

SIMPLE SWITCHER

Easy-to-use tools. Simple solutions.

national.com/switcher

New high-power SIMPLE SWITCHER® power modules meet a wider range of power design needs.



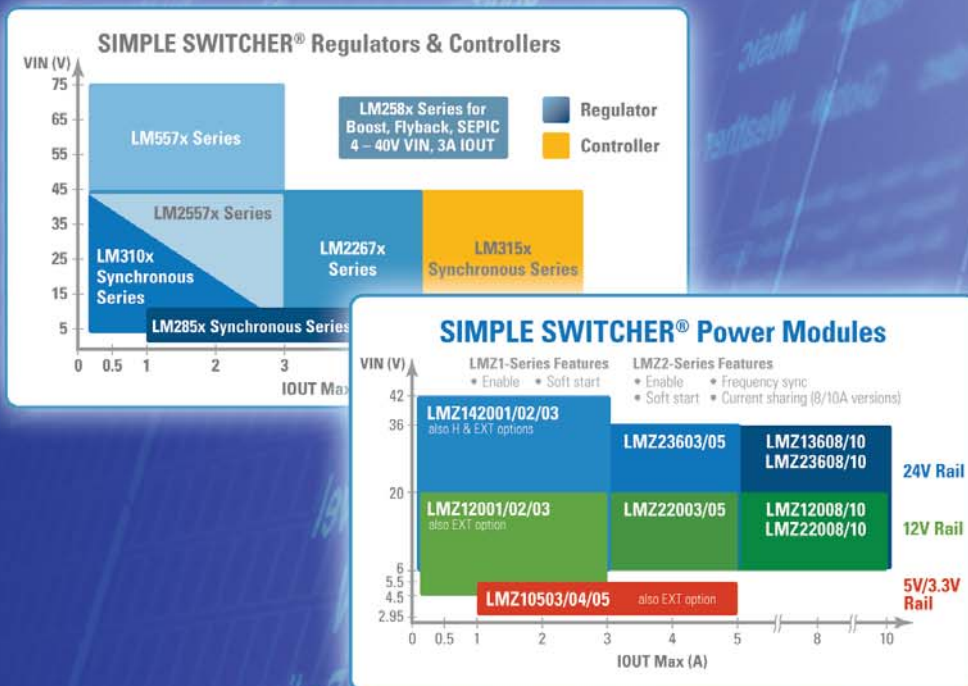
The newest additions to the SIMPLE SWITCHER® power module family feature load currents up to 10A, frequency sync, current sharing, and pin-to-pin compatibility to deliver an entire portfolio of ease-of-use solutions.

DESIGN MADE EASY



 *National*
Semiconductor

Experience end-to-end ease of use.



The SIMPLE SWITCHER® family of solutions – power modules, regulators, and controllers – combined with WEBENCH® designer tools, make power design quick and easy.

National's SIMPLE SWITCHER products allow you to design and optimize robust power supplies with a minimum set of external components. Supporting input voltage ranges of 3V to 75V, each SIMPLE SWITCHER series provides you with multiple products with pin-to-pin compatibility for added design flexibility. Plus, all SIMPLE SWITCHER products utilize National's WEBENCH Power Designer, Visualizer and FPGA Power Architect design and prototyping tools.

NEW SIMPLE SWITCHER power modules

National's newest SIMPLE SWITCHER power modules expand the portfolio and feature up to 10A of output current, frequency sync and current sharing.

To see the entire portfolio of SIMPLE SWITCHER easy-to-use products and tools, visit national.com/switcher

SIMPLE SWITCHER
Easy-to-use tools. Simple solutions.

SIMPLE SWITCHER® Power Modules

Whether your application requires superior EMI and thermal performance, high output current, high output voltage, testing to meet extreme conditions or simply a standard feature set, the family of SIMPLE SWITCHER power modules provides an all-in-one power solution in a small, easy-to-use package for a wide variety of power designs.

All Power Modules include:

- Integrated shielded inductor
- Precision enable, external soft-start, and tracking for sequencing
- Best-in-class thermal performance
- Low output voltage ripple
- Standard junction temperature grade: -40° to +125° C
- Pin-to-pin compatible for different load currents
- Easy-to-use package with single exposed copper bottom
- Passes EN55022 (CISPR22) Class B Radiated and Conducted EMI Standard

LMZ1-Series Power Modules

The LMZ1-series of SIMPLE SWITCHER power modules are ideal for applications requiring a standard feature set. All power modules in the LMZ1-series have a precision enable pin and soft-start pin.

LMZ1-Series Power Modules

Product ID	Output Current (A) Max.	Input Voltage (V)	Adjustable Output Voltage (V)	Peak Efficiency (%)	Operating Junction Temperature (°C)	Features	EMI EN55022/CISPR22 Class B Certification		Packaging
							Radiated	Conducted*	
LMZ10503/04/05	3/4/5	2.95 to 5.5	0.8 to 5	96	-40 to 125	EN, SS	✓	✓	TO-PMOD-7
LMZ12001/02/03	1/2/3	4.5 to 20	0.8 to 6	92	-40 to 125	EN, SS	✓	✓	TO-PMOD-7
LMZ14201/02/03	1/2/3	6 to 42	0.8 to 6	90	-40 to 125	EN, SS	✓	✓	TO-PMOD-7
LMZ12008/10	8/10	6 to 20	0.8 to 6	92	-40 to 125	EN, SS	✓	✓	TO-PMOD-11
LMZ13608/10	8/10	6 to 36	0.8 to 6	92	-40 to 125	EN, SS	✓	✓	TO-PMOD-11

* Additional input filter required

Specialized Power Modules

High Output Voltage Power Modules

The LMZ1420xH SIMPLE SWITCHER power modules have an output voltage range from 5V to 24V. These power modules are ideal for intermediate rail conversions, powering fans or other types of non-traditional points of load, and for sensing applications requiring voltages below -6V.

Extended Temperature and High Output Voltage Power Modules

Product ID	Output Current (A) Max.	Input Voltage (V)	Adjustable Output Voltage (V)	Peak Efficiency (%)	Operating Junction Temperature (°C)	Features	EMI EN55022/CISPR22 Class B Certification		Shock and Vibration Compliant	Packaging
							Radiated	Conducted*		
LMZ10503/04/05EXT	3/4/5	2.95 to 5.5	0.8 to 5	96	-55 to 125	EN, SS	✓	✓	✓	TO-PMOD-7
LMZ12001/02/03EXT	1/2/3	4.5 to 20	0.8 to 6	92	-55 to 125	EN, SS	✓	✓	✓	TO-PMOD-7
LMZ14201/02/03EXT	1/2/3	6 to 42	0.8 to 6	90	-55 to 125	EN, SS	✓	✓	✓	TO-PMOD-7
LMZ14201H/02H/03H	1/2/3	6 to 42	5 to 24	97	-40 to 125	EN, SS	✓	✓	—	TO-PMOD-7

* Additional input filter required

Extended Temperature (EXT) Family of Power Modules

The SIMPLE SWITCHER EXT power modules provide excellent performance in the most extreme conditions, with extended ambient temperatures guaranteed down to -55° C and shock and vibration compliant to meet military MIL-STD-883 standards.

NEW LMZ2-Series Power Modules

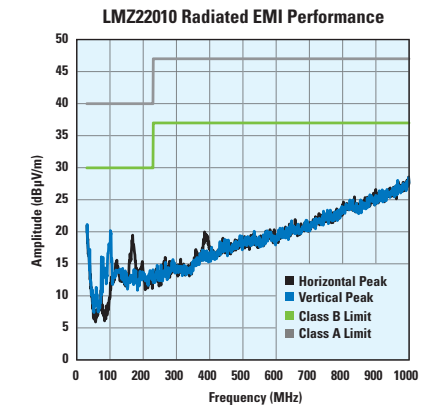
The newest power modules (LMZ2xxxx) are available in output currents up to 10A with additional features for powering high current intermediate rails, FPGAs, and noise sensitive applications. They also feature a frequency synchronization pin that controls the switching frequency of the internal circuitry, and a current sharing pin for paralleling multiple power modules together for achieving up to 60A of output current.

Frequency Synchronization

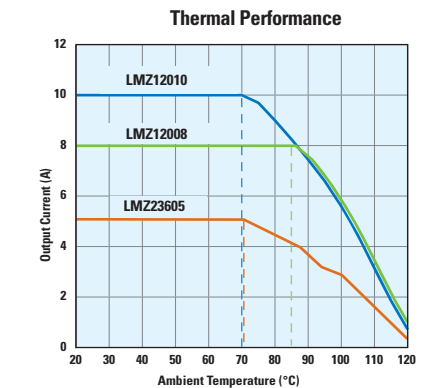
- Optimize efficiency and control switching noise in noise-sensitive systems with the power module's synchronizable switching frequency
- Synchronization pin can be set to a certain frequency for ease of filtering
- Multiple power modules can operate at the same frequency using this pin

Current Sharing

- Parallel multiple modules for up to 60A of output current in high current intermediate rail and FPGA applications



Complies with EN55022 (CISPR22) Class B Radiated EMI Standard



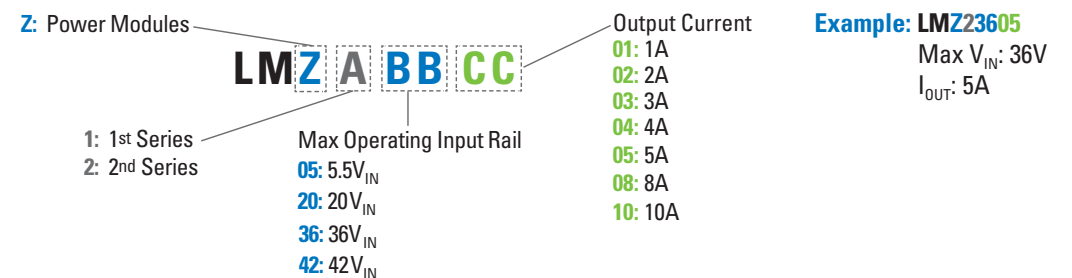
Thermal performance measured for a 12V to 3.3V conversion on a 3.5" x 2.9" four-layer board with no airflow or heatsink.

LMZ2-Series Power Modules

Product ID	Output Current (A) Max.	Input Voltage (V)	Adjustable Output Voltage (V)	Operating Junction Temperature (°C)	Features	EMI EN55022/CISPR22 Class B Certification		Packaging
						Radiated	Conducted*	
LMZ22003/5	3/5	6 to 20	0.8 to 5	-40 to 125	EN, SS, Freq Sync	✓	✓	TO-PMOD-7
LMZ23603/5	3/5	6 to 36	0.8 to 6	-40 to 125	EN, SS, Freq Sync	✓	✓	TO-PMOD-7
LMZ22008/10	8/10	6 to 20	0.8 to 6	-40 to 125	EN, SS, Freq Sync, Current Share	✓	✓	TO-PMOD-11
LMZ23608/10	8/10	6 to 36	0.8 to 6	-40 to 125	EN, SS, Freq Sync, Current Share	✓	✓	TO-PMOD-11

* Additional input filter required

SIMPLE SWITCHER Power Modules Nomenclature

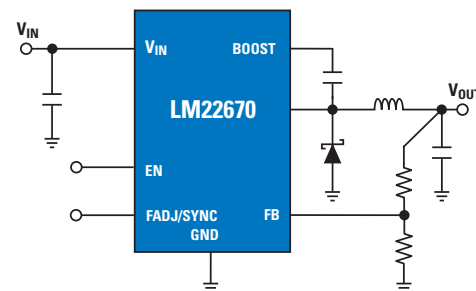


SIMPLE SWITCHER® Regulators and Controllers

SIMPLE SWITCHER Regulators — For designs that require high input voltage up to 75V, the SIMPLE SWITCHER regulator family provides the ultimate balance between ease of use and flexibility.

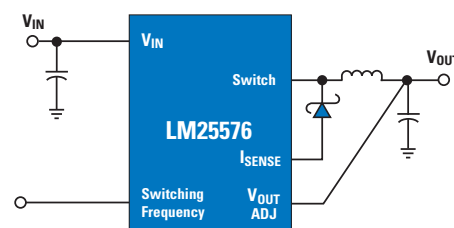
LM2267x and LM22680 family of regulators

- Thin TO-263 and PSOP-8 packaging
 - Exposed DAPs provide enhanced thermal dissipation
 - Halogen-free and lead-free
- Flexible
 - Adjustable and fixed switching frequencies allow for optimization between size and efficiency (up to 1 MHz)
- Adjustable and fixed output voltages: down to 1.285V
- Frequency sync: up to 1 MHz for easy management of EMI and/or input capacitance optimization
- Load currents: up to 5A
- Input voltages: up to 42V



LM2557x and LM557x family of regulators

- Emulated peak current mode architecture
 - Short duty cycle operation
 - Fast transient response
- Thermally enhanced eTSSOP-16 packaging
- Load currents: up to 3A
- Input voltages: up to 75V

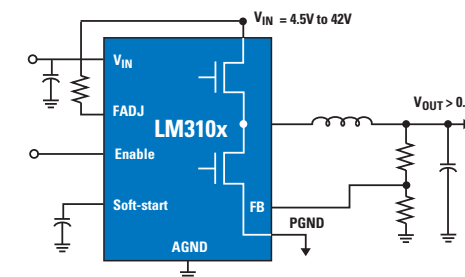


Non-Synchronous Regulators

Product ID	Output Current (A)	Input Voltage (V)	Adjustable Output Voltage (V)	Frequency Range (kHz)	Adj.	On/Off Pin	PWM Mode	Packaging
LM22671/74	0.5	4.5 to 42	1.285 to 37	200 to 1000 Adj	✓/–	✓	Voltage	PSOP-8
LM22672/75	1	4.5 to 42	1.285 to 37	200 to 1000 Adj	✓/–	✓	Voltage	PSOP-8
LM22680	2	4.5 to 42	1.285 to 37	200 to 1000 Adj	✓	✓	Voltage	PSOP-8
LM22670/73/76	3	4.5 to 42	1.285 to 37	200 to 1000 Adj	✓/–/–	–/✓/✓	Voltage	TO263-7 Thin, PSOP-8
LM22671/78/79	5	4.5 to 42	1.285 to 37	200 to 1000 Adj	✓/–/–	✓/✓/–	Voltage	TO263-7 Thin
LM25574	0.5	6 to 42	1.23 to 40	50 to 1000, Sync	✓	✓	Current	TSSOP-16
LM25575	1.5	6 to 42	1.23 to 40	50 to 1000, Sync	✓	✓	Current	eTSSOP-16
LM25576	3	6 to 42	1.23 to 40	50 to 1000, Sync	✓	✓	Current	eTSSOP-20
LM5574	0.5	6 to 75	1.23 to 70	50, Sync	✓	✓	Current	TSSOP-16
LM5575	1.5	6 to 75	1.23 to 70	50, Sync	✓	✓	Current	eTSSOP-16
LM5576	3	6 to 75	1.23 to 70	50, Sync	✓	✓	Current	eTSSOP-20

LM310x family of synchronous regulators

- COT control provides lightning-fast transient response
- No loop compensation
 - Reduces external component count
- Near-constant frequency operation from unregulated supplies
- Thermally enhanced eTSSOP-20 packaging
- Load currents: up to 2.5A
- Input voltages: up to 42V



Synchronous Regulators

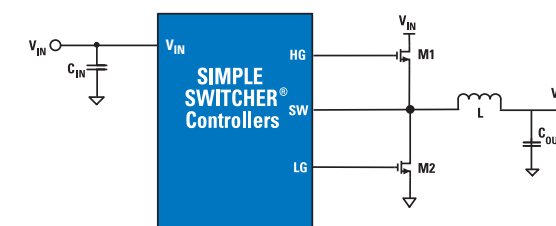
Product ID	Output Current (A)	Input Voltage (V)	Adjustable Output Voltage (V)	Frequency Range (kHz)	Sync	PWM Mode	Packaging
LM3103	0.75	4.5 to 42	0.6 to 38	up to 1000 Adj	—	COT	eTSSOP-16
LM3100	1.5	4.5 to 36	0.8 to 32	up to 1000 Adj	—	COT	eTSSOP-20
LM3102	2.5	4.5 to 42	0.8 to 38	up to 1000 Adj	—	COT	eTSSOP-20
LM2852	2	2.85 to 5.5	0.8 to 3.3	500, 1500	—	Voltage Mode	eTSSOP-14
LM2853	3	3 to 5.5	0.8 to 3.3	550	—	Voltage Mode	eTSSOP-14
LM2854	4	2.95 to 5.5	0.8 to 5	500, 1000	—	Voltage Mode	eTSSOP-16

COT= Constant On-time

SIMPLE SWITCHER Controllers — For designs that require higher output current, the SIMPLE SWITCHER controller family provides flexibility and ease of use with additional design resources including a MOSFET selector tool.

LM315x family of synchronous controllers

- Flexible and efficient
 - External FET selection allows for power efficiency optimization
- Reduced solution size
 - Patent-pending Emulated Ripple Mode allows the use of low-ESR output capacitors for reduced solution size and output voltage ripple
- Lowest controller Bill of Materials solution in the market
 - As low as 11 total components
- Exposed pad TSSOP-14 packaging
 - Provides enhanced thermal performance
- Load currents: up to 12A
- Input voltages: from 6V to 42V



Synchronous Controllers

Product ID	Input Voltage (V)	Output Min (V)	Output Max (V)	Feedback Tolerance (%)	Frequency Range (kHz) and Sync	Packaging
LM3150	6 to 42	0.6	Adj	1.50	up to 1000 Adj	eTSSOP-14
LM3151	6 to 42	3.3	3.3	1.50	250	eTSSOP-14
LM3152	6 to 33	3.3	3.3	1.50	500	eTSSOP-14
LM3153	6 to 18	3.3	3.3	1.50	750	eTSSOP-14

WEBENCH® Designer Tools

All SIMPLE SWITCHER® products are fully WEBENCH-enabled for maximum ease of design. Use the WEBENCH® designer tools to customize design reports, find Gerber files and evaluation boards, and generate complete BOM lists and ordering information.

FPGA Power Architect

Use this new tool to select an FPGA, enter voltage and current requirements and configure key specifications like V_{OUT} ripple, filter requirements and soft-start, and the tool will design the entire power system.

WEBENCH Power Architect

WEBENCH Power Architect creates a system of multiple power supplies that are optimized according to several performance parameters including topology, intermediate voltage rails, footprint, efficiency, component count and bill of materials (BOM) cost. Filter results further for a custom solution.



National Semiconductor
2900 Semiconductor Drive
Santa Clara, CA 95051
1 800 272 9959

Mailing address:
PO Box 58090
Santa Clara, CA 95052

Visit our website at:
national.com/switcher

**For more information,
send email to:**
support@nsc.com



Design Resources

Evaluation Boards

All SIMPLE SWITCHER power modules feature an evaluation board optimized for peak performance and increased flexibility. By incorporating additional ceramic and aluminum filter capacitors, the power module EVAL board demonstrates the low output ripple, fast transient response, and low radiated EMI of the device.

Easy High Current Prototyping—Making prototyping on the bench easy for high current applications, the new LMZ22010 10A EVAL board features connectors for plug-and-play current sharing. Simply connect multiple EVAL boards together for greater than 10A of output current.

The SIMPLE SWITCHER design guide

The SIMPLE SWITCHER design guide provides a turnkey solution for easy cut and paste. Get schematics and necessary BOM components for the most popular SIMPLE SWITCHER products including the new power modules, controllers and regulators. This design guide provides product information including V_{IN} , V_{OUT} , and I_{OUT} specifications along with a list of BOM components.

