

RFE

MAKING
BROADCAST
SMARTER

TV Transmitter TS Power Systems

TS POWER





TV Transmitter TS Power



PRODUCT DESCRIPTION

TS Power is RFE's High Power transmitter range, available in different versions with different output powers from 1500 to 20000 W rms (from 5000 to 24000 W p.s. when operating in analogue standards).

Equipment of the TS Power series are composed of some main subparts:

- An exciter (dual driver as an option), with native adaptive pre-correction circuits, bringing multiple input interfaces (ASI, AET, EDI, IP, Satellite) and on-board GPS / GLONASS receiver for accurate synchronization in SFN environments;
- Several amplifier stages (from 2 to 8 depending on the model and the output power level);
- A control and monitoring unit, with embedded change over system (Onellogic);
- An innovative and highly efficient Liquid cooling system.

TS Power transmitters support several digital modulation standards (DVB-T/H/T2, ISDB-T/Tb, DAB/DAB+/T-DMB, ATSC), as well as dual-cast analog operation (supporting PAL and NTSC).

TS Power obviously incorporates the innovative and distinctive engineering that has made the success of the low/medium power range of RFE transmitters, allowing unparalleled ease of use and maintenance.





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PRODUCT DESCRIPTION

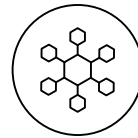
MAIN FEATURES

- Compact dimensions (single 19" Rack, including output filter)
- Output Power up to 12000W rms (COFDM), up to 20000W rms (ATSC) or up to 24000W p.s. (analogue)
- High efficiency broadband or wideband amplifier technology both in UHF and VHF bands
- Single or Dual driver
- Enhanced redundancy in Power Supply Units
- DVB-T/H/T2, ISDB-T/Tb, DAB/DAB+/T-DMB, ATSC, PAL, NTSC, NICAM modulations fully supported
- Embedded Re-Multiplexer/Layer Combiner/TS to BTS (188 to 204 byte) converter for ISDB-Tb
- Adaptive pre-correction circuits
- On-board high stability GPS / GLONASS receiver with battery
- Flexible input interfaces (ASI/BTS/SMPTE-310M, ETI, EDI, IP, Satellite, analog audio and video)
- Logic control and monitoring unit with embedded change over and switching system



Software Energy Saving

Energy and time saving through RFE smart software, directly installed on the Transmitter: the innovative firmware ensuring easy control and high performance.



Multiple Interface

Different television standards, being either analogue or digital, implemented on the same TV Transmitter, extending broadcasting operation.



Evolution Touch

Quick and intuitive control of the Transmitter thanks to the full colour touch screen, an easy-to-use LCD display installed on the device front panel.



TS Power 6000C
Air cooled TV transmitter



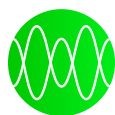
TS Power 12000L
Liquid cooled TV transmitter





SYSTEM	UHF digital output power	from 1500 W to 12000 W rms @ MER 38 dB typ. (DVB, ISDB) from 2400 W to 17000 W rms (ATSC)
	UHF analogue output power	from 5000 W to 24000 W p.s.
	VHF digital output power:	from 1600 W to 12000 W rms @ MER 37 dB typ. (DVB, ISDB) from 1800 W to 14000 W rms @ MER 34 dB typ. (DAB/DAB+/T-DMB) from 2500 W to 20000 W (ATSC)
	VHF analogue output power:	from 4600 W to 24000 W p.s.
	Configurations:	Single or dual driver
	RF output connector:	7/8" (f) or 1-5/8" (f) or 3-1/8" (f) or 4-1/8" (f), EIA, 50 Ohm (according to output power and frequency band)
	Frequency agility:	UHF Band IV and V or VHF Band III
	Frequency resolution:	1 Hz
	Pre-correction:	Adaptive
	Exciter:	TS Power or TS compact Series (according to the model)
	Integrated matrix circuits:	ASI/BTS/Video (dual), audio and RF
	BTS/ASI/Video matrix connectors:	BNC (f), 75 Ohm
	Audio matrix connectors:	Tini-QG "Mini XLR", 6 Pin (m), 600 Ohm
	Standard	EN300744, EN302304, EN302755 V1.3.1 (DVB-T2-Lite), TS101191, TS102773 (T2-MI), TS102034
MODULATOR DVB-T/-H/-T2	Inputs	4x ASI BNC (f), 75 Ohm or 2x ASI BNC (f), 75 Ohm and 2x RJ45 TS oIP 10/100/1000 Seamless switch between any input Hierarchical and not hierarchical (DVB-T)
	FFT	1K (DVB-T2), 2K, 4K, 8K, 8K ext. (DVB-T2), 16K & 16K ext. (DVB-T2), 32K & 32K ext. (DVB-T2)
	Code rate	All modes available according to the standard Block Short or Normal (DVB-T2) DVB-T: Reed-Solomon (204, 188) DVB-T2: BCH, LDPC
	Guard interval	1/32, 1/16, 1/8, 1/4, 19/256 (DVB-T2), 19/128 (DVB-T2), 1/128 (DVB-T2)
	Constellation	QPSK, 16QAM, 64QAM, 256QAM (DVB-T2). Rotated and non-rotated (DVB-T2)
	MISO processing	Supported
ISDB-Tb	Standard	ABNT NBR 15601, ABNT NBR 15603
	Inputs	4x ASI TS/BTS BNC (f), 75 Ohm or 2x ASI TS/BTS BNC (f), 75 Ohm and 2x RJ45 TS/BTS oIP 10/100/1000 Seamless switch between any input
	FFT	Mode 1 (2K), Mode 2 (4K), Mode 3 (8K)
	Code rate	1/2, 2/3, 3/4, 5/6, 7/8
	Guard interval	1/4, 1/8, 1/16, 1/32
	Hierarchical modulation	Up to 3 layers
	Constellation	QPSK, 16QAM, 64QAM
	Time interleaver	Fully supported
	Partial reception	Supported





DAB/DAB+/T-DMB

Standard	EN 300401, ETS 300 799
Inputs	4x ETI [NI[G703], NA5376[G704] or NA5592[G704]] BNC (f), 75 Ohm or 2x ETI BNC (f), 75 Ohm + 2x EDI [ETSI TS 102 693] RJ45 10/100/1000 Seamless switch between any input
Transmission modes	Mode I, II, III, IV [Automatically detected from the ETI stream, or user selectable]

ATSC

Operation	MFN or SFN operations
Standard	A/53, A/110
Inputs	4x ASI / SMPTE-310M BNC (f), 75 Ohm or 2x ASI / SMPTE-310M BNC (f), 75 Ohm and 2x RJ45 TS oIP 10/100/1000 Seamless switch between any input

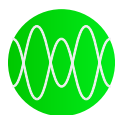
Analogue

Modulation	8-VSB
Input bit rate	19.39 Mbit/s
Bandwidth	6 MHz
Max processing delay	Up to 1 second [programmable]
Standard	B, G, D, K, M, N, I
Inputs	Video BNC (f), 75 Ohm, audio Tini-QG "Mini XLR", 6 Pin (m), 600 Ohm
Color system	PAL, NTSC
Integrated NICAM encoder	Available

**SATELLITE
RECEIVER
(OPTION)**

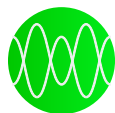
Standard	ETSI EN 300 421 [QPSK] [DVB-S] ETSI EN 302 307 [QPSK, 8PSK, 16APSK] [DVB-S2] ETSI EN 50083-9 [ASI] ETSI EN 50221 [Common Interface]
DVB-S2	VCM, CCM, Multi Stream and Single Stream, Normal & Short FEC frames
Symbol rate	1 - 45 Msym/s [DVB-S] 2 - 45 Msym/s [DVB-S2]
Constellation	QPSK, 8PSK, 16APSK
FEC	Automatic, all modalities available according to the standard Block Short or Normal DVB-S: Reed-Solomon [204,188] DVB-S2: BCH, LDPC
Roll-Off	0.2, 0.25, 0.35
Input connector	F (f), 75 Ohm
Frequency	L-band 930÷2250 MHz
LNB control voltage	Off, +13/18 Vdc, 22 kHz, 0.25 A [overload protection]
RF input level	40 ÷ 100 db/μV [with attenuator]
Output connector	BNC (f), 75 Ohm
Modality	188 bytes
Max input bit rate	80 Mbps [CAM limit: 72 Mbps]
CAM interface	PCMCIA DVB-CI Common Interface
CA mode [Conditional Access]	Multicrypt, Simulcrypt
CAS support	Mediaguard, Viaccess, Irdeto, Conax, BISS with Professional multiprogram CAM [descrambling of up to 24 Elementary Streams] Betacrypt, Cryptoworks, Nagravision with standard consumer CAM [descrambling of up to 4 services]





GPS / GLONASS	Input connector	N (f), 50 Ohm
	Input/Monitor output 10 MHz	BNC (f), 75 Ohm
	Input/Monitor output 1 PPS	BNC (f), 75 Ohm
	Phase noise	-140 dBc/Hz @ 10 kHz -150 dBc/Hz @ 100 kHz
	Stability	1e-12 / 24 H with disciplined OCXO
	Hold-over stability	5 µs after 5 hours (optional 1 µs after 24 hours)
MECHANICAL	Rack	See table on next page (other configurations are available on request)
	Width	600 mm
	Rack height	1530 mm (TS Power 1500H, 3000C) 1800 mm (TS Power 2200H, 4500C, 3000L, 4500L, 6000L) 2000 mm (TS Power 3000H, 6000C) 2070 mm (TS Power 9000L and 12000L)
	Depth:	800 mm (H versions) 1000 mm (C and L versions in UHF) 1200 mm (L versions in VHF)
CONTROLS	TFT touchscreen	
	Web GUI	
	SNMP	
	GPIO	
ENVIRONMENTAL	Operating temperature range	-5°C ÷ 40°C
	Max. relative humidity	90% non condensing
	Max. operating altitude	2500 m. a.s.l. (>2500 m. optional)
ELECTRICAL	Power supply	Energy distribution system with different options: • Line 380-400 V3N~, 50/60Hz • Line 220 V3N~, 50/60Hz • Line 220-240 V~, 50/60 Hz
	Efficiency	Up to 40% efficiency in digital (UHF models)
NOTES	To comply with the applicable standards and limit values for the suppression of out-of-band emissions (and in the case of digital standards, also for maintaining the required shoulder distance), the transmitter may only be operated with suitable filters at the RF output. Specifications are subject to change without notice.	





UHF BAND IV & V	OUTPUT POWER ¹				Number of amplifiers	Rack cabinet dimensions [filter incl.]	Cooling
	COFDM [rms]		ATSC [rms]	ATV [p.s.]			
	Broadband	Wideband					
MODEL							
TS Power 1500hu	1500 W	1500 W	2400 W	5000 W	2	30U 19"	Air
TS Power 2200hu	2300 W	2500 W	3500 W	7500 W	3	36U 19"	Air
TS Power 3000CU	2600 W	3000 W	4000 W	5000 W	2	30U 19"	Air
TS Power 3000LU	2600 W	3000 W	4500 W	7500 W	2	36U 19"	Liquid
TS Power 3000hU	3200 W	3500 W	4800 W	10000 W	4	40U 19"	Air
TS Power 4500CU	3900 W	4500 W	6000 W	7500 W	3	36U 19"	Air
TS Power 4500LU	3900 W	4500 W	6750 W	11000 W	3	36U 19"	Liquid
TS Power 6000CU	5000 W	6000 W	8000 W	10000 W	4	40U 19"	Air
TS Power 6000LU	5000 W	6000 W	9000 W	15000 W	4	36U 19"	Liquid
TS Power 9000LU	7500 W	9000 W	13000 W	22500 W	6	42U 19"	Liquid
TS Power 12000LU	10000 W	12000 W	17000 W	30000 W	8	42U 19"	Liquid
TS POWER 24000LU	20000 W	24000 W	34000 W	60000 W	16	4x42U 19"	Liquid
¹ Before bandpass filter							

¹ Before bandpass filter

VHF BAND III	OUTPUT POWER ¹				Number of amplifiers	Rack cabinet dimensions [filter incl.]	Cooling
	COFDM [rms]		ATSC [rms]	ATV [p.s.]			
	DVB/ISDB	DAB/DAB+					
MODEL							
TS Power 1500hV	1600 W	1800 W	2500 W	4600 W	2	30U 19"	Air
TS Power 2200hV	2400 W	2700 W	3750 W	6800 W	3	36U 19"	Air
TS Power 3000CV	3000 W	3600 W	5000 W	8000 W	2	30U 19"	Air
TS Power 3000LV	3000 W	3600 W	5000 W	8000 W	2	36U 19"	Liquid
TS Power 3000hV	3200 W	3600 W	5000 W	9000 W	4	40U 19"	Air
TS Power 4500CV	4500 W	5400 W	7500 W	12000 W	3	36U 19"	Air
TS Power 4500LV	4500 W	5400 W	7500 W	12000 W	3	36U 19"	Liquid
TS Power 6000CV	6000 W	7200 W	10000 W	16000 W	4	40U 19"	Air
TS Power 6000LV	6000 W	7200 W	10000 W	16000 W	4	36U 19"	Liquid
TS Power 9000LV	9000 W	10000 W	15000 W	24000 W	6	42U 19"	Liquid
TS Power 12000LV	12000 W	14000 W	20000 W	-	8	42U 19"	Liquid
¹ Before bandpass filter							

¹ Before bandpass filter

OPTIONS	
Opt. 2	Dual redundant exciter
Opt. G	GPS / GLONASS integrated receiver
Opt. KA	26 dB LNA GPS / GLONASS antenna including mounting kit and 25 mt. coaxial cable
Opt. S	DVB-S/S2 integrated receiver board, single and multistream, with CAM slot
Opt. IA	Additional input board, 4x ASI
Opt. IG	Additional input board, 2x ASI + 2x GbE
Opt. R	Additional input board, RF in
Opt. L	Software option for ISDB-Tb Remux/Layer Combiner/TS to BTS (188 to 204 byte) converter
Opt. T	Dual-cast software option, adds DVB-T modulation
Opt. T2	Dual-cast software option, adds DVB-T2 modulation
Opt. I	Dual-cast software option, adds ISDB-T modulation
Opt. AT	Dual-cast software option, adds ATSC modulation
Opt. P	Dual-cast software option, adds PAL modulation
Opt. N	Dual-cast software option, adds NTSC or PAL-M modulation
Opt. NC	Integrated NICAM encoder option

