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ARM Cortex®-M0

32-bit Microcontroller

NuMicro® Family
Mini57 Series
Datasheet

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1 GENERAL DESCRIPTION

The NuMicro® Mini57 series 32-bit microcontrollers are embedded with ARM® Cortex®-M0 core for industrial applications which need high performance, high integration, and low cost. The Cortex®-M0 is the newest ARM® embedded processor with 32-bit performance at a cost equivalent to the traditional 8-bit microcontroller.

The Mini57 series can run up to 48 MHz and operate at 2.1V ~ 5.5V, -40℃ ~ 105℃, and thus can support a variety of industrial control applications which need high CPU performance. The Mini57 offers 29.5 Kbytes embedded program Flash, size configurable Data Flash (shared with program Flash), 2 Kbytes Flash for the ISP, 1.5 Kbytes SPROM for security, and 4 Kbytes SRAM.

Many system level peripheral functions, such as I/O Port, Timer, UART, SPI, I^2C, PWM, ADC, Watchdog Timer, Analog Comparator and Brown-out Detector, have been incorporated into the Mini57 to reduce component count, board space and system cost. These useful functions make the Mini57 powerful for a wide range of applications.

Additionally, the Mini57 series is equipped with ISP (In-System Programming) and ICP (In-Circuit Programming) functions, which allow the user to update program memory without removing the chip from the actual end product.

2 FEATURES

- Core
  - ARM® Cortex®-M0 core running up to 48 MHz
  - One 24-bit system timer
  - Supports low power Idle mode
  - A single-cycle 32-bit hardware multiplier
  - NVIC for the 32 interrupt inputs, each with 4-level of priority
  - Supports Serial Wire Debug (SWD) interface and two watchpoints/four breakpoints
- Built-in LDO for wide operating voltage ranged: 2.1V to 5.5V
- Memory
  - 29.5 Kbytes Flash memory for program memory (APROM)
  - Configurable Flash memory for data memory (Data Flash)
  - 2 KB Flash memory for loader (LDROM)
  - Three 0.5 KB Flash memory for security protection (SPROM)
  - 4 KB SRAM for internal scratch-pad RAM (SRAM)
- Clock Control
  - Programmable system clock source
    - Switch clock sources on-the-fly
  - 4 ~ 24 MHz external crystal input (HXT)
  - 32.768 kHz external crystal input (LXT) for idle wake-up and system operation clock
  - 48 MHz internal oscillator (HIRC) (±1% accuracy at 25^0C, 5V)
    - Dynamically calibrating the HIRC OSC to 48 MHz ±1% from -40℃ to 105℃ by external 32.768K crystal oscillator (LXT)
  - 10 kHz internal low-power oscillator (LIRC) for Watchdog Timer and idle wake-up
- I/O Port
  - Up to 22 general-purpose I/O (GPIO) pins and 1 Reset pin for QFN-33 package
  - Four I/O modes:
    - Quasi-bidirectional input/output
    - Push-Pull output
    - Open-Drain output
    - Input only with high impendence
  - Optional TTL/Schmitt trigger input
  - I/O pin can be configured as interrupt source with edge/level setting
  - Supports high driver and high sink I/O mode

- Supports software selectable slew rate control
- GPIO built-in Pull-up/Pull-low resistor for selection

- Timer
  - Provides two channel 32-bit Timers; one 8-bit pre-scalar counter with 24-bit up-timer for each timer
  - Independent clock source for each timer
  - Provides One-shot, Periodic, Toggle and Continuous operation modes
  - 24-bit up counter value is readable through CNT (Timer Data Register)
  - Provides trigger counting/free counting/counter reset function triggered by external capture pin or internal comparator signal
  - Supports event counter function
  - Supports Toggle Output mode
  - Supports wake-up from Idle or Power-down mode
  - Timer0, Timer1 and Systick provided with Continuous capture function to capture at most 4 edges continuously on one signal
- Continuous Capture
  - Timer0, Timer1 and Systick have support Continuous capture function can Continuous Capture 4 edge on one signal
- Enhanced Input Capture
  - One unit of 24-bit input capture counter
  - Capture surce:
    - I/O inputs: ECAP0, ECAP1 and ECAP2
    - PWM Trigger
    - ADC Trigger
- WDT (Watchdog Timer)
  - Programmable clock source and time-out period
  - Supports wake-up function in Power-down mode and Idle mode
  - Interrupt or reset selectable on watchdog time-out
- PWM
  - Supports a built-in 16-bit PWM clock generators, providing six PWM outputs or three complementary paired PWM outputs
  - Shared same as clock source, clock divider, period and dead-zone generator
  - Supports group/synchronous/independent/ complementary modes
  - Supports One-shot or Auto-reload mode
  - Supports Edge-aligned and Center-aligned type
  - Supports Asymmetric mode
  - Programmable dead-zone insertion between complementary channels
  - Each output has independent polarity setting control

- Hardware fault brake and software brake protections
- Supports rising, falling, central, period, and fault break interrupts
- Supports duty/period trigger A/D conversion
- Timer comparing matching event trigger PWM to do phase change
- Supports comparator event trigger PWM to force PWM output low for current period
- Provides interrupt accumulation function

- USCI (Universal Serial Control Interface Controller)
  - Two USCI devices
  - Supports to be configured as UART, SPI or I²C individually
  - Supports programmable baud-rate generator
- ADC (Analog-to-Digital Converter)
  - 12-bit ADC with 700 kSPS
  - Supports 2 sample/hold
  - Up to 8-ch single-end input from I/O and one internal input from band-gap.
  - Conversion started either by software trigger, PWM trigger, ACMP trigger or external pin trigger
  - Supports temperature sensor for measurement chip temperature
  - Supports Simultaneous and Sequential function to continuous conversion 4 channels maximum.
- Programmable Gain Amplifier (PGA)
  - Supports 8 level gain selects from 1, 2, 3, 5, 7, 9, 11 and 13
  - Unity gain frequency up to 8 MHz
- Analog Comparator
  - Two analog comparators with programmable 16-level internal voltage reference
  - Built-in CRV (comparator reference voltage)
  - Supports Hysteresis function
  - Interrupt when compared results changed
- Hardware Divider
  - Signed (two's complement) integer calculation
  - 32-bit dividend with 16-bit divisor calculation capacity
  - 32-bit quotient and 32-bit remainder outputs (16-bit remainder with sign extends to 32-bit)
  - Divided by zero warning flag
  - 6 HCLK clocks taken for one cycle calculation
  - Waiting for calculation ready automatically when reading quotient and remainder
- ISP (In-System Programming) and ICP (In-Circuit Programming)

- BOD (Brown-out Detector)
  - 8 programmable threshold levels: 4.3V/4.0V/3.7V/3.0V/2.7V/2.4V/2.2V/2.0V
  - Supports Brown-out interrupt and reset option
- 96-bit unique ID
- LVR (Low Voltage Reset)
- Operating Temperature: -40℃~105℃
- Reliability: EFT > ± 4KV, ESD HBM pass 4KV
- Packages:
  - Green package (RoHS)
  - 20-pin TSSOP, 28-pin TSSOP, 33-pin QFN

3 ABBREVIATIONS

Acronym	Description
ACMP	Analog Comparator Controller
ADC	Analog-to-Digital Converter
AHB	Advanced High-Performance Bus
APB	Advanced Peripheral Bus
BOD	Brown-out Detection
BPWM	Basic Pulse Width Modulation
DAP	Debug Access Port
EPWM	Enhanced Pulse Width Modulation
FIFO	First In, First Out
FMC	Flash Memory Controller
GPIO	General-Purpose Input/Output
HCLK	The Clock of Advanced High-Performance Bus
HIRC	48 MHz Internal High Speed RC Oscillator
HXT	4~24 MHz External High Speed Crystal Oscillator
ICP	In Circuit Programming
ISP	In System Programming
ISR	Interrupt Service Routine
LDO	Low Dropout Regulator
LIRC	10 kHz internal low speed RC oscillator (LIRC)
LXT	32.768 kHz External Low Speed Crystal Oscillator
NVIC	Nested Vectored Interrupt Controller
PCLK	The Clock of Advanced Peripheral Bus
PWM	Pulse Width Modulation
SPI	Serial Peripheral Interface
SPS	Samples per Second
TMR	Timer Controller
UART	Universal Asynchronous Receiver/Transmitter
UCID	Unique Customer ID
WDT	Watchdog Timer

Table 3-1 List of Abbreviations

4 PARTS INFORMATION LIST AND PIN CONFIGURATION

4.1 NuMicro® Mini57 Naming Rule

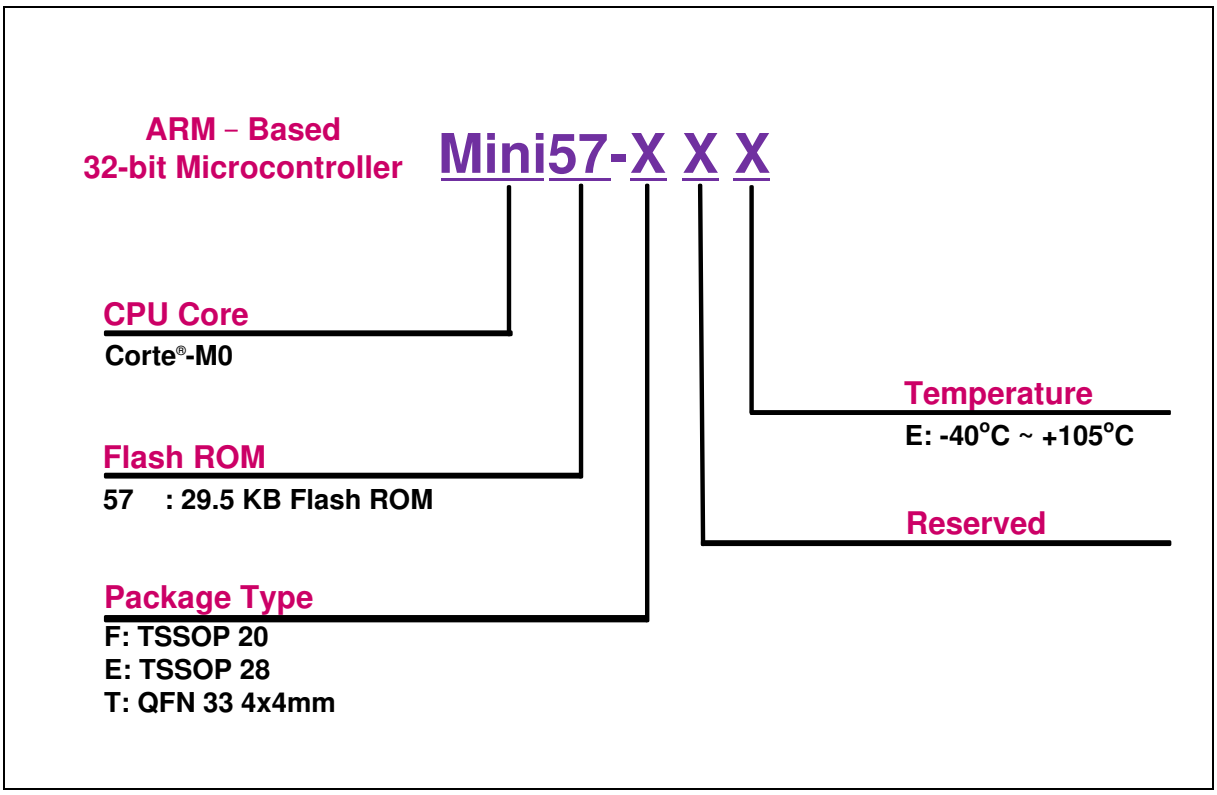

Figure 4.1-1 NuMicro® Mini57 Series Selection Code

4.2 NuMicro® Mini57 Series Selection Guide

* USCI can be set to UART, SPI or I^2C

Part Number	APROM	RAM	Data Flash	ISP Loader ROM	I/O	Timer	Connectivity	Comp.	PWM	ADC	PGA	ISP ICP IAP	IRC 10 kHz 48 MHz	Package
							USCI*							
Mini57TDE	29.5 KB	4 KB	Configurable	2.5 KB	up to 22	2x32-bit	2	2	8	8x12-bit	v	v	v	QFN33(4x4)
Mini57EDE	29.5 KB	4 KB	Configurable	2.5 KB	up to 22	2x32-bit	2	2	8	8x12-bit	v	v	v	TSSOP28
Mini57FDE	29.5 KB	4 KB	Configurable	2.5 KB	up to 18	2x32-bit	2	2	8	8x12-bit	v	v	v	TSSOP20

Table 4.2-1 NuMicro® Mini57 Series Selection Guide

4.3 Pin Configuration

4.3.1 TSSOP 28-Pin

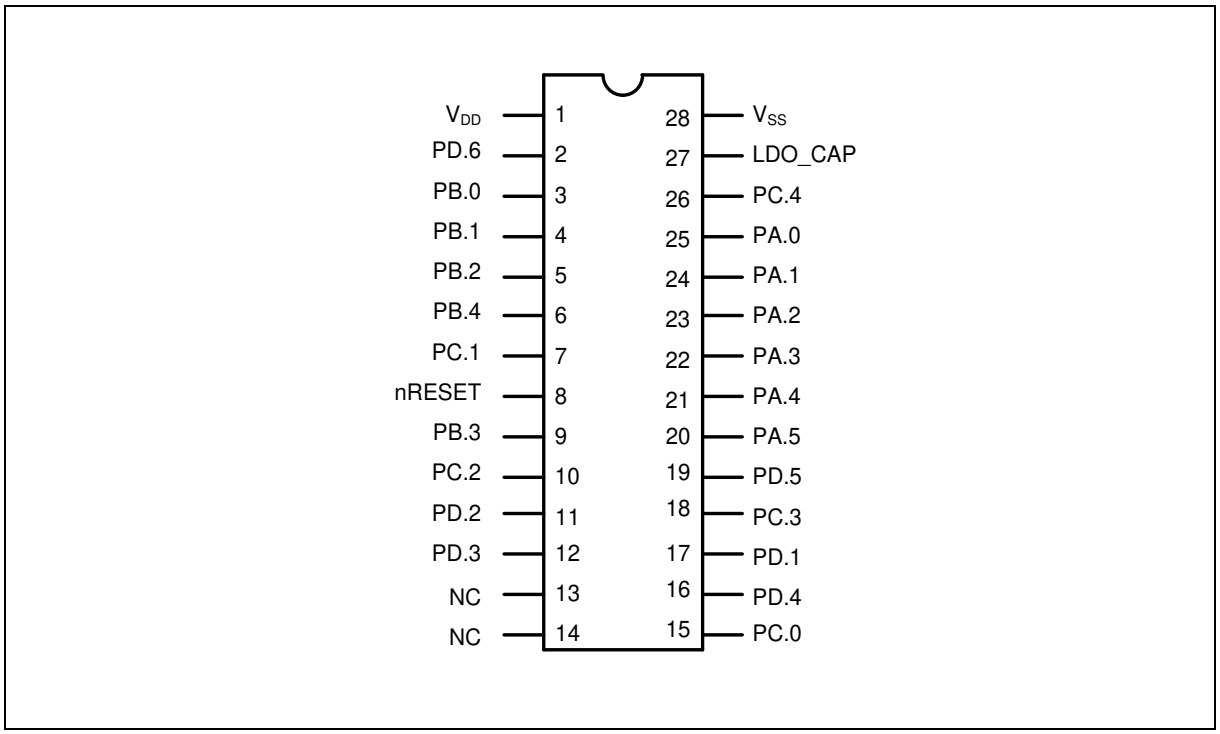

Figure 4.3-1 NuMicro® Mini57 Series TSSOP 28-pin Diagram

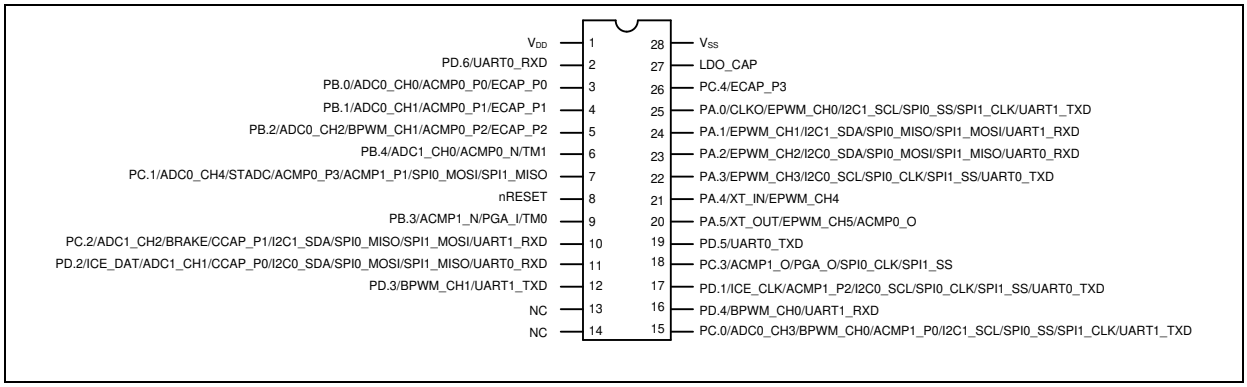

Figure 4.3-2 NuMicro® Mini57 Series TSSOP 28-pin Multi-function Diagram

4.3.2 TSSOP 20-Pin

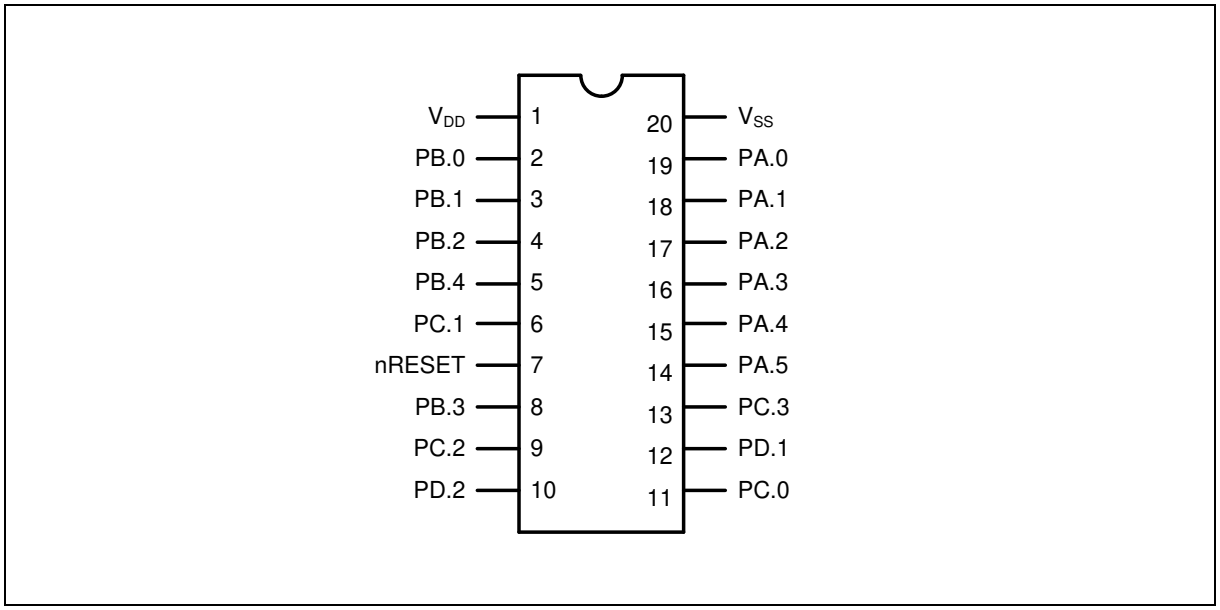

Figure 4.3-3 NuMicro® Mini57 Series TSSOP 20-pin Diagram

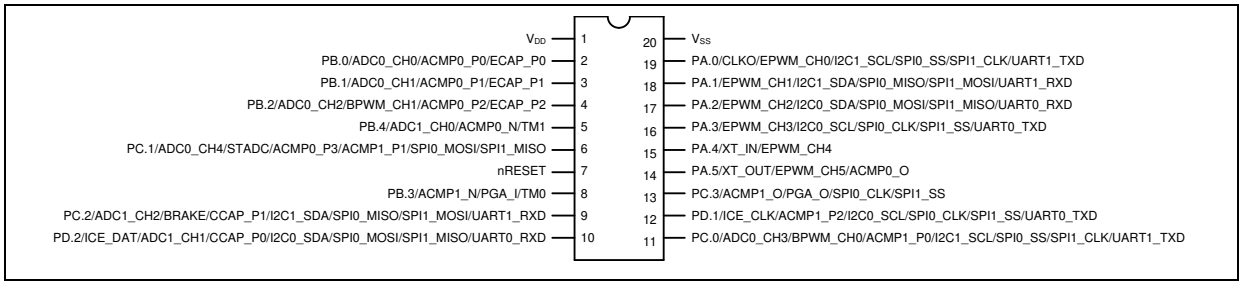

Figure 4.3-4 NuMicro® Mini57 Series TSSOP 20-pin Multi-function Diagram

4.3.3 QFN 33-Pin

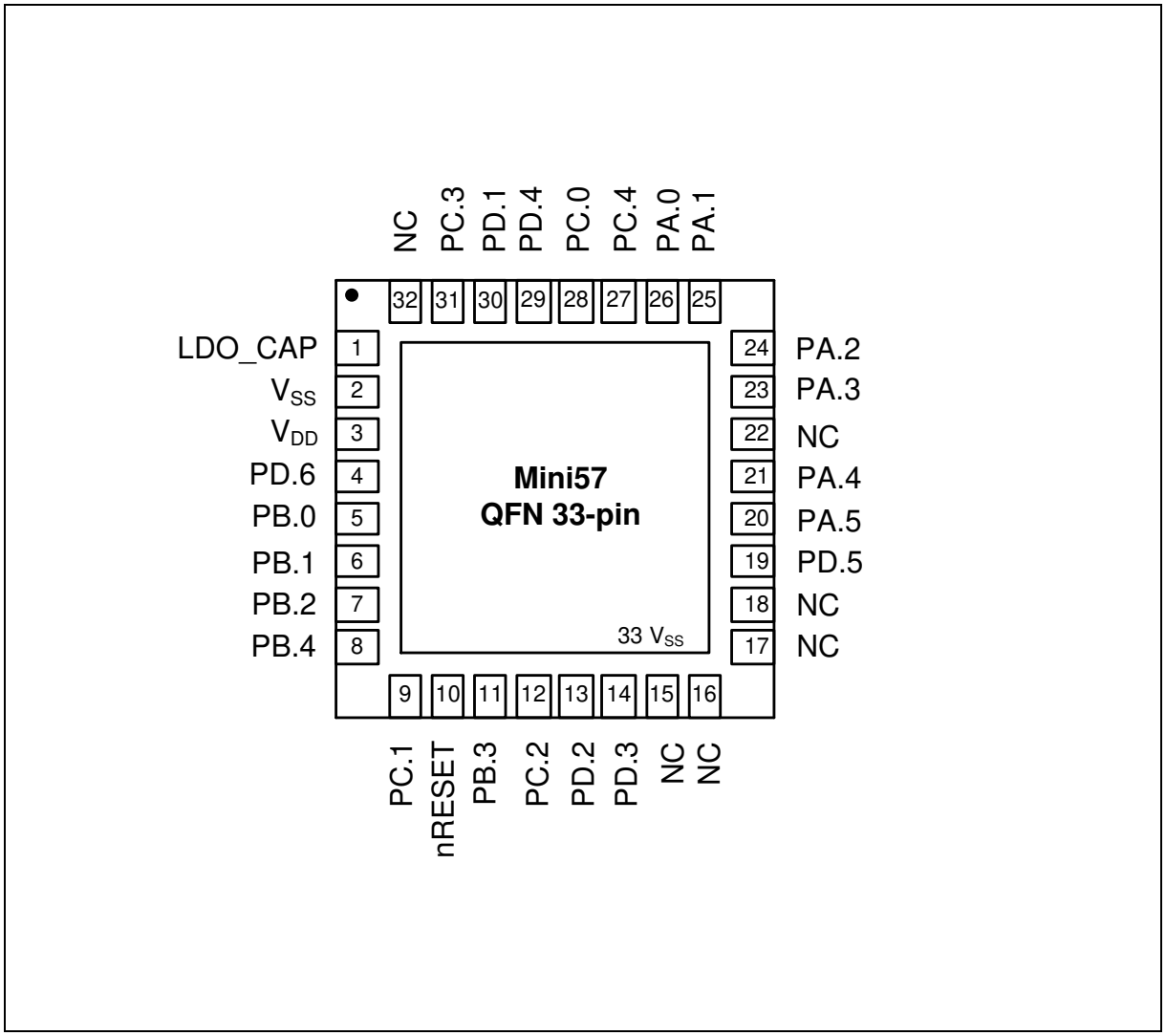

Figure 4.3-5 NuMicro® Mini57 Series QFN 33-pin Diagram

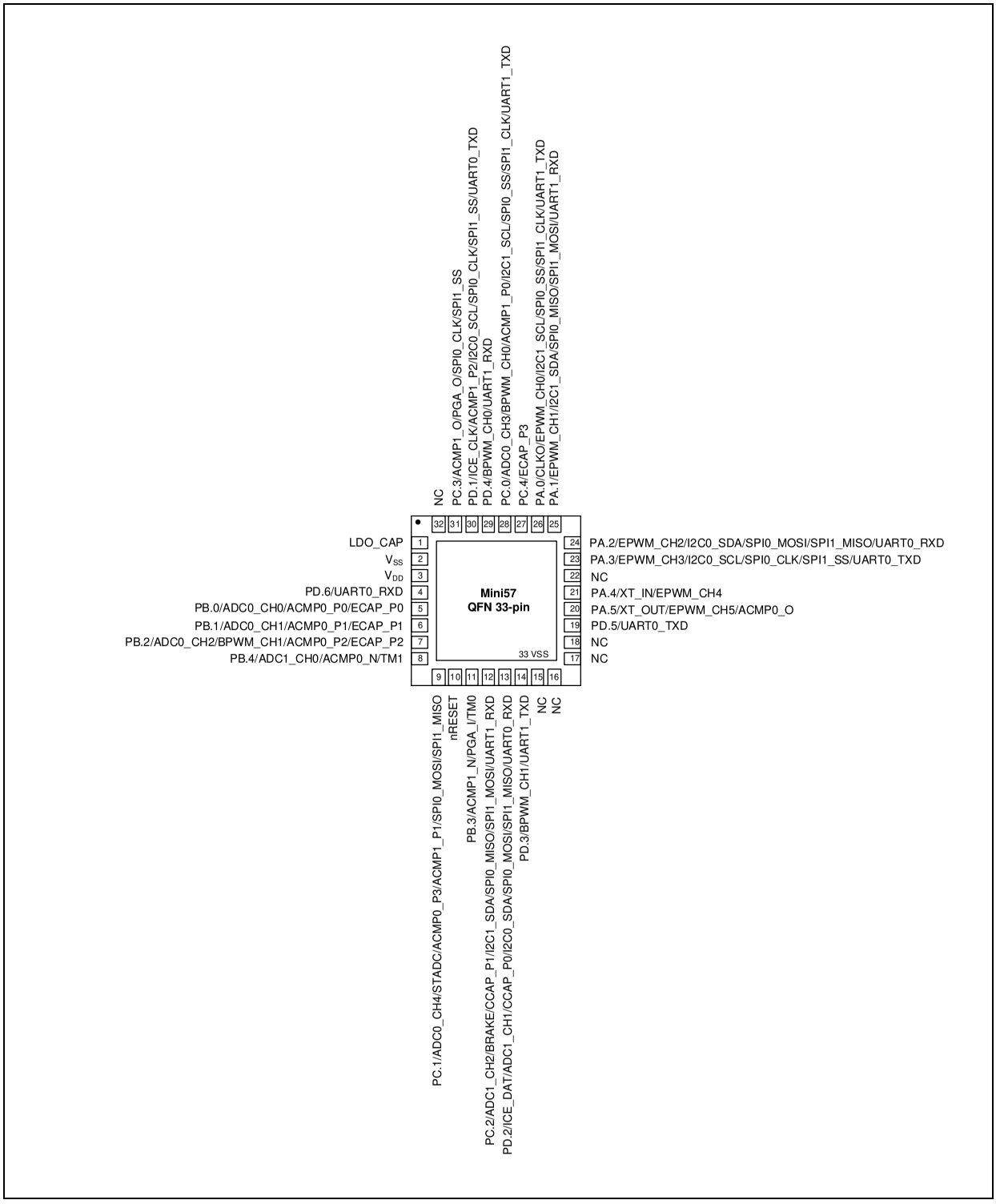

Figure 4.3-6 NuMicro® Mini57 Series QFN 33-pin Multi-function Diagram

4.4 Pin Description

4.4.1 Mini57 Series Pin Description

MFP* = Multi-function pin. (Refer to section SYS_GPx_MFP)

PA.0 MFP0 means SYS_GPA_MFP[3:0]=0x0.

PA.4 MFP5 means SYS_GPA_MFP[19:16]=0x5.

MFP only configures the ouput data or input data of PAD; the direction of PAD is configured by PMD.

The priority of MFP in the same multi-function was GPA > GPB > GPC > GPD.

The type A of multi-function needs to be configured to be input port.

4.4.1.1 Mini57 Series TSSOP28 Pin Description

Pin No.	Pin Name	Type	MFP*	Description
1	V_{DD}	A	MFP0	Power supply for I/O ports and LDO source for internal PLL and digital function.
2	PD.6	I/O	MFP0	General purpose digital I/O pin.
	UART0_RXD	I	MFPB	Data receiver input pin for UART0.
3	PB.0	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH0	A	MFP2	ADC0 channel0 analog input.
	ACMP0_P0	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P0	I	MFP7	Enhanced Input Capture input pin
4	PB.1	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH1	A	MFP2	ADC0 channel1 analog input.
	ACMP0_P1	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P1	I	MFP7	Enhanced Input Capture input pin
5	PB.2	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH2	A	MFP2	ADC0 channel2 analog input.
	BPWM_CH1	I/O	MFP3	PWM channel1 output/capture input.
	ACMP0_P2	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P2	I	MFP7	Enhanced Input Capture input pin
6	PB.4	I/O	MFP0	General purpose digital I/O pin.
	ADC1_CH0	A	MFP2	ADC1 channel0 analog input.
	ACMP0_N	A	MFP4	Analog comparator0 negative input pin.
	TM1	I/O	MFP7	Timer1 event counter input / toggle output
7	PC.1	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH4	A	MFP2	ADC0 channel4 analog input.

Pin No.	Pin Name	Type	MFP*	Description
	STADC	I	MFP3	ADC external trigger input.
	ACMP0_P3	A	MFP4	Analog comparator0 positive input pin.
	ACMP1_P1	A	MFP5	Analog comparator1 positive input pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
8	nRESET	I	MFP0	External reset input: active LOW, with an internal pull-up. Set this pin low reset to initial state.
9	PB.3	I/O	MFP0	General purpose digital I/O pin.
	ACMP1_N	A	MFP5	Analog comparator1 negative input pin.
	PGA_I	A	MFP6	PGA input pin
	TM0	I/O	MFP7	Timer0event counter input / toggle output
10	PC.2	I/O	MFP0	General purpose digital I/O pin.
	ADC1_CH2	A	MFP2	ADC1 channel2 analog input.
	BRAKE	I	MFP3	Brake input pin of EPWM.
	CCAP_P1	I	MFP7	Timer Continuous Capture input pin
	I2C1_SDA	I/O	MFP8	I^2C1 data input/output pin.
	SPI0_MISO	I/O	MFP9	SPI0 1st MISO (Master In, Slave Out) pin.
	SPI1_MOSI	I/O	MFPA	SPI1 MOSI (Master Out, Slave In) pin.
	UART1_RXD	I	MFPB	Data receiver input pin for UART1.
11	PD.2	I/O	MFP0	General purpose digital I/O pin.
	ICE_DAT	I/O	MFP1	Serial wired debugger data pin
	ADC1_CH1	A	MFP2	ADC1 channel1 analog input.
	CCAP_P0	I	MFP7	Timer Continuous Capture input pin
	I2C0_SDA	I/O	MFP8	I^2C0 data input/output pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
	UART0_RXD	I	MFPB	Data receiver input pin for UART0.
12	PD.3	I/O	MFP0	General purpose digital I/O pin.
	BPWM_CH1	I/O	MFP3	PWM channel1 output/capture input.
	UART1_TXD	O	MFPB	Data transmitter output pin for UART1.
13	NC			No Connection
14	NC			No Connection
15	PC.0	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH3	A	MFP2	ADC0 channel3 analog input.

Pin No.	Pin Name	Type	MFP*	Description
	BPWM_CH0	I/O	MFP3	PWM channel0 output/capture input.
	ACMP1_P0	A	MFP5	Analog comparator1 positive input pin.
	I2C1_SCL	I/O	MFP8	I^2C1 clock pin.
	SPI0_SS	I/O	MFP9	SPI0 slave select pin.
	SPI1_CLK	I/O	MFPA	SPI1 serial clock pin
	UART1_TXD	O	MFPB	Data transmitter output pin for UART1.
16	PD.4	I/O	MFP0	General purpose digital I/O pin.
	BPWM_CH0	I/O	MFP3	PWM channel0 output/capture input.
	UART1_RXD	I	MFPB	Data receiver input pin for UART1.
17	PD.1	I/O	MFP0	General purpose digital I/O pin.
	ICE_CLK	I	MFP1	Serial wired debugger clock pin
	ACMP1_P2	A	MFP5	Analog comparator1 positive input pin.
	I2C0_SCL	I/O	MFP8	I^2C0 clock pin.
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
	UART0_TXD	O	MFPB	Data transmitter output pin for UART0.
18	PC.3	I/O	MFP0	General purpose digital I/O pin.
	ACMP1_O	O	MFP5	Analog comparator1 output.
	PGA_O	A	MFP6	PGA output pin
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
19	PD.5	I/O	MFP0	General purpose digital I/O pin.
	UART0_TXD	O	MFPB	Data transmitter output pin for UART0.
20	PA.5	I/O	MFP0	General purpose digital I/O pin.
	XT_OUT	O	MFP1	External 4~24 MHz (high speed) crystal output pin.
	EPWM_CH5	I/O	MFP3	PWM channel5 output/capture input.
	ACMP0_O	O	MFP4	Analog comparator0 output.
21	PA.4	I/O	MFP0	General purpose digital I/O pin.
	XT_IN	I	MFP1	External 4~24 MHz (high speed) crystal input pin.
	EPWM_CH4	I/O	MFP3	PWM channel4 output/capture input.
22	PA.3	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH3	I/O	MFP3	PWM channel3 output/capture input.
	I2C0_SCL	I/O	MFP8	I^2C0 clock pin.

Pin No.	Pin Name	Type	MFP*	Description
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
	UART0_TXD	O	MFPB	Data transmitter output pin for UART0.
23	PA.2	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH2	I/O	MFP3	PWM channel2 output/capture input.
	I2C0_SDA	I/O	MFP8	I^2C0 data input/output pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
	UART0_RXD	I	MFPB	Data receiver input pin for UART0.
24	PA.1	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH1	I/O	MFP3	PWM channel1 output/capture input.
	I2C1_SDA	I/O	MFP8	I^2C1 data input/output pin.
	SPI0_MISO	I/O	MFP9	SPI0 1st MISO (Master In, Slave Out) pin.
	SPI1_MOSI	I/O	MFPA	SPI1 MOSI (Master Out, Slave In) pin.
	UART1_RXD	I	MFPB	Data receiver input pin for UART1.
25	PA.0	I/O	MFP0	General purpose digital I/O pin.
	CLKO	O	MFP1	Clock Out
	EPWM_CH0	I/O	MFP3	PWM channel0 output/capture input.
	I2C1_SCL	I/O	MFP8	I^2C1 clock pin.
	SPI0_SS	I/O	MFP9	SPI0 slave select pin.
	SPI1_CLK	I/O	MFPA	SPI1 serial clock pin
	UART1_TXD	O	MFPB	Data transmitter output pin for UART1.
26	PC.4	I/O	MFP0	General purpose digital I/O pin.
	ECAP_P3	I	MFP7	Enhanced Input Capture input pin
27	LDO_CAP	A	MFP0	LDO output pin.
28	V_{SS}	A	MFP0	Ground pin for digital circuit.

Table 4.4-1 TSSOP28 Pin Description

4.4.1.2 Mini57 Series TSSOP20 Pin Description

Pin No.	Pin Name	Type	MFP*	Description
1	V_{DD}	A	MFP0	Power supply for I/O ports and LDO source for internal PLL and digital function.
2	PB.0	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH0	A	MFP2	ADC0 channel0 analog input.
	ACMP0_P0	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P0	I	MFP7	Enhanced Input Capture input pin
3	PB.1	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH1	A	MFP2	ADC0 channel1 analog input.
	ACMP0_P1	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P1	I	MFP7	Enhanced Input Capture input pin
4	PB.2	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH2	A	MFP2	ADC0 channel2 analog input.
	BPWM_CH1	I/O	MFP3	PWM channel1 output/capture input.
	ACMP0_P2	A	MFP4	Analog comparator0 positive input pin.
	ECAP_P2	I	MFP7	Enhanced Input Capture input pin
5	PB.4	I/O	MFP0	General purpose digital I/O pin.
	ADC1_CH0	A	MFP2	ADC1 channel0 analog input.
	ACMP0_N	A	MFP4	Analog comparator0 negative input pin.
	TM1	I/O	MFP7	Timer1 event counter input / toggle output
6	PC.1	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH4	A	MFP2	ADC0 channel4 analog input.
	STADC	I	MFP3	ADC external trigger input.
	ACMP0_P3	A	MFP4	Analog comparator0 positive input pin.
	ACMP1_P1	A	MFP5	Analog comparator1 positive input pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
7	nRESET	I	MFP0	External reset input: active LOW, with an internal pull-up. Set this pin low reset to initial state.
8	PB.3	I/O	MFP0	General purpose digital I/O pin.
	ACMP1_N	A	MFP5	Analog comparator1 negative input pin.
	PGA_I	A	MFP6	PGA input pin
	TM0	I/O	MFP7	Timer0event counter input / toggle output
9	PC.2	I/O	MFP0	General purpose digital I/O pin.

Pin No.	Pin Name	Type	MFP*	Description
	ADC1_CH2	A	MFP2	ADC1 channel2 analog input.
	BRAKE	I	MFP3	Brake input pin of EPWM.
	CCAP_P1	I	MFP7	Timer Continuous Capture input pin
	I2C1_SDA	I/O	MFP8	I^2C1 data input/output pin.
	SPI0_MISO	I/O	MFP9	SPI0 1st MISO (Master In, Slave Out) pin.
	SPI1_MOSI	I/O	MFPA	SPI1 MOSI (Master Out, Slave In) pin.
	UART1_RXD	I	MFPB	Data receiver input pin for UART1.
10	PD.2	I/O	MFP0	General purpose digital I/O pin.
	ICE_DAT	I/O	MFP1	Serial wired debugger data pin
	ADC1_CH1	A	MFP2	ADC1 channel1 analog input.
	CCAP_P0	I	MFP7	Timer Continuous Capture input pin
	I2C0_SDA	I/O	MFP8	I^2C0 data input/output pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
	UART0_RXD	I	MFPB	Data receiver input pin for UART0.
11	PC.0	I/O	MFP0	General purpose digital I/O pin.
	ADC0_CH3	A	MFP2	ADC0 channel3 analog input.
	BPWM_CH0	I/O	MFP3	PWM channel0 output/capture input.
	ACMP1_P0	A	MFP5	Analog comparator1 positive input pin.
	I2C1_SCL	I/O	MFP8	I^2C1 clock pin.
	SPI0_SS	I/O	MFP9	SPI0 slave select pin.
	SPI1_CLK	I/O	MFPA	SPI1 serial clock pin
	UART1_TXD	O	MFPB	Data transmitter output pin for UART1.
12	PD.1	I/O	MFP0	General purpose digital I/O pin.
	ICE_CLK	I	MFP1	Serial wired debugger clock pin
	ACMP1_P2	A	MFP5	Analog comparator1 positive input pin.
	I2C0_SCL	I/O	MFP8	I^2C0 clock pin.
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
	UART0_TXD	O	MFPB	Data transmitter output pin for UART0.
13	PC.3	I/O	MFP0	General purpose digital I/O pin.
	ACMP1_O	O	MFP5	Analog comparator1 output.
	PGA_O	A	MFP6	PGA output pin

Pin No.	Pin Name	Type	MFP*	Description
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
14	PA.5	I/O	MFP0	General purpose digital I/O pin.
	XT_OUT	O	MFP1	External 4~24 MHz (high speed) crystal output pin.
	EPWM_CH5	I/O	MFP3	PWM channel5 output/capture input.
	ACMP0_O	O	MFP4	Analog comparator0 output.
15	PA.4	I/O	MFP0	General purpose digital I/O pin.
	XT_IN	I	MFP1	External 4~24 MHz (high speed) crystal input pin.
	EPWM_CH4	I/O	MFP3	PWM channel4 output/capture input.
16	PA.3	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH3	I/O	MFP3	PWM channel3 output/capture input.
	I2C0_SCL	I/O	MFP8	I^2C0 clock pin.
	SPI0_CLK	I/O	MFP9	SPI0 serial clock pin.
	SPI1_SS	I/O	MFPA	SPI1 slave select pin
	UART0_TXD	O	MFPB	Data transmitter output pin for UART0.
17	PA.2	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH2	I/O	MFP3	PWM channel2 output/capture input.
	I2C0_SDA	I/O	MFP8	I^2C0 data input/output pin.
	SPI0_MOSI	I/O	MFP9	SPI0 1st MOSI (Master Out, Slave In) pin.
	SPI1_MISO	I/O	MFPA	SPI1 MISO (Master In, Slave Out) pin.
	UART0_RXD	I	MFPB	Data receiver input pin for UART0.
18	PA.1	I/O	MFP0	General purpose digital I/O pin.
	EPWM_CH1	I/O	MFP3	PWM channel1 output/capture input.
	I2C1_SDA	I/O	MFP8	I^2C1 data input/output pin.
	SPI0_MISO	I/O	MFP9	SPI0 1st MISO (Master In, Slave Out) pin.
	SPI1_MOSI	I/O	MFPA	SPI1 MOSI (Master Out, Slave In) pin.
	UART1_RXD	I	MFPB	Data receiver input pin for UART1.
19	PA.0	I/O	MFP0	General purpose digital I/O pin.
	CLKO	O	MFP1	Clock Out
	EPWM_CH0	I/O	MFP3	PWM channel0 output/capture input.
	I2C1_SCL	I/O	MFP8	I^2C1 clock pin.
	SPI0_SS	I/O	MFP9	SPI0 slave select pin.
	SPI1_CLK	I/O	MFPA	SPI1 serial clock pin