

Trabajo Práctico Final -Protocolos de comunicación en SE

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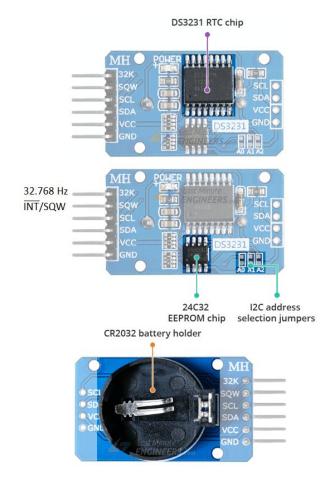
Objetivos del TP

- Implementar librería para manejo de módulo RTC
 + sensor de T° + EEPROM.
- Direccionamiento I²C.
- Código ejemplo para escribir y leer hora en el RTC, leer temperatura por protocolo y guardar en EEPROM.
- Uso de sapi_i2c.h: I2C0 @ 100kHz



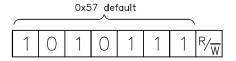
Hardware

- Alimentación 3.3 V
- Bus SCL + SDA enlazables.
- 8 direcciones I2C EEPROM ajustables (default 0x57)
- Dirección I²C RTC fija (0x68).
- Batería 3V CR2032
- Salidas programables:
 - Oscilador 32.768 Hz.
 - INT/SQW: señal cuadrada con DC ajustable o Pin digital.



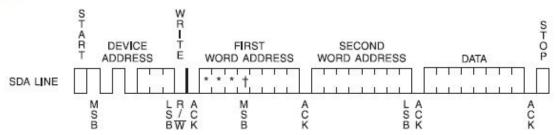
Hardware: EEPROM 24C32

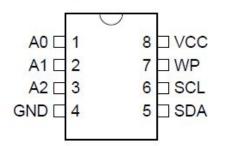
- Tamaño 32K (4096 x 8) bits.
- 128 páginas de 32 bytes.
- 8 bit device address: header (0b1010) + I²C address (0b111) + R/W.



12 bit word address: direcciones desde 0x0000 hasta 0x0FFF.

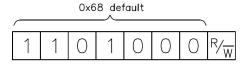
Byte Write





Hardware: RTC DS3231

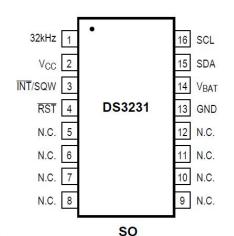
I²C slave address: Header (0b1101) + I2C address (0b000) + R/W



Registros horarios en BCD:

ADDRESS	BIT 7 MSB	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0 LSB	FUNCTION	RANGE
00h	0	10 Seconds			Seconds				Seconds	00-59
01h	0	10 Minutes			Minutes				Minutes	00-59
02h	0	12/24	AM/PM 20 Hour	10 Hour	Hour			Hours	1–12 + AM/PM 00–23	

- Compensación por temperatura y envejecimiento.
- 2 alarmas configurables (1/sec, 1/min, 1/hora, 1/dia, 1/semana, 1/mes, 1/año)
- Registro de temperatura accesible por I²C: 10 bits signados. Resolución 0.25°C
- Map address: 19 registros (0x00 a 0x12) de 8 bits.



Hardware: RTC DS3231

Lectura / Escritura:

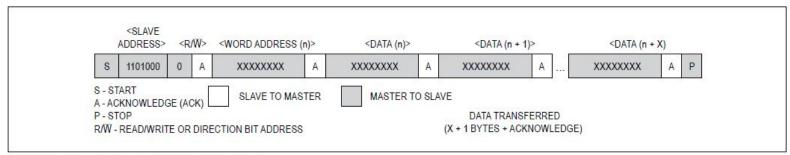


Figure 3. Data Write—Slave Receiver Mode

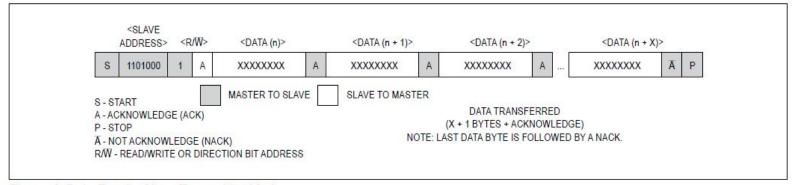


Figure 4. Data Read—Slave Transmitter Mode

RTC DS3231: Mapa de memoria

ADDRESS	BIT 7 MSB	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0 LSB	FUNCTION	RANGE
00h	0	10 Seconds			Seconds				Seconds	00-59
01h	0		10 Minutes	s	Minutes				Minutes	00-59
02h	0	12/24	AM/PM 20 Hour	10 Hour	Hour				Hours	1–12 + AM/PM 00–23
03h	0	0	0	0	0 Day			Day	1–7	
04h	0	0	10	Date	Date				Date	01-31
05h	Century	0	0	10 Month	Month				Month/ Century	01-12 + Century
06h		10	Year				Year	00-99		
07h	A1M1		10 Second	s	Seconds				Alarm 1 Seconds	00-59
08h	A1M2	10 Minutes Minutes						Alarm 1 Minutes	00-59	
09h	A1M3	12/24	AM/PM 20 Hour	10 Hour	Hour				Alarm 1 Hours	1–12 + AM/PM 00–23
0.41		DUIDE NO.			Day				Alarm 1 Day	1–7
0Ah	A1M4	DY/DT	10 Date		Date				Alarm 1 Date	1-31
0Bh	A2M2		10 Minute:	S	Minutes				Alarm 2 Minutes	00-59
0Ch	A2M3	12/24	AM/PM 20 Hour	10 Hour	Hour				Alarm 2 Hours	1–12 + AM/PM 00–23
ODL	A2M4	DY/DT	10 Date		Day				Alarm 2 Day	1–7
0Dh					Date				Alarm 2 Date	1-31
0Eh	EOSC	BBSQW	CONV	RS2	RS1	INTCN	A2IE	A1IE	Control	-
0Fh	OSF	0	0	0	EN32kHz	BSY	A2F	A1F	Control/Status	
10h	SIGN	DATA	DATA	DATA	DATA	DATA	DATA	DATA	Aging Offset	-
11h	SIGN	DATA	DATA	DATA	DATA	DATA	DATA	DATA	MSB of Temp	
12h	DATA	DATA	0	0	0	0	0	0	LSB of Temp	<u></u>

Preguntas?

Gracias!