N32G033xx Product Brief

N32G033 series based on Arm® Cortex®-M0, run up to 64MHz, supports zero wait FLASH instruction execution, up to 64KB embedded Flash, 6KB SRAM, integrated analog interface, 1x12bit 1Msps ADC, 3x differential rail to rail operational amplifiers, 1x high-speed comparator, 1x NTC, 4x complementary electronic control TIM, integrated 3x UART, 2x I2C, 2x SPI communication interfaces, 1x 3-channel DMA.

Key features

- **Core**
  - A 32-bit general-purpose microcontroller based on the Arm® Cortex®-M0 core, Single-cycle hardware multiply instruction
  - Run up to 64MHz
- **Encrypted memory**
  - Up to 64KByte embedded Flash memory, data 100,000 cycling and 10 years of data retention
  - SRAM of 6KB, STOP modes can be configured as retention
- **Low-power management**
  - Run mode: all peripherals configurable
  - STOP mode: TIM6, IWDG, UART3, COMP configurable operation, SRAM retention, all IO retention
- **Clock**
  - HIS_64M: Internal high-speed RC OSC 64MHz
  - LSI: Internal low-speed RC OSC 32KHz
  - MCO: Support 1-way clock output, configurable SYSCLK, HSI, and LSI clock output.
- **Reset**
  - Support power-on/power-off/external pin reset
  - Support watchdog reset, Support software reset
- **Communication interface**
  - 3xUART, Supports asynchronous mode, multiprocessor communication mode, single-wire half-duplex mode, hardware 485 mode
  - 2xSPI, up to 16 MHz
  - 2xI2C, up to 1 MHz, configurable master/slave mode
- **1xDMA, 3-channel, channel source address and destination address can be arbitrarily configurable**
- **Accelerator**
  - Supports 32-bit signed/unsigned dividers
  - Supports 32-bit unsigned root opening
- **Analog interface**
  - 1x12bit 1Msps ADC, up to 11 external single-ended input channels

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- 3 rail to rail differential operational amplifiers, built-in bias 1.8V, 1/2 VDDA, 1/4 VDDA, built-in maximum 32x programmable gain amplifier
- 1 high-speed analog comparator with built-in 256 level adjustable comparison benchmark
- Support internal NTC
- Internal independent reference voltage reference source
- Internal integrated voltage inspection unit

- **Supports up to 29 GPIos that support reuse functionality**
- **Timer counter**
  - 1x16-bit advanced timer counters, support input capture, complementary output, each timer support 7 independent channels. 4 channels support 8 complementary PWM outputs
  - 1x16-bit general purpose timer counters, 4 independent channels, supports input capture/output compare/PWM output
  - 1x32-bit general purpose timer counters, 3 independent channels, supports input capture/output compare/PWM output
  - 1x32-bit basic timer counters.
  - 1x24-bit SysTick
  - 1x14-bit Independent watchdog (IWDG)
- **Programming mode**
  - Support SWD online debugging interface
  - Support UART Bootloader
- **Security features**
  - Support write protection(WRP)
  - Support multiple read protection(RDP) levels (L0/L1/L2)
- **96-bit UID and 128-bit UCID**
- **Working conditions**
  - Operating voltage Range: 2.0V~5.5V
  - Operating Temperature Range: -40℃~105℃
- **Package**
  - QFN32(5 x 5mm)
  - QFN32 (4 x 4mm)
  - LQFP32
  - QFN20
  - UFQFPN20
  - TSSOP20

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1 Ordering Information

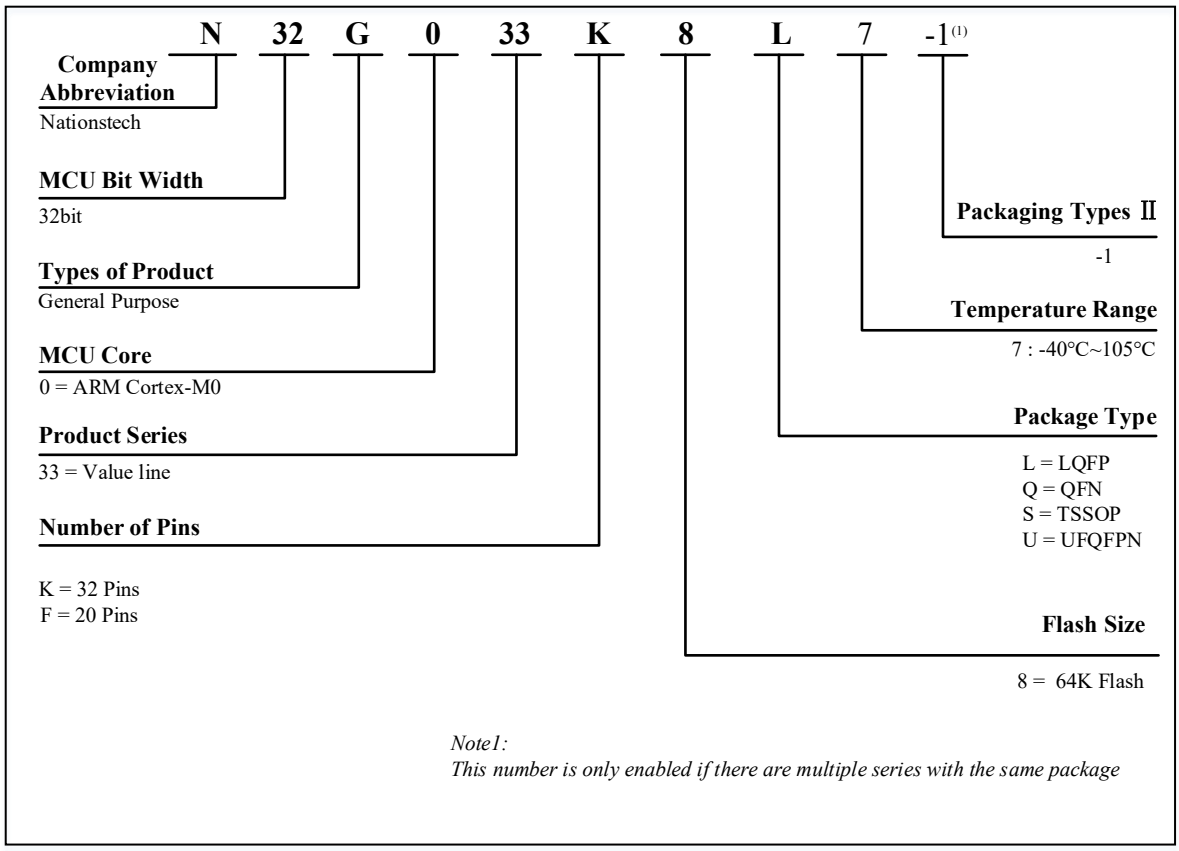

Table 1-1 N32G033 series ordering code information

Order Code(1)	Package	Package Size	Packaging(2)	SPQ(3)	temperature range
N32G033K8L7	LQFP32	7mm * 7mm	Tray	250	-40°C~105°C
N32G033K8Q7	QFN32	5mm *5mm	Tray	490	-40°C~105°C
			Reel	2500	
N32G033K8Q7-1	QFN32	4mm *4mm	Tray	490	-40°C~105°C
N32G033F8Q7	QFN20	3mm *3mm	Tray	490	-40°C~105°C
			Reel	5000	
N32G033F8S7	TSSOP20	6.5mm *4.4mm	Reel	3500	-40°C~105°C
N32G033F8U7	UFQFPN20	3mm *3mm	Tray	490	-40°C~105°C
			Reel	5000	

1. For the latest detailed ordering information, please refer to the selection manual.
2. This packaging is the basic packaging. If you have any other requirements, please contact National Technology
3. Minimum packaging quantity

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2 Product Model Resource Configuration

Table 2-1 N32G033 series resource configuration

Part Number		N32G033K8L7	N32G033K8Q7	N32G033K8Q7-1	N32G033F8Q7	N32G033F8S7	N32G033F8U7
Flash（KB）		64	64	64	64	64	64
SRAM（KB）		6	6	6	6	6	6
CPU frequency		ARM Cortex-M0 @64MHz					
Working environment		2.0~5.5V/-40~105℃					
Timer	Advanced	1					
	16 bit General	1					
	32 bit General	1					
	Basic	1					
Communication interface	SPI	2					
	I2C	2					
	UART	3					
GPIO		27	29	29	19	17	17
DMA		1x 3 Channel					
12bit ADC		1x 10Channel	1x 11Channel	1x 11Channel	1x 9Channel	1x 9Channel	1x 7Channel
COMP		1					
OPA		3	3	3	2	1	1
Security protection		Read/write protection(RDP/WRP)					
Package		LQFP32	QFN32(5x5mm)	QFN32(4x4mm)	QFN20	TSSOP20	UFQFPN20

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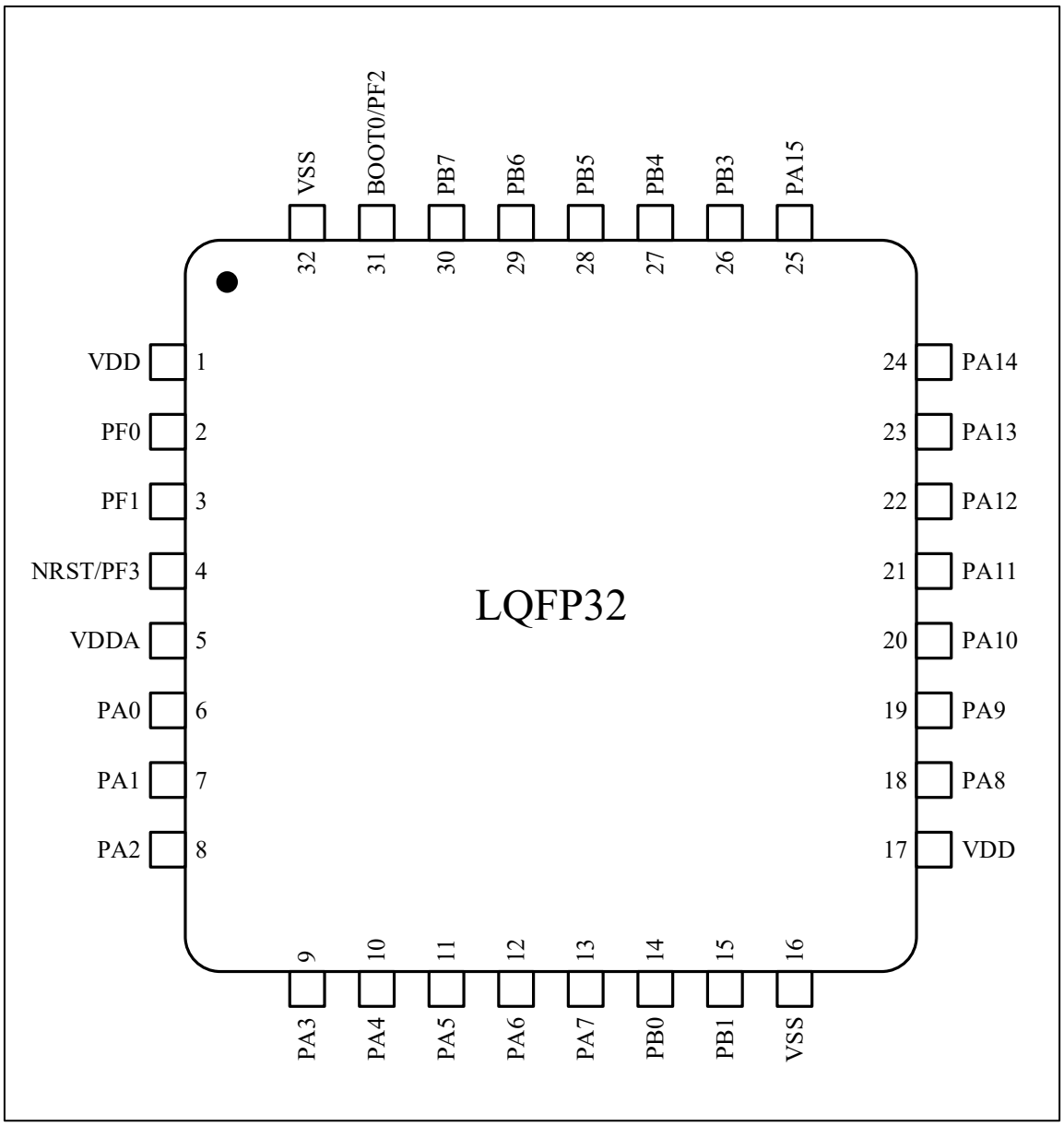
3 Package

3.1 LQFP32

3.1.1 LQFP32 pinouts



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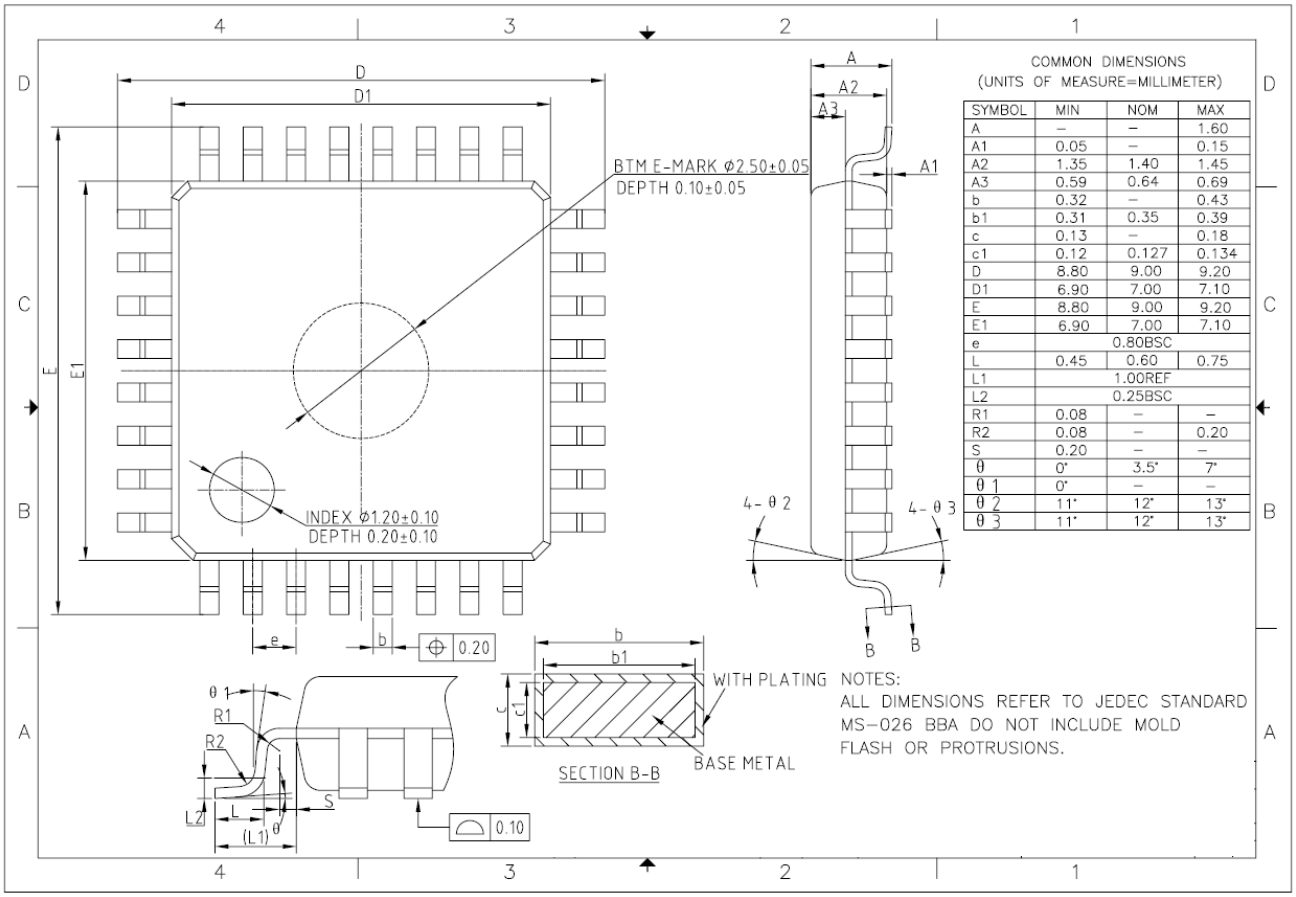
3.1.2 LQFP32 Package Size



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°

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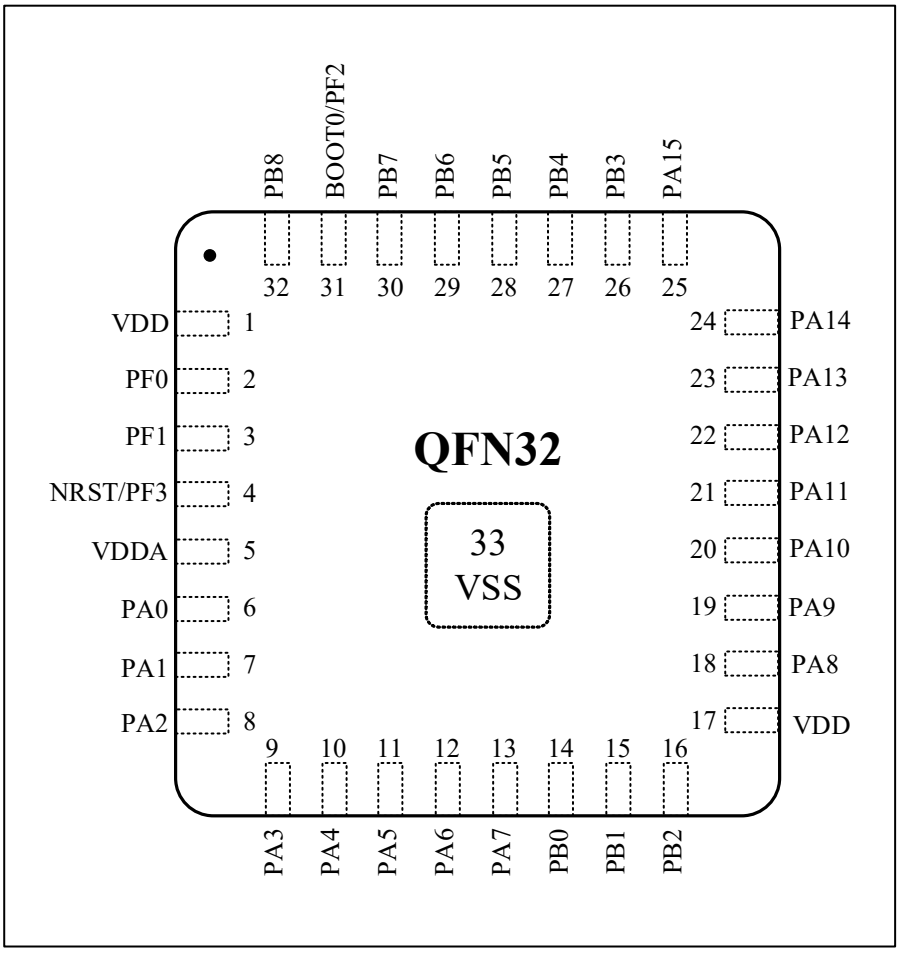
3.2 QFN32

3.2.1 QFN32 pinouts



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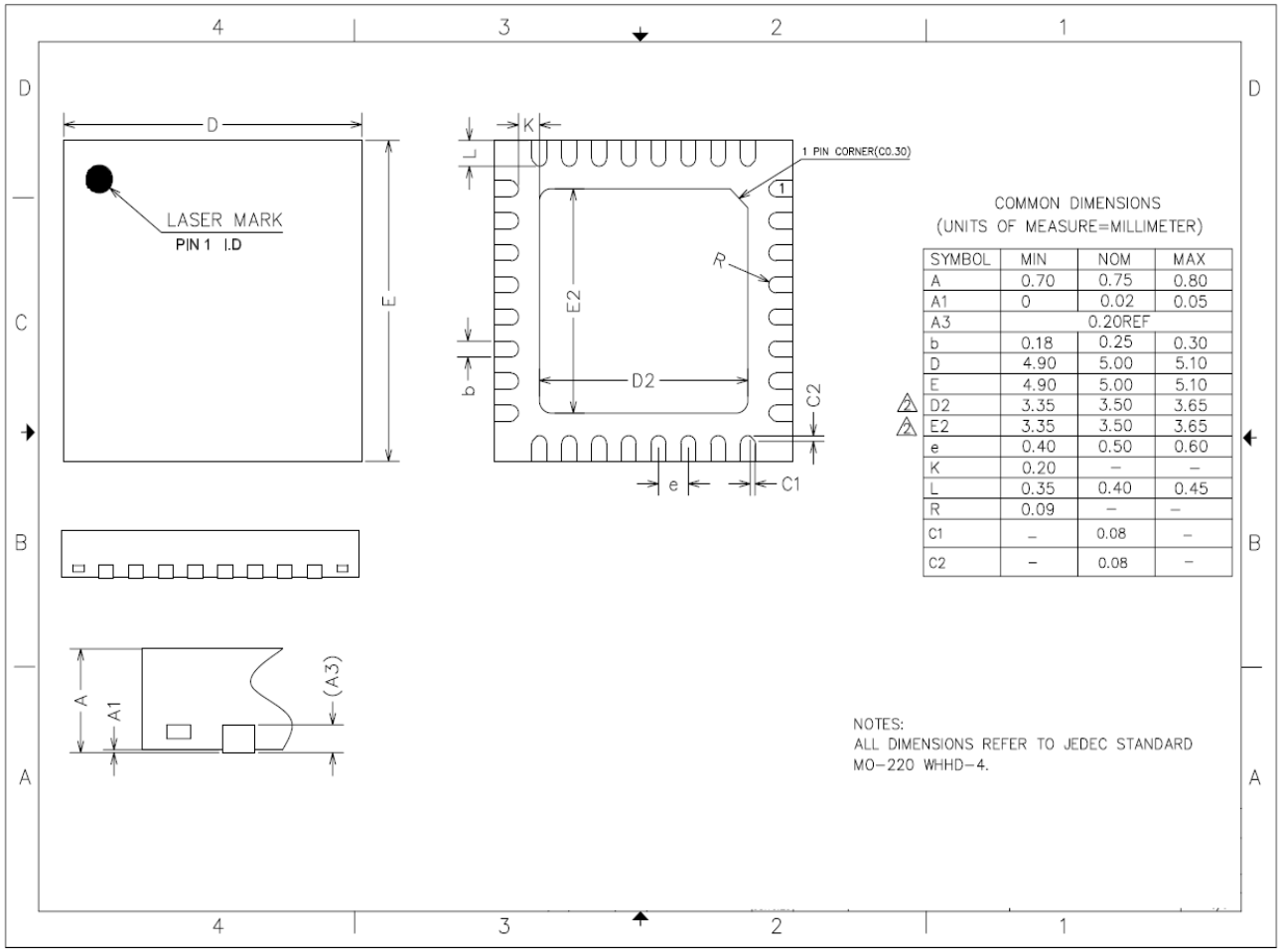
3.2.2 QFN32 (5x5mm) Package Size



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
D2	3.35	3.50	3.65
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	–

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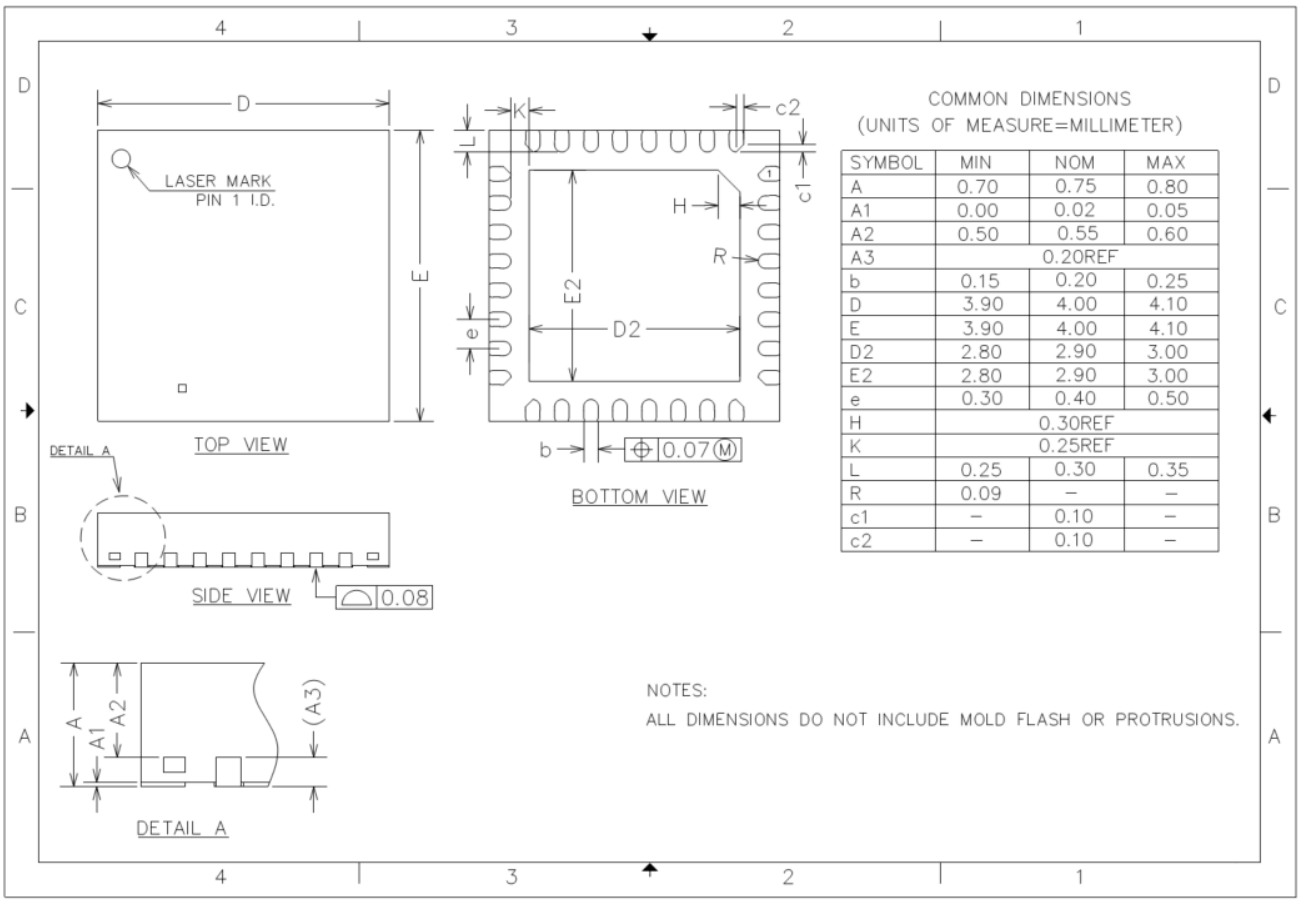
3.2.3 QFN32 (4x4mm) Package Size



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	–

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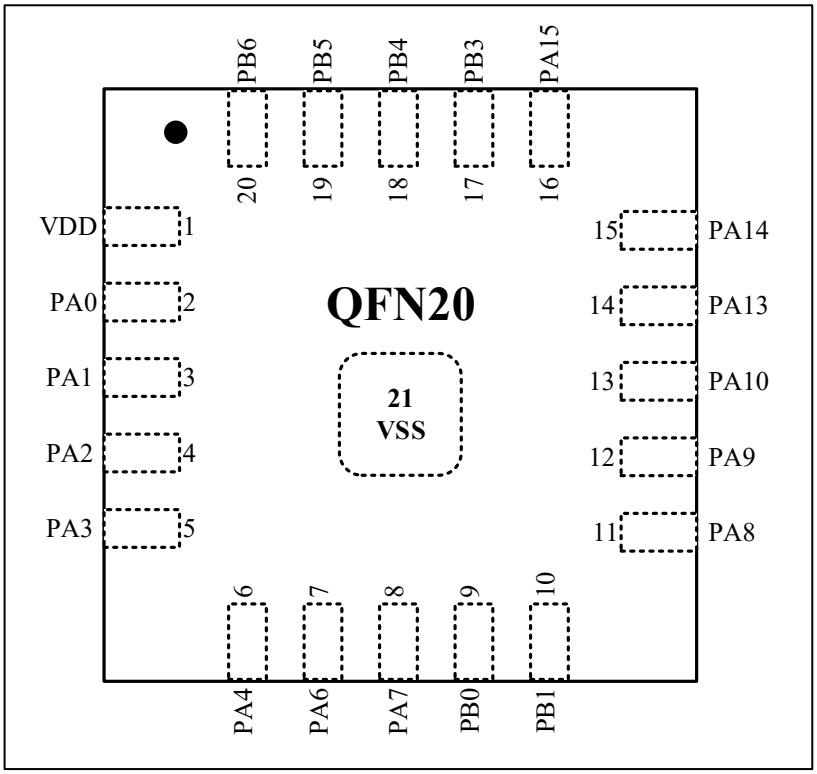
3.3 QFN20

3.3.1 QFN20 pinouts



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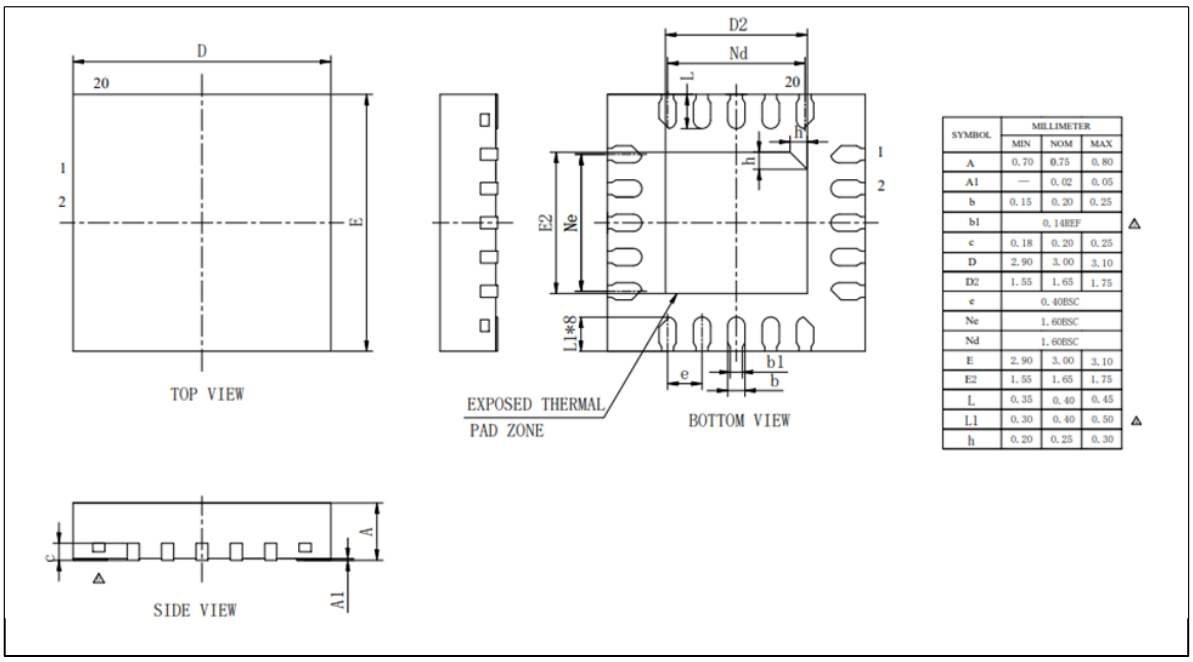
3.3.2 QFN20 Package Size



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.15	0.20	0.25
b1	0.14REF		△
e	0.18	0.20	0.25
D	2.90	3.00	3.10
D2	1.55	1.65	1.75
e	0.40BSC		
Ne	1.60BSC		
Nd	1.60BSC		
E	2.90	3.00	3.10
E2	1.55	1.65	1.75
L	0.35	0.40	0.45
L1	0.30	0.40	0.50
h	0.20	0.25	0.30

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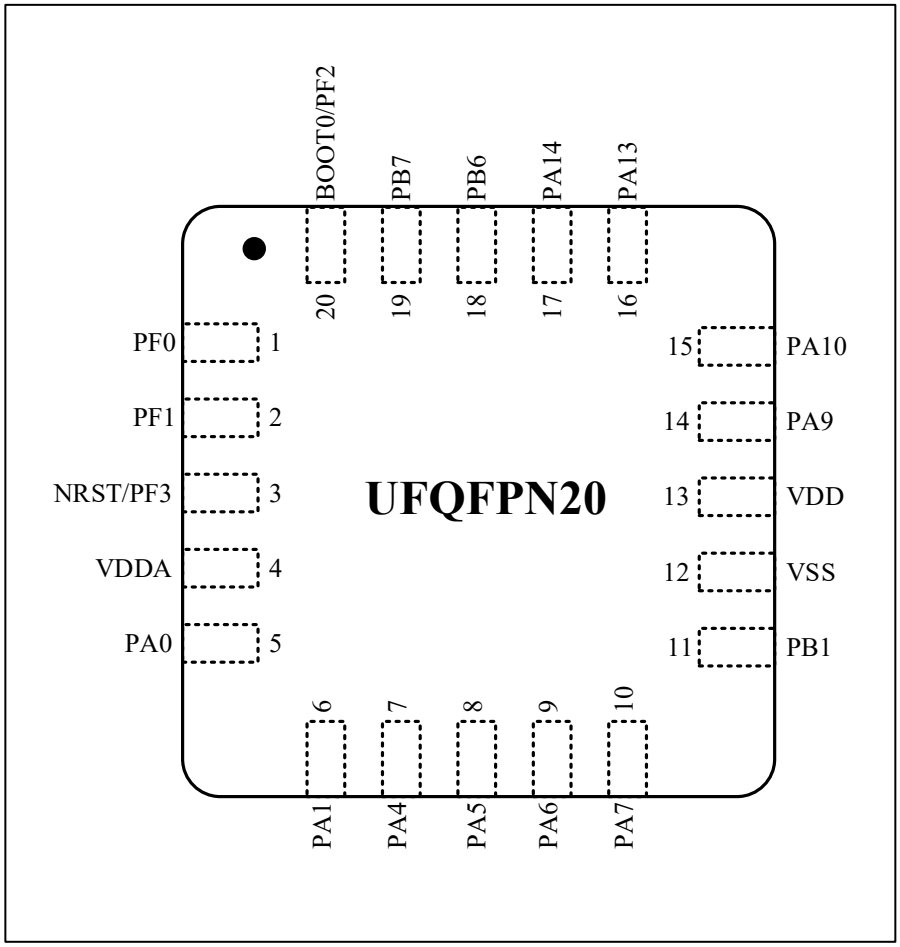
3.4 UFQFPN20

3.4.1 UFQFPN20 pinouts



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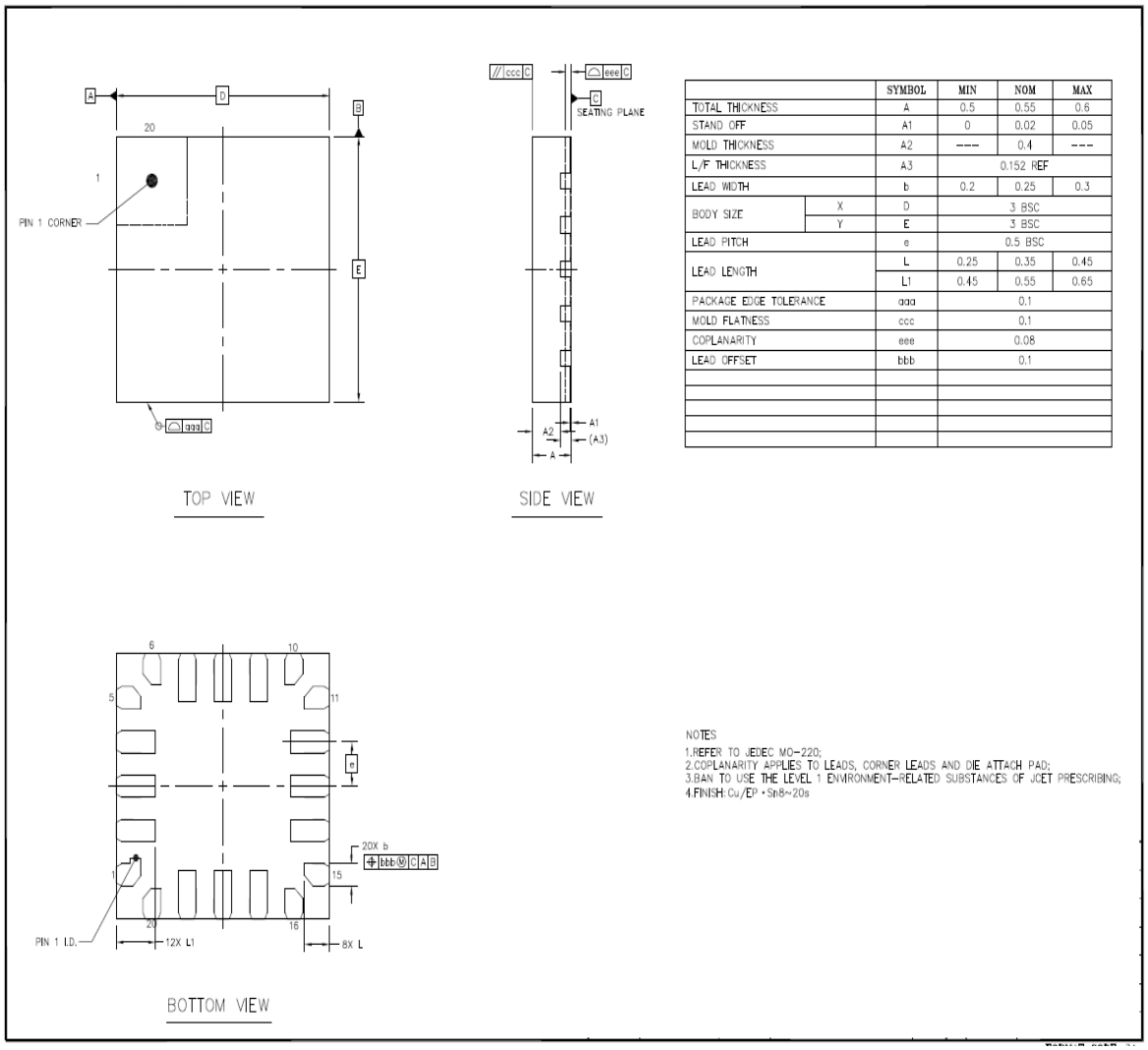
3.4.2 UFQFPN20 Package Size



		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	

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 JCET PRESCRIBING;
4.FINISH: Cu/EP +Sn8~20u

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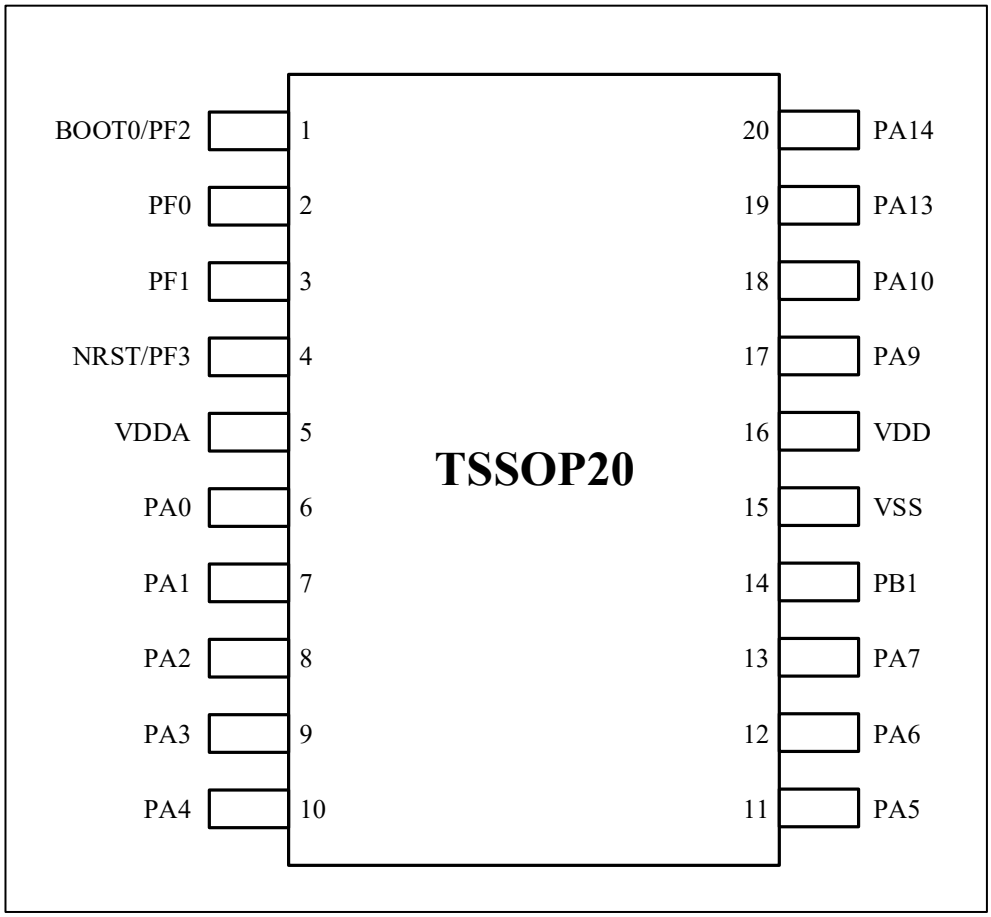
3.5 TSSOP20

3.5.1 TSSOP20 pinouts



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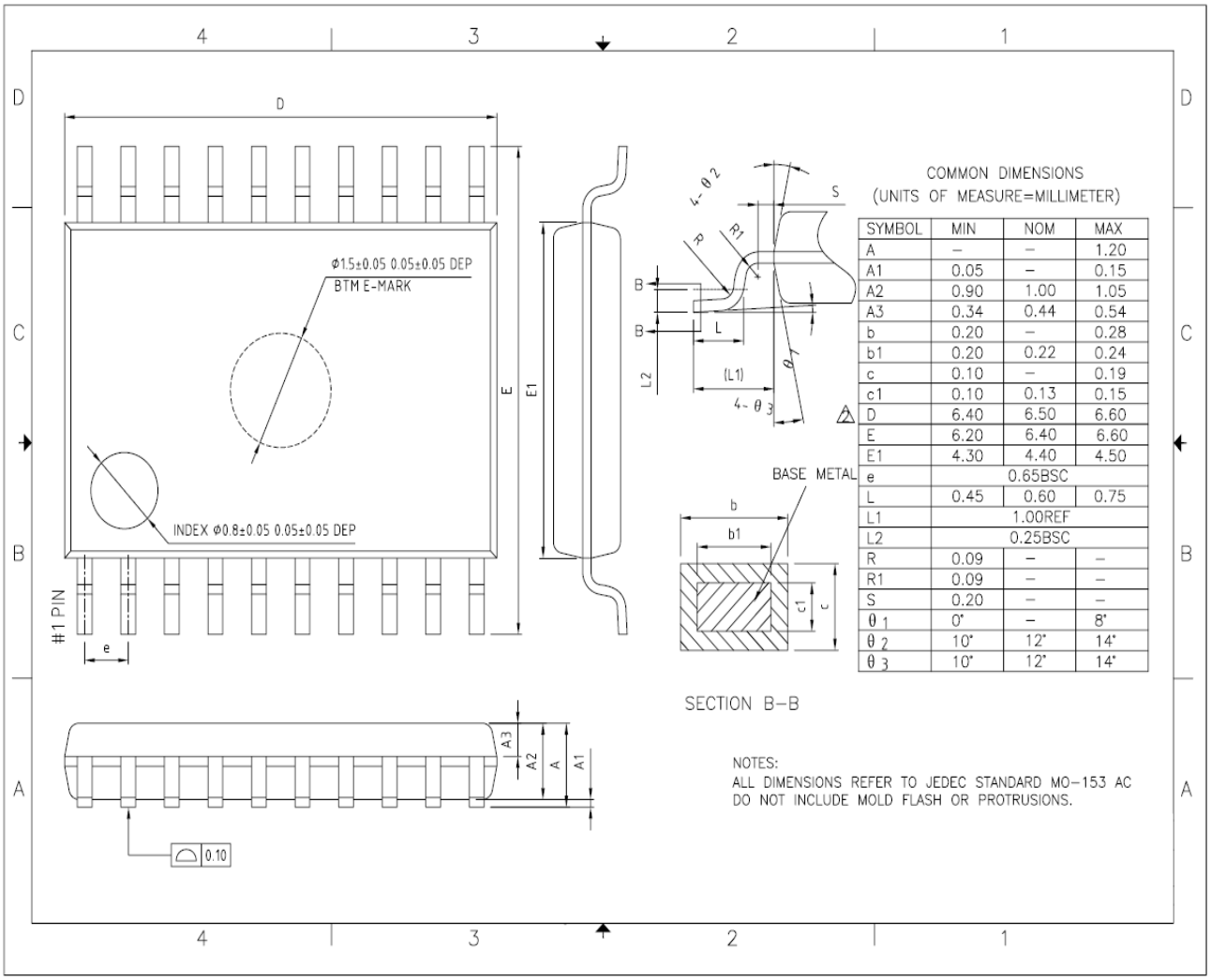
3.5.2 UFQFPN20 Package Size



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	–	–
θ1	0°	–	8°
θ2	10°	12°	14°
θ3	10°	12°	14°

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

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4 Version history

Date	Version	Modify
V0.1.0	2025.8.21	Initial version

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