PO Box 69, 395 Oakhill Road, Mountain Top, PA 18707
570-474-6751 or 1-800-266-9283 FAX 570-474-5469

1.0 INTRODUCTION

This report contains all the required data for certification of Thomcast's model SD1250C digital transmitter system. The data presented was taken from tests performed on a production transmitter system tuned to operate on ITFS channel C-4 (2584-2590 MHz) designed to transmit any one of 31 ITFS/MMDS television channels, in the MDS and ITFS bands. Other information required for Certification, such as circuit diagrams and descriptions, photographs, tune-up and maintenance procedures, and the technical manual are attached.

2.0 TEST EQUIPMENT

FCC Section 2.947 (d)

The following is a list of major test equipment, which was used in testing the transmitter for this report:

1.	Spectrum Analyzer	HP Model 8564E & 8593E
2.	Power Meter	HP Model 436A
3.	Frequency Counter	HP Model 5350B
4.	Digital Multimeter	Fluke Model 87
5.	Vector Signal Analyzer	HP 89441A
6.	Digital Transmission Analyzer	HP 3784A

3.0 MEASUREMENTS

FCC Section 2.1033 (c)(14)

➢ RF POWER OUTPUT

FCC Section 2.1046 (a) (c)

Output Power:	12.5 watts average QAM modulation; 10 watts average QAM modulation with three equally spaced 2 MHz carriers
Method of Measurement:	Per FCC 2.1046 (b)

The transmitter was operated into a dummy load of substantially zero reactance with a resistance equal to the transmission line characteristic impedance. Average power was directly measured using an HP 436A microwave power meter. The transmitter's % power meter was found to be within 2% of the indications provided by the external average power meter with output variations of 80% to 110% of the transmitter's rated output.

Output Power Calibration	See technical manual, document # DOC16-0057

➢ MODULATION CHARACTERISTICS

FCC Section 2.1047

The digital modulation format is Quadrature Amplitude Modulation with a 64 or 256 point signal constellation (64 QAM and 256 QAM) with the QAM symbol rate and occupied bandwidth optimized for a 6 MHz channel plan. Forward Error Correction (FEC) uses a concatenated coding approach that produces high coding gain at moderate complexity and overhead. The system FEC is optimized for quasi-error free operation at a threshold output error event rate of one error per 15 minutes.

To achieve the appropriate level of error protection required for transmission of digital data, an FEC based on Reed-Solomon coding is used. Protection against burst errors is achieved by use of byte interleaving.

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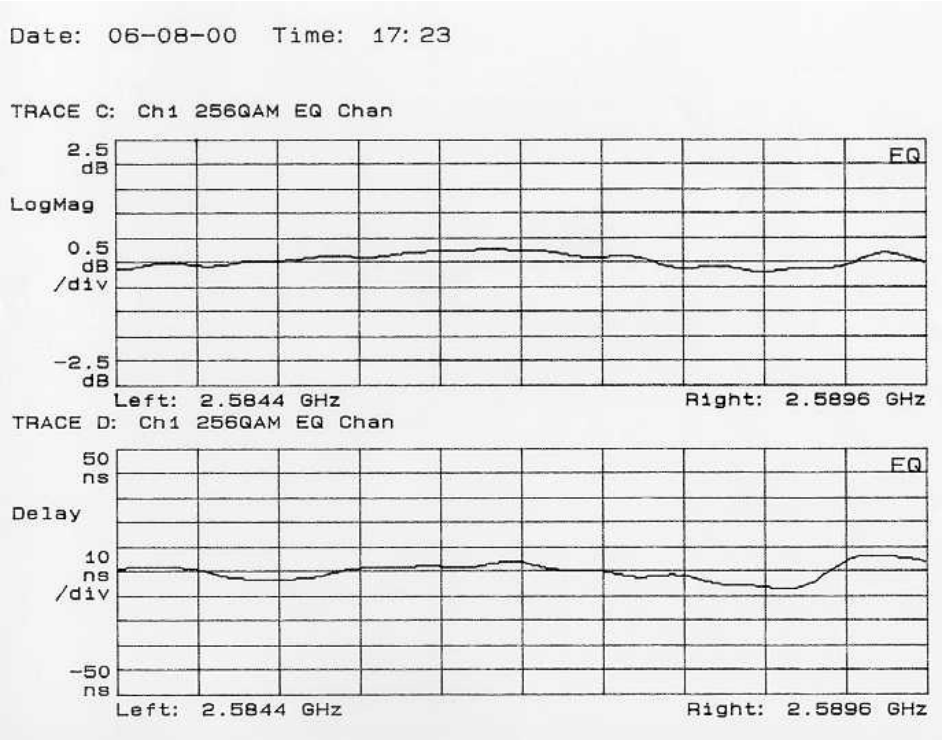

PLOT 1: Frequency response and group delay of the 256 QAM transmitter.

➢ OCCUPIED BANDWIDTH & FREQUENCY RESPONSE

FCC Section 2.1049 (e) (6) (i)

See the above plots for frequency response data.

❖ OCCUPIED BANDWIDTH

FCC Section 2.1047/2.1049/73.687 (a) (2)/74.936

Plots five and six demonstrate the occupied bandwidth of the QAM signal at the output of the system channel combiner at the maximum rated average power and symbol rate. The occupied bandwidth complies with the revised spectral mask per the FCC ruling. The signal meets the requirements of a sidelobe power spectral density less than –38 dB at the channel edge decreasing to less than –60 dB at ±3 MHz from the channel edge relative to the average power spectral density of the QAM signal within the main channel.

Plot seven demonstrates the occupied bandwidth of the 64 QAM modulation with three equally spaced carriers. The additional 1 dB backoff shown in plot seven follows the well known requirements for multi-carrier systems. Specifically, Leffel[1] cites results showing the backoff requirement of 1 dB when signals are increased from two to three carriers. Our laboratory test results reflect the backoff requirement predicated by Leffel. That requirement is incorporated in the rated output power of our transmitter, therefore, using the QAM modulation with three equally spaced 2 MHz carriers our transmitter is rated to 10 watts.

Each occupied bandwidth plot is labeled corresponding to the respective modulation format.

[1] Leffel, Michael, (Intermodulation Distortion in a Multi-Signal Environment), RF Design, June 1995

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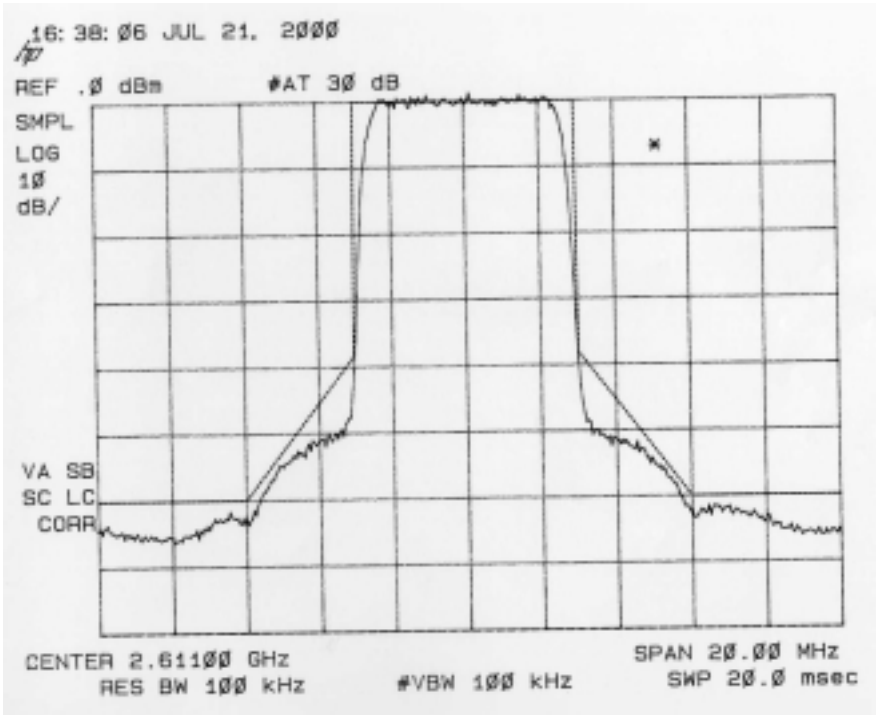
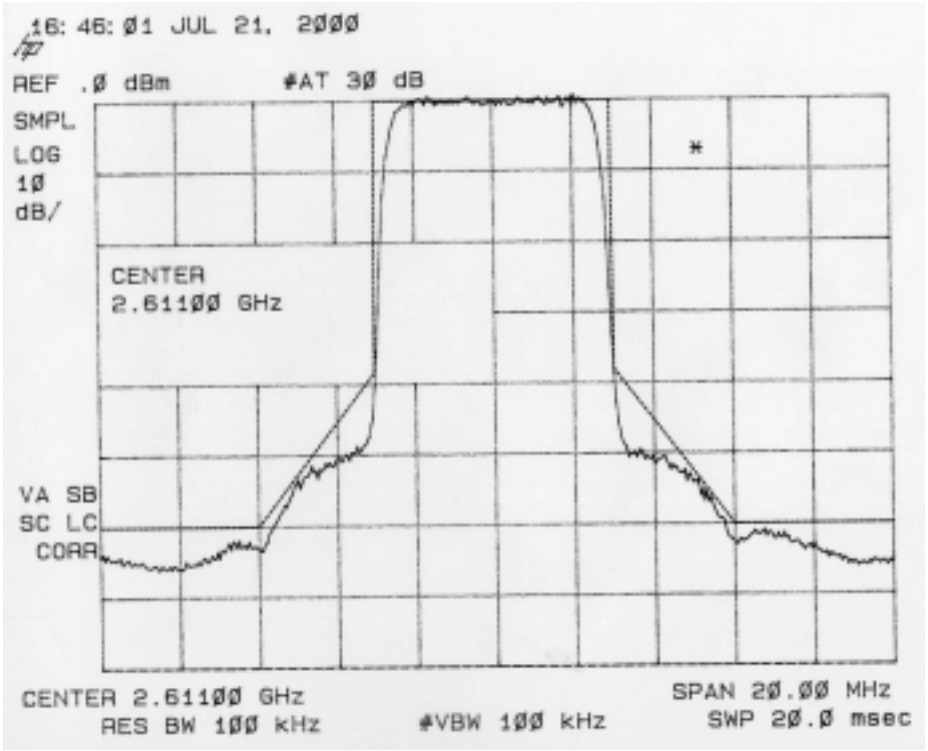


PLOT 2: Occupied bandwidth of the 64 QAM transmitter.



PLOT 3: Occupied bandwidth of the 256 QAM transmitter.

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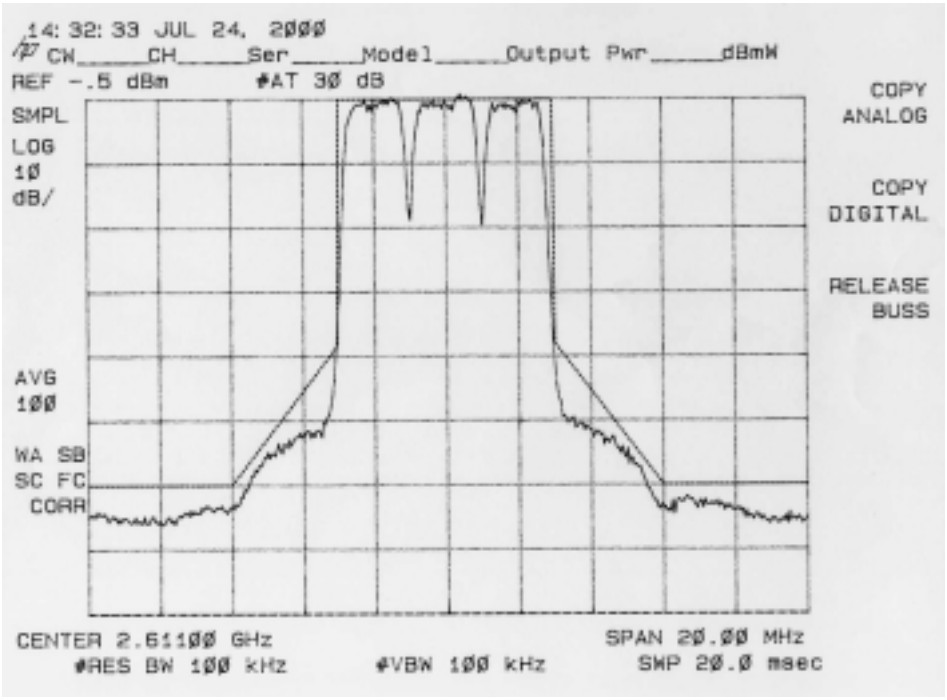

PLOT 4: Occupied bandwidth of the QAM modulation with three equally spaced 2MHz carriers[2].

- SPURIOUS EMISSIONS AT ANTENNA TERMINALS

FCC Section 2.1051/2.1057/21.908 (b)/74.936

Average Output Power:	12.5 watts average QAM modulation; 10 watts average QAM modulation with three equally spaced 2 MHz carriers
Type Modulation:	64/256 QAM
Spectrum Analyzer Setting:	The Spectrum Analyzer setting used in conducting the spurious emissions test at the equipment output terminals was as follows
Frequency Span:	2 MHz per Division
Center Frequency:	Adjusted continuously for 10 MHz to 27 GHz
Resolution Bandwidth:	100 KHz
Video Filter:	Out
Input Attenuator Setting:	Input level was set for a full-scale calibration of the average digital power. All other frequencies were referenced to this point.
Spurious Emissions:	See chart

[2] Test was performed using a spectral shaping assembly and a channel combiner. The agile is routed to the correct filtering system by the spectral shaping assembly.