

GFF910 Hardware Reference Manual

Revision 1.2

28 April 2014

Revision History

Revision	Revision History	Date
1.0	Initial release	21/11/2012
1.1	Update to current production settings	08/04/2014
1.2	Change colour coding for function shared pin 63	28/04/2014

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1 Introduction

1.1 Overview



The GFF910 module is designed to allow the user easy plug and play options for GSM, UMTS, HSPA and CDMA. With plug and play options via the Telit Global Form Factor the entire range of xE910 modules are supported and options such as voice and GPS can easily be fulfilled without the need for re-work or re-design.

By providing an 80 way Global Form Factor interface the GFF910 allows the user the option to mount the module which best fits their application.

In most cases your design needs to provide flexibility depending which region the product is to be deployed and or certified. The GFF910 form factor takes the guess work out of the design by providing a single connector for interfacing the entire range of radio types depending on your needs.

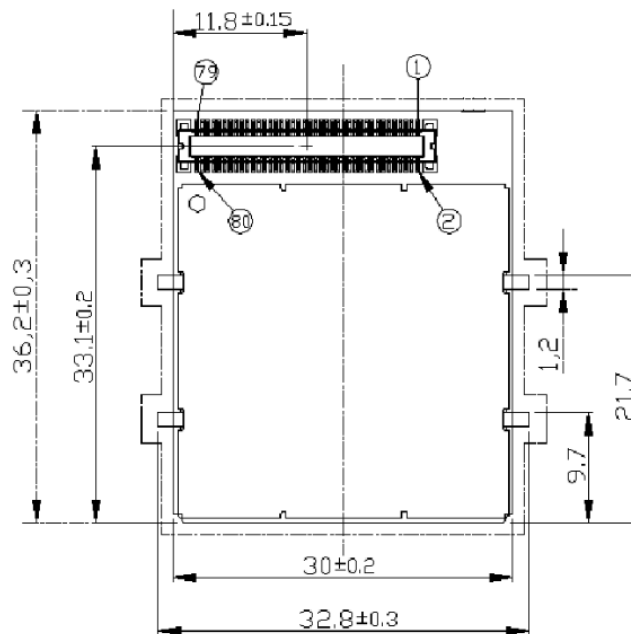
Full electrical and software (AT command) compatibility is maintained between each module type be it GSM (GFF910-GE), CDMA (GFF910-DE or GFF910-CE) or HSPA+ (GFF910-G).

2 Mechanical Specification

2.1 Dimension

- Length: 36.2mm
- Width: 30mm

- Thickness: 5.6mm



2.2 Socket Types

2.2.1 80 way plug specifications

- Manufacture: Molex Inc.
- Part Number: 0539490878

2.2.2 80 way socket specifications

- Manufacture: Molex Inc.
- Part Number: 0541500878

2.2.3 Top UFL connectors

- Manufacture: Taoglas Limited
- Part Number: RECE-20279-001E-01

3 Module Connections

3.1 Pin out

GFF910 Family uses an 80 pin Molex p.n. 53949-0878 male connector for the connections with the external applications. This connector matches the 54150-0878 models.

PIN	SIGNAL	I/O	FUNCTION	TYPE	WORKING RANGE	COMMENT
Power Supply						
1	VBAT	*	Main power supply	POWER	3.4V~4.20V	refer to HE910_Hardware_User_Guide
2	VBAT	*	Main power supply	POWER	3.4V~4.20V	
3	VBAT	*	Main power supply	POWER	3.4V~4.20V	
4	VBAT	*	Main power supply	POWER	3.4V~4.20V	
5	GND	*	Ground	POWER	*	refer to HE910_Hardware_User_Guide
6	GND	*	Ground	POWER	*	
7	GND	*	Ground	POWER	*	
8	*	*	*	*	*	Analog Audio, only EAR+, EAR-, MIC+ and MIC- available on modules have analog voice interface, e.g. GE910 and CE910.
9	NC	*	*	*	EAR+	
10	NC	*	*	*	EAR-	
11	*	*	*	*	*	
12	*	*	*	*	*	
13	NC	*	*	*	MIC+	
14	NC	*	*	*	MIC-	
15	*	*	*	*	*	
16	*	*	*	*	*	
17	*	*	*	*	*	*
SIM Card Interface						
18	SIMVCC	*	Power for the SIM	SIM CARD INTERFACE	1.8V/3V	refer to HE910_Hardware_User_Guide
19	SIMRST	O	External SIM signal-RESET	SIM CARD INTERFACE	1.8V/3V	
20	SIMIO	I/O	External SIM signal-Data I/O	SIM CARD INTERFACE	1.8V/3V	
21	SIMIN	I	External SIM signal-Presence(active low)	SIM CARD INTERFACE	CMOS 1.8V	
22	SIMCLK	O	External SIM signal - Clock	SIM CARD INTERFACE	1.8V/3V	
Trace						
23	RX_TRACE/SPI_MOSI	I/O	RX Data for debug monitor	Trace	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V. Shared with SPI TX & RX
24	TX_TRACE/SPI_MISO	I/O	TX Data for debug monitor	Trace	CMOS 2.8V	
Prog. /Data + Hw Flow Control						
25	C103/TXD	I	Serial data input (TXD) from DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
26	C104/RXD	O	Serial data output to DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	

27	C107/DSR	O	Output for Data set ready signal (DSR) to DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
28	C106/CTS	O	Output for Clear to send signal (CTS) to DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
29	C108/DTR	I	Input for Data terminal ready signal (DTR) from DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
30	C125/RING	O	Output for Ring indicator signal (RI) to DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
31	C105/RTS	I	Input for Request to send signal (RTS) from DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
32	C109/DCD	O	Output for Data carrier detect signal (DCD) to DTE	Prog. / Data + Hw Flow Control	CMOS 2.8V	
33	*	*	*	*	*	*
34	*	*	*	*	*	*
35	*	*	*	*	*	*
36	DVI_CLK	I/O	Digital Audio Interface (CLK)	Digital Audio Interface	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
37	ACD_IN1	AI	analog ADC input	Analog Interface	0 - 2.8V	Only available on HE910 and CE910
38	*	*	*	*	*	*
39	*	*	*	*	*	*
40	*	*	*	*	*	*
41	SPI_MRDY	I/O	MRDY	SPI interface	CMOS 2.8V	Only available on HE910
42	SPI_SRDY	I/O	SRDY	SPI interface	CMOS 2.8V	
43	SPI_CLK	I/O	CLK	SPI interface	CMOS 2.8V	Not available on GE910
44	SPI_CS_N(NC)	I/O	SPI SLAVE SELECT	SPI interface	CMOS 2.8V	Only available on DE910 and CE910
Miscellaneous Functions						
45	STAT_LED	O	Status indicator led	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V. Shared with GPIO1
46	GND	*	Ground	*	*	*
47	*	*	*	*	*	*
48	USB_VBUS	I	Power sense for the internal USB transceiver.	Miscellaneous Functions	5V	5V
49	PWRMON	O	Supply Output for external accessories / Power ON Monitor	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V. Max 50mA on VAUX
50	VAUX	O		Miscellaneous Functions	CMOS 2.8V	
51	*	*	*	*	*	*
52	*	*	*	*	*	*
53	ON/OFF	I	Input command for power ON	Miscellaneous Functions	CMOS 1.8V	Active low
54	RESET	I	Reset input	Miscellaneous Functions	CMOS 1.8V	Active low
55	VRTC	I	VRTC Backup capacitor	Miscellaneous Functions	Power	backup for the embedded RTC supply, refer to HE910_Hardware_User_Guide
56	*	*	*	*	*	*
57	*	*	*	*	*	*
58	*	*	*	*	*	*

59	GPIO_04	I/O	GPIO_04	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
60	*	*	*	*	*	*
61	*	*	*	*	*	*
62	*	*	*	*	*	*
63	GPIO_10	I/O	GPIO_10	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V. Optional for DVI_TX
64	*	*	*	*	*	*
65	DVI_RX	I/O	Digital Audio Interface (RX)	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
66	GPIO_03	I/O	GPIO_03	Miscellaneous Functions	CMOS 2.8V	
67	GPIO_08	I/O	GPIO_08	Miscellaneous Functions	CMOS 2.8V	
68	GPIO_06	I/O	GPIO_06	Miscellaneous Functions	CMOS 2.8V	
69	*	*	*	*	*	*
70	GPIO_01	I/O	GPIO_01	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V. Shared with STAT_LED
71	DVI_WAO	I/O	Digital Audio Interface (WAO)	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
72	*	*	*	*	*	*
73	GPIO_07	I/O	GPIO_07	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
74	GPIO_02	I/O	GPIO_02	Miscellaneous Functions	CMOS 2.8V	
75	*	*	*	*	*	*
76	GPIO_9	I/O	GPIO_9	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
77	*	*	*	*	*	*
78	GPIO_05	I/O	GPIO_05	Miscellaneous Functions	CMOS 2.8V	Working voltage depends on U2 (MIC5365/6-2.8). Can be adjusted to 2~5V.
79	USB_D+	I/O	USB differential Data +	Miscellaneous Functions	*	*
80	USB_D-	I/O	USB differential Data -	Miscellaneous Functions	*	*

NOTE:

- GPIO_01 on HE910 modem goes to both pin 45 and pin 70 via different level translators (to Pin 45 via a direction fixed level translators that it can supply large output current, to pin 70 via a bidirectional level translators, for customers need the GPIO functions.), because of the GPIO_01 on the HE910 modem has configurable multifunction. So if the STAT_LED function is used for indicate the network status, then it can't be used for normal GPIO, in order to make GFF910 compatible with old GC864 and UC864 modems for the STAT_LED and GPIO_01. That's why it goes to 2 pins on the 80 way connector.
- For a common design if only STAT_LED function is used and the GPIO_1 is not used applications, Please use pin 45 for STAT_LED and leave pin 70 floating. Because this pin compatible with other UC864 and GC864 family modems. But for some applications that GPIO_1 is very essential, please use pin 70 and leave pin 45 no connect.
- ON/OFF pulse (pull down) needs to be a bit longer than UC864-G especially when USB cable is attached. (Refer to the HE910 HW User Guide)
- AT command set is not 100% compatible e.g. default AUTOBND is 2 in HE910. (Refer to the HE910 Software and AT command User Guide)

- 5: GFF910 provides maximum 10 GPIO, and GPIO 1 is shared with STAT_LED. (Refer to the GFF910 H/W User guide)
- 6: GFF910 provides 1x ADC while UC864-G provides 2.
- 7: IP address can no longer have any leading zeroes for example 169.192.012.2 should be 169.192.12.2. IP addresses with leading zeroes are converted to an octet and this is in line with the normal Windows IP addressing.
- 8: Python interpreter has been enhanced from the old version 1.5.2+ supported in Elite and Xgold platforms to version 2.7.2. (Refer to the Telit Easy Script Python 2.7.2 document)
- 9: Pin 63 is a shared with GPIO_10 and DVI_TX, it connected to GPIO_10 by default. If DVI_TX needed, will need some hardware modifications.
- 10: DVI port is configured as Master only, please let us know if you need DVI port configured as Slave port.
- 11:

Colour Coding	
	100% compatible with UC864-G, if only these pins are used in your applications, GFF910 can replace old UC864/GC864
	Function shared pins. Pin 45 and 70 are coming out from GPIO_01 on xE910 via different level translators. Pin63 can be configured as DVI_TX, please let us know if you need digital voice pin DVI_TX.
	Directly from xE910, please refer xE910 hardware user manual for details
	Special Function pins only available on some xE910 modules
	Analog audio pins, depending on the availability on xE910 modules, please refer to the right xE910 user manual for more details.

- 12: RTS must be connected to the GND (on the module side) if flow control is not used
- 13: If not used, almost all pins must be left disconnected. The only exceptions are the Following:

Pin	Signal	Function
1	VBATT	Main power supply
2	VBATT	Main power supply
3	VBATT	Main power supply
4	VBATT	Main power supply
5	GND	Ground
6	GND	Ground
7	GND	Ground
46	GND	Ground
25	C103/TXD	Serial data input (TXD) from DTE
26	C104/RXD	Serial data output to DTE
31	C105/RTS	Input for Request to send signal (RTS) from DTE
53	ON/OFF	Input command for switching power ON or OFF (toggle command).
54	RESET	Reset input

3.2 Antenna Connectors

The GFF910 module is equipped with a 50 Ohm RF connector from Taoglas Limited, GSC type P/N: RECE-20279-001E-01 for Antenna, Diversity and GPS antenna connection. These connectors are located on top side of the module.

Interface cables are available:

<http://www.glynstore.com/pages/RF-Cable-Selection-Guide.html>

4 Hardware Commands

Please see Telit_HE910_Hardware_User_Guide for more details. Here is the download link:
http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

5 Power Supply

Please see Telit_HE910_Hardware_User_Guide for more details. Here is the download link:
http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

5.1 Power Supply Requirements

Please see Telit_HE910_Hardware_User_Guide for more details. Here is the download link:
http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

5.2 Power Consumption

Please see Telit_HE910_Hardware_User_Guide for more details. Here is the download link:
http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

6 GSM/WCDMA Radio Section

6.1 GFF910 Production Variants

6.1.1 4G Variants

GFF910-LE					
Variant	2G Frequencies (MHz)	WCDMA Frequencies (MHz/Band)	LTE Frequencies (MHz/Band)	HSPA+ Data – Rates DL/UL [Mbps]	LTE Data – Rates DL/UL [Mbps]
LE910-EUG	850/900/1800/1900	900 (B8) 2100 (B1)	800 (B20) 1800 (B3) 2600 (B7)	42/5.7	100/50
LE910-NAG (AT&T)	850/1900	850 (B5) 1900 (B2)	700 (B17) 850 (B5) AWS1700 (B4) 1900 (B2)	42/5.7	100/50
LE910-NAX (Verizon)	-	850 (B5) 1900 (B2)	700 (B13) AWS1700 (B4)	42/5.7	100/50

6.1.2 3G Variants

Product	Operating Bands 3G ²	Frequency Bands [MHz]	Throughput DL/UL [Mbps]	Voice	GPS	Rx- Diversity
GFF910-G	B5, B8, B2, B1, B4	800/850, 900, AWS1700, 1900, 2100	21/5.7	Y	Y	Y
GFF910-DG	B5, B8, B2, B1, B4	800/850, 900, AWS1700, 1900, 2100	21/5.7	N	Y	Y
GFF910-D	B5, B8, B2, B1, B4	800/850, 900, AWS1700, 1900, 2100	21/5.7	N	N	Y
GFF910-EUR	B5, B8, B1	800/850, 900, 2100	7.2/5.7	Y	N	N
GFF910-EUD	B5, B8, B1	800/850, 900, 2100	7.2/5.7	N	N	N
GFF910-EUG	B5, B8, B1	800/850, 900, 2100	7.2/5.7	N	Y	N
GFF910-NAR	B5, B2, B4	800/850, AWS1700, 1900	7.2/5.7	Y	N	N
GFF910-NAD	B5, B2, B4	800/850, AWS1700, 1900	7.2/5.7	N	N	N
GFF910-NAG	B5, B2, B4	800/850, AWS1700, 1900	7.2/5.7	N	Y	N

6.1.3 2G Variants

Variants	Frequencies	Voice	GPS	Notes
GFF910-GE	GSM /GPRS	YES	NO	GE910-QUAD
GFF910-GN	850/900/1800/1900	YES	YES	GE910-GNSS

6.1.4 CDMA Variants

Variants	Band Frequencies	Notes
GFF910-CE	800/1900	CE910-DUAL
GFF910-DE	800/1900	DE910-DUAL

7 Q&A

7.1 GPIO

Q1: Can GPIO1-10 be used as inputs?

- Yes, all GPIO1-10 can be configured as input via AT commands, for more detail please see AT command user manual.

Q2: why GPIO1 working differently when STAT_LED enabled?

- STAT_LED and GPIO1 are sharing with the same pin on HE910 module. So when STAT_LED enabled via AT commands, GPIO1 can't be used as an input or output. If issue command to force GPIO1 working as input or output then STAT_LED will lost its function.

Q3: why GPIO10 labelled "Optional for DVI_TX"?

- By default GPIO10 hardware configured connect to GPIO10, this pin also can be configured to DVI_TX. So if your application wants to use DVI interface, please let us know that we can configure this pin working as DVI_TX. Otherwise this pin only working as a GPIO.

Q4: Can GPIO1-10 working as output mode?

- Yes, all GPIO can be configured working as output pins via AT commands. But pull up to VAUX1 are needed on each GPIO to get 2.8V output. Otherwise only can get 1.8V output by default.

7.2 SPI

Q1: how can I use SPI interface.

- There are 2 pins shared with TX_TRACE and RX_TRACE. These 2 pins are configured to TX_TRACE and RX_TRACE by default. These 2 signals can be configured to SPI by change some resistors. If your application need SPI interface please let us know.

7.3 DVI

Q1: Can DVI working in slave mode?

- Yes, DVI interface can work in slave mode. But by default it has hardware configured as master mode. So if your application want use DVI as a slave port, please let us know, we can configure it before send it you.

7.4 UART

Q1: why I can't get UART working without hardware flow control?

- Please pull RTS to GROUND if the hardware flow control not used.
- Please see the NOTE below.

Q2: why I can't communicate to the modem after the socket connection without hardware flow control.

- Please use command AT&K0 to disable the hardware flow control before enable the socket connections.

NOTE:

According to V.24, some signal names are referred to the application side, therefore on the HE910 side these signal are on the opposite direction:

TXD on the application side will be connected to the receive line (here named C103/TXD)

RXD on the application side will be connected to the transmit line (here named C104/RXD)

7.5 UART_TRACE

Q1: What UART_TRACE interface used for?

- Normally this UART will be used for debugging, like module tracing or Python debugging etc.

7.6 VAUX1

Q1: How much current VAUX1 can drive?

- VAUX1 connected to an internal 150mA 2.8V regulator. This power line also supplier for internal level translators. So for safety operation, maximum 75mA from VAUX1.

7.7 VRTC

Q1: How can I use this pin?

- This pin connected to HE910 module directly, so please see "Telit_xE910_RTC_BackUp_Application_note". Here is the link attached:

http://www.telit.com/en/products/gsm-gprs.php?p_id=12&p_ac=show&p=121

7.8 RESET

Q1: How can I use this pin?

- This pin connected to HE910 module directly, so please see "Telit_HE910_Hardware_User_Guide". Here is the link attached:

http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

7.9 ON/OFF

Q1: How can I use this pin?

- This pin connected to HE910 module directly, so please see "Telit_HE910_Hardware_User_Guide". Here is the link attached:

http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

7.10 SIM INTERFACE

Q1: How can I use this interface?

- SIM interface connected to HE910 module directly, so please see "Telit_HE910_Hardware_User_Guide". Here is the link attached:

http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108

7.11 ADC

Q1: What is the input resistance on the ADC?

- ADC input range: 0 -2.8V
- ADC input resistance: 220K +/- 2%
- Actually we used a voltage divider (resistor network) to meet HE910's input requirements.

7.12 STAT_LED

Q1: how can I enable STAT_LED?

- STAT_LED and GPIO1 are sharing one pin one HE910. So use commands "AT#GPIO=1,1,2", "AT#SLED=4", "AT#SLEDSAV" to enable STAT_LED. Command "AT#GPIO=1,0,1", "AT#GPIO=1,0,0", "AT#GPIO=1,1,1" or "AT#GPIO=1,1,0" will disable STAT_LED.
(Note: GE910 only accept AT#SLED=2)

7.13 POWER SUPPLY

Q1: What is the power supply requirement?

- Power supply pins connected to HE910 module directly, so please see "Telit_HE910_Hardware_User_Guide". Here is the link attached:

http://www.telit.com/en/products/umts.php?p_id=14&p_ac=show&p=108