Notification about the transfer of the semiconductor business

The semiconductor business of Panasonic Corporation was transferred on September 1, 2020 to Nuvoton Technology Corporation (hereinafter referred to as "Nuvoton"). Accordingly, Panasonic Semiconductor Solutions Co., Ltd. became under the umbrella of the Nuvoton Group, with the new name of Nuvoton Technology Corporation Japan (hereinafter referred to as "NTCJ").

In accordance with this transfer, semiconductor products will be handled as NTCJ-made products after September 1, 2020. However, such products will be continuously sold through Panasonic Corporation.

Publisher of this Document is NTCJ.
If you would find description “Panasonic” or “Panasonic semiconductor solutions”, please replace it with NTCJ.

※ Except below description page
“Request for your special attention and precautions in using the technical information and semiconductors described in this book”

Nuvoton Technology Corporation Japan

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1.1 Overview

The MN103S is a 32-bit micro controller combining ease of use intended for programs development in the C language with a simple, high-performance architecture made possible through pursuit of cost performance.

Built around a compact 32-bit CPU with a basic instruction word length of 1 byte, this LSI includes internal memory for instructions and data, a clock generator, bus controller, interrupt controller, watchdog timer, standard peripheral circuitry such as timers and serial interfaces, PWM circuit best suited to controlling 3- phase motors, arithmetic unit for speed-up of inverter control and analog circuits. (A/D converters and VGA (Variable Gain Amplifier)) for motor position control.

The MN103S Series high-speed CPU coupled with abundance of peripheral features provides an easy means of developing on LSI for motor and power control applications requiring fast response a feature previously unavailable with conventional micro controllers.

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1.2 Product Summary

This manual describes LSI in the following Table 1.2-1 .

Table 1.2-1 Product Summary

LSI	ROM size	RAM size	Classification	Package
MN103SFX7K / X3K	256 KB	12 KB	Flash EEPROM version	LQFP 100 pin QFP 100 pin
MN103SFX6K / X2K	256 KB	12 KB	Flash EEPROM version	TQFP 80 pin LQFP 80 pin
MN103SFX5K / X1K	256 KB	12 KB	Flash EEPROM version	TQFP 64 pin

This LSI's functions are listed in Table 1.2-2 .

Table 1.2-2 Functions list

Function		MN103SFX7K	MN103SFX6K	MN103SFX5K	MN103SFX3K	MN103SFX2K	MN103SFX1K
Number of pins		100	80	64	100	80	64
General purpose ports	I/O port	74	54	42	82	62	50
	Input port	8	8	8	-	-	-
Special pin	Power pin	10	10	8	10	10	8
	Reset pin	1	1	1	1	1	1
	Oscillation pin	2	2	2	2	2	2
	On-board debugger pin	3	3	3	3	3	3
	N.C. pin	2	2	-	2	2	-
Interrupt	Internal factor	54	54	48	54	54	48
	External interrupt	9	9	8	9	9	8
Watchdog Timer		1	1	1	1	1	1
8-bit Timer		12	12	12	12	12	12
16-bit Timer		6	6	4	6	6	4
Serial interface	Clock synchronous/ UART	3	3	3	3	3	3
Complementary 3-phase PWM		2	2	2	2	2	2
10-bit A/D converter	Number of units	3	3	3	3	3	3
	Number of conversion channels	20	16	12	20	16	12
10-bit D/A converter		2	2	2	2	2	2
Variable Gain Amplifier		2	2	2	-	-	-
Comparator		2	2	2	2	2	2

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1.3 Features

This LSI's features are described.

CPU (MN103S core)	
Structure	LOAD/STORE architecture with 5-stage pipeline
Minimum instruction execution cycle	13.9 ns (72 MHz)
	(External oscillation frequency 8MHz, 9 multiplying)
Number of basic instructions	46
Number of addressing modes	6
Basic instruction length	1 byte
Memory space	Linear address space of 4 GB (for instructions / data)

Internal memory		
Internal ROM capacity		256 KB (Flash Memory)
Sector size	Large sector	32 KB (Total 224 KB)
	Small sector	8 KB (Total 32 KB)
Internal RAM capacity		12 KB

Extended calculation function	
Extended calculation instruction	High-speed multiplication, High-speed division, trigonometric function, absolute value, square root, LPF, 3-phase/2-phase conversion, PI calculation Product-sum operation of n-th degree, Saturate calculation

Clock generator	
External oscillation (crystal/ceramic)	4 to 16 MHz
Clock multiplying circuit (PLL)	4 to 12 multiplying

Operation mode	
CPU operation mode	NORMAL mode
Standby mode	SLEEP mode, HALT mode, STOP mode

Interrupt Controller	
Internal interrupt	Watchdog timer overflow, System error Timer, Serial, PWM, A/D conversion A/D conversion error detection, Comparator detection
External interrupt	External interrupt pin input Edge detection or Level detection can be selected

Reset function	
Pin reset	Control NRST pin from outside
Software reset	Writing to register
Power supply detection reset	Detection level: 3.6 V to 4.3 V

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Reset function	
Error detection reset	Error detection by watchdog timer

Watchdog timer	
Detection time	8.192 ms to 2097.15 ms (At External oscillation is 8 MHz.)
Function	Non-maskable interrupt generates when 1st overflow is detected. Forced-reset generates in LSI when 2nd overflow is detected.

8-bit timer	
Function	Interval timer, Timer pulse output, Event count, Baud rate timer, Cascade connection

16-bit timer	
Function	Interval timer, Event count, Up/Down count, Timer output, PWM output (Cycle variable, Pulse width variable), Input capture, One-shot output, Start trigger start, Generation of Start trigger for A/D conversion

Serial interface 0 and 1		
Communication mode		Clock synchronous serial/ Full duplex UART
Clock synchronous serial	Function	Parity error detection, Overrun error detection, Specification of First transfer bit, Selection of any transfer size from 7 to 8 bits
	Maximum transfer rate	3.0 Mbps
Full duplex UART	Function	Parity error detection, Overrun error detection, Framing error detection, Specification of First transfer bit, Selection of any transfer size from 7 to 8 bits
	Maximum transfer rate	375 kbps

Serial interface 2		
Communication mode		Clock synchronous serial/ Full duplex UART
Clock synchronous serial	Function	Overrun error detection, Specification of First transfer bit, Selection of any transfer size from 2 to 8 bits
	Maximum transfer rate	5.0 Mbps
Full duplex UART	Function	Parity error detection, Overrun error detection, Framing error detection, Specification of First transfer bit, Selection of any transfer size from 7 to 8 bits
	Maximum transfer rate	300 kbps

Complementary 3-phase PWM timer	
Minimum resolution	13.9 ns
Function	Triangular wave and saw-tooth wave output, dead time auto-insertion, double buffer update, output protection circuit, output timing variable function

A/D converter	
Resolution	10 bits
Number of channels	Up to 20 channels in 3 units (There is the share channel.)
Function	16-bit timer, A/D conversion start in synchronization with PWM, Multiple channel conversion, Conversion channel omitted function, Conversion result error detect function

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D/A converter	
Resolution	10 bits
Function	Reference of the comparator

VGA (Variable Gain Amplifier)	
Gain setting	2 to 20 times
Function	Differential input, 3 channels for + side input can be switched (- side is fixed)

Comparator	
Function	Comparator output cooperates with PWM output. (Pin protection)

Internal flash memory		
Rewritable times	Large sector (32 KB)	1000 times (Minimum)
	Small sector (8 KB)	100000 times (Minimum)
Data retention time		10 years

Package
100 pin LQFP (14 mm square, 0.5 mm pitch, halogen free)
100 pin QFP (18 mm square, 0.65 mm pitch)
80 pin TQFP (12 mm square, 0.5 mm pitch, halogen free)
80 pin LQFP (14 mm square, 0.65 mm pitch, halogen free)
64 pin TQFP (10 mm square, 0.5 mm pitch, halogen free)
* Panasonic "halogen free" semiconductor products refer to the products made of molding resin and interposer which conform to the following standards. - Bromine: 900 ppm (Maximum Concentration Value) - Chlorine: 900 ppm (Maximum Concentration Value) - Bromine + Chlorine: 1500 ppm (Maximum Concentration Value) The above-mentioned standards are based on the numerical value described in IEC61249-2-21.

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1.4 Pin

The specifications of pins in this LSI are described as follows.

- Pin configuration
- Pin function

1.4.1 Pin Configuration

Figure 1.4-1 to Figure 1.4-6 show the pin configuration.

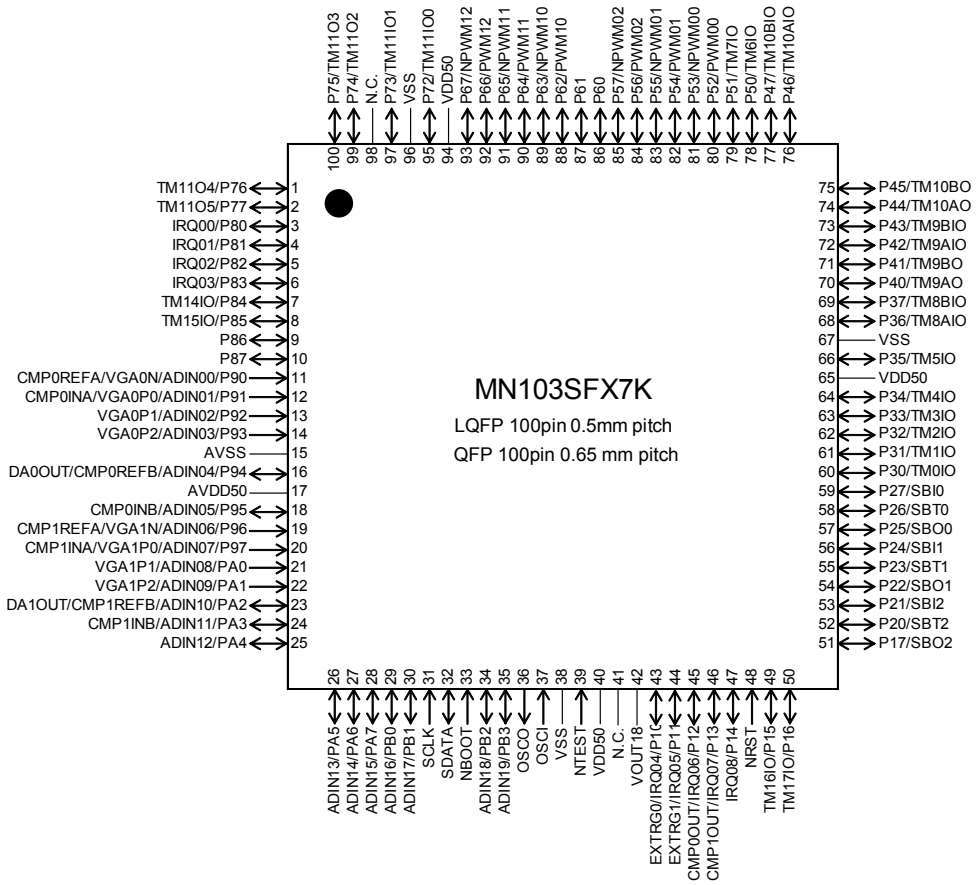

Figure 1.4-1 Pin Configuration of MN103SFX7K

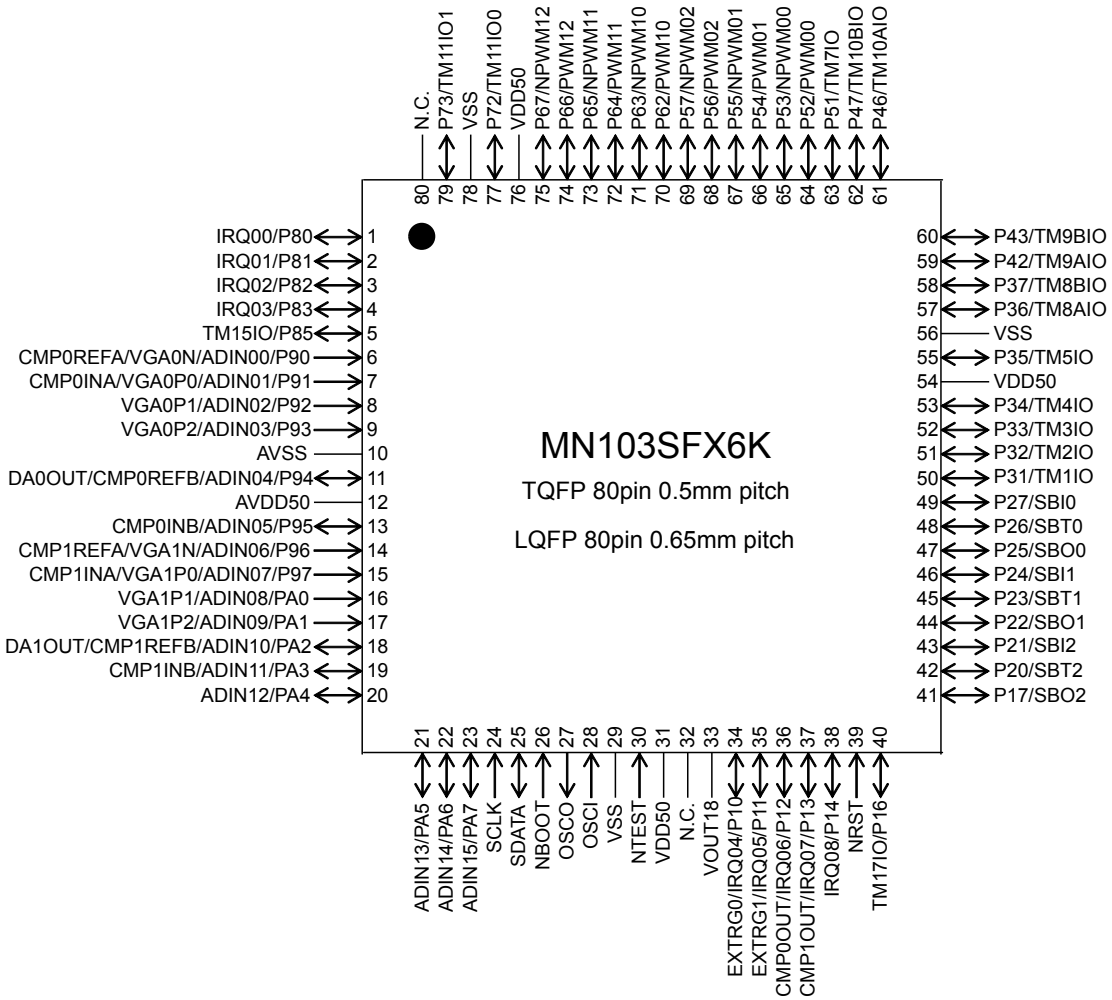

Figure 1.4-2 Pin Configuration of MN103SFX6K

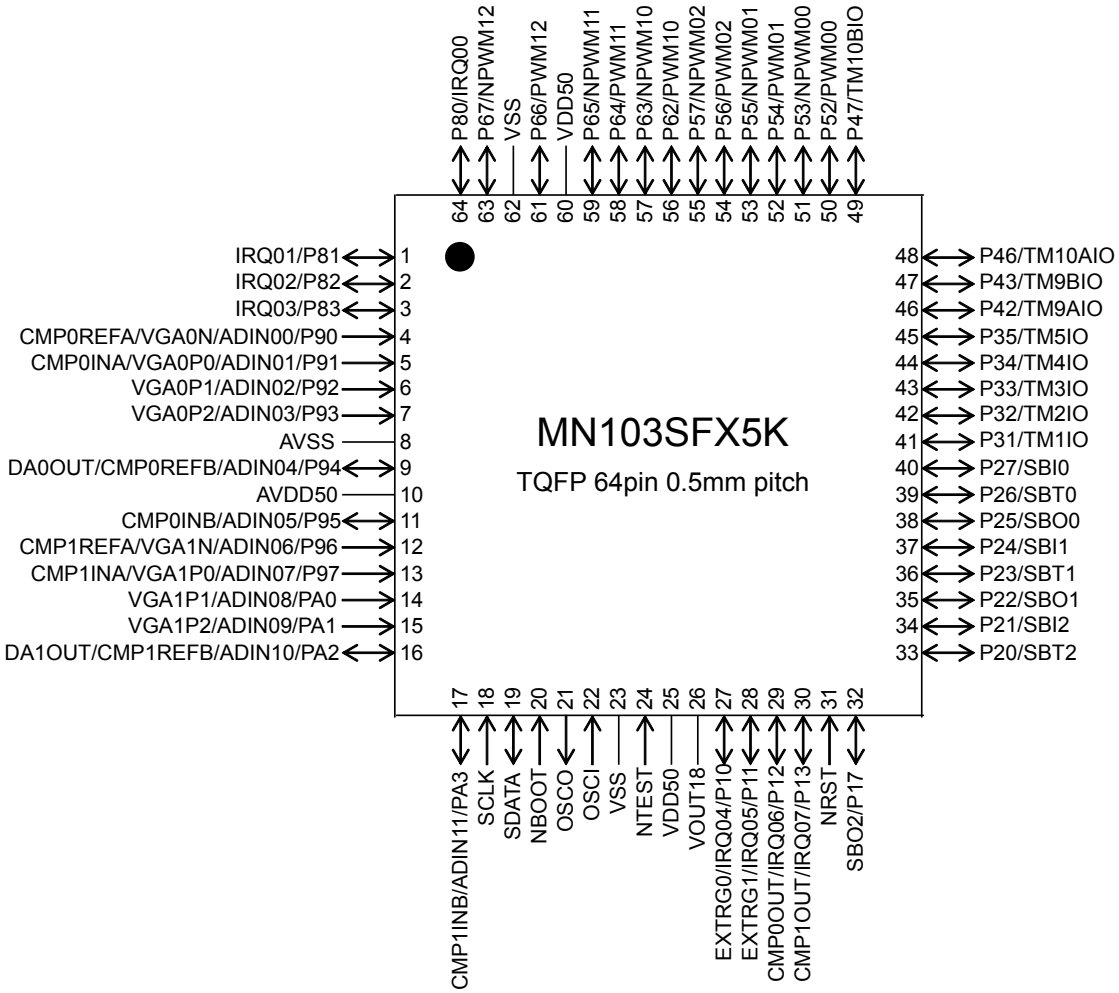

Figure 1.4-3 Pin Configuration of MN103SFX5K

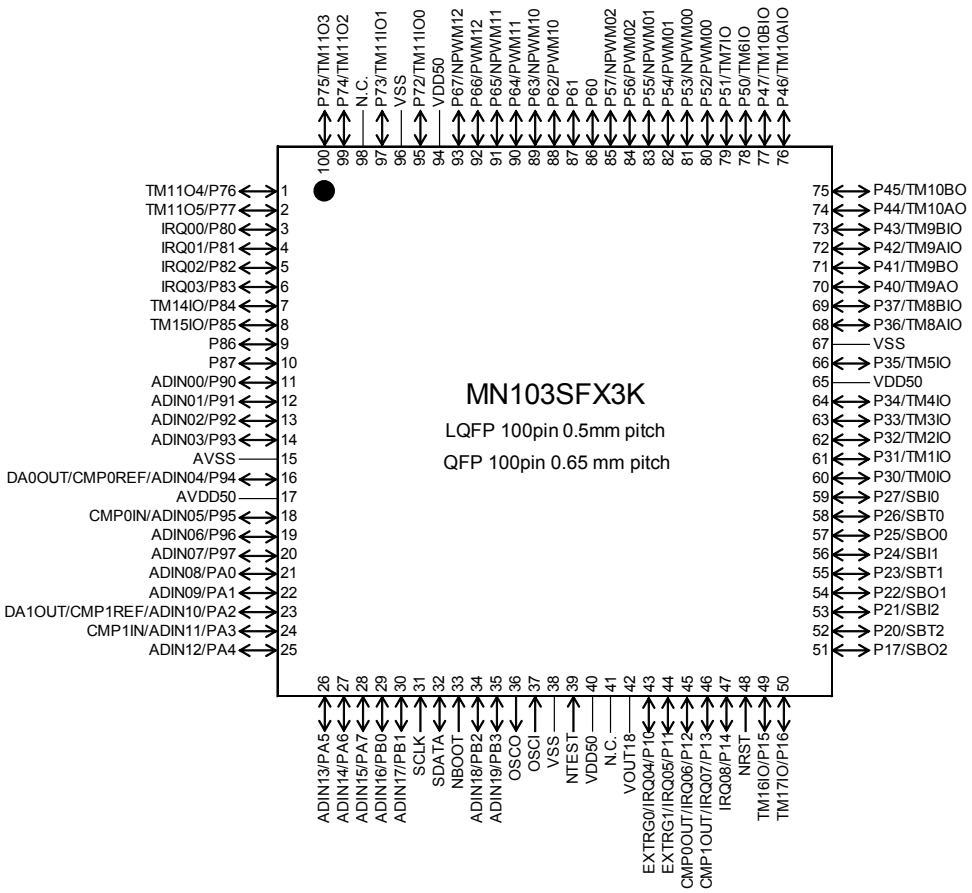

Figure 1.4-4 Pin Configuration of MN103SFX3K

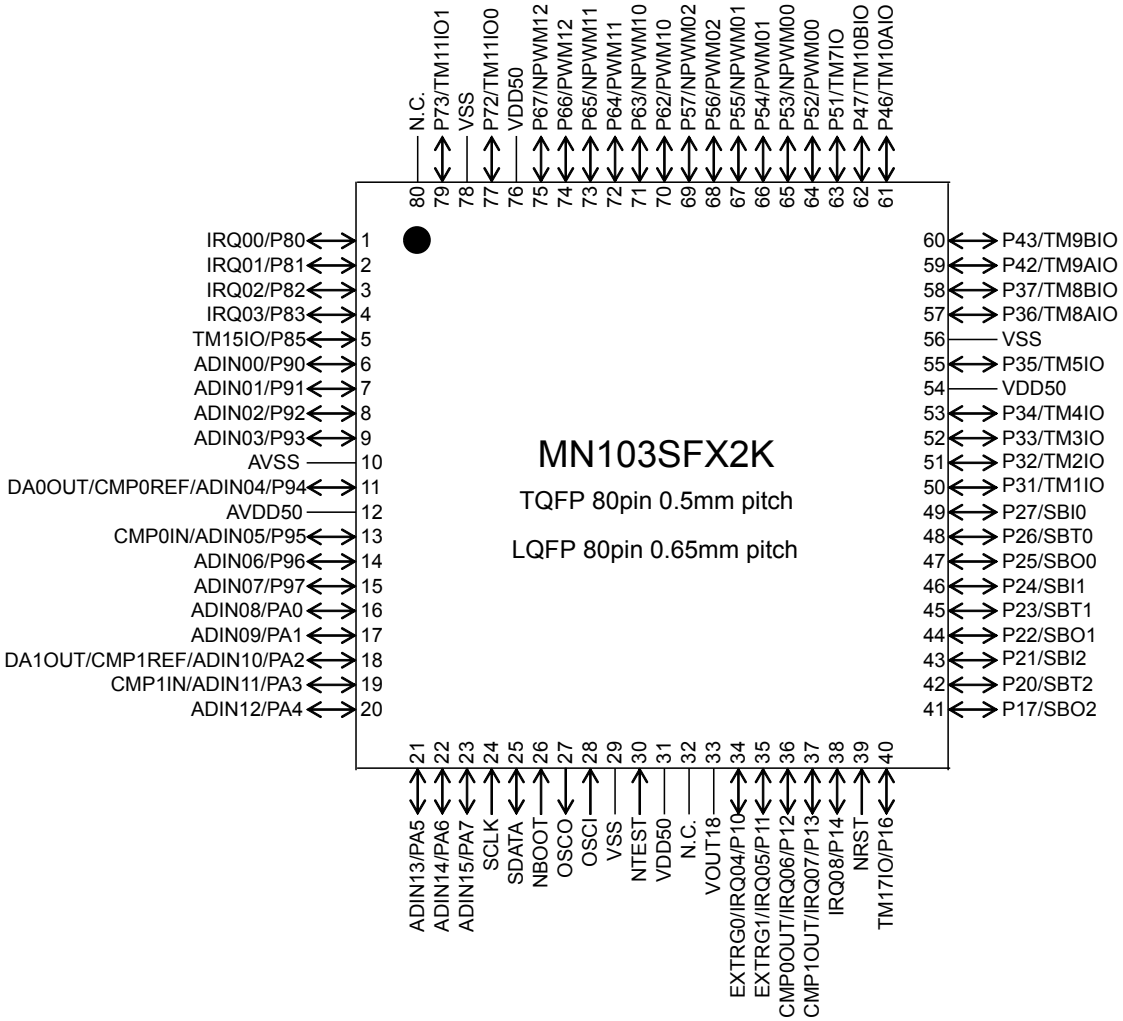

Figure 1.4-5 Pin Configuration of MN103SFX2K

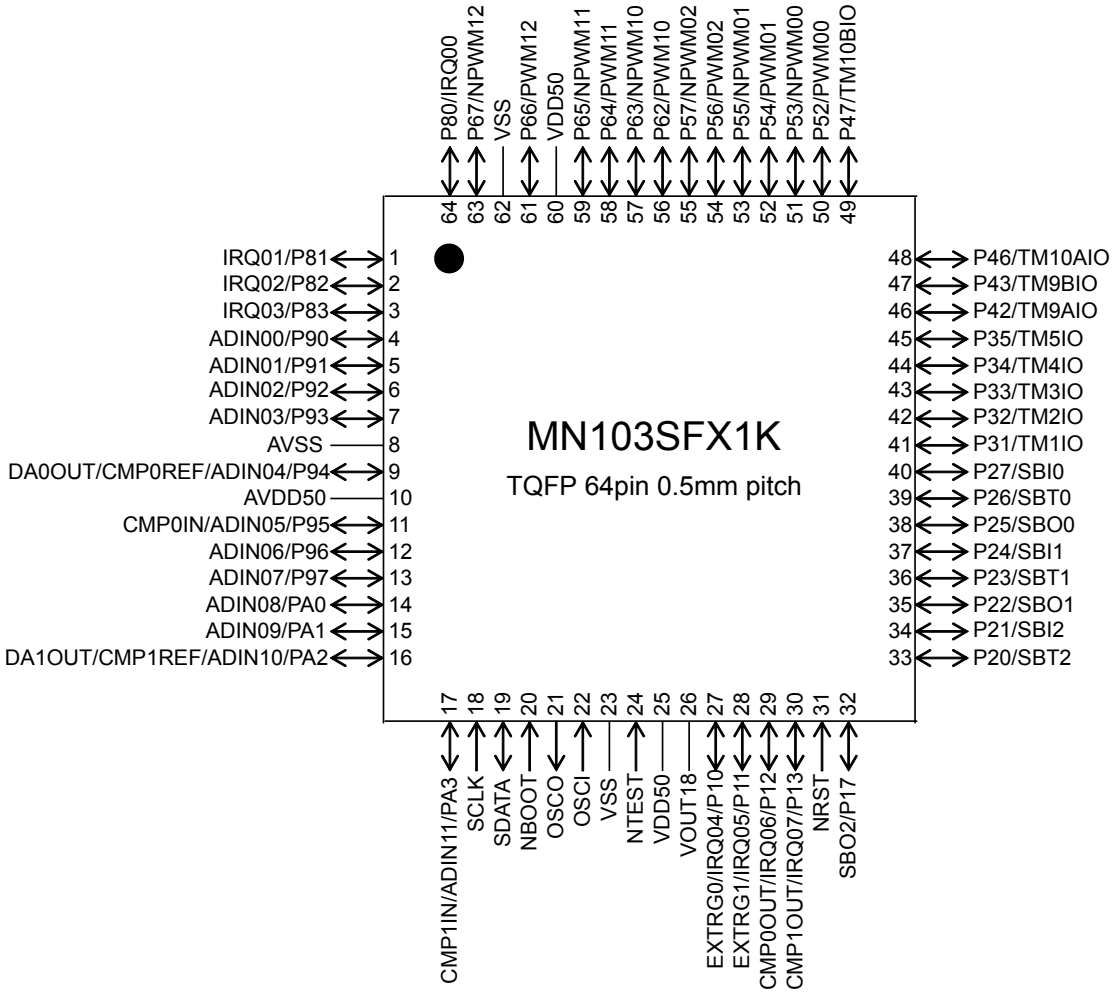

Figure 1.4-6 Pin Configuration of MN103SFX1K

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1.4.2 Pin Function

The pin function tables of each series are shown in the following order.

- Pin function table in MN103SFX7K series (Table 1.4-1)
- Pin function table in MN103SFX6K series (Table 1.4-2)
- Pin function table in MN103SFX5K series (Table 1.4-3)
- Pin function table in MN103SFX3K series (Table 1.4-4)
- Pin function table in MN103SFX2K series (Table 1.4-5)
- Pin function table in MN103SFX1K series (Table 1.4-6)

Hint:

When designing a board, resistor and capacity should be connected to the pins (power supply, GND, function control, clock, reset, on-board debug function, and Unused). Refer to [Chapter Overview] of LSI User's Manual for the value of resistor and capacity/

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1.4.2.1 Pin Function Table in MN103SFX7K Series

Pin function table in MN103SFX7K series is shown in Table 1.4-1 .

Table 1.4-1 Pin function table in MN103SFX7K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	40	Input			
		65				
		94				
Power supply pin for analog	AVDD50	17	Input			
GND pin for digital	VSS	38	Input			
		67				
		96				
GND pin for analog	AVSS	15	Input			
Power supply output pin for internal circuit	VOUT18	42	Output			
Test signal input pin	NTEST	39	Input			
Start sector control pin	NBOOT	33	Input			
Reset signal input pin (negative logic)	NRST	48	I/O			
High-speed oscillation input pin	OSCI	37	Input			
High-speed oscillation output pin	OSCO	36	Output			
External interrupt input pin	IRQ00	3	Input	P80		
	IRQ01	4	Input	P81		
	IRQ02	5	Input	P82		
	IRQ03	6	Input	P83		
	IRQ04	43	Input	P10	EXTRG0	
	IRQ05	44	Input	P11	EXTRG1	
	IRQ06	45	Input	P12	CMP0OUT	
	IRQ07	46	Input	P13	CMP1OUT	
	IRQ08	47	Input	P14		

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Function	Pin Name	Pin No.	I/O	Other Pins		
8-bit timer I/O pin	TM0IO	60	I/O	P30		
	TM1IO	61	I/O	P31		
	TM2IO	62	I/O	P32		
	TM3IO	63	I/O	P33		
	TM4IO	64	I/O	P34		
	TM5IO	66	I/O	P35		
	TM6IO	78	I/O	P50		
	TM7IO	79	I/O	P51		
	TM14IO	7	I/O	P84		
	TM15IO	8	I/O	P85		
	TM16IO	49	I/O	P15		
	TM17IO	50	I/O	P16		
16-bit timer I/O pin	TM8AIO	68	I/O	P36		
	TM8BIO	69	I/O	P37		
	TM9AO	70	Output	P40		
	TM9BO	71	Output	P41		
	TM9AIO	72	I/O	P42		
	TM9BIO	73	I/O	P43		
	TM10AO	74	Output	P44		
	TM10BO	75	Output	P45		
	TM10AIO	76	I/O	P46		
	TM10BIO	77	I/O	P47		
	TM11IO0	95	I/O	P72		
	TM11IO1	97	I/O	P73		
	TM11O2	99	Output	P74		
	TM11O3	100	Output	P75		
	TM11O4	1	Output	P76		
	TM11O5	2	Output	P77		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Motor control 3-phases PWM signal I/O pin	PWM00	80	Output	P52		
	NPWM00	81	Output	P53		
	PWM01	82	Output	P54		
	NPWM01	83	Output	P55		
	PWM02	84	Output	P56		
	NPWM02	85	Output	P57		
	PWM10	88	Output	P62		
	NPWM10	89	Output	P63		
	PWM11	90	Output	P64		
	NPWM11	91	Output	P65		
	PWM12	92	Output	P66		
	NPWM12	93	Output	P67		
Serial clock I/O pin	SBT0	58	I/O	P26		
	SBT1	55	I/O	P23		
	SBT2	52	I/O	P20		
	SBO0	57	Output	P25		
	SBO1	54	Output	P22		
	SBO2	51	I/O	P17		
	SBI0	59	Input	P27		
	SBI1	56	Input	P24		
	SBI2	53	Input	P21		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Analog input pin for A/D converter	ADIN00	11	Input	P90	VGA0N	CMP0REFA
	ADIN01	12	Input	P91	VGA0P0	CMP0INA
	ADIN02	13	Input	P92	VGA0P1	
	ADIN03	14	Input	P93	VGA0P2	
	ADIN04	16	Input	P94	CMP0REFB	DA0OUT
	ADIN05	18	Input	P95	CMP0INB	
	ADIN06	19	Input	P96	VGA1N	CMP1REFA
	ADIN07	20	Input	P97	VGA1P0	CMP1INA
	ADIN08	21	Input	PA0	VGA1P1	
	ADIN09	22	Input	PA1	VGA1P2	
	ADIN10	23	Input	PA2	CMP1REFB	DA1OUT
	ADIN11	24	Input	PA3	CMP1INB	
	ADIN12	25	Input	PA4		
	ADIN13	26	Input	PA5		
	ADIN14	27	Input	PA6		
	ADIN15	28	Input	PA7		
	ADIN16	29	Input	PB0		
	ADIN17	30	Input	PB1		
	ADIN18	34	Input	PB2		
	ADIN19	35	Input	PB3		
Analog input pin for VGA	VGA0N	11	Input	P90	ADIN00	CMP0REFA
	VGA0P0	12	Input	P91	ADIN01	CMP0INA
	VGA0P1	13	Input	P92	ADIN02	
	VGA0P2	14	Input	P93	ADIN03	
	VGA1N	19	Input	P96	ADIN06	CMP1REFA
	VGA1P0	20	Input	P97	ADIN07	CMP1INA
	VGA1P1	21	Input	PA0	ADIN08	
	VGA1P2	22	Input	PA1	ADIN09	
Comparator reference voltage input pin	CMP0REFA	11	Input	P90	ADIN00	VGA0N
	CMP0REFB	16	Input	P94	ADIN04	DA0OUT
	CMP1REFA	19	Input	P96	ADIN06	VGA1N
	CMP1REFB	23	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0INA	12	Input	P91	ADIN01	VGA0P0
	CMP0INB	18	Input	P95	ADIN05	
	CMP1INA	20	Input	P97	ADIN07	VGA1P0
	CMP1INB	24	Input	PA3	ADIN11	
Comparator output pin	CMP0OUT	45	Output	P12	IRQ06	
	CMP1OUT	46	Output	P13	IRQ07	

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Function	Pin Name	Pin No.	I/O	Other Pins		
D/A converter output pin	DA0OUT	16	Output	P94	ADIN04	CMP0REFB
	DA1OUT	23	Output	PA2	ADIN10	CMP1REFB
General-purpose I/O Port 1	P10	43	I/O	IRQ04	EXTRG0	
	P11	44	I/O	IRQ05	EXTRG1	
	P12	45	I/O	IRQ06	CMP0OUT	
	P13	46	I/O	IRQ07	CMP1OUT	
	P14	47	I/O	IRQ08		
	P15	49	I/O	TM16IO		
	P16	50	I/O	TM17IO		
	P17	51	I/O	SBO2		
General-purpose I/O Port 2	P20	52	I/O	SBT2		
	P21	53	I/O	SBI2		
	P22	54	I/O	SBO1		
	P23	55	I/O	SBT1		
	P24	56	I/O	SBI1		
	P25	57	I/O	SBO0		
	P26	58	I/O	SBT0		
	P27	59	I/O	SBI0		
General-purpose I/O Port 3	P30	60	I/O	TM0IO		
	P31	61	I/O	TM1IO		
	P32	62	I/O	TM2IO		
	P33	63	I/O	TM3IO		
	P34	64	I/O	TM4IO		
	P35	66	I/O	TM5IO		
	P36	68	I/O	TM8AIO		
	P37	69	I/O	TM8BIO		
General-purpose I/O Port 4	P40	70	I/O	TM9AO		
	P41	71	I/O	TM9BO		
	P42	72	I/O	TM9AIO		
	P43	73	I/O	TM9BIO		
	P44	74	I/O	TM10AO		
	P45	75	I/O	TM10BO		
	P46	76	I/O	TM10AIO		
	P47	77	I/O	TM10BIO		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 5	P50	78	I/O	TM6IO		
	P51	79	I/O	TM7IO		
	P52	80	I/O	PWM00		
	P53	81	I/O	NPWM00		
	P54	82	I/O	PWM01		
	P55	83	I/O	NPWM01		
	P56	84	I/O	PWM02		
	P57	85	I/O	NPWM02		
General-purpose I/O Port 6	P60	86	I/O			
	P61	87	I/O			
	P62	88	I/O	PWM10		
	P63	89	I/O	NPWM10		
	P64	90	I/O	PWM11		
	P65	91	I/O	NPWM11		
	P66	92	I/O	PWM12		
	P67	93	I/O	NPWM12		
General-purpose I/O Port 7	P72	95	I/O	TM11IO0		
	P73	97	I/O	TM11IO1		
	P74	99	I/O	TM11O2		
	P75	100	I/O	TM11O3		
	P76	1	I/O	TM11O4		
	P77	2	I/O	TM11O5		
General-purpose I/O Port 8	P80	3	I/O	IRQ00		
	P81	4	I/O	IRQ01		
	P82	5	I/O	IRQ02		
	P83	6	I/O	IRQ03		
	P84	7	I/O	TM14IO		
	P85	8	I/O	TM15IO		
	P86	9	I/O			
	P87	10	I/O			
General-purpose I/O Port 9	P90	11	Input	ADIN00	VGA0N	CMP0REFA
	P91	12	Input	ADIN01	VGA0P0	CMP0INA
	P92	13	Input	ADIN02	VGA0P1	
	P93	14	Input	ADIN03	VGA0P2	
	P94	16	I/O	ADIN04	CMP0REFB	DA0OUT
	P95	18	I/O	ADIN05	CMP0INB	
	P96	19	Input	ADIN06	VGA1N	CMP1REFA
	P97	20	Input	ADIN07	VGA1P0	CMP1INA

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port A	PA0	21	Input	ADIN08	VGA1P1	
	PA1	22	Input	ADIN09	VGA1P2	
	PA2	23	I/O	ADIN10	CMP1REFB	DA1OUT
	PA3	24	I/O	ADIN11	CMP1INB	
	PA4	25	I/O	ADIN12		
	PA5	26	I/O	ADIN13		
	PA6	27	I/O	ADIN14		
	PA7	28	I/O	ADIN15		
General-purpose I/O Port B	PB0	29	I/O	ADIN16		
	PB1	30	I/O	ADIN17		
	PB2	34	I/O	ADIN18		
	PB3	35	I/O	ADIN19		
Clock input pin for on-board debugger	SCLK	31	Input			
Data I/O pin for on-board debugger	SDATA	32	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	43	I/O	P10	IRQ04	
	EXTRG1	44	I/O	P11	IRQ05	

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1.4.2.2 Pin Function Table in MN103SFX6K Series

Pin function table in MN103SFX6K series is shown in Table 1.4-2 .

Table 1.4-2 Pin function table in MN103SFX6K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	31	Input			
		54				
		76				
Power supply pin for analog	AVDD50	12	Input			
GND pin for digital	VSS	29	Input			
		56				
		78				
GND pin for analog	AVSS	10	Input			
Power supply output pin for internal circuit	VOUT18	33	Output			
Test signal input pin	NTEST	30	Input			
Start sector control pin	NBOOT	26	Input			
Reset signal input pin (negative logic)	NRST	39	I/O			
High-speed oscillation input pin	OSCI	28	Input			
High-speed oscillation output pin	OSCO	27	Output			
External interrupt input pin	IRQ00	1	Input	P80		
	IRQ01	2	Input	P81		
	IRQ02	3	Input	P82		
	IRQ03	4	Input	P83		
	IRQ04	34	Input	P10	EXTRG0	
	IRQ05	35	Input	P11	EXTRG1	
	IRQ06	36	Input	P12	CMP0OUT	
	IRQ07	37	Input	P13	CMP1OUT	
	IRQ08	38	Input	P14		
8-bit timer I/O pin	TM1IO	50	I/O	P31		
	TM2IO	51	I/O	P32		
	TM3IO	52	I/O	P33		
	TM4IO	53	I/O	P34		
	TM5IO	55	I/O	P35		
	TM7IO	63	I/O	P51		
	TM15IO	5	I/O	P85		
	TM17IO	40	I/O	P16		

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Function	Pin Name	Pin No.	I/O	Other Pins		
16-bit timer I/O pin	TM8AIO	57	I/O	P36		
	TM8BIO	58	I/O	P37		
	TM9AIO	59	I/O	P42		
	TM9BIO	60	I/O	P43		
	TM10AIO	61	I/O	P46		
	TM10BIO	62	I/O	P47		
	TM11IO0	77	I/O	P72		
	TM11IO1	79	I/O	P73		
Motor control 3-phases PWM signal I/O pin	PWM00	64	Output	P52		
	NPWM00	65	Output	P53		
	PWM01	66	Output	P54		
	NPWM01	67	Output	P55		
	PWM02	68	Output	P56		
	NPWM02	69	Output	P57		
	PWM10	70	Output	P62		
	NPWM10	71	Output	P63		
	PWM11	72	Output	P64		
	NPWM11	73	Output	P65		
	PWM12	74	Output	P66		
	NPWM12	75	Output	P67		
Serial clock I/O pin	SBT0	48	I/O	P26		
	SBT1	45	I/O	P23		
	SBT2	42	I/O	P20		
	SBO0	47	Output	P25		
	SBO1	44	Output	P22		
	SBO2	41	I/O	P17		
	SBI0	49	Input	P27		
	SBI1	46	Input	P24		
	SBI2	43	Input	P21		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Analog input pin for A/D converter	ADIN00	6	Input	P90	VGA0N	CMP0REFA
	ADIN01	7	Input	P91	VGA0P0	CMP0INA
	ADIN02	8	Input	P92	VGA0P1	
	ADIN03	9	Input	P93	VGA0P2	
	ADIN04	11	Input	P94	CMP0REFB	DA0OUT
	ADIN05	13	Input	P95	CMP0INB	
	ADIN06	14	Input	P96	VGA1N	CMP1REFA
	ADIN07	15	Input	P97	VGA1P0	CMP1INA
	ADIN08	16	Input	PA0	VGA1P1	
	ADIN09	17	Input	PA1	VGA1P2	
	ADIN10	18	Input	PA2	CMP1REFB	DA1OUT
	ADIN11	19	Input	PA3	CMP1INB	
	ADIN12	20	Input	PA4		
	ADIN13	21	Input	PA5		
	ADIN14	22	Input	PA6		
	ADIN15	23	Input	PA7		
Analog input pin for VGA	VGA0N	6	Input	P90	ADIN00	CMP0REFA
	VGA0P0	7	Input	P91	ADIN01	CMP0INA
	VGA0P1	8	Input	P92	ADIN02	
	VGA0P2	9	Input	P93	ADIN03	
	VGA1N	14	Input	P96	ADIN06	CMP1REFA
	VGA1P0	15	Input	P97	ADIN07	CMP1INA
	VGA1P1	16	Input	PA0	ADIN08	
	VGA1P2	17	Input	PA1	ADIN09	
Comparator reference voltage input pin	CMP0REFA	6	Input	P90	ADIN00	VGA0N
	CMP0REFB	11	Input	P94	ADIN04	DA0OUT
	CMP1REFA	14	Input	P96	ADIN06	VGA1N
	CMP1REFB	18	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0INA	7	Input	P91	ADIN01	VGA0P0
	CMP0INB	13	Input	P95	ADIN05	
	CMP1INA	15	Input	P97	ADIN07	VGA1P0
	CMP1INB	19	Input	PA3	ADIN11	
Comparator output pin	CMP0OUT	36	Output	P12	IRQ06	
	CMP1OUT	37	Output	P13	IRQ07	
D/A converter output pin	DA0OUT	11	Output	P94	ADIN04	CMP0REFB
	DA1OUT	18	Output	PA2	ADIN10	CMP1REFB

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 1	P10	34	I/O	IRQ04	EXTRG0	
	P11	35	I/O	IRQ05	EXTRG1	
	P12	36	I/O	IRQ06	CMP0OUT	
	P13	37	I/O	IRQ07	CMP1OUT	
	P14	38	I/O	IRQ08		
	P16	40	I/O	TM17IO		
	P17	41	I/O	SBO2		
General-purpose I/O Port 2	P20	42	I/O	SBT2		
	P21	43	I/O	SBI2		
	P22	44	I/O	SBO1		
	P23	45	I/O	SBT1		
	P24	46	I/O	SBI1		
	P25	47	I/O	SBO0		
	P26	48	I/O	SBT0		
	P27	49	I/O	SBI0		
General-purpose I/O Port 3	P31	50	I/O	TM1IO		
	P32	51	I/O	TM2IO		
	P33	52	I/O	TM3IO		
	P34	53	I/O	TM4IO		
	P35	55	I/O	TM5IO		
	P36	57	I/O	TM8AIO		
	P37	58	I/O	TM8BIO		
General-purpose I/O Port 4	P42	59	I/O	TM9AIO		
	P43	60	I/O	TM9BIO		
	P46	61	I/O	TM10AIO		
	P47	62	I/O	TM10BIO		
General-purpose I/O Port 5	P51	63	I/O	TM7IO		
	P52	64	I/O	PWM00		
	P53	65	I/O	NPWM00		
	P54	66	I/O	PWM01		
	P55	67	I/O	NPWM01		
	P56	68	I/O	PWM02		
	P57	69	I/O	NPWM02		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 6	P62	70	I/O	PWM10		
	P63	71	I/O	NPWM10		
	P64	72	I/O	PWM11		
	P65	73	I/O	NPWM11		
	P66	74	I/O	PWM12		
	P67	75	I/O	NPWM12		
General-purpose I/O Port 7	P72	77	I/O	TM11IO0		
	P73	79	I/O	TM11IO1		
General-purpose I/O Port 8	P80	1	I/O	IRQ00		
	P81	2	I/O	IRQ01		
	P82	3	I/O	IRQ02		
	P83	4	I/O	IRQ03		
	P85	5	I/O	TM15IO		
General-purpose I/O Port 9	P90	6	Input	ADIN00	VGA0N	CMP0REFA
	P91	7	Input	ADIN01	VGA0P0	CMP0INA
	P92	8	Input	ADIN02	VGA0P1	
	P93	9	Input	ADIN03	VGA0P2	
	P94	11	I/O	ADIN04	CMP0REFB	DA0OUT
	P95	13	I/O	ADIN05	CMP0IN	
	P96	14	Input	ADIN06	VGA1N	CMP1REFA
	P97	15	Input	ADIN07	VGA1P0	CMP1INA
General-purpose I/O Port A	PA0	16	Input	ADIN08	VGA1P1	
	PA1	17	Input	ADIN09	VGA1P2	
	PA2	18	I/O	ADIN10	CMP1REFB	DA1OUT
	PA3	19	I/O	ADIN11	CMP1INB	
	PA4	20	I/O	ADIN12		
	PA5	21	I/O	ADIN13		
	PA6	22	I/O	ADIN14		
	PA7	23	I/O	ADIN15		
Clock input pin for on-board debugger	SCLK	24	Input			
Data I/O pin for on-board debugger	SDATA	25	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	34	I/O	P10	IRQ04	
	EXTRG1	35	I/O	P11	IRQ05	

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1.4.2.3 Pin Function Table in MN103SFX5K Series

Pin function table in MN103SFX5K series is shown in Table 1.4-3 .

Table 1.4-3 Pin function table in MN103SFX5K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	25	Input			
		60				
Power supply pin for analog	AVDD50	10	Input			
GND pin for digital	VSS	23	Input			
		62				
GND pin for analog	AVSS	8	Input			
Power supply output pin for internal circuit	VOUT18	26	Output			
Test signal input pin	NTEST	24	Input			
Start sector control pin	NBOOT	20	Input			
Reset signal input pin (negative logic)	NRST	31	I/O			
High-speed oscillation input pin	OSCI	22	Input			
High-speed oscillation output pin	OSCO	21	Output			
External interrupt input pin	IRQ00	64	Input	P80		
	IRQ01	1	Input	P81		
	IRQ02	2	Input	P82		
	IRQ03	3	Input	P83		
	IRQ04	27	Input	P10	EXTRG0	
	IRQ05	28	Input	P11	EXTRG1	
	IRQ06	29	Input	P12	CMP0OUT	
	IRQ07	30	Input	P13	CMP1OUT	
8-bit timer I/O pin	TM1IO	41	I/O	P31		
	TM2IO	42	I/O	P32		
	TM3IO	43	I/O	P33		
	TM4IO	44	I/O	P34		
	TM5IO	45	I/O	P35		
16-bit timer I/O pin	TM9AIO	46	I/O	P42		
	TM9BIO	47	I/O	P43		
	TM10AIO	48	I/O	P46		
	TM10BIO	49	I/O	P47		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Motor control 3-phases PWM signal I/O pin	PWM00	50	Output	P52		
	NPWM00	51	Output	P53		
	PWM01	52	Output	P54		
	NPWM01	53	Output	P55		
	PWM02	54	Output	P56		
	NPWM02	55	Output	P57		
	PWM10	56	Output	P62		
	NPWM10	57	Output	P63		
	PWM11	58	Output	P64		
	NPWM11	59	Output	P65		
	PWM12	61	Output	P66		
	NPWM12	63	Output	P67		
Serial clock I/O pin	SBT0	39	I/O	P26		
	SBT1	36	I/O	P23		
	SBT2	33	I/O	P20		
	SBO0	38	Output	P25		
	SBO1	35	Output	P22		
	SBO2	32	I/O	P17		
	SBI0	40	Input	P27		
	SBI1	37	Input	P24		
	SBI2	34	Input	P21		
Analog input pin for A/D converter	ADIN00	4	Input	P90	VGA0N	CMP0REFA
	ADIN01	5	Input	P91	VGA0P0	CMP0INA
	ADIN02	6	Input	P92	VGA0P1	
	ADIN03	7	Input	P93	VGA0P2	
	ADIN04	9	Input	P94	CMP0REFB	DA0OUT
	ADIN05	11	Input	P95	CMP0INB	
	ADIN06	12	Input	P96	VGA1N	CMP1REFA
	ADIN07	13	Input	P97	VGA1P0	CMP1INA
	ADIN08	14	Input	PA0	VGA1P1	
	ADIN09	15	Input	PA1	VGA1P2	
	ADIN10	16	Input	PA2	CMP1REFB	DA1OUT
	ADIN11	17	Input	PA3	CMP1INB	

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Function	Pin Name	Pin No.	I/O	Other Pins		
Analog input pin for VGA	VGA0N	4	Input	P90	ADIN00	CMP0REFA
	VGA0P0	5	Input	P91	ADIN01	CMP0INA
	VGA0P1	6	Input	P92	ADIN02	
	VGA0P2	7	Input	P93	ADIN03	
	VGA1N	12	Input	P96	ADIN06	CMP1REFA
	VGA1P0	13	Input	P97	ADIN07	CMP1INA
	VGA1P1	14	Input	PA0	ADIN08	
	VGA1P2	15	Input	PA1	ADIN09	
Comparator reference voltage input pin	CMP0REFA	4	Input	P90	ADIN00	VGA0N
	CMP0REFB	9	Input	P94	ADIN04	DA0OUT
	CMP1REFA	12	Input	P96	ADIN06	VGA1N
	CMP1REFB	16	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0INA	5	Input	P91	ADIN01	VGA0P0
	CMP0INB	11	Input	P95	ADIN05	
	CMP1INA	13	Input	P97	ADIN07	VGA1P0
	CMP1INB	17	Input	PA3	ADIN11	
Comparator output pin	CMP0OUT	29	Output	P12	IRQ06	
	CMP1OUT	30	Output	P13	IRQ07	
D/A converter output pin	DA0OUT	9	Output	P94	ADIN04	CMP0REFB
	DA1OUT	16	Output	PA2	ADIN10	CMP1REFB
General-purpose I/O Port 1	P10	27	I/O	IRQ04	EXTRG0	
	P11	28	I/O	IRQ05	EXTRG1	
	P12	29	I/O	IRQ06	CMP0OUT	
	P13	30	I/O	IRQ07	CMP1OUT	
	P17	32	I/O	SBO2		
General-purpose I/O Port 2	P20	33	I/O	SBT2		
	P21	34	I/O	SBI2		
	P22	35	I/O	SBO1	s	
	P23	36	I/O	SBT1		
	P24	37	I/O	SBI1		
	P25	38	I/O	SBO0		
	P26	39	I/O	SBT0		
	P27	40	I/O	SBI0		
General-purpose I/O Port 3	P31	41	I/O	TM1IO		
	P32	42	I/O	TM2IO		
	P33	43	I/O	TM3IO		
	P34	44	I/O	TM4IO		
	P35	45	I/O	TM5IO		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 4	P42	46	I/O	TM9AIO		
	P43	47	I/O	TM9BIO		
	P46	48	I/O	TM10AIO		
	P47	49	I/O	TM10BIO		
General-purpose I/O Port 5	P52	50	I/O	PWM00		
	P53	51	I/O	NPWM00		
	P54	52	I/O	PWM01		
	P55	53	I/O	NPWM01		
	P56	54	I/O	PWM02		
	P57	55	I/O	NPWM02		
General-purpose I/O Port 6	P62	56	I/O	PWM10		
	P63	57	I/O	NPWM10		
	P64	58	I/O	PWM11		
	P65	59	I/O	NPWM11		
	P66	61	I/O	PWM12		
	P67	63	I/O	NPWM12		
General-purpose I/O Port 8	P80	64	I/O	IRQ00		
	P81	1	I/O	IRQ01		
	P82	2	I/O	IRQ02		
	P83	3	I/O	IRQ03		
General-purpose I/O Port 9	P90	4	Input	ADIN00	VGA0N	CMP0REFA
	P91	5	Input	ADIN01	VGA0P0	CMP0INA
	P92	6	Input	ADIN02	VGA0P1	
	P93	7	Input	ADIN03	VGA0P2	
	P94	9	I/O	ADIN04	CMP0REFB	DA0OUT
	P95	11	I/O	ADIN05	CMP0INB	
	P96	12	Input	ADIN06	VGA1N	CMP1REFA
	P97	13	Input	ADIN07	VGA1P0	CMP1INA
General-purpose I/O Port A	PA0	14	Input	ADIN08	VGA1P1	
	PA1	15	Input	ADIN09	VGA1P2	
	PA2	16	I/O	ADIN10	CMP1REFB	DA1OUT
	PA3	17	I/O	ADIN11	CMP1INB	
Clock input pin for on-board debugger	SCLK	18	Input			
Data I/O pin for on-board debugger	SDATA	19	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	27	I/O	P10	IRQ04	
	EXTRG1	28	I/O	P11	IRQ05	

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1.4.2.4 Pin Function Table in MN103SFX3K Series

Pin function table in MN103SFX3K series is shown in Table 1.4-4 .

Table 1.4-4 Pin function table in MN103SFX3K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	40	Input			
		65				
		94				
Power supply pin for analog	AVDD50	17	Input			
GND pin for digital	VSS	38	Input			
		67				
		96				
GND pin for analog	AVSS	15	Input			
Power supply output pin for internal circuit	VOUT18	42	Output			
Test signal input pin	NTEST	39	Input			
Start sector control pin	NBOOT	33	Input			
Reset signal input pin (negative logic)	NRST	48	I/O			
High-speed oscillation input pin	OSCI	37	Input			
High-speed oscillation output pin	OSCO	36	Output			
External interrupt input pin	IRQ00	3	Input	P80		
	IRQ01	4	Input	P81		
	IRQ02	5	Input	P82		
	IRQ03	6	Input	P83		
	IRQ04	43	Input	P10	EXTRG0	
	IRQ05	44	Input	P11	EXTRG1	
	IRQ06	45	Input	P12	CMP0OUT	
	IRQ07	46	Input	P13	CMP1OUT	
	IRQ08	47	Input	P14		

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Function	Pin Name	Pin No.	I/O	Other Pins		
8-bit timer I/O pin	TM0IO	60	I/O	P30		
	TM1IO	61	I/O	P31		
	TM2IO	62	I/O	P32		
	TM3IO	63	I/O	P33		
	TM4IO	64	I/O	P34		
	TM5IO	66	I/O	P35		
	TM6IO	78	I/O	P50		
	TM7IO	79	I/O	P51		
	TM14IO	7	I/O	P84		
	TM15IO	8	I/O	P85		
	TM16IO	49	I/O	P15		
	TM17IO	50	I/O	P16		
16-bit timer I/O pin	TM8AIO	68	I/O	P36		
	TM8BIO	69	I/O	P37		
	TM9AO	70	Output	P40		
	TM9BO	71	Output	P41		
	TM9AIO	72	I/O	P42		
	TM9BIO	73	I/O	P43		
	TM10AO	74	Output	P44		
	TM10BO	75	Output	P45		
	TM10AIO	76	I/O	P46		
	TM10BIO	77	I/O	P47		
	TM11IO0	95	I/O	P72		
	TM11IO1	97	I/O	P73		
	TM11O2	99	Output	P74		
	TM11O3	100	Output	P75		
	TM11O4	1	Output	P76		
	TM11O5	2	Output	P77		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Motor control 3-phases PWM signal I/O pin	PWM00	80	Output	P52		
	NPWM00	81	Output	P53		
	PWM01	82	Output	P54		
	NPWM01	83	Output	P55		
	PWM02	84	Output	P56		
	NPWM02	85	Output	P57		
	PWM10	88	Output	P62		
	NPWM10	89	Output	P63		
	PWM11	90	Output	P64		
	NPWM11	91	Output	P65		
	PWM12	92	Output	P66		
	NPWM12	93	Output	P67		
Serial clock I/O pin	SBT0	58	I/O	P26		
	SBT1	55	I/O	P23		
	SBT2	52	I/O	P20		
	SBO0	57	Output	P25		
	SBO1	54	Output	P22		
	SBO2	51	I/O	P17		
	SBI0	59	Input	P27		
	SBI1	56	Input	P24		
	SBI2	53	Input	P21		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Analog input pin for A/D converter	ADIN00	11	Input	P90		
	ADIN01	12	Input	P91		
	ADIN02	13	Input	P92		
	ADIN03	14	Input	P93		
	ADIN04	16	Input	P94	CMP0REF	DA0OUT
	ADIN05	18	Input	P95	CMP0IN	
	ADIN06	19	Input	P96		
	ADIN07	20	Input	P97		
	ADIN08	21	Input	PA0		
	ADIN09	22	Input	PA1		
	ADIN10	23	Input	PA2	CMP1REF	DA1OUT
	ADIN11	24	Input	PA3	CMP1IN	
	ADIN12	25	Input	PA4		
	ADIN13	26	Input	PA5		
	ADIN14	27	Input	PA6		
	ADIN15	28	Input	PA7		
	ADIN16	29	Input	PB0		
	ADIN17	30	Input	PB1		
	ADIN18	34	Input	PB2		
	ADIN19	35	Input	PB3		
Comparator reference voltage input pin	CMP0REF	16	Input	P94	ADIN04	DA0OUT
	CMP1REF	23	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0IN	18	Input	P95	ADIN05	
	CMP1IN	24	Input	PA3	ADIN11	
Comparator output pin	CMP0OUT	45	Output	P12	IRQ06	
	CMP1OUT	46	Output	P13	IRQ07	
D/A converter output pin	DA0OUT	16	Output	P94	ADIN04	CMP0REF
	DA1OUT	23	Output	PA2	ADIN10	CMP1REF
General-purpose I/O Port 1	P10	43	I/O	IRQ04	EXTRG0	
	P11	44	I/O	IRQ05	EXTRG1	
	P12	45	I/O	IRQ06	CMP0OUT	
	P13	46	I/O	IRQ07	CMP1OUT	
	P14	47	I/O	IRQ08		
	P15	49	I/O	TM16IO		
	P16	50	I/O	TM17IO		
	P17	51	I/O	SBO2		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 2	P20	52	I/O	SBT2		
	P21	53	I/O	SBI2		
	P22	54	I/O	SBO1		
	P23	55	I/O	SBT1		
	P24	56	I/O	SBI1		
	P25	57	I/O	SBO0		
	P26	58	I/O	SBT0		
	P27	59	I/O	SBI0		
General-purpose I/O Port 3	P30	60	I/O	TM0IO		
	P31	61	I/O	TM1IO		
	P32	62	I/O	TM2IO		
	P33	63	I/O	TM3IO		
	P34	64	I/O	TM4IO		
	P35	66	I/O	TM5IO		
	P36	68	I/O	TM8AIO		
	P37	69	I/O	TM8BIO		
General-purpose I/O Port 4	P40	70	I/O	TM9AO		
	P41	71	I/O	TM9BO		
	P42	72	I/O	TM9AIO		
	P43	73	I/O	TM9BIO		
	P44	74	I/O	TM10AO		
	P45	75	I/O	TM10BO		
	P46	76	I/O	TM10AIO		
	P47	77	I/O	TM10BIO		
General-purpose I/O Port 5	P50	78	I/O	TM6IO		
	P51	79	I/O	TM7IO		
	P52	80	I/O	PWM00		
	P53	81	I/O	NPWM00		
	P54	82	I/O	PWM01		
	P55	83	I/O	NPWM01		
	P56	84	I/O	PWM02		
	P57	85	I/O	NPWM02		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 6	P60	86	I/O			
	P61	87	I/O			
	P62	88	I/O	PWM10		
	P63	89	I/O	NPWM10		
	P64	90	I/O	PWM11		
	P65	91	I/O	NPWM11		
	P66	92	I/O	PWM12		
	P67	93	I/O	NPWM12		
General-purpose I/O Port 7	P72	95	I/O	TM11IO0		
	P73	97	I/O	TM11IO1		
	P74	99	I/O	TM11O2		
	P75	100	I/O	TM11O3		
	P76	1	I/O	TM11O4		
	P77	2	I/O	TM11O5		
General-purpose I/O Port 8	P80	3	I/O	IRQ00		
	P81	4	I/O	IRQ01		
	P82	5	I/O	IRQ02		
	P83	6	I/O	IRQ03		
	P84	7	I/O	TM14IO		
	P85	8	I/O	TM15IO		
	P86	9	I/O			
	P87	10	I/O			
General-purpose I/O Port 9	P90	11	I/O	ADIN00		
	P91	12	I/O	ADIN01		
	P92	13	I/O	ADIN02		
	P93	14	I/O	ADIN03		
	P94	16	I/O	ADIN04	CMP0REF	DA0OUT
	P95	18	I/O	ADIN05	CMP0IN	
	P96	19	I/O	ADIN06		
	P97	20	I/O	ADIN07		
General-purpose I/O Port A	PA0	21	I/O	ADIN08		
	PA1	22	I/O	ADIN09		
	PA2	23	I/O	ADIN10	CMP1REF	DA1OUT
	PA3	24	I/O	ADIN11	CMP1IN	
	PA4	25	I/O	ADIN12		
	PA5	26	I/O	ADIN13		
	PA6	27	I/O	ADIN14		
	PA7	28	I/O	ADIN15		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port B	PB0	29	I/O	ADIN16		
	PB1	30	I/O	ADIN17		
	PB2	34	I/O	ADIN18		
	PB3	35	I/O	ADIN19		
Clock input pin for on-board debugger	SCLK	31	Input			
Data I/O pin for on-board debugger	SDATA	32	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	43	I/O	P10	IRQ04	
	EXTRG1	44	I/O	P11	IRQ05	

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1.4.2.5 Pin Function Table in MN103SFX2K Series

Pin function table in MN103SFX2K series is shown in Table 1.4-5 .

Table 1.4-5 Pin function table in MN103SFX3K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	31	Input			
		54				
		76				
Power supply pin for analog	AVDD50	12	Input			
GND pin for digital	VSS	29	Input			
		56				
		78				
GND pin for analog	AVSS	10	Input			
Power supply output pin for internal circuit	VOUT18	33	Output			
Test signal input pin	NTEST	30	Input			
Start sector control pin	NBOOT	26	Input			
Reset signal input pin (negative logic)	NRST	39	I/O			
High-speed oscillation input pin	OSCI	28	Input			
High-speed oscillation output pin	OSCO	27	Output			
External interrupt input pin	IRQ00	1	Input	P80		
	IRQ01	2	Input	P81		
	IRQ02	3	Input	P82		
	IRQ03	4	Input	P83		
	IRQ04	34	Input	P10	EXTRG0	
	IRQ05	35	Input	P11	EXTRG1	
	IRQ06	36	Input	P12	CMP0OUT	
	IRQ07	37	Input	P13	CMP1OUT	
	IRQ08	38	Input	P14		
8-bit timer I/O pin	TM1IO	50	I/O	P31		
	TM2IO	51	I/O	P32		
	TM3IO	52	I/O	P33		
	TM4IO	53	I/O	P34		
	TM5IO	55	I/O	P35		
	TM7IO	63	I/O	P51		
	TM15IO	5	I/O	P85		
	TM17IO	40	I/O	P16		

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Function	Pin Name	Pin No.	I/O	Other Pins		
16-bit timer I/O pin	TM8AIO	57	I/O	P36		
	TM8BIO	58	I/O	P37		
	TM9AIO	59	I/O	P42		
	TM9BIO	60	I/O	P43		
	TM10AIO	61	I/O	P46		
	TM10BIO	62	I/O	P47		
	TM11IO0	77	I/O	P72		
	TM11IO1	79	I/O	P73		
Motor control 3-phases PWM signal I/O pin	PWM00	64	Output	P52		
	NPWM00	65	Output	P53		
	PWM01	66	Output	P54		
	NPWM01	67	Output	P55		
	PWM02	68	Output	P56		
	NPWM02	69	Output	P57		
	PWM10	70	Output	P62		
	NPWM10	71	Output	P63		
	PWM11	72	Output	P64		
	NPWM11	73	Output	P65		
	PWM12	74	Output	P66		
	NPWM12	75	Output	P67		
Serial clock I/O pin	SBT0	48	I/O	P26		
	SBT1	45	I/O	P23		
	SBT2	42	I/O	P20		
	SBO0	47	Output	P25		
	SBO1	44	Output	P22		
	SBO2	41	I/O	P17		
	SBI0	49	Input	P27		
	SBI1	46	Input	P24		
	SBI2	43	Input	P21		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Analog input pin for A/D converter	ADIN00	6	Input	P90		
	ADIN01	7	Input	P91		
	ADIN02	8	Input	P92		
	ADIN03	9	Input	P93		
	ADIN04	11	Input	P94	CMP0REF	DA0OUT
	ADIN05	13	Input	P95	CMP0IN	
	ADIN06	14	Input	P96		
	ADIN07	15	Input	P97		
	ADIN08	16	Input	PA0		
	ADIN09	17	Input	PA1		
	ADIN10	18	Input	PA2	CMP1REF	DA1OUT
	ADIN11	19	Input	PA3	CMP1IN	
	ADIN12	20	Input	PA4		
	ADIN13	21	Input	PA5		
	ADIN14	22	Input	PA6		
	ADIN15	23	Input	PA7		
Comparator reference voltage input pin	CMP0REF	11	Input	P94	ADIN04	DA0OUT
	CMP1REF	18	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0IN	13	Input	P95	ADIN05	
	CMP1IN	19	Input	PA3	ADIN11	
Comparator output pin	CMP0OUT	36	Output	P12	IRQ06	
	CMP1OUT	37	Output	P13	IRQ07	
D/A converter output pin	DA0OUT	11	Output	P94	ADIN04	CMP0REF
	DA1OUT	18	Output	PA2	ADIN10	CMP1REF
General-purpose I/O Port 1	P10	34	I/O	IRQ04	EXTRG0	
	P11	35	I/O	IRQ05	EXTRG1	
	P12	36	I/O	IRQ06	CMP0OUT	
	P13	37	I/O	IRQ07	CMP1OUT	
	P14	38	I/O	IRQ08		
	P16	40	I/O	TM17IO		
	P17	41	I/O	SBO2		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 2	P20	42	I/O	SBT2		
	P21	43	I/O	SBI2		
	P22	44	I/O	SBO1		
	P23	45	I/O	SBT1		
	P24	46	I/O	SBI1		
	P25	47	I/O	SBO0		
	P26	48	I/O	SBT0		
	P27	49	I/O	SBI0		
General-purpose I/O Port 3	P31	50	I/O	TM1IO		
	P32	51	I/O	TM2IO		
	P33	52	I/O	TM3IO		
	P34	53	I/O	TM4IO		
	P35	55	I/O	TM5IO		
	P36	57	I/O	TM8AIO		
	P37	58	I/O	TM8BIO		
General-purpose I/O Port 4	P42	59	I/O	TM9AIO		
	P43	60	I/O	TM9BIO		
	P46	61	I/O	TM10AIO		
	P47	62	I/O	TM10BIO		
General-purpose I/O Port 5	P51	63	I/O	TM7IO		
	P52	64	I/O	PWM00		
	P53	65	I/O	NPWM00		
	P54	66	I/O	PWM01		
	P55	67	I/O	NPWM01		
	P56	68	I/O	PWM02		
	P57	69	I/O	NPWM02		
General-purpose I/O Port 6	P62	70	I/O	PWM10		
	P63	71	I/O	NPWM10		
	P64	72	I/O	PWM11		
	P65	73	I/O	NPWM11		
	P66	74	I/O	PWM12		
	P67	75	I/O	NPWM12		
General-purpose I/O Port 7	P72	77	I/O	TM11IO0		
	P73	79	I/O	TM11IO1		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 8	P80	1	I/O	IRQ00		
	P81	2	I/O	IRQ01		
	P82	3	I/O	IRQ02		
	P83	4	I/O	IRQ03		
	P85	5	I/O	TM15IO		
General-purpose I/O Port 9	P90	6	I/O	ADIN00		
	P91	7	I/O	ADIN01		
	P92	8	I/O	ADIN02		
	P93	9	I/O	ADIN03		
	P94	11	I/O	ADIN04	CMP0REF	DA0OUT
	P95	13	I/O	ADIN05	CMP0IN	
	P96	14	I/O	ADIN06		
	P97	15	I/O	ADIN07		
General-purpose I/O Port A	PA0	16	I/O	ADIN08		
	PA1	17	I/O	ADIN09		
	PA2	18	I/O	ADIN10	CMP1REF	DA1OUT
	PA3	19	I/O	ADIN11	CMP1IN	
	PA4	20	I/O	ADIN12		
	PA5	21	I/O	ADIN13		
	PA6	22	I/O	ADIN14		
	PA7	23	I/O	ADIN15		
Clock input pin for on-board debugger	SCLK	24	Input			
Data I/O pin for on-board debugger	SDATA	25	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	34	I/O	P10	IRQ04	
	EXTRG1	35	I/O	P11	IRQ05	

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1.4.2.6 Pin Function Table in MN103SFX1K Series

Pin function table in MN103SFX1K series is shown in Table 1.4-6 .

Table 1.4-6 Pin function table in MN103SFX1K series

Function	Pin Name	Pin No.	I/O	Other Pins		
Power supply pin for digital I/O	VDD50	25	Input			
		60				
Power supply pin for analog	AVDD50	10	Input			
GND pin for digital	VSS	23	Input			
		62				
GND pin for analog	AVSS	8	Input			
Power supply output pin for internal circuit	VOUT18	26	Output			
Test signal input pin	NTEST	24	Input			
Start sector control pin	NBOOT	20	Input			
Reset signal input pin (negative logic)	NRST	31	I/O			
High-speed oscillation input pin	OSCI	22	Input			
High-speed oscillation output pin	OSCO	21	Output			
External interrupt input pin	IRQ00	64	Input	P80		
	IRQ01	1	Input	P81		
	IRQ02	2	Input	P82		
	IRQ03	3	Input	P83		
	IRQ04	27	Input	P10	EXTRG0	
	IRQ05	28	Input	P11	EXTRG1	
	IRQ06	29	Input	P12	CMP0OUT	
	IRQ07	30	Input	P13	CMP1OUT	
8-bit timer I/O pin	TM1IO	41	I/O	P31		
	TM2IO	42	I/O	P32		
	TM3IO	43	I/O	P33		
	TM4IO	44	I/O	P34		
	TM5IO	45	I/O	P35		
16-bit timer I/O pin	TM9AIO	46	I/O	P42		
	TM9BIO	47	I/O	P43		
	TM10AIO	48	I/O	P46		
	TM10BIO	49	I/O	P47		

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Function	Pin Name	Pin No.	I/O	Other Pins		
Motor control 3-phases PWM signal I/O pin	PWM00	50	Output	P52		
	NPWM00	51	Output	P53		
	PWM01	52	Output	P54		
	NPWM01	53	Output	P55		
	PWM02	54	Output	P56		
	NPWM02	55	Output	P57		
	PWM10	56	Output	P62		
	NPWM10	57	Output	P63		
	PWM11	58	Output	P64		
	NPWM11	59	Output	P65		
	PWM12	61	Output	P66		
	NPWM12	63	Output	P67		
Serial clock I/O pin	SBT0	39	I/O	P26		
	SBT1	36	I/O	P23		
	SBT2	33	I/O	P20		
	SBO0	38	Output	P25		
	SBO1	35	Output	P22		
	SBO2	32	I/O	P17		
	SBI0	40	Input	P27		
	SBI1	37	Input	P24		
	SBI2	34	Input	P21		
Analog input pin for A/D converter	ADIN00	4	Input	P90		
	ADIN01	5	Input	P91		
	ADIN02	6	Input	P92		
	ADIN03	7	Input	P93		
	ADIN04	9	Input	P94	CMP0REF	DA0OUT
	ADIN05	11	Input	P95	CMP0IN	
	ADIN06	12	Input	P96		
	ADIN07	13	Input	P97		
	ADIN08	14	Input	PA0		
	ADIN09	15	Input	PA1		
	ADIN10	16	Input	PA2	CMP1REF	DA1OUT
	ADIN11	17	Input	PA3	CMP1IN	
Comparator reference voltage input pin	CMP0REF	9	Input	P94	ADIN04	DA0OUT
	CMP1REF	16	Input	PA2	ADIN10	DA1OUT
Comparator input pin	CMP0IN	11	Input	P95	ADIN05	
	CMP1IN	17	Input	PA3	ADIN11	

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Function	Pin Name	Pin No.	I/O	Other Pins		
Comparator output pin	CMP0OUT	29	Output	P12	IRQ06	
	CMP1OUT	30	Output	P13	IRQ07	
D/A converter output pin	DA0OUT	9	Output	P94	ADIN04	CMP0REF
	DA1OUT	16	Output	PA2	ADIN10	CMP1REF
General-purpose I/O Port 1	P10	27	I/O	IRQ04	EXTRG0	
	P11	28	I/O	IRQ05	EXTRG1	
	P12	29	I/O	IRQ06	CMP0OUT	
	P13	30	I/O	IRQ07	CMP1OUT	
	P17	32	I/O	SBO2		
General-purpose I/O Port 2	P20	33	I/O	SBT2		
	P21	34	I/O	SBI2		
	P22	35	I/O	SBO1		
	P23	36	I/O	SBT1		
	P24	37	I/O	SBI1		
	P25	38	I/O	SBO0		
	P26	39	I/O	SBT0		
	P27	40	I/O	SBI0		
General-purpose I/O Port 3	P31	41	I/O	TM1IO		
	P32	42	I/O	TM2IO		
	P33	43	I/O	TM3IO		
	P34	44	I/O	TM4IO		
	P35	45	I/O	TM5IO		
General-purpose I/O Port 4	P42	46	I/O	TM9AIO		
	P43	47	I/O	TM9BIO		
	P46	48	I/O	TM10AIO		
	P47	49	I/O	TM10BIO		
General-purpose I/O Port 5	P52	50	I/O	PWM00		
	P53	51	I/O	NPWM00		
	P54	52	I/O	PWM01		
	P55	53	I/O	NPWM01		
	P56	54	I/O	PWM02		
	P57	55	I/O	NPWM02		
General-purpose I/O Port 6	P62	56	I/O	PWM10		
	P63	57	I/O	NPWM10		
	P64	58	I/O	PWM11		
	P65	59	I/O	NPWM11		
	P66	61	I/O	PWM12		
	P67	63	I/O	NPWM12		

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Function	Pin Name	Pin No.	I/O	Other Pins		
General-purpose I/O Port 8	P80	64	I/O	IRQ00		
	P81	1	I/O	IRQ01		
	P82	2	I/O	IRQ02		
	P83	3	I/O	IRQ03		
General-purpose I/O Port 9	P90	4	I/O	ADIN00		
	P91	5	I/O	ADIN01		
	P92	6	I/O	ADIN02		
	P93	7	I/O	ADIN03		
	P94	9	I/O	ADIN04	CMP0REF	DA0OUT
	P95	11	I/O	ADIN05	CMP0IN	
	P96	12	I/O	ADIN06		
	P97	13	I/O	ADIN07		
General-purpose I/O Port A	PA0	14	I/O	ADIN08		
	PA1	15	I/O	ADIN09		
	PA2	16	I/O	ADIN10	CMP1REF	DA1OUT
	PA3	17	I/O	ADIN11	CMP1IN	
Clock input pin for on-board debugger	SCLK	18	Input			
Data I/O pin for on-board debugger	SDATA	19	I/O			
Trigger I/O pin for on-board debugger	EXTRG0	27	I/O	P10	IRQ04	
	EXTRG1	28	I/O	P11	IRQ05	

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1.5 Electrical Characteristics

Electrical characteristics is described.

Hint:

Electrical characteristics given in this section are preliminary and subject to change without notice. When using LSI, contact our sales office for product specifications.

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1.5.1 Absolute Maximum Ratings

					V_{SS} =AV_{SS} =0.0 V
Parameter		Symbol	Rating		Unit
A1	External supply voltage 1	V_{DD50A}	-0.3 to 7.0		V
A2	External supply voltage 2	AV_{DD50A}	-0.3 to 7.0		
A3	Internal supply voltage	V_{OUT18A}	-0.3 to 2.5		
A4	Input pin voltage	V_{I1A}	-0.3 to V_{DD50} +0.3 (Upper limit: 7.0)		
A5	Input pin voltage for VGA	V_{I2A}	-1.5 to V_{DD50} +0.3 (Upper limit: 7.0)		
A6	I/O pin voltage	V_{IOA}	-0.3 to V_{DD50} +0.3 (Upper limit: 7.0)		
A7	Average output current (I/O pin)	I_{OAVG}	±8.0		mA
A8	Peak output current	I_{OPEAK}	±15.0		
A9	Operating ambient temperature	T_{OPRA}	-40 to 105		°C
A10	Storage temperature	T_{STGA}	-40 to 125		
A11	Power dissipation	P_{DA}	Ta=85 °C	500	mW
			Ta=105 °C	330	
Note:	The absolute maximum ratings are the limit values beyond which the LSI may be damaged. It is not guarantee the operation in these conditions. The rating of the average output current is applied for the period of any 100 ms.				

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1.5.2 Operating Conditions

Operating Supply Voltage							V_{SS} = AV_{SS} =0.0 V Ta = -40 °C to 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
B1	External supply voltage 1	V_{DD50}		V_{RST}	5.0	5.5	V
B2	External supply voltage 2	AV_{DD50}		V_{RST}	V_{DD50}	5.5	
Note:	For the supply voltage detection level V_{RST} refer to Auto-reset characteristics in 1.5.4 Analog Characteristics.						
Note:	Internal regulator output can not be used for supply to other LSI.						

Oscillation circuit							V_{DD50} = AV_{DD50} =V_{RST} to 5.5 V V_{SS} = AV_{SS} = 0.0 V T_a = -40 °C to 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
B3	Input frequency	FOSC		4		16	MHz
B4	Internal feedback resistor	R_{FB}			1.2		MΩ
Note:	A capacity value changes by each oscillator. To decide appropriate capacity value, please consult the oscillator manufacturer and perform matching tests enough.						

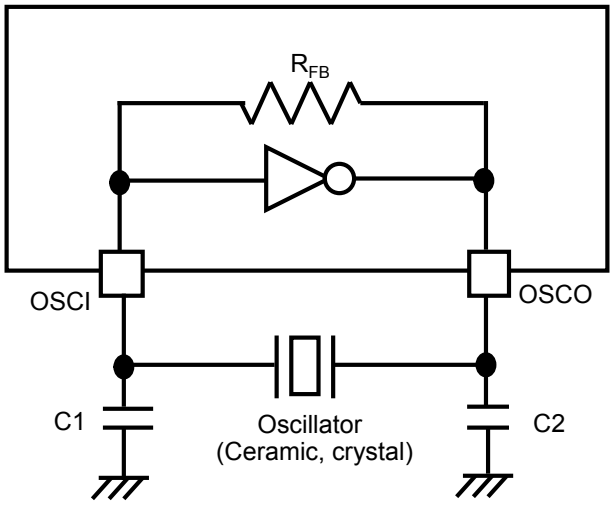

Figure 1.5-1 Oscillation Circuit

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External clock input OSCI (OSCO left open)				$V_{DD50} = AV_{DD50} = V_{RST}$ to 5.5 V $V_{SS} = AV_{SS} = 0.0$ V T_a = -40 °C to 105 °C			
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
B5	Clock frequency	Fcp		4		16	MHz
B6	High-level pulse width	twh1		25			ns
B7	Low-level pulse width	twl1		25			
B8	Rise time	twr1				5	ns
B9	Fall time	twf1				5	
Note: Be sure that the clock duty ratio is 45 % to 55 %.							

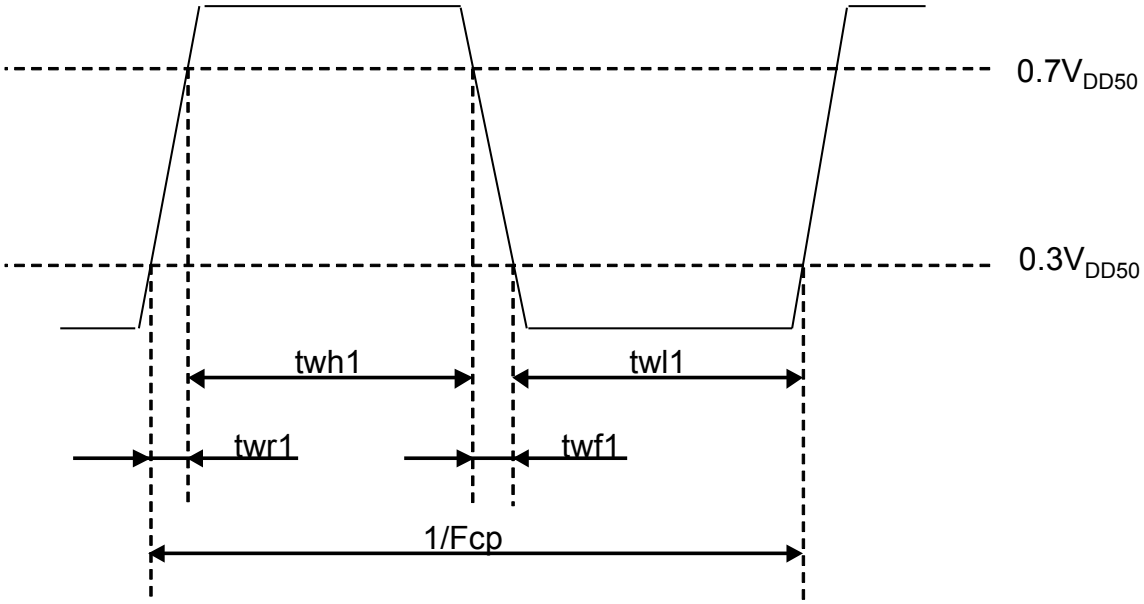

Figure 1.5-2 OSCI input waveform

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1.5.3 DC Characteristics

Power supply current during operation							V_{SS} = AV_{SS} =0.0 V T_a =-40 °C to 105 °C Output pins left open
Parameter		Sym-bol	Conditions		Rating		Unit
					TYP	MAX	
C1	Power supply current in NORMAL mode	I_{DD1}	V_{DD50} =5.0V, Fosc=8 MHz, PLL is used, MCLK=72 MHz, IOCLK=36 MHz Peripheral circuits are stopped.		23		mA
C2		I_{DD2}	V_{DD50} =5.0V, Fosc=8 MHz, PLL is used, MCLK=72 MHz, IOCLK=36 MHz Peripheral circuits are operating			40	
C3	Power supply current in SLEEP mode	I_{DD3}	V_{DD50} =5.0V, Fosc=8 MHz, PLL is used, MCLK=72 MHz, IOCLK=36 MHz Peripheral circuits are operating.		10	20	
C4	Power supply current in HALT mode	I_{DD4}	V_{DD50} =5.0V, Fosc=8 MHz, PLL is used, MCLK is stopped, IOCLK is stopped Peripheral circuits are stopped.		4	6	
C5	Power supply current in STOP mode	I_{DD5}	V_{DD50} =5.0V, Fosc is stopped, PLL is stopped	Ta=25 °C	150		µA
C6		I_{DD6}		Ta=105 °C		900	

Input pin 1 NRST, SCLK, SDATA							V_{DD50} = AV_{DD50} =5.0V V_{SS} =AV_{SS} = 0.0 V T_a = -40 °C to 105 °C
Parameter		Sym-bol	Conditions	Rating			Unit
				MIN	TYP	MAX	
C7	Input voltage High-level	V_{IH1}		V_{DD50} ×0.7		V_{DD50}	V
C8	Input voltage Low-level	V_{IL1}		V_{SS}		V_{DD50} ×0.3	
C9	Internal pull-up resistance	R_{IO1}	V_{DD50} = 5.0 V, V_{IN} = 0.0 V	15	30	60	kΩ

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Input pin 2 NBOOT, NTEST				$V_{DD50} = AV_{DD50} = 5.0V$ $V_{SS} = AV_{SS} = 0.0$ V $T_a = -40$ °C to 105 °C			
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
C10	Input voltage High-level	V_{IH2}		$V_{DD50} \times 0.7$		V_{DD50}	V
C11	Input voltage Low -level	V_{IL2}		V_{SS}		$V_{DD50} \times 0.3$	

Input pin 3 <Only MN103SFX7K / X6K / X5K> P90 to P93, P96, P97, PA0, PA1				$V_{DD50} = AV_{DD50} = 5.0V$ $V_{SS} = AV_{SS} = 0.0$ V $T_a = -40$ °C to 105 °C			
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
C12	Input voltage High-level	V_{IH3}		$V_{DD50} \times 0.7$		V_{DD50}	V
C13	Input voltage Low-level	V_{IL3}		V_{SS}		$V_{DD50} \times 0.3$	
C14	Input leakage current	I_{LK3}				±5	µA
C15	Input voltage range 1 of VGA	V_{IVGA1}	VGA is used Gain = 2	-1.00		1.00	V
C16	Input voltage range 2of VGA	V_{IVGA2}	VGA is used Gain = 3	-0.66		0.66	
C17	Input voltage range 3 of VGA	V_{IVGA3}	VGA is used Gain = 4	-0.50		0.50	
C18	Input voltage range 4 of VGA	V_{IVGA4}	VGA is used Gain = 5	-0.40		0.40	
C19	Input voltage range 5 of VGA	V_{IVGA5}	VGA is used Gain = 6	-0.33		0.33	
C20	Input voltage range 6 of VGA	V_{IVGA6}	VGA is used Gain = 8	-0.25		0.25	
C21	Input voltage range 7 of VGA	V_{IVGA7}	VGA is used Gain = 10	-0.20		0.20	
C22	Input voltage range 8 of VGA	V_{IVGA8}	VGA is used Gain = 20	-0.10		0.10	

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I/O pin
< MN103SFX7K>
P10 to P17, P20 to P27, P30 to P37, P40 to P47, P50 to P57, P60 to P67, P72 to P77, P80 to P87, P94, P95, PA2 to PA7, PB0 to PB3
< MN103SFX6K>
P10 to P14, P16, P17, P20 to P27, P31 to P37, P42, P43, P46, P47, P51 to P57, P62 to P67, P72, P73, P80 to P83, P85, P94, P95, PA2 to PA7
< MN103SFX5K>
P10 to P13, P17, P20 to P27, P31 to P35, P42, P43, P46, P47, P52 to P57, P62 to P67, P80 to P83, P94, P95, PA2 to PA3
< MN103SFX3K>
P10 to P17, P20 to P27, P30 to P37, P40 to P47, P50 to P57, P60 to P67, P72 to P77, P80 to P87, P90 to P97, PA0 to PA7, PB0 to PB3
< MN103SFX2K>
P10 to P14, P16, P17, P20 to P27, P31 to P37, P42, P43, P46, P47, P51 to P57, P62 to P67, P72, P73, P80 to P83, P85, P90 to P97, PA0 to PA7
< MN103SFX1K>
P10 to P13, P17, P20 to P27, P31 to P35, P42, P43, P46, P47, P52 to P57, P62 to P67, P80 to P83, P90 to P97, PA0 to PA3

V_{DD50} = AV_{DD50} =5.0 V
V_{SS} =AV_{SS} = 0.0 V
Ta = -40 °C to 105 °C

Parameter		Sym-bol	Conditions	Rating			Unit
				MIN	TYP	MAX	
C23	Input voltage High-level	V_{IH4}		V_{DD50} ×0.7		V_{DD50}	V
C24	Input voltage Low-level	V_{IL4}		V_{SS}		V_{DD50} ×0.3	
C25	Input leakage current	I_{LK4}				±5	µA
C26	Internal pull-up resistor	R_{IO4}	V_{DD50} = 5.0 V, V_{IN} = 0 V	15	30	60	kΩ
C27	Output voltage High-level	V_{OH4}	V_{DD50} = 5.0 V, I_{OH} = -2.5 mA	4.5			V
C28	Output voltage Low-level	V_{OL4}	V_{DD50} = 5.0 V, I_{OL} = 2.5 mA			0.5	

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1.5.4 Analog Characteristics

A/D0, A/D1, A/D2							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D1	Resolution	-				10	Bit
D2	Integral nonlinearity error	INLE	A/D sampling time ≥ 139ns A/D conversion clock ≤ 36 MHz			±2	LSB
D3	Differential non-linearity error	DNLE				±3	LSB
D4	Zero transition voltage	-		-20		20	mV
D5	Full-scale transition voltage	-		4980		5020	mV
D6	A/D conversion time	-	Resolution 10-bit	0.44			µs
D7	Analog input voltage	V_{IA}		AV_{SS}		AV_{DD50}	V
D8	Analog input leakage current	I_{IA}	When channel is not selected V_{IA} = 0V ~ AV_{DD50}			±5	µA
D9	Power supply current during operation (AVDD50 pin)	I_{AD}	A/D conversion clock = 36 MHz		1		mA/unit

D/A0, D/A1							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D10	Resolution	-				10	Bit
D11	Reference voltage Low-level	V_{REFL_DA}			AV_{SS}		V
D12	Reference voltage High-level	V_{REFH_DA}			AV_{DD50}		
D13	Integral nonlinearity error	INLE				±3	LSB
D14	Differential non-linearity error	DNLE				±3	
D15	Zero-scale output voltage	V_{ZS}	D9 ~ D0 = ALL "L"	-20		20	mV
D16	Full-scale output voltage	V_{FS}	D9 ~ D0 = ALL "H"	4980		5020	
D17	Settling time	T_{daset}				8	µs

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D/A0, D/A1							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D18	Power supply current during operation (AVDD50 pin)	I_{DA}			0.04		mA/unit

VGA0, VGA1							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D19	Gain	V_{vga_gain1}	GAIN setting = 2 times	1.960	1.995	2.030	Times
D20		V_{vga_gain2}	GAIN setting = 3 times	2.940	2.990	3.040	Times
D21		V_{vga_gain3}	GAIN setting = 4 times	3.920	3.990	4.060	Times
D22		V_{vga_gain4}	GAIN setting= 5 times	4.900	4.985	5.070	Times
D23		V_{vga_gain5}	GAIN setting= 6 times	5.880	5.980	6.080	Times
D24		V_{vga_gain6}	GAIN setting=8 times	7.840	7.965	8.090	Times
D25		V_{vga_gain7}	GAIN setting= 10 times	9.800	9.950	10.100	Times
D26		V_{vga_gain8}	GAIN setting= 20 times	19.600	19.900	20.200	Times
D27	Offset voltage	$V_{vga\_offset1}$	GAIN setting =2,3,4,5 times	-60	-25	10	mV
D28		$V_{vga\_offset2}$	GAIN setting =6,8,10 times	-80	-30	20	mV
D29		$V_{vga\_offset3}$	GAIN setting =20 times	-120	-40	40	mV
D30	Settling time	T_{vgaset}				0.6	µs
D31	Power supply current during operation (AVDD50 pin)	I_{VGA}			1.4		mA

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CMP0, CMP1							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D32	Input offset voltage	V_{offset}			±5	±25	mV
D33	Input dynamic range			50		4950	
D34	Input hysteresis width		Hysteresis setting ON		30		
D35			Hysteresis setting OFF		0		
D36	Response time		Noise filter is not used		30		ns
D37	Power supply current during operation (AVDD50 pin)	I_{COMP}			0.3		mA/unit

Auto reset							$V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
D38	Power supply voltage detection level 1	V_{RST1}	At rising	3.6	3.95	4.3	V
D39	Power supply voltage detection level 2	V_{RST2}	At falling	3.5	3.85	4.2	V
D40	Change rate of power supply voltage	ΔV_{DD50}		0.2			ms/V

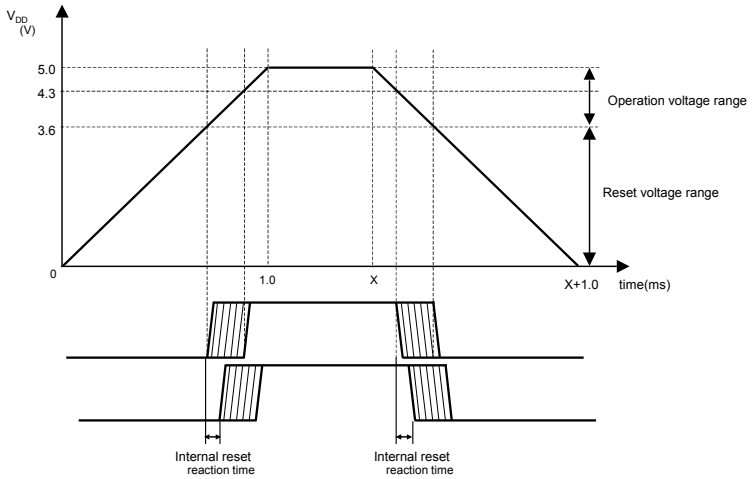

Figure 1.5-3 Auto-reset Characteristics

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1.5.5 AC Characteristics

Reset signal input timing							$V_{DD50} = AV_{DD50} = 5.0$ V $V_{SS} = AV_{SS} = 0.0$ V Ta = -40 °C ~ 105 °C
Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
E1	Reset signal pulse width (NRST)	t_{NRSTW}		1			µs

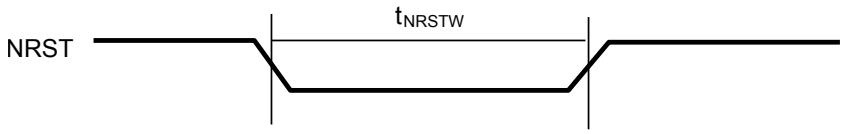

Figure 1.5-4 Reset signal pulse width

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1.5.6 Flash EEPROM E/W Characteristics

V_{SS} = AVss = 0.0 V
Ta = -40 °C ~ 105 °C

Parameter		Symbol	Conditions	Rating			Unit
				MIN	TYP	MAX	
F1	Power supply voltage at E/W	V_{DD50EW}		V_{RST}		5.5	V
F2	Ambient temperature at E/W	V_{OPREW}		-40		105	°C
F3	Permissible rewriting times	E_{MAX1}	Large sector (32 KB)	1,000			Times
F4	Permissible rewriting times	E_{MAX2}	Small sector (8 KB)	100,000			Times
F5	Data retention time	T_{HOLD}		10			Years

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1.6 Package Dimension

The package dimension of each series are shown in the following order.

- LQFP 100 pin Figure 1.6-1
- QFP 100 pin Figure 1.6-2
- TQFP 80 pin Figure 1.6-3
- LQFP 80 pin Figure 1.6-4
- TQFP 64 pin Figure 1.6-5

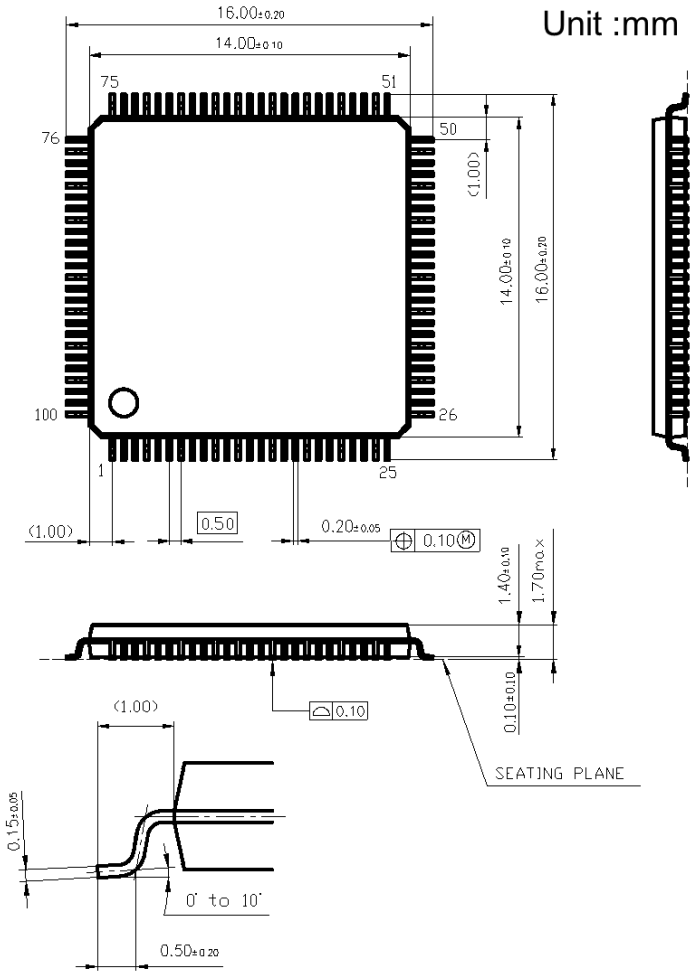

Figure 1.6-1 Package Dimension of LQFP 100 pin

Note:

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

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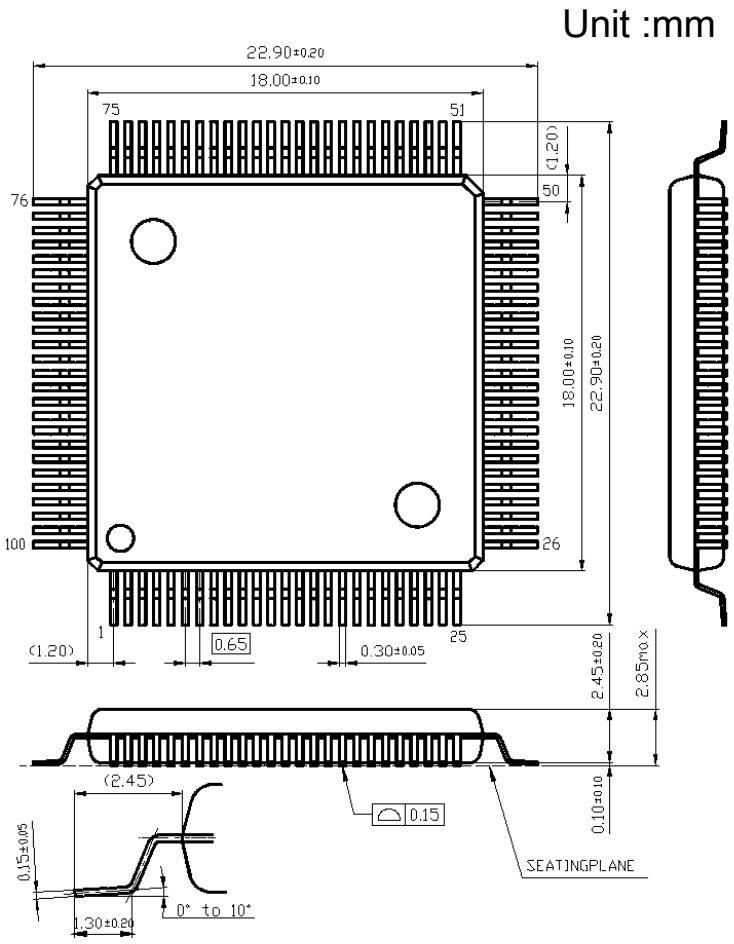

Figure 1.6-2 Package Dimension of QFP 100 pin

Note:

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

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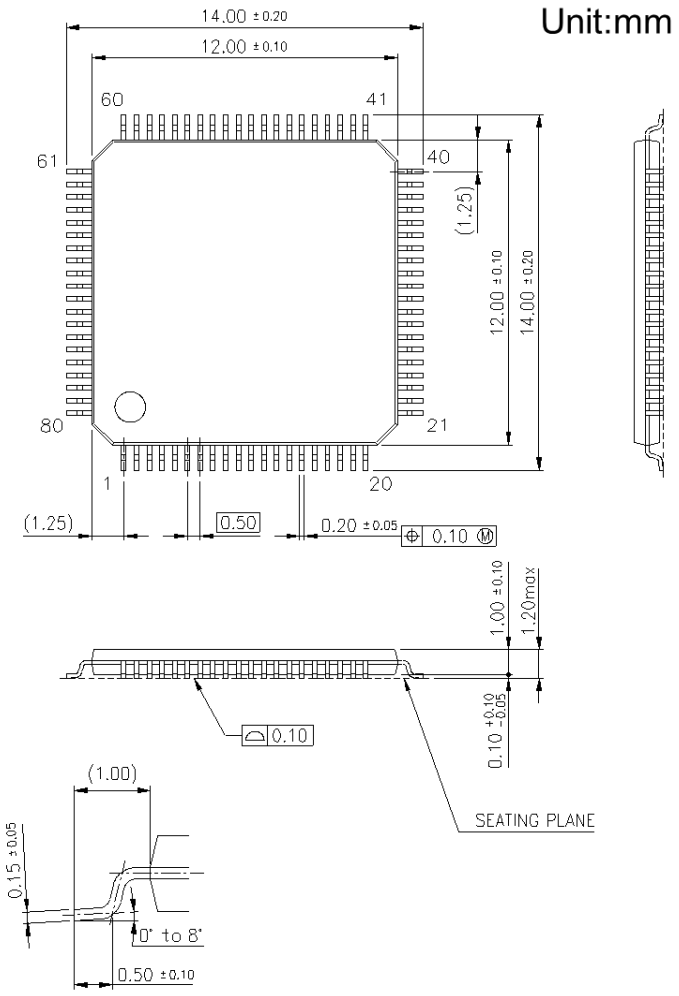

Figure 1.6-3 Package Dimension of TQFP 80 pin

Note:

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

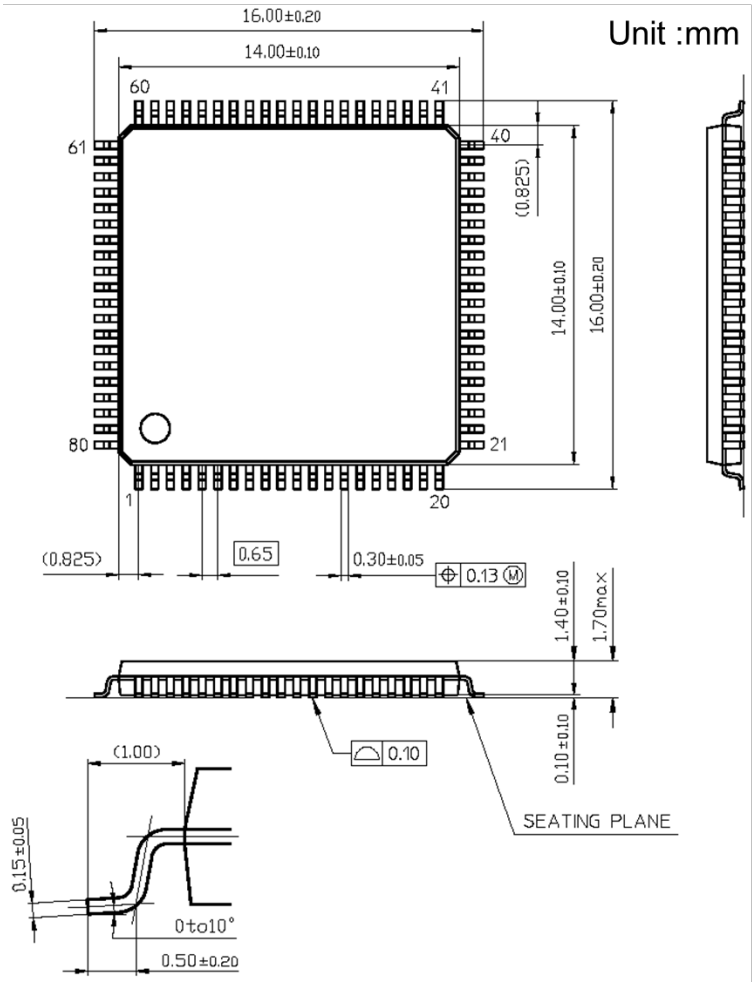

Figure 1.6-4 Package Dimension of LQFP 80 pin

Note:

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

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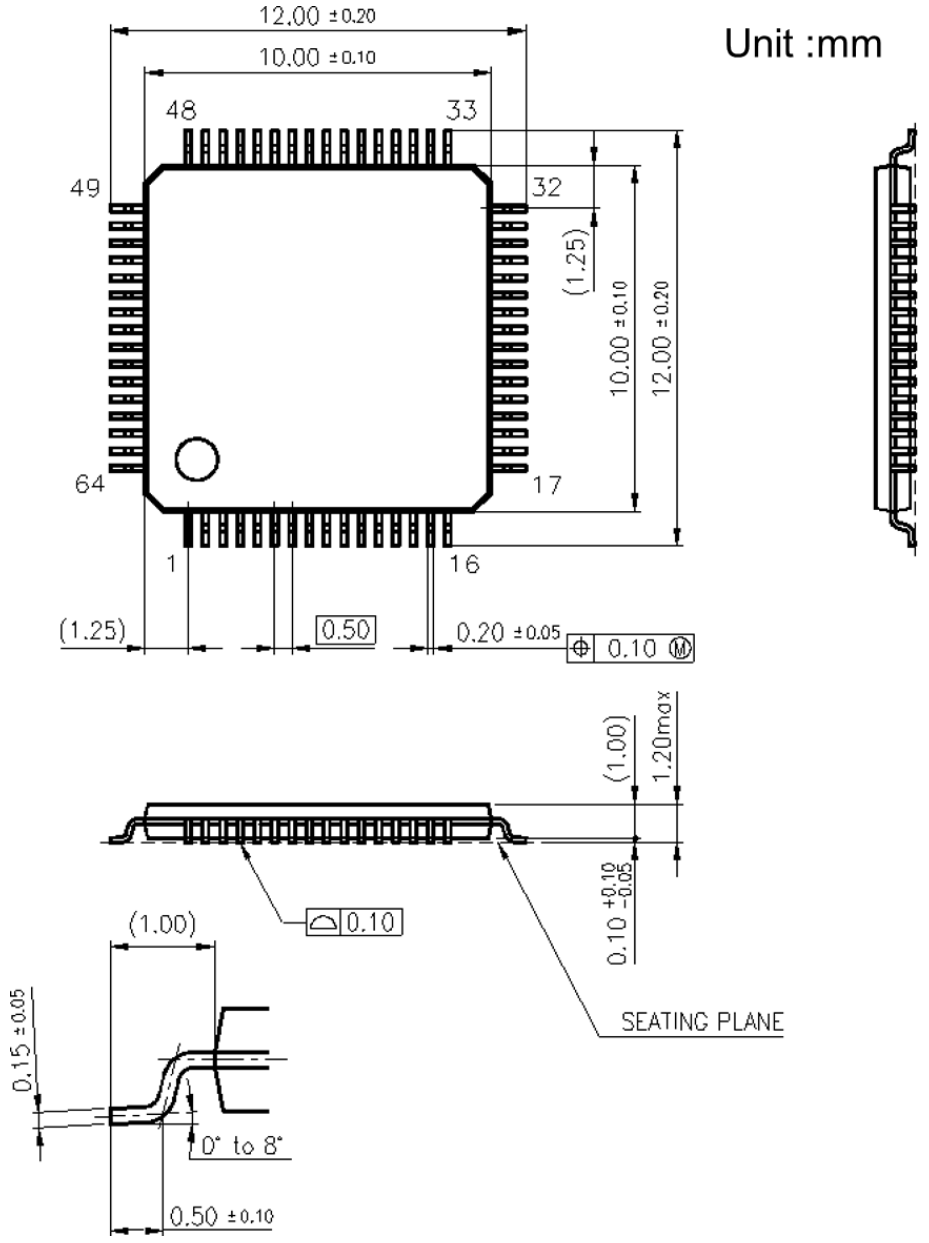

Figure 1.6-5 Package Dimension of TQFP 64 pin

Note:

The external dimensions of the package are subject to change. Before using this product, please obtain product specifications from the sales offices.

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