



Electrum AV

Drivers of special purpose



## Features

- The drivers use only a package and materials allowed to usage in special purpose devices
- The drivers are resistant to special exposure factors (radiation, mold fungi, salt fog, etc.)
- The drivers can operate in hard conditions: vibration, high or low pressure, temperature range -60...+85 °C, etc
- The drivers include a package and circuit designs providing its resistance to overloads
- Before shipment all the drivers undergo mandatory inspection on high or low temperature, they undergo burning test under load and at least 10 thermal cycles
- Warranty operating period for the drivers – 10 years



5DR1120P-A



5DR2120P-A



5DM1110A

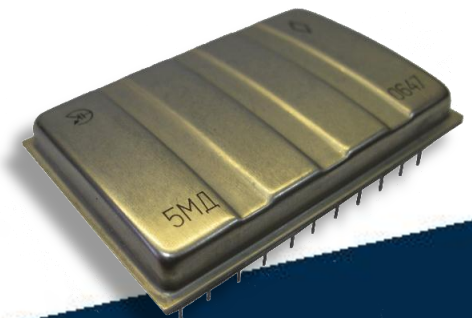
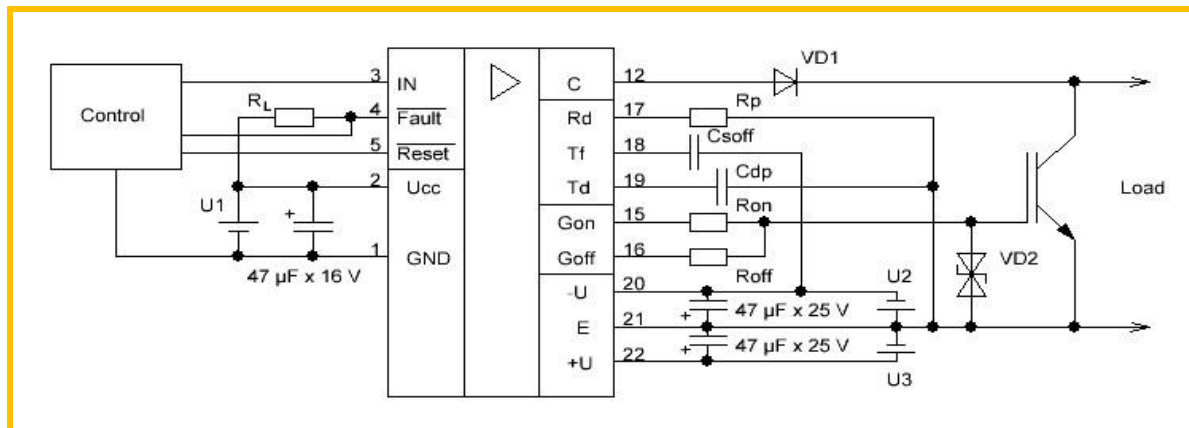
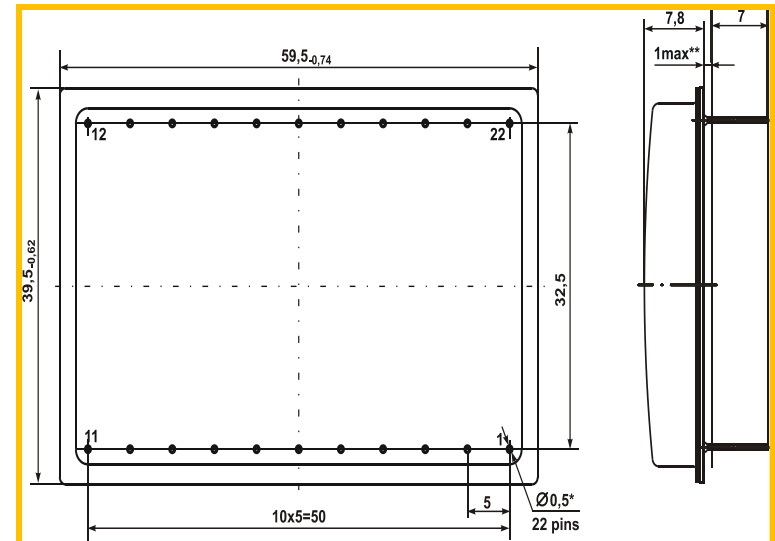
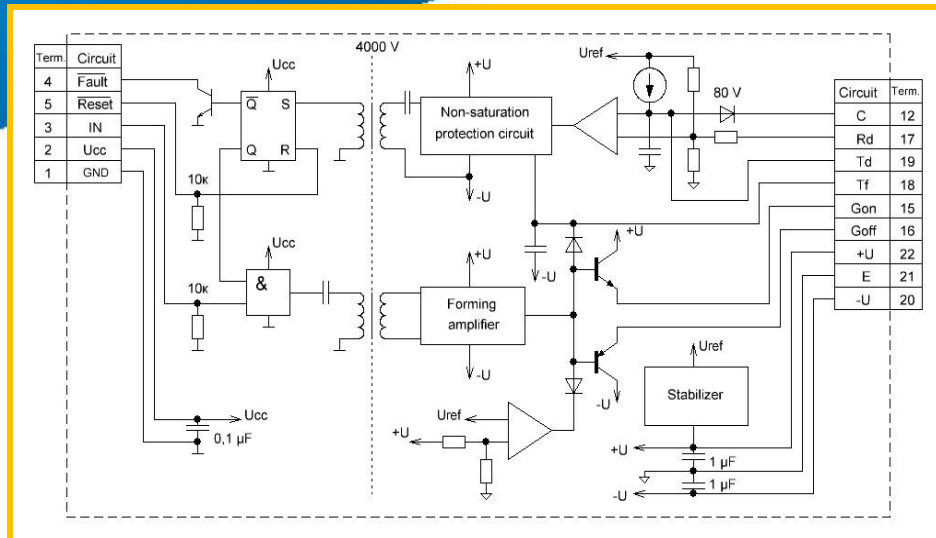




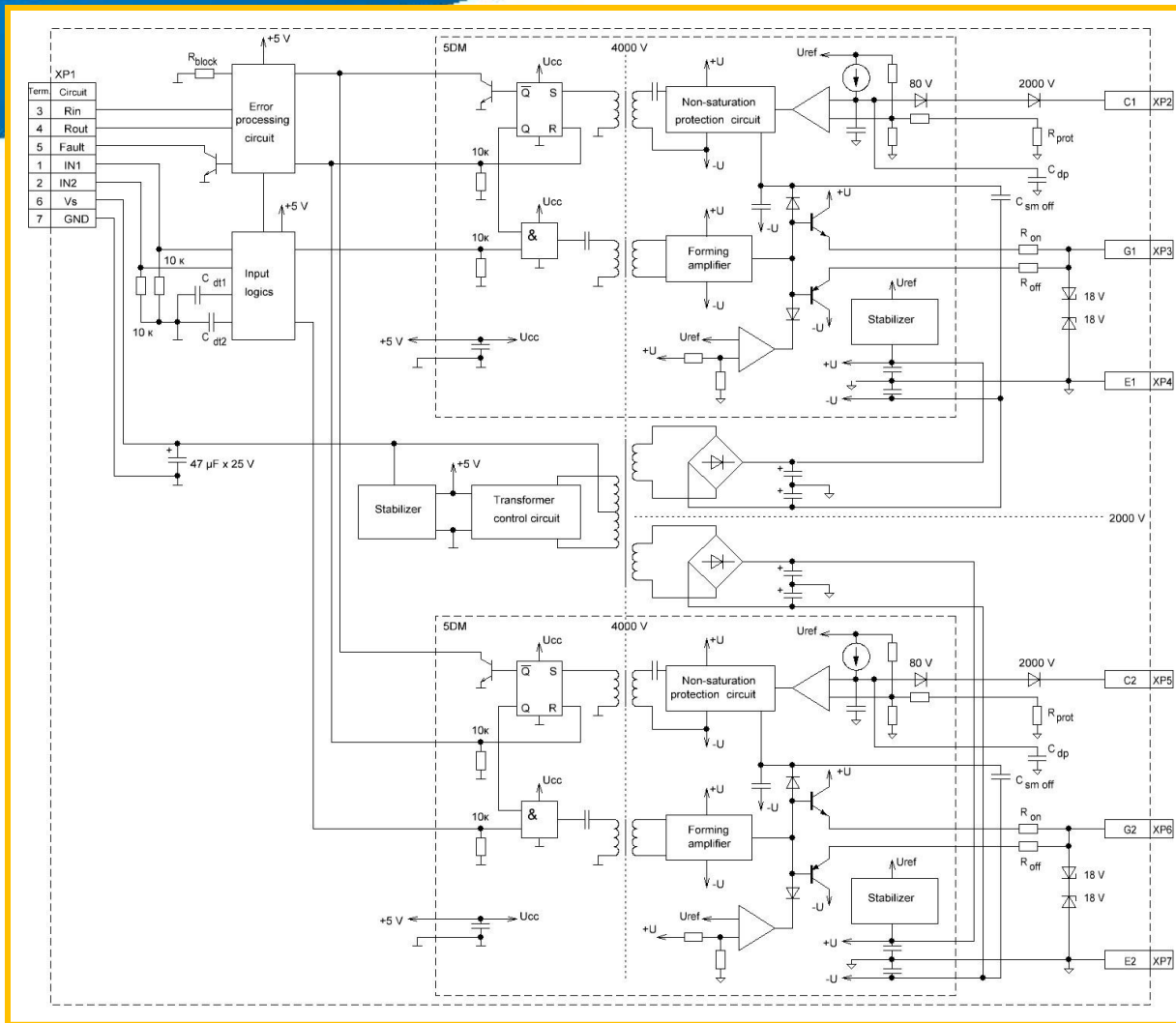
## Drivers functions

5DR2120	5DR1120	5DM1110	
			Control by transistor according to input signal
			Control of saturation voltage of controlled transistor
			Regulation of protection shutdown threshold on saturation voltage
			Smooth transistor shutdown at overcurrent
			Control blocking in emergency mode with giving status signal
			Regulation of delay for non-saturation protection operation and duration of smooth emergency shutdown
			External and internal reset of emergency mode
			Supply voltages control
			Regulation of blocking duration in emergency mode
			Forming of galvanically-separated output supply voltages
			Protection of controlled transistor gate against overvoltage
			Blocking of simultaneous switching of controlled transistors
			Forming of «dead time» for transistors' switching
			Regulation of «dead time» duration for switching

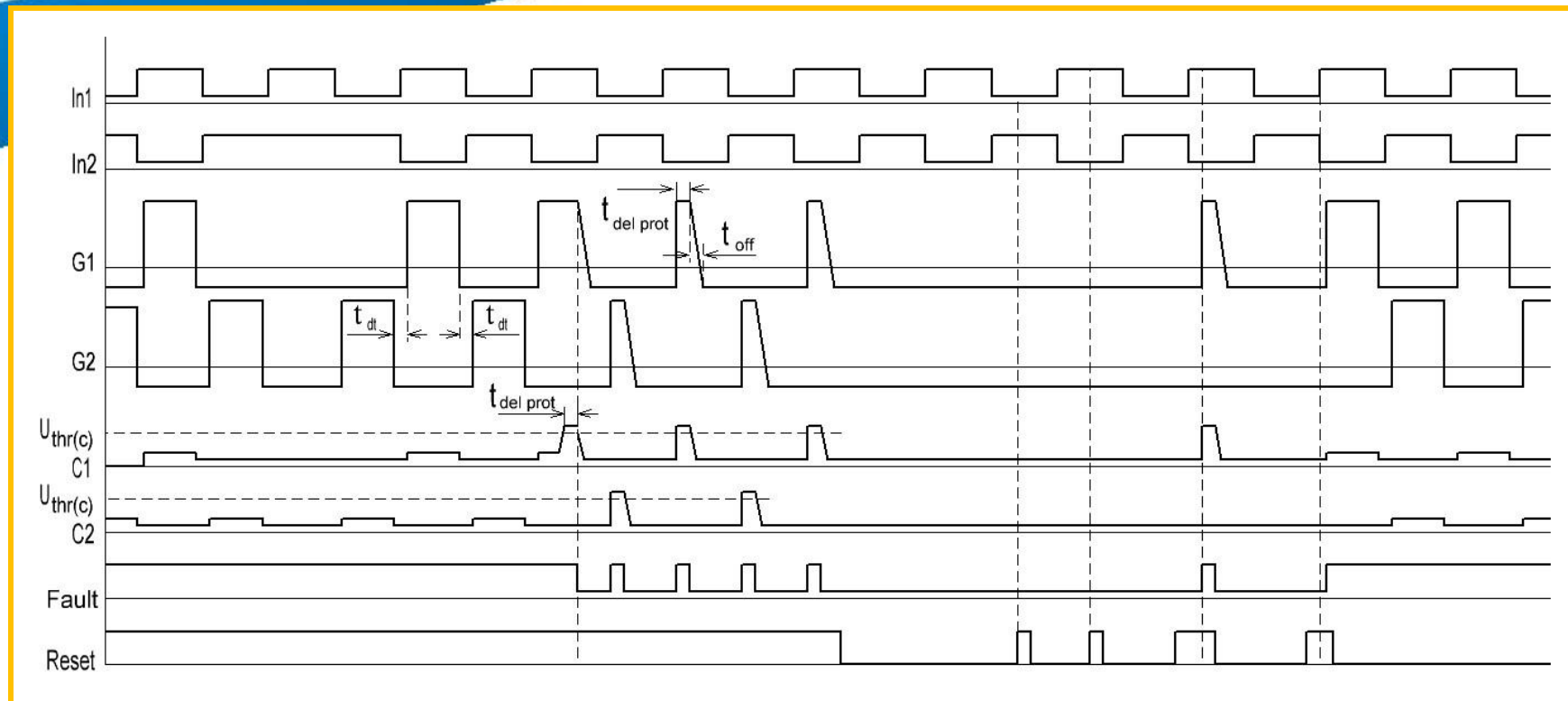
# 5DM1110A



# 5DR2120P-A



## Operation of 5DR2120P-A



**IN1,IN2** – input control signals

**G1,G2** – output signals on gates

**C1,C2** – signals on measuring collectors

**Fault** – signal of status emergency output

**Reset** – external signal of emergency reset

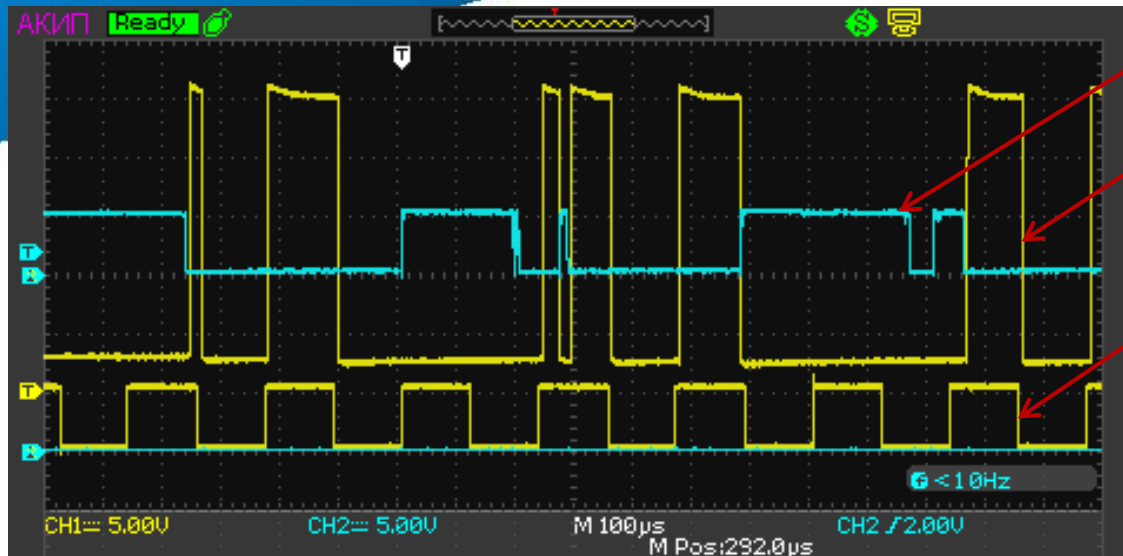
**$t_{del\ prot}$**  – protection operation delay

**$t_{smoff}$**  – smooth switch-off duration

**$t_{dt}$**  – «dead time» for switching

**$U_p$**  – protection operation voltage

## Blocking of simultaneous switching



Input of channel 2

Output of channel 1

Input of channel 1

Blocking: output signal of channel 1 at its correct control and superimposing of incorrect input signal of channel 2

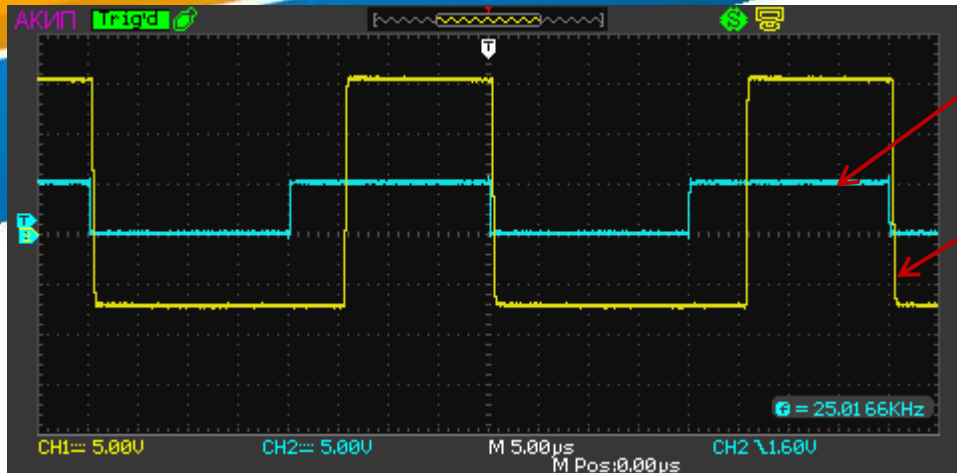
Blocking of simultaneous switching of both driver channel – this function excepting appearing of through current in controlled half-bridge when incorrect controlling.

The blocking lies in forming of off-states of both switches when supplying a level «log.1» to the control inputs of channel 1 and channel 2 simultaneously (corres. to on-state of switch).





## Forming of «dead time»



Input signal

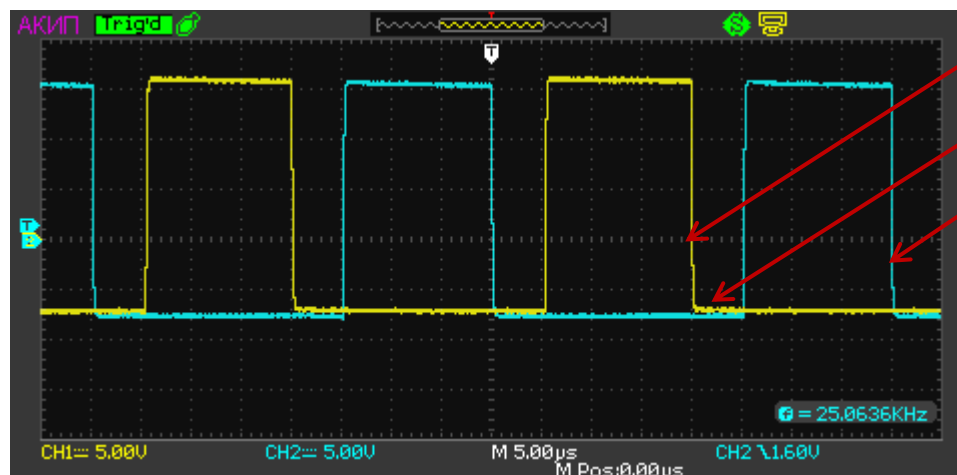
Output signal

«Dead time» – this is a phase of half-bridge switches operation; at this phase both switches are in off-state.

«Dead time» is necessary to exclude through currents when switching transistors.

«Dead time» is formed due to creation of artificial switching delay (with respect to input signal), thereby switching delay is not increased.

### Forming of switching delay



Output of channel 1

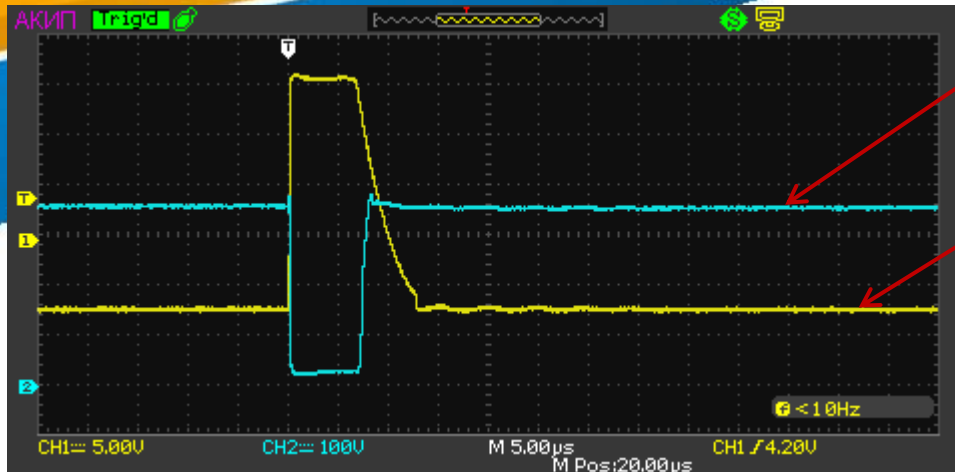
«Dead time»

Output of channel 2

### Output signals of two channels with «dead time»



## Non-saturation protection



Signal on collector

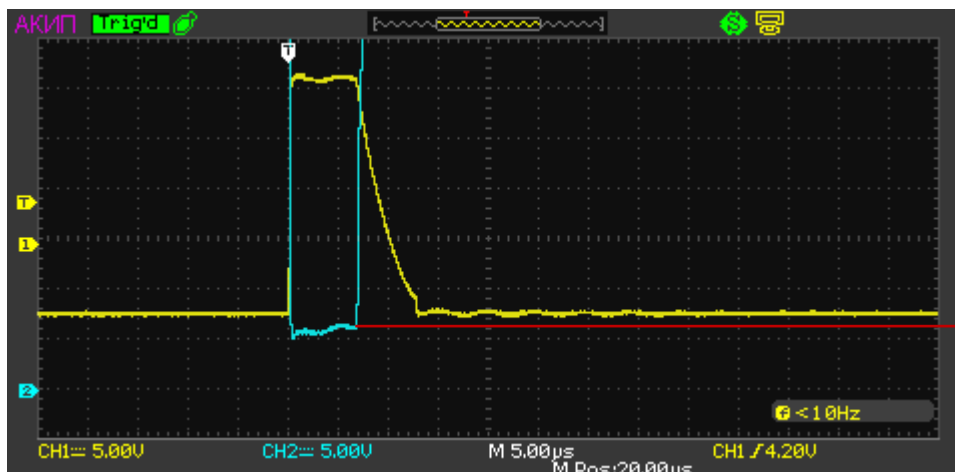
Increasing of voltage loss on collector-emitter junction at exceeding maximum permissible value by load current leads to transistor heat and its failure.

Signal on gate

Driver controls collector-emitter voltage fall and switches transistor off at exceeding given threshold by voltage.

Thus, it is carried out current protection (including against SC in load) of controlled transistor.

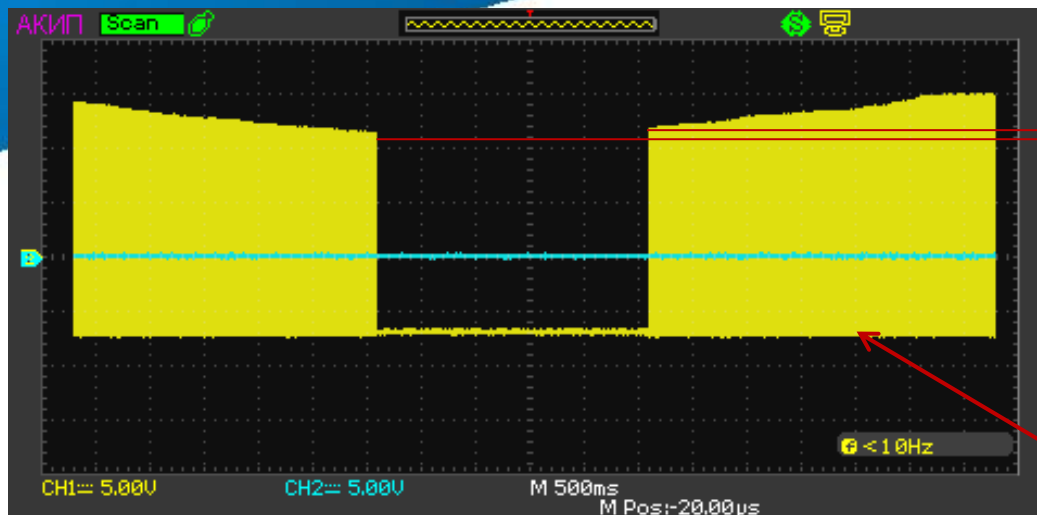
Pulse of «reset» of non-saturation protection



Protection operation threshold (5.8 V)

Collector-emitter voltage fall when protection operated

## Protection against undervoltage



Switch-on threshold  
Switch-off threshold

Gate signal

### Output signal when decreasing and increasing output supply voltage

Decreasing of barrier voltage in transistor gate can lead to its exiting the saturation state at given current and operating point displacement to active field of current-voltage diagram; it leads to increasing of voltage fall on collector-emitter junction and, as a result, to overheat and failure.

To avoid appearing the failure, the driver locks the control (direct lock output voltage) at decreasing output supply voltage lower than the permissible threshold (11 V) and allows operating at exceeding threshold 12 V by voltage.



## Basic parameters

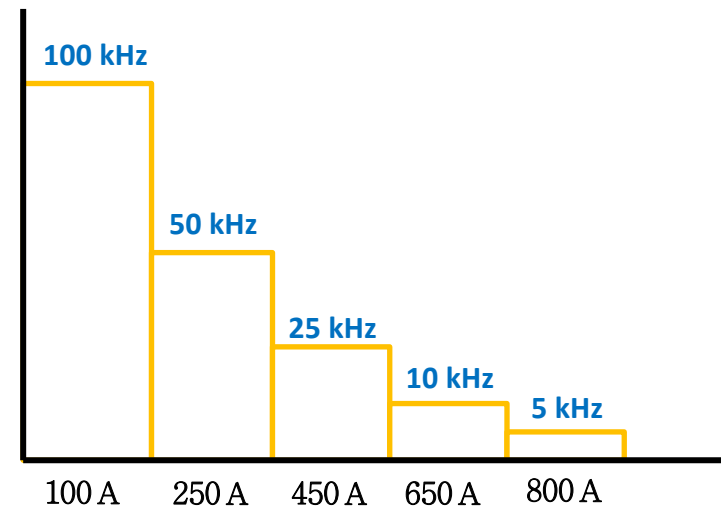
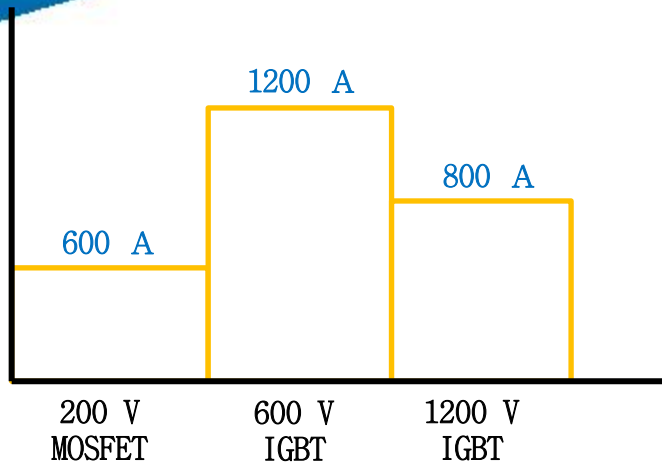
Parameter	Unit	Min	Typ.	Max
Supply voltage of 5DM1110	V	-20...0		13...20
Supply voltage of 5DR1120, 5DR2120	V	13.5	15	16.5
Switch-on voltage of undervoltage protection	V			11
Switch-off voltage of undervoltage protection	V	12		
Control voltage	V	0		5.5
Output pulse current	A		$\pm 12$	
Output average current	mA			100
Non-saturation protection operation voltage	V	2		8
Operating frequency	kHz			100
On/off delay time	$\mu$ s		0.9/0.5	1.5
Delay time for non-saturation protection operation	$\mu$ s	1		10
Duration of smooth emergency shutdown	$\mu$ s	1		10
Duration of blocking in emergency mode	ms	10		500
Reverse voltage of measuring collector	V	1800		
Insulation voltage between input and output (DC)	V	4000		

## Operation parameters

External exposure factor	External exposure factor value
Sinusoidal vibration:	
- frequencies range, Hz;	0.5 - 100
- acceleration amplitude, $m/s^2$ (g)	150 (15)
Single mechanical shock:	
- peak shock acceleration, $m/s^2$ (g);	40 (4)
- pulse duration of shock acceleration, ms	50

Climatic factor	Climatic factor value
Lower ambient temperature:	-60
Higher ambient temperature:	+85
Storage temperature, °C	from minus 65 to +100
Relative humidity with temperature 35 °C without moisture condensation, %, max	98
Ambient temperature change, °C	from minus 60 to +85
Lower atmospheric pressure, Pa (mm Hg)	86000 (650)
Higher atmospheric pressure, Pa (mm Hg)	106000 (800)

## Field of use



For IGBT with peak voltage 1200 V

The drivers can control transistors with currents up to 1200 A with frequency up to 100 kHz in circuits with peak voltage up to 1200 V

- In circuits of motors control
- In power pulse power supplies
- In currents and voltages converter
- In circuits of powerful relays and commutators



Contact details

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