广告位

安防监控摄像头购买/电气智能化工程安装可联系-超低价

无线AP覆盖/音响安装/智慧门禁/车牌识别

（电子与智能化二级资质）

廉价版智能沙盘/展厅移动机器人可联系

山西本地特种车辆租赁/混凝土/买车买房/抵押贷款需要可联系

办理各类企业/工程师人工智能工信部证书可联系（包过一条龙）

高光谱相机/100kg大型吊装无人机购买可联系

山西本地无人机高空清洗作业可联系/数字人视频生成

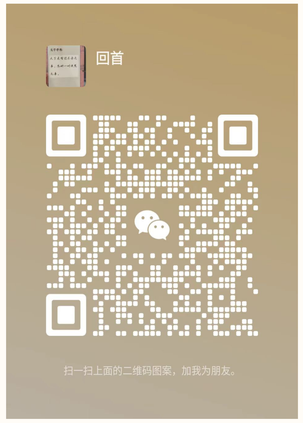
ERP沙盘模拟赛可dd/高校实验室装修/化工电子类实验设备

项目科技查新/双软评估/科小认证等包过一条龙可联系

企业代理记账/知识产权代缴/企业科技项目申报可联系

中国创翼创业创新大赛等各类企业创赛可代做（PPT/申报书/知识产权一条龙）

有以上需要均可dd我，介绍人来给提成！



办证

认证企业	方向	周期/方式	证书实物图
英伟达NVIDIA认证	人工智能计算证书	一周内全包下证	
腾讯云	交付工程师	一周内全包下证	
	云计算技能认证 区块链从业认证		
	腾讯高级工程师-数据库产品认证		
华为云	鲲鹏/华为云 技能认证	一周内全包下证	
	开发者工作级认证		
	大数据技能认证 hicp证书		
	openGauss数据库开发者证书		

A	B
项目类别	认证专业
商务管理类	人力资源管理师
	风险管理师
	项目管理师
	物联网管理师
	新媒体运营师
	大数据分析师
	互联网营销师
	数字经济管理师
	电子商务师
	电子政务师
	社会工作师
医疗防疫公共卫生类	消毒员
	公共场所卫生管理员
美学艺术类	化妆品测评师
	新媒体主播
	美业培训师
	美容院管理师
	摄影摄像与后期制作
经贸管理类	酒店经营管理师
	理财规划制师
	连锁经营管理师
	双碳管理师
	财务税务管理师
	工商企业管理师
	公共关系管理师
	微商经营管理师
	市场营销师
	劳动关系协调师
	计算机信息技术
	企业培训师
	管理会计师
	中式京调师
	中式面点师

以下说明来源为数据手册内容

DS3231S 电气参数

Recommended Operating Conditions

(T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	V_{CC}		2.3	3.3	5.5	V
	V_{BAT}		2.3	3.0	5.5	V
Logic 1 Input SDA, SCL	V_{IH}		0.7 × V_{CC}		V_{CC} + 0.3	V
Logic 0 Input SDA, SCL	V_{IL}		-0.3		0.3 × V_{CC}	V

Electrical Characteristics

(V_{CC} = 2.3V to 5.5V, V_{CC} = Battery Supply (see Table 1), T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Typical values are at V_{CC} = 3.3V, V_{BAT} = 3.0V, and T_A = +25°C, unless otherwise noted.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Active Supply Current	I_{CCA}	(Notes 4, 5)	V_{CC} = 3.63V			200	µA
			V_{CC} = 5.5V			300	
Standby Supply Current	I_{CCS}	I²C bus inactive, 32kHz output on, SQW output off (Note 5)	V_{CC} = 3.63V			110	µA
			V_{CC} = 5.5V			170	
Temperature Conversion Current	$I_{CCSCONV}$	I²C bus inactive, 32kHz output on, SQW output off	V_{CC} = 3.63V			575	µA
			V_{CC} = 5.5V			650	
Power-Fail Voltage	V_{PF}			2.45	2.575	2.70	V
Logic 0 Output, 32kHz, INT/SQW, SDA	V_{OL}	I_{OL} = 3mA				0.4	V
Logic 0 Output, RST	V_{OL}	I_{OL} = 1mA				0.4	V
Output Leakage Current 32kHz, INT/SQW, SDA	I_{LO}	Output high impedance		-1	0	+1	µA
Input Leakage SCL	I_{LI}			-1		+1	µA
RST Pin I/O Leakage	I_{OL}	RST high impedance (Note 6)		-200		+10	µA
V_{BAT} Leakage Current (VCC Active)	I_{BATLKG}				25	100	nA

Electrical Characteristics (continued)

(V_{CC} = 2.3V to 5.5V, V_{CC} = Active Supply (see Table 1), T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Typical values are at V_{CC} = 3.3V, V_{BAT} = 3.0V, and T_A = +25°C, unless otherwise noted.) (Notes 2, 3)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Output Frequency	f_{OUT}	V_{CC} = 3.3V or V_{BAT} = 3.3V			32.768		kHz
Frequency Stability vs. Temperature (Commercial)	$\Delta f/f_{OUT}$	V_{CC} = 3.3V or V_{BAT} = 3.3V, aging offset = 00h	0°C to +40°C			±2	ppm
			-40°C to +70°C			±3.5	
Frequency Stability vs. Temperature (Industrial)	$\Delta f/f_{OUT}$	V_{CC} = 3.3V or V_{BAT} = 3.3V, aging offset = 00h	-40°C to +0°C, 0°C to +40°C			±3.5, ±2	ppm
			-40°C to +85°C			±3.5	
Frequency Stability vs. Voltage	$\Delta f/V$				1		ppm/V
Trim Register Frequency Sensitivity per LSB	$\Delta f/LSB$	Specified at:	+40°C		0.7		ppm
			+25°C		0.1		
			+70°C		0.4		
			+85°C		0.8		
Temperature Accuracy	Temp	V_{CC} = 3.3V or V_{BAT} = 3.3V		-3		+3	°C
Crystal Aging	$\Delta f/f_O$	After reflow, not production tested	First year		±1.0		ppm
			0–10 years		±5.0		

Electrical Characteristics

(V_{CC} = 0V, V_{BAT} = 2.3V to 5.5V, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Note 2)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
Active Battery Current	I_{BATA}	EOSC = 0, BBSQW = 0, SCL = 400kHz (Note 8)	V_{BAT} = 3.63V			70	µA
			V_{BAT} = 5.5V			150	
Timekeeping Battery Current	I_{BAT}	EOSC = 0, BBSQW = 0, EN32kHz = 1, SCL = SDA = 0V or SCL = SDA = V_{BAT} (Note 8)	V_{BAT} = 3.63V		0.84	3.0	µA
			V_{BAT} = 5.5V		1.0	3.5	
Temperature Conversion Current	I_{BATTC}	EOSC = 0, BBSQW = 0, SCL = SDA = 0V or SCL = SDA = V_{BAT}	V_{BAT} = 3.63V			575	µA
			V_{BAT} = 5.5V			650	
Data-Retention Current	I_{BATTDR}	EOSC = 1, SCL = SDA = 0V, +25°C				100	nA

AC Electrical Characteristics

(V_{CC} = $V_{CC(MIN)}$ to $V_{CC(MAX)}$ or V_{BAT} = $V_{BAT(MIN)}$ to $V_{BAT(MAX)}$, V_{BAT} < V_{CC}, T_A = T_{MIN} to T_{MAX}, unless otherwise noted.) (Note 2)

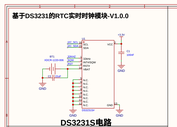
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
SCL Clock Frequency	f_{SCL}	Fast mode	100		400	kHz
		Standard mode	0		100	
Bus Free Time Between STOP and START Conditions	t_{BUF}	Fast mode	1.3			µs
		Standard mode	4.7			
Hold Time (Repeated) START Condition (Note 7)	$t_{HD:STA}$	Fast mode	0.6			µs
		Standard mode	4.0			
Low Period of SCL Clock	t_{LOW}	Fast mode	1.3			µs
		Standard mode	4.7			
High Period of SCL Clock	t_{HIGH}	Fast mode	0.6			µs
		Standard mode	4.0			
Data Hold Time (Notes 8, 9)	$t_{HD:DAT}$	Fast mode	0		0.9	µs
		Standard mode	0		0.9	
Data Setup Time (Note 10)	$t_{SU:DAT}$	Fast mode	100			ns
		Standard mode	250			
START Setup Time	$t_{SU:STA}$	Fast mode	0.6			µs
		Standard mode	4.7			
Rise Time of Both SDA and SCL Signals (Note 11)	t_R	Fast mode	20 + 0.1C_B		300	ns
		Standard mode			1000	
Fall Time of Both SDA and SCL Signals (Note 11)	t_F	Fast mode	20 + 0.1C_B		300	ns
		Standard mode			300	
Setup Time for STOP Condition	$t_{SU:STO}$	Fast mode	0.6			µs
		Standard mode	4.7			
Capacitive Load for Each Bus Line	C_B	(Note 11)			400	pF
Capacitance for SDA, SCL	$C_{I/O}$				10	pF
Pulse Width of Spikes That Must Be Suppressed by the Input Filter	t_{SP}				30	ns
Pushbutton Debounce	PB_{DB}				250	ms
Reset Active Time	t_{RST}				250	ms
Oscillator Stop Flag (OSF) Delay	t_{OSF}	(Note 12)			100	ms
Temperature Conversion Time	t_{CONV}				125	200	ms

Power-Switch Characteristics

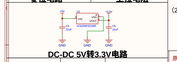
(T_A = T_{MIN} to T_{MAX})

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
V_{CC} Fall Time; $V_{PF(MAX)}$ to $V_{PF(MIN)}$	t_{VCCF}		300			µs
V_{CC} Rise Time; $V_{PF(MIN)}$ to $V_{PF(MAX)}$	t_{VCCR}		0			µs
Recovery at Power-Up	t_{REC}	(Note 13)		250	300	ms

基于DS3231的RTC实时时钟模块-V1.0.0









公众号链接



模块设计特点

（1）本模块采用DS3231S实时时钟，精度为：±2ppm（±2秒/月，年误差＜2分钟），内置 TCXO（温补晶振）

（2）本模块具备2路可编程闹钟 + 中断，内置，可读取温度

原理图	Schematic1		更新日期	2020-03-12
图示	P1		创建日期	2020-03-06
绘制			预计编码	
审核	基于DS3231的RTC实时时钟模块			
	版本	尺寸	页 1	共 1
	V1.0	A4	嘉立创EDA	

版本记录

V1.0.0版本-2026/03/11-零高幸：初版完成设计

以下说明来源为数据手册内容

DS3231S 简介

General Description

The DS3231 is a low-cost, extremely accurate I²C real-time clock (RTC) with an integrated temperature-compensated crystal oscillator (TCXO) and crystal. The device incorporates a battery input, and maintains accurate timekeeping when main power to the device is interrupted. The integration of the crystal resonator enhances the long-term accuracy of the device as well as reduces the piece-part count in a manufacturing line. The DS3231 is available in commercial and industrial temperature ranges, and is offered in a 16-pin, 300-mil SO package.

The RTC maintains seconds, minutes, hours, day, date, month, and year information. The date at the end of the month is automatically adjusted for months with fewer than 31 days, including corrections for leap year. The clock operates in either the 24-hour or 12-hour format with an AM/PM indicator. Two programmable time-of-day alarms and a programmable square-wave output are provided. Address and data are transferred serially through an I²C bidirectional bus.

A precision temperature-compensated voltage reference and comparator circuit monitors the status of V_{CC} to detect power failures, to provide a reset output, and to automatically switch to the backup supply when necessary. Additionally, the RST pin is monitored as a pushbutton input for generating a µP reset.

Benefits and Features

- Highly Accurate RTC Completely Manages All Timekeeping Functions
  - Real-Time Clock Counts Seconds, Minutes, Hours, Date of the Month, Month, Day of the Week, and Year, with Leap-Year Compensation Valid Up to 2100
  - Accuracy ±2ppm from 0°C to +40°C
  - Accuracy ±3.5ppm from -40°C to +85°C
  - Digital Temp Sensor Output: ±3°C Accuracy
  - Register for Aging Trim
  - RST Output/Pushbutton Reset Debounce Input
  - Two Time-of-Day Alarms
  - Programmable Square-Wave Output Signal
- Simple Serial Interface Connects to Most Microcontrollers
  - Fast (400kHz) I²C Interface
- Battery-Backup Input for Continuous Timekeeping
  - Low Power Operation Extends Battery-Backup Run Time
  - 3.3V Operation
- Operating Temperature Ranges: Commercial (0°C to +70°C) and Industrial (-40°C to +85°C)
- Underwriters Laboratories® (UL) Recognized

Applications

- Servers
- Telematics
- Utility Power Meters
- GPS

Ordering Information and Pin Configuration appear at end of data sheet.

DS3231S 引脚说明

Pin Description

PIN	NAME	FUNCTION
1	32kHz	32kHz Output. This open-drain pin requires an external pullup resistor. When enabled, the output operates on either power supply. It may be left open if not used.
2	V_{CC}	DC Power Pin for Primary Power Supply. This pin should be decoupled using a 0.1µF to 1.0µF capacitor. If not used, connect to ground.
3	INT/SQW	Active-Low Interrupt or Square-Wave Output. This open-drain pin requires an external pullup resistor connected to a supply at 5.5V or less. This multifunction pin is determined by the state of the INTCN bit in the Control Register (0Eh). When INTCN is set to logic 0, this pin outputs a square wave and its frequency is determined by RS2 and RS1 bits. When INTCN is set to logic 1, then a match between the timekeeping registers and either of the alarm registers activates the INT/SQW pin (if the alarm is enabled). Because the INTCN bit is set to logic 1 when power is first applied, the pin defaults to an interrupt output with alarms disabled. The pullup voltage can be up to 5.5V, regardless of the voltage on V_{CC}. If not used, this pin can be left unconnected.
4	RST	Active-Low Reset. This pin is an open-drain input/output. It indicates the status of V_{CC} relative to the V_{PF} specification. As V_{CC} falls below V_{PF}, the RST pin is driven low. When V_{CC} exceeds V_{PF}, for t_{REC}, the RST pin is pulled high by the internal pullup resistor. The active-low open-drain output is combined with a debounced pushbutton input function. This pin can be activated by a pushbutton reset request. It has an internal 50kΩ nominal value pullup resistor to V_{CC}. No external pullup resistors should be connected. If the oscillator is disabled, t_{REC} is bypassed and RST immediately goes high.
5–12	N.C.	No Connection. Must be connected to ground.
13	GND	Ground
14	V_{BAT}	Backup Power-Supply Input. When using the device with the V_{BAT} input as the primary power source, this pin should be decoupled using a 0.1µF to 1.0µF low-leakage capacitor. When using the device with the V_{BAT} input as the backup power source, the capacitor is not required. If V_{BAT} is not used, connect to ground. The device is UL recognized to ensure against reverse charging when used with a primary lithium battery. Go to www.maximintegrated.com/qa/info/ul.
15	SDA	Serial Data Input/Output. This pin is the data input/output for the I²C serial interface. This open-drain pin requires an external pullup resistor. The pullup voltage can be up to 5.5V, regardless of the voltage on V_{CC}.
16	SCL	Serial Clock Input. This pin is the clock input for the I²C serial interface and is used to synchronize data movement on the serial interface. Up to 5.5V can be used for this pin, regardless of the voltage on V_{CC}.

	A	B	C
	序号	专业名称	级别
2	1	广告艺术设计师	高级
3	2	网络工程师	高级
4	3	电子商务师	高级
5	4	室内设计师	高级
6	5	平面设计师	高级
7	6	ERP财务应用师	高级
8	7	JAVA软件工程师	高级
9	8	计算机辅助设计师	高级
10	9	软件技术开发工程师	高级
11	10	软件开发工程师	高级
12	11	物联网技术应用工程师	高级
13	12	数据库管理工程师	高级
14	13	软件设计师	高级
15	14	网络安全架构师	高级
16	15	渗透测试工程师	高级
17	16	提示工程师	高级
18	17	大模型开发工程师	高级
19	18	数字技术应用工程师	高级
20	19	大数据治理工程师	高级
21	20	数据安全工程师	高级
22	21	程序设计工程师	高级
23	22	AIGC应用工程师	高级
24	23	大模型应用工程师	高级
25	24	大数据采集工程师	高级
26	25	商务数棍分析师	高级
27	26	移动安全工程师	高级
28	27	安全运维工程师	高级
29	28	软件工程师	高级
30	29	数据库工程师	高级
31	30	音响工程	高级
32	31	舞台灯光	高级
33	32	通信工程师	高级
34	33	软件测试工程师	高级
35	34	新能源应用工程师	高级
36	35	新材料检测工程师	高级
37	36	新材料研发工程师	高级
38	37	新材料技术与应用工程师	高级
39	38	固体废物资源综合利用技术工程师	高级
40	39	现场管理工程师	高级
41	40	网络信息与安全工程师	高级
42	41	机器学习工程师	高级
43	42	python技术应用工程师	高级

企业认证证书 | 工信部职业 | 工信部人才交流中心测评证书 | 工

A	B	C
类别	编号	测评科目
计算机与软件	CPOO1	Office办公软件
	CPOO2	信息化办公
	CPOO3	计算机硬件维护
	CPOO4	系统管理
	CPOO8	设备管理
	CPOO9	网站管理
	CPO10	物流管理
	CPO11	网络营销
	CPO12	局域网组建
	CPO13	网络工程师
	CPO15	信息安全与管理
	CPO17	电子商务师
	CPO19	跨境电子商务师
	CPO20	数据管理
	CPO21	数据库应用技术
	CPO22	C语言编程高阶
	CPO24	.NET开发工程师
	CPO25	Android软件开发工程师
	CPO26	Java软件开发工程师
	CPO27	J2EE软件开发工程师
	CPO31	Web前端开发工程师
	CPO42	软件测试工程师
	CP206	财务信息化管理
	CPO45	平面设计师
	CPO47	网页设计师
	CPO48	二维动画设计师
	CPO49	三维设计师

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