To Whomsoever It May Concern

This letter is being issued to confirm that Redpine Signals, Inc., will ensure that the following information is included in the RS9113DB (FCC ID: XF6-RS9113DB, IC ID: 8407A-RS9113DB) Module's Programming Manual for customers who use this module with different antennas to help them comply with the FCC/IC regulatory requirements for products which use the module's modular approval.

The list of antennas with which the module has been tested with and certified for FCC/IC are given in Table 1 below.

Antenna Make	Model/Part #	Antenna Gain at 2.4GHz (dBi)	Antenna Gain at 5GHz (dBi)	Type of Antenna
Redpine Signals	-	0.99	4.42	Trace
Molex	PS-47950-001	3	4.6	External
Fractus	FR05-S1-NO-1-004	1.8	4.9	Chip
Radiation Technology, Inc	C0289-ANG0011	5	5	Dipole

Table 1: List of Antennas Used for RS9113DB FCC/IC Certification

The RS9113DB Module's Programming Reference Manual will include the information listed below. The Manual is provided to customers as part of the module's collateral which also includes the module's software and firmware. The module's firmware applies the attenuations required to comply with the regulatory requirements based on the type of antenna programmed. The commands required to program the transmit power and the antenna type and the attenuations applied are given in the tables that follow.

1) Commands to program the antenna being used for Wi-Fi, Bluetooth and ZigBee – see Tables 2, 3 and 4.
2) Commands to set transmit power of the module for Wi-Fi, Bluetooth and ZigBee – see Tables 5, 6 and 7.
3) Transmit power and attenuation values used during testing with different Antennas – see Tables 9, 10, 11 and 12.

1.1 Commands to Program Antenna Type

1.1.1 Command to Program Antenna Type for Wi-Fi

Command Name	Program Antenna Type for Wi-Fi
Description	This command is used to program antenna being used by the module for Wi-Fi out of the list of certified antennas. This command needs to be given before creating the VAP in the normal mode and before the

	"./transmit" command in the Wi-Fi Performance Test mode.
Default Value	0
Input Parameters	Base Interface (string like rpine0) Integer value mapped as follows: 0 – Redpine Antenna 1 – Molex Antenna 2 – Fractus Antenna 3- Radiation Technology, Inc Antenna
Output Parameter	None
Reset Required	No
Usage	`# ./onebox_util <base_interface> ant_type <antenna_type>`
Example	The command below sets the Antenna type to Fractus Antenna for Wi-Fi: `# ./onebox_util rpine0 ant_type 2`

Table 2: Command to Program Antenna Type for Wi-Fi

1.1.2 Command to Program Antenna Type for Bluetooth:

Command Name	Program Antenna Type for Bluetooth
Description	This command is used to program antenna being used by the module for Bluetooth out of the list of certified antennas. This command needs to be given before creating the HCI interface in the normal mode and before the "./transmit" command in the Bluetooth Performance Test mode.
Default Value	0
Input Parameters	Base Interface (string like hci0) Integer value mapped as follows: 0 – Redpine Signals Antenna 1 – Molex Antenna 2 – Fractus Antenna 3- Radiation Technology, Inc Antenna

Output Parameter	None
Reset Required	No
Usage	# hcitool –i<hciX>cmd 0x3F 0x0008 <antenna_type>
Example	The command below sets the Antenna type to Molex for Bluetooth: # hcitool –i hci0 cmd 0x3F 0x0008 1

Table 3: Command to Program Antenna Type for Bluetooth

1.1.3 Command to Program Antenna Type for ZigBee:

Command Name	Program Antenna Type for ZigBee
Description	This command is used to program antenna being used by the module for ZigBee out of the list of certified antennas. This command needs to be given before creating the base interface (like zigb0) in the normal mode and before the "./transmit" command in the ZigBee Performance Test mode.
Default Value	0
Input Parameters	Base Interface (string like zigb0) Integer value mapped as follows: 0 – Redpine Antenna 1 – Molex Antenna 2 – Fractus Antenna 3- Radiation Technology, Inc Antenna
Output Parameter	None
Reset Required	No
Usage	# ./zb_utilant_type<antenna_type>
Example	The command below sets the Antenna type to Fractus for ZigBee: # ./zb_utilant_type 2

Table 4: Command to Program Antenna Type for Bluetooth

1.2 Commands to Program Transmit Power

1.2.1 Command to Program Transmit Power for Wi-Fi

Description	This command is used to program the transmit power of the module for Wi-Fi. If the value of transmit power exceeds the maximum allowed power supported by the channel specified by the regulatory domain, then the minimum of the two values will be used.
Default Value	-
Input Parameters	VAP Name (string like wifi0, wifi1, etc.) Integer value in dBm
Output Parameter	None
Reset Required	No.
Usage	`#iwconfig<vap_name>txpower<val_in_dBm>`
Example	The command below sets the Wi-Fi transmit power to 15dBm: `# iwconfig wifi0 txpower 15`
Output Parameter	None

Table 5: Command to Program Transmit Power for Wi-Fi

1.2.2 Command to Program Transmit Power for Bluetooth

Description	This command is used to program the transmit power of the module for Bluetooth. If the value of transmit power exceeds the maximum allowed power supported by the channel specified by the regulatory domain, then the minimum of the two values will be used.
Default Value	10 – For Bluetooth 2.1+EDR 8 – For Bluetooth LE
Input Parameters	Base Interface (string like hci0) Integer value mapped as follows: 1 – Bluetooth 2.1+EDR 2 – Bluetooth LE Integer value in dBm

Output Parameter	None
Reset Required	No.
Usage	`# hcitool –i<hciX>cmd 0x3F 0x0006 <protocol><tx_power>`
Example	The command below sets the Bluetooth 2.1+ EDR transmit power to 7dBm: `# hcitool –i hci0 cmd 0x3F 0x0006 0x01 7`
Output Parameter	None

Table 6: Command to Program Transmit Power for Bluetooth

1.2.3 Command to Program Transmit Power for ZigBee

Description	This command is used to program the transmit power of the module for ZigBee. If the value of transmit power exceeds the maximum allowed power supported by the channel specified by the regulatory domain, then the minimum of the two values will be used.
Default Value	12
Input Parameters	Integer value in dBm
Output Parameter	None
Reset Required	No.
Usage	`# ./zb_utiltx_power<value_in_dBm>`
Example	The command below sets the ZigBeetransmit power to 9dBm: `# ./zb_utiltx_power 9`
Output Parameter	None

Table 7: Command to Program Transmit Power for ZigBee

1.3 Maximum Transmit Power and Attenuation Values

The transmit power and attenuation value settings in the following tables are mentioned for IEEE 802.11a/b/g/n, Bluetooth and ZigBee for the Low, Mid and High channel frequencies. The table below lists the actual frequencies for each technology corresponding to the Low, Mid and High columns in subsequent tables.

Technology	Low Channel Frequency (MHz)	Mid Channel Frequency (MHz)	High Channel Frequency (MHz)
802.11b	2412	2437	2462
802.11g	2412	2437	2462
802.11n 20MHz Bandwidth	2412	2437	2462
802.11n 40MHz Bandwidth	2422	2442	2457
802.11a (5GHz U-NII- 1)	5180	5200	5240
802.11n 20MHz Bandwidth(5GHz U-NII- 1)	5180	5200	5240
802.11n 40MHz Bandwidth(5GHz U-NII- 1)	5190	--	5230
802.11a (5GHz U-NII- 3)	5745	5785	5825
802.11n 20MHz Bandwidth (U-NII- 3)	5745	5785	5825
802.11n 40MHz Bandwidth(5GHz U-NII- 3)	5755	---	5795
Bluetooth	2402	2440	2480
ZigBee	2405	2440	2480

Table 8: Low, Mid and High Channel Frequencies for Wi-Fi, Bluetooth and ZigBee

1.3.1 Maximum Transmit Power and Attenuation Values for Redpine Signals Antenna

Mode	Data Rate (Mbps)	Channels					
		Low		Mid		High	
		Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)
802.11 b	1	18	0	20	0	18	0
	11	19	0	20	0	19	0
802.11 g	6	13	0	20	0	12	0
	24	13	0	20	0	12	0
	54	13	0	20	0	12	0
802.11 n_20MHz	MCS0	11	0	20	0	10	0
	MCS4	11	0	20	0	10	0
	MCS7	11	0	20	0	10	0
802.11 n_40MHz	MCS0	6	2	8	2	5	1
	MCS4	6	2	8	2	5	1
	MCS7	6	2	8	2	5	1
802.11a (5GHz U-NII-1)	6	20	0	20	0	20	0
	24	20	0	20	0	20	0
	54	20	0	20	0	20	0
802.11n 20MHz (5GHz U-NII-1)	MCS0	20	0	20	0	20	0
	MCS4	20	0	20	0	20	0
	MCS7	20	0	20	0	20	0
802.11n 40MHz (5GHz U-NII-1)	MCS0	6	0	-	-	7	0
	MCS4	6	0	-	-	7	0
	MCS7	6	0	-	-	7	0
802.11a (5GHz U-NII-3)	6	5	0	10	0	9	0
	24	5	0	10	0	9	0
	54	5	0	10	0	9	0

802.11n 20MHz (5GHz U-NII-3)	MCS0	4	0	9	0	7	0
	MCS4	4	0	9	0	7	0
	MCS7	4	0	9	0	7	0
802.11n 40MHz (5GHz U-NII-3)	MCS0	2	0	-	-	6	0
	MCS4	2	0	-	-	6	0
	MCS7	2	0	-	-	6	0
Bluetooth	1	15	0	15	0	15	0
	2	15	0	15	0	15	0
	3	15	0	15	0	15	0
	LE	15	0	15	0	15	0
ZigBee	250kbps	16	0	16	0	16	0

Table 9: Maximum Transmit Power and Attenuation Values for Redpine signals Antenna

1.3.2 Maximum Transmit Power and Attenuation Values for Molex Antenna

Mode	Data Rate (Mbps)	Channels					
		Low		Mid		High	
		Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)
802.11 b	1	16	4	16	4	16	4
	11	16	4	16	4	16	4
802.11 g	6	11	2	18	2	10	2
	24	11	2	18	2	10	2
	54	11	2	18	2	10	2
802.11 n_20MHz	MCS0	10	2	18	3	9	2
	MCS4	10	2	18	3	9	2
	MCS7	10	2	18	3	9	2
802.11 n_40MHz	MCS0	6	2	8	3	5	2
	MCS4	6	2	8	3	5	2

	MCS7	6	2	8	3	5	2
802.11a (5GHz U-NII-1)	6	11	0	14	0	14	0
	24	11	0	14	0	14	0
	54	11	0	14	0	14	0
802.11n 20MHz (5GHz U-NII-1)	MCS0	10	0	14	0	14	0
	MCS4	10	0	14	0	14	0
	MCS7	10	0	14	0	14	0
802.11n 40MHz (5GHz U-NII-1)	MCS0	6	0	-	-	7	0
	MCS4	6	0	-	-	7	0
	MCS7	6	0	-	-	7	0
802.11a (5GHz U-NII-3)	6	5	0	10	0	9	0
	24	5	0	10	0	9	0
	54	5	0	10	0	9	0
802.11n 20MHz (5GHz U-NII-3)	MCS0	4	0	9	0	8	0
	MCS4	4	0	9	0	8	0
	MCS7	4	0	9	0	8	0
802.11n 40MHz (5GHz U-NII-3)	MCS0	2	0	-	-	7	0
	MCS4	2	0	-	-	7	0
	MCS7	2	0	-	-	7	0
Bluetooth	1	15	0	15	0	15	0
	2	16	0	16	0	16	8
	3	16	0	16	0	16	7
	LE	15	0	15	0	15	0
ZigBee	250kbps	15	0	15	0	15	0

Table 10: Maximum Transmit Power and Attenuation Values for Molex Antenna

1.3.3 Maximum Transmit Power and Attenuation Values for Fractus Antenna:

Mode	Data Rate (Mbps)	Channels					
		Low		Mid		High	
		Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)
802.11 b	1	16	3	16	3	16	3
	11	16	3	16	3	16	3
802.11 g	6	11	3	18	3	10	3
	24	11	3	18	3	10	3
	54	11	3	18	3	10	3
802.11 n_20MHz	MCS0	10	3	18	4	9	3
	MCS4	10	3	18	4	9	3
	MCS7	10	3	18	4	9	3
802.11 n_40MHz	MCS0	6	1	8	2	5	1
	MCS4	6	1	8	2	5	1
	MCS7	6	1	8	2	5	1
802.11a (5GHz U-NII-1)	6	12	0	14	0	14	0
	24	12	0	14	0	14	0
	54	12	0	14	0	14	0
802.11n 20MHz (5GHz U-NII-1)	MCS0	12	0	14	0	14	0
	MCS4	12	0	14	0	14	0
	MCS7	12	0	14	0	14	0
802.11n 40MHz (5GHz U-NII-1)	MCS0	7	0	-	-	7	0
	MCS4	7	0	-	-	7	0
	MCS7	7	0	-	-	7	0
802.11a (5GHz U-NII-3)	6	5	0	10	0	10	0
	24	5	0	10	0	10	0
	54	5	0	10	0	10	0

802.11n 20MHz (5GHz U-NII-3)	MCS0	4	0	9	0	9	0
	MCS4	4	0	9	0	9	0
	MCS7	4	0	9	0	9	0
802.11n 40MHz (5GHz U-NII-3)	MCS0	3	0	-	-	8	0
	MCS4	3	0	-	-	8	0
	MCS7	3	0	-	-	8	0
Bluetooth	1	15	0	15	0	15	0
	2	16	0	16	0	16	8
	3	16	0	16	0	16	8
	LE	15	0	15	0	15	0
ZigBee	0.25	15	0	15	0	15	0

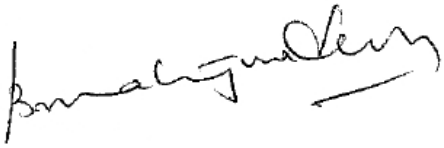
Table 11: Maximum Transmit Power and Attenuation Values for Fractus Antenna

1.3.4 Maximum Transmit Power and Attenuation Values for Radiation Technology, Inc Antenna:

Mode	Data Rate (Mbps)	Channels					
		Low		Mid		High	
		Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)	Max. Tx Power (dBm)	Attenuation Value (dBm)
802.11 b	1	16	3	16	3	16	3
	11	16	3	16	3	16	3
802.11 g	6	11	3	18	3	10	3
	24	11	3	18	3	10	3
	54	11	3	18	3	10	3
802.11 n_20MHz	MCS0	10	3	18	4	9	3
	MCS4	10	3	18	4	9	3
	MCS7	10	3	18	4	9	3
802.11	MCS0	6	1	8	2	5	1

n_40MHz	MCS4	6	1	8	2	5	1
	MCS7	6	1	8	2	5	1
802.11a (5GHz U-NII-1)	6	12	0	14	0	14	0
	24	12	0	14	0	14	0
	54	12	0	14	0	14	0
802.11n 20MHz (5GHz U-NII-1)	MCS0	12	0	14	0	14	0
	MCS4	12	0	14	0	14	0
	MCS7	12	0	14	0	14	0
802.11n 40MHz (5GHz U-NII-1)	MCS0	7	0	-	-	7	0
	MCS4	7	0	-	-	7	0
	MCS7	7	0	-	-	7	0
802.11a (5GHz U-NII-3)	6	5	0	10	0	10	0
	24	5	0	10	0	10	0
	54	5	0	10	0	10	0
802.11n 20MHz (5GHz U-NII-3)	MCS0	4	0	9	0	9	0
	MCS4	4	0	9	0	9	0
	MCS7	4	0	9	0	9	0
802.11n 40MHz (5GHz U-NII-3)	MCS0	3	0	-	-	8	0
	MCS4	3	0	-	-	8	0
	MCS7	3	0	-	-	8	0
Bluetooth	1	15	0	15	0	15	0
	2	16	0	16	0	16	8
	3	16	0	16	0	16	8
	LE	15	0	15	0	15	0
ZigBee	0.25	15	0	15	0	15	0

Table 12: Maximum Transmit Power and Attenuation Values for Radiation Technology, Inc Antenna



Mallik Reddy

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