U60 Vehicle Mounted Flat Panel Antenna
Antenna Development

Flat panel antenna will be a trend in the antenna development because of its small size, integrative structure and other excellent features. So far, it has been used in military equipment for replacing the traditional reflector antenna.
In the satcom industry, flat panel antennas have appeared in the market, presenting a new development trend.
Appearance

- **Square Aperture**
  Antenna is a square plate with waveguide horn array

- **3-Axle Motor Driven Mechanism**
  Elevation, azimuth and polarization are driven by motors for auto acquisition

- **Controller**
  The control of antenna for satellite automatic acquiring and tracking
Plat Panel

- **Type**
  Waveguide horn plate array antenna

- **Duplex**
  Supporting dual frequency, dual polarization and one panel shared with RX/TX

- **Panel Size**
  500*500*56
RF Unit Built in

- **Built in**
  LNB and BUC are built in the back of antenna plate with shield cover

- **BUC options**
  16W, 25W, W40, 80W and 100W
3-Axis Motorization

- **3 Motor Drivers**
  Three electrical motors are used to drive the antenna panel rotating in elevation, azimuth and polarization.

- **Rotation Range**
  - Elevation: 0-85°
  - Azimuth: ±200°
  - Polarization: ±90°
Deployment

- Parking the vehicle on the flat ground and heading for the equator direction as far as possible
- One button for auto satellite acquisition on the Controller in vehicle
Undeployment

- One button operation in vehicle on Controller for the undeployment
- After un-deployment, the antenna with profile height of 21CM, weight of 39Kg
- With light weight, low profile and streamlined shape, the mounted antenna has little influence on the vehicle stability, mobility and maneuverability
Interface Ports

- All interface ports on the rear of antenna base
- Those port will be connected with the Controller in vehicle
Controller

- The Controller contains a servo system board, receiving the panel status data from sensors and the commands from user as well as sending the control signals to antenna drive motors.

- All data on antenna present status and the parameters in configurations are displayed on the window.
Panel Structure

- A square pyramidal horn plus a OMT as one antenna element
- Arrange those elements on a plane to form an array antenna
- The feeding networks are also made with waveguide for RX/TX

- Array of $16 \times 16$ elements
- Aperture $600 \times 600$
- Gain
  - TX 39.4dBi
  - RX 38.4dBi
- Side lobe: -22dB
## Excellent Features

<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Small size, integrative structure and full duplex</strong></td>
<td><strong>High efficiency and high gain</strong></td>
<td><strong>Low side lobe</strong></td>
<td><strong>Costumer Benefit</strong></td>
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</tbody>
</table>

- 600×600 planar structure, supporting dual frequency, dual polarization and full duplex
- Waveguide-made antenna, with much higher efficiency than reflector one, resulting in high gain and high power capacity
- Optimizing the filed strength on antenna aperture to realize the low side lobe for increase RX C/N and avoid TX interference
- With the features of high gain, high power capacity and low side lobe, the antenna can be used with high power amplifier for high traffic link
Automation

- Based on ARM platform, servo system can finish many manual works and simplify the user’s antenna operation.
- Software with independent intellectual property rights makes antenna to align with satellite fast, accurately and intelligently.
- Realize one button control
- A lower requirement on user’s skills and experiences
Servo System

Main Board
• Based on ARM platform

Peripheral devices
• Send user’s command to main board
• Send antenna status data to main board
• Explain and execute control signals issued by main board.

Driving mechanism
• Precise and efficient mechanical reducer and motor drive mechanism
Features on Vehicle

• Low profile, low barycentre, little influence on the vehicle stability, mobility and maneuverability

• Simple appearance in structure, light weight, easy for installation, especially on the small off-road vehicles

• Streamlined shape with seamless appearance with the vehicle after installation, and nice visual effect
Software

• Flow Chart

- Initializing, waiting for user’s commands and executing the commands
- Sensing antenna geological position and current posture
- Calculating the satellite point parameters
- Manipulating the panel face to the satellite
- Locking in the Sat and auto tracking it on the received beacon level
Integration

• Flat Panel Array Ant.
  Waveguide horn array plate antenna, support duplex communications

• Servo System
  Servo control, sensors, motor driver and intelligent software

• RF Units
  LNB & BUC

• Optimum
  Small size, high integration, streamline shape and good looking on vehicle
Applications

- Used as convenient antenna in satellite communication system
- Associated with MODEM, Encoder, VoIP gateway, LAN-Switch and other user’s devices
Key Feature Summary

• Small aperture, high efficiency and high gain
• Low loss, low side lobe, used with high power amplifier
• Meet 2-4Mbps system traffic requirement
• Low profile, low bary-center, compact structure, little influence on vehicle appearance and its mobility
• Perfect in shape and function, especially used with SUV cars

- Realize rapid and accurate satellite pointing, with ARM servo platform and intelligent software
- Intelligently judge and correct the errors caused by vehicle heading and tilting
- High automation, little or no special training on operators
### Specifications

#### Key Indexes

- **Ant. Type**
  - Flat Panel Array Ant.
- **Aperture**
  - 600*600mm
- **Gain**
  - TX 39.4dB
  - RX 38.4dB
- **Side lobe**
  - -22dB
- **Control**
  - One button press
- **Weight**
  - 39Kg

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td>Antenna type</td>
<td>Waveguide horn array planar satellite antenna, supporting dual frequency, dual polarization</td>
</tr>
<tr>
<td>Antenna plate size</td>
<td>600x600mm</td>
</tr>
<tr>
<td>Frequency</td>
<td>TX: 14.00~14.50GHz</td>
</tr>
<tr>
<td></td>
<td>RX: 12.25~12.75GHz</td>
</tr>
<tr>
<td>IF interface</td>
<td>TX: N-type, Female, L-Band</td>
</tr>
<tr>
<td></td>
<td>RX: N-type, Female, L-Band</td>
</tr>
<tr>
<td>Gain</td>
<td>RX: ≥ 38.4 dB</td>
</tr>
<tr>
<td></td>
<td>TX: ≥ 39.4 dB</td>
</tr>
<tr>
<td>The first side lobe</td>
<td>≤-22dB</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear polarization</td>
</tr>
<tr>
<td>Cross Polarization</td>
<td>≥ 37dB, axial direction</td>
</tr>
<tr>
<td>VSWR</td>
<td>≤1.25:1</td>
</tr>
<tr>
<td>Acquisition mode</td>
<td>One button automatic or manually accurate operation</td>
</tr>
<tr>
<td>Acquisition time</td>
<td>≤ 4 minutes (Until locking in satellite)</td>
</tr>
<tr>
<td>Alignment accuracy</td>
<td>≤ 0.2dB</td>
</tr>
<tr>
<td>Angle range</td>
<td>Azimuth: ± 200º</td>
</tr>
<tr>
<td></td>
<td>Elevation: 0º~ -85º</td>
</tr>
<tr>
<td></td>
<td>Polarization: ± 90º</td>
</tr>
<tr>
<td>Built-In BUC</td>
<td>16/25/40/80/100W (Ku)</td>
</tr>
<tr>
<td>Weight</td>
<td>≤ 39Kg</td>
</tr>
<tr>
<td>Carry Dimensions</td>
<td>1450mm(L)x880mm(W)x213mm(H)</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-40°C ~ +55°C</td>
</tr>
<tr>
<td>Power supply</td>
<td>95-265 VAC±10%, 47-63Hz</td>
</tr>
</tbody>
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Applications

- Emergency Communications
- Public emergency management and security
- Oil and gas
- Natural disaster relief and recovery
- Industry emergency
- Field operations
- Fire fighting
THANKS!