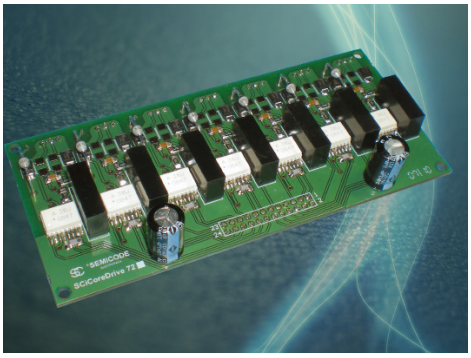
PRELIMINARY TECHNICAL INFORMATION



non-contractual photo

HIGHLIGHTS

- 7 channel IGBT driver
- suitable for 1200 V IGBT (900 V max. on DC-Link)
- Up to 8A$_{peak}$ output current
- Collector sensing & fault protection
- TTL level input signal
- 12 V$_{DC}$ supply
- Electrical isolation of 3000 V$_{AC}$

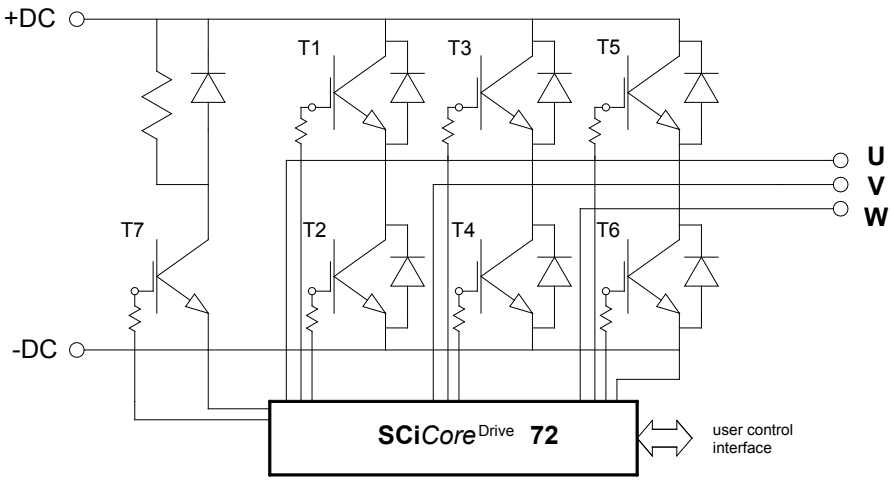
APPLICATIONS

- Inverters
- Converters
- Renewable energies
- Traction
- Welding
- UPS

SCiCoreDrive72 is a 7-channel driver designed to control three phase bridge inverters + brake arm with IGBT or MOSFET up to 1200 V. Incorporates an internal DC-DC converter for each channel. Includes a V_{CE} monitoring of IGBT providing protection in case of desat failure by soft turning-off the IGBT sending an optically isolated feedback fault signal. It also provides an under voltage lock out protection to avoid trigger the IGBT with insufficient gate voltage.

The fan-in of each driver channel is a signal PWM and a reset (for fault status) TTL compatible. Fault output of each channel is open collector and can be ORed easily by a pull up resistor.

Suitable for any architecture that includes three phase bridges of IGBT's with a DC-link up to 900V covering a wide range of applications: three-phase inverters, renewable energies, traction, welding, UPS.



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ELECTRICAL CHARACTERISTICS

Description	*symbol*	*conditions & notes*	*min.*	*typ.*	*max.*	*units*
supply voltage	V_{CC}			12.0	13.2	V
supply current no load	I_{SO}			336		mA
collector emitter voltage sense across the IGBT	V_{CEmax}				900	V
isolation voltage between input-output	$V_{ISOL\ P\text{-}S}$	1 min @ 50 Hz			3000	V_{AC}
isolation voltage between outputs	$V_{ISOL\ S\text{-}S}$				2000	V_{AC}
max. Switching frequency	f_{sw_max}	Q_G=0.5µC			100	kHz
duty cicle for PWM input signals	DC		0		100	%
output power per channel	P_{DR_CH}				1.5	W
turn ON gate voltage output	V_{G_ON}		14	15		V
turn OFF gate voltage output	V_{G_OFF}		-14	-15		V
output max. peak current	$I_{out\ max\ peak}$		-8		8	A
maximum charge at IGBT gate per pulse	$Q_{Gmax/PULSE}$				1.5	µC
minimum resistance value to R_{ON} output	R_{GON_min}		3.75			Ω
minimum resistance value to R_{OFF} output	R_{GOFF_min}		3.75			Ω

MECHANICAL AND ENVIRONMENTAL CHARACTERISTICS

Description	*symbol*	*conditions & notes*	*typ.*	*units*
height	H		26	mm
width	B		130	mm
lenght	T		60	mm
weight	W		80	gr
Protection grade (EN-60529 / CEI529 / UNE-20324)			IP-00	
Humidity max.		50% RH @ 35ºC / 90% RH @ 20ºC		
Pollution degree			III	

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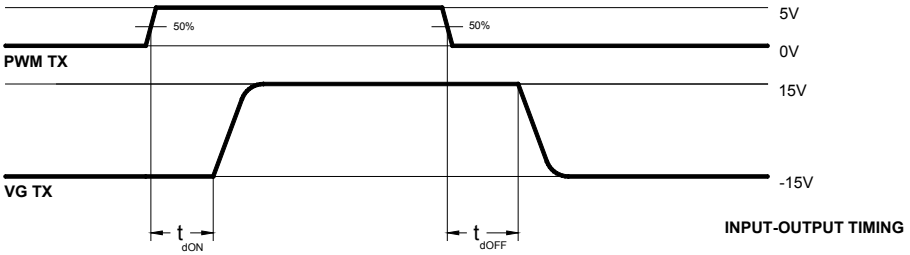
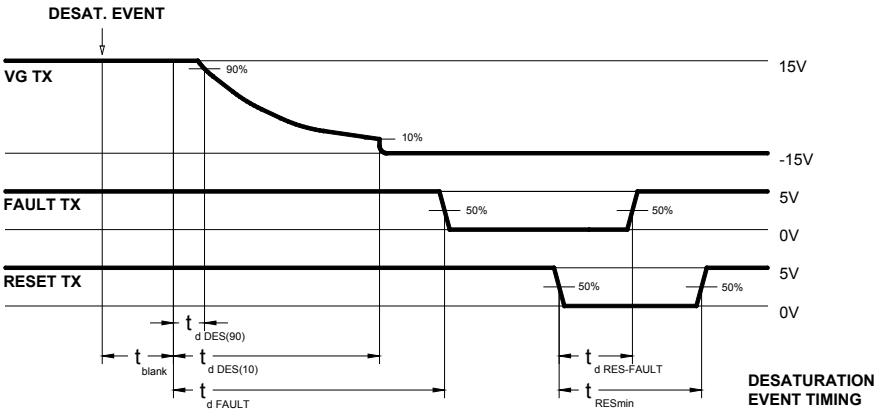
TIMMING AND LOGIC LEVELS

Description	*symbol*	*conditions & notes*	*min.*	*typ.*	*max.*	*units*
Logic low input voltages (PWM and reset)	$V_{PWM, RESET}$		-0.5		0.8	V
Logic high input voltages (PWM and reset)	$V_{PWM, RESET}$		2.0		5.5	V
Fault output current	I_{FAULT}				8	mA
Logic low input current	$I_{IN,RESET}$		-0.5	-0.4		mA
High output propagation time	$t_{d\ ON}$			440		ns
Low output propagation time	$t_{d\ OFF}$			460		ns
Desat. detection to FAULT output delay	$t_{d\ FAULT}$	C_G=10 nF		1.8	5	µs
Blanking time	t_{blank}	R_G=15 Ω			2.8	µs
Desat. detection to 90% V_{OUT} delay	$t_{d\ DES(90)}$	f_{sw}=10 kHz		0.3	0.5	µs
Desat. detection to 10% V_{OUT} delay	$t_{d\ DES(10)}$			2.0	3.0	µs
Reset to fault	$t_{d\ RES\_FAULT}$		3	7	20	µs
Minimum pulse width for RESET	PW_{RES_min}		0.1			µs



INPUT-OUTPUT TIMING



DESATURATION EVENT TIMING

VG TX reffers to the voltage at X-IGBT gate when **SCiCoreDrive72** is driving the IGBT via gate resistor. See APPLICATION.

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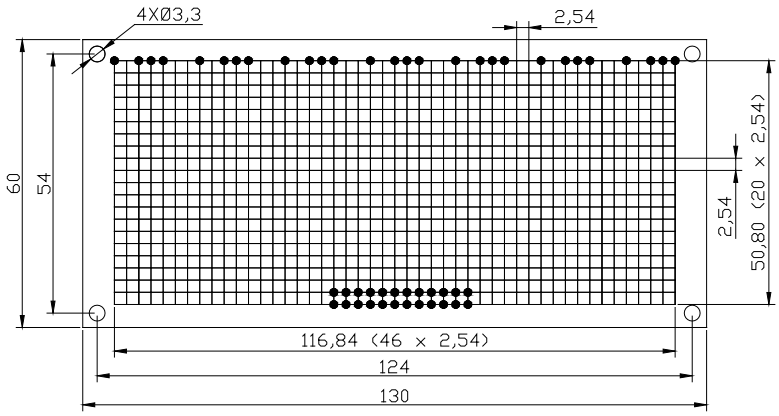
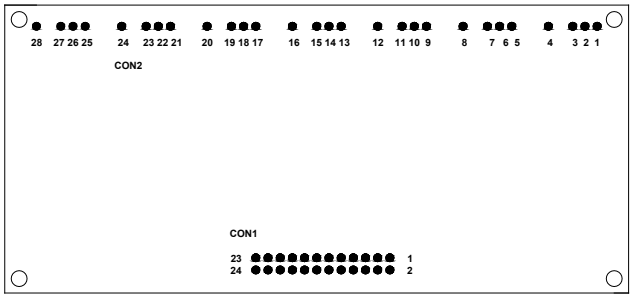
DIMENSIONAL DRAWING AND CONNECTIONS



all dimensions in mm



TOP VIEW

CON2	designation
1	EM T5
2	ROFF T5
3	RON T5
4	COL T5
5	EM T3
6	ROFF T3
7	RON T3
8	COL T3
9	EM T1
10	ROFF T1
11	RON T1
12	COL T1
13	EM T7
14	ROFF T7
15	RON T7
16	COL T7
17	EM T6
18	ROFF T6
19	RON T6
20	COL T6
21	EM T4
22	ROFF T4
23	RON T4
24	COL T4
25	EM T2
26	ROFF T2
27	RON T2
28	COL T2

CON1	designation	function	CON1	designation	function
1	FAULT T1	fault output channel 1	2	PWM T3	PWM signal input channel 3
3	RESET T1	reset input channel 1	4	RESET T3	reset input channel 3
5	PWM T1	PWM signal input channel 1	6	FAULT T3	fault output channel 3
7	GND	ground for supply and logic signals	8	PWM T5	PWM signal input channel 5
9	VCC	12 V_{DC} for supply voltage	10	RESET T5	reset input channel 5
11	5V output	5 V_{DC} auxiliary output	12	FAULT T5	fault output channel 5
13	FAULT T7	fault output channel 7	14	PWM T2	PWM signal input channel 2
15	RESET T7	reset input channel 7	16	RESET T2	reset input channel 2
17	PWM T7	PWM signal input channel 7	18	FAULT T2	fault output channel 2
19	FAULT T6	fault output channel 6	20	PWM T4	PWM signal input channel 4
21	RESET T6	reset input channel 6	22	RESET T4	reset input channel 4
23	PWM T6	PWM signal input channel 6	24	FAULT T4	fault output channel 4

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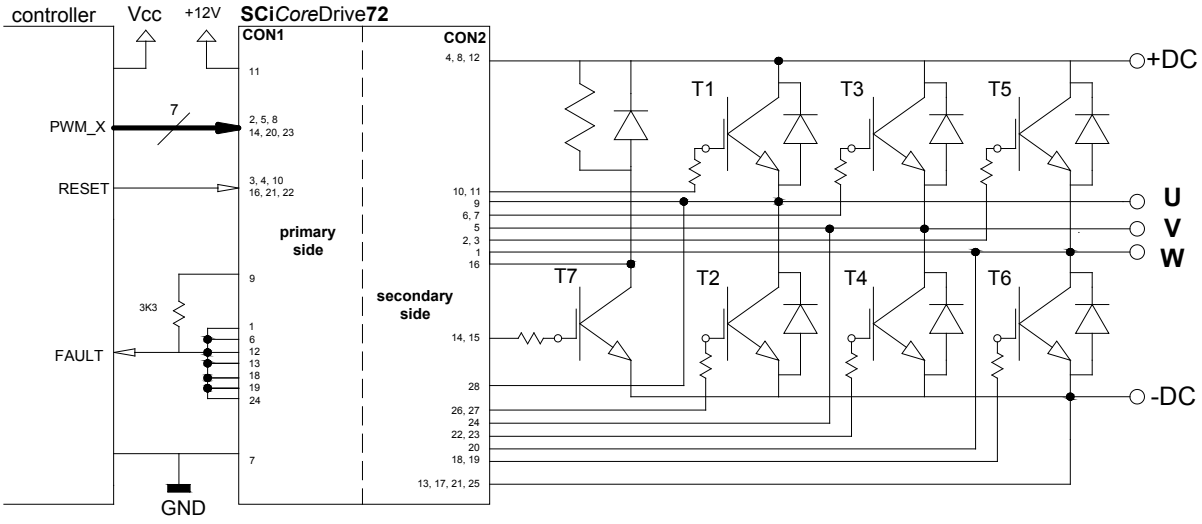
APPLICATION

SCiCoreDrive72 is designed to drive three-phase inverter bridges with additional brake arm, other configuration is possible. Each one of the 7 drivers are completely independent from each other and mantains the isolation. Below we can see the typical scheme for a three phases inverter with brake arm.

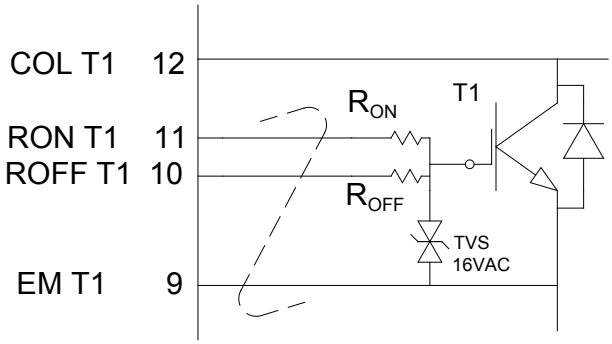


connection scheme

RECOMMENDATIONS

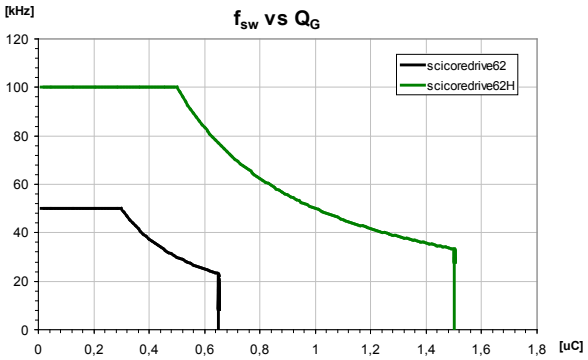
If the terminals of drived IGBT are pins or springs gate resistors and IGBT gate should be as close as possible (avoiding large tracks on PCB adaptation board). If the connection is with wires, a good practice is to twist the gate and emitter wires.

SCiCoreDrive72 offers 2 outputs for IGBT gate in order to connect different gate resistors values for turn on and off the IGBT, and no additional diodes is required. Sometimes a different performance for turn on than turn off the IGBT is better, due to inductive load. Transient voltage suppressor between gate and emitter is recommended to protect the gate against overvoltages due to parasistic gate inductances.



DETERMINING MAXIMUM ALLOWED SWITCHING FREQUENCY

There are 3 parameters in the driver that limits the switching frequency at IGBT gate: maximum switching frequency of the driver, (internal limitation of the driver), maximum gate charge per pulse (it depends of the input gate capacitance of the IGBT) and the maximum output power per channel. The last one determine the max. frequency by the following formula:



$$P_{DR\_CH}=f_{sw}\cdot Q_G\cdot(V_{G\_ON}-V_{G\_OFF})$$

FAULT DETECTION

Under normal operation, the input gate control signal (PWM TX) directly controls the IGBT TX and FAULT TX output remains in high state (if connected via pull-up resistor).

During the on state of the IGBT TX, if a voltage larger than 7 V appears in COL TX, it means that the IGBT is desaturated and it is working in active region, It can be dangerous because IGBT dissipates a lot of power in this state, then a failure condition is detected. When an IGBT fault is triggered, its corresponding IGBT is soft-turned off via ROFF TX terminal, reducing the IGBT current to zero in a controlled manner to avoid potential IGBT damage from inductive overvoltages.

Simultaneously, the fault status of the IGBT TX is transmitted back to the primary side, where the fault latch disables the gate control, and FAULT TX output is turned low.

Fault status of channel X remains low until RESET TX is activated (active low).

UVLO

The UnderVoltage LockOut (UVLO) feature is designed to prevent the application of insufficient gate voltage to the IGBT by forcing the **SCiCoreDrive72** output low during power-up. IGBTs typically require gate voltages of 15 V to achieve their rated $V_{CE(ON)}$ voltage. At gate voltages below 13 V typically, their on-voltage increases dramatically, especially at higher currents. At very low gate voltages (below 10 V), the IGBT may operate in the linear region and quickly overheat. The UVLO function causes the output to be clamped whenever insufficient operating supply is applied.

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