



### 2.4GHz 4-in-1 Active Integrated Antenna for Single-Port Transceivers

#### Description

BHWR250A is a complete RF Front-End solution from BHW's RF Active integrated Antenna (RFAiA™) product family. It integrates a 2.4GHz power amplifier with nominal transmit power of 13dBm with FCC-Compliant harmonic traps, a switch path for single-port interface with transceiver SoCs, and a compact antenna with high efficiency and stable VSWR under various PCB size and housing conditions, all into a compact 12x18mm design. BHWR250A can be easily surface-mounted to the main PCB without requiring any additional impedance matching, resulting in significantly simplified RF design and shorter product development cycle.

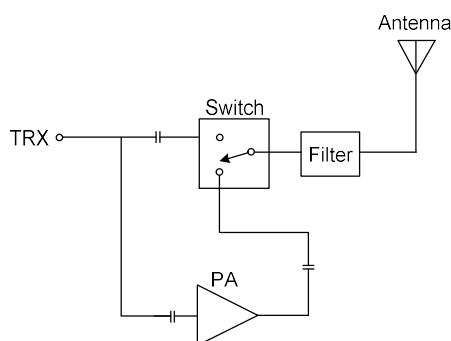
#### Key Features

- 2.4-2.5GHz Operation Frequency Range
- Operating Voltage: 1.8~4.2V
- Tx Power: 13/15dBm at 3.3/4.2V; Gain: 13dB
- Tx Current: 25/35mA for 13/15dBm at 3.3/4.2V
- Rx Insertion Loss: 1.3dB
- Robust ESD Protection
- Minimal and Relaxed RF Design for Main PCB
- Compact 12x18mm footprint for SMT

#### Key Applications

- ZigBee/Thread/Matter Modules
- 2.4GHz IoT Solutions
- Wireless Audio/Video
- Smart Home, Asset Tracking
- Remote Control
- Generic 2.4GHz TDD Radio Designs

#### Functional Block and Product Information

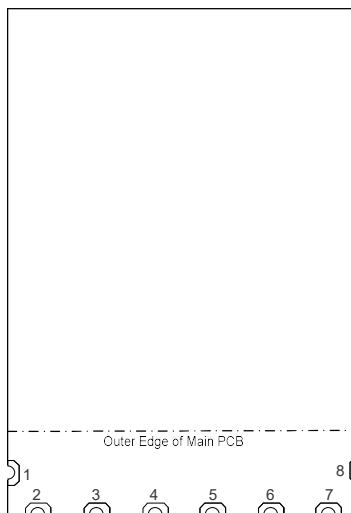


12x18x0.6mm PCB (with BHWM253)



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### Pin Assignment and Pin Description



(Top “See-Through” View)

Pin Number	Pin Name	Description
2	CRX	Logic Control Voltage for Rx
3	VDD	DC Supply Voltage
5	CTX	Logic Control Voltage for Tx
6	TRX	RF Port for Interface with SoC
1,4,7,8	GND	Connect to GND on Main PCB

### Absolute Maximum Ratings

Parameter	Rating	Unit
Maximum VDD Supply Voltage	4.5	V
Maximum Control Voltage	3.6	V
Maximum VDD Supply Current	50	mA
Maximum Tx Input Power	+30	dBm
Junction Temperature	+150	°C
Operation Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C
Moisture Sensitivity Level	MSL1	

Note: Do not exceed any single or combination of the above parameters. Sustained operation at or above the Absolute Maximum Ratings may result in permanent damage to the device. Maximum Input Power Rating assumes 50-Ohm load impedance.



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### Electrical Specifications

Transmit Mode: Nominal VDD=3.3V, CTX=3.3V, CRX=0

Parameter	Condition	Specification			Unit
		Min.	Typ.	Max.	
Operating Frequency		2.4		2.5	GHz
Operating Voltage	VDD	1.8	3.3	4.2	V
Logic Control Voltage	For CTX=High	1.2	3.3	3.6	V
Quiescent Current*	VDD=CRX=3.3V, No RF Input		12*		mA
Shutdown Current	VDD=3.3V, CRX=0			1	uA
Small-Signal Gain	Pin=-30dBm		13		dB
Output P1dB	VDD=3.3V		12		dBm
Total Current	VDD=3.3V, Pout=13dBm		25		mA
Harmonics	2~ 5*f0, 13/15dBm at 3.3/4.2V			-42	dBm/MHz
Input VSWR			1.5:1	2:1	dB

\*Quiescent current can be reduced with lower CTX control voltage or an external resistor on CTX pin.

Receive Mode: Nominal VDD=3.3V, CRX=3.3V, CTX=0

Parameter	Condition	Specification			Unit
		Min.	Typ.	Max.	
Operating Frequency		2.4		2.5	GHz
Operating Voltage	VDD	1.2	3.3	3.6	V
Logic Control Voltage	For CRX=High	1.2	3.3	3.6	V
Insertion Loss			1.3		dB
Input VSWR			1.7:1	2:1	dB



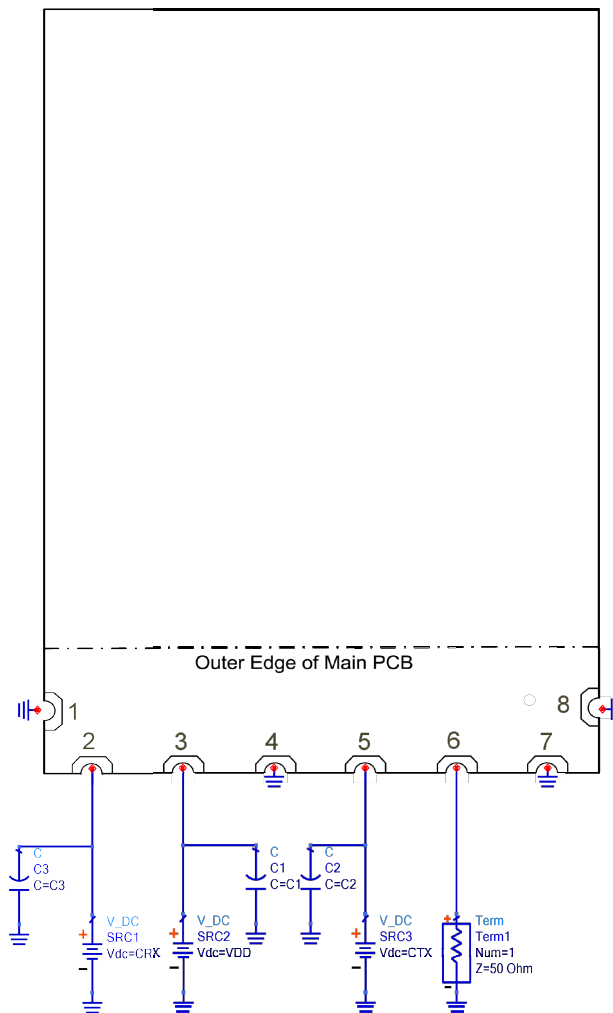
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### Transmit/Receive Control

CTX	CRX	Mode of Operation
0	0	All Off
1	0	Transmit (PA ON)
0	1	Receive (By-Pass)

### Application Schematic

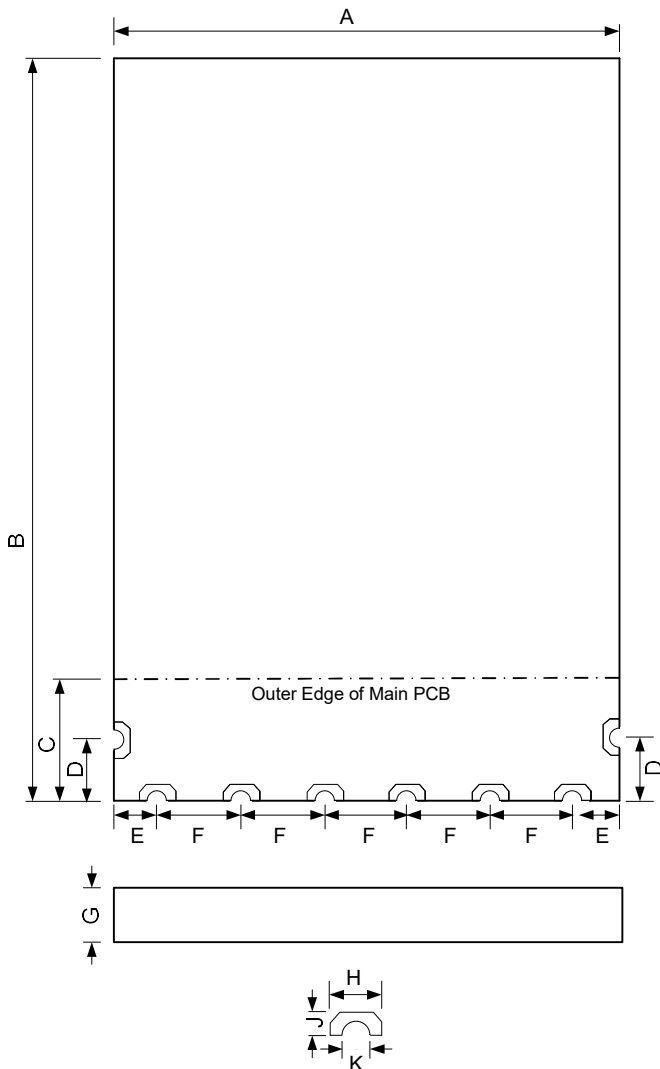
(Refer to BHWR250A EVB AppNote for Details)





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Mechanical Specifications



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	11.9	12.0	12.1
B	17.9	18.0	18.1
C	2.9	3.0	3.1
D	1.4	1.5	1.6
E	0.9	1.0	1.1
F	1.9	2.0	2.1
G	0.55	0.6	0.65
H	0.95	1.0	1.05
J	0.45	0.5	0.55
K	0.55	0.6	0.65