MC393

Dual Differential Comparators

Version 2.0

Contents:

Version History

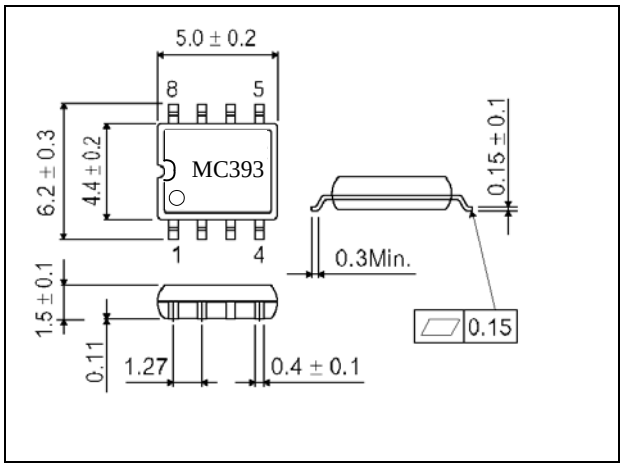
Version	Issued time	Notes
V1.0	March 10, 2007	Datasheet created.
V2.0	Aug. 8, 2010	Update datasheet format.

DESCRIPTION

The MC393 consists of two independent voltage comparators with an offset voltage specification as low as 2.0mV max. The comparators are designed specifically to operate from a single power supply over a wide range of voltages. Operation from dual supplies also is possible as long as the difference between the two supplies is 2V to 36V. Current drain is independent of the magnitude of supply voltage.

The comparators also have a unique characteristic that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

Outline Drawing

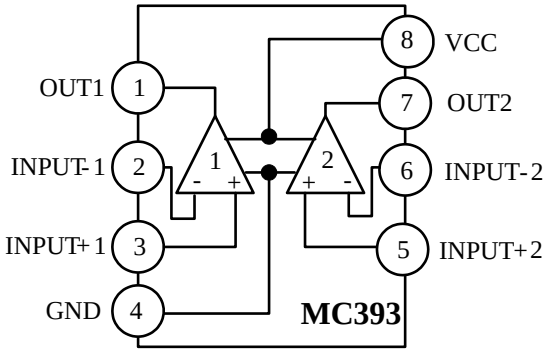


SOP-8 (Unit: mm)

FEATURE

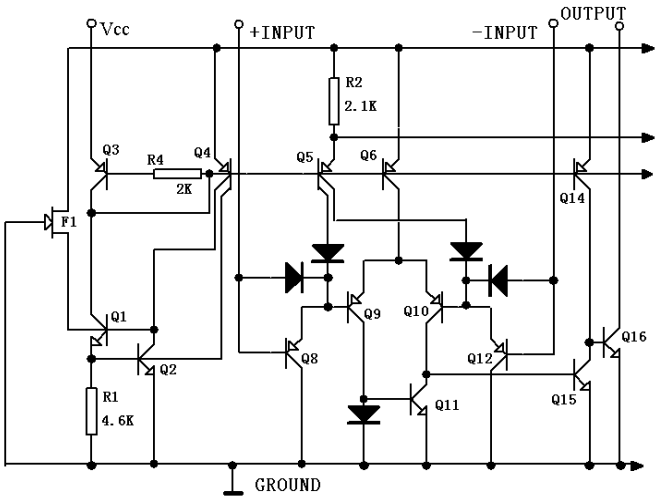
- Single supply or dual supplies
- Wide range of supply voltage
  - — Single supply: 2V to 36V
  - — Dual supplies: ±1.0V to ±18V
- Very low supply current drain (0.8mA), independent of supply voltage (2.0mW/comparator at 5.0V)
- Low input biasing current: 25nA
- Low input offset current: 5.0nA
- Low input offset voltage: 5.0mV
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Output voltage compatible with TTL, DTL, ECL, MOS and CMOS logic systems
- SOP-8 package

PIN DESCRIPTION



Pin No	Symbol	Description
1	OUT1	Output of comparator1
2	INPUT-1	Input (-) of comparator1
3	INPUT+1	Input (+) of comparator1
4	GND	Ground
5	INPUT+2	Input (+) of comparator2
6	INPUT-2	Input (-) of comparator2
7	OUT2	Output of comparator2
8	VCC	Power supply

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Characteristic		Symbol	Value	Unit
Supply Voltage Range	Single supply	Vcc	±18	V
	Dual supplies		36	
Differential Input Voltage		V_{DIFFIN}	36	V
Input Common-Mode Voltage		V_{COM}	-0.3~36	V
Output Short-Circuit to GND		I_{OG}	20	mA
Input Current		I_{CC}	50	mA
Maximum Junction Temperature		T_J	125	°C
Power Dissipation		P_{OUT}	300	mW
Operating Temperature		T_{AMB}	-20~+85	°C
Storage Temperature		T_{STG}	-65~150	°C

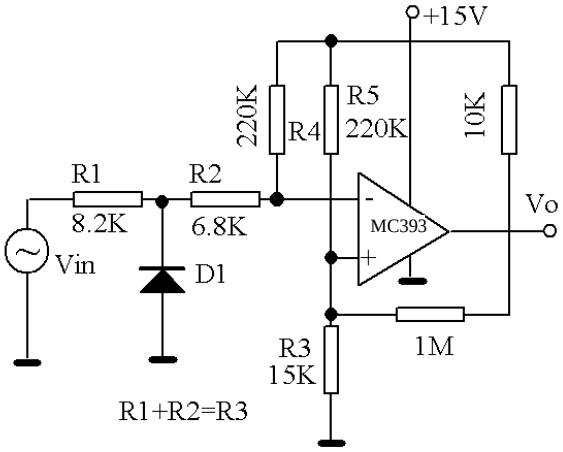
ELECTRICAL CHARACTERISTICS

(Unless otherwise specified: Ta=25℃, VCC=5.0V)

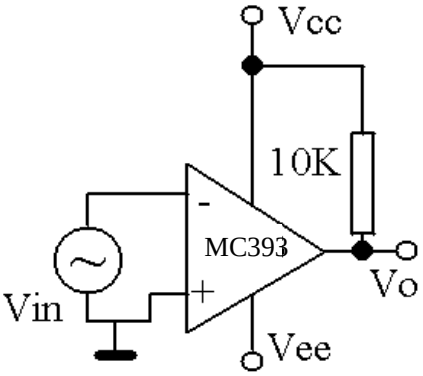
Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input Offset Voltage	V_{OFFSET}	Ta=25℃		±1.0	±5.0	mV
		0℃ ≤ Ta ≤ 70℃			±9.0	
Input Offset Current	I_{OFFSET}	Ta=25℃		±5.0	±50	nA
		0℃ ≤ Ta ≤ 70℃			±150	
Input Bias Current	I_{BIAS}	Ta=25℃	-	25	250	nA
		0℃ ≤ Ta ≤ 70℃			400	
Input Common-Mode Voltage Range	V_{COM}	Ta=25℃	0		Vcc-1.5	V
		0℃ ≤ Ta ≤ 70℃	0		Vcc-2.0	

Supply Current	Icc	R_L=∞, dual comparators		0.4	1.0	mA
		R_L=∞, dual comparators Vcc=30V			2.5	
Voltage Gain	G_{SIG}	VCC=15V, R_L≥15kΩ	50	200		V/mV
Large Signal Response Time	T_{RES}	V_{IN}=TTL Logic Swing, V_{REF}=1.4V, V_{RL}=5.0V, R_L=5.1KΩ		300		ns
Response Time	T_{RES}	V_{RL}=5.0V, R_L=5.1KΩ		1.3		ns
Input Differential Voltage	V_{IND}				Vcc	V
Output Sink Current	I_{SINK}	$V_{IN(-)}$ ≥ 1.0V,$V_{IN(+)}$ =0V,Vo ≤ 1.5V	6.0	16		mA
Output Saturation Voltage	V_{SAT}	$V_{IN(-)}$≥ 1.0V,$V_{IN(+)}$=0V, I_{SINK} ≤ 4.0mA		130	400	mV
		$V_{IN(-)}$ ≥ 1.0V,$V_{IN(+)}$ =0V, I_{SINK} ≤ 4.0mA 0℃ ≤ Ta ≤ 70℃			700	
Output Leakage Current	I_{OL}	$V_{IN(+)}$ ≥ 1.0V, $V_{IN(-)}$ =0V, Vo=5.0V		0.1		nA
		$V_{IN(+)}$ ≥ 1.0V, $V_{IN(-)}$ =0V, Vo=30V 0℃ ≤ Ta ≤ 70℃			1000	

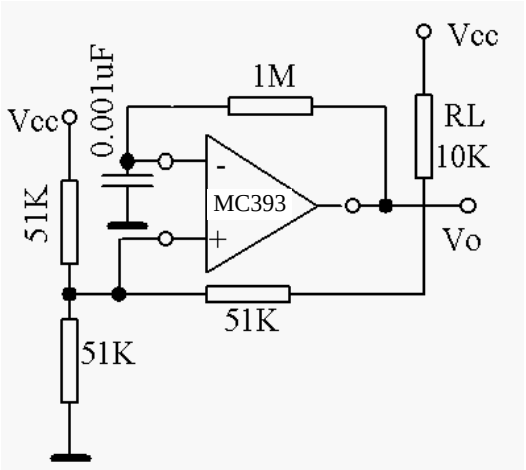
APPLICATION CIRCUIT



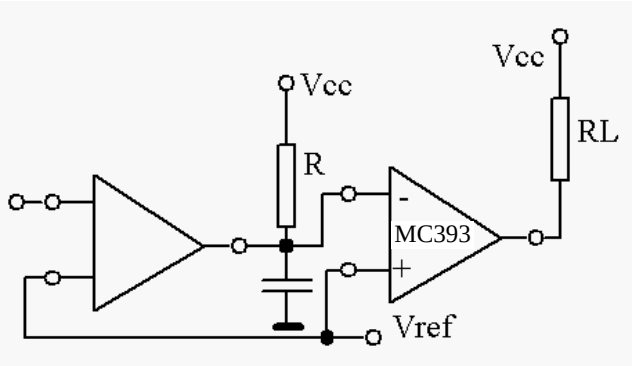
Zero Rectifier (Single Power Supply)



Zero Rectifier (Dual Power Supplies)



Squarewave Generator



Delay Circuit

TYPICAL PERFORMANCE CHARACTERISTICS

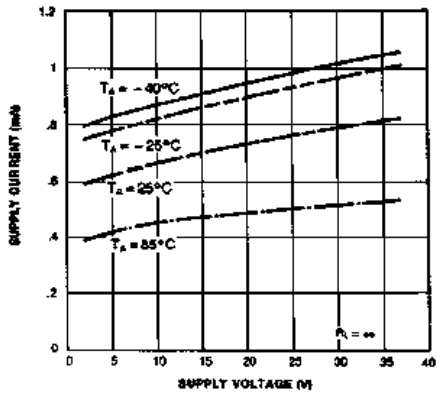


Figure 1. Supply Current vs Supply Voltage

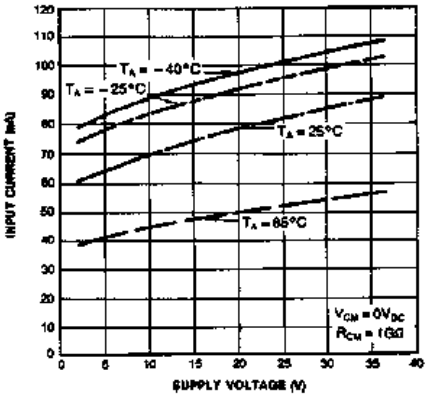


Figure 2. Input Current vs Supply Voltage

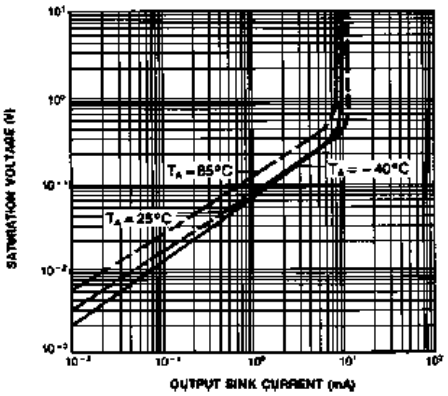


Figure 3. Output Saturation Voltage vs Sink Current

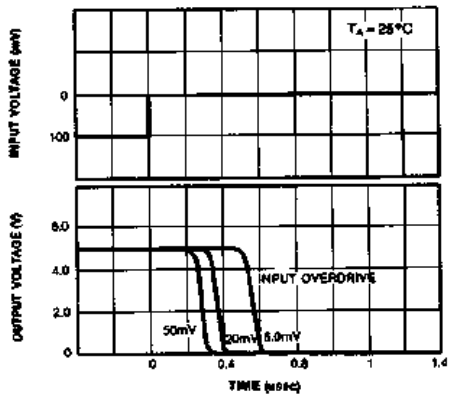


Figure 4. Response Time for Various Input Overdrive-Negative Transition

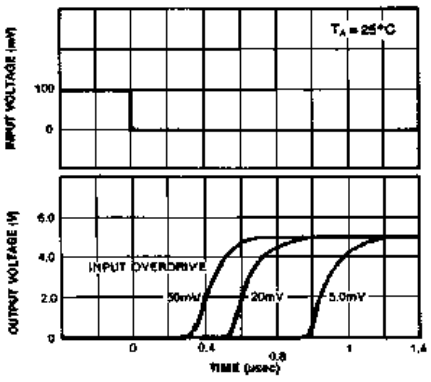
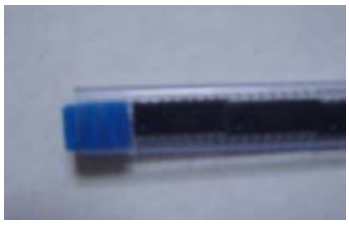


Figure 5. Response Time for Various Input Overdrive-Positive Transition

PACKING

SOP Tube Packing Process：

Packing Type	Pcs/ Tube	Pcs /Box	Pcs / Case
SOP8 (Tube)	**100**	**20,000**	**50,000**

No.	Packing Example	Packing Description
1		1. Make the first pin toward the non-white cork (the other side of the tube is white cork). 2. The direction is as Figure 1, please make the direction of all products the same. 3. 100pcs chips in each tube.
2		1. Tie plastic tubes with the same direction. 2. 20 tubes for each buddle, 2000pcs chips altogether.
3		1. Place tubes in small packaging boxes. 2. 20,000pcs chips in each box.
4		1. Cover small boxes, and stick the product label in the middle of right side. 2. Box size: 545x127x55mm
5		Place small boxes with the same direction in cartoon boxes.
6		1. Cover cartoon boxes, and seal with transparent adhesive tape. 2. Stick product label in top left corner of cartoon boxes. 3. 50,000pcs chips in each box. 4. Carton size:565x360x145mm
7		Product label on cartoon boxes

Important Notice

MC Devices reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to MC Devices' terms and conditions of sale supplied at the time of order acknowledgment.

MC Devices warrants performance of its products to the specifications applicable at the time of sale in accordance with MC Devices' standard warranty. Testing and other quality control techniques are also support this warrant.

美芯集成电路（深圳）有限公司
中国深圳高新区科技中二路软件园一期四栋 516 室
电话：（86）755-8618-5088
传真：（86）755-8618-5000
Email：sales@mcdevices.com
网址：www.mcdevices.com

MC DEVICES Co., Ltd

516 Bld. 4, National Software Base, Kejizhong 2 Rd.,
Shenzhen Hi-Tech Park,
Shenzhen, Guangdong, China
Tel: 86-755-8618-5088
Fax:86-755-8618-5000
Email: sales@mcdevices.com
http://www.mcdevices.com