DTU-52 Series High-Power Digital TV Transmitter

Embodying a commitment to quality and eco-friendliness

To install, make connections and operate this product, please carefully read and observe instructions, precautions and recommendations in our instruction manuals.

The colours in this brochure may differ from those of the actual unit. Designs and specifications of this product is subject to change without prior notice.
NEC leads the way forward in the digital TV broadcasting industry around the world

NEC is a leading global company which offers world-class technological solutions and resources in the broadcast market.

The result of expertise and technologies accumulated over many years

NEC transmitter equipment is renowned for High Reliability and Low Maintenance throughout the global broadcast community. The DTU-52 Series inherits the technological and performance advantages of the previous DTU-51 Series, which through many years of field operation, has been highly praised by our customers, and has successfully achieved two additional advantages: high efficiency and small footprint.

Features

- **Enhanced Efficiency**
  With the new PA, the DTU-52 Series enables a reduction in power consumption by an average of 20 to 30% compared to the previous model.

- **Small Footprint**
  The DTU-52 Series provides up to 8.7kW output power (average) by using 10 sets of PA units in a single rack, achieving a footprint of only 590 (W) x 2,000 (H) x 1,000 (D) mm, making it one of the smallest transmitter footprints in the world.

- **Advanced cooling system**
  With the adoption of Hybrid Closed System for cooling, there is the advantage of excellent cooling liquid exchangeability and automatic removal of air from the system when an amplifier is changed.

- **Compliant to a variety of digital terrestrial broadcasting standards**
  The DTU-52 Series is able to support a wide range of global digital standards including ATSC, DVB-T/H, ISDB-Tb, and the latest established standard - DVB-T2.

- **User friendly monitoring and control**
  Control and monitoring of the equipment is carried out via the colour LCD on the front of the rack which features an intuitive Graphic User Interface for easy maintainability. As an example, it is possible to monitor IM and MER without the use of measuring equipment.

- **Wide range of redundancy configuration**
  To meet customer’s ever increasing demands, the DTU-52 Series can offer wide range of backup options: from redundancy only in the liquid cooling system to N+1 configurations.

- **Wide band design**
  The DTU-52 Series is designed to be frequency-agile, covering the entire UHF band and thus, no channel-specific components are required.

- **Reduced maintenance costs**
  All DTU-52 Series transmitters are produced from, and supported by, one common set of modules, resulting in reduced costs from purchase to installation and support.

The latest in digital broadcasting technology

**Power Amplifiers (PA)**

The newly developed UA4000QE-S power amplifier utilizes the latest high power LDMOS, realizing compact design, enhanced efficiency and producing excellent reliability. Each PA can produce an output power of 1kW average and incorporates a switching power supply. Furthermore, it features an optimized combination of wideband matching circuits and controls. In terms of safety features, the PA is incorporated with a RS-485 interface, enabling comprehensive monitoring and remote control functionality. With the added benefit of self-protection circuits to protect against environmental factors such as high temperature, reflected power, low AC voltage and internal factors such as overvoltage and over current. Additionally, the PA is equipped with RF over input protection, which has a function of protecting the PA against excessive output power produced from the exciters due to human mis-operation and from the excessive input power in case there is malfunction in the divider.

DTU-52 Series High-Power Digital TV Transmitter

A DVB-T2 compliant DTU-52 Series installed at Winter Hill (UK) for Arqiva, transmission provider for UK terrestrial TV.

DTU-52 8.7kW Model DTU-52/8R7PQ
**DTU-52 Series High-Power Digital TV Transmitter**

**Features**

- **Enhanced Efficiency**
  With the new PA, the DTU-52 Series enables a reduction in power consumption by an average of 20 to 30% compared to the previous model.

- **Small Footprint**
  The DTU-52 Series provides up to 8.7kW output power (average) by using 10 sets of PA units in a single rack, achieving a footprint of only 590 (W) x 2,000 (H) x 1,000 (D) mm, making it one of the smallest transmitter footprints in the world.

- **Advanced cooling system**
  With the adoption of Hybrid Closed System for cooling, there is the advantage of excellent cooling liquid exchangeability and automatic removal of air from the system when an amplifier is changed.

- **Compliant to a variety of digital terrestrial broadcasting standards**
  The DTU-52 Series is able to support a wide range of global digital standards including ATSC, DVB-T/H, ISDB-Tb, and the latest established standard - DVB-T2.

- **User friendly monitoring and control**
  Control and monitoring of the equipment is carried out via the colour LCD on the front of the rack which features an intuitive Graphic User Interface for easy maintainability.
  As an example, it is possible to monitor IM and MER without the use of measuring equipment.

- **Wide range of redundancy configuration**
  To meet customers' ever increasing demands, the DTU-52 Series can offer wide range of backup options: from redundancy only in the liquid cooling system to N+1 configurations.

- **Wide band design**
  The DTU-52 Series is designed to be frequency-agile, covering the entire UHF band and thus, no channel-specific components are required.

- **Reduced maintenance costs**
  All DTU-52 Series transmitters are produced from, and supported by, one common set of modules, resulting in reduced costs from purchase to installation and support.

**The latest in digital broadcasting technology**

**Power Amplifiers (PA)**

The newly developed UA4000QE-S power amplifier utilizes the latest high power LDMOS, realizing compact design, enhanced efficiency and producing excellent reliability.

Each PA can produce an output power of 1kW average and incorporates a switching power supply. Furthermore, it features an optimized combination of wideband matching circuits and controls.

In terms of safety features, the PA is incorporated with an RS-485 interface, enabling comprehensive monitoring and remote control functionality. With the added benefit of self-protection circuits to protect against external factors such as high temperature, reflected power, low AC voltage and internal factors such as overvoltage and over current. Additionally, the PA is equipped with RF over input protection, which has a function of protecting the PA against excessive output power produced from the exciter due to human mis-operation and from the excessive input power in case there is malfunction in the divider.

**User friendly monitoring and control**

Control and monitoring of the equipment is carried out via the colour LCD on the front of the rack which features an intuitive Graphic User Interface for easy maintainability.

As an example, it is possible to monitor IM and MER without the use of measuring equipment.

**Wide range of redundancy configuration**

To meet customers' ever increasing demands, the DTU-52 Series can offer wide range of backup options: from redundancy only in the liquid cooling system to N+1 configurations.

**Wide band design**

The DTU-52 Series is designed to be frequency-agile, covering the entire UHF band and thus, no channel-specific components are required.

**Reduced maintenance costs**

All DTU-52 Series transmitters are produced from, and supported by, one common set of modules, resulting in reduced costs from purchase to installation and support.

**Features**

- **Enhanced Efficiency**
  With the new PA, the DTU-52 Series enables a reduction in power consumption by an average of 20 to 30% compared to the previous model.

- **Small Footprint**
  The DTU-52 Series provides up to 8.7kW output power (average) by using 10 sets of PA units in a single rack, achieving a footprint of only 590 (W) x 2,000 (H) x 1,000 (D) mm, making it one of the smallest transmitter footprints in the world.

- **Advanced cooling system**
  With the adoption of Hybrid Closed System for cooling, there is the advantage of excellent cooling liquid exchangeability and automatic removal of air from the system when an amplifier is changed.

- **Compliant to a variety of digital terrestrial broadcasting standards**
  The DTU-52 Series is able to support a wide range of global digital standards including ATSC, DVB-T/H, ISDB-Tb, and the latest established standard - DVB-T2.

NEC transmitter equipment is renowned for High Reliability and Low Maintenance throughout the global broadcast community. The DTU-52 Series inherits the technological and performance advantages of the previous DTU-51 Series, which through many years of field operation, has been highly praised by our customers, and has successfully achieved two additional advantages: high efficiency and small footprint.

**NEC leads the way forward in the digital TV broadcasting industry around the world**

NEC is a leading global company which offers world-class technological solutions and resources in the broadcast market.

**The result of expertise and technologies accumulated over many years**

NEC transmitter equipment is renowned for High Reliability and Low Maintenance throughout the global broadcast community. The DTU-52 Series inherits the technological and performance advantages of the previous DTU-51 Series, which through many years of field operation, has been highly praised by our customers, and has successfully achieved two additional advantages: high efficiency and small footprint.
Exciter

The compact DM-3000 Series Digital Exciter is packed with NEC’s state-of-the-art technology. A synthesizer tuned to all UHF-band signals enables all-band direct conversion to a RF output. Higher or lower bit rates are modified to usable bit rates for flexible bit-rate adaptability. Using the MIP created by the SFN adapter, seamless ASI switching can be performed. A truly impressive characteristic of the DM-3000 Series Digital Exciter is its ability to work in conjunction with other NEC transmitters as a signal processor — which greatly reduces the necessity for spare units while simplifying maintenance.

NEC’s newly developed DM-4000A Digital Exciter for the DTU-52 Series has enabled the Worlds first DVB-T2 transmitter into live operation.

Liquid Cooling

The liquid cooling system incorporates an automatic air-purge function and an Adaptive Fault Forecast function. These features work together to cut noise and installation costs, making the maintenance easier and boosting reliability. Coolant feeding and dust removal have been greatly simplified by a hybrid closed circuit, ensuring the coolant remains clean. There are two types of cooling systems that can be selected from the transmitter models.

“S type” comes with single drive and single pump and heat exchanger. “P type” comes with dual drive and redundant pumps and heat exchangers.

Local Control/Monitoring

The easy-to-view colour LCD screen located on the front of the rack features an intuitive GUI (Graphical User Interface), making transmitter control, monitoring and maintenance extremely easy to perform. The log data not only displays changes in operational status, including faults, but also enables verification of related data in case of system failure, thereby streamlining analysis of abnormal status. Frequency settings can be conducted at the touch of a button on the colour LCD screen.

Remote Control/Monitoring

The DTU-52 Series incorporates a web server and SNMP agent, enabling the transmitter to be connected to a local area network for monitoring and control of transmitter operations via a remote PC with a web browser. Whilst also allowing a SNMP manager to monitor and control from a different location at the same time. Thus, provide a cost-efficient maintenance, whilst the transmitter is in operation and without the requirement of expensive measurement equipment.

Functionality Benefits

Adaptive Digital Corrector (ADC)

The ADC automatically generates correction factors of non-linearity distortion and updates the correction table without interrupting program service. Optimum signal quality and service coverage are maintained, protected from the effects of ambient temperature, aging and other factors. The ADC comes integrated in the DM-3000 Series Digital Exciters and can be used to generate the correction factor for preset correction. Furthermore, the ADC is capable of analyzing feedback signals from the TX output, including inter-modulation level, MER value and other graphical data. Automatic adjustment of the IMP/MER values greatly reduces the time required for maintenance.

N+1 System

The DTU-52 Series frequency-agile design, allows for the construction of an N+1 system, offering redundancy for maximized reliability and transmission time. By using the latest N+1 controller, up to 8+1 system are available. At any given time, there is a transmitter ready to be activated should one of the active transmitters malfunction. When activated, the spare transmitter adjusts its frequency band accordingly without interfering with broadcast signals.
The compact DM-3000 Series Digital Exciter is packed with NEC’s state-of-the-art technology. A synthesizer tuned to all UHF-band signals enables all-band direct conversion to a RF output. Higher or lower bit rates are modified to usable bit rates for flexible bit-rate adaptability. Using the MIP created by the SFN adapter, seamless ASI switching can be performed. A truly impressive characteristic of the DM-3000 Series Digital Exciter is its ability to work in conjunction with other NEC transmitters as a signal processor — which greatly reduces the necessity for spare units while simplifying maintenance.

NEC’s newly developed DM-4000A Digital Exciter for the DTU-52 Series has enabled the World’s first DVB-T2 transmitter into live operation.

The liquid cooling system incorporates an automatic air-purge function and an Adaptive Fault Forecast function. These features work together to cut noise and installation costs, making the maintenance easier and boosting reliability. Coolant feeding and dust removal have been greatly simplified by a hybrid closed circuit, ensuring the coolant remains clean. There are two types of cooling systems that can be selected from the transmitter models.

“S type” comes with single drive and single pump and heat exchanger. “P type” comes with dual drive and redundant pumps and heat exchangers.

The DTU-52 Series frequency-agile design, allows for the construction of an N+1 system, offering redundancy for maximized reliability and transmission time. By using the latest N+1 controller, up to 8+1 systems are available. At any given time, there is a transmitter ready to be activated should one of the active transmitters malfunction. When activated, the spare transmitter adjusts its frequency band accordingly without interfering with broadcast signals.

The easy-to-view colour LCD screen located on the front of the rack features an intuitive GUI (Graphical User Interface), making transmitter control, monitoring and maintenance extremely easy to perform. The log data not only displays changes in operational status, including faults, but also enables verification of related data in case of system failure, thereby streamlining analysis of abnormal status. Frequency settings can be conducted at the touch of a button on the colour LCD screen.

The DTU-52 Series incorporates a web server and SNMP agent, enabling the transmitter to be connected to a local area network for monitoring and control of transmitter operations via a remote PC with a web browser. Whilst also allowing a SNMP manager to monitor and control from a different location at the same time. Thus, a cost-efficient maintenance, whilst the transmitter is in operation and without the requirement of expensive measurement equipment.

The ADC automatically generates correction factors of non-linearity distortion and updates the correction table without interrupting program service. Optimum signal quality and service coverage are maintained, protected from the effects of ambient temperature, aging and other factors. The ADC comes integrated in the DM-3000 Series Digital Exciters and can be used to generate the correction factor for preset correction. Furthermore, the ADC is capable of analyzing feedback signals from the TX output, including inter-modulation level, MER value and other graphical data. Automatic adjustment of the IMP/MER values greatly reduces the time required for maintenance.

The DTU-52 Series Digital TV Transmitter is designed to provide high-quality broadcasting with advanced features. It integrates NEC’s state-of-the-art technology to ensure reliability and efficiency in broadcasting applications.

**Exciter**

The compact DM-3000 Series Digital Exciter is packed with NEC’s state-of-the-art technology. A synthesizer tuned to all UHF-band signals enables all-band direct conversion to a RF output. Higher or lower bit rates are modified to usable bit rates for flexible bit-rate adaptability. Using the MIP created by the SFN adapter, seamless ASI switching can be performed. A truly impressive characteristic of the DM-3000 Series Digital Exciter is its ability to work in conjunction with other NEC transmitters as a signal processor — which greatly reduces the necessity for spare units while simplifying maintenance.

**Functionality Benefits**

**Adaptive Digital Corrector (ADC)**

The ADC automatically generates correction factors of non-linearity distortion and updates the correction table without interrupting program service. Optimum signal quality and service coverage are maintained, protected from the effects of ambient temperature, aging and other factors. The ADC comes integrated in the DM-3000 Series Digital Exciters and can be used to generate the correction factor for preset correction. Furthermore, the ADC is capable of analyzing feedback signals from the TX output, including inter-modulation level, MER value and other graphical data. Automatic adjustment of the IMP/MER values greatly reduces the time required for maintenance.

**N+1 System**

The DTU-52 Series frequency-agile design, allows for the construction of an N+1 system, offering redundancy for maximized reliability and transmission time. By using the latest N+1 controller, up to 8+1 system are available. At any given time, there is a transmitter ready to be activated should one of the active transmitters malfunction. When activated, the spare transmitter adjusts its frequency band accordingly without interfering with broadcast signals.

**Liquid Cooling**

The liquid cooling system incorporates an automatic air-purge function and an Adaptive Fault Forecast function. These features work together to cut noise and installation costs, making the maintenance easier and boosting reliability. Coolant feeding and dust removal have been greatly simplified by a hybrid closed circuit, ensuring the coolant remains clean. There are two types of cooling systems that can be selected from the transmitter models.

“S type” comes with single drive and single pump and heat exchanger. “P type” comes with dual drive and redundant pumps and heat exchangers.

**Local Control/Monitoring**

The easy-to-view colour LCD screen located on the front of the rack features an intuitive GUI (Graphical User Interface), making transmitter control, monitoring and maintenance extremely easy to perform. The log data not only displays changes in operational status, including faults, but also enables verification of related data in case of system failure, thereby streamlining analysis of abnormal status. Frequency settings can be conducted at the touch of a button on the colour LCD screen.

**Remote Control/Monitoring**

The DTU-52 Series incorporates a web server and SNMP agent, enabling the transmitter to be connected to a local area network for monitoring and control of transmitter operations via a remote PC with a web browser. Whilst also allowing a SNMP manager to monitor and control from a different location at the same time. Thus, a cost-efficient maintenance, whilst the transmitter is in operation and without the requirement of expensive measurement equipment.

**N+1 System**

The DTU-52 Series frequency-agile design, allows for the construction of an N+1 system, offering redundancy for maximized reliability and transmission time. By using the latest N+1 controller, up to 8+1 system are available. At any given time, there is a transmitter ready to be activated should one of the active transmitters malfunction. When activated, the spare transmitter adjusts its frequency band accordingly without interfering with broadcast signals.
### DTU-52 Series High-Power Digital TV Transmitter

#### DTU-52 Series Lineup

<table>
<thead>
<tr>
<th>Type</th>
<th>Output Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>R9</td>
<td>900W</td>
</tr>
<tr>
<td>1R8</td>
<td>1.8kW</td>
</tr>
<tr>
<td>2R7</td>
<td>2.7kW</td>
</tr>
<tr>
<td>3R6</td>
<td>3.6kW</td>
</tr>
<tr>
<td>4R4</td>
<td>4.4kW</td>
</tr>
<tr>
<td>5R3</td>
<td>5.3kW</td>
</tr>
<tr>
<td>6R2</td>
<td>6.2kW</td>
</tr>
<tr>
<td>7R0</td>
<td>7.0kW</td>
</tr>
<tr>
<td>7R8</td>
<td>7.8kW</td>
</tr>
<tr>
<td>8R7</td>
<td>8.7kW</td>
</tr>
<tr>
<td>10R0</td>
<td>10.0kW</td>
</tr>
</tbody>
</table>

#### Transmitter Standard Configuration

**S Type**
- Single Transmitter with Single Drive

**P Type**
- Single Transmitter with Dual Drive and Multiple PAs

**PE**
- Single Transmitter with Dual Drive and Single PA

**Cooling Type**
- (S)Q: Single liquid cooling system
- (P)Q: Redundant liquid cooling system

#### DTU-52 Series Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>DVB-T/H</th>
<th>ATSC</th>
<th>ISDB-Tb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>900W - 10kW</td>
<td>900W - 10kW</td>
<td>600W - 7.5kW</td>
</tr>
<tr>
<td>Output Frequency</td>
<td>470 - 862 (Band IV/V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Impedance</td>
<td>50Ω</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Power Supply Voltage</td>
<td>380/400/415 V, 3-phase, 4-wire</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage Fluctuation</td>
<td>-15%, +10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Supply Frequency</td>
<td>50/60Hz ±2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
<td>Indoors: 0˚C to +45˚C or -30˚C to +40˚C (using antifreeze and 3-way valve system)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>≦ 90% (no condensation)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Standard Perfromance

**DVB-T/H**
- Frequency Stability: ≦ ±1 x 10⁻⁷/year (internal reference use) (1 ± is also possible to lock an external 10MHz reference)
- Amplitude-frequency Response: ≦ ±0.5dB (excluding BPF)
- Bandwidth: 6MHz, 7MHz, 8MHz
- Intermodulation Products: ≦ -36dB
- MER (Modulation Error Ratio): ≦ ±3dB
- SNR (Signal to Noise Ratio): ≦ 39dB
- Spurious Emission: ≦ -60dBc
- Pilot Carrier Phase Noise: ≦ -54 dBc @ 20 kHz offset

**ATSC**
- Frequency Stability: ≦ ±0.5 x 10⁻⁷/year (internal reference use) (1 ± is also possible to lock an external 10MHz reference)
- Amplitude-frequency Response: ≦ ±0.5dB (excluding BPF)
- Bandwidth: 6MHz
- Intermodulation Products: ≦ -43dB
- MER (Modulation Error Ratio): ≦ ±3dB
- SNR (Signal to Noise Ratio): ≦ 39dB
- Spurious Emission: ≦ -60dBc
- Pilot Carrier Phase Noise: ≦ -54 dBc @ 20 kHz offset
### Configuration of DTU-52 (Liquid-cooled) Series

#### DTU-52 Series Lineup

<table>
<thead>
<tr>
<th><strong>Output Power</strong></th>
<th><strong>System Type</strong></th>
<th><strong>Cooling Type</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R9</strong></td>
<td>900W</td>
<td>Single Transmitter with Single Drive</td>
</tr>
<tr>
<td><strong>1R8</strong></td>
<td>1.8kW</td>
<td>Single Transmitter with Dual Drive and Multiple PAs</td>
</tr>
<tr>
<td><strong>2R7</strong></td>
<td>2.7kW</td>
<td>Single Transmitter with Dual Drive and Single PA</td>
</tr>
<tr>
<td><strong>3R6</strong></td>
<td>3.6kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>4R4</strong></td>
<td>4.4kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>5R3</strong></td>
<td>5.3kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>6R2</strong></td>
<td>6.2kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>7R0</strong></td>
<td>7.0kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>7R8</strong></td>
<td>7.8kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>8R7</strong></td>
<td>8.7kW</td>
<td>Single Transmitter with Single Drive and Single PA</td>
</tr>
<tr>
<td><strong>10R0</strong></td>
<td>10.0kW</td>
<td>Redundant liquid cooling system</td>
</tr>
</tbody>
</table>

#### Transmitter Standard Configuration

**DTU-52 Series Specifications**

<table>
<thead>
<tr>
<th>Specification</th>
<th>DVB-T/H</th>
<th>ATSC</th>
<th>ISDB-Tb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>900W - 10kW</td>
<td>900W - 10kW</td>
<td>600W - 7.5kW</td>
</tr>
<tr>
<td>Output Frequency</td>
<td>470 - 862 (Band IV/V)</td>
<td>380/400/415 V, 3-phase, 4-wire</td>
<td></td>
</tr>
<tr>
<td>Output Impedance</td>
<td>500</td>
<td>50/uni03A9</td>
<td></td>
</tr>
<tr>
<td>Input Power Supply Voltage</td>
<td>ASI x 4</td>
<td>SMPTE310 x 2</td>
<td>0.5A x 1</td>
</tr>
<tr>
<td>Voltage Fluctuation</td>
<td>50/60Hz ±2%</td>
<td>50/uni03A9</td>
<td></td>
</tr>
<tr>
<td>Power Supply Frequency</td>
<td>380/400/415 V, 3-phase, 4-wire</td>
<td>50/60Hz ±2%</td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature Range</td>
<td>Indoors: 0˚C to +45˚C</td>
<td>Indoors: 0˚C to +45˚C</td>
<td>Indoors: 0˚C to +45˚C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>≦90% (no condensation)</td>
<td>≦90% (no condensation)</td>
<td>≦90% (no condensation)</td>
</tr>
</tbody>
</table>

**Standard Performance**

<table>
<thead>
<tr>
<th>Specification</th>
<th>DVB-T/H</th>
<th>ATSC</th>
<th>ISDB-Tb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency Stability</td>
<td>±1 x 10^{-7} /year (internal reference use)</td>
<td>±1 x 10^{-7} /year (internal reference use)</td>
<td>±1 x 10^{-7} /year (internal reference use)</td>
</tr>
<tr>
<td>Amplitude-frequency Response</td>
<td>±0.5dB(excluding BPF)</td>
<td>±0.5dB(excluding BPF)</td>
<td>±0.5dB(excluding BPF)</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>6MHz, 7MHz, 8MHz</td>
<td>6MHz</td>
<td>6MHz</td>
</tr>
<tr>
<td>Intermodulation Products</td>
<td>-36dB</td>
<td>-36dB</td>
<td>-36dB</td>
</tr>
<tr>
<td>MER(Modulation Error Ratio)</td>
<td>±32dB</td>
<td>±32dB</td>
<td>±32dB</td>
</tr>
<tr>
<td>SNR(Signal to Noise Ratio)</td>
<td>±78dB</td>
<td>±78dB</td>
<td>±78dB</td>
</tr>
<tr>
<td>Spurious Emission</td>
<td>≦-60dBc</td>
<td>≦-60dBc</td>
<td>≦-60dBc</td>
</tr>
<tr>
<td>Pilot Carrier Phase Noise</td>
<td>-104 dBc/Hz @ 20 kHz offset</td>
<td>-104 dBc/Hz @ 20 kHz offset</td>
<td>-104 dBc/Hz @ 20 kHz offset</td>
</tr>
</tbody>
</table>
Embodying a commitment to quality and eco-friendliness