

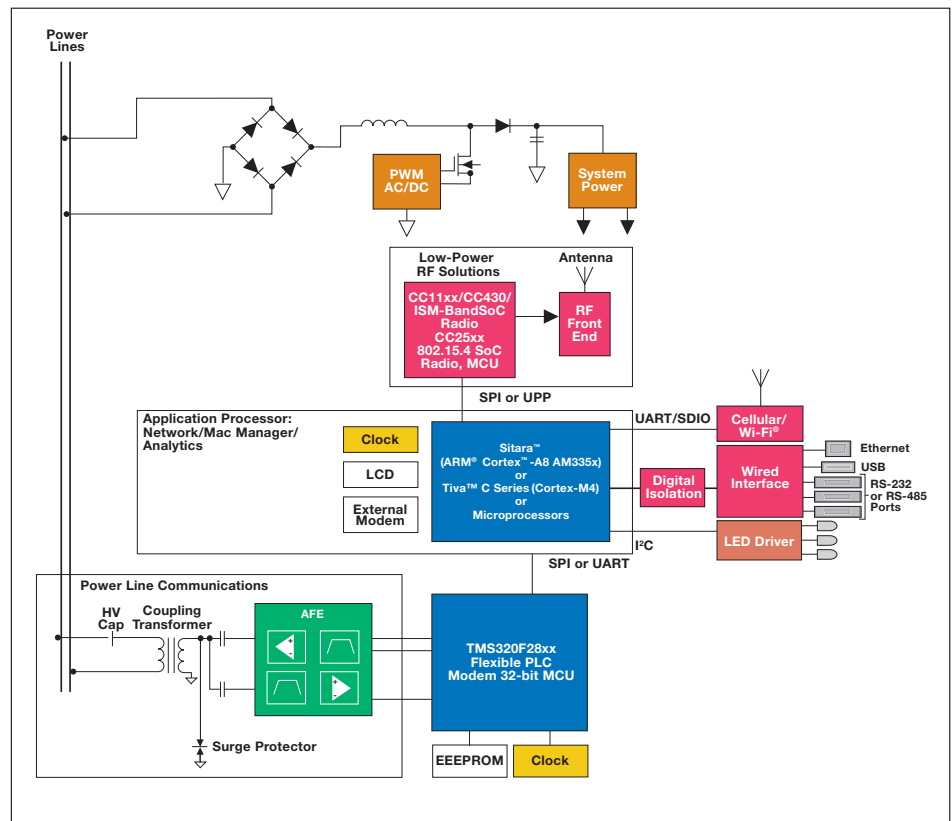
# Data Concentrator System Solution



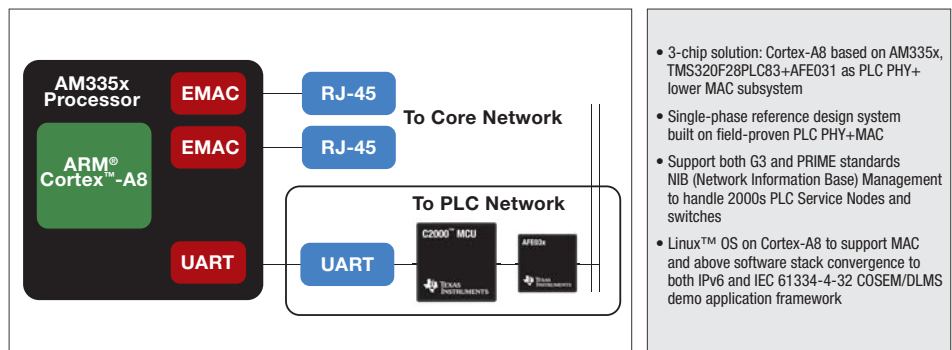
Automated metering infrastructure (AMI) and Automated meter reading (AMR) provide the necessary means to measure, analyze, collect energy usage and communicate that data to a central database for billing, troubleshooting, and analyzing. It would not be practical, technically as well as economically, for all meters to directly communicate with utility servers. Data concentrator applications are an important node in the AMI which is networked with several utility meters and central utility servers and enables communication of the data between the meters and the utility servers. Data concentrators at several points in the infrastructure securely aggregate data from a manageable number of meters and send to the utility servers.

The communication mode largely depends on the power infrastructure and can be either wired or wireless communication. Wired communication is comprised of Power Line Communication (PLC) and in some cases with serial or Ethernet-based communication where PLC is not suited for the infrastructure. The wireless communication comprises of mainly low-power RF (IEEE 802.15.4g protocol) communication and in some cases the existing cellular medium. The communication from the concentrator to the utility servers can be via Ethernet, GSM, GPRS, WiMAX or telecom networks.

TI Data Concentrator Solutions Block Diagram: Super Set



TI PLC Data Concentrator Platform



Learn more at [www.ti.com/smartgrid](http://www.ti.com/smartgrid), [www.ti.com/dataconcentrator](http://www.ti.com/dataconcentrator), and [www.ti.com/tool/tmdsd3359](http://www.ti.com/tool/tmdsd3359)

## TMDSDC3359 – Data Concentrator Evaluation Module

Evaluate TI's solutions for data concentrator based on ARM® technology. Support up to 2000 nodes G3-PLC standard, PRIME standard, IEEE-1901.2 standard

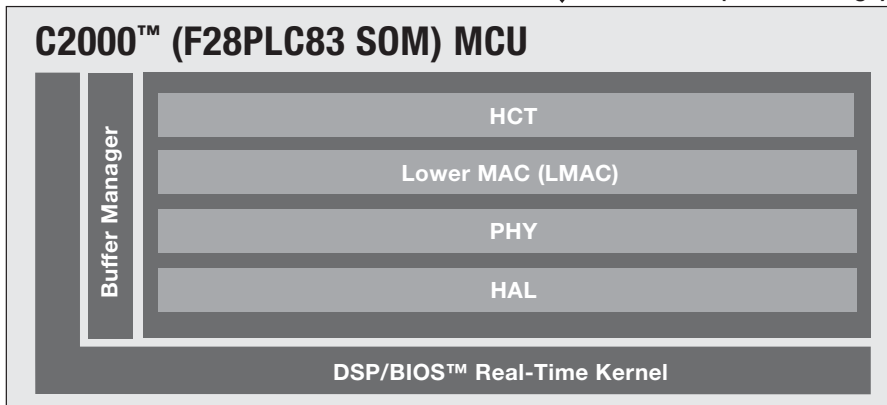
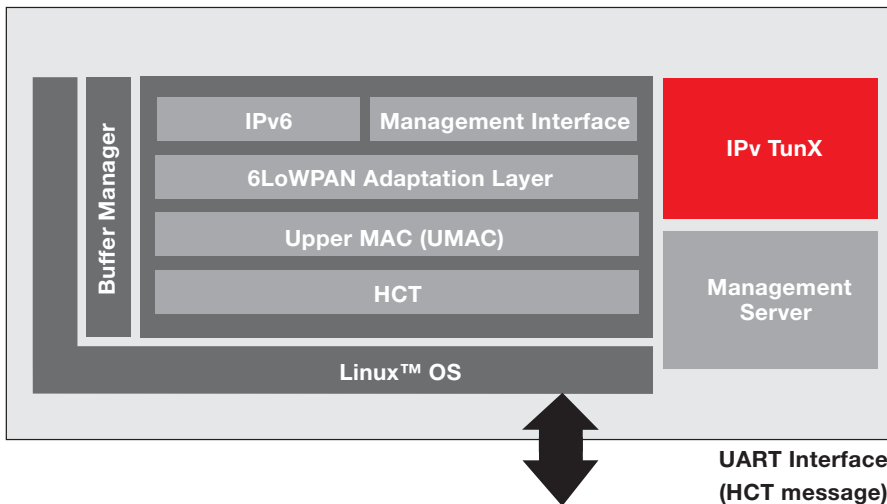
**Hardware Features**

- Isolation to prevent damage from high-voltage currents
- Three-phase power line communication module support
- On-board 120-/240-V power supply
- AM335x processor:**
  - Sitara™ ARM® Cortex™-A8 processor for upper-level data concentrator stack and communications
  - Full Linux BSP supported by TI
- Temperature sensor
- Sub-1GHz and 2.4GHz RF
- Infrared receiver and transmitter
- 2× USB
- 2× Ethernet
- 2× RS-232
- 3× RS-485

Supports control and data communications:  
 2× Ethernet,  
 3-phase PLC interface,  
 sub-1GHz and 2.4GHz RF,  
 2× RS-232, 3× RS-485

Designed to best practices for high-speed systems: Good reference for design passing ESD system tests; BOM and schematics available

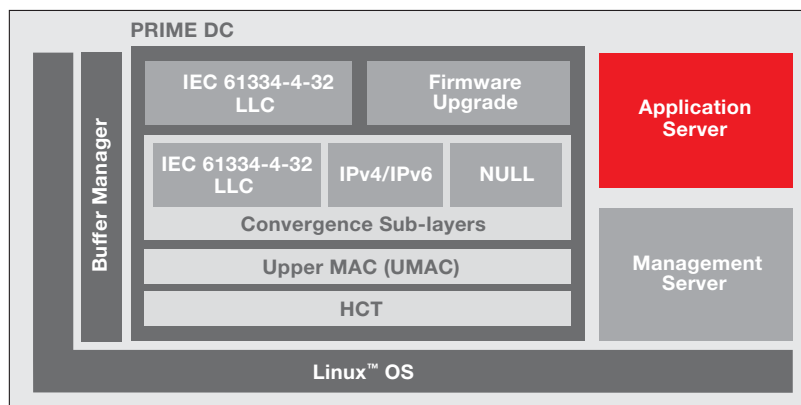
## ARM9™/Cortex™-A8 Processor



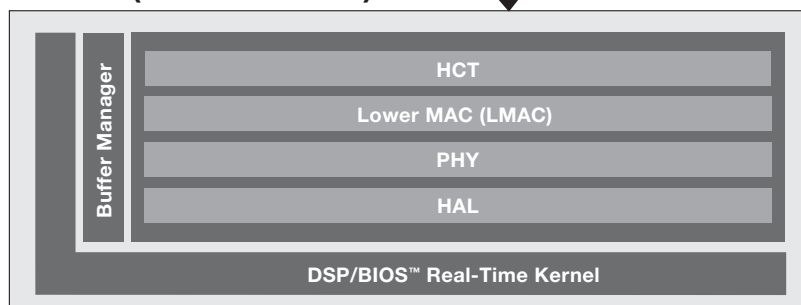
### Features on ARM9/Cortex-A8 Processor and C2000™ MCU

- **G3 Stack**
  - ARM9/Cortex-A8 processor
    - ADP 6LoWPAN bootstrapping
    - Mesh routing (LOAD)
    - Security EAP/PSK
    - Upper MAC
  - C2000 MCU
    - Lower MAC and PRIME PHY
- **G3 DC Interfaces**
  - Management
  - DLMS/COSEM IPv6 application
- **G3 Topology**
  - Maximum 2000 nodes
- **G3 DC Resources (ARM9/Cortex-A8 processor)**
  - Program memory: 256 KB
  - Data memory: 580 KB
  - CPU consumption: < 1%
  - Note: MIPS-intensive blocks in C2000 MCUs

# ARM9™/Cortex™-A8 Processor



## C2000™ (F28PLC83 SOM) MCU



### Features on PRIME Stack

- **PRIME Stack**
  - ARM9/Cortex-A8 processor
    - IEC 61334-4-32 LLC
    - IEC 61334-4-32 SSSCS and NUL SSSCS
    - Upper MAC
  - C2000 MCU
    - Lower MAC and PRIME PHY
- **PRIME DC Interfaces**
  - Management
  - Application
- **PRIME Topology**
  - Maximum 2000 nodes
  - 32 switches (to be increased for future release)
  - 3600 connections (Unicast and management)
- **PRIME DC Resources (ARM9/Cortex-A8 processor)**
  - Program memory: 192 kB
  - Data memory: 580 KB
  - CPU consumption: < 1%
  - Note: MIPS-intensive blocks in C2000 MCUs

Learn more at [www.ti.com/sitara](http://www.ti.com/sitara), [www.ti.com/tiva](http://www.ti.com/tiva) and [www.ti.com/piccolo](http://www.ti.com/piccolo)

### Embedded Processing Solutions

Description	Device	Key Benefits
Sitara™ ARM® Cortex™-A8 Microprocessors	AM335x	<ul style="list-style-type: none"> <li>• Up to 1-GHz Cortex-A8 32-bit RISC microprocessor</li> <li>• Extensive peripheral set (2× Gbit-Ethernet, CAN, USB, 8× UARTs extended from PRU, ...)</li> <li>• Flexible communication protocols</li> <li>• Linux™ community, Android™, Windows® Embedded CE, DSP/BIOS™ Real-Time Kernel and RTOS ecosystem of development partners</li> </ul>
Tiva™ C Series ARM Cortex-M4-Based MCUs	LM4F13x	<ul style="list-style-type: none"> <li>• Up to 80-MHz core</li> <li>• 256KB single-cycle Flash, 32KB single-cycle SRAM</li> <li>• Rich interface featuring 8× UARTs, USB, CAN, up to 43 GIPO, etc.</li> <li>• 2× 12-bit ADC with 12 analog input channels</li> </ul>
C2000™ 32-bit real-time MCUs	Piccolo™ floating-point series	<ul style="list-style-type: none"> <li>• PLC accelerators</li> <li>• Integrated real-time control peripherals</li> <li>• Support multiple PLC modulations</li> </ul>

### Digital Isolation | [www.ti.com/isolation](http://www.ti.com/isolation)

Description	Device	Key Benefits
Digital Isolation	ISO7131	<ul style="list-style-type: none"> <li>• 3-channel small footprint digital isolators provide galvanic isolation up to 2500 V<sub>RMS</sub> for 1 minute per UL and 4242 VPK</li> </ul>
Digital Isolation	ISO7140/41	<ul style="list-style-type: none"> <li>• 4-channel small footprint digital isolators provide galvanic isolation up to 2500 V<sub>RMS</sub> for 1 minute per UL and 4242 VPK</li> </ul>

### RS-485 (Isolated and Non-Isolated)

Description	Device	Key Benefits
RS-485 Interface	SN65HVD3082/85/88	<ul style="list-style-type: none"> <li>• 200Kbps / 1 Mbps / 20 Mbps capable half-duplex transceivers, operate with very low supply current</li> </ul>
RS-485 Interface	SN65HVD3080/83/86	<ul style="list-style-type: none"> <li>• 200Kbps to 20 Mbps capable full-duplex transceivers, operate with very low supply current</li> </ul>
Isolated RS-485 Interface	ISO3080/82/86/88	<ul style="list-style-type: none"> <li>• Isolated 5V full and half-duplex RS-485 transceivers, provide 2500 V<sub>RMS</sub> of isolation for 60s</li> </ul>

### Ethernet PHY

Description	Device	Key Benefits
Interface	TLK105L	<ul style="list-style-type: none"> <li>• 10/100 Ethernet PHY, error free to 150 meters, cable diagnostics, auto-MIDX, supports MII &amp; RMII</li> </ul>
Interface	DP83848K	<ul style="list-style-type: none"> <li>• 10/100 Ethernet PHY, error free to 130 meters, auto-MIDX, supports MII &amp; RMII</li> </ul>
Interface	DP83640	<ul style="list-style-type: none"> <li>• IEEE 1588 Precision Time Protocol transceiver for real-time industrial connectivity. Packet time stamps for clock synchronization</li> </ul>

## ESD

Description	Device	Key Benefits
ESD Protection	TPD1E10B06/B09	• Single-channel ESD protection in small 0402 package, $\pm 30\text{KV}$ IEC air-gap, over $\pm 30\text{KV}$ contact, bipolar or bidirectional signal support
ESD Protection	TPD4E1U06	• Quad-channel ultra-low cap ESD device, offers $\pm 15\text{KV}$ IEC air-gap and $\pm 15\text{KV}$ , suitable for multiple applications like USB
ESD Protection	TPD2E007	• Two-channel ESD protection offers system-level ESD solutions for wide range of industrial applications like RS-485, RS-232

## Temperature Sensors

Description	Device	Key Benefits
Temperature Sensor	TMP275	• $\pm 0.5^\circ\text{C}$ accurate from $-20^\circ\text{C}$ to $+100^\circ\text{C}$ , two-wire, serial output, two-wire and SMBus interface-compatible
Temperature Sensor	TMP108	• $\pm 0.75^\circ\text{C}$ accurate from $-20^\circ\text{C}$ to $+85^\circ\text{C}$ , $\pm 1^\circ\text{C}$ (max) from $-40^\circ\text{C}$ to $+125^\circ\text{C}$ , features SMBus and two-wire interface
Temperature Sensor	TMP75/LM75A	• $\pm 1.5^\circ\text{C}$ to $\pm 3^\circ\text{C}$ accuracy depending on temperature range, features SMBus and two-wire interface

## Isolated AC/DC Power Solutions | [www.ti.com/power](http://www.ti.com/power)

Description	Device	Key Benefits
AC/DC Supply	UCC28910	PWM HV switcher with 700V integrated power FET and primary-side regulation. Dedicated to flyback power supplies and provides isolated output voltage and current regulation without the use of an optical coupler.
AC/DC Supply	UCC28710/700	PWM controller with / without integrated 700V startup switch. Constant-voltage, constant-current controller with primary-side regulation, QR green mode, optocoupler less feedback, very low no-load pwr, high efficiency
AC/DC Supply	UCC28600/610	QR / DCM PWM controller, excellent efficiency at full load, industry-leading power consumption at no-load, and small footprint

## DC-DC Solutions

Description	Device	Key Benefits
Step-Down Regulator	TLV62065	• 2.9V to 5.5V with 2-A output, 2x2-mm footprint, synchronous DC/DC step-down converter, up to 97% efficient
Step-Down Regulator	TLV62080	• 2.5V to 5.5V input, 1.2-A step-down converter in 2x2-mm package and high efficiency over wide output current range
Step-Down Regulator	LM3671	• 2.7V to 5.5V input, 600-mA output, 2-MHz, step-down DC-DC converter optimized for powering low-voltage circuits
Step-Down Regulator	TPS62240	• 2 V to 6 V input with 300-mA output, 2.25-MHz buck in 2x2 SON/SOT23. Offers high efficiency, power save mode at light loads
Step-Down Regulator	TPS54227/327	• 4.5V to 18V input 2-A and 3-A output respectively; DC/DC step-down converter, adaptive on-time D-CAP2™ enables high efficiency over load range, fast transient response, allows use of low ESR caps. Adjustable soft start
Buck-Boost Regulator	TPS63030/1	• DC/DC buck-boost regulators: 0.8-A, low $I_q$ with up to 96% efficiency
Step-Up/Boost Regulator	LM2733	• 0.6-/1.6-MHz boost converter, has 40V integrated FET switch with low RDSon. Offers cycle-by-cycle current limiting

## Linear Regulators

Description	Device	Key Benefits
LDO	TLV71310/11/12/15/18	• Capacitor-free, 150-mA, LDO with 1.5% regulation over temp. This next-generation LDO was designed to be stable without an o/p cap
LDO	LP38691	• 500mA, low dropout CMOS linear regulator with tight output tolerance, and excellent AC performance with ultra-low ESR ceramic caps
LDO	TLV70710/11/12/15	• 200mA LDO with low $I_q$ , tight output regulation (2% typ). Offers excellent line and load transient performance

## PMICs

Description	Device	Key Benefits
PMU	TPS650250	• Low-cost PMU for AM335x processor
PMU	TPS65250	• Power management IC with "last gasp" storage and release circuit

## Voltage Supervisor & Reset

Description	Device	Key Benefits
Voltage Supervisor	TPS3831/9	• Ultra-low power 150nA, ultra-small voltage supervisor
Voltage Supervisor	TPS3700	• UV, OV voltage monitor; wide input voltage
Voltage Supervisor	TPS3808	• Highly accurate (0.5% typ) supervisor with low $I_q$ and adjustable reset delay

[www.ti.com/smartgrid](http://www.ti.com/smartgrid)

[www.ti.com/tool/tmdsdc3359](http://www.ti.com/tool/tmdsdc3359)

**Important Notice:** The products and services of Texas Instruments Incorporated and its subsidiaries described herein are sold subject to TI's standard terms and conditions of sale. Customers are advised to obtain the most current and complete information about TI products and services before placing orders. TI assumes no liability for applications assistance, customer's applications or product designs, software performance, or infringement of patents. The publication of information regarding any other company's products or services does not constitute TI's approval, warranty or endorsement thereof.

The platform bar, C2000, D-CAP2, DSP/BIOS, Piccolo, Sitara and Tiva are trademarks of Texas Instruments. All other trademarks are the property of their respective owners.

C090712

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

### Products

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
OMAP Applications Processors	<a href="http://www.ti.com/omap">www.ti.com/omap</a>
Wireless Connectivity	<a href="http://www.ti.com/wirelessconnectivity">www.ti.com/wirelessconnectivity</a>

### Applications

Automotive and Transportation	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Energy and Lighting	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
Space, Avionics and Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>

### TI E2E Community

[e2e.ti.com](http://e2e.ti.com)

# Mouser Electronics

Authorized Distributor

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

[Texas Instruments:](#)

[TMDSDC3359](#)