N32G030 x6/x8 Product Brief

The **N32G030 series adopts a 32-bit Cortex®-M0** core, operating frequency up to 48MHz. The devices **integrate up to 64KB embedded flash, 8KB SRAM**, multiple communication bus interfaces like U(S)ART, I2C, SPI**,** and analog interfaces such as a **12-bit 1Msps ADC,** an **OPAMP,** a **COMP**

Key Features

- **CPU Core**
  - A 32-bit general-purpose microcontroller based on the Cortex®-M0 core; Single-cycle hardware multiply instruction.
  - Maximum frequency up to 48MHz
- **Memories**
  - Up to 64KByte of embedded Flash memory,
    - supports encrypted storage function.
    - supports hardware ECC check.
    - 100,000 erase/write cycles, 10-years data retention.
  - Up to 8KByte embedded SRAM, supports hardware parity check.
- **Low Power Management**
  - STOP mode: RTC Run, maximum 8KByte SRAM retention, CPU register retention, all IOs retained.
  - PD (Power Down) mode: Supports NRST, PA1_WKUP0, PA2_WKUP1 wakeup.
- **Clock**
  - HSE: 4MHz~20MHz high-speed external crystal oscillator
  - LSE: 32.768KHz low-speed external crystal oscillator
  - HSI: high-speed internal RC 8MHz
  - LSI: low-speed internal RC 30KHz
  - Embedded high-speed PL.
  - Supports 2-channels clock output, configurable as system clock, HSI, HSE, LSI, LSE or PLL divisional output
- **Reset**
  - Supports power-on/power-down/external pin reset.
  - Supports watchdog reset.
- **Communication Interfaces**
  - 3xU(S)ART interfaces with a maximum rate up to 3 Mbps,
    - 2x USART interfaces (support 1xISO7816, 1xIrDA, LIN),
    - 1x LPUART interface (supports low power mode, the maximum rate up to 9600bps in this mode, can wake up chip from STOP mode)
  - 2x SPI interfaces with speed up to 18 MHz, one of which supports multiplexing with I2S.
  - 2x I2C interfaces with speed up to 1 MHz, which can be configured in master/slave mode and support dual address response in slave mode.
- **Analog Interfaces**
  - 1x 12bit 1Msps ADC, up to 12 external single-ended input channels

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

- 1x OPAMP, operational amplifier with built-in up to 32 times programmable gain amplifier (PGA)

1x COMP, high-speed analog comparator has an embedded 64-level adjustable reference embedded 64-level adjustable comparison reference

- **GPIO**
  - Up to 40 GPIOs that support multiplexed functions.
  - Support multiplexed functions.
- **DMA Controller**
  - 1x high-speed DMA controller
  - Each controller supports 5 channels.
  - Channel source address and destination address can be configured arbitrarily.
- **RTC Real-time Clock**
  - Supports leap year perpetual calendar, alarm event, periodic wake up
  - Supports internal and external clock calibration.
- **Beeper**
  - 1x Beeper, supports complementary output, 16mA output drive capacity.
- **Timers and Counters**
  - 2x16-bit advanced timers
    - Supports input capture, complementary output, orthogonal encoding input
    - Each timer has 4 independent channels. 3 of which supports 6 pairs complementary PWM outputs.
  - 1x16-bit general purpose timer
    - Supports input capture/output compare/PWM output.
    - Each timer has 4 independent channels
  - 1x16-bit basic timer
  - 1x16-bit low power timer
  - 1x24-bit SysTick timer
  - 1x7-bit Window Watchdog (WWDG)
  - 1x12-bit Independent Watchdog (IWDG)
- **Programming Methods**
  - Supports SWD debugging interface.
  - Supports UART Bootloader
- **Hardware Divider (HDIV) and Square Root (SQRT)**
- **Security Features**
  - Flash storage encryption.
  - CRC16/32 computation
  - Supports write protection (WRP), multiple read protection (RDP) levels (L0/L1/L2)
  - Supports external clock failure detection, tamper detection.
- **96-bit UID and 128-bit UCID**
- **Opertating Conditions**
  - Operating voltage range: 1.8V~5.5V
  - Operating temperature range: -40℃~105℃
  - ESD: ±4KV (HBM model), ±1KV (CDM model)
- **Packages**
  - UFQFPN20(3mm x 3mm)

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

- TSSOP20(6.5mm x 4.4mm)
- QFN32(4mm x 4mm)
- QFN32(5mm x 5mm)
- LQFP32(7mm x 7mm)
- LQFP48(7mm x 7mm)
- TQFP48(7mm x 7mm)

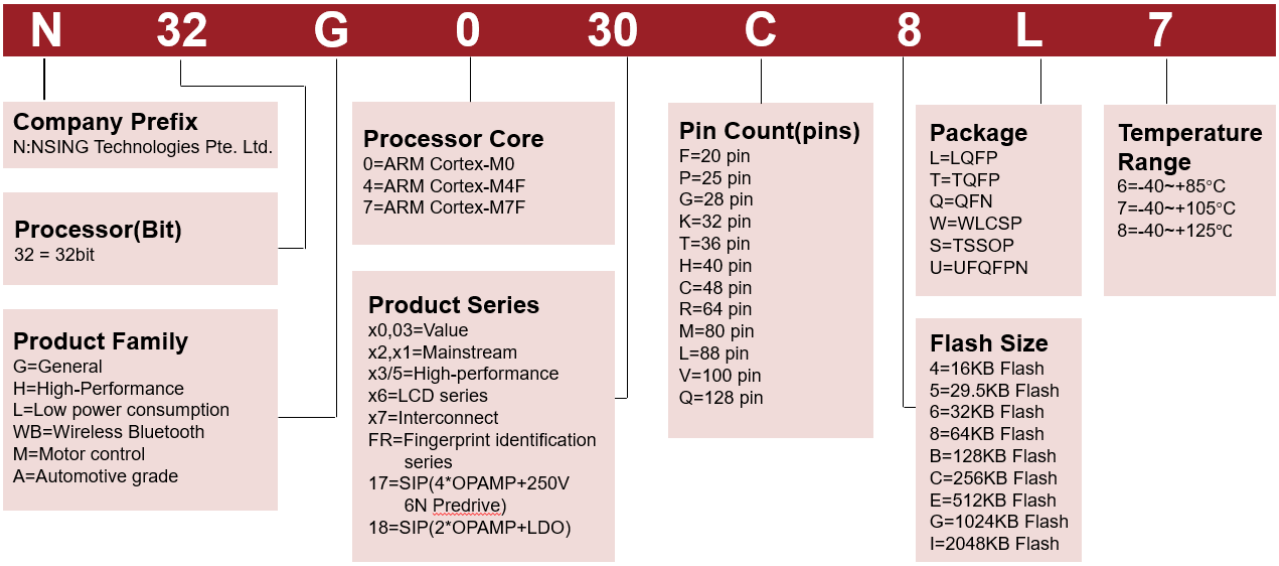
- **Ordering Information**

Reference	Part Number
N32G030x6 N32G030x8	N32G030F6U7, N32G030F6S7 N32G030K6L7, N32G030K6Q7, N32G030K6Q7-1 N32G030K8L7, N32G030C8L7, N32G030C8T7, N32G030F8S7

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

1 Naming Convention

Figure 1-1 N32G030 Series Part Number Information



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

2 Product Configurations

Device		N32G030F6U7	N32G030F6S7	N32G030K6Q7	N32G030K6Q71	N32G030K6L7	N32G030K8L7	N32G030C8L7	N32G030C8T7	N32G030F8S7
Flash Capacity (KB)		32	32	32	32	32	64	64	64	64
SRAM Capacity (KB)		8	8	8	8	8	8	8	8	8
CPU Frequency		ARM Cortex-M0 @48MHz								
Operating Environment		1.8~5.5V/-40~105℃								
Timer	General	1								
	Advanced	2								
	Basic	1								
	LPTIM	1								
	RTC	1								
Communication Interface	SPI	2								
	I2S	1								
	I2C	2								
	USART	2								
	LPUART	1								
GPIO		16		28		26		40		16
DMA Number of Channels		5								
12bit ADC Number of channels		1x12bit 7Channel	1x12bit 9Channel	1x12bit 10Channel				1x12bit 12Channel		1x12bit 9Channel
OPA/COMP		1/1								
Beeper		1								
Algorithm Support		CRC16/CRC32								
Security Protection		Read and Write Protection (RDP/WRP), Storage Encryption								
Package		UFQFPN20	TSSOP20	QFN32(1)	QFN32(2)	LQFP32	LQFP32	LQFP48	TQFP48	TSSOP20

Note: (1) QFN32(5mm x 5mm)

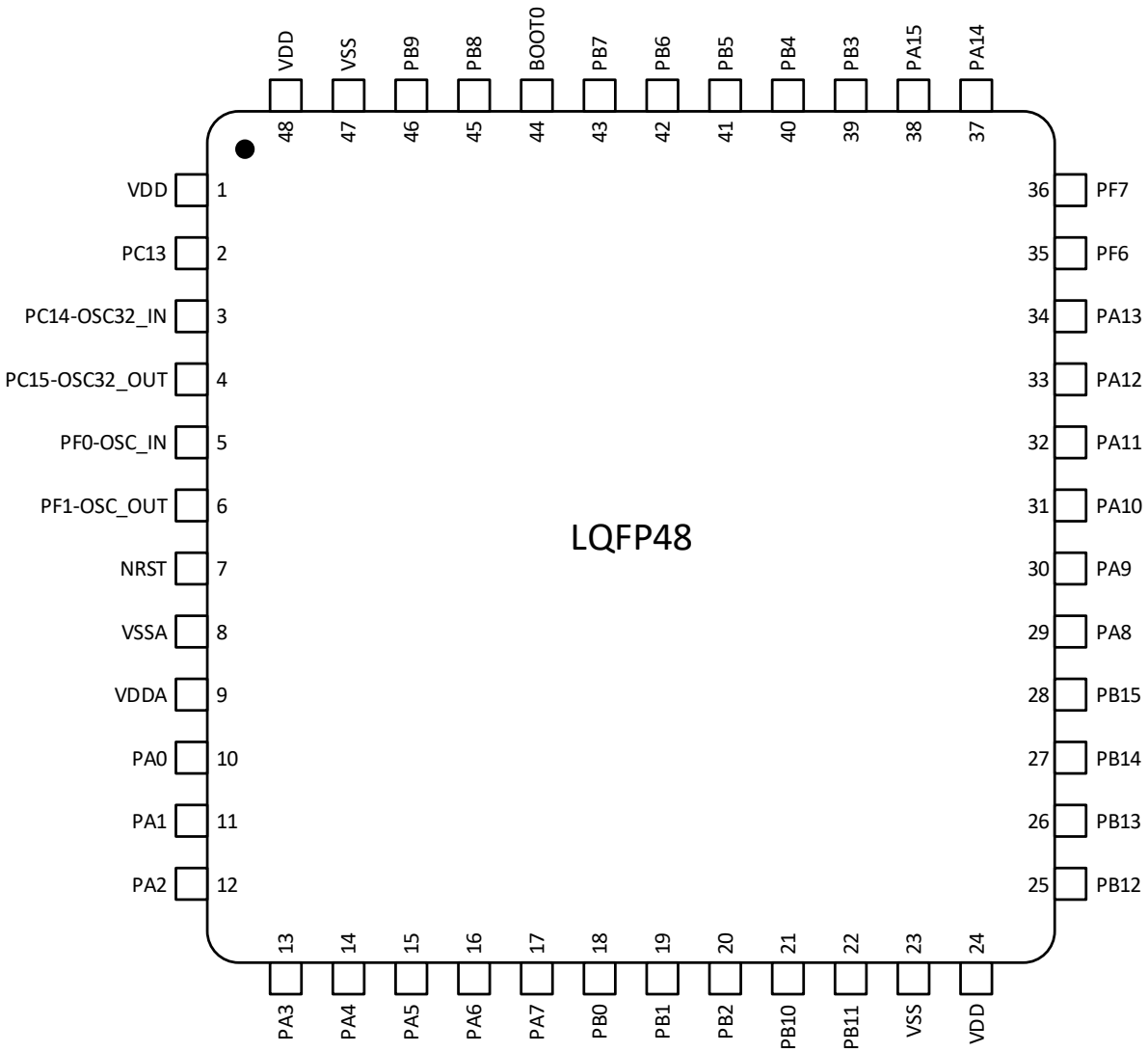
(2) QFN32(4mm x 4mm)

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3 Packages

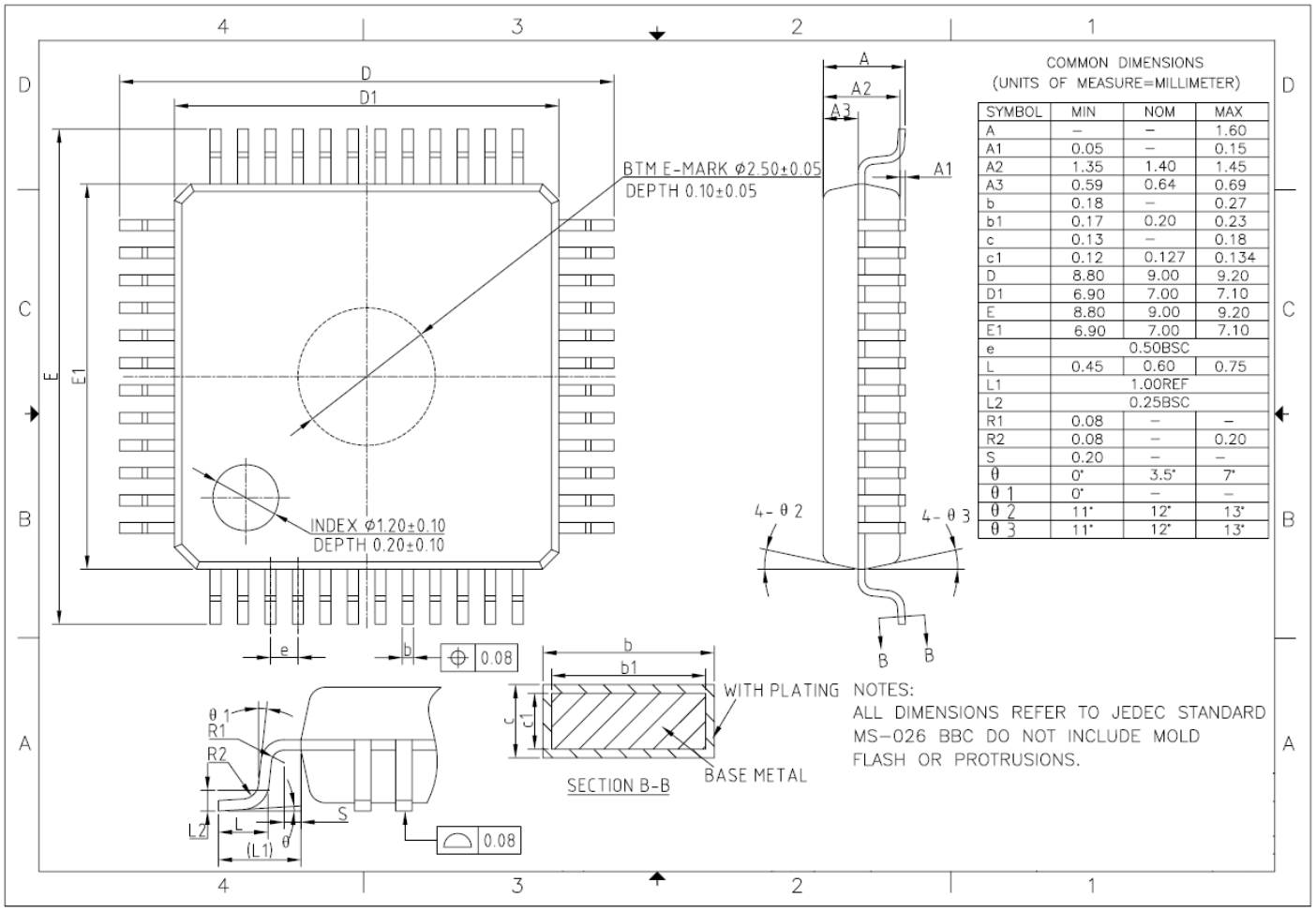
3.1 LQFP48 Package

3.1.1 LQFP48 Pin Assignment



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.1.2 LQFP48(7mm x 7mm) Package Dimensions

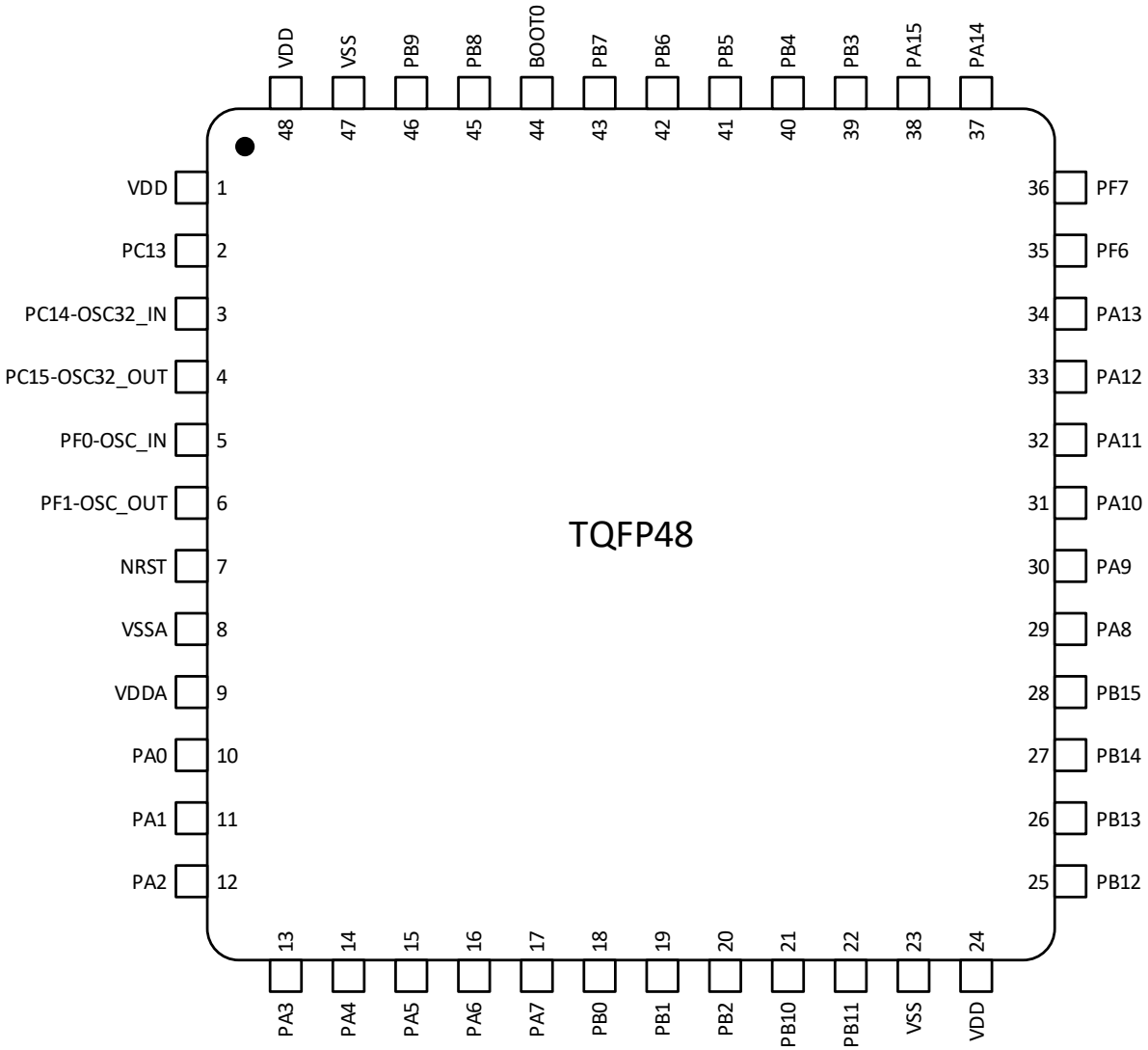


SYMBOL	MIN	NOM	MAX
A	–	–	1.60
A1	0.05	–	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e		0.50BSC	
L	0.45	0.60	0.75
L1		1.00REF	
L2		0.25BSC	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ 1	0°	–	–
θ 2	11°	12°	13°
θ 3	11°	12°	13°

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

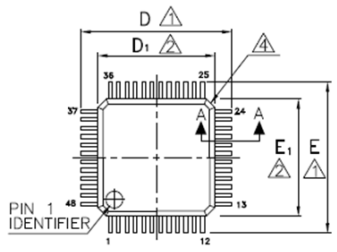
3.2 TQFP48 Package

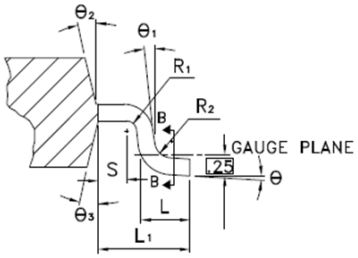
3.2.1 TQFP48 Pin Assignment



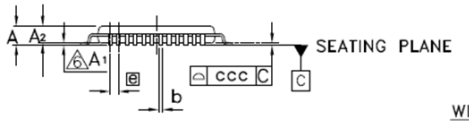
NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

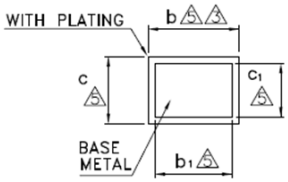
3.2.2 TQFP48(7mm x 7mm) Package Dimensions





SECTION A–A





SECTION B–B

Symbol	Dimension in mm			Dimension in inch		
	Min	Nom	Max	Min	Nom	Max
A	—	—	1.20	—	—	0.047
A1	0.05	—	0.15	0.002	—	0.006
A2	0.95	1.00	1.05	0.037	0.039	0.041
b	0.17	0.22	0.27	0.007	0.009	0.011
b1	0.17	0.20	0.23	0.007	0.008	0.009
c	0.09	—	0.20	0.004	—	0.008
c1	0.09	—	0.16	0.004	—	0.006
D	9.00 BSC			0.354 BSC		
D1	7.00 BSC			0.276 BSC		
E	9.00 BSC			0.354 BSC		
E1	7.00 BSC			0.276 BSC		
e	0.50 BSC			0.020 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 REF			0.039 REF		
R1	0.08	—	—	0.003	—	—
R2	0.08	—	0.20	0.003	—	0.008
S	0.20	—	—	0.008	—	—
θ	0°	3.5°	7°	0°	3.5°	7°
θ1	0°	—	—	0°	—	—
θ2	11°	12°	13°	11°	12°	13°
θ3	11°	12°	13°	11°	12°	13°
ccc	0.08			0.003		

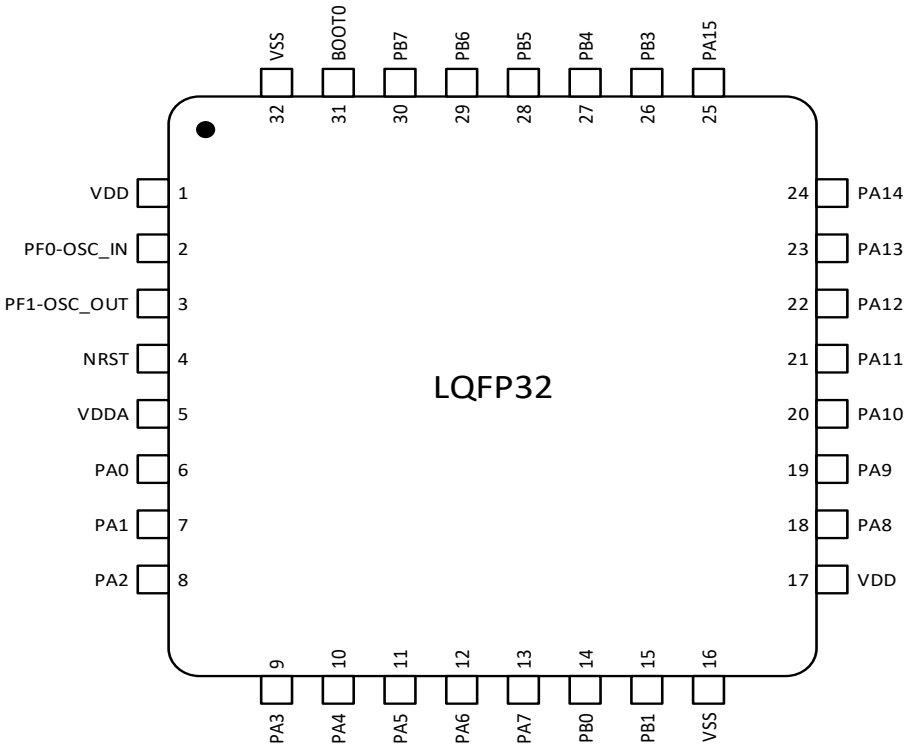
NOTE :

1. TO BE DETERMINED AT SEATING PLANE C.
2. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. D1 AND E1 ARE MAXIMUM PLASTIC BODY SIZE DIMENSIONS INCLUDING MOLD MISMATCH.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. DAMBAR CAN NOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.
4. EXACT SHAPE OF EACH CORNER IS OPTIONAL.
5. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10 mm AND 0.25 mm FROM THE LEAD TIP.
6. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
7. CONTROLLING DIMENSION : MILLIMETER.
8. REFERENCE DOCUMENT : JEDEC MS–026
9. SPECIAL CHARACTERISTICS C CLASS: ccc

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

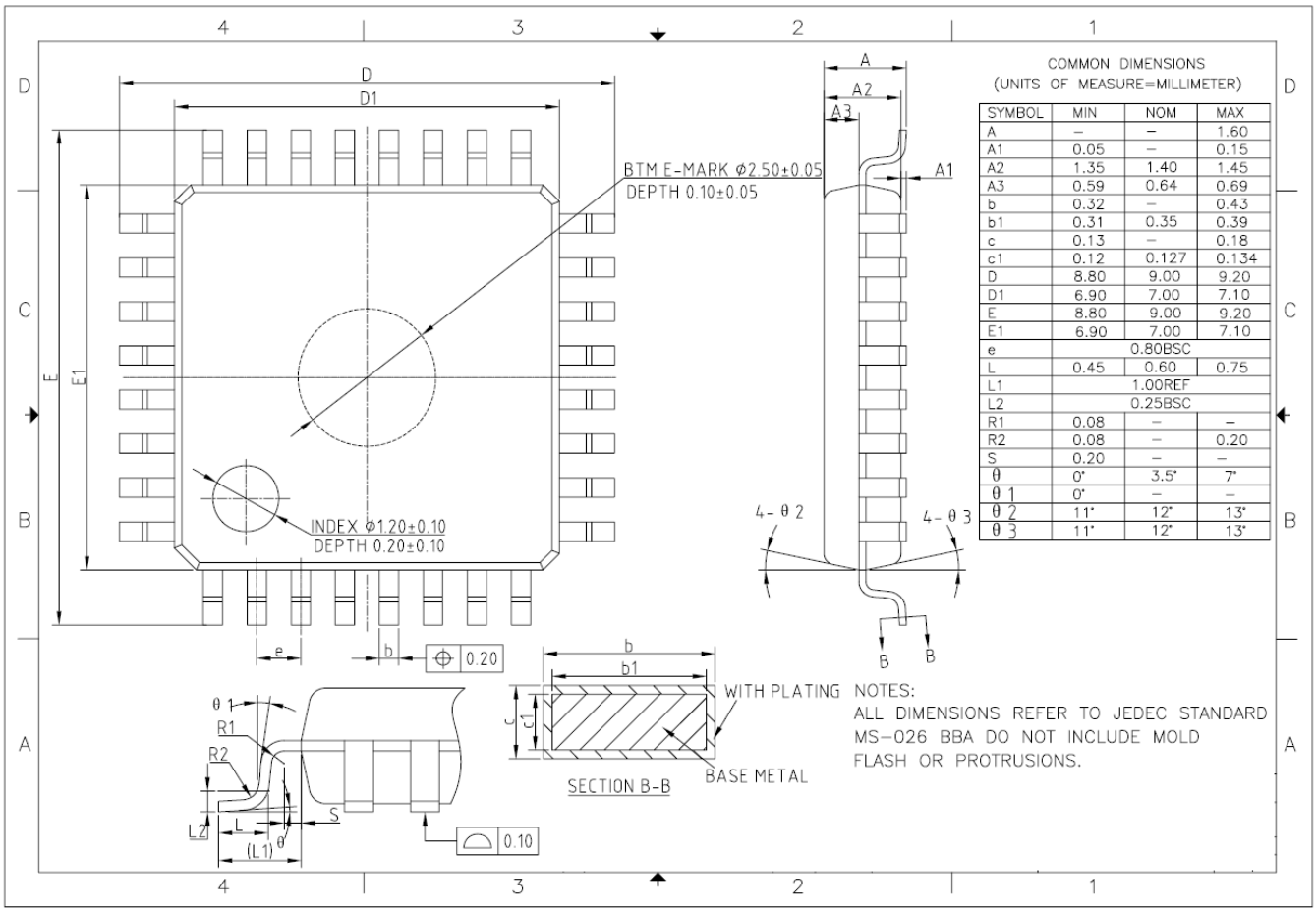
3.3 LQFP32 Package

3.3.1 LQFP32 Pin Assignment



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.3.2 LQFP32(7mm x 7mm) Package Dimensions



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

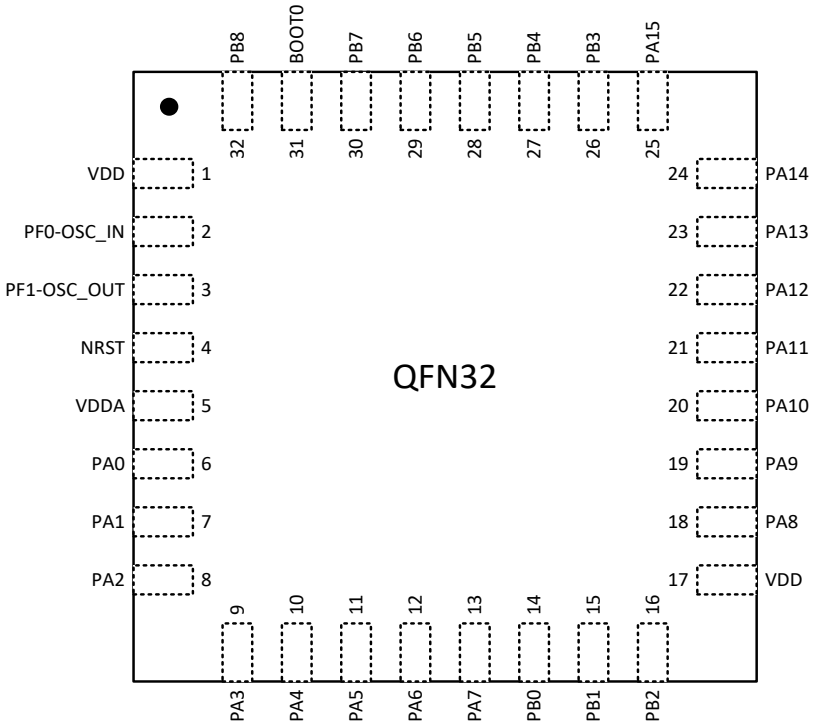
SYMBOL	MIN	NOM	MAX
A	–	–	1.60
A1	0.05	–	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.32	–	0.43
b1	0.31	0.35	0.39
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e		0.80BSC	
L	0.45	0.60	0.75
L1		1.00REF	
L2		0.25BSC	
R1	0.08	–	–
R2	0.08	–	0.20
S	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 BBA DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

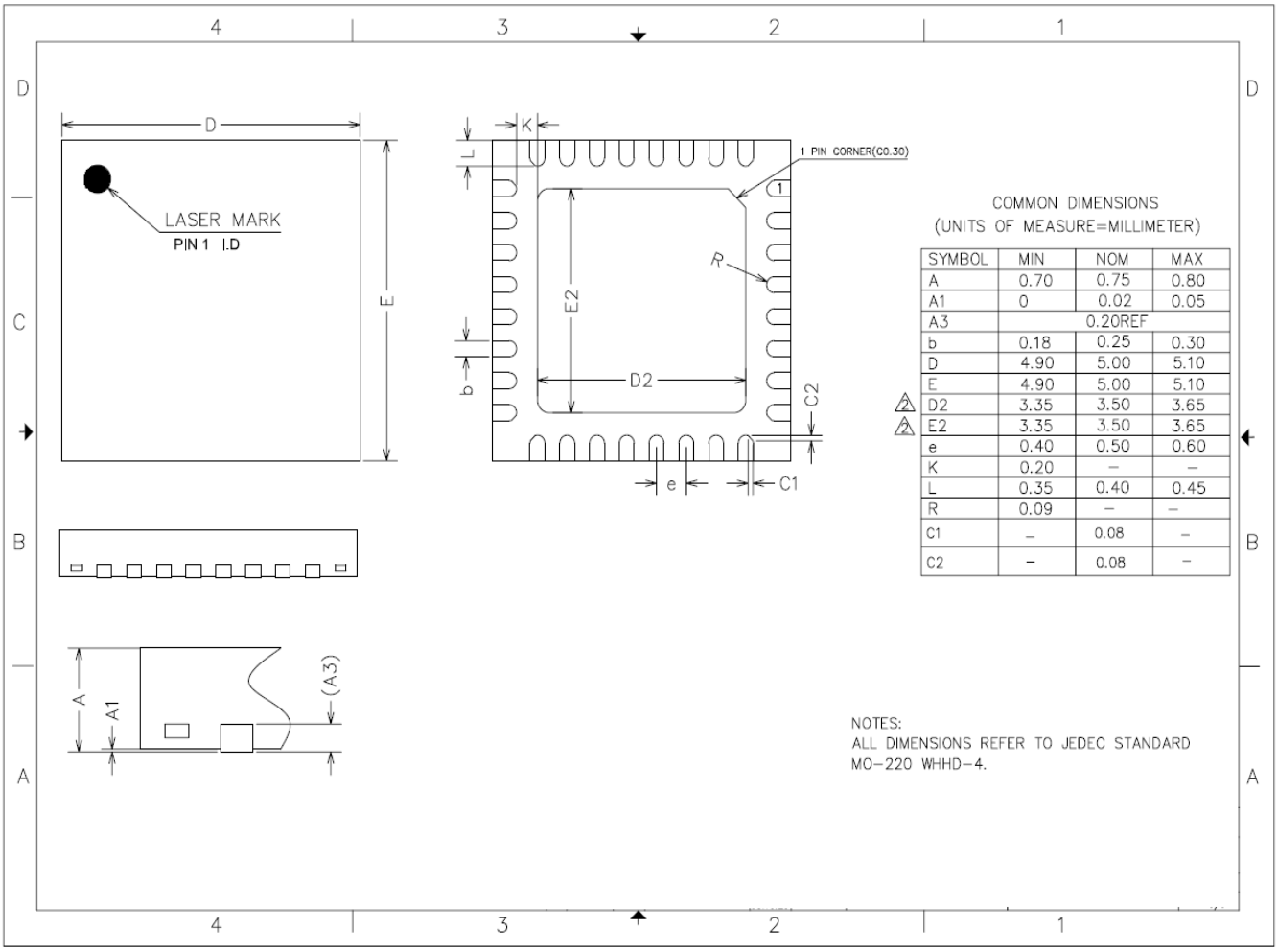
3.4 QFN32 Package (5mm x 5mm)

3.4.1 QFN32 (5mm x 5mm) Pin Assignment



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.4.2 QFN32 (5mm x 5mm) Package Dimensions



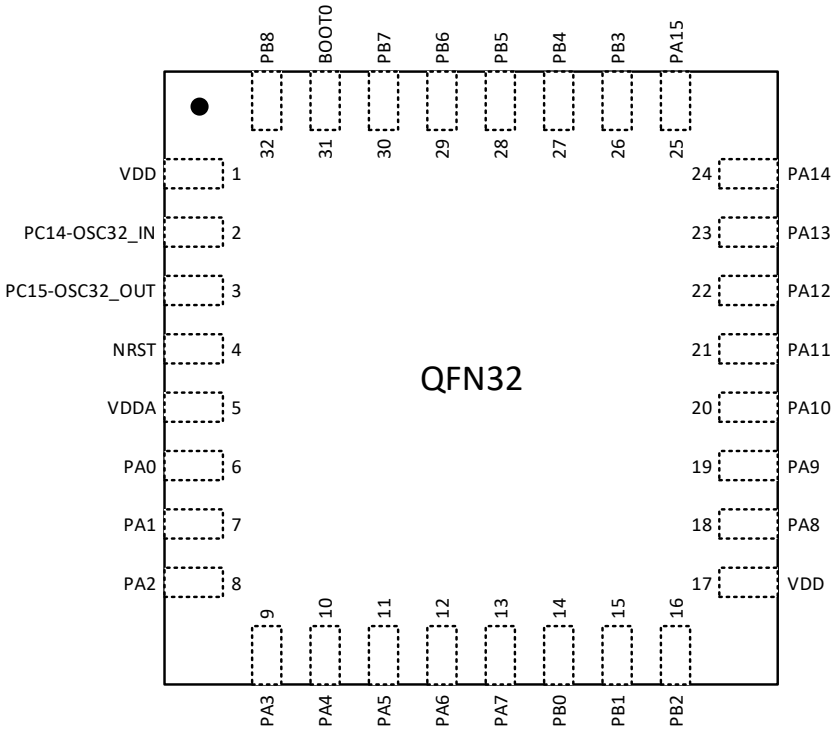
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
A3		0.20REF	
b	0.18	0.25	0.30
D	4.90	5.00	5.10
E	4.90	5.00	5.10
⚠2 D2	3.35	3.50	3.65
⚠2 E2	3.35	3.50	3.65
e	0.40	0.50	0.60
K	0.20	–	–
L	0.35	0.40	0.45
R	0.09	–	–
C1	–	0.08	–
C2	–	0.08	–

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

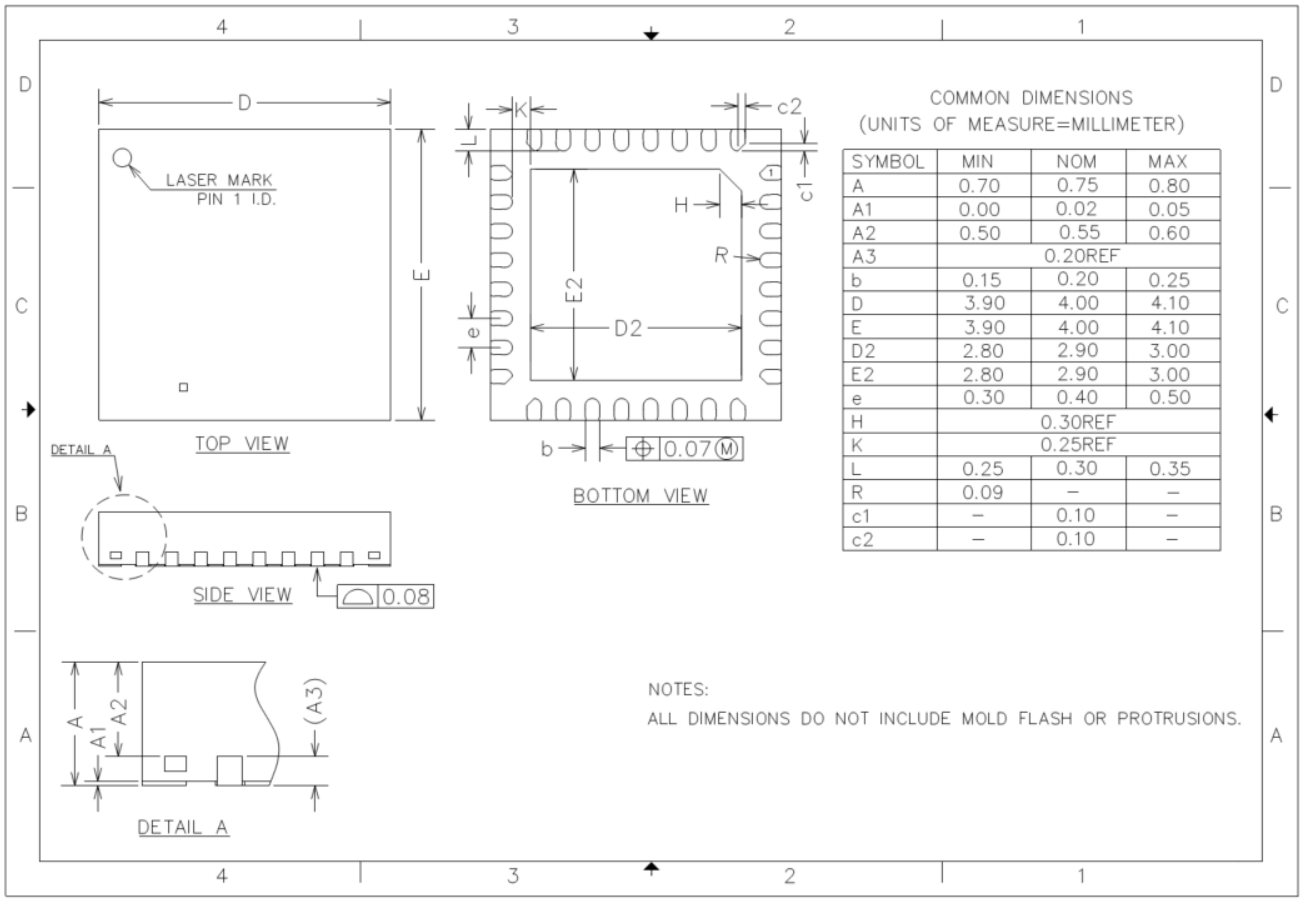
3.5 QFN32 Package (4mm x 4mm)

3.5.1 QFN32 (4mm x 4mm) Pin Assignment



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.5.2 QFN32 (4mm x 4mm) Package Dimensions



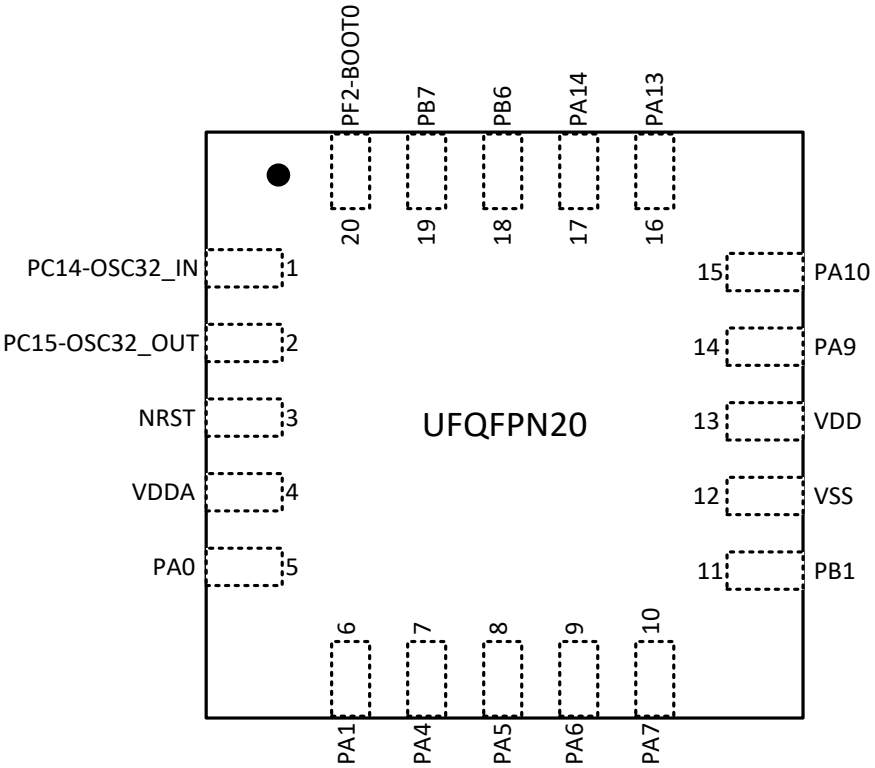
COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3		0.20REF	
b	0.15	0.20	0.25
D	3.90	4.00	4.10
E	3.90	4.00	4.10
D2	2.80	2.90	3.00
E2	2.80	2.90	3.00
e	0.30	0.40	0.50
H		0.30REF	
K		0.25REF	
L	0.25	0.30	0.35
R	0.09	–	–
c1	–	0.10	–
c2	–	0.10	–

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

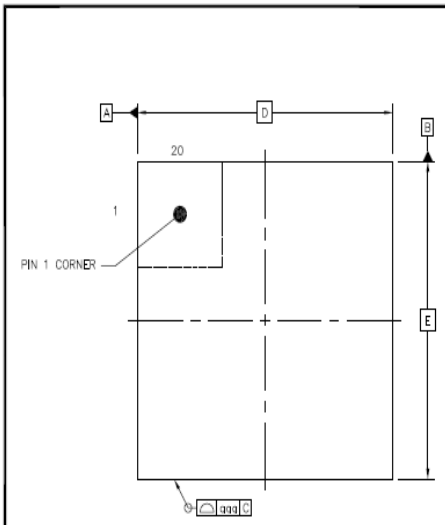
3.6 UFQFPN20 Package

3.6.1 UFQFPN20 Pin Assignment

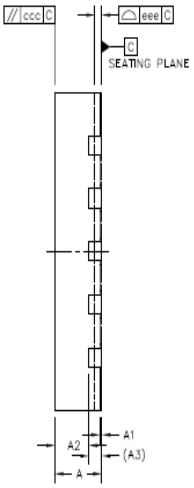


NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.6.2 UFQFPN20(3mm x 3mm) Package Dimensions

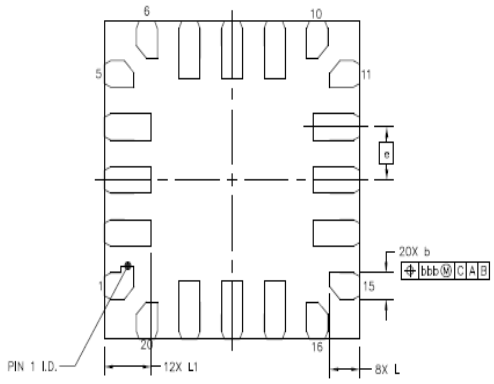


TOP VIEW



SIDE VIEW

		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	0.5	0.55	0.6
STAND OFF		A1	0	0.02	0.05
MOLD THICKNESS		A2	---	0.4	---
L/F THICKNESS		A3		0.152 REF	
LEAD WIDTH		b	0.2	0.25	0.3
BODY SIZE	X	D		3 BSC	
	Y	E		3 BSC	
LEAD PITCH		e		0.5 BSC	
LEAD LENGTH		L	0.25	0.35	0.45
		L1	0.45	0.55	0.65
PACKAGE EDGE TOLERANCE		aaa		0.1	
MOLD FLATNESS		ccc		0.1	
COPLANARITY		eee		0.08	
LEAD OFFSET		bbb		0.1	



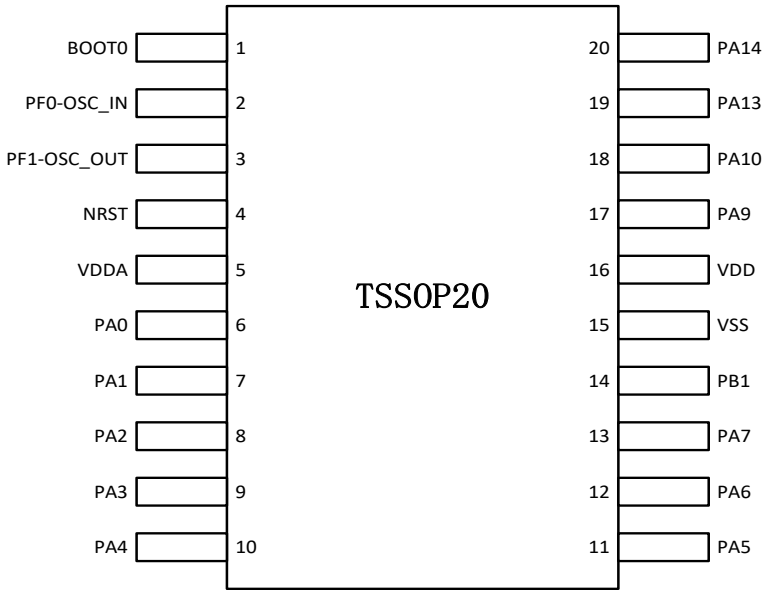
BOTTOM VIEW

NOTES
1.REFER TO JEDEC MO-220;
2.COPLANARITY APPLIES TO LEADS, CORNER LEADS AND DIE ATTACH PAD;
3.BAN TO USE THE LEVEL 1 ENVIRONMENT-RELATED SUBSTANCES OF JOET PRESCRIBING;
4.FINISH: Cu/EP • Sn8~20s

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

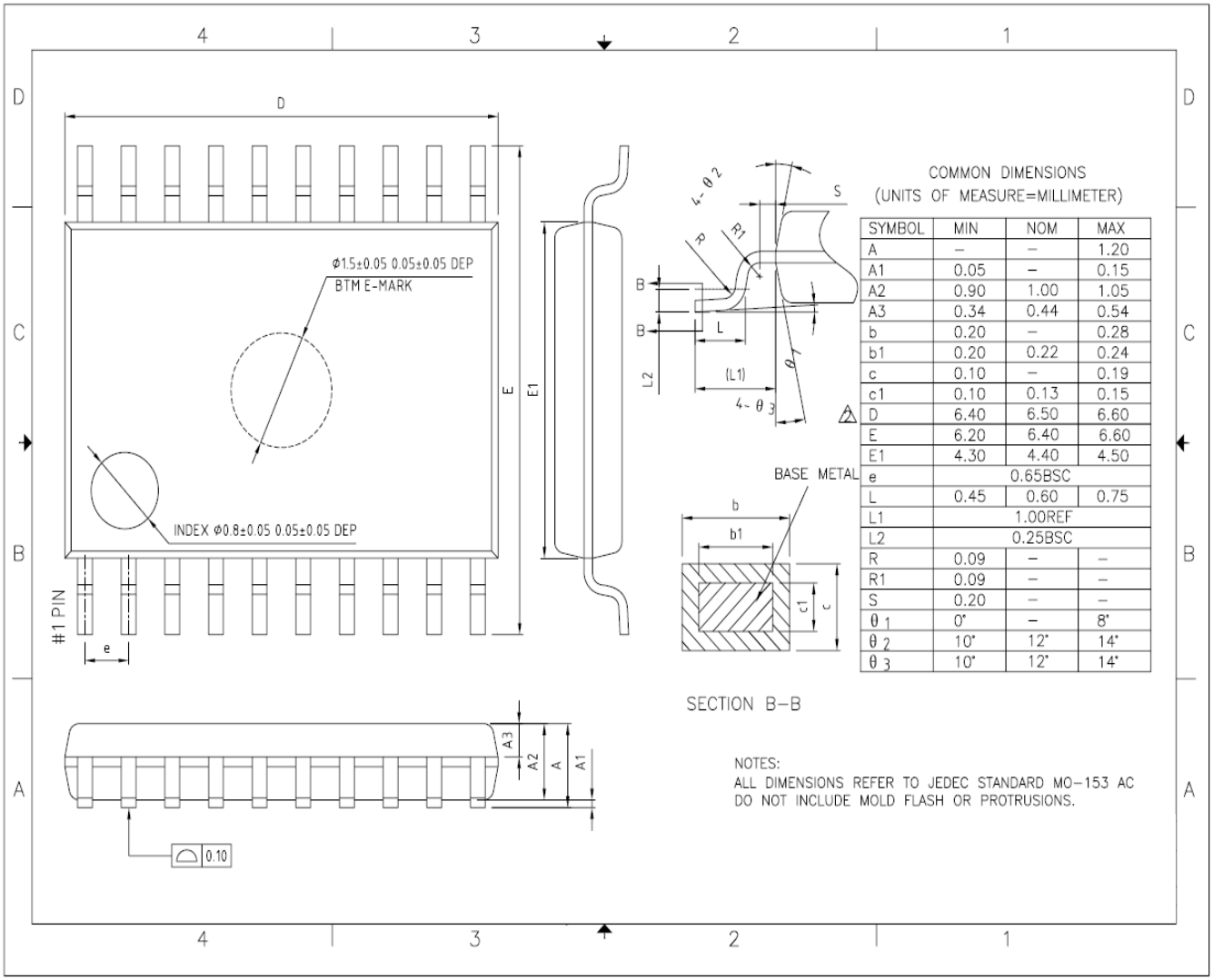
3.7 TSSOP20 Package

3.7.1 TSSOP20 Pin Assignment



NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

3.7.2 TSSOP20(6.5mm x 4.4mm) Package Dimensions



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	–	–	1.20
A1	0.05	–	0.15
A2	0.90	1.00	1.05
A3	0.34	0.44	0.54
b	0.20	–	0.28
b1	0.20	0.22	0.24
c	0.10	–	0.19
c1	0.10	0.13	0.15
D	6.40	6.50	6.60
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.45	0.60	0.75
L1	1.00REF		
L2	0.25BSC		
R	0.09	–	–
R1	0.09	–	–
S	0.20	–	–
θ 1	0°	–	8°
θ 2	10°	12°	14°
θ 3	10°	12°	14°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MO-153 AC
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg

4 Version History

Version	Date	Description
V1.0	2020.12.30	Initail document
V1.1	2021.08.16	1. Modified to have only 1 comparator 2. Add TQFP48 package information
V1.2	2022.3.17	Modify the size of retention SRAM to 8Kbyte
V1.3	2022.7.7	1. Modify the MCO to 2-way output in key feature 2. Delete reel in part number information
V1.4	2022.9.13	Key feature, delete programmable low level detection and reset.
V1.5.0	2023.7.31	Section 3.5.2. Modify package dimension of QFN32(4mx4m)

NSING Technologies Pte. Ltd.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
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.
Add: NSING, Teletech Park #02-28, 20 Science Park Road,
Singapore 117674
Tel: +65 69268090
Email: sales@nsing.com.sg