# DC1500W20

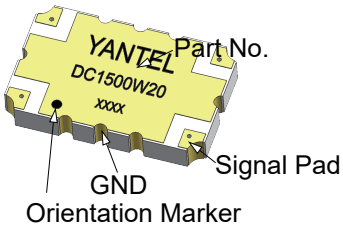
## Directional Coupler

Rev A0

### Description

High-power broadband surface-mounted and embedded coupler series, realizing the power synthesis and distribution of microwave high-power amplifier system, signal acquisition and other functions. Used in active phased array radar, microwave transceiver components, microwave amplifiers, radio stations, satellite communications and other projects, to provide standardized and customized high-quality and reliable products.

The performance and reliability indexes are in line with international products,and the pin definition and package size are compatible with international products, realizing 100% in-situ replacement.




### Features:

- **1000-2000 MHz**
- **AMPS**
- **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**

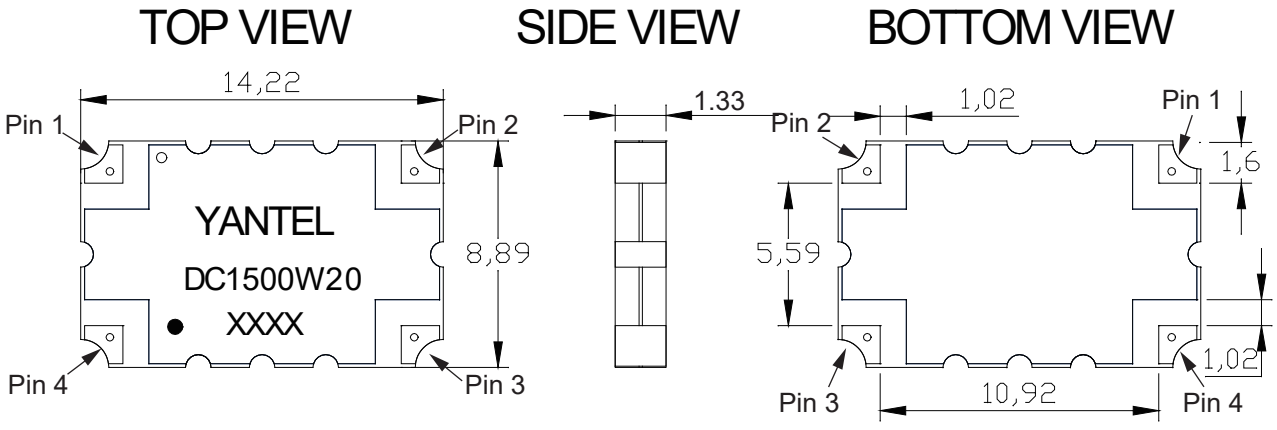
### Electrical Specifications

| Frequency | Coupling | Directivity | VSWR |
|---|---|---|---|
| *MHz* | *dB* | *dB Min* | *Max : 1* |
| 1000 - 2000 | 20±1.0 | 14 | 1.20 |

| Insertion Loss | Power | Operating Temp. |
|---|---|---|
| *dB Max* | *Avg. CW Watts* | *℃* |
| 0.25 | 200 | -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




**Note:** 1. All Dimensions show in Millimeters
2. RoHS Compliant in accordance with EU Directive(2011/65/EU)
3. Dimension tolerance: ±0.20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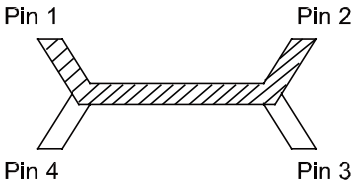
### Directional Coupler Pin Configuration

The DC1500W20 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℃)

| Frequency (MHz) | Coupling (dB) | Transmission (dB) | Insertion Loss (dB) | Directivity (dB) | Return Loss(dB) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | S11 | S22 | S33 | S44 |
| 1000 | -20.69 | -0.12 | -0.08 | -21.79 | -22.89 | -22.70 | -22.48 | -22.47 |
| 1050 | -20.45 | -0.12 | -0.08 | -21.50 | -22.81 | -22.75 | -22.44 | -22.38 |
| 1100 | -20.21 | -0.13 | -0.09 | -21.32 | -22.82 | -22.69 | -22.37 | -22.30 |
| 1150 | -20.02 | -0.14 | -0.09 | -20.78 | -22.50 | -22.60 | -22.54 | -22.66 |
| 1200 | -19.85 | -0.14 | -0.09 | -20.68 | -22.60 | -22.70 | -22.80 | -22.79 |
| 1250 | -19.68 | -0.14 | -0.10 | -20.08 | -22.46 | -22.57 | -23.04 | -23.08 |
| 1300 | -19.52 | -0.15 | -0.10 | -20.01 | -22.80 | -22.94 | -23.08 | -23.45 |
| 1350 | -19.46 | -0.15 | -0.10 | -19.92 | -22.59 | -22.90 | -23.07 | -23.31 |
| 1400 | -19.37 | -0.15 | -0.10 | -19.23 | -22.68 | -23.23 | -22.99 | -23.25 |
| 1450 | -19.32 | -0.16 | -0.11 | -19.26 | -22.66 | -23.05 | -23.18 | -23.48 |
| 1500 | -19.27 | -0.15 | -0.10 | -18.85 | -22.67 | -22.99 | -23.38 | -23.98 |
| 1550 | -19.24 | -0.16 | -0.10 | -18.47 | -22.57 | -23.11 | -24.07 | -24.54 |
| 1600 | -19.24 | -0.16 | -0.11 | -17.77 | -22.73 | -23.14 | -24.58 | -24.80 |
| 1650 | -19.29 | -0.16 | -0.11 | -17.55 | -22.51 | -23.27 | -24.66 | -24.84 |
| 1700 | -19.35 | -0.17 | -0.12 | -17.47 | -22.61 | -23.13 | -24.48 | -24.81 |
| 1750 | -19.42 | -0.16 | -0.11 | -16.87 | -22.74 | -23.25 | -24.48 | -24.87 |
| 1800 | -19.48 | -0.17 | -0.12 | -16.58 | -22.82 | -23.62 | -24.30 | -24.76 |
| 1850 | -19.60 | -0.17 | -0.12 | -16.19 | -22.70 | -23.36 | -25.04 | -25.28 |
| 1900 | -19.73 | -0.17 | -0.12 | -15.77 | -22.65 | -23.52 | -25.56 | -25.91 |
| 1950 | -19.92 | -0.17 | -0.12 | -15.31 | -22.39 | -23.14 | -26.03 | -26.15 |
| 2000 | -20.13 | -0.17 | -0.12 | -14.88 | -22.79 | -23.32 | -26.18 | -25.96 |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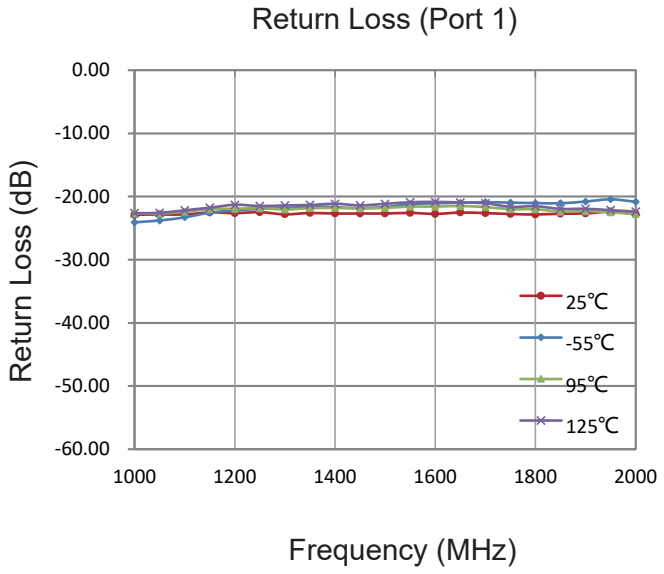
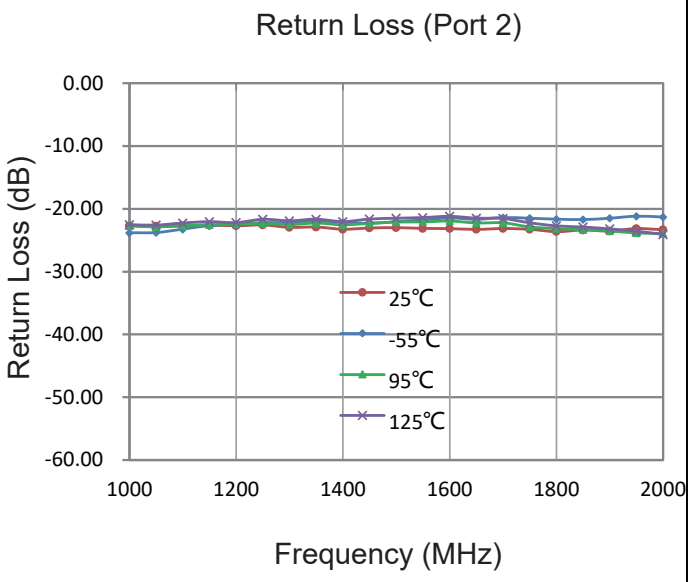
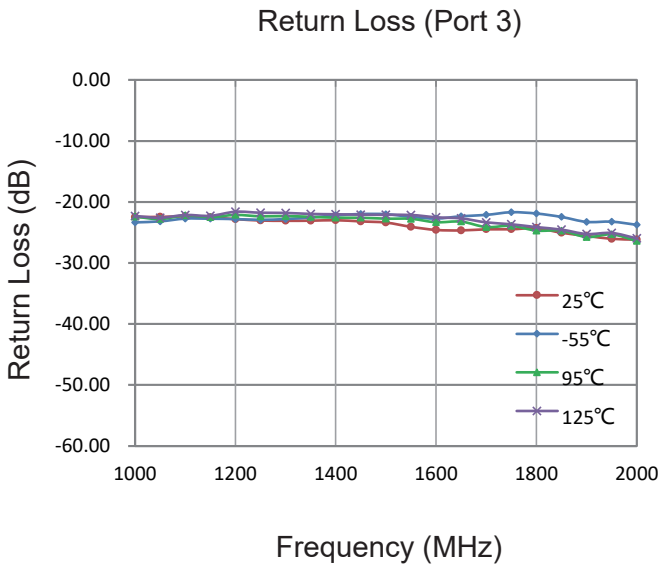
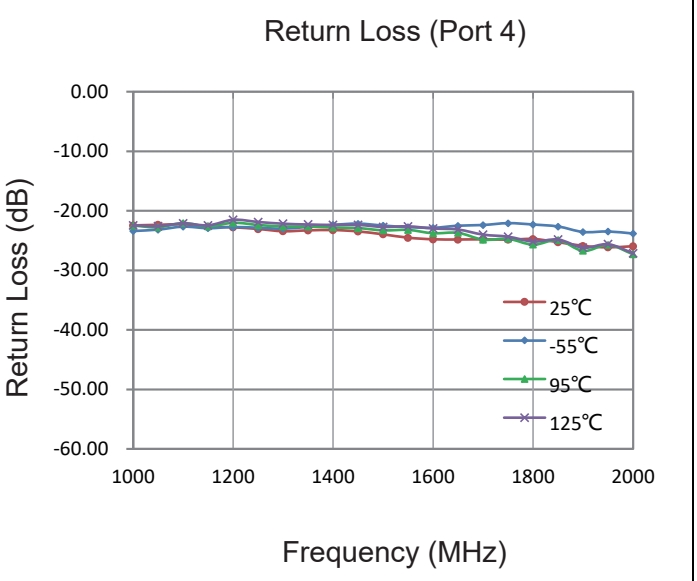
Rev A0

**Typical Performance (-55°C, 25°C ,95°C,125°C: 1000-2000 MHz)**





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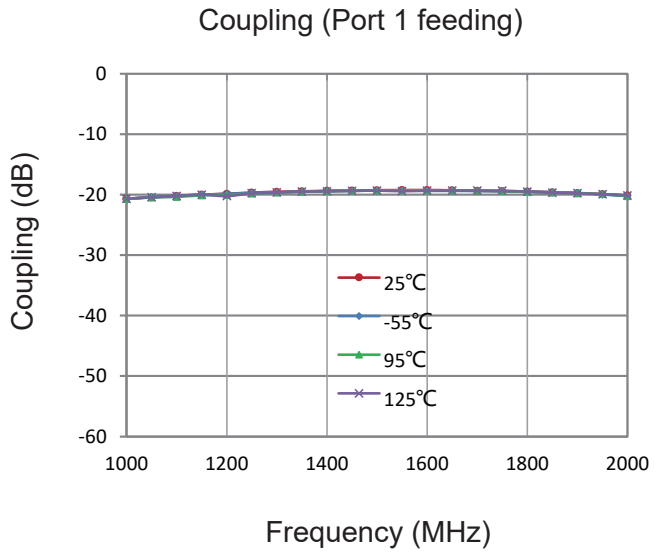


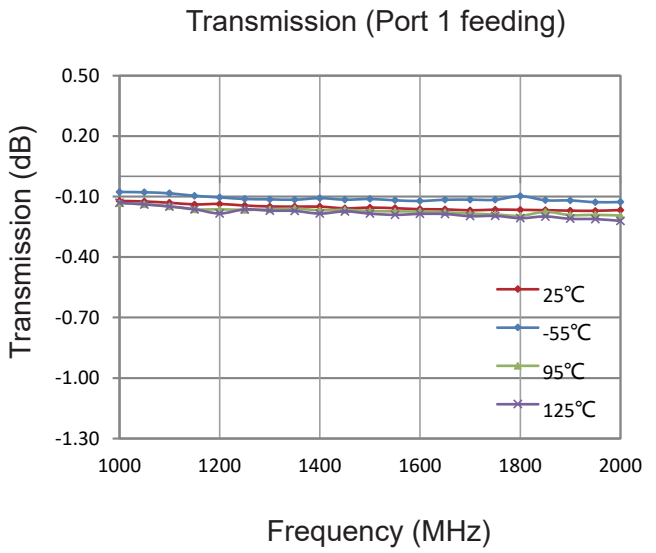


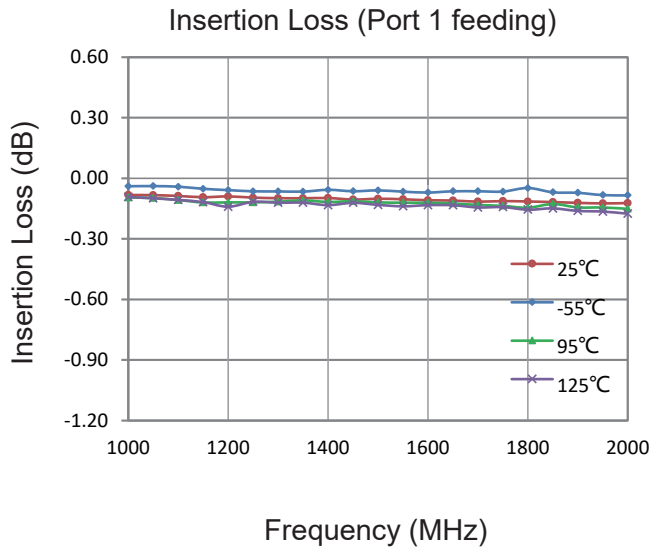


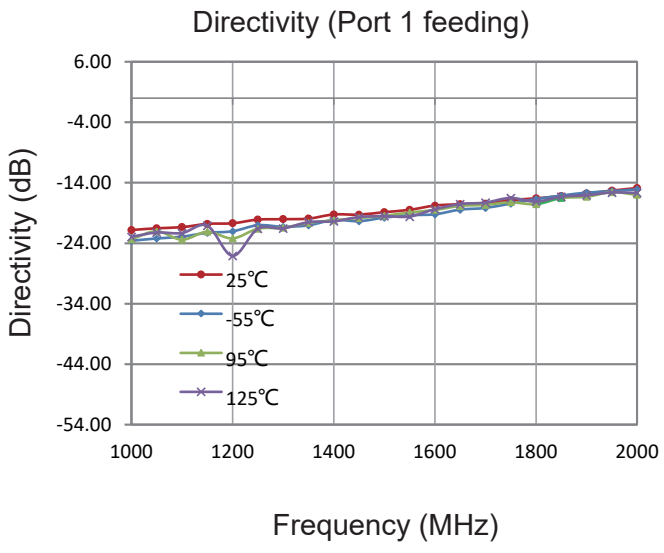



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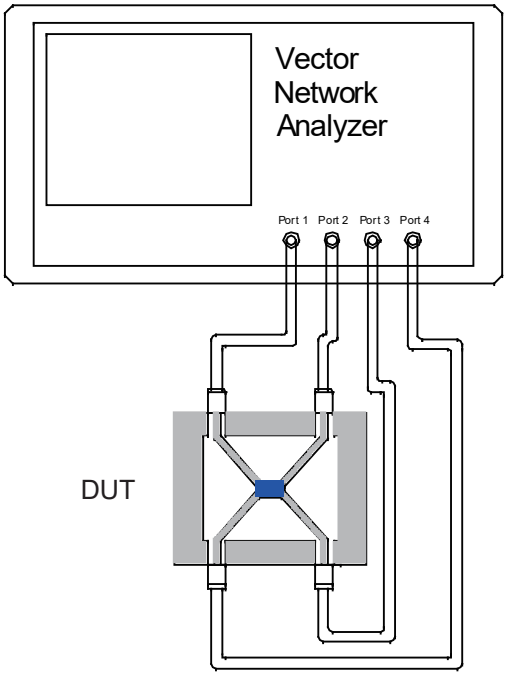
### Description of Measured Specifications

| Parameter | Description |
|---|---|
| **VSWR** | Voltage standing wave ratio, the impedance match to 50Ω, the ideal value is 1:1. |
| **Return Loss** | Loss of signal power resulting from the reflection caused by discontinuity of transmission line. |
| **Insertion Loss** | The input power divided by sum of power at the coupling port & transmission port. |
| **Coupling** | The input power divided by the power at coupling port. |
| **Transmission** | The input power divided by the power at transmission port. |
| **Directivity** | The power at the coupling port divided by the power at the isolated. |

### 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 2(S21).
5. Measure the data of isolation through port 1 to port 3(S31).
6. Measure the data of return loss port 1, port 2, port 3 & port 4.
7. According to the above data to calculate insertion loss, directivity.




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

| Frequency Range(MHz) | Demo Board Loss (dB) @25℃ |
|---|---|
| **470-860** | 0.06~0.10 |
| **800-1000** | 0.10~0.15 |
| **1200-1700** | 0.15~0.20 |
| **1700-2000** | 0.20~0.25 |
| **2000-2300** | 0.20~0.25 |
| **2300-2700** | 0.25~0.30 |

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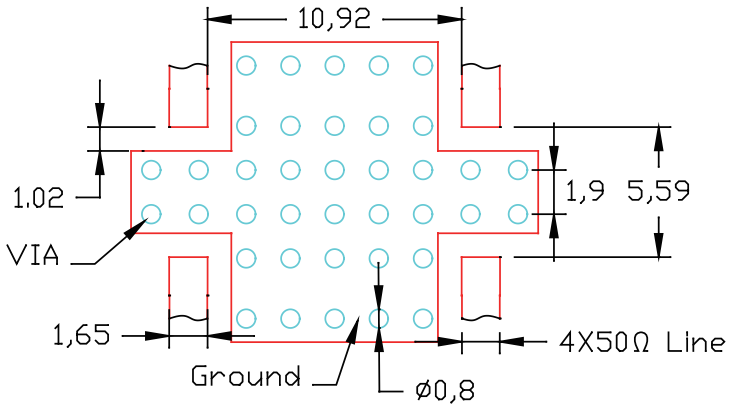
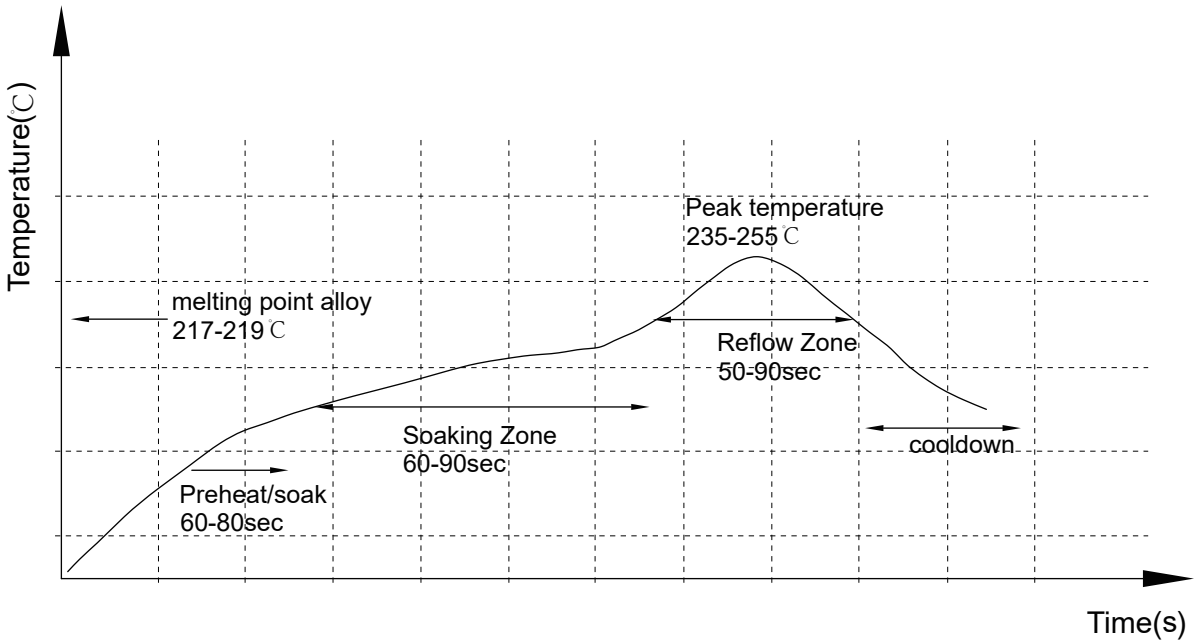
**Recommended PCB Layout**




NOTE:

1. 50Ω line width is shown above designing from RO4350B dieletric thickness 0.762mm; copper 1 OZ
2. Bottom side of the PCB is continuous ground plane.
3. All dimensions shown in mm.

**Reflow Profile**

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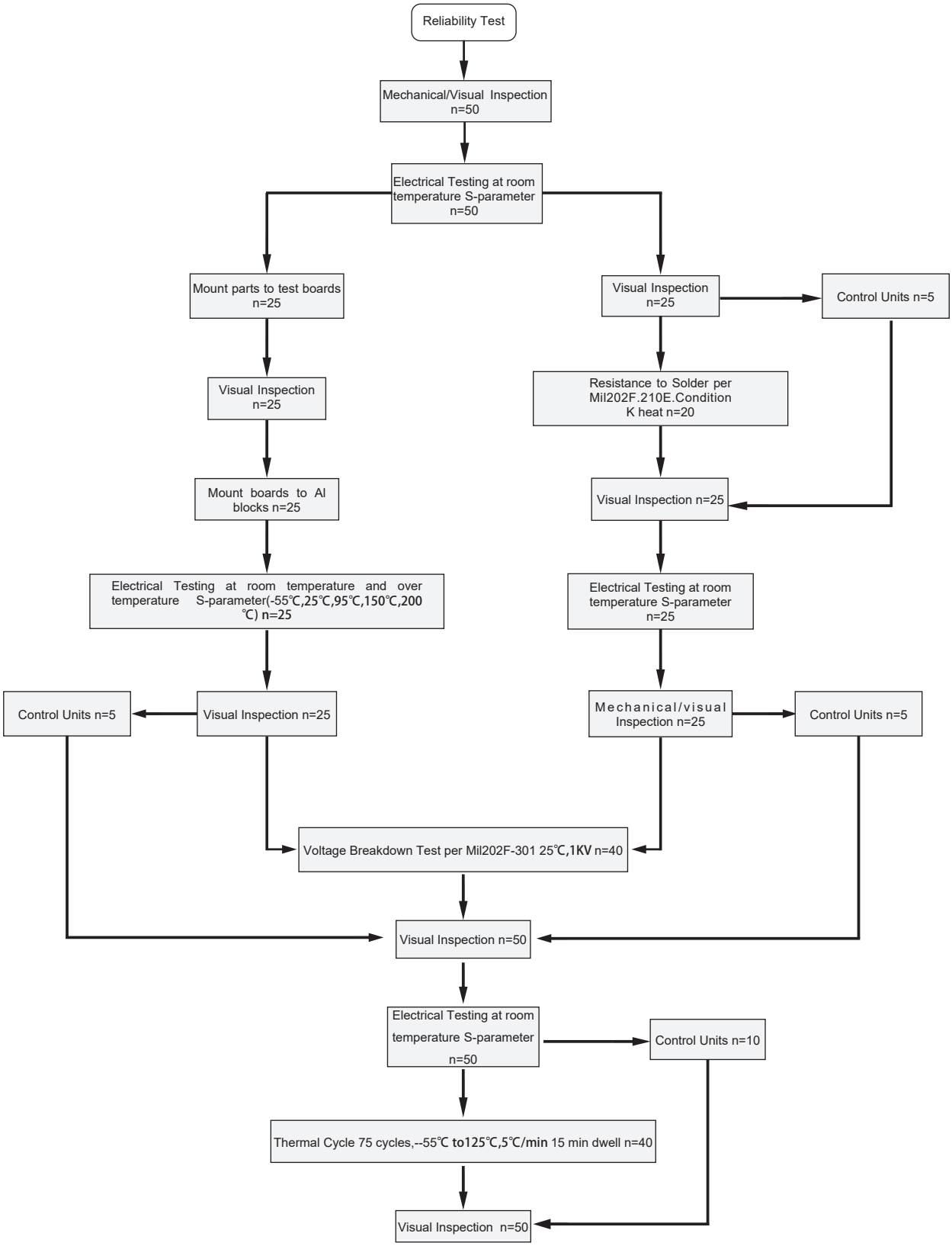
### Reliability Test Flow

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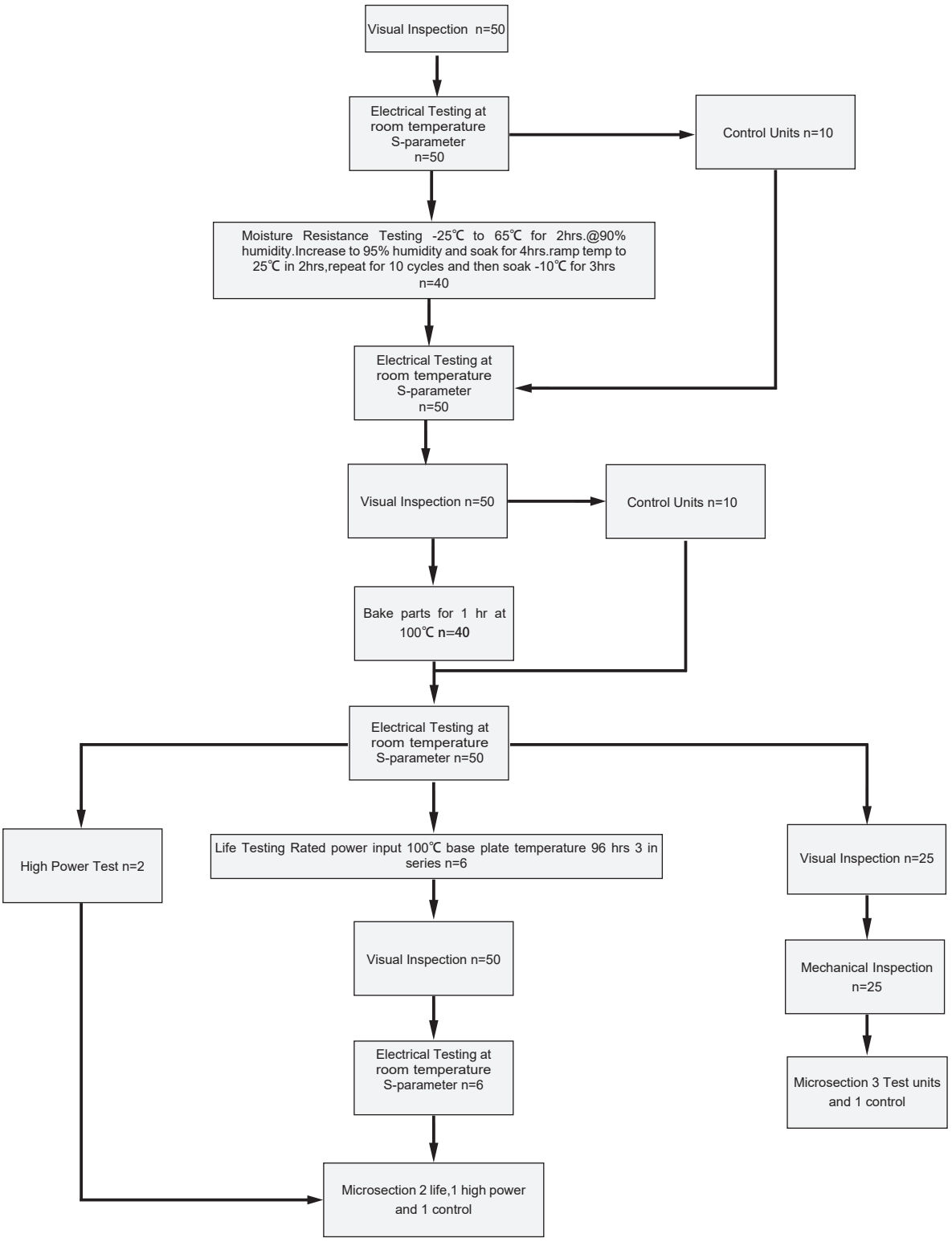


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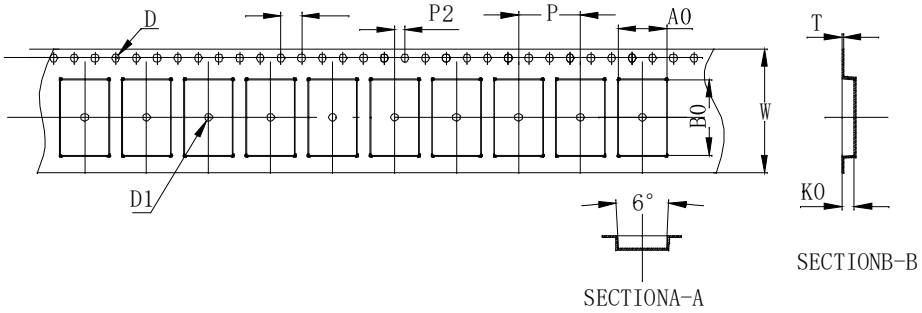
Rev A0

### 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.

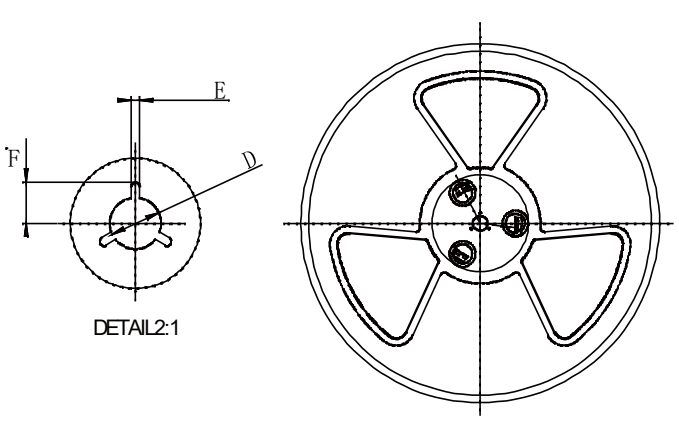
E. K0 measured from a place on the inside bottom of the pocket to top surface of carrier.

F. Material: PE 100

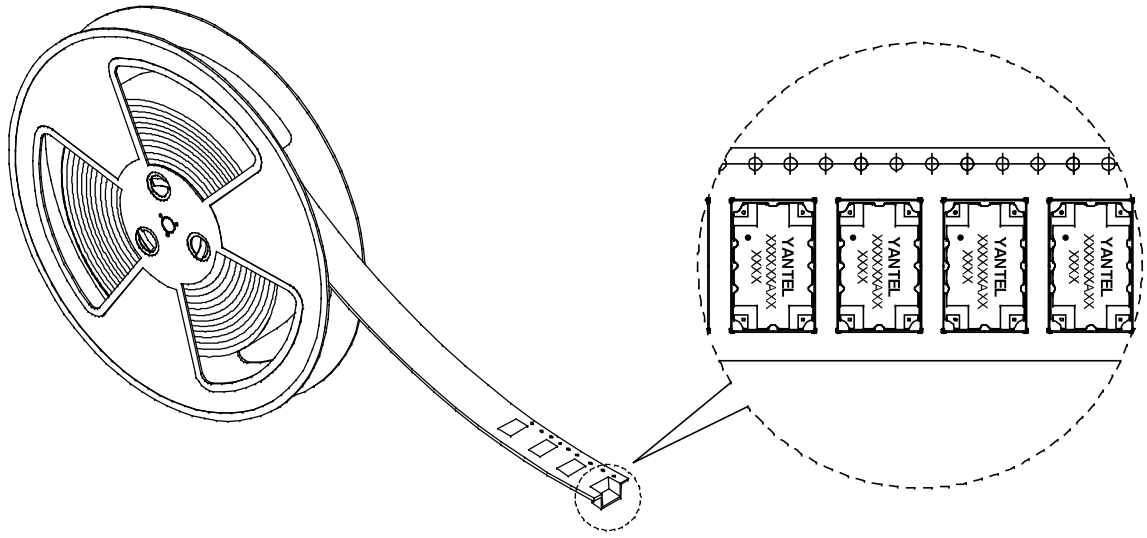
G. Thickness: 0.30±0.05mm

H. 500 units (maximum) / T&R

| ITEM | W | A0 | B0 | K0 | P | F | E | D | D1 | P0 | P2 | T | 7″ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DIM(mm) | 24.00 | 9.30 | 14.70 | 2.40 | 12.00 | 11.50 | 1.75 | 1.50 | 1.50 | 4.00 | 2.00 | 0.30 | P/R |
| 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 -0.00 | +0.10 -0.00 | +0.10 -0.10 | +0.10 -0.10 | +0.05 -0.05 | 500 pcs |




| Symbol | Dimensions (mm) |
|---|---|
| W | 24.5±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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