

ISO5125I Data Sheet

High-Voltage Insulated DC/DC Power Supply for SCALE™-2 Gate Drivers for 3.3kV, 4.5kV and 6.5kV IGBT Modules

Abstract

The ISO5125I is a single-channel insulated DC/DC converter suitable as a power supply for IGBT drivers up to 6.5kV. Its output power of 5W enables switching frequencies up to 5kHz for 6.5kV/750A IGBTs. The ISO5125I complements the 1SP0335 high-voltage IGBT drivers.

For drivers adapted to various types of high-power and high-voltage IGBT modules, refer to www.power.com/go/plug-and-play



Fig. 1 Power Supply ISO5125I

Features

- ✓ Electrical insulation up to 18kV_{AC}
- ✓ Creepage distance 60mm
- ✓ Output power 5W
- ✓ No electrolytic capacitors
- ✓ Shortens application development time
- ✓ Outstanding coupling capacitance 4pF
- ✓ Extremely reliable; long service life

Applications

- ✓ Traction
- ✓ Railroad power supplies
- ✓ Light rail vehicles
- ✓ Industrial drives
- ✓ HVDC
- ✓ Flexible AC transmission systems (FACTS)
- ✓ Medium-voltage converters

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Safety Notice!

The data contained in this data sheet is intended exclusively for technically trained staff. Handling all high-voltage equipment involves risk to life. Strict compliance with the respective safety regulations is mandatory!

Any handling of electronic devices is subject to the general specifications for protecting electrostatically sensitive devices according to international standard IEC 60747-1, Chapter IX or European standard EN 100015 (i.e. the workplace, tools, etc. must comply with these standards). Otherwise, this product may be damaged.

Mechanical Dimensions

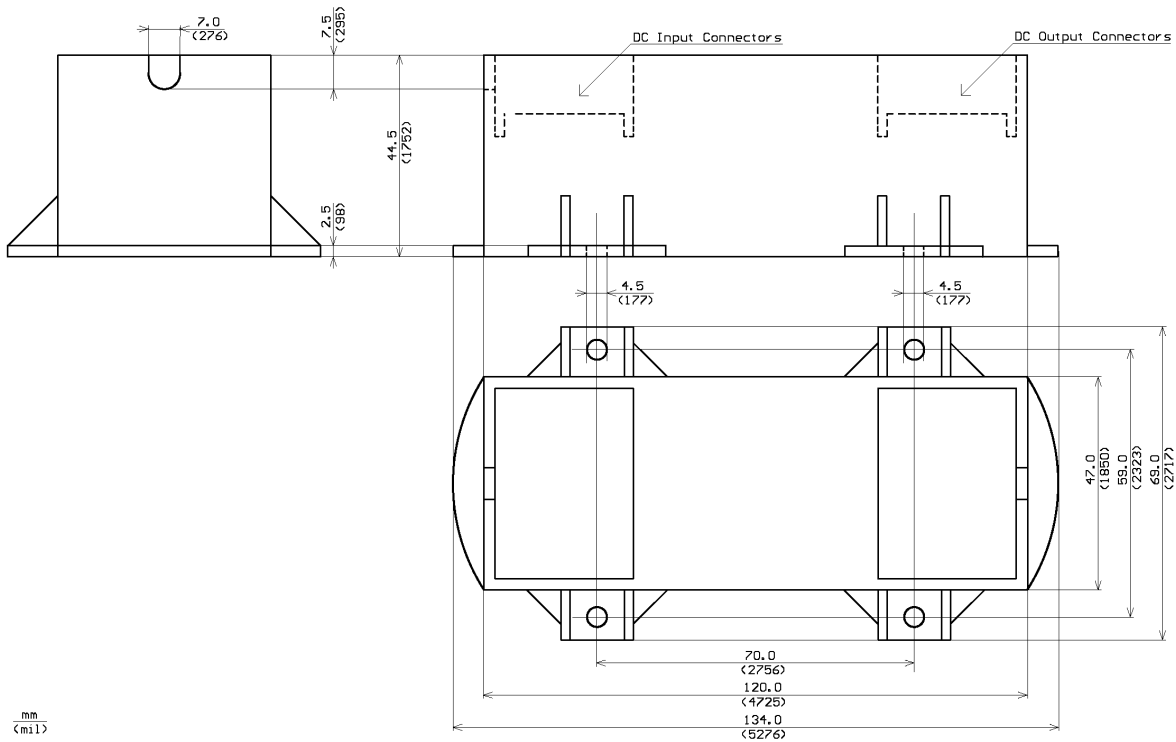


Fig. 2 Mechanical Drawing ISO5125I

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Input and Output Connectors

DC Input

Two DC input connectors X0 and X0S are available (see Fig. 3 below):

X0

1 = GND-IN
3 = GND-IN

2 = V_{IN} (+15V referred to GND-IN)

Manufacturer: ERNI, order code 284696. Link: www.power.com/gate-driver/go/ext_erni

X0S

1 = GND-IN

2 = V_{IN} (+15V referred to GND-IN)

Manufacturer: SAURO, order code MSB02005.

DC Output

Two DC output connectors X1 and X1S are available (see Fig. 3 below):

X1

1 = GND-OUT
3 = V_{OUT} (+25V referred to GND-OUT)

2 = V_{OUT} (+25V referred to GND-OUT)
4 = GND-OUT

Manufacturer: ERNI, order code 284697. Link: www.power.com/gate-driver/go/ext_erni

X1S

1 = GND-OUT

2 = V_{OUT} (+25V referred to GND-OUT)

Manufacturer: SAURO, order code MSB02005.

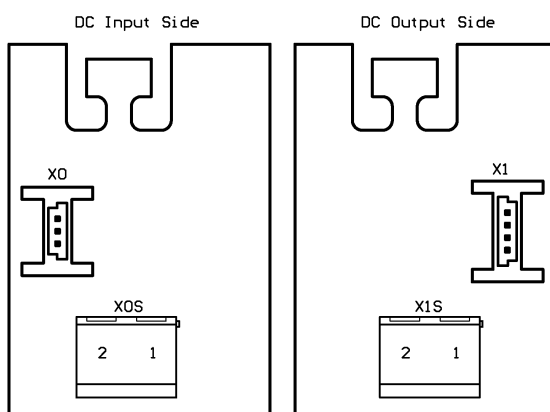


Fig. 3 View of the DC input and output connector sides

Pin 1 and designators IN and OUT are labeled on the PCB.

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Recommended Cables

The following cables for the X0 and X1 interfaces are recommended and may be ordered from Power Integrations:

Accessories	Interface	Length/Type	Power Integrations Ordering Number
Cable (Input, 3-pin)	X0	100cm	MBC31-100-0
Cable (Output, 4-pin)	X1	35cm	MBC41-035-0
Cable (Output, 4-pin)	X1	45cm	MBC41-045-0
Cable (Output, 4-pin)	X1	70cm	MBC41-070-0
Cable (Output, 4-pin)	X1	110cm	MBC41-110-0

Refer to www.power.com/gate-driver/go/ext_erni for more information

All cables are delivered with straight plugs on both sides.

Please note that the interface cable X1 carries high potential. The voltage rating of the recommended cables is only 300V. They must therefore be isolated. The user is fully responsible for providing adequate isolation to the delivered cables.

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Absolute Maximum Ratings

Parameter	Remarks	Min	Max	Unit
Input voltage	V_{IN} to GND-IN (Note 1)	0	16	V
Average output current	Note 2		200	mA
Average input current	Note 3		500	mA
Output power	Note 2		5	W
External blocking capacitance	Between V_{OUT} and GND-OUT		330	μ F
Dielectric test voltage	50Hz/1min			
for ISO5125I-45			7.4	kV _{RMS}
for ISO5125I-65			10.2	kV _{RMS}
for ISO5125I-100			15.2	kV _{RMS}
for ISO5125I-120			18.0	kV _{RMS}
Operating temperature		-40	85	$^{\circ}$ C
Storage temperature		-40	90	$^{\circ}$ C

Recommended Operating Conditions

Power Supply	Remarks	Min	Typ	Max	Unit
Supply voltage V_{IN}	To GND-IN (Note 1)	14.5	15	15.5	V

Electrical Characteristics

All data refer to +25 $^{\circ}$ C and an input voltage of V_{IN} =15V, unless otherwise specified.

Input Characteristics	Remarks	Min	Typ	Max	Unit
Input current	Without load (Note 4)	30	55	130	mA
	Load 50mA		142		mA
	Load 100mA		230		mA
	Load 200mA		395		mA
Turn-on threshold	Note 5		11.9		V
Turn-off threshold	Note 5		11.7		V
Output Characteristics	Remarks	Min	Typ	Max	Unit
Output voltage	No load (Note 1)		32		V
	Load 50mA (Note 1)		26.4		V
	Load 100mA (Note 1)		26		V
	Load 200mA (Note 1)		24.8		V
Output resistance	Notes 1, 2, 6		10.5		Ω
Internal blocking capacitance	Between V_{OUT} and GND-OUT		23		μ F

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Electrical Insulation	Remarks	Min	Typ	Max	Unit
ISO5125I-45:					
Operating voltage	Note 7			4.5	kV _{peak}
Dielectric test voltage (50Hz/1min)	Note 8			7.4	kV _{RMS}
Partial discharge ext. voltage	Note 9	3.6			kV _{RMS}
ISO5125I-65:					
Operating voltage	Note 7			6.5	kV _{peak}
Dielectric test voltage (50Hz/1min)	Note 8			10.2	kV _{RMS}
Partial discharge ext. voltage	Note 9	5.1			kV _{RMS}
ISO5125I-100:					
Operating voltage	Note 7			10.0	kV _{peak}
Dielectric test voltage (50Hz/1min)	Note 8			15.2	kV _{RMS}
Partial discharge ext. voltage	Note 9	7.8			kV _{RMS}
ISO5125I-120:					
Operating voltage	Note 7			12.0	kV _{peak}
Dielectric test voltage (50Hz/1min)	Note 8			18.0	kV _{RMS}
Partial discharge ext. voltage	Note 9	9.4			kV _{RMS}
Creepage distance	Note 10	60			mm
Clearance distance	Note 10	52			mm
Coupling capacitance	Between V _{IN} and V _{OUT}		4		pF

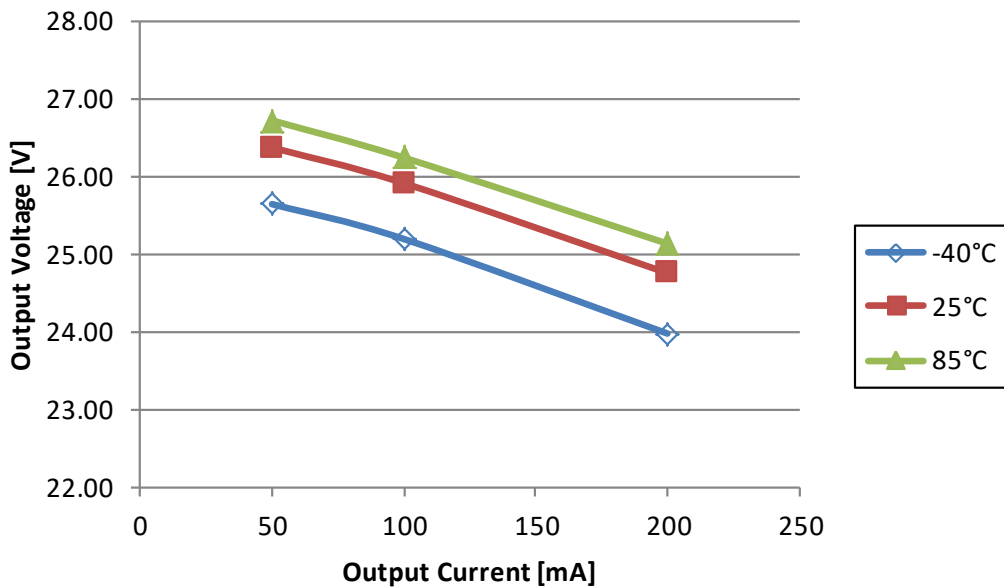


Fig. 4 Output Characteristics with V_{IN}=15V

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Footnotes to the key data

- 1) The output voltage is not regulated and tracks the input voltage. Input voltages higher than those specified can lead to destruction of the DC/DC converter or the gate driver.
- 2) The output voltage is not regulated and decreases with increasing load current. The DC/DC converter is not protected against overload.
- 3) Refers to the static case. The input current increases with decreasing temperature. The maximum value refers to an operating temperature of -40°C.
- 4) Refers to the static case without load. The input current increases with decreasing temperature. The maximum value refers to an operating temperature of -40°C.
- 5) Under-voltage monitoring of the input voltage. For a voltage lower than this limit, the DC/DC converter is switched off.
- 6) For an output current in the range of 50mA to 200mA. (For SCALE-2 high-voltage IGBT driver 1SP0335, the standby supply current is 45mA.)
- 7) Maximum continuous or repeatedly applied DC voltage or peak value of the repeatedly applied AC voltage between input and output or between input or output and the mounting plane.
- 8) The dielectric test voltage may be applied only once during one minute. It should be noted that with this (strictly speaking obsolete) test method, some (minor) damage occurs to the insulation layers due to the partial discharge. Consequently, this test is not performed at Power Integrations as a series test. In the case of repeated insulation tests (e.g. module test, equipment test, system test), the subsequent tests should be performed with a lower test voltage: the test voltage is reduced by 10% for each additional test. The more modern if more elaborate partial-discharge measurement is better suited than such test methods as it is almost entirely non-destructive.
- 9) The transformer of every production sample shipped to customers has undergone 100% testing at the given value or higher.
- 10) Distance between input and output or between input or output and the mounting plane. Mounting screws have not been considered.

Legal Disclaimer

The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. All parameters, numbers, values and other technical data included in the technical information were calculated and determined to our best knowledge in accordance with the relevant technical norms (if any). They may base on assumptions or operational conditions that do not necessarily apply in general. We exclude any representation or warranty, express or implied, in relation to the accuracy or completeness of the statements, technical information and recommendations contained herein. No responsibility is accepted for the accuracy or sufficiency of any of the statements, technical information, recommendations or opinions communicated and any liability for any direct, indirect or consequential loss or damage suffered by any person arising therefrom is expressly disclaimed.

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Ordering Information

Our international terms and conditions of sale apply

IGBT voltage class	DC/DC converter type #
3300V/4500V	ISO5125I-45
6500V	ISO5125I-65
6500V Multilevel	ISO5125I-100
6500V Multilevel	ISO5125I-120

Product home page: www.power.com/go/ISO5125I

Information about Other Products

For other drivers, evaluation systems product documentation and application support

Please click: www.power.com/gate-driver

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