



# U F I N E Technologies

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  - > CDMA / WCDMA / GSM / PCS Repeaters
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  - > Passive item
  - > Tower Mounted Amplifier
  - > MMDS item



UFINE Overview

|                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Company            | UFine Technologies Co., Ltd.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Location           | HQ/Factory-Bundang, Sungnam-city, South Korea                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Full time Employee | 60 (as of Jan 2009)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2008 revenues      | US\$18 Million                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Business Field     | <div>• Mobile RF Repeater</div> <div>• Fiber Optic Repeater</div> <div>• Distribution Antenna System (In-building distribution solution)</div> <div>• RF Passive item</div> <div>• MMDS item</div> <div>• System Integration Solution</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Accomplishment     | <div>• Acquired certificate of "INNO-BIZ medium-sized company"by Small &amp; Medium business Administration</div> <div>• Acquired certificate of "ISO9001:2000"</div> <div>• Selected "Venture Business" by Kibo Technology Fund</div> <div>• Selected "The most promising medium-sized company" by Small &amp; Medium business Administration</div> <div>• TU Media DMB Satellite Consortium Parnter</div> <div>• Wibro(3.5G) Co-Development Parnter</div> <div>• Awarded SK Telecom best partner</div>                                                                                                                                                                                                                                                                                                                                                              |
| Patents            | <div>• <b>Patent No. 0537570</b><br/>Title: Relay system for extending wireless LAN by converting frequency channel</div> <div>• <b>Patent No. 10-0660168</b><br/>Title: A repeater with the controlling flow for time division duplex (TDD) communication system</div> <div>• <b>Patent No. 0390715</b><br/>Title: Channel combiner/divider of mobile communication systems</div> <div>• <b>Patent No. 10-0788872</b><br/>Title: TDD RF repeater using separation of transmitting and receiving antennas</div> <div>• <b>Patent No. 10-0742558</b><br/>Title: Pedestrian sensors module using infrared sensor and control method thereof</div> <div>• <b>Patent No. 10-0777942</b><br/>Title: RF Repeater and thereof Controlling Method for TDD (Time Division Duplexing) Communication using the RF signal detecting time control and Switching Time Control</div> |

Products & Services

|                   |                   |                   |                                           |
|-------------------|-------------------|-------------------|-------------------------------------------|
| RF Repeater       | FRS, FSR, TRS     | DAS               | - CDMA (2G/3G)<br>- GSM<br>- PCS<br>- TRS |
| Divider Combiner  | MCSU              | TMA               | - For BTS<br>- For Repeaters              |
| Up/Down Converter | Upstream Receiver | MMDS Repeater     | - MMDS                                    |
| N/W Consulting    | NMS               | Network Equipment | - Network<br>- System Integration         |

Abbreviation

RF Radio Frequency

FOR Fiber Optic Repeater

FSR Frequency Shift Repeater

TRS Trunked Radio System Repeater

MCSU Multi Channel Service Unit

MMDS Multichannel Multipoint Distribution Service

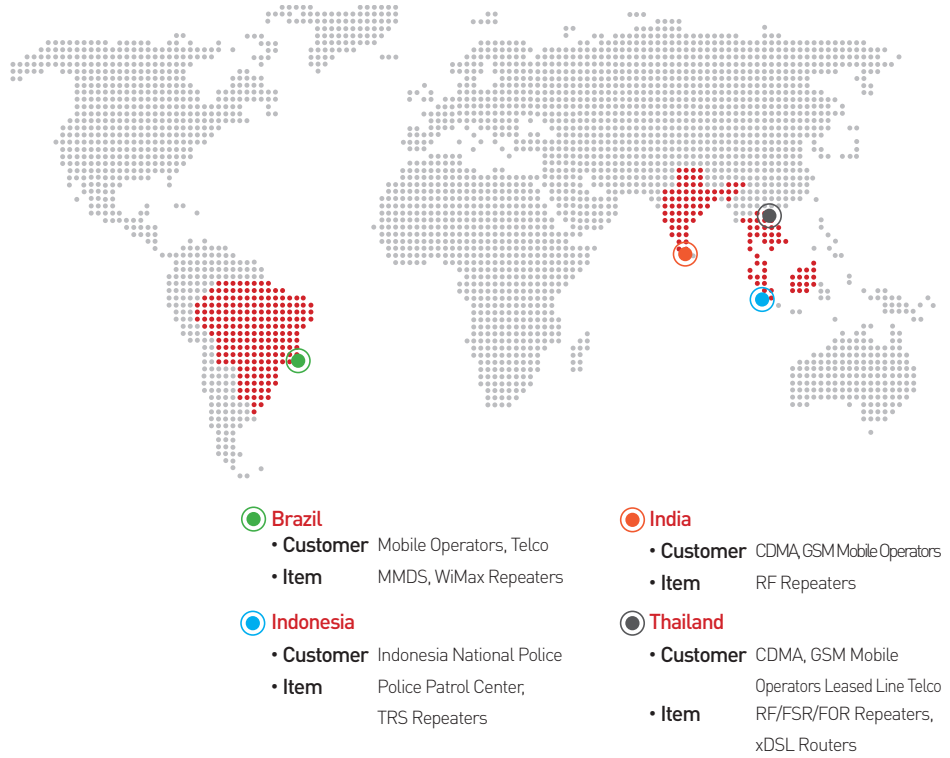
NMS Network Management System

Domestic Customer

• Item: CDMA Repeaters, DMB Antenna, RF Passive Products



Overseas



Facilities

Headquarter: Bundang-gu Sungnam-city, Korea



Factory: Yeongtong-gu Suwon-si Gyeonggi-do, Korea



Manufacturing Facilities

| Production Capacity        |                   |
|----------------------------|-------------------|
| • Passive RF Components    |                   |
| > Combiners                | 100,000 pcs/month |
| > Splitters                | 100,000 pcs/month |
| > Cavity Filter            | 50,000 pcs/month  |
| > Cavity Duplexer Filter   | 50,000 pcs/month  |
| > High Power Coupler       | 100,000 pcs/month |
| • CDMA/GSM/PCS RF Repeater | 5,000pcs/Month    |
| • CDMA/WCDMA/PCS/WiBro FOR | 800set/Month      |
| • WCDMA RF Repeater        | 3,500pcs/Month    |
| • Dual Band RF Repeater    | 3,500pcs/Month    |

| Production Equipment     |                     |
|--------------------------|---------------------|
| • Spectrum Analyzer      | 8 EA                |
| • Network Analyzer       | 10 EA               |
| • Digital Oscilloscope   | 5 EA                |
| • Smart Sensor           | 8 EA                |
| • Signal Generator       | 8 EA                |
| • Noise Figure Meter     | 5 EA                |
| • Burn-in Room           | 1 EA (RT~60°C)      |
| • Temp& Humidity Chamber | 4 EA (-30°C ~ 85°C) |



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Product Line Up

- > CDMA / WCDMA / GSM / PCS Repeaters
- > FOR (Fiber Optic Repeater)
- > DAS (Distribution Antenna System)
- > Passive Items
- > Tower Mounted Amplifier
- > MMDS Item

CDMA + WCDMA Dual In-door RF Repeater

Model Name : **Duo-SF & Duo-MF**

1. Feature

- Dual Band Coverage
  - > CDMA BW : 15Mhz (1FA~12FA)
  - > CDMA BW : 30Mhz (5FA~6FA)
- Auto Gain Control & Auto Level Control
- Remote Management System
  - > Easy attachable CDMA2000-1x Wireless Modem
- Built-in Replaceable PSU
- Lowest Noise via LNA on each Path
- Sharp Rejection Design
- Auto Alarm LED Status Indication
- Auto Shut Down for overpower
- User-friendly GUI Controller (with RS-232 cable)
- Easy Installation
  - > Input & Output port on top of Unit
  - > Coupling Port (SMA-type Female Connector) on the bottom of unit
- MTBF: 272,843 hrs



Duo-SF



Duo-MF

2. Specification

| Frequency Information |         |                         |           |  |
|-----------------------|---------|-------------------------|-----------|--|
| Band                  |         | Frequency               | Remark    |  |
| 2G                    | Forward | 869.025MHz ~ 883.965MHz | 1 ~ 12 FA |  |
|                       | Reverse | 824.025MHz ~ 838.965MHz |           |  |
| 3G                    | Forward | 2120.88MHz ~ 2149.32MHz | 6 ~ 5 FA  |  |
|                       | Reverse | 1930.88MHz ~ 1959.32MHz |           |  |

| Output Power |         |                         |                         |                |
|--------------|---------|-------------------------|-------------------------|----------------|
| Band         |         | Output Power            | Remark                  |                |
|              |         | Duo-SF                  | Duo-MF                  |                |
| 2G           | Forward | +11dBm/12FA (0.2dBm/FA) | +16dBm/12FA (5.2dBm/FA) | 1~12 FA        |
|              | Reverse | +21dBm/1FA              | +21dBm/1FA              | 1 FA Only      |
| 3G           | Forward | +15.8dBm/6FA(+8dBm/FA)  |                         | 6~5FA / 1~4 FA |
|              | Reverse | +21dBm/1FA              | +21dBm/1FA              | 1 FA Only      |

| Size, Power, Operating Environment |              |                  |
|------------------------------------|--------------|------------------|
| Band                               | Output Power |                  |
|                                    | Duo-SF       | Duo-MF           |
| Size (including PSU, W/H/D)        | 230x315x73mm | 275 x 360 x 80mm |
| Power consume                      | Max 50 W     | Max 70W          |
| Power                              | AC 220V      | AC 220V          |
| Operating Temperature Range        | -5 ~ +50℃    | -5 ~ +50℃        |
| Operating Humidity Range           | 5% ~ 95%     | 5% ~ 95%         |

| Coupling port |                           |         |
|---------------|---------------------------|---------|
| Port          | Output Coupling port (dB) | Remark  |
| FWD           | 23 dB ± 2 dB              | 2G + 3G |
| RVS           |                           | 2G + 3G |

| Alarm LED           |                                                                                        |                                |
|---------------------|----------------------------------------------------------------------------------------|--------------------------------|
| Input signal        | Abnormal Status                                                                        | LED Color                      |
| Reverse oscillation | ASD operation caused by RVS input overpower (oscillation)                              | Normal: Green<br>Abnormal: Red |
| Forward overpower   | ASD operation caused by FWD input overpower                                            |                                |
| Forward low output  | For more than 5minutes FWD output level stays at 10dB lower output power than standard |                                |
| Shut Down           | Unit in the running of ASD                                                             |                                |
| PLL Unlock          | PLL Unlock occurs                                                                      |                                |

| RF Specification                    |                                                                                                        |
|-------------------------------------|--------------------------------------------------------------------------------------------------------|
| CDMA (2G) Specification             |                                                                                                        |
| Item                                | Specification                                                                                          |
| System Group Delay                  | Max Less than 7μs Less than 2μs (Peak-to-peak)                                                         |
| Pass band Ripple                    | 3 dB p-p @ Attribute system has                                                                        |
| AGC Response Time                   | 100ms ~ 500ms                                                                                          |
| AGC Error / Control Step            | Reference ± 2.0 dB / 1dB Step                                                                          |
| Characteristic Impedance            | 50ohm                                                                                                  |
| Input VSWR                          | 1.5 : 1                                                                                                |
| In & out Band Spurious Emission     | 29dBc @fc ± 750KHz, 39dBc @fc ± 1.98MHz                                                                |
| Spurious Emission Limitation        | Gain on each Path * Maintain Less than NF                                                              |
| Tx / Rx Isolation                   | More than 83dB (SF) More than 88dB(MF)                                                                 |
| Forward Path Specification          |                                                                                                        |
| Gain (Control Range)                | SF 68dB(50 dB,) MF 73dB(50dB, MF)                                                                      |
| Adjacent Freq Oppression            | 29dBc @fc ± 750KHz, 44dBc @fc ± 1.98MHz                                                                |
| Input Power Range                   | SF -70 ~ -30dBm/1.23MHz MF -67.8 ~ -27.8dBm/1.23MHz                                                    |
| Maximum Output Power (AGC On)       | SF +11dBm/12FA(0.2dBm/FA) MF +16dBm/12FA(5.2dBm/FA)                                                    |
| Reverse Path Specification          |                                                                                                        |
| Gain (Control Range)                | SF 68dB(50 dB) MF 73dB(50 dB)                                                                          |
| Adjacent Freq Oppression            | More than Rho: 0.97                                                                                    |
| Input Power Range                   | Less than -50dBm/FA                                                                                    |
| Maximum Output Power                | +21dBm/1FA                                                                                             |
| Gain Balance                        | 0 ~ 15dB                                                                                               |
| Noise Figure (FWD Max Output Power) | SF Within 8dB at Gain Balance 10dB Within 2.6dB at Gain Balance 0dB MF Within 6dB at Gain Balance 10dB |

#### CDMA(2G) Band Rejection

| Item    | Freq (MHz)        | Specification (dBc)  | Note              |
|---------|-------------------|----------------------|-------------------|
| Forward | Less than 849     | More than 75         | Reverse Isolation |
|         | Less than 865     | More than 15         |                   |
|         | 869.025 ~ 883.965 | Less than Ripple 3dB | 25MHz Band Pass   |
| Reverse | Less than 821     | More than 3          |                   |
|         | 824.025 ~ 838.965 | Less than Ripple 3dB | 25MHz Band Pass   |
|         | More than 851     | More than 3          |                   |
|         | More than 869     | More than 75         | Forward Isolation |

#### WCDMA (3G) Specification

| Item                          | Specification                                                           |
|-------------------------------|-------------------------------------------------------------------------|
| System Group Delay            | Max Less than 7μs Less than 2μs (Peak-to-peak)                          |
| Pass band Ripple              | 3 dB p-p @ Attribute system has                                         |
| AGC Response Time             | 100ms ~ 500ms                                                           |
| AGC Error / Control Step      | Reference ± 2.0 dB / 1dB Step                                           |
| Characteristic Impedance      | 50ohm                                                                   |
| Input VSWR                    | 1.5 : 1                                                                 |
| Spurious Emission             | 4.2.6 항 참조                                                              |
| In band ACLR                  | More than 35dB @ in-band f_offset>5MHz                                  |
| Out band ACLR                 | More than 45dB@the edge of pass band ± 3.08MHz                          |
|                               | More than 50dB@the edge of pass band ± 8.08MHz (Input : -15dBm/FA only) |
| Pass band Ripple              | 3 dB p-p(Attribute system has)                                          |
| Error Vector Magnitude(EVM)   | Less than 12.5% @ 1FA Max input                                         |
| Peak Code Domain Error(PCDE)  | Less than -35dB                                                         |
| Frequency Stability           | ±0.01ppm                                                                |
| Tx/Rx Isolation               | SF More than 93dB                                                       |
|                               | MF More than 99dB                                                       |
| Pass band 3dB Bandwidth(6FA)  | More than 29.84MHz                                                      |
| Pass band 50dB Bandwidth(6FA) | Less than 32.5MHz                                                       |
| Forward Path Specification    |                                                                         |
| Gain(Control Range)           | SF 78dB(50dB)<br>MF 84dB(50dB)                                          |
| Frequency Range (6FA)         | 2120.88MHz ~ 2149.32MHz                                                 |
| Input Power Range             | -70 ~ -30dBm/FA                                                         |
| Maximum Output Power(AGC On)  | SF +15.8dBm/6FA(+8dBm/FA)                                               |
|                               | MF +21.8dBm/6FA(+8dBm/FA)                                               |
| Pass Band 3dB Bandwidth(6FA)  | More than 29.84MHz                                                      |
| Pass Band 50dB Bandwidth(6FA) | Less than 32.5MHz                                                       |
| Reverse Path Specification    |                                                                         |
| Gain(Control Range)           | SF 78dB(50dB)<br>MF 84dB(50dB)                                          |
| Frequency Range (6FA)         | 1930.88MHz ~ 1959.32MHz                                                 |
| Input Power Range             | Less than -50dBm/FA                                                     |
| Maximum Output Power          | +21dBm/1FA                                                              |
| Noise Figure                  | Less than 6dB (FWD: Max Output Power, at Gain Balance 10dB)             |

#### WCDMA (3G) Spurious Emission

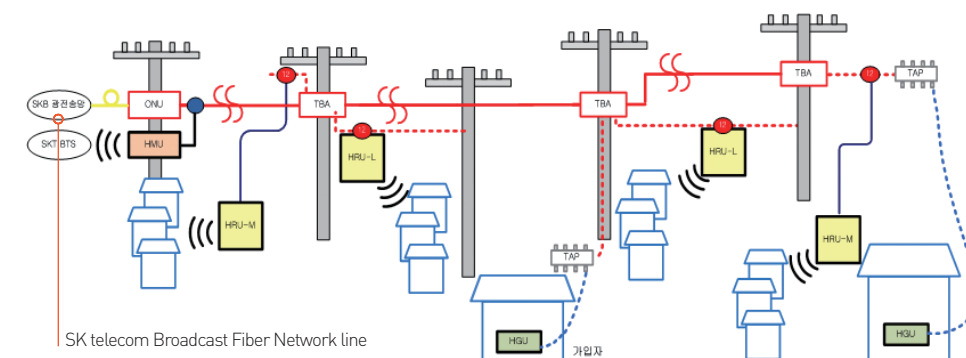
| Band          | Maximum Level | Measure Bandwidth | Note                                      |
|---------------|---------------|-------------------|-------------------------------------------|
| 9KHz~150KHz   | -13dBm        | 1KHz              | Bandwidth as in ITU-R SM.329-8.s4.1       |
| 150KHz~30MHz  |               | 10KHz             | Bandwidth as in ITU-R SM.329-8.s4.1       |
| 30MHz~1GHz    |               | 100KHz            | Bandwidth as in ITU-R SM.329-8.s4.1       |
| 1GHz~12.75GHz |               | 1MHz              | Upper frequency as in ITU-R SM.329-8.s2.6 |

## HFC-W2

It is new concept of WCDMA RF Out-door repeater which is used with existing laid Cable TV Network line in order to improve weakness of cellular phone signal at each households so it requires no additional network line which can allows service provides to save dramatically installation cost. HFC-W package consists of Main unit, Remote unit, additional Gateway unit so it is free from oscillation which usually damages to out-door RF repeater.



### 1. HFC-W2 Service Diagram



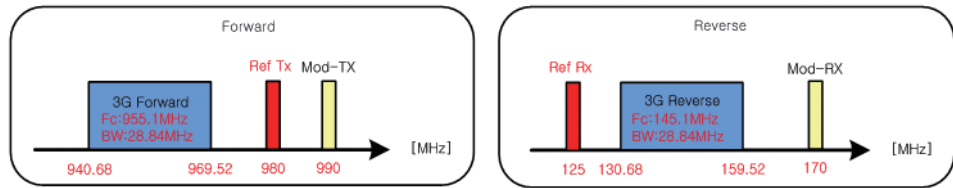
#### Abbreviation

|       |                                      |     |                                     |
|-------|--------------------------------------|-----|-------------------------------------|
| HFC   | Hybrid Fiber Coaxial                 | HGU | HFC Gateway Unit ( To be developed) |
| ONU   | Optical Network Unit                 | ●   | 8dB Coupler                         |
| TBA   | Trunked Broadcast Amplifier          | ●   | 12dB Coupler                        |
| HMU   | HFC Main Unit                        | --- | HFC Indirect line                   |
| HRU-M | HFC Remote Unit_ Middle Output Power | --- | HFC Direct line                     |
| HRU-L | HFC Remote Unit-Low Output Power     |     |                                     |

### 2. Specification

| Forward Path    |               |                                        |
|-----------------|---------------|----------------------------------------|
| Characteristic  | Specification |                                        |
| Input Range     | HMU           | -62 ~ -22dBm/6FA (including ALC 10dB ) |
| Output Power    | HRU-L         | 33dBm/6FA                              |
| Ripple          | HMU - HRU-L   | 3.5dB p-p 4dB                          |
| Delay           |               | Max 6us without cable                  |
| Outband ACLR    |               | 45dBc@FC±5MHz, 50dBc@FC±10MHz          |
| EVM             |               | Less than 12.5% @ 1FA                  |
| Freq. Stability |               | ±0.01ppm                               |
| Reverse Path    |               |                                        |
| Characteristic  | Specification |                                        |
| Input Range     | HRU-L         | -68dBm/1FA Max                         |
| Output Power    | HMU           | 27dBm/1FA Max                          |
| Ripple          | HRU-L - HMU   | 3.5dB p-p                              |
| Delay           |               | Max 6us                                |
| Outband ACLR    |               | 45dBc@FC±5MHz, 50dBc@FC±10MHz          |
| EVM             |               | Less than 12.5% @ 1FA                  |
| Freq. Stability |               | ±0.01ppm                               |

### 3. HFC Frequency Information



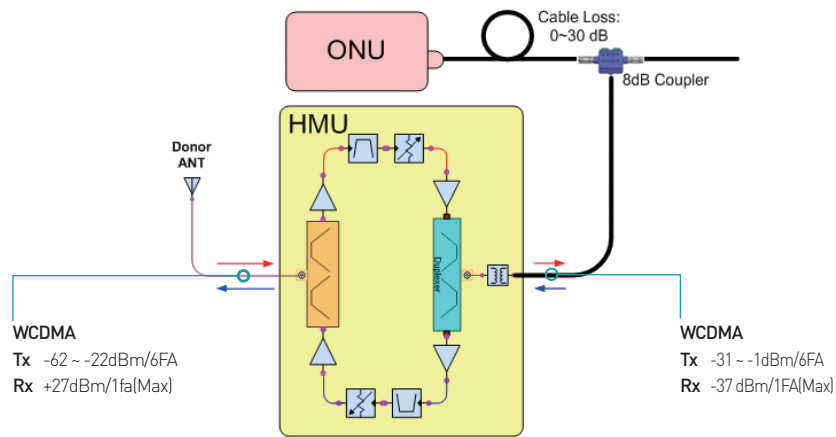
#### FWD

| Name    | Description                                                                      |
|---------|----------------------------------------------------------------------------------|
| REF_TX  | HMU transmits 980Mhz reference with which HRU & HGU generates PLL reference freq |
| 940~970 | HMU converts WCDMA FWD(2120~2150MHz) into 940~970MHz                             |
| MOD_TX  | Transmitting freq (990MHz) for FSK communication between HMU and HRU             |

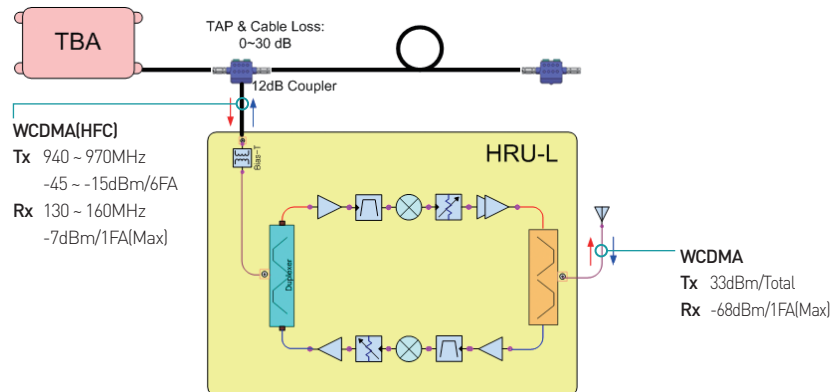
#### RVS

| Name    | Description                                                          |
|---------|----------------------------------------------------------------------|
| MOD_RX  | Transmitting freq (170MHz) for FSK communication between HMU and HRU |
| 130~160 | HMU converts WCDMA RVS(1930~1960MHz) into 130~160MH                  |
| REF_RX  | Reference freq (125MHz) for implementing RVS AGS function            |

### 4. HMU Block Diagram



### 5. HRU-L Block Diagram



## GSM + WCDMA Dual Home RF Repeater (13dBm + 10dBm)

Model Name : **UHR-230S + UHR230L**

- Standing type
- Service and link Separation type

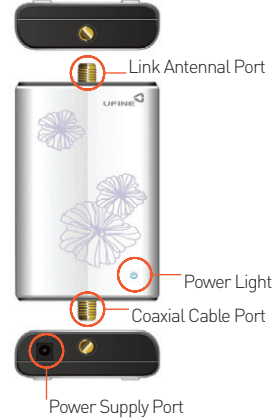
You will now be able to use your cell phone inside your home or office. Gone are the days when you had to go to the window upstairs or walk outside to use your cell phone. Like a skylight that brings sunlight into your home. UHR-230S (Service unit) and UHR-230L (Link unit) transports and amplifies the outdoor wireless signals into your home or office. You can enjoy a good quality of cellular phone conversation by extending Cell Zones into your home or office.

### 1. Service Unit / Link Unit

Service Unit



Link Unit

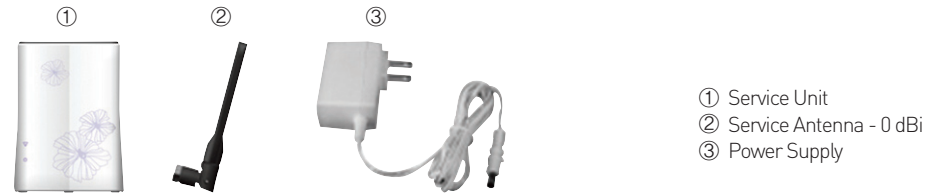


### 2. Specification

|                                                   |                                                                                                                                       |                                                         |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Frequency                                         | GSM                                                                                                                                   | UP Link : 824~849 MHz / Down Link : 869~894 MHz         |
|                                                   | WCDMA                                                                                                                                 | UP Link : 1940~1960 MHz / Down Link : 2130~2150 MHz     |
| Networks                                          | GSM, WCDMA                                                                                                                            |                                                         |
| Total System Gain                                 | GSM                                                                                                                                   | UP Link : 50dB (Adaptive) / Down Link : 56dB (Adaptive) |
|                                                   | WCDMA                                                                                                                                 | UP Link : 50dB (Adaptive) / Down Link : 56dB (Adaptive) |
| System Output Power (except Antenna)              | GSM                                                                                                                                   | UP Link : 15dBm/2tone max/Down Link : 13dBm/2tone max   |
|                                                   | WCDMA                                                                                                                                 | UP Link : 15dBm/1FA/Down Link : 10dBm/4FA               |
| Antenna Gain                                      | Link Antenna<br>GSM 5dBi/WCDMA 3dBi Omni, F-type Female<br>Service Antenna<br>0dBi Mono Type, F-type Male                             |                                                         |
| Unit Size                                         | Link Unit                                                                                                                             | 80 x 131 x 26mm                                         |
|                                                   | Service Unit                                                                                                                          | 115 x 160 x 43mm                                        |
| Power Supply                                      | AC Power Input                                                                                                                        | 100-240VAC, 50/60Hz, 0.3A                               |
|                                                   | DC Power Output                                                                                                                       | 5VDC, 2A                                                |
| Operating Conditions                              | Indoor use Only 0°C~40°C                                                                                                              |                                                         |
| Interface Loss between Link Unit and Service Unit | 5~15dB<br>Coax Cable Length :<br>GSM 5dB (25meter[82feet]) / 15dB (77m[252feet])<br>WCDMA 5dB (16meter[52feet]) / 15dB (47m[154feet]) |                                                         |

### 3. Product Contents

#### Product Contents (Service Part)



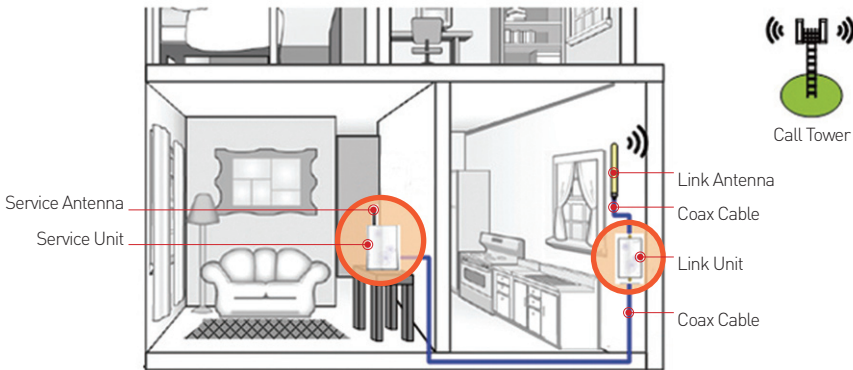
#### Product Contents (Link Part)



### 4. Installation Example

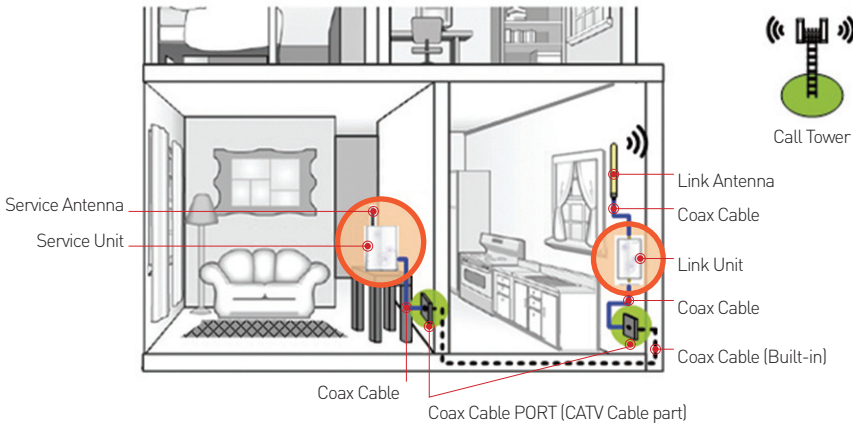
#### Example 1)

Connect Link and Service Unit by using the coaxial cable



#### Example 2)

Connect Link and Service Unit by using CATV terminal port on the wall



### CDMA/PCS 10dBm Home Repeater

Model Name : **UT-C800SB10R**

#### 1. Feature

- Customized band selective possible
- Easy installation
- Shut Down in case of overpower
- Small, Powerful, Economical Repeater
- Auto level Control

#### 2. Specification

| Specification      | Uplink                                             | Down link |
|--------------------|----------------------------------------------------|-----------|
| Frequency          | 869~889                                            | 824~844   |
|                    | Customized band selective possible                 |           |
| Bandwidth          | 20Mhz [Bandwidth is available upon user's request] |           |
| ALC Range          | +55dB                                              |           |
| ALC Range          | 20dB min                                           |           |
| Gain Flatness      | 4dB peak to peak                                   |           |
| DL Output Power    | +10dBm / 4FA                                       |           |
| Noise Figure       | 6dB Max                                            |           |
| Shut Down          | ALC 30dB@ +/- 5dB Range                            |           |
| Weight             | 480g                                               |           |
| Dimensions (H*W*D) | 107 x 128 x 22mm                                   |           |

### CDMA/PCS 15dBm, 17dBm Home Repeater

Model Name : **UT-C800SB15R, 17R**

#### 1. Feature

- Customized band selective possible
- Low interface
- Auto level Control
- Shut Down in case of overpower
- Small, Powerful, Economical Repeater
- Easy installation
- Manual Gain Control via Dip S/W

#### 2. Specification

| Specification                   | Uplink                                     | Down link                                                                    |
|---------------------------------|--------------------------------------------|------------------------------------------------------------------------------|
| Frequency                       | Customized band selective possible         |                                                                              |
| Bandwidth                       | Bandwidth is available upon user's request |                                                                              |
| Maximum Gain                    | 15R<br>17R                                 | 60dB : gain stability $\pm 1$ dB max<br>70dB : gain stability $\pm 2$ dB max |
| ALC Range                       | +15dB min (0~ 2dB)                         |                                                                              |
| Manual Gain control via Dip S/W | 20dB in Steps of 1dB                       |                                                                              |
| Gain Flatness                   | 7dB peak to peak                           |                                                                              |
| DL Output Power                 | 15R<br>17R                                 | +15dBm<br>+17dBm                                                             |
| Noise Figure                    | 15R<br>17R                                 | Better 5dB<br>Better 6dB                                                     |
| Shut Down                       | 15R<br>17R                                 | 13dBm (0~2dB)<br>14dBm (0~2dB)                                               |
|                                 |                                            | +18dBm (0~2dB)<br>+20dBm (0~2dB)                                             |
| Wetght                          | 480g                                       |                                                                              |
| Dimensions (H*W*D)              | 107 x 128 x 22mm                           |                                                                              |



## PCS 1900 Single In-building Repeater

Model Name : **FP-230**

Now an affordable solution to solve the dropped call and no signal problem in any indoor area. The FP-230 is easy to install and will increase your signal strength 100%. The expected area of coverage is more 250 square meters.

### 1. Feature

- System gain 70dB
- High Gain Bi-directional low noise
- Separate power supplier
- Auto Gain control
- Shut Down for over input power



### 2. Specification

| Division          | Down link                            | Up link                   | Remark              |
|-------------------|--------------------------------------|---------------------------|---------------------|
| Frequency Range   | 1930~1990                            | 1850~1910                 | 60MHz BW IF Filter  |
| Gain              | 70dB                                 | 70dB                      |                     |
| Gain Flatness     | +/- 4dB, over1930~1990Mhz            | +/- 4dB, over1850~1910Mhz |                     |
| Output power      | 23dB (Max)                           | 15dB (Max)                |                     |
| Noise Figure      | 5dB                                  | 5dB                       |                     |
| Group Delay       | 1μS                                  | 1μS                       | RBW (30kHz) △marker |
| Spurious Emission | Fc ± 885kHz:29dBc Fc ± 1.98MHz:39dBc |                           |                     |
| VSWR              | 1.5:1                                |                           |                     |

### 3. LED Operation

| LED       | Color status | Indication          | Remark                                      |
|-----------|--------------|---------------------|---------------------------------------------|
| Power LED | Off          | 1850~1910           |                                             |
|           | Green        | Normal working      |                                             |
| Alarm LED | Off          | Start up            | checking isolation between link and service |
|           | Green        | Normal working      |                                             |
|           | Red          | Shut down operation | Over-power oscillation                      |
| Input LED | Off          | < -80dBm            |                                             |
|           | Yellow       | -80dBm to -60dBm    |                                             |
|           | Green        | > -60dBm            |                                             |

### 4. Gain Control

| Gain control                  | Specification   | Remark                   |
|-------------------------------|-----------------|--------------------------|
| Manual Adjust Range           | 40~70dB         |                          |
| Step / Accuracy               | 1dB / +/-1dB    |                          |
| Manual Gain adjust            | 8bit Dip Switch | on Down Link and Up Link |
| AGC (Auto Gain Control)       | Yes             |                          |
| ALC range / ALC Response Time | 30dB / 300ms    |                          |

### 5. Mechanical & AC adaptor

| Division                       | Specification                           |
|--------------------------------|-----------------------------------------|
| RF Connector                   | N type Female                           |
| Impedance                      | 50 ohm                                  |
| Dimensions (H x L x W)         | 170mm x 220mm x 60mm                    |
| Weight max                     | 2Kg                                     |
| Mounting flanges and holes     | On both side                            |
| Supplied with AC to DC adaptor | 100~240V, 2.5A (Two flat parallel pins) |
| AC Frequency                   | 50~60Hz                                 |
| Power Consumption (max)        | 15watt                                  |
| Operating Temperature Range    | -10 to +50                              |

## CDMA Single 27dBm Repeater

Model Name : **UT-800SB27R**

### 1. Feature

- Customized band selective possible
- Easy installation
- Low Interference
- Auto & Manual Gain Control
- Auto shut down in case of overpower
- Separate Keypad
- Providing system information
- Control of power level, AGC status, Shutdown level, Power on/off



### 2. Specification

| Item                        | Specification   | Result                             |
|-----------------------------|-----------------|------------------------------------|
| [MHz]                       | Down Link       | Customized band selective possible |
|                             | Up Link         | Customized band selective possible |
| Input / Output Impedance    |                 | 50 Ω                               |
| Gain                        | Down Link       | 80dB ± 2dB                         |
|                             | Up Link         | 75dB ± 2dB                         |
| Ripple                      |                 | ≤ 3dB peak to peak                 |
| Delay                       |                 | ≤ 5u Sec                           |
| VSWR                        |                 | ≤ 1:1.5                            |
| Out Power                   | Down Link       | +27dBm                             |
|                             | Up Link         | +15dBm                             |
| Gain Control                | 30dB / 1dB Step | Manual                             |
|                             | 30dB Min        |                                    |
| ALC Level                   |                 | 5~27dBm                            |
| Shutdown                    | Down Link       | +30dBm (0~2dB)                     |
|                             | Up Link         | +18dBm (0~2dB)                     |
| Noise Figure                |                 | 5dB max Reverse                    |
| System Delay                |                 | 5u Sec max                         |
| Spectrum Mask               | ± 750KHz        | ≥ 45dBc                            |
|                             | ± 1.98MHz       | ≥ 60dBc                            |
|                             | Over 890MHz     | ≥ 80dBc                            |
| Adjacent CDMA Ch. Rejection |                 | ≥ 60dBc                            |
| Frequency Stability         |                 | ±0.05PPM                           |
| Wave form Quality Factor    |                 | > 0.97 Forward                     |
| Connector                   | N-Female        |                                    |
|                             | SMA-Female      | 30dB±1dB                           |
| Operating Temperature       |                 | -5°C~+55°C                         |
| SMPS Power Supply           |                 | 220VAC±20%, 47~63Hz                |
| LED                         |                 | Green : Power<br>Red : UL/DL Alarm |
| Control Method              |                 | RS-232(GUI) + Keypad *             |

CDMA Single 40dBm Out-door Repeater  
Model Name : **UT-C800SB40R**

1. Feature

- Enhances operator specific mobile coverage
- Low noise and highly linear RF performance
- ALC (Automatic Level Control) for maximal linear output power
- Auto Gain Control
- Low power consumption
- Built-in RMS modem (optional)
- High reliability
- Excellent out-of-band-signals rejection



2. Specification

| Frequency Range                            | Forward / Reverse  | Fixed 4 FA                          |
|--------------------------------------------|--------------------|-------------------------------------|
| Input Level                                | Forward / Reverse  | Min. 055dBm                         |
| Gain                                       | Forward            | 93dB (typ) gain stability ±1dB max. |
|                                            | Reverse Link       | 93dB (typ) gain stability ±1dB max. |
| Gain Ripple                                | Forward Link       | 3 dB peak to peak                   |
|                                            | Reverse Link       | 3 dB peak to peak                   |
| RF Output Level                            | Forward Link       | Max. +40dBm                         |
|                                            | Reverse Link       | Max. +30dBm                         |
| Channel Bandwidth                          |                    | 1.23 MHz                            |
| ALC Ranges                                 |                    | 30dB MIN                            |
| AGC Ranges                                 |                    | 20dB MIN                            |
| Manual Gain Control though<br>DIP switches |                    | 30dB in steps of 1dB                |
| Spurious Emission                          | Fc ± 750KHz        | -45dBc, min @ 30kHz RBW             |
|                                            | Fc ± 1.98KHz       | -60dBc, min @ 30kHz RBW             |
|                                            | 890.0MHz and above | -110dBc, min @ 30kHz RBW            |
| ALC Level                                  | Forward Link       | Can Set 35~41dBm                    |
|                                            | Reverse Link       | Can Set 25~31dBm                    |
| Shut Down Level                            | Forward Link       | Can Set 40~42dBm                    |
|                                            | Reverse Link       | Can Set 30~32dBm                    |
| Noise Figure                               |                    | Better 5dB max                      |
| Group Delay                                | Forward Link       | < 5 us                              |
|                                            | Reverse Link       | < 5 us                              |
| In/Out VSWR                                |                    | 1:1.5 max                           |
| Frequency Stability                        |                    | ±0.05PPM                            |
| Main Power Input Voltage                   |                    | AC220V +/- 20% only                 |
| Power Consumption                          |                    | 320W, max                           |
| Size                                       |                    | 400x500x200mm (L x H x D)           |
| Surge Arrestor                             |                    | For donor antenna side              |
| Operating Temperature                      |                    | -20°C ~ +55°C (ambient)             |
| Storage Temperature                        |                    | -20°C ~ +70°C (ambient)             |
| Humidity                                   |                    | 95%                                 |
| Shutdown (Reverse Link)                    |                    | Red LED ON @ abnormal               |

CDMA + PCS Dual Indoor Repeater  
Model Name : **FCP-152**

1. Feature

|            |             |
|------------|-------------|
| CDMA800 DL | 869 ~ 894   |
| UL         | 824 ~ 849   |
| PCS1900 DL | 1930 ~ 1990 |
| UP         | 1850 ~ 1910 |



We have come up with a dual band repeater that allows the combination of both PCS and Cellular.  
This dual repeater is ideal for smaller application such as office, home and small factories or warehouse This has a internal antenna which can cover up to 20,000 square feet of area.

- Provides high voice quality
- Eliminates dropped calls
- Corrects spotty coverage
- Greatly improves voice/data quality of cellular 800Mhz & 1900Mhz band service.
- Auto and manual Gain Control
- Auto level Control
- Monitoring system info with LED

2. Specification

| Item               | Specification                   |
|--------------------|---------------------------------|
| Freq Range         | Forward 869~894MHz              |
|                    | Reverse 824~849MHz              |
|                    | Forward 1930~1990MHz            |
|                    | Reverse 1850~1910MHz            |
| Bandwidth          | Forward 25MHz                   |
|                    | Reverse 25MHz                   |
|                    | Forward 60MHz                   |
|                    | Reverse 60MHz                   |
| Input Level        | Forward -30dBm/20FA             |
|                    | Reverse -27dBm/1FA              |
|                    | Forward -28dBm/20FA             |
|                    | Reverse -25dBm/1FA              |
| Output Level       | Forward 10dBm/20FA              |
|                    | Reverse 13dBm/1FA               |
|                    | Forward 12dBm/20FA              |
|                    | Reverse 15dBm/1FA               |
| Gain               | Adjust Range 40~70dB            |
|                    | Step 1dB                        |
|                    | Accuracy ±1dB                   |
| Noise Figure       | Forward 9dB @ Max Gain          |
|                    | Reverse 7dB @ Max Gain          |
| Delay              | 5µs                             |
| Tx / Rx Isolation  | More than 85dB                  |
| Isolation Check    | 85dB (Variance : less than 2dB) |
| VSWR @             | Max. 1:1.5                      |
| Impedance @        | 50ohm                           |
| Antenna Connectors | Link Ant Port Type-N Female     |
|                    | Service Ant Port Type-N Female  |

| Item                  | Specification           | Item                          | Specification                |
|-----------------------|-------------------------|-------------------------------|------------------------------|
| Power Supply          | 100 ~ 240 Vac @ 50/60Hz | ALC Response Time             | Setting up [Default : 300ms] |
| Operating Temperature | -10~55°C                | Gain Flatness 850             | Less than 4dBp-p             |
| Humidity              | 5~95%                   | 1900                          | Less than 4dBp-p             |
| Delta-T               | 20°C                    | Over-power Forward            | Setting up                   |
| GUI Interface         | RS-232C                 | Shutdown Reverse              | Setting up                   |
| Water-proof           | No                      | In-band Spurious Emission     | 29dBc @ Fc ± 750kHz          |
| Weight                | 4.5kg                   |                               | 39dBc @ Fc ± 1.98MHz         |
| Dimension             | 203 x 293 x 58 (mm)     | Out of Band Spurious Emission | -13dBm/30kHz @ 9~150kHz      |
| ALC Range             | 30dB                    |                               | -13dBm/30kHz @ 150kHz~30MHz  |
| ALC Level             | Setting up              |                               | -13dBm/30kHz @ 30MHz~1GHz    |
|                       |                         |                               | -13dBm/30kHz @ 1~12.75GHz    |

CDMA800, PCS1900 In-building Repeater

\_23dBm Out power, 70dB gain

Model Name : **FC-230 (CDMA800), FP-230(PCS1900)**

1. Feature

- CDMA800 DL 869 ~ 894  
UL 824 ~ 849  
PCS1900 DL 1930 ~ 1990  
UP 1850 ~ 1910
- Provides high voice quality
- Eliminates dropped calls
- Corrects spotty coverage
- Biggest coverage area in industry.
- Greatly improves voice/data quality of cellular 800Mhz & 1900Mhz band service.
- Monitoring system info with LED
- Auto gain & manual gain control
- Auto shut down in case of over power



2. Specification - RF Parameter

| Division                           | Down link               | Up link                 | Remark             |
|------------------------------------|-------------------------|-------------------------|--------------------|
| Frequency CDMA800                  | 869~894                 | 824~849                 | 25MHz BW IF Filter |
| Frequency PCS1900                  | 1930~1990               | 1850~1910               | 60MHz BW IF Filter |
| Gain                               | 70dB                    | 70dB                    |                    |
| Gain Flatness                      | +/- 4dB over 869~894Mhz | +/- 4dB over 869~894Mhz |                    |
| Output power                       | 23dB (Max)              | 15dB (Max)              |                    |
| Noise Figure                       | 5dB                     | 5dB                     |                    |
| Group Delay                        | 1μS                     | 1μS                     |                    |
| Conducted Spurious Emission (CDMA) | Fc ± 750kHz : 29dBc     | Fc ± 1.98MHz : 42dBc    | RBW(30kHz) Δmarker |
| Conducted Spurious Emission (PCS)  | Fc ± 885kHz : 29dBc     | Fc ± 1.98MHz : 39dBc    | RBW(30kHz) Δmarker |
| VSWR                               | 1.5:1                   |                         |                    |

3. LED operation

| LED       | Color status | Indication          | Remark                                               |
|-----------|--------------|---------------------|------------------------------------------------------|
| Power LED | Off          | Unit is off         |                                                      |
|           | Green        | Normal working      |                                                      |
| Alarm LED | Off          | Start up            | checking isolation between link and service antennas |
|           | Green        | Normal working      |                                                      |
|           | Red          | Shut down operation | Over-power oscilation                                |
| Input LED | Off          | < -80dBm            |                                                      |
|           | Yellow       | -80 dBm to -60 dBm  |                                                      |
|           | Green        | > -60dBm            |                                                      |

4. Gain control

| Gain control                  | Specification   | Remark                   |
|-------------------------------|-----------------|--------------------------|
| Manual Adjust Range           | 40~70dB         |                          |
| Step / Accuracy               | 1dB / +/- 1dB   |                          |
| Manual Gain adjust            | 8bit Dip Switch | on Down Link and Up Link |
| AGC (Auto Gain Control)       | Yes             |                          |
| ALC range / ALC Response Time | 30dB / 300ms    |                          |

5. Mechanical parameter

| Division                                    | Specification      |
|---------------------------------------------|--------------------|
| RF Connector                                | N type Female      |
| Impedance                                   | 50 ohm             |
| Estimated Physical Dimensions (H x L x W)   | 248 x 212 x 27.7mm |
| Estimated Weight max                        | 2.0kg              |
| Mounting flanges and holes                  | Required           |
| FCC/IC registration                         | back of unit       |
| Unique identifier (barcode/serial number)   | back of unit       |
| Product label-space for 4"x1.75"brand label | front of unit      |
| Manufacturer's identification               | No external        |

6. Specification - power & reliability

| Division                                                                  | Specification                                       |
|---------------------------------------------------------------------------|-----------------------------------------------------|
| Supplied with AC to DC adapter                                            | 120V AC                                             |
| AC Frequency                                                              | (North American Standard 3-prong AC plug)           |
| Power Consumption (max)                                                   | 60                                                  |
| Operating Temperature Range                                               | TBD                                                 |
| without Performance Degradation<br>(Unit is designed for indoor use only) | -10 to +50                                          |
| Storage Temperature Range                                                 | -55 to +85                                          |
| Regulatory Compliance                                                     | FCC CFR 47, part 24<br>IC RSS 133 (Industry Canada) |

## GSM900+DCS1800 Dual Combo (Expandable) Repeater

Model Name : **FG-206**

### 1. Feature

- Any combination of GSM and DCS is available in one body
- Easy to expend up to 4 GSM + 4 DCS with Plug-in Type Module
- Easy replacement of PSU (Independent Type)
- Automatic / Manual gain control function
- Automatic Shut down function
- Monitoring outpower with Front LED

### 2. Specification

| Description                               |     |   | FG206-3G1D                      |               |
|-------------------------------------------|-----|---|---------------------------------|---------------|
|                                           |     |   | UL                              | DL            |
| Frequency Range                           | GSM | 1 | 896.3~902.5                     | 941.3~947.5   |
|                                           |     | 2 | 906.5~907.3                     | 951.5~952.3   |
|                                           |     | 3 | 909.5~910.3                     | 954.5~955.3   |
|                                           | DCS | 1 | 1777.9~1777.9                   | 1872.9~1874.9 |
|                                           |     | 2 | 83~86                           |               |
|                                           |     | 3 | 98~101                          |               |
| ARFCN                                     | GSM | 1 | 32~62                           |               |
|                                           |     | 2 | 83~86                           |               |
|                                           |     | 3 | 98~101                          |               |
|                                           | DCS | 1 | 851~860                         |               |
|                                           |     | 2 | ±400KHz ≤ 50dB                  |               |
|                                           |     | 3 | ±600KHz ≤ 40dB                  |               |
| Out of Band Gain                          |     | 1 | ±1MHz ≤ 35dB                    |               |
|                                           |     | 2 | ±5MHz ≤ 25dB                    |               |
|                                           |     | 3 | 70 dB                           |               |
| Gain at 1st and Lst CH                    |     |   | 70 dB                           |               |
| Max Gain Gain Flatness                    |     |   | 3 p-p                           |               |
| ALC Range Gain Control Range(MGC)         |     |   | >20dB                           |               |
| Gain Control Accuracy                     |     |   | 31dB @ 1dB step                 |               |
| Input Power                               |     |   | 1-20dB @ ±1dB                   |               |
| Output Power                              |     |   | 21-31dB @ ±1.5dB                |               |
| Output Power Accuracy over all conditions |     |   | ≤-30dBm                         |               |
| Auto Shut Down                            |     |   | 15dBm                           | 20dBm         |
| Inter-modulation                          |     |   | ≤±3dB [-5 to +55]               |               |
| Spurious Emission                         |     |   | >23dBm                          |               |
| Noise Figure                              |     |   | ≤-36dBm (-30dBm)                |               |
| Delay                                     |     |   | ≤-30dBm (-24dBm)                |               |
| Tx / Rx isolation                         |     |   | ≤-36dBm                         |               |
| V.S.W.R                                   |     |   | ≤-30dBm                         |               |
| Impedance                                 |     |   | 1G~12.75GHz                     |               |
| Power Supply                              |     |   | 1G~12.75GHz                     |               |
| Operating Temperature                     |     |   | 6dB                             |               |
| Cooling                                   |     |   | 5uS                             |               |
| RF Connector                              |     |   | >85                             |               |
| Dimension(cm)                             |     |   | 1.5:1                           |               |
| Weight                                    |     |   | 50ohm                           |               |
| Local control                             |     |   | 110-260, 50/60Hz                |               |
| Monitoring                                |     |   | -5~55                           |               |
|                                           |     |   | heatsink convection cooling     |               |
|                                           |     |   | N - F                           |               |
|                                           |     |   | 27.8 x 29.5 x 5.5               |               |
|                                           |     |   | 5.98 (including Power Supplier) |               |
|                                           |     |   | GUI via RS232                   |               |
|                                           |     |   | LED                             |               |



Plugging place for Plug-in type saw filter module



Plug-in type module



Separate Power Supply Unit

## DCS1800 Single Combo (Expandable) Repeater

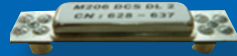
Model Name : **FG-203**

### 1. Feature

- Any band of DCS is available in one body with plug-in type module
- Any sub-band can be expended up to 4 in DCS in one body
- Easy replacement of PSU (Independent Type)
- Automatic / Manual gain control function
- Automatic Shut down function
- Monitoring out power with Front LED
- Built-in RMS Modem (Optional)

### 2. Specification (FG203-3D type)

| Description                             |     |   | 3D                          |                 |
|-----------------------------------------|-----|---|-----------------------------|-----------------|
|                                         |     |   | UL                          | DL              |
| Frequency Range                         | DCS | 1 | 1718.2 ~ 1719.2             | 1813.2 ~ 1814.2 |
|                                         |     | 2 | 1772.2 ~ 1778.8             | 1867.2 ~ 1873.8 |
|                                         |     | 3 | 1781.4 ~ 1784.8             | 1876.4 ~ 1879.8 |
| ARFCN                                   | DCS | 1 | 552 ~ 557                   |                 |
|                                         |     | 2 | 822 ~ 855                   |                 |
|                                         |     | 3 | 868 ~ 885                   |                 |
| BANDWIDTH                               | DCS | 1 | 1                           | 1               |
|                                         |     | 2 | 6.6                         | 6.6             |
|                                         |     | 3 | 3.4                         | 3.4             |
| Out of Band Gain                        |     | 1 | ±400KHz ≤ 50dB              |                 |
|                                         |     | 2 | ±600KHz ≤ 40dB              |                 |
|                                         |     | 3 | ±1MHz ≤ 35dB                |                 |
| Gain at 1st and Last CH                 |     |   | ±5MHz ≤ 25dB                |                 |
| Max Gain                                |     |   | 70 dB                       |                 |
| Gain Flatness                           |     |   | 70 dB                       |                 |
| ALC Range                               |     |   | 3 p-p                       |                 |
| Gain Control Range(MGC)                 |     |   | > 20 dB                     |                 |
| Gain Control Accuracy                   |     |   | 31 dB @ 1dB step            |                 |
| Input Power                             |     |   | 1 - 20 dB @ ± 1 dB          |                 |
| Output Power                            |     |   | 21 - 31 dB @ ± 1.5 dB       |                 |
| Output PWR Accuracy over all conditions |     |   | ≤ -30dBm                    |                 |
| Auto Shut Down                          |     |   | 15 dBm                      | 20 dBm          |
| Inter-modulation                        |     |   | ≤ ± 3 dB [-5 to +55 ]       |                 |
| Spurious Emission                       |     |   | > 23 dBm                    |                 |
| Noise Figure                            |     |   | ≤ -36dBm                    |                 |
| Delay                                   |     |   | ≤ -30dBm                    |                 |
| Tx / Rx isolation                       |     |   | 9 K ~ 1GHz                  |                 |
| V.S.W.R                                 |     |   | 1G ~ 12.75GHz               |                 |
| Impedance                               |     |   | ≤ -36dBm                    |                 |
| Power Supply                            |     |   | ≤ -30dBm                    |                 |
| Operating Temperature                   |     |   | 6 dB                        |                 |
| Cooling                                 |     |   | 5 uS                        |                 |
| RF Connector                            |     |   | > 85                        |                 |
| Dimension                               |     |   | 1.5 : 1                     |                 |
| Weight                                  |     |   | 50 ohm                      |                 |
| Graphic user interface display          |     |   | 110 - 260, 50/60Hz          |                 |
|                                         |     |   | -5 ~ 55                     |                 |
|                                         |     |   | heatsink convection cooling |                 |
|                                         |     |   | N - F                       |                 |
|                                         |     |   | 20.1 X 27 X5.7cm            |                 |
|                                         |     |   | 4.06kg                      |                 |
|                                         |     |   | GUI with RS-232             |                 |
|                                         |     |   | LED                         |                 |



Plug-in type module



Plugging place for Plug-in type saw filter module  
RMS modem place

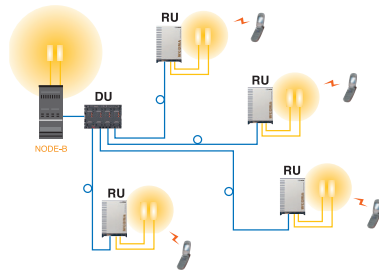
# Fiber Optic Repeater

## WCDMA Fiber Optic Repeater

There are a lot of benefits of utilizing the fiber optic cable in the repeater systems. One of them is that they are completely intensive to external interference. UFINE Fiber Optic Repeater is the best choice of an economic alternative to use of additional BTS in RF shadowed area.

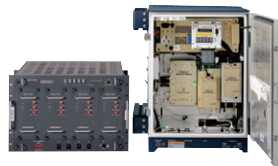
### 1. Abbreviations

- RU Remote Unit
- DU Donor Unit
- OTRU Optical Transceiver RF Unit
- D\_RCU Donor Unit \_ Repeater Control Unit
- D\_PSU Donor Unit \_ Power Supply Unit
- D\_SHELF Donor Unit \_ Shelf



### 2. Key Features

- Reverse Path(UL) Diversity
- Reverse Path(UL) Auto Gain Setting
- Ethernet Interface between D\_RCU and WRCS
- FSK Modem between D\_RCU and RU
- Key Pad, VFD(Vacuum Fluorescent Display), and Debug Port (RS-232c 38400bps) on D\_RCU for user control Firmware download
- Four OTRUs installable in Donor Shelf
- RF and optic signal level detection
- Current Meter on D\_PSU
- RU Heat Sink



### 3. Specification

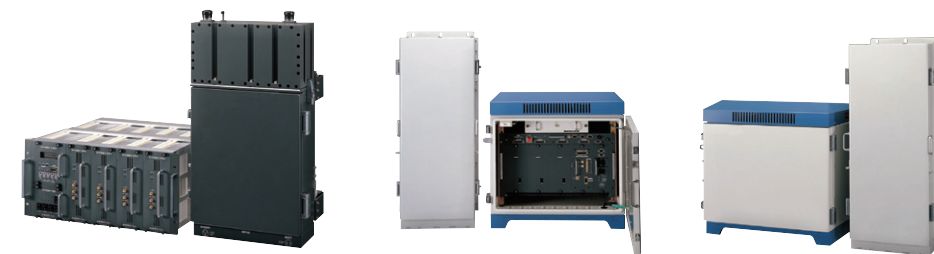
|              | Parameters                     | Conditions      | Units     | Values                                       |
|--------------|--------------------------------|-----------------|-----------|----------------------------------------------|
| Uplink RF    | Frequency                      |                 | MHz       | 1940.88~1959.32                              |
|              | Gain                           | optic loss 8dBo | dB        | 35~60                                        |
|              | Max Output Power               |                 | dBm/total | 16                                           |
|              | Max Input Power                |                 | dBm/total | -47                                          |
|              | VSWR                           |                 |           | ≤1.4                                         |
| Downlink RF  | Noise Figure                   | In Band         | dB        | ≤5                                           |
|              | Frequency                      |                 | MHz       | 2130.88~2149.32                              |
|              | Gain                           | optic loss 8dBo | dB        | 45~85 in 1dB(DU) or 0.5dB(RU) steps          |
|              | Max Output Power               |                 | dBm/total | 43                                           |
|              | Max Input Power                |                 | dBm/total | -14                                          |
| Optical      | VSWR                           |                 |           | ≤1.4                                         |
|              | Adjacent Channel Leakage Ratio |                 | dB        | 44.2dBc @ fc±5MHz<br>49.2dBc @ fc±10MHz      |
|              | Wavelength                     |                 | nm        | λDL:1510, λUL0:530, λUL1:1570                |
|              | Optical Loss Range             |                 | dBo       | 2~8dBo                                       |
|              | Optical Connector              |                 |           | FC/APC                                       |
| Power Supply | Donor Unit                     |                 | V, Hz, W  | 27VDC, OTRU≤60W                              |
|              | Remote Unit                    | Remote Unit     | V, Hz, W  | PSU+D_RCU±Shelf≤10W<br>220VAC, 60Hz, RU≤460W |
| Reliability  | Operating Temperature          | w x h x d       | ℃         | -30 ~ +50                                    |
|              | Temperature                    |                 |           |                                              |
| Mechanical   | Remote Unit Dimensions         |                 | mm        | 400 x 575 x 400[530]                         |
|              | Remote Unit Weight             |                 | Kg        | 54.2                                         |

# Fiber Optic Repeater

## CDMA Fiber Optic Repeater

### 1. Key Features

- Mounting Options Wall, Pole, Floor, etc.
- High Durability Enclosure Water-proof, Dust-protected
- WDM UL and DL into a fiber core
- Monitoring and Control Protocol SNMP
- Remote Control Functions UL gain setting, HPA on/off, etc.
- Remote Monitoring Functions Temperature, Optic Module Fault, etc.



### 2. Specification

|              | Parameters             | Conditions                | Units     | Values                                                                     |
|--------------|------------------------|---------------------------|-----------|----------------------------------------------------------------------------|
| Uplink RF    | Frequency              | 1850.625MHz~1909.375MHz   | MHz       | Up to six FA's within 25MHz selectable simultaneously                      |
|              | Gain                   |                           | dB        | 20~45                                                                      |
|              | Max Input Power        |                           | dBm/total | -55                                                                        |
|              | VSWR                   |                           |           | <1.5:1                                                                     |
|              | Noise Figure           | room temperature          | dB        | <5.0                                                                       |
| Downlink RF  | Frequency              | 1930.625MHz ~ 1989.375MHz | MHz       | Up to six FA'S within 25MHz selectable simultaneously                      |
|              | Max Output Power       |                           | dBm/total | 43                                                                         |
|              | Input VSWR             |                           |           | <1.5:1                                                                     |
|              | Spurious Emission      |                           | dB        | TIA97-E<br>(ITU Category A only :<br>TIA-97-E Tabke 4.4.1.3-2 Band class1) |
|              |                        |                           |           | UL : 1510, DL : 1550                                                       |
| Optical      | Wavelength             | 1 core                    | nm        |                                                                            |
|              | Optical Loss Range     |                           | dBo       | 0~6                                                                        |
|              | Optical Connector      |                           |           | FC/APC                                                                     |
| Power Supply | Donor Unit             |                           |           | <250W                                                                      |
|              | Remote Unit            |                           |           | <750W                                                                      |
| Reliability  | Operating Temperature  |                           | ℃         | -20 ~ +55                                                                  |
|              | MTBF                   | room temperature          | hours     | 50,000                                                                     |
|              |                        |                           |           |                                                                            |
| Mechanical   | Donor Unit Dimensions  | w x h x d                 | mm        | Shelf 482.6 x 266 x 400<br>Enclosure 538 x 545 x 615.5                     |
|              | Remote Unit Dimensions | w x h x d                 | mm        | 330 x 800 x 290                                                            |
|              |                        |                           |           |                                                                            |
|              |                        |                           |           |                                                                            |

# Fiber Optic Repeater

## WiBro Fiber Optic Repeater

### 1. Abbreviations

- RU Remote Unit
- DU Donor Unit
- OTRU Optical Transceiver RF Unit
- D\_RCU Donor Unit \_ Repeater Control Unit
- D\_PSU Donor Unit \_ Power Supply Unit
- D\_SHELF Donor Unit \_ Shelf



### 2. Key Features

- Reverse Path(UL) Diversity
- Time Division Duplex
- Delay Measurement between DU and RU
- Delay Adjustment between DU and RU
- Remote Control, Monitoring, and Download
- RU Heat Sink



### 3. Specification

|              | Parameters             | Conditions              | Units     | Values                  |
|--------------|------------------------|-------------------------|-----------|-------------------------|
| Uplink RF    | Frequency              |                         | MHz       | 2300~2327               |
|              | Gain                   | optic loss 2~8dBo       | dB        | 30~60 in 0.5dB steps    |
|              | Max Output Power       |                         | dBm/total | 10                      |
|              | Max Input Power        | Max ATT                 | dBm/total | -47                     |
|              | Input VSWR             |                         |           | <1.4                    |
|              | Noise Figure           | Max Gain                | dB        | <5                      |
| Downlink RF  | Frequency              |                         | MHz       | 2300~2327               |
|              | Gain                   | optic loss 2~8dBo       | dB        | 50~85 in 0.5dB steps    |
|              | Max Output Power       |                         | W         | 30W/total, 10W/FA       |
|              | Max Input Power        | Max ATT                 | dBm/FM    | -20                     |
|              | Input VSWR             |                         |           | <1.4                    |
|              | Spurious Emission      |                         |           | Category A              |
| Optical      | Wavelength             | 1 core<br>3 wavelengths | nm        | λTX 1450nm±7nm          |
|              |                        |                         |           | λRX0 1470nm±7nm         |
|              |                        |                         |           | λRX1 1490nm±7nm         |
|              | Optical Loss Range     |                         | dBo       | 2~8                     |
|              | Optical Connector      |                         |           | FC & APC Type           |
| Power Supply | Fiber Mode             |                         |           | 27VDC, 300W             |
|              | Donor Unit             |                         | V, Hz, W  | 220VAC, 60Hz, 550W      |
|              | Remote Unit            |                         | V, Hz, W  | <750W                   |
| Reliability  | Operating Temperature  | Remote Unit             | ℃         | -30~50                  |
|              | Enclosure              |                         |           | compliance with IP54    |
| Mechanical   | Donor Unit Dimensions  | h x w x d               | mm        | Fit to 19inch Open Rack |
|              | Remote Unit Dimensions | h x w x d               | mm        | 600 x 430 x 400[530]    |
|              | Donor Unit Weight      |                         | Kg        | 40                      |
|              | Remote Unit Weight     |                         | Kg        | 65.5                    |

# DAS(Distribution Antenna System)

### 1. Overview

Mobile Telecommunications service coverage can be limited by wave propagation shadow effect caused by mountains and buildings. Ufine Technologies In-building Distributed Antenna System has been designed for the purpose of enhancing wireless coverage in the buildings with low cost in the installation, operation and maintenance. The system supports GSM, CDMA, WCDMA, mobile WiMAX, iDEN, and mobile TV. The specific functions and performance can be customized by request of the customer. Ufine Technologies, located in South Korea, design and manufacture many kinds of coverage solution products.

### 2. In-building DAS Configuration

Ufine Technologies In-building DAS system consists of four kinds of products; Donor Hub Unit, Master Hub Unit, Slave Hub Unit, Remote Unit.

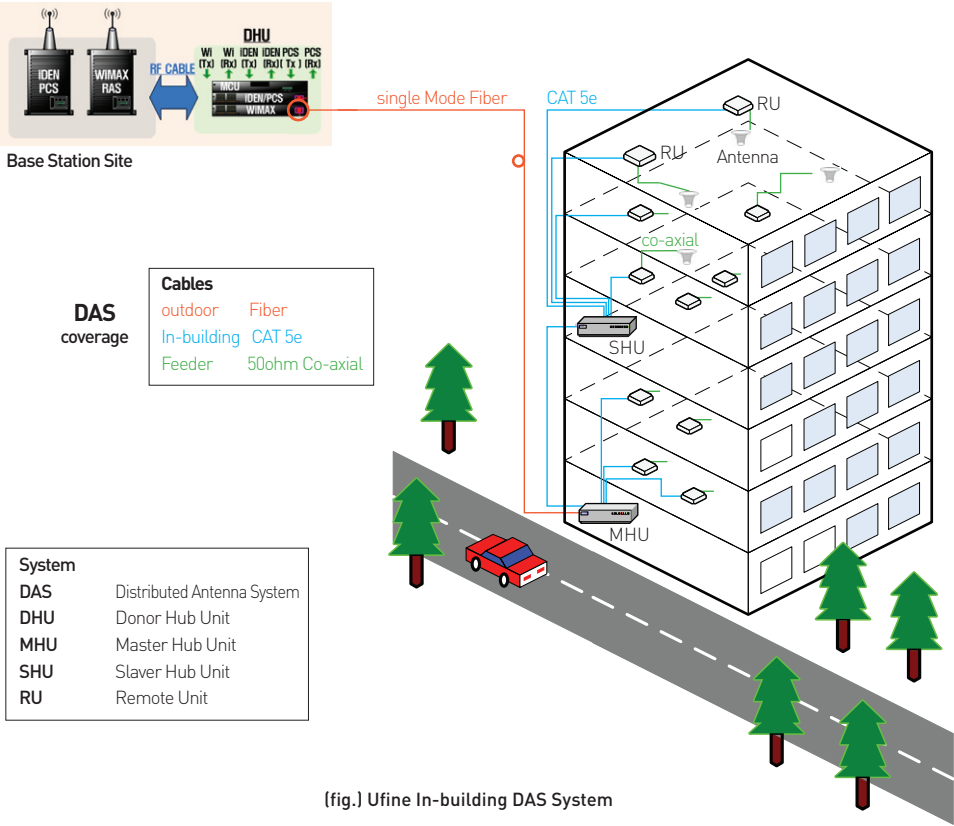


(fig.) DHU



(fig.) MHU

DHU is used in case that the base station is far from the target building. It has the 50ohm coaxial cable interface to the base station system, and the optical fiber interface to MHU.



(fig.) Ufine In-building DAS System

MHU, the system's master hub, is installed in the communications room of the building. It has the fiber cable interface from the source site, and eight RJ-45 ports, which are for connecting SHU or RU.



(fig.) SHU

SHU is used for scalability function in the building. It supports eight RJ-45 ports for connecting to RU's.



(fig.) RU

RU converts Digital data to RF signal, and vice versa. It has 50 ohm coaxial cable port for coverage omni antenna.

### 3. Key Features

#### 1) Easy installation

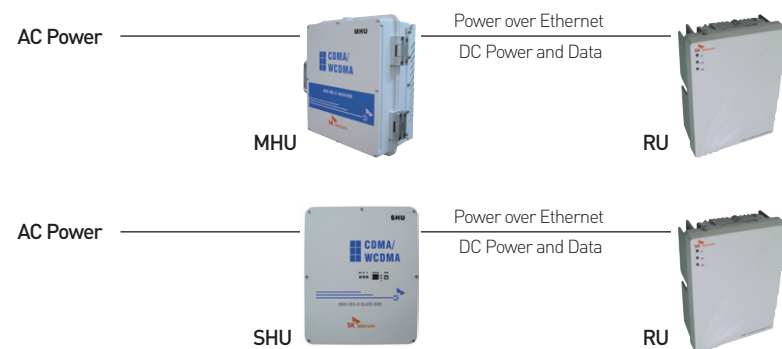
RU is easily installable by using its mounting bracket.



(fig.) RU Installation example

#### 2) PoE

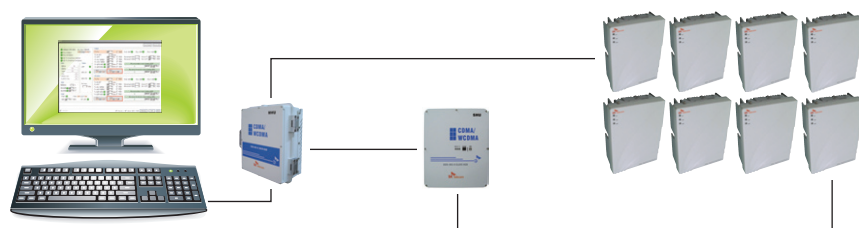
RU product is connected using UTP/STP CAT5e cable. It supports PoE (Power over Ethernet) function between SHU and RU, and between MHU and RU. There is no need to use additional power supply in the RU site.



(fig.) PoE Function

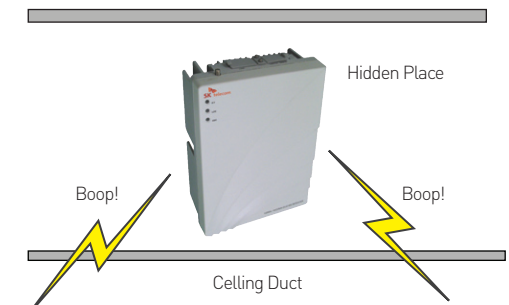
#### 3) Remote Operation & Management

The user can monitor and control the total system through Ufine Network Management System software.



(fig.) Operation and Monitoring

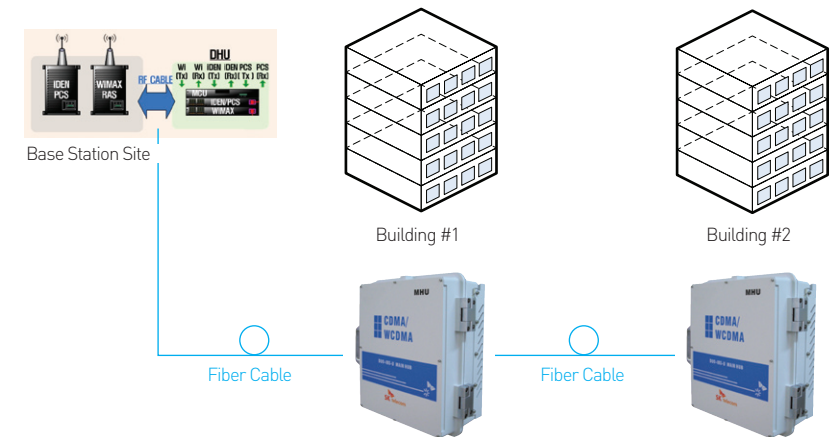
#### 4) Location Indication Alarm



(fig.) Location Indication Alarm Function

In case that RU is mounted in the hidden place, it is not easy to find out the location of the RU. It can cause the time consuming in repairing process. Location indicating alarming function can solve this problem by making RU to alarm sound.

#### 5) Scalability to another building



(fig.) MHU Cascade Option

It supports MHU Cascade function optionally. In case another building has to be covered, this optional function will be useful.

### 4. Specifications

Example Specifications of the dual mode (CDMA, WCDMA) system being used for South Korea's Telco SKT is as follows.

| Item             | Specifications                        |
|------------------|---------------------------------------|
| Service          | CDMA, WCDMA, etc.                     |
| RU Dimensions    | 25cm * 18cm * 75cm                    |
| Tx Gain          | CDMA 43~73dB<br>WCDMA 54~84dB         |
| Max Output Power | CDMA 16dBm/total<br>WCDMA 20dBm/total |
| CAT 5e max range | 100 meters                            |

(Table) Specifications

# Passive Item

### Broad Band In-building 2way Divider Applied to Repeater

Model Name : BDC-2N-10 (2G, 3G, DMB), BDC-2N-73-10 (2G, 3G, DMB, Disproportion of 7:3)  
Part No : 01000020610, 01000020611

| Division                      | Specification                            |                                          |
|-------------------------------|------------------------------------------|------------------------------------------|
|                               | BDC-2N-10                                | BDC-2N-73-10                             |
| Freq (MHz)                    | 824~894, 1885~2170, 2300~2400, 2600~2655 | 824~894, 1885~2170, 2300~2400, 2630~2655 |
| Number of Way                 | 2Way (1:1)                               | 2Way (7:3)                               |
| V.S.W.R                       | 1.2:1                                    | 1.2:1                                    |
| Insertion Loss (dB)           | Less than 3.5                            | 70% Less than 2dB, 30% Less than 6dB     |
| Isolation (dBc) between ports | More than 20dB                           | More than 20dB                           |
| Impedance (Ω)                 | 50                                       | 50                                       |
| Passive IM                    | -130dBc (37dBm or 40dBm 2Tone)           | -130dBc (37dBm or 40dBm 2Tone)           |
| Input Power(Avg.)             | 10W                                      | 10W                                      |
| Temperature Range             | -30℃ ~ +70℃                              | -30℃ ~ +70℃                              |
| In/Out Connector              | N Female                                 | N Female                                 |
| Dimension(mm)                 | 94 x 67 x 32.3 mm                        | 94 x 110 x 32.5 mm                       |
| Weight                        | 245g                                     | 519g                                     |

### Broad Band In-building 3way Divider Applied to Repeater

Model Name : BDC-3N-10 (2G, 3G, DMB Disproportion of 1:1:2)  
Part No : 01000020612

| Division                      | Specification                                             |
|-------------------------------|-----------------------------------------------------------|
| Freq (MHz)                    | 824~894, 1885~2170, 2300~2400, 2630~2655                  |
| Number of Way                 | 3Way (1:1:2)                                              |
| V.S.W.R                       | 1.2:1                                                     |
| Insertion Loss (dB)           | 25% Less than 7dB, 25% Less than 7dB, 50% Less than 3.5dB |
| Isolation (dBc) between ports | More than 20dB                                            |
| Impedance (Ω)                 | 50                                                        |
| Passive IM                    | -130dBc (37dBm or 40dBm 2Tone)                            |
| Input Power(Avg.)             | 10W                                                       |
| Temperature Range             | -30℃ ~ +70℃                                               |
| In/Out Connector              | N Female                                                  |
| Dimension(mm)                 | 126 x 110 x 32.5 mm                                       |
| Weight                        | 555g                                                      |

### Broad Band In-building 4way Divider Applied to Repeater

Model Name : BDC-4N-10(2G, 3G, DMB)  
Part No : 01000018321

| Division                      | Specification                            |
|-------------------------------|------------------------------------------|
| Freq (MHz)                    | 824~894, 1885~2170, 2300~2400, 2630~2655 |
| Number of Way                 | 4Way (1:1:1:1)                           |
| V.S.W.R                       | 1.2:1                                    |
| Insertion Loss (dB)           | 7dB                                      |
| Isolation (dBc) between ports | 20dB                                     |
| Impedance (Ω)                 | 50                                       |
| Passive IM                    | -130dBc (37dBm or 40dBm 2Tone)           |
| Input Power(Avg.)             | 10W                                      |
| Temperature Range             | -40℃ ~ +70℃                              |
| In/Out Connector              | N Female                                 |
| Dimension(mm)                 | 158 x 110 x 32.5 mm                      |
| Weight                        | 655g                                     |

### Dual Band 2way Divider Applied to Repeater

Model Name : DBPDC-2N, DBPDC-2N-73 (Disproportion of 7:3)  
Part No : 01000018318, 01000018319

| Division                      | Specification         |                       |
|-------------------------------|-----------------------|-----------------------|
|                               | DBPDC-2N              | DBPDC-2N-73           |
| Freq (MHz)                    | 824~894, 1885~2170MHz | 824~894, 1885~2170MHz |
| Number of Way                 | 2Way (1:1)            | 2Way (7:3)            |
| V.S.W.R                       | 1.2:1                 | 1.2:1                 |
| Insertion Loss (dB)           | 3.5                   | 70% : 2dB, 30% : 6dB  |
| Isolation (dBc) between ports | 20dB                  | 25dB                  |
| Impedance (Ω)                 | 50                    | 50                    |
| Passive IM                    | -130dBc (37dBm 2Tone) | -130dBc (37dBm 2Tone) |
| Input Power(Avg.)             | 10W                   | 10W                   |
| Temperature Range             | -40℃ ~ +70℃           | -40℃ ~ +70℃           |
| In/Out Connector              | N Female              | N Female              |
| Dimension(mm)                 | 95 x 66.2 x 32.3      | 95 x 97 x 32.3        |
| Weight                        | 220g                  | 245g                  |

### Dual Band 3way Divider Applied to Repeater

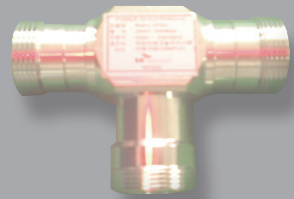
Model Name : DBPDC-3N (Disproportion of 2:1:1)  
Part No : 01000018320

| Division                      | Specification                     |
|-------------------------------|-----------------------------------|
| Freq (MHz)                    | 824~894, 1885~2170MHz             |
| Number of Way                 | 3Way (3:1:1)                      |
| V.S.W.R                       | 1.2:1                             |
| Insertion Loss (dB)           | 50% : 3.7dB, 25% : 7dB, 25% : 7dB |
| Isolation (dBc) between ports | 20dB                              |
| Impedance (Ω)                 | 50                                |
| Passive IM                    | -130dBc (37dBm 2Tone)             |
| Input Power(Avg.)             | 10W                               |
| Temperature Range             | -40℃ ~ +70℃                       |
| In/Out Connector              | N Female                          |
| Dimension(mm)                 | 123.8 x 111.4 x 33                |
| Weight                        | 510g                              |

### Dual Band 4way Divider Applied to Repeater

Model Name : DBPDC-4N  
Part No : 01000018321

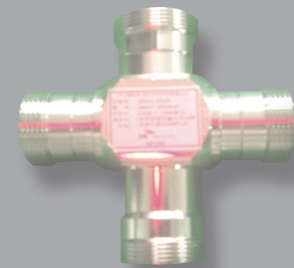
| Division                      | Specification         |
|-------------------------------|-----------------------|
| Freq (MHz)                    | 824~894, 1885~2170MHz |
| Number of Way                 | 4Way (1:1:1:1)        |
| V.S.W.R                       | 1.2:1                 |
| Insertion Loss (dB)           | 7                     |
| Isolation (dBc) between ports | 20dB                  |
| Impedance (Ω)                 | 50                    |
| Passive IM                    | -130dBc (37dBm 2Tone) |
| Input Power(Avg.)             | 10W                   |
| Temperature Range             | -40℃ ~ +70℃           |
| In/Out Connector              | N Female              |
| Dimension(mm)                 | 145 x 111.4 x 33      |
| Weight                        | 635g                  |



Wibro Broad Band Divider

Model Name : WiPDC-2D-200 (2Way)  
Part No : 01000024896

| Division            | Specification    |
|---------------------|------------------|
| Freq (MHz)          | 2300~2400        |
| Number of Way       | 2Way (1:1)       |
| V.S.W.R             | 1.2:1            |
| Insertion Loss (dB) | 3.2 (MAX)        |
| Impedance (Ω)       | 50               |
| Input Power(Avg.)   | 200W             |
| In/Out Connector    | 7/16" DIN Female |
| Temperature Range   | -40℃ ~ +70℃      |
| Dimension(mm)       | 84.2 x 65.5 x 32 |
| Weight              | 456g             |



Wibro Broad Band Divider

Model Name : WIPDC-3D-200(3Way)  
Part No : 01000024897

| Division            | Specification    |
|---------------------|------------------|
| Freq (MHz)          | 2300~2400        |
| Number of Way       | 3Way (1:1)       |
| V.S.W.R             | 1.2:1            |
| Insertion Loss (dB) | 5dB (MAX)        |
| Impedance (Ω)       | 50               |
| Input Power(Avg.)   | 200W             |
| In/Out Connector    | 7/16" DIN Female |
| Temperature Range   | -40℃ ~ +70℃      |
| Dimension(mm)       | 84.2 x 91.6 x 32 |
| Weight              | 510g             |



Single Band 2Way Divider Applied to BTS

Model Name : WPDC-2D  
Part No : 01000018302

| Division            | Specification         |
|---------------------|-----------------------|
| Freq (MHz)          | 1885~2170             |
| Number of Way       | 2Way (1:1)            |
| V.S.W.R             | 1.2:1                 |
| Insertion Loss (dB) | 3.2                   |
| Impedance (Ω)       | 50                    |
| Passive IM          | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)   | 1000W                 |
| Temperature Range   | -40℃ ~ +70℃           |
| In/Out Connector    | 7/16" DIN Female      |
| Dimension(mm)       | 132.8 x 67.9 x 30mm   |
| Weight              | 590g                  |



Single Band 2Way Divider Applied to BTS

Model Name : WPDC-3D  
Part No : 01000018303

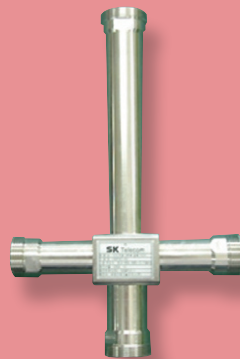
| Division            | Specification         |
|---------------------|-----------------------|
| Freq (MHz)          | 1885~2170             |
| Number of Way       | 3Way (1:1)            |
| V.S.W.R             | 1.2:1                 |
| Insertion Loss (dB) | 5                     |
| Impedance (Ω)       | 50                    |
| Passive IM          | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)   | 1000W                 |
| Temperature Range   | -40℃ ~ +70℃           |
| In/Out Connector    | 7/16" DIN Female      |
| Dimension(mm)       | 134.8 x 120.3 x 30mm  |
| Weight              | 711g                  |



Dual Band 2Way Divider Applied to BTS

Model Name : DBPDC-2D  
Part No : 01000018304

| Division               | Specification         |
|------------------------|-----------------------|
| Freq (MHz)             | 824~894, 1885~2170    |
| Number of Way          | 2Way (1:1)            |
| V.S.W.R                | 1.2:1                 |
| Insertion Loss (dB)    | 3.2                   |
| Impedance (Ω)          | 50                    |
| Passive IM             | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)      | 1000W                 |
| Temperature Range      | -40℃ ~ +70℃           |
| In/Out Connector       | 7/16" DIN Female      |
| Dimension(mm) / Weight | 134.8 x 188.9 x 30mm  |
| Weight (Max)           | 909g                  |



Dual Band 3Way Divider Applied to BTS

Model Name: DBPDC-3D  
Part No: 01000015305

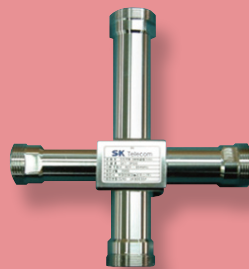
| Division               | Specification         |
|------------------------|-----------------------|
| Freq (MHz)             | 824~894, 1885~2170    |
| Number of Way          | 3Way (1:1)            |
| V.S.W.R                | 1.2:1                 |
| Insertion Loss (dB)    | 5.2                   |
| Impedance (Ω)          | 50                    |
| Passive IM             | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)      | 1000W                 |
| Temperature Range      | -40℃ ~ +70℃           |
| In/Out Connector       | 7/16" DIN Female      |
| Dimension(mm) / Weight | 134.8 x 214.3 x 30mm  |
| Weight (Max)           | 1084g                 |



Single Band 2Way Divider Applied to BTS

Model Name: 800Mhz 2PDD  
Part No: 01000005518

| Division               | Specification         |
|------------------------|-----------------------|
| Freq (MHz)             | 824~894               |
| Number of Way          | 2Way (1:1)            |
| V.S.W.R                | 1.2:1                 |
| Insertion Loss (dB)    | 3.21                  |
| Impedance (Ω)          | 50                    |
| Passive IM             | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)      | 1000W                 |
| Temperature Range      | -40℃ ~ +70℃           |
| In/Out Connector       | 7/16" DIN Female      |
| Dimension(mm) / Weight | 132.8 x 119.0 x 30mm  |
| Weight (Max)           | 717g                  |



Single Band 3Way Divider Applied to BTS

Model Name: 800Mhz 3PDD  
Part No: 01000005520

| Division               | Specification         |
|------------------------|-----------------------|
| Freq (MHz)             | 824~894               |
| Number of Way          | 3Way (1:1)            |
| V.S.W.R                | 1.2:1                 |
| Insertion Loss (dB)    | 5                     |
| Impedance (Ω)          | 50                    |
| Passive IM             | -140dBc (43dBm 2Tone) |
| Input Power(Avg.)      | 1000W                 |
| Temperature Range      | -40℃ ~ +70℃           |
| In/Out Connector       | 7/16" DIN Female      |
| Dimension(mm) / Weight | 134.8 x 172.33 x 30mm |
| Weight (Max)           | 758g                  |

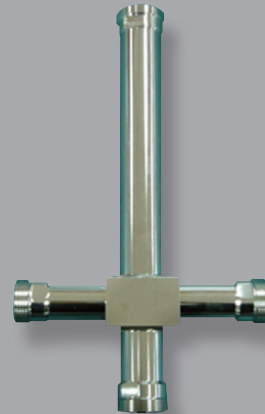


Four Band 2Way Divider Applied to Subway BTS

Model Name : BSPDC-2D-200, BSPDC-2N-200

Part No : 01000021903, 01000021903

| Division                | Specification                            |              |
|-------------------------|------------------------------------------|--------------|
|                         | BSPDC-2D-200                             | BSPDC-2N-200 |
| Freq (MHz)              | 824~894, 1885~2170, 2300~2400, 2630~2655 |              |
| Number of Way           | 3Way (1:1)                               | 2Way (1:1)   |
| V.S.W.R                 | 1.2:1                                    |              |
| Insertion Loss (dB)     | 3.3                                      |              |
| Impedance (Ω)           | 50                                       |              |
| Passive IM              | -140dBc (43dBm 2Tone)                    |              |
| Input Power (Avg.)      | 200W                                     |              |
| Temperature Range       | -40℃ ~ +70℃                              |              |
| In/Out Connector        | 7/16"DIN Female                          | N Female     |
| Dimension (mm) / Weight | 132.8 x 216.2 x 30mm                     |              |
| Weight (max)            | 874g                                     | 296g         |



Four Band 3Way Divider Applied to Subway BTS

Model Name : BSPDC-3D-200, BSPDC-3N-200

Part No : 01000021905, 01000021906

| Division                | Specification                            |              |
|-------------------------|------------------------------------------|--------------|
|                         | BSPDC-3D-200                             | BSPDC-3N-200 |
| Freq (MHz)              | 824~894, 1885~2170, 2300~2400, 2630~2655 |              |
| Number of Way           | 3Way (1:1)                               |              |
| V.S.W.R                 | 1.2:1                                    |              |
| Insertion Loss (dB)     | 5.2                                      |              |
| Impedance (Ω)           | 50                                       |              |
| Passive IM              | -140dBc (43dBm 2Tone)                    |              |
| Input Power (Avg.)      | 200W                                     |              |
| Temperature Range       | -40℃ ~ +70℃                              |              |
| In/Out Connector        | 7/16"DIN Female                          | N Female     |
| Dimension (mm) / Weight | 134.8 x 268.5 x 30mm                     |              |
| Weight (max)            | 1036g                                    |              |



Dual Band Combiner Applied to BTS

Model Name : DBD-2DIN-240, DBD-2N-150

Part No : 01000018306, 01000018323

| Division            | Specification                                                   |            |                                                              |            |
|---------------------|-----------------------------------------------------------------|------------|--------------------------------------------------------------|------------|
|                     | DBD-2DIN-240                                                    |            | DBD-2N-150                                                   |            |
| Freq (MHz)          | 824~894                                                         | 1920~2170  | 824~894                                                      | 1920~2170  |
| Insertion Loss (dB) | 0.2 (Max)                                                       | 0.2 (Max)  | 0.2 (Max)                                                    | 0.2 (Max)  |
| Return Loss (dB)    | 18.0 (Min)                                                      | 18.0 (Min) | 18.0 (Min)                                                   | 18.0 (Min) |
| Isolation (dBc)     | 55 (Min)                                                        | 55 (Min)   | 55 (Min)                                                     | 55 (Min)   |
| Impedance (Ω)       | 50                                                              |            | 50                                                           |            |
| Input Power (Avg.)  | 240W                                                            |            | 150W                                                         |            |
| Passive IM          | 3rd : more than 140dBc<br>(20W C.W 43dBm 2-Tone Input standard) |            | 3rd mover than 130.0dBc<br>(C.W 30dBm 2-Tone Input standard) |            |
| In/Out Connector    | DIN Type-Female (Water proof type)                              |            | N Type                                                       |            |
| Temperature Range   | -33℃ ~ +60℃ / 5% ~ 95%                                          |            | -33℃ ~ +60℃ / 5% ~ 95%                                       |            |
| Dimension(mm)       | 273.6 x 183 x 87                                                |            | 210 x 143 x 85                                               |            |

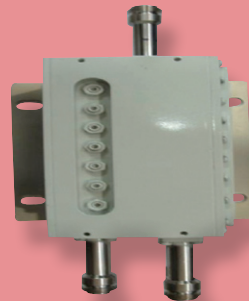


MCSU (Multi Channel Service Unit) Four Band Combiner

Model Name : MCSU

Part No : 01000021912

| Division               | Specification                                                      |            |            |            |
|------------------------|--------------------------------------------------------------------|------------|------------|------------|
| Freq (MHz)             | 1885~2170                                                          | 1920~2170  | 2300~2400  | 2630~2655  |
| Insertion Loss (dB)    | 0.6 (Max)                                                          | 11.0 (Max) | 11.0 (Max) | 11.0 (Max) |
| Return Loss (dB)       | 18.0 (Min)                                                         | 18.0 (Min) | 18.0 (Min) | 18.0 (Min) |
| Isolation (dBc)        | 0.2 (Max)                                                          | 0.3 (Min)  | 0.3 (Min)  | 0.3 (Min)  |
| Handing Power          | 5W                                                                 | 10W        | 10W        | 10W        |
| Passive IM             | 3rd : more than 130dBc (30dBm CW 2-Tone 2G TX Band input standard) |            |            |            |
| Band to band Isolation | 40dB (Min)                                                         |            |            |            |
| Port to port Isolation | 20dB                                                               |            |            |            |
| Impedance              | 50ohm                                                              |            |            |            |
| In/Out Connector       | N Type Female                                                      |            |            |            |
| Temperature            | -33 + 60℃                                                          |            |            |            |
| Dimension(mm)          | 412 x 167 x 78                                                     |            |            |            |



Broad Triple Band Combiner Applied to Subway Repeater

Model Name: TBD-3N-150

Part No: 01000024209

| Division               | Specification                                                      |           |           |
|------------------------|--------------------------------------------------------------------|-----------|-----------|
| Freq (MHz)             | 824~894                                                            | 1885~2170 | 2630~2655 |
| Insertion Loss (dB)    | 0.3 (Max)                                                          |           |           |
| Return Loss (dB)       | 18.0 (Min)                                                         |           |           |
| Isolation (dBc)        | 0.15 (Max)                                                         |           |           |
| Handing Power          | 150W                                                               |           |           |
| Passive IM             | 3rd : more than 130dBc (30dBm CW 2-Tone 2G TX Band input standard) |           |           |
| Band to band Isolation | 55dB (Min)                                                         |           |           |
| Impedance (Ω)          | 50ohm                                                              |           |           |
| In/Out Connector       | N Type Female                                                      |           |           |
| Temperature            | -33 + 60℃                                                          |           |           |
| Dimension(mm)          | 232 x 230 x 85                                                     |           |           |

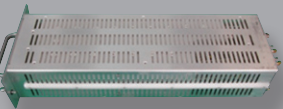
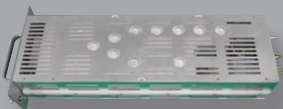


Wibro Dual Broad Band Combiner

Model Name: TBD-3N-150 (3G-WI)

Part No: 1000024898

| Division            | Specification                                                |           |
|---------------------|--------------------------------------------------------------|-----------|
| Freq (MHz)          | 2300~2400                                                    | 1920~2170 |
| Insertion Loss (dB) | 0.2 (Max)                                                    |           |
| Return Loss (dB)    | 18.0 (Min)                                                   |           |
| Isolation (dBc)     | 35 (Max)                                                     |           |
| Impedance (Ω)       | 50                                                           |           |
| Input Power (Avg.)  | 150W                                                         |           |
| Passive IM          | 3rd : more than 140dBc (20W C.W 43dBm 2-Tone Input standard) |           |
| In/Out Connector    | DIN Type-Female (Water proof type)                           |           |
| Temperature         | -33℃ ~ +70℃ / 5% ~ 95%                                       |           |
| Dimension(mm)       | 288 x 176 x 54                                               |           |



Duplexer Applied for FOR ( Fiber Optic Repeater)

Model Name : 2G/3G-Duplexer – 2N-150

Part No : 01000029881

| Division            | Specification                       |              |
|---------------------|-------------------------------------|--------------|
| Freq Range          | 824~849MHz                          | 1920~1980MHz |
|                     | 869~894MHz                          | 2110~2170MHz |
| Insertion Loss (dB) | 0.2 (Max)                           | 0.3 (Max)    |
| Return Loss (dB)    | 18.0 (Min)                          |              |
| Band pass Ripple    | 0.3 Max                             |              |
| Rejection           | 35 (Min)                            | 50 (Min)     |
| Impedance           | 50ohm                               |              |
| Input Power         | 150W                                |              |
| Inter modulation    | 3rd : 140dBc (20W C.W 2-Tone Input) |              |
| Size                | 230 x 188 x 61                      |              |
| Temperature         | -33 ~ +60℃                          |              |
| Connector           | N Type Female                       |              |

FEU (Front End Unit) Applied to BTS

Model Name: 1X/BTS /FEU Revision (25Mhz)

Part No: 01000022741

| Division            | Specification  |                  |
|---------------------|----------------|------------------|
| Frequency           | 869.025~893.62 | 824.025~848.625  |
| Insertion Loss      | ≤1.2dB         |                  |
| Gain                |                | 25.0±1.5dB       |
| Flatness            | ≤0.7dB         | ≤1.3dB           |
| Return Loss         | ≤17.7dB        |                  |
| Atten               | 810MHz         | ≥55dBc           |
|                     | 821MHz         | ≥20dBc           |
|                     | 851MHz         | ≥35dBc           |
|                     | 860MHz         | ≥55dBc           |
|                     | 865MHz         | ≥12dBc           |
|                     | 896MHz         | ≥25dBc           |
|                     | ≥896MHz        | ≥20dBc           |
| Harmonic            | ≥80dBc         |                  |
| Isolation           | ≥100dBc        |                  |
| Coupling Value      | Tx Test CPL    | 33.0±0.5dB       |
|                     | Tx EQP CPL     | 33.0±0.3dB       |
|                     | Tx Monitoring  | 40.0±0.3dB       |
|                     | ANT ANTCLPL    | ≥45dB            |
|                     | ANT EQPCPL     | ≥3.2dB           |
| Noise Figure        | ≥23dB          |                  |
| Output IP3          |                |                  |
| PIMD                | 3rd Order      | ≥140dBc          |
|                     | 5rd Order      | ≥160dBc          |
| Handling Power      | ≥240 Watts     | ≤150 Watts       |
| DC Input            |                | 8.5±1.0V, ≤550mA |
| I/O Port Connectors | N-Type (F)     | N-Type (F)       |



Dual Tower Mounted Amplifier

Model Name : FA-200T

1. Feature

- High TX / RX coverage
- Stronger signal, wider coverage
- Fewer call drops, Increase talk time
- Higher base station receiver sensitivity

Service operators have looked for the system of extending the coverage of bass station for both CDMA800 and PCS1900 or GSM900 and DCS1800.

Recent trend of amplifier has been changed from single band to dual or muti-band equipment.

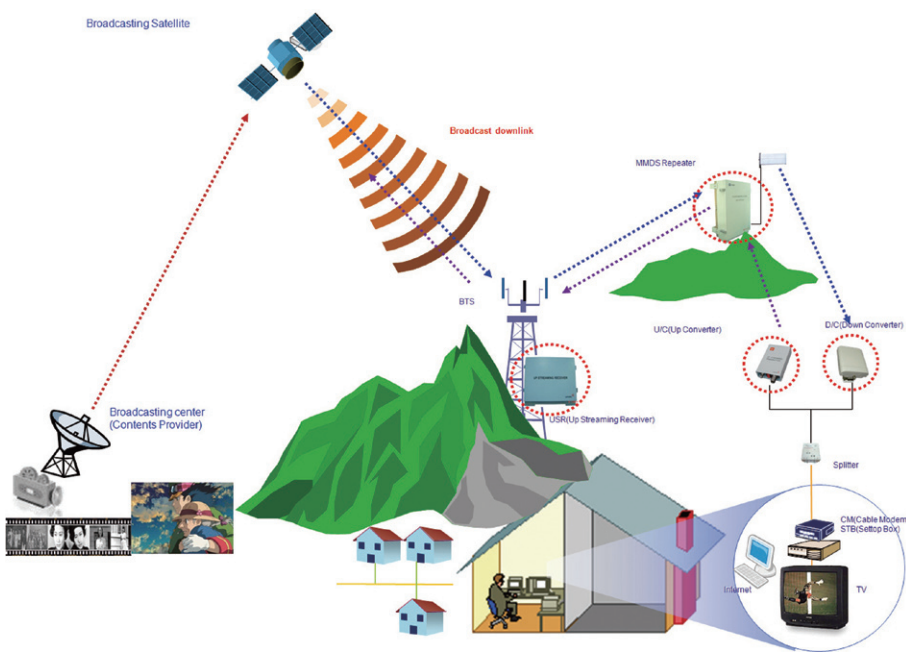
All the specification could be modified or adjusted by customer’s requirement.

It is most cost-effective solution for extending the coverage of existing base station.

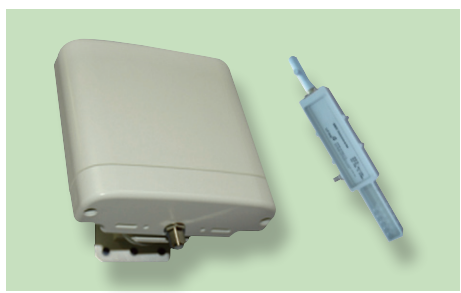
2. Specification

| Description     | Specification                             |                                                                                                                                                                                                                                                                 |
|-----------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Uplink          | Frequency range                           | 1710~1785MHz                                                                                                                                                                                                                                                    |
|                 | Return Loss, Normal Mode                  | 18dB(Antenna Port & BTS Port)                                                                                                                                                                                                                                   |
|                 | Return Loss, Bypass Mode                  | 15dB(Antenna Port & BTS Port)                                                                                                                                                                                                                                   |
|                 | Nominal gain                              | 14dB±1dB                                                                                                                                                                                                                                                        |
|                 | Passband ripple                           | 1.1dB max.                                                                                                                                                                                                                                                      |
|                 | Noise figure                              | 2.0dB Max at Normal Temp                                                                                                                                                                                                                                        |
|                 |                                           | /2.3dB at -40 to +65deg temp                                                                                                                                                                                                                                    |
|                 | Tx-band rejection, relative to gain level | > 70dB                                                                                                                                                                                                                                                          |
|                 | Output 3rd order Intercept Point(IP3)     | > +27dBm ; +25dBm min                                                                                                                                                                                                                                           |
|                 | 1 dB compression Point                    | > 15dBm                                                                                                                                                                                                                                                         |
|                 | Insertion loss bypass mode                | > 2.1dB                                                                                                                                                                                                                                                         |
|                 | Supply voltage, fed via the RF cable      | 12 V DC nominal @ 100-130 mA(8-31 V DC)                                                                                                                                                                                                                         |
|                 | Total Group Delay                         | 150nS max                                                                                                                                                                                                                                                       |
|                 | Antenna Receive Filter Rejection(RX1)     | -60dB                                                                                                                                                                                                                                                           |
|                 | BTS Receive Filter Rejection(RX2)         | -40dB                                                                                                                                                                                                                                                           |
| Downlink        | Frequency range                           | 1805~1880MHz                                                                                                                                                                                                                                                    |
|                 | Insertion loss, typical                   | 0.7dB Max                                                                                                                                                                                                                                                       |
|                 | Return Loss                               | > 18dB Return Loss,<br>(both at BTS & Antenna Port)                                                                                                                                                                                                             |
|                 | Filter Rejection in Rx Path               | > 47dB                                                                                                                                                                                                                                                          |
|                 | Average operating power, max(CW Power)    | > / = +53dBm (200W)                                                                                                                                                                                                                                             |
|                 | Power Handling Survival                   | +63dBm (2,000W)                                                                                                                                                                                                                                                 |
|                 | 3rd Order PIM in Tx Band @ BTS Port       | -120dBm Max (2 Tx Carriers at +43 dBm)                                                                                                                                                                                                                          |
|                 | Impedance                                 | 50 Ohms                                                                                                                                                                                                                                                         |
|                 | MTBF                                      | > 1000 000 Hrs.                                                                                                                                                                                                                                                 |
|                 | LNA Construction                          | Sigle Stage, Quadrature Balanaced                                                                                                                                                                                                                               |
| Miscellaneous   | Alarm functions                           | 1. 100-130mA normal operating Current,<br>No Alarm<br>2. Open circuit-if current is less than 30mA, Low Alarm (No Current to TMA)<br>3. One Amplifier Fails, 200 to 220 mA, Warning Alarm<br>4. Both Amplifiers Fail, 270 to 300mA,<br>High Alarm(By-Pass Mode) |
|                 | Grounding                                 | 16sq mm Stranded, Terminal Universal 2 holes                                                                                                                                                                                                                    |
|                 | EMC and safety approvals                  | ETS 300 342-3                                                                                                                                                                                                                                                   |
|                 | Power Consumption                         | <2W                                                                                                                                                                                                                                                             |
|                 | Current Injector (Bias-T)                 |                                                                                                                                                                                                                                                                 |
|                 | Return Loss                               | > 18dB                                                                                                                                                                                                                                                          |
|                 | Insertion Loss                            | <0.3dB in specified Frequency Band                                                                                                                                                                                                                              |
|                 | Isolation                                 | 70dB                                                                                                                                                                                                                                                            |
|                 |                                           |                                                                                                                                                                                                                                                                 |
|                 |                                           |                                                                                                                                                                                                                                                                 |
| Electrical Data |                                           |                                                                                                                                                                                                                                                                 |
|                 |                                           |                                                                                                                                                                                                                                                                 |
|                 |                                           |                                                                                                                                                                                                                                                                 |

MMDS Network Configuration



Product Line Up



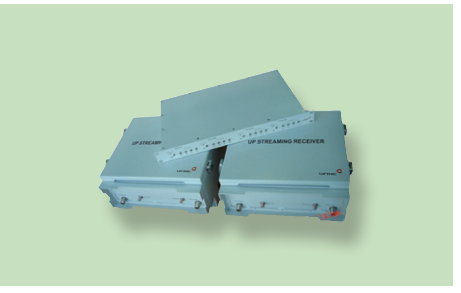
D/C (Down Converter)  
Antenna inside (8dBi, 11dBi)  
Stand Alone type (8dBi, 11dBi)



MMDS Repeater  
Output power (10W, 50W)



U/C (Up Converter) : Up Streaming Transmitter



USR (Up Streaming Receiver)  
Controller  
Remote Unit 1 (Sector 1, 2)  
Remote Unit 2 (Sector 3, 4)



Built in antenna



Stand along type

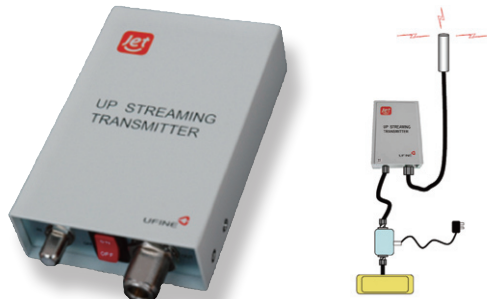
Down Converter(UBM-4208A)

| Items                      | Specifications                          |
|----------------------------|-----------------------------------------|
| Down Converter Gain        | 42dB                                    |
| Antenna Gain               | 8dBi / 11dBi                            |
| Input Frequency            | 2500~2686MHz                            |
| Output Frequency           | 222~408MHz                              |
| Gain Flatness              | +/- 2dB @222~408MHz                     |
| Noise Figure               | 2dB +/- 0.5dB                           |
| Local Frequency            | 2278MHz                                 |
| Local Frequency Stability  | 1.5ppm max @25℃<br>2.5ppm over temp.    |
| Local Phase Noise          | -80dBc/Hz @ 10KHz<br>-99dBc/Hz @ 100KHz |
| Local Leakage IF Port      | < -100dBm [-45]                         |
| Local Leakage Antenna Port | < -80dBm                                |
| IF Rejection               | > -80dBc                                |
| Image Rejection            | > -60dBc                                |
| Output Impedance           | 75 ohms                                 |
| Output Connector           | F-type female                           |
| Supply Voltage             | +18v DC                                 |
| Supply Current             | 240mA                                   |
| Temperature                | -20 to +60                              |
| Humidity                   | 0~95%                                   |
| Lighting Protection        | Meets or exceeds IEEE specifications    |
| Surge Protection           | Meets or exceeds IEEE specifications    |

Down Converter(UBM-4211A)

| Items                      | Specifications                          |
|----------------------------|-----------------------------------------|
| Down Converter Gain        | 38dB                                    |
| Input Frequency            | 2500~2686MHz                            |
| Output Frequency           | 222~408MHz                              |
| Gain Flatness              | +/- 2dB @222~408MHz                     |
| Noise Figure               | 2dB +/- 0.5dB                           |
| Local Frequency            | 2278MHz                                 |
| Local Frequency Stability  | 1.5ppm max @25℃<br>2.5ppm over temp.    |
| Local Phase Noise          | -80dBc/Hz @ 10KHz<br>-99dBc/Hz @ 100KHz |
| Local Leakage IF Port      | < -100dBm [-45]                         |
| Local Leakage Antenna Port | < -80dBm                                |
| IF Rejection               | > -80dBc                                |
| Image Rejection            | > -60dBc                                |
| Output Impedance           | 75 ohms                                 |
| Output Connector           | F-type female                           |
| Supply Voltage             | +18v DC                                 |
| Supply Current             | 240mA                                   |
| Temperature                | -20 to +60                              |
| Humidity                   | 0~95%                                   |
| Lighting Protection        | Meets or exceeds IEEE specifications    |
| Surge Protection           | Meets or exceeds IEEE specifications    |

## U/C (Up Converter) : Up Streaming Transmitter



### Up Steaming Transmitter

|               |              |
|---------------|--------------|
| Input Freq.   | 22~34MHz     |
| Output Freq.  | 2170~2182MHz |
| Gain          | +48dB        |
| Output P1     | +26dBm       |
| Local Leakage | -50dBm       |

## MMDS Repeater



### 10W Middle Power Repeater

- Two Way (bi-directional) System for Broadcasting & Data Service

|                | Down         | Up           |
|----------------|--------------|--------------|
| In/Out Freq.   | 2500~2686MHz | 2170~2182MHz |
| Gain           | +60 ~ +90dB  | +60 ~ +90dB  |
| Output Power   | 10W          | 1W           |
| Noise Figure   | 5dB          | 5dB          |
| OP Temperature | -20 ~ +50°C  | -20 ~ +50°C  |



### 50W High Power Repeater

- Two Way System for Broadcasting Service

|                | Down         | Up           |
|----------------|--------------|--------------|
| In/Out Freq.   | 2500~2686MHz | 2170~2182MHz |
| Gain           | +60 ~ +90dB  | +60 ~ +90dB  |
| Output Power   | 50W          | 2W           |
| Noise Figure   | 5dB          | 5dB          |
| OP Temperature | -20 ~ +50°C  | -20 ~ +50°C  |

## URS (Up Streaming Receiver)



### USR (Up Streaming Transmitter)

Controller Remote Unit 1 (Sector 1, 2)  
Remote Unit 2 (Sector 3, 4)

|              |                   |
|--------------|-------------------|
| Input Freq.  | 2170~2182MHz      |
| Output Freq. | 22~34MHz          |
| Gain         | +40dB             |
| Noise Figure | +2.5dBm           |
| Redundancy   | Switching Concept |



## Reference Sites In Brazil

> Brusque (Viamax) > Florianopolis (MMDSC) > Sao Paulo (TVA) > Natal (ACOM)

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