WISMO2x8 to HiLoNC V2 Migration Guide

HiLo Series

SIERRA WIRELESS

4114701
1.0
September 30, 2013

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Document History

Version	Date	Updates
1.0	September 30, 2013	Creation

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1. Introduction

This document provides guideline for designing applications based on the HiLoNC V2 product. Recommendations are provided to maximize the efficient migration from the AirPrime WISMO2x8 to the HiLoNC V2.

This document also defines the differences between both products and provides solutions. This document does not cover all the specifics and characteristics of the HiLoNC V2.

Refer to the various documents recommended in the List of References to design your product, found on the Sierra Wireless Developer Zone.

2. Reference Documents

2.1. List of References

HiLoNC V2 Technical Specification

URD1– OTL 5665.3– 001 / 71927 Edition 06

HiLoNC V2 Application Note

URD1– OTL 5665.3– 003 / 72238 Edition 02

HiLo Radio Application Note

URD1 - OTL 5635.1– 118 / 72618 ED01

AirPrime - WISMO218 - Product Technical Specification and Customer Design Guidelines

4111957

AirPrime - WISMO228 - Product Technical Specification and Customer Design Guidelines

4111958

All these documents are available on the Sierra Wireless Developer Zone.

2.2. Glossary

Term	Definition
GND	Ground
NC	Not Connected When a pin is marked as not connected, it means that no connection should be made from that pin to the application board.
Reserved	When a pin is marked as Reserved, it means that no connection should be made from the module pin to the application board; and that there might be a connection to the pin from within the module.

3. General Description

3.1. General Information

The table below defines the most important points of the HiLoNC V2 and the AirPrime WISMO2x8.

Table 1. Comparison Table Between the WISMO2x8 and HiLoNC V2

WISMO2x8	HiLoNC V2
	
STE 4901	**STE 4852**
Dual band (WS218) or quad band (WS228)	Quad band GSM
GSM / GPRS Class 10	GSM / GPRS Class 10
WISMO2x8 (commercial grade): -25°C / +75°C Class A -40°C / +85°C Class B -40°C / +85°C Storage	-40°C / +85°C Normal Temp range -40°C / +85°C Storage
1 x Full UART interface 1 x SPI interface (for trace only) 1 x Differential Analog Audio output 1 x Differential Analog Audio input 1 x ADC 3 x GPIO 1 x RTC 3 x PWM (include 1 x Buzzer)	1 x Full UART interface 1 x UART interface (for trace only) 1 x Differential Analog Audio output 1 x single ended Analog Audio input 1 x PCM 1 x ADC 3 x GPIO 1 x RTC 3 x PWM (include 1 x Buzzer)
25mm x 25mm x 2.8mm (typical)	24mm x 24mm x 2.5mm (typical)

4. Hardware Compatibility

4.1. Electrical Compatibility

4.1.1. Block Level Functional Compatibility

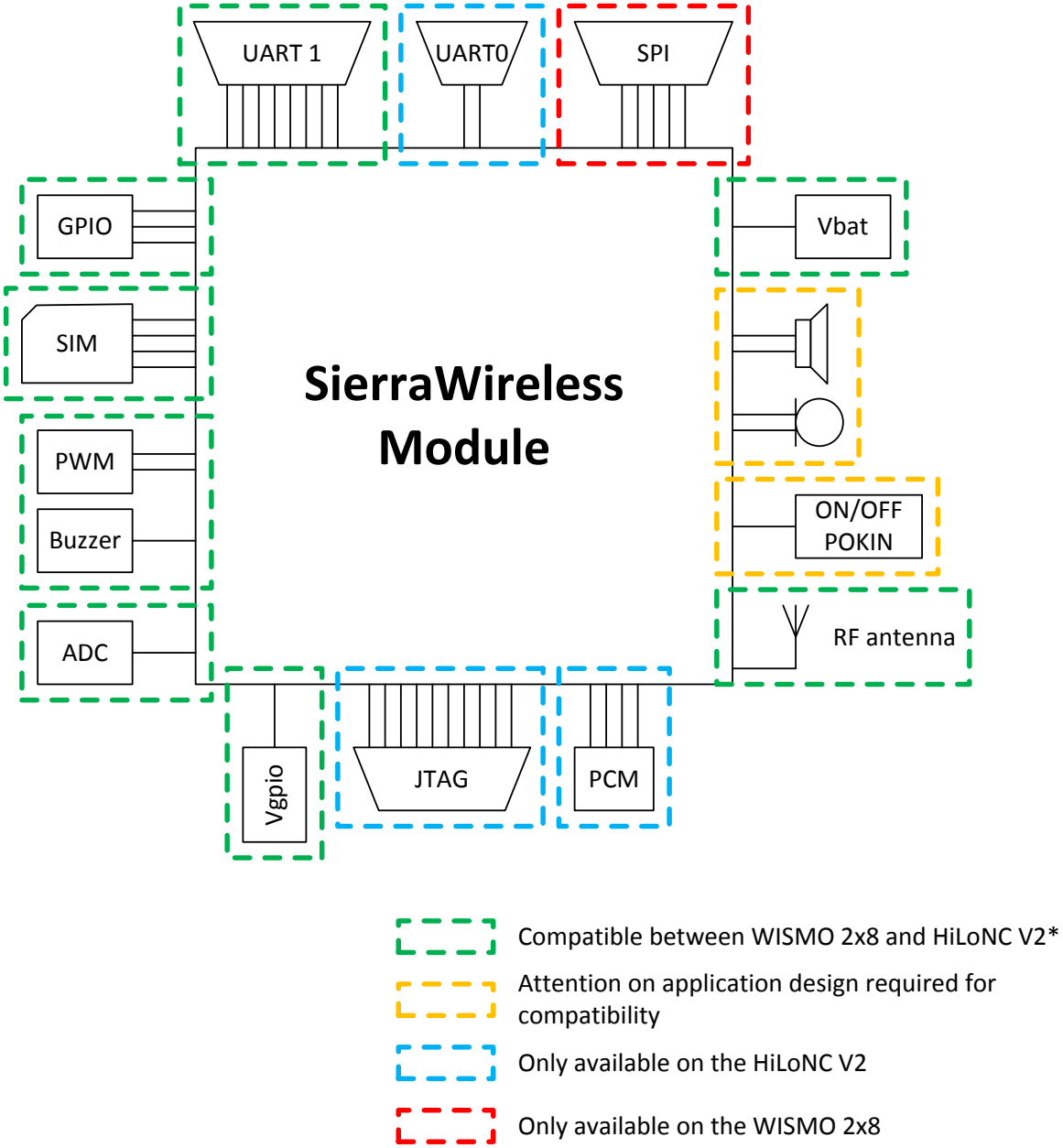


Figure 1. Block Level Functional Compatibility

* Some minor electrical characteristics differences may exist; refer to the Technical Specification listed in section 2.1 for complete information regarding both products.

4.1.2. Castellation Connector Pin Configuration

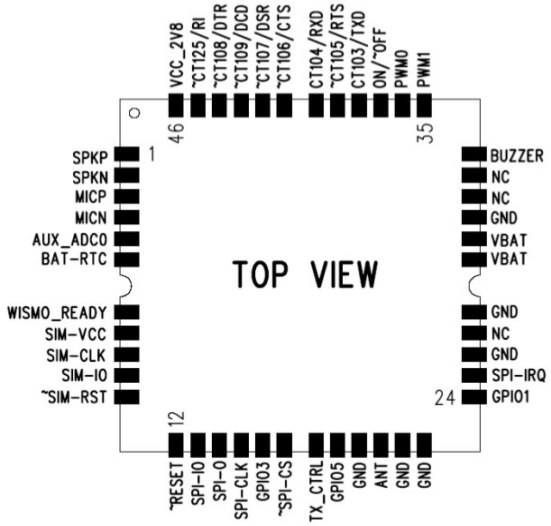
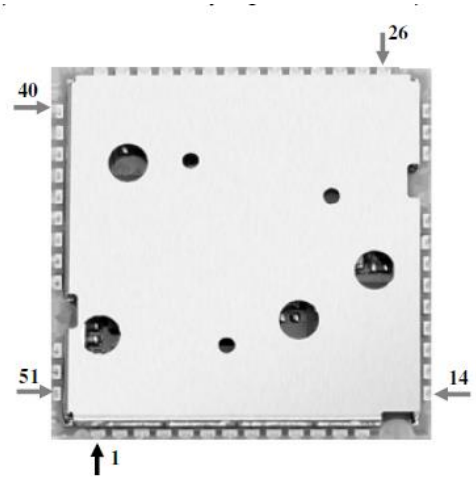
WISMO2x8	HiLoNC V2
	

Figure 2. Castellation Connector Pin Configuration

4.1.3. Pinout

Table 2. WISMO2x8/HiLoNC V2 Pinout

AirPrime WISMO2x8				HiLoNC V2			
1	**SPKP**	Speaker output positive 32Ω	Analog	**1**	**INTMIC_P**	Single ended input from microphone	Analog input
2	**SPKN**	Speaker output negative 32Ω	Analog	**2**	**AUX_ADC0**	Analog to digital converter	Analog input
3	**MICP**	Microphone input positive	Analog	**3**	**GND**	Ground	Ground
4	**MICN**	Microphone input negative	Analog	**4**	**VGPIO**	2.8V power supply output	I
5	**AUX_ADC0**	Analog to digital converter	I	**5**	**VBACKUP**	Power supply for RTC backup	I/O
6	**BAT-RTC**	Power supply for RTC backup	I	**6**	**PWM0**	DC PWM0	O
7	**WISMO_READY**	2.8 WISMO Ready	O	**7**	**RESET**	Module Reset	I
8	**SIM-VCC**	SIM power supply	O	**8**	**TDI**	JTAG purpose	I
9	**SIM-CLK**	SIM clock	O	**9**	**TDO**	JTAG purpose	O
10	**SIM-IO**	SIM data	I/O	**10**	**TMS**	JTAG purpose	I/O
11	**~SIM-RST**	SIM reset	O	**11**	**TRST**	JTAG purpose	I/O
12	**~RESET**	input reset signal	I	**12**	**TCK**	JTAG purpose	I/O
13	**SPI-IO**	2.8V SPI data input	I/O	**13**	**RTCK**	JTAG purpose	I/O
14	**SPI-O**	2.8V SPI data ouput	O	**14**	**GPIO2**	General purpose I/O 2	I/O
15	**SPI-CLK**	2.8V SPI clock output	O	**15**	**GPIO1**	General purpose I/O 1	I/O
16	**GPIO3**	2.8V GPIO	I/O	**16**	**RF_TX**	RF power transmitting indicator	O
17	**~SPI-CS**	2.8V SPI chip selection output	O	**17**	**PCM_CLK**	PCM clock signal	I/O
18	**TX_CTRL**	2.8V TX Burst Indicator	O	**18**	**PCM_SYNC**	PCM sync signal	I/O
19	**GPIO5**	2.8 GPIO	I/O	**19**	**PCM_OUT**	PCM data output	O
20	**GND**	Ground	Ground	**20**	**PCM_IN**	PCM data input	I
21	**ANT**	Radio antenna connection	RF	**21**	**GND**	Ground	Ground

AirPrime WISMO2x8				HiLoNC V2			
22	**GND**	Ground	Ground	**22**	**JTAG1**	JTAG configuration	I/O
23	**GND**	Ground	Ground	**23**	**JTAG2**	JTAG configuration	I/O
24	**GPIO1**	2.8V GPIO	I/O	**24**	**TEST**	JTAG configuration	I/O
25	**SPI-IRQ**	2.8 SPI interrupt request input	I	**25**	**UART0_RXD**	Trace UART0 receive	I
26	**GND**	Ground	Ground	**26**	**GPIO3**	General purpose I/O 3	I/O
27	**NC**	Not connected	NA	**27**	**GND**	Ground	Ground
28	**GND**	Ground	Ground	**28**	**ANT**	Radio antenna connection	RF
29	**VBATT**	Power supply	I	**29**	**GND**	Ground	Ground
30	**VBATT**	Power supply	I	**30**	**VBAT**	Power supply	I
31	**GND**	Ground	Ground	**31**	**VBAT**	Power supply	I
32	**NC**	Not connected	NA	**32**	**UART0_TXD**	Trace UART0 transmit	O
33	**NC**	Not connected	NA	**33**	**UART1_DSR**	UART1 data set ready	O
34	**BUZZER**	2.8V Buzzer PWM2	O	**34**	**UART1_DCD**	UART1 data carrier detect	O
35	**PWM1**	2.8V DC PWM 1	O	**35**	**UART1_RI**	UART1 ring indicator	O
36	**PWM0**	2.8V DC PWM 2	O	**36**	**UART1_DTR**	UART1 data terminal ready	I
37	**On/~OFF**	Power On control signal	I	**37**	**UART1_RTS**	UART1 request to send	I
38	**CT103/TXD***	2.8V UART1: Transmit data	I	**38**	**UART1_RX**	UART1 receive	I
39	**~CT105/RTS***	2.8V UART1: Request to send	I	**39**	**UART1_TX**	UART1 transmit	O
40	**CT104/RXD***	2.8V UART1: Receive data	0	**40**	**UART1_CTS**	UART1 clear to send	O
41	**~CT106/CTS***	2.8V UART1: Clear to send	0	**41**	**POK_IN**	Module power on signal	I
42	**~CT107/DSR**	2.8V UART1: Data set ready	0	**42**	**PWM2**	Buzzer PWM	O
43	**~CT109/DCD**	2.8V UART1: Data carrier datect	0	**43**	**PWM1**	DC PWM 1	O
44	**~CT108/DTR**	2.8V UART1: Data terminal ready	I	**44**	**SIM_CLK**	SIM clock	O
45	**~CT125/RI**	2.8V UART1: Ring indicator	0	**45**	**SIM_RST**	SIM reset	O
46	**VCC_2V8**	2.8V power supply from the embedded module	0	**46**	**SIM_DATA**	SIM data	I/O

AirPrime WISMO2x8				HiLoNC V2			
				47	**VSIM**	SIM power supply	O
				48	**VBAT**	Power supply	I
				49	**GND**	Ground	Ground
				50	**HSET_OUT_P**	Differential output to earphone 32Ω	O
				51	**HSET_OUT_N**	Differential output to earphone 32Ω	O

4.1.3.1. RF Band

The following table shows the RF capabilities of each embedded module

Table 3. RF Band Supported

Module	RF Band	Class
WISMO218	Bi band GSM (900/1800)	GPRS class10
WISMO228	Quad band GSM	GPRS class10
HiLoNC V2	Quad band GSM	GPRS class10

4.1.3.2. Temperature Range

Table 4. Operating Temperature Range

Module	RF Band
WISMO218	-25°C to +75°C Class A -40°C to +85°C Class B -40°C to +85°C Storage
WISMO228	-25°C to +75°C Class A -40°C to +85°C Class B -40°C to +85°C Storage
HiLoNC V2	-40°C to +85°C Class A -40°C to +85°C Class B -40°C to +85°C Storage

4.1.3.3. Power Supply

Table 5. Operating Voltages

VBAT	Wismo2x8	HiLoNC V2
V_{BAT} Min.	3.2 volt	3.2 volt
V_{BAT} Nominal	3.6 volt	3.7 volt
V_{BAT} Max.	4.8 volt	4.5 volt

Caution: *The Nominal Vin is slightly different but Vin Min. is the same on both products. The use of one or the other module should not require redesign of power supply.*

4.1.4. Application Design Limitation

4.1.4.1. RF Antenna Interface Direct Migration

There is no difference between the main antenna port of the WISMO 2x8 and the HiLoNC V2.

Table 6. RF Antenna Interface

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
20	GND	Ground	-	27	GND	Ground	-
21	ANT	Antenna port	-	28	RF	Antenna Port	-
22	GND	Ground	-	29	GND	Ground	-

4.1.4.2. Audio Interface

4.1.4.2.1. Analog Audio Interface

Table 7. Analog Audio Interface

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
1	SPKP	Speaker output positive 32Ω		50	/HSET_OUT_P	Differential output to earphone 32Ω	
2	SPKN	Speaker output negative 32Ω		51	/HSET_OUT_N	Differential output to earphone 32Ω	
3	MICP	Microphone input positive		1	/INTMIC_P	Single ended input from microphone	
4	MICN	Microphone input negative					

Caution: *The HiLoNC V2 support only single ended microphone. To avoid digital tracks crossing under and over the audio tracks. Some design layout precaution must be taken to avoid TDMA noise. For more details please see the § 8 AUDIO INTEGRATION and § 9 RECOMMENDATIONS ON LAYOUT OF CUSTOMER'S BOARD on the HiLoNC V2 Application Note.*

Caution: *For single-ended connections, the negative pole of the microphone, MICN, should be connected to GND.*

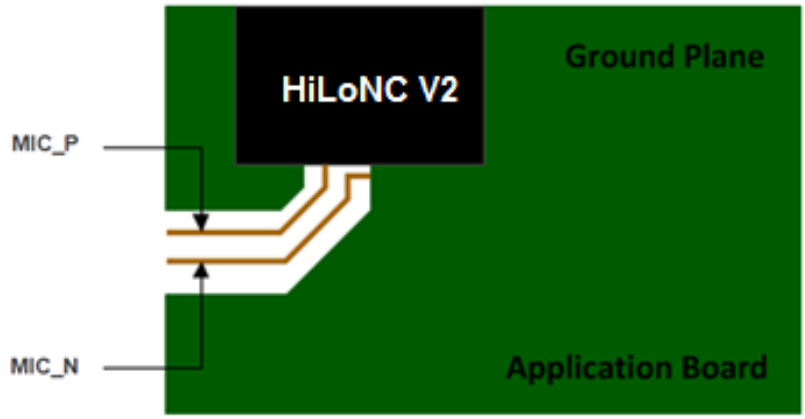


Figure 3. Example layout for single ended connection

Note: The WISMO2x8 use different audio amplifiers which results in different output power levels. The difference in the output power level can be easily compensated using gain control. Please refer to the HiLo AT commands interface specification.

4.1.4.2.2. Digital Audio Interface

The HiLoNC V2 embed a PCM Digital Audio Interface (Not supported by the WISMO2x8)

Table 8. Digital Audio Interface

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
			-	17	/PCM_CLK	PCM clock signal	2.8V
			-	18	/PCM_SYNC	PCM sync signal	2.8V
				19	/PCM_OUT	PCM data output	2.8V
			-	20	/PCM_IN	PCM data input	2.8V

4.1.4.3. Digital Control Signal

4.1.4.3.1. Turning On the Embedded Modules

Turning the embedded module ON is controlled by pin 37 for the WISMO2x8 and pin 41 for the HiLoNC V2. Note that both signals behave differently. The following table shows the differences between the control logic of the embedded modules.

Table 9. Turn On The Embedded modules

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
37	On/~OFF	Power On control signal	2.8V	41	/POK_IN	Module power on signal	3.0V

POK_IN is internally pulled up, a simple open collector or open drain transistor can be used for ignition.

Caution: *To start the HiLoNC V2 module, a low level pulse must be applied on POK_IN during 2000 ms, while the WISMO2x8 need 685 ms.*

Note: The POK_IN cannot be used for power off the module

Caution: *The POK_IN will become low after module is ready. An open collector or open drain transistor must be used. The POK_IN cannot be direcly driven by a GPIO signal.*

4.1.4.3.2. Turning OFF the Embedded Modules

4.1.4.3.2.1. Hardware Power Off

The POK_IN cannot be used for powering off the HiLoNC V2 module.

4.1.4.3.2.2. Software Power Off

The AT command AT+PSCPOF is used to power OFF the HiLoNC V2.

Note: Whatever the state of the POK_IN, when AT+PSCPOF is used, the module is turn OFF

4.1.4.3.3. Reset ✓ Direct Migration

WISMO2x8 and HiLoNC V2 both have an input RESET pin. This is a hardware reset and should only be used for emergency resets.

Table 10. Reset

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
12	~RESET	input reset signal	2.8V	7	/RESET_IN	Module Reset	2.8V

4.1.4.3.4. GPIO(s) ✓ Direct Migration

Three GPIOs are available:

Table 11. GPIO(s)

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
24	GPIO1	2.8 GPIO	2.8V	15	/GPIO1	General purpose I/O 1	2.8V
16	GPIO3	2.8 GPIO	2.8V	14	/GPIO2	General purpose I/O 2	2.8V
19	GPIO5	2.8 GPIO	2.8V	26	/GPIO3	General purpose I/O 3	2.8V

4.1.4.3.5. Signal for TX Burst Indication

Table 12. Signal for TX Burst Indication

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
18	TX_CTRL	2.8V TX Burst Indicator	2.8V	16	/RF_TX	RF power transmitting indicator	2.8V

4.1.4.4. Interfaces

4.1.4.4.1. UART1 Interface Direct Migration

WISMO2x8 and HiLoNC V2 both support full flow control signals UART Up to 115.2kbps with auto-bauding.

Table 13. UART1 Interface

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
38	CT103/TXD*	2.8V UART1: Transmit data	2.8V	39	/UART1_TX	UART1 transmit	2.85V
39	~CT105/RTS*	2.8V UART1: Request to send	2.8V	37	/UART1_RTS	UART1 request to send	2.85V
40	CT104/RXD*	2.8V UART1: Receive data	2.8V	38	/UART1_RX	UART1 receive	2.85V
41	~CT106/CTS*	2.8V UART1: Clear to send	2.8V	40	/UART1_CTS	UART1 clear to send	2.85V
42	~CT107/DSR	2.8V UART1: Data set ready	2.8V	33	/UART1_DSR	UART1 data set ready	2.8V
43	~CT109/DCD	2.8V UART1: Data carrier datect	2.8V	34	/UART1_DCD	UART1 data carrier detect	2.8V
44	~CT108/DTR	2.8V UART1: Data terminal ready	2.8V	36	/UART1_DTR	UART1 data terminal ready	2.8V
45	~CT125/RI	2.8V UART1: Ring indicator	2.8V	35	/UART1_RI	UART1 ring indicator	2.8V

4.1.4.4.2. Debug Interfaces: UART0 and SPI interfaces

The WISMO2x8 and the HiLoNC V2 support Digital Interface for debug purposes. It cannot be used for other purpose, it is strongly recommended to leave this interface accessible on tests points on the Customers PCB. It is not an issue for the customer because these interfaces are for sierra wireless internal use only.

Table 14. Debug Interfaces

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
13	SPI-IO	SPI Serial Input/output	2.8V				
14	SPI-O	SPI Serial Output	2.8V				
15	SPI-CLK	SPI Serial Clock	2.8V				
17	~SPI-CS	SPI Enable	2.8V				
25	SPI-IRQ	SPI Interrupt	2.8V				
				32	/UART0_TXD	Trace interface UART transmit	2.85V
				25	/UART0_RXD	Trace interface UART receive	2.85V

4.1.4.4.3. JTAG (for factory purpose)

Table 15. JTAG

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
				8	TDI	JTAG purpose	
				9	TDO	JTAG purpose	
				10	TMS	JTAG purpose	
				11	TRST	JTAG purpose	
				12	TCK	JTAG purpose	
				13	RTCK	JTAG purpose	
				22	JTAG1	JTAG configuration	
				23	JTAG2	JTAG configuration	
				24	TEST	JTAG configuration	

Note: These interfaces are for Sierra Wireless internal use only.

4.1.4.4.4. PWM Direct Migration

Table 16. PWM

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
36	PWM0	2.8 DC PWM2	2.85V	6	/PWM0	DC PWM0	2.85V
35	PWM1	2.8 DC PWM1	2.85V	42	/PWM1	DC PWM1	2.85V

4.1.4.4.5. Buzzer

Table 17. Buzzer

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
34	BUZZER	2.8 Buzzer PWM2	2.85V	42	/PWM2	Buzzer PWM	2.85V

Note: The frequency range of WISMO 2x8 is 200 Hz to 2,5kHz, while HiLoNC V2 is 243 Hz to 250 kHz.

4.1.4.4.6. ADC Direct Migration

An auxiliary ADC is available:

Table 18. ADC

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
5	AUX_ADC0	Analog to digital converter	-	2	/AUX_ADC0	Analog to digital converter	

4.1.4.4.7. SIM Interface  Direct Migration

Table 19. SIM Interface

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
8	SIM-VCC	SIM power supply	1.8V/2.9V	47	VSIM	SIM power supply	1.8V/2.9V
9	SIM-CLK	SIM clock	1.8V/2.9V	44	/SIM_CLK	SIM clock	1.8V/2.9V
10	SIM-IO	SIM data	1.8V/2.9V	46	/SIM_DATA	SIM data	1.8V/2.9V
11	~SIM-RST	SIM reset	1.8V/2.9V	45	/SIM_RST	SIM reset	1.8V/2.9V

4.1.4.5. Power Supply

4.1.4.5.1. VBATT  Direct Migration

Table 20. VBATT

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
29	VBATT	Power supply	3.6V	30	VBATT	Power supply	3.7V
30	VBATT	Power supply	3.6V	31	VBATT	Power supply	3.7V
				49	VABTT	Power supply	3.7V

Note: Some minors electrics characteristics differences may exist, please always refer to the Technical Specification.This should not be an issue.

4.1.4.5.2. VBACKUP  Direct Migration

Table 21. VBACKUP

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
6	BAT-RTC	Power supply for RTC backup	3V	5	VBACKUP	Power supply for RTC backup	3V

Note: Some minors electrics characteristics differences may exist, please always refer to the Technical Specification. This should not be an issue.

4.1.4.5.3. VGPIO Direct Migration

This +2.8V supply output is available on external pin of the module and can supply +2.8V external components. This power supply is available when the module is switched ON.

Table 22. VGPIO

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
46	VCC_2V8	2.8V power supply from the embedded module	2.8V	4	VGPIO	2.8V power supply output	2.8V

4.1.4.5.4. GND Direct Migration

Table 23. GND

Pin#	WISMO2x8			Pin#	HiLoNC V2		
	Signal Name	Function	Value		Signal Name	Function	Value
20	GND	Ground		27	GND	Ground	
22	GND	Ground		29	GND	Ground	
23	GND	Ground		3	GND	Ground	
26	GND	Ground		49	GND	Ground	
28	GND	Ground					
31	GND	Ground					

5. UART Behavior Differences

5.1. DCD

In WISMO2x8, the +WIPDATA command is used to read/write from/to a socket. On successful execution of the command, the UART switches to data mode, and the DCD signal is in ON state. The UART can be switched back to AT mode by sending “+++”, and the DCD signal will be in OFF state.

In HiLoNC V2, the +KTCPSND/KTCPRCV/KTCPSTART commands are used to read/write from/to a socket. On successful execution of these commands, the UART switches to data mode, and the DCD signal is in ON state. The UART can be switched back to AT mode by sending “+++”, and the DCD signal will be in ON state.

The difference is summarized in the table below.

Table 24. The difference in behavior of the DCD

DCD Element	WISMO2x8	HiLoNC V2
Online data mode	DCD ON	DCD ON
Switching to AT mode by “+++”	DCD OFF	DCD ON

5.2. RI Control

In both modules, RI can be activated on incoming calls, SMS, SMS-CB, USSD, and +CIEV event. The difference is that the behavior is controlled by different commands.

In WISMO2x8, the RI behavior is controlled by the +PSRIC command.

In HiLoNC V2, the RI behavior is controlled by the +KSYNC command.

5.3. Sleep Mode Management

In WISMO2x8, the sleep mode is managed by the +PSSLEEP command. It supports 2 modes:

Table 25. Sleep modes

<mode>	Description
0	The module doesn’t go in sleep mode as long as DTR is active
1	The module decides by itself (internal timing) when it goes in sleep mode

In HiLoNC V2, the sleep mode is managed by the +KSLEEP command. It supports 3 modes:

Table 26. AT+KSLEEP modes

<mode>	Description
0	The module doesn’t go in sleep mode as long as long as DTR is active
1	The module decides by itself (internal timing) when it goes in sleep mode
2	The module never goes in sleep mode

The points are summarized in the table below.

Table 27. Equivalence table

HiLoNC V2 +KSLEEP	Difference (if any)	WISMO2x8 +PSSLEEP
mode 0	*Equivalent to*	mode 0
mode 1	*Equivalent to*	mode 1
mode 2	*Not equivalent to*	N/A

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