

## ASSP

# Piezo Electric VCO

## M2 Series (D110)

### VOLTAGE CONTROLLED OSCILLATOR (4 to 30 MHz)

#### ■ DESCRIPTION

The M2 series (D110) Voltage Controlled Oscillators (VCO) directly oscillate in the frequency range of 4 to 30 MHz. The M2 series VCO use a piezoelectric single crystal with high electromechanical coupling coefficient (LiTaO<sub>3</sub>: lithium tantalate) for stable and wide variable frequency width.

Excellent S/N and jitter characteristic due to high Q of lithium tantalate can realize high quality playback sound and picture, especially in PLL circuit of digital audio and video equipments.

#### ■ FEATURES

- Wider variable frequency width than quartz crystals:  $\pm 0.2\%$  or more
- High stability (100 times more stable than LC or TTL-IC VCO)
- Excellent S/N and jitter characteristic due to high Q of lithium tantalate for high quality playback sound and picture.
- Excellent temperature characteristic:  $-300 \sim 500$  ppm ( $-10 \sim +70^\circ\text{C}$ )
- 10-pin SIP ready for high-density mounting.

#### ■ PACKAGE

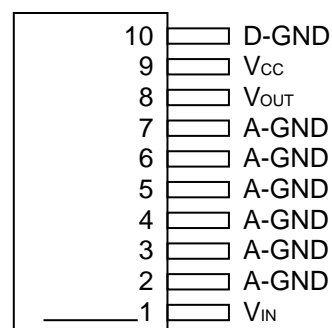


# M2 Series (D110)

## ■ TERMINAL ASSIGNMENT

Terminal No.	Terminal Name	Description
1	V <sub>IN</sub>	Control voltage input terminal
2, 3, 4, 5, 6, 7	A-GND	Analog grounding terminal
8	V <sub>OUT</sub>	Output terminal
9	V <sub>CC</sub>	Power supply terminal
10	D-GND	Digital grounding terminal

(Front view)



**Note:** The GND terminals are not connected inside the module.  
Be sure to route them on the PC board.

## ■ MAXIMUM RATINGS

Item	Symbol	Rated value	Unit
Power supply voltage	V <sub>CC</sub>	-0.5 ~ +7.0	V
Input control voltage	V <sub>IN</sub>	-0.5 ~ +10.0	
Power consumption	P <sub>D</sub>	100	mW
Operating temperature	T <sub>a</sub>	-10 ~ +70	°C
Storage temperature	T <sub>stg</sub>	-30 ~ +100	
Oscillation frequency range	—	4 ~ 30	MHz

## ■ RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Rated value	Unit
Power supply voltage	V <sub>CC</sub>	4.75 ~ 5.25	V
Input control voltage	V <sub>IN</sub>	0 ~ 5	
Operating temperature	T <sub>a</sub>	-10 ~ +60	°C

## ■ STANDARD FREQUENCIES

Frequencies	Uses	Part number
12.288 MHz	Audio	FAR-M2SC-12M288-D110
13.500 MHz	Video	FAR-M2SC-13M500-D110
14.318 MHz	Video	FAR-M2SC-14M318-D110
16.934 MHz	Audio	FAR-M2SC-16M934-D110

Frequencies	Uses	Part number
17.734 MHz	Video	FAR-M2SC-17M734-D110
22.579 MHz	Audio	FAR-M2SC-22M579-D110
24.576 MHz	Audio	FAR-M2SC-24M576-D110
28.636 MHz	Video	FAR-M2SC-28M636-D110

## ■ ELECTRICAL CHARACTERISTICS

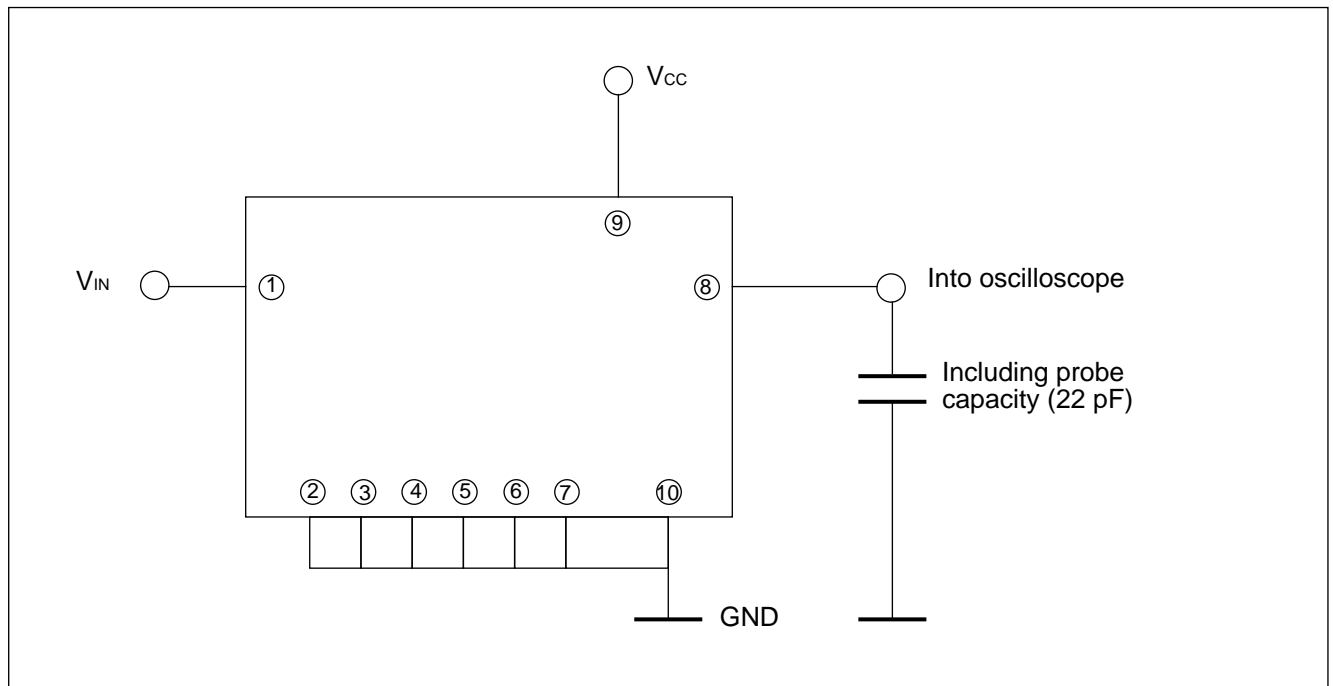
( $V_{CC} = 5.0\text{ V}$ )

Item	Symbol	Condition	Rated value			Unit	
			minimum	standard	maximum		
Power supply current	$I_{CC}$	Not loaded	—	10	15	mA	
Oscillation frequency	$f_H$	$V_{IN} = 5.0\text{ V}$	+2000	—	—	ppm	
	$f_1$	$V_{IN} = 0\text{ V}$	—	—	-2000		
Output voltage	H level	$V_{OH}$	$V_{IN} = 2.5\text{ V}$	$V_{CC} - 0.5$	5.0	V	
	L level	$V_{OL}$	$V_{IN} = 2.5\text{ V}$	—	0		0.5
Frequency voltage stability	$\Delta f (V_{CC})$	$V_{CC} = 4.75 \sim 5.25\text{ V}$	-100	—	+100	ppm	*1
Frequency temperature stability	$\Delta f (T_a)$	$V_{IN} = 2.5\text{ V}$	-300	—	+500		*2

\*1:  $V_{CC} = 5.0\text{ V}$  standard

\*2:  $25^\circ\text{C}$  standard,  $T_a = -10 \sim +70^\circ\text{C}$

## ■ MEASURING CIRCUIT DIAGRAM

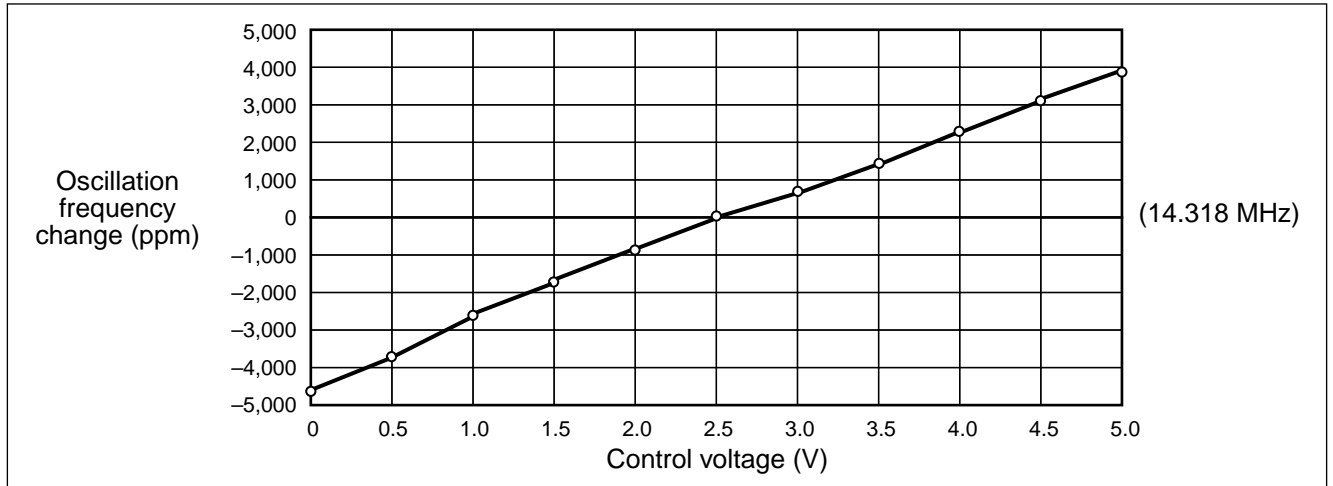


# M2 Series (D110)

## ■ STANDARD CHARACTERISTICS

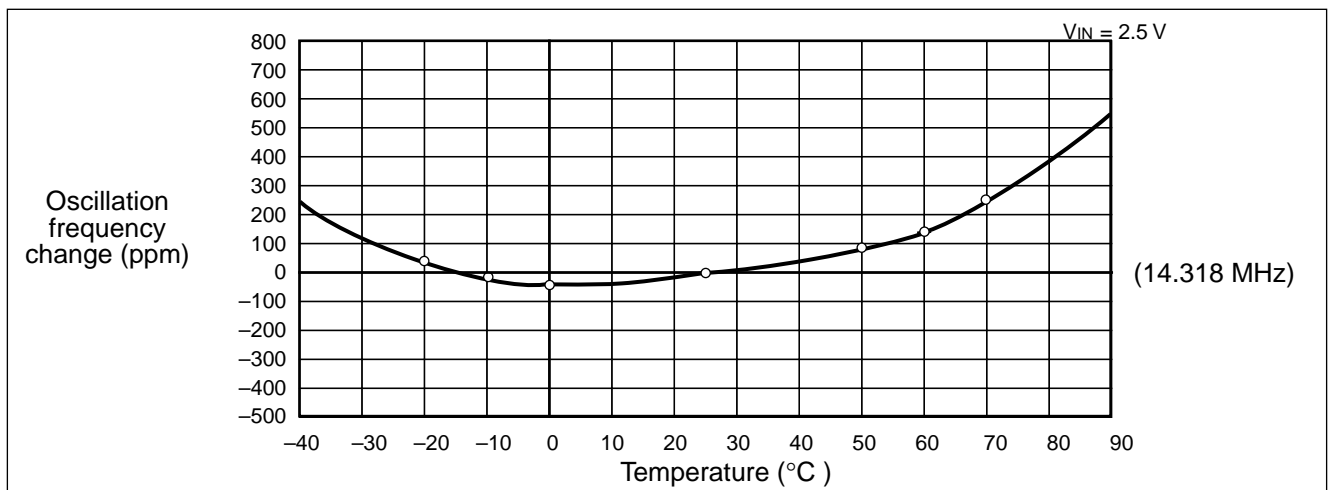
Part number : FAR-M2SC-14M318-D110

### 1. Control voltage and oscillation frequency



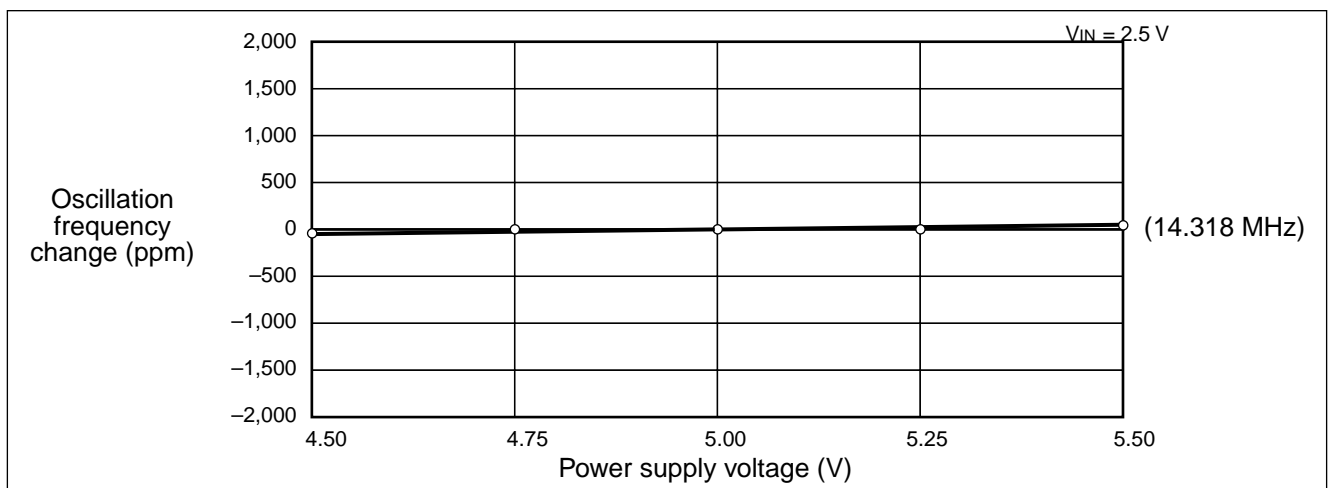
### 2. Temperature characteristics

(25°C standard)



### 3. Power supply voltage characteristics

( $V_{CC} = 5.0\text{ V}$  standard)





# FUJITSU LIMITED

*For further information please contact:*

## **Japan**

FUJITSU LIMITED  
Corporate Global Business Support Division  
Electronic Devices  
KAWASAKI PLANT, 4-1-1, Kamikodanaka  
Nakahara-ku, Kawasaki-shi  
Kanagawa 211-88, Japan  
Tel: (044) 754-3763  
Fax: (044) 754-3329

## **North and South America**

FUJITSU MICROELECTRONICS, INC.  
Semiconductor Division  
3545 North First Street  
San Jose, CA 95134-1804, U.S.A.  
Tel: (408) 922-9000  
Fax: (408) 432-9044/9045

## **Europe**

FUJITSU MIKROELEKTRONIK GmbH  
Am Siebenstein 6-10  
63303 Dreieich-Buchsschlag  
Germany  
Tel: (06103) 690-0  
Fax: (06103) 690-122

## **Asia Pacific**

FUJITSU MICROELECTRONICS ASIA PTE. LIMITED  
#05-08, 151 Lorong Chuan  
New Tech Park  
Singapore 556741  
Tel: (65) 281-0770  
Fax: (65) 281-0220

All Rights Reserved.

The contents of this document are subject to change without notice. Customers are advised to consult with FUJITSU sales representatives before ordering.

The information and circuit diagrams in this document presented as examples of semiconductor device applications, and are not intended to be incorporated in devices for actual use. Also, FUJITSU is unable to assume responsibility for infringement of any patent rights or other rights of third parties arising from the use of this information or circuit diagrams.

FUJITSU semiconductor devices are intended for use in standard applications (computers, office automation and other office equipment, industrial, communications, and measurement equipment, personal or household devices, etc.).

### **CAUTION:**

Customers considering the use of our products in special applications where failure or abnormal operation may directly affect human lives or cause physical injury or property damage, or where extremely high levels of reliability are demanded (such as aerospace systems, atomic energy controls, sea floor repeaters, vehicle operating controls, medical devices for life support, etc.) are requested to consult with FUJITSU sales representatives before such use. The company will not be responsible for damages arising from such use without prior approval.

Any semiconductor devices have inherently a certain rate of failure. You must protect against injury, damage or loss from such failures by incorporating safety design measures into your facility and equipment such as redundancy, fire protection, and prevention of over-current levels and other abnormal operating conditions.

If any products described in this document represent goods or technologies subject to certain restrictions on export under the Foreign Exchange and Foreign Trade Control Law of Japan, the prior authorization by Japanese government should be required for export of those products from Japan.

F9703

© FUJITSU LIMITED Printed in Japan