# 2SC0535T Description and Application Manual

Dual-Channel Cost Efficient Driver Core for IGBTs up to 3300V


## Abstract

The 2SC0535T dual-channel SCALE-2 driver core combines unrivalled compactness with broad applicability and cost efficiency. It is designed for industrial and traction applications requiring high reliability. The 2SC0535T drives all usual high-voltage IGBT modules up to 3300V. Its embedded paralleling capability allows easy inverter design covering higher power ratings. Multi-level topologies involving 1700V IGBTs with higher isolation requirements can also be easily supported by 2SC0535T.

The 2SC0535T is the most compact driver core in its voltage and power range, featuring a footprint of only 76.5 x 59.2mm and an insertion height of maximum 26mm. It allows even the most restricted insertion spaces to be efficiently used.



*Fig. 1 2SC0535T driver core*

## Contents

## Driver Overview

The 2SC0535T is a driver core equipped with CONCEPT's latest SCALE-2 chipset /1/. The SCALE-2 chipset is a set of application-specific integrated circuits (ASICs) that cover the main range of functions needed to design intelligent gate drivers. The SCALE-2 driver chipset is a further development of the proven SCALE technology /2/.

The 2SC0535T targets medium- and high-power, dual-channel IGBT applications up to 3300V. The driver supports switching up to 100kHz at best-in-class efficiency. The 2SC0535T comprises a complete dual-channel IGBT driver core, fully equipped with an isolated DC/DC converter, short-circuit protection, advanced active clamping and supply-voltage monitoring.

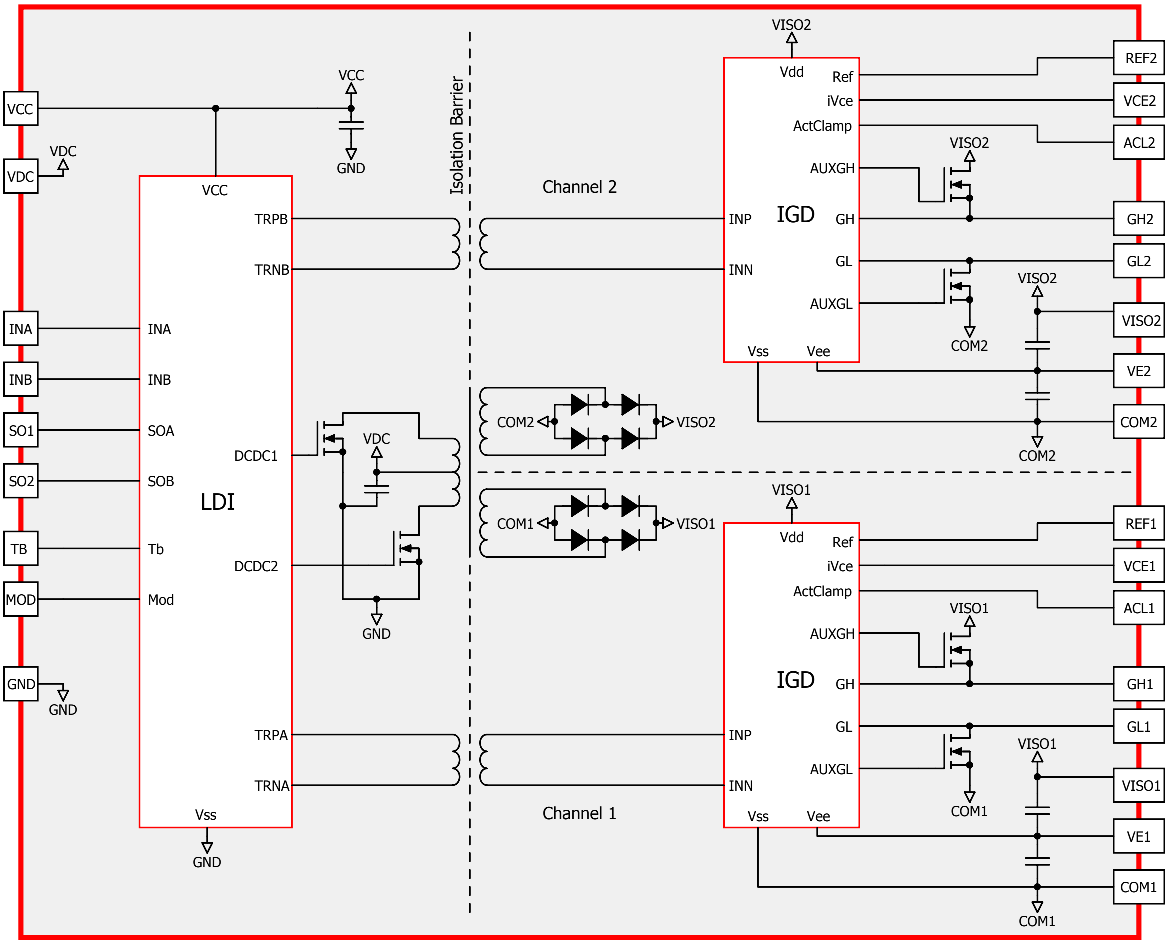


*Fig. 2 Block diagram of the driver core 2SC0535T*

## Mechanical Dimensions

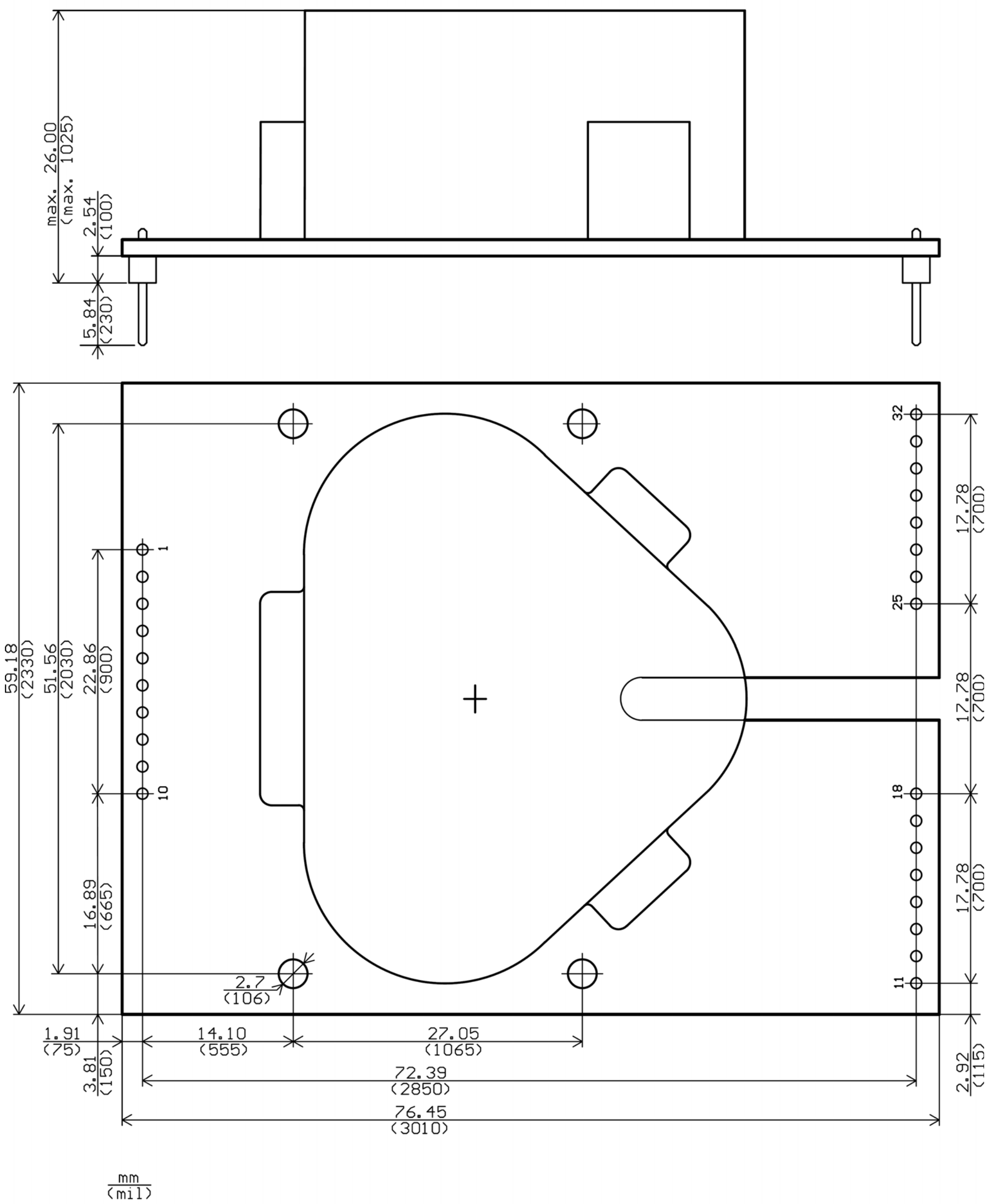


*Fig. 3 Mechanical drawing of 2SC0535T2Ax-33*

The primary side and secondary side pin grid is 2.54mm (100mil) with a pin cross section of 0.64mmx0.64mm. Total outline dimensions of the board are 59.2mmx76.5mm. The total height of the driver is maximum 26mm measured from the bottom of the pin bodies to the top of the populated PCB.

Note that the mechanical fixing points are placed in the clearance and creepage paths. Insulated fixation material (screws, distance bolts) must therefore be used in order not to reduce these.

Recommended diameter of solder pads: Ø 2mm (79 mil)
Recommended diameter of drill holes: Ø 1mm (39 mil)

## Pin Designation

| Pin No. and Name | | Function |
|---|---|---|
| **Primary Side** | | |
| 1 | VDC | DC/DC converter supply |
| 2 | SO1 | Status output channel 1; normally high-impedance, pulled down to low on fault |
| 3 | SO2 | Status output channel 2; normally high-impedance, pulled down to low on fault |
| 4 | MOD | Mode selection (direct/half-bridge mode) |
| 5 | TB | Set blocking time |
| 6 | VCC | Supply voltage; 15V supply for primary side |
| 7 | GND | Ground |
| 8 | INA | Signal input A; non-inverting input relative to GND |
| 9 | INB | Signal input B; non-inverting input relative to GND |
| 10 | GND | Ground |
| **Secondary Sides** | | |
| 11 | GL1 | Gate low channel 1; pulls gate low through turn-off resistor |
| 12 | GH1 | Gate high channel 1; pulls gate high through turn-on resistor |
| 13 | COM1 | Secondary side ground channel 1 |
| 14 | VE1 | Emitter channel 1; connect to (auxiliary) emitter of power switch |
| 15 | VISO1 | DC/DC output channel 1 |
| 16 | REF1 | Set $V_{ce}$ detection threshold channel 1; resistor to VE1 |
| 17 | VCE1 | $V_{ce}$ sense channel 1; connect to IGBT collector through resistor network |
| 18 | ACL1 | Active clamping feedback channel 1; leave open if not used |
| 19 | Free | |
| 20 | Free | |
| 21 | Free | |
| 22 | Free | |
| 23 | Free | |
| 24 | Free | |
| 25 | ACL2 | Active clamping feedback channel 2; leave open if not used |
| 26 | VCE2 | $V_{ce}$ sense channel 2; connect to IGBT collector through resistor network |
| 27 | REF2 | Set $V_{ce}$ detection threshold channel 2; resistor to VE2 |
| 28 | VISO2 | DC/DC output channel 2 |
| 29 | VE2 | Emitter channel 2; connect to (auxiliary) emitter of power switch |
| 30 | COM2 | Secondary side ground channel 2 |
| 31 | GH2 | Gate high channel 2; pulls gate high through turn-on resistor |
| 32 | GL2 | Gate low channel 2; pulls gate low through turn-off resistor |

Note: Pins with the designation “Free” are not physically present.

## Recommended Interface Circuitry for the Primary Side Connector

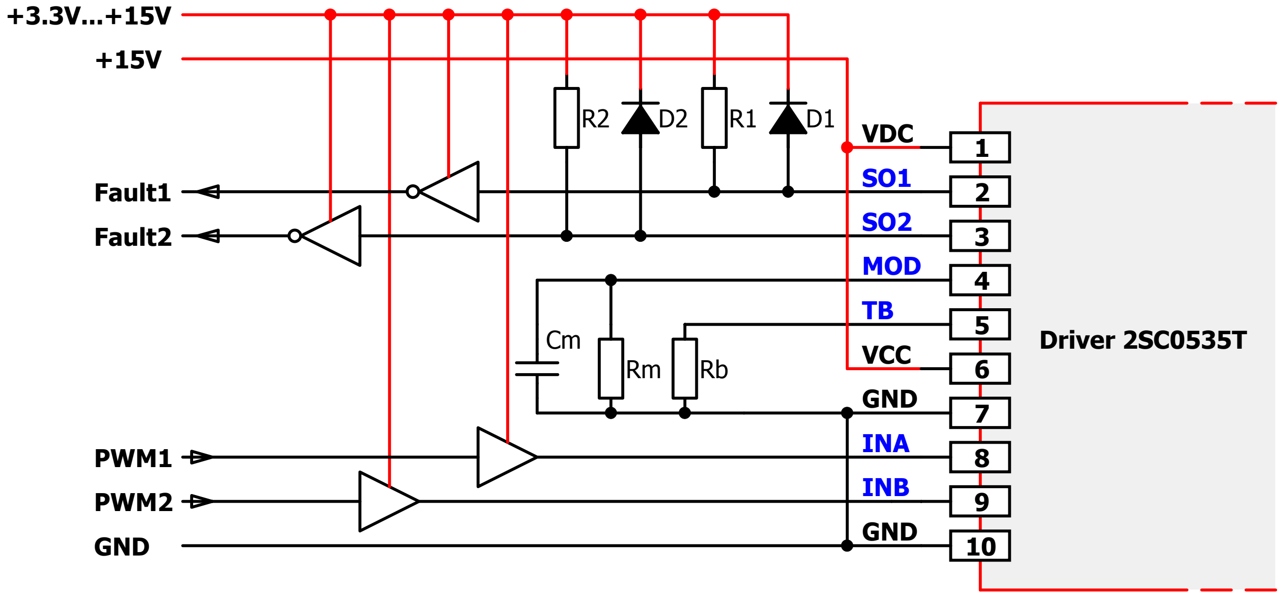


*Fig. 4 Recommended user interface of 2SC0535T (primary side)*

Both ground pins must be connected together with low parasitic inductance. A common ground plane or wide tracks are strongly recommended. The connecting distance between ground pins must be kept at a minimum.

## Description of Primary Side Interface

### General

The primary side interface of the driver 2SC0535T is very simple and easy to use.

The driver primary side is equipped with a 10-pin interface connector with the following terminals:

- 2 x power-supply terminals
- 2 x drive signal inputs
- 2 x status outputs (fault returns)
- 1 x mode selection input (half-bridge mode / direct mode)
- 1 x input to set the blocking time

All inputs and outputs are ESD-protected. Moreover, all digital inputs have Schmitt-trigger characteristics.

### VCC terminal

The driver has one VCC terminal on the interface connector to supply the primary side electronics with 15V.

## VDC terminal

The driver has one VDC terminal on the interface connector to supply the DC-DC converters for the secondary sides.

VDC should be supplied with 15V. It is recommended to connect the VCC and VDC terminals to a common +15V power supply. In this case the driver limits the inrush current at startup and no external current limitation of the voltage source for VDC is needed.

## MOD (mode selection)

The MOD input allows the operating mode to be selected with a resistor connected to GND.

### Direct mode

If the MOD input is connected to GND, direct mode is selected. In this mode, there is no interdependence between the two channels. Input INA directly influences channel 1 while INB influences channel 2. High level at an input (INA or INB) always results in turn-on of the corresponding IGBT. In a half-bridge topology, this mode should be selected only when the dead times are generated by the control circuitry so that each IGBT receives its own drive signal.

**Caution:** Synchronous or overlapping timing of both switches of a half-bridge basically shorts the DC link.

### Half-bridge mode

If the MOD input is connected to GND with a resistor $71k<R_m<181k$, half-bridge mode is selected. In this mode, the inputs INA and INB have the following functions: INA is the drive signal input while INB acts as the enable input (see Fig. 5). It is recommended to place a capacitor $C_m$=22nF in parallel to $R_m$ in order to reduce the deviation between the dead times at the rising and falling edges of INA respectively.

When input INB is low level, both channels are blocked. If it goes high, both channels are enabled and follow the signal on the input INA. At the transition of INA from low to high, channel 2 turns off immediately and channel 1 turns on after a dead time $T_d$.

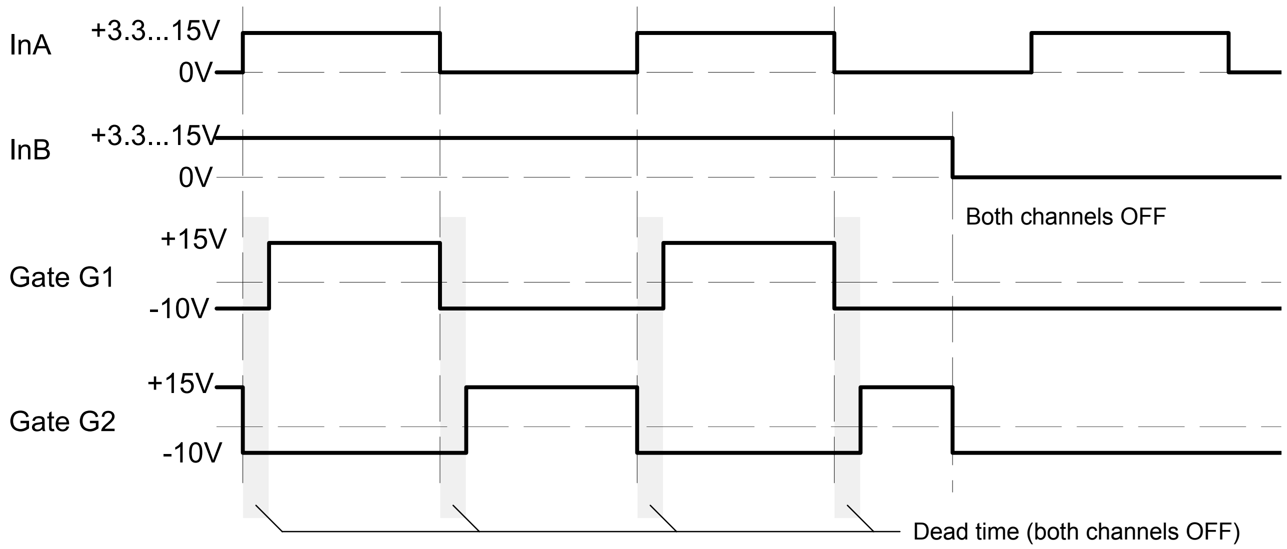


*Fig. 5 Signals in half-bridge mode*

The value of the dead time $T_d$ is determined by the value of the resistor $R_m$ according to the following formula (typical value):

$R_m[k\Omega] = 31.5 \cdot T_d[\mu s] + 52.7$ where $0.6\mu s < T_d < 4.1\mu s$ and $72k\Omega < R_m < 182k\Omega$

## INA, INB (channel drive inputs, e.g. PWM)

INA and INB are basically drive inputs, but their function depends on the MOD input (see above). They safely recognize signals in the whole logic-level range between 3.3V and 15V. Both input terminals feature Schmitt-trigger characteristics (refer to the driver data sheet /3/). An input transition is triggered at any edge of an incoming signal at INA or INB.

## SO1, SO2 (status outputs)

The outputs SOx have open-drain transistors. When no fault condition is detected, the outputs have high impedance. An internal current source of 500µA pulls the SOx outputs to a voltage of about 4V when leaved open. When a fault condition (primary side supply undervoltage, secondary side supply undervoltage, IGBT short-circuit or overcurrent) is detected, the corresponding status output SOx goes to low (connected to GND).

The diodes $D_1$ and $D_2$ must be Schottky diodes and must only be used when using 3.3V logic. For 5V…15V logic, they can be omitted.

The maximum SOx current in a fault condition must not exceed the value specified in the driver data sheet /3/.

Both SOx outputs can be connected together to provide a common fault signal (e.g. for one phase). However, it is recommended to evaluate the status signals individually to allow fast and precise fault diagnosis.

### How the status information is processed

a) A fault on the secondary side (detection of short-circuit of IGBT module or supply undervoltage) is transmitted to the corresponding SOx output immediately. The SOx output is automatically reset (returning to a high impedance state) after a blocking time $T_b$ has elapsed (refer to "TB (input for adjusting the blocking time $T_b$) for timing information).

b) A supply undervoltage on the primary side is indicated to both SOx outputs at the same time. Both SOx outputs are automatically reset (returning to a high impedance state) when the undervoltage on the primary side disappears.

## TB (input for adjusting the blocking time $T_b$)

The terminal TB allows the blocking time to be set by connecting a resistor $R_b$ to GND (see Fig. 4). The following equation calculates the value of $R_b$ connected between pins TB and GND in order to program the desired blocking time $T_b$ (typical value):

$R_b[k\Omega] = 1.0 \cdot T_b[ms] + 51$ where $20ms < T_b < 130ms$ and $71k\Omega < R_b < 181k\Omega$

The blocking time can also be set to a minimum of 9µs (typical) by selecting $R_b=0\Omega$. The terminal TB must not be left floating.

Note: It is also possible to apply a stabilized voltage at TB. The following equation is used to calculate the voltage $V_b$ between TB and GND in order to program the desired blocking time $T_b$ (typical value):

$V_b[V] = 0.02 \cdot T_b[ms] + 1.02$ where $20ms < T_b < 130ms$ and $1.42 < V_b < 3.62V$

## Recommended Interface Circuitry for the Secondary Side Connectors

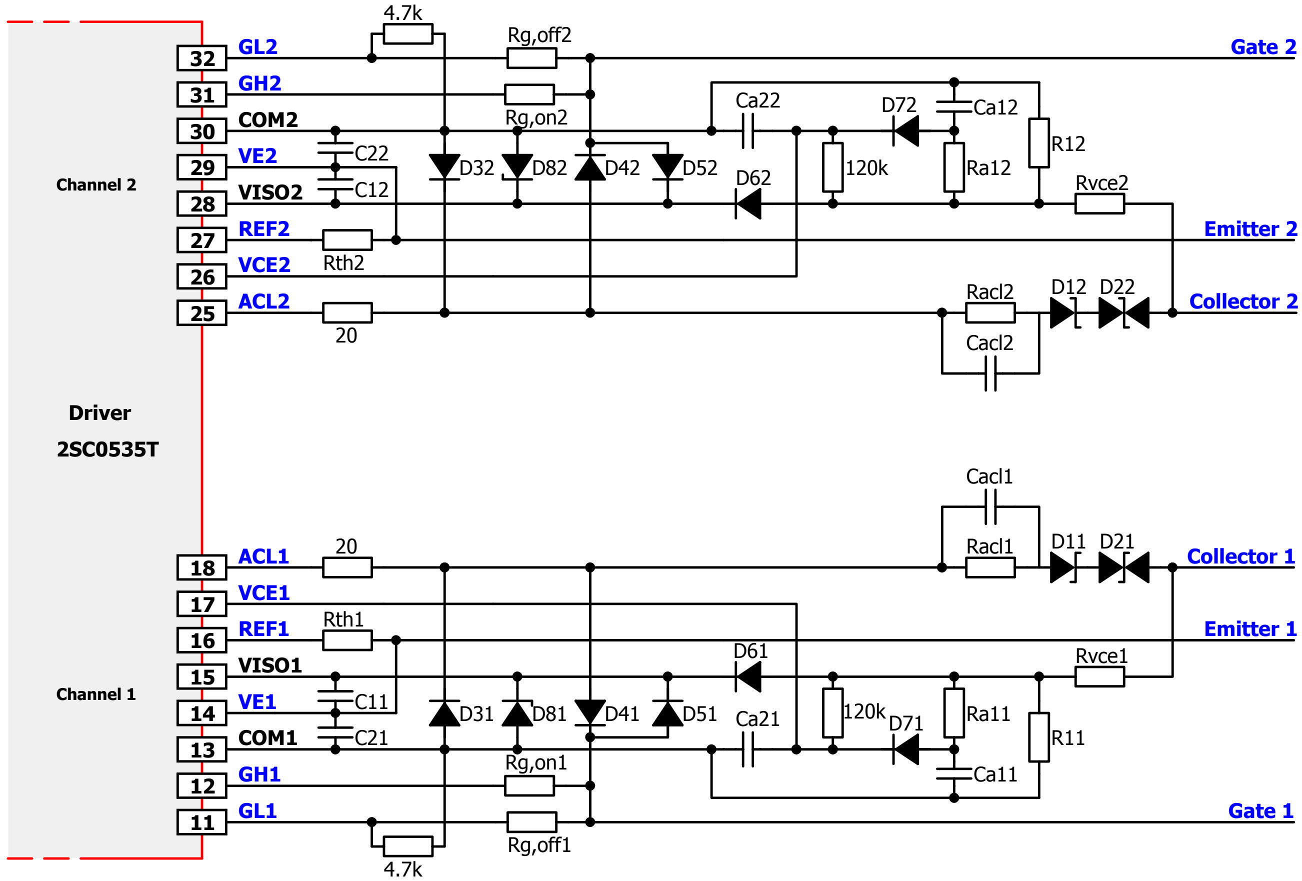


*Fig. 6 Recommended user interface of 2SC0535T with advanced active clamping (secondary sides)*

# Description of Secondary Side Interfaces

## General

Each driver's secondary side (driver channel) is equipped with an 8-pin interface connector with the following terminals (x stands for the number of the drive channel 1 or 2):

- 1 x DC/DC output terminal VISOx
- 1 x emitter terminal VEx
- 1 x reference terminal REFx for overcurrent or short-circuit protection
- 1x collector sense terminal VCEx
- 1x active clamping terminal ACLx
- 1x turn-on gate terminals GHx
- 1x turn-off gate terminals GLx

All inputs and outputs are ESD-protected.

## DC/DC output (VISOx), emitter (VEx) and COMx terminals

The driver is equipped with blocking capacitors on the secondary side of the DC/DC converter (for values, refer to the data sheet /3/).

It is recommended to insert an external capacitance of 9.4µF between the VISOx and VEx terminals ($C_{1x}$ in Fig. 6) to drive IGBT modules with a gate charge of up to 4.7µC.

For IGBTs with a higher gate charge, the following additional minimum blocking capacitance values are required for every 1µC gate charge beyond 4.7µC:

- 4µF per 1µC between VISOx and VEx ($C_{1x}$ in Fig. 6) as well as
- 2µF per 1µC between VEx and COMx ($C_{2x}$ in Fig. 6)

It is recommended to use double the overall capacitance value between VISOx and VEx than between VEx and COMx, including that already assembled on the driver.

The blocking capacitors must be connected as closely as possible to the driver's terminal pins with minimum inductance. Ceramic capacitors with a dielectric strength >20V are recommended.

If the capacitance $C_{1x}$ (resp. $C_{2x}$) exceeds 200µF (resp. 100µF), please contact CONCEPT's support service.

No static load must be applied between VISOx and VEx, or between VEx and COMx. A static load can be applied between VISOx and COMx if necessary.

A 27V zener diode with 2% tolerance (e.g. BZX384-B27 from NXP) must be placed between VISOx and COMx (D8x in Fig. 6).

## Reference terminal (REFx)

The reference terminal REFx allows the threshold to be set for short-circuit and/or overcurrent protection with a resistor placed between REFx and VEx. A constant current of 150µA is provided at pin REFx.

## Collector sense (VCEx)

The collector sense must be connected to the IGBT collector with the circuit shown in Fig. 6 in order to detect an IGBT overcurrent or short circuit.

General recommendations:

- It is recommended to dimension the resistor value of $R_{vcex}$ in order for a current of about 0.6-1mA to flow through $R_{vcex}$. The current through $R_{vcex}$ must not exceed 1mA. Either a high-voltage resistor or series-connected resistors may be used. In any case, the minimum creepage distance required for the application must be considered.
- It is recommended to use $R_{thx}$=68kΩ.
- The diode $D_{6x}$ must have a very low leakage current and a blocking voltage of > 40V (e.g. BAS416). Schottky diodes must be explicitly avoided.
- $R_{a1x}$ and $C_{a1x}$ allow the detection threshold to be optimized dynamically during IGBT turn-on as well as the response time to be adjusted. See below for recommended values.
- $R_{1x}$ allows the static threshold detection level $V_{ceth}$ to be increased if required (resistive voltage divider with $R_{vcex}$). $R_{1x}$ can be calculated as follows in order to determine a static $V_{ce}$ detection level of $V_{ceth}$:

$$R_{1x}[k\Omega] = R_{vcex}[k\Omega] \cdot \frac{0.15[mA] \cdot R_{thx}[k\Omega] + |V_{GLx}[V]|}{V_{ceth}[V] - 0.15[mA] \cdot R_{thx}[k\Omega]}$$

  $V_{GLx}$ is the absolute value of the turn-off voltage at the driver output. It depends on the driver load and can be found in the driver data sheet /3/.

- $C_{a2x}$ allows the response time (short-circuit duration) to be set.

Recommended value for 1700V IGBTs with DC-link voltages up to 1200V:

- $R_{vcex}$=1.8MΩ, $R_{thx}$=68kΩ
- $R_{1x}$, $R_{a1x}$, $C_{a1x}$, D7x not assembled
- $C_{a2x}$ must be adjusted according to Table 1 in order to obtain the required response time.

| **$C_{a2x}$ [pF]** | **Response time [µs]** |
|---|---|
| 0 | 1.5 |
| 15 | 4.9 |
| 22 | 6.5 |
| 33 | 8.9 |
| 47 | 12.2 |

*Table 1 Typical response time as a function of the capacitance $C_{a2x}$*

Recommended values for 3300V IGBTs with DC-link voltages up to 2200V:

- $R_{vcex}$=2.5MΩ
- $R_{1x}$=1.3MΩ, $R_{a1x}$=27kΩ, $C_{a1x}$=100pF, $C_{a2x}$=27pF, $R_{thx}$=68kΩ
- D7x: low-leakage diode with blocking voltage > 40V (e.g. BAS416)

This setup leads to a response time of about 6.8µs at a DC-link voltage of 2200V and a response time of about 9.4µs at a DC-link voltage of 1100V.

As the parasitic capacitances on the host PCB may influence the response time it is recommended to measure it in the final design. It is important to define a response time which is smaller than the maximum permitted short-circuit duration of the power semiconductor used.

Note that the response time can increase with decreasing DC-link voltage values.

For more details about the functionality of this feature, refer to "Vce monitoring / short-circuit protection" on page 15.

## Active clamping (ACLx)

Active clamping is a technique designed to partially turn on the power semiconductor as soon as the collector-emitter voltage exceeds a predefined threshold. The power semiconductor is then kept in linear operation.

Basic active clamping topologies implement a single feedback path from the IGBT's collector through transient voltage suppressor devices (TVS) to the IGBT gate. The 2SC0535T supports CONCEPT's advanced active clamping, where the feedback is also provided to the driver's secondary side at pin ACLx: as soon as the voltage on the right side of the 20Ω resistor (see Fig. 6) exceeds about 1.3V, the turn-off MOSFET is progressively switched off in order to improve the effectiveness of the active clamping and to reduce the losses in the TVS. The turn-off MOSFET is completely off when the voltage on the right side of the 20Ω resistors (see Fig. 6) approaches 20V (measured to COMx).

It is recommended to use the circuit shown in Fig. 6. The following parameters must be adapted to the application:

- TVS $D_{1x}$, $D_{2x}$: it is recommended to use:
  - Six 220V TVS with 1700V IGBTs with DC-link voltages up to 1200V. Good clamping results can be obtained with five unidirectional TVS P6SMB220A and one bidirectional TVS P6SMB220CA from Diotec or five unidirectional TVS SMBJ188A-E3 and one bidirectional TVS SMBJ188CA-E3 from Vishay.
  - Eight 300V TVS with 3300V IGBTs with DC-link voltages up to 2200V. Good clamping results can be obtained with seven unidirectional TVS P6SMB300A and one bidirectional TVS P6SMB300CA from Diotec.

  At least one bidirectional TVS ($D_{2x}$) per channel (≥220V for 1700V IGBTs and ≥300V for 3300V IGBTs) must be used in order to avoid negative current flowing through the TVS chain during turn-on of the antiparallel diode of the IGBT module due to its forward recovery behavior. Such a current could, depending on the application, lead to undervoltage of the driver secondary voltage VISOx to VEx (15V).

  Note that it is possible to modify the number of TVS in a chain. The active clamping efficiency can be improved by increasing the number of TVS used in a chain if the total threshold voltage remains at the same value. Note also that the active clamping efficiency is highly dependent on the type of TVS used (e.g. manufacturer).

- $R_{aclx}$ and $C_{aclx}$: These parameters allow the effectiveness of the active clamping as well as the losses in the TVS and the IGBT to be optimized. It is recommended to determine the value with measurements in the application. Typical values are: $R_{aclx}$=0…150Ω and $R_{aclx}$*$C_{aclx}$=100ns…500ns. $R_{aclx}$=0Ω is recommended to improve the effectiveness of active clamping.

- $D_{3x}$, $D_{4x}$ and $D_{5x}$: it is recommended to use Schottky diodes with blocking voltages >35V (>1A depending on the application).

  Please note that the 20Ω resistor as well as diodes $D_{3x}$, $D_{4x}$ and $D_{5x}$ must not be omitted if advanced active clamping is used. If advanced active clamping is not used, the 20Ω resistor as well as diodes $D_{3x}$ and $D_{4x}$ can be omitted.

## Gate turn-on (GHx) and turn-off (GLx) terminals

These terminals allow the turn-on (GHx) and turn-off (GLx) gate resistors to be connected to the gate of the power semiconductor. The GHx and GLx pins are available as separated terminals in order to set the turn-on and turn-off resistors independently without the use of an additional diode. Please refer to the driver data sheet /3/ for the limit values of the gate resistors used.

A resistor between GLx and COMx of 4.7k (other values are also possible) may be used in order to provide a low-impedance path from the IGBT gate to the emitter/source even if the driver is not supplied with power. No static load (e.g. resistors) must be placed between GLx and the emitter terminal VEx.

Note however that it is not advisable to operate the power semiconductors within a half-bridge with a driver in the event of a low supply voltage. Otherwise, a high rate of increase of $V_{ce}$ may cause partial turn-on of these IGBTs.

# How Do 2SC0535T SCALE-2 Drivers Work in Detail?

## Power supply and electrical isolation

The driver is equipped with a DC/DC converter to provide an electrically insulated power supply to the gate driver circuitry. All transformers (DC/DC and signal transformers) feature safe isolation to EN 50178, protection class II as well as EN 50124 between primary side and either secondary side.

Note that the driver requires a stabilized supply voltage.

## Power-supply monitoring

The driver's primary side as well as both secondary-side driver channels are equipped with a local undervoltage monitoring circuit.

In the event of a primary-side supply undervoltage, the power semiconductors are driven with a negative gate voltage to keep them in the off-state (the driver is blocked) and the fault is transmitted to both outputs SO1 and SO2 until the fault disappears.

In case of a secondary-side supply undervoltage, the corresponding power semiconductor is driven with a negative gate voltage to keep it in the off-state (the channel is blocked) and a fault condition is transmitted to the corresponding SOx output. The SOx output is automatically reset (returning to a high impedance state) after the blocking time.

## IGBT and MOSFET operation mode

The driver features two operation modes:

- The first mode is the default IGBT setup with both a positive (regulated) turn-on voltage of 15V (typical) and a second (non-regulated) turn-off voltage (see Fig. 6).
- The second mode has been specifically designed for ultra-fast MOSFET switching. It incorporates a single turn-on voltage only. The turn-off voltage is set to 0V. This MOSFET mode is activated by connecting the secondary-side terminals COMx and VEx. If 2SC0535T drivers are to be used in the MOSFET mode, please refer to the application note AN-1101 /4/ on www.IGBT-Driver.com/go/app-note.

## $V_{ce}$ monitoring / short-circuit protection

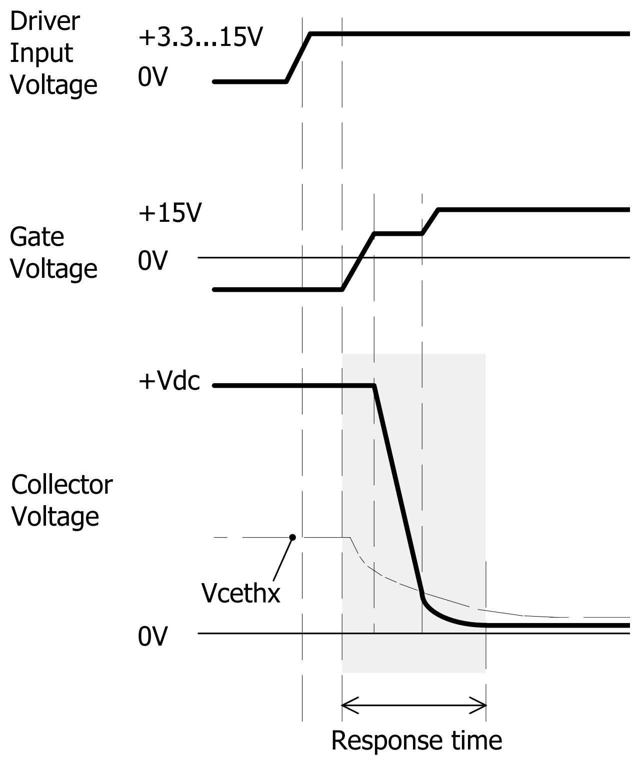


*Fig. 7 Turn-on characteristic of an IGBT*

Each channel of the 2SC0535T driver is equipped with a $V_{ce}$ monitoring circuit. The recommended external circuitry is shown in Fig. 6. A resistor ($R_{thx}$ in Fig. 6) is used as the reference element for defining the static turn-off threshold together with $R_{vcex}$ and $R_{1x}$. The value of the current flowing through $R_{thx}$ is 150µA (typical). It is recommended to choose threshold levels of about 10V for 1700V IGBTs or 50V for 3300V IGBTs. In this case, the driver will safely protect the IGBT against short circuit, but not necessarily against overcurrent. Overcurrent protection has a lower timing priority and it is recommended to realize it within the host controller.

During the response time, the $V_{ce}$ monitoring circuit is inactive. The response time is the time that elapses after turn-on of the power semiconductor until the collector voltage is measured (see Fig. 7).

Both IGBT collector-emitter voltages are measured individually. $V_{ce}$ is checked after the response time at turn-on to detect a short circuit or overcurrent. If the measured $V_{ce}$ at the end of the response time is higher than the dynamic threshold $V_{cethx}$, the driver detects a short circuit or overcurrent. The driver then turns the corresponding power semiconductor off. The fault status is immediately transferred to the corresponding SOx output of the affected channel. The power semiconductor is kept in the off state (non-conducting) and the fault is shown at pin SOx as long as the blocking time $T_b$ is active.

The blocking time $T_b$ is applied independently to each channel. $T_b$ starts as soon as $V_{ce}$ exceeds the threshold of the $V_{ce}$ monitoring circuit outside the response time span.

## Desaturation protection with sense diodes

If desaturation protection with sense diodes is required with the 2SC0535T, please refer to the application note AN-1101 /4/ on www.IGBT-Driver.com/go/app-note. Note that desaturation protection with sense diodes is not recommended for IGBT modules with voltage classes >1700V.

## Parallel connection of 2SC0535T

If parallel connection of 2SC0535T drivers is required, please refer to the application note AN-0904 /5/ on www.IGBT-Driver.com/go/app-note.

## 3-level or multilevel topologies

If 2SC0535T drivers are to be used in 3-level or multilevel topologies, please refer to the application note AN-0901 /6/ on www.IGBT-Driver.com/go/app-note.

## Bibliography


/1/ "Smart Power Chip Tuning", Bodo's Power Systems, May 2007

/2/ "Description and Application Manual for SCALE Drivers", CONCEPT

/3/ Data sheet SCALE-2 driver core 2SC0535T, CONCEPT

/4/ Application note AN-1101: Application with SCALE-2 Gate Driver Cores, CONCEPT

/5/ Application note AN-0904: Direct Paralleling of SCALE-2 Gate Driver Cores, CONCEPT

/6/ Application note AN-0901: Methodology for Controlling Multi-Level Converter Topologies with SCALE-2 IGBT Drivers, CONCEPT


**Note**: These papers are available on the Internet at www.IGBT-Driver.com/go/papers

## The Information Source: SCALE-2 Driver Data Sheets

CONCEPT offers the widest selection of gate drivers for power MOSFETs and IGBTs for almost any application requirements. The largest website on gate-drive circuitry anywhere contains all data sheets, application notes and manuals, technical information and support sections: www.IGBT-Driver.com

## Quite Special: Customized SCALE-2 Drivers

If you need an IGBT driver that is not included in the delivery range, please don't hesitate to contact CONCEPT or your CONCEPT sales partner.

CONCEPT has more than 25 years experience in the development and manufacture of intelligent gate drivers for power MOSFETs and IGBTs and has already implemented a large number of customized solutions.

## Technical Support

CONCEPT provides expert help with your questions and problems:

www.IGBT-Driver.com/go/support

## Quality

The obligation to high quality is one of the central features laid down in the mission statement of CT-Concept Technologie AG. The quality management system covers all stages of product development and production up to delivery. The drivers of the SCALE-2 series are manufactured to the ISO9001:2000 quality standard.

## Legal Disclaimer

This data sheet specifies devices but cannot promise to deliver any specific characteristics. No warranty or guarantee is given – either expressly or implicitly – regarding delivery, performance or suitability.

CT-Concept Technologie AG reserves the right to make modifications to its technical data and product specifications at any time without prior notice. The general terms and conditions of delivery of CT-Concept Technologie AG apply.

## Ordering Information

The general terms and conditions of delivery of CT-Concept Technologie AG apply.

| Type Designation | Description |
|---|---|
| 2SC0535T2A0-33 | Dual-channel SCALE-2 driver core |

Product home page: www.IGBT-Driver.com/go/2SC0535T

Refer to www.IGBT-Driver.com/go/nomenclature for information on driver nomenclature

## Information about Other Products

**For other driver cores:**

Direct link: www.IGBT-Driver.com/go/cores

**For other drivers, product documentation, evaluation systems and application support**

Please click onto: www.IGBT-Driver.com

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