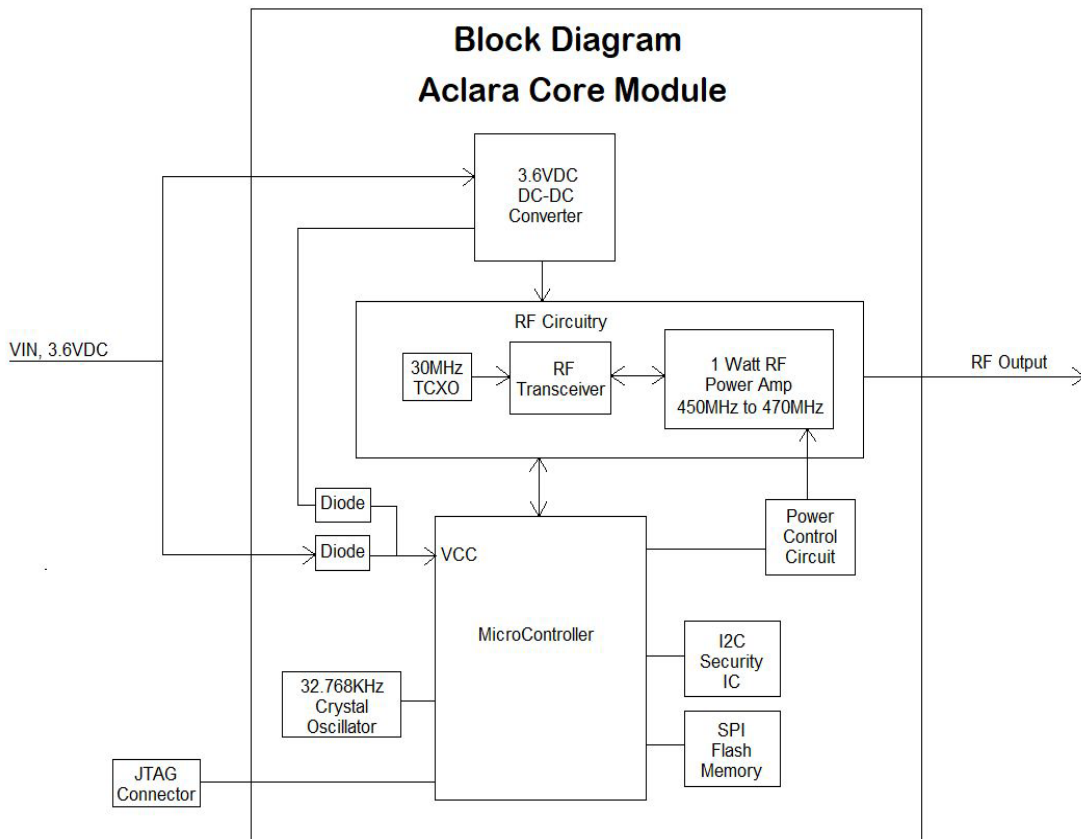


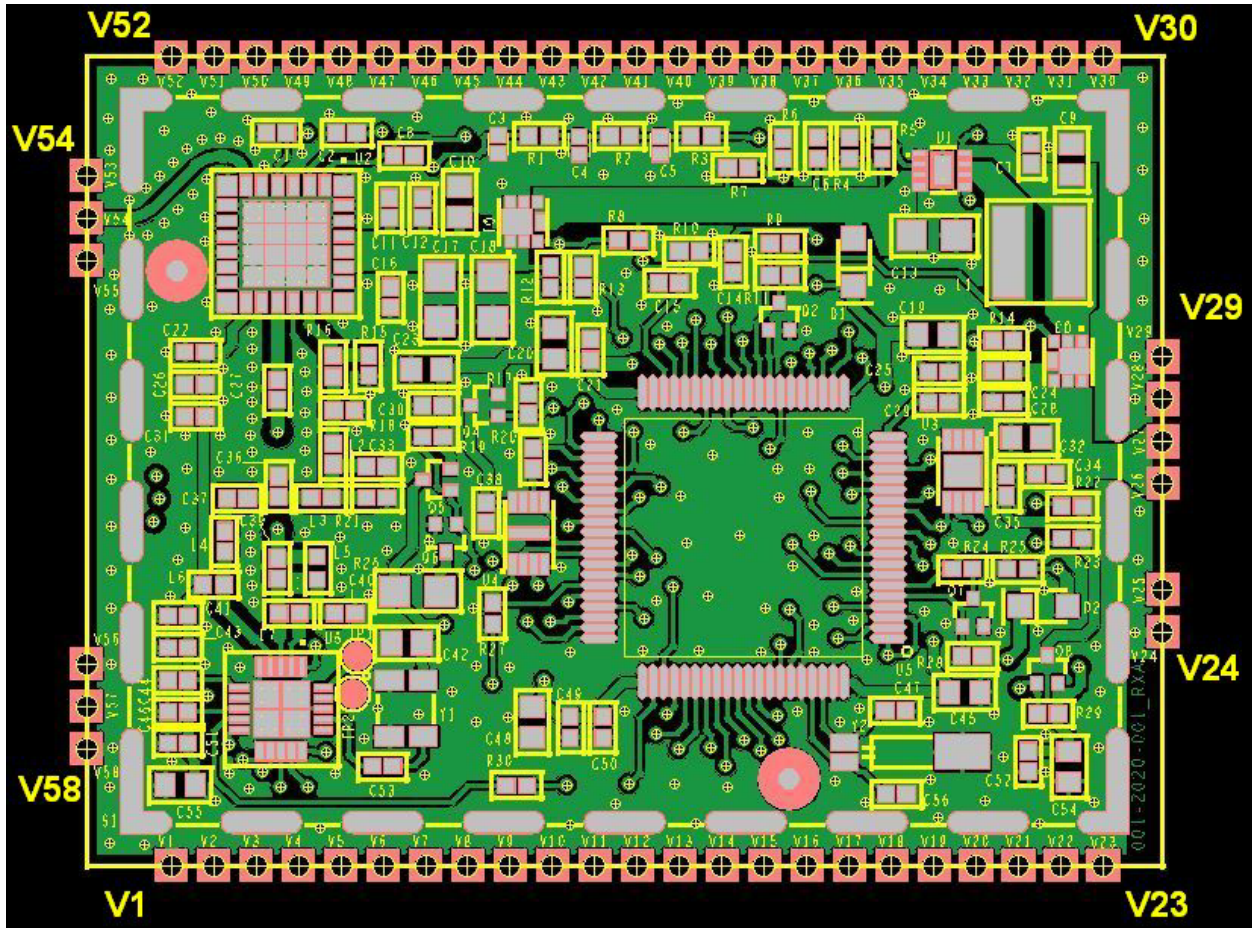
# Aclara Core Module Implementation Requirements

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The information in this document will provide guidance on proper implementation of the Aclara Core Module (ACM). The ACM is a fully contained MCU system with RF circuitry and regulated supplies that can be used on Aclara's proprietary end point devices to support Aclara's RF network. Proper RF performance, within Aclara's licensed operating frequency band of 450MHz to 470MHz, can be achieved by following a few design guidelines. The 1.5" x 2.0" package requires no connectors and is placed and soldered down as a surface mount device during production. With the module implemented properly, there is no need for repeating FCC transmitter tests, saving both time and cost of final device certifications.



## ACM Pinout



## ACM Pin Signal Description

Radio Pin#	Signal Name	Function	I/O Type	Level
V1	GND			
V2	P3.4	MCU GPIO	Digital I/O	3.3V
V3	P3.5	MCU GPIO	Digital I/O	3.3V
V4	P3.6	MCU GPIO	Digital I/O	3.3V
V5	P3.7	MCU GPIO	Digital I/O	3.3V
V6	P4.4	MCU GPIO	Digital I/O	3.3V
V7	P2.4	MCU SPI CLK	Digital Output	3.3V
V8	P5.4	CTS	Digital Input	3.3V
V9	P5.5	RTS	Digital Output	3.3V
V10	P1.1	MCU GPIO	Digital I/O	3.3V
V11	P2.7	XL nCS	Digital Output	3.3V
V12	P5.6	XL INT1	Digital Input	3.3V
V13	P5.7	XL INT2	Digital Input	3.3V
V14	P6.4	SDA	Digital Bi-Dir	3.3V
V15	P6.5	SCL	Digital Output	3.3V
V16	P6.6	MCU GPIO	Digital I/O	3.3V

V17	P6.7	MCU GPIO	Digital I/O	3.3V
V18	P1.0	MCU GPIO	Digital I/O	3.3V
V19	P6.0	MCU GPIO	Digital I/O	3.3V
V20	P6.1	MCU GPIO	Digital I/O	3.3V
V21	P6.2	MCU GPIO	Digital I/O	3.3V
V22	VCORE	VCORE 3.3V Output Voltage	Power Output	3.3V
V23	GND		Ground	
V24	GND		Ground	
V25	VBAT_LO	VBAT Low Current Voltage Input	Power Input	3.6V
V26	VBAT_HI	VBAT High Current Voltage Input	Power Input	3.6V
V27	VBAT_HI	VBAT High Current Voltage Input	Power Input	3.6V
V28	GND		Ground	
V29	GND		Ground	
V30	GND		Ground	
V31	P8.0	MCU GPIO	Digital I/O	3.3V
V32	P1.4	B WAKE	Digital Output	3.3V
V33	P3V6	3.6V RF Power Supply Output	Power Output	3.6V
V34	TDO	JTAG Test Data Output	Digital Output	3.3V
V35	TDI	JTAG Test Data Input	Digital Input	3.3V
V36	TMS	JTAG Test Mode Select	Digital Input	3.3V
V37	TCK	JTAG Test Clock	Digital Input	3.3V
V38	P7.7	MCU GPIO	Digital I/O	3.3V
V39	P4.0	MCU GPIO	Digital I/O	3.3V
V40	P4.2	B RESET	Digital Output	3.3V
V41	P2.5	SPI MOSI	Digital Output	3.3V
V42	P2.5	SPI MISO	Digital Input	3.3V
V43	MSP TEST	MCU TEST Input	Digital Input	3.3V
V44	MSP NMI	MCU nRESET/NMI Input	Digital Input	3.3V
V45	P8.1	MCU GPIO	Digital I/O	3.3V
V46	P2.0	TXD	Digital Output	3.3V
V47	P2.1	RXD	Digital Input	3.3V
V48	RX0 TX1	RF PA RX/TX Control Input	Digital Input	3.3V
V49	SKY EN	RF PA Enable Control Input	Digital Input	3.3V
V50	P8.2	ACM WAKE	Digital Input	3.3V
V51	P8.3	MCU GPIO	Digital I/O	3.3V
V52	GND		Ground	
V53	GND		Ground	
V54	ANT	RF Antenna Output	RF Output	
V55	GND		Ground	
V56	GND		Ground	
V57	NC	No Connect		
V58	GND		Ground	

## **Design Guidelines**

### **Power Supply :**

The ACM is designed to be operated at a nominal input voltage of 3.6VDC. The actual operating input voltage of the ACM can vary from a minimum of 2.8VDC to a maximum of 3.8VDC. This wide range of input voltage supports designs powered from a primary battery source. There are two voltage inputs, one for high current and one for low current. They can be powered from different battery sources if needed. The low current input voltage, VBAT\_LO, provides power for the MCU and its peripherals. The high current input voltage, VBAT\_HI, provides power for the RF circuitry and the regulated supply. The regulated supply can draw up to 1.0 Amp of current while providing a regulated 3.6VDC supply to the RF circuitry. This regulated supply assures consistent RF power levels over the entire range of input voltage.

### **Antenna :**

The ACM antenna output shall connect to a host board strip-line that provides a 50 ohm controlled impedance path to an antenna. The strip-line can connect to a RF connector in order to support an external (off-board) antenna or it can connect to an etched (on-board) antenna with a matching network to provide the proper 50 ohm termination for the strip-line. The ACM's maximum RF output level is 30dBm (1 Watt) of RF power. There is a maximum gain limit of +5dBi for the ACM antenna. Antenna placement shall be at least 100cm from any operator. Antenna type shall be EM Wave 073-0010 or equivalent.

### **Host Board Stackup :**

The Host PCB stackup shall be at least a 2-layer stackup with an overall thickness of 0.062" +/- 0.005" and use a minimum copper weight of 1/4oz. Ground flooding is allowed underneath the ACM module to provide further isolation from any digital interference. The ACM is a surface mount device (SMD) that uses castellated vias for pins and can be reflowed along with other SMD devices. High temperature board materials, such as Isola 410 or FR-408, with Tg ratings of 170C minimum shall be used to maintain coplanarity.

This information should be enough to assure a proper installation of the ACM into any new Aclara end point device that requires 450MHz to 470MHz licensed narrow band RF transmission. PCB Footprints and mechanical drawings can be provided by Aclara Engineering.

## Label Requirements :

The ACM requires a label on the product case that includes Bluetooth ID, model number and FCC ID numbers. The label must be easy to view and can include bar codes. An example label is shown in Figure 2.



## FCC/IC :

Pursuant to FCC 15.21 of the FCC rules, changes not expressly approved by Aclara Technologies LLC might cause harmful interference and void the FCC authorization to operate this product.

**Warning :**

The antennas used for this transmitter must be installed to provide a separation distance greater than 25 cm from all persons.

Ce produit est conforme à la norme FCC et aux limites d'exposition au rayonnement RSS-102 d'Industrie Canada définies pour un environnement non contrôlé.

**Compliance :**

This device complies with Part 15 of the FCC Rules and Innovation, Science and Economic Development Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference. and (2) this device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à des règlements Innovation, Sciences et Développement économique Canada exempts de licence standard RSS (s). Son fonctionnement est soumis aux deux conditions suivantes: (1) Ce dispositif ne doit pas causer d'interférences nuisibles, et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences pouvant entraîner un fonctionnement indésirable.