

## 120W UHF Transmitter/Repeater

Model: DTX 1200U

### Product Features

- 470 MHz - 860 MHz Broadband Transmitter/Repeater
- LDMOS Power Amplifier provides 120 Watt output for ATSC, ATSC-M/H, DVB-T/H, ISDB-T/T<sub>B</sub>, CMMB and DTMB waveforms
- SFN and MFN support
- Adaptive Non-linear Pre-corrector
- Manual Linear and Non-linear Digital Pre-correctors
- Touch screen display for real time user interface
- Remote control and self monitoring via Ethernet and RS485 interfaces
- Built in web server accessible through Ethernet connector with Internet Explorer
- Remotely manageable via SNMP
- GbE Transport Stream Input based on Pro-MPEG Forum CoP #3
- Occupying only 3 RU of standard 19" cabinet space



### Optional Features

- Integrated GPS Receiver
- Integrated DVB-S/S2, DVB-T/H or ISDB-T/T<sub>B</sub> Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors

### Product Description

The DTX 1200U is a compact, solid-state transmitter, designed for digital terrestrial television broadcasting over a UHF frequency range of 470 MHz to 860 MHz.

Using the latest technology, the DTX 1200U converts an input transport stream (MPEG-2, CMMB Multiplex or ISDB-T/T<sub>B</sub> Multiplex) to a COFDM or 8VSB modulated RF signal. UBS has developed a Direct Digital Synthesis (DDS) process that allowing the Universal Modulator board to provide the amplifier portion of the transmitter with an RF signal.

The modulator board RF output is amplified to a digital average output power level of 120 Watts by a highly efficient power amplifier, built using LD-MOS transistor technology. The power level stability at the transmitter's RF output is maintained by an internal automatic level control loop.

The PA employs its own microcontroller, which monitors the operation parameters of the PA, provides protection against abnormal operation conditions and communicates with the system controller.

The Adaptive 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 manual Linear and Non-linear Digital Pre-correctors can also be used to maximize transmitter performance.

With the addition of an integrated DVB-S/S2 Receiver, DVB-T/H Receiver or ISDB-T/T<sub>B</sub> Receiver, the DTX 1200U can be configured as a terrestrial repeater. The input data stream is received and re-broadcast as a COFDM or 8VSB waveform.

The transmitter's operational parameters are monitored and controlled by an embedded system controller that can be accessed from the front panel touch screen LCD or by using one of the remote control interfaces (Ethernet, SNMP, USB or RS232).

Optionally, the DTX 1200U RS232 interface can be dedicated for communication with a 3rd party UPS. In this case, the transmitter is configured with an extra set of SNMP parameters and will actively monitor the UPS.

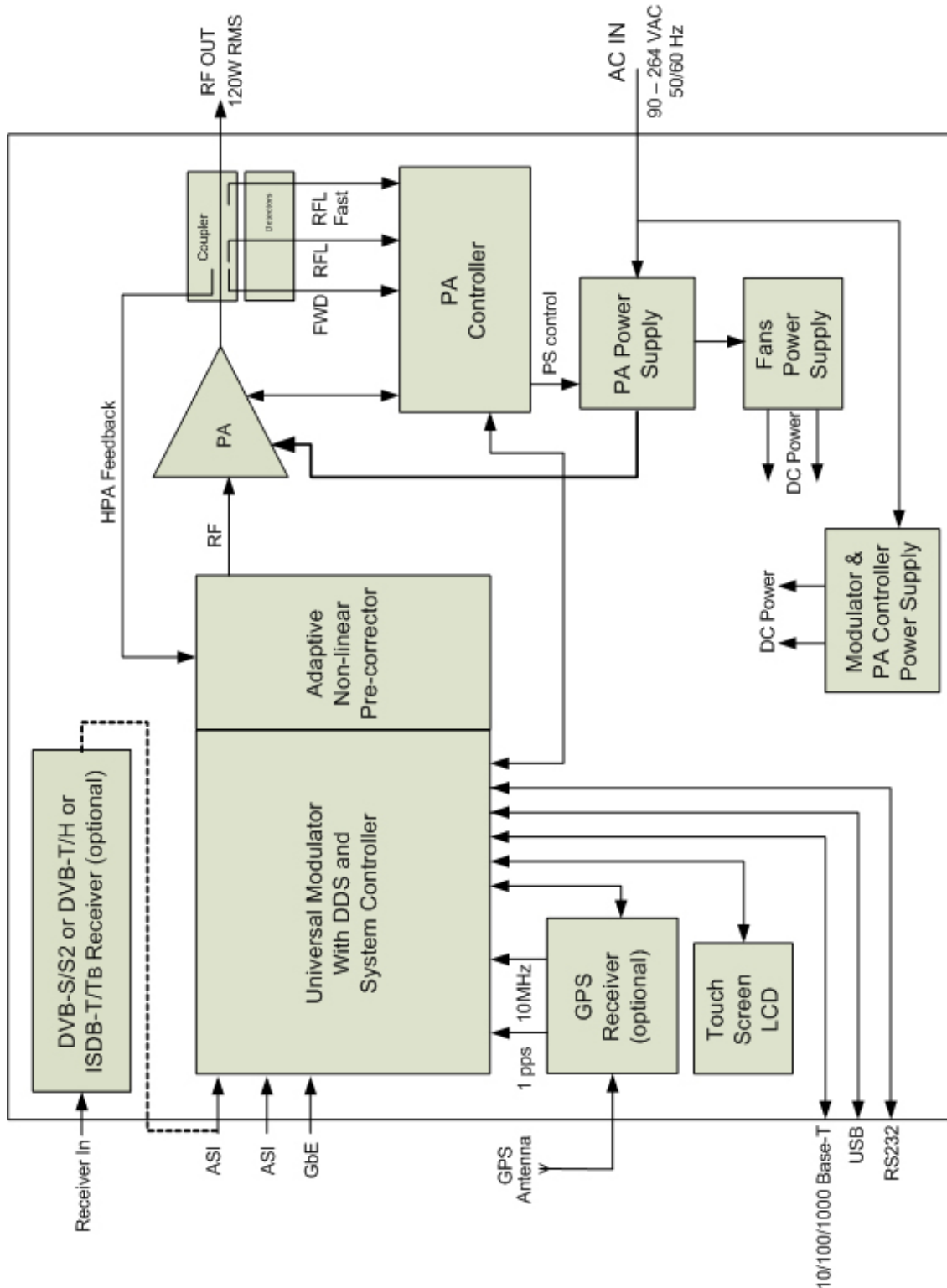
All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3"RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

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## Block Diagram (specifications are subject to change without notice)

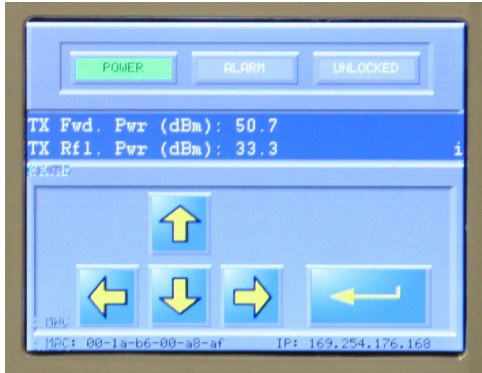




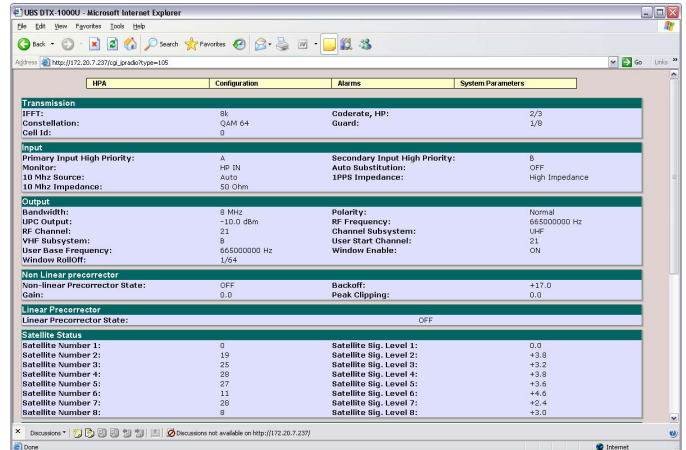
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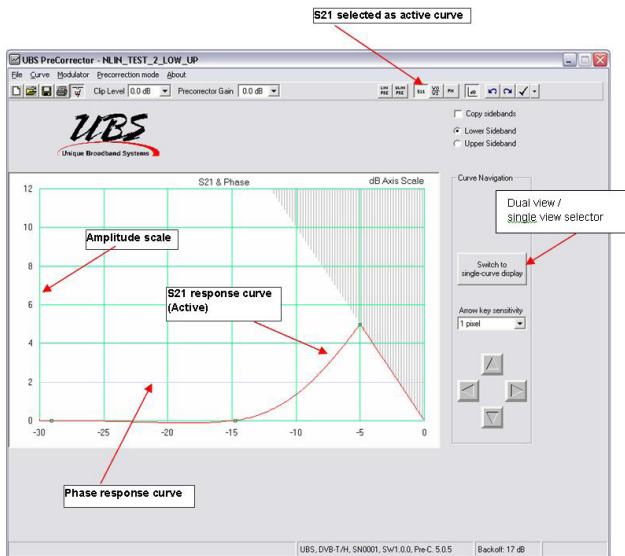
## Control Interfaces (specifications are subject to change without notice)



Touch Screen LCD



Web Interface



Manual Non-Linear Pre-Corrector - Dual View, S21 (active) and Phase

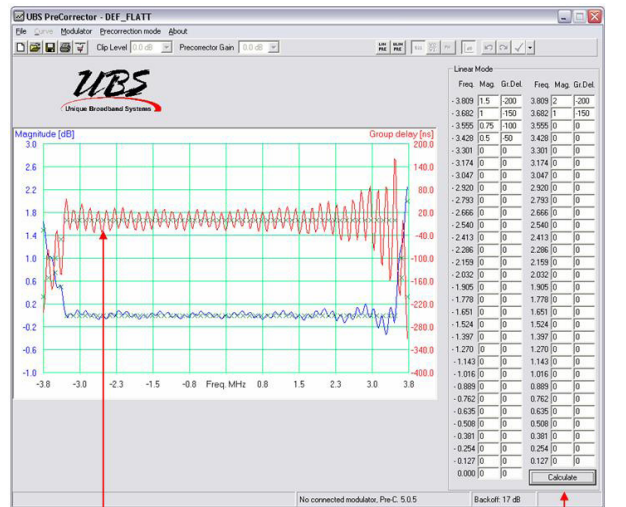


Figure 4-15 Curve Calculation

Graphic representation of the calculated curves

Start calculation

Manual Linear Pre-Corrector Screen

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Unique Broadband Systems Ltd.



Rear Panel

### Product Specifications (specifications are subject to change without notice)

#### Modulator Inputs

<b>DVB-ASI</b>	<b>IN-A, IN-B</b>	2 DVB-ASI inputs: BNC (F), 75 $\Omega$
<b>SMPTE-310M</b>	<b>IN-A, IN-B</b>	2 inputs (optional): BNC (F), 75 $\Omega$
<b>GbE Transport Stream (DVB-T/H mode only)</b>		Protocol: Pro-MPEG CoP #3 Connector: RJ45
<b>Clock Reference - 10 MHz (Note 1)</b>		Connector: BNC (F) Frequency: 10 MHz Level: 100 mV - 3 Vpp Impedance: 50 $\Omega$
<b>Time Reference - 1 PPS (Note 1)</b>		Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 $\Omega$

#### Modulator Outputs

<b>DVB-ASI</b>	<b>OUT-A, OUT-B</b>	2 DVB-ASI outputs: BNC (F) 75 $\Omega$
<b>IF Output</b>		Connector: BNC (F), 50 $\Omega$ Level: -30 dBm $\pm$ 2.0 dB
<b>Modulator RF Monitor</b>		Connector: SMA (F), 50 $\Omega$ Level: 30 dB below RF output
<b>Clock Reference - 10 MHz (Note 1)</b>		Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, $\pm$ 2.5 dB sinewave
<b>Time Reference - 1 PPS (Note 1)</b>		Connector: BNC (F), High Impedance Frequency: 1 PPS Level: TTL Trigger: Positive transition

**Note 1:** The "10MHz" and "1pps" are inputs, except in the units equipped with internal GPS receivers, where they become Monitoring Outputs (high impedance).

#### Power Amplifier RF Output

<b>RF Output Connector</b>	7/16 DIN-type (F), 50 $\Omega$
<b>Operating Frequency Range</b>	470 MHz - 860 MHz (Note 2)
<b>Frequency Setting Accuracy</b>	1 Hz step over entire operation range
<b>Frequency Stability</b>	1ppm internal, or in accordance with external GPS accuracy
<b>Phase Noise SSB</b>	100 Hz: < -80 dBc/Hz 1 kHz: < -85 dBc/Hz 10 kHz: < -95 dBc/Hz 100 kHz: < -120dBc/Hz
<b>Digital Average Output Power</b>	120 Watts
<b>Output Power Set Point Range</b>	10 dB
<b>Output Power Level Accuracy</b>	$\leq \pm 0.25$ dB
<b>Output Level Stability vs. time</b>	$\leq \pm 0.25$ dB/24 hrs max.
<b>In-band IMD</b>	$\leq -27$ dBc
<b>Spectral Regrowth</b>	$\leq -30$ dBc (at rated output power, without pre-correction) $\leq -36$ dBc (at rated output power, with adaptive and digital pre-correction)
<b>Output Spurious Level</b>	$\leq -60$ dBc
<b>Output Harmonics</b>	$\leq -60$ dBc (with output filter)
<b>Out-of-Band Emissions</b>	Compliant to FCC Part 27 [27.50(F)] requirements when using external mask filter
<b>RF Monitor</b>	Connector: N-type (F), 50 $\Omega$ Level: 51 dB below the RF output

**Note 2:** The DTX 1200U is designed to support the entire UHF range of 470 MHz to 860 MHz, however, each DTX 1200U is factory configured and aligned to operate on a specific RF channel. The RF output frequency is indicated on a label placed near the RF output connector and it is also displayed on the control modulator front panel. Administrative access is required to change the frequency through the Web Interface.



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## Product Specifications (specifications are subject to change without notice)

### Control Interfaces

<b>Front Panel</b>	Touch screen LCD
<b>USB Interface</b>	Connector: USB Type 2 Protocol: Interactive CLI commands
<b>RS232 Interface</b>	Connector: 9-pin SUB-D Male
<b>RS485 Interface</b>	2 Connectors: 9-pin SUB-D Female The modulator RS485 interface must be connected to the amplifier RS485 interface for control of the amplifier
<b>HPA Relay</b>	Connector: 9-pin SUB-D Male 2 Dry Contact Alarm relays Triggered by any major alarm
<b>Modulator Alarm Relays</b>	2 Dry Contact Alarm relays Triggered by any major alarm Contacts available on the RS232 connector
<b>Web Interface</b>	Internet Explorer 6.0+ Ethernet 10/100/1000 Base-T 2 Connectors: RJ45
<b>SNMP Control Interface</b>	Ethernet 10/100/1000 Base-T 2 Connectors: RJ45 MIBs are provided

### Power Supply

<b>Voltage</b>	90 - 264 VAC
<b>Frequency</b>	50/60 Hz
<b>Power Consumption</b>	max. 1000 Watts

### Mechanical

<b>Size</b>	3 U of 19" wide cabinet
<b>Dimensions (W x H x D)</b>	483mm x 133 mm x 554mm (19" x 5.25" x 21.82")
<b>Weight</b>	25 kg (55 lbs.)

### Environmental

<b>Operating Temperature</b>	0° C to +50° C (+32° F to +122° F)
<b>Storage Temperature</b>	-30° C to +70° C (-22° F to +158° F)
<b>Relative Humidity</b>	max. 95%, non condensing
<b>Cooling</b>	Forced air

### Adaptive Non-linear Pre-correction

<b>Frequency</b>	470 MHz to 860 MHz
<b>Spectral Regrowth Reduction</b>	7 dB $\pm$ 2 dB (Note 3)

### Manual Digital Pre-Correction

#### Non-Linear Pre-Correction

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

#### Linear Pre-Correction

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

**Note 3:** Greater improvement is possible under particular applications. Performance depends upon power level and waveform.



## 120W UHF Transmitter/Repeater

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### Product Specifications for Option Features (specifications are subject to change without notice)

#### Transport Stream Output

**Receiver ASI Output Connector** 2x BNC (F), 75  $\Omega$   
The receiver ASI output connector (1 or 2) must be connected to the DVB-ASI input connector (IN A or IN B) when a receiver is installed.

#### DVB-S/S2 Receiver

**Input Connector** F-type (F), 75  $\Omega$   
**Frequency Range** 950 MHz - 2150 MHz  
**Input Signal Level** -65 dBm to -25 dBm  
**LNB Voltage** 12 to 18 VDC  
**LNB Current** Two selectable output current limits: 450 mA / 750 mA  
**LNB Communication** Integrated DisEqC controller  
**Data Rate** 1 - 45 Mbps

#### Multistandard Demodulation

**Legacy DVB-S and DIRECTV** QPSK  
**DVB-S2** QPSK, 8PSK  
DVB-S2 Pilot processing

#### Multistandard Decoding

**Legacy DVB-S and DIRECTV**

- Viterbi soft decoder rate 1/2
- Puncture rates 1/2, 2/3, 3/4, 5/6, 6/7, 7/8
- Outer Reed-Solomon decoder as for DVB-S system
- Energy dispersal descrambler

**DVB-S2**

- LDPC and BCH decoder as for DVB-S2 requirements
- Supported rates: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10, as for DVB-S2 standard

#### DVB-T/H Receiver

**Input Connector** F-type (F), 75  $\Omega$   
**Frequency Range** 470 MHz - 860 MHz  
**Level** -80 dBm to -20 dBm

#### Demodulation and Decoding

**Supported Modes** IFFT: 2k, 4k, 8k  
**Guard Intervals** 1/4, 1/8, 1/16, 1/32  
**Code Rates** 1/2, 2/3, 3/4, 5/6, 7/8  
**Constellations** QPSK, 16-QAM, 64-QAM  
**Hierarchical Modes** Alpha - 1, 2 and 4 for 16-QAM and 64-QAM  
**Bandwidth** 8 MHz, 7 MHz, 6 MHz, 5 MHz

#### GPS Receiver

**Input Connector** F-type (F), 75  $\Omega$   
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**  $\pm 1$  usec during 2 hours  
**10 MHz Output Signal** Internally connected to the modulator input  
Level: 10 dBm  $\pm 2.5$  dBm, sine wave  
Harmonic Level: -40 dBc max.  
Phase Noise: 1 Hz: < -80 dBc/Hz  
10 Hz: < -115 dBc/Hz  
100 Hz: < -135 dBc/Hz  
1 kHz: < -145 dBc/Hz  
10 kHz: < -155 dBc/Hz  
100 kHz: < -155 dBc/Hz  
**1PPS Output Signal** Internally connected to the modulator input  
Level: TTL

#### ISDB-T/T<sub>B</sub> Receiver

**Input Connector** F-type (F), 75  $\Omega$   
**Frequency Range** 470 MHz - 860 MHz  
**Level** -80 dBm to -20 dBm

#### Demodulation and Decoding

**Supported Modes** IFFT: 2k, 4k, 8k  
**Guard Intervals** 1/4, 1/8, 1/16, 1/32  
**Code Rates** 1/2, 2/3, 3/4, 5/6, 7/8  
**Constellations** QPSK, 16-QAM, 64-QAM, DQPSK  
**Hierarchical Modes** up to 3 layers  
**Time Interleaver** 0 to 16  
**Bandwidth** 5.6 MHz