# N32G033xx Product Brief

**N32G033 series based on Arm® Cortex®-M0, run up to 64MHz, supports fast FLASH execution of instructions, 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, UART3 supports low-power wake-up.
  - 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, supports low-power wake-up.
  - 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
  - QFN20-1
  - UFQFPN20
  - TSSOP20



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# 1 Ordering Information

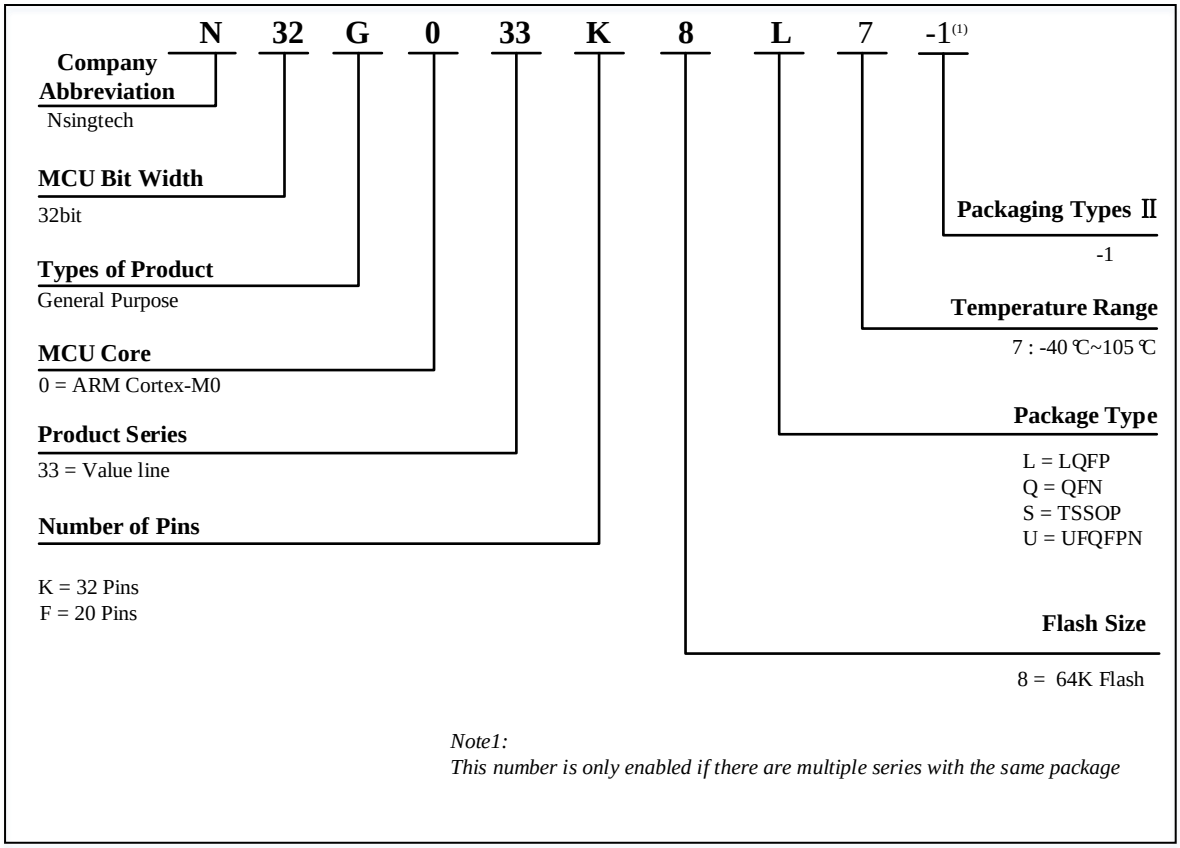


**Table 1-1 N32G033 series ordering code information**

| Order Code(1) | Package | Package Size | Packaging(2) | SPQ(3) | temperature range |
|---|---|---|---|---|---|
| N32G033K8L7 | LQFP32 | 7mm * 7mm | Tray | 250 | -40℃~105℃ |
| N32G033K8Q7 | QFN32 | 5mm *5mm | Tray | 490 | -40℃~105℃ |
| | | | Reel | 2500 | |
| N32G033K8Q7-1 | QFN32 | 4mm *4mm | Tray | 490 | -40℃~105℃ |
| N32G033F8Q7 | QFN20 | 3mm *3mm | Tray | 490 | -40℃~105℃ |
| | | | Reel | 5000 | |
| N32G033F8Q7 | QFN20 | 3mm *3mm | Tray | 490 | -40℃~105℃ |
| | | | Reel | 5000 | |
| N32G033F8S7 | TSSOP20 | 6.5mm *4.4mm | Tube | 70 | -40℃~105℃ |
| | | | Reel | 3500 | |
| N32G033F8U7 | UFQFPN20 | 3mm *3mm | Tray | 490 | -40℃~105℃ |
| | | | Reel | 5000 | |



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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 | N32G033F8Q7-1 | N32G033F8S7 | N32G033F8U7 |
|---|---|---|---|---|---|---|---|---|
| Flash（KB） | | 64 | 64 | 64 | 64 | 64 | 64 | 64 |
| SRAM（KB） | | 6 | 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 | 19 | 17 | 17 |
| DMA | | 1x 3 Channel | | | | | | |
| 12bit ADC | | 1x 10Channel | 1x 11Channel | 1x 11Channel | 1x 9Channel | 1x 9Channel | 1x 9Channel | 1x 7Channel |
| COMP | | 1 | | | | | | |
| OPA | | 3 | 3 | 3 | 2 | 2 | 1 | 1 |
| Security protection | | Read/write protection(RDP/WRP) | | | | | | |
| Package | | LQFP32 | QFN32(5x5 mm) | QFN32(4x4 mm) | QFN20 | QFN20-1 | TSSOP20 | UFQFPN20 |



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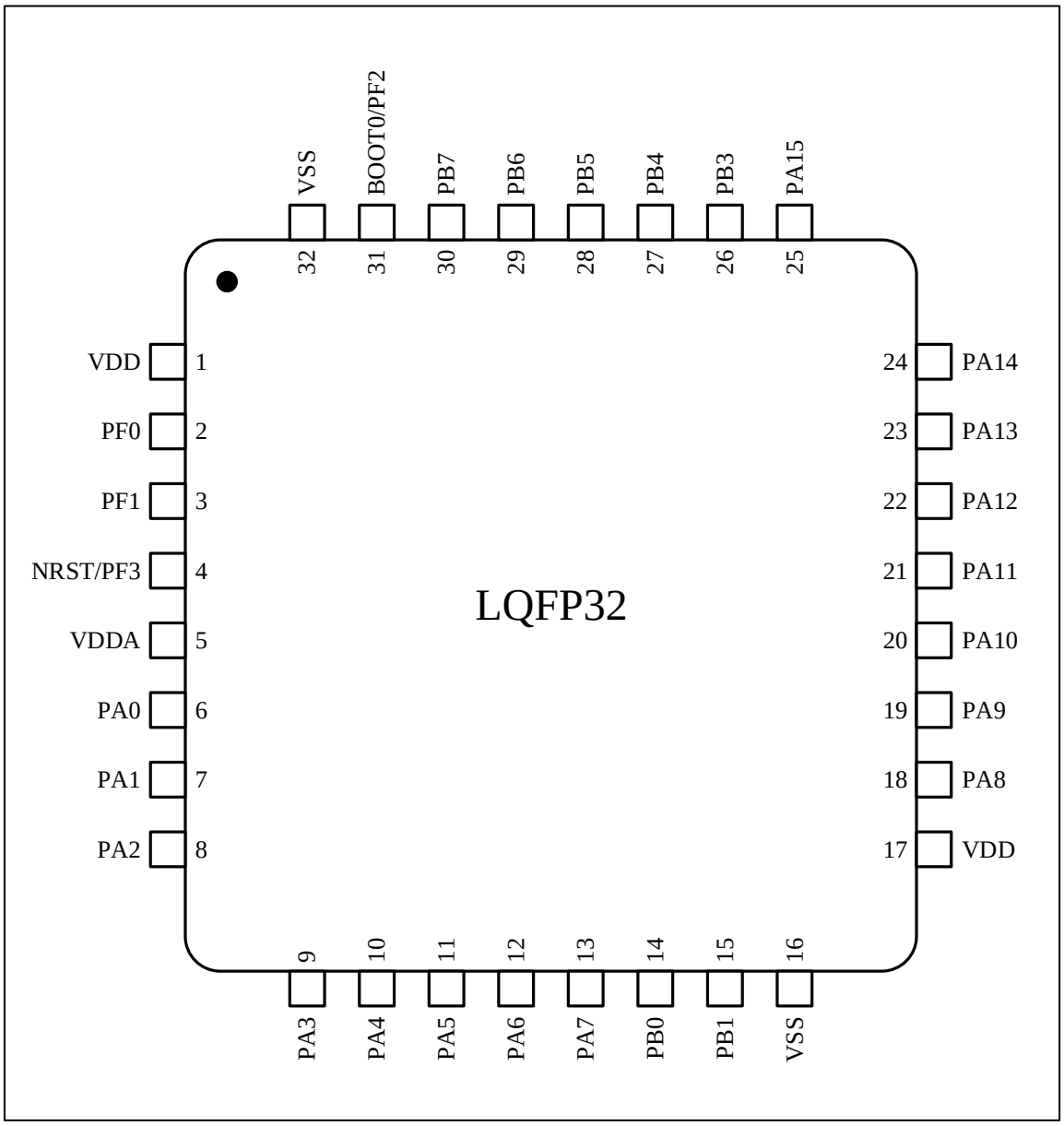
# 3 Package

## 3.1 LQFP32

### 3.1.1 LQFP32 pinouts



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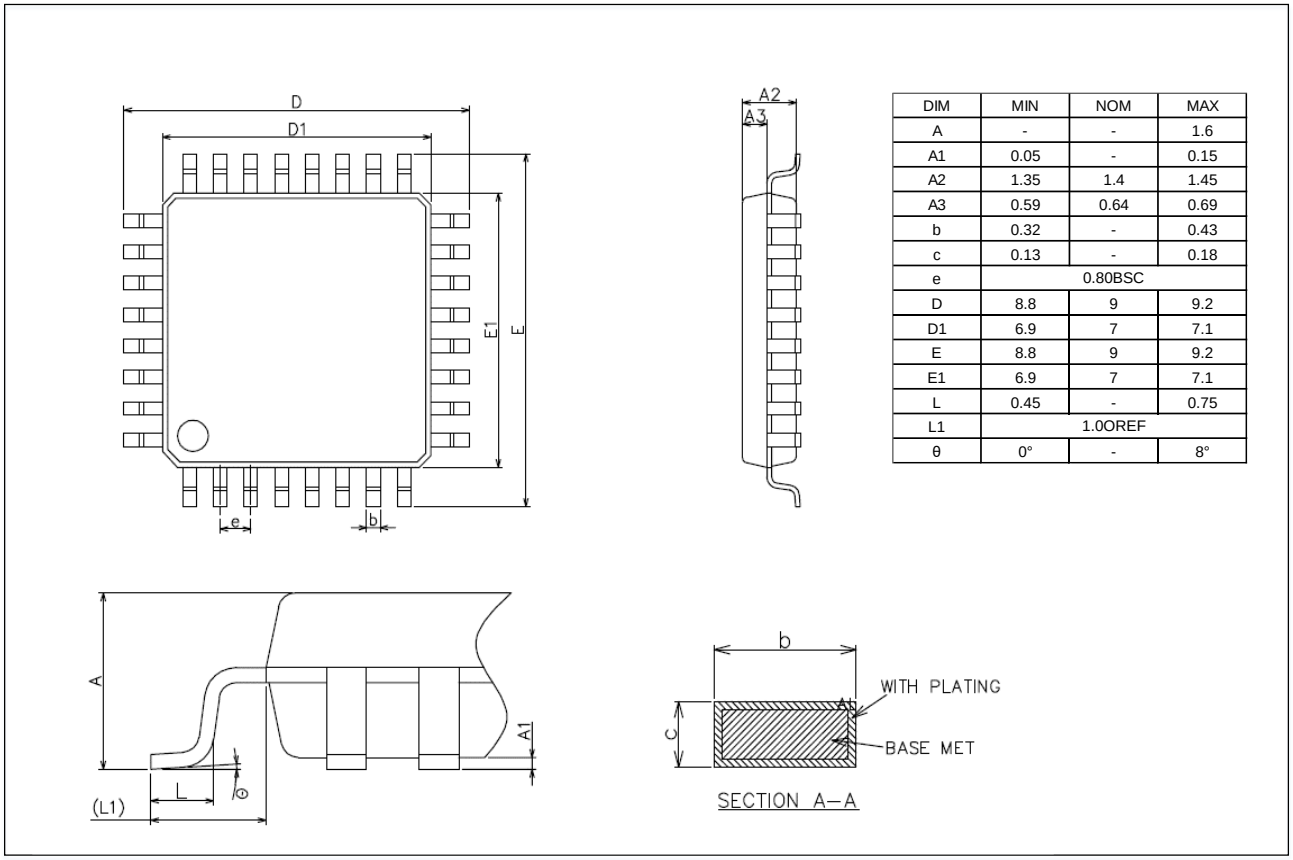
## 3.1.2 LQFP32 Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | - | - | 1.6 |
| A1 | 0.05 | - | 0.15 |
| A2 | 1.35 | 1.4 | 1.45 |
| A3 | 0.59 | 0.64 | 0.69 |
| b | 0.32 | - | 0.43 |
| c | 0.13 | - | 0.18 |
| e | | 0.80BSC | |
| D | 8.8 | 9 | 9.2 |
| D1 | 6.9 | 7 | 7.1 |
| E | 8.8 | 9 | 9.2 |
| E1 | 6.9 | 7 | 7.1 |
| L | 0.45 | - | 0.75 |
| L1 | | 1.0OREF | |
| θ | 0° | - | 8° |



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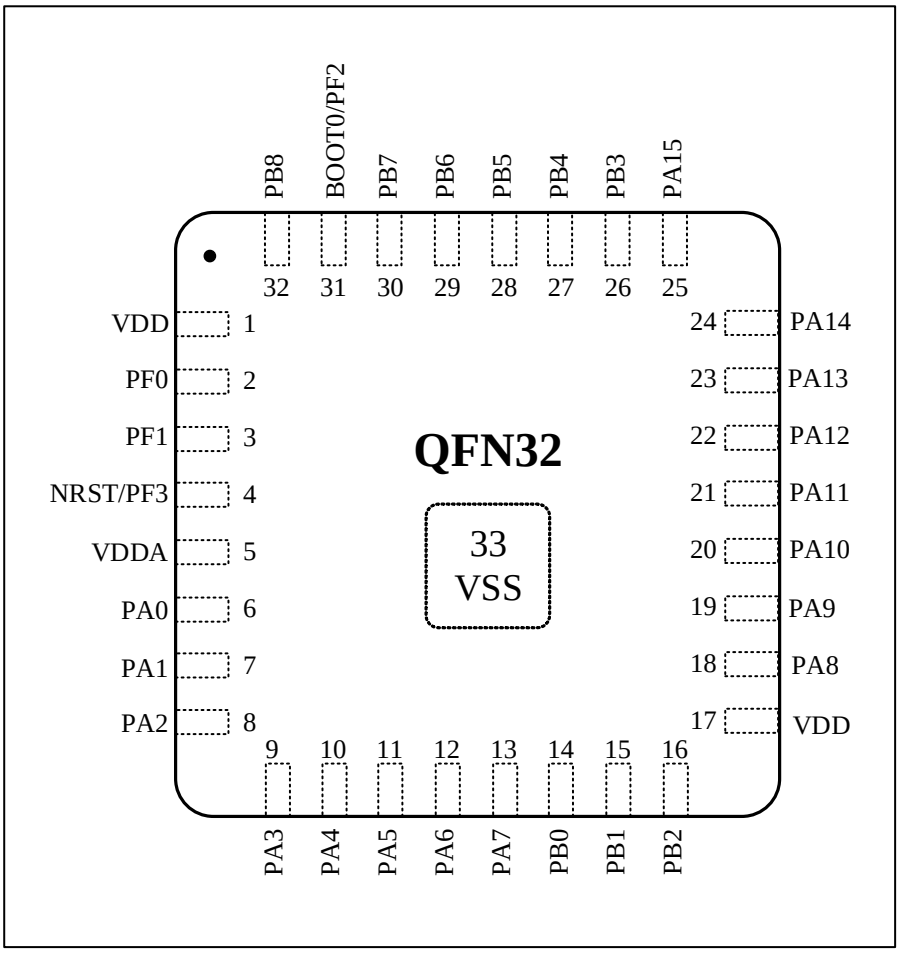
## 3.2 QFN32

### 3.2.1 QFN32 pinouts



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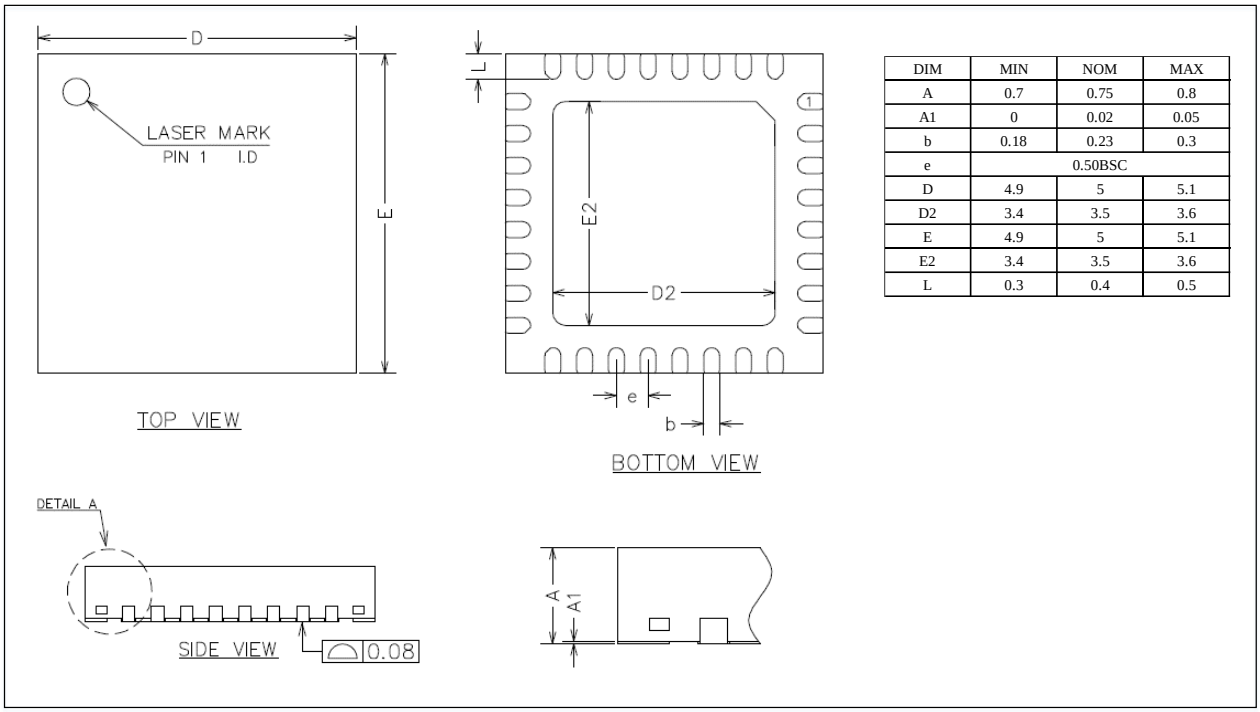
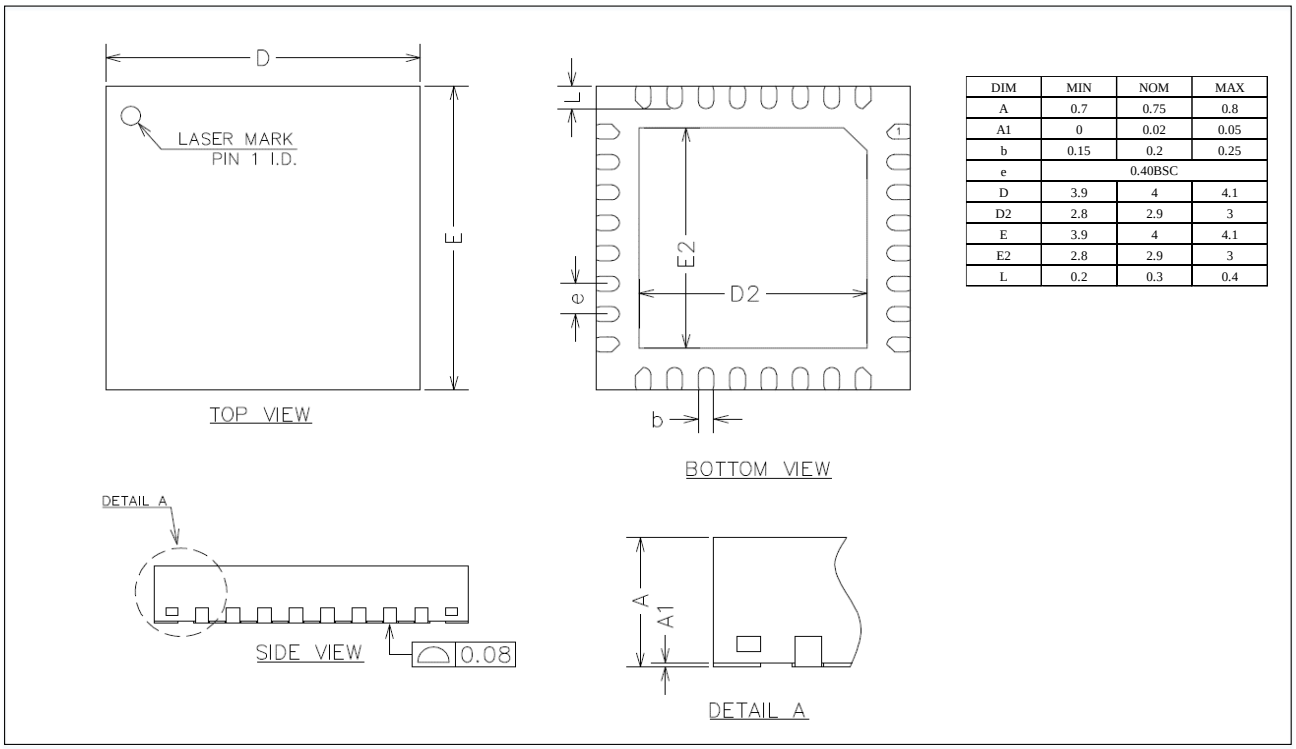
## 3.2.2 QFN32 (5x5mm) Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.7 | 0.75 | 0.8 |
| A1 | 0 | 0.02 | 0.05 |
| b | 0.18 | 0.23 | 0.3 |
| e | | 0.50BSC | |
| D | 4.9 | 5 | 5.1 |
| D2 | 3.4 | 3.5 | 3.6 |
| E | 4.9 | 5 | 5.1 |
| E2 | 3.4 | 3.5 | 3.6 |
| L | 0.3 | 0.4 | 0.5 |

## 3.2.3 QFN32 (4x4mm) Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.7 | 0.75 | 0.8 |
| A1 | 0 | 0.02 | 0.05 |
| b | 0.15 | 0.2 | 0.25 |
| e | | 0.40BSC | |
| D | 3.9 | 4 | 4.1 |
| D2 | 2.8 | 2.9 | 3 |
| E | 3.9 | 4 | 4.1 |
| E2 | 2.8 | 2.9 | 3 |
| L | 0.2 | 0.3 | 0.4 |



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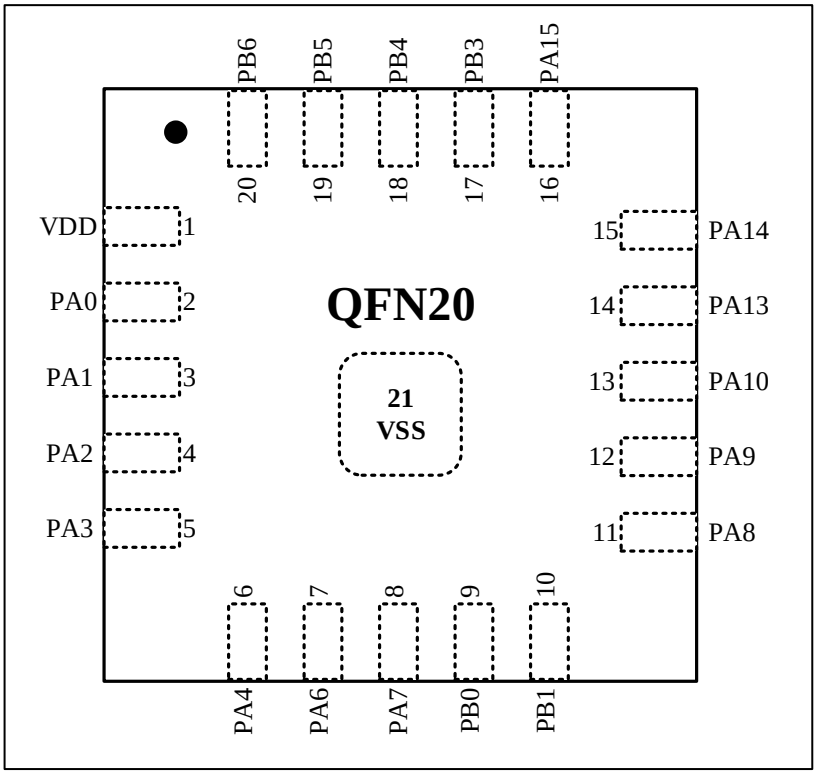
## 3.3 QFN20

### 3.3.1 QFN20 pinouts



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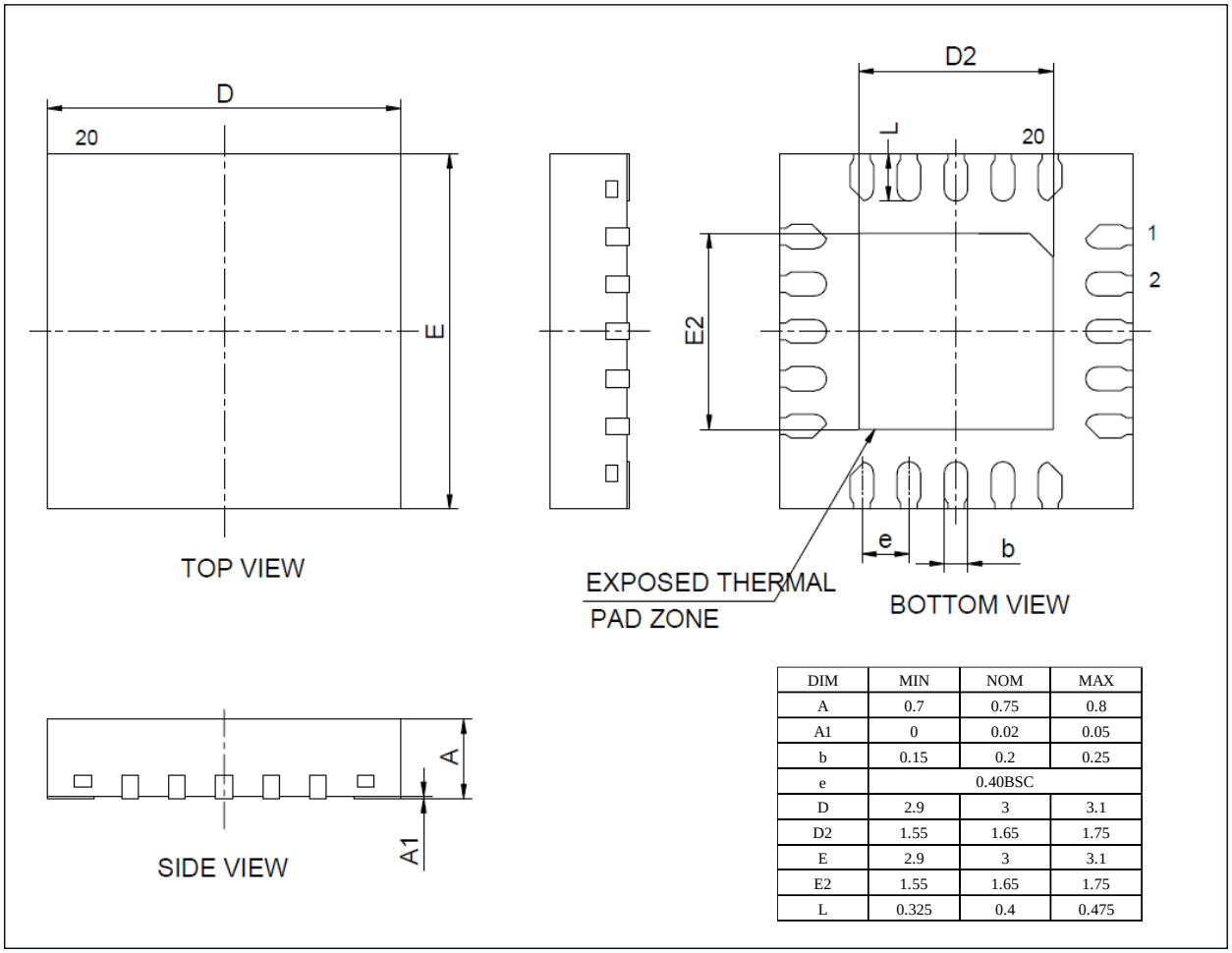
### 3.3.2 QFN20 Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.7 | 0.75 | 0.8 |
| A1 | 0 | 0.02 | 0.05 |
| b | 0.15 | 0.2 | 0.25 |
| e | | 0.40BSC | |
| D | 2.9 | 3 | 3.1 |
| D2 | 1.55 | 1.65 | 1.75 |
| E | 2.9 | 3 | 3.1 |
| E2 | 1.55 | 1.65 | 1.75 |
| L | 0.325 | 0.4 | 0.475 |



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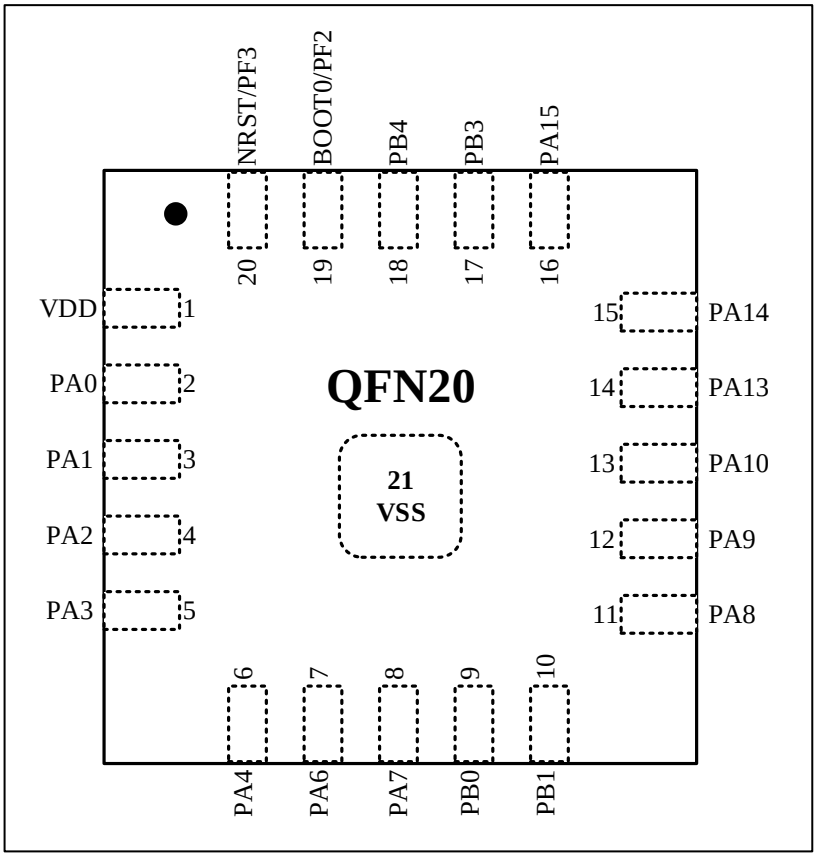
## 3.4 QFN20-1

### 3.4.1 QFN20-1 pinouts



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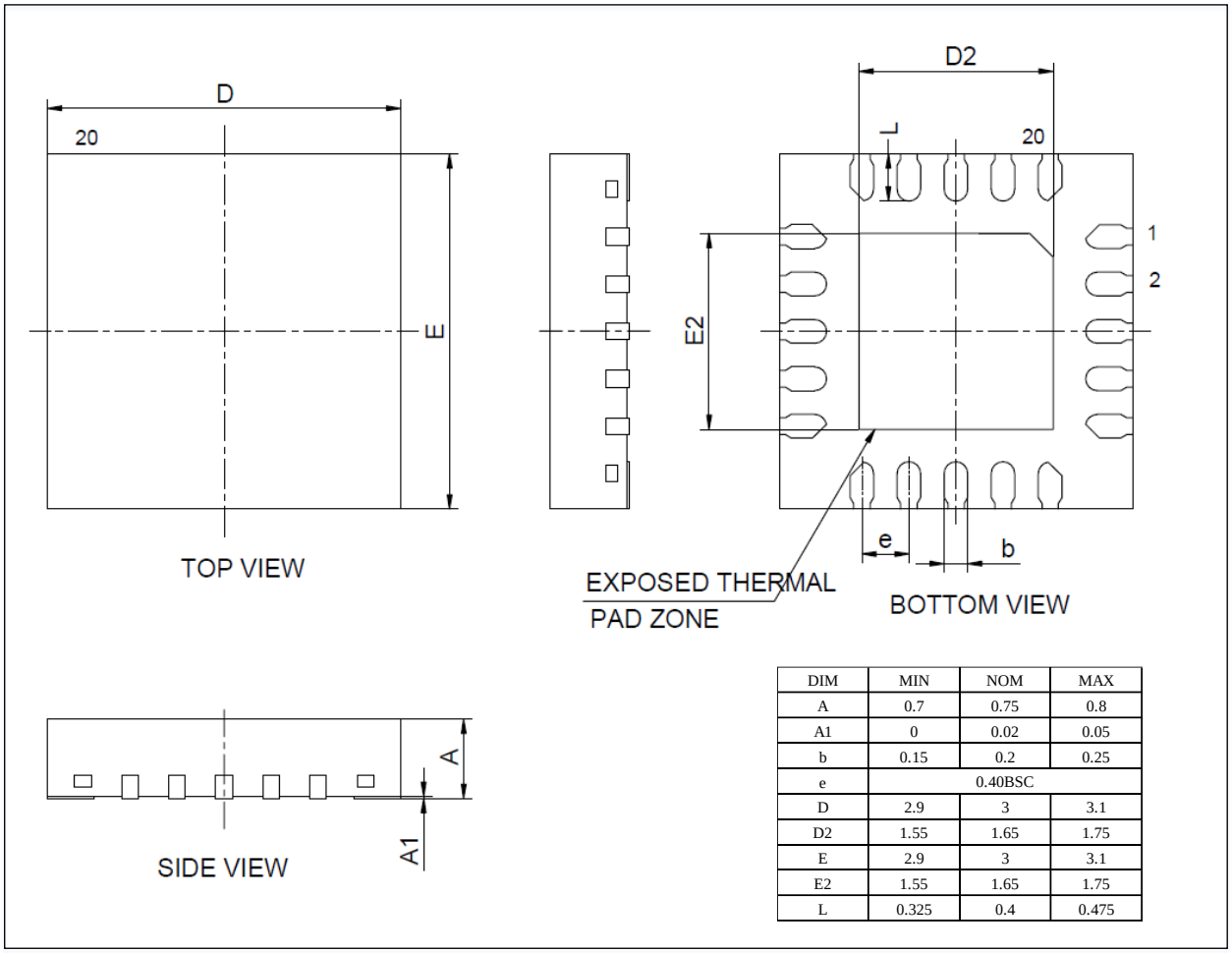
### 3.4.2 QFN20-1 Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.7 | 0.75 | 0.8 |
| A1 | 0 | 0.02 | 0.05 |
| b | 0.15 | 0.2 | 0.25 |
| e | | 0.40BSC | |
| D | 2.9 | 3 | 3.1 |
| D2 | 1.55 | 1.65 | 1.75 |
| E | 2.9 | 3 | 3.1 |
| E2 | 1.55 | 1.65 | 1.75 |
| L | 0.325 | 0.4 | 0.475 |



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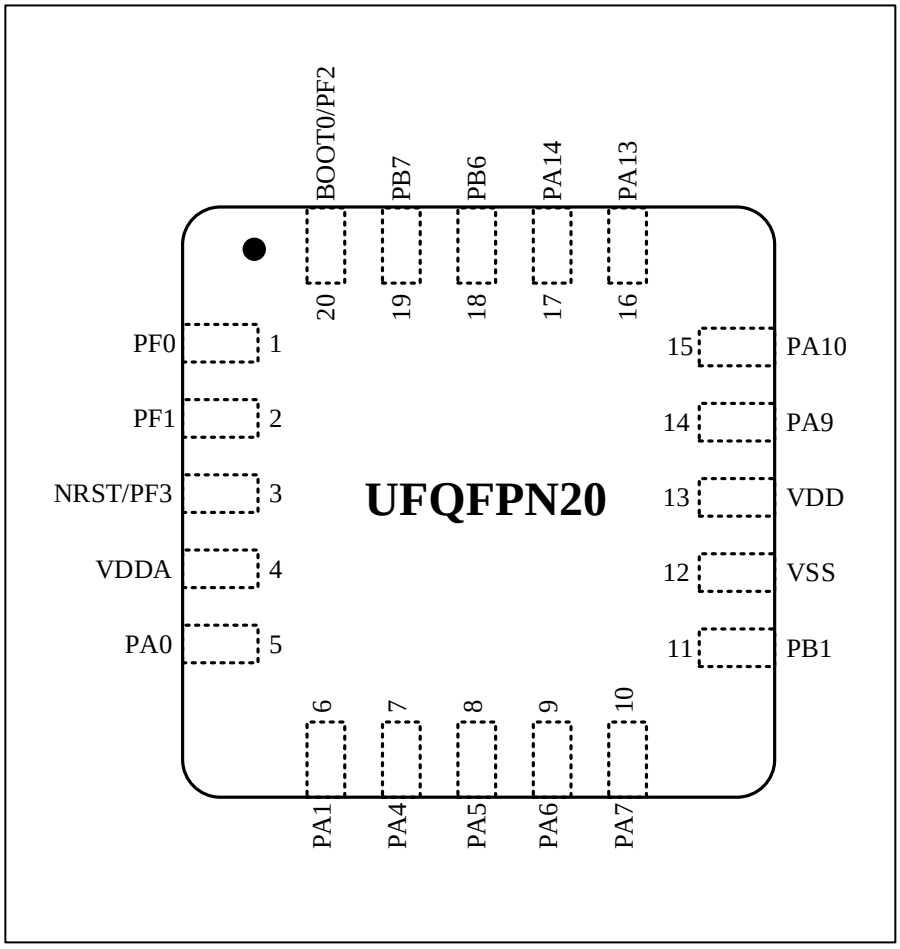
## 3.5 UFQFPN20

### 3.5.1 UFQFPN20 pinouts



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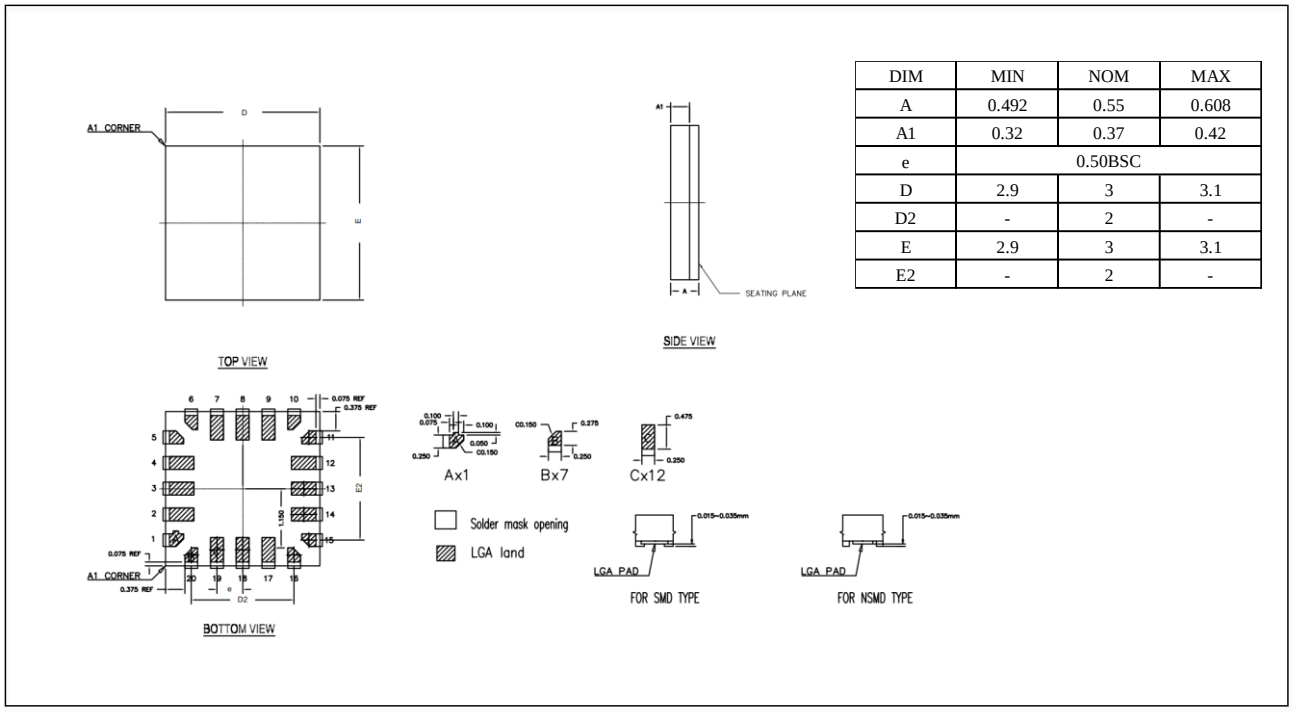
## 3.5.2 UFQFPN20 Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | 0.492 | 0.55 | 0.608 |
| A1 | 0.32 | 0.37 | 0.42 |
| e | | 0.50BSC | |
| D | 2.9 | 3 | 3.1 |
| D2 | - | 2 | - |
| E | 2.9 | 3 | 3.1 |
| E2 | - | 2 | - |



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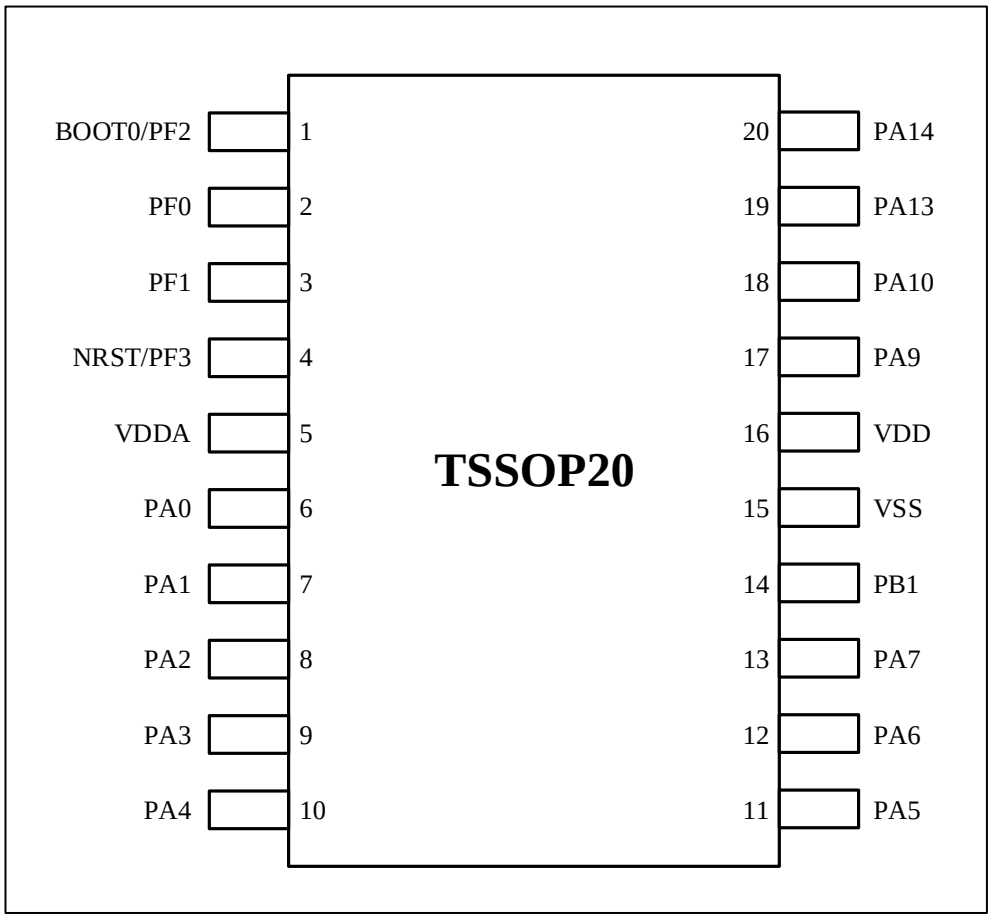
## 3.6 TSSOP20

### 3.6.1 TSSOP20 pinouts



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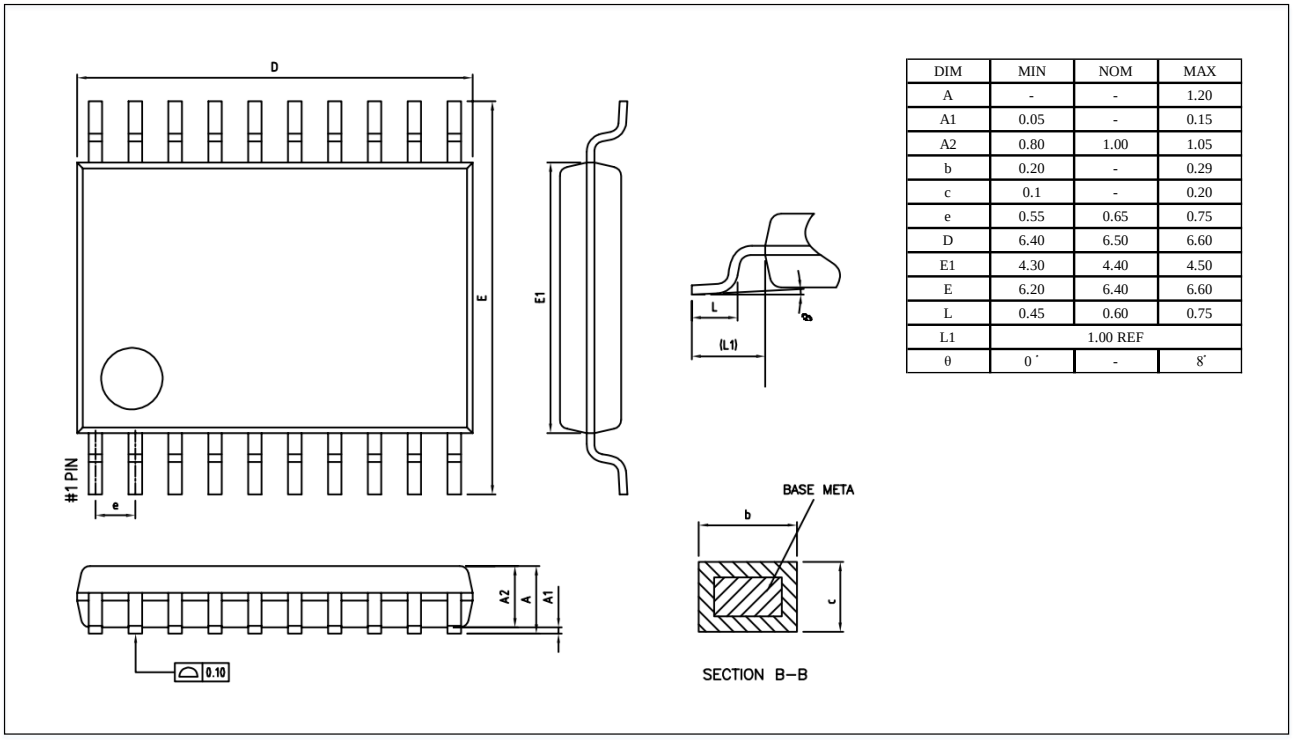
## 3.6.2 TSSOP20 Package Size




| DIM | MIN | NOM | MAX |
|---|---|---|---|
| A | - | - | 1.20 |
| A1 | 0.05 | - | 0.15 |
| A2 | 0.80 | 1.00 | 1.05 |
| b | 0.20 | - | 0.29 |
| c | 0.1 | - | 0.20 |
| e | 0.55 | 0.65 | 0.75 |
| D | 6.40 | 6.50 | 6.60 |
| E1 | 4.30 | 4.40 | 4.50 |
| E | 6.20 | 6.40 | 6.60 |
| L | 0.45 | 0.60 | 0.75 |
| L1 | 1.00 REF | | |
| θ | 0 ˚ | - | 8˚ |



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# 4 Version history

| Version | Date | Modify |
|---|---|---|
| V1.0.0 | 2025.9.17 | Initial version |
| V1.1.0 | 2025.12.23 | 1. TSSOP20 package size diagram update<br>2. N32G033F8S7 model adds Tube packaging |



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