

N32G451xB/xC/xE

Product Brief

The N32G451 series adopts a 32-bit ARM Cortex-M4F core, with a maximum operating frequency of 144MHz, supporting floating-point operations and DSP instructions. It integrates up to 512KB embedded Flash, 96KB SRAM, multiple communication bus interfaces like U(S)ART, I2C, SPI, USB, CAN, and analog interfaces such as 12-bit ADC and DAC. It also features a built-in hardware acceleration engine for encryption algorithms.

Key Features

- **CPU Core**
 - 32-bit ARM Cortex-M4 core + FPU, single-cycle hardware multiply and divide instructions, supports DSP instructions and MPU
 - Built-in 8KB instruction Cache supports Flash accelerator unit for zero-wait program execution.
 - Maximum frequency of 144MHz, 180DMIPS
- **Memories**
 - Up to 512KByte on-chip Flash, supports encrypted storage function, partition management and data protection, supports hardware ECC check, 100,000 erase/write cycles, 10-year data retention.
 - Up to 96KByte on-chip SRAM (including 16KByte Retention RAM), supports hardware parity check.
- **Low Power Management**
 - Stop0 mode: 150uA, RTC Run, all SRAM retained, all IOs retained, 20us fast wake-up.
 - Stop2 mode: 10uA, RTC Run, 16KByte Retention SRAM retained, CPU registers retained, all IOs retained, 40us fast wake-up.
 - Standby mode: 3uA, 84 backup registers retained, all IOs retained, optional RTC Run, 16KByte Retention SRAM retained, supports independent power supply via VBAT pin, 100us fast wake-up.
- **Clock**
 - 4MHz~32MHz external high-speed crystal oscillator
 - 32.768KHz external low-speed crystal
 - High-speed internal RC 8MHz
 - Low-speed Internal RC 40KHz
 - Built-in high-speed PLL
 - Supports 1-channel clock output, configurable as system clock, HSE, HSI or PLL divisional output.
- **Reset**
 - Supports power-on/power-down/brown-out/external pin reset.
 - Supports watchdog reset.

- **GPIO**
 - Up to 80 GPIOs.
 - Support multiplexed functions.
 - Maximum toggle speed of 50 MHz
 - Most GPIOs are 5V tolerant.
- **Communication Interfaces**
 - 7x U(S)ART interfaces with maximum rate up to 4.5 Mbps.
 - 3x USART interfaces (support 1xISO7816, 1xIrDA, LIN).
 - 4x UART interfaces.
 - 3x SPI interfaces with speed up to 36 MHz, 2 of which support I2S.
 - 4x I2C interfaces (Master/Slave) with speed up to 1 MHz where slave mode can support dual address responses.
 - 1x USB2.0 Full speed Device interface
 - 1x CAN 2.0 A/B bus interface
 - 1x SDIO interface, supports SD/MMC format.
- **Analog Interfaces**
 - 3x 12-bit ADCs with 5Msps,
 - Configurable as 12/10/8/6-bit mode.
 - Sampling rate up to 9Msps in 6-bit mode.
 - Up to 18 external single-ended input channels, supports differential mode.
 - 2x 12-bit DACs with 1Msps
 - Supports external reference voltage.
 - Analog voltage operation from 1.8~3.6V (VDDA)
- **DMA controllers**
 - 2x high-speed DMA controllers each supporting 8 channels, with arbitrary configurable channel source and destination addresses.
- **RTC real-time clock**
 - Supports leap-year calendar, alarm events, periodic wakeup.
 - Supports internal and external clock calibration.
- **Timers and Counters**
 - 2x 16-bit advanced timers with maximum control precision of 6.9ns
 - Support input capture, complementary output, quadrature encoder input etc.
 - Each timer has 4 independent channels, 3 of which support 6-channel complementary PWM output.

- 4x 16-bit general-purpose timers
 - Support input capture/output compare/PWM output.
 - Each with 4 independent channels.
- 2x 16-bit basic timers
- 1x 24-bit SysTick timer
- 1x 7-bit window watchdog (WWDG)
- 1x 12-bit independent watchdog (IWDG)

● **Programming Methods**

- Supports SWD/JTAG debugging interface.
- Supports UART, USB Bootloader

● **Security Features**

- Built-in hardware acceleration engine for encryption algorithms
- Supports AES, DES, SHA, SM1, SM3, SM4, SM7, MD5 algorithms.
- Flash storage encryption, multi-user partition management (MMU)
- TRNG true random number generator
- CRC16/32 computation
- Supports write protection (WRP), multiple levels of read protection (RDP) (L0/L1/L2)
- Supports secure boot, encrypted program download, secure update.
- Supports 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
- ESD: ±4KV (HBM model), ±1KV (CDM model)

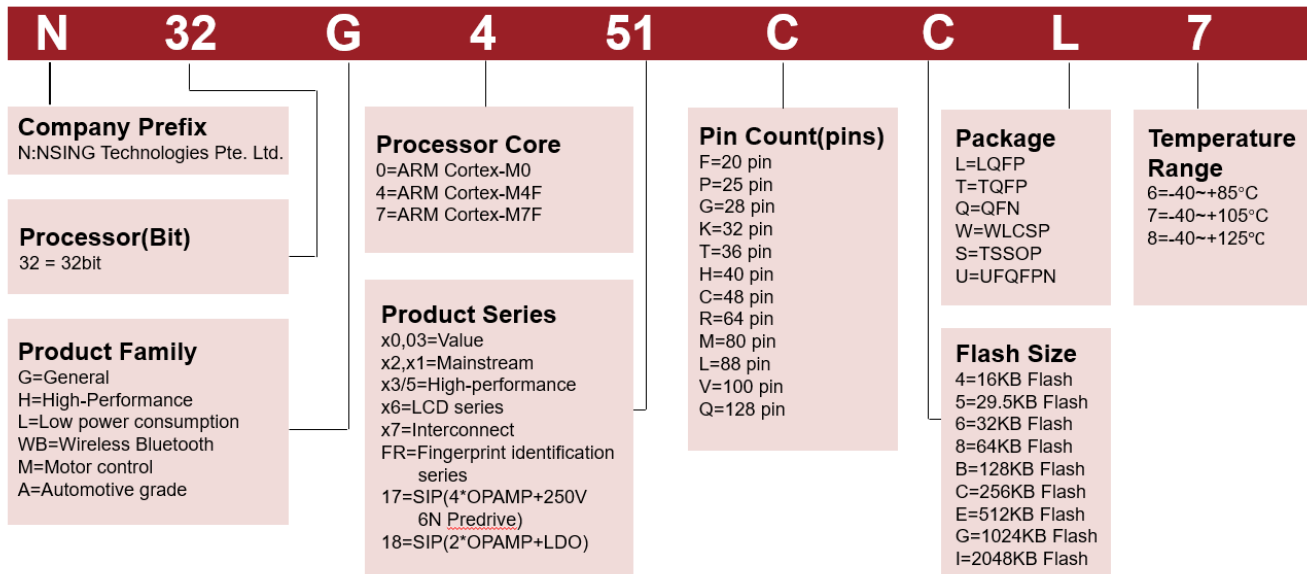
● **Packages**

- LQFP48 (7mm x 7mm)
- LQFP64 (10mm x 10mm)
- LQFP100 (14mm x 14mm)

● **Ordering Information**

Reference	Part Number
N32G451xB	N32G451CBL7, N32G451RBL7
N32G451xC	N32G451CCL7, N32G451RCL7, N32G451VCL7
N32G451xE	N32G451CEL7, N32G451REL7, N32G451VEL7

Naming Convention



Product Configurations

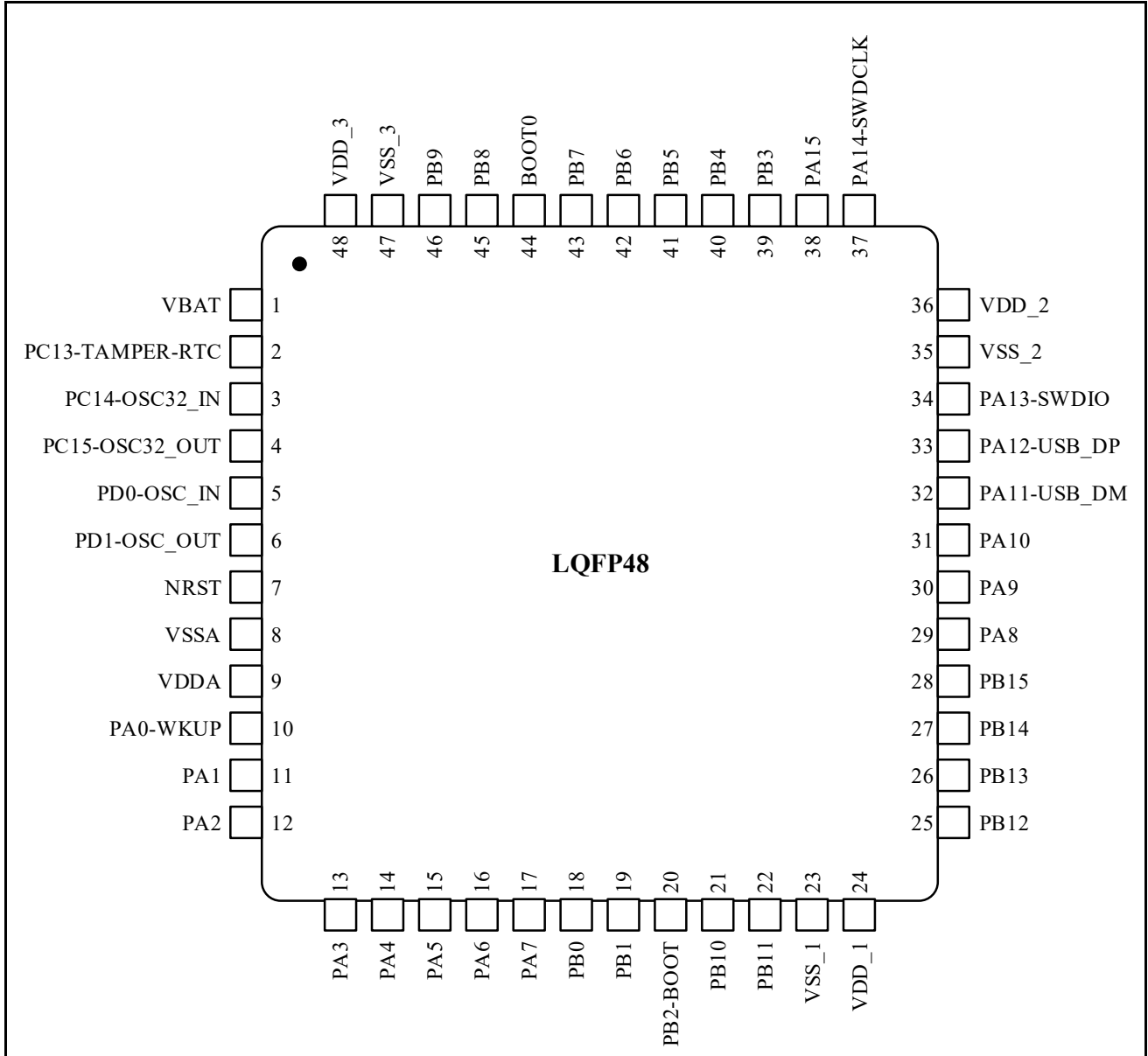
Device		N32G451CB/CC/CE			N32G451RB/RC/RE			N32G451VC/VE		
Flash Capacity (KB)		128	256	512	128	256	512	256	512	
SRAM Capacity (KB)		48	96	96	48	96	96	96	96	
CPU Frequency		ARM Cortex-M4F @144MHz,180DMIPS								
Operating Environment		1.8~3.6V/-40~105°C								
Timers	General	4								
	Advanced	2								
	Basic	2								
Communication Interfaces	SPI	3								
	I2S	2								
	I2C	3			4					
	USART	3								
	UART	3			4					
	USB	1								
	CAN	1								
	SDIO	No ⁽¹⁾			1					
GPIO		37			51			80		
DMA		2								
DMA Channels		16 Channel								
12bit ADC		3			3			3		
ADC Channels		13 Channel			19 Channel			31 Channel		
12bit DAC		2								
DAC Channels		2 Channel								
Algorithm Support		DES/3DES、AES、SHA1/SHA224/SHA256、SM1、SM3、SM4、SM7、MD5、CRC16/CRC32、TRNG								
Security Protection		Read/Write Protection (RDP/WRP), Storage Encryption, Partition Protection, Secure Boot								
Package		LQFP48			LQFP64			LQFP100		

Note: ⁽¹⁾ SDIO is not supported

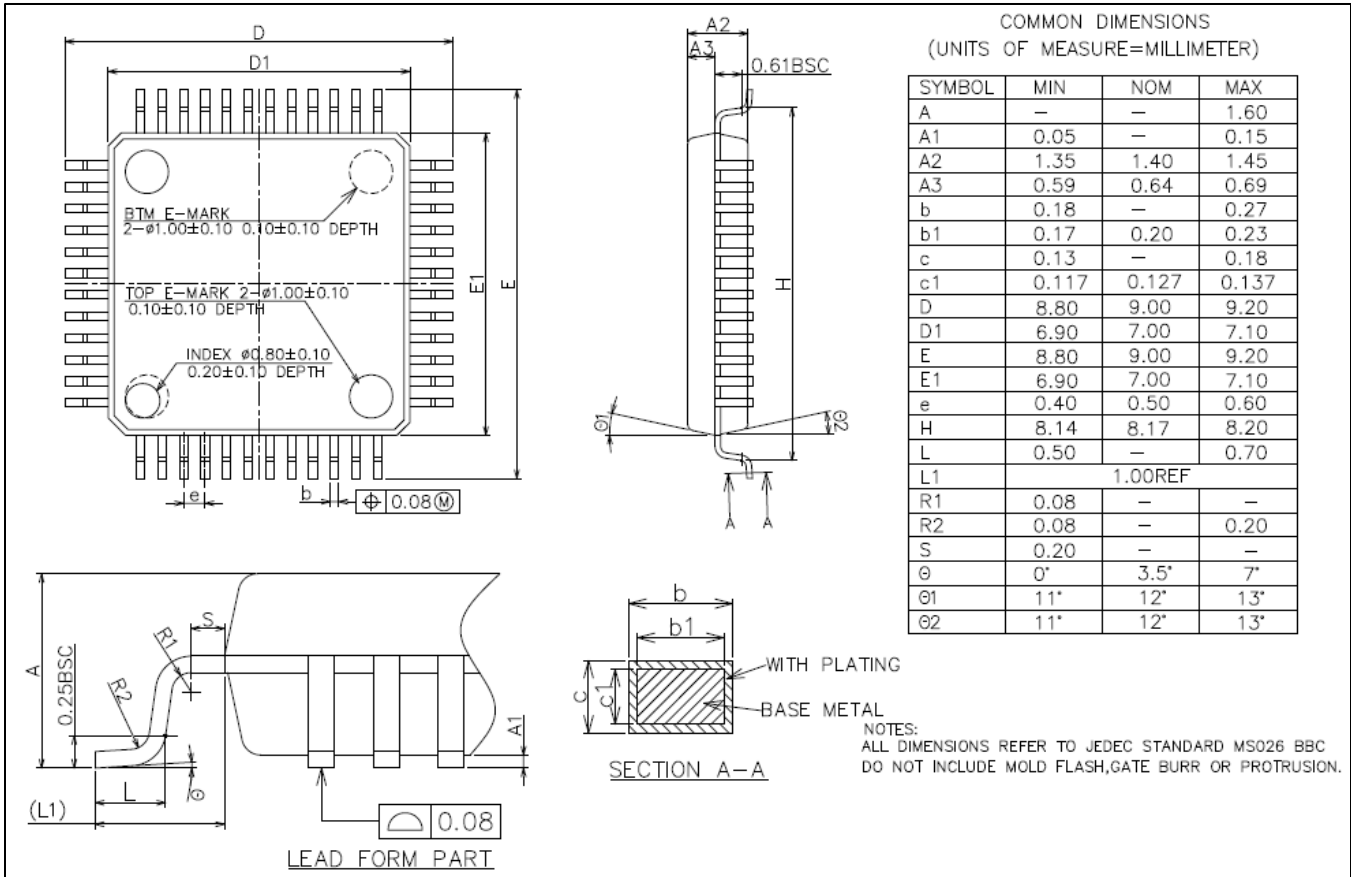
Packages

LQFP48 Package

LQFP48 Pin Assignment

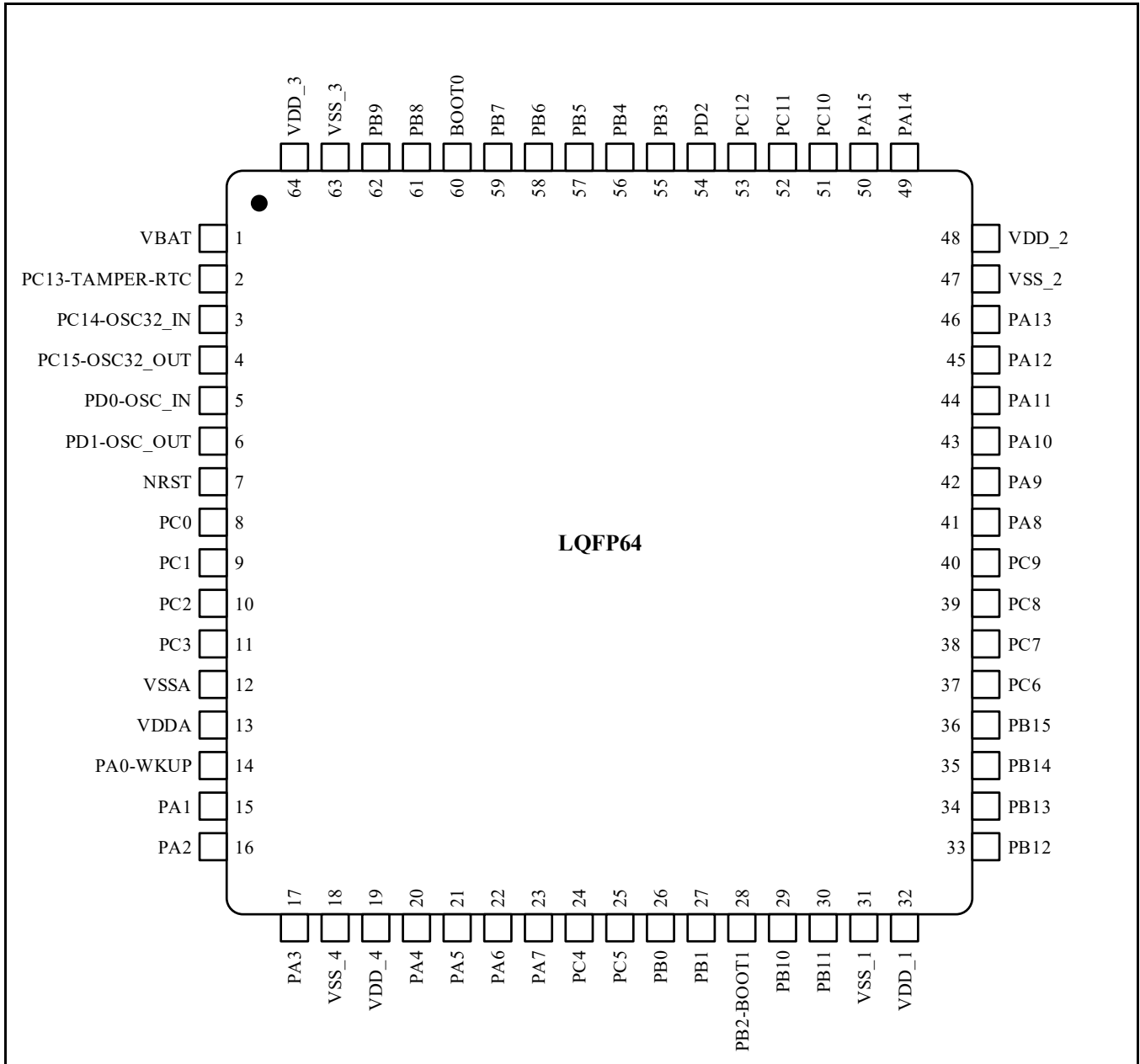


LQFP48 Package Dimensions

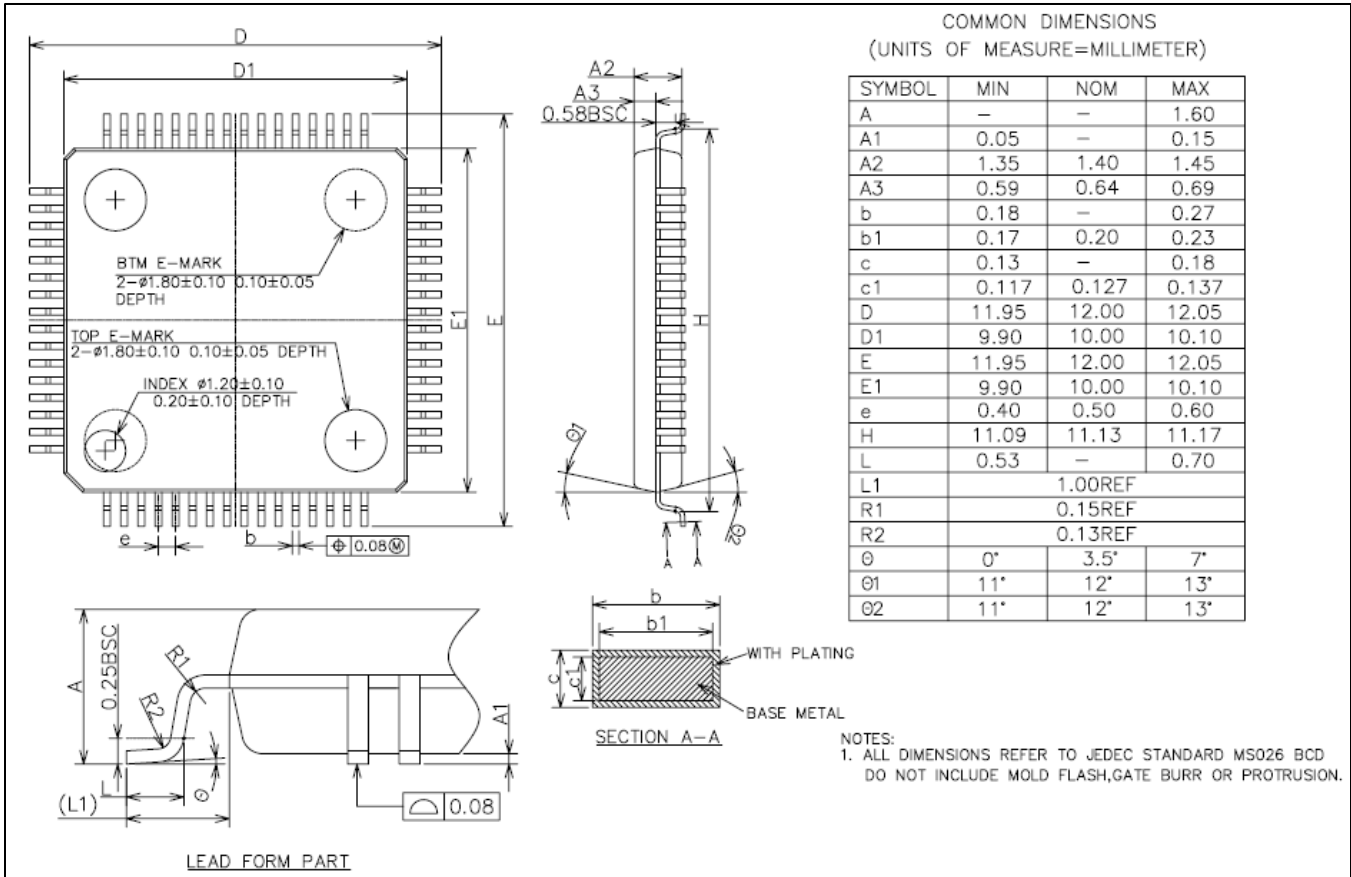


LQFP64 Package

LQFP64 Pin Assignment

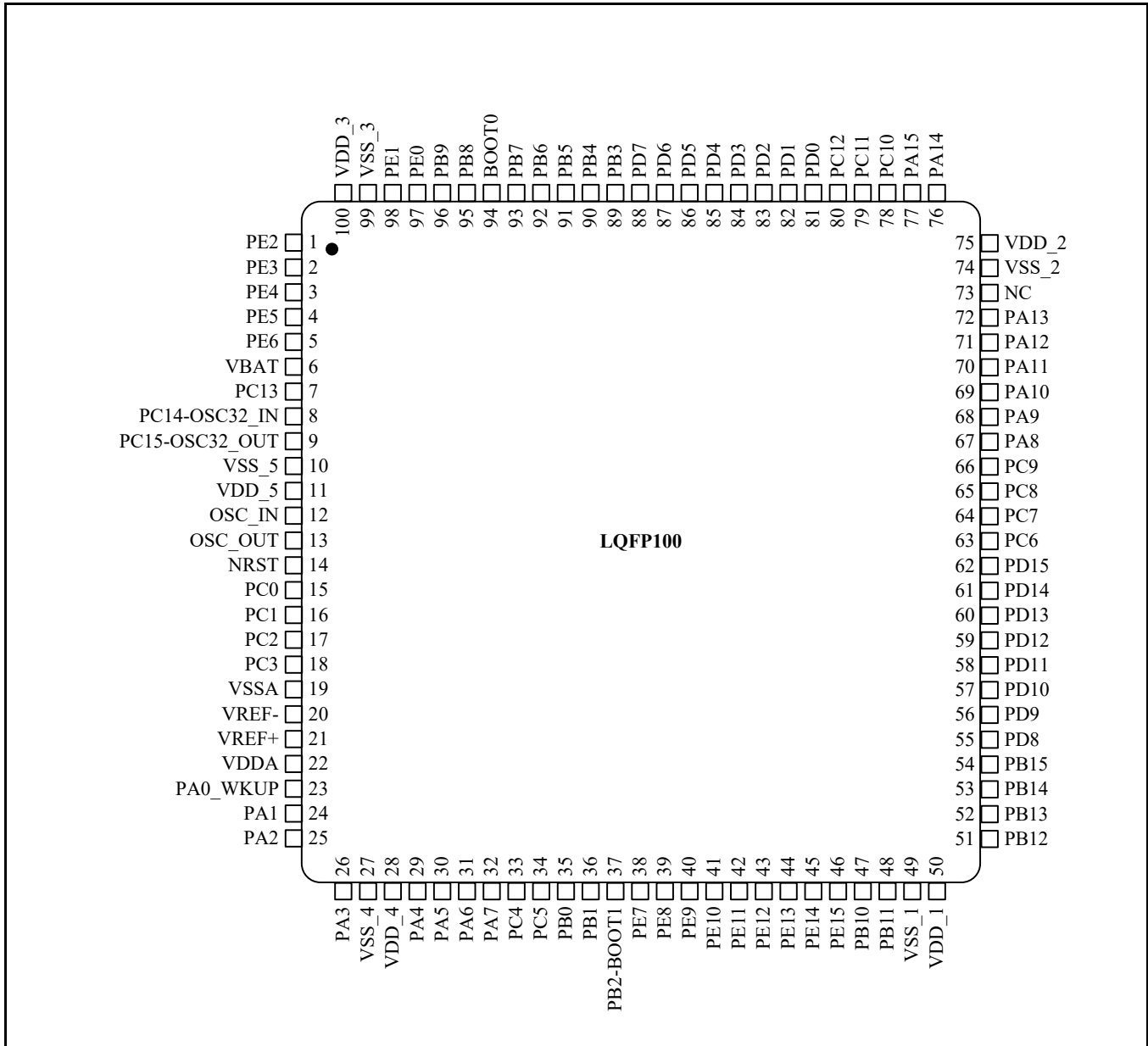


LQFP64 Package Dimensions

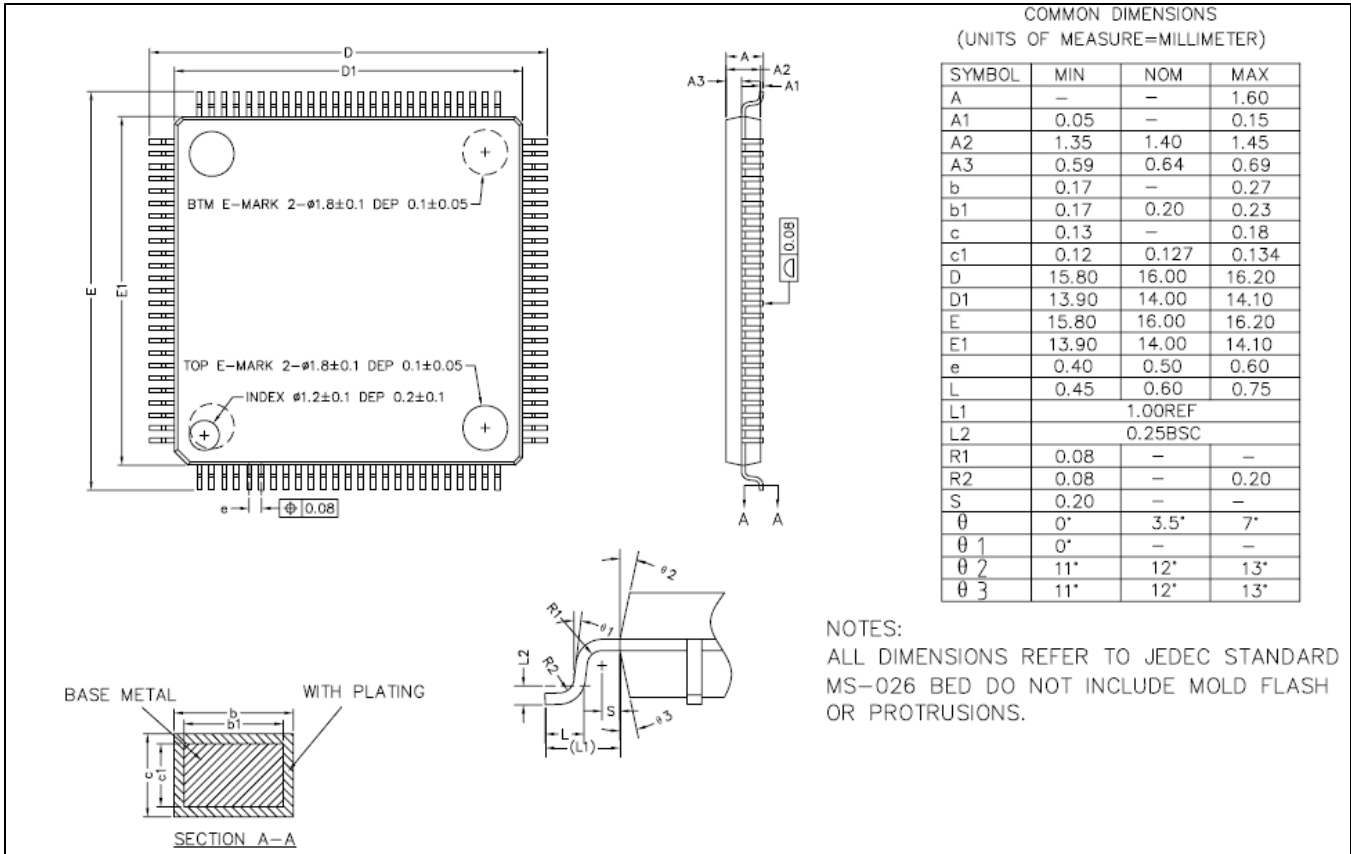


LQFP100 Package

LQFP100 Pin Assignment



LQFP100 Package Dimensions



Version History

Version	Date	Changes
V1.0.0	2023.5.30	Initial release
V1.0.1	2024.3.28	Error correction

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