TC1266

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

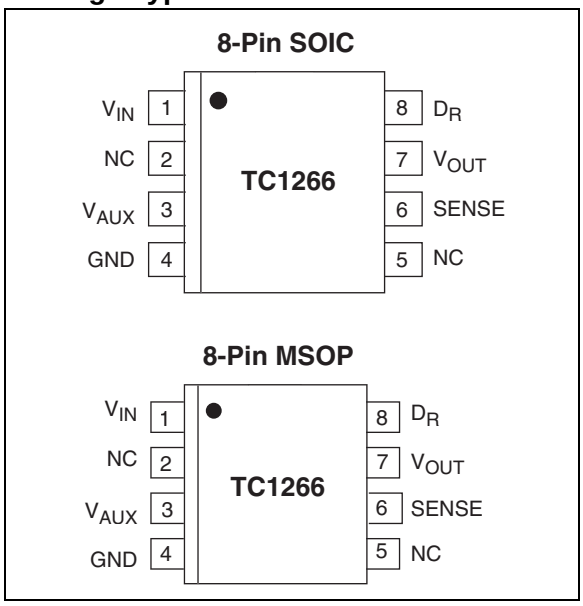
Applications

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

Device Selection Table

Part Number	Package	Junction Temp. Range
TC1266VOA	8-Pin SOIC (Narrow)	-5°C to +125°C
TC1266VUA	8-Pin MSOP	-5°C to +125°C

Package Type

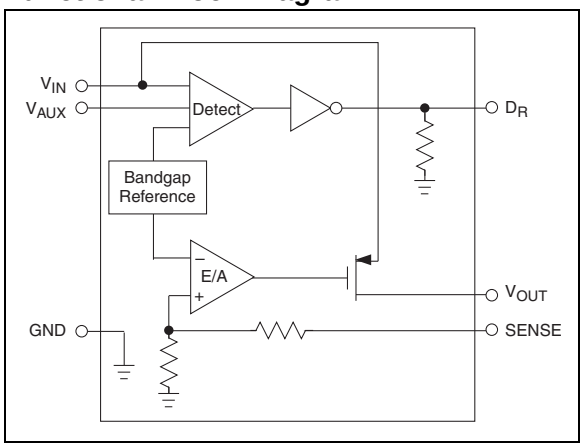


General Description

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 typical). 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 ensured glitch-free. High integration, automatic secondary supply switchover, Kelvin sensing, and small size make the TC1266 the optimum LDO for PCI 2.0 applications.

Functional Block Diagram



© 2001-2012 Microchip Technology Inc.

1.0 ELECTRICAL CHARACTERISTICS

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
Thermal Impedance,
Junction-to-Ambient (θ_{JA}).....130°C/W for SOIC
ESD Rating ..... 2 KV
Operating Temperature Range (T_A).....-5°C to +70°C
Storage Temperature Range (T_{STG})...-65°C to +150°C

*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 operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

TC1266 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: T_A = +25°C, V_{IN} = 5V, V_{AUX} = 3.3V, I_{OUT} = 0.1mA, C_{OUT} = 4.7µF, unless otherwise noted. **Boldface** type specifications apply over full operating temperature range.

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

Note 1: Ensured by design.
2: See 5V Detect Thresholds, Figure 4-1.
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, Figure 3-1.
5: See Timing Diagram, Figure 4-2.
6: Ground Current is independent of I_{LOAD}.

© 2001-2012 Microchip Technology Inc.

TC1266 ELECTRICAL SPECIFICATIONS (CONTINUED)

Electrical Characteristics: T_A = +25°C, V_{IN} = 5V, V_{AUX} = 3.3V, I_{OUT} = 0.1mA, C_{OUT} = 4.7µF, unless otherwise noted. **Boldface** type specifications apply over full operating temperature range.

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

Note 1: Ensured by design.
2: See 5V Detect Thresholds, Figure 4-1.
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, Figure 3-1.
5: See Timing Diagram, Figure 4-2.
6: Ground Current is independent of I_{LOAD}.

© 2001-2012 Microchip Technology Inc.

2.0 PIN DESCRIPTIONS

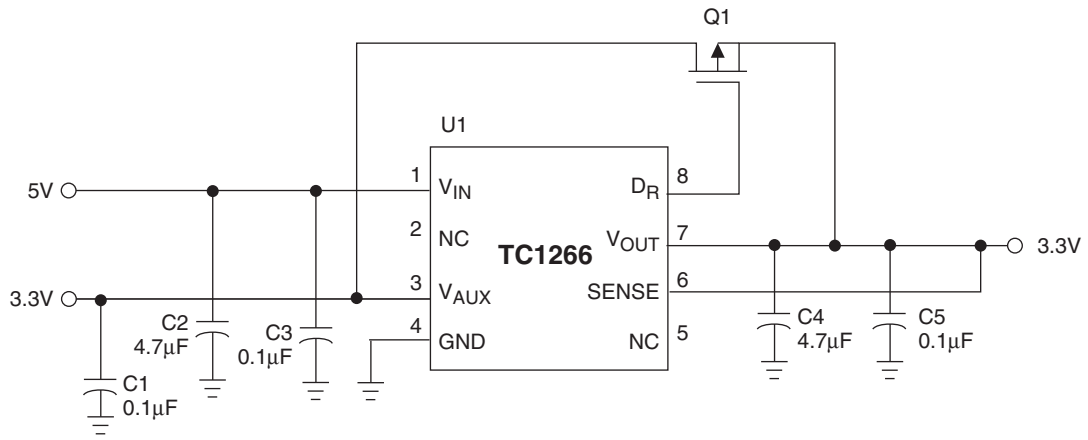
The descriptions of the pins are listed in Table 2-1.

TABLE 2-1: PIN FUNCTION TABLE

Pin No. (8-Pin SOIC) (8-Pin MSOP)	Symbol	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.

3.0 DETAILED DESCRIPTION

FIGURE 3-1: 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)

© 2001-2012 Microchip Technology Inc.

4.0 THERMAL CONSIDERATIONS

4.1 Thermal Shutdown

Integrated thermal protection circuitry shuts the regulator off when die temperature exceeds 160°C. The regulator remains off until the die temperature drops to approximately 150°C.

4.2 Power Dissipation

The amount of power the regulator dissipates is primarily a function of input and output voltage, and output current. The following equation is used to calculate worst case actual power dissipation:

EQUATION 4-1:

$$P_D \approx (V_{INMAX} - V_{OUTMIN})I_{LOADMAX}$$

Where:

P_D = Worst case actual power dissipation
V_{INMAX} = Maximum voltage on V_{IN}
V_{OUTMIN} = Minimum regulator output voltage
$I_{LOADMAX}$ = Maximum output (load) current

The maximum allowable power dissipation (Equation 4-2) is a function of the maximum ambient temperature (T_{AMAX}), the maximum allowable die temperature (T_{JMAX}) and the thermal resistance from junction-to-air (θ_{JA}).

EQUATION 4-2:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$

Where all terms are previously defined.

Equation 4-1 can be used in conjunction with Equation 4-2 to ensure regulator thermal operation is within limits. For example:

Given:

V_{INMAX} = 5V ± 5%
V_{OUTMIN} = 3.217V
$I_{LOADMAX}$ = 200mA
T_{JMAX} = 125°C
T_{AMAX} = 70°C
θ_{JA} = 130°C/W (SOIC)

Find: 1. Actual power dissipation
2. Maximum allowable dissipation

Actual power dissipation:

$$P_D \approx (V_{INMAX} - V_{OUTMIN})I_{LOADMAX}$$
$$= (5.25V - 3.217V)\ 200mA$$
$$= 407mW$$

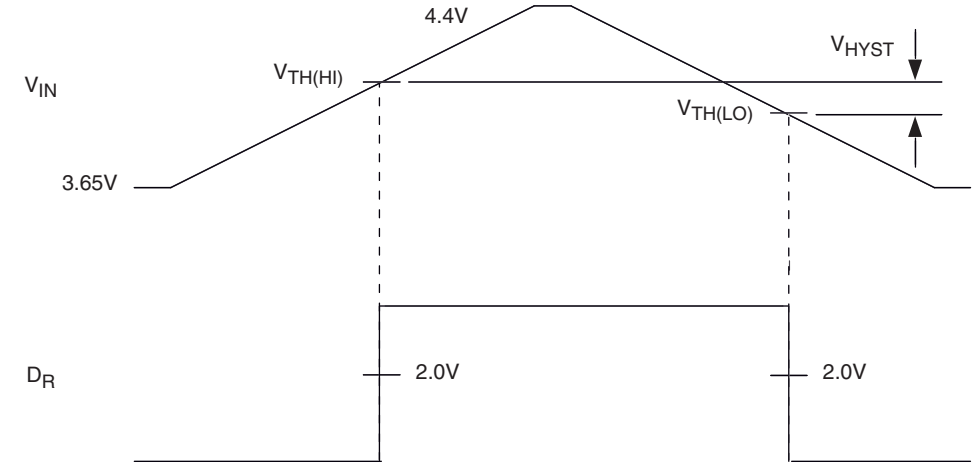
Maximum allowable power dissipation:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$
$$= \frac{(125 - 70)}{130}$$
$$= 423mW$$

In this example, the TC1266 dissipates a maximum of 407mW; below the allowable limit of 423mW.

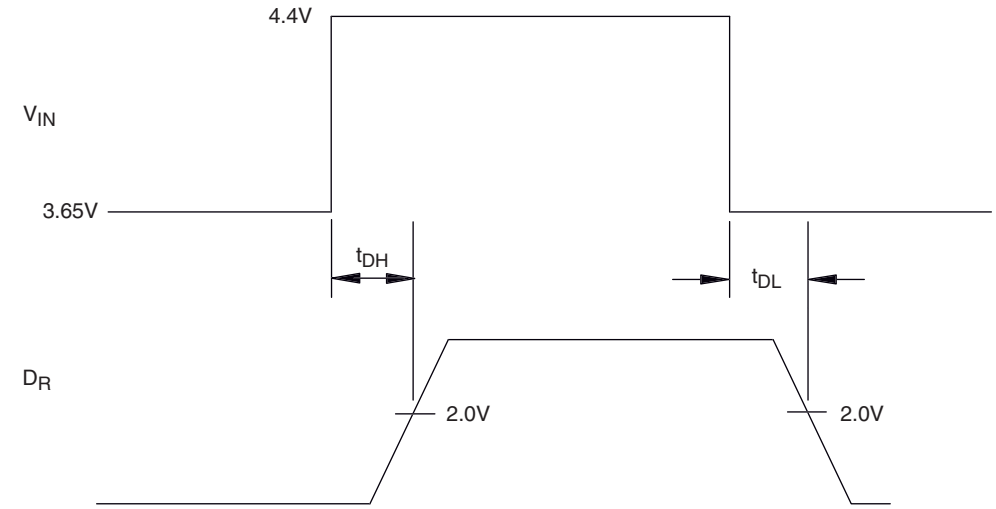
© 2001-2012 Microchip Technology Inc.

FIGURE 4-1: 5V DETECT THRESHOLD



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

FIGURE 4-2: TIMING DIAGRAM

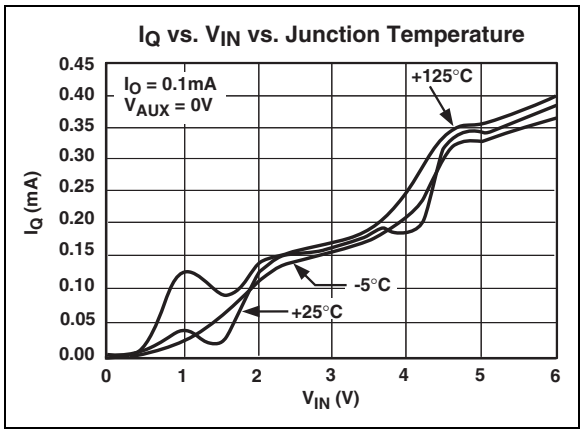


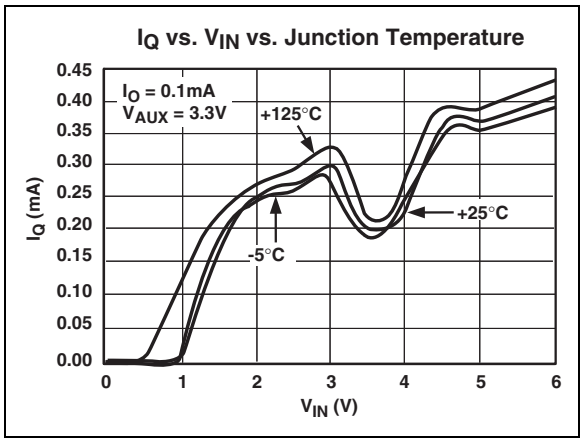
NOTE: V_{IN} rise and fall times (10% to 90%) to be ≤ 0.1µsec.

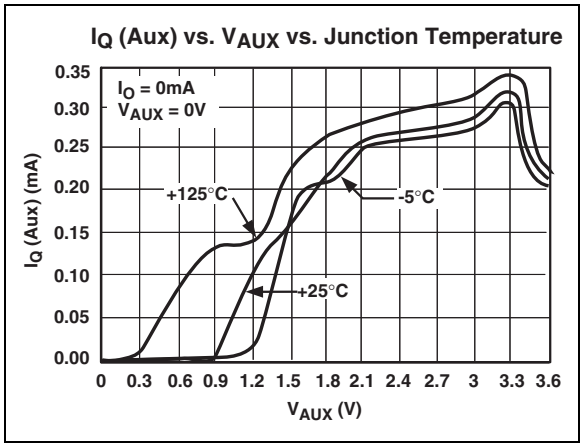
© 2001-2012 Microchip Technology Inc.

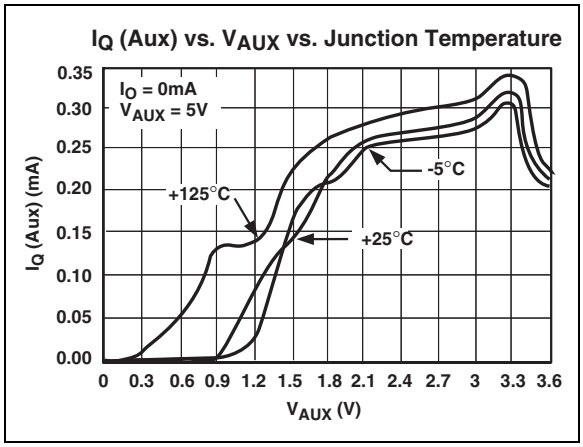
5.0 TYPICAL CHARACTERISTICS

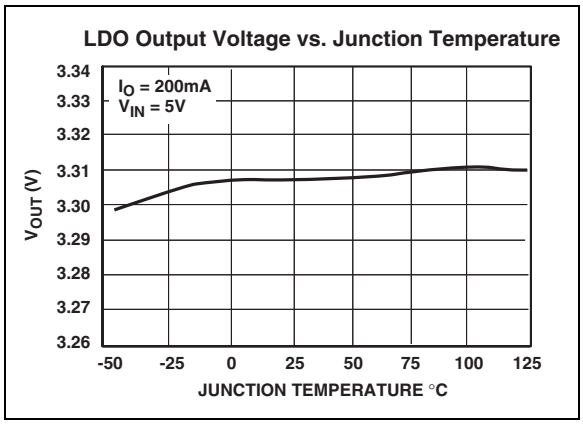
Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.





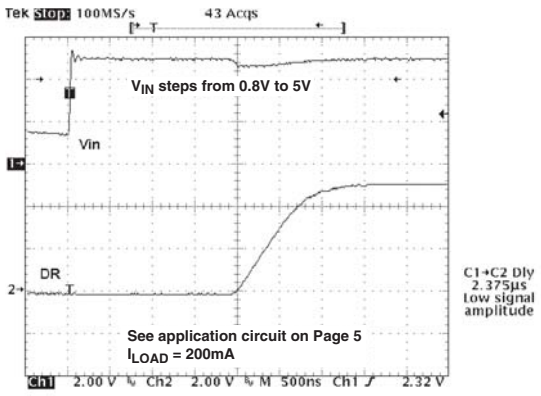






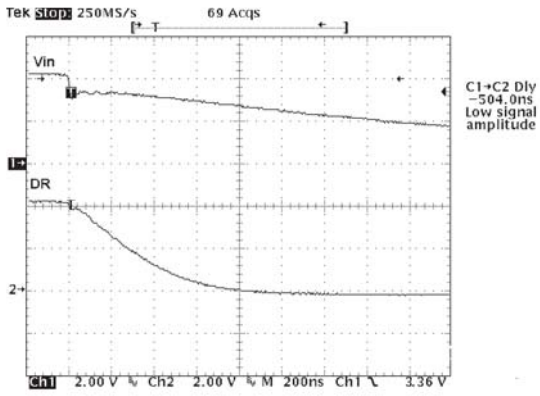
5.0 TYPICAL CHARACTERISTICS (CONTINUED)

Drive High Delay



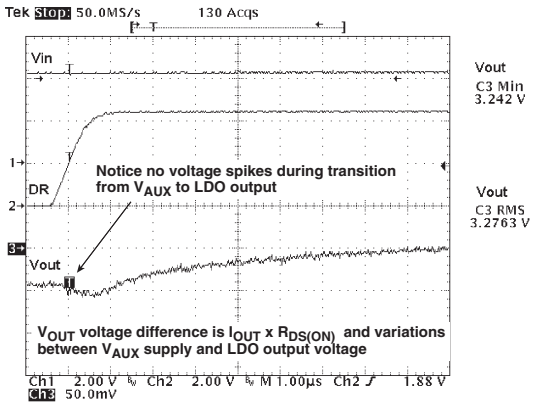
Trace 1: V_{IN} stepping for 0.8V to 5V
Trace 2: D_R going high at $V_{TH(HI)}$
TDH = < 4µS

Drive Low Delay



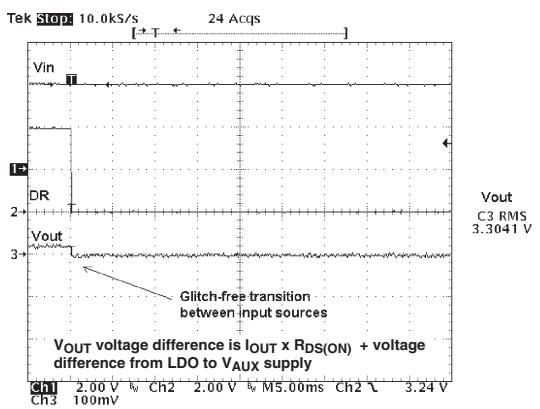
Trace 1: V_{IN} stepping for 5.5V to 0V
Trace 2: D_R going low
TDL = < 600nS

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} = 200µA

V_O (min) with V_{IN} Falling

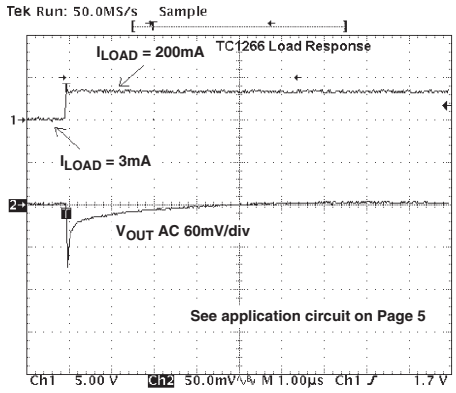


Trace 1: V_{IN} – discharging a 1500µF capacitor
Trace 2: D_R going low at $V_{TH(LO)}$
Trace 3: V_{OUT}, offset 3.3V. $V_{OUT(min)}$ = 3.14V
I_{LOAD} = 200µA

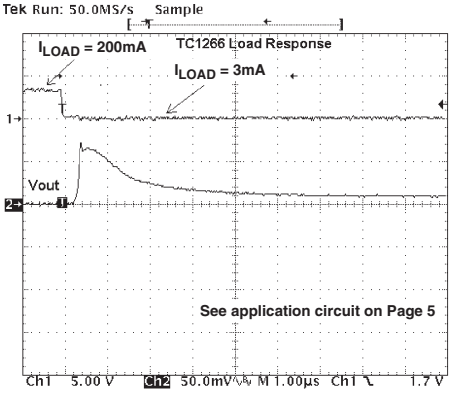
© 2001-2012 Microchip Technology Inc.

5.0 TYPICAL CHARACTERISTICS (CONTINUED)

Load Response Rising Edge



Load Response Falling Edge



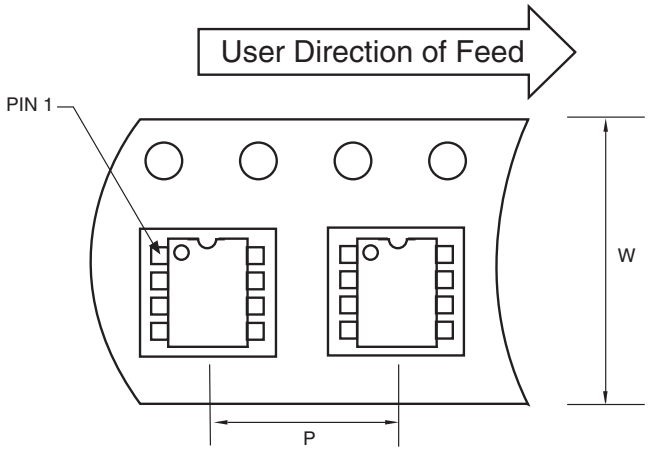
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

Package marking data not available at this time.

6.2 Taping Form

Component Taping Orientation for 8-Pin MSOP Devices

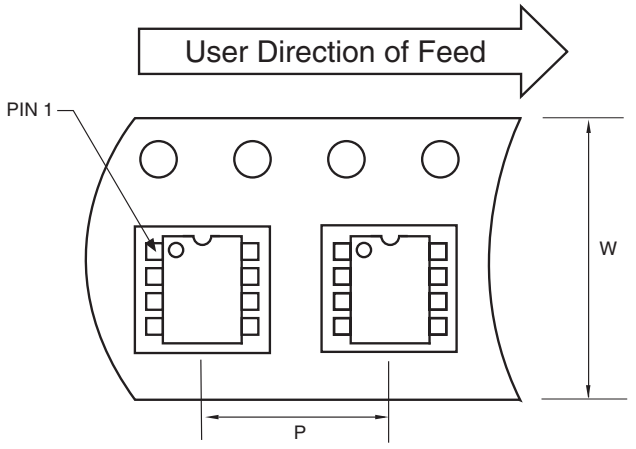


Standard Reel Component Orientation
for TR Suffix Device

Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
8-Pin MSOP	12 mm	8 mm	2500	13 in

Component Taping Orientation for 8-Pin SOIC (Narrow) Devices



Standard Reel Component Orientation
for TR Suffix Device

Carrier Tape, Number of Components Per Reel and Reel Size

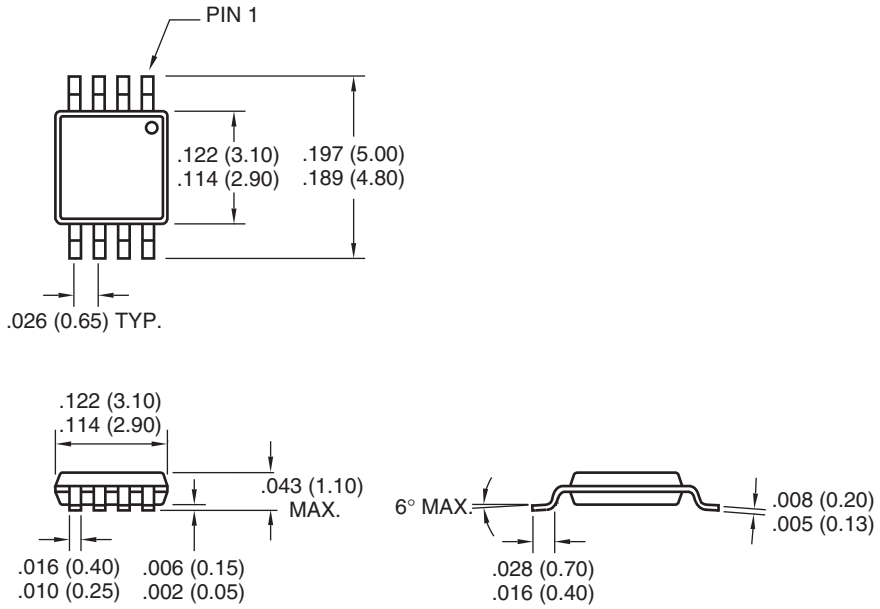
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
8-Pin SOIC (N)	12 mm	8 mm	2500	13 in

© 2001-2012 Microchip Technology Inc.

6.3 Package Dimensions

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

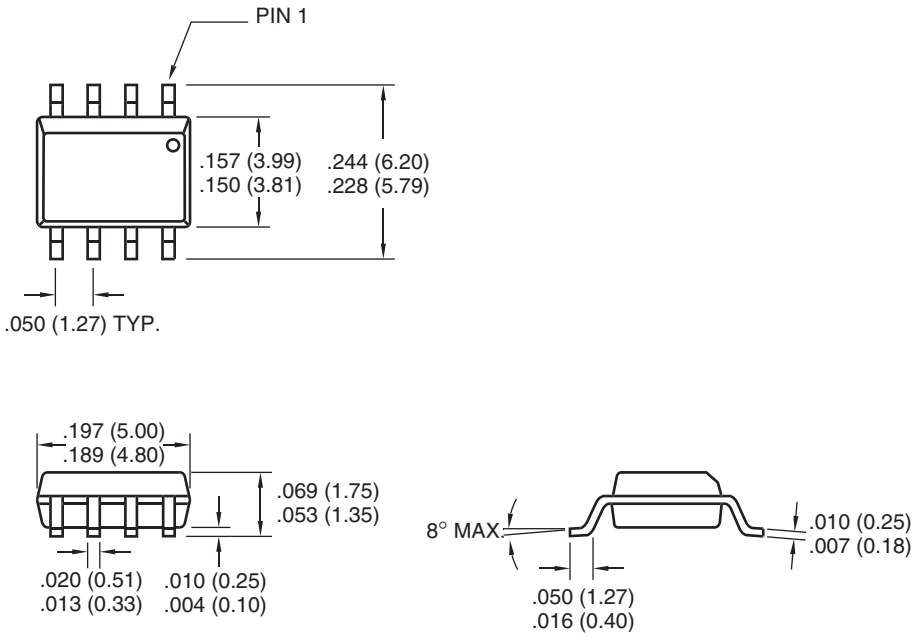
8-Pin MSOP



Dimensions: inches (mm)

Note: For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging

8-Pin SOIC



Dimensions: inches (mm)

© 2001-2012 Microchip Technology Inc.

7.0 REVISION HISTORY

Revision C (November 2012)

Added a note to each package outline drawing.

NOTES:

© 2001-2012 Microchip Technology Inc.

SALES AND SUPPORT

Data Sheets
Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

1. Your local Microchip sales office
2. The Microchip Worldwide Site (www.microchip.com)

Please specify which device, revision of silicon and Data Sheet (include Literature #) you are using.

New Customer Notification System
Register on our web site (www.microchip.com/cn) to receive the most current information on our products.

© 2001-2012 Microchip Technology Inc.

NOTES:

© 2001-2012 Microchip Technology Inc.

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE**.** Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

Trademarks

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, KEELOQ, KEELOQ logo, MPLAB, PIC, PICmicro, PICSTART, PIC^{32} logo, rfPIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

FilterLab, Hampshire, HI-TECH C, Linear Active Thermistor, MTP, SEEVAL and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

Analog-for-the-Digital Age, Application Maestro, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, dsSPEAK, ECAN, ECONOMONITOR, FanSense, HI-TIDE, In-Circuit Serial Programming, ICSP, Mindi, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, mTouch, Omniscient Code Generation, PICC, PICC-18, PICDEM, PICDEM.net, PICkit, PICtail, REAL ICE, rfLAB, Select Mode, SQI, Serial Quad I/O, Total Endurance, TSHARC, UniWinDriver, WiperLock, ZENA and Z-Scale are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

GestIC and ULPP are registered trademarks of Microchip Technology Germany II GmbH & Co. & KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2001-2012, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

Printed on recycled paper.

ISBN: 9781620767801

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

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

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

Santa Clara
Santa Clara, CA
Tel: 408-961-6444
Fax: 408-961-6445

Toronto
Mississauga, Ontario,
Canada
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2401-1200
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-2819-3187
Fax: 86-571-2819-3189

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-2566-1512
Fax: 91-20-2566-1513

Japan - Osaka
Tel: 81-66-152-7160
Fax: 81-66-152-9310

Japan - Yokohama
Tel: 81-45-471- 6166
Fax: 81-45-471-6122

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

Taiwan - Kaohsiung
Tel: 886-7-213-7828
Fax: 886-7-330-9305

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Spain - Madrid
Tel: 34-91-708-08-90
Fax: 34-91-708-08-91

UK - Wokingham
Tel: 44-118-921-5869
Fax: 44-118-921-5820

11/27/12

© 2001-2012 Microchip Technology Inc.