

Data Sheet

GU-LCIGBT-RY-V2-0x

Part No.: AA-10356-00x

Optical Input / Output: Glass Fiber or Plastic (POF)



Picture shows AA-10355-001 (Glass Fiber)


Trigger Generator for series connected IGBTs

Features

- For Series Connected IGBTs
- For Simultaneous Triggering
- Compact Design
- Immune to external EM Fields
- Optical Trigger Input Glass Fiber or Plastic (POF)
- Optical Status Feedback Glass Fiber or Plastic (POF)

Rev.	Remarks / changes	created		checked		released	
01	Initial	AST	10.10.13				
02	Changed some numbers	AST	17.10.13				
03	Clarified some entries	AST	30.10.13				

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1. Introduction

1.1. Description

The Trigger Generator AA-10356-002 is used to generate a turn-on gate pulse for series connected IGBTs. An inductive coupling using a high voltage isolated closed loop cable ensures the triggering of the IGBTs at different potential levels. See also Order code.

1.2. Electrical interfaces

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Auxiliary power	V_{Sup_aux}	AC, f=50/60Hz	18	40	48	VAC
	V_{Sup_aux}	DC	26	28	72	VDC
Auxiliary power consumption	P	Depends on repetition rate f	15	-	40	W
Trigger repetition rate	F	-	-	-	1000	Hz
Delay time ON	T_{on}	-	-	-	1.0	μ s
Delay time OFF	T_{OFF}	-	-	-	1.0	μ s
Emergency OFF	$T_{EmergencyOFF}$	-	-	-	10	μ s
Max number of connected IGBTs	N	-	-	-	-	Pcs ¹⁾

¹⁾ contact factory for more information

1.3. Optical interfaces

1.3.1. Optical Control Signal (CS)

AA-10356-001 GU-LCIGBT-RY-V2-01 Glass Fiber

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Control signal CS power hi	P_{Inp_high}	HFBR-2412	-9.2	-	-	dBm
Control signal CS power lo	P_{Inp_low}	HFBR-2412	-	-	-40	dBm

AA-10356-002 GU-LCIGBT-RY-V2-02 Plastic (POF)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Control signal CS power hi	P_{Inp_high}	HFBR-2528 (Avago)	-20	-	-	dBm
Control signal CS power lo	P_{Inp_low}	HFBR-2528 (Avago)	-	-	-42	dBm

1.3.2. Optical Status Feedback (SF1, SF2)

AA-10356-001 GU-LCIGBT-RY-V2-01 Glass Fiber

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Optical feedback SFx power hi ¹⁾	P_{Out_high}	HFBR-1414	-10	-	-	dBm
Optical feedback SFx power lo ¹⁾	P_{Out_low}	HFBR-1414	-	-	-40	dBm

AA-10356-002 GU-LCIGBT-RY-V2-02 Plastic (POF)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Optical feedback SFx power hi ¹⁾	P_{Out_high}	HFBR-1528 (Avago)	-20	-	-	dBm
Optical feedback SFx power lo ¹⁾	P_{Out_low}	HFBR-1528 (Avago)	-	-	-40	dBm

¹⁾ For 1m optical cable

1.4. Environmental conditions

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Ambient temperature	T _{amb}	-	-25	-	+60	°C
Storage temperature	T _{store}	-	-25	-	+85	°C
Humidity	Hum	Non condensing	-	-	95	% RH
Operating altitude	Alt	-			3000	m

2. Connectors and indicators



The Trigger Generator GU-LCIGBT-RY-V2xxx has a dangerous output voltage of at least 80V.
 - Do not open the Trigger Generator housing when it is powered
 - No wiring to be done when the Trigger Generator is powered

2.1. Connectors (POF model)

Parameter	Symbol	Description
Optical control signal	CS	HFBR-2528Z (Avago) /
Plug type on optical cable customer side	CS	HFBR-4532 (Avago)
Optical status feedback transmitter	SF1, SF2	HFBR-1528Z (Avago)
Plug type on optical cable customer side	SF1, SF2	HFBR-4532 (Avago)

2.2. Connectors (ST model)

Parameter	Symbol	Description
Optical control signal	CS	HFBR-2412Z (Avago) /
Plug type on optical cable customer side	CS	01-H200/VJZ-D26
Optical status feedback transmitter	SF1, SF2	HFBR-1414Z (Avago)
Plug type on optical cable customer side	SF1, SF2	01-H200/VJZ-D26

2.3. Terminal Block

Parameter	Symbol	Description
Electrical output	1,2	1 is near GND / 2 on potential (~VinDC)

2.4. Indicators

Parameter	Symbol	Description
LED (yellow)	CS_LED	Lit when CS is P _{INP_High} Dark when CS is P _{INP_Low}
LED (green)	SF2_LED	Lit when the trigger generator is ready Dark when the trigger generator is not ready

3. Function

3.1. Instructions for use

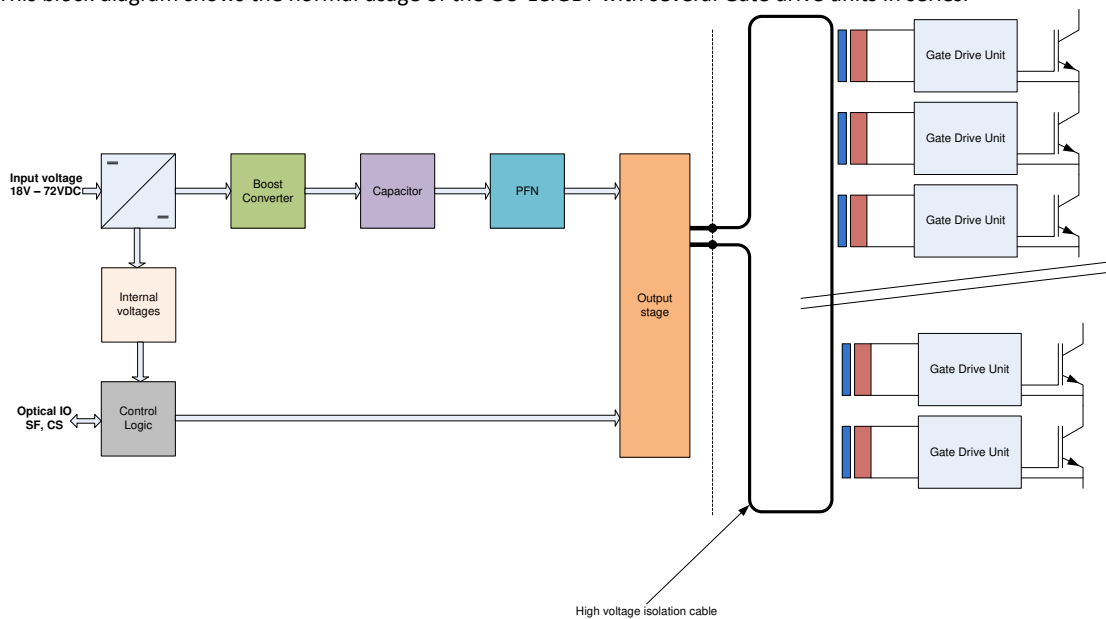
- Make sure that the device works correctly before using in a critical application.
- Consult the according datasheet for the correct optical power for the application you want to operate with this device

3.2. Principal design

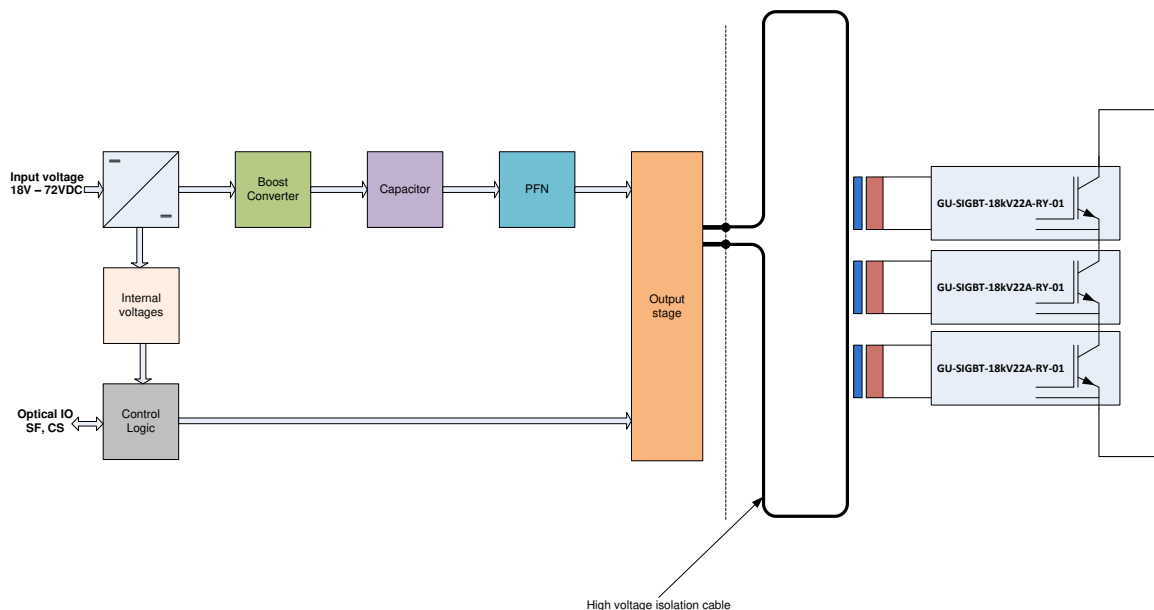
The GU-LCIGBT uses a special princip for switching ON and OFF the series connected IGBT's. In normal cases one needs as much isolated Gate Drive Units (GDU) as one has IGBT's in series. Each GDU needs then one isolation transformer for the power supply as well as one input (normally optical) for triggering. In the case of the "HV Switch 18kV/22A" we use an inductive approach to transfer the energy as well as the information if the switch has to be ON or OFF via one wire.

3.3. Block diagram

This block diagram shows the normal usage of the GU-LCIGBT with several Gate drive units in series.



The other usage is to use the GU-SIGBT-18kV22A-RY-01 as a "building block" with which one has the possibility to make a switch for up to 50kV. Every GU-SIGBT-18kV22A-RY-01 can switch up to 18kV@22A continuously with 1kHz.

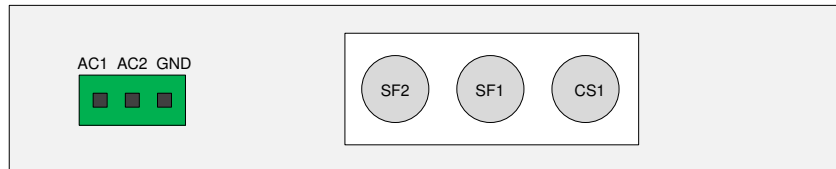


Inductive couplings and HV cable do not belong to scope of supply. To be ordered separately.



3.4. Power supply and optical IO

Input AC1 or AC2. GND must be wired to the protective earth. If DC input is used, connect PLUS to AC1, MINUS to AC2 and GND also to protective EARTH.



3.5. Timing diagrams

- Control signal -Trigger input from external source
- SF1 - shows the active period of the GU-LCIGBT (inverted CS)
- SF2 - shows the vital state of the Gate drive unit. Check before trigger. If there is no light the GU-LCIGBT has a major problem and triggering is NOT allowed. This signal can change anytime. So check this signal always to see that the GDU is still working properly.
- Output - Current output to inductive coupling

An active "high" control signal means that the switch is closed. Spoken in the meaning of the light input: LIGHT means switch is closed and current can flow.

3.5.1. Trigger pulse < 400ns

If the pulse on the control signal input has duration of less than 400ns no output pulse will be generated.

- Control signal -Trigger input from external source
- SF1 - shows the active period of the GU-LCIGBT (inverted CS)
- SF2 - shows the vital state of the Gate drive unit. Check before trigger. If there is no light the GU-LCIGBT has a major problem and triggering is NOT allowed. This signal can change anytime. So check this signal always to see that the GDU is still working properly.
- Output - Current output to inductive coupling

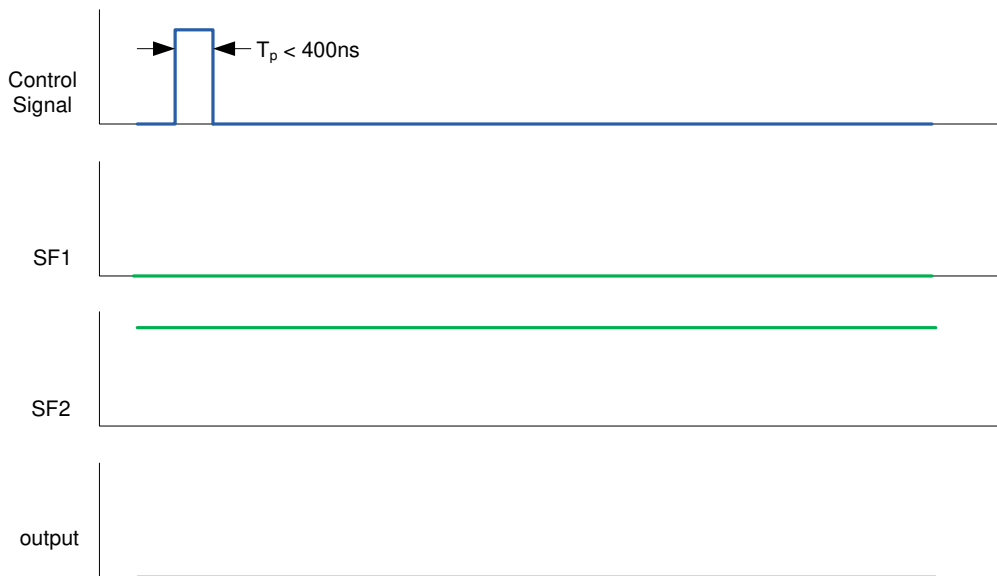


Fig. 1: Trigger pulse < 400ns

3.5.2. 400ns < Trigger pulse < 1ms

If the pulse duration lies between the minimum acceptable duration and 1ms the following output is generated.

- Control signal -Trigger input from external source
- SF1 - shows the active period of the GU-LCIGBT (inverted CS)
- SF2 - shows the vital state of the Gate drive unit. Check before trigger. If there is no light the GU-LCIGBT has a major problem and triggering is NOT allowed. This signal can change anytime. So check this signal always to see that the GDU is still working properly.
- Output - Current output to inductive coupling

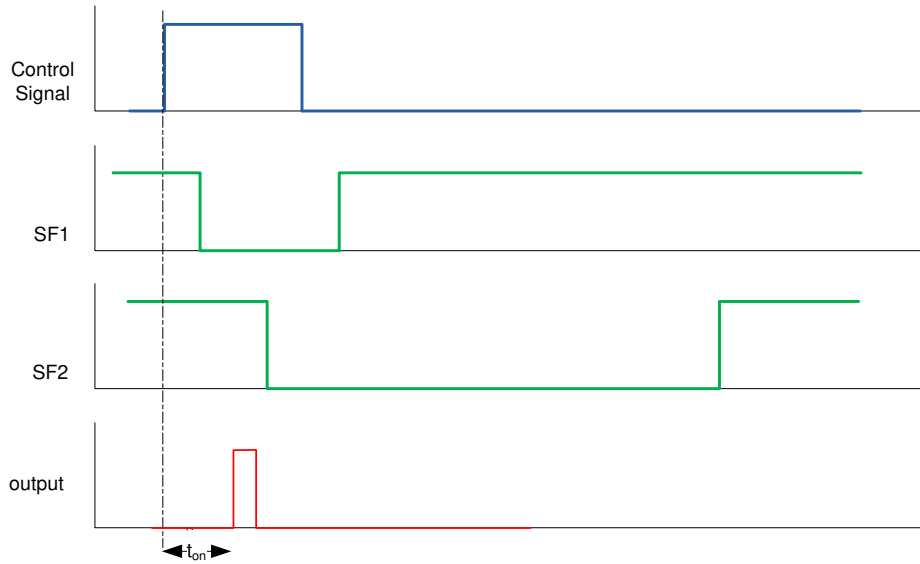


Fig. 2: 400ns < Trigger pulse < 1ms

3.5.3. Trigger pulse > 1ms

If the trigger pulse lasts longer than 1ms on the optical input there will be a post trigger every 1ms as long as the trigger input sees light (is in the On State). This is due the fact that the supply of the IGBT's must be recharged. The delay time t_{on} is below one micro second. SF1 indicates with a short pulse that the GDU is recharging the Switch.

- Control signal -Trigger input from external source
- SF1 - shows the active period of the GU-LCIGBT (inverted CS)
- SF2 - shows the vital state of the Gate drive unit. Check before trigger. If there is no light the GU-LCIGBT has a major problem and triggering is NOT allowed. This signal can change anytime. So check this signal always to see that the GDU is still working properly.
- Output - Current output to inductive coupling

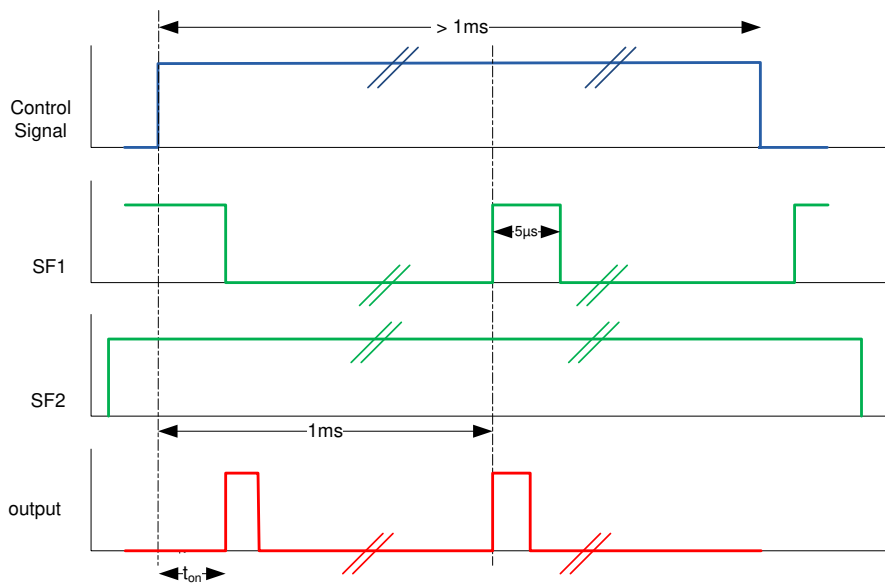
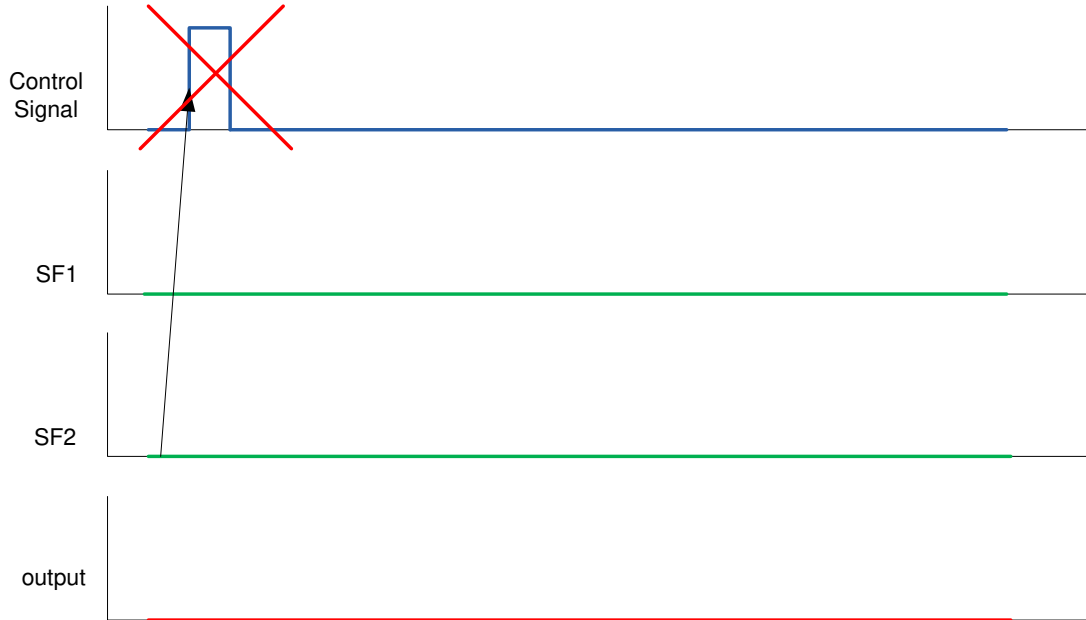


Fig. 3: Trigger pulse > 1ms

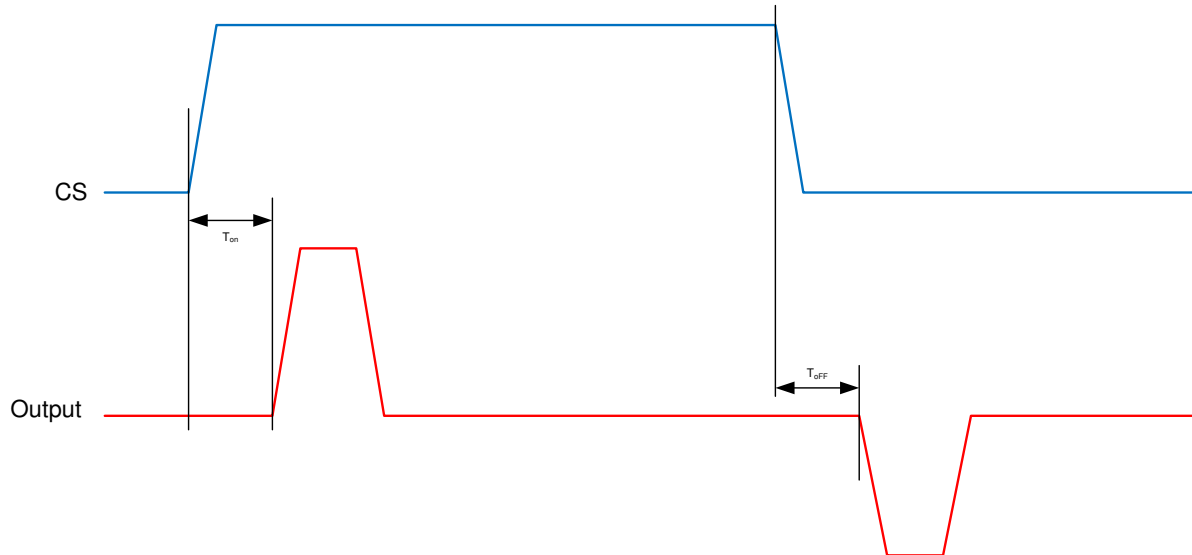
3.5.4. SF2 inactive (no light)

If SF2 is inactive (no light) there is a major problem in the GU-LCIGBT (eg. Pulse voltage Generator, power supply or logic defective). If so, triggering in this state is prohibited. If you do it anyway there will be NO output generated.



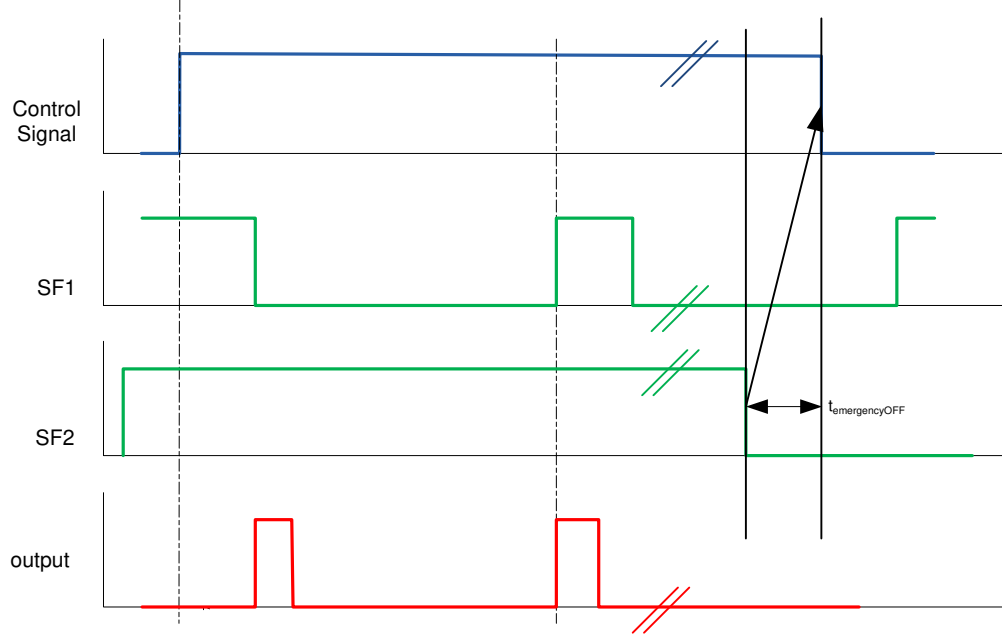
3.5.5. ON – OFF diagram

The diagram below shows a simplified ON – OFF cycle. The output is the current in the loop through the switches.



3.5.6. Emergency OFF

In case of an error (SF2 = NO Light) the GDU must be switched off regarding the $T_{EmergencyOFF}$ time.

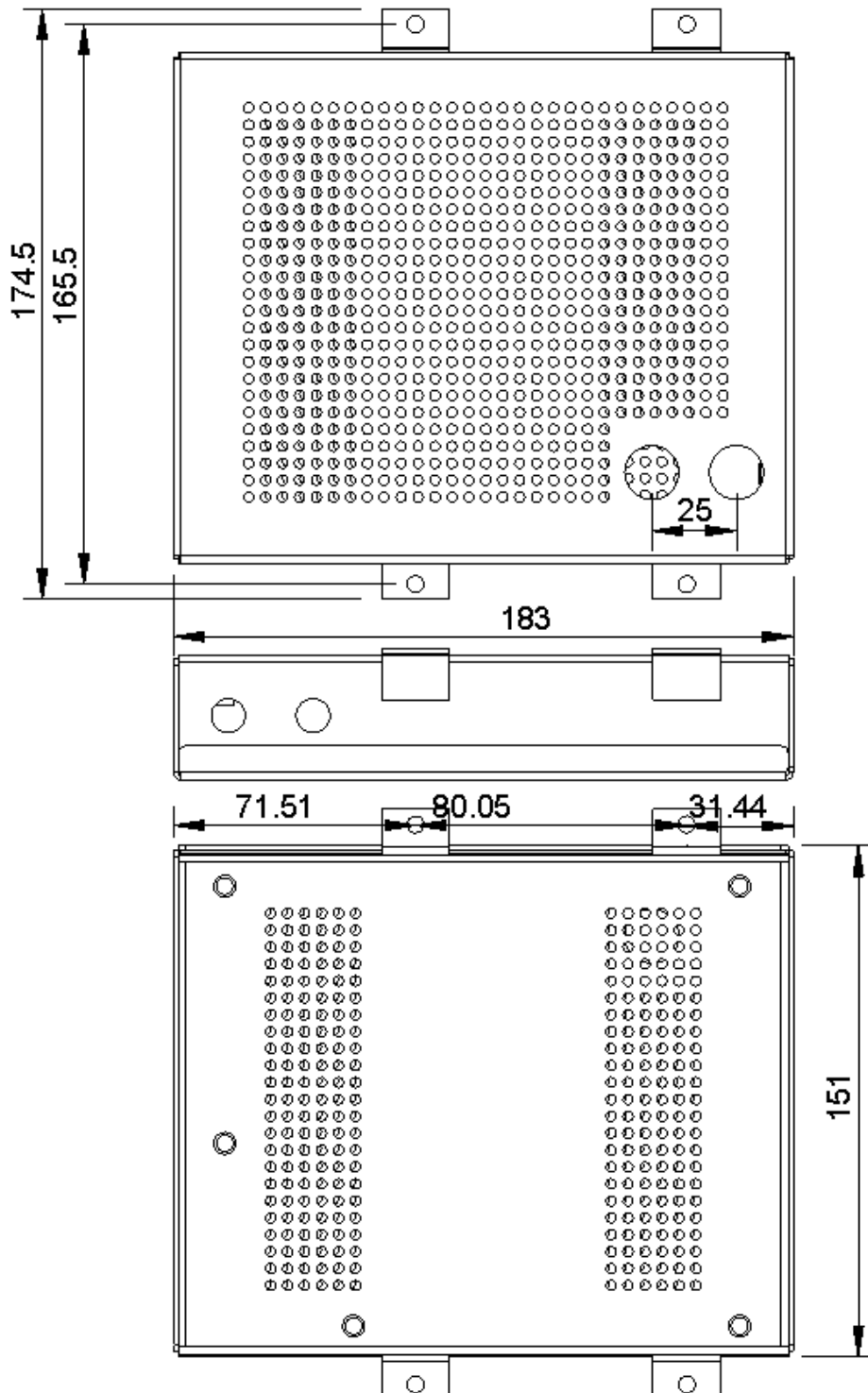


4. Mechanical

4.1. Parameters

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Weight	m	-		0.9		kg
Dimensions	WxDxH	-	(174.5 x 183 x 40)			mm

4.2. Mechanical Drawing





4.3. Labels

4.3.1. Front side

- Nothing

4.3.2. Rear side

- Nothing

4.3.3. Bottom side

- Type label with serial number

4.3.4. Top side

- Terminal (1, 2)
- CS
- SF1, SF2
- Aux. power

5. Order code

AA-10356-001

GU-LCIGBT-RY-V1-01 Optical Input / Output Glass Fiber

AA-10356-002

GU-LCIGBT-RY-V1-02 Optical Input / Output Plastic POF

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