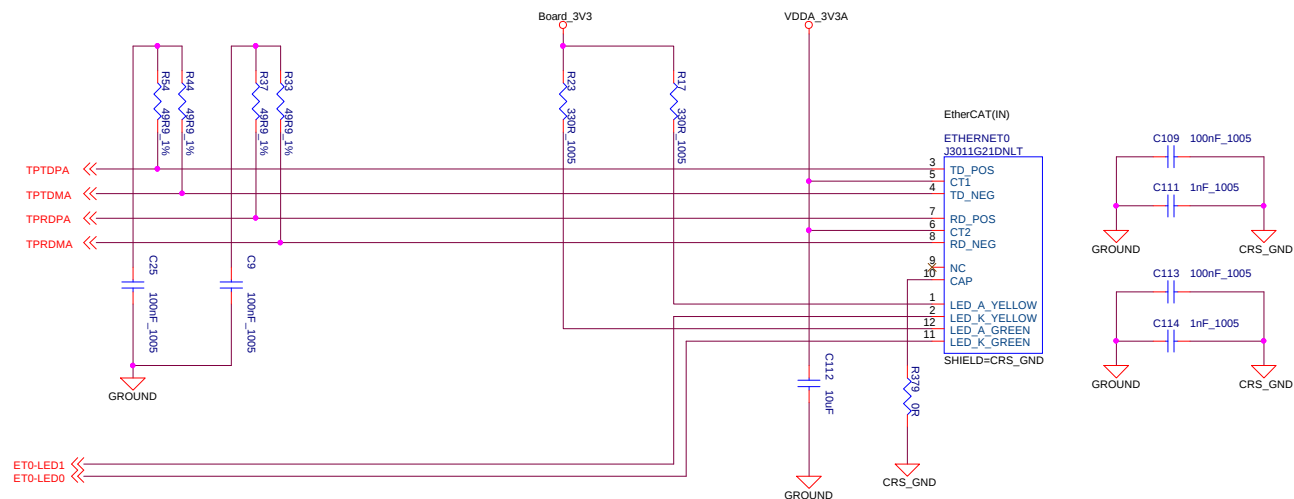
RXC

RXDV/CRSDV/CONFIG2

NOTE
The PHY interrupt is connected to IRQ1 and CATIRQ.
IRQ1 and CATIRQ can't be locked exclusively by hardware.
Therefore only enable one of the interrupts.

Renesas Electronics Corporation			
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Ethernet (RJ45)



Revision History

REV	DATE	PAGE	DESCRIPTION
1.00	01.10.2019	---	1st release edition.