

250W UHF Transmitter/Repeater

Model: DTX 2500U

Product Features

- 470 MHz - 860 MHz Broadband Transmitter/Repeater
- LDMOS Power Amplifier provides 250 Watt output for ATSC, ATSC-M/H, CMMB, DTMB, DVB-T/H, DVB-T2, DVB-SH, ISDB-T/T_B, DAB, DAB+ and T-DMB 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 / SMPTE 2022
- Occupying only 3 RU of standard 19" cabinet space



Optional Features

- Integrated GPS or GPS/GLONASS Receiver
- Integrated DVB-S/S2 Receiver
- Adaptive Linear and Non-linear Digital Pre-correctors

Product Description

The DTX 2500U 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 2500U converts an input transport stream (MPEG-2, CMMB Multiplex or ISDB-T/T_B 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 250 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, the DTX 2500U 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 2500U 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.

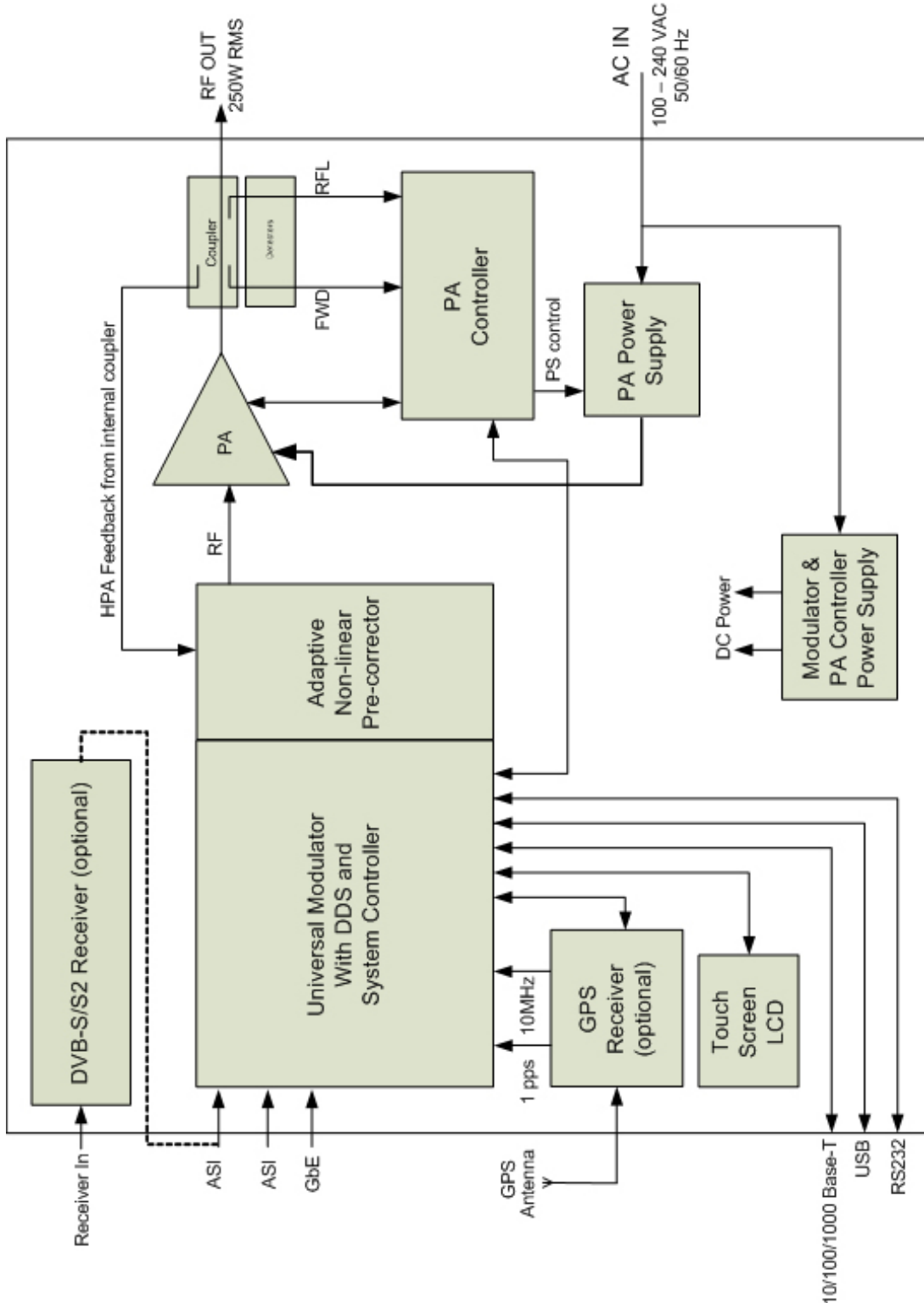
All of the transmitter's components are enclosed in a standard 19" rack mount chassis, occupying only 3 "RU" of cabinet space. The transmitter is forced air cooled using two compact high performance fans, which are installed on the transmitter enclosure front panel.

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Block Diagram

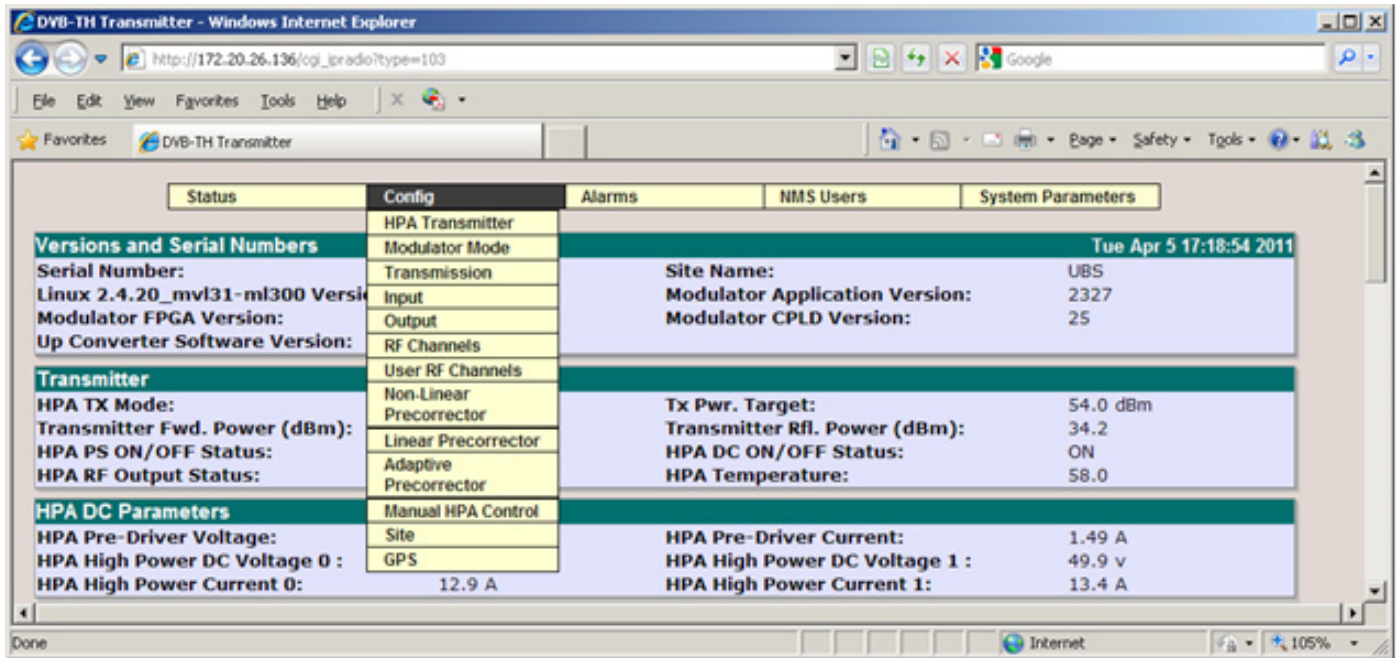




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Control Interfaces



Web Interface



Touch Screen LCD

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Rear Panel

Product Specifications

Modulator Inputs

DVB-ASI	IN-A, IN-B	2 DVB-ASI inputs: BNC (F), 75 Ω
SMPTE-310M	IN-A, IN-B	2 inputs (optional): BNC (F), 75 Ω
GbE Transport Stream (DAB and DVB-T2 excluded)		Protocol: Pro-MPEG CoP #3 / SMPTE 2022 Connector: RJ45
HPA FB		SMA (F), 50 Ω Level: -15 dBm to 0 dBm
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F) Frequency: 10 MHz Level: 0 dBm to 15 dBm Impedance: 50 Ω
Time Reference - 1 PPS (Note 1)		Connector: BNC (F) Frequency: 1 PPS Level: TTL Trigger: Positive transition Impedance: 50 Ω

Modulator Outputs

DVB-ASI	OUT-A, OUT-B	2 DVB-ASI outputs: BNC (F) 75 Ω
Modulator RF Monitor		Connector: SMA (F), 50 Ω Level: 30 dB below RF output
Clock Reference - 10 MHz (Note 1)		Connector: BNC (F), High Impedance Frequency: 10 MHz Level: 10 dBm, ± 2.5 dB sinewave
Time Reference - 1 PPS (Note 1)		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

RF Output Connector	7/16 DIN-type (F), 50 Ω
Operating Frequency Range	470 MHz - 860 MHz (Note 2)
Frequency Setting Accuracy	1 Hz step over entire operation range
Frequency Stability	1ppm internal, or in accordance with external GPS accuracy
Digital Average Output Power	250 Watts
Output Power Set Point Range	10 dB
Output Power Level Accuracy	≤ ±0.25 dB
Output Level Stability vs. time	≤ ±0.25 dB/24 hrs max.
In-band IMD	≤ -29 dBc
Spectral Regrowth	≤ -32 dBc (at rated output power, without pre-correction) ≤ -40 dBc (at rated output power, with adaptive non-linear pre-correction)
Output Spurious Level	≤ -60 dBm
Output Harmonics	≤ -60 dBc (with output filter)
Out-of-Band Emissions	Compliant to FCC Part 27 [27.50(F)] requirements when using external mask filter
RF Monitor	Connector: SMA (F), 50 Ω Level: 53 dB below the RF output

Note 2: The DTX 2500U is designed to support the entire UHF range of 470 MHz to 860 MHz, however, each DTX 2500U 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

Control Interfaces

Front Panel	Touch screen LCD
Ethernet Interface	Connector: 2x RJ45 Speed: 10/100/1000 Base-T
USB Interface	Connector: USB Type B
RS232 Interface	Connector: 9-pin SUB-D Male
RS485 Interface	2 Connectors: 9-pin SUB-D Female The modulator RS485 interface is used for control of the amplifier
Web Interface	Internet Explorer, Firefox, etc. Connector: Ethernet
SNMP Control Interface	Connector: Ethernet Note: MIBs are provided
CLI (Command Line Interface)	Connector: USB (HyperTerminal) or Ethernet (HyperTerminal and Telnet)
Alarm Relays	Connector: RS232 2 Dry Contact Alarm relays, triggered by any major alarm.

Adaptive Non-linear Pre-correction

HPA FB Connector	Connected to the PA output monitoring port when the Adaptive Pre-corrector is used
Frequency	470 MHz to 860 MHz
Spectral Regrowth Reduction	7 dB \pm 2 dB (Note 3)

Manual Digital Pre-Correction

Non-Linear Pre-Correction

Curve Formats	S 21 and VO/M
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	\pm 10 dB
Amplitude Resolution	0.01 dB
Group Delay Correction	\pm 2000 ns
Group Delay Resolution	1 ns
Peak Power Clip Level	+17 dB to +7 dB (peak power relative to average RMS level)

Power Supply

Voltage	100 - 240 VAC
Frequency	50/60 Hz
Power Consumption	max. 1500 Watts
Fuse	15A, 250V @ 110 VAC 10A, 250V @ 240 VAC

Mechanical

Size	3 U of 19" wide cabinet
Dimensions (W x H x D)	48.26 cm x 13.28 cm x 63.88 cm (19" x 5.23" x 25.15")
Weight	22 kg (48.5 lbs.)

Environmental

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

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

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Product Specifications for Optional Features

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 modulator 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

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	< 100 ns
1 PPS + 10 MHz	
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 exciter input Level: TTL



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Product Specifications for Optional Features

DVB-S/S2 Receiver Input

Input Connector	F-type (F), 75 Ω
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	Up to 45 Mbaud

DVB-S Demodulation and Decoding

DVB-S	EN 300 421
Constellation	QPSK
Outer FEC	Reed Solomon
Inner FEC	Viterbi
Code Rate	1/2, 2/3, 3/4, 5/6, 6/7, 7/8
Roll Off	0.35

DVB-S2 Demodulation and Decoding

DVB-S2	EN 302 307
Constellation	QPSK, 8PSK
Outer FEC-BCH	nldpc = 64800 (Long)
Inner FEC-LDPC	QPSK - 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10 8PSK - 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
DVB Modes	CCM (Constant Coding and Modulation)
Roll Off	0.20, 0.25, 0.35
Pilot Processing	Yes

DVB-S/S2 Transport Stream Output

Receiver ASI Out (1, 2)	Connector: 2x BNC (F), 75 Ω The DVB-S/S2 receiver ASI output connector (1 or 2) must be connected to the DVB-ASI input connector (IN A or IN B).
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