XS4 Original+
and
XS4 One S
KPP and Hilton extensions

E2131
W40MH and W40T

Antennas

Version	Date	Changes	Author
1.0	28/09/2023	First edition	U.T.

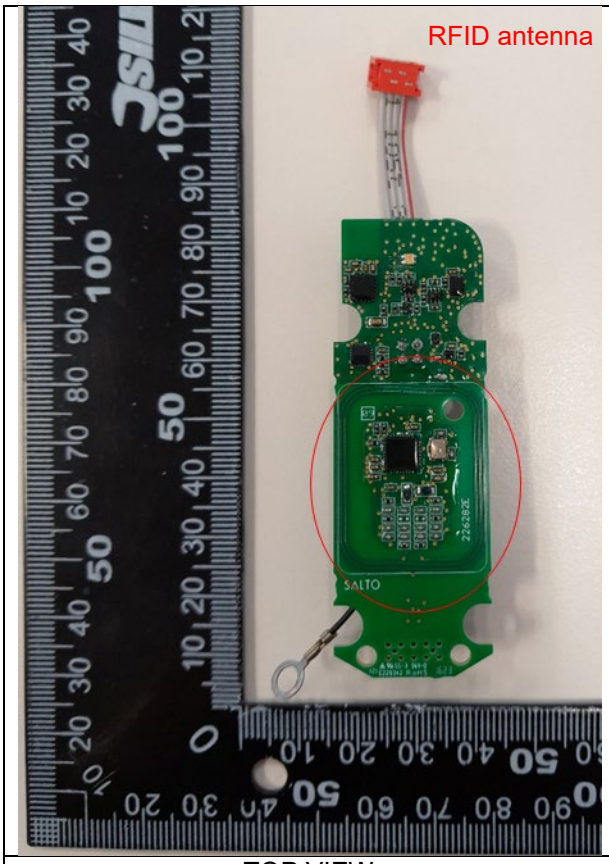
Table of contents

1 W40MH

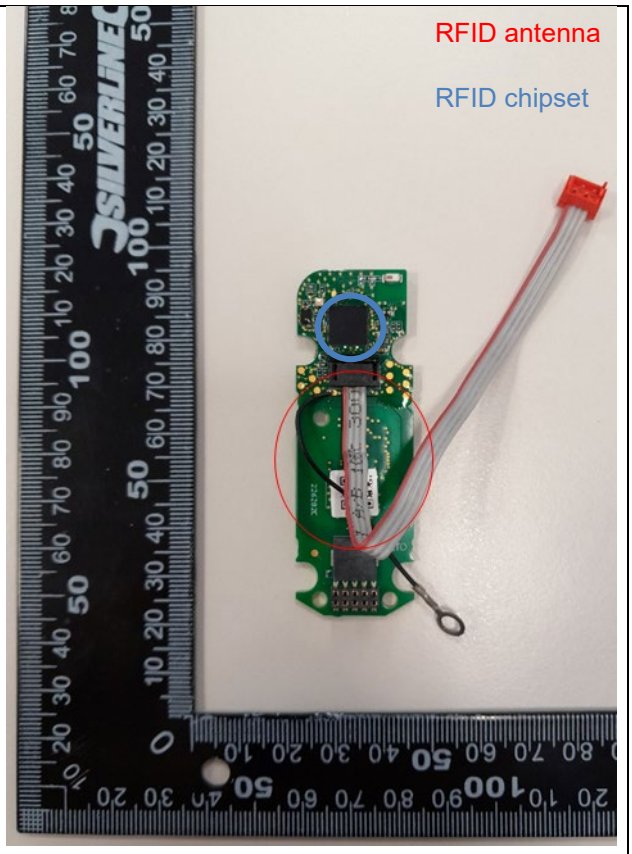
XS4 Original+ and XS4 One S E2131		W40MH MIFARE (1) + Bluetooth LE SoC (2)
Antennas	Number of antennas	2
	Manufacturer	1- SALTO Systems, S.L. 2- N\A
	Model number	1- W40M 2- N\A
	Type	1- Integral, PCB 2- Integral, Chip
	Gain	1- N\A 2- 0.5 dBi
	Frequency of Operation	1- 13.553 - 13.567 MHz 2- 2400 - 2483.5 MHz
Channels	Number of channels	1- N\A 2- 40
	Spacing	1- N\A 2- 2 MHz
	Bandwith	1- N\A 2- 1 MHz at 1Mbps
Type of Modulation		1- ISO 14443A: reader to card ASK 100%, card to reader OOK (subcarrier fc/16) & ISO 15693: reader to card ASK 10% - 30%, card to reader OOK (subcarrier fc/32) 2- GFSK 3- GFSK
Declared Nominal Output Power (Max.)		1- 25 dBm 2- 6 dBm
ITU Emission Designator		1- K1D 2- F1D
Equipment Configuration for frequency Stability: Data Rate		1- 106 Kbit/s, 26.48 Kbit/s 2- 1 Mbit/s
Equipment Configuration for Field Strenght Measurement: Data Rate		1- 106 Kbit/s, 26.48 Kbit/s 2- 1 Mbit/s

RFID Antenna

The RFID antenna was designed by Salto Systems, S.L. at Arkotz 9, Pol. Lanbarren 20180 Oiartzun (Gipuzkoa), Spain. The antenna model is W40M and it is located on the control circuit, 226282. The dimensions of the circuit and the antenna are shown in the following pictures.



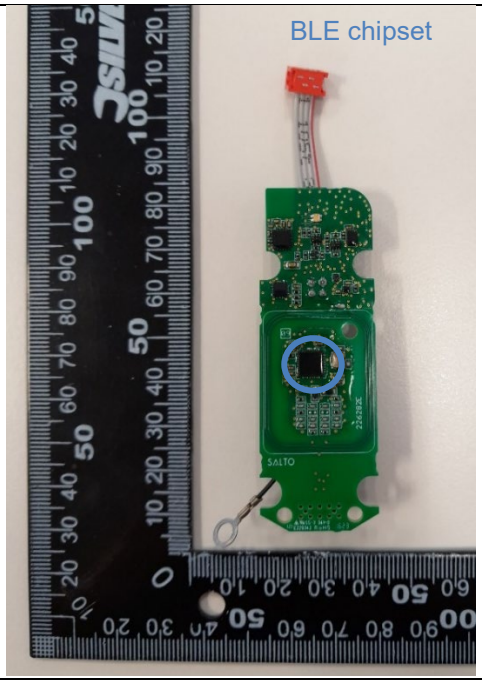
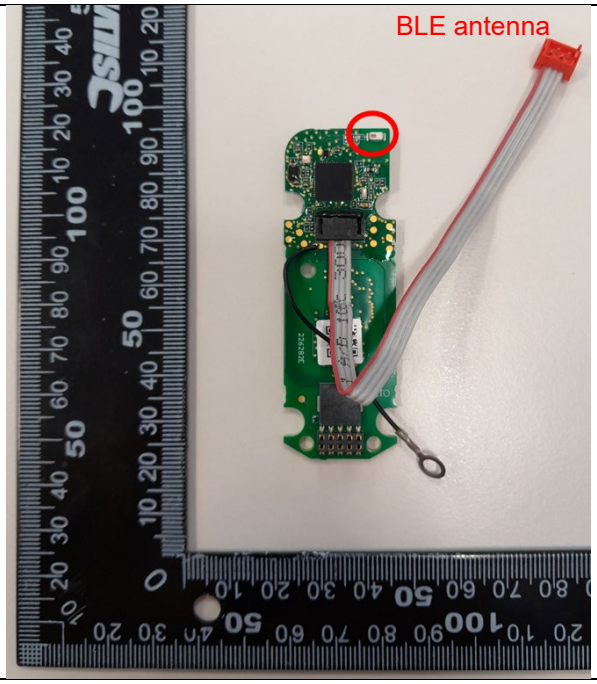
TOP VIEW



BOTTOM VIEW

Bluetooth LE Antenna

The Bluetooth LE antenna is the 2450AT18B100 model form Johanson Technology. The antenna is located on the bottom side of the control circuit, 226282. The following image shows the location of the antenna on the control circuit.

	
TOP VIEW	BOTTOM VIEW

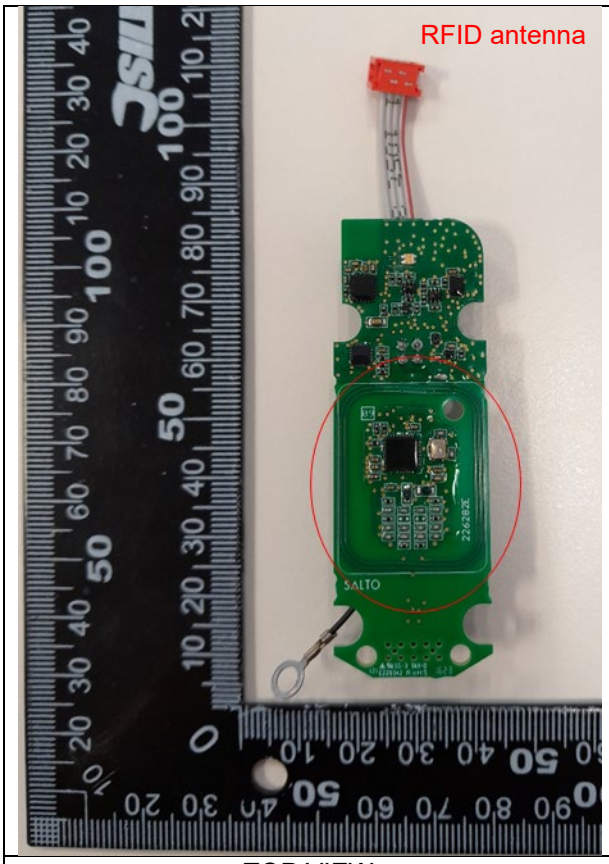
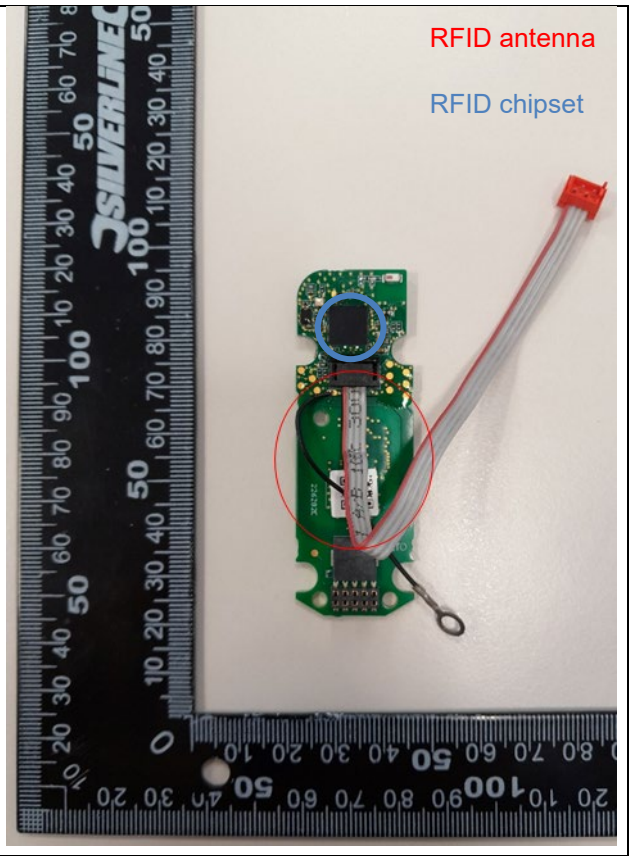
The remaining technical information of the antenna is described in the data sheet attached in Annex I.

2 W40T

XS4 Original+ and XS4 One S E2131		W40T MIFARE (1) + Bluetooth LE SoC (2) + BLE (3)
Antennas	Number of antennas	3
	Manufacturer	1- SALTO Systems, S.L. 2- N\A 3- N\A
	Model number	1- W40M 2- N\A 3- N\A
	Type	1- Integral, PCB 2- Integral, Chip 3- Integral, Chip
	Gain	1- N\A 2- 0.5 dBi 3- 1.5 dBi
	Frequency of Operation	1- 13.553 - 13.567 MHz 2- 2400 - 2483.5 MHz 3- 2400 - 2483.5 MHz
Channels	Number of channels	1- N\A 2- 40 3- 40
	Spacing	1- N\A 2- 2 MHz 3- 2 MHz
	Bandwith	1- N\A 2- 1 MHz at 1Mbps 3- 1 MHz at 1Mbps
Type of Modulation		1- ISO 14443A: reader to card ASK 100%, card to reader OOK (subcarrier fc/16) & ISO 15693: reader to card ASK 10% - 30%, card to reader OOK (subcarrier fc/32) 2- GFSK 3- GFSK
Declared Nominal Output Power (Max.)		1- 25 dBm 2- 6 dBm 3- 3 dBm
ITU Emission Designator		1- K1D 2- F1D 3- F1D
Equipment Configuration for frequency Stability: Data Rate		1- 106 Kbit/s, 26.48 Kbit/s 2- 1 Mbit/s 3- 1 Mbit/s
Equipment Configuration for Field Strenght Measurement: Data Rate		1- 106 Kbit/s, 26.48 Kbit/s 2- 1 Mbit/s 3- 1 Mbit/s

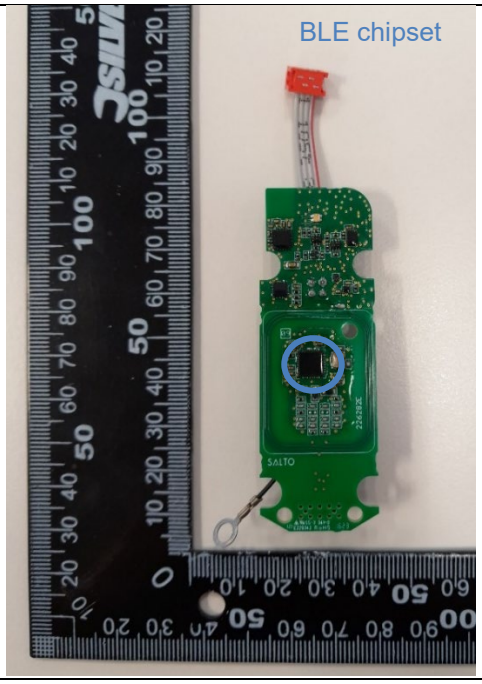
RFID Antenna

The RFID antenna was designed by Salto Systems, S.L. at Arkotz 9, Pol. Lanbarren 20180 Oiartzun (Gipuzkoa), Spain. The antenna model is W40M and it is located on the control circuit, 226282. The dimensions of the circuit and the antenna are shown in the following pictures.

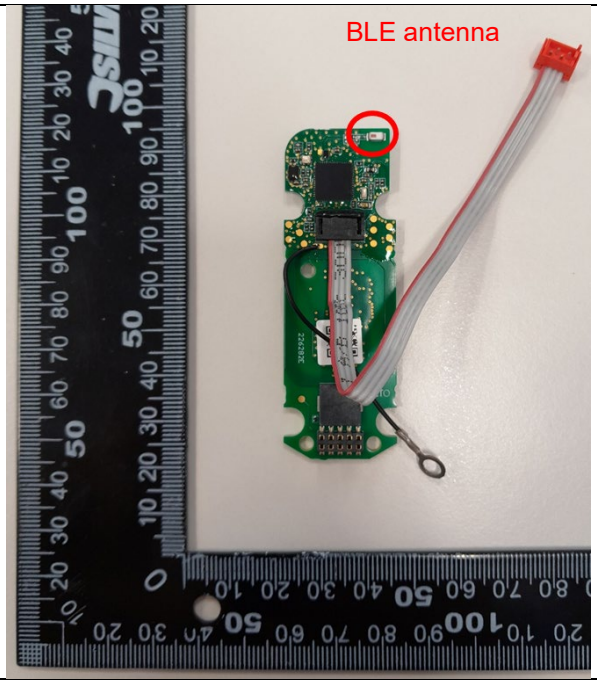
	
TOP VIEW	BOTTOM VIEW

Bluetooth LE Antenna for the SoC solution

The Bluetooth LE antenna for the SoC solution is the 2450AT18B100 model form Johanson Technology. The antenna is located on the bottom side of the control circuit, 226282. The following image shows the location of the antenna on the control circuit.



TOP VIEW

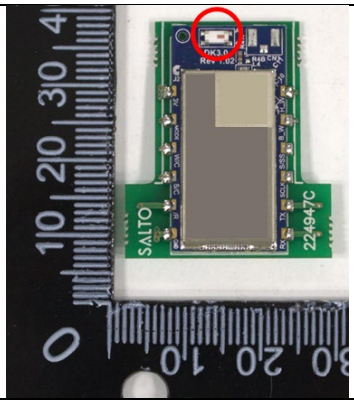


BOTTOM VIEW

The remaining technical information of the antenna is described in the data sheet attached in Annex I.

Bluetooth LE Antenna for the BLE BROKER module

The Bluetooth LE antenna for the DirectKey certified module from SUPRA is the 2450AT18D0100E model form Johanson Technology. The antenna is located on the bottom side of the control circuit, 226282. The following image shows the location of the antenna on the control circuit.



TOP VIEW

The remaining technical information of the antenna of the module is described in the data sheet attached in Annex II.

Annex I

"High Frequency Ceramic Solutions"

2450 MHz Antenna — **P/N 2450AT18B100**
Detail Specification: 08/10/09 — Page 1 of 3

General Specifications

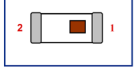
Part Number	2450AT18B100
Frequency Range	2400 - 2500 Mhz
Peak Gain	0.5 dBi typ. (XZ-V)
Average Gain	-0.5 dBi typ. (XZ-V)
Return Loss	9.5 dB min.

Input Power	3W max.
Impedance	50 Ω
Operating Temperature	-40 to +85°C
Reel Quanity	3,000

P/N Suffix	**Packaging Style**	Bulk	Suffix = S	Eg. 2450AT18B100S
		T & R	Suffix = E	Eg. 2450AT18B100E
	Termination Style	100% Tin	Suffix = None	Eg. 2450AT18B100(E or S)
		Tin / Lead	Please consult Factory	

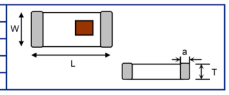
Terminal Configuration

No.	Function
1	Feeding Point
2	NC



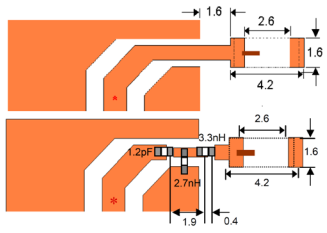
Mechanical Dimensions

	In	mm
L	0.126 ± 0.008	3.20 ± 0.20
W	0.063 ± 0.008	1.60 ± 0.20
T	0.051 +.004/-.008	1.30 +0.1/-0.2
a	0.020 ± 0.012	0.50 ± 0.30



Mounting Considerations

Mount these devices with brown mark facing up. Units: mm
Line width should be designed to provide 50 Ω impedance matching characteristics.



a) Without Matching Circuits

b) With Matching Circuits

JTI P/N for Matching Circuit:
Cap (1.2pF): 500R07S1R2BV4T
Inductor (2.7nH): L-07C2N7SV6T
Inductor (3.3nH): L-07C3N3SV6T

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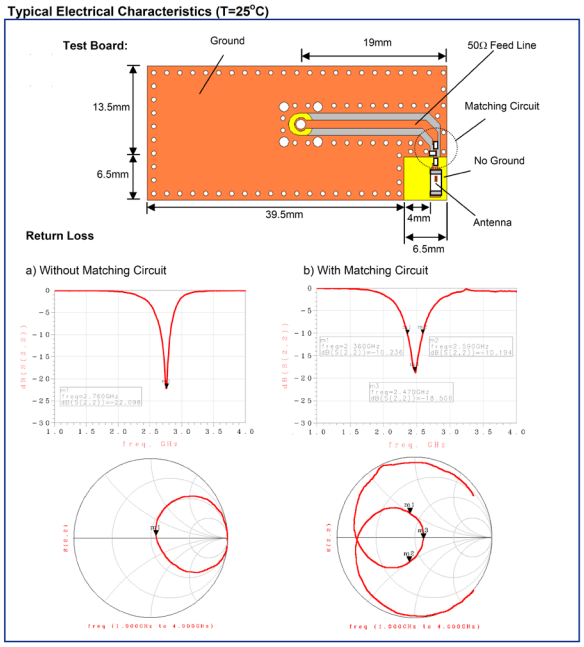
"High Frequency Ceramic Solutions"

2450 MHz Antenna — **P/N 2450AT18B100**
Detail Specification: 08/10/09 — Page 2 of 3

Typical Electrical Characteristics (T=25°C)



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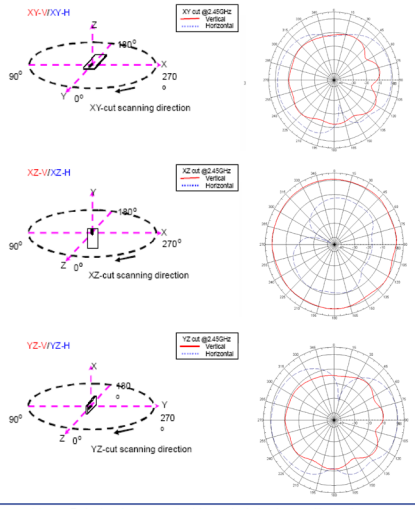
2450 MHz Antenna — **P/N 2450AT18B100**
Detail Specification: 08/10/09 — Page 3 of 3

Typical Radiation Patterns



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Annex II

"High Frequency Ceramic Solutions"

2.45 GHz SMD Antenna, EIA 1210, Detuning resilient, Edge Mount Design **P/N 2450AT18D0100**
Detail Specification: 9/17/2015 Page 1 of 6

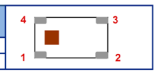
This antenna is optimal for edge middle mounting; rectangular and circular PCB shape applications, go to pages 2-4 for more info.

General Specifications

Part Number	2450AT18D0100	**Input/Output Power**	2W max. (CW)
Frequency (MHz)	2400 - 2500	**Impedance**	50 Ω
Peak Gain	1.5 dBi typ. (XZ-total)	**Reel Quantity**	3,000
Average Gain	-1.0 dBi typ. (XZ-total)	**Storage Temp**	-40 to +85°C
Return Loss	10.0 dB min.	**Total Radiation Efficiency**[1]	72%
Operating Temperature	-40 to +125°C		

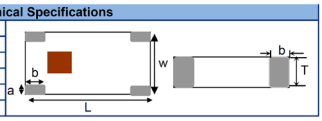
[1]Efficiency measured on 2450AT18D0100-EB1SMA 40x20mm EVB on page 2

No	Terminal Function		
1	Feeding Point	3	GND
2	GND	4	GND



Mechanical Specifications

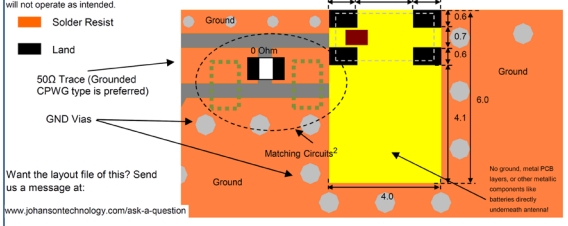
	In	mm
L	0.126 ± 0.008	3.20 ± 0.20
W	0.063 ± 0.008	1.60 ± 0.20
T	0.047 ± 0.008	1.20 ± 0.20
a	0.012 ± .004/-.008	0.30 ± 0.1/-0.2
b	0.020 ± 0.008	0.50 ± 0.20



Need help designing the antenna in? Use our antenna design services! www.johansontechnology.com/ipcantennaservices
2 Free layout reviews and if you need us to tune and characterize our antenna on your design (anechoic chamber) we can do that too (lab fee may apply for the latter).

Mounting Considerations 1: Standard Rectangular Layout

Mount these devices with the red square mark facing up. Otherwise the antenna will not operate as intended.



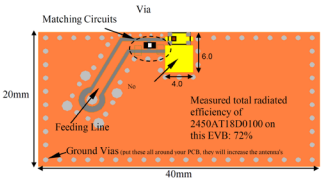
[2]It is recommended that the designer leave available slots for a "pi" (or shunt-series-shunt) network, even if all slots won't be used, this will prepare the PCB for the final mass production values of the matching circuit. The antenna matching network values above are used when antenna is mounted on Johanson's evaluation board. The matching values on client's PCB will be different. Go to: http://johansontechnology.com/tuning and see how to obtain the new values yourself if you have a network analyzer.

"High Frequency Ceramic Solutions"

2.45 GHz SMD Antenna, EIA 1210, Detuning resilient, Edge Mount Design **P/N 2450AT18D0100**
Detail Specification: 04/04/12 Page 2 of 6

This antenna is optimal for edge middle mounting; rectangular and circular PCB shape applications, go to pages 2-4 for more info.

Mounting Considerations 1: Standard Rectangular Layout (continued)

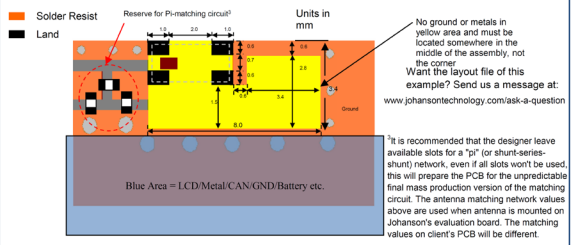


Orderable EVB p/n (comes with 1 female SMA connector mounted on the opposite side):
2450AT18D0100-EB1SMA
We offer 2 free layout reviews as well as antenna tuning and characterization services (lab fee may apply). For more info go to:
www.johansontechnology.com/ipcantennaservice

Want the layout file of the above? Send us a message at: www.johansontechnology.com/ask-a-question

To order a pre-tuned 50Ω EVB with a female SMA connector you see above Click here:
www.johansontechnology.com/request-a-sample
Reference p/n: 2450AT18D0100-EB1SMA

Mounting Considerations 2: Small clearance or "thin edge" applications



[3]It is recommended that the designer leave available slots for a "pi" (or shunt-series-shunt) network, even if all slots won't be used, this will prepare the PCB for the unpredictable final mass production version of the matching circuit. The antenna matching network values above are used when antenna is mounted on Johanson's evaluation board. The matching values on client's PCB will be different.

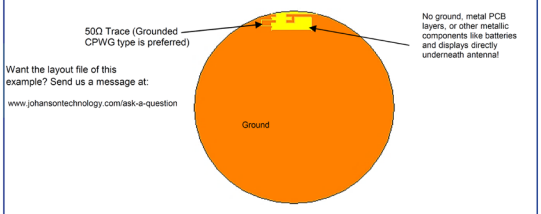
Note: There's no orderable EVB available for the above reference "Mounting Considerations 2" reference design

"High Frequency Ceramic Solutions"

2.45 GHz SMD Antenna, EIA 1210, Detuning resilient, Edge Mount Design **P/N 2450AT18D0100**
Detail Specification: 04/04/12 Page 3 of 6

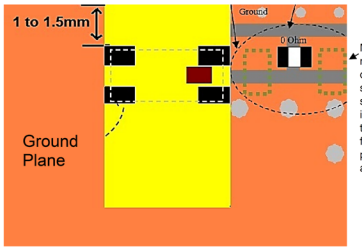
This antenna is optimal for edge middle mounting; rectangular and circular PCB shape applications, go to pages 2-4 for more info.

Mounting Considerations 3: Thin Edge + Circular PCB applications



Note: There's no orderable EVB available for the above reference "Mounting Considerations 3" reference design

Mounting Considerations 4: Chip antenna fed from the right



Matching Circuits: It is recommended that the designer leave available slots for a "pi" (or shunt-series-shunt) network, even if all slots won't be used, this will prepare the PCB for the final mass production values of the antenna matching securing

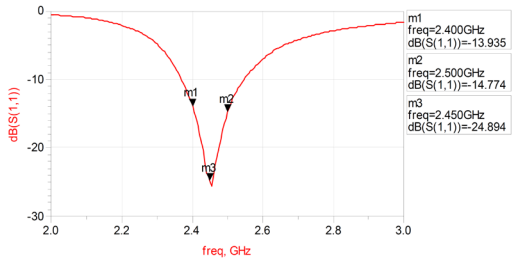
Note: There's no orderable EVB available for the above reference "Mounting Considerations 4" reference design

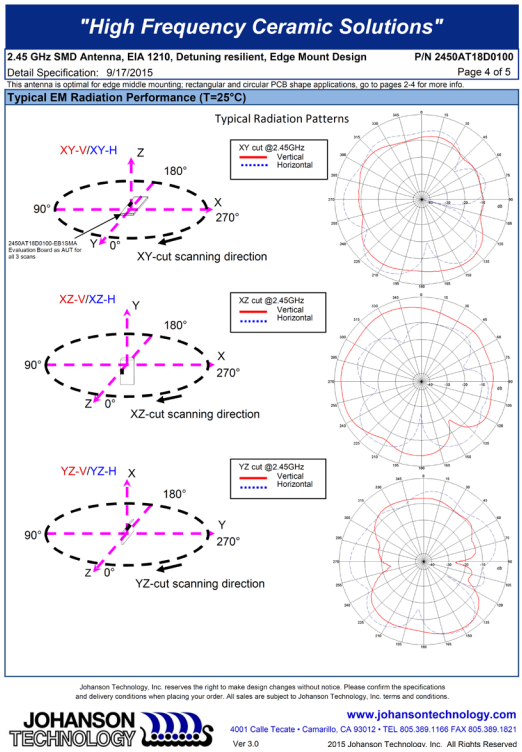
"High Frequency Ceramic Solutions"

2.45 GHz SMD Antenna, EIA 1210, Detuning resilient, Edge Mount Design **P/N 2450AT18D0100**
Detail Specification: 04/04/12 Page 3 of 5

This antenna is optimal for edge middle mounting; rectangular and circular PCB shape applications, go to pages 2-4 for more info.

Typical Return Loss (S11) Electrical Performance (T=25°C)





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