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GSM/GPRS Module BRM128GM

GSM/GPRS module for SMS or GPRS remote monitoring and control applications
Specially designed for hardware and application designers

Data-Logging to EEPROM
Data-Logging to Web-Server
Alarm Notification
Remote Control
Video Monitoring

Preliminary Data

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Introduction

The BRM128GM GSM/GPRS module is a communications device that connects used for wireless Data-Logging, Alarm Monitoring and Control of remote equipments and systems. The BRM128GM provides logging of data to internal EEPROM memory and to a web-server for access through a web browser. Multiple users can interrogate the BRM128GM or be notified on configurable events.
The BRM128GM GSM/GPRS module is specially designed as DIL-board for hardware and application designers.
The built-in quad-band Telit GM862-QUAD GSM module and is compatible with all 850, 900, 1800 or 1900Mhz GSM networks.

Features

- Internal quad-band GSM-module Telit GM862-QUAD
- Based on Atmega128L microcontroller
- All microcontroller pins available from pin headers
- 12 digital 3.3V input ports
- 8 analog 3.3V input ports
- 8 digital 3.3V output ports
- 2 SMT160-30 temperature sensor input (optional)
- Up to 11 additional 3.3V input/output ports
- Programming via RS232 interface (software included) and via SMS.
- Error notification using SMS messaging via cell phone
- Data Logging using GPRS
- Video monitoring (BRM128GM-VIDEO)
- Control via SMS
- Control from Cell Phone
- Control from PC
- BieneRemote module – BieneRemote module automatic control
- Configuration from any cell phone
- Configuration from PC
- Serial data EEPROM 1Mbit (optional – serial data Flash memory up to 64Mbit)
- +5VDC/1.5A stabilized or 3.8VDC/1.5A stabilized power supply
- +3.7V/800mA/h min Lithium battery (optional)
- Lithium battery charge control with external + 5VDC power supply (optional)
- 95x70 mm board with 2 x 2x23 pin headers
- Special firmware can be ordered for this module

BRM128GM-VIDEO
with TC5747 miniature color Web camera

SMS and GPRS Functions

BRM128GM module send an event SMS messages to up to 7 cell phones.
Up to 7 cell phone numbers can be used to send SMS commands to BRM128GM.
With the BRM128GM GSM/GPRS module you can use a mobile phone or SMS enabled PC to:

- Monitor the status of equipment or systems
- Send control commands to remote equipment
- Receive notification of events
- Receive video picture (BRM128GM-VIDEO)

Any BRM128GM module can be used to send SMS commands to other BieneRemote module for remote control. Any BRM128GM module can be programmed via SMS instruction.

Inputs / Outputs

Module programmed with 12 digital inputs, 8 analog inputs and 8 digital outputs 3.3V level.
All inputs and outputs has pin header connection.
0-1 and 1-0 event on the each digital inputs can be alarmed with individually alarm SMS-message. Two alarm level can be programmed for each analog and temperature inputs. Three state: < minimum level, > maximum level and normal, can be alarmed with individually alarm SMS-message.
Each output individually can be set ON or OFF via SMS command message. Output can be also programmed for set ON or OFF as time proportional pulse.

Input and Output Data Logging

Inputs, Outputs, Temperature can be logged to the 128K of internal EEPROM memory and to the Web-Server. Data may be accessed via the Client Website as online graphs, reports and CSV downloads.
Inputs can be scanned up to every 60 seconds. Logging can be as frequent as every 60 seconds. Different logging rates can be applied when an alarm is present. Instantaneous or averaged values can be logged.
All Inputs and states can be logged, and it can trigger alarms based on user-defined setpoints. Alarming and user notification settings can be set for each input.
All alarm states also can be send to Web-server using GPRS-Internet network.
Logging settings for each input can be set to:

- Logging Disabled
- Log to EEPROM and Web-server

Temperature Monitoring

Two SMT160-30 Smartec Temperature Sensor can be connected to the Temperature Sensor Inputs.
The temperature can be logged, and it can trigger alarms based on user-defined setpoints. The sensor has an accuracy up to 1°C from –45 to +135°C.

Power Supply Monitoring

The BRM128GM operates from a external +5VDC or 3.8VDC power source or external lithium 3.7V battery (optional). The analog input 8 used to monitor +5V power supply voltage. 3.7V battery voltage monitored in GM862 module.

Users and Administrators

The BRM128GM supports up to 7 users. Each user can interrogate the device for the current I/O status. Users can be notified based on changes to each input or output. Configuration tables allow inputs and outputs to be allocated to specific users (administrators).

Security

Caller ID security provide authentication for device interrogation and control.

Alarms

SMS messages can be sent to users when an input reaches an alarm state. The following setpoint configurations are available:
- Alarm when 0-1 event at digital input.
- Alarm when 1-0 event at digital input.
- Alarm when above set point at analog input.
- Alarm when below set point point at analog input.
- Alarm when inside set points point at analog input.
- Alarm when above set point at temperature input.
- Alarm when below set point point at temperature input.
- Alarm when inside set points point at temperature input.

Module Programming/Configuration

The BRM1280GM can be configured:from PC through RS232 port or remotely with SMS command. Configuration options include Alarm Message Content, System Settings, Users and Administrators Phone Numbers, and Alarm and Data-Logging Settings.

Module to Module Control

The BRM128GM supports Module-to-Module management with SMS command.

Video monitoring

Module video version BRM128GM-VIDEO has video monitoring function with TC5747 video camera. TC5747 is 640x480 color VGA miniature CMOS camera.

Technical specifications

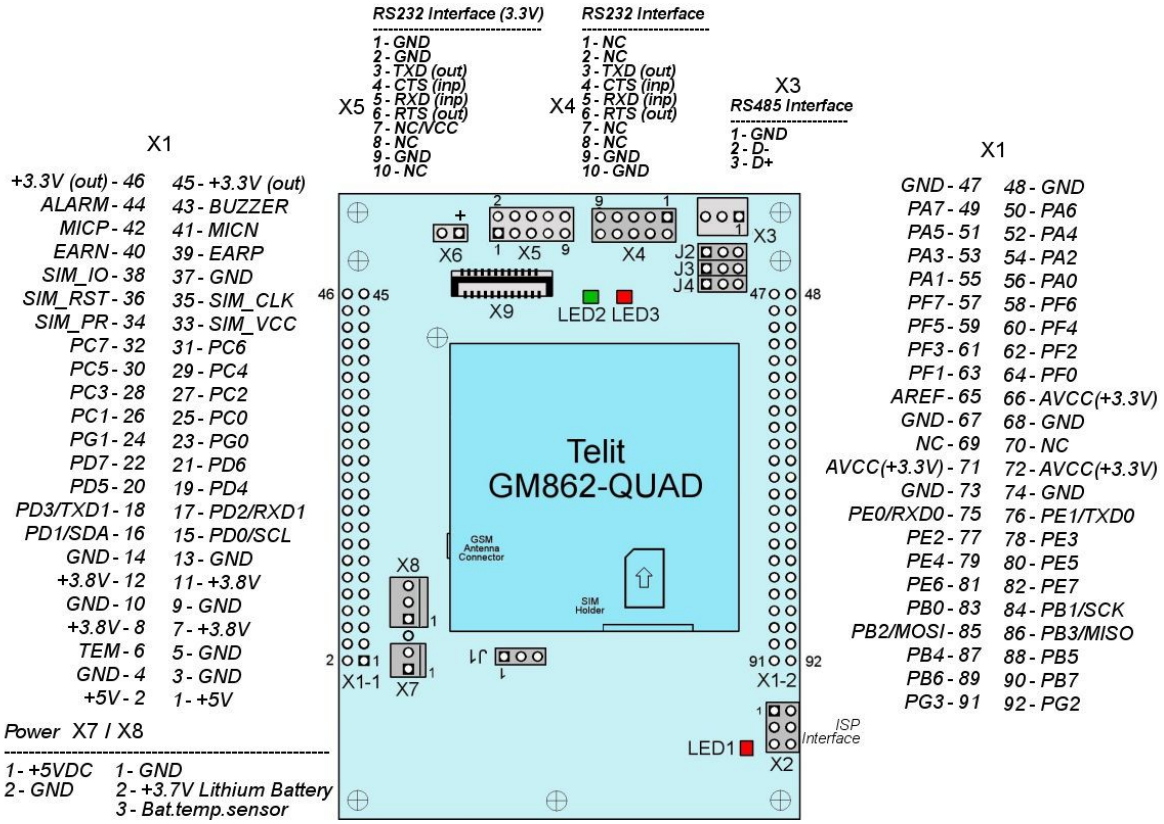
Technical specifications	BR128GM	BR1280GM	BRM128GM
GSM support			
GSM Module	Telit GM862-QUAD	Telit GM862-QUAD	Telit GM862-QUAD
GSM band support	850, 900, 1800, 1900 Mhz	850, 900, 1800, 1900 Mhz	850, 900, 1800, 1900 Mhz
RF Power	Class 4 (2W) 850Mhz,900Mhz, Class 1 (1W) 1800Mhz, 1900Mhz	Class 4 (2W) 850Mhz,900Mhz, Class 1 (1W) 1800Mhz, 1900Mhz	Class 4 (2W) 850Mhz,900Mhz, Class 1 (1W) 1800Mhz, 1900Mhz
GPRS	Class 10	Class 10	Class 10
Antenna Connection	50Ω SMA (f) Connector	50Ω SMA (f) Connector	50Ω SMA (f) Connector
Gateway Functions			
Remote Parmeter Reading	The value of any parameter can be requested from a GSM mobile	The value of any parameter can be requested from a GSM mobile	The value of any parameter can be requested from a GSM mobile
Remote Parameter Setting	The value of any parameter can be set from a GSM mobile	The value of any parameter can be set from a GSM mobile	The value of any parameter can be set from a GSM mobile
Programmable alarm message	Up to 44 alarm message can be programmed to any or all of 7+1 different GSM numbers	Up to 44 alarm message can be programmed to any or all of 7+1 different GSM numbers	Up to 56 alarm message can be programmed to any or all of 7+1 different GSM numbers
Programmable GSM Telephone numbers	Up to 7	Up to 7	Up to 7
Administration	All functions of the SMS module can be administered from a GSM mobile	All functions of the SMS module can be administered from a GSM mobile	All functions of the SMS module can be administered from a GSM mobile
Security	Incoming requests or commands can be accepted only from designated mobile numbers	Incoming requests or commands can be accepted only from designated mobile numbers	Incoming requests or commands can be accepted only from designated mobile numbers
SMS alarm message	Yes	Yes	Yes
SMS control	Yes	Yes	Yes
Services phone numbers	5	5	5
Administration phone numbers	3	3	3
User-defined alarm messages	Yes	Yes	Yes
GPRS/FTP	Yes	Yes	Yes
Video image sending	No	No	Yes
Call support	Module restart	Module restart	Module restart
Inputs			
Digital inputs	7 npn (sink) 12V	12 npn 12V	12 CMOS 3.3V
Optoisolated inputs	none	Additional order	-
Counter	none	2 inputs can function as 16bit resolution counter inputs	2 inputs can function as 16bit resolution counter inputs

Technical specifications	BR128GM	BR1280GM	BRM128GM
Analog inputs	Four 10-bit inputs: 0-5V unprotected; 0-10V/0-20mA/4-20mA optionally	Eight 10-bit inputs: 0-10V; 0-5V; 0-20mA; 4-20mA (with switch selectable)	Seven 10-bit 0-3.3V inputs
Analog Input impedance	100MOm	0-10V / 0-5V: 50kOm 0-20mA / 4-20mA: 249 Om	100MOm
Temperature measurement inputs	optionally	1 SMT30-160 input	2 SMT30-160
Temperature measurement range		-45...+135°C	-45...+135°C
Temperature sensor	2 or 4-wire PT1000 optionally	SMT30-160 (Smartec); 2 or 4 wire Pt1000 or Pt100 optionally	SMT30-160 (Smartec)
Digital input event	0-1 and 1-0	0-1 and 1-0	0-1 and 1-0
Analog input event	below min / min / norm / max / over max	min / norm / max	min / norm / max
Temperature input event	below min / min / norm / max / over max	min / norm / max	min / norm / max
Digital input filter			
Analog input filter			
Temperature input filter			
Sampling Rate			
Outputs			
Outputs	4 Open Drain MOSFET 20V max	8 Open Drain MOSFET 50V max	8 CMOS 3.3V
Relay outputs	1 (NO/COM/NC), 24VDC/120VAC/ 0.5A	3 (NO/COM/NC), 28VDC/230VAC/5A optional	no
PWM outputs	no	2 outputs can function as PWM	2 outputs can function as PWM
Analog outputs	no	Additional order	no
Digital output control	On-Off or Time Proportional	On-Off or Time Proportional	On-Off or Time Proportional
Alarming			
SMS alarm message	Yes	Yes	Yes
User-defined messages	Yes	Yes	Yes
Phone number			
Services phone numbers	5	7	7
Administration phone numbers	3	3	3
Control			
SMS control	Yes	Yes	Yes
Call support	Module restart	Module restart	Module restart
Communications			
GPRS/FTP	Yes	Yes	Yes
Serial communications	RS232; RS495 optionally	RS232; RS485 optionally	RS232; RS485 optionally
MODBUS	none	Additional order	Additional order
Function			
Data logger function	Yes	Yes	Yes
Video image sending	No	No	Yes (BRM128GM-VIDEO)
EEPROM memory for data logging	64Kbyte	128Kbyte	128Kbyte

Technical specifications	BR128GM	BR1280GM	BRM128GM
Human - Module control	Yes	Yes	Yes
Module - Module control (outside)	Yes	Yes	Yes
Module - Module control (inside)	Yes	Yes	Yes
Control			
Module Control	via SMS	via SMS	via SMS
Programming			
Module programming	RS232 port, via SMS	RS232 port, via SMS	RS232 port, via SMS
Muscelaneus			
Microcontroller	ATMEGA128	ATMEGA128	ATMEGA128L
Real Time Clock	none	date and time, 3V lityum battery	GM862 RTC with 3.7V lithium battery
On-board monitoring	none	+12VDC power supply monitoring (optional); board temperature monitoring (optional)	+5VDC power supply monitoring
Buzzer output	none	One output can function as GM862 buzzer	BR862 buzzer output
I/O expansion option	none	Up to 9 additional I/Os optionally	Up to 9 additional I/Os optionally
Wiring Connections	Screw terminals Wire range - 26-16 AWG 1.5 mm^2	Screw terminals Wire range - 24-12 AWG 2.5 mm^2	Pin header 2.54mm pitch
Data-Logging	nputs, Outputs, Temperature can be logged to the 64K of internal EEPROM memory and to the Web-Server. Data may be accessed via the Client Website as online graphs, reports and CSV downloads.	Inputs, Outputs, Temperature, Power Voltage can be logged to the 128K of internal EEPROM memory and to the Web-Server. Data may be accessed via the Client Website as online graphs, reports and CSV downloads.	Inputs, Outputs, Temperature can be logged to the 128K of internal EEPROM memory and to the Web-Server. Data may be accessed via the Client Website as online graphs, reports and CSV downloads.
Electrical			
Required Power supply	12VDC satabilized / 1.5A min (2A peak)	12VDC satabilized / 1.5A min (2A peak)	+5VDC or +3.8VDC stabilized / 1.5A min (2A peak) 3.7V lithium battery - optional
Power maintenance	60mA standby, 350mA (rms), 2A peak	70mA standby, 350mA (rms), 2A peak	20mA standby, 500mA (rms) max, 2A peak
Environmental			
Operating temperature	0 to +50°C	0 to +50°C	0 to +50°C
Extended operating temperature	-20 to +70°C	-20 to +70°C	-20 to +70°C
Storage Temperature	-40 to +85°C	-40 to +85°C	-40 to +85°C
Humidity	0-95% non-condensing	0-95% non-condensing	0-95% non-condensing
Dimensions			
Dimensions (mm x mm)	65x100	155x87	95x70
Enclosure	JM33 (Pactec) if without adapter	DIN-rail mounting	no
Weight (kg)			

Hardware

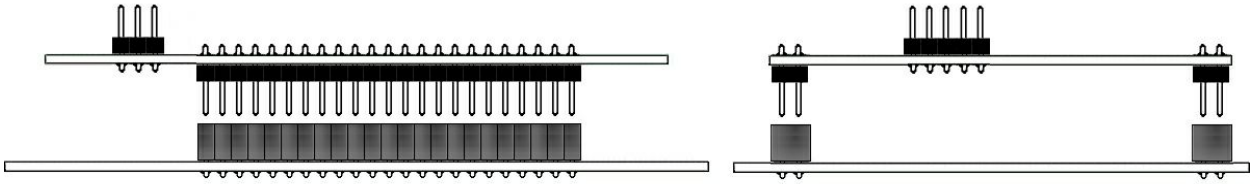
The BRM128GM module consists of the Atmega128L-8AU microcontroller, +3.8V voltage regulator, RS232 and RS485 interface, built-in GSM module with SIM header, GSM antenna connector, pin headers for external power supply and for input and output signal connection and connector for TC5747 Web camera connection.

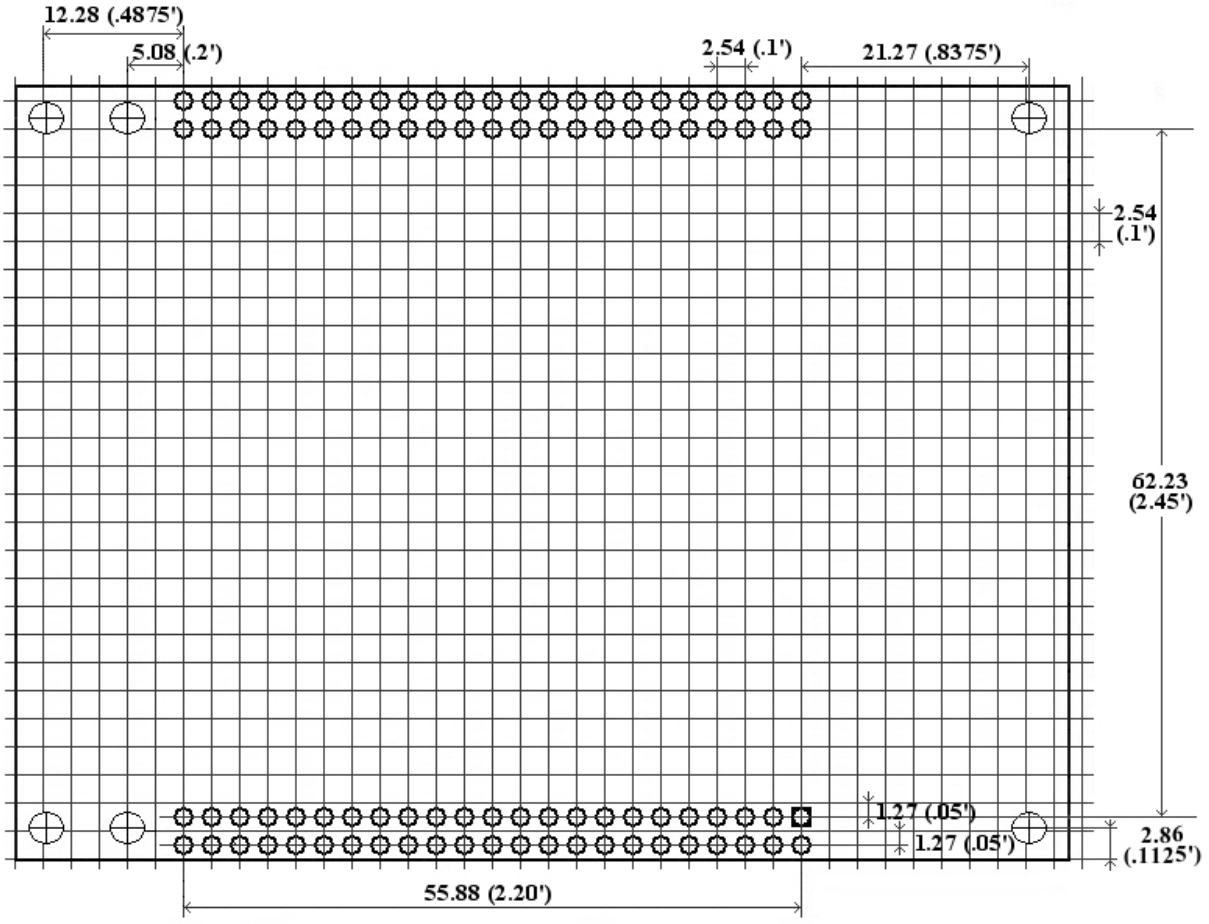


See “Input and Output connection” bellow.

All microcontroller signal pin (0...3.3V) connected from microcontroller to pin header through 100 Om serial resistor. Electrical parameter see in ATMEGA128L (3.3V power) datasheet.
All GM862 pin connected to pin header electrical parameter see in GM862-QUAD user manual.
You can connect external SIM holder.You can connect external GSM status LED to additional connector.
For module powered you can use +5VDC external stabilized power supply, 3.8VDC stabilized power supply or 3.7V lithium battery (optionally – lithium battery charghe control from 5...5.5VDC power).

Board to board conection:





Power Supply

The BRM128GM operates from a +5VDC or 3.8VDC external power source. It draws less then 20mA standby, less then 350mA rms and 2A peak max. 1.5A stabilized power supply min recommenden.
1.5A min. stabilized power supply is recommended.
800mA/h or more 3.7V/3.75V lithium battery is recommended for battery option.
With lithium battery option +5.0...5.5VDC power source used for battery charge.

SIM Card

Small SIM-card with 1.8V or 3V technology

Preparation of SIM card

- Delete any SMS messages from SIM.
- Write SMS message to SIM (for standard version only)
- Disable PIN code request so it will not prompt for a PIN code on turning on.
- Write 3 authorized numbers to Phone Book (position 1,2,3)
  You can to position 1 write number 99 or +99 – for disable authorization numbers

  Note:
  - *The BRM128GM can only be used with small SIM-cards with 1.8V or 3V technology.*
  - *For SIM card preparation you can use cell phone or external GSM modem.*
  - *SIM card change if power turn off.*

LED indicators

- Module status indication - RED LED (LED1)
- GSM Modem GM862 status indication - GREEN LED (LED2)
- RED LED (LED3) – for additional use

Module LED indication (Red LED1)

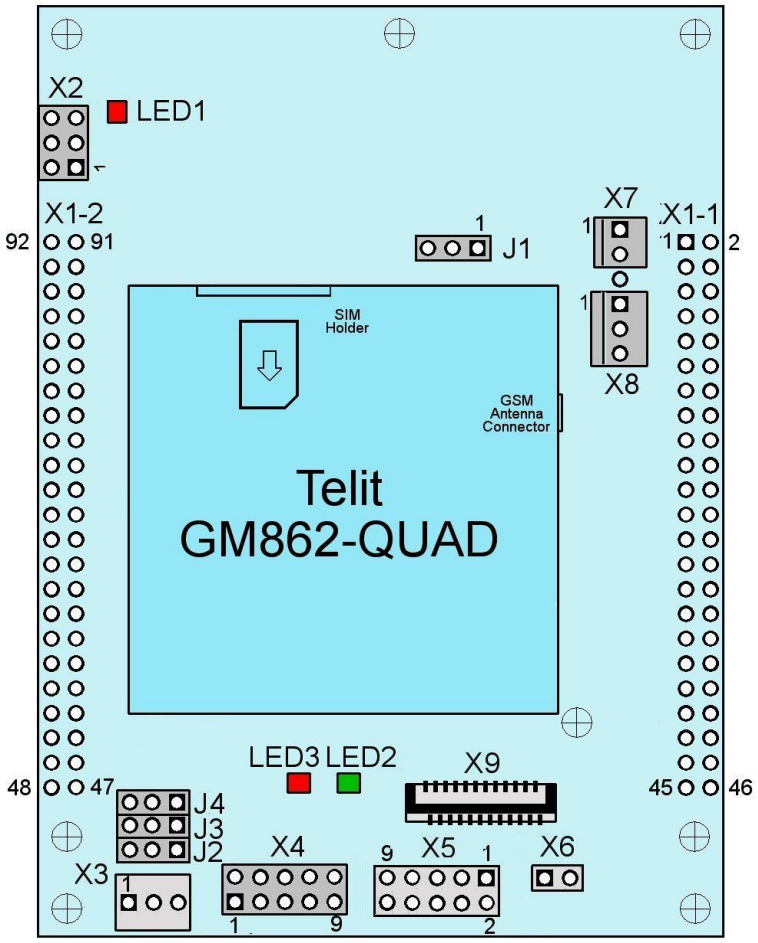
LED status	**Modem status**
Permanently off	Device off
Short blinking after power on and after 1 min periodic blinking	SIM card read process
Short blinking (period 5-6 sec)	Module in work
Permanently on	Module work with modem

GSM Modem LED indication (Green LED2)

LED status	**Modem status**
Permanently off	Device off
Fast blinking (period 1s, ton 0,5s)	Net search / Not registered / Turning off
Slow blinking (period 3s, ton 0,3s)	Registered full service
Permanently on	A call is active

Connectors and Jumpers

- Power supply, charger X7 and battery (optional) connector X8.
- Controlled equipment inputs and outputs X1 connectors (2x23 pin headers X1-1, X1-2)
- ISP interface connector (X2 – 2X3 pin header)
- Serial interface (RS-232 level) X4 connector
- Serial interface (3.3V) X3 connector (optional)
- RS485 interface connector X3.(optional)
- GSM status LED connector X6 (optional)
- Web camera TC5747 connector X9 (BRM128GM-VIDEO).



Jumpers

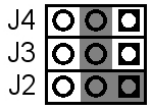
Power Supply select (J1)

J1/1-2 - external +5VDC stabilized power supply:

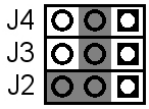
J1/2-3 - external +3.7V/3.75V lithium battery with charge from external 5..5.5V power:

RS232/RS485 port select (J4,J5)

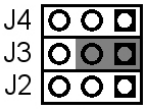
J2/1-2 - RS232 port used (PC connection to a RS232 port):



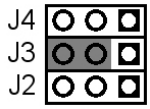
J2/2-3 - RS485 port used:



J3/1-2 - RxD1 to RS-232 output for testing



J3/2-3 - TxD1 to RS-232 output for testing



Inputs and Outputs Connection

Inputs and outputs connected from Atmega128L microcontroller pin to 2x23 pin headers X1. All processor pin connected to X1 pin headers.

X1-1

Pin	*Port*	*Function*		*Pin*	*Port*	*Function*	
1	+5VDC	Power/Charger	input	2	+5VDC	Power/Charger	input
3	GND	GND		4	GND	GND	
5	GND	GND		6	TEM	Litheon Battery Temperature sensor (optional)	input
7	+3.8V	+3.8V	inp/out	8	+3.8V	+3.8V	inp/out
9	GND	GND		10	GND	GND	
11	+3.8V	+3.8V	inp/out	12	+3.8V	+3.8V	inp/out
13	GND	GND		14	GND	GND	
15	PD0/SCL	SCL	inp/out	16	PD1/SDA	SDA	inp/out
17	PD2/RXD1	GM862	input	18	PD3/TXD1	GM862	output
19	PD4	OUTPUT1	out	20	PD5	OUTPUT2	out
21	PD6	INPUT5	inp	22	PD7	INPUT6	inp
23	PG0	INPUT1	inp	24	PG1	INPUT2	inp
25	PC0		inp/out	26	PC1		inp/out
27	PC2		inp/out	28	PC3		inp/out
29	PC4	used	inp/out	30	PC5	used	inp/out
31	PC6	used	inp/out	32	PC7	Used (led)	
33	SIM_VCC	External SIM holder	output	34	SIM_PR	External SIM holder	input
35	SIM_CLK	External SIM holder	output	36	SIM_RST	External SIM holder	output
37	GND			38	SIM_IO	External SIM holder	inp/out
39	EARP	GM862 Hand free EARPHONE+ output	output	40	EARN	GM862 Hand free EARPHONE- output	output
41	MICN	GM862 Handfree MICROPHONE- input	input	42	MICP	GM862 Hand free MICROPHONE+ input	input
43	Buzzer	GM862 Buzzer output	output	44	Alarm	GM862 Alarm output	output
45	+3.3V	+3.3V	output	46	+3.3V	+3.3V	output

X1-2

Pin	*Port*	*Function*		*Pin*	*Port*	*Function*	
47	GND	GND		48	GND	GND	
49	PA7		inp/out	50	PA6		inp/out
51	PA5	used	inp/out	52	PA4		inp/out
53	PA3	used	inp/out	54	PA2	used	inp/out
55	PA1	INPUT7	inp	56	PA0		inp/out
57	PF7	used	inp/out	58	PF6	ANALOG7	inp
59	PF5	ANALOG6	inp	60	PF4	ANALOG5	inp
61	PF3	ANALOG4	inp	62	PF2	ANALOG3	inp
63	PF1	ANALOG2	inp	64	PF0	ANALOG1	inp
65	AREF	ATMEGA128L AREF	inp/out	66	AVCC(+3.3V)	Analog VCC (+3.3V)	output
67	GND	GND		68	GND	GND	
69	NC	Not connected		70	NC	Not connected	
71	AVCC(+3.3V)	Analog VCC (+3.3V)	output	72	AVCC(+3.3V)	Analog VCC (+3.3V)	output
73	GND	GND		74	GND	GND	
75	PE0(RXD0)	RXD0	input	76	PE1(TXD0)	TXD0	output
77	PE2	INPUT3	inp	78	PE3	INPUT4	inp
79	PE4	OUTPUT3	out	80	PE5	OUTPUT4	out
81	PE6	INPUT8	inp	82	PE7	Used (ring)	out
83	PB0		inp/out	84	PB1(SCK)	Used (led)	out
85	PB2(MOSI)	INPUT11	inp	86	PB3(MISO)	INPUT12	inp
87	PB4	OUTPUT5	iout	88	PB5	OUTPUT6	out
89	PB6	OUTPUT7	iout	90	PB7	OUTPUT8	out
91	PG3	INPUT9	inp	92	PG2	INPUT10	inp

Note:
1. All microcontroller signal pin (0...3.3V) connected from microcontroller to pin header through 100 Om serial resistor. Electrical parameter see in ATMEGA128L (3.3V power) datasheet.
2. All GM862 pin connected to pin header electrical parameter see in GM862-QUAD user manual.

Power Supply Connection

External +5VDC stabilized Power Supply (J1/1-2 jumper) or external 3.7V lithium battery or other power supply (J1/2-3 jumper) can be connected with X7, X8 connectors or with X1 pin header. Power supply for this module: stabilized and with min. current 1.5A continuous and 2 A peak.

+5VDC power mode

In this mode +5VDC...+5.5VDC (up to +12VC max. with optional order, without battery mode) power supply connected to X7 connector or to X1/1,2 pin header. J1 jumper in this mode: 1-2 connected.

X7 – connector

Pin	Description		
1	**+5VDC**	5VDC..+5.5VDC power	input
2	**GND**		

X8 - connector

Pin		Function	
1	GND		
2	+3.8VDC	+3.8VDC	output
3	TEM	Not used	input

X1 pin-headers:power pins

Pin		***Function***		***Pin***		***Function***	
1	+5VDC	**+5V Power**	input	2	+5VDC	**+5V Power**	input
3	GND	GND		4	GND	GND	
5	GND	GND		6	TEM	Not used	input
7	+3.8V	+3.8Voutput	output	8	+3.8V	+3.8V output	output
9	GND			10	GND		
11	+3.8V	+3.8Voutput	output	12	+3.8V	+3.8Voutput	output

+3.8VDC power mode

In this mode +3.8VDC power supply connected to X8 connector or to X1/7,8,11,12 pin header. J1 jumper in this mode:not jumpered.

X8 - connector

Pin		Function	
1	**GND**		
2	**+3.8VDC**	+3.8VDC power	input
3	TEM	Not used	input

X1 pin-headers:power pins

Pin		***Function***		***Pin***		***Function***	
1	+5VDC	Not used	input	2	+5VDC	Not used	input
3	GND	GND		4	GND	GND	
5	GND	GND		6	TEM	Not used	input
7	+3.8VDC	**+3.8V power**	input	8	+3.8VDC	**+3.8V power**	input
9	GND			10	GND		
11	+3.8VDC	**+3.8V power**	input	12	+3.8VDC	**+3.8V power**	input

+3.7V lithium battery power mode (optional ordered)

More that 800mA/h 3.7V lithium battery is recommended in battery power mode..J1 jumper in this mode: 2-3 connected. +5V...+5.5V power supply or charger can by connected for battery charge. 500mA +5V...+5.5V power supply or charger recommended for battery charge. Charge delay controlled with on-board microcontroller.

X8 connector

Pin		Function	
1	GND		
2	+3.8VDC		input/output
3	TEM	Battery Temperature Sensor Output (not used)	input

X7 – connector

Pin	Description		
1	+5V...+5.5DC	For battery on-board charger	input
2	GND		

+3.7V lithium battery used without charger:

Pin	***Port***	***Function***		***Pin***	***Port***	***Function***	
1	+5VDC	Not used	input	2	+5VDC	Not used	input
3	GND	GND		4	GND	GND	

Pin	*Port*	*Function*		*Pin*	*Port*	*Function*	
5	GND	GND		6	TEM	Not used	input
7	+3.7V	**+3.7V battery**	input	8	+3.7V	**+3.7V battery**	input
9	GND			10	GND		
11	+3.8VDC	**+3.8V battery**	input	12	+3.8VDC	**+3.8V battery**	input

+3.7V lithium battery used with charger:

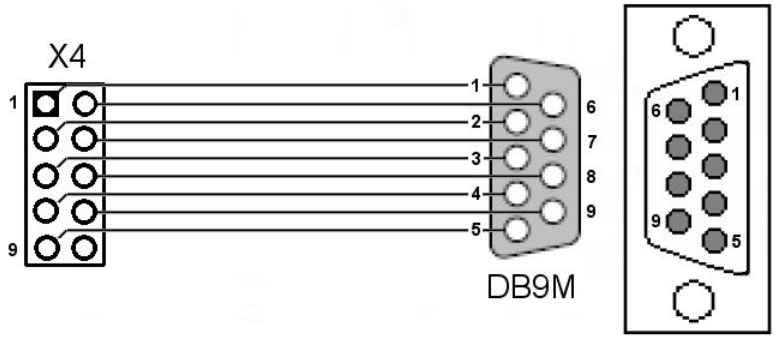
Pin	*Port*	*Function*		*Pin*	*Port*	*Function*	
1	+5V...+5.5V	**Charger**	input	2	+5...+5.5V	**Charger**	input
3	GND	GND		4	GND	GND	
5	GND	GND		6	NTC	NTC sensor	input
7	+3.7V	**+3.7V battery**	input	8	+3.7V	**+3.7V battery**	input
9	GND			10	GND		
11	+3.8VDC	**+3.8V battery**	input	12	+3.8VDC	**+3.8V battery**	input

RS232 and RS485 interface

RS232 interface connectors

2x5 pin header connector (X4), RS232 interface (RS232 level):

X4 (2x5 pin header)		*DB9M*		*DB9M (PC)*		
1	NC	1		1		
2	NC	6		6		
3	TXD (out)	2	TXD (out)	2	RXD (inp)	
4	CTS (inp)	7	CTS (inp)	7	RTS (out)	
5	RXD (inp)	3	RXD (inp)	3	TXD (out)	
6	RTS (out)	8	RTS (out)	8	CTS (inp)	
7	NC	4		4		
8	NC	9		9		
9	GND	5	GND	5	GND	
10	GND					



2x5 pin header connector (X5), RS232 interface (+3.3V level):

X4 (2x5 pin header)		***DB9F***				
1	GND	1				
2	GND	6				
3	TXD (out)	2	TXD (out)			
4	CTS (inp)	7	CTS (inp)			
5	RXD (inp)	3	RXD (inp)			
6	RTS (out)	8	RTS (out)			
7	NC	4	NC			
8	NC	9				
9	GND	5	GND			
10	NC					

RS485 interface connector

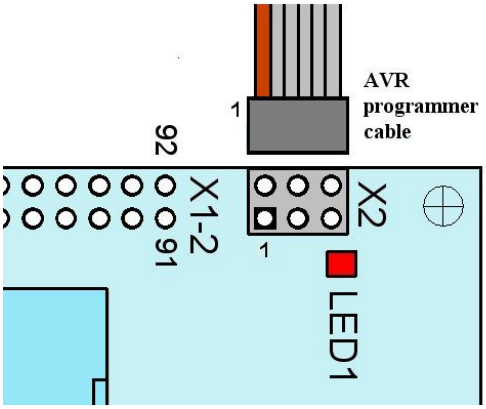
3-pin connector (X3), RS485 (+3.3V level)

X3 (RS485)	
1	GND
2	DATA -
3	DATA +

ISP interface connector

Used for firmware update.

X2	
1	TXD0
2	+3.3V
3	SCK
4	RXD0
5	RESET/
6	GND



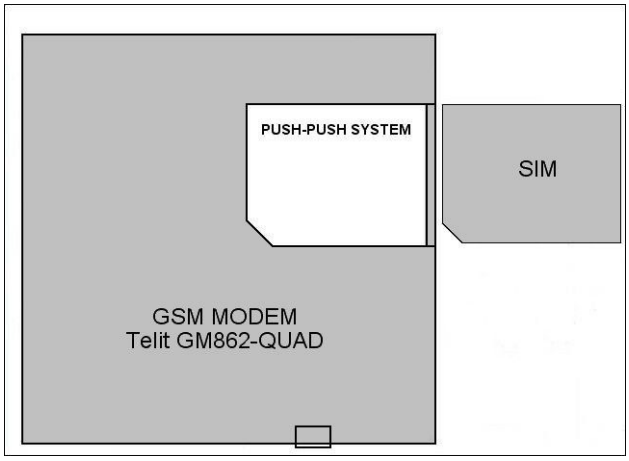
Antenna connection

GSM antenna must be connected to MMCX connector in GM862 modem. Use only the 50Om antenna of the necessary frequency range. Module can be complected with MMCX-SMA(f) cable and SMA(m) GSM antenna.

***Note**: It is very important that the antenna is installed on a location where the GSM-network coverage is sufficient. Please also check carefully that antennas are not installed nearby technical devices, cables etc which could influence the GSM-radiation.*

SIM card insertion

SIM card holder built-in GM862 module. It is inserted in GM862 modems push-push system. You can use external SIM holder – all SIM control line from GM862 connected to pin headers. 1.8V or 3V SIM card can be used.



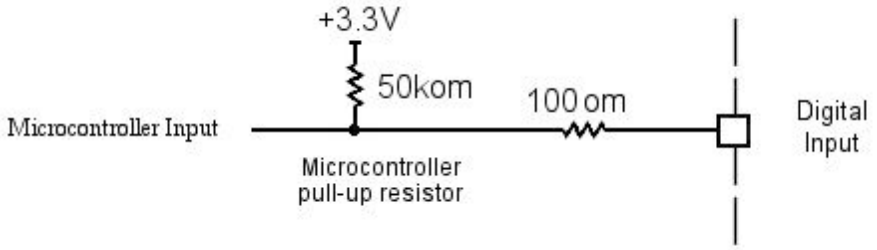
Web camera connection

TC5747 color Web camera connected in BRM128GM-VIDEO to X9 connector. TC5747 is 640x480 color VGA miniature CMOS camera.

Inputs / Outputs Schematic

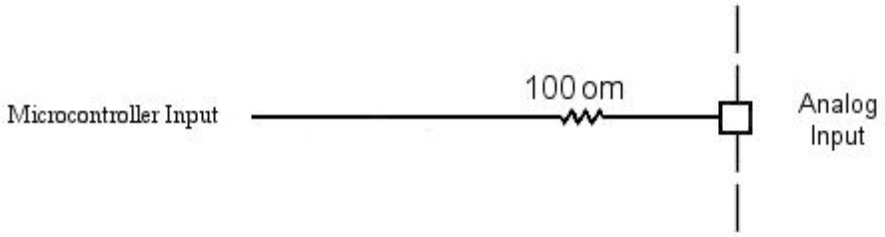
Digital Inputs

Input type: CMOS (Atmega128L)
Protection: serial 100 Om resistor
Input Voltage: 0V to VCC (VCC = +3.3V)
Free Input: logic "1"
Logic "0": 0V…+0.6V
Logic "1": +2.4V…+3.3V



0-3.3V Analog Inputs

Input type: CMOS (Atmega128L)
Protection: serial 100 Om resistor
Input Voltage: 0V to VCC (VCC = +3.3V)
Input resistance: 100 MOm.
ADC resolution: 10-bit



Digital Outputs

Output type: CMOS (Atmega128L)
Protection: serial 100 Om resistor
Logic “0” output voltage. 0V..0.4V
Logic “1” output voltage: 2.4...3.3V