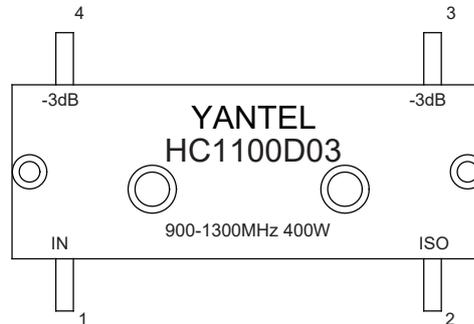


Hybrid Coupler Pin Configuration

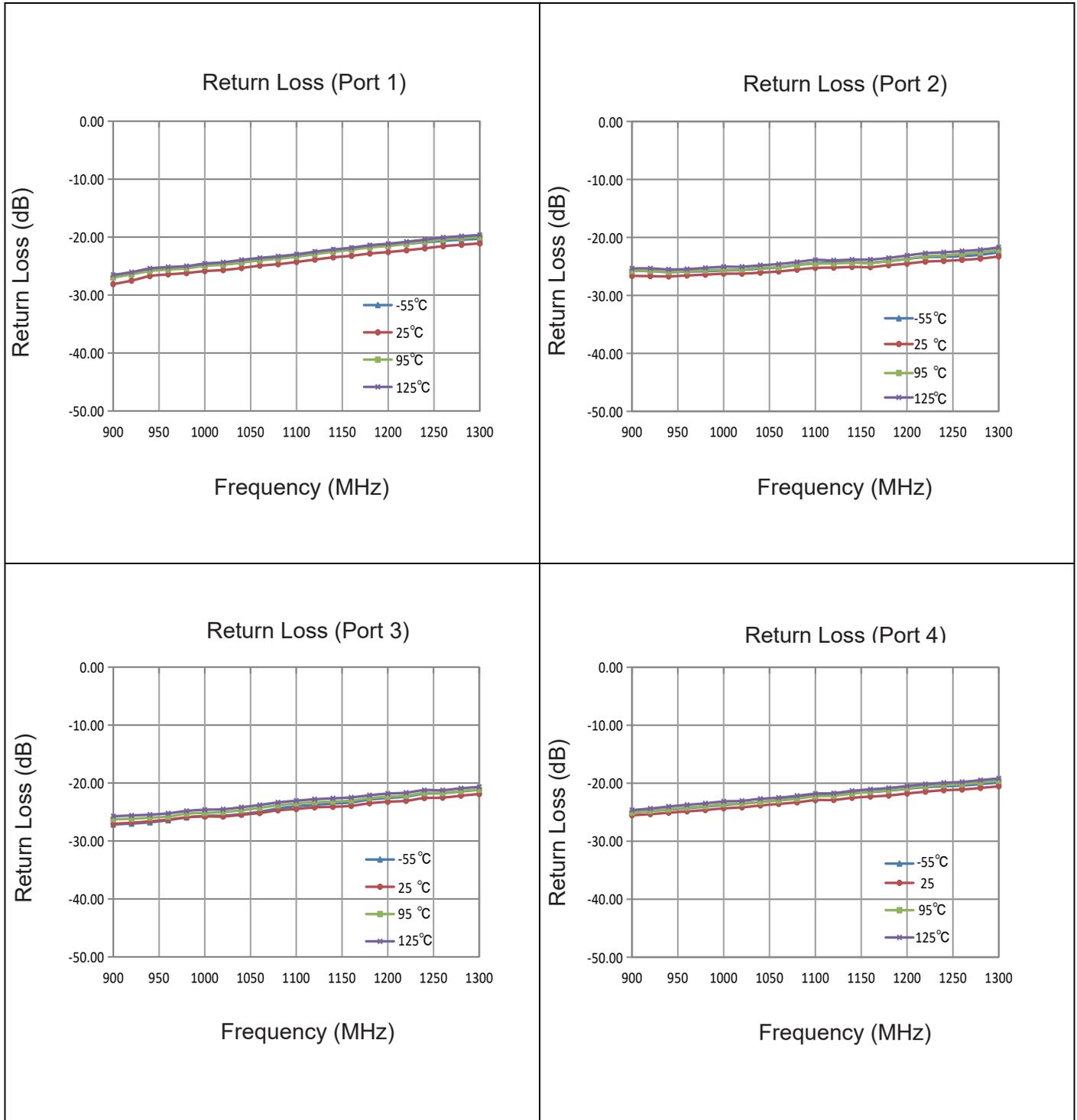


Configuration	Pin 1	Pin 2	Pin 3	Pin 4
Splitter	Input	Isolated	-3dB $\angle \theta - 90$	-3dB $\angle \theta$
Splitter	Isolated	Input	-3dB $\angle \theta$	-3dB $\angle \theta - 90$
Splitter	-3dB $\angle \theta - 90$	-3dB $\angle \theta$	Input	Isolated
Splitter	-3dB $\angle \theta$	-3dB $\angle \theta - 90$	Isolated	Input
*Combiner	A $\angle \theta - 90$	A $\angle \theta$	Isolated	Output
*Combiner	A $\angle \theta$	A $\angle \theta - 90$	Output	Isolated
*Combiner	Isolated	Output	A $\angle \theta - 90$	A $\angle \theta$
*Combiner	Output	Isolated	A $\angle \theta$	A $\angle \theta - 90$

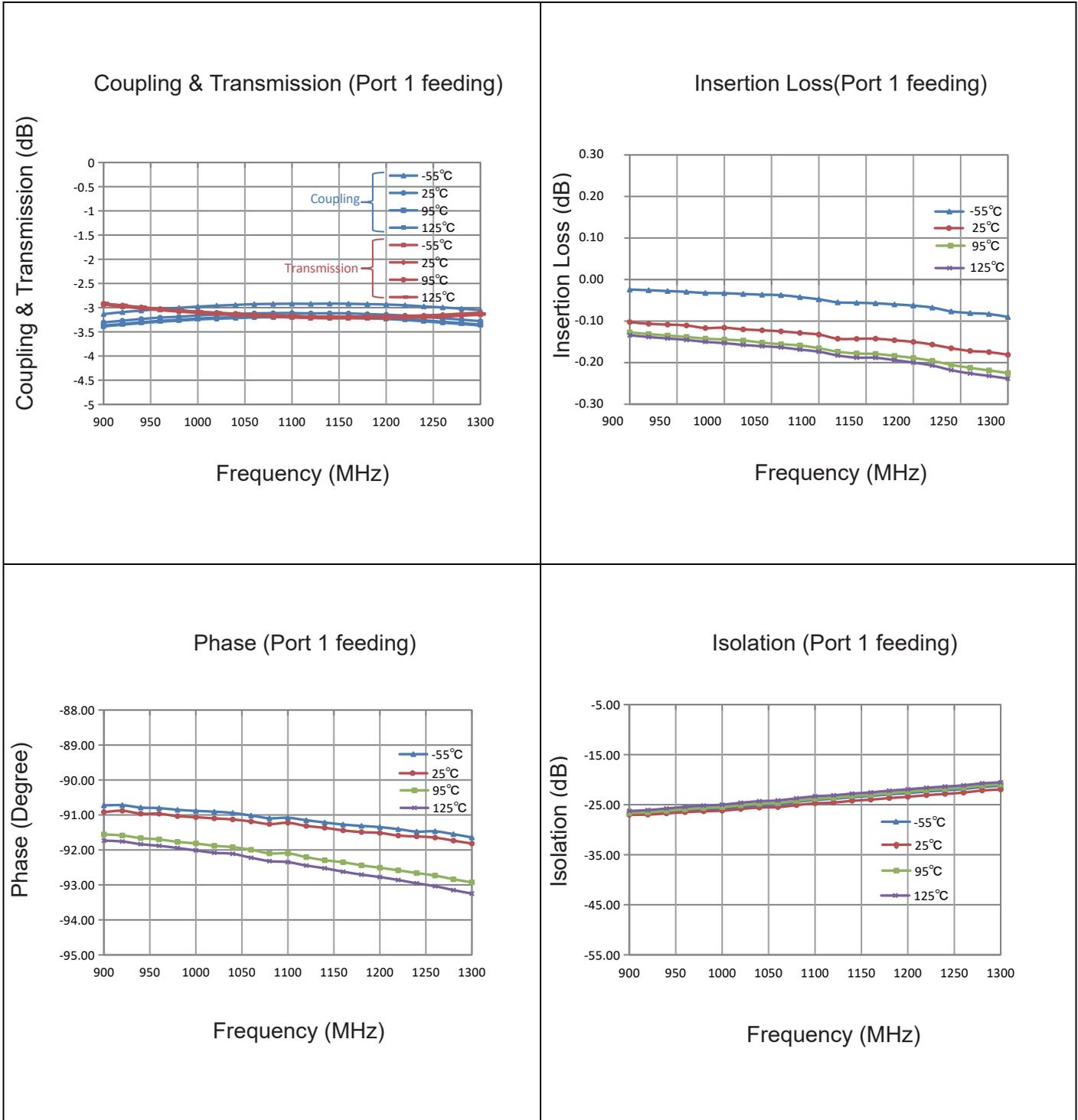
Typical Performance Data (@25

Frequency (MHz)	Coupling (dB)	Transmission (dB)	Insertion Loss (dB)	Isolation (dB)	Amplitude Balance (dB)	Phase (degree)	Return Loss(dB)			
							S11	S22	S33	S44
900	-3.31	-2.93	-0.10	-27.02	-0.19	-90.92	-28.11	-26.64	-27.04	-25.53
920	-3.27	-2.97	-0.11	-26.98	-0.15	-90.88	-27.51	-26.68	-26.85	-25.33
940	-3.24	-3.01	-0.11	-26.75	-0.12	-90.96	-26.72	-26.72	-26.61	-25.09
960	-3.21	-3.04	-0.11	-26.51	-0.08	-90.97	-26.42	-26.56	-26.32	-24.85
980	-3.19	-3.07	-0.12	-26.32	-0.06	-91.03	-26.21	-26.43	-25.92	-24.63
1000	-3.16	-3.09	-0.12	-26.21	-0.03	-91.06	-25.86	-26.25	-25.77	-24.32
1020	-3.15	-3.11	-0.12	-25.87	-0.02	-91.10	-25.69	-26.24	-25.78	-24.17
1040	-3.13	-3.13	-0.12	-25.58	0.00	-91.13	-25.34	-26.07	-25.47	-23.83
1060	-3.12	-3.15	-0.12	-25.49	0.02	-91.19	-24.92	-25.87	-25.18	-23.57
1080	-3.11	-3.16	-0.13	-25.09	0.03	-91.26	-24.68	-25.56	-24.71	-23.29
1100	-3.11	-3.17	-0.13	-24.73	0.03	-91.22	-24.28	-25.26	-24.49	-22.91
1120	-3.12	-3.19	-0.14	-24.59	0.03	-91.31	-23.88	-25.21	-24.20	-22.88
1140	-3.12	-3.19	-0.14	-24.22	0.04	-91.37	-23.49	-25.09	-24.10	-22.52
1160	-3.12	-3.19	-0.14	-24.00	0.03	-91.44	-23.23	-25.12	-23.94	-22.30
1180	-3.13	-3.18	-0.15	-23.68	0.02	-91.49	-22.83	-24.79	-23.49	-22.12
1200	-3.15	-3.18	-0.15	-23.42	0.01	-91.51	-22.58	-24.53	-23.24	-21.78
1220	-3.16	-3.17	-0.16	-23.10	0.00	-91.59	-22.28	-24.17	-23.07	-21.46
1240	-3.19	-3.16	-0.17	-22.85	-0.02	-91.61	-21.94	-24.06	-22.59	-21.21
1260	-3.22	-3.15	-0.17	-22.59	-0.04	-91.65	-21.57	-23.88	-22.53	-21.09
1280	-3.25	-3.12	-0.17	-22.16	-0.06	-91.73	-21.32	-23.67	-22.18	-20.81
1300	-3.28	-3.11	-0.18	-21.97	-0.09	-91.82	-21.09	-23.28	-21.90	-20.53

Typical Performance (-55°C, 25°C, 95°C, 125°C: 900-1300 MHz)



Typical Performance (-55°C, 25°C, 95°C,125°C: 900-1300 MHz)



HC1100D03

Hybrid Coupler 3 dB, 90

Rev A1.1

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.	$VSWR = \frac{V_{max}}{V_{min}}$ V _{max} = voltage maxima of a standing wave V _{min} = 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.	$\text{Return Loss (dB)} = 20 \log \frac{VSWR + 1}{VSWR - 1}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	$\text{Insertion Loss(dB)} = 10 \log \frac{P_{in}}{P_{cpl} + P_{transmission}}$
Isolation	The input power divided by the power at the isolated port.	$\text{Isolation(dB)} = 10 \log \frac{P_{in}}{P_{iso}}$
Phase Balance	The difference in phase angle between the two output ports.	Phase at coupled port – Phase at transmission port
Amplitude Balance	The power at each output divided by the average power of the two outputs.	$10 \log \frac{P_{cpl}}{\left(\frac{P_{cpl} + P_{transmission}}{2}\right)} \quad \text{or} \quad 10 \log \frac{P_{transmission}}{\left(\frac{P_{cpl} + P_{transmission}}{2}\right)}$

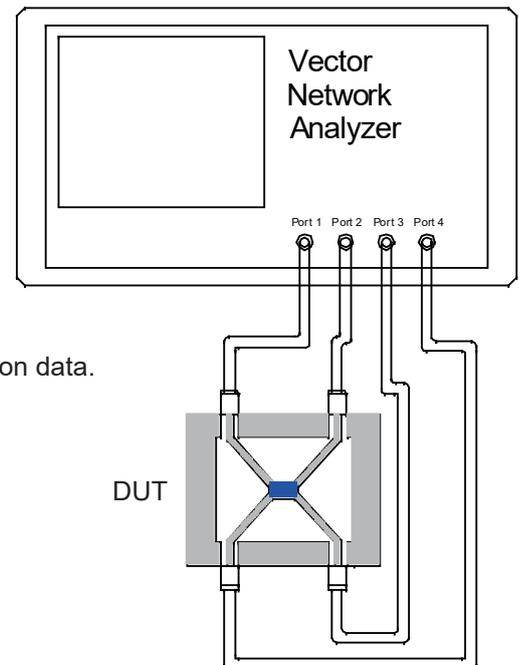
Test Method

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°C
470-860	0.07
800-1000	0.10
1200-1700	0.15
1700-2000	0.15
2000-2300	0.20
2300-2700	0.25

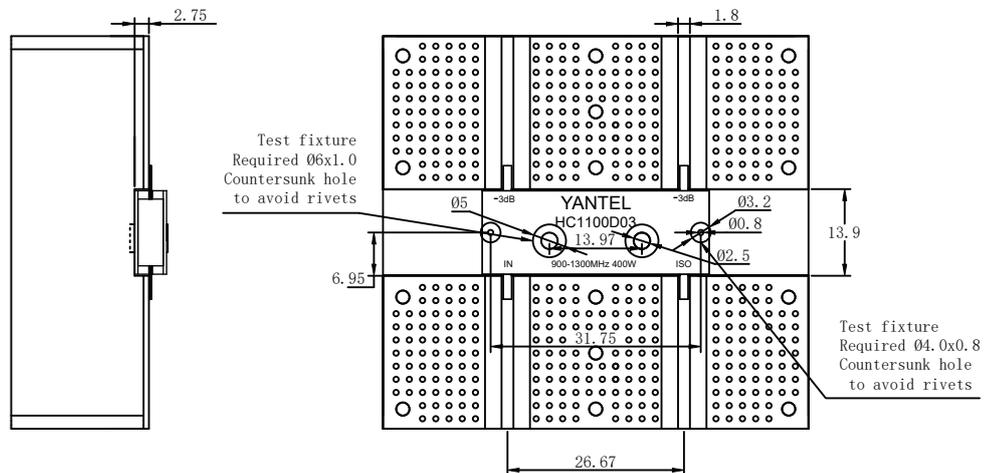


HC1100D03

Hybrid Coupler 3 dB, 90

Rev A1.1

Recommended PCB Layout



NOTE:

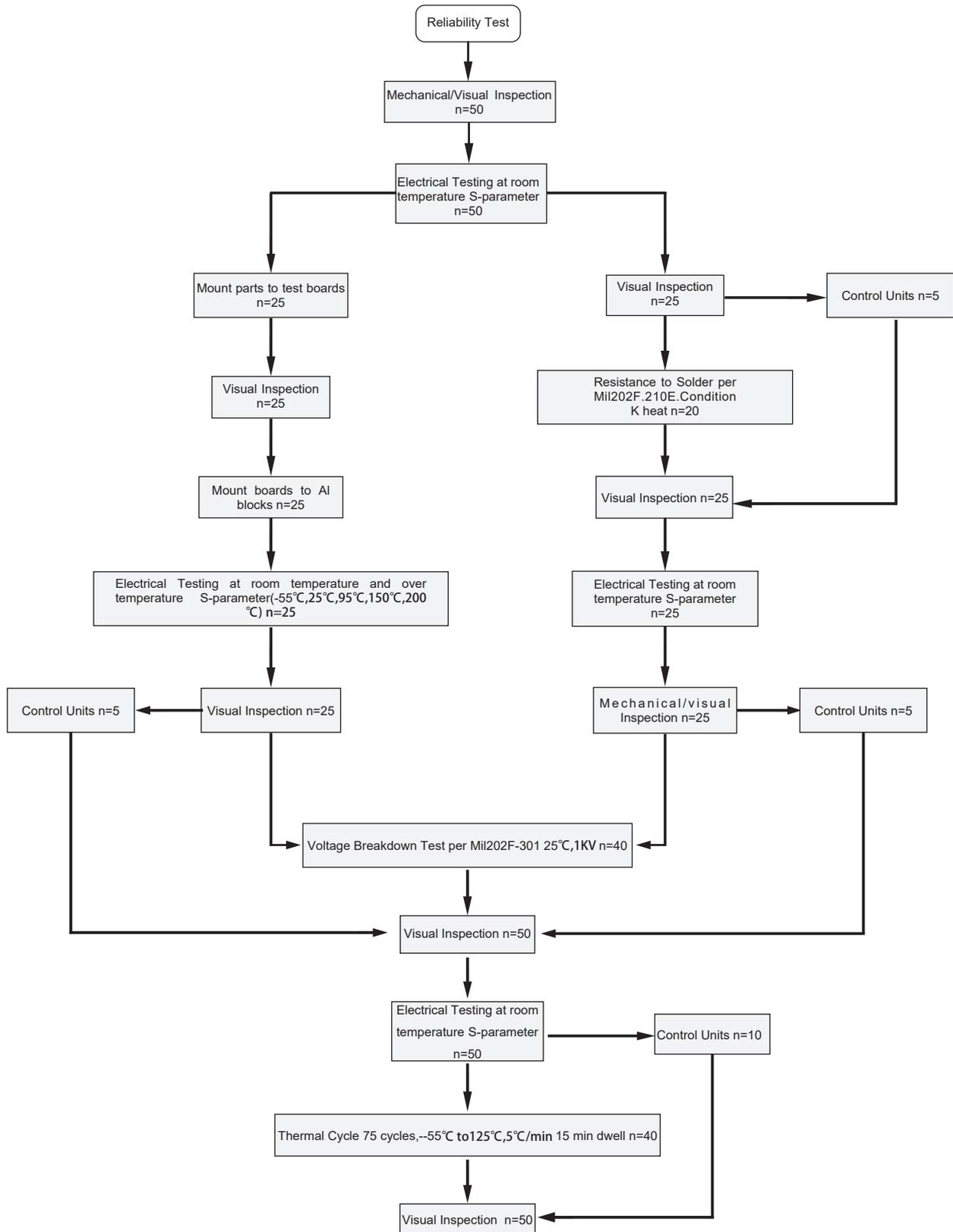
1. 50Ω line width is shown above designing from $\epsilon_r=3.55$ THK=32mil copper 1 OZ
2. Bottom side of the PCB is continuous ground plane.
3. All dimensions shown in mm.

HC1100D03

Hybrid Coupler 3 dB, 90

Rev A1.1

Reliability Test Flow



HC1100D03

Hybrid Coupler 3 dB, 90°

Rev A1.1

Reliability Test Flow

