

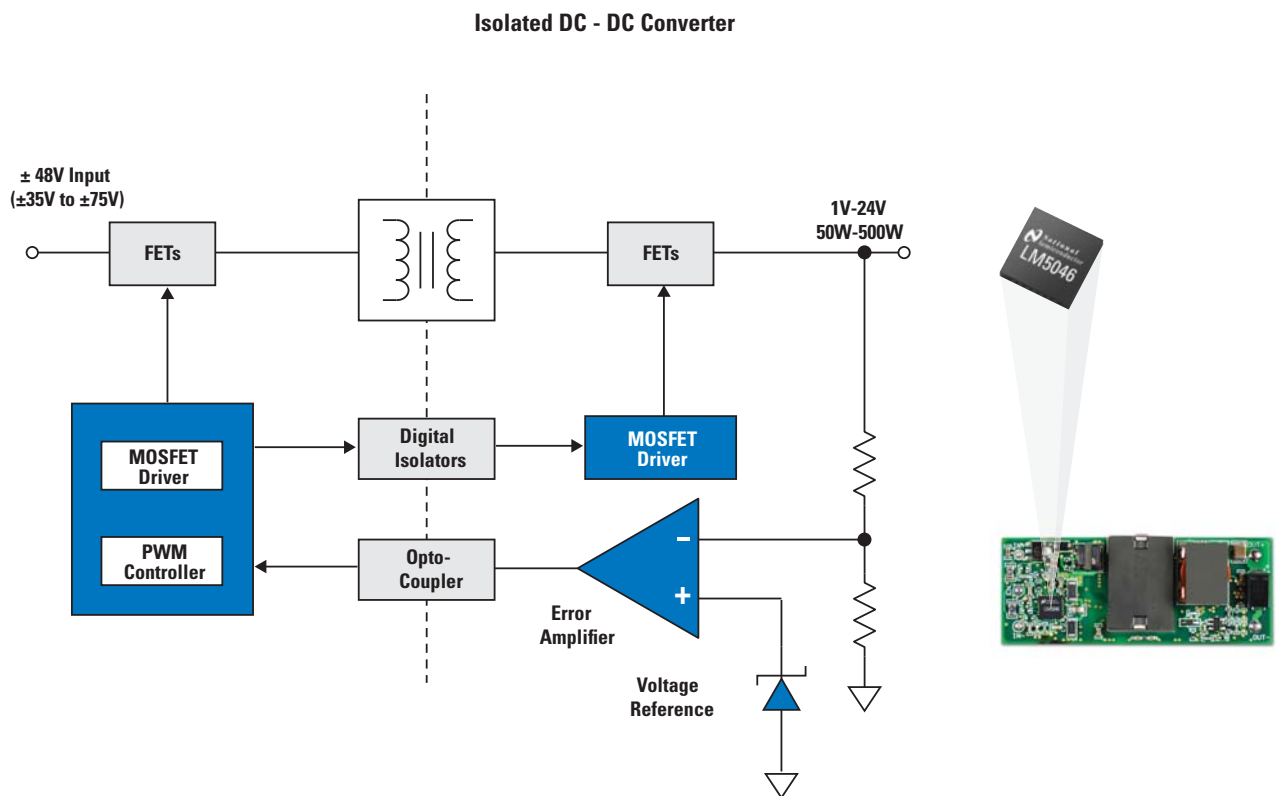
Merchant Power Solutions

Isolated DC-DC Converter Applications

national.com/isolatedpower

Higher power density solutions for smaller form factors

- Industry's most integrated family of full-bridge controllers with all four primary-side MOSFET drivers and synchronous rectifier control signals
- Advanced topologies such as full-bridge, phase-shifted full-bridge, active clamp, and half-bridge support high-power applications
- Integrated solutions reduce BOM count and save valuable space
- Small footprint, high-voltage half-bridge gate drivers capable of operating with supply voltages up to 100V at high speeds with low power consumptions
- High performance rail-to-rail amplifiers deliver enhanced accuracy with increased swing and operating range at low power consumption
- High-precision shunt voltage references deliver excellent output accuracy and noise performance over temperature



High-Voltage Isolated PWM Controllers

National offers controllers for isolated solutions that maximize power density and efficiency for a range of merchant power module applications.

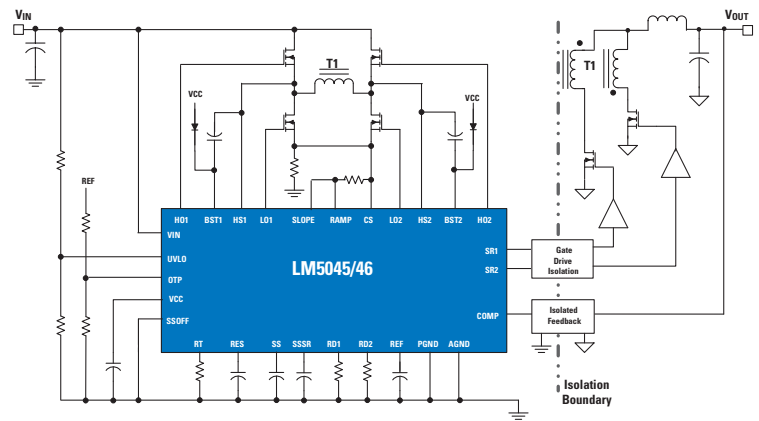
Power Module Form Factor	Power Level	Ideal Topologies	National's Solutions
1/2 Brick	> 500W	Interleaved Forward, Cascade	LM5034, LM5041
1/4 Brick	300 to 400W	Cascade, Half-Bridge, Full-Bridge	LM5041, LM5035, LM5039, LM5037, LM5045, LM5046
1/8 Brick	100 to 250W	Active Clamp Forward, Half-Bridge, Full Bridge	LM5025, LM5026, LM5027, LM5035, LM5039, LM5045/46
1/16 Brick	< 100W	Active Clamp Forward	LM5025, LM5026, LM5027

LM5045/46 – Most Integrated Family of Full-Bridge PWM Controllers

Features

- High current 2A full-bridge gate drivers
- Intelligent sync rectifier start-up for linear turn-on into pre-biased loads
- 5V sync rectifier drive for digital isolators or transformer
- 105V high-current start-up regulator
- Synchronous rectifier gate drive logic control signals
- Independently programmable synchronous rectifier delays (LM5045)
- Programmable resonant times for ZVS operation (LM5046)

Block Diagram



Isolated PWM Controllers

Product ID	Topologies	Input Max Voltage (V)	Input Min Voltage (V)	Gate Drive Current (A)	Frequency Max (kHz)	PWM Mode*	Packaging	Other Features
LM25037 ^E	Push-pull, half-bridge, full-bridge	75	5.5	1.2	2000	V/C	TSSOP-16	Alternating outputs
LM5021	AC/DC, Flyback, Forward	30	8	1	1000	C	MSOP-8, MDIP-8	Ultra low start-up current
LM5022 ^E	Flyback, Forward, Buck or Boost	65	6	1	2000	C	MSOP-10	Precision reference
LM5020 ^E	Flyback, Forward, Boost	100	13	1	1000	C	LLP-10, MSOP-10	Max duty cycle limiting
LM5030 ^E	Push-pull, half-bridge, full-bridge	100	15	1.5	1000	C	TSSOP-20	Dual-mode current limit
LM5033 ^E	Push-pull, half-bridge, full-bridge	100	15	1.5	1000	V	LLP-10, MSOP-10	Dual alternating drivers
LM5041/A/B ^E	Current/voltage-fed push-pull or bridge	100	15	1.5	1000	C	LLP-16, TSSOP-16	For cascaded topologies
LM5025/A/B/C ^E	Forward active clamp	105	13	3/1	1000	V	LLP-16, TSSOP-16	Programmable deadtime/overlap
LM5026 ^E	Forward active clamp	105	13	3/1	1000	C	LLP-16, TSSOP-16	Programmable deadtime/overlap
LM5032	Dual independent or interleaved	105	13	2.5	1000	C	TSSOP-16	Hiccup mode current limit
LM5034 ^E	Dual interleaved forward active clamp	105	13	2.5/1.5	1000	C	TSSOP-20	Reset transistor driver
LM5035/A/B/C ^E	Half-bridge	105	13	2	1000	V/C	LLP-24, eTSSOP-20, TSSOP-28	Sync rectification for high efficiency
LM5037 ^E	Push-pull, half-bridge, full-bridge	105	13	1.2	2000	V	TSSOP-16	Alternating outputs
LM5027/A ^E	Forward active clamp	105	13	2/1/3	1000	V	eTSSOP-20, LLP-24	3A sync rectifier driver
LM5039 ^E	Half-bridge	105	13	2	1000	V/C	LLP-24, eTSSOP-20	Average, Cycle-Cycle, Hiccup
LM5045/46 ^E	Full-bridge	105	14	2	2000	V/C	eTSSOP-28, LLP-28	Pre-bias startup

* V = Voltage mode C = Current mode PowerWise product ^E Evaluation board

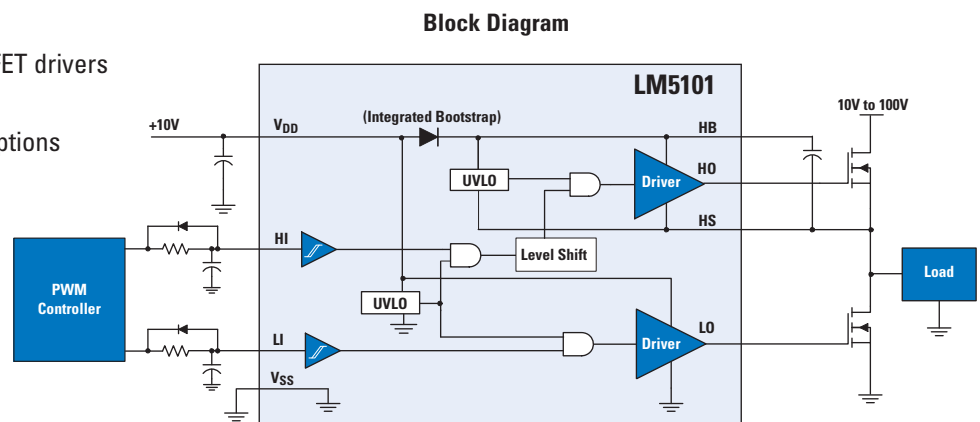
High-Voltage MOSFET Drivers

National also has a broad range of low-side, high-side, and bridge MOSFET (FET) drivers that have been integrated within controller ICs and implemented as dedicated ICs, enabling optimized system solutions for a wide variety of topologies and power levels. Partitioning the gate-drive function outside the PWM controller allows the controller to run cooler and be more stable by eliminating the high peak currents and heat dissipation required to drive a power MOSFET at very high frequencies. MOSFET drivers from National support wide input voltage ranges, adaptive transition timing, UVLO, and powerful gate-drive current levels.

LM510X – Family of High-Speed MOSFET Drivers

Features

- Single and dual versions
- Pin compatible 1A, 2A, 3A bridge MOSFET drivers
- Operation up to 100V
- Complementary or independent drive options



MOSFET Drivers

Product ID	Topology	Input Max Voltage (V)	Supply Min (V)	Supply Max (V)	Peak Sink Current (A)	Peak Source Current (A)	Bottom Driver Prop Delay (nS)	Top Driver Prop Delay (nS)	Pulse Width Min	Input Control Type	Packaging
LM5100C	Synchronous buck, bridge	100	7.5	14	1	1	25	25	50	Dual, independent	SO-8
LM5101C	Synchronous buck, bridge	100	7.5	14	1	1	25	25	50	Dual, independent	LLP-10, SO-8, eMSOP-8
LM5109B	Buck, bridge	100	7.5	14	1	1	25	25	50	Dual, independent	LLP-8, SO-8
LM5107	Buck, bridge	100	7.5	14	1.4	1.3	25	25	50	Dual, independent	LLP-8, SO-8
LM5106	Synchronous buck, bridge	100	7.5	14	1.8	1.2	32	32	50	Single PWM	MSOP-10, LLP-10
LM5100B	Synchronous buck, bridge	100	7.5	14	2	2	25	25	50	Dual, independent	LLP-10, SO-8
LM5101B	Synchronous buck, bridge	100	7.5	14	2	2	25	25	50	Dual, independent	SO-8, LLP-10
LM5102	Synchronous buck, bridge	100	7.5	14	2	2	35	35	50	Dual, independent	MSOP-8
LM5104	Synchronous buck, bridge	100	7.5	14	2	2	35	35	50	Single PWM	LLP-10, SO-8
LM5105	Synchronous buck	100	7.5	14	2	2	35	35	50	Single PWM	LLP-10
LM5100A	Synchronous buck, bridge	100	7.5	14	3	3	25	25	50	Dual, independent	LLP-8, SO-8, PSOP-8
LM5101A	Synchronous buck, bridge	100	7.5	14	3	3	25	25	50	Dual, independent	LLP-10, SO-8EP, LLP-8, PSOP-8
LM5110	Forward, push-pull, etc	N/A	3.5	14	5	2	25	25	25	Dual, independent	LLP-10, SO-8EP
LM5111	Forward, push-pull, etc	N/A	3.5	14	5	3	25	25	25	Dual, independent	SO-8
LM5112	Forward, push-pull, etc	N/A	3.5	14	7	3	25	N/A	25	Dual, independent	LLP-6

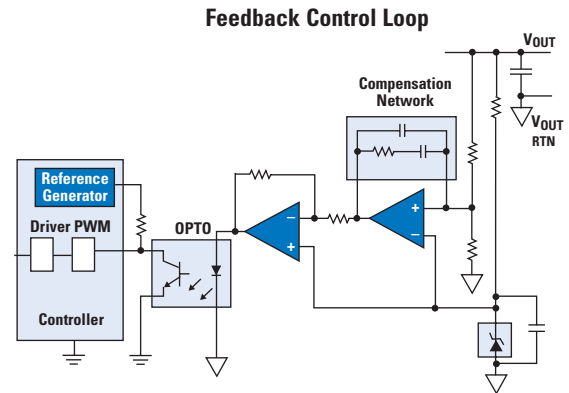
High-Performance Amplifiers and Voltage References

LMH6618/19 – Single/Dual 130 MHz, 1.25 mA RRIO Operational Amplifiers

Features

$V_S = 5V$, $R_L = 1\text{ k}\Omega$, $T_A = 25^\circ\text{C}$ and $AV = +1$, unless otherwise specified

- 2.7 to 11V supply voltage range
- 1.25 mA supply current per channel
- 130 MHz small signal bandwidth
- $\pm 0.6\text{ mV}$ input offset voltage (max at 25°C)
- $55\text{ V}/\mu\text{s}$ slew rate
- 90 ns settling time to 0.1%
- 120 ns settling time to 0.01%



High Performance Rail-to-Rail Amplifiers for Merchant Power Modules

Product ID	CH	Gain Bandwidth (MHz)	Supply Min (V)	Supply Max (V)	Slew Rate (V/ μs)	Offset Voltage Max, 25C (mV)	Supply Current per Ch (mA)	PSRR (dB)	Package
Rail-to-Rail Input and Output									
LM6142	2	17	1.8	24	25	1	0.65	87	SOIC8, MDIP8
LM6144	4	17	1.8	24	25	1	0.65	87	SOIC14, MDIP14
LM7301	1	4	2.2	30	1.25	6	0.57	104	SOT23-5, SOIC8
LMH6618	1	140	2.7	11	55	0.6	1.35	104	TSOT23-6, SOIC8
LMH6619	2	140	2.7	11	55	0.6	1.45	104	TSOT23-6, SOIC8
LMH6645	1	55	2.5	12	22	3	0.725	95	SOT23-5, SOIC8
LMH6646	2	55	2.5	12	22	3	0.725	95	SOIC8, Mini-SOIC8
LMH6647 (w/ shutdown)	1	55	2.5	12	22	3	0.725	95	SOT23-6, SOIC8
Rail-to-Rail Output									
LMH6642	1	130	2.7	12.8	135	5	2.7	90	SOT23-5, SOIC8
LMH6643	2	130	2.7	12.8	135	3.4	2.7	90	SOIC8, Mini-SOIC8
LMH6644	4	130	2.7	12.8	135	5	2.7	90	SOIC14, TSSOP14

Shunt Voltage References

Product ID	V_{OUT} Options (V)	Initial Accuracy (%)	Tempco (ppm/ $^\circ\text{C}$)	Quiescent Current (mA)	Noise (μV_{pp})	Packaging
LMV431	Adj	1.5	138, 129	0.055	8.0	T0-92, SOT-23
LM4041	1.225, Adj	0.2, 2, 0.5, 1, 0.1	150, 100	0.06	20	SOT-23, SC-70, T0-92
LM4051	1.225, Adj	0.1	50	0.06	20	SOT-23
LM4050	2.0, 2.5, 4.096, 5.0, 8.2, 10	0.1, 0.2, 0.5	50	0.06 to 15.0	41	SOT23-3, CerPack
LM4030	2.5, 4.096, 5.0	0.05, 0.1, 0.15	10, 20, 30	0.065	105	SOT23-5

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/isolatedpower

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

