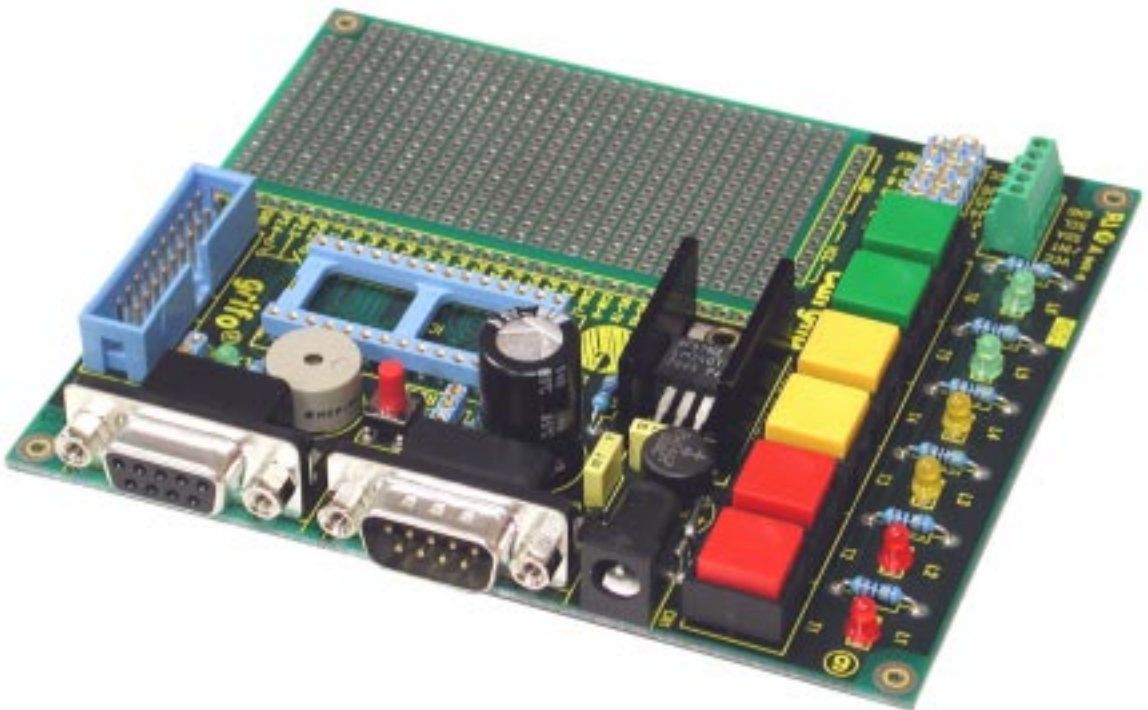


# CAN GMT

CAN - grifo® MiniModule Test

## TECHNICAL MANUAL



**grifo**®  
ITALIAN TECHNOLOGY

Via dell' Artigiano, 8/6  
40016 San Giorgio di Piano  
(Bologna) ITALY  
E-mail: [grifo@grifo.it](mailto:grifo@grifo.it)

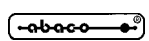


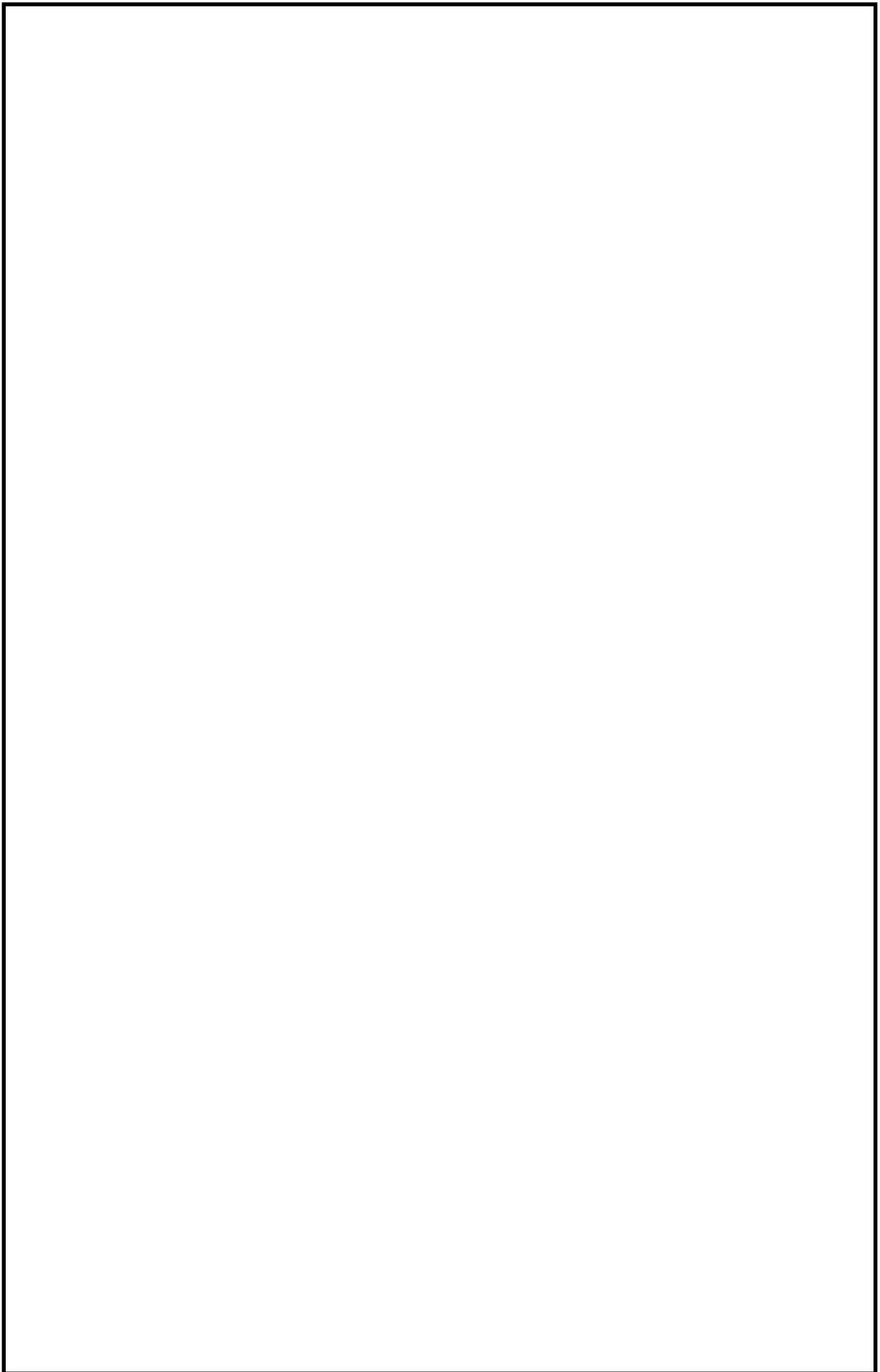
<http://www.grifo.it>      <http://www.grifo.com>  
Tel. +39 051 892.052 (a. r.)      FAX: +39 051 893.661

CAN GMT

Rel. 5.10

Rel. 25 June 2002

, GPC®, grifo®, are trade marks of grifo®



# CAN GMT

CAN - grifo® MiniModule Test

## TECHNICAL MANUAL

28 pins dual in line female socket (100 mils pitch, 600 mils width) capable to accomodate the modules type **CAN GM1**, **CAN GM2**, etc.; standard jack 2,1 mm power supply connector; power supply section that accept an input voltage in the range **7÷12V AC or DC**, compatible with the greater part of low cost main adaptors; **LED** on +5 Vdc voltage, generated by power supply section; **RESET** push button; **Buzzer** for acoustic signal driven by CAN GMx module or by external signal; **LED** that shows status of **real time clock /INT** output signal on CAN GMx module; screw driver connector with **I<sup>2</sup>C BUS** signals of CAN GMx module; DB9 female connector with **RS 232** serial line of CAN GMx module; DB9 male connector with **CAN line** of CAN GMx module (standard CIA: DS102); **16 TTL I/O lines** of CAN GMx module are connected to a low profile 20 pins connector with standard pin outs that can be used to directly manage the numerous **grifo®** cards; **jumper** for connection of 120 ohm **termination** resistor, on CAN line; 6 push **buttons**, 6 **jumpers** and 6 **LEDs** suitable for setting, forcing and display the status of 6 TTL I/O lines of CAN GMx module; **three colours LEDs** (red, yellow, green) to discriminate their functionality; **pod** and jumper for **A/D reference voltage** connection of CAN GMx module; **wide prototype area**, double sided with metallized holes, surrounded of pods that bring all the module signals and respective names; **two mounting possibility**: layed on a plane surface through 4 rubber supports or bolt on each surfaces through 4 support holes, placed on the corner of the board; **small dimension**: 100 x 120 x 30 mm.

**grifo®**  
ITALIAN TECHNOLOGY

Via dell' Artigiano, 8/6  
40016 San Giorgio di Piano  
(Bologna) ITALY  
E-mail: grifo@grifo.it

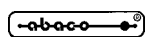


<http://www.grifo.it>      <http://www.grifo.com>  
Tel. +39 051 892.052 (a. r.)      FAX: +39 051 893.661

CAN GMT

Rel. 5.10

Rel. 25 June 2002

, GPC®, grifo®, are trade marks of grifo®

## DOCUMENTATION COPYRIGHT BY grifo®, ALL RIGHTS RESERVED

No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, either electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written consent of **grifo®**.

### IMPORTANT

Although all the information contained herein have been carefully verified, **grifo®** assumes no responsibility for errors that might appear in this document, or for damage to things or persons resulting from technical errors, omission and improper use of this manual and of the related software and hardware.

**grifo®** reserves the right to change the contents and form of this document, as well as the features and specification of its products at any time, without prior notice, to obtain always the best product.

For specific informations on the components mounted on the card, please refer to the Data Book of the builder or second sources.

### SYMBOLS DESCRIPTION

In the manual could appear the following symbols:

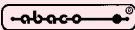


Attention: Generic danger



Attention: High voltage

### Trade Marks

, **GPC®**, **grifo®** : are trade marks of **grifo®**.

Other Product and Company names listed, are trade marks of their respective companies.

# GENERAL INDEX

INTRODUCTION .....	1
CARD VERSION .....	1
GENERAL FEATURES .....	2
TECHNICAL FEATURES .....	4
GENERAL FEATURES .....	4
PHYSICAL FEATURES .....	4
ELECTRIC FEATURES .....	4
INSTALLATION .....	6
CONNECTIONS .....	6
CN1 - POWER SUPPLY CONNECTOR .....	6
CN3 - I <sup>2</sup> C BUS EXPANSION CONNECTOR .....	7
CN2 - TTL I/O CONNECTOR .....	8
CN4 - RS 232 SERIAL LINE CONNECTOR .....	10
CN5 - CAN SERIAL LINE CONNECTOR .....	11
POWER SUPPLY .....	12
RESET KEY .....	12
I/O CONNECTION .....	12
BUZZER .....	12
COLOURED BUTTONS .....	13
VISUAL FEEDBACK .....	13
JUMPERS .....	14
ELECTRIC DIAGRAM .....	16
APPENDIX A: ALPHABETICAL INDEX .....	A-1

# FIGURE INDEX

FIGURE 1: COMPONENTS MAP .....	3
FIGURE 2: CARD PHOTO .....	3
FIGURE 3: CARD OVERALL IMAGE .....	5
FIGURE 4: CN1 - POWER SUPPLY CONNECTOR .....	6
FIGURE 5: CN3 - I <sup>2</sup> C BUS EXPANSION CONNECTOR .....	7
FIGURE 6: CN2 - TTL I/O CONNECTOR .....	8
FIGURE 7: CORRESPONDANCE BETWEEN PINS OF CAN GMx AND CN2 .....	9
FIGURE 8: CN4 - RS 232 SERIAL LINE CONNECTOR .....	10
FIGURE 9: CN5 - CAN SERIAL LINE CONNECTOR .....	11
FIGURE 10: VISUAL FEEDBACK TABLE .....	13
FIGURE 11: JUMPERS SUMMARIZING TABLE .....	14
FIGURE 12: CARD IMAGE .....	15
FIGURE 13: JUMPERS, CONNECTORS, LEDs, BUTTONS, ETC. LOCATION .....	15
FIGURE 14: CAN GMT ELECTRIC DIAGRAM .....	16

## INTRODUCTION

The use of these devices has turned - IN EXCLUSIVE WAY - to specialized personnel.

The purpose of this handbook is to give the necessary information to the cognizant and sure use of the products. They are the result of a continual and systematic elaboration of data and technical tests saved and validated from the manufacturer, related to the inside modes of certainty and quality of the information.

The reported data are destined- IN EXCLUSIVE WAY- to specialized users, that can interact with the devices in safety conditions for the persons, for the machine and for the environment, impersonating an elementary diagnostic of breakdowns and of malfunction conditions by performing simple functional verify operations , in the height respect of the actual safety and health norms.

The informations for the installation, the assemblage, the dismantlement, the handling, the adjustment, the reparation and the contingent accessories, devices etc. installation are destined - and then executable - always and in exclusive way from specialized warned and educated personnel, or directly from the TECHNICAL AUTHORIZED ASSISTANCE, in the height respect of the manufacturer recommendations and the actual safety and health norms.

The devices can't be used outside a box. The user must always insert the cards in a container that respect the actual safety normative. The protection of this container is not threshold to the only atmospheric agents, but specially to mechanic, electric, magnetic, etc. ones.

To be on good terms with the products, is necessary guarantee legibility and conservation of the manual, also for future references. In case of deterioration or more easily for technical updates, consult the AUTHORIZED TECHNICAL ASSISTANCE directly.

To prevent problems during card utilization, it is a good practice to read carefully all the informations of this manual. After this reading, the user can use the general index and the alphabetical index, respectly at the begining and at the end of the manual, to find information in a faster and more easy way.

## CARD VERSION

The present handbook is reported to the **CAN GMT** card release **251001** and later. The validity of the bring informations is subordinate to the number of the card release. The user must always verify the correct correspondence among the two denotations. On the card the release number is present in more points both board printed diagram (serigraph) and printed circuit (for example between IC2 and the prototyping area both on the component side and on the solder side).

## GENERAL FEATURES

**CAN GMT** (Controller Area Network - **grifo**<sup>®</sup> MiniModule Test) is an experimental board based on **grifo**<sup>®</sup> MiniModules featuring 28 pins socket like **CAN GM1**, **GM2**, etc. (Controller Area Network - **grifo**<sup>®</sup> MiniModule **1**, **2**, etc.). It provided with a wide prototyping area that the user can employ to develop an own specific hardware to interface to I/O signals, in order to specialize the board for one's application. The prototyping area is also provided with items that allow to easy the prototype development (power supply in several positions, greater pods, etc.).

The presence of 6 coloured LEDs and 6 corresponding coloured push buttons connectable to as many TTL I/O signals of microcontroller allows the application to be built faster, in fact they let the developer probe very quickly the program internal status during debugging, detect error conditions or particular situations, etc. An autoscillating buzzer can be connected to another I/O signal of the microcontroller.

In addition, the board can support a double serial interface, RS 232 and CAN, to test the communication modalities of application program.

A wide range of demo programs and use examples allow an immediate use of the board.

Overall features are:

- 28 pins dual in line female socket (100 mils pitch, 600 mils width) capable to accomodate the modules type **CAN GM1**, **CAN GM2**, etc.
- Standard jack 2,1 mm power supply connector.
- Power supply section that accept an input voltage in the range **7÷12V AC or DC**, compatible with the greater part of low cost main adaptors.
- **LED** on +5 Vdc voltage, generated by power supply section.
- **RESET** push button.
- **Buzzer** for acoustic signal driven by CAN GMx module or by external signal.
- **LED** that shows status of **real time clock /INT** output signal on CAN GMx module.
- Screw driver connector with **I<sup>2</sup>C BUS** signals of CAN GMx module.
- DB9 female connector with **RS 232** serial line of CAN GMx module.
- DB9 male connector with **CAN line** of CAN GMx module (standard CIA: DS102).
- **16 TTL I/O lines** of CAN GMx module are connected to a low profile 20 pins connector with standard pin outs that can be used to directly manage the numerous **grifo**<sup>®</sup> cards.
- **Jumper** for connection of 120 ohm **termination** resistor, on **CAN** line.
- 6 push **buttons**, 6 **jumpers** and 6 **LEDs** suitable for setting, forcing and display the status of 6 TTL I/O lines of CAN GMx module.
- **Three colours LEDs** (red, yellow, green) to discriminate their functionality.
- **Pod** and jumper for **A/D reference voltage** connection of CAN GMx module.
- **Wide prototype area**, double sided with metallized holes, surrounded of pods that bring all the module signals and respective names.
- **Two mounting possibility**: layed on a plane surface through 4 rubber supports or bolt on each surfaces through 4 support holes, placed on the corner of the board.
- **Small dimension**: 100 x 120 x 30 mm.



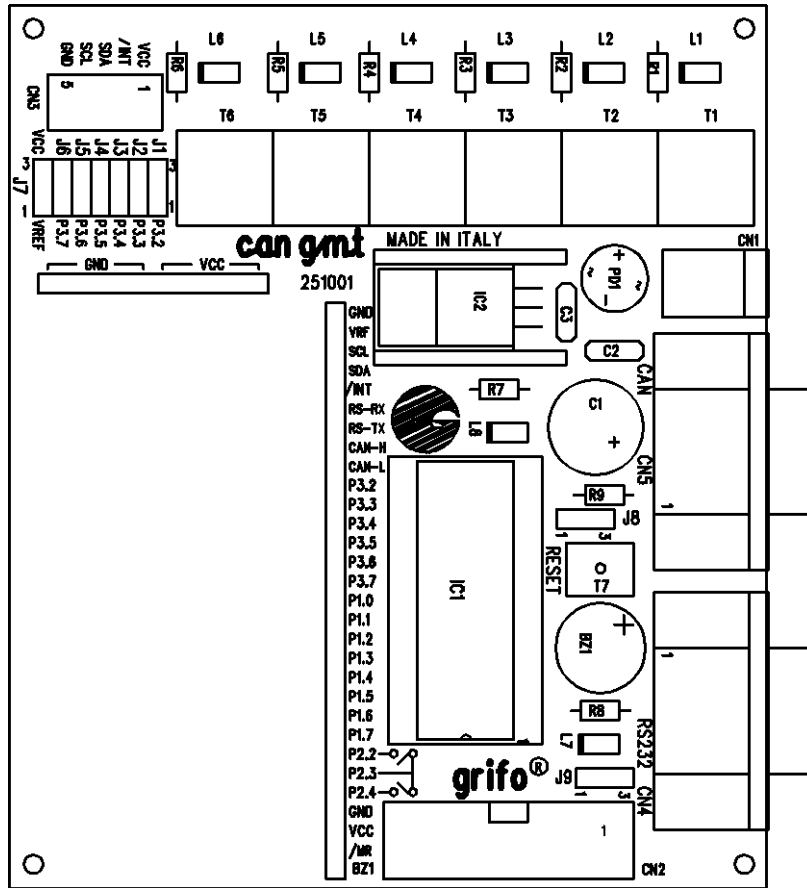


FIGURE 1: COMPONENTS MAP

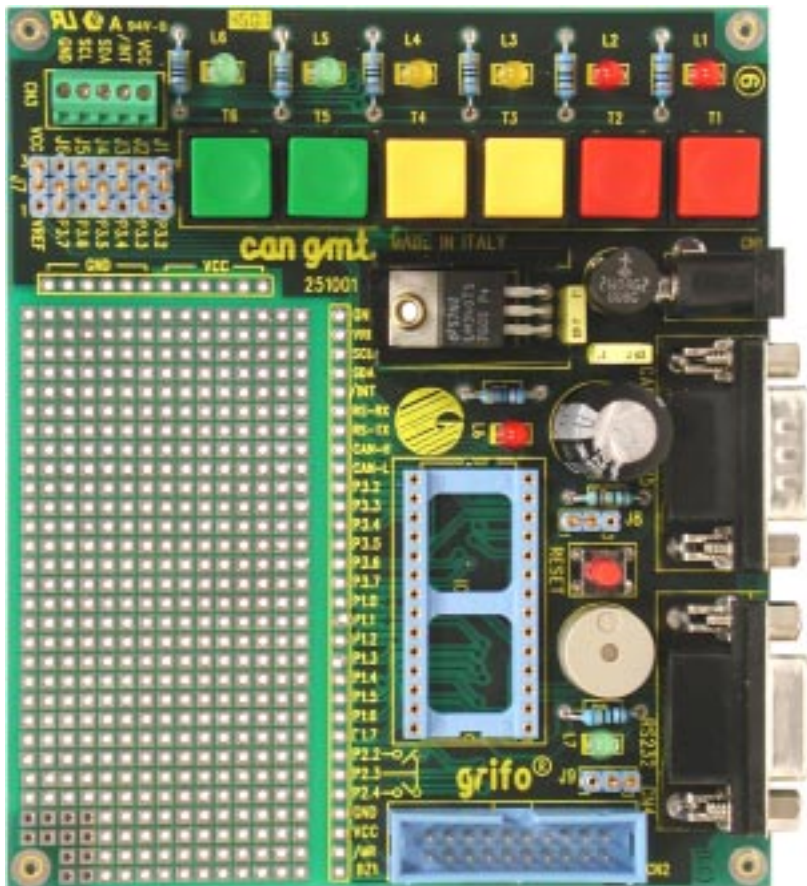


FIGURE 2: CARD PHOTO

## TECHNICAL FEATURES

### GENERAL FEATURES

**Devices:**

- 6 coloured push buttons
- 6 coloured LEDs
- 6 configuration jumpers for LEDs and buttons
- 1 buzzer
- 1 reset key
- 1 power supply section based on 7805
- 1 prototyping area
- 1 female socket 28 pin for **grifo**<sup>®</sup> MiniModules like **CAN GM1, CAN GM2**, ecc.

**CPU:** according to which **grifo**<sup>®</sup> MiniModule is installed

### PHYSICAL FEATURES

**Size:** 100 x 120 x 30 mm

**Weight:** 90 g

**Connectors:**

- CN1: PCB mounting socket
- CN2: 20 pins, male, vertical, low profile connector
- CN3: 5 pins PCB screw terminal connector
- CN4: 9 pins D type 90 degrees female
- CN5: 9 pins D type 90 degrees male

**Temperature range:** 0÷50 °C

**Relative humidity:** 20%÷90% (without condense)

### ELECTRIC FEATURES

**Power supply voltage:** 7÷12 Vac or 9÷16 Vdc (\*)

**Current available on +5 Vdc** 400 ma (\*)

**CAN termination net:** line termination = 124 Ω

(\*) Data reported are referred to a working temperature of 20° C.

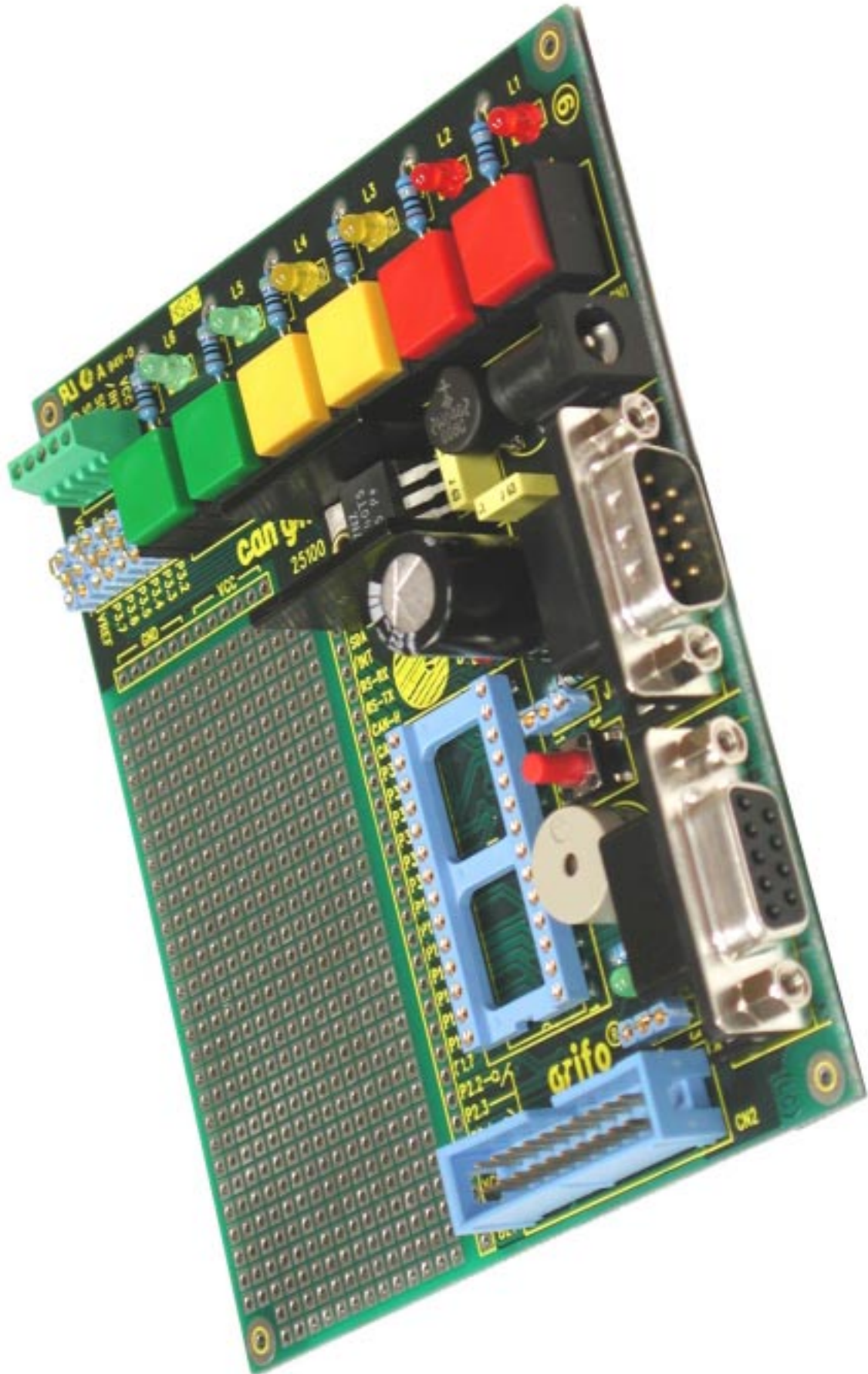


FIGURE 3: CARD OVERALL IMAGE

## INSTALLATION

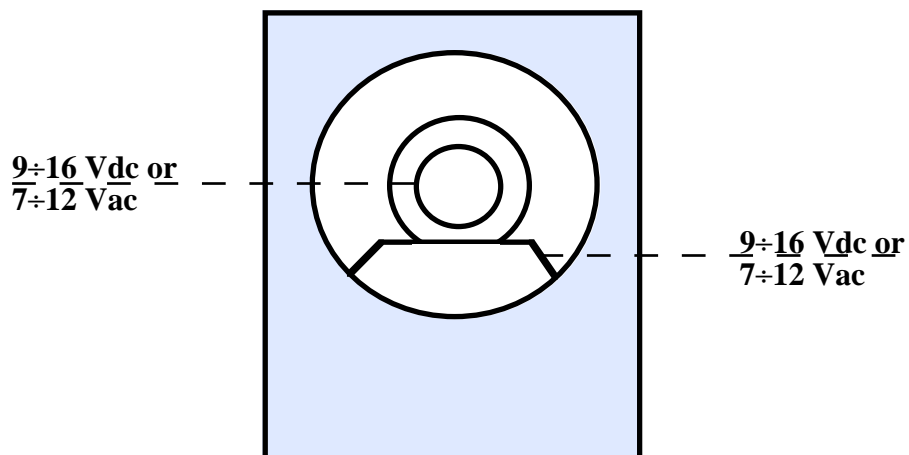
In this chapter there are the information for a right installation and correct use of the card. The user can find the location and functions of each connectors, jumpers, LEDs and some explanatory diagrams.

### CONNECTIONS

The **CAN GMT** module has 5 connectors that can be linkeded to other devices or directly to the field, according to system requirements. In this paragraph there are connectors pin out, a short signals description (including the signals direction) and connectors location (please refer to figure 13).

#### **CN1 - POWER SUPPLY CONNECTOR**

CN1 is a PCB mounting socket. The board supply voltage must be provided through this connector. Voltage in the range 7÷12 AC or 9÷16 DC, can be used; this means that any kind of inexpensive supply source (like cheap power supplies, transformers, etc.) can be employed to supply **CAN GMT**.



**FIGURE 4: CN1 - POWER SUPPLY CONNECTOR**

Signals description:

$7\div 12 \text{ Vac or } 9\div 16 \text{ Vdc}$  = I - Input for power supply in the range 7÷12 V AC or 9÷16 DC

## CN3 - I<sup>2</sup>C BUS EXPANSION CONNECTOR

CN3 is a 6 pins screw terminal connector, 2.54 mm pitch.

Through CN3 it is possible to use a standard interface to any I<sup>2</sup>C BUS device. The connector provides +5 Vdc and GND terminals generated by on board supply section to supply comfortably external devices or systems.

In addition the presence of I<sup>2</sup>C BUS signals and interrupt signal allow to drive indifferently peripherals both in polling and in interrupt mode.

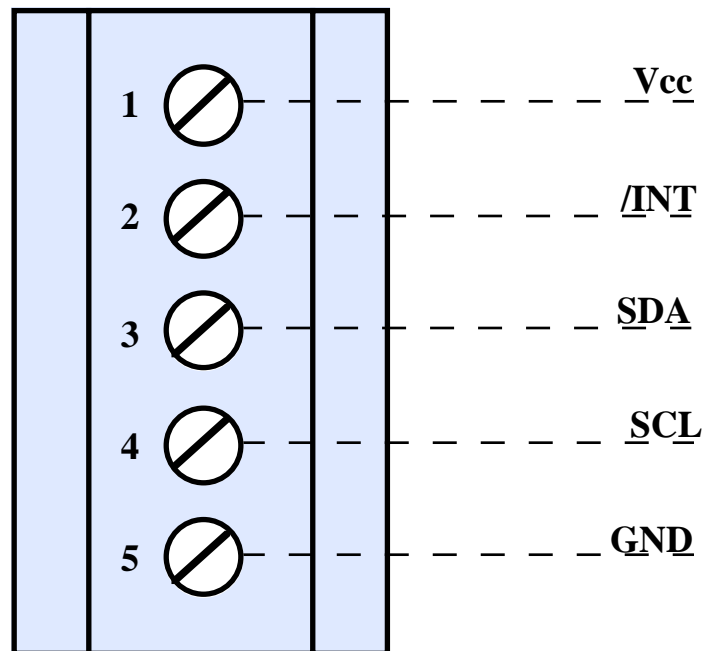


FIGURE 5: CN3 - I<sup>2</sup>C BUS EXPANSION CONNECTOR

Signals description:

<b>Vcc</b>	=	O	-	+5 Vdc generated by CAN GMT on board supply section
<b>/INT</b>	=	I	-	Interrupt signal
<b>SDA</b>	=	I/O	-	Bidirectional I <sup>2</sup> C BUS data signal
<b>SCL</b>	=	O	-	I <sup>2</sup> C BUS clock signal
<b>GND</b>	=	O	-	Ground for +5 Vdc generated by CAN GMT

## CN2 - TTL I/O CONNECTOR

CN2 is a 20 pins, male, vertical, low profile connector, 2.54 mm pitch. Through CN2 the **CAN GMx** module on board signals and the external world are connected.

As the signals may vary according to the MiniModule installed, the following figure shows the socket pin number connected to the connector pin number. The table in the following page describes the signal physically connected to CN2 according to the **CAN GMx** MiniModule installed.

There is also the correspondance to **I/O ABACO®** standard connector used on **grifo®** cards.

Signals layout has been designed to reduce noise and interference and so to warrant a good connection performance.

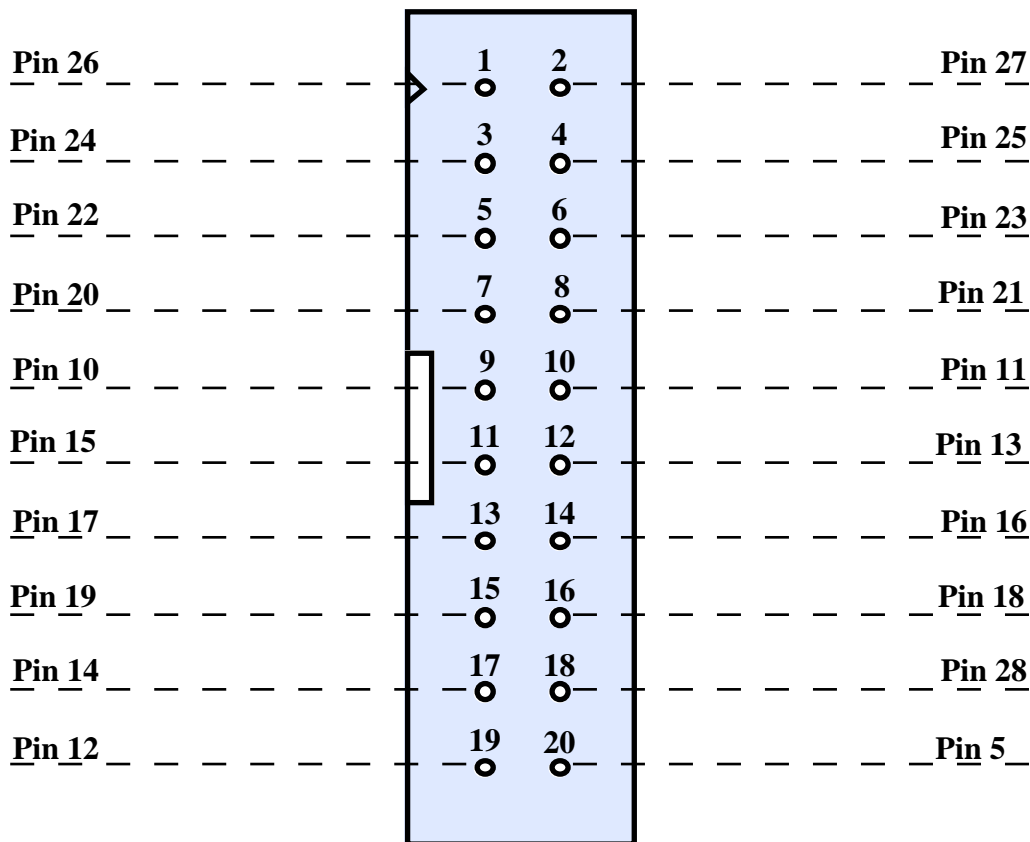


FIGURE 6: CN2 - TTL I/O CONNECTOR

Signals description:

Correspondance between pins of **CAN GMx** MiniModule installed on IC1 and signals available on CN2 is shown in following table.



PIN IC1	I/O ABACO®	CAN GM1	CAN GM2
27	PA.0	P1.0	P1.0
26	PA.1	P1.1	P1.1
25	PA.2	P1.2	P1.2
24	PA.3	P1.3	P1.3
23	PA.4	P1.4	P1.4
22	PA.5	P1.5	P1.5
21	PA.6	P1.6	P1.6
20	PA.7	P1.7	P1.7
19	PC.0	P3.2	P3.2
18	PC.1	P3.3	P3.3
17	PC.2	P3.4	P3.4
16	PC.3	P3.5	P3.5
15	PC.4	P3.6	P3.6
13	PC.5	P3.7	P3.7
10	PC.6	P2.4	DSW1.7
11	PC.7	P2.3	Common DSW1.7, 1.8
28	+5 Vdc	+5 Vdc	+5 Vdc
14	GND	GND	GND
12	-	P2.2	DSW1.8
5	-	/INT	/INT

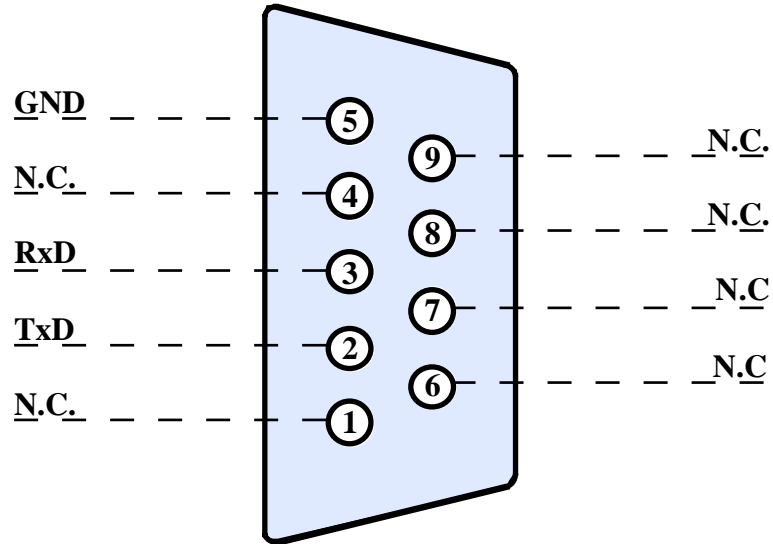
FIGURE 7: CORRESPONDANCE BETWEEN PINS OF CAN GMx AND CN2

**CN4 - RS 232 SERIAL LINE CONNECTOR**

CN4 is a 9 pins, female, D type connector, 90 degrees.

This connector is dedicated to RS 232 connection.

The electric protocol follows the CCITT normative and all the signals are placed in order to reduce interference and electrical noise and in order to simplify connection with other systems.



**FIGURE 8: CN4 - RS 232 SERIAL LINE CONNECTOR**

Signals description:

- RxD** = I - Serial line RS 232 Receive Data.
- TxD** = O - Serial line RS 232 Transmit Data.
- GND** = - Ground signal.
- N.C.** = - Not connected.

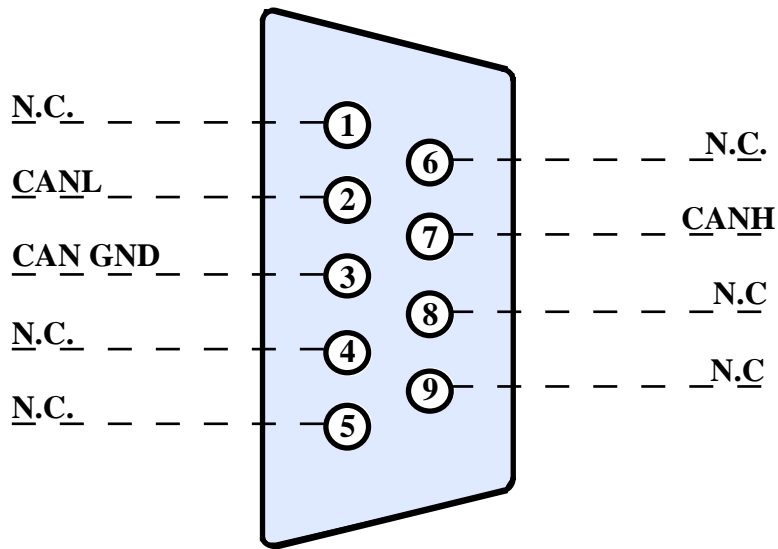


**CN5 - CAN SERIAL LINE CONNECTOR**

CN5 is a 9 pins, male, D type connector, 90 degrees.

This connector is dedicated to CAN connection.

The electric protocol follows the CCITT normative and all the signals are placed in order to reduce interference and electrical noise and in order to simplify connection with other systems.



**FIGURE 9: CN5 - CAN SERIAL LINE CONNECTOR**

Signals description:

- CANH** = I/O - Differential line high for CAN BUS
- CANL** = I/O - Differential line low for CAN BUS
- CAN GND** = - CAN ground signal.
- N.C.** = - Not connected.

**NOTE**

**CAN GMT** features a resistor to terminate CAN line.

Jumper J8 can insert it in the line or exclude it, in detail:

- J8 connected in 1-2 Termination resistor inserted
- J8 connected in 2-3 Termination resistor not inserted

## **POWER SUPPLY**

CAN GMT board is provided with an efficient circuitry that allows to solve in an efficient and comfortable way the problem to supply the board in any use condition.

This section is based on the famous and efficient 7805 that allows to supply the board with a voltage in the range 7÷12 Volt, both AC and DC, without any polarity distinction through the PCB mounting socket CN1. The presence of a diode rectifier between CN1 and 7805 creates a voltage difference of about 0.6 Volts between the ground of an eventual DC supply input and the +5 Vdc of CAN GMT.

## **RESET KEY**

T7 reset key of CAN GMT board allows the user to reset the CAN GMx MiniModule and restarting it in a general clearing condition.

The main purpose of this key is to come out of infinite loop conditions, useful especially during debug and develop phases, or to ensure a particular initial status. Please see figure 13 for an easy localization of this contact.

## **I/O CONNECTION**

To prevent possible connecting problems between CAN GMT and the external systems, the user has to read carefully the information of the previous paragraphs and he must follow these instructions:

- For RS 232 and CAN communication signals the user must follow the standard rules of these protocols.
- For all TTL signals the user must follow the rules of this electric standard. The connected digital signal must be always referred to card digital ground (GND). For TTL signals, the 0 Vdc level corresponds to logic state "0", while 5Vdc level corresponds to logic state "1".

## **BUZZER**

An autoscillatin capacitive buzzer is installed on CAN GMT, it generates a continuous sound at about 1 KHz by simply driving it with a CAN GMx TTL signal.

Connection is made on pin 5 of IC1 (please see figure 7 to know which microcontroller pin is connected). Jumper J9 allow to disconnect the pin of IC1 from the buzzer and to connect this latter to a pod of the prototyping area.

## COLOURED BUTTONS

**CANGMT** is provided with 6 buttons differentiated by their colour and connected to 6 corresponding LEDs with the same colour.

The purpose of this section is, for example, to set particular starting or working conditions of the application program, in addition to being able to perform demonstrations and analysis of any application system installed in the prototyping area, if jumpers from J1 to J6 are properly connected.

## VISUAL FEEDBACK

**CAN GMT** board is provided with eight LEDs:

LED	MEANING
L1	If ON, indicates that pin 19 of IC1 or pod P3.2 of prototyping area is at low level (zero volt) or that push button T1 is pressed.
L2	If ON, indicates that pin 18 of IC1 or pod P3.3 of prototyping area is at low level (zero volt) or that push button T2 is pressed.
L3	If ON, indicates that pin 17 of IC1 or pod P3.4 of prototyping area is at low level (zero volt) or that push button T3 is pressed.
L4	If ON, indicates that pin 16 of IC1 or pod P3.5 of prototyping area is at low level (zero volt) or that push button T4 is pressed.
L5	If ON, indicates that pin 15 of IC1 or pod P3.6 of prototyping area is at low level (zero volt) or that push button T5 is pressed..
L6	If ON, indicates that pin 13 of IC1 or pod P3.7 of prototyping area is at low level (zero volt) or that push button T6 is pressed.
L7	If ON, indicates the presence of +5 Vdc rectified supply.
L8	If ON, indicates that signal /INT (pin 20 of IC1) is activated (zero volt).

**FIGURE 10: VISUAL FEEDBACK TABLE**

The main purpose of these LEDs is to give a visual indication of the **CAN GMx** MiniModule status, making easier the operations of system working verify. To easily locate these LEDs on the board, please refer to figure 13.

Selection between signal on IC1 and prototyping area is made through jumpers J1÷J6, please see next paragraph for further information.

## JUMPERS

CAN GMT features 9 jumpers that allow to perform configurations of the board working modalities. Here follows their list, location and purpose according to their connection.

JUMPER	CONNECTION	PURPOSE	DEF.
J1	position 1-2	Connects pin 19 of IC1 to button T1 and LED L1.	*
	position 2-3	Connects pin 19 of IC1 to pod P3.2 of the prototyping area.	
J2	position 1-2	Connects pin 18 of IC1 to button T2 and LED L2.	*
	position 2-3	Connects pin 18 of IC1 to pod P3.3 of the prototyping area.	
J3	position 1-2	Connects pin 17 of IC1 to button T3 and LED L3.	*
	position 2-3	Connects pin 17 of IC1 to pod P3.4 of the prototyping area.	
J4	position 1-2	Connects pin 16 of IC1 to button T4 and LED L4.	*
	position 2-3	Connects pin 16 of IC1 to pod P3.5 of the prototyping area.	
J5	position 1-2	Connects pin 15 of IC1 to button T5 and LED L5.	*
	position 2-3	Connects pin 15 of IC1 to pod P3.6 of the prototyping area.	
J6	position 1-2	Connects pin 13 of IC1 to button T6 and LED L6.	*
	position 2-3	Connects pin 13 of IC1 to pod P3.7 of the prototyping area.	
J7	position 1-2	Connects pin 1 of IC1 to +5 Vdc.	*
	position 2-3	Connects pin 1 of IC1 to pod VRF.	
J8	position 1-2	Connects termination resistor to CAN line.	*
	position 2-3	Does not connect termination resistor to CAN line.	
J9	position 1-2	Connects pin 5 of IC1 to autoscillating buzzer.	*
	position 2-3	Connects pin 5 of IC1 to pod BZ1 in the prototyping area.	

FIGURE 11: JUMPERS SUMMARIZING TABLE

The \* means default connection.

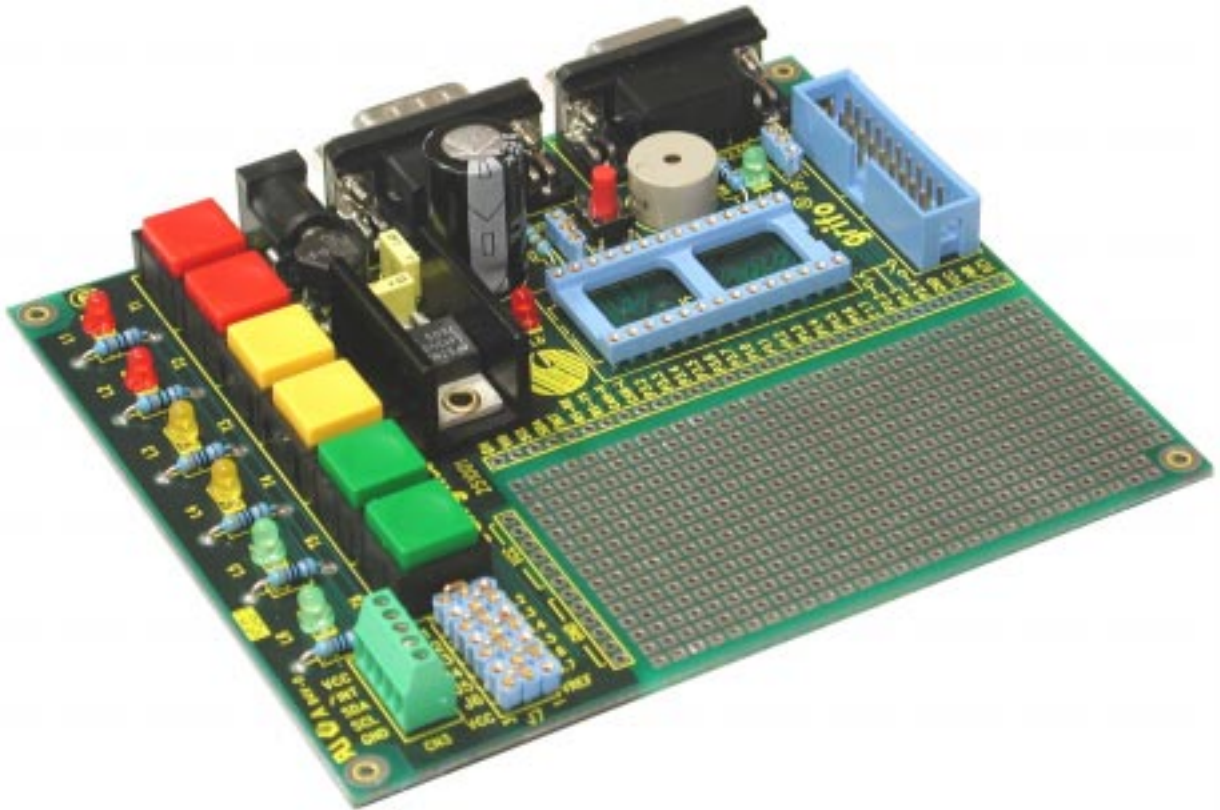


FIGURE 12: CARD IMAGE

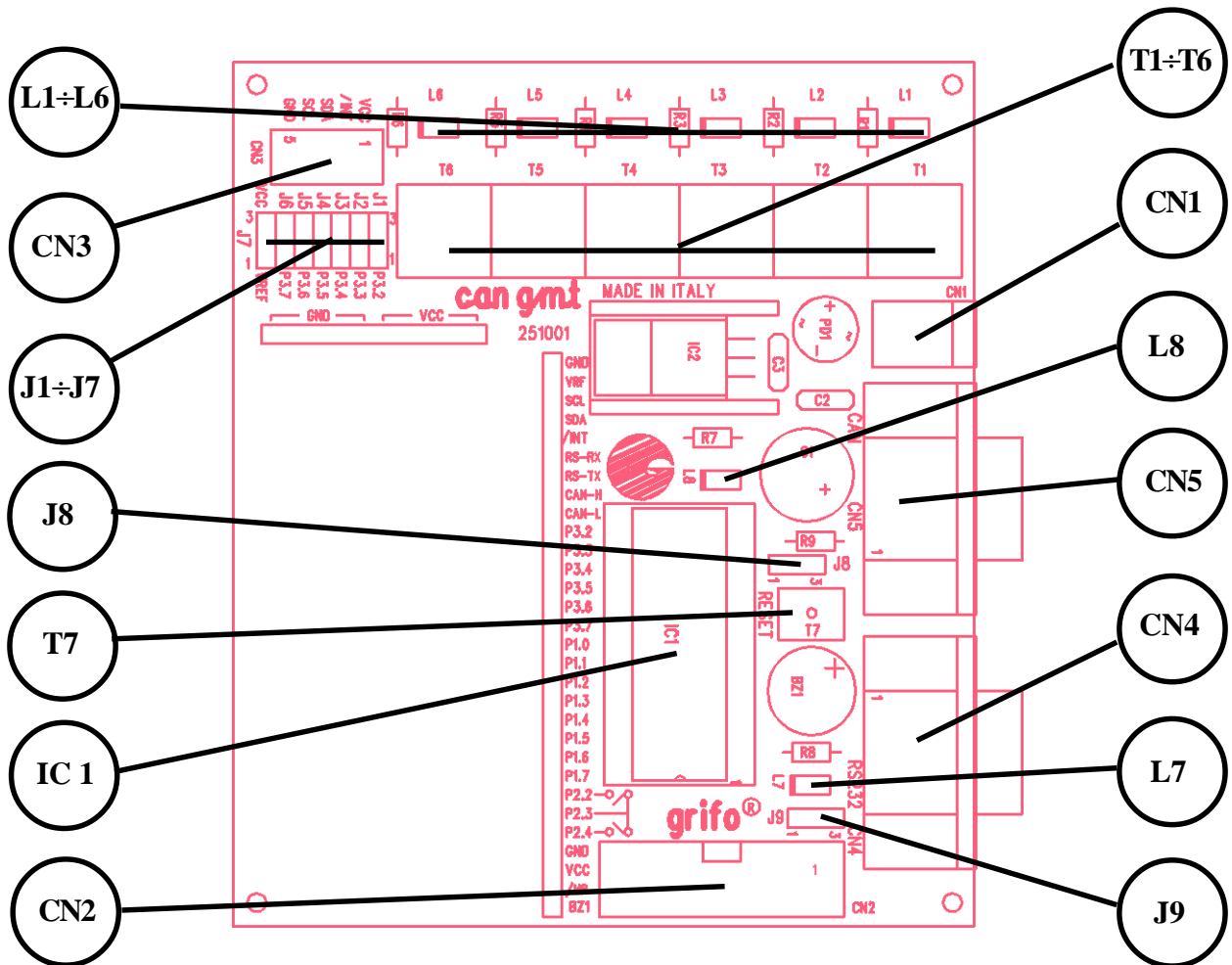


FIGURE 13: JUMPERS, CONNECTORS, LEDs, BUTTONS, ETC. LOCATION



## APPENDIX A: ALPHABETICAL INDEX

**SYMBOLS**

/INT 7  
7805 12

**B**

BUTTONS 4, 13, 14  
BUZZER 4, 12

**C**

CAN 12  
CAN CONNECTOR 11  
CAN GMX 4, 8, 12, 13  
CAN TERMINATION 4, 11  
CARD VERSION 1  
CONNECTOR 4  
  CN1 6  
  CN2 8  
  CN3 7  
  CN4 10  
  CN5 11  
CPU 4  
CURRENT AVAILABLE 4

**E**

ELECTRIC DIAGRAM 16

**I**

I/O 8  
I/O ABACO® 8  
I<sup>2</sup>C BUS 7

**J**

JUMPERS 13, 14

**L**

LEDS 4, 13, 14

**P**

POWER 4, 6, 12  
PROTOTYPING 4

**R**

RELATIVE HUMIDITY 4  
RESET 4, 12  
RS 232 10, 12

**S**

SCL 7  
SDA 7  
SIZE 4  
SUPPLY 4, 6, 12

**T**

TEMPERATURE RANGE 4  
TTL 8, 12

**W**

WEIGHT 4