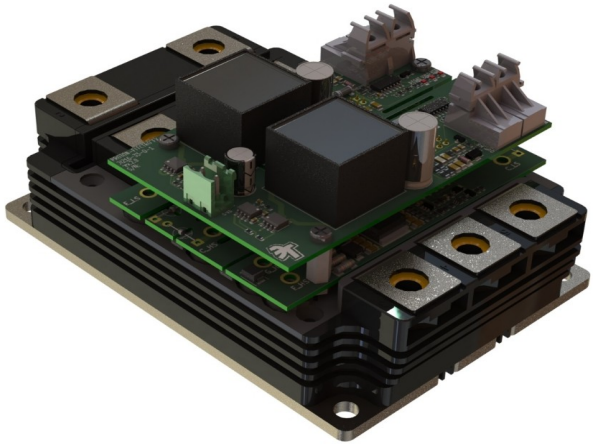
DI216-33-O-1

Plug & play IGBT gate driver datasheet



DI216-33-O-1 two-channel plug and play IGBT driver designed for IGBT modules type MIXM and voltage up to 3300 V.

Typical application

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

Features

- Two chanel IGBT driver
- Drives IGBTs up to V_{CE} = 3300 V
- Gate peak current I_{OUT} ±16 A
- Gate output voltage V_{OUT} +15/-9 V
- Optical control interface
- Isolation testing voltage 7.2 kV AC
- Frequency PWM up to 15 kHz
- IGBT short-circuit protection with soft switch-off
- Power-supply monitoring (UVLO)
- Compact design 100x67x46 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}		±16	A
Frequency PWM	f_{SW}	Gate charge Q_G = 10200 uC	15	kHz
Isolation voltage	U_{ISOL}	First to second side, 60 sec	7200	V rms
Output power	P_{OUT}	For 1 chanel	3.6	W
dV/dt	dU/dt	Rate of change of input to output voltage	50	kV/µs
DC-link voltage	U_{DC}		2400	V
Collector-Emitter voltage	U_{CE}		3300	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		330		mA
Average supply current	$I_{s(max)}$	f_{SW}= 15 kHz Q_G= 10200 nC		790		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	$U_{CE(ref)}$			8.2		V
Response time	$t_{bl(VCE)}$			8		us
Error signal activation delay time	t_{bton}			500		ns
Channel control lockout time	t_{btoff}			1		ms

Advance Data

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			125		g

Operating modes of the driver

1. Normal operation

In the normal operation mode of the driver, when a light pulse is applied to the optical input of the upper and lower channels (HS/LS), 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.

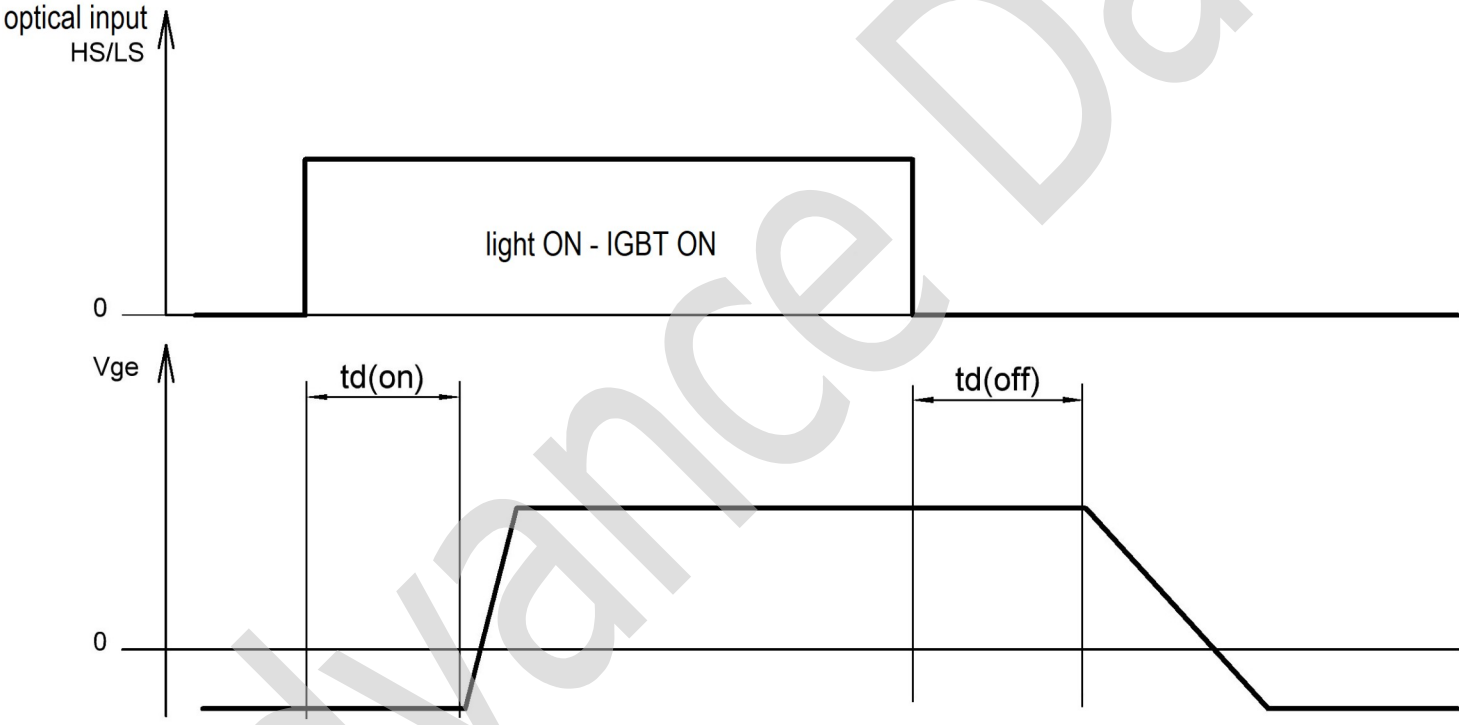


Figure 1 — Normal operation mode of the driver

2. The occurrence of errors

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

1. Low supply voltage of the upper (HS) or lower channel (LS).
2. Over-current accident (DESAT).
3. An accident caused by exceeding the temperature of the R_{TD} module substrate.

2.1 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.

Advance Data

2.2 DESAT circuit mode

The DESAT circuit is a driver protection circuit that protects the IGBT module from high-amplitude currents. The delayed tbl(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 UCE(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 tbtoff. The ERROR HS/LS driver output will be converted to an error state. Figure 2 shows a diagram of the operation of the DESAT protective circuit.

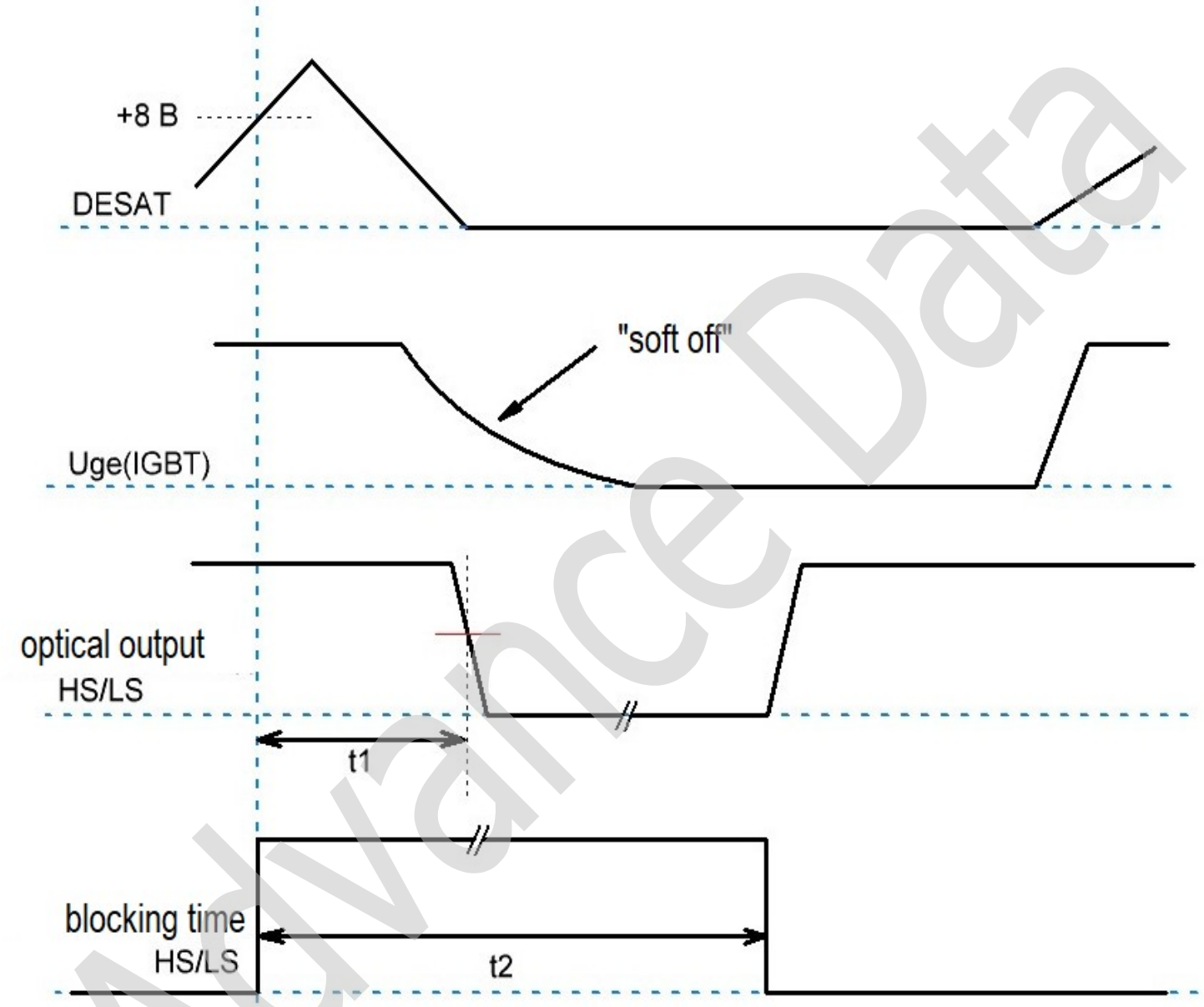


Figure 2 — DESAT protection circuit

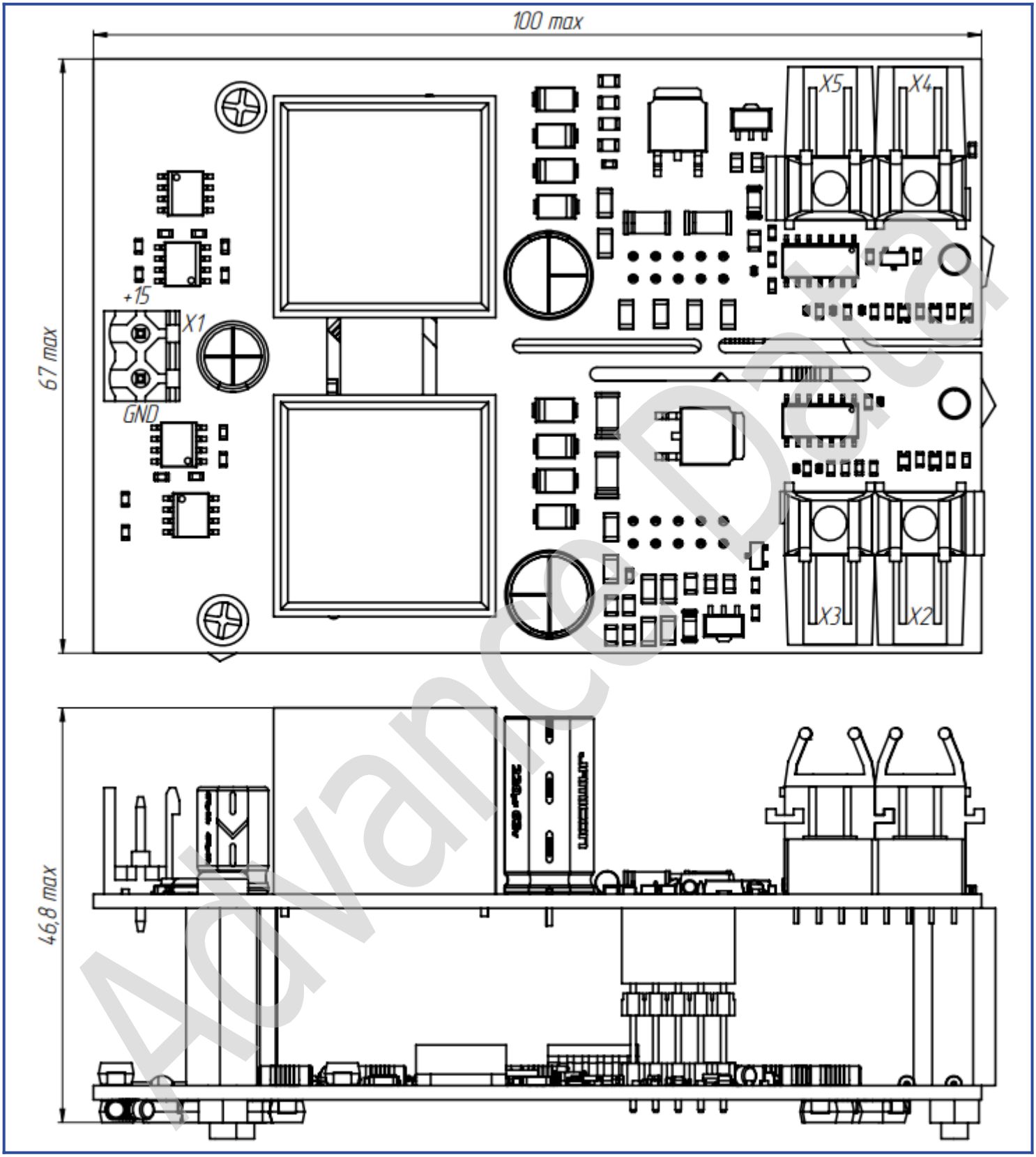
t1 – error enable delay time t_{bton} 500 ns
t2 – channel control lock time t_{btoff} 1 ms

2.3 Over-temperature protection

Over-temperature protection is implemented by monitoring the readings of the module's NTC thermistor. If the NTC resistance of the RTD thermistor falls below the threshold value, the driver will enter an error state and block control. The error will be reset automatically when the resistance of the NTC thermistor corresponding to the permissible temperature is reached.

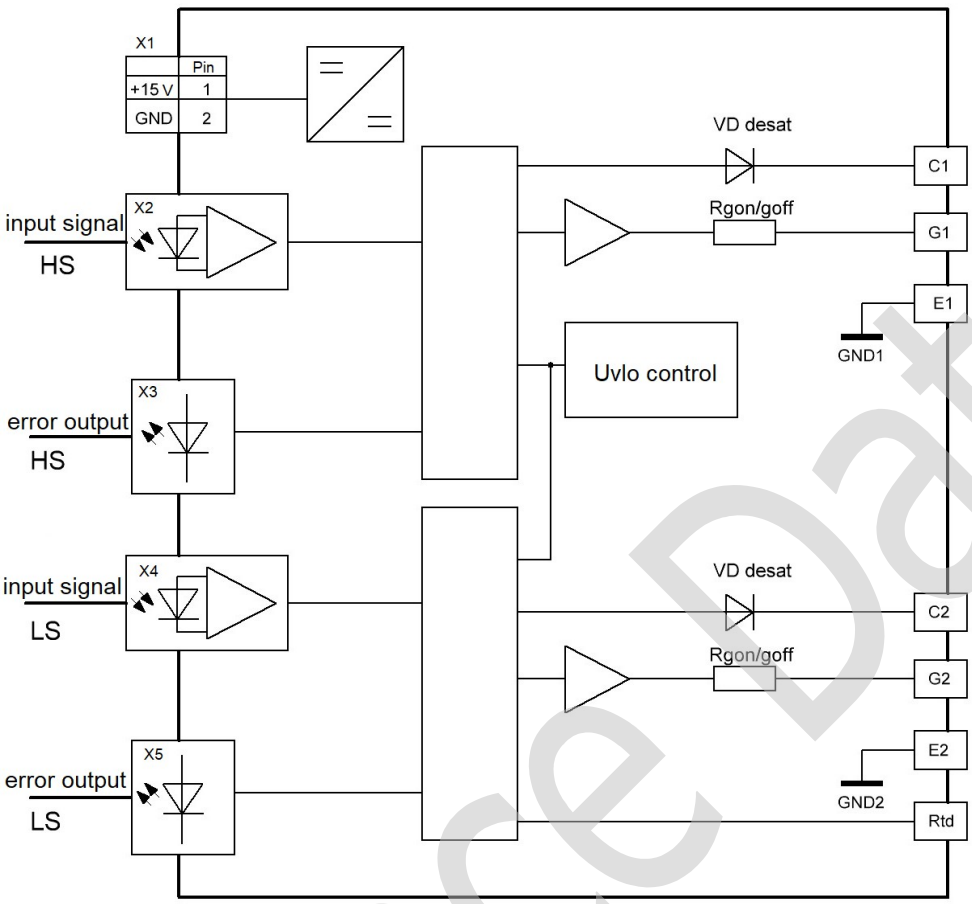
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Overall dimensions



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Functional diagram



Pin Designation (X1 - 2EDGV-5.08-02P-1-4)

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

Pin Designation (HFBR-2531Z)

HFBR-2531Z connector (X2 – high channel, X4 – low channel) is the receiver of the control input signal.

Pin Designation (HFBR-1531Z)

The HFBR-1531Z connector (X3 — high channel, X5 — low channel) is an error signal transmitter.

Part numbering guide

DI	2	16	-	33	-	O	-	1	
DI									IGBT driver
	2								Number of Output Channels
		16							Maximum pulse output current
				33					IGBT module class
						O			Optical interface
								1	Version for IGBT modules type MIXM

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