

### Description

The DC0550W40 is a low profile, high performance 40dB directional coupler. It is designed for DCS & PCS applications. This component is suitable for feed-forward amplifier and signal sampling circuits where low insertion loss, high directivity is required. It can be used in power applications up to 600 Watts.

Parts have been subjected to rigorous qualification testing and they are using materials with coefficients for thermal expansion (CTE) compatible with common substrates such as FR4, G-10, RF-35, RO4350B and polyimide.



### Features:

- 475-620 MHz
- DCS & PCS
- Low Insertion Loss
- High Directivity
- Low VSWR
- Good Repeatability
- CTE compatible with FR4, G-10, RF-35, RO4350B and polyimide
- Immersion gold, prevent surface oxidation & scratch
- RoHS Compliant
- Tape & Reel Package available

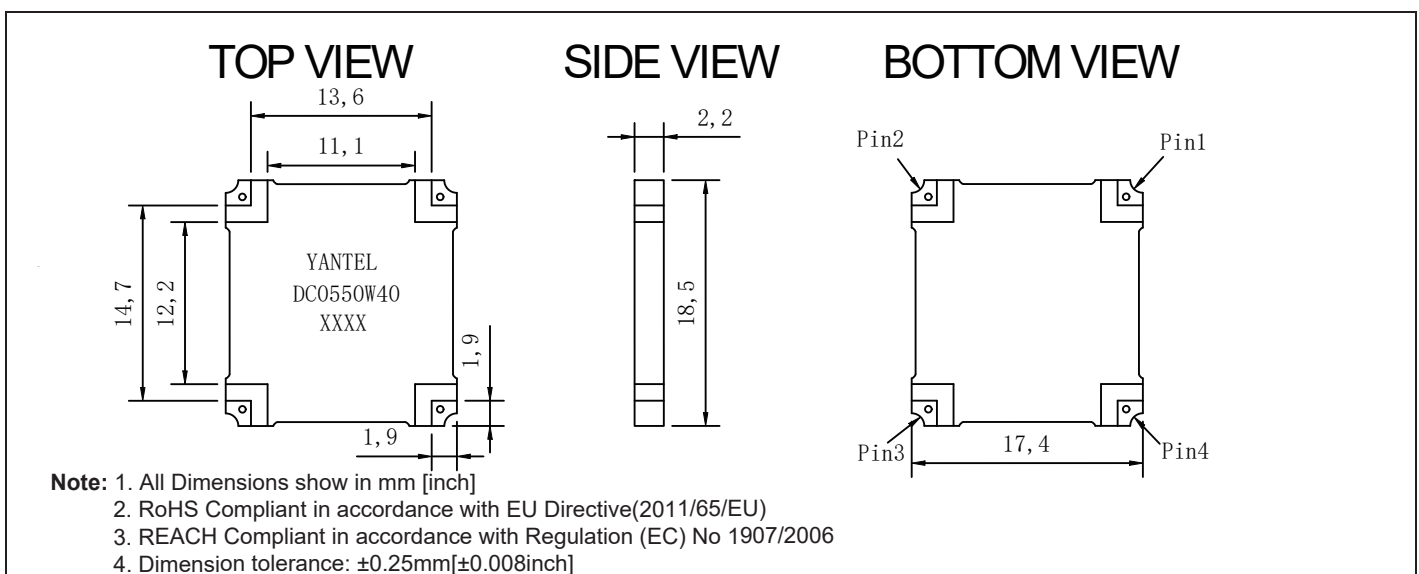
### Electrical Specifications (typical)

| Frequency<br>MHz         | Forward Coupled<br>dB  | Directivity<br>dB Min | Return Loss<br>dB Min |
|--------------------------|------------------------|-----------------------|-----------------------|
| 475-620                  | 40±2                   | 15                    | 19                    |
| Insertion Loss<br>dB Max | Power<br>Avg. CW Watts | Operating Temp.<br>°C |                       |
| 0.2                      | 600                    | -55 to +85            |                       |

### Note:

1. All above test data resulting from specify demo board.
2. Insertion loss has removed the thru board loss.

### Mechanical Outline



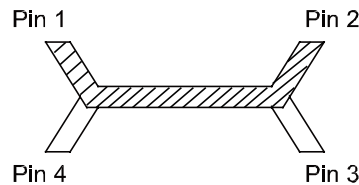
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### Directional Coupler Pin Configuration

The DC0550W40 has an orientation marker to denote Pin1. Once port one has been identified the other ports are known automatically. Please see the chart below for clarification:



| Pin 1        | Pin 2        | Pin 3    | Pin 4    |
|--------------|--------------|----------|----------|
| Input        | Transmission | Isolate  | Coupling |
| Transmission | Input        | Coupling | Isolate  |

### Typical Performance Data (@25°C)

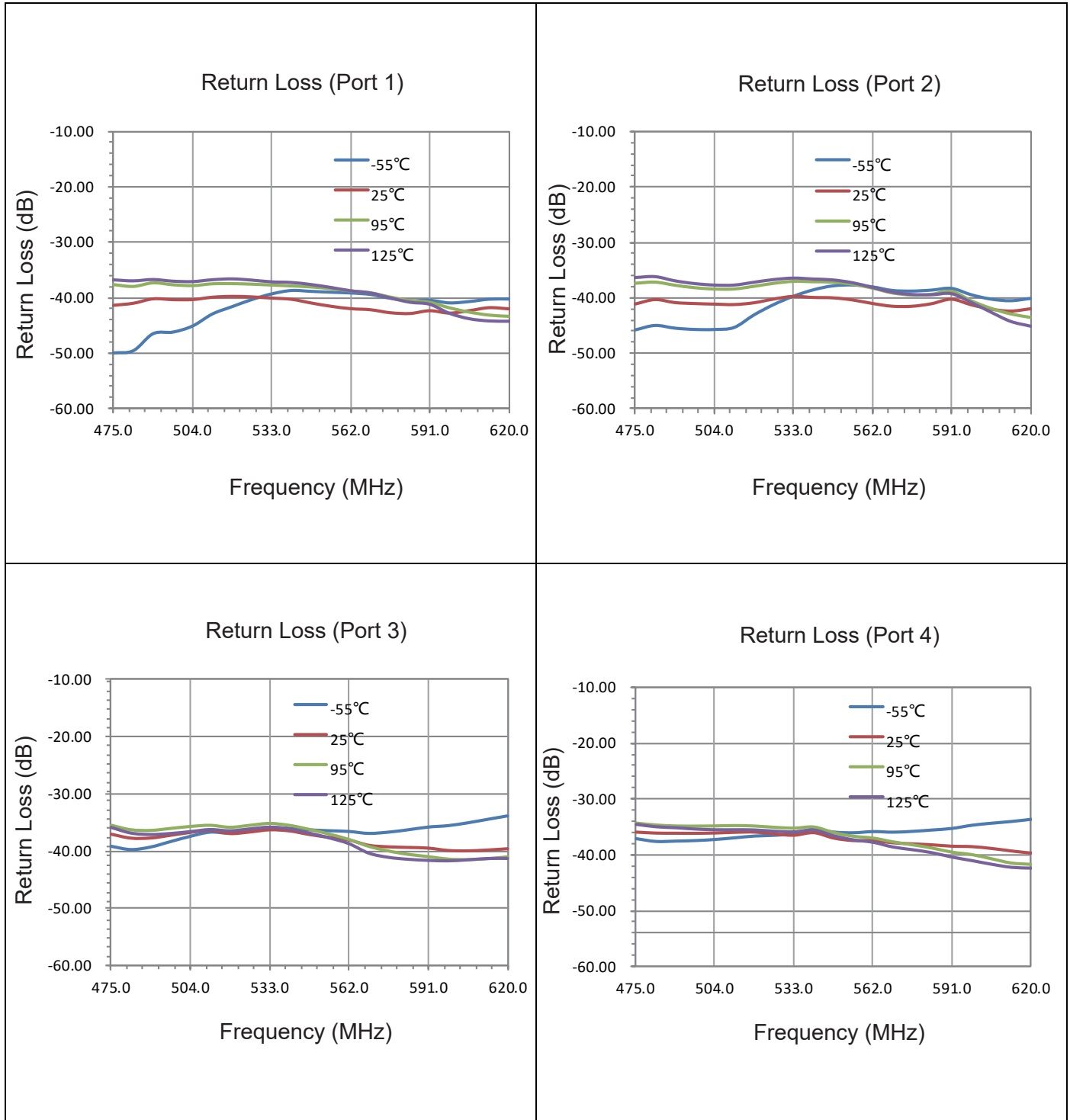
| Frequency (MHz) | Coupling (dB) | Transmission (dB) | Insertion Loss (dB) | Directivity (dB) | Return Loss(dB) |        |        |        |
|-----------------|---------------|-------------------|---------------------|------------------|-----------------|--------|--------|--------|
|                 |               |                   |                     |                  | S11             | S22    | S33    | S44    |
| 475.0           | -40.51        | -0.07             | -0.07               | -19.63           | -41.40          | -41.14 | -37.07 | -35.85 |
| 482.3           | -40.33        | -0.07             | -0.07               | -19.46           | -41.03          | -40.33 | -37.76 | -36.03 |
| 489.5           | -40.32        | -0.05             | -0.05               | -19.83           | -40.24          | -40.87 | -37.73 | -36.06 |
| 496.8           | -40.29        | -0.05             | -0.05               | -19.46           | -40.39          | -41.06 | -37.27 | -36.07 |
| 504.0           | -40.24        | -0.05             | -0.05               | -19.45           | -40.38          | -41.16 | -36.77 | -36.02 |
| 511.3           | -40.17        | -0.05             | -0.05               | -20.04           | -39.96          | -41.24 | -36.39 | -35.89 |
| 518.5           | -39.98        | -0.04             | -0.04               | -20.07           | -39.81          | -40.92 | -36.96 | -35.86 |
| 525.8           | -39.94        | -0.04             | -0.04               | -19.72           | -39.90          | -40.23 | -36.70 | -36.20 |
| 533.0           | -39.89        | -0.04             | -0.04               | -19.38           | -40.11          | -39.74 | -36.32 | -36.41 |
| 540.3           | -39.77        | -0.03             | -0.03               | -19.37           | -40.33          | -39.94 | -36.51 | -35.96 |
| 547.5           | -39.71        | -0.04             | -0.04               | -20.07           | -40.99          | -40.01 | -37.13 | -36.93 |
| 554.8           | -39.59        | -0.03             | -0.03               | -20.42           | -41.57          | -40.40 | -37.63 | -37.39 |
| 562.0           | -39.45        | -0.02             | -0.02               | -20.50           | -42.00          | -41.04 | -38.08 | -37.37 |
| 569.3           | -39.33        | -0.02             | -0.02               | -20.94           | -42.20          | -41.54 | -38.99 | -37.79 |
| 576.5           | -39.28        | -0.03             | -0.03               | -20.71           | -42.73          | -41.55 | -39.26 | -37.98 |
| 583.8           | -39.22        | -0.03             | -0.03               | -20.47           | -42.87          | -41.08 | -39.36 | -38.16 |
| 591.0           | -39.12        | -0.02             | -0.02               | -20.46           | -42.37          | -40.26 | -39.48 | -38.41 |
| 598.3           | -39.09        | -0.03             | -0.03               | -20.74           | -42.80          | -41.28 | -39.89 | -38.48 |
| 605.5           | -38.97        | -0.01             | -0.01               | -20.65           | -42.36          | -42.07 | -39.95 | -38.82 |
| 612.8           | -38.88        | -0.03             | -0.03               | -20.61           | -41.83          | -42.43 | -39.80 | -39.27 |
| 620.0           | -38.81        | 0.00              | 0.00                | -21.15           | -42.03          | -42.01 | -39.59 | -39.65 |

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**Typical Performance (-55°C, 25°C, 95°C, 125°C: 475-620MHz)**

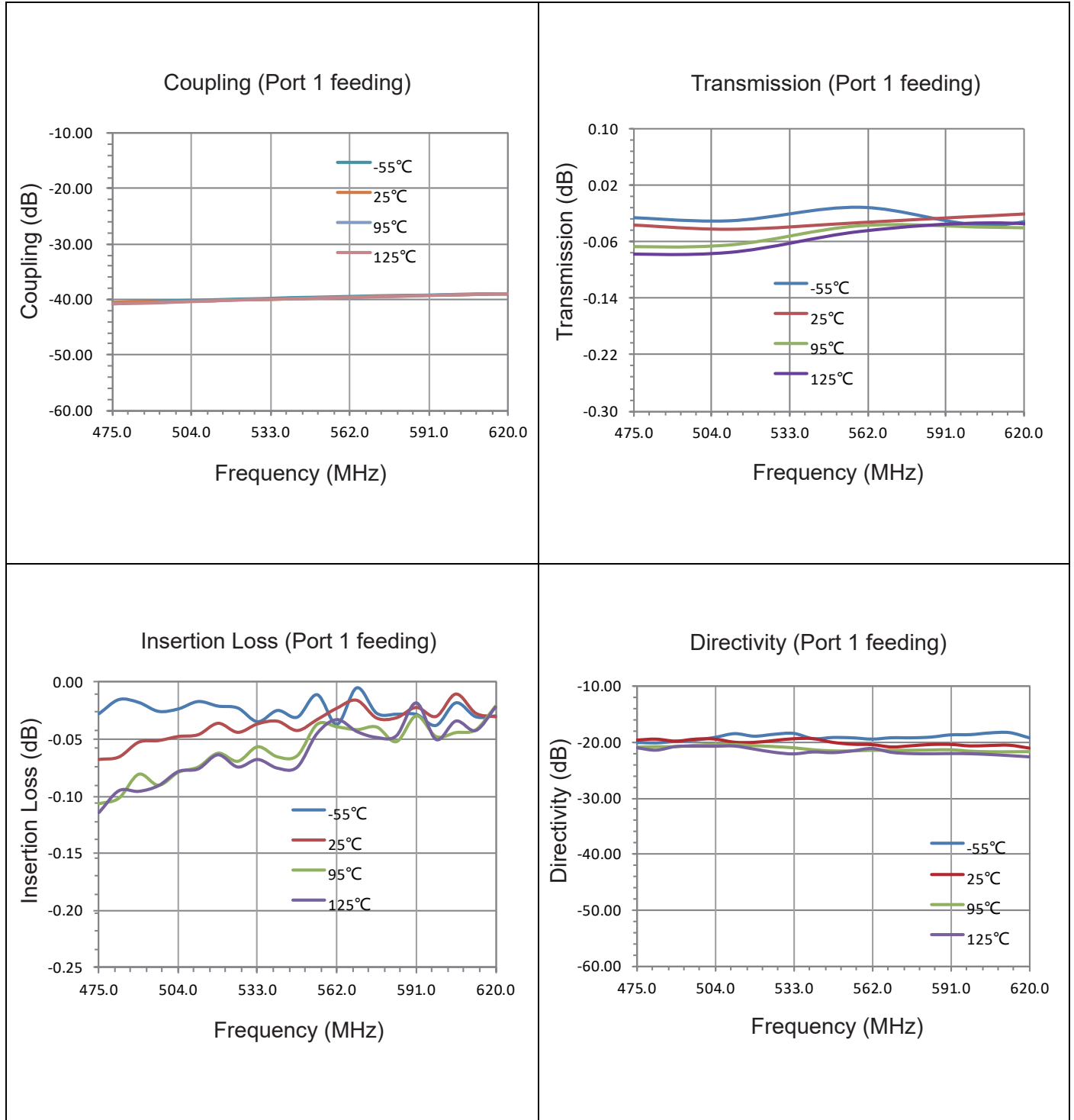


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### Description of Measured Specifications

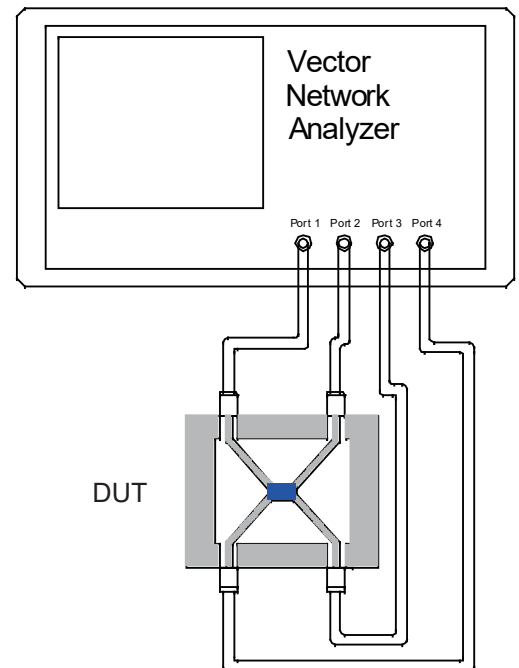
| Parameter              | Description  |
|------------------------|--|
| <b>VSWR</b>            | Voltage standing wave ratio, the impedance match to $50\ \Omega$ , the ideal value is 1:1.       |
| <b>Return Loss</b>     | Loss of signal power resulting from the reflection caused by discontinuity of transmission line. |
| <b>Insertion Loss</b>  | The input power divided by sum of power at the Forward Coupled port & transmission port          |
| <b>Forward Coupled</b> | The input power divided by the power at coupling port.   |
| <b>Transmission</b>    | The input power divided by the power at transmission port.                                       |
| <b>Directivity</b>     | The power at the Forward Coupled port divided by the power at the Reflected Coupled port         |

### Test Method

1. Calibrating your vector network analyzer.
2. Connect the VNA 4 Port to DUT respectively.
3. Measure the data of Forward coupled through port 1 to port 4(S41).
4. Measure the data of transmission through port 1 to port 3(S31).
5. Measure the data of Reflected Coupled through port 1 to port 2(S21).
6. Measure the data of return loss port 1, port 3.
7. According to the above data to calculate insertion loss, directivity.

Note:

1. When calculating insertion loss at room temperature, coupling & transmission data both need remove demo board loss. Please see demo board loss data below the table :

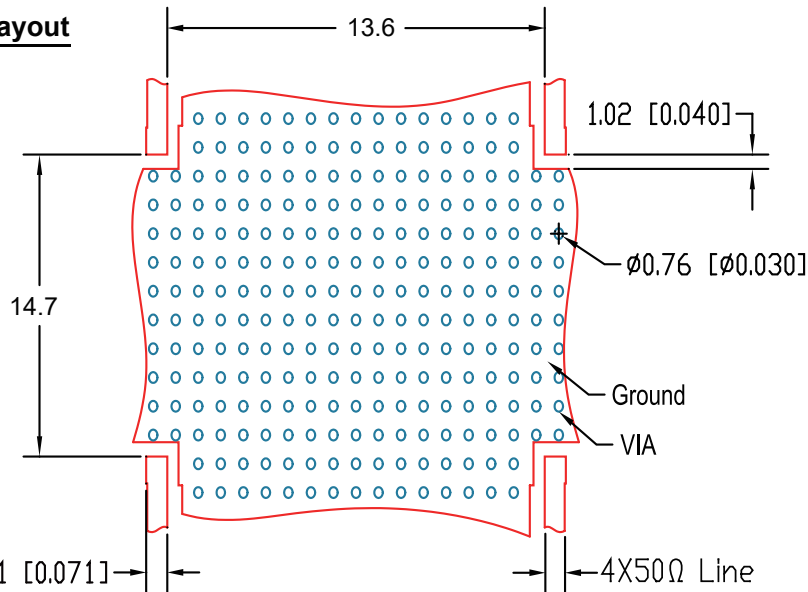


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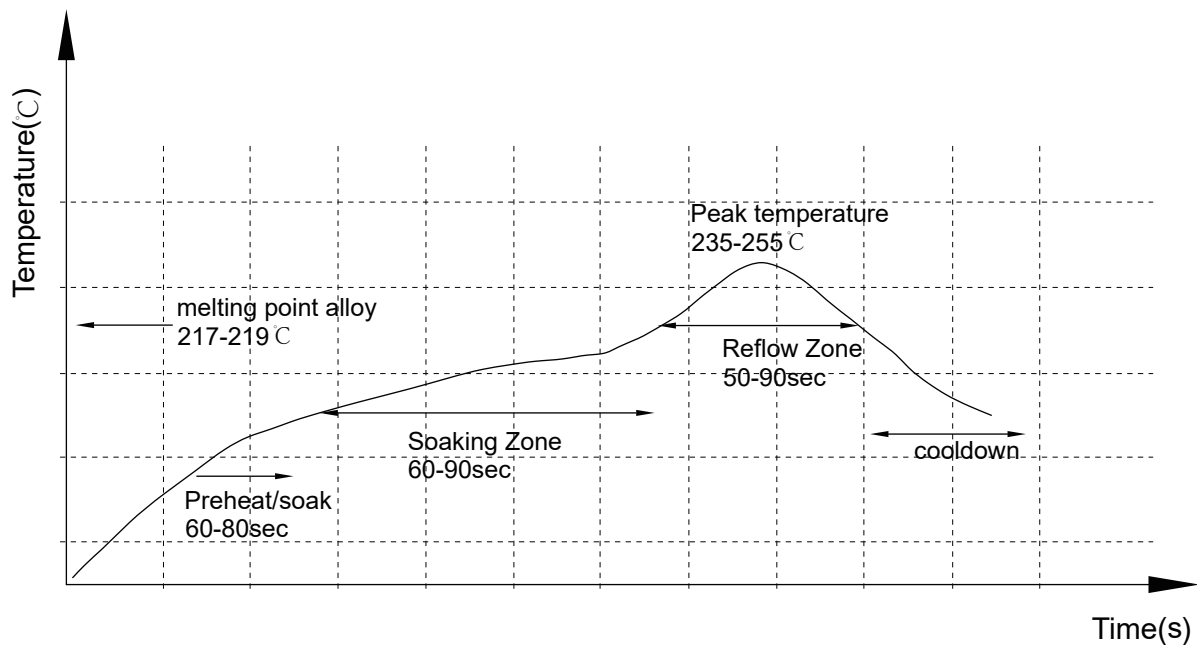
### Recommended PCB Layout



NOTE:

- 50 $\Omega$  line width is shown above designing from RO4003 dielectric thickness 0.81mm; copper 1 OZ
- Bottom side of the PCB is continuous ground plane.
- All dimensions shown in mm [inch].

### Reflow Profile

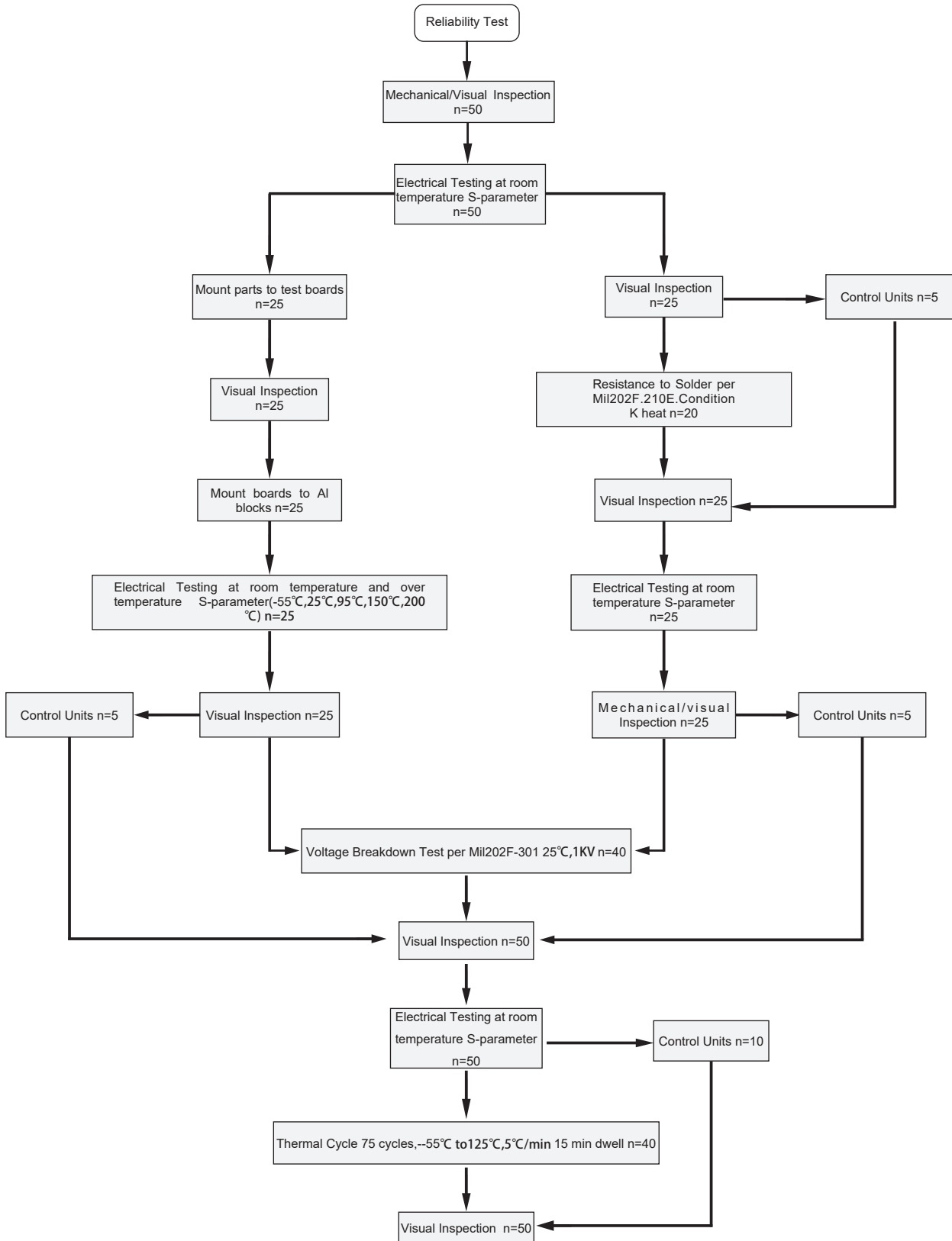


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### Reliability Test Flow

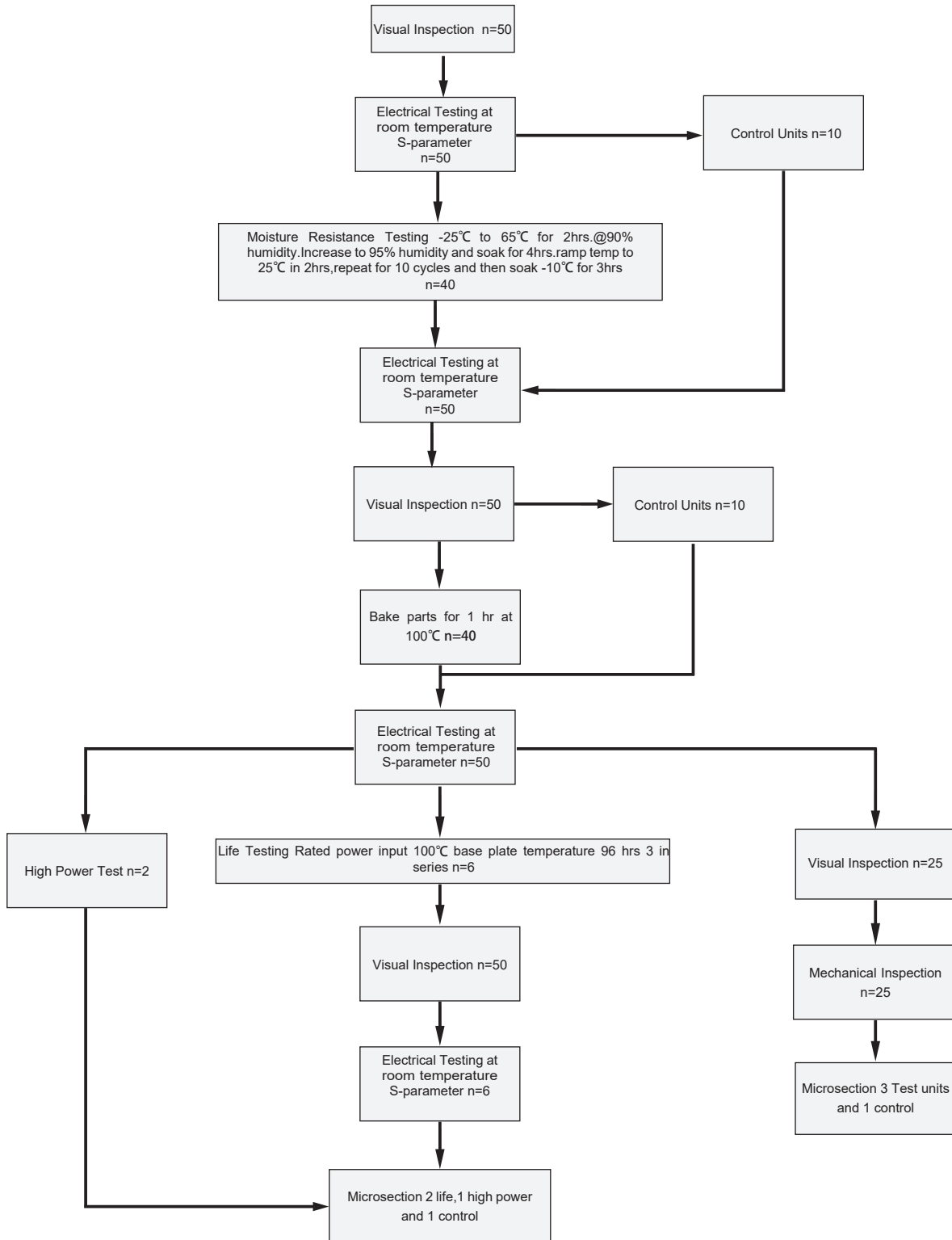


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