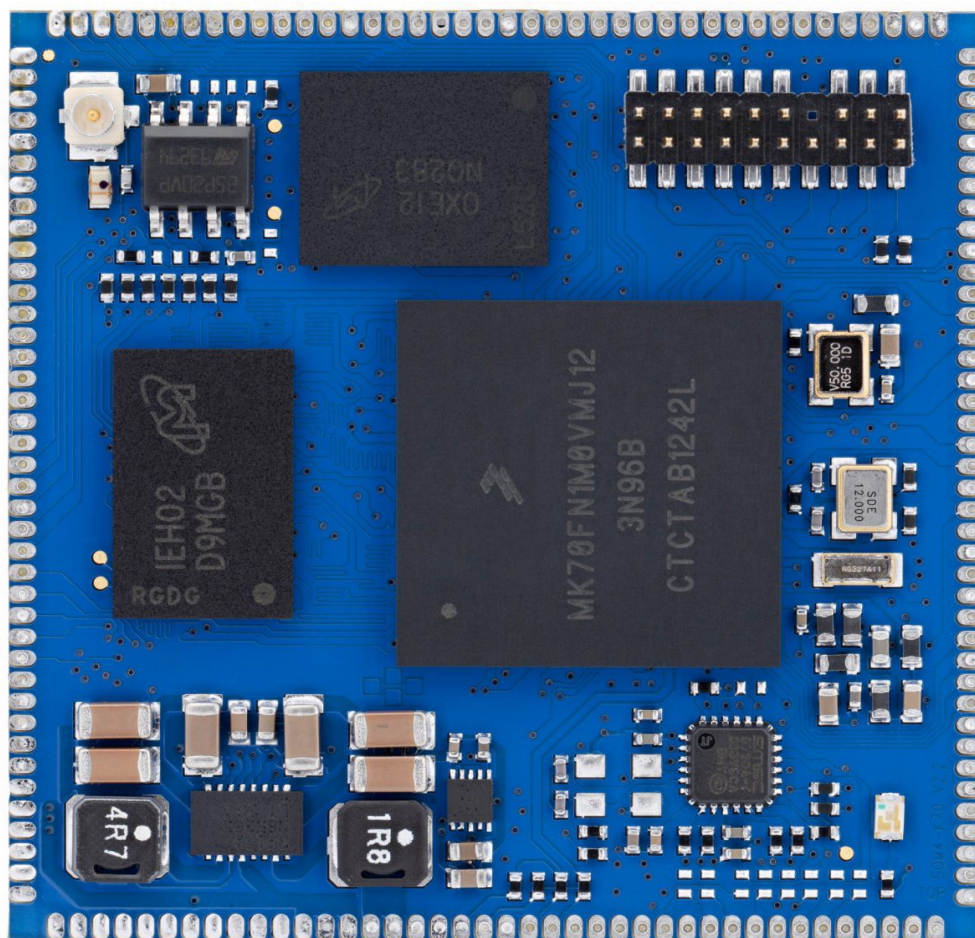


# SQM4-K70 W/M Datasheet

Rev. 2.2 A



## Revision history

Date	Doc.Rev	HW version	Changes
11. 6. 2012	Rev.1.0	V1.0	Initial Release
28. 8. 2012	Rev.1.1	V1.1	RIM Frame size changed Solder mask color set to blue

26. 2. 2013	Rev.1.1b	V1.1b	UART0 pinout corrected, suggested ALT changed
14.6.2013	Rev.2.0	V2.0	Footprint changed to header 1mm pitch
15.9.2013	Rev.2.1	V2.1	Compatible pinout to VF6
13.11.2013	Rev.2.2	V2.2	WiFi modem AR4100P or SPI EEPROM added
29. 1.2014	Rev.2.2A	V2.2	Minor mistakes corrected, module markings changed

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## 1. Introduction

### 1.1 Hardware

SQM4-K70 is a solderable computer module based on the new Freescale ARM Cortex M4 microcontroller Kinetis K70 series. It runs at up to 150 Mhz and consumes as little as 500mW.

It also offers all the interfaces needed in a modern embedded device: beside the internal Flash memory, external NAND Flash, interfaces available for data storage – SD micro card, USB Memory Stick.

The module provides glueless connectivity to passive and active LCDs with resolution up to 800x600, as well as 4-wire resistive touch screens without next controller.

An integrated Ethernet PHY provides 10/100 Mbit Ethernet connection with time stamp functionality.

It is produced in two basic variants: SQM4-K70W with Wi-Fi modem and SQM4-K70M with SPI EEPROM

### 1.2 Software

The operating system supported by default is Freescale MQX. Bare metal routines are supported as well. Additionally there are many other RTOS applicable on ARM M4/ Kinetis family microcontrollers.

### 1.3 Features Summary

CPU:

- MK70FN1M0 120 / 150 Mhz

Memory:

- 1 MB FLASH on chip
- 128 kB SRAM on chip
- 64MBx16 DDR2 on module

- 128 MBx8 NAND FLASH on module

Interfaces:

- LCD 24bit
- Touch screen
- I2S audio digital
- I2C interconnect
- CAN
- USB OTB/HOST/DEVICE
- SPI
- UART / IR
- SDCard
- Ethernet 10/100 Mbit
- Tamper detect
- A/D high speed 12 bit
- A/D 16 bit
- D/A 12 bit
- Compare
- Wi-Fi modem AR4100P or EEPROM 32kB

Up to 134 GPIO

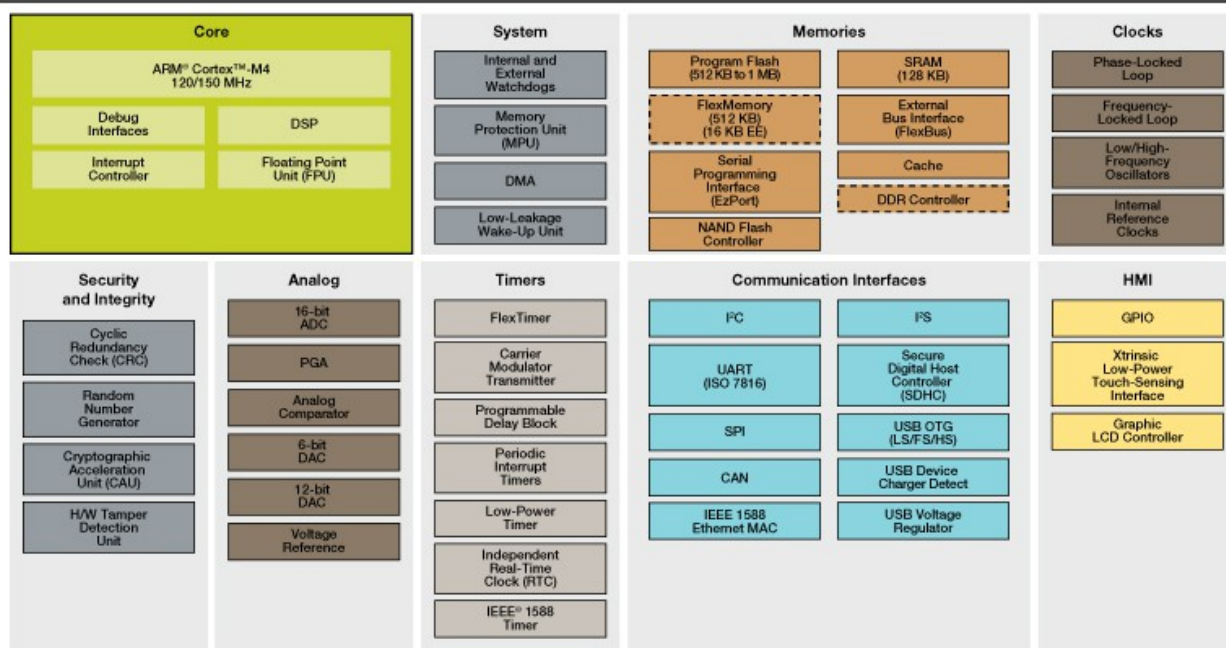
## 1.4 Reference Documents

Freescale MK70FN1M0 Microcontroller K70 Sub-Family Data Sheet for 120 MHz devices in 256 pin packages:

- Freescale Kinetis K70 Family Fact Sheet: [KINETIS K70 FS](#)
- Freescale Kinetis K70 Family Datasheet: [KINETIS K70 DS](#)
- Elnico SQM4-K70 schematic: [SQM4-K70-sch](#)
- Micron DDR2 memory datasheet: [DDR2](#)
- Micron NAND Flash memory datasheet: [NAND FLASH MT29F2G08](#)
- Microchip SPI EEPROM datasheet: [25AA256ISN](#)
- SMSC Ethernet PHY: [LAN8720AI](#)
- Qualcomm Atheros WiFi modem: [AR4100P](#)

## 1.5 K70 Microcontroller Block Diagram

### Kinetis K70 Family



□ Standard Feature    □ Optional Feature

## 2. Functional Description

### 2.1 Module SQM4-K70 Block Diagram

Sheet 3 DDR2 SDRAM MEMORY	Sheet 2 K70FN1M0 MCU PART A 50 MHz XTAL 32.768 KHz XTAL 12 MHz XTAL JTAG DEBUG HEADER TAMPER DETECT USB ESD PROTECTION RESET CIRQUITS	Sheet 3 K70FN1M0 MCU PART B VBAT VSSA/VDDA filter VREFH/VREFL filter VREF_OUT VREGIN, VOUT33
Sheet 3 NAND FLASH MEMORY		
Sheet 3 SWITCHING POWER SUPPLY 3.3V AND 1.8V		
Sheet 3 DDR-2 TERMINATION SUPPLY		
Sheet 3 ETHERNET PHY	Sheet 2	Sheet 3
Sheet 3 DDR-2 TERMINATION RESISTORS	RIM CONNECTOR	Wi-Fi MODEM or EEPROM
Sheet 3 DDR-2 CAPACITORS		

### 3. Signal Description

This chapter describes the signals grouped by their function and used in SQM4-EasyBoard. Some of SQM4-K70 pins have dedicated functionality, but most are highly multiplexed. One pin can have up to 8 different roles and the same functionality is sometimes also usable as a General Purpose Input/Output pin (GPIO).

IO Types notation:	I:	Digital CMOS input
	O:	Digital CMOS output
	IO:	Digital CMOS input / output
	AIN:	Analog input
	AOUT:	Analog output
	AINOUT:	Analog input / output
	PWR:	Power supply
	PWOUT:	Power supply output

### 3.1 SD card

Pin Name	Description	IO type	Multiplexed
SDHC_D1	Bidirectional line for read/write data	IO	PTE0
SDHC_D0	Bidirectional line for read/write data	IO	PTE1
SDHC_DCLK	SD/SDIO Card Bus Clock	IO	PTE2
SDHC_CMD	SD/SDIO Card Command	IO	PTE3
SDHC_D3	Bidirectional line for read/write data	IO	PTE4
SDHC_D2	Bidirectional line for read/write data	IO	PTE5
SDHC_CD	SD/SDIO Card Change disc flag	IO	PTA28

### 3.2 LCD Controller

Pin Name	Description	IO type	Multiplexed
LCD_PCLK	LCD Pixel Clock	IO	PTF0
LCD_DE	LCD Data Enable	IO	PTF1
LCD_HSYNC	LCD Refresh Horizontal Sync	IO	PTF2
LCD_VSYNC	LCD Refresh Vertical Sync	IO	PTF3
LCD_R0	LCD Display Red Data from frame buffer	IO	PTE27
LCD_R1	LCD Display Red Data from frame buffer	IO	PTE28
LCD_R2	LCD Display Red Data from frame buffer	IO	PTF22
LCD_R3	LCD Display Red Data from frame buffer	IO	PTF23
LCD_R4	LCD Display Red Data from frame buffer	IO	PTF24
LCD_R5	LCD Display Red Data from frame buffer	IO	PTF25
LCD_R6	LCD Display Red Data from frame buffer	IO	PTF26
LCD_R7	LCD Display Red Data from frame buffer	IO	PTF27
LCD_G0	LCD Display Green Data from frame buffer	IO	PTF12
LCD_G1	LCD Display Green Data from frame buffer	IO	PTF13
LCD_G2	LCD Display Green Data from frame buffer	IO	PTF14
LCD_G3	LCD Display Green Data from frame buffer	IO	PTF15
LCD_G4	LCD Display Green Data from frame buffer	IO	PTF16
LCD_G5	LCD Display Green Data from frame buffer	IO	PTF17
LCD_G6	LCD Display Green Data from frame buffer	IO	PTF18
LCD_G7	LCD Display Green Data from frame buffer	IO	PTE26
LCD_B0	LCD Display Blue Data from frame buffer	IO	PTF4
LCD_B1	LCD Display Blue Data from frame buffer	IO	PTF5



Pin Name	Description	IO type	Multiplexed
LCD_B2	LCD Display Blue Data from frame buffer	IO	PTF6
LCD_B3	LCD Display Blue Data from frame buffer	IO	PTF7
LCD_B4	LCD Display Blue Data from frame buffer	IO	PTF8
LCD_B5	LCD Display Blue Data from frame buffer	IO	PTF9
LCD_B6	LCD Display Blue Data from frame buffer	IO	PTF10
LCD_B7	LCD Display Blue Data from frame buffer	IO	PTF11

### 3.3 UARTS

Pin Name	Description	IO type	Multiplexed
UART3_RTS_B	Full Function UART Request to Send	IO	PTB8
UART3_CTS_B	Full Function UART Clear to Send	IO	PTB9
UART3_RX	Full Function UART Receive Data	IO	PTB10
UART3_TX	Full Function UART Transmit Data	IO	PTB11
UART1_RTS_B	Full Function UART Request to Send	IO	PTC1
UART1_CTS_B	Full Function UART Clear to Send	IO	PTC2
UART1_RX	Full Function UART Receive Data	IO	PTC3
UART1_TX	Full Function UART Transmit Data	IO	PTC4
UART5_RX	UART Receive Data	IO	PTF19
UART5_TX	UART Transmit Data	IO	PTF20
UART5_RTS_B	UART Request to Send	IO	PTF21

### 3.4 Synchronous Serial Port (SSP)

Pin Name	Description	IO type	Multiplexed
SPI2_SCK	Serial bit clock	IO	PTD12
SPI2_SOUT	Serial data out	IO	PTD13
SPI2_SIN	Serial data in	IO	PTD14
SPI2_PCS	Chip select for SSP2	IO	PTD15
SPI0_PCS0*	Chip select for SSP0 shareable	IO	PTE16
SPI0_SCK*	Serial bit clock shareable	IO	PTE17
SPI0_SOUT*	Serial data out shareable	IO	PTE18
SPI0_SIN*	Serial data in – shareable	IO	PTE19

\* These pins are shareable with WiFi modem or EEPROM



### 3.5 USB

Pin Name	Description	IO type	Multiplexed
USB0_DN	USB OTG/HOST/DEVICE Negative Line	IO	
USB0_DP	USB OTG/HOST/DEVICE Positive Line	IO	
USB0_VBUS	USB Power Bus	PWR	
USB0_OC	USB Overcurrent HOST	IO	PTD2
USB1_OC	USB Overcurrent OTG	IO	PTD3
USB0_EN	USB Power Enable HOST	IO	PTD6
USB1_EN	USB Power Enable OTG	IO	PTD7

### 3.6 I2C

Pin Name	Description	IO type	Multiplexed
I2C0_SCL	Serial Clock	IO	PTB2
I2C0_SDA	Serial Data	IO	PTB3

### 3.7 I2S

Pin Name	Description	IO type	Multiplexed
I2S0_MCLK	Audio Master Clock	IO	PTE6
I2S0_RXD0	Receive Data	IO	PTE7
I2S0_RX_FS	Receive Frame Sync	IO	PTE8
I2S0_RX_BCLK	Transmit Bit Clock	IO	PTE9
I2S0_TXD0	Transmit Data	IO	PTE10
I2S0_TX_FS	Transmit Frame Sync	IO	PTE11
I2S0_BCLK	Transmit Bit Clock	IO	PTE12

### 3.8 Tamper detect

Pin Name	Description	IO type	Multiplexed
TAMPER0	External tamper input or active tamper output	IO	
TAMPER1	External tamper input or active tamper output	IO	
TAMPER2	External tamper input or active tamper output	IO	
TAMPER3	External tamper input or active tamper output	IO	

### 3.9 JTAG

Pin Name	Description	IO type	Multiplexed
TCK	Test Clock	IO	PTA0
TDI	Test Data In	IO	PTA1
TDO	Test Data Out	IO	PTA2
TMS	Test Mode Select	IO	PTA3
TRACE_CLKOUT	Trace Clock Output	IO	PTA6
TRACE_D3	Trace Data	IO	PTA7
TRACE_D2	Trace Data	IO	PTA8
TRACE_D1	Trace Data	IO	PTA9
TRACE_DO	Trace Data	IO	PTA10

### 3.10 Digital to Analog Converter

Pin Name	Description	IO type	Multiplexed
DAC0_OUT	Output D/A converter 12 bit	AOUT	
DAC1_OUT	Output D/A converter 12 bit	AOUT	
VSSA	Analog ground	AOUT	

### 3.11 CAN

Pin Name	Description	IO type	Multiplexed
CAN0_TX	CAN Transmit Pin	IO	PTB18
CAN0_RX	CAN Receive Pin	IO	PTB19

### 3.12 Touch

Pin Name	Description	IO type	Multiplexed
ADC1_SE10	4wire Resistive Touch Panel (X Plus Term)	AINOUT	PTB4
ADC1_SE11	4wire Resistive Touch Panel (X Minus Term)	AINOUT	PTB5
ADC1_SE12	4wire Resistive Touch Panel (Y Plus Term)	AINOUT	PTB6
ADC1_SE13	4wire Resistive Touch Panel (Y Minus Term)	AINOUT	PTB7

### 3.13 Ethernet

Pin Name	Description	IO type	Multiplexed
LED20	Activity Indicator	O	PTA15
LED10	Speed Indicator	O	PTA16
RXN0	TX Differential Output (minus)	O	PTA17
RXP0	TX Differential Output (plus)	O	PTA5
TXN0	RX Differential Input (minus)	I	PTA13
TXP0	RX Differential Input (minus)	I	PTA12
TAP0	Power	O	PTA14

### 3.14 Analog to Digital Converter

Pin Name	Description	IO type	Multiplexed
ADC0_SE16	Single ended analog channel input	AIN	
ADC1_SE16	Single ended analog channel input	AIN	
PGA0DP	Differential analog channel input	AIN	
PGA0DM	Differential analog channel input	AIN	
PGA1DP	Differential analog channel input	AIN	
PGA1DM	Differential analog channel input	AIN	
PGA2DP	Differential analog channel input	AIN	
PGA2DM	Differential analog channel input	AIN	
CMP3_IN4	Analog voltage inputs	IO	PTA24
CMP3_IN5	Analog voltage inputs	IO	PTA25
ADC2_SE15	Single ended analog channel input	IO	PTA26
ADC2_SE14	Single ended analog channel input	IO	PTA27
ADC2_SE13	Single ended analog channel input	IO	PTA28
ADC2_SE12	Single ended analog channel input	IO	PTA29

### 3.15 Miscalanes

Pin Name	Description	IO type	Multiplexed
NMI	Non maskable interrupt pending	IO	PTA4
FTM0_CH2	FlexTimer	IO	PTA5
RESET_B	System Reset	IO	
UART4_TX	Alternate to EXTAL1 12MHz	IO	PTE24

Pin Name	Description	IO type	Multiplexed
UART4_RX	Alternate to EXTAL2 12MHz	IO	PTE25
FTM2_CH1	FlexTimer	IO	PTA11
FTM1_FLT0	FlexTimer Fault	IO	PTA19

### 3.16 Power

Pin Name	Description	IO type	Multiplexed
P5V	Main power supply	PWR	
GND	System ground	PWR	
VBATIN	Battery backup and RTC power supply	PWR	
P3V3	Output supply power	PWOUT	
VDDA	Analog power supply filtered from P3V3	PWOUT	
VSSA	Analog ground filtered from GND	PWOUT	
VREFH	Analog reference positive	PWOUT	
VREFL	Analog reference negative	PWOUT	

## 4. SQM4 connectors

### 4.1 Physical location

The main 160 pin **RIM**<sup>®</sup> connection is placed along the module perimeter, on the bottom or top side respectively. JTAG/JTRACE 19pin header 1.27 pitch connector is placed on the top side.

### 4.2 RIM 160 connection

Pin #	Description	Type	Note #
1	PTB20/ADC2_SE4a/SPI2_PCS0/CMP0_OUT	Bidirectional	
2	PTB21/ADC2_SE5a/SPI2_SCK/CMP1_OUT	Bidirectional	
3	PTD7/CMT_IRO/UART0_TX/FTM0_CH7	Bidirectional	
4	PTB22/SPI2_SOUT/CMP2_OUT	Bidirectional	
5	PTB11/SPI1_SCK/UART3_TX/I2S1_TX_FS	Bidirectional	
6	PTB10/SPI1_PCS0/UART3_RX/I2S1_TX_BCLK	Bidirectional	
7	PTB8/UART3_RTS_B	Bidirectional	
8	PTB9/SPI1_PCS1/UART3_CTS_B	Bidirectional	
9	PTD11/SPI2_PCS0/UART5_CTS_B/GLCD_CONTR	Bidirectional	
10	PTD0/SPI0_PCS0/UART2_RTS_B/I2S1_RXD1	Bidirectional	

Pin #	Description	Type	Note #
11	PTC4/SPI0_PCS0/UART1_TX/FTM0_CH3	Bidirectional	
12	PTC3/CMP1_IN1/SPI0_PCS1/UART1_RX	Bidirectional	
13	PTC1/ADC0_SE15/SPI0_PCS3/UART1_RTS_B	Bidirectional	
14	PTC2/ADC0_SE4b/SPI0_PCS2/UART1_CTS_B	Bidirectional	2
15	PTB2/ADC0_SE12/I2C0_SCL/UART0_RTS_B	Bidirectional	
16	PTB3/ADC0_SE13/I2C0_SDA/UART0_CTS_B	Bidirectional	
17	PTB19/TSI0_CH12/CAN0_RX/FTM2_CH1	Bidirectional	
18	PTB18/TSI0_CH11/CAN0_TX/FTM2_CH0	Bidirectional	
19	PTC19/UART3_CTS_B/ENET0_1588_TMR3	Bidirectional	
20	PTE16/ADC0_SE4a/SPI0_PCS0/UART2_TX	Bidirectional	2, 3
21	PTE19/ADC0_SE7a/SPI0_SIN/UART2_RTS_B	Bidirectional	2, 3
22	PTE18/ADC0_SE6a/SPI0_SOUT/UART2_CTS_B	Bidirectional	2, 3
23	PTE17/ADC0_SE5a/SPI0_SCK/UART2_RX	Bidirectional	2, 3
24	PTB23/SPI2_SIN/SPI0_PCS5/CMP3_OUT	Bidirectional	2
25	PTC12/UART4_RTS_B/FTM3_FLT0	Bidirectional	
26	PTC13/UART4_CTS_B	Bidirectional	
27	PTC14/UART4_RX	Bidirectional	
28	PTC15/UART4_TX	Bidirectional	
29	PTC18/UART3_RTS_B/ENET0_1588_TMR2	Bidirectional	
30	PTD6/ADC0_SE7b/SPI0_PCS3/UART0_RX	Bidirectional	
31	PTD2/SPI0_SOUT/UART2_RX	Bidirectional	
32	PTD12/SPI2_SCK/FTM3_FLT0/SDHC0_D4	Bidirectional	
33	PTD13/SPI2_SOUT/SDHC0_D5	Bidirectional	
34	PTD14/SPI2_SIN/SDHC0_D6	Bidirectional	
35	PTD15/SPI2_PCS1/SDHC0_D7	Bidirectional	
36	PTD3/SPI0_SIN/UART2_TX/FTM3_CH3	Bidirectional	
37		Bidirectional	4
38	WIFI_DEBUG_UART_RXD	Bidirectional	1
39	WIFI_DEBUG_UART_TXD	Bidirectional	1
40		Bidirectional	
41	PGA2PD	Bidirectional	
42	PGA2DM	Bidirectional	
43	PGA3DP	Bidirectional	

Pin #	Description	Type	Note #
44	PGA3DM	Bidirectional	
45	ADC0_SE16	Bidirectional	
46	ADC1_SE16	Bidirectional	
47			4
48			4
49	GND_1	Ground	
50	GND_2	Ground	
51	GND_3	Ground	
52	P5V_1	Power	
53	P5V_2	Power	
54	P5V_3	Power	
55	VDD33_1	Power	
56	VDD33_2	Power	
57	VBATIN	Power	
58	RESET_B	Bidirectional	
59	USB0_DN	Bidirectional	
60	USB0_DP	Bidirectional	
61	USB0_VBUS	Bidirectional	
62	USB0_DN_1	Bidirectional	
63	USB0_DP_1	Bidirectional	
64	USB0_VBUS_1	Bidirectional	
65			4
66			4
67	NONE/PTB1/I2C0_SDA/RMII0_MDC	Bidirectional	
68	NONE/PTB0/I2C0_SCL/RMII0_MDIO	Bidirectional	
69	TAP0/PTA14/SPI0_PCS0/RMII0_CRS_DV	Bidirectional	
70	TXP0/PTA12/CAN0_TX/RMII0_RXD1	Bidirectional	
71	TXN0/PTA13/CAN0_RX/RMII0_RXD0	Bidirectional	
72	RXP0/PTA5/USB_CLKIN/RMII0_RXER	Bidirectional	
73	RXN0/PTA17/SPI0_SIN/RMII0_TXD1	Bidirectional	
74	LED10/PTA16/SPI0_SOUT/RMII0_TXD0	Bidirectional	
75	LED20/PTA15/SPI0_SCK/RMII0_TXEN	Bidirectional	
76	PTA29/ADC2_SE12	Bidirectional	

Pin #	Description	Type	Note #
77	PTB16/SPI1_SOUT/UART0_TX/I2S1_TXD0	Bidirectional	
78	PTB17/SPI1_SIN/UART0_RX/I2S1_TXD1	Bidirectional	
79	PTE24/EXTAL1/CAN1_TX/UART4_TX	Bidirectional	
80	PTE25/XTAL1/CAN1_RX/UART4_RX	Bidirectional	
81			4
82			4
83	PTD1/ADC0_SE5b/SPI0_SCK/UART2_CTS_B	Bidirectional	
84	PTC0/ADC0_SE14/SPI0_PCS4/PDB0_EXTRG	Bidirectional	
85	VREFH	Power	
86	VREFL	Power	
87	VSSA	Ground	
88	DAC0_OUT/CMP1_IN3/ADC0_SE23	Bidirectional	
89	DAC1_OUT/CMP0_IN4/CMP2_IN3/ADC1_SE23	Bidirectional	
90	PGA0DP/ADC0_DP0/ADC1_DP3	Bidirectional	
91	PGA0DM/ADC0_DM0/ADC1_DM3	Bidirectional	
92	PGA1DP/ADC1_DP0/ADC0_DP3	Bidirectional	
93	PGA1DM/ADC1_DM0/ADC0_DM3	Bidirectional	
94	PTB4/ADC1_SE10/GLCD_CONTR	Bidirectional	
95	PTB5/ADC1_SE11/ENET0_1588_TMR2	Bidirectional	
96	PTB6/ADC1_SE12	Bidirectional	
97	PTB7/ADC1_SE13	Bidirectional	
98	PTF20/SPI2_PCS1/UART5_TX/FTM2_CH0	Bidirectional	
99	PTF19/SPI2_SIN/UART5_RX/FTM1_CH1	Bidirectional	
100	PTF21/ADC3_SE6b/UART5_RTS_B/FTM2_CH1	Bidirectional	
101	PTA4/NMI/TSI0_CH5/FTM0_CH1	Bidirectional	
102	PTA6/ADC3_SE6a/FTM0_CH3/TRACE_CLKOUT	Bidirectional	
103	PTA7ADC0_SE10/FTM0_CH4/TRACE_D3	Bidirectional	
104	PTA8/ADC0_SE11/FTM1_CH0/TRACE_D2	Bidirectional	
105	PTA9/ADC3_SE5a/TRACE_D1/FTM1_QD_PHB	Bidirectional	
106	PTA10/ADC3_SE4a/TRACE_D0/FTM2_QD_PHA	Bidirectional	
107	PTA11/ADC3_SE15/FTM2_CH1/FTM2_QD_PHB	Bidirectional	
108	PTA19/XTAL0/FTM1_FLT0/FTM_CLKIN1	Bidirectional	
109	PTA24/CMP3_IN4	Bidirectional	



Pin #	Description	Type	Note #
110	PTA25/CMP3_IN5	Bidirectional	
111	PTA26/ADC2_SE15	Bidirectional	
112	TAMPER0	Bidirectional	
113	TAMPER1	Bidirectional	
114	TAMPER2	Bidirectional	
115	TAMPER3	Bidirectional	
116	PTE12/ADC3_SE17/I2S0_TX_BCLK	Bidirectional	
117	PTA27/ADC2_SE14	Bidirectional	
118	PTE10/UART5_CTS_B/I2S0_TXD0	Bidirectional	
119	PTE11/UART5_RTS_B/I2S0_TX_FS	Bidirectional	
120	PTE6/SPI0_PCS3/UART3_CTS_B/I2S0_MCLK	Bidirectional	
121	PTE9/ADC2_SE17/UART5_RX/I2S0_RX_BCLK	Bidirectional	
122	PTE7/UART3_RTS_B/I2S0_RXD0	Bidirectional	
123	PTE8/UART5_TX/I2S0_RX_FS	Bidirectional	
124	PTE2/ADC1_SE6a/SPI1_SCK/SDHC0_DCLK	Bidirectional	
125	PTE3/ADC1_SE7a/SPI1_SIN/SDHC0_CMD	Bidirectional	
126	PTE1/ADC1_SE5a/SPI1_SOUT/SDHC0_D0	Bidirectional	
127	PTE0/ADC1_SE4a/SPI1_PCS1/SDHC0_D1	Bidirectional	
128	PTE5/SPI1_PCS2/UART3_RX/SDHC0_D2	Bidirectional	
129	PTE4/SPI1_PCS0/UART3_TX/SDHC0_D3	Bidirectional	
130	PTA28/ADC2_SE13	Bidirectional	
131	GND_4	Ground	
132	PTF2/ADC2_SE6a/I2C1_SCL/GLCD_HSYNC	Bidirectional	
133	PTF3/ADC2_SE7a/I2C1_SDA/GLCD_VSYNC	Bidirectional	
134	PTF0/ADC2_SE11/CAN0_TX/GLCD_PCLK	Bidirectional	
135			4
136	PTF1/ADC2_SE10/CAN0_RX/GLCD_DE	Bidirectional	
137	PTE27/UART4_RTS_B/I2S1_MCLK/GLCD_D16	Bidirectional	
138	PTE28/ADC3_SE7a/GLCD_D17	Bidirectional	
139	PTF22/I2C0_SCL/UART5_CTS_B/GLCD_D18	Bidirectional	
140	PTF23/I2C0_SDA/FTM1_CH1/GLCD_D19	Bidirectional	
141	PTF24/CAN1_RX/FTM1_QD_PHA/GLCD_D20	Bidirectional	
142	PTF25/CAN1_TX/FTM1_QD_PHB/GLCD_D21	Bidirectional	

Pin #	Description	Type	Note #
143	PTF26/FTM2_QD_PHA/GLCD_D22	Bidirectional	
144	PTF27/FTM2_QD_PHB/GLCD_D23	Bidirectional	
145	PTF12/UART2_CST_B/GLCD_D8	Bidirectional	
146	PTF13/UART2_RX/GLCD_D9	Bidirectional	
147	PTF14/UART2_TX/GLCD_D10	Bidirectional	
148	PTF15/UART0_RTS_B/GLCD_D11	Bidirectional	
149	PTF16/SPI2_PCS0/UART0_CTS_B/GLCD_D12	Bidirectional	
150	PTF17/SPI2_SCK/UART0_RX/GLCD_D13	Bidirectional	
151	PTF18/SPI2_SOUT/UART0_TX/GLCD_D14	Bidirectional	
152	PTE26/UART4_CTS_B/I2S1_TXD0/GLCD_D15	Bidirectional	
153	PTF4/ADC2_SE4b/I2S1_TXD0/GLCD_D0	Bidirectional	
154	PTF5/ADC2_SE5b/FTM3_CH5/GLCD_D1	Bidirectional	
155	PTF6/ADC2_SE6b/FTM3_CH6/GLCD_D2	Bidirectional	
156	PTF7/ADC2_SE7b/UART3_RX/GLCD_D3	Bidirectional	
157	PTF8/UART3_TX/I2S1_MCLK/GLCD_D4	Bidirectional	
158	PTF9/CMP2_IN4/UART3_RTS_B/GLCD_D5	Bidirectional	
159	PTF10/CMP2_IN5/UART3_CTS_B/GLCD_D6	Bidirectional	
160	PTF11/UART2_RTS_B/GLCD_D7	Bidirectional	

### 4.3 RIM 160 Notes

Note 1: Active in -W version only

Note 2: Shareable with AR4100P in -W version

Note 3: Shareable with 25AA256 in -M version

Note 4: Not connected

### 4.4 JTAG

Pin #	Description
1	P3V3
3	GND
5	GND
7	NC
9	PTA4/NMI
11	P5V
13	P5V

Pin #	Description
2	PTA3/TMS
4	PTA0/TCK
6	PTA2/TDO
8	PTA1/TDI
10	RESET_B
12	PTA6/CLKOUT
14	PTA10/TRACE D0

15	GND
17	GND
19	GND

16	PTA9/TRACE D1
18	PTA8/TRACE D2
20	PTA7/TRACE D3

## 5. Technical Specifications

### 5.1 Electrical – DC characteristic

Symbol	Description	Min	Typ	Max	Unit
V <sub>cc</sub>	Power supply voltage	3.3	5.0	5.5	V
I <sub>cc</sub>	Operating current		160	210	mA
V <sub>IH</sub>	Digital input high voltage	2.3		V <sub>CC</sub>	V
V <sub>IL</sub>	Digital input low voltage	-0.1		0.66	V
V <sub>IHUSB</sub>	Digital input high voltage USB			5.5	V
V <sub>OUT</sub>	Output supply voltage – switching regulator	3.2	3.3	3.4	V
I <sub>OUT</sub>	Output supply current			500	mA

### 5.2 Mechanical

Symbol	Description	Min	Typ	Max	Unit
W	Width		43		mm
H	Height		43		mm
D	Depth		5.5	8.5	mm

### 5.3 Temperature Range

Symbol	Description	Min	Typ	Max	Unit
T <sub>AMB</sub>	Operating temperature range 1)	-40		85	°C
T <sub>AMB</sub>	Operating temperature range 2)	0		70	°C
T <sub>STOR</sub>	Storage temperature range	-40		105	°C
T <sub>SOLD</sub>	Solderable temperature 3)		260		°C
H <sub>AMB</sub>	Operating ambient humidity	10		90	%RH
T <sub>STOR</sub>	Storage humidity	10		90	%RH

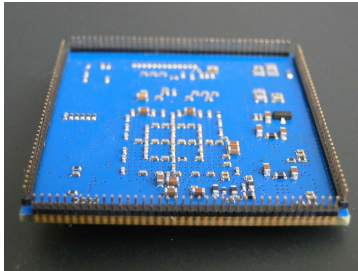
Note 1: Industrial variant

Note 2: Commercial variant

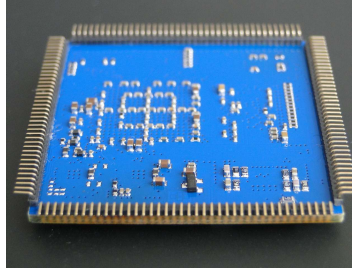
Note 3: 5 seconds peak

## 5.4 Decal and montage variants

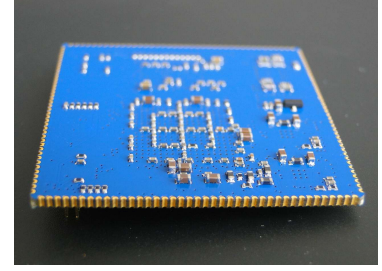
Suffix	Description	Removable	PCB Gap	Picture
-D	Removable, plug in to pin header socket	Yes	No	1
-R	RIM <sup>®</sup> connection directly solderable to the board	No	No	2
-S	Pin header connector directly solderable to the board	No	No	3
-E	Edge connection directly solderable to the board	No	Yes	4



Picture 1



Picture 3



Picture 4

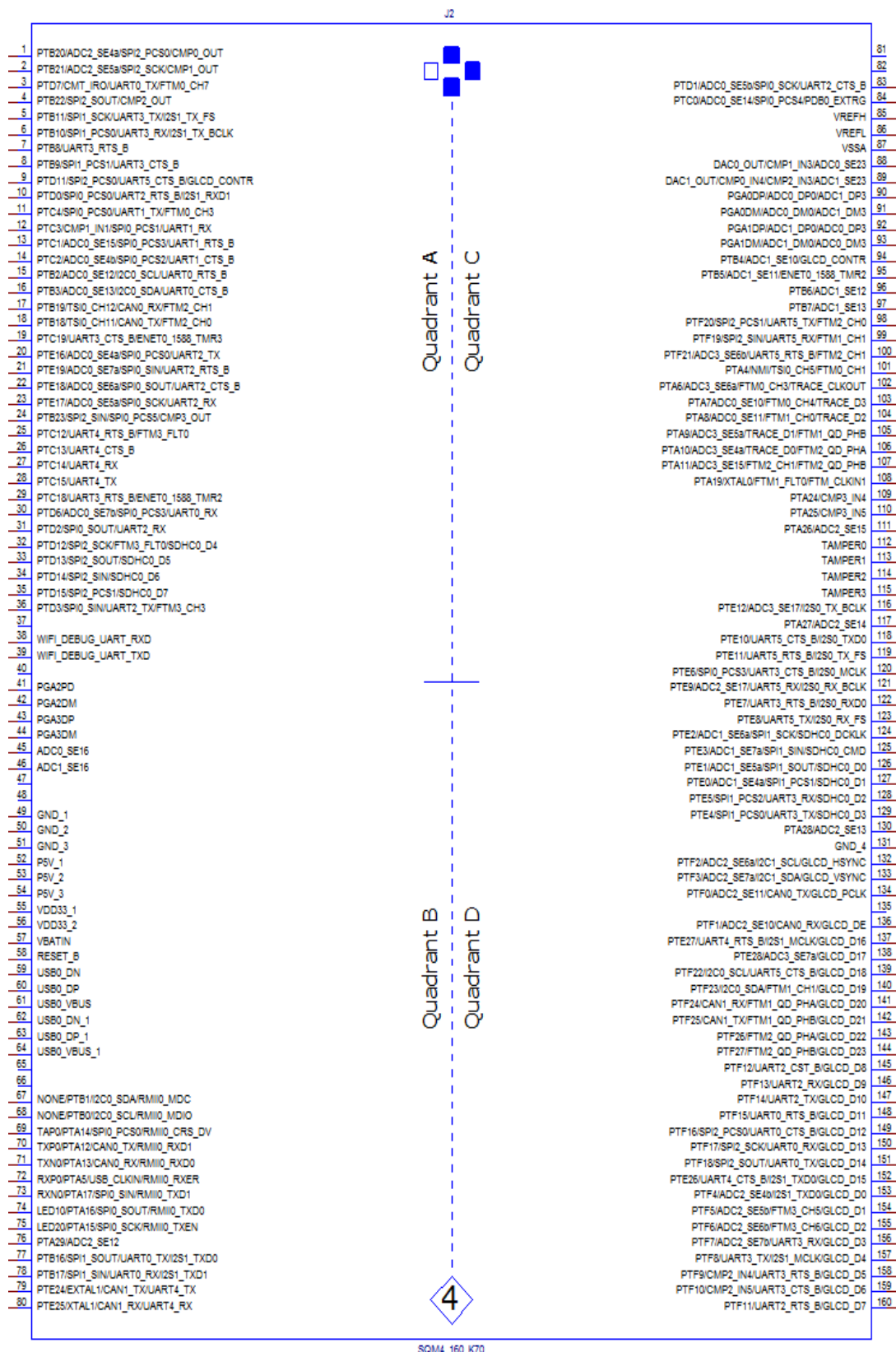
## 5.5 RoHS Compliance

SQM4-K70 module complies with the European Union's Directives EN55022 Class B.

## 6. Schematics and PCB layout

Note: Higher resolution schematics are in separated pdf files on web pages.

## 6.1 Schematic logical symbol

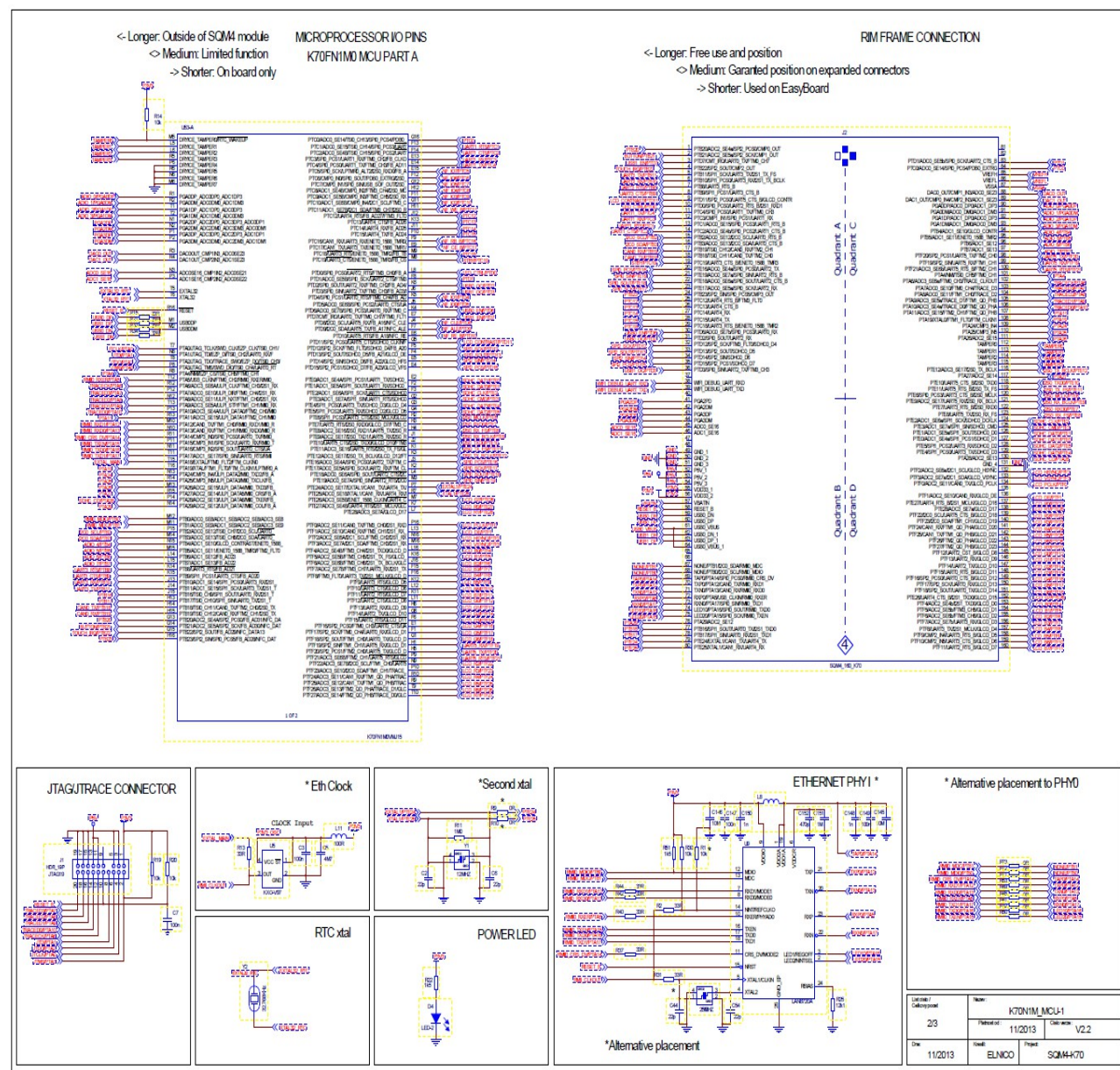


SQM4\_160\_K70

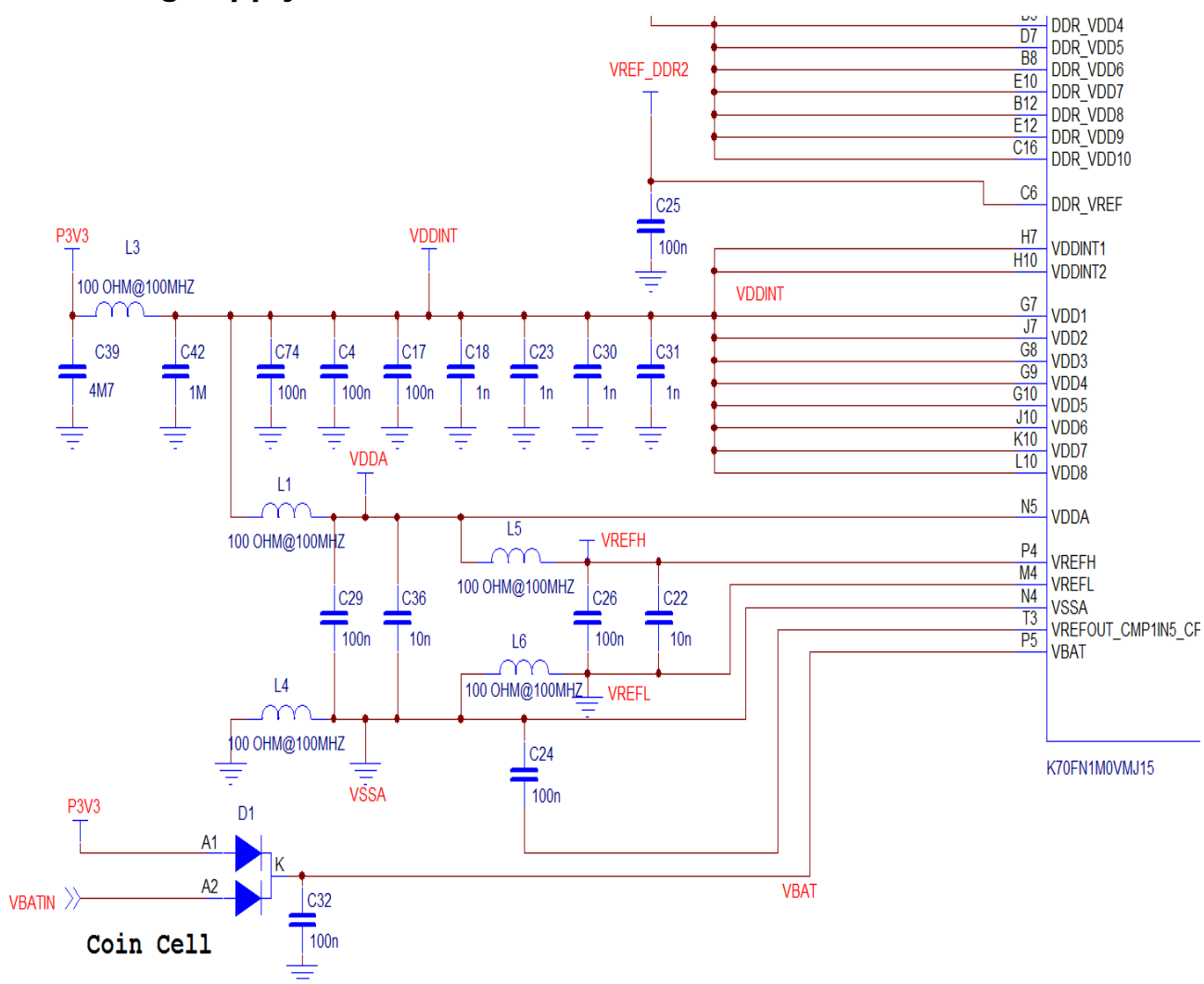


## 6.2 Short Schematic of SQM4-K70 module

Main connections and parts.



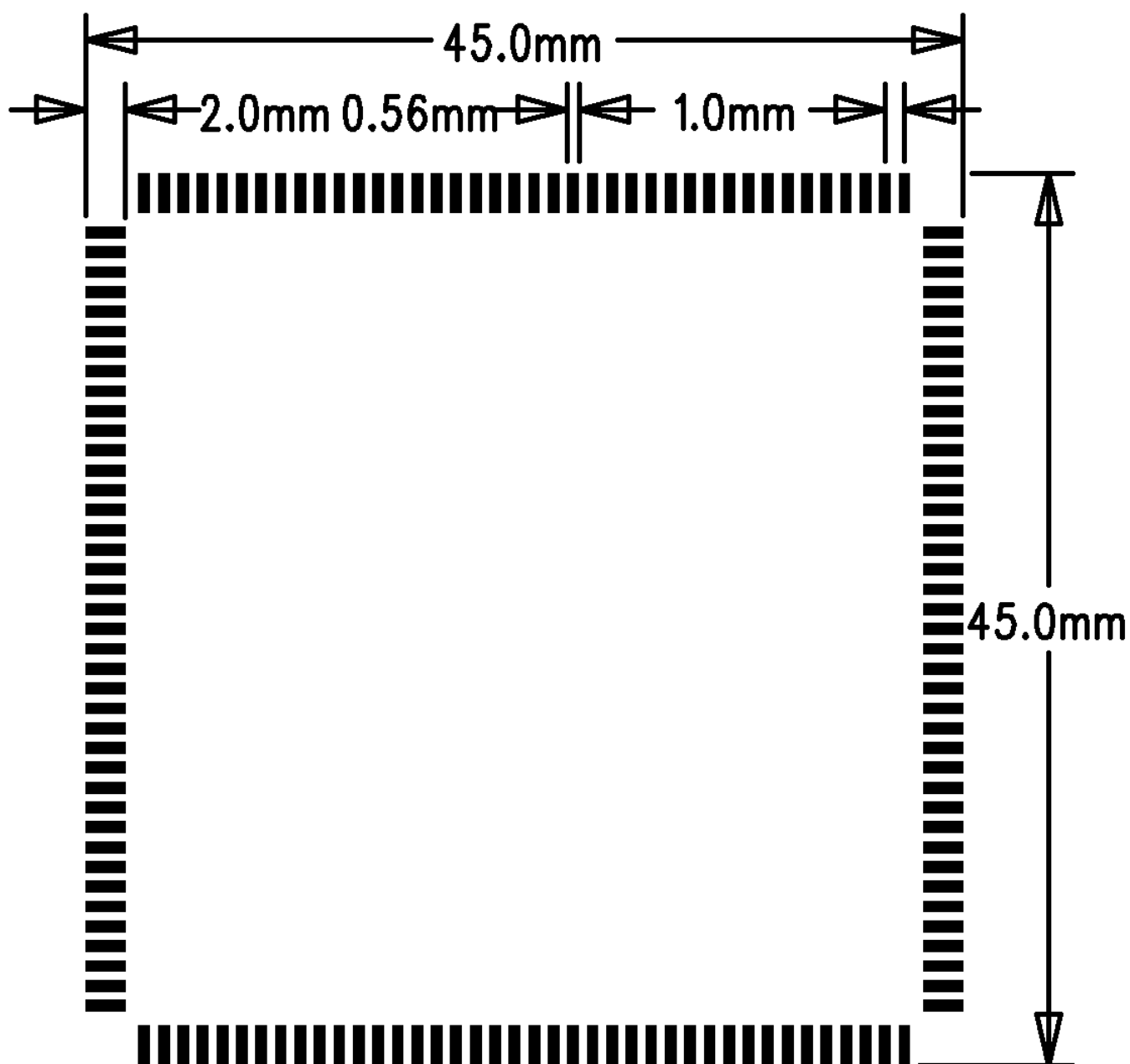
### 6.3 Analog supply schematic



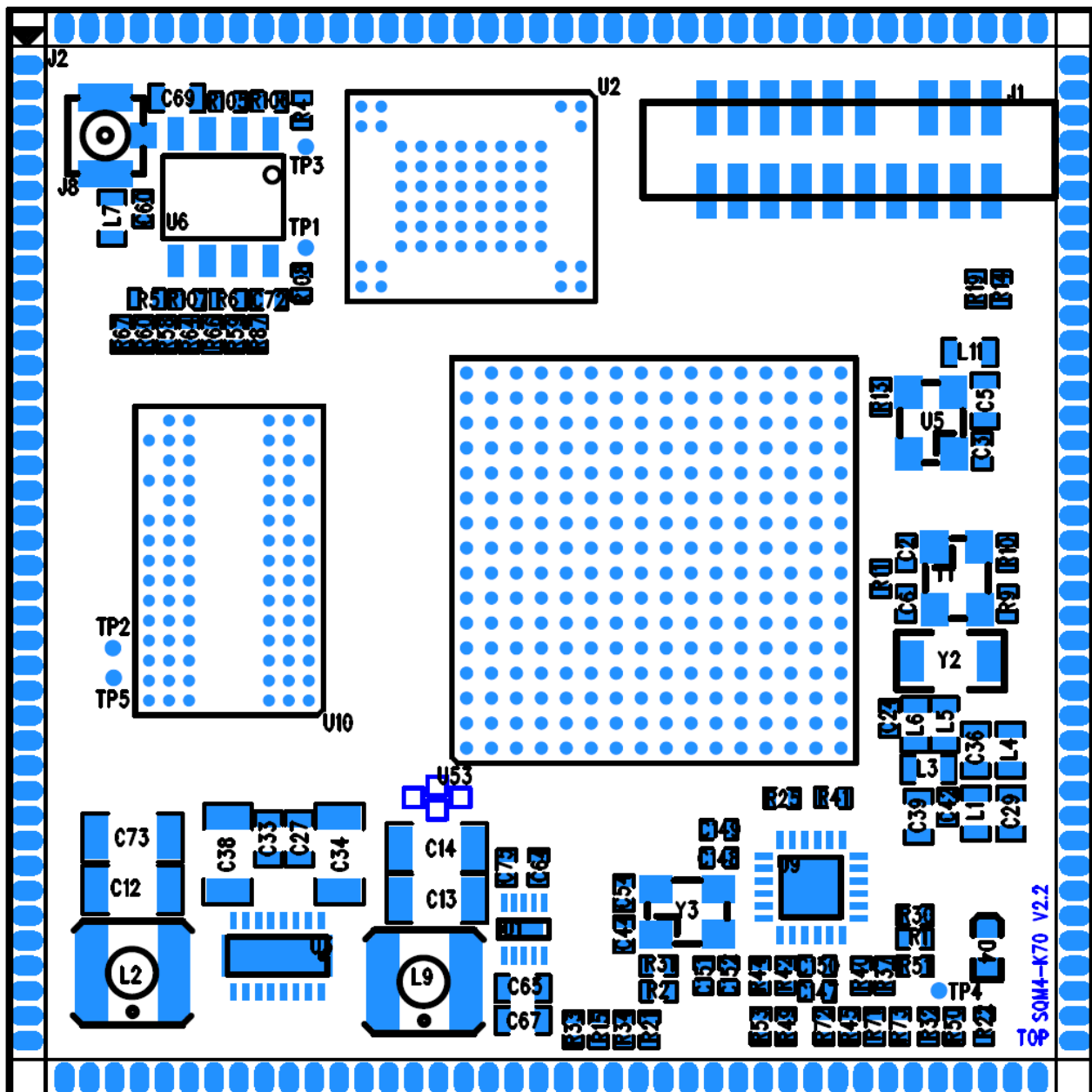


## 6.4 PCB Footprint for SQM4 module

All variants have compatible footprint.



## 6.5 PCB Silkscreen TOP of SQM4-K70 module





## 7. Ordering information

### 7.1 Module markings

MODULE	TYPE	VARIANT OPTION	DECAL OPTION	TEMPERATURE OPTION
SQM4	K70	-M EEPROM Memory	-E Edge Connection	-C 0 to +70°C
		-W WiFi AR4100	-S Pin Solderable	-I -40 to +85°C
			-R RIM® Connection	
			-D Socket Removable	

### 7.2 Order example

SQM4-K70-MSC

### 7.3 Customer's variants

Ask ELNICO Ltd. for placement and parts variants possibility:

- Ethernet Phy quantity and placement,
- DDR2 size,
- NAND Flash size and placement,
- JTAG Connector placement,
- Analog supply filters or connection
- EEPROM / FRAM / FLASH size and placement.

## 8. Final agreement

### 8.1 Disclaimer

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