COS/MOS INTEGRATED CIRCUIT

M 751

PRELIMINARY DATA

TOUCH TONE GENERATOR

- 2.5 to 5V SUPPLY
- INTERNAL PULL-UP WITH DIODE PROTECTION ON ALL INPUTS
- ON CHIP CRYSTAL CONTROLLED OSCILLATOR: 4.433619 MHz
- INTERNAL CAPACITORS FOR THE CRYSTAL OSCILLATOR
- LOW HARMONIC DISTORTION
- HIGH BAND TONES PRE-EMPHASIS

The M751 can provide all tone frequency pairs required for the Touch Tone Dialling System. The output frequencies are obtained from an internal crystal controlled oscillator whose frequency is reduced in two independent programmable counters. The dividing ratio is controlled by the selected key. The circuit is to be used with 4 x 4 matrix keyboard which generates 4 rows and 4 columns input signals in a 2 by 8 contacts closed to ground format. If two or more keys are activated simultaneously no-illegal tones are sent on the line; if only one contact per each key is grounded, the selected column or row tone is generated. An internal buffer is provided to achieve a 2 pole low-pass active filter requiring only 4 external passive components. The filtered output tone must be adequately interfaced to the telephone line. The device can be supplied in plastic or ceramic 16 pin dual in-line package.

ABSOLUTE MAXIMUM RATINGS*

V_{DD} **	Supply voltage	-0.5 to V_{DD}	+5.5	V
V_I	Input voltage	-0.3 to V_{DD}	+5.5	V
T_{op}	Operating temperature range	-25 to	+50	°C
T_{stg}	Storage temperature range	-55 to	+125	°C
P_{tot}	Power dissipation		400	mW

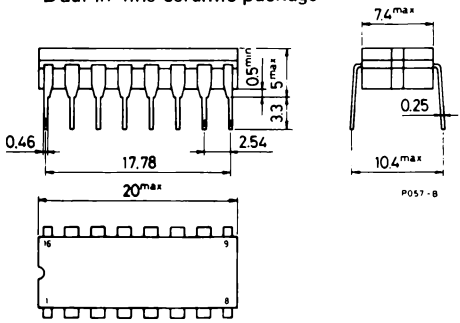
* Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other condition above those indicate in the "Recommended operating conditions" section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

** All voltages are refered to V_{SS} pin voltage.

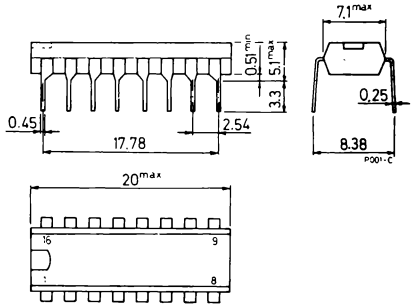
ORDERING NUMBERS: M751 B1 for dual in-line plastic package
M751 D1 for dual in-line ceramic package

MECHANICAL DATA (dimensions in mm)

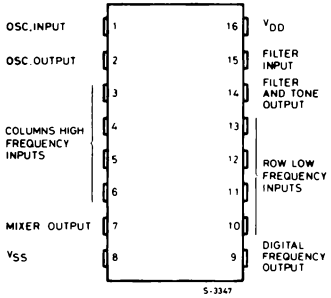
Dual in-line ceramic package



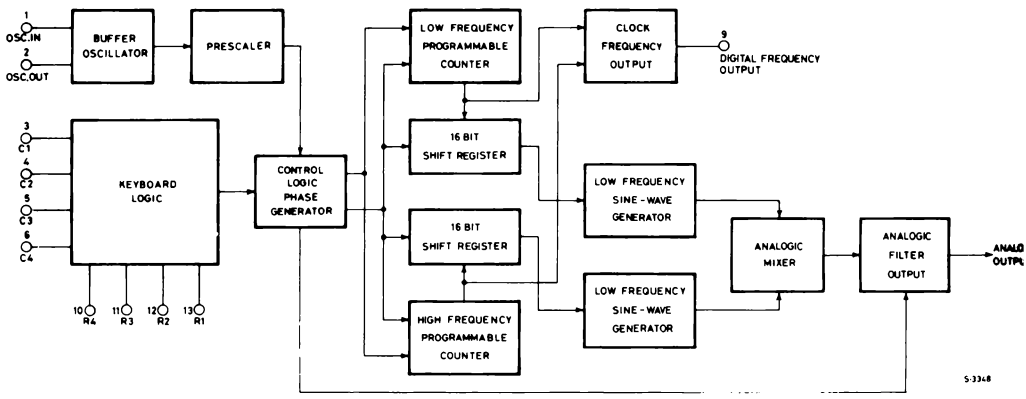
Dual in-line plastic package



PIN CONNECTIONS



BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (All parameters are 100% tested at 25°C, T_{amb}= 25°C)

	Parameter		Test conditions	Values			Unit
				Min.	Typ.	Max.	
DC CHARACTERISTICS							
Supplies	V_{DD}	Voltage supply range		2.5	3	5	V
	V_{DD}	Operating supply range	V_{DD}= 3V		2.5	3.5	mA
Inputs	I_{INH}	Input high current	V_{DD}= 3V V_{IH} = 3V			1	µA
	I_{INL}	Input low current	V_{DD}= 3V V_{IL} = 0V	-1		-25	µA
Outputs	I_{OL}	Output sink current at digital frequency output	V_{DD}= 3V See note 1 V_{OL}= 1V	200			µA
AC CHARACTERISTICS							
	Δf/f	Maximum output tones frequency tolerance	At crystal frequency f_o = 4.433619 MHz		0.4	1.2	%
	V_{LF}	Nominal output amplitude lower tones at filter tone output; pin 14	V_{DD}= 3V See note 2	150	175	200	mVpp
	V_{HF}	Nominal output amplitude high tones at filter tone output; pin 14	V_{DD}= 3V See note 2	195	220	245	mVpp
		Preeamphasis		1	2	3	dB
	V_{DC}	Continuous output at filter tone output; two tones activated	V_{DD}= 3V See note 3		1.1		V
		Unwanted frequency components	f = 3.4 KHz			-33	dB m
			f = 50 KHz			-80	dB m
		Total harmonic distortion for single frequency				2	%
	t_s	Start-up time	V_{DD}= 3V See fig. 2		3	5	ms
	t_r	Maximum voltage supply rise time	V_{DD}= 3V See fig. 2			0.5	ms

Note 1 : Digital frequency output is open drain.

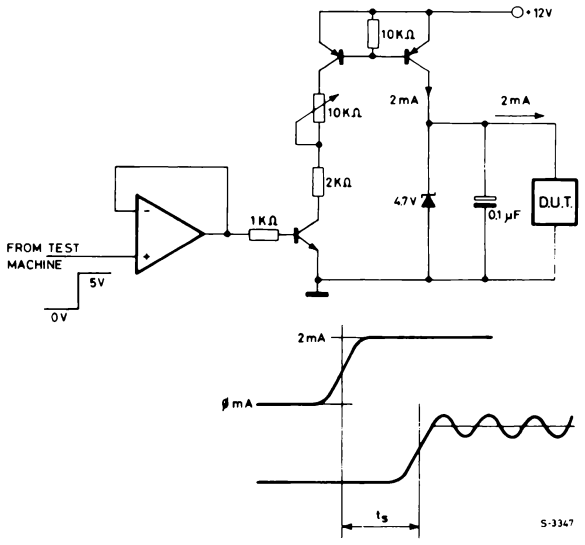
2 : The value of the alternative output component (VLF, VHF) at two different conditions of supply voltages can be related as follows:

$$V_{LF'(HF)}\ (mVpp) = V_{LF\ (HF)}\ (mVpp)\ \frac{V_{DD'}}{V_{DD}}$$

3 : The value of the continuous output component (V_{DC}) at two different conditions of supply voltages can be related as follows:

$$V_{DC'}\ (V) = V_{DC}\ (V)\ \frac{V_{DD'}}{V_{DD}}$$

TEST CIRCUIT AND START UP TIME DEFINITION



APPLICATION CIRCUIT