

ASSP

Piezoelectric VCO (6 to 30 MHz)

M2 Series (F150)

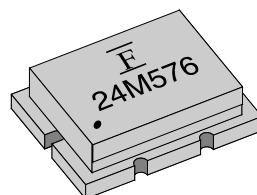
■ DESCRIPTION

The M2 series (F150) of VCO (Voltage Controlled Oscillator) apply to the frequency range 6 to 30 MHz. These VCOs have a high stability and wide controllable frequency ranges using a LiTaO₃ piezoelectric single crystal with high electromechanical coupling coefficient. Output level applies to CMOS type for digital interface.

■ FEATURES

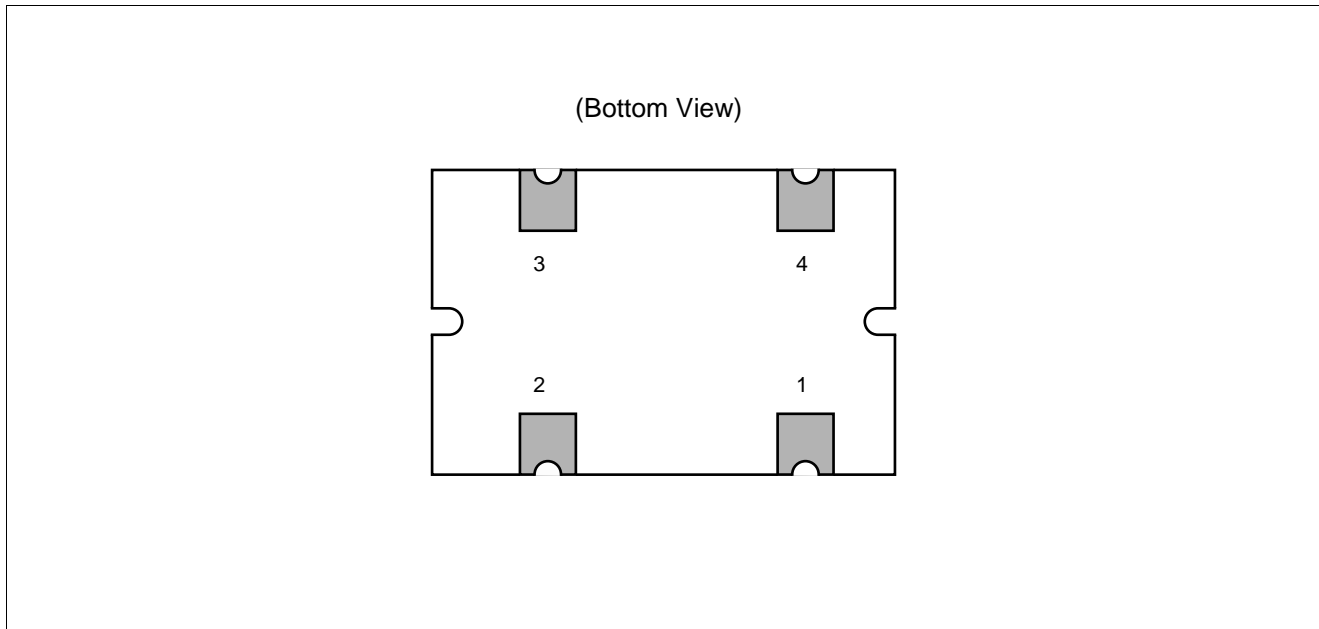
- Wide frequency controllable range (Over than ± 2000 ppm)
- High carrier noise ratio
- Excellent temperature stability
- CMOS output level
- Compact package (8 × 11 × 2.6 mm)
- Surface mountable package (SMD)

■ PACKAGE



M2 Series (F150)

■ PIN ASSIGNMENT



■ PIN DESCRIPTIONS

Pin No.	Symbol	Descriptions
1	V_{IN}	INPUT (Control voltage)
2	GND	GROUND
3	V_{CC}	V_{CC} (Supply voltage)
4	V_{OUT}	OUTPUT

M2 Series (F150)

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating		Unit
		Min.	Max.	
Supply voltage	V_{CC}	-0.5	+7.0	V
Control voltage	V_{IN}	-0.5	+7.0	V
Output voltage	V_{OUT}	-0.5	$V_{CC} + 0.5$	V
Output current	I_{OUT}	-25	+25	mA
Operating temperature	T_a	-10	+70	°C
Storage temperature	T_{stg}	-40	+100	°C

WARNING: Piezoelectric devices can be permanently damaged by application of stress (voltage, current, temperature, etc.) in excess of absolute maximum ratings. Do not exceed these ratings.

■ RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Value		Unit
		Min.	Max.	
Supply voltage	V_{CC}	+4.75	+5.25	V
Control voltage	V_{IN}	0	+5.0	V
Operating temperature	T_a	-10	+70	°C

WARNING: The recommended operating conditions are required in order to ensure the normal operation of the piezoelectric device. All of the device's electrical characteristics are warranted when the device is operated within these ranges.

Always use semiconductor devices within their recommended operating condition ranges. Operation outside these ranges may adversely affect reliability and could result in device failure.

No warranty is made with respect to uses, operating conditions, or combinations not represented on the data sheet. Users considering application outside the listed conditions are advised to contact their FUJITSU representatives beforehand.

■ STANDARD FREQUENCIES

Nominal frequency	Part number	Application
14.318 MHz	FAR-M2CC-14M318-F150	Video
16.934 MHz	FAR-M2CC-16M934-F150	Audio
18.432 MHz	FAR-M2CC-18M432-F150	Video
24.576 MHz	FAR-M2CC-24M576-F150	Audio
25.175 MHz	FAR-M2CC-25M175-F150	Display

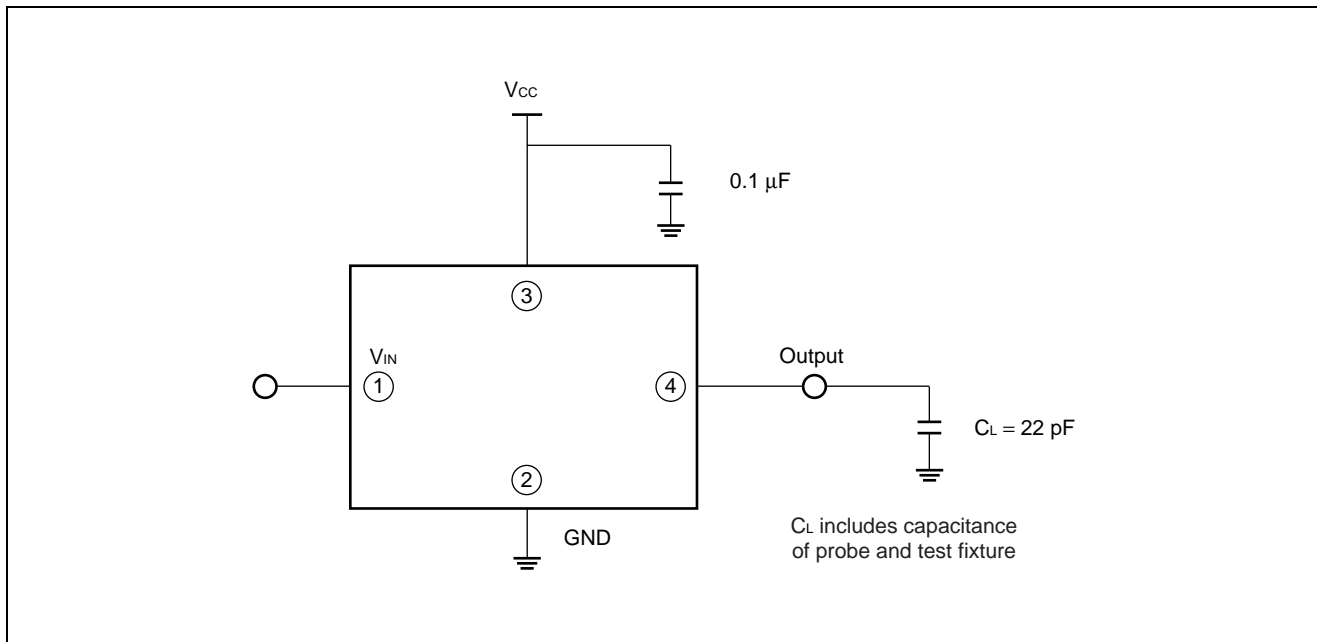
M2 Series (F150)

■ ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Condition	Value			Unit	Remarks	
			Min.	Typ.	Max.			
Current consumption	I_{CC}	Without load	—	5.0	10	mA		
Output voltage	"H"	V_{OH}	$V_{IN} = 2.5\text{ V}$	$V_{CC} - 0.5$	5.0	—	V	
	"L"	V_{OL}		—	0	+0.5	V	
Oscillation frequency	f_H	$V_{IN} = 5.0\text{ V}$	+2000	—	—	ppm	Nominal frequency reference	
	f_L	$V_{IN} = 0.0\text{ V}$	—	—	-2000	ppm		
Frequency stability	$\Delta f(V_{CC})$	$V_{CC} = 4.75\text{ V}$ to 5.25 V $V_{IN} = 2.5\text{ V}$	-150	—	+150	ppm	$V_{CC} = 5.0\text{ V}$ reference	
Frequency stability with temperature	$\Delta f(T_a)$	$V_{IN} = 2.5\text{ V}$ $T_a = -10\text{ to }+70\text{ }^\circ\text{C}$	-500	—	+500	ppm	25°C reference	

Unless otherwise specified $T_a = +25\text{ }^\circ\text{C}$, $V_{CC} = 5.0\text{ V}$

■ MEASUREMENT CIRCUIT

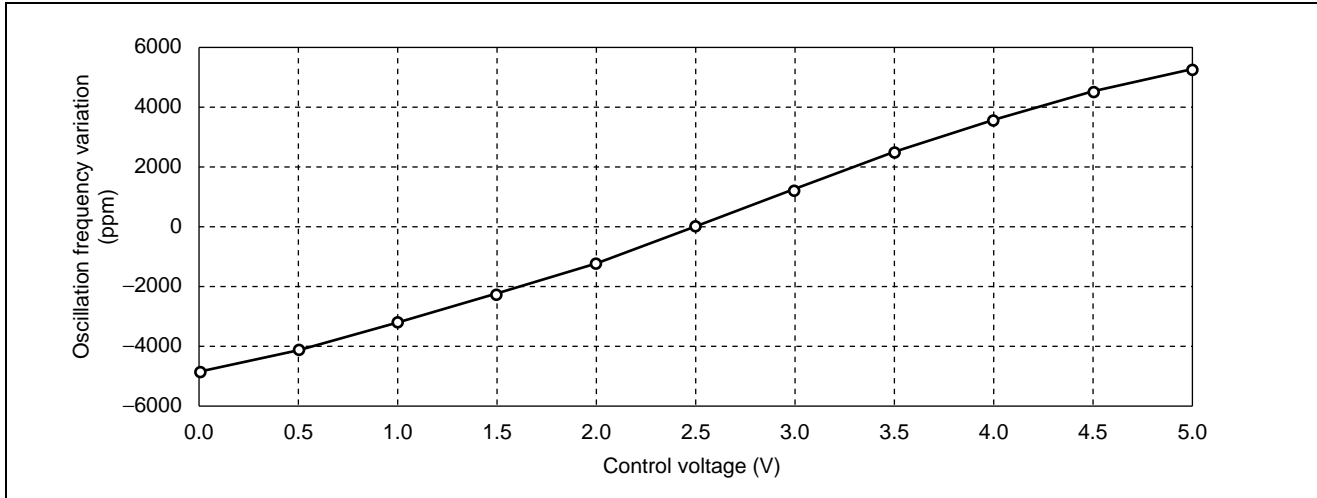


M2 Series (F150)

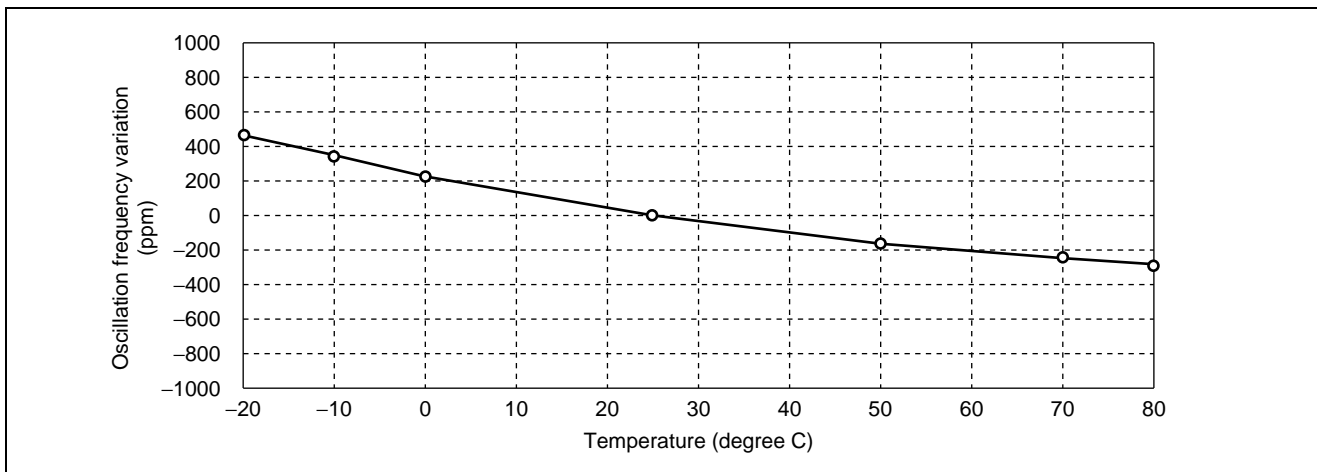
■ TYPICAL CHARACTERISTICS

Part number: FAR-M2CC-16M934-F150

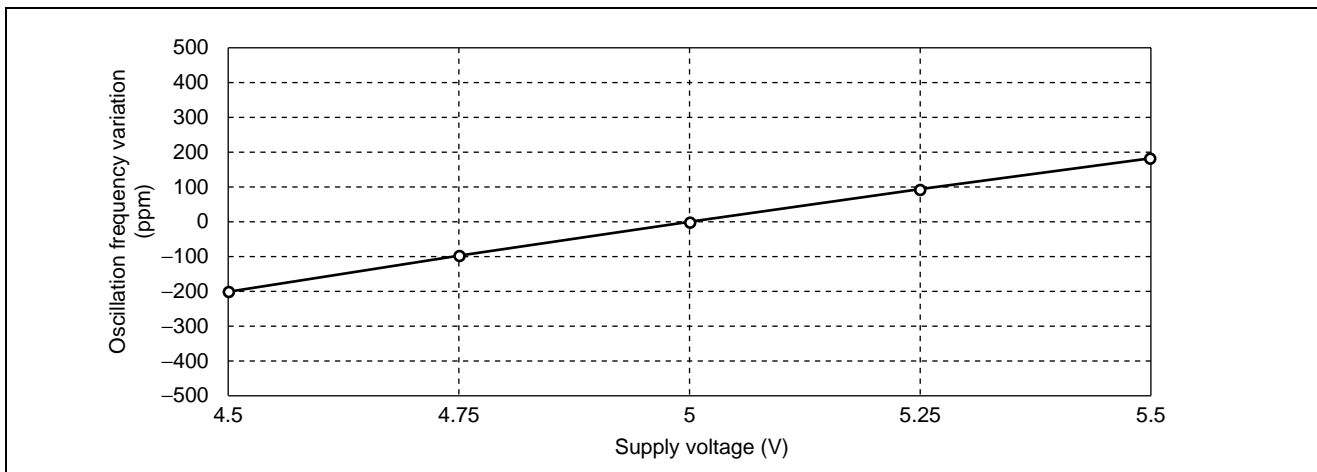
1. Control Voltage vs. Oscillation Frequency Variation



2. Temperature Characteristics



3. Supply Voltage (Vcc) vs. Oscillation Frequency Variation



M2 Series (F150)

■ PART NUMBER DESIGNATION

[Designation example]

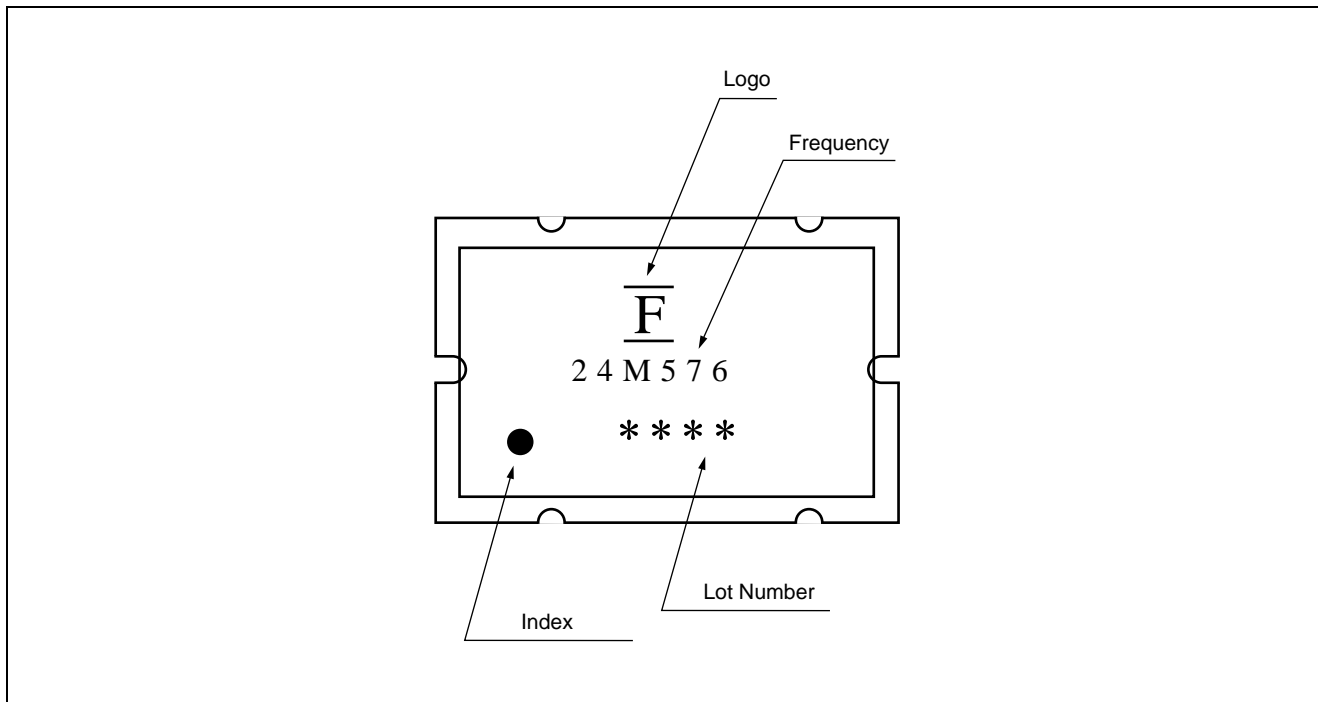
FAR – M2CC – □□□□□□ – F150 – R
(1) (2)

(1) : Frequency : This specifies the nominal frequency using six alphanumeric characters.
M indicates the decimal point.

[Example] 24.576 MHz → 24M576

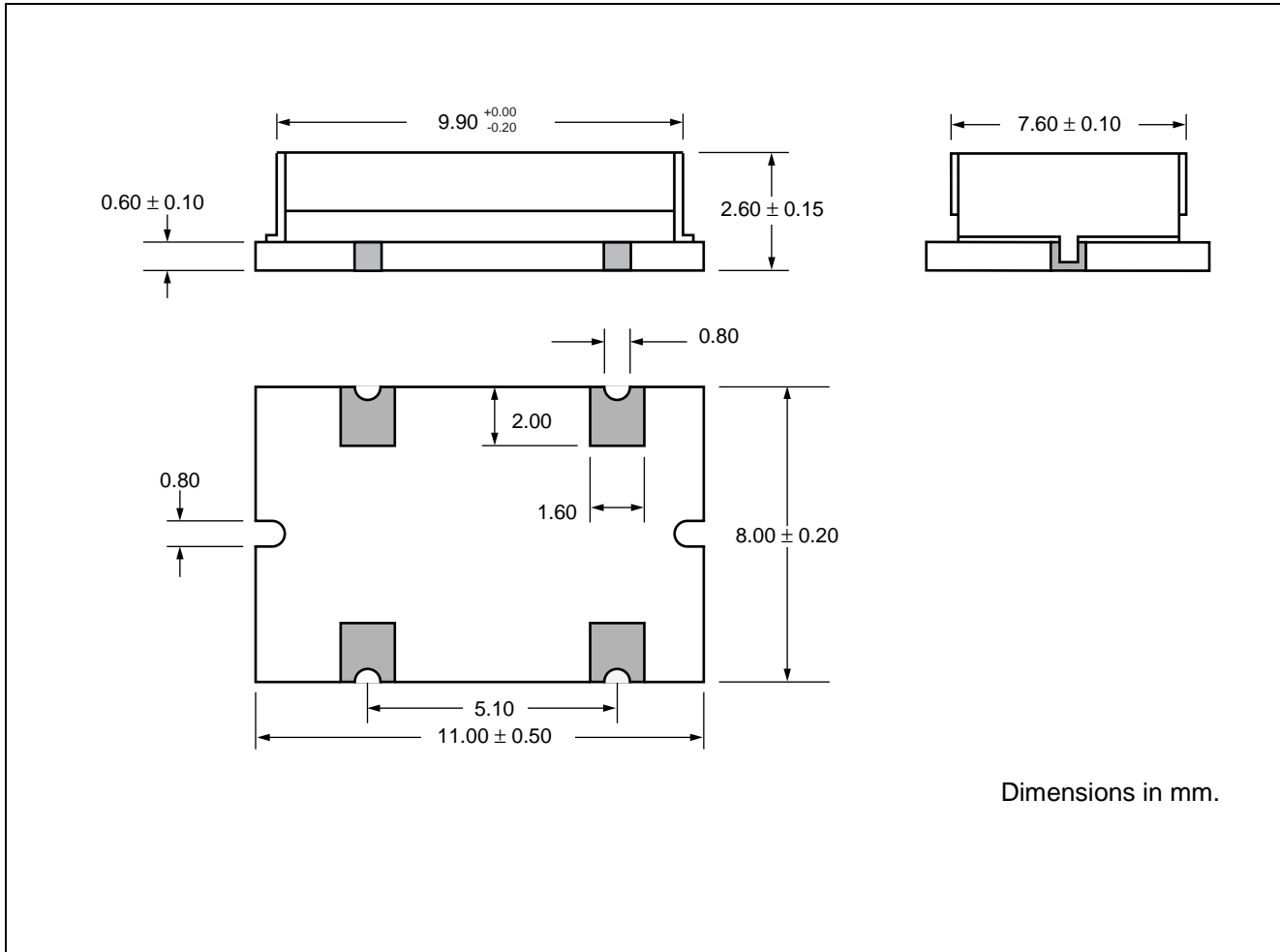
(2) : Taping : “-R” means 1000 pcs/reel

■ MARKING



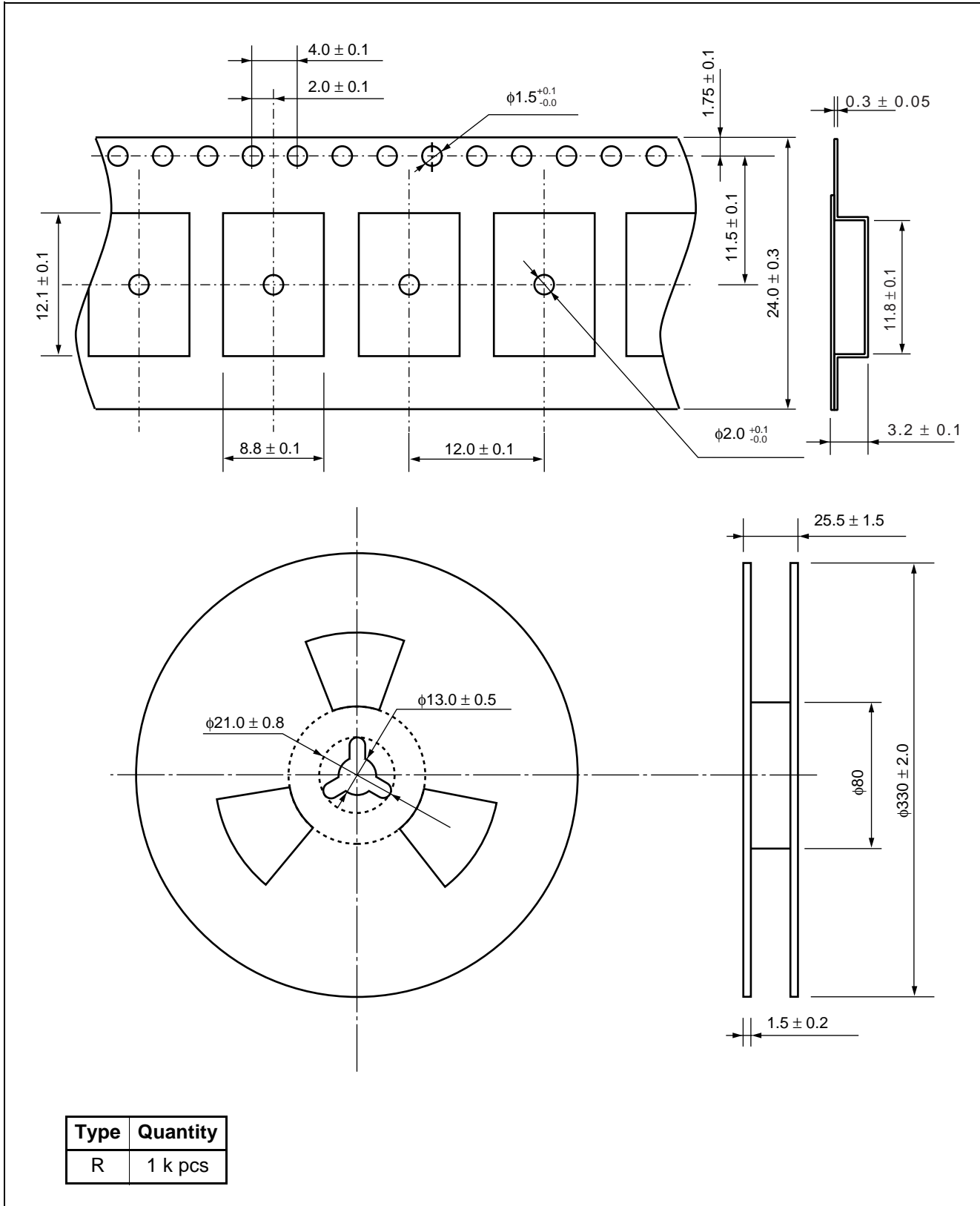
M2 Series (F150)

■ PACKAGE DIMENSION



M2 Series (F150)

■ PACKAGE: Reel type



M2 Series (F150)

FUJITSU LIMITED

For further information please contact:

Japan

FUJITSU MEDIA DEVICES LIMITED
Marketing and Technical Support Dept.
SUN HAMADA BLDG 2F
1-19-20, Shin-yokohama
Kouhoku-ku, Yokohama-shi
Kanagawa 222-0033, Japan
Tel: 81(45) 471-0067
Fax: 81(45) 471-0069

<http://www.fujitsu.co.jp/>

North and South America

FUJITSU MICROELECTRONICS, INC.
Semiconductor Division
3545 North First Street
San Jose, CA 95134-1804, USA
Tel: (408) 922-9000
Fax: (408) 922-9179

Customer Response Center
Mon. - Fri.: 7 am - 5 pm (PST)
Tel: (800) 866-8608
Fax: (408) 922-9179

<http://www.fujitsumicro.com/>

Europe

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

<http://www.fujitsu-edc.com/>

Asia Pacific

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

<http://www.fmap.com.sg/>

F9812

© FUJITSU LIMITED Printed in Japan

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 are 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 an inherent chance 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 Law of Japan, the prior authorization by Japanese government will be required for export of those products from Japan.