SPDC5W

5 W isolated DC-DC converter module

Datasheet - preliminary data

Features

- Input voltage: 10 to 36 V
- 2 isolated output voltages:
  - +15 V / +10 V for SPDC5WI, 200 mA
  - +20 V / +5 V for SPDC5WS, 200 mA
- Input / output overvoltage protection
- Max. voltage ripple: < 10%
- Shutdown input
- Low quiescent current
- Trimmed oscillator for precise frequency control
- Automatic feed forward compensation
- Internally trimmed reference with undervoltage lockout
- Low start-up and operating current
- 6000 VAC isolation
- Compliant with IEC 60747-5-2 and UL1577
- Dimensions: 23.0 x 22.0 x 15.0 mm

Applications

- Industrial
- Battery operated equipment

Description

This DC-DC converter module is able to generate two isolated voltage outputs with an isolation up to 6 kV.

This device provides current limit control of high source (or sink) peak currents thanks to an internal PWM comparator and a totem pole output stage. Minimal external parts are required, making the final DC-DC isolated module very compact in size.

The ideal use of the device is to provide proper voltage levels to high voltage power transistors - IGBTs for SPDC5WI or MOSFETs for SPDC5WS - in Gate driving switching applications.

The device can also find application in handheld battery operated equipment, communication systems and power delivery modules.

It comes ready to use with an optimized internal layout and, as it is composed of discrete ICs, can be easily re-engineered for custom requirements.

1 Introduction

This DC-DC isolated module provides power supply for Gate Drivers directly from the DC bus (i.e., at 24 V) commonly used in industrial applications.

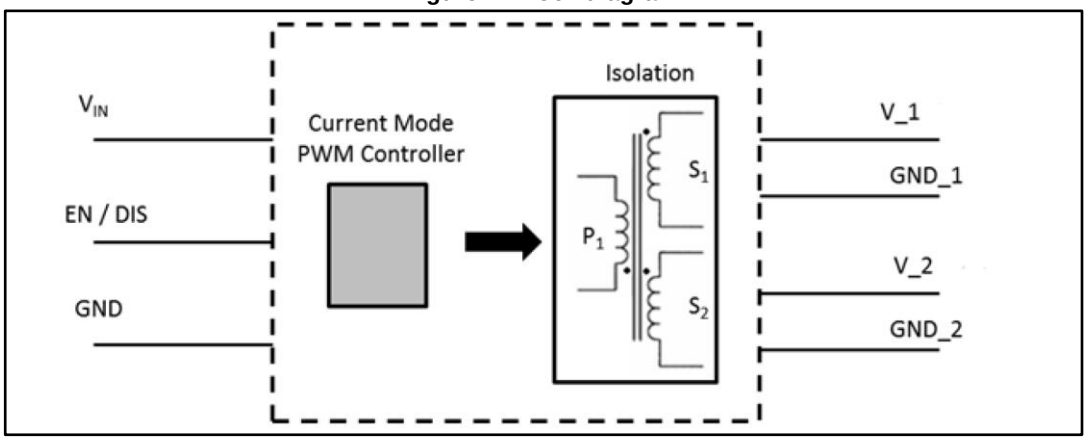
This solution allows reduced development times with a plug and play block that is already optimized in terms of efficiency and form factor. Another competitive advantage for designers is IEC 60747-5-2 and UL 1577 compliance.

Input voltages from 10 to 36 V again render this module ideal for use in industrial environments.

1.1 Block diagram

The block diagram below shows how the DC-DC converter module works, with its main blocks and IO.

Figure 1: Block diagram



1.2 Product version

Outputs, having different ground, can carry out up to 200 mA.

- SPDC5WI: V_1 +15V and V_2 +10V; typically used to drive IGBT gates.
- SPDC5WS: V_1 +20V and V_2 +5V; typically used to drive MOSFETs.

1.3 Pin connections

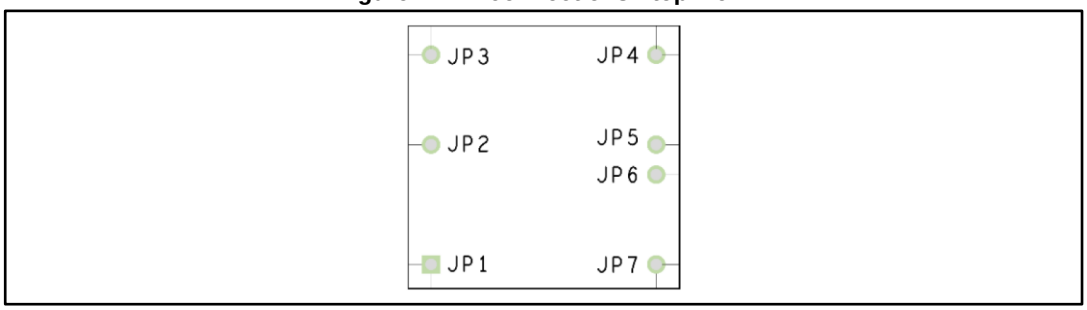
The table and figure below describe the pins assignments.

Table 1: Pin numbering

Pin number	Function	Description
JP1	Vin	Converter input supply pin. Operative voltage 10 - 36 V DC
JP2	Enable / Disable	a voltage > 1.5 V disables the SPDC5WX converter
JP3	GND	Ground pin
JP4	Vout1	Regulated output V1. Typically +15 V for SPDC5WI and +20 V for SPDC5WS
JP5	Vout1-	Output ground reference for V1
JP6	Vout2	Regulated output V2. Typically +10 V for SPDC5WI and +5V for SPDC5WS
JP7	Vout2-	Output ground reference for V2

Information in the above table may subject to changes as the DC-DC converter module is not at the commercial maturity state (prototype).

Figure 2: Pin connections - top view



2 Absolute maximum ratings

The table below summarizes the absolute maximum ratings for the DC-DC converter module.

Table 2: Absolute maximum ratings

Symbol	Description	Value	Unit
V_{IN}	Supply voltage	36	V
I_{OUT}	Output current of the DC-DC converter module (per channel)	200	mA
En	Enable voltage	- 0.5 to 10	V
T_{ON}	Operating temperature range	- 40 to 85	°C
T_{stg}	Storage temperature range	- 40 to 85	°C
V_{IS}	Isolation voltage	6000	VAC
V_{LOAD}	Load voltage regulation	10	%
W_E	Weight	14	g

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3 Electrical characteristics

Only the main input / output characteristics regarding the current mode PWM controller device are provided in the following tables.

Table 3: Electrical characteristics at T_{amb} = - 25 to 85 °C, unless otherwise specified.

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{st}	Start-up current	V_{IN} = 6.5 V		0.4	0.6	mA
V_{st}	Start-up voltage	SPDC5WX	9	11	12	V
V_{IN}	Input voltage		10	24	36	V
V_{OUT1}	Output voltage 1	SPDC5WI	13.5	15	16.5	V
V_{OUT2}	Output voltage 2		9	10	11	V
V_{OUT1}	Output voltage 1	SPDC5WS	18	20	22	V
V_{OUT2}	Output voltage 2		4.55	5	5.45	V
V_{oli}	Line voltage regulation	Low to high line			± 2	%
f_{OSC}	Switching frequency			150		kHz
Ehi	SPDC5WX disabled	Enable High	1.5		5	V
Elow	SPDC5WX enabled	Enable Low	0		0.3	V
η	Efficiency			79		%
η	Efficiency	At V_{IN} = 10 V Full load		80		%
I_O	Output current	At V_{IN} = 36 V Full load	0		200	mA
C_L	Capacitive load			100		µF
Ripple	Output ripple				200	mVpp

Information in the above table may subject to changes as the DC-DC converter module is not at the commercial maturity state (prototype).

4 Package information

Figure 3: Package drawing (sample image)

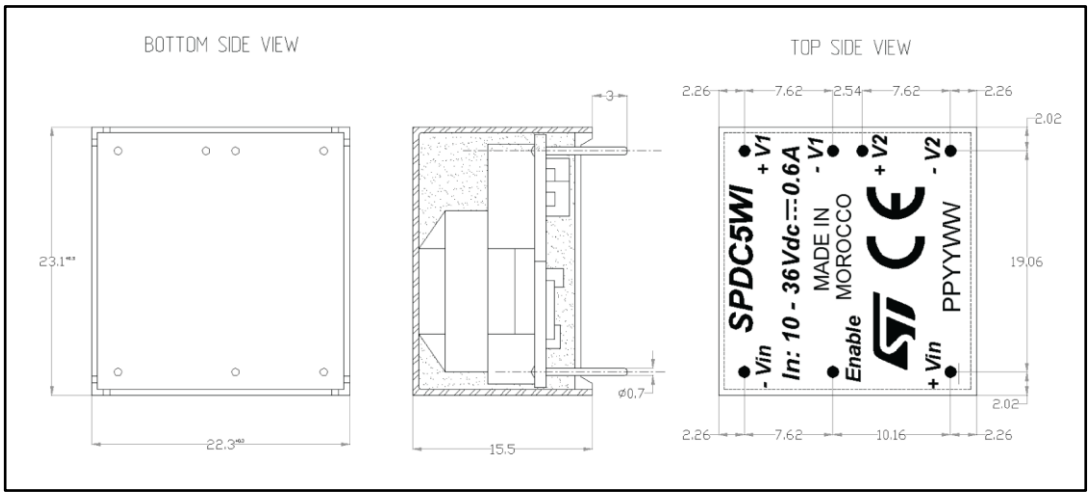
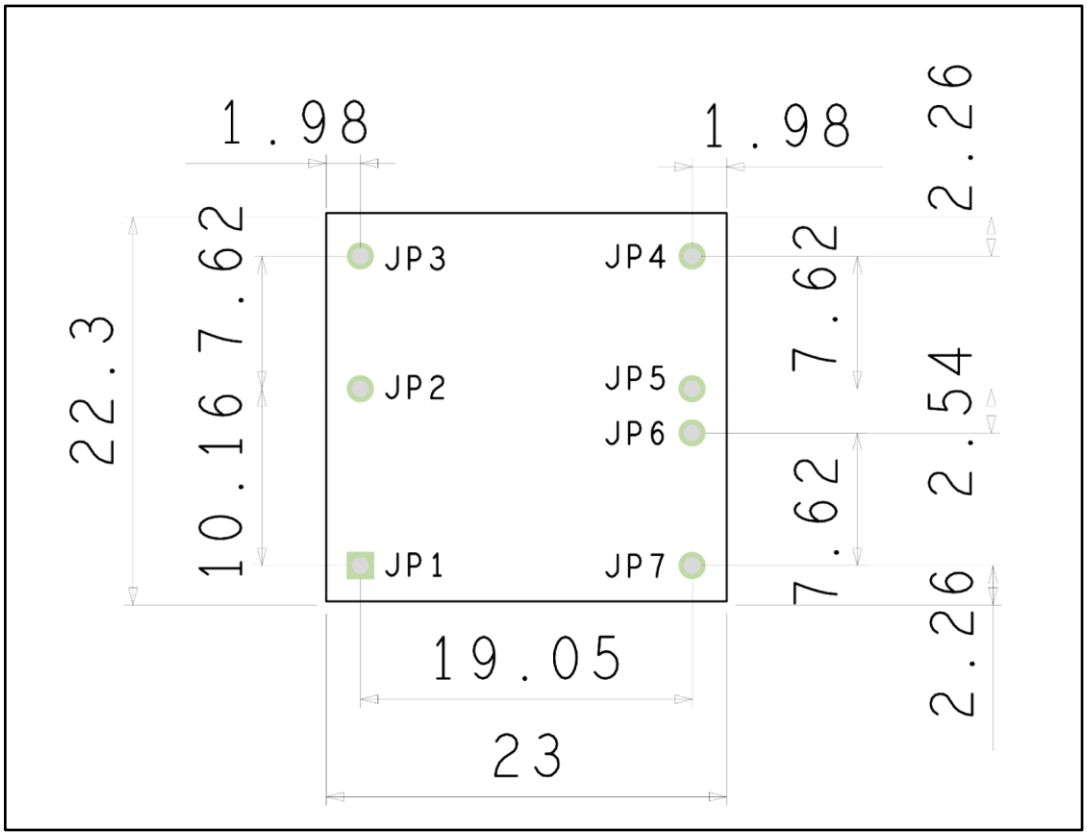
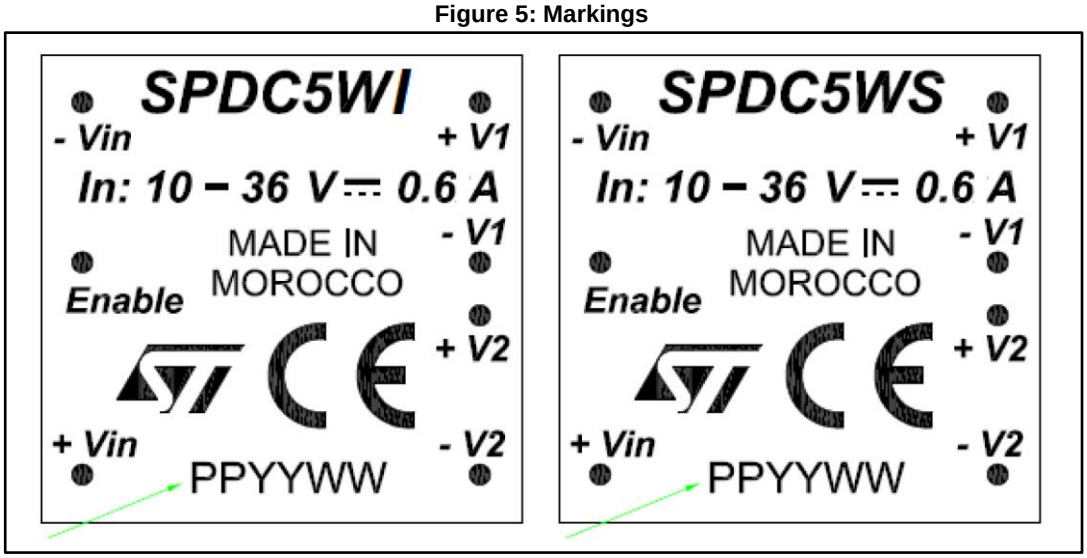


Figure 4: Mechanical dimensions (in mm) - Top view



4.1 Marking

Figure 5: Markings



4.2 Traceability code

Each module is identified by a code marked on the top side of the module itself.

The code has the following format:

PPYYWW

PP → Production area code

YY → Last 2 digits of the year

WW → Week of manufacturing start of the year

4.3 Ordering information

Table 4: Ordering information

Order code	Output voltage V1	Output voltage V2	MOQ
SPDC5WS	20 V	5 V	910
SPDC5WI	15 V	10 V	910

5 Revision history

Table 5: Document revision history

Date	Version	Changes
03-Aug-2016	1	Initial release.
02-Dec-2016	2	Updated: figure on the cover page and *Figure 3: "Package drawing (sample image)"*.

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