

**Arm<sup>®</sup> ARM926EJ-S<sup>™</sup>**  
**32-bit Microcontroller**

**NuMicro<sup>®</sup> Family**  
**NUC980 Series**  
**Product Brief**

*The information described in this document is the exclusive intellectual property of Nuvoton Technology Corporation and shall not be reproduced without permission from Nuvoton.*

*Nuvoton is providing this document only for reference purposes of NuMicro microcontroller based system design. Nuvoton assumes no responsibility for errors or omissions.*

*All data and specifications are subject to change without notice.*

For additional information or questions, please contact: Nuvoton Technology Corporation.

[www.nuvoton.com](http://www.nuvoton.com)

## 1 GENERAL DESCRIPTION

The NUC980 series 32-bit microprocessor is powered by the ARM926EJ-S™ processor core with 16 KB I-cache, 16 KB D-cache and MMU running up to 300 MHz. Its SDRAM interface supports SDR/DDR/DDR2/LPDDR type SDRAM running up to 150 MHz. The NUC980 series supports built-in 16KB embedded SRAM and 16.5 KB IBR (Internal Boot ROM) for booting from USB, NAND, SD/eMMC and SPI Flash, and industrial operating temperature from -40°C to 85°C. In addition, the NUC980 series provides built-in DDR in LQFP package to ease PCB design and reduce the BOM cost.

The NUC980 series is equipped with a large number of high speed digital peripherals, such as two 10/100 Mbps Ethernet MAC supporting RMII, a USB 2.0 high speed host/device, a USB 2.0 high speed host controller, up to six USB 1.1 host lite interfaces, two CMOS sensor interfaces supporting CCIR601 and CCIR656 type sensor, two SD interfaces supporting SD/SDHC/SDIO card, a NAND Flash interface supporting SLC and MLC type NAND Flash, an I2S interface supporting I2S and PCM protocol. Also the NUC980 series offers a built-in hardware cryptography accelerator that supports RSA, ECC, AES, SHA, HMAC and a random number generator (RNG).

The NUC980 series provides up to ten UART interfaces, two ISO-7816-3 interfaces, a Quad-SPI interface, two SPI interfaces, up to four I2C interfaces, four CAN 2.0B interfaces, eight channels PWM output, eight channels 12-bit SAR ADC, six 32-bit timers, WDT (Watchdog Timer), WWDT( Window Watchdog Timer), 32.768 kHz XTL and RTC (Real Time Clock). The NUC980 series also supports two 10-channel peripheral DMA (PDMA) for automatic data transfer between memories and peripherals.

The NuMicro® NUC980 series is suitable for a wide range of applications such as:

- Smart Home gateway
- Fingerprint Machine.
- Power concentrator
- Data Collector
- Smart Home Appliance
- Serial server
- 2D/1D Barcode reader
- Barcode printer
- Power Distribution Unit
- Ethernet Industrial Control
- SNMP Card
- Ethernet RTU / DTU

## 2 FEATURES

### ● Operating Characteristics

- Voltage range: 3.3 V to 3.6 V
- Temperature range: -40°C to +85°C
- EFT 4KV
- ESD HBM 6 KV

### ● Core

- Arm® ARM926EJ-S™ processor running up to 300 MHz
- Built-in 16 KB instruction cache and 16 KB data cache
- Built-in Memory Management Unit (MMU)
- Supports JTAG debug interface

### ● Memories

- Built in 128M / 64M / 16M Byte SDRAM Memory in LQFP package
- Two sets of Secure Digital Host Controllers, compliant with SD Memory Card Specification Version 2.0.
- Supports SLC and MLC type NAND Flash device and supports ECC8, ECC12 and ECC24 BCH algorithm
- Support Quad SPI NOR / NAND up to 100MHz
- External Bus Interface (EBI) supports maximum external address space of 1 Mbytes

### ● Boot Source

- Q-SPI NAND Flash
- Q-SPI NOR Flash
- NAND Flash
- SD Card / eMMC
- USB

### ● Clocks

- 12 MHz HXT crystal oscillator or external input clock
- 32.768 kHz LXT crystal oscillator or external input clock for RTC system operation
- Dual PLL up to 500 MHz for high speed module operation.

### ● Power management

- Integrated with Power-on Reset, Brown-out Reset and Low Voltage Reset
- Normal run: 150mA @ 1.2V; CPU 300 MHz
- Power-down: 3mA
- Power off, RTC mode :10uA

### ● Timers

- Six 32-bit timers
- Eight 16-bit PWM (Up to 8 channels)
- One Independent watchdog
- One window watchdog
- RTC with Calendar and Alarm

### ● PDMA

- Two sets PDMA
- Up to 20 channels
- Channel can be operated by – software trigger, SPI, UART, EBI

### ● Cryptography Accelerator

- RSA-2048 / ECC-256 / AES-256 / SHA-512
- HMAC
- PRNG

### ● Analog

- Up to 8 channels 12-bit 600KSPS SAR ADC

### ● Communication interfaces

- 10 sets of 17.5 MHz UART interfaces with UART, RS-485 and IrDA mode
- Two sets of ISO-7816-3 which are compliant with ISO-7816-3 T=0, T=1
- 4 sets of 400 kHz I<sup>2</sup>C interfaces
- 2 sets of 96 MHz SPI interface
- 1 set of quad SPI

- **Advanced Communication Interface**

- Six USB Full Speed Host Lite ports.
- Two sets 10/100M Ethernet MAC
- Two sets CMOS image sensor interface supporting CCIR656 and CCIR601 type. .
- One set of on-chip USB 2.0 high speed dual role transceiver configurable as host, device or ID-dependent.
- One set of on-chip USB 2.0 high speed transceiver with host only.
- One set of I2S controller with I2S protocol and PCM protocol
- Four CAN 2.0B interfaces

- **Package**

- LQFP 64-EP 10mm x 10 mm
- LQFP 128 14mm x 14mm
- LQFP 216 24mm x 24mm

### 3 BLOCK DIAGRAM

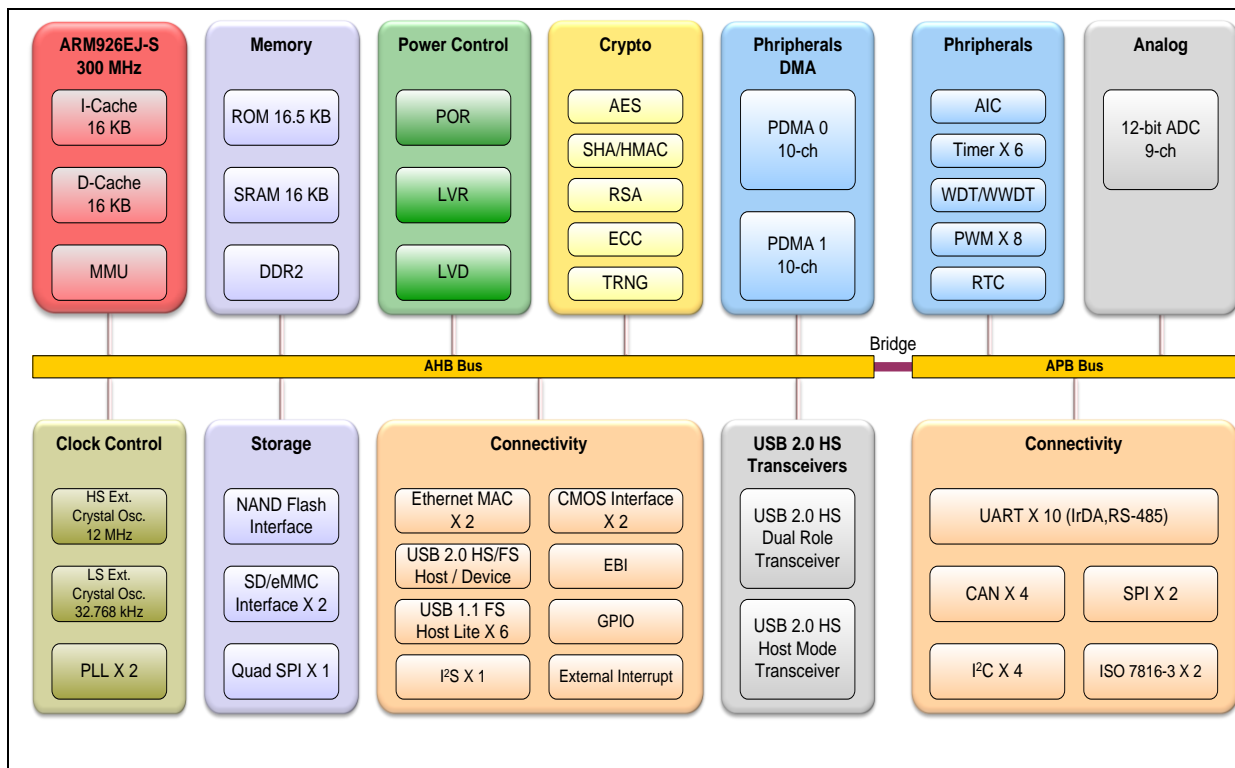


Figure 3-1 NuMicro® NUC980 Block Diagram

## 4 PARTS INFORMATION

### 4.1 NUC980 Series Naming Rule

NUC	9	80	D	K	6	1	Y	C
Nuvoton	Core	Series	Package	Pin Count	DDR Size	DDR Vendor ID	PB Free	CAN Support
	ARM 926EJ-S	Ethernet	D: LQFP	R:64 pin K:128 pin F:216 pin	7:128MB 6: 64MB 4: 16MB			C: CAN N/A : Non CAN

Table 4-1 NuMicro® NUC980 Series Naming Rule

## 4.2 NUC980 Series Selection Guide

Part Number		NUC980					
		DF71YC	DK61YC	DK61Y	DK41Y	DR61Y	DR41Y
DDR Size(MB)		128	64		16	64	16
I/O		104	92			40	
RTC		√	√			-	
Connectivity	UART	10	10			8	
	SPI	3	3			2	
	I <sup>2</sup> C	4	4			2	
	CAN	4	4	-		-	
External Bus Interface		√	√			-	
Camera Interface		2	2			2	
SPI NAND		√	√			-	
NAND Flash Interface		√	√			-	
16-bit PWM		8	8			5	
10/100Mb Ethernet MAC		2	2			1	
USB 1.1 FS Host Lite		6	6	-		-	
USB 2.0 HS Host		1	1			-	
USB 2.0 HS Host / Device		1	1			1	
12-bit ADC		8	8			2	
Package		LQFP216	LQFP128			LQFP64 - EP	

Table 4-2 NuMicro® NUC980 Series Selection Guide

## 5 PIN CONFIGURATION

### 5.1 NUC980 Series Pin Diagram

#### 5.1.1 NUC980 Series LQFP64-EP Pin Diagram

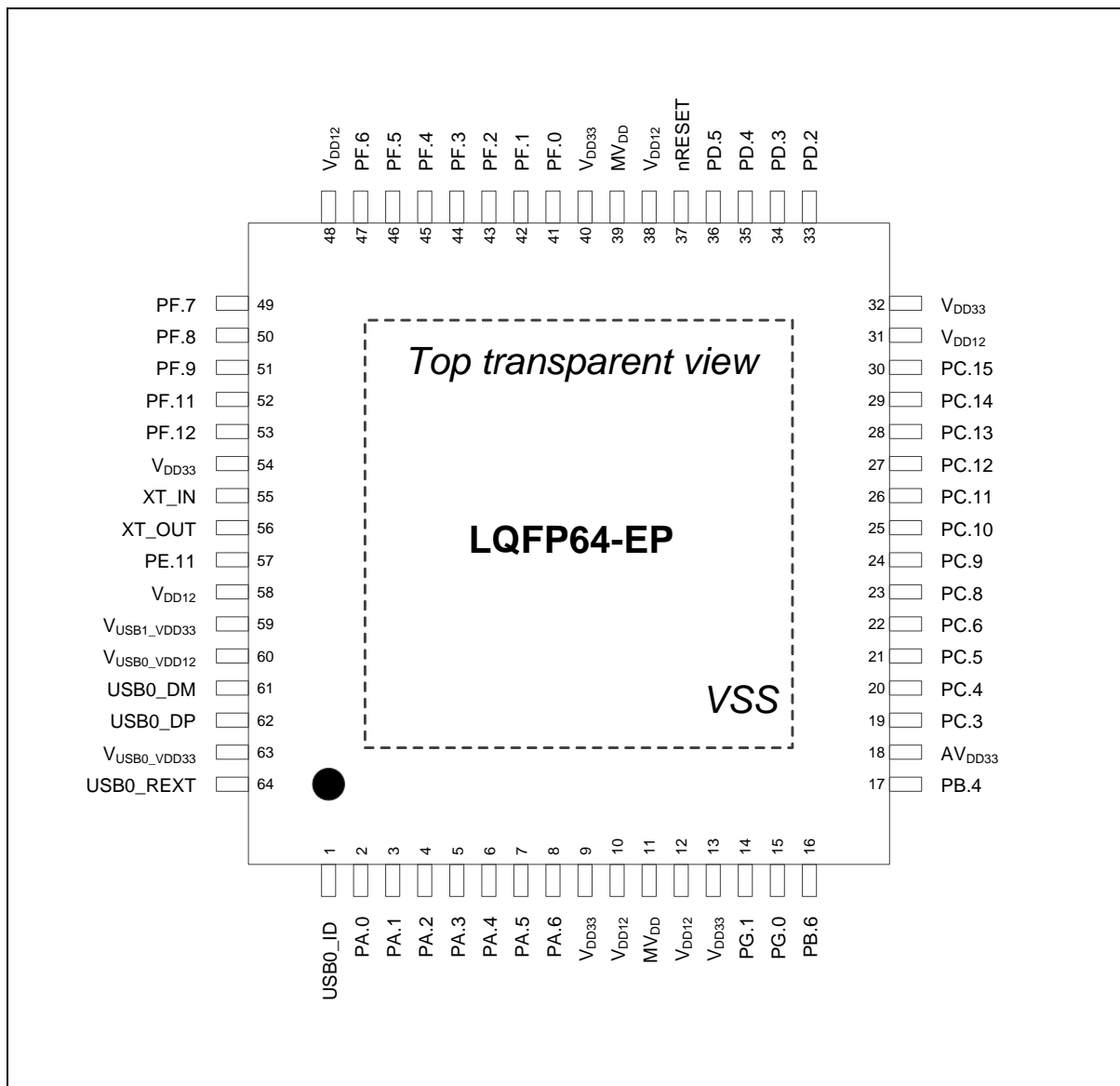


Figure 5-1 NUC980 Series LQFP 64-EP pin Diagram



### 5.1.2 NUC980 Series LQFP128 Pin Diagram

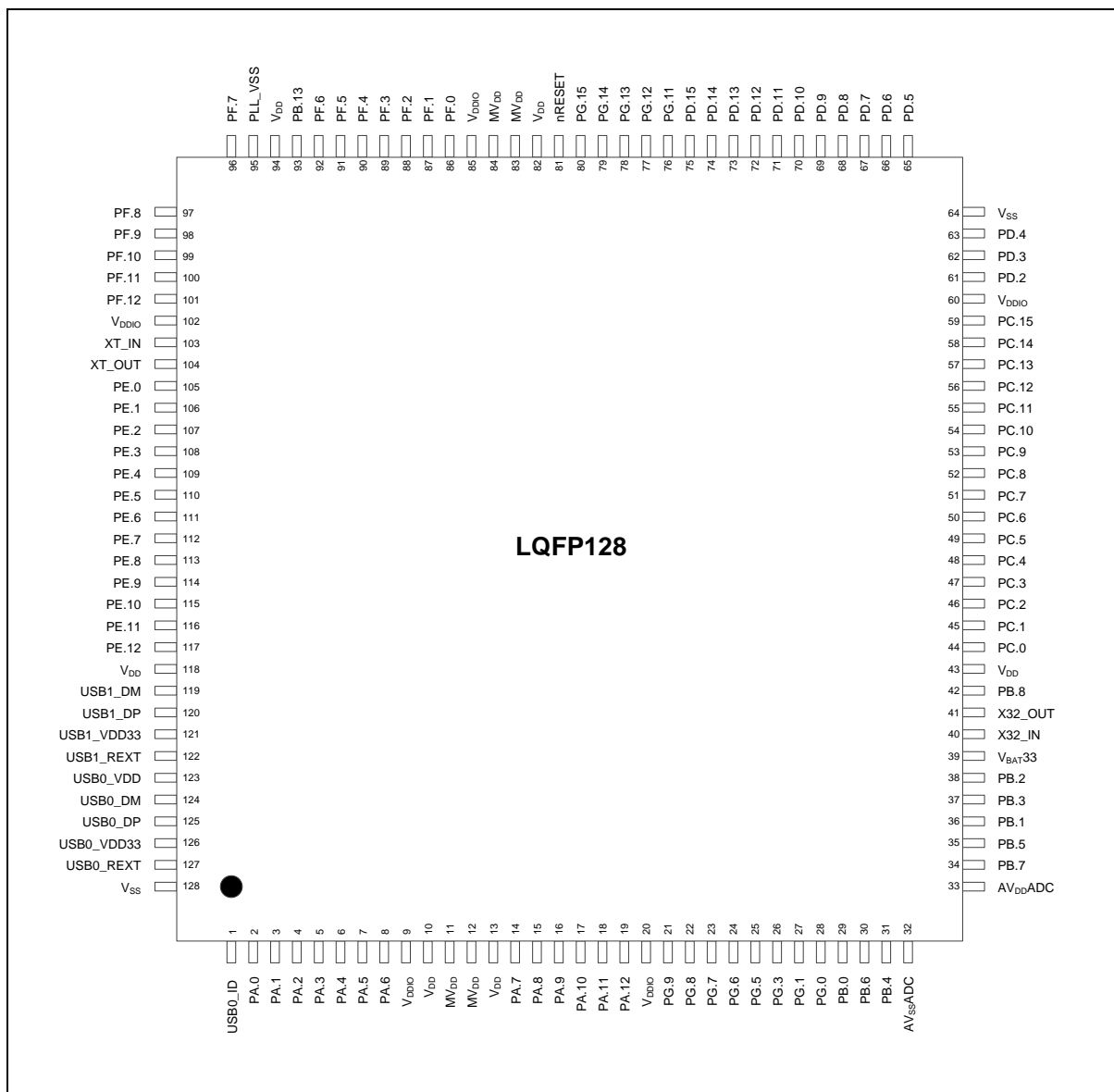


Figure 5-2 NUC980 Series LQFP 128-pin Diagram

[illegible]

Figure 5-3 NUC980 Series LQFP 216-pin Diagram

## 6 UTILITIES

### 6.1 Programmer and Debugger

NuWriter	Advance high speed USB programming tool
----------	---

### 6.2 Development Environment

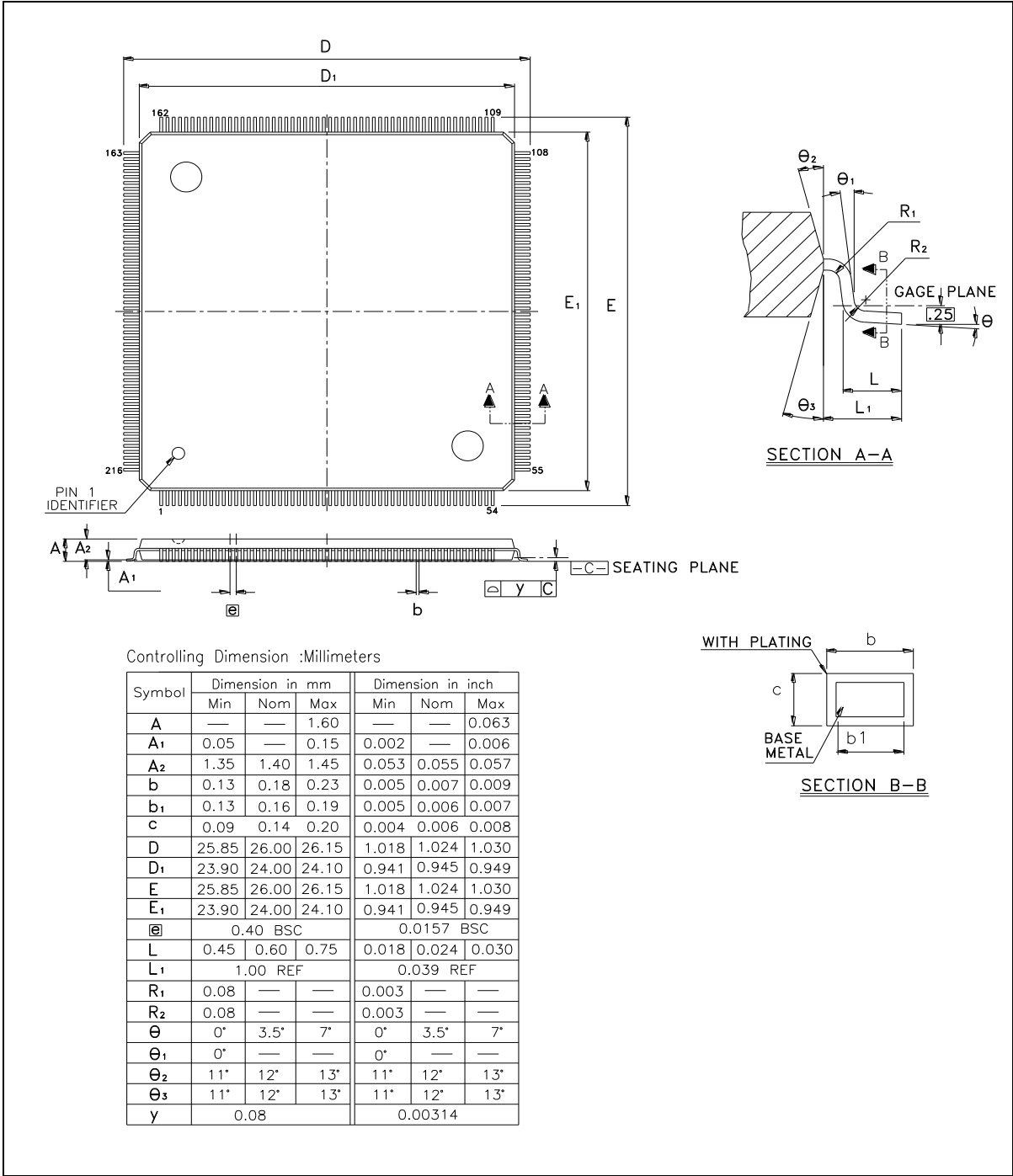
Compiler IDE	Non-OS Keil Pro MDK , Linux OS GCC
Non-OS Software Package	Non-OS Board Support Package(BSP), Sample Code
Linux OS Software Package	Linux Board Support Package(BSP) , Sample Code , Application sample code
Buildroot	A tool that simplifies and automates the process of building a complete Linux system for an embedded system

### 6.3 Development Board

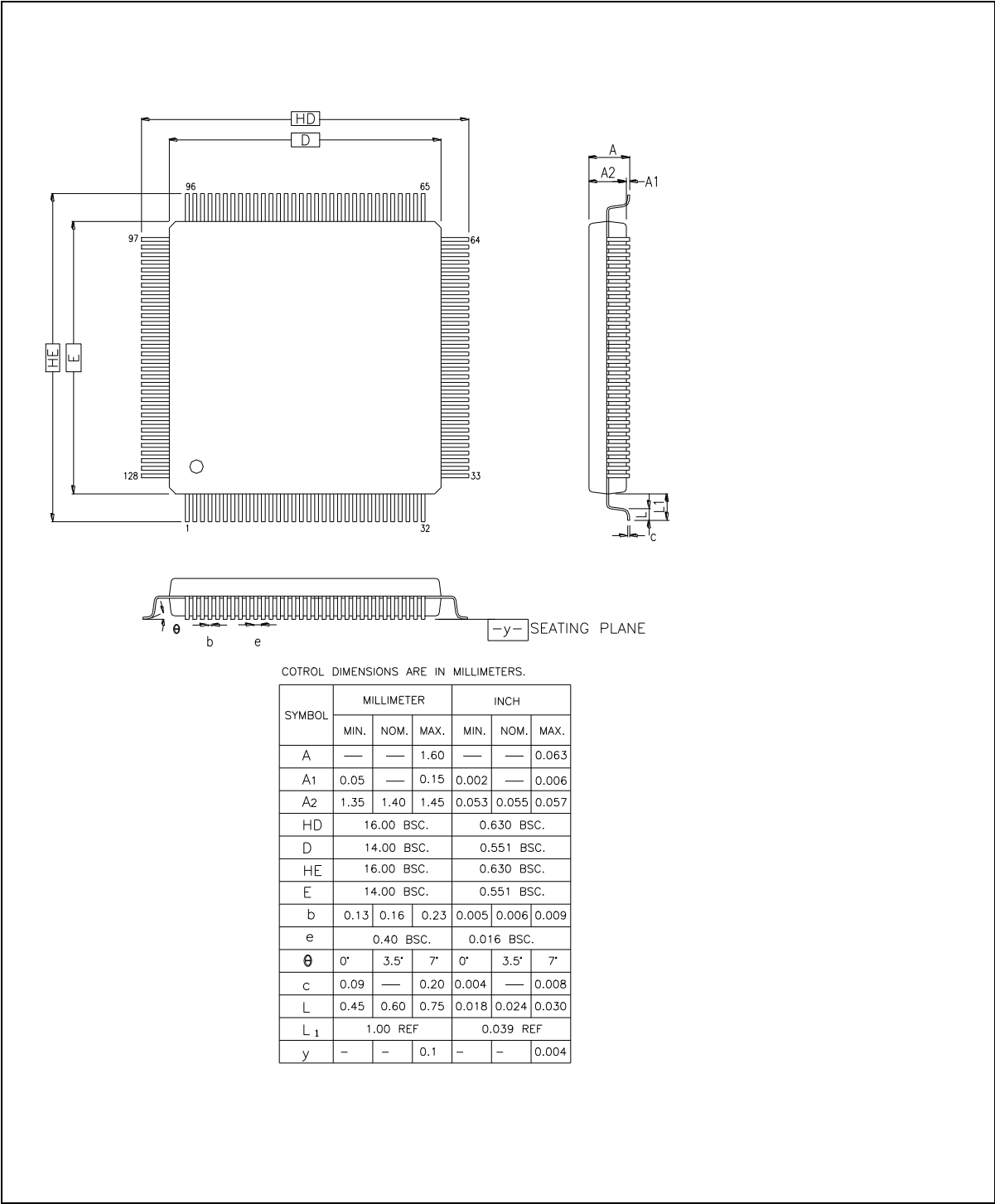
Part No.	Part Number	Feature
NK-NUC980	NUC980DF61YC, NUC980DK61YC, NUC980DK61Y, NUC980DK41Y,NUC980DR61Y,NUC980DR41Y	Dual Ethernet / Dual Camera / Dual USB, Full Function
NK-980IOT	NUC980DK61Y	Arduino linterface Support
NK-980ETH2P	NUC980DK61YC	Dual Ethernet to eight UART
NK-980USB8P	NUC980DK61YC	One port Ethernet and Eight Ports USB Host

7 PACKAGE DIMENSIONS

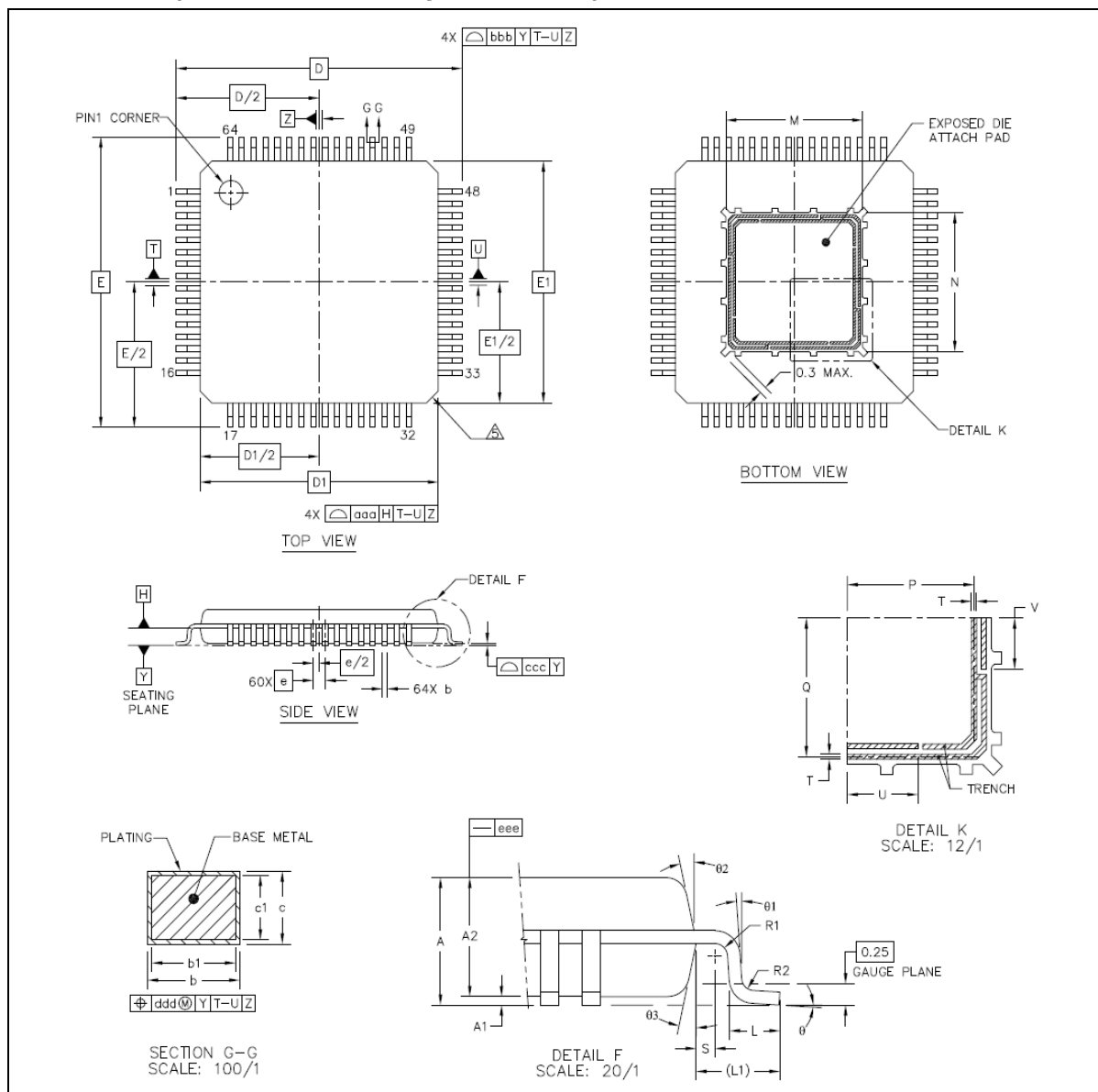
7.1 LQFP216 (24x24x1.4mm footprint 2.0mm)



7.2 LQFP128 (14x14x1.4mm footprint 2.0mm)




### 7.3 LQFP64-EP (10x10x1.4mm footprint 2.0 mm)



		SYMBOL	MIN	NOM	MAX
TOTAL THICKNESS		A	----	----	1.6
STAND OFF		A1	0.05	----	0.15
MOLD THICKNESS		A2	1.35	1.4	1.45
LEAD WIDTH(PLATING)		b	0.17	0.22	0.27
LEAD WIDTH		b1	0.17	0.2	0.23
L/F THICKNESS(PLATING)		c	0.09	----	0.2
L/F THICKNESS		c1	0.09	----	0.16
BODY SIZE	X	D	12 BSC		
	Y	E	12 BSC		
	X	D1	10 BSC		
	Y	E1	10 BSC		
LEAD PITCH		e	0.5 BSC		
		L	0.45	0.6	0.75
FOOTPRINT		L1	1 REF		
		θ	0°	3.5°	7°
		θ1	0°	----	----
		θ2	11°	12°	13°
		θ3	11°	12°	13°
		R1	0.08	----	----
		R2	0.08	----	0.2
		S	0.2	----	----
EP SIZE	X	M	5.64	5.74	5.84
	Y	N	5.64	5.74	5.84
		P	2.47	2.52	2.57
		Q	2.67	2.72	2.77
		T	0.05	----	0.15
		U	1.35	----	1.45
		V	0.95	----	1.05
PACKAGE EDGE TOLERANCE		aaa	0.2		
LEAD EDGE TOLERANCE		bbb	0.2		
COPLANARITY		ccc	0.08		
LEAD OFFSET		ddd	0.08		
MOLD FLATNESS		eee	0.05		

#### NOTES

1. DATUM T, U, AND Z TO BE DETERMINED AT DATUM PLANE H.
2. DIMENSIONS D AND E TO BE DETERMINED AT SEATING PLANE DATUM Y.
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25 PER SIDE. DIMENSIONS D1 AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE DATUM H.
4. DIMENSION b DOES NOT INCLUDE DAM BAR PROTRUSION. ALLOWABLE DAM BAR PROTRUSION SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED THE MAXIMUM b DIMENSION BY MORE THAN 0.08 mm. DAM BAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSION AND AN ADJACENT LEAD IS 0.07 mm.

 EXACT SHAPE OF EACH CORNER IS OPTIONAL.

## 8 REVISION HISTORY

Date	Revision	Description
2019.01.03	1.00	Initial version.



### Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.

---

*Please note that all data and specifications are subject to change without notice.  
All the trademarks of products and companies mentioned in this datasheet belong to their respective owners.*