

# 采用瑞萨电子RL78/L12系列MCU IC卡智能水表参考设计

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MCU产品中心

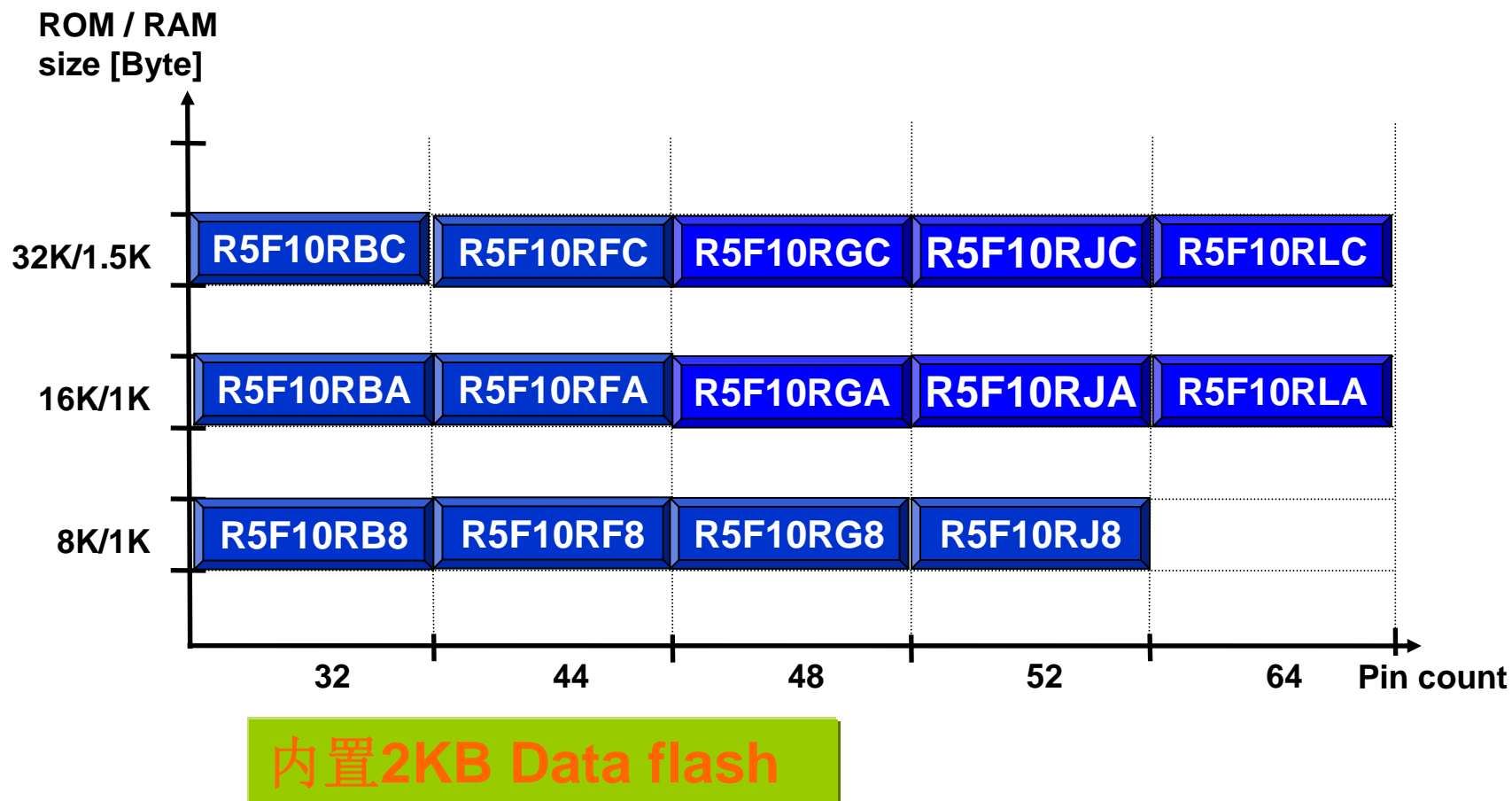
# RL78/L12系列MCU的特点

- 内置高速晶振（**CPU最高24MHz，精度为±1%**）
- 独立低速晶振（**15KHz**）
- 内置硬件**RTC**
- 内置液晶驱动（**4x39/8x35**）
- 内置硬件乘除法器
- 内置蜂鸣器驱动
- 内置**1.45V**参考电压
- 内置低电压检测
- 内置串行通信（**UART, I2C, CSI**）
- 内置片上调试功能
- 宽电压工作（**1.6V~5.5V**）

# RL78/L12系列MCU低功耗高性能特性

- **70uA/MHz**
- **0.92uA @32.768kHz HALT模式，RTC、WDT、LCD工作**
- **处理器性能1.27DMIPS/MHz**
- **单周期执行指令，最快指令时间为0.04167us @24MHz，  
低速30.5us @32.768kHz**
- **ADC和串行接口可在STOP模式下操作**

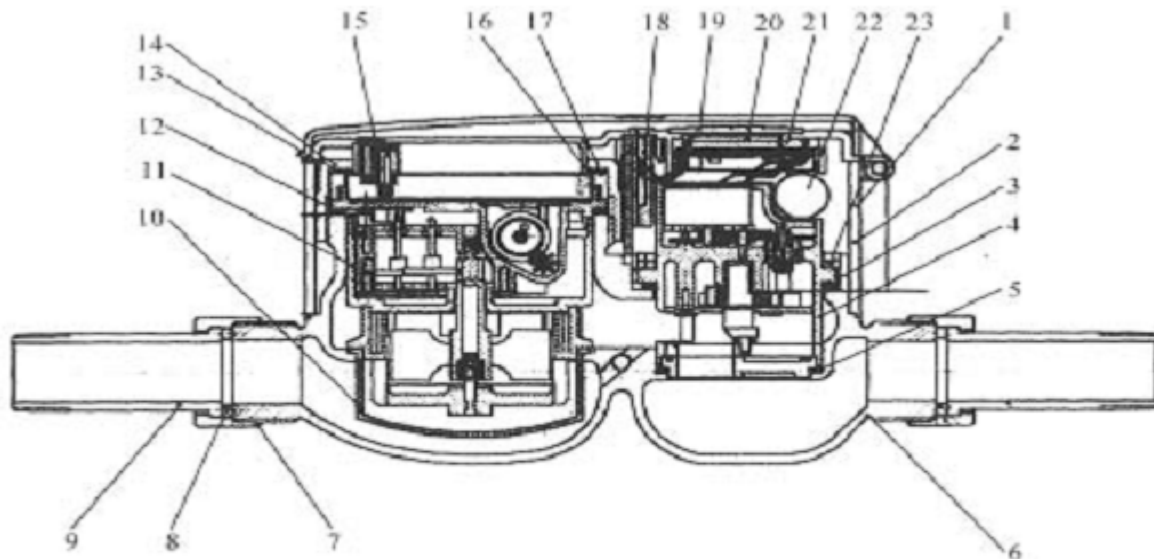
# RL78/L12系列MCU的产品线



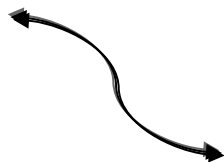
# RL78/L12功能概述

Item		R5F10RBx	R5F10RFx	R5F10RGx	R5F10RJx	R5F10RLx
Pin Count		32	44	48	52	64
Internal memory	Flash memory (KB)	8 to 32	8 to 32	8 to 32	8 to 32	16,32
	RAM (KB)	1,1.5	1,1.5	1,1.5	1,1.5	1,1.5
	Data Flash (KB)	2	2	2	2	2
Main system Clock	High-speed	X1 (crystal/ceramic) oscillation, external main system clock input 1~20MHz				
	High-speed	1~24MHz				
Subsystem clock		--	XT1(crystal) oscillation,external subsystem clock			
low-speed on-chip		Internal oscillation 15 kHz(TYP.):Vdd = 1.6 to 5.5V				
Timer	16-bit	8 channels		8 channels		
	Watchdo	1 channel				
	RTC	1 channel				
	Interval	1 channel				
	Timer	4 channels (PWM outputs:3)	5 channels (PWM outputs:4)	6 channels (PWM outputs:5)	8 channels (PWM outputs:7)	
RTC		1Hz (subsystem clock: fsub = 32.768kHz)				
Clock output/buzzer output		1	2			
		2.44 kHz,4.88 kHz,1.25 MHz,2.5 MHz,5 MHz,10 MHz (Main system clock: fmain = 20 MHz operation) 256 Hz,512 Hz, 1.024 kHz, 4.096 kHz, 8.192 kHz, 16.384 kHz,32.768 kHz (Subsystem clock: fsub = 32.768 kHz)				
8/10 bit resolution A/D		4 channels	7 channels	9 channels	10channel	10channel
Serial interface		CSI: 2 channel/UART (LIN-bus supported): 1 channel				
LCD controller/drive	internal voltage boosting method,capacitor split method,and external					
	segment signal	13	22(18)	26(22)	30(26)	39(35)
	Common signal	4	4(8)			
Multiplier and divider/multiply accumulator		16 bits × 16 bits = 32 bits (Unsigned or signed) 32 bits ÷ 32 bits = 32 bits (Unsigned) 16 bits × 16 bits + 32 bits = 32 bits (Unsigned or signed)				
DMA controller		2 channels				
Voltage detector		1.63 V to 4.06 V (14 stages)				
On-chip debug function		provided				
Power supply voltage		VDD = 1.6 to 5.5 V				
Operating ambient		TA = -40 to +85°C				

# 控制原理



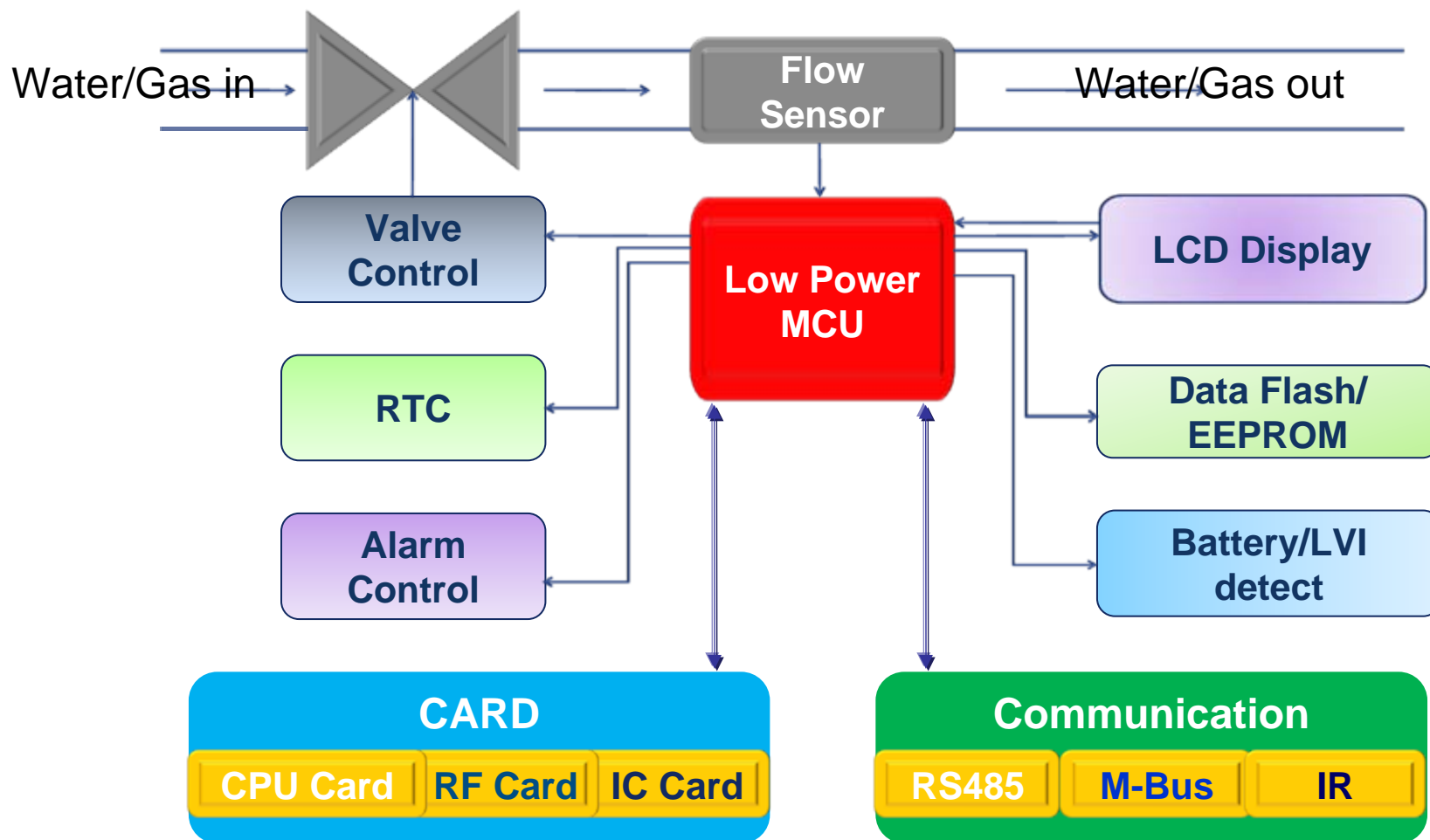
1-表盖; 2-表罩; 3-阀上垫圈; 4-阀体部分; 5-阀下垫圈; 6-表壳; 7-连接螺母; 8-密封圈; 9-接管; 10-滤水网; 11-叶轮计量机构; 12-密封圈; 13-垫圈; 14-铜罩; 15-发讯部件; 16-不锈钢圈; 17-封口圈; 18-卡座; 19-透明片; 20-LCD 集成线路板; 21-线路保护罩; 22-电池; 23-阀体铜压环



读写卡器



# 工作流程



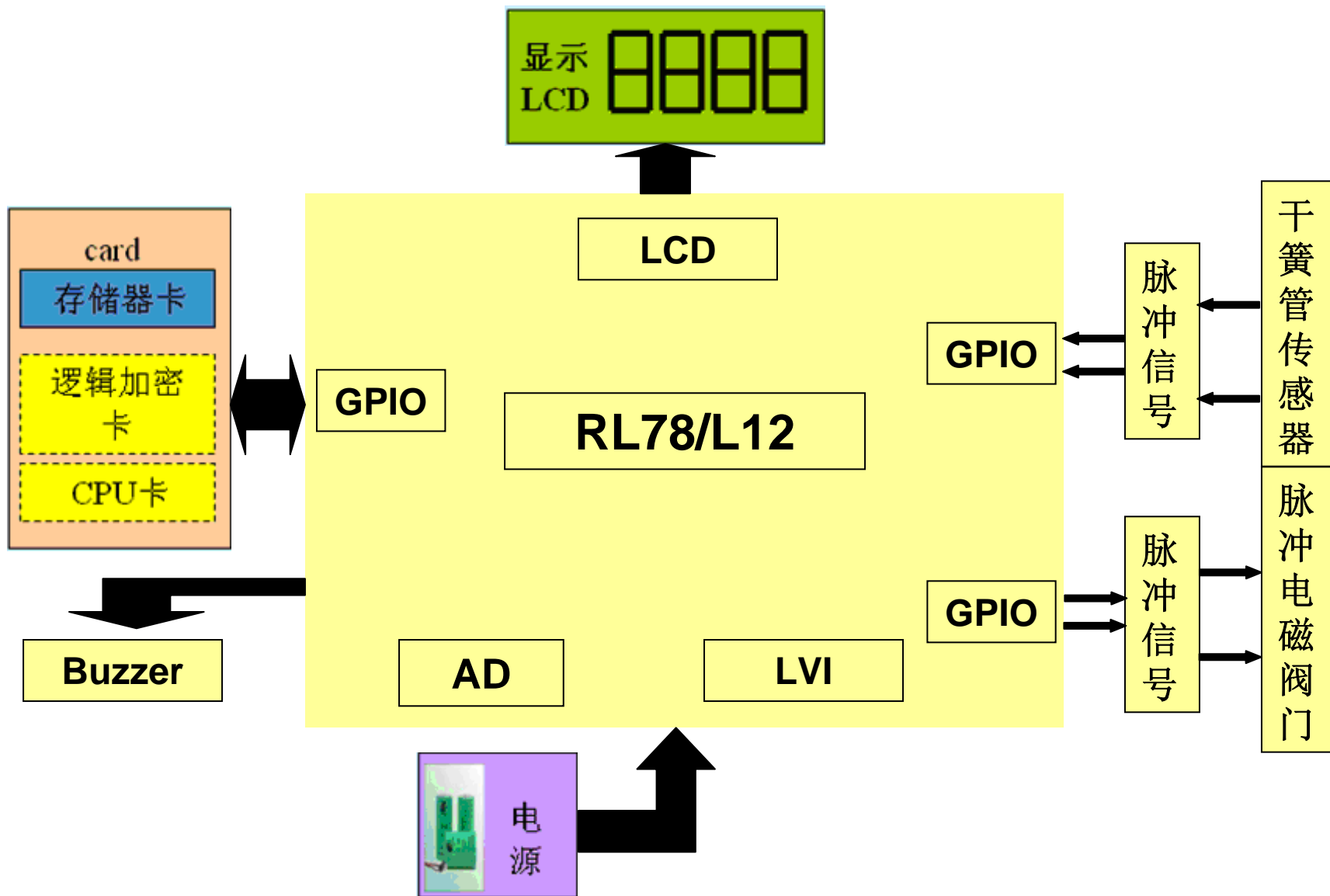
# IC卡水表参考设计特点

- 采用**3.6V**锂电池直接供电
- 实时时钟指示
- 阀门堵转判断
- 存储器卡
- 蜂鸣器报警
- **Data Flash**数据存储
- **LCD**多种信息显示
- 低功耗模式

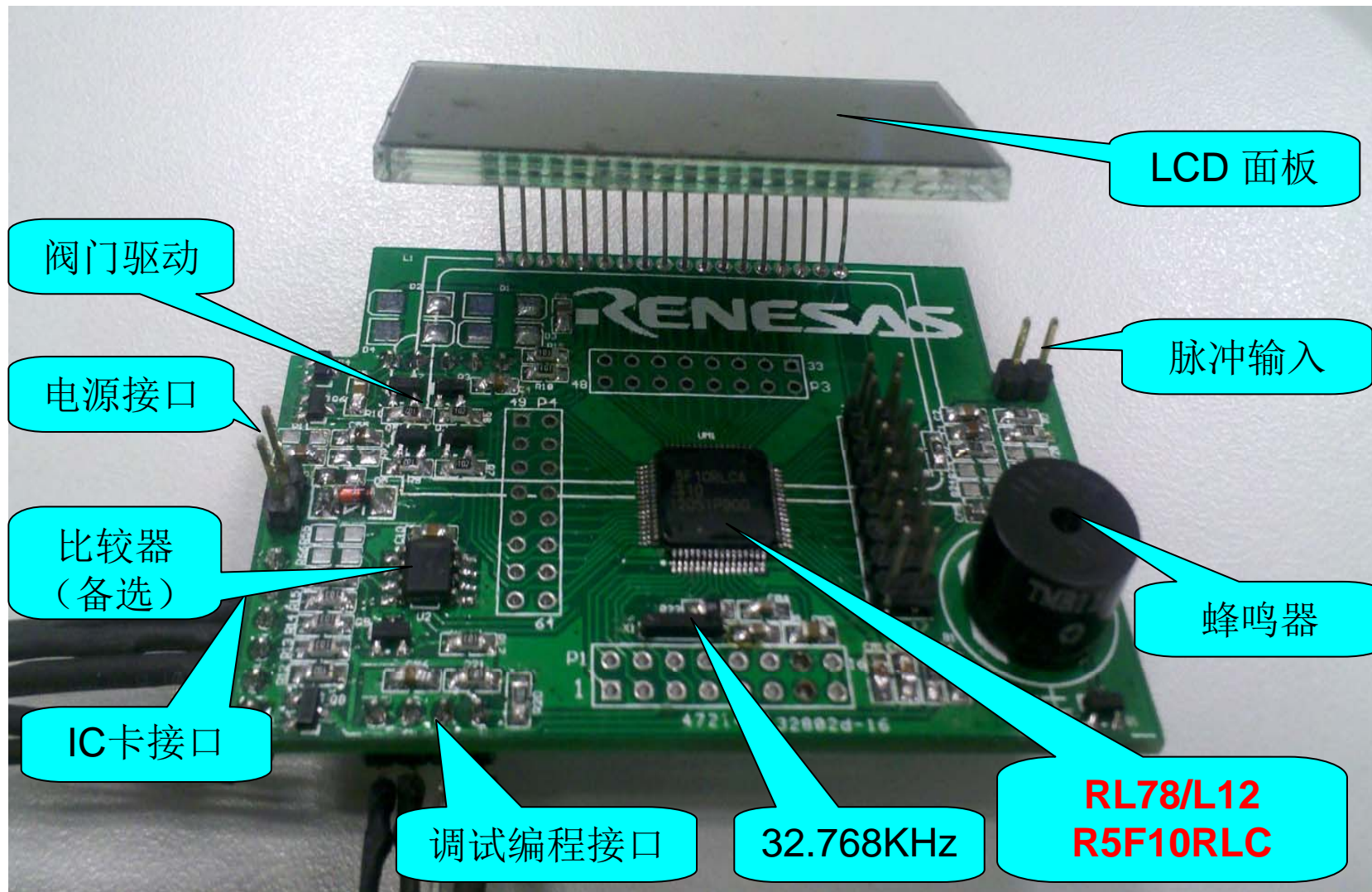


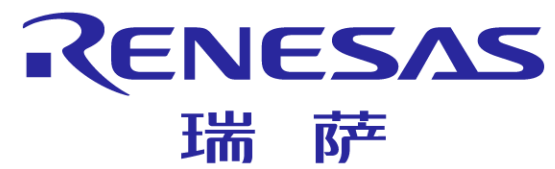


# IC卡智能水表参考设计的结构框图



# 控制面板





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