![Yantel logo]

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.
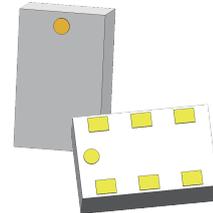
Features:

- 3200 – 3700MHz
- Mean Coupling 20dB
- 0.56mm Height Profile
- Ultra Low Insertion Loss
- Surface Mountable
- Tape & Reel
- RoHS Compliant
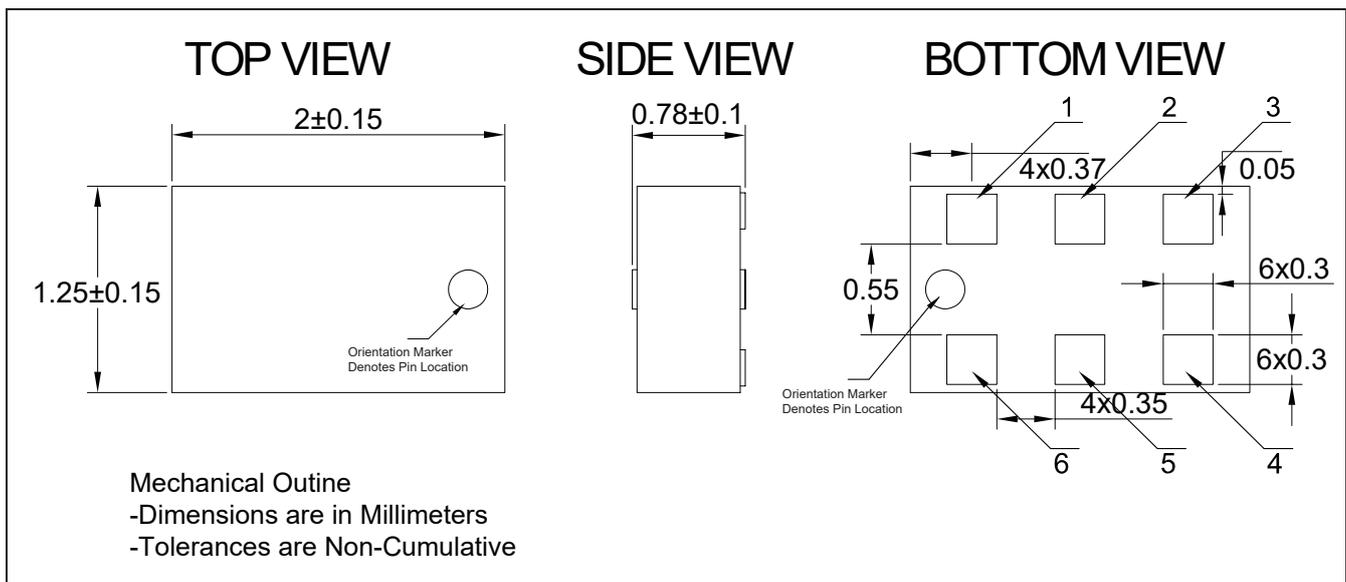- Halogen Free
- -55°C to 85°C

Electrical Specifications

Frequency	Coupling		Directivity	Return Loss
MHz	*dB Min*	*dB Max*	*dB Min*	*dB Min*
3200 - 3700	19.5	22.5	17	16.0

Insertion Loss	Power	Operating Temp.
dB Max	*Avg. CW Watts*	*ºC*
0.40	2	-55 to +95

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

Mechanical Outline

TOP VIEW — 2±0.15, 1.25±0.15, Orientation Marker Denotes Pin Location

SIDE VIEW — 0.78±0.1

BOTTOM VIEW — 1 2 3, 4x0.37, 0.05, 6x0.3, 6x0.3, 0.55, 4x0.35, Orientation Marker Denotes Pin Location, 6 5 4

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

Directional Coupler Pin Configuration

The DC35T20 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:

Orientation Marker
Denotes Pin Location
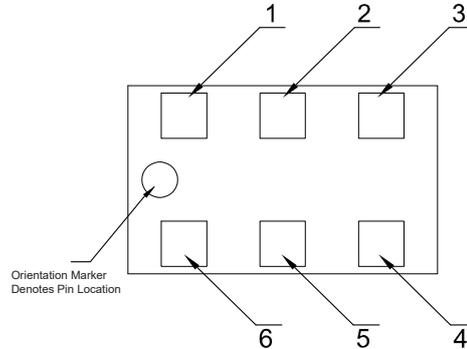
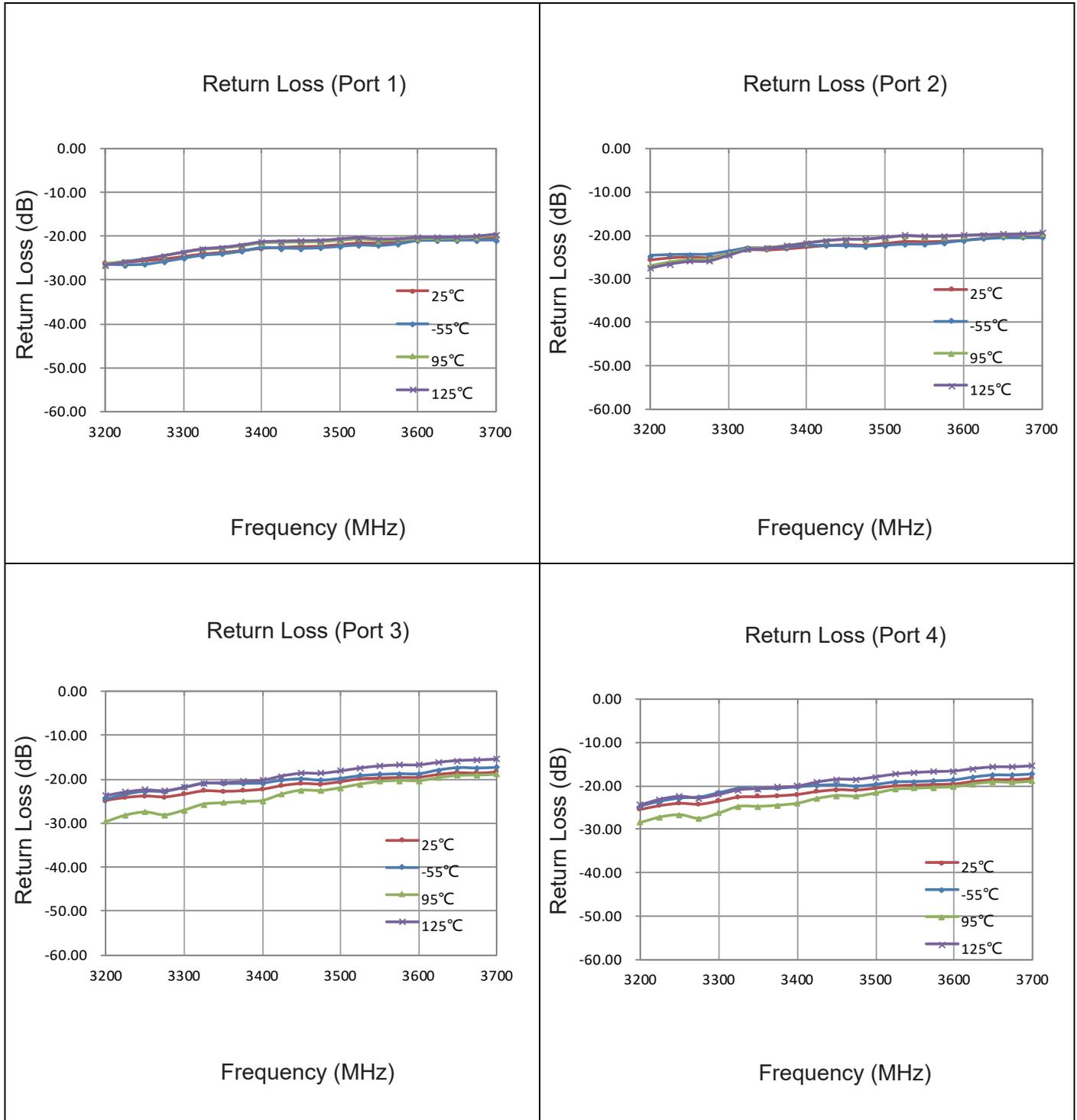| Pin	Configuration-1	Configuration-2
1	Direct	Input
2	Isolated	Coupled
3	Gnd	Gnd
4	Gnd	Gnd
5	Coupled	Isolated
6	Input	Direct

Typical Performance Data (@25℃)

Frequency (MHz)	Coupling (dB)	Transmission (dB)	Insertion Loss (dB)	Directivity (dB)	Return Loss(dB)			
					S11	S22	S33	S44
3200	-19.78	-0.33	-0.28	-25.33	-26.14	-25.62	-24.85	-25.29
3225	-19.83	-0.34	-0.29	-24.92	-25.83	-25.14	-24.20	-24.41
3250	-19.89	-0.34	-0.29	-24.69	-25.51	-24.91	-23.86	-23.93
3275	-19.95	-0.34	-0.29	-24.81	-25.11	-25.07	-24.07	-24.12
3300	-20.02	-0.35	-0.30	-24.34	-24.57	-24.25	-23.43	-23.37
3325	-20.07	-0.35	-0.30	-23.77	-24.02	-23.31	-22.68	-22.49
3350	-20.14	-0.35	-0.30	-23.78	-23.68	-23.28	-22.79	-22.42
3375	-20.21	-0.35	-0.31	-23.49	-23.26	-23.06	-22.65	-22.21
3400	-20.29	-0.35	-0.31	-22.96	-22.77	-22.68	-22.29	-21.89
3425	-20.37	-0.36	-0.31	-22.54	-22.57	-22.31	-21.48	-21.23
3450	-20.46	-0.36	-0.32	-22.15	-22.42	-22.11	-20.99	-20.83
3475	-20.54	-0.36	-0.32	-21.78	-22.31	-22.20	-21.11	-20.90
3500	-20.63	-0.36	-0.32	-21.17	-21.95	-21.83	-20.58	-20.45
3525	-20.72	-0.37	-0.33	-20.60	-21.59	-21.39	-19.93	-19.92
3550	-20.82	-0.37	-0.33	-20.67	-21.67	-21.42	-19.75	-19.77
3575	-20.92	-0.37	-0.33	-20.53	-21.48	-21.33	-19.62	-19.63
3600	-21.03	-0.38	-0.34	-20.22	-21.07	-21.11	-19.55	-19.50
3625	-21.15	-0.38	-0.34	-19.72	-20.88	-20.67	-18.92	-18.93
3650	-21.27	-0.38	-0.35	-19.43	-20.74	-20.40	-18.54	-18.55
3675	-21.39	-0.38	-0.35	-19.55	-20.68	-20.47	-18.64	-18.55
3700	-21.52	-0.39	-0.35	-19.11	-20.42	-20.21	-18.36	-18.32

Power Derating Curves

DC35T20Power Derating Curve
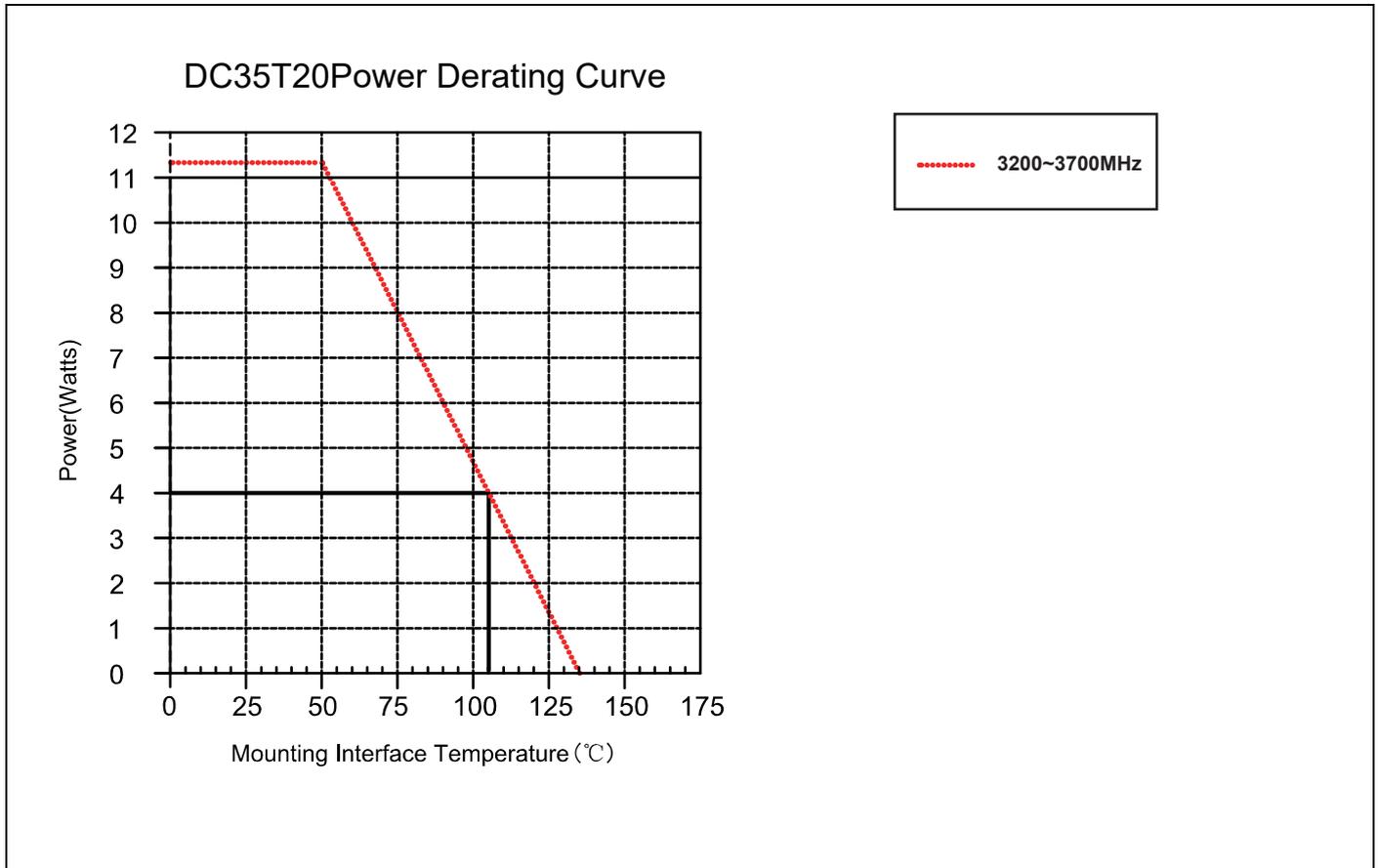
Power Derating:

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

Typical Performance (-55°C,25°C,95°C,125°C: 3200-3700 MHz)

Return Loss (Port 1)

Return Loss (Port 2)

Return Loss (Port 3)

Return Loss (Port 4)

Typical Performance (-55°C,25°C,95°C,125°C: 3200-3700MHz)

Coupling (Port 1 feeding)

Transmission (Port 1 feeding)

Insertion Loss (Port 1 feeding)

Directivity (Port 1 feeding)
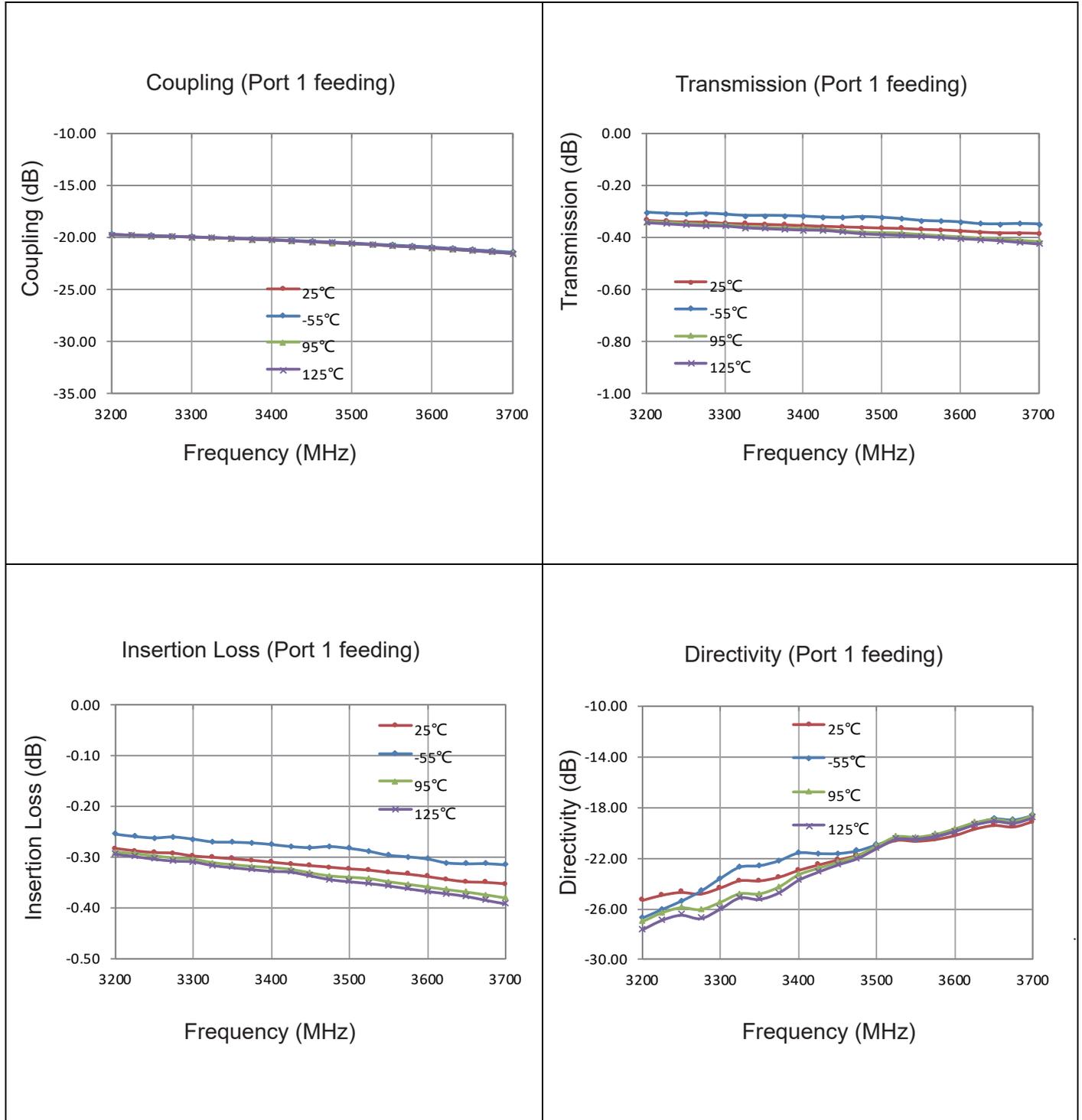
Definition of Measured Specifications

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.	$VSWR = \dfrac{V_{max}}{V_{min}}$ 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.	$Return\ Loss\ (dB)= 20log\ \dfrac{VSWR +1}{VSWR\ \text{-}1}$
Insertion Loss	The input power divided by the sum of the power at the two output ports.	$Insertion\ Loss(dB)= 10log\ \dfrac{P_{in}}{P_{cpl} + P_{transmission}}$
Isolation	The input power divided by the power at the isolated port.	$Isolation(dB)= 10log\ \dfrac{P_{in}}{P_{iso}}$
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.	$10log\ \dfrac{P_{cpl}}{\left(\dfrac{P_{cpl} + P_{transmission}}{2}\right)}$ or $10log\ \dfrac{P_{transmission}}{\left(\dfrac{P_{cpl} + P_{transmission}}{2}\right)}$

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℃
470-860	0.07
800-1000	0.10
1200-1700	0.15
1700-2000	0.15
2000-2300	0.20
2300-3700	0.25
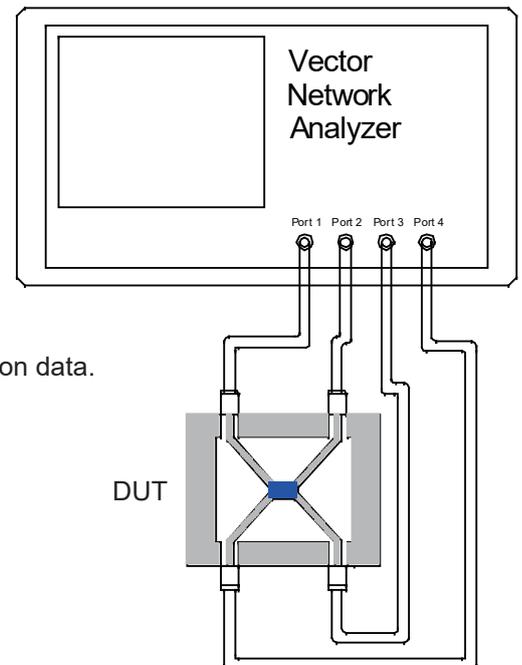
Recommended PCB Layout
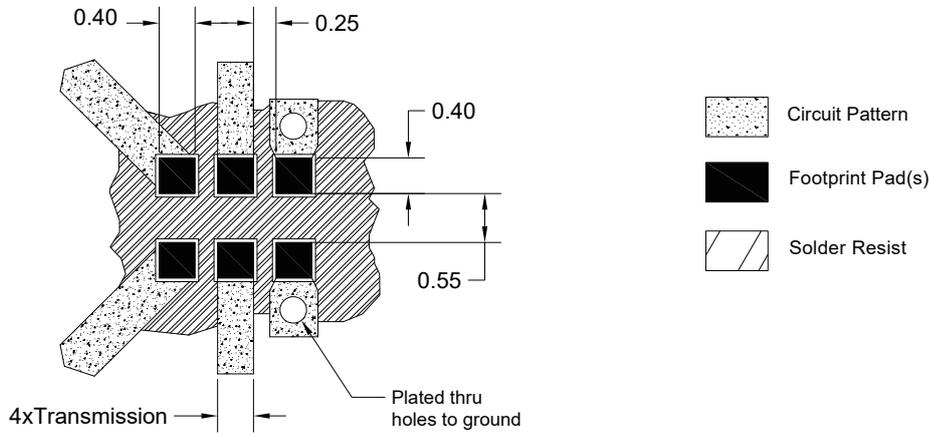
NOTE:

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
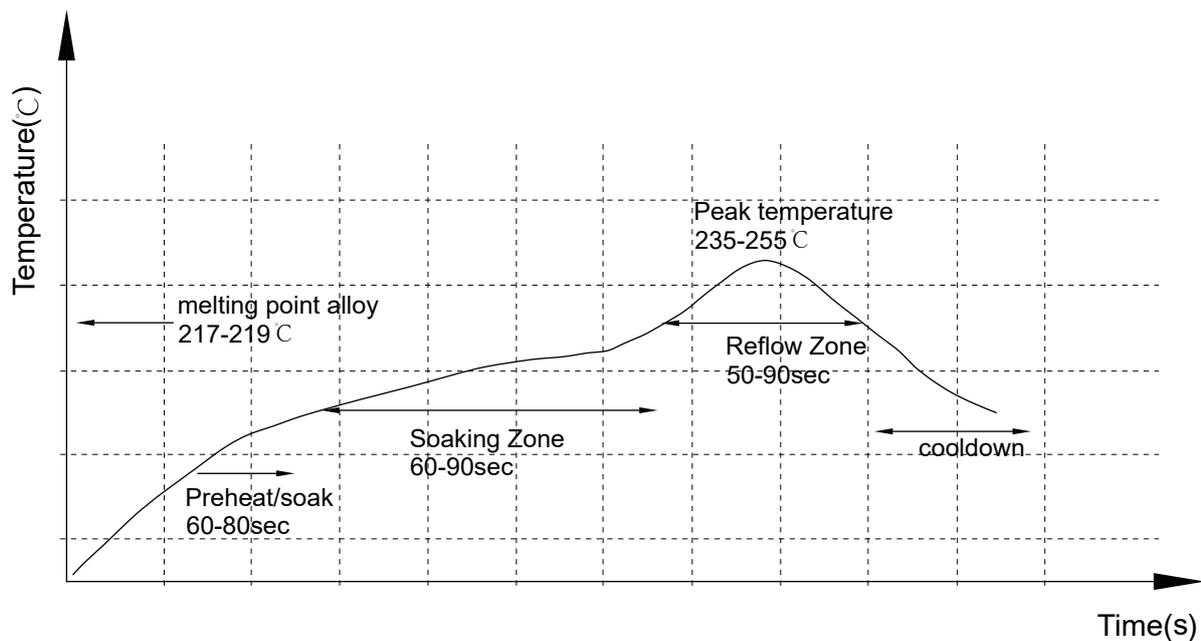
Reliability Test Flow

```
                          ┌─────────────────┐
                          │ Reliability Test │
                          └────────┬────────┘
                                   ▼
                       ┌──────────────────────────┐
                       │ Mechanical/Visual Inspection │
                       │           n=50             │
                       └────────────┬─────────────┘
                                    ▼
                       ┌──────────────────────────┐
                       │ Electrical Testing at room │
                       │ temperature S-parameter    │
                       │           n=50             │
                       └──────────────────────────┘
```

- Mechanical/Visual Inspection n=50
- Electrical Testing at room temperature S-parameter n=50
- Mount parts to test boards n=25
- Visual Inspection n=25
- Control Units n=5
- Visual Inspection n=25
- Resistance to Solder per Mil202F.210E.Condition K heat n=20
- Mount boards to Al blocks n=25
- Visual Inspection n=25
- Electrical Testing at room temperature and over temperature S-parameter(-55℃,25℃,95℃,150℃,200℃) n=25
- Electrical Testing at room temperature S-parameter n=25
- Control Units n=5
- Visual Inspection n=25
- Mechanical/visual Inspection n=25
- Control Units n=5
- Voltage Breakdown Test per Mil202F-301 25℃,1KV n=40
- Visual Inspection n=50
- Electrical Testing at room temperature S-parameter n=50
- Control Units n=10
- Thermal Cycle 75 cycles,--55℃ to125℃,5℃/min 15 min dwell n=40
- Visual Inspection n=50

Reliability Test Flow

```
                    Visual Inspection  n=50
                            │
                            ▼
                  Electrical Testing at
                  room temperature          ──────►   Control Units n=10
                  S-parameter
                  n=50
                            │
                            ▼
         Moisture Resistance Testing -25℃ to 65℃ for 2hrs.@90%
         humidity.Increase to 95% humidity and soak for 4hrs.ramp temp to
         25℃ in 2hrs,repeat for 10 cycles and then soak -10℃ for 3hrs
         n=40
                            │
                            ▼
                  Electrical Testing at
                  room temperature          ◄──────
                  S-parameter
                  n=50
                            │
                            ▼
                  Visual Inspection n=50    ──────►   Control Units n=10
                            │
                            ▼
                  Bake parts for 1 hr at
                  100℃ n=40
                            │
                            ▼
                  Electrical Testing at
                  room temperature
                  S-parameter n=50
         ┌──────────────────┼──────────────────────────────┐
         ▼                  ▼                               ▼
   High Power      Life Testing Rated power input    Visual Inspection n=25
   Test n=2        100℃ base plate temperature
                   96 hrs 3 in series n=6                    │
                            │                                ▼
                            ▼                        Mechanical Inspection
                   Visual Inspection n=50            n=25
                            │                                │
                            ▼                                ▼
                   Electrical Testing at            Microsection 3 Test units
                   room temperature                 and 1 control
                   S-parameter n=6
         │                  │
         └────────┬─────────┘
                  ▼
         Microsection 2 life,1 high power
         and 1 control
```

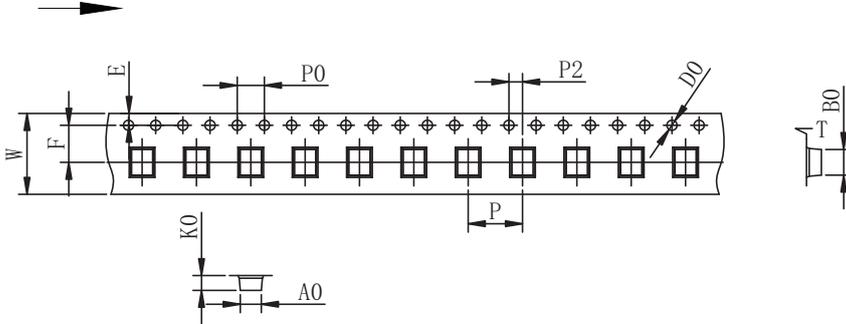**Yantel**®

Tape and Reel Drawing

Feeding Direction

ITEM	W	A0	B0	K0	K1	P	F	E	D0	P0	P2	t	7"
DIM(mm)	8.0	1.45	2.30	1.00		4.0	3.5	1.75	1.5	4.0	2.0	0.2	P/R
TOLE	+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 -0.10	+0.10 -0.00	+0.10 -0.10	+0.10 -0.10	+0.05 -0.05	5000pcs

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. 5000 units (maximum) / T&R

DETAIL2:1
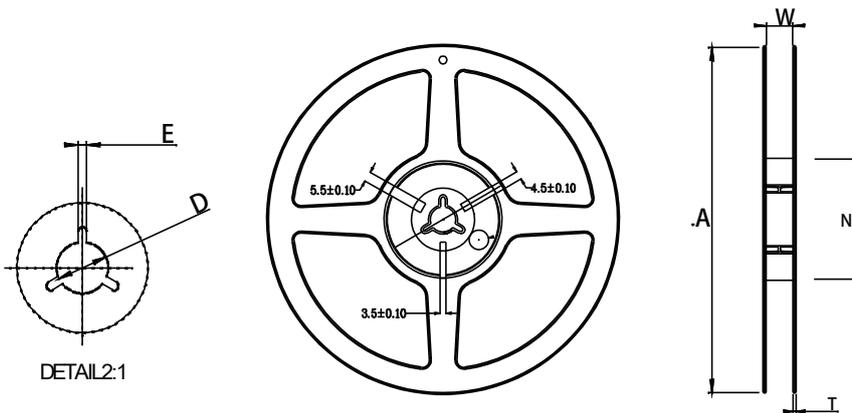
Symbol	Dimensions(mm)
W	9.0±0.4
A	180±0.3
N	60±0.3
T	1.4±0.2
E	3±0.5
D	25±0.8