

Low power low offset voltage dual comparators

Primary characteristics		
Parameter	Value	Unit
Supply voltage	36	V
Power dissipation	660	mW

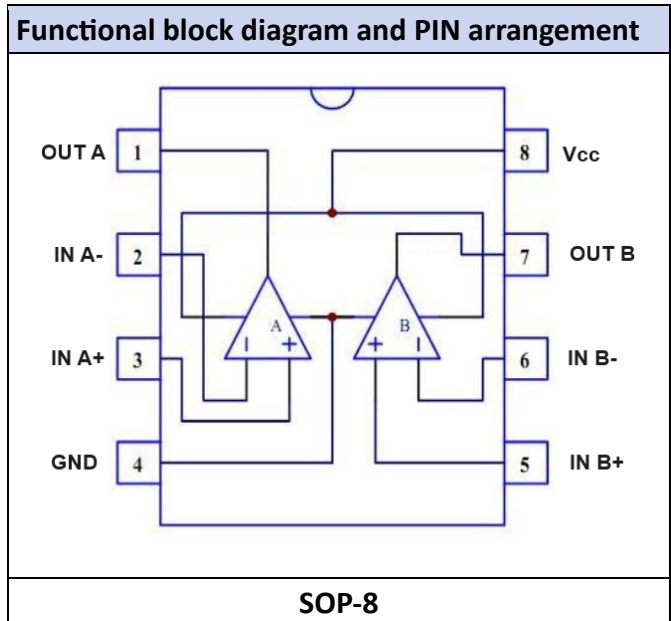
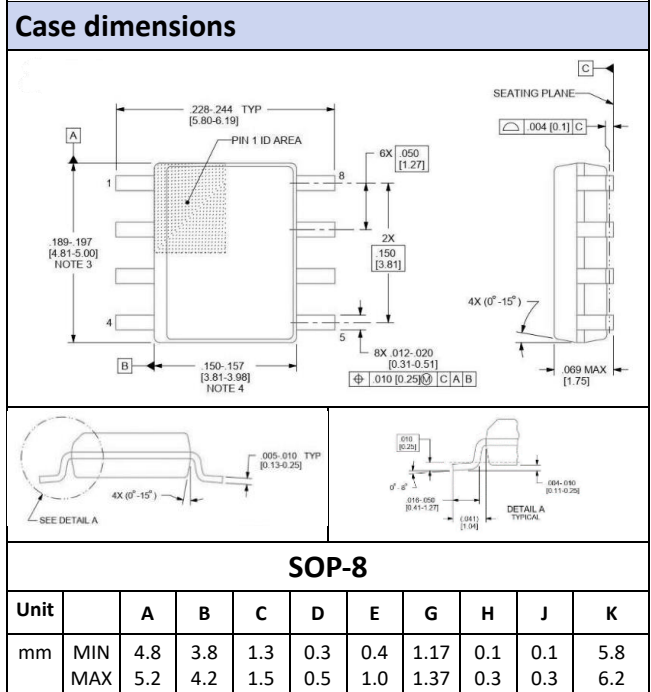
Description

LM393 is an integrated circuit consisting of two independent, high-precision voltage comparators with a low offset voltage, maximum 2.0mV. It is designed for wide voltage range and single-supply operation, but can also be powered by dual supplies; furthermore, regardless of the power supply voltage, it has low power consumption. It also features a characteristic: even with single-supply operation, the comparator's input common-mode voltage range is close to ground level. It is primarily used in limiters, simple analog-to-digital converters, pulse generators, square wave generators, delay generators, wideband voltage-controlled oscillators, MOS clock timers, multi-frequency oscillators, and high-level digital logic gate circuits.

The **LM393** is designed for direct connection to TTL and CMOS logic; when powered by dual supplies, it is compatible with MOS logic circuits—this is the unique advantage of the low-power **LM393** compared to standard comparators.

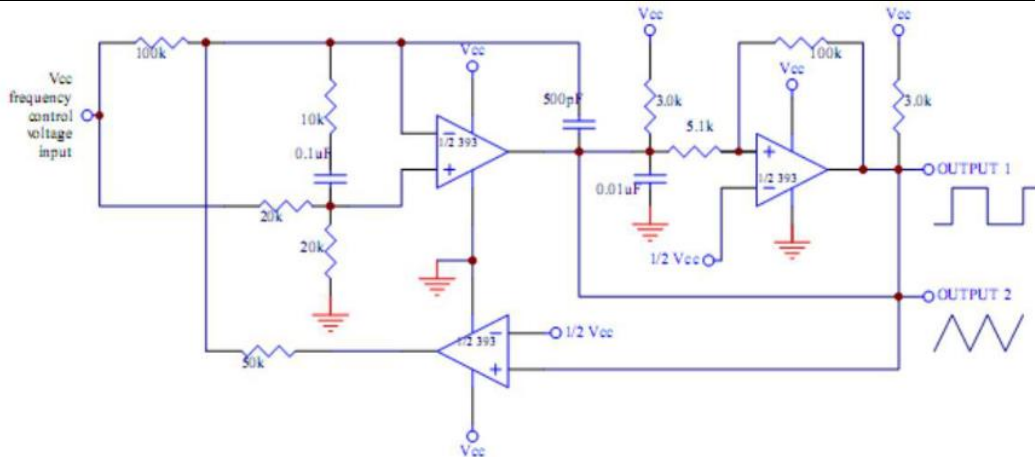
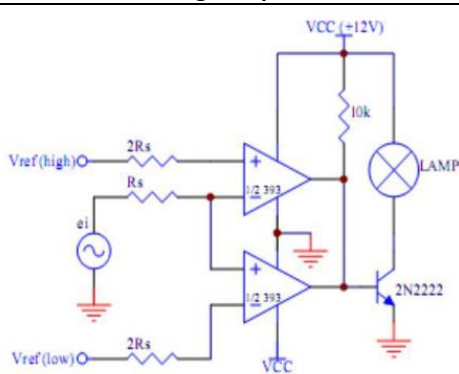
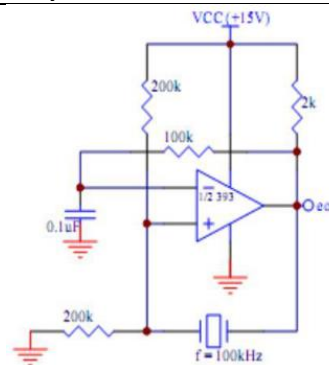
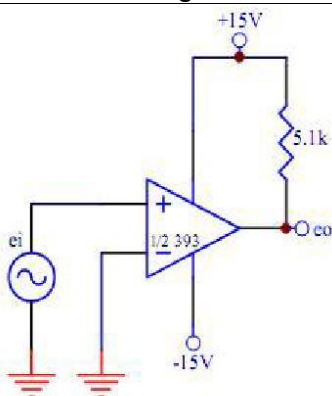
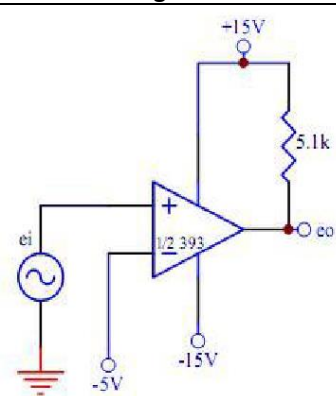
Features

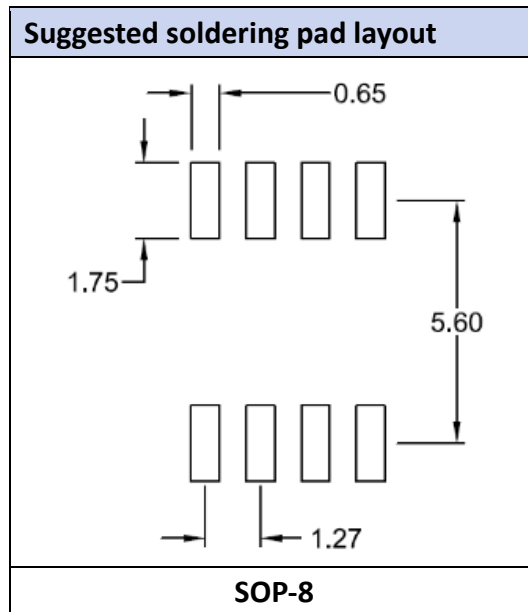
- Pb-free and **RoHS** compliant
- Reduced offset voltage due to temperature drift
- Can be powered by a single supply
- Input common-mode voltage range close to ground level
- Compatible with logic circuits
- Wide power supply voltage range:
 - Single supply: 2.0V to 36V
 - Dual supplies: $\pm 1.0V$ to $\pm 18V$
- Low power supply current consumption (0.4mA)
- Low input bias current: 25nA
- Low input offset current: $\pm 5.0nA$
- Maximum input offset voltage: $\pm 3.0mV$
- Input common-mode voltage range close to ground level
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage: 250mV @4.0mA
- Output levels compatible with TTL, DTL, ECL, MOS and CMOS logic systems



Absolute maximum ratings					
Parameter		Symbol	Value		Unit
			Min.	Max.	
Power supply voltage	Single	V_{CC}	-	36	V
	Dual		-	± 18	V
Differential mode input voltage		V_{IDR}	-	36	V
Common mode input voltage		V_{IN}	-0.3	36	V
Input current		I_{IN}	-	50	mA
Power consumption		P_D	-	660	mW
Operating temperature		T_A	0	70	$^{\circ}C$
Storage temperature		T_{STG}	-65	150	$^{\circ}C$

Electrical characteristics						
$T_A=25^{\circ}C$ unless otherwise specified						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Input offset voltage	V_{IO}	$0^{\circ}C \leq T_A \leq 70^{\circ}C$	-	0.8	5.0	mV
			-	-	9.0	
Input offset current	I_{IO}	$0^{\circ}C \leq T_A \leq 70^{\circ}C$	-	2.3	50	mV
			-	-	150	
Input bias current	I_{IB}	$0^{\circ}C \leq T_A \leq 70^{\circ}C$	-	4.2	250	μA
			-	-	400	
Input common mode voltage range	V_{ICR}	$0^{\circ}C \leq T_A \leq 70^{\circ}C$	0	-	$V_{CC}-1.5$	V
			0	-	$V_{CC}-2.0$	
Supply current	I_{CC}	$R_L=\infty, V_{CC}=5.0V$	-	0.59	1.0	mA
		$R_L=\infty, V_{CC}=36V$	-	0.67	2.5	
Voltage gain	G_V	$R_L \geq 15k\Omega, V_{CC}=15V$	50	200	-	V/mV
Large signal response time	T_{RES}	$V_{RL}=5.0V, R_L=5.1k\Omega$	-	1.3	-	μs
Output sink current	I_{SINK}	$V_{IN(-)}=1.0V, V_{IN(+)}=0, V_O \leq 1.5V$	6.0	43.7	-	mA
Output saturation voltage	V_{SAT}	$V_{IN(-)}=1.0V, V_{IN(+)}=0, I_{SINK} \leq 4.0mA$	-	47.3	400	mV
		$V_{IN(-)}=1.0V, V_{IN(+)}=0, I_{SINK} \leq 4.0mA$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	-	-	700	
Output leakage current	I_{OL}	$V_{IN+}=1.0V, V_{IN-}=0V, V_O=5.0V$	-	0.1	-	nA
		$V_{IN+}=1.0V, V_{IN-}=0V, V_O=30V$ $0^{\circ}C \leq T_A \leq 70^{\circ}C$	-	-	1000	
Input differential mode voltage	V_{ID}		-	-	36	V

Application circuits
Two-stage high-frequency voltage-controller oscillator

Limiting comparator

Crystal controlled oscillator

Zero crossing detector

Cmparator with negative reference voltage




Ordering information			
Part Number	Package	Shipping Quantity	Dimensions
LM393	SOP-8	2500 pcs / reel	---

Disclaimer

Akyga semi reserves the right to make changes without notice to any product specification herein, to make corrections, modifications, enhancements or other changes. Akyga semi or anyone on its behalf assumes no responsibility or liability for any errors or inaccuracies. Data sheet specifications and its information contained are intended to provide a product description only. "Typical" parameters which may be included on Akyga semi data sheets and/ or specifications can and do vary in different applications and actual performance may vary over time. Akyga semi does not assume any liability arising out of the application or use of any product or circuit. Akyga semi products are not designed, intended or authorized for use in medical, life-saving implant or other applications intended for life-sustaining or other related applications where a failure or malfunction of component or circuitry may directly or indirectly cause injury or threaten a life without expressed written approval of Akyga semi. Customers using or selling Akyga semi components for use in such applications do so at their own risk and shall agree to fully indemnify Akyga semi and its subsidiaries harmless against all claims, damages and expenditures.