

MEASUREMENT: 6

MEASUREMENT OF FREQUENCY STABILITY

MEASUREMENT: 6**SECTION 2.1055****MEASUREMENT OF FREQUENCY STABILITY****RESPONSE:**

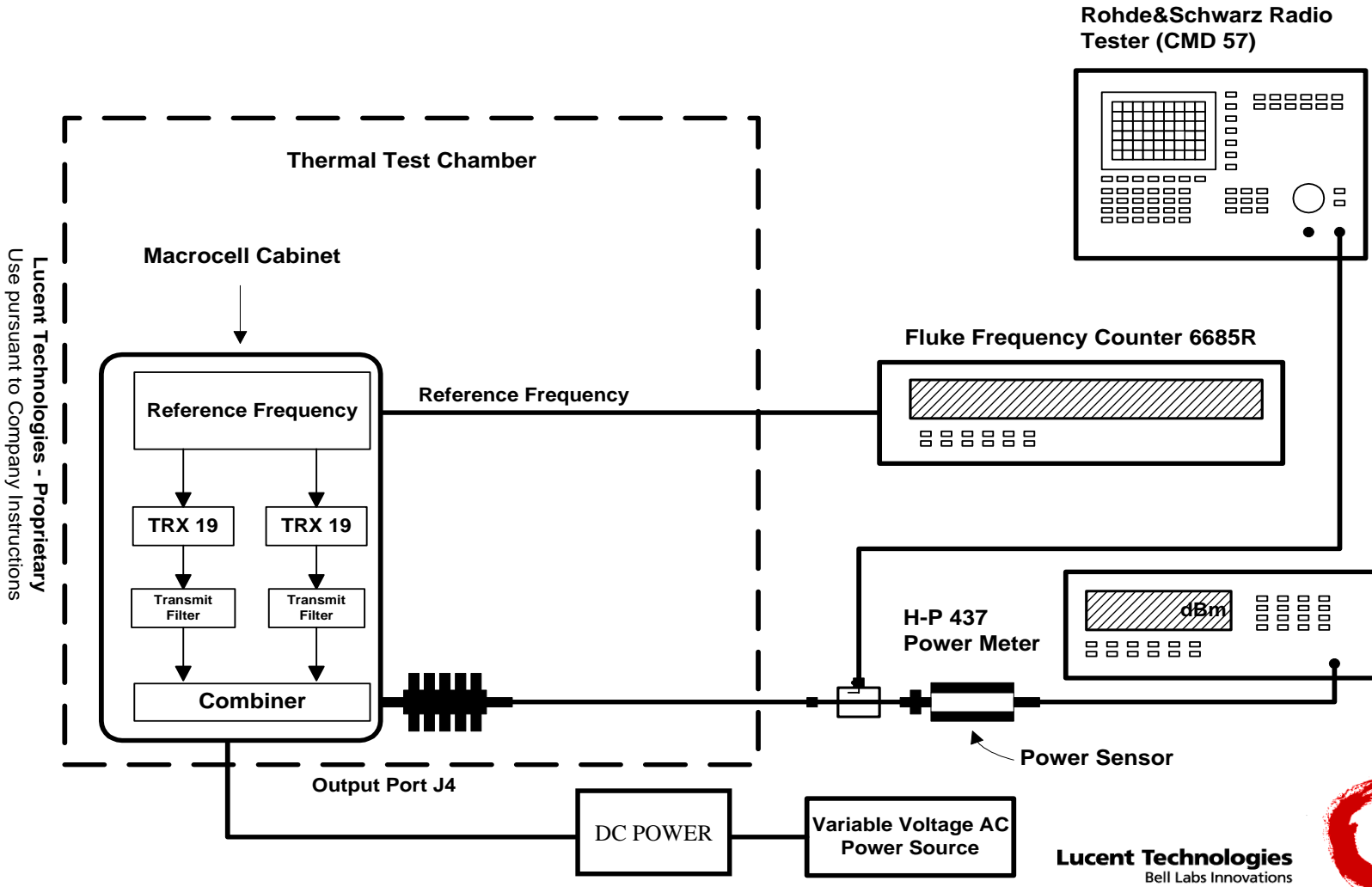
The frequency stabilization and accuracy of the GSM signal amplified by the TRX19 is a function of reference frequency generator used by the Voltage Controlled Oscillator (VCO). The reference frequency generator is highly accurate frequency unit which is phase-locked with VCO of the TRX19. Any change reference frequency generator will affect the output frequency of TRX19.

The frequency stability test data was measured TRXs installed and tested in a fully configured Flexent GSM indoor Macrocell Cabinet. The entire Macrocell Cabinet was subjected to the FCC specified environments while operating at full rated power. The 13 MHz reference oscillator deviations TRX19 output power frequency deviations were measured. The measurement setup is depicted in Figure 6 A. The TRX19 operates from 54V DC power supply and it is capable of operating in temperature range -15C to 55C. Below -15C, the TRXs shuts down by temperature sensors and software control. Therefore temperature stability characteristics are not measured below -15C. The low temperature shut down procedure is explained in following pages.

RESULTS:

The required frequency stability over temperature and voltage is 0.05 ppm. The attached measured data documents shows that the worse case frequency stability over temperature and voltage as 0.046 ppm.

TEST CONFIGURATION FOR FREQUENCY STABILITY



Lucent Technologies - Proprietary
Use pursuant to Company Instructions

APPLICANT: Lucent Technologies

FCC ID: AS5FLX-01

Lucent Technologies
Bell Labs Innovations



LOW TEMPERATURE SHUT DOWN PROCEDURE

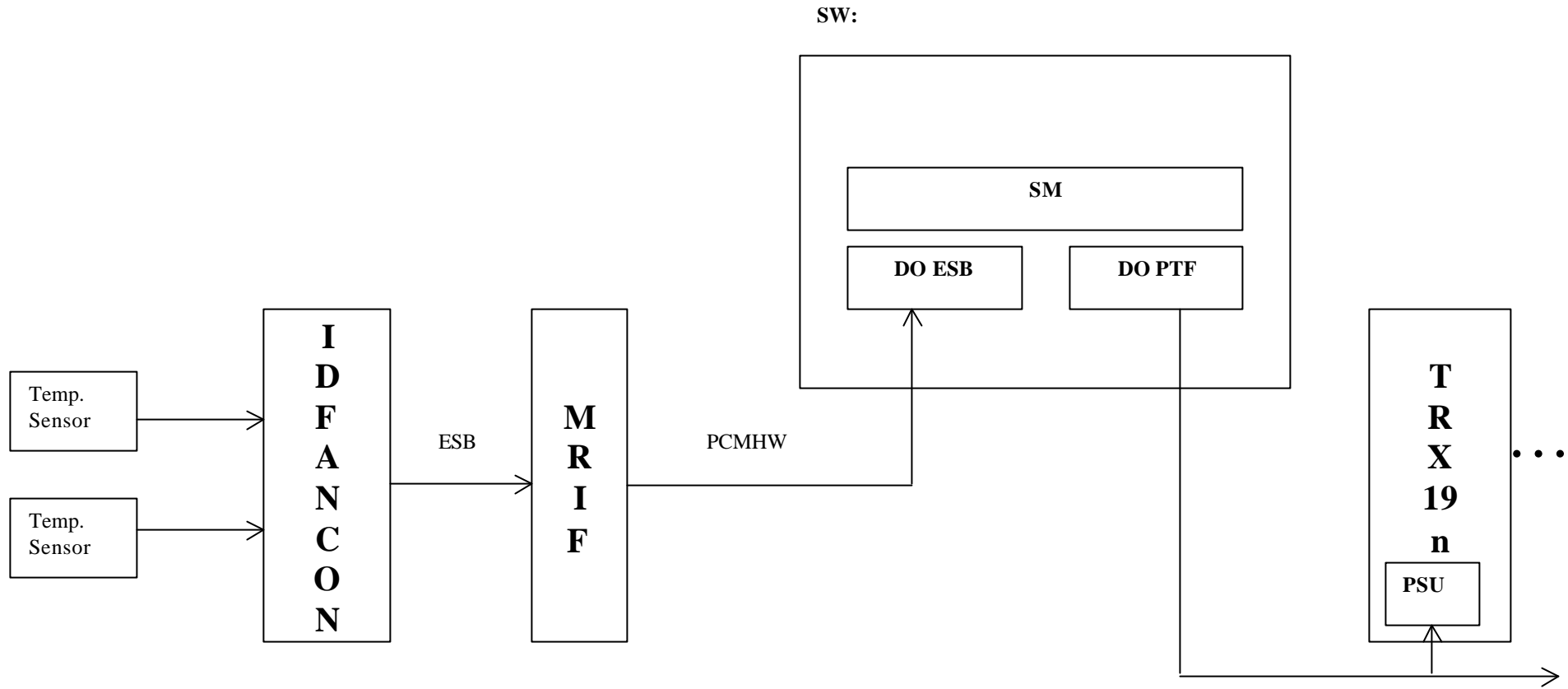
A signal flow diagram is attached to show the functionality with arrowheads.

In the indoor cabinet two temperature sensors are fitted in the door to measure the incoming air temperature. Both of these sensors are connected to the INDOOR FAN CONTROLLER unit fitted on top right corner of the cabinet. Temperature is measured by both IDFANCONs in parallel.

If one of these sensors senses a temperature of < -15 Degrees Celsius, an alarm, (IDFANCON_LOW_TEMP) under software control will be raised by the IDFANCON unit. This alarm signal is forwarded via MRIF to CC (Central Controller) which will interrupt the DO PTF and switch OFF the power to all TRx's. With power supply shut off, there is no transmission from any TRX19.

When 5 Degrees Celsius above the turn off temperature is reached then the alarm condition will be cleared. The SM (System Manager) will set power ON to all the TRX19' units.

All TRX19's will reboot and the unit will restore to normal functionality.



Block diagram for turning off the TRXs at low temperatures

ESB - External Signalling Bus

PCMHW - PCM Highway

SM - System Manager

Note: For other abbreviations see previous page.

**MEASUREMENT OF FREQUENCY STABILITY
(FLEXENT GSM MACROCELL IN-DOOR CABINET)**

Reference and Transmit Frequency Deviation at -15 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.56	47
0.5	13,000,000.58	41
1.0	13,000,000.55	36
1.5	13,000,000.59	39
2.0	13,000,000.57	44
2.5	13,000,000.55	42
3.0	13,000,000.56	43
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at -15 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.56	47
48.0	13,000,000.58	41
50.0	13,000,000.55	36
52.0	13,000,000.60	39
54.0	13,000,000.57	44
56.0	13,000,000.55	42
58.0	13,000,000.56	43
60.0	13,000,000.55	43
62.1	13,000,000.56	45
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at -10 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.58	37
0.5	13,000,000.52	27
1.0	13,000,000.55	34
1.5	13,000,000.52	35
2.0	13,000,000.52	39
2.5	13,000,000.54	31
3.0	13,000,000.55	38
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at -10 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.58	37
48.0	13,000,000.52	27
50.0	13,000,000.55	34
52.0	13,000,000.52	35
54.0	13,000,000.52	39
56.0	13,000,000.54	31
58.0	13,000,000.55	38
60.0	13,000,000.52	38
62.1	13,000,000.53	32
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at 0 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.26	-11
0.5	13,000,000.26	-8
1.0	13,000,000.27	-6
1.5	13,000,000.26	-10
2.0	13,000,000.27	-11
2.5	13,000,000.27	-8
3.0	13,000,000.26	-11
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at 0 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.26	13
48.0	13,000,000.26	-6
50.0	13,000,000.27	-6
52.0	13,000,000.26	-10
54.0	13,000,000.27	-11
56.0	13,000,000.27	-11
58.0	13,000,000.26	-10
60.0	13,000,000.27	-11
62.1	13,000,000.27	-5
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +10 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.18	-18
0.5	13,000,000.17	-17
1.0	13,000,000.19	-16
1.5	13,000,000.18	-20
2.0	13,000,000.19	-18
2.5	13,000,000.18	-21
3.0	13,000,000.18	-20
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +10 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.18	-18
48.0	13,000,000.20	-17
50.0	13,000,000.19	-16
52.0	13,000,000.19	-20
54.0	13,000,000.18	-18
56.0	13,000,000.19	-21
58.0	13,000,000.20	-20
60.0	13,000,000.20	-14
62.1	13,000,000.20	-15
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +20 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.13	-36
0.5	13,000,000.12	-29
1.0	13,000,000.12	-39
1.5	13,000,000.12	-32
2.0	13,000,000.13	-36
2.5	13,000,000.13	-26
3.0	13,000,000.13	-33
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +20 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.13	-36
48.0	13,000,000.12	-29
50.0	13,000,000.12	-39
52.0	13,000,000.12	-32
54.0	13,000,000.13	-36
56.0	13,000,000.13	-26
58.0	13,000,000.13	-33
60.0	13,000,000.12	-36
62.1	13,000,000.12	-30
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +30 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.06	-51
0.5	13,000,000.06	-45
1.0	13,000,000.05	-46
1.5	13,000,000.08	-47
2.0	13,000,000.07	-50
2.5	13,000,000.06	-51
3.0	13,000,000.07	-38
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +30 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.06	-51
48.0	13,000,000.06	-45
50.0	13,000,000.05	-46
52.0	13,000,000.08	-47
54.0	13,000,000.07	-50
56.0	13,000,000.06	-43
58.0	13,000,000.07	-51
60.0	13,000,000.06	-38
62.1	13,000,000.07	-52
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +40 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.06	-54
0.5	13,000,000.05	-51
1.0	13,000,000.06	-45
1.5	13,000,000.05	-48
2.0	13,000,000.06	-47
2.5	13,000,000.05	-47
3.0	13,000,000.06	-48
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +40 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.06	-54
48.0	13,000,000.05	-51
50.0	13,000,000.06	-45
52.0	13,000,000.05	-48
54.0	13,000,000.06	-47
56.0	13,000,000.05	-47
58.0	13,000,000.06	-48
60.0	13,000,000.06	-43
62.1	13,000,000.06	-47
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +50 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	12,999,999.98	-59
0.5	12,999,999.97	-57
1.0	12,999,999.96	-61
1.5	12,999,999.98	-61
2.0	12,999,999.97	-59
2.5	12,999,999.97	-62
3.0	12,999,999.98	-65
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +50 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	12,999,999.98	-61
48.0	12,999,999.97	-57
50.0	12,999,999.96	-61
52.0	12,999,999.98	-61
54.0	12,999,999.97	-59
56.0	12,999,999.97	-62
58.0	12,999,999.98	-69
60.0	12,999,999.97	-65
62.1	12,999,999.97	-60
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at +55 Degrees C @ 54 Volts		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.03	-63
0.5	13,000,000.03	-60
1.0	13,000,000.03	-65
1.5	13,000,000.03	-69
2.0	13,000,000.03	-68
2.5	13,000,000.03	-61
3.0	13,000,000.03	-64
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at +55 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	12,999,999.96	-61
48.0	12,999,999.96	-60
50.0	12,999,999.96	-63
52.0	12,999,999.96	-63
54.0	12,999,999.98	-60
56.0	12,999,999.97	-62
58.0	12,999,999.97	-62
60.0	12,999,999.97	-60
62.1	12,999,999.97	-64
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at 40 Degrees C @ 54 Volts (From +55 Degree C down to +20 C)		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.06	-50
0.5	13,000,000.07	-44
1.0	13,000,000.07	-49
1.5	13,000,000.06	-43
2.0	13,000,000.06	-48
2.5	13,000,000.06	-45
3.0	13,000,000.07	-52
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at 40 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.06	-50
48.0	13,000,000.05	-45
50.0	13,000,000.07	-47
52.0	13,000,000.07	-50
54.0	13,000,000.05	-50
56.0	13,000,000.06	-45
58.0	13,000,000.06	-48
60.0	13,000,000.06	-45
62.1	13,000,000.06	-51
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at 30 Degrees C @ 54 Volts (From +55 Degree C down to +20 C)		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.08	-44
0.5	13,000,000.07	-43
1.0	13,000,000.07	-52
1.5	13,000,000.06	-40
2.0	13,000,000.08	-49
2.5	13,000,000.05	-41
3.0	13,000,000.06	-53
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at 30 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.08	-44
48.0	13,000,000.07	-41
50.0	13,000,000.07	-46
52.0	13,000,000.06	-47
54.0	13,000,000.07	-47
56.0	13,000,000.06	-45
58.0	13,000,000.05	-45
60.0	13,000,000.06	-44
62.1	13,000,000.07	-48
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)

Reference and Transmit Frequency Deviation at 20 Degrees C @ 54 Volts (From +55 Degree C down to +20 C)		
Time (Minutes)	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
0	13,000,000.12	-36
0.5	13,000,000.13	-34
1.0	13,000,000.13	-33
1.5	13,000,000.11	-40
2.0	13,000,000.14	-32
2.5	13,000,000.12	-30
3.0	13,000,000.13	-33
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

Reference and Transmit Frequency Deviation at 30 degree C over voltage / frequency range		
Volts DC	Measurement Reference Frequency (Reference Frequency = 13MHz)	Tx Frequency Deviation (Hz)
45.9	13,000,000.12	-37
48.0	13,000,000.12	-33
50.0	13,000,000.14	-28
52.0	13,000,000.12	-34
54.0	13,000,000.13	-36
56.0	13,000,000.12	-31
58.0	13,000,000.13	-29
60.0	13,000,000.13	-30
62.1	13,000,000.13	-34
SPECIFICATION	+ / - .000000650 MHz or 0.65 Hz (+ / - 0.05 ppm)	+ / - 97.04 Hz (+ / - 0.05 ppm)
RESULTS	PASS	PASS

J4 RF Tx Power Deviation = 0.3 dBm, Transmit Channel Monitored: 565 (1940.8MHz)