

N32H474xC/xE

Product Brief

N32H474 series adopts a 32-bit ARM Cortex-M4F core, with a maximum operating frequency of 200MHz, supporting floating-point unit and DSP instructions. It integrates up to 512-KB embedded flash, 192-KB SRAM (including 32-KB CCM SRAM), and 4-KB Backup SRAM. It also integrates 4x 12bit 4.7Msps ADCs, 8x 12bit DAC, 4x PGA, 7x COMP, USB FS Device, U(S)ART, I2C, SPI, CAN-FD, Ethernet, and other communication interfaces. It supports FEMC, xSPI high-speed storage interfaces, I2S audio interface, super high-resolution timer, multiple advanced control timers, general timers, basic timers, low-power timers. It also features a built-in hardware acceleration engine for cryptographic algorithms, supporting AES/TDES, SHA, MD5 algorithms, TRNG true random number generator, and CRC16/32.

Key features

- **CPU Core**
 - 32-bit ARM Cortex-M4F + FPU, single-cycle hardware multiplication and division instruction, support DSP instruction and MPU
 - Built-in 8-KB instruction Cache supporting Flash acceleration unit for zero-wait program execution
 - Frequency up to 200 MHz, 250 DMIPS
- **Memories**
 - 512-KByte of embedded Flash memory with ECC
 - Supports encryption, multi-user partition and data protection
 - 100,000 erase/write cycles and 10-years data retention
 - 160-KByte of general SRAM with hardware parity checking
 - 32-KByte of CCM SRAM with ECC, defaults to general SRAM after power-up, configurable as CCM SRAM
 - 4-KByte of Backup SRAM with ECC available in Standby mode
- **Power Modes**
 - Run mode: 45 mA/MHz@200 MHz (peripherals off, 3.3 V@25°C)
 - Stop0 mode: SRAM and all registers can be configured to retention, RTC run
 - Standby mode: typical value 6uA, all backup registers and Backup SRAM retained, all IOs retained, optional RTC run
- **Clock**
 - HSE: 4MHz~32MHz high-speed external crystal oscillator
 - LSE: 32.768KHz low-speed external crystal oscillator
 - Built-in multiple high speed PLLs

- MCO: Supports 2-channel clock outputs, which can be configured independently as clock output
- HSI: High-speed internal RC 8MHz, with an accuracy of -1.5% to +2% across the full temperature range.
- LSI: Low-speed internal RC 32KHz, with an accuracy of +/-10% across the full temperature range.
- **Reset**
 - Supports power-on/brown-out/external pin reset
 - Supports watchdog reset
 - Supports programmable voltage detection
- **GPIOs**
 - Up to 107 GPIOs
- **Communication Interfaces**
 - 1x USB2.0 FS Device interface, built-in PHY, supports crystal-less mode
 - 6x SPI interfaces, 2x I2S interfaces, support half/full duplex mode, multiplexed with SPI interfaces
 - U(S)ART interfaces
 - 4x USART interfaces (support ISO7816, IrDA, LIN)
 - 4x UART interfaces
 - TX/RX of USART3/UART5/UART8 can be mapped to all pins
 - 4x I2C interfaces(Master/Slave) with speed up to 1 MHz where slave mode support dual address response
 - 3x CAN-FD bus interface, TX/RX can be mapped to all pins
- **High Performance Analog Interfaces**
 - 4x 12bit ADCs with 4.7Msps
 - Multiple precision configuration, support 12-bit, 10-bit, 8-bit, 6-bit sampling precision, resolution up to 16-bit with hardware oversample
 - Up to 16 external single-ended input channels, 3 internal single-ended input channels, support differential mode and single-ended mode
 - 8x 12bit DAC
 - DAC1~4: Support 1 internal output channel and 1 external output channel, with a sampling rate of 1Msps. Support output channel buffered/unbuffered modes.
 - DAC5~8: Support 1 internal output channel and 1 external output channel, with a sampling rate of 15Msps. Only support output channel buffered/unbuffered modes.
 - 4x rail-to-rail PGAs, support differential mode and single-ended mode
 - 7x high-speed comparators (COMP)
 - Supports 1 reference voltage VREFBUF (2.048V/2.5V/2.9V configurable)
 - 1x temperature sensor

- **High Speed External Memory Interfaces**

- 1x xSPI interface, supporting external SRAM, PSRAM and Flash, supporting XIP
- 1x FEMC (Flexible External Memory Controller) interface, supporting external SRAM, PSRAM, NOR Flash and NAND Flash, 8/16-bit data bus width configurable

- **CORDIC Mathematical hardware accelerator for motor control functions**

- **Built-in filter mathematical accelerator FMAC, supporting FIR, IIR filtering**

- **DMA Controllers**

- 2x DMA controller
- Each controller supports 8 channels
- Channel source address and destination address can be configured arbitrarily

- **RTC real-time clock**

- Supports leap-year calendar, alarm event, periodic wake up
- Supports internal and external clock calibration

- **Timers**

- 1x 16bit super high-resolution timer (SHRTIM1)
 - Supports 6x 16-bit timer units, each timer unit has 2 independent channels, with a maximum control precision of 125ps.
 - Supports 12 independent PWM outputs or 6 pairs of complementary PWM outputs.
- 3x 16-bit advanced control timers with maximum control precision of 5 ns
 - Support input capture, complementary output, quadrature encoder input etc.
 - Each has 6 independent channels, 4 of which support 4 pairs of complementary PWM output.
- 10x 16-bit general purpose timers (GTIM1~10)
 - GTIM1~7, with a maximum control precision of 5.56ns, each timer has up to 4 independent channels, each channel supports input capture, output comparison, PWM generation, and single-pulse mode output.
 - GTIM8~10, with a maximum control precision of 5ns, each timer has up to 4 independent channels, each channel supports input capture, output comparison, PWM generation, and single-pulse mode output, only channel 1 supports complementary output with dead time, supports break input.
- 2x 32-bit basic timers
- 2x 16-bit low-power timer, can operate in Stop0 and Standby mode.
- 1x 24-bit SysTick timer.
- 1x 14-bit Window Watchdog (WWDG)
- 1x 12-bit Independent Watchdog (IWDG)

- **Programming Methods**

- Support SWD/JTAG debugging interface.
- Support UART and USB Bootloader
- **Security Features**
 - Flash encryption, multi-user partition management unit (SMPU)
 - Supports write protection (WRP), multiple read protection (RDP) levels (L0/L1/L2)
 - Built-in hardware acceleration engine for cryptographic algorithm
 - Supports AES/TDES, SHA, and MD5 algorithms
 - True random number generator(TRNG)
 - CRC16/32 operation
 - Supports secure boot, program encryption download, secure firmware update
 - Supports external clock failure detection, anti-tamper detection.

- **96-bit UID and 128-bit UCID**

- **Operating Conditions**

- Operating voltage range: 1.8V~3.6V
- Operating temperature range: -40°C ~ 105°C/125°C
- ESD: ±4KV (HBM model), ±1KV (CDM model)
- EFT: EFT: VDD (+/-4KV, level A), I/O (+/-2KV, level A)

- **Packages**

- UQFN48(7mm x 7mm)
- LQFP48(7mm x 7mm)
- LQFP64(10mm x 10mm)
- LQFP80(12mm x 12mm)
- LQFP100(14mm x 14mm)
- LQFP128(14mm x 14mm)

- **Ordering Information**

Reference	Part Number
N32H474xC	N32H474CCU7 N32H474CCL7, N32H474RCL7, N32H474MCL7, N32H474VCL7, N32H474QCL7 N32H474CCU8 N32H474CCL8, N32H474RCL8, N32H474MCL8, N32H474VCL8, N32H474QCL8
N32H474xE	N32H474CEU7 N32H474CEL7, N32H474REL7, N32H474MEL7, N32H474VEL7, N32H474QEL7, N32H474VEL7-W

	N32H474CEU8 N32H474CEL8, N32H474REL8, N32H474MEL8, N32H474VEL8, N32H474QEL8
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1 Ordering Information

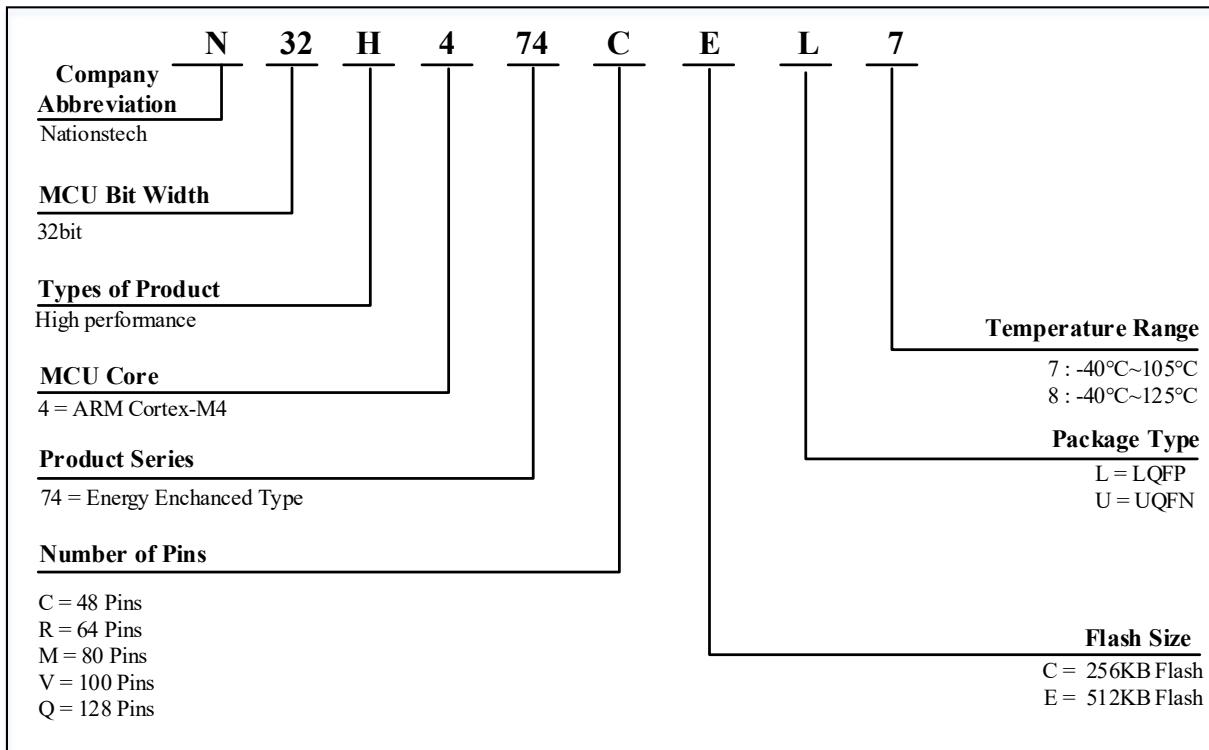


Table 1-1 N32H474 Series Ordering Code

Ordering Code ⁽¹⁾	Package	Size	Packaging ⁽²⁾	SPQ ⁽³⁾	Temperature range
N32H474CCU7	UQFN48	7mm x 7mm	Tray	260	-40°C~105°C
N32H474CCL7	LQFP48	7mm x 7mm	Tray	250	-40°C~105°C
N32H474RCL7	LQFP64	10mm x 10mm	Tray	160	-40°C~105°C
N32H474MCL7	LQFP80	12mm x 12mm	Tray	119	-40°C~105°C
N32H474VCL7	LQFP100	14mm x 14mm	Tray	90	-40°C~105°C
N32H474QCL7	LQFP128	14mm x 14mm	Tray	90	-40°C~105°C
N32H474CEU7	UQFN48	7mm x 7mm	Tray	260	-40°C~105°C
N32H474CEL7	LQFP48	7mm x 7mm	Tray	250	-40°C~105°C
N32H474REL7	LQFP64	10mm x 10mm	Tray	160	-40°C~105°C
N32H474MEL7	LQFP80	12mm x 12mm	Tray	119	-40°C~105°C
N32H474VEL7	LQFP100	14mm x 14mm	Tray	90	-40°C~105°C
N32H474QEL7	LQFP128	14mm x 14mm	Tray	90	-40°C~105°C
N32H474VEL7-W	LQFP100	14mm x 14mm	Tray	90	-40°C~105°C
N32H474CCU8	UQFN48	7mm x 7mm	Tray	260	-40°C~125°C
N32H474CCL8	LQFP48	7mm x 7mm	Tray	250	-40°C~125°C
N32H474RCL8	LQFP64	10mm x 10mm	Tray	160	-40°C~125°C

N32H474MCL8	LQFP80	12mm x 12mm	Tray	119	-40°C~125°C
N32H474VCL8	LQFP100	14mm x 14mm	Tray	90	-40°C~125°C
N32H474QCL8	LQFP128	14mm x 14mm	Tray	90	-40°C~125°C
N32H474CEU8	UQFN48	7mm x 7mm	Tray	260	-40°C~125°C
N32H474CEL8	LQFP48	7mm x 7mm	Tray	250	-40°C~125°C
N32H474REL8	LQFP64	10mm x 10mm	Tray	160	-40°C~125°C
N32H474MEL8	LQFP80	12mm x 12mm	Tray	119	-40°C~125°C
N32H474VEL8	LQFP100	14mm x 14mm	Tray	90	-40°C~125°C
N32H474QEL8	LQFP128	14mm x 14mm	Tray	90	-40°C~125°C

1. For the latest detailed-ordering information, please refer to the Selection Guide.
2. The packaging provided is the basic packaging. If user has any other requirements, please contact Naitons.
3. Minimum packaging quantity.

2 Product Configurations

Table 2-1 N32H474 Series Product Configuration

Device	N32H474CCU7/8 N32H474CEU7/8	N32H474CCL7/8 N32H474CEL7/8	N32H474RCL7/8 N32H474REL7/8	N32H474MCL7/8 N32H474MEL7/8	N32H474VCL7/8 N32H474VEL7/8	N32H474QCL7/8 N32H474QEL7/8		
Operating Condition	1.8~3.6V/-40~105°C /125°C							
CPU Frequency	ARM Cortex-M4F @200MHz, 250DMIPS							
Flash Capacity (KB)	256	512	256	512	256	512		
Total SRAM (KB)	General SRAM	112	160	112	160	112		
	CCM SRAM ⁽¹⁾	32						
	Backup SRAM	4						
Times	SHRTIM	1*16bit ⁽²⁾		1*16bit				
	ATIM	3*16bit		3*16bit				
	GTIM	7*16bit 3*16bit		7*16bit 3*16bit	7*16bit 3*16bit			
	BTIM	2*32bit						
	LPTIM	2*16bit						
	SysTick timer	1						
	WWDG	1*14bit						
	IWDG	1*12bit						
	RTC	Yes						
Communication Interfaces	SPI/I2S	5/2		6/2				
	I ² C	4						
	USART	4						
	UART	4						
	USB FS Device	Yes						
	FDCAN	3						
Memory Expansion	XSPI	Yes ⁽³⁾		Yes				
	FEMC	No		Yes ⁽⁴⁾	Yes			

GPIO WKUP Pins	42 3	38 3	52 4	66 4	86 5	107 5
DMA Number of channels	2 16Channel					
12bit ADC Number of channels	4 21Channel	4 20Channel	4 26Channel	4 38Channel	4 45Channel	4 51Channel
12bit DAC Number of channels	8 8 (4 External/Internal + 4 Internal)					
PGA	4					
COMP	7					
VREFBUF	Yes					
Algorithm Support	DES/3DES、AES、SHA1/SHA224/SHA256, MD5, CRC16/CRC32					
TRNG	Yes					
Cordic	Yes					
FMAC	Yes					
Security Protection	Read-write protection (RDP/WRP), storage encryption, partition protection, secure boot					
Package	UQFN48	LQFP48	LQFP64	LQFP80	LQFP100	LQFP128

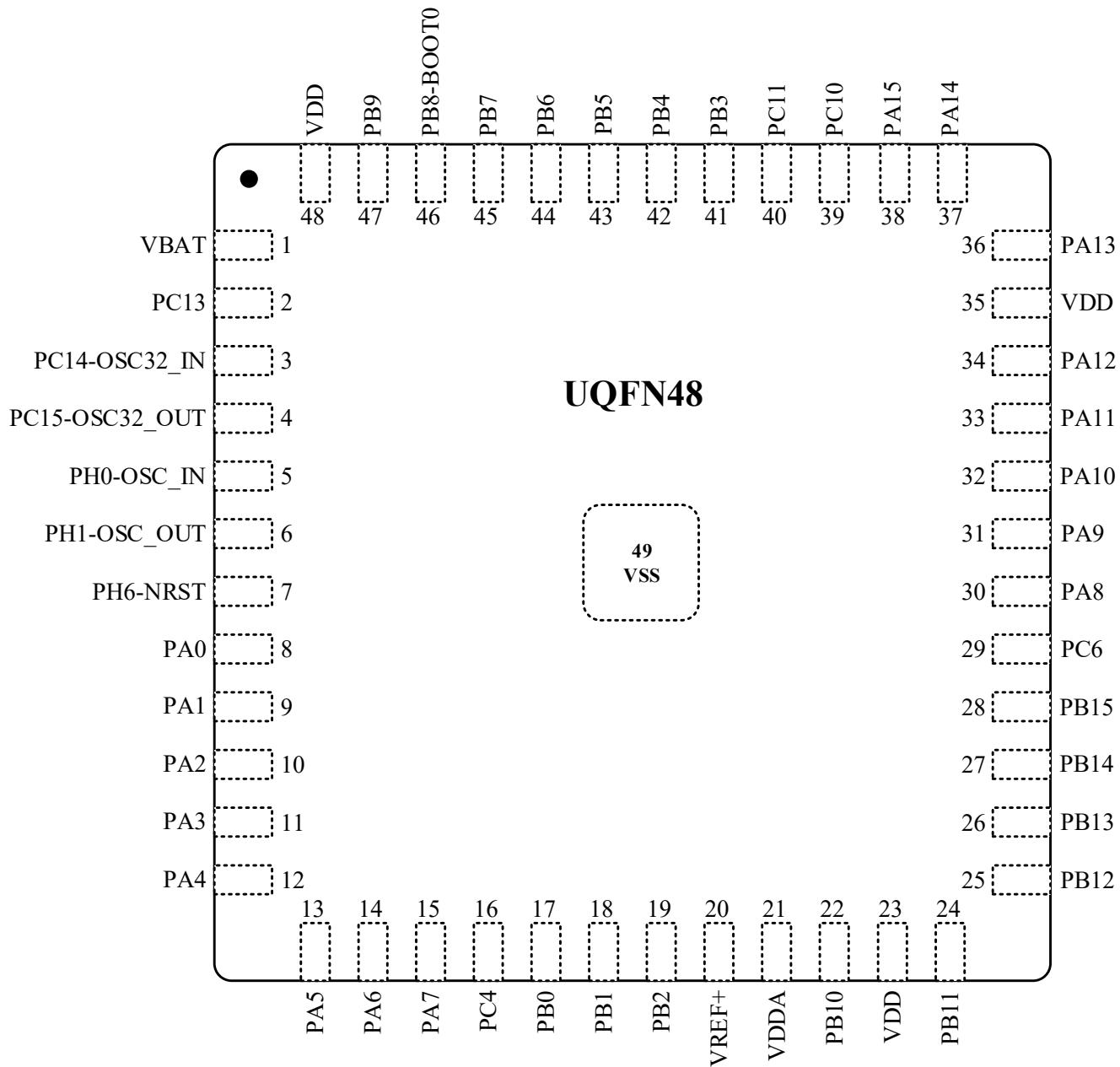
Notes:

- (1) CCM SRAM is powered up as general SRAM by default, and users can configure it as CCM SRAM.
- (2) SHRTIM in the two packaging forms UQFN48 and LQFP48 only supports 4 timing units A~D.
- (3) XSPI does not support 8-wire mode.
- (4) FMEC only supports address bus and data bus multiplexing

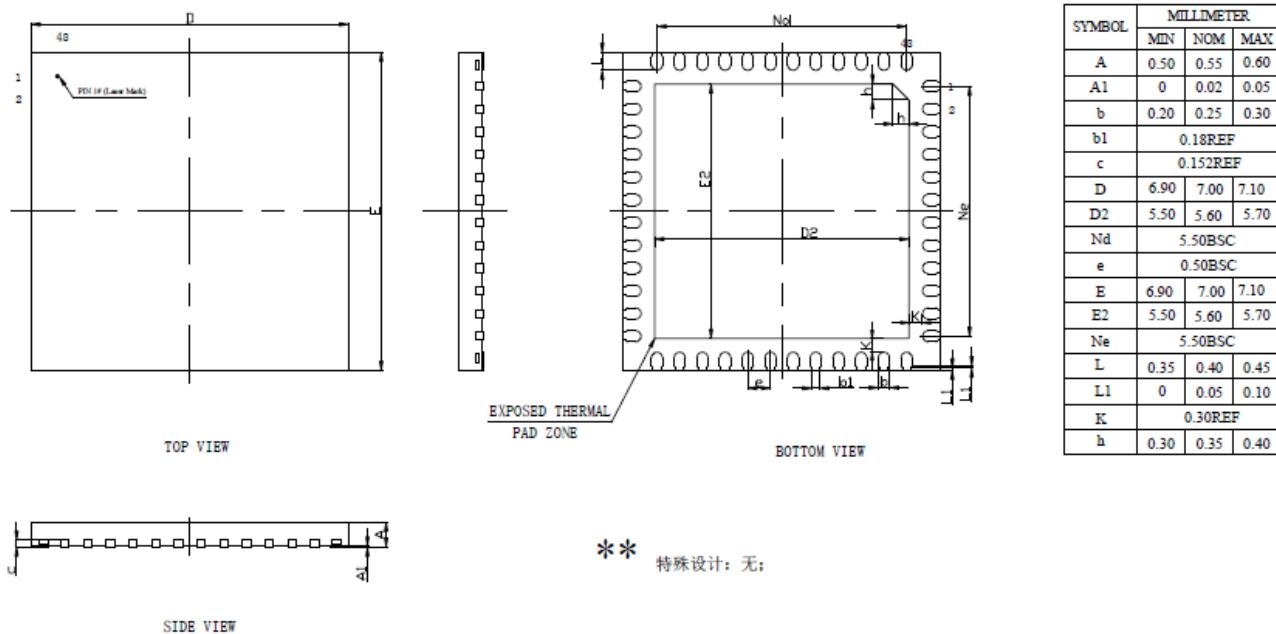
3 Package

3.1 UQFN48

3.1.1 UQFN48 Pinout



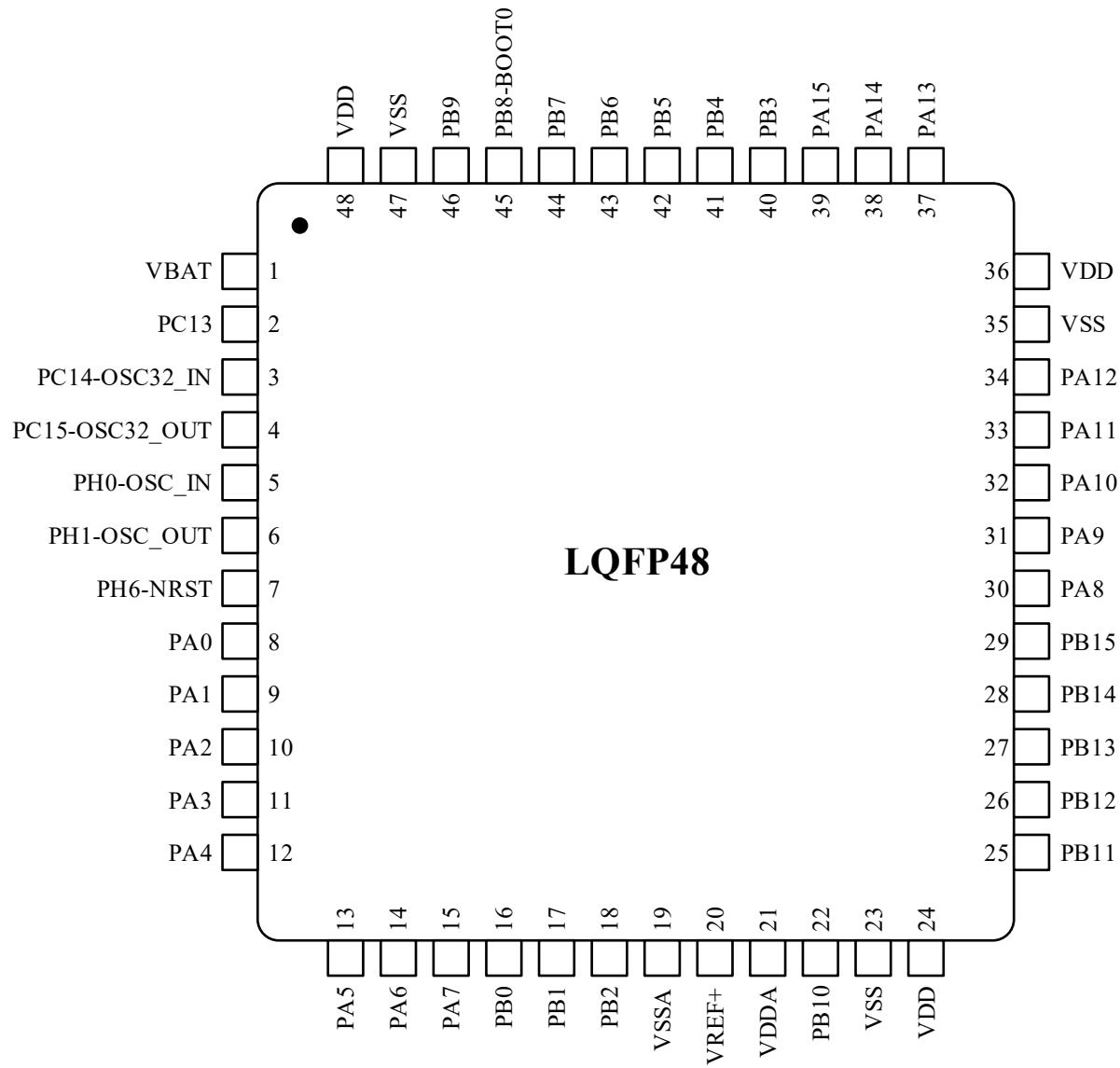
3.1.2 UQFN48 Package



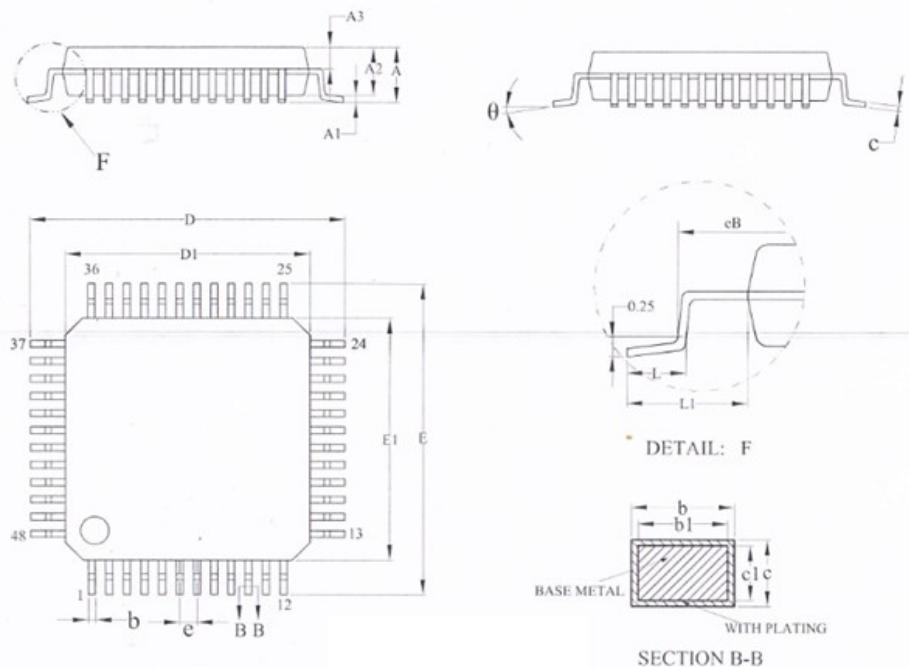
** 特殊设计: 无;

3.2 LQFP48

3.2.1 LQFP48 Pinout



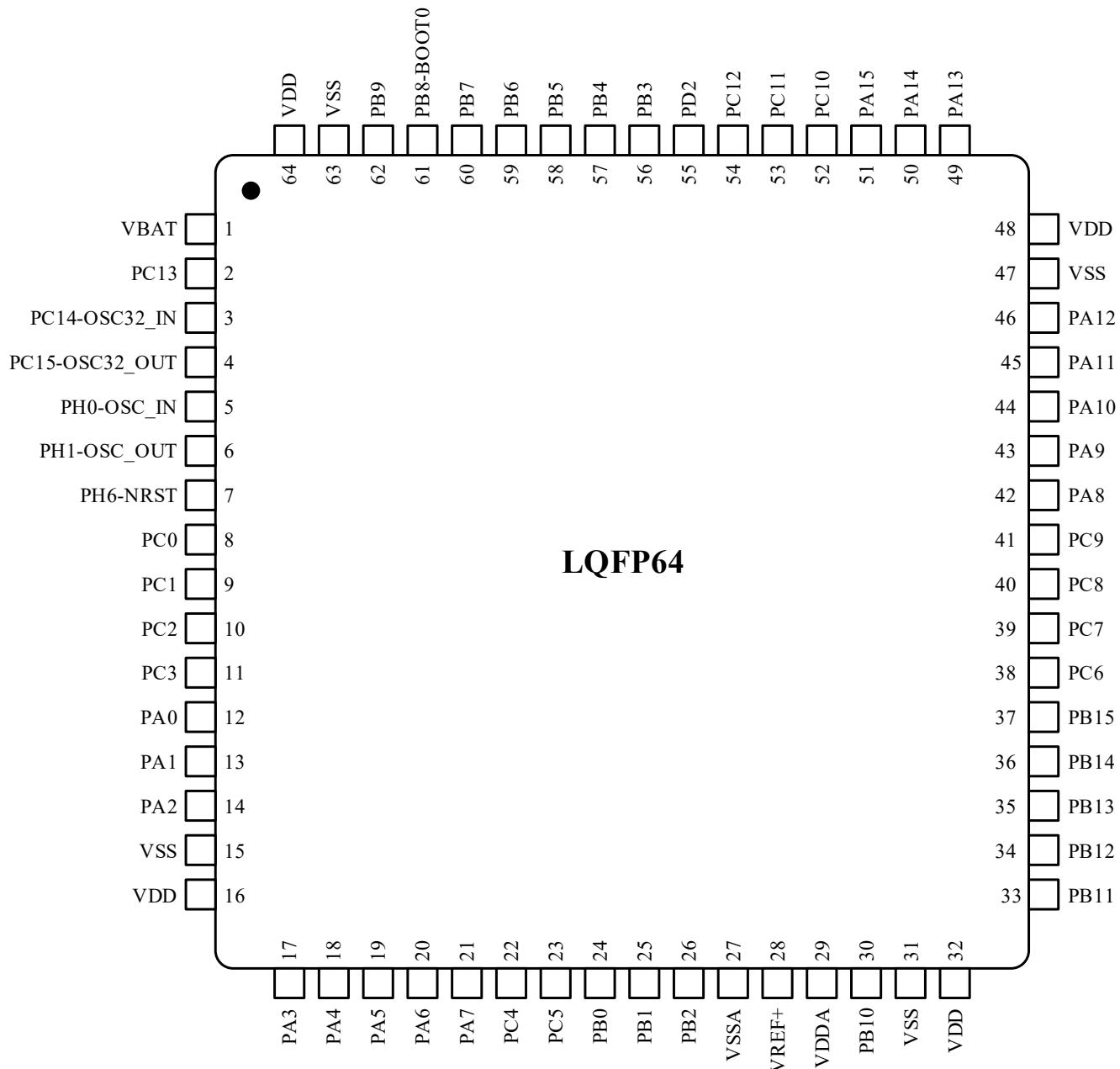
3.2.2 LQFP48 Package



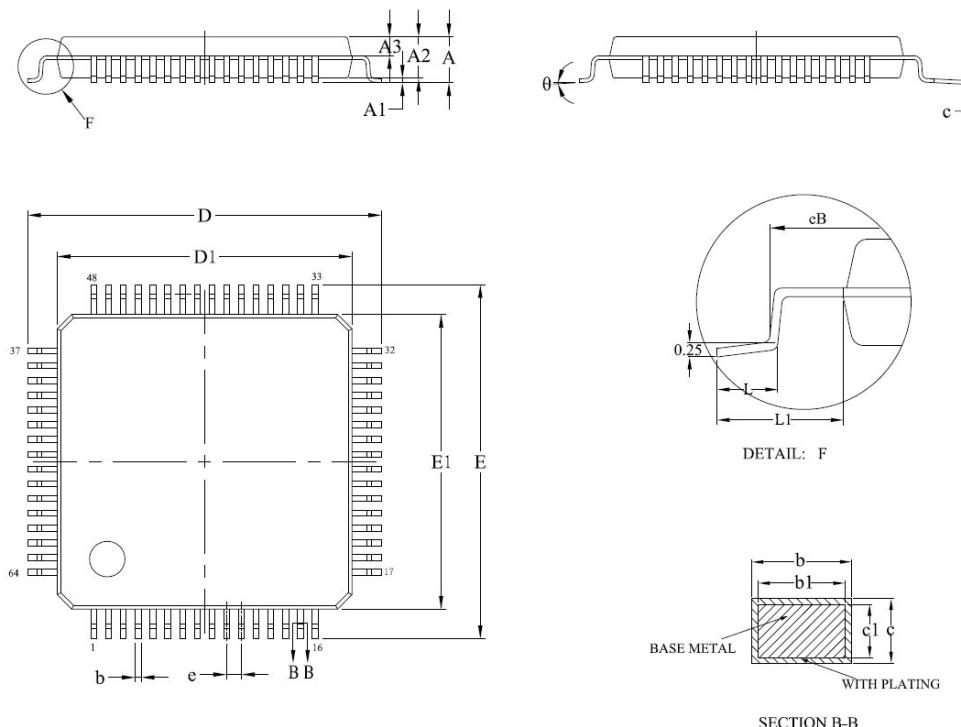
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
cB	8.10	—	8.25
e	0.50BSC		
L	0.45	—	0.75
L1	1.00REF		
θ	0	—	7°

3.3 LQFP64

3.3.1 LQFP64 Pinout



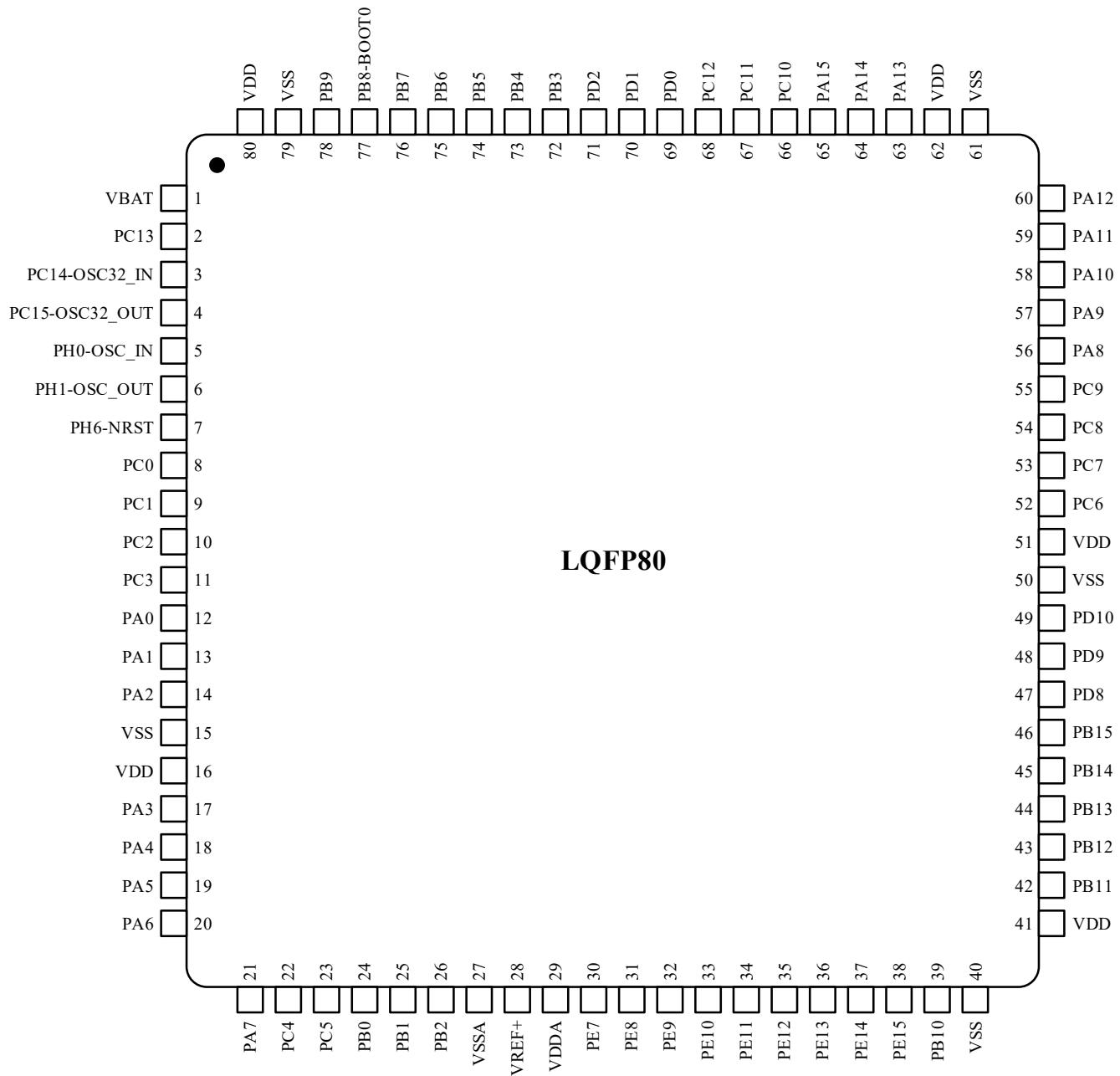
3.3.2 LQFP64 Package



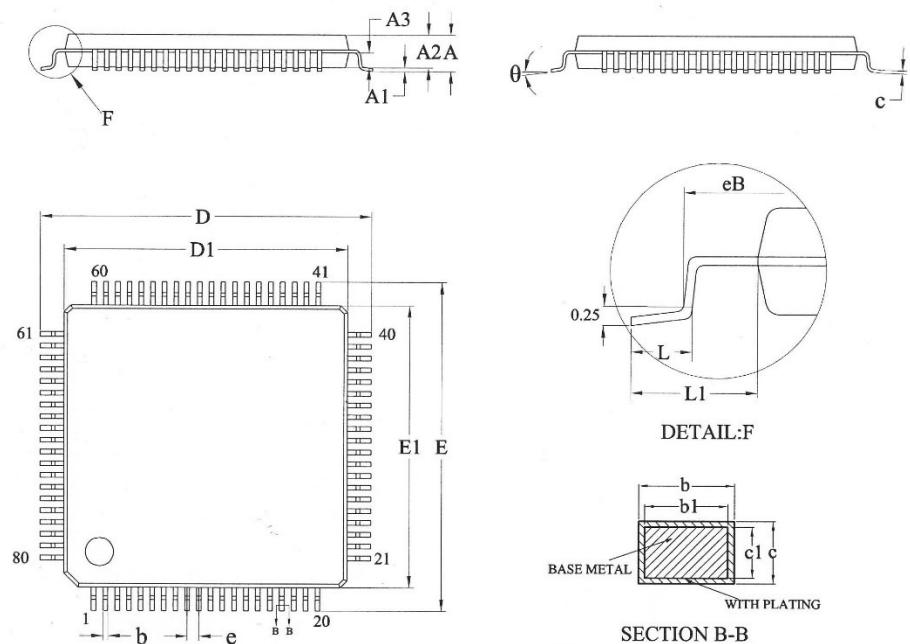
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	11.80	12.00	12.20
D1	9.90	10.00	10.10
E	11.80	12.00	12.20
E1	9.90	10.00	10.10
e	0.50BSC		
eB	11.05	—	11.25
L	0.45	—	0.75
L1	1.00REF		
θ	0	—	7°

3.4 LQFP80

3.4.1 LQFP80 Pinout



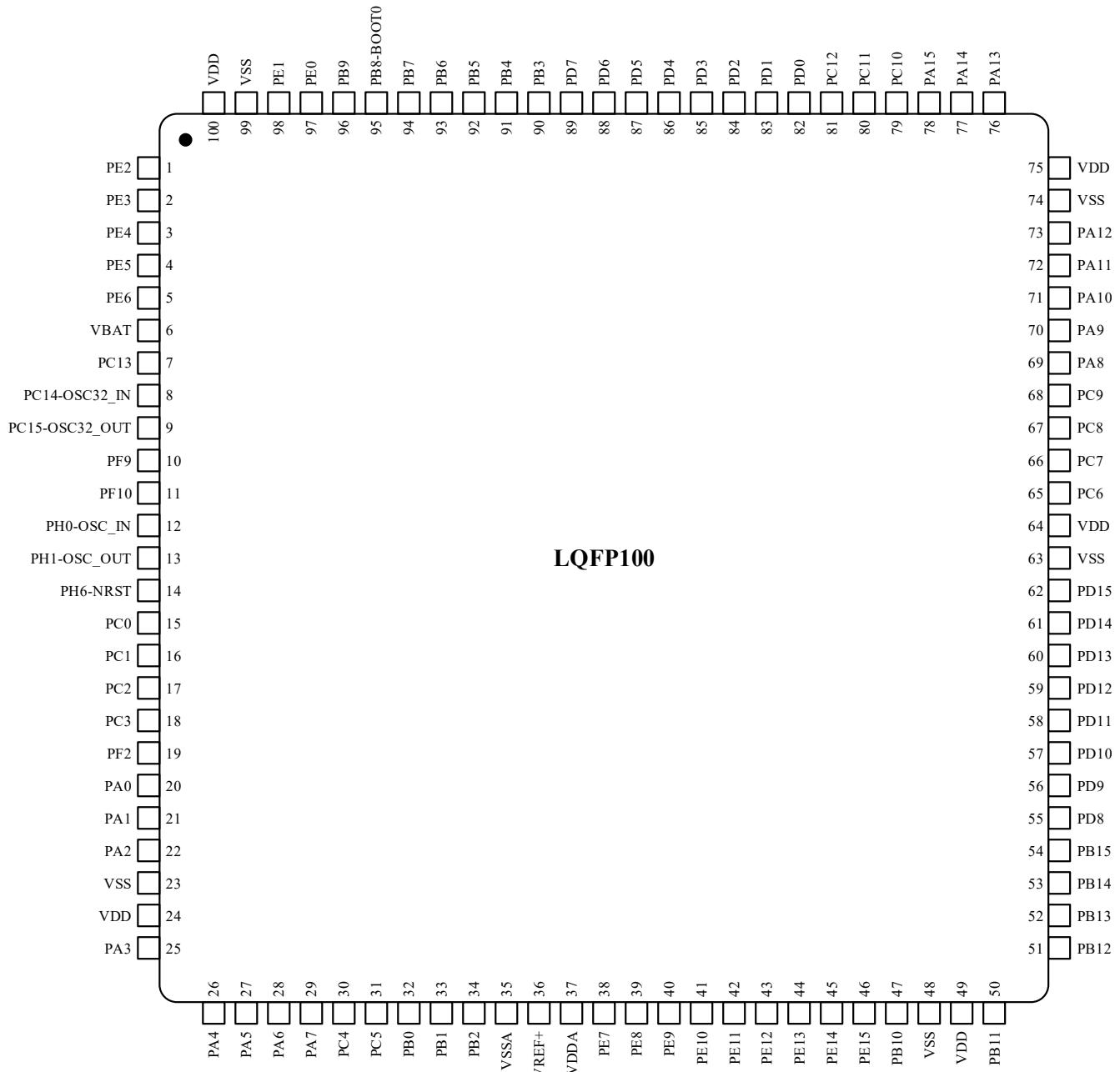
3.4.2 LQFP80 Package



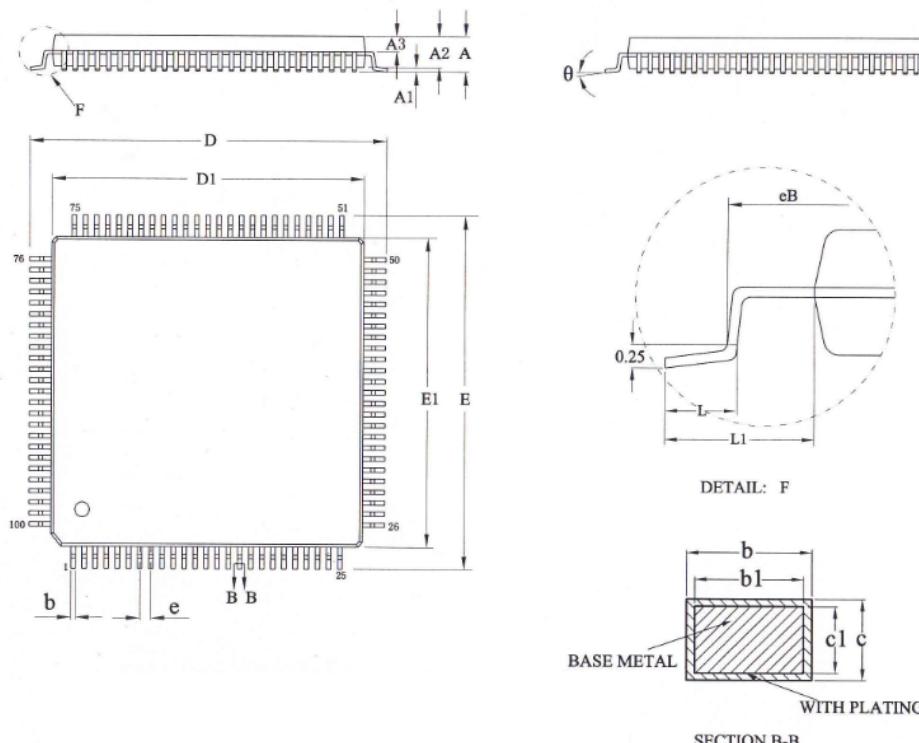
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	13.80	14.00	14.20
D1	11.90	12.00	12.10
E	13.80	14.00	14.20
E1	11.90	12.00	12.10
eB	13.05	—	13.25
e	0.50BSC		
L	0.45	0.60	0.75
L1	1.00REF		
θ	0	—	7°

3.5 LQFP100

3.5.1 LQFP100 Pinout



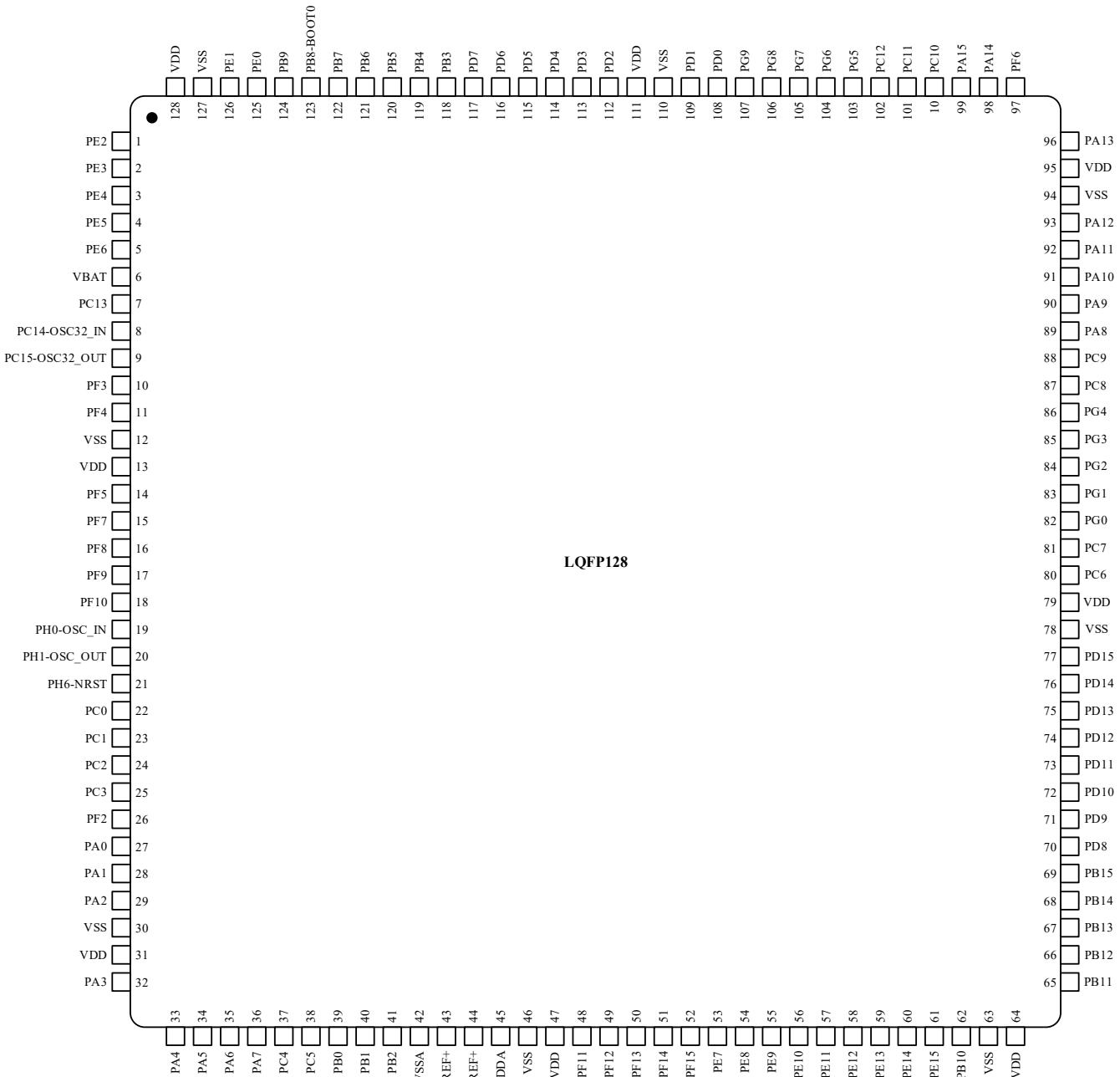
3.5.2 LQFP100 Package



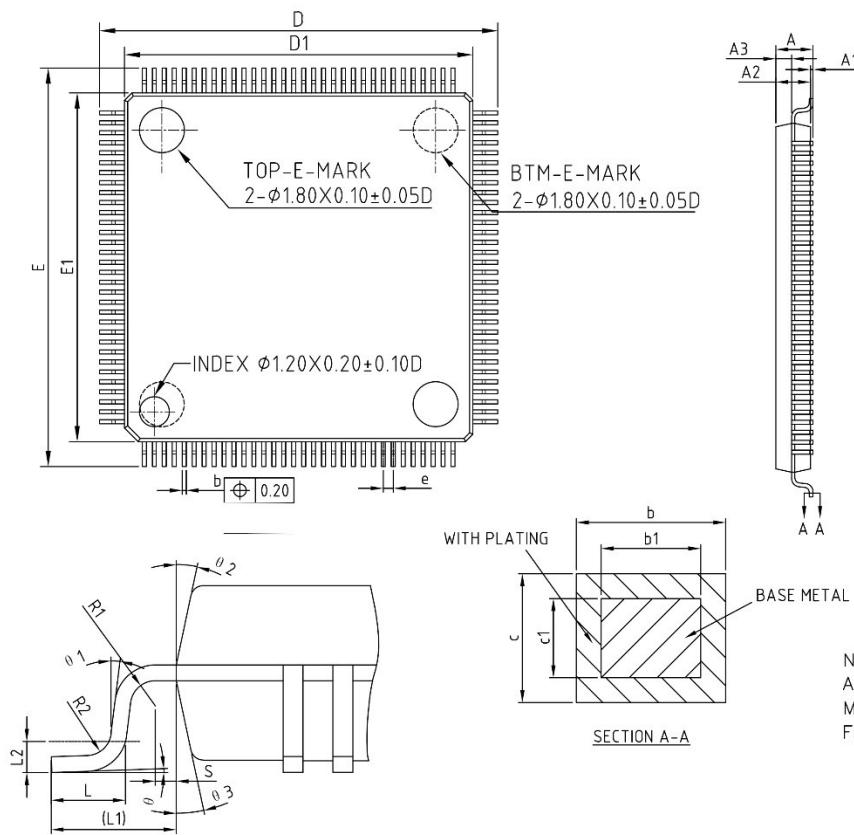
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	15.80	16.00	16.20
D1	13.90	14.00	14.10
E	15.80	16.00	16.20
E1	13.90	14.00	14.10
eB	15.05	—	15.35
e	0.50BSC		
L	0.45	—	0.75
L1	1.00REF		
θ	0	—	7°

3.6 LQFP128

3.6.1 LQFP128 Pinout



3.6.2 LQFP128 Package



COMMON DIMENSIONS
(UNITS OF MEASURE= MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.14	—	0.23
b1	0.13	0.16	0.19
c	0.13	—	0.18
c1	0.12	0.127	0.134
D	15.80	16.00	16.20
D1	13.90	14.00	14.10
E	15.80	16.00	16.20
E1	13.90	14.00	14.10
e	0.40BSC		
L	0.45	0.60	0.75
L1	1.00REF		
L2	0.25BSC		
R1	0.08	—	—
R2	0.08	—	0.20
S	0.20	—	—
θ	0°	3.5°	7°
θ1	0°	—	—
θ2	11°	12°	13°
θ3	11°	12°	13°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD
MS-026 BEE DO NOT INCLUDE MOLD
FLASH OR PROTRUSIONS.

4 Version History

Version	Date	Changes
V1.0.0	2024.11.12	Initial release

5 Disclaimer

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