N32H760 Product Brief

The N32H760 series features an ARM Cortex-M7 core with a maximum operating frequency of 600MHz, supporting double-precision floating-point operations and DSP instructions. It includes (2/4MB) of on-chip FLASH and up to 1504KB of SRAM (comprising 1024KB TCM SRAM and 480KB SRAM) + 4KB Backup SRAM. It integrates three 12-bit 5Msps ADCs, four high-speed comparators, four 12-bit DACs, multiple high-speed U(S)ARTs, I2C, xSPI, SPI, USBFS Dual Role, CAN-FD, SDRAM, FEMC, SDMMC, 10/100 Ethernet communication interfaces, a digital camera interface (DVP), TFT-LCD graphical interface, JPEG hardware codec, and GPU. It also includes a high-performance hardware acceleration engine for encryption algorithms, supporting AES/TDES, and SHA as well as a TRNG true random number generator and CRC8/16/32. It supports up to 114 GPIOs and comes in TFBGA100, LQFP100, and LQFP144 package options.

Key Features

- **CPU Core**
  - 32-bit ARM Cortex-M7 core, double-precision floating-point unit, DSP instructions and MPU support
  - Built-in 32KB instruction cache and 32KB data cache with ECC
  - Maximum frequency of 600MHz, 1284 DMIPS
- **Encrypted Memory**
  - 2M/4M Byte on-chip Flash, supporting encrypted storage with automatic program decryption during execution
  - 1504KB built-in SRAM, supporting ECC verification
    - 1024KB TCM SRAM, configurable as D-TCM, I-TCM, or SRAM
    - 480KB on-chip SRAM
    - 4KB Backup SRAM, supporting ECC
- **Working Modes**
  - Run mode
  - SLEEP mode: AXI enabled, AHB enabled
  - Stop0 mode: SRAM, TCM, RTC, LSE, IWDG enabled
  - Stop2 mode: Flash in standby mode, SRAM, TCM, RTC, LSE, IWDG, Backup SRAM, backup registers enabled, I/O maintained
  - Standby mode: Backup SRAM, RTC, IWDG, LSE, backup registers enabled, SRAM, TCM closed
  - VBAT mode: Backup SRAM, RTC, LSE, backup registers enabled
- **Clock**

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

  - 4MHz~48MHz external high-speed crystal
  - 4MHz~50MHz external clock input
  - 32.768KHz external low-speed crystal
  - Three built-in high-speed PLLs
  - Built-in MSI clock, supporting configurable 31.25K/62.5K/125K/250K/500K/1M/2M/4M/8M/16MHz clocks
  - Internal high-speed RC 64MHz
  - Internal low-speed RC 32KHz
- **Reset**
  - Supports power-on/power-down/external pin reset
  - Supports watchdog reset and software system reset
  - Supports programmable voltage detection
- **High-Speed Communication Interfaces**
  - 7 USART interfaces/5 UART interfaces, supporting ISO7816, IrDA, LIN
  - 2 LPUART interfaces
  - 6 SPI interfaces, supporting master/slave modes, speeds up to 50 MHz
  - 8 I2C interfaces, speeds up to 3.4 MHz, configurable master/slave modes, dual address response in slave mode
  - 2 USBFS Dual Role interfaces
  - 6 CAN-FD bus interfaces
  - 1 Ethernet MAC interface, supporting 10M/100M communication rates, IEEE 1588 time synchronization protocol
- **High-Performance Analog Interfaces**
  - 3 12-bit 5Msps ADCs, supporting 12-bit, 10-bit resolution, hardware oversampling to 16-bit, up to 55 external single-ended input channels, 5 internal single-ended input channels, supporting single-ended and differential modes
  - 4 high-speed analog comparators
  - 4 12-bit DACs, including 2 1Msps DACs supporting output with or without Buffer, and 2 DACs for internal chip connection only, with 15Msps sampling rate
  - 2 MCO outputs, configurable to output SYSCLK, HSE, MSI, LSE, LSI, HSI64, or PLL clock division
  - 1 reference voltage VREFBUF (configurable as 1.5V/1.8V/2.048V/2.5V)
  - 1 temperature sensor
- **Audio Interfaces**

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

  - 4 I2S, supporting master/slave modes, audio sampling frequencies from 8KHz~192KHz
  - 8 PDM digital microphone interfaces built into DSMU
- **Memory Expansion Interfaces**
  - 1 FEMC (Flexible External Memory Controller) interface, bus rate 100 MHz, SRAM/PSRAM/Nor Flash supporting 16/32-bit data width configuration, NAND Flash supporting 8/16-bit data width configuration
  - 1 xSPI interface, supporting 1/2/4/8-bit data width, configurable master/slave, speeds up to 133 MHz, usable for expanding SRAM, PSRAM, and Flash, supporting XIP
  - 1 SDRAM interface, speeds up to 133 MHz
  - 2 SDMMC interfaces, supporting SD/SDIO 3.0, eMMC 4.51 format, speeds up to 104MHz
- **Image Processing Interfaces**
  - 1 Digital Camera Interface (DVP), supporting 8/10/12/16bit, speeds up to 110MHz
  - 1 TFT-LCD display interface, supporting up to 24-bit parallel digital RGB LCD, providing all signal interfaces for direct connection to various LCD and TFT panels, resolution up to 1920x1080
  - Built-in 2.5D graphics processor, supporting image scaling, rotation, mixing, anti-aliasing, texture mapping, etc.
  - Hardware JPEG encoder/decoder
- **Up to 114 GPIOs, low-speed GPIOs support 5V tolerance (under VDD=3.3V±10% conditions)**
- **Cordic accelerator for motor control, supporting trigonometric and hyperbolic functions, floating-point input and output**
- **Delta Sigma Module Unit (DSMU)**
- **Built-in filter algorithm accelerator FMAC, supporting FIR, IIR filtering**
- **3 high-speed DMA controllers, each supporting 8 channels, 1 MDMA supporting 16 channels, configurable channel source and destination addresses**
- **RTC real-time clock, supporting leap year perpetual calendar, alarm events, periodic wake-up, internal and external clock calibration**
- **Timer Counters**
  - 2 16-bit advanced timer counters, supporting input capture, complementary output, quadrature encoder input, with precision up to 3.3ns; each timer has 6 independent channels, with 4 channels supporting 4 pairs of complementary PWM outputs
  - 10 16-bit general-purpose timers (GTIM1~10), each with 4 independent channels, supporting input capture, output compare, PWM generation
  - 4 32-bit basic timer counters (BTIM1~4)

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

- 5 16-bit low-power timers (LPTIM1~5), operational in Stop2 mode
- 1x 24-bit SysTick, 1x 14-bit window watchdog (WWDG), 1x 12-bit independent watchdog (IWDG)

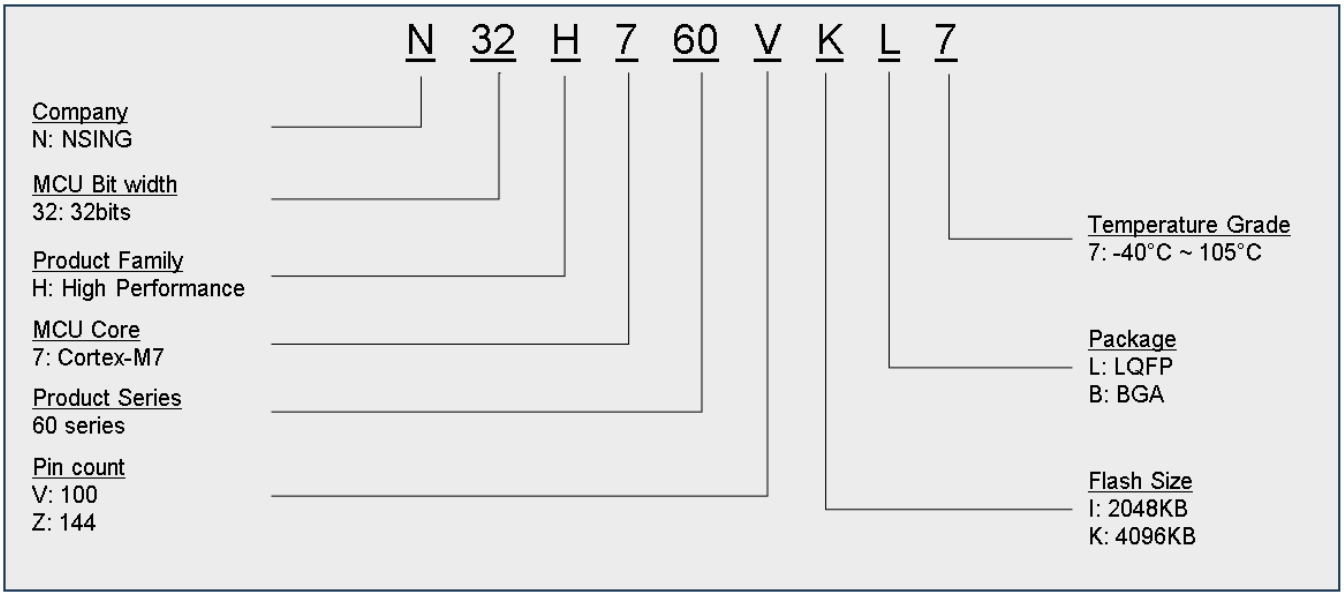
- **Programming Methods**
  - Supports SWD/JTAG online debugging interfaces
  - Supports USB, UART Bootloader
- **Security Features**
  - FLASH has up to 4 encryption partitions, supporting storage encryption
  - Supports write protection (WRP), multiple read protection (RDP) levels (L0/L1/L2)
  - Built-in password algorithm hardware acceleration engine, supporting AES/TDES, SHA, SM4 algorithms
  - TRNG true random number generator, CRC8/16/32 operations
  - Supports secure boot, encrypted program download, secure update, external high-speed and low-speed clock failure detection
  - Supports tamper detection
- **128-bit UCID supported in OTP**
- **Working Conditions**
  - Operating voltage range: 2.3V~3.6V
  - Chip junction temperature range: -40°C~125°C
- **Certification**
  - USB IF
  - IEC61508 SIL2
- **Packages**
  - TFBGA100 (8mm x 8mm)
  - LQFP100 (14mm x 14mm)
  - LQFP144 (20mm x 20mm)
- **Ordering Models**

  - N32H760xxx7: N32H760VIB7, N32H760VKB7, N32H760VIL7, N32H760VKL7, N32H760ZIL7, N32H760ZKL7

Series	Model
N32H760xxx7	N32H760VIB7, N32H760VKB7, N32H760VIL7, N32H760VKL7, N32H760ZIL7, N32H760ZKL7

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

1 Naming Convention



NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

2 Product Model Resource Configuration

Table 0-1 N32H760 Series Resource Configuration

Device Model		N32H760 VIB7	N32H760 VKB7	N32H760 VIL7	N32H760 VKL7	N32H760 ZIL7	N32H760 ZKL7
Flash（KB）		2048	4096	2048	4096	2048	4096
SRAM（KB）	TCM	1024					
	System RAM	480					
	Backup RAM	4					
Core	M7	600MHz					
Operating Voltage		2.3V~3.6V					
Coprocessors	Cordic	Yes					
	DSMU	Yes					
	FMAC	Yes					
Timers	ADTIM	2					
	GPTIM	10					
	BSTIM	4					
	LPTIM	5					
	SysTick timer	1					
	WWDG	1*14bit					
	IWDG	1*12bit					
	RTC	Yes					
Communication Interfaces	SPI/I2S	5/4				6/4	
	I2C	8					
	USART	3				7	
	UART	5					
	LPUART	2					
	USBFS Dual Role	2					
	CAN FD	4					
	10/100M ETH	1					
Expanded Storage	SDRAM	No				Yes	
	xSPI	1					
	FEMC	Yes					
	SDMMC	2					
Analog	12bit ADC	3					
	12bit DAC Number of channels	2+2[1] 2 External channels					
	Comparator	4					
	VREFBUF	Yes					
Imaging	LCDC	Yes					
	GPU	Yes					

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

	JPEG	Yes		
	DVP	1		
GPIO		82		114
DMA Number of channels		3 24Channel		
MDMA Number of channels		1 16Channel		
Algorithm Support		DES/3DES, AES, SHA1/SHA224/SHA256, CRC8/16/CRC32		
Security Protection		Read/write protection (RDP/WRP), storage encryption, secure boot		
Package		TFBGA100	LQFP100	LQFP144

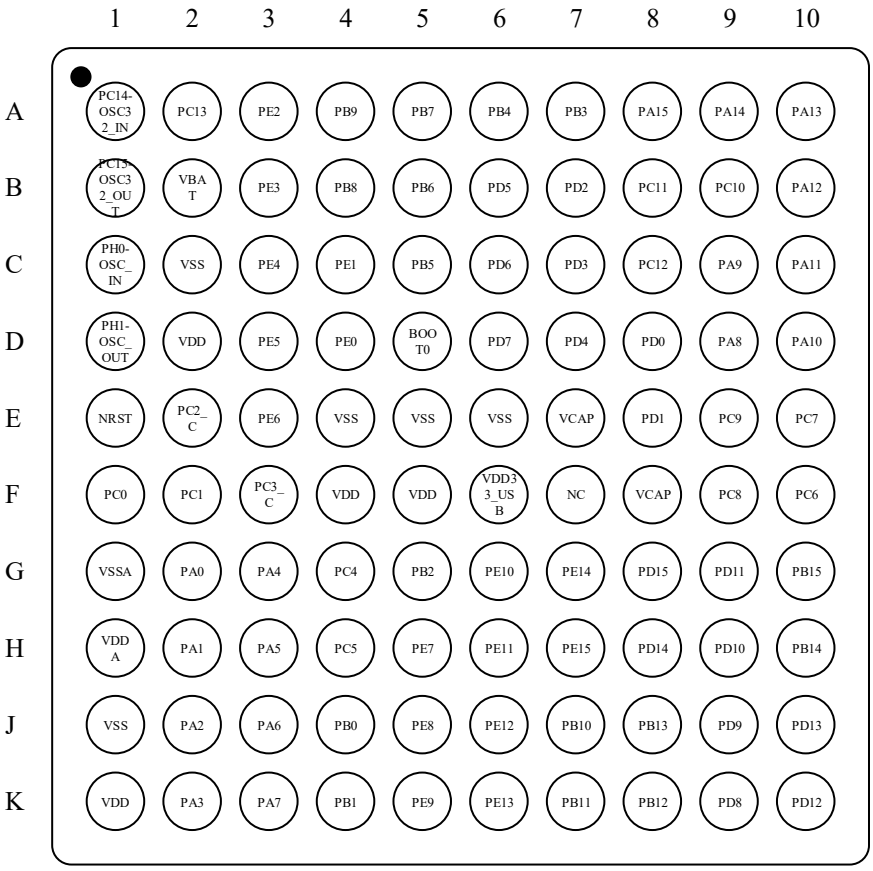
Note：2 DACs only support internal connection and cannot output to GPIO.

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

3 Package Information

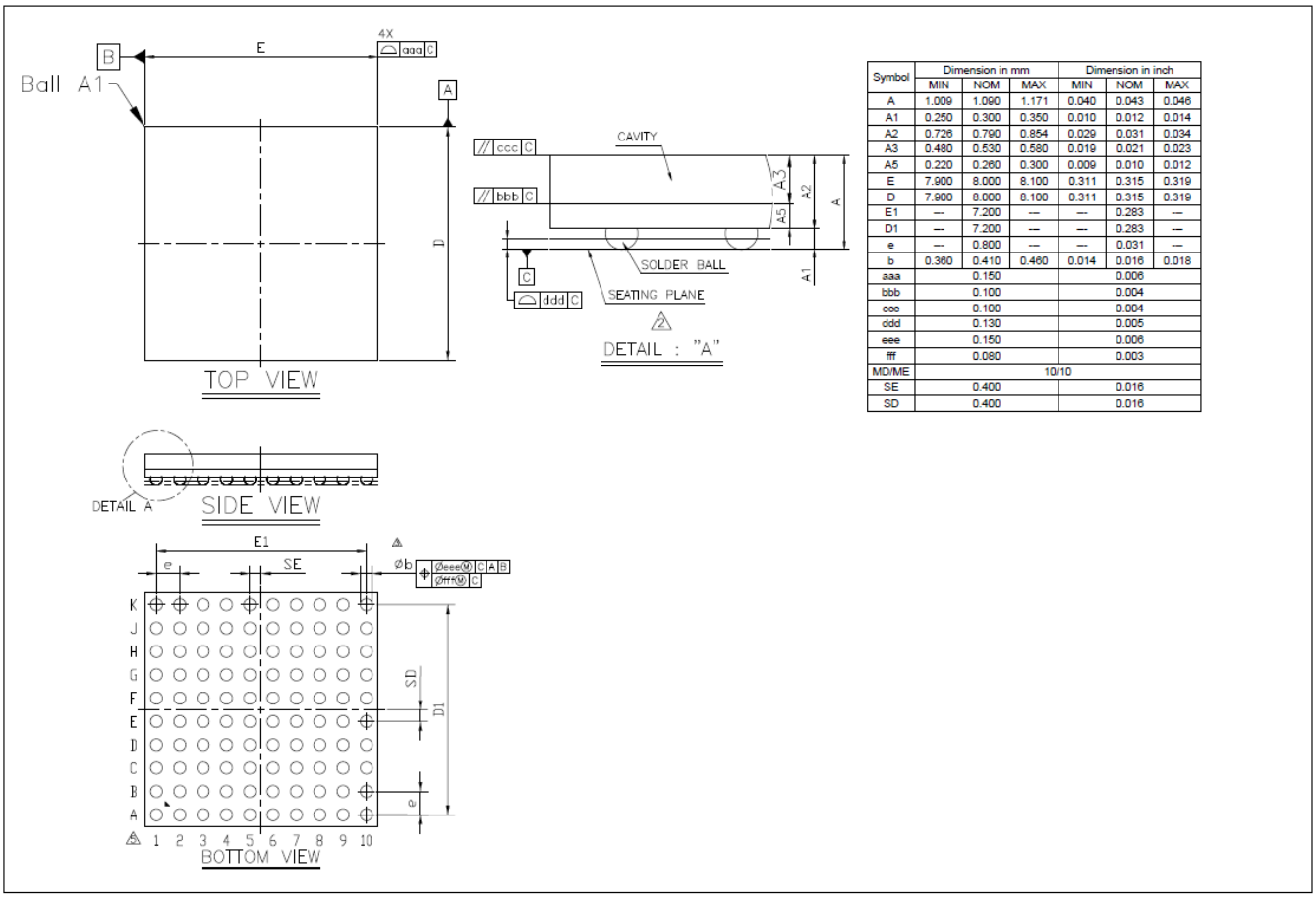
TFBGA100 Package

TFBGA100 Pin Distrubution



NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

TFBGA100 Package Size

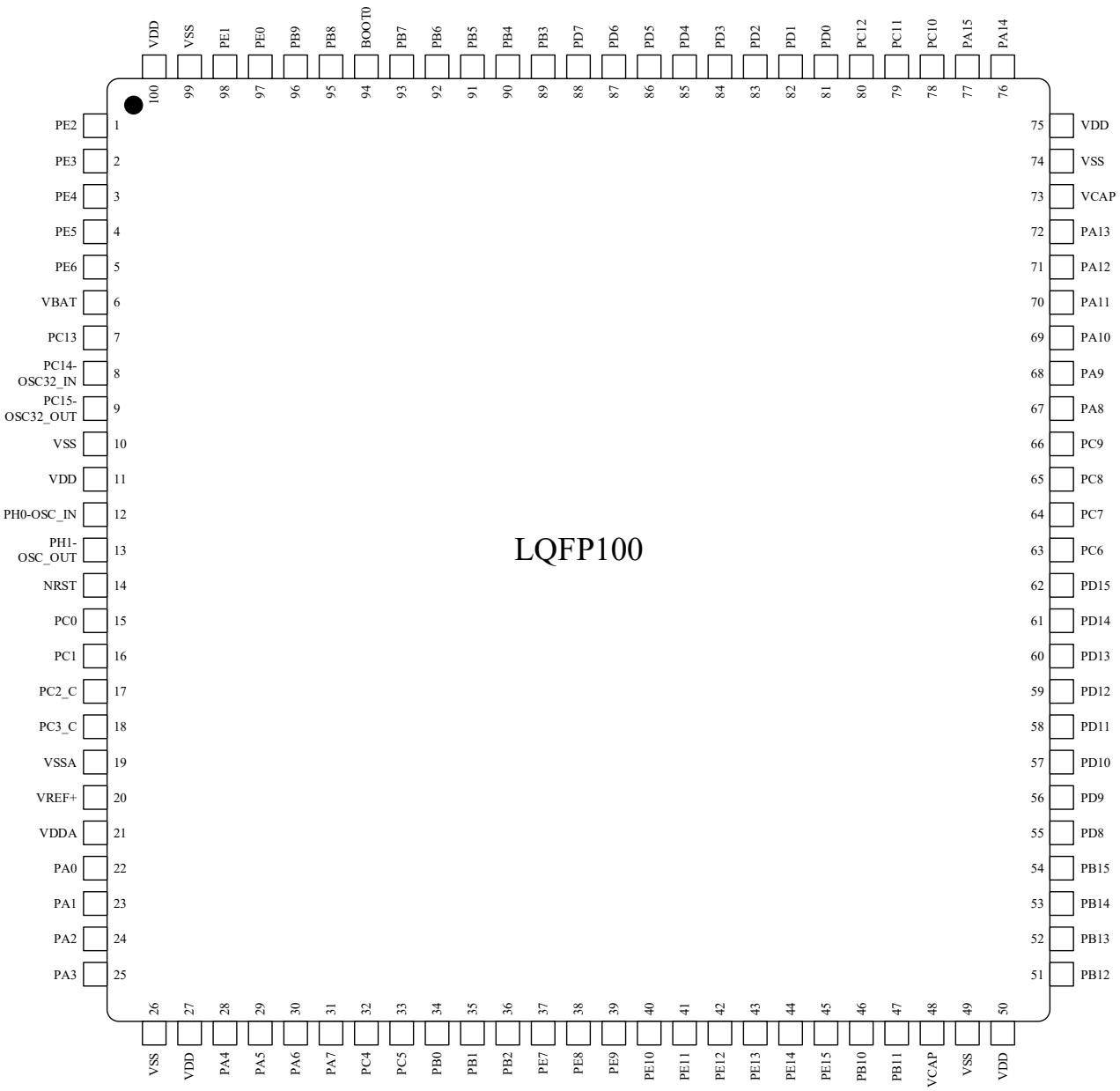


Symbol	Dimension in mm			Dimension in inch		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.009	1.090	1.171	0.040	0.043	0.046
A1	0.250	0.300	0.350	0.010	0.012	0.014
A2	0.726	0.790	0.854	0.029	0.031	0.034
A3	0.480	0.530	0.580	0.019	0.021	0.023
A5	0.220	0.260	0.300	0.009	0.010	0.012
E	7.900	8.000	8.100	0.311	0.315	0.319
D	7.900	8.000	8.100	0.311	0.315	0.319
E1	---	7.200	---	---	0.283	---
D1	---	7.200	---	---	0.283	---
e	---	0.800	---	---	0.031	---
b	0.360	0.410	0.460	0.014	0.016	0.018
aaa		0.150			0.006	
bbb		0.100			0.004	
ccc		0.100			0.004	
ddd		0.130			0.005	
eee		0.150			0.006	
fff		0.080			0.003	
MD/ME		10/10				
SE		0.400			0.016	
SD		0.400			0.016	

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

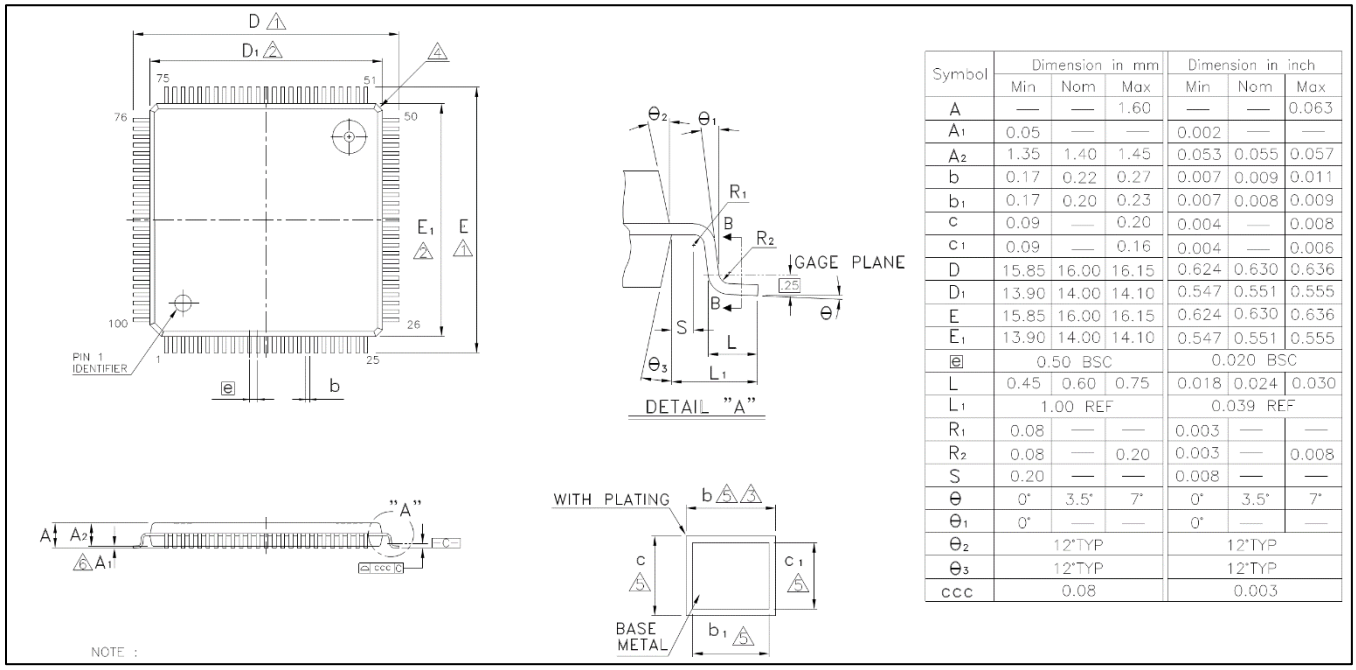
LQFP100 Package

LQFP100 Pin Distribution



NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

LQFP100 Package Size

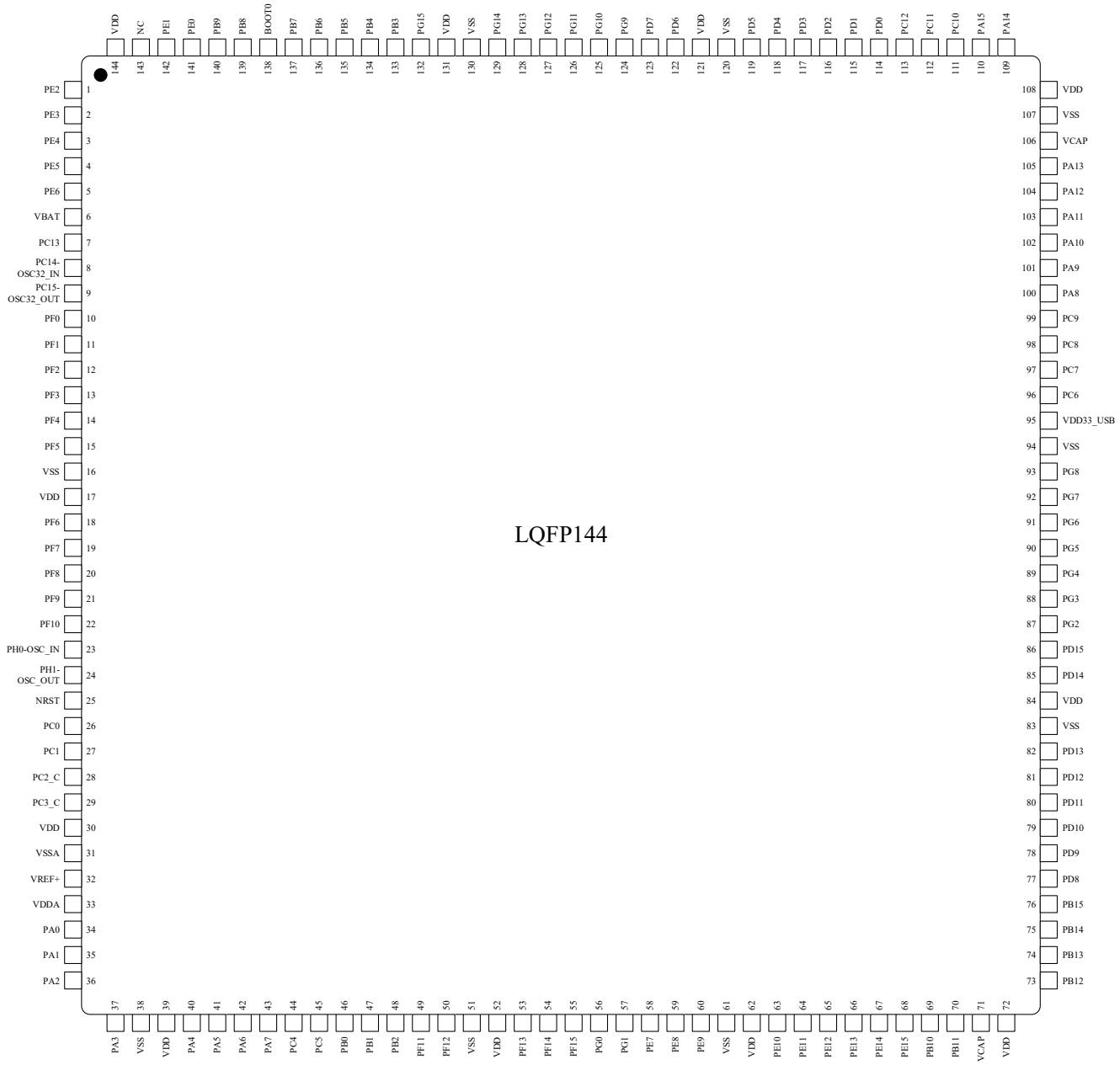


Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	—	—	1.60	—	—	0.063
A_1	0.05	—	—	0.002	—	—
A_2	1.35	1.40	1.45	0.053	0.055	0.057
b	0.17	0.22	0.27	0.007	0.009	0.011
b_1	0.17	0.20	0.23	0.007	0.008	0.009
c	0.09	—	0.20	0.004	—	0.008
c_1	0.09	—	0.16	0.004	—	0.006
D	15.85	16.00	16.15	0.624	0.630	0.636
D_1	13.90	14.00	14.10	0.547	0.551	0.555
E	15.85	16.00	16.15	0.624	0.630	0.636
E_1	13.90	14.00	14.10	0.547	0.551	0.555
e	0.50 BSC			0.020 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L_1	1.00 REF			0.039 REF		
R_1	0.08	—	—	0.003	—	—
R_2	0.08	—	0.20	0.003	—	0.008
S	0.20	—	—	0.008	—	—
θ	0°	3.5°	7°	0°	3.5°	7°
$θ_1$	0°	—	—	0°	—	—
$θ_2$	12°TYP			12°TYP		
$θ_3$	12°TYP			12°TYP		
ccc	0.08			0.003		

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

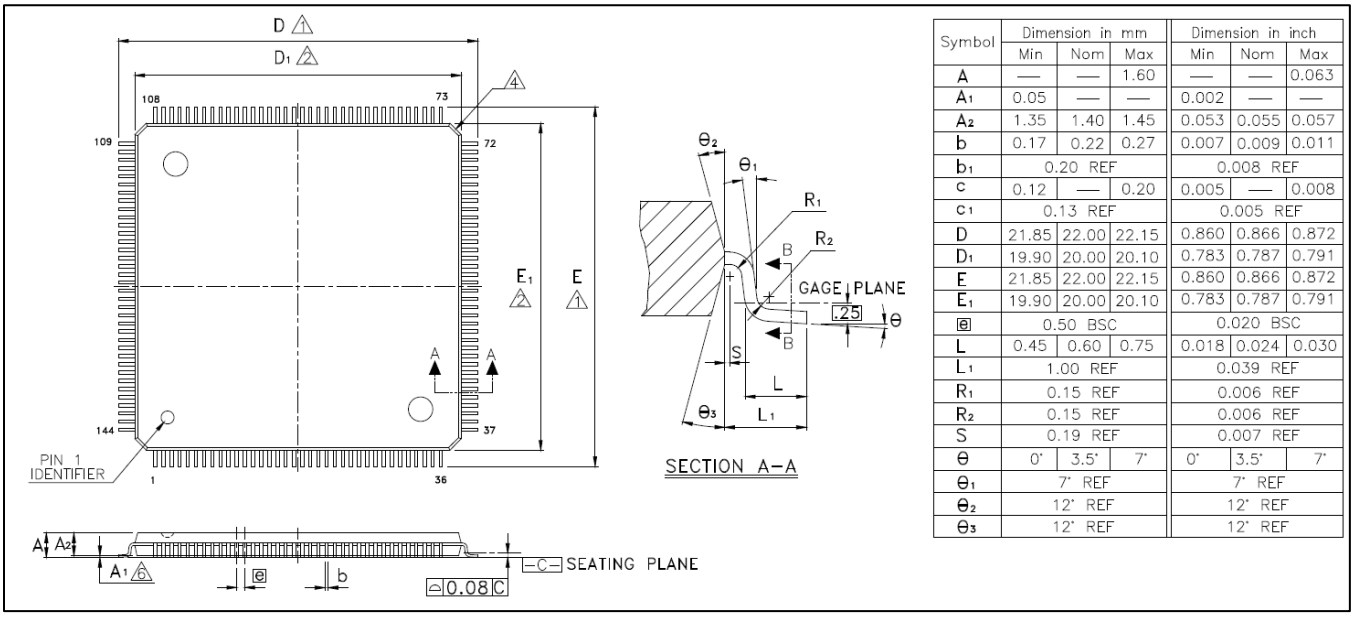
LQFP144 Package

LQFP144 Pin Distribution



NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

LQFP144 Package Size



Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	—	—	1.60	—	—	0.063
A_1	0.05	—	—	0.002	—	—
A_2	1.35	1.40	1.45	0.053	0.055	0.057
b	0.17	0.22	0.27	0.007	0.009	0.011
b_1	0.20 REF			0.008 REF		
c	0.12	—	0.20	0.005	—	0.008
c_1	0.13 REF			0.005 REF		
D	21.85	22.00	22.15	0.860	0.866	0.872
D_1	19.90	20.00	20.10	0.783	0.787	0.791
E	21.85	22.00	22.15	0.860	0.866	0.872
E_1	19.90	20.00	20.10	0.783	0.787	0.791
e	0.50 BSC			0.020 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L_1	1.00 REF			0.039 REF		
R_1	0.15 REF			0.006 REF		
R_2	0.15 REF			0.006 REF		
S	0.19 REF			0.007 REF		
θ	0°	3.5°	7°	0°	3.5°	7°
$θ_1$	7° REF			7° REF		
$θ_2$	12° REF			12° REF		
$θ_3$	12° REF			12° REF		

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

4 Version History

Version	Date	Changes
V1.0.0	2025.4.17	First release

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg

5 Disclaimer

This document is the exclusive property of NSING TECHNOLOGIES PTE. LTD. (Hereinafter referred to as NSING). This document, and the product of NSING described herein (Hereinafter referred to as the Product) are owned by NSING under the laws and treaties of Republic of Singapore and other applicable jurisdictions worldwide. The intellectual properties of the product belong to Nations Technologies Inc. and Nations Technologies Inc. does not grant any third party any license under its patents, copyrights, trademarks, or other intellectual property rights. Names and brands of third party may be mentioned or referred thereto (if any) for identification purposes only. NSING reserves the right to make changes, corrections. enhancements, modifications, and improvements to this document at any time without notice. Please contact NSING and obtain the latest version of this document before placing orders. Although NATIONS has attempted to provide accurate and reliable information, NATIONS assumes no responsibility for the accuracy and reliability of this document. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. In no event shall NATIONS be liable for any direct, indirect, incidental, special, exemplary, or consequential damages arising in any way out of the use of this document or the Product. NATIONS Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, Insecure Usage'. Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, all types of safety devices, and other applications intended to supporter sustain life. All Insecure Usage shall be made at user's risk. User shall indemnify NATIONS and hold NATIONS harmless from and against all claims, costs, damages, and other liabilities, arising from or related to any customer's Insecure Usage Any express or implied warranty with regard to this document or the Product, including, but not limited to. The warranties of merchantability, fitness for a particular purpose and non-infringement are disclaimed to the fullest extent permitted by law. Unless otherwise explicitly permitted by NATIONS, anyone may not use, duplicate, modify, transcribe or otherwise distribute this document for any purposes, in whole or in part.

NSING Technologies Pte. Ltd.
Address: 20 Science Park, #03-15/16
Teleteck Park, East Wing, Singapore 117674
Email: sales@nsing.com.sg