VECTRON INTERNATIONAL
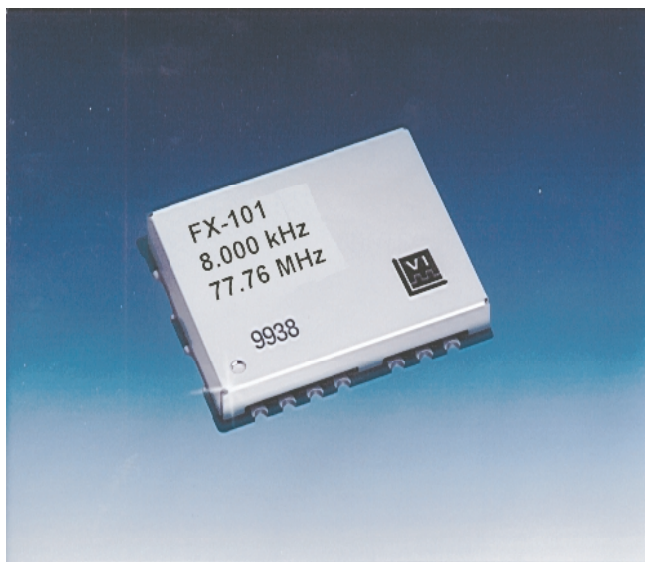
A DOVER TECHNOLOGIES COMPANY

FX-101
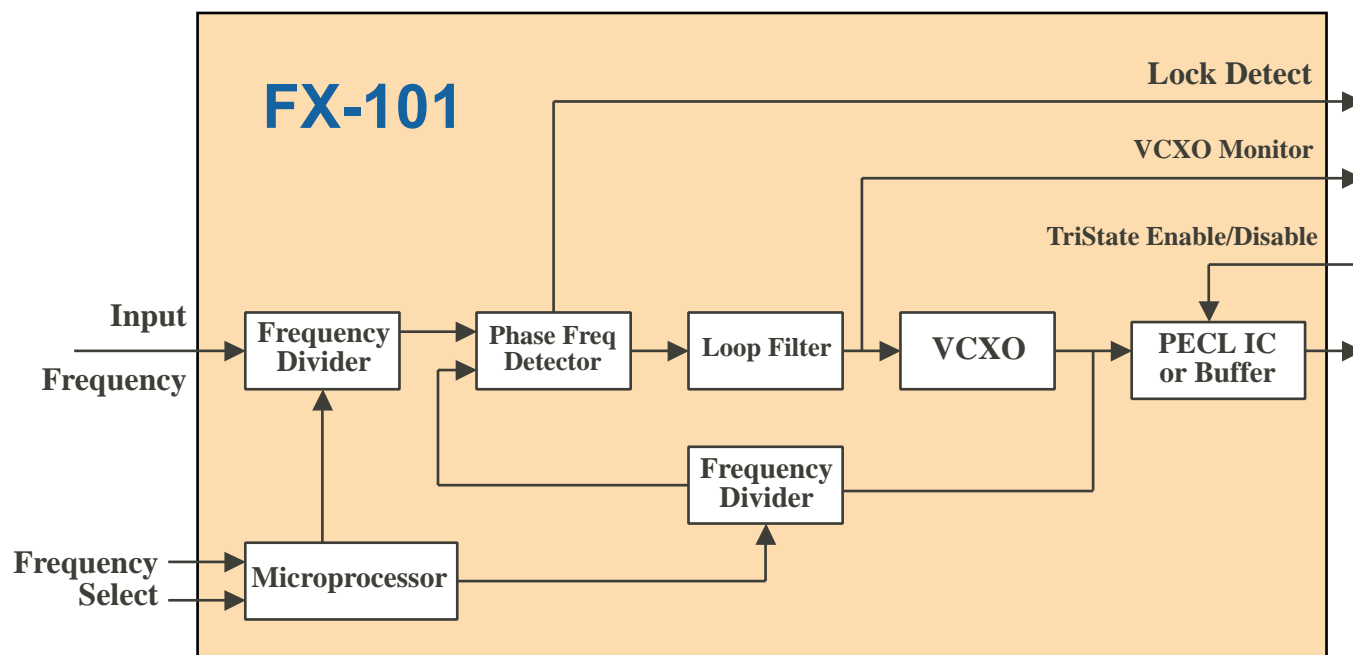
Frequency Translator

Features

- Output frequencies up to 77.760 MHz
- Locked to specified Input frequency, e.g. 8 kHz
- 1" x 0.8" x 0.2", Surface Mount (FR4 base)
- Single 5.0 Vdc or 3.3 Vdc supply
- Optional CMOS or PECL Output
- Low Output Jitter

Applications

- SONET / SDH / ATM / DSL-PON interconnects
- 8 kHz/16.384 MHz/19.44 MHz to 77.76 MHz
- 8 kHz/1.544 MHz/2.048 MHz to 44.736MHz

FX-101 Frequency Translator

Description

Vectron's FX-101 is a crystal based frequency translator which is used to translate any input frequency such as 8 kHz, 1.544 MHz, 2.048 MHz, 19.440 MHz etc. to any specific frequency less than or equal to 77.76 MHz. The input frequency does not have to be a 50/50% duty cycle and as an example can be an 8 kHz signal with a logic high "on time" of only 1us, such as a BITS clock. The FX-101 also has the ability to translate up to any of 4 different input frequencies to one common output frequency, such as input frequencies of 8 kHz and 1.544 MHz and 19.44 MHz and any other frequency between 333 Hz and 77.76 MHz translating them to an output frequency up to 77.76 MHz.
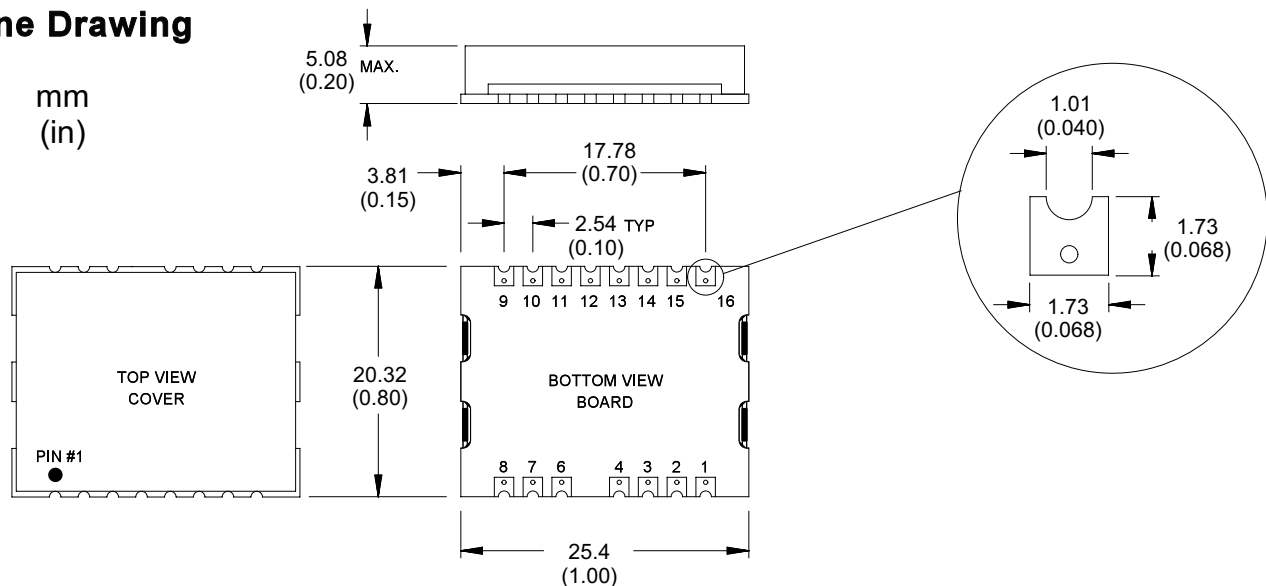
The "Input Frequency tracking capability" is the total amount of input frequency deviation in which the FX-101 is guaranteed to track or translate. As an example, a typical input clock would be 8 kHz ± 20 ppm. The FX-101 is guaranteed to track at least ±50 ppm of error over temperature/ aging/ power supply and is more than twice what most applications require. The PLL control voltage is brought out through a 470K ohm resistor. This would allow for the use of external circuitry (analog comparators or an A/D converter plus a processor) to detect when the control voltage is getting close to the limits of the pull range.

Performance Characteristics

Parameter		Symbol	Minimum	Typical	Maximum	Units
Supply Voltage,	**C** = 5 Vdc	V_{DD}	4.75	5.00	5.25	Vdc
	D = 3.3 Vdc	V_{DD}	3.15	3.30	3.45	Vdc
Supply Current		I_{DD}		45	70	mA
Input Signal, "0"	**A** = HCMOS	CLKIN	0		$0.2(V_{DD})$	Vdc
Input Signal, "1"	**A** = HCMOS	CLKIN	$0.7(V_{DD})$		5.5	Vdc
OUTPUT,	**F** = Comp PECL	---	---	PECL	---	---
V_{OH}		V_{OH}	V_{DD}-1.025		V_{DD}-0.880	Vdc
V_{OL}		V_{OL}	V_{DD}-1.810		V_{DD}-1.620	Vdc
Rise / Fall Time (77.76 MHz)		t_R/t_F		0.5	2	ns
OUTPUT,	**A** = HCMOS	---	---	HCMOS	---	---
V_{OH},	I_{OL} = 50 uA	V_{OH}	V_{DD}-0.3			Vdc
V_{OL},	I_{OL} = 50 uA	V_{OL}			0.1	Vdc
Rise / Fall Time (77.76 MHz/20% to 80%)		t_R/t_F		1.4	2.5	ns
Output Symmetry,		Sym	45		55	%
Freq >62.208 MHz and 3.3V		Sym	40		60	%
Jitter @ 77.76 MHz (rms 12 kHz to 20 MHz)				0.5	1.0	ps
Input Frequency Tracking Capability (Can translate a Stratum 1,2,3,3E,4 or SONET Min source)		APR	+/-50			ppm
Operating Temperature		Temp Range **C** = 0ºC to +70ºC Temp Range **F** = -40ºC to +85ºC				
Size		See page 3 for outline Drawings and Dimensions				

FX-101 Frequency Translator

Outline Drawing

mm
(in)

5.08 (0.20) MAX.

3.81 (0.15)

17.78 (0.70)

2.54 TYP (0.10)

9 10 11 12 13 14 15 16

TOP VIEW COVER

PIN #1

20.32 (0.80)

BOTTOM VIEW BOARD

8 7 6 4 3 2 1

25.4 (1.00)

1.01 (0.040)

1.73 (0.068)

1.73 (0.068)

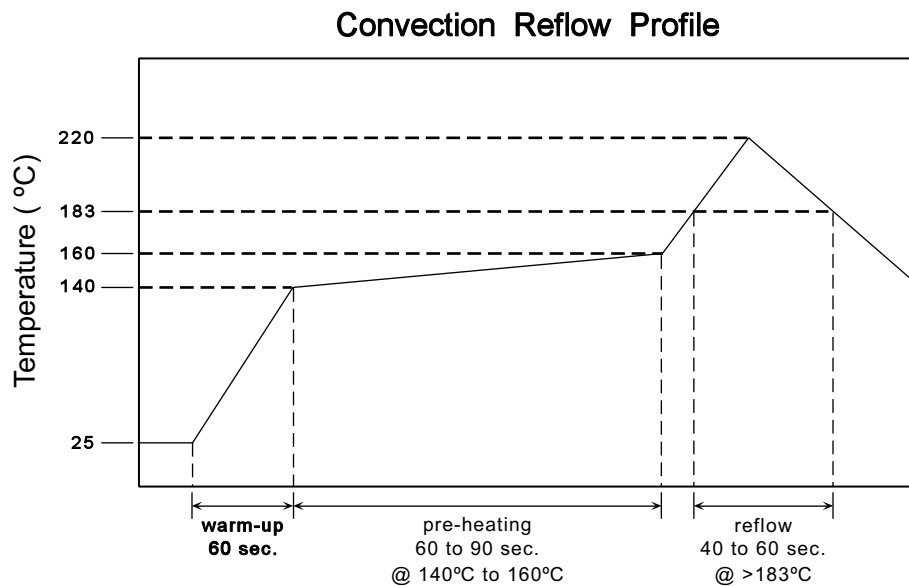| Pin	Symbol	Function
1	CLKIN	Input Frequency
2	GND	Ground
3	LD (Output)	Lock Detect Logic "1" indicates a locked condition and requires a couple hundred pF capacitor to ground to operate correctly. Logic "0" indicates that no input signal is detected and can be used as a loss-of-signal alarm. Toggles when not locked.
4	Monitor (Output)	PLL/ VCXO control voltage Under locked conditions, should be >0.3V and <3.0 V for the 3.3 volt option or >0.5V and <4.5V for the 5 volt option. Input frequency may be out of range if voltage exceeds these limits.
5	NC	No Connection
6	NC	No Connection
7	GND	Ground
8	Tri-state (Input) Disable (Input)	TriState (**HCMOS output option**) Logic "1" (or no connect) = Output enabled Logic "0" = Output in high impedance Disable (**PECL output option**) Logic "1" = Output disabled Logic "0" (or no connect) = Output enabled
9	OUT	VCXO Output (PECL) or HCMOS Output
10	COUT	Complementary VCXO Output (PECL) or NC for HCMOS output option
11	NC	No Connection
12	Select A	Do not Exceed Vdd (NC for one input frequency)
13	Select B	Do not Exceed Vdd (NC for one or two input frequencies)
14	NC	No Connection
15	GND	Ground
16	V_{DD}	Power Supply Voltage (5 Vdc or 3.3 Vdc)

FX-101 Frequency Translator

Recommended Land Pattern

mm
(in)

TYP.
2.54
(0.10)

TYP. 12 PLACES
1.91
(0.075)

3.04
(0.12)

16 15 14 13 12 11 10 9

TOP VIEW
BOARD

19.05
(0.75)

9.53
(0.375)

C̶L

1   2   3   4   6   7   8

C̶L

8.89
(0.35)

17.78
(0.70)
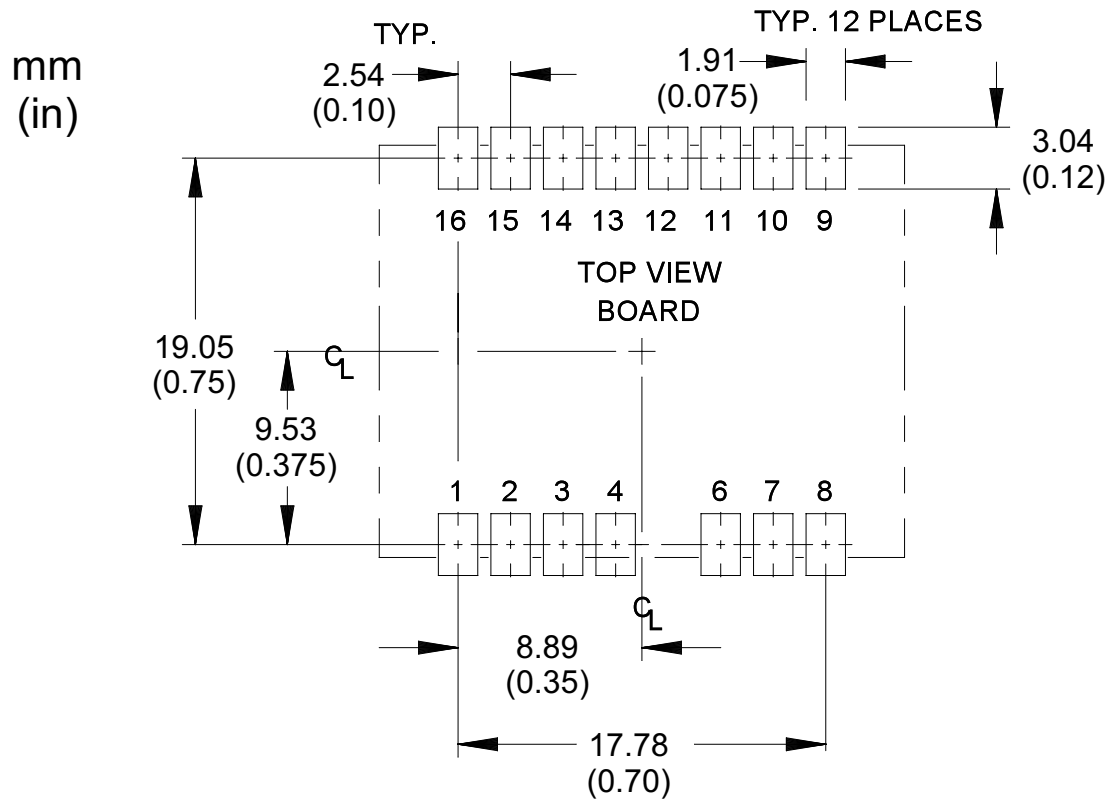
Recommended Reflow Profile

Convection Reflow Profile

Temperature (°C)

220
183
160
140

25

warm-up
60 sec.

pre-heating
60 to 90 sec.
@ 140ºC to 160ºC

reflow
40 to 60 sec.
@ >183ºC
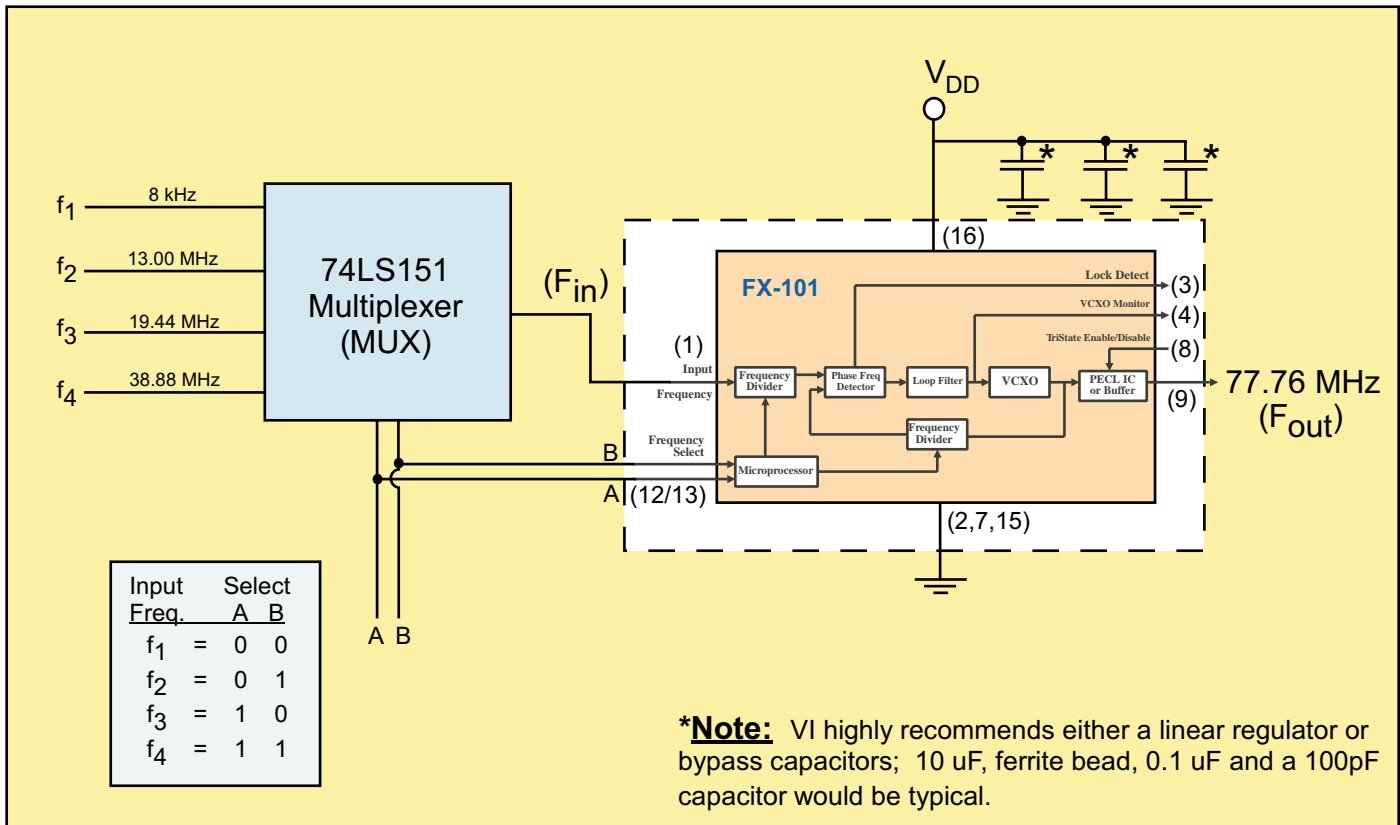
NOTE: This FX-101 should not be subjected to a wash process that will immerse it in solvents.
NO CLEAN is the recommended procedure.

FX-101 Frequency Translator

Typical Application

All components outside the dotted line box are user supplied components and/or connections. This is just one possible configuration of the FX-101. For additional information about your specific needs please contact our Factory.

FAQ's

Q: What are the different input frequencies Available?
A: The FX-101 is able to handle any input frequency between 333 Hz and 77.76 MHz. (A list of standard frequencies is available on page 7.)

Q: How many different input frequencies can a specific FX-101 accept?
A: Each FX-101 can be programmed to accept up to 4 different frequencies.

Q: Does the output frequency need to be 77.76 MHz?
A: No, the output frequency can be any frequency between 1.024 MHz and 77.76 MHz. (A list of standard frequencies is available on page 7.)

Q: If there is only one input pin, how can your unit accept 4 different frequencies?
A: The customer is required to supply a multiplexer which would switch between the different input frequencies. The multiplexers' select pins would need to be sync'd to the select pins of the FX-101. (The drawing above illustrates this configuration.)

FX-101 Frequency Translator

FX-100 Series Selection Guide
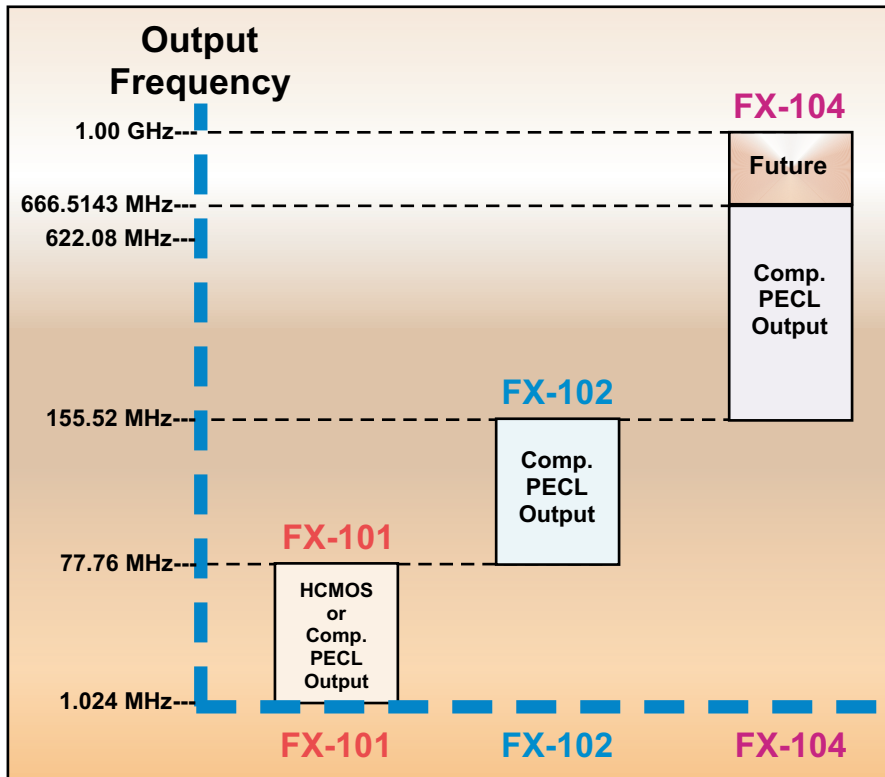
Handling Precautions

Although protection circuitry has been designed into this device, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. VI employs a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode.
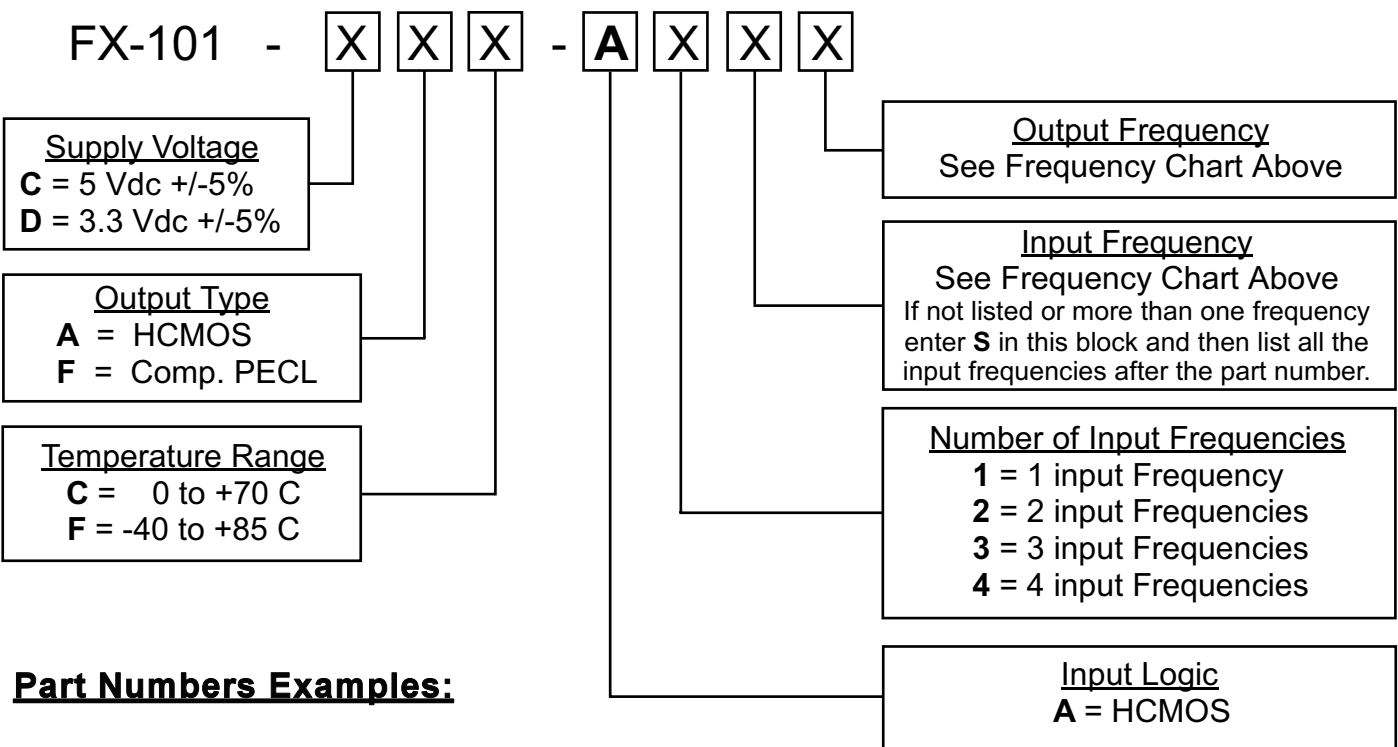
Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500 ohms, capacitance = 100pf) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained by using these circuit parameters.

ESD Threshold Voltage		
Model	Threshold	Unit
Human-Body (HBM)	500	V min
Charged-Device	500	V min

FX-101 Frequency Translator

Standard Frequencies					
333 Hz	A	2.048 MHz	J	26.00 MHz	T
2 kHz	B	4.096 MHz	K	27.00 MHz	W
8 kHz	C	8.192 MHz	L	38.88 MHz	X
16 kHz	D	13.00 MHz	M	44.736 MHz	Y
64 kHz	E	16.384 MHz	N	51.84 MHz	0
1.024 MHz	F	19.44 MHz	P	61.44 MHz	1
1.544 MHz	H	20.48 MHz	R	77.76 MHz	2
		Special SCD	S		

How to Order

FX-101 - X X X - A X X X

Supply Voltage
C = 5 Vdc +/-5%
D = 3.3 Vdc +/-5%

Output Type
A = HCMOS
F = Comp. PECL

Temperature Range
C = 0 to +70 C
F = -40 to +85 C

Output Frequency
See Frequency Chart Above

Input Frequency
See Frequency Chart Above
If not listed or more than one frequency enter **S** in this block and then list all the input frequencies after the part number.

Number of Input Frequencies
1 = 1 input Frequency
2 = 2 input Frequencies
3 = 3 input Frequencies
4 = 4 input Frequencies

Input Logic
A = HCMOS

Part Numbers Examples:

FX-101-DFC-A1P2

FX-101-DFC-A4S2 - 8 kHz, 1.544 MHz, 2.048 MHz, 19.44 MHz

Visit Our Website at   www.vectron.com

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