DRIVER IGBT 3073

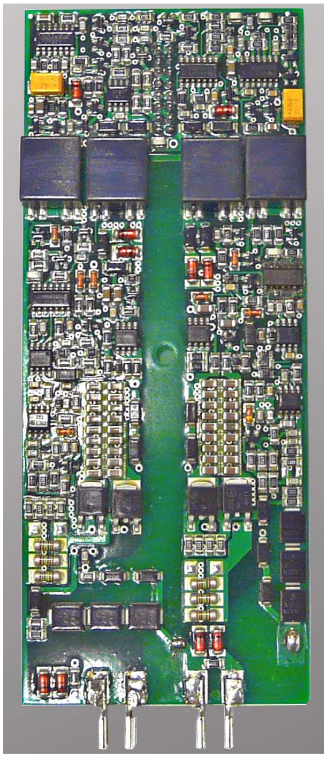
DESCRIPTION

Driver for double IGBTs of mid-range, in a 1200-1700V working range. This driver by itself can control a branch (TOP and BOTTOM)

This card, unlike another type of Driver is personalized from factory. Does not need additional elements such as printed circuits, resistors, capacitors, neither calculations, nor adjustments, just input control signals and the IGBT connections. (collector, emitter and gate).

Each Driver is adjusted to be able to operate only with one or two IGBT modules. With this personalization a better performance is obtained and there is a better adaptation to electric and physical characteristics of each IGBT.

Easy connections from the board to the IGBT through faston terminals. Connections with interface through double 16_{PIN} row.

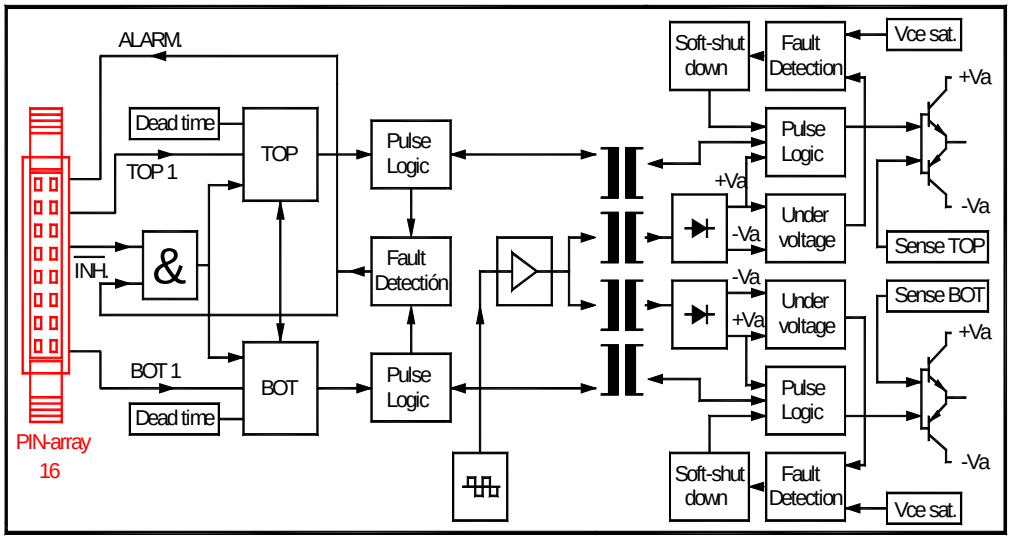


SPECIFICATIONS

- ✓ 4500V (Up.eff.) electric insulation between primary and secondary.
- ✓ 4500V (Up.eff.) electric insulation between secondaries.
- ✓ Inputs TOP, BOTTOM and INH (inputs CMOS 20V max., 3K3 impedance).
- ✓ Inputs signals filtration. Signals with less time than 1µs are rejected.
- ✓ Trigger inputs protected against electrostatic discharges.
- ✓ Min. dead time generation, can not be accumulated to the one applied by software.
- ✓ Working cycle from 0 to 100%.
- ✓ Recommended tension for boards supply 16 V_{DC}.
- ✓ Protection against supply drop in voltage in both secondaries +13V/-13V.
- ✓ Protections against overcurrents by comparison of the $V_{ce.sat.}$ with prefixed standard.
- ✓ **Soft shut down** of the IGBT with alarm**.** (This procedure avoids V_{ce} overtension in the most unfavourable moment).
- ✓ Overcurrent active protection on the switching off of the IGBT **"DVRC" (Dynamic Voltage Rise Control).** This protections acts from 900V on. Configurated according to model.
- ✓ Open-Collector output alarm. Alarm prolonged during 30ms.
- ✓ Signals and supply connexion through double pins row.
- ✓ Working temperature from –40ºC to 70ºC
- ✓ Commutation frequency 20 KHz
- ✓ Possibility of higher frequencies up to 60 Khz for other IGBTs families.
- ✓ Measurements 67x116mm.
- ✓ Trigger with +15V/-15V in both IGBTs
- ✓ Easy adaptation with interface MTC-3074.

DRIVER IGBT 3073

GENERAL DIAGRAM IN BLOCKS



Explanatory notes:

- All inputs are protected against tension peaks.
- The INH input is an additional input for input pulses authorization, when it is not used it will have to remain as +Vcc.

PROTECTIONS

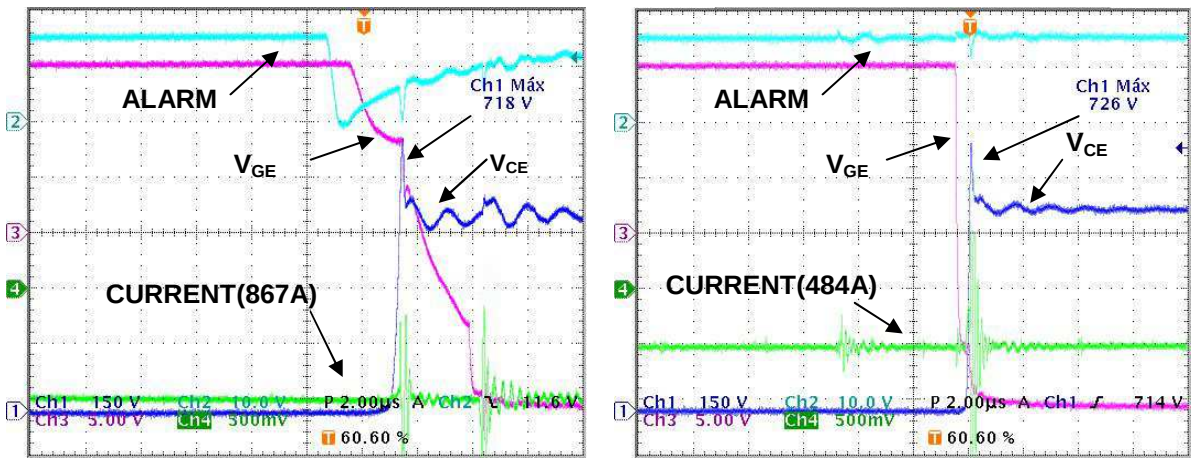
Soft Shut Down

It is used to disconnect the IGBT in a soft way when an alarm is produced. In this manner we avoid the IGBT destruction due to a excessive tension during the shutting down process T_{off}. In the left hand side graph we can appreciate a soft shut down, this shut down generates a 748V overtension with 867A. In the right hand side graph a normal T_{off} shut down of 484 peak generates 726V block peak.

The descent slope of the soft shut down is personalized with a resistance value determined by the IGBT model, **$R._{SSD}$**.

In a normal operation the IGBT is triggered quickly to minimize the commutation losses. (right hand side graph)

CM400DY-24NF



The protection circuit is based on comparing constantly the $V_{ce.sat}$ with a prearranged standard, if for any reason, the Vce.sat exceeds the standard, a soft shut down takes places. This MTC-3073 Driver is personalized to each IGBT with different Vce.sat comparison standards, depending on *"$V_{ce.sat}$ lecture retard", "Switching on" and "$V_{ce.sat}$"* according to *"Characteristics table"* attached at the end of the document.

The driver is adjusted to be able to operate with just one or two IGBT modules. Each driver is personalized to each IGBTs electric characteristics, in this manner a better performance is obtained and there is a better adaptation to electric and physique characteristics of each IGBT.

Power supply secondary alarm.

If the secondary supply falls because a short-circuit or an excessive consumption, a trigger in bad conditions or insufficient can be originated, being able to destroy the IGBT. To prevent this situation there is a comparator in each of the secondaries that cuts the triggers when the power supply falls below **+13/-13V.**

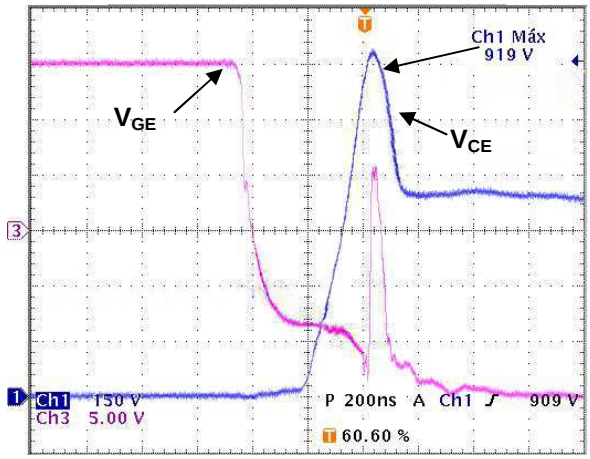
This alarm also generates a **"Soft Shut Down".**

Active alarm "DVRC" (Dynamic Voltage Rise Control).

In the normal working cycle of the IGBT exists the possibility that the short-circuit takes place exactly during the normal shut down T_{off} (rapid shut down) of the IGBT, this is a very strange case, but it can happen. In this case the system will not realize a soft shut down, being able to destroy the IGBT. For these cases, the **"DVRC"** active alarm is implanted. This additional circuit controls the derivative *di/dt* in all the IGBT shutting down operation, therefore prevents an inadmissible V_{ce} voltage.

In the graph below we can see how the protection has entered from 900V of V_{ce}.

CM400DY-24NF



DEAD TIME

Dead time guarantees us the minimum commutation time between triggers in a branch, before one starts driving the other must be shut down. This dead time is assured by hardware. This time can not be accumulated to the one that could be added by software. If the control generates a time lower than the one stipulated to the equipment, the circuit adds this minimum dead time.

4µs is this drivers dead time.

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INPUTS SIGNALS FILTER TOP/BOTTOM

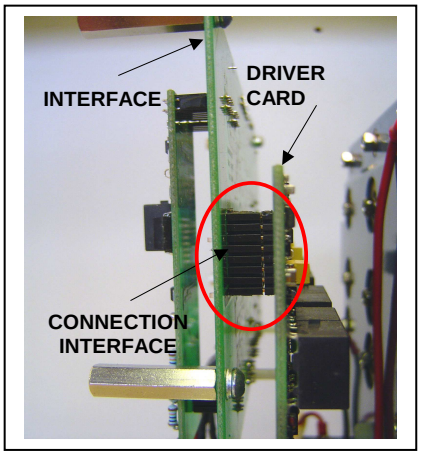
Each of the channels *(top y bottom)* has a filter on the input that filters all signals lower than **1µs**. This passive filter that we have connected to the input guarantees the elimination of any not wanted electric noise.

GATE RESISTOR R_{gate}

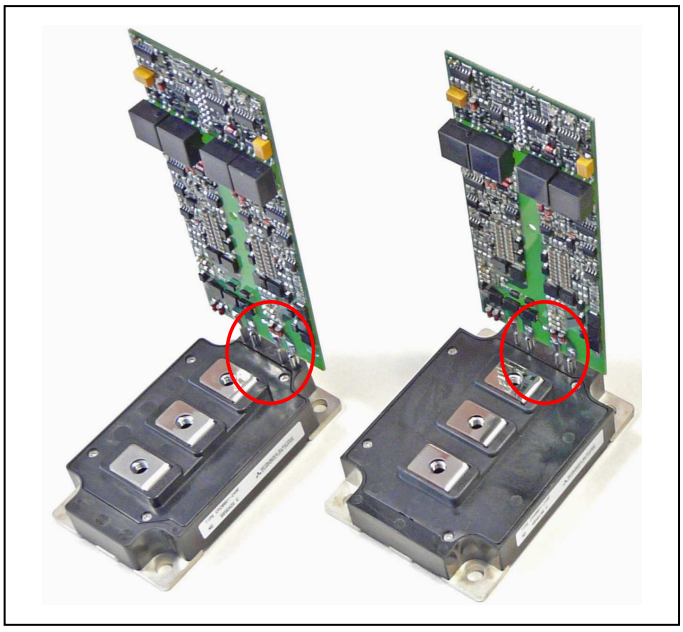
The driver MTC-3073 has different gate resistors $\mathbf{R_{gate}}$ personalized to each IGBT according to *"Characteristics table"* attached at the end of the document.

The $\mathbf{R_{gate}}$ resistor is adapted searching the ideal working point of the IGBT, trying to obtain a better performance of the equipment, as well as a better protection.

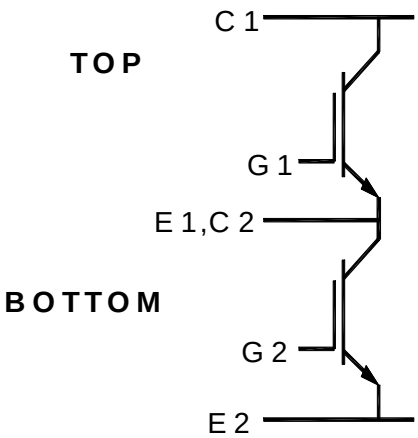
DRIVER CONNECTION

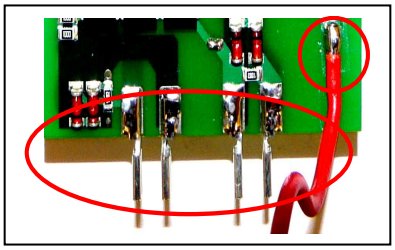


Supply connection and signals to exterior through double pins row. This row is placed on card reverse.



Connection on to IGBT through faston terminals, in "Base ***G1-2***" and the *"Emisor **E1-2"*** from (TOP and BOTTOM) and through cable *"Colector **C1**"* fromTOP





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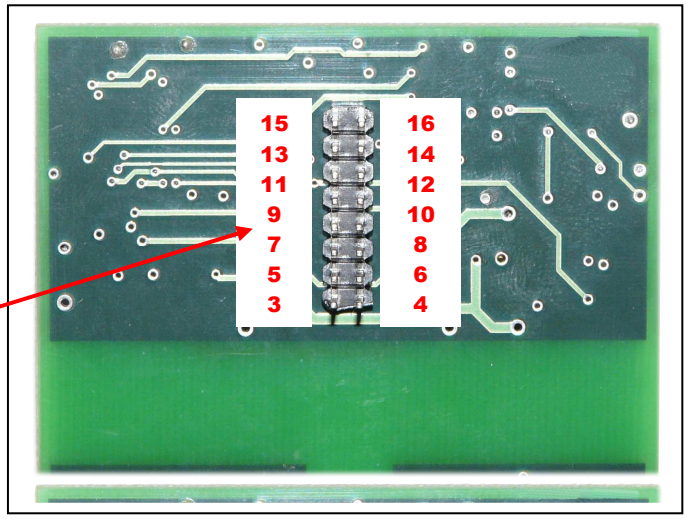
PIN OUT

Pin	Signal	Remark
1	+VDD	15-16V
2	+VDD	
3	GND	Ground 0V
4	TOP	PWM Input TOP
5	TOP	
6	GND	Ground 0V
7	BOT	PWM Input BOT
8	BOT	
9	GND	Ground 0V
10	INH	Input INH. 0 = Stop
11	INH	
12	GND	Ground 0V
13	reserved.	
14	reserved.	
15	ALARM.	Fault Output
16	ALARM.	



CHARACTERISTICS TABLE

	CARD MODEL	CODE	Lecture Retard Vce.	Ton tail value IGBT	Vce. Sat.	R. SSD. Value	DVRC. V.	Rg. DRIVE (Ω)	Rg. mod. IGBT (Ω)	Qg IGBT (nC).	NF LINE	SERIE A
	MTC-3073-	202	650ns	390pf	2,35	2k	900	1,6	3	1350	CM200DY-24NF	CM300DY-24A
	MTC-3073-	402	760ns	470pf	2,35	2k	900	0,73	2	2700	CM400DY-24NF	CM600DY-24A
*	MTC-3073-	207	760ns	470pf	2,65	2k	1200	2,4		1330		CM200DY-34A
*	MTC-3073-	407	900ns	470pf	2,65	2k	1200	1,6		2000		CM300DY-34A
	** Preliminaries*											