N32G052xx Product Brief

N32G052 series based on Arm® Cortex®-M0, run up to 64MHz, up to 128KB embedded Flash, 8KB data Flash, 16KB SRAM, integrated analog interface, 1x12bit 1Msps ADC, 4x Comparator, 1x8/12bit 1Msps DAC, integrated multi-channel UART, I2C, SPI, CAN and other digital communication interfaces, Segment LCD Driver Interface, built-in password algorithm hardware acceleration engine.

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 128KByte embedded Flash memory, 8KByte embedded Data Flash memory, supports encrypted storage, supports hardware ECC verification, data 100,000 cycling and 10 years of data retention
  - SRAM of 16KB, STOP modes can be configured as retention, supporting hardware parity
- **Low-power management**
  - Run mode: all peripherals configurable
  - SLEEP mode: all peripherals configurable
  - STOP mode: TIM6, IWDG, RTC configurable operation, 16KByte SRAM retention, CPU register retention, all IO retention
  - Power Down mode: support NRST, PA0_WKUP0, PA2_WKUP1 wakeup
- **Clock**
  - HSE: 8MHz~16MHz external high-speed crystal
  - HSI: Internal high-speed RC OSC 8MHz
  - HSI_24MHz: Internal high-speed RC OSC 24MHz, available only as an ADC sample clock source option
  - LSI: Internal low-speed RC OSC 32KHz
  - Built-in high-speed PLL
  - MCO: Support 1-way clock output, configurable SYSCLK, HSI, HSE, LSI, and PLL clock output that can be divided.
- **Reset**
  - Support power-on/power-off/external pin reset
  - Supports programmable low voltage detection reset(LVR)
  - Support watchdog reset, Support software reset
- **Communication interface**
  - 5xUART, Supports asynchronous mode, multiprocessor communication mode, single-wire half-duplex mode
  - 3xSPI, up to 16 MHz

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- 2xI2C, up to 1 MHz, configurable master/slave mode
- 1xCAN 2.0A/B bus interface, up to 1Mbps

- **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**
- **Segment LCD display driver, support up to 256 segments (8x32) or 144 segments (4x36) or 111 segments (3x37)**
- **Analog interface**
  - 1x12bit 1Msps ADC , up to 15 external single-ended input channels
  - 4xCOMP (Comparator has an internal independent 6bit DAC)
  - 1x 12bit DAC, sampling rate 1Msps
  - Internal 1.2V independent reference voltage reference source
  - Internal integrated low voltage check unit
- **Up to 61 GPIOs**
- **1xBeeper, 16mA output drive capacity**
- **Timer counter**
  - 1x16-bit advanced timer counters, support input capture, complementary output, orthogonal encoding input, each timer support 5 independent channels. 4 channels support 8 complementary PWM outputs
  - 4x16-bit general purpose timer counters, 4 independent channels, supports input capture/output compare/PWM output
  - 1x16-bit basic timer counters, supports STOP wake-up low-power mode.
  - 1x24-bit SysTick
  - 1x14-bit Window Watchdog (WWDG)
  - 1x12-bit Independent watchdog (IWDG)
- **Programming mode**
  - Support SWD online debugging interface
  - Support UART Bootloader
- **Security features**
  - CRC16 calculation
  - Flash storage encryption, multi-user partition management (MMU)
  - 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: 2.0V~5.5V
  - Operating Temperature Range: -40℃~105℃
- **Package**

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- LQFP64(14mm x14mm, 0.8mm pitch)
- LQFP64(10mm x10mm, 0.8mm pitch)
- LQFP64(7mm x7mm, 0.4mm pitch)
- LQFP48(7mm x7mm, 0.5mm pitch)
- LQFP44(10mm x10mm,0.8mm pitch,pinouts 1)
- LQFP44(10mm x10mm,0.8mm pitch,pinouts 2)
- QFN32(5mm x5mm, 0.5mm pitch)

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1 Ordering Information

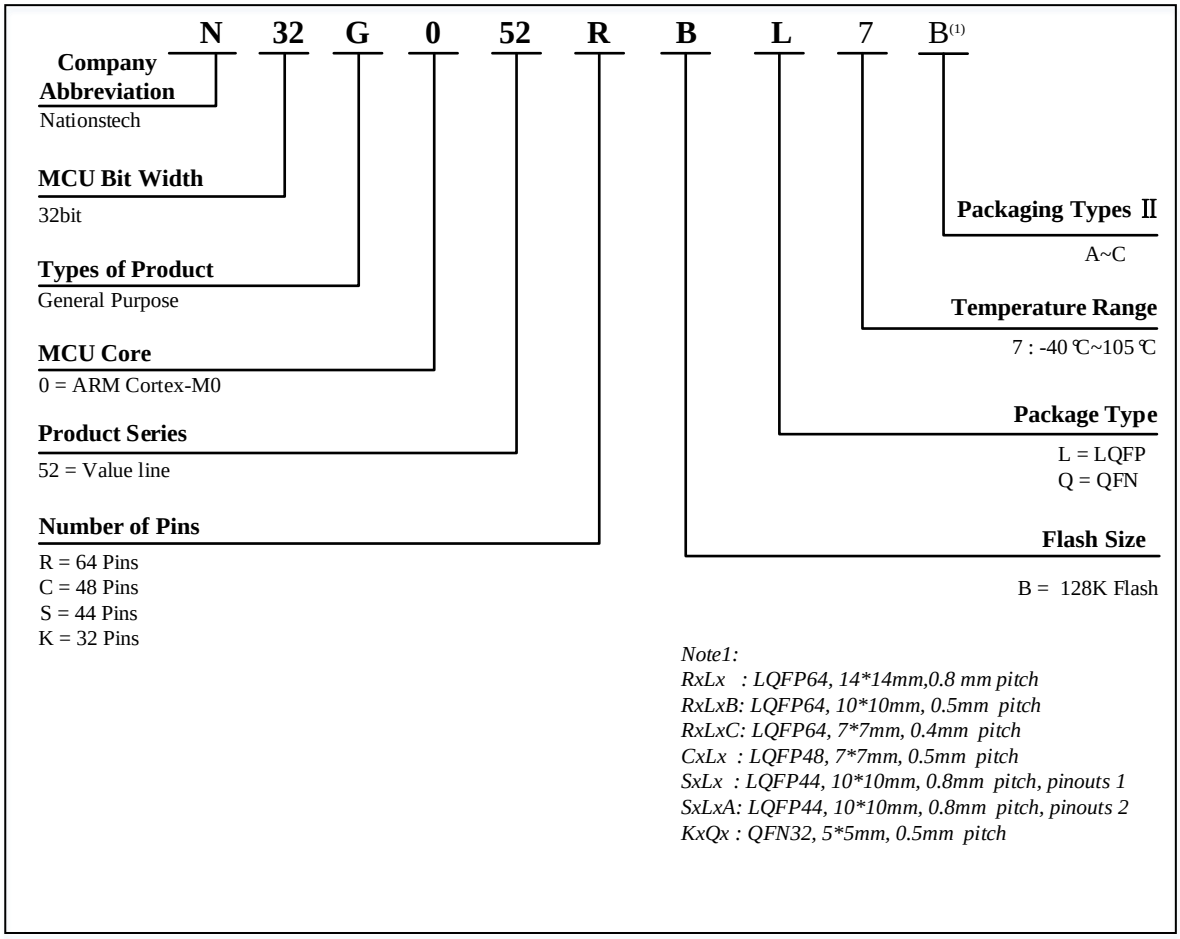

Table 1-1 N32G052 series ordering code information

Order Code(1)	Package	Package Size	Packaging(2)	SPQ(3)	temperature range
N32G052RBL7	LQFP64	14*14mm	Tray	90	-40°C~105°C
N32G052RBL7B	LQFP64	10*10mm	Tray	160	-40°C~105°C
N32G052RBL7C	LQFP64	7*7mm	Tray	250	-40°C~105°C
N32G052CBL7	LQFP48	7*7mm	Tray	250	-40°C~105°C
N32G052SBL7	LQFP44	10*10mm	Tray	160	-40°C~105°C
N32G052SBL7A	LQFP44	10*10mm	Tray	160	-40°C~105°C
N32G052KBQ7	QFN32	5*5mm	Tray	490	-40°C~105°C
			Reel	2500	

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 N32G052 series resource configuration

Part Number		N32G052RBL7	N32G052RBL7B	N32G052RBL7C	N32G052CBL7	N32G052KBQ7
Flash（KB）		128	128	128	128	128
DATA flash(KB)		8	8	8	8	8
SRAM（KB）		16	16	16	16	16
CPU frequency		ARM Cortex-M0 @64MHz	ARM Cortex-M0 @64MHz	ARM Cortex-M0 @64MHz	ARM Cortex-M0 @64MHz	ARM Cortex-M0 @64MHz
Working environment		2.0~5.5V/-40~105℃	2.0~5.5V/-40~105℃	2.0~5.5V/-40~105℃	2.0~5.5V/-40~105℃	2.0~5.5V/-40~105℃
Timer	Advanced	1	1	1	1	1
	General	4	4	4	4	4
	Basic	1	1	1	1	1
	Beeper	1	1	1	1	1
Communication interface	SPI	3	3	3	3	3
	I2C	2	2	2	2	2
	UART	5	5	5	5	5
	CAN	1	1	1	1	1
GPIO		61	61	61	45	29
DMA		1x 5 Channel	1x 5 Channel	1x 5 Channel	1x 5 Channel	1x 5 Channel
RTC		1	1	1	1	1
12bit ADC		1x 15Channel	1x 15Channel	1x 15Channel	1x 12Channel	1x 8Channel
12bit DAC		1x 1Channel	1x 1Channel	1x 1Channel	1x 1Channel	1x 1Channel
COMP		4	4	4	4	3
Segment LCD		8x32/4x36/ 3*37	8x32/4x36/ 3*37	8x32/4x36/ 3*37	8x22/4x26/ 3*27	4*11/2*13
Algorithm support		CRC16	CRC16	CRC16	CRC16	CRC16
Security protection		Read/write protection (RDP/WRP)	Read/write protection (RDP/WRP)	Read/write protection (RDP/WRP)	Read/write protection (RDP/WRP)	Read/write protection (RDP/WRP)
Package		LQFP64(14*14mm, 0.8mm pitch)	LQFP64(10*10mm, 0.8mm pitch)	LQFP64(7*7mm, 0.4mm pitch)	LQFP48(7*7mm, 0.5mm pitch)	QFN32(5x5mm, 0.5mm pitch)

Part Number		N32G052SBL7	N32G052SBL7A
Flash（KB）		128	128
DATA flash(KB)		8	8
SRAM（KB）		16	16
CPU frequency		ARM Cortex-M0 @64MHz	ARM Cortex-M0 @64MHz
Working environment		2.0~5.5V/-40~105℃	2.0~5.5V/-40~105℃
Timer	Advanced	1	1
	General	4	4
	Basic	1	1

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	Beeper	1	1
Communication interface	SPI	3	3
	I2C	2	2
	UART	5	5
	CAN	1	1
GPIO		41	41
DMA		1x 5 Channel	1x 5 Channel
RTC		1	1
12bit ADC		1x 15Channel	1x 15Channel
12bit DAC		1x 1Channel	1x 1Channel
COMP		4	4
Segment LCD		3*27	3*27
Algorithm support		CRC16	CRC16
Security protection		read/write protection（RDP/WRP）	read/write protection（RDP/WRP）
Package		LQFP44(10*10mm, 0.8mm pitch，pinouts 1)	LQFP44(10*10mm, 0.8mm pitch，pinouts 2)

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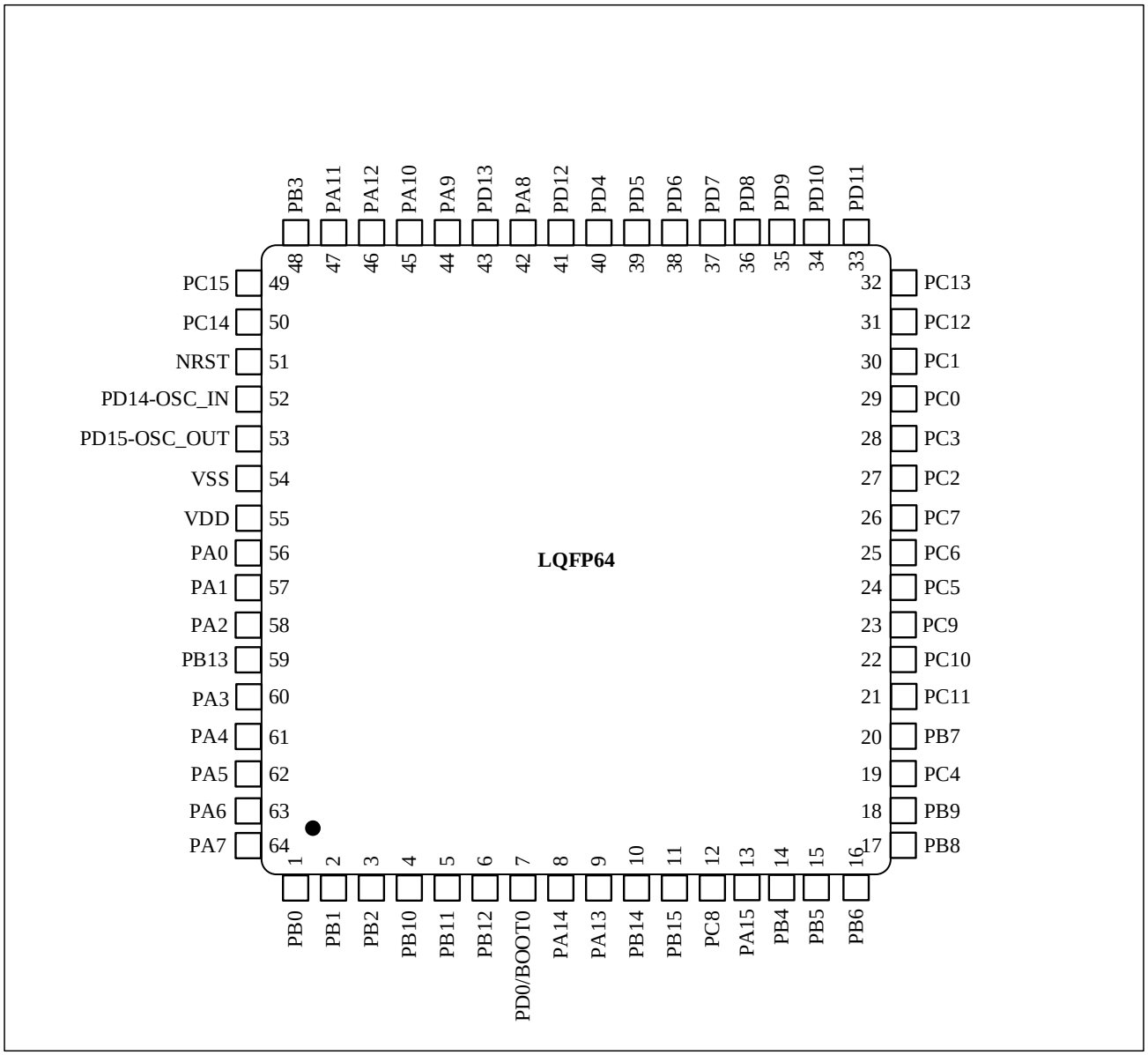
3 Package

3.1 LQFP64

3.1.1 LQFP64 pinouts

N32G052RBL7/ N32G052RBL7B/ N32G052RBL7C pin ordering is the same.



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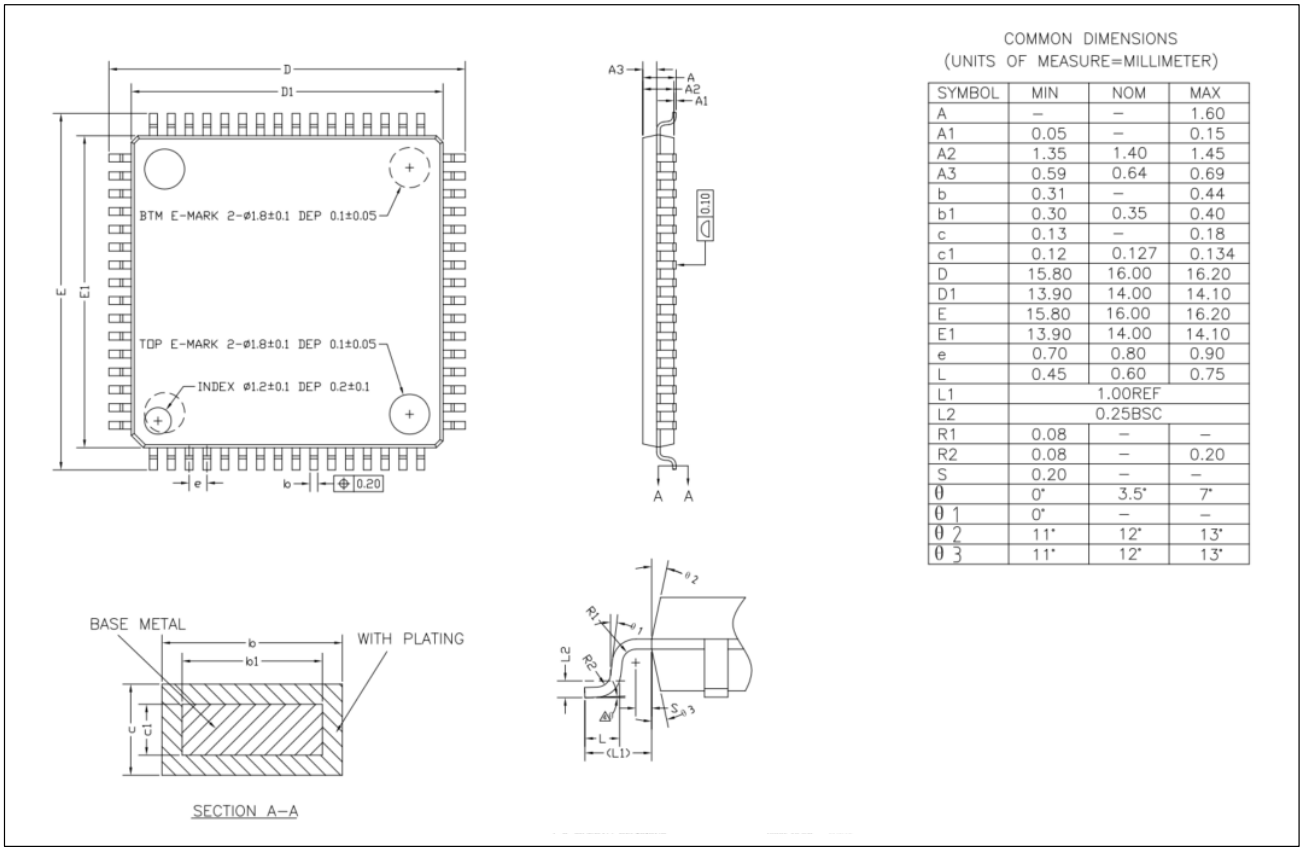
3.1.2 LQFP64 (14x14mm) Package Size



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	0.31	–	0.44
b1	0.30	0.35	0.40
c	0.13	–	0.18
c1	0.12	0.127	0.134
D	15.80	16.00	16.20
D1	13.90	14.00	14.10
E	15.80	16.00	16.20
E1	13.90	14.00	14.10
e	0.70	0.80	0.90
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°
θ 1	0°	–	–
θ 2	11°	12°	13°
θ 3	11°	12°	13°

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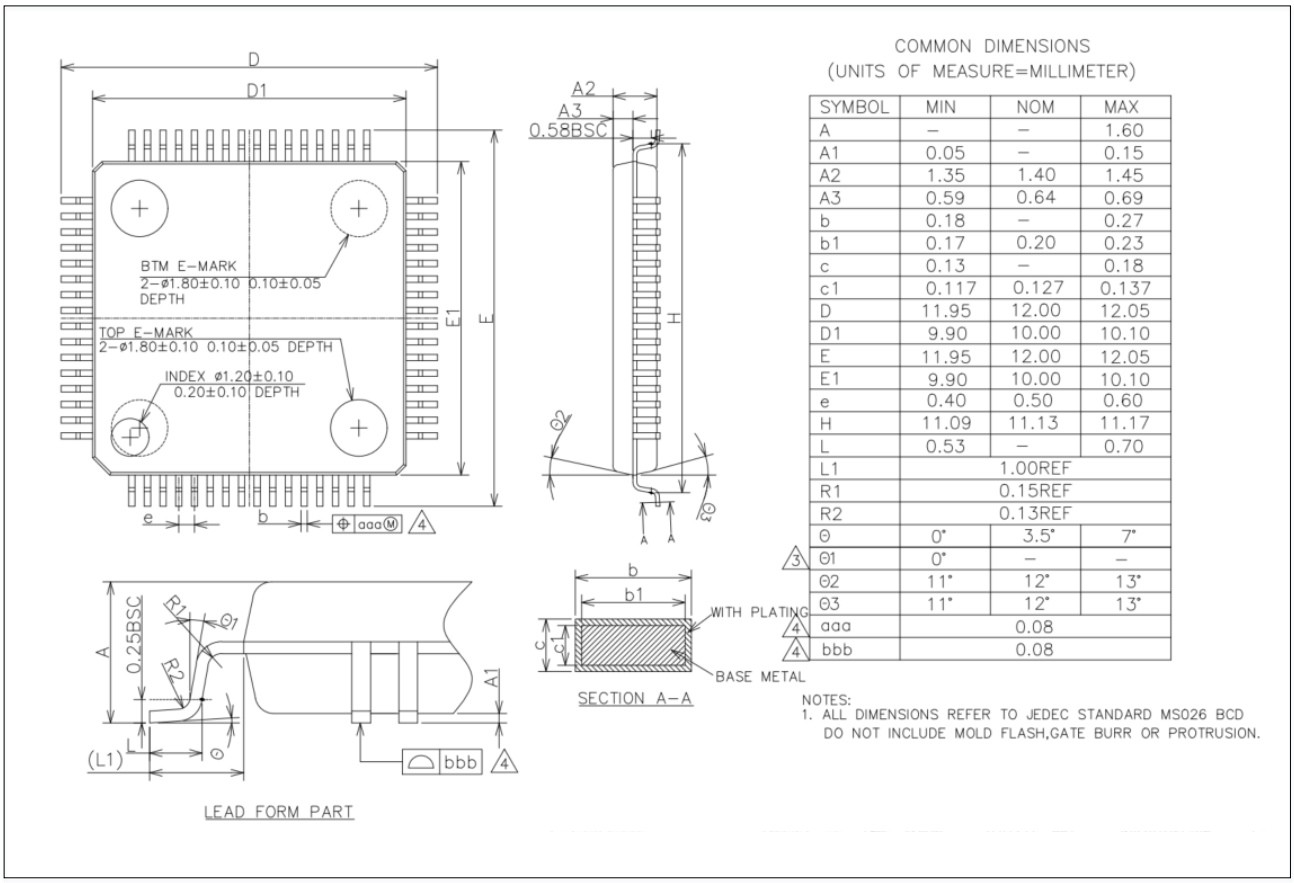
3.1.3 LQFP64 (10x10mm) Package Size



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	11.95	12.00	12.05
D1	9.90	10.00	10.10
E	11.95	12.00	12.05
E1	9.90	10.00	10.10
e	0.40	0.50	0.60
H	11.09	11.13	11.17
L	0.53	–	0.70
L1	1.00REF		
R1	0.15REF		
R2	0.13REF		
θ	0°	3.5°	7°
3 θ1	0°	–	–
θ2	11°	12°	13°
θ3	11°	12°	13°
4 aaa	0.08		
4 bbb	0.08		

NOTES:
1. ALL DIMENSIONS REFER TO JEDEC STANDARD MS026 BCD
DO NOT INCLUDE MOLD FLASH,GATE BURR OR PROTRUSION.

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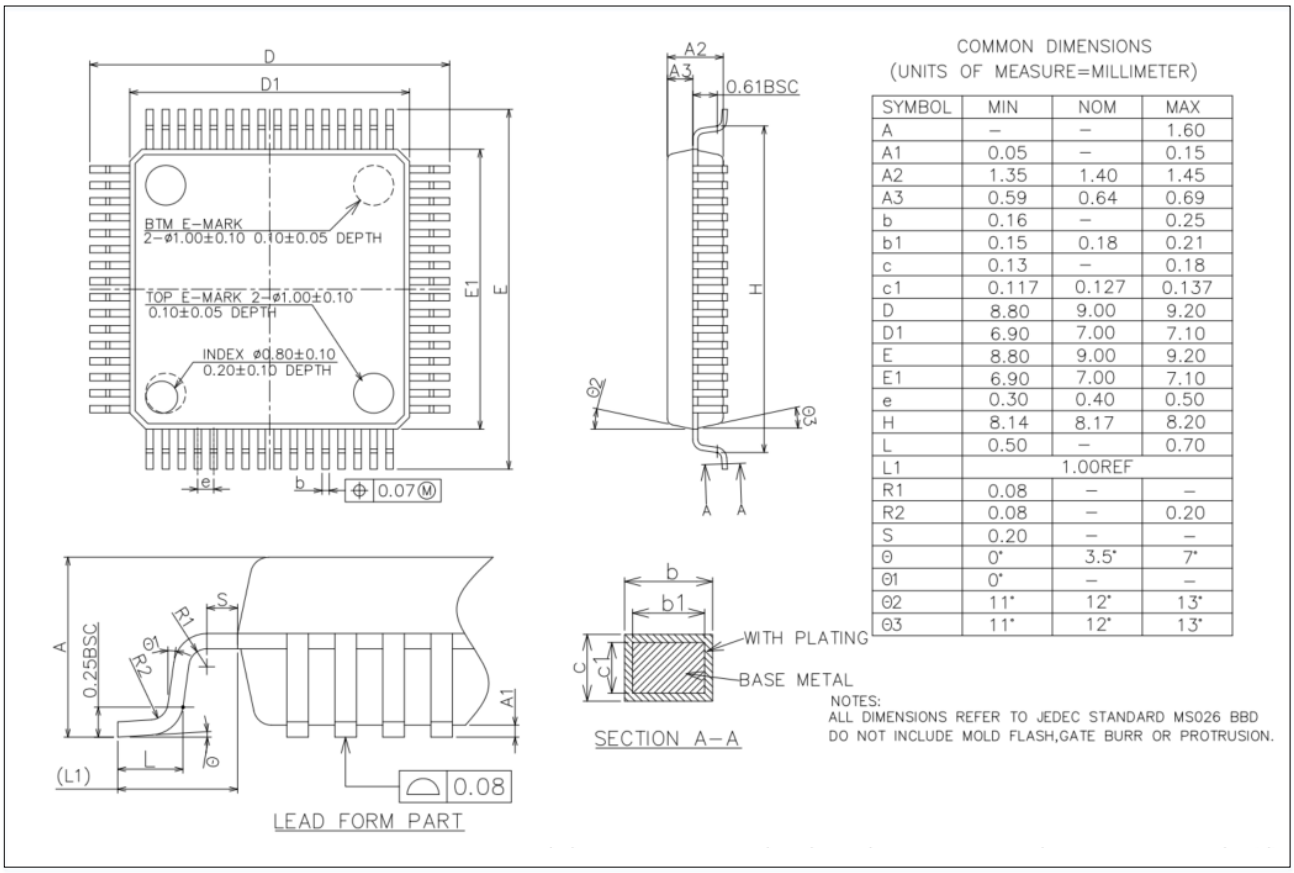
3.1.4 LQFP64 (7x7mm) Package Size



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	0.16	–	0.25
b1	0.15	0.18	0.21
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	0.30	0.40	0.50
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	0°	–	–
θ2	11°	12°	13°
θ3	11°	12°	13°

NOTES:
ALL DIMENSIONS REFER TO JEDEC STANDARD MS026 BBD
DO NOT INCLUDE MOLD FLASH,GATE BURR OR PROTRUSION.

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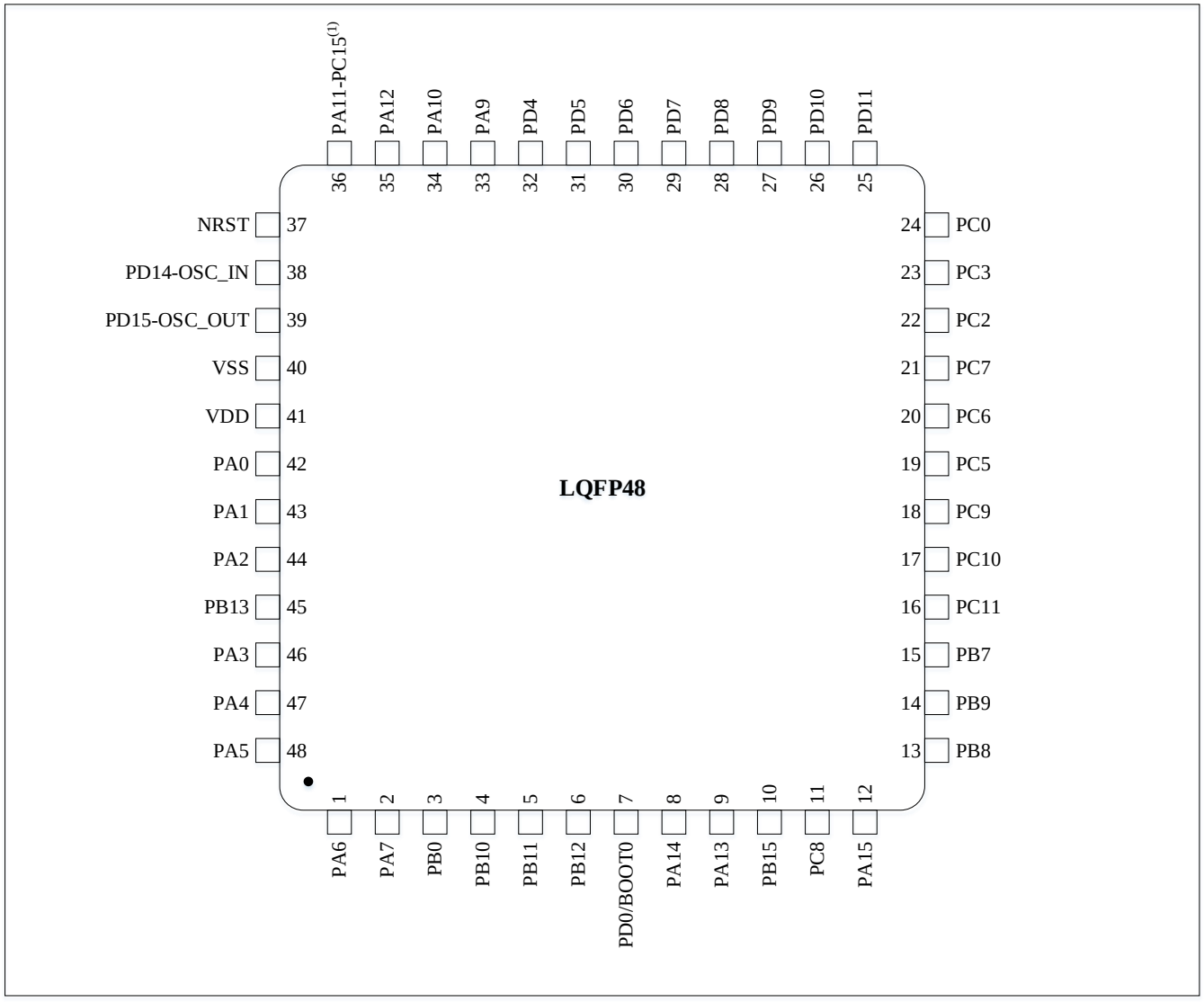
3.2 LQFP48

3.2.1 LQFP48 pinouts



1. *36pin is a combination IO, which is a combination of PA11 and PC15; Only one IO can be used simultaneously, and other IOs on the same pin must be configured in analog mode to avoid affecting the IO being used.*

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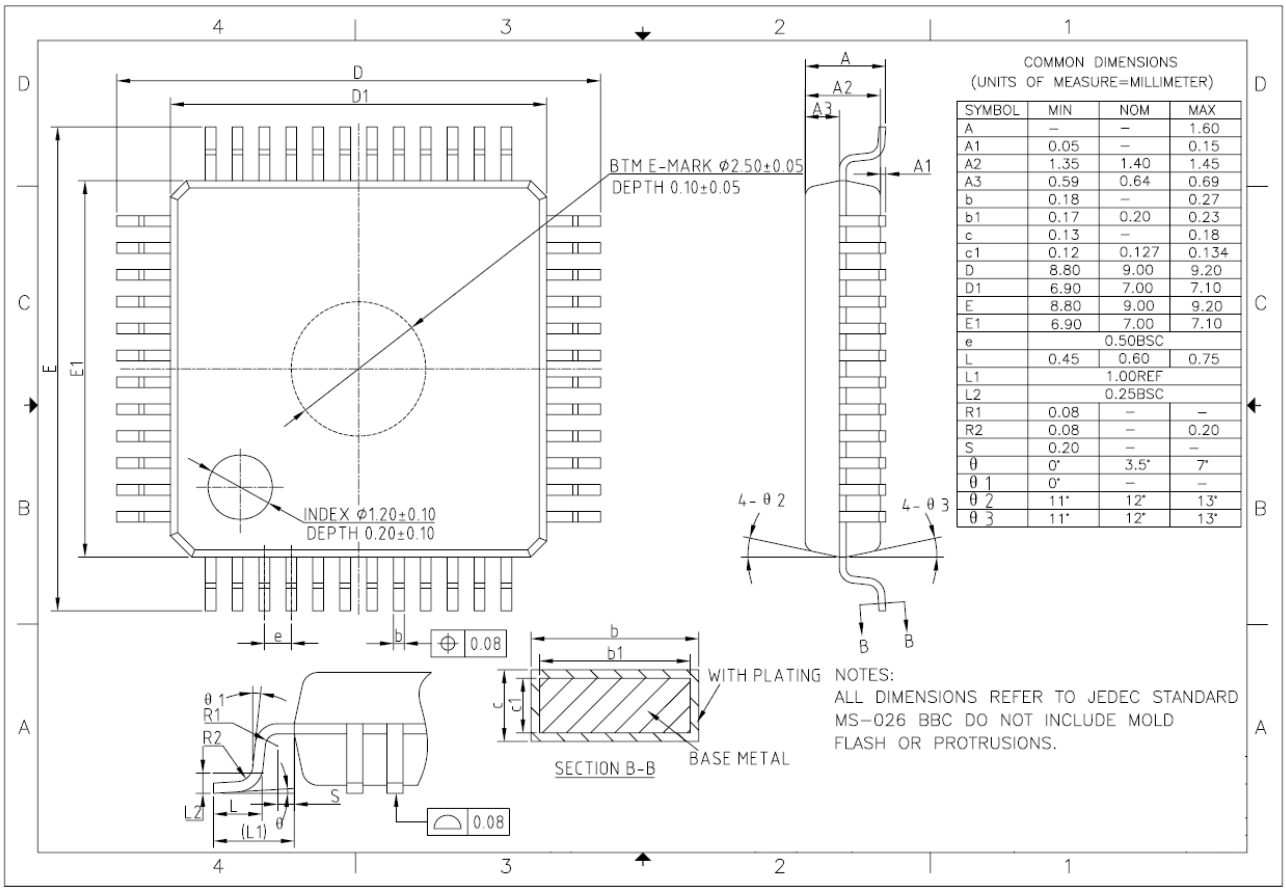
3.2.2 LQFP48 (7x7mm) Package Size



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	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°
θ 1	0°	–	–
θ 2	11°	12°	13°
θ 3	11°	12°	13°

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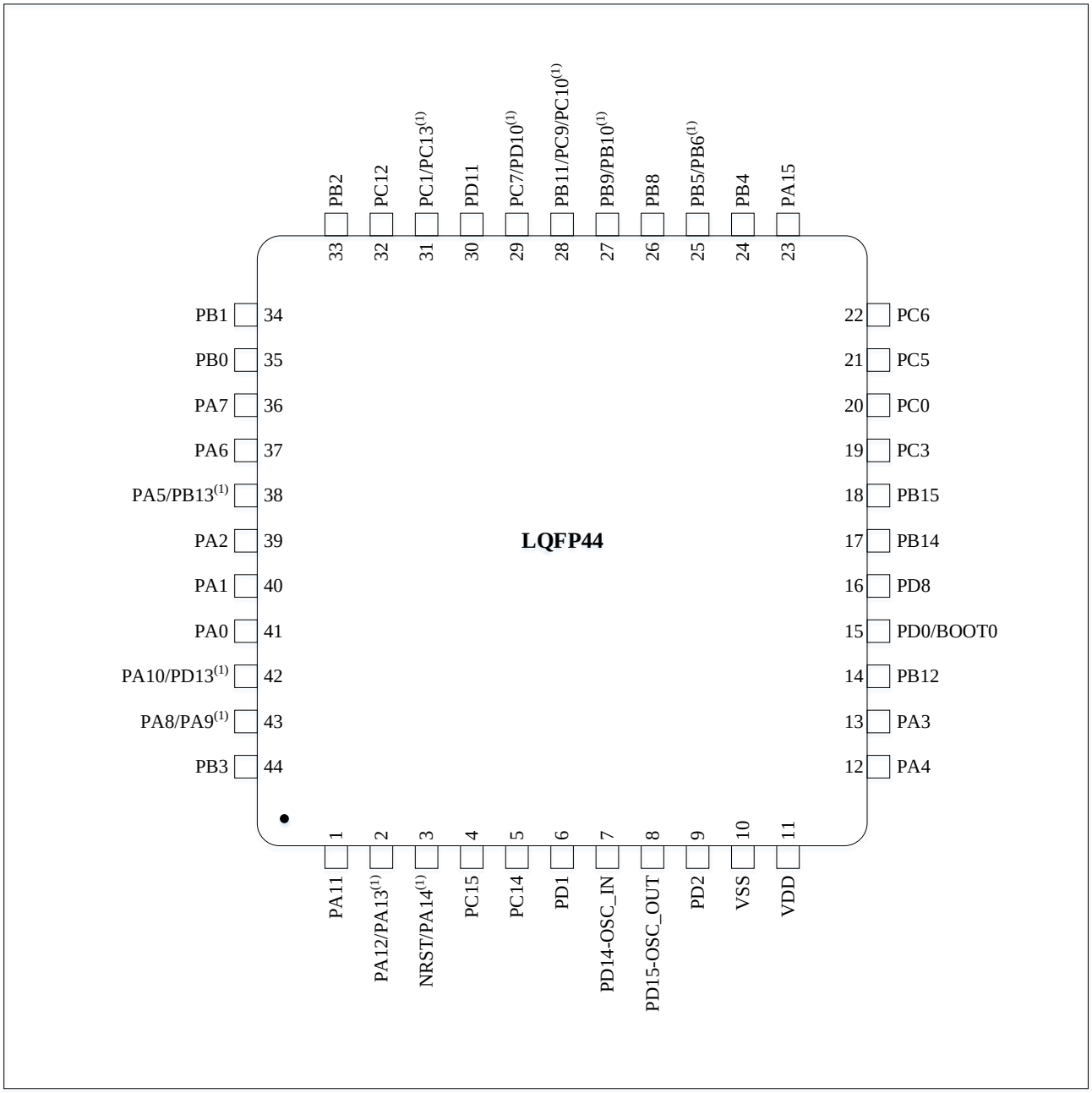
3.3 LQFP44

3.3.1 LQFP44 pinouts 1



1. *2pin, 3pin, 25pin, 27pin, 28pin, 29pin, 31pin, 38pin, 42pin, and 43pin are combined IO, where the 2pin is a combination of PA12 and PA13, where the 3pin is a combination of NRST and PA14 (PA14 is only used for debugging and is not recommended for production design), where the 25pin is a combination of PB5 and PB6, where the 27pin is a combination of PB9 and PB10, where the 28pin is a combination of PB11, PC9, and PC10, where the 29pin is a combination of PC7 and PD10, where the 31pin is a combination of PC1 and PC13, where the 38pin is a combination of PA5 and PB13 , where the 42pin is a combination of PA10 and PD13, and the 43pin*

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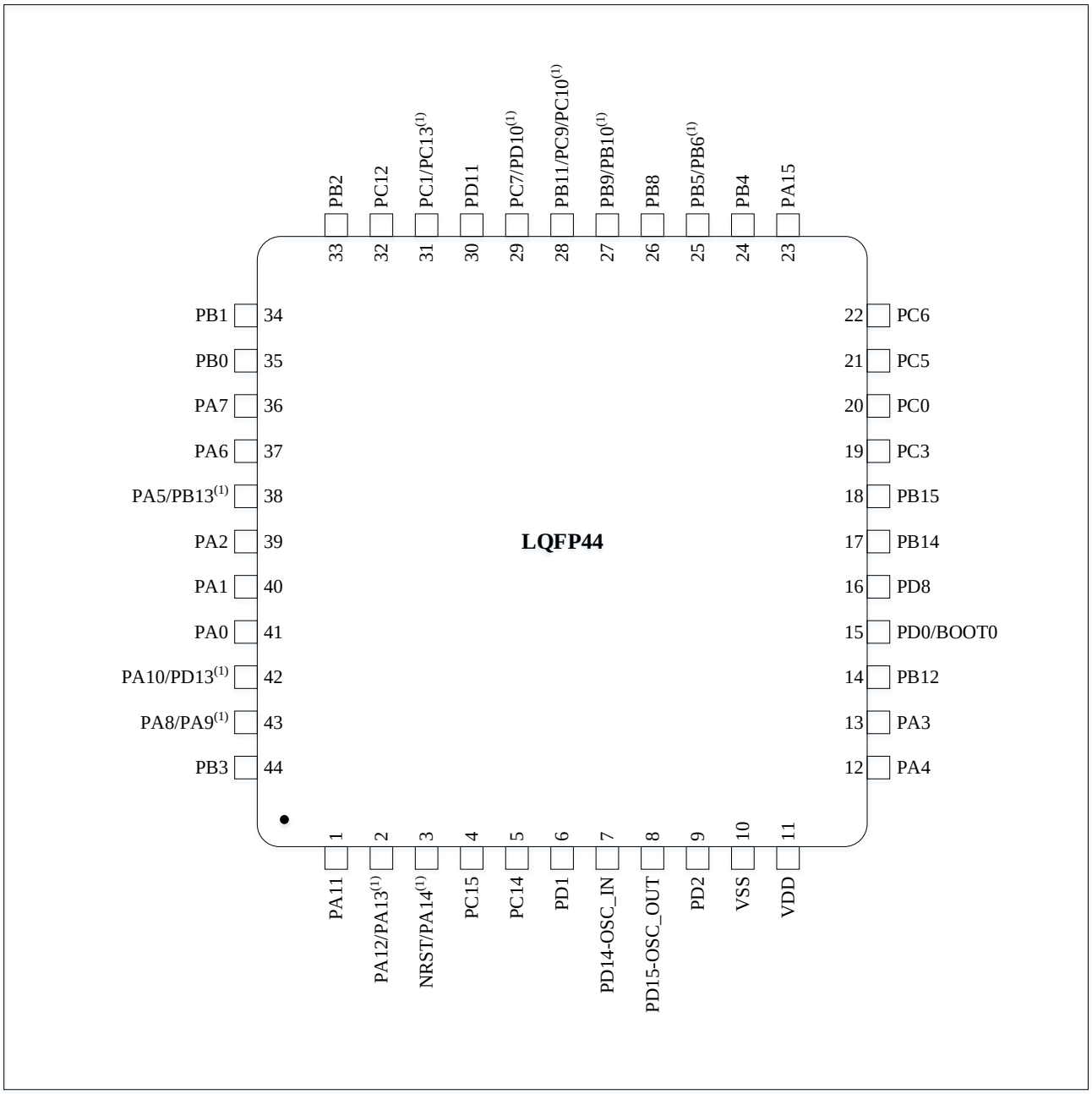
is a combination of PA8 and PA9; Only one IO can be used simultaneously, and other IOs on the same pin must be configured in analog mode to avoid affecting the IO being used.

3.3.2 LQFP44 pinouts 2



1. *2pin, 6pin, 25pin, 27pin, 28pin, 29pin, 31pin, 38pin, 42pin, and 43pin are combined IO, where the 2pin is a combination of PA12 and PA13, where the 6pin is a combination of PD1 and PA14, where the 25pin is a combination of PB5 and PB6, where the 27pin is a combination of PB9 and PB10, where the 28pin is a combination of PB11, PC9, and PC10, where the 29pin is a combination of PC7 and PD10, where the 31pin is a*

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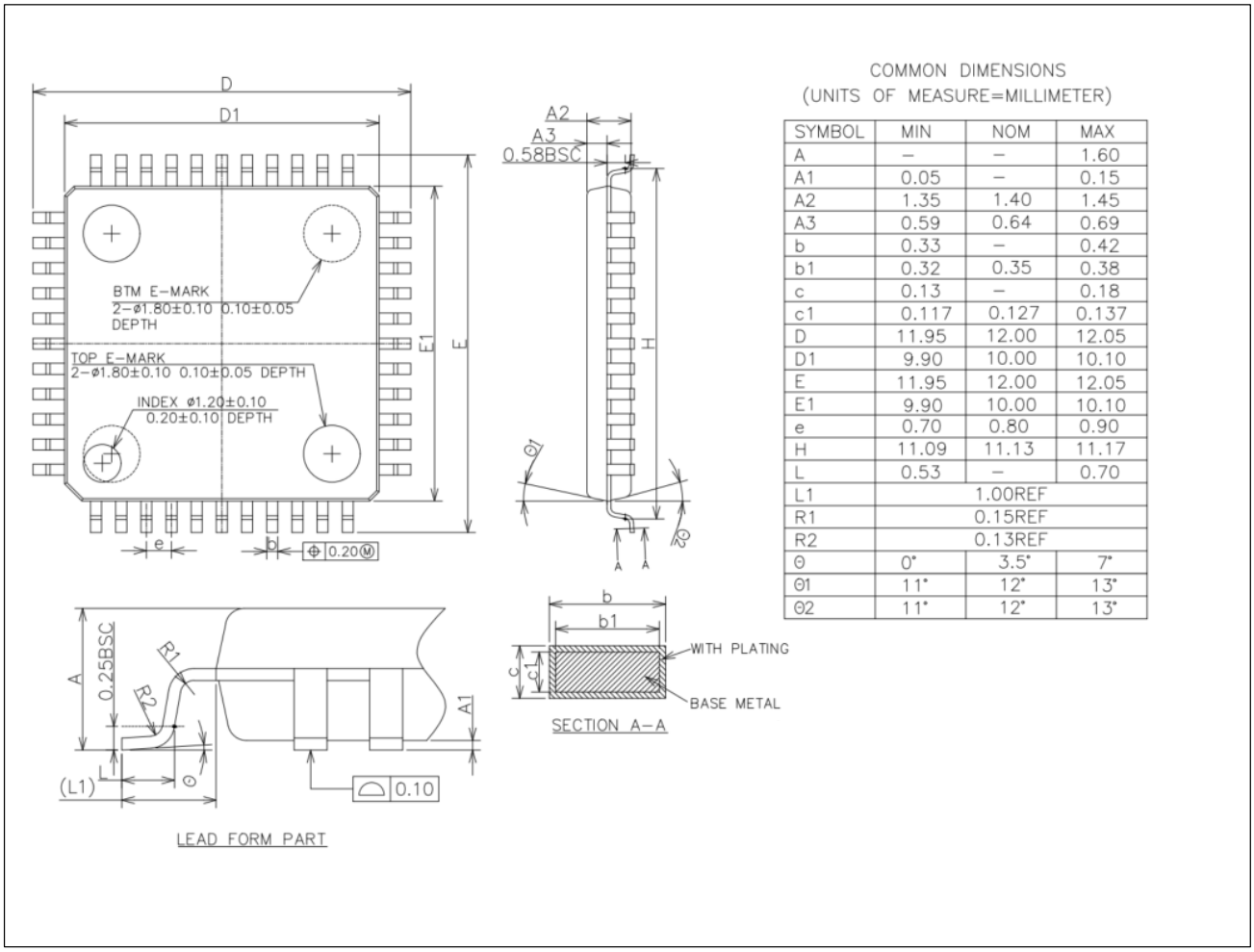
combination of PC1 and PC13, where the 38pin is a combination of PA5 and PB13 , where the 42pin is a combination of PA10 and PD13, and the 43pin is a combination of PA8 and PA9; Only one IO can be used simultaneously, and other IOs on the same pin must be configured in analog mode to avoid affecting the IO being used.

3.3.3 LQFP44 (10x10mm) Package Size

N32G052SBL7/ N32G052SBL7A package size is consistent



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	11.95	12.00	12.05
D1	9.90	10.00	10.10
E	11.95	12.00	12.05
E1	9.90	10.00	10.10
e	0.70	0.80	0.90
H	11.09	11.13	11.17
L	0.53	–	0.70
L1	1.00REF		
R1	0.15REF		
R2	0.13REF		
θ	0°	3.5°	7°
θ1	11°	12°	13°
θ2	11°	12°	13°

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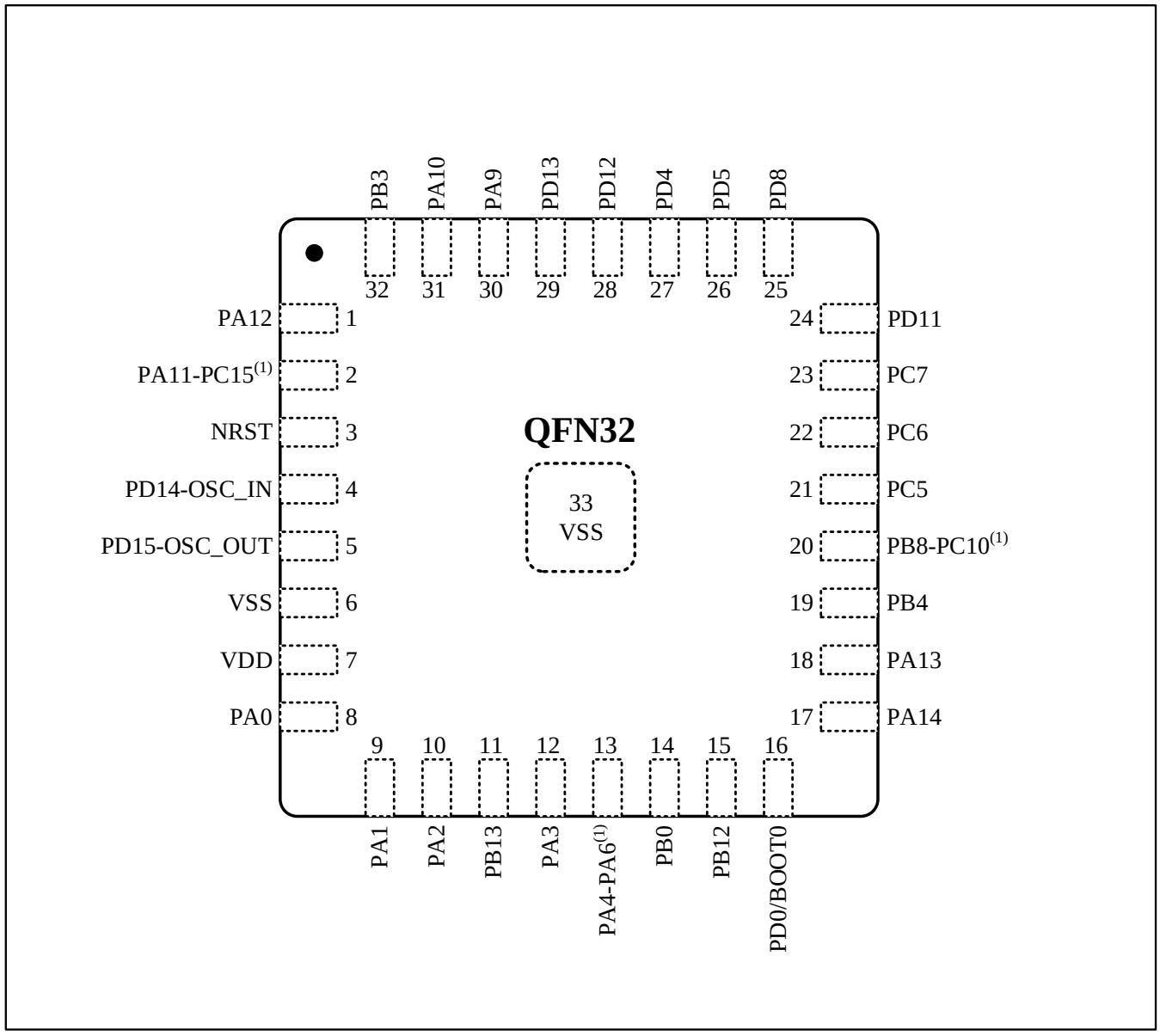
3.4 QFN32

3.4.1 QFN32 pinouts



2. *pin-2, pin-13 and pin-20 are combination IOs, where pin-2 is a combination of PA11 and PC15, where pin-13 is a combination of PA4 and PA6, and where pin-20 is a combination of PB8 and PC10; Only one of the IOs can be used at the same time, and other IOs on the same pin must be configured in analogue mode, so as not to affect the IOs being used. IOs in use.*

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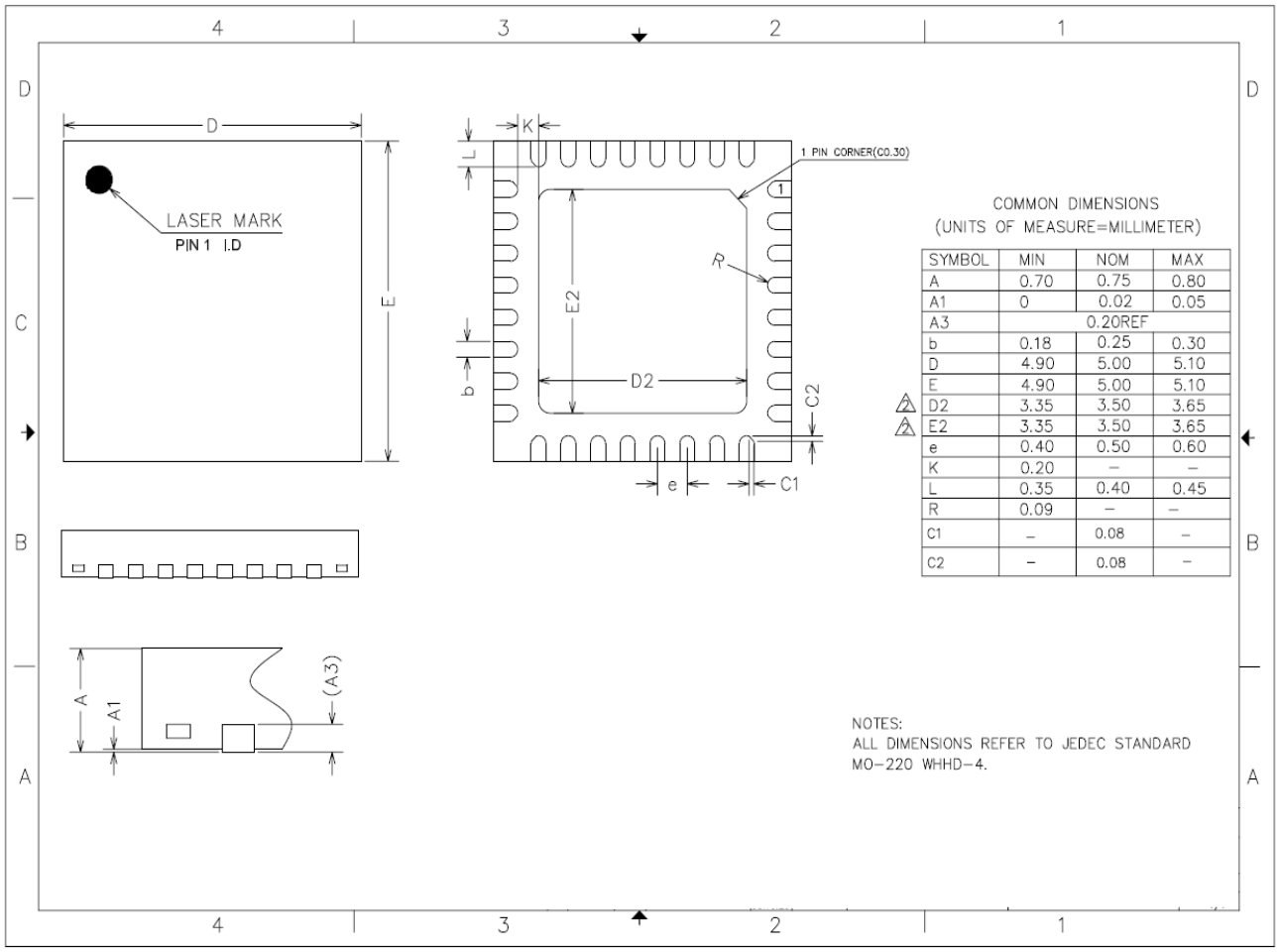
3.4.2 QFN32 (5x5mm) Package Size



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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4 Version history

Date	Version	Modify
V1.0.0	2024.7.18	Initial version
V1.1.0	2024.11.8	1. Two new packaging models for LQFP44 have been added 2. Delete all power off descriptions in PD mode 3. Change name rule to ordering information

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