

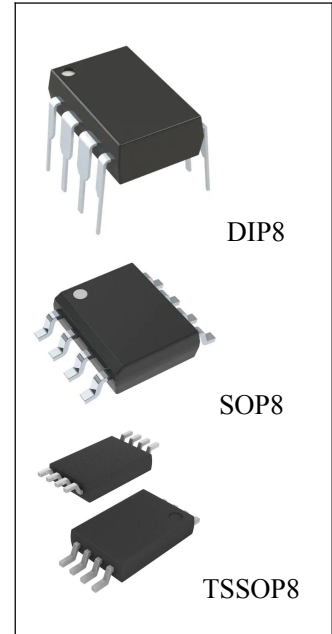
D393

Dual Differential Comparators Circuit

General Description

The D393 consists of two independent voltage comparators with an offset voltage specification as low as 2.0mV max. for two comparators which were designed specifically to operation from a single power supply over a wide range of voltages. Operate from split power supplies is also possible, and the low power supply current drain is independent of the magnitude of the power supply voltage. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

D393 are available in DIP8, SOP8 and TSSOP8 packages.



Features

- Wide supply voltage range: single supply operation: 2V to 36V
dual supply operation: $\pm 1V$ to $\pm 18V$
- Very low supply current drain (0.8mA) independent of supply voltage (2.0mW/comparator at 5.0 VDC)
- 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.

Package Information

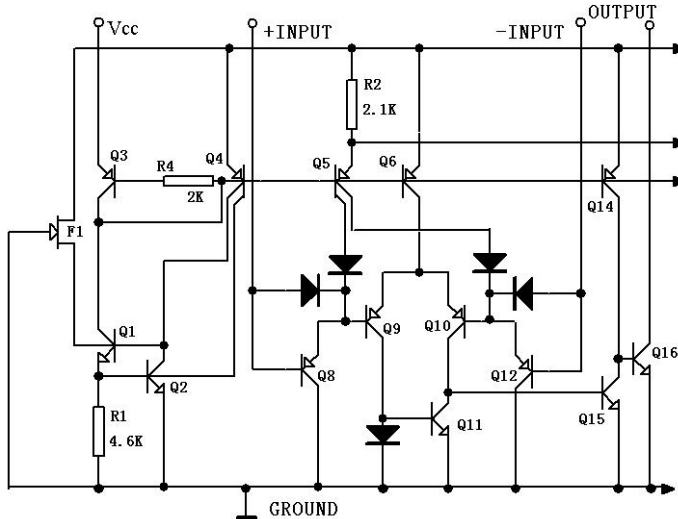
Part NO.	Package Description	Package Marking	Package Option
D393	DIP8	CHMC D393 SXXXX	50/Tube
D393(F)	SOP8	CHMC D393 SXXXX	100/Tube 4000/Reel
D393(T)	TSSOP8	CHMC D393 SXXXX	100/Tube 4000/Reel

CHMC: Trademark

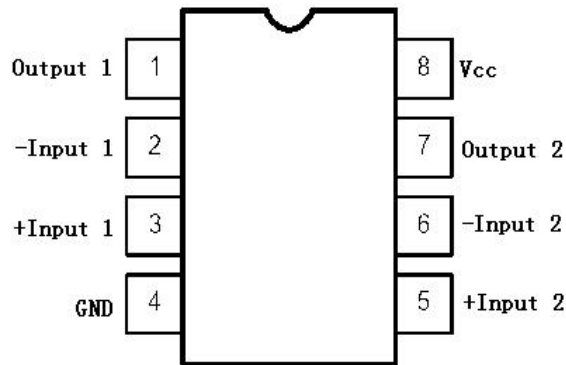
D393: Part NO.

SXXXX: Lot NO.

Block Diagram



Pin Connection



D393(DIP8/SOP8/TSSOP8)

Pin Configurations

No	Description	Symbol	No	Description	Symbol
1	Output 1	OUT1	5	+Input2	IN2 (+)
2	-Input1	IN1 (-)	6	-Input2	IN2 (-)
3	+Input1	IN1 (+)	7	Output 2	OUT1
4	Ground	GND	8	Supply Voltage	Vcc

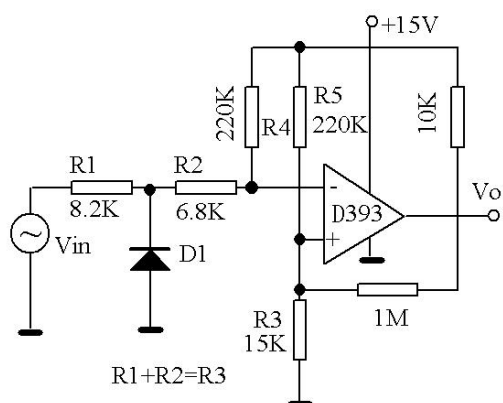
Absolute Maximum Ratings (Tamb=25℃)

Characteristics		Symbol	Value		Unit
			Min	Max	
Supply Voltage	Single supply voltage	Vcc		±18	V
	Dual supplies voltage			36	
Differential Input Voltage		VIDR		36	V
Input common-mode voltage		VICR	-0.3	36	V
Output short-circuit to ground		I _{OG}		20	mA
Input Current		I _{IN}		50	mA
Maximum junction temperature		T _J		125	℃
Power Dissipation		P _D		570	mW
Operating Temperature Range		Tamb	-25	85	℃
Storage Temperature Range		Tstg	-65	150	℃

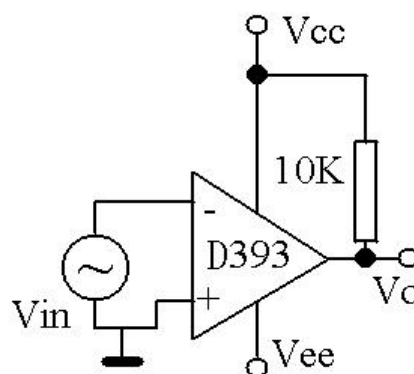
Electrical Characteristics (Unless otherwise specified :Vcc=5V, Tamb=25℃)

Characteristics	Test conditions	Symbol	Min	Typ.	Max	Unit
Input Offset Voltage		V _{IO}		±1.0	±5.0	mV
	-25℃ ≤ Ta ≤ 85℃				±9.0	
Input Offset Current		I _{IO}		±5.0	±50	nA
	-25℃ ≤ Ta ≤ 85℃				±150	
Input Bias Current		I _{IB}		25	250	nA
	-25℃ ≤ Ta ≤ 85℃				400	
Input Common-mode Voltage Range		V _{ICR}	0		Vcc-1.5	V
	-25℃ ≤ Ta ≤ 85℃		0		Vcc-2.0	
Supply Current	R _L =∞ dual comparator	I _{CC}		0.4	1.0	mA
	R _L =∞, dual comparator Vcc=30V				2.5	
Voltage Gain	R _L ≥ 15KΩ, Vcc=15V	G _V	50	200		V/mV
Large Signal Response Time	V _{IN} =TTL Logic Swing, V _{REF} =1.4V, V _{RL} =5.0V, R _L =5.1KΩ	t _{RES}		300		ns
Response Time	V _{RL} =5.0V, R _L =5.1KΩ	t _{RES}		1.3		μs
Input Differential Voltage		V _{ID}			Vcc	V
Output Sink Current	V _{IN} (-) ≥ 1.0V, V _{IN} (+)=0V, V _O ≤ 1.5V	I _{SINK}	6.0	16		mA
output saturation voltage	V _{IN} (-) ≥ 1.0V, V _{IN} (+) =0V, I _{SINK} ≤ 4.0mA	V _{SAT}		150	400	mV
	V _{IN} (-) ≥ 1.0V, V _{IN} (+) =0V, I _{SINK} ≤ 4.0mA -25℃ ≤ Ta ≤ 85℃				700	
Output Leakage Current	V _{IN} (+) ≥ 1.0V, V _{IN} (-) =0V, V _O =5.0V	I _{OL}		0.1		nA
	V _{IN} (+) ≥ 1.0V, V _{IN} (-) =0V, V _O =30V -25℃ ≤ Ta ≤ 85℃				1000	

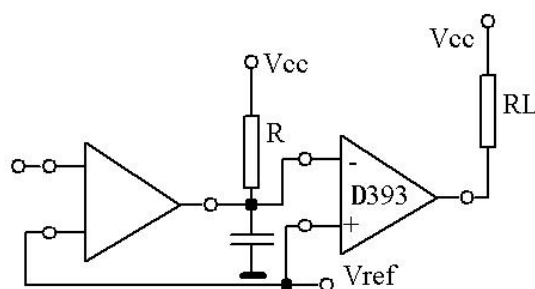
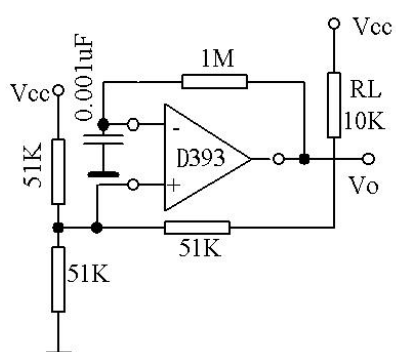
Application Circuit



Applied single power Supply



Applied split power supplies



Characteristics Curves

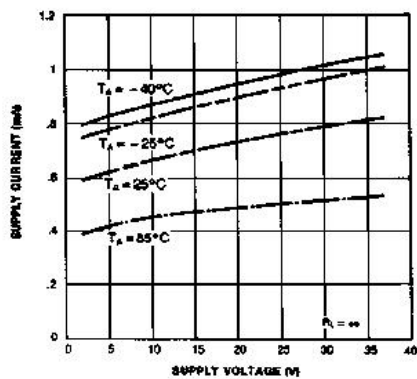


Figure 1. Supply Current vs Supply Voltage

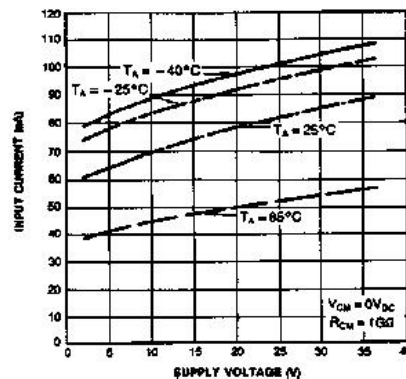


Figure 2. Input Current vs Supply Voltage

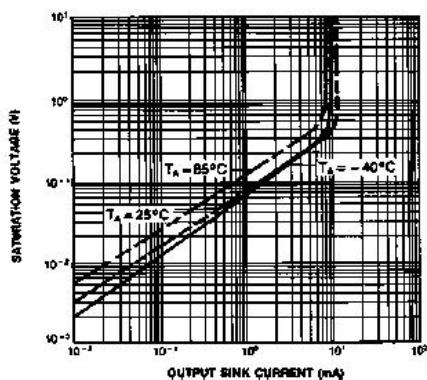


Figure 3. Output Saturation Voltage vs Sink Current

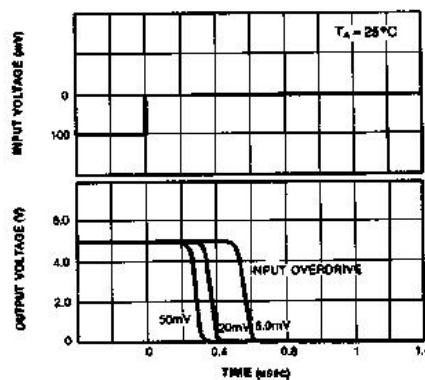


Figure 4. Response Time for Various Input Overdrive-Negative Transition

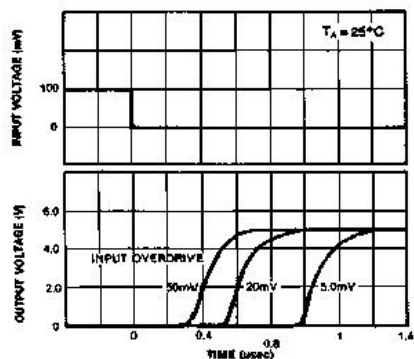


Figure 5. Response Time for Various Input Overdrive-Positive Transition

Outline Dimensions

DIP8

Unit:mm

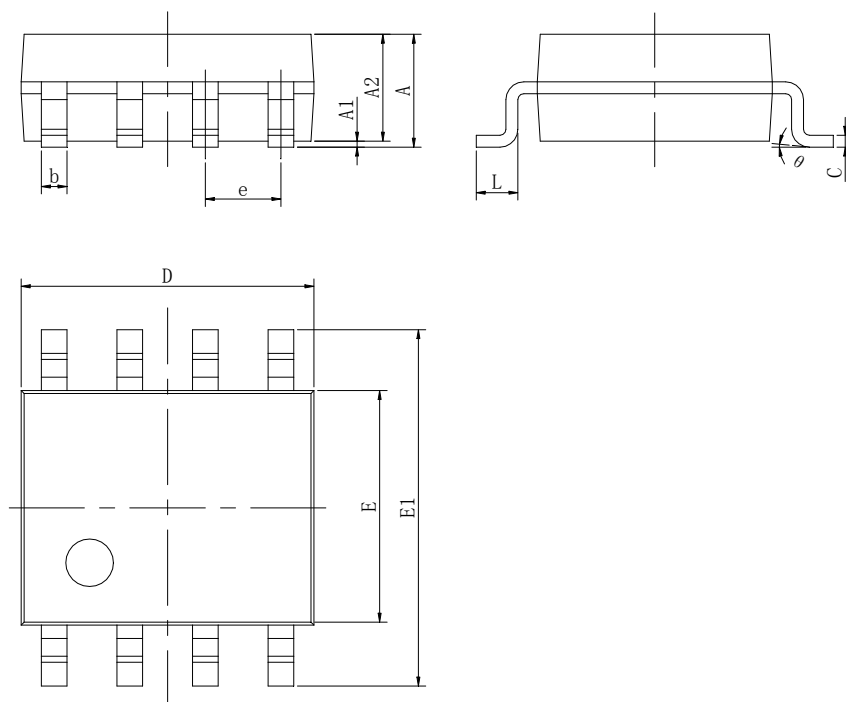
The diagram illustrates the physical dimensions of a DIP8 package through three distinct views:

- Side View (Top Left):** Shows the profile of the package. Dimensions include *A* (total height), *A1* (height of the mounting tab), *A2* (height of the body), *B* (width of the mounting tab), *B1* (width of the body), *L* (length of the mounting tab), and *e* (pitch between pins).
- Top View (Bottom Left):** Shows the package from above. Dimensions include *D* (total width) and *E* (total length).
- Front View (Top Right):** Shows the package from the front. Dimensions include *E1* (width of the mounting tab), *E2* (width of the body), and *C* (thickness of the mounting tab).

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	3.710	4.310	0.146	0.170
A1	0.510		0.020	
A2	3.200	3.600	0.126	0.142
B	0.380	0.570	0.015	0.022
B1	1.524(BSC)		0.060(BSC)	
C	0.204	0.360	0.008	0.014
D	9.000	9.400	0.354	0.370
E	6.200	6.600	0.244	0.260
E1	7.320	7.920	0.288	0.312
e	2.540(BSC)		0.100(BSC)	
L	3.000	3.600	0.118	0.142
E2	8.400	9.000	0.331	0.354

SOP8

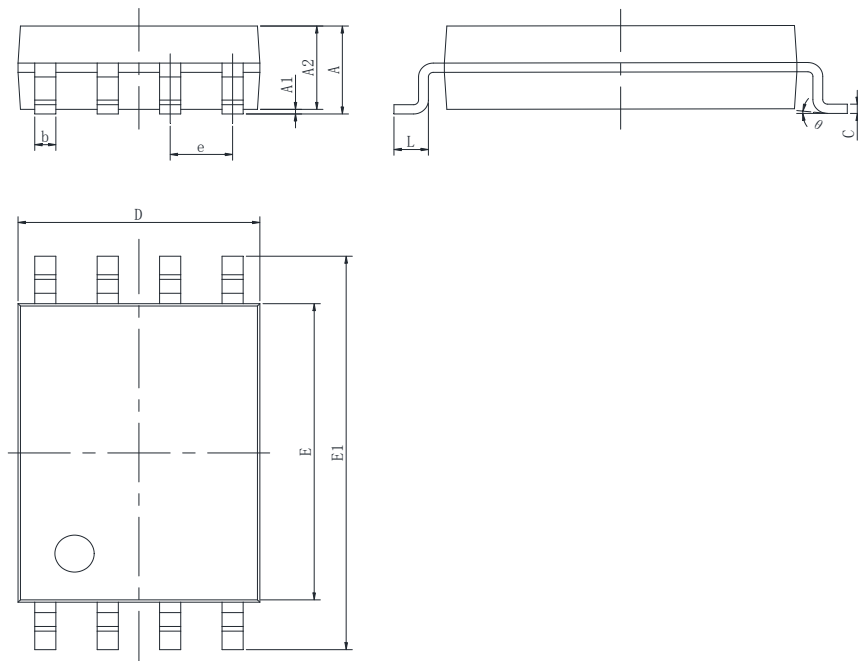
Unit:mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.800	0.053	0.071
A1	0.000	0.250	0.000	0.010
A2	1.250	1.550	0.053	0.061
b	0.300	0.510	0.011	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.201
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

TSSOP8

Unit:mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A		1.100		0.043
A1	0.020	0.150	0.001	0.006
A2	0.800	1.000	0.031	0.039
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	2.900	3.100	0.114	0.122
E	4.300	4.500	0.169	0.177
E1	6.250	6.550	0.246	0.258
e	0.650(BSC)		0.026(BSC)	
L	0.500	0.700	0.020	0.028
θ	0°	8°	0°	8°

Statements

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