N32H492xE/xG Product Brief

N32H492 series employs a 32-bit ARM Cortex-M4F core operating at a maximum frequency of 240MHz, supporting floating-point operations and DSP instructions. It integrates up to 1MB of embedded Flash, 320KB of SRAM (including 80KB of CCM SRAM) plus 4KB of Backup SRAM. The device incorporates three 12-bit 4.7Msps ADCs, two 12-bit DACs, and integrated communication interfaces including USB FS Device, USB HS Host/Device, U(S)ART, I2C, SPI, CAN-FD, and Ethernet. It supports SDIO, FEMC, xSPI, SDRAM high-speed memory interfaces, supports I2S audio interface, supports multiple advanced timers, general-purpose timers, basic timers, low-power timers, built-in cryptographic algorithm hardware acceleration engine, supports AES/TDES, SHA, SM3, SM4, MD5 algorithms, supports TRNG true random number generator, supports 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 8KB I-Cache (instruction cache) and 1KB D-Cache (data cache), supporting Flash Accelerator Unit for zero-wait program execution
  - Frequency up to 240 MHz, 300 DMIPS
- **Memories**
  - 1MByte on-chip Flash, dual-bank support, enabling secure storage, partition management and data protection, 10,000 erase/write cycles, 10-year data retention
  - 240KB general-purpose SRAM, configurable for ECC support; maximum capacity 192KB when ECC enabled
  - 80KB CCM SRAM, defaulted as general-purpose SRAM, configurable as CCM SRAM, configurable for ECC support, maximum capacity 64KB when ECC enabled
  - 4-KByte of Backup SRAM with ECC available in Standby mode
- **Power Modes**
  - Run mode: All peripherals configurable for operation
  - Sleep Mode: CPU halted, peripherals configurable for operation
  - Stop0 mode: SRAM and all registers can be configured to retention, RTC run
  - Standby mode: 6uA, all backup registers and Backup SRAM retained, all IOs retained, optional RTC run
  - VBAT mode: 4uA, all backup registers and Backup SRAM 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, -1.5% to +2% accuracy (full temperature range)
  - LSI: Low-speed internal RC 32KHz, +/-10% accuracy (full temperature range)
- **Reset**

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

- Supports power-on/brown-out/external pin reset
- Supports watchdog reset
- Supports programmable voltage detection

- **GPIOs**
  - Up to 118 GPIOs, PD6 to PD7 and PG9 to PG15 comprise nine I/O pins capable of supporting VDDIO input power supply operation.
- **Communication Interfaces**
  - 1x USB2.0 FS Device interface, built-in PHY, supports crystal-less mode
  - 1 USB High-Speed Host/Device interface, with integrated PHY
  - 6x SPI interfaces, 2x I2S interfaces, support half/full duplex mode, multiplexed with SPI interfaces
  - U(S)ART interfaces
    - 5x USART interfaces (support ISO7816, IrDA, LIN)
    - 5x 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
  - 1x IEEE-802.3-2002 compatible Ethernet MAC interface, supports 10M/100M Ethernet, IEEE1588 synchronized Ethernet protocol
  - 1x DVP (Digital Video Port) supporting 8/10/12/16 bit data
- **High Performance Analog Interfaces**
  - 3x 12-bit 4.7 Msps ADCs, supporting 12-bit, 10-bit, 8-bit, and 6-bit sampling precision, with hardware oversampling capability up to 16-bit. ADC1 supports up to 16 external single-ended input channels, while ADC2 and ADC3 support up to 18 external single-ended input channels. Both single-ended and differential modes are supported.
  - 2x 12-bit DACs, each supporting one internal output channel and one external output channel. Sampling rate: 1 Msps. Supports buffered and unbuffered outputs. Capable of internal output, external output, or simultaneous internal and external output.
  - 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
  - 1x SDIO interface, support SD/SDIO/MMC format
  - 1x SDRAM interface, configurable 8/16-bit data width
- **Mathematical hardware accelerator CORDIC for motor control functions**
- **Delta Sigma Module Unit (DSMU)**
- **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**
  - 3x 16-bit advanced timer/counters supporting input capture, complementary outputs, quadrature encoding inputs, etc., with a maximum control precision of 4.17ns; each timer features six independent channels, four of which support four pairs of complementary PWM outputs
  - 10x general-purpose timers (GTIM1–10):
    - GTIM2/3/5/6/7: 16-bit counters with a maximum control precision of 4.17 ns. Each timer features up to 4 independent channels, each supporting input capture, output compare, PWM generation, and single-pulse mode output.
    - GTIM1/4: 32-bit counters with maximum control precision of 4.17 ns. Each timer provides up to 4 independent channels, each supporting input capture, output compare, PWM generation, and single-pulse mode output;
    - GTIM8–10, 16-bit counters with a maximum control precision of 4.17 ns. Each timer features up to four independent channels, each supporting input capture, output compare, PWM generation, and single-pulse mode output. Only Channel 1 supports complementary outputs with dead time and brake input capability.
  - 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, SM3, SM4, 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℃ ~ 105℃
- **Packages**
  - LQFP64(10mm x 10mm)
  - BGA64 (5mm x 5mm)
  - BGA72 (4.41mm x 3.76mm)
  - BGA81 (4.41mm x 3.76mm)
  - LQFP100(14mm x 14mm)
  - LQFP144(20mm x 20mm)

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

1 Ordering Information

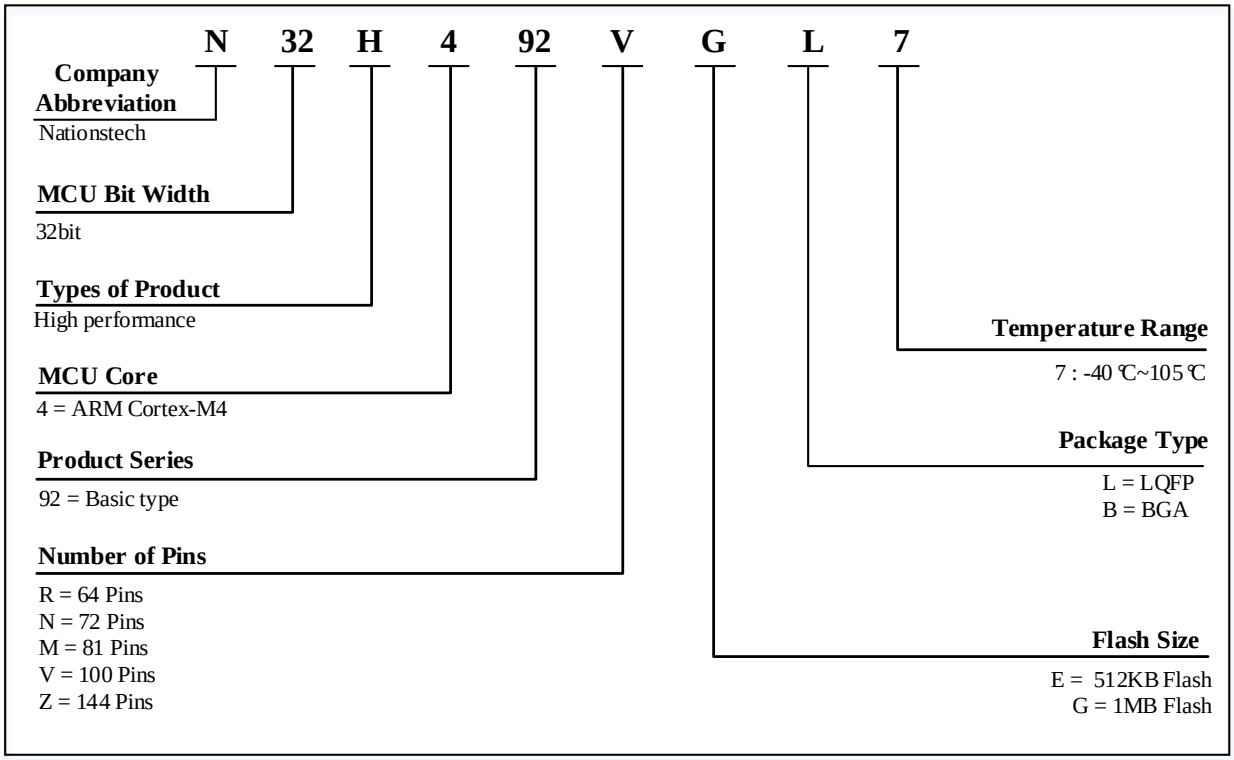


Table 1-1 N32H492 Series Ordering Code

Ordering Code(1)	Package	Size	Packaging(2)	SPQ(3)	Temperature range
N32H492RGL7	LQFP64	10mm x 10mm	Tray	160	-40℃～105℃
N32H492RGB7	BGA64	5mm x 5mm	TBD	TBD	-40℃～105℃
N32H492NGB7	BGA72	4.41mm x 3.76mm	TBD	TBD	-40℃～105℃
N32H492MGB7	BGA81	4.41mm x 3.76mm	TBD	TBD	-40℃～105℃
N32H492VGL7	LQFP100	14mm x 14mm	Tray	90	-40℃～105℃
N32H492ZGL7	LQFP144	20mm x 20mm	Tray	60	-40℃～105℃
N32H492REL7	LQFP64	10mm x 10mm	Tray	160	-40℃～105℃
N32H492REB7	BGA64	5mm x 5mm	TBD	TBD	-40℃～105℃
N32H492NEB7	BGA72	4.41mm x 3.76mm	TBD	TBD	-40℃～105℃
N32H492MEB7	BGA81	4.41mm x 3.76mm	TBD	TBD	-40℃～105℃
N32H492VEL7	LQFP100	14mm x 14mm	Tray	90	-40℃～105℃
N32H492ZEL7	LQFP144	20mm x 20mm	Tray	60	-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.

2 Product Configurations

Table 2-1 N32H492 Series Product Configuration

Device		N32H492RE/RGL7		N32H492RE/RGB7		N32H492NE/NGB7		N32H492ME/MGB7		N32H492VE/VGL7		N32H492ZE/ZGL7	
Operating Condition		1.8~3.6V/-40~105℃											
CPU Frequency		ARM Cortex-M4F @240MHz, 300DMIPS											
Flash Capacity (KB)		512	1024	512	1024	512	1024	512	1024	512	1024	512	1024
Total SRAM (KB)	General SRAM	240(1)											
	CCM SRAM(2)	80(3)											
	Backup SRAM	4											
Times	ATIM	3*16bit											
	GTIM	5*16bit											
		2*32bit(4)											
		3*16bit(5)											
	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^2C	4											
	USART	5											
	UART	5											
	USB FS Device	Yes(6)											
	USB HS DualRole	Yes(6)											
	FDCAN	3											
	Ethernet	Yes											
Memory	XSPI	Yes											

Expansion	FEMC	No				Yes[7]	Yes
	SDIO	Yes					
	SDRAM	No					Yes
Human-computer interaction	DVP	Yes					
GPIO WKUP Pins		54 5	52 5	59 5	67 5	85 7	118 7
Nb of I/Os down to 1.8 V[8]		0	0	6	6	0	9
DMA Number of channels		2 16					
12bit ADC Number of channels		3 20	3 23	3 23	3 23	3 20	3 28
12bit DAC Number of channels		2 2					
Algorithm Support		DES/3DES、AES、 SHA1/SHA224/SHA256、SM3、SM4、MD5、CRC16/CRC32					
TRNG		Yes					
Cordic		Yes					
DSMU Number of channels		1 8					
Security Protection		Read-write protection (RDP/WRP), storage encryption, partition protection, secure boot					
Package		LQFP64	BGA64	BGA72	BGA81	LQFP100	LQFP144

Note:

1. *With ECC enabled, SRAM capacity is 192KB; without ECC enabled, SRAM capacity is 240KB. ECC is enabled by default.*
2. *Upon power-up, the default configuration is general-purpose SRAM; software can configure it as CCM SRAM.*
3. *With ECC enabled, SRAM capacity is 64KB; without ECC enabled, SRAM capacity is 80KB. ECC is enabled by default.*
4. *Only GTIM1 and GTIM4 support 32-bit timers;*
5. *Only GTIM8/9/10 support brake functionality, with channel 1 supporting complementary channel output;*
6. *For BGA81/71/64 packages, USB FS Device and USB HS Host/Device are mutually exclusive;*
7. *Only supports lower 16-bit address and data multiplexing mode;*

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

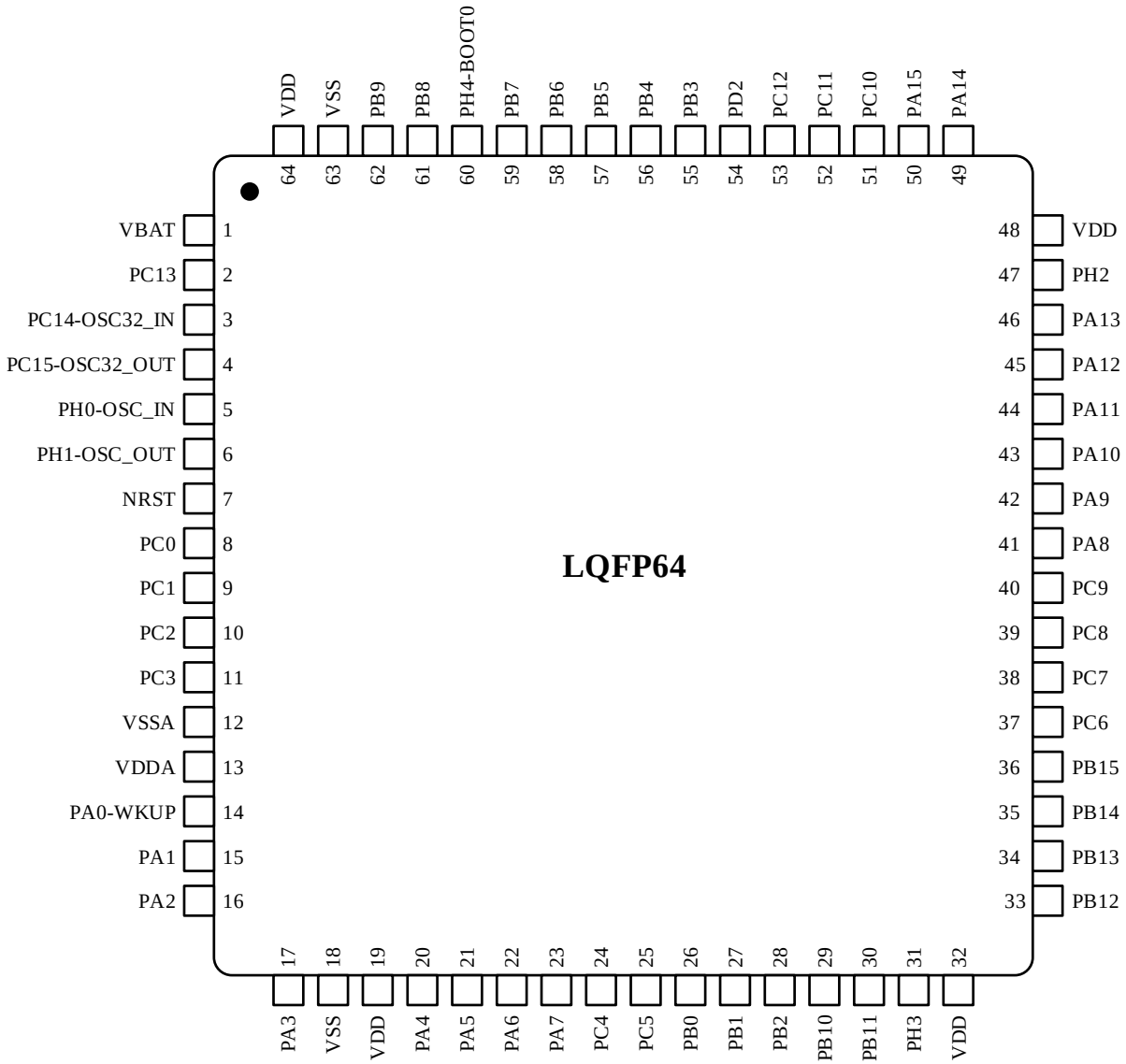
8. *For BGA81 and BGA72 packages, pins PG9 to PG14 may support operation powered via the VDDIO input. For LQFP144 packages, pins PD6 to PD7 and PG9 to PG15 may support operation powered via the VDDIO input, with input voltage support ranging from 1.8V to 3.6V.*

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

3 Package

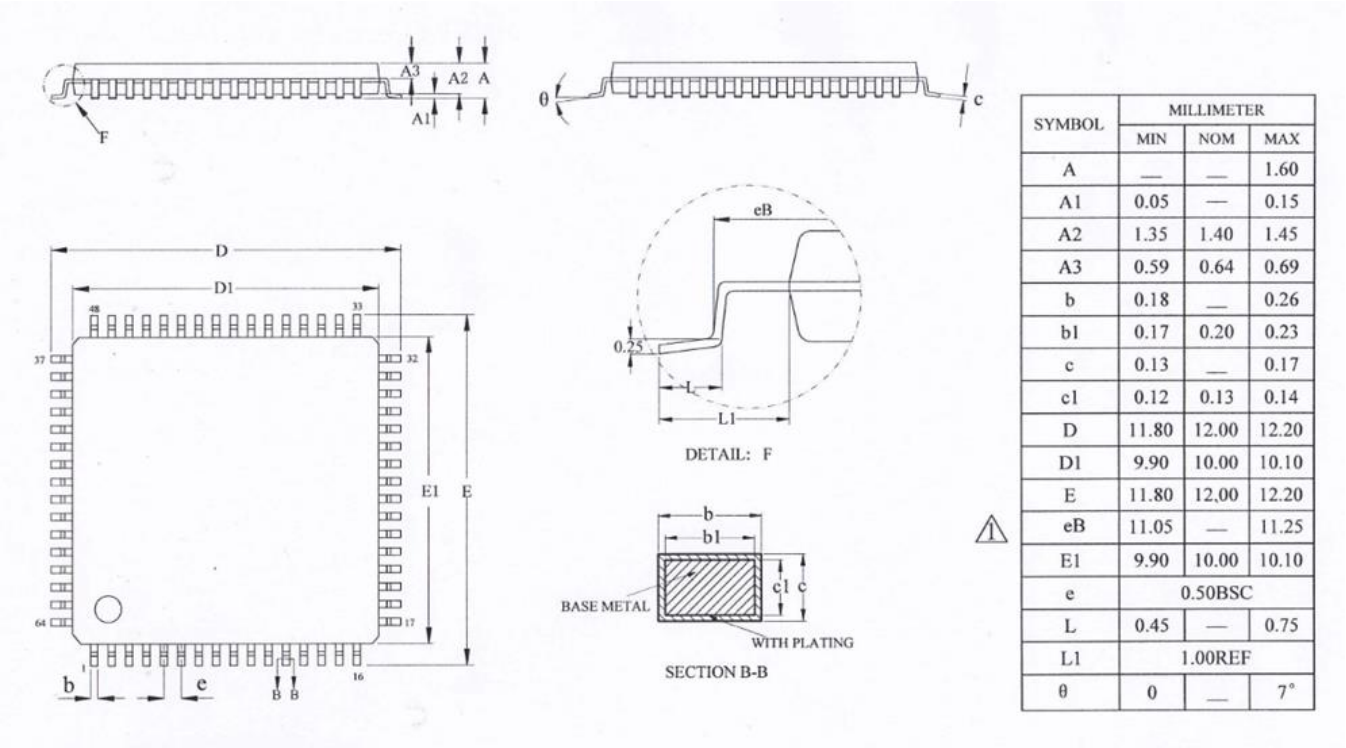
3.1 LQFP64

3.1.1 LQFP64 Pinout



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

3.1.2 **LQFP64 Package**

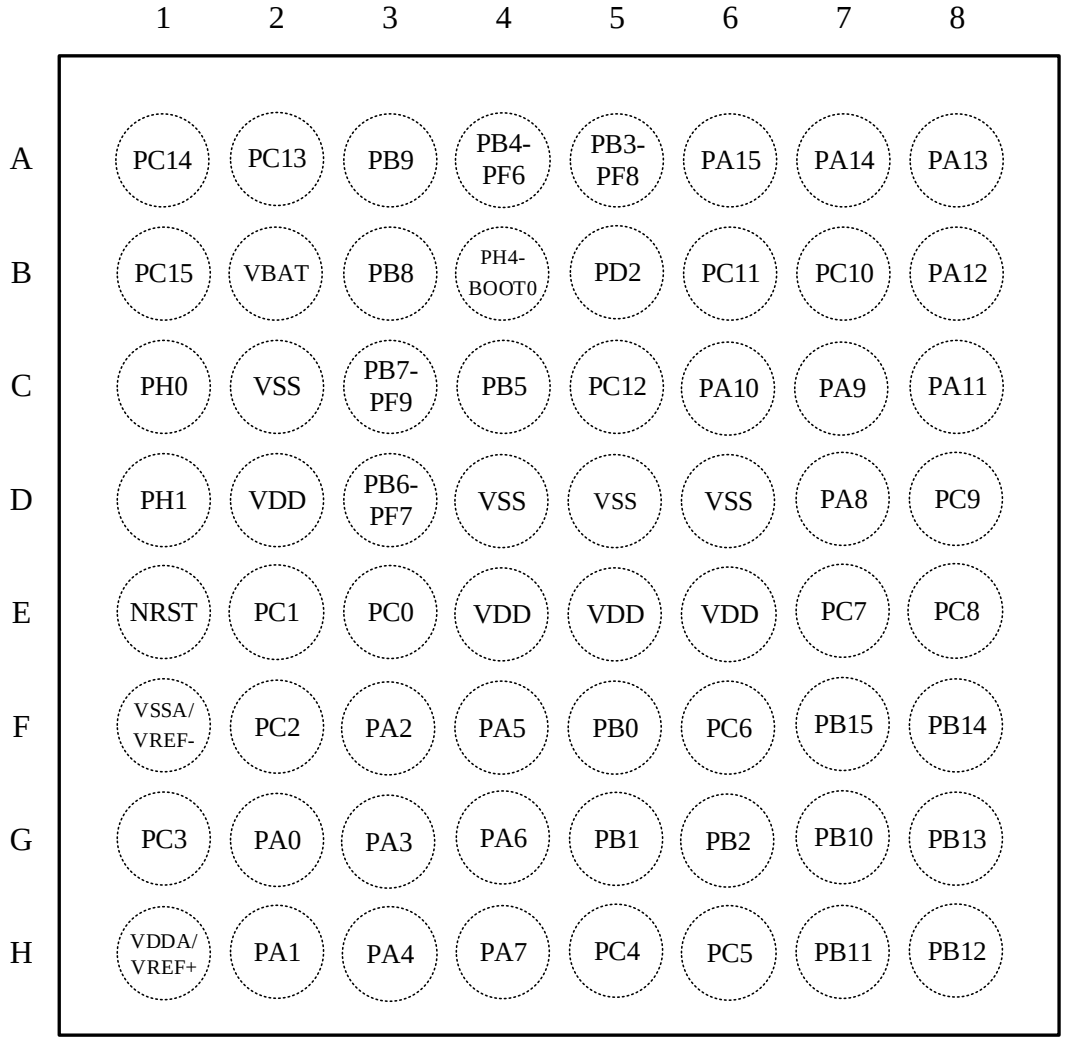


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	11.80	12.00	12.20
D1	9.90	10.00	10.10
E	11.80	12,00	12.20
eB	11.05	—	11.25
E1	9.90	10.00	10.10
e	0.50BSC		
L	0.45	—	0.75
L1	1.00REF		
θ	0	—	7°

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

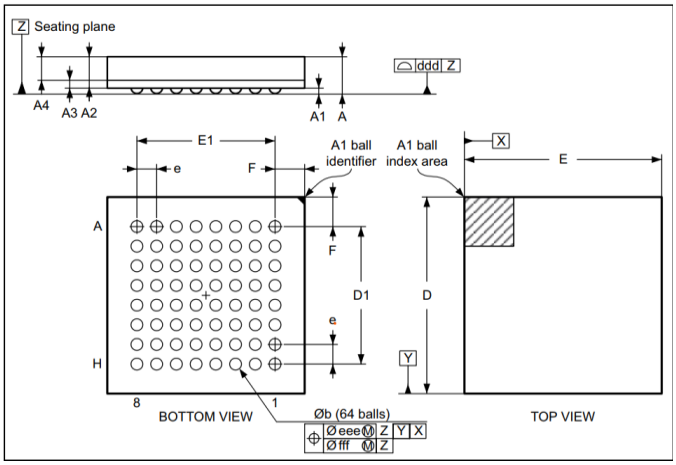
3.2 BGA64

3.2.1 **BAG64 Pinout**



Top view

3.2.2 **BGA64 Package**

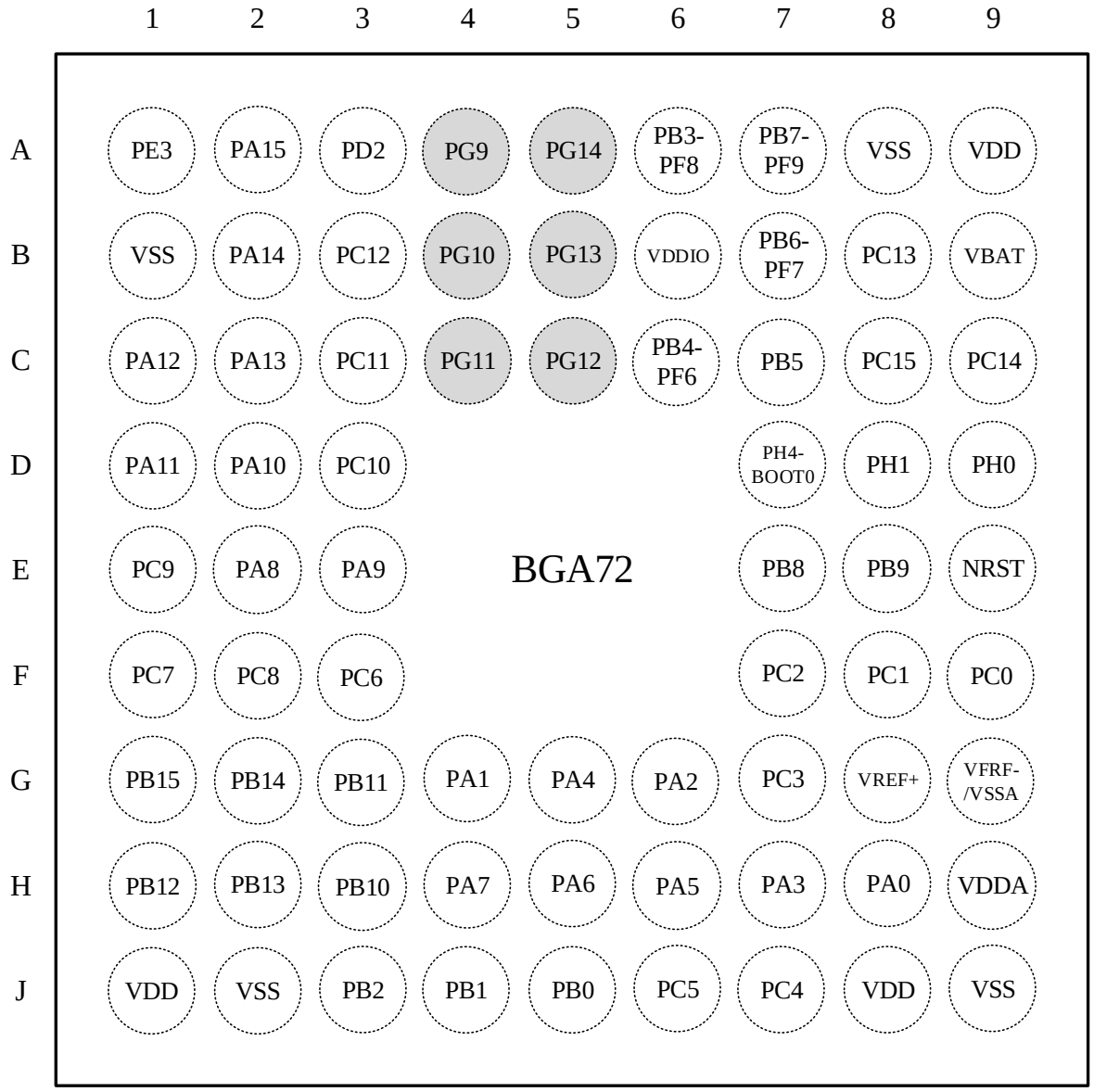


Symbol	millimeters			inches[1]		
	Min	Typ	Max	Min	Typ	Max
A	0.460	0.530	0.600	0.0181	0.0209	0.0236
A1	0.050	0.080	0.110	0.0020	0.0031	0.0043
A2	0.400	0.450	0.500	0.0157	0.0177	0.0197
A3	0.080	0.130	0.180	0.0031	0.0051	0.0071
A4	0.270	0.320	0.370	0.0106	0.0126	0.0146
b	0.170	0.280	0.330	0.0067	0.0110	0.0130
D	4.850	5.000	5.150	0.1909	0.1969	0.2028
D1	3.450	3.500	3.550	0.1358	0.1378	0.1398
E	4.850	5.000	5.150	0.1909	0.1969	0.2028
E1	3.450	3.500	3.550	0.1358	0.1378	0.1398
e	-	0.500	-	-	0.0197	-
F	0.700	0.750	0.800	0.0276	0.0295	0.0315
ddd	-	-	0.080	-	-	0.0031
eee	-	-	0.150	-	-	0.0059
fff	-	-	0.050	-	-	0.0020

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

3.3 BGA72

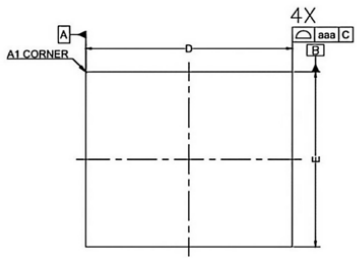
3.3.1 BGA72 Pinout



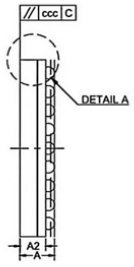
Top view

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

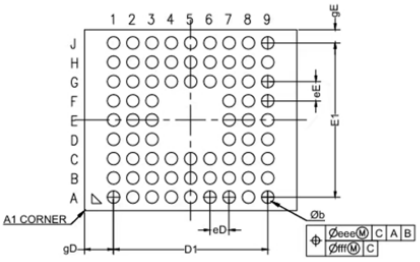
3.3.2 **BGA72 Package**



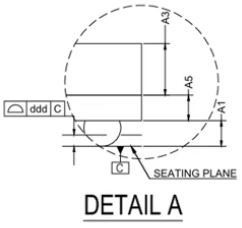
TOP VIEW



SIDE VIEW



BOTTOM VIEW



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

ITEM		SYMBOL	COMMON DIMENSIONS		
			MIN.	NOM.	MAX
Body Size	X	D	4.300	4.400	4.500
	Y	E	3.660	3.760	3.860
Ball Pitch	X	eD		0.400	
	Y	eE		0.400	
Total Thickness		A	0.662	0.733	0.804
Ball Stand Off		A1	0.138	0.188	0.238
Mold+Substrate		A2	0.495	0.545	0.595
Mold Thickness		A3	0.325	0.365	0.405
Substrate Thickness		A5	0.150	0.180	0.210
Ball Size		b	0.208	0.258	0.308
Package Edge Tolerance		aaa		0.100	
Mold Flatness		ccc		0.200	
Coplanarity		ddd		0.080	
Ball Offset (Package)		eee		0.150	
Ball Offset (Ball)		fff		0.050	
Ball Count		n		72	
Edge Ball Center to Center	X	D1		3.200	
	Y	E1		3.200	
Edge Ball Center to Package Edge	X	gD		0.600	
	Y	gE		0.280	

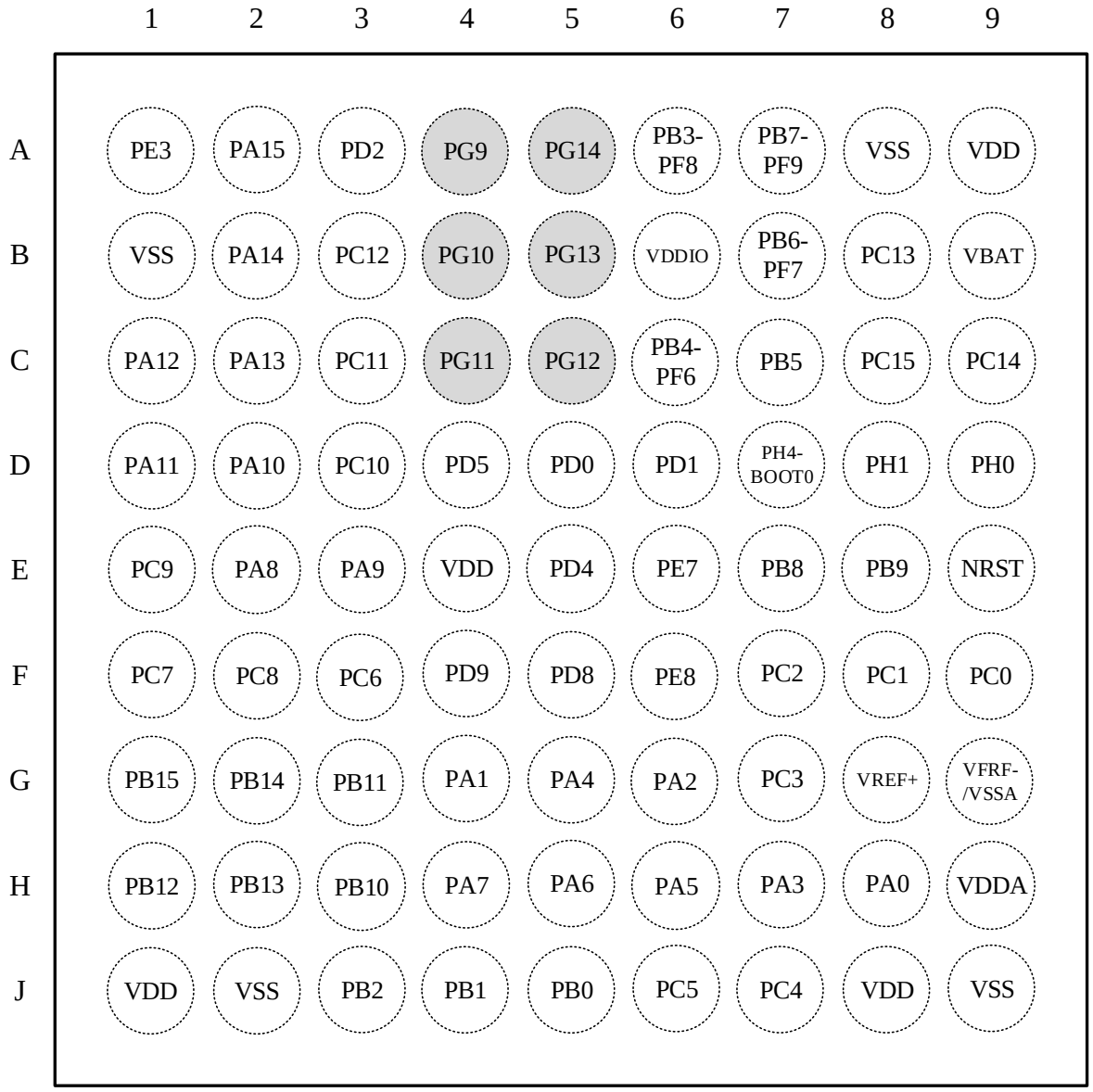
NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. All DIMENSIONS AND TOLERANCE CONFORM TO ASME Y14.5M-2009.
3. TERMINAL POSITIONS DESIGNATION PER JESD 95.

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

3.4 BGA81

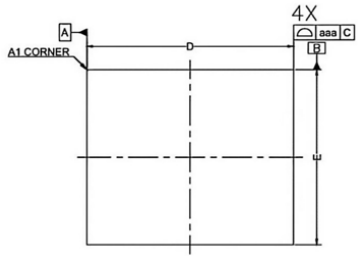
3.4.1 BGA81 Pinout



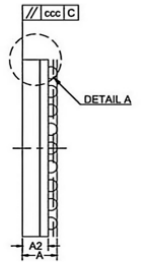
Top view

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

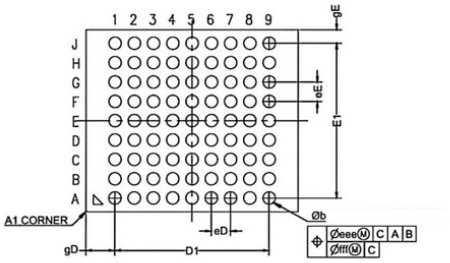
3.4.2 **BGA81 Package**



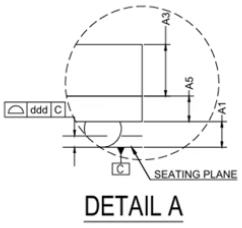
TOP VIEW



SIDE VIEW



BOTTOM VIEW



COMMON DIMENSIONS

(UNITS OF MEASURE=MILLIMETER)

ITEM		SYMBOL	COMMON DIMENSIONS		
			MIN.	NOM.	MAX.
Body Size	X	D	4.300	4.400	4.500
	Y	E	3.660	3.760	3.860
Ball Pitch	X	eD		0.400	
	Y	eE		0.400	
Total Thickness		A	0.662	0.733	0.804
Ball Stand Off		A1	0.138	0.188	0.238
Mold+Substrate		A2	0.495	0.545	0.595
Mold Thickness		A3	0.325	0.365	0.405
Substrate Thickness		A5	0.150	0.180	0.210
Ball Size		b	0.208	0.258	0.308
Package Edge Tolerance		aaa		0.100	
Mold Flatness		ccc		0.200	
Coplanarity		ddd		0.080	
Ball Offset (Package)		eee		0.150	
Ball Offset (Ball)		fff		0.050	
Ball Count		n		81	
Edge Ball Center to Center	X	D1		3.200	
	Y	E1		3.200	
Edge Ball Center to Package Edge	X	gD		0.600	
	Y	gE		0.280	

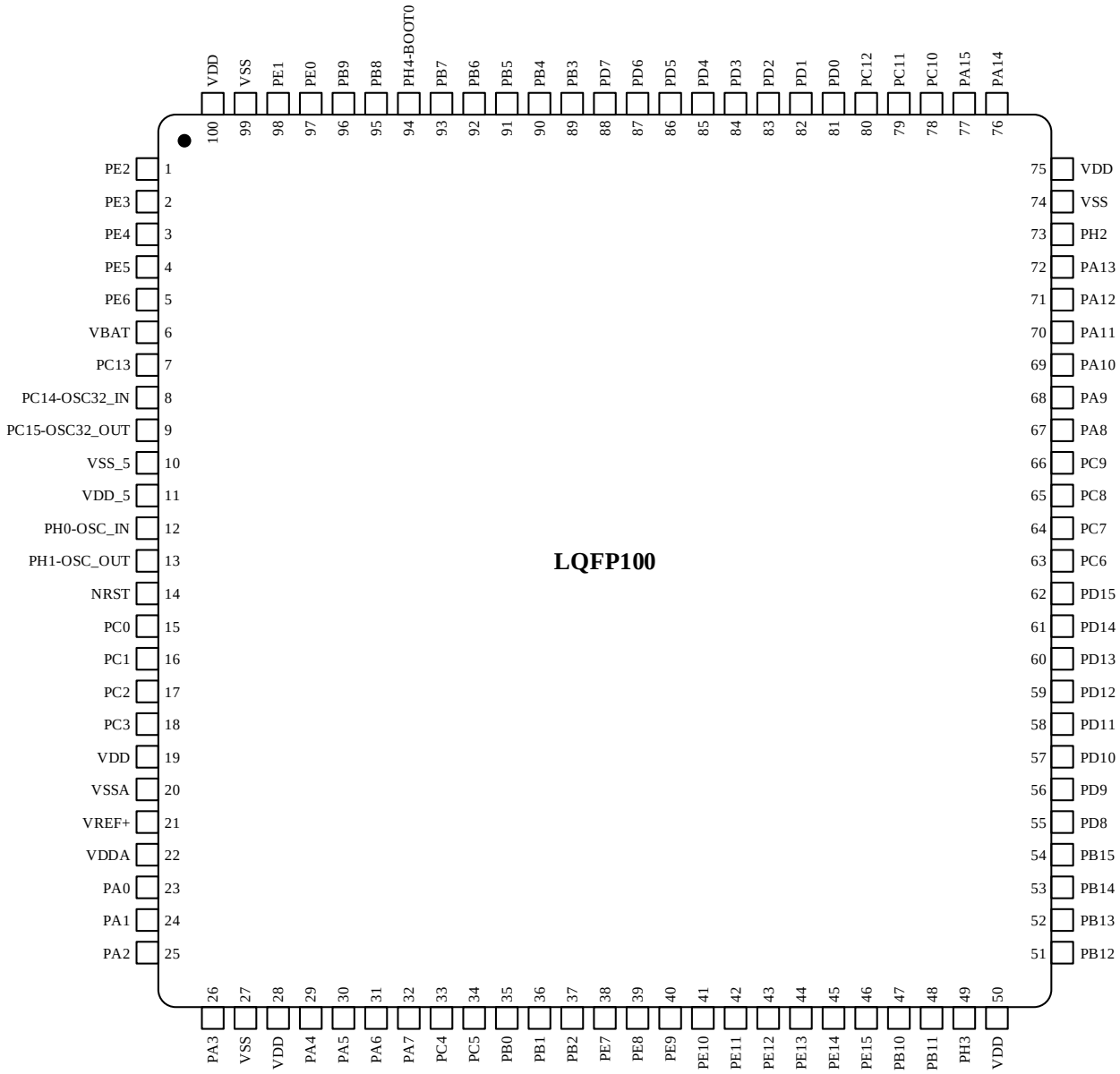
NOTES:

1. DIMENSIONS ARE IN MILLIMETERS.
2. All DIMENSIONS AND TOLERANCE CONFORM TO ASME Y14.5M-2009.
3. TERMINAL POSITIONS DESIGNATION PER JESD 95.

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

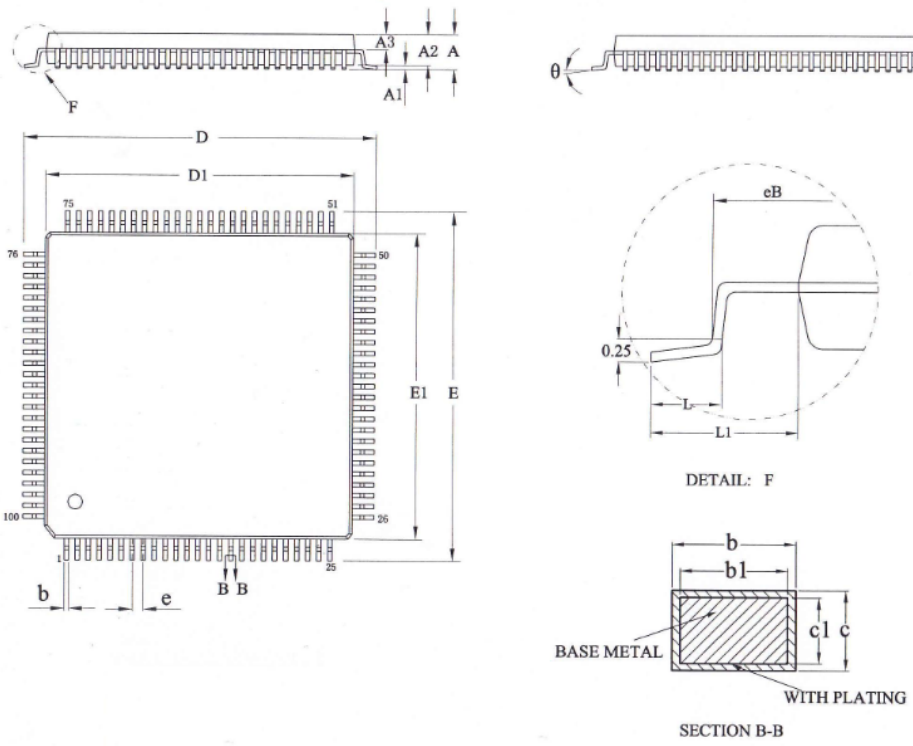
3.5 LQFP100

3.5.1 LQFP100 Pinout



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

3.5.2 **LQFP100 Package**

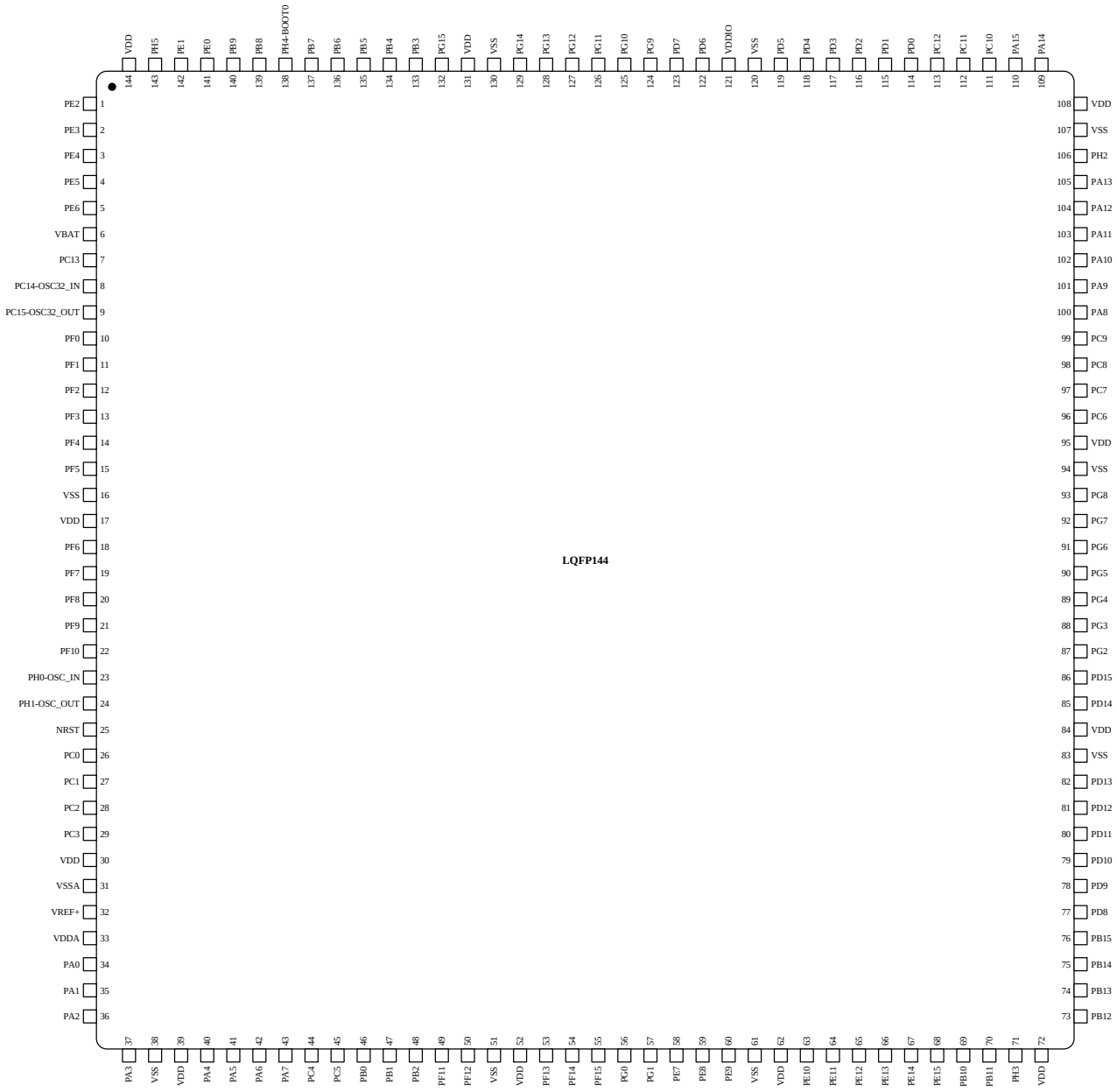


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.60
A1	0.05	—	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	—	0.26
b1	0.17	0.20	0.23
c	0.13	—	0.17
c1	0.12	0.13	0.14
D	15.80	16.00	16.20
D1	13.90	14.00	14.10
E	15.80	16.00	16.20
E1	13.90	14.00	14.10
eB	15.05	—	15.35
e	0.50BSC		
L	0.45	—	0.75
L1	1.00REF		
θ	0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

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

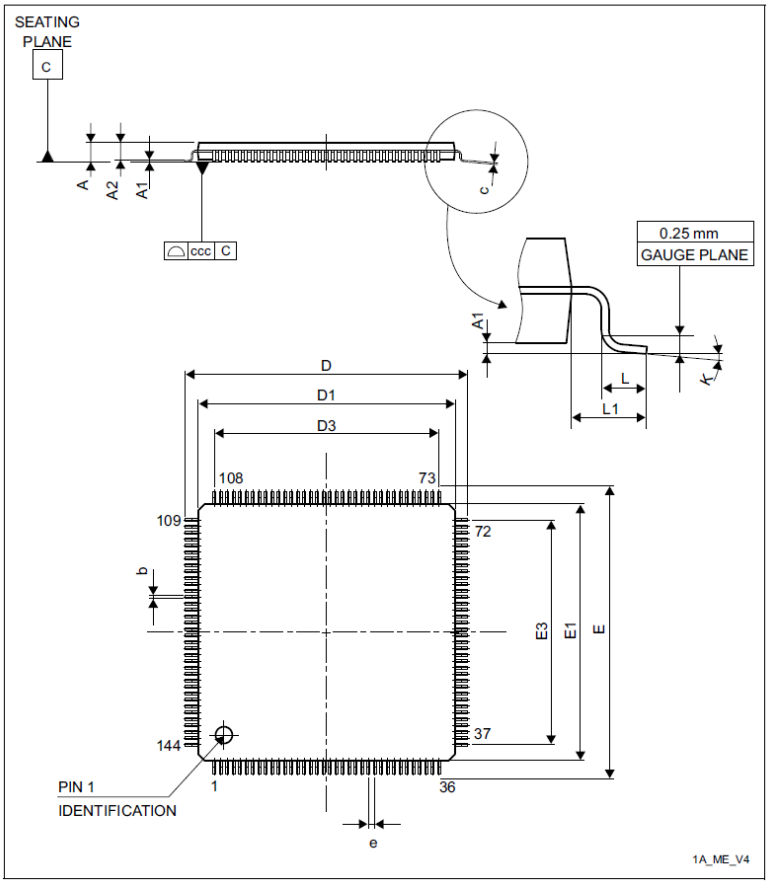
3.6 LQFP144

3.6.1 LQFP144 Pinout



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

3.6.2 **LQFP144 Package**



Symbol	millimeters			inches[1]		
	Min	Typ	Max	Min	Typ	Max
A	-	-	1.600	-	-	0.0630
A1	0.050	-	0.150	0.0020	-	0.0059
A2	1.350	1.400	1.450	0.0531	0.0551	0.0571
b	0.170	0.220	0.270	0.0067	0.0087	0.0106
c	0.090	-	0.200	0.0035	-	0.0079
D	21.800	22.000	22.200	0.8583	0.8661	0.874
D1	19.800	20.000	20.200	0.7795	0.7874	0.7953
D3	-	17.500	-	-	0.689	-
E	21.800	22.000	22.200	0.8583	0.8661	0.8740
E1	19.800	20.000	20.200	0.7795	0.7874	0.7953
E3	-	17.500	-	-	0.6890	-
e	-	0.500	-	-	0.0197	-
L	0.450	0.600	0.750	0.0177	0.0236	0.0295
L1	-	1.000	-	-	0.0394	-
k	0°	3.5°	7°	0°	3.5°	7°
ccc	-	-	0.080	-	-	0.0031

4 Version History

Date	Version	Changes
2026.1.22	V1.0.0	Initial 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 NSING Technologies Inc. and NSING 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 NSING has attempted to provide accurate and reliable information, NSING 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 NSING 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. NSING 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 NSING and hold NSING 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 NSING, 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