

Gate Driver Unit 2EG01XCxN11N

■ Overview

2EG01XCxN11N is a dual channel gate driver designed for IGBT power module.
 This gate driver unit contains a built-in isolated DC/DC converter and gate drive circuit.
 After mounting the gate resistors, It is ready to use by mounting it on the IGBT power module.

■ Features

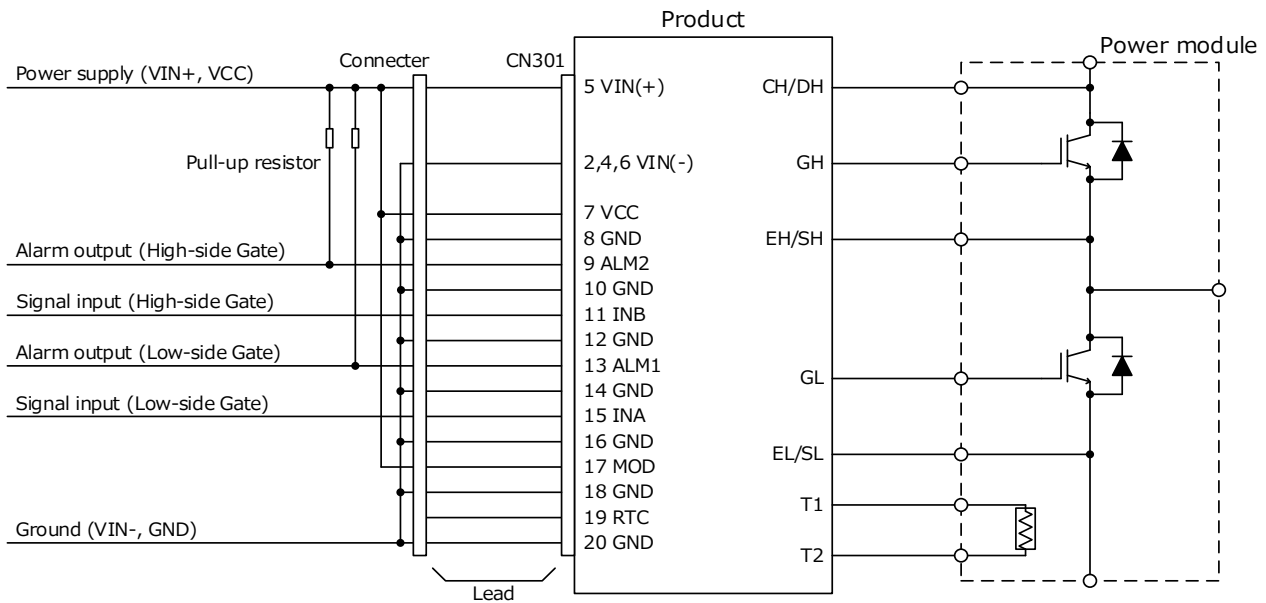
- Ideal for drive of IGBT Power module
- Gate voltage : +15V/-10V
- Gate resistor : Open (lead resistor mounting possible)
- Short circuit detection voltage : 10V(TYP)
- ALL-IN-ONE (Built-in isolated DC / DC converter and gate drive circuit)
- Low parasitic capacitance (12pF(TYP)) ; highly resistant to common-mode noise.
- Fast response : About 130nsec(typ)
- The isolation for primary-secondary signal used fast response isolator.
- Dielectric withstand voltage : AC5000V
- Insulation distance (clearance / creepage) : 14mm/16mm (As for Gate driver PCB) *Refer to P6 for details
- DC/DC converter input voltage : 13~28V
- Power supply for gate driver input voltage : 13~28V
- Signal input voltage : 3.3~15V or 15V
- Overload protection (DC/DC converter)
- Overheat protection (DC/DC converter)
- Desaturation protection (Gate drive circuit)
- Soft turn-off function (Gate drive circuit)
- Fault signal output function (Gate drive circuit)
- Under-voltage lockout(UVLO) (Gate drive circuit)
- Direct mode / Half bridge mode can be switched. (Gate drive circuit)
- Safety standards : UL508(file no.E243511) (DC/DC converter only)
- Reinforced isolation according to IEC 60664-1 (IEC61800-5-1, IEC62477-1, IEC62109-1, etc.)
- UL compliant (UL1741, UL508, etc.)

■ Application

Industrial inverter, power conditioner, etc.

■ Module information

Part number	Signal input voltage	Coating	Status
2EG01XCCN11N	3.3 to 15V	No	In development
2EG01XCDN11N	15V	No	In development

■ Circuit Image

■ Pin Connection

CN301 : RA-H201TD (JST)

Pin No.	Name	Function	Pin No.	Name	Function
1	N.C.	Unused	2	VIN(-)	Power supply for DC/DC converter(-)
3	N.C.	Unused	4	VIN(-)	Power supply for DC/DC converter(-)
5	VIN(+)	Power supply for DC/DC converter(+)	6	VIN(-)	Power supply for DC/DC converter(-)
7	VCC	Power supply for drive circuit	8	GND	Ground for drive circuit
9	ALM2	Alarm signal output 2 (High side)	10	GND	Ground for drive circuit
11	INB	Control input B (High side)	12	GND	Ground for drive circuit
13	ALM1	Alarm signal output 1 (Low side)	14	GND	Ground for drive circuit
15	INA	Control input A (Low 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)

Connection on the power module

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

■ Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Conditions · Note	
Input voltage for DC/DC converter	V_{IN}	-0.3	28	Vdc	Between $V_{IN}(+)$ to $V_{IN}(-)$	
Input voltage for Gate driver	V_{CC}	-0.3	28	Vdc	Between V_{CC} to GND	
Input-side signal voltage	V_{SG}	-0.3	$V_{CC}+0.3$ or 18 *	V	INA, INB *Whichever is less	
	V_{MOD}	-0.3	28	V	MOD	
	V_{RTC}	-0.3	5	V	RTC	
Maximum gate current	I_{GPEAK}	-	43	A		
Switching frequency	F_{SW}	-	100	kHz	See the permissible frequency curve	
Short circuit detection pin voltage	V_{SD}	0	1700	V		
Alarm signal output pin maximum voltage	V_{ALM}	-0.3	$V_{CC}+0.3$ or 28 *	V	ALM1,2 *Whichever is less	
Input-side signal maximum current	I_{ALM}	-	5	mA	ALM1,2	
Operating temperature range	$V_{IN}=13.5-18V$	T_{OP}	-40	85	°C	See the permissible frequency curve
	$V_{IN}=18-26.4V$	T_{OP}	-40	75	°C	
Operating humidity	RH_{OP}	20	95	%RH	No condensation	
Storage temperature range	T_{STG}	-40	90	°C		
Storage humidity	RH_{STG}	5	95	%RH	No condensation	

■ Recommended Operating Conditions

Item	Symbol	Min	Max	Unit	Conditions · Note
Input voltage range for DC/DC converter	V_{IN}	13.5	26.4	Vdc	
Input voltage range for gate driver	V_{CC}	13.5	26.4	Vdc	
Driver circuit number	N	-	2	-	
Maximum gate charge	Q_G	-	7000	nC	*1
Switching frequency ($Q_G=7000nC$)	F_{SW}	-	15.6	kHz	See the permissible frequency curve
MOD pin high input voltage	V_{MODH}	3.3	26.4	V	
MOD pin low input voltage	V_{MODL}	-0.3	0.5	V	
2EGxxxCx1xN					
Logic high level input voltage	V_{SGH}	3.3	$V_{CC}+0.3$ or 16 *	V	INA, INB *Whichever is less
Logic low level input voltage	V_{SGL}	-0.3	0.5	V	INA, INB
Source current of control signal	I_{SG}	3.2	-	mA	INA, INB $V_{SG}=15V$
2EGxxxDx1xN					
Logic high level input voltage	V_{SGH}	13	$V_{CC}+0.3$ or 16 *	V	INA, INB *Whichever is less
Logic low level input voltage	V_{SGL}	-0.3	0.5	V	INA, INB
Source current of control signal	I_{SG}	3.3	-	mA	INA, INB $V_{SG}=15V$

*1 If the gate charge exceeds the allowable value, the gate voltage at turn-on and turn-off will drop, which may affect the switching performance of the IGBT.

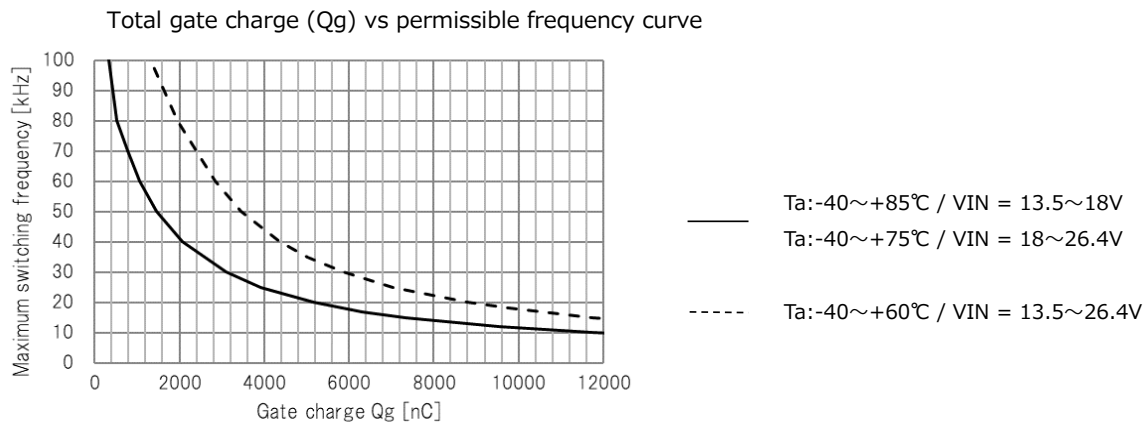
If you are considering using it under conditions other than the recommended conditions, please contact us.

■ Permissible frequency curve

Gate resistor power derating is not included.

Use the output power in a range with sufficient margin for the allowable power of the gate resistor.

Recommended resistor surface temperature : 120°C or less.


■ Electrical Specification (Vin=Vcc=15V.Ta=25°C, Unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Conditions · Note
DC/DC converter						
Start-up voltage	V _{START}	-	11.5	12.5	V	
Input current	I _{IN}	-	0.5	-	A	Fsw=15.6kHz / Test load: 280nF
Standby power	P _{STBY}	-	1.3	-	W	No load
Logic inputs for 2EGxxxCx1xN						
Logic high level input voltage	V _{SGH}	-	2.1	2.3	V	INA, INB / Guaranteed by design
Logic low level input voltage	V _{SGL}	1.0	1.2	-	V	INA, INB / Guaranteed by design
Logic pull-down resistance	R _{SGD}	-	4700	-	Ω	INA, INB
Logic inputs for 2EGxxxDx1xN						
Logic high level input voltage	V _{SGH}	-	10.4	11.4	V	INA, INB / Guaranteed by design
Logic low level input voltage	V _{SGL}	4.9	5.9	-	V	INA, INB / Guaranteed by design
Logic pull-down resistance	R _{SGD}	-	4500	-	Ω	INA, INB
Gate driver output						
Output pin voltage(High)	V _{OUTH}	14	15	16	V	No load
Output pin voltage(Low)	V _{OUTL}	-11	-10	-9	V	No load
Gate resistor	Rg(ON)	-	OPEN	-	Ω	No mounting / Lead resistor can be mounted.
	Rg(OFF)	-	OPEN	-		
Auxiliary gate capacitor	Cge	-	OPEN	-	nF	
Delay time	Turn ON time	t _{PON}	-	130	-	ns
	Turn OFF time	t _{POFF}	-	130	-	ns
Dead time	t _{DEAD}	-	3	-	us	Half bridge mode

■ Protection

Item	Symbol	Min	Typ	Max	Unit	Conditions · Note
DC/DC converter						
Overload protection	-	10.5	-	-	W	Auto recovery
Overheat protection	-	120	-	150	°C	Auto recovery, Internal temperature
Gate driver						
Output voltage(H) UVLO OFF voltage	V _{UVLOOH}	13.2	13.5	13.8	V	Guaranteed by design
Output voltage(H) UVLO ON voltage	V _{UVLOOL}	12.2	12.5	12.8	V	Guaranteed by design
Short circuit detection voltage	V _{SD}	-	10	-	V	
Short circuit detection filter time	t _{SHORTFIL}	-	3.9	-	us	Collector open
Alarm signal output L voltage	V _{ALML}	-	-	0.5	V	I _{ALM} =5mA
Alarm signal response time	t _{ALM}	-	0.2	-	us	
Restart time	t _{RESTART}	-	110	-	ms	
Soft turn-off resistance	R _{STO}	-	18	-	Ω	
Soft turn-off duration	t _{STO}	-	4	-	us	

■ Insulation

Item	Specification	Conditions · Note
Between Input-Output		
Dielectric withstand voltage	AC5000V	1min, Cutoff 2mA
Insulation resistance	100MΩ or more	DC500V
Partial discharge extinction voltage	1768Vpeak or more	According to EN50178/IEC 60270
Common-mode transient immunity (CMTI)	70kV/us	
Minimum clearance distances	14mm	As for Gate driver PCB
Minimum creepage distances	16mm	
Between Input-Output / IGBT device terminal - Gate driver PCB Input side		
Minimum clearance distances	15mm	Infineon / EconoDUAL package
Minimum creepage distances	16mm	
Minimum clearance distances	13.4mm	Mitsubishi electronics / NX_DX package
Minimum creepage distances	16mm	
Minimum clearance distances	12mm	Fuji electronics / M254,M285 package
Minimum creepage distances	16mm	
Between CH1-CH2		
Minimum clearance distances	7mm	Excluding electrical connections point
Minimum creepage distances	12mm	

■ Storage Conditions

Item	Min	Max	Unit	Conditions · Note
Storage temperature	-25	60	°C	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°C(MAX) Less than 5sec

■ Usage Cautions

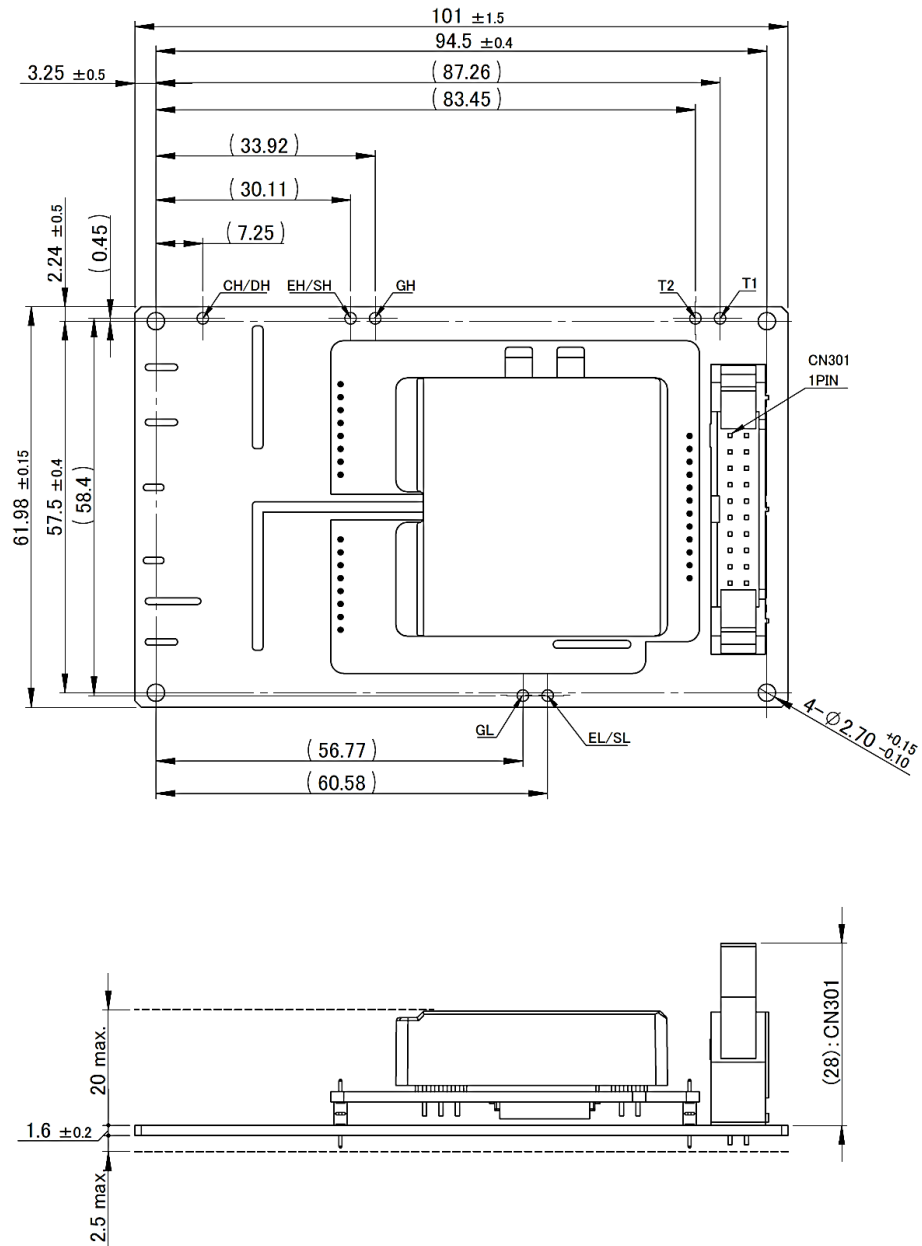
- Always mount fuse on the plus side of input for ensuring safety because the fuse is not built-in the product.
Please select the fuse considering conditions such as steady current, inrush current, and ambient temperature.
When using a fuse having large rated current or high capacity input electrolytic condenser, by combining another converter and input line and input electrolytic condenser, fuse may not blow off in the case of abnormality.
Do not combine high voltage line and fuse.

- 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 IGBT power module.

- This product has DESAT protection for arm short circuit and load short circuit protection.
However, even if this protection works, the IGBT may be damaged if abnormally high current occurs due to IGBT'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 IGBT.

■ Outline Dimensional Drawing



Unit: mm

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

■ Product Weight

72.0g(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.
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 - 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.
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