

8-22GHz, 2-Way Power Divider/Combiner

GaAs Monolithic Microwave IC in SMD leadless package

Description

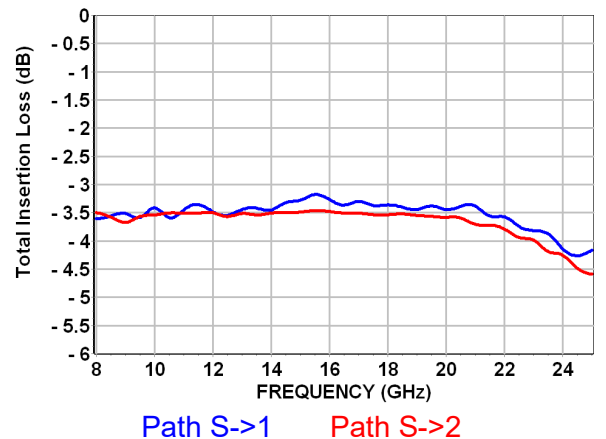
The CHW4212-QKA is a 2-way 0° Power Divider/Combiner designed for wideband operation from 8 to 22GHz. It supports many applications including phase array radars, 5G and satellite communications, Test & Measurements.

The circuit is manufactured on GaAs passive technology dedicated for high performance. It is supplied in RoHS compliant 2x2mm SMD package.



Main Features

- Broadband performances: 8-22GHz
- Insertion Loss (above 3 dB): 0.5dB
- Isolation in the range of 20dB
- Good amplitude unbalance: < 0.5dB
- Very good phase unbalance: Typical 2°
- 8L DFN2x2
- MSL1



Main Electrical Characteristics

Tamb.= +25°C

| Symbol | Parameter | Min | Typ | Max | Unit |
|-----------|-----------------------------|-----|-----|-----|------|
| Freq | Frequency range | 8 | | 22 | GHz |
| IL | Insertion Loss (above 3 dB) | | 0.5 | | dB |
| Isolation | Isolation | | 20 | | dB |
| AU | Amplitude Unbalance | | 0.2 | | dB |
| PU | Phase Unbalance | | 2 | | ° |

Specifications

Tamb.= +25°C,

| Symbol | Parameter | Min | Typ | Max | Unit |
|---------------|---|------------|------------|------------|-------------|
| Freq | Frequency range | 8 | | 22 | GHz |
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| Isolation | Isolation | | 20 | | dB |
| AU | Amplitude Unbalance | | 0.2 | | dB |
| PU | Phase Unbalance | | 2 | | ° |
| RL_Sum | Return Loss (Port Sum) | | 20 | | dB |
| RL_12 | Return Loss (Port 1-2) | | 22 | | dB |
| PH_Sum | Power Handling (on Port Sum) when the part is used as Power divider | | | 30 | dBm |
| PH_12 | Power Handling on Port1and on Port2 when the part is used as Combiner | | | 27 | dBm |

These values are representative of on board measurements as defined on the drawing in paragraph " Evaluation board for measurements accuracy" using RF probes

Absolute Maximum Ratings ⁽¹⁾T_{amb.} = +25°C

| Symbol | Parameter | Values | Unit |
|-------------|---|--------|------|
| Pin_Max_Sum | Maximum input power (AMR) on Sum port when the part is used as Power divider | 33 | dBm |
| Pin_Max_12 | Maximum input power (AMR) on Port 1 and on Port 2 when the part is used as Combiner | 30 | dBm |

Temperature Range

| | | | |
|------------------|-----------------------------|-------------|----|
| T _a | Operating temperature range | -40 to +85 | °C |
| T _{stg} | Storage temperature range | -55 to +150 | °C |

Typical Package Sij parameters

Tamb.= +25°C.

The reference planes used for Sij measurements presented in this document are located at 0.8mm offset from the package edges.

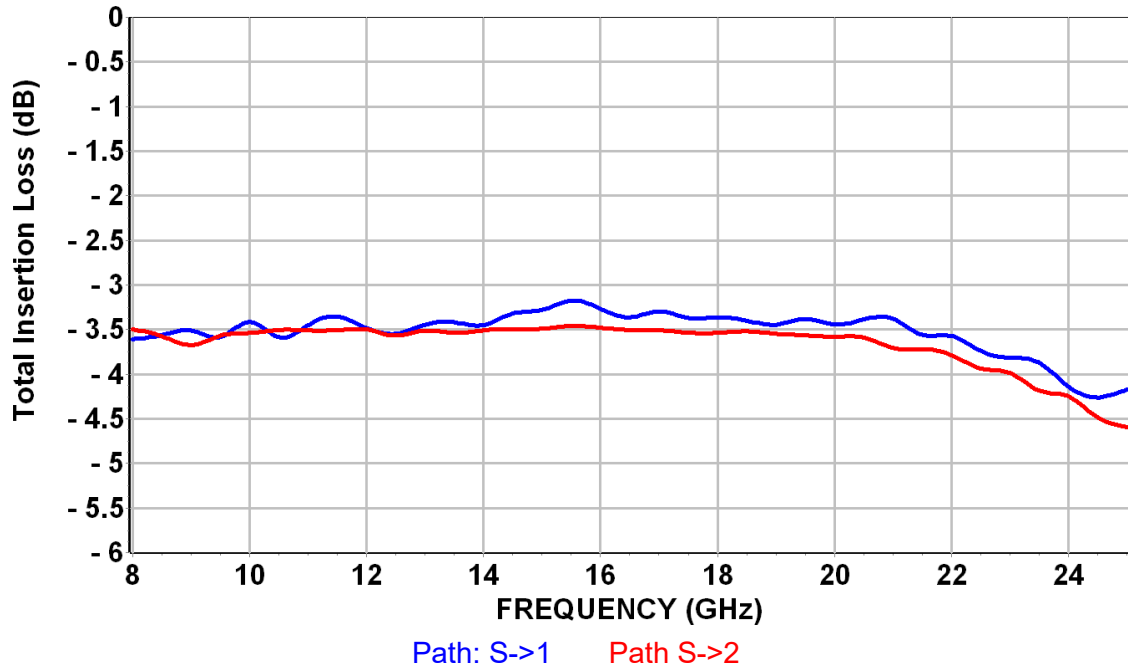
Path : S->2

| Freq (GHz) | S11 (dB) | PhS11 (°) | S12 (dB) | PhS12 (°) | S21 (dB) | PhS21 (°) | S22 (dB) | PhS22 (°) |
|------------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|
| 8,00 | -14,69 | 71,55 | -3,50 | -130,77 | -3,50 | -130,84 | -20,90 | 5,14 |
| 8,50 | -14,47 | 65,03 | -3,58 | -139,16 | -3,58 | -139,24 | -21,21 | -0,69 |
| 9,00 | -14,08 | 52,95 | -3,68 | -147,02 | -3,67 | -147,09 | -21,08 | -7,70 |
| 9,50 | -15,31 | 41,81 | -3,57 | -154,97 | -3,57 | -155,04 | -21,83 | -15,03 |
| 10,00 | -16,01 | 32,34 | -3,54 | -163,23 | -3,54 | -163,30 | -22,35 | -19,64 |
| 10,50 | -16,84 | 28,95 | -3,51 | -171,88 | -3,50 | -171,98 | -22,90 | -21,61 |
| 11,00 | -17,36 | 22,94 | -3,51 | 179,62 | -3,51 | 179,54 | -23,35 | -22,86 |
| 11,50 | -17,68 | 22,29 | -3,51 | 170,89 | -3,51 | 170,79 | -23,72 | -20,77 |
| 12,00 | -18,67 | 10,13 | -3,50 | 162,90 | -3,50 | 162,79 | -23,92 | -22,75 |
| 12,50 | -17,87 | 9,87 | -3,57 | 154,14 | -3,57 | 154,02 | -23,70 | -18,63 |
| 13,00 | -19,34 | 9,92 | -3,51 | 145,67 | -3,51 | 145,57 | -23,60 | -19,99 |
| 13,50 | -19,88 | -1,94 | -3,54 | 137,56 | -3,54 | 137,42 | -23,20 | -19,08 |
| 14,00 | -21,42 | -2,60 | -3,51 | 129,10 | -3,51 | 128,98 | -23,11 | -20,82 |
| 14,50 | -21,83 | 2,76 | -3,50 | 120,47 | -3,50 | 120,35 | -22,87 | -20,60 |
| 15,00 | -21,26 | 12,60 | -3,49 | 111,80 | -3,49 | 111,71 | -21,99 | -24,36 |
| 15,50 | -24,49 | 12,18 | -3,47 | 103,56 | -3,46 | 103,44 | -22,42 | -27,83 |
| 16,00 | -21,59 | 5,27 | -3,49 | 94,51 | -3,48 | 94,39 | -22,81 | -33,70 |
| 16,50 | -23,74 | 5,05 | -3,51 | 85,85 | -3,50 | 85,73 | -23,61 | -37,71 |
| 17,00 | -23,92 | 12,68 | -3,52 | 77,21 | -3,51 | 77,10 | -24,48 | -40,24 |
| 17,50 | -24,37 | 22,38 | -3,54 | 68,58 | -3,53 | 68,47 | -25,66 | -45,36 |
| 18,00 | -25,75 | 31,79 | -3,54 | 59,92 | -3,54 | 59,81 | -28,03 | -46,88 |
| 18,50 | -23,10 | 30,97 | -3,53 | 51,09 | -3,52 | 50,98 | -31,42 | -52,13 |
| 19,00 | -23,42 | 44,88 | -3,56 | 42,28 | -3,55 | 42,18 | -40,27 | 1,81 |
| 19,50 | -22,61 | 61,80 | -3,57 | 33,40 | -3,56 | 33,33 | -34,14 | 65,44 |
| 20,00 | -24,02 | 88,90 | -3,58 | 24,12 | -3,58 | 24,04 | -26,94 | 75,98 |
| 20,50 | -20,40 | 82,67 | -3,59 | 15,33 | -3,59 | 15,24 | -23,18 | 71,49 |
| 21,00 | -15,14 | 86,52 | -3,71 | 6,08 | -3,71 | 5,99 | -20,18 | 65,87 |
| 21,50 | -14,28 | 73,00 | -3,72 | -2,57 | -3,72 | -2,64 | -17,88 | 59,13 |
| 22,00 | -12,80 | 70,70 | -3,79 | -12,02 | -3,79 | -12,13 | -16,51 | 53,75 |
| 22,50 | -10,98 | 66,53 | -3,94 | -21,38 | -3,94 | -21,47 | -15,06 | 43,69 |
| 23,00 | -10,47 | 57,17 | -3,99 | -29,86 | -3,99 | -29,91 | -13,89 | 37,82 |
| 23,50 | -8,33 | 52,59 | -4,19 | -39,52 | -4,19 | -39,62 | -12,63 | 29,92 |
| 24,00 | -7,92 | 43,14 | -4,25 | -48,14 | -4,25 | -48,26 | -11,88 | 22,39 |
| 24,50 | -6,76 | 31,83 | -4,49 | -56,94 | -4,48 | -57,06 | -11,25 | 15,55 |
| 25,00 | -6,24 | 22,62 | -4,59 | -65,81 | -4,59 | -65,98 | -10,71 | 7,32 |

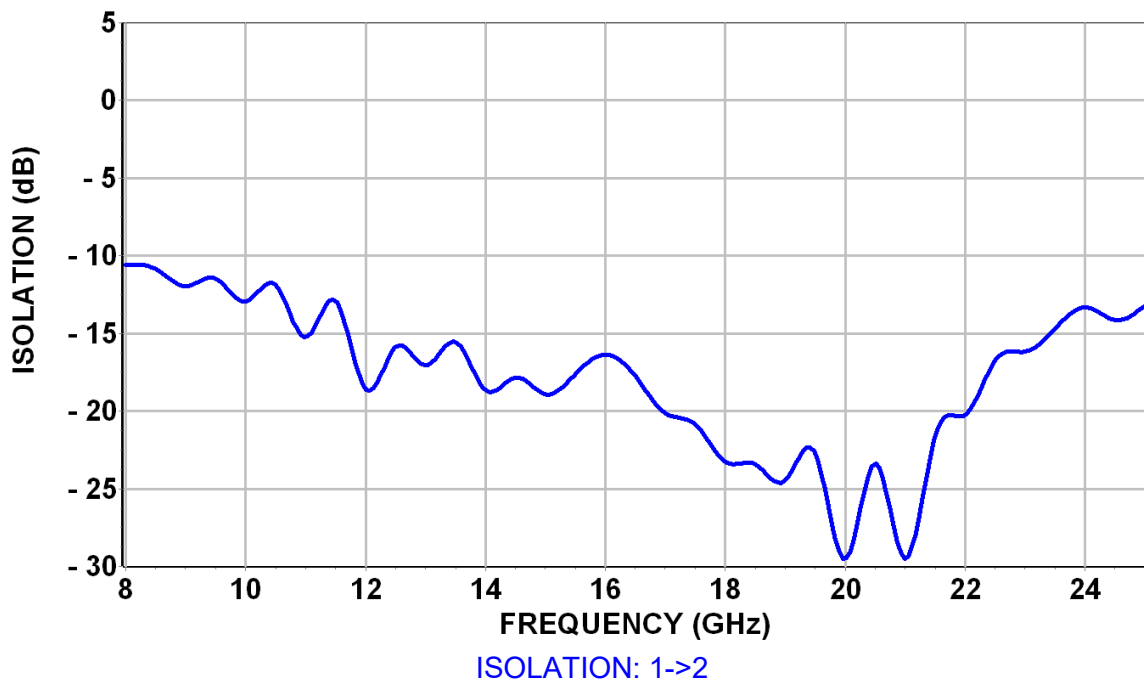
Typical Board Measurements

Tamb.= +25°C (see "Evaluation board for measurements accuracy" using RF probes)

Total Insertion versus Frequency



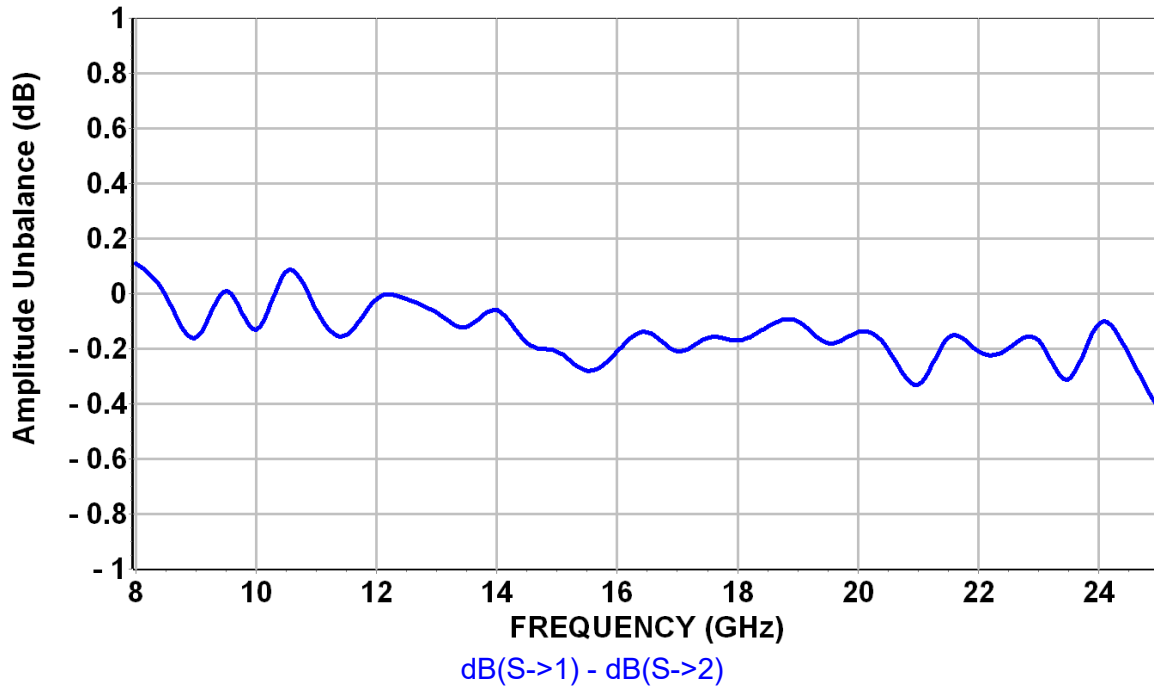
Isolation versus Frequency



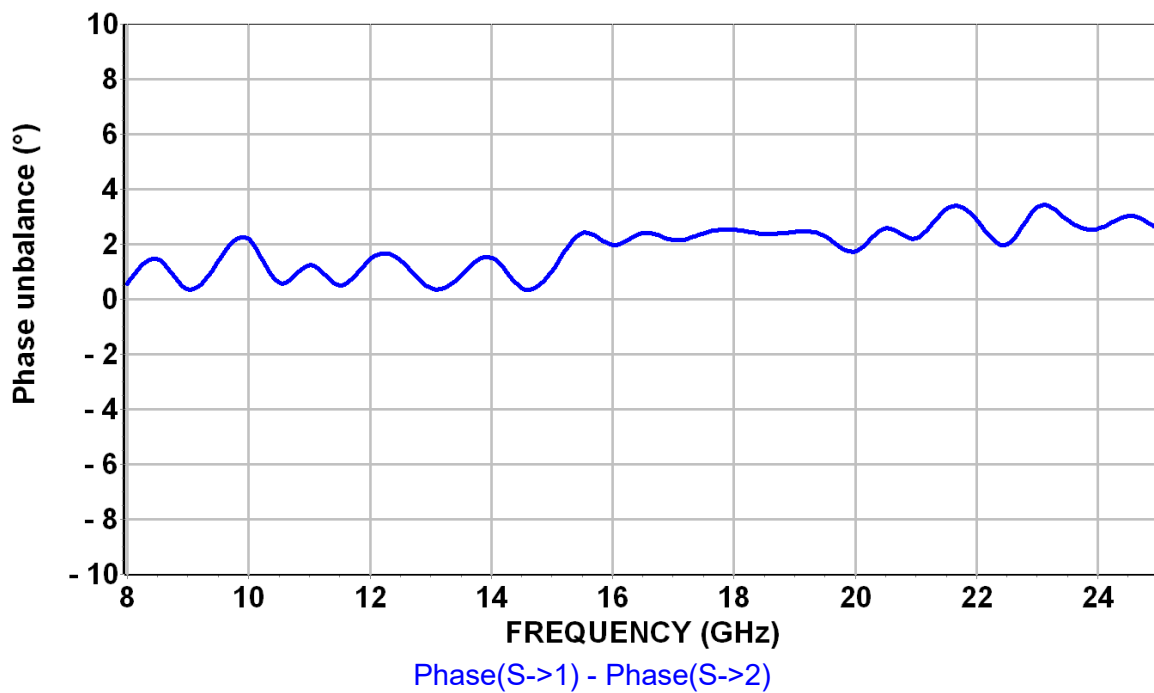
Typical Board Measurements

Tamb.= +25°C (see “Evaluation board for measurements accuracy” using RF probes)

Amplitude Unbalance versus Frequency



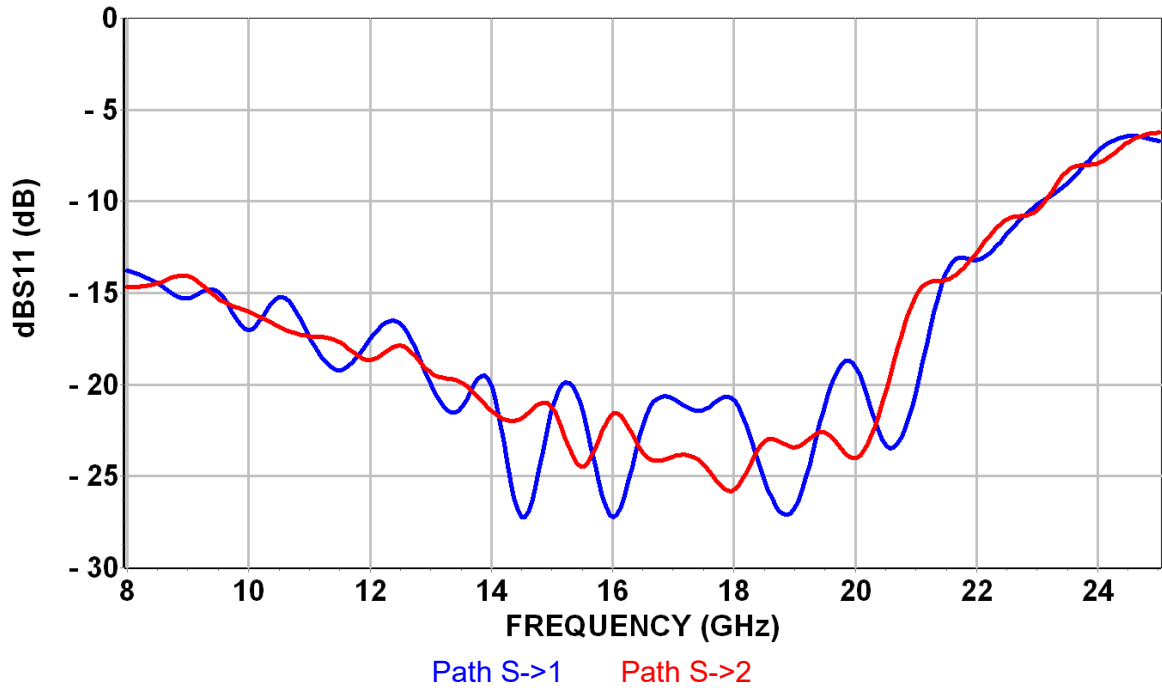
Phase Unbalance versus Frequency



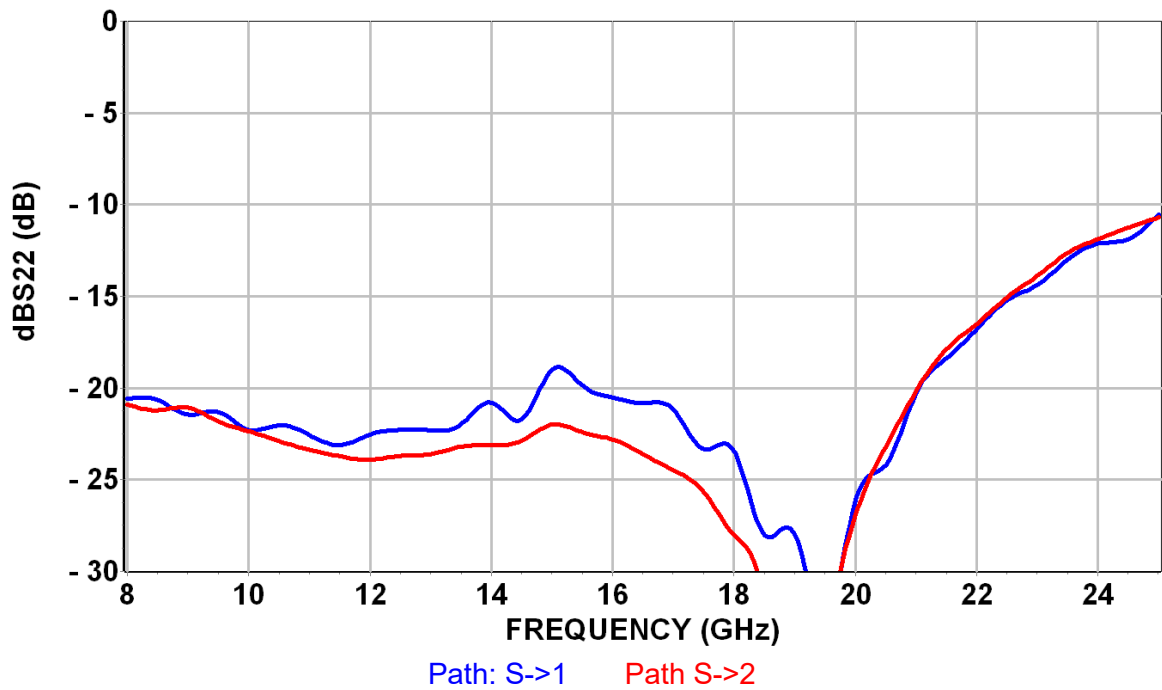
Typical Board Measurements

Tamb.= +25°C (see "Evaluation board for measurements accuracy" using RF probes)

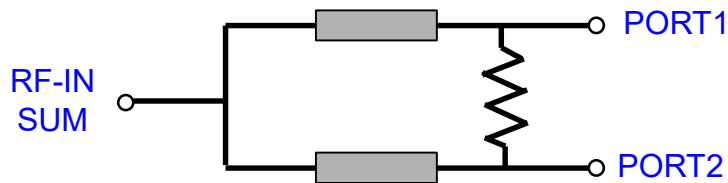
Input Return Loss (SUM) versus Frequency



Output Return Loss (Port 1,2) versus Frequency



Simplified Schematic for the 2-Way 0° 50 ohms Power Divider / Combiner

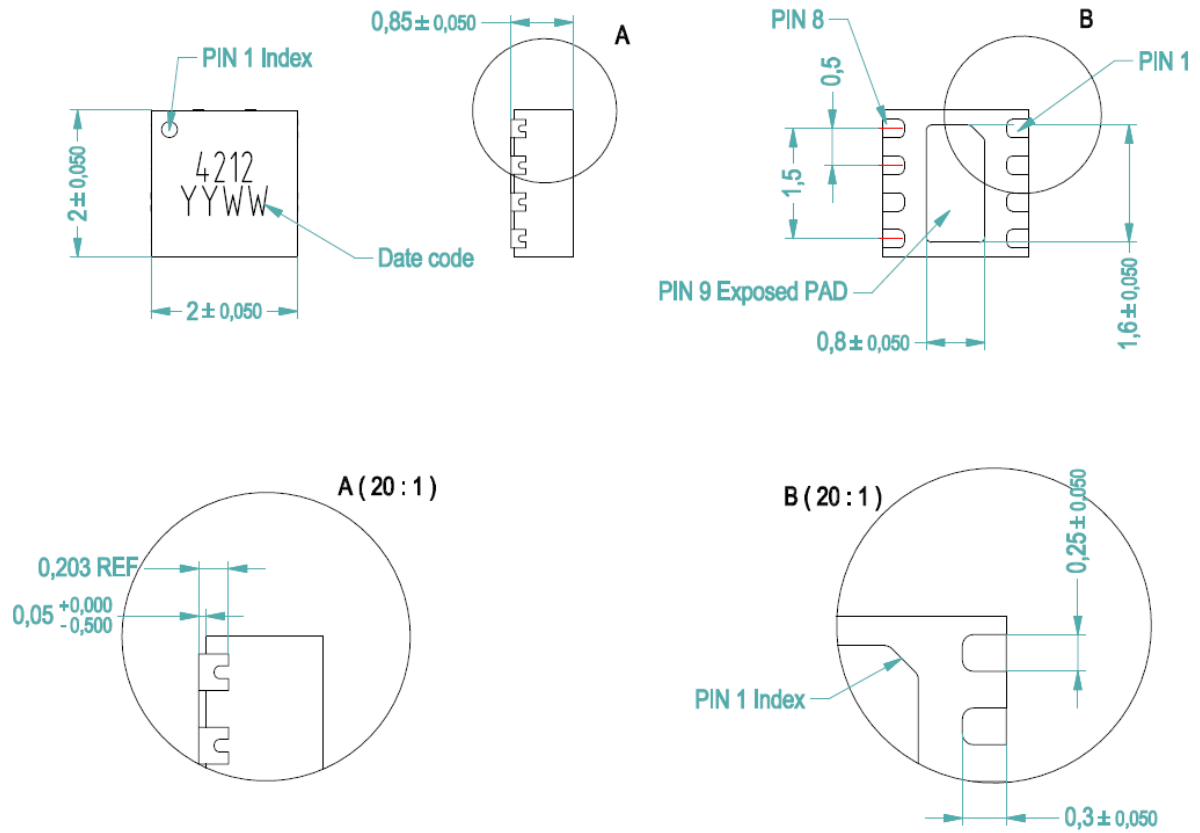


The SUM PORT has been noted S in the previous pages of this document.

Path S->1 is entering the part on the SUM port and exiting thru the PORT1 (North East access of the package)

Path S->2 is entering the part on the SUM port and exiting thru the PORT2 (South East access of the package)

Package outline ⁽¹⁾



| | | | |
|---------------------|--------------|-----------|----------|
| Lead Free | (Green) | 1- NC | 5- PORT2 |
| Units : | mm | 2- GND | 6- GND |
| From the standard : | JEDEC MO-229 | 3- IN-SUM | 7- GND |
| | (VCCD) | 4- NC | 8- PORT1 |
| | 9- GND | | |

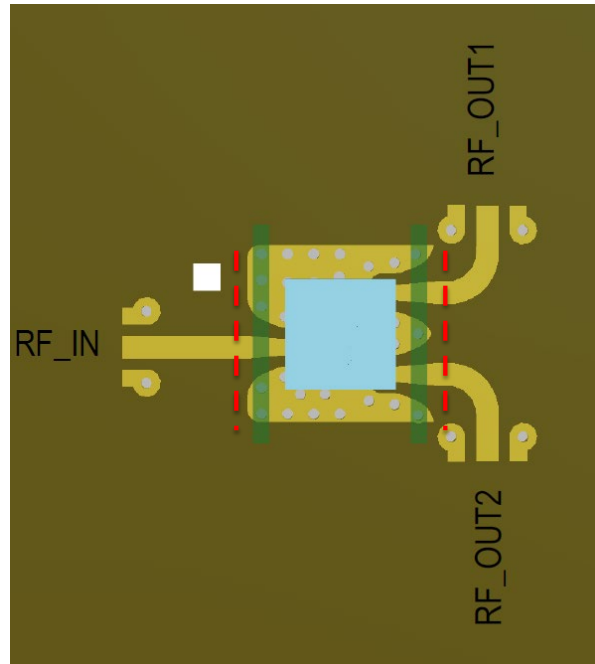
⁽¹⁾ The package outline drawing included to this data-sheet is given for indication.

⁽²⁾ It is strongly recommended to ground all pins marked “GND” through the PCB board. Ensure that the PCB board is designed to provide the best possible ground to the package.

Evaluation board for measurements accuracy

Losses due to board are partly de-embedded: the reference planes used for S_{ij} measurements presented previously in this datasheet are located at 0.8mm offset from the package edges. Reference planes are showed in red on the drawing.

Note: The given S_{ij} parameters incorporate the land pattern of the evaluation board.

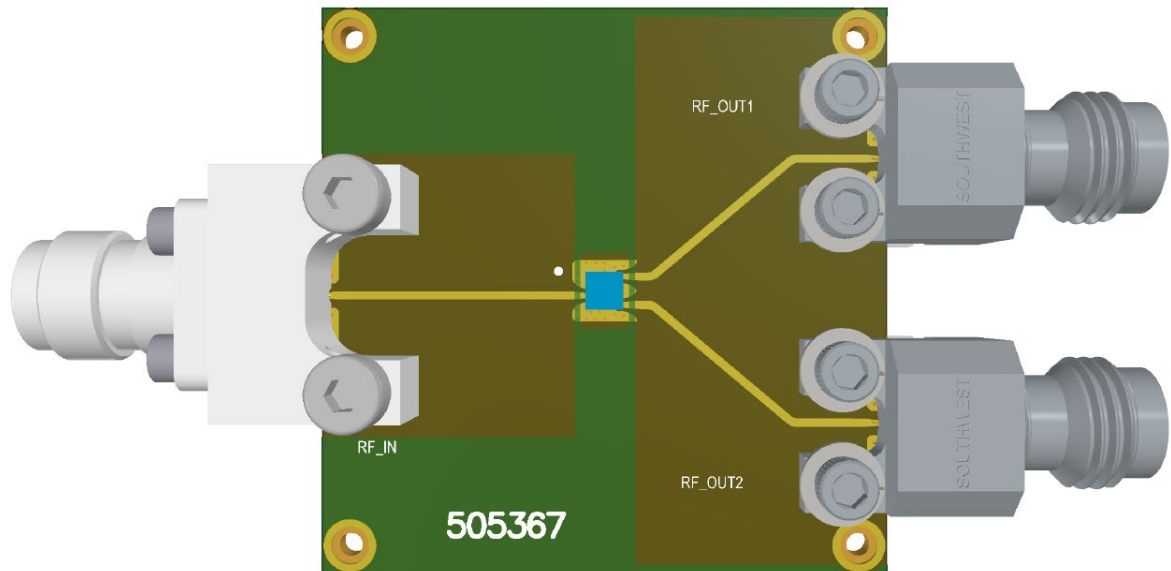


Package Information

| Parameter | Value |
|-----------------------|-------------------------------------|
| Package body material | RoHS-compliant |
| | Low stress Injection Molded Plastic |
| Lead finish | Ni-Pd-Au |

Evaluation board for temperature characterization

- Compatible with the proposed footprint.
- Based on typically Ro4003 / 8mils or equivalent.
- Using a micro-strip to coplanar transition to access the package.
- Recommended for the implementation of this product on a module board.
- See application note AN0017 for details.



Note: All board measurements are performed using shielded cables to ensure safe operations.

Recommended package footprint

Recommended package footprint could be provided on request.

SMD mounting procedure

For the mounting process standard techniques involving solder paste and a suitable reflow process can be used. For further details, see application note AN0017 at <https://www.ums-rf.com>.

Recommended environmental management

UMS products are compliant with the regulation in particular with the directives RoHS N°2011/65 and REACH N°1907/2006. More environmental data are available in the application note AN0019 also available at <https://www.ums-rf.com>.

Recommended ESD management

Refer to the application note AN0020 available at <https://www.ums-rf.com> for ESD sensitivity and handling recommendations for the UMS package products.

Ordering Information

DFN 2x2 package:

CHW4212-QKA/XY

Tape & Reel: XY = 21

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