



AP.35E.07.0054A

## Specification

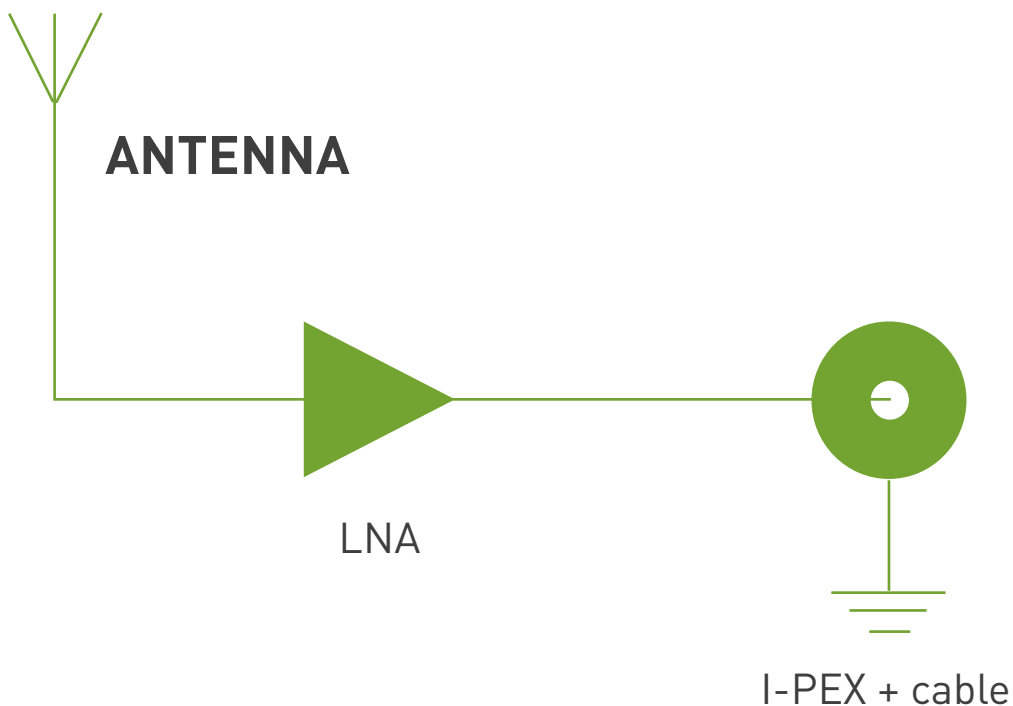
|                     |                                                                                                                                                                                                      |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Part No.</b>     | <b>AP.35E.07.0054A</b>                                                                                                                                                                               |
| <b>Product Name</b> | 35mm One Stage GPS Active Patch<br>Antenna Module with front-end Saw Filter                                                                                                                          |
| <b>Features</b>     | Industry leading GPS antenna performance<br>35mm*35mm*5.5mm (Ground Plane)<br>54mm Ø1.13 I-PEX MHFI (U.FL)<br>15dB LNA<br>Wide Input Voltage 1.8V to 5.5V<br>Low Power Consumption<br>ROHS Compliant |

## 1. Introduction

The AP.35E has been designed specifically for embedded (inside device) integration with GPS receiver modules where there is a GSM transmitter nearby and risk of interference and saturation.

The AP.35E combines a 35\*35\*3.5mm advanced low profile ceramic patch antenna with a one stage LNA and a front-end SAW filter with ultra thin coaxial cable.

The Ground Plane size of 35\*35mm combined with the larger size GPS Patch, gives this solution a performance increase in gain of 1~2dB. It also helps shields the patch antenna from noise and increases performance at low elevations. Taoglas active antenna modules utilise XtremeGain™ technology for the highest sensitivity in the industry. The AP.35E consists of 2 functional blocks – the LNA and also the patch antenna.



The AP.35E has a SAW filter on the front of it. The main use of the AP.35E would be for small devices where the GSM transmitter is close to the GPS antenna, it helps avoid burn-out of the LNA or the module due to interference from the GSM transmitter at out band frequencies.

## 2. Specification

### 2.1 Patch Antenna

| Parameter       | Specification                     |
|-----------------|-----------------------------------|
| Frequency       | 1575.42 ± 1.023MHz                |
| Gain @ Zenith   | +2.5 dBic Typ. @ Zenith (35mm GP) |
| Polarization    | RHCP                              |
| Axial Ratio     | 3.0dB max. @Zenith                |
| Patch Dimension | 35*35*3.5mm                       |

### 2.2 LNA

| Parameter         | Specification                                |                            |                  |
|-------------------|----------------------------------------------|----------------------------|------------------|
| Frequency         | 1575.42 ± 1.023MHz                           |                            |                  |
| Outer Band        | F0=1575.42MHz                                |                            |                  |
| Attenuation       | F0±30MHz 9dB min.                            |                            |                  |
|                   | F0±50MHz 20dB min.                           |                            |                  |
|                   | F0±100MHz 25dB min.                          |                            |                  |
| Output Impedance  | 50Ω                                          |                            |                  |
| Output VSWR       | 2.0 Max                                      |                            |                  |
| Pout at 1dB Gain  | Typ. -2dBm                                   |                            |                  |
| Compression point | Min. -6dBm                                   |                            |                  |
|                   | LNA Gain, Power Consumption and Noise Figure |                            |                  |
| Voltage           | LNA Gain (Typ)                               | Power Consumption (mA) Typ | Noise Figure Typ |
| Min. 1.8V         | 14dB                                         | 3mA                        | 2.5dB            |
| Typ. 3.0V         | 15dB                                         | 3mA                        | 2.5dB            |
| Max. 5.5V         | 15dB                                         | 3mA                        | 2.5dB            |

### 2.3 Cable & Connector

| Parameter | Specification                                  |
|-----------|------------------------------------------------|
| RF Cable  | Coaxial Cable Ø1.13 ± 0.1mm, length 62 ± 2.0mm |
| Connector | IPEX MHFI (U.FL)                               |

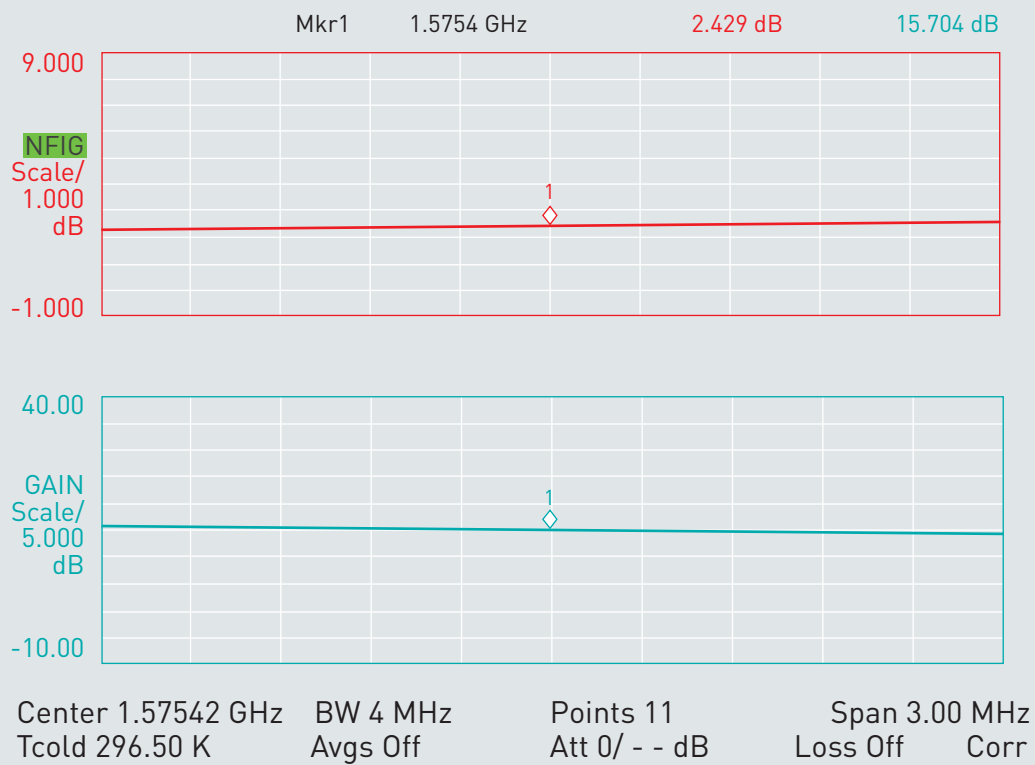
### 3. LNA Gain and Out Band Rejection @3.0V

► Tr1 S21 Log Mag 10.00dB/ Ref -30.00dB (F2)



|     |     |     |    |               |         |    |
|-----|-----|-----|----|---------------|---------|----|
| Cg1 | Tr1 | S21 | 1  | 1.5754200 GHz | 15.116  | dB |
| Cg1 | Tr1 | S21 | 2  | 1.5554200 GHz | 14.667  | dB |
| Cg1 | Tr1 | S21 | 3  | 1.5954200 GHz | 12.663  | dB |
| Cg1 | Tr1 | S21 | 4  | 1.5454200 GHz | 5.3884  | dB |
| Cg1 | Tr1 | S21 | 5  | 1.6054200 GHz | -20.272 | dB |
| Cg1 | Tr1 | S21 | 6  | 1.5254200 GHz | -8.4576 | dB |
| Cg1 | Tr1 | S21 | 7  | 1.6254200 GHz | -21.711 | dB |
| Cg1 | Tr1 | S21 | 8  | 1.6754200 GHz | -12.491 | dB |
| Cg1 | Tr1 | S21 | >9 | 1.4754200 GHz | -13.972 | dB |

## 4. LNA Noise Figure @3.0V

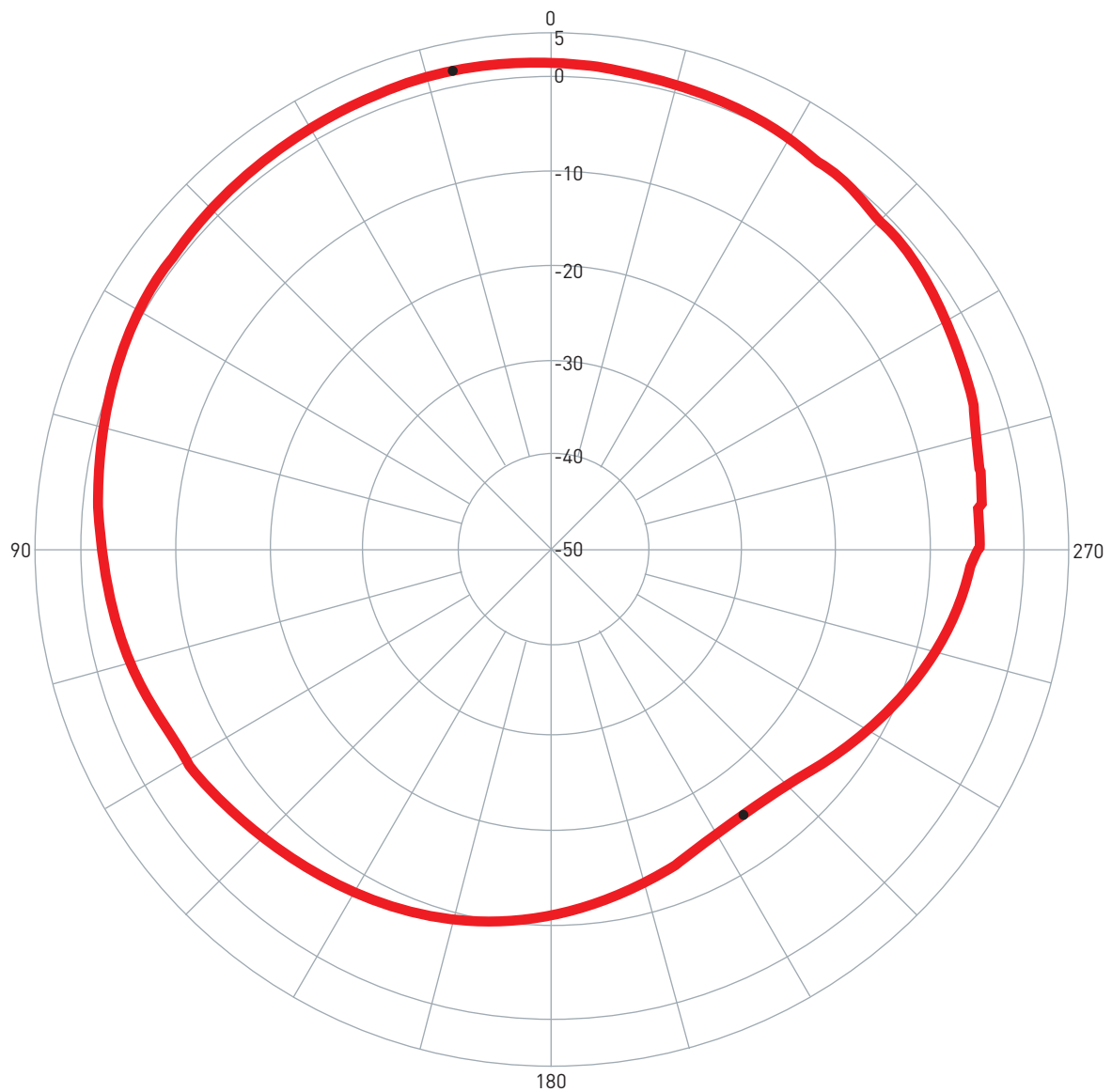


## 5. Total Specification (through Antenna, LNA, Cable and Connector)

| Parameter             | Specification                                                 |
|-----------------------|---------------------------------------------------------------|
| Frequency             | 1575.42 ± 1.023MHz                                            |
| Gain                  | At 5V: 18± 3dBi<br>At 3V: 17.5 ± 3dBi<br>At 1.8V: 15.5 ± 3dBi |
| Output Impedance      | 50Ω                                                           |
| Polarization          | RHCP                                                          |
| Output VSWR           | Max 2.0                                                       |
| Operation Temperature | -40°C to + 85°C                                               |
| Storage Temperature   | -40°C to + 85°C                                               |
| Relative Humidity     | 40% to 95%                                                    |
| Input Voltage         | Min:1.8V Typ. 3.0V Max:5V                                     |
| Antenna               | 35*35*5.5mm                                                   |
| Weight(g)             | 14.6g                                                         |

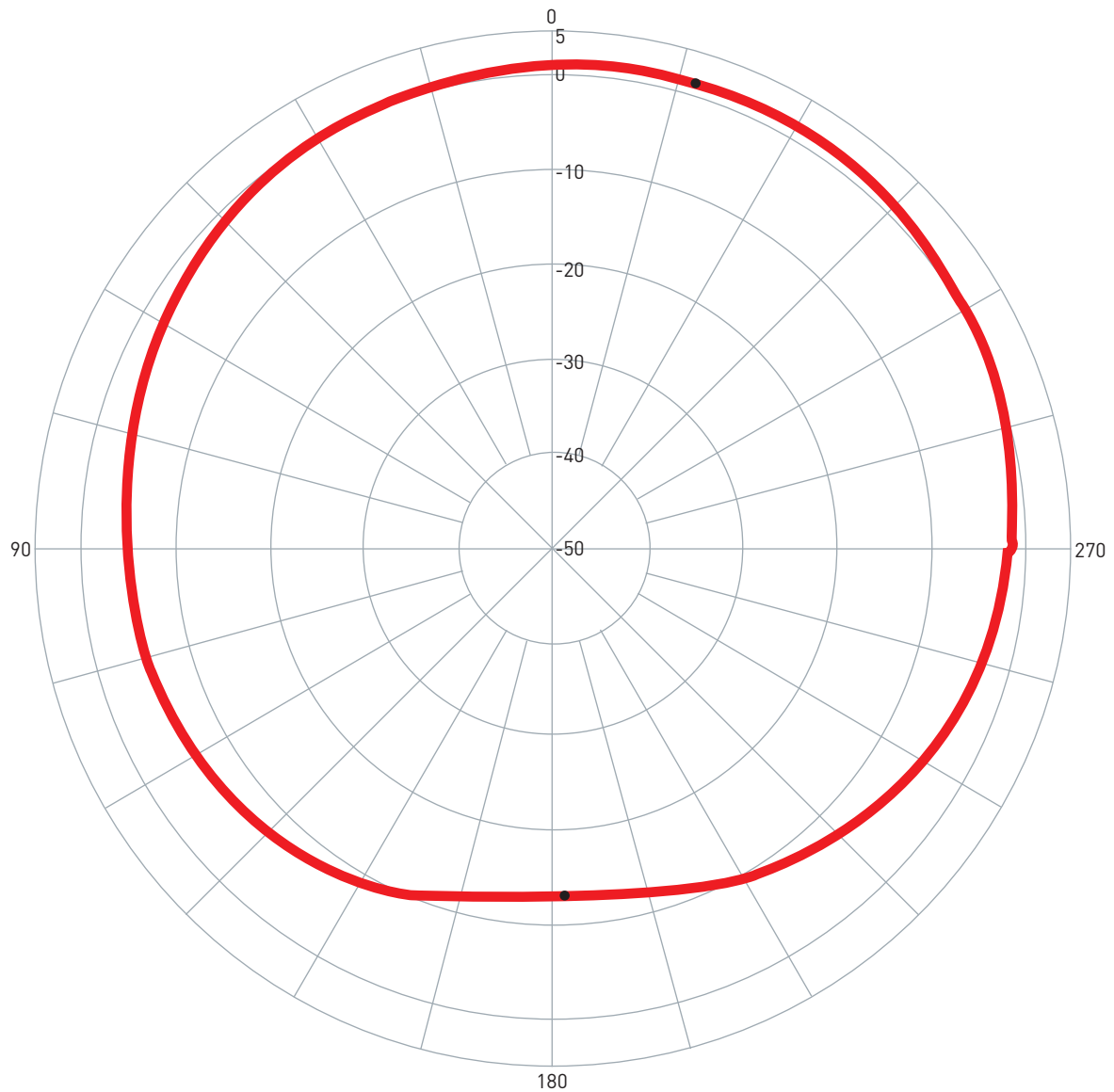
## 6. Radiation Patterns

### 6.1 XZ Plane Radiation



| Pattern                                                                               | Model No.       | Test Mode | Freq (Mhz) | Max Gain (dBi) | Min Gain (dBi)  | Avg. Gain (dBi) | Source Polar | Date      |
|---------------------------------------------------------------------------------------|-----------------|-----------|------------|----------------|-----------------|-----------------|--------------|-----------|
| 1  | AP.35A.07.0054A | XZ        | 1575.42    | 1.65 / 11.56   | -15.22 / 215.70 | -2.22           | RHCP         | 2010/1/14 |

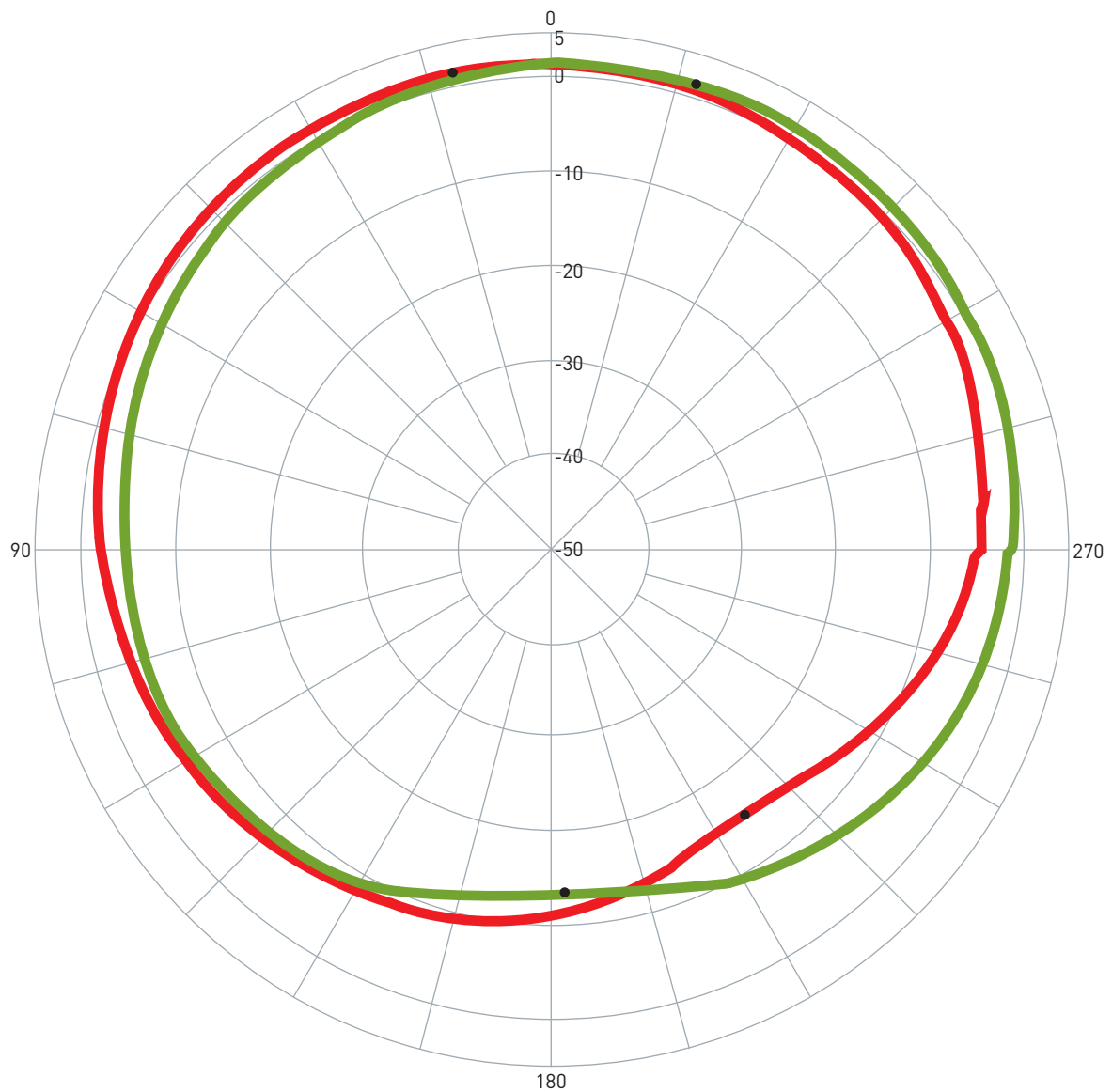
## 6.2 YZ Plane Radiation



| Pattern                                                                               | Model No.       | Test Mode | Freq (Mhz) | Max Gain (dBi) | Min Gain (dBi) | Avg. Gain (dBi) | Source Polar | Date      |
|---------------------------------------------------------------------------------------|-----------------|-----------|------------|----------------|----------------|-----------------|--------------|-----------|
| 1  | AP.35A.07.0054A | YZ        | 1575.42    | 1.62 / 343.00  | -13.37 / 182   | -2.08           | RHCP         | 2010/1/14 |



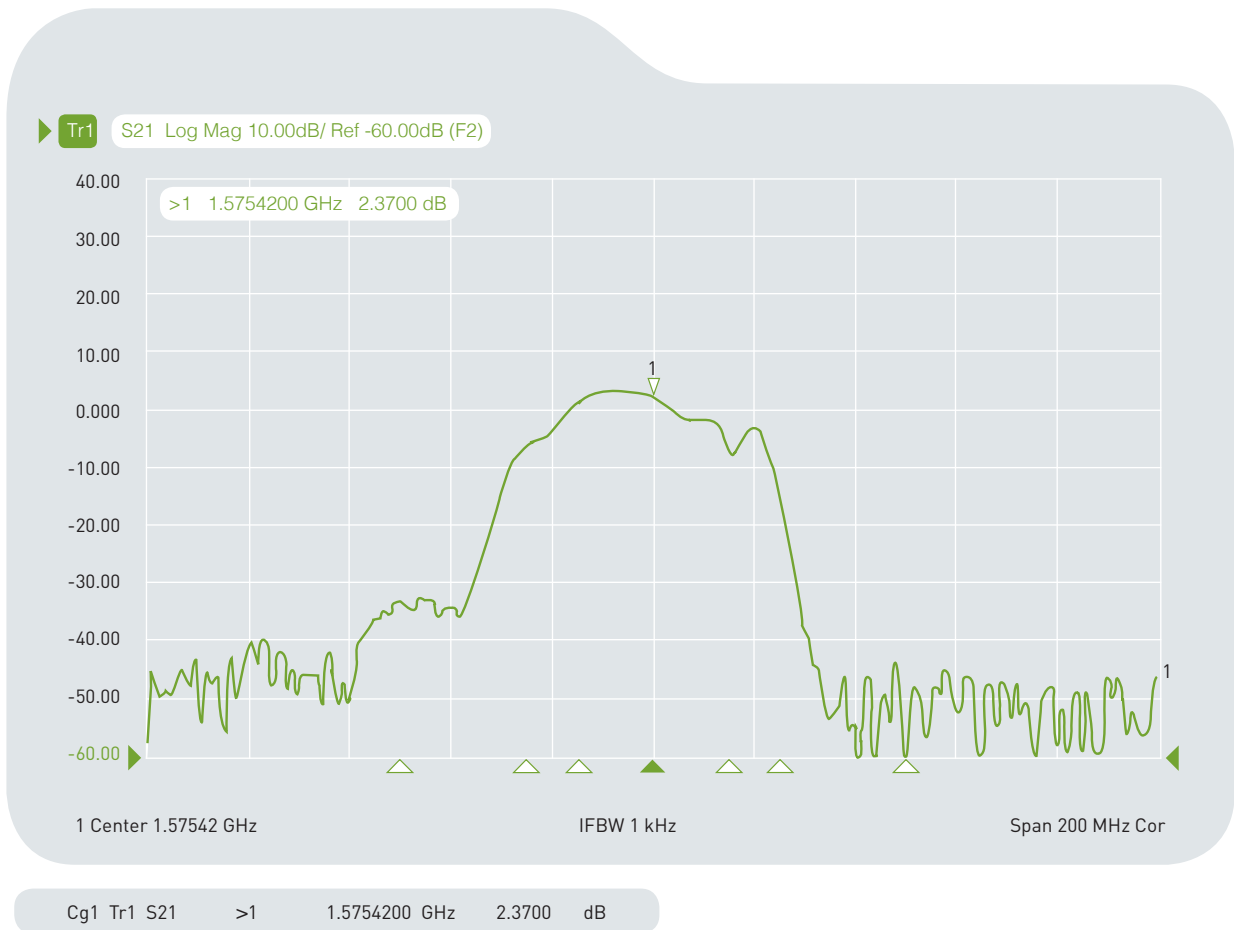
## 6.3 XY Plane Radiation



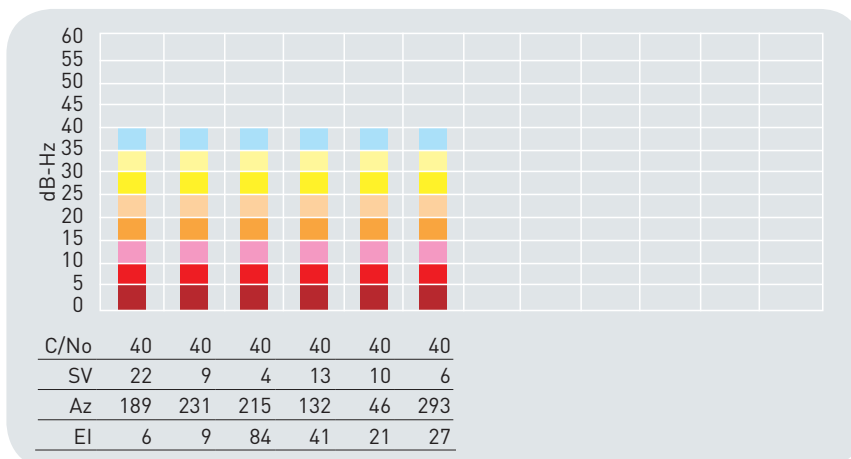
| Pattern                                                                               | Model No.       | Test Mode | Freq (Mhz) | Max Gain (dBi) | Min Gain (dBi)  | Avg. Gain (dBi) | Source Polar | Date      |
|---------------------------------------------------------------------------------------|-----------------|-----------|------------|----------------|-----------------|-----------------|--------------|-----------|
| 1  | AP.35A.07.0054A | XZ        | 1575.42    | 1.65 / 11.56   | -15.22 / 215.70 | -2.22           | RHCP         | 2010/1/14 |
| 2  | AP.35A.07.0054A | XZ        | 1575.42    | 1.62 / 343.00  | -13.37 / 182.00 | -2.08           | RHCP         | 2010/1/14 |

## 7. Reliability Test

### 7.1 (Room temperature +25°C)

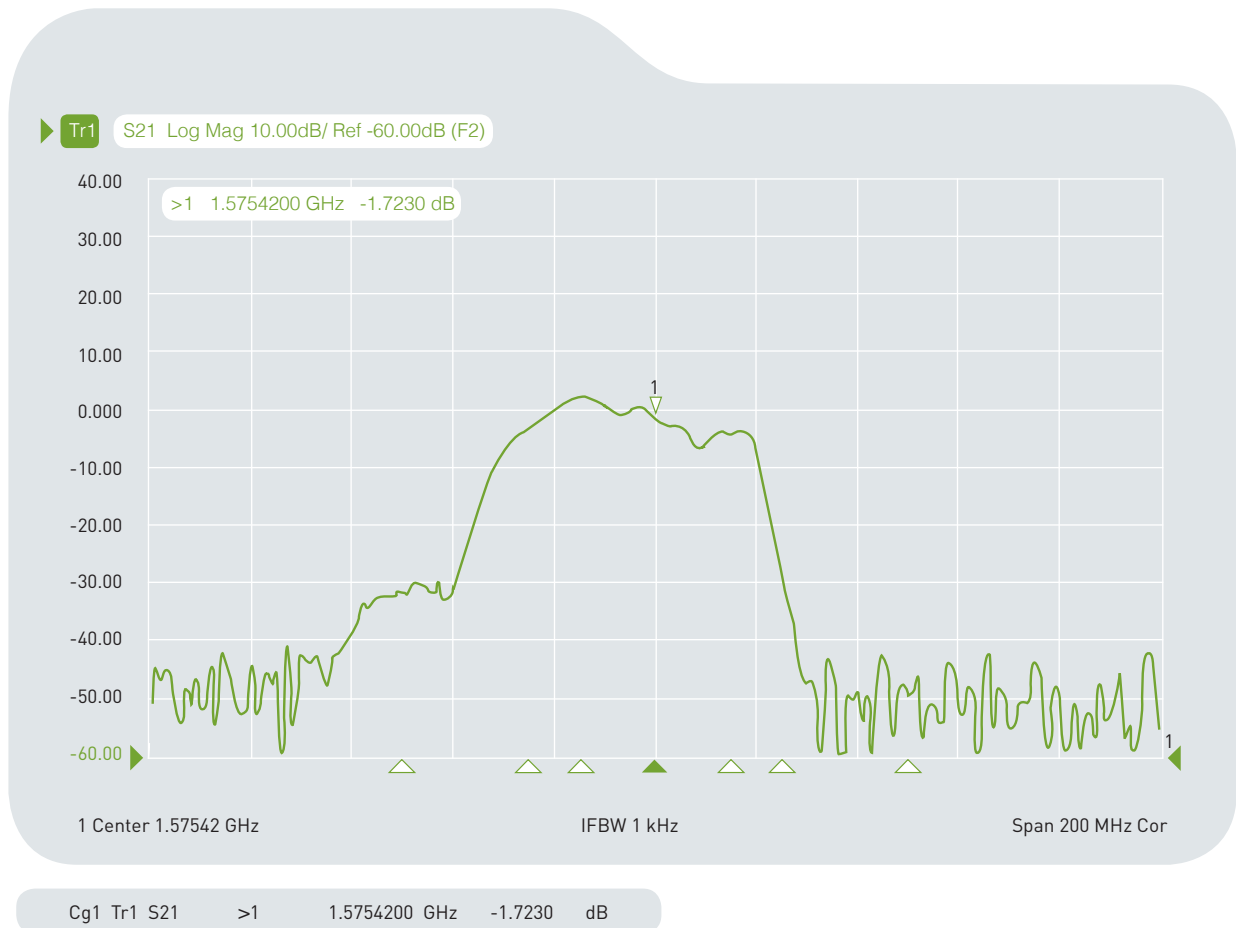


#### 7.1.1 S21 Radiation Gain at +25°C

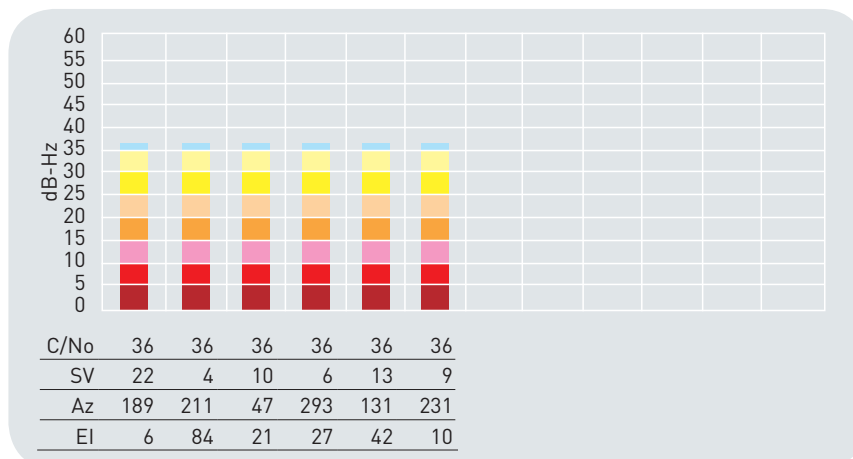


**C/N at  
+25°C**

## 7.2 (Room temperature +85°C)

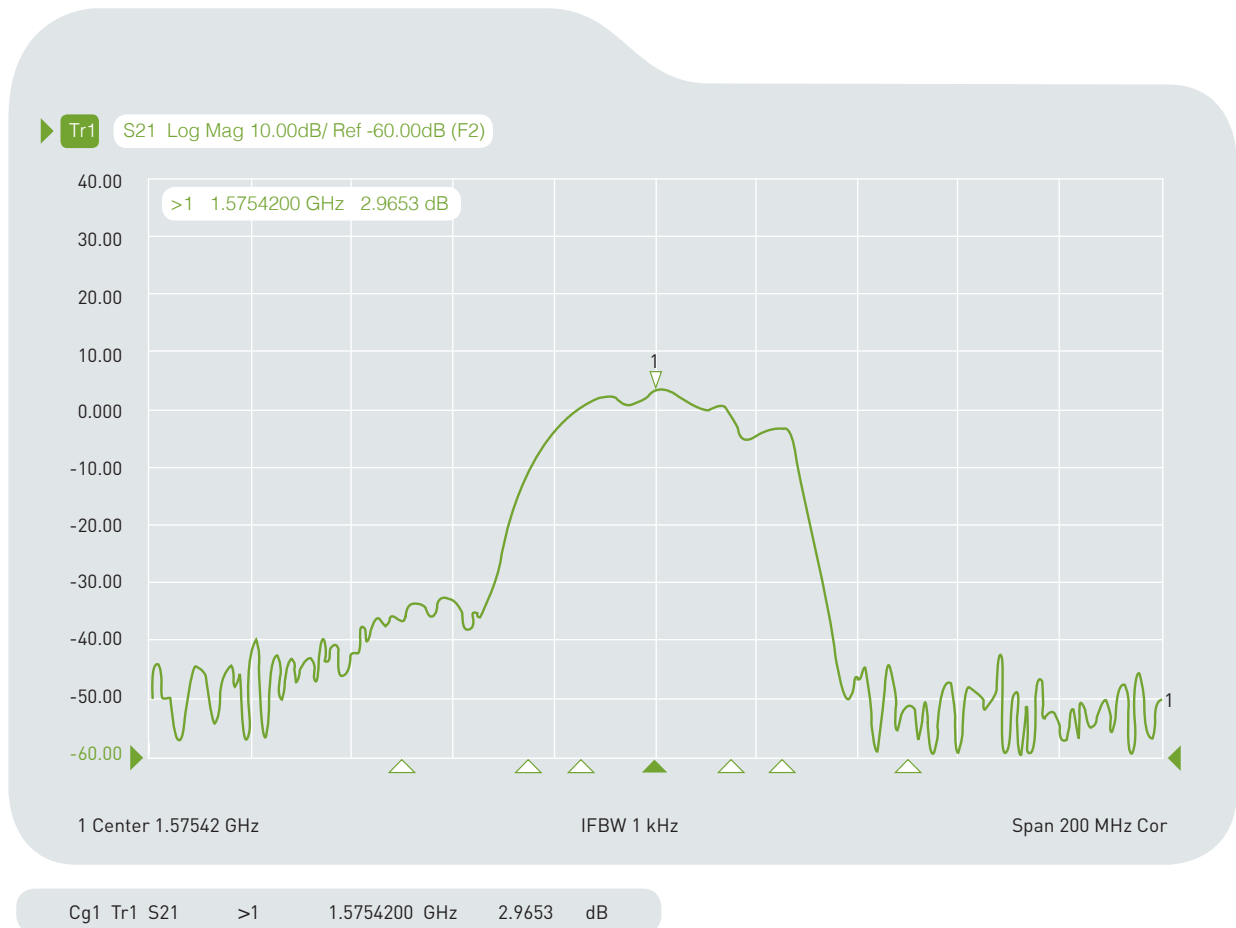


### 7.2.1 S21 Radiation Gain at +85°C

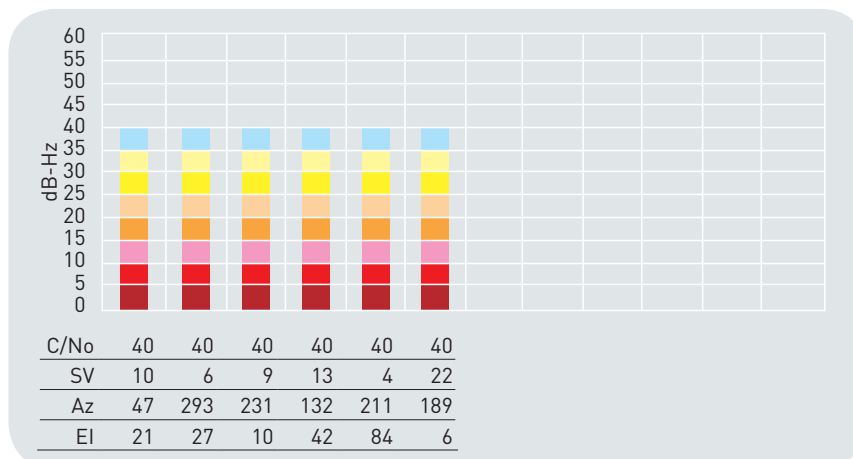


**C/N at  
+85°C**

## 7.3 (Low temperature -40°C)



### 7.3.1 S21 Radiation Gain at -40°C



**C/N at  
-40°C**



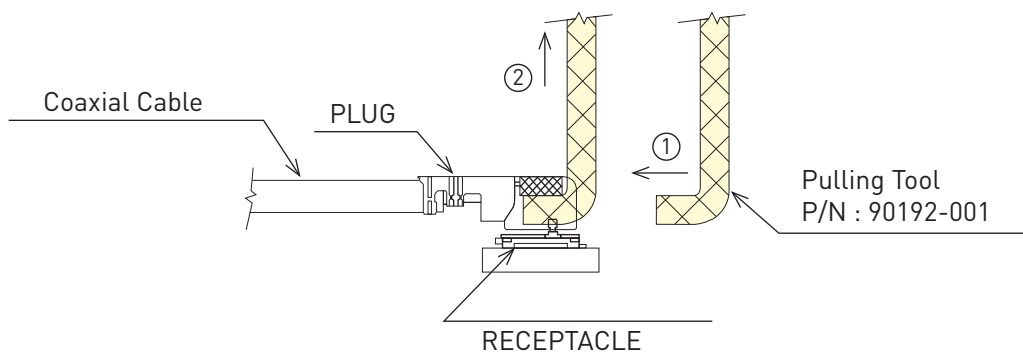
## 9. IPEX MHFI Usage Precautions

### 9.1 Mating / unmating

(1) To disconnect connectors, insert the end portion of I-PEX under the connector flanges and pull off vertically, in the direction of the connector mating axis.

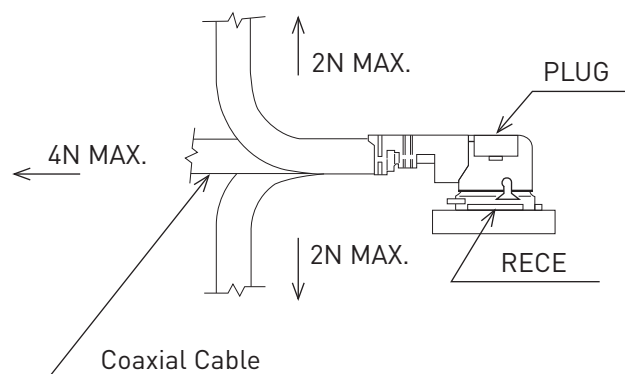
(2) To mate the connectors, the mating axes of both connectors must be aligned and the connectors can be mated. The "click" will confirm fully mated connection.

Do not attempt to insert on an extreme angle.



### 9.2 Pull forces on the cable after connectors are mated

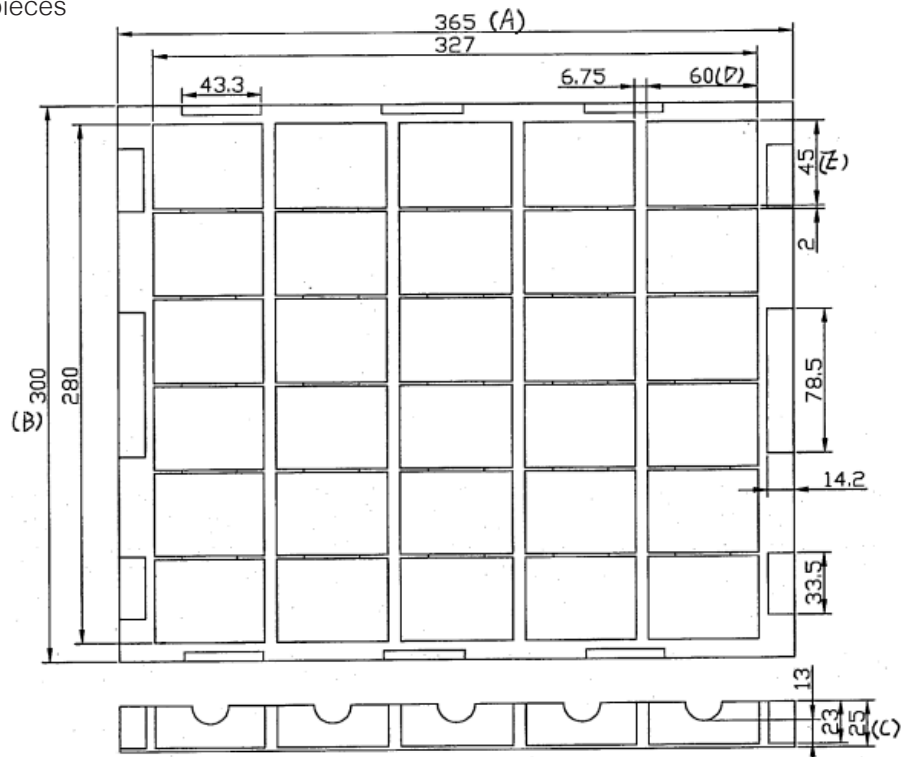
After the connectors are mated, do not apply a load to the cable in excess of the values indicated in the diagram below.



## 10. Packaging

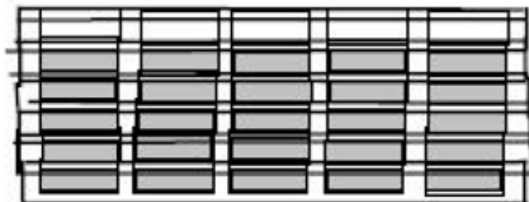
Packaged in Tray with Foam

One Tray = 30 pieces



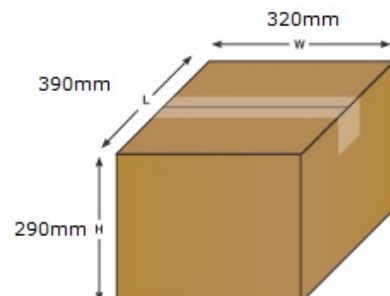
5 Trays packaged together per Section

150 pieces



2 Sections per Outer Carton

300 pieces



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