MEGATIVY

FLEXIBLE MEDIUM-POWER TELEVISION TRANSMITTER

Modular high-efficient design for smooth digital migration

Transmission system experience

Backed by more than 100 years in television transmission systems and hundreds of systems deployed all around the world, Thomson Broadcast has paved the way for smooth and cost efficient digital switchover -DSO- to benefit from the digital dividend, offer more high quality contents and generate potentially greater income. Thomson Broadcast solution is also recommended for next generation standard migration.

Thomson Broadcast is the right partner for transmission turnkey systems. From the very beginning of the migration project, Thomson Broadcast expertise may be very useful to assist governments, ministries or broadcasters in the current analog and digital network diagnosis, in the technical and technological choices, in coverage studies and most important in the financial engineering.

Thanks to undeniably gained valuable experience in operational deployments, Thomson Broadcast offers a full range of end-to-end professional services to ensure global compatibility and continuous television signal availability.

Guaranteed system interoperability

Global interoperability is a crucial factor of success in any network deployment. With a long know-how, Thomson Broadcast is optimizing its digital systems with high efficient Gigativy transmitters and smart integration of best-in-class technologies, from the Head-end, satellite downlink, receiver-decoder to the antenna and mast. Thomson Broadcast guarantees the complete system interoperability and quality of services, from the installation, to the commissioning.

For UHD video and immersive sound

Latest digital standards have been developed to be more efficient and flexible - for fixed and mobile TV - but still robust. New H265 compression allows currently to transmit 4K and 8K for fixed and mobile receivers while television is now viewed in a variety of ways. With the support of latest digital standards, Thomson Broadcast offers a unique viewers experience benefiting from detailed and realistic TV picture ever seen with High Dynamic Range -HDR- capability and immersive audio sound.

With Megativy Transmitter for all standards

GLOBAL ENERGY EFFICIENCY

Includes transmitter energy savings and the added value generate by the optimization of transmission station consumption.

LOWEST TOTAL COST OF OWNERSHIP

Maximized power density for highest output power with minimized maintenance operations.

MODULAR DESIGN

Easily upgradable in power, with ducted or non-ducted air cooling solution.

QUICK INSTALLATION AND EASY MONITORING

Easy operations via HMI, SNMP and Web server in standard for local and remote operations.

COMPLETE TELEVISION TRANSMISSION

- Consulting services
- Financial engineering
- Project management
- Coverage studies
- Site survey
- Energy & system engineering
- Complete TV transmitter range
  - *All digital standards*
  - *High-medium-&-low power range*
  - *RF auxiliaries*
- Head-ends
- Antennas & masts
- Installation
- Commissioning
- On-site training
- Service Level Agreement (SLA)
- Preventive maintenance
- Network management system

GreenPower

For huge OPEX savings

Global energy efficiency

While transmitter efficiiency is a critical part of the Operational expenditures -OPEX-, global energy efficiency of the transmission station has to be evaluated and optimized. Megativy medium-power transmitter integrated in Thomson system is the ideal compromise between high-efficiency up to 40% including cooling and low maintenance operations. With transmitters networks deployed for an average 20-year lifecycle, minimizing operating cost is crucial.

Thomson Broadcast has been developing GreenPower solution for more than 10 years now, investing also on renewable energy solution for off-grid sites.

In Megativy product line, the implementation of the latest generation and version of 50-V LDMOS transistor technology in Doherty operation mode, combined with managed peak-to-average power ratio (PAPR) and MISO technologies allows increased power for maximum coverage while maintaining exemplary RF performance. Also the high gain architecture ensures complete amplifiers redundancy for continuous system availability.

Two part-bands have been designed 470-600MHz and 600-700MHz for the best efficiency ever reached on each part-band. Power supply voltage are also optimized to adjust to the required output power while operating at the optimal point.

As part of a global system, the integrated or external cooling system has been in-house redesigned with a specific focus on highest efficiency results. While rejecting heat in the room might be a technical choice, integrating a cooling cabinet in the rack may allow great energy savings combined with small carbon footprint.

Lowest total cost of ownership

With operational cost surpassing initial transmitter investment by more than 5 times over their lifetime, expensive costs such as unexpected on–site maintenance operations may overload the global balance.

Megativy has been in-house designed to offer best power density up to 4kW in a single rack minimizing floor space requirements then reducing rental costs.

The high modularity of Megativy transmitter based on more than 30 year of field implementation contributes to lower operational costs. Indeed easy scalability in output power allows quick change of geographical coverage.

Simplified maintenance procedures, easy access to all modules and intervention time minimization strongly decreases maintenance costs. Most of the modules i.e. exciter, amplifier made of palets, power supply of the control system, are hot pluggable and may be replaced within less than 10 minutes. The use of standard power supply units referenced for main telecom applications guarantees its market availability. An active reserve power supply is also available in the control system to avoid long start-up after a power failure.

Maintenance procedures are easily achieved by a single person with no high technical skills and no fine tuning is required after modules exchanges nor channel changes in the same part-band due to the help of the DAP feature.

Moreover to enhance the serviceability of medium- power Megativy and high–power Gigativy ranges share the same spares parts for Thomson entire television transmitter ranges, most of the building modules are common to both medium- and high-power ranges: exciters, control systems, palets of the amplifiers and power supplies. This leads to fewer overall spare parts, a great ease in the training of the maintenance staff, and a straightforward repair policy.

Modular design

Model overview from 500W to 4000w in a single rack

With a base building block of 500W amplifier, TV transmitters are easily scalable to fit just about any power requirement. Gigativy transmitter rack can be equipped with up to 8 amplifiers running in parallel for an industry unmatched 4kW power in a single rack.

<table>
<tr><th>Number of amplifiers</th><th>Rms output Power (*)</th><th>Footprint
W,D,H (mm / inch) (**)</th><th>Approx. Weight (kg / lb) (**)</th><th>Number of transmitters per rack Multi-TX DD</th></tr>
<tr><td>1</td><td>500 W</td><td>STANDALONE OR
600 x 800 x 6U / 23.6 x 31.5 x 10.5
OPTIONAL CABINET</td><td>40 / 88</td><td>Up to 6</td></tr>
<tr><td>2</td><td>1000 W</td><td>STANDALONE OR
600 x 800 x 10U / 23.6 x 31.5 x 17.5
OPTIONAL CABINET</td><td>70 / 154</td><td rowspan="2">Up to 3</td></tr>
<tr><td>3</td><td>1500 W</td><td rowspan="5">600 x 800 x 42U / 23.6 x 31.5 x 73.5</td><td>210 / 463</td></tr>
<tr><td>4</td><td>2000 W</td><td>230 / 507</td><td rowspan="3">Up to 2</td></tr>
<tr><td>5</td><td>2500 W</td><td>250 / 551</td></tr>
<tr><td>6</td><td>3000 W</td><td>270 / 595</td></tr>
<tr><td>8</td><td>4000 W</td><td>330 / 727</td><td></td></tr>
</table>

* Output power before RF band filter

** Double drive configuration

GreenPower

For huge OPEX savings

Modular design

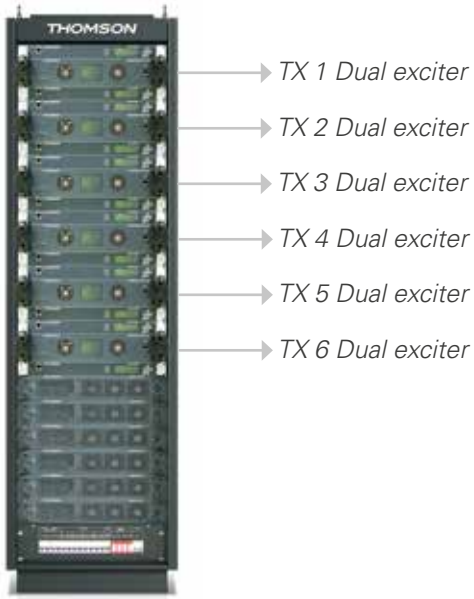
The great modularity of this series allows all configuration.

Standalone product

The transmitter system may be delivered as a separate chassis with an integrated amplifier cooling

Multi-rack model

With up to **6 transmitters** in the same rack, Thomson Broadcast meets broadcasters' highest requirements delivering up to - multiplexers. Footprint and rental costs are optimized whereas security of each transmitter is guaranteed by an independent security system.



N+1 configuration

N+1 configuration in Passive Reserve is offered for an outstanding solution redundancy

For huge OPEX savings

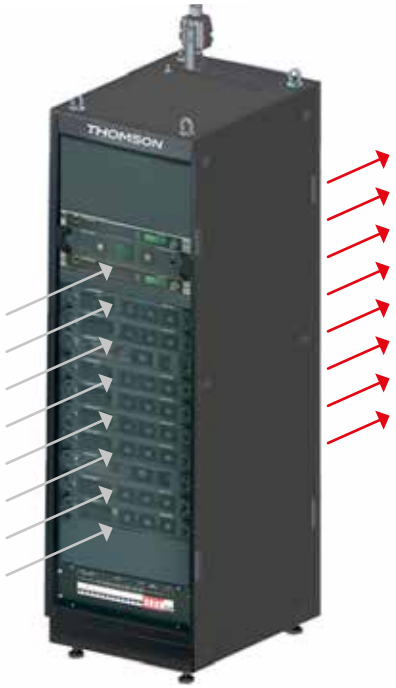
Modular design

Cooling system adaptable no any station and environmental conditions

A very efficient cooling system has been developed with high dissipating capacity, low-noise level and maximum security.

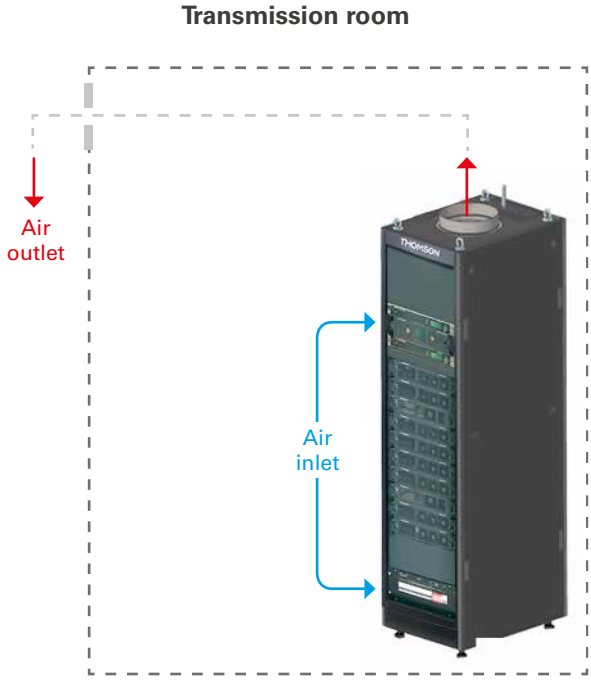
Integrated amplifier cooling - 1 choice

The dust-proof integrated fans do not require any air filter preventing from costly maintenance operations.



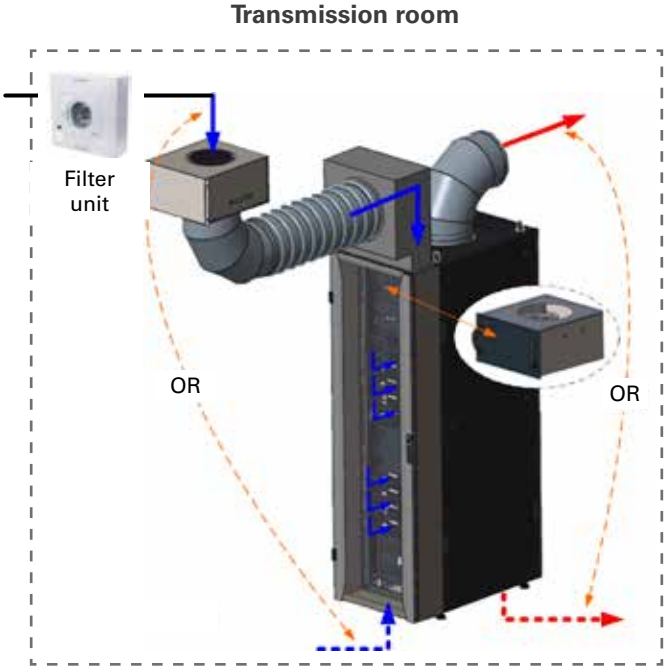
Integrated cabinet cooling- 2 choices

When heat dissipation is a constraint, heat may be exhausted outside the transmission room with an optional kit.



External cooling.

Air is taken and exhausted outside the technical room. Exhaust-fan unit and blower features the same EC centrifugal fans for adjustment flow rate to the required output power, optimization of energy consumption via EC motor technology and limited acoustic noise due to air flow adjustment.



For huge OPEX savings

Quick installation and easy monitoring

Latest generation of exciter and control system for any standard

Latest generation exciter has been designed to support all modulations scheme in a highly compact 1U module and 4U in Dual Drive and Passive Reserve configuration.

For the highest performances, it integrates leading-edge FPGA technology and sophisticated Digital Signal Processing -DSP- algorithms.

Leveraging digital modulation technologies, advanced modes i.e. SISO-MISO, multiple PLP's and composite T2-base /T2-Lite (option) for DVB standard, are supported. SISO-MISO support allows maximum coverage and high quality guarantee. Composite T2-base /T2-Lite and multiple PLP's and composite T2-Base & T2 Lite provides high flexibility while adapting specific robustness to broadcasters' needs. Within a single channel, UHD, SD, Mobile and Radio Services may be transmitted at the same time using existing infrastructures.

Simplified maintenance procedures, easy access to all modules and intervention time minimization strongly decreases maintenance costs. Most of the modules i.e. exciter, amplifier made of palets, power supply of the control system, are hot pluggable and may be replaced within less than 10 minutes. The use of standard power supply units referenced for main telecom applications guarantees its market availability.

An active reserve power supply is also available in the control system to avoid long start-up after a power failure.

Maintenance procedures are easily achieved by a single person with no high technical skills and no fine tuning is required after modules exchanges nor channel changes in the same part-band due to the help of the DAP feature.

Moreover to enhance the serviceability of medium- power Megativy and high–power Gigativy ranges share the same spares parts for Thomson entire television transmitter ranges, most of the building modules are common to both medium-and high-power ranges: exciters, control systems, palets of the amplifiers and power supplies. This leads to fewer overall spare parts, a great ease in the training of the maintenance staff, and a straightforward repair policy.

To offer outstanding signal availability, real-time Digital Adaptive Pre-correction -DAP- technology compensates for performance variances due to changes in environmental conditions, component aging, and reduction of output power. Optimal RF signal quality and stability are guaranteed at all times without the need for user intervention. It also allows to run transmitters close to their saturation point by adapting power amplifiers' inherent non-linearities and minimizing the memory effects of the circuitry.

High power peaks are corrected by Peak to Average Power Ratio -PAPR- reduction system and protection clipping for the best possible coverage. Automatic Gain Control feature also drives power amplifier stage to automatically adjust output power.

In terms of inputs, the exciter features 2 ASI input streams and 2 IP input stream which can be used for stream redundancy with primary and secondary stream.

The exciter integrates T2-MI stream inputs on both ASI and IP inputs monitored by an intelligent input redundancy switching mechanism and management.

GNSS receiver using GPS and GLONASS systems is included in standard. For monitoring operations, an RJ45 port on the front of the equipment is available for fully IP-controlled solution IP stream. Embedded web server and SNMP agent are also embedded in standard.

The in-house new designed control system manages and monitors operation on the entire transmission chain, switching exciters, amplifiers and transmitters in case of N+1 configuration, ensuring 7/7 television signal availability. It also monitors the cooling system. Local operation can be achieved on the touch screen or remotely via the Web server.

This latest generation of exciter provides an open and adaptive platform ready for any future development.

Exciter redundancy

Highest level of integration in a 1U- for ultimate signal availability

Single drive configuration

Dual drive configuration with control system

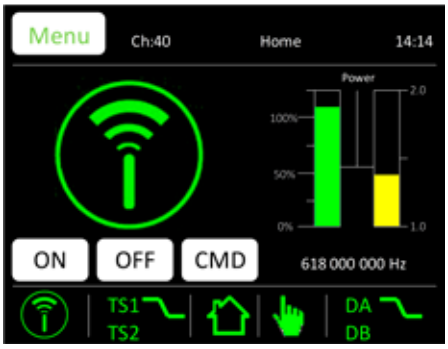
Passive Reserve configuration with control system

For huge OPEX savings

Quick installation and easy monitoring

Intuitive local and remote control and monitoring

In normal operational conditions, the transmitter system may be intuitively operated directly via the local control panel in the touch screen for advanced control and monitoring. All required information are available through a two to three click navigation.



For quick remote monitoring purposes, each Megativy includes as a standard feature, Web server and SNMP agent to remotely deliver a real-time comprehensive display of the transmitter's status as well as the identification and precise location of any fault. This monitoring interface is also accessible locally via a dedicated RJ45 LAN port.

Control and monitoring cab be achieved with any standard devices including smartphones, tablets or personal computer.

The web interface has been in-house designed so to interoperate with complete transmission Network Management System.

SPECIFICATIONS

Standards

MODULATION	MODES	CHANNEL BANDWIDTH	INPUTS
DVB-T DVB-T2 Dualcast DVB-T/DVB-T2 Composite T2-base and T2-Lite	MISO - MPLP - PAPR- T2- Lite	5/6/7/8 MHz	2 x ASI, 2 x IP Dual ASI & IP changeover without interruption ASI to IP or IP to ASI changeover without interruption
ISDB-T ISDB-Tb		6 MHz	2 x ASI Dual ASI changeover without interruption BTS
ATSC 1,0 ATSC 3,0	MPLP - PAPR - LDM	6 MHz	2 x ASI, 2 x SMPTE-310M 2 x IP

Frequency range

UHF band	470 - 700 MHz

Output

OUTPUT	CONNECTORS	up to 1500 W Rms for 2000 W Rms From 2500 W up to 4000 W Rms	7-16 7/8" EIA 1" 5/8 IEC
	CHARACTERISTICS	Shoulder level MER	> 37 dB > 34 dB

Supply voltage

MAINS POWER SUPPLY	AC PHASES	Three phases: non-floating, neutral, earth
	STANDARD VOLTAGES	208 V / 220 V / 240 V / 380 V / 400 V with tolerance of ± 15%
	SINGLE PHASE FOR 500W OR 1000W	230V+15%/ 120V-15%
	FREQUENCY	50 or 60 Hz (± 3 Hz)
	POWER FACTOR AT NOMINAL OPERATION	> 0.95

SEPARATE MAINS POWER SUPPLY CONNECTIONS FOR EXCITER & CONTROL SYSTEM	AC PHASES	Two single phase AC inputs
	STANDARD VOLTAGES	230V+15% / 120V-15%
	CONNECTORS	CEE 22 available on the cabinet roof

Environmental conditions

Guaranteed specifications with VSWR= 1,5:1	
External air temperature	0° to + 45° C up to 1500 m / 5000 ft
Derating	5°C per 1000 m / 3000 ft on max. Temperature
Ambient Air temperature	+ 5° to + 45° C
Maximum altitude	3000 m / 10 000 ft (1)
Storage temperature	-30° C to + 60° C
Relative humidity	≤ 95% without condensation
Acoustic noise	< 65 dB(A) @ 1m / 1.5m height

Clock & Synchronization

Frequency range	10 MHz	50 Ω	-15 to +15 dBm	BNC female
Timing reference	1 PPS	5k Ω	LVTTL	BNC female
Internal GNSS	GPS, GLONASS	50 Ω	Max sensitivity: -138 dBm	TNC female

Local & Remote Control & Monitoring

Locally & remotely	Dry loop
	LCD touchscreen
	Control by push button in case of CPU failure
	Web interface
	SNMP interface

GreenPower

Specifications are subject to change without notice.

THOMSON
BROADCAST
54 avenue Jean Jaurès - 92700 Colombes - France - Phone : +33 (0)1 40 80 40 00