



Panchip Microelectronics Co., Ltd.

PAN5010

Datasheet

Video Processing SoC

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Abbreviation

ADC	Analog-to-Digital Converter
BOD	Brown-out Detector
DDR	Double Data Rate
DPLL	Digital PhaseLockedLoop
FPU	Floating-point Unit
GPIO	General-purpose Input/Output
I2C	Inter-Integrated Circuit
ISP	Image Signal Processor
LDO	Low Dropout Regulator
LVR	Low Voltage Reset
MCU	Microcontroller Unit
MPU	Memory Protection Unit
NVIC	Nested Vectored Interrupt Controller
PWM	Pulse Width Modulation
SIP	System-In-Package
SPI	Serial Peripheral Interface
SRAM	Static Random Access Memory
UART	Universal Asynchronous Receiver/Transmitters
WDT	Watchdog Timer
WWDT	Window Watchdog Timer

1 General Description

The PAN5010 is a video processing SoC which has integrated 32-bit MCU, ISP, JPEG and H.264. The SOC is specially designed for accelerating video streaming performance, while H.264 encoder and JPEG encoder are mainly used for constructing the arts used in video streaming.

The main frequency of PAN5010 MCU can run up to 200MHz, and it has built-in 4KB I-Cache and 16KB D-Cache. I-Cache is used to cache commands from SPI Flash, and D-Cache is used to cache DDR1 data. Meanwhile, 1024K bytes of embedded Flash and 8K bytes of SRAM are also built into the PAN5010.

The PAN5010 has integrated with video encoder (H.264), JPEG codec, CMOS sensor interface, image signal processor (ISP), ADC, etc. PAN5010 has many high-performance peripheral functions, such as up to 41 general-purpose I/O ports, three 24-bit timers, four UARTs, two SPI interfaces, two I2C interfaces, and one 16-bit PWM providing 7 channels Generator, a 6-channel 12-bit ADC, watchdog timer, window watchdog timer and a power-down detector. PAN5010 has the characteristics of high integration, high anti-interference, and high reliability. It is very suitable for drone aerial photography, baby monitor, smart toys, video doorbell and other monitoring applications.

1.1 Key Features

- **Core**
 - MCU core running up to 200MHz with 4KB I-Cache & 16KB D-Cache
 - Supports DSP extension with hardware divider
 - Supports IEEE 754 compliant Floating-point Unit (FPU)
 - Supports Memory Protection Unit (MPU)
 - One 24-bit system timer
 - Supports Low Power Sleep mode by WFI and WFE instructions
 - Single-cycle 32-bit hardware multiplier
 - Supports programmable 16 level priorities of Nested Vectored Interrupt Controller (NVIC)
 - Supports programmable mask-able interrupts
- **Memory**
 - 1024 KB Flash memory for program memory
 - 8 KB SRAM for internal RAM (SRAM)
 - 4 KB I-Cache used to cache instruction or literal data from SPI Flash
 - 16KB D-Cache used to cache data from DDR1 SDRAM
 - 64/128/256Mb SDRAM with DDR1 used for image video cache
- **Clock Control**
 - Built-in 16MHz internal high speed RC oscillator (HIRC) for system operation
 - Built-in 32 kHz internal low speed RC oscillator (LIRC) for lower power control
 - Support external 16Mhz crystal
 - 5 independent DPLLs for DDR/MCU/ISP/H264/Sensor
- **Video Input**

- Only support DVP interface, MIPI is not supported
- Support ITU-R BT 601/656 or RGB Bayer data
- Support 8/10-bit parallel input
- Pixel clock configurable, max 84M
- Vsync/Hsync configurable
- **ISP**
 - Supports image size: (1920×1080), and any size from scaling down
 - RGB bayer demosaicing
 - Black level compensation
 - Defect pixel detection / correction
 - Lens shade correction
 - Filtering (noise, sharpness/blurring)
 - Auto white balancing
 - Auto exposure measurement
 - Auto focus measurement
 - Histogram calculation
 - Color correction matrix
 - Wide dynamic range
 - Gamma correction
 - Color space conversion to YCbCr
 - Image scaling
- **H.264 Encoder**
 - Supports ITU-T Recommendation H.264 Coding, Standard (MPEG-4 part 10) baseline profile Level 3.1 standard
 - Supports up to the 720p+30w @50fps video resolution
 - Supports YUV 4:2:0 video input format (MB base)
 - Rate control
 - Video stabilization
 - Encoder accelerate engine
- **JPEG Encoder**
 - Baseline sequential mode JPEG codec function compliant with ISO/IEC 10918-1 international JPEG standard supported.
 - Support to encode interleaved YUV 4:2:2/4:2:0 and gray-level (Y only) format image
- **I/O Port**
 - Up to 100Mhz
 - Supports Push-pull output, Open-drain output, Input only with high impedance
 - Schmitt trigger input
- **SDIO**
 - Two master SDIO device
 - Full compliance with SD Memory Card Specifications Version 2.0
 - Full compliance with SD I/O Card Specification Version 2.0: card support for two different databus modes: 1-bit (default) and 4-bit

- **Timer**
 - Provides three Timers; each timer with 24-bit up-timer
- **WDT**
 - 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
- **WWDT**
 - Includes a 6-bit down counter, a 6-bit comparator, and a 4-bit prescaler
 - Programmable maximum 11-bit prescale counter period from 4-bit value (PSCSEL) to WWDT counter
- **PWM**
 - One built-in 16-bit PWM generators, providing seven PWM outputs
- **UART**
 - Four UART devices
 - Buffered receiver and transmitter, each with 168-byte FIFO
- **SPI**
 - Two SPI device
 - Both supports Master or Slave mode
- **I2C**
 - Two I2C devices
 - Supports Master/Slave mode
 - Bidirectional data transfer between masters and slaves
- **ADC (Analog-to-Digital Converter)**
 - Analog input voltage range: 0 ~ 2.4V or 0~1.4V
 - 12-bit resolution
 - Up to six single-end analog input channels
 - Maximum ADC clock frequency is 24 MHz, and 14 ADC clocks per sample
- **BOD (Brown-out Detector)**
 - With 4 programmable threshold levels: 3.0V/2.7V/2.4V/2.2V
 - Supports brown-out interrupt and reset option
- **LVR (Low Voltage Reset)**
 - Threshold voltage level: $1.8 \pm 0.1V$
- **Package**
 - QFN56 package, 7×7 mm
- **DC/AC Characteristics**
 - Operating Temperature: $-40^{\circ}C \sim 85^{\circ}C$
- ESD: HBM $\pm 5KV$
 - Power
 - DPLL power supply: 1.2V



- Digital core power supply: 1.2V
- DDR power supply: 2.4~2.7V
- Universal IO power supply(SAVDD): 2.8~3.6V
- Camera Sensor IO power built in 1.8V or powered externally
 - Power consumption
- 720P@50FPS: 550mA

1.2 Typical Applications

- Drone aerial photography
- Baby monitor
- Smart toys
- Video doorbells
- Other monitoring applications

2 Products List

Name	FLASH(MB)	SDRAM(Mb)	I2C	SPI	UART	DMA	Package
PAN5010B1AP	1	64	2	2	4	1	QFN56
PAN5010B1BP	1	128	2	2	4	1	QFN56
PAN5010B1CP	1	256	2	2	4	1	QFN56

3 Block Diagram

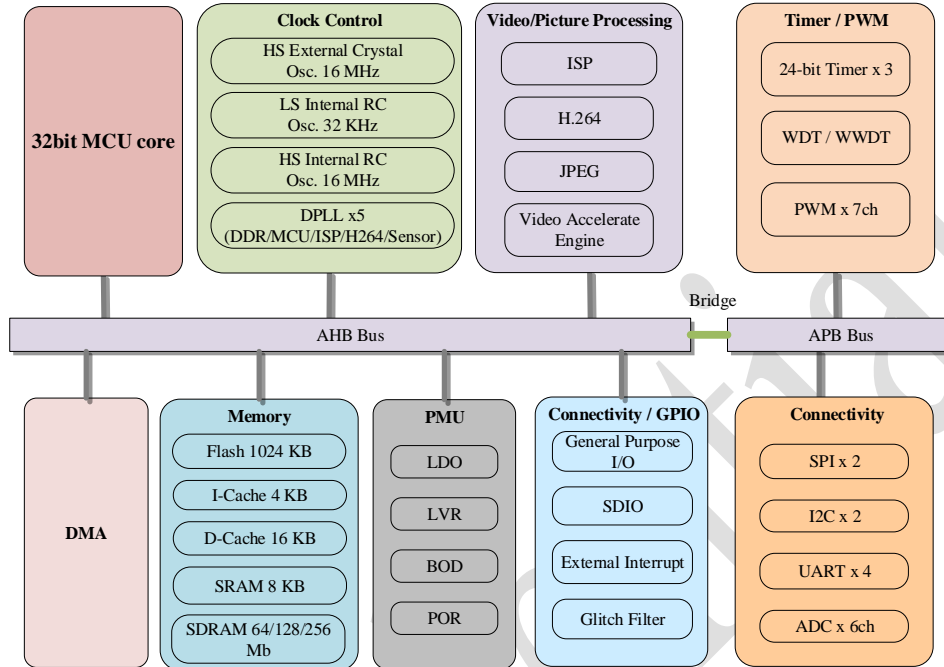


Figure 3-1 PAN5010 Block Diagram

4 Pin Information

4.1 QFN-56 Diagram

PAN5010 with QFN56 pin package pin-out is shown in Figure 4-1.

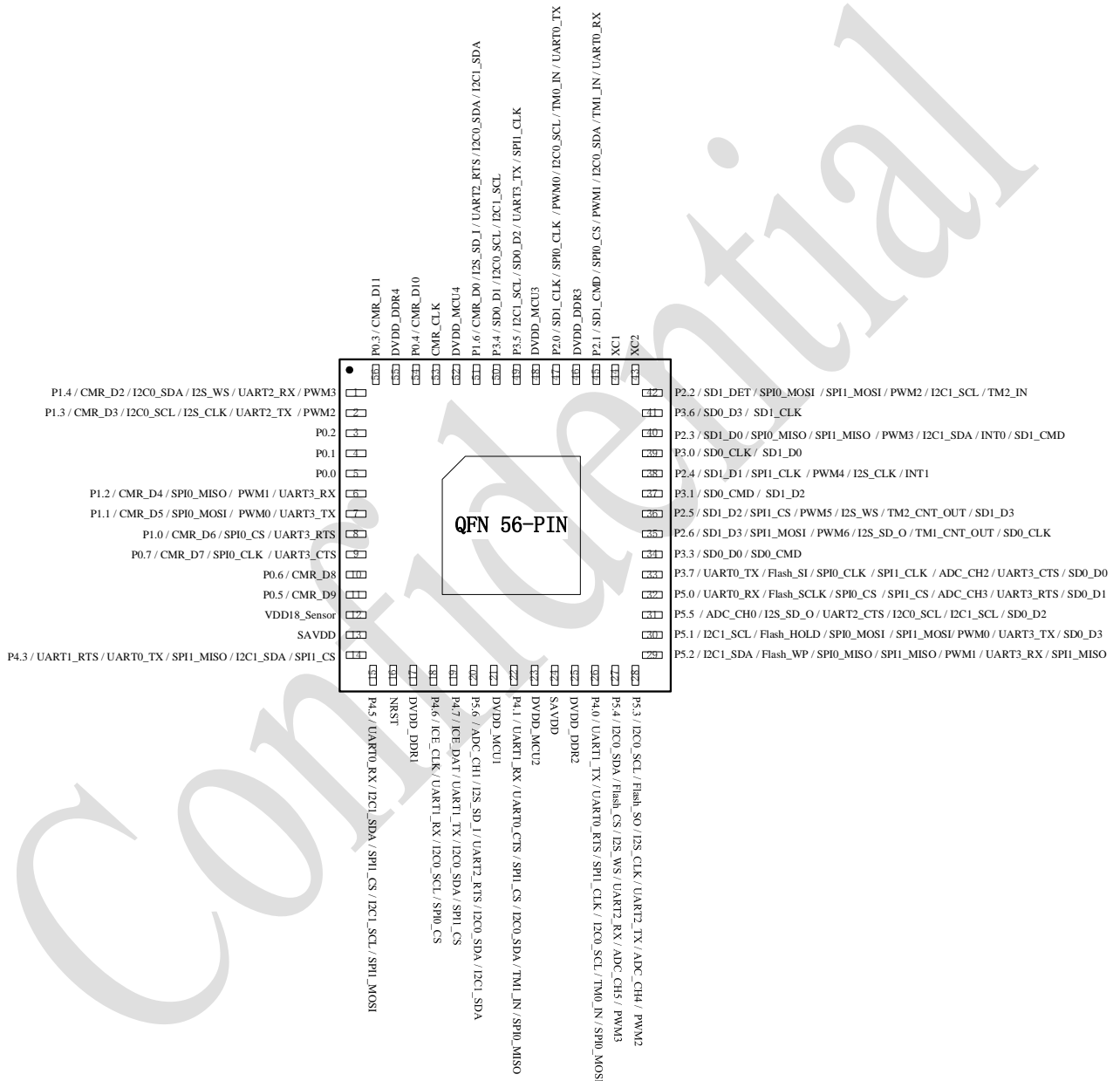


Figure 4-1 QFN56 Pin Diagram

4.2 QFN-56 Descriptions

Detail pin descriptions see Table 4-1.

Table 4-1 QFN56 Pin Descriptions

Pin Number	Pin Name	Pin Type	Description
1	P1.4	I/O	General purpose digital I/O pin
	CMR_D2	DI	Camera D2 input pin
	I2C0_SDA	DI/DO	I2C0 data pin
	I2S_WS	DI	I2S WS pin
	UART2_RX	DI	UART2 RX pin
	PWM3	DO	PWM0 channel3 output pin
2	P1.3	I/O	General purpose digital I/O pin
	CMR_D3	DI	Camera D3 input pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	I2S_CLK	DI	I2S CLK pin
	UART2_TX	DO	UART2 TX pin
	PWM2	DO	PWM0 channel2 output pin
3	P0.2	I/O	General purpose digital I/O pin
4	P0.1	I/O	General purpose digital I/O pin
5	P0.0	I/O	General purpose digital I/O pin
6	P1.2	I/O	General purpose digital I/O pin
	CMR_D4	DI	Camera D4 input pin
	SPI0_MISO	DI/DO	SPI0 MISO pin
	PWM1	DO	PWM0 channel1 output pin
	UART3_RX	DI	UART3 RX pin
7	P1.1	I/O	General purpose digital I/O pin
	CMR_D5	DI	Camera D5 input pin
	SPI0_MOSI	DI/DO	SPI0 MOSI pin
	PWM0	DO	PWM0 channel0 output pin
	UART3_TX	DO	UART3 TX pin
8	P1.0	I/O	General purpose digital I/O pin
	CMR_D6	DI	Camera D6 input pin
	SPI0_CS	DO	SPI0 CS pin
	UART3_RTS	DO	UART3 RTS pin
9	P0.7	I/O	General purpose digital I/O pin
	CMR_D7	DI	Camera D7 input pin
	SPI0_CLK	DI/DO	SPI0 CLK pin
	UART3_CTS	DI	UART3 CTS pin
10	P0.6	I/O	General purpose digital I/O pin
	CMR_D8	DI	Camera D8 input pin

11	P0.5	I/O	General purpose digital I/O pin
	CMR_D9	DI	Camera D9 input pin
12	VDD18_Sensor	P	Power supply for sensor IO
13	SAVDD1	P	Power supply
14	P4.3	I/O	General purpose digital I/O pin
	UART1_RTS	DO	UART1 RTS pin
	UART0_TX	DO	UART0 TX pin
	SPI1_MISO	DI/DO	SPI1 MISO pin
	I2C1_SDA	DI/DO	I2C1 data pin
	SPI1_CS	DI/DO	SPI1 CS pin
15	P4.5	I/O	General purpose digital I/O pin
	UART0_RX	DI	UART0 RX pin
	I2C1_SDA	DI/DO	I2C1 data pin
	SPI1_CS	DI/DO	SPI1 CS pin
	I2C1_SCL	DI/DO	I2C1 CLK pin
	SPI1_MOSI	DI/DO	SPI1 MOSI pin
16	NRST	DI	Reset pin
17	DVDD_DDR1	P	DDR power supply
18	P4.6	I/O	General purpose digital I/O pin
	ICE_CLK	DI	ICE CLK pin
	UART1_RX	DI	UART1 RX pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	SPI0_CS	DI/DO	SPI0 CS pin
19	P4.7	I/O	General purpose digital I/O pin
	ICE_DAT	DI	ICE data pin
	UART1_TX	DO	UART1 TX pin
	I2C0_SDA	DI/DO	I2C0 data pin
	SPI1_CS	DI/DO	SPI1 CS pin
19	P5.6	I/O	General purpose digital I/O pin
	ADC_CH1	AI	ADC channel1 analog input pin
	I2S_SD_I	DI	I2S_SD input pin
	UART2_RTS	DO	UART2 RTS pin
	I2C0_SDA	DI/DO	I2C0 data pin
	I2C1_SDA	DI/DO	I2C1 data pin
21	DVDD_MCU1	P	Digital core
22	P4.1	I/O	General purpose digital I/O pin
	UART1_RX	DI	UART1 RX pin

	UART0_CTS	DI	UART0 CTS pin
	SPI1_CS	DI/DO	SPI1 CS pin
	I2C0_SDA	DI/DO	I2C0 data pin
	TM1_IN	DI	TM1 input pin
	SPI0_MISO	DI/DO	SPI0 MISO pin
23	DVDD_MCU2	P	Digital core
24	SAVDD	P	Power supply
25	DVDD_DDR2	P	DDR power supply
26	P4.0	I/O	General purpose digital I/O pin
	UART1_TX	DO	UART1 TX pin
	UART0_RTS	DO	UART0 RTS pin
	SPI1_CLK	DI/DO	SPI1 CLK pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	TM0_IN	DI	TM0 input pin
	SPI0_MOSI	DI/DO	SPI0 MOSI pin
27	P5.4	I/O	General purpose digital I/O pin
	I2C0_SDA	DI/DO	I2C0 data pin
	I2S_WS	DO	I2S WS pin
	UART2_RX	DI	UART2 RX pin
	ADC_CH5	AI	ADC channel5 analog input pin
	PWM3	DO	PWM0 channel3 output pin
28	P5.3	I/O	General purpose digital I/O pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	I2S_CLK	DI	I2S CLK input pin
	UART2_TX	DO	UART2 TX pin
	ADC_CH4	AI	ADC channel4 analog input pin
	PWM2	DO	PWM0 channel2 output pin
29	P5.2	I/O	General purpose digital I/O pin
	I2C1_SDA	DI/DO	I2C1 data pin
	Flash_WP	DI/DO	Flash WP pin
	SPI0_MISO	DI/DO	SPI0 MISO pin
	SPI1_MISO	DI/DO	SPI1 MISO pin
	PWM1	DO	PWM0 channel1 output pin
	UART3_RX	DI	UART3 RX pin
	SPI1_MISO	DI/DO	SPI1 MISO pin
30	P5.1	I/O	General purpose digital I/O pin
	I2C1_SCL	DI/DO	I2C1 CLK pin

	Flash_HOLD	DI/DO	Flash HOLD pin
	SPI0_MOSI	DI/DO	SPI0 MOSI pin
	SPI1_MOSI	DI/DO	SPI1 MOSI pin
	PWM0	DO	PWM0 channel0 output pin
	UART3_TX	DO	UART3 TX pin
	SD0_D3	DI/DO	SD0 D3 pin
31	P5.5	I/O	General purpose digital I/O pin
	ADC_CH0	AI	ADC channel0 analog input pin
	I2S_SD_O	DO	I2S_SD output pin
	UART2_CTS	DI	UART2 CTS pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	I2C1_SCL	DI/DO	I2C1 CLK pin
	SD0_D2	DI/DO	SD0 D2 pin
32	P5.0	I/O	General purpose digital I/O pin
	UART0_RX	DI	UART0 RX pin
	Flash_SCLK	DO	Flash SCLK output pin
	SPI0_CS	DI/DO	SPI0 CS pin
	SPI1_CS	DI/DO	SPI1 CS pin
	ADC_CH3	AI	ADC channel3 analog input pin
	UART3_RTS	DO	UART3 RTS pin
	SD0_D1	DI/DO	SD0 D1 pin
33	P3.7	I/O	General purpose digital I/O pin
	UART0_TX	DO	UART0 TX pin
	Flash_SI	DI/DO	Flash SI pin
	SPI0_CLK	DI/DO	SPI0 CLK pin
	SPI1_CLK	DI/DO	SPI1 CLK pin
	ADC_CH2	AI	ADC channel2 analog input pin
	UART3_CTS	DI	UART3 CTS pin
	SD0_D0	DI/DO	SD0 D0 pin
34	P3.3	I/O	General purpose digital I/O pin
	SD0_D0	DI/DO	SD0 D0 pin
	SD0_CMD	DI/DO	SD0 CMD pin
35	P2.6	I/O	General purpose digital I/O pin
	SD1_D3	DI/DO	SD1_D3 pin
	SPI1_MOSI	DI/DO	SPI1 MOSI pin
	PWM6	DO	PWM0 channel6 output pin
	I2S_SD_O	DO	I2S_SD output pin

	TM1_CNT_OUT	DO	TM1_CNT output pin
	SD0_CLK	DO	SD0 CLK pin
36	P2.5	I/O	General purpose digital I/O pin
	SD1_D2	DI/DO	SD1_D2 pin
	SPI1_CS	DI/DO	SPI1 CS pin
	PWM5	DO	PWM0 channel5 output pin
	I2S_WS	DO	I2S WS pin
	TM2_CNT_OUT	DO	TM2_CNT output pin
	SD1_D3	DI/DO	SD1 D3 pin
37	P3.1	I/O	General purpose digital I/O pin
	SD0_CMD	DI/DO	SD0 CMD pin
	SD1_D2	DI/DO	SD1 D2 pin
38	P2.4	I/O	General purpose digital I/O pin
	SD1_D1	DI/DO	SD1 D1 pin
	SPI1_CLK	DI/DO	SPI1 CLK pin
	PWM4	DO	PWM0 channel4 output pin
	I2S_CLK	DI	I2S CLK input pin
	INT1	DI	External interrupt pin1
39	P3.0	I/O	General purpose digital I/O pin
	SD0_CLK	DO	SD0 CLK pin
	SD1_D0	DI/DO	SD1 D0 pin
40	P2.3	I/O	General purpose digital I/O pin
	SD1_D0	DI/DO	SD1 D0 pin
	SPI0_MISO	DI/DO	SPI0 MISO pin
	SPI1_MISO	DI/DO	SPI1 MISO pin
	PWM3	DO	PWM0 channel3 output pin
	I2C1_SDA	DI/DO	I2C1 data pin
	INT0	DI	External interrupt pin0
	SD1_CMD	DI/DO	SD1 CMD pin
41	P3.6	I/O	General purpose digital I/O pin
	SD0_D3	DI/DO	SD0 D3 pin
	SD1_CLK	DO	SD1 CLK output pin
42	P2.2	I/O	General purpose digital I/O pin
	SD1_DET	DI	SD1_DET pin
	SPI0_MOSI	DI/DO	SPI0 MOSI pin
	SPI1_MOSI	DI/DO	SPI1 MOSI pin
	PWM2	DO	PWM0 channel2 output pin

	I2C1_SCL	DI/DO	I2C1 CLK pin
	TM2_IN	DI	TM2 input pin
43	XC2	AO	Crystal pin2
44	XC1	AI	Crystal pin1
45	P2.1	I/O	General purpose digital I/O pin
	SD1_CMD	DI/DO	SD1 CMD pin
	SPI0_CS	I/O	SPI0 CS pin
	PWM1	O	PWM0 channel1 output pin
	I2C0_SDA	I/O	I2C0 data pin
	TM1_IN	DI	TM1 input pin
	UART0_RX	DI	UART0 RX pin
46	DVDD_DDR3	P	DDR power supply
47	P2.0	I/O	General purpose digital I/O pin
	SD1_CLK	DO	SD1 CLK output pin
	SPI0_CLK	DI/DO	SPI0 CLK pin
	PWM0	DO	PWM0 channel0 output pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	TM0_IN	DI	TM0 input pin
	UART0_TX	DO	UART0 TX pin
48	DVDD_MCU3	P	Digital core
49	P3.5	I/O	General purpose digital I/O pin
	I2C1_SCL	DI/DO	I2C1 CLK pin
	SD0_D2	DI/DO	SD0 D2 pin
	UART3_TX	DO	UART3 TX pin
	SPI1_CLK	DI/DO	SPI1 CLK pin
50	P3.4	I/O	General purpose digital I/O pin
	SD0_D1	DI/DO	SD0 D1 pin
	I2C0_SCL	DI/DO	I2C0 CLK pin
	I2C1_SCL	DI/DO	I2C1 CLK pin
51	P1.6	I/O	General purpose digital I/O pin
	CMR_D0	DI	Camera D0 input pin
	I2S_SD_I	DI	I2S_SD input pin
	UART2_RTS	DO	UART2 RTS pin
	I2C0_SDA	DI/DO	I2C0 data pin
	I2C1_SDA	DI/DO	I2C1 data pin
52	DVDD_MCU4	P	Digital core
53	CMR_CLK	O	Image sensor clock output pin
54	P0.4	I/O	General purpose digital I/O pin
	CMR_D10	DI	Camera D10 input pin

55	DVDD_DDR4	P	DDR power supply
56	P0.3	I/O	General purpose digital I/O pin
	CMR_D11	DI	Camera D11 input pin

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5 Electrical Characteristics

All the parameters are accurate to the one decimal place.

5.1 Absolute Maximum Ratings

Table 5-1 Absolute Maximum Ratings

Symbol	Description	Parameter			Unit
		Min	Typ	Max	
VDD	VDD1/VDD2/VDD3/VDD4	TBD	-	3.6	V
V _I	Input voltage	TBD	-	VDD	V
V _O	Output voltage	VSS	-	VDD	V
T _{OP}	Operating Temperature	-40	-	TBD	°C
T _{STG}	Storage Temperature	-40	-	TBD	°C

Note: Exceeding one or more of the limiting values may cause permanent damage to PAN5010.

Caution: Electrostatic sensitive device, comply with protection rules when operating.

5.2 DC Electrical Characteristics

Table 5-2 Voltage and Current

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VDD	Power Supply	TBD	3	3.6	V	TA=25°C
VSS	Ground	-	0	-	V	-
VOL	Output Low Level Voltage	VSS	-	TBD	V	-
VIH	Input High Level Voltage	TBD	3	3.6	V	-
VIL	Input Low Level Voltage	VSS	-	TBD	V	-
VOH	Output High Level Voltage	TBD	-	VDD	V	-

5.3 16 MHz Crystal Oscillator Characteristics

Table 5-3 16M RC Oscillator

Symbol	Parameter	Condition	Min	Typ	Max	Unit
F _{XTAL(16M)}	Crystal Oscillator Frequency	-	-	16	-	MHz
ESR(16M)	Equivalent Series Resistance	-	-	-	TBD	Ω
Δf _{XTAL(16M)}	Crystal Frequency Tolerance	-	TBD	-	TBD	ppm
V _{CLK(EXT)(16M)}	External Clock Voltage	-	TBD	TBD	-	V
φ _{N(EXTERNAL)16M}	Phase Noise	f _c = 50 kHz in case of an external reference clock	-	-	TBD	dBc/Hz

5.4 Stable Low Frequency RCX Oscillator Characteristics

Table 5-4 Stable Low Frequency RCX Oscillator

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
fRC(RCX)	RCX Oscillator Frequency	Default setting,	14	27	42	Khz

5.5 AC Electrical Characteristics

Table 5-5 DPLL

Symbol	Parameter	Min	Typ	Max	Unit	Notes
VDD2	Power Supply	TBD	-	3.6	V	-
T _A	Temperature	-40	-	85	°C	-
F _{in}	Input Clock Frequency	-	16	-	MHz	-
F _{DPLL}	Clock Frequency	-	200	1000	MHz	-

Table 5-6 ADC

Symbol	Parameter	Min	Typ	Max	Unit	Notes
-	Resolution	-	12	-	Bit	-
VDD2	Power Supply	TBD	-	TBD	VDDA	-
ITOT	Operation Current	660	-	940	uA	-
INL	Integral Nonlinearity Error	-	-	±10	LSB	-
SYS_CLK	System Clock	-	-	200	MHz	-
SAR_adc	Clock Frequency	-	-	16	MHz	-
FS	Sample Rate	-	-	TBD	MHz	-
T _s	Sample Time	TBD	-	-	SYS_CLK	-
T _h	Compare Time	TBD	-	-	SYS_CLK	-
TCONV	Data Output cycle	TBD	TBD	TBD	SYS_CLK	-
N	S-H counter	TBD	TBD	TBD	-	-
V _{in}	Analog input voltage	0 0	-	VDD 2.4	V	-
C _{in}	Input Capacitance	-	TBD	-	pF	-
R _{in}	Input resistance	TBD	-	-	KΩ	See Note
V _{ref}	ADC reference voltage	-	VBG	-	V	-
DATA	ADC Output	000	-	FFF	HEX	-
SFDR	Spurious Free Dynamic	-	64	-	dB	-

$$Rin = \frac{EXTSMPT \langle 9:0 \rangle (1 + ADC_CTL \langle 19:16 \rangle)}{f_{adc} \times C_{in} \times \ln \frac{V_{in}}{V_{in} - V_{real}}}$$

Note:

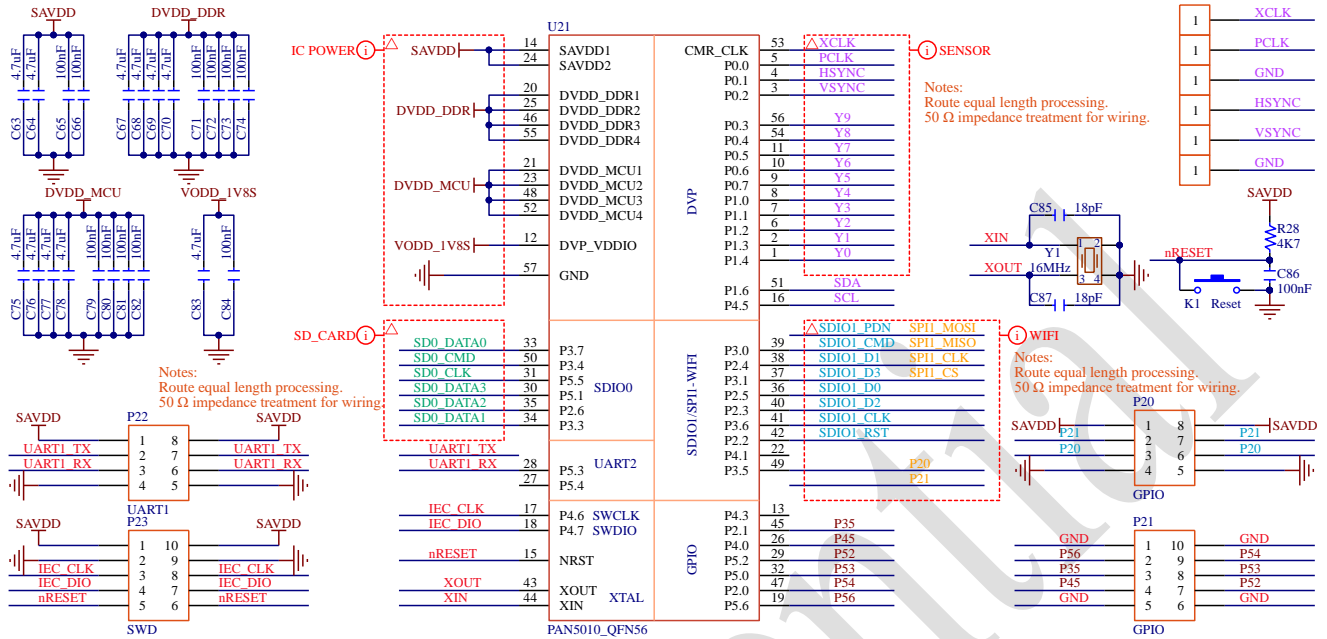
Table 5-7 LVR

Symbol	Parameter	Min	Typ	Max	Unit	Notes
VDD2	Power Supply	TBD	3	3.6	V	-
VLVR	Threshold Voltage	-	1.82	-	V	-

Table 5-8 BOD

Symbol	Parameter	Vout(V) 1->0	Vout(V) 0->1	Test Conditions	Notes
V _{BOD}	Brown-Out Detector	2.12	1.99	EN_BOD=1 BODVL<1:0>=00	
		2.41	2.26	EN_BOD=1 BODVL<1:0>=01	
		2.8	2.64	EN_BOD=1 BODVL<1:0>=10	
		3.0	2.86	EN_BOD=1 BODVL<1:0>=11	

6 Reference Schematic Diagram



7 Package Dimensions

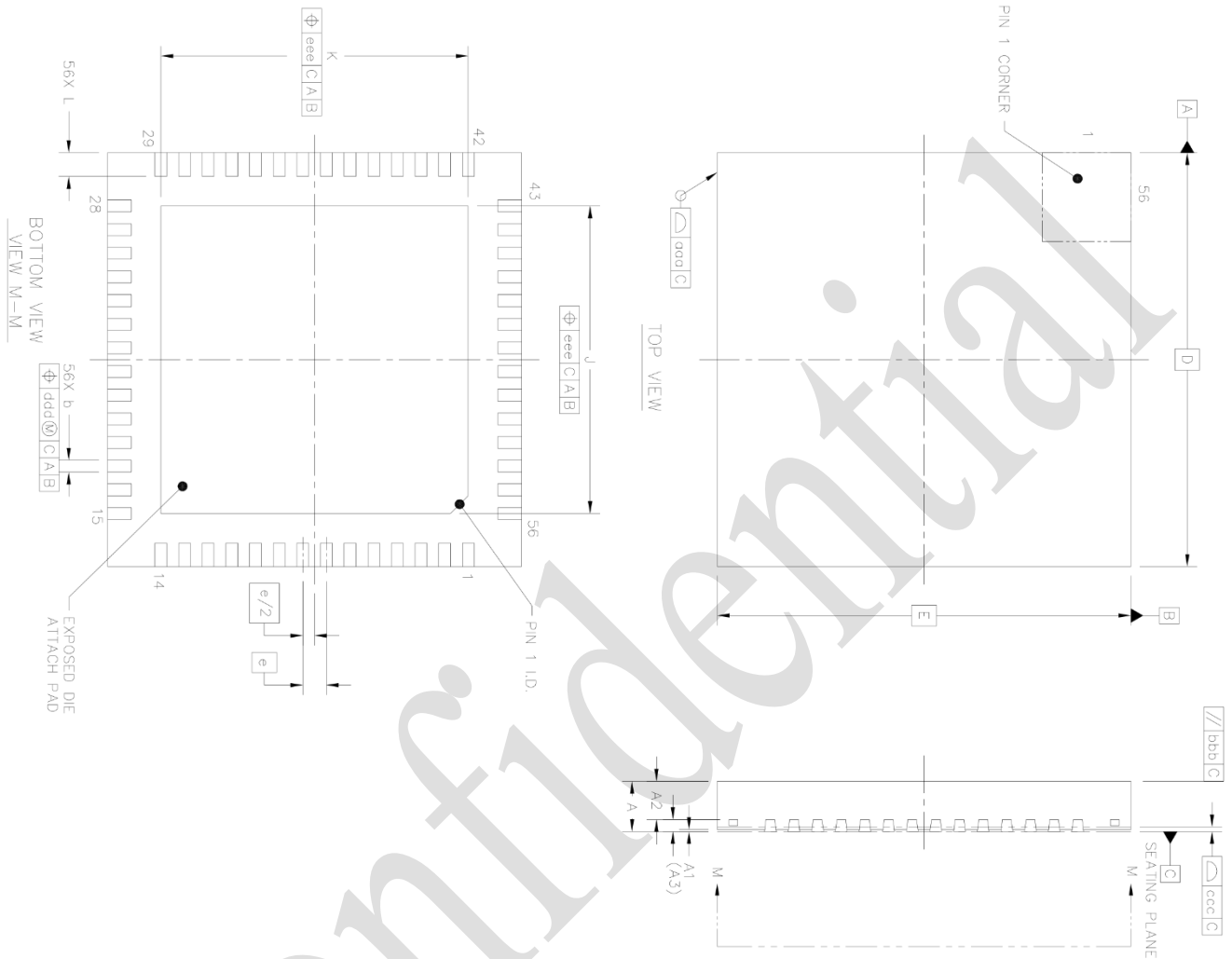


Figure 7-1 QFN56 Package Views

Table 7-1 QFN56 Package Detail Parameters

	SYMBOL	MIN.(mm)	NOM.(mm)	MAX.(mm)
TOTAL THICKNESS	A	0.80	0.85	0.90
STAND OFF	A1	0	0.035	0.05
MOLD THICKNESS	A2	-	0.65	0.67
L/F THICKNESS	A3	0.203 REF		
LEAD WIDTH	b	0.15	0.2	0.25
BODY SIZE	X	D	7 BSC	

	Y	E	7 BSC		
LEAD PITCH		e	0.4 BSC		
EP SIZE	X	J	5.1	5.2	5.3
	Y	K	5.1	5.2	5.3
LEAD LENGTH		L	0.35	0.4	0.45
PACKAGE EDGE TOLERANCE		aaa	0.1		
MOLD FLATNESS		bbb	0.1		
COPLANARITY		ccc	0.08		
LEAD OFFSET		ddd	0.1		
EXPOSED PAD OFFSET		eee	0.1		

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8 Precautions

- (1) This product is a CMOS device and should be protected against static electricity during storage, transportation and use.
- (2) Grounding when device is in use.
- (3) Reflow temperature can not exceed 260°C.

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9 Storage Conditions

- (1) Products should be stored in sealed packages: when the temperature is less than 30 degrees and the humidity is less than 90%, it can last for 12 months.
- (2) After the package is opened, the components will be used in the reflow process or other high-temperature processes. The following conditions must be met:
 - 1) Completed within 72 hours and the factory environment is less than $30^{\circ}\text{C} \leq 60\% \text{ RH}$.
 - 2) Stored in 10% RH environment.
 - 3) Exhaust at 125°C for 24 hours to remove internal water vapor before used.

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