N32G030 x6/x8 Product Brief

N32G030 series based on Arm® Cortex®-M0, run up to 48MHz, up to 64KB embedded flash, 8KB SRAM, integrated analog interface, 1x12bit 1Msps ADC, 1xOPAMP, 1xcomparator, integrated multi-channel U(S)ART, I2C, SPI and other digital communication interfaces.

Key feature

- **Core**
  - A 32-bit general-purpose microcontroller based on the Arm® Cortex®-M0 core, Single-cycle hardware multiply instruction
  - Run up to 48MHz
- **Encrypted memory**
  - Up to 64KByte embedded Flash memory, supports encrypted storage, supports hardware ECC verification, data 100,000 cycling and 10 years of data retention
  - SRAM of 8KB, supporting hardware parity
- **Low-power management**
  - Stop mode: RTC Run, maximum 8KByte SRAM retention, CPU register retention, all IO retention
  - Power Down mode: support 3 IO wakeup
- **Clock**
  - HSE: 4MHz~20MHz external high-speed crystal
  - LSE: 32.768KHz external low-speed crystal
  - HSI: Internal high-speed RC OSC 8MHz
  - LSI: Internal low-speed RC OSC 30KHz
  - Built-in high-speed PLL
  - MCO: Support 2-way clock output, configurable SYSCLK, HSI, HSE, LSI, LSE, and PLL clock output that can be divided.
- **Reset**
  - Support power-on/power-off/external pin reset
  - Support programmable low voltage detection and reset
  - Support watchdog reset
- **Communication interface**
  - 3xU(S)ART, with a maximum rate of 3 Mbps, of which 2 USART interfaces (support 1xISO7816, 1xIrDA, LIN), 1 of which support low power (LPUART, the highest communication rate in this mode is 9600bps) ,Stop mode can be awakened
  - 2xSPI, up to 18 MHz, one of which supports multiplexing with I2S
  - 2xI2C, the rate is up to 1 MHz, which can be configured in master/slave mode and support dual address response in slave mode
- **Analog interface**
  - 1x12bit 1Msps ADC , up to 12 external single-ended input channels

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- 1xOPAMP, internal programmable gain amplifier up to 32 times
- 1xCOMP (Comparator has an internal independent 6bit DAC)

- **Up to 40 GPIOs**
- **1xDMA, 5-channel, channel source address and destination address can be arbitrarily configurable**
- **1x RTC real-time clock, support leap year perpetual calendar, alarm event, periodic wake up, support internal and external clock calibration**
- **1xBeeper, support complementary output, 16mA output drive capacity**
- **Timer counter**
  - 2x16-bit advanced timer counters, support input capture, complementary output, orthogonal encoding input, each timer support 4 independent channels. Each timer support 3 pairs complementary PWM outputs
  - 1x16-bit general purpose timer counters, 4 independent channels, supports input capture/output compare/PWM output
  - 1x16-bit basic timer counters
  - 1x16-bit low power timer counter. support single pulse and double pulse counting function, can work in STOP mode
  - 1x24-bit SysTick
  - 1x7-bit Window Watchdog (WWDG)
  - 1x12-bit Independent watchdog (IWDG)
- **Programming mode**
  - Support SWD online debugging interface
  - Support UART Bootloader
- **Hardware Divider(HDIV)and Square Root(SQRT)**
- **Security features**
  - Flash storage encryption
  - CRC16/32 calculation
  - Support write protection(WRP), multiple read protection(RDP) levels (L0/L1/L2)
  - Support external clock failure detection, tamper detection
- **96-bit UID and 128-bit UCID**
- **Working conditions**
  - Operating voltage Range: 1.8V~5.5V
  - Operating Temperature Range: -40℃~105℃
  - ESD: ±4KV (HBM model), ±1KV (CDM model)
- **Package**
  - UFQFPN20(3mm x 3mm)
  - TSSOP20(6.5mm x 4.4mm)
  - QFN32(4mm x 4mm)
  - QFN32(5mm x 5mm)
  - LQFP32(7mm x 7mm)
  - LQFP48(7mm x 7mm)

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

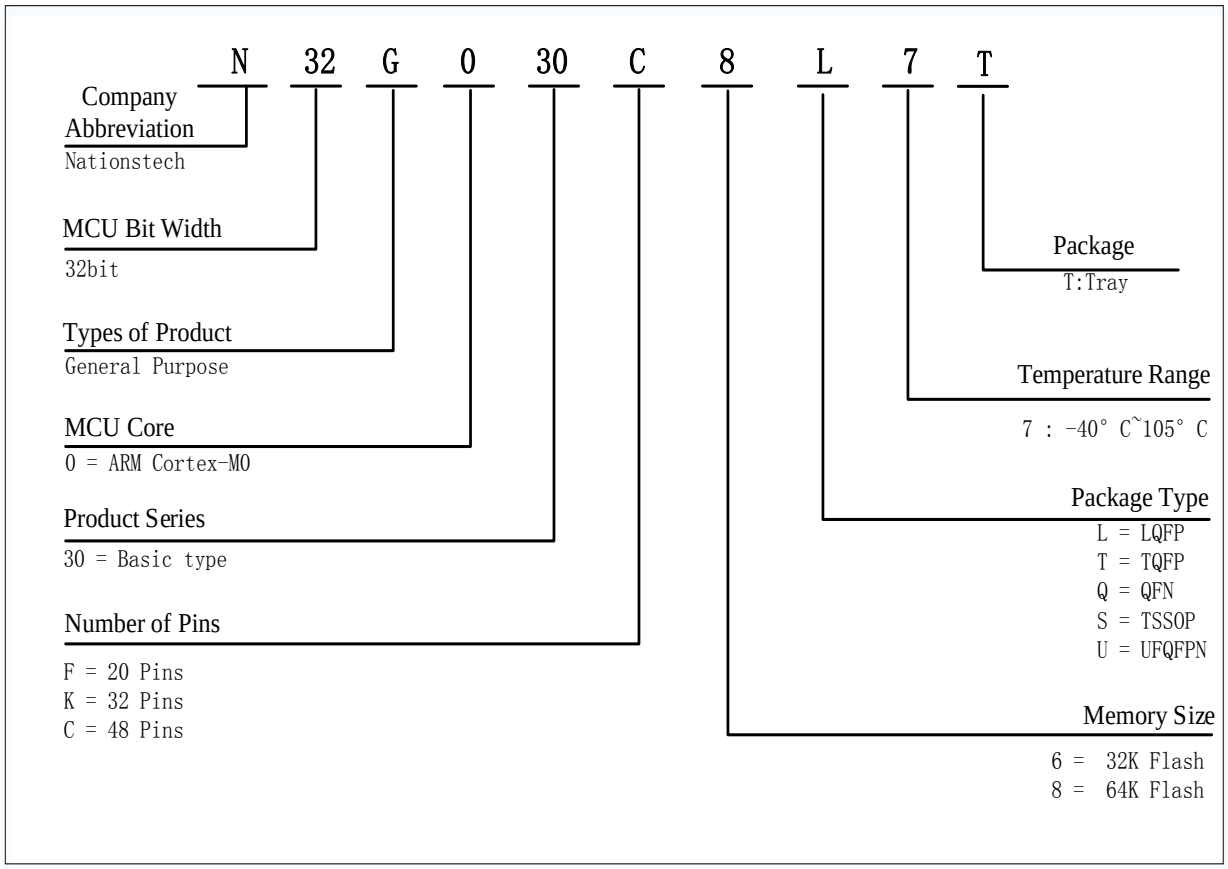
– TQFP48(7mm x 7mm)

- **Order model**

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

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

1 Part number information



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

2 List of devices

Table 2-1 N32G030 Series devices features and peripheral list

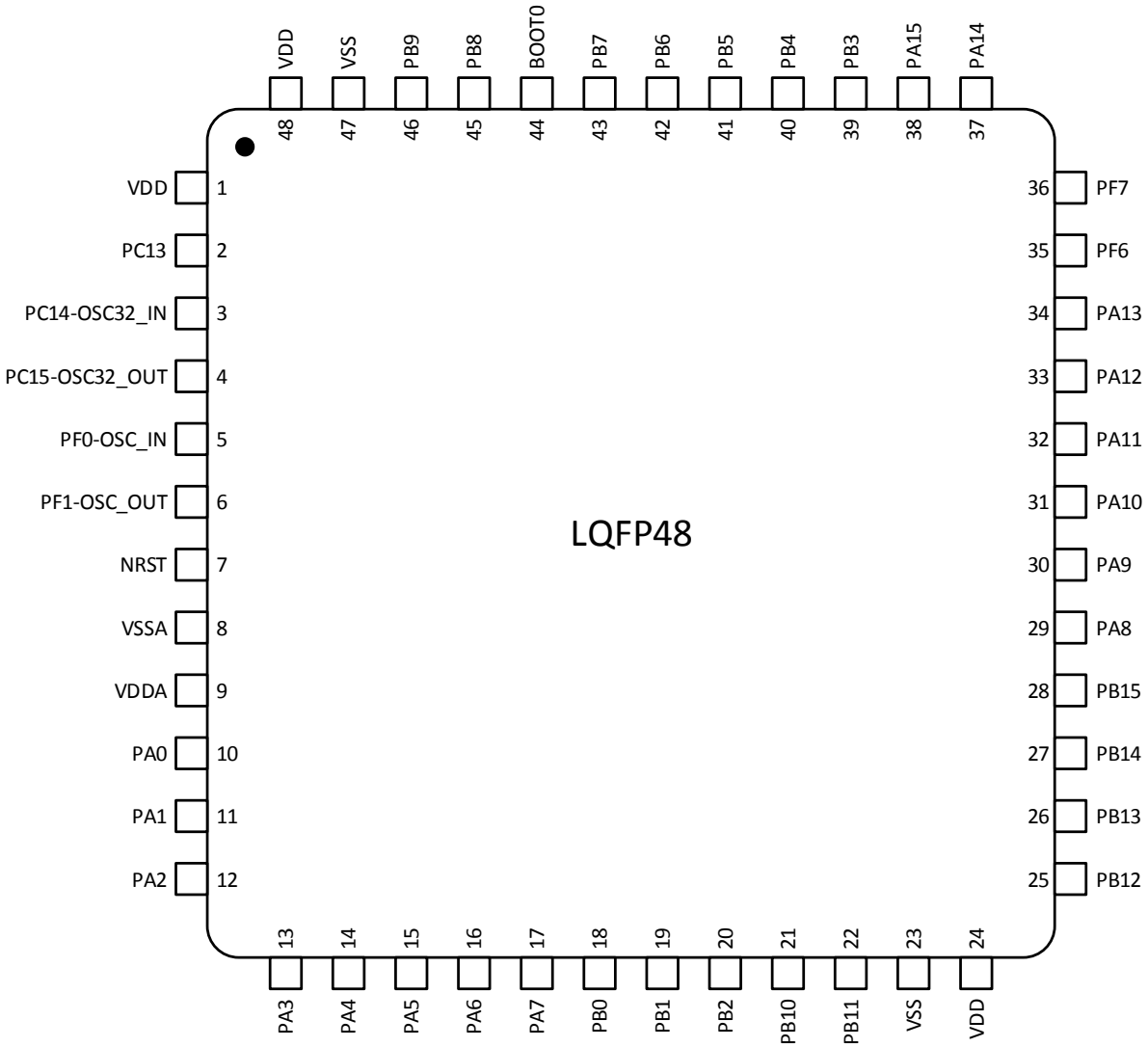
Part Number		N32G030 F6U7	N32G030F6S7	N32G030K6Q7	N32G030 K6Q7-1	N32G030 K6L7	N32G030 K8L7	N32G030 C8L7	N32G030 C8T7	N32G030F8S7
Flash capacity (KB)		32	32	32	32	32	64	64	64	64
SRAM capacity (KB)		8	8	8	8	8	8	8	8	8
CPU frequency		ARM Cortex-M0 @48MHz								
working environment		1.8~5.5V/-40~105℃								
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 (5mx5m)	QFN32 (4mx4m)	LQFP32	LQFP32	LQFP48	TQFP48	TSSOP20

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3 Package information

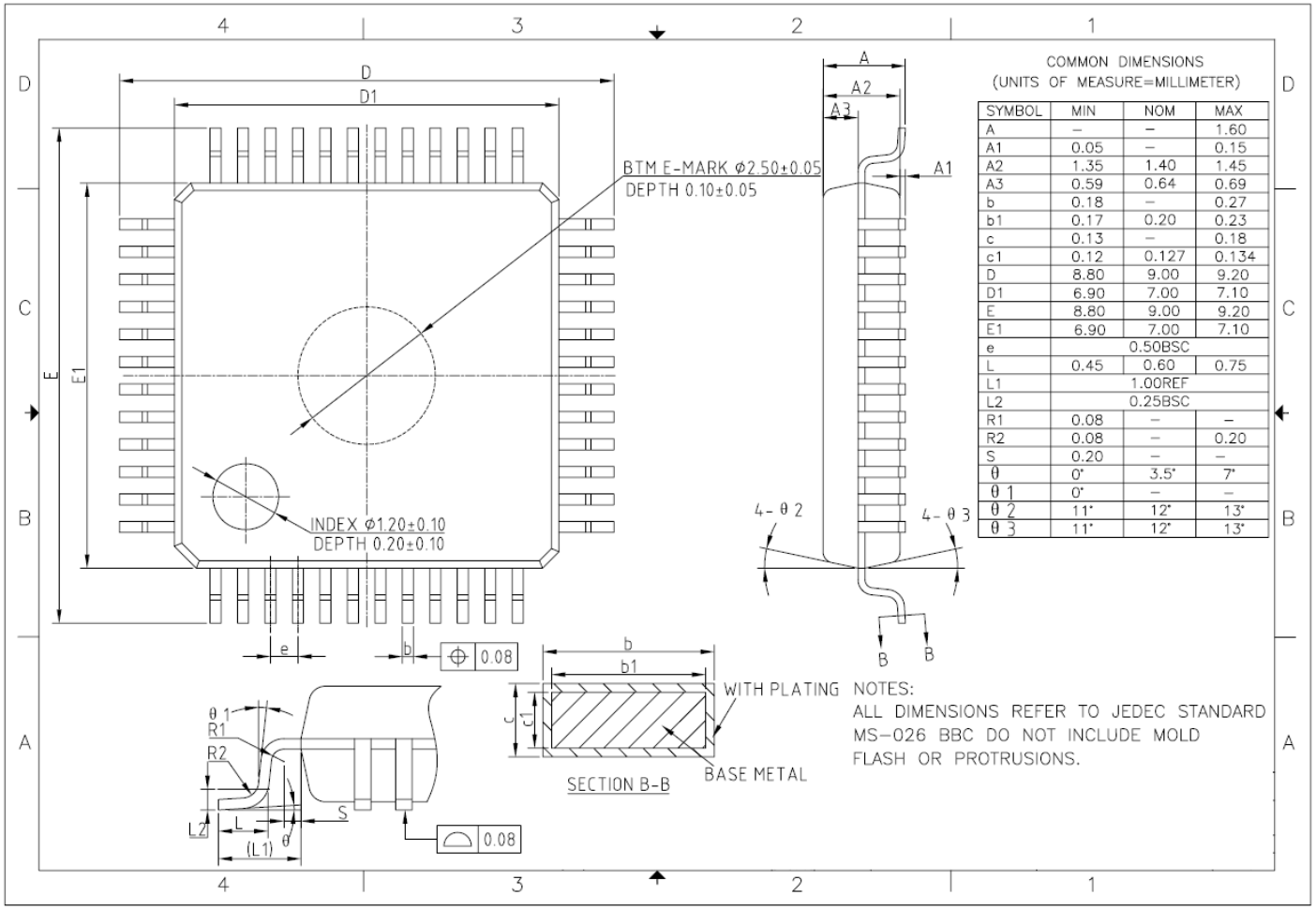
3.1 LQFP48

3.1.1 LQFP48 pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.1.2 LQFP48 package

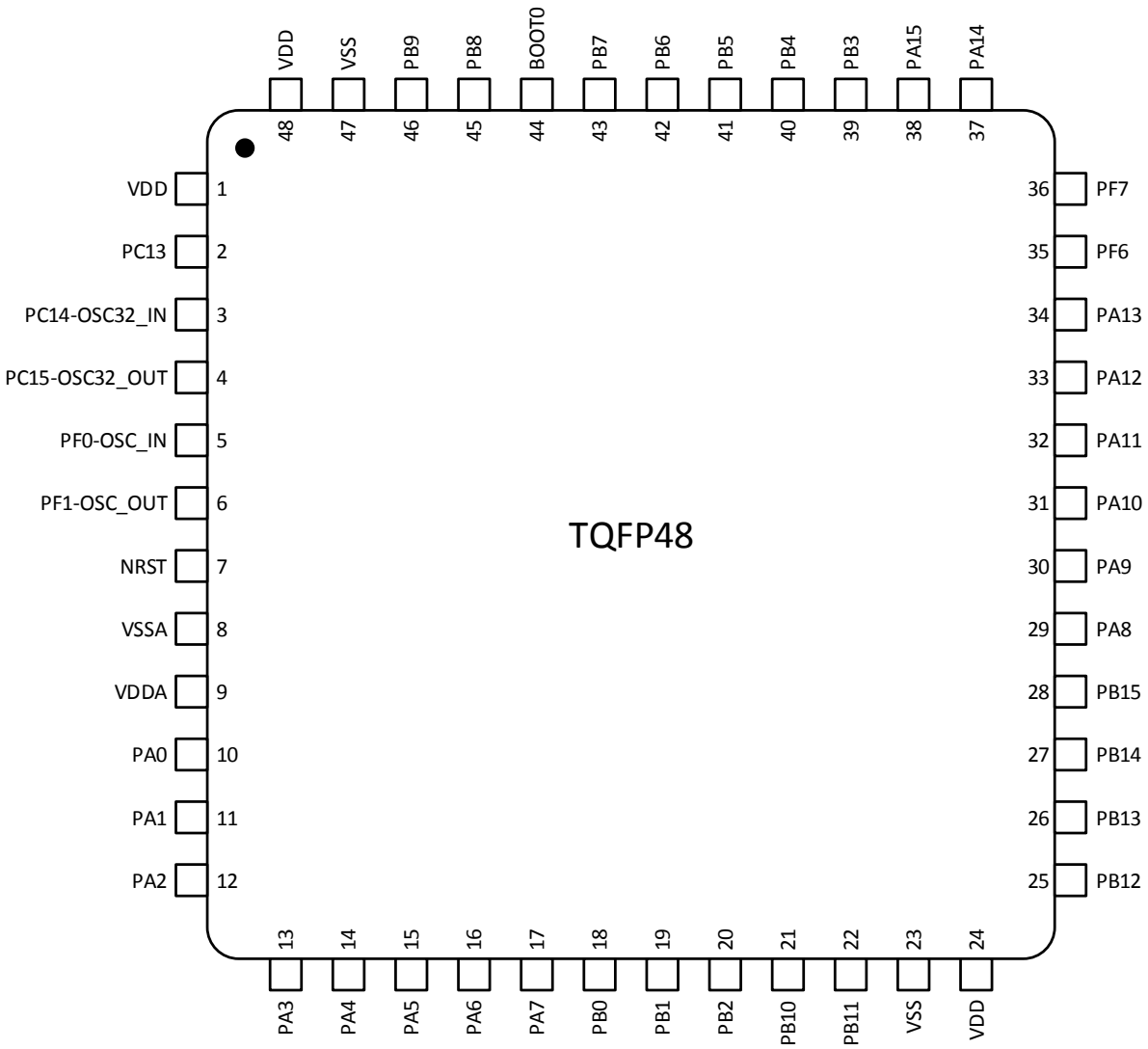


SYMBOL	MIN	NOM	MAX
A	–	–	1.60
A1	0.05	–	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e		0.50BSC	
L	0.45	0.60	0.75
L1		1.00REF	
L2		0.25BSC	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ1	0°	–	–
θ2	11°	12°	13°
θ3	11°	12°	13°

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

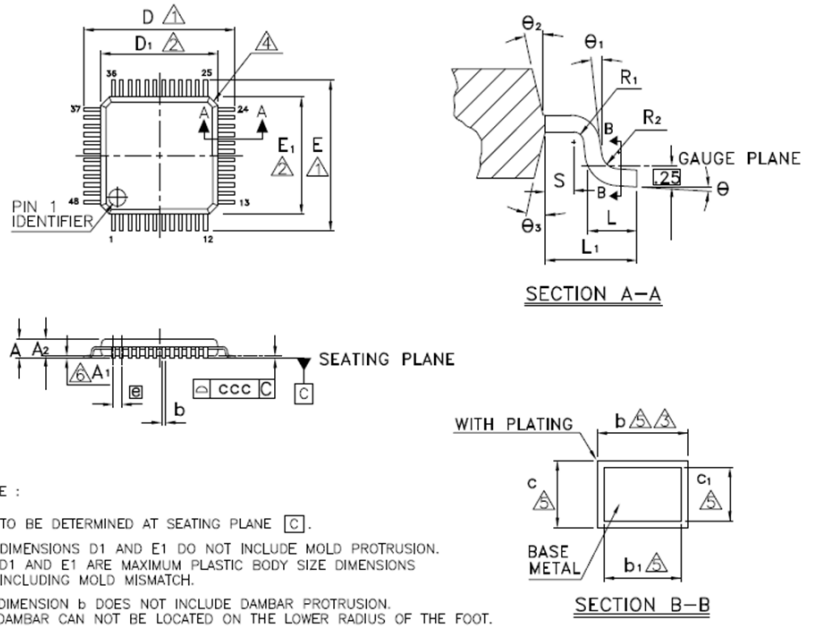
3.2 TQFP48

3.2.1 TQFP48 pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.2.2 TQFP48 package



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		

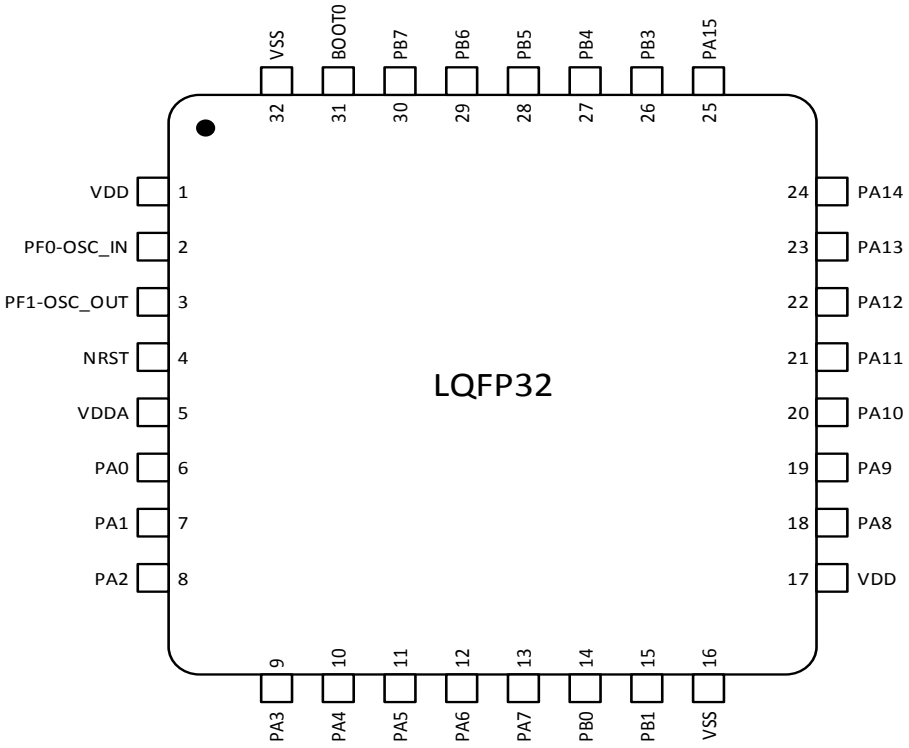
NOTE :

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

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

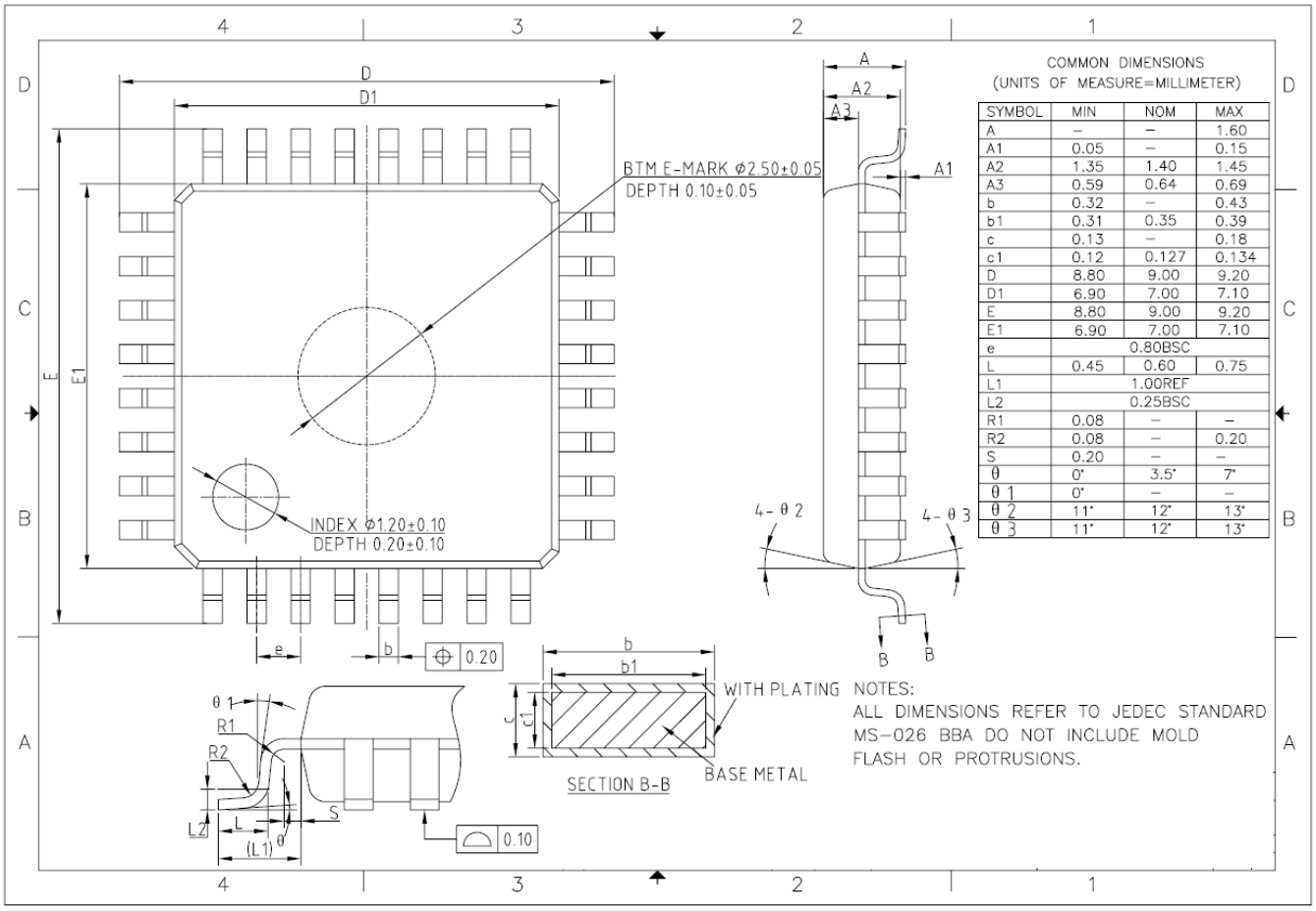
3.3 LQFP32

3.3.1 LQFP32 pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.3.2 LQFP32 package



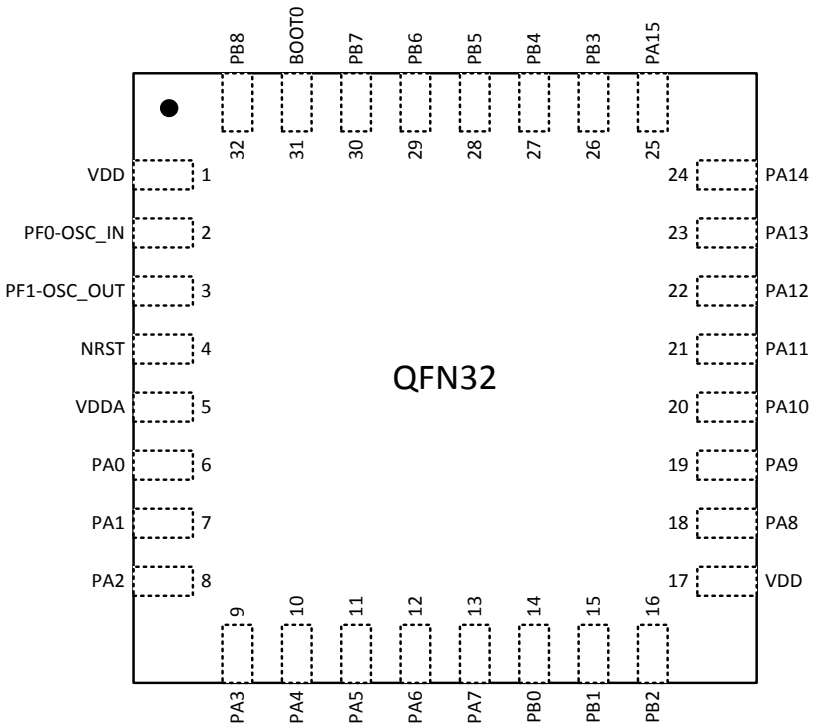
SYMBOL	MIN	NOM	MAX
A	–	–	1.60
A1	0.05	–	0.15
A2	1.35	1.40	1.45
A3	0.59	0.64	0.69
b	0.32	–	0.43
b1	0.31	0.35	0.39
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	8.80	9.00	9.20
D1	6.90	7.00	7.10
E	8.80	9.00	9.20
E1	6.90	7.00	7.10
e		0.80BSC	
L	0.45	0.60	0.75
L1		1.00REF	
L2		0.25BSC	
R1	0.08	–	–
R2	0.08	–	0.20
S	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.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

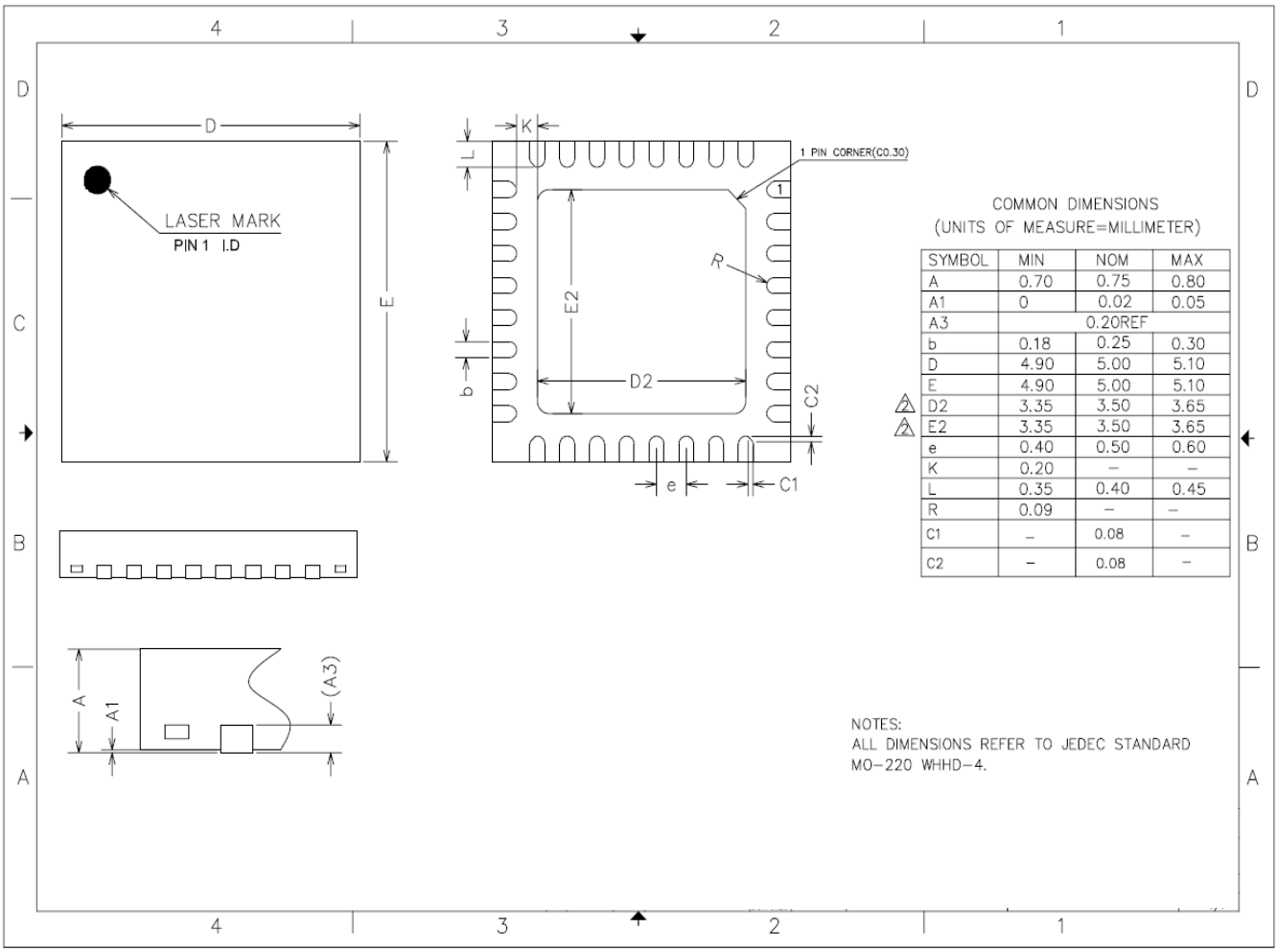
3.4 QFN32(5mx5m)

3.4.1 QFN32 (5mx5m) pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

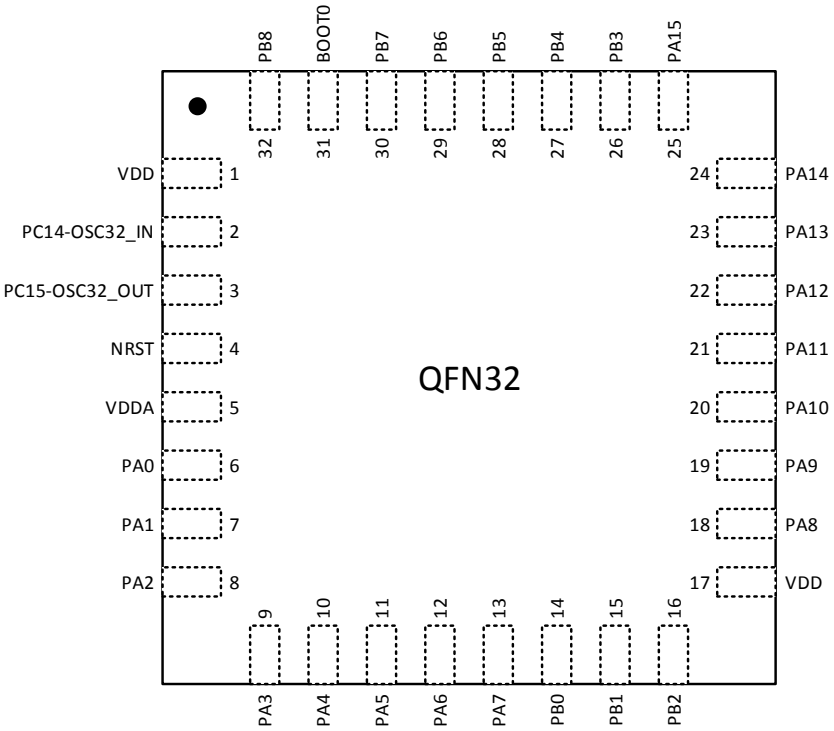
3.4.2 QFN32 (5mx5m) package



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

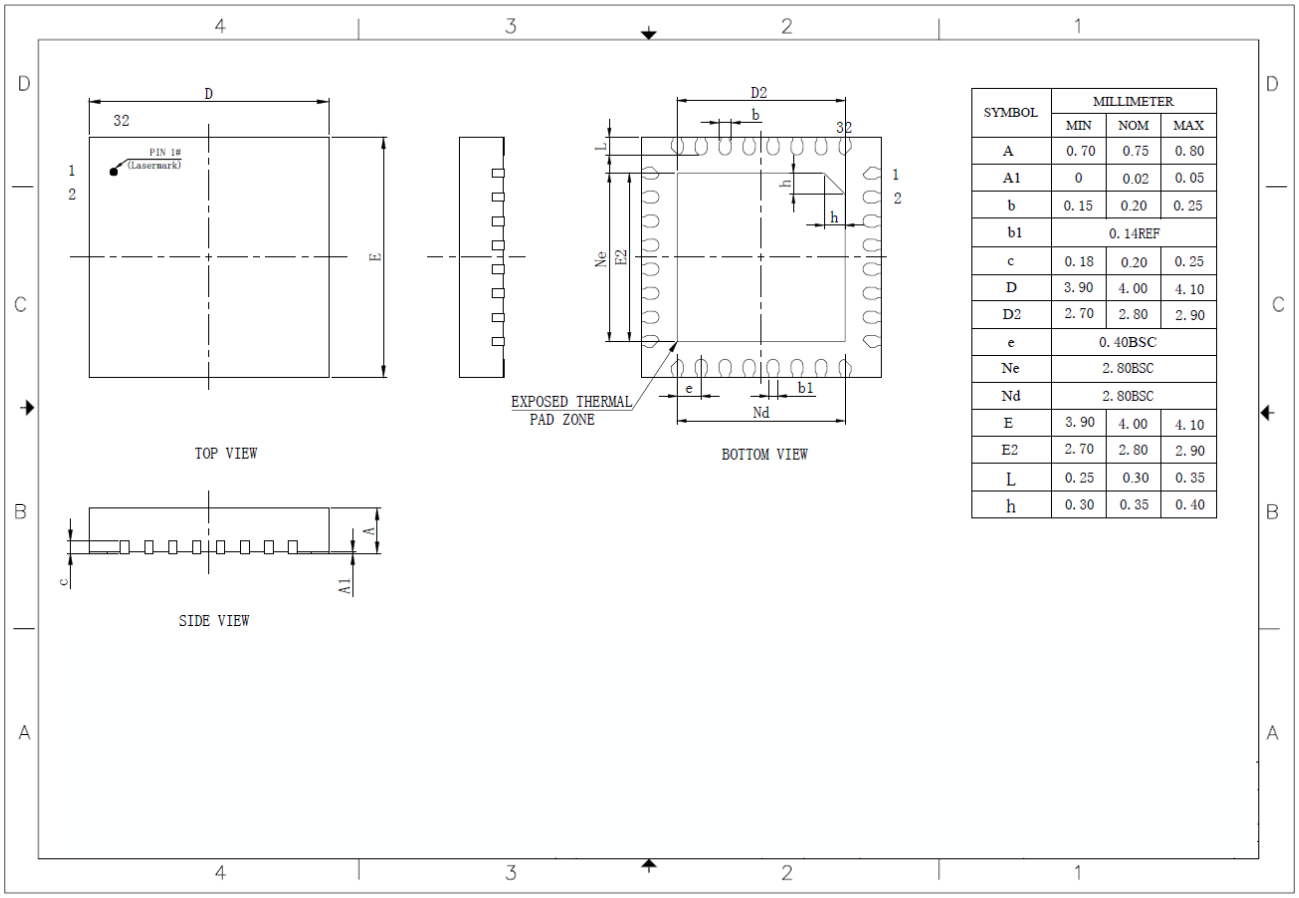
3.5 QFN32 (4mx4m)

3.5.1 QFN32 (4mx4m) pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.5.2 QFN32 (4mx4m) package

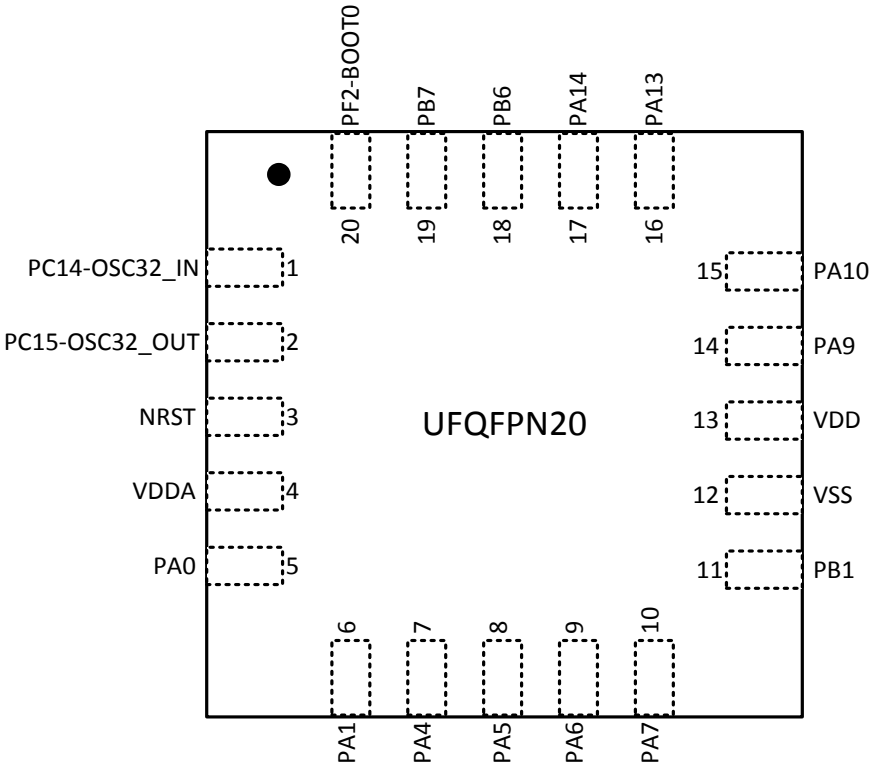


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
b	0.15	0.20	0.25
b1	0.14REF		
c	0.18	0.20	0.25
D	3.90	4.00	4.10
D2	2.70	2.80	2.90
e	0.40BSC		
Ne	2.80BSC		
Nd	2.80BSC		
E	3.90	4.00	4.10
E2	2.70	2.80	2.90
L	0.25	0.30	0.35
h	0.30	0.35	0.40

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

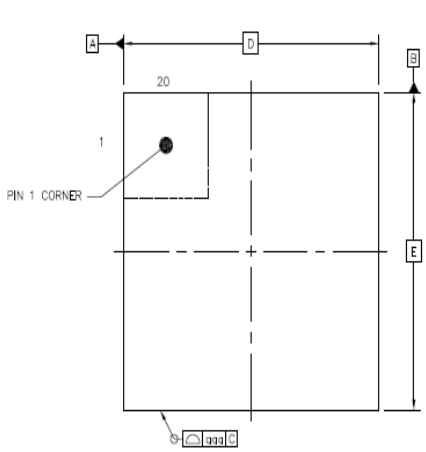
3.6 UFQFPN20

3.6.1 UFQFPN20 pinouts

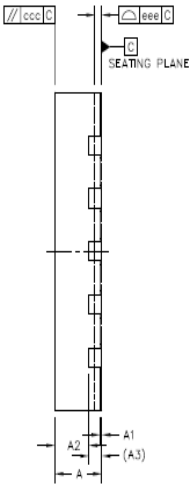


Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.6.2 UFQFPN20 package

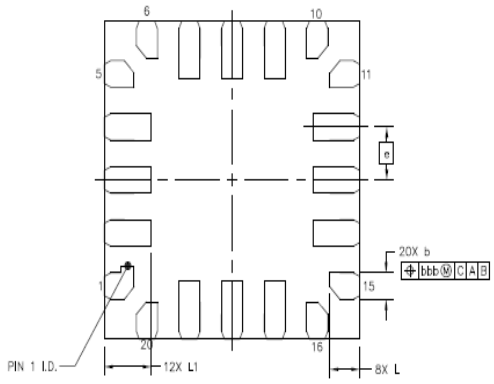


TOP VIEW



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	



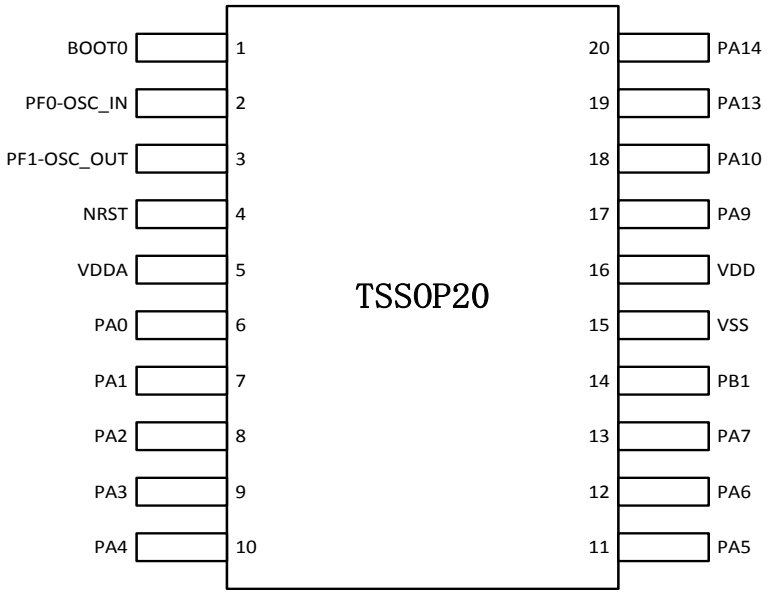
BOTTOM VIEW

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

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

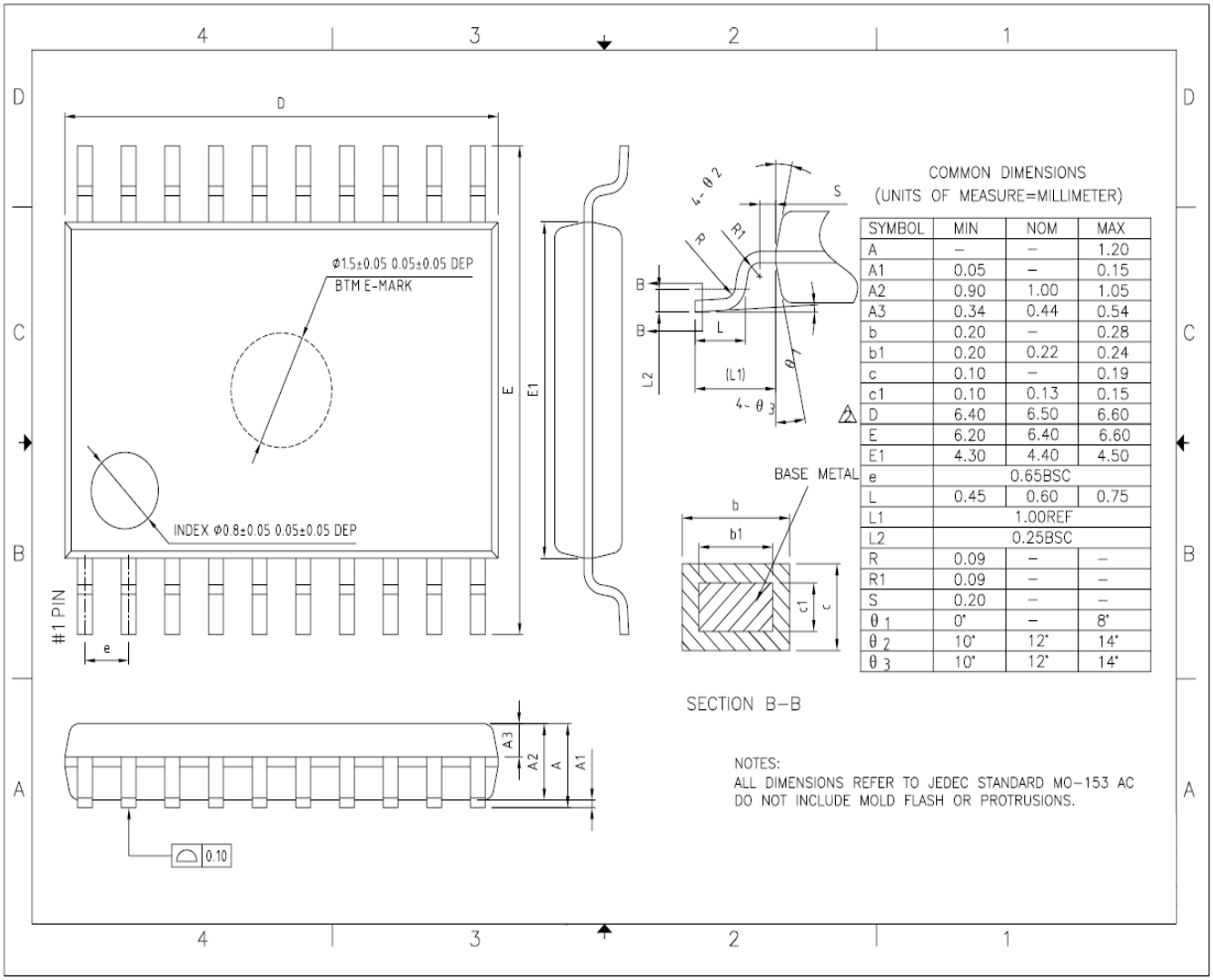
3.7 TSSOP20

3.7.1 TSSOP20 pinouts



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3.7.2 TSSOP20 package



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.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

4 Revision History

Version	Date	Description
V1.0	2020.12.30	1. Initail document
V1.1	2021.08.16	1. Modified to have only 1 comparator 2. Add TQFP48 package information
V1.2	2022.3.17	1. 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

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

5 Notice

This document is the exclusive property of Nations Technologies Inc. (Hereinafter referred to as NATIONS). This document, and the product of NATIONS described herein (Hereinafter referred to as the Product) are owned by NATIONS under the laws and treaties of the People's Republic of China and other applicable jurisdictions worldwide.

NATIONS does not grant 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.

NATIONS reserves the right to make changes, corrections, enhancements, modifications, and improvements to this document at any time without notice. Please contact NATIONS 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 support or 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.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China