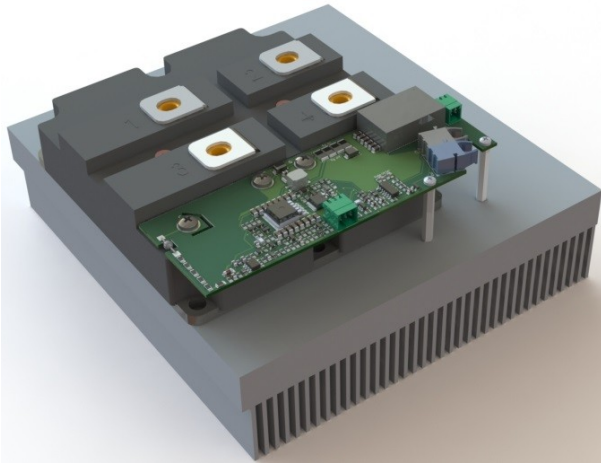




Typical application

- Converters for solar and wind energy
- Uninterruptible Power Supply (UPS)
- Electric transport
- Frequency converter
- Active rectifiers

MI130-17-O-1 one-channel plug and play IGBT driver designed for IGBT modules type MIHM and MISM voltage up to 1700 V.

Features

- One channel IGBT driver
- Drives IGBTs up to $V_{CE} = 1700V$
- Gate peak current $I_{OUT} \pm 30 A$
- Gate output voltage $V_{OUT} +15/-9 V$
- Optical control interface
- Isolation testing voltage 4 kV AC
- Frequency PWM up to 20 kHz
- IGBT short-circuit protection with soft switch-off
- Power-supply monitoring (UVLO)
- Compact design 147x50x12 mm

Maximum rated values

Definition	Symbol	Conditions	Value	Unit
Supply voltage V_{CC}	U_{SUP}		15.5	V
Logic input voltage	$U_{IN_A/B}$		15.5	V
Gate peak current	I_{OUT}		± 30	A
Frequency PWM	f_{SW}	Gate charge $Q_G = 7150 \mu C$	20	kHz
Isolation voltage	U_{ISOL}	First to second side, 60 sec	4000	V rms
Output power	P_{OUT}	For 1 channel	3.6	W
dV/dt	dU/dt	Rate of change of input to output voltage	50	kV/ μs
DC-link voltage	U_{DC}		1100	V
Collector-Emitter voltage	U_{CE}		1700	V
Operating temperature	T_{OP}		-40...+85	°C
Storage temperature	T_{STOR}		-40...+85	°C

Characteristics

Definition	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Supply voltage V_{CC}	U_{SUP}		14.5	15	15.5	V
UVLO threshold	U_{UVLO}	Switch-off threshold 13.7 V Switch-on threshold 14.3 V	13.7		14.3	V
Supply current I_{CC}	$I_{S(idle)}$	Without load		240		mA
Average supply current	$I_{S(max)}$	$f_{SW} = 20 \text{ kHz}$ $Q_G = 7150 \text{ nC}$		690		mA
Turn-on output voltage	$U_{G(on)}$			15		V
Turn-off output voltage	$U_{G(off)}$			-9		V
The wavelength used in transmitting and receiving the signal	λ			660		nm
V_{CE} monitoring threshold	$U_{CE(ref)}$			9		V
Response time	$t_{bl(VCE)}$			8		μs
Error signal activation delay time	t_{bton}			500		ns
Channel control lockout time	t_{btoff}		1		1.5	ms



Definition	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Turn-on gate resistor	$R_{G(on)}$			1		Ω
Turn-off gate resistor	$R_{G(off)}$			1		Ω
Creepage distance primary to secondary side	$l_{clear(PS)}$			7.7		mm
Creepage distance secondary to secondary side	$l_{clear(SS)}$			5.8		mm
Weight	W			80		g

Operating modes of the driver

Normal operation

In the normal operation mode of the driver, when a light pulse is applied to the optical input IGBT is turned on. In case of an emergency, the LED of the optical output stops glowing. The control input signal is blocked until the cause of the emergency situation is eliminated. A diagram explaining the operation of the driver is shown in Figure 1.

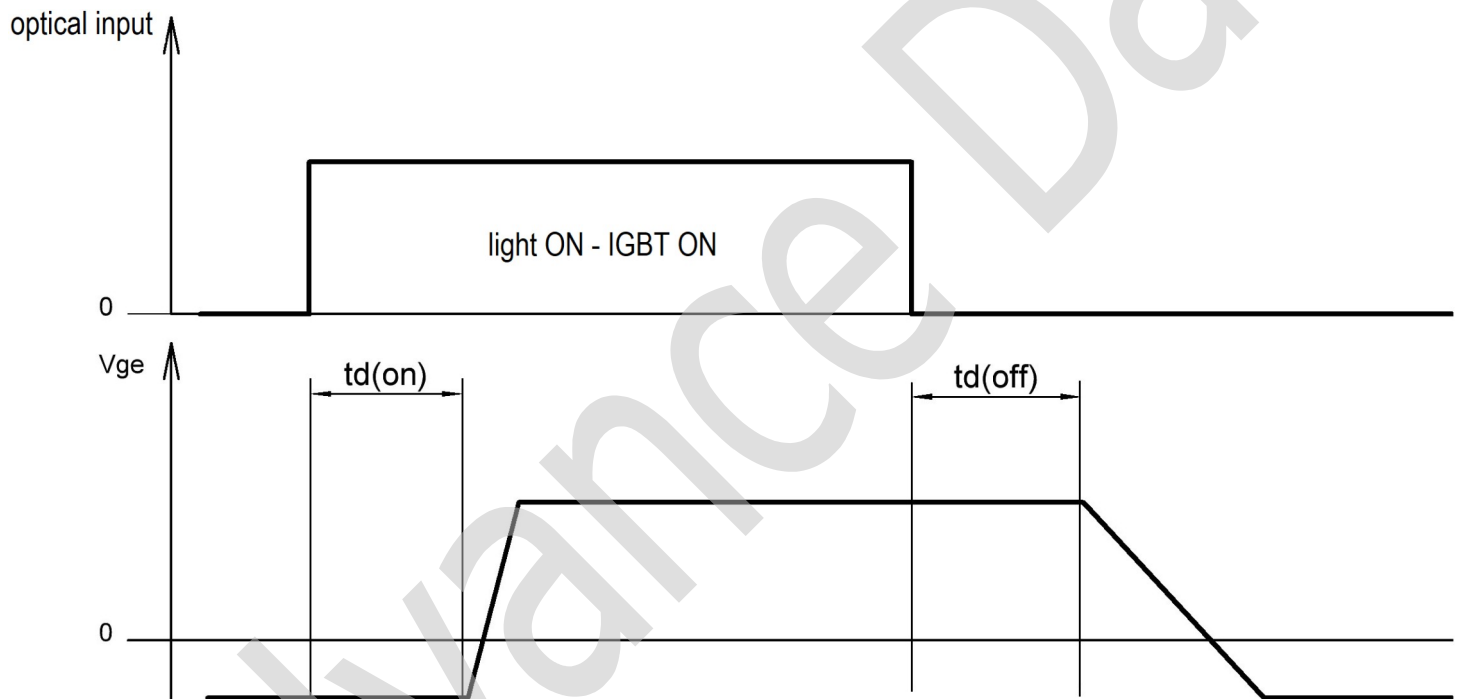


Figure 1 — Normal operation mode of the driver

The occurrence of errors

If an abnormal situation occurs, the ERROR optical output stops signaling. The occurrence of an emergency situation is possible for one or more reasons:

1. Low supply voltage.
2. Over-current accident (DESAT).



Frequency of the PWM control signal

The maximum allowable power of the MI130-17-O-1 POUT driver is 4.2 watts. To determine the maximum PWM operating frequency depending on the gate charge, use the formula:

$$f_{sw} = \frac{P_{OUT}}{Q_G \times n \times \Delta U}$$

f_{sw} - is the maximum PWM operating frequency.

P_{OUT} - is the output power of the driver.

Q_G - is the gate charge of the transistor.

n - is the number of modules

ΔU_G - is the voltage range at the gate.

Figure 2 shows the dependence of the PWM frequency on the total gate charge.

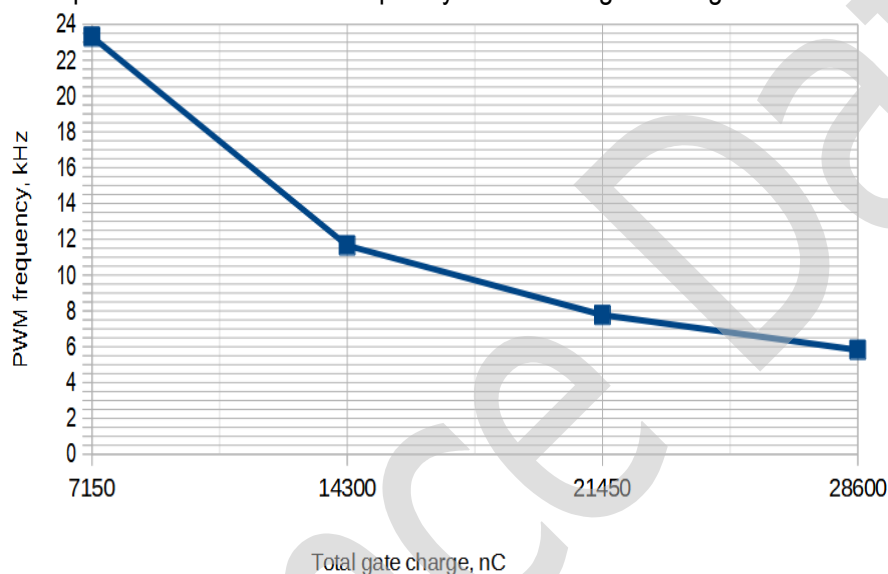


Figure 2 — Dependence of the PWM frequency on the gate charge

Operating mode of UVLO

If the USUP supply voltage drops below +13.7 V, the driver enters an error state and blocks the control input signals, the IGBT module will be turned off via the gate resistor Rg off. To exit the error state, it is necessary to raise the USUP supply voltage to a value of +14.3 V.

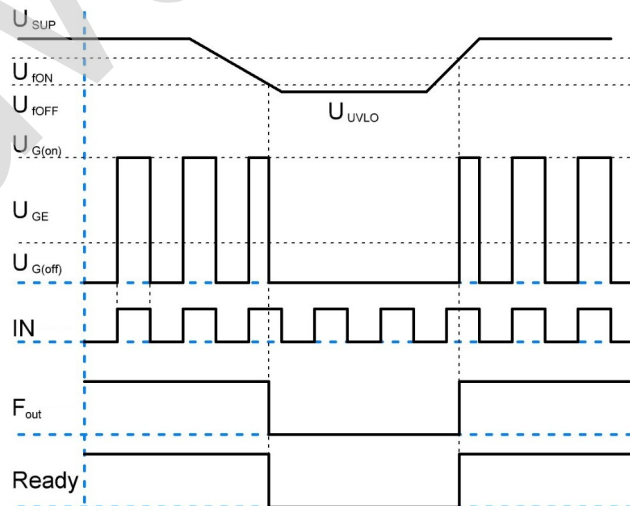


Figure 3 — Diagram of low-power protection operation

DESAT circuit mode

The DESAT circuit is a driver protection circuit that protects the IGBT module from high-amplitude currents. The delayed $t_{bl(VCE)}$ circuit, after starting to turn on the IGBT, begins to control the voltage drop of the IGBT transistor between the collector-emitter terminals. If the voltage drop exceeds the $U_{CE(ref)}$ value, the driver will turn off the IGBT module using the "soft" shutdown function and block the control input signals for the duration of t_{btoff} . The ERROR driver output will be converted to an error state. Figure 4 shows a diagram of the operation of the DESAT protective circuit.

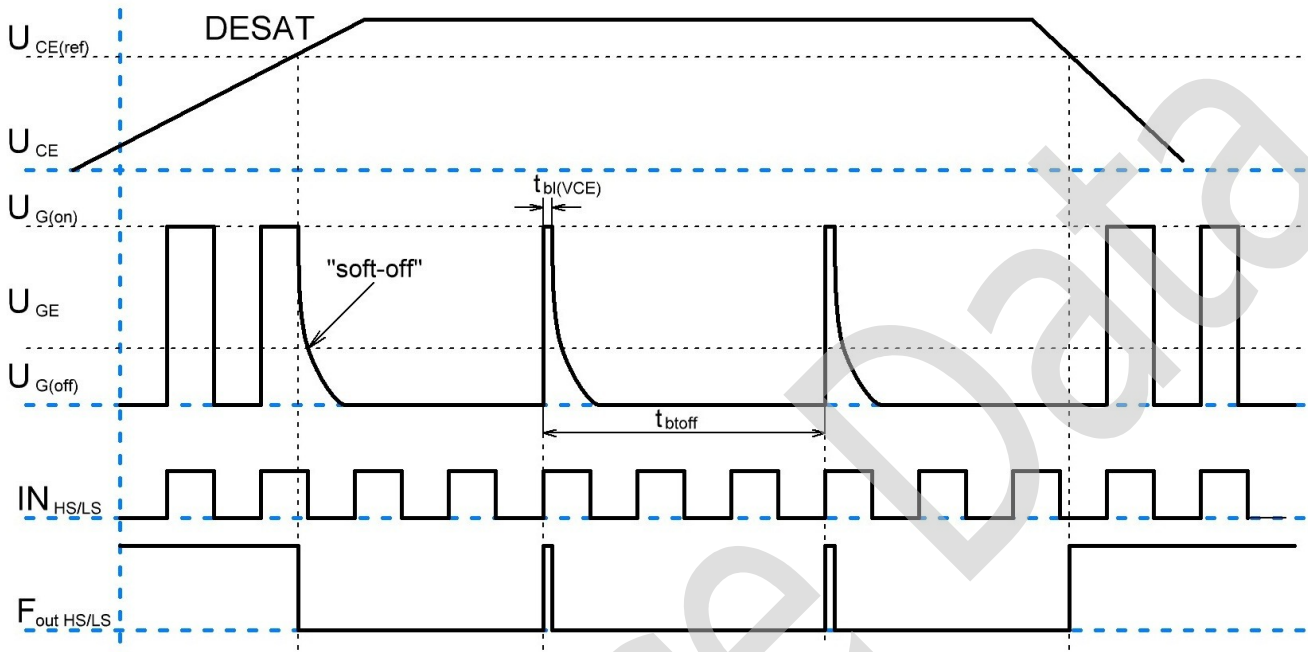
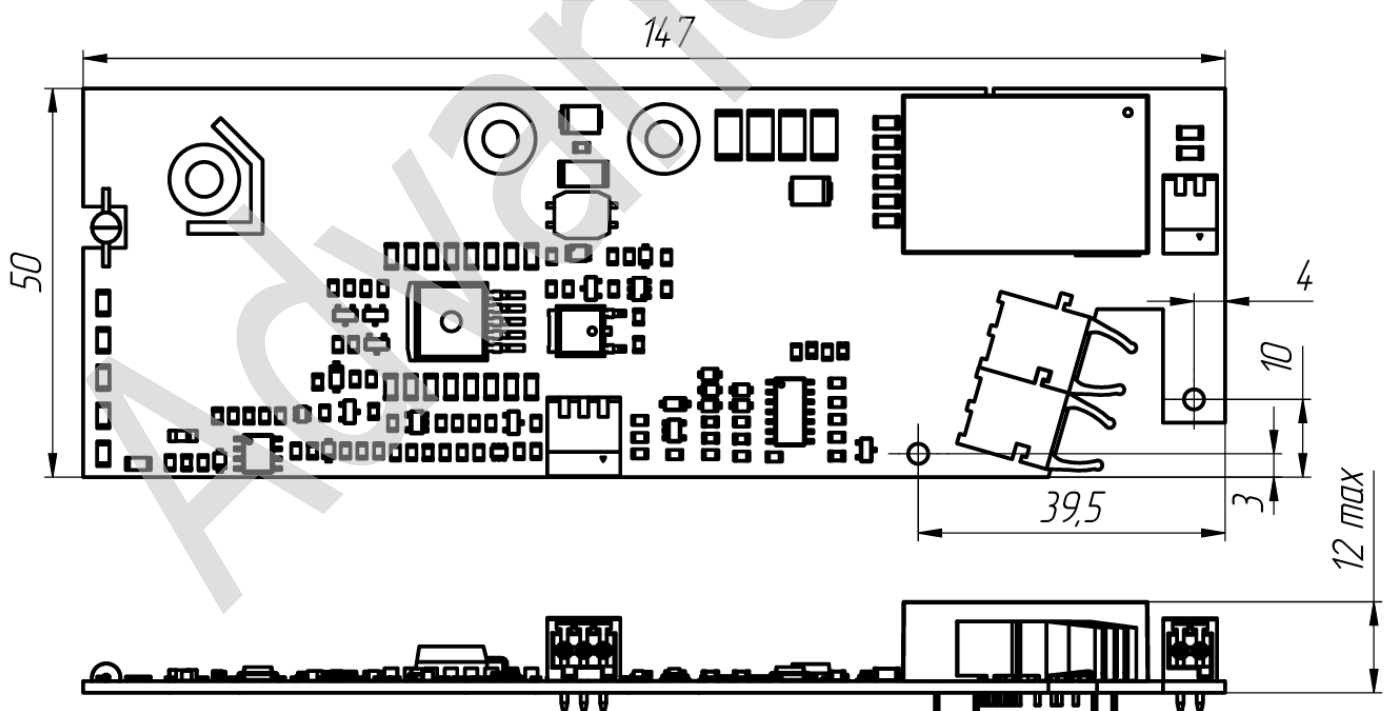
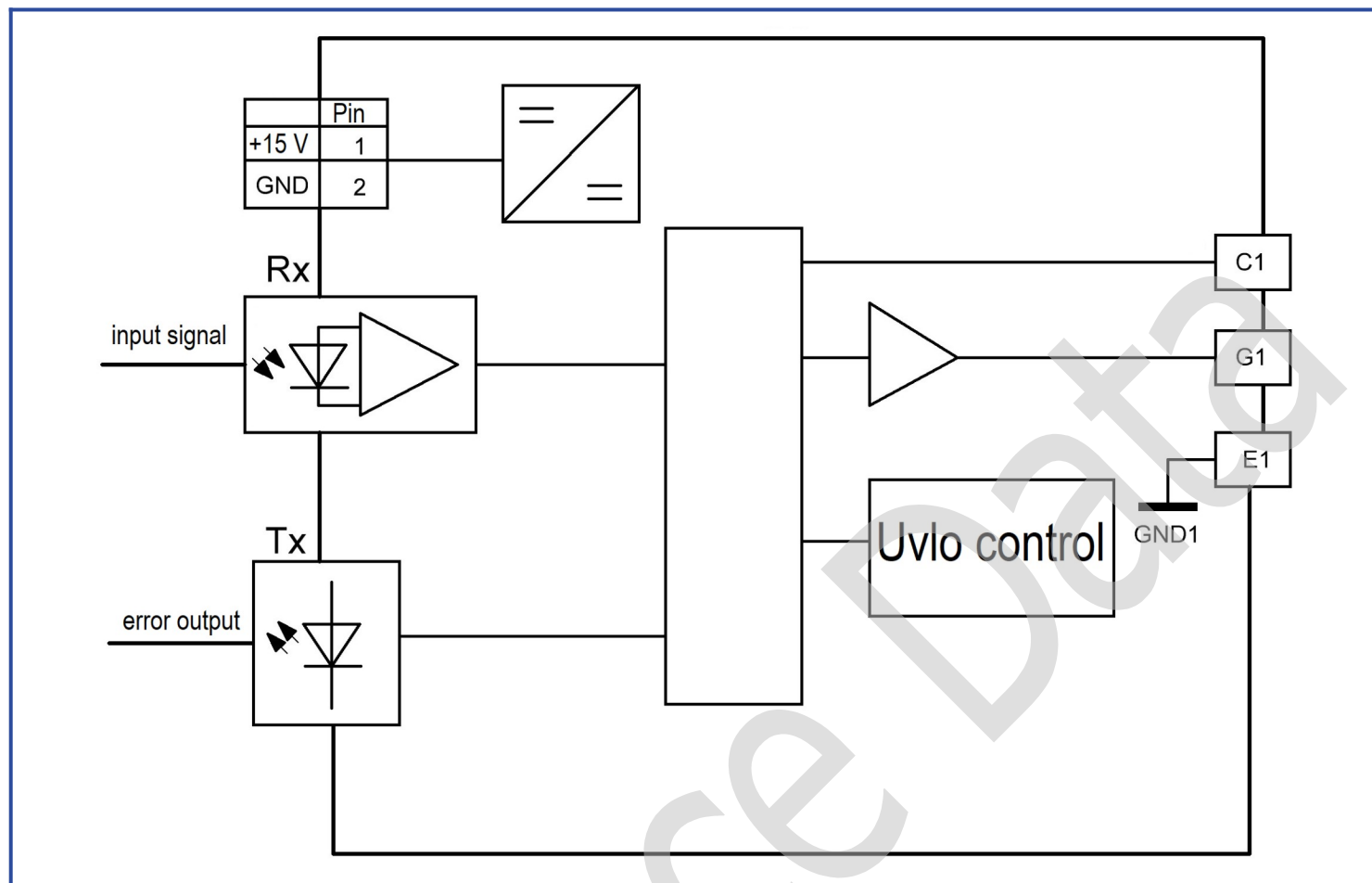


Figure 4 — Diagram of the DESAT protection circuit operation

Overall dimensions



Functional diagram

Pin Designation (15EDGRC-2.5-02P)

№ pin	Input connector	№ pin	Входной разъем
1	Power supply +15 V	2	GND

Pin Designation (HFBR-2521Z)

HFBR-2521Z connector is the receiver of the control input signal.

Pin Designation (HFBR-1521Z)

The HFBR-1521Z connector is an error signal transmitter.

Part numbering guide

MI	1	30	-	17	-	O	-	1	
MI									IGBT master-driver
	1								Number of Output Channels
		30							Maximum pulse output current
				17					IGBT module class
						O			Optical interface
								1	Version for IGBT modules type MIHM, MISM

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