

Data Sheet

QF1600F06B

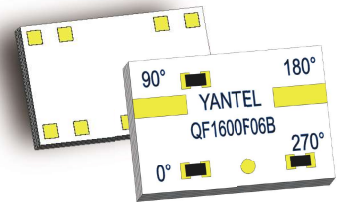
Quadrifilar Directional Coupler
1520 MHz-1660 MHz



Rev A1.1

Features

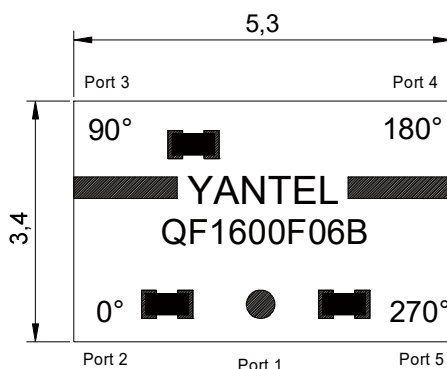
- Ultra Small Size (5.3×3.4mm)
- Excellent phase & amplitude balance
- Excellent repeatability
- Passive RF Component, no need external DC power supply
- Have one Input port and four Output ports that have -6dB -(0°, 90°, 180°, 270°) of phase difference
- Quadrifilar Coupler, 4-Phased Antenna Feeder, Helicaled Antenna Feeder
- Operating Temperature: -40°C to +105°C
- Tape & Reel



Applications

- Realizing the World's Most Compact High Precision GNSS Antenna (GPS, Beidou, Galileo, Glonass)

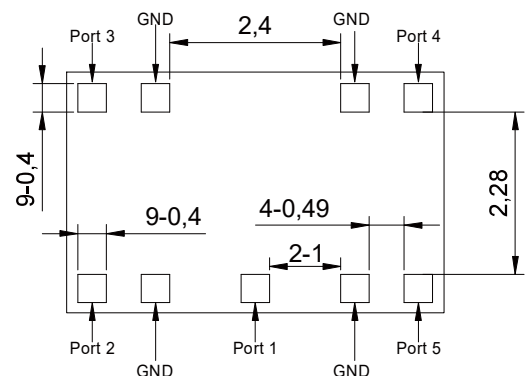
Mechanical Outline



TOP VIEW



SIDE VIEW



BOTTOM VIEW

Port 1	Port 2	Port 3	Port4	Port 5
Input	Output1 -6dB, 0°	Output2 -6dB, -90°	Output3 -6dB, -180°	Output4 -6dB, -270°

Mechanical Outline

- Dimensions are in Millimeters
- Tolerances are Non-Cumulative
- Dimension tolerance: $\pm 0.20\text{mm} [\pm 0.008\text{inch}]$

Electrical Specifications at 25° C

Part No.	Freq. Range (MHz) FL~FU	Power (W)	Size LxW (mm)	Return Loss Min (dB)	Insertion Loss Max (dB)	Isolation Min (dB)	Phase Balance (deg)	Amplitude Balance Max (dB)
QF1600F06B	1520-1660	5	5.3X3.4	14.5	0.70	20	90±9.0	±0.55

Data Sheet

QF1600F06B

Quadrifilar Directional Coupler

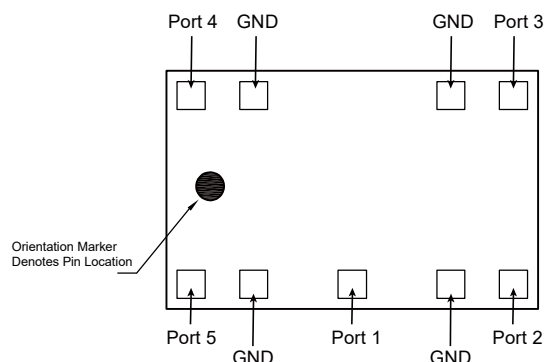
1520 MHz-1660 MHz



Rev A1.1

Hybrid Coupler Pin Configuration

The QF1600F06B 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:



Port 1	Port 2	Port 3	Port4	Port 5
Input	Output1 -6dB, 0°	Output2 -6dB, -90°	Output3 -6dB, -180°	Output4 -6dB, -270°

Typical Performance Data (@25°C)

Frequency (MHz)	S21 (dB)	S31 (dB)	S41 (dB)	S51 (dB)	Amplitude Balance	Insertion Loss	Return Loss(dB)				
							S11	S22	S33	S44	S55
1520	-6.62	-6.73	-7.17	-6.27	0.49	-0.66	-19.01	-21.15	-26.22	-15.21	-17.66
1527	-6.60	-6.73	-7.17	-6.29	0.49	-0.66	-19.11	-21.09	-26.22	-15.17	-17.63
1534	-6.57	-6.73	-7.17	-6.30	0.49	-0.66	-19.23	-21.04	-26.26	-15.14	-17.62
1541	-6.55	-6.73	-7.17	-6.32	0.49	-0.66	-19.38	-21.01	-26.33	-15.10	-17.61
1548	-6.53	-6.73	-7.16	-6.33	0.48	-0.66	-19.54	-20.98	-26.42	-15.07	-17.60
1555	-6.51	-6.73	-7.16	-6.35	0.48	-0.66	-19.73	-20.94	-26.56	-15.04	-17.58
1562	-6.49	-6.73	-7.16	-6.37	0.48	-0.66	-19.91	-20.91	-26.72	-15.02	-17.55
1569	-6.47	-6.74	-7.16	-6.39	0.48	-0.66	-20.09	-20.88	-26.95	-15.01	-17.51
1576	-6.45	-6.74	-7.15	-6.41	0.48	-0.66	-20.26	-20.85	-27.18	-15.01	-17.47
1583	-6.43	-6.74	-7.15	-6.43	0.47	-0.66	-20.39	-20.80	-27.32	-15.01	-17.43
1590	-6.41	-6.74	-7.15	-6.45	0.47	-0.66	-20.53	-20.75	-27.47	-15.02	-17.40
1597	-6.39	-6.74	-7.15	-6.47	0.47	-0.66	-20.63	-20.66	-27.40	-15.01	-17.38
1604	-6.37	-6.75	-7.14	-6.49	0.47	-0.66	-20.73	-20.57	-27.33	-15.00	-17.35
1611	-6.35	-6.75	-7.14	-6.51	0.46	-0.66	-20.76	-20.51	-27.12	-15.00	-17.35
1618	-6.33	-6.75	-7.14	-6.53	0.46	-0.66	-20.79	-20.45	-26.89	-15.01	-17.35
1625	-6.32	-6.76	-7.14	-6.55	0.46	-0.66	-20.82	-20.42	-26.60	-15.01	-17.36
1632	-6.30	-6.76	-7.14	-6.57	0.46	-0.66	-20.85	-20.40	-26.30	-15.00	-17.38
1639	-6.28	-6.76	-7.15	-6.58	0.47	-0.66	-20.93	-20.40	-26.11	-15.01	-17.39
1646	-6.26	-6.76	-7.15	-6.59	0.47	-0.66	-21.05	-20.42	-26.00	-15.03	-17.39
1653	-6.24	-6.77	-7.15	-6.61	0.47	-0.66	-21.24	-20.43	-25.94	-15.06	-17.40
1660	-6.23	-6.77	-7.15	-6.62	0.47	-0.66	-21.55	-20.43	-25.92	-15.10	-17.41

Data Sheet

QF1600F06B

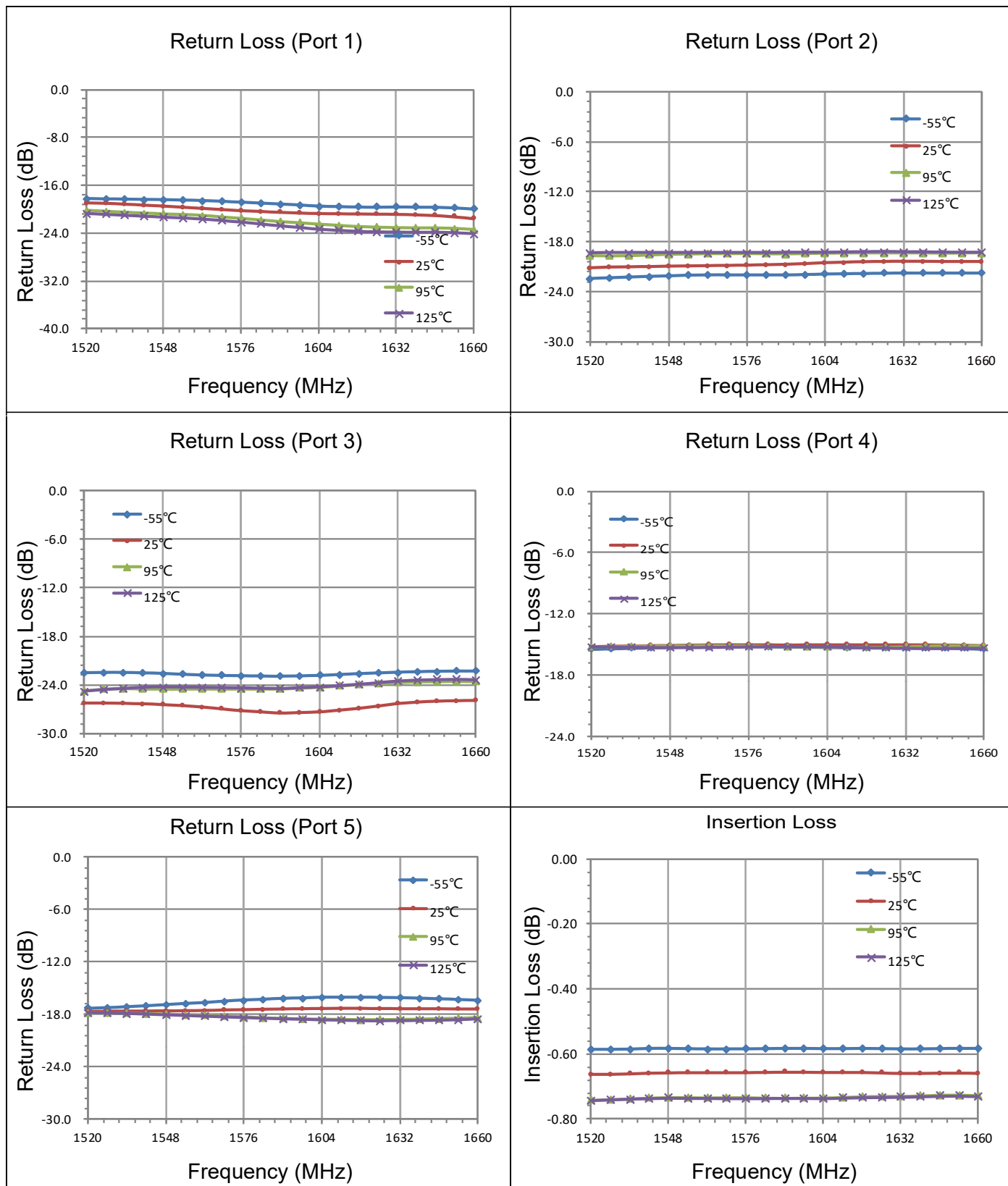
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Typical Performance (-55°C,25°C,95°C,125°C: 1520-1660 MHz)



Data Sheet

QF1600F06B

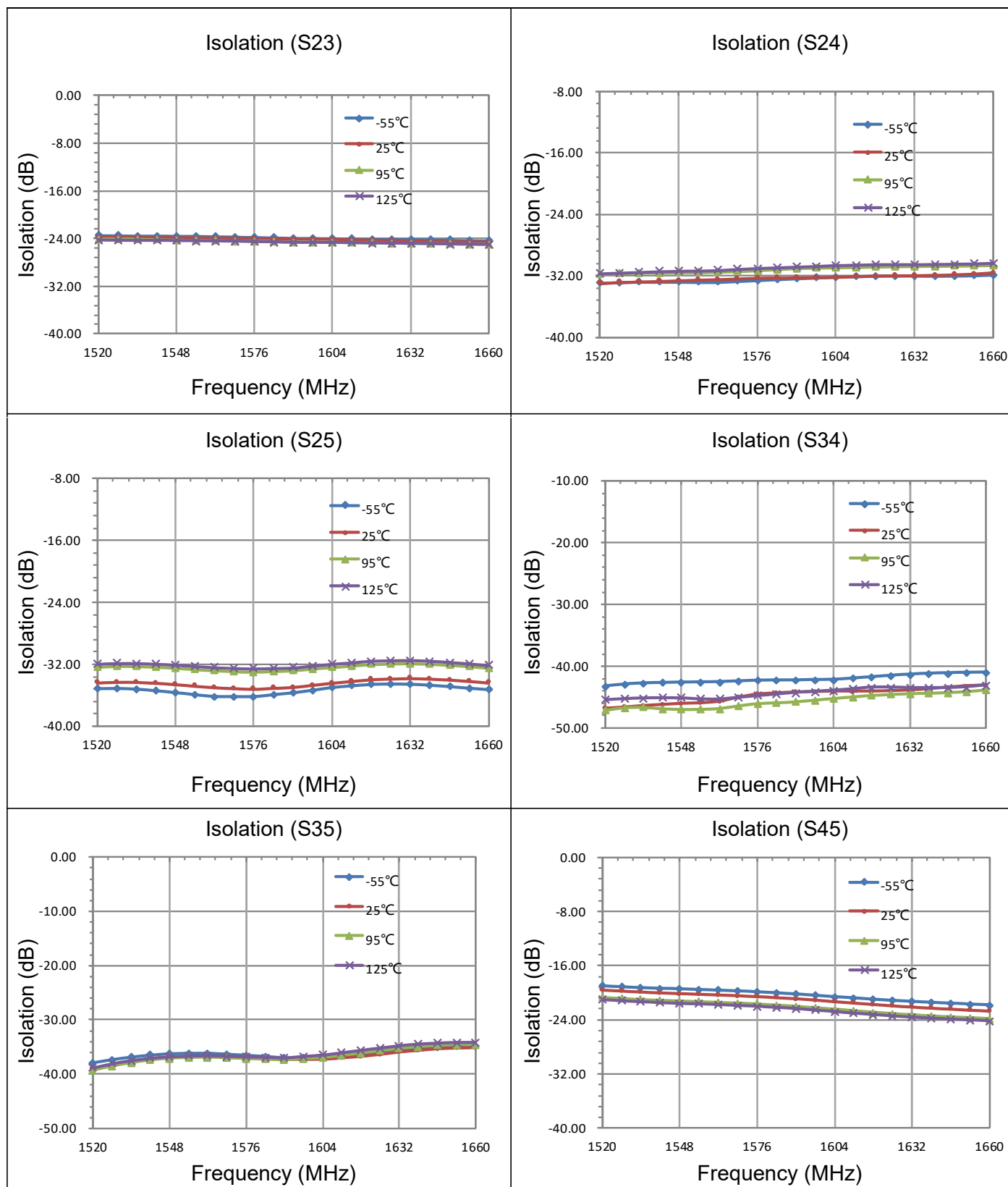
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Typical Performance (-55°C,25°C,95°C,125°C: 1520-1660 MHz)



Data Sheet

QF1600F06B

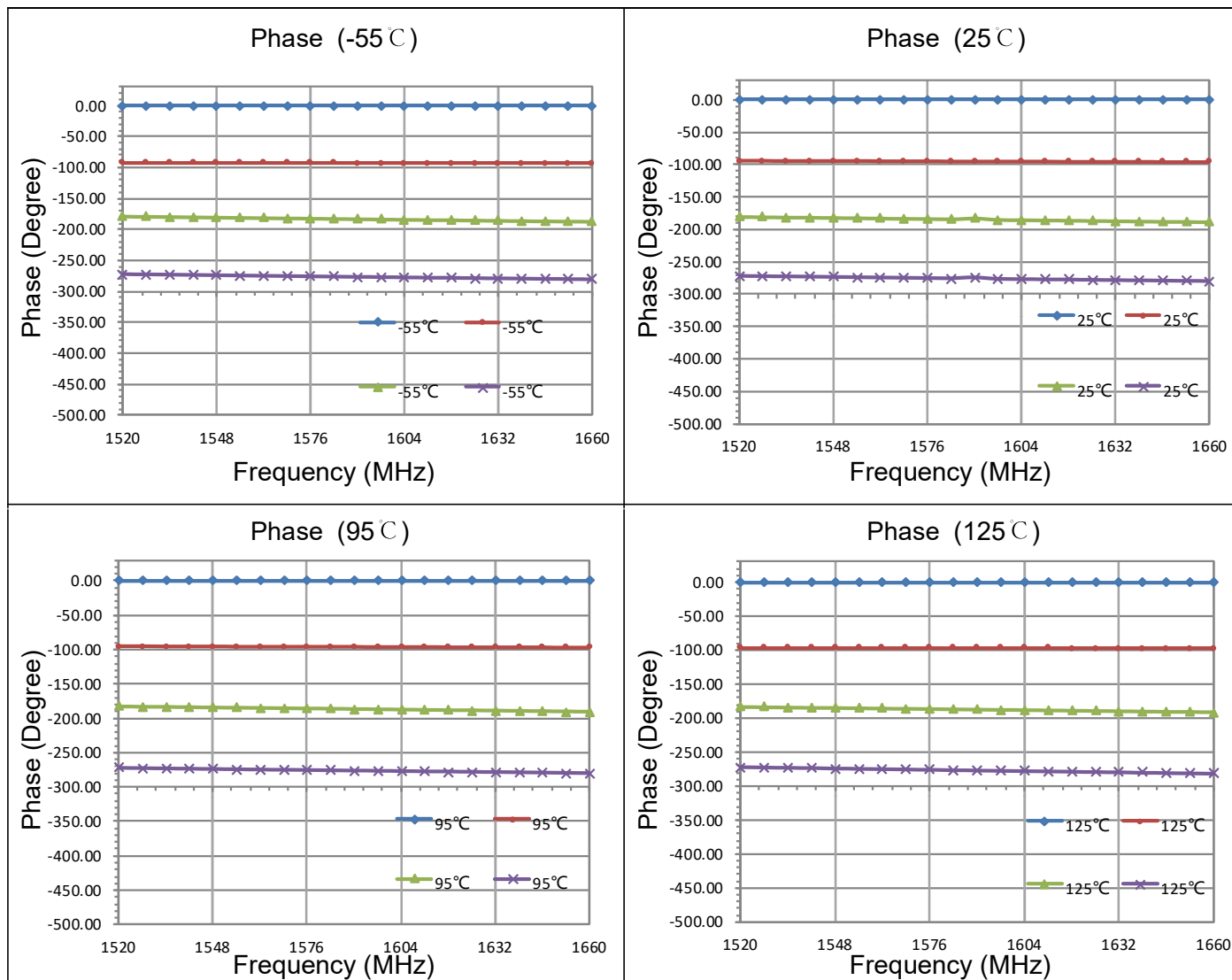
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Typical Performance (-55°C,25°C,95°C,125°C: 1520-1660 MHz)



Data Sheet

QF1600F06B

Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Definition of Measured Specifications

	S-Parameter(dB)	Power Method[dB]
Output 1	S21	$10 \cdot \log \left(\frac{P_{out1}}{P_{in}} \right)$
Output 2	S31	$10 \cdot \log \left(\frac{P_{out2}}{P_{in}} \right)$
Output 3	S41	$10 \cdot \log \left(\frac{P_{out3}}{P_{in}} \right)$
Output 4	S51	$10 \cdot \log \left(\frac{P_{out4}}{P_{in}} \right)$
Insertion Loss		$10 \cdot \log \left(\frac{P_{in}}{P_{out1+out2+out3+out4}} \right)$
Amplitude Balance		$10 \cdot \log \left(\frac{P_{out1 \sim out4}}{P_{out1+out2+out3+out4}} \right)$
Isolation 1	S23	$10 \cdot \log \left(\frac{P_{out3}}{P_{out2}} \right)$
Isolation 2	S24	$10 \cdot \log \left(\frac{P_{out4}}{P_{out2}} \right)$
Isolation 3	S25	$10 \cdot \log \left(\frac{P_{out5}}{P_{out2}} \right)$
Isolation 4	S34	$10 \cdot \log \left(\frac{P_{out4}}{P_{out3}} \right)$
Isolation 5	S35	$10 \cdot \log \left(\frac{P_{out5}}{P_{out3}} \right)$
Isolation 6	S45	$10 \cdot \log \left(\frac{P_{out5}}{P_{out4}} \right)$
Phase Balance 1(0°)	Phase (S21)	
Phase Balance 2(-90°)	Phase (S31) -Phase (S21)	
Phase Balance 2(-180°)	Phase (S41) -Phase (S21)	
Phase Balance 2(-270°)	Phase (S51) -Phase (S21)	

P_{in} : Power of Input Port1

P_{out2} : Power of output Port3

P_{out4} : Power of output Port5

P_{out1} : Power of output Port2

P_{out3} : Power of output Port4

Data Sheet

QF1600F06B

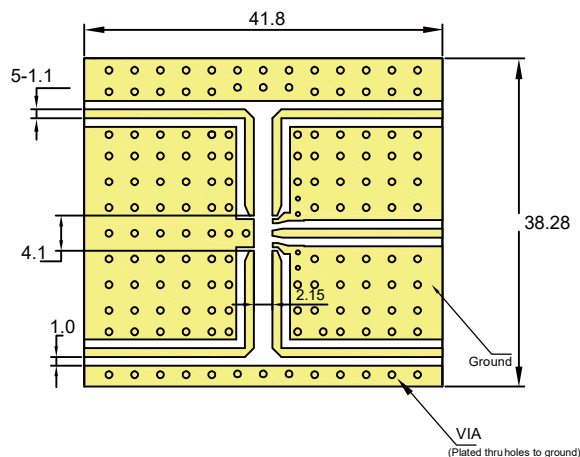
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

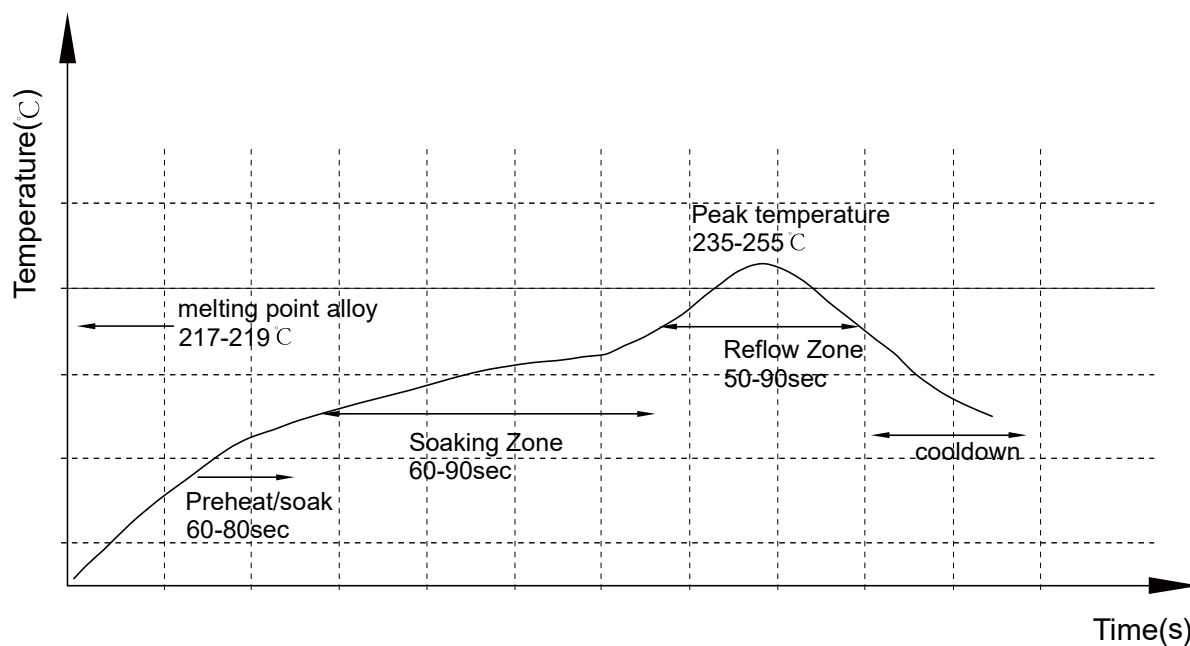
Recommended PCB Layout



NOTE:

1. 50Ω line width is shown above designing from $\epsilon_r=3.66$ THK=0.508mm copper 0.5 OZ
2. Bottom side of the PCB is continuous ground plane.
3. All dimensions shown in mm [inch].

Reflow Profile



Data Sheet

QF1600F06B

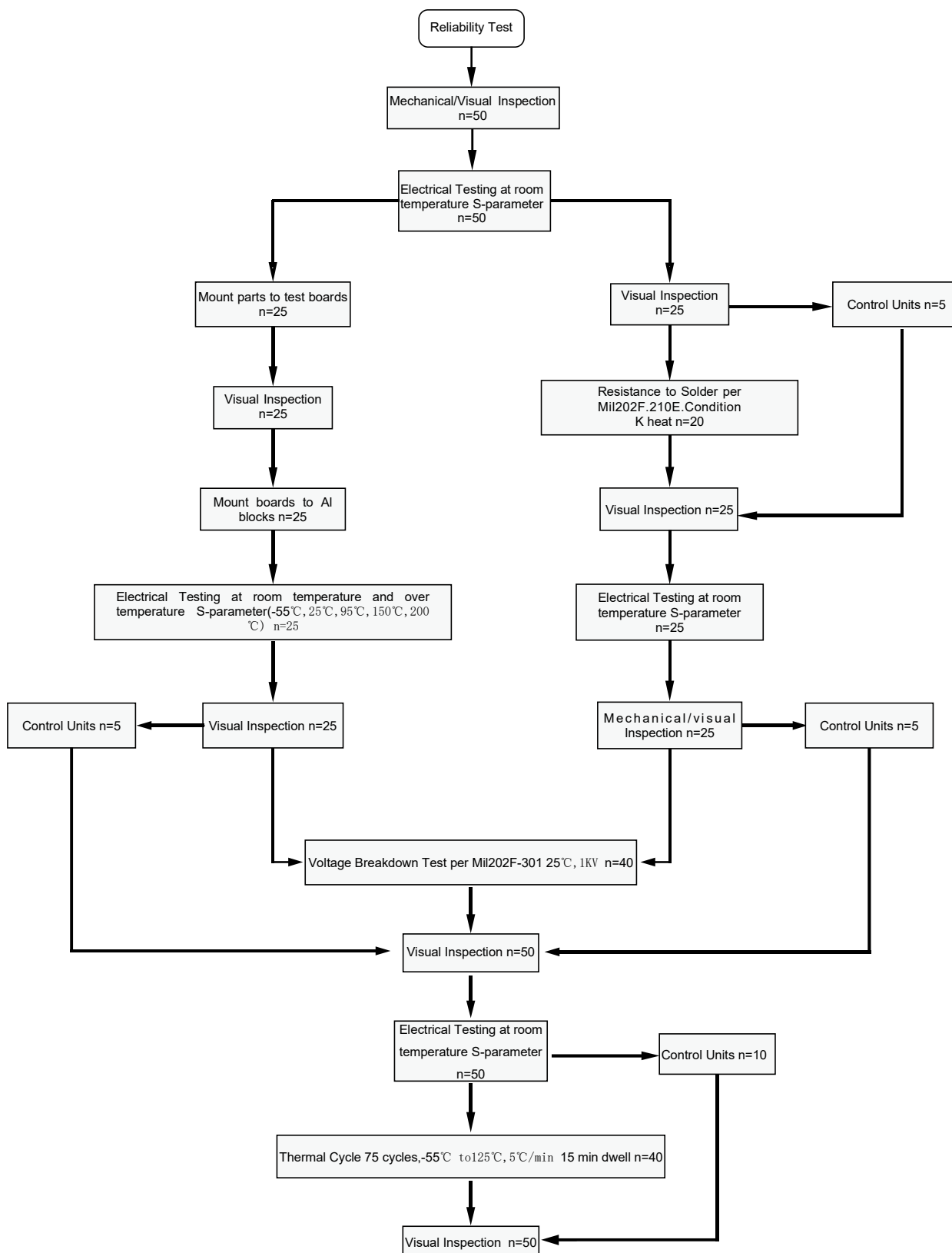
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Reliability Test Flow



Data Sheet

QF1600F06B

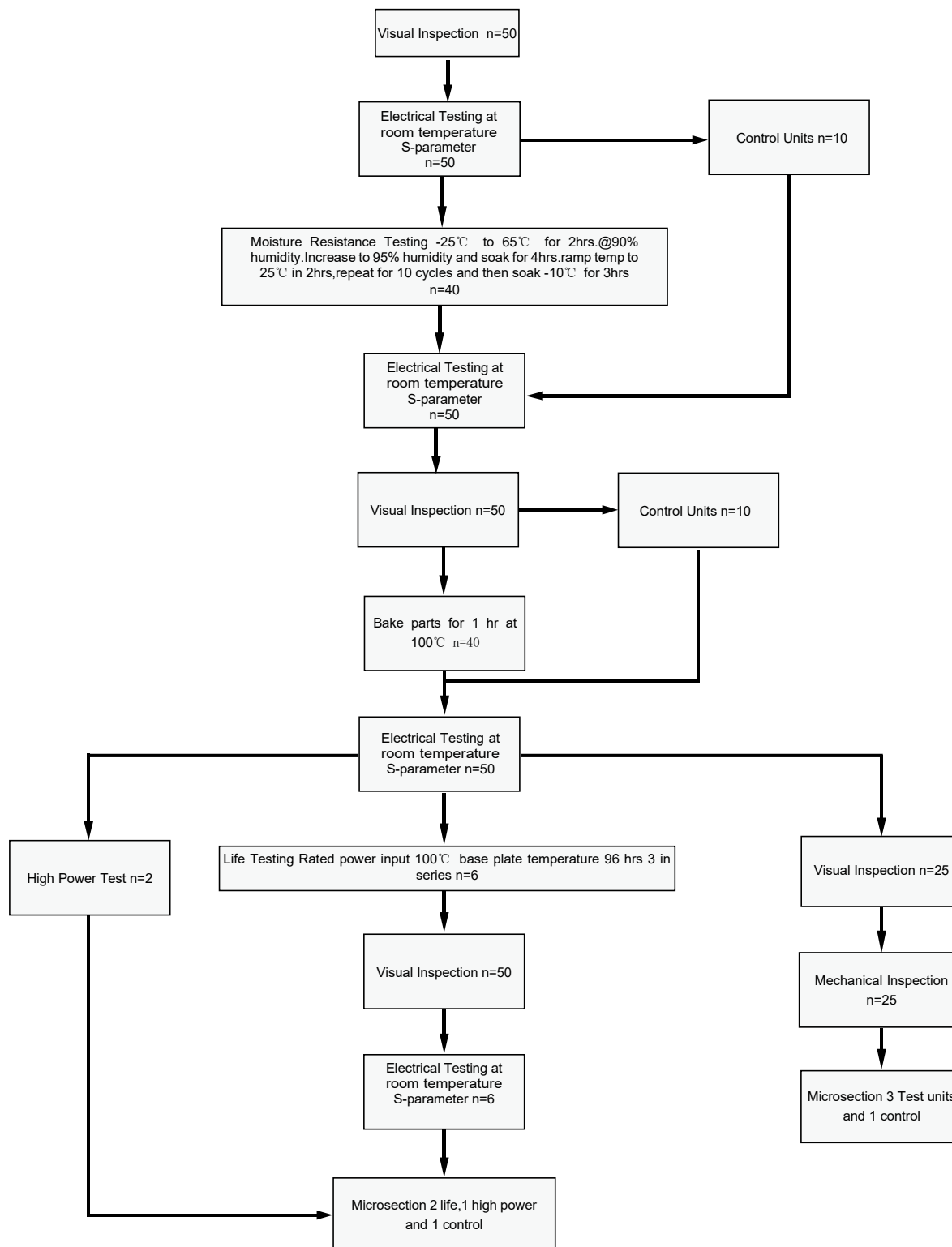
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.1

Reliability Test Flow



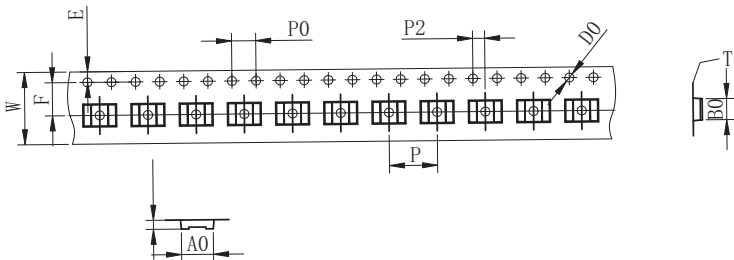
Data Sheet
QF1600F06B
Quadrifilar Directional Coupler
1520 MHz-1660 MHz



Rev A1.1

Tape and Reel Drawing

Feeding Direction



- Notice:
A.10 Sprocket hole pitch cumulative tolerance is 0.2mm.
B. Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
C. All dimensions meet EIA-418-B requirements.
D. A0 & B0 measured as indicated.
E. K0 measured from a place on the inside bottom of the pocket to top surface of carrier.
F. Material: PE 100
G. Thickness: 0.30±0.05mm
H. 1000 units (maximum) / T&R

Table with 14 columns: ITEM, W, A0, B0, K0, K1, P, F, E, D, P0, P2, t, 13". It contains DIM and TOLE rows with various numerical values and tolerances.

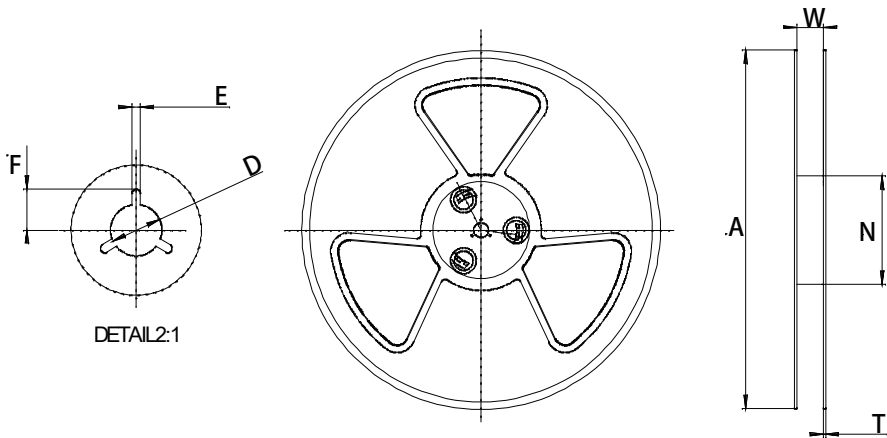


Table with 2 columns: Symbol, Dimensions(mm). It lists dimensions W, A, N, T, E, F, and D with their corresponding values and tolerances.

