

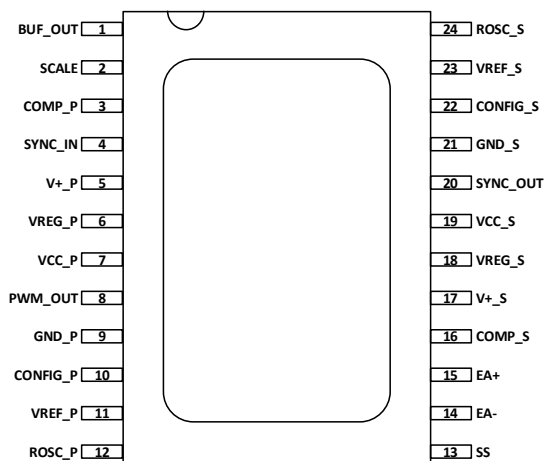
SPMFB520RH

Rad-Hard Versatile Magnetic Feedback IC

FEATURES

- Magnetic feedback for isolated DC/DC converters
- Low power consumption
- Precise and fast feedback transfer by phase modulation
- Bi-directional phase transfer
- Integrated transformers
- Isolation voltage ≥ 500 V
- Adjustable 100 kHz to 1 MHz frequency externally synchronizable
- Secondary side CMOS output for synchronous rectification
- 2.5V Voltage reference (2x outputs)
- Transconductance error amplifier for feedback input and regulation
- Scalable amplified feedback voltage output
- Additional CMOS output for pulse phase feedback
- LDR TID > 100 krad (Si)
- SEE tolerant LET ≤ 60 MeV·cm²/mg
- Latch-up immune (fully isolated SOI technology)
- Screened according to ESCC
- Extended temperature range: -55 °C to +125 °C

PINOUT



DESCRIPTION

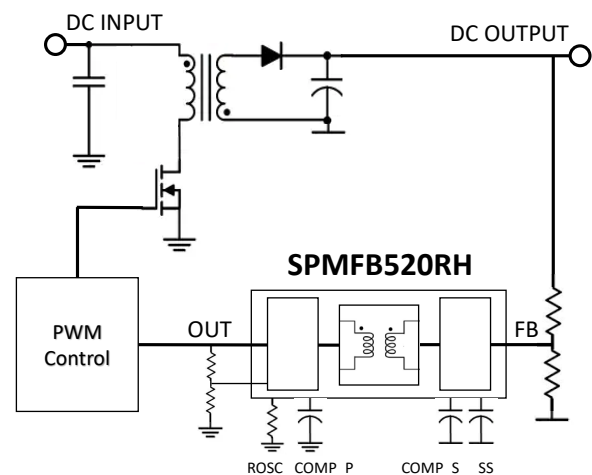
The SPMFB520RH is a radiation hardened integrated circuit for a magnetic transfer of the feedback signal from the secondary to the primary side of isolated DC/DC converters. The magnetic transfer allows the creation of robust and radiation hardened low-power link, in contrast to commonly used optocouplers, that require very high working current to achieve the desired speed and to overcome their poor radiation hardness.

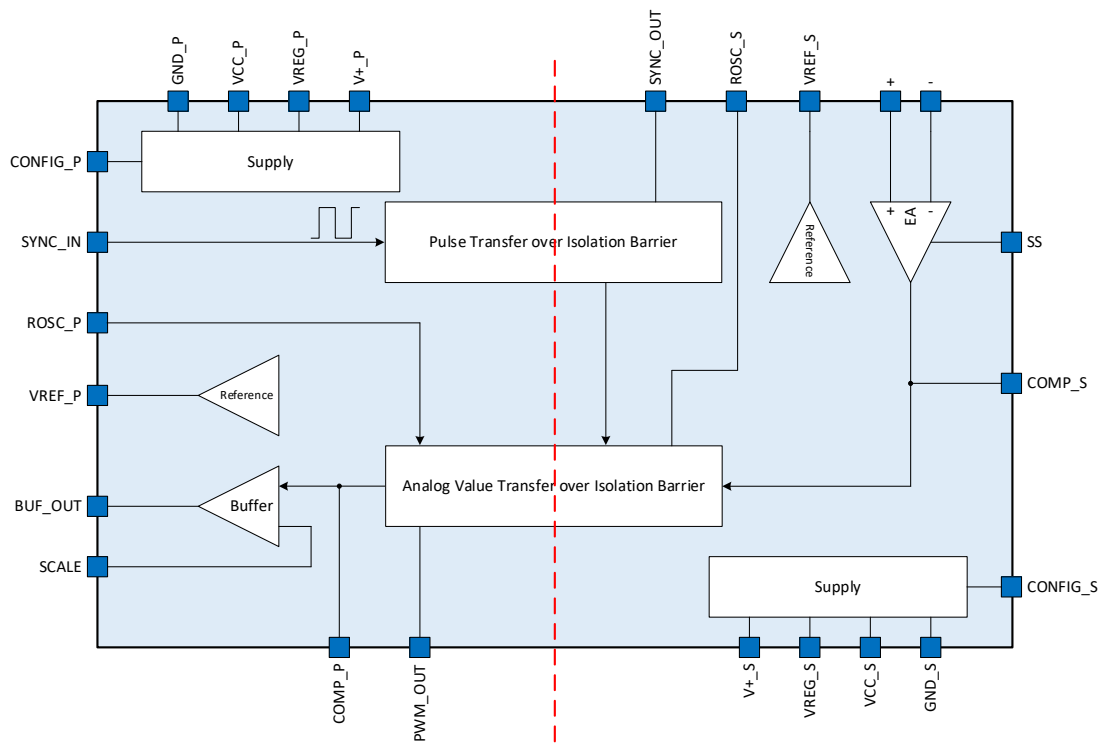
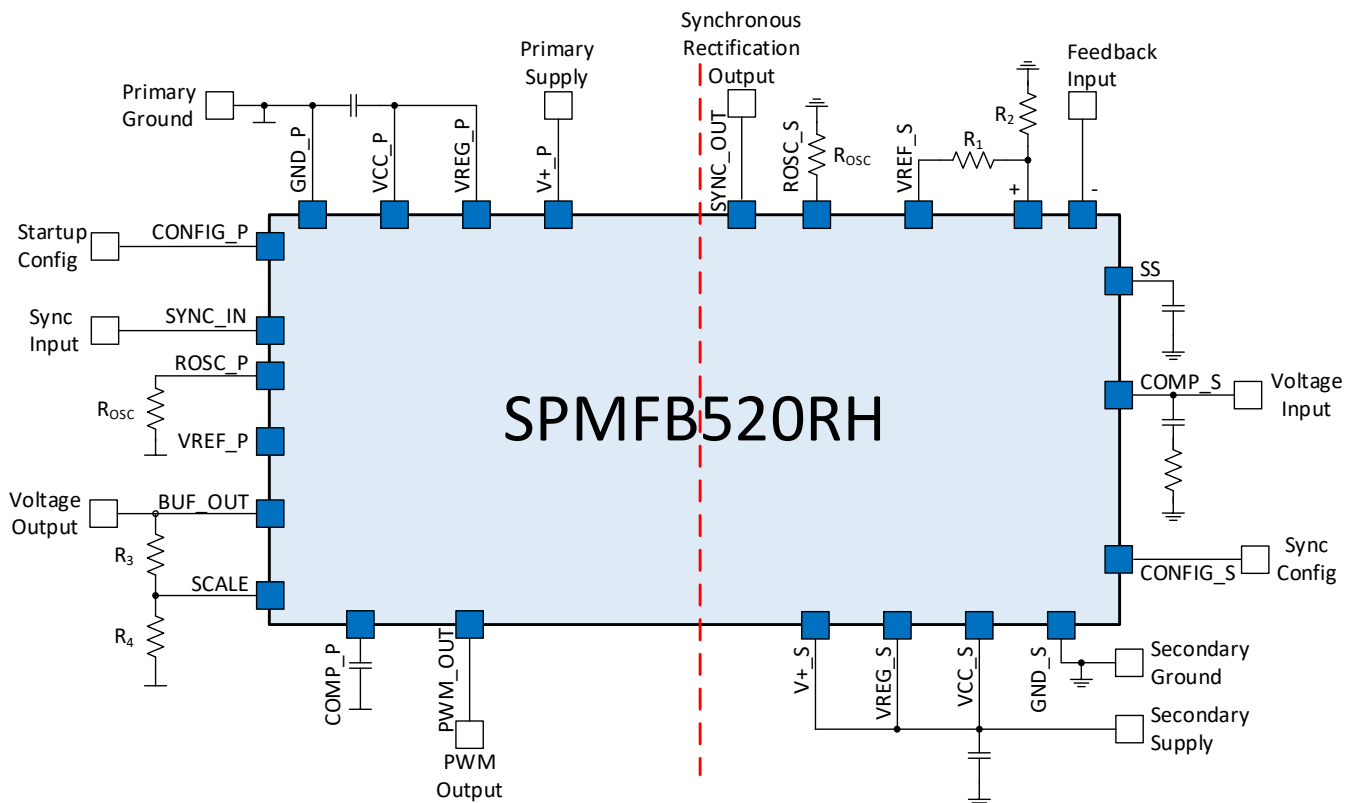
The isolated link uses micro transformers and pulse phase modulation, which has low sensitivity to the property variations of the coupling elements and of the control electronic to some extent.

The working frequency is set to the same value on the primary and the secondary side by applying the same R_{OSC} resistor value. The SPMFB520RH can be synchronized to an external clock after starting up with its internal oscillator.

The device is packaged in a hermetically sealed flatpack with straight leads.

TYPICAL APPLICATION



FUNCTIONAL BLOCK DIAGRAM

EXTERNAL CONNECTIONS (EXAMPLE)


SPMFB520RH

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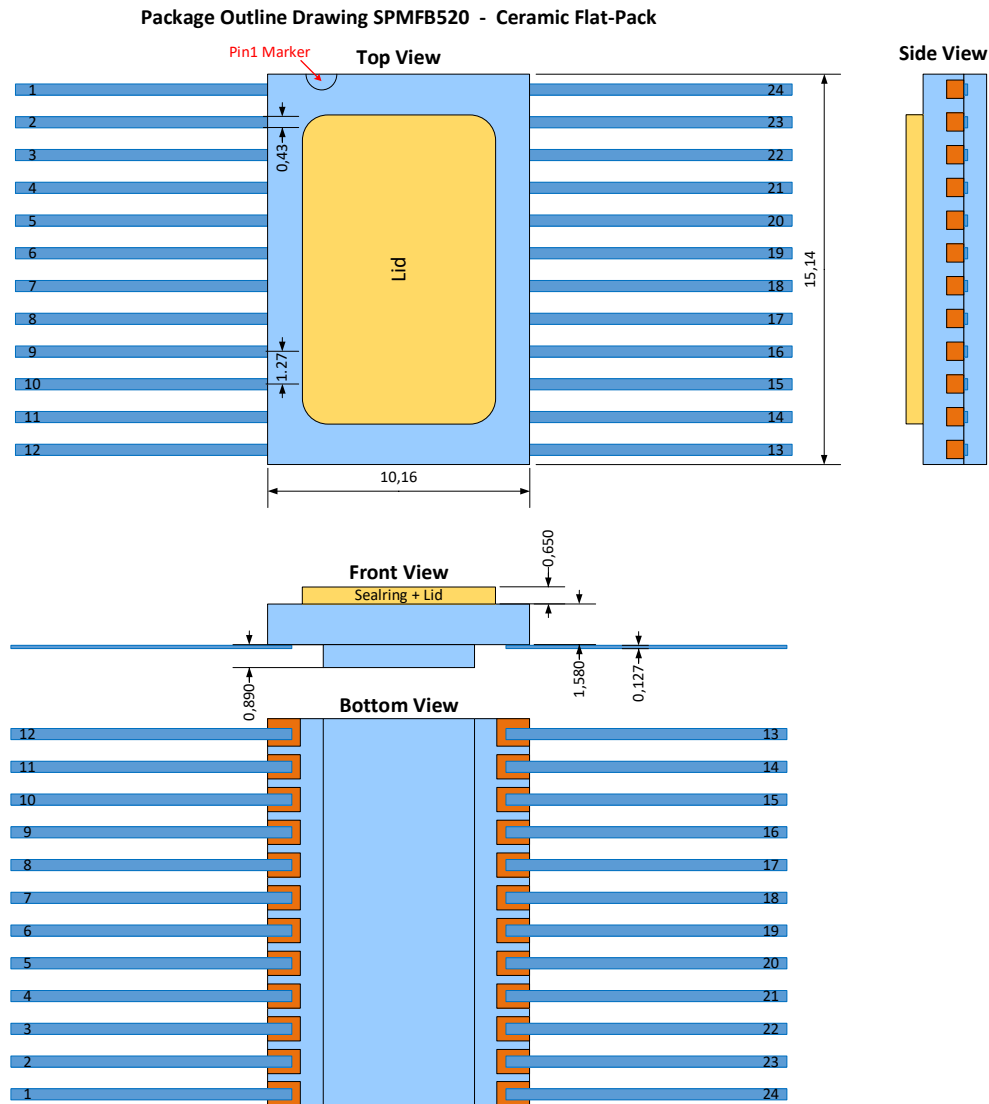
PIN DESCRIPTIONS

PIN NAME	PIN NUMBER	ISOLATION SIDE	PIN DESCRIPTION
BUF_OUT	1	primary	Scaled voltage output of the amplified feedback signal
SCALE	2	primary	Scale setting for the feedback voltage output OUT
COMP_P	3	primary	This pin is made available for loop compensation.
SYNC_IN	4	primary	Input pin for synchronization to an external frequency. A synchronization clock can be applied in running condition.
V+_P	5	primary	Up to 20V supply input for the supply voltage regulator. If unused, short circuit with VREG_P.
VREG_P	6	primary	5V output of the supply voltage regulator. Can supply VCC_P. If unused, short circuit with V+_P.
VCC_P	7	primary	3-6 V supply input for IC operation. Block capacitor needed.
PWM_OUT	8	primary	CMOS output for frequency and phase of pulse phase feedback
GND_P	9	primary	Analog ground pin
CONFIG_P	10	primary	Configuration input
VREF_P	1	primary	Output of the voltage reference 2.5V
ROSC_P	12	primary	Oscillation frequency setting: Connect a resistor from ROSC_P pin to the GND_P pin to set the oscillation frequency (same resistor value as ROSC_S). Leaving the pin unconnected sets the frequency to 1 MHz.
SS	13	secondary	Soft Start input. Connect a capacitor according to the desired soft start duration.
EA-, EA+	14, 15	secondary	Inputs of the error amplifier. Connect these pins to VREF if the error amplifier is not used (e.g. direct transfer of the analog value).
COMP_S	16	secondary	This pin is the error amplifier output and is made available for loop compensation by connecting an RC network.
V+_S	17	secondary	Supply input for the supply voltage regulator. If unused, short circuit with VREG_S.
VREG_S	18	secondary	5V output of the supply voltage regulator. Can supply VCC_S. If unused, short circuit with V+_S.
VCC_S	19	secondary	3-6 V supply input for IC operation. Block capacitor needed.
SYNC_OUT	20	secondary	CMOS output for frequency and phase transferred from the SYNC_IN pin. Can be used for synchronous rectification.
GND_S	21	secondary	Analog ground pin
CONFIG_S	22	secondary	Configuration input
VREF_S	23	secondary	Output of the voltage reference 2.5V
ROSC_S	24	secondary	Oscillation frequency setting: Connect a resistor from ROSC_S pin to the GND_P pin to set the oscillation frequency (same resistor value as ROSC_S). Leaving the pin unconnected sets the frequency to 1 MHz.

PARAMETERS

#	PARAMETER	SYM BOL	UNIT	MIN	TYP	MAX	CONDITIONS
1	Isolation Voltage		V	500			GND_P to GND_S
2	Supply Voltage		V	3		20	Two separate supply pins
3	Supply Current		mA			20	
Voltage Reference							
Full temp., line and load range, incl. radiation drift							
4	Output Voltage		V	2.46	2.5	2.54	
5	Output Current		mA	-1		10	
Transconductance Error Amplifier							
Full temp. and line range, incl. radiation drift.							
6	Gain Bandwidth Product		MHz	5			Input voltage range 0 V to 2 V
7	Input Offset Voltage		mV			2	Input voltage range 0 V to 2 V
8	Input Offset Current		μA			1	Input voltage range 0 V to 2 V
9	Transconductance		mA/V		1		50% of output range
10	Open Loop Gain		dB	80			Input voltage range 0 V to 2 V
Oscillator							
Full temp. and line range, incl. radiation drift.							
11	Frequency Accuracy		%	-10		10	
12	SYNC pin low threshold		V	1			
13	SYNC pin high threshold		V			2	
14	SYNC signal Duty Cycle		%	4		96	
Feedback Signal							
Full temp., line and load range, incl. radiation drift.							
15	Output Voltage		V	0		5	Upper voltage up to VCC_P
16	Bandwidth		kHz	25			(-3) dB gain or (-45) deg phase
17	Signal to Noise Ratio		dB	TBD			
UVLO							
Full temp. and line range, incl. radiation drift.							
18	Enable Level		V			2.9	
19	Disable Level		V	2.7			

PACKAGE DRAWING



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