

SPPWM120RH

Rad-Hard Versatile PWM Controller with Start-Up

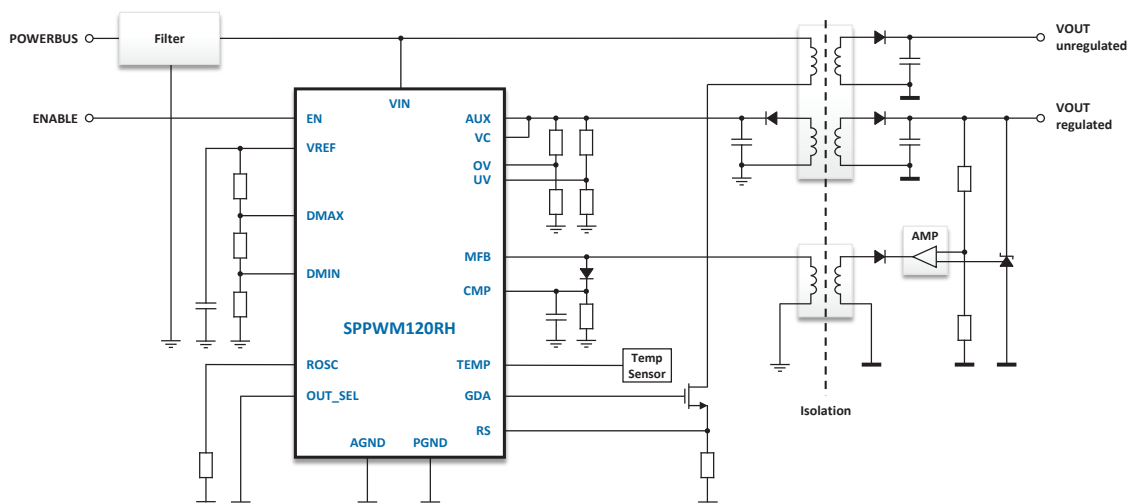
FEATURES

- High-voltage startup current source (up to 125 V)
- Toggled and complementary output selectable
- Error flag and protection for over-temperature, over-current and over-voltage
- Status flag shows normal working condition and under-voltage events
- GaN capable gate driver
- Adjustable 100 kHz to 1 MHz frequency externally synchronizable
- Duty cycle limits set by external resistor divider
- Pulsed current output for magnetic feedback
- 2.5V Voltage reference output
- LDR TID > 100 krad (Si)
- SEE tolerant LET $\leq 60 \text{ MeV}\cdot\text{cm}^2/\text{mg}$
- Latch-up immune (fully isolated SOI technology)
- Screened according to ESCC
- Extended temperature range: $-55 \text{ }^\circ\text{C}$ to $+125 \text{ }^\circ\text{C}$

APPLICATIONS

- Isolated and non-isolated DC/DC converters
- Flyback topology
- Satellite systems and launch vehicles

TYPICAL APPLICATION



DESCRIPTION

The SPPWM120RH is a radiation hardened PWM controller for high-power applications with error and status monitoring for over-temperature, under- and over-voltage. With the additional status pin the SPPWM120RH signals normal operation state.

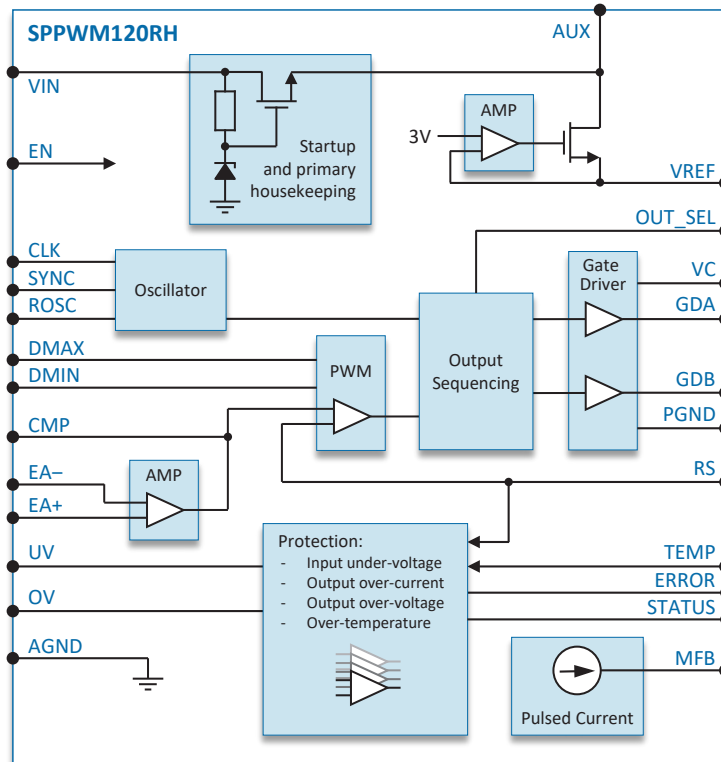
The SPPWM120RH can charge a capacitor connected to the AUX pin from the 125 V power bus for startup. With the stored energy the PWM controller starts regulation until the AUX winding is able to supply the controller.

The output driver can be switched between toggled and complementary output sequencing. The integrated gate driver has its separate supply pins and is suited for GaN FET applications.

The SPPWM120RH can be synchronized to an external clock after starting up with its internal oscillator. The internal clock is provided on an output CLK pin for synchronization.

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

FUNCTIONAL BLOCK DIAGRAM



PIN DESCRIPTIONS

PIN NAME	PIN NUMBER	PIN DESCRIPTION
VIN	1	Power bus input for the startup current circuit.
EN	2	Enable input pin: The EN pin is a digital input pin that enables or disables the regulator. Set the EN pin high to turn the regulator on; set it to GND, to turn the regulator off. An OFF/ON sequence will reset the latching protections.
CLK	3	Clock output pin: Open-drain output that provides the clock of the internal oscillator.
SYNC	4	Input pin for synchronization to an external frequency. A synchronisation clock can be applied in running condition.
ROSC	5	Oscillation frequency setting: Connect a resistor from ROSC pin to the AGND pin to set the oscillation frequency. Leaving the pin unconnected sets the frequency to 500 kHz.
DMAX	6	Maximum and minimum duty cycle setting: Configuration pins to set the maximum and minimum duty cycle by an external resistor divider.
DMIN	7	
CMP	8	This pin is the error amplifier output and is made available for loop compensation. In isolated applications with magnetic feedback the CMP pin will be used as input for the rectified signal from the feedback transformer.

PIN DESCRIPTIONS (CONTINUED)

PIN NAME	PIN NUMBER	PIN DESCRIPTION
EA-, EA+	9, 10	Inputs of the error amplifier. Connect these pins to VREF if the error amplifier is not used (e.g. isolated topology with magnetic feedback).
UV	11	Connection point for the under-voltage adjustment resistor divider. Allows to change the under-voltage threshold depending on the input voltage bus range.
OV	12	Connection point for the adjustment resistor for fine tuning the output over-voltage threshold. This pin can be also used as monitor signal for the auxiliary voltage value.
AGND	13	Analog ground pin.
AUX	14	Voltage for the primary housekeeping.
VREF	15	2.5 V reference output for duty cycle and error amplifier settings.
OUT_SEL	16	Configuration input pin: Connect the pin to AGND for complementary output sequencing or to VREF for toggled output sequencing.
VC	17	Gate driver supply voltage.
GDA / GDB	18, 19	High current outputs A and B of the on-chip gate driver stage.
PGND	20	Gate driver power ground.
RS	21	Source of the MOSFET: To be connected to current sense resistor to obtain a voltage proportional to the switch current. This signal is used by the PWM to terminate the switch conduction.
TEMP	22	Temperature sense input: Place a PTC resistor in close proximity to the output transistor(s) with good thermal connection.
ERROR	23	Error signal: Open drain output, will pull the pin to AGND in case an error occurred.
STATUS	24	Status signal: Open drain output, will pull the pin to AGND in case an error or under-voltage event occurs.
MFB	25	Magnetic feedback: Pulsed current will be applied to this pin to transfer the feedback from the secondary side via an external transformer to the primary. A diode to COMP will rectify the signal. Connect this pin to AGND if not used.