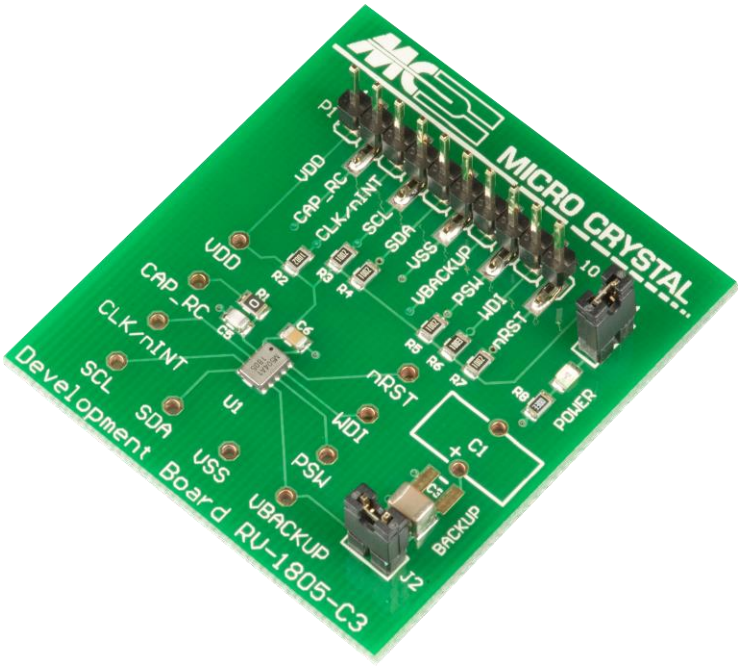
MICRO CRYSTAL SWITZERLAND

RV-1805-C3
Development Board

DEVELOPMENT BOARD



RV-1805-C3
Extreme Low Power RTC Module

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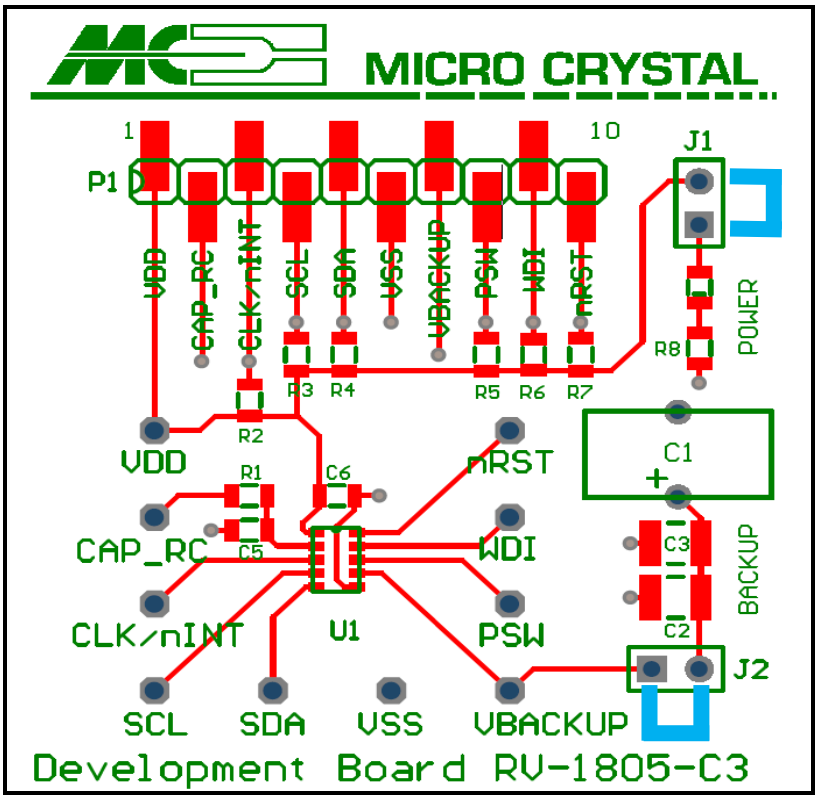
RV-1805-C3

The RV-1805-C3 is soldered onto the Development Board.
Every pin is either accessible at test pins 1 – 10 or at the test vias situated around the device.
The following passive components are already soldered on the Board:

C1	xx	Option for Supercap for backup supply
C2	10 nF	Backup supply buffer cap
C2	xx	Option for double layer cap for backup supply
C5	47pF	Filter cap for auto calibration
C6	10 nF	Decoupling capacitor between V_{SS} and V_{DD}
R1	0 Ω	to limit inrush current for external Supercap
R2	10 kΩ	Pull-up resistor INT to V_{DD}
R3	10 kΩ	Pull-up resistor SCL to V_{DD}
R4	10 kΩ	Pull-up resistor SDA to V_{DD}
R5	10 kΩ	Pull-up resistor PSW to V_{DD}
R6	100 kΩ	Pull-up resistor WDI to V_{DD}
R7	10 kΩ	Pull-up resistor RST to V_{DD}
R8	330 Ω	Current limiting resistor for LED
LED	green	Supply current consumption of the LED has to be considered

DEVELOPMENT BOARD



JUMPER 1

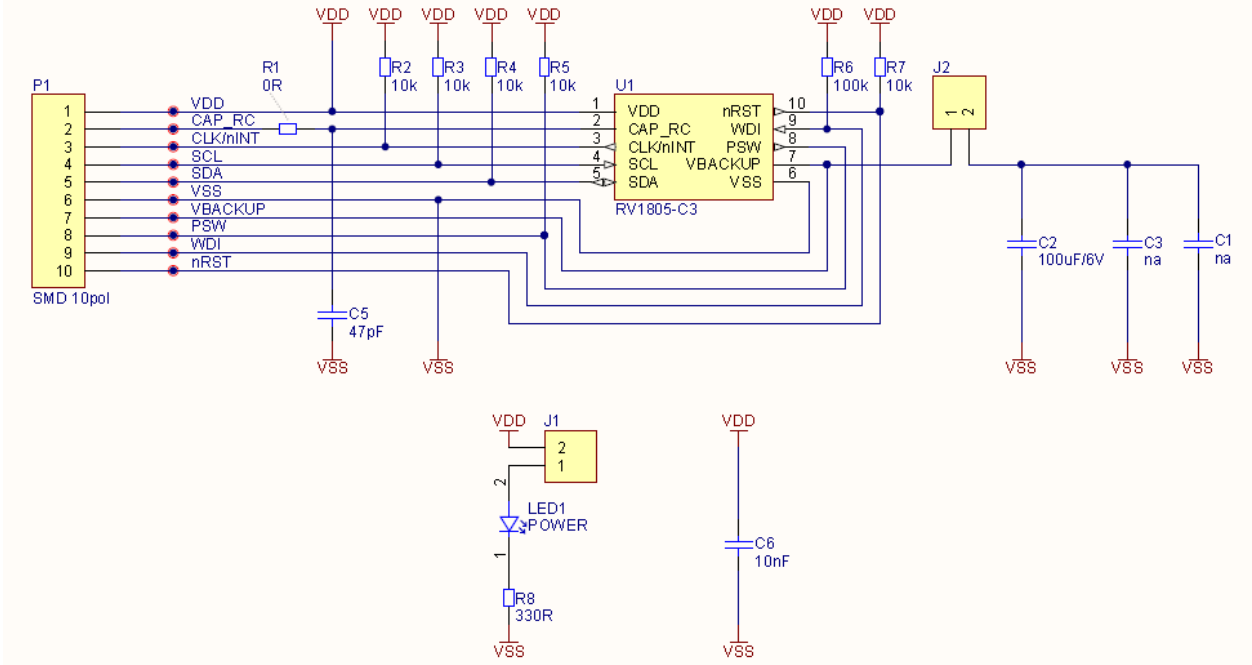
Power for LED

JUMPER 2

Add Supercap

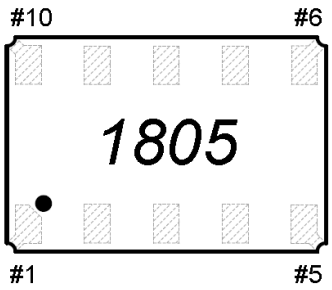
Development Board RV-1805-C3

SCHEMATICS



PINOUT RV-1805-C3

C3 Package: (top view)



# 1	V_{DD}	# 10	RST
# 2	CAP_RC	# 9	WDI
# 3	CLK / $\overline{INT}$	# 8	PSW
# 4	SCL	# 7	V_{BACKUP}
# 5	SDA	# 6	V_{SS}

PIN DESCRIPTION

Symbol	Pin #	Description
V_{DD}	1	Positive supply voltage, primary power connection
Cap_RC	2	Auto calibration filter connection. A 47 pF ceramic capacitor should be placed between this pin and VSS for improved Auto calibration mode timing accuracy.
CLK / $\overline{INT}$	3	Clock output / Interrupt. Primary interrupt output connection. It is an open drain output. An external pull-up resistor must be added to this pin. It should be connected to the host device and is used to indicate when the RTC can be accessed via the I^2C-bus interface
SCL	4	I^2C Serial Clock Line input. A pull-up resistor is required on this pin
SDA	5	I^2C Serial Data Line. A pull-up resistor is required on this pin
V_{SS}	6	Ground connection
V_{BACKUP}	7	Backup supply voltage
PSW	8	Power Switch output. Secondary interrupt output connection. It is an open drain output
WDI	9	Watchdog timer reset Input connection. It may also be used to generate an External interrupt
RST	10	Reset output. It is an open drain output

Datasheet and Application-Manual are available for download under: www.microcrystal.com

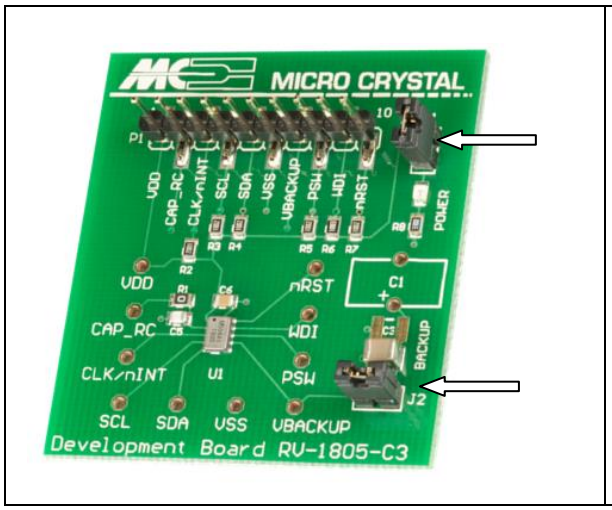
Development Board RV-1805-C3

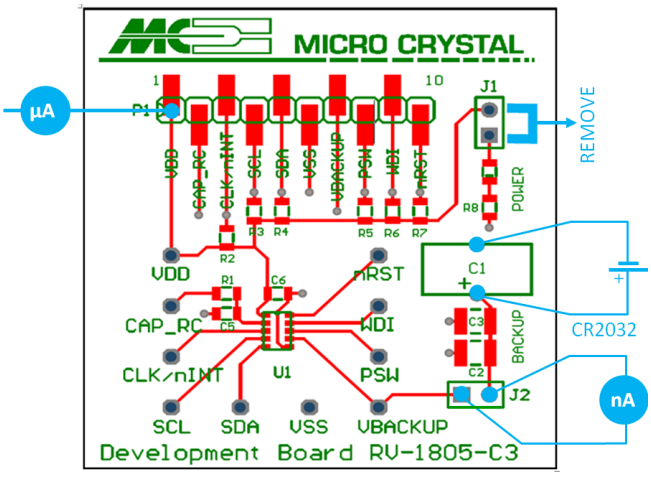
RTC set-up for lowest power consumption

Upon initial power-up the Real-time Clock module RV-1805-C3 has activated some outputs. These are pulling additional power. They need to be switched off first! The key points in Hardware and Software are outlined to achieve the exceptionally low current consumption of << 100nA.
(Reference: Application Note RV-1805-C3 Measuring Current Consumption and Frequency Accuracy)

Hardware:
To measure current draw of the RV-1805-C3, an A-meter must be inserted in series with the RV-1805-C3 VDD

1. Demoboard RV-1805-C3
2. Current measured into VDD (at pin 1)
3. Disconnect jumper J1 to switch off the LED (5mA), refer to the picture below
4. Replace jumper J2 by an nA-meter, connect a Li battery 3V to ground
5. Connect the Demoboard with: VSS, SCL, SDA, VDD with µA-meter, e.g. with the USB-I^{2}C-Bus dongle
6. Power up the device: VSS, VDD and connect the I^{2}C-Bus SCL, SDA





Software:
Steps for setting the RTC in the lowest power mode:

1. The nRST and PSW outputs are active low and draw pulldown currents. (Total about 650µA)
2. Deactivate these outputs in Control register1:
   - CLKB must be set to 1
   - PSWB needs to be set 1, for this LKP bit must be cleared first!

→ If only either bit CLKB or PSWB is set to 1, the current is reduced only to some 320µA

4. Control register 2: all bits set to 0, making sure no other modes are activated
5. The program sequence for setting the RTC RV-1805-C3 into low power mode can be implemented in a few lines of code:

```
START condition I2C-Bus
  D2h   Slave address: write
  1Dh   Address pointer
  00h   Set LKP = 0
STOP    condition I2C-Bus
START
  D2h   Slave address: write
  10h   Address pointer to control register 1
  30h   Set PSWB and CLKB bits =1
  00h   Clear control register 2
STOP
```

6. Current draw into VDD is now some 3.7µA, 3.6µA derive from leakage currents through I/Os

Hardware: Switch to back-up mode:

7. Power down the interface: VDD, SCL, SDA = 0V. Read the current into VBACKUP on the nA-meter: <0.10 µA

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202690-AA00 RV-1805-C3-EVALUATION-BOARD