



AirPrime WPx5xx/WP76xx/WP77xx

Scalability Guide



SIERRA
WIRELESS®

41110866
Rev 9

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Revision History

Revision number	Release date	Changes
1	April 2017	Created
2	May 2017	Added WP7607, WP7609
3	September 2017	Added WP7608 Removed Memory from Mechanical/Hardware Differences table Updated Pin Differences table: <ul style="list-style-type: none"> • Added pins 2,8,9 • Updated pin 21 for WP76xx • Updated pin 100, 101, 102—removed COEX1 alternate function • Removed pins 101, 102 (removed COEX1, COEX2 alternate functions) • Updated pin 65 for WP76xx • Removed pin 108 (ADC3 now on all modules)
4	September 2017	Added WP7700, WP7702
5	August 2018	Added WP7610
6	August 2018	Added WP7609 2G support
7	January 2019	Added WP7605

Revision number	Release date	Changes
8	June 2019	Added sections—Power Interface Variations; Current Consumption
9	July 2019	Corrected band support for WP7607/07-1/09—Added Band 28 Added WP7611/WP7611-1



1: Introduction

This document describes the physical and functional variations between WPx5xx-series, WP76xx-series, and WP77xx-series modules. Features that are the same across all WP module series are not included.

For detailed specifications, refer to Product Technical Specification documents available from source.sierrawireless.com.

1.1 Mechanical/Hardware Variations

Table 1-1: Mechanical/Hardware Variations

Feature	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702	Section ^a	
Thickness	4.352 ± 0.203 mm			2.50 ± 0.20 mm																1.4
Application core	Cortex A5 (550 MHz processor)			Cortex A7 (1.3 GHz processor)																3.6.1 3.9.1 (WP7611)
RTC—External backup	Yes			No																4.2
Low Power State	ULPM			ULPS (ULPM, PSM)			PSM		ULPS (ULPM, PSM)				PSM			ULPS (ULPM, PSM)			3.2.2	
Power Supply (absolute max rating)																				
Min (V)	-0.3	-0.3	-0.3	0																3.5.1 3.8.1 (WP7611)
Max (V)	6.0	4.6	5.5	VBAT_BB: 6.0 VBAT_RF: 5.5																
UVLO threshold voltage, falling ^b																				
Min (V)	1.5			2.225																3.2.1
Typ (V)	2.55			2.4																
Max (V)	3.05			2.8																

a. Section references are from WPx5xx PTS rev15, WP76xx PTS rev9.3, WP7611 PTS rev1.2, WP77xx PTS rev4. (Subject to change.)

b. WP76xx/WP77xx—Hysteresis set in firmware to 425 mV

1.2 Functional Variations

Table 1-2: Functional Variations

Feature	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610 ^b	WP7611	WP7611-1	WP7700	WP7702	Section ^a
GNSS support ^b	GPS, GLONASS, Galileo			GPS, GLONASS, Galileo, BeiDou															3.4.1
	GNSS sensitivity for WP76xx/WP77xx is subject to change																		3.7.1 (WP7611)
Internal GNSS LNA	Y			N															3
RF Diversity	N	Y	Y	Y											N		3.3.5 (WPx5xx) 3.3.4 (WP76xx) 3.6.3 (WP7611) 3.3.3 (WP77xx)		

a. Section references are from WPx5xx PTS rev15, WP76xx PTS rev9.3, WP7611 PTS rev1.2, WP77xx PTS rev4. (Subject to change.)

b. Internal GNSS is not supported while LTE RF transmitter is operating on LTE B14.

1.3 Supported RF Bands

Table 1-3: Supported RF Bands

RAT	Band	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702
LTE	Category		3	3	4	1	4	1	4	4	1	4	1	4	4	4	1	M1,NB1	M1,NB1
	B1		Y						Y	Y	Y	Y	Y	Y				Y	Y
	B2			Y			Y	Y							Y	Y	Y	Y	Y
	B3		Y						Y	Y	Y	Y	Y	Y				Y	Y
	B4			Y	Y	Y	Y	Y							Y	Y	Y	Y	Y
	B5			Y			Y	Y				Y	Y	Y	Y	Y	Y	Y	Y
	B7		Y							Y	Y				Y				
	B8		Y						Y	Y	Y	Y	Y	Y				Y	Y
	B11								Y										
	B12			Y			Y	Y								Y	Y	Y	Y
	B13				Y	Y										Y	Y	Y	Y
	B14															Y	Y	Y	
	B17			Y												Y			Y
	B18									Y									Y
	B19									Y									Y
	B20		Y								Y	Y							Y
	B21									Y ^a									
B25			Y													Y	Y		
B26			Y													Y	Y	Y	

Table 1-3: Supported RF Bands (Continued)

RAT	Band	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702
LTE	B28									Y	Y			Y					
	B40											Y	Y						
	B41 (2535–2655 MHz)											Y	Y						
	66														Y	Y	Y		
	71															Y	Y		
UMTS	B1	Y	Y						Y	Y	Y	Y	Y	Y					
	B2	Y		Y			Y	Y							Y	Y	Y		
	B4			Y			Y	Y							Y	Y	Y		
	B5	Y		Y			Y	Y						Y	Y	Y	Y		
UMTS	B6	Y							Y										
	B8	Y	Y							Y	Y	Y	Y	Y					
	B19	Y							Y										
GSM/ GPRS/ EDGE	GSM 850																		Y (GPRS/ EDGE)
	E-GSM 900		Y							Y	Y	Y	Y	Y					Y (GPRS/ EDGE)
	DCS 1800		Y							Y	Y	Y	Y	Y					Y (GPRS/ EDGE)
	PCS 1900																		Y (GPRS/ EDGE)

Table 1-3: Supported RF Bands (Continued)

RAT	Band	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702
CDMA EVDO Release A	BC0			Y ^b															
	BC1			Y ^b															
	BC10			Y ^b															
GNSS	GPS	Y	Y ^b														Y ^b		
	GLONASS	Y	Y ^b												Y ^{b,c}		Y ^b		
	Galileo	Y	Y ^b														Y ^b		
	BeiDou	N	N	N	Y ^b														Y ^b

- a. Antenna isolation (>20 dB) between cellular and GNSS antennas is required to prevent GNSS performance degradation while B21 is in use.
b. SKU-dependent
c. Internal GNSS is not supported while LTE RF transmitter is operating on LTE B14.

1.4 Pinout Variations

Table 1-4: Pinout Variations

Pin	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702	
2	UART1_RI			UART1_RI (Do not install external pull-up on this pin, otherwise the module will not boot.)															
8	UART1_DCD			UART1_DCD (Do not install external pull-up on this pin, otherwise the module will not boot.)															
9	UART1_DSR			UART1_DSR (Do not install external pull-up on this pin, otherwise the module will not boot.)															
21	BAT_RTC (I/O)			Reserved															
31	Reserved	RF_DIV		RF_DIV													Reserved		
41	GPIO8 Refer to module-specific PTS documents for differences in Digital I/O Characteristics tables for this pin between WP8548/75xx and WP76xx/WP77xx. Differences include Pull up/down resistance, Keeper resistance, and input/output voltage ranges.																		
43	Reserved			EXT_GPS_LNA_EN															
55	UIM2_VCC			Reserved															
56	UIM2_DATA			Reserved															
57	UIM2_RESET_N			Reserved															
58	UIM2_CLK			Reserved															
65	UIM2_DET			GPIO4															
92	GPIO38					Reserved		GPIO38					Reserved			GPIO38			
93	GPIO39			Reserved															
94	GPIO40					Reserved		GPIO40					Reserved			GPIO40			
95	GPIO41					Reserved		GPIO41					Reserved			GPIO41			
100	GPIO34			Reserved															

Table 1-4: Pinout Variations (Continued)

Pin	WP8548	WP7502	WP7504	WP7601	WP7601-1	WP7603	WP7603-1	WP7605	WP7607	WP7607-1	WP7608	WP7608-1	WP7609	WP7610	WP7611	WP7611-1	WP7700	WP7702
102	GPIO36		GPIO36				Reserved	GPIO36			Reserved			GPIO36				
	COEX3																	
103	GPIO37				Reserved				GPIO37			Reserved			GPIO37			
107	ADC2				Reserved				ADC2			Reserved			ADC2			
108	ADC3				Reserved				ADC3			Reserved			ADC3			
153	ANT_CTL0		ANT_CTL0															
	GPIO28																	
154	ANT_CTL1		ANT_CTL1															
	GPIO29																	
155	ANT_CTL2		ANT_CTL2															
	GPIO30																	
156	ANT_CTL3		ANT_CTL3															
	GPIO31																	

1.5 Power Interface Variations

1.5.1 Power On/Off Timing

Note: The host should not drive any signals to the module until >100 ms from the start of the power-on sequence.

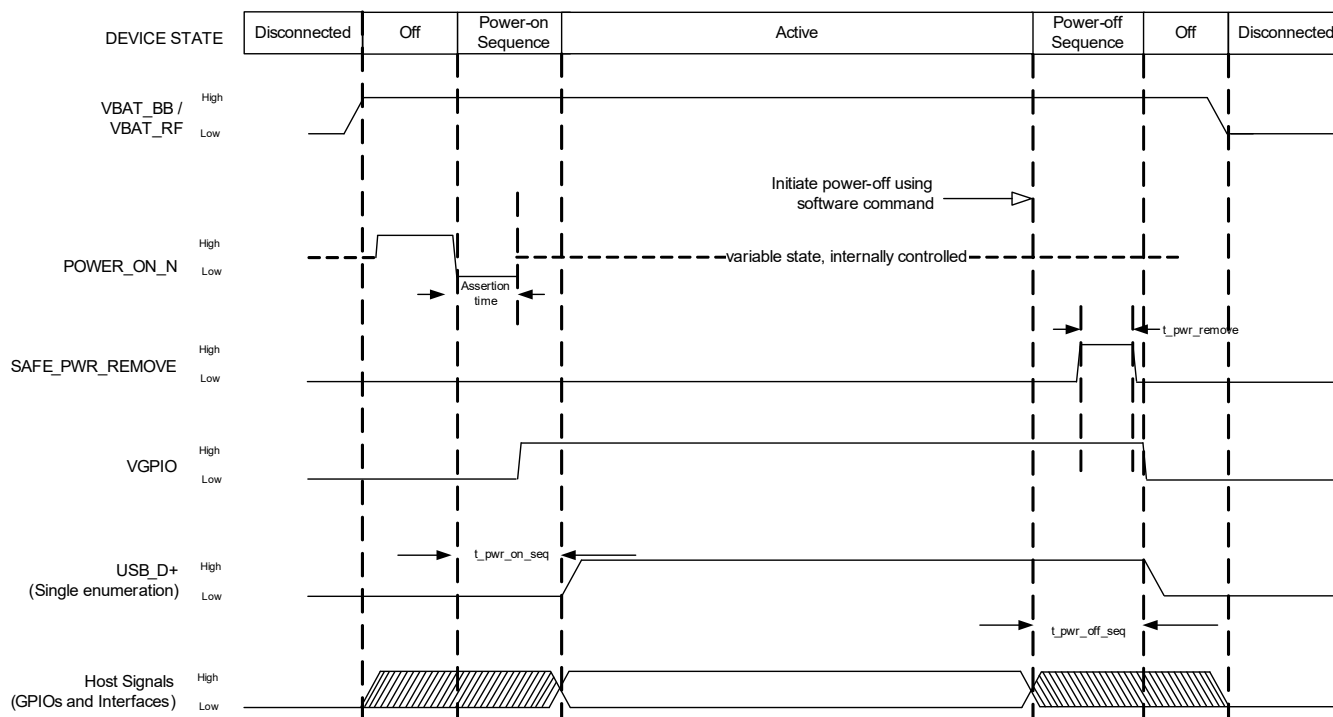


Figure 1-1: Signal Timing

Table 1-5: POWER_ON_N Timing Parameters

Parameter		Min	Typ	Max	Units
t_pwr_on_seq	WPx5xx	-	14.5	15.5	s
	WP76xx	-	15	24 ^a	
	WP77xx	-	14.5	15.5	
t_pwr_off_seq		-	0.4–5.5	6	s
t_pwr_remove		-	13	-	ms
Assertion time ^b		200			ms

a. Value is based on disabled custom parameters "HSICENABLE" and "BOOTQUIETDISABLE". Note that there will be an increase in value if either of these custom parameters are enabled.

b. Assertion time is the time required to keep POWER_ON_N at LOW level to ensure the module can be powered ON successfully.

1.5.2 POWER_ON_N, RESET_IN_N and AT!POWERDOWN Use Cases

Table 1-6 describes the behavior of WP modules depending on POWER_ON_N, RESET_IN_N and AT!POWERDOWN use cases.

Table 1-6: POWER_ON_N, RESET_IN_N and AT!POWERDOWN Use Cases

Use Case		WP7502, WP7504, WP8548	WP7601, WP7603, WP7607, WP7608, WP7609, WP7700, WP7702	WP7605, WP7610, WP7611
POWER_ON_N	VBATT is applied then POWER_ON_N is asserted	Turns ON	Turns ON	Turns ON
	POWER_ON_N is asserted then VBATT is applied	Turns ON	Turns ON	Turns ON
RESET_IN_N	POWER_ON_N is left asserted then RESET_IN_N is asserted	Resets	Resets	Resets
	POWER_ON_N is de-asserted then RESET_IN_N is asserted	Resets	Emergency OFF	Resets
	POWER_ON_N is de-asserted then RESET_IN_N is asserted for the duration described in Emergency Power Off , below.	Emergency OFF	Emergency OFF	Emergency OFF
AT!POWERDOWN AT Command	POWER_ON_N is asserted then the power OFF command is sent	Restarts	Turns OFF	Restarts
	POWER_ON_N is de-asserted then the power OFF command is sent	Turns OFF	Turns OFF	Turns OFF

1.5.3 Emergency Power Off

The module can be switched off by controlling the RESET_IN_N pin. this must only be used in emergency situations if the system freezes (not responding to commands).

To perform an emergency power off:

1. De-assert POWER_ON_N.
2. While POWER_ON_N is de-asserted, assert RESET_IN_N (logic low) for at least:
 - (WPx5xx) 32 ms
 - (WP76xx/WP77xx) 8 seconds

This immediately powers down the module.

1.6 Current Consumption

All current consumption values are module-specific. Refer to the Product Technical Specifications for each module, available at source.sierrawireless.com.