SR100 Operational description

a) An operational description (relating to the block diagram) of all circuitry and devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation, and for limiting power.

Circuitry and devices for determining frequency

- The *Synthesizer* is an Fractional N PLL which is used to scale the reference clock from 13 MHz to the operating frequency between 860 MHz to 960 MHz.
- A TCXO reference provides the base frequency for the synthesizer.

Circuitry and devices for stabilizing frequency

- Attenuator pads on the output to increase reverse isolation and reduce pulling on the synthesizer.
- RF Shields to prevent radiated RF to couple back on the synthesizer circuitry and cause frequency instability or pulling.
- Matching circuitry on the output to decrease frequency instability due to mismatch between the synthesizer stage and the succeeding stages.

Circuitry and devices for suppression of spurious radiation

- Shields for suppression of spurious radiation due to power amplification.
- Low pass filter before the antenna port to suppression harmonics (especially the second harmonic) of the fundamental carrier frequency.

Circuitry and devices for limiting modulation and power

- Power detector, internal DAC, directional coupler, digital attenuator and a closed loop power control scheme implemented in the microcontroller limits both modulation depth and power to user specified values with an accuracy of +-1dB for a maximum power output of 30dBm (1 Watt).

b) Describe the modulation scheme; including the type of modulation, and a description of the modulating signal (e.g. video, audio, or data). If applicable, include the maximum data rate, modulation index, and maximum transmit time during any 100 mS period. Make reference to any applicable interoperability standards or communication protocols.

Description of modulation scheme

Transmit modulation on the SkyeModule M10 Rev. G is dependent on the Tag protocol supported and used on the device. The M10 Rev. G natively supports the following Tag protocols

1. EPC Class1 Gen2 / ISO 180006C

2. ISO 180006B
3. EM4122 and EM 4123

The maximum transmit time in a 100ms period, modulation depth and data rate are a factor of the protocol under consideration. The type of modulation and description can similarly be found on the respective protocol standards.

c) If the device is a Part 15.247 frequency hopping transmitter, describe compliance of the associated receiver with 15.247(a)(1) of the FCC rules (see attachment). Specifically, explain how the receiver's input bandwidth matches the hopping channel bandwidth of the corresponding transmitter and how the receiver shifts frequencies in synchronization with the transmitted signal.

Compliance with 15.247(a)(1)

The SkyeModule M10 Rev. G is a frequency hopping transmitter and therefore complies with the receiver specifications laid out in the Part 15.247(a)(1). The input bandwidth of the receiver is filtered to match the hopping channel frequency of the transmitter and tracks the frequency of the transmitter because of its zero IF architecture thus maintaining synchronization at all times during operation.

d) If the device is a Part 15.247 frequency-hopping transmitter, describe how the device meets the definition of a frequency-hopping spread spectrum system found in Section 2.1. The description should include the number of hopping frequencies, the time of occupancy (dwell time) per hopping channel and an explanation of how the hopping sequence is generated (provide an example of the hopping channel sequence). Also include a description of how each of the EUT's hopping channels is used equally on average.

Compliance with Frequency hopping spread spectrum

The SkyeModule M10 Rev. G is a frequency hopping spread spectrum systems since it changes its frequency of operation at a predetermined rate and at specific frequencies. The M10 hops with nominal channel spacing of 200 KHz and at a minimum of 50 channels between 902 and 928 MHz. The M10 dwells at a channel for no more than 100 ms which is ensured with a timer driven interrupt on the microcontroller. The hopping channels are chosen pseudo randomly using a pseudo random function within the microcontroller which takes as its seed a random value (the system timer register value before commencement of hopping). The normal probability distribution of the pseudo random number ensures equal number of utilization of every channel over a sufficient time interval.

Example for hopping 50 times among 50 channels between 902 – 928 MHz (channel spacing = 200 KHz)

Hopping Sequence	*Hopping Channel*
1	913
2	916.4
3	918.8
4	916.2
5	913.6
6	918.4
7	916
8	918.6
9	912.4
10	914
11	911
12	918
13	917.2
14	915.4
15	919.8
16	920
17	917.4
18	910.2
19	915.2
20	919.4
21	911.8
22	915.8
23	911.2
24	910.8
25	913.8
26	914.2
27	911.6
28	912.2
29	918.2
30	912
31	919.2
32	912.6
33	913.4
34	911.4
35	910.4
36	919.6
37	912.8
38	917
39	917.8
40	915
41	916.6

42	914.4
43	914.6
44	919
45	917.6
46	913.2
47	916.8
48	915.6
49	910.6
50	914.8

e) If the device is a Part 15.247 frequency-hopping transmitter, describe how the EUT does not have the ability to coordinate with other FHSS systems in an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

M10's inability to coordinate with other FHSS systems

Through firmware design in compliance with the requirement for the product