

NEGATIVE SLOPE TEMPERATURE SENSOR IC

FEATURES

- Linear Output Voltage -8 mV/°C Output
- Active High On/Off Control
- 2.7 to 10.0 V Supply Range
- Miniature Package (SOT-23-5)
- Minimum External Parts Count
- Low Power Consumption

DESCRIPTION

The TK11070 is a temperature sensor IC with a linear negative slope output of -8 mV/°C over the range of -30 to + 105 °C. Its wide operating voltage range of 2.7 to 10.0 V makes it suitable for a number of applications requiring accurate temperature control, such as electronic thermostats for climate control, refrigerators, and industrial process controls. The device is in the "on" state when the control pin is pulled to a logic high level. In the "off" state, the standby current is 1 μA maximum.

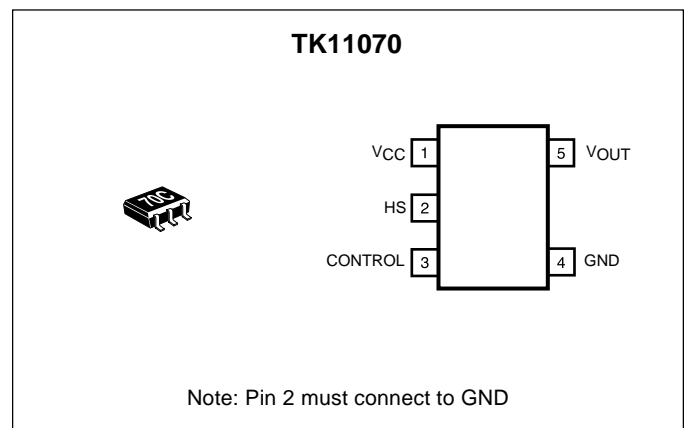
A typical application is to make a digital representation of temperature with an A/D converter, or to make a thermal detector with a comparator.

The TK11070 has a compensation pin for a 0.1 μF capacitor that ensures stability over the IC's operating temperature range.

The TK11070 is available in a miniature SOT-23-5 surface mount package.

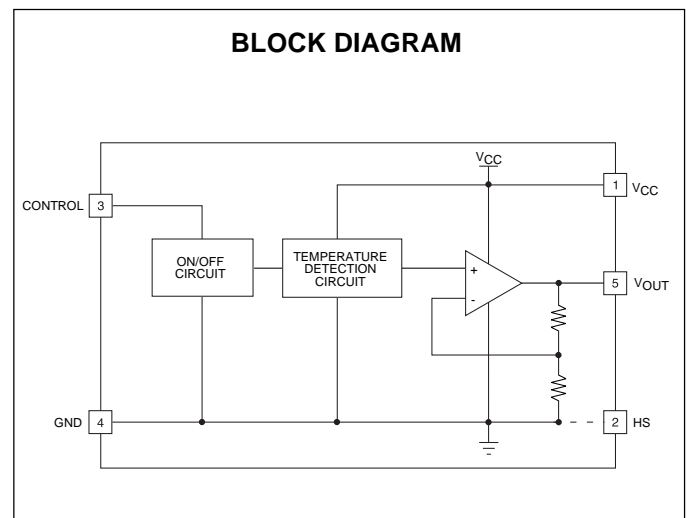
APPLICATIONS

- Home and Industrial Thermostats
- Automotive Climate Control
- Battery Charger Temperature Monitor
- Notebook Computer Temperature Monitor
- Electronic Thermometers
- Fish Finder Water Temperature
- Industrial Process Controllers
- Home Appliance Temperature Control
- Liquid Crystal Panel Contrast Adjustment



ORDERING INFORMATION	
TK11070M	 Tape/Reel Code

TAPE/REEL CODE
TL: Tape Left



TK11070

ABSOLUTE MAXIMUM RATINGS

Supply Voltage	12 V	Storage Temperature Range	-55 to +150 °C
Operating Voltage	2.7 to 10.0 V	Operating Temperature Range	-30 to +105 °C
Power Dissipation (Note 1)	150 mW	Lead Soldering Temperature (10 s)	235 °C
Junction Temperature	150 °C		

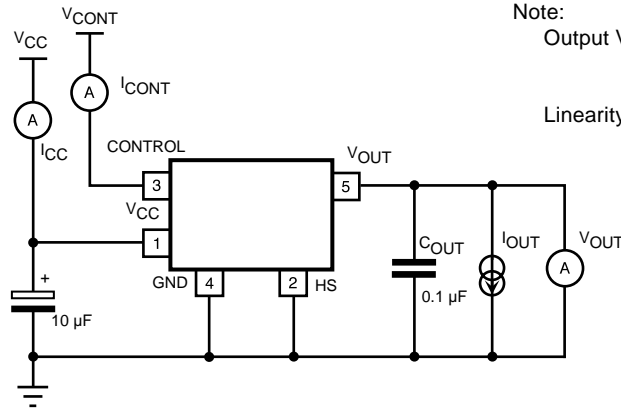
TK11070 ELECTRICAL CHARACTERISTICS

Test Conditions: $V_{CC} = 3.0\text{ V}$, $V_{CONT} = 2.4\text{ V}$, $I_{OUT} = 0\text{ }\mu\text{A}$, $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{OUT}	Output Voltage	$T_A = -30\text{ }^\circ\text{C}$		2.440		V
		$T_A = -25\text{ }^\circ\text{C}$	1.980	2.000	2.020	V
		$T_A = 85\text{ }^\circ\text{C}$	1.492	1.520	1.548	V
T_C	Temperature Coefficient	$T_A = 25\text{ to }85\text{ }^\circ\text{C}$	-8.5	-8.0	-7.5	mV/°C
Line Reg	Line Regulation	$V_{CC} = 3\text{ to }10\text{ V}$	-4	2	8	mV
Load Reg	Load Regulation	$I_{OUT} = 0\text{ }\mu\text{A to } \pm 10\text{ }\mu\text{A}$	-8	0	8	mV
I_{CC}	Supply Current	$V_{CONT} = 2.4\text{ V}$		75	100	μA
I_{OUT}	Output Current	$\Delta V_{OUT} \leq 20\text{ mV}$	-100		10	μA
I_{STBY}	Standby Supply Current	$V_{CONT} \leq 0.6\text{ V}$			1	μA
CONTROL TERMINAL SPECIFICATIONS						
I_{CONT}	Control Current		2.0	3.5	6.0	μA
$V_{CONT(ON)}$	Control Voltage (ON)	$V_{OUT} = 1.98\text{ to }2.02\text{ V}$, Output ON	1.8	2.4	V_{CC}	V
$V_{CONT(OFF)}$	Control Voltage (OFF)	$V_{OUT} < 0.1\text{ V}$, Output OFF	GND		0.6	V

Note 1: Power dissipation is 150 mW when mounted as recommended. Derate at 1.2 mW/°C for operation above 25 °C.

TEST CIRCUIT



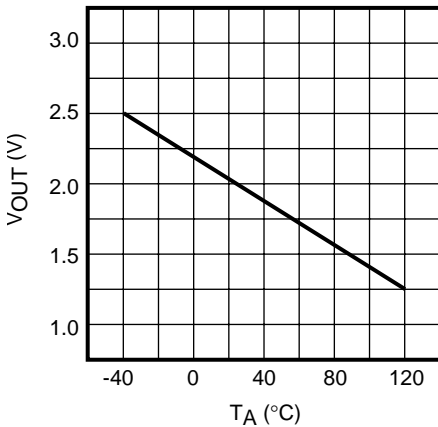
Note:
Output Voltage: $V_{OUT(TYP)} = 2.2\text{ V} + (-8\text{ mV}/^{\circ}\text{C}) \times T_A$
where T_A is in $^{\circ}\text{C}$

Linearity Error: $V_{ERR} = V_{OUT} - V_{OUT(TYP)}$
 $T_{ERR} = V_{ERR} / (-8\text{ mV}/^{\circ}\text{C})$

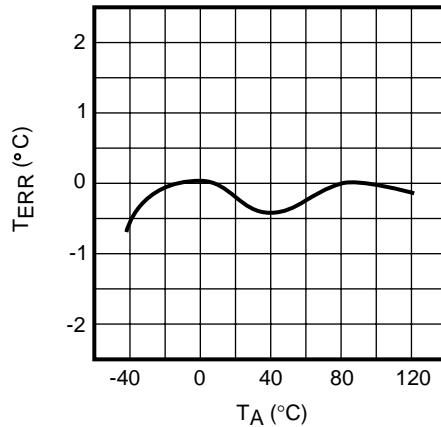
TYPICAL PERFORMANCE CHARACTERISTICS

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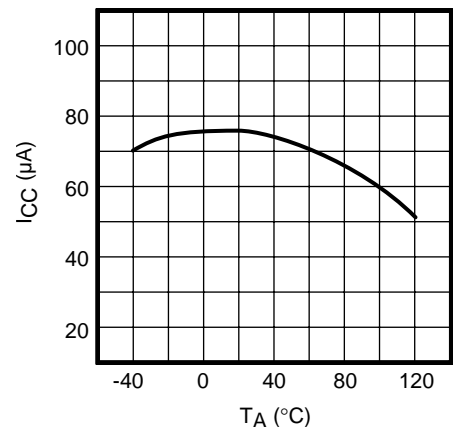
OUTPUT VOLTAGE vs. TEMPERATURE



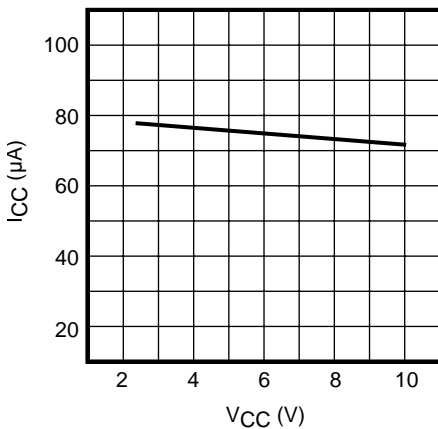
LINEARITY ERROR vs. TEMPERATURE



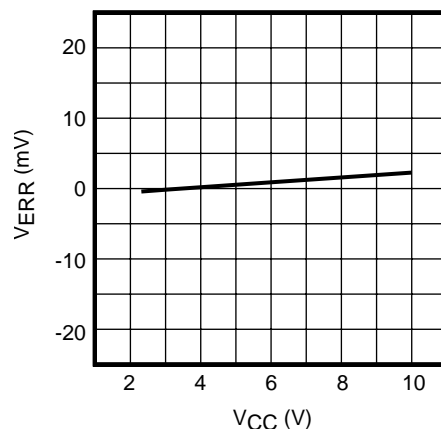
INPUT CURRENT vs. TEMPERATURE



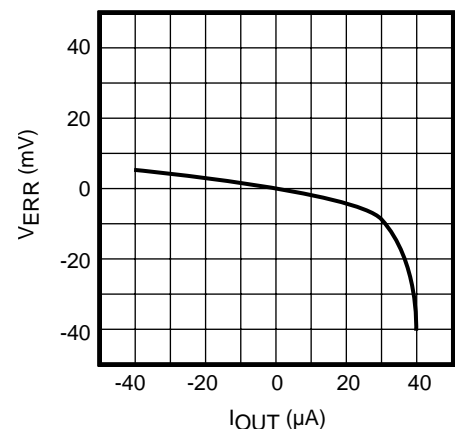
INPUT CURRENT vs. INPUT VOLTAGE



LINE REGULATION

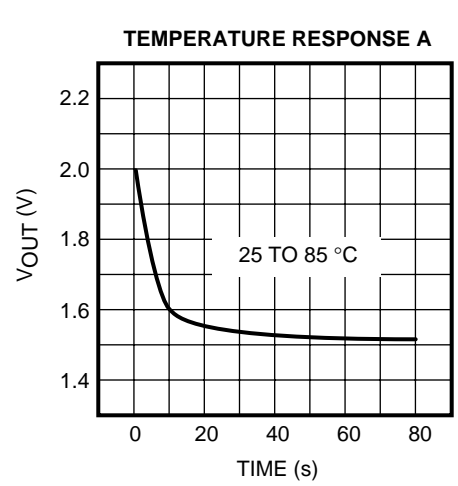
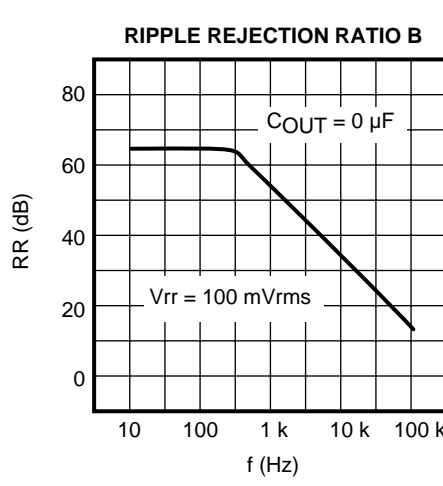
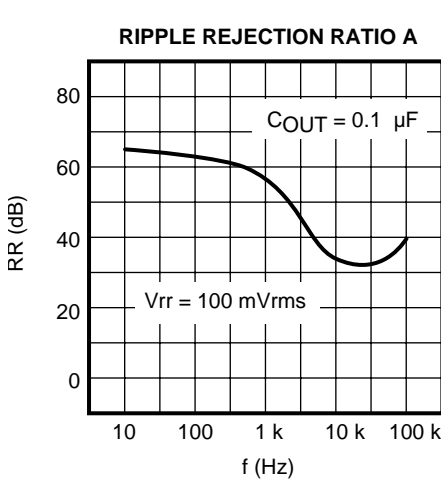
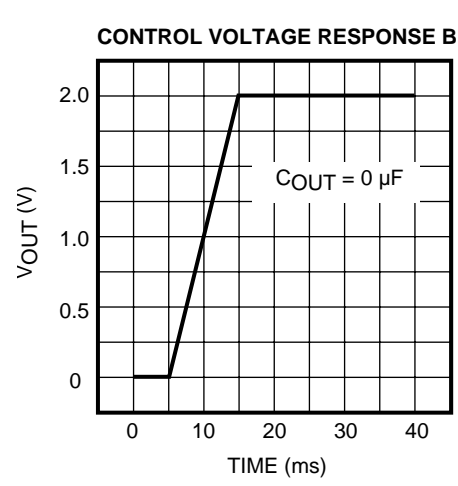
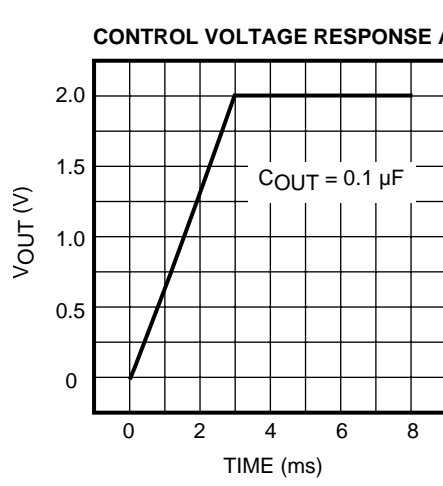
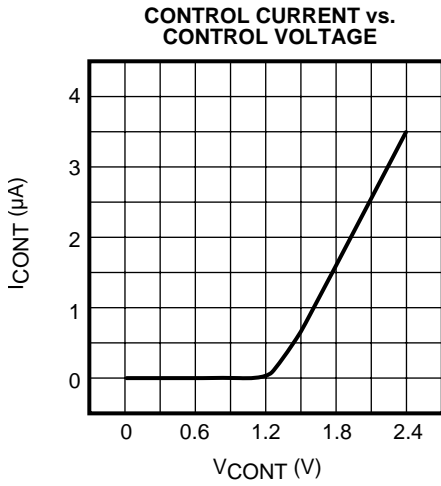
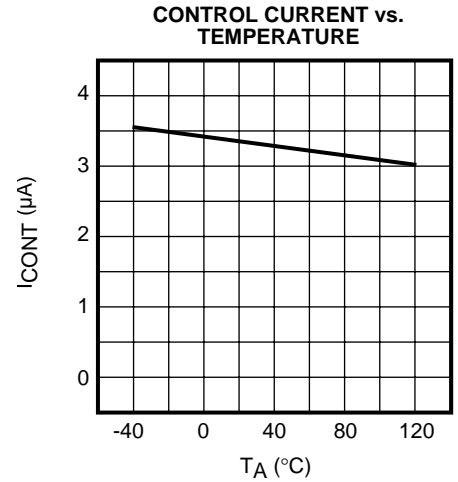
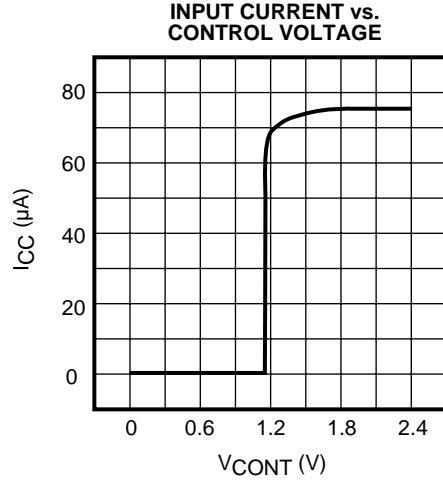
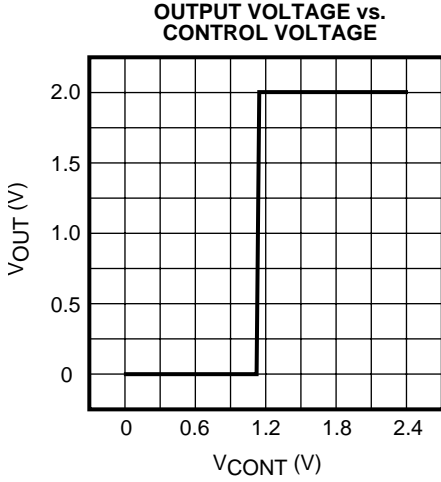


LOAD REGULATION



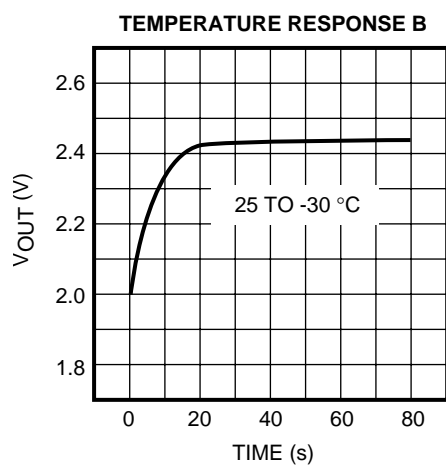
TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

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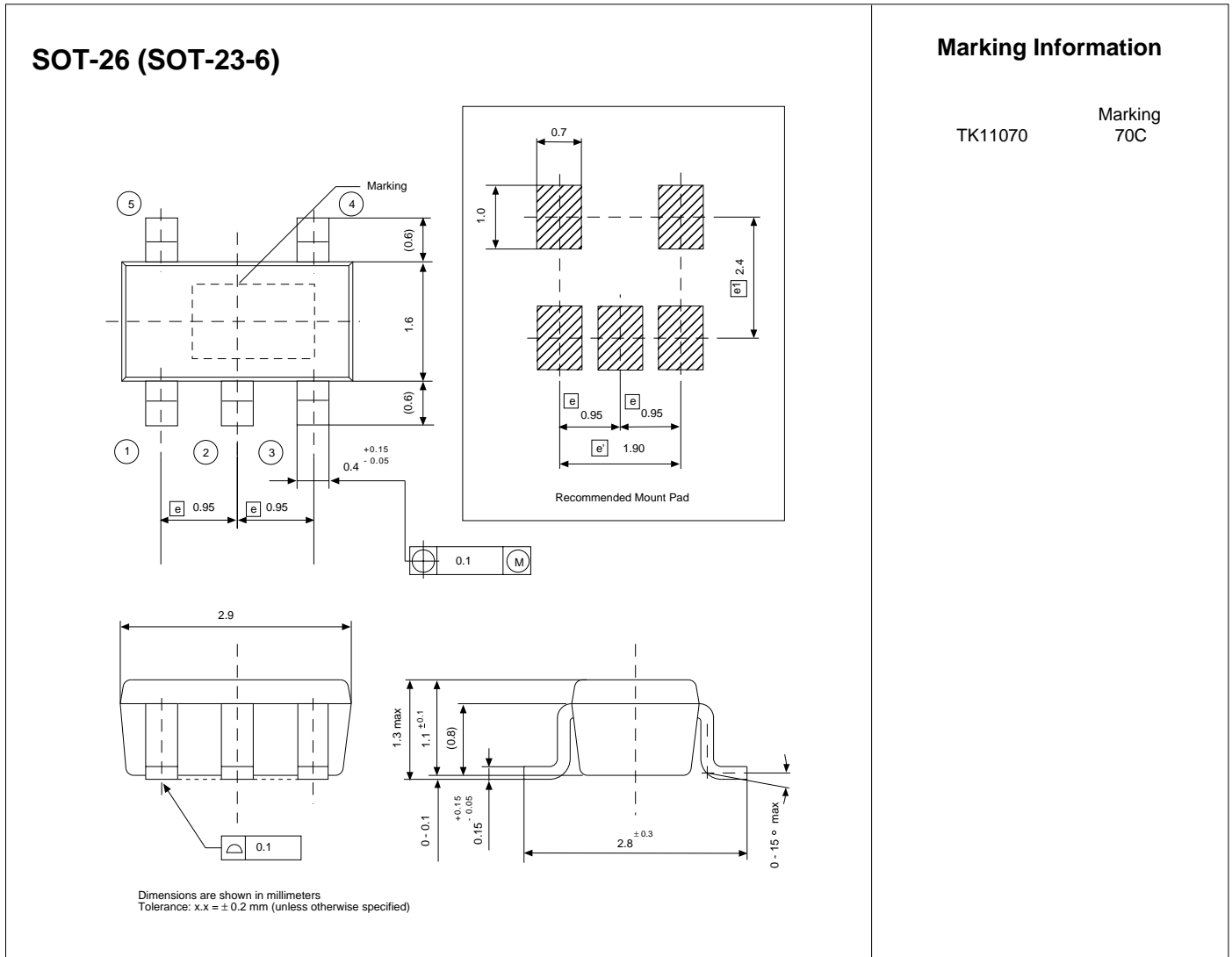


TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

$V_{CC} = 3\text{ V}$, $V_{CONT} = 2.4\text{ V}$, $I_{OUT} = 0\text{ }\mu\text{A}$, $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.



PACKAGE OUTLINE



Toko America, Inc. Headquarters
1250 Feehanville Drive, Mount Prospect, Illinois 60056
Tel: (847) 297-0070 Fax: (847) 699-7864

TOKO AMERICA REGIONAL OFFICES

Midwest Regional Office
Toko America, Inc.
1250 Feehanville Drive
Mount Prospect, IL 60056
Tel: (847) 297-0070
Fax: (847) 699-7864

Western Regional Office
Toko America, Inc.
2480 North First Street, Suite 260
San Jose, CA 95131
Tel: (408) 432-8281
Fax: (408) 943-9790

Eastern Regional Office
Toko America, Inc.
107 Mill Plain Road
Danbury, CT 06811
Tel: (203) 748-6871
Fax: (203) 797-1223

Semiconductor Technical Support
Toko Design Center
4755 Forge Road
Colorado Springs, CO 80907
Tel: (719) 528-2200
Fax: (719) 528-2375

Visit our Internet site at <http://www.tokoam.com>

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