Evluation board for Gate Driver Module 2RB010CB

■Overview

Evaluation board for Gate driver 2CG series/2DMB series.

The power module of the SiC MOSFET/IGBT can be driven simply by mounting a Gate resistor.

■Features

- Ideal for evaluation of 2CG series/2DMB series
- Gate voltage : Open (lead resistor mounting possible)
- Built-in DC5V regulator for Vcc (Vcc input voltage range: 13.5 to 26.4V)
- Additional circuit for DESAT protection
- Soft turn-off resistor : 50Ω

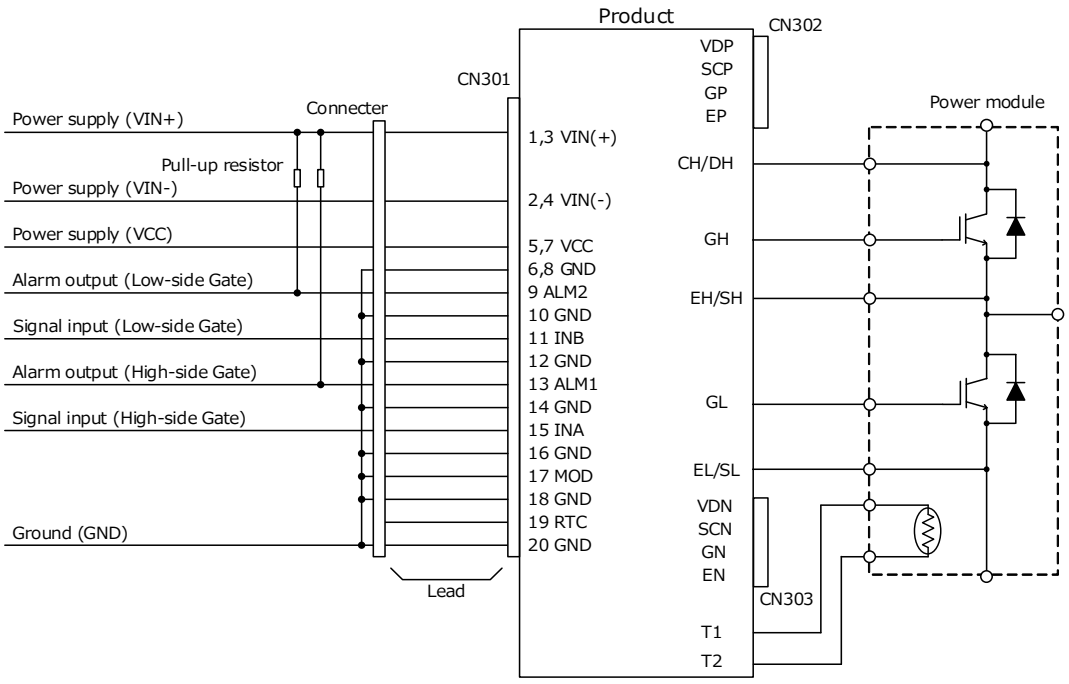
For more information on the 2CG series/2DMB series, please refer to the 2DMB series Datasheets and Application notes.

The example of application circuits and parts value which are indicated to this application note aim at assistance of a design.
Therefore, external parts variation or user operating conditions are not fully taken into consideration.
Please take parts variation, operating conditions into consideration when designing.

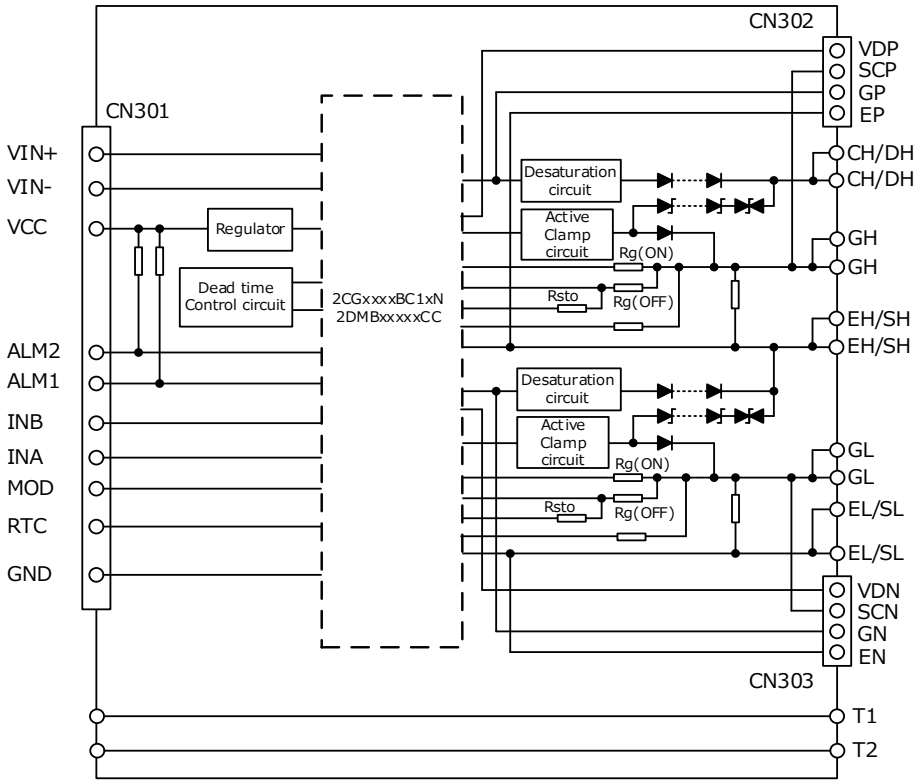
■Series information

Part number	Miller clamp	Active clamp	CN301	V_{SD}	Status
2RB010CB	None	None	Straight	10V	Active
2RB020BB	Yes	None	Right angle	5V	Active

■Circuit Image



■Internal Block Diagram



※2CGxxxxBC1xN and 2DMBxxxxCC is not implemented

■Pin Connection

Input

CN301 : RA-H201TD (JST)

Pin No.	Name	Function	Pin No.	Name	Function
1	VIN(+)	Power supply for DC/DC converter(+)	2	VIN(-)	Power supply for DC/DC converter(-)
3	VIN(+)	Power supply for DC/DC converter(+)	4	VIN(-)	Power supply for DC/DC converter(-)
5	VCC	Power supply for drive circuit	6	GND	Ground for drive circuit
7	VCC	Power supply for drive circuit	8	GND	Ground for drive circuit
9	ALM2	Alarm signal output 2 (Low side)	10	GND	Ground for drive circuit
11	INB	Control input B (Low side)	12	GND	Ground for drive circuit
13	ALM1	Alarm signal output 1 (High side)	14	GND	Ground for drive circuit
15	INA	Control input A (High side)	16	GND	Ground for drive circuit
17	MOD	Mode select	18	GND	Ground for drive circuit
19	RTC	Recovery time of protection circuit control	20	GND	Ground for drive circuit

※Reference receptacle : RA-S201T (JST)

Output

Connection on the power module

Name	CH	Function
CH/DH	1	Drain/Collector connection, High side
CH/DH	1	Drain/Collector connection, High side
GH	1	Gate connection, High side
GH	1	Gate connection, High side
EH/SH	1	Source/Emitter connection, High side
EH/SH	1	Source/Emitter connection, High side
GL	2	Gate connection, Low side
GL	2	Gate connection, Low side
EL/SL	2	Source/Emitter connection, Low side
T1	-	Thermistor pin connection
T2	-	Thermistor pin connection

CN302 : B4B-XH-2 (JST) For Gate connection

Pin No.	Name	Function
1	VDP	Output pin of DC/DC converter, High side
2	SCP	Short circuit detection pin, High side
3	GP	Gate connection, High side
4	EP	Source/Emitter connection, High side

※Reference receptacle : XHP-4 (JST)

CN303 : B4B-XH-2 (JST) For Gate connection

Pin No.	Name	Function
1	EN	Source/Emitter connection, Low side
2	GN	Gate connection, Low side
3	SCN	Short circuit detection pin, Low side
4	VDN	Output pin of DC/DC converter, Low side

※Reference receptacle : XHP-4 (JST)

■Absolute Maximum Ratings

Item		Symbol	Min	Max	Unit	Conditions・Note
Input voltage for Gate driver		V_{CC}	-0.3	28	Vdc	Between VCC to GND
Other input voltage		-	-	-	V	According to the data sheet of each model
Short circuit detection pin voltage		V_{SD}	0	1700	V	
Operating temperature range	V_{IN}=13.5-18V	T_{OP}	-40	85	℃	See the permissible frequency curve
	V_{IN}=18-26.4V	T_{OP}	-40	75	℃	
Operating humidity		RH_{OP}	20	95	%RH	No condensation
Storage temperature range		T_{STG}	-40	90	℃	
Storage humidity		RH_{STG}	5	95	%RH	No condensation

■Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions・Note
Input voltage range for gate driver	V_{CC}	13.5	26.4	Vdc	
Driver circuit number	N	-	2	-	

■Electrical Specification

Item	Symbol	Min	Typ	Max	Unit	Conditions・Note
Gate resistor	Rg(ON)	-	OPEN	-	Ω	No mounting / Lead resistor can be mounted.
	Rg(OFF)	-	OPEN	-		
Auxiliary gate capacitor	Cge	-	OPEN	-	nF	

■Protection

Item	Symbol	Min	Typ	Max	Unit	Conditions・Note
Short circuit detection voltage	V_{SD}	-	10	-	V	
Short circuit detection filter time	$t_{SHORTFIL}$	-	3.6	-	us	Collector open
Alarm signal response time	t_{ALM}	-	0.2	-	us	
Soft turn-off resistance	R_{STO}	-	10	-	Ω	

■Insulation

Item	Specification	Conditions・Note
-	-	According to the data sheet of each model

■Parts list

Input side

Symblo	Description	Part No.
C351,352	Capacitor	OPEN (SMD/1608)
C361,362	Capacitor	OPEN (SMD/1608)
R352,353	Resistor	OPEN (SMD/1608)
R355,356	Resistor	OPEN (SMD/1608)

Output side

Symblo	Description	Part No.	Manufacture
D301-303,320-323,340	Diode	CMF05	TOSHIBA
D304,324	Capacitor	RB160VAM-60	ROHM
C301,321	Capacitor	120pF 50V	MURATA
C302,322	Capacitor	OPEN (SMD/1608)	-
C307,327	Capacitor	OPEN (SMD/1608)	-
C308,328	Capacitor	OPEN(1608)	-
R301-304,321-324	Resistor	OPEN (Lead)	-
R305,306,325,326	Resistor	100Ω 0.25W(SMD/3216)	-
R307,327	Resistor	0Ω (SMD/1608)	-
R308,328	Resistor	10kΩ 0.125W(2012)	-
R309,329	Resistor	OPEN(1608)	-
R310,330	Resistor	100Ω 0.1W(SMD/1608)	-
R404,424	Resistor	OPEN(1608)	-
JC301,321	Resistor	OPEN (SMD/1608)	-

■Storage Conditions

Item	Min	Max	Unit	Conditions・Note
Storage temperature	-25	60	℃	A packing state

※If you want to use past the long period there is a concern that the solder non-wetting by terminal oxidation to occur.
Therefore, please use from taking enough tests.

■Recommended Soldering Condition

・Soldering condition of hand work : 360℃(MAX) Less than 5sec

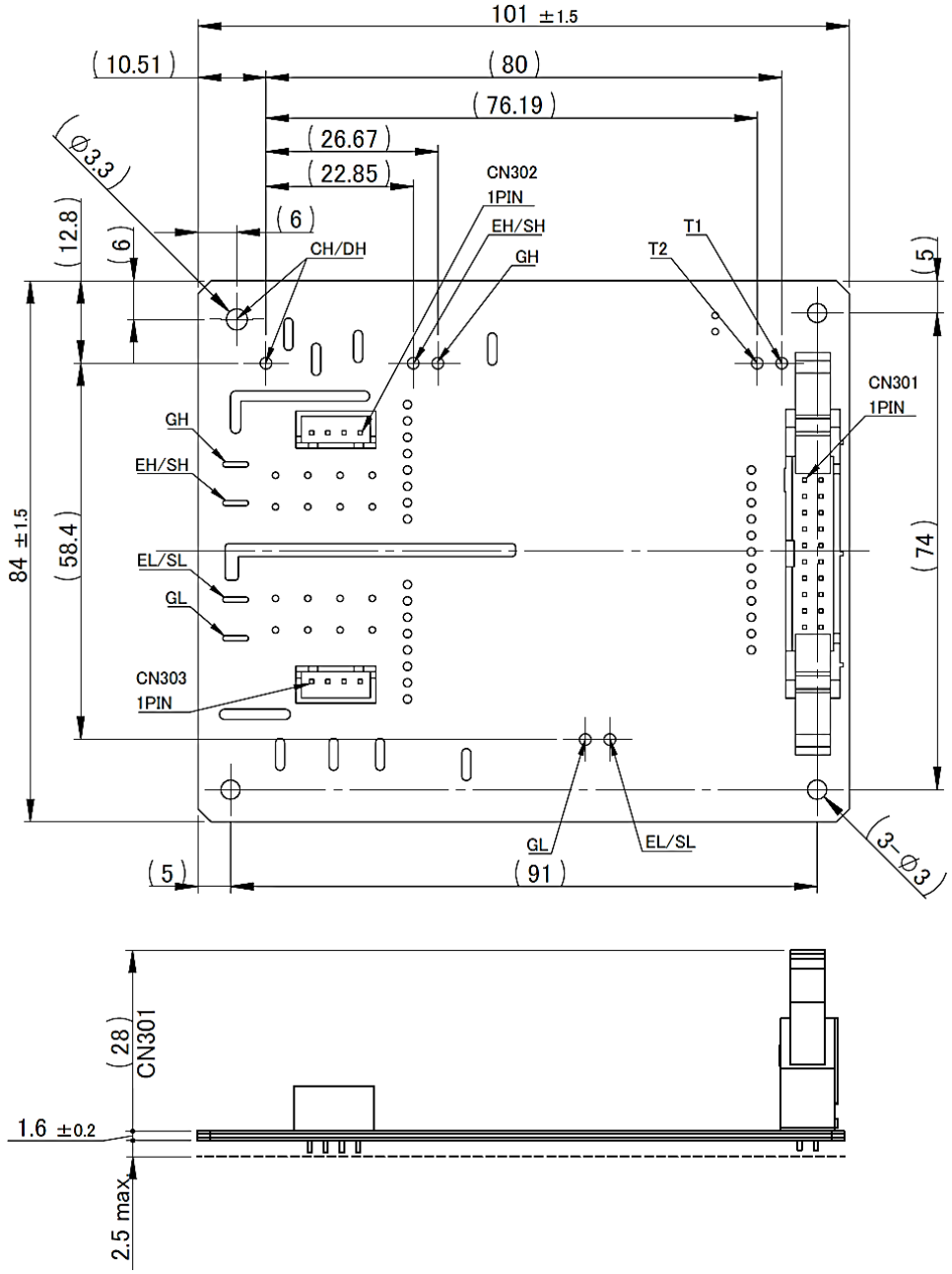
■Usage Cautions

- Make sure the rise/fall time of the input signal is 500ns or less.
  Also, keep input wiring as far as possible from noise sources.
  To prevent malfunction due to noise, a high signal voltage within the recommended range is recommended.

- Please do not apply excessive stress to this product when attaching to the device power module.

- This product has DESAT protection for arm short circuit and load short circuit protection.
  However, even if this protection works, the device may be damaged if abnormally high current occurs due to the device's characteristics variations or the load short-circuit mode during parallel operation.
  To ensure safety, be sure to check the short-circuit current at the unit in which this product is integrated,
  and evaluate whether it can protect under the condition that there is no damage to the device.

■Outline Dimensional Drawing



Unit: mm

Note: 1. The dimensional tolerance without directions is ± 0.5mm.

■Product Weight

34.0g(typ)

■Important Notice

- This information and product are subject to change without prior notice for the purpose of improvements, etc.
  Ensure that you are in possession of the most up-to-date information when using this product.

- The operation examples and circuit examples shown in this document are for reference purposes only, and TAMURA Corporation disclaims all responsibility for any violations of industrial property rights, intellectual property rights and any other rights owned by TAMURA Corporation or third parties that these may entail.

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- TAMURA has evaluated the efficiency and performance of this product in a usage environment determined by us.
  Depending on your usage environment or usage method, there is the possibility that this product will not perform sufficiently as shown in the specifications, or may malfunction.
  When applying this product to your devices or systems, please ensure that you conduct evaluations of their state when integrated with this product. You are responsible for judging its applicability.
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  - Use in liquids such as water, oil, chemical solutions, or organic solvents, and use in locations where the product will be exposed to such liquids.
  - Use that involves exposure to direct sunlight, outdoor exposure, or dusty conditions.
  - Use in locations where corrosive gases such as salt air, C12, H2S, NH3, SO2, or NO2, are present.
  - Use in environments with strong static electricity or electromagnetic radiation.
  - Use that involves placing inflammable material next to the product.
  - Use of this product either sealed with a resin filling or coated with resin.
  - Use of water or a water soluble detergent for flux cleaning.
  - Use in locations where condensation is liable to occur.

- This product is not designed to resist radiation.

- This product is not designed to be connected in series or parallel.
  Do not operate this product in a series, parallel, or N+1 redundant configuration.

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