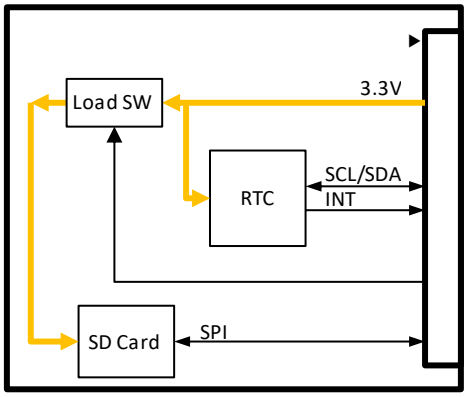
AZ02 RTC&microSD

1. Description

This leaf is equipped with an NXP Real-Time Clock PCF8523TK and a micro SD card slot. The RTC can output an interrupt signal to the MCU by an alarm or a timer. The micro SD card can be accessed by the SPI interface.

2. Leaf specification

2-1. Block diagram



2-2. Power supply specification

Symbol	Parameter	Condition	Min.	Typ.	Max.
Vdd	Power Supply Voltage	–	2.7V	3.3V	3.6V
Idd	Operating current	Active	-	3.4uA	-
		Sleep	-	1uA	-

※Excluding current consumption of microSD

2-3. Main parts

Reference No.	Part name	Part number	Vendor name	note
IC460	Real-Time Clock	PCF8523TK	NXP	–
IS260	micro SD Card slot	105162-0101	molex	–

2-4. Appearance

Top Side	Back Side
 micro SD Card slot (IS260)	

2-5. Pinout

Name	Function
SCL	I2C bus clock
SDA	I2C bus data
D6	SDPON : MicroSD power on　H:power on　L:power off
D10	CS : SPI Chip Select
D13	SCLK : SPI Serial ClocK
D11	MOSI : Master Out Slave In
D12	MISO : Master In Slave Out
3V3	3.3V power input
GND	GND

3. Real-Time Clock (PCF8523TK) Specification

3-1. Description

Item	Description
Type	Real-Time Clock (RTC) and calendar
Interrupt	Alarm and timer
quartz crystal unit	FC-12M 32.768000kHz 7.0 +20.0-20.0
Interfaces	I2C

3-2. Specifications

3-2-1. Absolute Maximum Ratings

Parameter	Value
Operating Temperature	-40℃ to +105℃
Maximum Operation Voltage	Vin 6.5V

3-2-2. Electrical characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.
Vdd	Operating voltage	power management function active	1.8V	-	5.5V
Iq	Quiescent current	I2C-bus active; fscl=1000kHz	-	-	200uA
		I2C-bus inactive; interrupts disabled	-	150nA	500nA

3-3. Link to data sheet

https://www.nxp.com/jp/products/analog/signal-chain/real-time-clocks/ic-real-time-clocks-rtc/real-time-clock-rtc-and-calendar:PCF8523?lang=jp&lang_cd=jp&

4. Main functions and libraries

4-1. RTC Control

include file:RTClib.h

https://github.com/adafruit/RTClib

Function	Description
RTC_PCF8523 rtc	Create instance for PCF8523 【parameter】 rtc: Instance name（rtc)
rtc.begin()	Initialize communication with RTC 【parameter】 null 【return value】 true false
rtc.initialized()	Initialize RTC 【parameter】 null 【return value】 true false
rtc.adjust(DateTime (date, time))	Specify date and time on RTC 【parameter】 DateTime year (16byte) month (8byte) day (8byte) hour (8byte) minute (8byte) second (8byte) dayOfWeek (8byte) 【return value】 null
rtc.now()	Read current date and time from RTC 【parameter】 null 【return value】 DateTime year (16byte) month (8byte) day (8byte) hour (8byte) minute (8byte) second (8byte) dayOfWeek (8byte)

5. microSD Specification

5-1. Description

This Leave contains only a micro SD card connector, no active circuitry is provided. The card can be directly accessed by the MCU.

5-2. microSD control

include:SD.h(Arduino IDE Standard Libraries)
spi.h(Arduino IDE Standard Libraries)

Function	Description
SD.begin()	Initialize Libraries and SD card, make SPI bus and Chip Select pin available. Pin 10 is the default SPI pin. 【statement】 SD.begin(clock,cspin) 【parameter】 clock : Set SPI clock. Recommended value for Leaf connector : 2500000 cspin: Connect to chip-select terminal of SD.　Default:SS terminal of SPI 【return value】 true false
SD.exists()	Check existence of specified file. 【statement】 SD.exists(filename) 【parameter】 filename: File name which should be validated. A path can be specified with (slash '/') prior the file name. 【return value】 true false
SD.mkdir()	Create Directory 【statement】 SD.mkdir(filename) 【parameter】 filename: Directory name which should be created. A path can be specified with (slash '/') prior the directory name. 【return value】 true false

SD.open()	Open file function. In write mode a new file will be created if the filename specified does not. 【statement】 SD.open(filename) SD.open(filename, mode) 【parameter】 filename: The name of the file which should be opened. A path can be specified with (slash '/') prior the file name. mode (optional): Specify mode. Default mode is FILE_READ. FILE_READ:read FILE_WRITE: read and write 【return value】 Returns a File object referring to the opened file. In read mode, returns false if it could not be opened.
SD.remove()	Delete file function. 【statement】 SD.remove(filename) 【parameter】 filename: The name of the file which should be deleted. A path can be specified with (slash '/') prior the file name. 【return value】 true false File does not exist : return value is Unspecified.

5-3. Power saving control

The micro SD card’s power supply can be turned of with the load switch to reduce power consumption.

6. Revision history

Rev A1.0: First edition, January 2020