chanhvinh.com

TC1265

800 mA Fixed-Output CMOS LDO with Shutdown

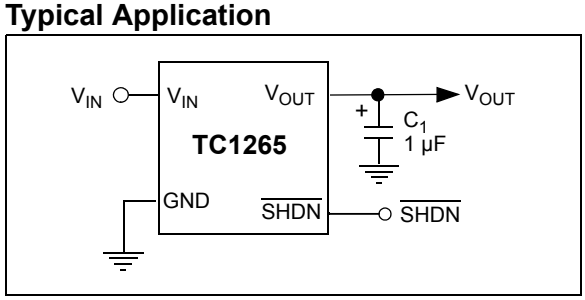
Features

- Very Low Dropout Voltage
- 800 mA Output Current
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Overcurrent and Overtemperature Protection
- $\overline{\text{SHDN}}$ Input for Active Power Management
- $\overline{\text{ERROR}}$ Output Can Be Used as a Low Battery Detector (SOIC only)

Applications

- Battery-operated Systems
- Portable Computers
- Medical Instruments
- Instrumentation
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS
- Pagers

Typical Application



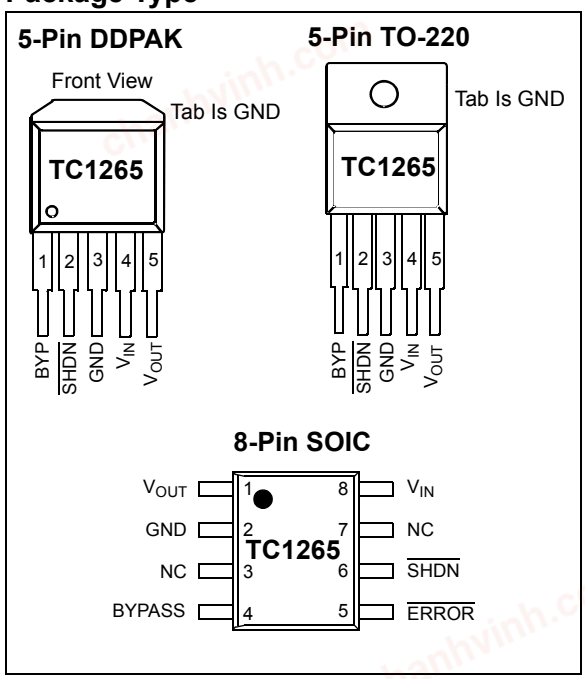
Description

The TC1265 is a fixed-output, high-accuracy (typically ±0.5%) CMOS low dropout regulator. Designed specifically for battery-operated systems, the TC1265's CMOS construction eliminates wasted ground current, significantly extending battery life. Total supply current is typically 80 µA at full load (20 to 60 times lower than in bipolar regulators).

Key features of the TC1265 include ultra low noise operation, very low dropout voltage (typically 450 mV at full load) and fast response to step changes in load.

The TC1265 incorporates both overtemperature and overcurrent protection. The TC1265 is stable with an output capacitor of only 1 µF and has a maximum output current of 800 mA. It is available in 8-Pin SOIC, 5-Pin TO-220 and 5-Pin DDPAK packages.

Package Type



© 2006 Microchip Technology Inc.

chanhvinh.com

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Input Voltage 6.5V
Output Voltage..... (V_{SS} – 0.3V) to (V_{IN} + 0.3V)
Power Dissipation.....Internally Limited **(Note 7)**
Maximum Voltage on Any Pin .....V_{IN} +0.3V to -0.3V
Operating Temperature Range..... -40°C < T_J < 125°C
Storage Temperature.....-65°C to +150°C

† Notice: Stresses above those listed under "Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operation listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, V_{IN} = V_R + 1.5V, **(Note 1)**, I_L = 100 µA, C_L = 3.3 µF, $\overline{SHDN}$ > V_{IH}, T_A = +25°C. **Boldface** type specifications apply for junction temperatures of -40°C to +125°C.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Input Operating Voltage	V_{IN}	**2.7**	—	**6.0**	V	**Note 2**
Maximum Output Current	I_{OUTMAX}	**800**	—	—	mA	
Output Voltage	V_{OUT}	**V_R – 2.5%**	V_R ± 0.5%	**V_R + 2.5%**	V	$V_R \geq$ 2.5V
		V_R – 2%	V_R ± 0.5%	**V_R + 3%**		V_R = 1.8V
V_{OUT} Temperature Coefficient	$\Delta V_{OUT}/\Delta T$	—	40	—	ppm/°C	**Note 3**
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	—	0.007	**0.35**	%	(V_R + 1V) ≤ V_{IN} ≤ 6V
Load Regulation **(Note 4)**	$\Delta V_{OUT}/V_{OUT}$	**-0.01**	0.002	**+0.01**	%/mA	I_L = 0.1 mA to I_{OUTMAX}
Dropout Voltage **(Note 5)**	$V_{IN}–V_{OUT}$	—	20	**30**	mV	$V_R \geq$ 2.5V, I_L = 100 µA
		—	50	**160**		I_L = 100 mA
		—	150	**480**		I_L = 300 mA
		—	260	**800**		I_L = 500 mA
		—	450	**1300**		I_L = 800 mA
		—	1000	**1200**		V_R = 1.8V, I_L = 500 mA
		—	1200	**1400**		I_L = 800 mA
Supply Current	I_{DD}	—	80	**130**	µA	$\overline{SHDN}$ = V_{IH}, I_L = 0
Shutdown Supply Current	I_{SHDN}	—	0.05	**1**	µA	$\overline{SHDN}$ = 0V
Power Supply Rejection Ratio	PSRR	—	64	—	db	F ≤ 1 kHz
Output Short Circuit Current	I_{OUTSC}	—	1200	1400	mA	V_{OUT} = 0V
Thermal Regulation	$\Delta V_{OUT}/\Delta P_D$	—	0.04	—	V/W	**Note 6**
Output Noise	eN	—	260	—	nV/√Hz	I_L = I_{OUTMAX}, F = 10 kHz

Note 1: V_R is the regulator output voltage setting.

2: The minimum V_{IN} has to justify the conditions: $V_{IN} \geq V_R + V_{DROPOUT}$ and $V_{IN} \geq$ 2.7V for I_L = 0.1 mA to I_{OUTMAX}.

3:
$$TCV_{OUT} = \frac{(V_{OUTMAX} - V_{OUTMIN}) \cdot 10^6}{V_{OUT} \times \Delta T}$$

4: Regulation is measured at a constant junction temperature using low duty cycle pulse testing. Load regulation is tested over a load range from 0.1 mA to the maximum specified output current. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

5: Dropout voltage is defined as the input-to-output differential at which the output voltage drops 2% below its nominal value measured at a 1.5V differential.

6: Thermal regulation is defined as the change in output voltage at a time T after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a current pulse equal to I_{LMAX} at V_{IN} = 6V for T = 10 ms.

7: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction-to-air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation causes the device to initiate thermal shutdown. Please see **Section 5.0 "Thermal Considerations"** for more details.

8: Hysteresis voltage is referenced to V_R.

© 2006 Microchip Technology Inc.

chanhvinh.com

DC CHARACTERISTICS (CONTINUED)

Electrical Specifications: Unless otherwise indicated, $V_{IN} = V_R + 1.5V$, **(Note 1)**, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$. **Boldface** type specifications apply for junction temperatures of -40°C to +125°C.

Parameters	Sym	Min	Typ	Max	Units	Conditions
$\overline{SHDN}$ Input						
$\overline{SHDN}$ Input High Threshold	V_{IH}	**45**	—	—	$\%V_{IN}$	
$\overline{SHDN}$ Input Low Threshold	V_{IL}	—	—	**15**	$\%V_{IN}$	
$\overline{ERROR}$ Output (SOIC Only)						
Minimum Operating Voltage	V_{MIN}	1.0	—	—	V	
Output Logic Low Voltage	V_{OL}	—	—	**400**	mV	1 mA Flows to $\overline{ERROR}$
$\overline{ERROR}$ Threshold Voltage	V_{TH}	—	0.95 x V_R	—	V	
$\overline{ERROR}$ Positive Hysteresis	V_{HYS}	—	50	—	mV	**Note 8**

Note 1: V_R is the regulator output voltage setting.

2: The minimum V_{IN} has to justify the conditions: $V_{IN} \geq V_R + V_{DROPOUT}$ and $V_{IN} \geq 2.7V$ for $I_L = 0.1\ mA$ to I_{OUTMAX}.

3:
$$TCV_{OUT} = \frac{(V_{OUTMAX} - V_{OUTMIN}) - 10^6}{V_{OUT} \times \Delta T}$$

4: Regulation is measured at a constant junction temperature using low duty cycle pulse testing. Load regulation is tested over a load range from 0.1 mA to the maximum specified output current. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

5: Dropout voltage is defined as the input-to-output differential at which the output voltage drops 2% below its nominal value measured at a 1.5V differential.

6: Thermal regulation is defined as the change in output voltage at a time T after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a current pulse equal to I_{LMAX} at $V_{IN} = 6V$ for T = 10 ms.

7: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction-to-air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation causes the device to initiate thermal shutdown. Please see **Section 5.0 "Thermal Considerations"** for more details.

8: Hysteresis voltage is referenced to V_R.

TEMPERATURE CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, $V_{IN} = V_R + 1.5V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Temperature Ranges						
Specified Temperature Range	T_A	-40	—	+125	°C	**(Note 1)**
Operating Temperature Range	T_J	-40	—	+125	°C	
Storage Temperature Range	T_A	-65	—	+150	°C	
Thermal Package Resistances						
Thermal Resistance, 5L-DDPAK	θ_{JA}	—	57	—	°C/W	
Thermal Resistance, 5L-TO-220	θ_{JA}	—	71	—	°C/W	
Thermal Resistance, 8L-SOIC	θ_{JA}	—	163	—	°C/W	

Note 1: Operation in this range must not cause T_J to exceed Maximum Junction Temperature (+125°C).

© 2006 Microchip Technology Inc.

chanhvinh.com

2.0 TYPICAL PERFORMANCE CURVES

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.

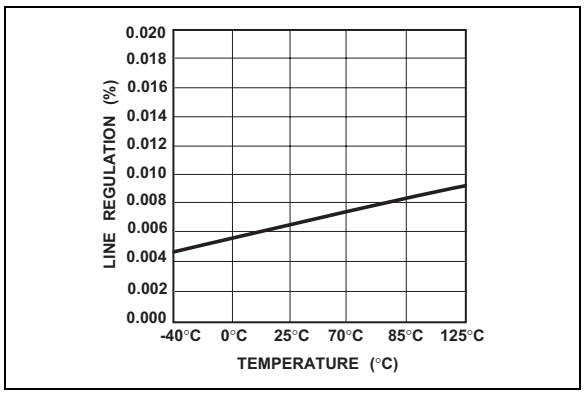


FIGURE 2-1: *Line Regulation vs. Temperature.*

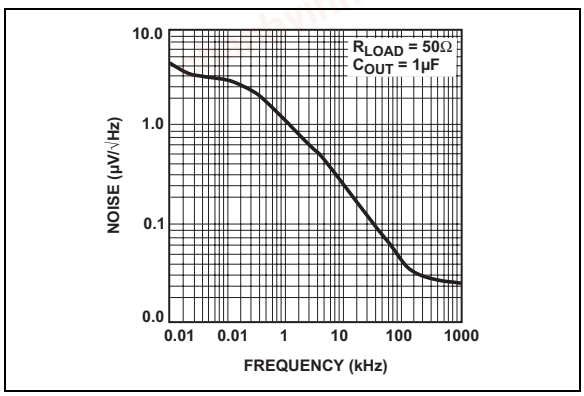


FIGURE 2-2: *Output Noise vs. Frequency.*

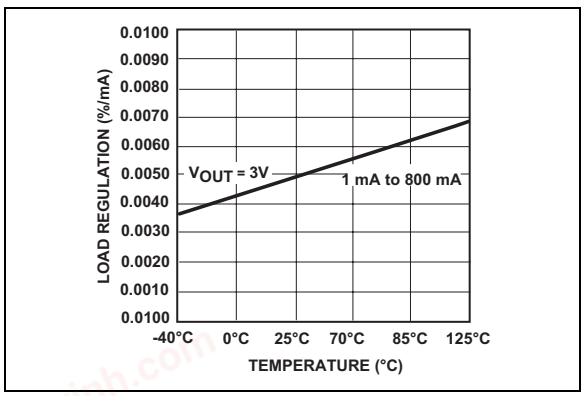


FIGURE 2-3: *Load Regulation vs. Temperature.*

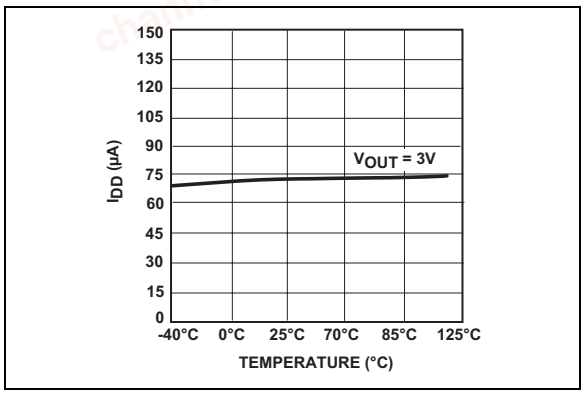


FIGURE 2-4: *I_{DD} vs. Temperature.*

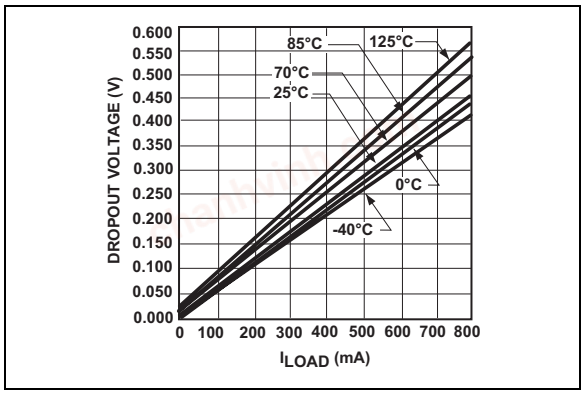


FIGURE 2-5: *3.0V Dropout Voltage vs. I_{LOAD}.*

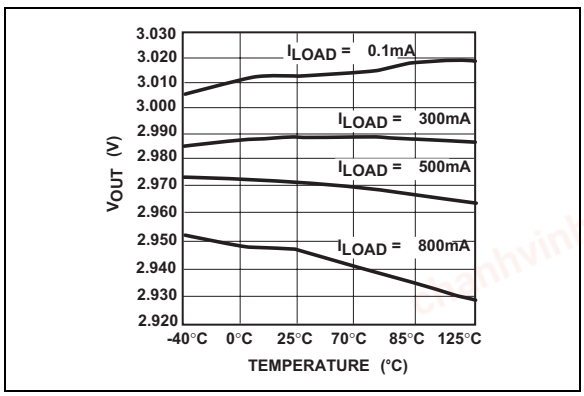


FIGURE 2-6: *3.0V V_{OUT} vs.Temperature.*

© 2006 Microchip Technology Inc.

chanhvinh.com

2.0 TYPICAL PERFORMANCE CURVES (CONT)

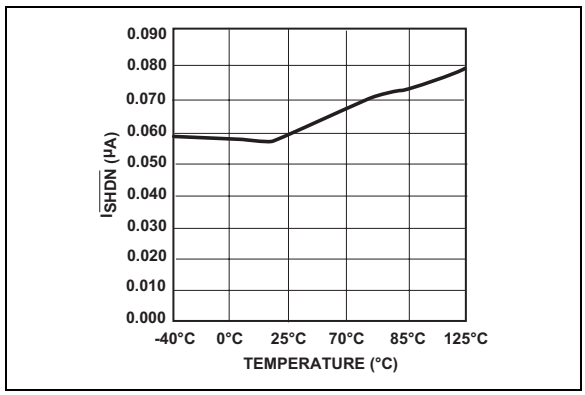


FIGURE 2-1: *$I_{\overline{SHDN}}$ vs. Temperature.*

chanhvinh.com

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin No. (8-Pin SOIC)	Pin No. (5-Pin DDPAK) (5-Pin TO-220)	Symbol	Description
1	5	V_{OUT}	Regulated voltage output
2	3	GND	Ground terminal
3	—	NC	No connect
4	1	BYPASS	Reference bypass input
5	—	$\overline{ERROR}$	Out-of-Regulation Flag (open-drain output)
6	2	$\overline{SHDN}$	Shutdown control input
7	—	NC	No connect
8	4	V_{IN}	Unregulated supply input

3.1 Regulated Output Voltage (V_{OUT})

Regulated voltage output.

3.2 Ground (GND)

Ground terminal.

3.3 Reference Bypass (BYPASS)

Reference bypass input. Connecting a 470 pF to this input further reduces output noise.

3.4 Out-of-Regulation Flag ($\overline{ERROR}$)

Out-of-regulation flag (open-drain output). This output goes low when V_{OUT} is out-of-tolerance by approximately -5%.

3.5 Shutdown Control ($\overline{SHDN}$)

Shutdown control input. The regulator is fully enabled when a logic-high is applied to this input. The regulator enters shutdown when a logic-low is applied to this input. During shutdown, the output voltage falls to zero and the supply current is reduced to 0.05 µA (typical).

3.6 Unregulated Supply (V_{IN})

Unregulated supply input.

© 2006 Microchip Technology Inc.

chanhvinh.com

4.0 DETAILED DESCRIPTION

The TC1265 is a precision, fixed-output LDO. Unlike bipolar regulators, the TC1265's supply current does not increase with load current. In addition, V_{OUT} remains stable and within regulation over the entire 0 mA to $I_{LOADMAX}$ load current range (an important consideration in RTC and CMOS RAM battery back-up applications).

Figure 4-1 shows a typical application circuit.

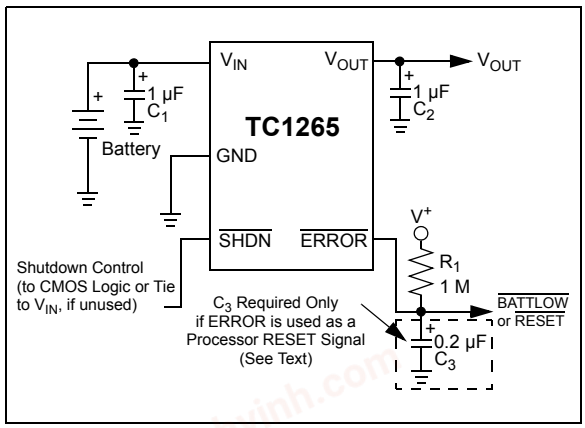


FIGURE 4-1: *Typical Application Circuit.*

4.1 Output Capacitor

A 1 µF (min.) capacitor from V_{OUT} to ground is required. The output capacitor should have an Effective Series Resistance (ESR) greater than 0.1Ω and less than 5Ω. A 1 µF capacitor should be connected from V_{IN} to GND if there is more than 10 inches of wire between the regulator and the AC filter capacitor, or if a battery is used as the power source. Aluminum electrolytic or tantalum capacitor types can be used. Since many aluminum electrolytic capacitors freeze at approximately -30°C, solid tantalums are recommended for applications operating below -25°C. When operating from sources other than batteries, supply-noise rejection and transient response can be improved by increasing the value of the input and output capacitors, and by employing passive filtering techniques.

4.2 $\overline{\text{ERROR}}$ Output

$\overline{\text{ERROR}}$ is driven low whenever V_{OUT} falls out of regulation by more than – 5% (typ.). This condition may be caused by low input voltage, output current limiting, or thermal limiting. The $\overline{\text{ERROR}}$ threshold is 5% below rated V_{OUT} regardless of the programmed output voltage value (e.g., $\overline{\text{ERROR}}$ = V_{OL} at 4.75V (typ.) for a 5.0V regulator and 2.85V (typ.) for a 3.0V regulator). $\overline{\text{ERROR}}$ output operation is shown in Figure 4-2.

Note that $\overline{\text{ERROR}}$ is active when V_{OUT} is at or below V_{TH} and inactive when V_{OUT} is above V_{TH} + V_H.

As shown in Figure 4-1, $\overline{\text{ERROR}}$ can be used as a battery low flag or as a processor $\overline{\text{RESET}}$ signal (with the addition of timing capacitor C_3). R_1 x C_3 should be chosen to maintain $\overline{\text{ERROR}}$ below V_{IH} of the processor $\overline{\text{RESET}}$ input for at least 200 ms to allow time for the system to stabilize. Pull-up resistor R_1 can be tied to V_{OUT}, V_{IN} or any other voltage less than (V_{IN} + 0.3V).

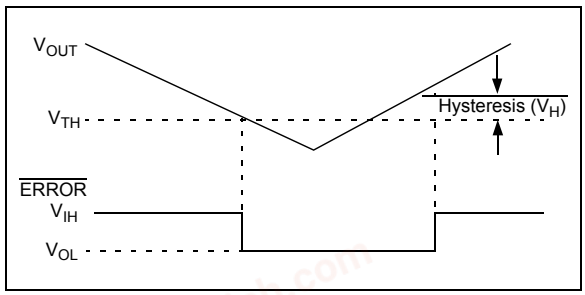


FIGURE 4-2: *$\overline{\text{ERROR}}$ Output Operation.*

chanhvinh.com

5.0 THERMAL CONSIDERATIONS

5.1 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.

5.2 Power Dissipation

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

EQUATION 5-1:

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

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 5-2) 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 5-2:

Where:

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

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

Table 5-1 and Table 5-2 show various values of θ_{JA} for the TC1265 package types.

TABLE 5-1: THERMAL RESISTANCE GUIDELINES FOR TC1265 IN 8-PIN SOIC PACKAGE

Copper Area (Topside)*	Copper Area (Backside)	Board Area	Thermal Resistance (θ_{JA})
2500 sq mm	2500 sq mm	2500 sq mm	60°C/W
1000 sq mm	2500 sq mm	2500 sq mm	60°C/W
225 sq mm	2500 sq mm	2500 sq mm	68°C/W
100 sq mm	2500 sq mm	2500 sq mm	74°C/W

* Pin 2 is ground. Device is mounted on the top-side.

TABLE 5-2: THERMAL RESISTANCE GUIDELINES FOR TC1265 IN 5-PIN DDPAK/TO-220 PACKAGE

Copper Area (Topside)*	Copper Area (Backside)	Board Area	Thermal Resistance (θ_{JA})
2500 sq mm	2500 sq mm	2500 sq mm	25°C/W
1000 sq mm	2500 sq mm	2500 sq mm	27°C/W
125 sq mm	2500 sq mm	2500 sq mm	35°C/W

* Tab of device attached to top-side copper

Equation 5-1 can be used in conjunction with Equation 5-2 to ensure regulator thermal operation is within limits. For example:

Given:

V_{INMAX} = 3.3V ± 10%
V_{OUTMIN} = 2.7V ± 0.5%
$I_{LOADMAX}$ = 275 mA
T_{JMAX} = 125°C
T_{AMAX} = 95°C
θ_{JA} = 60°C/W (SOIC)

Find:

1. Actual power dissipation
2. Maximum allowable dissipation

Actual power dissipation:

$$P_D \approx (V_{INMAX} - V_{OUTMIN})I_{LOADMAX}$$
$$P_D = (3.3 \times 1.1) - (2.7 \times .995)275 \times 10^{-3}$$
$$P_D = 260 \text{ mW}$$

Maximum allowable power dissipation:

$$P_{DMAX} = \frac{T_{JMAX} - T_{AMAX}}{\theta_{JA}}$$
$$P_{DMAX} = \frac{(125 - 95)}{60}$$
$$P_{DMAX} = 500 \text{ mW}$$

In this example, the TC1265 dissipates a maximum of 260 mW, below the allowable limit of 500 mW. In a similar manner, Equation 5-1 and Equation 5-2 can be used to calculate maximum current and/or input voltage limits. For example, the maximum allowable V_{IN} is found by substituting the maximum allowable power dissipation of 500 mW into Equation 5-1, from which V_{INMAX} = 4.6V.

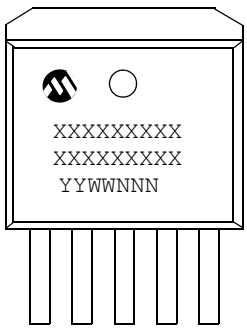
© 2006 Microchip Technology Inc.

chanhvinh.com

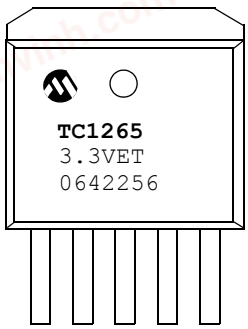
6.0 PACKAGING INFORMATION

6.1 Package Marking Information

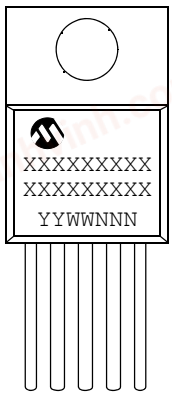
5-Lead DDPAK



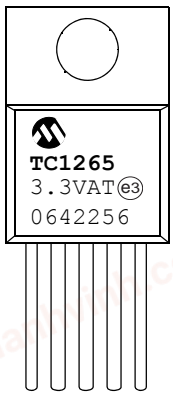
Example



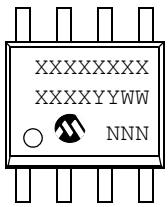
5-Lead TO-220



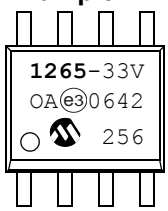
Example:



8-Lead SOIC (150 mil)



Example:



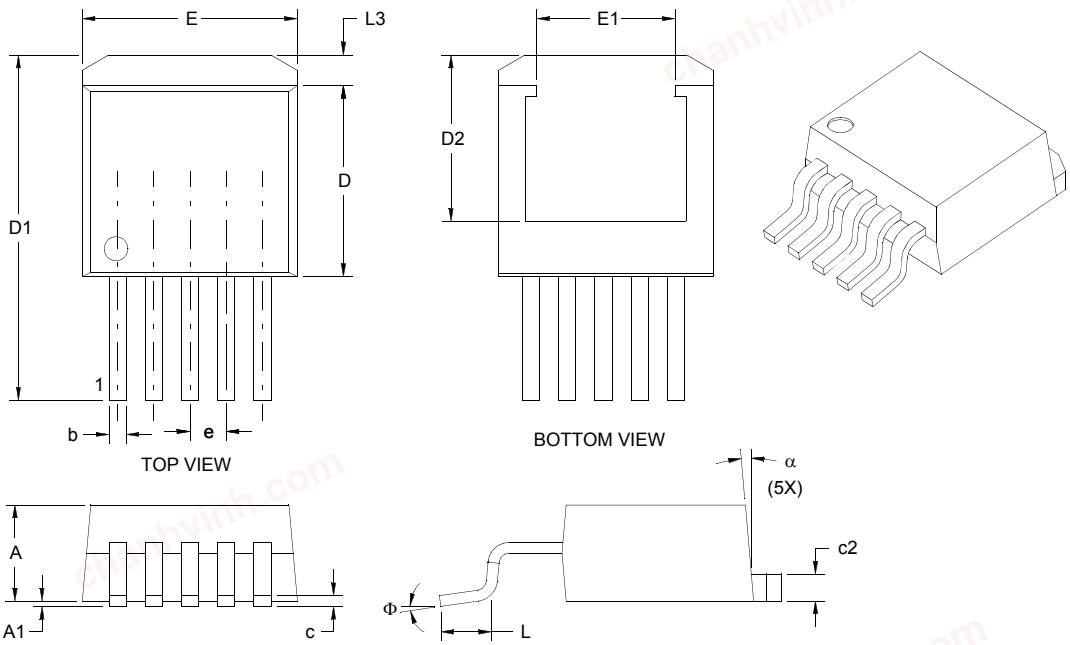
Legend:	XX...X	Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information.

chanhvinh.com

5-Lead Plastic (ET) (DDPAK))

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



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins			5			5	
Pitch	e		.067 BSC			1.70 BSC	
Overall Height	A	.170	.177	.183	4.32	4.50	4.65
Standoff §	A1	.000	.005	.010	0.00	0.13	0.25
Overall Width	E	.385	.398	.410	9.78	10.11	10.41
Exposed Pad Width	E1		.256 REF			6.50 REF	
Molded Package Length	D	.330	.350	.370	8.38	8.89	9.40
Overall Length	D1	.549	.577	.605	13.94	14.66	15.37
Exposed Pad Length	D2		.303 REF			7.75 REF	
Lead Thickness	c	.014	.020	.026	0.36	0.51	0.66
Pad Thickness	c2	.045	--	.055	1.14	--	1.40
Lead Width	b	.026	.032	.037	0.66	0.81	0.94
Foot Length	L	.068	.089	.110	1.73	2.26	2.79
Pad Length	L3	.045	--	.067	1.14	--	1.70
Foot Angle	Φ	--	--	8°	--	--	8°
Mold Draft Angle	α	3°	--	7°	3°	--	7°

* Controlling Parameter

§ Significant Characteristic

Notes:

Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254mm) per side.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.
See ASME Y14.5M

REF: Reference Dimension, usually without tolerance, for information purposes only.
See ASME Y14.5M

JEDEC equivalent: TO-252

Drawing No. C04-012

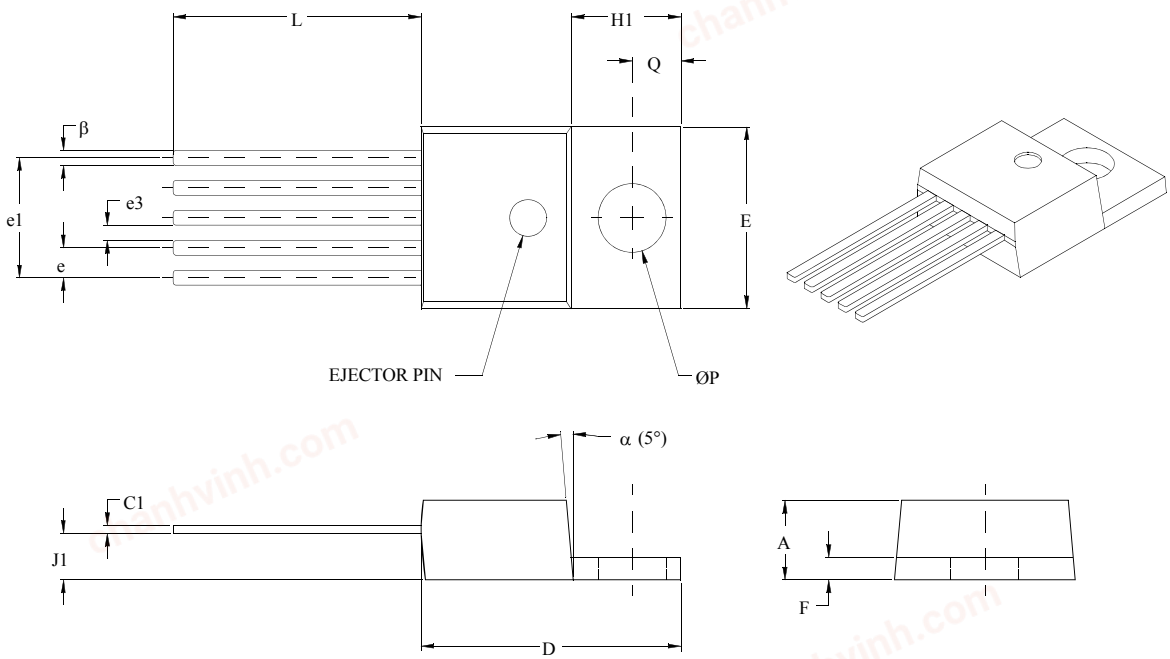
Revised 07-19-05

© 2006 Microchip Technology Inc.

chanhvinh.com

5-Lead Plastic Transistor Outline (AT) (TO-220)

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



Units		INCHES*		MILLIMETERS	
Dimension Limits		MIN	MAX	MIN	MAX
Lead Pitch	e	.060	.072	1.52	1.83
Overall Lead Centers	e1	.263	.273	6.68	6.93
Space Between Leads	e3	.030	.040	0.76	1.02
Overall Height	A	.160	.190	4.06	4.83
Overall Width	E	.385	.415	9.78	10.54
Overall Length	D	.560	.590	14.22	14.99
Flag Length	H1	.234	.258	5.94	6.55
Flag Thickness	F	.045	.055	1.14	1.40
Through Hole Center	Q	.103	.113	2.62	2.87
Through Hole Diameter	P	.146	.156	3.71	3.96
Lead Length	L	.540	.560	13.72	14.22
Base to Bottom of Lead	J1	.090	.115	2.29	2.92
Lead Thickness	C1	.014	.022	0.36	0.56
Lead Width	β	.025	.040	0.64	1.02
Mold Draft Angle	α	3°	7°	3°	7°

* Controlling Parameter

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" (0.254 mm) per side.

JEDEC equivalent: TO-220

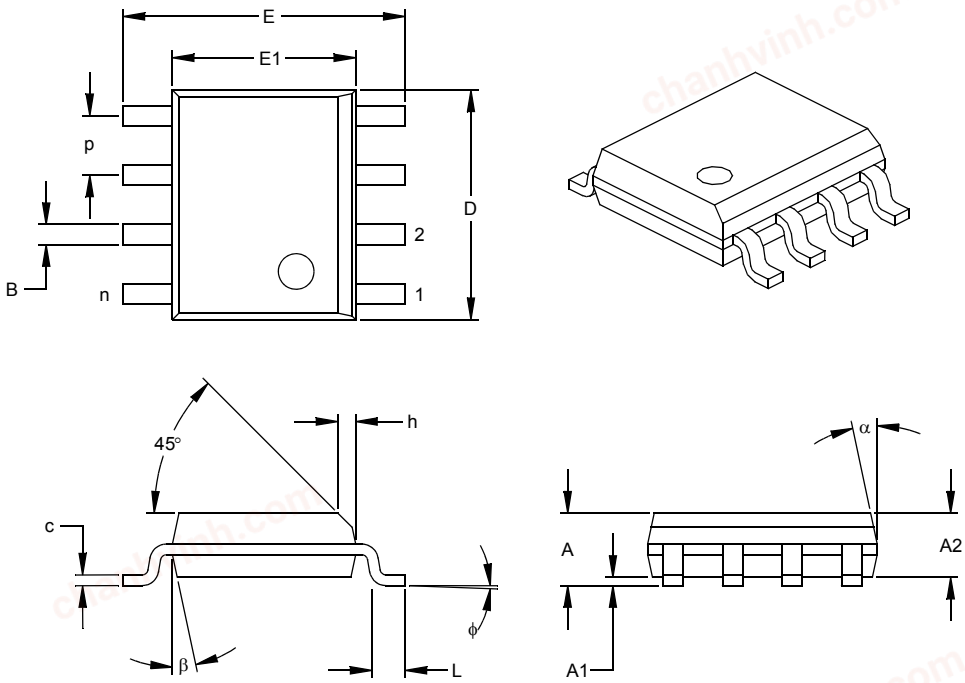
Drawing No. C04-036

Revised 08-01-05

chanhvinh.com

8-Lead Plastic Small Outline (SN) – Narrow, 150 mil Body (SOIC)

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



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		8			8	
Pitch	p		.050			1.27	
Overall Height	A	.053	.061	.069	1.35	1.55	1.75
Molded Package Thickness	A2	.052	.056	.061	1.32	1.42	1.55
Standoff §	A1	.004	.007	.010	0.10	0.18	0.25
Overall Width	E	.228	.237	.244	5.79	6.02	6.20
Molded Package Width	E1	.146	.154	.157	3.71	3.91	3.99
Overall Length	D	.189	.193	.197	4.80	4.90	5.00
Chamfer Distance	h	.010	.015	.020	0.25	0.38	0.51
Foot Length	L	.019	.025	.030	0.48	0.62	0.76
Foot Angle	ϕ	0	4	8	0	4	8
Lead Thickness	c	.008	.009	.010	0.20	0.23	0.25
Lead Width	B	.013	.017	.020	0.33	0.42	0.51
Mold Draft Angle Top	α	0	12	15	0	12	15
Mold Draft Angle Bottom	β	0	12	15	0	12	15

* Controlling Parameter
§ Significant Characteristic

Notes:
Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010” (0.254mm) per side.
JEDEC Equivalent: MS-012
Drawing No. C04-057

© 2006 Microchip Technology Inc.

chanhvinh.com

APPENDIX A: REVISION HISTORY

Revision D (October 2006)

- **Section 1.0 "Electrical Characteristics"**: Changed dropout voltage voltage typical value for I_L = 500 mA from 700 to 1000 and maximum value from 1000 to 1200 for. Changed typical value for I_L = 800 mA from 890 to 1200
- **Section 6.0 "Packaging Information"**: Added pb-free symbol to package marking information
- Added disclaimer to package outline drawings
- Updated package outline drawings as needed
- Added Appendix A - Revision History

Revision C (October 2004)

- Not Documented

Revision B (May 2002)

- Not Documented

Revision A (March 2002)

- Original Release of this Document.

chanhvinh.com

chanhvinh.com

NOTES:

chanhvinh.com

© 2006 Microchip Technology Inc.

chanhvinh.com

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	X.XX	XX	XX
Device	Voltage Option	Package	Tape and Reel

Device	TC1265	Fixed Output CMOS LDO with Shutdown
Voltage Option:*	1.8V = 1.8V 2.5V = 2.5V 3.0V = 3.0V 3.3V = 3.3V * Other output voltages are available. Please contact your local Microchip sales office for details.	
Package	AT = Plastic (TO-220), 5-Lead ET = Plastic Transistor Outline (DDPAK), 5-Lead ETTR = Plastic Transistor Outline (DDPAK), 5-Lead, Tape and Reel OA = Plastic SOIC, (150 mil Body), 8-lead OATR = Plastic SOIC, (150 mil Body), 8-lead, Tape and Reel	

Examples:

a)	TC1265-1.8VAT	1.8V LDO, TO-220-5 pkg.
b)	TC1265-2.5VAT	2.5V LDO, TO-220-5 pkg.
c)	TC1265-3.0VAT	3.0V LDO, TO-220-5 pkg.
d)	TC1265-3.3VAT	3.3V LDO, TO-220-5 pkg.
a)	TC1265-1.8VETTR	1.8V LDO, DDPAK-5 pkg., Tape and Reel
b)	TC1265-2.5VETTR	2.5V LDO, DDPAK-5 pkg., Tape and Reel
c)	TC1265-3.0VETTR	3.0V LDO, DDPAK-5 pkg., Tape and Reel
d)	TC1265-3.3VETTR	3.3V LDO, DDPAK-5 pkg., Tape and Reel
a)	TC1265-1.8VOA	1.8V LDO, SOIC-8 pkg.
b)	TC1265-1.8VOATR	1.8V LDO, SOIC-8 pkg., Tape and Reel
c)	TC1265-2.5VOA	2.5V LDO, SOIC-8 pkg.
d)	TC1265-2.5VOATR	2.5V LDO, SOIC-8 pkg., Tape and Reel
e)	TC1265-3.0VOA	3.0V LDO, SOIC-8 pkg.
f)	TC1265-3.0VOATR	3.0V LDO, SOIC-8 pkg., Tape and Reel
g)	TC1265-3.3VOA	3.3V LDO, SOIC-8 pkg.
h)	TC1265-3.3VOATR	3.3V LDO, SOIC-8 pkg., Tape and Reel

chanhvinh.com

NOTES:

chanhvinh.com

© 2006 Microchip Technology Inc.

chanhvinh.com

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, Accuron, dsPIC, KEELOQ, microID, MPLAB, PIC, PICmicro, PICSTART, PRO MATE, PowerSmart, rfPIC, and SmartShunt are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

AmpLab, FilterLab, Migratable Memory, MXDEV, MXLAB, SEEVAL, SmartSensor and The Embedded Control Solutions Company are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Application Maestro, CodeGuard, dsPICDEM, dsPICDEM.net, dsPICworks, ECAN, ECONOMONITOR, FanSense, FlexROM, fuzzyLAB, In-Circuit Serial Programming, ICSP, ICEPIC, Linear Active Thermistor, Mindi, MiWi, MPASM, MPLIB, MPLINK, PICkit, PICDEM, PICDEM.net, PICLAB, PICtail, PowerCal, PowerInfo, PowerMate, PowerTool, REAL ICE, rfLAB, rfPICDEM, Select Mode, Smart Serial, SmartTel, Total Endurance, UNI/O, WiperLock and ZENA 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.

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

© 2006, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

Printed on recycled paper.

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949:2002

Microchip received ISO/TS-16949:2002 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona, Gresham, Oregon and Mountain View, California. The Company's quality system processes and procedures are for its PIC® 8-bit MCUs, 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.

chanhvinh.com

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://support.microchip.com
Web Address:
www.microchip.com

Atlanta
Alpharetta, GA
Tel: 770-640-0034
Fax: 770-640-0307

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

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

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

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

Kokomo
Kokomo, IN
Tel: 765-864-8360
Fax: 765-864-8387

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
Habour 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: 86-10-8528-2100
Fax: 86-10-8528-2104

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

China - Fuzhou
Tel: 86-591-8750-3506
Fax: 86-591-8750-3521

China - Hong Kong SAR
Tel: 852-2401-1200
Fax: 852-2401-3431

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: 86-755-8203-2660
Fax: 86-755-8203-1760

China - Shunde
Tel: 86-757-2839-5507
Fax: 86-757-2839-5571

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

China - Xian
Tel: 86-29-8833-7250
Fax: 86-29-8833-7256

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-4182-8400
Fax: 91-80-4182-8422

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

Korea - Gumi
Tel: 82-54-473-4301
Fax: 82-54-473-4302

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

Malaysia - Penang
Tel: 60-4-646-8870
Fax: 60-4-646-5086

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: 886-3-572-9526
Fax: 886-3-572-6459

Taiwan - Kaohsiung
Tel: 886-7-536-4818
Fax: 886-7-536-4803

Taiwan - Taipei
Tel: 886-2-2500-6610
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

10/19/06

© 2006 Microchip Technology Inc.