



Indoor Terrestrial Transmitter / Repeater

Product Features

- Compact, self-contained cabinet
- Forced air cooling system
- Modular construction for easy maintenance
- Scalable design supporting 1 multiplex with optional hardware upgrade to 2 or 3 multiplexes
- Universal platform supports multiple waveforms
- Exciter module includes modulator/controller, upconverter, band pass filter, GPS or GPS/GLONASS receiver (optional) and DVB-S/S2 receiver (optional)
- High performance LDMOS power amplifier
- RF overdrive, high VSWR and over-temperature protection
- DVB-ASI, IP (based on Pro-MPEG Forum CoP #3), G.703/G.704, SMPTE-310M and DVB-S/S2 input interfaces supported
- Linear and Non-linear Digital Pre-correction
- Remote control and self monitoring via Web GUI
- SNMP for network management

Optional Features

- Adaptive Non-linear Pre-correction
- Output band pass filter, coupler and RF detectors
- UPS allows alarm reporting and remote access for several minutes following a power outage

Frequency Bands

1452 MHz - 1492 MHz

1610 MHz - 1675 MHz

1980 MHz - 2010 MHz

2100 MHz - 2300 MHz)

2500 MHz - 2700 MHz)

(custom frequencies available upon request)

Output Power Level

50W, 100W and 200W

(400W optional)



50W, 100W Transmitter/Repeater



200W Transmitter/Repeater

Waveforms Supported

ATSC, ATSC-M/H, CMMB, DTMB, DVB-T, DVB-T2, DVB-H, DVB-SH(A), DVB-SH(B), DAB, DAB+, T-DMB, ISDB-T/T_B and Proprietary (XM, SIRIUS, etc.)

Indoor Terrestrial Transmitter / Repeater



Transmitter/Repeater Overview

The Indoor Transmitter/Repeater cabinet includes an Exciter and High Power Amplifier (HPA), with an optional Bandpass Filter, Coupler and RF Detectors. In addition to a Modulator, the Exciter system includes an internal Upconverter, Controller, optional GPS Receiver and optional DVB-S/S2 Receiver.

The Universal Exciter can receive a structured MPEG-2 TS, CMMB multiplex stream or ISDB-T/T_B multiplexed TS on its ASI inputs. G.703/G.704 inputs are used in DAB mode and accept either NA or NI signals. Optionally, two serial SMPTE-310M inputs can be supplied. The Exciter is also accepts an IP encapsulated MPEG-2 structured Transport Stream on the RJ-45 Ethernet port. The IP input is protected using an MPEG PRO CoP #3 FEC / SMPTE 2022 protocol.

The Exciter modulator board converts the digital ASI, NA, NI or IP input stream into a digital waveform and creates a single analog RF output suitable for amplification in the Power Amplifier (PA). The coding and modulation of the data depends on the selected waveform.

The System Controller supports transmitter/repeater operation, configuration, management and status reporting. The site control includes power up, power down, RF control processes, control commands for status requests and operating parameters, etc.

The transmitter/repeater identity (name, password, local IP address, SNMP, etc.) can be configured remotely or locally. Remote upgrade of the transmitter/repeater software is supported.

The Exciter supports a web interface (Web GUI) for its user interface and is responsible for software and configuration management. Remote control of the transmitter/repeater is typically managed via an SNMP agent.

The GPS or GPS/GLONASS Receiver, located in the exciter chassis, supplies 10 MHz and 1PPS for synchronization purposes.

The DVB-S/S2 receiver demodulates an incoming satellite signal and provides an output ASI signal.

The PA is designed to operate as a final amplification stage for the indoor transmitter/repeater system. It amplifies the Exciter output signal to a power level of 50, 100 or 200 Watts, while maintaining acceptable output emission levels.

The PA architecture is based on a solid state design operating in the Class A/AB linear mode and is fully protected against input overdrive, overheating and output load VSWR conditions. The protection circuits are all self-correcting, allowing restoration of the amplifier to the normal operational state upon removal of the fault condition.

The Output Bandpass Filter is constructed using high performance dielectric resonator (DR) coupled cavities. The DR design minimizes the size and weight of the filter, while maintaining low insertion loss and providing high rejection of out-of-band components.

The Output Coupler provides sample ports for output signal level control and monitoring. It employs coaxial air line design for low losses and high directivity. **The RF Detectors** provide accurate forward and reverse RMS power level measurements from the Output Coupler. The power level measurement is waveform and temperature independent.

Digital Linear and Non-linear Pre-correctors (pre-distorters) significantly improve the performance of the Power Amplifier. The Non-linear pre-corrector compensates for the HPA non-linearity and is able to provide separate adjustment for the low and high frequency shoulders of the wide channel spectrum. The Linear pre-corrector compensates for the the group delay created by an output filter.

The Adaptive Non-linear Pre-corrector is a superior pre-distortion solution that compensates for RF Power Amplifier non-linearities including AM/AM and AM/PM distortion and protects against IMD and spectral regrowth while maximizing EVM performance. The complex signal processing is done in the RF domain and supports a fully adaptive operation: the feedback signal (HPA output) is compared to the exciter's RF output signal (HPA input) in order to optimize the correction which will improve the shoulders of the RF output.

An optional UPS (80 Watt / 450 VA) is intended to supply backup power to the Exciter. This will ensure site monitoring will continue during a power outage as well as signal generation to ensure a fast recovery time once power is restored. The HPA includes redundant power supplies.



200W Transmitter/Repeater with Additional multiplexes (Exciters) and UPS



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Indoor Terrestrial Transmitter / Repeater

Product Specifications

Control Interfaces

Front Panel	LCD display and cursor/ execute keys
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D (M)
RS485 Interface	Connector: 9-pin SUB-D (F)
I/O Interface	Connector: 9-pin SUB-D (F)
Web GUI	Internet Explorer, Firefox, etc. Connector: Ethernet
CLI (Command Line)	Connector: USB (Hyperterminal) or Ethernet (HyperTerminal and Telnet)
SNMP Control Interface	Ethernet 10/100/1000 Base-T MIBs are provided
Alarm Relays	Connector: RS232, RS485 and I/O 2 Dry Contact Alarm relays, triggered by any major alarm

Exciter Inputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
SMPTE-310M	2x BNC (F), 75 Ω (optional)
GbE Transport Stream (DAB and DVB-T2 excluded)	Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45

Exciter Monitoring Outputs

DVB-ASI	2x BNC (F), 75 Ω
G.703/G.704	2x BNC (F), 50 Ω
RF Monitor	SMA (F), 50 Ω
Reference Monitor	BNC (F), 50 Ω Frequency: 10 MHz Level: 2 Vpp
10 MHz (Clock Reference) (Note 1)	BNC (F), High Impedance Level: 10dBm \pm 2.5 dB sinewave
1PPS (Time Reference) (Note 1)	BNC (F), High Impedance Level: TTL Trigger: Positive transition

Amplifier RF Output

Output Frequency:	TBD
Connector	N-type (F), 50 Ω or 7/16" DIN (F), 50 Ω
Digital Average Output Power	50W, 100W or 200W
Gain Variation over Temperature	$\leq \pm 1$ dB
Gain Variation over the Signal BW	≤ 0.5 dB
In-band IMD	≤ -27 dBc (without pre-correction)
Spectral Regrowth (at rated output power)	≤ -30 dBc (without pre-correction) ≤ -36 dBc (with pre-correction)
Frequency Stability	Internal reference 0.3ppm / or in accordance with external ref. accuracy

Exciter RF Output

Spectrum Polarity	Inverted or non-inverted, selectable
Level	-10 dBm to 0 dBm in 0.1 dB step
Level Stability	± 0.3 dB
Return Loss	> 20 dB
Shoulder Level	< -50 dBc
Spurious Level Outside Channel	< -60 dBm
MER	≥ 45 dB ≥ 45 dB (DVB-T2)
Amplitude Flatness Center frequency ± 3.8 MHz:	± 0.3 dB
Group delay response: Center frequency ± 3.8 MHz:	± 10 ns
Phase Noise SSB (measured @ 474 MHz)	10 Hz: < -60 dBc/Hz 100 Hz: < -85 dBc/Hz 1 kHz: < -100 dBc/Hz 10 kHz: < -105 dBc/Hz 100 kHz: < -120 dBc/Hz 1 MHz: < -135 dBc/Hz

Note 1: The 10MHz and 1PPS connectors are inputs, except when the exciter is equipped with an internal GPS receiver. In this case, the 10MHz and 1PPS connector become monitoring outputs (high impedance).

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Product Specifications

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/VI
Amplitude Scale	Linear and Logarithmic
Correction Points	Max. 256, user-defined position
Spectral Regrowth Reduction	Max. 12 dB, subject to available headroom
Phase Correction	-6 to +30 degrees, subject to available headroom

Linear Pre-Correction

Correction Points	61
Point Spacing	1/60 of nominal spectrum BW
Amplitude Correction	±10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	±2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Adaptive Non-linear Pre-Correction

HPA FB Connector	To be coupled from the PA output when the Adaptive Pre-corrector is used
Frequency	470 - 860 MHz 1600 MHz - 2800 MHz
Spectral Regrowth Reduction	7 dB ±2 dB (Note 2)

Note 2: Greater improvement is possible under particular conditions. Performance depends upon power level, frequency and waveform.

Power Supply (50W Transmitter/Repeater)

Voltage	100 – 240 VAC
Frequency	50 – 60 Hz
Power Consumption	400 W (S-Band), 800 W (MMDS)

Power Supply (100W Transmitter/Repeater)

Voltage	100 – 240 VAC
Frequency	50/60 Hz
Power Consumption	1 kW (S-Band), 1.5 kW (MMDS)

Power Supply (200W Transmitter/Repeater)

Voltage	198 – 242 VAC (220 VAC ±10%)
Frequency	50/60 Hz
Power Consumption	1.9 kW (typical)

Mechanical (50W and 100W Transmitter/Repeater)

Dimensions (W x H x D)	59 cm x 49.3 cm x 66 cm (23.2" x 19.4" x 26.0")
Weight (with 1 Exciter, no BPF, no UPS)	50 – 60 kg (110 – 132 lbs.)
Weight (with 1 Exciter, BPF and UPS)	70 – 80 kg (154 – 176 lbs.)

Mechanical (200W Transmitter/Repeater)

Dimensions (W x H x D)	59 cm x 79.1 cm x 84.2 cm (23.2" x 31.4" x 33.2")
Weight (with 1 Exciter, no BPF, no UPS)	107 kg (236 lbs.)
Weight (with 1 Exciter, BPF and UPS)	127 kg (280 lbs.)

Environmental

Operating Temperature	+0° C to +50° C (+32° F to +122° F)
Storage Temperature	-30° C to +65° C (-22° F to +149° F)
Relative Humidity	max. 95%, non condensing
Cooling	Forced air



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Indoor Terrestrial Transmitter / Repeater

Product Specifications

GPS Receiver

Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 1575.42 MHz
12 Parallel Channels	C/A code (1.023 MHz chip rate) Code plus carrier tracking (carrier aided tracking)
Tracking Capability	12 simultaneous satellite vehicles
Acquisition Time (Time To First Fix, TTFF)	< 15 seconds typical TTFF-hot (with current almanac, position, time and ephemeris) < 150 seconds typical TTFF-cold (no stored information)
Positioning Accuracy	< 5 m, 1 – sigma < 10 m, 2 – sigma
Timing Accuracy	< 2 ns, 1 – sigma < 6 ns, 6 – sigma
Holdover Time	± 1 usec during 2 hours
10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ± 2.5 dBm, sine wave Harmonic Level: -40 dBc max.
Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

DVB-S/S2 Receiver

Input Connector	VSAT Antenna: F-type (F), 75 Ω
Input Frequency	Range 950 MHz - 2150 MHz
Input Signal Level	-65 dBm to -25 dBm
Modulation Type	QPSK, 8PSK
FEC	DVB-S and DVB-S2 compliant
Symbol Rate	1 - 45 Mbaud
Output Connectors	2 DVB-ASI outputs: BNC (F), 75 Ω

GPS/GLONASS Receiver

Input Connector	F-type (F), 75 Ω 5 Vdc biased
Recommended Antenna	Bullet III GPS antenna – Trimble model no. 57860-10 or equivalent
Receiver Architecture	L1 - 1575.42 MHz / GLONASS - L1 frequency range
32 Parallel Channels	GPS C/A code (1.023 MHz chip rate) / GLONASS PT code - WASS / EGNOS Code plus carrier tracking (carrier aided tracking)
Tracking Capability	24 simultaneous satellite vehicles
Acquisition Time (Time To First Fix, TTFF) (Tested at -40°C to +85°C)	< 15 s typical TTFF-hot (with current almanac, position, time and ephemeris) < 40 s typical TTFF-warm (with current almanac, position, time) < 150 s typical TTFF-cold (No stored information)
Positioning Accuracy	GPS: < 10m / 20m GLONASS: < 10 m / 20m
Timing Accuracy 1PPS + 10MHz	< 100 ns
Holdover Time	≤ 2.5 μ sec during 2 hours
10 MHz Output Signal	Internally connected to the exciter input Level: 10 dBm ± 2.5 dBm, sine wave Harmonic Level: -30 dBc max.
Phase Noise:	1 Hz: < -75 dBc/Hz 10 Hz: < -110 dBc/Hz 100 Hz: < -125 dBc/Hz 1 kHz: < -135 dBc/Hz 10 kHz: < -155 dBc/Hz 100 kHz: < -155 dBc/Hz
1PPS Output Signal	Internally connected to the modulator input Level: TTL

UPS

Height	1RU
Power	280 Watts / 450 VA
Backup Time	10 Minutes (Exciter Only)



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Part Number Configuration



Band
 YL – L-Band
 YS – S-Band
 YC – C-Band
 YX – X-Band
 KU – Ku-Band
 KA – Ka-Band

Output Power
L-Band
 0250W,0500W
S-Band
 0150W, 0300W
C-Band
 0010W, 0020W, 0040W,
 0080W,0100W, 0150W,0200W,
 0250W,0300W, 0325W,0400W,
 0650W,0800W
X-Band
 0275W, 0550W
Ku-Band
 0060W,
 0080W,0100W, 0150W,0200W,
 0300W,0400W, 0800W,
Ka-Band
 TWTA, UP TO 1.5KW
 AVAILABLE PLEASE CALL FOR INQUIRY
FOR HIGH POWER 1KW AND ABOVE PLEASE CONTACT OUR SALES DEPARTMENT

Sub Band
L-Band
 A (1.0-2.0 GHz)
 B (1.5-3.0 GHz)
 C (1.0- 2.5 GHz)
S-Band
 A (2.02-2.12 GHz)
 B (2.20-2.30 GHz)
C-Band
 A (5.850-6.425 GHz)
 B (5.750-6.475 GHz)
 C (5.750-6.670 GHz)
 D (5.850-6.725 GHz)
 E (6.425-6.725 GHz)
 F (6.725-7.025 GHz)
X-Band
 A (7.70-8.40 GHz)
 B (7.90-8.40 GHz)
 C (7.50-8.50 GHz)
 D (9.50-10.50 GHz)
Ku-Band
 A (14.00-14.50 GHz)
 B (13.75-14.50 GHz)
 C (12.75-13.25 GHz)
 D (13.00-14.50 GHz)
 E (13.25-13.75 GHz)
Ka-Band
 A (27.5-31.0 GHz)

Configuration/Options
 STD – Standard
 ISP – Input Sample Port
 WGF* – 90° Output W/G Flange
 WSP* – 90° Output W/G Flange with Input Sample Port
 FPS** – Front Panel Power Switch
 RPM – Reflected Power Monitor
 FRM** – Front Panel Power Switch and Reflected Power Monitor
 EPS – External, Redundant Power Supply, 1RU N+1
 EPE – External Power Supply, 1RU N+1 and Rear Panel
 * Available in all but S-Band-and L-Bands
 ** Not Available with External 1RU N+1 Redundant Power Supply

Block Up Converter
 B - BUC
 X – Not Available

Enclosure
 I - Indoor
 O - Outdoor