



Power Supply & Power Adapter Solutions



Products and solutions enabling high active-mode efficiency, low standby-mode consumption, and power factor correction, for highly efficient power supplies from ON Semiconductor.



www.onsemi.com



ON Semiconductor Provides Expertise, Solutions, and Products that Enable Designers to Quickly Improve System Efficiency

Evolving Efficiency Standards

Evolving regulations and incentives, targeted towards improving energy efficiency, are intended to limit global climate change. Enhancing power supply efficiency alone can save over 2% of global energy consumption. Many organizations worldwide (such as China Energy Conservation Project, Japan Top Runner, USA Environmental Protection Agency, European Code of Conduct) now develop regulations and incentives for power supply efficiency, like ENERGY STAR® and 80 PLUS®. ON Semiconductor actively participates in standards organizations and working groups, so that we can provide solutions to the market that meet all of the relevant specifications, worldwide.

Power Supply Expertise

ON Semiconductor provides products and solutions that save power from line to load, enabling quick deployment of cost-effective power supplies that meet evolving global efficiency standards. Our expertise in high-efficiency power supplies helps solve your challenges in all focus areas for efficiency enhancement:

- Low standby-mode power consumption
- High active-mode power efficiency
- Power factor correction

And since we provide a full range of power supply semiconductors – from highly integrated power factor controllers, ac-dc controllers, and dc-dc controllers, to discrete MOSFETs, rectifiers, diodes, and transistors – we can help you design complete power supply solutions, with all active components sourced from and supported by a single supplier.

GreenPoint® Reference Designs

ON Semiconductor provides GreenPoint reference designs for selected types of internal and external power supplies. These open reference designs provide roadmaps for the design of highly efficient power supplies, helping you get to market quickly by providing documentation that includes schematics, BOMs, Gerber files, design descriptions, and test results. The reference designs meet all relevant global efficiency standards, providing access to global markets with a single design.



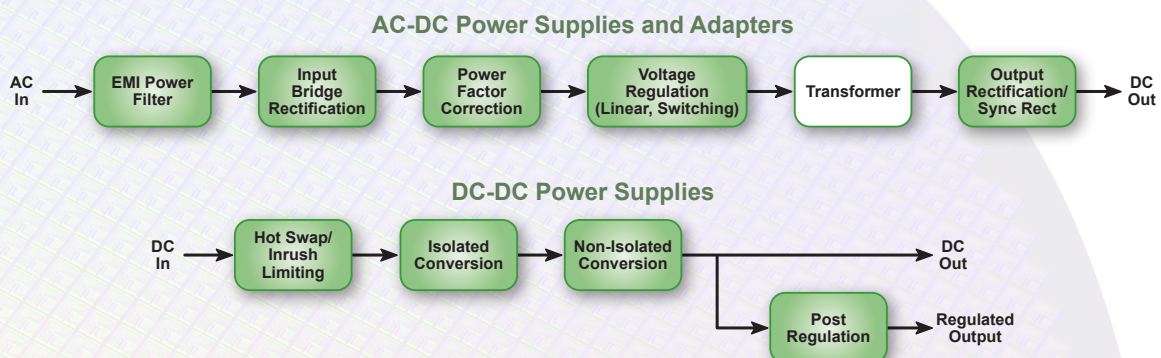
Global Power Supply Presence

ON Semiconductor maintains a broad, global network of design and applications resources, including resources devoted to power supplies.

Our Product Design Centers define and develop advanced power management integrated circuits, utilizing the latest architectures and development tools. Products are targeted for a range of process technologies, including analog CMOS, Bi-CMOS, and Very High Voltage (VHV).

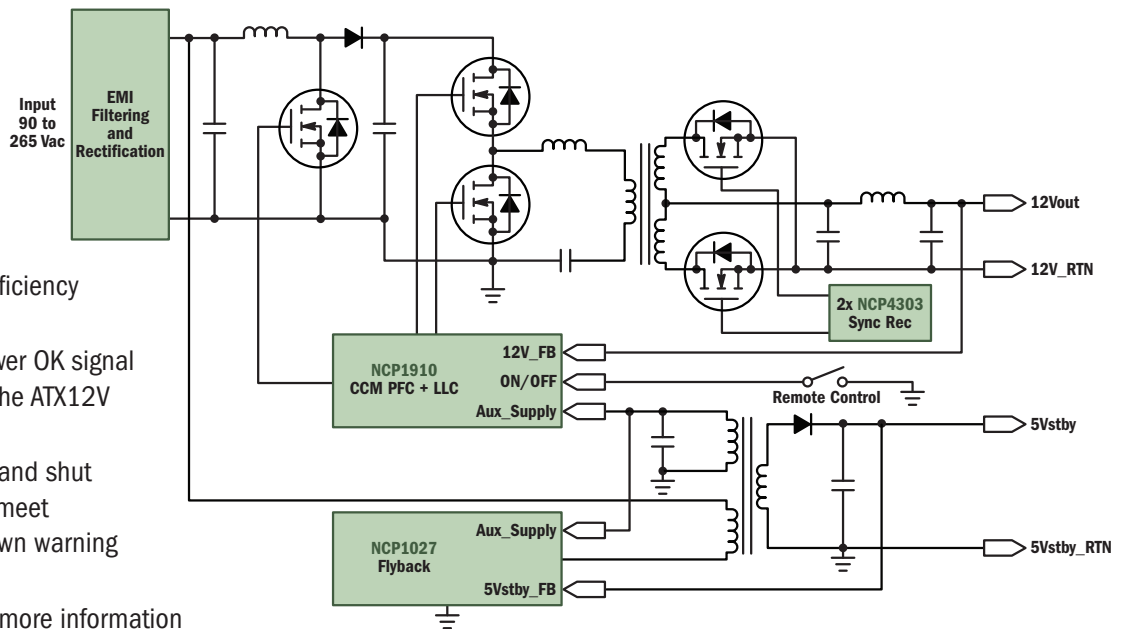
Our Solutions Engineering Centers focus on developing value-added total solutions for specific end market applications. These centers are staffed with applications engineers with design experience, and are equipped with all of the resources necessary for local manufacturers to benefit from the vast power management experience of ON Semiconductor.

A global network of Field Applications Engineers provides truly customer-specific support. These local resources can help you optimize your power supply designs, by contributing their experience and training, with both applications and specific components, to your design location.



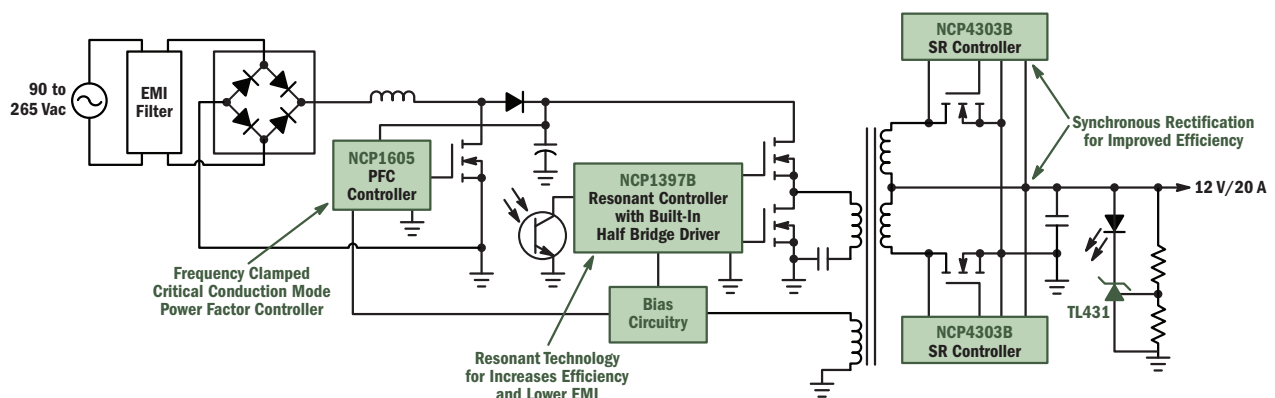
Single Chip CCM PFC + LLC Solution for 310 W ATX Power Supply

- Featuring NCP1910 high performance CCM PFC + LLC combo controller
- Satisfies 80 PLUS® Gold efficiency specifications
- Integrated ON/OFF and Power OK signal operation to conform with the ATX12V specification
- Easily configurable startup and shut down timing sequences to meet hold-up time and power down warning requirements
- Download AND8474/D for more information



240 W All-in-One PC Power Supply

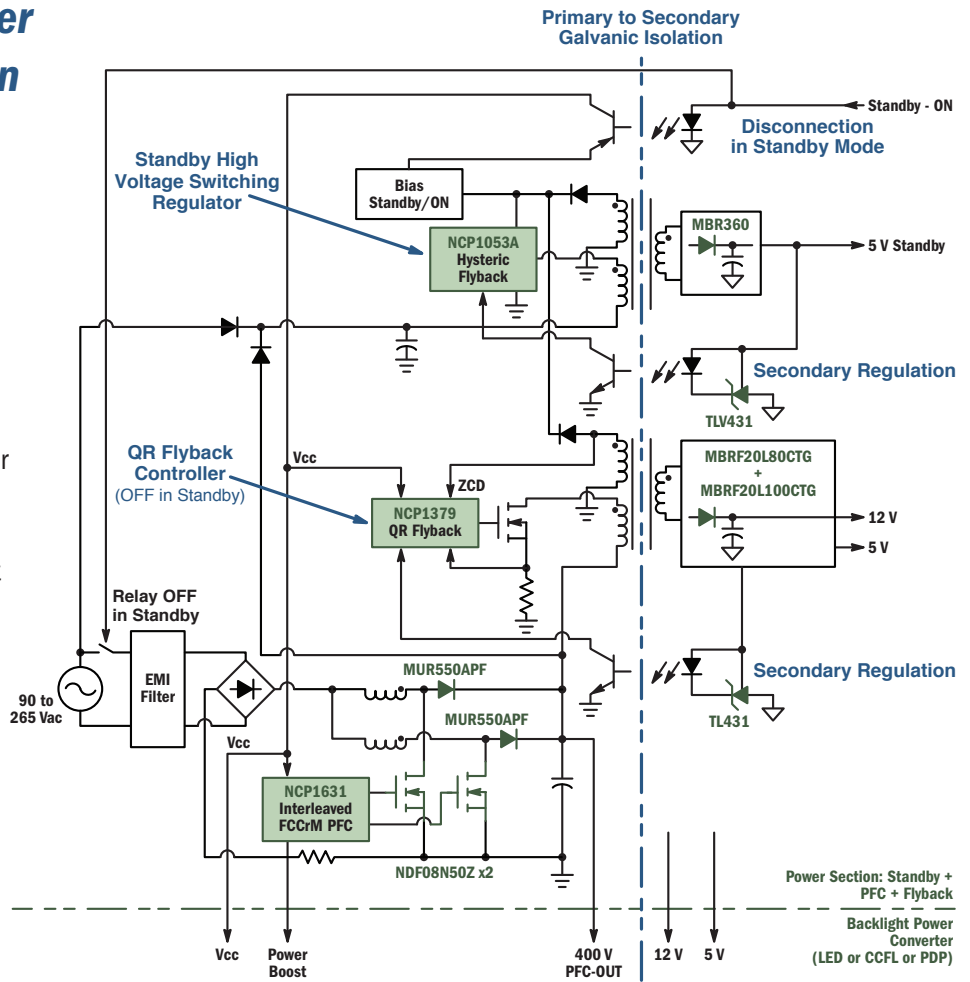
- 12 V, 20 A SMPS intended for high efficiency All-in-One PC power supply
- Frequency clamped power factor correction front end controlled by NCP1605
- Half-bridge resonant LLC control provided by NCP1397
- Secondary side synchronous rectification provided by NCP4303
- Download AND8460/D for more information



300 W SLIM LCD TV Power Supply Reference Design



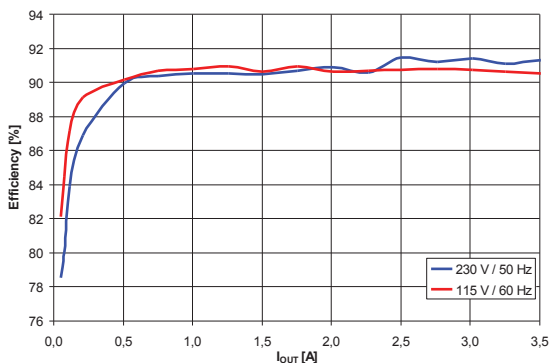
- Utilizes NCP1631 for interleaved frequency clamped critical conduction power factor correction
- NCP1053A integrated switching regulator provides low power standby (Pin < 25 mW in off mode)
- High efficiency NCP1379 quasi-resonant flyback converter for powering signal processing and audio amplifiers
- Board height limited to 8 mm for slim LCD TV designs
- Download TND401/D for complete, production-ready design documentation



65 W Notebook Adapter with Low No-Load Input Power Consumption

No Load Input Power Consumption

Input Voltage	Input Power (mW)
85 V; 60 Hz	8.3
115 V; 60 Hz	9.9
230 V; 60 Hz	17.8
265 V; 60 Hz	21.8



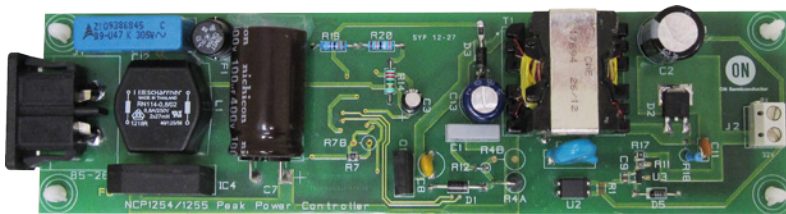
- <10 mW no load input power consumption at V_{IN} = 115 Vac
- Active mode efficiency > 90%
- Featuring NCP1246 High Voltage AC-DC Fixed Frequency Controller
 - Integrated active X2 capacitor discharge solution
 - Frequency foldback and skip mode for optimal efficiency across the load range
 - Low power consumption sleep mode allowing output voltage hiccup
- Featuring NCP4354 Off Mode Detection
 - Automatically detects no load condition and turns off NCP1246 by optocoupler
 - Provides CCCV feedback or CV feedback (like TL431)
 - <100 μA consumption
 - Optional Integrated LED Driver

90 W PFC + QR Adapter, 10 mW Standby

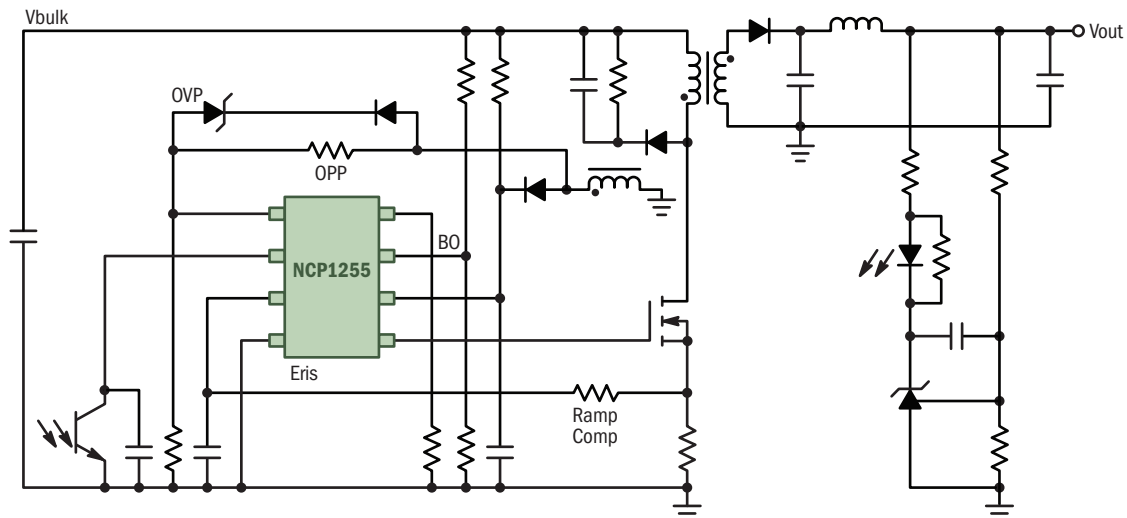
- NCP1937 combines Power Factor Correction (PFC) controller and Quasi-Resonant (QR) controller
- <10 mW no-load standby performance
- High voltage startup circuit and active input filter capacitor discharge circuitry
- High voltage line voltage detector
- Integrated high voltage switch disconnects PFC feedback resistor divider
- Fault input for severe fault condition
- Download DN05044/D for more information



15 W Nominal Power Supply with 40 W Peak Power



- NCP1255 operates at 65 kHz frequency with 130 kHz during peak power
- Frequency foldback with skip mode
- Adjustable brown-out protection
- Adjustable dual timer OCP
- Download AND9115/D for more information



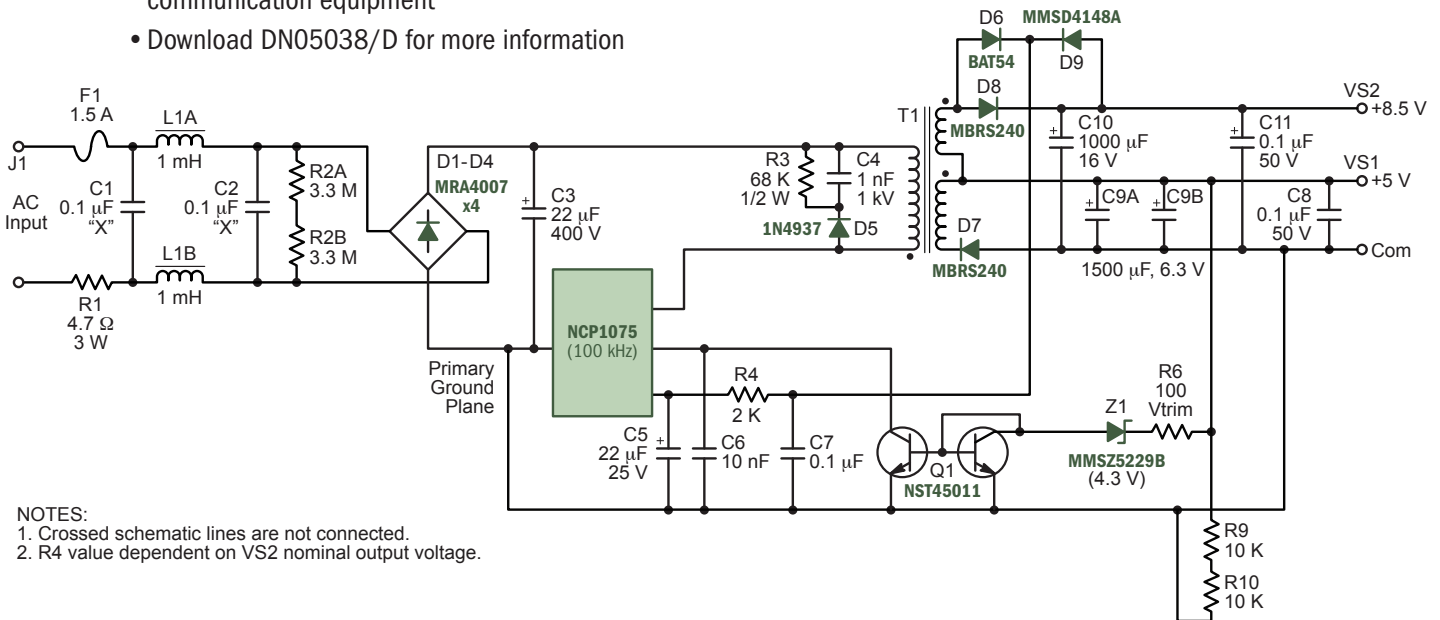
40 W AC-DC Power Adapter



- Compact, high performance 12 V, 3.3 A flyback power adapter
- Featuring highly integrated NCP1250 fixed frequency flyback controller in a small TSOP-6 package
- Also utilizes NCP4810 for active X-2 discharge
- Average efficiency of > 87%
- No load input power of 33 mW at low line
- Download AND8486/D for more information

Non-Isolated, 8 W Dual Output Offline Power Supply

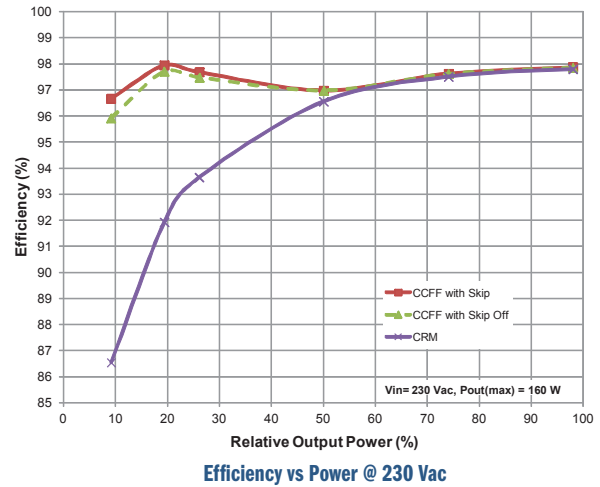
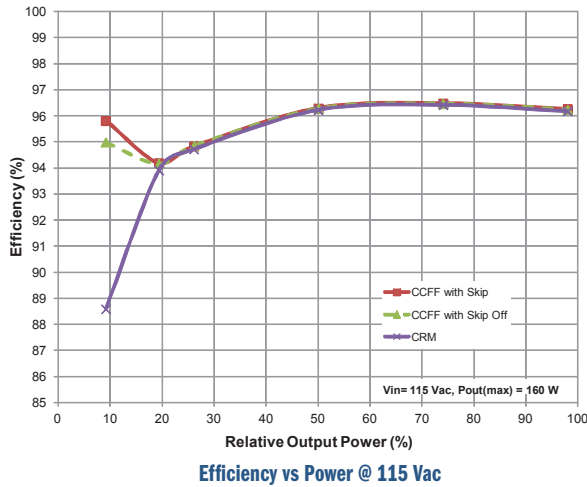
- NCP1075 creates compact, dual output supply, with only 68 mW standby power
- EN55022, Level B Conducted EMI
- Intended for use in white goods, E-meters, and low power communication equipment
- Download DN05038/D for more information



Power Factor Correction

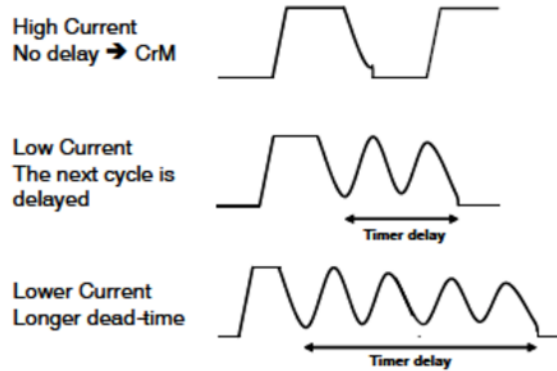
160 W PFC Boost using NCP1611 or NCP1612

- Improved efficiency in light load over traditional CrM PFC
- Unlike CrM, switching frequency is reduced at light load
- Improved reliability and safety without extra components



NCP1611 and NCP1612 Features

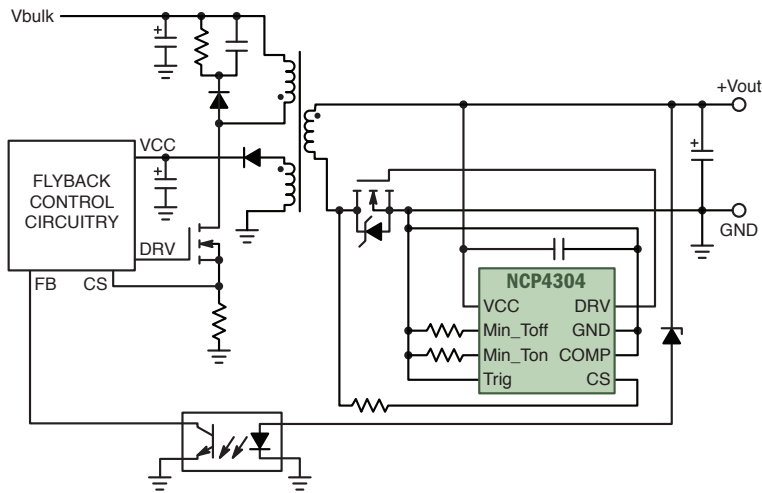
- CrM with Current Controlled Frequency Foldback (CCFF)
- Shorted Boost or Bypass Diode Protection
- Comprehensive Open / Short Pin Protection
- Enhanced Transient Response
- Soft Overvoltage Protection
- Brownout Detection
- Optional Skip Mode
- Thermal Shutdown
- Wide Vcc Range to 35 Vdc



Power Factor Controllers

Device	Conduction Mode	Frequency	Control Mode	Package
NCP1605	Critical, Discontinuous	Variable and/or Fixed	Voltage	SOIC-16
NCP1607	Critical	Variable	Voltage	SOIC-8
NCP1608	Critical	Variable	Voltage	SOIC-8
NCP1611	Critical	Variable	Voltage	SOIC-8
NCP1612	Critical	Variable	Voltage	SOIC-10
NCP1631	Critical, Discontinuous (Interleaved)	Variable and/or Fixed	Current	SOIC-16
NCP1652	Continuous, Discontinuous	Fixed	Current	SOIC-16, SOIC-20W
NCP1653	Continuous	Fixed	Current	PDIP-8, SOIC-8
NCP1654	Continuous	Fixed	Current	SOIC-8

Secondary Side Controllers



NCP4304 Typical Application Example - DCM or QR Flyback Converter

Features

- Self contained control of synchronous rectifier in CCM, DCM, and QR flyback applications
- Precise true secondary zero current detection with adjustable threshold
- Automatic parasitic inductance compensation input

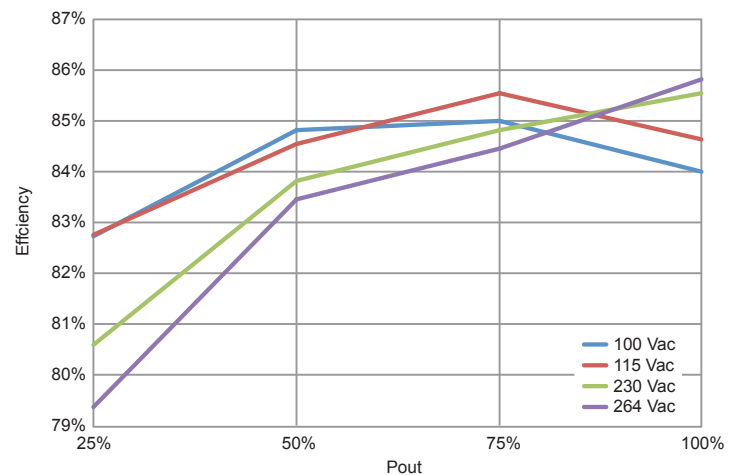
Secondary Side Controllers

Device	Function	Package
NCP4304	Secondary Side Synchronous Rectification Driver	SOIC-8, DFN-8
NCP4328	Secondary Side CC/CV Controller	TSOP-5, TSOP-6
NCP4353	Sleep Mode Controller for Low Standby Power	TSOP-6
NCP4354/5	Sleep Mode Controller for Low Standby Power	SOIC-8

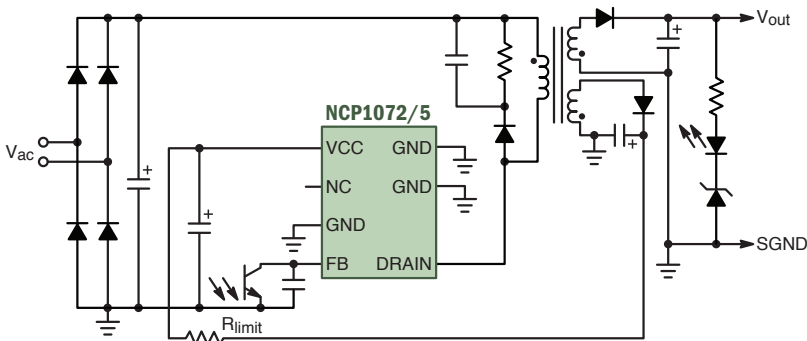
NCP1072, NCP1075 High Voltage Regulators

Features

- Built-in 700 V MOSFET with typical $R_{DS(ON)}$ of 11 Ω
- Peak current: NCP1072 = 250 mA and NCP1075 = 450 mA
- Dynamic Self-Supply: no need for an auxiliary winding
- Frequency foldback and skip-mode with jittering
 - Improved light load efficiency
 - Improved EMI over the entire range
- No load power < 50 mW



Efficiency of 10 W Adapter Using NCP1075



AC-DC Controllers and Regulators



Features

- Comprehensive, versatile portfolio supports:
 - Fixed frequency and variable frequency
 - Different topologies, from the classical flyback, to the half bridge resonant via the forward active clamp
 - Broad range of price-performance options, from cost effective devices to highly integrated controllers and regulators
- Embedded features ease compliance with stringent efficiency requirements: frequency foldback, Soft-Skip™ mode
- Functions reduce EMI signatures and facilitate compliance with safety standards

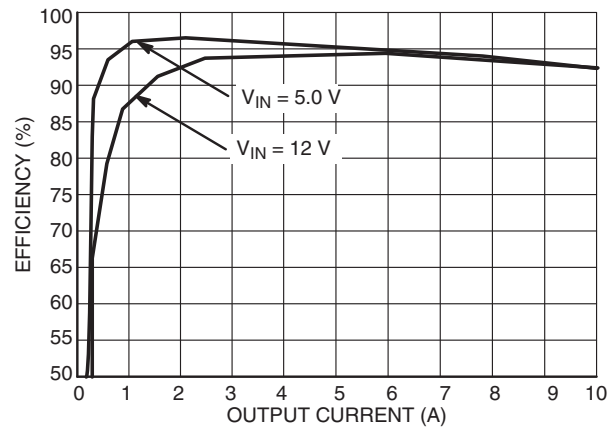
AC-DC Controllers and Regulators

Device	Topology	Frequency	Control Mode	Package
NCP1010~15	Buck/Boost/Buck-Boost/Flyback	Fixed	Current	SOT-223, PDIP-7
NCP1027~28	Buck/Boost/Buck-Boost/Flyback	Fixed	Current	PDIP-7
NCP1050~55	Flyback	Fixed	Gated Oscillator	PDIP-7, SOT-223
NCP1072/75	Flyback	Fixed	Current	PDIP-7, SOT-223
NCP1200	Flyback	Fixed	Current	SOIC-8, PDIP-8
NCP1203	Flyback	Fixed	Current	SOIC-8, PDIP-8
NCP1207A/B	Flyback	Variable	Current	SOIC-7, SOIC-8, PDIP-8
NCP1216/16A	Flyback/Forward	Fixed	Current	SOIC-8, PDIP-7
NCP1217/17A	Flyback/Forward	Fixed	Current	SOIC-8, PDIP-7
NCP1218/19	Flyback	Fixed	Current	SOIC-7
NCP1230	Flyback	Fixed	Current	SOIC-8, PDIP-7
NCP1234/6	Flyback	Fixed	Current	SOIC-8
NCP1237/38/88	Flyback	Fixed	Current	SOIC-7
NCP1244	Flyback	Fixed	Current	SOIC-7
NCP1246/7	Flyback	Fixed	Current	SOIC-8
NCP1249	Flyback	Fixed	Current	SOIC-9
NCP1250/1	Flyback	Fixed	Current	TSOP-6
NCP1252	Flyback/Forward	Fixed	Current	SOIC-8
NCP1253/4/5	Flyback	Fixed	Current	TSOP-6 or SOIC-8
NCP1271	Flyback	Fixed	Current	SOIC-8, PDIP-8
NCP1308	Flyback	Variable	Current	SOIC-8
NCP1336	QR Flyback	Variable	Current	SOIC-14
NCP1337	Flyback	Variable	Current	SOIC-7, PDIP-7
NCP1338	Flyback	Variable	Current	SOIC-7, PDIP-7
NCP1351	Flyback	Variable	Current	SOIC-8
NCP1377	Flyback	Variable	Current	SOIC-7, SOIC-8, PDIP-7
NCP1379/80	Flyback	Variable	Current	SOIC-8
NCP1392/3	Half-Bridge Resonant	Variable	Current	SOIC-8
NCP1395	Half-Bridge/Full Bridge Resonant	Variable	Voltage	SOIC-16, PDIP-16
NCP1396	Half-Bridge Resonant	Variable	Voltage	SOIC-16
NCP1397	Half-Bridge Resonant	Variable	Voltage	SOIC-16
NCP1398	Half-Bridge Resonant	Variable	Voltage	SOIC-16NB
NCP1562	Forward Active Clamp	Fixed	Voltage	SOIC-16
NCP1910	Combination PFC + LLC Half-Bridge	Fixed PFC, Variable LLC	Current	SOIC-24
NCP1927	Combination PFC + QR Flyback	Variable	Current	SOIC-16
NCP1937	Combination PFC + QR Flyback	Variable	Current	SOIC-20

DC-DC Controllers and Regulators

Features

- Integrated switching regulators from 0.5 A to 5 A
- Various topologies including buck, boost, buck/boost, and inverting
- Wide input voltage range up to 200 V
- PWM controllers capable of driving up to 30 A



DC-DC Regulators

Device	Vin (V)		Topology	Frequency (kHz)	Output Current (A)	Package
	Min	Max				
LM2574	4.75	40	Buck	52	0.5	D2PAK, TO-220
LM2594	4.75	40	Buck	150	0.5	SOIC-8, PDIP-8
LM2575	4.75	40	Buck	52	1.0	D2PAK, TO-220
LM2595	4.75	40	Buck	150	1.0	D2PAK, TO-220
NCP1030/31	10	200	Buck, Boost	300	0.5 / 1.0	Micro8
CS51411/2/3/4	4.5	40	Buck	260	1.5	SOIC-8, DFN-18
NCP3063	3	40	Buck, Boost, Inverting, Buck/Boost	up to 250	1.5	DFN-8, SOIC-8, PDIP-8
NCP3064	3	40	Buck, Boost, Inverting, Buck/Boost	up to 250	1.5	DFN-8, SOIC-8, PDIP-8
NCP3065	3	40	Buck, Boost, Inverting, Buck/Boost	up to 250	1.5	DFN-8, SOIC-8, PDIP-8
NCP3066	3	40	Buck, Boost, Inverting, Buck/Boost	up to 250	1.5	DFN-8, SOIC-8, PDIP-8
MC34063A	3	40	Buck, Boost, Inverting, Buck/Boost	up to 100	1.5	DFN-8, SOIC-8, PDIP-8
NCP1595	4	5.5	Buck	1200	1.5	DFN-6
CS5171/2/3	2.7	30	Boost	280/560	1.5	SOIC-8
NCP1597	4	5.5	Buck	1200	2.0	DFN-6
NCP1599	2.7	5.5	Buck	1200	3.0	DFN-6, DFN-10
NCP3170	4.5	18	Buck	500 / 1000	3.0	SOIC-8
MC34166	7.5	40	Step-up/Step-down	72	3.0	D2PAK, TO-220
LM2576	4.75	40	Buck	52	3.0	D2PAK, TO-220
LM2596	4.75	40	Buck	150	3.0	D2PAK, TO-220
MC34163	2.5	40	Buck, Boost, Inverting, Buck/Boost	up to 100	3.4	SOIC-16, PDIP-16
NCV33163	2.5	60	Buck, Boost, Inverting, Buck/Boost	up to 100	3.4	SOIC-16, PDIP-17
NCP3163	2.5	40	Buck, Boost, Inverting, Buck/Boost	up to 300	3.4	SOIC-16WB, DFN-18
MC34167	7	40	PWM Step-down	72	5.0	D2PAK, TO-220

DC-DC Controllers

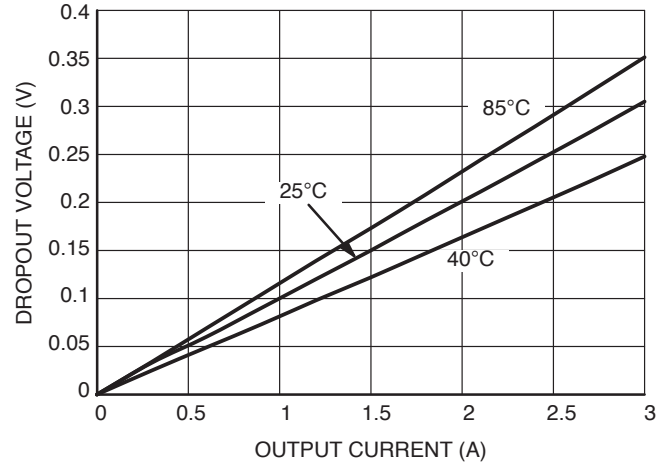
Device	V_{in} (V)		Isolated	Frequency (kHz)	Control Mode	Package
	Min	Max				
CS5124	7.7	75	Yes	400	Current	SOIC-8
CS51022	3.3	72	Yes	200 - 1000	Current	SOIC-16, TSSOP-16
CS51031	4.5	16	No	200 - 700	Hysteretic	SOIC-8
CS51221	3.3	72	Yes	200 - 1000	Voltage	SOIC-16, TSSOP-16
NCP1034	8	100	No	25 to 500	Voltage	SOIC-16
NCP1216A	10	500	Yes	65, 100, 133	Current	SOIC-8, PDIP-7
NCP1217A	10	500	Yes	65, 100, 133	Current	SOIC-8, PDIP-7
NCP1294	3.3	72	Yes	200 - 1000	Voltage	SOIC-16, TSSOP-16
NCP1587	4.5	13.2	No	275	Voltage	SOIC-8
NCP1589	4.5	13.2	No	300/600	Hysteretic	SOIC-8
NCP3011	4.5	28	No	400	Voltage	TSSOP-14
NCP3020A/B	4.5	28	No	300/600	Voltage	SOIC-8
NCP3030	4.7	28	No	1200/2400	Voltage	SOIC-8
SG3525	8	35	No	100 - 400	Voltage	SOIC-16, PDIP-16
TL494	7	40	No	40 - 200	Voltage	SOIC-16, PDIP-16
TL594	7	40	No	40 - 300	Voltage	SOIC-16, PDIP-16, TSSOP-16



Linear Voltage Regulators

NCP4632 Features

- 3 A LDO with Reverse Current Protection
- Operating input voltage range: 1.6 – 5.25 V
- Output voltage range: 0.8 – 4.5 V (0.1 V steps for fixed options)
- Supply current
 - Typical operation mode: 350 μ A
 - Standby mode: <1.0 μ A
- Dropout voltage
 - 150 mV Typ @ I_{OUT} = 1 A, V_{OUT} = 2.5 V
 - 510 mV Typ @ I_{OUT} = 3 A, V_{OUT} = 2.5 V
- Output voltage accuracy: 1%
- Line regulation: 0.15%/V Typ



Dropout Voltage vs. Output Current at NCP4632xDT33

Linear Voltage Regulators

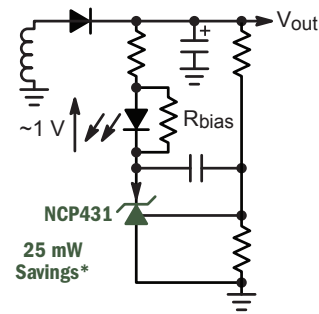
Device	V _I Max	I _{OUT} Typ	V _{OUT} ** (V)	V _{DO} Typ	Package(s)
NCP4632	6 V	3.0 A	0.8, 1.5, 2.8, 3.3	480 mV	DPAK
NCP5663	9 V	3.0 A	1.5, 1.8, Adj	1.0 V	D2PAK
NCP59300/1/2	18 V	3.0 A	1.8, 2.5, 2.8, 3.0, 3.3, Adj	300 mV	D2PAK, DFN-8
NCP5662	9 V	2.0 A	1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, Adj	1.0 V	D2PAK, DFN-8
NCP59150/1/2	18 V	1.5 A	1.8, 2.5, 2.8, 3.0, 3.3, Adj	300 mV	D2PAK, DFN-8
NCP565	9 V	1.5 A	1.2, 1.5, 2.8, 3.0, 3.3, Adj	900 mV	D2PAK, DFN-6, SOT-223
NCP5661	9 V	1.0 A	1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, Adj	1.0 V	DFN-6, DPAK
NCP690/1/2	6 V	1.0 A	1.25, 1.5, 1.8, 2.5, 3.3, 5	120 mV	DFN-6
NCP693	7 V	1.0 A	0.8, 1.0, 1.2, 2.5, 3.3	450 mV	UDFN-6
NCP694	6 V	1.0 A	0.8, 1.0, 1.2, 2.5, 3.3, Adj	180 mV	HSO-6, SOT-89
NCP3335A	12 V	500 mA	1.5, 1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 5.0, Adj	340 mV	DFN-10, Micro8
NCP4629	24 V	500 mA	5.0, 6.0, 12.0	135 mV	DPAK
NCP5500	18 V	500 mA	1.5, 3.3, 5.0, Adj	230 mV	DPAK, SOIC-8
NCP5501	18 V	500 mA	1.5, 3.3, 5.0	300 mV	DPAK
NCP605	6 V	500 mA	1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 5.0, Adj	150 mV	DFN-6
NCP705	6 V	500 mA	0.8, 1.8, 2.8, 3.0, 3.3	250 mV	SOT-223, WDFN-6
NCP752	5.5 V	200 mA	1.8, 2.8, 3.0, 3.3	130 mV	SOT-223, XDFN-6
NCP4623	24 V	150 mA	3.3, 4.5, 4.8, 5.0, 10.0, 12.0, Adj	200 mV	SOT-23, XDFN-6
NCP4641	35 V	150 mA	3.0, 5.0, 8.0	200 mV	SOT-89
NCP571	12 V	150 mA	0.8, 0.9, 1.0, 1.2	350 mV	DFN-6, TSOP-5
NCP600	6 V	150 mA	1.3, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 3.5, 5.0, Adj	75 mV	DFN-6, TSOP-5
LP2950	30 V	100 mA	3.0, 3.3, 5.0	350 mV	DPAK, TO-92
LP2951	30 V	100 mA	3.0, 3.3, Adj	350 mV	Micro8, PDIP-8, SOIC-8
NCP4640	50 V	50 mA	2.0, 3.0, 3.3, 8.0, 12.0	200 mV	SOT-89
NCP508	13 V	50 mA	1.5, 1.8, 2.5, 2.8, 3.0, 3.3	155 mV	SC-70, WDFN-6
NCP715*	24 V	50 mA	3.3	tbd	SC-70, XDFN-6
NCP51460	30 V	20 mA	3.3	900 mV	SOT-23

* Pending 2H13. ** Consult factory for other output voltage options.

Voltage References

NCP431 Features

- Programmable Precision Reference
- Pin to pin upgrade of the TL431 product
- Reduces no load power consumption in SMPS applications
- Reduced minimum cathode current (40 μ A)
- Programmable output voltage to 36 V
- Voltage reference tolerance: 0.5% @ 25°C (NCP431B)
- Integrated temperature compensation



$$\text{TL431 } I_{\text{bias}} = \frac{V_f}{R_{\text{bias}}} = \frac{1}{1\text{K}} = 1 \text{ mA}$$

$$\text{NCP431 } I_{\text{bias}} = \frac{V_f}{R_{\text{bias}}} = \frac{1}{10\text{K}} = 100 \mu\text{A}$$

* for 19 V output adapter

Voltage References

Device	Type	Tolerance	Package
NCP431A	Adjustable	1%	TO-92, SOIC-8, SOT-23-3
NCP431B	Adjustable	0.5%	SOT-23-3
TL431	Adjustable	2.2%	SOIC-8, PDIP-8, Micro8, TO-92
TL431A	Adjustable	1.0%	SOIC-8, PDIP-8, Micro8, TO-92
TL431B	Adjustable	0.4%	SOIC-8, PDIP-8, Micro8, TO-92
LM285	Fixed	1%, 1.5%	SOIC-8, TO-92
LM385	Fixed	1%, 1.5%, 2%, 3%	SOIC-8, TO-92
LM385B	Fixed	1%, 1.5%	SOIC-8, TO-92

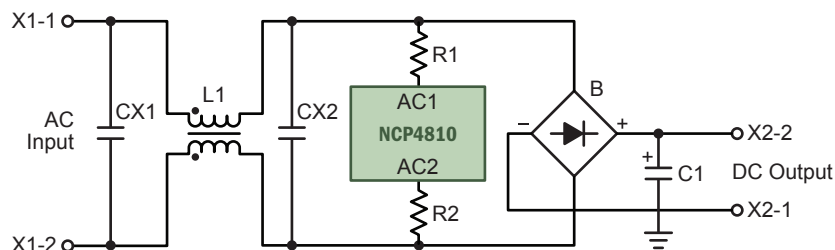
Active X Capacitor Discharging

Features

- Increased efficiency
- Minimal consumption when AC line is detected
- Fast X capacitor discharging
- Increased reliability
- Increased safety
- Helps with NEMKO certification

Device	Integrated/Discrete	Voltage Rating	Discharge Current	Package
NCP1246*	Integrated with Flyback	500 V	15 mA	SOIC-7
NCP1249	Integrated with Flyback	500 V	10 mA	SOIC-9
NCP1937	Integrated with PFC + Flyback	700 V	11.5 mA	SOIC-20
NCP4810	Discrete	700 V	1 mA	SOIC-8

* NEMKO Certified.

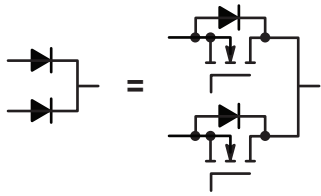


MOSFETs for Power Conversion

ORing MOSFETs

Features

- Low RDS(on) for low conduction loss
- 30 V for IM bus ORing
- 100 V for 48 V bus ORing



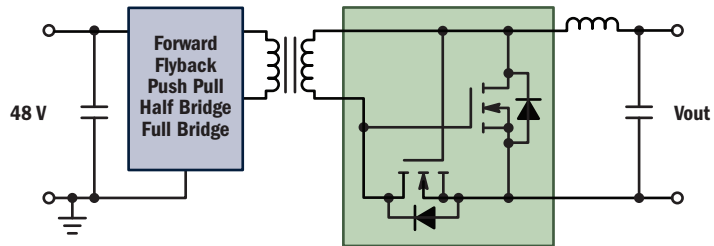
MOSFETs as ORing Diodes

Device	Configuration	Polarity	V _{DS} (V)	V _{GS} (V)	R _{DS(ON)} mΩ		Q _g (nC)	Q _{gd} (nC)	R _G (Ω)	Package
					V _{GS} = 10 V					
					Typ	Typ				
NTMFS4H01N	Single	N	25	20	0.5	0.7	47	13	0.8	S08-FL
NTMFS4H01NF	Int. Schottky	N	25	20	0.53	0.75	46	12	0.8	S08-FL
NTMFS4H02N	Single	N	25	20	1	1.5	47	10	0.8	S08-FL
NTMFS4H02NF	Int. Schottky	N	25	20	1	1.6	48	11	0.8	S08-FL
NTMFS4C01N	Single	N	30	20	0.9	1.2	65	18	1	S08-FL
NTMFS4931N	Single	N	30	20	0.85	1.2	62.1	10.1	0.7	S08-FL
NTMFS5C404NL	Single	N	40	20	0.56	0.85	81	23.8	--	S08-FL
NTMFS5C410NL	Single	N	40	20	0.71	1	66	22	--	S08-FL
NTP6410AN	Single	N	100	20	11	10	120	57	2.4	TO-220, D2PAK
NTP6411AN	Single	N	100	20	12.7	---	100	47	3.1	TO-220, D2PAK

Isolated Topology DC-DC (Bricks)

Features

- Low RDS(on) for low conduction loss
- Low capacitance for low switching loss
- Integrated Schottky for low diode loss



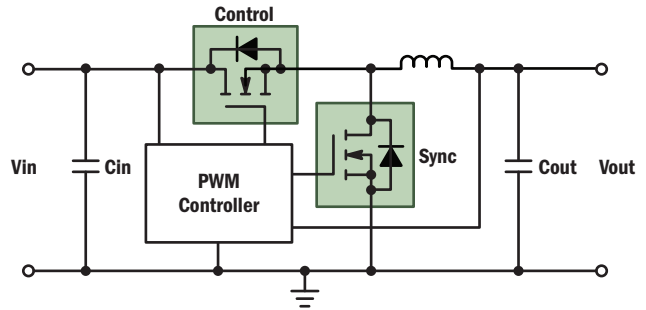
Device	Configuration	Polarity	V _{DS} (V)	V _{GS} (V)	R _{DS(ON)} mΩ		Q _g (nC)	Q _{gd} (nC)	C _{ISS} (pF)	C _{CRSS} (pF)	R _G (Ω)	Application	Package
					V _{GS} = 10 V								
					Typ	Typ							
NTMFS4H01N	Single	N	25	20	0.5	0.7	47	13	5793	241	0.8	Secondary Synchronous	S0-8FL
NTMFS4H01NF	Single	N	25	20	0.53	0.75	46	12	5706	237	0.8		S0-8FL
NTMFS4H013NF	Single	N	25	20	0.7	1	28	7.5	3780	150	1		S0-8FL
NTMFS4H02N	Single	N	25	20	1	1.5	47	10	2672	111	0.8		S0-8FL
NTMFS4H02NF	Single	N	25	20	1	1.6	48	11	2634	109	0.8		S0-8FL
NTTFS4H05N	Single	N	25	20	2.6	3.8	9.8	2.7	1232	51	1		u8FL
NTTFS4H07N	Single	N	25	20	3.7	5.4	6.1	1.7	768	32	0.8		u8FL
NTMFS4C05N	Single	N	30	20	2.7	4	14	5	1972	59	1		S0-8FL
NTMFS4C06N	Single	N	30	20	3.2	4.8	11.6	4	1683	40	1		S0-8FL
NTMFS4C08N	Single	N	30	20	4.6	6.8	8.4	3.3	1113	39	1		S0-8FL
NTTFS4C05N	Single	N	30	20	2.9	4.1	14.5	5.5	1988	71	1		u8FL
NTMFS5C404NL	Single	N	40	20	0.56	0.85	81	23.8	12168	79.8	--		S0-8FL
NTMFS5C410NL	Single	N	40	20	0.71	1	66	22	8862	116	--		S0-8FL
NTMFS5C442NL	Single	N	40	20	2.2	3.4	22		3000	28	--		S0-8FL
NTMFS5830NL	Single	N	40	20	1.7	2.6	60	32	5880	500	0.5	S0-8FL	
NTMFS5832NL	Single	N	40	20	3.1	5	25	12.7	2700	250	1.2	S0-8FL	
NTMFS5C604NL	Single	N	60	20	0.93	1.25	52	12.7	8900	40	--	Primary	S0-8FL
NTMFS5C612NL	Single	N	60	20	1.2	1.65	41	10.9	6660	45	--		S0-8FL
NTMFS5C646NL	Single	N	60	20	3.8	5	15.7	5.1	2164	17	--		S0-8FL
NTMFS5844NL	Single	N	60	20	10.2	13	15	8	1460	96	0.62		S0-8FL
NTTFS5820NL	Single	N	60	20	10.1	13	15	8	1462	96	0.62		u8FL
NTTFS5826NL	Single	N	60	20	19	25	8.4	3.9	850	50	1.5		u8FL

MOSFETs for Power Conversion

Non-Isolated Topology “Buck” DC-DC

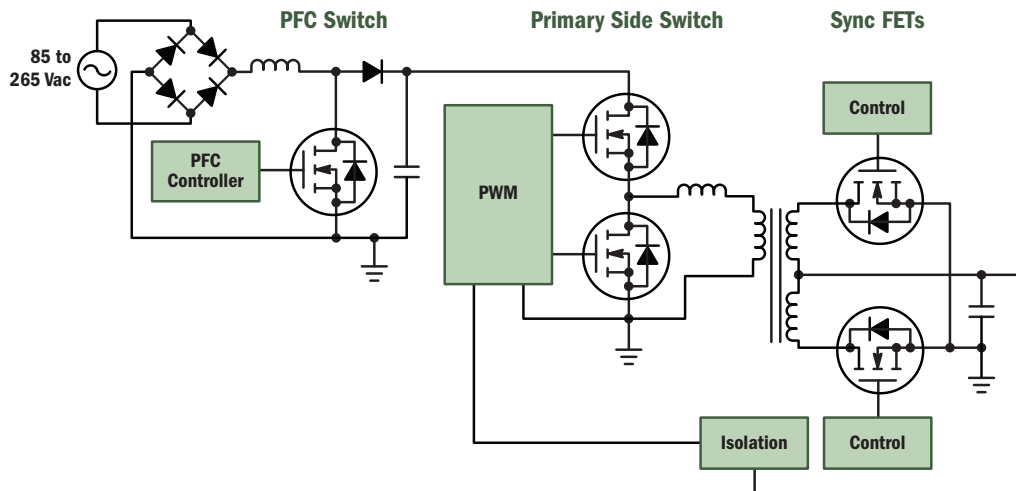
Features

- Low $R_{DS(on)}$ for low conduction loss
- Low capacitance for low switching loss
- Integrated Schottky for enhanced light load efficiency



Device	Configuration	VDS (V)	VES (V)	RDS(ON) mΩ		Qg (nC)	Qgd (nC)	Ciss (pF)	Crss (pF)	RG (Ω)	Application	Package
				VGS= 10 V	VGS= 4.5 V							
				Typ	Typ							
NTMFS4H01N	Single	25	20	0.5	0.7	47	13	5793	241	0.8	Synchronous side	SO-8FL
NTMFS4H01NF	Int. Schottky	25	20	0.53	0.75	46	12	5706	237	0.8	Synchronous side	SO-8FL
NTMFS4H013NF	Int. Schottky	25	20	0.7	1	28	7.5	3780	150	1	Synchronous side	SO-8FL
NTMFS4H02N	Single	25	20	1	1.5	47	10	2672	111	0.8	Synchronous side	SO-8FL
NTMFS4H02NF	Int. Schottky	25	20	1	1.6	48	11	2634	109	0.8	Synchronous side	SO-8FL
NTTFS4H05N	Single	25	20	2.6	3.8	9.8	2.7	1232	51	1	Control Side	u8FL
NTTFS4H07N	Single	25	20	3.7	5.4	6.1	1.7	768	32	0.8	Control Side	u8FL
NTMFS4C05N	Single	30	20	2.7	4	14	5	1972	59	1	Synchronous side	SO-8FL
NTMFS4C06N	Single	30	20	3.2	4.8	11.6	4	1683	40	1	Synchronous side	SO-8FL
NTMFS4C08N	Single	30	20	4.6	6.8	8.4	3.3	1113	39	1	Synchronous side	SO-8FL
NTMFS4C09N	Single	30	20	4.6	6.8	10.9	5.4	1252	126	1	Synchronous side	SO-8FL
NTMFS4C10N	Single	30	20	5.8	8.9	9.8	3.7	987	162	1	Synchronous side	SO-8FL
NTMFS4C13N	Single	30	20	7.3	11.4	7.8	3.7	770	127	1	Synchronous side	SO-8FL
NTTFS4C05N	Single	30	20	2.9	4.1	14.5	5.5	1988	71	1	Control Side	u8FL
NTTFS4985NF	Int. Schottky	30	20	2.8	4.16	13.6	4.1	2075	46	1	Synchronous side	u8FL
NTTFS4C08N	Single	30	20	4.7	7.2	8.4	3.3	1113	39	1	Control Side	u8FL
NTTFS4C10N	Single	30	20	5.9	8.8	10.1	6.1	993	163	1	Control Side	u8FL
NTTFS4C13N	Single	30	20	7.5	11.2	7.8	3.7	770	127	1	Control Side	u8FL

MOSFETs for Power Conversion



PFC Switch and Primary Side Switch MOSFETs

Device	V _{DS} (V)	I _D (A)	V _{GS} (V)	Max R _{DS(on)} @ 50% I _D (Ω)	Q _{g Typ} (nC)	Package
NDD03N80Z	800	3	30	4.5	20	DPAK, IPAK
NDF10N62ZG	620	10	30	0.75	47	TO-220 FP
NDF06N62ZG	620	6	30	1.2	31	TO-220 FP
NDF04N62ZG	620	4	30	2	19	TO-220 FP
NDF10N60ZH	600	10	30	0.75	47	TO-220 FP
NDF08N60ZH	600	8	30	0.95	39	TO-220 FP
NDF06N60ZH	600	6	30	1.2	31	TO-220 FP
NDF04N60ZH	600	4	30	2	19	TO-220 FP
NDD04N60Z	600	4	30	2	19	DPAK, IPAK
NDF03N60ZH	600	3	30	3.6	12	TO-220 FP
NDD03N60Z	600	3	30	3.6	12	DPAK, IPAK
NDF02N60ZH	600	2	30	4.8	10.1	TO-220 FP
NDD02N60Z	600	2	30	4.8	10.1	DPAK, IPAK
NDF11N50ZH	500	11	30	0.52	46	TO-220 FP
NDF08N50ZH	500	8	30	0.85	31	TO-220 FP
NDF05N50ZH	500	5	30	1.5	18.5	TO-220 FP
NDD05N50Z	500	5	30	1.5	18.5	DPAK, IPAK
NDD04N50Z	500	4	30	2.7	12	DPAK, IPAK
NDD03N50Z	500	3	30	3.3	10	DPAK, IPAK

MOSFET Drivers

Features

- Drives high voltage power MOSFETs and IGBTs, provides two outputs
- Suitable for multiple topologies like half-bridge, asymmetrical half-bridge, active clamp, full bridge
- High voltage range, up to 600 V
- Robust devices with dV/dt immunity of ± 50 V/ns
- Pin to pin compatible with industry standards

MOSFET Drivers

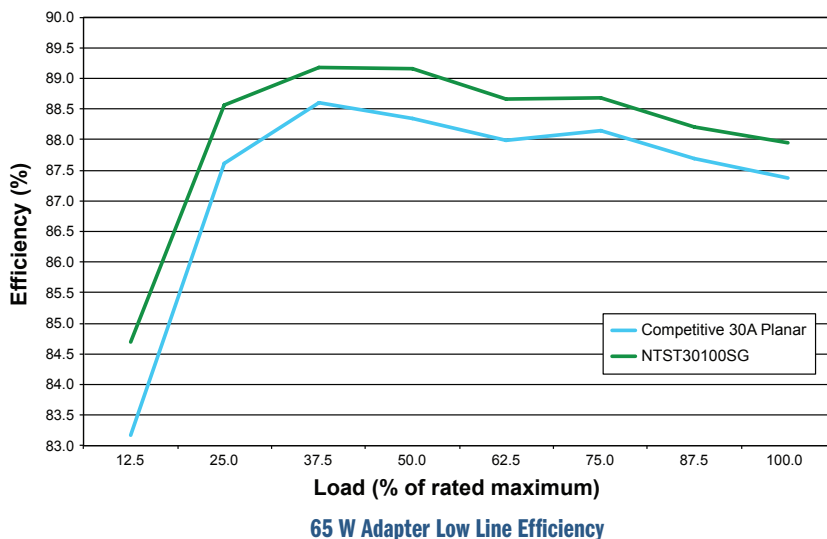
Device	Function	Type	No of Drivers	Package
NCP5104	Single Input High and Low Side Power MOSFET Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5111	Single Input Half-Bridge Power MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5106A/B	Dual Inputs High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5304	Dual Inputs High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5181	Dual Inputs High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8



Trench Schottky Rectifiers for Improved Efficiency

Features

- Low V_f
- High operating temperature capabilities
- Enhanced efficiency



Trench Schottky Rectifiers

Device	V_{RRM} (V)	V_f Max (V)	I_R Max (μ A)	I_O (A)	I_{FSM} (A)	Package
NTS(x)2080CT	80	0.68-0.82	0.6	20	100-150	T0-220-FP, T0-220
NTS(x)3080CT	80	0.65-0.82	0.7	30	160	T0-220-FP, T0-220
NTS8100MFS	100	0.62	7	8	150	S0-8FL
NTS10100(x)MFS	100	0.59-0.61	15	10	200	S0-8FL
NTS12100(x)MFS	100	0.64	15	12	200	S0-8FL
NTS(x)20100CT	100	0.68	0.8	20	150	I2PAK, D2PAK, T0-220-FP, T0-220
NTSV20100CT	100	0.82	0.8	20	100	T0-220
NTSV30100SG	100	0.85	1	30	100	T0-220
NTS(x)30100CT	100	0.68	0.5	30	160	I2PAK, D2PAK, T0-220, T0-220-FP
NTSV30H100CT	100	0.82	0.5	30	500	T0-220
NTS10120(x)MFS	120	0.63	3.1	10	200	S0-8FL
NTS12120(x)MFS	120	0.68	9.2	12	200	S0-8FL
NTS(x)20120CT	120	0.72-0.86	0.7	20	120	I2PAK, D2PAK, T0-220-FP, T0-220
NTS(x)30120CT	120	0.76-0.92	0.8	30	150	I2PAK, D2PAK, T0-220-FP, T0-220
NTS(x)40100CT	100	0.68	0.8	40	160	I2PAK, D2PAK, T0-220-FP, T0-220
NTS(x)40120CT	120	0.71	0.5	40	250	I2PAK, D2PAK, T0-220-FP, T0-220

Note: All V_f data is taken at rated current, 125°C ambient. All I_R data is taken at rated voltage, 25°C, per leg.

Rectifiers

Device	VRRM (V)	VF Max (V)	IR Max (uA)	Io (A)	IFSM (A)	Package
MBRF10H150CT	150	0.69	45	10	150	TO-220-FP
MBR(x)20H150CT	150	0.68	50	20	180	TO-220, TO-220-FP
MBR(x)30H150CT	150	0.73	60	30	200	TO-220, TO-220-FP
MBR16100CT	100	0.6	100	16	150	TO-220
MBR(x)41H100CT	100	0.67	10	40	350	TO-220, I2PAK
MBR60H100CT	100	0.72	10	60	350	TO-220
MBR(x)10L60CT	60	0.49	220	10	200	TO-220, TO-220-FP
MBR(x)2060CT	60	0.75	150	20	150	TO-220, TO-220-FP
MBR(x)20L60CT	60	0.54	380	20	240	TO-220, TO-220-FP
MBR(x)30L60CT	60	0.57	350	30	240	TO-220, TO-220-FP
MBRB30H60CT	60	0.56	300	30	260	I2PAK
MBR40L60CT	60	0.58	550	40	240	TO-220
MBR1545CT	45	0.57	100	15	150	TO-220
MBRF2045CT	45	0.57	100	20	150	TO-220-FP
MBR(x)20L45CT	45	0.47	500	20	180	TO-220, TO-220-FP
MBR2545CT	45	0.57	200	30	150	TO-220
MBRF2545CT	45	0.62	200	25	150	TO-220-FP
MBR3045ST	45	0.57	200	30	150	TO-220
MBRB3045CT-1	45	0.57	200	30	150	I2PAK
MBRF30L45CT	45	0.44	650	30	190	TO-220-FP
MBR40L45CT	45	0.48	1200	40	200	TO-220
MBR60L45CT	45	0.53	1200	60	200	TO-220
MBR2030CTL	30	0.4	5000	20	150	TO-220
MBR(x)30H30CT	30	0.4	800	30	260	TO-220, I2PAK

Note: All VF data is taken at rated current, 125°C ambient. All IR data is taken at rated voltage, 25°C, per leg.

Planar Ultrafast Rectifiers – PFC-Boost Diodes

Device	VRRM (V)	VF Max (V)	IR Max (uA)	Io (A)	IFSM (A)	Package
NHP(x)08S600G	600	1.8	400	8	40	TO-220, TO-220-FP
NHP(x)15S600G	600	1.8	800	15	45	TO-220, TO-220-FP
NHP(x)220(x)T3G	200	0.9	35	2	50	SOD123FL, POWERMITE®

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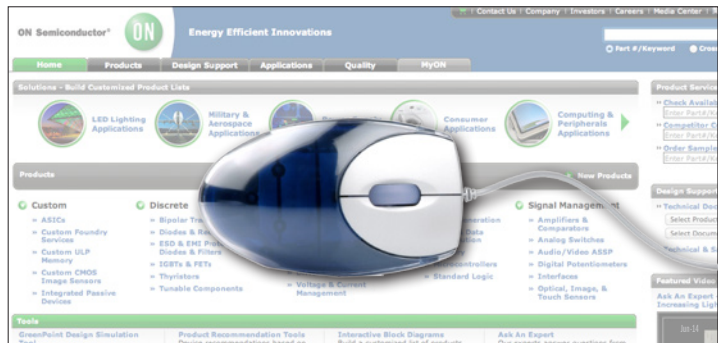
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