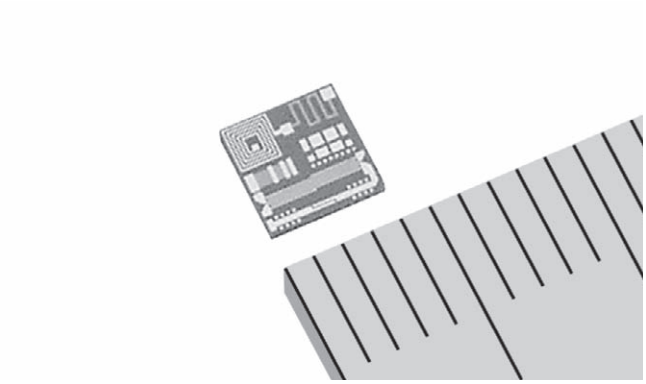
Thin Film Circuit Substrate(RUSUB™)

RU Series

■ Features

1. Low insertion loss for using high Q-value dielectric substrate.
2. A wide selection of substrate material to meet your needs.
3. Excellent reliability by means of developed suitable film structure.
4. For compatibility with gold electrodes, die bonding with AuSn and wire bonding with gold wire are possible.
5. Thin film microfabrication technology allows precise micro pattern.
6. Through via hole, and AuSn pre-coating are available.
7. CR complex product is available when combining a capacitor with a high dielectric substrate and a thin film resistor.



Pic. 1

■ Main Applications

Subject product: Devices for microwave, millimeter wave, and optical communications.

Application: MIC circuit substrate, impedance matching circuit, bypass circuit substrate, couplers, filter, capacitor, capacitor networks, resistor networks, etc.

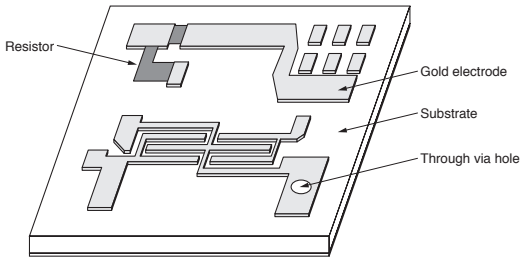


Fig. 1

■ Substrate characteristics and practical correspondent scope

Table 1. Substrate characteristics and practical correspondent scope.

Series	Dielectric constant [εr] (*1)	Size min. (L×W×T) [mm] (*2)	Capacity Temperature characteristics [ppm/°C] (*3)	Through hole	TaN Resistance	L/S min. [μm] (*4)	Coefficient of Thermal Expansion [ppm/°C] (*1)	Temperature conductivity [W/(m·°C)] (*1)
N	9	0.25×0.25×0.09	–	○	○	20/20	4.6	200.0
A	10	0.25×0.25×0.20	–	○	○	20/20	7.0	33.5
H	39	0.25×0.25×0.09	0±30	○	○	30/20	6.6	1.9
K	90	0.25×0.25×0.09	–330±120	×	○	30/20	9.2	2.3
U	150	0.25×0.25×0.09	–750±120	×	○	30/20	11.7	2.0
F	250	0.25×0.25×0.09	–750±600	×	○	30/20	12.2	4.0
D	300	0.25×0.25×0.09	–2200±500	×	○	30/20	10.4	2.6
Y	3000	0.25×0.25×0.09	±10%	×	○	30/20	10.7	2.5
Z	10000	0.25×0.25×0.09	+30, –80%	×	×	30/20	10.5	1.6
X	15000	0.25×0.25×0.09	+30, –90%	×	×	30/20	14.0	2.4

(*1) Typical value.
(*2) L=length, W=width, T=thickness.
(*3) Temperature range –25 to 85°C, reference temperature 25°C
(*4) L=line, S=space

■ Practical correspondent scope of resistor

Table 2. Practical correspondent scope of resistor

Material	TaN
Sheet resistance [Ω]	12.5, 25, 50
Operating temperature range [°C]	–55 to +125
Rated power [mW/mm^2]	100
Resistance tolerance [%] *	±20
Resistance temperature coefficient [ppm/°C]	–70±50

* Please contact us for other tolerance than indicated above.

■ Practical correspondent scope of through via hole

Table 3. Practical correspondent scope of through via hole

a: Hole to hole [mm]	0.22 min.
b: Distance between hole and electrode [mm]	0.10 min.
c: Distance between electrode and chip edge [mm]	0.15 min.

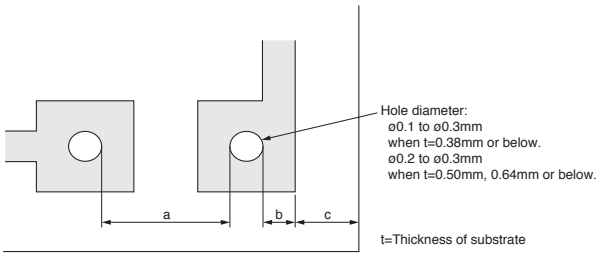


Fig. 2 Through via hole diameter

Table 4. AuSn Pre-Coating Specification

1.AuSn Pre-Coating Thickness	5±2μm,10±3μm,15±4μm
2.Coating Size	Min 150μm□±10μm (5μm Thickness) Min 150μm□±20μm (10,15μm Thickness)
3.AuSn-Electrode Offset (Topside)	≧25μm
4.AuSn-Electrode Offset (Backside)	≧50μm Electrode with backside offset

■ Note

Data sending method: When requiring our product, please send pattern by CAD data and information to the below e-mail address.

Table 5. Information of sending data

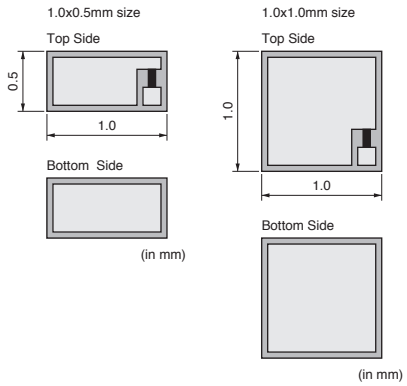
CAD data format	DXF, DWG
Mail address	rusub@murata.co.jp

■ Product Example

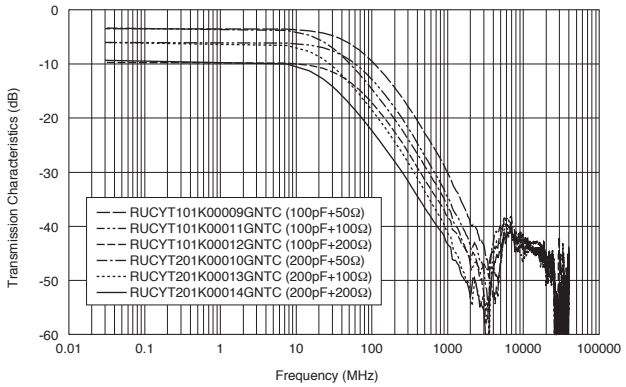
- Six types of standard samples of RUSUB™ C+R (Capacitor + Resistor) are available.
- The custom substrate size, capacity, resistance value, and electrode pattern shape is available upon request.

Part Number	Size	Thickness	Capacitance	Resistance
RUCYT101K00009GNTC	1.0mm × 0.5mm	0.11 ± 0.025mm	100pF ± 10%	50 Ω ± 20%
RUCYT101K00011GNTC	1.0mm × 0.5mm	0.11 ± 0.025mm	100pF ± 10%	100 Ω ± 20%
RUCYT101K00012GNTC	1.0mm × 0.5mm	0.11 ± 0.025mm	100pF ± 10%	200 Ω ± 20%
RUCYT201K00010GNTC	1.0mm × 1.0mm	0.12 ± 0.025mm	200pF ± 10%	50 Ω ± 20%
RUCYT201K00013GNTC	1.0mm × 1.0mm	0.12 ± 0.025mm	200pF ± 10%	100 Ω ± 20%
RUCYT201K00014GNTC	1.0mm × 1.0mm	0.12 ± 0.025mm	200pF ± 10%	200 Ω ± 20%

■ Shape



■ Frequency Characteristics



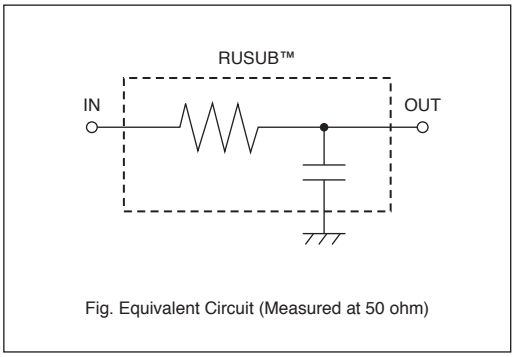


Fig. Equivalent Circuit (Measured at 50 ohm)

Notice

■ Notice (Storage and Operating Condition)

Note the following to prevent poor die bonding and poor wire bonding.

1. Store the capacitors in manufacturer's package in the following conditions without a rapid thermal change in an indoor room.
   · Temperature: -10 to 40°C
   · Humidity: 30 to 70%RH
2. Avoid storing the capacitors in the following conditions.
   (a) Ambient air containing corrosive gas. (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)
   (b) Ambient air containing volatile or combustible gas
   (c) In environments with high concentration of airborne particles
   (d) In liquid (water, oil, chemical solution, organic solvents, etc.)
   (e) In environments where condensation may occur
   (f) In direct sunlight
   (g) In freezing environments

■ Notice (Soldering and Mounting)

1. Die bonding of substrate
   (1) Using materials and bonding conditions
      · Solders: Au -20%Sn
      · Bonding temperature: 300 to 320°C
      · Bonding time: less than 1 minute
      · Bonding atmosphere: N_2 atmosphere
   (2) Notice
      (a) Please scrub the capacitors while mounting.
      (b) Die bonding condition is affected by what kind of solder and base substrate is used. Please evaluate die bonding condition in advance with the same materials as mass production materials and make sure that there is no effect, especially cracking of the ceramics.
2. Wire Bonding
   (1) Using materials and bonding conditions
      · Wire lead: 25 microns diameter gold wire
      · Bonding temperature: 150 to 250°C
      · Bonding methods: Thermocompression or thermosonic bonding
   (2) Notice
      Please do not bond closer than 25 microns from the edge of the electrode.

PLEASE CONTACT US BEFORE USING OUR PRODUCTS IN OTHER BONDING CONDITIONS NOT LISTED ABOVE.

■ Notice (Handling)

Do not directly touch capacitors with bare hands to prevent poor die bonding and poor wire bonding.

● Part Numbering

Thin Film Circuit Substrates (RUSUB™)

(Part Number) RU C H D 1R5K 01001 GT TC

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽

❶ Product ID

Pruduct ID	
RU	Thin film circuit substrate

❷ Representative Characteristics

Code	Representative characteristics
C	Capacitance
R	Resistance
D	Dimension

❸ Substrate Materials

Code	εr	Code	εr
N	9	**F**	250
A	10	**D**	300
H	39	**Y**	3000
K	90	**Z**	10000
U	150	**X**	15000

Substrate material code: A=Alumina, N=Aluminum Nitride

❹ Structure of metalized film: Indicated by 1 alphabet.

❺ Characteristic values: Characteristic value by representative characteristics will be indicated with 4 digit number.

❻ Individual specification code: Indicated by 5 digit number.

❼ Other specifications: Indicated by 2 alphabets.

❽ Packaging

Code	Packaging
TC	Tray

for EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).

⚠Note:

1. Export Control
   <For customers outside Japan>
   No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.
   <For customers in Japan>
   For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed above
3. Product specifications in this catalog are as of May 2012. They are subject to change or our products in it may be discontinued without advance notice.
   Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
4. Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.
5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please review our product specifications or consult the approval sheet for product specifications before ordering.
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7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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