FORM A
OPERATION DESCRIPTION – FOR DEVICES OTHER THAN PARTS 11, 15 AND 18 OF THE FCC RULES

This form will be used for the evaluation of devices other than parts 11, 15 and 18 of the FCC rules.

Please complete and return along with your other supporting exhibits.

SECTION A Type of Emission

Please state what Type of Emission(s) your device(s) has. Refer to FCC part 2.201 and 2.202 for more information.

Device Name/Model	Emission Type Description	Emission Type Code
NWJ26C001A / EB-VS3	*GMSK Phase modulation (0.2Mhz channel spacing)*	*330KGXW*

SECTION B Frequency Range

Please state what frequency range(s) your device(s) operates over. Please provide “From” and “To” frequencies.

Device Name/Model	Frequency Range (MHz)
NWJ26C001A / EB-VS3	*T/X 1850MHz – 1910MHz* *R/X 1930MHz – 1990MHz*

SECTION C Range of Operating Power

Please state the range(s) your device(s) operates over, and how the power adjustment is controlled.

Device Name/Model	Power Range (W)	Power Control
NWJ26C001A / EB-VS3	*0.001 – 1.0 Watts*	*Controlled by RF power detection and voltage control on PA gain control pin.*

SECTION D Maximum Power Rating

Please specify the maximum power rating(s) of your device(s) as defined in the applicable part(s) of the FCC rules.

Device Name/Model	Max Power (W)	FCC Part
NWJ26C001A / EB-VS3	*2.0 Watts*	*24.232*

SECTION E DC Voltages

Please specify the DC voltages applied to the DC currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

Device Name/Model	Power Level	DC Voltage	Component
NWJ26C001A / EB-VS3	*Max power (1.0 W)*	*3.7VDC nominal, 2.5A*	*RF Power Amplifier (PA)*

SECTION F Tune Up Procedure

Please provide Information about your Tune Up Procedure over the power range (previously specified) or at the specific power levels (also specified). For equipment employing digital modulation techniques, a detailed description of the modulation system to be employed must be provided. This will at least include the response characteristics (Frequency, Phase and Amplitude) or any filters provided, and a description of the modulation wave train, this shall be submitted for the maximum rated conditions under which the equipment will be operated.

See details in document below

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Supplement to FCC Form A.

Model: EB-VS3 FCC ID: NWJ26C001A

Function of the Active Devices-- Pursuant 2.983 (d6)

Transmitter

U102	SKY77328-13	Tri Band PA Module

Receiver

U101	PMB6270V V1.1	Transceiver IC
U103	ASM4518806T-2505P	Antenna Switch Module

Synthesizer

U401	MAA3278A	VCTCXO

Power control

U3002	PQ6CB11X1BP	DCDC IC
U900	PMB6812 V1.62	Regulator IC
Q902	RTQ035P02L02TR	Switching Transistor
U500	PMB8875 V1.18 G14	Base Band IC

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Circuit Descriptions

A. Means for Stabilizing Transmitter Output Frequency

To meet requirements of Subpart J Section 2.983(d10)

As a result of the following approach, the frequency stabilization requirement is achieved

1. Phase Locking

A Voltage Controlled local Oscillator (VCO) whose frequency output is divided in 1/2 and 1/4 to produce the desired RF frequency produces the transmitter carrier. The oscillator is phase locked to a reference oscillator by an independent PLL (Phased Locked Loop) circuit. The reference oscillator is a Voltage Controlled Temperature Compensated Crystal Oscillator (VCTCXO). Therefore, the transmitter carrier frequency has the same stability as the VCTCXO.

2. VCTCXO

The output frequency of the VCTCXO is frequency locked to the RF signal transmitted from a cellular base station by means of an Automatic Frequency Control (AFC) circuit. The received reference signal from the base station is down converted and compared to the mobile station internal frequency. Any differences between the base station reference frequency and the mobile station internal frequency are corrected by fine tuning the VCTCXO frequency. The AFC control circuit is designed such that the transmitter carrier output is maintained within ±0.1ppm of the base station reference frequency.

B. Means for Suppressing Spurious Radiation

To meet requirements of Subpart J Section 2.983(d-11)

As a result of the following approach, the attenuation requirement for spurious and harmonic radiation is achieved.

1. Shielding

The RF and Digital sections are enclosed by 3 shield can enclosures. These enclosures are soldered on the gold plated ground of the PCB. All oscillators are enclosed.

2. Filtering

Filtering is provided at ASM (Antenna Switch Module). Low pass filters contained in the ASM are separated by band. One filter is provided for 900MHz operation and Another one is provided for 1800 & 1900 MHz operation.

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C. Means for limiting Transmitter Output Power

To meet requirements of Subpart J Section 2.983(d-11)

The PA module employed in the design contains an integrated power control function. This power control method is based on control of collector current. A high-speed control loop is incorporated to regulate the collector current of the amplifier while maintaining a constant bias on each of the gain stages. By regulating collector current, the amplification stages are held in saturation across all power levels. As a result, output power fluctuations associated with variation in the supply voltage, input power, and temperature are minimized. A control voltage provided by the base band IC interfacing the PA module is used to select the desired output power of the transmitter.

D. Means for Digital Modulation

To meet requirements of Subpart J Section 2.983(d-11)
The GSM Transceiver IC employed in the design supports a Sigma-delta modulation system. That is, I & Q signals provided from the base band IC are directly up-converted to RF by this modulator. To limit the bandwidth of the transmitted signal, 0.3 Gaussian pre-modulation filtering is applied to the I & Q signals prior to modulating the carrier. The Gaussian pre-filtering is performed within the base band IC. In addition, low pass filtering contained in the Transceiver IC, is used to remove any additional digital clock noise. The modulation data rate for the signal is 270.833Kbps.

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