1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings*

Supply Voltage .....+7V

Voltage on Any Pin with Respect to Supplies:
.....V_{SS} -0.3 to V_{DD} +0.3V

Operating Temperature .....-40°C to +125°C

Storage Temperature Range .....-55°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.

ELECTRICAL CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, these specifications apply for the entire supply voltage range and for T_A = -40°C to +125°C.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Supply Voltage	V_{DD}	2.7	—	4.4	V	TC1047
		2.5	—	5.5	V	TC1047A
Supply Current, Operating	I_Q	—	35	60	µA	
Average Slope of Output Voltage	A_V	—	10	—	mV/°C	
Temperature Accuracy	TMP_{ACY}	-2	±0.5	+2	°C	T_A = 25°C
		-3	±0.5	+3	°C	T_A = +125°C
		—	1.0	—	°C	T_A = -40°C
Output Voltage	V_{OUT}	—	100	—	mV	T_A = -40°C
		730	750	770	mV	T_A = 25°C
		1720	1750	1780	mV	T_A = +125°C
Output Source and Sink Current	I_{OUT}	100	—	—	µA	

TEMPERATURE CHARACTERISTICS

Electrical Specifications: Unless otherwise indicated, V_{DD} = +2.3V to +5.5V and V_{SS} = GND.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Temperature Ranges						
Specified Temperature Range	T_A	-40	—	+85	°C	
Operating Temperature Range	T_A	-40	—	+125	°C	**Note 1**
Storage Temperature Range	T_A	-65	—	+150	°C	
Thermal Package Resistances						
Thermal Resistance, 3L-SOT-23B	θ_{JA}	—	336	—	°C/W	

Note 1: The TC1047/TC1047A operate over this extended temperature range, but with reduced performance. In any case, the Junction Temperature (T_J) must not exceed the Absolute Maximum specification of +150°C.

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.

Note: Unless otherwise indicated, V_{DD} = 2.7V thru 4.4V and T_A = -40°C to +125°C.

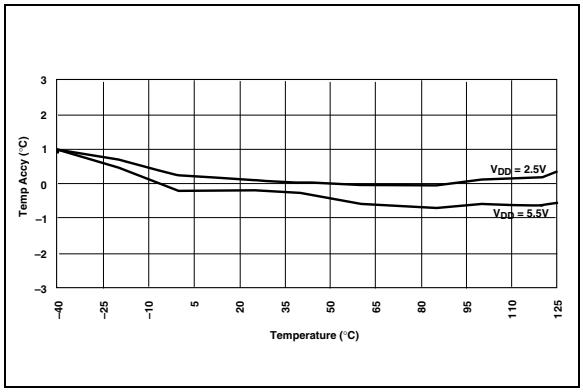


FIGURE 2-1: *Temperature Accuracy vs. Temperature.*

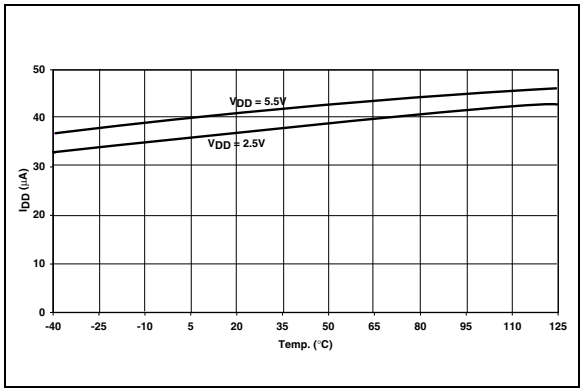


FIGURE 2-2: *Supply Current vs. Temperature.*

3.0 PIN DESCRIPTIONS

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

TABLE 3-1: PIN FUNCTION TABLE

Pin No.	Symbol	Description
1	V_{DD}	Input Supply Voltage
2	V_{OUT}	Temperature Sensor Output Terminal
3	V_{SS}	Ground Terminal

4.0 DETAILED DESCRIPTION

The TC1047 and TC1047A have an output voltage that varies linearly with temperature in degrees Celsius. Figure 4-1 shows a plot of the output voltage versus temperature for the TC1047 and TC1047A. The temperature slope is fixed at 10 mV/°C and the output voltage at 0°C is 500 mV.

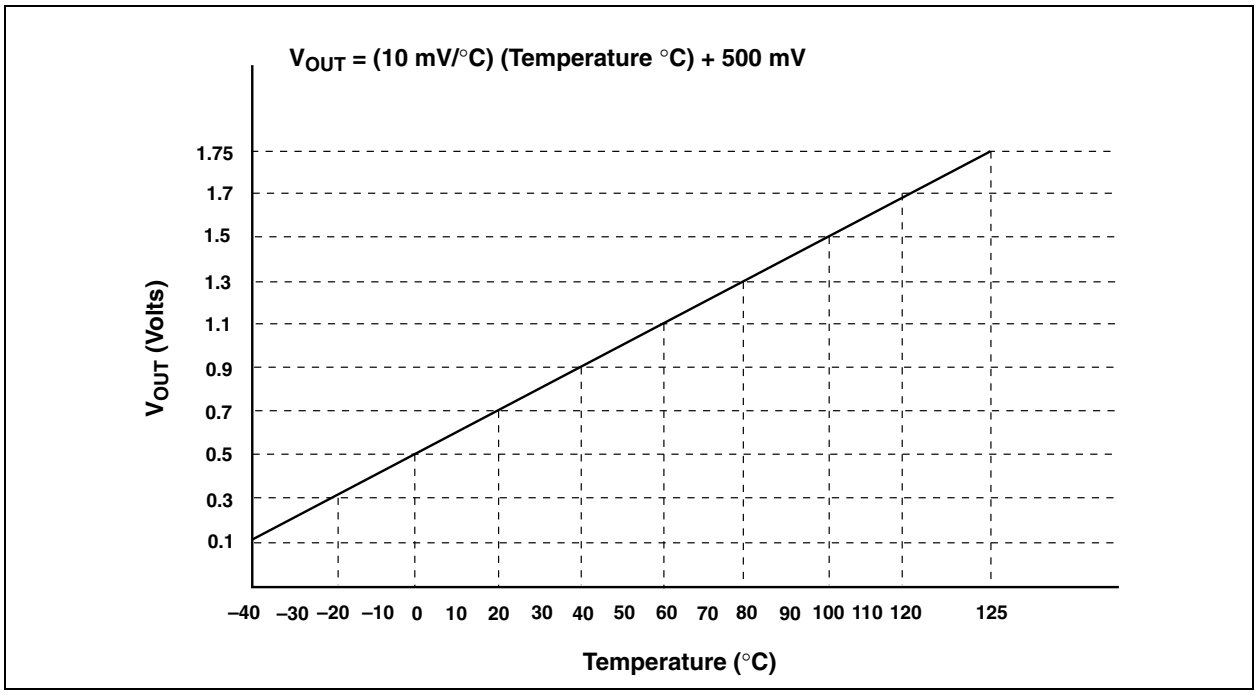
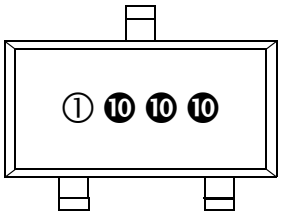


FIGURE 4-1: *Output Voltage vs. Temperature.*

5.0 PACKAGE INFORMATION

5.1 Package Marking Information

3-Pin SOT-23B



1 & 2 = part number code + temperature range and voltage

Part Number	Code
TC1047	AL
TC1047A	BL

3 = year and quarter code

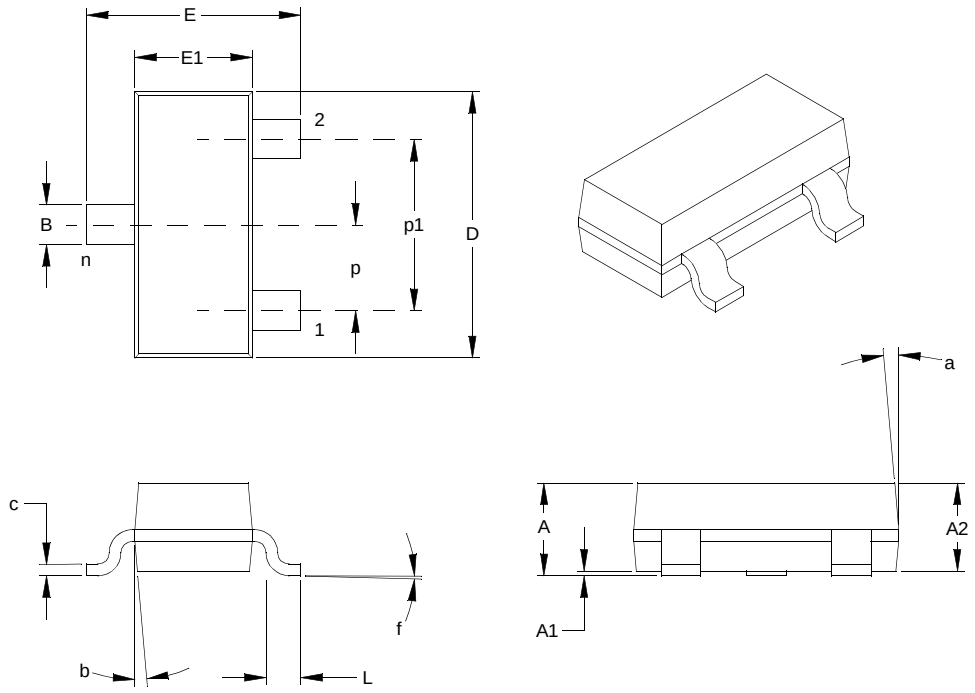
4 = lot ID number

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.

3-Lead Plastic Small Outline Transistor (TT) (SOT-23)

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		3			3	
Pitch	p		.038			0.96	
Outside lead pitch (basic)	p1		.076			1.92	
Overall Height	A	.035	.040	.044	0.89	1.01	1.12
Molded Package Thickness	A2	.035	.037	.040	0.88	0.95	1.02
Standoff	A1	.000	.002	.004	0.01	0.06	0.10
Overall Width	E	.083	.093	.104	2.10	2.37	2.64
Molded Package Width	E1	.047	.051	.055	1.20	1.30	1.40
Overall Length	D	.110	.115	.120	2.80	2.92	3.04
Foot Length	L	.014	.018	.022	0.35	0.45	0.55
Foot Angle	f	0	5	10	0	5	10
Lead Thickness	c	.004	.006	.007	0.09	0.14	0.18
Lead Width	B	.015	.017	.020	0.37	0.44	0.51
Mold Draft Angle Top	a	0	5	10	0	5	10
Mold Draft Angle Bottom	b	0	5	10	0	5	10

*Controlling Parameter

Notes:

Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" (0.127mm) per side.

JEDEC Equivalent: TO-236
Drawing No. C04-104

Revised 03-11-05

APPENDIX A: REVISION HISTORY

Revision D (December 2012)

Added a note to each package outline drawing.

Revision C (May 2005)

The following is the list of modifications:

1. Added Appendix A: Revision History.

Revision B (May 2002)

Revision A (March 2001)

- Original Release of this Document.

NOTES:

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
Device	Temperature Range	Package

Device:	TC1047:	Precision Temp-to-Voltage Converter
	TC1047xTR:	Precision Temp-to-Voltage Converter (Tape and Reel)
Temperature Range:	V =	-40°C to +125°C
Package:	NB =	Plastic Small Outline Transistor, SOT-23B, 3-lead

Examples:

a) TC1047VNBTR: Precision Temp-to-Voltage Converter

b) TC1047AVNBTR: Precision Temp-to-Voltage Converter

NOTES:

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