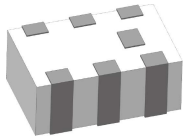
HC35T03R

3dB 90° Hybrid Coupler

Rev A1.0

Description

The products are widely used in China and global 4G/5G base station, 5G network coverage, BeiDou navigation antenna, vehicle-mounted high-precision navigation (unmanned) antenna and other applications. The products have miniaturization, low-loss, wide-bandwidth, high power density, high reliability, high cost-effective and other competitive advantages.



Features:

- **3200-4200 MHz**
- **0.7mm Height Profile**
- **High Isolation,Low Loss**
- **LTE Bands:22,42,43**
- **WiMax WiBro Applications**
- **Surface Mountable**
- **Tape & Reel**
- **Non-conductive Surface**
- **RoHS Compliant**
- **Halogen-free**
- **100% RF tested**

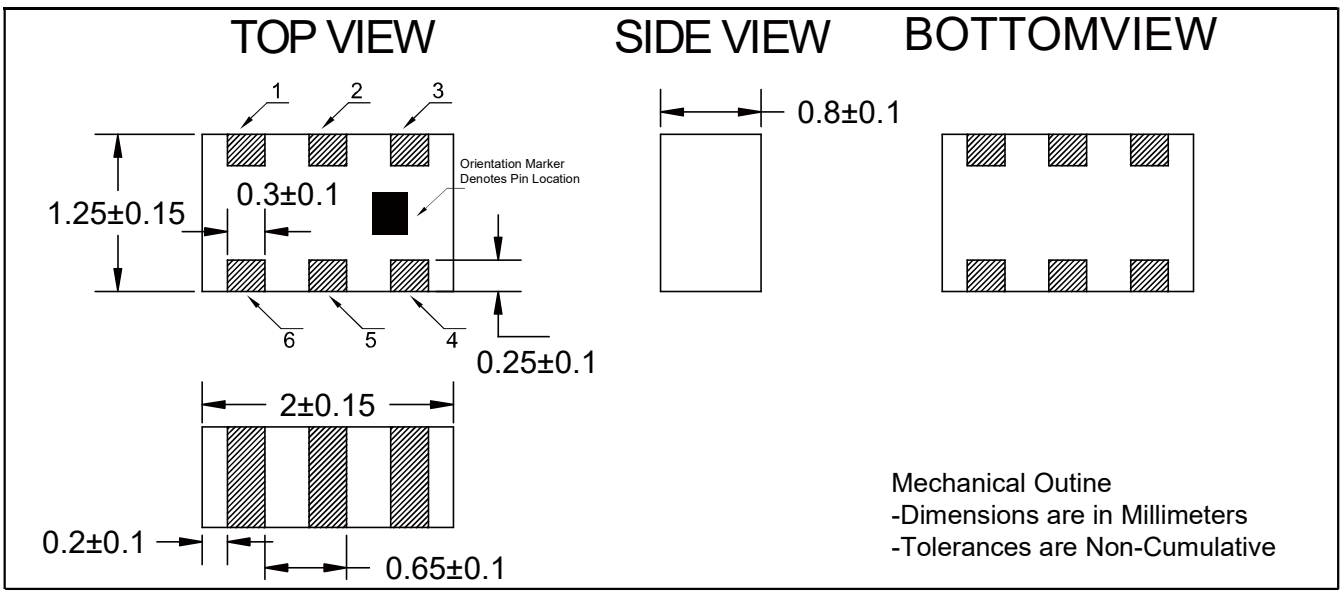
Electrical Specifications

Frequency	Isolation	Insertion Loss	VSWR
MHz	*dB Min*	*dB Max*	*Max : 1*
3200-4200	20	0.33	1.30

Amplitude Balance	Phase Balance	Power	Operating Temp.
dB Max	*Degrees*	*Avg. CW Watts at 105°C*	*°C*
± 0.30	90 ± 5.0	4	-55 to +105

Notes:
1. All the above data are based on specified demo board.
2. Insertion loss:Thru board loss has been removed.

Mechanical Outline



Mechanical Outine
-Dimensions are in Millimeters
-Tolerances are Non-Cumulative

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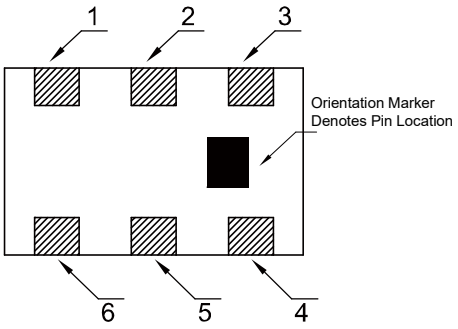
Hybrid Coupler Pin Configuration

The HC35T03R 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	Configuration-1	Configuration-2	Configuration-3	Configuration-4
1	Input	Isolated	Coupled	Direct
2	GND	GND	GND	GND
3	Isolated	Input	Direct	Coupled
4	Coupled	Direct	Input	Isolated
5	GND	GND	GND	GND
6	Direct	Coupled	Isolated	Input

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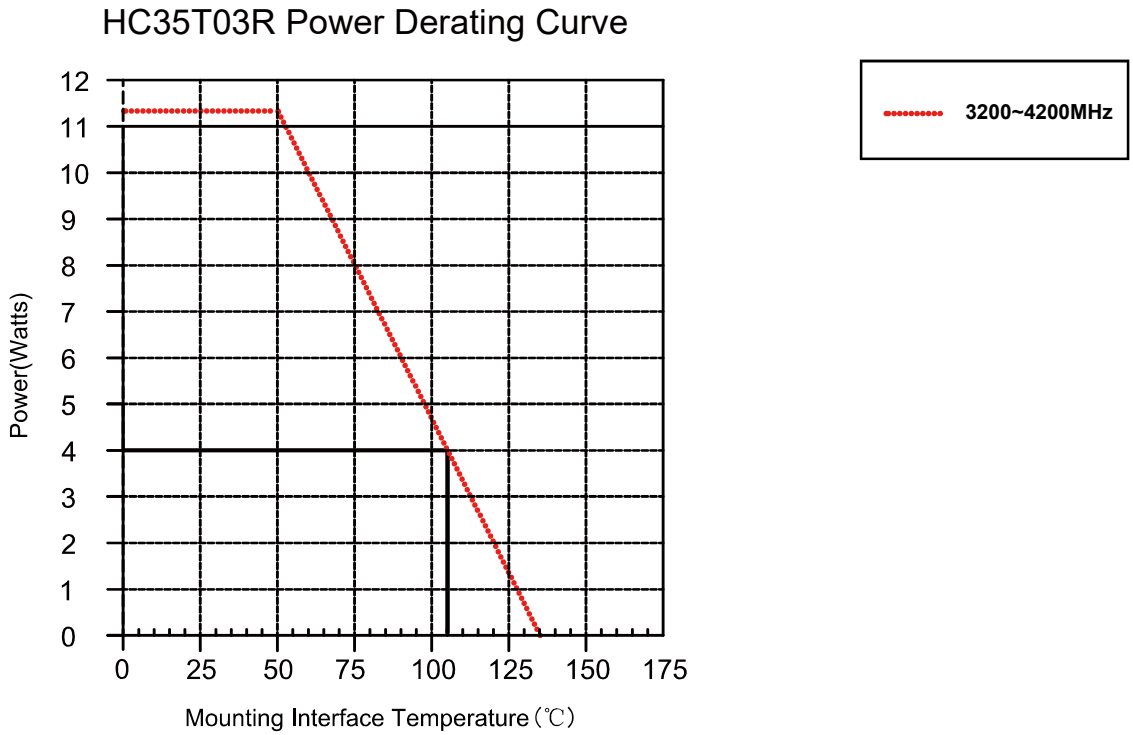
Power Derating Curves



Power Derating:

As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

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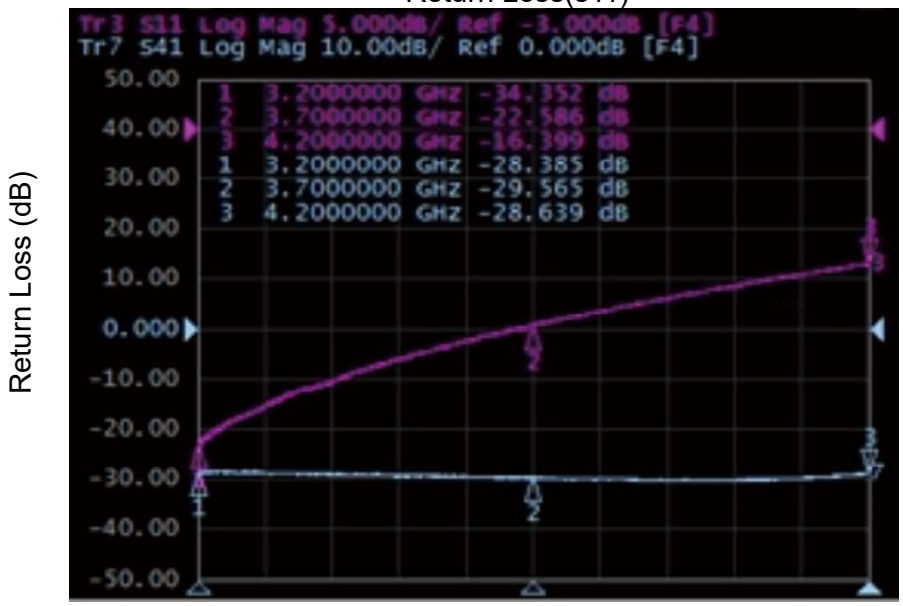
Typical Performance (25°C: 3200-4200 MHz)

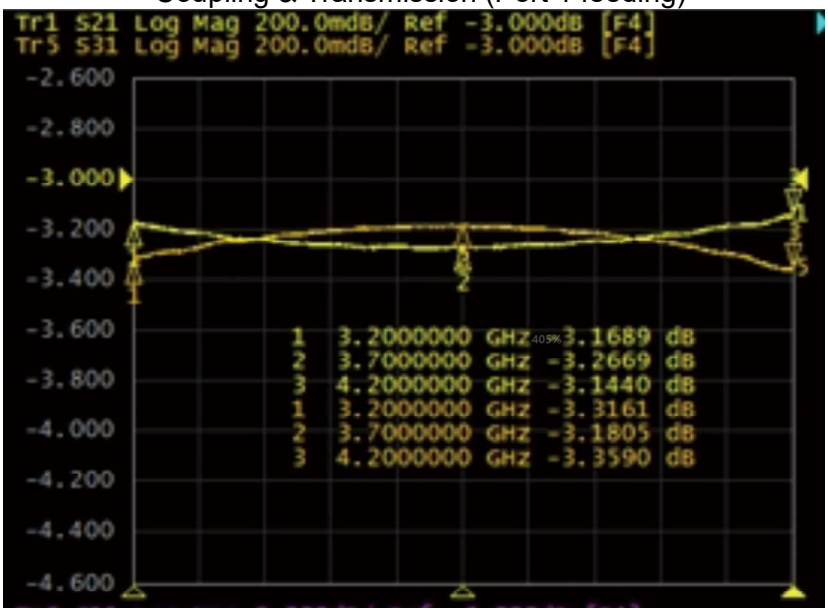
Return Loss(s11)



Return Loss (dB)

Frequency (MHz)

Coupling & Transmission (Port 1 feeding)



Coupling & Transmission (dB)

Frequency (MHz)

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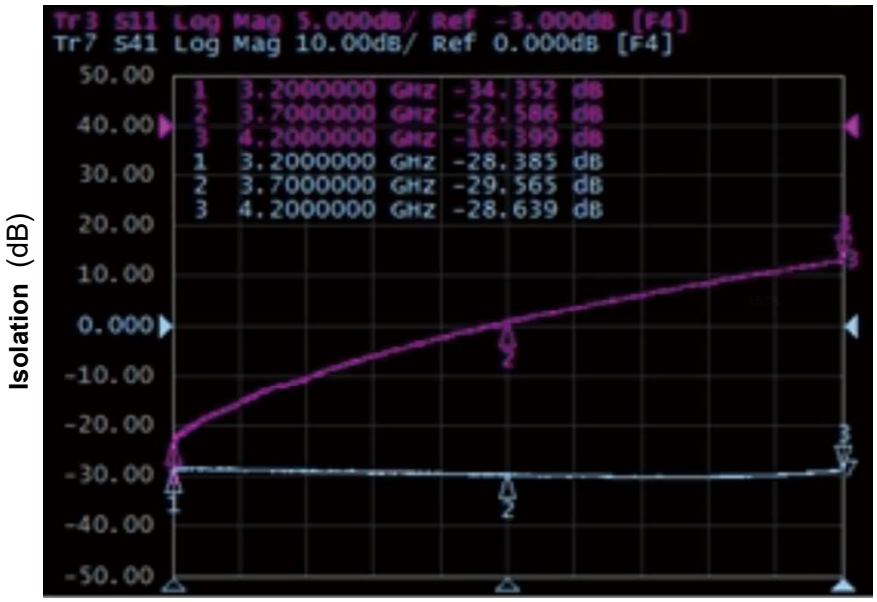
Typical Performance (25°C: 3200-4200 MHz)

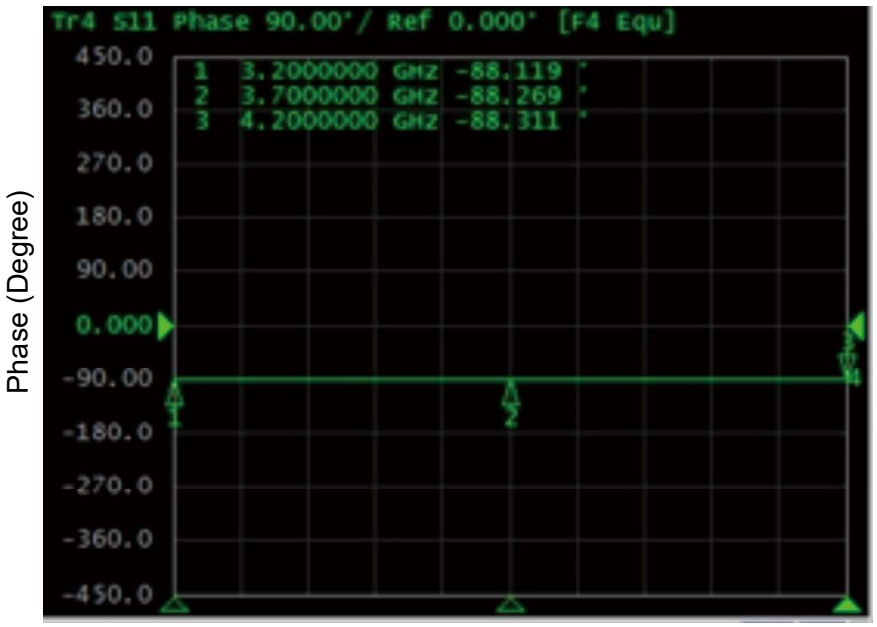
Isolation (s41)



Isolation (dB)

Frequency (MHz)

Phase (Port 1 feeding)



Phase (Degree)

Frequency (MHz)

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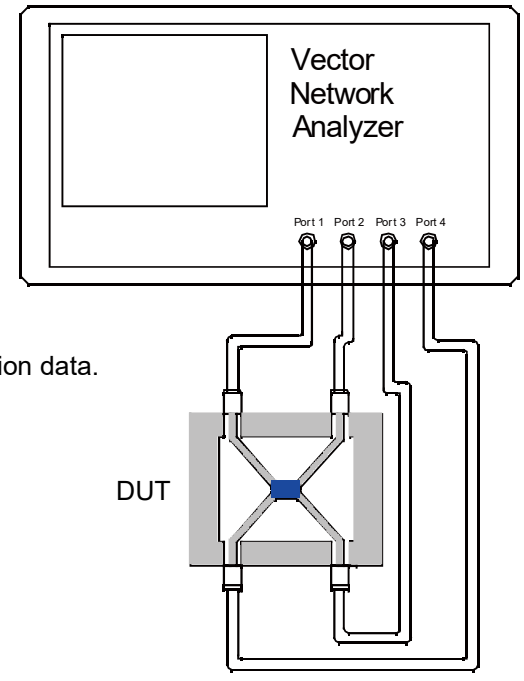
Definition of Measured Specifications

Parameter	Definition	Mathematical Representation
VSWR (Voltage Standing Wave Ratio)	The impedance match of the coupler to a 50Ω system. A VSWR of 1:1 is optimal.	$VSWR = \frac{V_{max}}{V_{min}}$ Vmax = voltage maxima of a standing wave Vmin = voltage minima of a standing wave
Return Loss	The impedance match of the coupler to a 50Ω system. Return Loss is an alternate means to express VSWR.	Return Loss (dB)= $20\log \frac{VSWR+1}{VSWR-1}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	Insertion Loss(dB)= $10\log \frac{P_{in}}{P_{cpl}+P_{transmission}}$
Isolation	The input power divided by the power at the isolated port.	Isolation(dB)= $10\log \frac{P_{in}}{P_{iso}}$
Phase Balance	The difference in phase angle between the two output ports.	Phase at coupled port – Phase at transmisson port
Amplitude Balance	The power at each output divided by the average power of the two outputs.	$10\log \frac{P_{cpl}}{(\frac{P_{cpl}+P_{transmission}}{2})}$ or $10\log \frac{P_{transmission}}{(\frac{P_{cpl}+P_{transmission}}{2})}$

Test Method

1. Calibrating your vector network analyzer.
2. Connect the VNA 4 Port to DUT respectively.
3. Measure the data of coupling 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 isolation through port 1 to port 2(S21).
6. Measure the data of phase port 4 & port 3(port 1 feeding).
7. Measure the data of return loss port 1, port 2, port 3 & port 4.
8. According to the above data to calculate insertion loss, amplitude balance & phase.



Note:

1. When calculating insertion loss at room temperature, demo board loss should be removed from both coupling & transmission data.

Please refer to the below table for demo board loss :

Frequency Range(MHz)	Demo Board Loss (dB) @25℃
470-860	0.07
800-1000	0.10
1200-1700	0.15
1700-2000	0.15
2000-2300	0.20
2300-2700	0.25

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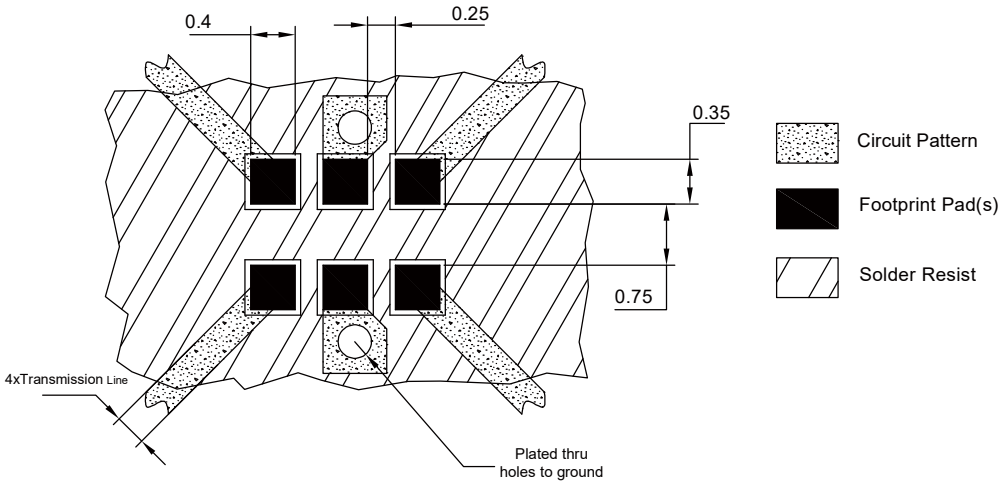
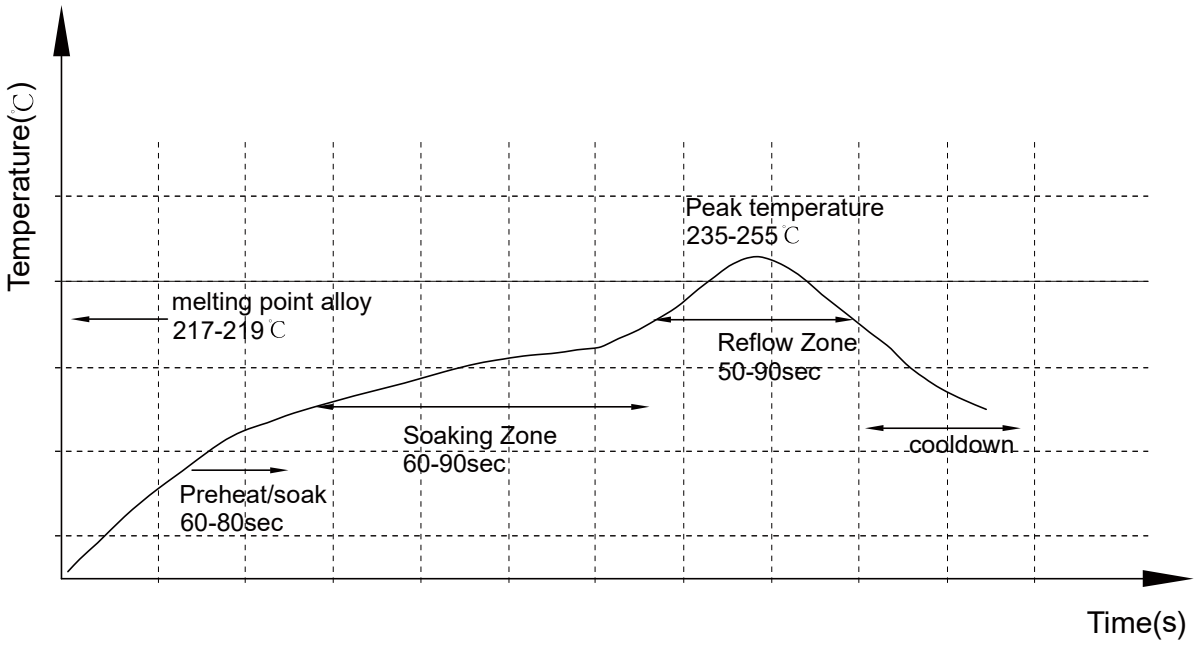
Recommended PCB Layout



NOTE:

1. 50Ω line width is shown above designing.
2. Bottom side of the PCB is continuous ground plane.
3. All dimensions shown in mm [inch].

Reflow Profile



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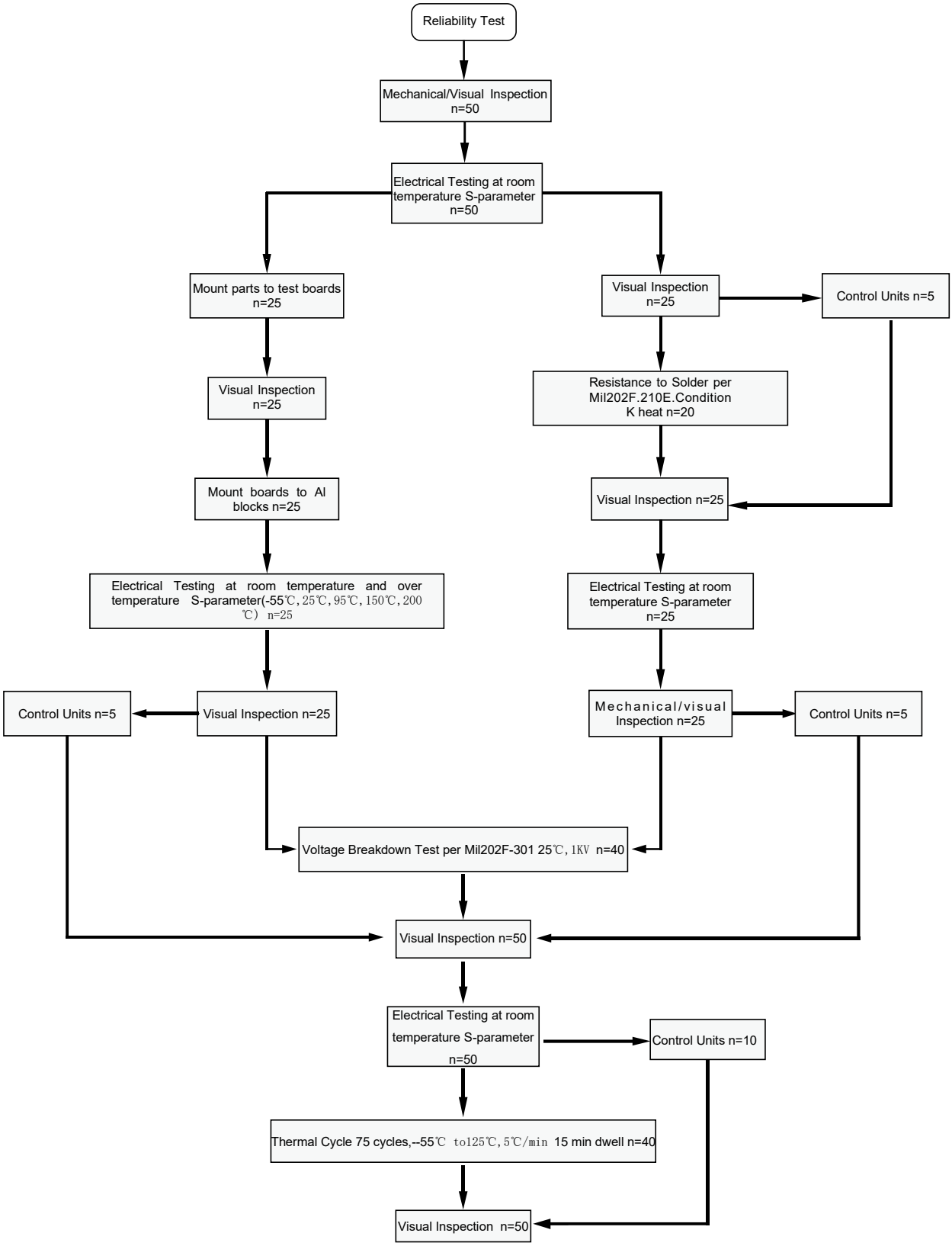
Reliability Test Flow



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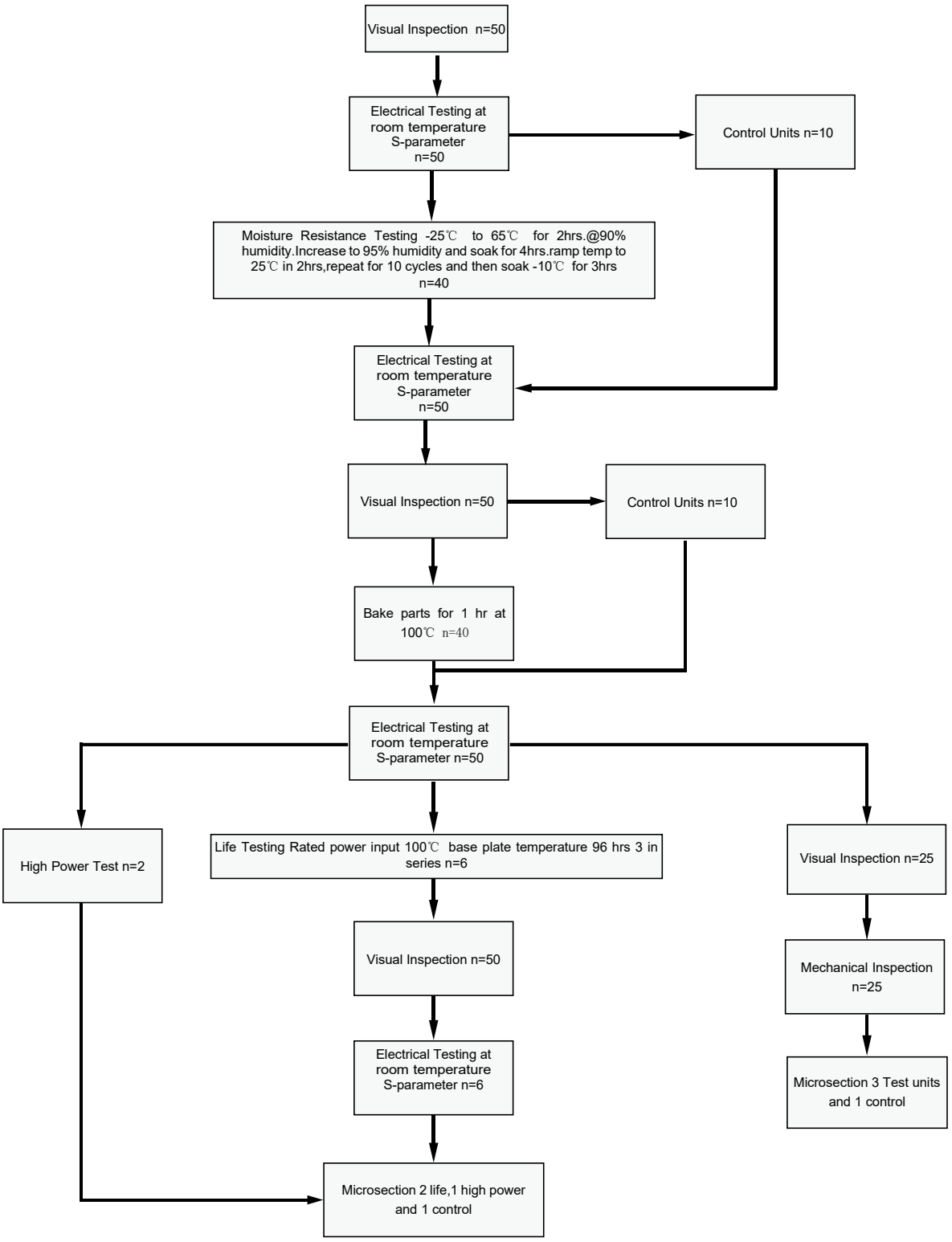
Reliability Test Flow



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