2.1055 Measurements required: Frequency stability.

(a) The frequency stability shall be measured with variation of ambient temperature as follows:

(1) From -30°C to +50°C for all equipment except that specified in paragraphs (a) (2) and (3) of this section.

NOTE: Paragraphs (a) (2) and (3) do not apply to this Part 27 equipment.

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10°C through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

. . .

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

Harris Response

Measurements were made in accord with 2.1055(a)(1), from -30°C to +50°C, and from -15% to +15% of the nominal AC line voltage.

An Apex Mobile exciter typical of all units to be used in the ATLAS Mobile transmitters was tested 1/18/2007. The following describes the procedure and the results of those tests.

Setup:

The exciter will be locked to a GPS 1pps source and the frequency counter will be locked to the same GPS reviewer 10MHz. The exciter will be placed in the environmental chamber and operated over the specified temp range. At each temperature the AC line voltage will be varied via a variac from nominal (120vac) to 85% (102vac) to 115% (138vac) .

Equipment:	**Manufacturer & Model**	**Serial Number**
GPS Receiver	Trimble Thunderbolt P/N 48050-61	832576657
Frequency Counter:	HP 53132A	08899
Multimeter:	HP 34401A	00971
Enviromental Chamber:	Tenny Versa Tenn Model T30RC	12437-51
Variac:	Powerstat 3PN2168	None
Exciter:	APEX FLO Exciter.	MSR13798-05-002

Data:

Temp in C	AC Line Voltage		
	102	120	138
-30	718999999.735	718999999.745	718999999.751
-20	718999999.926	718999999.931	718999999.951
-10	718999999.843	718999999.843	718999999.851
0	718999999.926	718999999.931	718999999.926
10	718999999.911	718999999.915	718999999.909
20	718999999.907	718999999.913	718999999.921
30	718999999.983	718999999.981	718999999.982
40	718999999.961	718999999.969	718999999.961
50	718999999.975	718999999.988	718999999.991

Requirement:
Per FLO Minimum Performance Specification the tolerance must be within +/- 1 x 10E-9. At 719MHz this equates to +/-0.719 Hz. The frequency must be within:

Minimum 718999999.281
Maximum 719000000.719

Conclusion:
This exciter and the transmitters using it are able to maintain frequency within the channel, as required by Part 27, and within the specification provided by Qualcomm.

Note:
While the data was taken in accordance with FCC regulations to -30°C, it must be noted that the exciter is not specified to operate below 0°C. Provision should be made to avoid operation below 0°C or shut down the equipment by external means.

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