N32L43xx8/xB Product Brief

N32L43x series uses 32-bit ARM Cortex-M4F core, maximum working frequency 108MHz, support floating point operation and DSP instructions, integrated up to 128KB embedded encryption Flash, 32KB SRAM, integrated with rich high-performance analog interface, Built-in one 12bit 5Msps ADC, two independent rail-to-rail operational amplifiers, two high-speed comparators, one 1Msps 12bit DAC, Integrated low power flow metering module . Integrated multi-channel U(S)ART, LPUART, I2C, SPI, USB, CAN and other digital communication interfaces, Segment LCD Driver Interface, built-in password algorithm hardware acceleration engine

Main features

- **CPU core**
  - 32-bit ARM Cortex-M4 core + FPU, single-cycle hardware multiply and divide instructions, support DSP instructions and MPU.
  - Built-in 2KB instruction Cache, support Flash acceleration unit execution program 0 wait
  - The highest frequency is 108MHz, 135DMIPS
- **Cryptographic memory**
  - Up to 128KByte in-chip Flash, support encrypted storage, partition management and data protection, support hardware ECC verification, 100,000 erasing times, 10 years of data retention
  - Up to 32KByte in-chip SRAM, including 24Kbyte SRAM1(Stop2 mode can be configured as retention) and 8 Kbyte SRAM2(both Standby and Stop2 modes can be configured as retention), supporting hardware parity check
- **Low power management**
  - Support Run, Sleep, LP Run, LP Sleep, Stop2, Standby mode
- **High-performance analog interface**
  - 1x 12bit 5Msps ADC, 12/10/8/6 bits configurable, up to 16 external single-ended input channels, supporting differential mode
  - Two rail-to-rail operational amplifiers with built-in programmable gain amplifier up to 32 times
  - Two high-speed analog comparators with built-in 64-level adjustable comparison reference, COMP1 support working in STOP2 mode
  - 1x 12bit DAC, sampling rate 1Msps
  - Internal 2.048V independent reference voltage reference source
- **Clock**
  - 4MHz~32MHz external high-speed crystal
  - 32.768KHz External low-speed crystal
  - Internal high-speed RC(HSI) 16MHz
  - Internal multi-speed RC(MSI) 100K~4MHz
  - Internal low-speed RC(LSI) 40KHz
  - Built-in high-speed PLL
  - Supports one clock output, which can be configured as low-speed or high-speed clock output
- **Reset**
  - Support power on, brown-out, and external pin reset
  - Support watchdog reset, software reset
- **Support up to 64 GPIOs.**

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- **Communication interface**
  - Five U(S)ART interfaces, including three USART interfaces (support 1xISO7816, 1xIrDA, LIN) and two UART interfaces
  - One LPUART, support STOP2 to wake up MCU in low power consumption state
  - Two SPI interfaces, the rate is up to 27 Mbps, support I2S communication
  - Two I2C interfaces, the rate is up to 1 MHz, which can be configured in master/slave mode and support dual address response in slave mode
  - One USB2.0 FS Device interface
  - One CAN 2.0A/B bus interface
- **Segment LCD driver interface**
  - Supports up to 320 segments (8x40) or 176 segments (4x44) monochrome passive LCD display
  - Flexible LCD refresh rate support (30~102Hz)
  - Support static, 1/2, 1/3, 1/4, 1/8 duty cycle
  - Support static, 1/2, 1/3, 1/4 bias
  - Support normal display in Stop2 mode
- **Low-power flow metering module (LPRCNT), which can work in STOP2 low-power state, suitable for battery-powered flow metering applications**
- **One high-speed DMA controller, each controller supports 8 channels, channel source address and destination address can be configured arbitrarily**
- **RTC real-time clock, support leap year perpetual calendar, alarm event, periodic wake up, support internal and external clock calibration**
- **Timer counter**
  - Two 16bit advanced timer counters, support input capture, complementary output, quadrature encoding input, the highest control accuracy is 9.25ns,each timer has four independent channels, three of which support six-channel complementary PWM output
  - Five 16bit general purpose timer counters, each timer has 4 independent channels, support input capture/output comparison /PWM output
  - Two 16bit basic timer counters
  - One 16bit low power timer counter, support double pulse counting function, can work in STOP2 mode
  - 1x 24bit SysTick
  - 1x 7bit window Watchdog (WWDG)
  - 1x 12bit independent Watchdog (IWDG)
- **Programming method**
  - Support SWD/JTAG online debugging interface
  - Support UART and USB Bootloader
- **Security features**
  - Built-in cryptographic algorithm hardware acceleration engine
  - Support AES, DES, TDES, SHA1/224/256, SM1, SM3, SM4, and SM7 algorithms
  - Flash storage encryption, multi-user partition management (MMU)
  - TRNG true random number generator
  - CRC16/32 calculation

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- Support write protection (WRP), multiple read protection (RDP) levels (L0/L1/L2)
- Support security start, program encryption download, security updates
- Support external clock failure detection, tamper detection

- **96-bit UID and 128-bit UCID**
- **The working conditions**
  - Operating voltage range: 1.8V~3.6V
  - Operating temperature range: -40℃ ~ 105℃
  - ESD: ±4KV (HBM model), ±1KV (CDM model)
- **Package**
  - LQFP32(7mm x 7mm)
  - LQFP48(7mm x 7mm)
  - LQFP64(10mm x 10mm)
  - LQFP80(12mm x 12mm)
- **Order model**

Type	Model
N32L433	N32L433K8L7, N32L433KBL7
N32L436	N32L436C8L7, N32L436R8L7, N32L436CBL7,N32L436RBL7， N32L436MBL7

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1 Ordering information

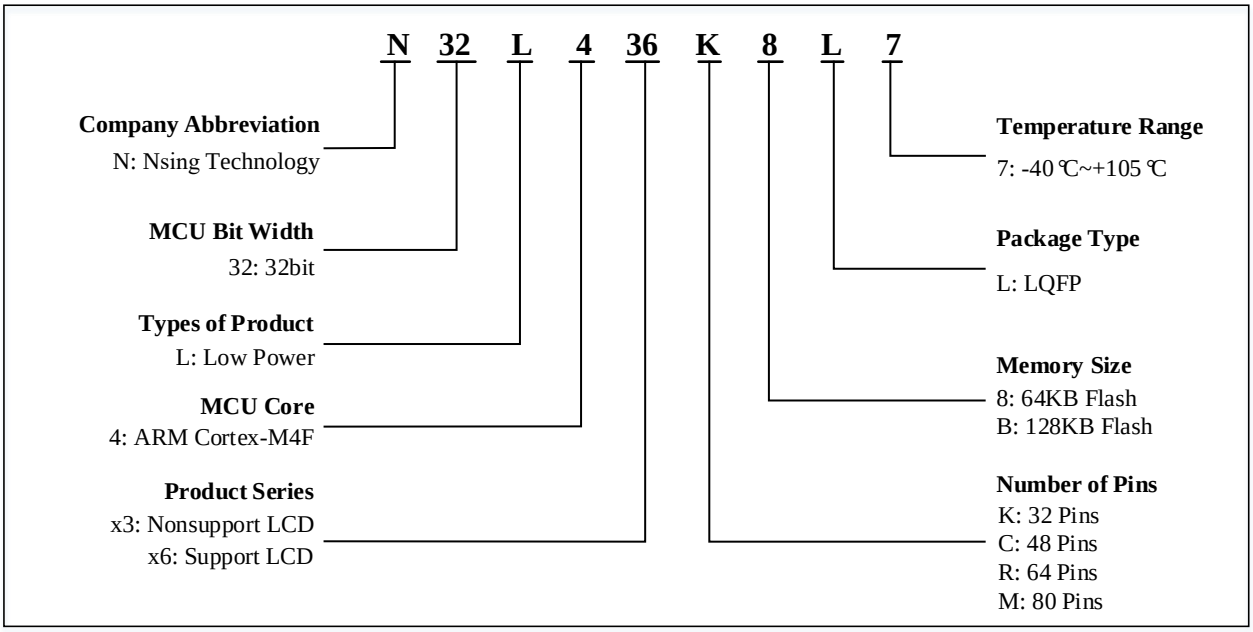

Table 1-1 N32L43x Series Ordering Code

Ordering code(1)	Package	Package size	Packaging(2)	SPQ(3)	Temperature range
N32L436C8L7	LQFP48	7mm * 7mm	Tray	250	-40℃～105℃
N32L436CBL7	LQFP48	7mm * 7mm	Tray	250	-40℃～105℃
N32L436R8L7	LQFP64	10mm * 10mm	Tray	160	-40℃～105℃
N32L436RBL7	LQFP64	10mm * 10mm	Tray	160	-40℃～105℃
N32L436MBL7	LQFP80	12mm * 12mm	Tray	119	-40℃～105℃
N32L433K8L7	LQFP32	7mm * 7mm	Tray	250	-40℃～105℃
N32L433KBL7	LQFP32	7mm * 7mm	Tray	250	-40℃～105℃

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.

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2 List of devices

Type of device		N32L433K8/B		N32L436C8/B		N32L436R8/B		N32L436MB
Flash size (KB)		64	128	64	128	64	128	128
SRAM size (KB)		24	32	24	32	24	32	32
CPU frequency		ARM Cortex-M4F @108MHz，130DMIPS						
Work environment		1.8~3.6V/-40~105℃						
Timer	General	5						
	Advanced	2						
	Basic	2						
	LPTIM	1						
Communication interface	SPI(1)	2						
	I2S(1)	2						
	I2C	2						
	UART	2						
	USART	2		3				
	LPUART	1						
	USB	1						
	CAN	1						
GPIO		26		38		52		64
DMA Number of Channels		1x 8 Channel						
12bit ADC Number of channels		1x 10Channel		1x 10Channel		1x 16Channel		1x 16Channel
12bit DAC Number of channels		1x 1 Channel						
LPRCNT(low-power non-magnetic metering)		Not support		Support				
OPAMP/COMP		2/2						
Segment LCD		Not support		4x20		4x34/8x30(2)(3)		4x44/8x40(3)
Algorithm support		DES/TDES、AES、 SHA1/SHA224/SHA256SM1、SM3、SM4、SM7、CRC16/CRC32、TRNG						
Security and protection		Read and write protection (RDP/WRP), storage encryption, partition protection, and security startup						
Package		LQFP32		LQFP48		LQFP64		LQFP80

1. SPI1 and SPI2 interfaces can flexibly switch between SPI mode and I2S audio mode
2. LQFP64 package version B chips do not support LCD 1/8 duty cycle mode (8x30)
3. In the 1/8 duty cycle mode, the B-version and C-version chip LCDs do not support 1/4 bias

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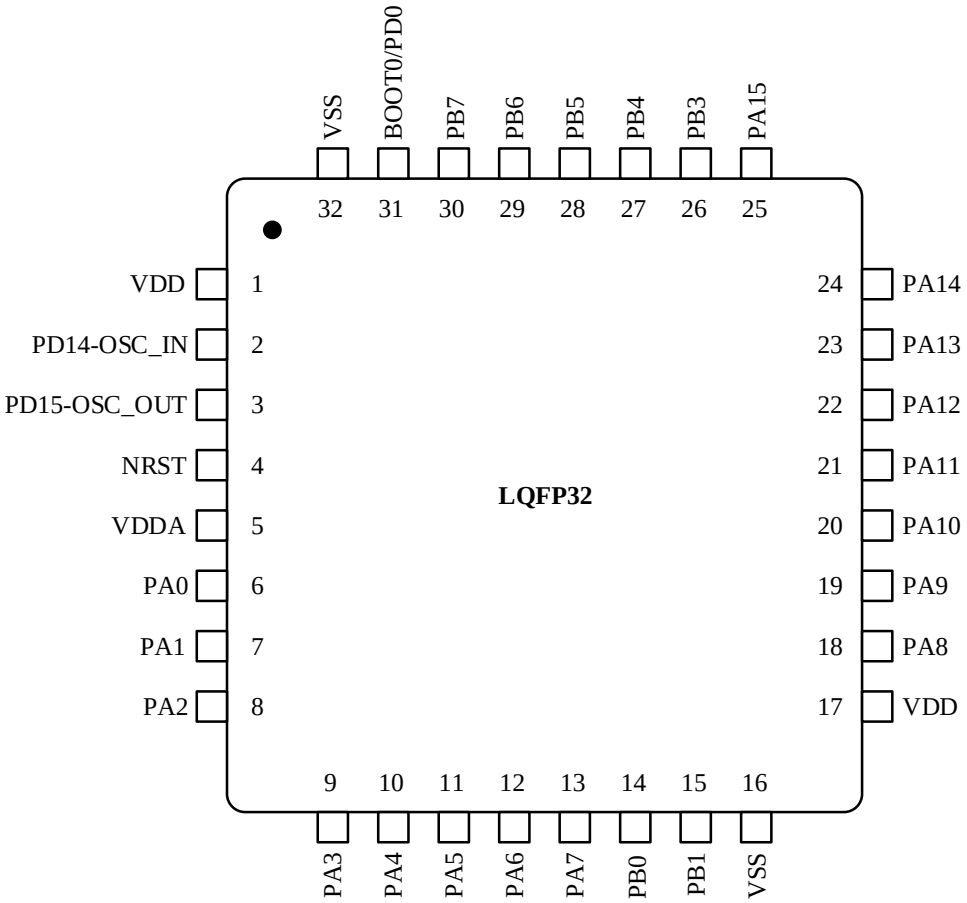
3 Package

3.1 LQFP32

3.1.1 LQFP32 pinout



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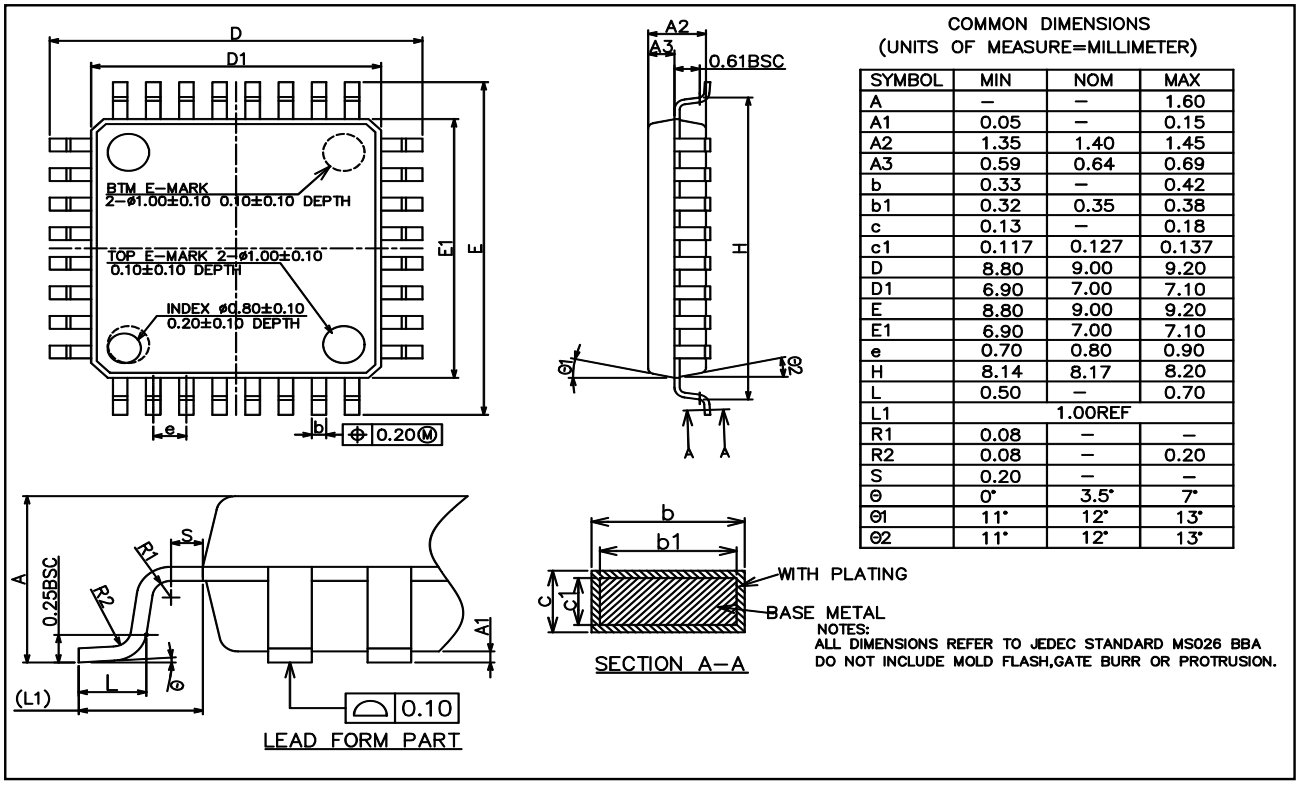
3.1.2 LQFP32 package



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	0.33	–	0.42
b1	0.32	0.35	0.38
c	0.13	–	0.18
c1	0.117	0.127	0.137
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
e	0.70	0.80	0.90
H	8.14	8.17	8.20
L	0.50	–	0.70
L1		1.00REF	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

NOTES:
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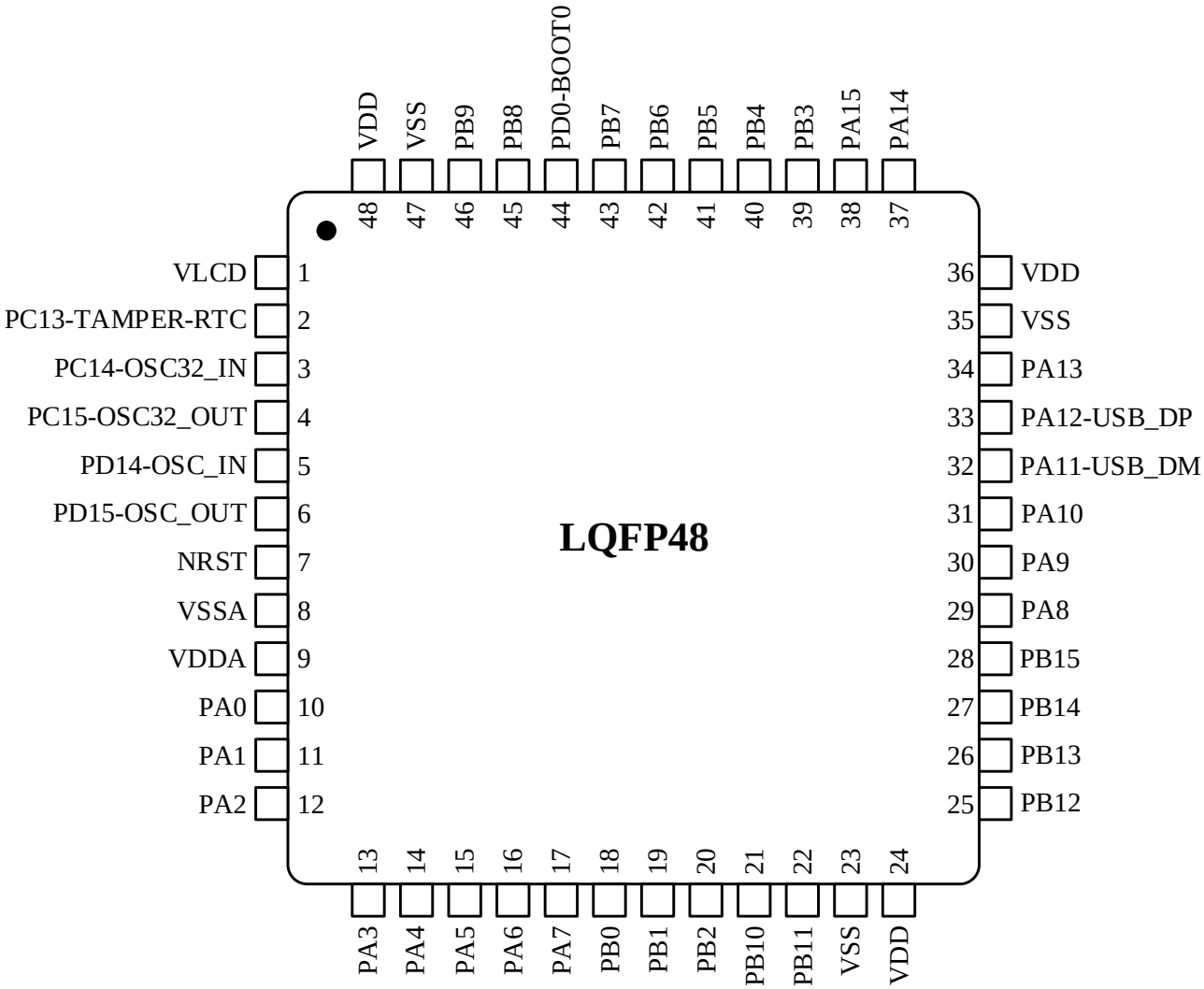
3.2 LQFP48

3.2.1 LQFP48 pinout



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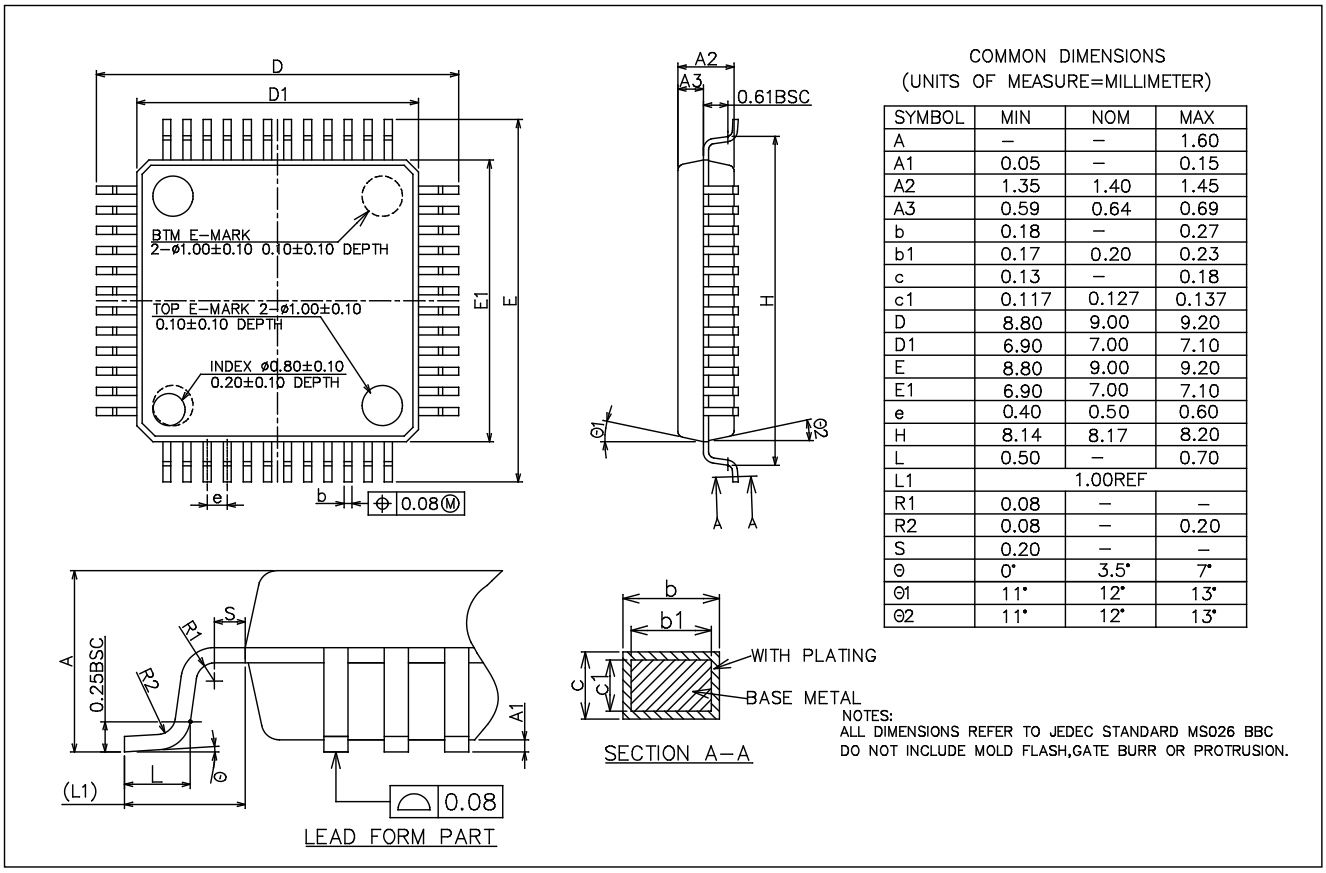
3.2.2 LQFP48package



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	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.117	0.127	0.137
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
e	0.40	0.50	0.60
H	8.14	8.17	8.20
L	0.50	–	0.70
L1		1.00REF	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

NOTES:
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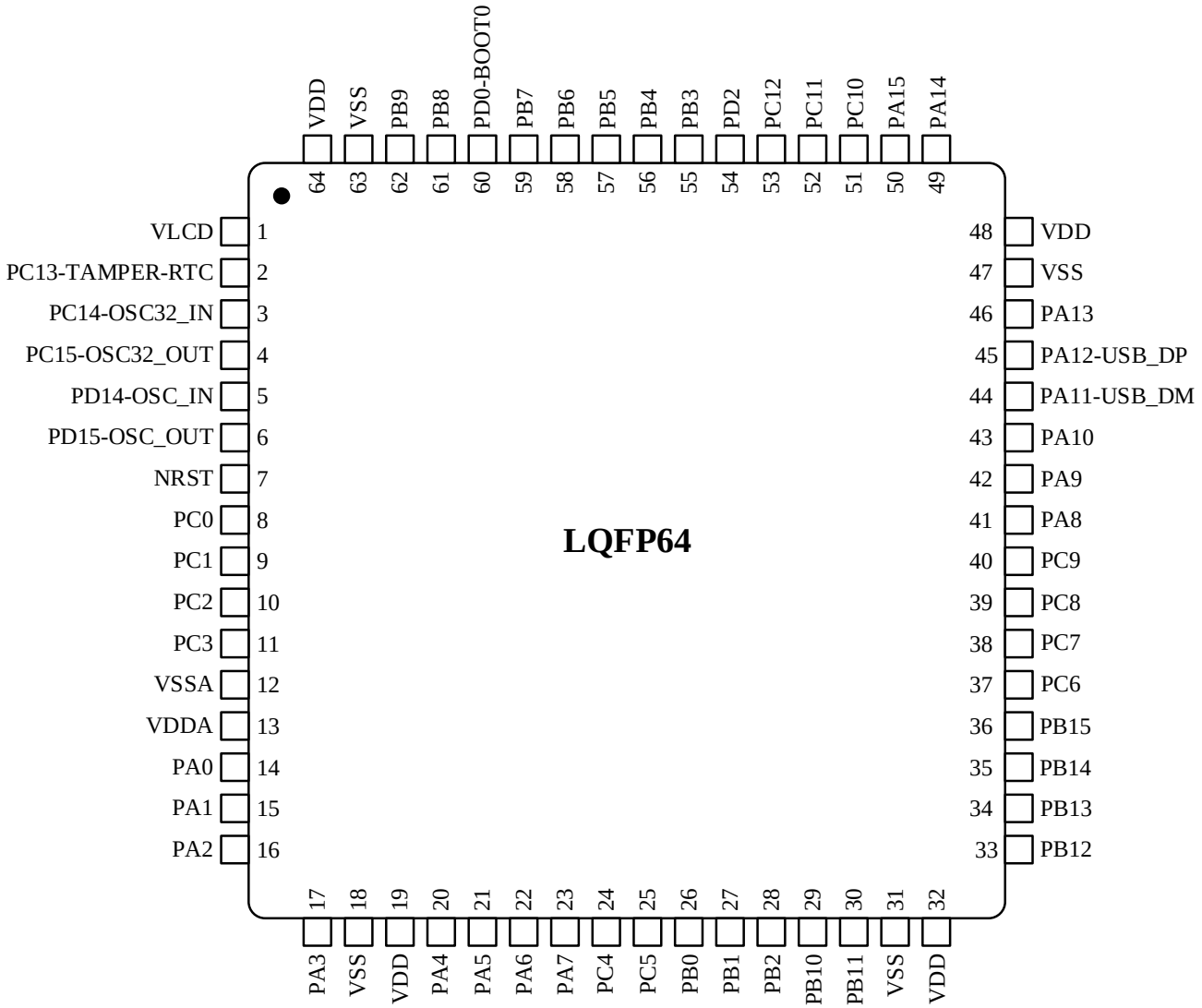
3.3 LQFP64 package

3.3.1 LQFP64 pinout



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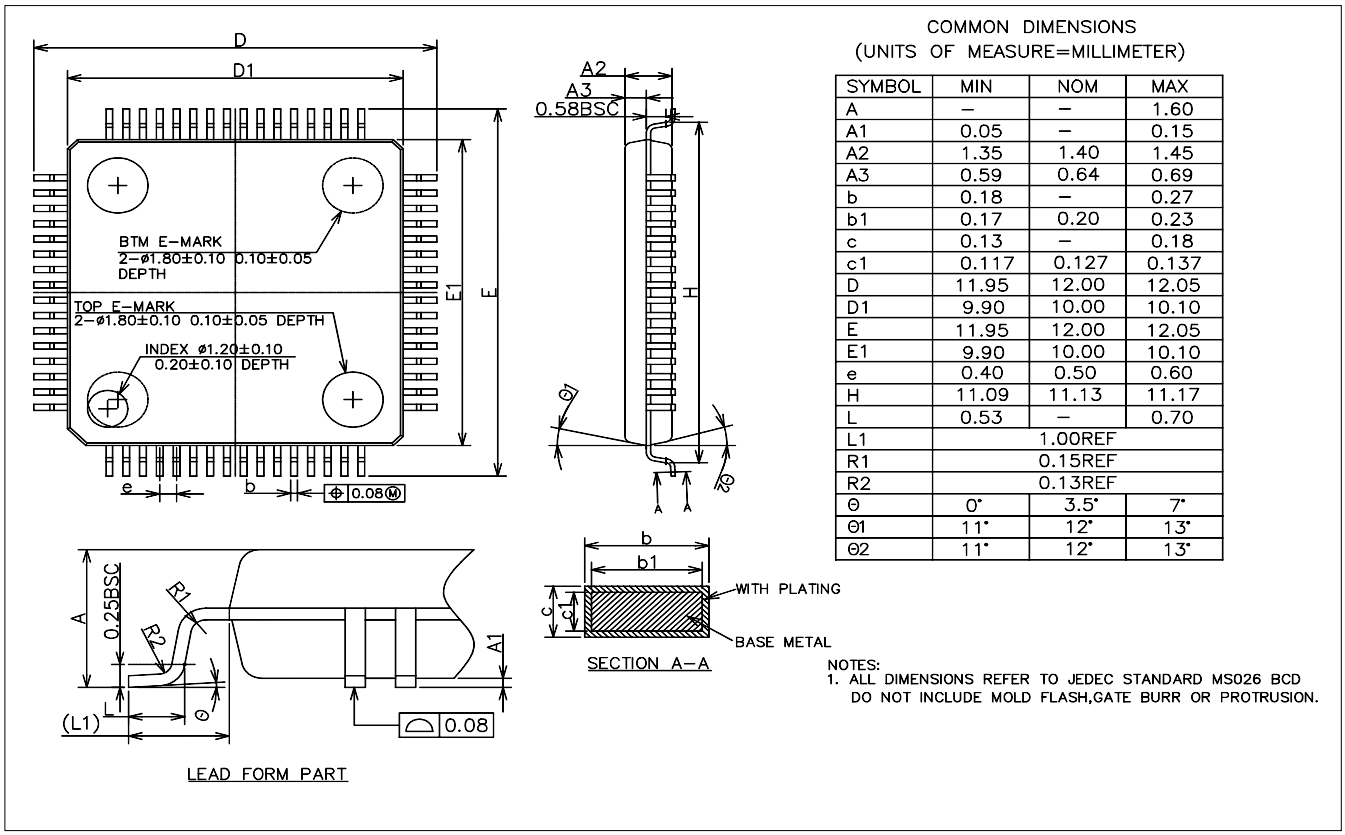
3.3.2 LQFP64 package



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	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.117	0.127	0.137
D	11.95	12.00	12.05
D1	9.90	10.00	10.10
E	11.95	12.00	12.05
E1	9.90	10.00	10.10
e	0.40	0.50	0.60
H	11.09	11.13	11.17
L	0.53	–	0.70
L1		1.00REF	
R1		0.15REF	
R2		0.13REF	
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

NOTES:
1. ALL DIMENSIONS REFER TO JEDEC STANDARD MS026 BCD
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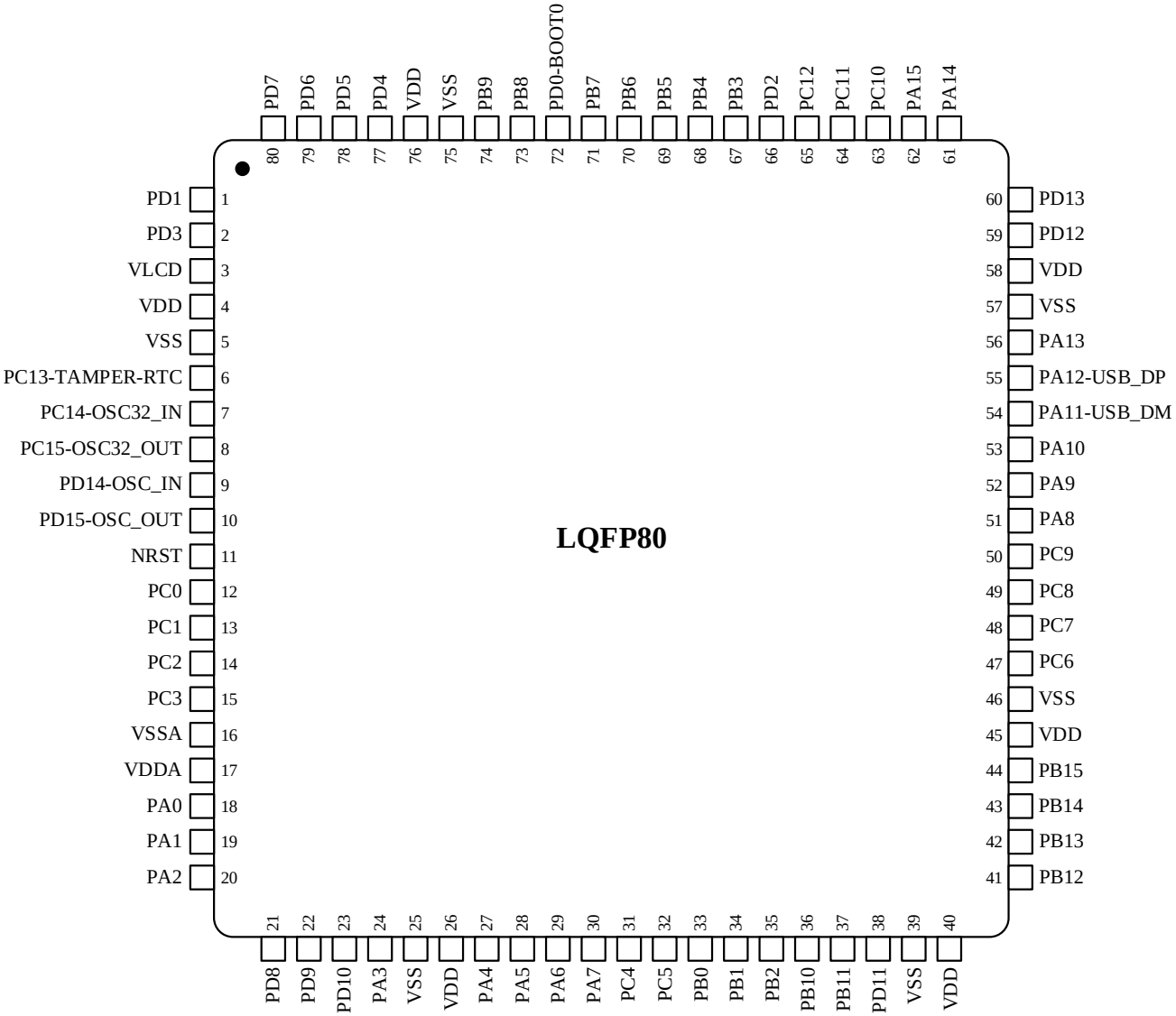
3.4 LQFP80 package

3.4.1 LQFP80 pinout



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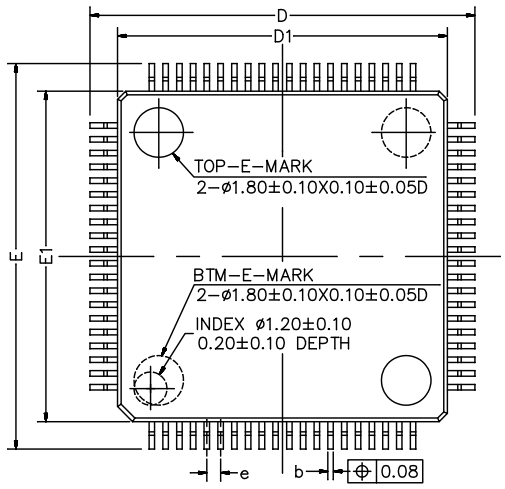
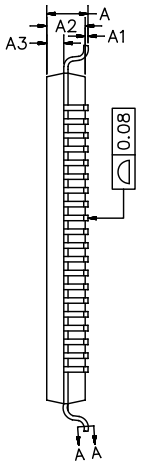
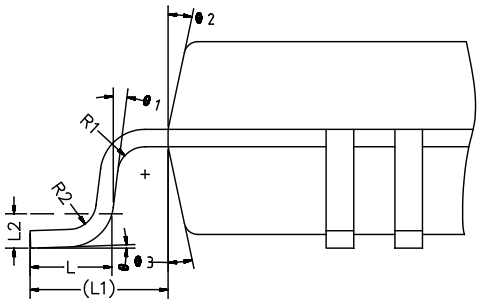
3.4.2 LQFP80 package

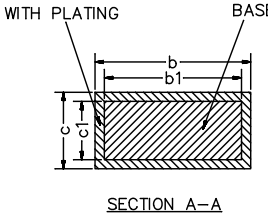




COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

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	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.12	0.127	0.134
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
e	0.40	0.50	0.60
L	0.45	0.60	0.75
L1	1.00REF		
L2	0.25BSC		
R1	0.08	–	–
R2	0.08	–	0.20
θ	0°	3.5°	7°
θ1	0°	–	–
θ2	11°	12°	13°
θ3	11°	12°	13°





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4 Version history

Version	Date	Note
V1.0	2020.7.1	Initial release
V1.2	2021.4.14	1. Update the product model resource configuration 2. Update the LCD version difference description
V1.3	2021.7.6	1. Modify the description of low power
V2.0.0	2024.07.18	1. Add Table 1-1 N32L43x Series Ordering Code

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