

## PRELIMINARY DATA

### 7-STAGE DIVIDER

- LOW POWER DISSIPATION
- LOW OUTPUT IMPEDANCE ON BOTH HIGH AND LOW STATE
- WIDE SUPPLY VOLTAGE RANGE: 5 to 15V
- HIGH NOISE IMMUNITY
- INPUTS FULLY PROTECTED

The M738/M740/M741/M747 are integrated circuits constructed in COS/MOS technology for use as frequency dividers in electronic organs. All the devices consist of 7 stages of binary division connected to give five divider blocks for the M741/M747 and four divider blocks for the M738/M740. The information transfer occurs on the positive going edge of the clock, for M740 and M747, and the negative going edge of the clock for M738/M741, and each output features a symmetrical impedance buffer ( $300\Omega$  typ. at  $V_{DD} = 10V$ ). They are available in 14 lead dual in-line plastic package.

### ABSOLUTE MAXIMUM RATINGS\*

$V_{DD}^{**}$	Supply voltage	-0.5 to 15	V
$V_I$	Input voltage (at any pin)	-0.5 to $V_{DD} + 0.5$	V
$P_{tot}$	Total power dissipation (per package)	200	mW
$T_{stg}$	Storage temperature	-65 to 150	°C
$T_{op}$	Operating temperature	-40 to 85	°C

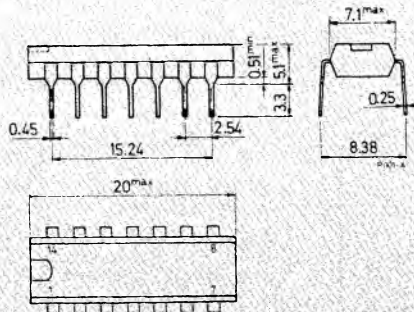
\* Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure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

\*\* All voltages values are referred to  $V_{SS}$  pin voltage.

ORDERING NUMBERS: M 7XX B1 for dual in-line plastic package

### MECHANICAL DATA

Dimensions in mm

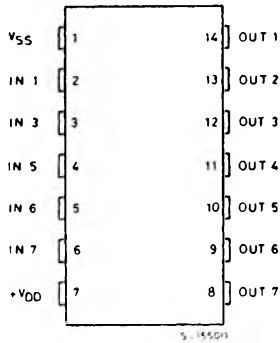




**M 738/M 740**  
**M 741/M 747**

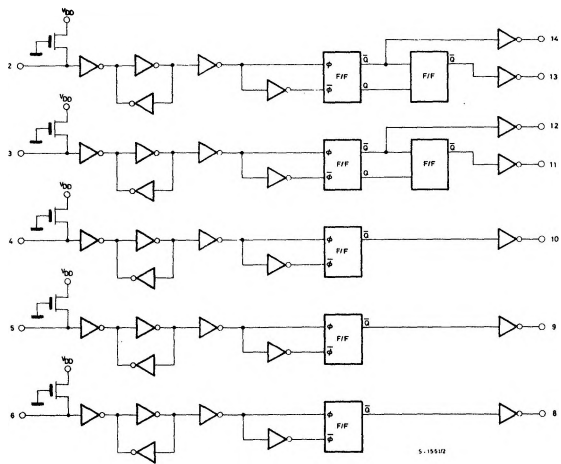
### CONNECTION DIAGRAMS

For M741/M747

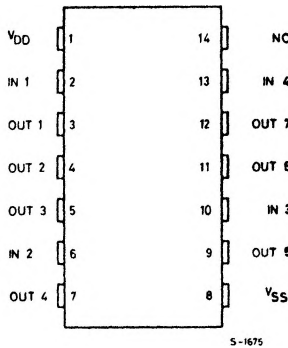


### FUNCTIONAL DIAGRAMS

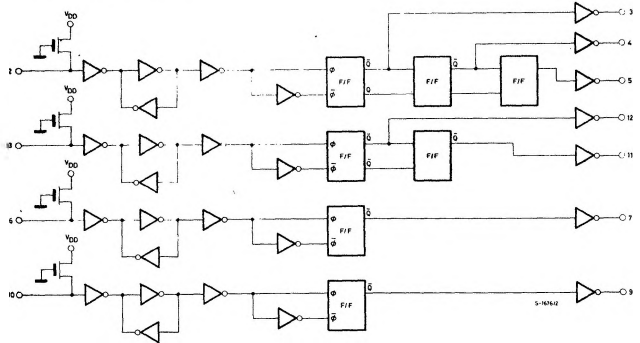
For M741/M747



For M738/M740



For M738/M740



### RECOMMENDED OPERATING CONDITIONS

Parameter		$V_{DD}(V)$	Min.	Typ.	Max.	Unit
$V_{DD}$	Supply voltage		5		15	V
$V_I$	Input voltage		-0.5	$V_{DD} + 0.5$		V
$T_{op}$	Operating temperature		-40		85	$^{\circ}C$
$t_w$	Width of clock pulse (high or low)	5		200		ns
		10		100		



M 738/M 740  
M 741/M 747

**STATIC ELECTRICAL CHARACTERISTICS** (over recommended operating conditions)  
Typical values are at  $T_{amb} = 25^{\circ}\text{C}$

Parameter	Test conditions	Values									Unit		
		$V_O$ (V)	$V_{DD}$ (V)	$-40^{\circ}\text{C}$			$25^{\circ}\text{C}$			$85^{\circ}\text{C}$			
				Min.	Typ.	Max.	Min.	Typ.	Max.	Min.		Typ.	Max.
$I_{CCL}$ Quiescent supply current	$V_i = V_{DD}$	5			5			5			300	$\mu\text{A}$	
		10			10			10			600		
		15			50			50			2000		
$V_{OH}$ High level output voltage	$I_o = 0$	5	4.99			4.99			4.95			V	
		10	9.99			9.99			9.95				
		15	14.99			14.99			14.95				
$V_{OL}$ Low level output voltage	$I_o = 0$	5			0.01			0.01			0.05	V	
		10			0.01			0.01			0.05		
		15			0.01			0.01			0.05		
$I_{OL}$ Output drive current N-channel		0.5	5	0.5			0.5	0.8		0.45		mA	
		0.5	10	1			1	1.6		0.95			
		0.5	15	1.6			1.6	2.5		1.55			
$I_{OH}$ Output drive current P-channel		4.5	5	-0.5			-0.5	-0.8		-0.45		mA	
		9.5	10	-1			-1	-1.6		-0.95			
		14.5	15	-1.6			-1.6	-2.5		-1.55			
$I_{IL}$ Input current	$V_i = 0$		15				3	30	100		$\mu\text{A}$		
$I_{IH}$ Input current	$V_i = V_{DD}$		15			1				1	$\mu\text{A}$		

**DYNAMIC ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$ )

Parameter	Test conditions	Values			Unit		
		$V_{DD}$ (V)	Min.	Typ.		Max.	
$t_{PLH}$ , $t_{PHL}$ Propagation delay time from inputs to:	1 division stage outputs	$C_L = 15\text{ pF}$ on all outputs see timing diagram	5			500	ns
			10			250	
	2 division stage outputs		5			1000	ns
			10			500	
	3 division stage outputs		5			1500	ns
			10			750	
$t_{TLH}$ , $t_{THL}$ Output transition time			5			500	ns
			10			250	
$f_{max}$ Maximum toggle frequency		$C_L = 15\text{ pF}$ on all outputs	5	0.6	2.5		MHz
			10	2	5		
* Cross talk immunity level				70		dB	
$C_I$ Input capacitance				5		pF	

\* Send a frequency of 20 kHz to input  $V_{i1}$  charge output  $V_{O1}$  with 5 k $\Omega$  and 15 pF, measure the level of the 10 kHz frequency present at all outputs.

$$\text{Cross talk level} = 20 \log \frac{V_{O1} (10 \text{ kHz})}{V_{OX} (10 \text{ kHz})}$$

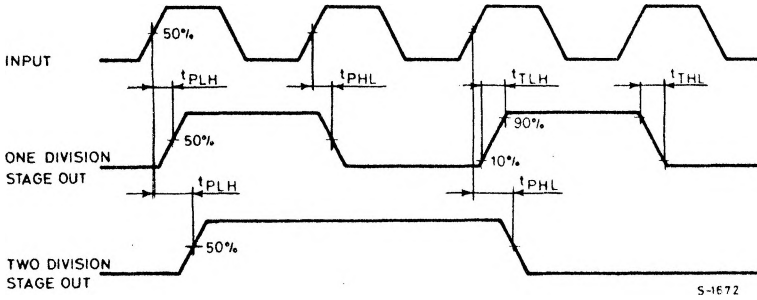
With the exception of  $V_{O1}$ , the output where the 10 kHz signal is greatest is  $V_{OX}$ .  
This operation is repeated for all the inputs.



M 738/M 740  
M 741/M 747

## TIMING DIAGRAM

For M740/M747



For M738/M741

