OPM15 Hardware Datasheet

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Key Features of OPM15-E Radio

- RoHS
- Operating spectrum range: 2.4GHz global unlicensed band
- Up to 100kbps application throughput
- Low power consumption (operating: ~60mW; sleeping: ~4uW)
- Power control function supported (-18dBm to 5dBm direct RF output power)
- RF sensitivity of less than -94dBm
- Surface mount compatible with standard 2.0 mm BGA package interface
- Footprint size: 14.25 mm x 12mm x 2.55 mm
- Operating Temperature range: up to [-40 °C to +85 °C] range
- Wide Supply-Voltage Range 2 V–3.6 V
- OPM network protocol stack integrated: supporting dynamic networking deployment
- Supporting real-time services with unlimited multi-hop network scalability
- Better network resource utilization
- Robust to wireless interferences
- IEEE 802.15.4 RF and TCP/IP compliant

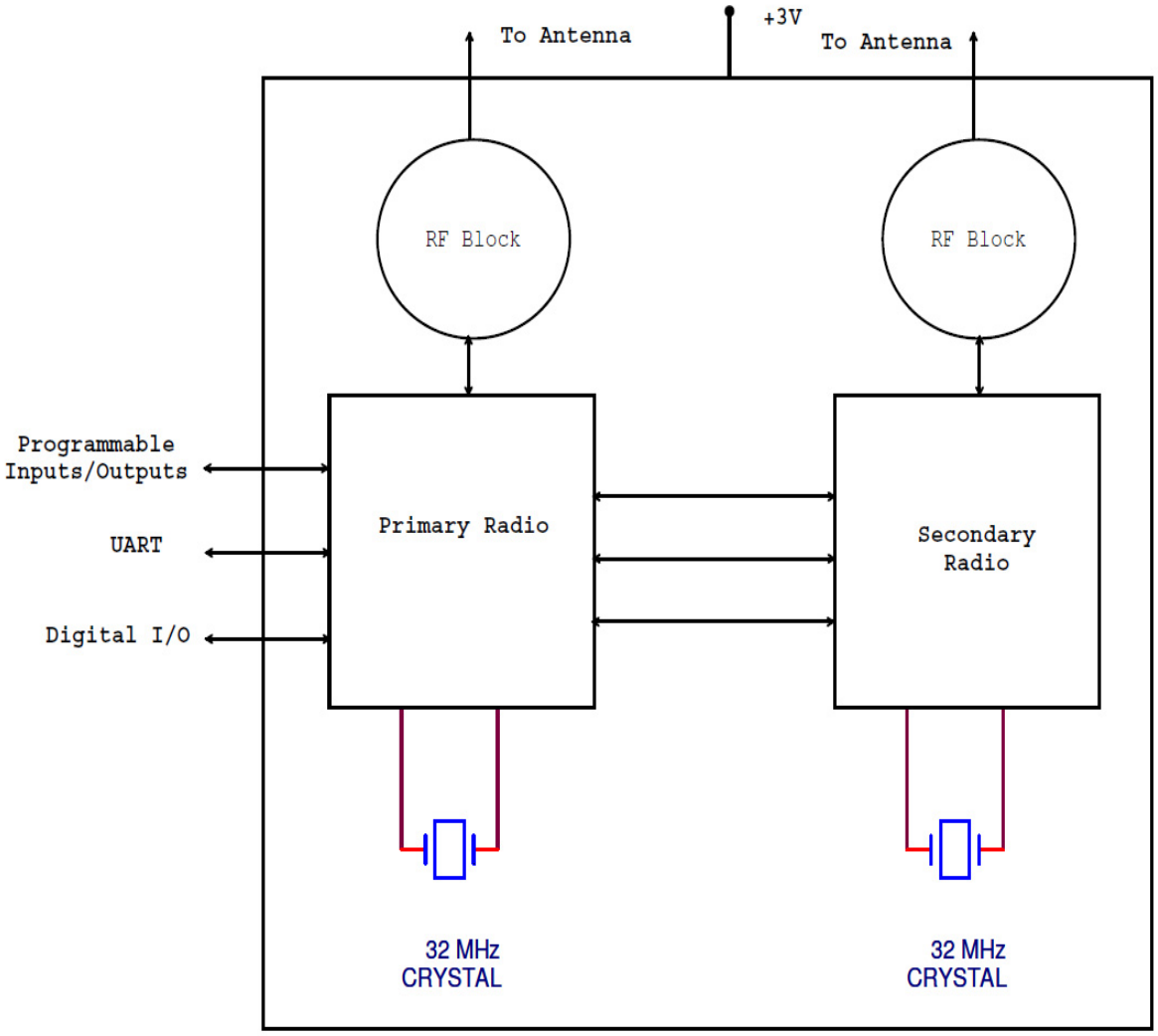
Description

The OPM15-E series of radio modules are of the smallest cognitive radio system in industry that integrates opportunistic wireless mesh network stack. It provides the most flexibility for a wide range of applications. The result is a fully integrated module providing a complete system for dynamic wireless network with real-time and high-performance communications**.**

Applications

- Real-time wireless sensor networks
- Wireless location/tracking and communication networks
- Smart power infrastructure networks
- Industrial wireless control networks
- Emergency wireless networks
- Wireless networking in interference intensive environments

Functional Block diagram



Absolute Maximum Ratings:

		Minimum	Maximum	Unit
Power Supply		-0.3	3.9	V
Input RF level			+10	dBm
Voltage on any digital pin		-0.3	Vdd + 0.3, V ≤ 3.9	V
Storage Temperature		-40	125	°C
ESD(1)	• All pads according to human-body model, JEDEC STD 22, method A114 • According to charged-device model, JEDEC STD 22, method c101		2000 500	V V
Maximum reflow Temperature			240	°C

(1) Stresses beyond those listed under absolute Maximum Ratings may cause permanent damage to the module. Precautions should be used when handling the module in order to prevent ESD damage.

Recommended Operating Conditions

	Minimum	Maximum	Unit
Operating ambient temperature range (Part # dependent: see ordering information)	-40 (-10)	85 (60)	°C
Operating Supply Voltage	2	3.6	V

DC Characteristics

T – 25 °C, VDD = 3V, unless otherwise noted

Parameter	Test Condition	Min.	Typical	Max.	unit
Logic -0 input voltage				0.5	V
Logic -1 input voltage		2.5			V
Logic -0 input current		-50		50	nA
Logic -1 input current		-50		50	nA
I/O pin pull up and pull down resistors			20		KΩ
Logic -0 output voltage, 4 mA pins	Output load 4 mA			0.5	V
Logic -1 output voltage, 4 mA pins	Output load 4 mA	2.4			V

Pin Descriptions

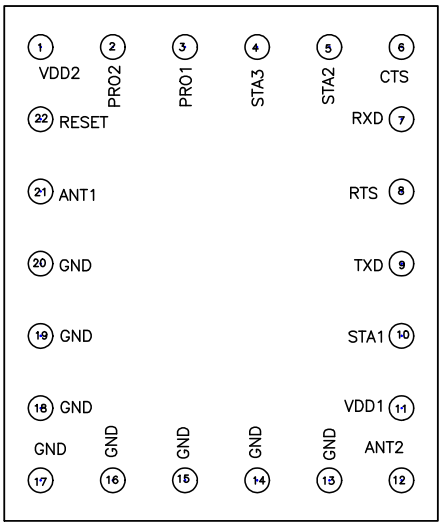


Figure 2 - OPM15-E Radio Top View (Through View)

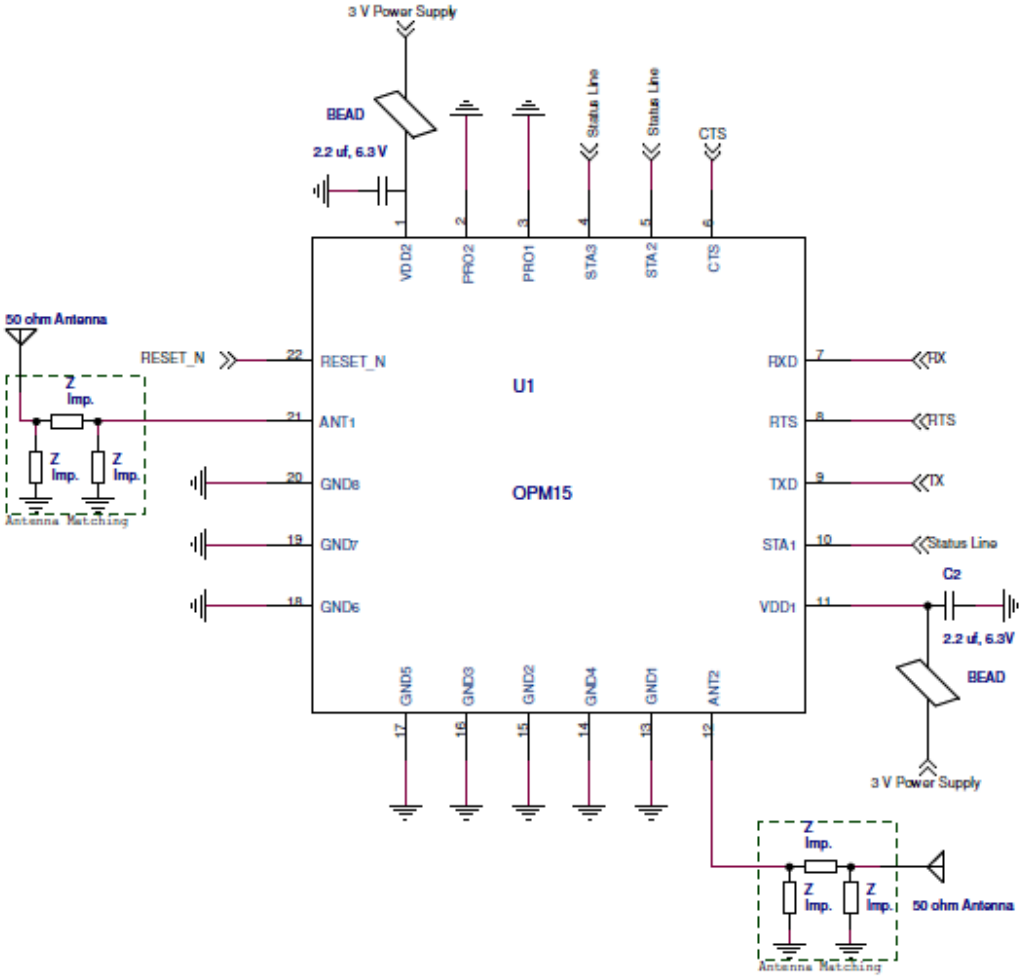
The Table below defines the pin functions

Pin Number	Pin Name	Description
1	VDD2	1.8V TO 3.8 Volts digital and analog power supply
2	PRO2	Factory port[1] 2 (Digital I/O)
3	PRO1	Factory port 1 (Digital I/O)
4	STA3	State port[2] 3 (Digital I/O)
5	STA2	State port 2 (Digital I/O)
6	CTS	CTS of TTL serial (Digital I/O)
7	RXD	RXD of TTL serial (Digital I/O)
8	RTS	RTS of TTL serial (Digital I/O)
9	TXD	TXD of TTL serial (Digital I/O)
10	STA1	State port 1 (Digital I/O)
11	VDD1	2V TO 3.6V digital and analog power supply
12	ANT2	50 Ω Antenna Output
13	GND	Ground
14	GND	Ground
15	GND	Ground
16	GND	Ground
17	GND	Ground
18	GND	Ground
19	GND	Ground
20	GND	Ground
21	ANT1	50 Ω Antenna Output
22	RESET	Hardware reset (Force the input pin low – 0 to reset)

Table 1 - Pin Descriptions

[1] Factory ports shall be connected to ground or NC in customer applications.
[2] For details on status pins (STAx) refer to the OPM15 programming guide.

Typical Application



1. ⏚ = Connection to low impedance ground plane
2. BEAD = Ferrite Bead BLM15HG102SN1D (MURATA) or an equivalent
3. Antenna's should be matched as required

Figure 3 – Typical Application

General Design Considerations

The following are general design considerations:

- Decoupling capacitors and ferrite beads should be placed as close as possible to the VDD pins.
- Grounds should go directly to a ground plane.
- All ground pins should be connected.
- Where possible power lines should be kept away from RF antenna pins.
- Follow antenna manufacturer's application notes for antenna layout. Surface mount and PCB embedded antennas do not usually have an impedance of 50 ohm across the desired frequency range. The proximity of other components, ground layouts, antenna feed arrangements, connectors, cables, enclosure plastics have significant impact on antenna impedance and its performance. By adding a matching circuit, the antenna impedance is modified so it is closer to 50 Ohm, thus maximizing power to antenna load and minimizing reflections on the feed line.
- It is recommended that SMT and PCB embedded Antennas should be placed minimum 50 mm apart and 90° to each other to minimize mutual interference.

Physical Dimensions

Attribute	Millimetres	Inches
Length	14.25 ± 0.125	0.561 ± 0.005
Width	12.00 ± 0.125	0.472 ± 0.005
Height	2.25 ± 0.125	0.089 ± 0.005

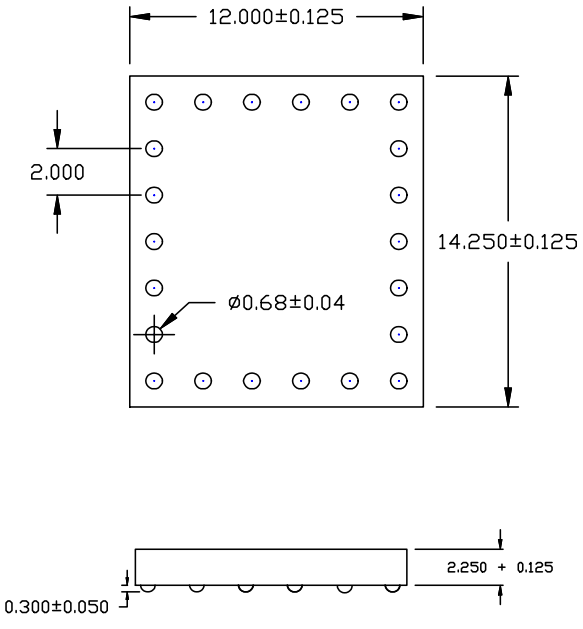


Figure 4 OPM15-E Radio Mechanical Specifications

Ordering Information

Part Number	Firmware stack	RoHS Compliant	Recommended Operating Temperature
OPM15-E0	API_3_2_0	Yes	-10 °C to +60 °C
OPM15-E1	API_3_2_0	Yes	-40 °C to +85 °C

Note: Reflow document available for RoHS compliant modules