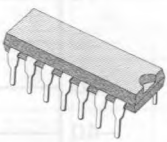
SGS-THOMSON MICROELECTRONICS

TSG8751

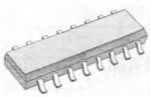
SWITCHED CAPACITOR FILTER

- 4TH ORDER
- SELECTIVITY FACTOR Q = 25
- GAIN AT CENTER FREQUENCY G_O : 20dB (typ.)
- LOW STOPBAND ATTENUATION : G_O : – 65dB (typ.) AT $f < 0.3\ f_O$
- HIGH STOPBAND ATTENUATION : G_O : – 65dB (typ.) AT $f > 3\ f_O$
- CLOCK TO CENTER FREQ. RATIO : 60
- CLOCK FREQUENCY RANGE : 1.5 TO 720kHz
- CENTER FREQUENCY RANGE : 25Hz TO 12kHz

Note : For general characteristics, see TSGF04 specifications. For non standard quality level, consult SGS-THOMSON general ordering information.



P
DIP-14
(Plastic Package)



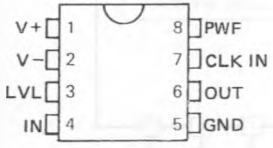
FP
SO-18
(Plastic Micropackage)

P
DIP-8
(Plastic Package)

DESCRIPTION

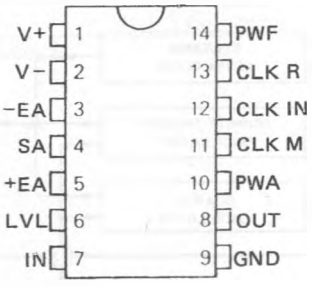
The TSG8751 is a HCMOS high selectivity band-pass filter.

PIN CONNECTIONS



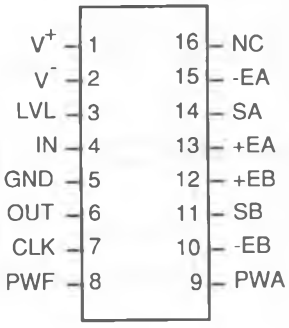
8 pins : FILTER ONLY
DIP-8 Package

E88TSG8751-01



14 pins : FILTER + 1 OP-AMP
DIP-14 Package

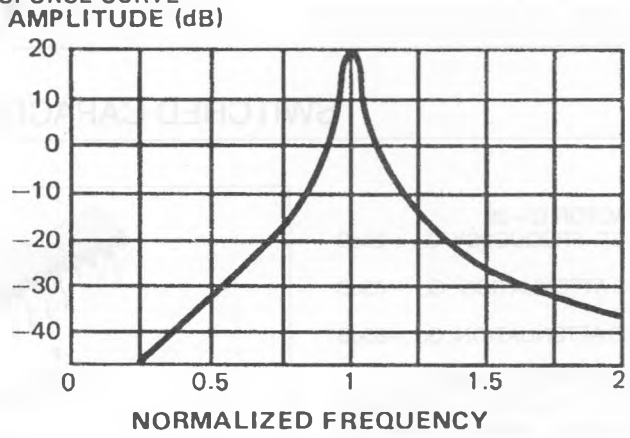
E88TSG8751-02



SO-16 Package

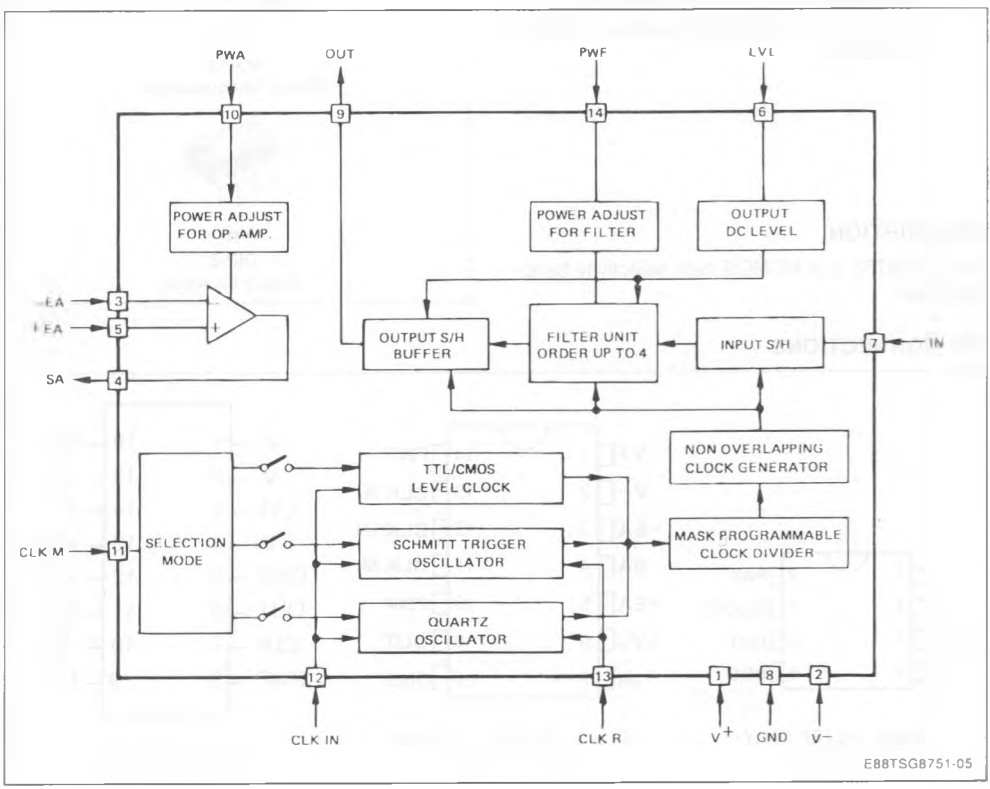
E88TSG8751-03

AMPLITUDE RESPONSE CURVE



E88TSG8751-04

BLOCK DIAGRAM



E88TSG8751-05

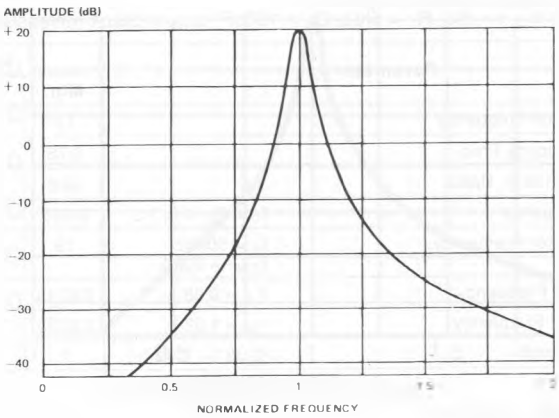
FILTER SPECIFICATIONS

ELECTRICAL OPERATING CHARACTERISTICS
T_{amb} = 25°C, V + = 5V, V − = − 5V, R_L = 5kΩ, CL = 100pF. I_{PWF} = 50µA (unless otherwise specified)

Symbol	Parameter		Value			Unit
			Min.	Typ.	Max.	
f_e	External Clock Frequency		1.5		720(*)	kHz
f_i	Internal Sampling Freq.		0.75		360(*)	kHz
f_e f_0	Clock to Center fr. Ratio		58.8	60	61.2	
f_0	Center Frequency	$f_0 = (f_{lc} + f_{hc})$ 2	0.025		12(*)	kHz
G_0	Gain at Center Frequency	f_e = 60kHz I_{PWF} = 50µA	19	20	21	dB
f_{lc}	Low Cut Off Frequency	$F_{lc} = 0.98\ f_0$	0.0245		11.76	kHz
f_{hc}	High Cut Off Frequency	$f_{hc} = 1.02\ f_0$	0.0255		12.24	kHz
BW	− 3dB Bandwich	[0.98 f_0, 1.02 f_0]	1		480	Hz
Q	Quality Factor	$Q = f_0$ BW		25		
Als	Low Stopband Attenuation	f < 0.3 f_0	G_0 − 63	G_0 − 65		dB
Ahs	High Stopband Attenuation	f > 3 f_0	G_0 − 63	G_0 − 65		dB
V_{off}	Output DC Offset Voltage	LVL = 0V I_{PWF} = 50µA		± 100	± 200	mV
LVL	DC Level Adjustment			± 67		mV
LG	Level Gain			3		
R_{PWF}	PWF Resistance		20		72	kΩ
I_{PWF}	Input Current on PWF		50		150	µA
I + I −	Supply Current	f_e = 60kHz I_{PWF} = 50µA I_{PWA} = 0µA		1.6 1.6	3 3	mA
PSRR + PSRR −	Supply Rejection Ratio	f_e = 60kHz f_{in} = 1kHz		30(**) 31(**)		dB
R_{IN}	Input Resistance			3		MΩ
C_{IN}	Input Capacitance			20		pF
Vo	Output Voltage Swing			+ 3.5 − 4.5		VPP
V_A	Output Noise	BW = 1kHz f_e = 60kHz V_{IN} = 2Vrms		91.8(**)		µVrms
SNR	Signal to Noise Ratio			66		dB

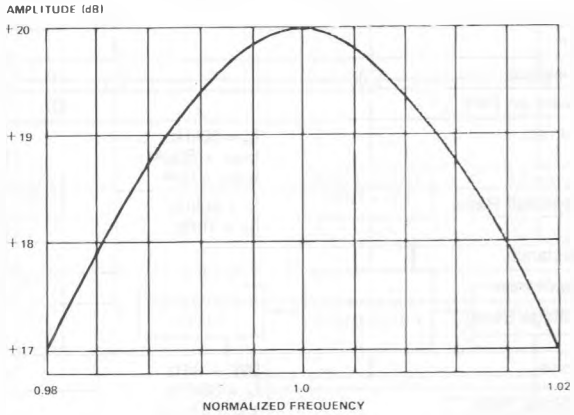
(*) At maximum f_e (with I_{PWF} = 150µA) : f_e/f_o = 61 ± 2%.
(**) Value divided by the gain.

TYPICAL AMPLITUDE RESPONSE CURVE



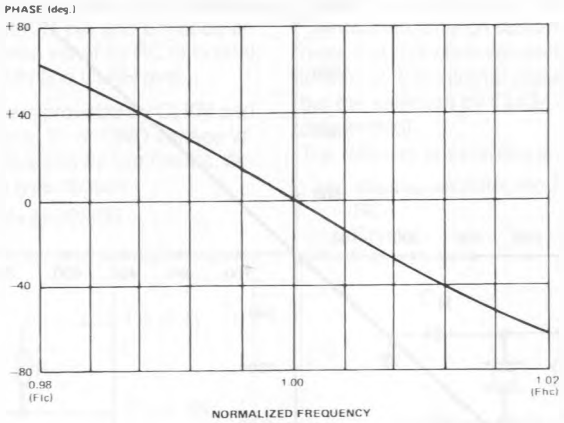
E88TSG8751-06

TYPICAL AMPLITUDE RESPONSE CURVE IN PASSBAND



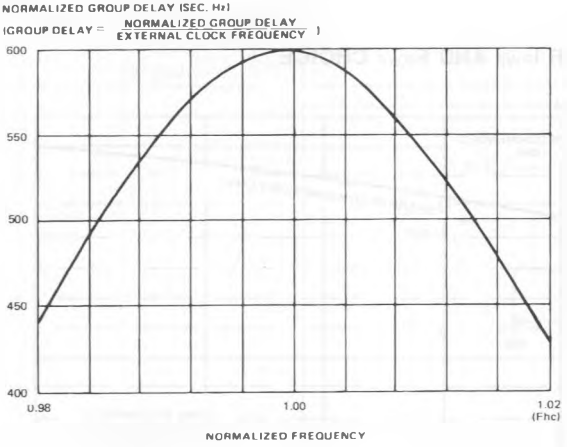
E88TSG8751-07

TYPICAL PHASE RESPONSE CURVE IN PASSBAND



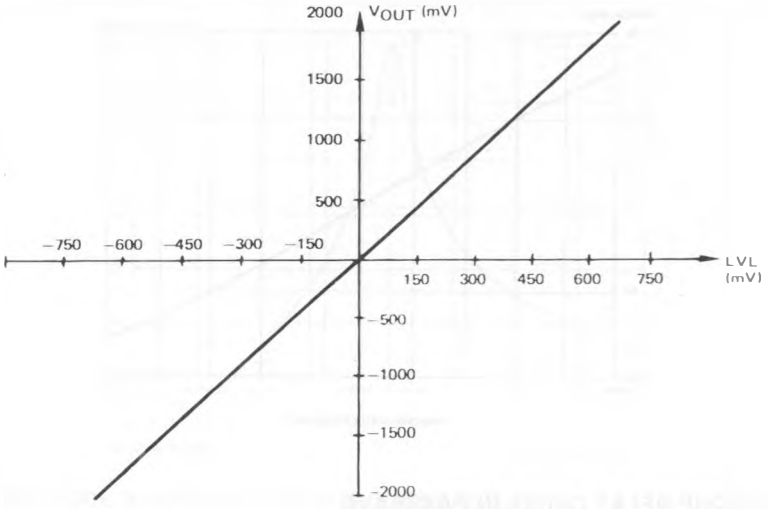
E88TSG8751-08

TYPICAL GROUP DELAY CURVE IN PASSBAND



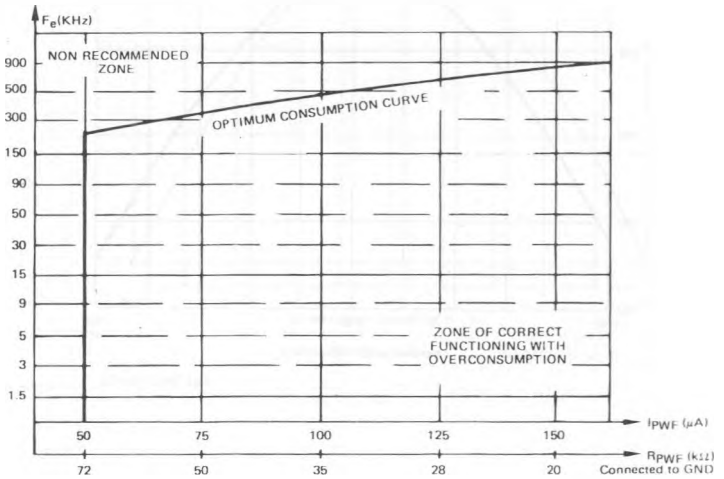
E88TSG8751-09

TYPICAL OUTPUT DC VOLTAGE ADJUSTMENT FROM LVL PIN



E88TSG8751-10

USER'S GUIDE FOR I_{PWF} AND R_{PWF} CHOICE



E88TSG8751-11

CLOCK OSCILLATOR

The TSGF04 base accepts external compatible TTL/CMOS clocks on CLKIN pin and provides an internal oscillator performed either by RC or crystal connected between CLKIN and CLKR pins.

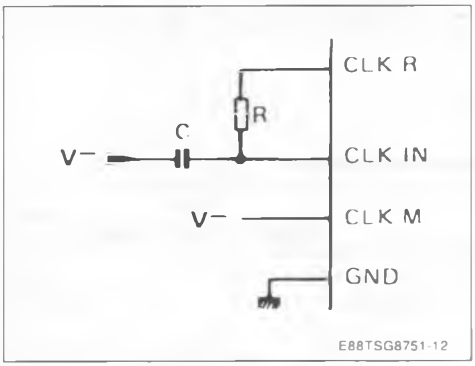
The clock selection mode is provided by CLKM pad which can be connected to V- or GND voltage levels. This connection is realized by two means, depending on the package type chosen :

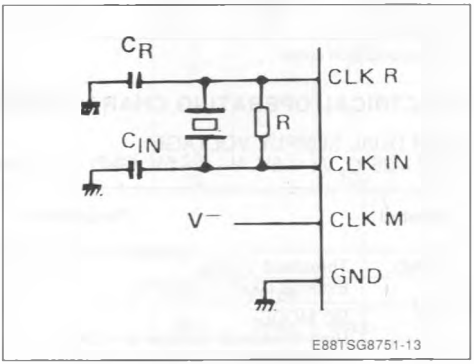
- with 14-pin package, via pin CLKM
- with 8-pin package, by internal connection readily performed, only on custom filters.

(note that CLKM pin connected to V+, allows the selection of the internal crystal-controlled oscillator, but the selection by CLKM connected to V- is recommended).

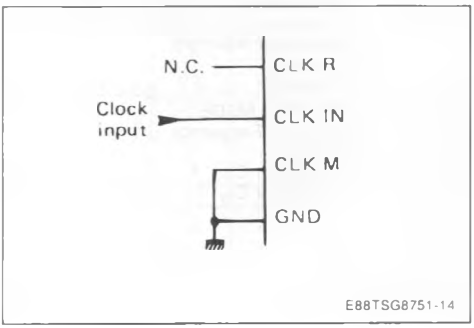
The different possibilities are :

- two internal oscillator modes :
  - RC
  - Crystal

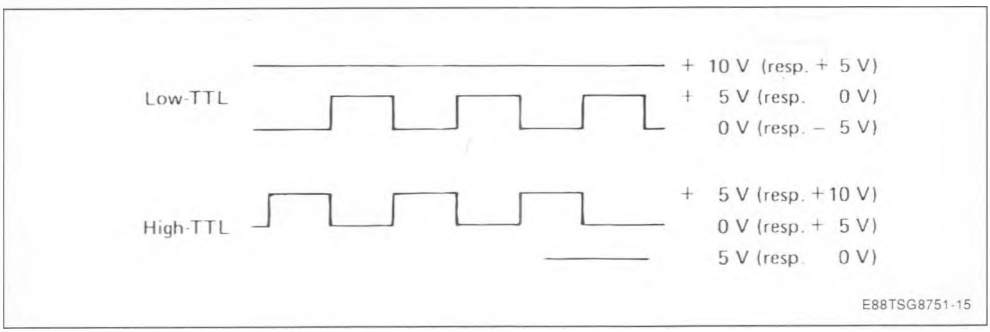




- three external clocks :
  - low-TTL
  - high-TTL
  - CMOS



The "low-TTL" and "high-TTL" clock levels are :



For each package version, the following tables resume, the availability of the different clocks, in terms of the power supply.

Note that in 8-pin version, the clock mode (CLKM) is internally set to GND voltage, except in the case of CMOS clock and 0-5V power supply, where CLKM is internally connected to V- voltage.

8-Pin Package			
	0.5V	0.10V	– 5. + 5V
Low-TTL	NO	C	C
High-TTL	NO	YES	YES
CMOS	C	YES	YES
RC Mode	NO	NO	NO
Crystal Mode	NO	NO	NO

C = Customization option.

14-Pin Package			
	0.5V	0.10V	– 5. + 5V
Low-TTL	NO	C	C
High-TTL	NO	CLKM = GND	CLKM = GND
CMOS	CLKM = V^-	CLKM = GND	CLKM = GND
RC Mode	CLKM = V^-	CLKM = V^-	CLKM = V^-
Crystal Mode	CLKM = V^-	CLKM = V^-	CLKM = V^-

ELECTRICAL OPERATING CHARACTERISTICS

WITH DUAL SUPPLY VOLTAGE
T_{amb} = 25°C, V+ = 5V, V– = – 5V, GND = 0V, (unless otherwise specified)

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
GND	Threshold Voltage		1.5		V
	External Clock Frequency			5	MHz
V –	RC MODE :				
	High Threshold Voltage on CLKIN	1	1.25	1.5	V
	Corresponding Voltage on CLKR		– 5		V
	Low Threshold Voltage on CLKIN	– 1.5	– 1.25	– 1	V
	Corresponding Voltage on CLKR		+ 5		V
	Oscillator Frequency			5	MHz
	Resistor	2		10 000	kΩ
	Capacitor	0		47	nF
V –	CRYSTAL MODE :				
	Oscillator Frequency			5	MHz
	Resistor		1		MΩ
	Capacitor C_R	10		100	pF
	Capacitor C_{IN}	10		30	pF

ELECTRICAL OPERATING CHARACTERISTICS (continued)

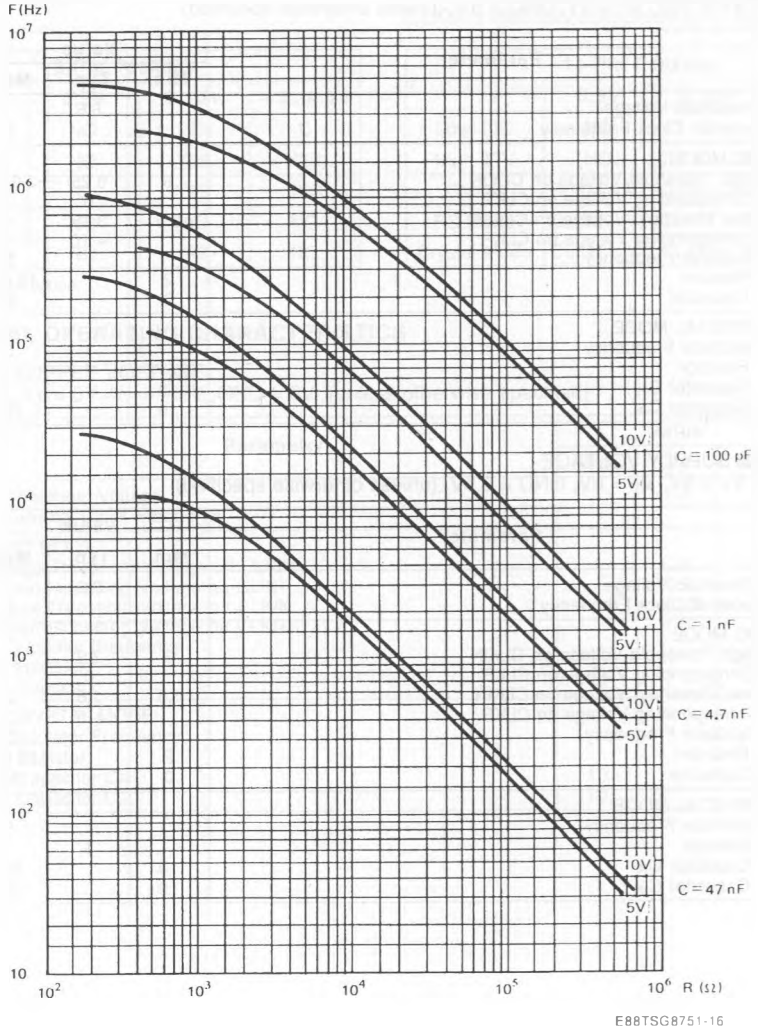
WITH SINGLE SUPPLY VOLTAGE
T_{amb} = 25°C, V+ = 10V, V– = 0V, GND = 5V, (unless otherwise specified)

CLKM	Parameter	Value			Unit
		Min.	Typ.	Max.	
GND	Threshold Voltage		6.5		V
	External Clock Frequency			5	MHz
V –	RC MODE :				
	High Threshold Voltage on CLKIN	6	6.25	6.5	V
	Corresponding Voltage on CLKR		0		V
	Low Threshold Voltage on CLKIN	3.5	3.75	4	V
	Corresponding Voltage on CLKR		+ 10		V
	Oscillator Frequency			5	MHz
	Resistor	2		10 000	kΩ
	Capacitor	0		47	nF
V –	CRYSTAL MODE :				30
	Oscillator Frequency			5	
	Resistor		1		MHz
	Capacitor C_R	10			MΩ
	Capacitor C_{IN}	10		100	pF

WITH SINGLE SUPPLY VOLTAGE
T_{amb} = 25°C, V+ = 5V, V– = 0V, GND = 2.5V, (unless otherwise specified)

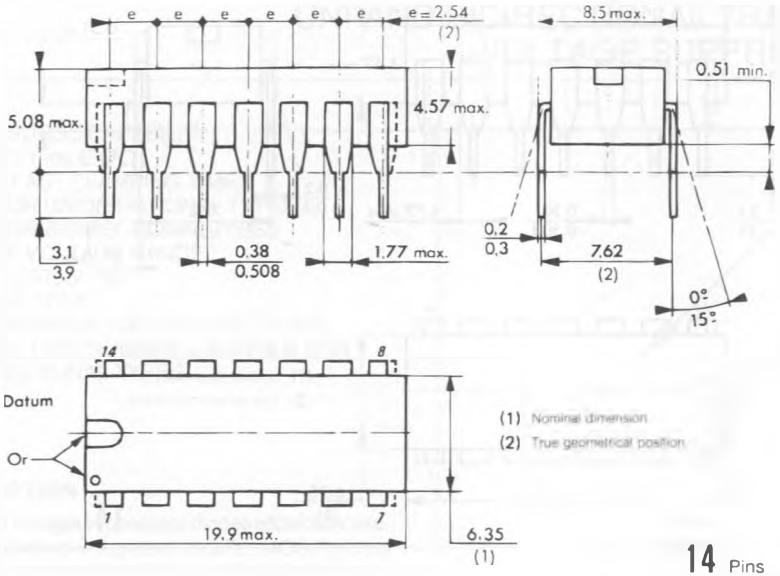
CLKM	Parameter	Value			Unit
		Min.	Typ.	Max.	
GND	Threshold Voltage		3.8		V
	External Clock Frequency			5	MHz
V –	RC MODE :				
	High Threshold Voltage on CLKIN	3	3.2	3.4	V
	Corresponding Voltage on CLKR		0		V
	Low Threshold Voltage on CLKIN	1.5	1.8	2	V
	Corresponding Voltage on CLKR		+ 5		V
	Oscillator Frequency			5	MHz
	Resistor	2		10 000	kΩ
	Capacitor	0		47	nF
V –	CRYSTAL MODE :				
	Oscillator Frequency			5	
	Resistor		1		MHz
	Capacitor C_R	10		100	MΩ
	Capacitor C_{IN}	10		30	pF

With internal RC oscillator mode, the user's guide for R and C choice is given by following curves and for both supply voltages : 0-5V. 0-10V.

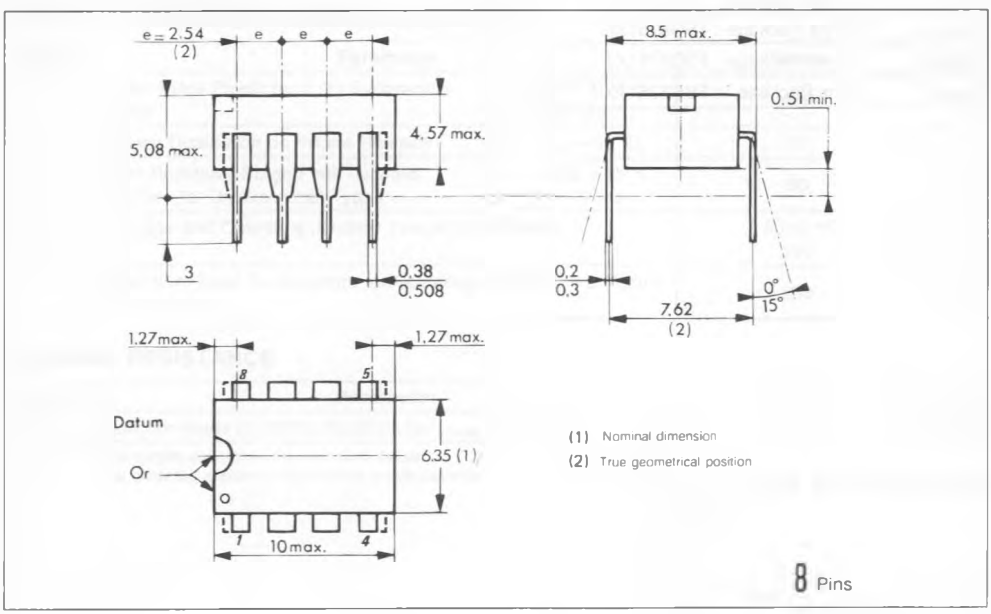


PACKAGE MECHANICAL DATA

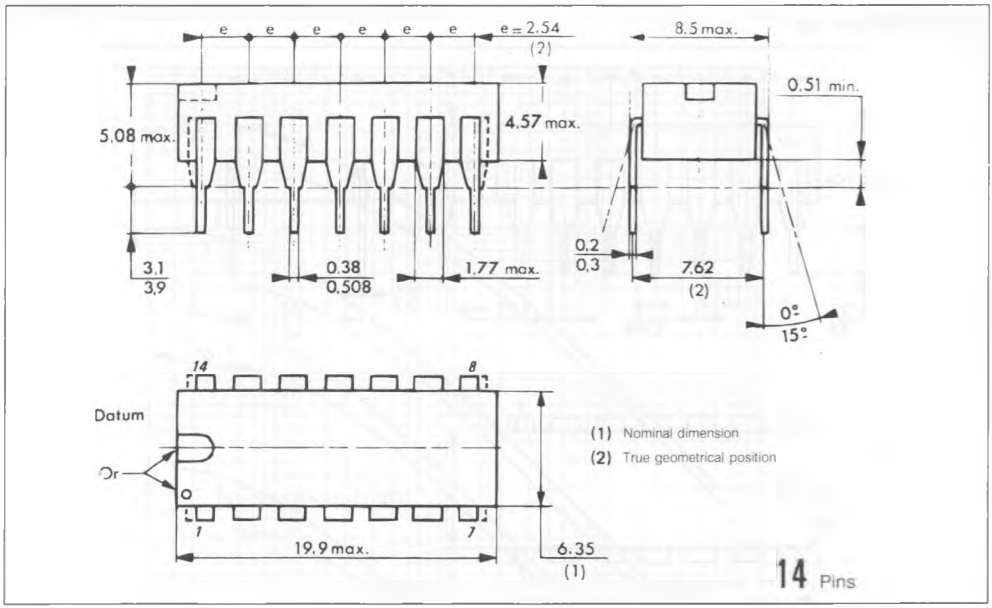
14 PINS - Plastic Dip



8 PINS - Plastic Package



16 PINS - Plastic Micropackage



ORDER CODES

Plastic	14 Pins Package : TSG8751XP
Ceramic	14 Pins Package : TSG8751XC
Cerdip	14 Pins Package : TSG8751XJ
Plastic	8 Pins Package : TSG87511XP