BRD8077/D
Rev. 4, Sep-2015

ON Semiconductor®

Energy Efficient Innovations

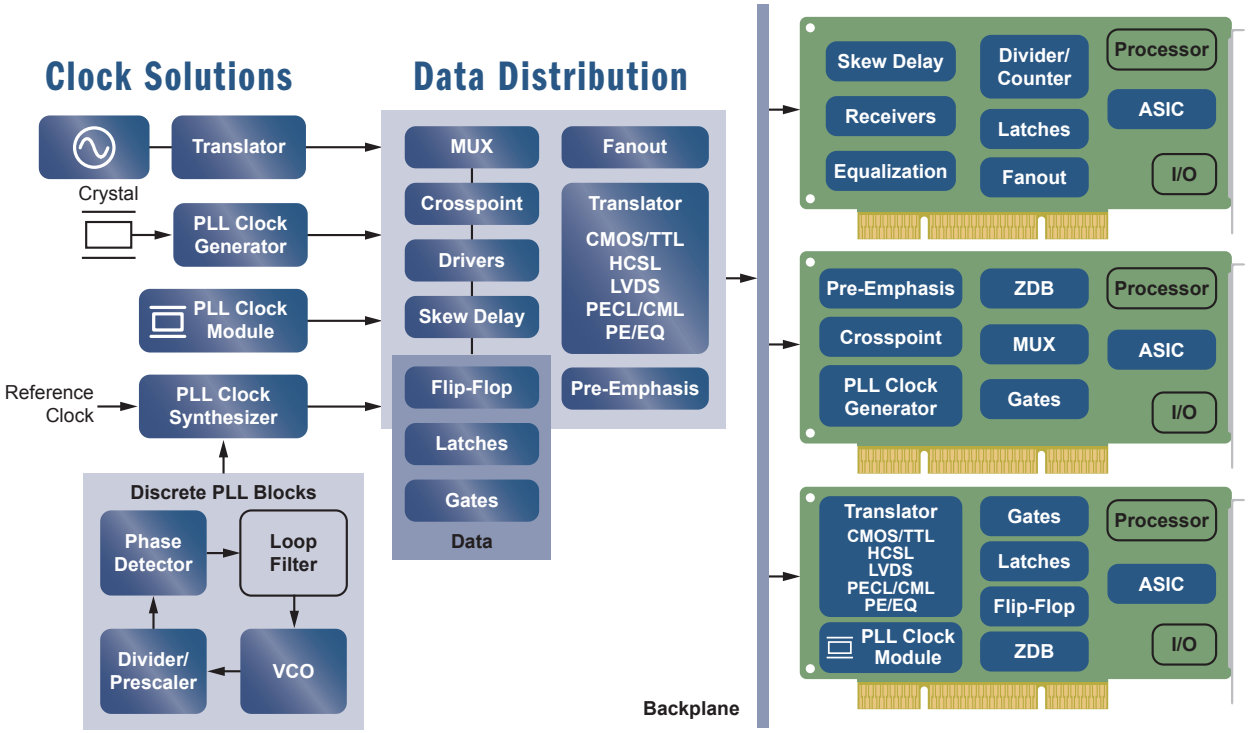
Networking & Telecom Solutions

Power management, protection, and timing solutions for communications infrastructure from ON Semiconductor.

www.onsemi.com

Copyright © 2015, SCILLC

Timing and Data Distribution Subsystem



ON Semiconductor provides a complete portfolio of timing and data management solutions for all aspects of the clock tree. System designers can optimize their clock circuits with industry leading clock distribution devices, demonstrating the industry's lowest jitter and skew. A broad product portfolio, with multiple output and interface options, allows system designers to build clock circuits that satisfy their specific application requirements. ON Semiconductor utilizes CMOS, Bipolar, and SiGe technology to leverage the best performance for any given application. For further details by device, function, or parametrics, refer to our website at **www.onsemi.com**.

Expanding on more than 30 years of experience as the world's leader in high performance ECL-based clock distribution, ON Semiconductor has extended its expertise into ultra low jitter PLL clock synthesis and generation. The new PureEdge™ PLL devices utilize a fully differential architecture that enables performance that satisfies the timing requirements for the most demanding applications.

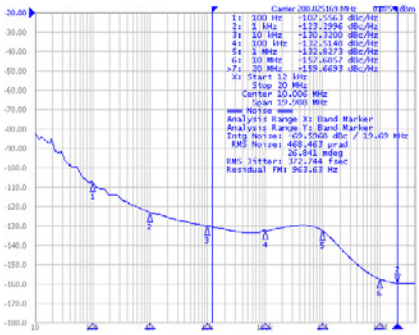
Performance Capabilities

- Differential design for reduced noise
- ECL, PECL, CML, LVDS, HSTL, HCSL, LVTTL/LVCMOS outputs for flexible interfacing
- Maximum clock rates >10 GHz
- Maximum data rates >12 Gbps
- Typical jitter as low as 30 fs
- Integrated termination resistors for simplified circuit design
- Edge rates as low as 28 ps
- Low phase noise floor ≤ –174 dBc/Hz
- Low skew

PLL Clock Synthesizers/Generators

Features

- Based on phase-locked-loop techniques with zero PPM synthesis error
- Low jitter for high accuracy clock signals
- Available in industrial temperature range -40°C to +85°C
- Supports output interfaces: LVPECL, LVDS, HCSL, LVTTL/LVCMOS
- Multiple PLLs and multiple output options

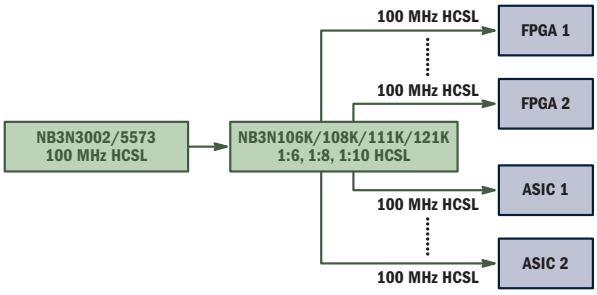


NB3N5573 Typical Phase Noise at Fc = 200 MHz

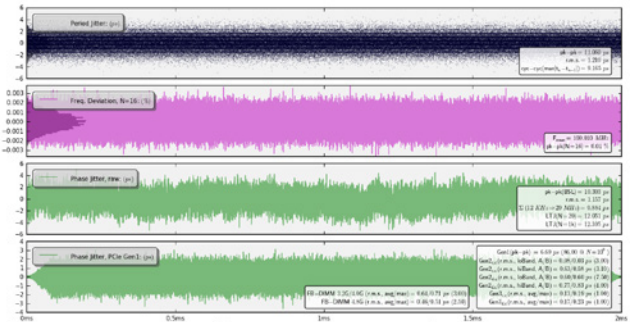
Device	Input (MHz)	Output (MHz)	Application	Input Level					Output Level	VCC Typ (V)	Package(s)
				XTAL	CML	CMOS	LVPECL	TTL			
NB3N3002	25	25/125/200	CPU/DIMM, PCIe Gen 1,2,3	✓		✓		✓	HCSL	3.3	TSSOP-16
NB3N5573	25	25/100/125/200	CPU/DIMM, PCIe Gen 1,2,3	✓		✓		✓	HCSL	3.3	TSSOP-16
NB3N51032	25	25/100/125/200	CPU/DIMM, PCIe Gen 1,2,3	✓		✓		✓	HCSL	3.3	TSSOP-16
NB3N3020	5 to 27	5 to 210	Network GigE	✓	✓	✓	✓		ECL, LVTTL	3.3	TSSOP-16
NB3N501	2 to 50	13 to 160	Networking, Consumer, STB	✓					CMOS	3.3, 5	SOIC-8
NB3N502	2 to 50	14 to 120	Networking, Consumer, STB	✓		✓			LVCMOS	3.3, 5	SOIC-8
NB4N507A	5 to 52	50 to 200	Networking, Consumer, STB	✓		✓			ECL	3.3, 5	SOIC-16
NB3N508S	27	216	VCXO Set Top Box	✓		✓			LVDS	3.3	TSSOP-16
NB3N511	1 to 50	14 to 200	Networking, Consumer, STB	✓					CMOS	3.3, 5	SOIC-8
NB3N51034	25	100/200	CPU/DIMM, PCIe Gen 1,2,3	✓		✓			HCSL	3.3	TSSOP-20
NB3N51044	25	100/125	CPU/DIMM, PCIe Gen 1,2,3	✓		✓			HCSL	3.3	TSSOP-28
NB3N51054	25	100	CPU/DIMM, PCIe Gen 1,2,3	✓					HCSL	3.3	TSSOP-24

PCIe Timing Solutions

- PCIe clock synthesizers with single, dual, and quad outputs
- PCIe buffers with 1:6, 1:8, 1:10, and 1:21 fanouts
- Solutions for one, two, six, eight, ten, and twenty-one channel applications available
- Ultra low skew
- Small propagation delay variation (up to 21 output)
- Jitter compliant with PCIe Gen 1,2, 3 specification
- Direct device interface eliminates external termination components and simplifies BOM



PCIe Gen 1, 2, 3 Clock Generation and Distribution



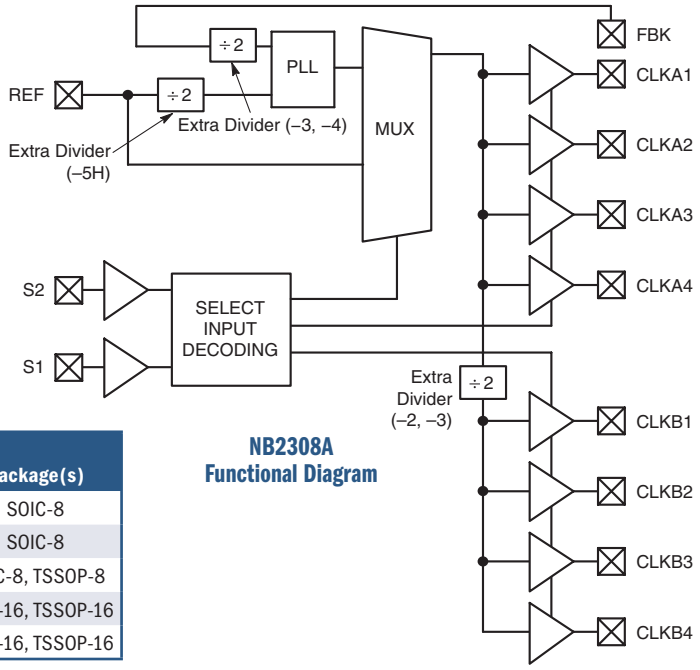
Jitter Results After Fanout

Zero Delay Buffers

Features

- Industry standard functions and pin-outs
- Zero input-output propagation delay, adjustable by capacitive load
- Multiple configurations available for maximum flexibility
- Operating frequency to 133 MHz for CPU and PCI compatibility

Device	Input Level	Output Level	VCC Typ (V)	fMax Typ (MHz)	Channels	tSkew 0-0 Max (ps)	Package(s)
NB3N2302	CMOS	CMOS	3.3, 5	133	2	250	SOIC-8
NB2304A	CMOS	CMOS	3.3	133.3	4	200	SOIC-8
NB2305A	CMOS	CMOS	3.3	133.3	5	250	SOIC-8, TSSOP-8
NB2308A	CMOS	CMOS	3.3	133.3	8	200	SOIC-16, TSSOP-16
NB2309A	CMOS	CMOS	3.3	133.3	9	250	SOIC-16, TSSOP-16

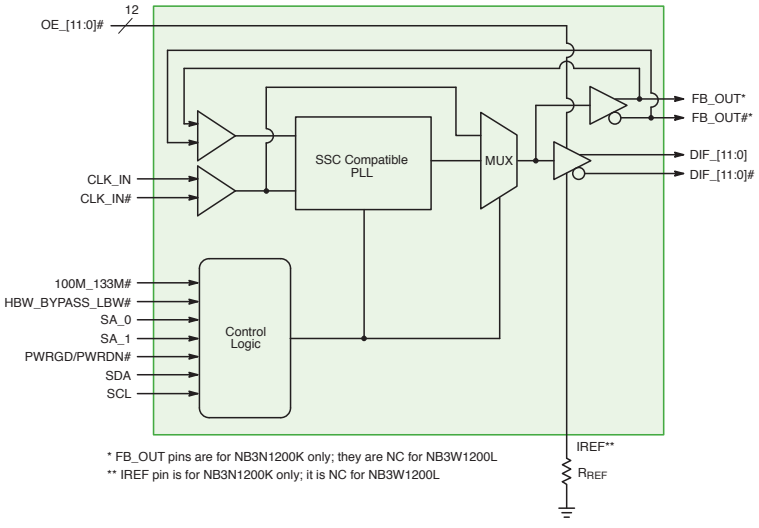


NB2308A Functional Diagram

PCIe Zero Delay Buffers

Features

- Differential SRC clock support
- NB3N1900K, NB3N1200K: DB1900Z and DB1200Z compliant with 19 and 12 output pairs respectively
- NB3W1200L, NB3W800L: DB1200ZL and DB800ZL compliant with 12 and 8 low power NMOS push-pull output pairs respectively
- NB3W1900L: 19 low power NMOS push-pull output pairs
- Optimized for 100 MHz and 133 MHz to meet PCIe* Gen 2/Gen 3 and Intel QPI phase jitter specifications
- Spread spectrum compatible for low EMI
- Pseudo-external fixed-feedback for low input-to-output delay variation
- Individual OE control pin for each output
- SMBUS programmability for power down mode, PLL BW modes, PLL/Bypass mode & frequency selection

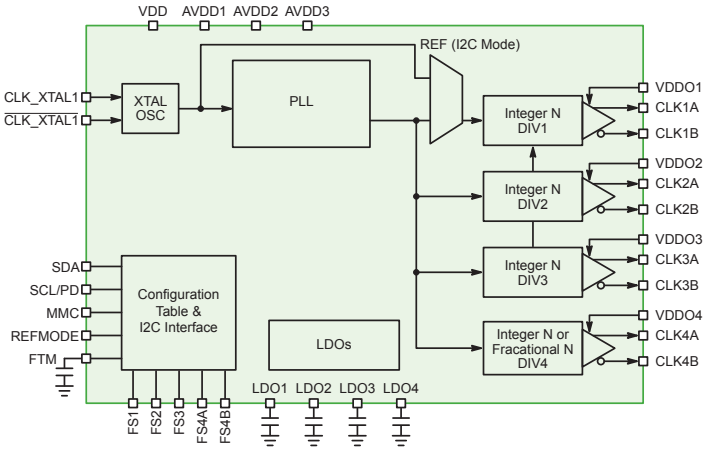


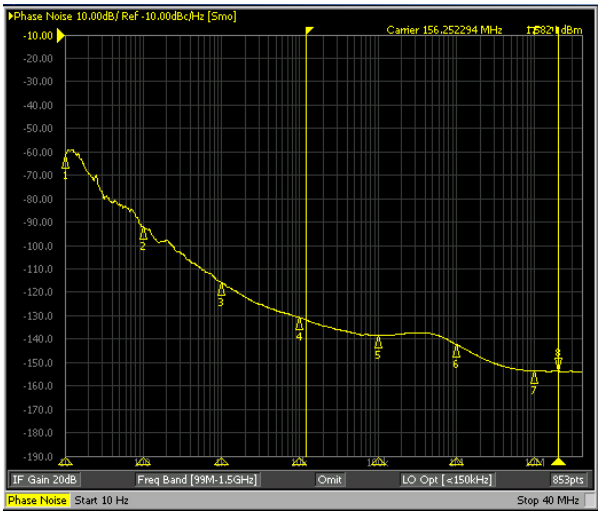
NB3N1200K Simplified Block Diagram

Low Noise, Programmable Multi-Rate Clock Generator

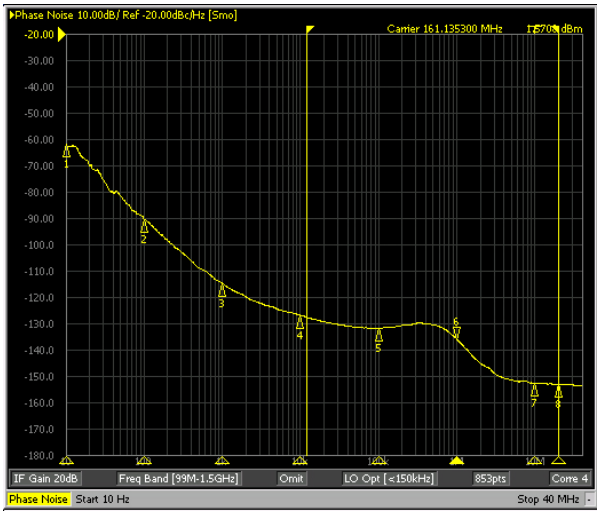
NB3H5150 Features

- Uses 25 MHz Crystal or reference input
- External Loop Filter is not required
- User programmable frequencies with four Independent Output Pairs:
  - CLK(1:3) are derived from Integer-N dividers, and CLK4 is derived from either an Integer-N divider or a Fractional-N divider
  - Several different output frequencies can be selected through I2C/SMBus interface or Frequency Select (FSn) pins
- Each output pair can be configured either as two LVCMOS outputs (or) a differential LVPECL pair
- Input supply voltage supports 3.3V or 2.5V operation
- Each output pair has an independent supply voltage rail (VDDOx):
  - For LVCMOS outputs, the supply voltage rail supports 1.8V, 2.5V or 3.3V operation
  - For LVPECL output pairs, the supply voltage rail supports 2.5V or 3.3V operation
- PLL Bypass Mode and Power Down Mode
- QFN-32 package
- -40°C to +85°C Ambient Operation Temp





Integer-N Output RMS Phase Jitter = 233 fs !!
Integer-N Output Phase Noise (Max) = 300 fs
Integration range = 12 kHz - 20 MHz



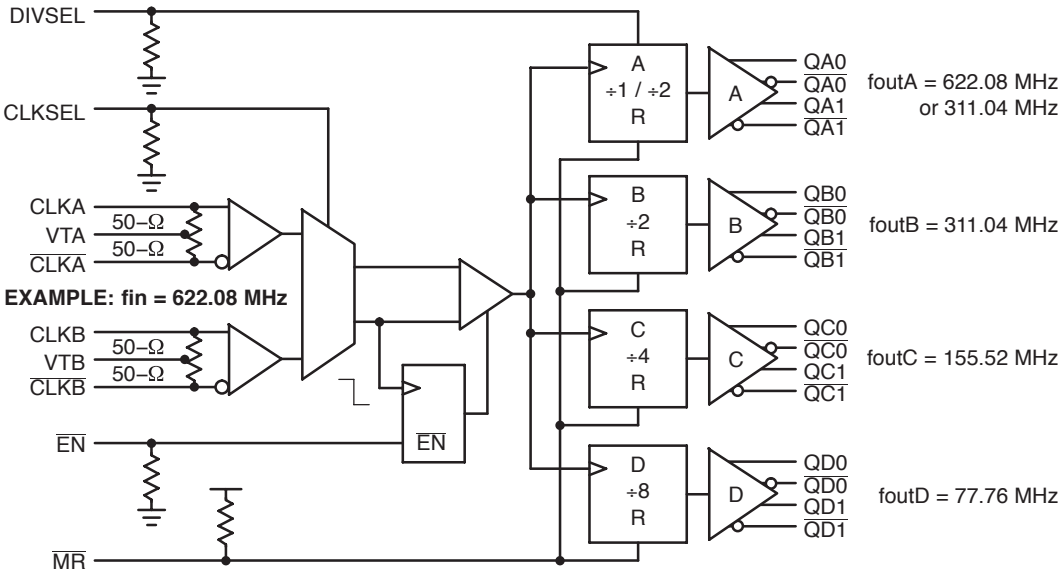
Fractional-N Output RMS Phase Jitter = 371 fs !!
Fractional-N Output Phase Noise (Max) = 1 ps
Integration range = 12 kHz - 20 MHz

Dividers and Counters

Features

- Low jitter and skew for highly accurate phase matching
- Multiple outputs and ratios combined for integrated circuit designs
- Supports interface and voltage translation

Device	Input Level				Output Level	VCC Typ (V)	fMax Typ (GHz)	Div Ratios	Package(s)
	CML	CMOS	LVPECL	LVDS					
NB4L339	✓		✓	✓	ECL	2.5, 3.3	0.7	1 or 2; 2; 4; 8	QFN-32
NB7V32M	✓		✓	✓	CML	1.8, 2.5	10	2	QFN-16
NB7N017M	✓		✓	✓	CML	3.3	3.5	2 to 256	QFN-16
NB7L32M	✓		✓	✓	CML	2.5, 3.3	14	2	QFN-16
NB6N239S	✓	✓	✓	✓	LVDS	3.3	3	1/2/4/8; 2/4/8/16	QFN-16
NB6L239	✓	✓	✓	✓	ECL	2.5, 3.3	3	1/2/4/8; 2/4/8/16	QFN-16

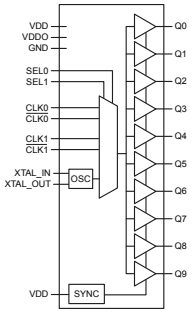


NB4L339 Functional Diagram

Clock and Data Distribution

Features

- Complete portfolio of fanout buffers, multiplexers, cross point switches
- Supporting frequencies from DC to 12 GHz/Gbps
- Device noise floor as low as -174 dBc
- Pre-Emphasis and Equalization blocks available
- Offer new direct X-tal interface capabilities
- Industry leading additive jitter as low as 30 fs typical
- Industry leading output-to-output skew as low as 3 ps minimum
- Wide offering of voltage and interface translation:
  - ECL, PECL, CML, LVPECL, LVDS, M-LVDS, HSTL, HCSL, LVCMOS/LVTTL
- Power supply 1.5 V, 1.8 V, 2.5 V, 3.3 V, 5.0 V



NB3F8L3010C
Functional Diagram

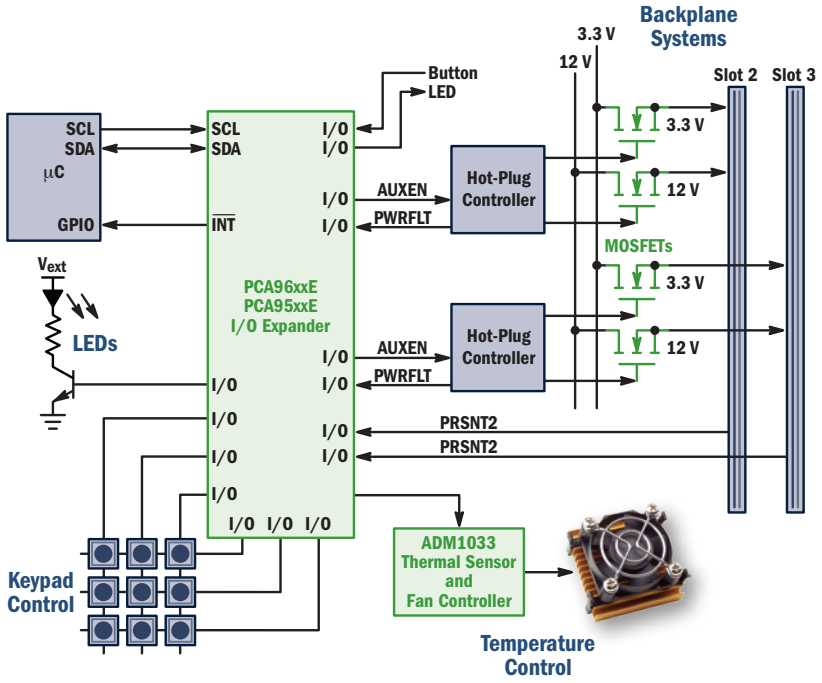
Device	Outputs per Channel	Output Level	Input Level								V_{CC} Typ (V)	t_{Skew} O-O (ps)	f_{Max} Typ (GHz)	Package(s)
			CML	CMOS	LVPECL	HCSL	HSTL	LVDS	XTAL	TTL				
NB3N106K/08K NB3N111K/21K	6, 8, 10, 21	HCSL		✓	✓	✓	✓	✓		✓	3.3	100	0.4	QFN-52, QFN-32, QFN-24
NB3L83948C	12	CMOS		✓		✓	✓	✓		✓	2.5, 3.3	25	0.35	LQFP-32
NB3V8312C	12	CMOS		✓						✓	1.8, 2.5, 3.3	150	0.25	LQFP-32
NB3F8L3010C	10	CMOS		✓	✓	✓	✓	✓	✓	✓	1.5, 1.8, 2.5, 3.3	55	0.2	QFN-32
NB3M8T3910G	10	HCSL, CMOS,LVDS, ECL			✓	✓		✓			2.5, 3.3	50	1.4	QFN-48
NB7L111M	10	CML	✓	✓	✓			✓		✓	2.5, 3.3	20	5.5	QFN-52
NB7L1008/M	8	ECL/CML	✓		✓			✓			2.5, 3.3	20/25	7/8	QFN-32
NB7V585M	6	CML	✓		✓			✓			1.8, 2.5	30	7	QFN-32
NB7V586M	6	CML	✓		✓			✓			1.8	30	6	QFN-32
NB7VQ1006M	6	CML	✓		✓			✓			1.8, 2.5	1	7.5	QFN-24
NB3F8L3005C	5	CMOS		✓	✓	✓	✓	✓	✓	✓	1.5, 1.8, 2.5, 3.3	55	0.2	QFN-32
NB3L853141	5	ECL	✓	✓	✓	✓	✓	✓		✓	2.5,3.3	30	700	TSSOP-20
NBSG14	5	ECL	✓	✓	✓			✓		✓	2.5, 3.3	15	12	QFN-16, BGA-16
NB3M8302C/04C	2, 4	CMOS, TTL		✓						✓	2.5, 3.3	45, 85	0.2	SOIC-8
NB3N853501E	4	ECL		✓							3.3	30	0.266	TSSOP-20
NB3N853531E	4	ECL		✓					✓	✓	3.3	30	0.266	TSSOP-20
NB6HQ14M	4	CML	✓	✓	✓			✓		✓	2.5	3	5	QFN-16
NB6L14/M	4	ECL/CML	✓	✓	✓			✓		✓	2.5, 3.3	20	3	QFN-16
NB6L14S/N14S	4	LVDS	✓	✓	✓		✓	✓		✓	2.5/3.3	20	2	QFN-16
NB7HQ14M	4	CML	✓		✓			✓			2.5	15	7	QFN-16
NB7L14/M	4	ECL/CML	✓	✓	✓			✓		✓	2.5, 3.3	15	7/8	QFN-16
NB4L339	2	ECL	✓		✓			✓			2.5, 3.3	60	0.7	QFN-32
NB4N11M	2	CML	✓	✓	✓			✓		✓	3.3	25	2.5	TSSOP-8
NB6L11	2	ECL	✓	✓	✓			✓		✓	2.5, 3.3	15	6	TSSOP-8, SOIC-8
NB6L11M	2	CML	✓	✓	✓			✓		✓	2.5, 3.3	15	2	QFN-16
NB6L11S	2	LVDS	✓	✓	✓		✓	✓		✓	3.3	25	2	QFN-16
NB6L611	2	ECL	✓	✓	✓			✓		✓	2.5, 3.3	15	3	QFN-16
NB7L11M	2	CML	✓	✓	✓			✓		✓	2.5, 3.3	15	8	QFN-16
NB7L72M	2	CML	✓	✓	✓			✓		✓	2.5, 3.3	10	8.5	QFN-16
NB7L572	2	CML	✓	✓	✓			✓		✓	2.5, 3.3	15	7	QFN-32
NB3L8504S	4	LVDS	✓		✓	✓	✓	✓			2.5, 3.3	50	0.7	TSSOP-16
NB3L8543S	4	LVDS	✓		✓	✓	✓	✓			2.5, 3.3	40	0.65	TSSOP-20
NB3L8533	4	LVPECL	✓		✓	✓	✓	✓			2.5, 3.3	30	0.65	TSSOP-20
NB3L208K	8	HCSL			✓	✓		✓			2.5, 3.3	100	0.35	QFN-32
NB3U1548C	4	LVCMOS, LVTTL		✓						✓	1.5, 1.8, 2.5, 3.3	250	0.16	TSSOP-8, SOIC-8
NB3N4666C*	4	LVCMOS, LVTTL			✓	✓		✓			3.3	50	0.2	TSSOP-16, QFN-16
NB3V1102C/3C NB3V1104C/6C	2, 3, 4, 6	LVCMOS		✓							1.8, 2.5, 3.3	50	0.25	TSSOP-14,8
NB7VQ572M	2	CML	✓		✓			✓			1.8, 2.5	15	5	QFN-32
NBSG11	2	ECL	✓	✓	✓			✓		✓	2.5, 3.3	15	12	QFN-16, BGA-16
NB6L56	1	ECL	✓		✓		✓	✓			2.5, 3.3	25	2.5	QFN-32

* Pending 4Q15

Cascadable I/O Expanders

Key Features

- I2C and SMBus interfaces
- 1 MHz SCL clock frequency
- 30 mA SDA sink capability



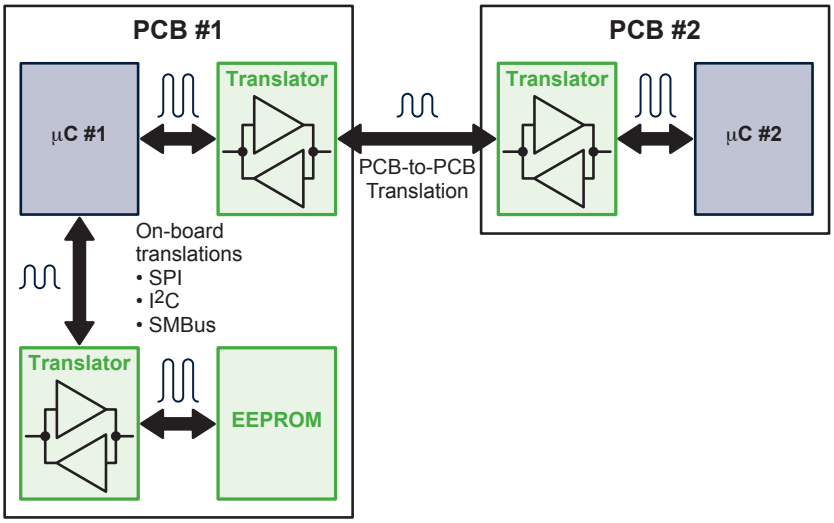
Device	I/O	Cascadable	Vcc Min (V)	Vcc Max (V)	Interrupt Output	I/O Pullups	LED Blink/ PWM	Package
PCA9535E	16	64 Programmable Slave Addresses	1.65	5.5	✔			QFN-24, SOIC-24, TSSOP-24
PCA9655E	16	64 Programmable Slave Addresses	1.65	5.5	✔			QFN-24, SOIC-24, TSSOP-24
PCA9654E	8	8 Slave ID Addresses	1.65	5.5	✔	✔		SOIC-16, WQFN-16, TSSOP-16

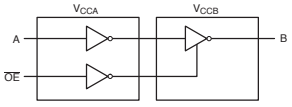
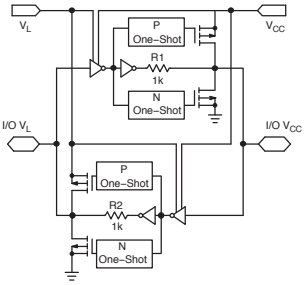
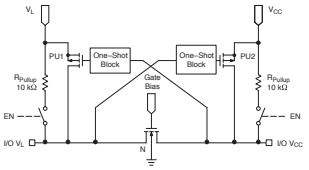
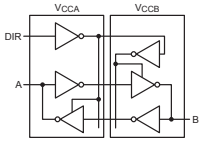
Logic Translators

Dual supply voltage logic translators connect ICs and PCBs together that operate at different supply voltages.

Key Features

- Industry's first devices with independent power supplies ($V_L < V_{CC}$, $V_L = V_{CC}$, or $V_L > V_{CC}$)
- High 100 pF capacitive drive capability
- Overvoltage tolerant enable and I/O pins
- Non-preferential power-up sequencing
- Power-off protection

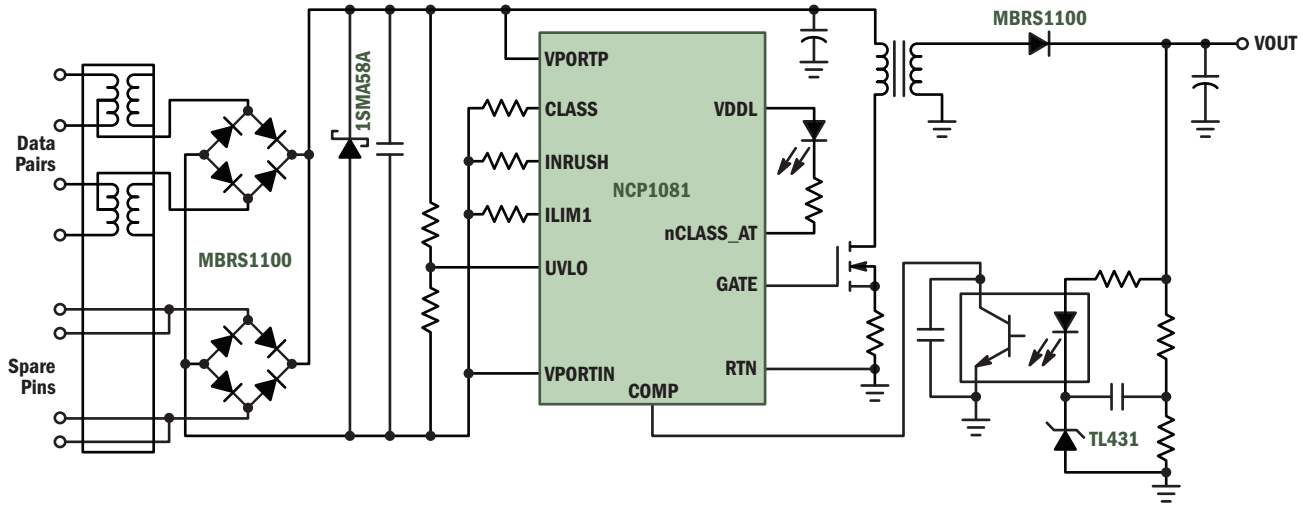


	Unidirectional Translator	Autosense Bidirectional Translator (Push-Pull Output)	Autosense Bidirectional Translator (Open-Drain Output)	Bidirectional Translator (with Direction Pin)
Block Diagram				
Attributes	• High Data Rate • Low Power Consumption	• High Data Rate • Low Power Consumption	• High Data Rate • Low Power Consumption • Flexible PCB Design	• High Data Rate • Low Power Consumption • Flexible PCB Design
Trade-Offs	• Fixed Input & Output Pins	• Modest Output Current	• Modest Bandwidth	• Directional Control Pin Required
Applications	• SPI • GPIO	• SPI • GPIO	• I2C, SMBus, PMBus • GPIO • SDIO Cards • 1-Wire Bus	• GPIO
Sample Device (I/O Channels, Package)	• NLSV1T34 (1-Bit, ULLGA-6) • NLSV1T240/244 (1-Bit, UDFN-6) • NLSV2T240/244 (2-Bit, UDFN-8) • NLSV4T240/244 (4-Bit, UDFN-12) • NLSV4T3234 (4-Bit, CSP-11) • NLSV8T240/244 (8-Bit, UDFN-20)	• NLSX3012 (2-Bit, UDFN-8) • NLSX3014 (4-Bit, UQFN-12) • NLSX3013 (8-Bit, CSP-20) • NLSX3018 (8-Bit, UDFN-20) • NLSX4014 (4-Bit, UQFN-12) • NLSX5011 (1-Bit, UULGA-6, UDFN-6) • NLSX5012 (2-Bit, UDFN-8) • NLSX5014 (4-Bit, UDFN-12)	• NLSX3373 (2-Bit, UDFN-8) • NLSX3378 (4-Bit, CSP-12) • NLSX4373 (2-Bit, UDFN-8) • NLSX4378 (4-Bit, CSP-12)	• NLSV1T45 (1-Bit, ULLGA-6) • NLSV2T245 (2-Bit, UQFN-10) • NLSV2T3236 (2-Bit, UQFN-10) • NLA16T245 (16-Bit, TSSOP-48)

Power over Ethernet

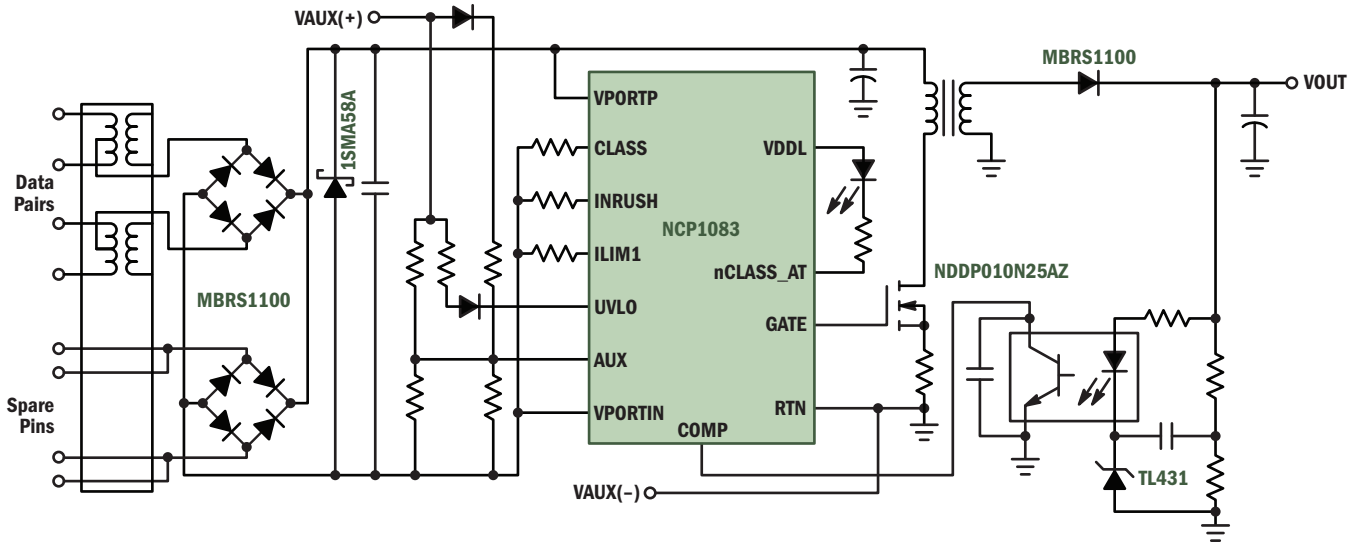
IEEE 802.3at, 40 W

- Delivers 25.5 W for PoE+ IEEE 802.3at (Draft 4.0) and up to 40 W in proprietary applications
- Supports IEEE two event classification
- Integrated multi-topology dc-dc converter controller implements highly efficient power conversion at low output voltages
- Best in-class cable ESD and thermal characteristics



IEEE 802.3at + Auxiliary, 40 W

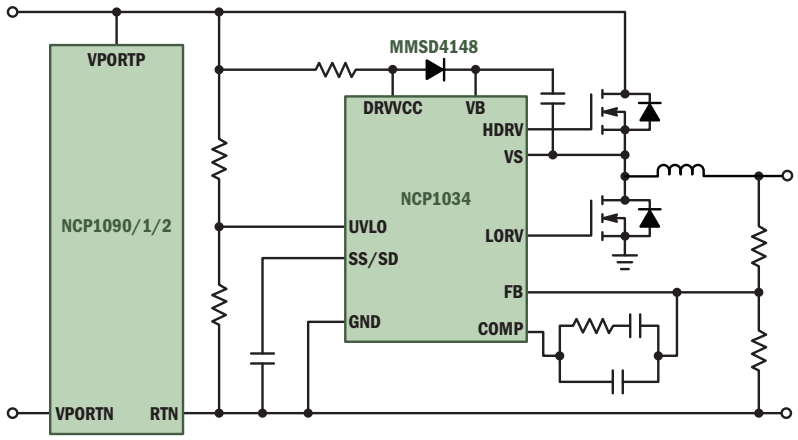
- Auxiliary input voltage range from 9.0 V to 57 V
- Integrated multi-topology dc-dc converter controller implements highly efficient power conversion at low output voltages in conjunction with auxiliary voltage input
- Delivers 25.5 W for PoE+ IEEE 802.3at (Draft 4.0) and up to 40 W in proprietary applications
- Supports IEEE two event classification
- Best-in-class cable ESD and thermal characteristics



Power over Ethernet

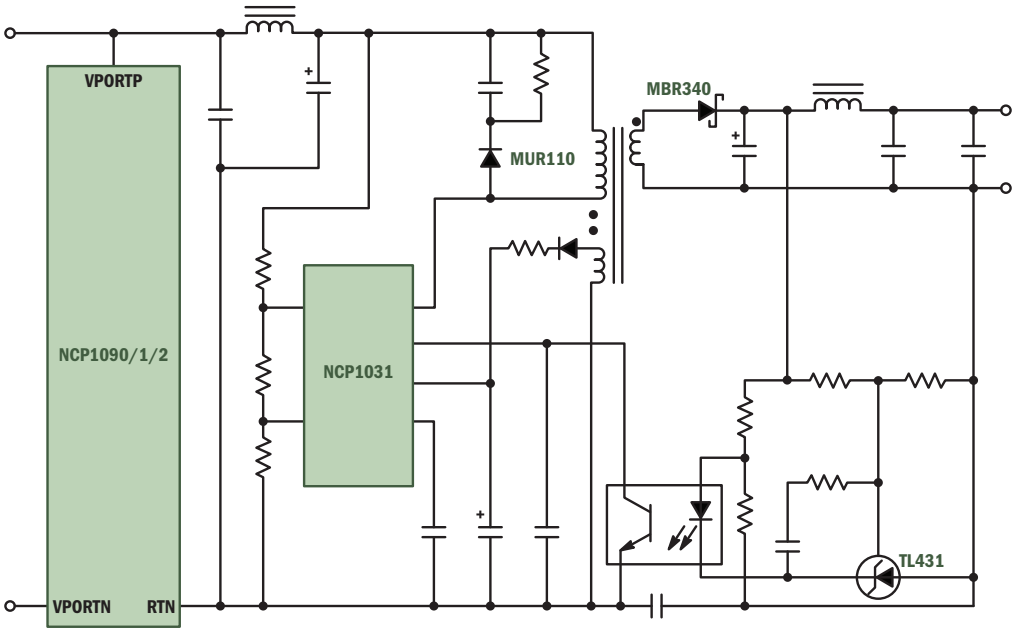
IEEE 802.3at (Non-Isolated), up to 40 W

- Non-isolated application for simple cost effective solution
- Programmable overcurrent protection
- Flexibility to scale output MOSFETs for power requirement



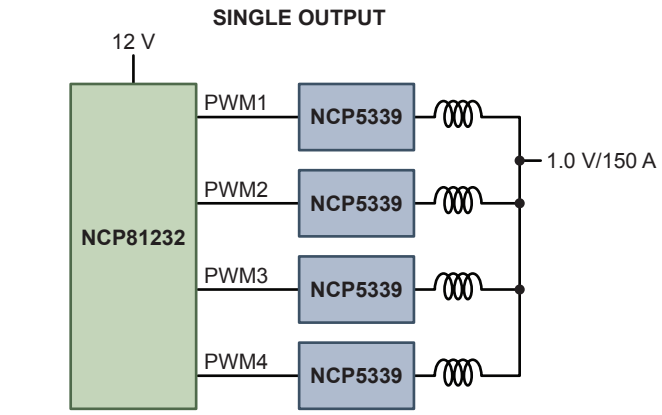
IEEE 802.3af, 3 W

- Integrated PWM controller and Power Device for up to 7.5 W requirements
- Up to 1 MHz switching frequency for high power density design
- Can be configured in any single-ended topology such as forward or flyback

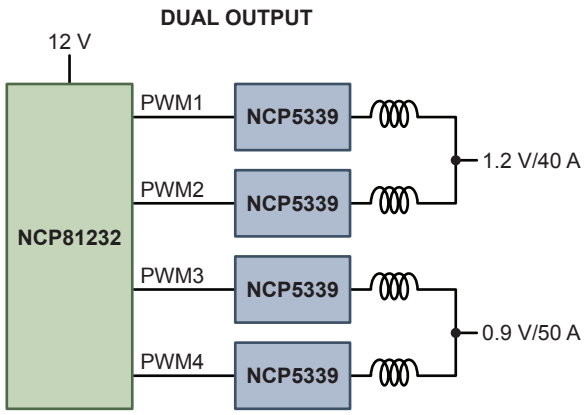


Multiphase Controllers with Dual Control Loops

for Powering CPUs, FPGAs, Core Processors, DSPs, and DDR Memory



Multi-phase controller can be configured as 4+0, 3+0, or 3+1 (dual output) for design optimization



Multi-phase controller in a 2+2 configuration (up to 4 phases) driving DrMOS power stages

Features

- Delivers single output (4 phases) or dual output with 8 combinations for greater flexibility
- Remote voltage sense for output accuracy
- Compatible with NCP81162 phase doubler for higher current capability
- Fixed frequency architecture (voltage mode with dual edge modulation) with excellent load transient response
- Dual differential current sensing supports DCR sensing or Iout from DrMOS

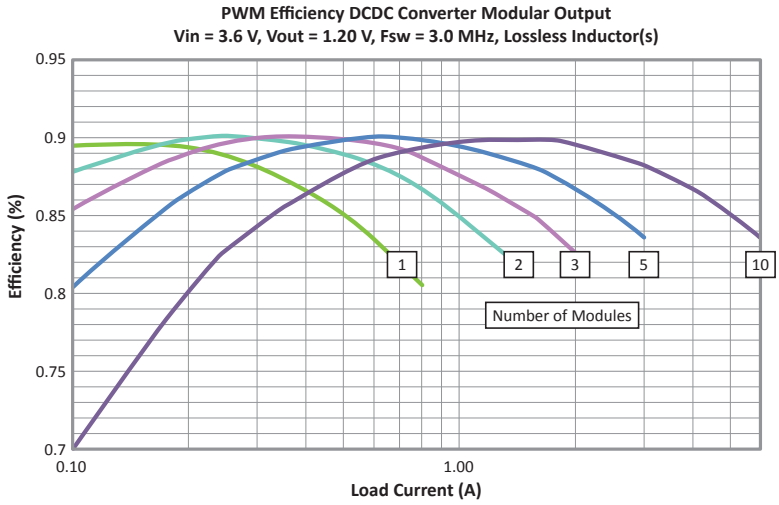
Device	Function	Package
NCP81232	4-Phase Dual Loop Controller	QFN-40
NCP81234*	2-Phase Dual Loop Controller	QFN-28
NCP5338	40 A DrMOS	QFN-40
NCP5339*	50 A DrMOS	QFN-40

* Pending 1Q16.

ARM® Core DC-DC Converters

Key Features

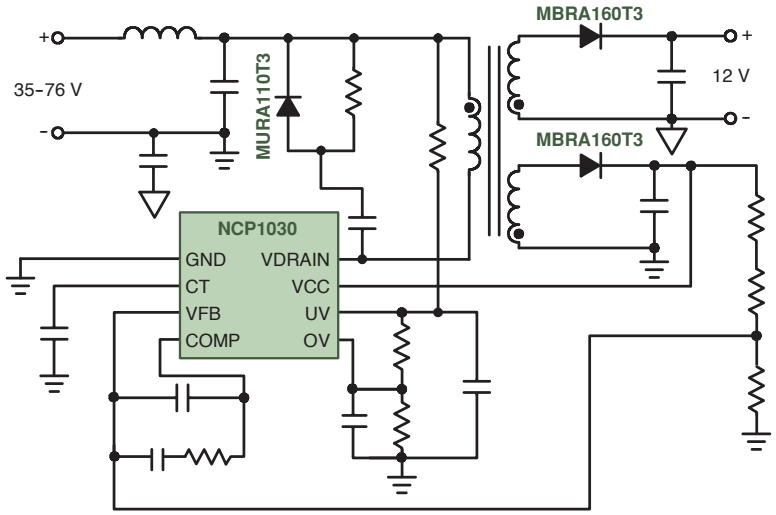
- High regulating performance from 0.6 V to 1.4 V
  - Modular efficiency with fragmented power stage
  - Dynamic voltage scaling per output steps of 6.25 mV by I2C
  - Tight accuracy of ±1%, due to differential sensing
- Fast transient response
  - Proprietary PFM to PWM transition with equivalent performance to PWM only
  - Thermally handle high peak current demands up to 10 ms
  - Flexible design to transient handling output capacitor from 22 µF to 100 µF



Device	V_{IN} (V)	V_{OUT} (V)	I_{OUT} (A)	f_{SW} (MHz)	Control	Features	Package
NCP6338	2.3 – 5.5	0.6 – 1.4	6.0	3.0	I²C; VSEL	Modular power stage; Differential sensing	WLCSP-30
NCP6336B	2.3 – 5.5	0.6 – 1.4	5.0	2.74	I²C	Transient load helper	WLCSP-20
NCP6356B*	2.5 – 5.5	0.6 – 1.4	5.0	3.0	I²C; VSEL	Adaptive Constant On Time	WLCSP-20
NCP6335	2.3 – 5.5	0.6 – 1.4	4.0	3.0	I²C; VSEL	Transient load helper	WLCSP-20
NCP6343	2.3 – 5.5	0.6 – 1.4	3.5	3.0	I²C	Dynamic voltage scaling	WLCSP-15

* Pending 4Q15

DC-DC Power Conversion



Isolated Bias Supply

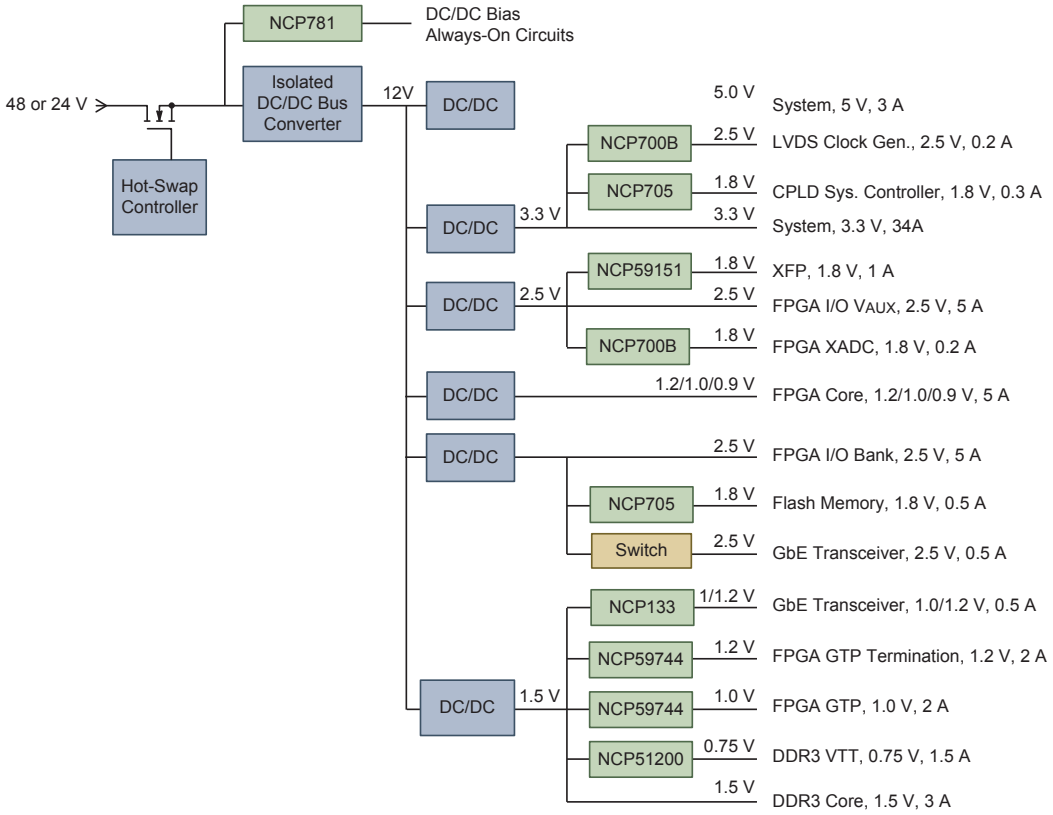
Regulators

Device	Topology	Io Typ (A)	fsw Typ (kHz)	Vcc Min (V)	Vcc Max (V)	Features	Package(s)
NCP3231	Step-Down	20	500	4.5	18	0. 6 V internal voltage reference @ up to 25 A	QFN-40
NCP3233	Step-Down	20	500	3.0	16	0. 6 V internal voltage reference @ up to 20 A	QFN-40
NCP3232N	Step-Down	15	500	4.5	21	0. 6 V internal voltage reference @ up to 15 A	QFN-40
NCP1592	Step-Down	6.0	Up to 700	3.0	6.0	Output down to 0.891 V with 1.0% accuracy	TSSOP-28
NCP3135	Step-Down	5.0	1100	2.9	5.5	5 A continuous output	QFN-16
NCP3133A	Step-Down	3.0	1000	2.9	5.5	3 A continuous output; internal soft start	QFN-16
NCP3170A	Step-Down	3.0	500	4.5	18	Output down to 0.8 V	SOIC-8
NCP3170B	Step-Down	3.0	1000	4.5	18	Output down to 0.8 V	SOIC-8
NCP1032	Flyback; Forward; Step-Down	1.0	Up to 1000	-	200	Integrated 200 V switch; internal soft start	WDFN-8
NCP1031	Flyback; Forward; Step-Down	1.0	Up to 1000	-	200	Integrated 200 V switch	DFN-8, SOIC-8
NCP1030	Flyback; Forward; Step-Down	0.5	300	-	200	2nd side bias supply	Micro8

PWM Controllers

Device	Topology	Vcc Min (V)	Vcc Max (V)	fsw Typ (kHz)	Features	Package(s)
CS5124	Flyback; Forward; Step-Down	7.6	75	400	Small package	SOIC-8
NCP1034	Step-Down	8.0	100	Up to 500	Non-isolated buck	SOIC-16
NCP1294	Flyback; Forward; Buck-Boost; Boost	3.3	7.5	Up to 1000	Enhanced UC384x	SOIC-16, TSSOP-16
NCP3011	Step-Down	4.7	28	400	EN, PG, SYNC	TSSOP-14
NCP3020	Step-Down	4.7	28	300; 600	Capable of 20 A output	SOIC-8
NCP81232	Multiphase Step-Down	4.5	20	1200	Compatible to 3.3/5 V DrMOS, Dual Outputs	QFN-40
TL494	Flyback; Forward; Half-Bridge; Push-Pull; Step-Down; Step-Up	7.0	40	Up to 200	Versatile controller	PDIP-16, SOIC-16
TL594	Flyback; Forward; Half-Bridge; Push-Pull; Step-Down; Step-Up	7.0	40	Up to 300	Versatile controller	PDIP-16, SOIC-16, TSSOP-16

Linear Voltage Regulators



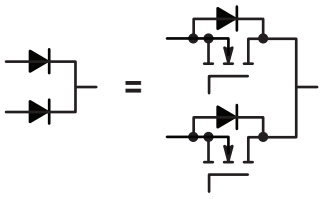
Device	I_O Typ	Function	Features	Package
NCP715	50 mA	Ultra-low Quiescent Current LDO	Ultra-low quiescent current; Wide input voltage range	SC-70-5, DFN-6
NCP716	80 mA	Ultra-low Quiescent Current LDO	Ultra-low quiescent current; Wide input voltage range	WDFN-6
NCP700B	200 mA	Ultra-low Noise LDO	High PSRR; Ultra-low noise	SOT-23-5, WDFN-6
NCP702	200 mA	Ultra-low Noise LDO	High PSRR; Ultra-low noise	SOT-23-5, WDFN-6
NCP703	300 mA	Ultra-low Noise LDO	Ultra-low noise; High PSRR	SOT-23-5, WDFN-6
NCP705	500 mA	Ultra-low Noise LDO	Ultra-low noise; High PSRR	WDFN-6
NCP133	500 mA	Ultra-Low Dropout Voltage Regulator with Bias Rail	Typical dropout: 140 mV @ 500 mA; High PSRR; Very fast transient response	XDFN-6
NCP59800	1 A	Low Noise, RF LDO	Typical dropout: 200 mV @ 1 A; High PSRR; Ultra-low noise	DFN-8
NCP59748	1.5 A	Ultra-Low Dropout Voltage Regulator with Bias Rail	Typical dropout: 60 mV @ 500 mA; High PSRR; Very fast transient response	DFN-10, QFN-20
NCP59744	3 A	Ultra-Low Dropout Voltage Regulator with Bias Rail	Typical dropout: 115 mV @ 3 A; High PSRR; Very fast transient response	QFN-20
NCP59749	3 A	Ultra-Low Dropout Voltage Regulator with Bias Rail	Typical dropout: 120 mV @ 3 A; High PSRR; Very fast transient response	DFN-10, QFN-20
NCP51200	3 A	DDR3 Termination Regulator	Fast load transient response; Soft start; Remote sensing	DFN-10
NCP51401	3 A	DDR4 Termination Regulator	Fast load transient response; Soft start; Remote sensing	DFN-10
NCP59749	3 A	Ultra-Low Dropout Voltage Regulator with Bias Rail	Typical dropout: 120 mV @ 3 A; High PSRR; Very fast transient response	DFN-10, QFN-20
NCP58302	3 A	Adjustable True LDO Linear Voltage Regulator	Typical dropout: 250 mV @ 3 A, 370 mV @ 3 A; Maximum voltage input 18 V; Stable with tantalum capacitors on the output	D2PAK-5

MOSFETs for Power Conversion

ORing MOSFETs

Features

- Low $R_{DS(on)}$ for low conduction loss
- 30 V for IM bus ORing
- 100 V for 48 V bus ORing



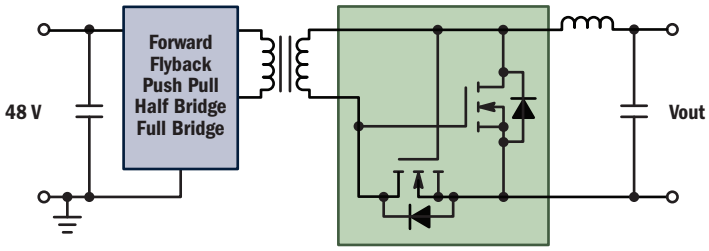
MOSFETs as ORing Diodes

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	V_{GS}= 4.5 V				
					Typ	Typ				
NTMFS4H01N	Single	N	25	20	0.55	0.76	39	8.5	1.2	SO8-FL
NTMFS4H01NF	Int. Schottky	N	25	20	0.56	0.79	37.8	8	1.3	SO8-FL
NTMFS4H013NF	Single	N	25	20	0.72	1.1	26	5.8	1	SO8-FL
NTMFS4H02N	Single	N	25	20	1.1	1.7	18	4.2	1	SO8-FL
NTMFS4H02NF	Int. Schottky	N	25	20	1.1	1.6	18.7	4.3	1	SO8-FL
NTMFS4C01N	Single	N	30	20	0.71	0.94	63	13	1	SO8-FL
NTMFS5C404NL	Single	N	40	20	0.56	0.85	81	23.8	--	SO8-FL
NTMFS5C410NL	Single	N	40	20	0.71	1	66	22	--	SO8-FL
NTMFS5C604NL	Single	N	60	20	0.93	1.25	52	12.7	--	SO8-FL
NTMFS5C612NL	Single	N	60	20	1.2	1.65	41	10.9	--	SO8-FL

Isolated Topology DC-DC (Bricks)

Features

- Low $R_{DS(on)}$ for low conduction loss
- Low capacitance for low switching loss
- Integrated Schottky for low diode loss



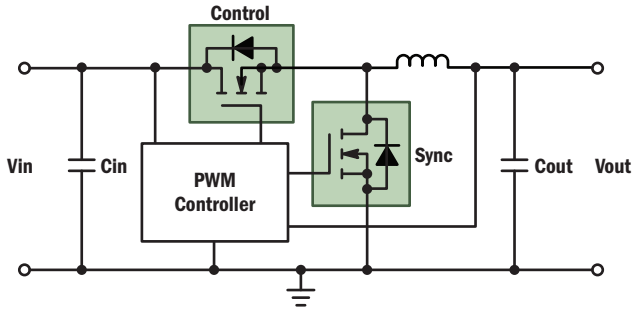
Device	Configuration	Polarity	V_{DS} (V)	V_{GS} (V)	$R_{DS(ON)}$ mΩ		Q_g (nC)	Q_{gd} (nC)	C_{iss} (pF)	C_{rss} (pF)	R_G (Ω)	Application	Package
					V_{GS}= 10 V	V_{GS}= 4.5 V							
					Typ	Typ							
NTMFS4H01N	Single	N	25	20	0.55	0.76	39	8.5	5693	212	1.2		SO-8FL
NTMFS4H01NF	Int. Schottky	N	25	20	0.56	0.79	37.8	8	5538	175.3	1.3		SO-8FL
NTMFS4H013NF	Single	N	25	20	0.72	1.1	26	5.8	3923	114	1		SO-8FL
NTMFS4H02N	Single	N	25	20	1.1	1.7	18	4.2	2651	103	1		SO-8FL
NTMFS4H02NF	Int. Schottky	N	25	20	1.1	1.6	18.7	4.3	2652	94	1		SO-8FL
NTTFS4H05N	Single	N	25	20	2.5	3.8	8.7	1.88	1205	45	1		u8FL
NTTFS4H07N	Single	N	25	20	3.8	5.8	5.7	1.26	771	34	1	Secondary Synchronous	u8FL
NTMFS4C05N	Single	N	30	20	2.7	4	14	5	1972	59	1		SO-8FL
NTMFS4C06N	Single	N	30	20	3.2	4.8	11.6	4	1683	40	1		SO-8FL
NTMFS4C08N	Single	N	30	20	4.6	6.8	8.4	3.3	1113	39	1		SO-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	–		SO-8FL
NTMFS5C410NL	Single	N	40	20	0.71	1	66	22	8862	116	–		SO-8FL
NTMFS5C430NL	Single	N	40	20	1.2	1.7	32	9	4300	72	–		SO-8FL
NTMFS5C423NL	Single	N	40	20	1.6	2.4	23	6.7	3100	60	–	Control/Synchronous	SO-8FL
NTMFS5C442NL	Single	N	40	20	2.2	3.4	22	6.7	3000	28	–		SO-8FL
NTMFS5C604NL	Single	N	60	20	0.93	1.25	52	12.7	8900	40	–		SO-8FL
NTMFS5C612NL	Single	N	60	20	1.2	1.65	41	10.9	6660	45	–	Primary/Secondary Synchronous	SO-8FL
NTMFS5C646NL	Single	N	60	20	3.8	5	15.7	5.1	2164	17	–		SO-8FL
NTMFS5C670NL	Single	N	60	20	5.4	7.2	9.2	1.5	1400	15	–		SO-8FL

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



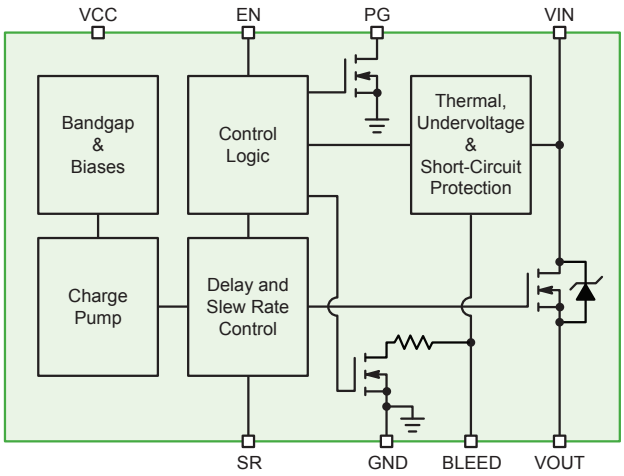
Device	Configuration	V_{DS} (V)	V_{GS} (V)	$R_{DS(ON)}$ mΩ		Q_g (nC)	Q_{gd} (nC)	C_{iss} (pF)	C_{rss} (pF)	R_G (Ω)	Application	Package
				V_{GS}= 10 V	V_{GS}= 4.5 V							
				Typ	Typ							
NTMFS4H01N	Single	25	20	0.55	0.76	39	8.5	5693	212	1.2	Synchronous Side	SO-8FL
NTMFS4H01NF	Int. Schottky	25	20	0.56	0.79	37.8	8	5538	175.3	1.3	Synchronous Side	SO-8FL
NTMFS4H013NF	Single	25	20	0.72	1.1	26	5.8	3923	114	1	Synchronous Side	SO-8FL
NTMFS4H02N	Single	25	20	1.1	1.7	18	4.2	2651	103	1	Synchronous Side	SO-8FL
NTMFS4H02NF	Int. Schottky	25	20	1.1	1.6	18.7	4.3	2652	94	1	Synchronous Side	SO-8FL
NTTFS4H05N	Single	25	20	2.5	3.8	8.7	1.88	1205	45	1	Synchronous Side	u8FL
NTTFS4H07N	Single	25	20	3.8	5.8	5.7	1.26	771	34	1	Synchronous Side	u8FL
ATP202	Single	30	20	9	14	27	4	1650	160	–	Control Side	ATPAK
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
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
NTMFS5C404NL	Single	40	20	0.56	0.85	81	23.8	12168	79.8	–	Synchronous Side	SO-8FL
NTMFS5C410NL	Single	40	20	0.71	1	66	22	8862	116	–	Synchronous Side	SO-8FL
NTMFS5C423NL	Single	40	20	1.6	2.4	23	6.7	3100	60	–	Control/Synchronous	SO-8FL
NTMFS5C430NL	Single	40	20	1.2	1.7	32	9	4300	72	–	Control/Synchronous	SO-8FL
NTMFS5C442NL	Single	40	20	2.2	3.4	22	6.7	3000	28	–	Control Side	SO-8FL

Advanced Load Switches

ON Semiconductor provides a comprehensive range of load switches, suitable for a variety of different power trees.

- Copackaged MOSFET plus CMOS controllers – value-added features plus high performance
- Monolithic CMOS smart load switches – value added features, low cost
- Discrete MOSFETs – simple, high performance

ecoSWITCH™ ADVANCED LOAD MANAGEMENT



NCP45xxx Integrated Load Switch Feature

- Simple/clean design
- No current consumption in standby power mode
- Small PCB footprint
- Low $R_{DS(ON)}$ due to charge pump driving NMOS
- Adjustable soft-start time (SR)
- Adjustable integrated discharge
- Fault protection
- Power rail monitoring & sequencing

Type	Device	r_{on} (mΩ)	I Max (A)	V_I Min (V)	V_I Max (V)	I_Q (μA)	Discharge	Slew Rate (μs)	Features	Package(s)
Smart Load Switch	NCP330	26 at 3.3 V	3	1.8	5.5	100	-	2000	Reverse blocking	TDFN-4
	NCP333	55 at 3.3 V	1.5	1.2	5.5	1	Auto	95	-	WLCSP-4
	NCP334	47 at 3.3 V	2	1.2	5.5	1	-	71	-	WLCSP-4
	NCP335	47 at 3.3 V	2	1.2	5.5	1	Auto	71	-	WLCSP-4
	NCP336	23 at 3.3 V	3	1.2	5.5	1	-	810	-	WLCSP-6
	NCP337	23 at 3.3 V	3	1.2	5.5	1	Auto	810	-	WLCSP-6
	NCP338	27 at 1.8 V	2	1	3.6	0.6	Auto	20	-	WLCSP-6
	NCP339	26 at 3.3 V	3	1.2	5.5	2	-	2700	Reverse blocking	WLCSP-6
	NCP432	50 at 1.8 V	1.5	1	3.6	0.6	-	20	-	WLCSP-4
	NCP433	50 at 1.8 V	1.5	1	3.6	0.6	Auto	20	-	WLCSP-4
	NCP434	43 at 1.8 V	2	1	3.6	0.6	-	61	-	WLCSP-4
	NCP435	43 at 1.8 V	2	1	3.6	0.6	Auto	61	-	WLCSP-4
	NCP436	23 at 1.8 V	3	1	3.6	1	-	27	-	WLCSP-6
	NCP437	23 at 1.8 V	3	1	3.6	1	Auto	27	-	WLCSP-6
ecoSWITCH™ Integrated Load Switch	NCP45524	18.0	6	0.5	13.5	-	Adj	-	Power good	DFN-8
	NCP45525	18.0	6	0.5	13.5	-	Adj	Adj	-	DFN-8
	NCP45560	2.4	24	0.5	13.5	-	Adj	Adj	Power good; Fault	DFN-12
	NCP45540	3.3	20	0.5	13.5	-	Adj	Adj	Power good; Fault	DFN-12
	NCP45541	3.3	20	0.5	13.5	-	Adj	Adj	Power good	DFN-12
	NCP45520	9.5	10.5	0.5	13.5	-	Adj	-	Power good; Fault	DFN-8
	NCP45521	9.5	10.5	0.5	13.5	-	Adj	Adj	Fault	DFN-8

Thermal Management

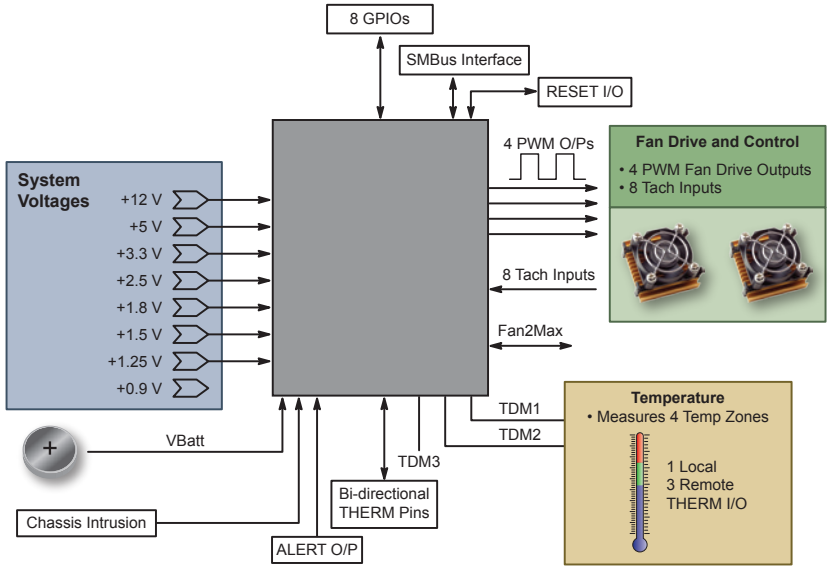
Extensive Portfolio

Local Sensors provide temperature information at the device location

Remote Sensors provide temperature information of a transistor located at a different position on the board; also includes local sensor capability

Fan Controllers integrate the temperature sensor with a fan controller/monitor

System Monitors integrate combinations of remote and/or local temperature sensing, voltage monitoring, fan control & monitoring, reset control, and GPIO functions

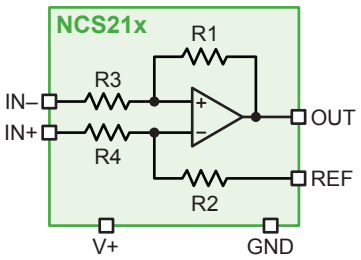


	Device	Supply Range (V)	Temperature Range (°C)	Local Accuracy (°C)	Interface	Number of Addresses	SRC (Ω)	Remote Accuracy	Remote Channels	Fan Channels	TACH Channels	Voltage Monitoring Channels	GPIOs	Package
System Monitors	ADM1026	3 - 5.5	-40 to +120	±3	I2C/SMBUS	3	–	±3	2	8	8	19	17	LQFP-48
	ADT7462	3 - 5.5	-40 to +125	±2.25	I2C/SMBUS	2	2 k	±2.25	3	4	8	13	8	LFCSP-32
	NCT80	2.8 - 5.75	-40 to +125	±2	I2C/SMBUS	8	–	–	–	–	2	7	1	TSSOP-24
	ADT7476	3 - 3.6	-40 to +120	±1.5	I2C/SMBUS	3	–	±1.5	2	3	4	5	–	QSOP-24
Fan Controllers	ADT7473	3 - 3.6	-40 to +120	±1.5	I2C/SMBUS	3	3 k	±1.5	2	3	4			QSOP-16
	ADT7475	3 - 3.6	-40 to +120	±1.5	I2C/SMBUS	1	–	±1.5	2	3	4			QSOP-16
	ADM1033	3 - 3.6	-40 to +120	±1	I2C/SMBUS	8	1 k	±1	1	1	1			QSOP-16
	ADM1034	3 - 3.6	-40 to +120	±1	I2C/SMBUS	8	1 k	±1	2	2	2			QSOP-16
Remote Sensors	NCT72	2.8 - 3.6	-40 to +125	±1	I2C/SMBUS	2	1.5 k	±1	1					DFN-8, WDFN-8
	NCT218	1.4 - 2.75	-40 to +125	±1.75	I2C/SMBUS	2	150	±1	1					WDFN-8, WLCSP-8
	NCT210	3 - 5.5	-55 to +125	±1	I2C/SMBUS	9	–	±3	2					QSOP-16
	ADM1032	3 - 5.5	-40 to +125	±3	I2C/SMBUS	2	–	±1	1					SOIC-8, MSOP-8
	ADT7461	3 - 5.5	-40 to +125	±3	I2C/SMBUS	2	3 k	±1	1					SOIC-8, MSOP-8
	ADT7481	3 - 3.6	-40 to +125	±1	I2C/SMBUS	2	–	±1	2					MSOP-10
	ADT7483	3 - 3.6	-40 to +125	±1	I2C/SMBUS	9	–	±1	2					QSOP-16
Local Sensors	NCT375*	3 - 5.5	-55 to +125	±1	I2C/SMBUS	8								DFN-8, SOIC-8, Micro8
	NCT475*	3 - 5.5	-55 to +125	±1	I2C/SMBUS	4								CSP-6
	NCT203	1.4 - 2.75	-40 to +125	±1.75	I2C/SMBUS	1								DFN-8, SOIC-8, Micro8

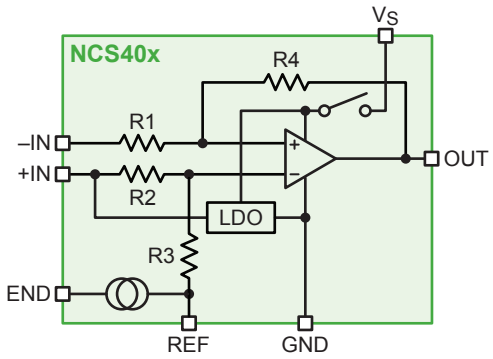
* Pending 4Q15.

Current Sensing with Zero-Drift, Precision Op Amps

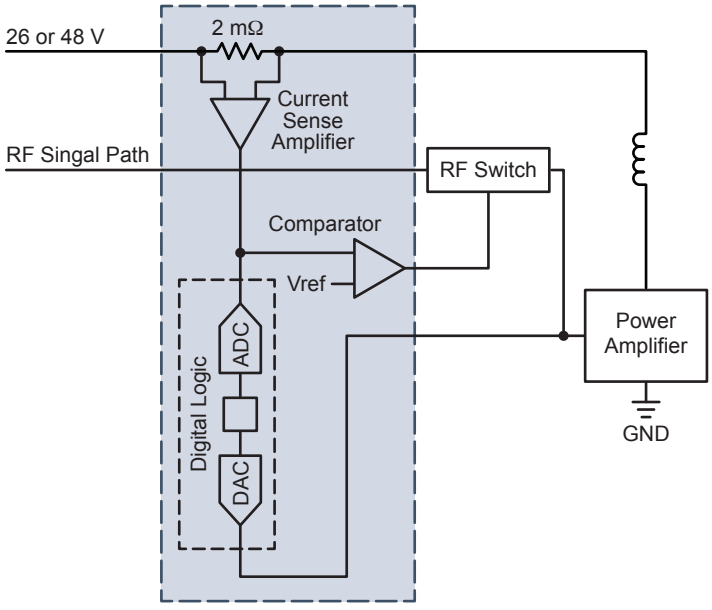
Device	Channels	V_S Min (V)	V_S Max (V)	Input CM Range (V)	I_Q /Channel (µA)	GBW (kHz)	V_{OS} Max (µV)	V_{OS} Drift (µV/°C)	Gain Error (%)	CMRR (dB)	e_{p-p} (µVpp)	Features	Package
NCS21x	1	2.7	26	2.7 to 26	65	14	35	0.5	1	140	-	Low V_{OS}	SOT-363
NCS40x	1	4.0	5.5	4.0 to 80	800	500	200	0.1	0.35	110	23	Low V_{OS}	Micro8™
NCS325	1	1.8	5.5	V_{SS}-0.1 to V_{DD}+0.1	21	350	50	0.02	-	110	1	Low V_{OS}	SOT-23
NCSx333	1, 2	1.8	5.5	V_{SS}-0.1 to V_{DD}+0.1	21	350	10	0.03	-	120	1	Low V_{OS}	Various



Device	Gain	R3 – R4	R1 – R2
NCS213	50	20 kΩ	1 mΩ
NCS215	75	13.3 kΩ	1 mΩ
NCS214	100	10 kΩ	1 mΩ
NCS210	200	5 kΩ	1 mΩ
NCS211	500	2 kΩ	1 mΩ
NCS212	1000	1 kΩ	1 mΩ

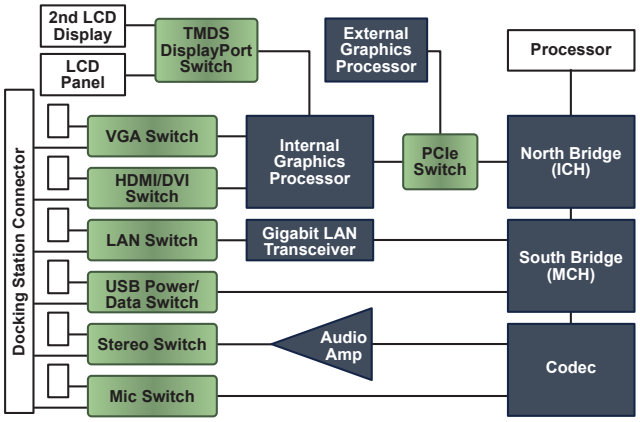


Device	Gain	R3 – R4	R1 – R2
NCS400	14	1050 kΩ	75 kΩ
NCS401	20	1.5 mΩ	75 kΩ
NCS402	50	1.2 mΩ	30 kΩ
NCS403	100	1.5 mΩ	15 kΩ



Switching Devices

ON Semiconductor offers a range of switching devices for high speed interface in servers, desktop computing, notebook and netbook computers. Applications include PCI Express, DisplayPort, Gigabit Ethernet and USB 2.0.



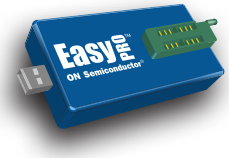
Server Implementation

Device	Interface	Data Rate	No Channels	Quiescent Current
NCN3612B	PCIe 3.0, DisplayPort 1.2	8 Gb/s	12	250 µA
NCN3411	PCIe 3.0	8 Gb/s	8	200 µA
NCN2612B	PCIe 2.0, DisplayPort 1.1	5 Gb/s	12	250 µA
NS3L500	Gigabit Ethernet	1 Gb/s	11	250 µA
NCN1188	USB 2.0 / MHL	2.25 Gb/s	2	21 µA
NS5S1153	USB 2.0	480 Mb/s	2	21 µA
NLAS7242	USB 2.0	480 Mb/s	2	1 µA
NLAS52231	Audio	36 MHz	2	1 µA
NLAS4684	Audio	9.5 MHz	2	180 nA

EEPROMs for Configuration and Calibration

Features

- Broad density range: 1 kb to 2 Mb
- Wide operating Vcc range: 1.8/1.7 V to 5.5 V
- High endurance: 1 million program/erase cycles
- Wide temperature range: industrial and extended



EasyPRO™ is a user-friendly, portable programming tool for ON Semiconductor serial EEPROMs (I^2C, SPI, Microwire)

EEPROMs

Data Transmission Standard	Device	Density	Organization*	V_{CC} Min (V)	V_{CC} Max (V)	f_{CLK} Max (MHz)	Package(s)
I^2C	CAT24M01	1 Mb	128k x 8	1.8	5.5	1	SOIC-8, TSSOP-8, UDFN-8
	CAT24C512	512 kb	64k x 8	1.8	5.5	1	SOIC-8, TSSOP-8, UDFN-8
	CAT24C256	256 kb	32k x 8	1.8	5.5	1	SOIC-8, TSSOP-8, UDFN-8
	CAT24C128	128 kb	16k x 8	1.8	5.5	1	SOIC-8, TSSOP-8, UDFN-8
	CAT24C64	64 kb	8k x 8	1.7	5.5	1	SOIC-8, TSSOP-8, UDFN-8
	CAT24C32	32 kb	4k x 8	1.7	5.5	1	SOIC-8, TSSOP-8, UDFN-8; WLCSP-5
	CAT24C16	16 kb	2k x 8	1.7	5.5	0.4	SOIC-8, TSSOP-8, UDFN-8, TSOT23-5, WLCSP-4, WLCSP-5
	CAT24C08	8 kb	1k x 8	1.7	5.5	0.4	SOIC-8, TSSOP-8, UDFN-8, TSOT23-5, WLCSP-4, WLCSP-5
	CAT24C04	4 kb	512 x 8	1.7	5.5	0.4	SOIC-8, TSSOP-8, UDFN-8, TSOT23-5, WLCSP-4, WLCSP-5
	CAT24C02	2 kb	256 x 8	1.7	5.5	0.4	SOIC-8, TSSOP-8, UDFN-8, TSOT23-5, WLCSP-4, WLCSP-5
SPI	CAT25M02	2 Mb	256k x 8	1.7	5.5	10	SOIC-8
	CAT25M01	1 Mb	128k x 8	1.8	5.5	10	SOIC-8, TSSOP-8
	CAT25512	512 kb	64k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25256	256 kb	32k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25128	128 kb	16k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25640	64 kb	8k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25320	32 kb	4k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25160	16 kb	2k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25080	8 kb	1k x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25040	4 kb	512 x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25020	2 kb	256 x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
	CAT25010	1 kb	128 x 8	1.8	5.5	20	SOIC-8, TSSOP-8, UDFN-8
Microwire	CAT93C86	16 kb	2k x 8 / 1k x 16	1.8	5.5	3	SOIC-8
	CAT93C86B	16 kb	2k x 8 / 1k x 16	1.8 / 1.65	5.5	4	SOIC-8, TSSOP-8, UDFN-8
	CAT93C76	8 kb	1k x 8 / 512 x 16	1.8	5.5	3	SOIC-8, TSSOP-8
	CAT93C76B	8 kb	1k x 8 / 512 x 16	1.8 / 1.65	5.5	4	SOIC-8, TSSOP-8, UDFN-8
	CAT93C66	4 kb	512 x 8 / 256 x 16	1.8	5.5	2	SOIC-8, TSSOP-8
	CAT93C56	2 kb	256 x 8 / 128 x 16	1.8	5.5	2	SOIC-8, TSSOP-8
	CAT93C46	1 kb	128 x 8 / 64 x 16	1.8	5.5	2	SOIC-8, TSSOP-8
	CAT93C46B	1 kb	128 x 8 / 64 x 16	1.8 / 1.65	5.5	4	SOIC-8, TSSOP-8, UDFN-8

* Organization for Microwire devices is selectable.

Application Specific EEPROMs

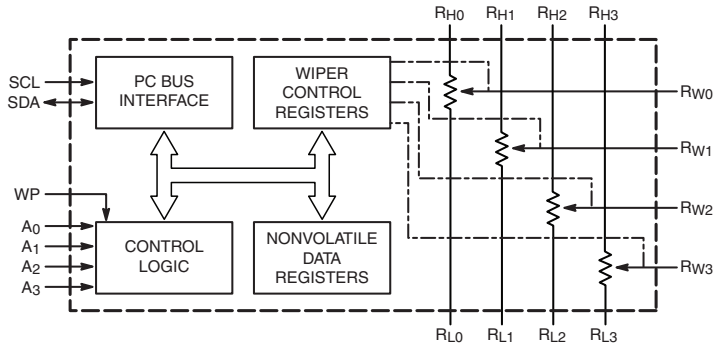
Data Transmission Standard	Device	Density	Organization	V_{CC} Min (V)	V_{CC} Max (V)	f_{CLK} Max (MHz)	Package(s)	Notes
I^2C	CAT24C208	8 kb	1024 x 8	2.5	5.5	0.4	SOIC-8	VESA™ dual-port serial EEPROM
I^2C	CAT34C04*	4 kb	512 x 8	1.7	5.5	1	UDFN-8	Serial Presence Detect (SPD) I2C EEPROM for DDR4 DIMM
I^2C/SMBus	CAT34TS04	4 kb	512 x 8	2.2	5.5	1	TDFN-8, UDFN-8	4 kb SPD EEPROM w/ Temperature Sensor for DDR4 DIMM
I^2C	CAT34C02	2 kb	256 x 8	1.7	5.5	0.4	UDFN-8, TDFN-8, TSSOP-8	Serial Presence Detect (SPD) I2C EEPROM for DDR3 DIMM
I^2C/SMBus	CAT34TS02	2 kb	256 x 8	3.0	3.6	0.4	TDFN-8, UDFN-8	2 kb SPD EEPROM w/ Temperature Sensor for DDR3 DIMM

* Pending 4Q15.

Digital Potentiometers (POTs) for Trimming and Calibration

Features

- No drift over time or temperature
- No changes due to mechanical stress or shock
- Systems can be calibrated real-time, in the field
- Broad portfolio provides for selection of optimal number of pots and taps

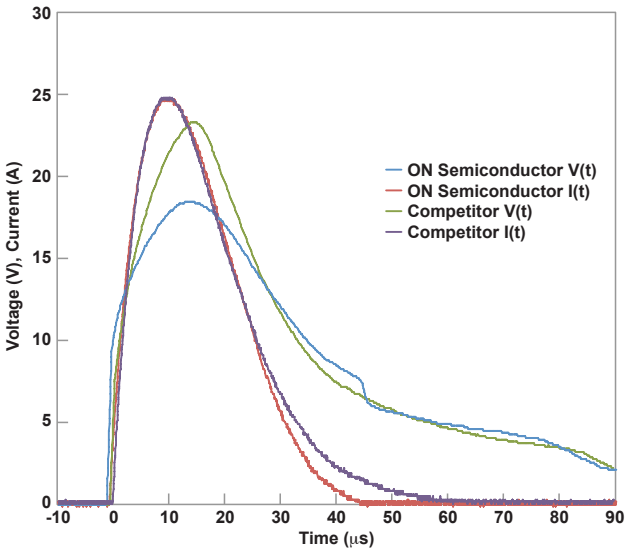


Device	Number of Pots	Number of Taps	Resistance (kΩ)	Buffered Wiper	Interface	Volatile	Non-Volatile	Packages
CAT5120/1/2	1	16	10, 50, 100		UP/DOWN	✓		SOT-23-6, SC-70-6
CAT5110	1	32	10, 50, 100		UP/DOWN	✓		SOT-23-6, SC-70-6
CAT5112	1	32	10, 50, 100	✓	UP/DOWN		✓	PDIP-8, SOIC-8, MSOP-8, TSSOP-8
CAT5114	1	32	10, 50, 100		UP/DOWN		✓	PDIP-8, SOIC-8, MSOP-8, TDFN-8, TSSOP-8
CAT5115	1	32	10, 50, 100		UP/DOWN	✓		PDIP-8, SOIC-8, MSOP-8, TSSOP-8
CAT5118/9	1	32	10, 50, 100		UP/DOWN	✓		SOT-23-5, SC-70-5
CAT5123/4	1	32	10, 50, 100		UP/DOWN	✓		SOT-23-5
CAT5125	1	32	10, 50, 100		UP/DOWN	✓		SOT-23-6
CAT5126	1	32	10, 50, 100		UP/DOWN	OTP		MSOP-8, TDFN-8
CAT5127	1	32	10, 50, 100		UP/DOWN		✓	MSOP-8, TDFN-8
CAT5128	1	32	10, 50, 100		UP/DOWN	✓		SOT-23-8
CAT5129	1	32	10, 50, 100		UP/DOWN		✓	TSOT-23-6
CAT5111	1	100	10, 50, 100	✓	UP/DOWN		✓	PDIP-8, SOIC-8, MSOP-8, TSSOP-8
CAT5113	1	100	1, 10, 50, 100		UP/DOWN		✓	PDIP-8, SOIC-8, MSOP-8, TSSOP-8
CAT5116	1	100	32 (Log Taper)		UP/DOWN		✓	PDIP-8, SOIC-8, MSOP-8, TSSOP-8
CAT5132	1	128	10, 50, 100		I²C		✓	MSOP-10
CAT5133	1	128	10, 50, 100		UP/DOWN		✓	MSOP-10
CAT5137	1	128	50		I2C		✓	SC-88-6, SC-70-6
CAT5138	1	128	10		I2C		✓	SC-88-6, SC-70-6
CAT5140	1	256	50, 100		I2C		✓	MSOP-8
CAT5171	1	256	50, 100		I2C		✓	SOT-23-8
CAT5172	1	256	50		SPI		✓	SOT-23-8
CAT5221	2	64	2.5, 10, 50, 100		I²C		✓	SOIC-20, TSSOP-20
CAT5411	2	64	2.5, 10, 50, 100		SPI		✓	SOIC-24, TSSOP-24
CAT5419	2	64	2.5, 10, 50, 100		I²C		✓	SOIC-24, TSSOP-24
CAT5261	2	256	50, 100		SPI		✓	SOIC-24, TSSOP-24
CAT5269	2	256	50, 100		I²C		✓	SOIC-24, TSSOP-24
CAT5271	2	256	50, 100		I2C		✓	MSOP-10
CAT5273	2	256	50		I2C		✓	MSOP-10
CAT5241	4	64	2.5, 10, 50, 100		I²C		✓	SOIC-20, TSSOP-20
CAT5401	4	64	2.5, 10, 50, 100		SPI		✓	SOIC-24, TSSOP-24
CAT5409	4	64	2.5, 10, 50, 100		I²C		✓	SOIC-24, TSSOP-24
CAT5251	4	256	50, 100		SPI		✓	SOIC-24, TSSOP-24
CAT5259	4	256	50, 100		I²C		✓	SOIC-24, TSSOP-24

Surge Protection

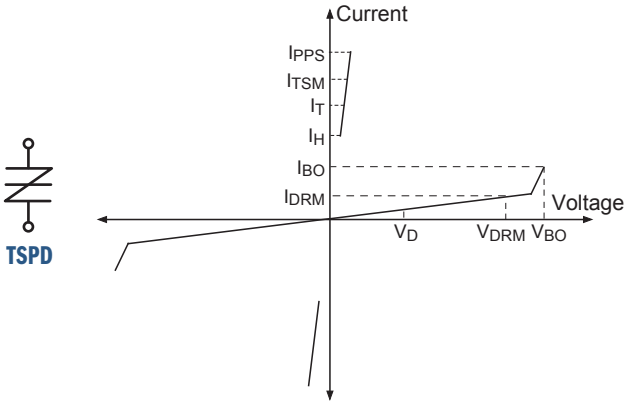
ON Semiconductor provides solutions for protecting against surge strikes, induced by a lighting strike or power-cross fault. Common interfaces found in a wide variety of consumer and telecommunications/networking equipment are the RJ45 interface for the 10/100BASE-T and 1000BASE-T Ethernet protocols and the RJ11 interface for xDSL protocols. RJ45 consists of four pairs of differential data lines, each carrying a maximum data rate of 250 Mbps in a 1000BASE-T configuration, while RJ11 consists of a single differential data pair. These interfaces are often surge rated to an intra-building standard. Protection for these interfaces mainly consist of ensuring that transverse (metallic or differential) surge strikes do not damage sensitive downstream chips such as PHYs. Differential protection is achieved by connecting shunt protection elements from line-to-line (for each pair of lines) that transfer the incoming hostile surge energy back towards the source. This is different from common mode protection as elements are connected line-to-GND and shunt the surge energy to GND.

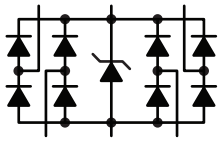
For lower data-rates (10/100BASE-T, xDSL), ON Semiconductor offers a combination of crowbar devices known as thyristor surge protector devices (TSPD), and transient voltage suppressor (TVS) devices similar to those used in ESD protection. TSPDs offer the advantage of lower clamping voltages and possess higher surge current capability, for both common and differential mode protection.

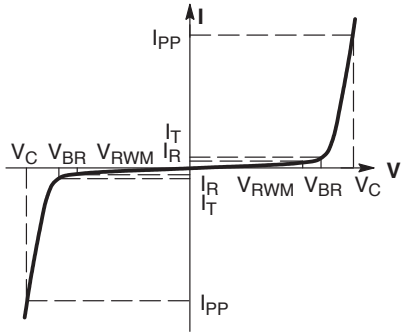


Example of V & I plots in an 8/20 µs surge

TVS clamping devices support surge levels for the 8/20 µs pulse and are commonly used on the tertiary or PHY-side to capture and safely dissipate any residual surge pulses. Pictured in the figure above is a time-domain plot of the 8/20 µs surge current applied to the TVS from ON Semiconductor. Also shown are time-domain response voltages, clearly showing the superiority of the ON Semiconductor solution in comparison to a competing device.





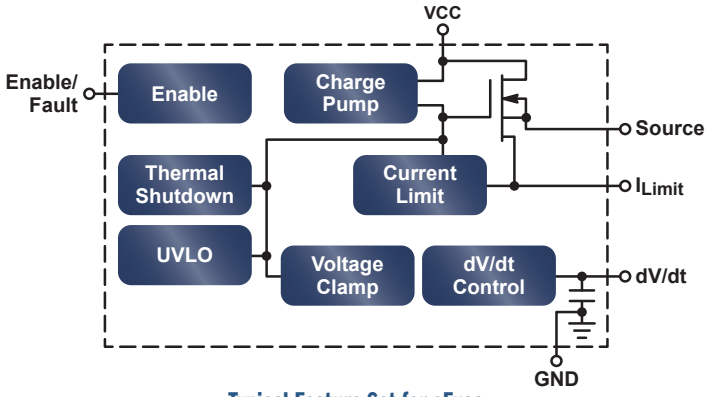


Electronic Fuses for Inrush Current Limiting on Power Buses

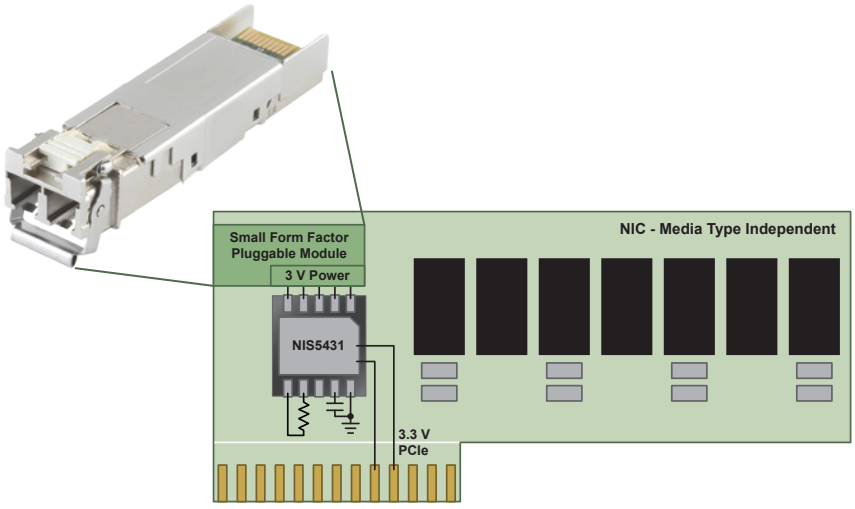
3-12 V Power Bus Hot Plug Protection

Features

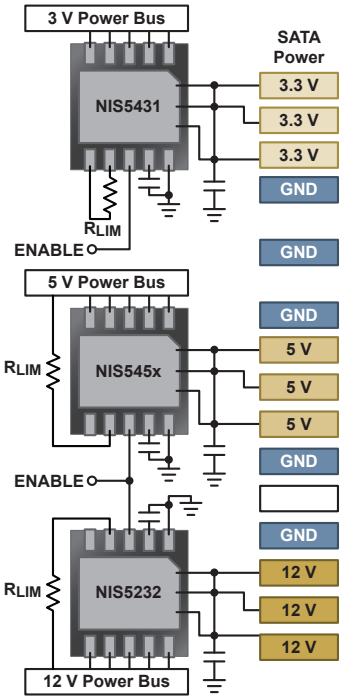
- Low $R_{DS(ON)}$, high operating and trip currents (I_{OP}, I_{TRIP})
- Overvoltage protection
- Precise I_{TRIP} control
- Slew rate control
- Thermal shut-down
- EN pin for synchronizing multiple eFuses
- Outperforms poly-fuses:
  - Tighter spec tolerances
  - Lower resistance
  - Shorter trip-time
  - Superior repeatability
- High efficiency with high current capability
- eFuses in parallel achieve practically any desired level of I_{OP} and I_{TRIP}



Typical Feature Set for eFuse



Network Interface Card Application



Hard Drive/Solid State Drive Application

Device	Input Voltage (V)	Output Clamping Voltage (V)	I_{TRIP} Trip Current (A)	$R_{DS(ON)}$ (mΩ)	Adjustable I_{TRIP}	Auto Recovery	Latching	Package
NIS5112	-0.6 to 18	15	2.5	28	Yes	Yes	Yes	SOIC-8
NIS5132	-0.6 to 18	15	3.5	44	Yes	Yes	Yes	DFN-10
NIS5232	-0.6 to 18	15	4	44	Yes	No	Yes	DFN-10
NIS5135	-0.6 to 18	6.65	3.5	68	Yes	Yes	Yes	DFN-10
NIS5451*	-0.6 to 14	5.5	1.6	40	Yes	No	Yes	WDFN-10
NIS5452	-0.6 to 14	5.85	2.1	40	Yes	No	Yes	WDFN-10
NIS5431	-0.6 to 14	3.85	1.6	45	Yes	No	Yes	WDFN-10

* Pending 4Q15.

Ethernet: 10/100BASE-T, 1000BASE-TX, and Gigabit

Surge/ESD Protection for Four Pairs

The 1000BASE-T or Gigabit Ethernet interface operating at higher bitrates is susceptible to ESD strikes, cable-discharge events and lightning-induced transients. Our products help meet IEC 61000-4-5, GR-1089-CORE and other Standards.

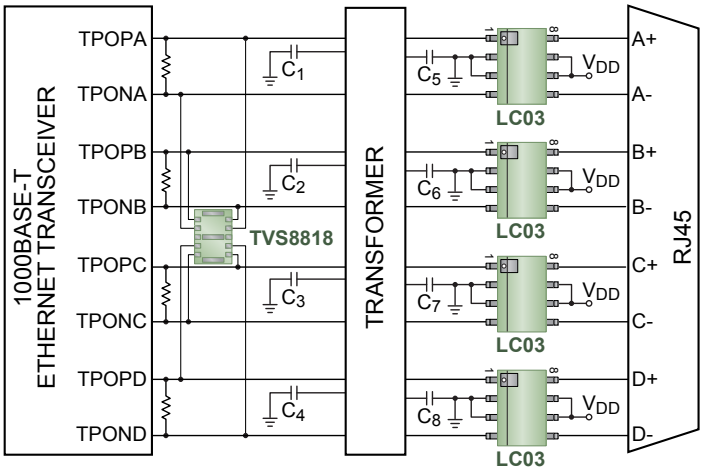
Features

- Line-to-line capacitance < 3 pF
- V_{clamp} (25 A surge) < 11 V
- IEC 61000-4-2 rating > 30 kV
- No latching danger
- Surge rating maintained to 125°C

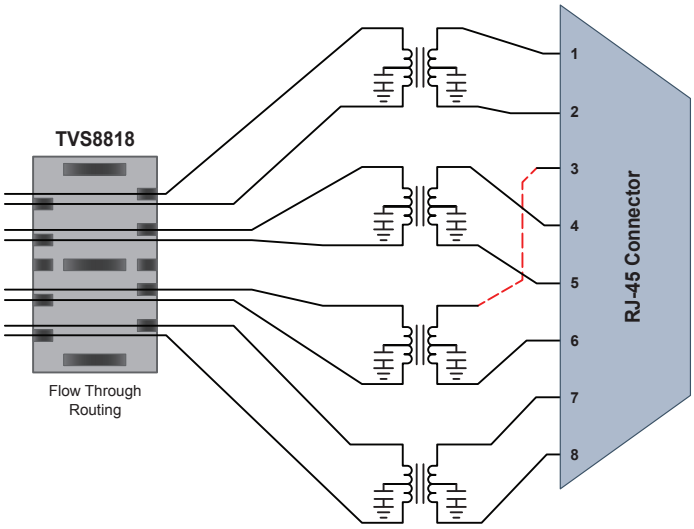
Benefits

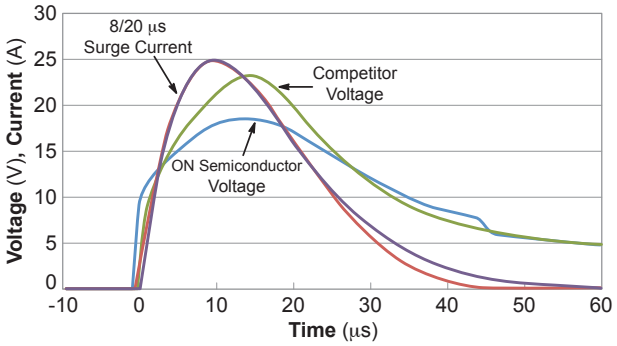
- Compatible with Gb Ethernet and beyond
- Enhanced protection for downstream electronics
- Accommodates operating transients above 3.3 V
- Small form-factor allows integration into connectors

Typical Application



Line Side : LC03-6 (optional)
Transformer Side: TVS8818
Protection against metallic (transverse) strikes





Line-to-Line Surge

Transient Voltage Suppressors

Device	V_{DC} Max (V)	Line Transient Max (V)	Surge I_{PP}, 8/20 µs (A)	Typical Line-Line Capacitance (pF)	ESD Contact Rating (kV)	Package
LC03-6	6.7	7.0	100	8.0	±30	SOIC-8
TVS8814**	3.0	3.2	35	1.5	±30	UDFN-8
TVS8818**	3.0	3.2	35	1.5	±30	UDFN-10
SRDA3.3	3.3	5.0	25	4.0	±8	SOIC-8
SRDA05	5.0	7.0	23	5.0	±8	SOIC-8
NUP4114H	5.0	5.0	12*	0.4	±13	TSOP-6

* On Pin 5. ** Pending 4Q15.

T1/E1, T3/E3, and xDSL Ports

Surge protection for GR-1089, TIA-968-A, ITU-T and IEC 61000-4-5

T1/E1 links (< 2 Mbps), T3/E3 links (< 43 Mbps) and xDSL lines (< 52 Mbps) are susceptible to ESD strikes, cable-discharge events and lightning-induced transients.

TVS Features

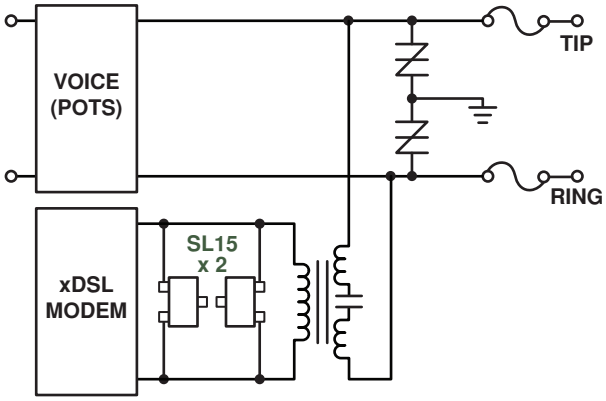
- Capable of all T1/E1 and xDSL voltages with a variety of capacitance values, for driver-side protection

TSPD Features

- C_{line} <14 pF for 50 A surge under 8/20 μs (NP0080TA series)

Benefits

- Required data-rates are supported by TSPDs
- TVS devices provide high levels of tertiary protection without latching



Typical xDSL + POTS Application

Thyristor Surge Protection Devices

Device	V_{DRM} (V)	V_{BO} (V)	V_T (V)	C_O (pF)	I_H (mA)	Surge I_{PP}, 10/1000 μs (A)	Package
NP0080TA Series	8-16	9.5-18	–	11-13	50	50 (8/20 μs)	TSOP-5

Transient Voltage Suppressors

Device	V_{DC} Max (V)	Surge I_{PP}, 8/20 μs (A)	Line-Line Capacitance (pF)	ESD Contact Rating (kV)	Package
SRDA3.3	3.3	25	4.0	±8	SOIC-8
SRDA05	5.0	23	5.0	±8	SOIC-8
LC03-6	5.0	100	8.0	±30	SOIC-8
SL05 to SL24	5 to 24	5 to 17	3.5	±8	SOT-23

Sales and Design Assistance from ON Semiconductor

ON Semiconductor Technical Support
www.onsemi.com/support

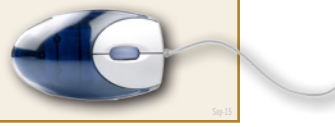
ON SEMICONDUCTOR INTERNATIONAL SALES OFFICES		
GREATER CHINA	Beijing	86-10-8577-8200
	Hong Kong	852-2689-0088
	Shenzhen	86-755-8209-1128
	Shanghai	86-21-5131-7168
	Taipei, Taiwan	886-2-2377-9911
FRANCE	Paris	33 (0)1 39-26-41-00
GERMANY	Munich	49 (0) 89-93-0808-0
INDIA	Bangalore	91-98-808-86706
ISRAEL	Raanana	972 (0) 9-9609-111
ITALY	Milan	39 02 9239311
JAPAN	Tokyo	81-3-5817-1050
KOREA	Seoul	82-31-786-3700
MALAYSIA	Penang	60-4-6463877
SINGAPORE	Singapore	65-6484-8603
SLOVAKIA	Piestany	421 33 790 2450
UNITED KINGDOM	Windsor	44 1753 62 6718

For a comprehensive listing of ON Semiconductor Sales Offices, Distributors, and Rep Firms, please visit:

Americas & EMEA: www.onsemi.com/sales

China: www.onsemi.cn/sales

Japan: www.onsemi.jp/sales



ON Semiconductor Distribution Partners		
Allied Electronics	www.alliedelec.com	(800) 433-5700
Altima Corp.	www.altima.co.jp	(81) 45 476 2155
Arrow Electronics	www.arrow.com	(800) 777-2776
Avnet	www.em.avnet.com	(800) 332-8638
Chip One Stop, Inc.	www.chip1stop.com/maker/on	(81) 45 470 8771
Daiwa Distribution Ltd.	www.daiwahk.com	(852) 2341 3351
Digi-Key	www.digikey.com	(800) 344-4539
EBV Elektronik	www.ebv.com/en/locations.html	(49) 8121 774-0
Future & FAI Electronics	www.futureelectronics.com/contact	1-800-FUTURE1 (388-8731)
Mouser Electronics	www.mouser.com	(800) 346-6873
Newark/Farnell	www.farnell.com/onsemi	(800) 4-NEWARK
OS Electronics Co., Ltd.	www.oselec.jp	Japanese: (81) 3 3255 5985 Other Languages: (81) 3 3255 6066
Promate Electronic Co.	www.promate.com.tw	(886) 2 2659 0303
RinnoVent Co., Ltd. (Ryosan Group)	www.ryosan.co.jp	(81) 3 3862 2440
RS Components KK	jp.rs-online.com	(81) 45 335 8550
Segyung Britestone Co.	www.britestone.com	(82) 2 3218 1511
Serial Microelectronics, HK	www.serialsys.com.hk	(852) 2790 8220
World Peace Industries Co.	www.wpi-group.com	(852) 2365 4860
WT Microelectronics Co.	www.wtmec.com	(852) 2950 0820
Yosun Electronics	www.yosun.com.tw	(886) 2 2659 8168

AMERICAS REP FIRMS			
Alabama	Huntsville	e-Components	(256) 533-2444
Brazil	Countrywide	Ammon & Rizos	(+55) 11-4688-1960
California	Bay Area	Electec	(408) 496-0706
	Southern California	Tech Coast Sales	(949) 305-6869
Canada	Eastern Canada	Astec	(905) 607-1444
Connecticut	Statewide	Paragon Electronic Systems	(603) 645-7630
Florida	Statewide	e-Components	(888) 468-2444
Georgia	Atlanta	e-Components	(888) 468-2444
Illinois	Statewide	Matrix – Design Technology	(952) 400-1070
Indiana	Fishers	Bear VAI	(317) 570-0707
Iowa	Statewide	Matrix – Design Technology	(319) 362-6824
Maine	Statewide	Paragon Electronic Systems	(603) 645-7630
Maryland	Columbia	Mechtronics Sales	(410) 309-9600
Massachusetts	Statewide	Paragon Electronic Systems	(603) 645-7630
Mexico	Countrywide	Ammon & Rizos	(+55) 11-4688-1960
Michigan	St. Joseph	Bear VAI	(440) 526-1991
Minnesota	Eden Prairie	Matrix – Design Technology	(952) 400-1070
Missouri	Belton	Matrix – Design Technology	(816) 589-2308
Nebraska	Statewide	Matrix – Design Technology	(816) 589-2308
New Hampshire	Statewide	Paragon Electronic Systems	(603) 645-7630
New Jersey	Statewide	S.J. Metro	(516) 942-3232
New York	Binghamton	TriTech - Full Line Rep	(607) 722-3580
	Jericho	S.J. Metro	(516) 942-3232
	Rochester	TriTech - Full Line Rep	(585) 385-6500
North Carolina	Raleigh	e-Components	(888) 468-2444
North Dakota	Statewide	Matrix – Design Technology	(952) 400-1070
Ohio	Brecksville	Bear VAI Technology	(440) 526-1991
Puerto Rico	Countrywide	e-Components	(888) 468-2444
Rhode Island	Statewide	Paragon Electronic Systems	(603) 645-7630
South Dakota	Statewide	Matrix – Design Technology	(952) 400-1070
Vermont	Statewide	Paragon Electronic Systems	(603) 645-7630
Wisconsin	Statewide	Matrix – Design Technology	(952) 400-1070

ON Semiconductor and the ON logo are registered trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free USA/Canada.
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative

BRD8077-4 PRINTED IN USA 09/15 IRONWOOD XXXX 1K

BRD8077/D

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

ON Semiconductor:
NCP6336BFCCT1G