

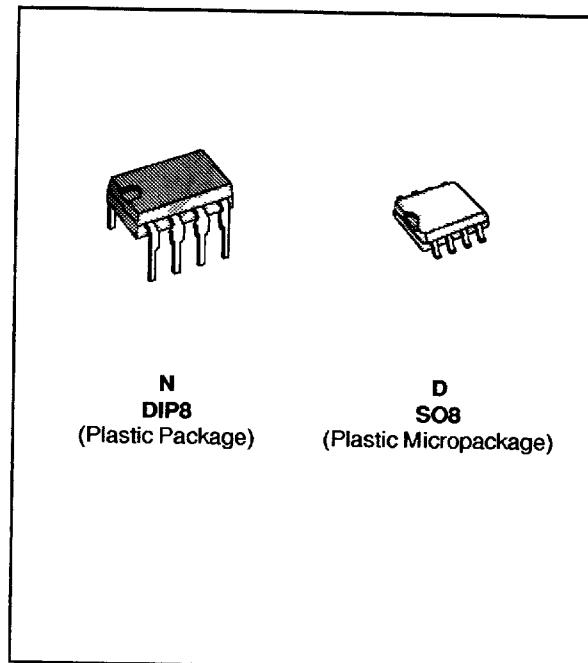


**SGS-THOMSON**  
MICROELECTRONICS

**TS3V393**

## 3V MICROPOWER DUAL VOLTAGE COMPARATORS

- DEDICATED TO 3.3V OR BATTERY SUPPLY  
(specified at 3V and 5V)
- EXTREMELY LOW SUPPLY CURRENT :  
**9µA typ/comparator**
- WIDE SINGLE SUPPLY RANGE  
**2.7V to 16V**
- EXTREMELY LOW INPUT CURRENTS :  
**1pA TYP**
- INPUT COMMON-MODE VOLTAGE RANGE  
INCLUDES GND
- FAST RESPONSE TIME : 2.5µs typ for  
5mV overdrive
- PIN-TO-PIN AND FUNCTIONALLY  
COMPATIBLE WITH BIPOLAR LM393



### DESCRIPTION

The TS3V393 is a micropower dual CMOS voltage comparator with extremely low consumption of 9µA typ / comparator (20 times less than bipolar LM393). Similar performances are offered by the dual micropower comparator TS3V3702 with a push-pull CMOS output.

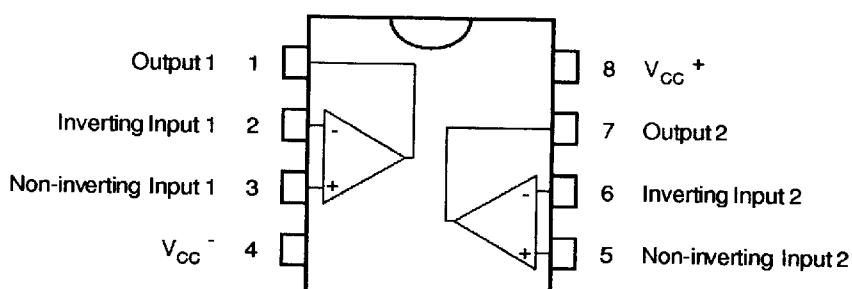
Thus response times remain similar to the LM393.

### ORDER CODES

Part Number	Temperature Range		Package	
	N	D	N	D
TS3V393I	-40°C, +125°C		●	●

383-01 TBL

### PIN CONNECTIONS (top view)



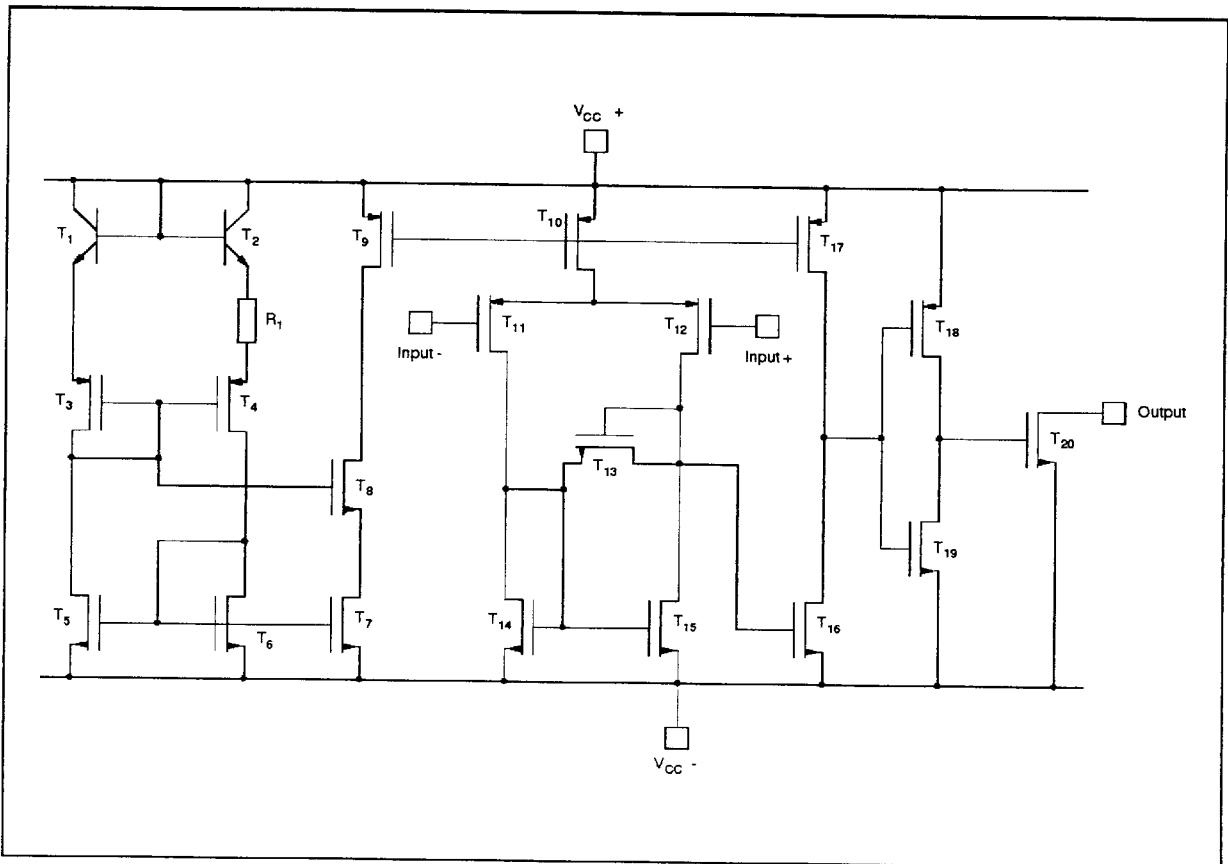
383-01 EFS

January 1995

1/6

■ 7929237 0076190 4TO ■

## SCHEMATIC DIAGRAM (for 1/2 TS3V393)



393-02 EPS

## MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_{CC}^+$	Supply Voltage - (note 1)	18	V
$V_{id}$	Differential Input Voltage - (note 2)	$\pm 18$	V
$V_i$	Input Voltage - (note 3)	18	V
$V_o$	Output Voltage	18	V
$I_o$	Output Current	20	mA
$T_{oper}$	Operating Free-Air Temperature Range TS3V393I	-40 to +125	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature Range	-65 to +150	$^{\circ}\text{C}$

393-02 TAB

- Notes : 1. All voltage values, except differential voltage, are with respect to network ground terminal.  
 2. Differential voltages are the non-inverting input terminal with respect to the inverting input terminal.  
 3. The magnitude of the input and the output voltages must never exceed the magnitude of the positive supply voltage.  
 4. Short circuit from outputs to  $V_{CC}^+$  can cause excessive heating and eventual destruction.

## OPERATING CONDITIONS

Symbol	Parameter	Value	Unit
$V_{CC}^+$	Supply Voltage	2.7 to 16	V
$V_{icm}$	Common Mode Input Voltage Range	0 to $V_{CC}^+ - 1.5$	V

393-03 TAB

**ELECTRICAL CHARACTERISTICS** $V_{CC^+} = 3V, V_{CC^-} = 0V, T_{amb} = 25^\circ C$  (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{IO}$	Input Offset Voltage - (note 1) $V_{IC} = 1.5V$ $T_{min} \leq T_{amb} \leq T_{max}$ .			5 6.5	mV
$I_{IO}$	Input Offset Current - (note 2) $V_{IC} = 1.5V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		1	300	pA
$I_{IB}$	Input Bias Current - (note 2) $V_{IC} = 1.5V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		1	600	pA
$V_{ICM}$	Input Common Mode Voltage Range $T_{min} \leq T_{amb} \leq T_{max}$ .	0 to $V_{CC^+} - 1.2$ 0 to $V_{CC^+} - 1.5$			V
CMR	Common-mode Rejection Ratio $V_{IC} = V_{ICM}$ min.		70		dB
SVR	Supply Voltage Rejection Ratio $V_{CC^+} = 3V$ to 5V		70		dB
$I_{OH}$	High Level Output Current $V_{ID} = +1V, V_{OH} = 3V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		2	40 1000	nA
$V_{OL}$	Low Level Output Voltage $V_{ID} = -1V, I_{OL} = +6mA$ $T_{min} \leq T_{amb} \leq T_{max}$ .		400	500 600	mV
$I_{CC}$	Supply Current (each comparator) No load - Outputs low $T_{min} \leq T_{amb} \leq T_{max}$ .		9	20 25	µA
$t_{PLH}$	Response Time Low to High $V_{IC} = 0V, f = 10kHz, R_L = 5.1k\Omega, C_L = 15pF, Overdrive = 5mV$ TTL Input		1.5 0.7		µs
$t_{PHL}$	Response Time High to Low $V_{IC} = 0V, f = 10kHz, R_L = 5.1k\Omega, C_L = 15pF, Overdrive = 5mV$ TTL Input		2.5 0.08		µs

Note : 1. The specified offset voltage is the maximum value required to drive the output up to 4.5V or down to 0.3V.  
 2. Maximum values including unavoidable inaccuracies of the industrial test.

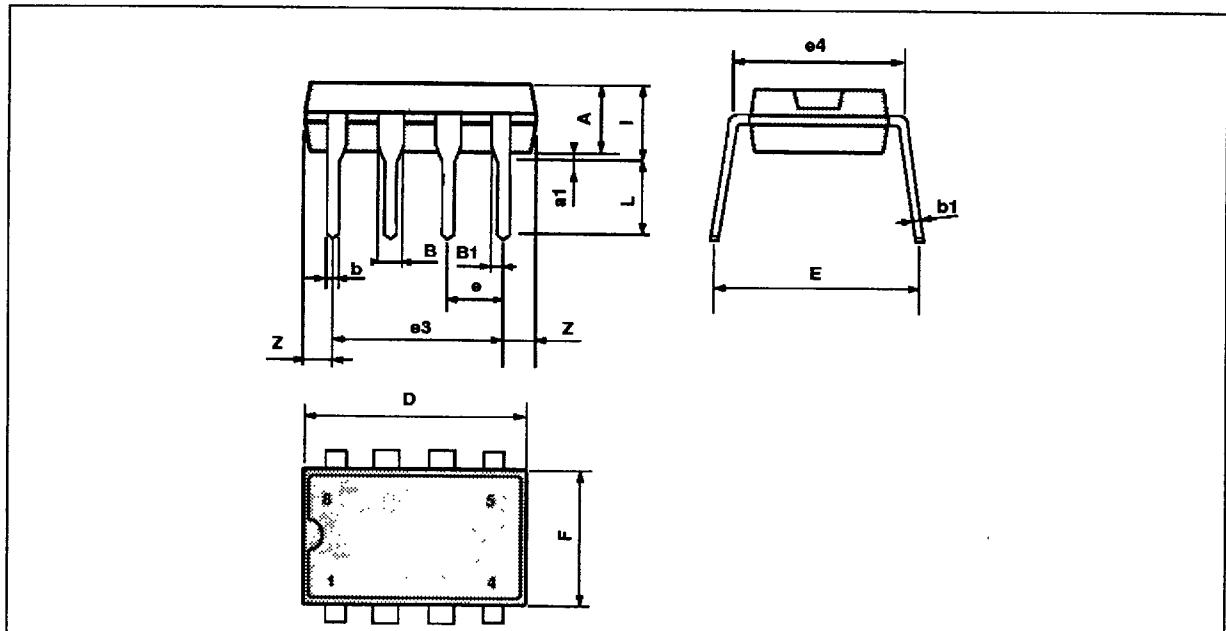
385-04-TB

**ELECTRICAL CHARACTERISTICS** $V_{CC^+} = 5V$ ,  $V_{CC^-} = 0V$ ,  $T_{amb} = 25^\circ C$  (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$V_{IO}$	Input Offset Voltage - (note 1) $V_{IC} = 2.5V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		1.4	5 6.5	mV
$I_{IO}$	Input Offset Current - (note 2) $V_{IC} = 2.5 V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		1	300	pA
$I_{IB}$	Input Bias Current - (note 2) $V_{IC} = 2.5 V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		1	600	pA
$V_{ICM}$	Input Common Mode Voltage Range $T_{min} \leq T_{amb} \leq T_{max}$ .	0 to $V_{CC^+} - 1.2$ 0 to $V_{CC^+} - 1.5$			V
CMR	Common-mode Rejection Ratio $V_{IC} = V_{ICM}$ min.		70		dB
SVR	Supply Voltage Rejection Ratio $V_{CC^+} = +5V$ to $+10V$		80		dB
$I_{OH}$	High Level Output Current $V_{ID} = 1V$ , $V_{OH} = +5V$ $T_{min} \leq T_{amb} \leq T_{max}$ .		2	40 1000	nA
$V_{OL}$	Low Level Output Voltage $V_{ID} = -1V$ , $I_{OL} = 6mA$ $T_{min} \leq T_{amb} \leq T_{max}$ .		260	400 650	mV
$I_{CC}$	Supply Current (each comparator) No load - Outputs low $T_{min} \leq T_{amb} \leq T_{max}$ .		10	20 25	µA
$t_{PLH}$	Response Time Low to High $V_{IC} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV TTL Input			1.5 0.7	µs
$t_{PHL}$	Response Time High to Low $V_{IC} = 0V$ , $f = 10kHz$ , $R_L = 5.1k\Omega$ , $C_L = 15pF$ , Overdrive = 5mV TTL Input			2.5 0.08	µs

Note : 1. The specified offset voltage is the maximum value required to drive the output up to 4.5V or down to 0.3V.  
 2. Maximum values including unavoidable inaccuracies of the industrial test.

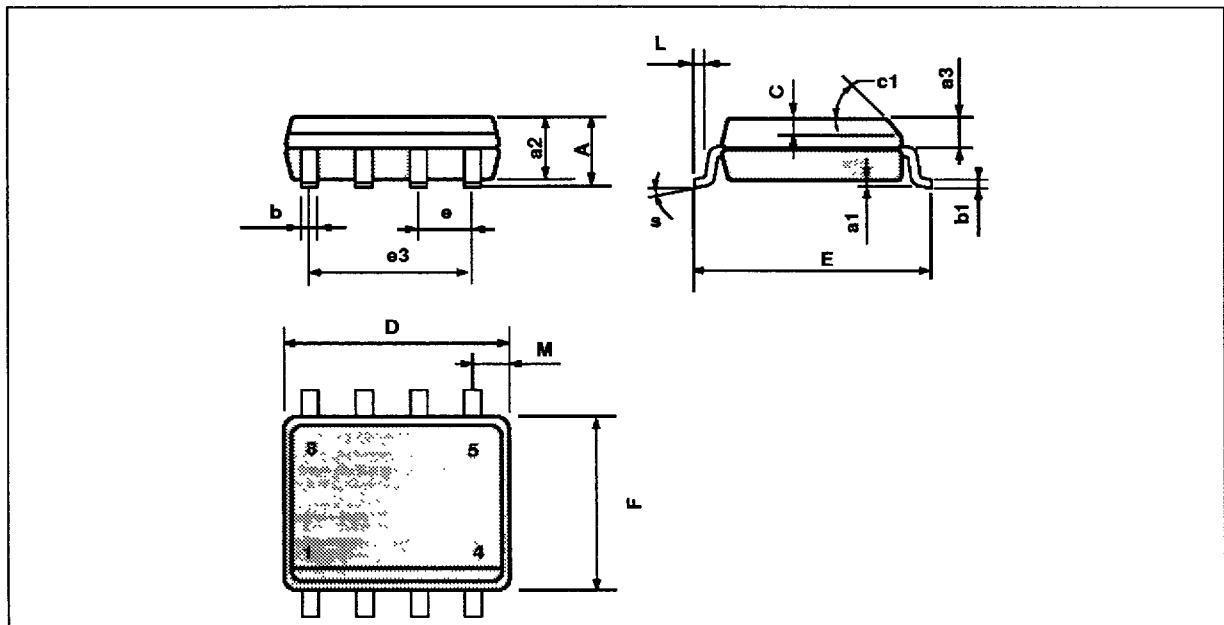
393-05 TBL

**PACKAGE MECHANICAL DATA**  
**8 PINS - PLASTIC DIP**


PM-DIP8 EPS

DIP8 TBL

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

**PACKAGE MECHANICAL DATA**  
**8 PINS - PLASTIC MICROPACKAGE (SO)**


PM-SO8 EPS

SO8 TBL

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S			8° (max.)			

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