UNIVERSITAS KATOLIK SOEGIJAPRANATA

LAMPIRAN A

DATA IC XR2206CP

Monolithic Function Generator

GENERAL DESCRIPTION

The XR-2206 is a monolithic function generator integrated circuit capable of producing high quality sine, square, triangle, ramp, and pulse waveforms of high-stability and accuracy. The output waveforms can be both amplitude and frequency modulated by an external voltage. Frequency of operation can be selected externally over a range of 0.01 Hz to more than 1 MHz.

The circuit is ideally suited for communications, instrumentation, and function generator applications requiring sinusoidal tone, AM, FM, or FSK generation. It has a typical drift specification of 20 ppm/°C. The oscillator frequency can be linearly swept over a 2000:1 frequency range, with an external control voltage, having a very small affect on distortion.

FEATURES

Low-Sine Wave Distortion	.5%, Typical
Excellent Temperature Stability	20 ppm/°C, Typical
Wide Sweep Range	2000:1, Typical
Low-Supply Sensitivity	0.01%V, Typical
Linear Amplitude Modulation	
TTL Compatible FSK Controls	
Wide Supply Range	10V to 26V
Adjustable Duty Cycle	1% to 99%

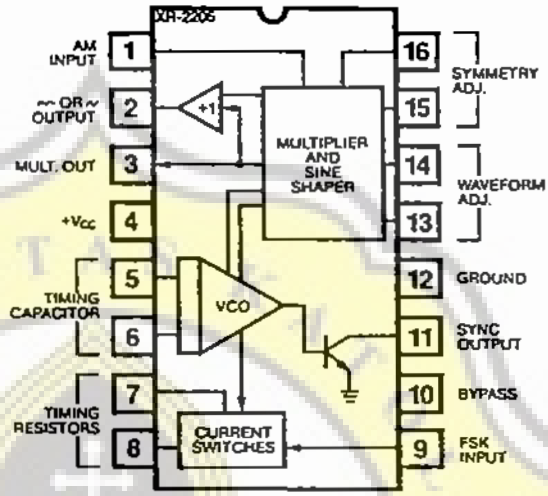
APPLICATIONS

Waveform Gencration
Sweep Generation
AM/FM Generation
V/F Conversion
FSK Generation
Phase-Locked Loops (VCO)

ABSOLUTE MAXIMUM RATINGS

Power Supply	26V
Power Dissipation	750 mW
Derate Above 25°C	5 mW/°C
Total Timing Current	6 mA
Storage Temperature	-65°C to +150°C

FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-2206M	Ceramic	-55°C to +125°C
XR-2206N	Ceramic	0°C to +70°C
XR-2206P	Plastic	0°C to +70°C
XR-2206CN	Ceramic	0°C to +70°C
XR-2206CP	Plastic	0°C to +70°C

SYSTEM DESCRIPTION

The XR-2206 is comprised of four functional blocks: a voltage-controlled oscillator (VCO), an analog multiplier and sine-shaper; a unity gain buffer amplifier; and a set of current switches.

The VCO actually produces an output frequency porportional to an input current, which is produced by a resistor from the timing terminals to ground. The current switches route one of the timing pins current to the VCO controlled by an FSK input pin, to produce an output frequency. With two timing pins, two discrete output frequencies can be independently produced for FSK Generation Applications.

XR-2206

ELECTRICAL CHARACTERISTICS

Test Conditions: Test Circuit of Figure 1, $V^+ = 12V$, $T_A = 25°$, $C = 0.01\ \mu F$, $R_1 = 100\ k\Omega$, $R_2 = 10\ k\Omega$, $R_3 = 25\ k\Omega$ unless otherwise specified. S_1 open for triangle, closed for sine wave.

PARAMETER	XR-2206M			XR-2206C			UNIT	CONDITIONS
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
GENERAL CHARACTERISTCS								
Single Supply Voltage	10		26	10		26	V	
Split Supply Voltage	±5		±13	±5		±13	V	
Supply Current		12	17		14	20	mA	$R_1 > 10\ k\Omega$
OSCILLATOR SECTION								
Max. Operating Frequency	0.5	1		0.5	1		MHz	$C = 1000\ pF$, $R_1 = 1\ k\Omega$
Lowest Practical Frequency		0.01			0.01		Hz	$C = 50\ \mu F$, $R_1 = 2\ M\Omega$
Frequency Accuracy		±1	±4		±2		% of f_o	$f_o = 1/R_1C$
Temperature Stability		±10	±50		±20		ppm/°C	$0°C < T_A < 75°C$, $R_1 = R_2 = 20\ k\Omega$
Supply Sensitivity		0.01	0.1		0.01		%/V	$V_{LOW} = 10V$, $V_{HIGH} = 20V$, $R_1 = R_2 = 20\ k\Omega$
Sweep Range	1000:1	2000:1			2000:1		$f_H = f_L$	f_H @ $R_1 = 1\ k\Omega$, f_L @ $R_1 = 2\ M\Omega$
Sweep Linearity								
10:1 Sweep		2			2		%	$f_L = 1\ kHz$, $f_H = 10\ kHz$
1000:1 Sweep		8			8		%	$f_L = 100\ Hz$, $f_H = 100\ kHz$
FM Distortion		0.1			0.1		%	±10% Deviation
Recommended Timing Components								
Timing Capacitor: C	0.001		100	0.001		100	µF	See Figure 4.
Timing Resistors: R_1 & R_2	1		2000	1		2000	kΩ	
Triangle Sine Wave Output								See Note 1, Figure 2.
Triangle Amplitude		160			160		mV/kΩ	Figure 1, S_1 Open
Sine Wave Amplitude	40	60	80		60		mV/kΩ	Figure 1, S_1 Closed
Max. Output Swing		6			6		Vp-p	
Output Impedance		600			600		Ω	
Triangle Linearity		1			1		%	
Amplitude Stability		0.5			0.5		dB	For 1000:1 Sweep
Sine Wave Amplitude Stability		4800			4800		ppm/°C	See Note 2.
Sine Wave Distortion								
Without Adjustment		2.5			2.5		%	$R_1 = 30\ k\Omega$
With Adjustment		0.4	1.0		0.5	1.5	%	See Figures 6 and 7.
Amplitude Modulation								
Input Impedance	50	100		50	100		kΩ	
Modulation Range		100			100		%	
Carrier Suppression		55			55		dB	
Linearity		2			2		%	For 95% modulation
Square-Wave Output								
Amplitude		12			12		Vp-p	Measured at Pin 11.
Rise Time		250			250		nsec	$C_L = 10\ pF$
Fall Time		50			50		nsec	$C_L = 10\ pF$
Saturation Voltage		0.2	0.4		0.2	0.6	V	$I_L = 2\ mA$
Leakage Current		0.1	20		0.1	100	µA	$V_{11} = 26V$
FSK Keying Level (Pin 9)	0.8	1.4	2.4	0.8	1.4	2.4	V	See section on circuit controls
Reference Bypass Voltage	2.9	3.1	3.3	2.5	3	3.5	V	Measured at Pin 10.

Note 1: Output amplitude is directly proportional to the resistance, R_3, on Pin 3. See Figure 2.
Note 2: For maximum amplitude stability, R_3 should be a positive temperature coefficient resistor.

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LAMPIRAN B

DATA IC μA 741

IRCHILD
lumberger Company

μA741
Operational Amplifier

Linear Division Operational Amplifiers

ription

A741 is a high performance monolithic operational ier constructed using the Fairchild Planar Epitaxial ss. It is intended for a wide range of analog applica- High common mode voltage range and absence of up tendencies make the μA741 ideal for use as a e follower. The high gain and wide range of operat- ltage provide superior performance in integrator, ing amplifier, and general feedback applications.

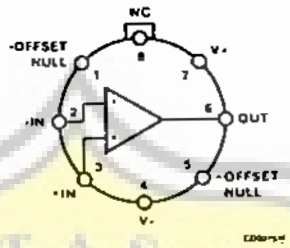
Frequency Compensation Required
rt Circuit Protection
set Voltage Null Capability
ge Common Mode And Differential Voltage ges
v Power Consumption
Latch Up

lute Maximum Ratings

e Temperature Range	
al Can and Ceramic DIP	−65°C to +175°C
ded DIP and SO-8	−65°C to +150°C
ting Temperature Range	
nded (μA741AM, μA741M)	−55°C to +125°C
mercial (μA741EC, μA741C)	0°C to +70°C
Temperature	
al Can and Ceramic DIP	
oldering, 60 s)	300°C
ded DIP and SO-8	
oldering, 10 s)	265°C
al Power Dissipation[1, 2]	
Metal Can	1.00 W
Molded DIP	0.93 W
Ceramic DIP	1.30 W
3	0.81 W
Voltage	
41A, μA741, μA741E	±22 V
41C	±18 V
ntial Input Voltage	±30 V
Voltage[3]	±15 V
Short Circuit Duration[4]	Indefinite

= 150°C for the Molded DIP and SO-8, and 175°C for the Metal and Ceramic DIP.
gs apply to ambient temperature at 25°C. Above this temperature, e the 8L-Metal Can at 6.7 mW/°C, the 8L-Molded DIP at nW/°C, the 8L-Ceramic DIP at 8.7 mW/°C, and the SO-8 at nW/°C.
upply voltages less than ± 15 V, the absolute maximum input ge is equal to the supply voltage.
circuit may be to ground or either supply. Rating applies to 125°C temperature or 75°C ambient temperature.

Connection Diagram
8-Lead Metal Package
(Top View)

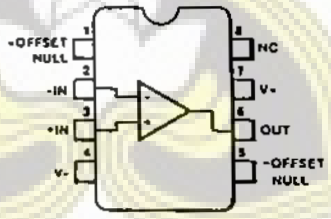


Lead 4 connected to case.

Order Information

Device Code	Package Code	Package Description
μA741HM	5W	Metal
μA741HC	5W	Metal
μA741AHM	5W	Metal
μA741EHC	5W	Metal

Connection Diagram
8-Lead DIP and SO-8 Package
(Top View)



Order Information

Device Code	Package Code	Package Description
μA741RM	6T	Ceramic DIP
μA741RC	6T	Ceramic DIP
μA741SC	KC	Molded Surface Mount
μA741TC	9T	Molded DIP
μA741ARM	6T	Ceramic DIP
μA741ERC	6T	Ceramic DIP
μA741ETC	9T	Molded DIP

μA741 and μA741C
Electrical Characteristics $T_A = 25°C$, $V_{CC} = \pm 15$ V, unless otherwise specified.

Symbol	Characteristic		Condition	μA741			μA741C			Unit
				Min	Typ	Max	Min	Typ	Max	
V_{IO}	Input Offset Voltage		$R_S \leq 10$ kΩ		1.0	5.0		2.0	6.0	mV
$V_{IO\ adj}$	Input Offset Voltage Adjustment Range				± 15			± 15		mV
I_{IO}	Input Offset Current				20	200		20	200	nA
I_{IB}	Input Bias Current				80	500		80	500	nA
Z_I	Input Impedance			0.3	2.0		0.3	2.0		MΩ
I_{CC}	Supply Current				1.7	2.8		1.7	2.8	mA
P_c	Power Consumption				50	85		50	85	mW
CMR	Common Mode Rejection			70			70	90		dB
V_{IR}	Input Voltage Range			± 12	± 13		± 12	± 13		V
PSRR	Power Supply Rejection Ratio				30	150				μV/V
			$V_{CC} = \pm 5.0$ V to ± 18 V					30	150	
I_{OS}	Output Short Circuit Current				25			25		mA
A_{VS}	Large Signal Voltage Gain		$R_L \geq 2.0$ kΩ, $V_O = \pm 10$ V	50	200		20	200		V/mV
V_{OP}	Output Voltage Swing		$R_L = 10$ kΩ	± 12			± 12	± 14		V
			$R_L = 2.0$ kΩ	± 10			± 10	± 13		
TR	Transient Response	Rise time	$V_I = 20$ mV, $R_L = 2.0$ kΩ, $C_L = 100$ pF, $A_V = 1.0$		0.3			0.3		μs
		Overshoot			5.0			5.0		%
BW	Bandwidth				1.0			1.0		MHz
SR	Slew Rate		$R_L \geq 2.0$ kΩ, $A_V = 1.0$		0.5			0.5		V/μs