

Messrs. **Digi-Key**

Issue No. : PC-02-054

Date of issue : November 15, 2002

Classification : ☒ New ☐ Change ☐ Renewal

## Delivery Specification

Product Description : Dual Band Directional Coupler

Product Part Number : EHFFD1824

Classification of Spec : Individual Product Specification

Applications : Cellular phone

For other applications, contact the undersigned in advance.

Term of Validity : November 14, 2007 from the date of issue.

|                                                                             |                  |
|-----------------------------------------------------------------------------|------------------|
| CUSTOMER USE ONLY                                                           | Receipt Record#: |
| This was certainly received by us.<br>1(one) copy is being returned to you. | Date of receipt: |
|                                                                             | Received by:     |
|                                                                             | Title:           |
|                                                                             | Dept.:           |

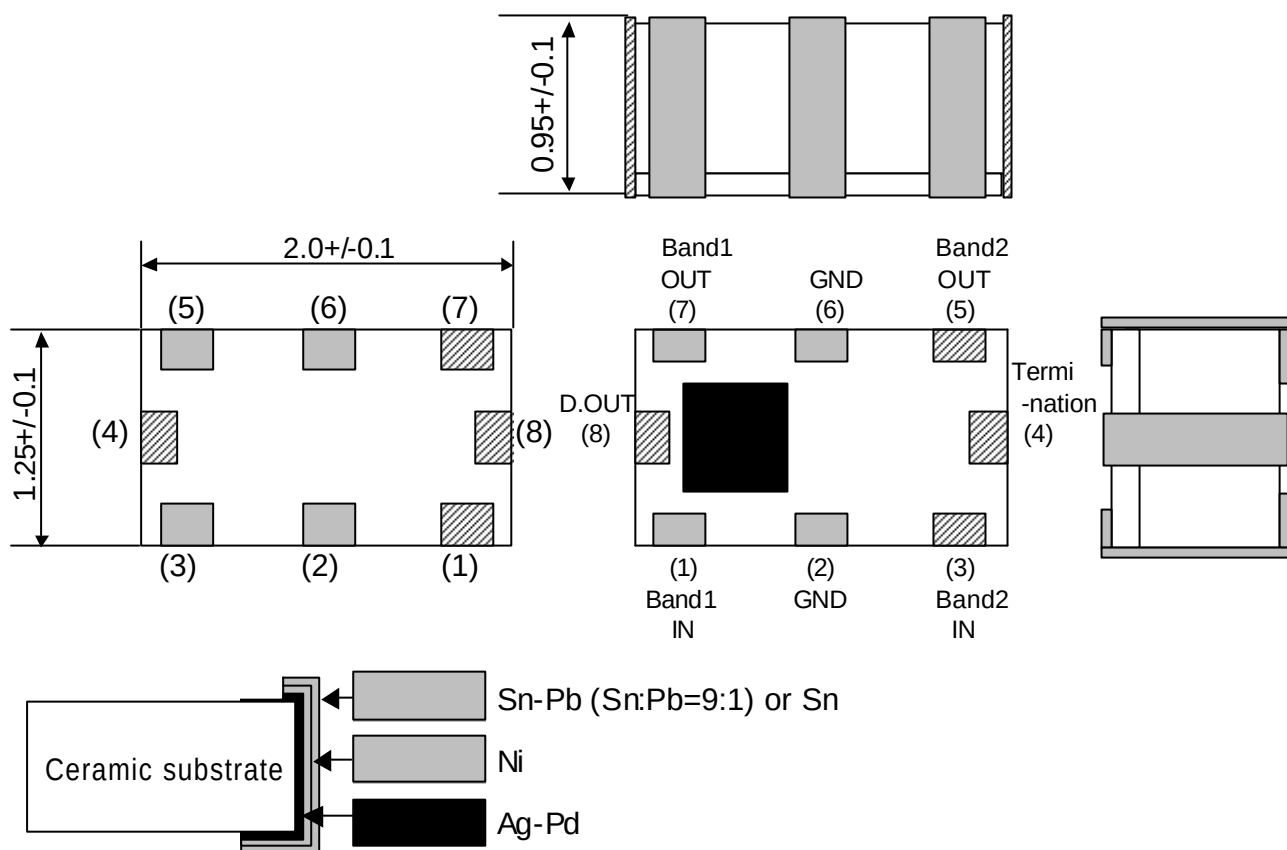
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992-1 Aiba Ohno-cho Ibi-gun Gifu 501-0598 JAPAN  
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|               |                          |
|---------------|--------------------------|
| Prepared by   | : S.Endo                 |
| Checked by    | : M. Mizuno              |
| Authorized by | : M. Mizuno              |
| Title         | : Manager of Engineering |

[Shape, appearance, dimension] Unit: mm

<Back View>

<Front & Side View>



Note 1) "typ" is used where no dimensional tolerance applies.

| Item                        | Description                                                                                                                                                        |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Appearance/<br>construction | Product surface shall be covered with a protective film, which does not easily separate nor present noticeable unevenness, scratches, pinholes, color changes etc. |
|                             | Terminals shall ensure practically acceptable quality.                                                                                                             |
|                             | Substrate shall be as shown in the drawing with no excessive chippings, scratches, burrs, or cracks.                                                               |
| Marking                     | Shall be legible in black (with printing paste).                                                                                                                   |
| Remarks                     | ■ marked side for pin 1.                                                                                                                                           |

Dual Directional Coupler

Delivery Specification

EHF FD1824

Appearance

Enact. Date November 15, 2002

P.S.M

Approval

Check

Plan

Enfo. Date November 15, 2002

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M. Mizuno

M. Mizuno

S.Endo

Drawing No.  
151-EHF- FD1824 9-1

[Absolute maximum ratings]

| No. | Item                  | Symbol | Rating           | Unit | Remark           |
|-----|-----------------------|--------|------------------|------|------------------|
| 1   | Maximum Input Power   | Pmax   | 3.2/1.5(Band1/2) | W    | DC bias is zero. |
| 2   | Operating Temperature | Topr   | -30~+85          | degC |                  |
| 3   | Storage Temperature   | Tstg   | -40~+85          | degC |                  |

Note: This component cannot apply a DC Bias.

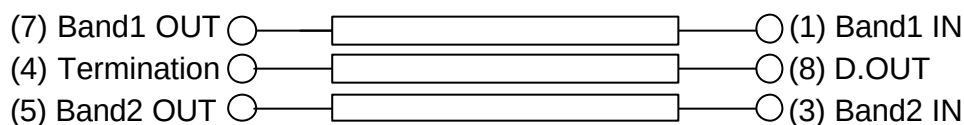
[Characteristics]

T= 25 +/- 5 degC

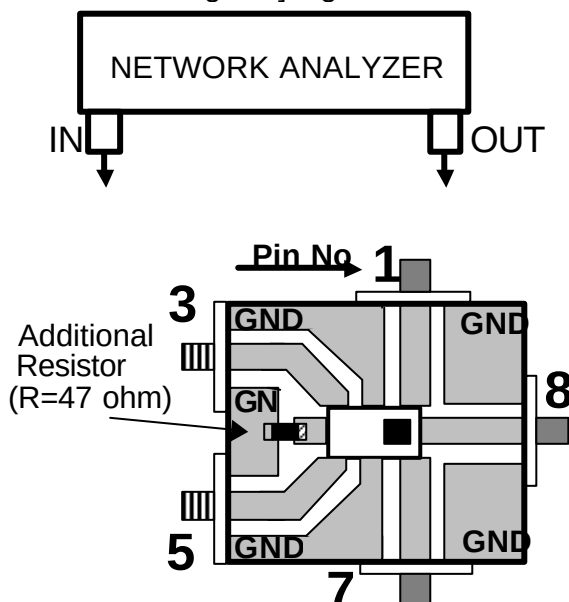
| No. | Item                         |       | Test Circuit | Specification |      |      | Unit |
|-----|------------------------------|-------|--------------|---------------|------|------|------|
|     |                              |       |              | min.          | typ. | max. |      |
| 1   | Frequency range              | Band1 | Fig.1        | 880           | -    | 915  | MHz  |
| 2   | Frequency range              | Band2 | Fig.1        | 1710          | -    | 1785 | MHz  |
| 3   | Insertion loss *1            | Band1 | Fig.1        | -             | -    | 0.45 | dB   |
| 4   | Insertion loss *1            | Band2 | Fig.1        | -             | -    | 0.45 | dB   |
| 5   | Coupling                     | Band1 | Fig.1        | 13.0          | 14.0 | 15.0 | dB   |
| 6   | Coupling                     | Band2 | Fig.1        | 13.0          | 14.0 | 15.0 | dB   |
| 7   | Isolation                    | Band1 | Fig.1        | 18.0          | -    | -    | dB   |
| 8   | Isolation                    | Band2 | Fig.1        | 18.0          | -    | -    | dB   |
| 9   | Input V.S.W.R. in both Bands |       | Fig.1        | -             | -    | 1.5  | -    |
|     |                              |       |              |               |      |      |      |
|     |                              |       |              |               |      |      |      |

\*1 not include Test Board Loss  
Band1 : 0.10 dB  
Band2 : 0.15 dB

[Circuit]



[Test Circuit Diagram] Fig.1



- <3. Insertion loss in Band1>  
(1) to (7) , others=Termination(50 ohm)
- <4. Insertion loss in Band2>  
(3) to (5) , others =Termination(50 ohm)
- <5. Coupling in Band1>  
(1) to (8) , others =Termination(50 ohm)
- <6. Coupling in Band2>  
(3) to (8) , others =Termination(50 ohm)
- <7. Isolation in Band1>  
(7) to (8) , others =Termination(50 ohm)
- <8. Isolation in Band2>  
(5) to (8) , others =Termination(50 ohm)
- <9. Isolation in Band1In to Band2 Out>  
(1) to (5) , others =Termination(50 ohm)
- <10. Isolation in Band1In to Band2 In >  
(1) to (3) , others =Termination(50 ohm)

Dual Directional Coupler

Delivery Specification

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Specification and measurement

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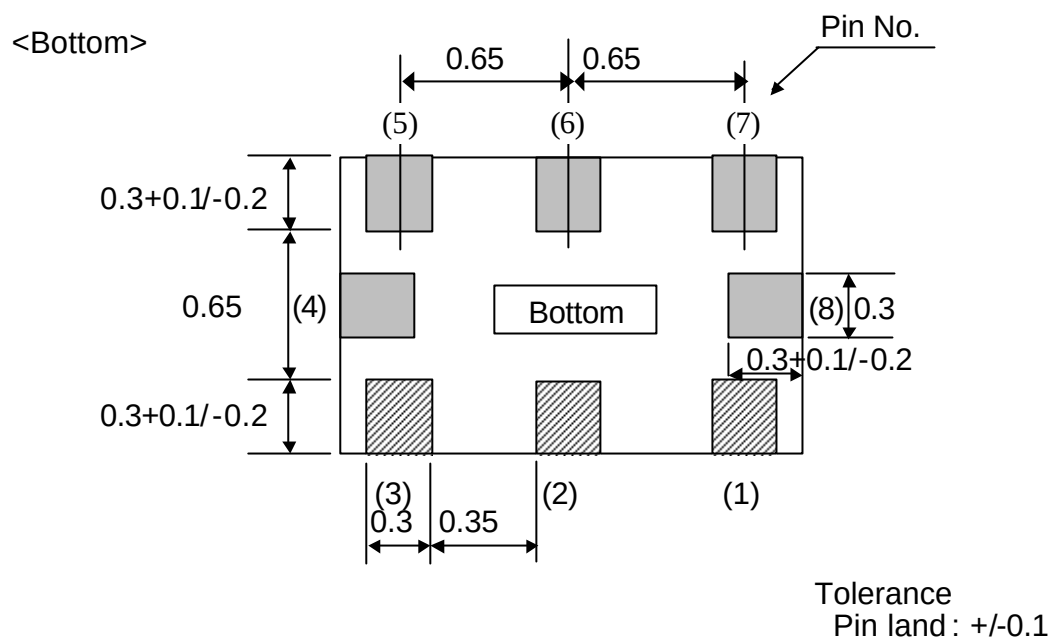
M. Mizuno

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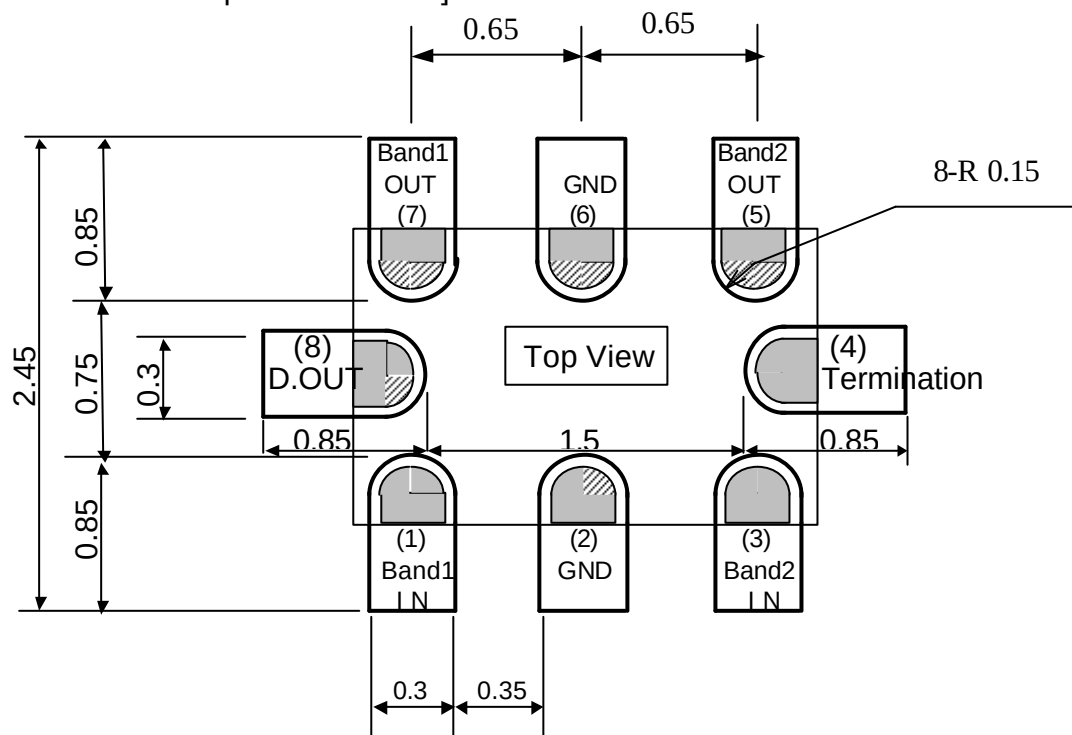
S.Endo

Drawing No.  
151-EHF- FD1824 9-2

[Terminal dimensions] Unit: mm



[Recommended PCB pad dimensions] Unit: mm



Dual Directional Coupler

Delivery Specification

EHF FD1824

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Approval

Check

Plan

Terminals/Recommended lands

Enfo. Date November 15, 2002

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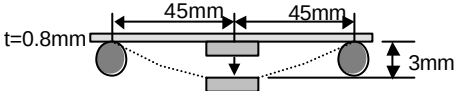
M. Mizuno

M. Mizuno

S.Endo

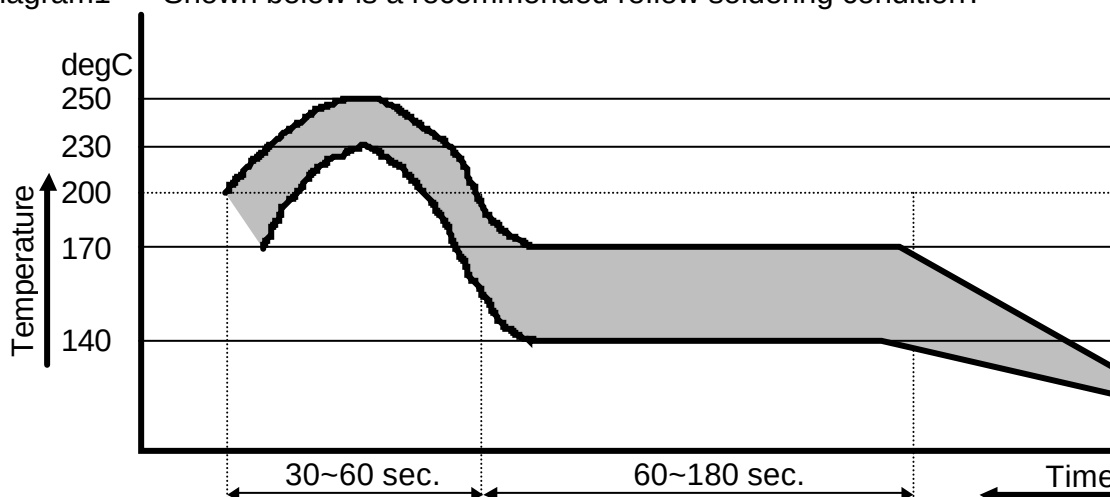
Drawing No.  
151-EHF- FD1824 9-3

# [Quality characteristics]

| Test item                              | Test condition                                                                                                                                                                                                                                                                                     | Judgment criteria                                                                                               |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| High temperature                       | +85degC, 1000h                                                                                                                                                                                                                                                                                     | No abnormality shall be observed in appearance or electrical characteristics.                                   |
| Low temperature                        | -40degC, 1000h                                                                                                                                                                                                                                                                                     |                                                                                                                 |
| High-temperature high-humidity storage | +60degC, 90%RH, 1000h                                                                                                                                                                                                                                                                              |                                                                                                                 |
| Pressure Pot                           | +121degC, 99%RH, 2.026x10 <sup>5</sup> Pa, 100h                                                                                                                                                                                                                                                    |                                                                                                                 |
| Temperature cycling                    | -40...+85degC, Each 30 min., 200cy                                                                                                                                                                                                                                                                 |                                                                                                                 |
| Vibration                              | 10...500Hz, 10G, in each direction of XYZ, 2h30min.                                                                                                                                                                                                                                                |                                                                                                                 |
| Impact                                 | 100G, 6mS, Half sinusoidal wave, in each direction of XYZ, 3 times                                                                                                                                                                                                                                 |                                                                                                                 |
| Shock (Drop)                           | 1.8m, 6 facesx6cy(36 times with 100g Dummy Load)                                                                                                                                                                                                                                                   |                                                                                                                 |
| Electro static discharge               | 200pF, 0 ohm, +/-200V, Each 5 times                                                                                                                                                                                                                                                                |                                                                                                                 |
| Soldering heat resistance              | Manual hot gas: 260+/-10degC, 30 sec., 2 times                                                                                                                                                                                                                                                     | Over 90% of the terminal surface shall be covered with solder.                                                  |
|                                        | Soldering iron: 260+/-10degC, 3 sec., 2 times                                                                                                                                                                                                                                                      |                                                                                                                 |
|                                        | Reflow: 260degC peak, 2 times                                                                                                                                                                                                                                                                      |                                                                                                                 |
| Solder ability                         | Solder bath: 235+/-5degC, 2 sec.                                                                                                                                                                                                                                                                   | Over 95% of the terminal surface shall be covered with solder.                                                  |
|                                        | Reflow: 230degC                                                                                                                                                                                                                                                                                    |                                                                                                                 |
| Board warping                          | <p>Assemble this component on a PC board with 0.8mm thickness using the recommended soldering condition shown below, and apply a bending force of 3mm warping at a rate of 1mm/sec. 5 seconds and 5 times.</p>  | There should not be any cracks in the component or solder joints, no abnormality in electrical characteristics. |
| Terminal removal                       | Solder a component on a PC board using the recommended condition shown below and then press the component sideways at 1mm/sec. Destruction limit 9.8N or greater.                                                                                                                                  |                                                                                                                 |
| Seating plane co-planarity             | Within 0.1mm                                                                                                                                                                                                                                                                                       |                                                                                                                 |

## < Recommended soldering condition >

Diagram1 Shown below is a recommended reflow soldering condition.



Dual Directional Coupler

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EHF FD1824

Quality Characteristics

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S.Endo

Drawing No.  
151-EHF- FD1824 9-4

[Cautions for use]

- (1) Operating a product over the maximum rating for even a moment may result in a product failure or breakage. Never use a product in such a condition that it may cause a safety problem.
- (2) Opening or short-circuiting the product terminals or inserting a product in the reverse orientation while power is being supplied may cause a breakage. Always avoid such circumstances.
- (3) Operations in a corrosive gas atmosphere or improper environments such as high-temperature, high-humidity or dewy conditions may lead to product performance deterioration, a breakage, a change in appearance etc. Please avoid such conditions, as they are unsafe.
- (4) Always ground the soldering iron or soldering bath used for assembly operation to avoid any excessive voltage applied to a product.
- (5) After soldering with solder bridges, incomplete soldering or in the reverse orientation, supplying power may result in a product breakage. Please confirm the soldered condition before supplying power to the product.
- (6) Excessive stress on the terminals may cause a contact failure or performance deterioration. Please use caution.
- (7) Please provide a fail-safe provision in the product you design by taking any failure of our product into consideration.
- (8) This product does not include a DC-cutting device. Application of a DC Current may cause product deterioration or breakage.

\* If any question arises about the safety of this product, please contact us immediately with a request for an engineering examination.

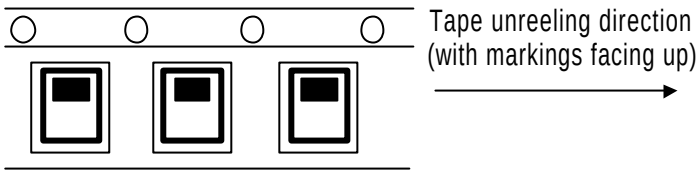
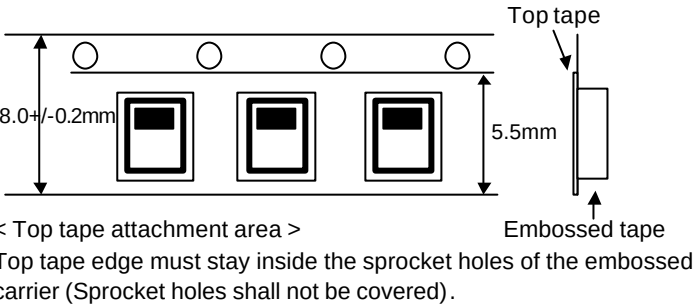
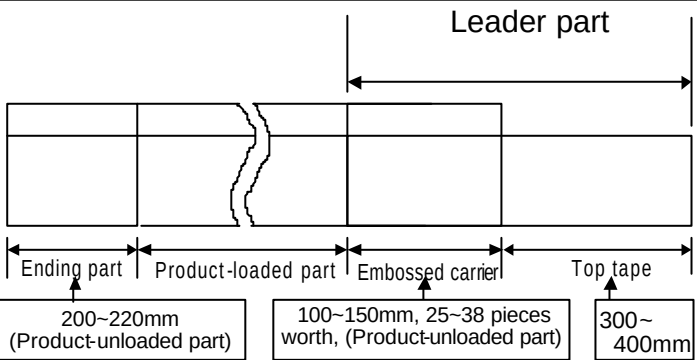
[Remarks]

- \*1: All of the materials used in this product are those listed as the existing chemical substances based on the "Law for examination and regulation of manufacture of chemical substances".
- \*2: The production process of this product does not use any ozone-depleting chemicals (OZC) regulated by the Montreal Protocol.
- \*3: Validity of this specification is 5 years from the date of issue, but the validity is considered on going unless any changes are made.

|                               |       |                        |           |        |                                    |
|-------------------------------|-------|------------------------|-----------|--------|------------------------------------|
| Dual Directional Coupler      |       | Delivery Specification |           |        | EHF FD1824<br>Cautions             |
| Enact. Date November 15, 2002 | P.S.M | Approval               | Check     | Plan   |                                    |
| Enfo. Date November 15, 2002  | ----- | M. Mizuno              | M. Mizuno | S.Endo | Drawing No.<br>151-EHF- FD1824 9-5 |

[Packaging materials]

1. Materials
  - 1) Embossed carrier tape (Refer to the attachment)
  - 2) Top tape: Anti-static
  - 3) Packaging box (Refer to the attachment)
  - 4) Packaging tape, carrier-securing adhesive tape
2. Specification

| No. | Item                                  | Condition                                                                            | Remarks                                                                                                                                                                      |
|-----|---------------------------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Reel outer diameter                   | Refer to the attachment.                                                             |                                                                                                                                                                              |
| 2   | Reel inner diameter                   | Refer to the attachment.                                                             |                                                                                                                                                                              |
| 3   | Reel inner width                      | Refer to the attachment.                                                             |                                                                                                                                                                              |
| 4   | Quantity in a reel                    | 4000 pieces/reel                                                                     |                                                                                                                                                                              |
| 5   | Taping direction                      |    |                                                                                                                                                                              |
| 6   | Top tape attachment position          |   | Tape breaks force.<br>Min. 10N<br>Top cover tape strength.<br>Min. 10N<br>Tape peel force.<br>0.1...1.0N<br>Tape peel angle.<br>165...180degree<br>Reel weight.<br>Max 1500g |
| 7   | Label attachment position             |   | Indicated Item<br>Pat No., Lot No.<br>Quantity, Maker<br>Country of Origin                                                                                                   |
| 8   | Tape leader part and tape ending part |  |                                                                                                                                                                              |
| 9   | Missing products                      | No missing products shall be allowed.                                                |                                                                                                                                                                              |
| 10  | Packaged quantity in a box            | 21 reels/box (Max)                                                                   | 84000 pieces/box(Max)                                                                                                                                                        |

Dual Directional Coupler

Delivery Specification

EHF FD1824

Packaging specification 1

Enact. Date November 15, 2002

P.S.M

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Enfo. Date November 15, 2002

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M. Mizuno

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S.Endo

Drawing No.  
151-EHF- FD1824 9-6

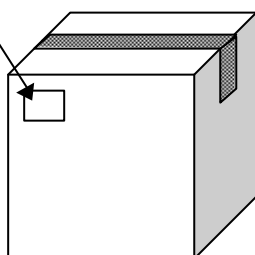
## 1. Method

- 1) Load products in each cavity of an embossed carrier tape, in the correct orientation, by leaving the product-unloaded part shown in Item No. 8(P9-6) of the packaging specification.
- 2) Heat-seal a top tape in good alignment on the carrier tape.
- 3) After 4000 pieces are loaded and reeled, provide a product-unloaded part at the tape-leader portion. Secure the tip of the carrier tape with a piece of adhesive tape.
- 4) Stack the reels (21 reels max.) and enclose them in a packaging box. Close the flaps with a piece of adhesive tape.
- 5) Provide markings on the packaging box.

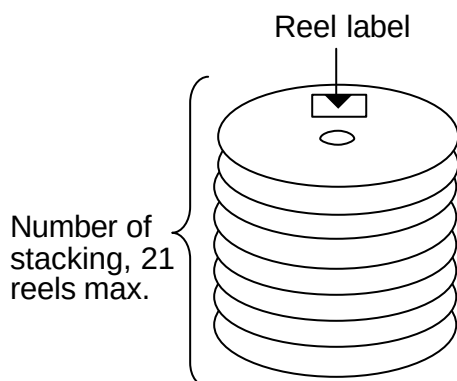
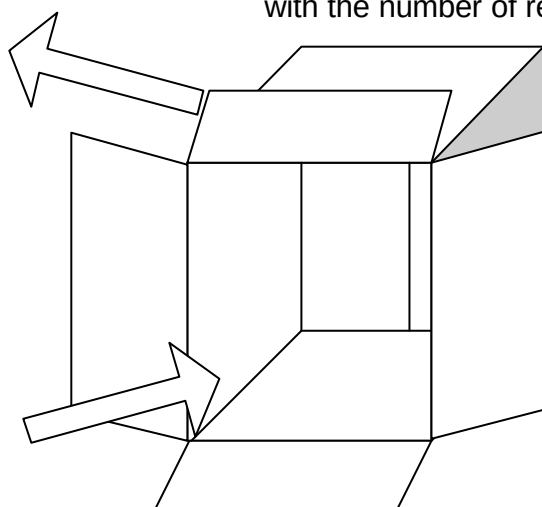
< Items to be indicated >

1. Part No.
2. Quantity
3. Lot No.
4. Manufacturer name
5. Country of origin

Marking on the packaging box



Packaging box shape varies with the number of reels enclosed.

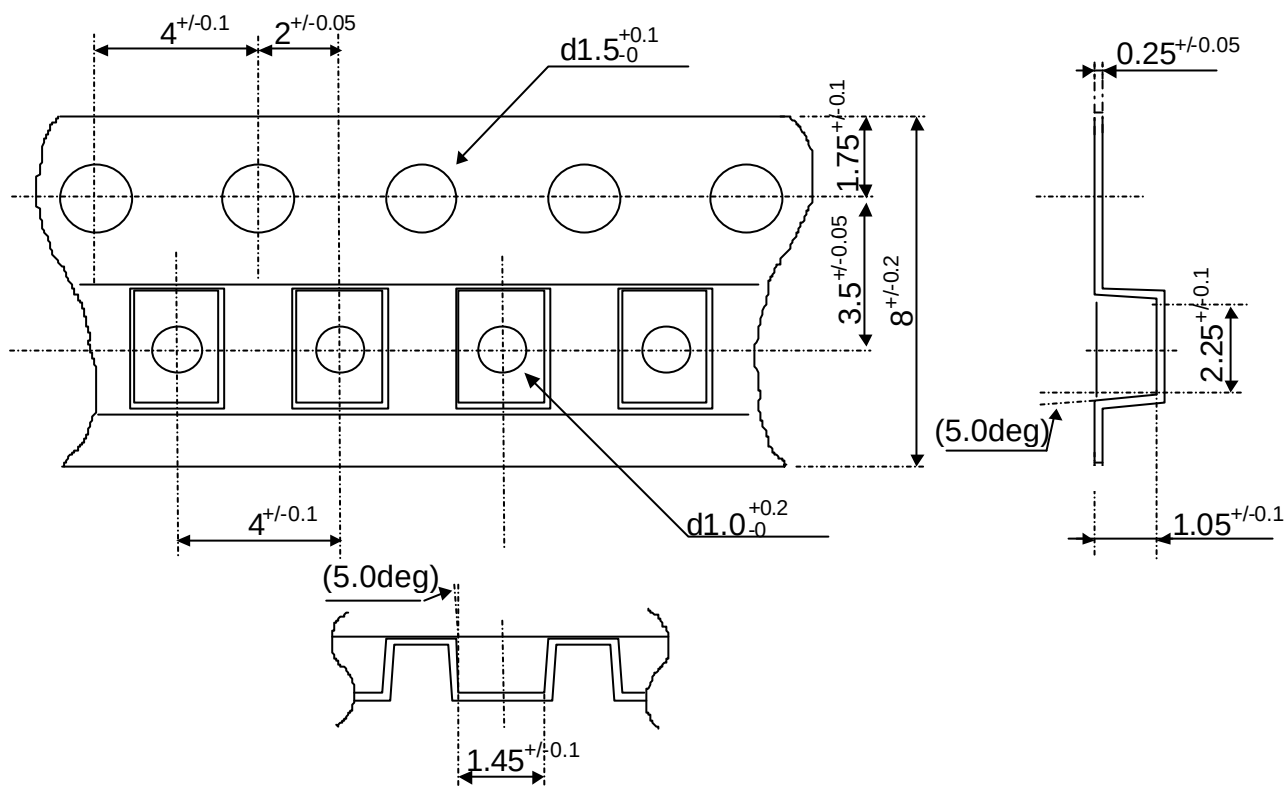


\* Insert cushion material in the empty spaces to secure reels.

|                               |       |                        |           |        |                                         |
|-------------------------------|-------|------------------------|-----------|--------|-----------------------------------------|
| Dual Directional Coupler      |       | Delivery Specification |           |        | EHF FD1824<br>Packaging specification 2 |
| Enact. Date November 15, 2002 | P.S.M | Approval               | Check     | Plan   |                                         |
| Enfo. Date November 15, 2002  | ----- | M. Mizuno              | M. Mizuno | S.Endo | Drawing No.<br>151-EHF- FD1824 9-7      |



[Embossed tape dimensions] Unit: mm



<Remarks>

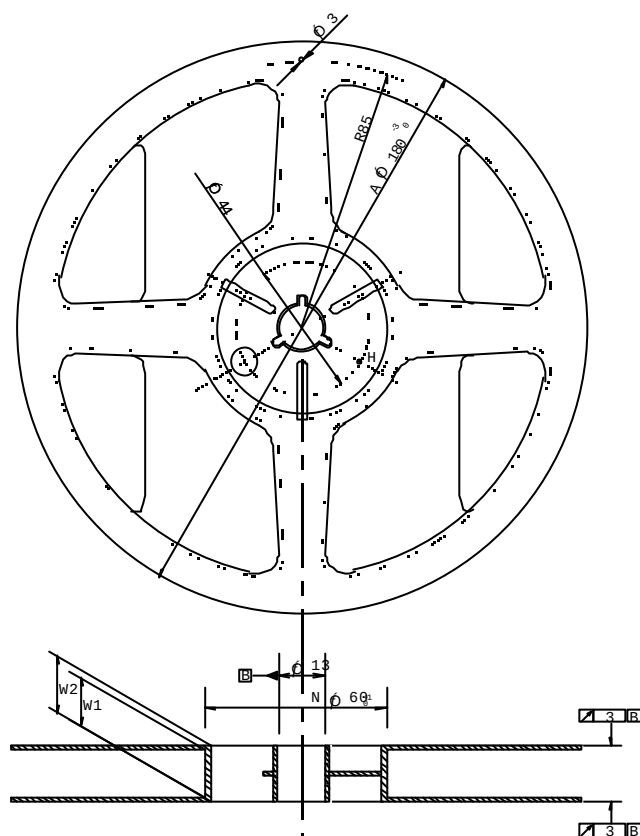
- (1) Unspecified corner radius shall be 0.3mm max.
- (2) Cumulative pitch error of sprocket holes shall be  $+/-0.2$ mm for 10 pitches.

|                               |       |                        |           |        |                                         |
|-------------------------------|-------|------------------------|-----------|--------|-----------------------------------------|
| Dual Directional Coupler      |       | Delivery Specification |           |        | EHF FD1824<br>Packaging specification 3 |
| Enact. Date November 15, 2002 | P.S.M | Approval               | Check     | Plan   |                                         |
| Enfo. Date November 15, 2002  | ----- | M. Mizuno              | M. Mizuno | S.Endo | Drawing No.<br>151-EHF- FD1824 9-8      |

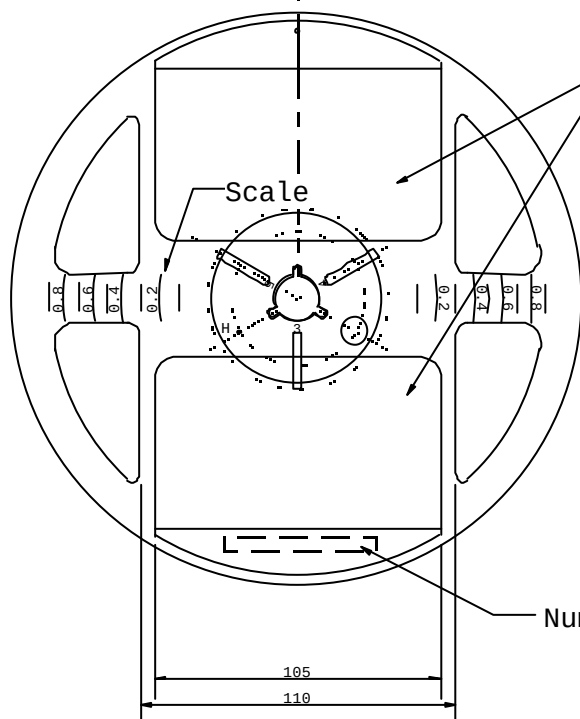
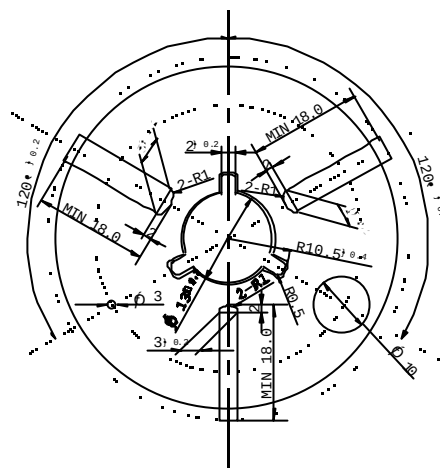
[Reel dimensions] Unit: mm

(1) This reel conforms to EIAJ-RRM-08B based on EIAJ standard.

(2) Material: PS (Polystyrene)



Center area



Label  
105...50

Scale

Rim , Hub

| Rim A                          | Hub N                         |
|--------------------------------|-------------------------------|
| 180 <sup>0</sup> <sub>-3</sub> | 60 <sup>+1</sup> <sub>0</sub> |

Inner width , Outer width

| Tape width | Inner width W1 | Outer width W2 |
|------------|----------------|----------------|
| 8          | 9+/-0.3        | 11+/-1.0       |

Number

Dual Directional Coupler

Delivery Specification

EHFFD1824

Packaging specification 4

Enact. Date November 15, 2002

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Approval

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Drawing No.

151-EHF-FD1824 9-9

# AMEYA360

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