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## What is "Embedded - Microcontrollers"?

"Embedded - Microcontrollers" refer to small, integrated circuits designed to perform specific tasks within larger systems. These microcontrollers are essentially compact computers on a single chip, containing a processor core, memory, and programmable input/output peripherals. They are called "embedded" because they are embedded within electronic devices to control various functions, rather than serving as standalone computers. Microcontrollers are crucial in modern electronics, providing the intelligence and control needed for a wide range of applications.

## Applications of "Embedded - Microcontrollers"

| Details | |
|---|---|
| Product Status | Active |
| Core Processor | ARM® Cortex®-M0 |
| Core Size | 32-Bit Single-Core |
| Speed | 42MHz |
| Connectivity | EBI/EMI, I²C, SPI, UART/USART |
| Peripherals | Brown-out Detect/Reset, DMA, I²S, POR, PWM, WDT |
| Number of I/O | 86 |
| Program Memory Size | 128KB (128K x 8) |
| Program Memory Type | FLASH |
| EEPROM Size | - |
| RAM Size | 16K x 8 |
| Voltage - Supply (Vcc/Vdd) | 1.8V ~ 3.6V |
| Data Converters | A/D 12x12b; D/A 2x12b |
| Oscillator Type | Internal |
| Operating Temperature | -40°C ~ 85°C (TA) |
| Mounting Type | Surface Mount |
| Package / Case | 128-LQFP |
| Supplier Device Package | 128-LQFP (14x14) |
| Purchase URL | https://www.e-xfl.com/product-detail/nuvoton-technology-corporation-america/nano100ke3bn |

# 2 FEATURES

The equipped features are dependent on the product line and their sub products.

## 2.1 Nano100 Features – Base Line

- Core
  - ARM® Cortex™-M0 core running up to 42 MHz
  - One 24-bit system timer
  - Supports Low Power Sleep mode
  - Single-cycle 32-bit hardware multiplier
  - NVIC for the 32 interrupt inputs, each with 4-levels of priority
  - Serial Wire Debug supports with 2 watchpoints/4 breakpoints
- Brown-out
  - Built-in 2.5V/2.0V/1.7V BOD for wide operating voltage range operation
- Flash EPROM Memory
  - Runs up to 42 MHz with zero wait state for discontinuous address read access
  - 64K/32K/123K bytes application program memory (APROM)
  - 4 KB in system programming (ISP) loader program memory (LDROM)
  - Programmable data flash start address and memory size with 512 bytes page erase unit
  - In System Program (ISP)/In Application Program (IAP) to update on-chip Flash EPROM
- SRAM Memory
  - 16K/8K bytes embedded SRAM
  - Supports DMA mode
- DMA: Supports 8 channels: one VDMA channel, 6 PDMA channels and one CRC channel
  - VDMA
    - Memory-to-memory transfer
    - Supports block transfer with stride
    - Supports word/half-word/byte boundary address
    - Supports address direction: increment and decrement
  - PDMA
    - Peripheral-to-memory, memory-to-peripheral, and memory-to-memory transfer
    - Supports word boundary address
    - Supports word alignment transfer length in memory-to-memory mode
    - Supports word/half-word/byte alignment transfer length in peripheral-to-memory and memory-to-peripheral mode

- Supports hardware warm reset sequence process
- Supports hardware deactivation sequence process
- Supports hardware auto deactivation sequence when detect the card is removal
- Supports UART mode (Half Duplex)

- EBI (External bus interface) support
  - Accessible space: 64 KB in 8-bit mode or 128 KB in 16-bit mode
  - Supports 8bit/16bit data width
  - Supports byte write in 16-bit Data Width mode
- One built-in temperature sensor with 1℃ resolution
- 96-bit unique ID
- 128-bit unique customer ID
- Operating Temperature: -40℃~85℃
- Packages:
  - All Green package (RoHS)
  - LQFP 128-pin(14x14) / 64-pin(7x7) / 48-pin(7x7) / QFN 48-pin(7x7)

## 2.3 Nano120 Features – USB Connectivity Line

- Core
  - ARM® Cortex™-M0 core running up to 42 MHz
  - One 24-bit system timer
  - Supports Low Power Sleep mode
  - Single-cycle 32-bit hardware multiplier
  - NVIC for the 32 interrupt inputs, each with 4-levels of priority
  - Serial Wire Debug supports with 2 watchpoints/4 breakpoints
- Brown-out
  - Built-in 2.5V/2.0V/1.7V BOD for wide operating voltage range operation
- Flash EPROM Memory
  - Runs up to 42 MHz with zero wait state for discontinuous address read access.
  - 64K/32K/123K bytes application program memory (APROM)
  - 4KB in system programming (ISP) loader program memory (LDROM)
  - Programmable data flash start address and memory size with 512 bytes page erase unit
  - In System Program (ISP)/In Application Program (IAP) to update on chip Flash EPROM
- SRAM Memory
  - 16K/8K bytes embedded SRAM
  - Supports PDMA mode
- DMA: Support 8 channels: one VDMA channel, 6 PDMA channels, and one CRC channel
  - VDMA
    - Memory-to-memory transfer
    - Supports block transfer with stride
    - Supports word/half-word/byte boundary address
    - Supports address direction: increment and decrement
  - PDMA
    - Peripheral-to-memory, memory-to-peripheral, and memory-to-memory transfer
    - Supports word boundary address
    - Supports word alignment transfer length in memory-to-memory mode
    - Supports word/half-word/byte alignment transfer length in peripheral-to-memory and memory-to-peripheral mode
    - Supports word/half-word/byte transfer data width from/to peripheral
    - Supports address: increment, fixed, and wrap around
  - CRC

## 2.4 Nano130 Features – Advanced Line

- Core
  - ARM® Cortex™-M0 core running up to 42 MHz
  - One 24-bit system timer
  - Supports Low Power Sleep mode
  - Single-cycle 32-bit hardware multiplier
  - NVIC for the 32 interrupt inputs, each with 4-levels of priority
  - Serial Wire Debug supports with 2 watchpoints/4 breakpoints
- Brown-out
  - Built-in 2.5V/2.0V/1.7V BOD for wide operating voltage range operation
- Flash EPROM Memory
  - Runs up to 42 MHz with zero wait state for discontinuous address read access.
  - 64K/32K/123K bytes application program memory (APROM)
  - 4KB in system programming (ISP) loader program memory (LDROM)
  - Programmable data flash start address and memory size with 512 bytes page erase unit
  - In System Program (ISP)/In Application Program (IAP) to update on chip Flash EPROM
- SRAM Memory
  - 16K/8K bytes embedded SRAM
  - Supports DMA mode
- DMA : Supports 8 channels: one VDMA channel,6 PDMA channels, and one CRC 25egiste
  - VDMA
    - Memory-to-memory transfer
    - Supports block transfer with stride
    - Supports word/half-word/byte boundary address
    - Supports address direction: increment and decrement
  - PDMA
    - Peripheral-to-memory, memory-to-peripheral, and memory-to-memory transfer
    - Supports word boundary address
    - Supports word alignment transfer length in memory-to-memory mode
    - Supports word/half-word/byte alignment transfer length in peripheral-to-memory and memory-to-peripheral mode
    - Supports word/half-word/byte transfer data width from/to peripheral
    - Supports address direction: increment, fixed, and wrap around
  - CRC

3.3.3.2 NuMicro™ Nano120 LQFP 64-pin

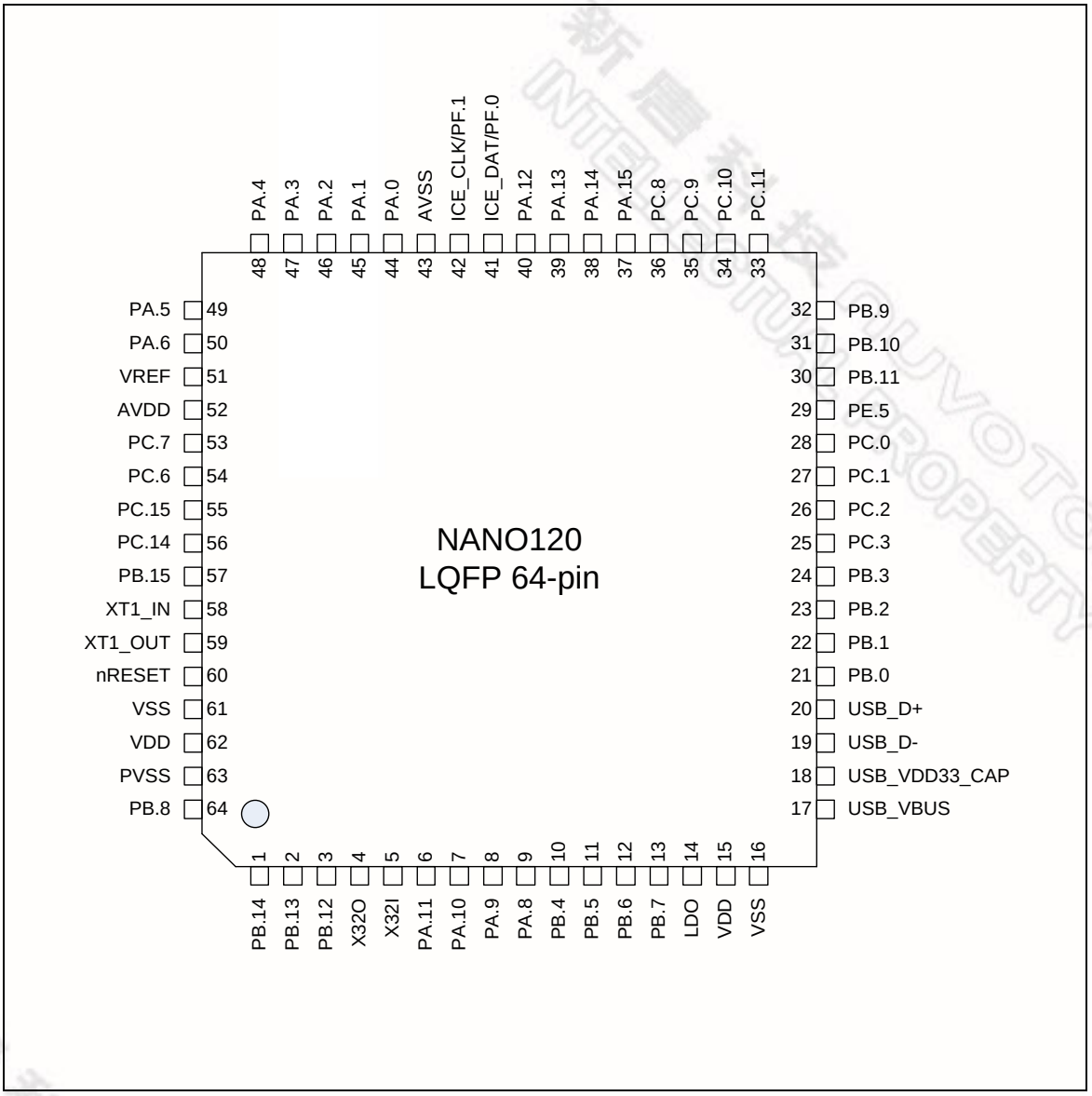



Figure 3-8 NuMicro™ Nano120 LQFP 64-pin Diagram

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP/QFN 48-pin | | | |
| 26 | | | | | NC |
| 27 | 15 | 11 | VDD | **P** | Power supply for I/O ports and LDO source |
| 28 | | | | | NC |
| 29 | 16 | 12 | VSS | **P** | Ground |
| 30 | | | VSS | **P** | Ground |
| 31 | | | VSS | **P** | Ground |
| 32 | | | VSS | **P** | Ground |
| 33 | | | PE.12 | **I/O** | General purpose digital I/O pin |
| 34 | | | PE.11 | **I/O** | General purpose digital I/O pin |
| 35 | | | PE.10 | **I/O** | General purpose digital I/O pin |
| 36 | | | PE.9 | **I/O** | General purpose digital I/O pin |
| 37 | | | PE.8 | **I/O** | General purpose digital I/O pin |
| 38 | | | PE.7 | **I/O** | General purpose digital I/O pin |
| 39 | | | | | NC |
| 40 | | | | | NC |
| 41 | | | | | NC |
| 42 | | | | | NC |
| 43 | | | | | NC |
| 44 | 17 | 13 | PB.0 | **I/O** | General purpose digital I/O pin |
| | | | UART0_RXD | **I** | UART0 Data receiver input pin |
| | | | SPI1_MOSI0 | **I/O** | SPI1 1st MOSI (Master Out, Slave In) pin |
| 45 | 18 | 14 | PB.1 | **I/O** | General purpose digital I/O pin |
| | | | UART0_TXD | **O** | UART0 Data transmitter output pin |
| | | | SPI1_MISO0 | **I/O** | SPI1 1st MISO (Master In, Slave Out) pin |
| 46 | 19 | 15 | PB.2 | **I/O** | General purpose digital I/O pin |
| | | | UART0_RTSn | **O** | UART0 Request to Send output pin |
| | | | EBI_nWRL | **O** | EBI low byte write enable output pin |
| | | | SPI1_CLK | **I/O** | SPI1 serial clock pin |
| 47 | 20 | 16 | PB.3 | **I/O** | General purpose digital I/O pin |
| | | | UART0_CTSn | **I** | UART0 Clear to Send input pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP/QFN 48-pin | | | |
| | | | EBI_nWRH | **O** | EBI high byte write enable output pin |
| | | | SPI1_SS0 | **I/O** | SPI1 1st slave select pin |
| 48 | 21 | | PD.6 | **I/O** | General purpose digital I/O pin |
| 49 | 22 | | PD.7 | **I/O** | General purpose digital I/O pin |
| 50 | 23 | | PD.14 | **I/O** | General purpose digital I/O pin |
| 51 | 24 | | PD.15 | **I/O** | General purpose digital I/O pin |
| 52 | | | PC.5 | **I/O** | General purpose digital I/O pin |
| | | | SPI0_MOSI1 | **I/O** | SPI0 2nd MOSI (Master Out, Slave In) pin |
| 53 | | | PC.4 | **I/O** | General purpose digital I/O pin |
| | | | SPI0_MISO1 | **I/O** | SPI0 2nd MISO (Master In, Slave Out) pin |
| 54 | 25 | 17 | PC.3 | **I/O** | General purpose digital I/O pin |
| | | | SPI0_MOSI0 | **I/O** | SPI0 1st MOSI (Master Out, Slave In) pin |
| | | | I2S_DO | **O** | I2S data output |
| | | | SC1_RST | **O** | SmartCard1 RST pin |
| 55 | 26 | 18 | PC.2 | **I/O** | General purpose digital I/O pin |
| | | | SPI0_MISO0 | **I/O** | SPI0 1st MISO (Master In, Slave Out) pin |
| | | | I2S_DI | **I** | I2S data input |
| | | | SC1_PWR | **O** | SmartCard1 PWR pin |
| 56 | 27 | 19 | PC.1 | **I/O** | General purpose digital I/O pin |
| | | | SPI0_CLK | **I/O** | SPI0 serial clock pin |
| | | | I2S_BCLK | **I/O** | I2S bit clock pin |
| | | | SC1_DAT | **I/O** | SmartCard1 DATA pin(SC1_UART_RXD) |
| 57 | 28 | 20 | PC.0 / MCLKO | **I/O** | General purpose digital I/O pin / Module clock output pin |
| | | | SPI0_SS0 | **I/O** | SPI0 1st slave select pin |
| | | | I2S_LRCLK | **I/O** | I2S left right channel clock |
| | | | SC1_CLK | **O** | SmartCard1 clock pin(SC1_UART_TXD) |
| 58 | | | PE.6 | **I/O** | General purpose digital I/O pin |
| 59 | | | | | NC |
| 60 | | | | | NC |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP/QFN 48-pin | | | |
| | | | SPI1_MOSI1 | I/O | SPI1 2nd MOSI (Master Out, Slave In) pin |
| | | | PWM1_CH1 | O | PWM1 Channel1 output |
| | | | SNOOPER | I | Snooper pin |
| | | | INT1 | I | External interrupt 1 |
| | | | I2C0_SCL | O | I2C0 clock pin |
| 71 | | | PC.12 | I/O | General purpose digital I/O pin |
| | | | SPI1_MISO1 | I/O | SPI1 2nd MISO (Master In, Slave Out) pin |
| | | | PWM1_CH0 | O | PWM1 Channel0 output |
| | | | INT0 | I | External interrupt0 input pin |
| | | | I2C0_SDA | I/O | I2C0 data I/O pin |
| 72 | 33 | | PC.11 | I/O | General purpose digital I/O pin |
| | | | SPI1_MOSI0 | I/O | SPI1 1st MOSI (Master Out, Slave In) pin |
| | | | UART1_TXD | O | UART1 Data transmitter output pin |
| 73 | 34 | | PC.10 | I/O | General purpose digital I/O pin |
| | | | SPI1_MISO0 | I/O | SPI1 1st MISO (Master In, Slave Out) pin |
| | | | UART1_RXD | I | UART1 Data receiver input pin |
| 74 | 35 | | PC.9 | I/O | General purpose digital I/O pin |
| | | | SPI1_CLK | I/O | SPI1 serial clock pin |
| | | | I2C1_SCL | I/O | I2C1 clock pin |
| 75 | 36 | | PC.8 | I/O | General purpose digital I/O pin |
| | | | SPI1_SS0 | I/O | SPI1 1st slave select pin |
| | | | EBI_MCLK | O | EBI external clock output pin |
| | | | I2C1_SDA | I/O | I2C1 data I/O pin |
| 76 | 37 | 25 | PA.15 | I/O | General purpose digital I/O pin |
| | | | PWM0_CH3 | I/O | PWM0 Channel3 output |
| | | | I2S_MCLK | O | I2S master clock output pin |
| | | | TC3 | I | Timer3 capture input |
| | | | SC0_PWR | O | SmartCard0 Power pin |
| | | | UART0_TXD | O | UART0 Data transmitter output pin |
| 77 | 38 | 26 | PA.14 | I/O | General purpose digital I/O pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP/QFN 48-pin | | | |
| | | | PWM0_CH2 | **I/O** | PWM0 Channel2 output |
| | | | EBI_AD15 | **I/O** | EBI Address/Data bus bit15 |
| | | | TC2 | **I** | Timer2 capture input |
| | | | UART0_RXD | **I** | UART0 Data receiver input pin |
| 78 | 39 | 27 | PA.13 | **I/O** | General purpose digital I/O pin |
| | | | PWM0_CH1 | **I/O** | PWM0 Channel1 output |
| | | | EBI_AD14 | **I/O** | EBI Address/Data bus bit14 |
| | | | TC1 | **I** | Timer1 capture input |
| | | | I2C0_SCL | **I/O** | $I^2C0$ clock pin |
| 79 | 40 | 28 | PA.12 | **I/O** | General purpose digital I/O pin |
| | | | PWM0_CH0 | **I/O** | PWM0 Channel0 output |
| | | | EBI_AD13 | **I/O** | EBI Address/Data bus bit13 |
| | | | TC0 | **I** | Timer0 capture input |
| | | | I2C0_SDA | **I/O** | $I^2C0$ data I/O pin |
| 80 | 41 | 29 | ICE_DAT | **I/O** | Serial Wired Debugger Data pin |
| | | | PF.0 | **I/O** | General purpose digital I/O pin |
| | | | INT0 | **I** | External interrupt0 input pin |
| 81 | 42 | 30 | ICE_CLK | **I** | Serial Wired Debugger Clock pin |
| | | | PF.1 | **I/O** | General purpose digital I/O pin |
| | | | FCLKO | **O** | Frequency Divider output pin |
| | | | INT1 | **I** | External interrupt1 input pin |
| 82 | | | | | NC |
| 83 | | | VDD | **P** | Power supply for I/O ports and LDO source for internal PLL and digital circuit |
| 84 | | | | | NC |
| 85 | | | VSS | **P** | Ground |
| 86 | | | VSS | **P** | Ground |
| 87 | 43 | 31 | AVSS | **AP** | Ground Pin for analog circuit |
| 88 | | | AVSS | **AP** | Ground Pin for analog circuit |
| 89 | 44 | 32 | PA.0 | **I/O** | General purpose digital I/O pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| 29 | 16 | | VSS | **P** | Ground |
| 30 | | | VSS | **P** | Ground |
| 31 | | | VSS | **P** | Ground |
| 32 | | | VSS | **P** | Ground |
| 33 | | | PE.12 | **I/O** | General purpose digital I/O pin |
| | | | UART1_CTSn | **I** | UART1 Clear to Send input pin |
| 34 | | | PE.11 | **I/O** | General purpose digital I/O pin |
| | | | UART1_RTSn | **O** | UART1 Request to Send output pin |
| 35 | | | PE.10 | **I/O** | General purpose digital I/O pin |
| | | | UART1_TXD | **O** | UART1 Data transmitter output pin |
| 36 | | | PE.9 | **I/O** | General purpose digital I/O pin |
| | | | UART1_RXD | **I** | UART1 Data receiver input pin |
| 37 | | | PE.8 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG9 | **O** | LCD segment output 9 at LQFP128 |
| 38 | | | PE.7 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG8 | **O** | LCD segment output 8 at LQFP128 |
| 39 | | | | | NC |
| 40 | | | | | NC |
| 41 | | | | | NC |
| 42 | | | | | NC |
| 43 | | | | | NC |
| 44 | 17 | | PB.0 | **I/O** | General purpose digital I/O pin |
| | | | UART0_RXD | **I** | UART0 Data receiver input pin |
| | | | SPI1_MOSI0 | **I/O** | SPI1 1st MOSI (Master Out, Slave In) pin |
| | | | LCD_SEG1 | **O** | LCD segment output 1 at LQFP64 (or as LD_COM5) |
| | | | LCD_SEG7 | **O** | LCD segment output 7 at LQFP128 |
| 45 | 18 | | PB.1 | **I/O** | General purpose digital I/O pin |
| | | | UART0_TXD | **O** | UART0 Data transmitter output pin |
| | | | SPI1_MISO0 | **I/O** | SPI1 1st MISO (Master In, Slave Out) pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| | | | LCD_SEG0 | O | LCD segment output 0 at LQFP64 (or as LCD_COM4) |
| | | | LCD_SEG6 | O | LCD segment output 6 at LQFP128 |
| 46 | 19 | | PB.2 | I/O | General purpose digital I/O pin |
| | | | UART0_RTSn | O | UART0 Request to Send output pin |
| | | | EBI_nWRL | O | EBI low byte write enable output pin |
| | | | SPI1_CLK | I/O | SPI1 serial clock pin |
| | | | LCD_COM3 | O | LCD common output 3 at LQFP64 |
| | | | LCD_SEG5 | O | LCD segment output 5 at LQFP128 |
| 47 | 20 | | PB.3 | I/O | General purpose digital I/O pin |
| | | | UART0_CTSn | I | UART0 Clear to Send input pin |
| | | | EBI_nWRH | O | EBI high byte write enable output pin |
| | | | SPI1_SS0 | I/O | SPI1 1st slave select pin |
| | | | LCD_COM2 | O | LCD common output 2 at LQFP64 |
| | | | LCD_SEG4 | O | LCD segment output 4 at LQFP128 |
| 48 | 21 | | PD.6 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG3 | O | LCD segment output 3 at LQFP128 |
| 49 | 22 | | PD.7 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG2 | O | LCD segment output 2 at LQFP128 |
| 50 | 23 | | PD.14 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG1 | O | LCD segment output 1 at LQFP128 (or as LCD_COM5) |
| 51 | 24 | | PD.15 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG0 | O | LCD segment output 0 at LQFP128 (or as LCD_COM4) |
| 52 | | | PC.5 | I/O | General purpose digital I/O pin |
| | | | SPI0_MOSI1 | I/O | SPI0 2nd MOSI (Master Out, Slave In) pin |
| | | | LCD_COM3 | O | LCD common output 3 at LQFP128 |
| 53 | | | PC.4 | I/O | General purpose digital I/O pin |
| | | | SPI0_MISO1 | I/O | SPI0 2nd MISO (Master In, Slave Out) pin |
| | | | LCD_COM2 | O | LCD common output 2 at LQFP128 |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128 | LQFP 64 | LQFP 48 | | | |
| 61 | 29 | | PE.5 | I/O | General purpose digital IO pin |
| | | | PWM1_CH1 | I/O | PWM1 Channel1 output |
| 62 | 30 | | PB.11 | I/O | General purpose digital IO pin |
| | | | PWM1_CH0 | I/O | PWM1 Channel0 output |
| | | | TM3 | O | Timer3 external counter input |
| | | | SC2_DAT | I/O | SmartCard2 DATA pin(SC2_UART_RXD) |
| | | | SPI0_MISO0 | I/O | SPI0 1st MISO (Master In, Slave Out) pin |
| 63 | 31 | | PB.10 | I/O | General purpose digital IO pin |
| | | | SPI0_SS1 | I/O | SPI0 2nd slave select pin |
| | | | TM2 | O | Timer2 external counter input |
| | | | SC2_CLK | O | SmartCard2 clock pin(SC2_UART_TXD) |
| | | | SPI0_MOSI0 | I/O | SPI0 1st MOSI (Master Out, Slave In) pin |
| 64 | 32 | | PB.9 | I/O | General purpose digital IO pin |
| | | | SPI1_SS1 | I/O | SPI1 2nd slave select pin |
| | | | TM1 | O | Timer1 external counter input |
| | | | SC2_RST | O | SmartCard2 RST pin |
| | | | INT0 | I | External interrupt0 input pin |
| 65 | | | PE.4 | I/O | General purpose digital IO pin |
| | | | SPI0_MOSI0 | I/O | SPI0 1st MOSI (Master Out, Slave In) pin |
| 66 | | | PE.3 | I/O | General purpose digital IO pin |
| | | | SPI0_MISO0 | I/O | SPI0 1st MISO (Master In, Slave Out) pin |
| 67 | | | PE.2 | I/O | General purpose digital IO pin |
| | | | SPI0_CLK | I/O | SPI0 serial clock pin |
| 68 | | | PE.1 | I/O | General purpose digital IO pin |
| | | | PWM1_CH3 | I/O | PWM1 Channel3 output |
| | | | SPI0_SS0 | I/O | SPI0 1st slave select pin |
| 69 | | | PE.0 | I/O | General purpose digital IO pin |
| | | | PWM1_CH2 | I/O | PWM1 Channel2 output |
| | | | I2S_MCLK | O | I2S master clock output pin |
| 70 | | | PC.13 | I/O | General purpose digital IO pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128 | LQFP 64 | LQFP 48 | | | |
| | | | SPI1_MOSI1 | I/O | SPI1 2nd MOSI (Master Out, Slave In) pin |
| | | | PWM1_CH1 | O | PWM1 Channel1 output |
| | | | SNOOPER | I | Snooper pin |
| | | | INT1 | I | External interrupt 1 input pin |
| | | | I2C0_SCL | O | I2C 0 clock pin |
| 71 | | | PC.12 | I/O | General purpose digital IO pin |
| | | | SPI1_MISO1 | I/O | SPI1 2nd MISO (Master In, Slave Out) pin |
| | | | PWM1_CH0 | O | PWM1 Channel 0 output |
| | | | INT0 | I | External interrupt 0 input pin |
| | | | I2C0_SDA | I/O | I2C 0 data I/O pin |
| 72 | 33 | | PC.11 | I/O | General purpose digital IO pin |
| | | | SPI1_MOSI0 | I/O | SPI1 1st MOSI (Master Out, Slave In) pin |
| | | | UART1_TXD | O | UART1 Data transmitter output pin |
| 73 | 34 | | PC.10 | I/O | General purpose digital IO pin |
| | | | SPI1_MISO0 | I/O | SPI1 1st MISO (Master In, Slave Out) pin |
| | | | UART1_RXD | I | UART1 Data receiver input pin |
| 74 | 35 | | PC.9 | I/O | General purpose digital IO pin |
| | | | SPI1_CLK | I/O | SPI1 serial clock pin |
| | | | I2C1_SCL | I/O | I2C 1 clock pin |
| 75 | 36 | | PC.8 | I/O | General purpose digital IO pin |
| | | | SPI1_SS0 | I/O | SPI1 1st slave select pin |
| | | | EBI_MCLK | O | EBI external clock output pin |
| | | | I2C1_SDA | I/O | I2C 1 data I/O pin |
| 76 | 37 | 25 | PA.15 | I/O | General purpose digital IO pin |
| | | | PWM0_CH3 | I/O | PWM0 Channel3 output |
| | | | I2S_MCLK | O | I2S master clock output pin |
| | | | TC3 | I | Timer3 capture input |
| | | | SC0_PWR | O | SmartCard0 Power pin |
| | | | UART0_TXD | O | UART0 Data transmitter output pin |
| 77 | 38 | 26 | PA.14 | I/O | General purpose digital IO pin |

### 3.4.4 NuMicro™ Nano130 Pin Description

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| 1 | | | PE.13 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG27 | O | LCD segment output 27 at LQFP128 |
| 2 | 1 | | PB.14 | I/O | General purpose digital I/O pin |
| | | | INT0 | I | External interrupt0 input pin |
| | | | SC2_CD | I | SmartCard2 card detect |
| | | | SPI2_SS1 | I/O | SPI2 2nd slave select pin |
| | | | LCD_SEG12 | O | LCD segment output 12 at LQFP64 |
| | | | LCD_SEG26 | O | LCD segment output 26 at LQFP128 |
| 3 | 2 | | PB.13 | I/O | General purpose digital I/O pin |
| | | | EBI_AD1 | I/O | EBI Address/Data bus bit1 |
| | | | LCD_SEG11 | O | LCD segment output 11 at LQFP64 |
| | | | LCD_SEG25 | O | LCD segment output 25 at LQFP128 |
| 4 | 3 | | PB.12 | I/O | General purpose digital I/O pin |
| | | | EBI_AD0 | I/O | EBI Address/Data bus bit0 |
| | | | FCLKO | O | Frequency Divider output pin |
| | | | LCD_SEG10 | O | LCD segment output 10 at LQFP64 |
| | | | LCD_SEG24 | O | LCD segment output 24 at LQFP128 |
| 5 | | | | | NC |
| 6 | 4 | | X32O | O | External 32.768 kHz crystal output pin |
| 7 | 5 | | X32I | I | External 32.768 kHz crystal input pin |
| 8 | | | | | NC |
| 9 | 6 | | PA.11 | I/O | General purpose digital I/O pin |
| | | | I2C1_SCL | I/O | I2C1 clock pin |
| | | | EBI_nRD | O | EBI read enable output pin |
| | | | SC0_RST | O | SmartCard0 RST pin |
| | | | SPI2_MOSI0 | I/O | SPI2 1st MOSI (Master Out, Slave In) pin |
| | | | LCD_SEG9 | O | LCD segment output 9 at LQFP64 |
| | | | LCD_SEG23 | O | LCD segment output 23 at LQFP128 |
| 10 | 7 | | PA.10 | I/O | General purpose digital I/O pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| | | | I2C1_SDA | **I/O** | $I^2C1$ data I/O pin |
| | | | EBI_nWR | **O** | EBI write enable output pin |
| | | | SC0_PWR | **O** | SmartCard0 Power pin |
| | | | SPI2_MISO0 | **I/O** | SPI2 1st MISO (Master In, Slave Out) pin |
| | | | LCD_SEG8 | **O** | LCD segment output 8 at LQFP64 |
| | | | LCD_SEG22 | **O** | LCD segment output 22 at LQFP128 |
| 11 | 8 | | PA.9 | **I/O** | General purpose digital I/O pin |
| | | | I2C0_SCL | **I/O** | $I^2C0$ clock pin |
| | | | SC0_DAT | **I/O** | SmartCard0 DATA pin(SC0_UART_RXD) |
| | | | SPI2_CLK | **I/O** | SPI2 serial clock pin |
| | | | LCD_SEG7 | **O** | LCD segment output 7 at LQFP64 |
| | | | LCD_SEG21 | **O** | LCD segment output 21 at LQFP128 |
| 12 | 9 | | PA.8 | **I/O** | General purpose digital I/O pin |
| | | | I2C0_SDA | **I/O** | $I^2C0$ data I/O pin |
| | | | SC0_CLK | **O** | SmartCard0 clock pin(SC0_UART_TXD) |
| | | | SPI2_SS0 | **I/O** | SPI2 1st slave select pin |
| | | | LCD_SEG6 | **O** | LCD segment output 6 at LQFP64 |
| | | | LCD_SEG20 | **O** | LCD segment output 20 at LQFP128 |
| 13 | | | PD.8 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG19 | **O** | LCD segment output 19 at LQFP128 |
| 14 | | | PD.9 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG18 | **O** | LCD segment output 18 at LQFP128 |
| 15 | | | PD.10 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG17 | **O** | LCD segment output 17 at LQFP128 |
| 16 | | | PD.11 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG16 | **O** | LCD segment output 16 at LQFP128 |
| 17 | | | PD.12 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG15 | **O** | LCD segment output 15 at LQFP128 |
| 18 | | | PD.13 | **I/O** | General purpose digital I/O pin |
| | | | LCD_SEG14 | **O** | LCD segment output 14 at LQFP128 |

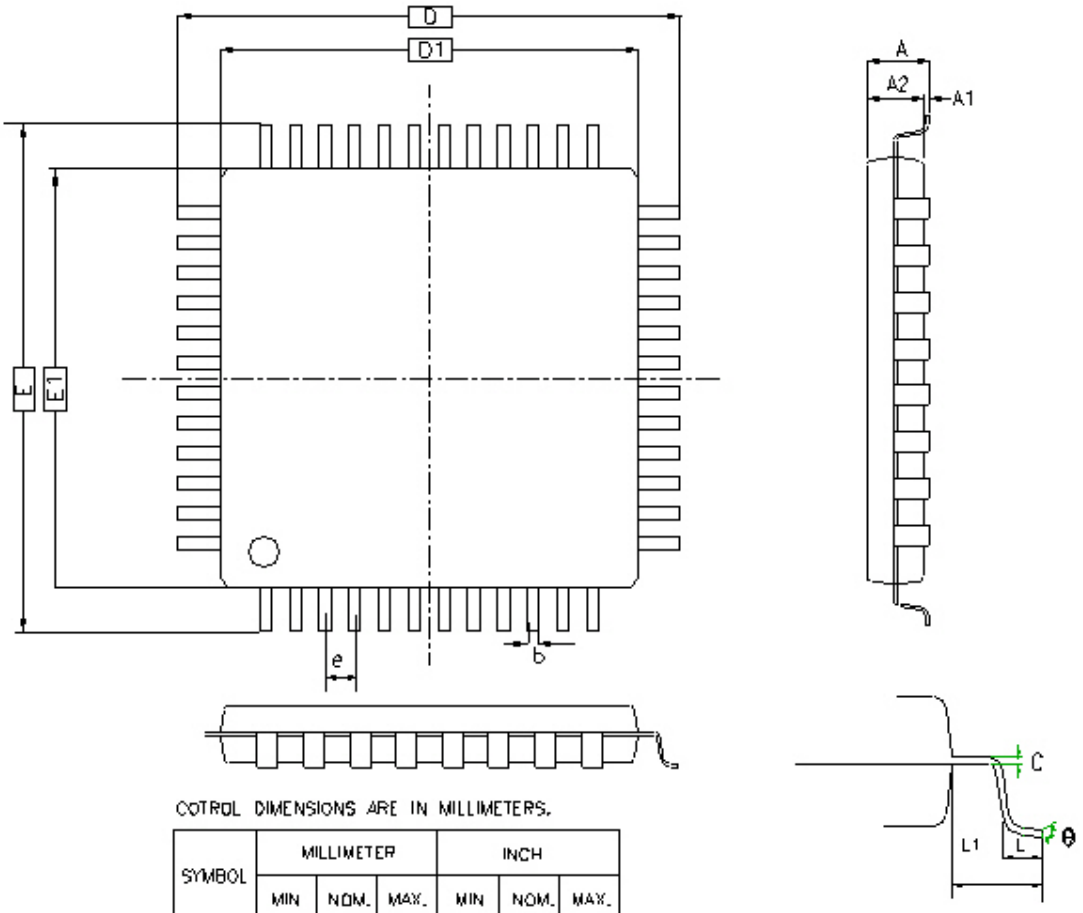
| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| | | | EBI_nWRL | O | EBI low byte write enable output pin |
| | | | SPI1_CLK | I/O | SPI1 serial clock pin |
| | | | LCD_COM3 | O | LCD common output 3 at LQFP64 |
| | | | LCD_SEG5 | O | LCD segment output 5 at LQFP128 |
| 47 | 24 | | PB.3 | I/O | General purpose digital I/O pin |
| | | | UART0_CTSn | I | UART0 Clear to Send input pin |
| | | | EBI_nWRH | O | EBI high byte write enable output pin |
| | | | SPI1_SS0 | I/O | SPI1 1st slave select pin |
| | | | LCD_COM2 | O | LCD common output 2 at LQFP64 |
| | | | LCD_SEG4 | O | LCD segment output 4 at LQFP128 |
| 48 | | | PD.6 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG3 | O | LCD segment output 3 at LQFP128 |
| 49 | | | PD.7 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG2 | O | LCD segment output 2 at LQFP128 |
| 50 | | | PD.14 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG1 | O | LCD segment output 1 at LQFP128 (or as LCD_COM5) |
| 51 | | | PD.15 | I/O | General purpose digital I/O pin |
| | | | LCD_SEG0 | O | LCD segment output 0 at LQFP128 (or as LCD_COM4) |
| 52 | | | PC.5 | I/O | General purpose digital I/O pin |
| | | | SPI0_MOSI1 | I/O | SPI0 2nd MOSI (Master Out, Slave In) pin |
| | | | LCD_COM3 | O | LCD common output 3 at LQFP128 |
| 53 | | | PC.4 | I/O | General purpose digital I/O pin |
| | | | SPI0_MISO1 | I/O | SPI0 2nd MISO (Master In, Slave Out) pin |
| | | | LCD_COM2 | O | LCD common output 2 at LQFP128 |
| 54 | 25 | | PC.3 | I/O | General purpose digital I/O pin |
| | | | SPI0_MOSI0 | I/O | SPI0 1st MOSI (Master Out, Slave In) pin |
| | | | I2S_DO | O | $I^2S$ data output |
| | | | SC1_RST | O | SmartCard1 RST pin |
| | | | LCD_COM1 | O | LCD common output 1 at LQFP64 |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| | | | SPI0_MISO0 | I/O | SPI0 1st MISO (Master In, Slave Out) pin |
| | | | LCD_V1 | O | LCD Unit voltage for LCD charge pump circuit at LQFP64 |
| | | | LCD_V1 | O | LCD Unit voltage for LCD charge pump circuit at LQFP128 |
| 63 | 31 | | PB.10 | I/O | General purpose digital I/O pin |
| | | | SPI0_SS1 | I/O | SPI0 2nd slave select pin |
| | | | TM2 | O | Timer2 external counter input |
| | | | SC2_CLK | O | SmartCard2 clock pin(SC2_UART_TXD) |
| | | | SPI0_MOSI0 | I/O | SPI0 1st MOSI (Master Out, Slave In) pin |
| | | | LCD_V2 | O | LCD driver biasing voltage at LQFP64 |
| | | | LCD_V2 | O | LCD driver biasing voltage at LQFP128 |
| 64 | 32 | | PB.9 | I/O | General purpose digital I/O pin |
| | | | SPI1_SS1 | I/O | SPI1 2nd slave select pin |
| | | | TM1 | O | Timer1 external counter input |
| | | | SC2_RST | O | SmartCard2 RST pin |
| | | | INT0 | I | External interrupt0 input pin |
| | | | LCD_V3 | O | LCD driver biasing voltage at LQFP64 |
| | | | LCD_V3 | O | LCD driver biasing voltage at LQFP128 |
| 65 | | | PE.4 | I/O | General purpose digital I/O pin |
| | | | SPI0_MOSI0 | I/O | SPI0 1st MOSI (Master Out, Slave In) pin |
| 66 | | | PE.3 | I/O | General purpose digital I/O pin |
| | | | SPI0_MISO0 | I/O | SPI0 1st MISO (Master In, Slave Out) pin |
| 67 | | | PE.2 | I/O | General purpose digital I/O pin |
| | | | SPI0_CLK | I/O | SPI0 serial clock pin |
| 68 | | | PE.1 | I/O | General purpose digital I/O pin |
| | | | PWM1_CH3 | I/O | PWM1 Channel3 output |
| | | | SPI0_SS0 | I/O | SPI0 1st slave select pin |
| 69 | | | PE.0 | I/O | General purpose digital I/O pin |
| | | | PWM1_CH2 | I/O | PWM1 Channel2 output |
| | | | I2S_MCLK | O | $I^2S$ master clock output pin |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| 70 | | | PC.13 | I/O | General purpose digital I/O pin |
| | | | SPI1_MOSI1 | I/O | SPI1 2nd MOSI (Master Out, Slave In) pin |
| | | | PWM1_CH1 | O | PWM1 Channel1 output |
| | | | SNOOPER | I | Snooper pin |
| | | | INT1 | I | External interrupt 1 input pin |
| | | | I2C0_SCL | O | I2C0 clock pin |
| 71 | | | PC.12 | I/O | General purpose digital I/O pin |
| | | | SPI1_MISO1 | I/O | SPI1 2nd MISO (Master In, Slave Out) pin |
| | | | PWM1_CH0 | O | PWM1 Channel0 output |
| | | | INT0 | I | External interrupt0 input pin |
| | | | I2C0_SDA | I/O | I2C0 data I/O pin |
| 72 | 33 | | PC.11 | I/O | General purpose digital I/O pin |
| | | | SPI1_MOSI0 | I/O | SPI1 1st MOSI (Master Out, Slave In) pin |
| | | | UART1_TXD | O | UART1 Data transmitter output pin |
| | | | LCD_SEG31 | O | LCD segment output 31 at LQFP64 |
| 73 | 34 | | PC.10 | I/O | General purpose digital I/O pin |
| | | | SPI1_MISO0 | I/O | SPI1 1st MISO (Master In, Slave Out) pin |
| | | | UART1_RXD | I | UART1 Data receiver input pin |
| | | | LCD_SEG30 | O | LCD segment output 30 at LQFP64 |
| 74 | 35 | | PC.9 | I/O | General purpose digital I/O pin |
| | | | SPI1_CLK | I/O | SPI1 serial clock pin |
| | | | I2C1_SCL | I/O | I2C1 clock pin |
| | | | LCD_SEG29 | O | LCD segment output 29 at LQFP64 |
| 75 | 36 | | PC.8 | I/O | General purpose digital I/O pin |
| | | | SPI1_SS0 | I/O | SPI1 1st slave select pin |
| | | | EBI_MCLK | O | EBI external clock output pin |
| | | | I2C1_SDA | I/O | I2C1 data I/O pin |
| | | | LCD_SEG28 | O | LCD segment output 28 at LQFP64 |
| 76 | 37 | | PA.15 | I/O | General purpose digital I/O pin |
| | | | PWM0_CH3 | I/O | PWM0 Channel3 output |

| Pin No. | | | Pin Name | Pin Type | Description |
|---|---|---|---|---|---|
| LQFP 128-pin | LQFP 64-pin | LQFP 48-pin | | | |
| 82 | | | | | NC |
| 83 | | | VDD | **P** | Power supply for I/O ports and LDO source for internal PLL and digital circuit |
| 84 | | | | | NC |
| 85 | | | VSS | **P** | Ground |
| 86 | | | VSS | **P** | Ground |
| 87 | 43 | | AVSS | **AP** | Ground Pin for analog circuit |
| 88 | | | AVSS | **AP** | Ground Pin for analog circuit |
| 89 | 44 | | PA.0 | **I/O** | General purpose digital I/O pin |
| | | | AD0 | **AI** | ADC analog input0 |
| | | | SC2_CD | **I** | SmartCard2 card detect |
| 90 | 45 | | PA.1 | **I/O** | General purpose digital I/O pin |
| | | | AD1 | **AI** | ADC analog input1 |
| | | | EBI_AD12 | **I/O** | EBI Address/Data bus bit12 |
| 91 | 46 | | PA.2 | **I/O** | General purpose digital I/O pin |
| | | | AD2 | **AI** | ADC analog input2 |
| | | | EBI_AD11 | **I/O** | EBI Address/Data bus bit11 |
| | | | UART1_RXD | **I** | UART1 Data receiver input pin |
| | | | LCD_SEG23* | **AO** | LCD segment output 23 at LQFP64 |
| 92 | 47 | | PA.3 | **I/O** | General purpose digital I/O pin |
| | | | AD3 | **AI** | ADC analog input3 |
| | | | EBI_AD10 | **I/O** | EBI Address/Data bus bit10 |
| | | | UART1_TXD | **O** | UART1 Data transmitter output pin |
| | | | LCD_SEG22* | **AO** | LCD segment output 22 at LQFP64 |
| 93 | 48 | | PA.4 | **I/O** | General purpose digital I/O pin |
| | | | AD4 | **AI** | ADC analog input4 |
| | | | EBI_AD9 | **I/O** | EBI Address/Data bus bit9 |
| | | | SC2_PWR | **O** | SmartCard2 Power pin |
| | | | I2C0_SDA | **I/O** | $I^2C$0 data I/O pin |
| | | | LCD_SEG21* | **AO** | LCD segment output 21 at LQFP64 |

## 4.4 LQFP48 (7x7x1.4 mm footprint 2.0 mm)




COTROL DIMENSIONS ARE IN MILLIMETERS.

| SYMBOL | MILLIMETER | | | INCH | | |
|---|---|---|---|---|---|---|
| | MIN | NOM. | MAX. | MIN | NOM. | MAX. |
| A | — | — | 1.60 | — | — | 0.063 |
| A1 | 0.05 | 0.10 | 0.15 | 0.002 | 0.004 | 0.006 |
| A2 | 1.35 | 1.40 | 1.45 | 0.053 | 0.055 | 0.057 |
| D1 | 6.90 | 7.00 | 7.10 | 0.272 | 0.276 | 0.280 |
| E1 | 6.90 | 7.00 | 7.10 | 0.272 | 0.276 | 0.280 |
| e | 0.35 | 0.50 | 0.65 | 0.014 | 0.020 | 0.280 |
| D | 8.9 | 9.00 | 9.10 | 0.350 | 0.354 | 0.358 |
| E | 8.9 | 9.00 | 9.10 | 0.350 | 0.354 | 0.358 |
| L | 0.45 | 0.60 | 0.75 | 0.018 | 0.024 | 0.030 |
| L1 | — | 1.00 | — | — | 0.039 | — |
| C | 0.09 | — | 0.20 | 0.0035 | — | 0.0079 |
| θ | 0° | — | 7° | 0° | — | 7° |
| b | 0.17 | 0.22 | 0.27 | 0.007 | 0.0087 | 0.011 |