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# Fleck Radio Specifications

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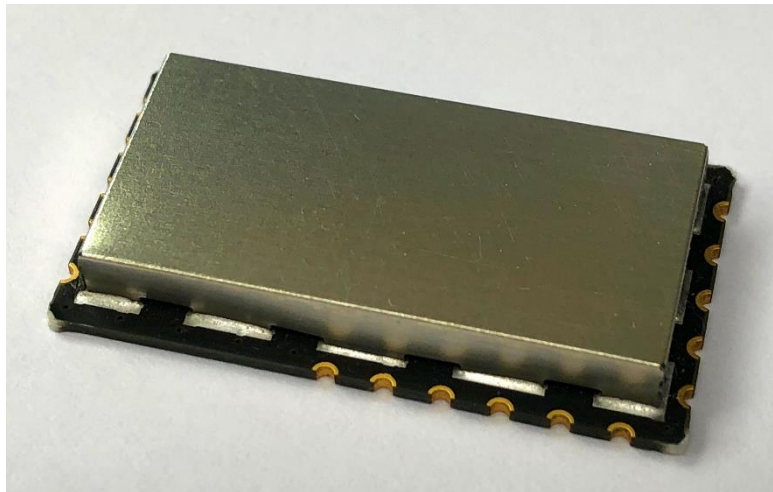
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# 1 Introduction

The Fleck radio is a 100mW GMSK radio transceiver module for use in low power and long range wireless communication applications. The module will be compliant to 2014/53/EU (RED) and harmonised standard ETSI EN 300 220 Category 1. It has programmable over the air data rates, with a sensitivity as low as -127dBm at 200bps. Data over the air can be encrypted up to AES 256. The receiver includes a SAW filter to reject unwanted signals, and the module incorporates a low power ARM processor.

It is available in the license exempt telemetry bands 434MHz, 869MHz, and 915MHz. This document outlines the specification of the 869MHz radio module.



*Figure 1 Fleck Radio Module*

## 2 Electrical Specifications

### 2.1 Absolute Maximum Ratings

Parameter	Min	Typ	Max	Unit
Operating Temperature	-30 <sup>1</sup>	+25	+85	°C
Supply Voltage	1.8	3.3	3.6	V
RF Output Power	-	-	100	mW

Table 1 Absolute Maximum Ratings

### 2.2 General Characteristics

Parameter	Description	Min	Typ	Max	Unit
All operating conditions	Receive Current	-	-	20	mA
	Sleep Current	-	-	2.5	µA
	Channel Spacing	6.25	12.5	300	kHz
	Over air Data Rate	200	2400	100,000	bps
	Frequency Accuracy	-	-	±0.5	ppm
	RTC Accuracy	-	-	±5	ppm
	UART Baud Rate	100	9600	230,400	bps
Frequency 869.1-869.4MHz	RF Output Power	-	-	25	mW
	Transmit Current	56	62	67	mA
Frequency 869.4-869.65MHz	RF Output Power	-	-	100	mW
	Transmit Current	94	102	110	mA
Frequency 869.65-870.0MHz	RF Output Power	-	-	25	mW
	Transmit Current	56	62	67	mA

Table 2 General Electrical Characteristics

<sup>1</sup> The module can operate down to -40°C with reduced frequency accuracy.

## 2.3 Receiver Characteristics

Parameter	Min	Typ	Max	Unit
Sensitivity at 200 bps	-	-127	-	dBm
Sensitivity at 2400 bps	-	-117	-	dBm
Sensitivity at 100,000 bps		-104		dBm

*Table 3 Receiver Characteristics*

## 3 Product Roadmap

Variants at 169MHz and 458MHz are also in development with the same package and pinout.

## 4 Module Dimensions

The module has been designed using 0.1" pad spacing and is therefore suitable for surface mounting, hand soldering, and prototyping.

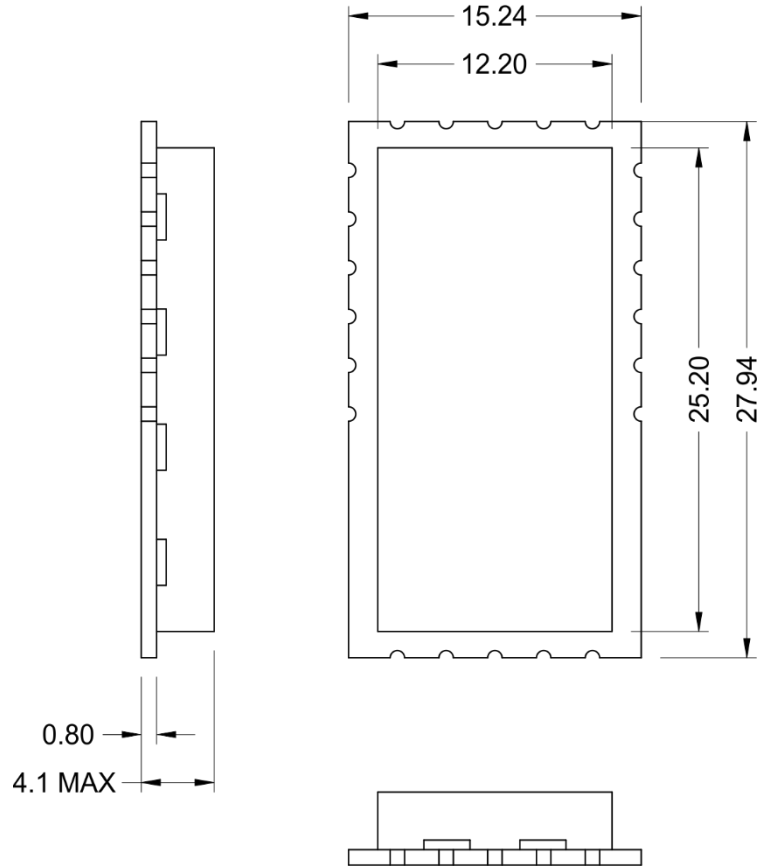


Figure 2 Module Dimensions



# 5 Module Pin Descriptions

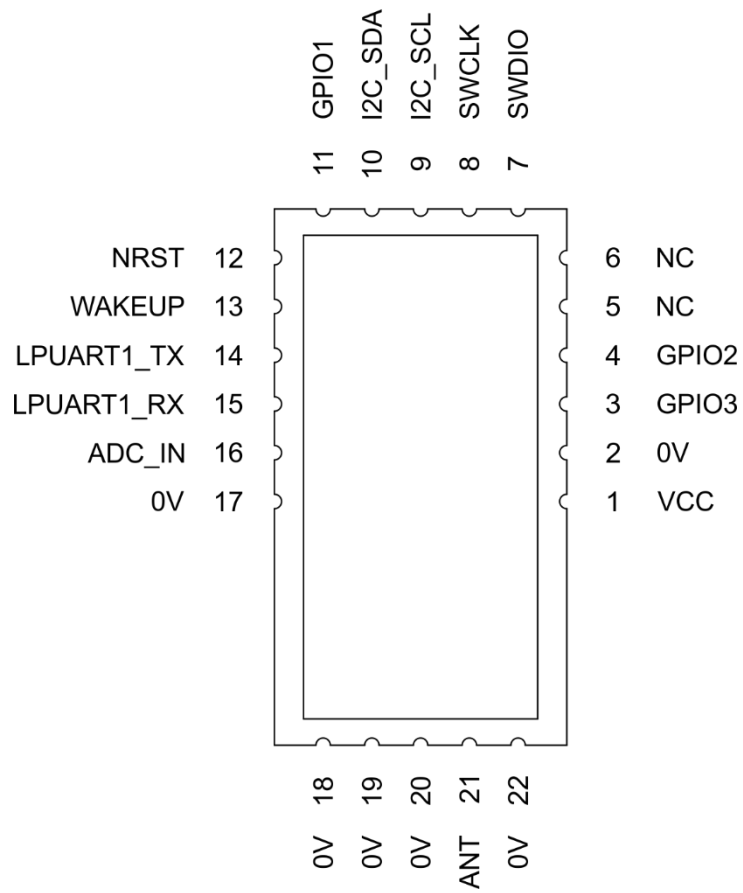


Figure 3 Pin Descriptions

Pin	Pin Name	I/O	Description
1	VCC	VCC	+1.8V to +3.6V Supply Voltage. Recommended +3.3V
2	oV	GND	Connect to PCB ground
3	GPIO3	I/O	General Purpose Digital I/O Configured through registers to perform various functions
4	GPIO2	I/O	
5	NC	-	Do not connect
6	NC	-	Do not connect
7	SWDIO	I/O	SWD data
8	SWCLK	I	SWD clock
9	I2C_SCL	I/O	I2C clock. Fleck is an I2C Master by default.
10	I2C_SDA	I/O	I2C data. Fleck is an I2C Master by default.
11	GPIO1	I/O	<i>see GPIO note above</i>
12	NRST	I	Hardware reset. Internally pulled-up, drive Low to reset.
13	WAKEUP	I	Wakeup/Interrupt input
14	LPUART1_TX	O	UART Transmit
15	LPUART1_RX	I	UART Receive
16	ADC_IN	I	Analogue/Digital Convertor Input. Must not exceed VCC.
17	oV	GND	Connect to PCB ground
18	oV	GND	Connect to PCB ground
19	oV	GND	Connect to PCB ground
20	oV	GND	Connect to PCB ground
21	ANT	I/O	Antenna
22	oV	GND	Connect to PCB ground

*Table 4 Pin Descriptions*

# Appendices

## Appendix A: Definitions

Term	Definition
ACK	Acknowledgement
ADC	Analogue Digital Converter
bps	Bits Per Second
dBm	Power level in dBs with respect to 1mW
GMSK	Gaussian Minimum Shift Keying
GPIO	General Purpose Input Output
I2C	Inter-Integrated Circuit. A serial communication bus typically used for attaching peripherals to microcontrollers
kHz	Kilohertz
MHz	Megahertz. A unit of frequency. ( $10^6$ Hz)
PCB	Printed Circuit Board
ppm	Parts Per Million
RED	Radio Equipment Directive. Regulatory framework for placing radio equipment on the market
RTC	Real Time Clock
TBC	To Be Determined
RF	Radio Frequency
UART	Universal Asynchronous Receiver Transmitter
VCC	Voltage Collector Collector. A voltage supply signal

## Appendix B: Document Revision History

Revision	Description of Change	Author(s)	Date
Draft v0.1	Initial Draft	P. Benham	30 Oct 2017
v1.0	Initial Release	P. Benham	30 Nov 2017
V1.1	Updated current consumption, registered office, telephone number, and frequency variants	P. Benham	17 July 2018