



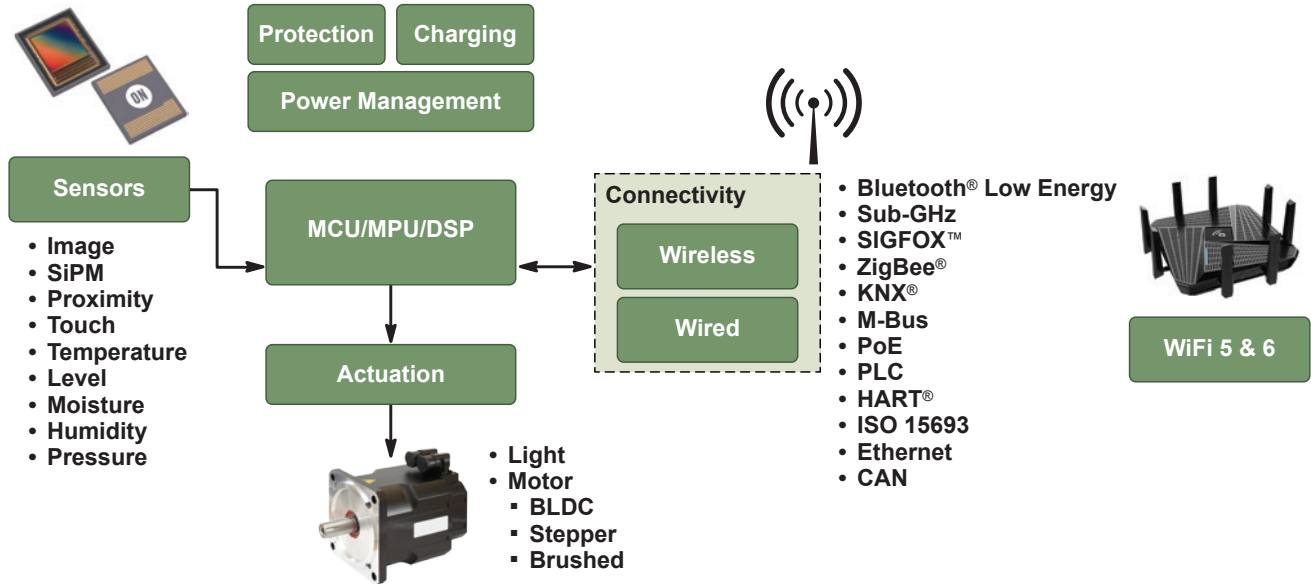
Internet-of-Things Solutions



Comprehensive solutions for connectivity, sensing, power management, motor control, processing, and protection from ON Semiconductor.



Internet-of-Things Solutions



- Seamlessly connected intelligent devices that sense, analyze and control the environment
- Connected smart lighting, surveillance/security systems, HVAC systems, home appliances, energy management systems, vehicles, traffic control
- Key building blocks include sensors/actuators, ultra low power MCUs/DSPs, connectivity, power management, security and software, chip integration and micro-packaging

Connected Lighting Platform for LED Control

The LIGHTING-1-GEVK Connected Lighting Platform is a modular development kit for prototyping cost-effective, industrial LED lighting solutions. The platform is extremely energy efficient and features wireless control (on/off, dimming, etc.) and two independently controlled LED channels that provide a maximum brightness of 7000 lumens.

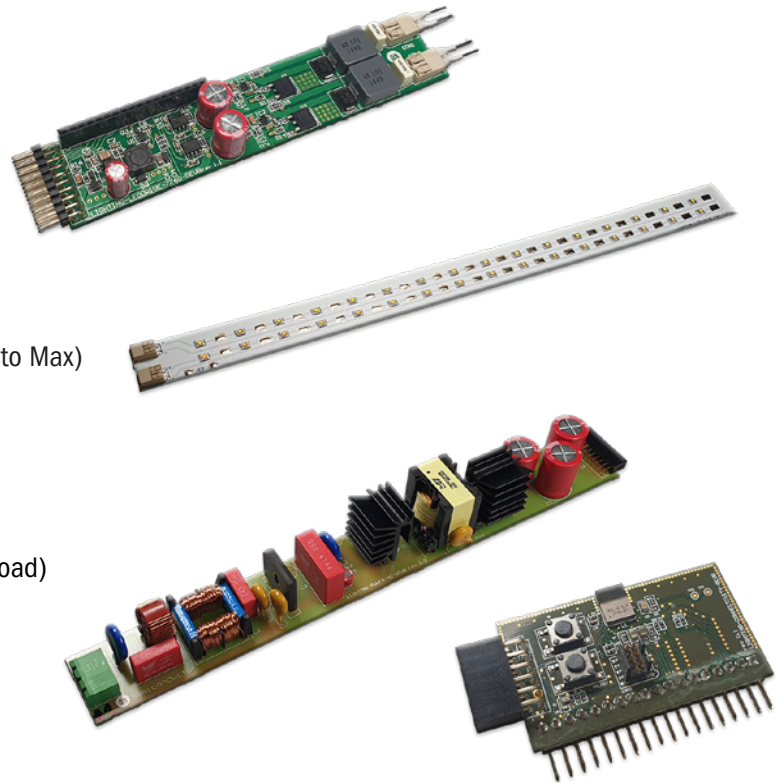
The base platform consists of four components:

- LED module, supporting 2 strings (warm white and cool white) of 16 LEDs
- Bluetooth® Low Energy connectivity board featuring RSL10 SIP
- AC-DC power board (Vin AC: 90 – 270 V, Vout DC: 55 V, Pout electrical: 70 W, Power Factor >0.99 at full load)
- LED driver board featuring FL7760 (dimming down to 0.6%, telemetry data, 12-bit PWM)

The platform provides several LED control functionalities using the RSL10 Sense and Control mobile app (iOS®, Google Play®) or web client. The platform is supported by a comprehensive development environment, including a CMSIS-Pack featuring customizable firmware, free RTOS, and various use cases. The PoE Power Module is available separately for Power Over Ethernet (PoE) connectivity up to 90 W.

Features

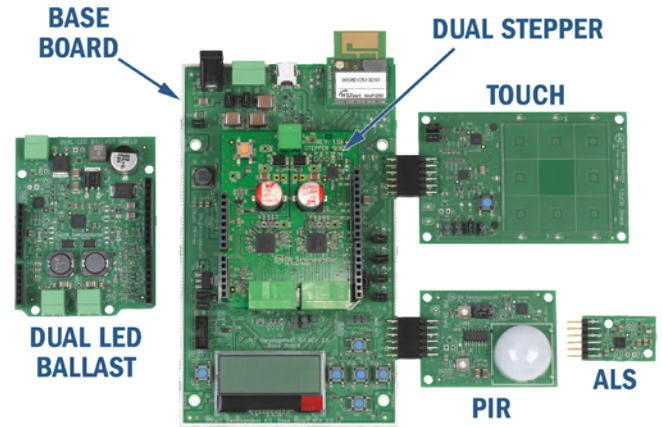
- High-power lighting
 - Up to 2 strings of 16 LEDs (7000 Lumen)
 - Dual independent LED Channel
 - White balance control (12-bit dimmer from 0 to Max)
- Multiple connectivity options
 - Bluetooth Low Energy
 - Power Over Ethernet (PoE)
 - Zigbee® GreenPower (Pending 2Q20)
- Compliant with multiple industry standards
- High efficiency power conversion (>90% at full load)



IoT Development Kit

Features

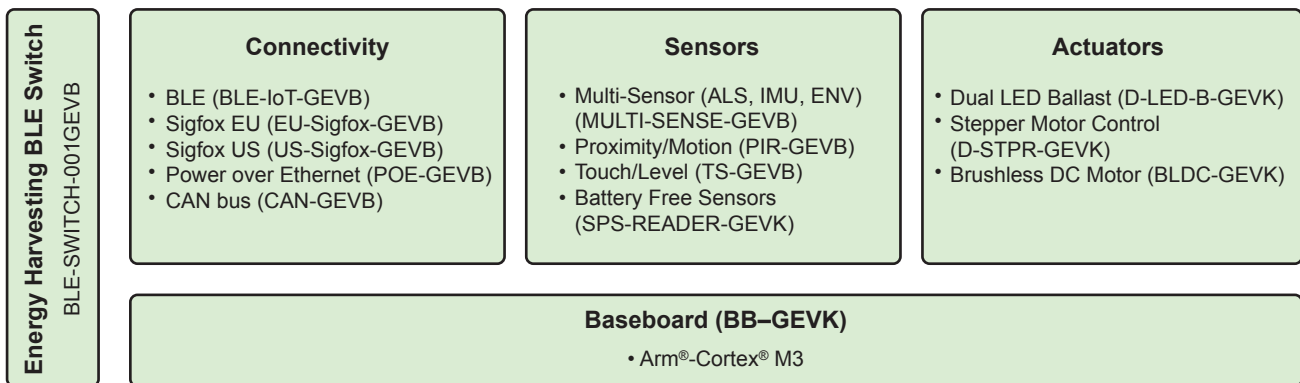
- Comprehensive portfolio of sensors, connectivity and actuators
- ARM®Cortex®-M3 Processor, ARM Mbed Operating System
- Eclipse based IDE with 40+ IoT use case examples
- Secure Cloud Connectivity (AWS, IBM, Azure, Google Cloud, etc.)
- Mobile Application for Bluetooth Low Energy use cases
- Detailed documentation of system hardware (BoM, schematics and layout files) and software design



Markets & Applications



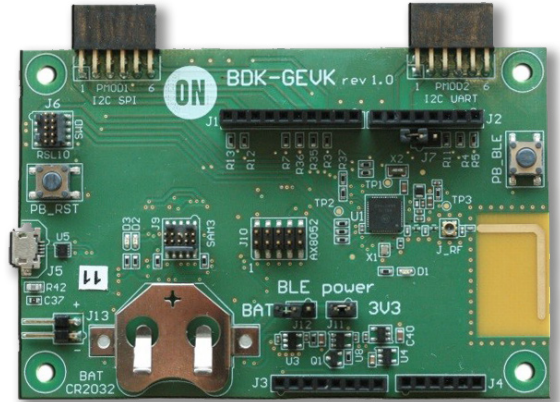
Modules



Bluetooth IoT Development Kit

Features

- Features Industry's Lowest Power Bluetooth 5 radio
 - 62.5 nW Deep Sleep
 - 7 mW Peak Receiving
- Configurable mobile application supporting cloud connectivity
 - Compatible with AWS, Azure, Bluemix or custom cloud services
- Ready-to-Use Sample Code
- Easily Connect to Other IoT Development Kit Shield Boards
 - Complete range of options for sensing (proximity, motion, touch), and control (dual LED, stepper motor, brushless DC)



EXPERTISE

Markets & Applications



Environmental Control



Security



Smart Appliances

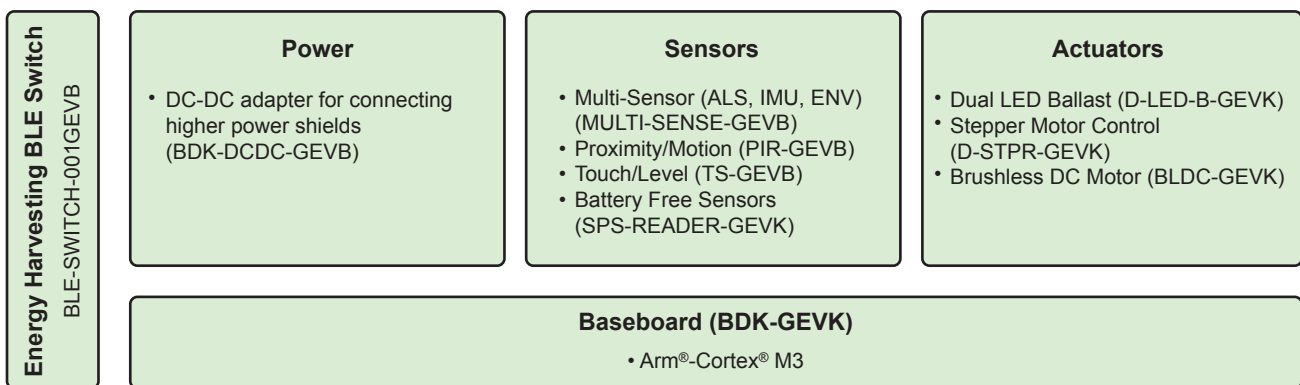


Wearables



Smart Lighting

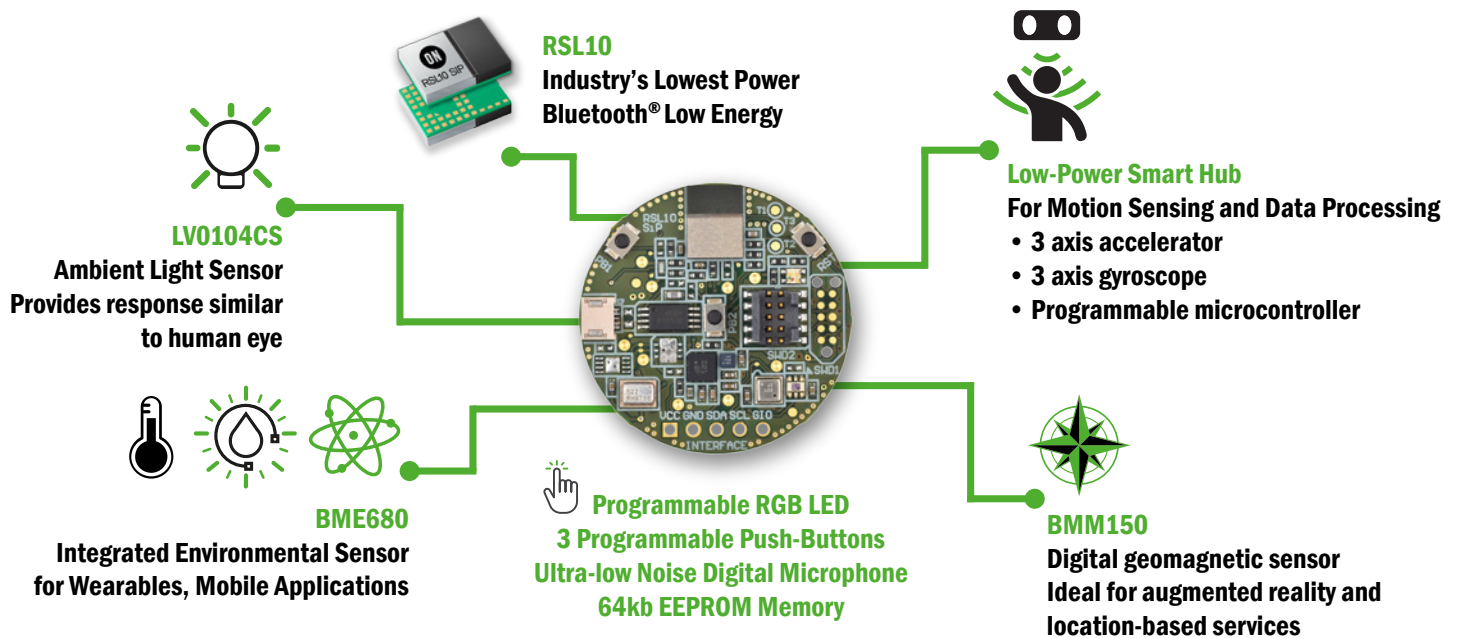
Modules



Sensor Development Kit

The RSL10 Sensor Development Kit combines cutting-edge sensor technology, Bluetooth 5 data rates, and optimized power consumption to provide a ready-to-use prototyping platform for developing IoT applications with lasting battery life. Built around the RSL10 SIP, the development kit is pre-loaded with a custom service protocol that requires no additional programming.

Products	Description
RSL10-SENSE-GEVK	RSL10 Sensor Development Kit
RSL10-SENSE-DB-GEVK	RSL10 Sensor Development Kit with Debugger



Temperature Sensor Beacon

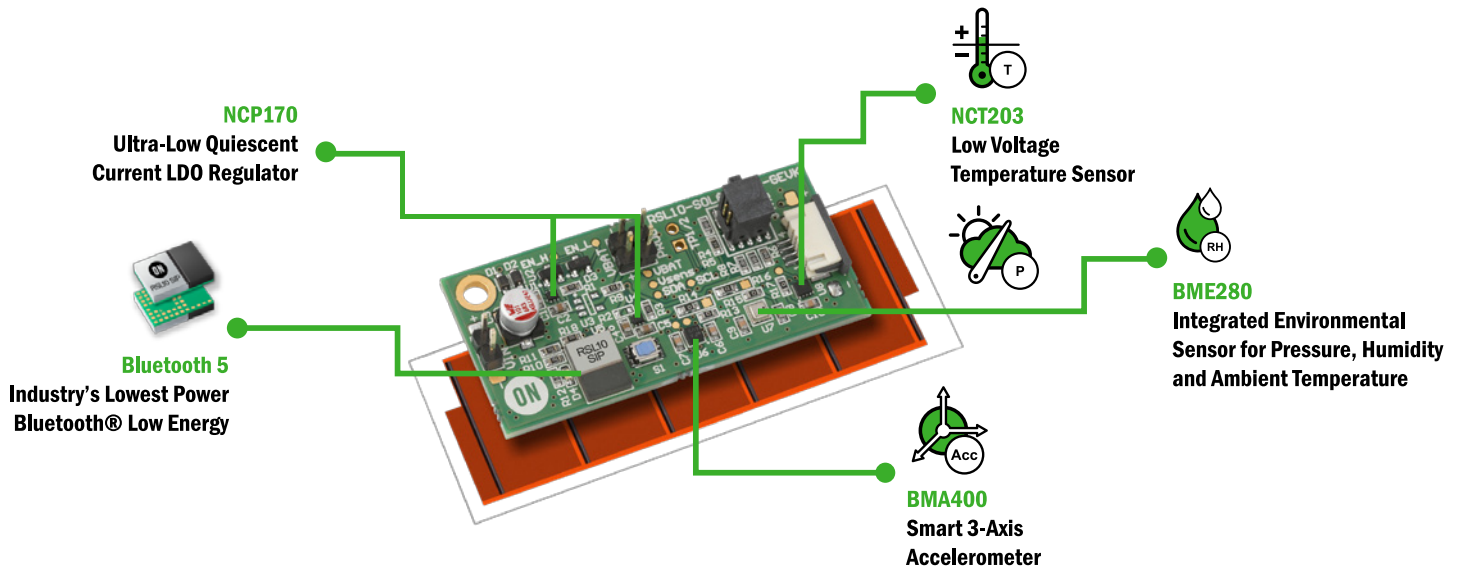
- Ultra-low power BLE beacon features
- Industry's lowest power Bluetooth 5 SoC, RSL10
- Digital temperature sensor NCT375
- Battery life > 6 years
 - CR2032 coin cell included
 - Advertising packets (temperature reading, URL) sent every 2 seconds
- Follows Eddystone beacon format
 - Use any of the freely available beacon scanner apps
- [RSL10-COIN-GEVB](#)



RSL10 Solar Cell Multi-Sensor Platform

The RSL10 Sensor Development Kit combines cutting-edge sensor technology, Bluetooth 5 data rates, and optimized power consumption to provide a ready-to-use prototyping platform for developing IoT applications with lasting battery life. Built around the RSL10 SIP, the development kit is pre-loaded with a custom service protocol that requires no additional programming.

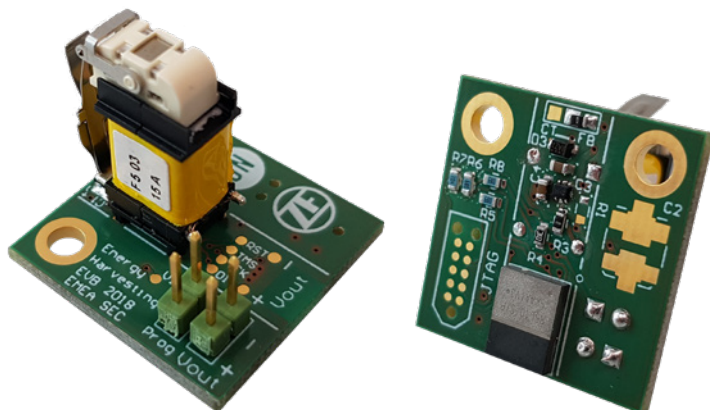
Products	Description
RSL10-SOLARSENS-GEVK	RSL10 Solar Cell Multi-Sensor Platform



Energy Harvesting BLE Switch

The Energy Harvesting Bluetooth Low Energy Switch is a complete evaluation system for energy harvesting applications, such as lighting, door and window control, and step counters. Featuring the RSL10 SIP and high-efficiency harvester switch from ZF Electronic, the battery-less switch offers the industry's lowest power consumption and is entirely self-powered. Using the provided firmware and RSL10 Software Development Kit (SDK), the battery-less switch is easily customizable.

Products	Description
BLE-SWITCH001-GEVB	Energy Harvesting BLE Switch



2018 China's Most Competitive IoT Solution

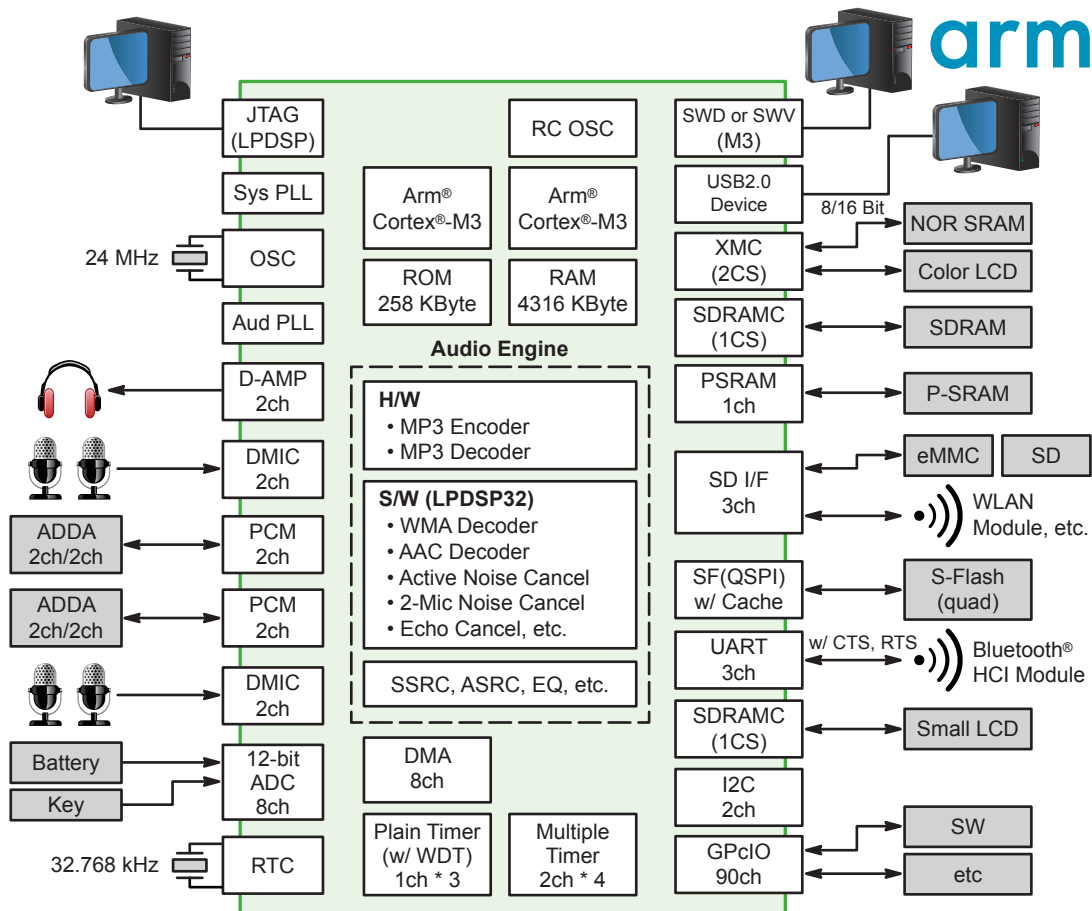
High Resolution, Low Power Audio Processing SoC

LC823455 Features

- System-on-Chip with Arm Cortex-M3 Dual, and proprietary 32-bit DSP (LPDSP) multi-core system
- High resolution 32-bit, 192 kHz audio processing capability
- Enabling ANC function to shorten ambient acoustic sound path
- Power saving by reducing CPU/DSP load through hard wired audio functions:
 - ASRC (Asynchronous Sample Rate Converter)
 - Hardware mixer - EQ (6 band equalizer)
- Integrated analog functions:
 - 4 channels of digital MIC PDM I/F
 - Low-power Class D HP amplifier
 - System PLL
 - Dedicated audio PLL, ADC
- Multiple interfaces:
 - USB2.0 HS device
 - eMMC
 - SD card
 - SPI
 - I2C



CONNECTIVITY



WiFi Connectivity Solutions

Quantenna Features for 802.11ax Gateways/AP/Repeaters

- Best in class performance and capacity with MU-MIMO 11ax 8x8 and 5x5
- Full-offload architecture for host-less repeater/extender solutions
- Adaptive 8x8: Switch between single 8x8 or dual 4x4 networks in real-time to maximize client throughput
- Support 8 Stream FB: Process 8 stream client feedback for best performance both SU-MIMO and MU-MIMO
- ESP: For clients with less than 8 Stream FB, reconstruct full channel information, to improve speed and range
- Background DFS: Up to 4 chains for background 5 GHz scanning
- Always-ON DFS: Advanced hardware to detect and isolate radar to subcarrier; stay on clean DFS channels
- Channel State Information (CSI) extraction capabilities for WiFi motion sensing applications
- WFA Easymesh compatible
- WiFi 6 certified



CONNECTIVITY

Protocol	Solution Set	MIMO Configuration
802.11ax (WiFi 6)	QSR10GU-AX	8x8 + 4x4
	QSR5GU-AX	5x5 + 4x4
	QSR5GA-AX	5x5 + 2x2
802.11ac (WiFi 5)	QV860	4x4 + 2x2
	QV840	4x4 (5 GHz only)
	QV842	4x4 (dual band selectable)
	QV952	2x2 (dual band selectable)
	QV940	2x4 (5 GHz only client)

RSL10 Bluetooth Low Energy Technology Radio SoCs

With so many options for wireless available, what sets the RSL10 radio SoC family apart? Simple. It offers the industry's lowest power Bluetooth Low Energy technology. Supporting 2 Mbps data rates provided by Bluetooth 5 (twice the speed as with previous Bluetooth generations), RSL10 enables advanced wireless functionality without compromising battery life. RSL10 can be easily integrated into any device.

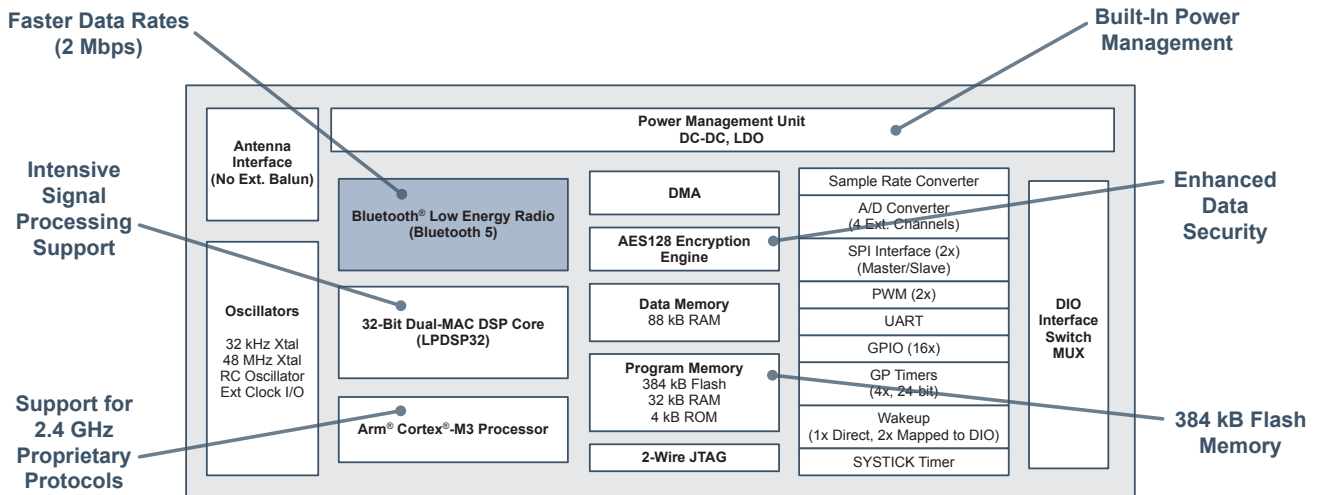
SoC Features

- Industry's lowest power consumption (62 nW in Deep Sleep, 7 mW in Receive Mode)
- Supports Bluetooth Low Energy and 2.4 GHz proprietary protocols
- Flexible Voltage Supply Range (1.1 - 3.3 V)
- IP protection feature
- Available packages WLCS-51, QFN-48

SIP Features

- All-in-one solution
 - RSL10 radio SoC
 - Integrated antenna, filtering, power management, passives
- Fully certified to worldwide regulatory standards
 - Bluetooth SIG, FCC (USA), CE (Europe), IC (Canada), KCC (Korea), MIC (Japan)

CONNECTIVITY



Development Tools

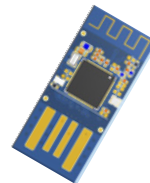
Software Development Kit (SDK)

- IDE support for Eclipse, Keil, and IAR
- Bluetooth Low Energy protocols, precompiled sample code and libraries, technical documentation
- Support for Bluetooth Mesh networking



RSL10 Development Board

- Compliance with Arduino form factor
- Integrated PCB antenna
- On-board J-link adapter for easy debugging



RSL10 USB Dongle

- Provided with Bluetooth Low Energy Explorer software to help verify or diagnose wireless connections during development

Ultra Low Power Radio Solutions

Sub-GHz Radio Features

- Highly flexible software defined sub-GHz radios for proprietary or standards based networking from 27 MHz to 1.05 GHz
- RadioLab – full featured radio configurator and code generator GUI
- CodeBlocks – full featured software development environment and toolchain with seamless integration of RadioLab and software stacks
- Available as either stand-alone transceivers or combined with MCU (8052 or Arm Cortex-M0+) in a SoC
- Multi-protocol support

2.4 GHz Radio Features

- Highly optimized for ultra low power consumption
- Hardware defined IEEE 802.15.4 Radio SoC
- Arm Cortex-M3 with 640 kB FLASH and 48 kB RAM
- Advanced power management and security hardware acceleration
- Industry leading receive current of 3.6 mA
- Supports Zigbee and proprietary (any 802.15.4 software stack)



RF Transceivers

Device	Protocol Supported	Frequency (MHz)	Data Rate (kbps)	Voltage Supply (V)	Power Consumption	TX Power (dBm)	RX Sensitivity (dBm)	Package
AX5043	Proprietary	27 - 1050	0.1 - 125	1.8 - 3.6	RX 6.5 - 9.5 mA TX 7.5 mA @ 0 dBm	0 to 16	-137 @ 0.1 kbps	QFN-28
AX5243	Proprietary	27 - 1050	0.1 - 125	1.8 - 3.6	RX 6.5 - 9.5 mA TX 7.5 mA @ 0 dBm	0 to 16	-137 @ 0.1 kbps	QFN-20
AX5051	Proprietary	433/868/915	1 - 350	2.2 - 3.6	RX 16 - 21 mA TX 11 - 45 mA	0 to 16	-116	QFN-28
AX5031	Proprietary	433/868/915	1 - 350	2.2 - 3.6	RX 16 - 21 mA TX 11 - 45 mA	0 to 16	–	QFN-20

RF SoCs

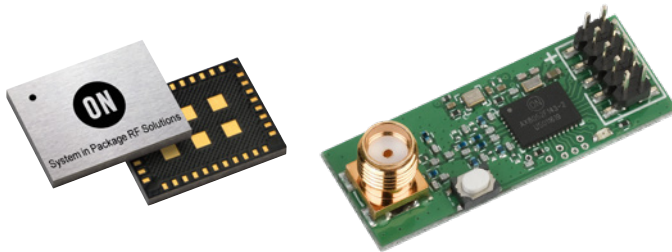
Device	Protocol Supported	Frequency (MHz)	Data Rate (kbps)	Peripheral Interface	Flash (kB)	RAM (kB)	GPIO	Package
AX8052F131	Proprietary	400 - 700 800 - 940	1 - 600	Configurable	64	8	21	QFN-40
AX8052F143	Proprietary, Sigfox	27 - 1050	0.1 - 125	Configurable	64	8	19	QFN-40
AX8052F151	Proprietary	400 - 700 800 - 940	1 - 600	Configurable	64	8	21	QFN-40
AXM0F243	Proprietary	27 - 1050	1 - 600	Configurable	64	8	20	QFN-40
NCS36510	Proprietary, Zigbee	2400 - 2480	250	Configurable	640	48	18	QFN-40

Comprehensive Sigfox™ Solutions



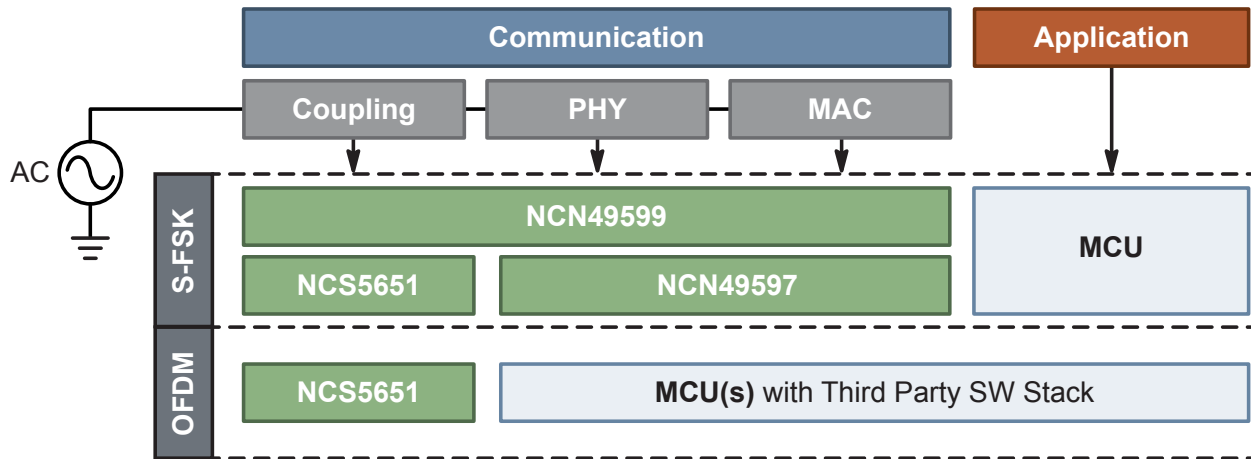
Product Features

- ON Semiconductor is a leading Sigfox device supplier
- Sigfox verified solution for all global Sigfox regions
- Reference designs are Sigfox verified and the design files are available for hassle-free copy and paste replication
- Sigfox solution provided as a modem controlled by AT commands or as a system on chip (SoC) controlled by software API
- Multi-protocol support
- New System-in-Package module for ultra-miniature applications; AT version is fully CE certified out of the box
- Rich partner network of pre-certified modules



Device	AT	API	Sigfox Region	Frequency (MHz)	GPIO	Package
AX-SIP-SFEU-x-yy	✓		RC1	868	10	SIP-38
AX-SIP-SFEU-API-x-yy		✓	RC1	868	10	SIP-38
AX-SFEU-x-yy	✓		RC1	868	10	QFN-40
AX-SFEU-API-x-yy		✓	RC1	868	10	QFN-40
AX-SFUS-x-yy	✓		RC2 / RC4 (LATAM)	902 / 920	10	QFN-40
AX-SFUS-API-x-yy		✓	RC2 / RC4 (LATAM)	902 / 920	10	QFN-40
AX-SFJK-x-yy	✓		RC3	923	10	QFN-40
AX-SFJK-API-x-yy		✓	RC3	923	10	QFN-40
AX-SFAZ-x-yy	✓		RC4	920	10	QFN-40
AX-SFAZ-API-x-yy		✓	RC4	920	10	QFN-40

PLC Modems/Power Line Driver



	Device	Function	Features	Package (s)	
Smart Grid Modem	NCN49599	PLC S-FSK Modem; A - D Band	<ul style="list-style-type: none"> • Arm Cortex M0 • Baud rate: 4800 Bauds • S-FSK modulation 	<ul style="list-style-type: none"> • Hardware embedded MAC + PHY • Embedded 1.2 A, 2-stage power amplifier with current limitation and thermal protection 	QFN-56
	NCN49597	PLC S-FSK Modem; A - D Band	<ul style="list-style-type: none"> • Arm Cortex M0 • Baud rate: 4800 Bauds 	<ul style="list-style-type: none"> • S-FSK modulation • Hardware embedded MAC + PHY 	QFN-52
Power Amplifier	NCS5651	Power Line Driver; Class AB	<ul style="list-style-type: none"> • Low distortion power line driver with optimized interface for PLC modems • Capability to drive 2.0 A peak into reactive loads 	<ul style="list-style-type: none"> • Current shutdown minimizes power consumption during power down state • Rail-to-Rail Drop of Only ± 1 V with $I_{out} = 1.5$ A 	QFN-20 EP

KNX Transceivers

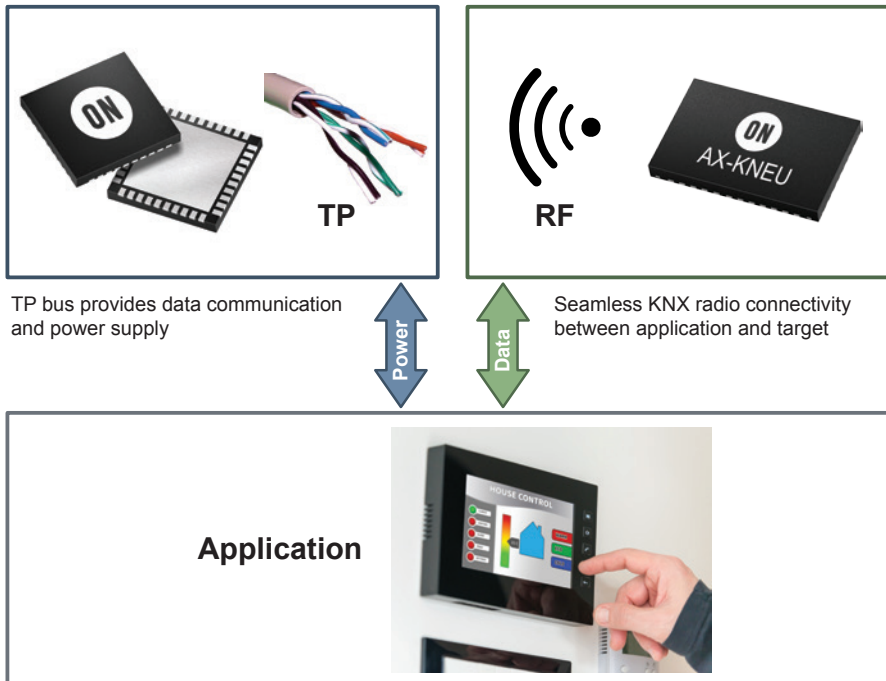
KNX is a standardized (EN 50090, ISO/IEC 14543), OSI-based network communications protocol for intelligent buildings. KNX is the successor to, and convergence of, three previous standards: the European Home Systems Protocol (EHS), BatiBUS, and the European Installation Bus (EIB or Instabus).

KNX Open Standards

- EN 50090: European Standard
- ISO/IEC 14543-3: International Standard
- GB/Z 20965: Chinese Standard
- ANSI/ASHRAE 135: US Standard

Applications

- Connects appliances and sensors, especially for climate and light control – wired or wireless – to the 9600 Baud KNX twisted pair (TP) bus inside a building



RF	AX8052F143
Multi/Ready	✓
High Sensitivity	✓
Ultra Low Receive and Standby Current	✓
PHY + MAC	✓

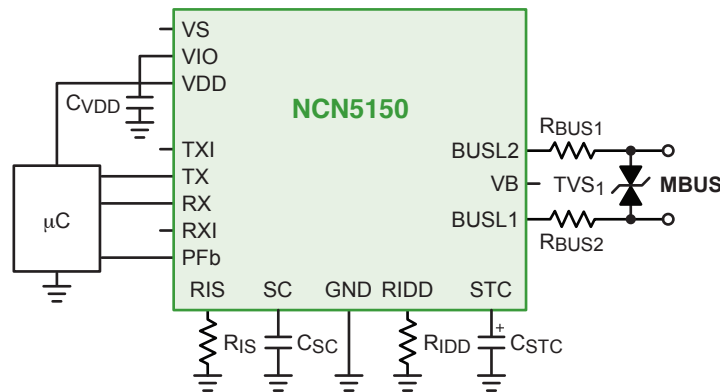
Twisted Pair	NCN5121	NCN5110	NCN5130
Efficiency Increase	✓	✓	✓
10/20 mA Bus Current Consumption	✓		
5 to 40 mA Bus Current Consumption		✓	✓
KNX Bus Current Limitation	✓	✓	✓
PHY + MAC Layer (TPUART Compatible)	✓		✓
PHY Layer (Analog Only)		✓	
3.3 V Fixed DC/DC	✓	✓	✓
Adjustable DC/DC	✓	✓	✓
20 V LDO	✓	✓	✓
Analog Monitor Output	✓		✓



M-BUS Transceivers

Wired M-Bus Features

- Satisfies physical requirements for M-BUS, described in EN 13757-2 and EN 1434-3
- UART communication speeds up to 38400 baud
- Integrated 3.3 V VDD LDO regulator (extended peak current of 15 mA)
- Supports powering slave device from the bus or from external power supply
- SOIC-16 and QFN-20 packages



General Application Diagram

AX8052F143 Wireless M-Bus System on Chip

- Ultra-low-power AX8052 MCU
- CPU active mode 150 μ A/MHz
- Low-power sleep modes with RAM retention
- High performance narrow-band RF transceiver
- Wide frequency range
- Large amount of memory

Wireless M-Bus Transceivers

- Ultra-low-power
- 50 nA deep sleep current
- 500 nA power-down current
- High sensitivity & selectivity
- -126 dBm @ 1 kbps, 868 MHz, FSK
- Constant Tx output power over $V_{DD} = 1.8 - 3.6$ V

M-Bus Transceivers

Device	Frequency (MHz)	Data Rate (kbps)	Voltage Supply (V)	Power Consumption	Tx Power (dBm)	Rx Sensitivity (dBm)	Package
AX5043	27 - 1050	0.1 - 125	1.8 - 3.6	RX 6.5 - 9.5 mA; TX 7.5 mA @ 0 dBm	0 to 16	-133 @ 0.2 kbps; -126 @ 1 kbps; -106 @ 100 kbps	QFN-28
AX5243	27 - 1050	0.1 - 125	1.8 - 3.6	RX 6.5 - 9.5 mA; TX 7.5 mA @ 0 dBm	0 to 16	-135 @ 0.1 kbps; -126 @ 1 kbps; -107 @ 100 kbps	QFN-20

M-Bus System on Chip

Device	Protocol Supported	Frequency (MHz)	Data Rate (kbps)	Peripheral Interface	Flash (kB)	RAM (kB)	GPIO	Package
AX8052F143	KNX, M-Bus, Proprietary	27-1050	0.1 - 125	AT command via UART	64	8	19	QFN-40

Modems



AMIS-49200 & AMIS-49250 Fieldbus Physical Layer Medium Access Units

- Compatible to both FOUNDATION Fieldbus H1 (Type 111 and Type 112 per FF-816) and PROFIBUS PA standards
- Enables Fieldbus to completely power field devices using the integrated power supply block
- Data rate: 31.25 kbps voltage mode
- Low current consumption 500 μ A typ
- LQFP-44 and NQFP-44 packages



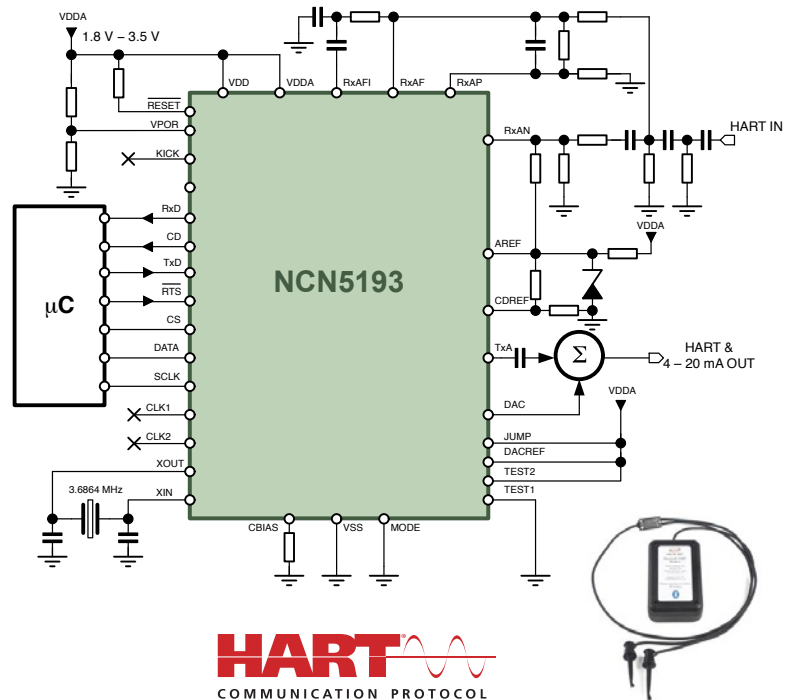
CONNECTIVITY

Industrial HART Protocol Modems

- Single-chip, half-duplex 1200 bps FSK modem
- Bell 202 shift frequencies of 1200 Hz and 2200 Hz
- Transmit-signal wave shaping
- Receive band-pass filter

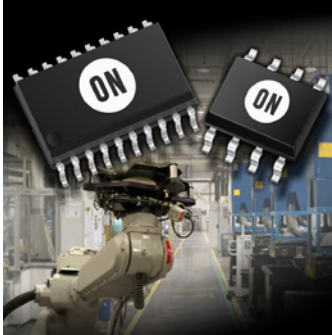
HART Modems

Device	Input Frequency	DAC	Temp Range (°C)	Package
NCN5193	460.8 kHz, 920 kHz, or 1.8 MHz	Integrated 16-bit Sigma-Delta	-40 to +85	QFN-32
NCN5192	460.8 kHz, 920 kHz, or 1.8 MHz	Integrated 16-bit Sigma-Delta	-40 to +85	QFN-32
A5191HRT	460.8 kHz	External	-40 to +85	QFN-32, LQFP-32, PLCC-28



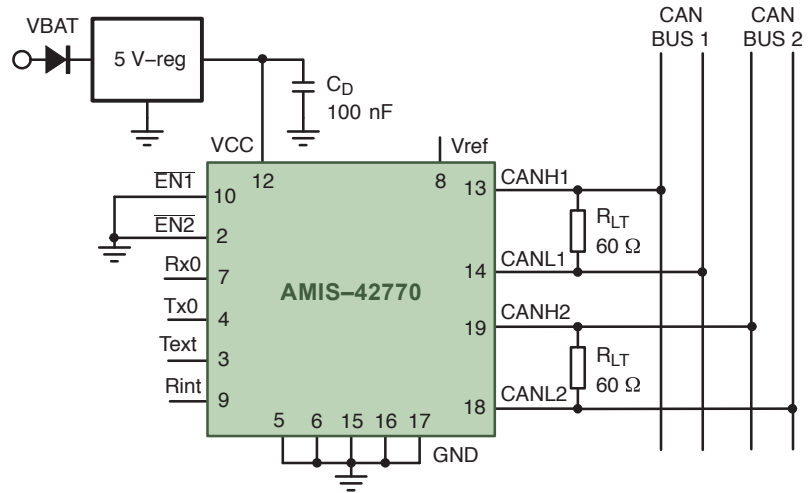
HART
COMMUNICATION PROTOCOL

CAN Transceivers for Long Networks, >500 m



Features

- ISO 11898-2 compliant
- Up to 1 Mb/s communication speed
- Delivers low transmit data rate in networks exceeding 1 km
- Functional in 12 V and 24 V systems



CONNECTIVITY

CAN Transceivers



Device	Type	Description	Package
AMIS42770	Dual	High-Speed CAN Repeater	SOIC-20
AMIS42670	Single	High-Speed CAN Transceiver for Long Networks	SOIC-8

Power-Over-Ethernet (PoE) Controllers

for Wireless Access Points, Small Cells, Surveillance Cameras, PoS Terminals, Digital Signage

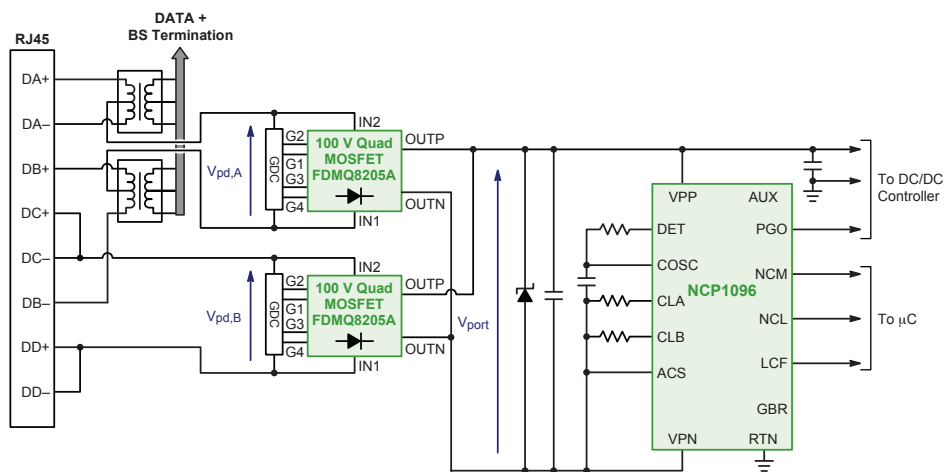
ON Semiconductor offers a complete portfolio of interface controllers for emerging PoE applications. The front-end PD device is compliant with IEEE802.3af, IEEE802.3at, and the new IEEE802.3bt standards, and power is provided using two-pair and four-pair configurations to meet all requirements. The portfolio includes ASSPs PD chips with (NCP108x) and without (NCP109x) integrated PWM controllers, which can convert PoE input power to one or more output voltages in a Powered Device.

Features – NCP1095, NCP1096

- Fully compliant with new IEEE 802.3bt for high power up to 90 W PoE
- Supports Autoclass
- Integrated low RDS(ON) pass-switch (NCP1096)
- Support for Short MPS
- Pass Switch disabling input for rear auxiliary supply operation
- 135 mA typical inrush current limiting
- Full backward compatibility with IEEE 802.3af/at

Complete building blocks for a highly efficient PoE Powered Device

- PoE-PD Interface controller – NCP1095, NCP1096
- Active MOSFET bridge – Greenbridge™2 FDMQ8205A
- Downstream DC-DC controller – NCP1566 Active Clamp Forward Converter
- Supplementary discrete components



Device	Description	Topology	Control Mode	V _{CC} Min (V)	V _{CC} Max (V)	P _d Typ (W)	R _{on} Typ (Ω)	Package
NCP1080	PoE PD Controller and DC-DC Converter	Flyback	Current	0	57	15	0.6	TSSOP-20
NCP1081	PoE PD Controller and DC-DC Converter	Flyback	Current	0	57	40	0.6	TSSOP-20
NCP1082	PoE PD Controller and DC-DC Converter, with Auxiliary Supply Support	Flyback	Current	0	57	15	0.6	TSSOP-20
NCP1083	PoE PD Controller and DC-DC Converter, with Auxiliary Supply Support	Flyback	Current	0	57	40	0.6	TSSOP-20
NCP1090	PoE PD Interface Controller	–	–	0	57	15	0.5	SOIC-8, TSSOP-8
NCP1091	PoE PD Interface Controller with Programmable UVLO	–	–	0	57	15	0.5	SOIC-8, TSSOP-8
NCP1092	PoE PD Interface Controller with Vaux Support	–	–	0	57	15	0.5	SOIC-8, TSSOP-8
NCP1093	PoE PD Interface Controller	–	–	0	57	25	0.5	DFN-10
NCP1094	PoE PD Interface Controller with Vaux Support	–	–	0	57	25	0.5	DFN-10
NCP1095	802.3bt PoE PD Interface Controller with External Hot Swap Transistor	–	–	0	57	100	–	TSSOP-16
NCP1096	802.3bt PoE PD Interface Controller with Internal Hot Swap Transistor	–	–	0	57	100	0.07	TSSOP-16 EP

Motion Detector Passive Infrared Controller (PIR) – NCS36000

- Passive infrared controller circuit for the lighting and occupancy sensing market
- Amplifies and conditions signal from PIR sensor

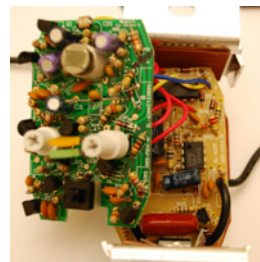
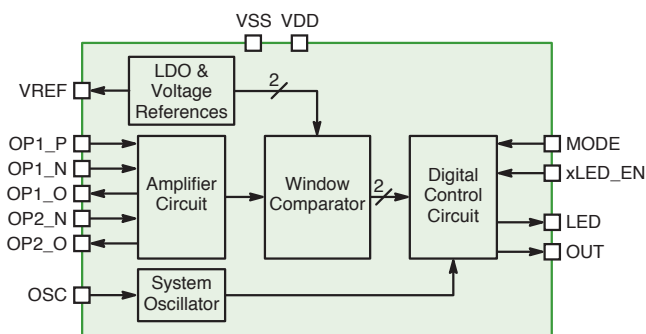


Features

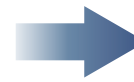
- 3.0 – 5.75 V operation
- Integrated low noise 2-stage amplifiers
- Internal voltage reference to drive sensor
- Internal oscillator with external RC
- Single or dual pulse detection
- Digital filter to minimize false alarms
- Direct drive of LED and relay

Benefits

- Lower BOM cost than comparable discrete solutions
 - Extremely flexible solution
 - Customer can customize digital filtering
 - Customer can customize analog processing
- Designed for wide range of occupancy sensors



Old Solution



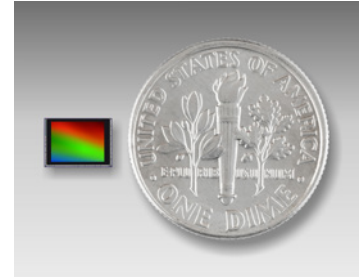
NCS36000 Solution

SENSING



Mainstream CMOS Image Sensors

From security and IP cameras around your home, business and factory; to smart lighting with intelligent sensors; to connected doorbells, appliances, robots, and 2D scanners; the need for image sensing is only growing. Mainstream image sensors from ON Semiconductor provide a wide range of performance, size, power, and resolution options which meet the needs of the growing IoT ecosystem and use models. Using advanced CMOS manufacturing processes allow for great imaging, whether it is a vibrant color image for human viewing or a detailed monochromatic image used in machine vision and light industrial use. The ON Semiconductor mainstream image sensor portfolio has the performance and resolution needed for emerging and established applications.



Device	Sensor/SOC	Resolution (MP)	Optical Format	Frame Rate	Pixel Size (µm)	Shutter Type ¹	CFA	Operating Temp (°C)
MT9V115	SOC	VGA	1/13"	30 fps	1.8	ERS	Color	-30 to +70
ASX340CS	SOC	VGA	1/4"	60 fps	5.6	ERS	Color	-30 to +70
ASX370CS	SOC	VGA	1/7"	30 fps	3.0	ERS	Color	-30 to +70
MT9V024	Sensor	WVGA	1/3"	60 fps	6.0	GS	Color, Mono	-40 to +105
MT9V034	Sensor	WVGA	1/3"	60 fps	6.0	GS	Color, Mono	-30 to +70
ARX3A0	Sensor	0.3	1/10"	360 fps	2.2	ERS	Mono	-30 to +70
AR0144CS	Sensor	1	1/4"	60 fps	3.0	GS	Color, Mono	-40 to +85
AR0141CS	Sensor	1.2	1/4"	1.2 45fps, 720P 60 fps	3.0	ERS	Color	-30 to +85
AR0130CS	Sensor	1.2	1/3"	1.2 45fps, 720P 60 fps	3.8	ERS	Color, Mono	-30 to +70
AR0134CS	Sensor	1.2	1/3"	1.2 54fps, 720 60 fps	3.8	GS	Color, Mono	-30 to +70
AR0135CS	Sensor	1.2	1/3"	1.2 60fps, 720 60 fps	3.8	GS	Color, Mono	-30 to +70
MT9M114	SOC	1.3	1/6"	1.3 30fps, VGA 75 fps	1.9	ERS	Color	-30 to +70
AR0237CS	Sensor	2.1	1/2.7"	1080P 60 fps	3	ERS	Color	-30 to +85
AR0237IR	Sensor	2.1	1/2.7"	1080P 60 fps	3	ERS	RGB-IR	-30 to +85
AR0238	Sensor	2.1	1/2.7"	1080P 60 fps	3	ERS	Color	-30 to +85
AR0239	Sensor	2.1	1/2.7"	1080P 90 fps	3	ERS	Color	-30 to +85
AR0261	Sensor	2.1	1/6"	1080p 60 fps	1.4	ERS	Color	-30 to +70
AS0260	SOC	2.1	1/6"	30 fps	1.4	ERS	Color	-30 to +70
AR0221	Sensor	2.1	1/1.8"	60 fps	4.2	ERS	Color	-30 to +85
AR0330	Sensor	3.5	1/3"	1080P 60 fps	2.2	ERS, GRR	Color	-30 to +70
AR0430	Sensor	4	1/3"	120 fps	2	ERS	Color	-30 to +85
AR0431	Sensor	4	1/3"	120 fps	2	ERS	Color	-30 to +85
AR0521	Sensor	5	1/2.5"	60 fps	2.2	ERS	Color, Mono	-30 to +85
AR0522	Sensor	5	1/2.5"	60 fps	2.2	ERS	Color, Mono	-30 to +85
AR01011HS	Sensor	10	1"	60 fps	3.4	ERS	Color	-30 to +70
AR1335	Sensor	13	1/3.2"	13 30 fps, 1080P 60 fps	1.1	ERS, GRR	Color	-30 to +70
AR1337	Sensor	13	1/3.2"	13 30 fps, 1080P 60 fps	1.1	ERS, GRR	Color	-30 to +70
AR1820HS	Sensor	18	1/2.3"	18 24 fps, 1080P 120 fps	1.25	ERS, GRR	Color	-30 to +70

1. ERS = Electronic Rolling Shutter, GRR = Global Reset Release, GS = Global Shutter. NOTE: Some products available with extended temperature ranges.

Co-Processors for Mainstream CMOS Image Sensors

Device	Resolution (MP)	Frame Rate (fps)	Video	Output Format	Package
AP0100CS	1	45	1.2 MP/45 fps; 720p/60 fps	NTSC/PAL; YUV	VFBGA-100
AP0101CS	1	45	1.2 MP/45 fps; 720p/60 fps	SMPTTE 296M; YUV	VFBGA-81
AP1302	13	30	13 MP/30 fps; 1080p/120 fps	JPEG; RAW; RGB565; RGB888; YUV	VFBGA-120

X-Class CMOS Image Sensors

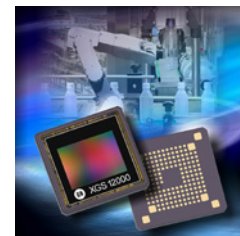
The X-Class image sensor platform supports multiple CMOS pixel architectures within the same image sensor frame, allowing a single camera design to support not only multiple product resolutions but also different pixel functionality. The initial devices in this platform are based on an advanced 3.2 μm global shutter CMOS pixel that features superior imaging performance, high image uniformity, and low noise – providing high-performance imaging in a small camera footprint.

X-Class Features

- One camera design for multiple resolutions and pixel functionality
- High bandwidth, low power HiSPi digital interface
- Speed grades available to match performance to application

XGS Pixel Features

- Advanced 3.2 μm Global Shutter
- High performance, low noise design



Device	Resolution (MPix)	Pixel Count (H x V)	Pixel (μm)	Diagonal (mm)	Lens	CFA ¹	FPS Max	Evaluation Kit
XGS 8000	8.8	4096 x 2160	3.2	14.8	1/1.1"	C/M	130	✓
XGS 12000	12.6	4096 x 2160	3.2	16.4	1"	C/M	87	✓

1. CFA Options – Bayer Color (C), Monochrome (M).

PYTHON CMOS Image Sensors

With resolutions from VGA to 25 megapixels, the PYTHON family of image sensors addresses the needs of general purpose industrial imaging applications such as machine vision inspection and motion monitoring, security, surveillance, and intelligent transportation systems (ITS). Combining flexibility in configuration and resolution with high speed and high sensitivity, these devices capture fast moving scenes without distortion by combining low read noise and high sensitivity with frame rates up to 815 fps.

Features

- CDS global shutter technology with low noise performance
- True HW scalable family concept
- High configurability and fast adaptability
- Quadratic speed increase with ROI windowing
- Multiple regions of interest
- High dynamic range
- Color, Monochrome, and Enhanced NIR configurations
- Standard and protective tape configurations
- Low power, cost-effective configurations



Device	Resolution (MPix)	Pixel Count (H x V)	Pixel (μm)	Diagonal (mm)	Lens	CFA ¹	FPS Max	Evaluation Kit
PYTHON 300	0.3	640 x 480	4.8	3.8	1/4"	C/M/NIR	815	✓
PYTHON 480	0.5	800 x 600	4.8	4.8	1/3.6"	C/M	120	✓
PYTHON 500	0.5	800 x 600	4.8	4.8	1/3.6"	C/M/NIR	545	✓
PYTHON 1300	1.3	1280 x 1024	4.8	7.9	1/2"	C/M/NIR	210	✓
PYTHON 2000	2.3	1920 x 1200	4.8	10.9	2/3"	C/M/NIR	225	✓
PYTHON 5000	5.3	2592 x 2048	4.8	15.9	1"	C/M/NIR	100	✓
PYTHON 12K	12.5	4096 x 3072	4.5	23.0	4/3	C/M/NIR	160	✓
PYTHON 16K	16.8	4096 x 4096	4.5	26.1	APS-H	C/M/NIR	120	✓
PYTHON 25K	26.2	5120 x 5120	4.5	32.6	APS-H	C/M/NIR	80	✓

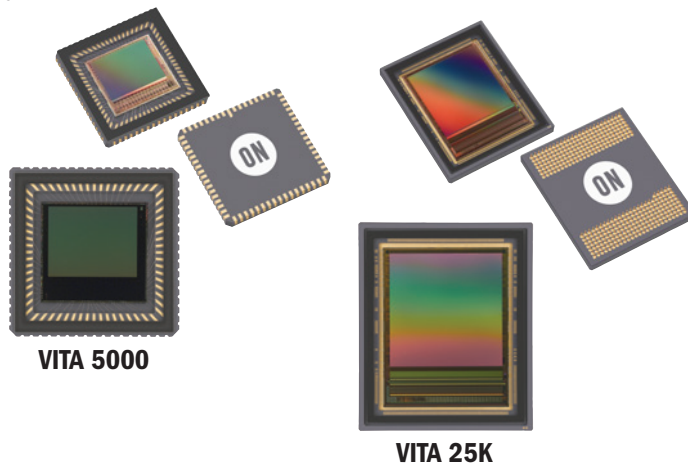
1. CFA Options – Bayer Color (C), Monochrome (M), Enhanced NIR (NIR).

Versatile CMOS Image Sensors

VITA image sensors combine flexibility in configuration and resolution with high speed and high sensitivity, addressing a wide range of customer requirements in a cost-effective family of rolling/global shutter CMOS image sensors. A flexible read-out architecture makes them well suited for machine vision, intelligent transportation systems and surveillance, and other applications that demand high functionality, while delivering excellent image quality.

Features

- 1.3 to 25 Megapixels
- Pipelined and triggered global shutter with dual readout
- Rolling shutter with CDS
- Quadratic speed increase with ROI windowing
- Multiple regions of interest



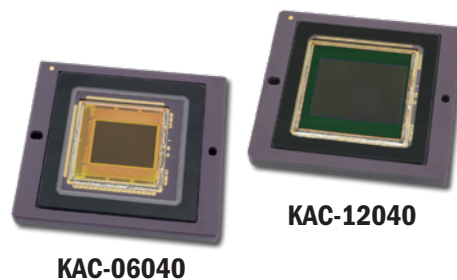
Device	Resolution (MPix)	Pixel Count (H x V)	Pixel (μm)	Diagonal (mm)	Lens	CFA ¹	FPS Max	Evaluation Kit
VITA 1300	1.3	1280 x 1024	4.8	7.9	1/2"	C/M	150	✓
VITA 2000	2.3	1920 x 1200	4.8	10.9	2/3"	C/M	90	✓
VITA 5000	5.3	2592 x 2048	4.8	15.9	1"	C/M	75	✓
VITA 12K	12.6	4096 x 3072	4.5	23.0	4/3"	C/M	160	✓
VITA 16K	16.8	4096 x 4096	4.5	26.1	APS-H	C/M	125	✓
VITA 25K	26.2	5120 x 5120	4.5	32.6	APS-H	C/M	80	✓

1. CFA Options - Bayer Color (C), Monochrome (M).

KAC image sensors provide both global shutter and low noise rolling shutter modes, combined with programmable bit depth (8 to 14 bit) with a flexible readout architecture that supports interspersed video streams. These features enable the use of multiple regions of interest that can simultaneously monitor both wide areas and local regions, making these devices ideal for machine vision, surveillance, ITS, and analytical microscopy.

Features

- Global shutter, low noise rolling shutter
- Programmable bit depth
- Interspersed video streams
- Multiple regions of interest
- High frame rates
- High NIR sensitivity



Device	Resolution (MPix)	Pixel Count (H x V)	Pixel (μm)	Diagonal (mm)	Lens	CFA ¹	FPS Max	Evaluation Kit
KAC-06040	6	2832 x 2128	4.7	16.7	1"	C/M	160	✓
KAC-12040	12	4000 x 3000	4.7	23.5	4/3"	C/M	70	✓

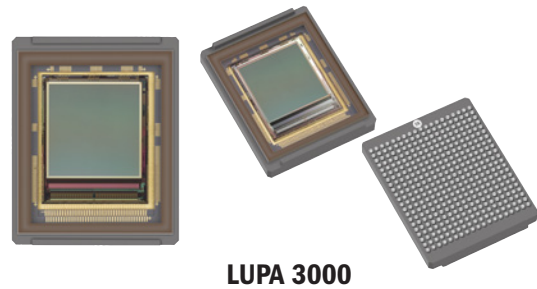
1. CFA Options - Bayer Color (C), Monochrome (M).

High Speed CMOS Image Sensors

LUPA devices offer resolution as high as 2048 x 2048 and frame rates up to 500 fps. These features, combined with a power consumption as low as 150 mW with absolutely no blooming or lag, create a perfect foundation for highly reliable, high sensitivity image sensors.

Features

- Frame rates up to 500 fps at several megapixel resolutions
- Unprecedented sensitivity
- Pipelined global shutter
- Low power dissipation
- High resolution
- No blooming or image lag
- Mono and color variants



LUPA 3000

Device	Resolution (MPix)	Pixel Count (H x V)	Pixel (µm)	Diagonal (mm)	Lens	CFA ¹	FPS Max	Evaluation Kit
LUPA 300	0.3	640 x 480	9.9	7.9	1/2"	C/M	250	✓
LUPA 1300-2	1.3	1280 x 1024	14	22.9	1"	C/M	500	✓
LUPA 3000	3	1696 x 1710	8	19.3	1"	C/M	485	✓

1. CFA Options - Bayer Color (C), Monochrome (M).



Ultra Low Power CMOS Image Sensor

Features

- Optimized for small, low power image sensing cameras
- Detects motion or changes in lighting conditions, and wakes up system
- Consumes <2.5 mW while active, ideal for battery powered cameras
- 1/10 inch optical format to fit into smallest profile cameras
- DevWare evaluation software available

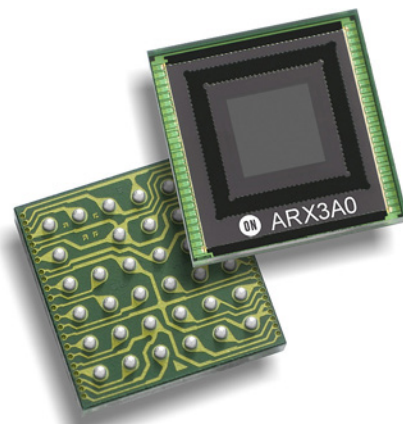


Image Sensor Evaluation Support



ON Semiconductor provides supporting hardware and software to qualified engineering teams to accelerate product development. These kits contain everything necessary to build a working prototype with test functionality.



Capacitive Touch Sensors

Features

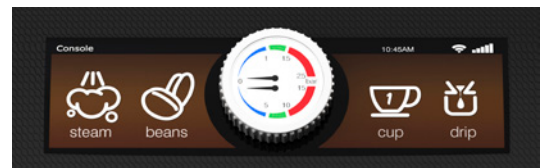
- Differential capacitive detection down to femtofarad level using mutual capacitance
- High noise immunity for improved stability and reliability
- Adhesive free for simplified manufacturing flow
- Calibration function for adaptability



Door Phone

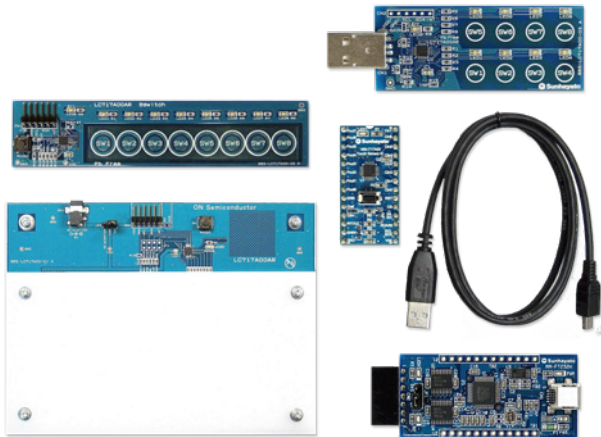


Light Switch



Control Panel

Evaluation Kits



LC717A00ARGEVK

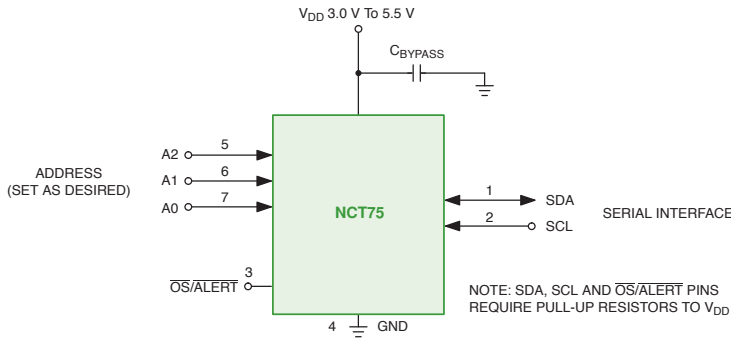


LC717A30UJGEVK

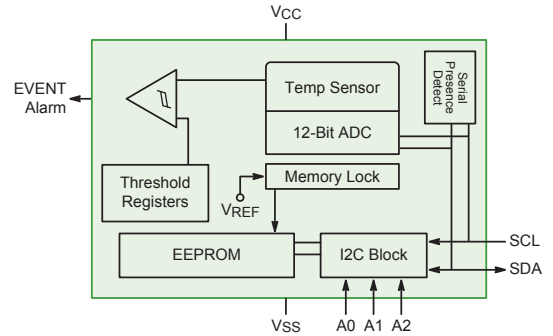
LC717A30URGEVK Available

Device	Proximity/Gesture Sensing (cm)	Sensing Inputs	Sensing Outputs	Interface Control	V _{DD} (V)	Package
LC717A00AJ	0-10	8	8	I2C, SPI	2.6 - 5.5	SSOP-30
LC717A00AR	0-10	8	8	I2C, SPI	2.6 - 5.5	VCT-28
LC717A10AJ	0-10	16	0	I2C, SPI	2.6 - 5.5	SSOP-30
LC717A10AR	0-10	16	0	I2C, SPI	2.6 - 5.5	VCT-28
LC717A10PJ	0-10	16	0	I2C, SPI	2.6 - 5.5	SSOP-30
LC717A30UJ	0-20	8	0	I2C, SPI	2.6 - 5.5	SSOP-30
LC717A30UR	0-20	8	0	I2C, SPI	2.6 - 5.5	VCT-28

Temperature Sensors



NCT75 Application Diagram

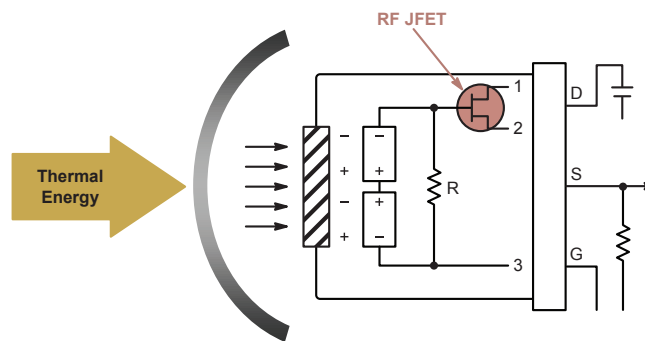


Temperature Sensor + EEPROM Block Diagram

Device	Sensor Type	EEPROM	Data Transmission Standard	I _{CC} Max (mA)	V _{CC} Max (V)	V _{CC} Min (V)	T Min (°C)	T Max (°C)	Temperature Error (°C)	Package
NCT75	Local	—	SMBus	0.575	3	5.5	-55	125	±1	DFN-8, Micro8, SOIC-8
NCT218	Remote	—	I2C	—	1.6	2.75	—	—	—	WDFN-8, WLCSP-8
NCT214	Local & Remote	—	SMBus	0.35	3	3.6	-40	125	±1	WDFN-10
NCT72	Local & Remote	—	I2C	0.35	2.8	3.6	-40	125	±1	DFN-8, WDFN-8
CAT34TS00	Local	—	SMBus/I2C	0.5	1.9	1.7	-20	125	±1	UDFN-8
CAT34TS02	Local	2 kb	SMBus/I2C	0.5	3.63	2.97	-20	125	±1	UDFN-8, TDFN-8
N34TS04	Local	4 kb	SMBus/I2C	1.0	5.5	1.7	-20	125	±1	UDFN-8, TDFN-8

SENSING

RF JFETs for Infrared (IR) Sensing

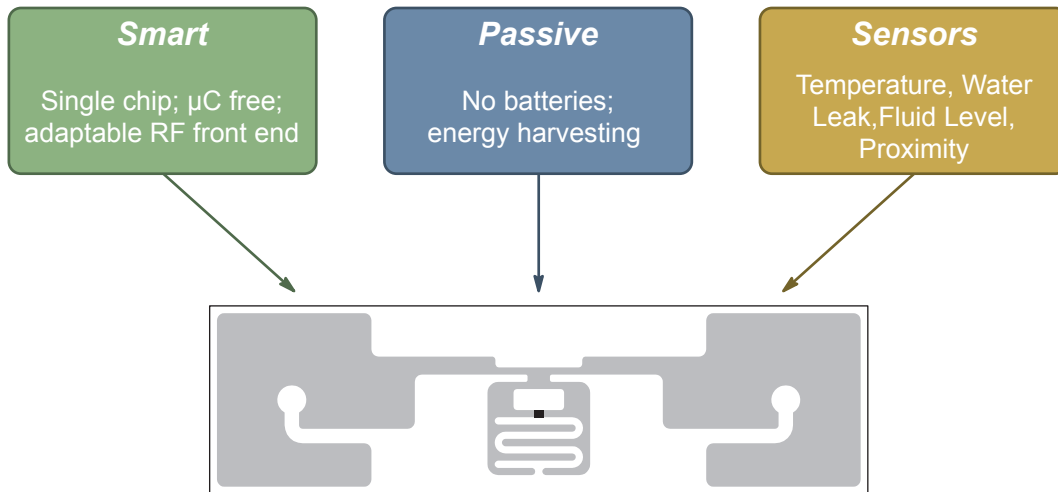


Infrared Sensor for White Goods, Security, and Lighting

Device	V _{DD0} Min (V)	I _{SS} Min (mA)	I _{SS} Max (mA)	y _{fs} Typ (mS)	C _{ISS} Typ (pF)	C _{RSS} Typ (pF)	Package
TF412S	30	1.2	3	5	4	1.1	SOT-883
TF414	40	0.05	0.13	0.11	0.7	0.3	SOT-883
2SK545	40	0.055	0.095	0.13	1.7	0.7	CP (SOT-23)
2SK3666	30	0.6	3	6.5	4	1.1	CP (SOT-23)

Energy Harvesting Wireless Sensors

*Introducing the World's First Battery-Free, μ C-Free Sensor Tag
Breakthrough Sensor Technology Implemented on RFID*



Features	Benefits
• Battery-free and wireless	➔ Ideal for locations with limited access • underground, within walls, intrusive to body, within boxes, toxic or dangerous locations
• Ultra-thin	➔ Ideal for space-constrained applications • Within doorways, within RFID tags, peel and stick, bandages
• Low cost to scale	➔ Effective where multiple sensors are required • Disposable products, multiple data points, increasing needs over time

Device	Sensing Functions	Sensor Reading Sensitivity	Surface Placement	Form Factor
SPS1M001FOM	Moisture	Low Sensitivity	Metal	Flexible PET
SPS1M002PET	Moisture	Low Sensitivity	Non-Metal	Flexible PET
SPS1F001PET	Fluid Level	High Sensitivity	Non-Metal	Flexible PET
SPS1T001PET	Temperature	0 to +50°C ($\pm 0.3^\circ\text{C}$) or -40 to 85°C ($\pm 1^\circ\text{C}$)	Non-Metal	Flexible PET
SPS1T001PCB	Temperature	0 to +50°C ($\pm 0.3^\circ\text{C}$) or -40 to 85°C ($\pm 1^\circ\text{C}$)	Metal	Hard Tag PCB



- High performance, 8 port reader
- USB, Ethernet, and WiFi connectivity
- Fully certified for regulatory compliance
- Options for different geographic regions

SPSPDR1-8 UHF Reader Hub

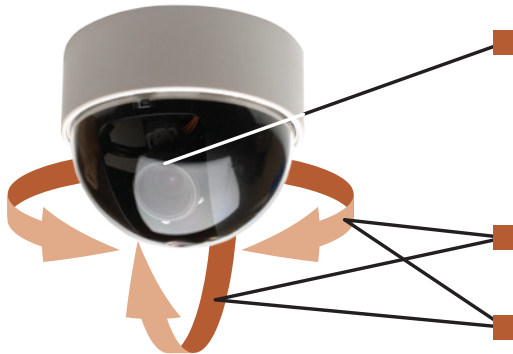
Motor Drive for Small Motor Control

Stepper Motor Driver for Paper Feed – DC 3~12 V
LV8716QA, LV8711T, LV8712T, LV8713T,
LV8548MC, LV8549MC

DC Motor Driver for Paper Cut – DC 3~12 V
LB1938FA, LV8417CS



Hand Terminal (POS) Printer



Security Camera

Stepper Motor Driver for Zoom/Focus – DC 5 V
LV8414CS, LV8411GR, LV8413GP, LV8716QA

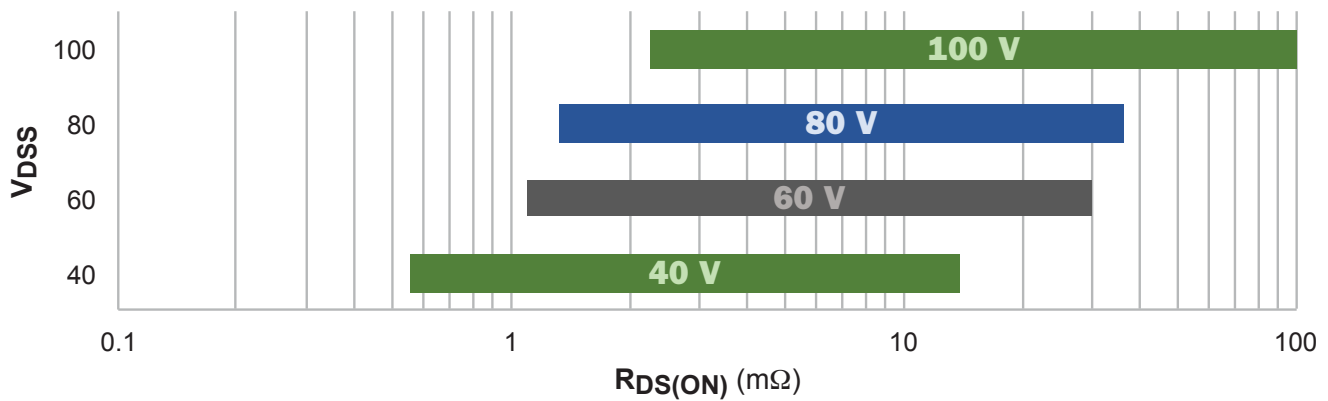
Stepper Motor Driver for Panning/Tilt - DC 12 V
LV8714TA, LV8711T, LV8712T, LV8713T,
LV8402GP, LV8548MC

Stepper Motor Driver for Panning/Tilt - DC 24 V
LV8729V, LV8731V

Device	Motor	V _M Max (V)	V _{CC} Max (V)	Motor Current Max (A)	Step Resolution	Control Type	PWM Constant Current	Protection	Package(s)
LV8413GP	Stepper / 2 x Brush DC	6	6	0.4	Half	Parallel	None	TSD, UVLO	VCT-16
LV8411GR	2 x Stepper / 4 x Brush DC	6	6	0.4	Half	Parallel	None	TSD, UVLO	VCT-24
LV8414CS	2 x Stepper	6	6	0.4	1/64	Clock	Included	TSD, UVLO	WLP-32K
LB1938FA	Brush DC	10.5	–	0.8	–	Parallel	None	TSD, UVLO	Micro8
LV8417CS	Brush DC	12.6	6	1	–	Parallel	None	TSD, UVLO	WLP-9
LV8716QA	Stepper / 2 x Brush DC	12.6	–	1	Half	Parallel	Included	TSD, UVLO	QFN-16
LV8402GP	Stepper / 2 x Brush DC	16	6	1.4	Half	Parallel	None	TSD, UVLO	VCT-24
LV8711T	Stepper / 2 x Brush DC	18	6	0.8	Half	Parallel	Included	OC, TSD, UVLO	TSSOP-24
LV8712T	Stepper	18	6	0.8	1/8	Clock	Included	TSD, UVLO	TSSOP-24
LV8713T	Stepper	18	6	0.8	1/32	Clock	Included	TSD, UVLO	TSSOP-24
LV8714TA	2 x Stepper	18	–	1.5	Free	Parallel	Included	OC, TSD, UVLO	TQFP-48 EP
LV8548MC	Stepper / 2 x Brush DC	20	–	1	Half	Parallel	None	TSD, UVLO	SOIC-10
LV8549MC	Stepper	20	–	1	Full Step	Parallel	None	TSD, UVLO	SOIC-10
LV8702V	Stepper	36	–	2.5	Quarter	Clock	Included	Stall, OC, TSD, UVLO	SSOP-44J EP
LV8729V	Stepper	36	–	1.8	1/128	Clock	Included	OC, TSD, UVLO	SSOP-44K EP
LV8731V	Stepper / 2 x Brush DC	36	–	2	1/16	Clock/Parallel	Included	OC, TSD, UVLO	SSOP-44K EP

Power MOSFETs for Motor Control

ON Semiconductor offers an expansive portfolio of power MOSFETs, utilizing advanced Trench technology. Devices that enable increased system level efficiency through low conduction losses, and low switching losses, are available in a range of standard and innovative packages.

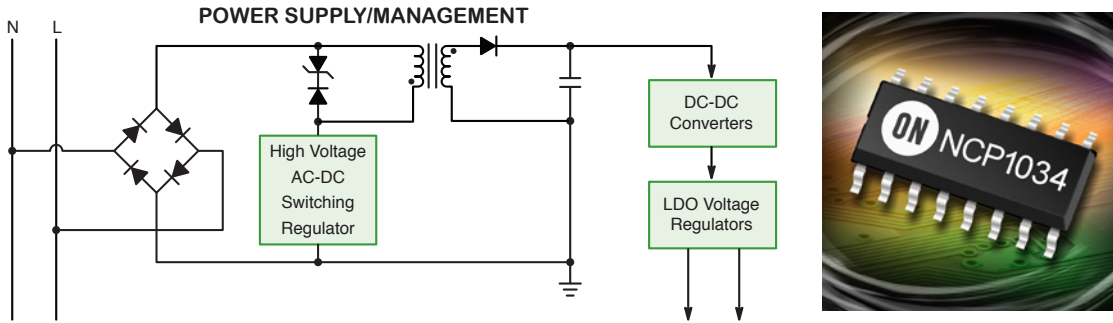


N-Channel Power MOSFETs

Device	Type	V _{DS} (V)	R _{DS(on)} (mΩ)	Q _{G(TOT)} (nC)	Package
FDBL0065N40	Single	40	0.65	220	TO-LL (H-PSOF)
FDBL0110N60	Single	60	1.1	170	TO-LL (H-PSOF)
FDBL0150N80	Single	80	1.4	172	TO-LL (H-PSOF)
FDBL0200N100	Single	100	2	95	TO-LL (H-PSOF)
FDBL0630N150	Single	150	6.3	70	TO-LL (H-PSOF)
FDB0105N407L	Single	40	0.8	208	D2-PAK 7L (TO-263)
FDB0170N607L	Single	60	1.4	173	D2-PAK 7L (TO-263)
FDB0165N807L	Single	80	1.6	217	D2-PAK 7L (TO-263)
FDB1D7N10CL7	Single	100	1.7	116	D2-PAK 7L (TO-263)
FDB0630N1507L	Single	150	6.4	97	D2-PAK 7L (TO-263)
FDMD85100	Half Bridge	100	9.9	22	PQFN-8
FDMD8580	Half Bridge	80	4.6	57	PQFN-8
FDMD8560L	Half Bridge	60	3.2	92	PQFN-8
FDMD8540L	Half Bridge	40	1.5	81	PQFN-8
FDMD82100	Half Bridge	100	19	12	PQFN-12
FDMD8280	Half Bridge	80	8.2	31	PQFN-12
FDMD8260L	Half Bridge	60	5.8	49	PQFN-12
FDMD8240L	Half Bridge	40	2.6	40	PQFN-12

Device	Type	V _{DS} (V)	R _{DS(on)} (mΩ)	Q _{G(TOT)} (nC)	Package
NTMFS5C404NLT	Single	40	0.67	181	SO-8FL (DFN-5)
NTMFS5C604NLT	Single	60	1.2	52	SO-8FL (DFN-5)
NTMFS6H800N	Single	80	2.2	82	SO-8FL (DFN-5)
FDMS86180	Single	100	3.2	60	Power56
FDMC8360L	Single	40	2.1	57	Power33
NTTFS5C453NLT	Single	40	3	35	u8FL
FDMC86570L	Single	60	4.3	63	Power33
FDMC86340	Single	80	6.5	38	Power33
FDMC86184	Single	100	8.5	21	Power33
NTMTS0D4N04CL	Single	40	0.4	163	DFNW-8
NTMTS0D7N06CL	Single	60	0.68	103	DFNW-8
NTMTS1D2N08H	Single	80	1.1	147	DFNW-8
FDMT800100DC	Single	100	2.95	79	PQFN-8 (Power88)
FDMT800120DC	Single	120	4.2	76	PQFN-8 (Power88)
FDMT800150DC	Single	150	6.5	77	PQFN-8 (Power88)

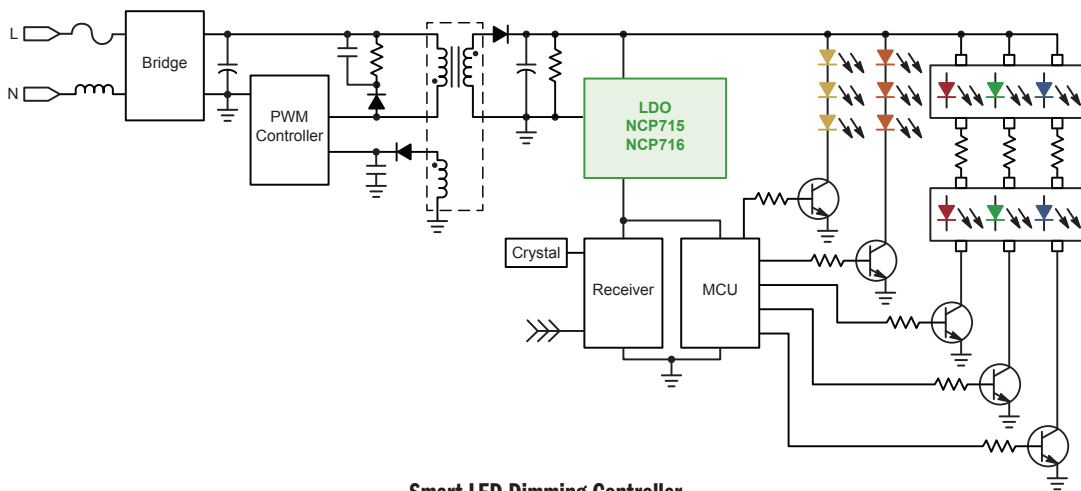
Power Supply/Management, Voltage Regulation



	Device	Function	Features	Package
AC-DC	FSL3276A/306LR/336LR	High Voltage Rugged Buck Switcher	<ul style="list-style-type: none"> 650 V, $R_{DS(ON)} = 30/18/4 \Omega$, 50 kHz, with enhanced protection 	PDIP-7, LSOP-7
	NCP1010~15 NCP1070~77	Self-Supply High Voltage Monolithic Switching Regulator for Low Power Offline Power Supplies	<ul style="list-style-type: none"> Dynamic self-supply, no need of an auxiliary winding Current-mode fixed frequency (options of 65 kHz, 100 kHz, 130 kHz) 	PDIP-7, SOT-223
	NCP1075~79A/B	Enhanced Switcher for Robust, Highly Efficient Power Supplies	<ul style="list-style-type: none"> 700 V, 2.9 to 13.5 Ω with enhanced protection 	PDIP-7
	NCP1124/26/29	High Voltage Monolithic Switching Regulator for Medium Power Offline Power Supplies	<ul style="list-style-type: none"> 650 V, 9/6/2 Ω rugged FET current-mode fixed frequency (65 kHz, 100 kHz) 	PDIP-7
DC-DC	NCP3170	3 A Switching Regulator	<ul style="list-style-type: none"> Output voltage adjustable to 0.8 V 500 kHz or 1 MHz switching frequency 	SOIC-8
	NCP3063/4	1.5 A Switching Regulator or utilize as controller for up to 5 A	<ul style="list-style-type: none"> Capable of 40 V input Up to 250 kHz switching frequency 	SOIC-8
	LM2594/5/6	0.5 A/1.0 A/3 A Switching Regulators	<ul style="list-style-type: none"> Capable of 40 V input Fixed 150 kHz switching frequency 	TO-220, DPAK, SOIC-8, PDIP-8
	NCP3020/11	PWM Controller	<ul style="list-style-type: none"> 4.7-28 V input voltage range EN/PG/SYNC features Fixed 300/400/600 kHz switching frequency 	SOIC-8, TSSOP-14
	NCP1034	PWM Controller	<ul style="list-style-type: none"> Capable of up to 100 V input Adjustable switching frequency (50-500 kHz) 	SOIC-16

LDO Regulators

Device	I _{out} (mA)	Dropout Typ @ 3.3 V (mV)	I _q (μA)	PSRR @ 1 kHz (dB)	V _{in} Max (V)	V _{out} (V)	Package(s)
NCP785A	10	–	12	80	450	3.3, 5.0, 12, 15	SOT-89-3
NCP786A	10	–	10	65	450	1.275	DFN-6
NCP508	50	180	145	70	13	1.5, 1.8, 2.5, 2.8, 3.0, 3.3	SC-70-5, WDFN-6
NCP715	50	350	4.7	52	24	1.2, 1.5, 1.8, 2.5, 3.0, 3.3, 5.0	SC-70-5, XDFN6
NCP716	80	350	4.7	52	24	1.2, 1.5, 1.8, 2.5, 3.0, 3.3, 5.0	SC-70-5, XDFN6
NCP171	80	41	0.05/50	65	6	0.8, 1.0, 1.2, 1.65, 1.8, 2.5, 2.8, 3.0, 3.3	XDFN-4
NCP781	100	–	2.5	80	150	Adj., 1.5, 3.3, 5.0, 12.0, 15.0	DFN-6
NCP120	150	30	80	72	6	0.8, 1.05, 1.1, 1.15, 1.2, 1.5, 1.8, 2.1	XDFN-6
NCP571	150	450	40	–	12	0.8, 0.9, 1.0, 1.2	TSOP-5, DFN-6
NCP170	150	240	0.5	40	5.5	1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3	SOT-563, XDFN-4, TSOP-5
NCP716B	150	70	3.2	55	24	3.0, 3.3, 5.0	TSOP-5
NCP700B	200	118	70	82	5.5	1.8, 2.8, 3.0, 3.3	WDFN-6, TSOP-5
NCP702	200	140	10	68	6	1.8, 2.8, 3.0, 3.3	XDFN-6, TSOP-5
NCP752	200	130	12	68	6	1.8, 2.8, 3.0, 3.3	SOT-23-5, XDFN-6
NCP160	250	120	20	100	6	1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 3.5, 4.5, 5.0, 5.14	XDFN-4, WLCSP-4
NCP163	250	80	12	92	6	1.8, 2.6, 2.8, 2.85, 2.9, 2.925	XDFN-4, WLCSP-4
NCP703	300	180	12	68	6	1.8, 2.8, 3.0, 3.3	XDFN-6, TSOP-5
NCP130	300	60	80	75	6	0.8, 1.05, 1.1, 1.15, 1.2, 1.5, 1.8, 2.1	XDFN-6
NCP718	300	300	4	60	24	1.2, 1.5, 1.8	TSOT-23, WDFN-6
NCP161	450	120	20	100	6	1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 3.5, 4.5, 5.0, 5.14	XDFN-4, WLCSP-4
NCP3335A	500	250	190	75	18	Adj., 1.5, 1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 5.0	Micro8, DFN-10
NCP3334	500	250	190	75	18	Adj.	SOIC-8
NCP705	500	250	12	70	6	0.8, 1.8, 2.8, 3.0, 3.3	SOT-223-6, WDFN-6
NCP5500	500	230	300	75	18	Adj., 1.5, 5.0	DPAK-5, SOIC-8
NCP133	500	140	80	72	6	Adj, 0.9, 1.0, 1.05, 1.1, 1.15, 1.2, 1.25, 1.3, 1.8	XDFN-6
NCP137	700	40	35	85	6	Adj.	WLCSP-6
NCP186	1 A	100	90	75	6	1.2, 1.75, 1.8, 1.85, 2.5, 2.8, 3.0, 3.3, 3.5, 3.9	XDFN-8
NCP187	1.2 A	180	30	75	6	1.2, 1.8, 3.3	DFN-6
NCP59748	1.5 A	60	–	70	6	Adj.	DFN-10, QFN-20
NCP59744	3 A	100	–	70	6	Adj.	QFN-20

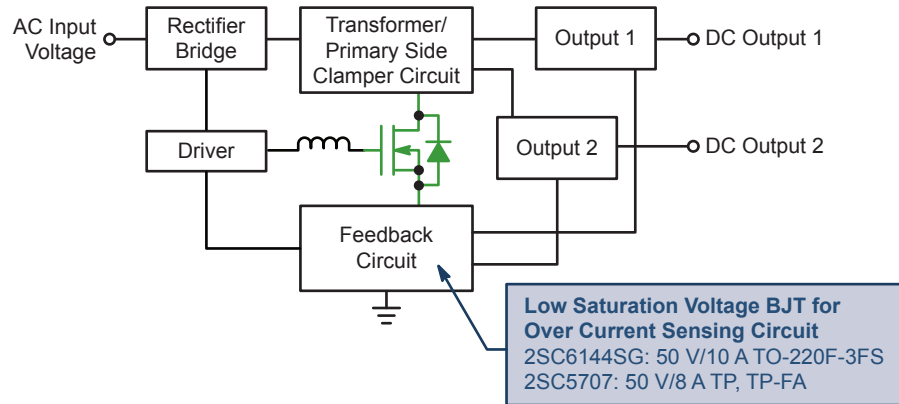


Smart LED Dimming Controller

Power MOSFETs for Circuit Breakers and Metering Power Supplies

Features

- High reliability
- Low power dissipation
- Avalanche ruggedness
- High-speed switching



Power Source Voltage	Device	V _{DDs} (V)	I _D (A)	R _{DS(ON)} (Ω) @ 10 V		C _{iss} (pF)	Q _g (nC)	G-S Protection Diode	Package
				Typ	Max				
≤AC 240 V	BFL4026	900	5	2.8	3.6	650	33	–	TO-220F
AC 380 V to 480 V	NDFPD1N150C	1500	0.1	100	150	80	4.2	–	TO-220F
	NDFP03N150C	1500	2.5	8	10.5	650	34	–	TO-220F
	NDTL03N150C	1500	2.5	8	10.5	650	34	–	TO-3P
	NDUL03N150C	1500	2.5	8	10.5	650	34	–	TO-3PF
	NDUL09N150C	1500	9	2.2	3	2025	114	–	TO-3PF
AC 590 V to 690 V	WPH4003	1700	3	8.2	10.5	850	48	–	TO-3PF

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

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 Input High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5304	Dual Input High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5181	Dual Input High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8, PDIP-8
NCP5183	Dual Input High Voltage High and Low-Side MOSFET or IGBT Driver	Half-Bridge	2	SOIC-8
NCP81075	Dual Input High Voltage High and Low-Side MOSFET Driver	Half-Bridge	2	SOIC-8, DFN-8, WDFN-10
NCP81080	Dual Input High Voltage High and Low-Side MOSFET Driver	Half-Bridge	2	SOIC-8, DFN-8



LC709204F High Accuracy Fuel Gauge LSI

Fuel Gauge for 1 Cell Li+ with Low Power and with No Sense Resistor

Conventional Display



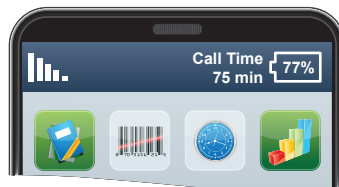
Features

- State of Health reporting
- Accuracy of remaining capacity $\pm 2.8\%$ (0 ~ +50°C)
- Ultra-low operating consumption current of 2 μA
- Standby mode current (RAM retention) of 0.1 μA
- No need for sense resistor for current detection

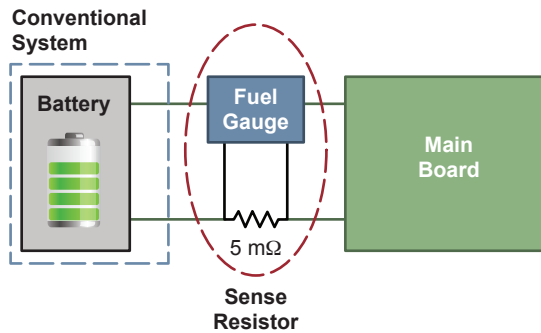
With LC709204F



Detailed Display of Remaining Capacity

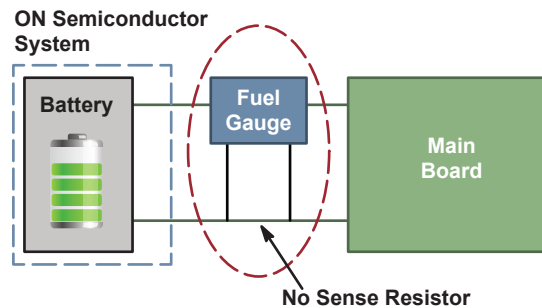


Correct Operating Time



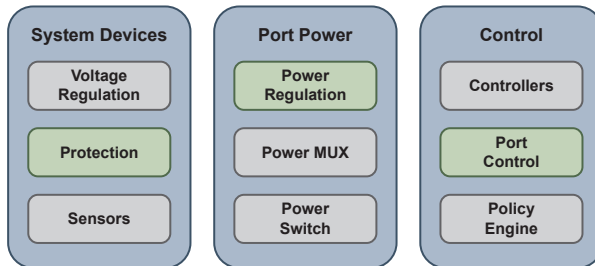
ON Semiconductor Solution (No Sense Resistor)

- No power loss
- No heat generation



USB-C for Wall Receptacle

Wall receptacles that include direct USB cable connections are becoming increasingly popular for charging mobile devices. ON Semiconductor offers high performance, high density USB-C (Type-C) power supplies for the USB wall receptacle solutions.



Block Diagram



System Devices

Function	Device	Description
Protection	NIS6350	Electronic Fuse, 5 V, 46 mΩ
	NIS5020	Electronic Fuse, 12 V, 14 mΩ
	ESD5581	ESD Protection, Bidirectional, 5 V, 10 pF, 6 A, 0.6 x 0.3 mm
	ESDM3551	ESD Protection Diode, CC and SBU Protection (5.5 V - USB 3.x), 21 pF, 0.6 x 0.3 mm
	NSPU3051	ESD and Surge Protection, CC, SBU and Vbus Lines, (5.5V - USB 3.x), 80 pF, 1.0 x 0.6 mm
	NSPM2052	ESD and Surge Protection Device, Vbat and Vbus Applications, 5 V, 120 A, 1.6 x 1.0 mm
	NSPM0061	ESD and Surge Protection, 6.3 V, 70 A, 1.6 x 1.0 mm
	NSPM0101	ESD and Surge Protection, 10 V, 60 A, 1.6 x 1.0 mm
	NSPU5132	ESD and Surge Protection Device, Unidirectional, 13.5 V, 200 A, 2.0 x 1.8 mm
	NSPU5201	ESD and Surge Protection Device, Unidirectional, 20 V, 140 A, 2.0 x 1.8 mm

Port Power

Function	Device	Description
Power Regulation	NCP1342	High Frequency Quasi-Resonant Flyback Controller
	NCP1568	Active Clamp Flyback Controller with ZVS
	NCP4306	Secondary Side Synchronous Rectification Driver

Control

Function	Device	Description
Port Control	FUSB302T	Programmable USB Type-C Controller with PD (Default SRC)
	FUSB3301	USB Type-C Source-Only Controller
	FUSB308BV	USB Type-C Port Controller with USB-PD

USB 2.0

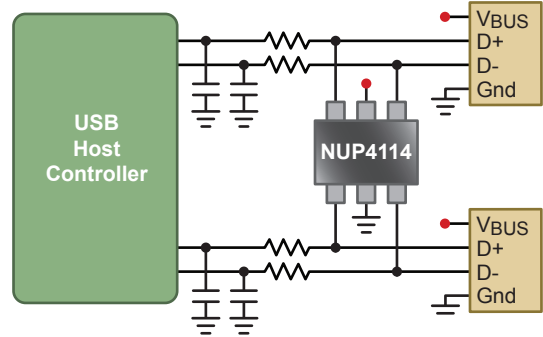
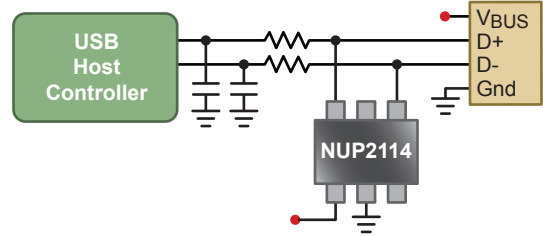
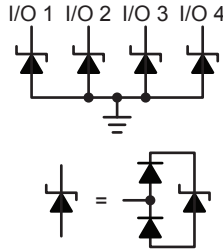
One High Speed Pair, V_{CC}, Low Capacitance ESD Protection

Key Requirement

- Cap < 5 pF

Features

- 0.35 - 3.0 pF
- Multi-part solutions available
- Industry leading low clamping voltage



Device	Data Lines	Capacitance (pF)	Package	Size (mm)
NUP2114UPX	1 Pair (D+/-) + Vbus	0.8	SOT-553	1.2 x 1.6
NUP2114UCM	1 Pair (D+/-) + Vbus	0.8	TSOP-6	3.0 x 2.75
ESDL3552	1 Pair (Tx, Rx, D+/-)	0.25	X4DFN-3	0.62 x 0.32
NUP4114UPX	2 Pair (D+/-) + Vbus	0.5	SOT-563	1.6 x 1.6
NUP4114UCL	2 Pair (D+/-) + Vbus	0.5	SC-88	2.0 x 2.1
NUP4114H	2 Pair (D+/-) + Vbus	0.5	TSOP-6	3.0 x 2.75
ESDL2031	Single Line (Tx, Rx, D+/-)	0.4	X4DFN-2	0.6 x 0.3
ESDL1531	Single Line (Tx, Rx, D+/-)	0.2	X4DFN-2	0.445 x 0.24
ESD7L5.0	2	0.5	SOT-723	1.2 x 1.2
ESD8351MUT	1	0.37	X3DFN-2	0.6 x 0.3
ESD8351P2T	1	0.37	SOD-923	1.0 x 0.6
ESD9L5.0	1	0.5	SOD-923	1.0 x 0.6

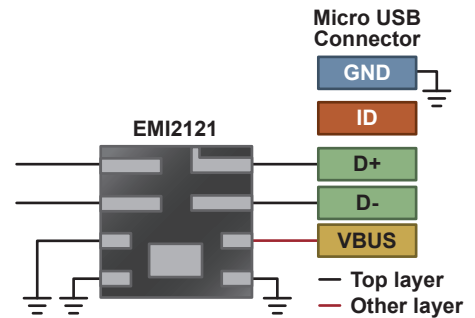
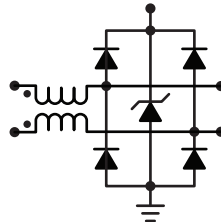
One High Speed Pair, V_{CC}, Common Mode Filter + ESD Protection

Key Requirement

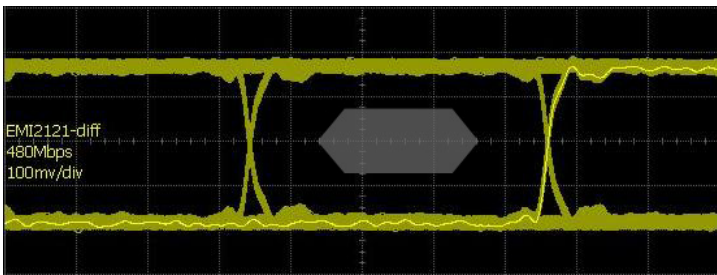
- Cap < 5 pF
- Common Mode Filtering

Features

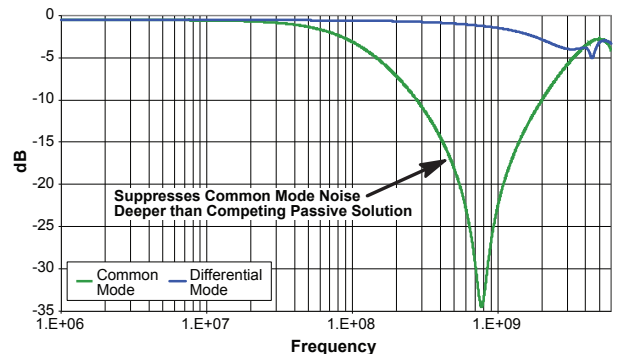
- 0.5 - 0.8 pF
- Integrated EMI suppression with ESD protection
- Industry leading low clamping voltage



Device	Pairs	Capacitance @ 2.5 V (pF)	CM Attenuation @ 800 MHz (-dB)	DM Bandwidth F3dB (GHz)	Package	Size (mm)
EMI2121	1	0.9	-25	2.5	WQFN-8	2.2 x 2.0 x 0.75



USB 2.0 @ 480 Mb/s



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

Four Pairs, Low Capacitance Surge and ESD Protection

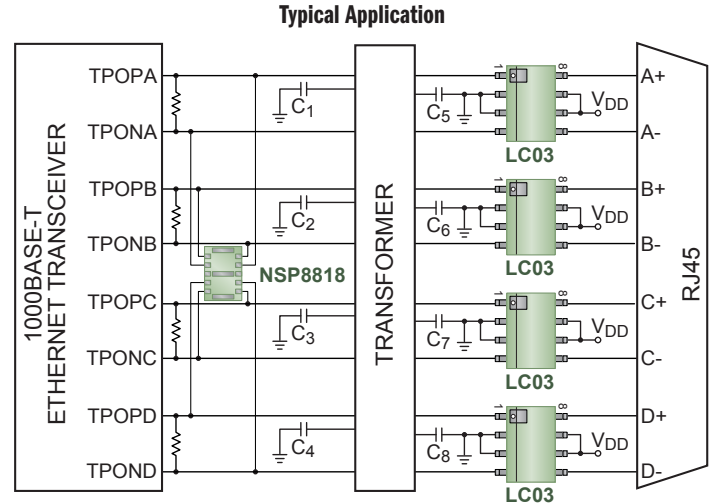
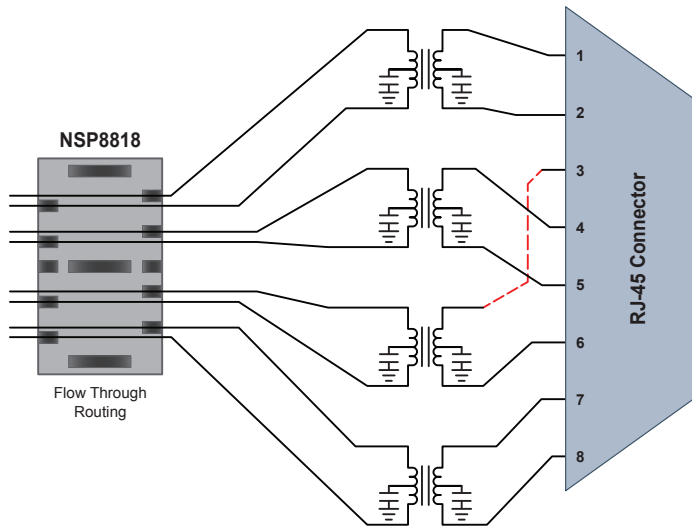
The 1000BASE-T or Gigabit Ethernet interface operating at higher bitrates is susceptible to ESD strikes, cable-discharge events and lightning-induced transients. Our products help meet IEC 61000-4-5, GR-1089-CORE and other Standards.

Features

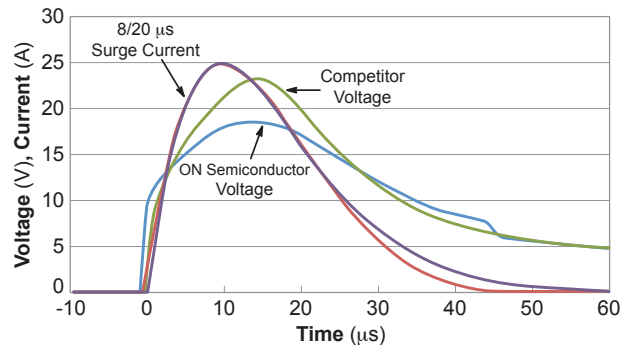
- Line-to-line capacitance < 3 pF
- V_{clamp} (25 A surge) < 11 V
- IEC 61000-4-2 rating > 30 kV
- No latching danger
- Surge rating maintained to 125°C

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



Line Side : LC03-6 (optional)
Transformer Side: NSP8818
Protection against metallic (transverse) strikes



Line-to-Line Surge

Surge Protection Devices

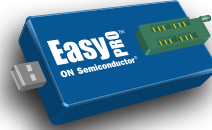
Device	V _{DC} Max (V)	Line Transient Max (V)	Surge I _{pp} , 8/20 μs (A)	Typical Line-Line Capacitance (pF)	ESD Contact Rating (kV)	Package
LC03-6	6.7	7	100	8	±30	SOIC-8
NSP4201	5	6	25	1.5	±30	TSOP-6
NUP4114H	5	5	12*	0.4	±13	TSOP-6
SRDA05	5	7	23	5	±8	SOIC-8
ESD8708	3.3	6	7.5	0.18	±30	UDFN-14
SRDA3.3	3.3	5	25	4	±8	SOIC-8
NSP8814	3	3.2	35	1.5	±30	UDFN-8
NSP8818	3	3.2	35	1.5	±30	UDFN-10

* On Pin 5.

EEPROMs for Configuration and Calibration

Features

- Broad density range: 1 kb to 2 Mb
- Wide operating Vcc range: 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 (I²C, SPI, Microwire)

EEPROMs

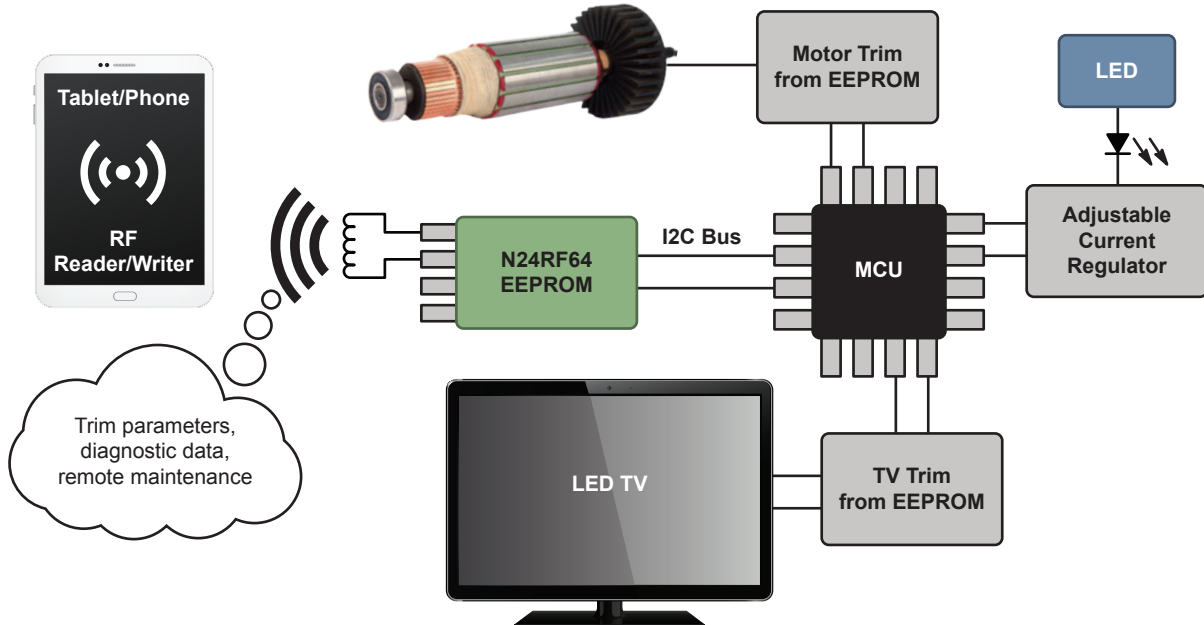
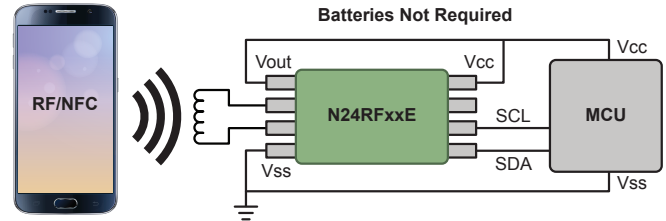
Data Transmission Standard	Density	Organization*	V _{CC} Min (V)	V _{CC} Max (V)	f _{CLK} Max (MHz)	Package(s)
I ² C	1 Mb	128k x 8	1.7, 1.8	5.5	0.4, 1	USB, SOIC-8, TSSOP-8, UDFN-8, TSOT23-5, WLCSP-4, WLCSP-5, WLCSP-8
	512 kb	64k x 8				
	256 kb	32k x 8				
	128 kb	16k x 8				
	64 kb	8k x 8				
	32 kb	4k x 8				
	16 kb	2k x 8				
	8 kb	1k x 8				
	4 kb	512 x 8				
	2 kb	256 x 8				
SPI	2 Mb	256k x 8	1.7, 1.8	5.5	10, 20	SOIC-8, TSSOP-8, UDFN-8
	1 Mb	128k x 8				
	512 kb	64k x 8				
	256 kb	32k x 8				
	128 kb	16k x 8				
	64 kb	8k x 8				
	32 kb	4k x 8				
	16 kb	2k x 8				
	8 kb	1k x 8				
	4 kb	512 x 8				
Microwire	2 kb	256 x 8	1.65, 1.8	5.5	2, 3, 4	SOIC-8, TSSOP-8, UDFN-8
	1 kb	128 x 8				
	16 kb	2k x 8 / 1k x 16				
	16 kb	2k x 8 / 1k x 16				
	8 kb	1k x 8 / 512 x 16				
	8 kb	1k x 8 / 512 x 16				
	4 kb	512 x 8 / 256 x 16				
	2 kb	256 x 8 / 128 x 16				
1 kb	128 x 8 / 64 x 16					
1 kb	128 x 8 / 64 x 16					

* Organization for Microwire devices is selectable.

RF/NFC EEPROM

Features

- RF/NFC interface for contactless transmission of data up to 150 cm
- ISO 15693 / ISO 18000-3 Mode 1 Compliant RF/NFC at 13.56 MHz
- 2,000,000 Program / Erase Cycles
- 200 year data retention
- 64-bit Unique Identifier (UID)
- Multiple 32-bit passwords and Lock Feature
- I2C Interface
 - 4 selectable slave addresses using pins A0 ad A1
 - 1 MHz bus speeds
- Energy harvesting output pin; able to power small peripheral or MCU



Sample Application

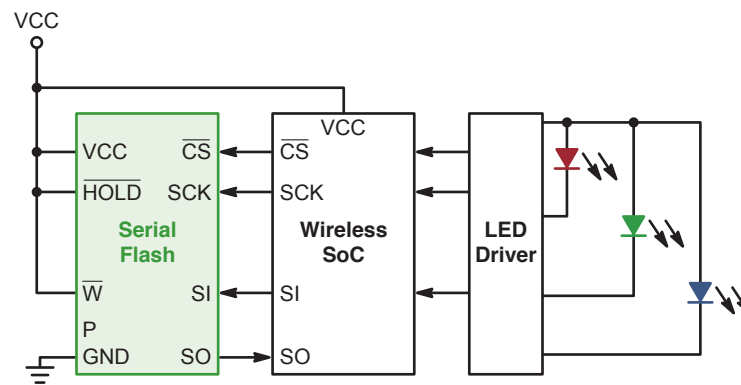
RF EEPROMs

Device	Memory Density (kb)	Energy Harvesting Output	Temperature Range	Package(s)
N24RF64E	64	Yes	-40 to +105°C	SOIC-8, TSSOP-8
N24RF64	64	No	-40 to +105°C	SOIC-8, TSSOP-8
N24RF16E	16	Yes	-40 to +105°C	SOIC-8, TSSOP-8
N24RF16	16	No	-40 to +105°C	SOIC-8, TSSOP-8
N24RF04E	4	Yes	-40 to +105°C	SOIC-8, TSSOP-8
N24RF04	4	No	-40 to +105°C	SOIC-8, TSSOP-8

Serial NOR Flash

Features

- Faster data rewrite (Sector Erase/Page Program)
- Lower power consumption with efficient rewrite operation
- 20-year data retention with no data deterioration
- Consistent Sector Erase operation time (t_{SE}) over device lifetime
- Industry's fastest WRITE performance minimizes system risk during field firmware upgrades



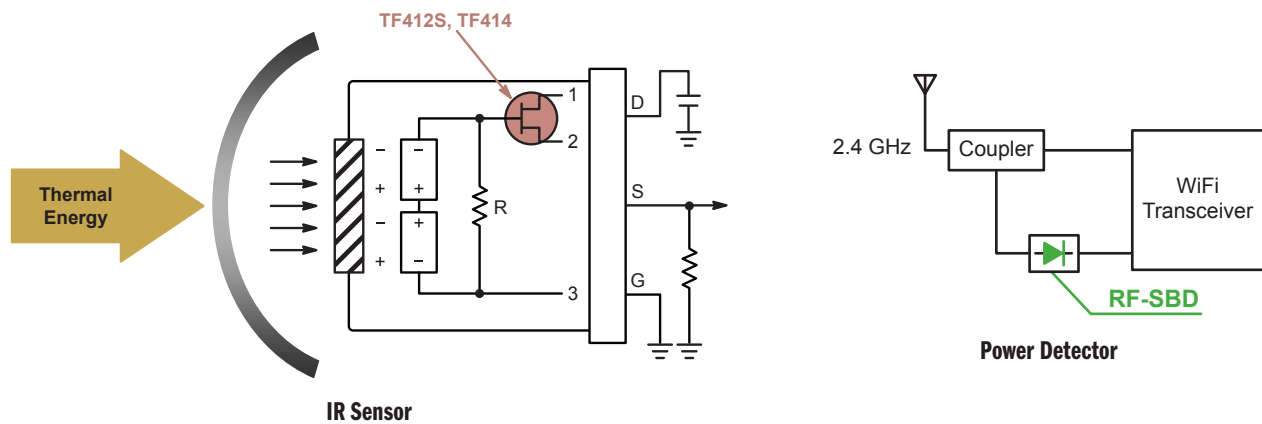
Smart LED Block Diagram

Device	Density	Power Supply (V)	Sector Erase Time (ms)	Page Program Time (ms)	Read/Write Current (mA)	Package
LE25S20	2 Mb	1.65 - 1.95	80	3	6 Read; 15 Write	SOIC-8, VSOIC-8
LE25U20A	2 Mb	2.3 - 3.6	80	4	6 Read; 15 Write	SOIC-8, VSOIC-8, WDFN-8
LE25U40C	4 Mb	2.3 - 3.6	80	4	6 Read; 15 Write	SOIC-8, VSON-8, VDFN-8
LE25S40	4 Mb	1.65 - 1.95	80	6	6 Read; 15 Write	SOIC-8, VSOIC-8, VDFN-8, VSON-8
LE25W81	8 Mb	2.45 - 3.6	100	0.3	6 Read; 15 Write	VSON-8, VDFN-8
LE25S81A	8 Mb	1.65 - 1.95	15	0.3	5 Read; 4.5 Erase	SOIC-8, VSOIC-8
LE25S161	16 Mb	1.65 - 1.95	15	0.4	4.5 Read; 4.5 Erase	SOIC-8, VSOIC-8, UDFN-8, WLCSP-8

RF Discretes

ON Semiconductor offers a range of discrete RF devices for Internet-of-Things products. These efficient, micro-packaged devices provide capabilities for tuning, low-noise amplification, and sensor interface.

Device Type	Key Features	Functions	Package(s)
RF BJTs	Low noise figure (≤ 1.5 dB), high gain (9 to 18 dB), high cut-off frequency, low operation voltage	FM LNA, Buffer, IF Amp	TSOP-6, SOT-343
RF Schottky Diodes	Small interterminal capacitance (0.15 to 0.69 pF), small forward voltage (≤ 0.32 V), fewer parasitic components	Level Detection	X2DFN-2
PIN Diodes	Small interterminal capacitance (≤ 0.23 dB), small forward series resistance ($\leq 4.5 \Omega$), auto gain control	Gain Control	SC-70, SC-59
RF MMIC	Wide band response (up to 3.6 GHz), high gain (up to 33 dB), low current, high output power	Buffer, IF Amp	SC-88FL
RF JFETs	High $ y_{fs} $ (up to 50 mS), low noise figure (≤ 1.5 dB), low capacitance ($C_{iss} \leq 10$ pF), low I_{DSS} , low I_{GSS}	AM LNA	SC-59, SOT-883 (XDFN)
Varactors	Capacitance ratio range (1.65 to 6.0), high Q factor (up to 150), low reverse current	FM Tuning	SC-59, SC-70



	Consumer		Industrial		Communications	
	Set-Top Box	Satellite LNB	Smart Meters	Drones	Wireless LAN	Walkie-Talkie
RF BJT 2SCxx, 15NGNxx, CPHxx, MCHxx	◆	◆	◆	◆	◆	◆
RF Schottky 1SSxx, NSRxx, SBXxx	◆	◆	◆	◆	◆	
PIN Diode 1SVxx	◆	◆				
JFET 2SKxx, CPHxx, MCHxx, MMBFxx, TFxx						◆
MMIC SMAxx	◆	◆	◆	◆	◆	◆

COMPONENTS

Standard Logic and MiniGate™

Available logic functions

- Logic Gates, Buffers, Flip-Flops
- Arithmetic Functions
- Bus Transceivers
- Latches and Registers
- Multiplexers and Analog Switches
- Logic Level Translators

Standard Logic Family	Device Prefix	V _{CC}		t _{PD} (nS)	I _{OUT} (mA)	Input Logic Level	Packages
		Min (V)	Max (V)				
Metal Gate	MC14	3	18	50 @ V _{CC} = 15 V	±4.2 @ V _{CC} = 15 V	CMOS	SOIC, TSSOP, QFN
AC	MC74AC/74AC	2	6	6 @ V _{CC} = 5 V	±24 @ V _{CC} = 4.5 V	CMOS	
ACT	MC74ACT/74ACT	4.5	5.5	5.5 @ V _{CC} = 5 V	±24 @ V _{CC} = 4.5 V	TTL	
HC	MC74HC/MM74HC	2	6	13 @ V _{CC} = 6 V	±5.2 @ V _{CC} = 6 V (Std)	CMOS	
					±7.8 @ V _{CC} = 6 V (Bus Driver)		
HCT	MC74HCT/MM74HCT	4.5	5.5	15 @ V _{CC} = 5 V	±4.0 @ V _{CC} = 4.5 V (Std)	TTL	
					±6.0 @ V _{CC} = 4.5 V (Bus Driver)		
LCX	MC74LCX/74LCX	2.3	3.6	5.5 @ V _{CC} = 3 V	±24 @ V _{CC} = 3 V	LVTTTL	
LVX	MC74LVX/74LVX	2	3.6	6.6 @ V _{CC} = 3 V	±4 @ V _{CC} = 3 V	LVTTTL	
VCX	MC74VCX/74VCX	1.65	3.6	3.5 @ V _{CC} = 3 V	±24 @ V _{CC} = 3 V	LVTTTL	
VHC	MC74VHC/74VHC	2	5.5	5.2 @ V _{CC} = 4.5 V	±8 @ V _{CC} = 4.5 V	CMOS	
VHCT	MC74VHCT/74VHCT	4.5	5.5	3.6 @ V _{CC} = 4.5 V	±8 @ V _{CC} = 4.5 V	TTL	
LVT	74LVT	2.7	3.6	3.6 @ V _{CC} = 3.0 V	-32/64 @ V _{CC} = 3.0 V	TTL	

MiniGate Family	Number of Gates	Device Prefix	V _{CC}		t _{PD} (nS)	I _{OUT} (mA)	Input Logic Level	Packages
			Min (V)	Max (V)				
HC	1	MC74HC1G/NC7S	2	6	6.5 @ V _{CC} = 5 V	±5.2 @ V _{CC} = 6 V	CMOS	TSOP, SC-88, SC-74, SOT-553, SOT-953, US8, UDFN, UQFN, MicroPak
HCT	1	NC7ST	4.5	5.5	6.5 @ V _{CC} = 5 V	±2 @ V _{CC} = 6 V	TTL	
VHC	1	MC74VHC1G/NLU1G/NL17SH	1.65	5.5	3.8 @ V _{CC} = 4.5 V	±8 @ V _{CC} = 4.5 V	CMOS	
	2	NLU2G						
	3	NLU3G						
VHCT	1	MC74VHCT1G/NLU1GT/NL17SHT	4.5	5.5	3.6 @ V _{CC} = 4.5 V	±8 @ V _{CC} = 4.5 V	TTL	
	2	NLU2GT						
	3	NLU3GT						
LCX	1	NL17SZ/NC7SZ/NLX1G	1.65	5.5	2.4 @ V _{CC} = 3 V	±24 @ V _{CC} = 3 V	CMOS	
	2	NC27WZ/NC7WZ/NLX2G						
	3	NL37WZ/NC7NZ/NLX3G						
VCX	1	NL17SV/NC7SV	0.9	3.6	1.0 @ V _{CC} = 3 V	±24 @ V _{CC} = 3 V	LVTTTL	
SG	1	NL17SGxx	0.9	3.6	2.2 @ V _{CC} = 3 V	±8 @ V _{CC} = 3 V	LVTTTL	
SP	1	NC7SP	0.9	3.6	3.0 @ V _{CC} = 3 V	±2.6 @ V _{CC} = 3 V	LVTTTL	
	2	NC7WP						
	3	NC7NP						
AUP	1	74AUP1G	0.8	3.6	2.9 @ V _{CC} = 3 V	±4 @ V _{CC} = 3 V	Schmitt	
	1	74AUP1T	2.3	3.6	3.3 @ V _{CC} = 3 V	±4 @ V _{CC} = 3 V	Schmitt	

Integrated Passive Devices (IPD) Efficient RF System-in-Package Solutions

Integrating passive devices into our HighQ™ copper platform gives a cost-effective, space-saving solution for all RF needs.

IPD Technology Characteristics

- Target frequency: 500 MHz to 40 GHz
- Low profile, minimal footprint
- Tight tolerance

Typical Applications

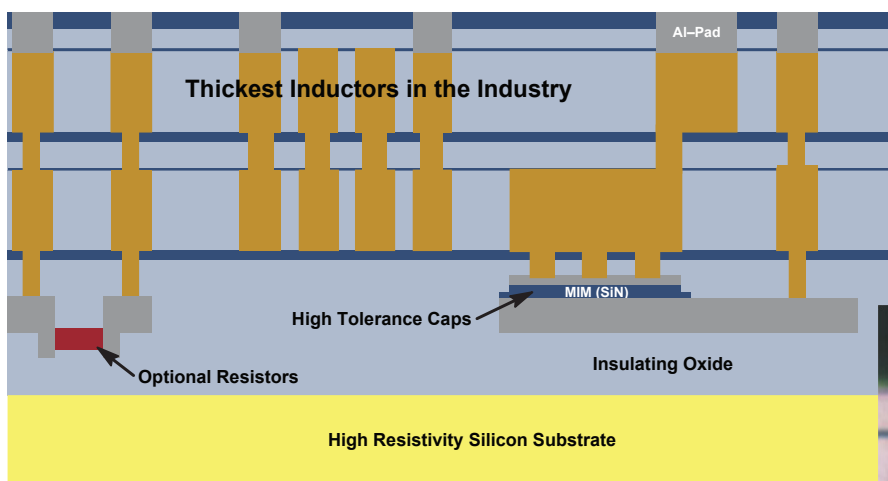
- Antenna Switch
- WiFi®/Bluetooth
- Power Amplifier
- Zigbee

Typical IPD Designs

- Baluns
- Couplers
- Diplexers
- Balanced Filters
- Splitters
- Matching networks



IPD Technology (R, L, C)



Performance

- Guaranteed $\pm 5.0\%$ capacitor tolerance
- Typical $< 1\%$ variance between capacitors on common IPD
- Dual Cu stack up of 12 μm for high Q inductors



Dual Copper Stackup with Full Length Stitched Via

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	91-80-427-74100
ISRAEL	Raanana	972 (0) 9-9609-111
ITALY	Milan	39 02 9239311
JAPAN	Tokyo	81-3-6880-1777
KOREA	Seoul	82-31-786-3700
MALAYSIA	Penang	60-4-6463877
SINGAPORE	Singapore	65-6496-8888
SLOVAKIA	Piestany	421 33 790 2450
THAILAND	Bangkok	66-2-115-0542
UNITED KINGDOM	Maidenhead	44 (0) 1628 244326

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



AMERICAS REP FIRMS

Alabama	Huntsville	e-Components	(256) 533-2444
Brazil	Countrywide	Ammon & Rizos	(+55)224688-1960
California	Bay Area	Electec	(408) 496-0706
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	Chicago	Matrix Design Technology	(630) 780-9124
Indiana	Statewide	Bear VAI Technology	(440) 526-1991
Iowa	Cedar Rapids	Matrix Design Technology	(319) 362-6824
Kansas	Olathe	Matrix Design Technology	(913) 998-8852
Kentucky	Statewide	Bear VAI Technology	(440) 526-1991
Maine	Statewide	Paragon Electronic Systems	(603) 645-7630
Massachusetts	Statewide	Paragon Electronic Systems	(603) 645-7630
Mexico	Countrywide	Ammon & Rizos	(+52) 333-6419900
Michigan	Statewide	Bear VAI Technology	(440) 526-1991
Minnesota	Eden Prairie	Matrix Design Technology	(952) 400-1070
Missouri	Cedar Rapids	Matrix Design Technology	(319)-362-6824
Nebraska	Cedar Rapids	Matrix Design Technology	(319)-362-6824
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	Eden Prairie	Matrix Design Technology	(952) 400-1070
Ohio	Statewide	Bear VAI Technology	(440) 526-1991
Pennsylvania	Western PA	Bear VAI Technology	(440) 526-1991
Pennsylvania	Eastern PA	SJ Mid Atlantic	(856) 866-1234
Puerto Rico	Countrywide	e-Components	(888) 468-2444
Rhode Island	Statewide	Paragon Electronic Systems	(603) 645-7630
South Carolina	Statewide	e-Components	(888) 468-2444
South Dakota	Eden Prairie	Matrix Design Technology	(952) 400-1070
Tennessee	Statewide	e-Components	(888) 468-2444
Vermont	Statewide	Paragon Electronic Systems	(603) 645-7630
Wisconsin	Milwaukee	Matrix Design Technology	(262) 389-6790

ON Semiconductor Distribution Partners

Arrow Electronics	www.arrow.com	(800) 777-2776
Avnet Inc.	www.avnet.com	(800) 332-8638
CEAC International Ltd	www.ceoport.com	852-2302-4018
Digi-Key Corporation	www.digikey.com	(800) 344-4539
Framos GmbH	www.framos.com	+49 89 710667-0
Future Electronics	www.futureelectronics.com	1-800-FUTURE1 (388-8731)
Kotech Semicon Co., Ltd.	www.kotechsemi.com	+82-2-557-4335
Macnica, Inc.	www.macnica.com	+81-45-470-9870
Mouser Electronics, Inc.	www.mouser.com	(800) 346-6873
OS Electronics Co., Ltd	www.oselec.com	(81) 3 3255 5985
Premier Farnell plc	www.farnell.com	(800) 4-NEWARK
RS Components Limited	www.rs-online.com	03457 201201
Ryoden Trading Co., Ltd.	www.ryoden.co.jp/en	(81) 3 5396 6310
Ryosan Co., Ltd	www.ryosan.co.jp/eng	(81) 3 3862 2635
SAS Seltech	www.seltech-international.com	+33-1-48-92-90-2
Serial Microelectronics (HK) Ltd	www.serialsystem.com	(852) 2790 8220
Uniquist Corporation	www.uniquist.co.kr	82-31-7089988
World Peace Industries Co. Ltd. (WPI)	www.wpi-group.com	(852) 2365 4860
WT Microelectronics Co., Ltd	www.wtmec.com	(852) 2950 0820
Wuhan P&S Information Technology Co., Ltd	www.icbase.com	(86) 27 8156 6668 or 400-800-8051
Yosun Industrial Corp	www.wpgoldings.com/yosung	(886) 2 2659 8168
Rochester Electronics	www.rocelec.com	+1-978-462-9332

EasyPRO, GreenBridge, HighQ, and MiniGate are trademarks of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries. The Apple logo, Apple App Store logo, and the Safari logo are trademarks of Apple Inc., registered in the U.S. and other countries and regions. Arm and Cortex are registered trademarks of Arm Limited (or its subsidiaries) in the EU and/or elsewhere. Bluetooth is a registered trademark of Bluetooth SIG. Google Play and the Google Play logo, the Google Chrome logo and the Android Robot logo are trademarks of Google LLC. HART and the HART logo are registered trademarks of the HART Communication Foundation. iOS is a trademark or registered trademark of Cisco in the U.S. and other countries and is used under license by Apple Inc. KNX and the KNX logo are registered trademarks of KNX and its suppliers or licensors. OMS is a registered trademark of OMS Group, Germany. SIGFOX and the SIGFOX logo are trademarks of SIGFOX. Wi-Fi is a registered trademark of the Wi-Fi Alliance. Zigbee is a registered trademark of Zigbee Alliance. Electron D'Or logo and China's Most Competitive IoT Solution logo used with permission. All other brand names and product names appearing in this document are trademarks of their respective holders.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of its product or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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 REQUESTS

Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT

North American Technical Support:
Voice Mail: 1 800-282-9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910

For additional information, please contact your local Sales Representative