

POWER IN THE AIR!



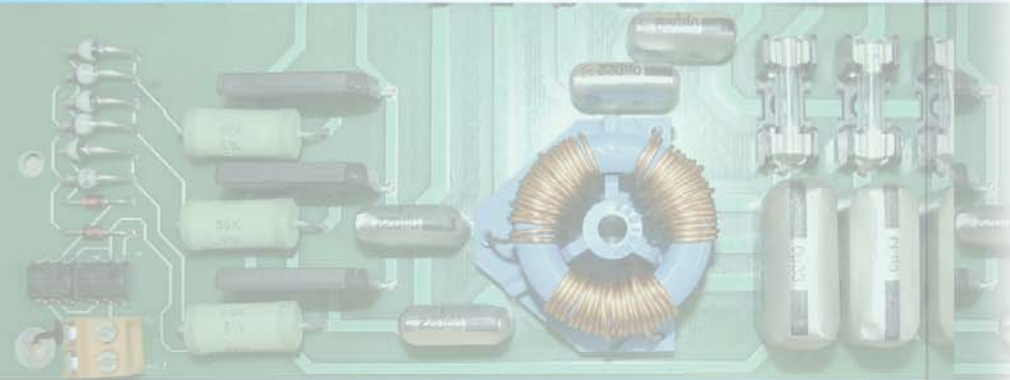
U3

20kW VHF/FM Transmitter:
19 inch rack-mount



TRANSRADIO
SenderSysteme Berlin

THE HIGH-POWER VHF/FM TRANSMITTER FAMILY U3



Features

High output power, yet compact design

- Up to 20kW transmitter output power per 19" standard rack

Integrated digital exciter

- Exciter with fully digital design and digital input via AES/EBU or SPDIF
- Only 25mW input power per amplifier

Redundancy

- All redundancy/standby topologies supported (passive exciter standby, passive transmitter standby, active transmitter standby, (n+1) transmitter standby (max 6+1))
- High intrinsic redundancy; even in 2,5kW version, owing to the internal design employing three amplifier modules
- Dual-redundant central 24V-power supply with operating mode display provides supply voltage for exciters and splitters (each power supply on different phase)
- Support for distribution diversity: if the digital audio input fails, the transmitter will revert automatically to an analogue input and vice-versa

Fail-safe design

- Self-sustaining protective circuit for every amplifier module against overload, over-temperature, VSWR deviation, over-voltage and over-current
- Amplifier modules are designed to be hot-pluggable. All connections are via plug & socket to facilitate removal/installation without the use of tools whilst the transmitter remains on air.
- Interlocking mechanism and operating mode display for the 400Vac mains power supply for maximum operating safety during the change of the amplifier modules

Easy upgrade

- Easy upgrade from 2,5kW to 5kW, 10kW and 20kW due to the modular concept

Multi-Transmitter-Option

- A single 19" Rack can support up to either:
 - 4 × 2,5kW transmitters,
 - or 3 × 5kW transmitters,
 - or 2 × 10kW transmitters in
- Facilitates n+1 solutions in 19" rack

Optimised cooling

- Integrated air-cooling up to 10kW per 19" rack
- Optimised cooling through dedicated air-flow to every amplifier module

Long lifespan

- Low output transistor junction temperatures for high MTBF: nine output devices for each 2,5kW output

Fast installation

- External interconnections centralised for fast installation (also, central connection point can be mounted external to the transmitter)
- Circular air connectors simplifies external ducting design and minimises building work (core-drilling etc.)

Optimised space

- The amplifier chassis in the 2,5kW, 5kW and 10kW versions of the transmitter can be varied in order to optimise the space for additional 19" customer equipment

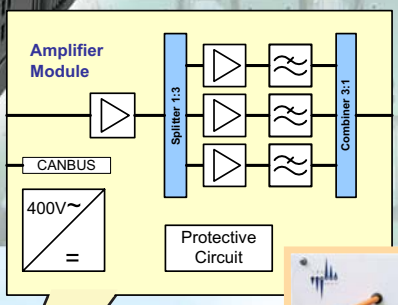
Easy handling

- 15 kg power amplifier modules for comfortable replacement – one person handling

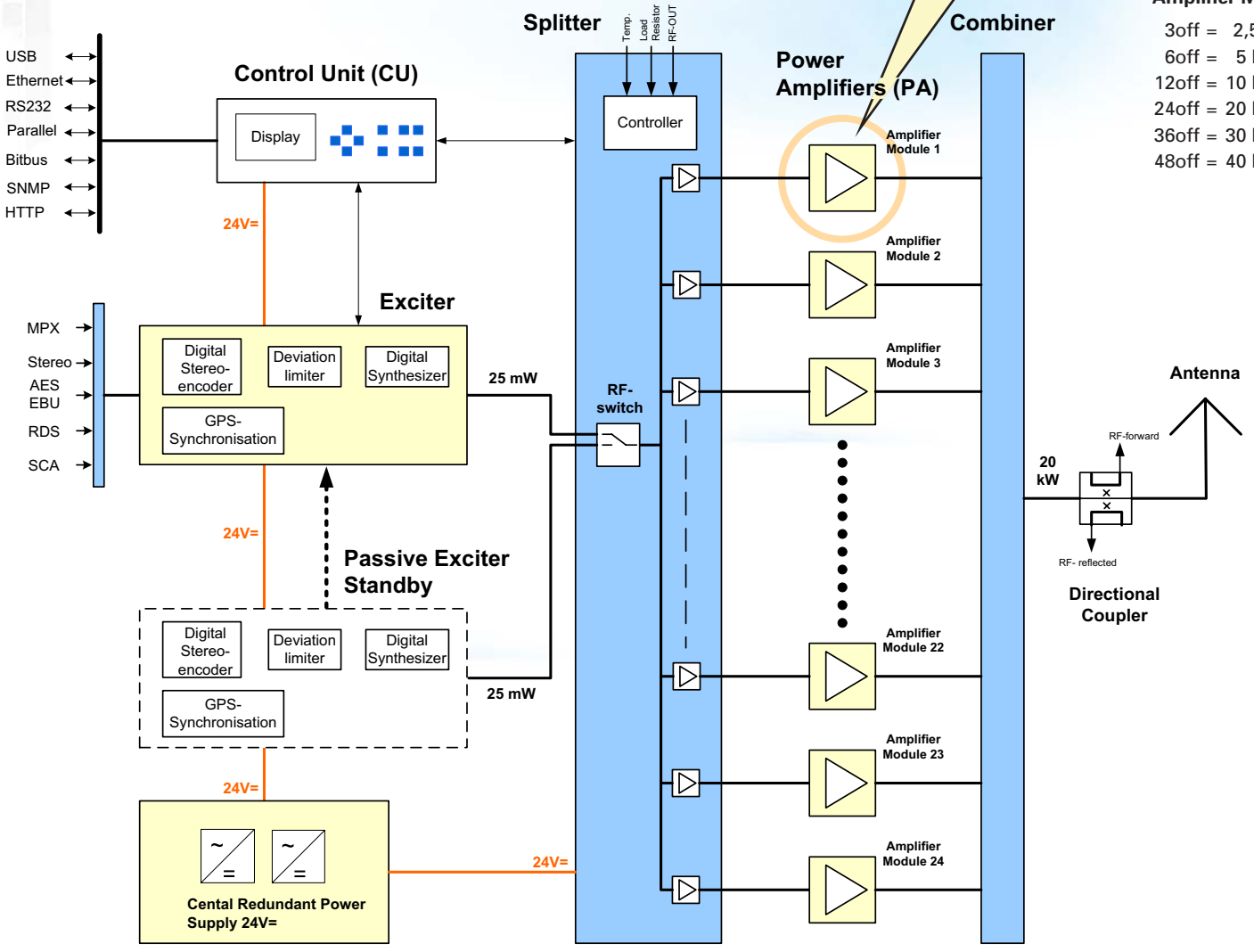
THE MODULAR DESIGN



Overview VHF/FM Transmitter U3-20 (20 kW):



- Amplifier Module**
- 3off = 2,5 kW
 - 6off = 5 kW
 - 12off = 10 kW
 - 24off = 20 kW
 - 36off = 30 kW
 - 48off = 40 kW





The digital exciter E3420 has been developed to offer outstanding audio and RF performance, together with future-proof functions such as support for SFN's (Single Frequency Networks) and Audio Network Protocols.

The modular concept of the audio inputs gives the broadcaster excellent interface flexibility:

- Digital AES
- Analog L/R
- Analog MPX
- IP Audio network (Ethernet - ETH)

The multiple-inputs can also be configured to provide redundancy /backup of the audio feed.

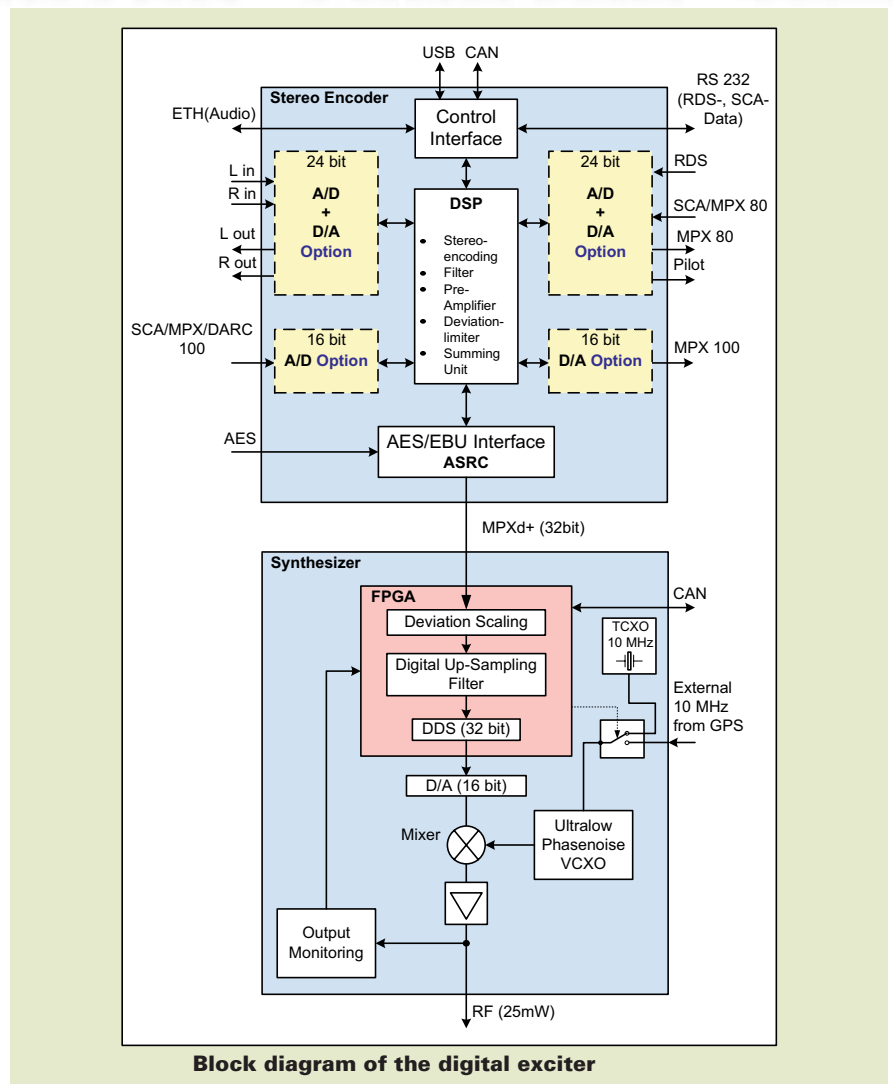
All inputs, including RDS and SCA, are digitized and processed, which guarantees the full control of the signals.

Furthermore the exciter can be synchronised to GPS via an external 10 MHz interface, which is necessary for SFN operation (and precision-offset working).

The functions of the exciters are controlled and monitored via CAN-Bus from the control unit of the transmitters.

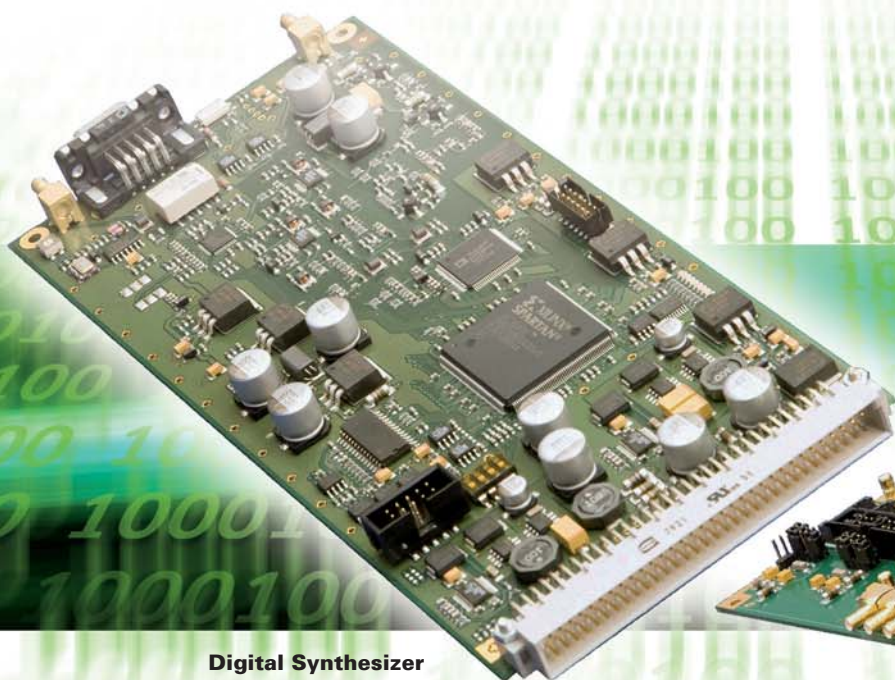
The basic version offers pure digital connectivity via AES/EBU: this may be upgraded using Feature Expansion Packs (FEP's) for additional analogue inputs (AF, RDS, SCA, MPX) and functionality.

Optional features available on request: Program Input Switchover, RDS Modulator/Insertor, Web server, Direct Uplink Codec Support, Program/Loudness Optimizer



Block diagram of the digital exciter

TECHNICAL SPECIFICATION



Digital Synthesizer



Digital Stereo Encoder

Compact standard 19" rack of 1U height

Dual 24 Bit A/D Converter 32...210 kS/s

16 Bit converters 1536 kS/s for SCA input / MPX output

Digital Signal Processing power using Blackfin® DSP / Xilinx FPGA technology

Digital MPX link (MPXd+) between digital stereo encoder and digital synthesizer

PLL controlled VCXO for minimum phase noise (GPS lockable)

GENERAL	RF Range:	87.5 ... 108 MHz in 10 kHz steps
	Deviation limiter	AGC (Automatic Gain Control) with variable threshold and configurable fade-in time Final clipper at ± 75 kHz, ITU BS 412 compliance optional
	Deviation scaling	1 ... 250 kHz in 1 kHz steps, typ. 75 kHz
	Mono modes	L only or (L + R) / 2
	Control ports	CAN, V24, USB, Ethernet, carrier blocking loop
INPUTS	AF	AES/EBU: -9 dBFS -10...+8 dB (32...192 kS/s with sample rate conversion) Analog: +6 dBu -10...+8 dB, balanced (600 Ohm / > 6 kOhm) MPX (up to 100 kHz): -10 / +11.46 dBu Streaming protocols (optional on request)
	2 SCA / MPX	-23...-9.5 dBu, Deviation 2...4 kHz (75 Ohm / > 6 kOhm, up to 100 kHz)
	RDS	-23...-9.5 dBu, Deviation 2...4 kHz (75 Ohm / > 6 kOhm)
	Synchronization	10 MHz (1Vpp at 50 Ohms)
OUTPUTS	Pilot	19 kHz 1Vpp 1:1
	Wordclock	48 kHz 5Vpp 1:1
	MPX analog	11,46 dBu at 75 Ohms
	RF	87.5 ... 108 MHz with +14 dBm at 50 Ohms
	AF-PP	Patch panel output for analog AF signal feed
	LR out	Program monitoring port
PERFORMANCE	MPX frequency response	$\pm 0,05$ dB (30 Hz...55 kHz), $\pm 0,2$ dB (55 kHz...100 kHz)
	Stereo crosstalk	> 60 dB (30 Hz...15 kHz)
	Modulation distortion	< 0.05% / < 0.02% typ.
	SNR mono	78 dB / 86 dB typ. (CCIR)
	SNR stereo	72 dB / 77 dB typ. (CCIR)

Specifications subject to change without notice

U3 VHF/FM-TRANSMITTER SPECIFICATION



U3 VHF/FM High-Power Transmitter family

Type	U3-2,5	U3-5	U3-10	U3-20	U3-30	U3-40
Output power	2,5 kW	5 kW	10 kW	20kW	30kW	40kW
Power adjustment range	-6dB to 0dB					
Power supply	3/N/PE 400V AC +10% / -15% for rated. Pout					
Number of amplifier module	3	6	12	24	36	48
Number of Racks	1					2
RF-connector	7/16	1 5/8" (EIA)			3 1/8" (EIA)	

Generic specification

Output Power fold-back commences at	VSWR>1,5
Suppression of RF harmonics	>87dBc
Suppression of reverse intermodulation	>15dB relative to reverse input power
Noise power relative to carrier (>2MHz offset)	< -150dBc/Hz
Frequency range	87.5MHz to 108MHz in 10KHz steps
Output Frequency stability over 3 month period	<300Hz
Modulation system	F3E
Operational modes	mono, stereo, MPX, (L+R)/2, SCA, AES/EBU, SPDIF
AF-input impedance frequency	>2k Ohm or 600 Ohm
Input level for 40kHz deviation	-5.25dBu to +12,5dBu in 0.25 dB steps
Frequency deviation stability (over temperature & output frequency range)	better than ±1%
Amplitude diviation	<0.1dB
Signal to noise ratio	>70dB at AFmod = 500Hz and 40kHz frequency deviation (CCIR weighted)
Non linear distortion	<0.1% between AFmod 40Hz and 15kHz at 75kHz deviation
Stereo crosstalk attenuation	>55dB for AFmod 40Hz to 15kHz
Cooling system	forced air (internal up to 10kW or external blower)
Recovery time following mains interruption	<2sec.
Ambient temperature range	-10°C to +45°C
Rel. humidity	<=95%
Remote control	Ethernet, RS232 standard, Bitbus, SNMP, HTTP or parallel interface
Number of preset (program name, set power, AF-level, modulation type, deviation limiter, frequencies)	6

Specification subject to change and subject to contract



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