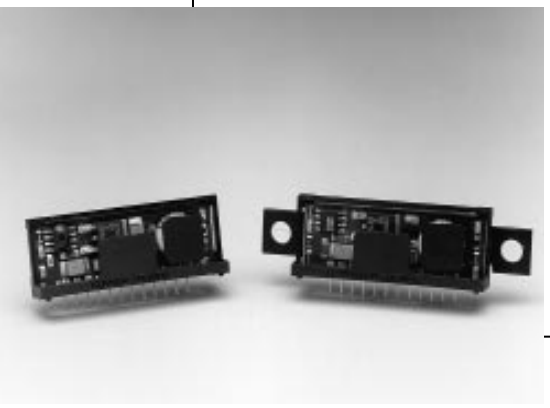
PT6305 Series

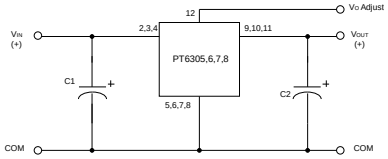
3 AMP HIGH-PERFORMANCE ADJUSTABLE ISR



- Single-Device 5V to 3V Power
- 85% Efficiency
- Small SIP Footprint: 0.36" x 2.00" x 0.60"(H)
- Wide Input Voltage Range: +4.5V to +9.0V
- Internal Short Circuit Protection
- Over-Temperature Protection

The PT6305N is Power Trends' new high performance +5V to +3.3V, 3 Amp, 12-Pin SIP (Single In-line-Package) Integrated Switching Regulator (ISR). This high-performance ISR allows easy integration of low-power 3.3V logic IC's into existing 5V systems without redesigning the central power supply. Only one external capacitor is required for proper operation. The PT6306,7,8 can be used to power high-speed data buses (+2.1V), or the new GTL (+1.2V) logic buses.

Standard Application

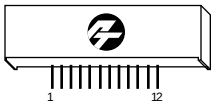


C_1 = Optional electrolytic (100µF)
C_2 = Required 100µF electrolytic (No tantalum)
See capacitor application note on page 43.

Pin-Out Information

Pin No.	Function
1	N/C
2	V_{in}
3	V_{in}
4	V_{in}
5	GND
6	GND

Pin No.	Function
7	GND
8	GND
9	V_{out}
10	V_{out}
11	V_{out}
12	Adjust (See page 40.)



Ordering Information

PT6305□ = +3.3 Volts
PT6306□ = +1.8 Volts
PT6307□ = +2.1 Volts
PT6308□ = +1.2 Volts
(For dimensions, see page 66.)

PT Series Suffix (PT1234X)

Case/Pin Configuration	Heat Tab Configuration: *None*	*Side*
Vertical Through-Hole	N	R
Horizontal Through-Hole	A	G
Horizontal Surface Mount	C	B

(See Thermal Application Notes on page 44 for heat tab application data.)

Specifications

Characteristics (T_a=25°C unless noted)	Symbols	Conditions		PT6305 SERIES Min	Typ	Max	Units
Output Current	I_o	4.5 ≤ V_{in} ≤ V_{in} MAX		0.3	—	3.0**	ADC
Current Limit	I_{cl}	V_{in} = +5V		—	3.6	5.0	ADC
Short Circuit Current	I_{sc}	V_{in} = +5V		—	5.0	—	Apk
Input Voltage Range	V_{in}	0.3A ≤ I_o ≤ 3.0A	PT6305N PT6306N PT6307N PT6308N	4.5 4.5 4.5 4.5	— — — —	9 9 9 6.0	VDC VDC VDC VDC
Static Voltage Tolerance	V_o	V_{in} = +5V, I_o = 3.0A 0°C ≤ T_a ≤ +70°C	PT6305N PT6306N PT6307N PT6308N	3.2 1.7 2.0 1.1	3.3 1.8 2.1 1.2	3.4 1.9 2.2 1.3	VDC VDC VDC VDC
Line Regulation	Reg_{line}	4.5V ≤ V_{in} ≤ 5.5V, I_o = 3.0A		—	±25	±50	mV
Load Regulation	Reg_{load}	V_{in} = +5V, 0.3 ≤ I_o ≤ 3.0A		—	±25	±50	mV
V_o Ripple/Noise pk-pk	V_n	V_{in} = 5V, I_o = 3.0A		—	66	—	mV
Transient Response with C_2 = 100µF	t_{tr} V_{os}	I_o step between 1.5A and 3.0A V_o over/undershoot		— —	200 200	— —	µSec mV
Efficiency	η	V_{in} = +5V, I_o = 1.5A	PT6305N PT6306N PT6307N PT6308N	— — — —	85 74 77 63	— — — —	% % % %
		V_{in} = +5V, I_o = 3.0A	PT6305N PT6306N PT6307N PT6308N	— — — —	80 68 72 57	— — — —	% % % %
Switching Frequency	f_o	4.5 ≤ V_{in} ≤ V_{in} MAX 0.3A ≤ I_o ≤ 3.0A		500	650	800	KHz
Operating Temperature	T_a	Free Air Convection (40-60 LFM) Over V_{in} and I_o Ranges		0	—	+70*	°C
Thermal Resistance	θ_{ja}	Free Air Convection (40-60 LFM)		—	25	—	°C/W
Storage Temperature	T_s	—		-40	—	+125	°C
Mechanical Shock	Per Mil-STD-883D, Method 2002.3 Condition A, 1 msec, Half Sine, mounted to a fixture			—	—	500	G's
Mechanical Vibration	Per Mil-STD-883D, Method 2007.2 Condition A, 20-2000 Hz			—	—	15	G's
Weight	—	—		—	11.2	—	grams
Relative Humidity	—	Non-condensing		0	—	95	%

*See Thermal Derating chart. **The PT6305 Series can be easily paralleled to provide output current in multiples of 3 amps. Please contact a Power Trends' Application Engineer for the appropriate application note. ***Note:*** *The PT6305 Series requires a 100µF electrolytic capacitor for proper operation in all applications.*

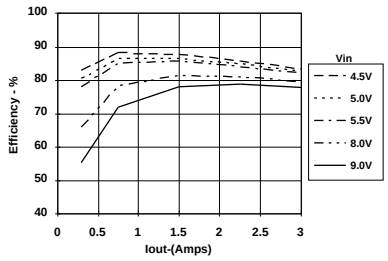
Power Trends, Inc. 27715 Diehl Road, Warrenville, IL 60555 **(800) 531-5782** Fax: (630) 393-6902

CHARACTERISTIC DATA

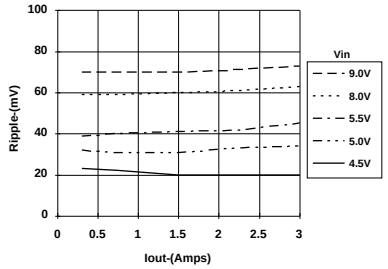
PT6305, 3.3 VDC

(See Note 1)

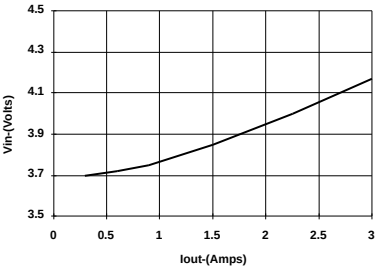
Efficiency vs Output Current



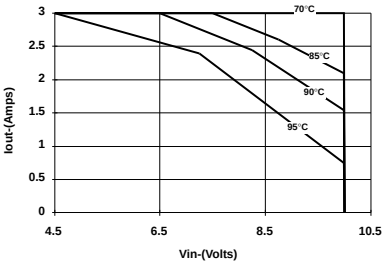
Ripple vs Output Current



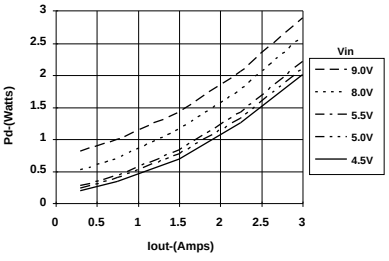
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)



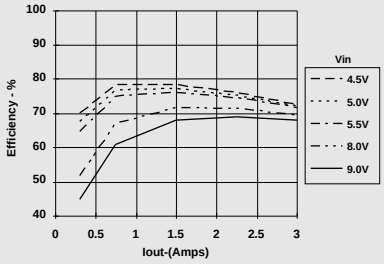
Power Dissipation vs Output Current



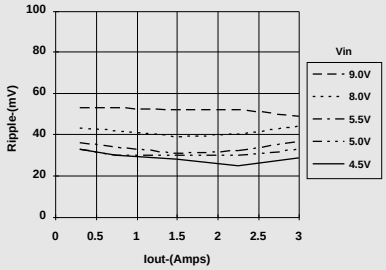
PT6307, 2.1 VDC

(See Note 1)

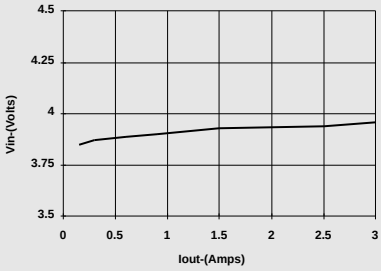
Efficiency vs Output Current



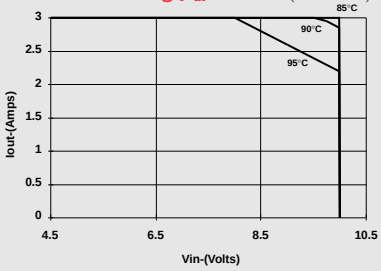
Ripple vs Output Current



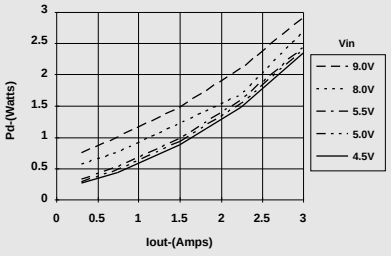
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)



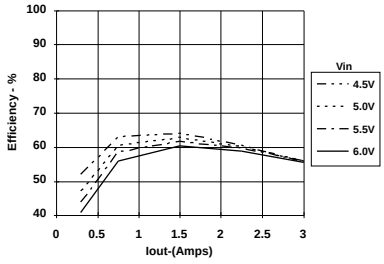
Power Dissipation vs Output Current



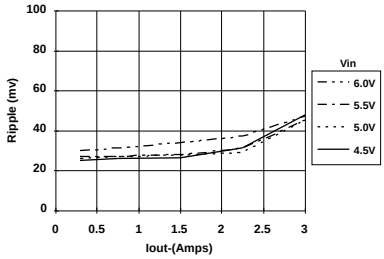
PT6308, 1.2 VDC

(See Note 1)

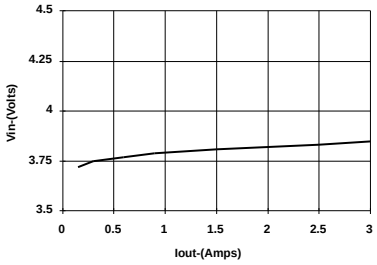
Efficiency vs Output Current



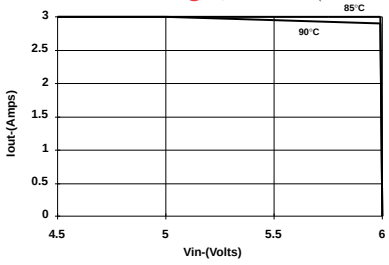
Ripple vs Output Current



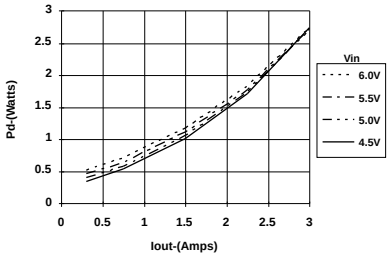
Minimum Input Voltage (See Note 2)



Thermal Derating (T_a) (See Note 3)



Power Dissipation vs Output Current



Note 1: *All data listed in the above graphs, except for derating data, has been developed from actual products tested at 25°C. This data is considered typical data for the ISR.*
Note 2: *Minimum V_{in} data is typical and is not guaranteed. The data corresponds to a 2% output voltage drop.*
Note 3: *Thermal derating graphs are developed in free air convection cooling of 40-60 LFM with no optional heat tab soldered in a printed circuit board. (See Thermal Application Notes).*

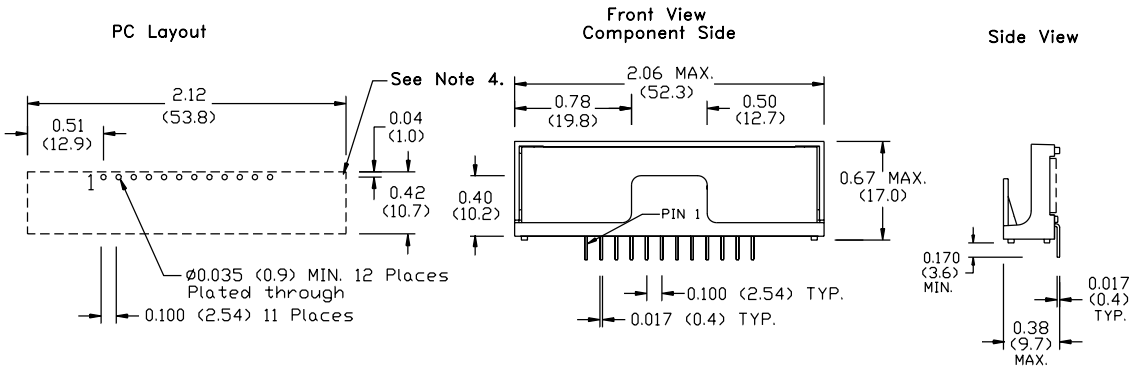
Product families using this package style:
PT6400
PT5060

Package Style 300
Suffix A, C, D, E, N, P

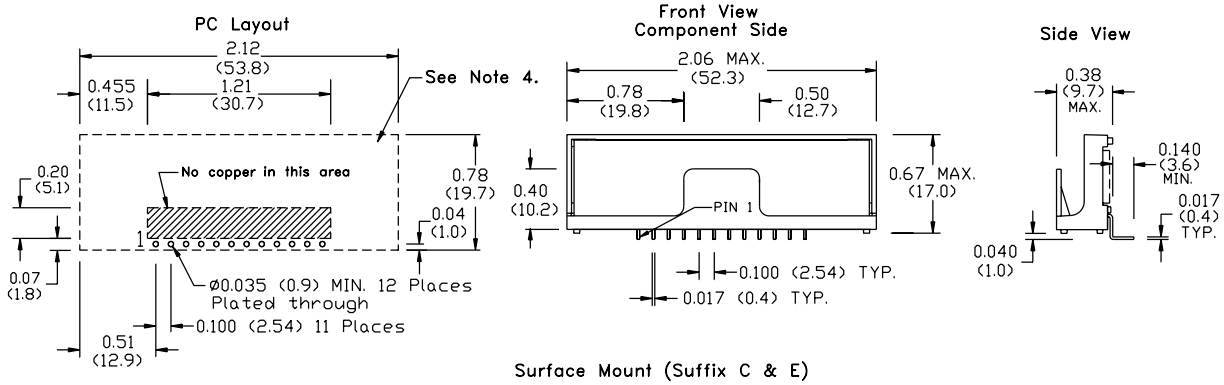
PACKAGE INFORMATION AND DIMENSIONS

Revised 2/11/2000

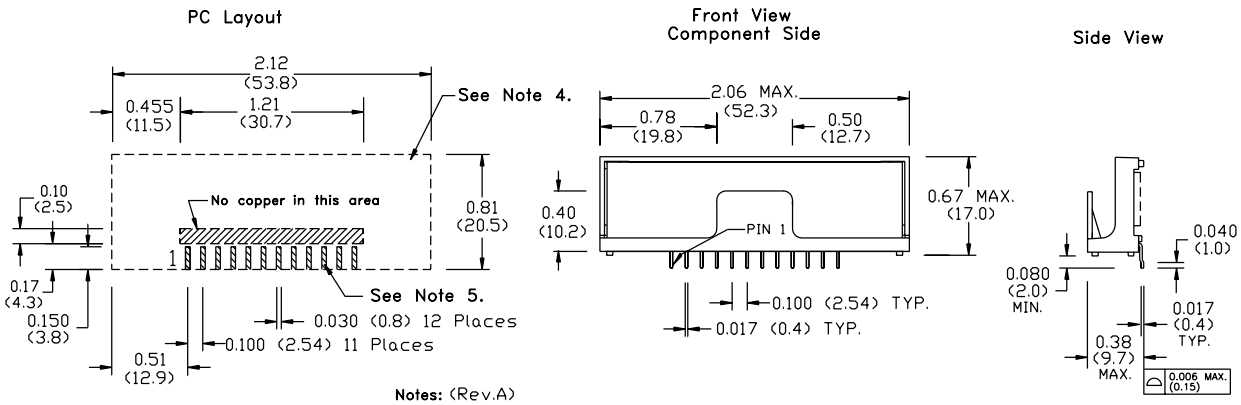
Vertical Through-Hole Mount (Suffix N & P)



Horizontal Through-Hole Mount (Suffix A & D)



Surface Mount (Suffix C & E)



Notes: (Rev.A)

1: All dimensions are in inches (mm).
2: 2 place decimals are ±.030 (±0.8mm).
3: 3 place decimals are ±.010 (±0.3mm).
4: Recommended mechanical keep out area.
5: Power pin connections should utilize two or more vias per input, ground and output pin.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
PT6306A	OBSOLETE	SIP MODULE	ECA	12		TBD	Call TI	Call TI	0 to 70		
PT6306B	OBSOLETE	SIP MODULE	ECK	12		TBD	Call TI	Call TI	0 to 70		
PT6306C	OBSOLETE	SIP MODULE	ECC	12		TBD	Call TI	Call TI	0 to 70		
PT6306G	OBSOLETE	SIP MODULE	ECG	12		TBD	Call TI	Call TI	0 to 70		
PT6306R	OBSOLETE	SIP MODULE	ECE	12		TBD	Call TI	Call TI	0 to 70		

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Pb-Free (RoHS Exempt): This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead/Ball Finish - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead/Ball Finish values may wrap to two lines if the finish value exceeds the maximum column width.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and

continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals.
TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

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		**Applications**	
Audio	www.ti.com/audio	Automotive and Transportation	www.ti.com/automotive
Amplifiers	amplifier.ti.com	Communications and Telecom	www.ti.com/communications
Data Converters	dataconverter.ti.com	Computers and Peripherals	www.ti.com/computers
DLP® Products	www.dlp.com	Consumer Electronics	www.ti.com/consumer-apps
DSP	dsp.ti.com	Energy and Lighting	www.ti.com/energy
Clocks and Timers	www.ti.com/clocks	Industrial	www.ti.com/industrial
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Security	www.ti.com/security
Power Mgmt	power.ti.com	Space, Avionics and Defense	www.ti.com/space-avionics-defense
Microcontrollers	microcontroller.ti.com	Video and Imaging	www.ti.com/video
RFID	www.ti-rfid.com		
OMAP Applications Processors	www.ti.com/omap	**TI E2E Community**	e2e.ti.com
Wireless Connectivity	www.ti.com/wirelessconnectivity		

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265