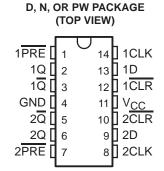
74AC11074 DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCAS499A - DECEMBER 1986 - REVISED APRIL 1996

- Center-Pin V_{CC} and GND Configurations
 Minimize High-Speed Switching Noise
- EPIC™ (Enhanced-Performance Implanted CMOS) 1-µm Process
- 500-mA Typical Latch-Up Immunity at 125°C
- Package Options Include Plastic Small-Outline (D) and Thin Shrink Small-Outline (PW) Packages, and Standard Plastic 300-mil DIPs (N)



description

This device contains two independent positive-edge-triggered D-type flip-flops. A low level at the preset (\overline{PRE}) or clear (\overline{CLR}) input sets or resets the outputs regardless of the levels of the other inputs. When \overline{PRE} and \overline{CLR} are inactive (high), data at the data (D) input that meets the setup-time requirements are transferred to the outputs on the low-to-high transition of the clock (CLK) pulse. Clock triggering occurs at a voltage level and is not directly related to the rise time of the clock pulse. Following the hold-time interval, data at the D input may be changed without affecting the levels at the outputs.

The 74AC11074 is characterized for operation from -40°C to 85°C.

FUNCTION TABLE

	INP	UTS		OUTPUT			
PRE	CLR	CLK	D	Q	Q		
L	Н	Х	Χ	Н	L		
Н	L	X	Χ	L	Н		
L	L	X	Χ	н†	H [†]		
Н	Н	1	Н	Н	L		
Н	Н	1	L	L	Н		
Н	Н	L	Χ	Q_0	\overline{Q}_0		

[†] This configuration is nonstable; that is, it does not persist when $\overline{\mathsf{PRE}}$ or $\overline{\mathsf{CLR}}$ returns to its inactive (high) level.



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

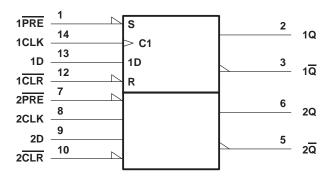
EPIC is a trademark of Texas Instruments Incorporated



74AC11074 DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCAS499A - DECEMBER 1986 - REVISED APRIL 1996

logic symbol[†]



[†] This symbol is in accordance with ANSI/IEEE Std 91-1984 and IEC Publication 617-12.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)‡

Supply voltage range, V _{CC}	–0.5 V to 7 V
Input voltage range, V _I (see Note 1)	$-0.5 \text{ V to V}_{CC} + 0.5 \text{ V}$
Output voltage range, V _O (see Note 1)	$-0.5 \text{ V to V}_{CC} + 0.5 \text{ V}$
Input clamp current, I_{IK} ($V_I < 0$ or $V_I > V_{CC}$)	±20 mA
Output clamp current, I _{OK} (V _O < 0 or V _O > V _{CC})	±50 mA
Continuous output current, I_O ($V_O = 0$ to V_{CC})	±50 mA
Continuous current through V _{CC} or GND	±100 mA
Maximum power dissipation at $T_A = 55^{\circ}C$ (in still air) (see Note 2): D package	1.25 W
N package	1.1 W
PW package	0.5 W
Storage temperature range, T _{stg}	65°C to 150°C

[‡] Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES: 1. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.
 - 2. The maximum package power dissipation is calculated using a junction temperature of 150°C and a board trace length of 750 mils, except for the N package, which has a trace length of zero.



recommended operating conditions

			MIN	NOM	MAX	UNIT
Vcc	Supply voltage		3	5	5.5	V
		V _{CC} = 3 V	2.1			
\vee_{IH}	High-level input voltage	$V_{CC} = 4.5 V$	3.15			V
		$V_{CC} = 5.5 V$	3.85			
		V _{CC} = 3 V			0.9	
VIL	Low-level input voltage	V _{CC} = 4.5 V			1.35	V
		$V_{CC} = 5.5 V$			1.65	
VI	Input voltage		0		V_{CC}	V
Vo	Output voltage		0		VCC	V
		V _{CC} = 3 V			-4	
loh	High-level output current	$V_{CC} = 4.5 \text{ V}$			-24	mA
VO		V _{CC} = 5.5 V			-24	
		V _{CC} = 3 V			12	
loL	Low-level output current	V _{CC} = 4.5 V			24	mA
		V _{CC} = 5.5 V			24	
Δt/Δν	Input transition rise or fall rate		0		10	ns/V
TA	Operating free-air temperature		-40		85	°C

electrical characteristics over recommended operating free-air temperature range (unless otherwise noted)

DADAMETER	TEST CONDITIONS	W	T,	Վ = 25°C	;	MINI	MAY	LINUT
PARAMETER	TEST CONDITIONS	vcc	MIN	TYP	MAX	MIN	MAX	UNIT
		3 V	2.9			2.9		
	I _{OH} = -50 μA	4.5 V	4.4			4.4		
		5.5 V	5.4			5.4		
Voн	$I_{OH} = -4 \text{ mA}$	3 V 2.58						V
		4.5 V	3.94			3.8		
	$I_{OH} = -24 \text{ mA}$	5.5 V	4.94			4.8		
	$I_{OH} = -75 \text{ mA}^{\dagger}$	5.5 V				3.85		
		3 V			0.1		0.1	
	I _{OL} = 50 μA	4.5 V			0.1		0.1	
		5.5 V			0.1		0.1	
VOL	I _{OL} = 12 mA	3 V			0.36		0.44	V
		4.5 V			0.36		0.44	
	I _{OL} = 24 mA	5.5 V			0.36		0.44	
	$I_{OL} = 75 \text{ mA}^{\dagger}$	5.5 V					1.65	
lį	V _I = V _{CC} or GND	5.5 V			±0.1		±1	μΑ
Icc	$V_I = V_{CC}$ or GND, $I_O = 0$	5.5 V			4		40	μΑ
C _i	V _I = V _{CC} or GND	5 V		3.5				pF

[†] Not more than one output should be tested at a time, and the duration of the test should not exceed 10 ms.

74AC11074 DUAL POSITIVE-EDGE-TRIGGERED D-TYPE FLIP-FLOP WITH CLEAR AND PRESET

SCAS499A - DECEMBER 1986 - REVISED APRIL 1996

timing requirements over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (see Figure 1)

			$T_A = 2$	25°C		BAAV	
			MIN	MAX	MIN	MAX	UNIT
fclock	Clock frequency		0	100	0	100	MHz
	Dulas direction	PRE or CLR low			4		
t _W	Pulse duration	CLK low or high	5		5		ns
		Data high or low	5		5		
t _{su}	Setup time before CLK↑	1		1		ns	
th	Hold time after CLK↑		0		0		ns

timing requirements over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (see Figure 1)

			T _A = 2	25°C	MIN	MAY	
		MIN	MAX	IVIIN	MAX	UNIT	
fclock	Clock frequency		0	125	0	125	MHz
	Dalam danafan	PRE or CLR low	4		4		
t _W	Pulse duration	CLK low or CLK high	4		4		ns
		Data high or low	3.5		3.5		
t _{su}	Setup time before CLK↑	PRE or CLR inactive	1		1		ns
th	Hold time after CLK↑		0		0		ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 3.3 V \pm 0.3 V (unless otherwise noted) (see Figure 1)

DADAMETED	FROM	то	T,	_Δ = 25°C	;		MAY	
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	UNIT
f _{max}			100	125		100		MHz
t _{PLH}	PRE or CLR	0 0 7 0	1.5	5.8	9.3	1.5	10	
t _{PHL}	PRE OF CLR	Q or Q	1.5	6.5	11.4	1.5	12.2	ns
t _{PLH}	011	0 0 7 0	1.5	7.7	10.5	1.5	11.3	20
^t PHL	CLK	Q or Q	1.5	7.3	9.7	1.5	10.6	ns

switching characteristics over recommended operating free-air temperature range, V_{CC} = 5 V \pm 0.5 V (unless otherwise noted) (see Figure 1)

24244555	FROM	то	T,	ղ = 25°C	;			
PARAMETER	(INPUT)	(OUTPUT)	MIN	TYP	MAX	MIN	MAX	UNIT
f _{max}			125	150		125		MHz
^t PLH	PRE or CLR	0 0 7 0	1.5	4.2	6.6	1.5	7.1	
^t PHL		Q or Q	1.5	4.7	8.2	1.5	9	ns
t _{PLH}	OL IX	0 01 0	1.5	5.4	7.5	1.5	8.2	20
^t PHL	CLK	Q or Q	1.5	5	6.9	1.5	7.5	ns

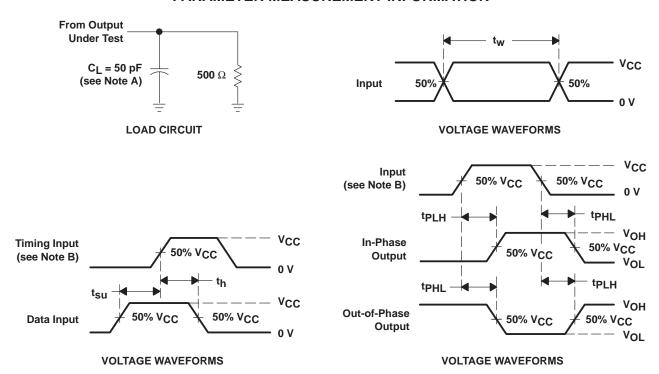
operating characteristics, V_{CC} = 5 V, T_A = 25°C

	PARAMETER	TEST CO	TYP	UNIT	
C _{pd}	Power dissipation capacitance	C _L = 50 pF,	f = 1 MHz	30	pF



SCAS499A - DECEMBER 1986 - REVISED APRIL 1996

PARAMETER MEASUREMENT INFORMATION



NOTES: A. C_L includes probe and jig capacitance.

- B. All input pulses are supplied by generators having the following characteristics: PRR \leq 10 MHz, $Z_O = 50 \Omega$, $t_f = 3 \text{ ns}$, $t_f = 3 \text{ ns}$.
- C. The outputs are measured one at a time with one input transition per measurement.

Figure 1. Load Circuit and Voltage Waveforms

PACKAGE OPTION ADDENDUM

www.ti.com 11-Nov-2009

PACKAGING INFORMATION

Orderable Device	Status ⁽¹⁾	Package Type	Package Drawing	Pins	Packag Qty	e Eco Plan ⁽²⁾	Lead/Ball Finish	MSL Peak Temp ⁽³⁾
74AC11074D	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074DE4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074DG4	ACTIVE	SOIC	D	14	50	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074DR	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074DRE4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074DRG4	ACTIVE	SOIC	D	14	2500	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074N	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
74AC11074NE4	ACTIVE	PDIP	N	14	25	Pb-Free (RoHS)	CU NIPDAU	N / A for Pkg Type
74AC11074PWLE	OBSOLETE	TSSOP	PW	14		TBD	Call TI	Call TI
74AC11074PWR	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074PWRE4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM
74AC11074PWRG4	ACTIVE	TSSOP	PW	14	2000	Green (RoHS & no Sb/Br)	CU NIPDAU	Level-1-260C-UNLIM

⁽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.

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.



PACKAGE OPTION ADDENDUM

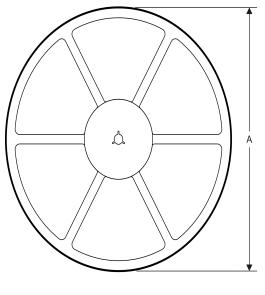
11-Nov-2009 www.ti.com In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

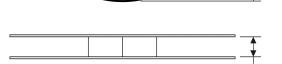
PACKAGE MATERIALS INFORMATION

www.ti.com 14-Jul-2012

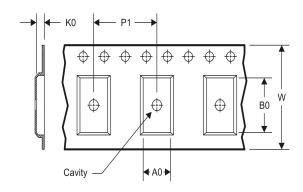
TAPE AND REEL INFORMATION

REEL DIMENSIONS





TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
В0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

TAPE AND REEL INFORMATION

*All dimensions are nominal

Device	Package Type	Package Drawing		SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
74AC11074DR	SOIC	D	14	2500	330.0	16.4	6.5	9.0	2.1	8.0	16.0	Q1
74AC11074PWR	TSSOP	PW	14	2000	330.0	12.4	6.9	5.6	1.6	8.0	12.0	Q1

www.ti.com 14-Jul-2012



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
74AC11074DR	SOIC	D	14	2500	367.0	367.0	38.0
74AC11074PWR	TSSOP	PW	14	2000	367.0	367.0	35.0

N (R-PDIP-T**)

PLASTIC DUAL-IN-LINE PACKAGE

16 PINS SHOWN



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Falls within JEDEC MS-001, except 18 and 20 pin minimum body length (Dim A).
- The 20 pin end lead shoulder width is a vendor option, either half or full width.



D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in inches (millimeters).
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0.006 (0,15) each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0.017 (0,43) each side.
- E. Reference JEDEC MS-012 variation AB.



D (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE

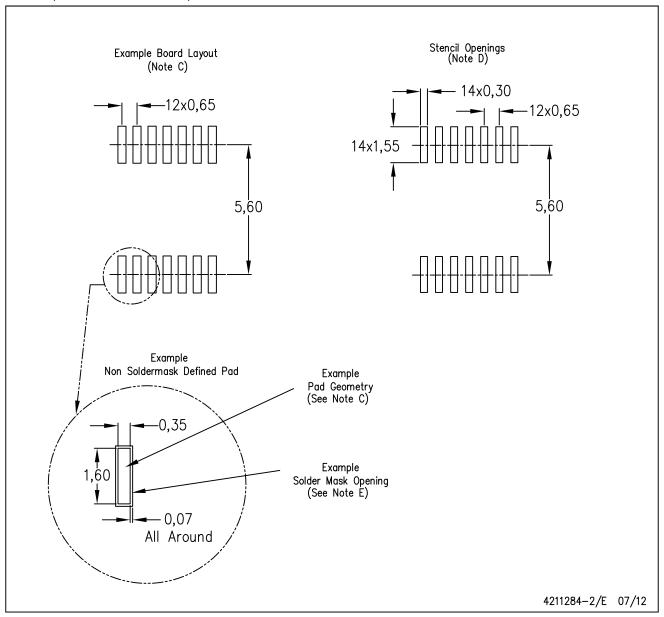


- A. All linear dimensions are in millimeters. Dimensioning and tolerancing per ASME Y14.5M—1994.
- B. This drawing is subject to change without notice.
- Body length does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed 0,15 each side.
- Body width does not include interlead flash. Interlead flash shall not exceed 0,25 each side.
- E. Falls within JEDEC MO-153



PW (R-PDSO-G14)

PLASTIC SMALL OUTLINE



- A. All linear dimensions are in millimeters.
- B. This drawing is subject to change without notice.
- C. Publication IPC-7351 is recommended for alternate designs.
- D. Laser cutting apertures with trapezoidal walls and also rounding corners will offer better paste release. Customers should contact their board assembly site for stencil design recommendations. Refer to IPC-7525 for other stencil recommendations.
- E. Customers should contact their board fabrication site for solder mask tolerances between and around signal pads.



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 which meet ISO/TS16949 requirements, mainly for automotive use. Components which have not been so designated are neither designed nor intended for automotive use; and TI will not be responsible for any failure of such components to meet such requirements.

Products Applications

Audio Automotive and Transportation www.ti.com/automotive www.ti.com/audio **Amplifiers** amplifier.ti.com Communications and Telecom www.ti.com/communications **Data Converters** dataconverter.ti.com Computers and Peripherals www.ti.com/computers DI P® Products Consumer Electronics www.dlp.com 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/medical Interface interface.ti.com Medical www.ti.com/security

Power Mgmt <u>power.ti.com</u> Space, Avionics and Defense <u>www.ti.com/space-avionics-defense</u>

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 <u>www.ti.com/wirelessconnectivity</u>