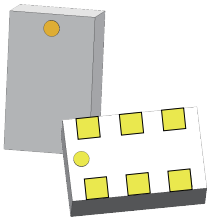
PD15T03

Ultra Low Profile 0805 Power Divider

Rev A1.4

Description

The PD15T03 is a low profile, sub-miniature Wilkinson power divider in an easy to use surface mount package. The PD15T03 is ideal for high volume manufacturing and delivers higher performances than traditional printed and lumped element solutions. The PD15T03 is matched to 50 Ω and has a height profile of 0.5 mm which is ideal for high level integrations in the following markets: DVB-S, DVB-H (USA), GSM, DCS, PCS, CDMA, 3G and GPS. The PD15T03 does not include the resistive element and therefore, requires an external resistor for operation. The PD15T03 is available on tape and reel for high volume manufacturing pick and place.



Features:

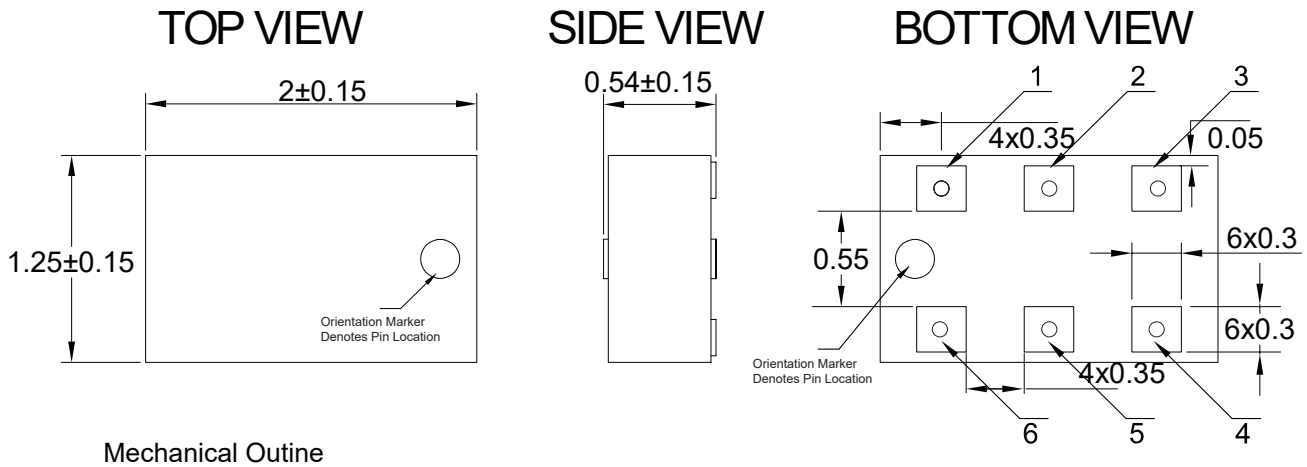
- **1100-1700 MHz**
- **High Return Loss**
- **0.5mm Height Profile**
- **50Ω Input / 50Ω Outputs**
- **Low Insertion Loss**
- **Surface Mountable**
- **Tape & Reel**
- **Non-conductive Surface**
- **RoHS Compliant**
- **External resistor required**
- **Halogen Free**

Electrical Specifications

Frequency	Isolation	Insertion Loss	Return LOSS
MHz	*dB Min*	*dB Max*	*Min (dB) Input/Output*
1100-1700	10.5	0.6	12/16
Amplitude Balance	**Phase Balance**	**Power**	**Operating Temp.**
dB Max	*Degrees*	*Avg. CW Watts at 105°C*	*°C*
± 0.15	± 3.0	2	-55 to +105

Notes:
1. All the above data are based on specified demo board.
2. Insertion loss:Thru board loss has been removed.
3. The part cannot be used near the shielding case.

Mechanical Outline



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

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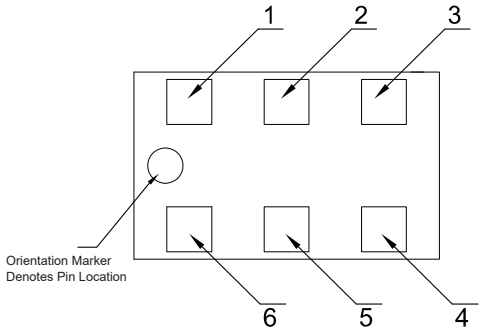
Power Divider Pin Configuration

The PD15T03 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	Designation
1	GND
2	input
3	GND
4	Output 1
5	GND
6	Output 2

Typical Performance Data (@25℃)

Frequency (MHz)	S12 (dB)	S13 (dB)	Insertion Loss (dB)	Isolation (dB)	Amplitude Balance (dB)	Phase (degree)	Return Loss(dB)		
							S11	S22	S33
1100	-3.30	-3.64	-0.40	-21.96	0.35	-0.78	-19.67	-19.15	-16.82
1130	-3.29	-3.64	-0.40	-23.22	0.35	-0.77	-19.29	-18.65	-17.25
1160	-3.28	-3.64	-0.39	-24.72	0.35	-0.74	-18.98	-18.32	-17.81
1190	-3.27	-3.64	-0.39	-26.45	0.37	-0.75	-18.65	-18.06	-18.21
1220	-3.28	-3.65	-0.39	-27.98	0.37	-0.74	-18.35	-17.65	-18.55
1250	-3.27	-3.64	-0.39	-29.50	0.37	-0.71	-18.13	-17.27	-19.10
1280	-3.27	-3.65	-0.39	-30.30	0.38	-0.70	-17.94	-17.00	-19.52
1310	-3.27	-3.66	-0.39	-29.98	0.39	-0.69	-17.64	-16.67	-19.55
1340	-3.27	-3.66	-0.39	-28.75	0.39	-0.68	-17.34	-16.25	-19.70
1370	-3.27	-3.67	-0.40	-27.26	0.40	-0.65	-17.10	-15.93	-19.72
1400	-3.27	-3.68	-0.40	-25.79	0.41	-0.69	-16.80	-15.66	-19.64
1430	-3.28	-3.70	-0.41	-24.39	0.41	-0.67	-16.41	-15.23	-19.11
1460	-3.29	-3.71	-0.42	-23.17	0.42	-0.61	-16.06	-14.84	-18.64
1490	-3.30	-3.72	-0.44	-22.18	0.42	-0.65	-15.73	-14.55	-18.23
1520	-3.31	-3.74	-0.45	-21.22	0.43	-0.62	-15.42	-14.23	-17.71
1550	-3.33	-3.76	-0.46	-20.39	0.44	-0.56	-15.05	-13.78	-16.99
1580	-3.34	-3.78	-0.48	-19.68	0.44	-0.55	-14.71	-13.45	-16.49
1610	-3.35	-3.80	-0.50	-18.97	0.45	-0.53	-14.37	-13.14	-15.97
1640	-3.38	-3.83	-0.52	-18.31	0.46	-0.48	-13.90	-12.74	-15.33
1670	-3.40	-3.86	-0.54	-17.83	0.46	-0.49	-13.45	-12.33	-14.74
1700	-3.42	-3.88	-0.56	-17.33	0.47	-0.48	-13.11	-12.06	-14.29

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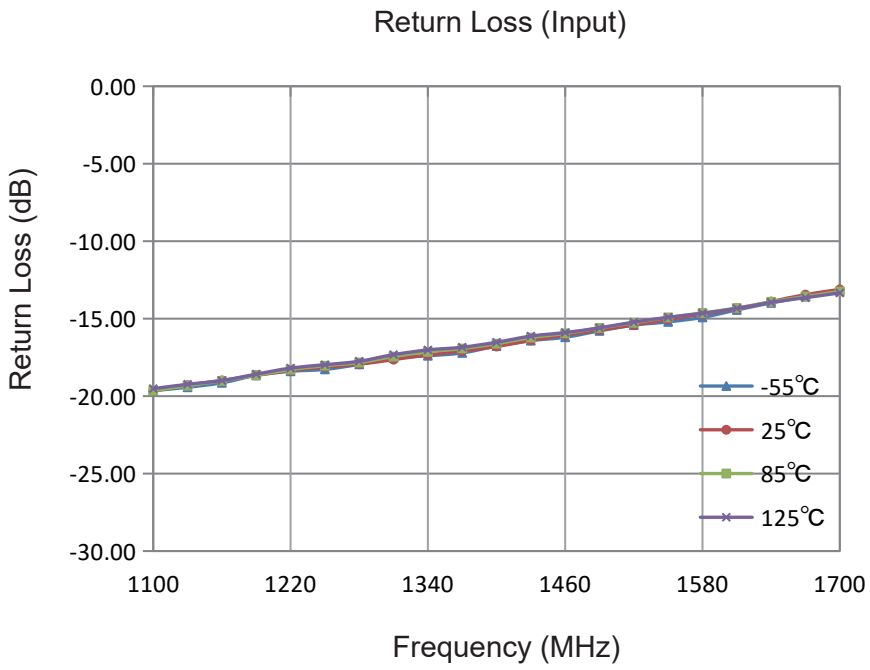
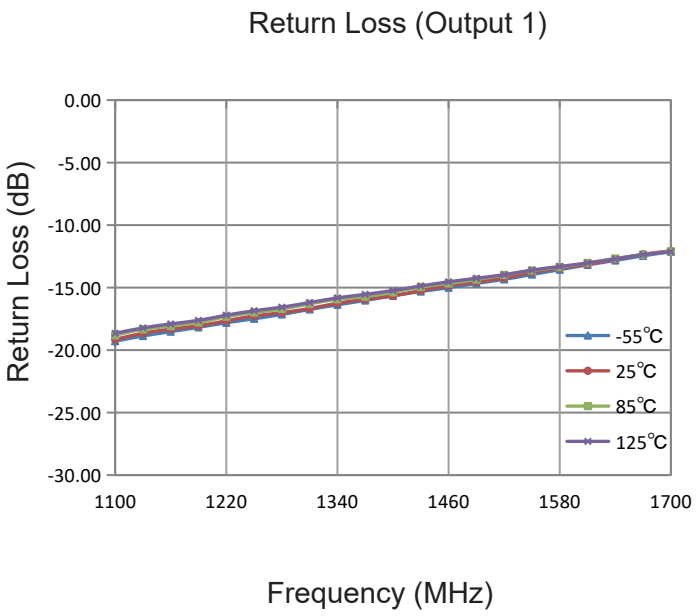
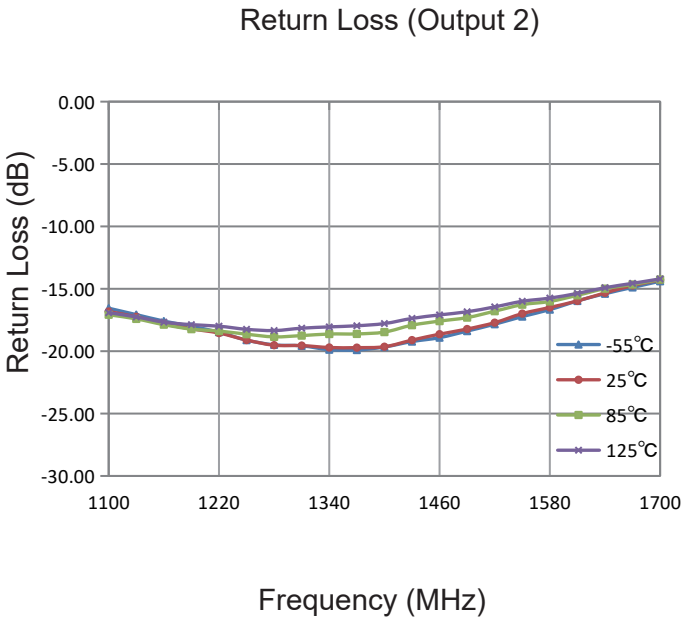
Typical Performance (-55°C,25°C,85°C,125°C: 1100-1700 MHz)







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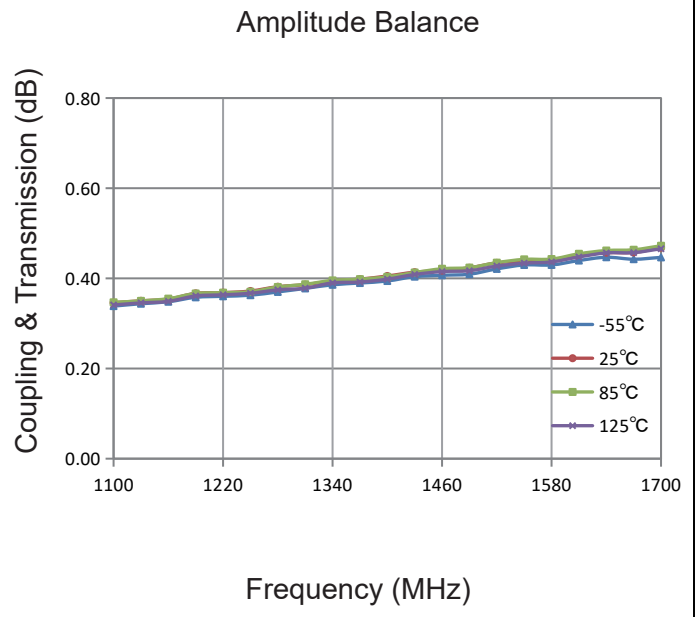

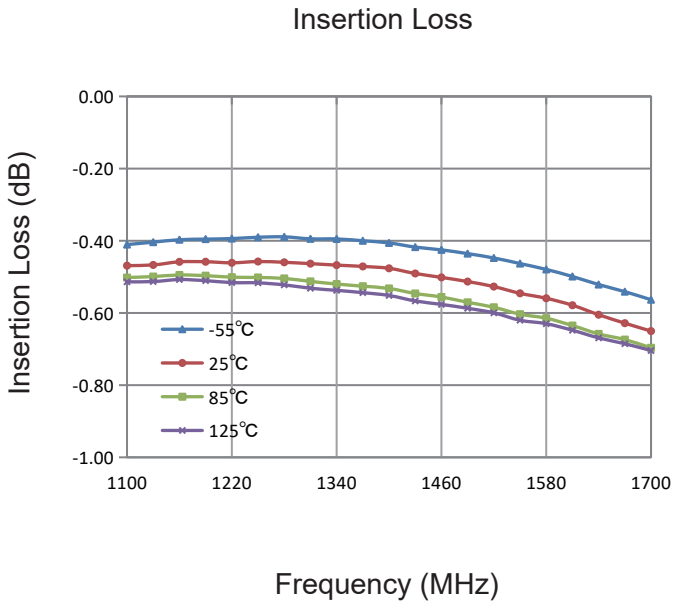

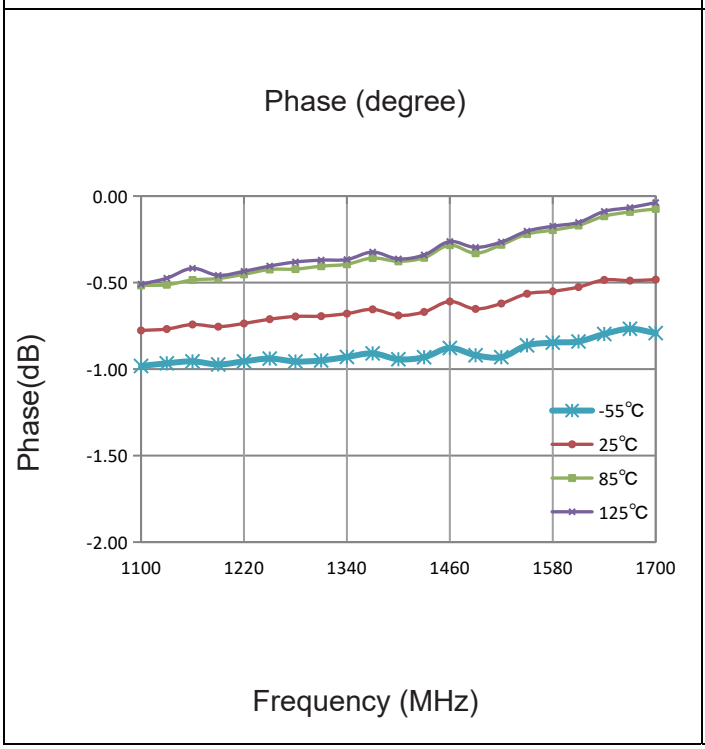

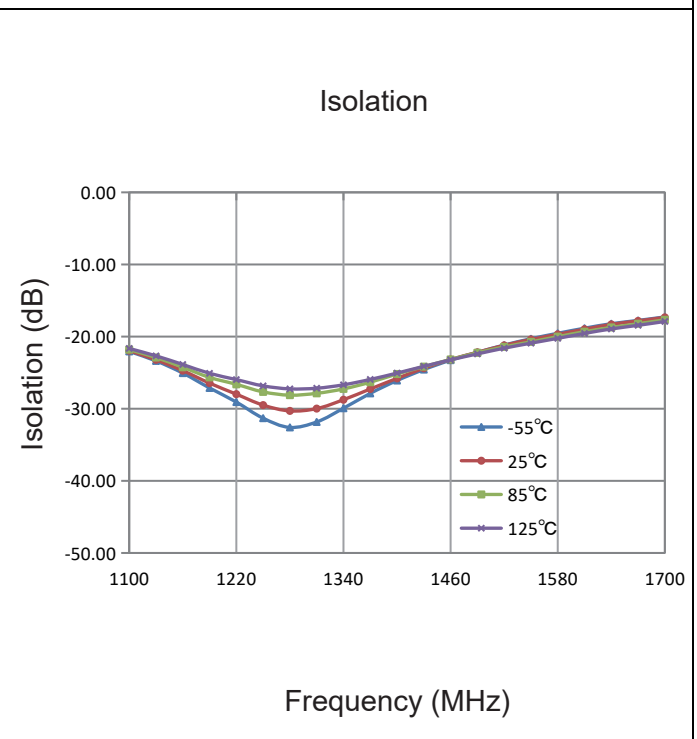

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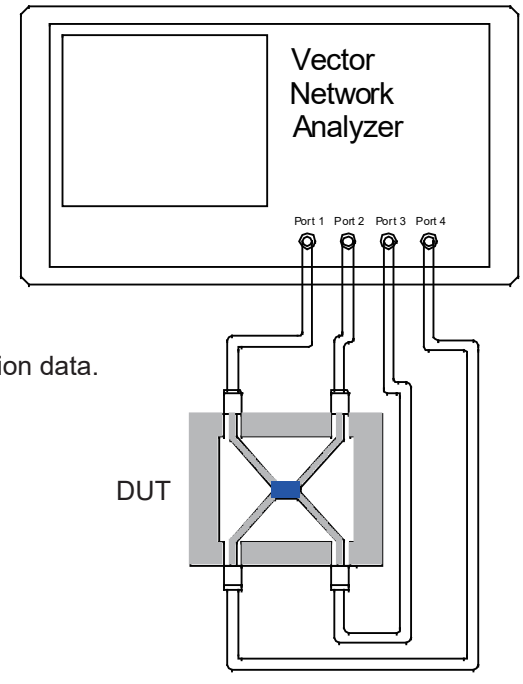
Definition of Measured Specifications

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

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
2300-2700	0.25

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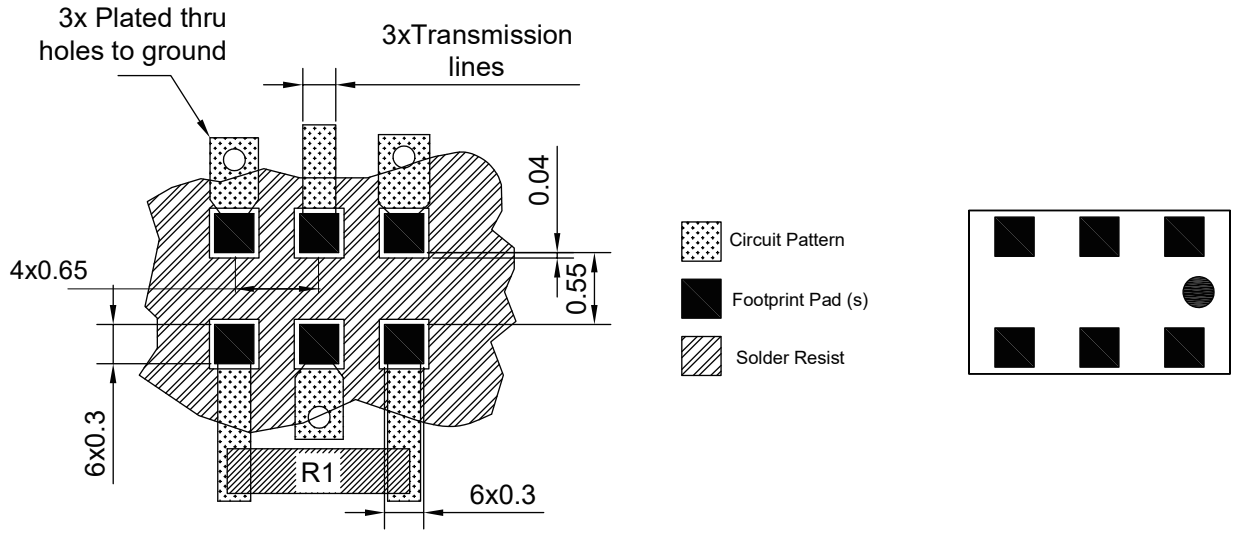
Mounting Configuration:

In order for surface mount components to work optimally, the proper impedance transmission lines must be used to connect to the RF ports. If this condition is not satisfied, insertion loss, Isolation and VSWR may not meet published specifications.

An example of the PCB footprint used in the testing of these parts is shown below. In specific designs, the transmission line widths need to be adjusted to the unique dielectric coefficients and thicknesses as well as varying pick and place equipment tolerances. In addition, since the PD15T03 is a Wilkinson power divider, an external 0603 100Ω resistor must be mounted in locations R1 as shown in the Figure below.

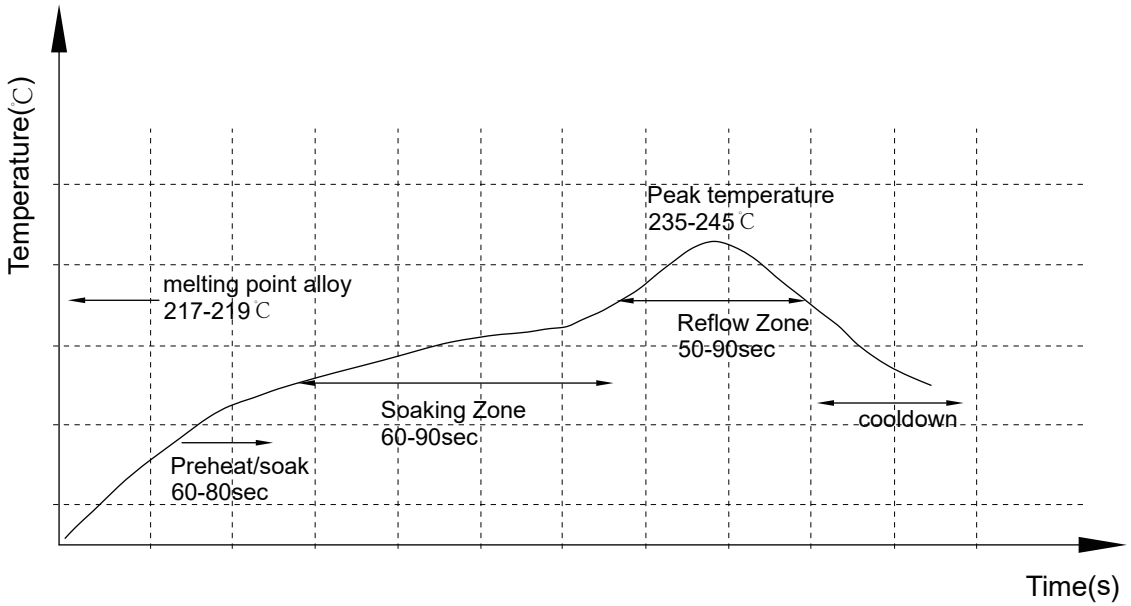
Pad Footprint w/ 0603 Resistor Locations



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



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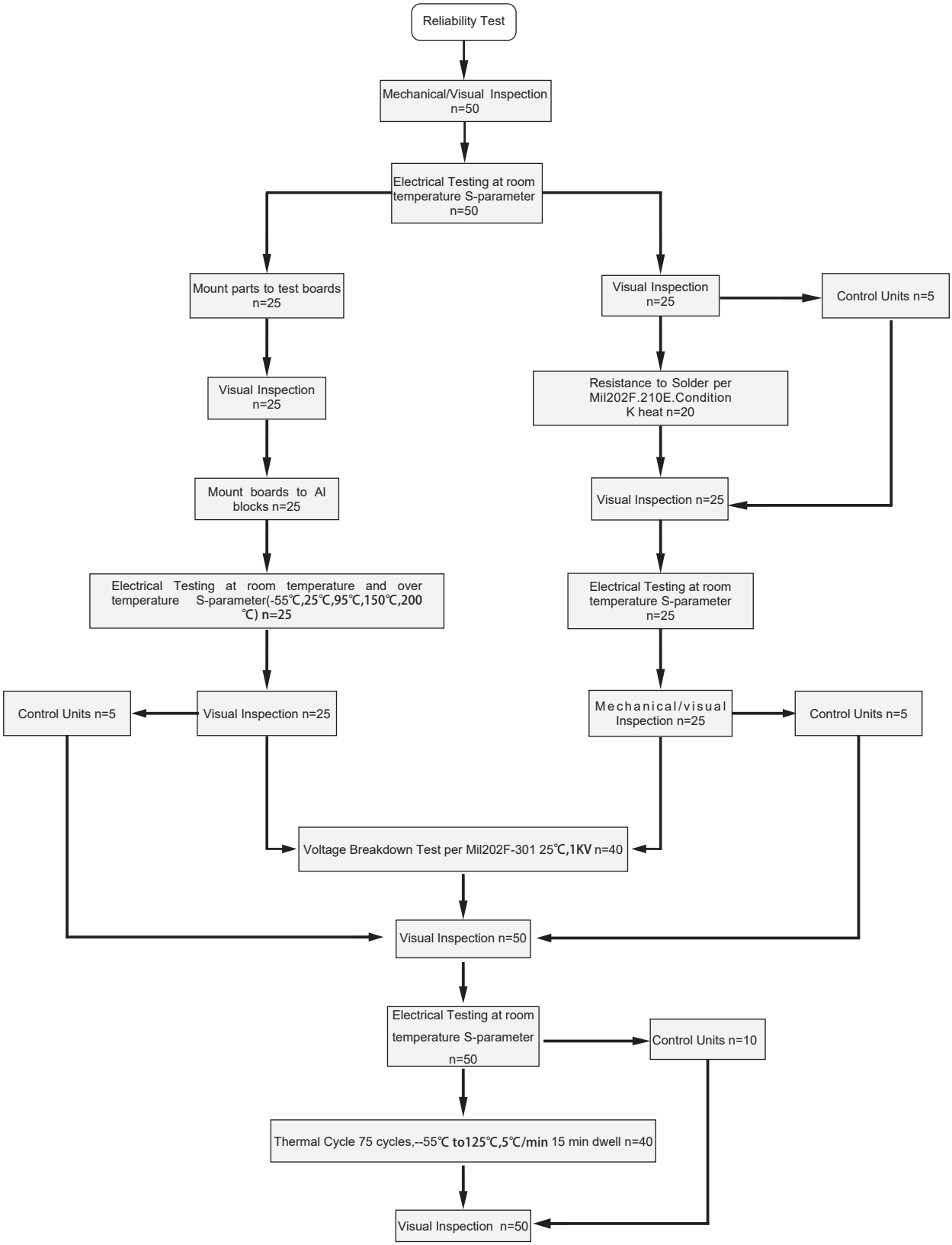
Reliability Test Flow



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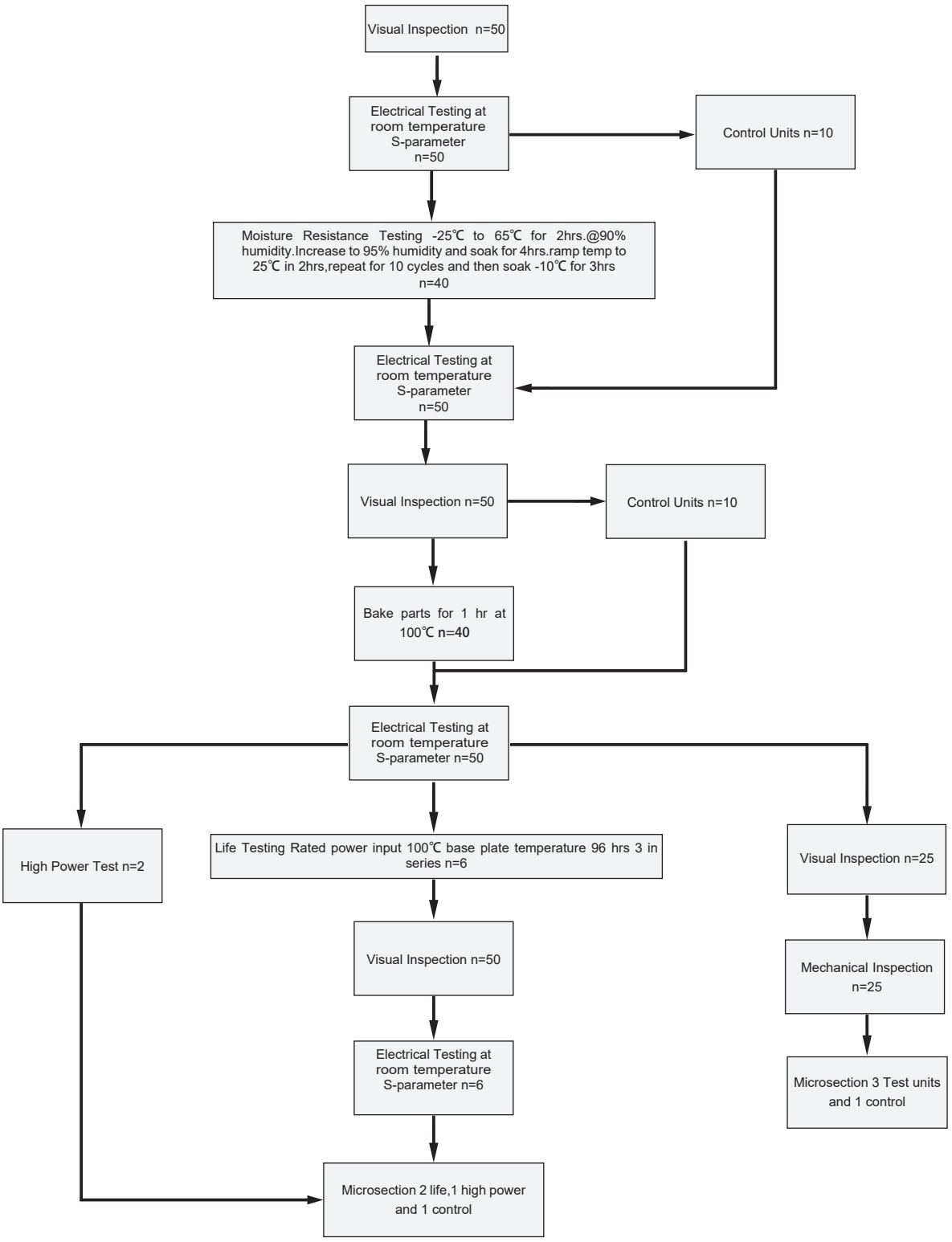
Reliability Test Flow



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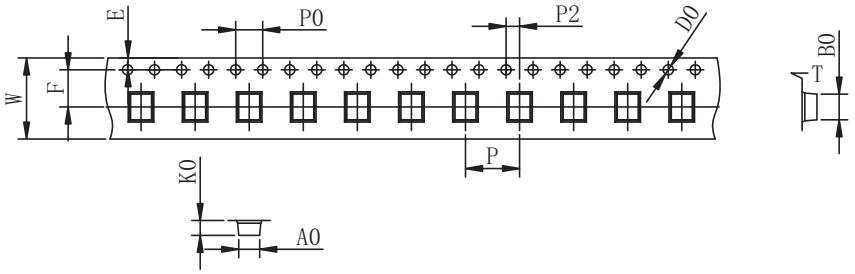
Tape and Reel Drawing

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.

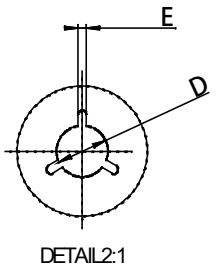
D. A0 & B0 measured as indicated.

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

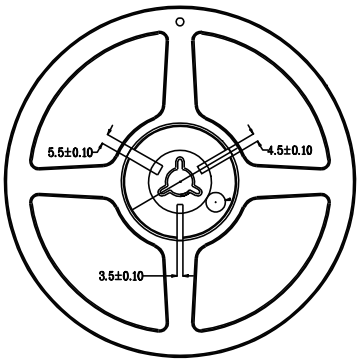
F. Material: PE 100

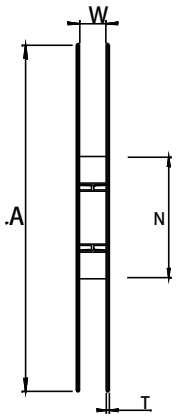
G. Thickness: 0.20±0.05mm

H. 5000 units (maximum) / T&R

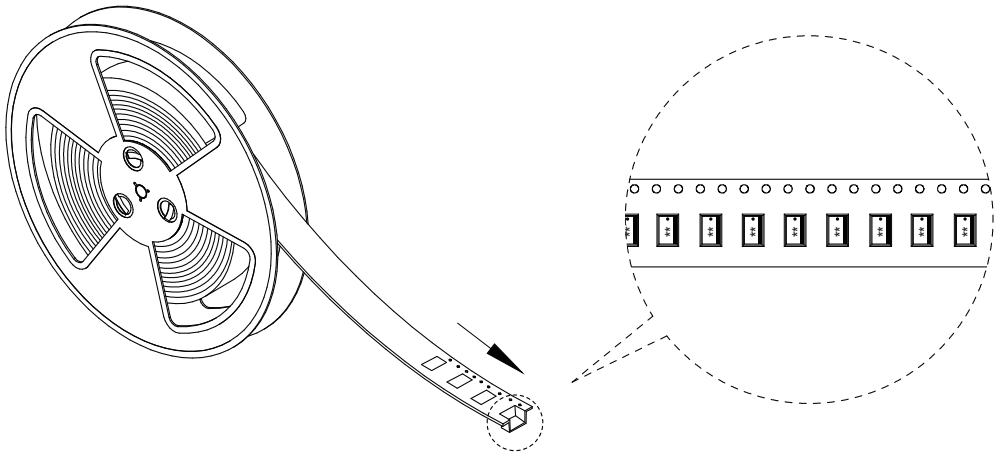


DETAIL2:1





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



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