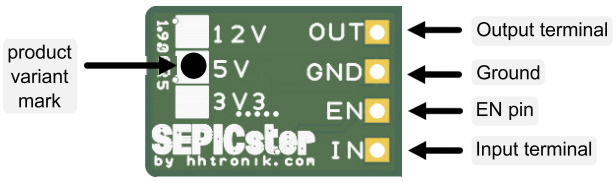
The SEPICster module family offers fixed value DC-DC converters that can perform both step up and step down conversion seamlessly. This enables application where the power source voltage range encompasses the desird output voltage. The converters provide a stable output over a wide input supply range under various load conditions.

Features

- Small: 16.4x10.8x4.9mm
- Fixed output voltages: 3.3/5/12V
- High efficiency (typ. ≥ 65%, up to 82%)
- Wide supply voltage range: 2V to 19V
- Excellent line and load regulation
- Enable pin
- Low quiescent current (typ. 60µA ≤ I_Q ≤ 200µA)

Connections



Application notes

The module might heat up significantly under certain operation conditions, especially at higher loads.

Avoid over-load conditions, do not short-circuit or invert polarity. Such error condition may damage the module. Beware of LC-Spikes when using higher supply voltages!

As their name indicates the SEPICster modules are based on the Single Ended Primary Inductance Converter topology. The main advantage of this topology is that it allows for the input voltage to be higher or lower than the output voltage. It does however come with its own set of drawbacks; namely the reduced efficiency, the relatively low current supply capability and a substantial amount of ripple under certain operation conditions, especially at the far ends of the operational range. Please refer to the charts below to determine if the load capability and ripple behavior fits your application.

The EN pin is tied to V_{IN} via a 100KΩ resistor. Make sure any application circuitry used to switch the EN pin can handle the voltage. To enter shutdown mode, the EN pin must be driven low (≤ 0.4V).

The modules can typically supply more than 50mA from their starting voltage to the maximum rated input voltage. Refer to the chart "*Typical safe maximum load vs. input voltage*" on the next page for details.

Input characteristics				
Parameter	Min.	Typ.	Max.	Units
Voltage range	2		19	V
Startup voltage (1)	1.98	2.05		V
Quiescent current		140		µA

(1) Figure at I_{load} ≤ 50mA

Output characteristics general				
Parameter	Min.	Typ.	Max.	Units
Out. voltage accuracy (1)		3		%
Line regulation (2)		0.2	1	%/V
Load regulation (2)		0.5	1	%
RMS ripple		10	100	mV

(1) Figure at $T_{AMBIENT}$ 21.5°C
(2) Figures at I_{load} ≤ 300mA

Product variants / current supply capability (1)				
Parameter	Min.	Typ.	Max.	Units
SEPICster 3v3		380	525	mA
SEPICster 5v		330	450	mA
SEPICster 12v		150	225	mA

(1) Please refer to the chart "*Typical safe maximum load vs. input voltage*" for more details about input voltage dependent operation points. Ratings at 21.5°C ambient. Max. current rating at module temperature ≤ $T_{ambient}$ + 50°C for safe long term operation with V_{OUT} constrained to specified load and line regulation characteristics. Higher supply is possible with adequate cooling.

Mechanical characteristics				
Parameter	Min.	Typ.	Max.	Units
Length		16.4		mm
Width		10.8		mm
Height		4.9		mm
Weight		1.2		g

Absolute maximum ratings				
Parameter	Min.	Typ.	Max.	Units
Input pin	-0.3		26	V
EN pin	-0.3		26	V
Output pin	-0.3		30	V
Ambient temperature	-30		80	°C
Storage temperature	-55		135	°C

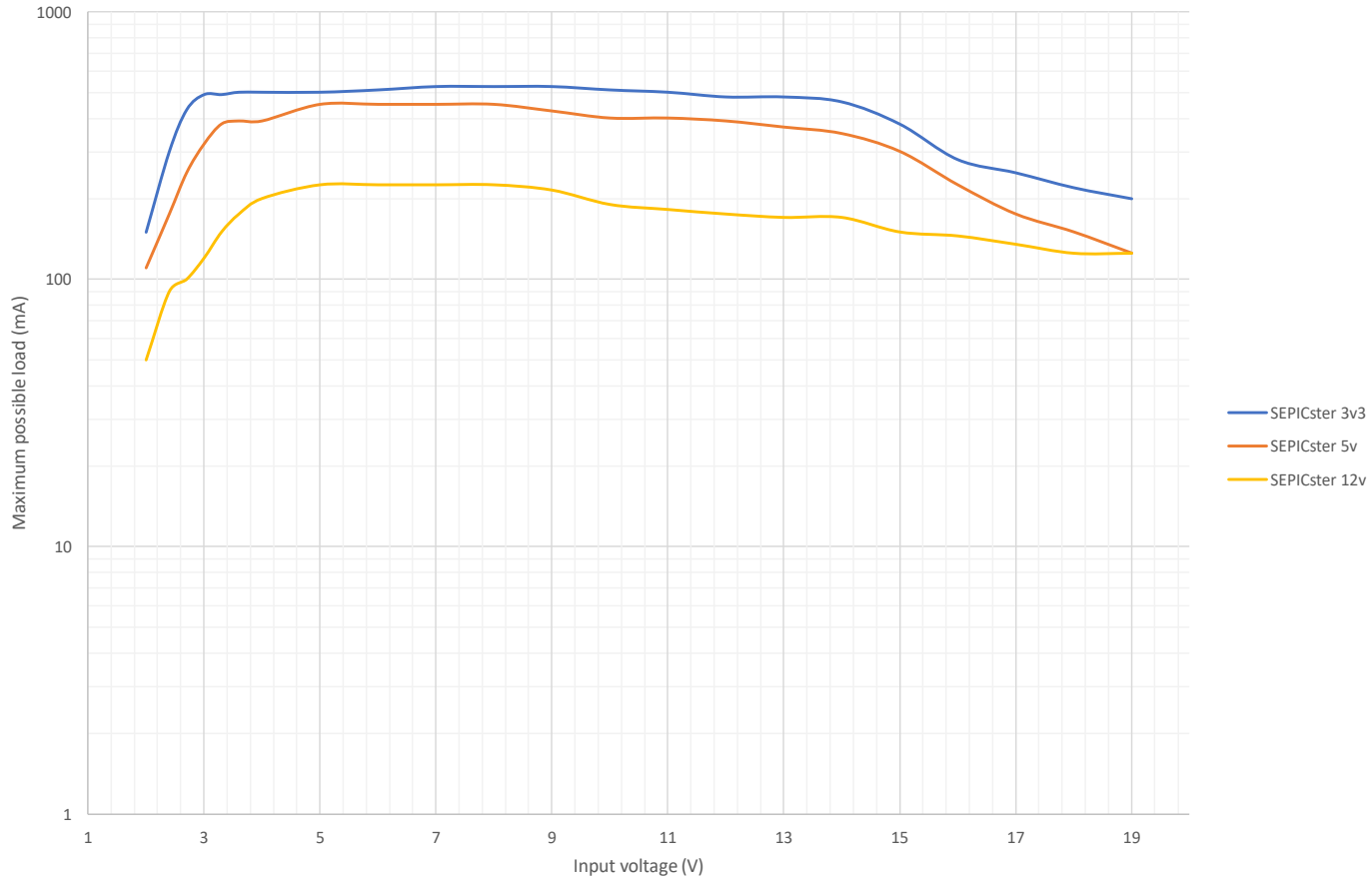
The startup voltage depends on the load present on the output. Stable startup is usually possible at 2V for loads smaller than 50mA.

If required, the transient response behavior can be improved by adding additional reservoir capacitance on the output of the module. Recommended values are 33uF to 100uF.

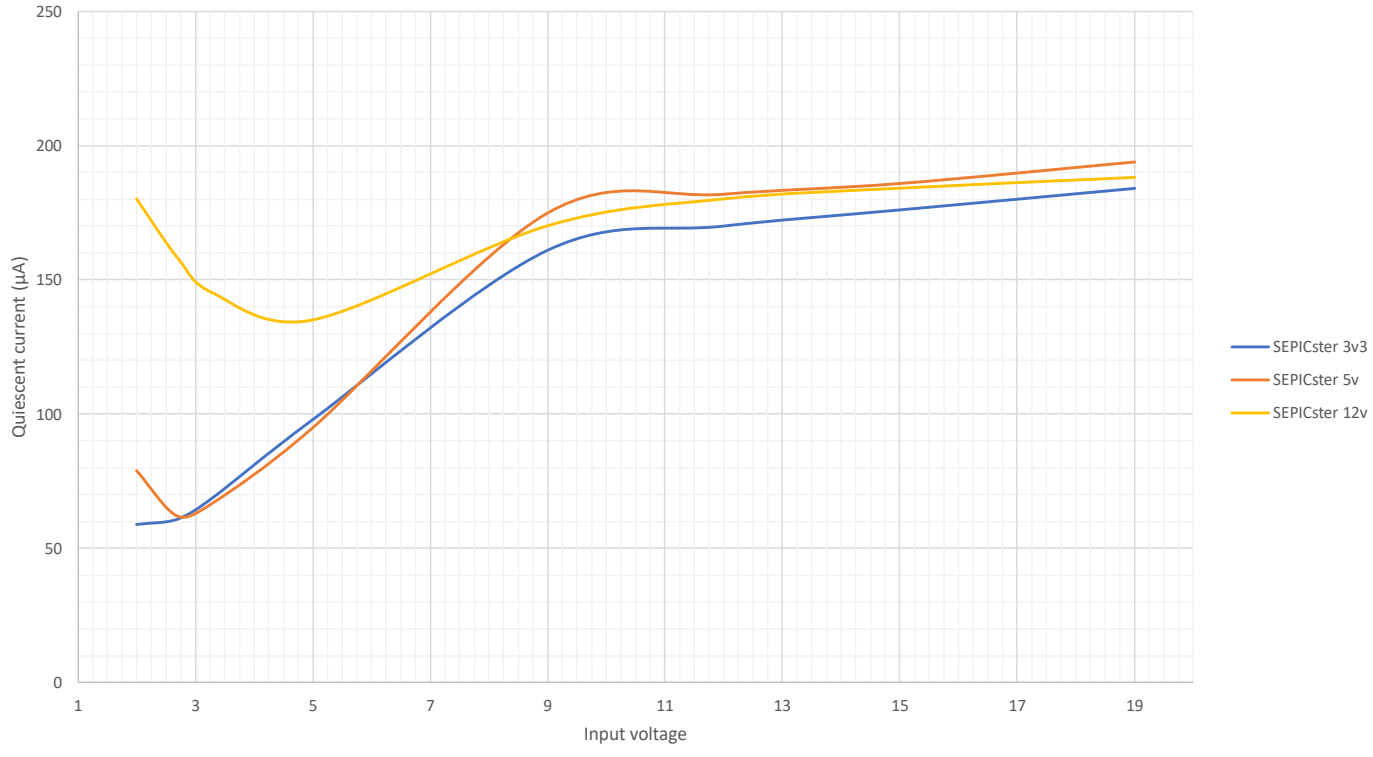
The available maximum sustained current supply may be increased by providing additional cooling.

Note that increased load and higher temperatures may affect the durability of the module. It is recommended to keep the average operation temperature under 80°C. The module include thermal protection shutting down the regulator when the junction temperature of the control IC reaches 155°C.

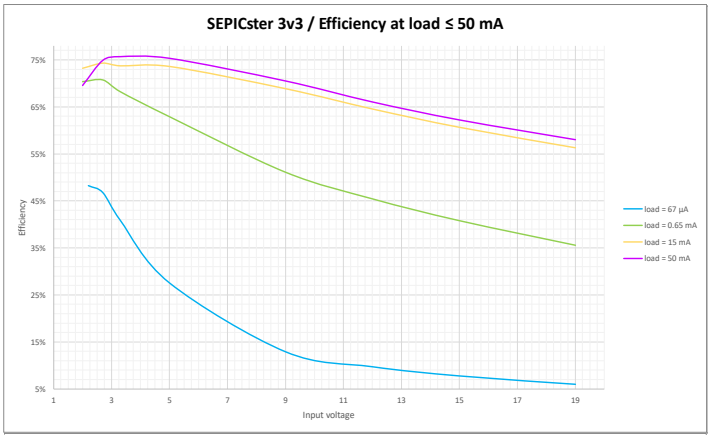
Typical safe maximum load vs input voltage

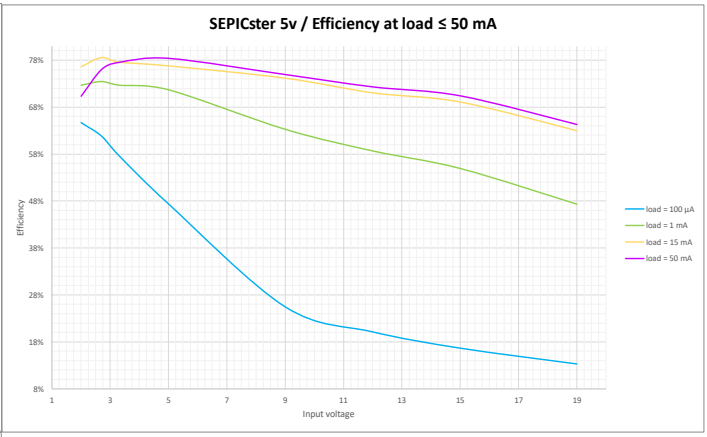


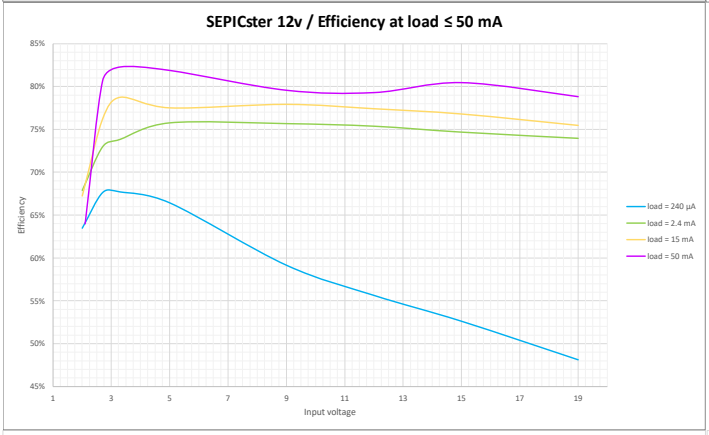
Quiescent current (Iload = 0 mA)

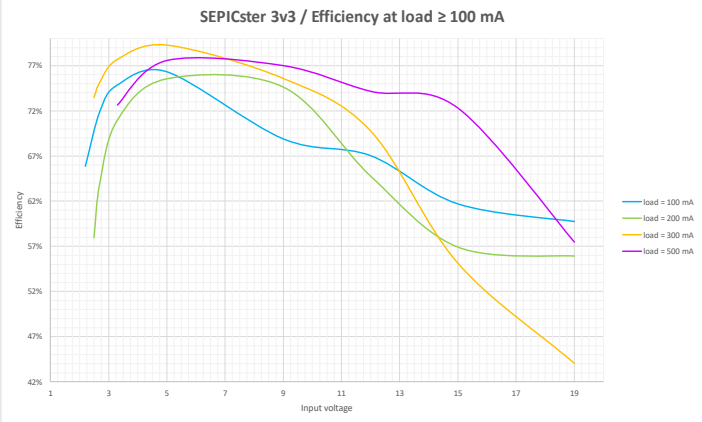


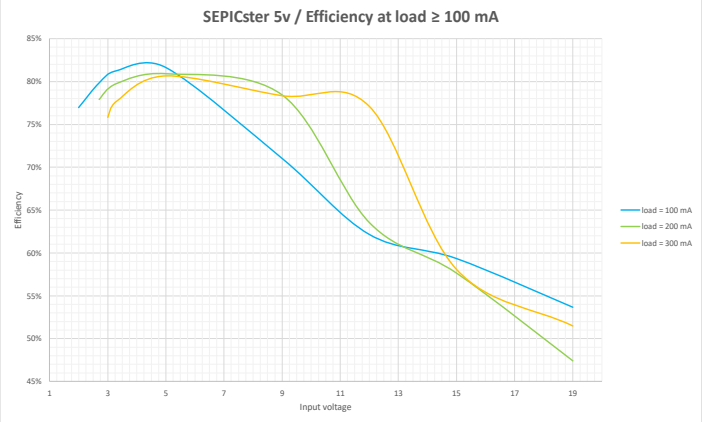
Efficiency measurements

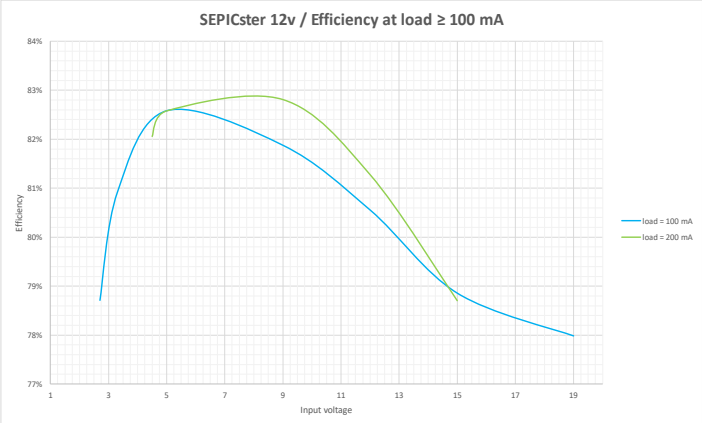




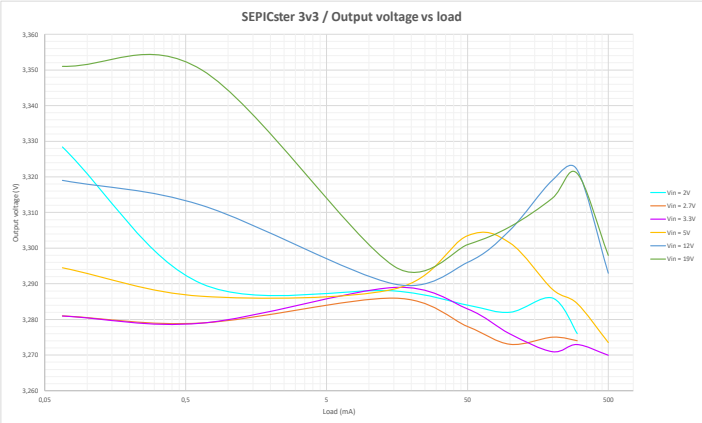


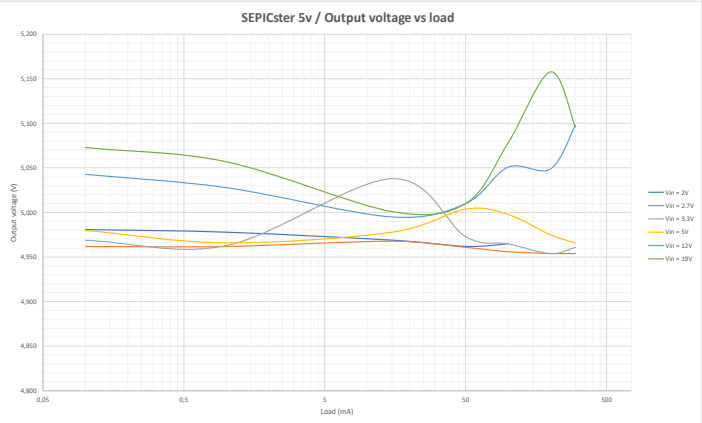


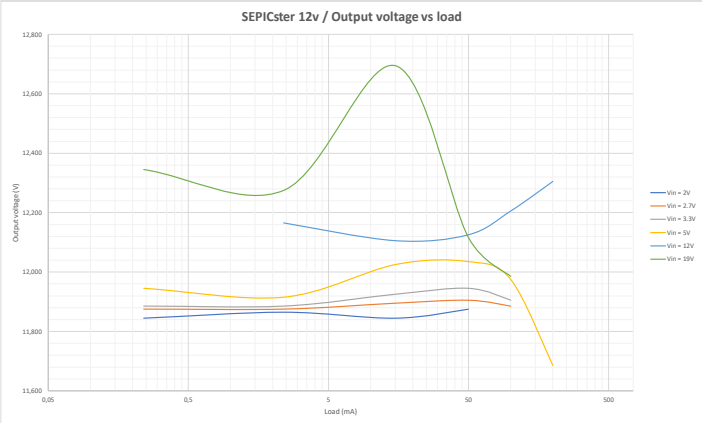




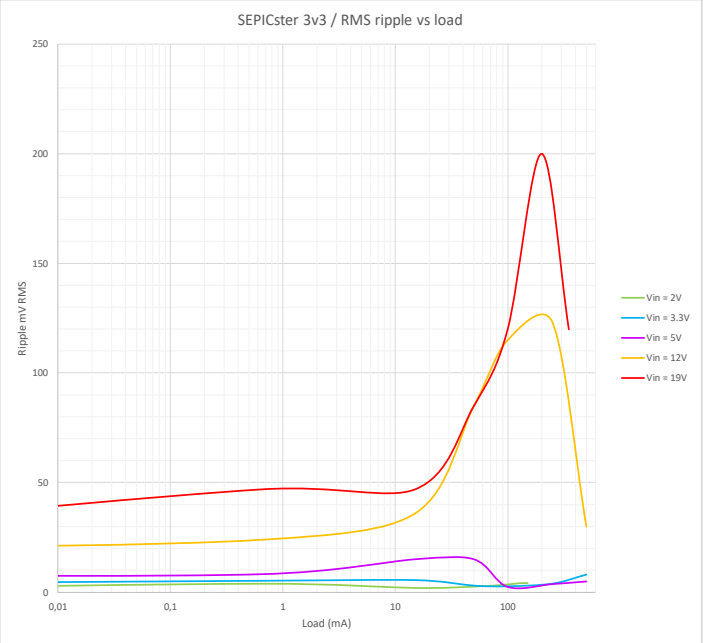
Load regulation

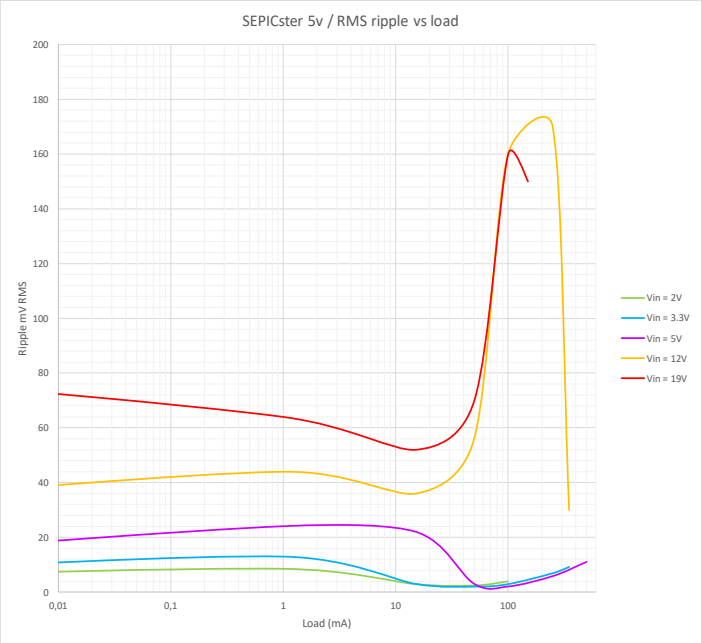


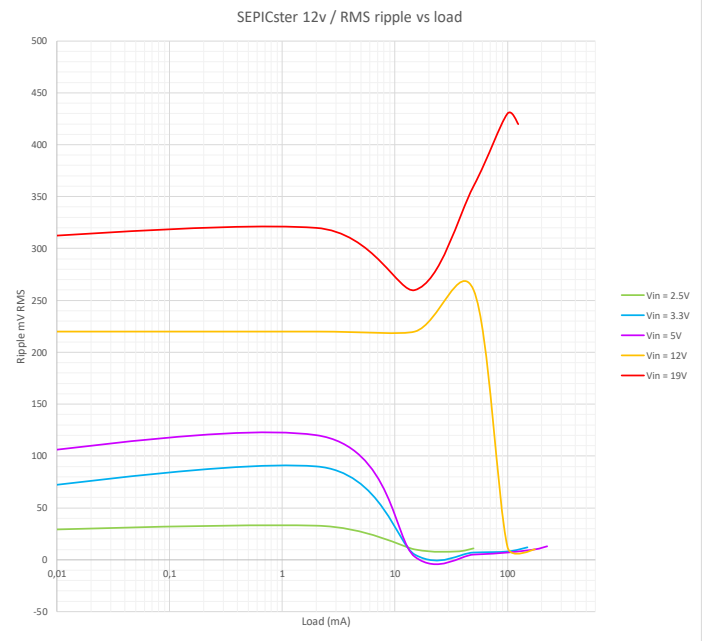




Ripple







Note: measured at 20MHz bandwidth using a 1x probe.

Note on LC spikes

Please note that voltage spikes can occur when disconnecting a module from longer power supply wires (such as typically used in laboratory environments). These voltage spikes can easily exceed the maximum acceptable input voltage modules even at modest supply voltages around 12-15V.

To mitigate this issue we recommend you:

- use short wiring when possible
- reduce the supply voltage or switch off the power supply before physically disconnecting the module
- add an additional input capacitance of at least 33uF close to the BUCKster module