Linear Building Block – Dual Low-Power Comparator and Voltage Reference with Shutdown

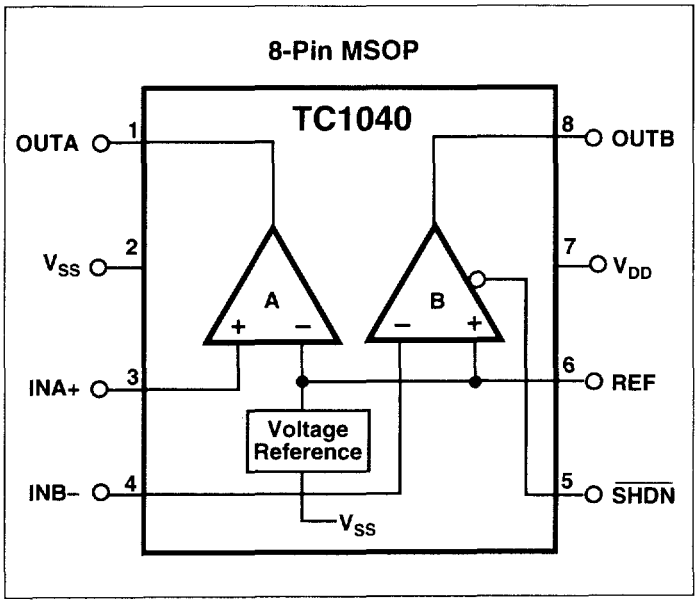
FEATURES

- Combines Two Comparators and a Voltage Reference in a Single Package
- Optimized for Single-Supply Operation
- Small Package ..... 8-Pin MSOP (Occupies Only Half the Area of an 8-Pin SOIC)
- Ultra Low Input Bias Current ..... Less than 100 pA
- Low Quiescent Current .... Operating 10µA (Typ.) Shutdown 6µA (Typ.)
- Rail-to-Rail Inputs and Outputs
- Operates Down to V_{DD} = 1.8V
- Reference and One Comparator Remain Active in Shutdown to Provide Supervisory Functions

APPLICATIONS

- Power Supply Circuits
- Battery Operated Equipment
- Consumer Products
- Replacements for Discrete Components

PIN CONFIGURATION



GENERAL DESCRIPTION

The TC1040 is a mixed-function device combining two comparators and a voltage reference in a single 8-Pin package. The inverting input of comparator A and the non-inverting input of comparator B are internally connected to the reference.

This increased integration allows the user to replace two packages, which saves space, lowers supply current, and increases system performance. The TC1040 operates from two 1.5V alkaline cells down to V_{DD} = 1.8V. It requires only 10 µA, typical, of supply current, which significantly extends battery life. A low-power shutdown input ($\overline{SHDN}$) disables one of the comparators, placing its output in a high-impedance state. This mode saves battery power and allows comparator outputs to share common analog lines (multiplexing). Shutdown current is 6 µA (typical).

Rail-to-rail inputs and outputs allow operation from low supply voltages with large input and output signal swings. Packaged in an 8-Pin MSOP, the TC1040 is ideal for applications requiring low-power level detection.

ORDERING INFORMATION

Part No.	Package	Temp. Range
TC1040CEUA	8-Pin MSOP	– 40°C to +85°C

TC1043EV Evaluation Kit for Linear Building Block Family

TC1040

ABSOLUTE MAXIMUM RATINGS*

Supply Voltage 6.0V
Voltage on Any Pin:
(With Respect to Supplies) .. (V_{SS} – 0.3V) to (V_{DD} +0.3V)
Operating Temperature Range: ..... – 40°C to + 85°C
Storage Temperature Range ..... – 55°C to +150°C
Lead Temperature (Soldering, 10 sec) ..... +260°C

* 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: Typical values apply at 25°C and V_{DD} = 3V. Minimum and maximum values apply for T_A = –40° to +85°C and V_{DD} = 1.8V to 5.5V, unless otherwise specified.

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{DD}	Supply Voltage		1.8	—	5.5	V
I_Q	Supply Current, Operating	All outputs unloaded, $\overline{SHDN}$ = V_{DD}	—	10	15	µA
I_{SHDN}	Supply Current, Shutdown	COMPA and V_{REF} Outputs unloaded, $\overline{SHDN}$ = V_{SS}	—	6	10	µA
Shutdown Input						
V_{IH}	Input High Threshold		80% V_{DD}	—	—	V
V_{IL}	Input Low Threshold		—	—	20% V_{DD}	V
I_{SI}	Shutdown Input Current		—	—	±100	nA
Comparators						
R_{OUT}(SD)	Output Resistance in Shutdown	$\overline{SHDN}$ = V_{SS}, COMPB only	20	—	—	M
C_{OUT}(SD)	Output Capacitance in Shutdown	$\overline{SHDN}$ = V_{SS}, COMPB only	—	—	5	pF
T_{SEL}	Select Time (For Valid Output)	($\overline{SHDN}$ = V_{IH} to V_{OUT}) R_L =10K to V_{SS}, COMPB only	—	20	—	µsec
T_{DESEL}	Deselect Time	($\overline{SHDN}$ = V_{IL} to V_{OUT}) R_L =10K to V_{SS}, COMPB only	—	500	—	nsec
V_{IR}	Input Voltage Range		V_{SS} – 0.2	—	V_{DD} +0.2	V
V_{OS}	Input Offset Voltage	V_{DD} = 3V, T_A = 25°C T_A = –40°C to 85°C	– 5 –5	—	+5 +5	mV
I_B	Input Bias Current	T_A = 25°C, INA+, INB– = V_{DD} to V_{SS}	—	—	±100	pA
V_{OH}	Output High Voltage	R_L = 10K to V_{SS}	V_{DD} – 0.3	—	—	V
V_{OL}	Output Low Voltage	R_L = 10K to V_{DD}	—	—	0.3	V
PSRR	Power Supply Rejection Ratio	T_A = 25°C, V_{DD} = 1.8V to 5V	60	—	—	dB
I_{SRC}	Output Source Current	INA+ = V_{DD}, INB– = V_{SS} Output Shorted to V_{SS} V_{DD} = 1.8V	1	—	—	mA
I_{SINK}	Output Sink Current	INA+ = V_{SS}, INB– = V_{DD}, Output Shorted to V_{DD} V_{DD} = 1.8V	2	—	—	mA
t_{PD1}	Response Time	100 mV Overdrive, C_L = 100pF	—	4	—	µsec
t_{PD2}	Response Time	10 mV Overdrive, C_L = 100pF	—	6	—	µsec