

WISMO Quik Q3100 series

WISMO Quik Q3106 Product Specification

Reference: **WM_PRJ_Q3100_PTS_001**

Revision: **002**

Date: **5th February 2003**



Preliminary

Document Information

Revision	Date	History of the evolution	
001	Nov 2002	Creation as "Preliminary".	
002	Feb 2003	Stop of the Q3126 series and availability of the first mechanical drawing. Q3106E has been added.	

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Caution

Information furnished herein by Wavecom are accurate and reliable. However no responsibility is assumed for its use. Please read carefully the safety precautions for a terminal based on WISMO Quik Q3106 Series.

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Trademarks

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Overview

This document defines and specifies the WISMO QUIK Q3106 Series, available under four GSM/GPRS Cl.10 versions:

- **Q3106A:** E-GSM/GPRS **900/1800** MHz version with **16** Mbits of Flash memory and **2** Mbits of SRAM (16/2)
- **Q3106B:** E-GSM/GPRS **900/1800** MHz version with **32** Mbits of Flash memory and **4** Mbits of SRAM (32/4)
- **Q3106D:** E-GSM/GPRS **900/1800** MHz version with **64** Mbits of Flash memory and **8** Mbits of SRAM (64/8). This configuration will be available for handset application and vertical application where UART2 is not used.
- **Q3106E:** E-GSM/GPRS **900/1800** MHz version with **64** Mbits of Flash memory and **4** Mbits of SRAM (64/4). This configuration will be available for handset application and vertical application where UART2 is not used.

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Reference Documents

- [1] AT Commands Interface Guide
Ref WM_SW_OAT_IFS_001

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1 General description

1.1 General information

WISMO Quik Q3106 is a self-contained E-GSM/GPRS 900/1800 dual band module including the following features:

- 32 x 44 x 3 mm
- 2 Watts E-GSM900/GSM radio section running under 3.6 Volts
- 1 Watt DCS1800 radio section running under 3.6 Volts
- Digital section running under 2.8 Volts
- 3V SIM interface
- Real Time Clock with calendar
- Battery charger
- Echo Cancellation + noise reduction
- Full GSM or GSM/GPRS software stack
- Hardware GPRS class 10 capable
- Complete shielding
- Complete interfacing:
 - Power supply
 - Serial link
 - Audio
 - SIM card
 - Keyboard
 - LCD (not available with AT commands)

WISMO Quik Q3106 Series has one external connection:

- General Purpose Connector (GPC) to Digital, Keyboard, Audio, Supply, and RF connection

WISMO Quik Q3106 Series is designed to fit in very small terminals and only some custom functions have to be added to make a complete Dual Band solution:

- Keypad and LCD module
- Earpiece and Microphone
- Base connector
- Battery
- Antenna switch
- SIM connector

1.2 Functional description

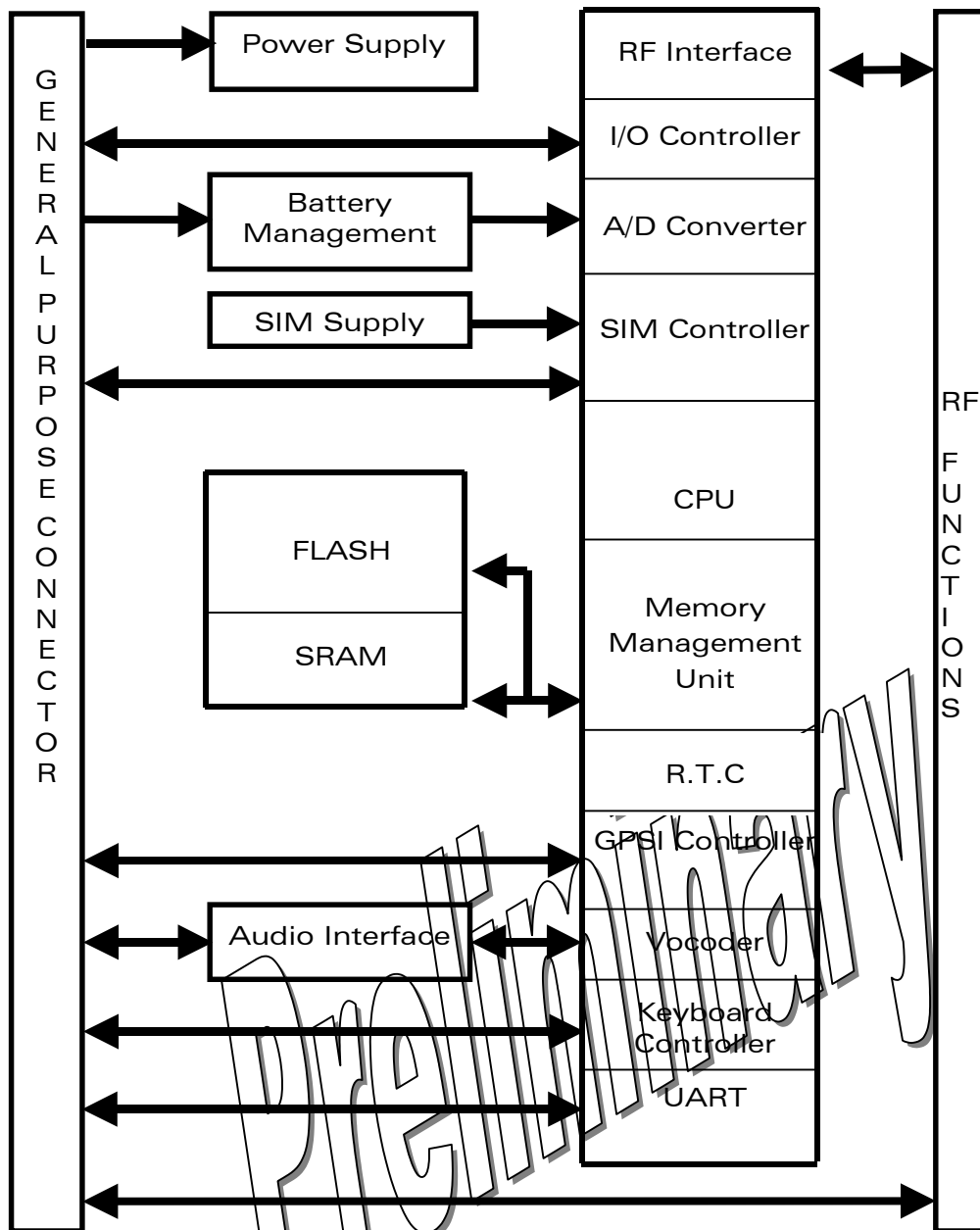


Figure 1: Functional architecture

1.2.1 RF functionalities

The Radio Frequency (RF) functionalities comply with the Phase II E-GSM 900/DCS 1800 recommendation. The frequencies are:

Q3106:

Characteristics	Q3106	
	E-GSM 900	DCS 1800
Frequency TX	880 to 915 MHz	1710 to 1785 MHz
Frequency RX	925 to 960 MHz	1805 to 1880 MHz

The RF part is based on a specific dual band chip including :

- Low-IF Receiver (IF = Intermediate Frequency)
- Dual RF (Radio Frequency) synthesizer
- Digital IF to Baseband Converter
- Offset PLL (Phase Lock Loop) transmitter
- Dual band PA (Power Amplifier) module including control loop

1.2.2 Baseband functionalities

The digital part of the WISMO Quik Q3106 Series is composed of a PHILIPS-VLSI chip (ONE C GSM/GPRS Kernel). This chipset is using a 0,25 μ m mixed technology CMOS, which allows massive integration as well as low current consumption.

1.3 Firmware

WISMO Quik Q3106 Series is designed to be integrated into various types of applications such as handsets or vertical applications (telemetry, multimedia, ...).


For vertical applications, the firmware offers a set of AT commands to control the module. With this standard software, some interfaces of the module are not available since they are dependent on the peripheral devices connected to the module. They are the LCD interface and the SPI bus.

2 Interfaces

2.1 General Purpose Connector (GPC)

A 100 pin connector¹ is provided to interface the WISMO Quik Q3106 Series with a board containing either a LCD module, or a keyboard, or a SIM connector, or a battery connection...

The interfaces available on the GPC are described in the next paragraphs.

 Please be aware that some of these interfaces cannot be handled when using the WISMO Quik Q3106 Series driven by AT commands: LCD interface, SPI bus.



This symbol is used to indicate the interfaces not available with AT commands.

These functions have then to be managed externally i.e using the main processor of the application.

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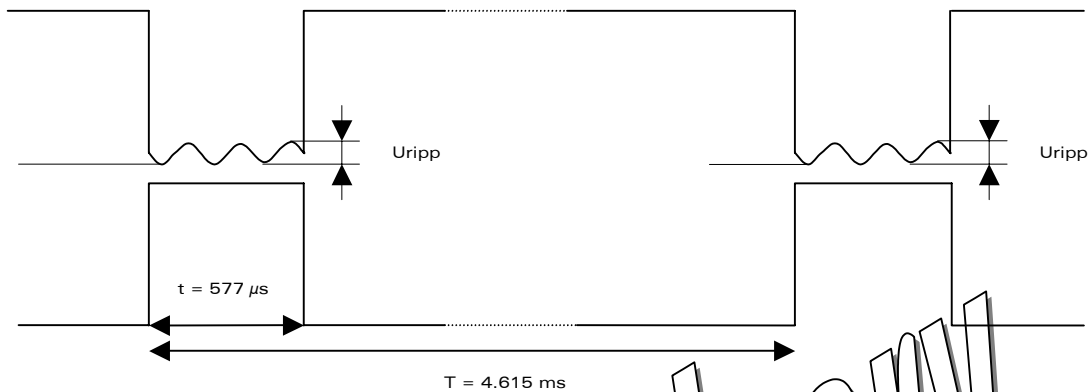
¹ The communication interface connector is a 100 pin connector with 0.5mm pitch from NAIS: (see chapter connector reference for further details):

2.2 Power supply

2.2.1 Power supply description

The power supply is one of the key issues in the design of a GSM terminal. Due to the bursted emission in GSM / GPRS, the power supply must be able to deliver high current peaks in a short time. During these peaks the ripple (U_{ripp}) on the supply voltage must not exceed a certain limit (see table "Power Supply Voltage" bellow).

- In communication mode, a GSM/GPRS classe 2 terminal emits 577 μ s radio bursts every 4.615 ms.



- In communication mode, a GPRS class 10 terminal emits 1154 μ s radio bursts every 4.615 ms.

VBATT is the only power supply. It's used to supply the RF part and the baseband part (VDD).

The WISMO Quik Q3106 Series shielding case is the grounding. The ground has to be connected on the mother board through a complete layer on the PCB.

Power Supply Voltage

	V_{MIN}	V_{NOM}	V_{MAX}	$U_{ripp} \text{ max}$
VBATT	3.3 V (*)	3.6 V	4.5 V (**)	50 mVpp for freq < 200kHz 2 mVpp for freq > 200kHz

(*): This value has to be guaranteed during the burst (with 2.0 A Peak in GSM or GPRS mode)

(**): max operating Voltage Stationary Wave Ratio (VSWR) 2:1

When supplying the module with a battery, the total impedance (battery+protections+PCB) should be <150 mOhm.

2.2.2 Power consumption

Following information are given assuming a 50 Ω RF output.

Power consumption in OFF mode
 (module supplied, OFF state, no software running)

	Conditions	I _{NOM}	I _{MAX}
Overall consumption*	Off	5 μA	10 μA

*VBATT + VDD

Power consumption in E-GSM 900 mode for Q3106 (GSM and GPRS data)

	Conditions	I _{NOM}	I _{MAX}
GSM data			
Overall consumption*	During TX bursts @PCL5	1.75 A	1.9 A
	During RX bursts	125 mA	150 mA
	Average 1RX/1TX@PCL5	275 mA	300 mA
	Average 1RX/1TX @PCL8	190 mA	210 mA
	Average Idle mode	2.3 mA	3 mA
GPRS data			
Overall consumption*	During 2Tx burst (PCL5)	1.75 A	1.9 A
	Com Packet Data GPRS (2Tx, PCL5, 3Rx)	500 mA	600 mA

Power Control Level: PCL5=2 W typ, PCL8=0.8 W typ.
 *VBATT + VDD

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Power consumption in DCS 1800 mode for Q3106 (GSM and GPRS data)

	Conditions	I _{NOM}	I _{MAX}
GSM data			
Overall consumption*	During TX bursts @PCL5	1.1 A	1.2 A
	During RX bursts	125 mA	150 mA
	Average 1RX/1TX@PCL5	200 mA	225 mA
	Average 1RX/1TX @PCL8	150 mA	170 mA
	Average Idle mode	2.3 mA	3 mA
GPRS data			
Overall consumption*	During 2Tx burst _(30dBm)	1.1 A	1.2 A
	Com Packet Data GPRS (2Tx _{30dBm} , 3Rx)	400 mA	500 mA

Power Control Level: PCL5=2 W typ.; PCL8=0.5 W typ.
* VBATT + VDD

Power Supply Pinout

Signal	Pin number
VBATT	77, 78, 79, 80
GND	Shielding

The grounding connection is done through the shielding.

2.3 Electrical information for digital I/O

All digital I/O comply with 3 Volts CMOS.

Operating conditions

Parameter	I/O type	Min	Max	Condition
V _{IL}	CMOS	-0.5 V	0.8 V	
V _{IH}	CMOS	2.1 V	3.0 V	
V _{OL}	1X		0.2 V	I _{OL} = -1 mA
	2X		0.2 V	I _{OL} = -2 mA
	3X		0.2 V	I _{OL} = -3 mA
V _{OH}	1X	2.6 V		I _{OH} = 1 mA
	2X	2.6 V		I _{OH} = 2 mA
	3X	2.6 V		I _{OH} = 3 mA

To interface the WISMO Quik Q3106 Series digital signals with other logics:

- 3 V logic: some serial resistors (between 2.2 kΩ and 4.7 kΩ) can be added on the lines
- 3.3 V logic: some serial resistors (between 4.7 kΩ and 10 kΩ) can be added on the lines.
- For higher voltage logics, a resistor bridge or a level shifter IC can be added.

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2.4 LCD interface

The WISMO Quik Q3106 Series can be connected to a LCD module driver through either a SPI bus or a two-wire interface.

2.4.1 SPI bus

The SPI bus includes a CLK signal, an I/O signal and an EN signal complying with SPI bus standard. The maximum speed transfer is 13 Mbits/s.

Pin description

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
SPI_CLK_1	23	O	1X	SPI Serial Clock	SCL
SPI_DAT_1	25	I/O	CMOS / 1X	SPI Data	SDA
SPI_EN_1	28	O	1X	SPI Enable	

SCL and SDA are I2C signals.

2.4.2 Two wire interface

The two wire interface includes a CLK signal and a DATA signal complying with a standard 96 kHz interface. The maximum speed transfer is 400 kbits/s.

Pin description

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
SCL	23	O	1X	Serial Clock	SPI_CLK_1
SDA	25	I/O	CMOS / 1X	Data	SPI_DAT_1



2.5 SPI Auxiliary bus

A second SPI bus called SPI2 is available for the WISMO Quik Q3106 Series. The maximum speed transfer is 13 Mbits/s.

Pin description

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
SPI_CLK_2	27	O	1X	SPI Serial Clock	GPIO7
SPI_DAT_2	50	I/O	CMOS / 1X	SPI Data	GPIO6
SPI_EN_2	21	O	1X	SPI Enable	LCDEN

2.6 Parallel Bus

The WISMO Quik Q3106 Series offers a 16-bit bus interface on 22 wires.

In addition to the 16 data bits, the parallel bus includes the control signals (/RD, /WR, A2, A3, GPO1, CSUSR).

GPO1 can be used to generate a chip select signal, CSUSR is a chip select signal which can be used to drive any parallel peripheral device.

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
GPO1	24	O	CMOS/3X	Enable Signal	
CSUSR	53	O (I/O)	CMOS/2X	User_chip_select	GPIO3
D0	7	I/O	CMOS/3X	Data bus	
D1	8	I/O	CMOS/3X	Data bus	
D2	17	I/O	CMOS/3X	Data bus	
D3	14	I/O	CMOS/3X	Data bus	
D4	15	I/O	CMOS/3X	Data bus	
D5	12	I/O	CMOS/3X	Data bus	
D6	13	I/O	CMOS/3X	Data bus	
D7	10	I/O	CMOS/3X	Data bus	
D8	9	I/O	CMOS/3X	Data bus	
D9	16	I/O	CMOS/3X	Data bus	
D10	11	I/O	CMOS/3X	Data bus	
D11	18	I/O	CMOS/3X	Data bus	
D12	5	I/O	CMOS/3X	Data bus	

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
D13	6	I/O	CMOS/3X	Data bus	
D14	19	I/O	CMOS/3X	Data bus	
D15	20	I/O	CMOS/3X	Data bus	
/WR	4	O	CMOS/3X	Write operation	
/RD	3	O	CMOS/3X	Read operation	
A2	1	O	CMOS/3X	Data/command selection	
A3	2	O	CMOS/3X	Data/command selection	

2.7 Keyboard interface

Warning:

This interface is not FULLY available with AT commands:

An AT command allows to get the input key code (see AT+CMER command description). This code has then to be processed by the application.

This interface provides 10 connections: 5 rows (ROW0 to ROW4) and 5 columns (COL0 to COL4).

The scanning is a digital one, and the debouncing is done in the WISMO Quik Q3106 Series. No discrete components like R,C (Resistor, Capacitor) are needed.

Pin description

Signal	Pin number	I/O	I/O type	Description
ROW0	33	I/O	CMOS / 1X	Row scan
ROW1	32	I/O	CMOS / 1X	Row scan
ROW2	35	I/O	CMOS / 1X	Row scan
ROW3	34	I/O	CMOS / 1X	Row scan
ROW4	37	I/O	CMOS / 1X	Row scan
COL0	36	I/O	CMOS / 1X	Column scan
COL1	39	I/O	CMOS / 1X	Column scan
COL2	38	I/O	CMOS / 1X	Column scan
COL3	41	I/O	CMOS / 1X	Column scan
COL4	40	I/O	CMOS / 1X	Column scan

2.8 Serial link

A flexible 6-wire serial interface is available complying with V24 protocol signaling but not with V28 (electrical interface) due to a 2.8 Volt interface.

The signals are Tx data (CT103/TXD1), Rx data (CT104/RXD1), Request To Send (CT105/RTS1), Clear To Send (CT106/CTS1), Data Terminal Ready (CT108-2/DTR1) and Data Set Ready (CT107/DSR1).

The set of serial link signals can be required for GSM DATA service application and is generated by the general purpose I/O provided by the WISMO Quik Q3106 Series. The 2 additional signals are Data Carrier Detect (CT109/DCD1) and Ring Indicator (CT125/RI1).

Pin description

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
CT103 / TXD1	51	I	CMOS	Transmit serial data	
CT104 / RXD1	49	O	1X	Receive serial data	
CT105 / RTS1	52	I	CMOS	Request To Send	
CT106 / CTS1	54	O	1X	Clear To Send	
CT107 / DSR1	45	O	1X	Data Set Ready	
CT108-2 / DTR1	46	I	CMOS	Data Terminal Ready	EXTINT2
CT109 / DCD1	26	O	CMOS / 2X	Data Carrier Detect	GPIO1/PWM1
CT125 / RI1	48	O	CMOS / 2X	Ring Indicator	GPIO8
CT102 / GND	Shielding legs			Ground	

The rising time and the falling time of the reception signals (mainly CT103) have to be less than 200 ns.

The minimum width of the reception signals (mainly CT103) have to be more than 2 ms.

Note:

The WISMO Quik Q3106 Series has been designed to be operated using all the serial signals. In particular, it is necessary to use the RTS1/CTS1 hardware flow control signals in order not to lose data.

2.9 SIM interface

5 signals are available:

- SIM_VCC: SIM power supply.
- SIM_RST: reset.
- SIM_CLK: clock.
- SIM_IO: I/O port.
- SIM_PRES: SIM card detect.

The SIM interface controls a 3 V SIM (and a 5 SIM through an external SIM driver). This interface is fully compliant with GSM 11.11 recommendations concerning SIM functions.

It is recommended to add Transient Voltage Suppressor diodes on the signals connected to the SIM socket in order to prevent any ElectroStatic Discharge. TVS diodes with low capacitance (less than 10 pF) have to be connected on SIM_CLK and SIM_IO to avoid any disturbance of the rising and falling edges. These types of diodes are mandatory for the Full Type Approval. They shall be placed as close as possible to the SIM socket.

The following references can be used: DALC208SC6 from ST Microelectronics.

Pin description

Signal	Pin number	I/O	I/O type	Description
SIM_CLK	73	O	2X	SIM Clock
SIM_RST	76	O	2X	SIM Reset
SIM_IO	74	I/O	CMOS / 3X	SIM Data
SIM_VCC	75	O		SIM Power Supply
SIM_PRES	30	I	CMOS	SIM Card Detect

Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Unit
SIM_IO V _{IH}	I _{IH} = ± 20 μA	0.7xSIM_VCC			V
SIM_IO V _{IL}	I _{IL} = 1 mA			0.3xSIM_VCC	V
SIM_RST, SIM_IO SIM_CLK V _{OH}	Source current = 20 μA	SIM_VCC - 0.1 V			V
SIM_RST, SIM_IO SIM_CLK V _{OL}	Sink current = -200 μA			0.1	V

Parameter	Conditions	Min	Typ	Max	Unit
SIM_VCC* Output Voltage	$I_{SIM_VCC} \leq 6 \text{ mA}$	2.70	2.80	2.85	V
SIM_CLK Rise/Fall Time	Loaded with 30 pF			50	ns
SIM_RST, SIM_IO Rise/Fall Time	Loaded with 30 pF			1	μs
SIM_CLK Frequency	Loaded with 30 pF			3.25	MHz

(*): given for the 3 V interface. An external SIM driver is needed to handle 5 V SIMs.

Note:

When not used **SIM_PRES** has to be tied to VCC.

When used, a low to high transition means that the SIM card is inserted and a high to low transition means that the SIM card is removed.

2.10 General Purpose Input/Output

The WISMO Quik Q3106 Series provides:

- 9 General Purpose I/O,
- 4 General Purpose Outputs,
- 1 General Purpose Input.

They are used to control any external device such as a LCD, vibrator, Led_Out or a Keyboard backlight.

Pin description

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
GPIO0	67	I/O	CMOS / 2X	General Purpose I/O	LED_OUT
GPIO1	26	I/O	CMOS / 2X	General Purpose I/O	PWM1 / DCD1
GPIO2	30	I/O	CMOS / 2X	General Purpose I/O	SIMPRES
GPIO3	53	I/O	CMOS / 2X	General Purpose I/O	CSUSR
GPIO4	44	I/O	CMOS / 2X	General Purpose I/O	CTS2 / ADD22
GPIO5	47	I/O	CMOS / 2X	General Purpose I/O	RTS2 / ADD23
GPIO6	50	I/O	CMOS / 2X	General Purpose I/O	SDA2 (SPI_DAT_2)

Signal	Pin number	I/O	I/O type	Description	Multiplexed with
GPI07	27	I/O	CMOS / 2X	General Purpose I/O	SCL2 (SPI_CLK_2)
GPI08	48	I/O	CMOS / 2X	General Purpose I/O	RI1
GPO0	69	O	CMOS / 3X	General Purpose O	
GPO1	24	O	CMOS / 3X	General Purpose O	
GPO2	72(*)	O	CMOS / 3X	General Purpose O	RXD2
GPO3	72(*)	O	CMOS / 3X	General Purpose O	32K
GPI	71	I	CMOS	General Purpose I	TXD2

(*) Pin 72 signal allocation:

- GPO3 or 32K in case of 64 Mbits Flash memory use,
- GPO2 or RXD2 in case of 16/32 Mbits Flash Memory use.

The following GPIOs are not available (reserved) in case of module running with the AT command firmware:

Signal	Pin number	I/O	I/O type	Description	Comments
GPI00	67	O	CMOS / 2X	General Purpose O	LED_OUT (*)
GPO0	69	O	CMOS / 3X	General Purpose O	SIM 3V
GPI01	26	I/O	CMOS / 2X	General Purpose I/O	DCD1 / PWM1
GPI08	48	I/O	CMOS / 2X	General Purpose I/O	RI

(*) The LED_OUT signal can be used to drive a LED through an open-collector transistor according to the module activity status.

2.11 Activity Status Indication

LED status	WISMO Quik Q3106 Series status	
OFF	Module in download mode or module OFF	
ON	Permanent	Module switched ON, not registered on the network
	Slow flash LED ON for 200 ms, OFF for 2 s	Module switched ON, registered on the network
	Quick flash LED ON for 200 ms, OFF for 600 ms	Module switched ON, registered on the network, communication in progress

2.12 Analog to Digital Converter

Analog to Digital converter input is provided by the WISMO Quik Q3106 Series. This converter is a 10-bit one, ranging from 0 to 2.8 V.

Pin description

Signal	Pin number	I/O	I/O type	Description
AUX_ADC	42	I	Analog	A/D converter

Electrical Characteristics

Parameter	Min	Max	Unit
Resolution	10		bits
Sampling rate	90.3		Ksps
Input signal range	0	2.8 V	V
ADC Reference Accuracy	0.75	2	%
Integral Accuracy	+/- 1		LSB
Differential Accuracy	+/- 1		LSB
Input Impedance (R)	4.7		kΩ
Input Impedance (C)		100	nF

2.13 Audio interface

Two different microphone inputs and two different speaker outputs are supported.

The WISMO Quik Q3106 Series also includes an echo cancellation feature which allows hands-free function.

2.13.1 Microphone Inputs

The MIC2 inputs already include the biasing for an electret microphone allowing an easy connection to a handset.

The MIC1 inputs do not include an internal bias. MIC1/SPK1 is then appropriate for a hands-free system or a handset with biasing external to the module.

2.13.1.1 Common microphone input characteristics

The connection can be either differential or single-ended but using a differential connection in order to reject common mode noise and TDMA noise is strongly recommended. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as shielding in order to avoid any disturbance on the audio path.

Internal audio filter characteristics

Frequency	Gain
0-150 Hz	< -22 dB
150-180 Hz	< -11 dB
180-200 Hz	< -3 dB
200-3700 Hz	0 dB
>4000 Hz	< -60 dB

The gain of MIC inputs is internally adjusted and can be tuned from 30 dB to 51 dB using an AT command, see AT commands documentation for more details.

Microphone gain vs Max input voltage

Transmit Gain (dB)	Max Vin (mVrms)
30	43.80
33	31.01
36	21.95
39	15.54
42	11
45	7.79
48	5.51
51	3.9

Recommended characteristics for the microphone:

- 2V – 0.5 mA
- 2 kohms
- Sensitivity -40 to -50 dB
- SNR > 50 dB
- Frequency response compatible with the GSM specifications

For possible references, see Section “Connector and peripheral device references”, § 4.3.

2.13.1.2 Main Microphone Inputs (MIC2)

The MIC2 inputs are differential ones. They already include the convenient biasing for an electret microphone (0.5 mA and 2 Volts). This electret microphone can be directly connected on these inputs. The impedance of the microphone 2 has to be around 2 k Ω . These inputs are the standard ones for an handset design while MIC1 inputs can be connected to an external headset or a hands-free kit.

AC coupling is already embedded in the module.

Pin description

Signal	Pin #	I/O	I/O type	Description
MIC2P	61	I	Analog	Microphone 2 positive input
MIC2N	63	I	Analog	Microphone 2 negative input

2.13.1.3 Auxiliary Microphone Inputs (MIC1)

The MIC1 inputs are differential ones and they do not include internal bias. To use these inputs with an electret microphone, bias has to be generated outside the WISMO Quik Q3106 Series module according to the characteristic of this electret microphone. These inputs are the standard ones used for an external headset or a hands-free kit.

AC coupling is already embedded in the module.

Pin description

Signal	Pin #	I/O	I/O type	Description
MIC1P	59	I	Analog	Microphone 1 positive input
MIC1N	57	I	Analog	Microphone 1 negative input

2.13.1.4 Differential connection

Impedance of the microphone input in differential mode:

- Module ON: $R_{in} = 10 \text{ k}\Omega \pm 10\%$
- Module OFF: $R_{in} > 1 \text{ M}\Omega \pm 10\%$

2.13.2 Speaker Outputs

2.13.2.1 Common speaker output characteristics

The connection can be differential or single-ended but using a differential connection to reject common mode noise and TDMA noise is strongly recommended. Moreover in single-ended mode, 1/2 of the power is lost. When using a single-ended connection, be sure to have a very good ground plane, a very good filtering as well as shielding in order to avoid any disturbance on the audio path.

Speaker outputs SPK2 are push-pull amplifiers and can be loaded down to 150 Ohms and up to 1nF (see details in table *Speaker gain vs Max output voltage*).

These outputs are differential and the output power can be adjusted by step of 2 dB. The output can be directly connected to a speaker.

The gain of SPK outputs is internally adjusted and can be tuned using an AT command. See AT command documentation for more details.

Speaker gain vs Max output voltage

Receive Gain (dB) (*)	Max output level (Vrms)	Max.speaker load (Ω)
+2	1.74	150
0	1.38	50
-2	1.099	32
-4	0.873	32
-6	0.693	32
-8	0.551	32
-10	0.437	32
-12	0.347	32
-14	0.276	32
-16	0.219	32
-18	0.174	32
-20	0.138	32
-22	0.110	32
-24	0.087	32
-26	0.069	32
-26	0.069	32

(*) analog gain: might not be significant

Recommended characteristics for the speaker:

- Impedance: 150 Ohms²
- Type: 10 mW, electro-magnetic
- Sensitivity: 110 dB
- Frequency response compatible with the GSM specifications

For possible references, see Section "Connector and peripheral device references", § 4.4.

2.13.2.2 Speaker 2 Outputs

Pin description

Signal	Pin #	I/O	I/O type	Description
SPK2P	64	O	Analog	Speaker 2 positive output
SPK2N	62	O	Analog	Speaker 2 negative output

2.13.2.3 Speaker 1 Outputs

Pin description

Signal	Pin #	I/O	I/O type	Description
SPK1P	58	O	Analog	Speaker 1 positive output
SPK1N	60	O	Analog	Speaker 1 negative output

2.13.3 Buzzer Output

The buzzer output is a digital one. A buzzer can be directly connected between this output and VBATT. The maximum current is 80 mA (PEAK).

Pin description

Signal	Pin #	I/O	I/O type	Description
BUZ	70	O	Digital	Buzzer output

² 32 Ohms for handsets

Operating conditions

Parameter	Condition	Min	Max	Unit
V _{OL}	I _{AVERAGE} = 40 mA		0.6	v
I _{PEAK}	VBATT = VBATTmax		80	mA
I _{AVERAGE}	VBATT = VBATTmax		40	mA

2.14 Battery charging interface

The WISMO Quik Q3106 Series module supports one battery charging circuit for Li-Ion batteries.

This circuit uses an interface which consists of a current source inputs (CHG_IN) where the constant current has to flow in order to charge the battery.

This current value depends on the battery capacity. It is recommended to provide a current equal to the value of the capacity plus 50 mA. For a 550 mA battery the current will be 600 mA. The maximum current is 800 mA.

A specific AT command (AT+WBCM), available from 4.3 level, allows to manage the charge battery (start and stop the charge, enable or disable unsolicited Battery Charge Indications and set the battery charge parameters).

The WISMO Quik Q3106 Series module monitors the battery voltage to detect the end of the charge. WISMO Quik Q3106 Series also monitors the temperature of the battery through the BAT_TEMP pin which has to be connected to a temperature sensor inside the battery (a NTC resistor for instance).

Pin description

Signal	Pin number	I/O	I/O type	Description
CHG_IN	65, 66	I	Supply	Current source input
BAT_TEMP	43	I	Analog	A/D converter

Electrical Characteristics

Parameter	Min	Max	Typ	Unit
BAT_TEMP resolution	10			bits
BAT_TEMP sampling rate	90.3			Ksps/s
BAT_TEMP Input Impedance (R)	4.7			kΩ
BAT_TEMP Input Impedance (C)		100		nF

Parameter	Min	Max	Typ	Unit
CHG_IN Voltage (for I=Imax)	+VBATT max + 0.7V	TBD*		V
CHG_IN Current		800		mA
BAT_TEMP Input signal range			2.8	V

* To be parametrized as per battery manufacturer

2.15 ON / ~OFF

2.15.1 General description

This input is used to switch ON or OFF the WISMO Quik Q3106 Series module. A high level signal has to be provided on the pin ON/~OFF to switch ON the module.

The level of the voltage of this signal has to be maintained between 2.4 V and VCC during a minimum of 500 ms.

This signal can be left at high level until switch off.

To be able to switch OFF the module, the pin ON/~OFF has to be released.

Through the firmware, the module can be switched off (using the AT+CPOF command).

Pin description

Signal	Pin number	I/O	I/O type	Description
ON/~OFF	56	I	CMOS	Module Power ON

Electrical Characteristics

Parameter	Min	Max	Unit
Input Impedance (R)	10		kΩ
Input Impedance (C)		50	pF

Operating conditions

Parameter	I/O type	Min	Max	Unit
V_{IL}		0 V	0.6 V	V
V_{IH}		2.4 V	VDD+0.5V	V

2.15.2 Operating sequences

2.15.2.1 Power ON

Once the module is supplied by the power source, the application must set the ON/~OFF signal to high to start the module power ON sequence. The ON/~OFF signal must be held for 1 s minimum. After this time, an internal mechanism keeps it on hold. During the power ON sequence, an internal reset is automatically performed by the module for 240 ms (typical). During this phase, any external reset should be avoided. Once the initialisation is complete (timing is SIM and network dependent) the AT interface answers « OK » to the application³. For further details, please check the AT commands manual (AT+WIND, AT+WAIP)

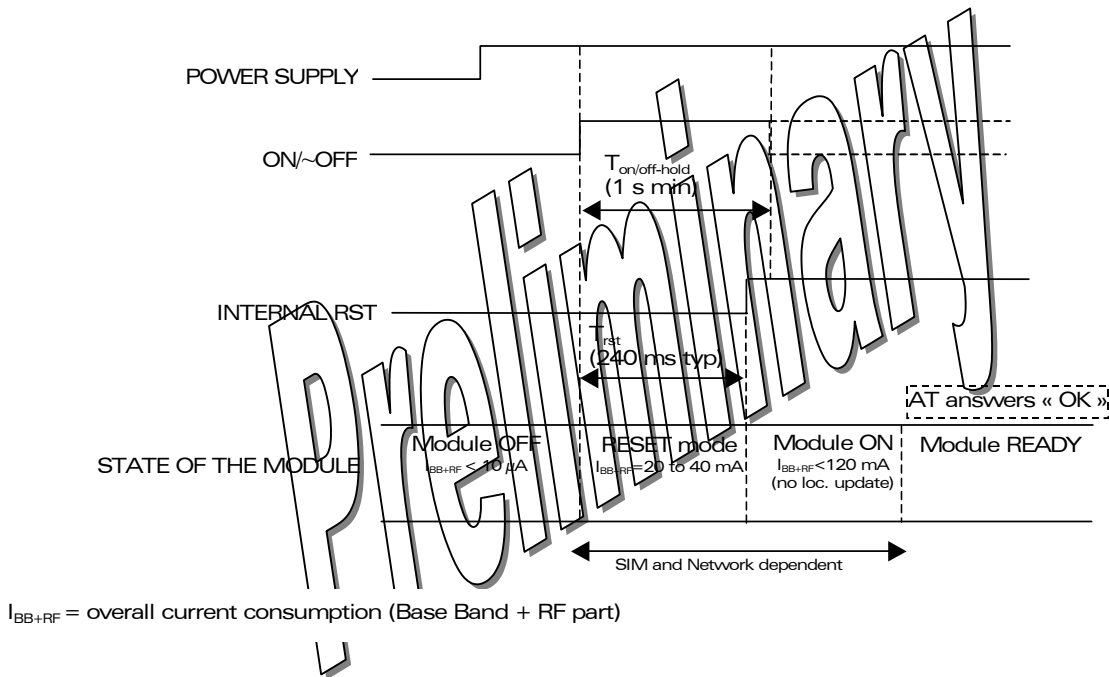
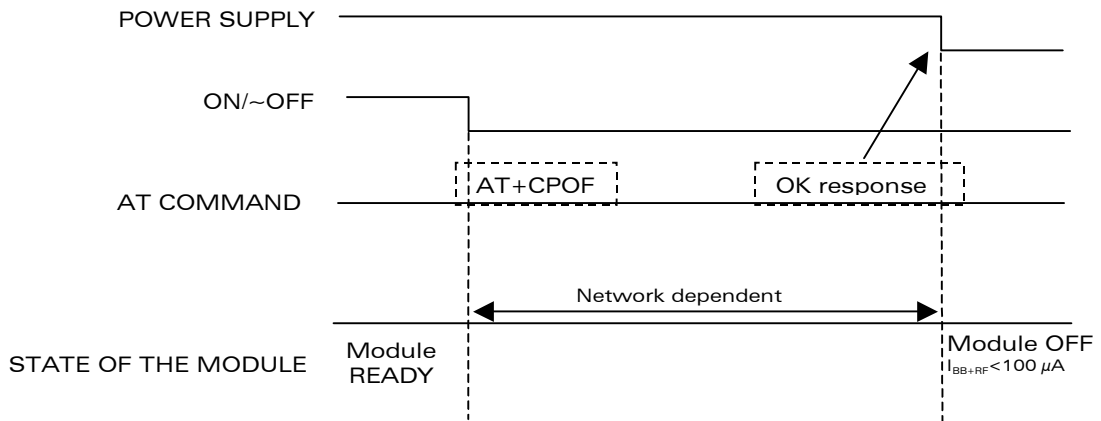


Figure 2: Power-ON sequence (no PIN code activated)

³ For this, the application has to send AT.J. If the application manages hardware flow control, the AT command can be sent during the initialisation phase. Another solution is to use the AT+WIND command to get an unsolicited status from the module.

2.15.2.2 Power OFF

To properly power OFF the module, the application must set the ON/~OFF signal to low and then send the AT+CPOF command to de-register from the network and switch off the module. Once the « OK » response is issued by the module, the power supply can be switched off.



I_{BB+RF} = overall current consumption (Base Band + RF part)

Figure 3: Power-OFF sequence

2.16 BOOT (optional)

This input can be used to download a software in the Flash ROM of the WISMO Quik Q3106 Series module. The internal boot procedure is started when this pin is low during the reset of the module. In normal mode this pin has to be left open. In Internal boot mode, low level has to be set through a 1 kΩ resistor. If used, this input has to be driven by an open collector or an open drain output.

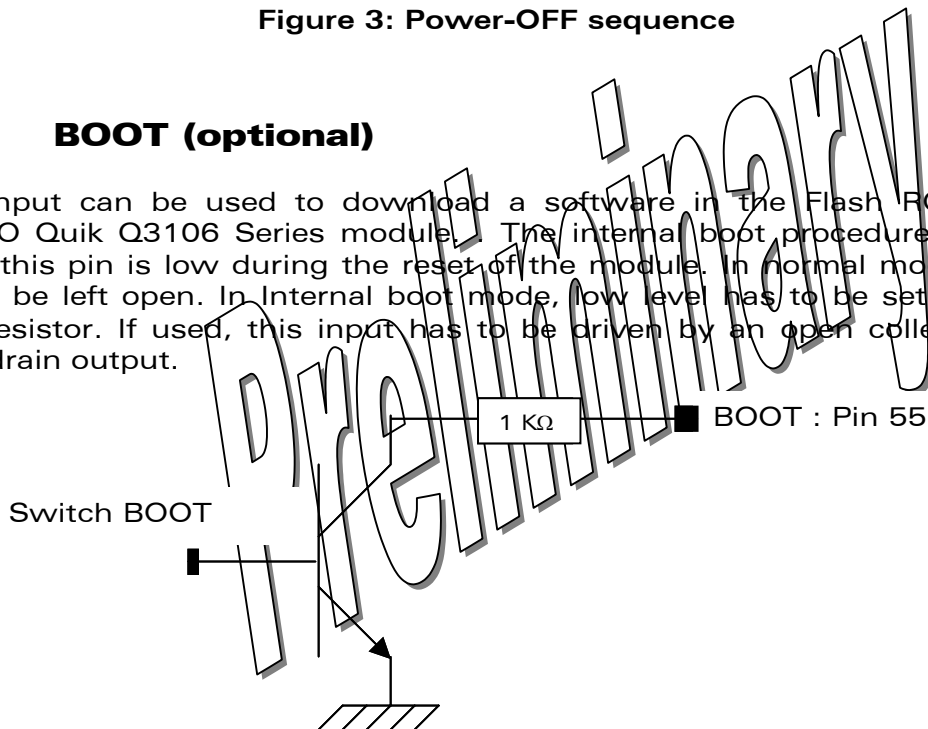


Figure 4: BOOT pin connection

- If Switch BOOT = 1, Boot pin 55 = 0, for download mode
- If Switch BOOT = 0, Boot pin 55 = 1, for normal mode

Pin description

Signal	Pin number	I/O	I/O type	Description
BOOT	55	I	CMOS	Flash Loading

Note: The nominal firmware download procedure uses the X-modem.

2.17 Reset signal (~RST)

2.17.1 General description

This signal is used to force a reset procedure by providing low level during at least 100 μ s.

This signal has to be considered as an emergency reset only. A reset procedure is already driven by an internal hardware during the power-up sequence.

This signal can also be used to provide a reset to an external device. It then behaves as an output.

If no external reset is necessary this input can be left open. If used (emergency reset), it has to be driven by an open collector or an open drain output.

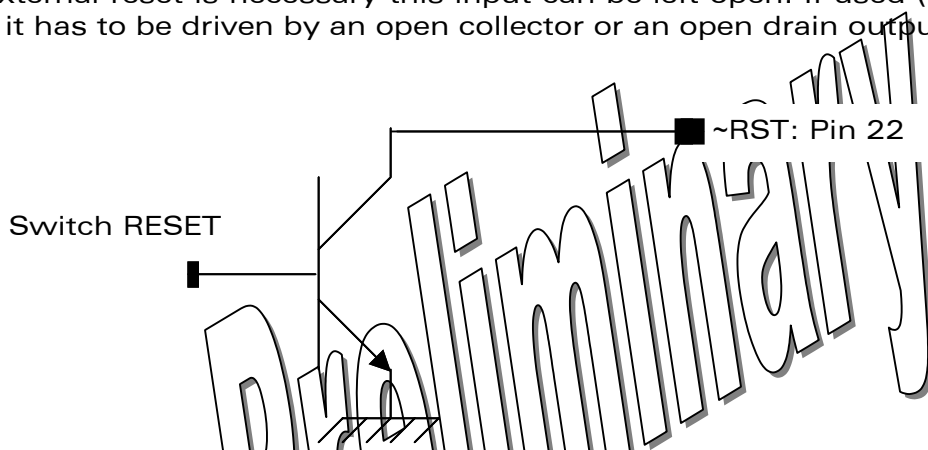


Figure 5: ~RST pin connection

- If Switch RESET = 1, ~RST pin 22 = 0
- If Switch RESET = 0, ~RST pin 22 = 1

Pin description

Signal	Pin number	I/O	I/O type	Description
~RST	22	I/O	Schmitt	Module Reset

Electrical Characteristics

Parameter	Min	Max	Unit
Input Impedance (R)	4.7		kΩ
Input Impedance (C)		10	nF

Operating conditions

Parameter	Min	Max	Condition
*V _{T-}	1.1 V	1.2 V	
*V _{T+}	1.7 V	1.9 V	
V _{OL}		0.4 V	I _{OL} = -50 μA
V _{OH}	2.0 V		I _{OH} = 50 μA

* V_{T-}, V_{T+}: Hysteresis Level

Additional comments on RESET:

The RESET process is activated either by the external ~RST signal OR by an internal signal (coming from a RESET generator). This automatic reset is activated at Power-up.

The module remains in reset mode as long as the ~RST signal is held low. This signal should be used only for "emergency" resets.

A software reset will be preferred to a hardware reset.

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2.17.2 Reset sequence

To activate the « emergency » reset sequence, the \sim RST signal has to be set to low level for 100 μ s minimum. As soon as the reset is complete, the AT interface answers « OK » to the application⁴.

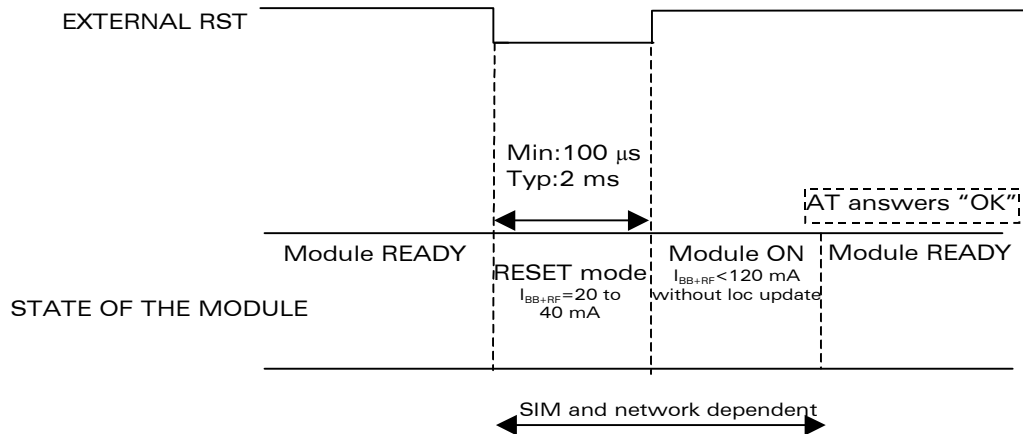


Figure 6: Reset sequence

2.18 External Interrupt (\sim INTR)

The WISMO Quik Q3106 Series provides an external interrupt input. This input is very sensitive and an interrupt is activated on high to low edge. If this signal is not used it can be left open. If used this input has to be driven by an open collector or an open drain output.

This input is used for instance to power OFF automatically the module.

Pin description

Signal	Pin number	I/O	I/O type	Description
\sim INTR	29	I	CMOS	External Interrupt

Electrical characteristics

Parameter	Min	Max	Unit
V _{IL}	-0.5 V	0.7 V	Volt
V _{IH}	2.2 V	3.0 V	Volt

⁴ For this, the application has to send AT.J. If the application manages hardware flow control, the AT command can be sent during the initialisation phase. Another solution is to use the AT +WIND command to get an unsolicited status from the module.

2.19 VCC output

This output can be used to power some external functions. VCC has to be used as a digital power supply. This power supply is available when the module is on.

Pin description

Signal	Pin number	I/O	I/O type	Description
VCC	31	O	Supply	Digital supply

Operating conditions

Parameter	Condition	Min	Max	Unit
Output voltage	I = 10 mA	2.74	2.86	V
Output Current			50	mA

2.20 Real Time Clock Supply (BAT_RTC)

2.20.1 Interface description

This pin is used as a back-up power supply for the internal Real Time Clock. The RTC is supported by the module when powered on but a back-up power supply is needed to save date and time information when the module is switched off.

If the RTC is not used, this pin can be left open.

Pin description

Signal	Pin number	I/O	I/O type	Description
BAT_RTC	68	I/O	Supply	RTC Back-up supply

2.20.2 Operating conditions

Parameter	Condition	Min	Max	Unit
Input voltage		2	2.75	V
Input Current	VCC=0 V; t° = 25 °C BAT_RTC=2.5 V		3	µA
Input Current	VCC=0 V; t°: -20 °C/+55 °C BAT_RTC=2.5 V		10	µA
Output voltage		2.4	2.75	V
Output current			2	mA

2.21 RF interface

The impedance is 50 Ohms nominal and the DC impedance is 0 Ohm.

2.21.1 RF connection

Mechanical system:

The RF connection is made by a 2 mm high board to board connector.

Connection solution:

The solution consists in the insertion of the RF transmission through the I/O 100-pin connector.

Notes:

- The WISMO Quik Q3106 Series does not support an antenna switch for a car kit but this function can be implemented externally and it can be driven using a GPIO.
- The client RF connector should be chosen in order to minimize losses in the frequency bands used for GSM 900 MHz and DCS 1800 MHz.
- 0.5 dB can be considered as a maximum value for loss between the module and an external connector.

2.21.2 RF performances

RF performances are compliant with the ETSI recommendation GSM 05.05.

The main parameters for Receiver are :

- E-GSM 900 Reference Sensitivity = -104 dBm Static & TUHigh
- DCS 1800 Reference Sensitivity = -102 dBm Static & TUHigh
- Selectivity @ 200 kHz: > +9 dBc
- Selectivity @ 400 kHz: > +41 dBc
- Linear dynamic range: 63 dB
- Co-channel rejection: > +9 dBc

And for Transmitter:

- Maximum output power (E-GSM): 33 dBm +/- 2 dB at ambient temperature
- Maximum output power (DCS 1800): 30 dBm +/- 2 dB at ambient temperature
- Minimum output power (E-GSM): 5 dBm +/- 5 dB at ambient temperature
- Minimum output power (DCS 1800): 0 dBm +/- 5 dB at ambient temperature

2.21.3 Antenna specifications

The antenna must fulfil the following requirements:

- Frequency depends on application. A dual Band antenna shall work in these frequency bands and have the following characteristics:

Characteristics	Q3106	
	E-GSM 900	DCS 1800
Frequency TX	880 to 915 MHz	1710 to 1785 MHz
Frequency RX	925 to 960 MHz	1805 to 1880 MHz
Impedance	50 Ohms	
VSWR	Rx max	1.5 :1
	Tx max	1.5 :1
Typical radiated gain	0dBi in one direction at least	

Preliminary

3 Technical specifications

3.1 General Purpose Connector pin out description

Pin #	Name	I/O	I/O type	Description	Comment
1	A2	O	CMOS/3X	Address_2	
2	A3	O	CMOS/3X	Address_3	
3	/RD	O	CMOS/3X	Read Enable	
4	/WR	O	CMOS/3X	Write Enable	
5	D12	I/O	CMOS/3X	Data for peripheral	
6	D13	I/O	CMOS/3X	Data for peripheral	
7	D0	I/O	CMOS/3X	Data for peripheral	
8	D1	I/O	CMOS/3X	Data for peripheral	
9	D8	I/O	CMOS/3X	Data for peripheral	
10	D7	I/O	CMOS/3X	Data for peripheral	
11	D10	I/O	CMOS/3X	Data for peripheral	
12	D5	I/O	CMOS/3X	Data for peripheral	
13	D6	I/O	CMOS/3X	Data for peripheral	
14	D3	I/O	CMOS/3X	Data for peripheral	
15	D4	I/O	CMOS/3X	Data for peripheral	
16	D9	I/O	CMOS/3X	Data for peripheral	
17	D2	I/O	CMOS/3X	Data for peripheral	
18	D11	I/O	CMOS/3X	Data for peripheral	
19	D14	I/O	CMOS/3X	Data for peripheral	
20	D15	I/O	CMOS/3X	Data for peripheral	
21	SPI_EN_2 LCDEN	O	CMOS/1X	Enable of SPI_2 Enable of LCD	Multiplexed
22	~RST	I/O	SCHMITT	Module Reset	Active low
23	SPI_CLK_1 or SCL	O	CMOS/3X	SPI clock Or I2C clock	Multiplexed
24	GPO1	O	CMOS/3X	General purpose output	
25	SPI_DAT_1 Or SDA	I/O	CMOS/3X	SPI I/O Or I2C I/O	Multiplexed
26	GPIO1 Or CT109/DCD1	I/O O	CMOS/2X	General purpose I/O V24 Serial Link Data Carrier Detect	Multiplexed
27	GPIO7 or SPI_CLK_2	I/O O	CMOS/2X	General Purpose I/O Or SPI Clock	Multiplexed
28	SPI_EN_1	O	CMOS/1X	Enable of SPI_1	
29	~INTR	I	CMOS	External interrupt	Active low. 100K Pull-up inside

Pin #	Name	I/O	I/O type	Description	Comment
30	SIM_PRES or GPIO2	I I/O	CMOS	SIM Card detect or General Purpose I/O	Multiplexed
31	VCC	O	Supply	Low power supply	2.8V
32	ROW1	I/O	CMOS/1X	Keyboard Row	
33	ROW0	I/O	CMOS/1X	Keyboard Row	
34	ROW3	I/O	CMOS/1X	Keyboard Row	
35	ROW2	I/O	CMOS/1X	Keyboard Row	
36	COL0	I/O	CMOS/1X	Keyboard Column	
37	ROW4	I/O	CMOS/1X	Keyboard Row	
38	COL2	I/O	CMOS/1X	Keyboard Column	
39	COL1	I/O	CMOS/1X	Keyboard Column	
40	COL4	I/O	CMOS/1X	Keyboard Column	
41	COL3	I/O	CMOS/1X	Keyboard Column	
42	AUX_ADC	I	Analog	Auxiliary ADC input	Can be tied to GND if not used
43	BAT_TEMP	I	Analog	ADC input for battery temperature measurement	Can be tied to GND if not used
44	GPIO4 Or CTS2/ADD22	I/O	CMOS/2X	General Purpose I/O	Multiplexed
45	CT107/DSR1	O	CMOS/1X	V24 Serial Link interface Data Set Ready	
46	CT108-2/DTR1 Or EXTINT2	I	CMOS	V24 Serial Link interface Data Terminal Ready Or External interrupt 2	Pull up to VCC with 100K When not used
47	GPIO5 Or RTS2/ADD23	I/O	CMOS/2X	General Purpose I/O	Multiplexed
48	GPIO8 Or CT125/RI1	I/O O	CMOS/2X	General purpose I/O or V24 Serial Link Ring Indicator	Multiplexed
49	CT104/RXD1	O	1X	V24 Serial Link interface Receive	
50	GPIO6 Or SPI_DAT_2 Or SDA2	I/O	CMOS/2X	General Purpose I/O Or SPI_IO 2 Or I2C I/O	Multiplexed
51	CT103/TXD1	I	CMOS	V24 Serial Link interface Transmit data	

Pin #	Name	I/O	I/O type	Description	Comment
52	CT105/RTS1	I	CMOS	V24 Serial Link interface Request to send	Pull up to VCC with 100K When not used
53	GPI03 Or CSUSR	I/O O	CMOS/2X	General Purpose I/O User Chip Select	Multiplexed
54	CT106/CTS1	O	1X	V24 Serial Link interface Clear To Send	
55	BOOT	I	CMOS	BOOT	Pulldown through 1K for Flash downloading
56	ON/~OFF	I	CMOS	Module Power ON/OFF	
57	MIC1N	I	Analog	Microphone 1 negative input	
58	SPK1P	O	Analog	Speaker 1 positive output	
59	MIC1P	I	Analog	Microphone 1 positive input	
60	SPK1N	O	Analog	Speaker 1 negative output	
61	MIC2P	I	Analog	Microphone 2 positive input	
62	SPK2N	O	Analog	Speaker 2 negative output	
63	MIC2N	I	Analog	Microphone 2 negative input	
64	SPK2P	O	Analog	Speaker 2 positive output	
65	CHG_IN	I	Supply	Supply for battery charging	High current
66	CHG_IN	I	Supply	Supply for battery charging	High current
67	GPI00 Or LED_OUT	I/O O	CMOS/2X	General purpose I/O module state	Multiplexed
68	BAT_RTC	I/O	Supply	RTC Back-up Supply	
69	GPO0	O	CMOS/3X	General purpose output	
70	BUZ	O	CMOS	Buzzer output	80 mA Max
71	GPI	I	CMOS	General Purpose Input	100K Pull-down inside
72(*)	GPO2/RXD2 Or GPO3/32K	I O	CMOS/3X	General Purpose Output or I/O	Multiplexed
73	SIM_CLK	O	CMOS/2X	Clock for SIM interface	

Pin #	Name	I/O	I/O type	Description	Comment
74	SIM_IO	I/O	CMOS/3X	I/O for SIM interface	
75	SIM_VCC	O	Supply	SIM CARD supply	6mA max
76	SIM_RST	O	2X	Reset for SIM interface	
77	VBATT	I	Supply	Battery input	
78	VBATT	I	Supply	Battery input	
79	VBATT	I	Supply	Battery input	
80	VBATT	I	Supply	Battery input	
81- >95	GND			Shielding	
96	ANT	I/O	RF	RF line	
97- >100	GND			Shielding	

(*) Pin 72 signal allocation:

- GPO3 or 32K in case of 64 Mbits Flash memory use
- GPO2 or RXD2 in case of 16/32 Mbits Flash Memory use

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3.2 Environmental specifications

3.2.1 Operational conditions of functioning

Conditions	Temperature range
Operating / Full GSM specifications compliant	-20°C to +55°C
Operating / functional	-20°C to +70°C
Storage	-30°C to +85°C

3.2.2 Environmental qualification

Q3106		ENVIRONMENTAL CLASSES					
TYPE OF TEST	STANDARDS	STORAGE Class 1.2		TRANSPORTATION Class 2.3		OPERATING (PORT USE) Class 7.3	
Cold	IEC 68-2.1 Ab test	-25° C	72 h	-40° C	72 h	-20° C (GSM900) -10° C (GSM1800/1900)	16 h 16h
Dry heat	IEC 68-2.2 Bb test	+70° C	72 h	+70° C	72 h	+55° C	16 h
Change of temperature	IEC 68-2.14 Na/Nb test			-40° / +30° C	5 cycles t1 = 3 h	-20° / +30° C (GSM900) -10° / +30° C (GSM1800/1900):	3 cycles 8 cycles t1 = 3 h
Damp heat cyclic	IEC 68-2.30 Db test	+30° C 90% - 100% RH variant 1	2 cycles	+40° C 90% - 100% RH variant 1	2 cycles	+40° C 90% - 100% RH variant 1	2 cycles
Damp heat	IEC 68-2.56 Cb test	+30° C	4 days	+40° C	4 days	+40° C	4 days
Sinusoidal vibration	IEC 68-2.6 Fc test	5 - 62 Hz : 62 - 200Hz : 3 x 5 sweep cycles	5 mm / s 2 m / s2				
Random vibration wide band	IEC 68-3.36 Fdb test			5 - 20 Hz : 20 - 500Hz : 3 x 10 min	0.96 m2 / s3 - 3 dB / oct	10 - 12 Hz : 12 - 150Hz : 3 x 30 min	0.96 m2 / s3 - 3 dB / oct

3.3 Mechanical specifications

3.3.1 Physical characteristics

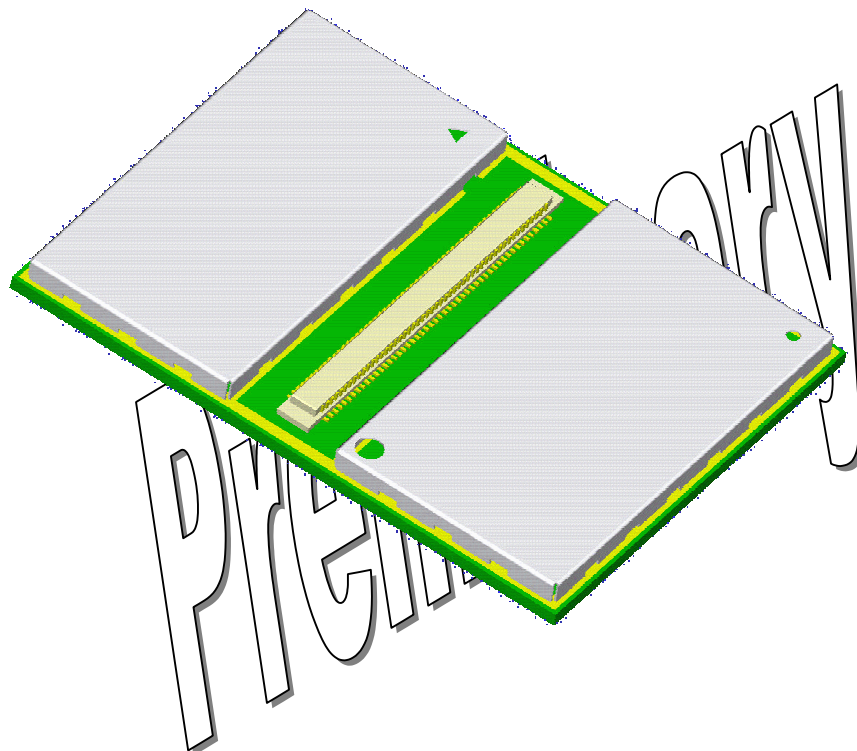
The WISMO Quik Q3106 Series module has a complete self-contained shield.

- Dimensions: 32 x 44 x 3 mm external dimensions (except shielding pins)
- Weight: <12 g [TBC]

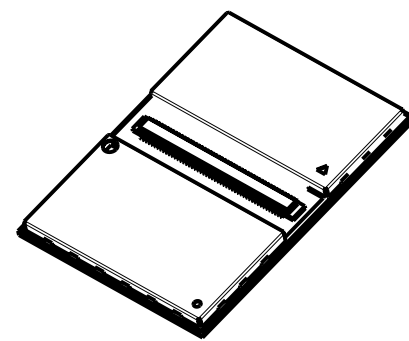
3.3.2 Mechanical drawings

The next page gives the mechanical specifications of WISMO Quik Q3106 Series.

An overview of the WISMO Quik Q3106 Series module is shown here-under.



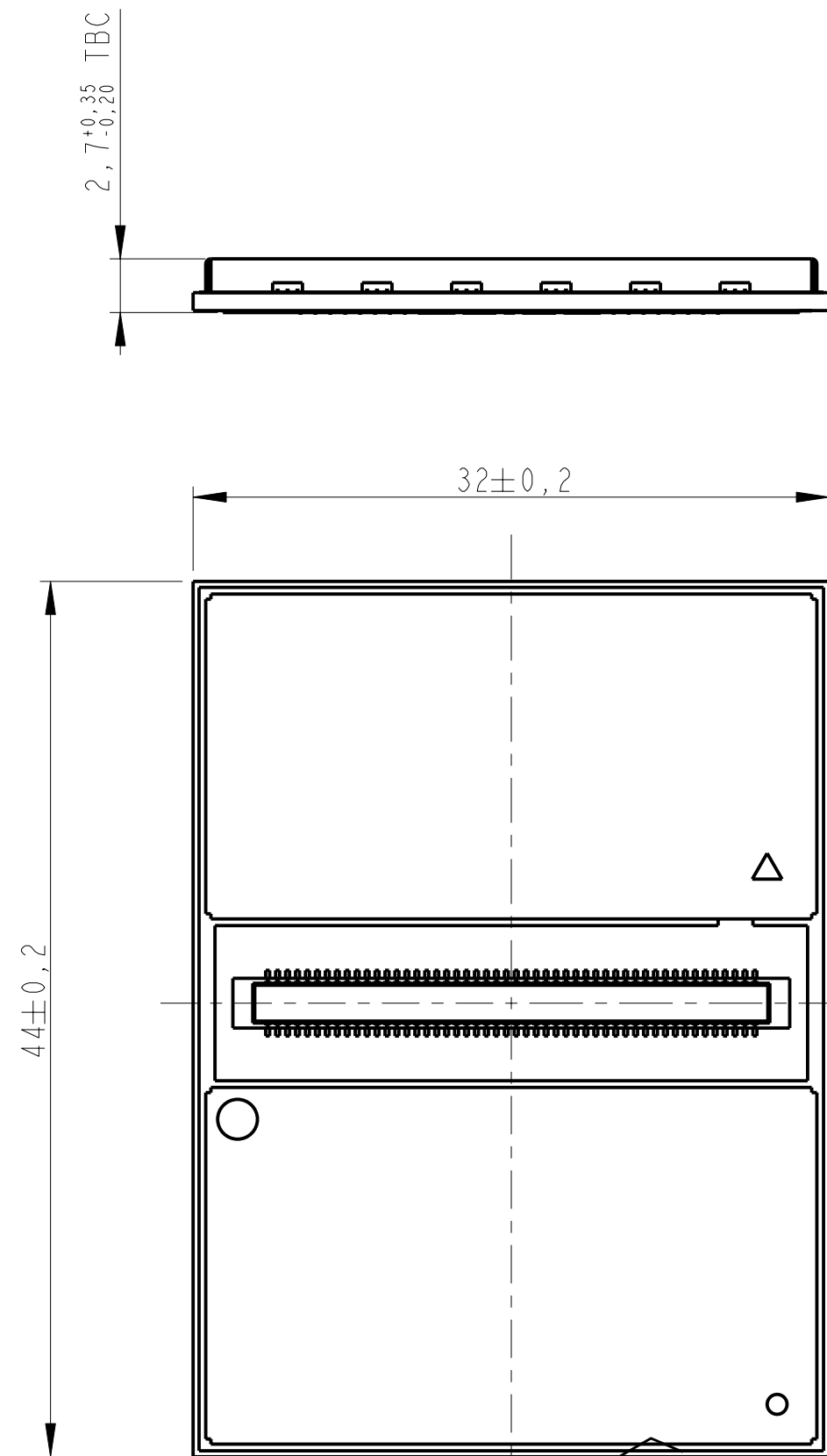
MAXIMUM BULK OCCUPIED ON THE MOTHER BOARD}



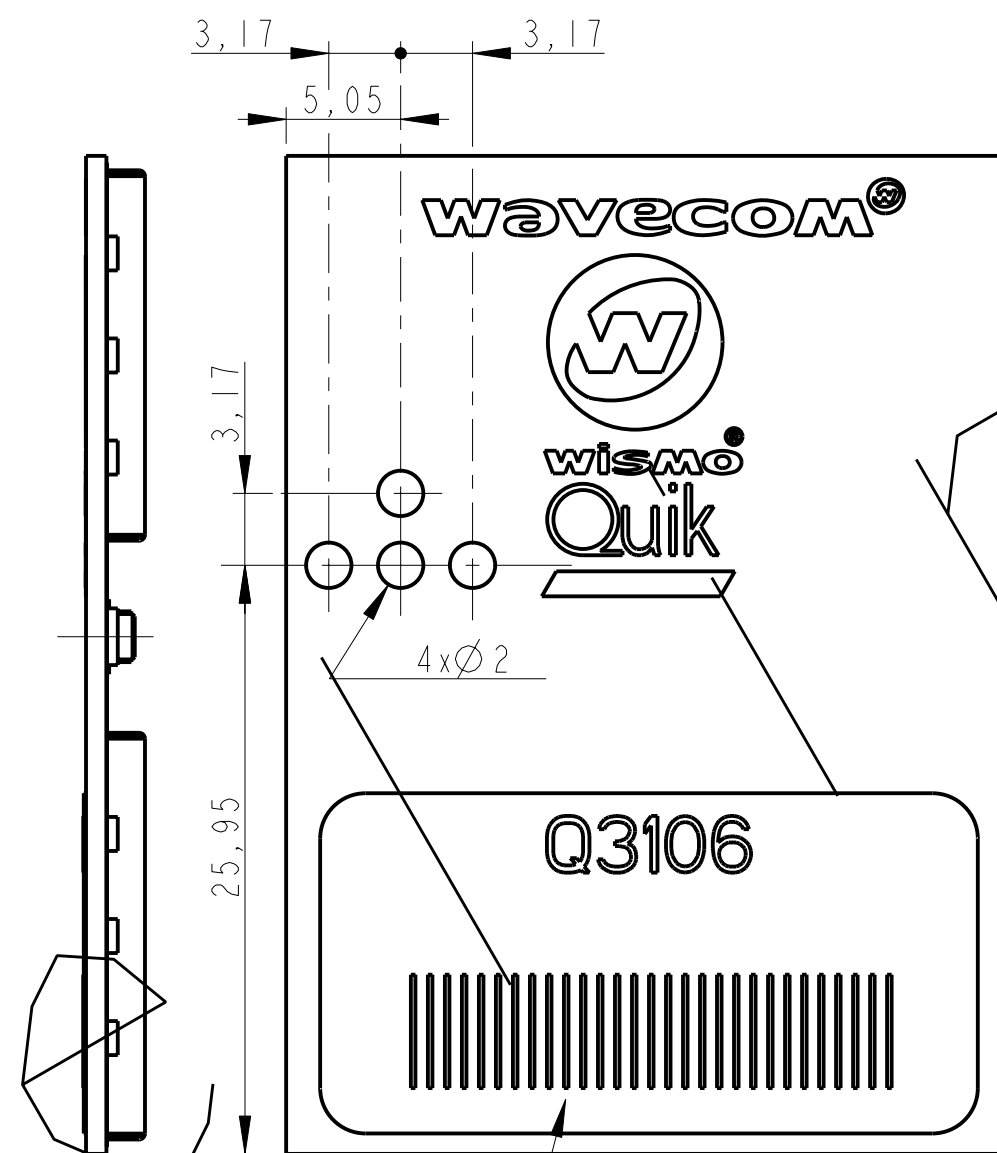
SCALE 1,000

3^{+0,45}/_{-0,25} TBC
(with stacking tolerances)

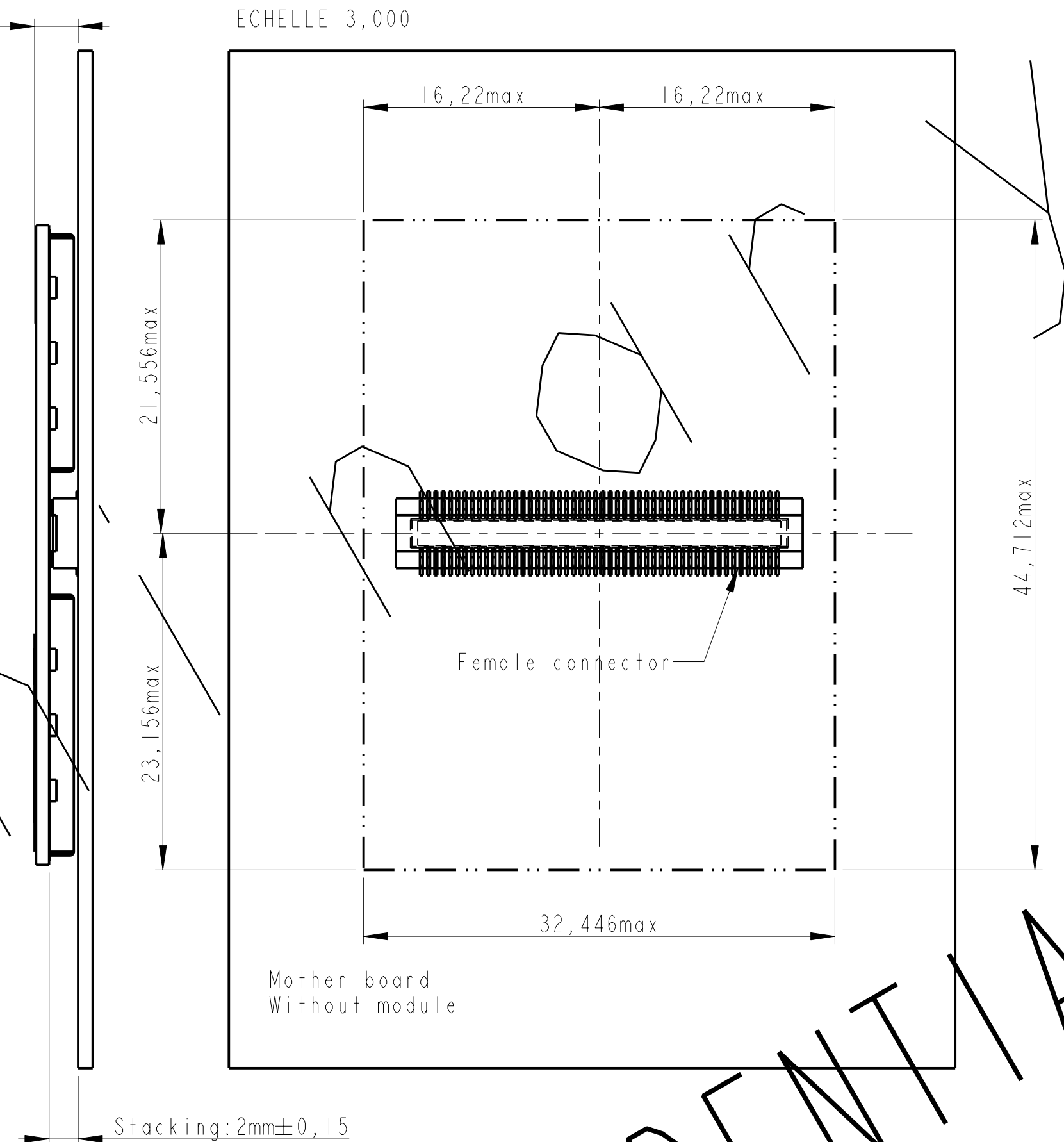
ECHELLE 3,000



ECHELLE 3,000



Sticker



CONFIDENTIAL

Creation	31/01/03	JPM	JJO	Preliminary	01
MODIFICATION	DATE	AUTHOR	RESP.	STATUS	IND

Wismo Quik - Q3106		TOL.GEN.: ±0,1		SCALE: /
MODULE DIMENSIONS		FOLIO: 1/1	FORMAT: A2	
		WM-2-2153-V-009-A		
wavecom		AUTEUR: JPM		
PRO/ENGINEER WM2E-MODULE		RESPONS: JJO		
				01 IND.

4 Connector and peripheral device references

4.1 General Purpose Connector

The GPC is a 100-pin connector with 0.5 mm pitch from NAIS with the following reference:

AXK6F00345J

The matting connector has the following reference:

AXK5F00545J

The stacking height is 2.0 mm.

For further details see GPC data sheets in appendix. More information is also available from <http://www.nais-e.com/>

4.2 SIM Card Reader

- ITT CANNON CCM03 series (see <http://www.ittcannon.com>)
- AMPHENOL C707 series (see <http://www.amphenol.com>)
- JAE (see <http://www.jae.com>)

Drawer type:

- MOLEX 99228-0002 (connector) / MOLEX 91236-0002 (holder) (see <http://www.molex.com>)

4.3 Microphone

Possible suppliers:

- HOSIDEN
- PANASONIC

Preliminary

4.4 Speaker

Possible suppliers:

- SANYO
- HOSIDEN
- PRIMO
- PHILIPS

4.5 Antenna Cable

The following cable reference has been qualified for being mounted on WISMO Quik Q3106 Series:

- RG178

4.6 GSM antenna

GSM antennas and support for antenna adaptation can be obtained from manufacturers such as:

- ALLGON (<http://www.allgon.com>)
- MOTECO (<http://www.moteco.com>)
- GALTRONICS (<http://www.galtronics.com>)

4.7 RF connector

RF connector and accessories can be obtained from:

- Nais (<http://www.nais-s.com>)

Preliminary

5 Appendix

5.1 Wavecom acceptance test

These tests are Wavecom internal qualification tests. They are performed on a Wavecom evaluation platform (module on test board).

Test	Applied standard	Acceptance criteria
Performance Test	ETSI recommendation for GSM900/GSM1800 (and GSM900/GSM1900) communication.	Full conformity to the recommendation regarding the main RF parameters.
Cooking Test	-	The test continues even after the Cooking Test milestone has been reached
Stress Test	Therma shocks IEC 68-2-14.	Full conformity to the recommendation regarding the main parameters.
Vibration Test	Sinusoidal vibration IEC 68-2-6.	No performance degradation or mechanical degradation is allowed after test.
Vibration Test	Random vibration IEC 68-2-36.	No performance degradation or mechanical degradation is allowed after test.
Shock Test	IEC 68-2-27.	No performance degradation or mechanical degradation is allowed after test.
Bump Test	IEC 68-2-29.	No performance degradation or mechanical degradation is allowed after test.
Humidity Test	Corrosion test IEC 68-2-3.	No visible degradation of the product, both visual and functional. The unit is tested at room temperature and must be fully operative for the main RF parameters.
Warehouse Test	Low temperature IEC 68-2-1.	Under normal condition (room temperature) after the test, the unit must behave in full conformity with the main RF parameters specification.
Warehouse Test	High temperature IEC 68-2-2.	Under normal condition (room temperature) after the test, the unit must behave in full conformity with the main RF parameters specification.
Dust Test1	MIL-STD-810D, method 510-3.	No visible dust in the visible areas. No more than 50 dust particules in the cabinet of the product. The unit, tested at room temperature must be fully operative.
Light Test1	UV radiation and temperature EDF HN60E03.	Visual inspection on the discoloration and other degradation effects such as cracks in the material of the unit after the test.

Fall Test1	IEC 68-2-32.	Only minor casing degradation is allowed, with a maximum dimension change of 1mm. The unit must remain fully operative and full specification for the main RF parameters.
Electro Static Discharge Test	IEC 1000-4-2.	No performance degradation allowed after the test.
Salt Mist Test	IEC 68-2-11	After the test, visual inspection on the unit.
Atmosphere Test	Flowing mixed gas corrosion. IEC 68-2-60	After the test, visual inspection on the unit and inside.
Marking Test	EN 60 950	After the test, visual inspection on the unit. No degradation is allowed on the marking.

Preliminary

5.2 Standards and Recommendations

GSM ETSI, 3GPP, GCF and NAPRD03 recommendations for Phase II.

Specification Reference	Title
3GPP TS 45.005 v5.5.0 (2002-08) Release 5	Technical Specification Group GSM/EDGE. Radio Access Network; Radio transmission and reception
GSM 02.07 V8.0.0 (1999-07)	Digital cellular telecommunications system (Phase 2+); Mobile Stations (MS) features (GSM 02.07 version 8.0.0 Release 1999)
GSM 02.60 V8.1.0 (1999-07)	Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description, Stage 1 (GSM 02.60 version 8.1.0 Release 1999)
GSM 03.60 V7.9.0 (2002-09)	Technical Specification Group Services and System Aspects; Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service description; Stage 2 (Release 1998)
3GPP TS 43.064 V5.0.0 (2002-04)	Technical Specification Group GERAN; Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Overall description of the GPRS radio interface; Stage 2 (Release 5)
3GPP TS 03.22 V8.7.0 (2002-08)	Technical Specification Group GSM/EDGE. Radio Access Network; Functions related to Mobile Station (MS) in idle mode and group receive mode; (Release 1999)
3GPP TS 03.40 V7.5.0 (2001-12)	Technical Specification Group Terminals; Technical realization of the Short Message Service (SMS) (Release 1998)
3GPP TS 03.41 V7.4.0 (2000-09)	Technical Specification Group Terminals; Technical realization of Cell Broadcast Service (CBS) (Release 1998)
ETSI EN 300 903 V8.1.1 (2000-11)	Digital cellular telecommunications system (Phase 2+); Transmission planning aspects of the speech service in the GSM Public Land Mobile Network (PLMN) system (GSM 03.50 version 8.1.1 Release 1999)

Specification Reference	Title
3GPP TS 04.06 V8.2.1 (2002-05)	Technical Specification Group GSM/EDGE Radio Access Network; Mobile Station - Base Station System (MS - BSS) interface; Data Link (DL) layer specification (Release 1999)
3GPP TS 04.08 V7.18.0 (2002-09)	Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (Release 1998)
3GPP TS 04.10 V7.1.0 (2001-12)	Technical Specification Group Core Networks; Mobile radio interface layer 3 Supplementary services specification; General aspects (Release 1998)
3GPP TS 04.11 V7.1.0 (2000-09)	Technical Specification Group Core Network; Digital cellular telecommunications system (Phase 2+); Point-to-Point (PP) Short Message Service (SMS) support on mobile radio interface (Release 1998)
3GPP TS 45.005 v5.5.0 (2002-08)	Technical Specification Group GSM/EDGE. Radio Access Network; Radio transmission and reception (Release 5)
3GPP TS 45.008 V5.8.0 (2002-08)	Technical Specification Group GSM/EDGE Radio Access Network; Radio subsystem link control (Release 5)
3GPP TS 45.010 V5.1.0 (2002-08)	Technical Specification Group GSM/EDGE Radio Access Network; Radio subsystem synchronization (Release 5)
3GPP TS 46.010 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Transcoding (Release 5)
3GPP TS 46.011 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Substitution and muting of lost frames for full rate speech channels (Release 5)
3GPP TS 46.012 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Comfort noise aspect for full rate speech traffic channels (Release 5)

Specification Reference	Title
3GPP TS 46.031 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Discontinuous Transmission (DTX) for full rate speech traffic channels (Release 5)
3GPP TS 46.032 V5.0.0 (2002-06)	Technical Specification Group Services and System Aspects; Full rate speech; Voice Activity Detector (VAD) for full rate speech traffic channels (Release 5)
TS 100 913V8.0.0 (1999-08)	Digital cellular telecommunications system (Phase 2+); General on Terminal Adaptation Functions (TAF) for Mobile Stations (MS) (GSM 07.01 version 8.0.0 Release 1999)
GSM 09.07 V8.0.0 (1999-08)	Digital cellular telecommunications system (Phase 2+); General requirements on interworking between the Public Land Mobile Network (PLMN) and the Integrated Services Digital Network (ISDN) or Public Switched Telephone Network (PSTN) (GSM 09.07 version 8.0.0 Release 1999)
3GPP TS 51.010-1 v5.0.0 (2002-09)	Technical Specification Group GSM/EDGE ; Radio Access Network ;Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (Release 5)
3GPP TS 51.011 V5.0.0 (2001-12)	Technical Specification Group Terminals; Specification of the Subscriber Identity Module - Mobile Equipment (SIM - ME) interface (Release 5)
ETS 300 641 (1998-03)	Digital cellular telecommunications system (Phase 2); Specification of the 3 Volt Subscriber Identity Module - Mobile Equipment (SIM-ME) interface (GSM 11.12 version 4.3.1)
GCF-CC V3.7.1 (2002-08)	Global Certification Forum - Certification criteria
NAPRD03 V2.6.0 (2002-06)	North America Permanent Reference Document for PTCRB tests

5.3 Safety recommendations (for information only)

IMPORTANT
FOR THE EFFICIENT AND SAFE OPERATION OF
YOUR GSM APPLICATION BASED ON WISMO Quik Q3106 Series
PLEASE READ THIS INFORMATION CAREFULLY

5.3.1 RF safety

5.3.1.1 General

Your GSM terminal is based on the GSM standard for cellular technology. The GSM standard is spread all over the world. It covers Europe, Asia and some parts of America and Africa. This is the most used telecommunication standard.

Your GSM terminal is actually a low power radio transmitter and receiver. It sends out and receives radio frequency energy. When you use your GSM application, the cellular system which handles your calls controls both the radio frequency and the power level of your cellular modem.

5.3.1.2 Exposure to RF energy

There has been some public concern about possible health effects of using GSM terminals. Although research on health effects from RF energy has focused on the current RF technology for many years, scientists have begun research regarding newer radio technologies, such as GSM. After existing research had been reviewed, and after compliance to all applicable safety standards had been tested, it has been concluded that the product was fitted for use.

If you are concerned about exposure to RF energy there are things you can do to minimize exposure. Obviously, limiting the duration of your calls will reduce your exposure to RF energy. In addition, you can reduce RF exposure by operating your cellular terminal efficiently by following the below guidelines.

5.3.1.3 Efficient terminal operation

For your GSM terminal to operate at the lowest power level, consistent with satisfactory call quality:

If your terminal has an extendible antenna, extend it fully. Some models allow you to place a call with the antenna retracted. However your GSM terminal operates more efficiently with the antenna fully extended.

Do not hold the antenna when the terminal is « IN USE ». Holding the antenna affects call quality and may cause the modem to operate at a higher power level than needed.

5.3.1.4 Antenna care and replacement

Do not use the GSM terminal with a damaged antenna. If a damaged antenna comes into contact with the skin, a minor burn may result. Replace a damaged antenna immediately. Consult your manual to see if you may change the antenna yourself. If so, use only a manufacturer-approved antenna. Otherwise, have your antenna repaired by a qualified technician.

Use only the supplied or approved antenna. Unauthorized antennas, modifications or attachments could damage the terminal and may contravene local RF emission regulations or invalidate type approval.

5.3.2 General safety

5.3.2.1 Driving

Check the laws and the regulations regarding the use of cellular devices in the area where you have to drive as you always have to comply with them. When using your GSM terminal while driving, please:

- give full attention to driving,
- pull off the road and park before making or answering a call if driving conditions so require.

5.3.2.2 Electronic devices

Most electronic equipment, for example in hospitals and motor vehicles is shielded from RF energy. However RF energy may affect some improperly shielded electronic equipment.

5.3.2.3 Vehicle electronic equipment

Check your vehicle manufacturer representative to determine if any on-board electronic equipment is adequately shielded from RF energy.

5.3.2.4 Medical electronic equipment

Consult the manufacturer of any personal medical devices (such as pacemakers, hearing aids, etc...) to determine if they are adequately shielded from external RF energy.

Turn your terminal **OFF** in health care facilities when any regulations posted in the area instruct you to do so. Hospitals or health care facilities may be using RF monitoring equipment.

5.3.2.5 Aircraft

Turn your terminal OFF before boarding any aircraft.

- Use it on the ground only with crew permission.
- Do not use it in the air.

To prevent possible interference with aircraft systems, Federal Aviation Administration (FAA) regulations require you to have permission from a crew member to use your terminal while the aircraft is on the ground. To prevent interference with cellular systems, local RF regulations prohibit using your modem while airborne.

5.3.2.6 Children

Do not allow children to play with your GSM terminal. It is not a toy. Children could hurt themselves or others (by poking themselves or others in the eye with the antenna, for example). Children could damage the modem, or make calls that increase your modem bills.

5.3.2.7 Blasting areas

To avoid interfering with blasting operations, turn your unit OFF when in a « blasting area » or in areas posted: « turn off two-way radio ». Construction crew often use remote control RF devices to set off explosives.

5.3.2.8 Potentially explosive atmospheres

Turn your terminal **OFF** when in any area with a potentially explosive atmosphere. It is rare, but your modem or its accessories could generate sparks. Sparks in such areas could cause an explosion or fire resulting in bodily injuries or even death.

Areas with a potentially explosive atmosphere are often, but not always, clearly marked. They include fueling areas such as petrol stations; below decks on boats; fuel or chemical transfer or storage facilities; and areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

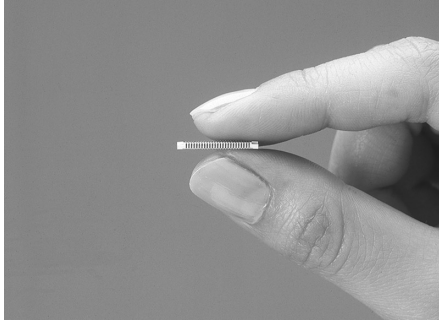
Do not transport or store flammable gas, liquid, or explosives, in the compartment of your vehicle which contains your terminal or accessories.

Before using your terminal in a vehicle powered by liquefied petroleum gas (such as propane or butane) ensure that the vehicle complies with the relevant fire and safety regulations of the country in which the vehicle is to be used.

5.4 General Purpose Connector data sheet

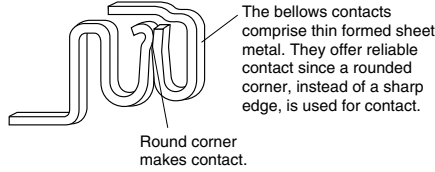
The next four pages are the NAIS data sheets for the GPC (also available from <http://www.nais-e.com/>).

Preliminary

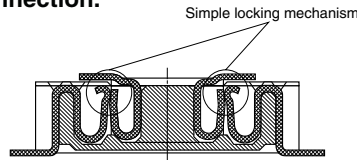


2. Unique bellows-type contacts

Our unique bellows-type contacts resist mating stress and offer high contact reliability.

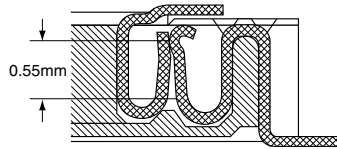


3. Simple locking mechanism is employed which is suitable for FPC connection.



4. Mating length 0.55mm

While achieving a low profile of 1.5mm between PCBs, the effective mating length has been extended to ensure that there is some latitude in the mating.

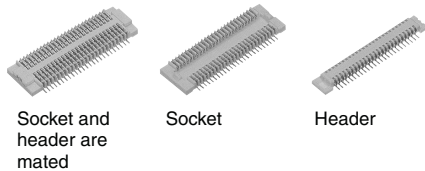


5. Construction resistant to solder lift-off

The construction provides a longer distance between the actual contact areas of the contacts and the pins to yield an improved resistance to solder lift-off.

APPLICATIONS

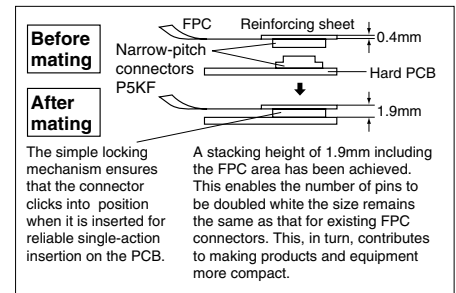
- Cellular phones
- PHS
- Portable data terminals
- Compact portable devices



FEATURES

1. Low profile of 1.5mm
Low profiles of 1.5mm, 2.0mm and 2.5mm are realized. They allow products to be slimmer.

Ideal for FPC-to-PCB connections



SPECIFICATIONS

1. Characteristics

Item		Specifications	Conditions															
Electrical characteristics	Rated current	0.5A/terminal (Max. 10 A at total terminals)																
	Rated voltage	AC, DC 60V																
	Breakdown voltage	150V AC for 1 minute	Detection current: 1mA															
	Insulation resistance	Min. 1,000MΩ (initial)	Using 500V DC megger															
	Contact resistance	Max. 90mΩ	Measured with HP4338B															
Mechanical characteristics	Composite insertion force	Max. 0.981N {100gf}/terminal × total terminals (initial)																
	Composite removal force	Min. 0.0588N {6gf}/terminal × total terminals (initial)																
	Post holding force	Max. 0.981N {100gf}	Measures the maximum load in the post axial direction until removal															
Environmental characteristics	Ambient temperature	-55°C to +85°C	No freezing at low temperatures															
	Soldering heat resistance	Max. peak temperature of 245°C	Infrared reflow soldering															
		300°C within 5 seconds	Soldering iron															
	Thermal shock resistance (header and socket mated)	5 cycles, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	<table border="1"> <thead> <tr> <th>Sequence</th> <th>Temperature (°C)</th> <th>Time (minutes)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55⁺⁰₋₃</td> <td>30</td> </tr> <tr> <td>2</td> <td>25⁺¹⁰₋₅</td> <td>Max. 5</td> </tr> <tr> <td>3</td> <td>85⁺³₋₃</td> <td>30</td> </tr> <tr> <td>4</td> <td>25⁺¹⁰₋₅</td> <td>Max. 5</td> </tr> </tbody> </table>	Sequence	Temperature (°C)	Time (minutes)	1	-55 ⁺⁰ ₋₃	30	2	25 ⁺¹⁰ ₋₅	Max. 5	3	85 ⁺³ ₋₃	30	4	25 ⁺¹⁰ ₋₅	Max. 5
	Sequence	Temperature (°C)	Time (minutes)															
	1	-55 ⁺⁰ ₋₃	30															
	2	25 ⁺¹⁰ ₋₅	Max. 5															
3	85 ⁺³ ₋₃	30																
4	25 ⁺¹⁰ ₋₅	Max. 5																
Humidity resistance (header and socket mated)	120 hours, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	Bath temperature 40±2°C, humidity 90 to 95% R.H.																
Saltwater spray resistance (header and socket mated)	24 hours, insulation resistance min. 100MΩ, contact resistance max. 90mΩ	Bath temperature 35±2°C, saltwater concentration 5±1%																
H ₂ S resistance (header and socket mated)	48 hours, contact resistance max. 90mΩ	Bath temperature 40±2°C, gas concentration 3±1 ppm, humidity 75 to 80% R.H.																
Lifetime characteristics	Insertion and removal life	50 times	Repeated insertion and removal speed of max. 200 times/hours															
Unit weight		Stacking height 1.5mm 20 terminals; Socket: 0.06g Header: 0.04g																

2. Material and surface treatment

Part name	Material	Surface treatment
Molded portion	Heat-resistant resin (UL94V-0)	—
Contact	Copper alloy	Contact portion: Au plating over Ni Terminal portion: Au plating over Ni

PRODUCT TYPES

Stacking height	No. of contacts		Part No.
1.5 mm	10	Socket	AXK5F10345J
		Header	AXK6F10345J
	12	Socket	AXK5F12345J
		Header	AXK6F12345J
	14	Socket	AXK5F14345J
		Header	AXK6F14345J
	16	Socket	AXK5F16345J
		Header	AXK6F16345J
	20	Socket	AXK5F20345J
		Header	AXK6F20345J
	22	Socket	AXK5F22345J
		Header	AXK6F22345J
	24	Socket	AXK5F24345J
		Header	AXK6F24345J
	30	Socket	AXK5F30345J
		Header	AXK6F30345J
	34	Socket	AXK5F34345J
		Header	AXK6F34345J
	40	Socket	AXK5F40345J
		Header	AXK6F40345J
	50	Socket	AXK5F50345J
		Header	AXK6F50345J
	60	Socket	AXK5F60345J
		Header	AXK6F60345J
	70	Socket	AXK5F70345J
		Header	AXK6F70345J
	80	Socket	AXK5F80345J
		Header	AXK6F80345J
2.0 mm	10	Socket	AXK5F10545J
		Header	AXK6F10345J
	12	Socket	AXK5F12545J
		Header	AXK6F12345J
	14	Socket	AXK5F14545J
		Header	AXK6F14345J
	16	Socket	AXK5F16545J
		Header	AXK6F16345J
	20	Socket	AXK5F20545J
		Header	AXK6F20345J
	22	Socket	AXK5F22545J
		Header	AXK6F22345J
	24	Socket	AXK5F24545J
		Header	AXK6F24345J
	30	Socket	AXK5F30545J
		Header	AXK6F30345J
	34	Socket	AXK5F34545J
		Header	AXK6F34345J
	40	Socket	AXK5F40545J
		Header	AXK6F40345J
	50	Socket	AXK5F50545J
		Header	AXK6F50345J
	60	Socket	AXK5F60545J
		Header	AXK6F60345J
	70	Socket	AXK5F70545J
		Header	AXK6F70345J
	80	Socket	AXK5F80545J
		Header	AXK6F80345J
100	Socket	AXK5F00545J	
	Header	AXK6F00345J	

- Notes) 1. In order to reduce the amount of packaging materials used to help protect the global environment, it is recommended that each packaging box contain 2,000 units with the "J" product number suffix. Embossed tape packages containing 1,000 units in the inside boxes (reels) are also available. The latter have the "P" product number suffix. When placing orders, change the "J" suffix to the "suffix P".
2. Regarding ordering units: During production: Please make orders in 1-reel units.
Samples for mounting confirmation: Please consult us. (See "Regarding sample orders to confirm proper mounting" on page 7.)
Samples: Small lot orders are possible. Change the suffix "J" to the suffix "P".
3. The standard type comes with no positioning bosses. Connectors with positioning bosses are available for on-demand production. For this type of connector, 9th digit of the part no. changes from 4 to 3. e.g. Stacking height 1.5mm 10 contacts for sockets: AXK5F10335J

Stacking height	No. of contacts		Part No.
	2.5 mm	10	Socket
Header			AXK6F10545J
12		Socket	AXK5F12545J
		Header	AXK6F12545J
14		Socket	AXK5F14545J
		Header	AXK6F14545J
16		Socket	AXK5F16545J
		Header	AXK6F16545J
20		Socket	AXK5F20545J
		Header	AXK6F20545J
22		Socket	AXK5F22545J
		Header	AXK6F22545J
24		Socket	AXK5F24545J
		Header	AXK6F24545J
30		Socket	AXK5F30545J
		Header	AXK6F30545J
34		Socket	AXK5F34545J
		Header	AXK6F34545J
40		Socket	AXK5F40545J
		Header	AXK6F40545J
50		Socket	AXK5F50545J
		Header	AXK6F50545J
60		Socket	AXK5F60545J
		Header	AXK6F60545J
70		Socket	AXK5F70545J
		Header	AXK6F70545J
80		Socket	AXK5F80545J
		Header	AXK6F80545J
100	Socket	AXK5F00545J	
	Header	AXK6F00545J	

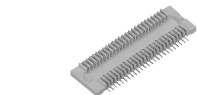
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DIMENSIONS

mm General tolerance ± 0.2

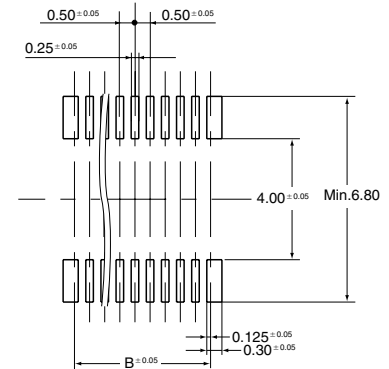
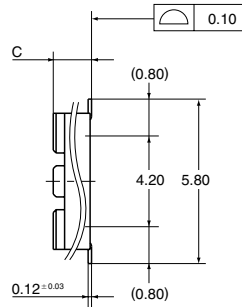
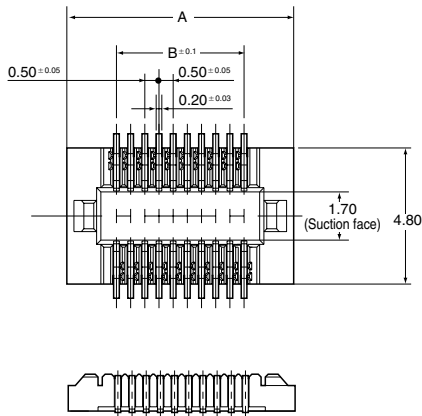
• Socket body

Recommended PC board pattern (TOP VIEW)



Dimension table (mm)

No. of contacts	A	B
10	5.50	2.00
12	6.00	2.50
14	6.50	3.00
16	7.00	3.50
20	8.00	4.50
22	8.50	5.00
24	9.00	5.50
30	10.50	7.00
34	11.50	8.00
40	13.00	9.50
50	15.50	12.00
60	18.00	14.50
70	20.50	17.00
80	23.00	19.50
100	28.00	24.50



Stacking height	C
1.5 mm	1.35
2.0 mm, 2.5 mm	1.85

Note) P5K series (stacking heights 3 mm and 3.5 mm) and the P5KS series (stacking heights 4.0 mm, 4.5 mm, 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm, 7 mm, 8 mm, and 9 mm) cannot be mated to this type.

• Header

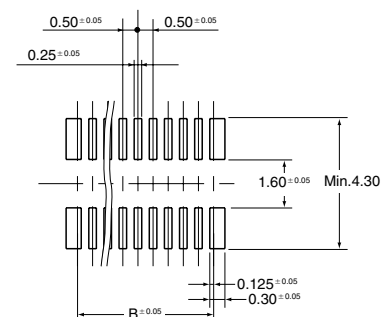
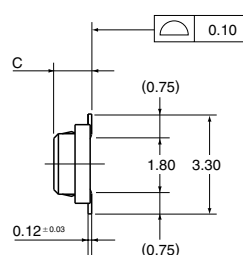
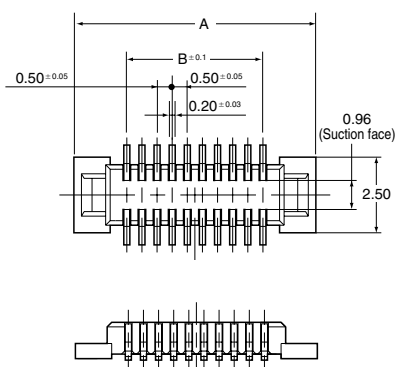
mm General tolerance ± 0.2

Recommended PC board pattern
(TOP VIEW)



Dimension table (mm)

No. of contacts	A	B
10	5.50	2.00
12	6.00	2.50
14	6.50	3.00
16	7.00	3.50
20	8.00	4.50
22	8.50	5.00
24	9.00	5.50
30	10.50	7.00
34	11.50	8.00
40	13.00	9.50
50	15.50	12.00
60	18.00	14.50
70	20.50	17.00
80	23.00	19.50
100	28.00	24.50



Stacking height	C
1.5 mm, 2.0 mm	1.25
2.5 mm	1.75

Note) P5K series (stacking heights 3 mm and 3.5 mm) and the P5KS series (stacking heights 4.0 mm, 4.5 mm, 5.0 mm, 5.5 mm, 6.0 mm, 6.5 mm, 7 mm, 8 mm, and 9 mm) cannot be mated to this type.

• Socket and header are mated

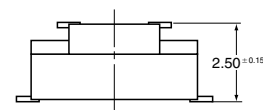
Stacking height 1.5 mm



Stacking height 2.0 mm



Stacking height 2.5 mm



NOTES

1. Preventing vibration and shock

In order to secure the PC board connection even when a shock applied, please keep a connector away from the influence of the shock by fixing the PC boards to the enclosure or any other means.

2. These models are made very thin so that they may be smaller in size and light in weight than before.

Take care not to give then excessive force when mating them together or unmating them; otherwise, breakage may result. To prevent damage from incorrect insertions, please confirm the correct position before mating connectors.

3. Keep the PC board warp 0.03 mm or below as against the overall length of the connector.

