

# **KT1025A Datasheet**

**QingYue Technology Co.,LTD**

**Version: V1.0**

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## KT1025A Features

### High performance 32-bit RISC CPU

- RISC 32-bit CPU
- DC-160MHz operation
- Support DSP instructions
- 64Vectored interrupts
- 4 Levels interrupt priority

### Flexible I/O

- 11 GPIO pins
- All GPIO pins can be programmable as input or output individually
- All GPIO pins are internal pull-up/pull-down selectable individually
- CMOS/TTL level Schmitt triggered input
- External wake up/interrupt on all GPIOs

### Peripheral Feature

- One full speed USB 2.0 OTG controller
- One audio interface supports IIS, left adjusted, right adjusted and DSP mode
- Four multi-function 16-bit timers, support capture and PWM mode
- Three 16-bit PWM generator for motor driving
- One 16-bit active parallel port
- One full-duplex basic UART
- Two full-duplex advanced UART
- One SPI interface supports host and device mode
- Two SD Card Host controller
- One IIC interface supports host and device mode
- One Quadrate decoder
- Watchdog
- 1 Crystal Oscillator
- 16-bit Stereo DAC with headphone amplifier, SNR  $\geq$  95dB
- 1 channel ADC , SNR  $\geq$  90dB
- 1 channel MIC amplifier
- 2 channels Stereo analog MUX
- 8 channels 10-bit ADC
- 2 channels 8 levels Low Voltage Detector
- Power-on reset
- Embedded PMU support low power mode

### Bluetooth Feature

- CMOS single-chip fully-integrated radio and baseband
- Compliant with Bluetooth V5.0+BR+EDR+BLE specification
- Bluetooth Piconet and Scatternet support

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- Meet class2 and class3 transmitting power requirement
  - Support GFSK and  $\pi/4$  DQPSK all packet types
  - Provides +2dbm transmitting power
  - receiver with -89dBm sensitivity
  - Support a2dp\avctp\avdtp\avrcp\hfp\spp\smp\att\gap\gatt\rfcomm\sdpl2cap profile

### **FM Tuner**

- Support worldwide frequency band 76-108MHz
- Fully integrated digital low-IF tuner & frequency synthesizer
- Autonomous search tuning
- Digital auto gain control (AGC)
- Digital adaptive noise cancellation
- Programmable de-emphasis (50/75 uS)
- Receive signal strength indicator (RSSI)
- Radio search in multi-channel simultaneously
- Digital volume control

### **Power Supply**

- VBAT is 2.2V to 5.5V
- VDDIO is 2.2V to 3.6V
- RTCVDD is 2.2V to 3.6V

### **Packages**

- QSOP24

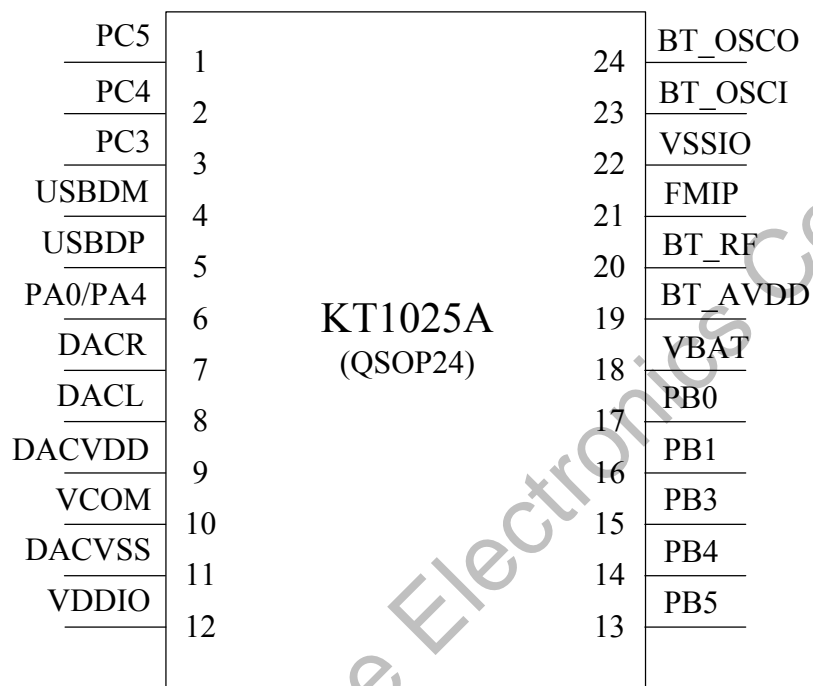
### **Temperature**

- Operating temperature: -20°C to +70°C
- Storage temperature: -65°C to +150°C

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# 1、 Pin Definition

## 1.1 Pin Assignment



**Figure 1-1 KT1025A\_QSOP24 Package Diagram**

## 1.2 Pin Description

**Table 1-1 KT1025A\_QSOP24 Pin Description**

PIN NO.	Name	I/O Type	High Drive (mA)	Function	Other Function
1	PC5	I/O	24	GPIO	SD1CLKA: SD1 Clock(A); SPI1DOB: SPI1 Data Out(B); UART2RXD: Uart2 Data In(B); IIC_SDA_B: IIC SDA(B);
2	PC4	I/O	24	GPIO	SD1CMDA: SD1 Command(A); SPI1CLKB: SPI1 Clock(B); UART2TXD: Uart2 Data Out(B); IIC_SCL_B: IIC SCL(B);
3	PC3	I/O	24	GPIO	SD1DAT0A: SD1 Data0(A); SPI1DIB: SPI1 Data In(B); UART0RXC: Uart0 Data In(C); TMR3: Timer3 Clock Input; ADC10: ADC Input Channel 10;
4	USBDM	I/O	4	USB Negative Data (pull down)	UART1RXD: Uart1 Data In(D); SPI2DOB: SPI2 Data Out(B); IIC_SDA_A: IIC SDA(A); ADC11: ADC Input Channel 11;
5	USBDP	I/O	4	USB Positive Data (pull down)	UART1TXD: Uart1 Data Out(D); SPI2CLKB: SPI2 Clock(B); IIC_SCL_A: IIC SCL(A);
6	PA0	I/O	24	GPIO	PLNK_DAT0: PLNK Data0; MIC: MIC Input Channel; UART0RXB: Uart0 Data In(B);
	PA4	I/O	24	GPIO	PWM1: Timer1 PWM Output; AMUX1R: Simulator Channel1 Right; ADC1: ADC Input Channel 1; UART2RXA: Uart2 Data In(A); Touch11: Touch Input Channel 11;
7	DACR	O	/	DAC Right Channel	
8	DACL	O	/	DAC Left Channel	
9	DACVDD	P	/	DAC Power	
10	VCOM	P	/	DAC Reference	
11	DACVSS	P	/	Ground	
12	VDDIO	P	/	IO Power 3.3v	

13	PB5	I/O	8	GPIO	UART0TXB: Uart0 Data Out(B); AMUX0R: Simulator Channel0 Right; SPI1DOA: SPI1 Data Out(A); SD0CLKB: SD0 Clock(B); ADC9: ADC Input Channel 9; Touch5: Touch Input Channel 5;
14	PB4	I/O	8	GPIO	PWM3: Timer3 PWM Output; AMUX0L: Simulator Channel0 Left; SPI1CLKA: SPI1 Clock(A); SD0CMDB: SD0 Command(B); ADC8: ADC Input Channel 8; SPI0_DAT2AB(2): SPI0 Data2(AB); Touch4: Touch Input Channel 4;
15	PB3	I/O	8	GPIO	PWM2: Timer2 PWM Output; UART2RXC: Uart2 Data In(C); SPI1DIA: SPI1 Data In(A); SD0DAT0B: SD0 Data0(B); AMUX2R: Simulator Channel2 Right; SPI0_DAT3AB(3): SPI0 Data3(AB); Touch3: Touch Input Channel 3;
16	PB1	I/O	8	GPIO	TMR2: Timer2 Clock Input; UART1RXA: Uart1 Data In(A); SPI2DOA: SPI2 Data Out(A); ADC7: ADC Input Channel 7; Touch1: Touch Input Channel 1;
17	PB0	I/O	8	GPIO	UART1TXA: Uart1 Data Out(A); SPI2CLKA: SPI2 Clock(A); ADC6: ADC Input Channel 6; Touch0: Touch Input Channel 0;
18	VBAT	P	/	LDO Power	
19	BT_AVDD	P	/	BT Power 1.3v	
20	BT_RF	P	/		
21	FMIP	I	/		
22	VSSIO	P	/	Ground	
23	BT_OSCI	I	/	BT OSC In	
24	BT_OSCO	O	/	BT OSC Out	

## 2、Electrical Characteristics

### 2.1 PMU Characteristics

Table 2-1

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
VBAT	Voltage Input	2.2	3.7	5.5	V	
V <sub>3.3</sub>	Voltage output	—	3.3	—	V	LDO5V = 5V, 100mA loading
V <sub>1.2</sub>		—	1.2	—	V	LDO5V = 5V, 50mA loading
V <sub>1.3</sub>	Voltage output		1.3		V	LDO5V=5V, 100mA loading
V <sub>DACVDD</sub>	DAC Voltage	—	3.1	—	V	LDO5V = 5V, 10mA loading
I <sub>L3.3</sub>	Loading current	—	—	150	mA	LDO5V = 5V

### 2.2 IO Input/Output Electrical Logical Characteristics

Table 2-2

IO input characteristics						
Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V <sub>IL</sub>	Low-Level Input Voltage	-0.3	—	0.3* VDDIO	V	VDDIO = 3.3V
V <sub>IH</sub>	High-Level Input Voltage	0.7* VDDIO	—	VDDIO+0.3	V	VDDIO = 3.3V
IO output characteristics						
V <sub>OL</sub>	Low-Level Output Voltage	—	—	0.33	V	VDDIO = 3.3V
V <sub>OH</sub>	High-Level Output Voltage	2.7	—	—	V	VDDIO = 3.3V

### 2.3 Internal Resistor Characteristics

Table 2-3

Port	General Output	High Drive	Internal Pull-Up Resistor	Internal Pull-Down Resistor	Comment
PA0 PA4 PC3~PC5	8mA	24mA	10K	10K	1、USBDM & USBDP default pull down 2、internal pull-up/pull-down resistance   accuracy ±20%
PB0 PB1 PB3~PB5	4mA	8mA	10K	10K	
USBDM USBDP	4mA	—	1.5K	15K	

## 2.4 DAC Characteristics

Table 2-4

Parameter	Min	Typ	Max	Unit	Test Conditions
Frequency Response	20	—	20K	Hz	1KHz/0dB 10Kohm loading With A-Weighted Filter
THD+N	—	-69	—	dB	
S/N	—	95	—	dB	
Crosstalk	—	-80	—	dB	
Output Swing		1		Vrms	1KHz/-60dB 10Kohm loading With A-Weighted Filter
Dynamic Range		90		dB	
DAC Output Power	11		—	mW	32ohm loading

## 2.5 ADC Characteristics

Table 2-5

Parameter	Min	Typ	Max	Unit	Test Conditions
Dynamic Range		85		dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
S/N	—	90	—	dB	1KHz/-60dB 10Kohm loading With A-Weighted Filter
THD+N	—	-72	—	dB	
Crosstalk	—	-80	—	dB	

## 2.6 BT Characteristics

### 2.6.1 Transmitter

#### Basic Data Rate

Table 2-6

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power			0	4	dBm	25°C, Power Supply Voltage=5V 2441MHz
RF Power Control Range			20		dB	
20dB Bandwidth			950		KHz	
Adjacent Channel	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
Transmit Power	+3MHz		-44		dBm	
	-3MHz		-35		dBm	



**Enhanced Data Rate****Table 2-7**

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			1.2		dB	25°C, Power Supply Voltage=5V 2441MHz
$\pi/4$ DQPSK Modulation Accuracy	DEVM RMS		6		%	
	DEVM 99%		10		%	
	DEVM Peak		15		%	
Adjacent Channel	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
Transmit Power	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

## 2.6.2 Receiver

**Basic Data Rate****Table 2-8**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply Voltage=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

**Enhanced Data Rate****Table 2-9**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-89		dBm	25°C, Power Supply Voltage=5V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

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## 2.7 FM Receiver Characteristics

Table 2-10

Parameter	Min	Typ	Max	Unit	Test Conditions
Input Frequency	76		108	MHz	
Usable Sensitivity	3	4	8	dB $\mu$ V EMF	(S+N)/N=26dB
Adjacent Channel Selectivity		48		dB	$\pm$ 200kHz
IIP3		88		dB $\mu$ V EMF	$\Delta f_1=200$ kHz, $\Delta f_2=400$ kHz
Audio Output Voltage	0		3	V	Empty load
Audio Frequency Response	20		20k	Hz	DAC test
Audio (S+N)/N		52		dB	
Stereo Separation		40		dB	
Audio Total Harmonic Distortion (THD)		0.4		%	

### 3、Package Information

#### 3.1 QSOP24

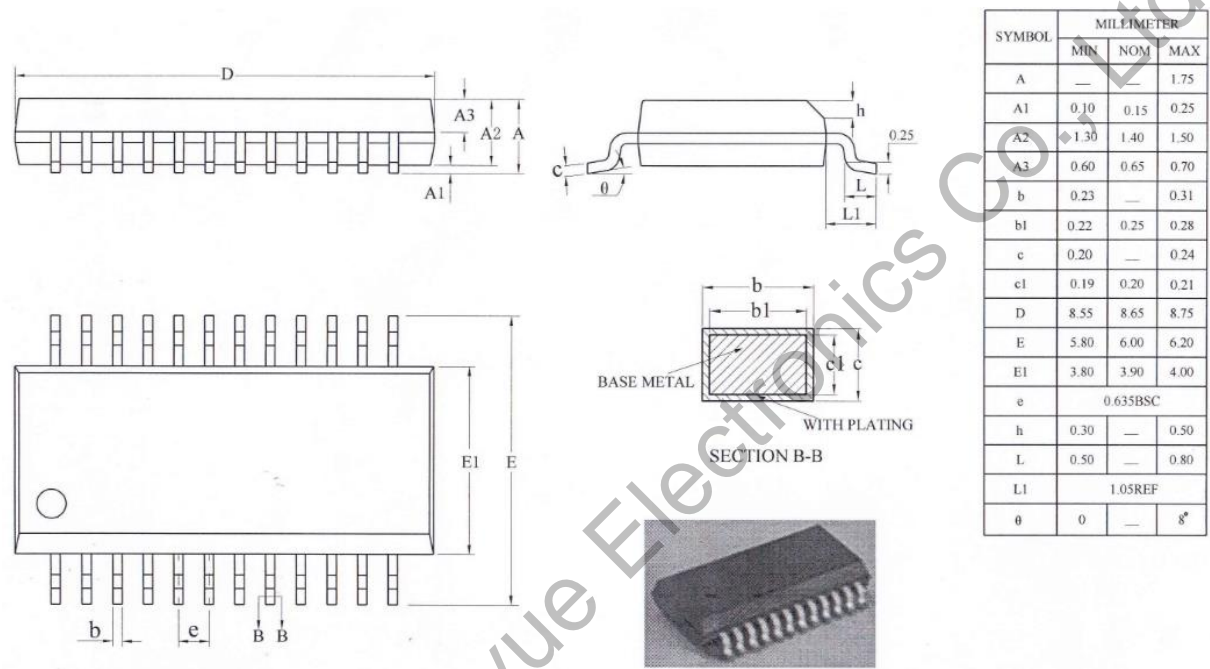


Figure 3-1. KT1025A\_QSOP24 Package

## 4、Revision History

Date	Revision	Description
2018.04.20	V1.0	Initial Release

Shenzhen Qingyue Electronics Co., Ltd.