N32G032 x6/x8 Product Instruction

N32G032 series based on Arm® Cortex®-M0, runup to 48MHz, up to 64KB embedded flash, 16KB SRAM, integrated analog interface, 1x12bit 1Msps ADC, 1xOPAMP, 3xcomparator, integrated multi-channel U(S)ART, I2C, SPI, CAN and other digital communication interfaces, built-in hardware acceleration engine for cryptographic algorithm.

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, multi-user partition management and data protection, supports hardware ECC verification, data 100,000 cycling and 10 years of data retention
  - SRAM of 16KB, supporting hardware parity
- **Low-power management**
  - Stop mode: RTC Run, maximum 16KByte 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 watchdog reset
- **Communication interface**
  - 6xU(S)ART, with a maximum rate of 3 Mbps, of which 2 USART interfaces (support 1xISO7816, 1xIrDA, LIN), 4x UART interfaces, 2 of which support low power (LPUART, the highest communication rate in this mode is 9600bps) , Stop mode can be awakened
  - 3xSPI, up to 12 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. Supports dual-level communication: normal level (signal level matches chip VDD) and low level (chip VDD 3.3V or 5V, signal level 1.8V) two levels can be selected.
  - 1x CAN 2.0A/B bus interface.
- **Analog interface**

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- 1x12bit 1Msps ADC , up to 16 external single-ended input channels
- 1xOPAMP, internal programmable gain amplifier up to 32 times
- 3xCOMP, built-in 64-level adjustable comparison reference

- **Up to 56 GPIOs**
- **1xDMA, 8-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**
- **2xBeeper, 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. 3 of which support 6 pairs complementary PWM outputs
  - 2x16-bit general purpose timer counters, each timer has 4 independent channels, supports input capture/output compare/PWM output
  - 1x16-bit basic timer counters
  - 1x16-bit low power timer counter
  - 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**
  - Built-in cryptographic algorithm hardware acceleration engine
  - Support AES, SM4 algorithms
  - Flash storage encryption
  - Flash storage encryption, Multi-user partition Management Unit (MMU)
  - TRNG true random number generator
  - 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)

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- QFN32(5mm x 5mm)
- LQFP32(7mm x 7mm)
- LQFP48(7mm x 7mm)
- LQFP64(10mm x 10mm)
- WLCSP25(2.128mm x 2.065mm)

- **Order model**

Series	Part Number
N32G032x6 N32G032x8	N32G032F6U7, N32G032F6S7, N32G032F8S7 N32G032P6W7, N32G032P8W7 N32G032K6L7, N32G032K8L7, N32G032K6Q7 N32G032C8L7 N32G032R8L7

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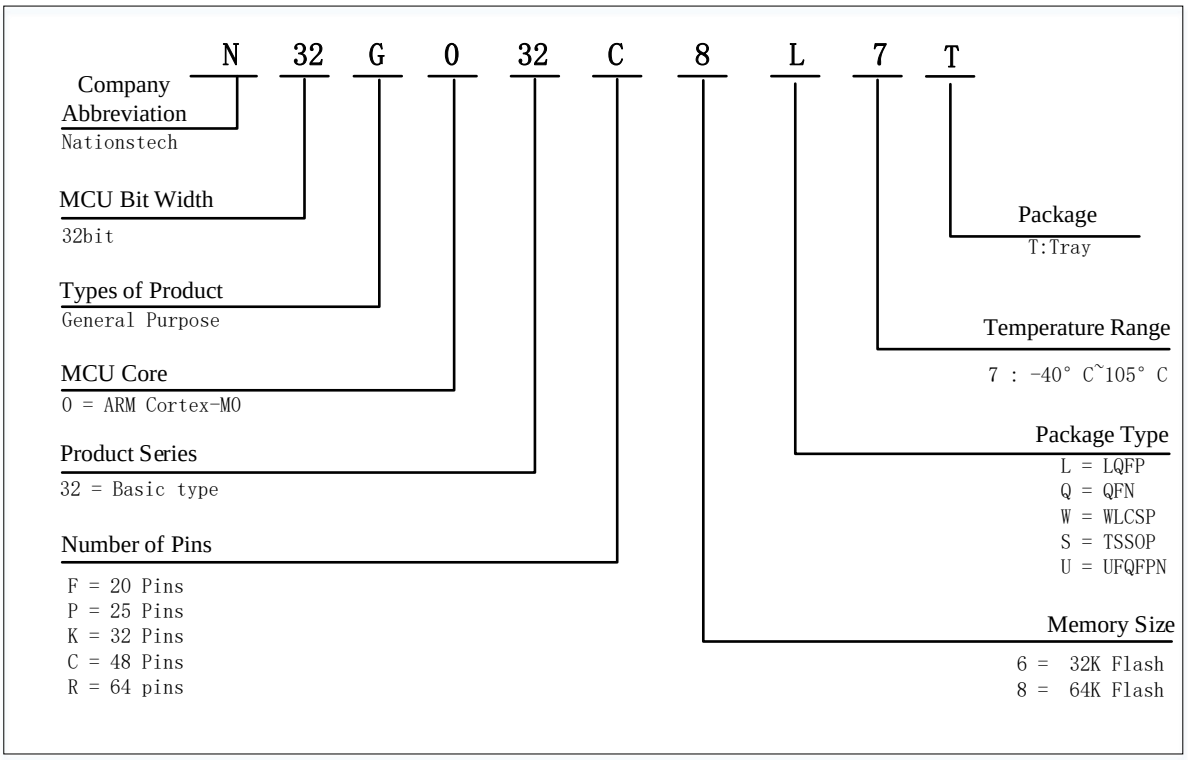
1 Part number information

Figure 1-1 N32G032 Series order code information



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2 Product model resource configuration

Part Number		N32G032 F6U7	N32G032 F6/8S7	N32G032 P6/8W7	N32G032 K6Q7	N32G032 K6/8L7	N32G032 C8L7	N32G032 R8L7
Flash capacity (KB)		32	32/64	32/64	32	32/64	64	64
SRAM capacity (KB)		8	8/16	8/16	8	8/16	16	16
CPU frequency		ARM Cortex-M0 @48MHz						
working environment		1.8~5.5V/-40~105℃						
Timer	General	2						
	Advanced	2						
	Basic	1						
	LPTIM	1						
	RTC	1						
communication interface	SPI	1			2		3	3
	I2S	1						
	I2C	2						
	USART	2						
	UART	1		2				
	LPUART	2						
	CAN	1						
GPIO		16		21	28	26	40	56
DMA Number of Channels		1 8Channel						
12bit ADC Number of channels		1 7Channel	1 9Channel	1 10Channel	1 10Channel	1 10Channel	1 10Channel	1 16Channel
OPA/COMP		1/2	1/3	1/2	1/3	1/3	1/3	1/3
Beeper		2	1	2				
Algorithm support		AES、SM4、CRC16/CRC32、TRNG						
security protection		Read and write protection (RDP/WRP), storage encryption, partition protection						
Package		UFQFPN20	TSSOP20	WLCSP25	QFN32	LQFP32	LQFP48	LQFP64

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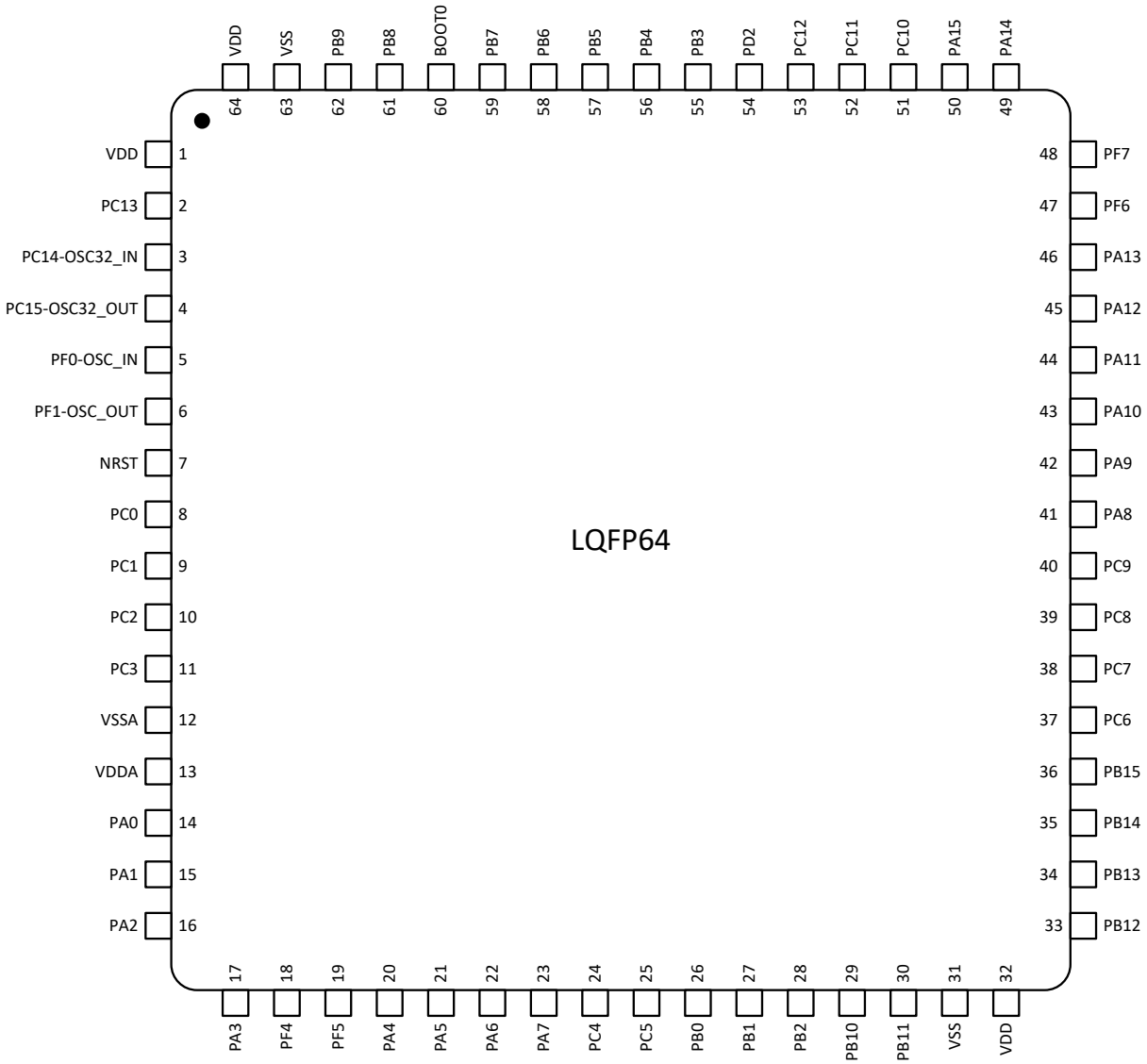
3 Package information

3.1 LQFP64

3.1.1 LQFP64 pinouts



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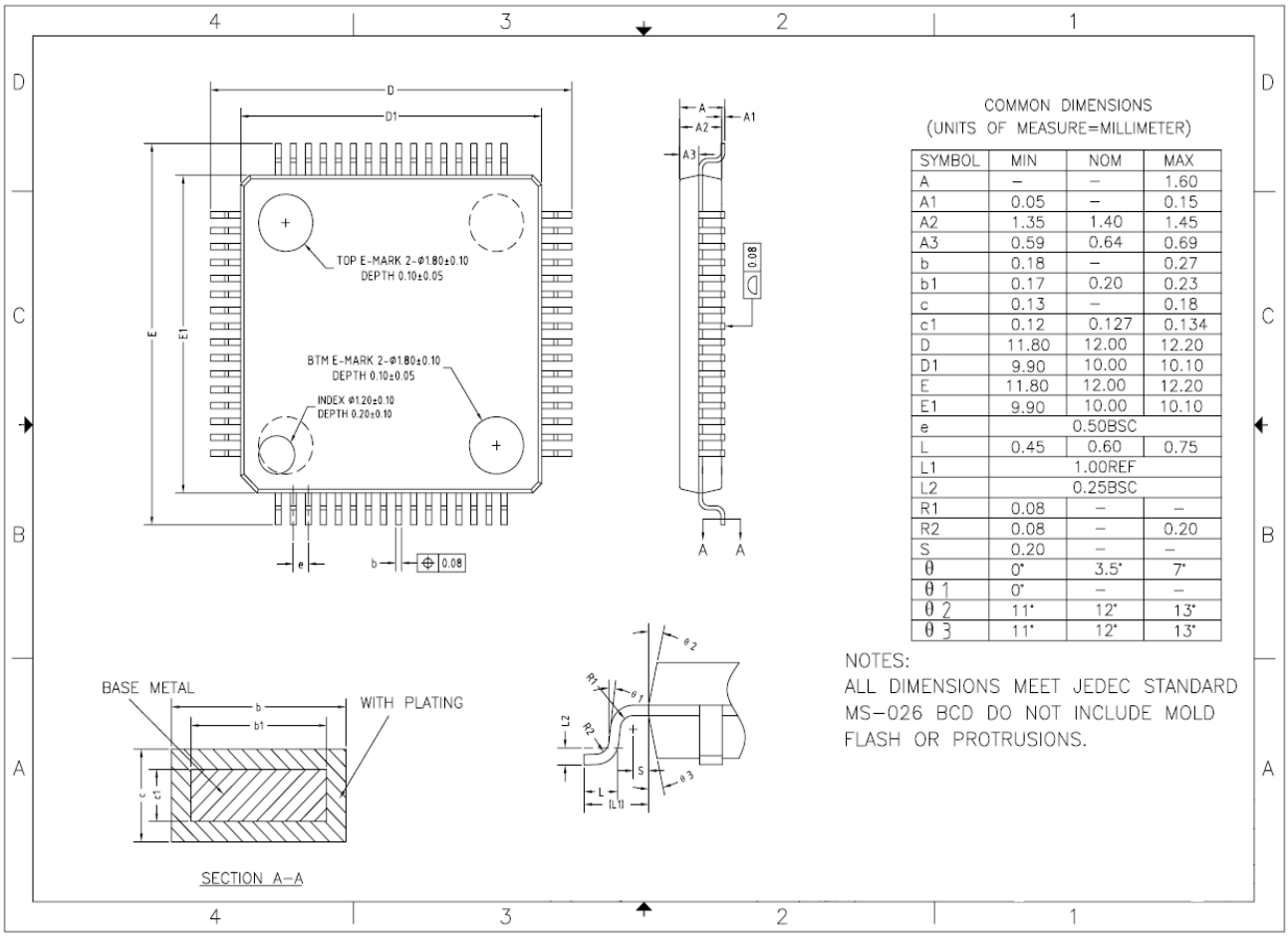
3.1.2 LQFP64 package



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	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	11.80	12.00	12.20
D1	9.90	10.00	10.10
E	11.80	12.00	12.20
E1	9.90	10.00	10.10
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°

NOTES:
ALL DIMENSIONS MEET JEDEC STANDARD MS-026 BCD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

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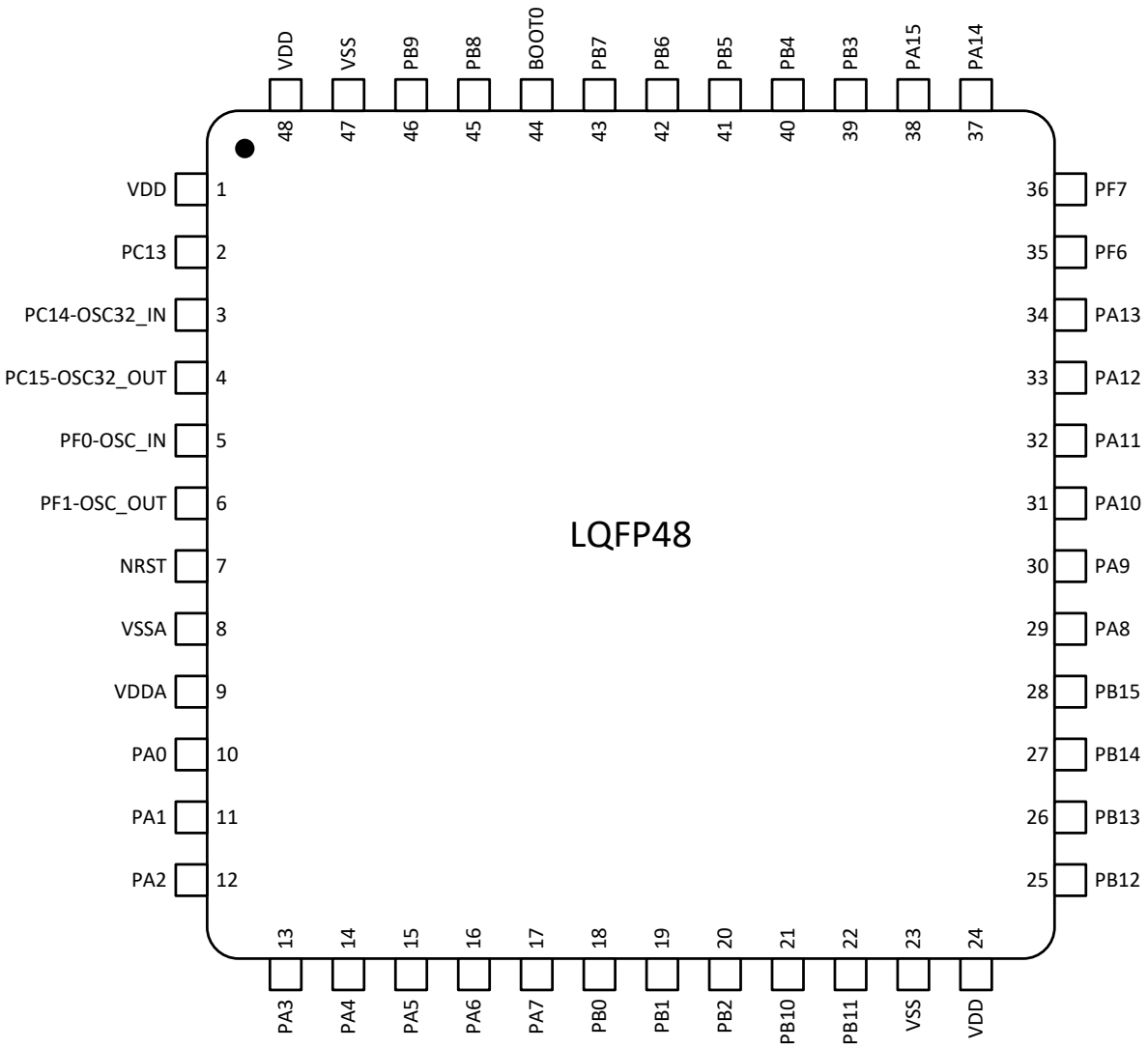
3.2 LQFP48

3.2.1 LQFP48 pinouts



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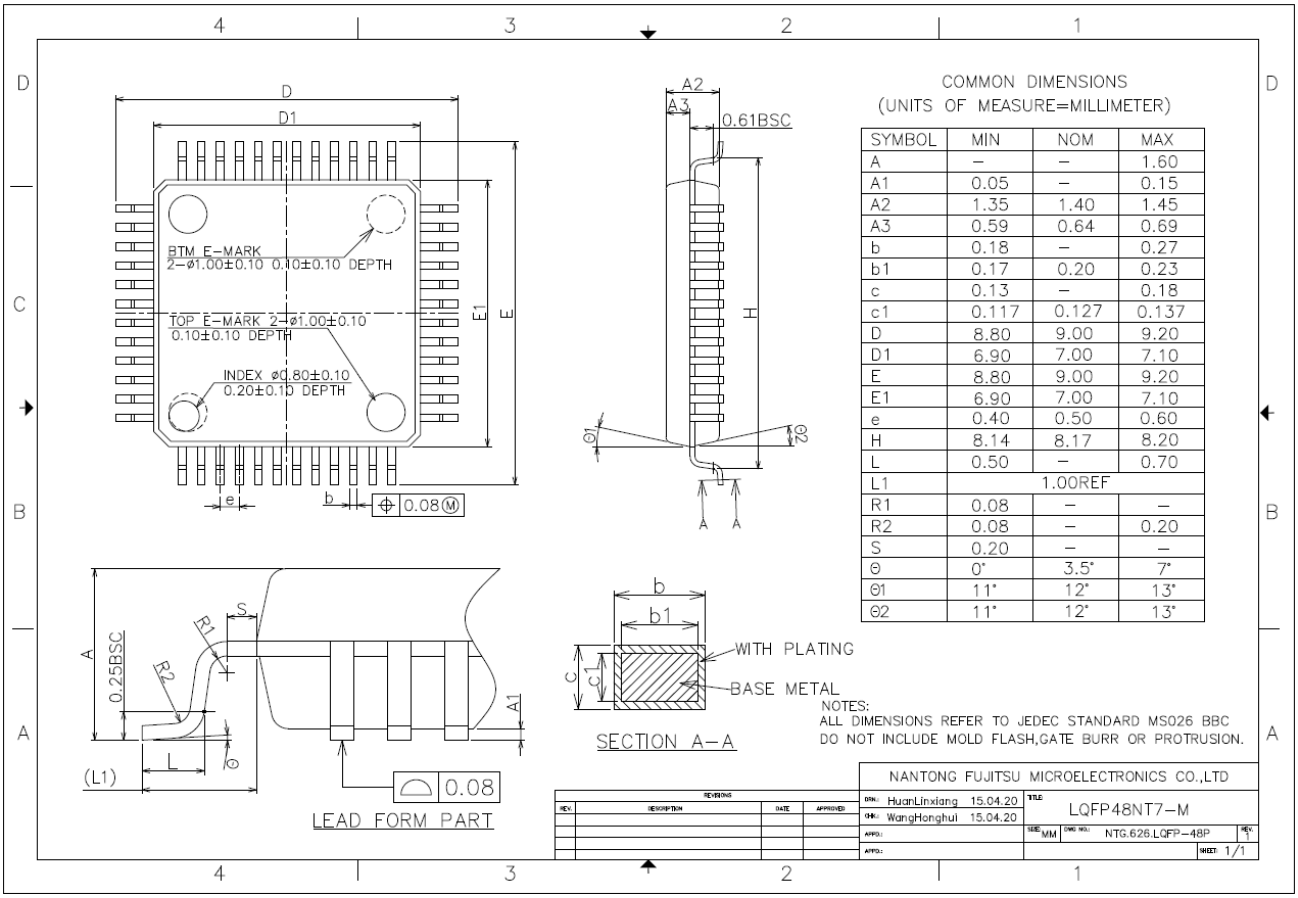
3.2.2 LQFP48 package



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	0.18	–	0.27
b1	0.17	0.20	0.23
c	0.13	–	0.18
c1	0.117	0.127	0.137
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	0.40	0.50	0.60
H	8.14	8.17	8.20
L	0.50	–	0.70
L1		1.00REF	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

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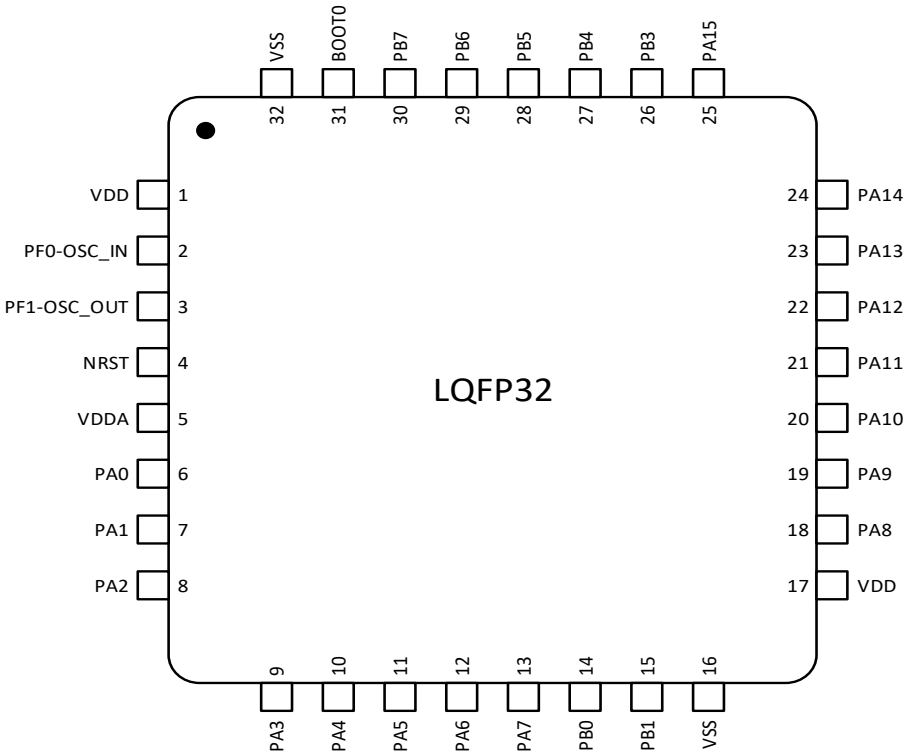
3.3 LQFN32

3.3.1 LQFN32 pinouts



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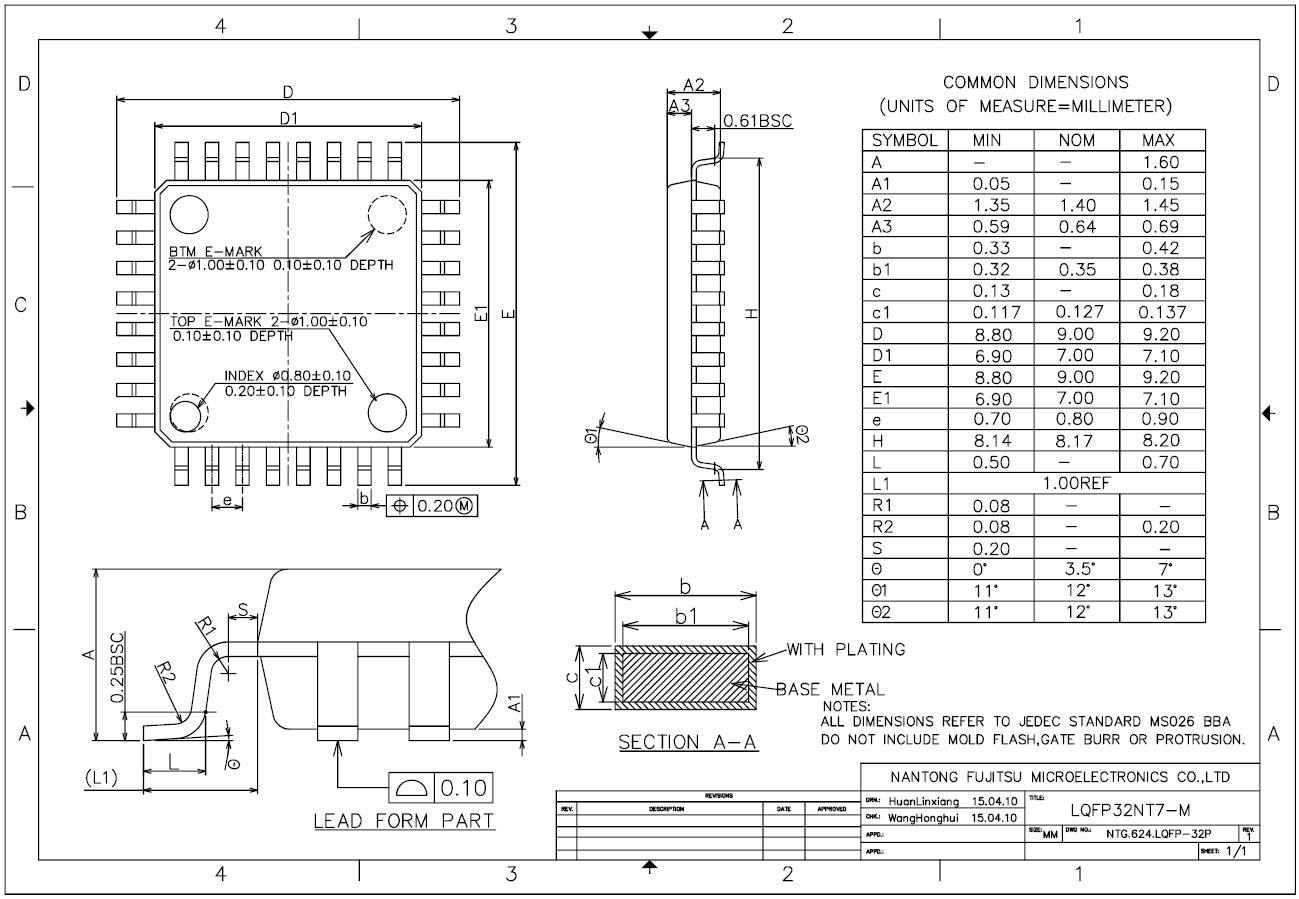
3.3.2 LQFN32 package



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	0.33	–	0.42
b1	0.32	0.35	0.38
c	0.13	–	0.18
c1	0.117	0.127	0.137
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	0.70	0.80	0.90
H	8.14	8.17	8.20
L	0.50	–	0.70
L1		1.00REF	
R1	0.08	–	–
R2	0.08	–	0.20
S	0.20	–	–
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MS026 BBA
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DRN: HuanLinxiang 15.04.10
CHK: WangHonghui 15.04.10
APPD:
APPD:
TITLE: LQFP32NT7-M
SIZE: MM DWG NO.: NTG.624.LQFP-32P REV: 1
SHEET: 1/1

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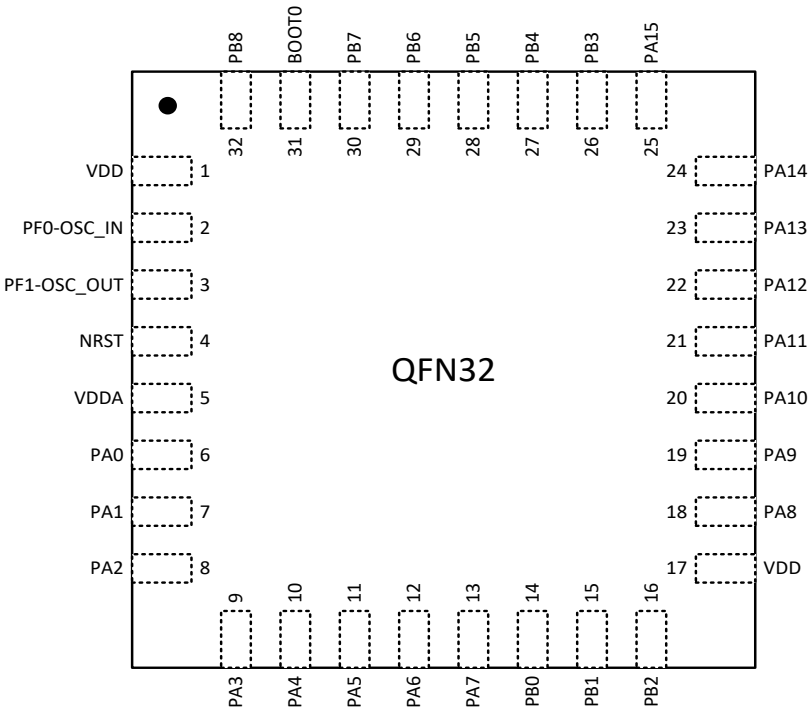
3.4 QFN32
3.4.1 QFN32 pinouts



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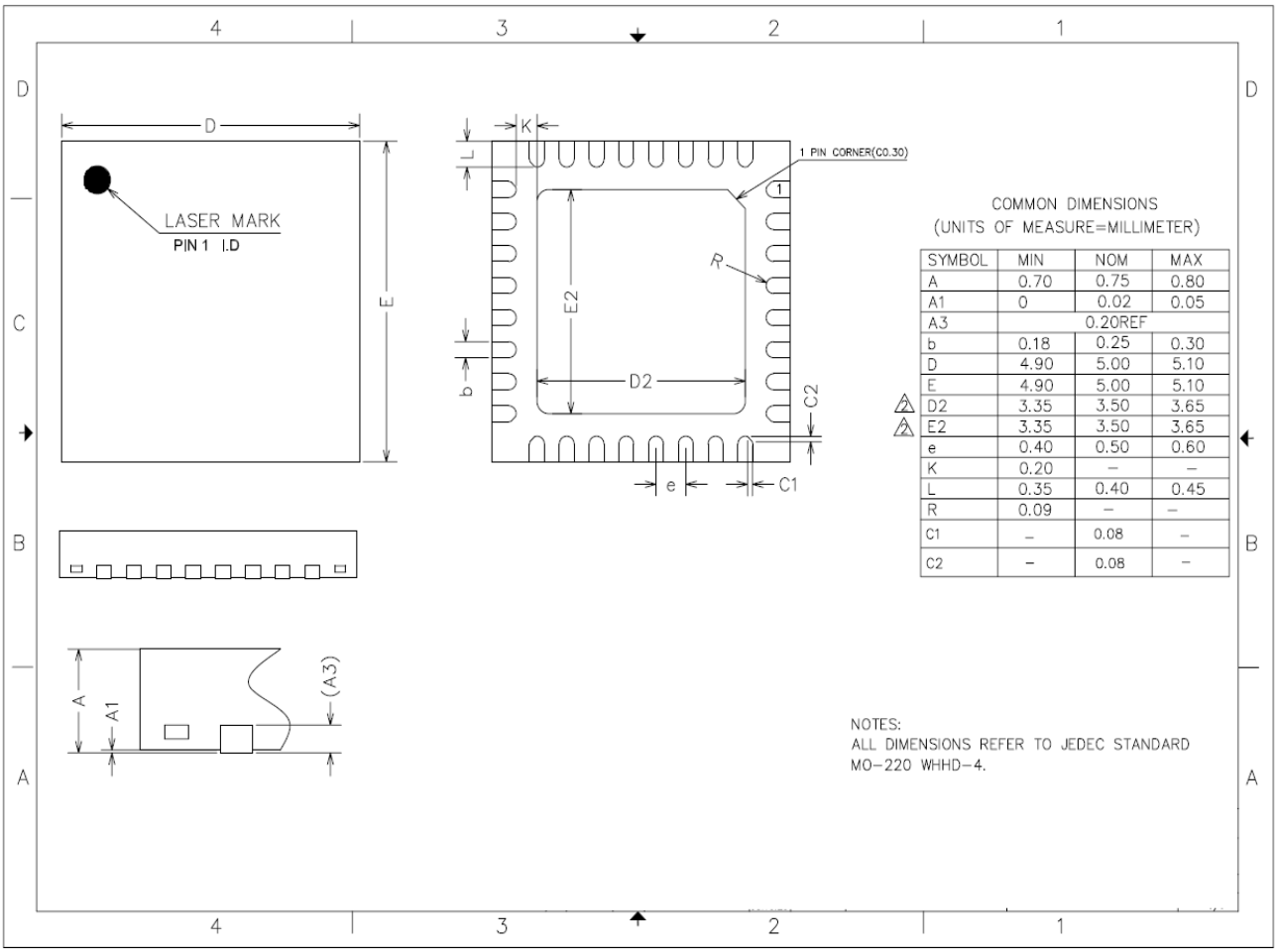
3.4.2 QFN32 package



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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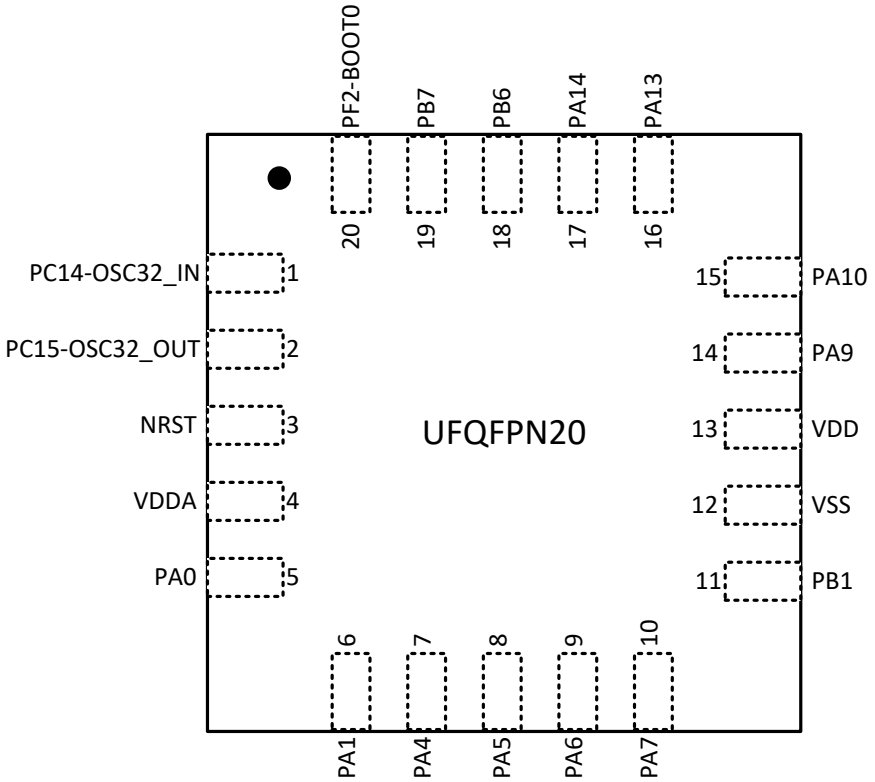
3.5 UFQFPN20
3.5.1 UFQFPN20 pinouts



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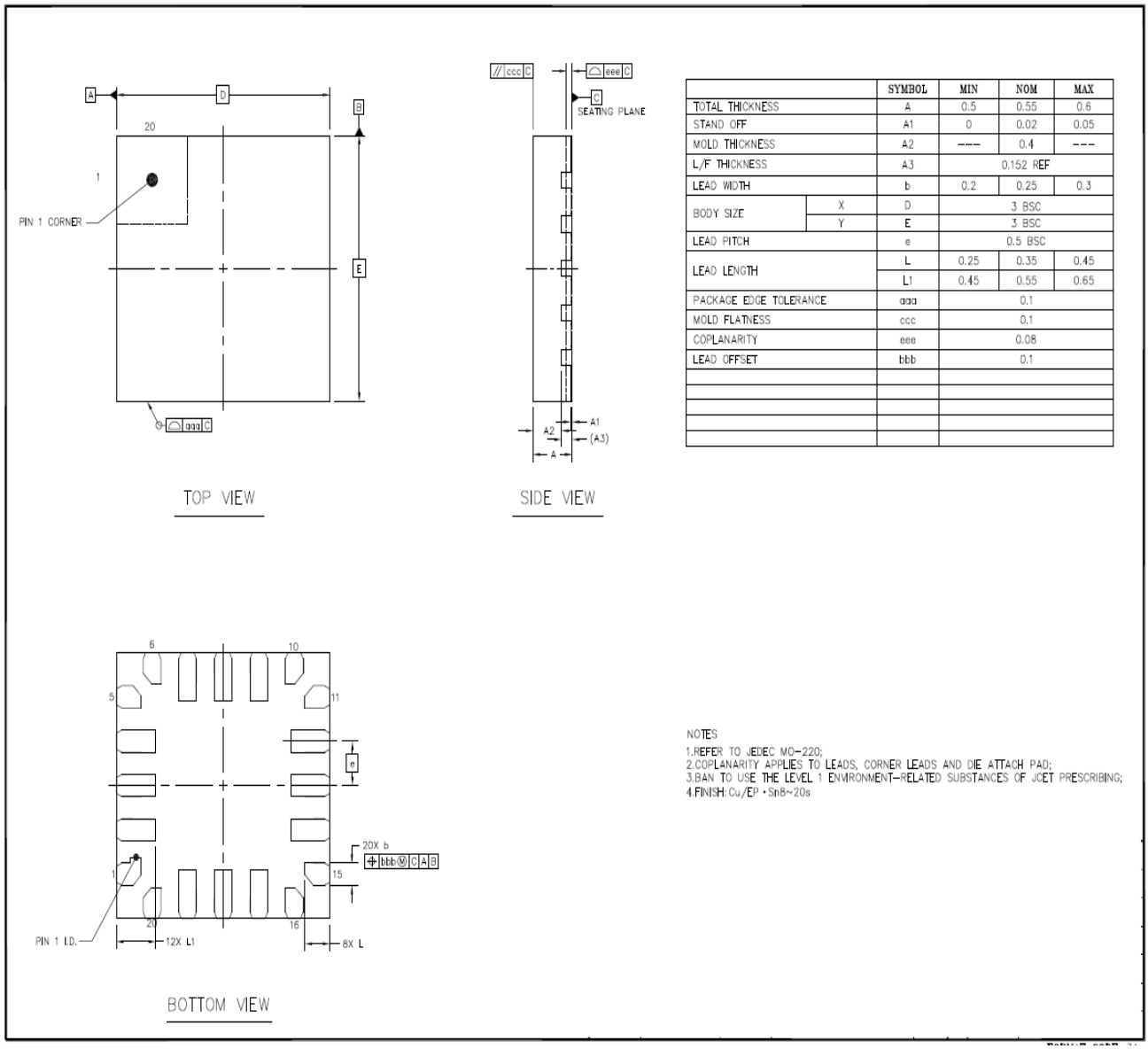
3.5.2 UFQFPN20 package



		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·Sn8~20s

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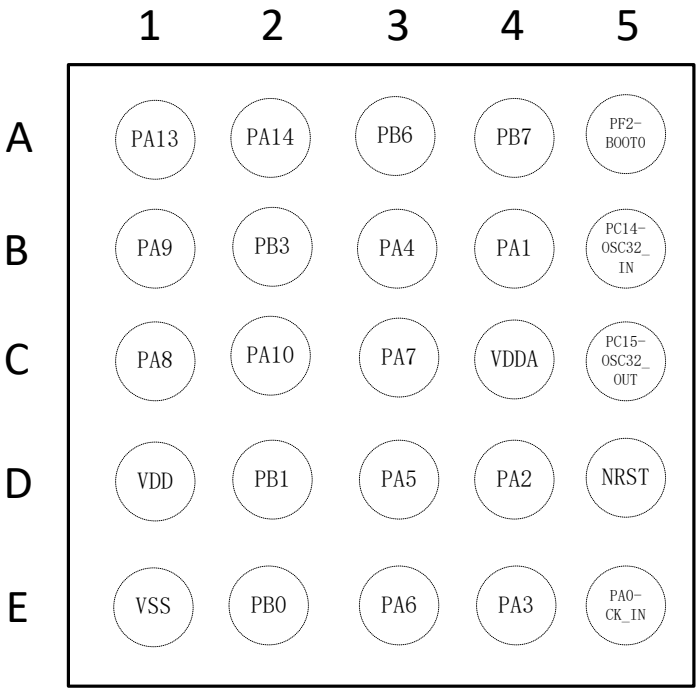
3.6 WLCSP25
3.6.1 WLCSP25 pinouts



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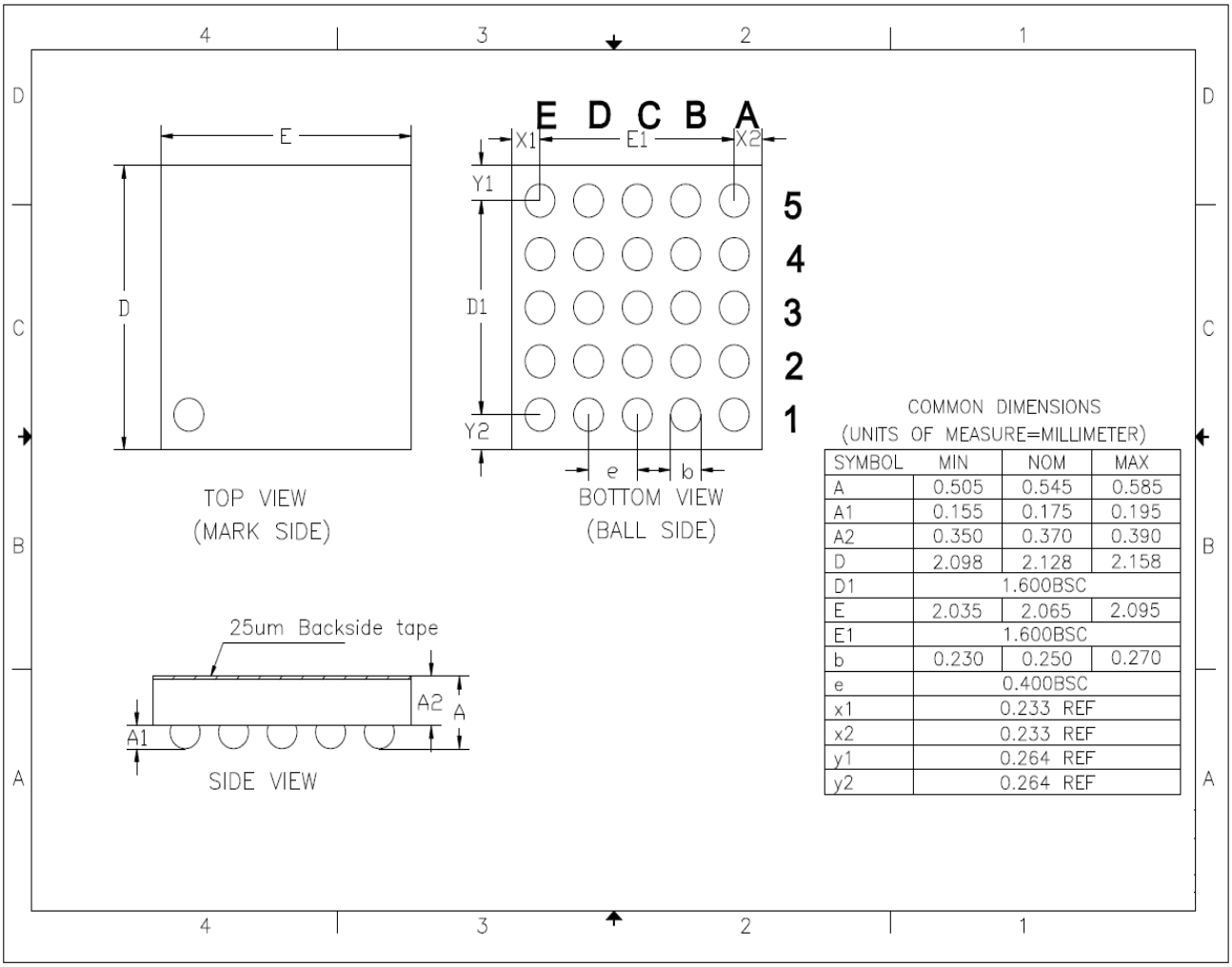
3.6.2 WLCSP25 package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.505	0.545	0.585
A1	0.155	0.175	0.195
A2	0.350	0.370	0.390
D	2.098	2.128	2.158
D1	1.600BSC		
E	2.035	2.065	2.095
E1	1.600BSC		
b	0.230	0.250	0.270
e	0.400BSC		
x1	0.233 REF		
x2	0.233 REF		
y1	0.264 REF		
y2	0.264 REF		

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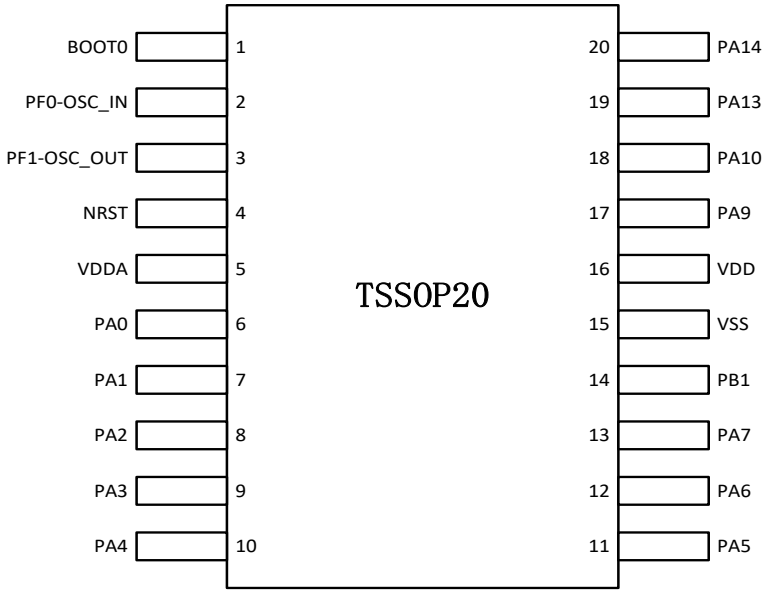
3.7 TSSOP20
3.7.1 TSSOP20 pinouts



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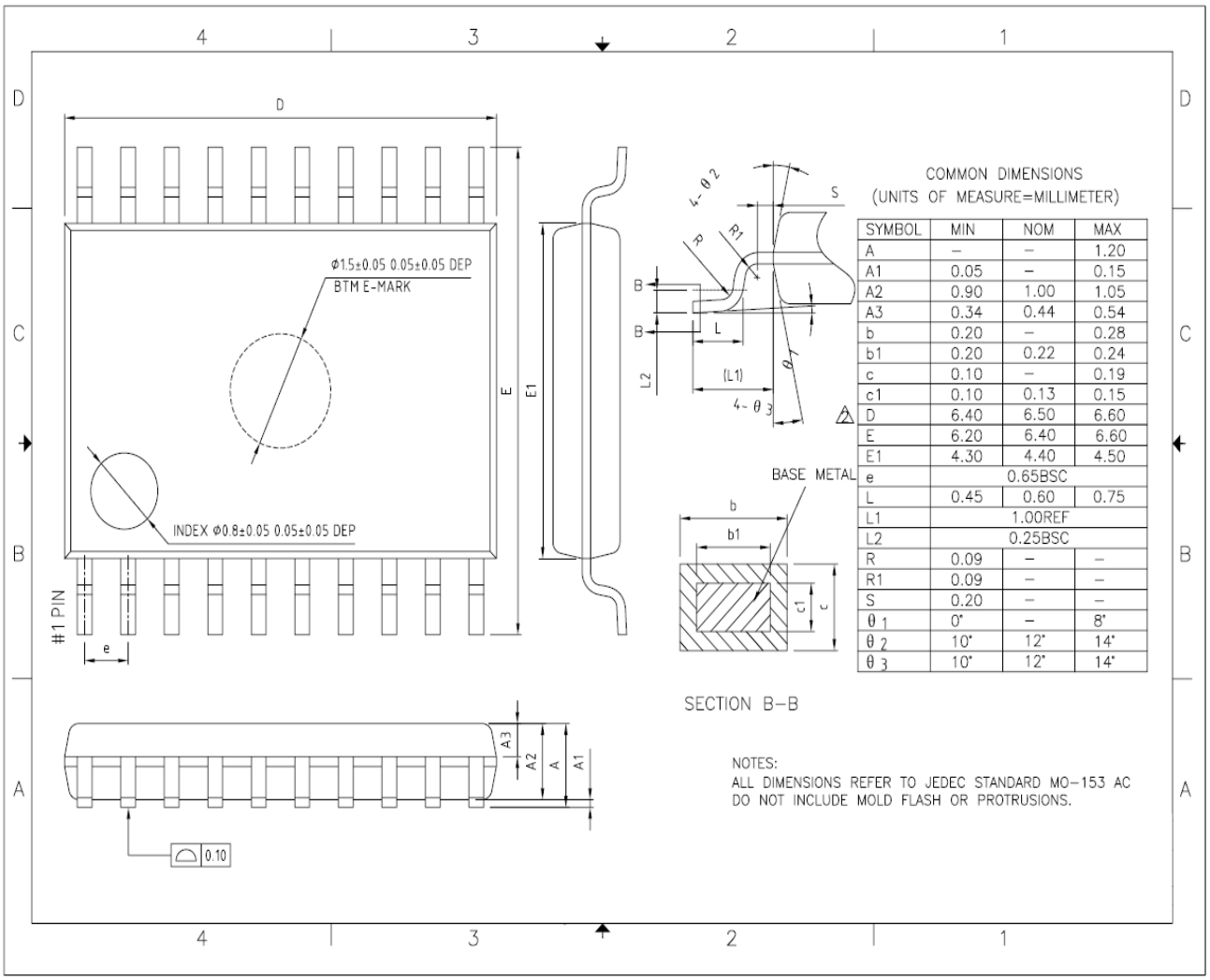
3.7.2 TSSOP20 package



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
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4 Revision History

Version	Date	Note
V2.1.0	2023.8.23	1. Initial document
V2.2.0	2024.5.07	1. Section 3.2.2. Modify package dimension of LQFP48 2. Section 3.3.2. Modify package dimension of LQFP32

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