

# General Technical Information

To

**Non-Controlled Copy**

CUSTOMER'S PRODUCT NAME
-------------------------

TDK'S PRODUCT NAME
<b>RF Components</b>
(DEA, DPX, TPX, HHM, ANT, DLF series)

Please return this specification to TDK representatives.  
If orders are placed without returned specification, please allow us to judge that specification is accepted by your side.

RECEIPT CONFIRMATION
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DATE:    YEAR    MONTH    DAY

TDK Corporation  
Sales  
Electronic Components Sales &  
Marketing Group

Engineering  
Electronic Components Business Company  
Communication Devices Business Group

APPROVED	Person in charge

APPROVED	CHECKED	Person in charge

## RF Components

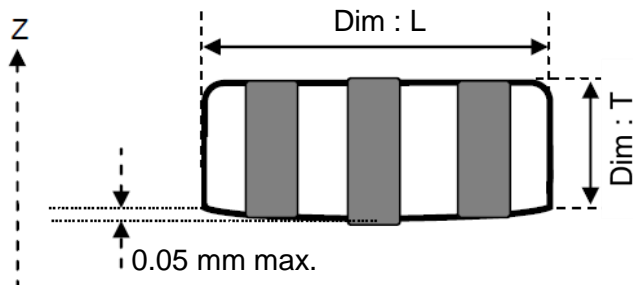
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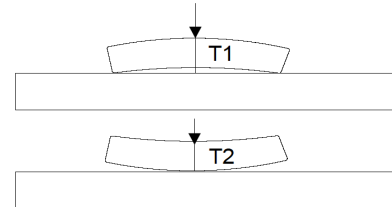
## RF Components

### ■ Coplanarity

0.05mm max. difference in Z-direction as follows :



Coplanarity measurement method  
Coplanarity = T1-T2



Each terminal extends the full length of the TDK RF Components.  
Hence, any coplanarity deviation between terminals is due to curvature in the substrate.  
TDK guarantees that the edge of each terminal is within 0.05mm of the horizontal plane.  
For specifications of each product, please contact us.

### ■ Storage Conditions

Temperature	: +5 to +30 °C
Humidity	: 20 to 70% RH
Term of storage	: Within 6 months <sup>*1</sup>
	: Within 6 months (Before opening a plastic bag)
	: Within 1 month (After opening a plastic bag) <sup>*2</sup>
Baking	: Unnecessary

\*1 After the 6 months, confirm solderability before use.

\*2 After the 1 month, confirm solderability before use.

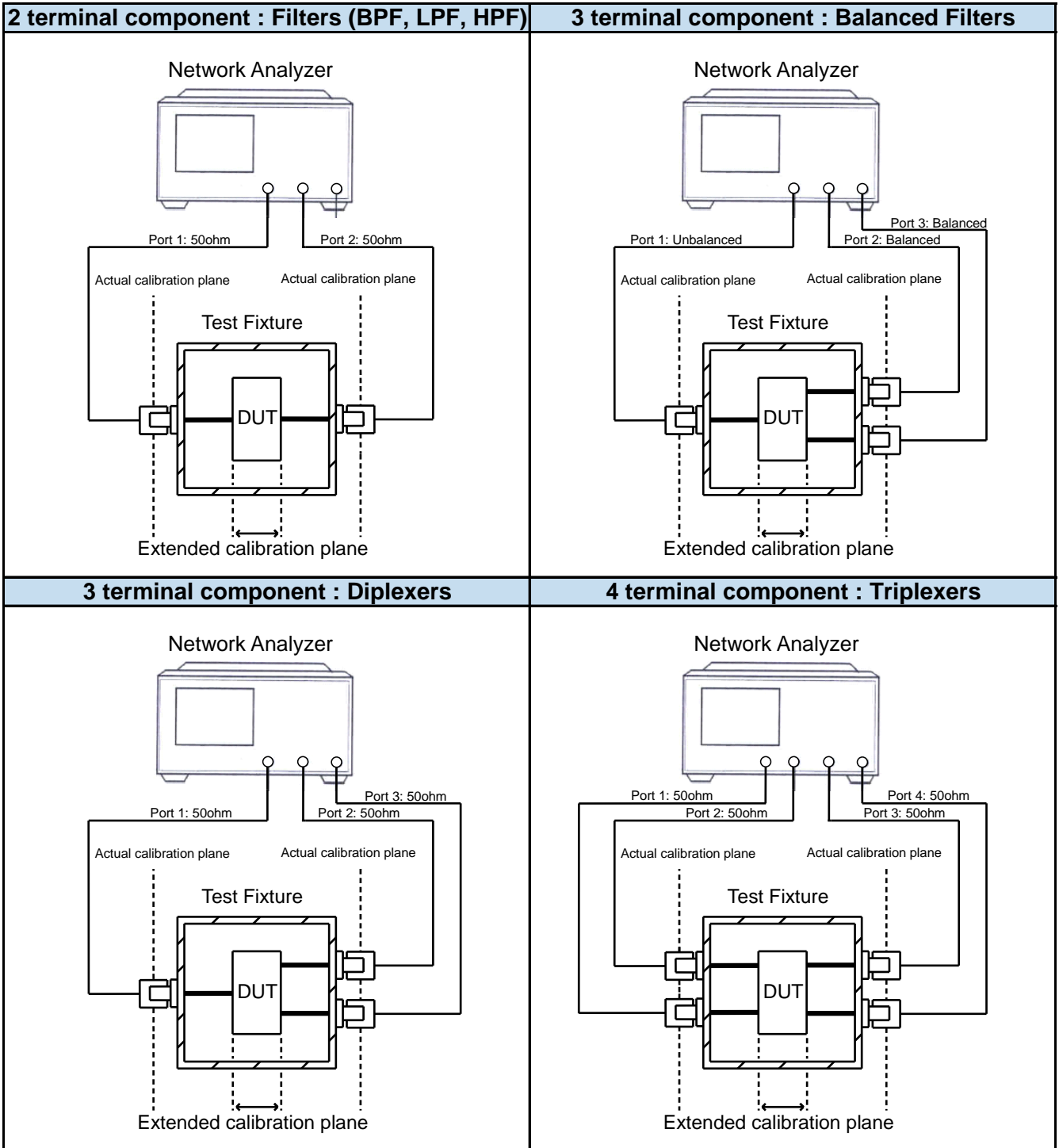
### ■ Moisture Sensitivity Level

MSL : Equal to LEVEL 1

Note : Product is not resin molded type. Baking is not required.

# RF Components

## ■ Test Circuit



Note1 : The Port Extension function on the Network Analyzer is used to extend the calibration plane to the DUT terminals.

Note2 : Loss in the PCB traces is compensated for by measurement data taken on a PCB Thru' line.

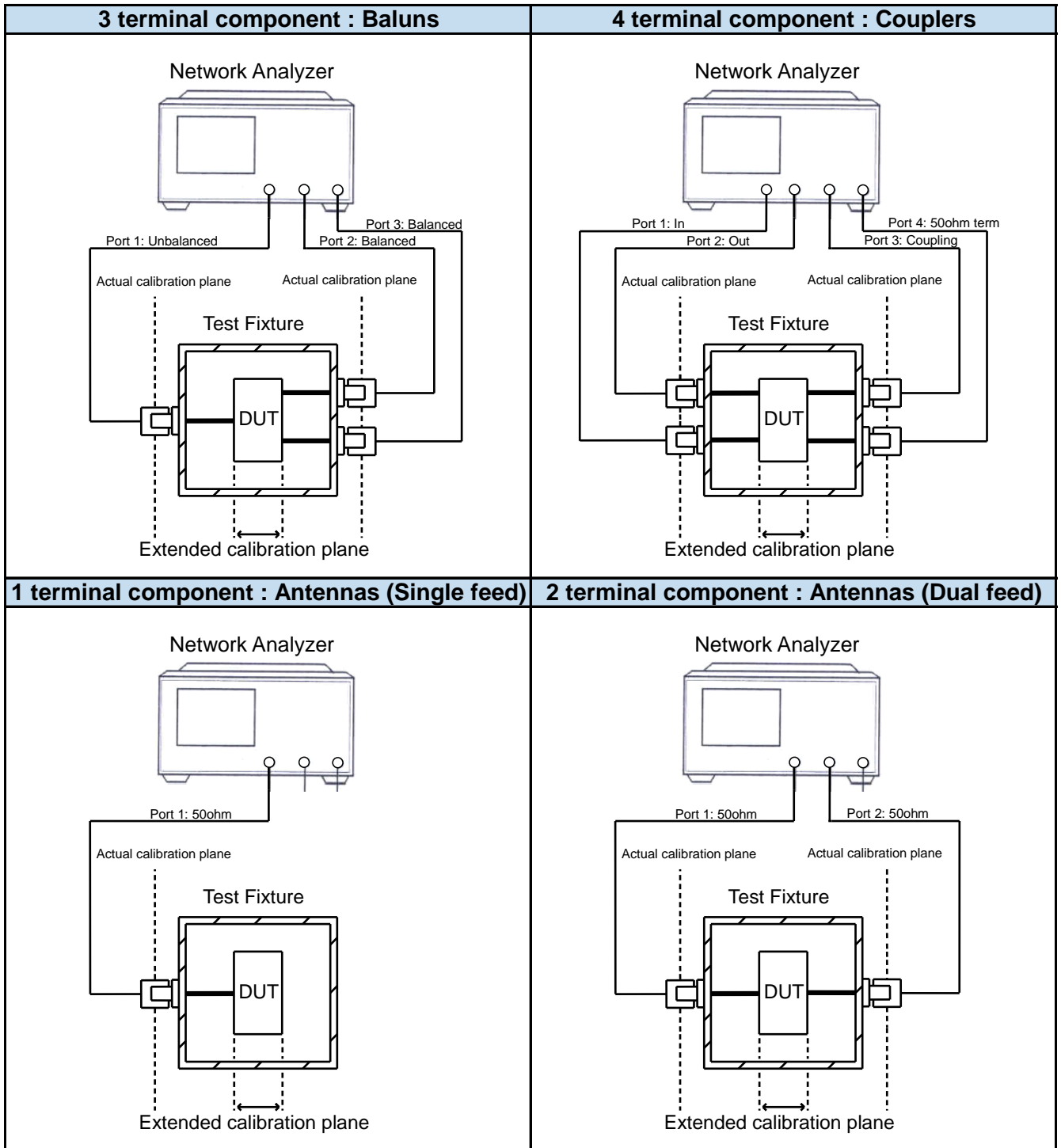
Note3 : Line width of evaluation board should be designed to match 50 ohm characteristic impedance depending on PCB material and thickness.

All specifications are subject to change without notice.

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# RF Components

## ■ Test Circuit



Note1 : The Port Extension function on the Network Analyzer is used to extend the calibration plane to the DUT terminals.

Note2 : Loss in the PCB traces is compensated for by measurement data taken on a PCB Thru' line.

Note3 : Line width of evaluation board should be designed to match 50 ohm characteristic impedance depending on PCB material and thickness.

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## RF Components

### ■ Test Methods (Commercial Grade)

This product satisfies the electrical specification after the following tests.

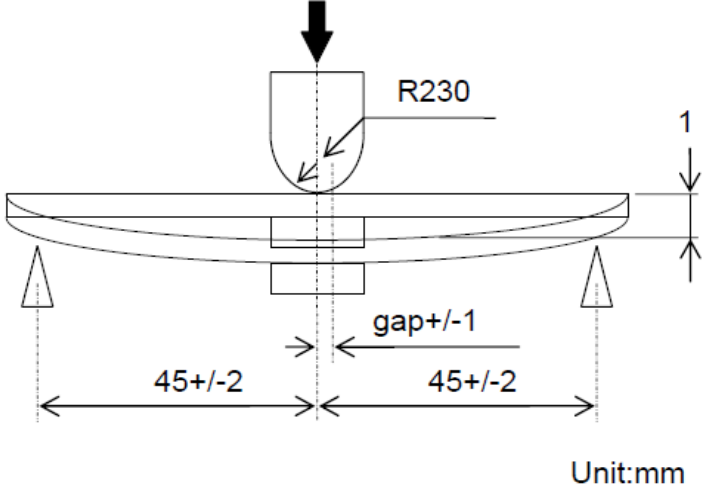
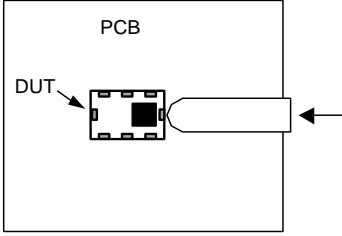
Measurement shall be conducted after test sample is kept at room temperature for 1 to 2 hours.

Items	Test methods
Temperature Characteristics	According to JIS C 60068-2-1 & JIS C 60068-2-2 Initial measurement shall be taken at +25°C. Repeat measurement over operating temperature range (-40°C to +85°C).
High Temperature Storage	According to JIS C 60068-2-2 +85°C±2°C for 1,000 hrs.
Low Temperature Storage	According to JIS C 60068-2-1 -40°C±2°C for 500 hrs.
Humidity (Steady State)	According to JIS C 60068-2-67 +60°C±2°C, 90~95% R.H. for 1,000 hrs.
Thermal Shock (In Air)	According to JIS C 60068-2-14 -40°C to +85°C for 350 cycles, 30 min. per cycle When moving the sample in the test chamber, moving time must not exceed 3 minutes.
Vibration (Sinusoidal)	According to JIS C 60068-2-6 Vibrate the component with amplitude of 1.52mm P-P, changing the frequencies from 10Hz to 500Hz. Repeat this for 2 hours each in 3 perpendicular directions.
Mechanical Shock	According to JIS C 60068-2-27 Acceleration : 1000 m/s <sup>2</sup> (102G) Duration : 6 sec Direction : X, Y, Z ,X', Y' ,Z' Cycle : 18 cyc (3 cycles each direction)
Solderability Test (Dipping Method)	According to JIS C 60068-2-58 & JIS C 60068-2-20 Dipped terminal surface shall be covered by at least 75% in solder after dipping in solder bath of 245°C±3°C for 3±0.3 sec. Solder composition : Sn-3.0Ag-0.5Cu Flux : 25wt% rosin + 75wt% isopropyl alcohol solution
Free Fall	According to JIS C 60068-2-32 Dropped onto steel plate or concrete from 100cm height three times.

# RF Components

## ■ Test Methods (Commercial Grade)

This product satisfies the electrical specification after the following tests.  
 Measurement shall be conducted after test sample is kept at room temperature for 1 to 2 hours.

Items	Test methods																
Bendability of Substrate	<p>According to JIS C 60068-2-21</p> <p>Solder specimen components on the test printed circuit board (L:100 x W:40 x T:0.8mm) in appended recommended PCB pattern apply the load in direction of the arrow until bending reaches 1mm for 5±1 sec.</p>  <p style="text-align: right;">Unit:mm</p>																
Adherence (Push test)	<p>According to JIS C 60068-2-21</p> <p>Solder specimen components on the test printed circuit board (L:100 x W:40 x T:0.8mm) in appended recommended PCB pattern apply the load in direction of the arrow until 2N to 5N for 5±1 sec.</p>  <table border="1" data-bbox="1077 1482 1495 1769"> <thead> <tr> <th>Component size</th> <th>Strength[N]</th> </tr> </thead> <tbody> <tr> <td>0.65 x 0.5 mm</td> <td>2</td> </tr> <tr> <td>1.0 x 0.5 mm</td> <td>5</td> </tr> <tr> <td>1.4 x 1.1 mm</td> <td>3</td> </tr> <tr> <td>1.6 x 0.8 mm</td> <td>5</td> </tr> <tr> <td>2.0 x 1.25 mm</td> <td>5</td> </tr> <tr> <td>2.0 x 1.5 mm</td> <td>5</td> </tr> <tr> <td>2.5 x 2.0 mm</td> <td>5</td> </tr> </tbody> </table>	Component size	Strength[N]	0.65 x 0.5 mm	2	1.0 x 0.5 mm	5	1.4 x 1.1 mm	3	1.6 x 0.8 mm	5	2.0 x 1.25 mm	5	2.0 x 1.5 mm	5	2.5 x 2.0 mm	5
Component size	Strength[N]																
0.65 x 0.5 mm	2																
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2.0 x 1.5 mm	5																
2.5 x 2.0 mm	5																

## RF Components

### ■ Test Methods (Automotive Grade of ANT series)

This product satisfies the electrical specification after the following tests.

Items	Test methods
Pre- and Post-Stress Electrical Test	According to User Spec. Test is performed except as specified in the applicable stress reference and the additional requirements in Table 5.
High Temperature Exposure (Storage)	According to MIL-STD-202 Method 108 1000 hrs. at rated operating temperature 85°C. Unpowered. Measurement at 24±2 hours after test conclusion. Interval 250hrs, 500hrs
Temperature Cycling	According to JESD22 Method JA-104 1000 cycles (-40°C to +85°C). Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 3 min. maximum transition time. Interval 250hrs, 500hrs
Biased Humidity	According to MIL-STD-202 Method 103 1000 hours 85°C/85%RH. Unpowered. Measurement at 24±4 hours after test conclusion. Interval 250hrs, 500hrs
Operational Life	According to MIL-STD-202 Method 108 1000 hrs. @ 85°C part will be tested at that temperature. Rated power(+4dBm). Measurement at 24±4 hours after test conclusion. Interval 250hrs, 500hrs
External Visual	According to MIL-STD-883 Method 2009 Inspect device construction, marking and workmanship. Electrical Test not required.
Physical Dimension	According to JESD22 Method JB-100 Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical Test not required.
Terminal Strength (Leaded)	According to MIL-STD-202 Method 211 Test leaded device lead integrity only. Conditions: A (910 g), C (1.13 kg), E (1.45 kg-mm)
Resistance to Solvents	According to MIL-STD-202 Method 215 Note: Add Aqueous wash chemical. OKEM Clean or equivalent. Do not use banned solvents.

All specifications are subject to change without notice.

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## RF Components

### ■ Test Methods (Automotive Grade of ANT series)

This product satisfies the electrical specification after the following tests.

Items	Test methods
Mechanical Shock	According to MIL-STD-202 Method 213 Condition C Peak value(g's) = 100 duration (D) (ms) = 6
Vibration	According to MIL-STD-202 Method 204 5g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"X5" PCB, .031" thick, 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000 Hz.
Resistance to Soldering Heat	According to MIL-STD-202 Method 210 Condition B Dip : Pb free (Sn-3Ag-0.5Cu), 260 ±5(solder temp) 10 ±1(sec), 25mm/s ±6 mm/s
ESD	According to MIL-STD-883 Method 3015.8 HBM ESD Cd=100pF. Rd=2000ohm.
Solderability	According to J-STD-002 SMD: a) Method B, 4 hrs @ 155°C dry heat @ 235°C 5sec b) Method B @ 215°C 10sec category 3. c) Method D category 3 @ 260°C 10sec
Electrical Characterization	According to User Spec. Parametrically test per lot and sample size requirements, summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperatures.
Flammability	According to UL-94 V-0 or V-1 Acceptable
Board Flex	According to AEC-Q200-005 Bend = 2mm. 60sec PCB 100x40mm t=1.6mm
Terminal Strength (SMD)	According to AEC-Q200-006 Force of 1.8kg for 60 sec.

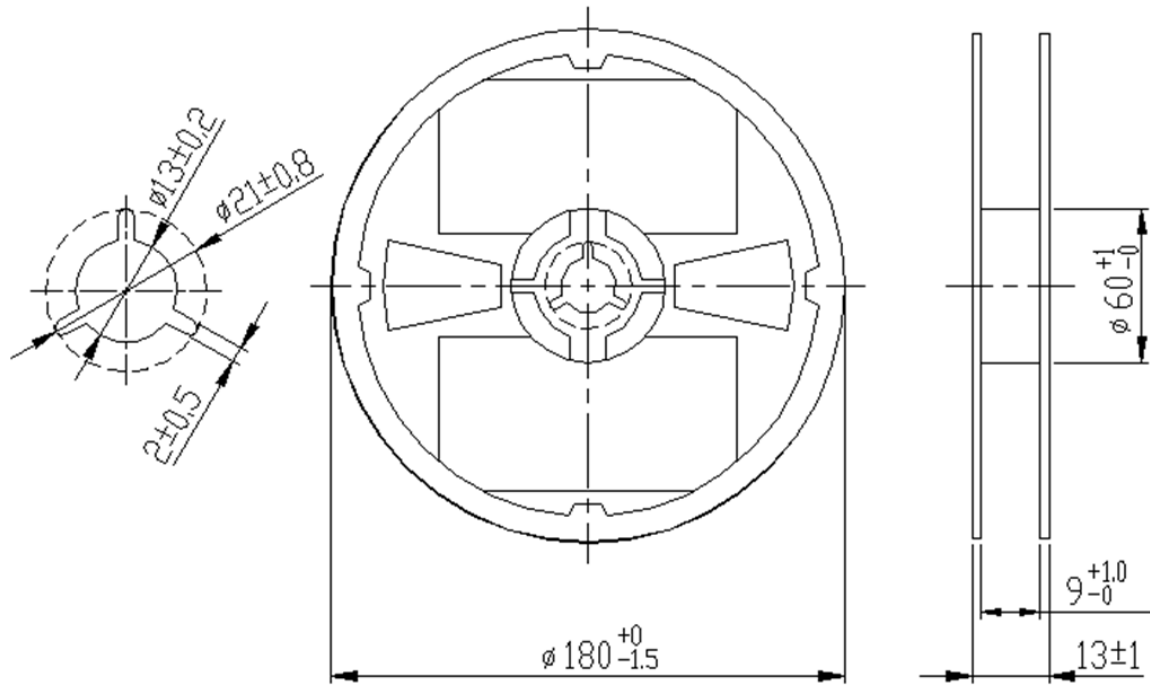
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## RF Components

### ■ Reel Dimensions

Specified according to JIS C 0806-3



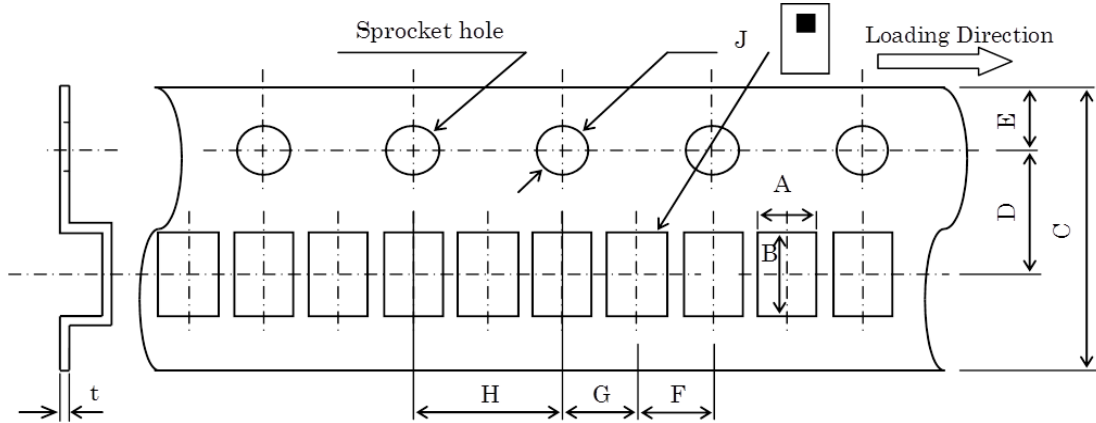
Dimensions in mm

Material : Plastic

# RF Components

## Carrier Tape Dimensions

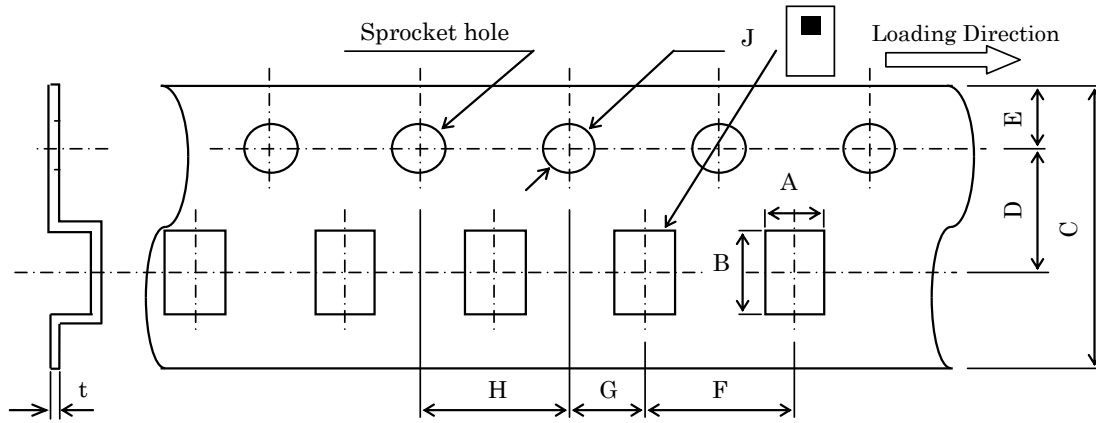
Specified according to JIS C 0806-3



Material : Plastic

Tape dimensions (mm) & Standard package quantity (pcs/reel)

Component size	A	B	C	D	E	F	G	H	J	t	Quantity
0.65 x 0.5 mm	0.6 +/-0.03	0.8 +/-0.03	8.0 +0.3/-0.1	3.5 +/-0.05	1.75 +/-0.1	2.0 +/-0.05	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.2 +/-0.06	10,000
1.0 x 0.5 mm	0.62 +/-0.05	1.12 +/-0.05	8.0 +/-0.2	3.5 +/-0.05	1.75 +/-0.1	2.0 +/-0.05	2.0 +/-0.05	4.0 +/-0.05	1.5 +0.1/-0	0.25 +/-0.05	10,000



Material : Plastic

Tape dimensions (mm) & Standard package quantity (pcs/reel)

Component size	A	B	C	D	E	F	G	H	J	t	Quantity
1.4 x 1.1 mm	1.35 +/-0.05	1.65 +/-0.05	8.0 +/-0.2	3.5 +/-0.05	1.75 +/-0.1	4.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.25 +/-0.05	4,000
1.6 x 0.8 mm	0.97 +/-0.05	1.8 +/-0.05	8.0 +/-0.2	3.5 +/-0.05	1.75 +/-0.1	4.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.25 +/-0.05	4,000
2.0 x 1.25 mm	1.45 +/-0.1	2.2 +/-0.1	8.0 +0.3/-0.1	3.5 +/-0.05	1.75 +/-0.1	4.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.25 +/-0.05	2,000
2.0 x 1.5 mm	1.75 +/-0.1	2.3 +/-0.1	8.0 +/-0.2	3.5 +/-0.05	1.75 +/-0.1	4.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.3 +/-0.05	2,000
2.5 x 2.0 mm	2.2 +/-0.1	2.7 +/-0.1	8.0 +0.3/-0.1	3.5 +/-0.05	1.75 +/-0.1	4.0 +/-0.1	2.0 +/-0.05	4.0 +/-0.1	1.5 +0.1/-0	0.25 +/-0.05	2,000

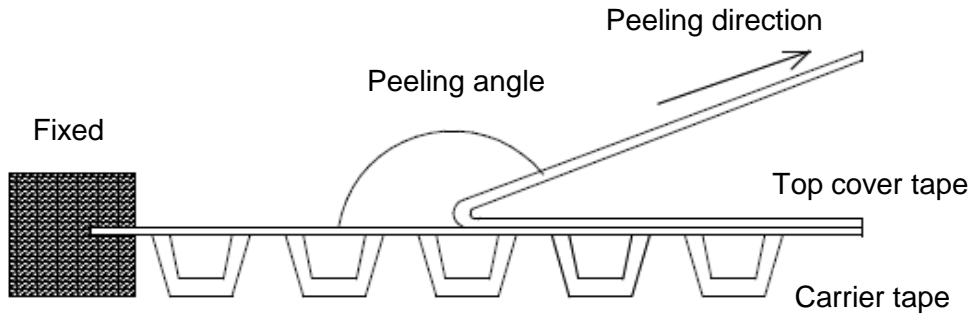
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## RF Components

### Carrier Tape Peel Back Force

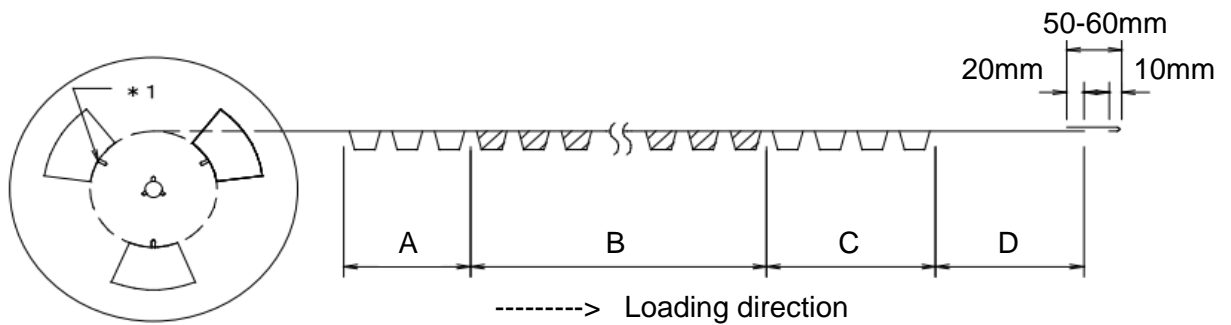
Specified according to JIS C 0806-3  
 Peel back force of top tape



- Peel Angle : 165 to 180 degree against the fixed surface of tape
- Peel Speed : 300mm ± 10mm per min
- Peel Force : 0.1 to 1.0 N (8mm tape width)

### Leader and Trailer Tape Length

Specified according to JIS C 0806-3

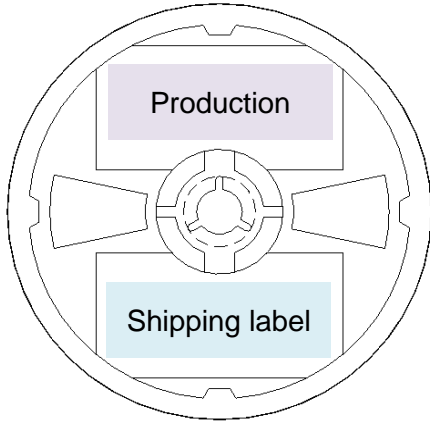


- A : Trailer Section (Blank components) 160mm min.
- B : Component Section
- C : Leader Section 100mm min.
- D : Top cover tape (Alone) 400mm min. (C+D)

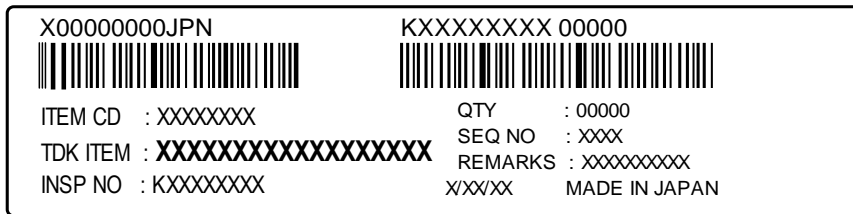
# RF Components

## Label

Reel label placement



Production label example



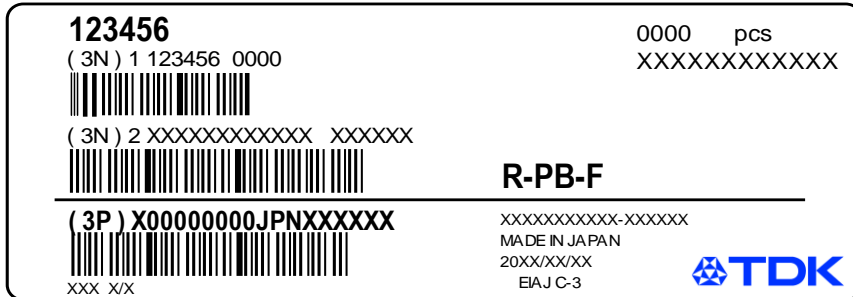
- |          |                     |               |                                   |
|----------|---------------------|---------------|-----------------------------------|
| ITEM CD  | : TDK item code     | QTY           | : Quantity                        |
| TDK ITEM | : TDK part number   | SEQ NO        | : Production lot reference number |
| INSP NO  | : Inspection number | REMARKS       | : Production lot number           |
|          |                     | X/XX/XX       | : Date (year / month / day)       |
|          |                     | MADE IN JAPAN | : Country of origin               |

# RF Components

## Label

Shipping label example

Individual / Inner label for domestic



Left side

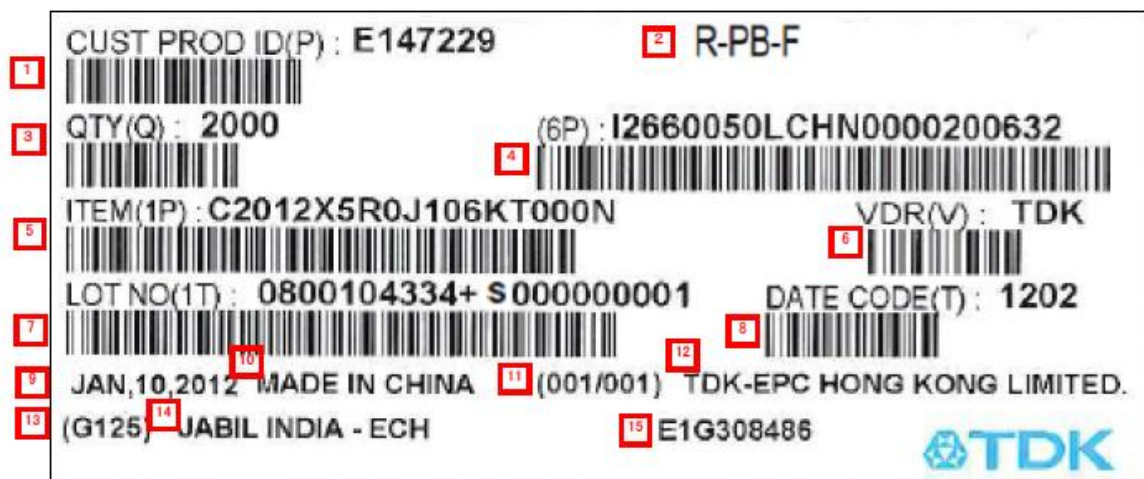
- Line1 : Customer part number
- Line2 : Customer part number/Quantity
- Line3 : TDK control number
- Line4 : TDK item code/Country of origin/TDK's customer code
- Line5 : TDK administrative comment field
- Line6
- Line7

Right side

- : Quantity and unit
- : TDK control number
- : RoHS indication
- : TDK part number
- : Country of origin
- : Ship date (year / month / day)
- : Label type

Shipping label example

Individual / Inner / Shipping mark label for foreign



- |   |                        |
|---|------------------------|
| 1 : Customer P#   | 8 : Shipping week      |
| 2 : RoHS marking  | 9 : Shipping date      |
| 3 : Qty   | 10 : Country of origin |
| 4 : Product category+TDK item code+Country code+Customer code | 11 : Box count         |
| 5 : TDK item description                                      | 12 : Company name      |
| 6 : Vender code   | 13 : Specification     |
| 7 : Shipping Lot No.+S+Serial No.                             | 14 : Customer name     |
|   | 15 : Inspection No.    |

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## RF Components

### ■ Product Origin

1. TDK Akita Corporation, Akita, Japan
2. TDK Dalian Corporation, Dalian, China

### ■ Cautions

1. Do not use and store the component in following conditions. Performance may deteriorates.
  - 1-1. Exposure to atmosphere containing corrosive gas, such as  $\text{Cl}_2$ ,  $\text{NH}_3$ ,  $\text{SO}_x$  and  $\text{NO}_x$ .
  - 1-2. Exposure to volatile or combustible gases.
  - 1-3. Exposure to excessive dust.
  - 1-4. Exposure to water.
  - 1-5. Exposure to direct sunlight.
  - 1-6. Exposure to freezing temperature.
  - 1-7. Exposure to dew condensation due to high humidity.
2. When assembling the printed circuit board with the component mounted, be sure that residual stress is not given to the component due to the overall distortion of the printed circuit board and partial distortion such as at screw tightening portions.
3. Do not use the components above the maximum allowable operating temperature. Surface temperature including self heating should be below maximum operating temperature.
4. The components are not designed or warranted to meet the requirements outside of the contents regulated in this specifications.