

Preliminary Data Sheet

QF2100F06B

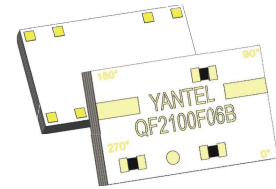
Quadrifilar Directional Coupler

1980 MHz-2200 MHz



Features

- Ultra Small Size (5.28×3.38mm)
- 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

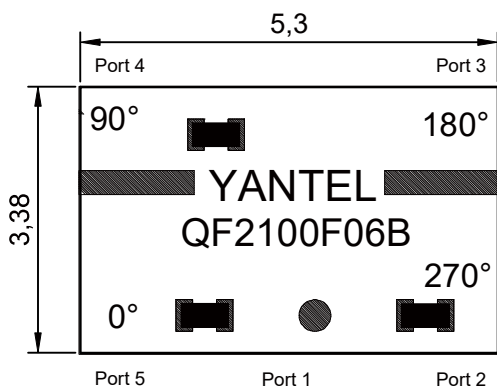


Applications

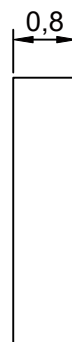
- Realizing the World's Most Compact High Precision GNSS Antenna (GPS, Beidou, Galileo, Glonass)



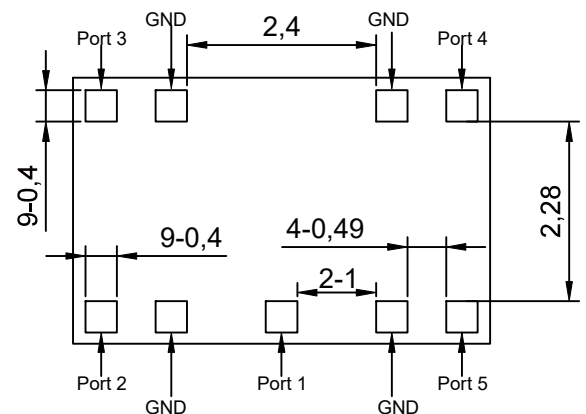
Mechanical Outline



TOP VIEW



SIDE VIEW



BOTTOM VIEW

| Port 1 | Port 2 | Port 3 | Port 4 | Port 5 |
|--------|-----------------------|------------------------|-----------------------|----------------------|
| Input | Output1 -6dB, 270° | Output2 -6dB, -180° | Output3 -6dB, -90° | Output4 -6dB, -0° |

Mechanical Outline

- Dimensions are in Millimeters
- Tolerances are Non-Cumulative
- Dimension tolerance: ±0.20mm[±0.008inch]

Electrical Specifications at 25° C

| Part No. | Freq. Range (MHz) FL~FU | Power (W) | Size LxW (mm) | Typical Return Loss (dB) | Typical Insertion Loss (dB) | Typical Isolation (dB) | Typical Phase Balance (deg) | Typical Amplitude Balance (dB) |
|-----------|----------------------------|-----------|---------------|--------------------------|-----------------------------|------------------------|-----------------------------|--------------------------------|
| QF2100F06 | 1980-2200 | 5 | 5.28X3.38 | 15.0 | 0.70 | 22 | 90±9 | ±0.60 |

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Add: No.308-322, 3F, Building 1, Juchuang Jingu Innovation Park, Wenyuan Road 35, Xili Street, Nanshan, Shenzhen, China
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Data Sheet

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Quadrifilar Directional Coupler

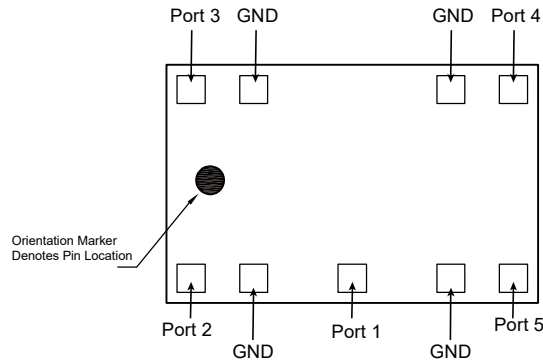
1980 MHz-2200 MHz



Rev A1.0

Hybrid Coupler Pin Configuration

The QF2100F06B 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, 270° | Output2 -6dB, -180° | Output3 -6dB, -90° | Output4 -6dB, -0° |

Typical Performance Data (@25°C)

| Frequency (MHz) | S21 (dB) | S31 (dB) | S41 (dB) | S51 (dB) | Amplitude Balance | Insertion Loss | Return Loss(dB) | | | | | VSWR | | | | |
|-----------------|----------|----------|----------|----------|-------------------|----------------|-----------------|--------|--------|--------|--------|------|------|------|------|------|
| | | | | | | | S11 | S22 | S33 | S44 | S55 | S11 | S22 | S33 | S44 | S55 |
| 1980 | -6.50 | -6.86 | -7.22 | -6.21 | 0.54 | -0.66 | -21.56 | -18.62 | -20.97 | -15.89 | -17.91 | 1.18 | 1.27 | 1.20 | 1.38 | 1.29 |
| 1991 | -6.48 | -6.87 | -7.22 | -6.21 | 0.54 | -0.66 | -22.16 | -18.61 | -20.88 | -15.92 | -17.90 | 1.17 | 1.27 | 1.20 | 1.38 | 1.29 |
| 2002 | -6.46 | -6.87 | -7.22 | -6.21 | 0.55 | -0.65 | -22.78 | -18.62 | -20.78 | -15.96 | -17.87 | 1.16 | 1.27 | 1.20 | 1.38 | 1.29 |
| 2013 | -6.45 | -6.88 | -7.21 | -6.21 | 0.54 | -0.65 | -23.28 | -18.66 | -20.63 | -16.02 | -17.80 | 1.15 | 1.26 | 1.21 | 1.38 | 1.30 |
| 2024 | -6.43 | -6.89 | -7.20 | -6.23 | 0.53 | -0.65 | -23.46 | -18.74 | -20.41 | -16.10 | -17.68 | 1.14 | 1.26 | 1.21 | 1.37 | 1.30 |
| 2035 | -6.42 | -6.89 | -7.20 | -6.25 | 0.52 | -0.65 | -23.20 | -18.81 | -20.25 | -16.24 | -17.61 | 1.15 | 1.26 | 1.22 | 1.36 | 1.30 |
| 2046 | -6.41 | -6.89 | -7.19 | -6.28 | 0.51 | -0.65 | -22.75 | -18.89 | -20.12 | -16.36 | -17.57 | 1.16 | 1.26 | 1.22 | 1.36 | 1.31 |
| 2057 | -6.39 | -6.89 | -7.18 | -6.30 | 0.51 | -0.65 | -22.23 | -18.98 | -20.05 | -16.46 | -17.55 | 1.17 | 1.25 | 1.22 | 1.35 | 1.31 |
| 2068 | -6.37 | -6.89 | -7.18 | -6.32 | 0.51 | -0.65 | -21.96 | -19.09 | -20.09 | -16.51 | -17.55 | 1.17 | 1.25 | 1.22 | 1.35 | 1.31 |
| 2079 | -6.34 | -6.89 | -7.18 | -6.34 | 0.51 | -0.65 | -21.88 | -19.16 | -20.06 | -16.55 | -17.52 | 1.18 | 1.25 | 1.22 | 1.35 | 1.31 |
| 2090 | -6.32 | -6.89 | -7.18 | -6.36 | 0.51 | -0.65 | -22.01 | -19.25 | -20.04 | -16.59 | -17.46 | 1.17 | 1.24 | 1.22 | 1.35 | 1.31 |
| 2101 | -6.30 | -6.90 | -7.19 | -6.38 | 0.52 | -0.65 | -22.35 | -19.39 | -20.01 | -16.64 | -17.37 | 1.17 | 1.24 | 1.22 | 1.35 | 1.31 |
| 2112 | -6.28 | -6.90 | -7.19 | -6.40 | 0.51 | -0.66 | -22.80 | -19.48 | -19.87 | -16.74 | -17.24 | 1.16 | 1.24 | 1.23 | 1.34 | 1.32 |
| 2123 | -6.27 | -6.91 | -7.19 | -6.42 | 0.51 | -0.66 | -23.21 | -19.60 | -19.75 | -16.88 | -17.14 | 1.15 | 1.23 | 1.23 | 1.33 | 1.32 |
| 2134 | -6.26 | -6.91 | -7.19 | -6.43 | 0.51 | -0.66 | -23.55 | -19.72 | -19.64 | -17.03 | -17.06 | 1.14 | 1.23 | 1.23 | 1.33 | 1.33 |
| 2145 | -6.24 | -6.91 | -7.18 | -6.45 | 0.50 | -0.66 | -23.75 | -19.79 | -19.51 | -17.16 | -16.98 | 1.14 | 1.23 | 1.24 | 1.32 | 1.33 |
| 2156 | -6.22 | -6.92 | -7.18 | -6.47 | 0.50 | -0.66 | -23.70 | -19.81 | -19.51 | -17.28 | -16.98 | 1.14 | 1.23 | 1.24 | 1.32 | 1.33 |
| 2167 | -6.21 | -6.92 | -7.18 | -6.49 | 0.50 | -0.66 | -23.84 | -19.78 | -19.55 | -17.37 | -16.98 | 1.14 | 1.23 | 1.24 | 1.31 | 1.33 |
| 2178 | -6.20 | -6.92 | -7.18 | -6.51 | 0.49 | -0.66 | -24.13 | -19.76 | -19.60 | -17.45 | -16.98 | 1.13 | 1.23 | 1.23 | 1.31 | 1.33 |
| 2189 | -6.18 | -6.92 | -7.17 | -6.53 | 0.50 | -0.66 | -24.53 | -19.78 | -19.65 | -17.51 | -16.99 | 1.13 | 1.23 | 1.23 | 1.31 | 1.33 |
| 2200 | -6.17 | -6.93 | -7.17 | -6.55 | 0.52 | -0.67 | -25.34 | -19.83 | -19.59 | -17.60 | -17.00 | 1.11 | 1.23 | 1.23 | 1.30 | 1.33 |

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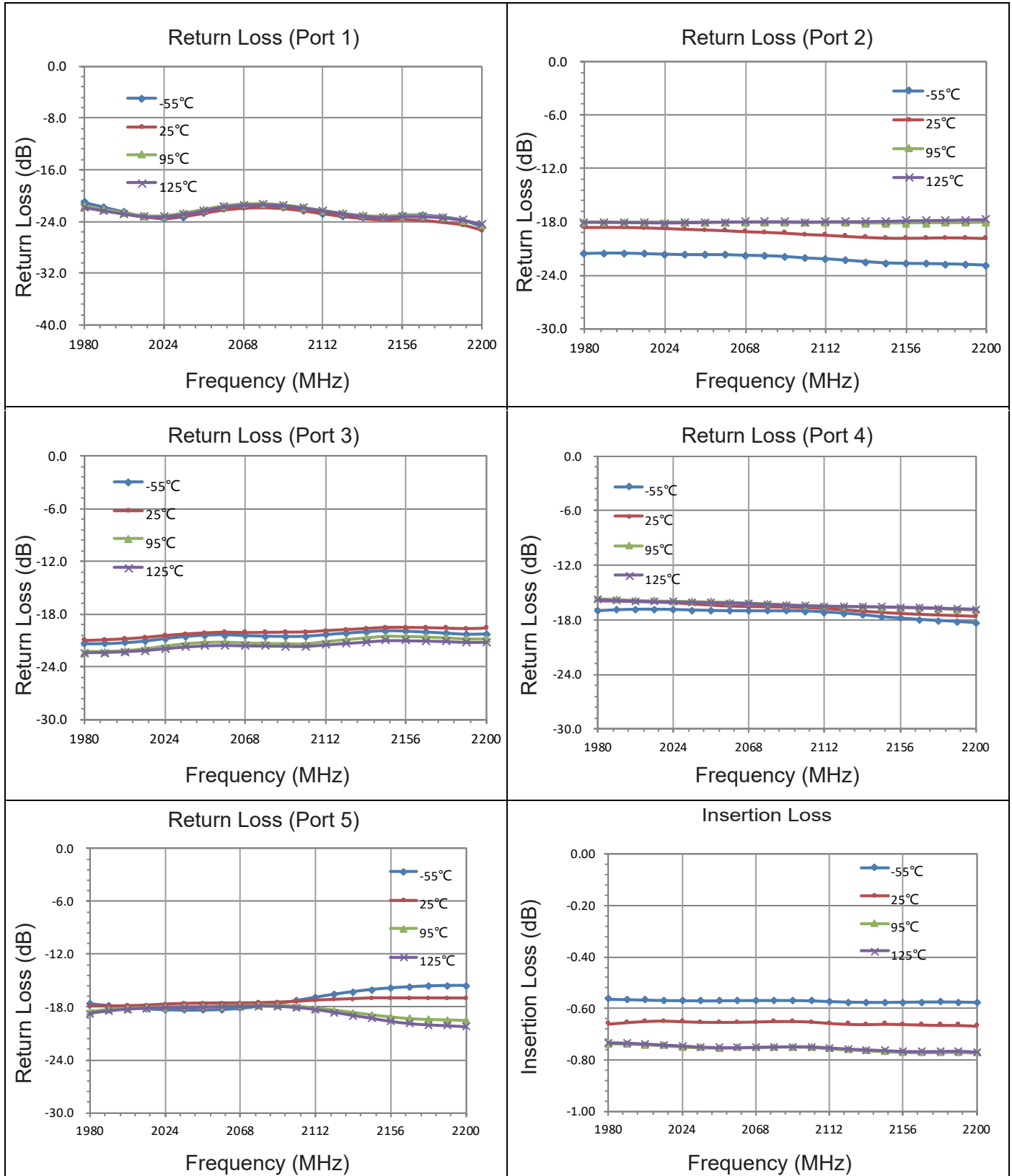
QF2100F06B

Quadrifilar Directional Coupler
1980 MHz-2200 MHz



Rev A1.0

Typical Performance (-55°C,25°C,95°C,125°C: 1980-2200 MHz)



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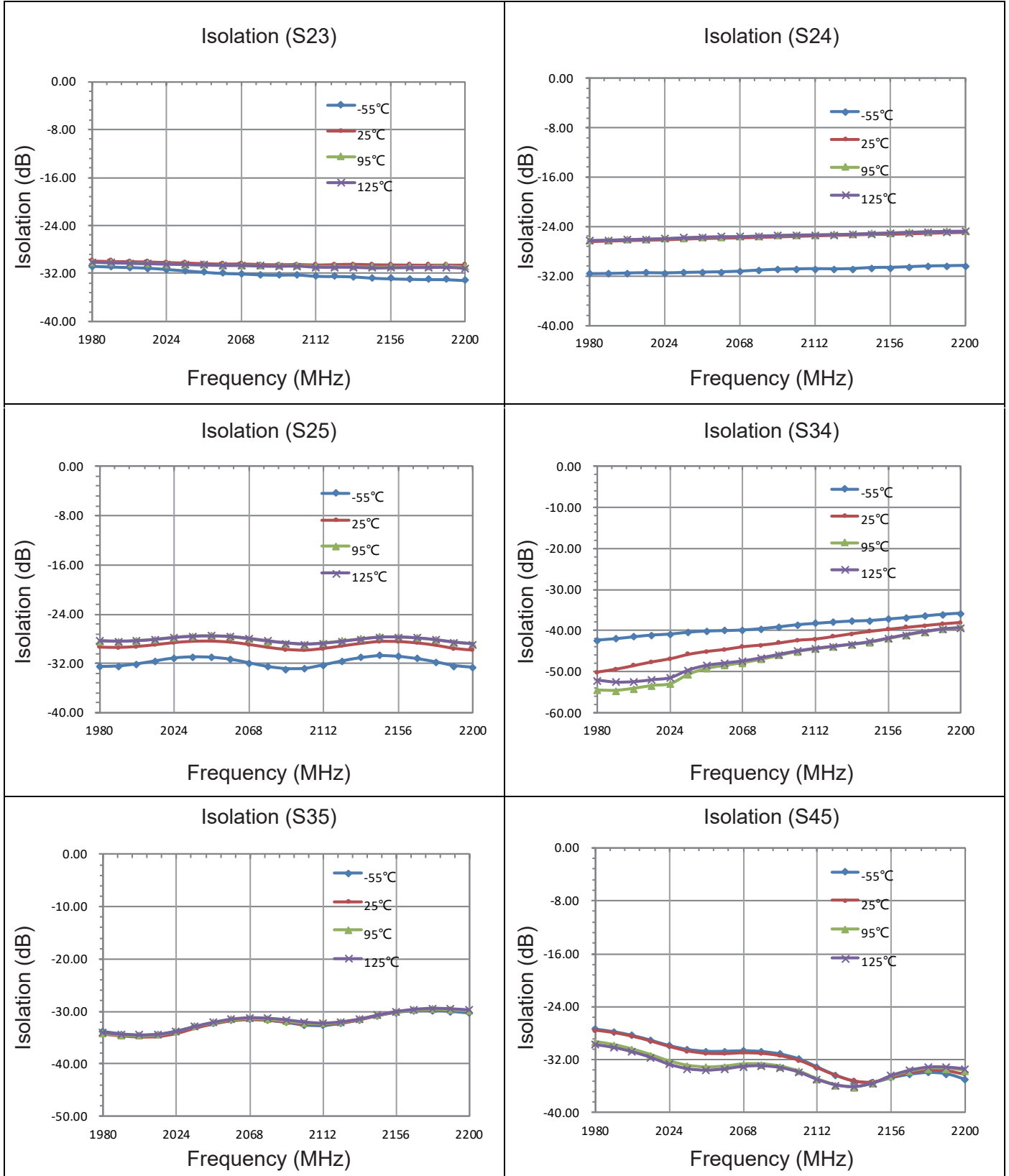
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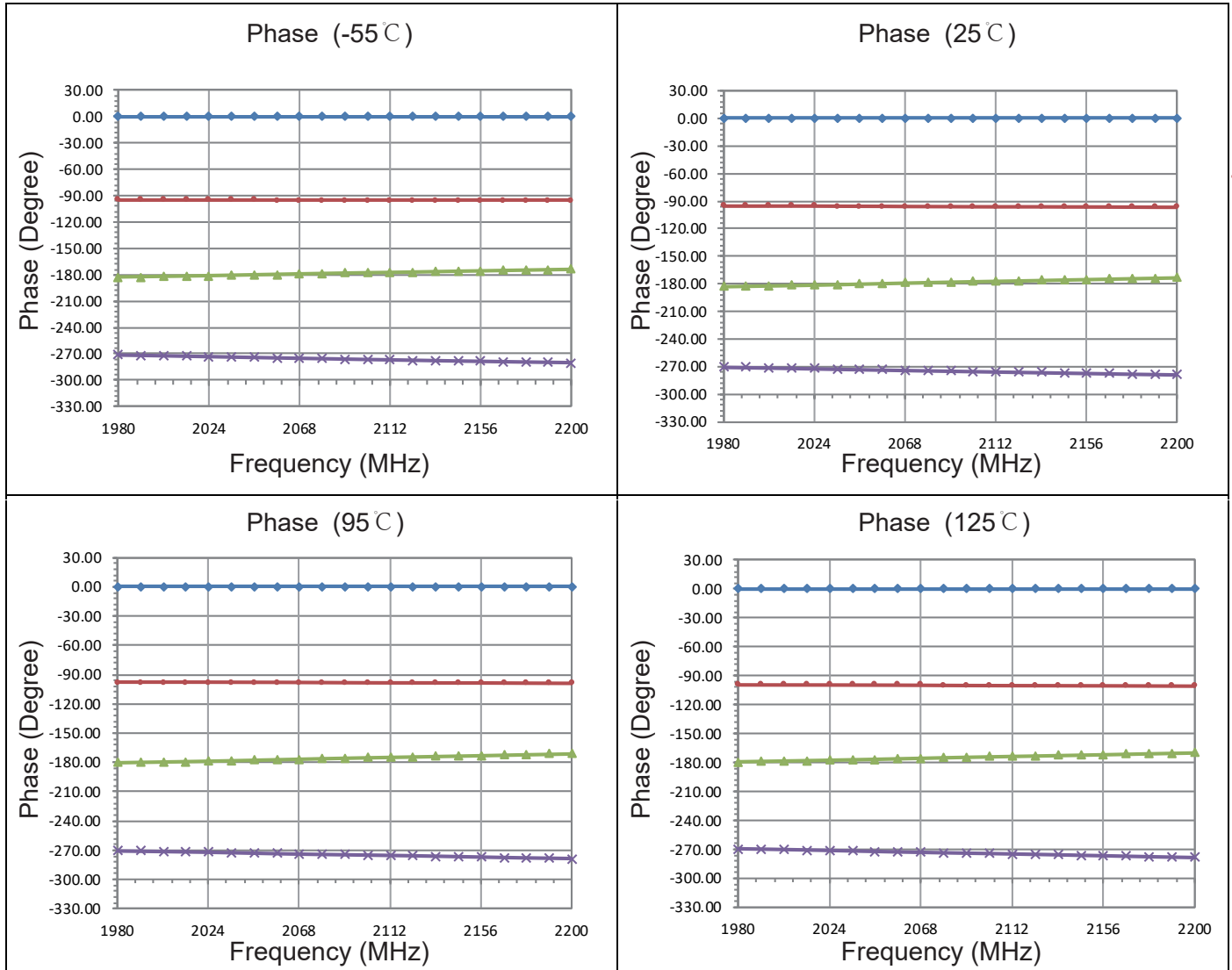
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Data Sheet

QF1600F06

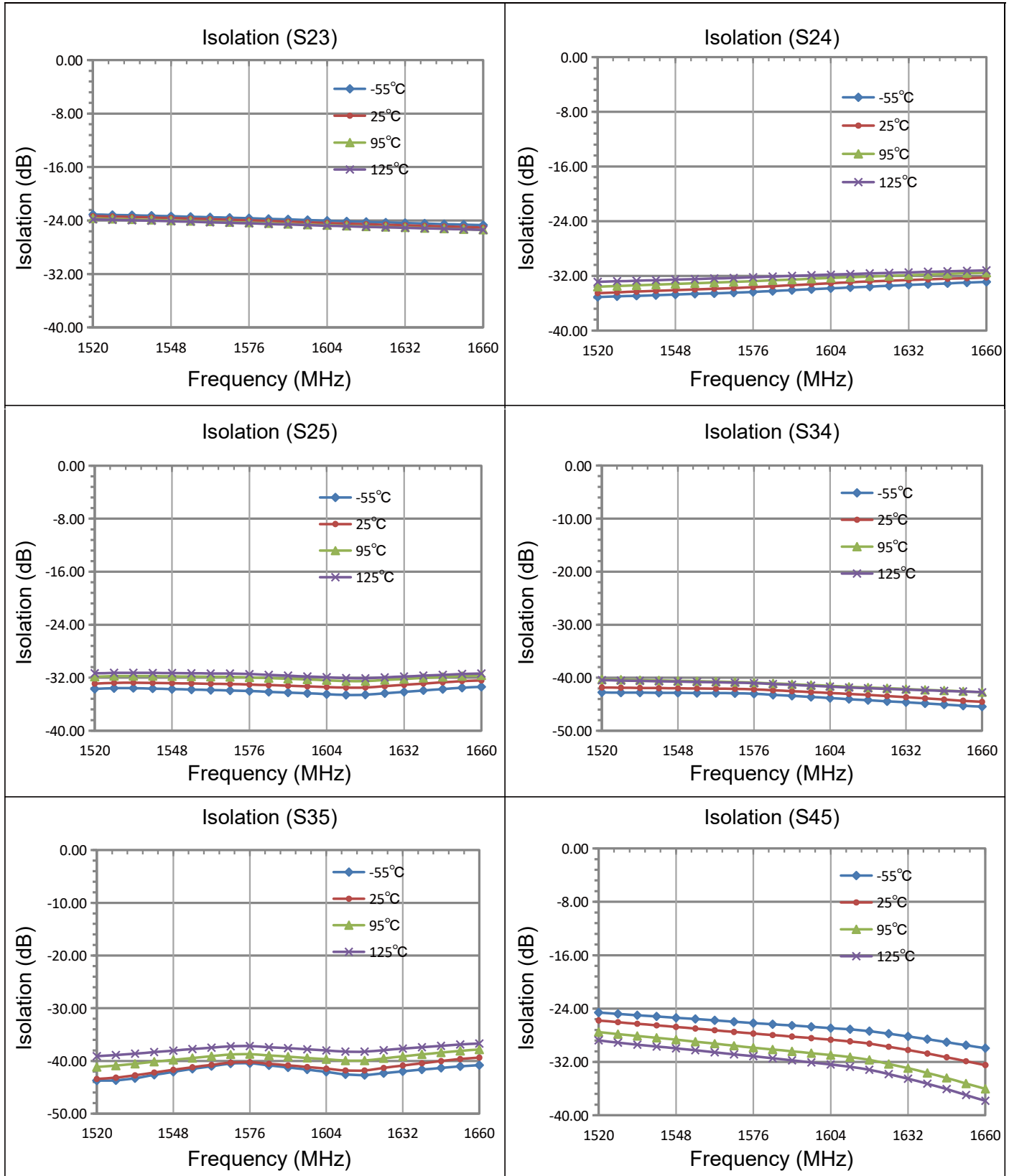
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.0

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



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Data Sheet

QF1600F06

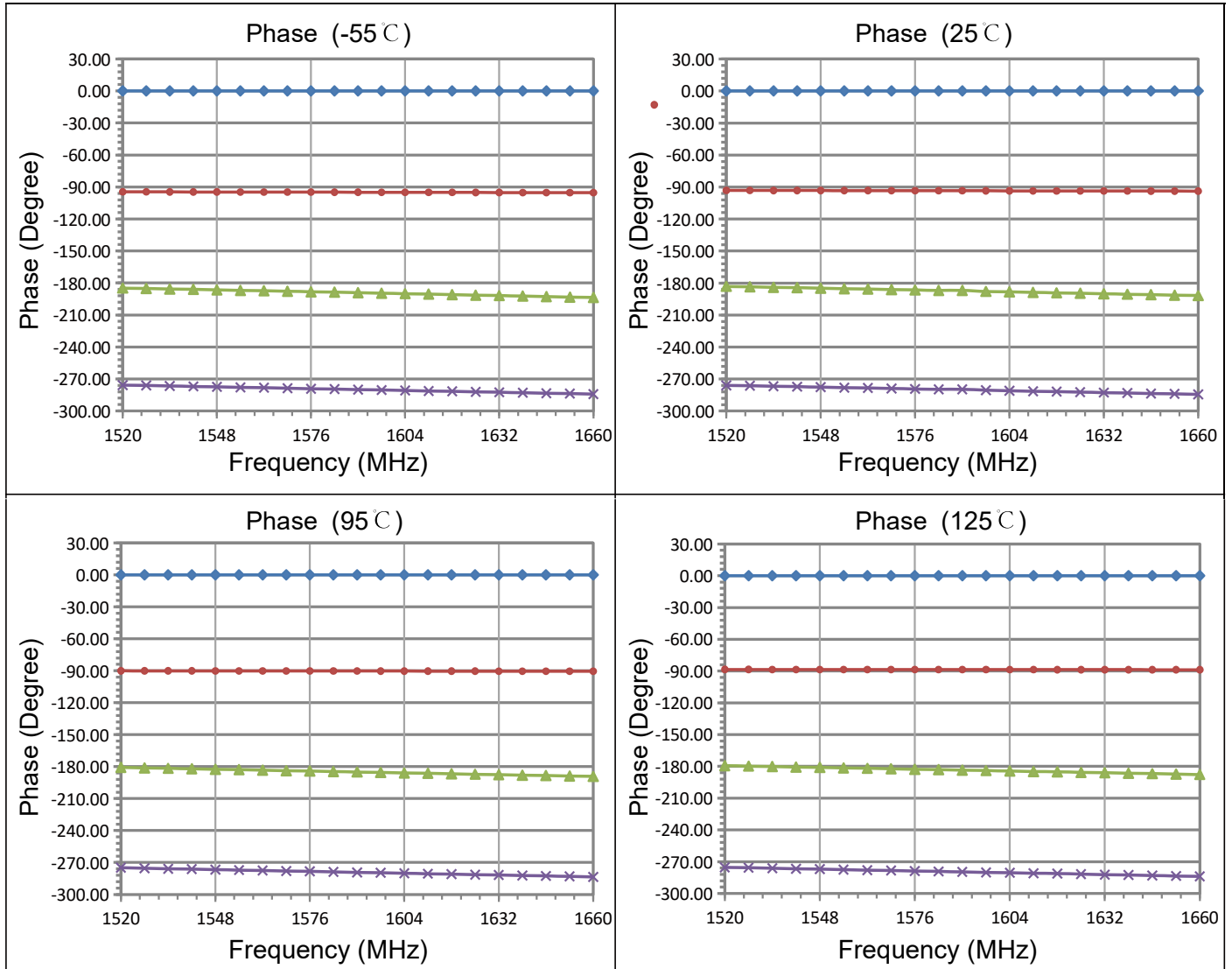
Quadrifilar Directional Coupler

1520 MHz-1660 MHz



Rev A1.0

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



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1980 MHz-2200 MHz



Rev A1.0

Definition of Measured Specifications

| | S-Parameter(dB) | Power Method[dB] |
|------------------------|--|--|
| Output 1 | S ₂₁ | $10 \cdot \log \left(\frac{P_{out1}}{P_{in}} \right)$ |
| Output 2 | S ₃₁ | $10 \cdot \log \left(\frac{P_{out2}}{P_{in}} \right)$ |
| Output 3 | S ₄₁ | $10 \cdot \log \left(\frac{P_{out3}}{P_{in}} \right)$ |
| Output 4 | S ₅₁ | $10 \cdot \log \left(\frac{P_{out4}}{P_{in}} \right)$ |
| Insertion Loss | | $10 \cdot \log \left(\frac{P_{in}}{P_{out1+out2+out3+out4}} \right)$ |
| Amplitude Balance | | $10 \cdot \log \left(\frac{P_{out1-out4}}{P_{out1+out2+out3+out4} / 2} \right)$ |
| Isolation 1 | S ₂₃ | $10 \cdot \log \left(\frac{P_{out3}}{P_{out2}} \right)$ |
| Isolation 2 | S ₂₄ | $10 \cdot \log \left(\frac{P_{out4}}{P_{out2}} \right)$ |
| Isolation 3 | S ₂₅ | $10 \cdot \log \left(\frac{P_{out5}}{P_{out2}} \right)$ |
| Isolation 4 | S ₃₄ | $10 \cdot \log \left(\frac{P_{out4}}{P_{out3}} \right)$ |
| Isolation 5 | S ₃₅ | $10 \cdot \log \left(\frac{P_{out5}}{P_{out3}} \right)$ |
| Isolation 6 | S ₄₅ | $10 \cdot \log \left(\frac{P_{out5}}{P_{out4}} \right)$ |
| Phase Balance 1(0°) | Phase (S ₂₁) | |
| Phase Balance 2(-90°) | Phase (S ₃₁) -Phase (S ₂₁) | |
| Phase Balance 2(-180°) | Phase (S ₄₁) -Phase (S ₂₁) | |
| Phase Balance 2(-270°) | Phase (S ₅₁) -Phase (S ₂₁) | |

P_{in} : Power of Input Port1

P_{out1}: Power of output Port2

P_{out2}: Power of output Port3

P_{out3}: Power of output Port4

P_{out4}: Power of output Port5

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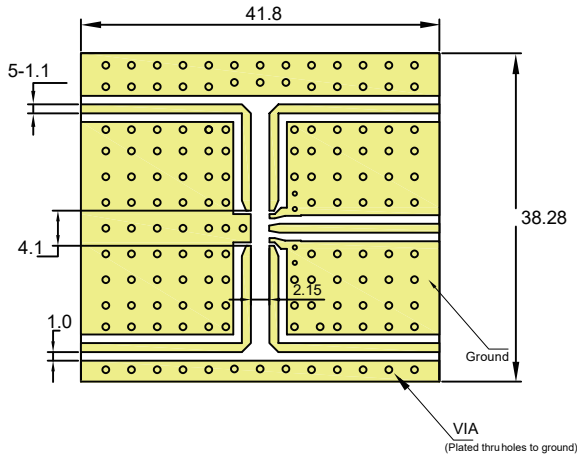
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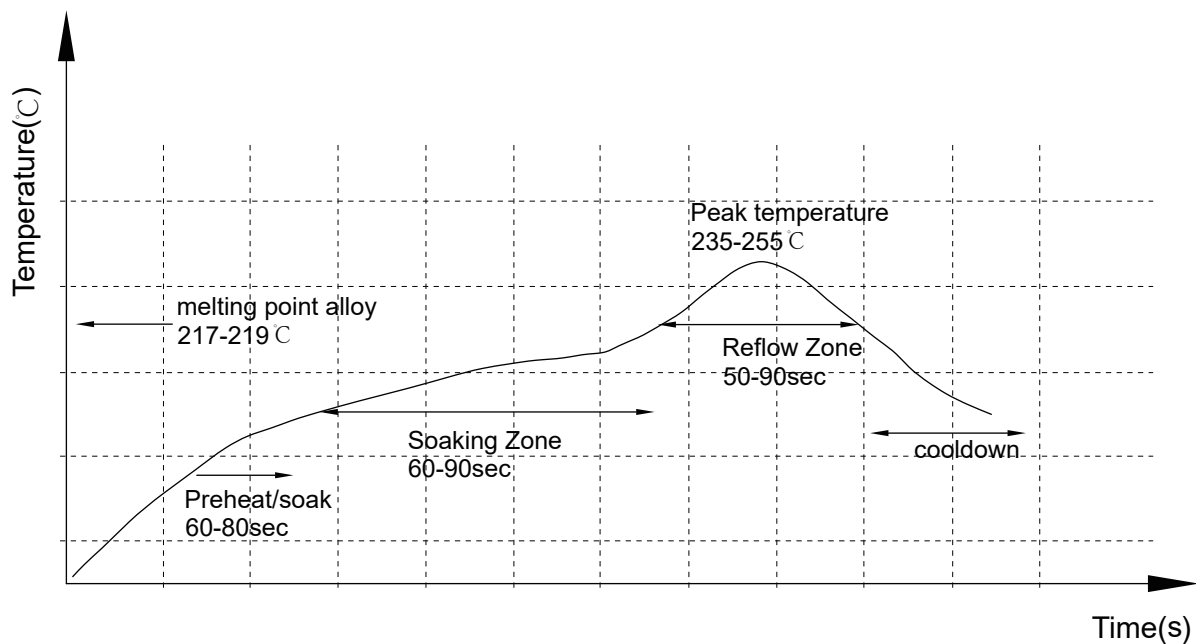
Recommended PCB Layout



NOTE:

1. 50Ω line width is shown above designing from $Er=3.66$ 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



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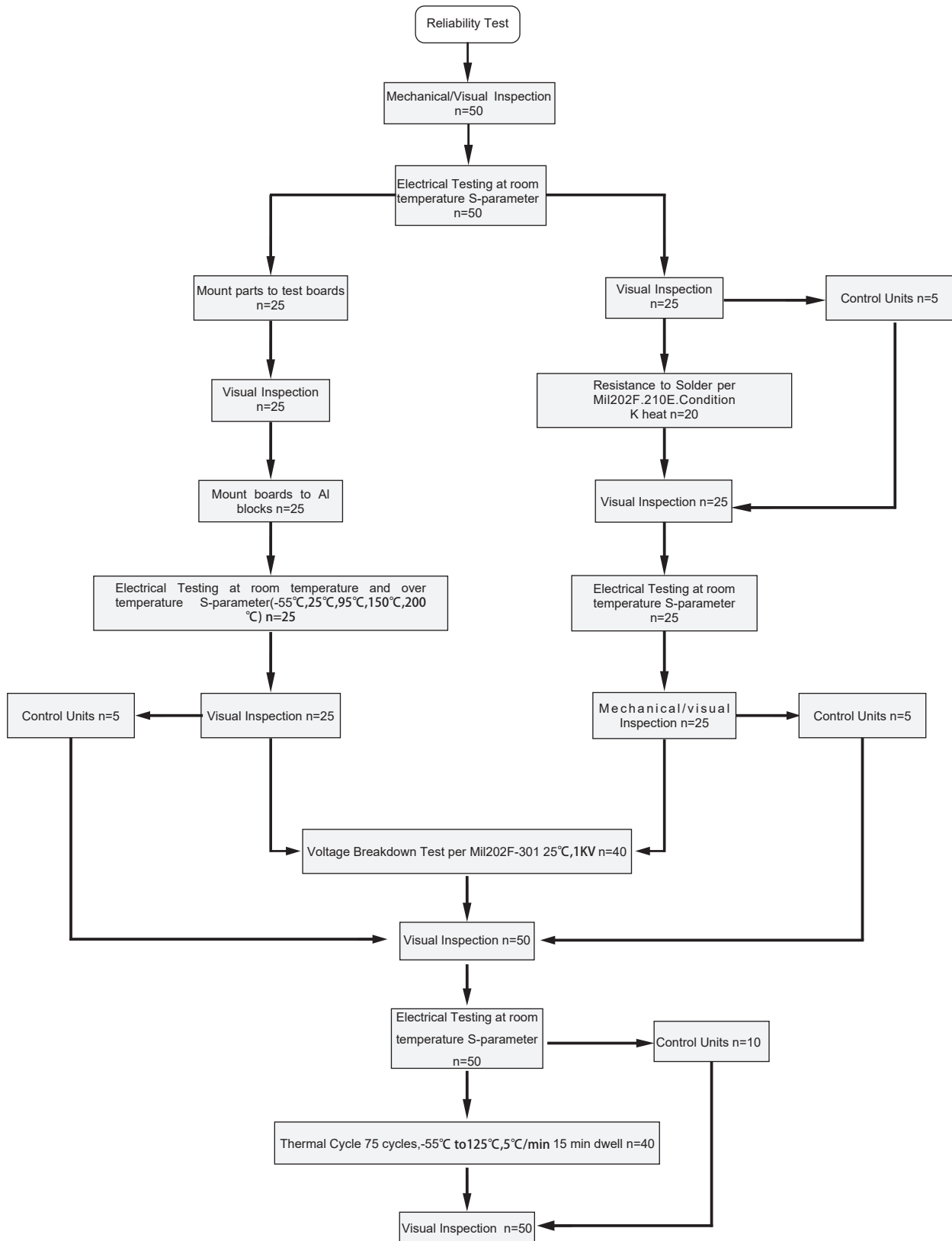
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Reliability Test Flow



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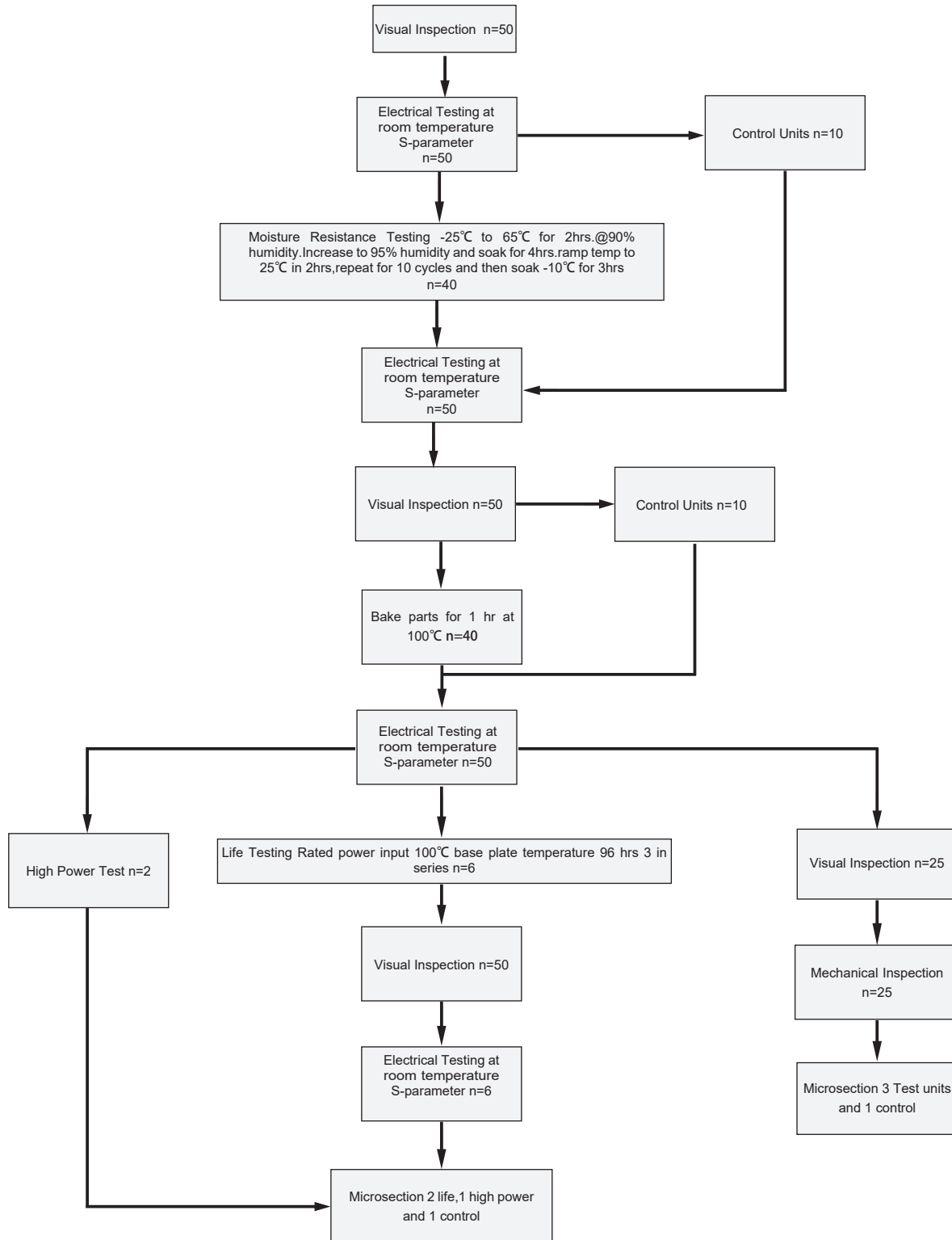
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Reliability Test Flow



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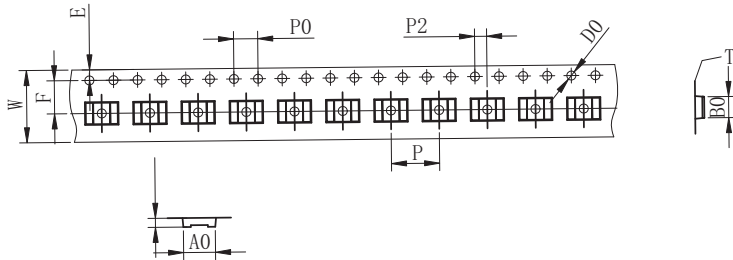
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Rev A1.0

Tape and Reel Drawing

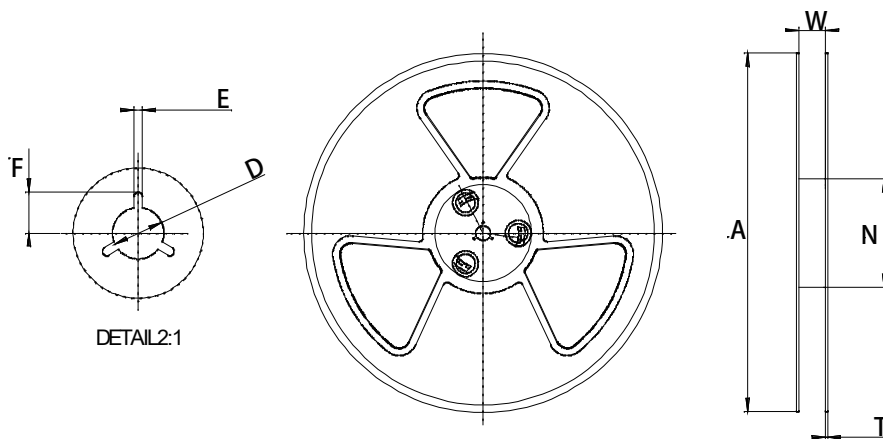
Feeding Direction



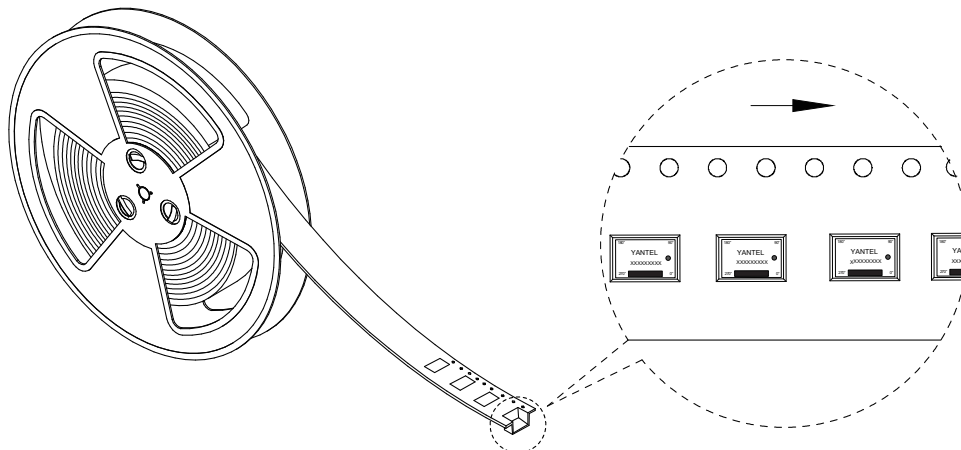
| ITEM | W | A0 | B0 | K0 | K1 | P | F | E | D | P0 | P2 | t | 13" |
|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--------------|
| DIM | 12.0 | 5.6 | 3.7 | 1.00 | | 8 | 5.5 | 1.75 | 1.50 | 4.00 | 2.00 | 0.3 | 长度/盘 元件/盘 |
| TOLE | +0.30 -0.30 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.10 | +0.10 -0.00 | +0.10 -0.10 | +0.10 -0.10 | +0.05 -0.05 | 55M 6000 PCS |

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



| Symbol | Dimensions(mm) |
|--------|----------------|
| W | 12.5±0.4 |
| A | 177±0.5 |
| N | 63±0.3 |
| T | 1.8±0.2 |
| E | 2.1±0.3 |
| F | 10.75±0.3 |
| D | 13.5+0.5/-0.2 |



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