200mA PCI LDO

FEATURES

- **Glitch-Free Transition Between Input Sources**
- **Automatic Input Source Selection**
- **External PMOS Bypass Switch Control**
- **Built-In 5V Detector**
- **1% Regulated Output Voltage Accuracy**
- **200mA Load Current Capability**
- **Kelvin Sense Input**
- **Low Dropout Voltage (240mV @ Full Load)**
- **Low Ground Current, Independent of Load**

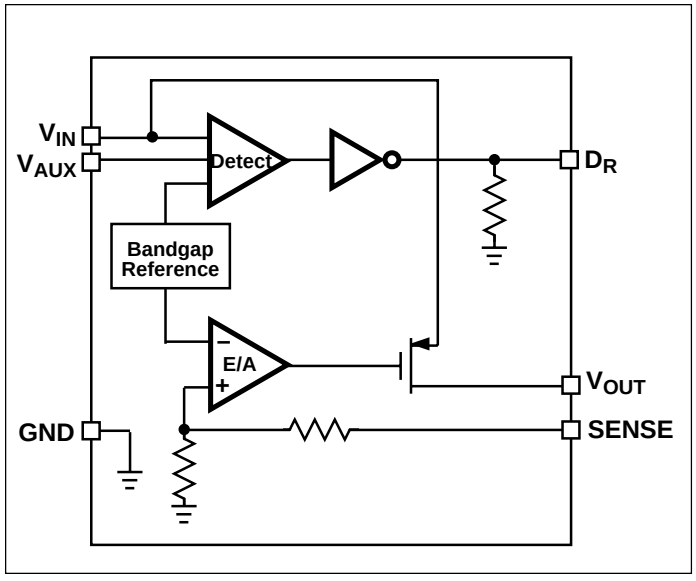
APPLICATIONS

- **PCMCIA**
- **COMPAQ PCI**
- **PCI**
- **Network Interface Cards (NICs)**
- **Cardbus™ Technology**

ORDERING INFORMATION

Part No.	Package	Temperature Range (Tj)
TC1266VOA	8-Pin SOIC (Narrow)	–5°C to +125°C
TC1266VUA	8-Pin MSOP	–5°C to +125°C

BLOCK DIAGRAM

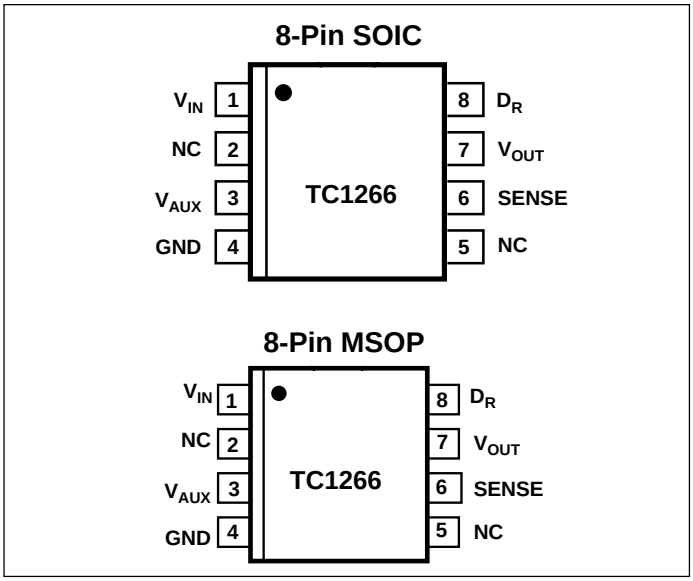


GENERAL DESCRIPTION

The TC1266 is an application-specific, low dropout regulator (LDO) specifically intended for use in PCI peripheral card applications complying with PCI Power Management (PCI 2.0). It provides an uninterrupted, 3.3V, 200mA (max) output voltage when the main (5V) or auxiliary (3.3V) input voltage supplies are present.

The TC1266 consists of an LDO, a voltage threshold detector, external switchover logic and gate drive circuitry. It functions as a conventional LDO as long as the voltage on the main supply input (V_{IN}) is above the lower threshold (3.90V typ). Should the voltage on V_{IN} fall below the lower threshold the LDO is disabled, and an external P-channel MOSFET is automatically turned on, connecting the auxiliary supply input to V_{OUT}, and ensuring an uninterrupted 3.3V output. The main supply is automatically selected if both the main and auxiliary input supplies are present, and transition from one input supply to the other is guaranteed glitch-free. High integration, automatic secondary supply switchover, Kelvin sensing, and small size make the TC1266 the optimum LDO for PCI 2.0 applications.

PIN CONFIGURATION



TC1266

ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage (V_{IN}) ..... –0.5V to + 7V (Max)
Auxiliary Supply Voltage (V_{AUX}) ..... –0.5V to + 7V (Max)
LDO Output Current (I_{OUT}) 200mA
Operating Temperature Range (T_A) ..... –5°C to +70°C
Storage Temperature Range (T_{STG}) ..... –65°C to +150°C
Lead Temperature (Soldering, 10 Sec) ..... 300 °C
Thermal Impedance Junction-to-Ambient (θ_{JA}) ..... 130°C/W for SOIC
ESD Rating ..... 2 KV

Static-sensitive device. Unused devices must be stored in conductive material. Protect devices from static discharge and static fields. Stresses above 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 above those indicated in the operational sections of the specifications is not implied. Exposure to Absolute Maximum Rating Conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS: T_A = +25°C, V_{IN} = 5V, V_{AUX} = 3.3V, I_{OUT} = 0.1mA, C_{OUT} = 4.7µF, unless otherwise specified. Values in **BOLD** apply over full operating temperature range.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{IN}	Supply Voltage	V_{AUX} = 0V	**4.3**	**5.0**	**5.5**	V
I_{GND}	GROUND Current	V_{AUX} = 0V, (Note 6)	—	230	**450**	µA
		V_{AUX} = 3.3V, (Note 6)	—	260	**500**	
I_{VIN}	Reverse Leakage from V_{AUX}	V_{AUX} = 3.6V, V_{IN} = 0V, I_{OUT} = 0 mA	—	–0.1	**–1.0**	µA
V_{AUX}	Supply Voltage		**3.0**	**3.3**	**3.6**	V
$I_{Q(AUX)}$	Quiescent Current	V_{IN} = 0V, I_{OUT} = 0 mA	—	50	70	µA
			—	—	**100**	
		V_{IN} = 5V, I_{OUT} = 0 mA	—	60	80	
			—	—	**120**	
I_{VAUX}	Reverse Leakage from V_{IN}	V_{IN} = 5.5V, V_{AUX} = 0V, I_{OUT} = 0 mA	—	–0.1	**–1.0**	µA
$V_{TH(LO)}$	5V Detector Low Threshold Voltage	V_{IN} Falling (Notes 2, 3)	—	3.90	—	V
			3.75	—	**4.05**	
V_{HYST}	5V Detector Hysteresis Voltage	(Notes 2, 3)	—	260	—	mV
			200		**300**	
$V_{TH(HI)}$	5V Detector High Threshold Voltage	V_{IN} Rising (Notes 2, 3)	—	4.15	**—**	V
			4.0	—	**4.30**	
V_{OUT}	LDO Output Voltage	I_{OUT} = 20 mA	—	3.300	—	V
		4.3V ≤ V_{IN} ≤ 5.5V, 0 mA ≤ I_O ≤ 200mA	**3.234**	—	**3.366**	
		3.75V ≤ V_{IN} ≤ 4.3V, 0 mA ≤ I_{OUT} ≤ 200mA (Note 4)	**3.000**	—	—	
I_{OUT}	Output Current		200	—	—	mA
$REG_{(LINE)}$	Line Regulation	V_{IN} = 4.3V to 5.5V	—	0.05	—	%
			–0.5	—	**0.5**	
$REG_{(LOAD)}$	Load Regulation	I_{OUT} = 0.1 mA to 200mA	—	0.05	—	%
			–0.5	—	**0.5**	

ELECTRICAL CHARACTERISTICS: T_A = +25°C, V_{IN} = 5V, V_{AUX} = 3.3V, I_{OUT} = 0.1mA, C_{OUT} = 4.7µF, unless otherwise specified. Values in **BOLD** apply over full operating temperature range.

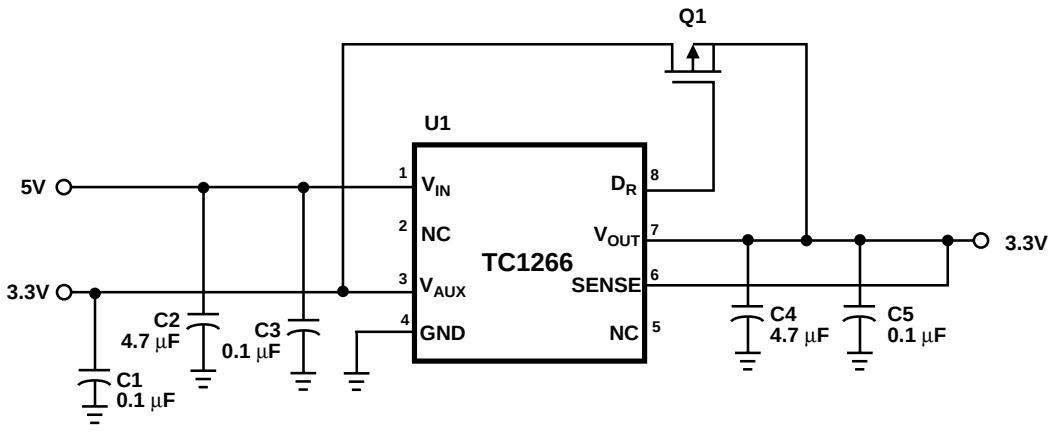
Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{DR}	Drive Voltage	4.3V ≤ V_{IN} ≤ 5.5V, I_{DR}=200µA	V_{IN} – 0.2	V_{IN} – 0.1	—	V
			V_{IN} – 0.3	—	—	
		V_{IN} < $V_{TH(LO)}$, I_{DR} = 200µA	—	35	150	mV
			—	—	**200**	
$I_{DR(PK)}$	Peak Drive Current	Sinking: V_{IN} = 3.75V, V_{DR} = 1V; Sourcing: V_{IN} = 4.3V, V_{IN}–V_{DR} = 2V	7	—	—	mA
			6	—	—	
t_{DH}	Drive High Delay (Notes 1,5)	C_{DR} = 1.2 nF, V_{IN} ramping up, measured from V_{IN} = $V_{TH(HI)}$ to V_{DR} = 2V	—	4	—	µsec
			—	—	**8**	
t_{DL}	Drive Low Delay (Notes 1,5)	C_{DR} = 1.2 nF, V_{IN} ramping down, measured from V_{IN} = $V_{TH(LO)}$ to V_{DR} = 2V	—	0.6	1.5	µsec
			—	—	**3.0**	

NOTES: 1. Guaranteed by design.
2. See 5V Detect Thresholds on page 4.
3. Recommended source impedance for 5V supply; ≤ 0.25Ω. This will ensure that I_{OUT} x R_{SOURCE} < V_{HYST}, thus avoiding D_R toggling during 5V detect threshold transitions.
4. In application circuit below.
5. See timing diagram on page 4.
6. Ground current is independent of I_{LOAD}.

PIN DESCRIPTION

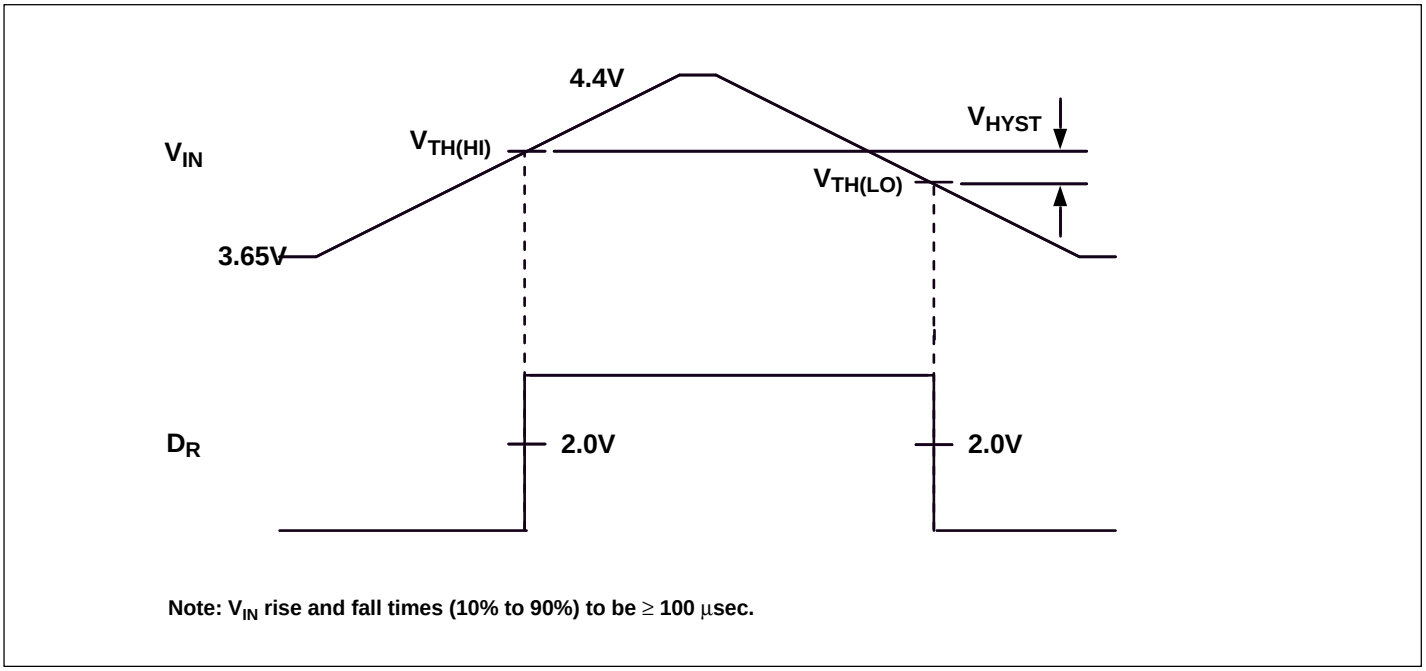
Pin Number	Name	Description
1	V_{IN}	Main Input Supply for the TC1266, nominally 5V.
2	NC	Not connected.
3	V_{AUX}	Auxiliary Input Supply, nominally 3.3V.
4	GND	Logic and power ground.
5	NC	Not connected.
6	SENSE	Sense Pin for V_{OUT}. Connect to V_{OUT} at the load to minimize voltage drop across PCB traces.
7	V_{OUT}	LDO 3.3V output.
8	D_R	Driver output for external P-channel MOSFET pass element.

APPLICATION CIRCUIT



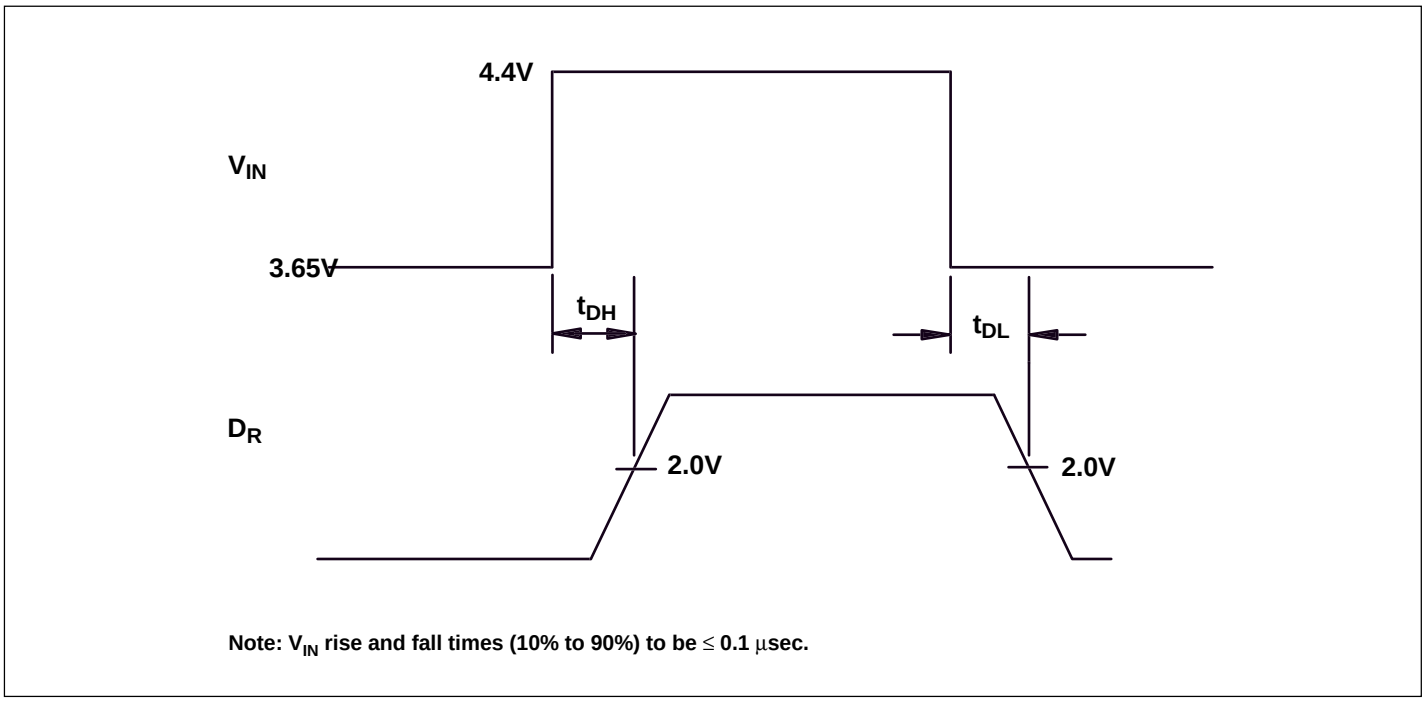
Note: External switch (Q1): use Motorola MGSF1P02ELT1 or equivalent (PMOS, typical Gate Threshold Voltage = 1V, typical $R_{DS(ON)}$ = 0.4Ω at VGS = 2.5V.)

TC1266



Note: V_{IN} rise and fall times (10% to 90%) to be ≥ 100 μsec.

Figure 1. 5V Detect Threshold

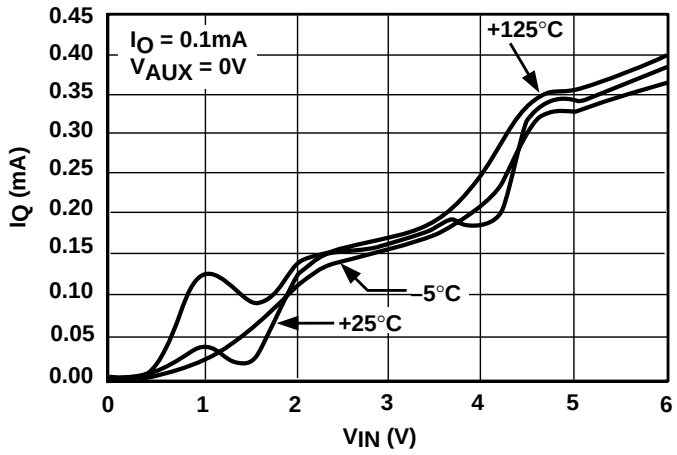


Note: V_{IN} rise and fall times (10% to 90%) to be ≤ 0.1 μsec.

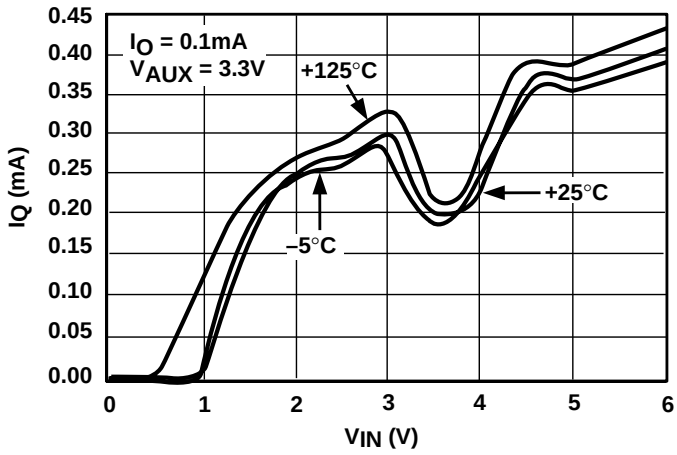
Figure 2. Timing Diagram

TYPICAL CHARACTERISTICS

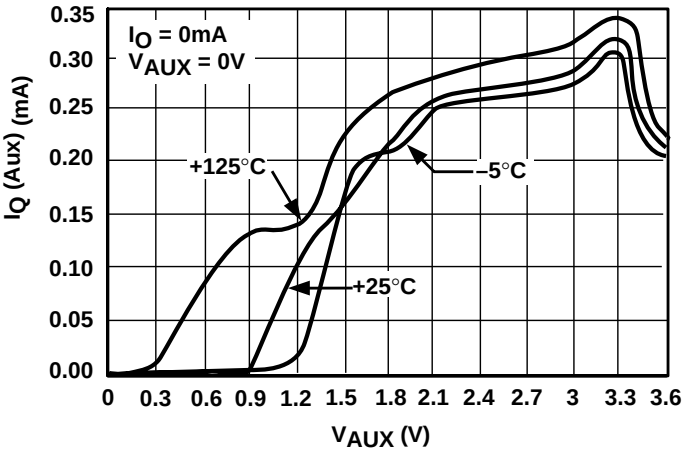
I_Q vs. V_{IN} vs. Junction Temperature



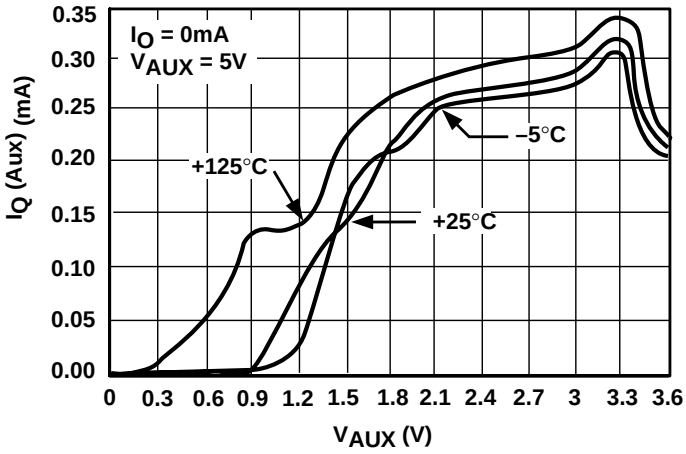
I_Q vs. V_{IN} vs. Junction Temperature



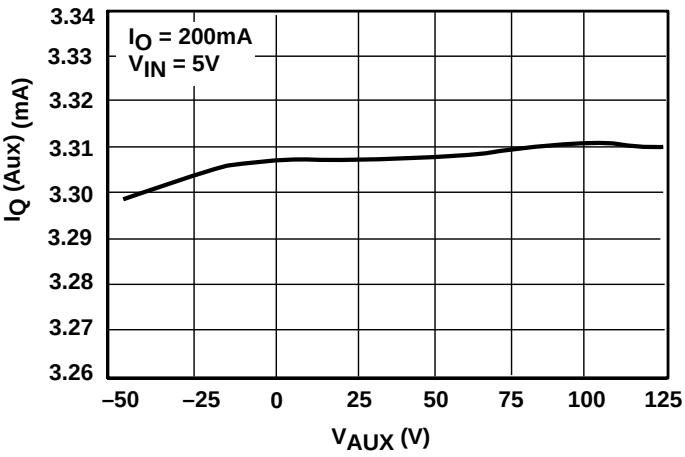
I_Q (Aux) vs. V_{AUX} vs. Junction Temperature



I_Q (Aux) vs. V_{AUX} vs. Junction Temperature



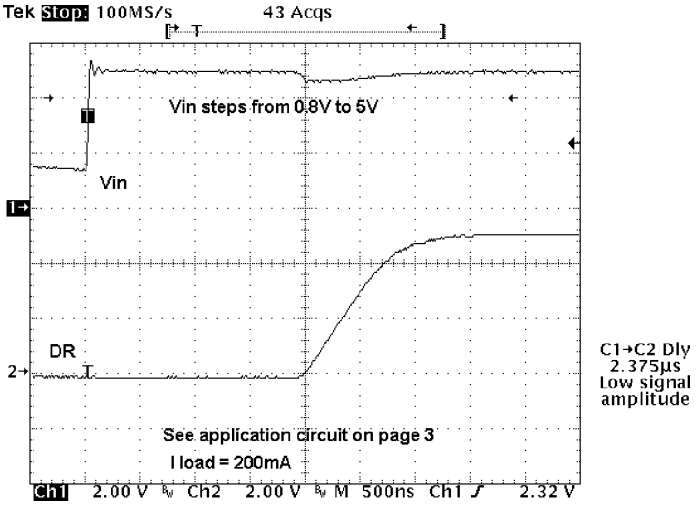
LDO Output Voltage vs. Junction Temperature



TC1266

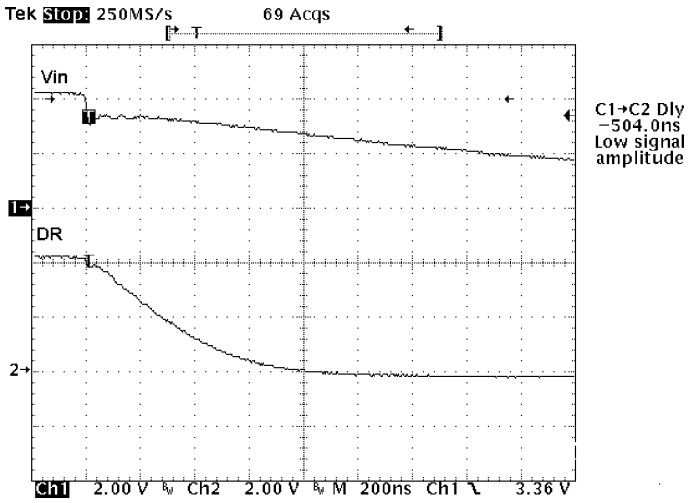
TYPICAL CHARACTERISTICS (CONT.)

Drive High Delay



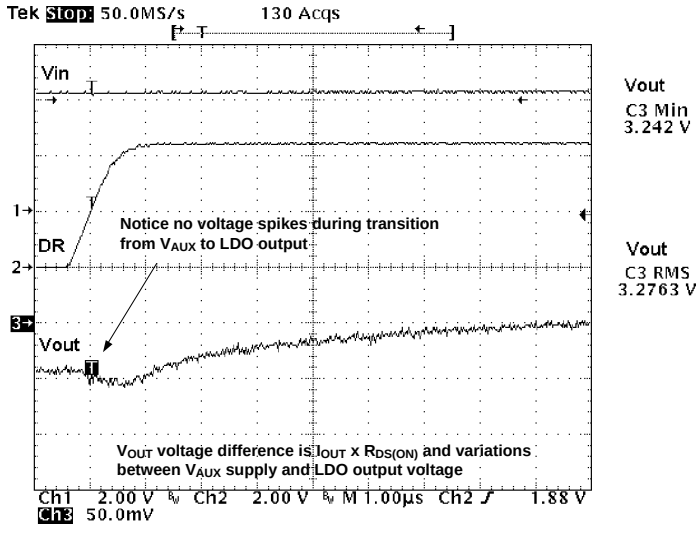
Trace 1: V_{IN} stepping for 0.8V to 5V
Trace 2: D_R going high at V_{TH}(Hi)
TdH = < 4µS

Drive Low Delay



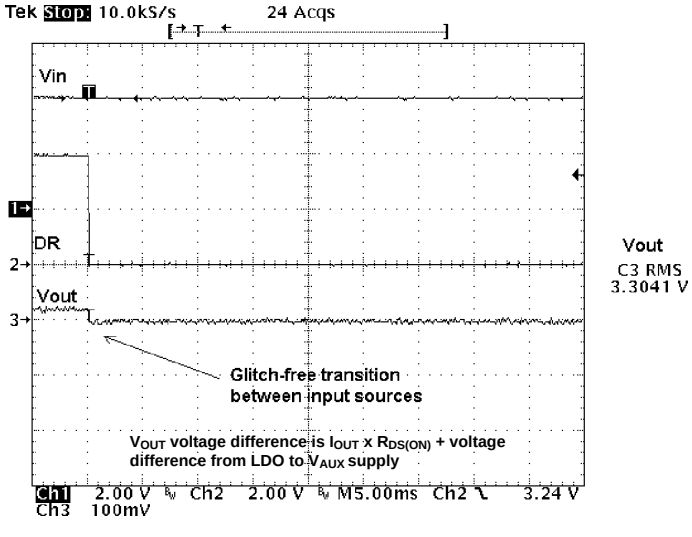
Trace 1: V_{IN} stepping for 5.5V to 0V
Trace 2: D_R going low
TDL = < 600nS

V_O (min) with V_{IN} Rising



Trace 1: V_{IN} – 3A charging a 1500µF capacitor
Trace 2: D_R going high at V_{TH} (HI)
Trace 3: V_{OUT}, offset 3.3V. V_{OUT} (min) = 3.24V
I_{LOAD} = 20mA

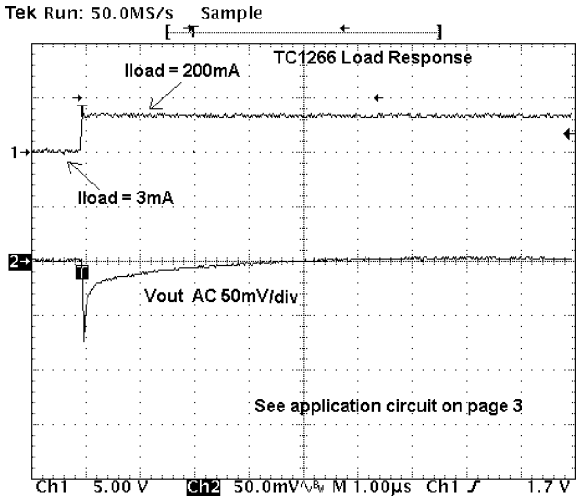
V_O (min) with V_{IN} Falling



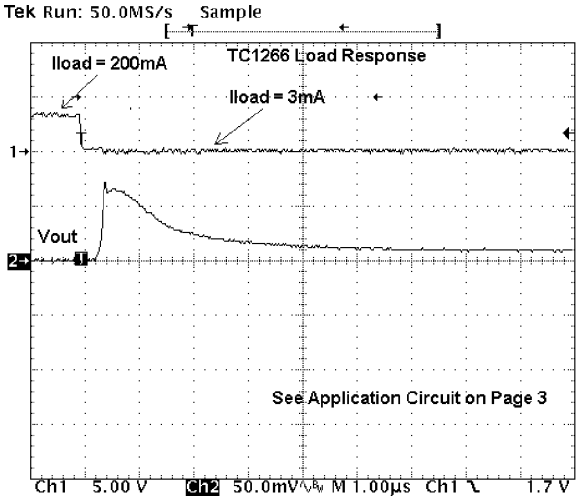
Trace 1: Vin – discharging a 1500µF capacitor
Trace 2: D_R going low at V_{TH} (LO)
Trace 3: V_{OUT}, offset 3.3V. V_{OUT} (min) = 3.14V
I_{LOAD} = 20mA

LOAD REGULATION

Load Response Rising Edge



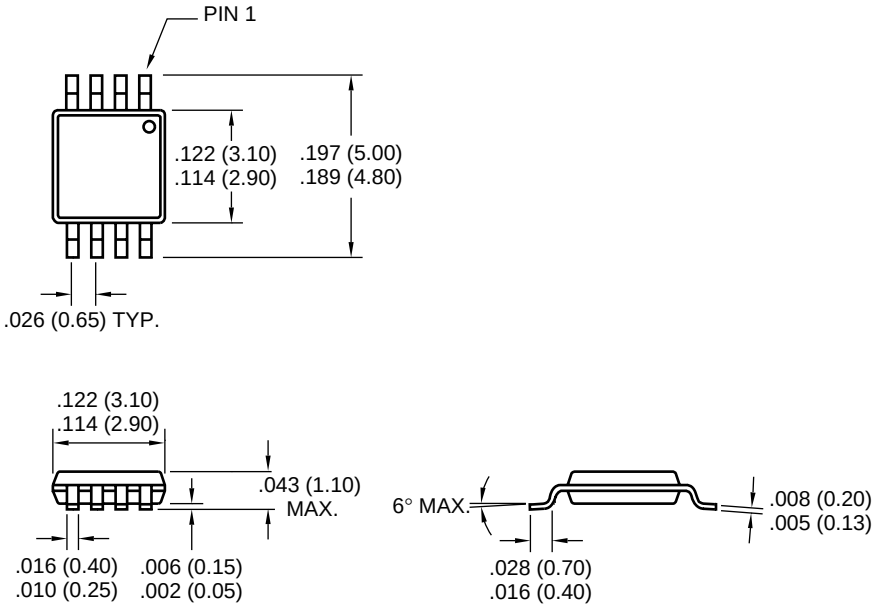
Load Response Falling Edge



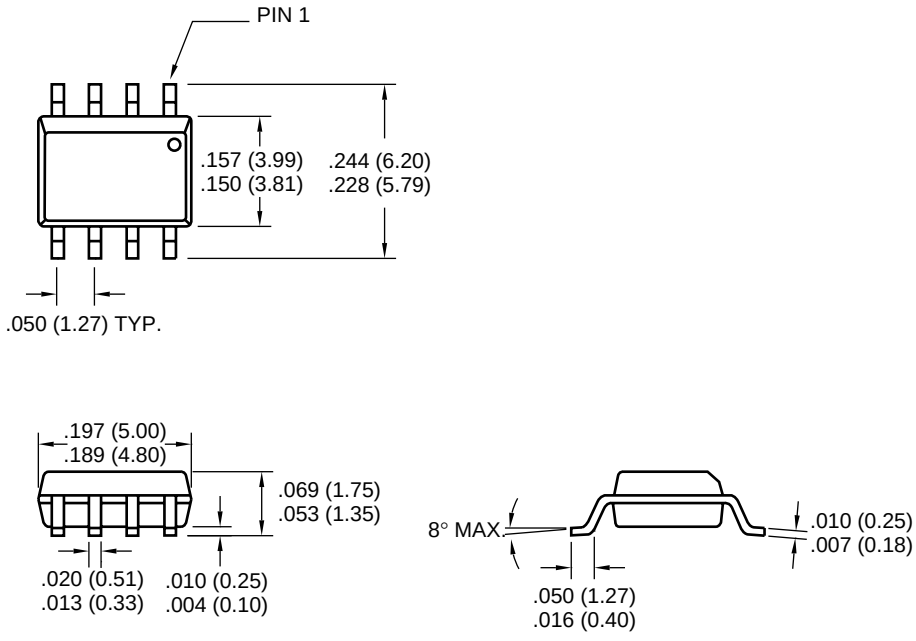
TC1266

PACKAGE DIMENSIONS

8-Pin MSOP



8-Pin SOIC (Narrow)



Dimensions: inches (mm)

WORLDWIDE SALES AND SERVICE

AMERICAS

Corporate Office
2355 West Chandler Blvd.
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Dallas
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Addison, TX 75001
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Dayton
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Miamisburg, OH 45342
Tel: 937-291-1654 Fax: 937-291-9175

Detroit
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Farmington Hills, MI 48334
Tel: 248-538-2250 Fax: 248-538-2260

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Mountain View
Analog Product Sales
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Mountain View, CA 94043-1836
Tel: 650-968-9241 Fax: 650-967-1590

New York
150 Motor Parkway, Suite 202
Hauppauge, NY 11788
Tel: 631-273-5305 Fax: 631-273-5335

San Jose
Microchip Technology Inc.
2107 North First Street, Suite 590
San Jose, CA 95131
Tel: 408-436-7950 Fax: 408-436-7955

Toronto
6285 Northam Drive, Suite 108
Mississauga, Ontario L4V 1X5, Canada
Tel: 905-673-0699 Fax: 905-673-6509

ASIA/PACIFIC

China - Beijing
Microchip Technology Beijing Office
Unit 915
New China Hong Kong Manhattan Bldg.
No. 6 Chaoyangmen Beidajie
Beijing, 100027, No. China
Tel: 86-10-85282100 Fax: 86-10-85282104

China - Shanghai
Microchip Technology Shanghai Office
Room 701, Bldg. B
Far East International Plaza
No. 317 Xian Xia Road
Shanghai, 200051
Tel: 86-21-6275-5700 Fax: 86-21-6275-5060

Hong Kong
Microchip Asia Pacific
RM 2101, Tower 2, Metroplaza
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: 852-2401-1200 Fax: 852-2401-3431

India
Microchip Technology Inc.
India Liaison Office
Divyasree Chambers
1 Floor, Wing A (A3/A4)
No. 11, OíShaugnessey Road
Bangalore, 560 025, India
Tel: 91-80-2290061 Fax: 91-80-2290062

Japan
Microchip Technology Intl. Inc.
Benex S-1 6F
3-18-20, Shinyokohama
Kohoku-Ku, Yokohama-shi
Kanagawa, 222-0033, Japan
Tel: 81-45-471- 6166 Fax: 81-45-471-6122

Korea
Microchip Technology Korea
168-1, Youngbo Bldg. 3 Floor
Samsung-Dong, Kangnam-Ku
Seoul, Korea
Tel: 82-2-554-7200 Fax: 82-2-558-5934

ASIA/PACIFIC (continued)

Singapore
Microchip Technology Singapore Pte Ltd.
200 Middle Road
#07-02 Prime Centre
Singapore, 188980
Tel: 65-334-8870 Fax: 65-334-8850

Taiwan
Microchip Technology Taiwan
11F-3, No. 207
Tung Hua North Road
Taipei, 105, Taiwan
Tel: 886-2-2717-7175 Fax: 886-2-2545-0139

EUROPE

Australia
Microchip Technology Australia Pty Ltd
Suite 22, 41 Rawson Street
Epping 2121, NSW
Australia
Tel: 61-2-9868-6733 Fax: 61-2-9868-6755

Denmark
Microchip Technology Denmark ApS
Regus Business Centre
Lautrup hoj 1-3
Ballerup DK-2750 Denmark
Tel: 45 4420 9895 Fax: 45 4420 9910

France
Arizona Microchip Technology SARL
Parc díActivite du Moulin de Massy
43 Rue du Saule Trapu
Batiment A - ler Etage
91300 Massy, France
Tel: 33-1-69-53-63-20 Fax: 33-1-69-30-90-79

Germany
Arizona Microchip Technology GmbH
Gustav-Heinemann Ring 125
D-81739 Munich, Germany
Tel: 49-89-627-144 0 Fax: 49-89-627-144-44

Germany
Analog Product Sales
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D-82152 Martinsried, Germany
Tel: 49-89-895650-0 Fax: 49-89-895650-22

Italy
Arizona Microchip Technology SRL
Centro Direzionale Colleoni
Palazzo Taurus 1 V. Le Colleoni 1
20041 Agrate Brianza
Milan, Italy
Tel: 39-039-65791-1 Fax: 39-039-6899883

United Kingdom
Arizona Microchip Technology Ltd.
505 Eskdale Road
Winnersh Triangle
Wokingham
Berkshire, England RG41 5TU
Tel: 44 118 921 5869 Fax: 44-118 921-5820