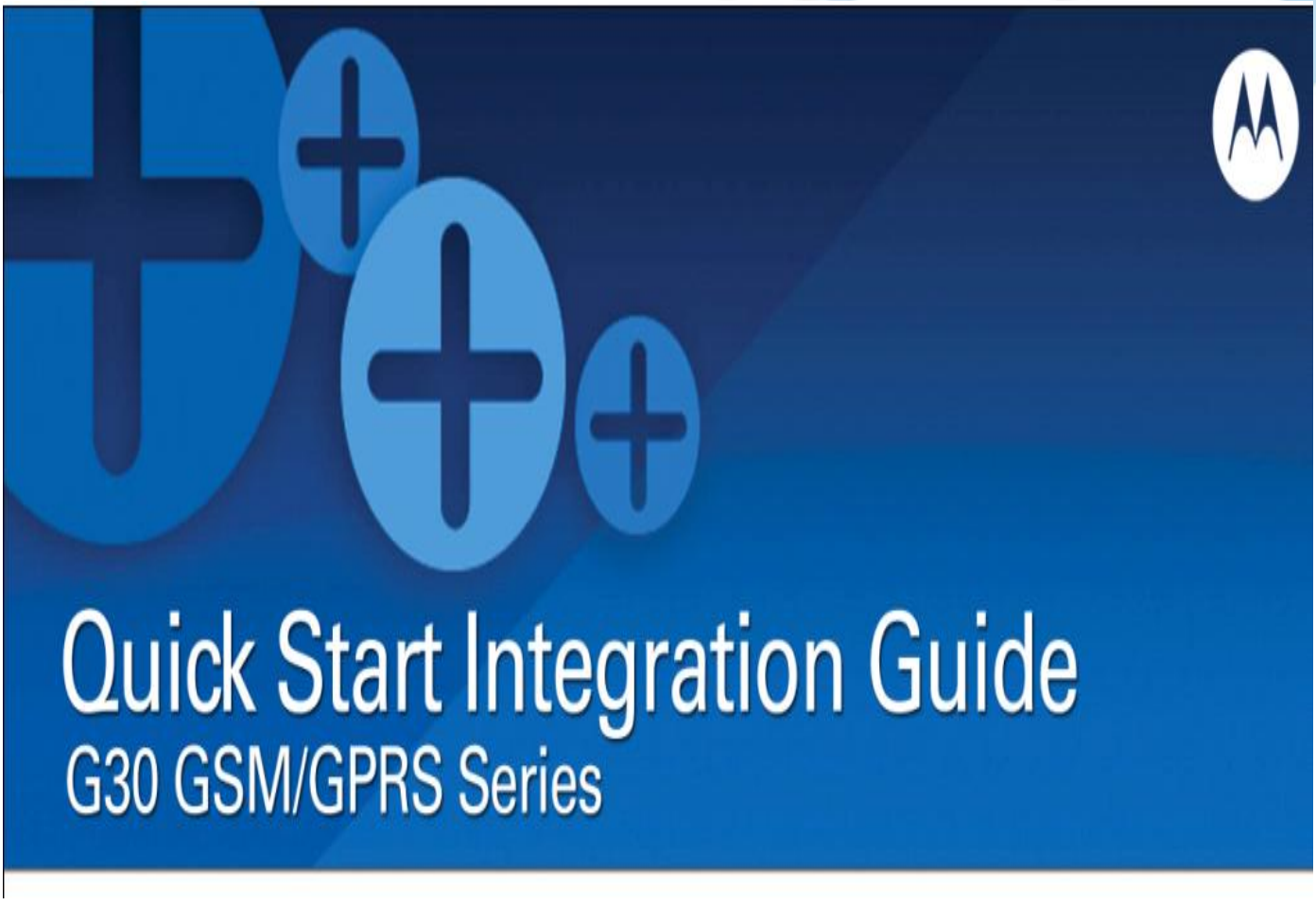
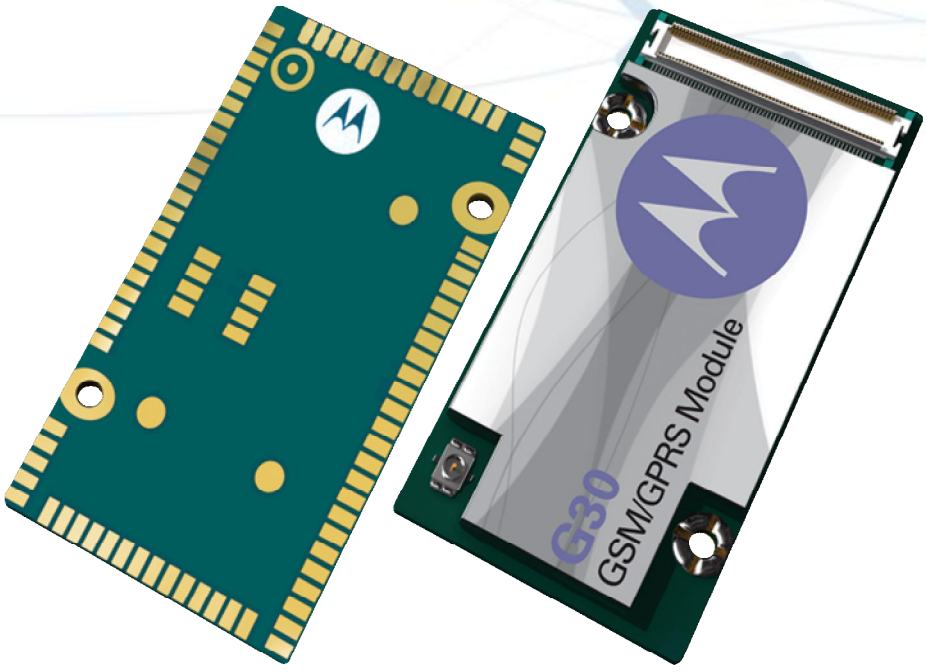


Technical Information
Motorola G30 Quick-Start Integration Guide

Version 1.0
January 2010

MOTOROLA



MODULES
Zero time, Zero effort

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Scope

Note: This document does not replace the G30 Developer Guide (DG).

This document provides the electrical, mechanical and environmental requirements for properly integrating the G30 module in a host application.

This document gives a complete set of hardware features and functions that may be provided by G30.

The availability of any feature or function, which is described in this document, depends on the hardware revision and software version of a specific G30 model, and also the capabilities of the host application which must provide a user interface and control the module via AT commands.

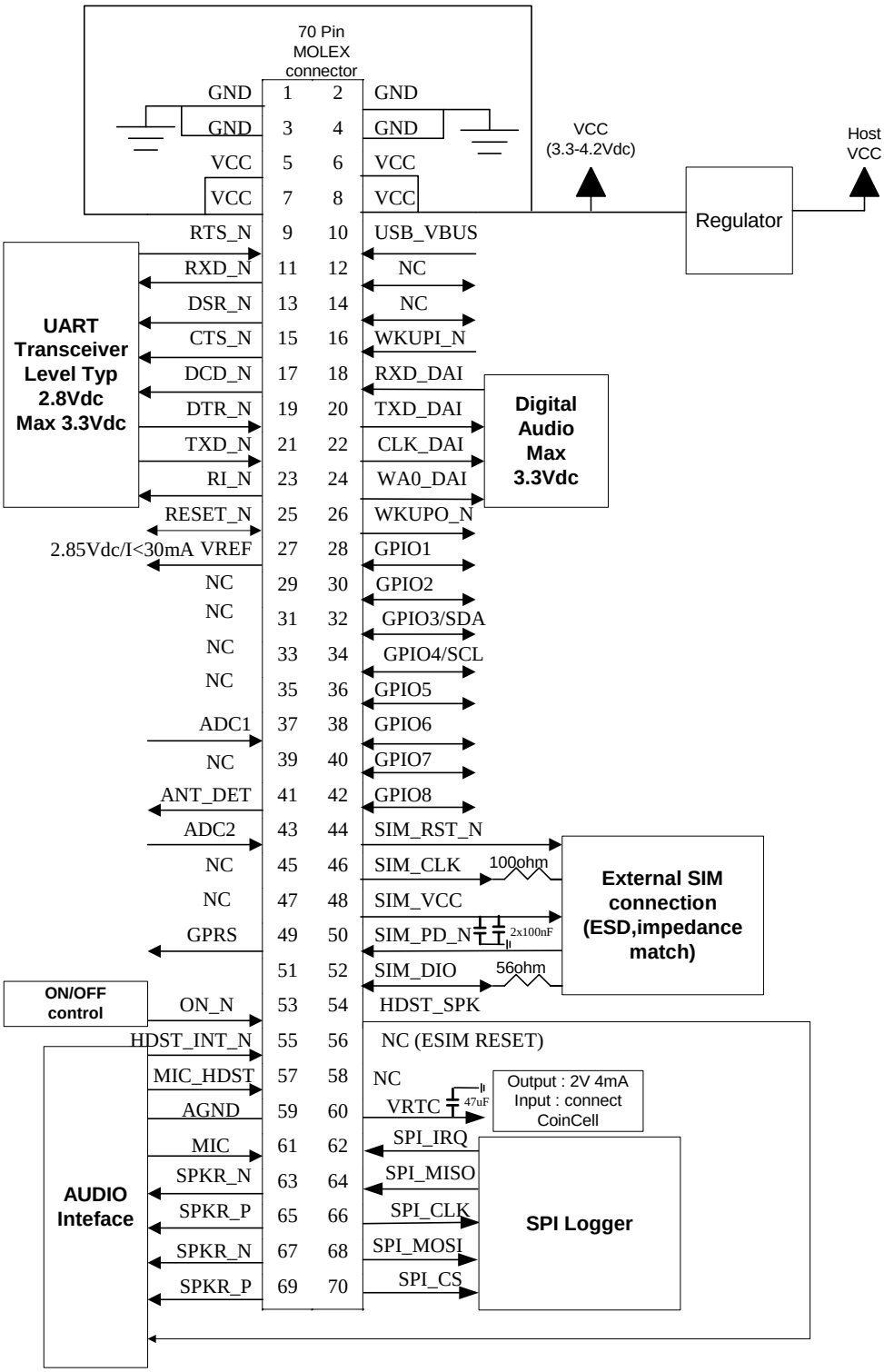
The parameters and values provided in this manual are defined under typical conditions. These values may vary when subject to different conditions, such as SW version, network status, application settings and environmental conditions.

For further information and detailed specifications please refer to the G30 Developer Guide. - Located on MotoDev at http://developer.motorola.com/products/wirelessmodules/

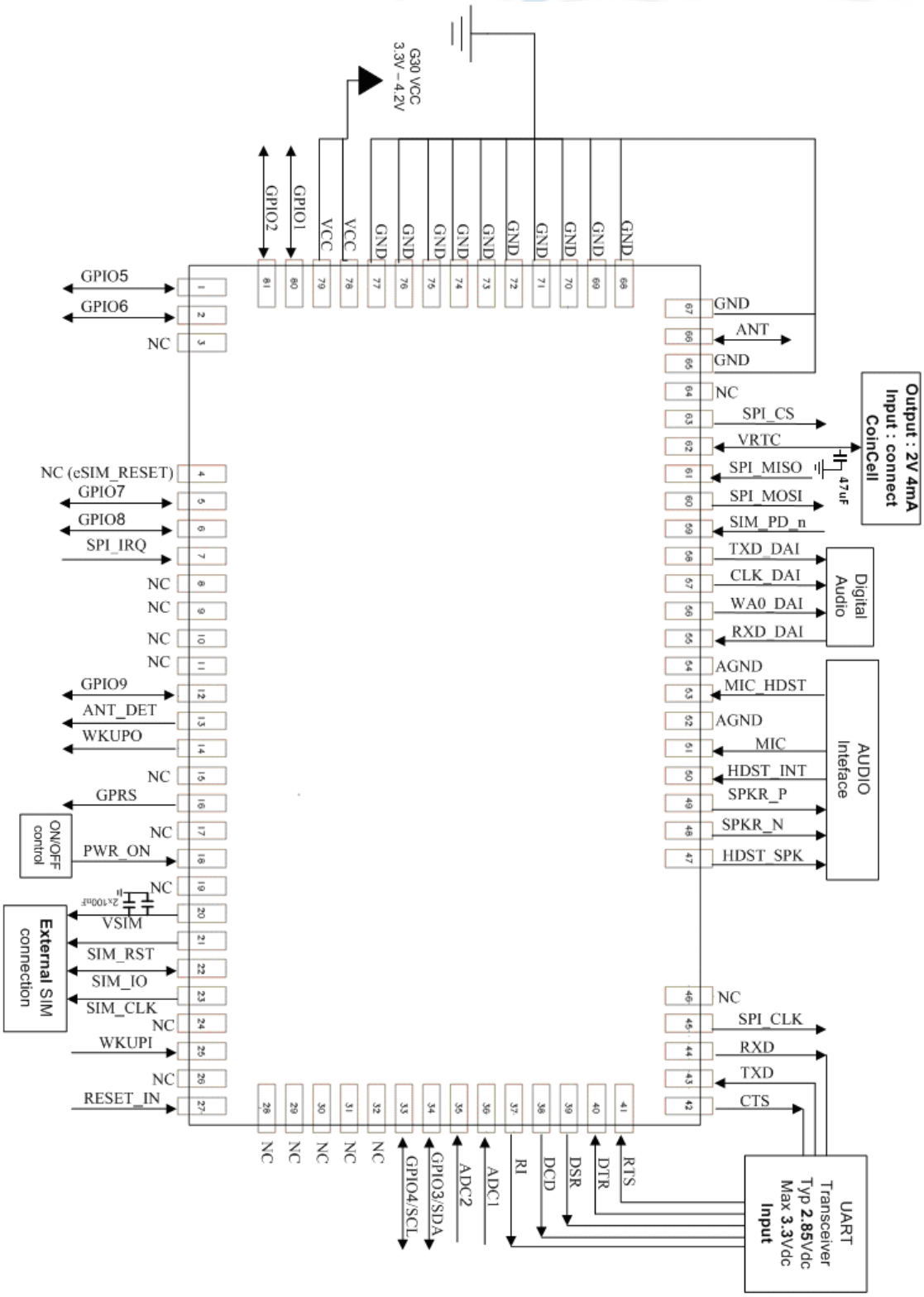
70 pin connection

G30 connection

Description of 70 pin connector brief integration connection



LGA Connection



Important:

- Customer application should have an option to connect G30 (via RS232) directly to PC to provide reflashing capability especially in LGA ver. See *G30 logging and flashing*
- Customer application should have an option to connect G30 SPI BUS to provide embedded logging capability, especially in LGA ver. See *G30 logging and flashing:*
- Use pin 25 – RESET_IN (Bi-directional) to monitor G30.
    - Use as input to G30 for HW WD (as open collector).
    - Use as Output from G30
        - When high- G30 is powered-on then you can enable input pins to G30 (except ADC line).
        - When low- G30 is in reset state or powered off.
- Interface signals that are not used by the customer application must be left unconnected. G30 incorporates the necessary internal circuitry to keep unconnected signals in their default state. Do not connect any components to, or apply any voltage on, signals that are not used by the application.
- Signals that are defined as "Do Not Use", or NC, must remain externally unconnected in any case. These signals are reserved for future use.
- Make sure that all the input voltage levels (like UART) will not exceed 3.3Vdc (the typical Voltage is 2.85Vdc)
- The G30 UART will not send data over the serial interface in case the DTR_N and/or RTS_N input signals are disabled (set high). Therefore, regardless of the handshake method, it is still required to enable these signals for proper operation, by asserting them low.
    - On start up– The CTS_N signal indicates the serial communications interface (UART) status, Active low.
        - When high -uart communication is off.
        - When low- uart communication is on (can send AT commands).
- When customer is using G30 A/D he must verify that input voltage will be lower then 0.92Vdc when the modem is off, in case of inserting voltage higher then 0.92Vdc the modem will not turn on.
- G30 has internal ESD protection of 8K contact and 15K air on RF port and shield, all additional ESD protection should implemented on customer application.

Bands & Power Classes

The G30 is designed with quad-band GSM capabilities, supporting the following GSM Bands: 850/900/1800/1900 MHz with GPRS multislot class 10.
G30 can operate on any
GSM/GPRS/EGPRS network to provide voice and data communications.

Power Supply

The G30 power supply must be a single external DC voltage source of 3.3V to 4.2V. The power Supply must be able to sustain the voltage level during a GSM transmit burst current surge, which May reach 2.0A.

It is recommended that the voltage drops during a transmit burst will not exceed 300mV, measured on the G30 interface connector. In any case, the G30 supply input must not drop below the minimum operating level during a transmit burst. Dropping below the minimum operating level may result in a low voltage detection, which will initiate an automatic power-off.
To minimize the losses and transients on the power supply lines, it is recommended to follow these guidelines:

- Use a 1000 uF, or greater, low ESR capacitor on the G30 supply inputs. The capacitor should be located nearest to G30 interface connector.
- Use low impedance power source, cabling and board routing
- Use cabling and routing as short as possible
- Filter the G30 supply lines using filtering capacitors, as described in the following table:

Description	Usage	Capacitor
Minimizes power supply losses during transmit bursts- no more than 200mV. Use maximum possible value.	GSM Transmit current serge	1000 uF
Filters digital logic noises from clocks and data sources.	Digital switching noise	10 nF, 100 nF
Filters transmission EMI.	1800/1900 MHz GSM bands	8.2 pF, 10 pF
Filters transmission EMI.	850/900 MHz GSM bands	33 pF, 39 pF

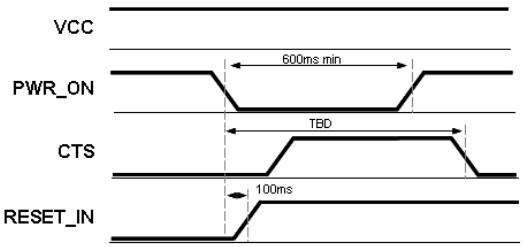
Power On/Off Operation

Turning the G30 on Using PWR_ON:

"The ON_N input signal is set high by an internal pull-up resistor whenever a power supply is applied to G30. Therefore, **it is recommended to operate this signal using an open collector/drain circuit connection."**

Asserting the PWR_ON signal low for a minimum of 600 milliseconds and a maximum Of 1.5 seconds will cause the G30 to turn-on.

Asserting the PWR_ON signal low for more than 1.5 seconds may cause the G30 to interpret the Signal as a power-off command, and turn off immediately after turning on.

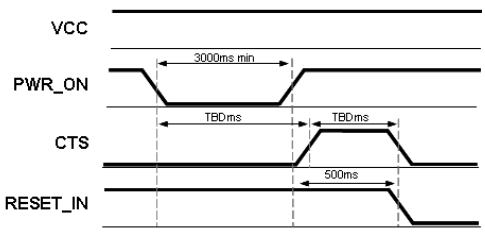


Turning the G30 OFF:

There are several ways to turn the G30 off:

- Asserting the PWR_ON signal low for a minimum of 3 seconds.
- Low power automatic shut down.
- AT command (AT+MRST)

The PWR_ON signal is set high using an internal pull up resistor when power is applied to G30. Asserting the PWR_ON signal low for a minimum of 3 seconds and releasing will turn G30 Off. This will initiate a normal power-off process, which includes disabling of all applications Interfaces (UART, SIM card, audio, etc.) and closing the network connection, and may take Several seconds, depending on application state.



SIM Connection:

- G30 is designed to support two SIM card options with the same SIM signals: External SIM card, Or an on board Embedded SIM (eSIM), depending on the G30 model.
- Both 1.8 V and 3 V SIM types are supported; activation and deactivation with automatic voltage Switch from 1.8 V to 3 V is implemented.

E-SIM or external SIM Card

G30 SIM card has internal SIM chip (eSIM) and external interface to SIM connector depending on model

When external SIM is connected:

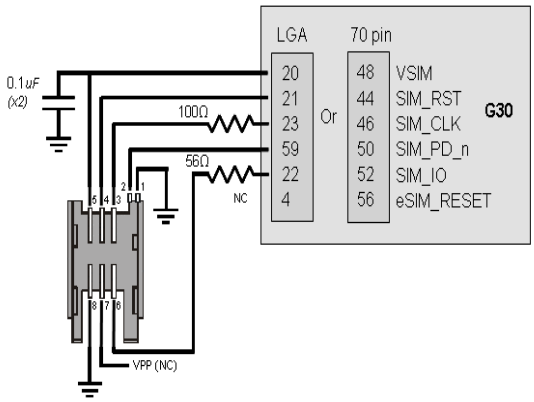
- Connect all SIM signals to the external SIM connector (VSIM , SIM_RST, SIM_IO, SIM_CLK, SIM_PD_n)
- Verify that eSIM_RESET pin is left unconnected.

It is highly recommended to Add on the SIM VCC line 2 cap of 100nF each or Cap 220nF with Low ESR, the placement should be very close to SIM_VCC.

It is highly recommended to add serial resistor to match SIM card signals on pins:

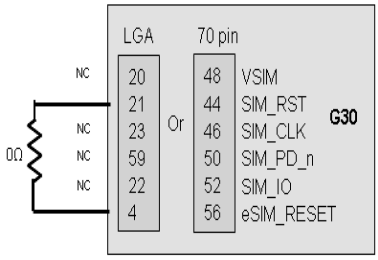
46-SIM CLK add serial resistor of 100Ω

52-SIM DIO add serial resistor of 56Ω



When eSIM is used:

- Verify that the following signals are not connected: VSIM, SIM_IO, SIM_CLK.
- SIM_RST signal must be connected to eSIM_RESET signal via an optional 0 ohm resistor
- Connect SIM_PD_n pin to GND via O ohm resistor in case the SIM detection is disabledby SW (+MSMPD command),



Flashing and Data Logging

In the event of logging or reflashing the module SW, the host must provide access to several I/O Lines especially when using the 81 pin LGA interface version.

The G30 SPI interface is used for data logging, and therefore, it is recommended that the host Application will have the ability to support it.

In addition, in order to support G30 SW upgrade, the host application must have access to the G30 UART signals (TXD, RXD only).

In order to support both data logging, and SW upgrade, it is recommended to use a single header Connector that will contain all required signals with additional SPI indication, VCC and GND Signals.

Note: When a header can't be implemented due to engineering constrains (lack of place), the Host application should support sufficient soldering pads or test points for wire-up.

It is recommended to implement the above in accordance with the following table:

Data Logging and SW Upgrading Application Connector

Pin # (81 pin LGA interface)	Pin # (70 pin connector interface)	G30 Signal Name	Application Header Connector Pinout 
68-77	**1-4**	GND	1
78-79	**5-8**	VCC	9
7	**62**	SPI_IRQ	10
27	**25**	RESET_IN	3
45	**66**	SPI_CLK	2
60	**68**	SPI_MOSI	8
61	**64**	SPI_MISO	6
63	**70**	SPI_CS	4
43	**21**	TXD	5
44	**11**	RXD	7
		SPI connection indication	11
		Flashing connec-tion indication	12

Note: Recommended application connector: SAMTEC TSM-106-02-S-DV-LC 12 pin.

Pin Assignment

Pin No.	@70 Pin Conn.	Name	I/O	Function	Value @ Reset	Characteristics (Refer to Section 2.2.2/3)
1	36	GPIO5	I/O	GPIO	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
2	38	GPIO6	I/O	GPIO	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B
3	**Not Connected**					
4	56	eSIM_RESET	I	Embedded SIM reset	T	If eSIM is being used connect this line to SIM_RST pin 21(LGA) pin 44 (70 pin)
5	40	GPIO7	I/O	GPIO	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
6	42	GPIO8	I/O	GPIO	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
7	62	SPI_IRQ	I	SPI Interrupt Input		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class C. PU/PD class B.
			I/O	Capture/Compare		
			I/O	GPIO	I H 100K PU	
8-11	**Not Connected**					
12		GPI9	I	GP Input Only	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
13	41	ANT_DET	I/O	GPIO		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
			O	Antenna Detect	L - No Antenna H - Valid Antenna	
14	26	WKUPO	I/O	GPIO		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
			O	Wake-Up Out	H	
15	**Not Connected**					
16	49	GPRS	I/O	GPIO		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
			O	GPRS	L - Valid GPRS connection H - No GPRS connection	

Pin No.	@70 Pin Conn.	Name	I/O	Function	Value @ Reset	Characteristics (Refer to Section 2.2.2/3)
17	Not Connected					
18	53	PWR_ON	I	Power-on/off	T/PD	Generic digital interfaces(2.0V typ.)
19	Not Connected					
20	48	VSIM	O	SIM supply output		VSIM = 1.80 V typical if SIM card = 1.8V type or VSIM = 2.85 V typical if SIM card = 3.0V type
21	44	SIM_RST	O	SIM reset	L	SIM interface voltage domain. Output driver class E. PU/PD class B.
22	52	SIM_IO	I/O	SIM data	H 4.7K PU	SIM interface voltage domain. Output driver class E. PU/PD class B.
23	46	SIM_CLK	O	SIM clock	L	SIM interface voltage domain. Output driver class E. PU/PD class B.
24	Not Connected					
25	16	WKUPI	I/O	Capture/Compare		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class C. PU/PD class B.
			I	Wake-Up In	I H 100K PU	
26	Not Connected					
27	25	RESET_IN	OC	External reset input	I H 19K PU	External reset signal voltage domain.
28-32	Not Connected					
33	34	GPIO4/SCL	I/O	I2C bus data line		I2C interface voltage domain. Fixed open drain. External pull-up required. Value at reset: T/OD.
			I/O	GPIO	I H 100K PU	
34	32	GPIO3/SDA	I/O	I2C bus data line		I2C interface voltage domain. Fixed open drain. External pull-up required.
			I/O	GPIO	I H 100K PU	
35	43	ADC2	I	Analog-to-Digital Converter Input	L	Resolution: 12 bits Voltage span: 0V-1.92V
36	37	ADC1	I	Analog-to-Digital Converter Input	L	Resolution: 12 bits Voltage span: 0V-1.92V

Pin No.	@70 Pin Conn.	Name	I/O	Function	Value @ Reset	Characteristics (Refer to Section 2.2.2/3)
37	23	RI	O	Ring Indicator	H.	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
			I/O	GPIO		
38	17	DCD	O	Data Carrier Detect	H	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class B. PU/PD class B
39	13	DSR	O	Data Set Ready	L	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class B slow. PU/PD class A.
40	19	DTR	I	data terminal ready	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class C. PU/PD class B.
41	9	RTS	I	ready to send	4.7K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class E. PU/PD class C.
42	15	CTS	O	Clear To Send		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class C.
43	21	TXD	I	Transmitted Data GPIO	200K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class E. PU/PD class C.
44	11	RXD	O	Received Data GPIO	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class E. PU/PD class C.
45	66	SPI_CLK	O	SPI Clock Short to Pin 57 LGA	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
46	**Not Connected**					
47	54	HDST_SPK	O	Low power single-ended analog audio output		Used in handset or in headset mode
48	63,67	SPKR_N	O	High power differential analog audio output		Used in ring tones or in hands free mode
49	65,69	SPKR_P	O	High power differential analog audio output		Used in ring tones or in hands free mode
50	55	HDST_INT	I	Headset detection input		Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class E.
			I	External interrupt		

Pin No.	@70 Pin Conn.	Name	I/O	Function	Value @ Reset	Characteristics (Refer to Section 2.2.2/3)
				input		PU/PD class B.
			I/O	GPIO		Value at reset: T/PD.
51	61	MIC	I	Headset microphone analog bias		Single ended supply output and signal input for Handset microphone. Used in handset or in hands free mode
52	59	AGND1	I	Handset microphone analog reference		Local ground of the Handset microphone
53	57	MIC_HDST	I	Headset microphone analog bias		Single ended supply output and signal input for microphone. Used in headset mode
54	59	AGND2	I	Headset microphone analog reference		Local ground of the Headset microphone
55	18	RXD_DAI	I	I2S receive data Short to pin 61	47K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
56	24	WA0_DAI	O	I2S word alignment Short to pin 60	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
57	22	CLK_DAI	O	I2S clock Short to pin 45	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
58	20	TXD_DAI	O	I2S transmit data Short to pin 63	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
59	50	SIM_PD_n	I/O	SIM present detect	OD/L	SIM interface voltage domain. Output driver class E. PU/PD class B.
60	68	SPI_MOSI	O	SPI sync data (MOSI) Short to pin 5	T	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B
61	64	SPI_MISO	I	SPI sync data (MISO) Short to pin 55	47K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class D. PU/PD class B.
62	60	VRTC	I/0	Real Time Clock Supply Output		VRTC = 2.0 V (typical) 2Ma Connect a 47uF capacitor to ground.
63	70	SPI_CS	O	SPI chip select Short to pin 58	T	Generic digital interfaces voltage domain (Typ. 2.85V). Output driver class D. PU/PD class B.
64	Not Connected					
65	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
66	**N.C**	ANT	I/O	RF antenna		50 Ohm nominal impedance
67	1,2,3,4	GND	NA	Ground		GND pins are internally

Pin No.	@70 Pin Conn.	Name	I/O	Function	Value @ Reset	Characteristics (Refer to Section 2.2.2/3)
						shorted between them.
68	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
69	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
70	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
71	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
72	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
73	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
74	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
75	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
76	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
77	1,2,3,4	GND	NA	Ground		GND pins are internally shorted between them.
78	5,6,7,8	VCC	I	Voltage Supply Input		VCC pins are internally shorted between them.
79	5,6,7,8	VCC	I	Voltage Supply Input		VCC pins are internally shorted between them.
80	28	GPIO1	I/O	GPIO	I H 100K PU	Generic digital interfaces voltage domain (Typ. 2.85V). Output driver class F. PU/PD class B. Value at reset: T.
81	30	GPIO2	I/O	GPIO	I H 100K PU	Generic digital interfaces (Typ. 2.85V) voltage domain. Output driver class F. PU/PD class B.
	27	VREF	O	Reference voltage supply	2.85V	Max current source 30mA
82-89	**Not Connected**					
RF TP	**Not Connected Refer to "RF Recommendation" on DG**					

Motorola G30 - G24 Differences Summary

Motorola's new "30" SMT-LGA Form Factor Family, based on 81 pin platform, is designed with backward and forward compatibility, and with future upgraded scalability.
The G30 LGA GSM/GPRS module is also available with a 70 pin connector, maintaining the same mounting design as the '24' family. This model version is offered for customers looking to draw on the G30 feature set, but wish to stick with connectorized solution.

Extra Features:

- Motorola's proprietary IPs.
- Embedded chip SIM capability.
- AT commands Interface and TCP/IP stacks compatible with the G24 family.
- Board to Board connector option.
- High compatibility to the "24" family Form Factor and Pin-out.
- Full Duplex Audio.

Features Removed

- EDGE
- Java
- UART2
- USB
- ADC3
- IGN
- TX_EN

Features added

- VRTC
- ESIM Embedded SIM
- Unit ready indication using reset signal
- FOTA ATs
- M2M application
  - I2C
  - SPI

Power Supply

The G30 current consumption values may be slightly different than G24. Refer to the G30 HW Description Developer Guide for power consumption details.

Interfaces

- UART
- SPI for logging.
- SIM card
- I2C (via M2M SW package)

SIM Card

G30 SIM card has internal SIM chip and external interface to SIM connector as G24, G30 also supports:

- 1.8V SIM cards.
- eSIM Embedded SIM

Audio

Differences in the audio output and input gain settings between G24 and G30 may be noticed. Different gain levels for each path might need to be set through AT commands, depending on the application.
G30 digital audio:
PCM bus clock frequency 144 kHz
I2S bus CLK - 512 kHz.
.

ON/OFF Timing

Turning the G24 ON Using ON_N

Asserting the ON_N signal low for a minimum of 500 milliseconds and a maximum of 1.5 seconds will cause the G24 to turn-on.

Turning the G30 ON Using ON_N

Asserting the ON_N signal low for a minimum of 600 milliseconds will cause the G30 to turn-on.

Turning the G24 OFF Using ON_N

Asserting the ON_N signal low for a minimum of 2 seconds.

Turning the G30 OFF Using ON_N

Asserting the ON_N signal low for a minimum of 3 seconds.

VREF pin 27

G30 can supply current up to 30mA, while G24 supply current up to 200mA.

Mechanical Interface

The mechanical design is similar between G24 and G30.

G30:
Size (with 3 mm connector): 40 x 24.4 x 3.5 mm
3.8mm +/-0.2mm stack heights are

G24:
Size (with 3 mm connector): 45.2 x 24.4 x 6 mm
6.5mm stack height