

**MARS (SD4) Frequency Stability over Temperature (Below 1.5PPM)
Part 90.213 & 2.995**

GE MDS LLC. 12/06/07

To verify that the MARS output frequency did not shift by more than 1.5 PPM over the rated operating temperature, testing was done. The test was conducted in an environmental chamber with the temperature ranging from -30 to 50°C. The radio was operational during the entire part of the test with control line, power line and antenna line coming out of the chamber. The temperature was incremented by 10°C and once the thermocouple probe had reached the desired temperature the radio was soaked an additional 15 minutes at that temperature to be certain. Frequency stability was then measured on a communications test set (Aeroflex 3920). Below are the results of the temperature testing.

**Radio: MDS MARS
(SER 1699863)
MDS MARS Nominal
Tx Freq (425MHz)**

Nominal Supply Voltage

Ambient Temperature (°C)	10 V		13.8 V		16 V	
	Freq Error (Hz)	PPM	Freq Error (Hz)	PPM	Freq Error (Hz)	PPM
-30	145	0.341	81	0.191	148	0.348
-20	107	0.252	105	0.247	108	0.254
-10	206	0.485	206	0.485	206	0.485
0	252	0.593	252	0.593	254	0.598
10	294	0.692	295	0.694	290	0.682
20	213	0.501	217	0.511	204	0.480
30	38	0.089	43	0.101	26	0.061
40	- 179	- 0.421	- 173	- 0.407	- 190	- 0.447
50	- 377	- 0.887	- 372	- 0.875	- 388	- 0.913

From the results it is clear that the MDS Mars (SD4) radio meets the 1.5PPM criteria. The set desired frequency being 425.00MHz would indicate the frequency shift would have to be less than (+/-) 637.5 hertz. From the collected data, the largest deviation is at +50°C@16vdc, which is - 388 Hz, which is well inside the (+/-) 637.5 Hz or (+/-)1.5ppm spec.