N32G401x6/x8 Product Brief

N32G401 series based on 32-bit ARM Cortex-M4F kernel, run up to 72MHz, support floating-point unit and DSP instructions, up to 64KB embedded flash, 8KB SRAM, integrated high-performance analog interface, built-in 1x12bit 4.2Msps ADC, 3x high-speed comparators, Integrated multi-channel U(S)ART, I2C, SPI and other digital communication interfaces.

Key features

- **CPU core**
  - 32-bit ARM Cortex-M4 + FPU, DSP instruction support
  - Built-in 1KB instruction Cache, which support Flash acceleration unit to execute program 0 wait
  - Run up to 72MHz, 90DMIPS
- **Encrypted memory**
  - Up to 64KByte of embedded Flash memory, supporting encrypted storage, multi-user partition management and data protection, 10,000 cycling and 10 years data retention.
  - 8KByte of SRAM, retention in Stop2 mode, configurable in Standby mode
- **Power consumption mode**
  - Support Run, Sleep, Stop0, Stop2, Standby mode
- **High-performance analog interface**
  - 1x 12bit 4.2Msps ADC, 12/10/8/6 bits configurable, up to 16 external single-ended input channels, 3 internal single-ended input channels, support differential mode
  - 3x COMP (each comparator has an internal independent 6bit DAC)
- **Clock**
  - HSE: 4MHz~32MHz external high-speed crystal
  - LSE: 32.768KHz external low-speed crystal
  - HSI: Internal high-speed RC 8MHz
  - LSI: Internal low speed RC 40KHz
  - 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**
  - Supports power-on/power-off/external pin reset
  - Support watchdog reset, software reset
  - Support programmable voltage detection
- **Up to 39+1 GPIOs are supported**
- **Communication interface**
  - 4x U(S)ART interfaces, including 2x USART interfaces (supporting ISO7816, IrDA, LIN) and 2x UART interfaces

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- 2x SPI interfaces, master mode up to 28Mbps(without CRC), 20Mbps(with CRC), slave mode up to 32Mbps, support I^2S
- 2x I2C interfaces with a rate up to 1 MHz, which can be configured in master/slave mode and support dual address response in slave mode

- **1x DMA controller, each controller supports 8 channels, channel source address and destination address can be arbitrarily configurable**
- **1x RTC real-time clock, support leap year perpetual calendar, alarm clock event, periodic wake up, support internal and external clock calibration**
- **1x Beeper, support complementary output, 12mA output drive capability**
- **Timing counter**
  - 2x 16-bit advanced timer counters, support input capture, complementary output, orthogonal encoding input, maximum control accuracy 7.8ns; Each timer has four independent channels, Timer1 supports 4 channels and 8 complementary PWM output , Timer8 supports 3 channels and 6 complementary PWM output
  - 4x 16-bit general purpose timer counters, each timer has 4 independent channels, support input capture/output comparison /PWM output
  - 1x 16-bit basic timer counter
  - 1x 16-bit low power timer counter, support single pulse and double pulse counting function, can work in STOP2 mode
  - 1x 24-bit SysTick
  - 1x 14-bit Window Watchdog (WWDG)
  - 1x 12-bit Independent Watchdog (IWDG)
- **Programming mode**
  - Support SWD/JTAG online debugging interface
  - Supports UART Bootloader
- **Security features**
  - Flash Storage encryption, Multi-user partition Management Unit (MMU)
  - CRC16/32 operation
  - Support write protection (WRP), multiple read protection (RDP) levels (L0/L1/L2)
  - Support safe start, program encryption download, security updates
  - Support external clock failure detection, tamper detection
- **96-bit UID and 128-bit UCID**
- **Working conditions**
  - Operating voltage range: 2.4V~3.6V
  - Operating temperature range: -40℃ ~ 105℃
  - ESD: ±4KV (HBM model), ±2KV (CDM model)
- **Encapsulation**
  - LQFP32(7mm x 7mm)
  - LQFP48(7mm x 7mm)
  - QFN20(3mm x 3mm)

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- QFN28(4mm x 4mm)
- QFN32(4mm x 4mm)
- QFN32-1(5mm x 5mm)
- QFN48(6mm x 6mm)
- TSSOP20(6.5mm x 4.4mm)

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1 Ordering Information

Figure 1-1 N32G401 Series Part Number Information

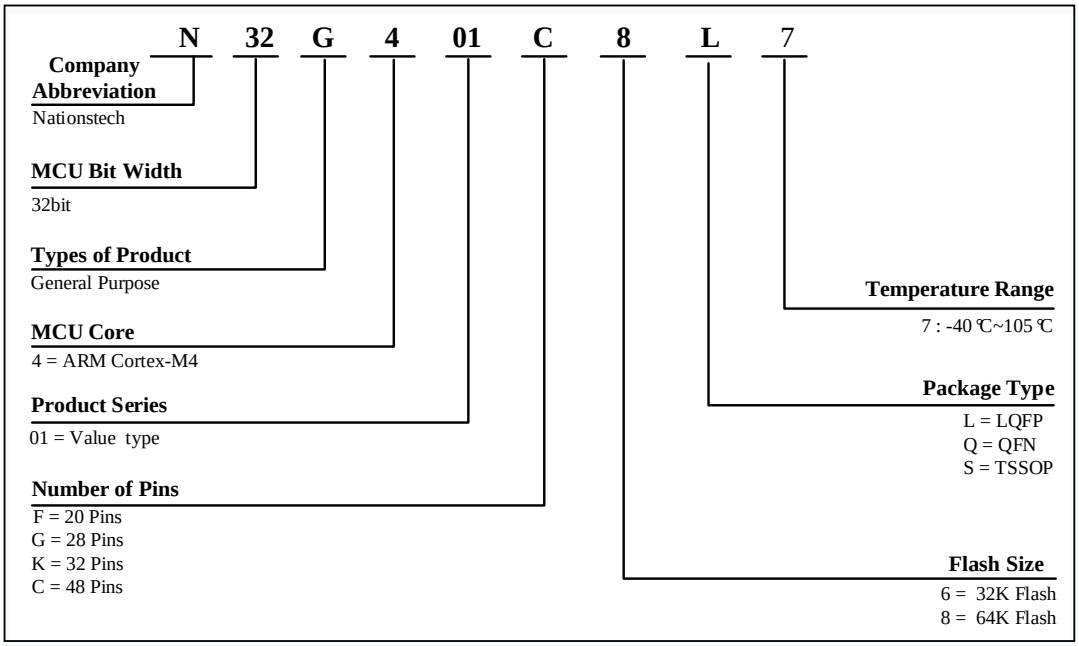

Table 1-1 N32G401 Series Ordering Code

Ordering code (1)	Package	Package size	Packaging (2)	SPQ(3)	Temperature range
N32G401C8L7	LQFP48	7mm*7mm	Tray	250	-40℃ ~ 105℃
N32G401C8Q7	QFN48	6mm*6mm	Tray	490	-40℃ ~ 105℃
N32G401K8L7	LQFP32	7mm*7mm	Tray	250	-40℃ ~ 105℃
N32G401K8Q7	QFN32	4mm*4mm	Tray	490	-40℃ ~ 105℃
N32G401K8Q7-1	QFN32-1	5mm*5mm	Tray	490	-40℃ ~ 105℃
N32G401G8Q7	QFN28	4mm*4mm	Tray	490	-40℃ ~ 105℃
N32G401F8Q7	QFN20	3mm*3mm	Tube	490	-40℃ ~ 105℃
N32G401F8S7-1	TSSOP20	6.5mm*4.4mm	Tube	70	-40℃ ~ 105℃

1. For the latest detailed ordering information, please refer to the Selection Guide.
2. The packaging provided is the basic packaging. If user has any other requirements, please contact Naitons.
3. Minimum packaging quantity.

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2 List of devices

Table 2-1 N32G401 series resource configuration

Part Number		N32G401 F6S7-1	N32G401 F8S7-1	N32G401 F6Q7	N32G401 F8Q7	N32G401 G6Q7	N32G401 G8Q7	N32G401K6L7 N32G401K6Q7	N32G401K8L7 N32G401K8Q7	N32G401 K8Q7-1	N32G401C6L7 N32G401C6Q7	N32G401C8L7 N32G401C8Q7
Flash capacity (KB)		32	64	32	64	32	64	32	64	64	32	64
SRAM capacity (KB)		16	16	16	16	16	16	16	16	8	16	16
CPU frequency		ARM Cortex-M4F @72MHz，90DMIPS										
working environment		2.4~3.6V/-40~105℃										
Timer	General	4										
	Advanced	2 (Timer1 supports 4 channels and 8 complementary output, Timer8 supports 3 channels and 6 complementary output)										
	Basic	1										
	LPTIM	1										
Communication interface	SPI	2										
	I2S	2										
	I2C	2										
	UART	1				2						
	USART	2										
BEEPER		1										
GPIO		15+1				23+1		25+1		27+1	39+1	
DMA Number of Channels		1 8 Channel										
12bit ADC Number of channels		1 9Channel		1 7Channel		1 10Channel				1 11Channel	1 16Channel	
COMP		0	3									
security protection		Read and write protection (RDP/WRP), storage encryption, partition protection, secure boot										
Package		TSSOP20		QFN20		QFN28		LQFP32 QFN32		QFN32-1	LQFP48 QFN48	

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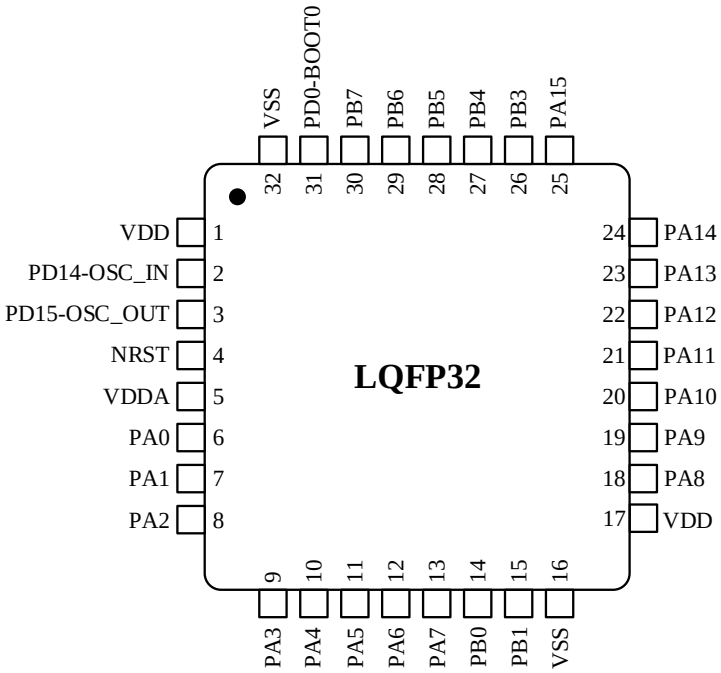
3 Package Information

3.1 LQFP32

3.1.1 LQFP32 Pinout



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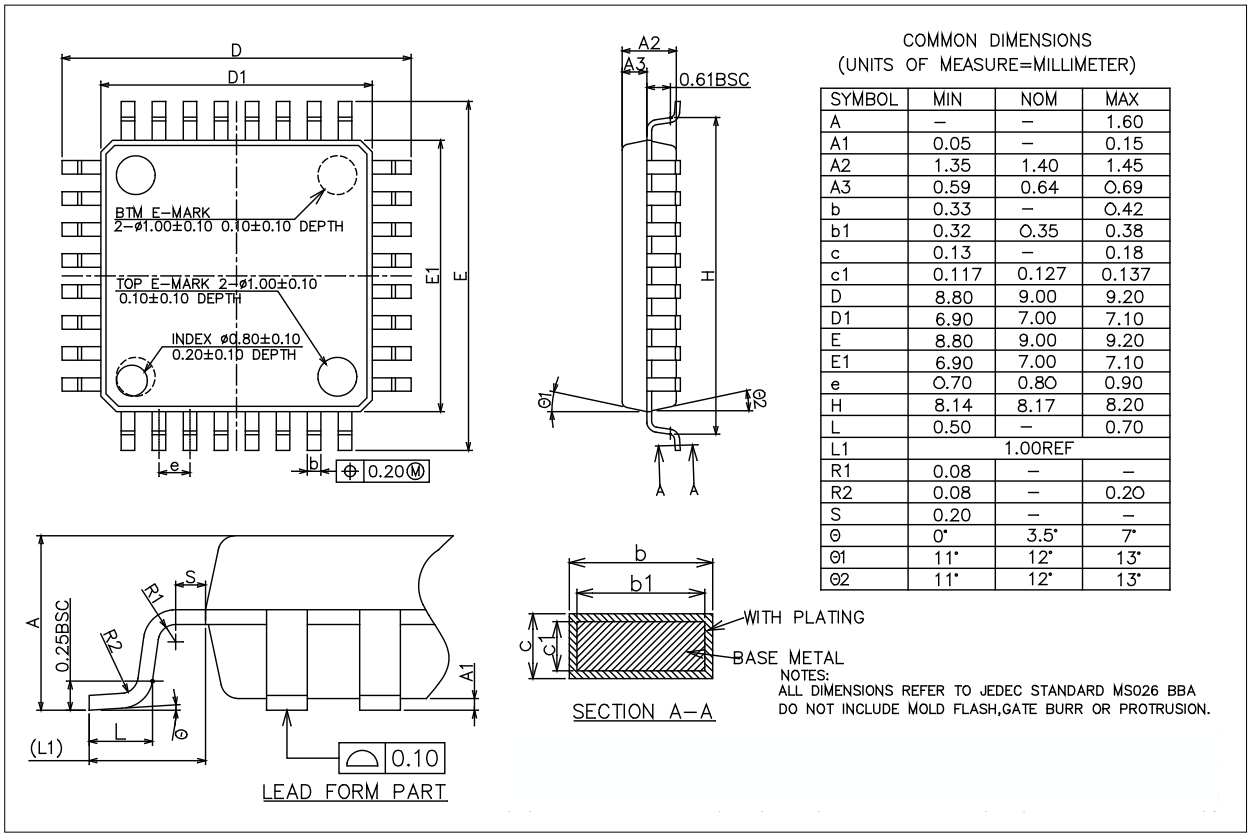
3.1.2 LQFP32 Package



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:
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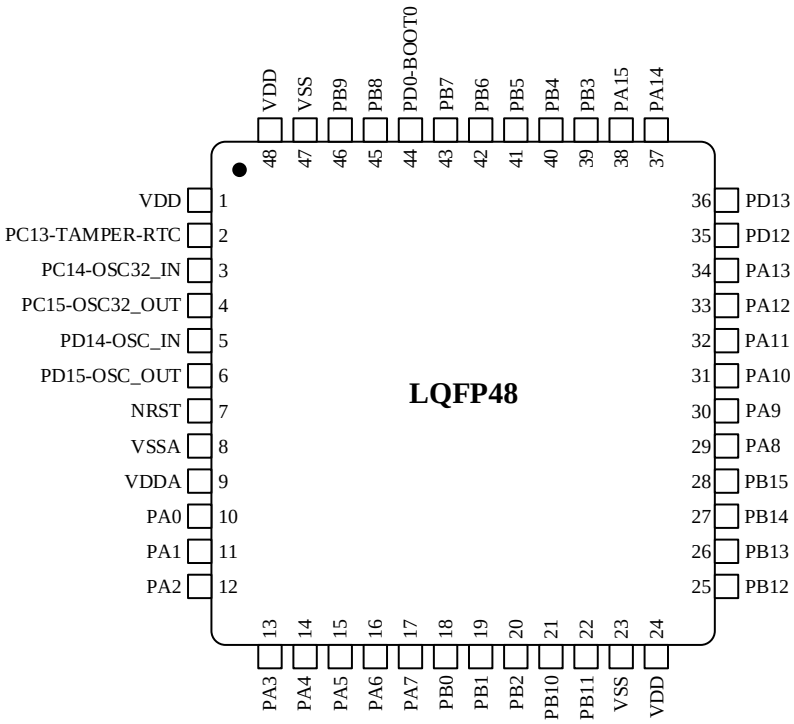
3.2 LQFP48

3.2.1 LQFP48 Pinout



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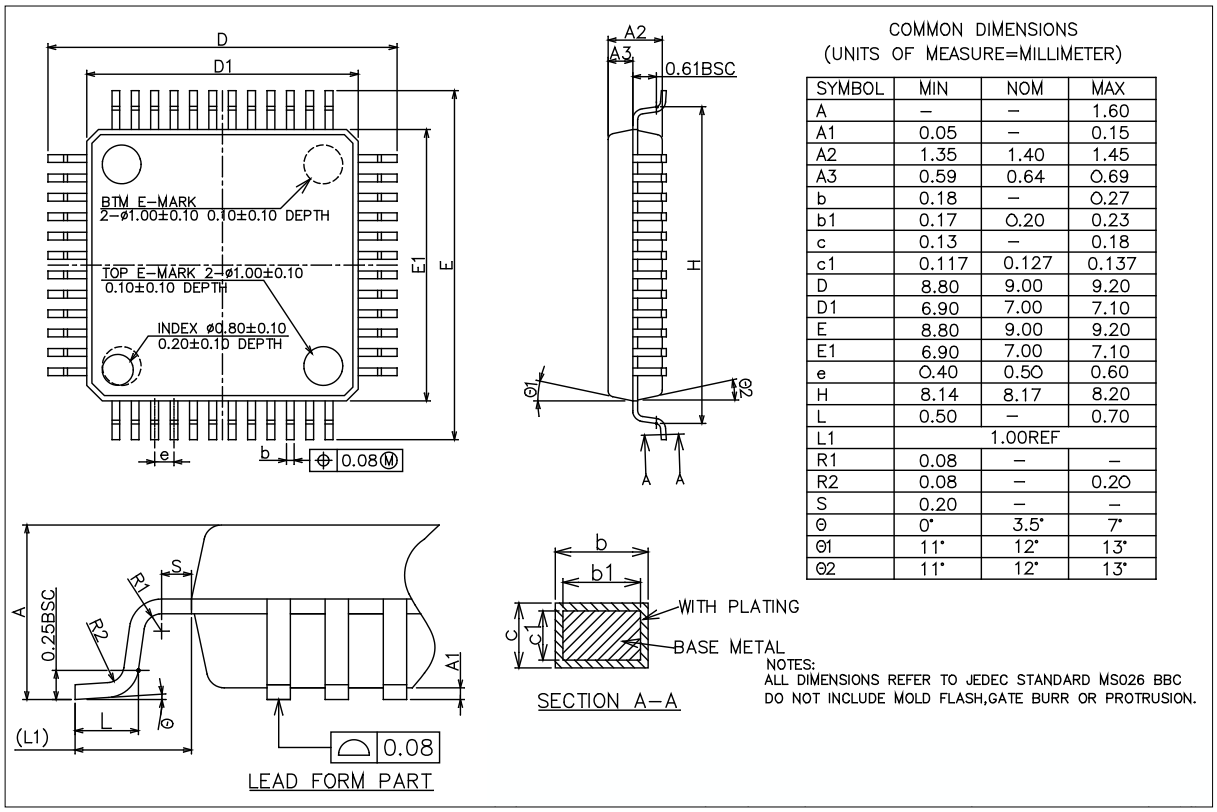
3.2.2 LQFP48 Package



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°

NOTES:
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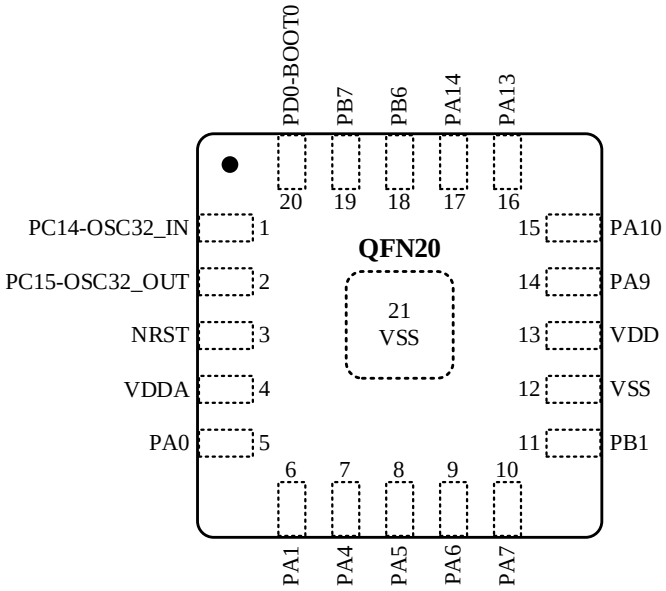
3.3 QFN20

3.3.1 QFN20 Pinout



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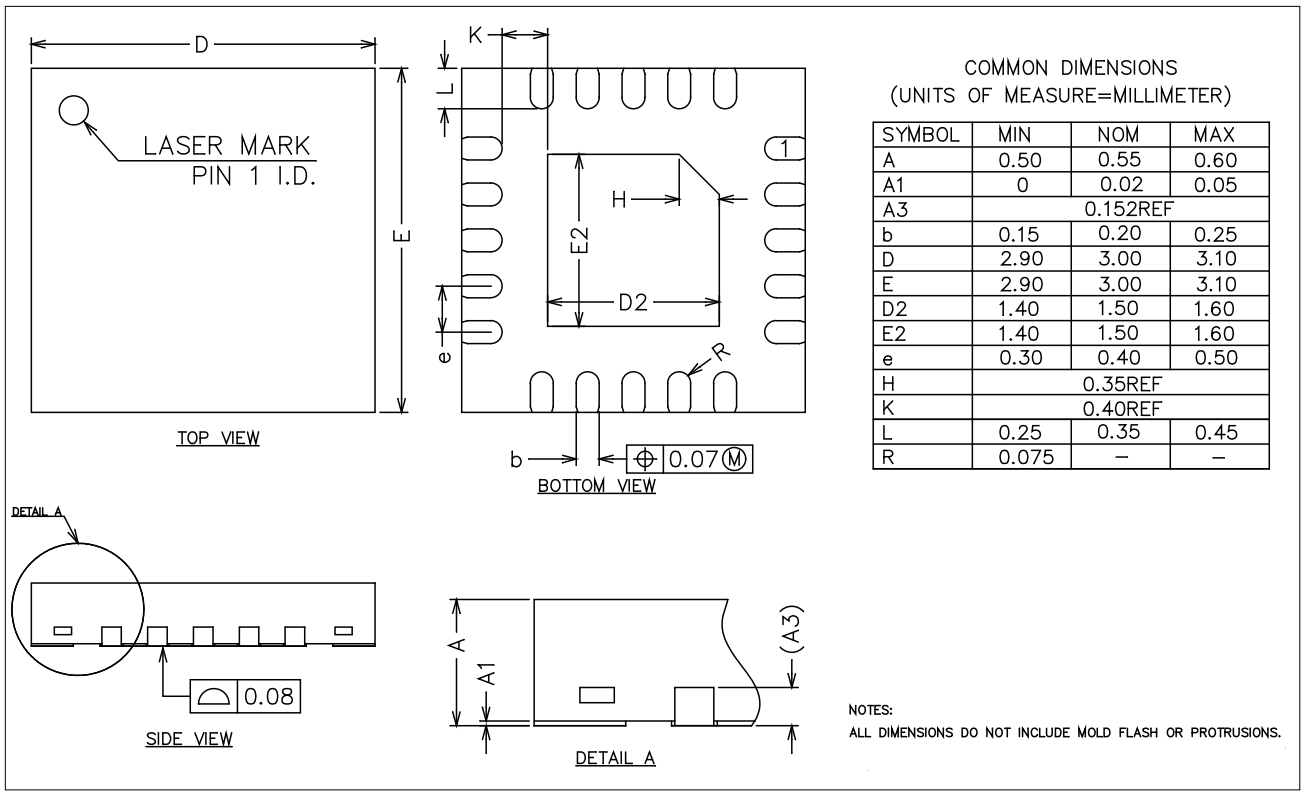
3.3.2 QFN20 Package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.50	0.55	0.60
A1	0	0.02	0.05
A3		0.152REF	
b	0.15	0.20	0.25
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.40	1.50	1.60
E2	1.40	1.50	1.60
e	0.30	0.40	0.50
H		0.35REF	
K		0.40REF	
L	0.25	0.35	0.45
R	0.075	–	–

NOTES:
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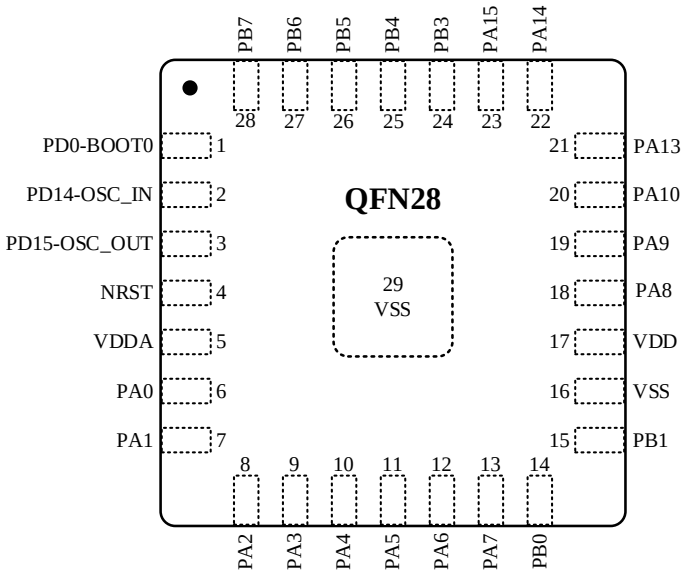
3.4 QFN28

3.4.1 QFN28 Pinout



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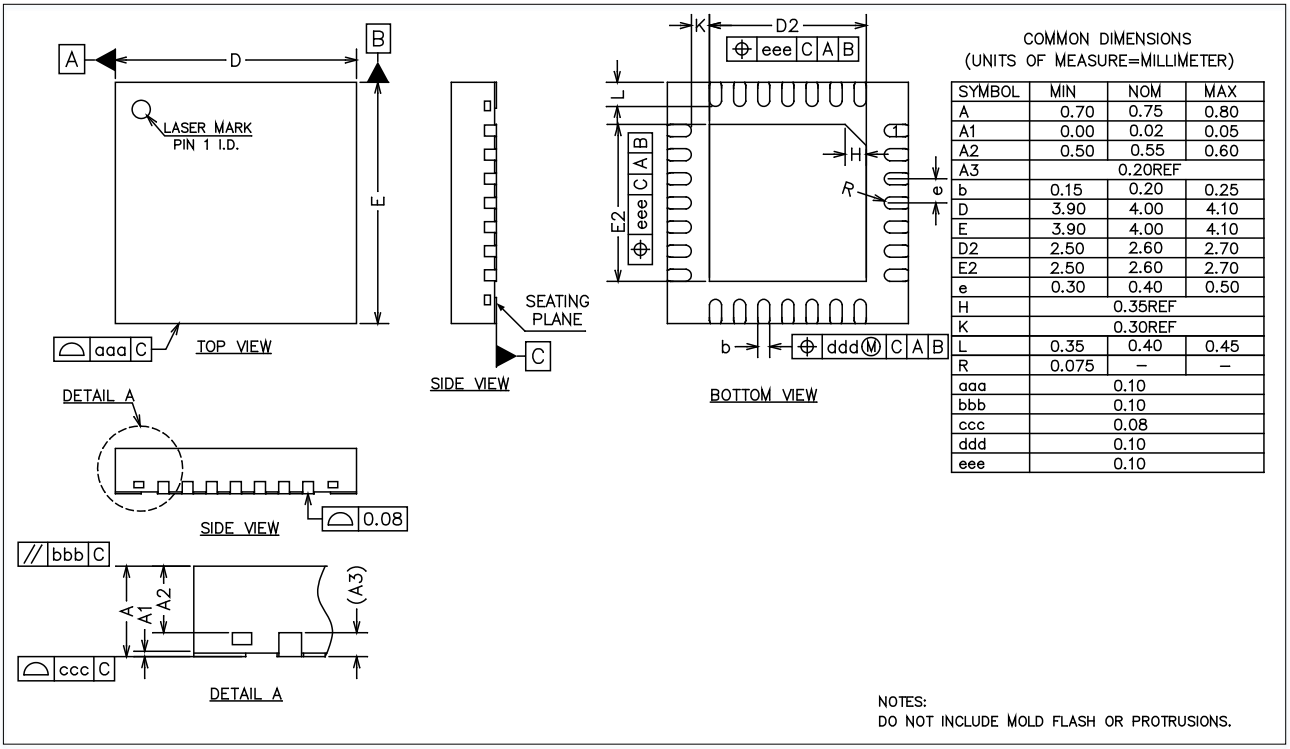
3.4.2 QFN28 Package



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	2.50	2.60	2.70
E2	2.50	2.60	2.70
e	0.30	0.40	0.50
H		0.35REF	
K		0.30REF	
L	0.35	0.40	0.45
R	0.075	–	–
aaa		0.10	
bbb		0.10	
ccc		0.08	
ddd		0.10	
eee		0.10	

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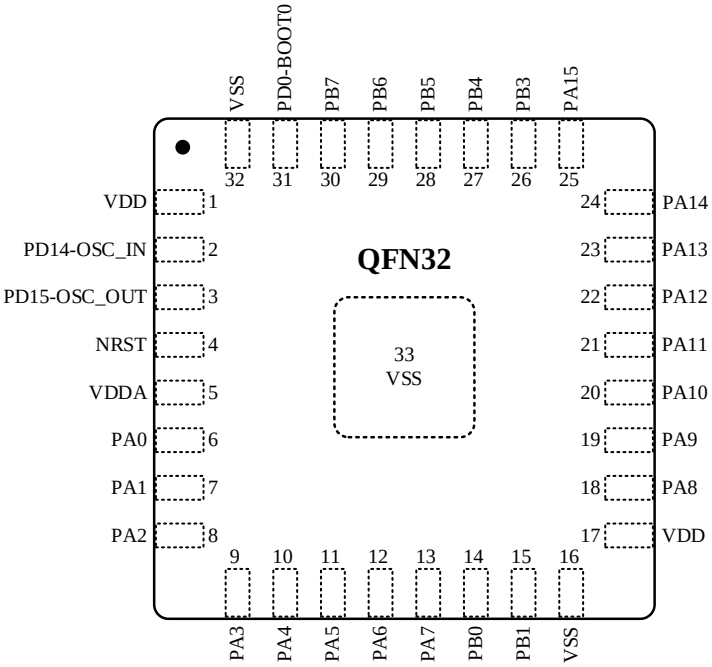
3.5 QFN32

3.5.1 QFN32 Pinout



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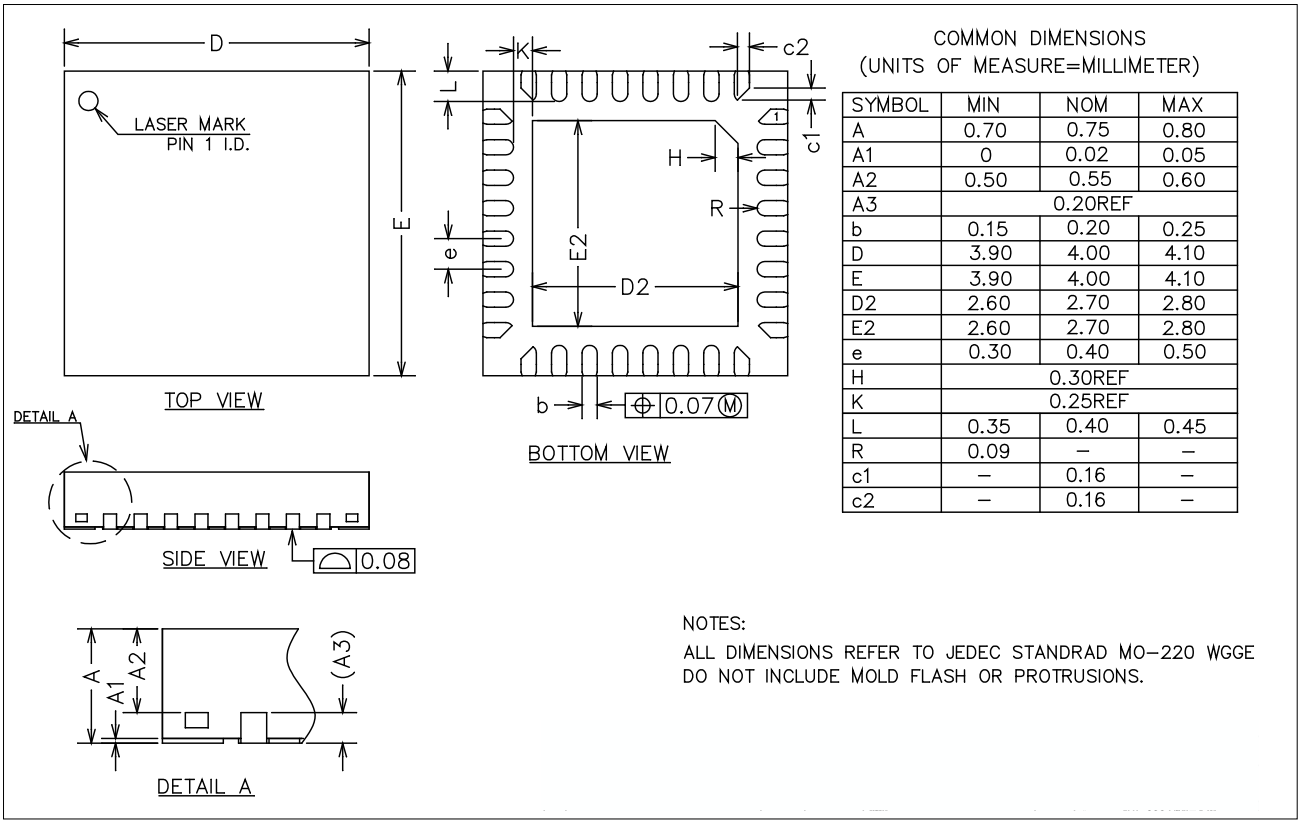
3.5.2 QFN32 Package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
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	2.60	2.70	2.80
E2	2.60	2.70	2.80
e	0.30	0.40	0.50
H		0.30REF	
K		0.25REF	
L	0.35	0.40	0.45
R	0.09	–	–
c1	–	0.16	–
c2	–	0.16	–

NOTES:
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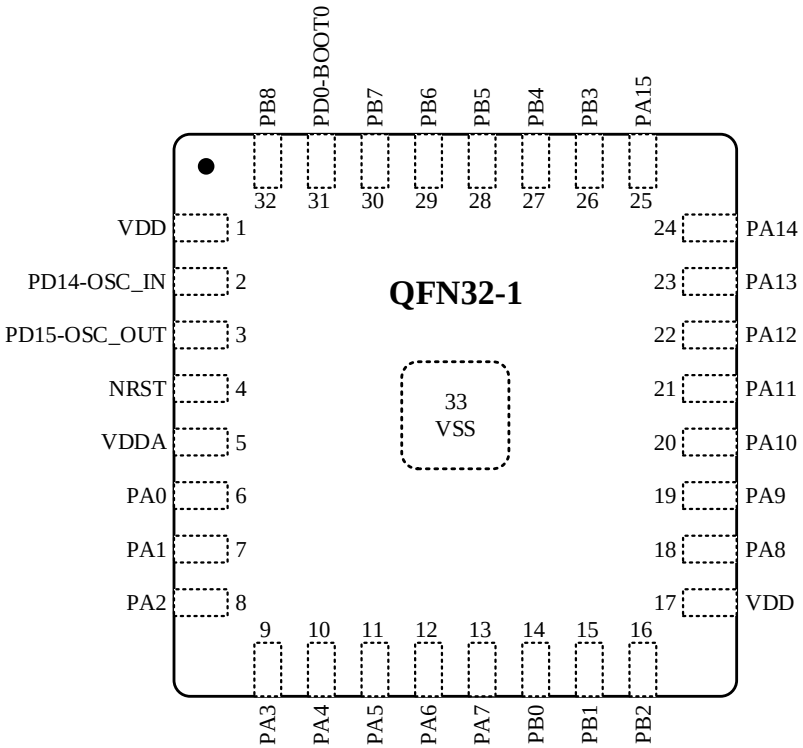
3.6 QFN32-1

3.6.1 QFN32-1 Pinout



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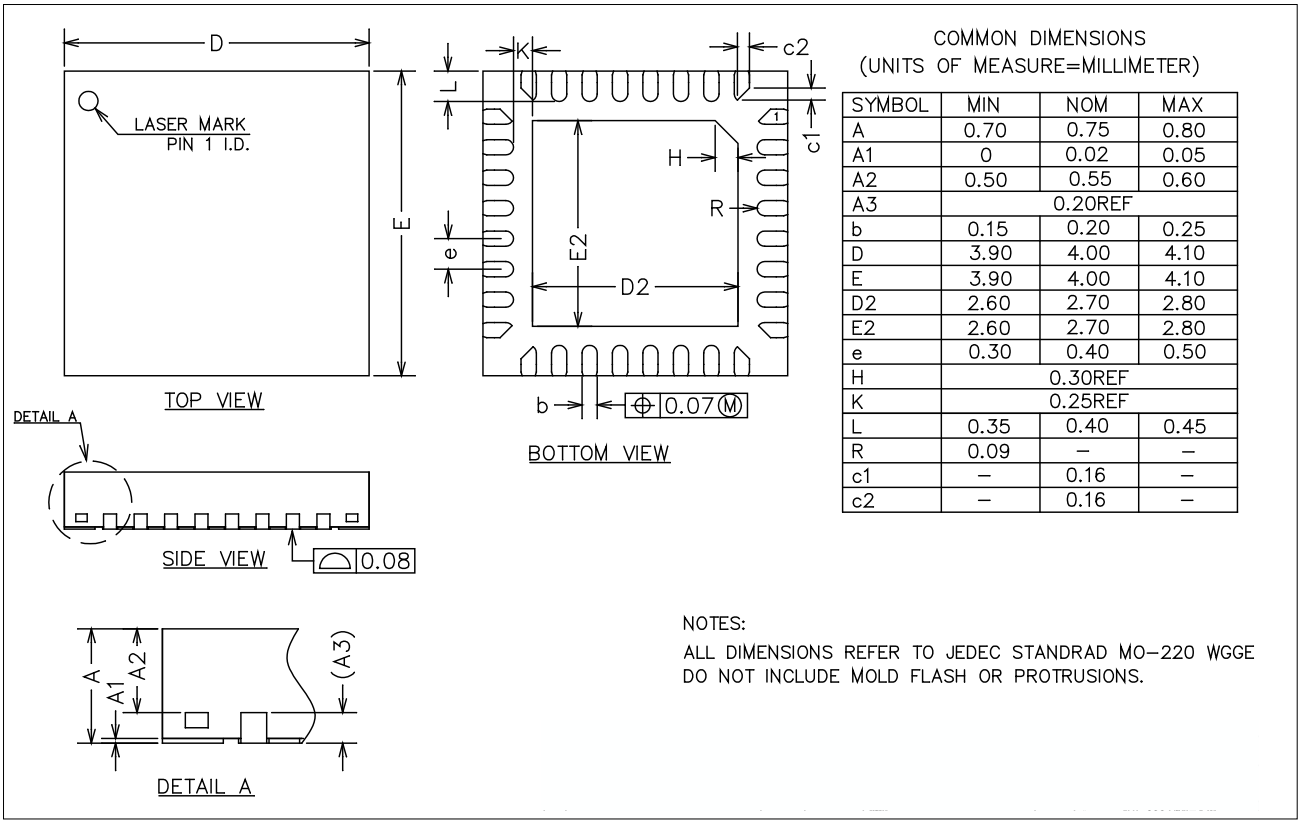
3.6.2 QFN32 Package



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0	0.02	0.05
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	2.60	2.70	2.80
E2	2.60	2.70	2.80
e	0.30	0.40	0.50
H		0.30REF	
K		0.25REF	
L	0.35	0.40	0.45
R	0.09	–	–
c1	–	0.16	–
c2	–	0.16	–

NOTES:
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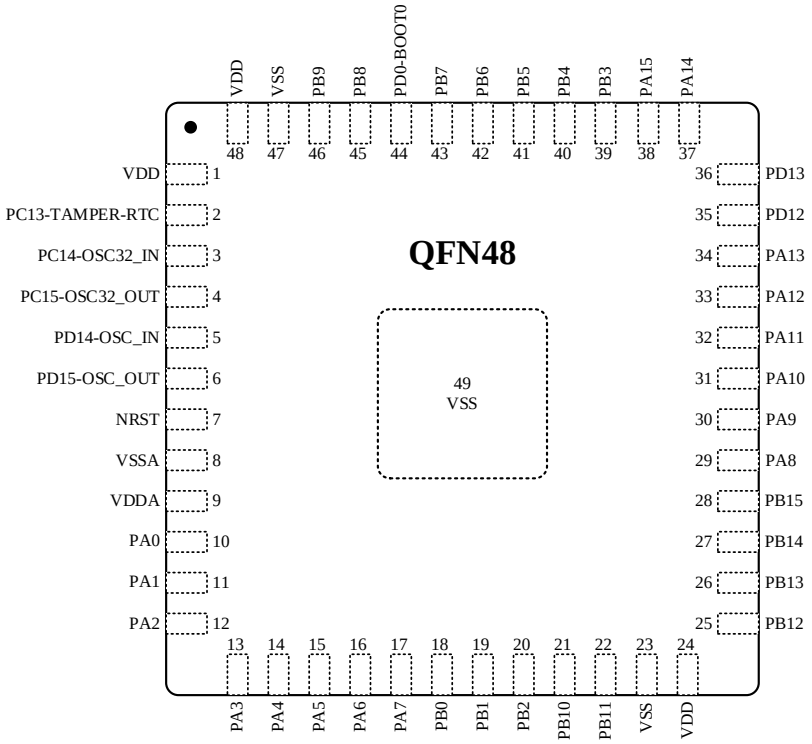
3.7 QFN48

3.7.1 QFN48 Pinout



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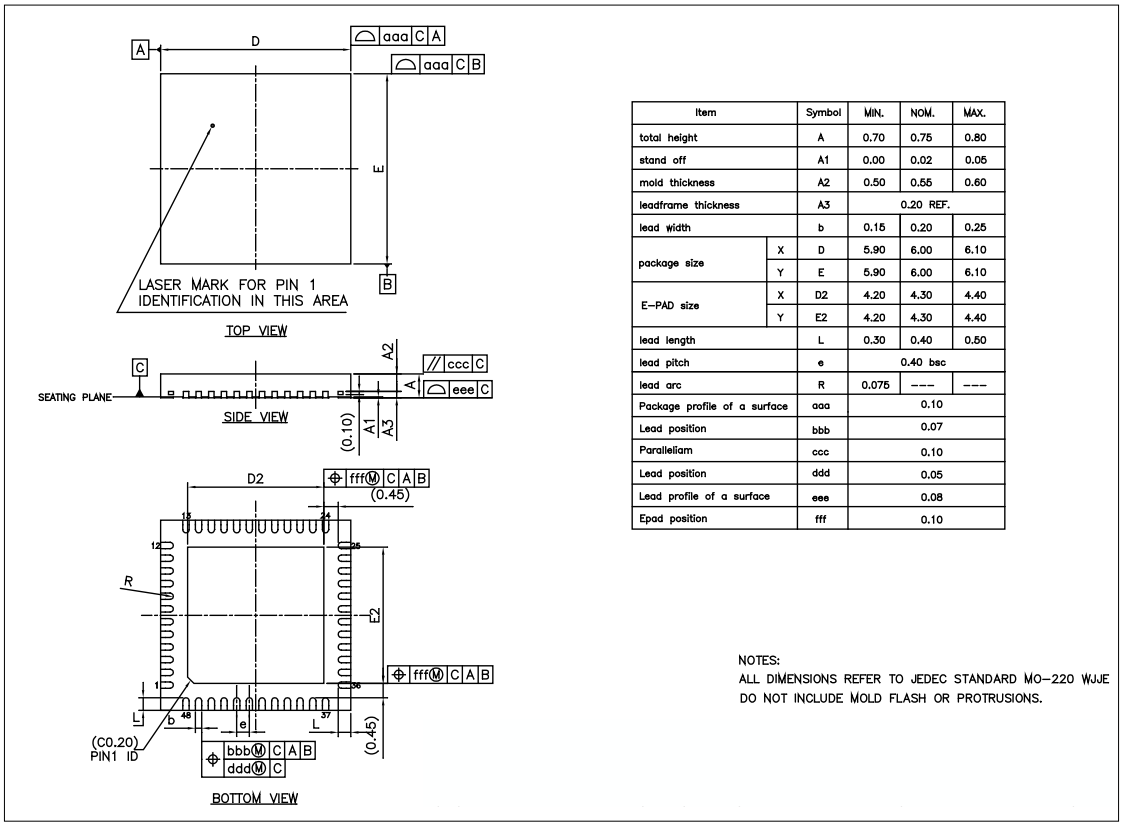
3.7.2 QFN48 Package



Item		Symbol	MIN.	NOM.	MAX.
total height		A	0.70	0.75	0.80
stand off		A1	0.00	0.02	0.05
mold thickness		A2	0.50	0.55	0.60
leadframe thickness		A3		0.20 REF.	
lead width		b	0.15	0.20	0.25
package size	X	D	5.90	6.00	6.10
	Y	E	5.90	6.00	6.10
E-PAD size	X	D2	4.20	4.30	4.40
	Y	E2	4.20	4.30	4.40
lead length		L	0.30	0.40	0.50
lead pitch		e		0.40 bsc	
lead arc		R	0.075	---	---
Package profile of a surface		aaa		0.10	
Lead position		bbb		0.07	
Paralleliam		ccc		0.10	
Lead position		ddd		0.05	
Lead profile of a surface		eee		0.08	
Epad position		fff		0.10	

NOTES:
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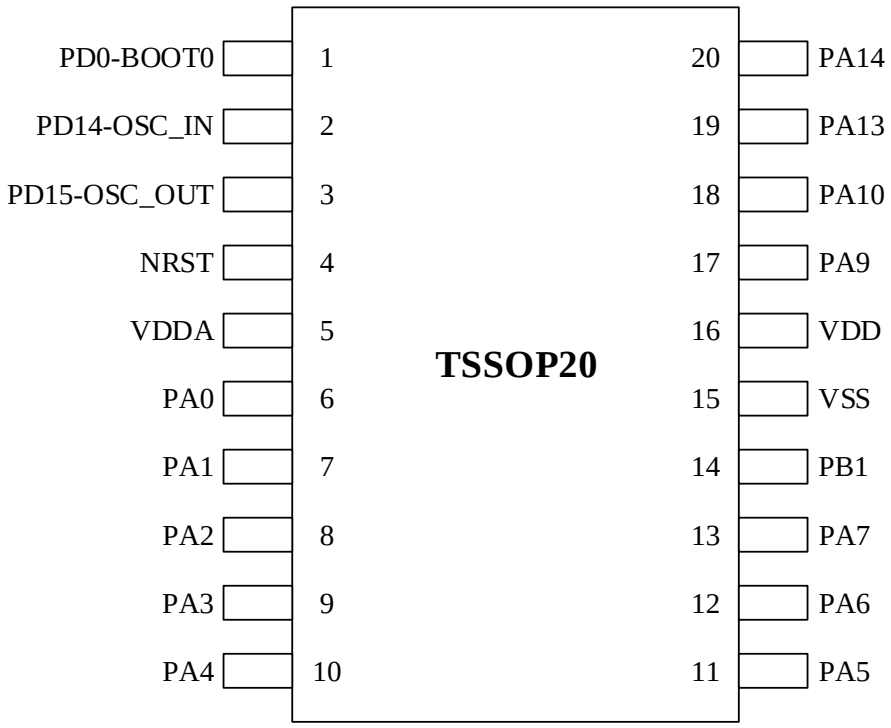
3.8 TSSOP20

3.8.1 TSSOP20 Pinout



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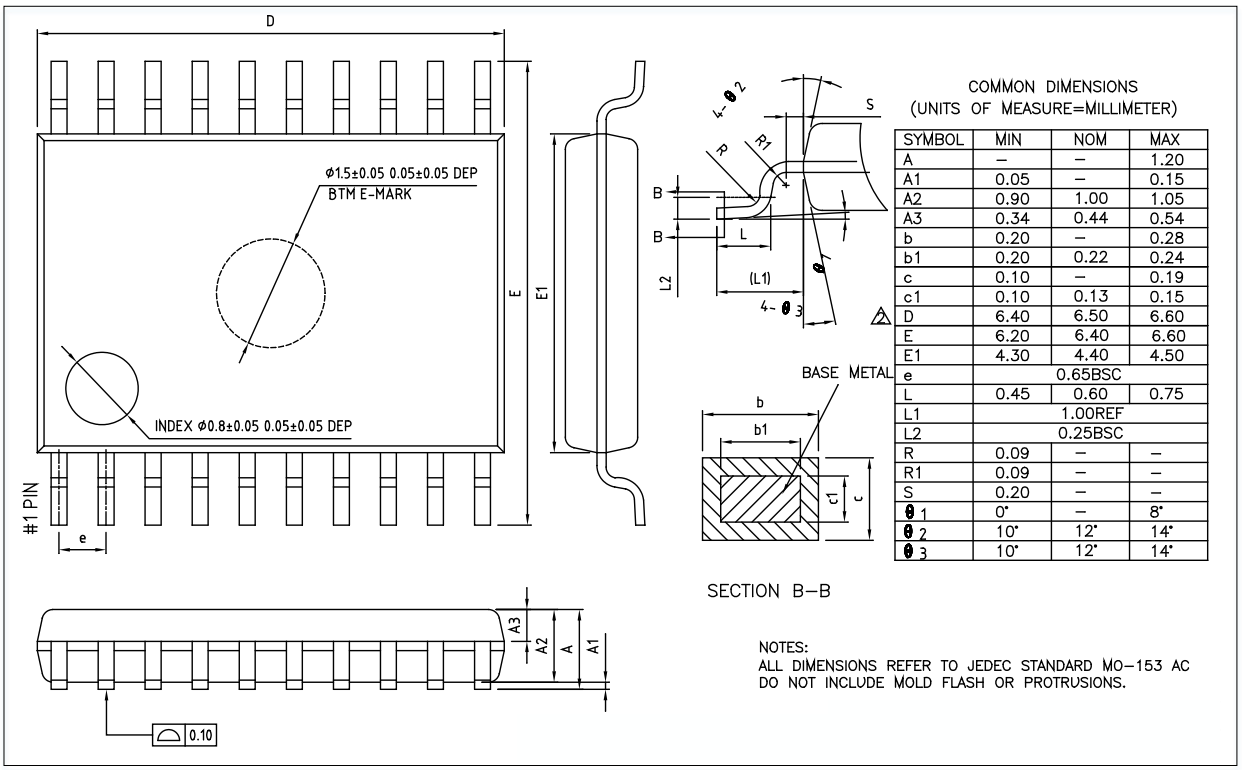
3.8.2 TSSOP20 Package



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

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4 Version history

Version	Date	Remark
V1.0.0	2023.6.6	Initial release
V2.0.0	2024.9.1	1. Add N32G401K8Q7-1 2. Modify Part number information to ordering information, modify ordering information table

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