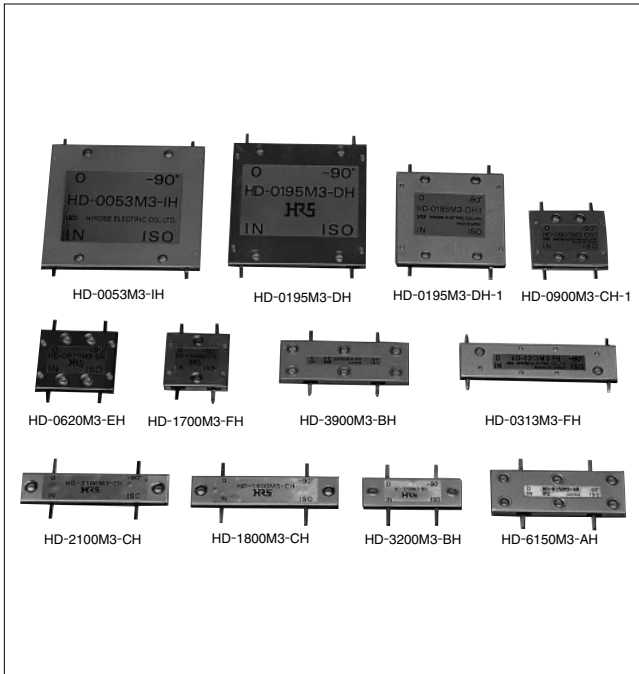


3 dB 90° Card Couplers

HD-M Series



■ Features

1. High Performance

The high frequency characteristics feature. Extremely low loss and a high degree of matching.

2. Power Uniform Distribution and 90° Phase Difference Type

This is a one input, two output (or two input, one output) power uniform distribution type having a 90° phase difference between the two outputs (or two inputs).

3. Miniature and Lightweight

Corrosion-resistant aluminum is used for the cover and the Hirose Electric original pattern design, which uses a stripline triplate method, enables the couplers to be extremely small and lightweight.

4. Equipped with Tabs

Tabs permit direct mounting to surface circuits.

5. High Power Type

This type can be used with up to 100 W of power.

■ Product Specifications

| | | | | |
|---------|--|--|--|----------------------------|
| Ratings | Frequency range (Note) Characteristic impedance Maximum Input Power (Note) | 30 to 6400 MHz 50 ohms 50 to 100 W | Operating temperature range Operating relative humidity | -10°C to +65°C 95% Max. |
|---------|--|--|--|----------------------------|

Note: The frequency range and the maximum input power will differ depending on the products.

| Item | Standard | Conditions |
|--------------------------|---|---|
| 1. Insulation resistance | 500M ohms min | 100 V DC |
| 2. Vibration | No electrical discontinuity of 1 μ s or more No damage, cracks, or parts dislocation | Frequency of 10 to 2000 Hz, overall amplitude of 1.52 mm, acceleration of 98 m/s ² for 2 hours in each of 3 directions |
| 3. Shock | | Acceleration of 980 m/s ² , sine half-wave waveform, 3 cycles in each of the 3 axis |
| 4. Temperature cycle | No damage, cracks, or parts dislocation | Temperature : -55°C → +5°C to +35°C → +85°C → +5°C to +35°C Time : 30 → 15 max. → 30 → 15 max. (Minutes) 200 cycles |
| 5. Corrosion resistance | No serious corrosion | Exposed to 20% salt water solution for 48 hours |
| 6. Hydrogen sulfide gas | No damage, cracks, or parts dislocation | Exposed to 10% potassium sulfide solution for 100 hours |

● The test method conforms to MIL-STD-202.

■ Materials

| Part | Material | Finish |
|-----------|-----------------|--------------------------|
| Cover (A) | Stainless steel | ----- |
| Cover (B) | Aluminum | Conductive white Alumite |
| Board | Dielectric | Gold plating |
| Rivets | Aluminum | ----- |
| Eyelet | Brass | Nickel plating |
| Tabs | Phosphor bronze | Gold plating |
| Cover (A) | Stainless steel | ----- |
| Cover (B) | Stainless steel | ----- |

Ordering Information

HD-0195M 3 - D H - 1

① ② ③ ④ ⑤ ⑥

| | | |
|---|---|--------------------|
| ① Series Name: HD (Directional Couplers) | ③ Coupling 3:3dB | ⑤ Form H:H Type |
| ② Center Frequency(MHz) Examples 0053M: 53MHz 0300M: 300MHz 6150M:6150MHz | ④ Frequency Relative Bandwidth C:From 10% to below 15% D:From 15% to below 20% E:From 20% to below 25% F:From 25% to below 30% G:From 30% to below 35% | ⑥ Suffix |

Specifications

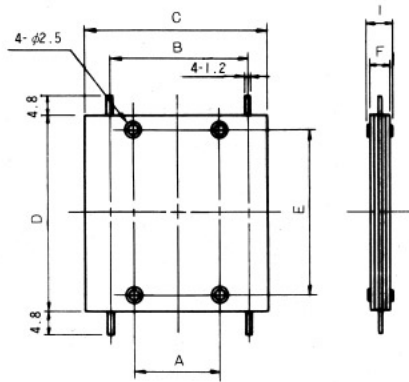
| Part Number | Frequency Range (MHz) | Coupling (dB) | Frequency Sensitivity (dB) | Isolation (dB Min) | V.S.W.R. (Max) | Weight (g) | Power (W) | Fig |
|----------------|-----------------------|---------------------------------|----------------------------|--------------------|----------------|------------|-----------|-----|
| HD-0053M3-IH | 30~76 | 3 ^{+0.35} ₀ | ±0.75 | 15 | 1.40 | 22 | 100 | 1 |
| HD-0070M3-GH | 45~85 | 3 ^{+0.35} ₀ | ±0.5 | 20 | 1.20 | 25 | 50 | 2 |
| HD-0125M3-GH | 80~160 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 22 | 100 | 2 |
| HD-0155M3-IH | 90~220 | 3 ^{+0.3} ₀ | ±0.8 | 20 | 1.20 | 23 | 100 | 2 |
| HD-0195M3-DH | 160~230 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 22 | 100 | 2 |
| HD-0195M3-DH-1 | 160~230 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 11 | 100 | 1 |
| HD-0300M3-FH | 225~400 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 10 | 100 | 2 |
| HD-0300M3-FH-1 | 225~400 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 9 | 100 | 1 |
| HD-0313M3-FH | 225~400 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 6 | 100 | 3 |
| HD-0430M3-CH | 360~470 | 3 ^{+0.3} ₀ | ±0.3 | 20 | 1.20 | 10 | 100 | 2 |
| HD-0620M3-EH | 470~770 | 3 ^{+0.3} ₀ | ±0.5 | 20 | 1.20 | 6 | 100 | 2 |
| HD-0660M3-GH | 470~880 | 3 ^{+0.3} ₀ | ±0.6 | 19 | 1.20 | 6 | 100 | 2 |

■ Specifications

| Part Number | Frequency Range. (MHz) | Coupling (dB) | Frequency Sensitivity (dB) | Isolation (dB Min) | V.S.W.R. (Max) | Weight (g) | Power (W) | Fig. |
|----------------|------------------------|--------------------|----------------------------|--------------------|----------------|------------|-----------|------|
| HD-0660M3-GH-1 | 440~880 | 3 ^{+0.35} | ±0.6 | 20 | 1.20 | 6 | 100 | 1 |
| HD-0700M3-FH | 500~900 | 3 ^{+0.3} | ±0.5 | 20 | 1.20 | 6 | 100 | 2 |
| HD-0750M3-GH | 500~1,000 | 3 ^{+0.3} | ±0.5 | 20 | 1.20 | 5 | 100 | 1 |
| HD-0900M3-CH | 800~1,000 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 6 | 100 | 2 |
| HD-0900M3-CH-1 | 800~1,000 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 6 | 100 | 1 |
| HD-0900M3-CH-2 | 800~1,000 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 6 | 100 | 3 |
| HD-1500M3-GH | 1,000~2,000 | 3 ^{+0.3} | ±0.6 | 20 | 1.25 | 4 | 100 | 4 |
| HD-1700M3-FH | 1,200~2,200 | 3 ^{+0.3} | ±0.5 | 20 | 1.20 | 5 | 50 | 5 |
| HD-1800M3-CH | 1,600~2,000 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 3 | 50 | 6 |
| HD-1900M3-CH | 1,700~2,100 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 3 | 50 | 6 |
| HD-2100M3-CH | 1,900~2,300 | 3 ^{+0.3} | ±0.3 | 20 | 1.20 | 3 | 50 | 6 |
| HD-2400M3-BH | 2,200~2,600 | 3 ^{+0.4} | ±0.5 | 20 | 1.20 | 3 | 100 | 8 |
| HD-2500M3-BH | 2,300~2,700 | 3 ^{+0.4} | ±0.3 | 21 | 1.25 | 3 | 100 | 6 |
| HD-3200M3-BH | 3,000~3,400 | 3 ^{+0.4} | ±0.3 | 18 | 1.30 | 3 | 100 | 6 |
| HD-3900M3-BH | 3,600~4,200 | 3 ^{+0.4} | ±0.5 | 18 | 1.30 | 7 | 100 | 7 |
| HD-6150M3-AH | 5,900~6,400 | 3 ^{+0.4} | ±0.5 | 18 | 1.30 | 7 | 100 | 7 |

- There is a 90° phase difference between the output and the coupling.
- The VSWR has a common standard for both the primary line and the secondary line.

External Dimensions



PCB Mounting Pattern

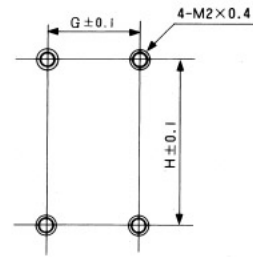
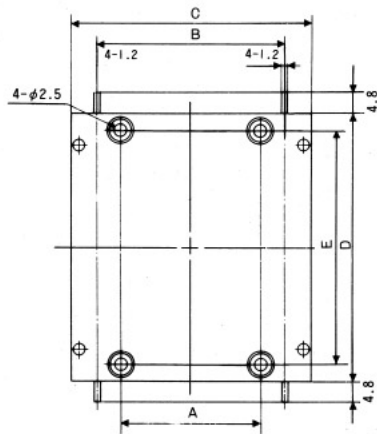


Fig.1

| Part Number | A | B | C | D | E | F | G | H | I |
|----------------|------|------|------|------|------|-----|------|------|-----|
| HD-0053M3-IH | 28.0 | 44.5 | 53.3 | 50.8 | 44.5 | 3.2 | 28.0 | 44.5 | 3.6 |
| HD-0195M3-DH-I | 17.3 | 26.9 | 36.3 | 38.1 | 31.8 | 2.9 | 17.3 | 31.8 | 3.3 |
| HD-0300M3-FH-I | 12.7 | 21.8 | 31.8 | 31.8 | 25.4 | 3.1 | 12.7 | 25.4 | 3.5 |
| HD-0660M3-GH-I | 7.9 | 17.8 | 25.4 | 25.4 | 19.1 | 3.1 | 7.9 | 19.1 | 3.5 |
| HD-0750M3-GH | 8.0 | 16.8 | 25.4 | 22.2 | 15.9 | 3.2 | 8.0 | 15.9 | 3.6 |
| HD-0900M3-CH-I | 8.0 | 17.0 | 25.5 | 22.5 | 15.9 | 3.4 | 8.0 | 15.9 | 3.8 |



PCB Mounting Pattern

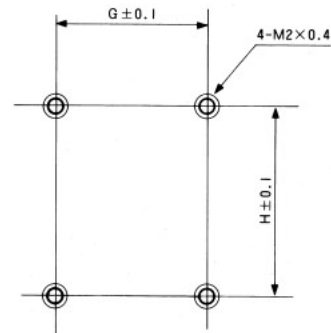


Fig.2

| Part Number | A | B | C | D | E | F | G | H |
|--------------|------|------|------|------|------|-----|------|------|
| HD-0900M3-CH | 8.0 | 17.0 | 25.5 | 22.5 | 15.9 | 3.0 | 8.0 | 15.9 |
| HD-0620M3-EH | 8.0 | 17.0 | 25.5 | 22.5 | 15.9 | 3.1 | 8.0 | 15.9 |
| HD-0430M3-CH | 12.8 | 21.8 | 32.0 | 32.0 | 25.4 | 3.0 | 12.8 | 25.4 |
| HD-0300M3-FH | 12.8 | 21.8 | 32.0 | 32.0 | 25.4 | 3.2 | 12.8 | 25.4 |
| HD-0195M3-DH | 28.0 | 37.1 | 46.1 | 51.0 | 44.5 | 3.0 | 28.0 | 44.5 |
| HD-0155M3-IH | 28.0 | 37.1 | 46.1 | 51.0 | 44.5 | 3.4 | 28.0 | 44.5 |
| HD-0125M3-GH | 28.0 | 37.1 | 46.1 | 51.0 | 44.5 | 3.2 | 28.0 | 44.5 |
| HD-0070M3-GH | 28.0 | 44.5 | 53.5 | 51.0 | 44.5 | 3.2 | 28.0 | 44.5 |
| HD-0660M3-GH | 8.0 | 17.0 | 25.5 | 22.5 | 15.9 | 3.3 | 8.0 | 15.9 |
| HD-0700M3-FH | 8.0 | 17.0 | 25.5 | 22.5 | 15.9 | 3.1 | 8.0 | 15.9 |

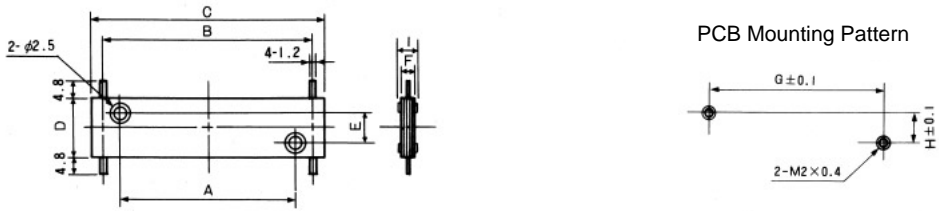


Fig.3

| Part Number | A | B | C | D | E | F | G | H | I |
|----------------|------|------|------|------|-----|-----|------|-----|-----|
| HD-0313M3-FH | 38.1 | 45.7 | 50.8 | 12.7 | 6.4 | 3.2 | 38.1 | 6.4 | 3.6 |
| HD-0900M3-CH-2 | 38.1 | 45.7 | 50.8 | 12.7 | 6.4 | 3.2 | 38.1 | 6.4 | 3.6 |

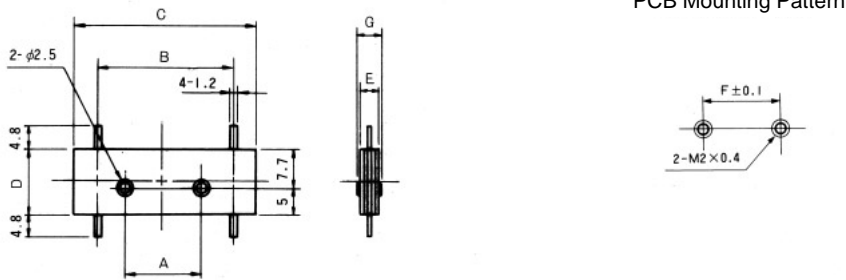


Fig.4

| Part Number | A | B | C | D | E | F | G |
|--------------|------|------|------|------|-----|------|-----|
| HD-1500M3-GH | 14.0 | 26.7 | 34.3 | 12.7 | 3.2 | 14.0 | 3.6 |

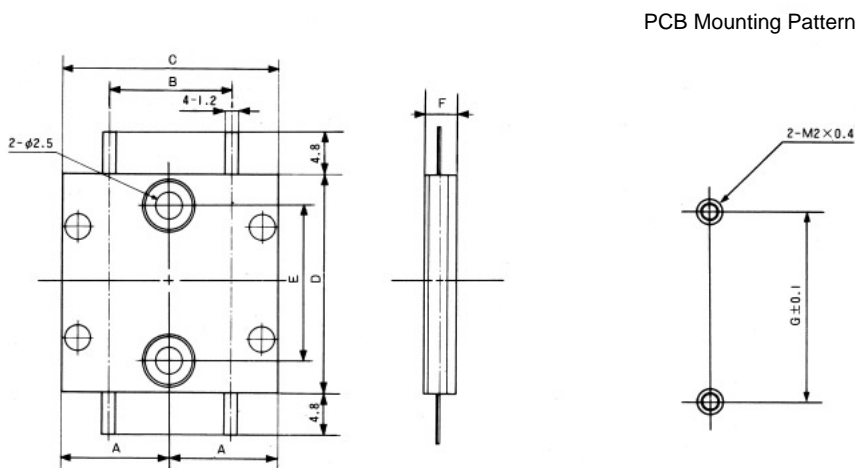


Fig.5

| Part Number | A | B | C | D | E | F | G |
|--------------|-------|------|------|------|------|-----|------|
| HD-1700M3-FH | 10.35 | 11.7 | 20.7 | 20.7 | 14.3 | 3.3 | 14.3 |

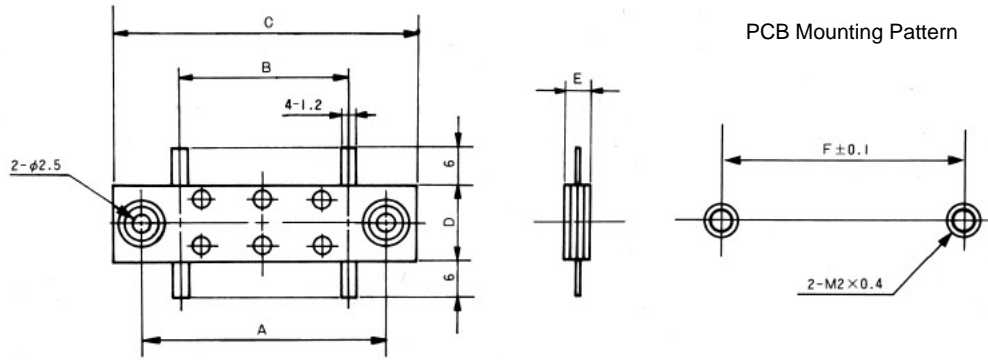


Fig.6

| Part Number | A | B | C | D | E | F |
|--------------|------|------|------|------|-----|------|
| HD-2100M3-CH | 40.2 | 26.8 | 46.6 | 10.0 | 2.8 | 40.2 |
| HD-1900M3-CH | 40.2 | 26.8 | 46.6 | 10.0 | 2.8 | 40.2 |
| HD-1800M3-CH | 40.2 | 26.8 | 46.6 | 10.0 | 2.8 | 40.2 |
| HD-3200M3-BH | 25.1 | 15.1 | 31.1 | 10.0 | 3.3 | 25.1 |
| HD-2500M3-BH | 40.2 | 26.8 | 46.6 | 10.0 | 3.1 | 40.2 |

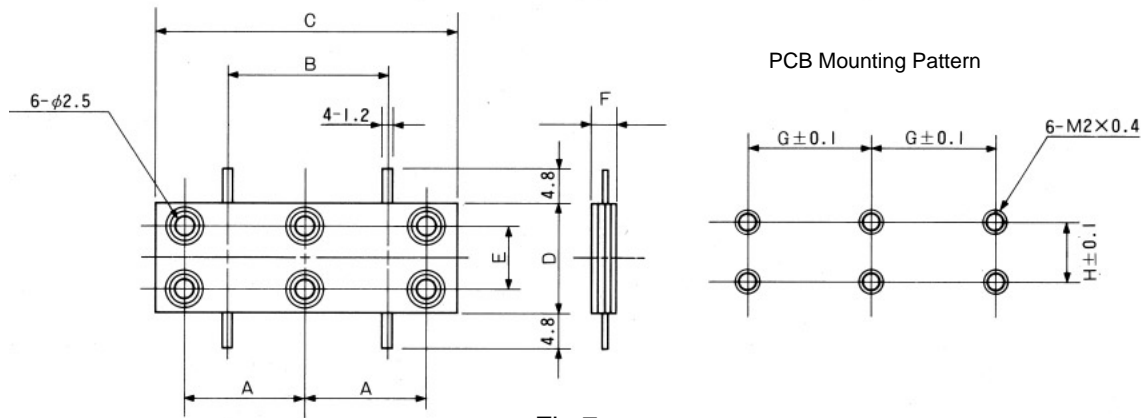
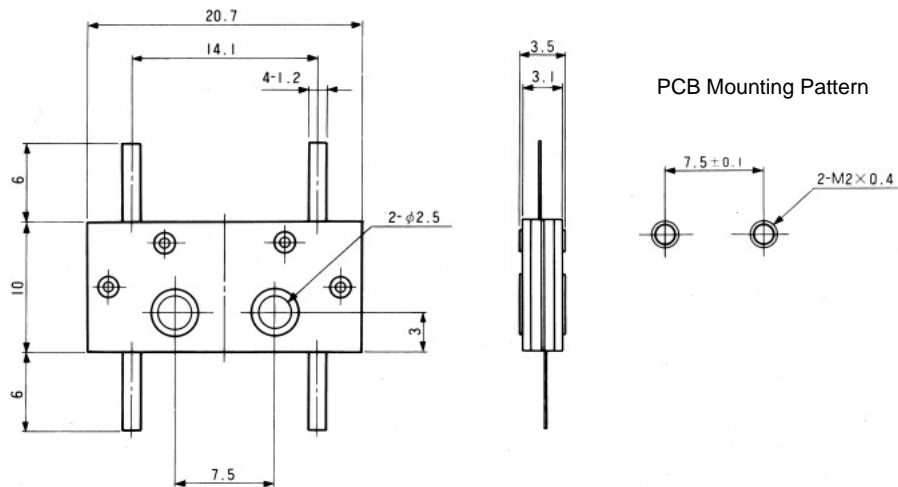


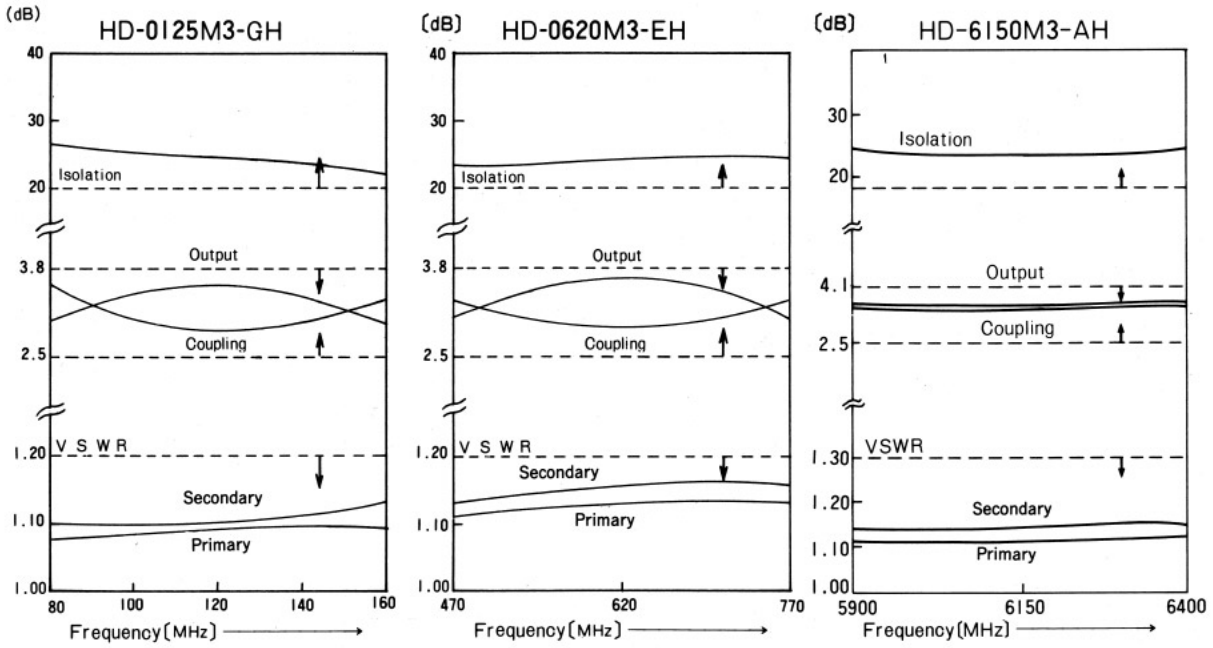
Fig.7

| Part Number | A | B | C | D | E | F | G | H |
|--------------|----|----|----|----|-----|-----|----|-----|
| HD-3900M3-BH | 17 | 22 | 42 | 15 | 8.5 | 3.2 | 17 | 8.5 |
| HD-6150M3-AH | 17 | 22 | 42 | 15 | 8.5 | 3.2 | 17 | 8.5 |

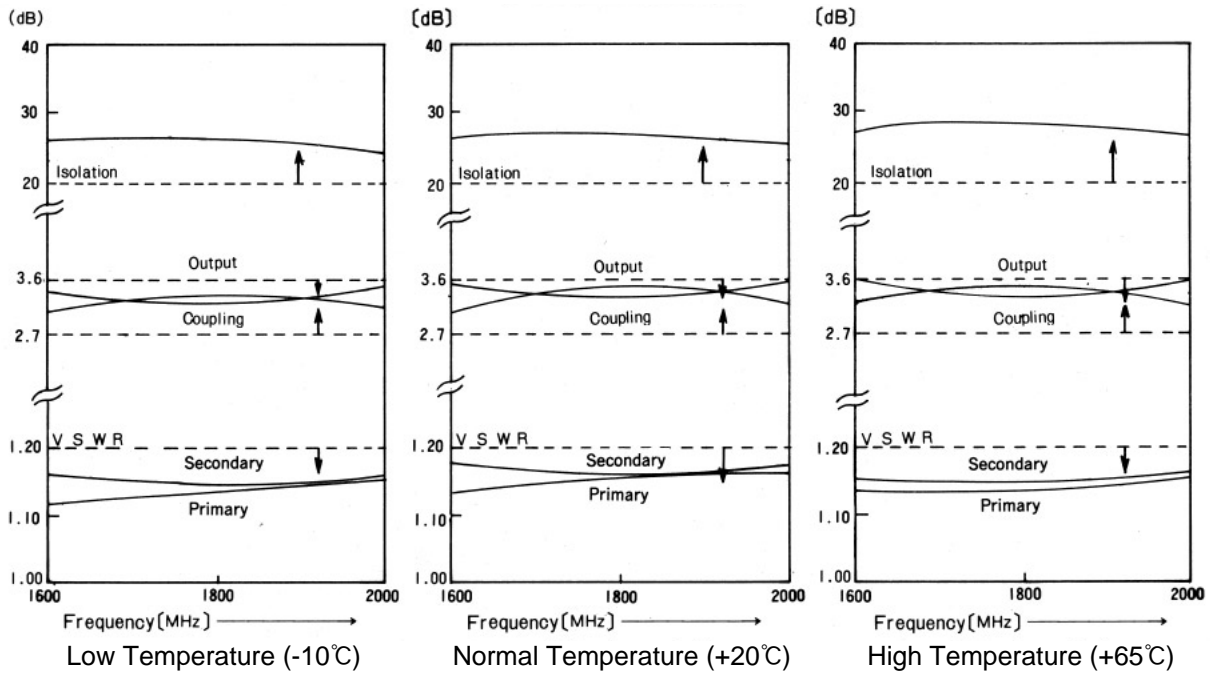


HD-2400M3-BH
Fig.8

Typical Data



Temperature Test Data
<HD-1800M3-CH>



■ Mounting Method

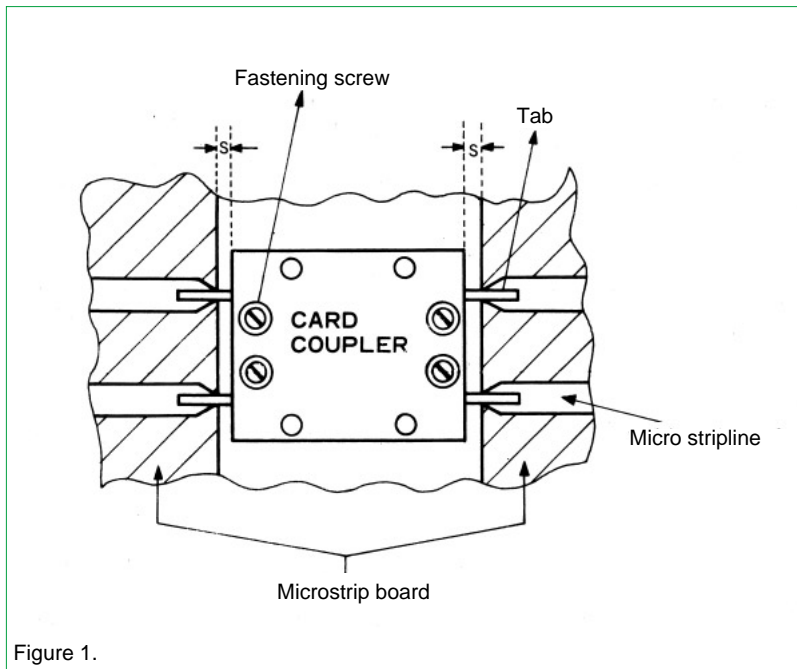


Figure 1.

The three types of mounting methods illustrated in the diagrams below will mount the card coupler for use under optimum conditions.

The fastening screws in the diagrams are M2 screws tightened to 1.5 kg · cm. When the tip of the micro stripline is of Teflon type material ($\epsilon_r = 2.6$), C chamfering of C1 is performed at t1.6, and of C0.5 at t1.2.

The side view diagrams of Figure 1 are illustrated in Figures 2, 3, and 4 below. Gap S between the card coupler and the microstrip board surface should be used to agree with the following conditions.

| | | |
|-----------------|-------|------------------|
| Below 500 MHz | | $S \leq 0.5$ mm |
| 500 to 2300 MHz | | $S \leq 0.25$ mm |
| Above 2300 MHz | | $S \leq 0.15$ mm |

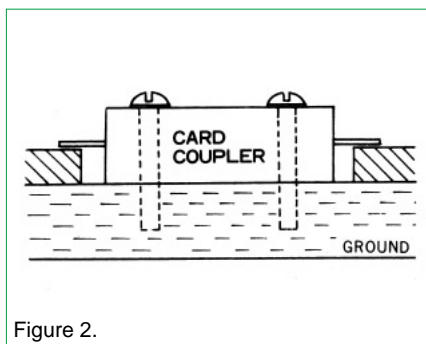


Figure 2.

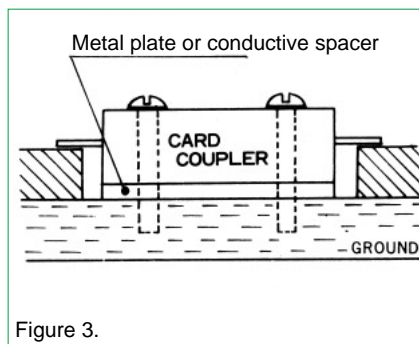


Figure 3.

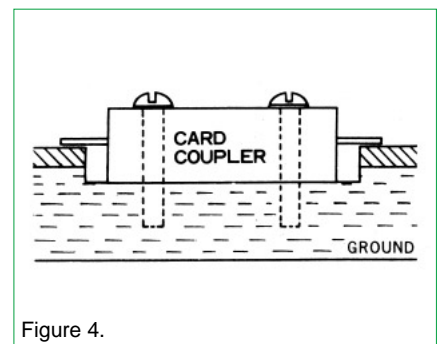


Figure 4.

● When the Ground Board is Constructed of 0.4 mm Stainless and 0.8 mm Aluminum

(When the Thickness of the Microstrip Board is 1.6 or 1.2 mm)

For t1.6 boards, use with the stainless case of the card coupler facing upward. For t1.2 boards, use with the aluminum case of the card coupler facing upward. Mount and fix the card coupler with fastening screws as illustrated in Figure 2. Next, solder the tabs and micro stripline, then use.

(When the Thickness of the Microstrip Board is Greater than 1.6 mm)

Insert a metal plate or a conductive spacer between the coupler and ground, then mount as illustrated in Figure 3 so that the surface of the tabs and the position of the microstrip board are equal. Fix the card coupler with fastening screws as illustrated in Figure 3. Next, solder the tabs and micro stripline, then use.

(When the Thickness of the Microstrip Board is Less than 1.2 mm)

Cut the ground at the position of the coupler and attach so that the surface of the tabs is in contact with the micro stripline. Fix the card coupler with fastening screws as illustrated in Figure 4. Next, solder the tabs and micro stripline, then use.

For VE Items (in which Aluminum Is Used Above and Below the Ground Board and the Eyelets Protrude Beyond the Cover)

The height of the cover will be a value 0.1 mm less than one half of the overall thickness.

For Directional Card Couplers (HD-0900M (10 dB) and HD-0900M (20 dB),etc.)

The height of the cover will be a value 0.35 mm less than one half of the overall thickness.

(When Spacing H of the Micro Stripline Board and the Tabs is $0 \leq H \leq 0.3$ mm)

Fix the card coupler with fastening screws as illustrated in Figure 2.

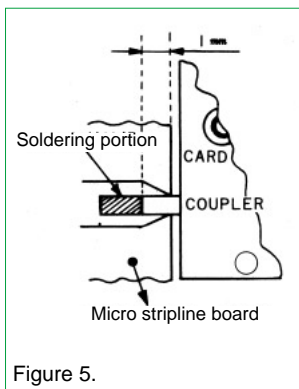
Next, solder the tabs and micro stripline, then use.

(When Spacing H of the Micro Stripline Board and the Tabs is $H < 0$)

Insert a metal plate or a conductive spacer between the coupler and ground, then mount as illustrated in Figure 3 so that the surface of the tabs and the position of the microstrip board are equal. Fix the card coupler with fastening screws as illustrated in Figure 3. Next, solder the tabs and micro stripline, then use.

(When Spacing H of the Micro Stripline Board and the Tabs is $H > 0.3$ mm)

Cut the ground at the position of the coupler and attach so that the surface of the tabs is in contact with the micro stripline. Fix the card coupler with fastening screws as illustrated in Figure 4. Next, solder the tabs and micro stripline, then use.



At the time of soldering, solder with a space of 1 mm from the edge of the micro stripline as illustrated in Figure 5.