



# Electronic Organ Circuits

## MM5555, MM5556 chromatic frequency generators general description

The National Semiconductor MM5555, MM5556 chromatic frequency generators are MOS/LSI frequency synthesizers designed to generate musical frequencies. The circuits provide thirteen semitone outputs, fully spanning the equal tempered octave. The divisors have been carefully selected to offer excellent tuning accuracy and to eliminate any "locked" (just-intoned) fifths. Output characteristics are fully compatible with the MM5554 Frequency Divider. The MM5555 or MM5556 is packaged in a 14-lead dual-in-line package.

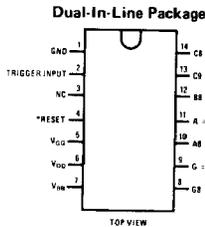
## features

- Single-phase squarewave input
- 7 kHz to 2.2 MHz input frequency
- Accuracy of 0.5129 cent

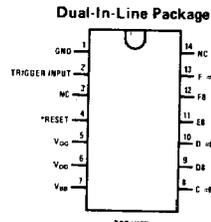
## applications

- Electronic organs
- Electronic music synthesizers
- Musical instrument tuners

## connection and logic diagrams

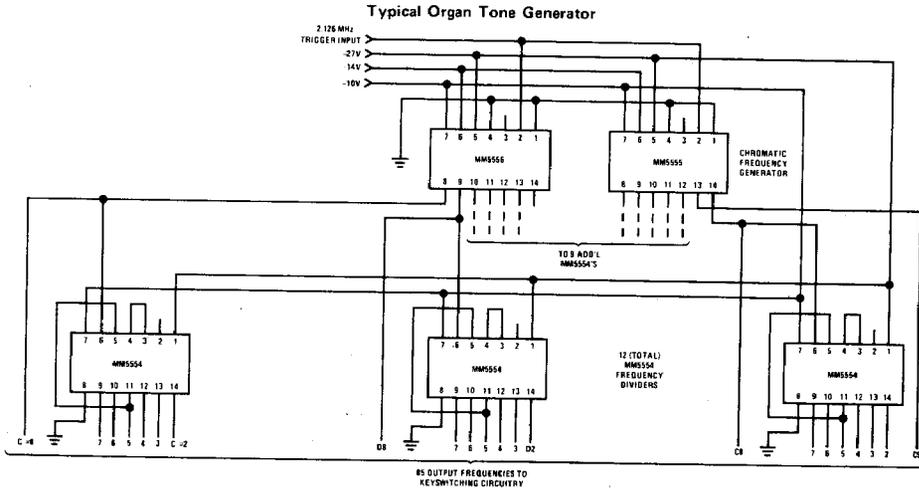


Order Number MM5555N  
See Package 18



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See Package 18

\*Used only for testing. Pin 4 is normally grounded.



## output details (2.12608-MHz input)

MM5555

NOTE	DIVISOR	OUTPUT FREQUENCY	E.T.S. FREQUENCY	CENT ERROR
C#8	508	4185.20	4186.01	-0.326
C9	254	8370.39	8372.02	-0.326
B#8	269	7903.64	7902.13	+0.321
A=8	285	7459.93	7458.62	+0.295
A#8	302	7040.00	7040.00	0
G=8	320	6644.00	6644.88	-0.221
G#8	339	6271.62	6271.93	-0.082

MM5556

NOTE	DIVISOR	OUTPUT FREQUENCY	E.T.S. FREQUENCY	CENT ERROR
F=8	359	5922.23	5919.91	+0.658
F#8	380.5	5587.60	5587.65	-0.017
E#8	403	5275.63	5274.04	+0.507
D=8	427	4979.11	4978.03	+0.364
D#8	452.5	4698.52	4698.64	-0.042
C#8	479.5	4433.95	4434.92	

**absolute maximum ratings**

Clock Generator Voltage ( $V_{GG}$ )	0.3V to -33V
Logic Supply Voltage ( $V_{DD}$ )	0.3V to -25V
Buffer Supply Voltage ( $V_{BB}$ )	0.3V to -18V
Trigger Input Voltage ( $V_{IT}$ )	0.3V to -18V
Power Dissipation ( $P_D$ )	800 mW
Storage Temperature ( $T_S$ )	-55°C to +100°C
Operating Temperature ( $T_A$ )	0°C to +70°C

**electrical characteristics**

$T_A$  within operating range ( $V_{GG} = -27V \pm 2V$ ,  $V_{DD} = -14V \pm 1V$ ,  $V_{BB} = -10V \pm 0.5V$ ), unless otherwise noted.

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS
Trigger Input					
Frequency	$f_{IT}$	7.0	2126.08	2200	kHz
Capacitance	$C_{IT}$			7.0	pF/pkg
Rise and Fall Times (10% to 90% at 2.2 MHz)	$t_r, t_f$			30	ns
Pulse Width (at -5.0V)	$p_w$	0.4T		0.6T	$(T = \frac{1}{f_{IT}})$
Logical High Level	$V_{ITH}$	-2.0	0	0.3	V
Logical Low Level	$V_{ITL}$	-16	-10	-8.0	V
Leakage Current	$I_{ITL}$			1.0	$\mu A$
Buffer Outputs: (loaded 20 k $\Omega$ to ground and 20 k $\Omega$ to $V_{BB}$ , $T_A = 25^\circ C$ )					
Logical High Level	$V_{OH}$	-1.0		0	V
Logical Low Level	$V_{OL}$	$V_{BB}$		-8.0	V
C8 Duty Cycle			50		%
C #8 thru C9 Duty Cycle			30		%
Supply Currents: (no output loads, $T_A = 25^\circ C$ )					
Clock Generator Supply	$I_{GG}$	1.5		3.5	mA
Logic Supply	$I_{DD}$	16		34	mA
Buffer Supply	$I_{BB}$	22		40	mA
				25	$\mu A$

**typical performance characteristics**

