

**Description:** 860-930MHz Embedded Helical Antenna

**Series:**  
**SMD Helical Antenna**

**PART NUMBER: W3139**



**Features:**

- Antenna type: Helix with molded plastic support
- Fully SMD compatible
- Size 14x3mm
- Minimum keep out 4.2mm
- RoHS compliant

**Applications:**

- ISM 868MHz and 915MHz radio systems
- Sensors
- Remote controls
- Security
- IoT

All dimensions are in mm / inches

Issue: 1924

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Herrenberg, Germany  
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Suzhou New District  
Jiangsu Province, Suzhou 215009 PR China  
Tel: 86 512 6807 9998



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**ELECTRICAL SPECIFICATIONS**

Antenna Type	Helical
Frequency	860-930MHz
Nominal Impedance	50 Ω
Radiation Pattern	Omni
Polarization	Linear
Power Withstanding	2W

	Frequency band	Return Loss	Gain	Efficiency
<b>PWB 1</b> (small clearance, 4.2mm copper free area from the PCB edge )	ISM868±5MHz	<-8dB	-2.5	35%
	ISM915±13MHz	<-8dB	-2.5	30%
<b>PWB 2</b> (big clearance, 9.5mm copper free area from the PCB edge)	ISM868±5MHz	<-10dB	-0.5	55%
	ISM915±13MHz	<-10dB	-1	45%

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### MECHANICAL SPECIFICATIONS

Overall Length / Height	14 mm / 3 mm
Weight	0.52 g
Antenna Color / Material	White
Fix system	SMD+Glue
Recommended Glue	Resinlab EP1320LV Black
Solder Paste Thickness	Min 0.15mm

### ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	-40° C~+85 ° C
Storage Temperature	-40 ° C ~+85° C
RoHS Compliant	Yes

### OTHER SPECIFICATIONS

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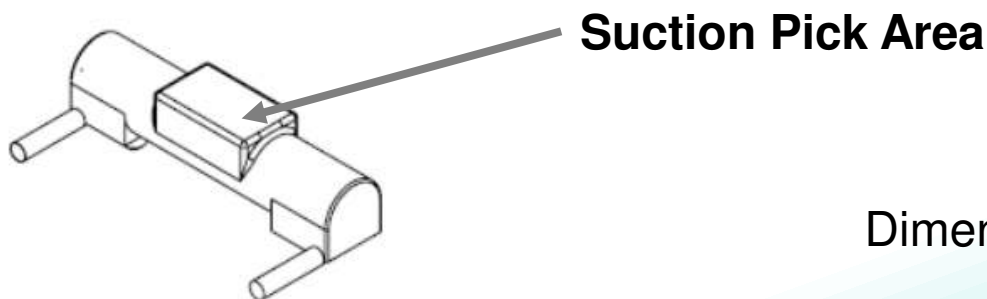
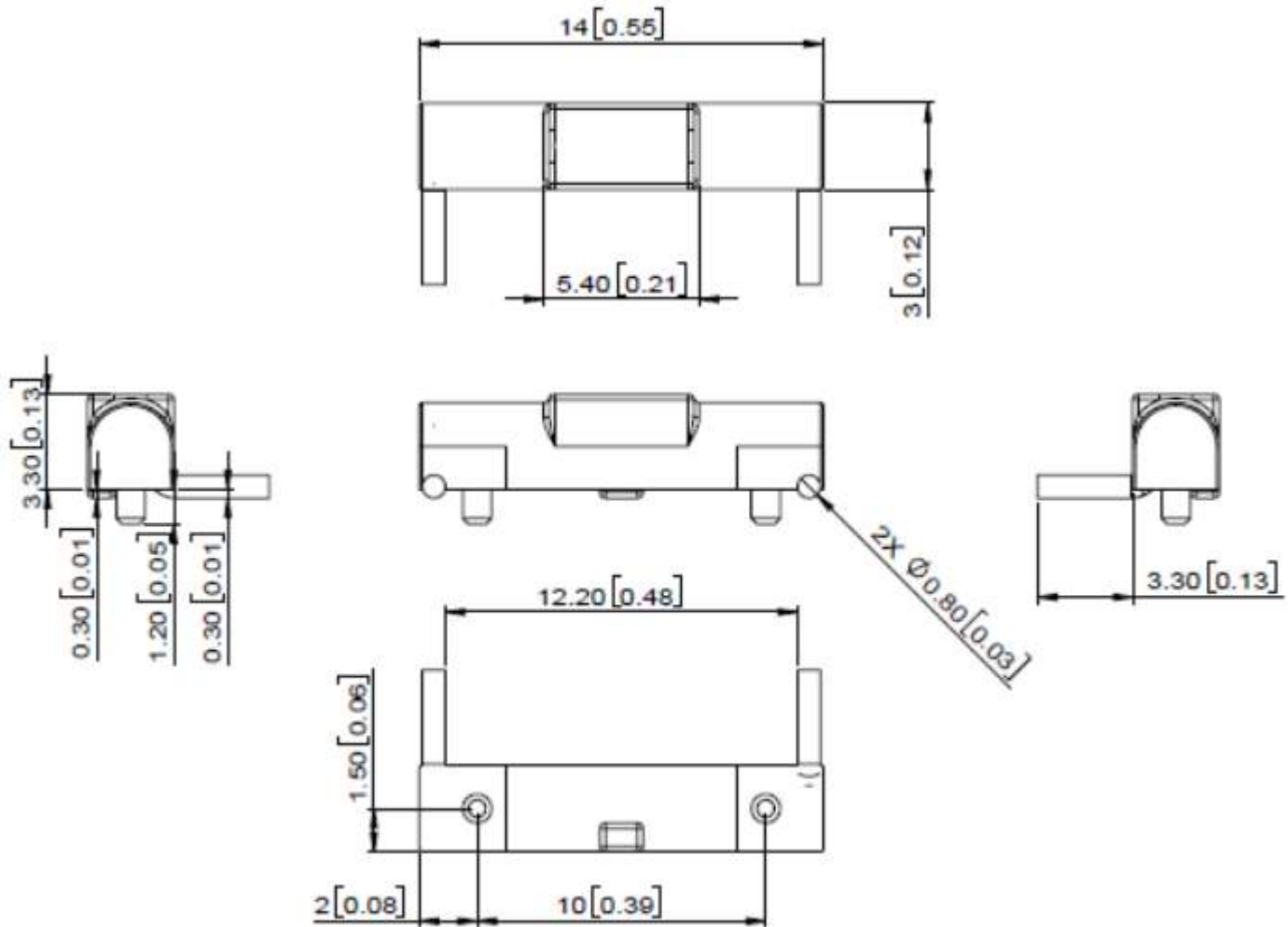
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**MECHANICAL DRAWING**



Dimension Unit: mm[inch]

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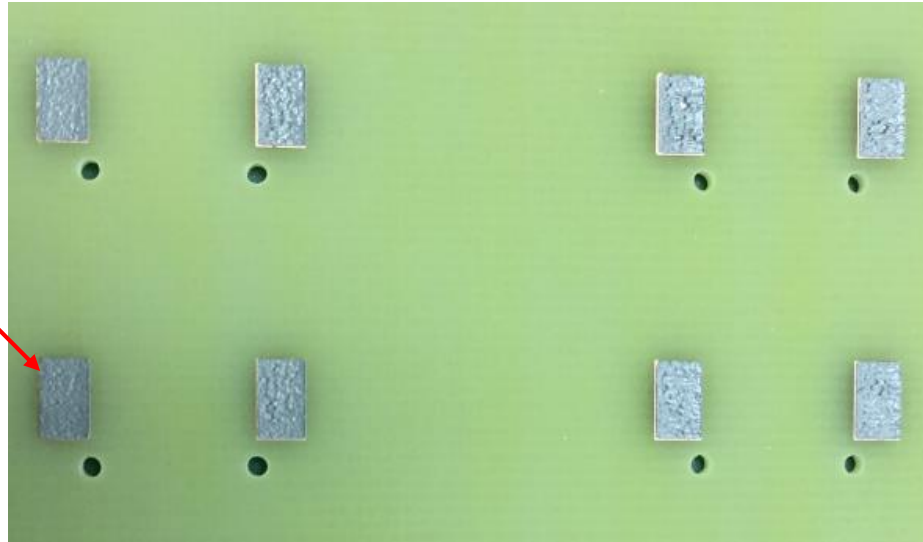
**PART NUMBER: W3139**

**FIX SYSTEM RECOMMENDATION**

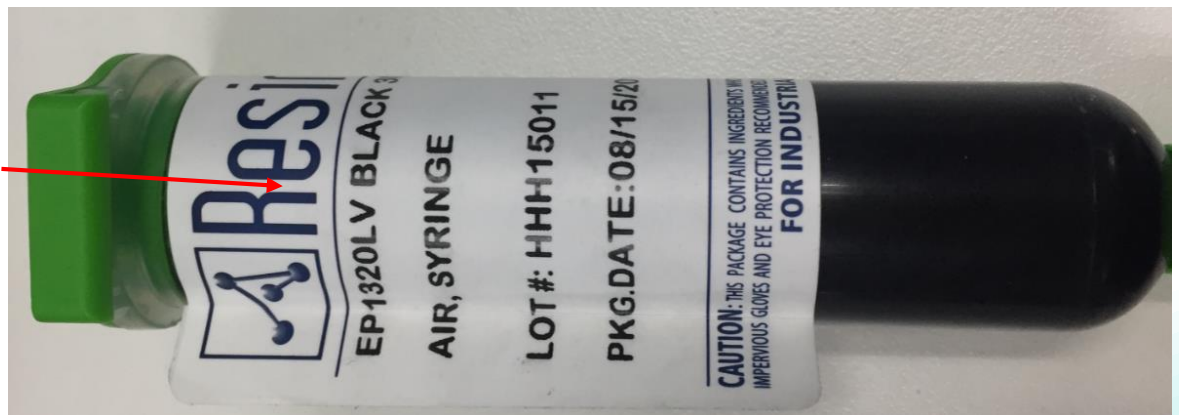
Fix system

1. SMD process
2. Solder paste thickness: minimum 0.15mm
3. Glue is required, Recommended Glue: Resinlab EP1320LV Black, usage and position see below recommended area.

Solder paste



Recommended Glue Type



Dimension Unit: mm[inch]

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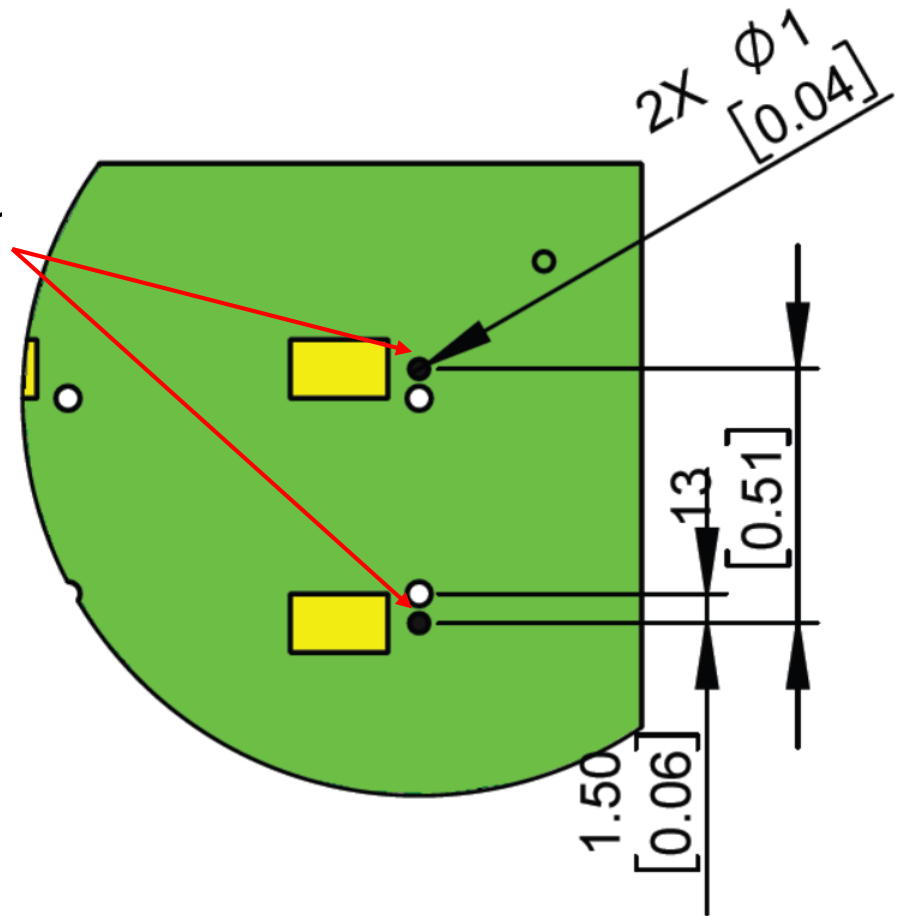
**PART NUMBER:** W3139

**FIX SYSTEM RECOMMENDATION**

Fix system

1. Glue position on PCB for recommendation

Glue position on PCB for recommendation



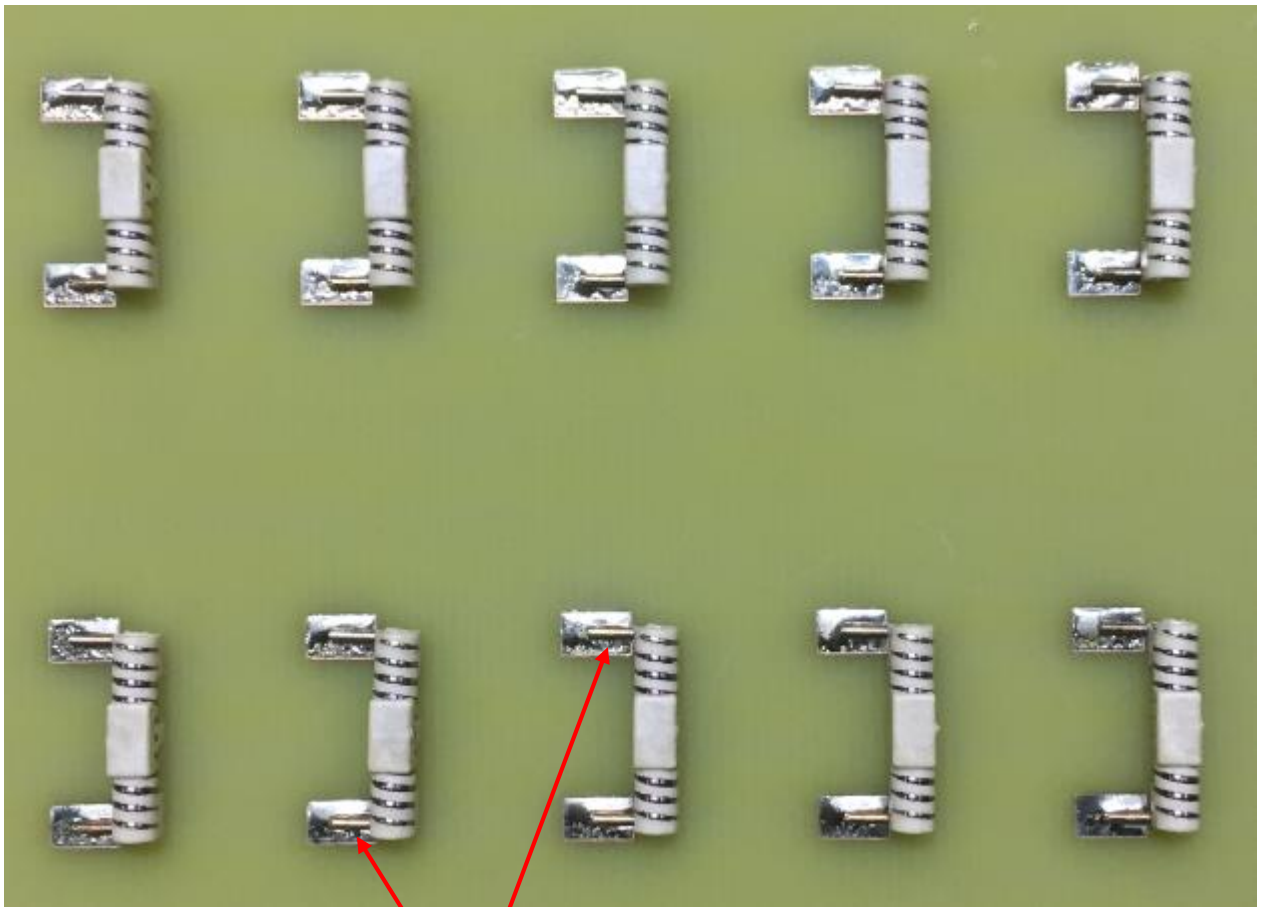
Dimension Unit: mm[inch]

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**FIX SYSTEM RECOMMENDATION**



Solder effect

Dimension Unit: mm[inch]

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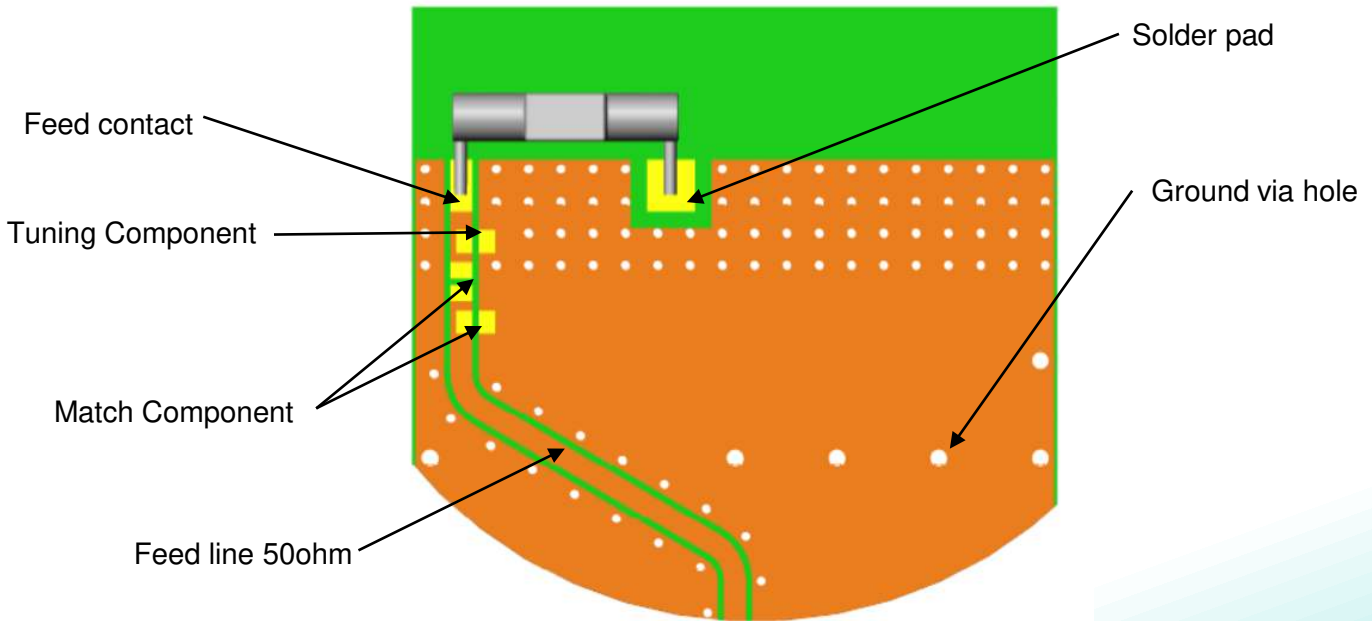
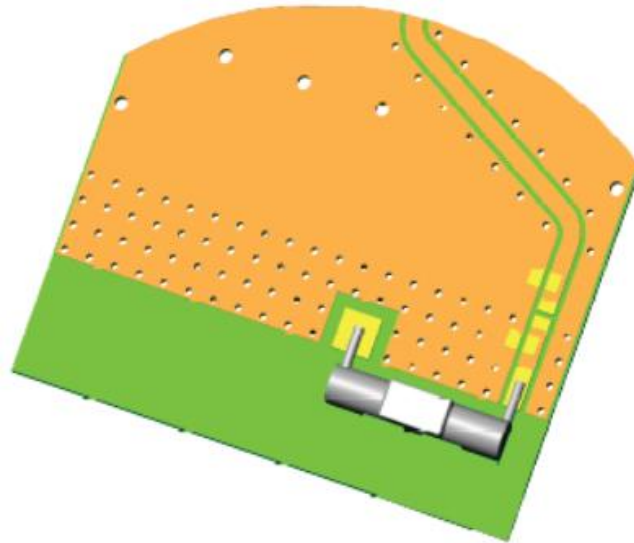
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**TEST SETUP**

**PWB 1 Layout for W3139 SMD Helical Antenna**



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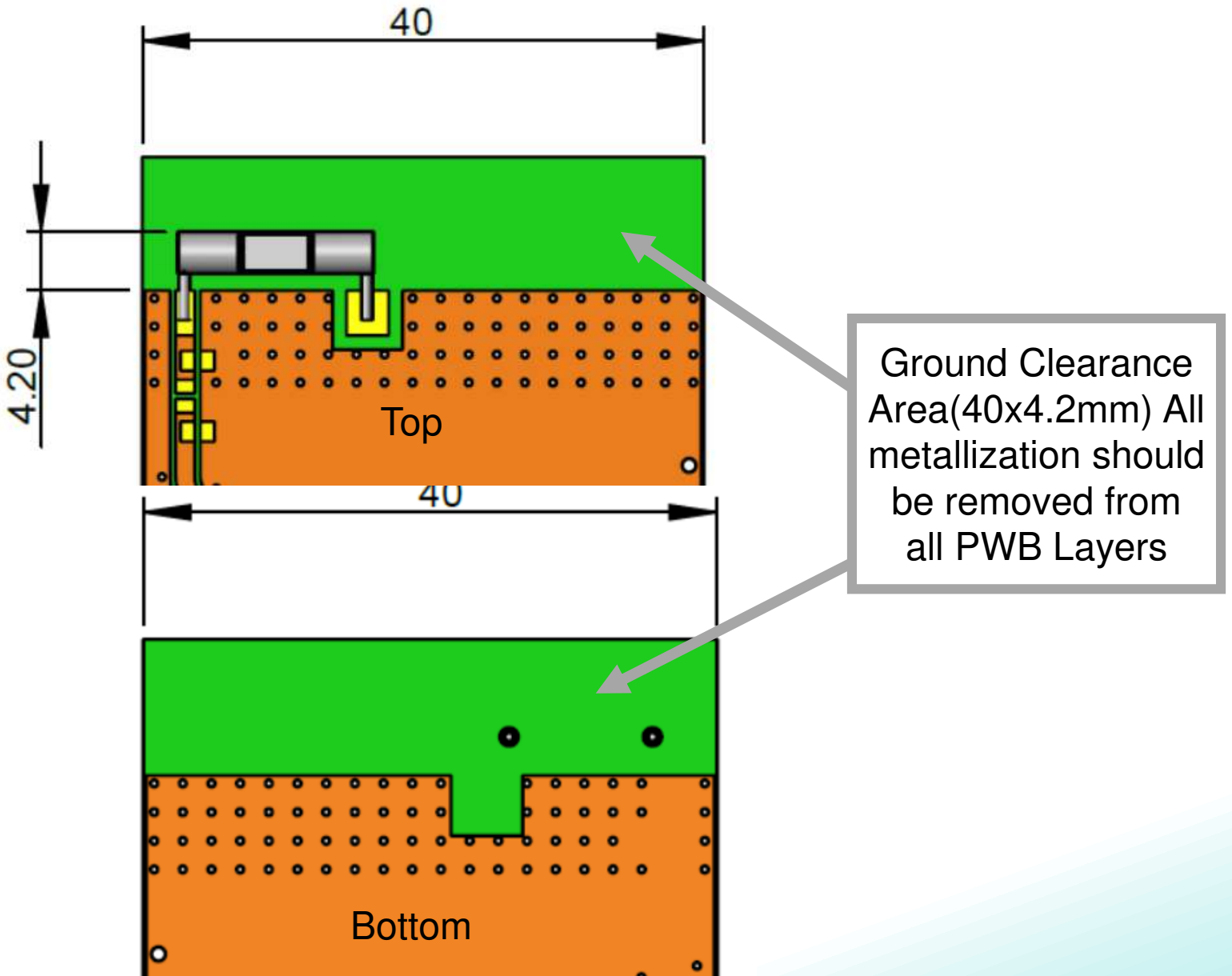
**Series:**  
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**TEST SETUP**

PWB 1 ground clearance area (Top):40x4.2mm

PWB 1 ground clearance area (Bottom):40x4.2mm



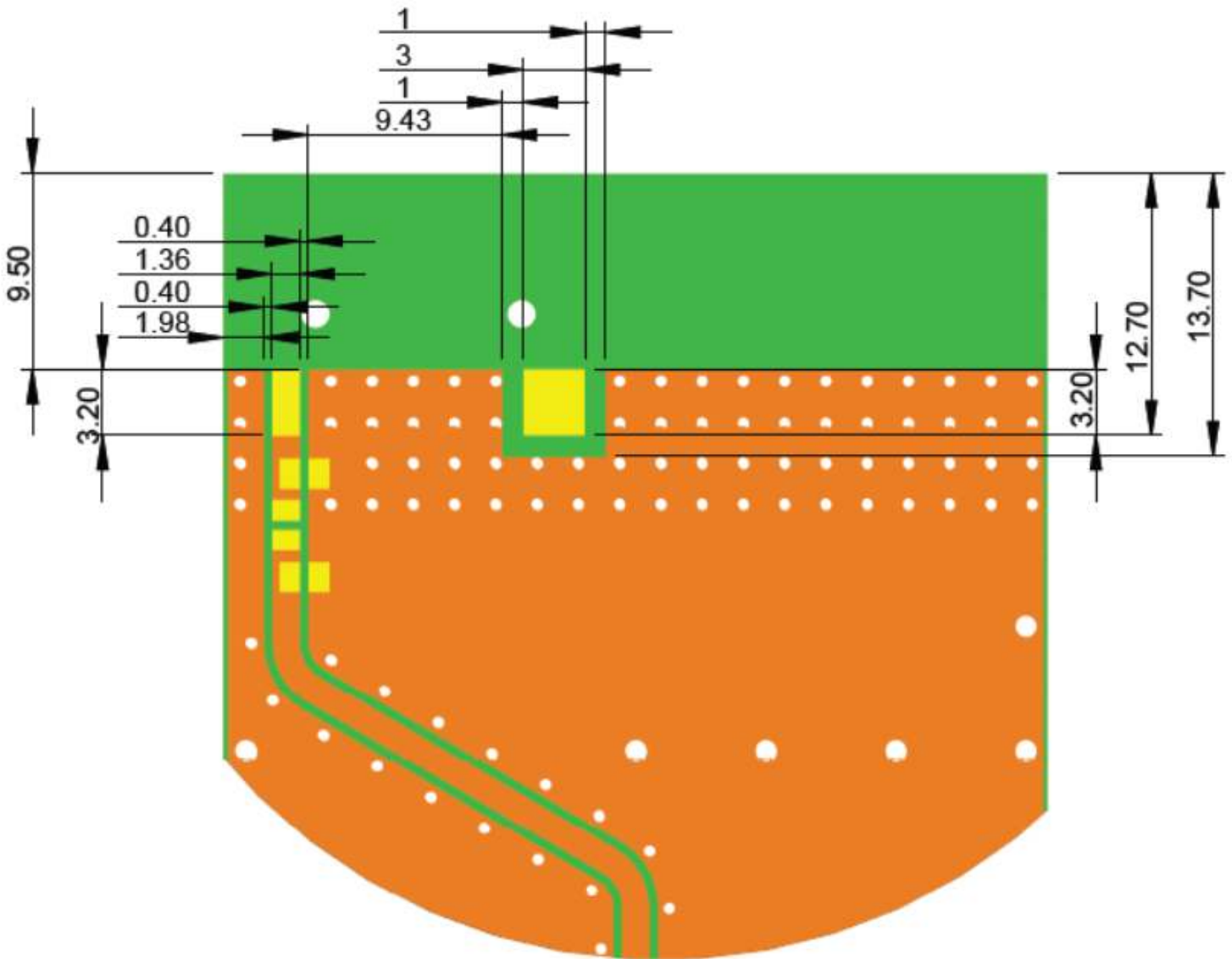
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**TEST SETUP**

PWB 1 Pad dimension in top copper



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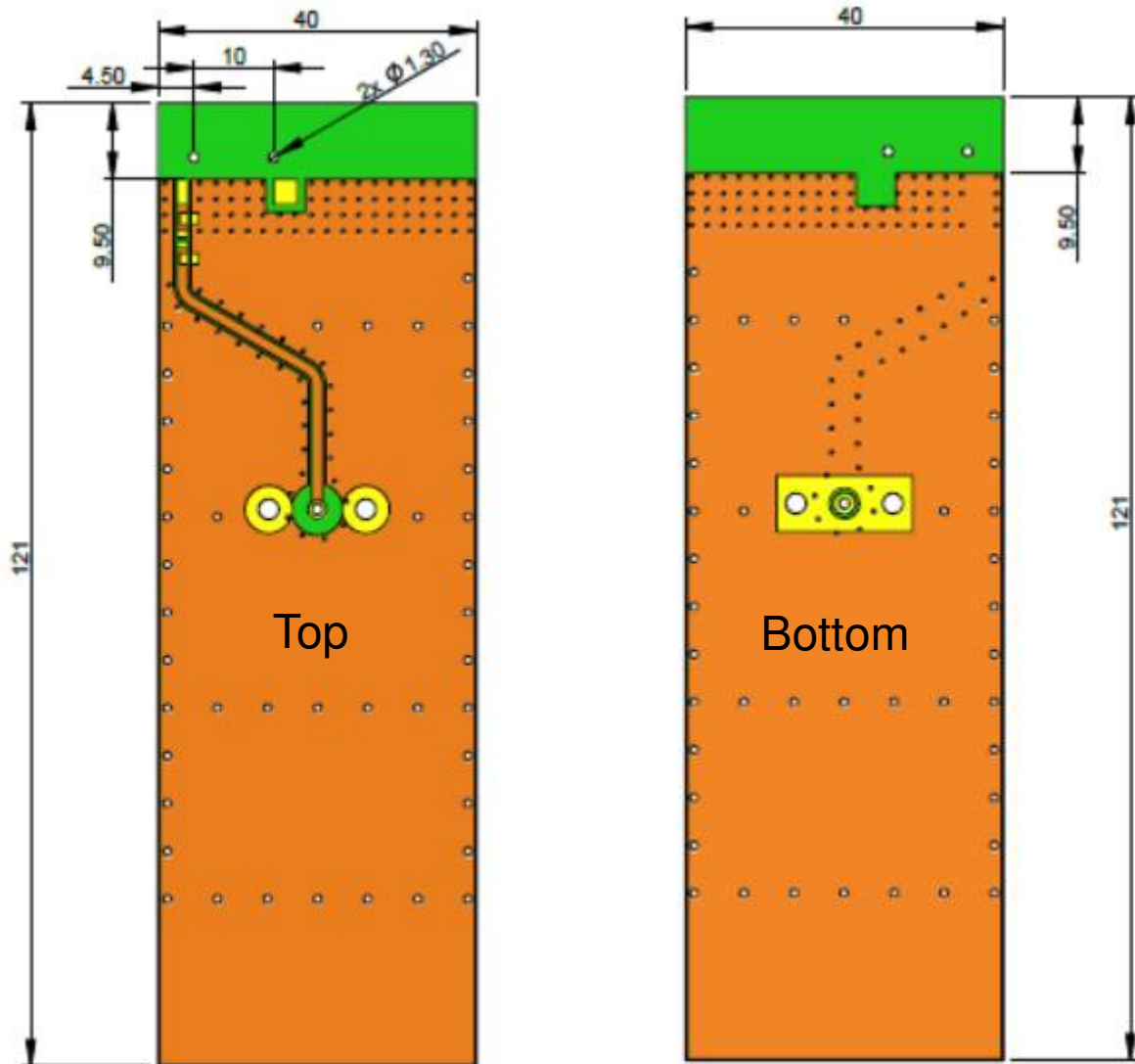
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PWB 1 Pad dimension in top copper



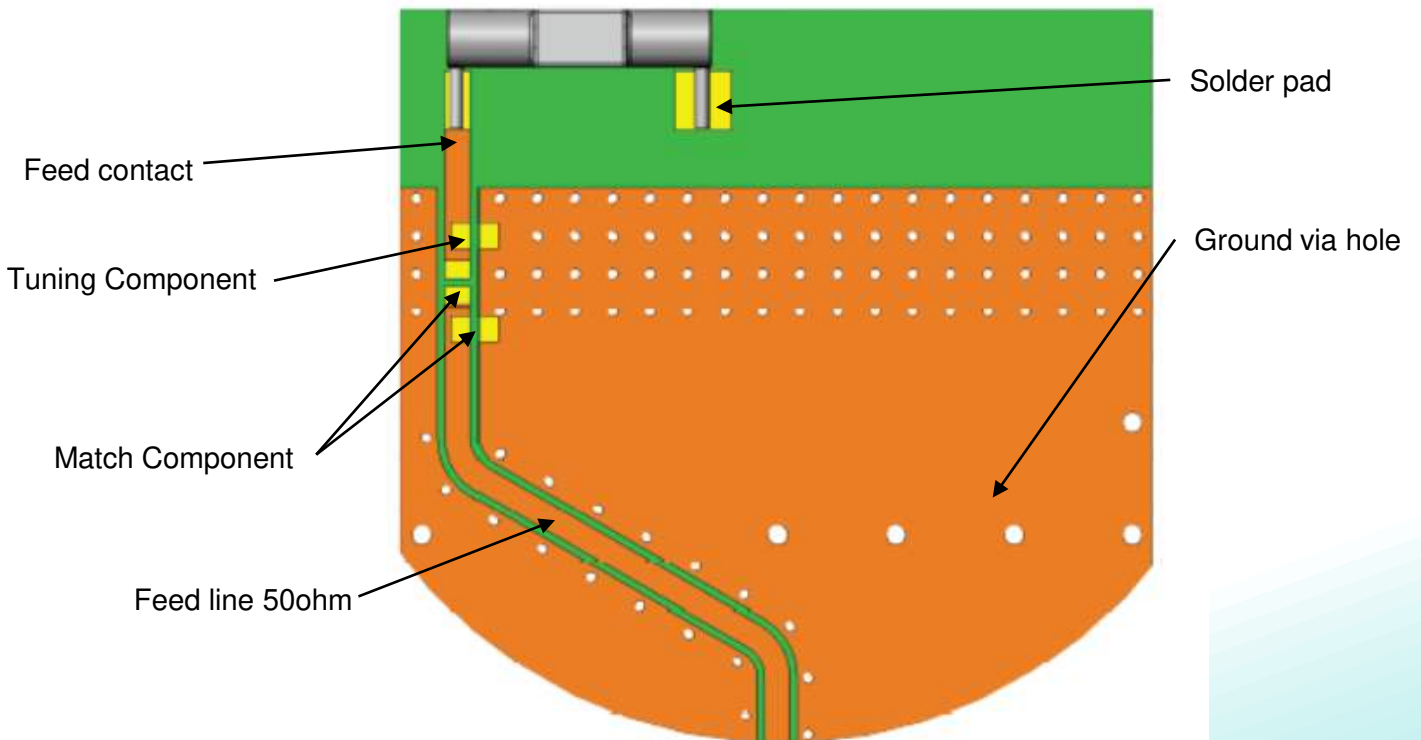
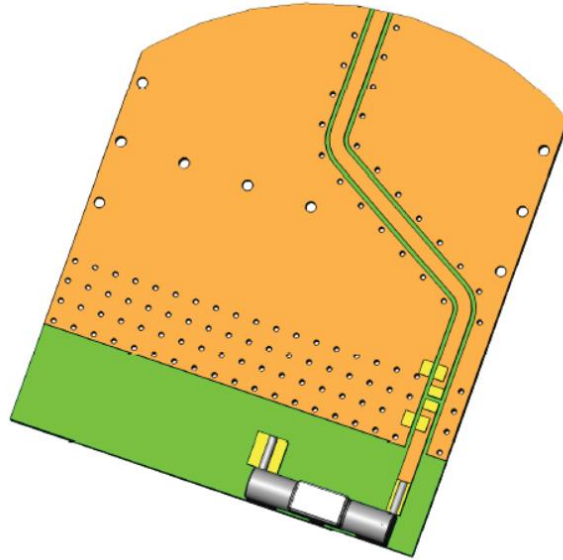
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**TEST SETUP**

**PWB 2 Layout for W3139 SMD Helical Antenna**



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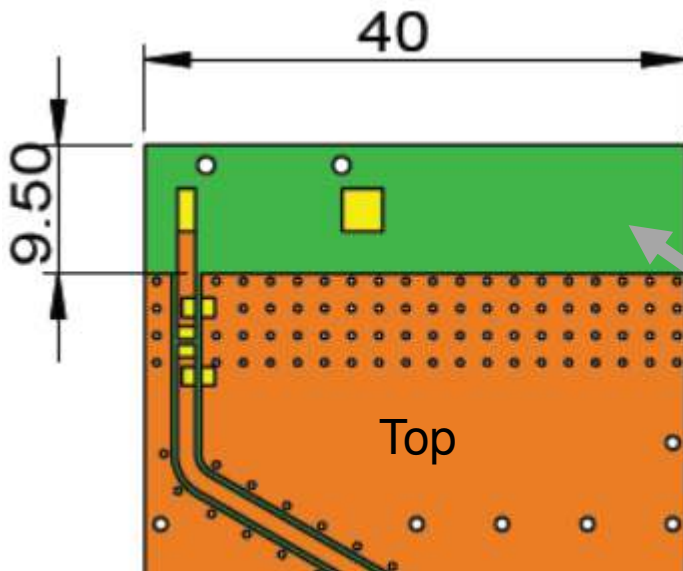
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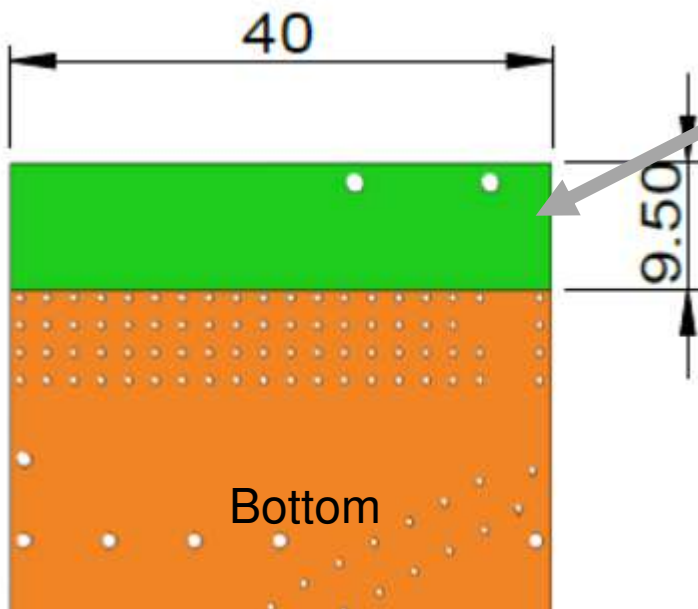
**TEST SETUP**

PWB 2 ground clearance area (Top):40x9.5mm

PWB 2 ground clearance area (Bottom):40x9.5mm



Ground Clearance Area(40x9.5mm) All metallization should be removed from all PWB Layers



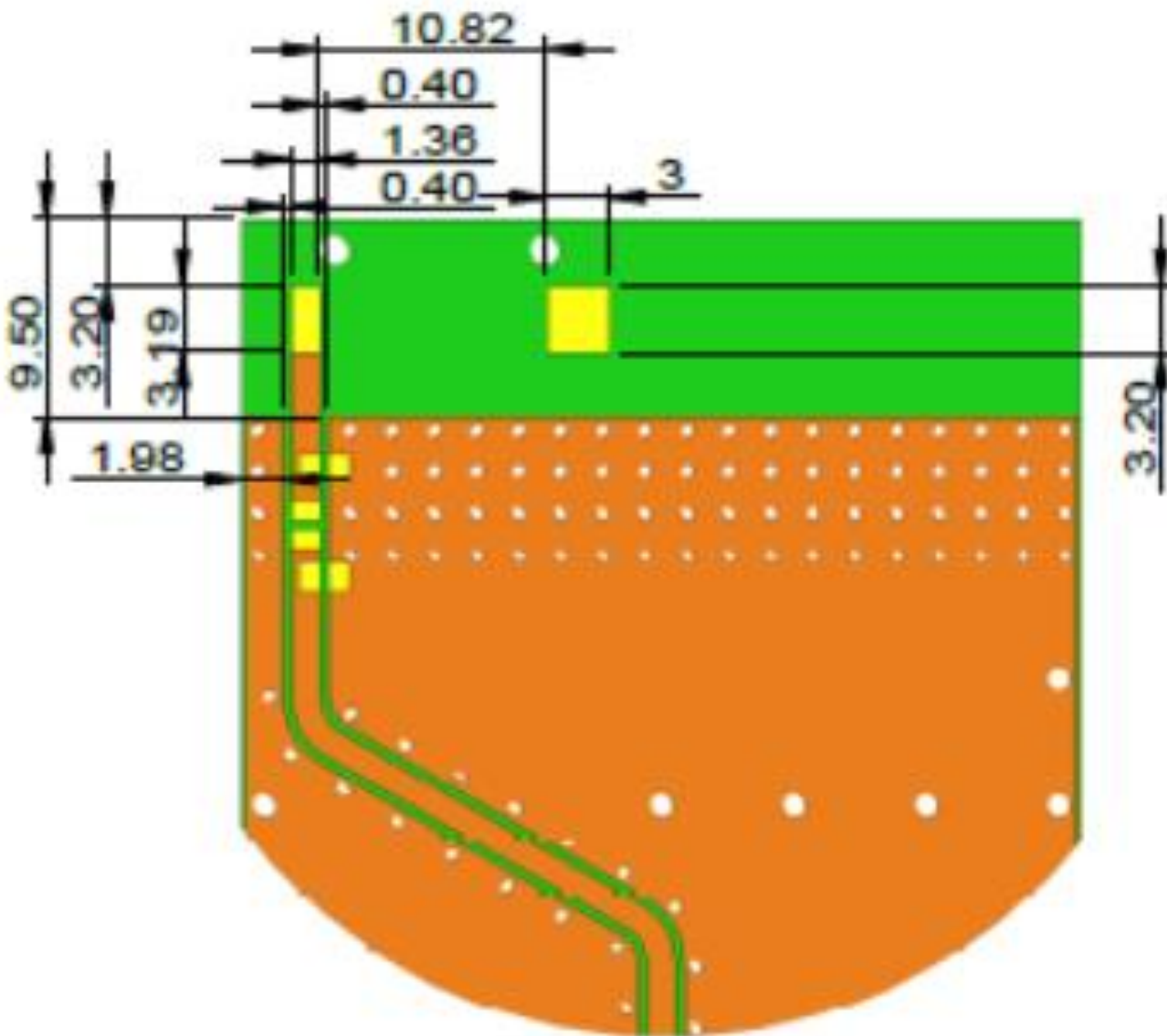
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 SMD Helical Antenna

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**TEST SETUP**

PWB 2 Pad dimension in top copper



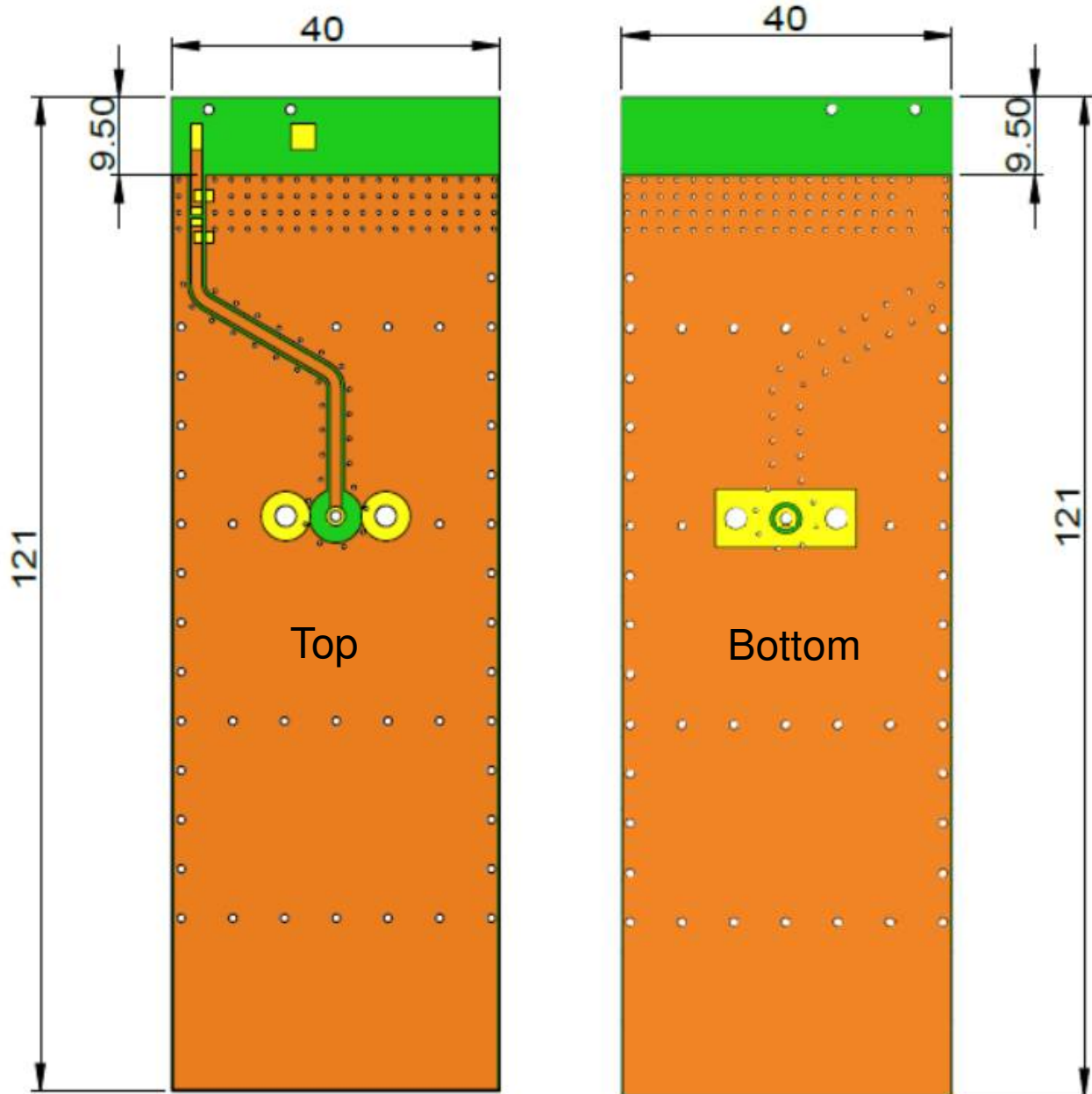
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**TEST SETUP**

PWB 2 Pad dimension in top copper



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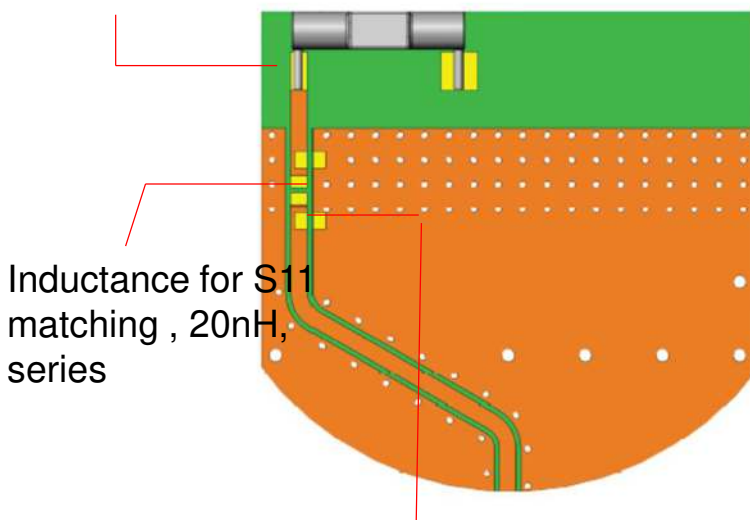
**ISM 868MHz matching circuit.**

(PWB 2 big clearance)

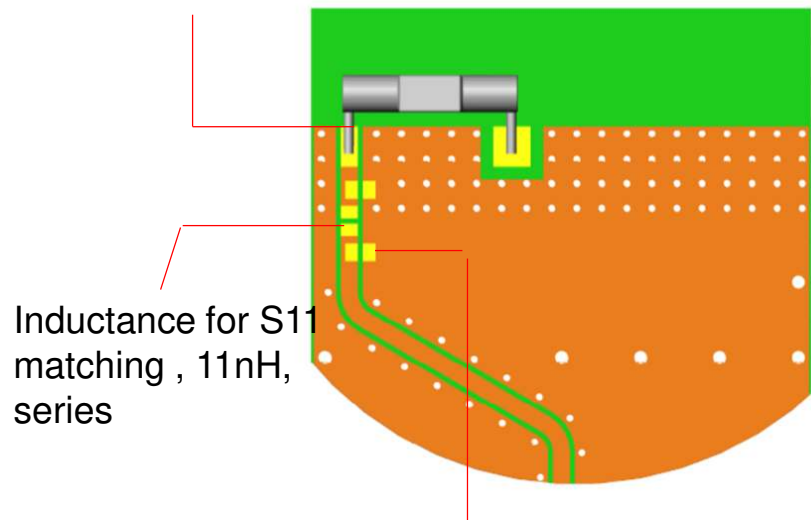
(PWB 1 small clearance)

Antenna feed point

Antenna feed point



Inductance for S11 matching , 20nH, series



Inductance for S11 matching , 11nH, series

Capacitance for S11 matching , 6.8pF, shunt

Capacitance for S11 matching , 9.1pF, shunt

Note : Exact matching and tuning components value depend on application , board size ,cover etc.



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**CHARTS**

ISM 868MHz two version performance , test in free space.



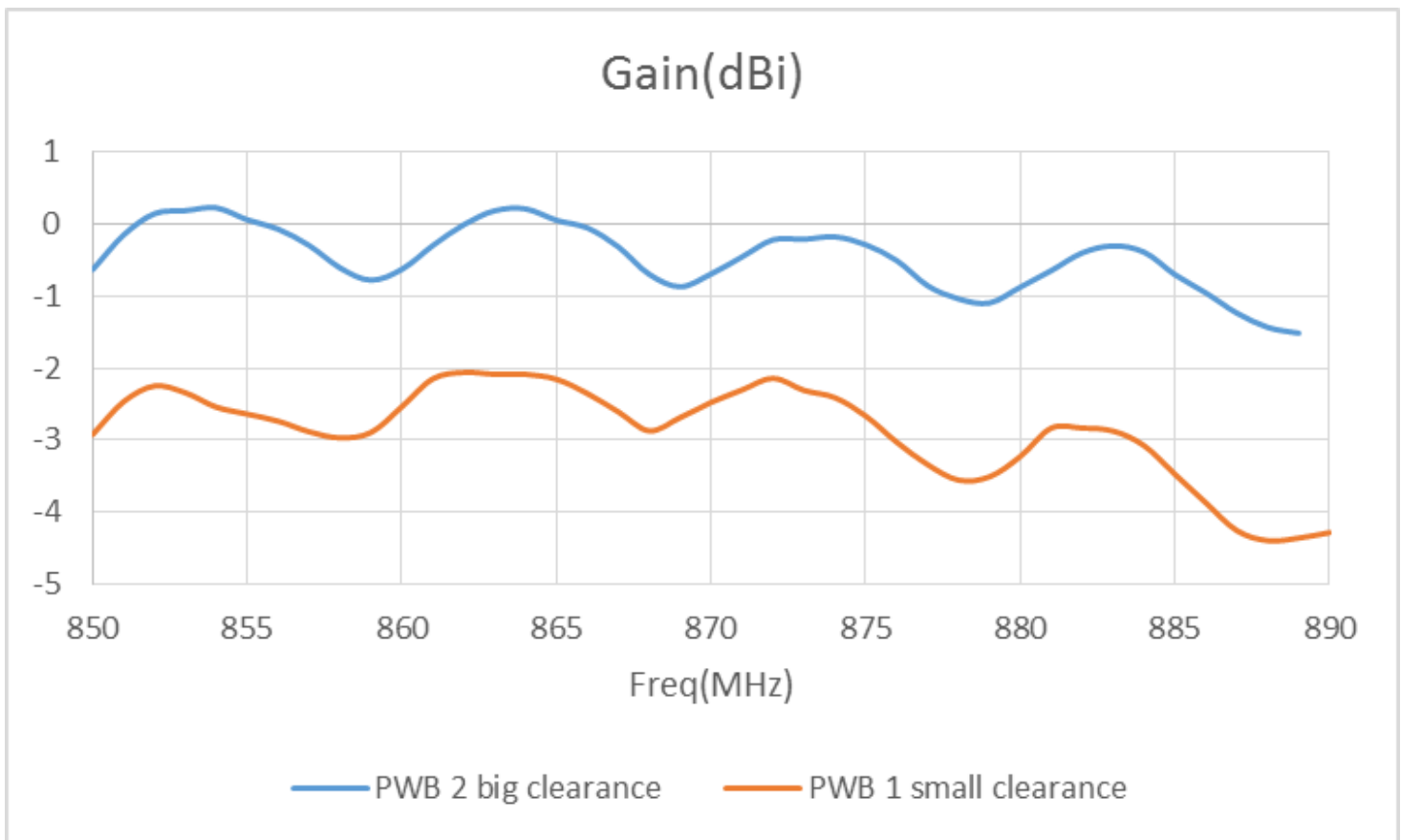
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ISM 868MHz two version performance ,test in free space.



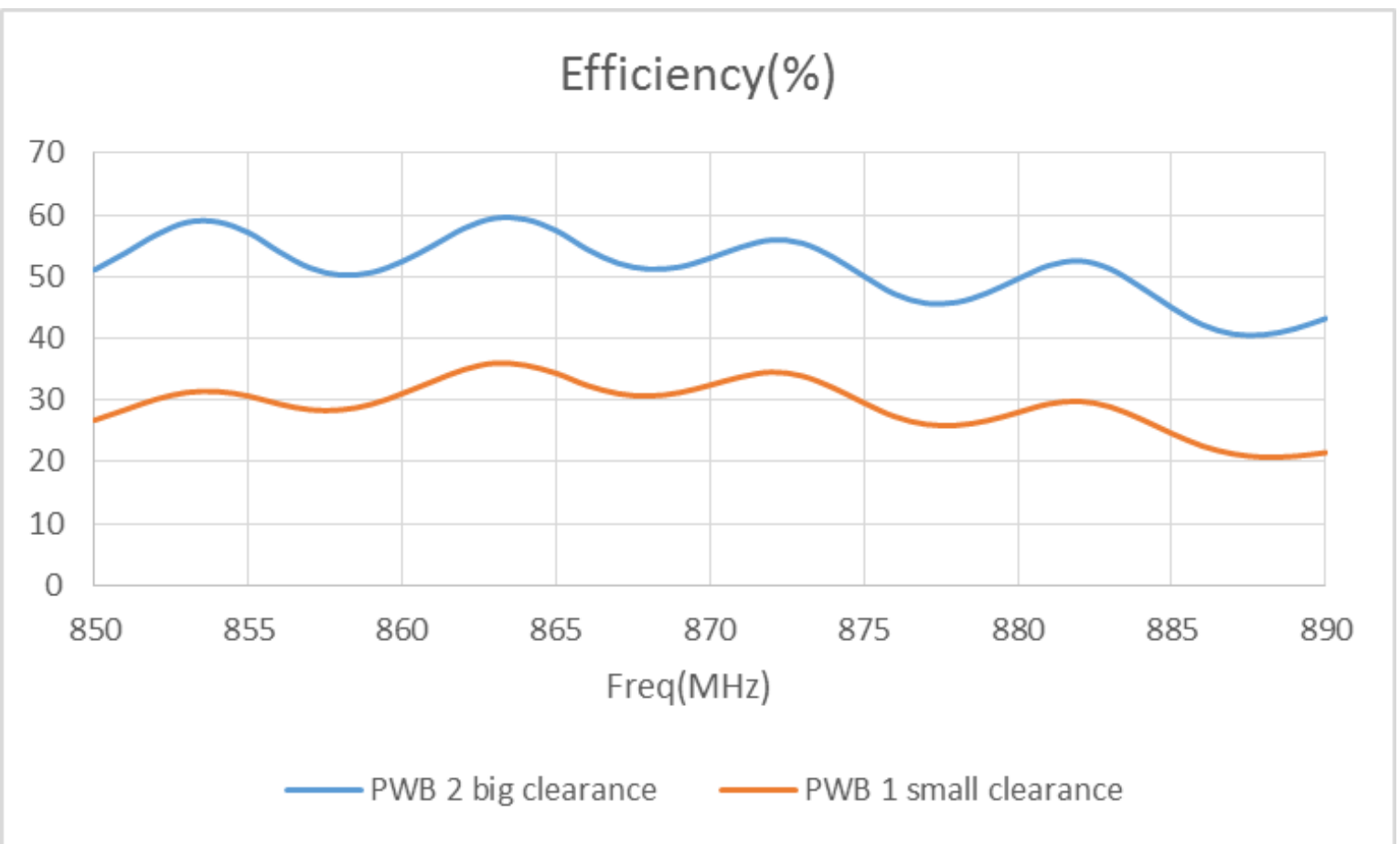
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ISM 868MHz two version performance , test in free space.



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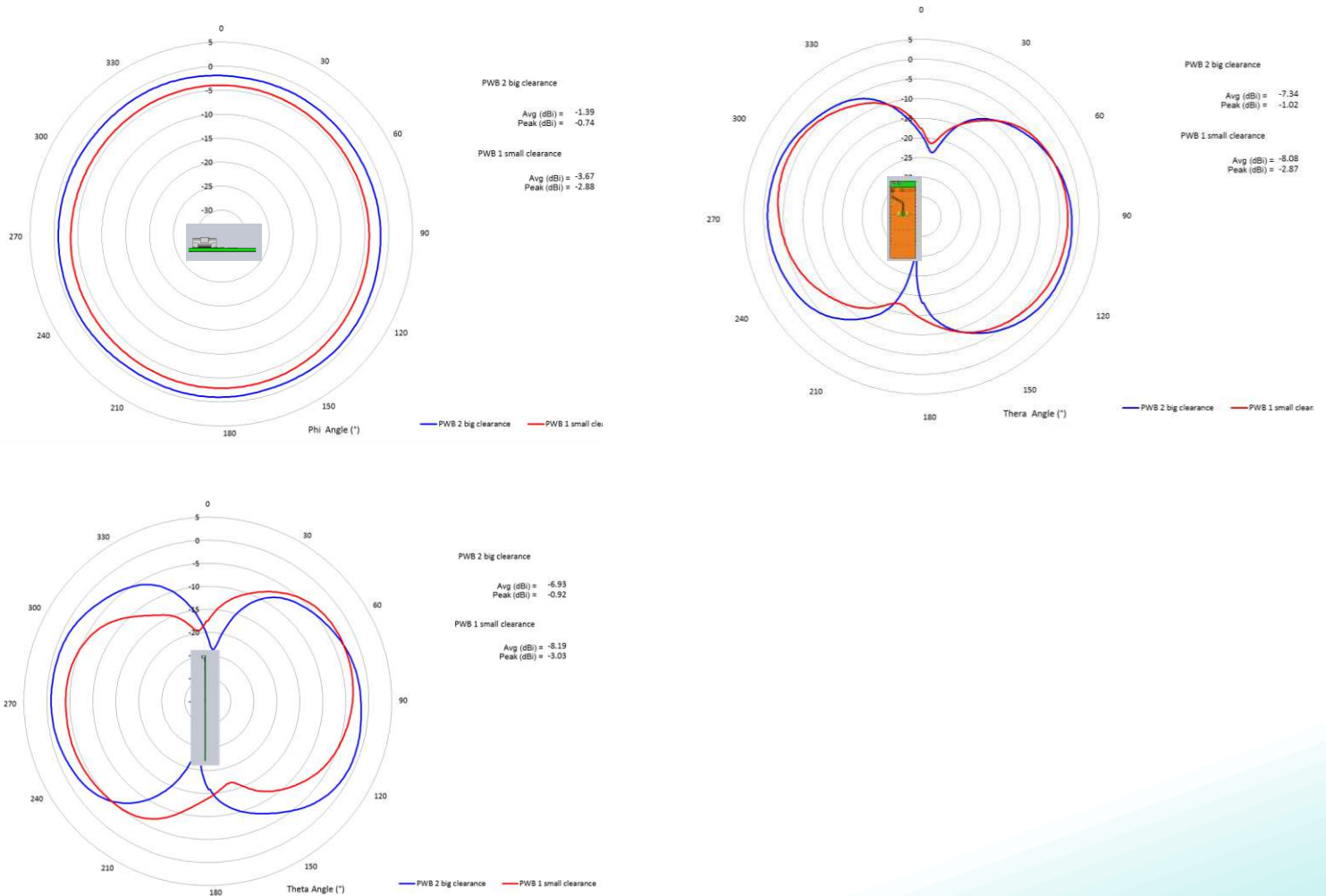
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**CHARTS**

ISM 868MHz two version performance , test in free space.

Typical radiation pattern in free space



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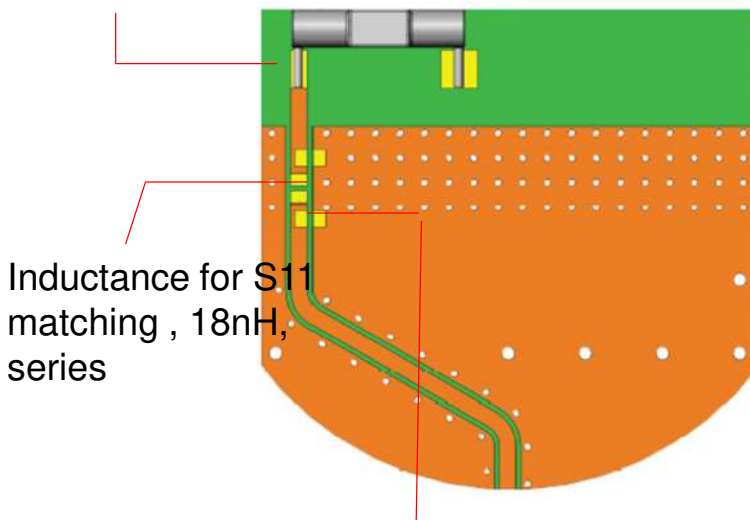
**ISM 915MHz matching circuit.**

(PWB 2 big clearance)

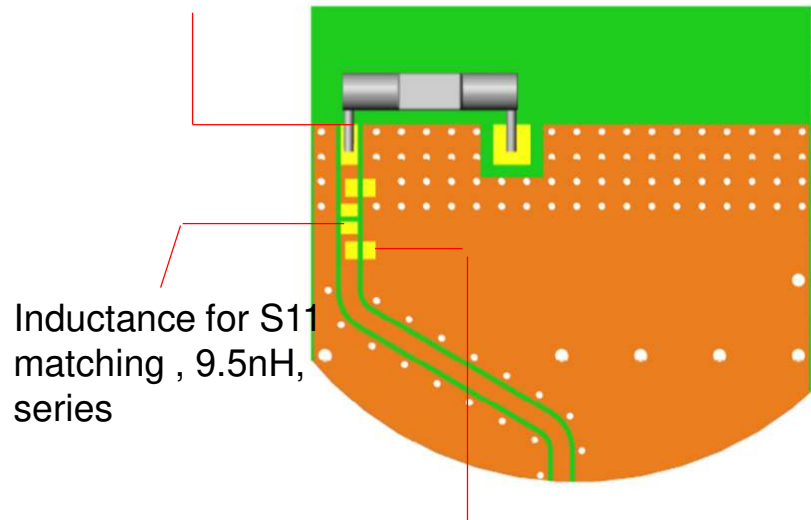
(PWB 1 small clearance)

Antenna feed point

Antenna feed point



Inductance for S11 matching , 18nH, series



Inductance for S11 matching , 9.5nH, series

Capacitance for S11 matching , 5.1pF, shunt

Capacitance for S11 matching , 9.1pF, shunt

Note : Exact matching and tuning components value depend on application , board size ,cover etc.

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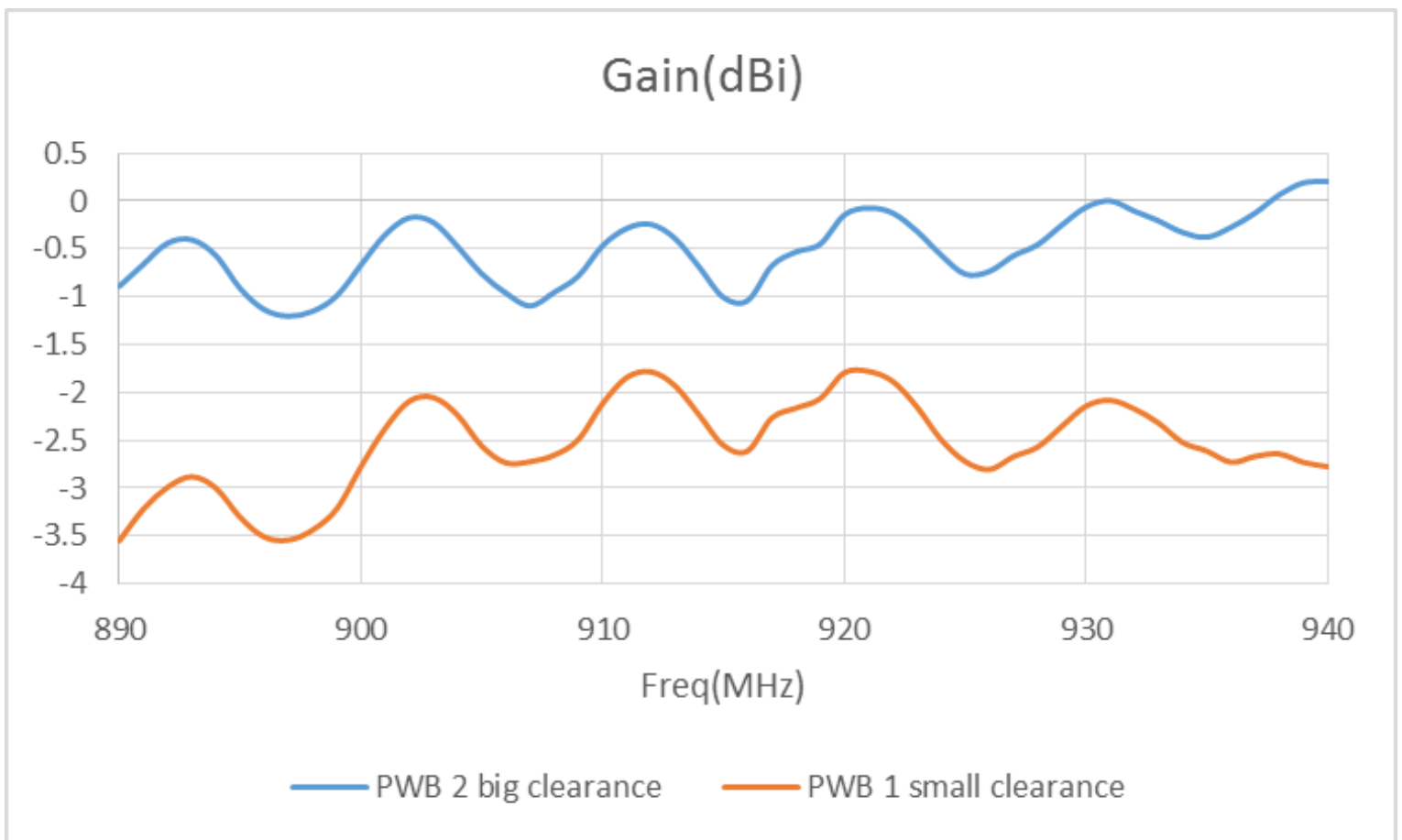
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CHARTS

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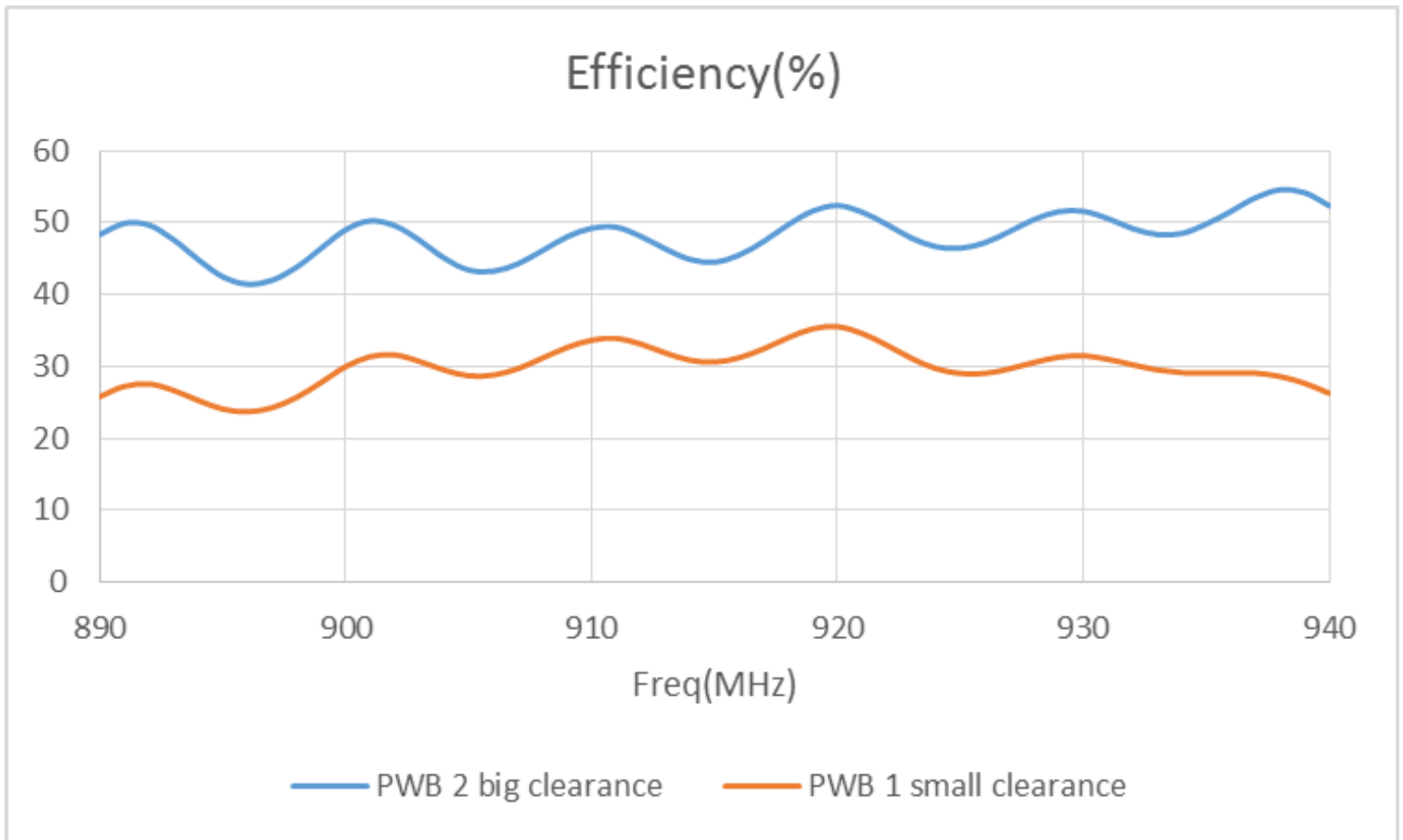
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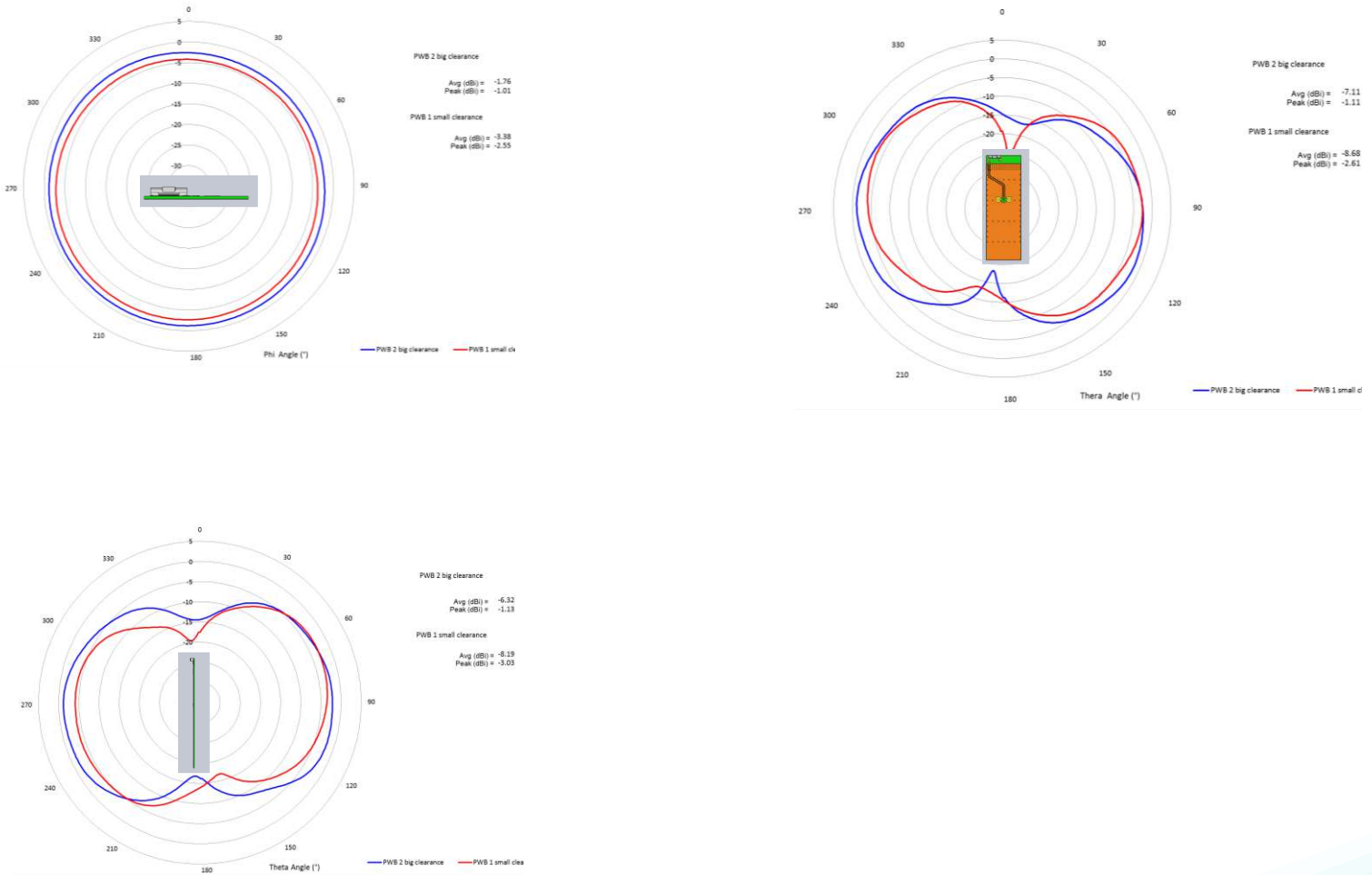
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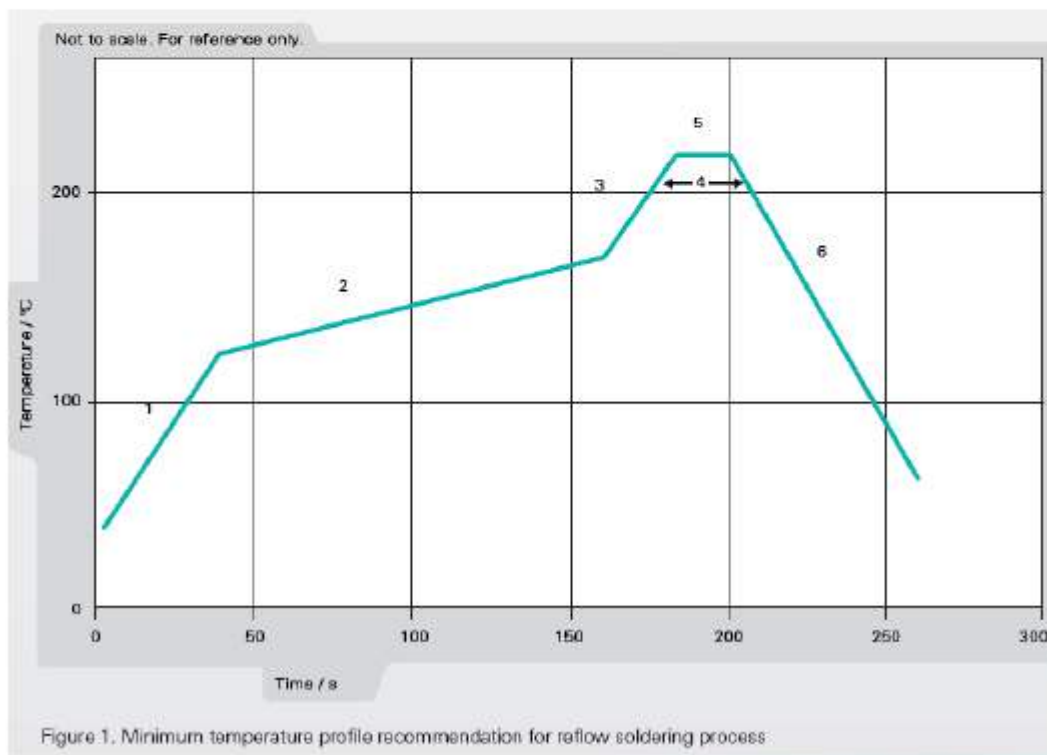
**PART NUMBER: W3139**

**Recommendation for reflow soldering process**

Printing stencil thickness 0,15 - 0,25 mm is recommended for the solder paste. The maximum soldering temperature should not exceed 260°C. The temperature profile recommendations for reflow soldering process is presented in the Figures 1 and 2. The reflow profile

presented in figure 1 describes minimum reflow temperatures. The reflow profile presented in figure 2 describes maximum reflow temperatures, located at the center of the coverage area.

	Method of heat transfer	Controlled hot air convection
1	Average temperature gradient in preheating	2.5 °C/s
2	Soak time	2-3 minutes
3	Max temperature gradient in reflow	3 °C/s
4	Time above 217 °C	Max 30 sec
5	Peak temperature in reflow	230 °C for 10 seconds
6	Temperature gradient in cooling	Max -5 °C/s



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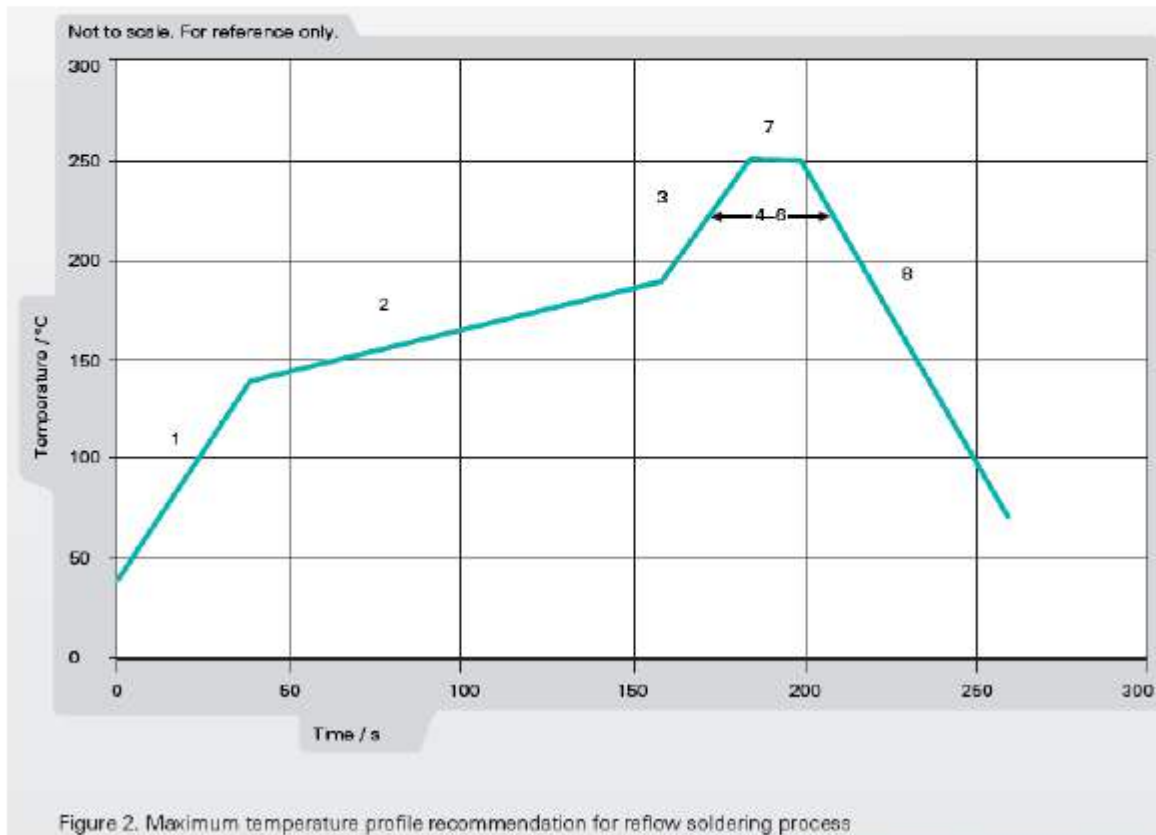
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	Method of heat transfer	Controlled hot air convection
1	Average temperature gradient in preheating	2.5 °C/s
2	Soak time	2-3 minutes
3	Max temperature gradient in reflow	3 °C/s
4	Time above 217 °C	Max 60 sec
5	Time above 230 °C	Max 50 sec
6	Time above 250 °C	Max 10 sec
7	Peak temperature in reflow	260 °C for 5 seconds
8	Temperature gradient in cooling	Max -5 °C/s



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