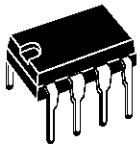
SGS-THOMSON MICROELECTRONICS

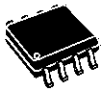
TS393C,I,M

MICROPOWER DUAL CMOS VOLTAGE COMPARATORS

- EXTREMELY LOW SUPPLY CURRENT : 9µA TYP/COMPARATOR
- WIDE SINGLE SUPPLY RANGE (3V to 16V) OR DUAL SUPPLIES (±1.5V to ±8V)
- EXTREMELY LOW INPUT BIAS CURRENT : 1pA TYP
- EXTREMELY LOW INPUT OFFSET CURRENT : 1pA TYP
- INPUT COMMON-MODE VOLTAGE RANGE INCLUDES GND
- HIGH INPUT IMPEDANCE $10^{12}\Omega$ TYP
- FAST RESPONSE TIME : 2.5µs TYP FOR 5mV OVERDRIVE
- PIN-TO-PIN AND FUNCTIONALLY COMPATIBLE WITH BIPOLAR LM393



N
DIP8
(Plastic Package)



D
SO8
(Plastic Micropackage)

DESCRIPTION

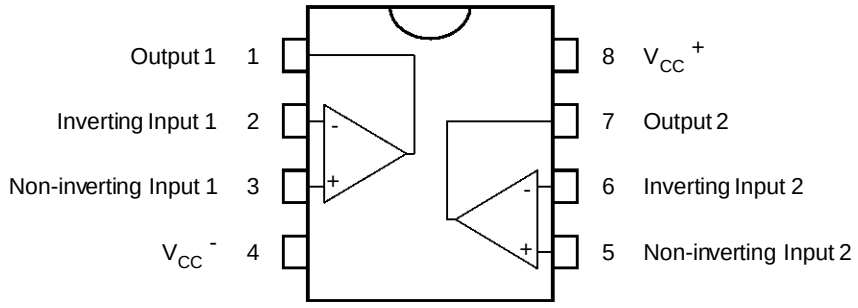
The TS393 is a micropower CMOS dual voltage comparator with extremely low consumption of 9µA typ / comparator (20 times less than bipolar LM393). Similar performances are offered by the dual micropower comparator TS3702 with a push-pull CMOS output.

Thus response times remain similar to the LM393.

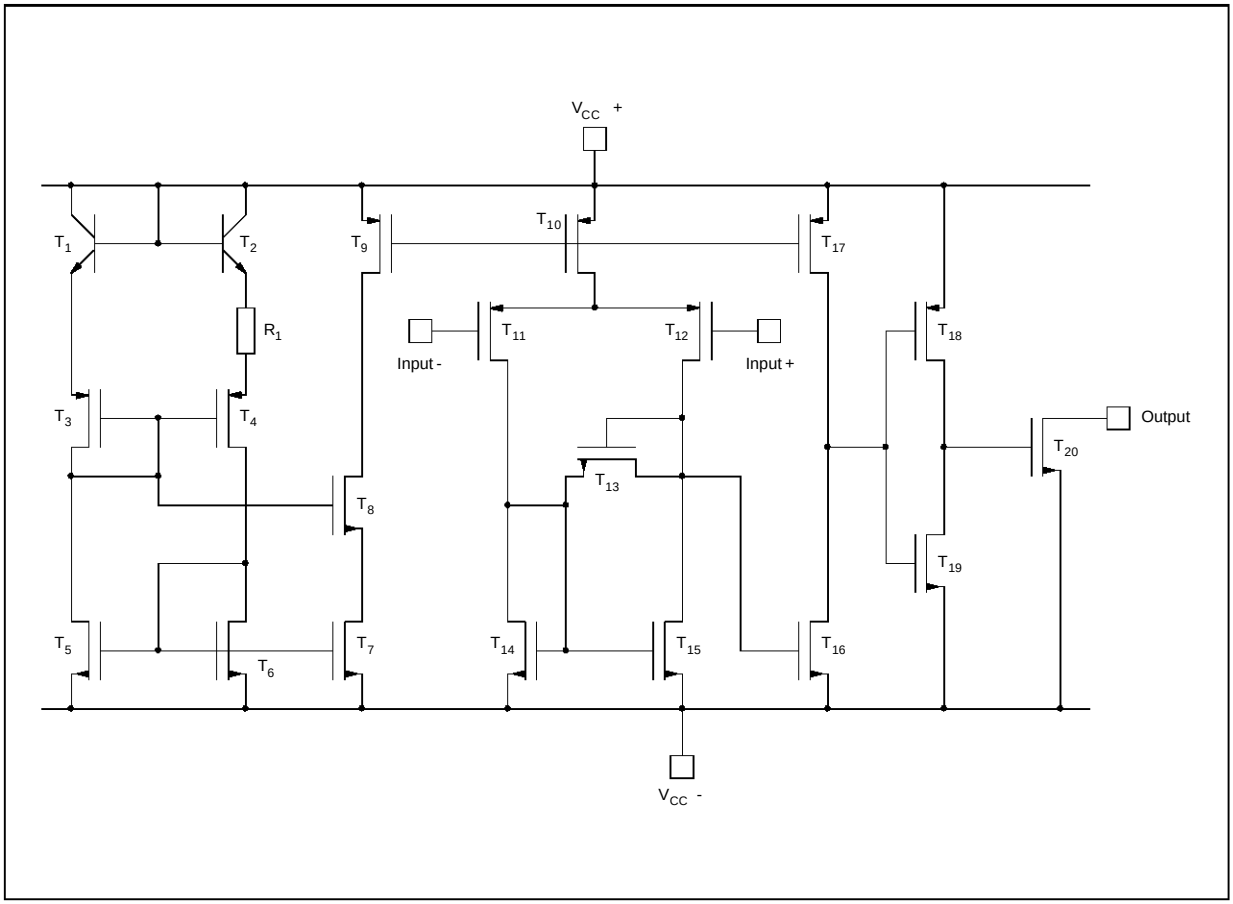
ORDER CODES

Part Number	Temperature Range	Package	
		N	D
TS393C	0°C, +70°C	●	●
TS393I	-40°C, +125°C	●	●
TS393M	-55°C, +125°C	●	●
Example : TS393CN			

PIN CONNECTIONS (top view)



SCHEMATIC DIAGRAM (for 1/2 TS393)



MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}^+	Supply Voltage - (note 1)	18	V
V_{id}	Differential Input Voltage - (note 2)	±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 TS393C TS393I TS393M	 0 to +70 -40 to +125 -55 to +125	°C
T_{stg}	Storage Temperature Range	-65 to +150	°C

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	TS393C,I TS393M	3 to 16 4 to 16	V
V_{icm}	Common Mode Input Voltage Range		0 to V_{CC}^+ -1.5	V

ELECTRICAL CHARACTERISTICS

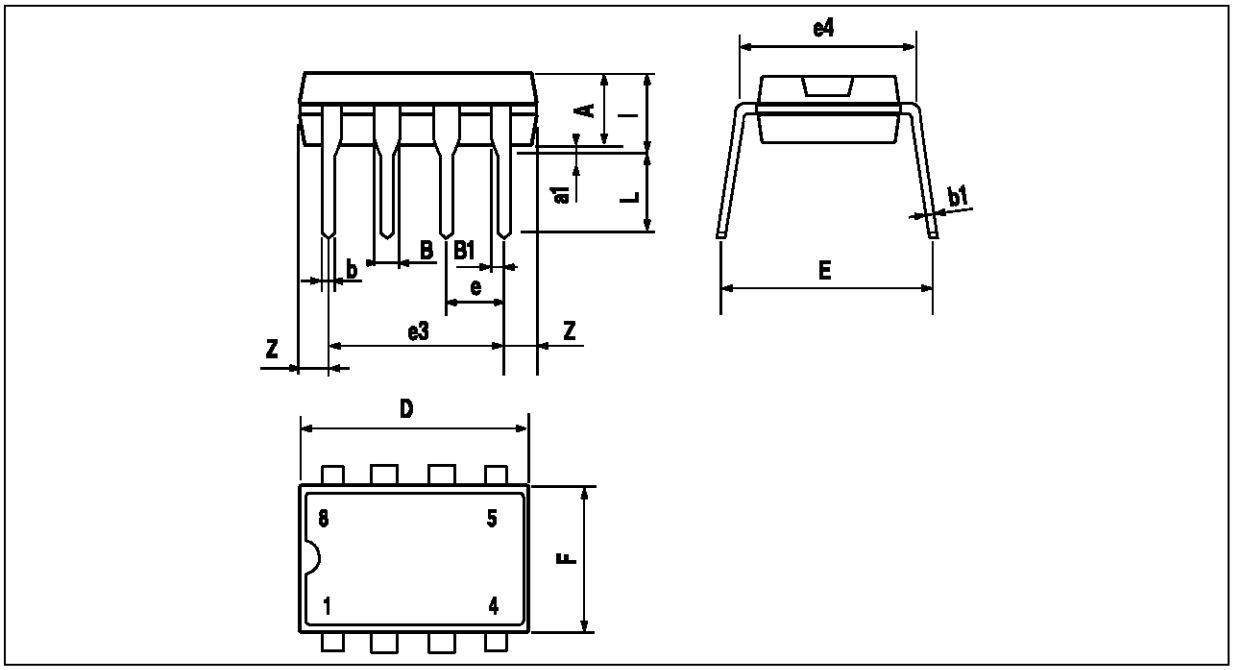
$V_{CC}^+ = 5V$, $V_{CC}^- = 0V$, $T_{amb} = 25°C$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage $V_{IC} = V_{Icm\ min.}$, $V_{CC}^+ = 5V$ to $10V$ - (note 1) $T_{min.} \leq T_{amb} \leq T_{max}$.		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 $V_{IC} = V_{icm\ min.}$		71		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 (2 comparators) No load - Outputs low $T_{min.} \leq T_{amb} \leq T_{max}$.		20	40 50	µA
t_{PLH}	Response Time Low to High $V_{ic} = 0V$, $f = 10kHz$, $R_L = 5.1k\Omega$, $C_L = 15pF$, Overdrive = 5mV Overdrive = 10mV Overdrive = 20mV Overdrive = 40mV TTL Input		1.5 1.2 1.0 0.8 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 Overdrive = 10mV Overdrive = 20mV Overdrive = 40mV TTL Input		2.5 1.9 1.2 0.8 0.08		µs
t_f	Fall Time $f = 10kHz$, $C_L = 15pF$, $R_L = 5.1k\Omega$, Overdrive 50mV		25		ns

Note : 1. The specified offset voltage is the maximun 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.

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC DIP



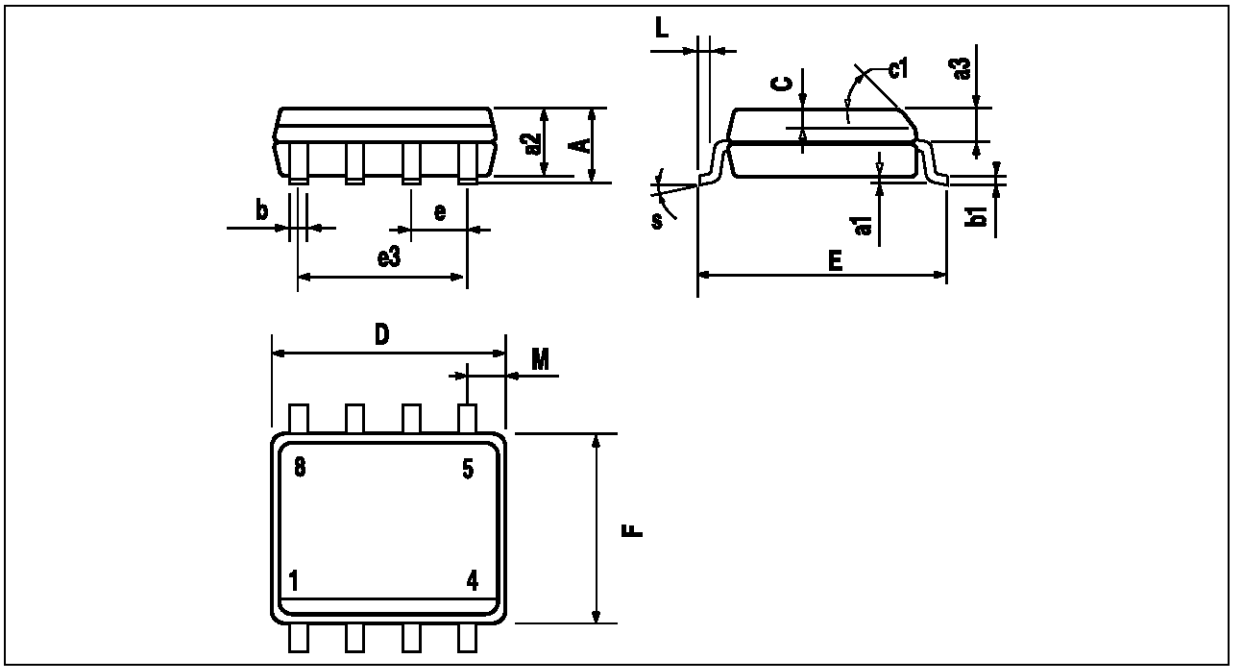
PM-DIP8.EPS

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			0260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

PACKAGE MECHANICAL DATA

8 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO8.EPS

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.)					

SO8.TBL

ORDER CODE :