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FCC / IC Certification Application
FCC ID: O8FCAGEMS
IC:3905A-CAGEMS

Treo 650 (GSM)
Frequency and Power Stability
Vs.
Temperature and Supply Voltage

IC: RSS132 - 6.3

IC: RSS 133 - 7

FCC: Part 2.1055

This document outlines the compliance of the Treo 650 against Industrie Canada RSS 132 and RSS 133 and FCC Part 2.1055 Frequency and power stability requirements for the Treo 650.

Frequency Versus Temperature and Supply Voltage

RSS132 Section 6.3 Compliance and FCC Part 2.1055 (900 MHz)

IC RSS 132 Section 6.3

The RF carrier frequency shall not depart from the reference frequency in excess of the following values:

Equipment type Frequency tolerances

(a) Base Station +1.5 parts per million

(b) Mobile Station +2.5 parts per million

FCC Part 2.1055 Specification:

-30 to 50 C temperature Range and a Supply voltage variation of +/- 15% from the nominal supply voltage.

Results: Frequency Vs Supply Voltage

The maximum Frequency Drift versus supply voltage was 0.00970638 PPM

Supply Voltage	Channel	Freq (MHz)	Reference Freq Delta (Hz)	Delta Freq from Ref (Hz)	Drift (PPM)
3.510	128	824.2		8	0.00970638
3.510	190	836.6		6	0.00717189
3.510	251	848.8		5	0.00589067
3.900	128	824.2	0	REF	
3.900	190	836.6	0	REF	
3.900	251	848.8	0	REF	
4.200	128	824.2		-5	-0.0060665
4.200	190	836.6		-5	-0.0059766
4.200	251	848.8		3	0.0035344

IC RSS 133 Section 9.2.1
FCC Part 2.1055

Results: Frequency Drift Vs. Temperature (900 MHz)

Temp (C)	Channel	Freq (MHz)	Freq Error (Hz)	Drift From Ref (Hz)	Drift (Micro %) IC Limit =5
-20	1013	824.7	10	10	1.213
-20	384	836.5	20	0	0.000
-20	777	848.3	10	20	2.358
-10	1013	824.7	11	9	1.091
-10	384	836.5	20	0	0.000
-10	777	848.3	25	5	0.589
0	1013	824.7	14	6	0.728
0	384	836.5	20	0	0.000
0	777	848.3	20	10	1.179
10	1013	824.7	17	3	0.364
10	384	836.5	20	0	0.000
10	777	848.3	25	5	0.589
20	1013	824.7	20	0	0.000
20	384	836.5	20	0	0.000
20	777	848.3	30	0	0.000
30	1013	824.7	16	4	0.485
30	384	836.5	15	5	0.598
30	777	848.3	28	2	0.236
40	1013	824.7	12	8	0.970
40	384	836.5	10	10	1.195
40	777	848.3	24	6	0.707
50	1013	824.7	10	10	1.213
50	384	836.5	5	15	1.793
50	777	848.3	22	8	0.943
60	1013	824.7	10	10	1.213
60	384	836.5	0	20	2.391
60	777	848.3	20	10	1.179

Frequency Drift Versus Temperature AND Supply Voltage

IC RSS133 Section 7 Compliance

Notes:

The standard requires over a voltage range of the case of the Treo possible. The nominal VDC. A 15% variation of 3.315 to 4.485 VDC.

In the case of 3.315VDCe the device to operate. In the case of 4.485VDC the device will shut down due to the over voltage protection circuitry.

7. Frequency Stability

The unmodulated carrier frequency shall be measured under the conditions specified below.

A sufficient stabilization period at each temperature shall be used prior to each

the unit to be tested +/- 15% form nominal. In 650, this is not operating voltage is 3.9 yields a voltage range

voltage is to low for the device to operate. In the case of 4.485VDC the device will shut down due to the over voltage protection circuitry.

The product was tested over the operating voltage range of nominal supply voltage +/-10% (3.51VDC to 4.20 VDC)

Additionally, the Treo 650 is not specified to operate down to -30C. As expected, the device did not operate at -30C, thus a measurement was not possible. The unit was tested fro -20 to + 60 C.

IC RSS133 Section 7 Compliance (1900MHz)

Frequency Drift Versus
Temperature and Supply Voltage

Temp (C)	VDC	Channel	Freq (MHz)	Tot Freq Drift Temp & VDC (HZ)	Drift (PPM) Limit (+/- 2.5)
-20	3.510	512	1850.2	-126.0	-0.068
-20	3.510	660	1879.8	-19.8	-0.011
-20	3.510	810	1909.8	-12.2	-0.006
-20	4.200	512	1850.2	-123.0	-0.066
-20	4.200	660	1879.8	-14.8	-0.008
-20	4.200	810	1909.8	-18.2	-0.010
-10	3.510	512	1850.2	-25	-0.014
-10	3.510	660	1879.8	-22	-0.012
-10	3.510	810	1909.8	-16.6	-0.009
-10	4.200	512	1850.2	-22	-0.012
-10	4.200	660	1879.8	-17	-0.009
-10	4.200	810	1909.8	-22.6	-0.012
0	3.510	512	1850.2	-31	-0.017
0	3.510	660	1879.8	-22	-0.012
0	3.510	810	1909.8	-16.3	-0.009
0	4.200	512	1850.2	-28	-0.015
0	4.200	660	1879.8	-17	-0.009
0	4.200	810	1909.8	-22.3	-0.012
10	3.510	512	1850.2	-31.7	-0.017
10	3.510	660	1879.8	-24	-0.013
10	3.510	810	1909.8	-12.5	-0.007
10	4.200	512	1850.2	-28.7	-0.016
10	4.200	660	1879.8	-19	-0.010
10	4.200	810	1909.8	-18.5	-0.010
20	3.510	512	1850.2		0.000
20	3.510	660	1879.8		0.000
20	3.510	810	1909.8		0.000
20	4.200	512	1850.2		0.000
20	4.200	660	1879.8		0.000
20	4.200	810	1909.8		0.000
30	3.510	512	1850.2	-27	-0.015
30	3.510	660	1879.8	-22.1	-0.012
30	3.510	810	1909.8	-12	-0.006
30	4.200	512	1850.2	-24	-0.013
30	4.200	660	1879.8	-17.1	-0.009
30	4.200	810	1909.8	-18	-0.009
40	3.510	512	1850.2	-27.2	-0.015
40	3.510	660	1879.8	-20.2	-0.011
40	3.510	810	1909.8	-14	-0.007
40	4.200	512	1850.2	-24.2	-0.013
40	4.200	660	1879.8	-15.2	-0.008
40	4.200	810	1909.8	-20	-0.010
50	3.510	512	1850.2	-24.4	-0.013
50	3.510	660	1879.8	-18.3	-0.010
50	3.510	810	1909.8	-14.7	-0.008
50	4.200	512	1850.2	-21.4	-0.012
50	4.200	660	1879.8	-13.3	-0.007
50	4.200	810	1909.8	-20.7	-0.011
60	3.510	512	1850.2	-16.0	-0.009
60	3.510	660	1879.8	-11.0	-0.006
60	3.510	810	1909.8	-11.7	-0.006
60	4.200	512	1850.2	-13.0	-0.007
60	4.200	660	1879.8	-6.0	-0.003
60	4.200	810	1909.8	-17.7	-0.009

FCC Part 2.1055 (FCC 1900 MHz)

Frequency Stability Vs Temperature

The maximum Frequency drift versus temperature was .05 PPM

Temp (C)	Channel	Freq (MHz)	Freq Error (Hz)	Drift From Ref (Hz)	Drift (Micro %) Limit =5
-20	512	1850.2	-112.0	93.0	0.050
-20	660	1879.8	-11.8	-4.2	-0.002
-20	810	1909.8	-10.2	0.2	0.000
-10	512	1850.2	-11	-8.0	-0.004
-10	660	1879.8	-14	-2.0	-0.001
-10	810	1909.8	-14.6	4.6	0.002
0	512	1850.2	-17	-2.0	-0.001
0	660	1879.8	-14	-2.0	-0.001
0	810	1909.8	-14.3	4.3	0.002
10	512	1850.2	-17.7	-1.3	-0.001
10	660	1879.8	-16	0.0	0.000
10	810	1909.8	-10.5	0.5	0.000
20	512	1850.2	-8.7	-10.3	-0.006
20	660	1879.8	-12.0	-4.0	-0.002
20	810	1909.8	-13.0	3.0	0.002
30	512	1850.2	-13	-6.0	-0.003
30	660	1879.8	-14.1	-1.9	-0.001
30	810	1909.8	-10	0.0	0.000
40	512	1850.2	-13.2	-5.8	-0.003
40	660	1879.8	-12.2	-3.8	-0.002
40	810	1909.8	-12	2.0	0.001
50	512	1850.2	-10.4	-8.6	-0.005
50	660	1879.8	-10.3	-5.7	-0.003
50	810	1909.8	-12.7	2.7	0.001
60	512	1850.2	-2.0	-17.0	-0.009
60	660	1879.8	-3.0	-13.0	-0.007
60	810	1909.8	-9.7	-0.3	0.000