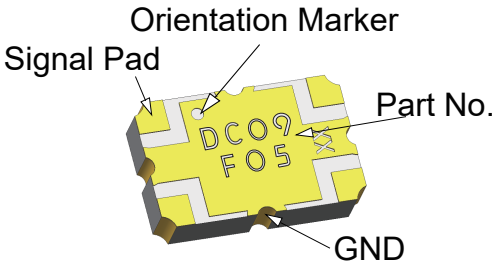
DC09F05

Directional Coupler

Rev A1.1

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:

- 700-1000 MHz
- Doherty Amplifier
- High Power
- Very Low Loss
- Tight Amplitude Balance
- High Isolation
- Production Friendly
- Tape and Reel

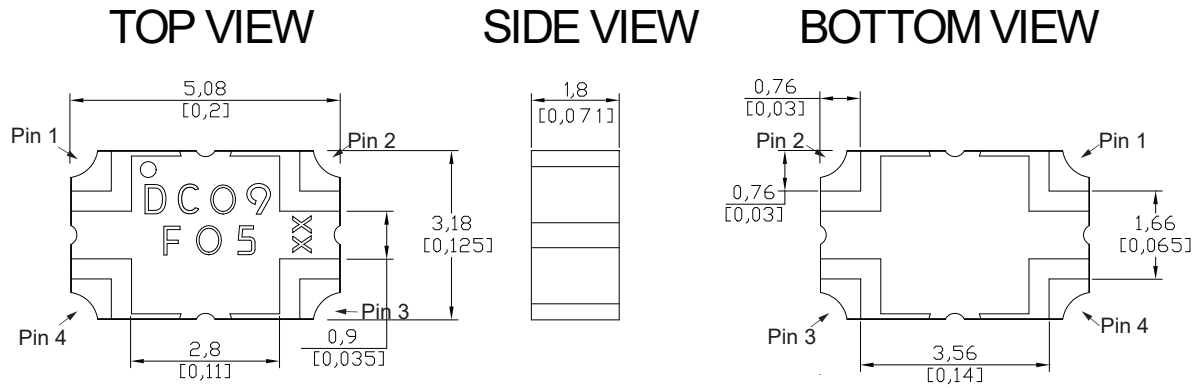
Electrical Specifications

Frequency	Coupling	Isolation	VSWR
MHz	*dB*	*dB Min*	*Max : 1*
700 - 1000	5±0.30	20	1.22
700 - 1000	5±0.33	18	1.34

Insertion Loss	Phase Balance	Power	Operating Temp.
dB Max	*Degrees*	*Avg. CW Watts at 95 ℃*	*°C*
0.30	90±4.0	25	-55 to +105
0.33	90±4.4	25	105 to +125

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

Mechanical Outline



Note: 1. All Dimensions show in mm [inch]
2. RoHS Compliant in accordance with EU Directive(2011/65/EU)
3. REACH Compliant in accordance with Regulation (EC) No 1907/2006
4. Dimension tolerance: ±0.20mm[±0.008inch]

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Add: 3F, Building 3, Southern District 2 of Zhongguan Honghualing Industrial Park, Xili, Nanshan, Shenzhen, China
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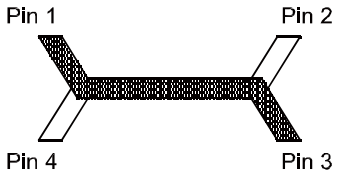
Directional Coupler Pin Configuration

The DC09F05 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	Isolate	Transmission	Coupling
Isolate	Input	Coupling	Transmission
Transmission	Coupling	Input	Isolate
Coupling	Transmission	Isolate	Input

Typical Performance Data (@25℃)

Frequency (MHz)	Coupling (dB)	Transmission (dB)	Insertion Loss (dB)	Isoloation (dB)	Phase (degree)	Return Loss(dB)			
						S11	S22	S33	S44
700	-5.17	-1.73	-0.11	-24.94	-88.65	-30.66	-24.05	-30.02	-28.73
715	-5.11	-1.75	-0.10	-24.72	-88.63	-30.62	-23.86	-29.70	-28.64
730	-5.05	-1.76	-0.09	-24.52	-88.61	-30.52	-23.65	-29.49	-28.53
745	-5.00	-1.79	-0.10	-24.31	-88.62	-30.30	-23.46	-29.27	-28.33
760	-4.97	-1.83	-0.11	-24.12	-88.62	-30.00	-23.30	-28.99	-28.03
775	-4.94	-1.86	-0.12	-23.93	-88.55	-29.65	-23.12	-28.61	-27.70
790	-4.92	-1.89	-0.14	-23.75	-88.49	-29.27	-22.96	-28.20	-27.44
805	-4.86	-1.87	-0.11	-23.58	-88.47	-28.84	-22.80	-27.89	-27.31
820	-4.82	-1.87	-0.09	-23.42	-88.48	-28.53	-22.62	-27.67	-27.25
835	-4.82	-1.90	-0.11	-23.25	-88.47	-28.43	-22.46	-27.52	-27.12
850	-4.81	-1.93	-0.12	-23.09	-88.41	-28.36	-22.31	-27.36	-26.87
865	-4.80	-1.94	-0.13	-22.94	-88.37	-28.21	-22.16	-27.11	-26.53
880	-4.77	-1.93	-0.11	-22.80	-88.37	-27.85	-22.03	-26.77	-26.22
895	-4.76	-1.93	-0.11	-22.66	-88.33	-27.41	-21.89	-26.44	-25.98
910	-4.76	-1.94	-0.12	-22.53	-88.24	-27.13	-21.74	-26.17	-25.81
925	-4.77	-1.95	-0.13	-22.41	-88.19	-27.08	-21.58	-25.99	-25.67
940	-4.77	-1.93	-0.11	-22.27	-88.18	-27.03	-21.44	-25.88	-25.48
955	-4.78	-1.92	-0.11	-22.14	-88.19	-26.85	-21.29	-25.71	-25.23
970	-4.81	-1.93	-0.13	-22.02	-88.23	-26.56	-21.16	-25.46	-24.93
985	-4.85	-1.95	-0.15	-21.93	-88.20	-26.25	-21.04	-25.16	-24.64
1000	-4.87	-1.94	-0.16	-21.85	-88.16	-25.97	-20.92	-24.90	-24.40

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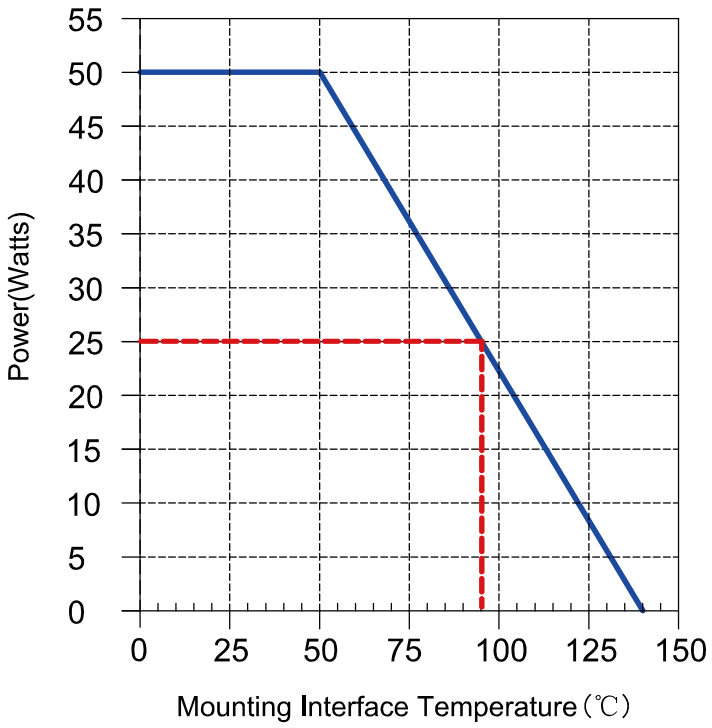
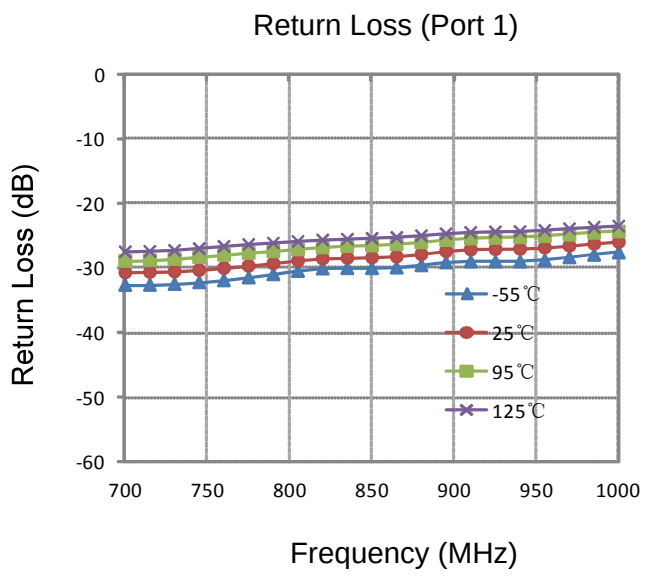
Power Derating Curves

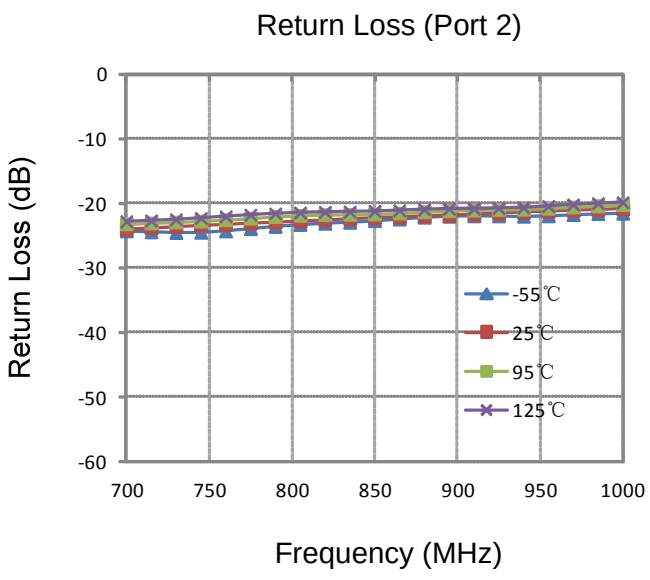


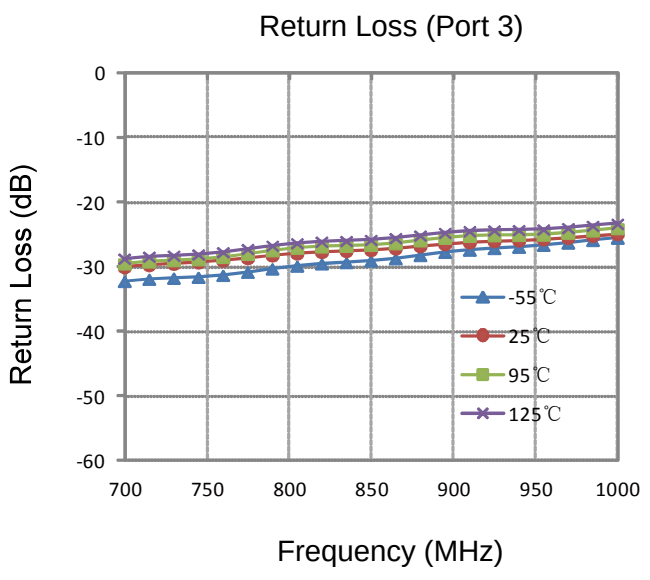
Power Derating:

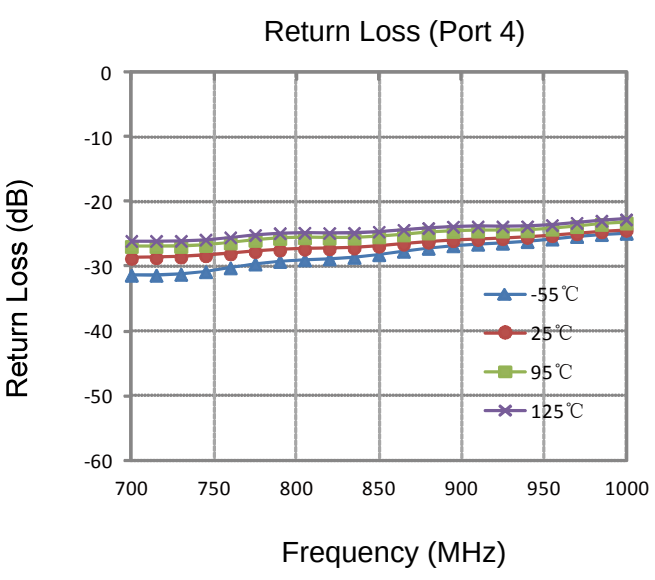
As the mounting interface temperature approaches the maximum continuous operating temperature, the power handling decreases to zero.

Typical Performance (-55°C, 25°C, 95°C, 125°C:700-1000 MHz)









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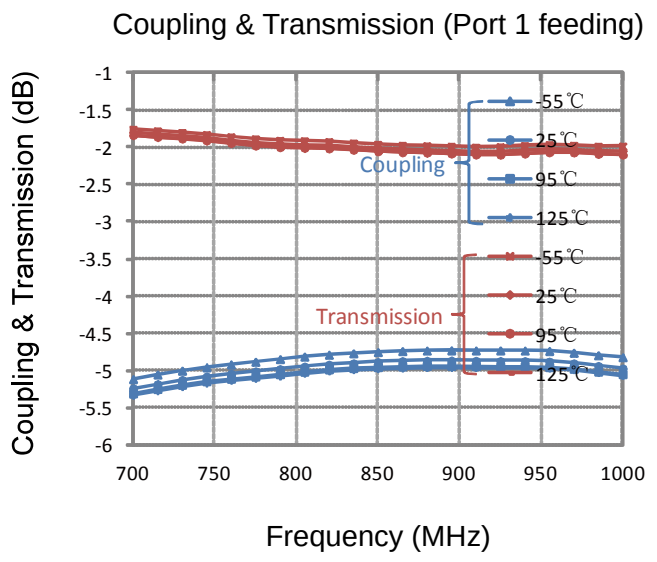
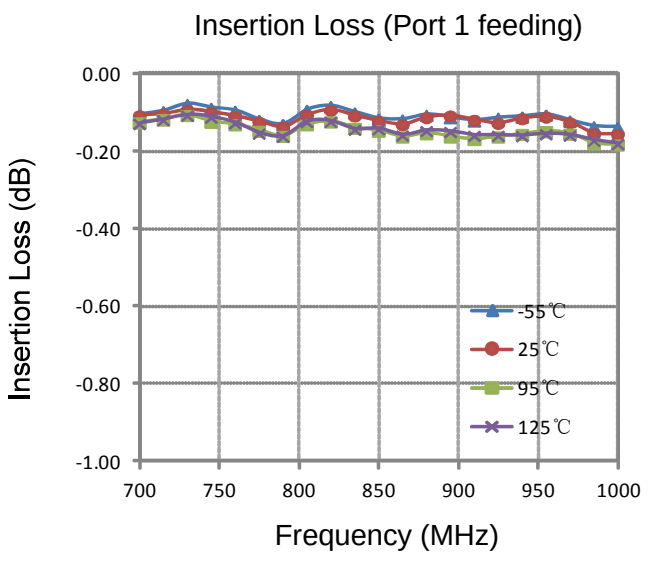
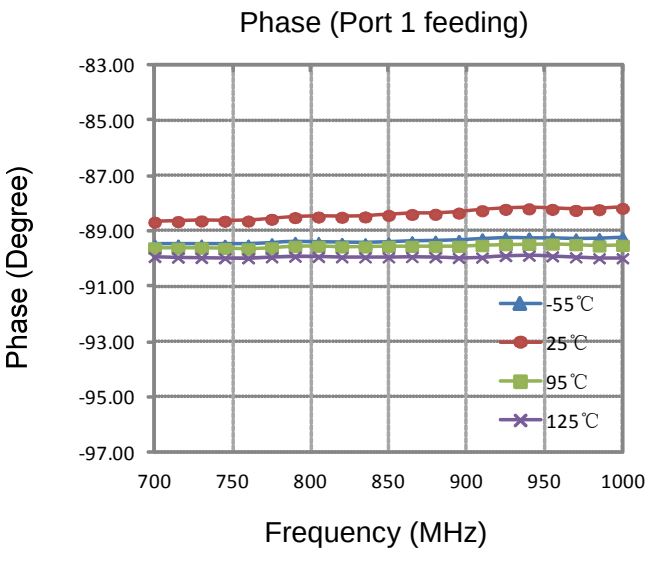
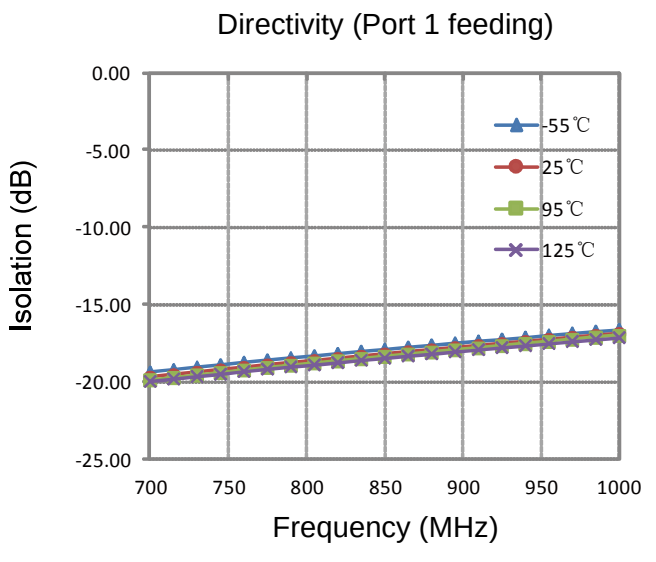
Typical Performance (-55°C, 25°C, 95°C, 125°C: 700-1000 MHz)









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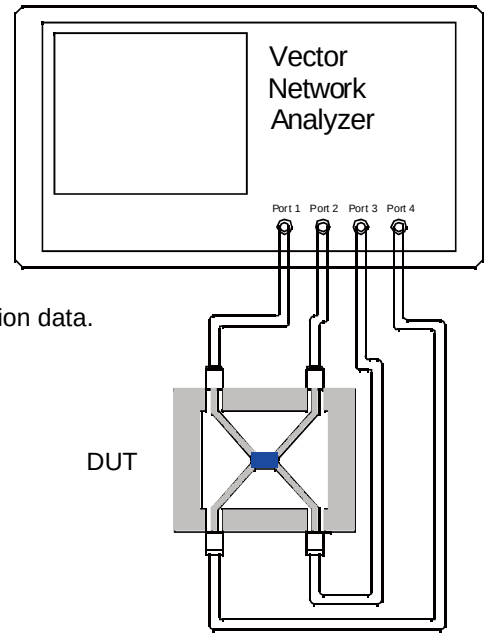
Description of Measured Specifications

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.
Phase Balance	The difference between coupling port and transmission port.

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 return loss port 1, port 2, port 3 & port 4.
7. According to the above data to calculate insertion loss, directivity and phase balance.



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
2300-2700	0.25

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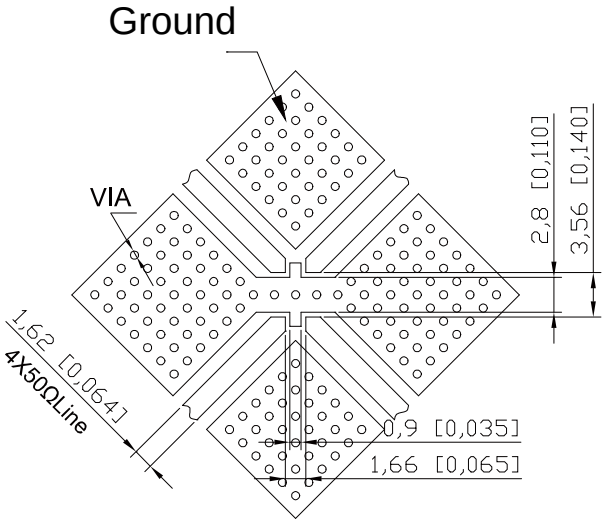
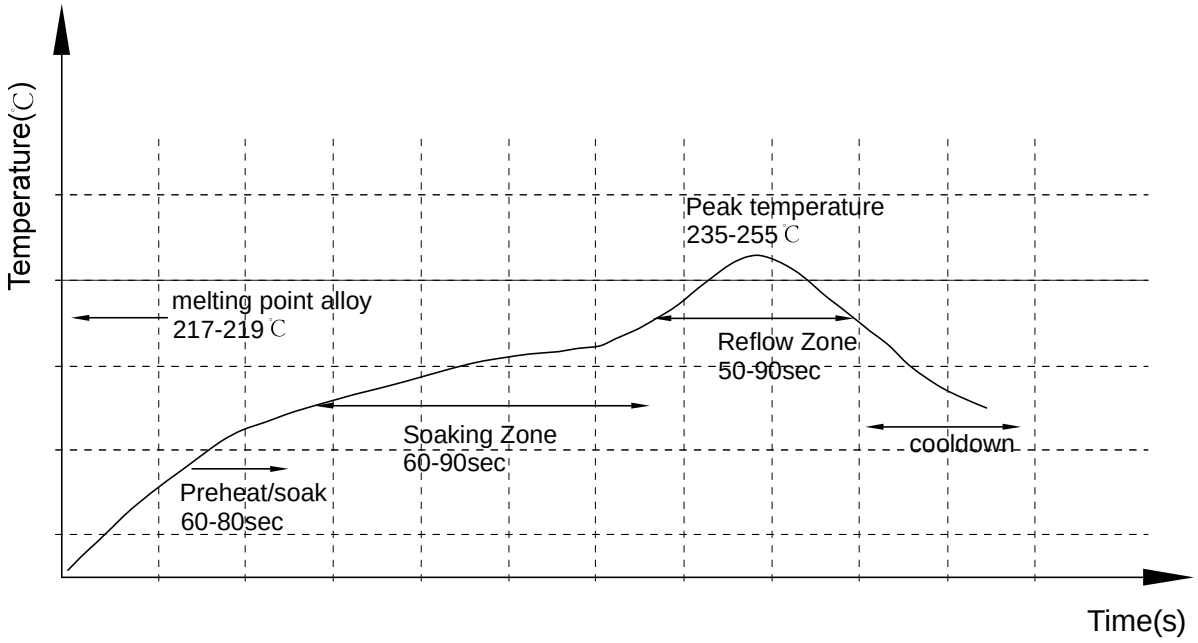
Recommended PCB Layout



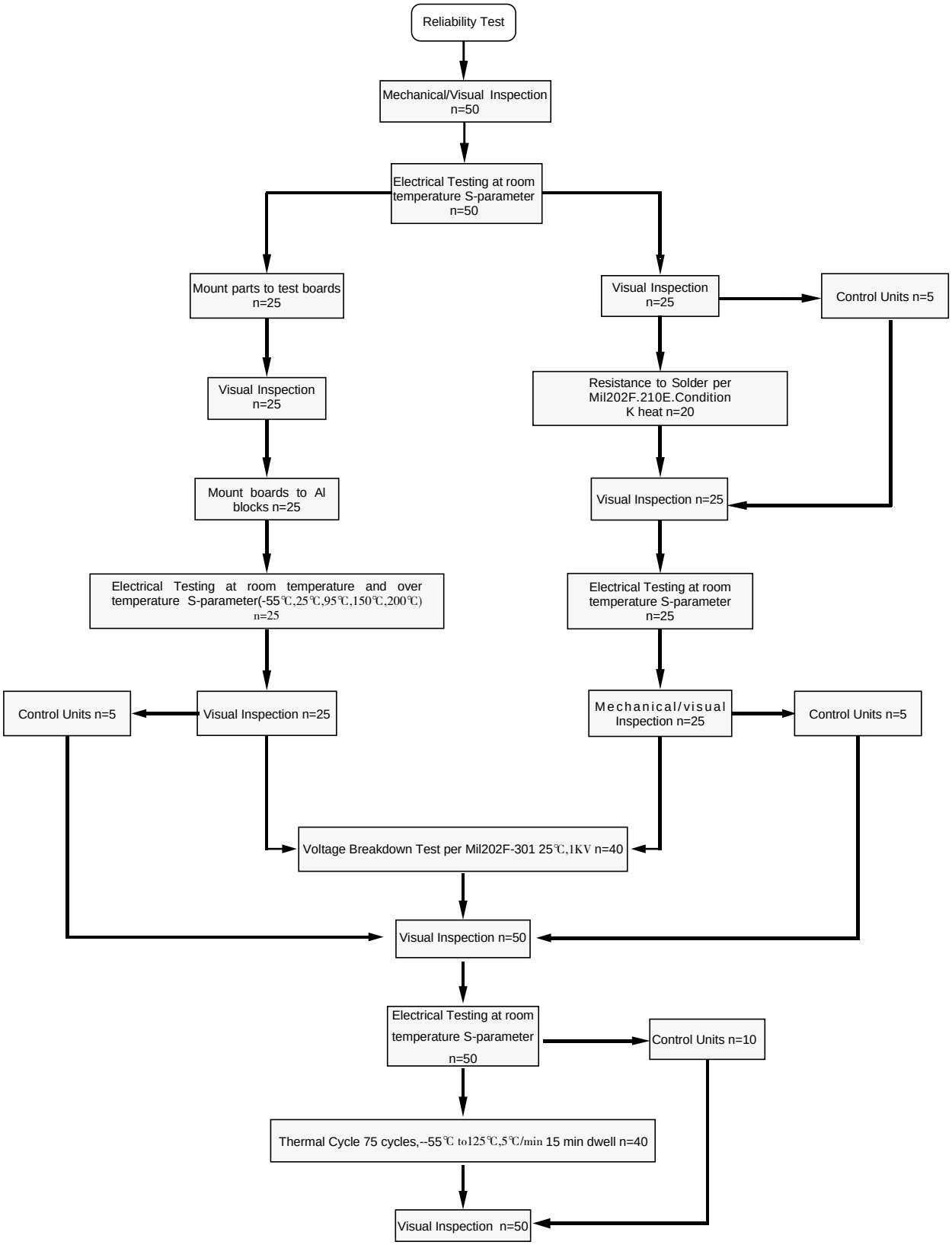
NOTE:

1. 50Ω line width is shown above designing from Er=3.66THK=0.762mm copper 1 OZ
2. Bottom side of the PCB is continuous ground plane.
3. All dimensions shown in mm [inch].

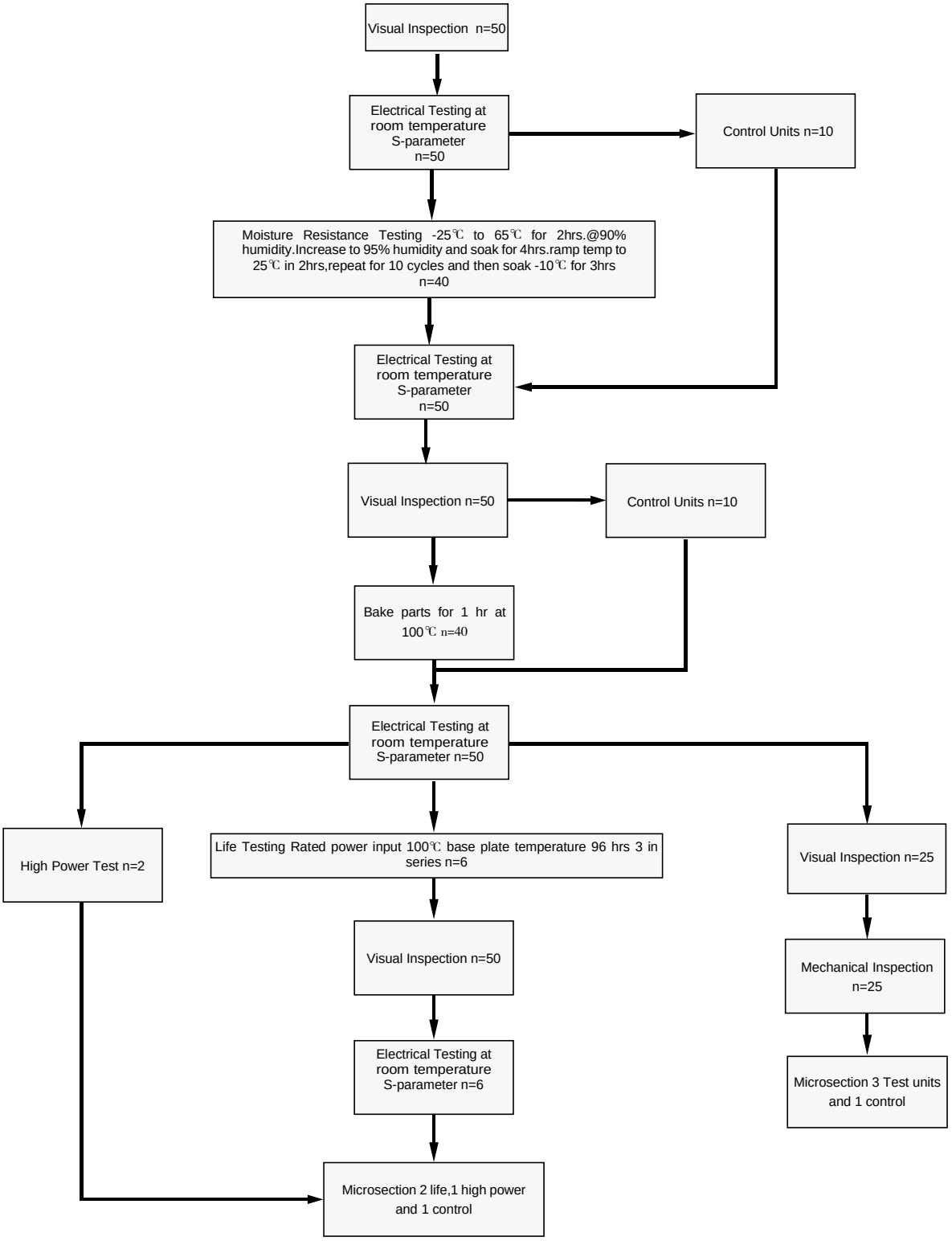
Reflow Profile



Reliability Test Flow



Reliability Test Flow



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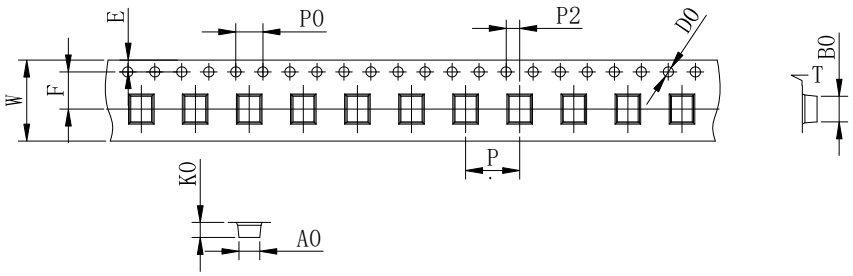
Tape and Reel Drawing

Feeding Direction



ITEM	W	A0	B0	K0	P	F	E	D	P0	P2	t	7"
DIM(mm)	16.0	3.45	5.35	2.3	8	7.5	1.75	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 -0.10	+0.10 -0.10	+0.05 -0.05	1000pcs

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.

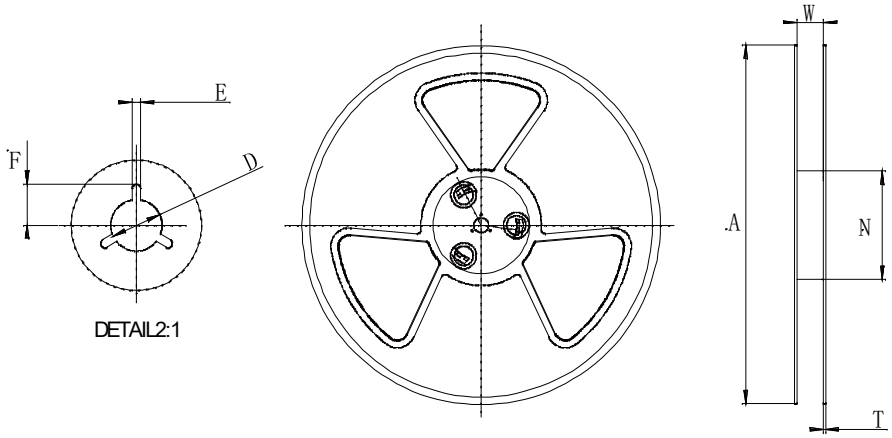
D. A0 & B0 measured as indicated.

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

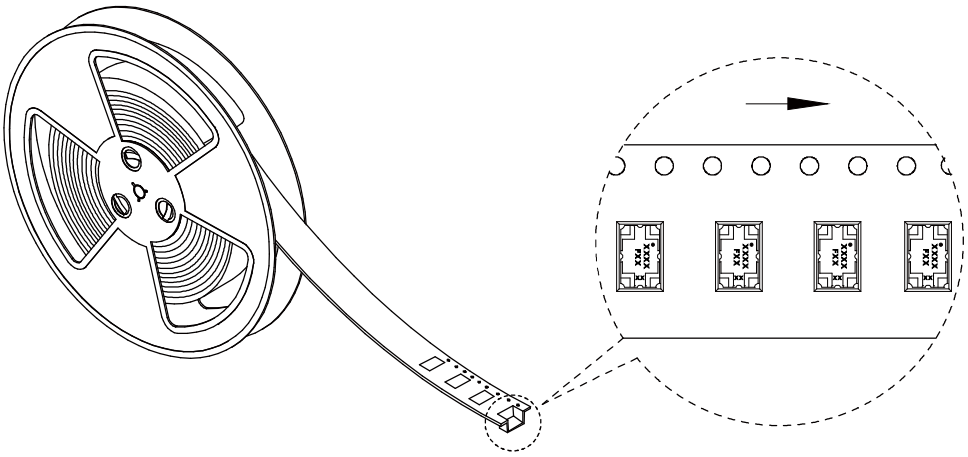
F. Material: PE 100

G. Thickness: 0.30±0.05mm

H. 1000 units (maximum) / T&R



Symbol	Dimensions(mm)
W	16.5±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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