FUJITSU SEMICONDUCTOR
DATA SHEET

DS04-21710-1E

ASSP

# Piezoelectric VCO (6 to 30 MHz)

## M2 Series (F150)



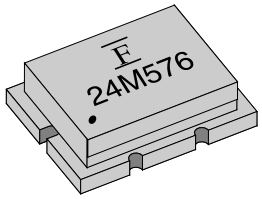
### ■ DESCRIPTION

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 $LiTaO_3$ piezoelectric single crystal with high electromechanical coupling coefficient. Output level applies to CMOS type for digital interface.

### ■ FEATURES

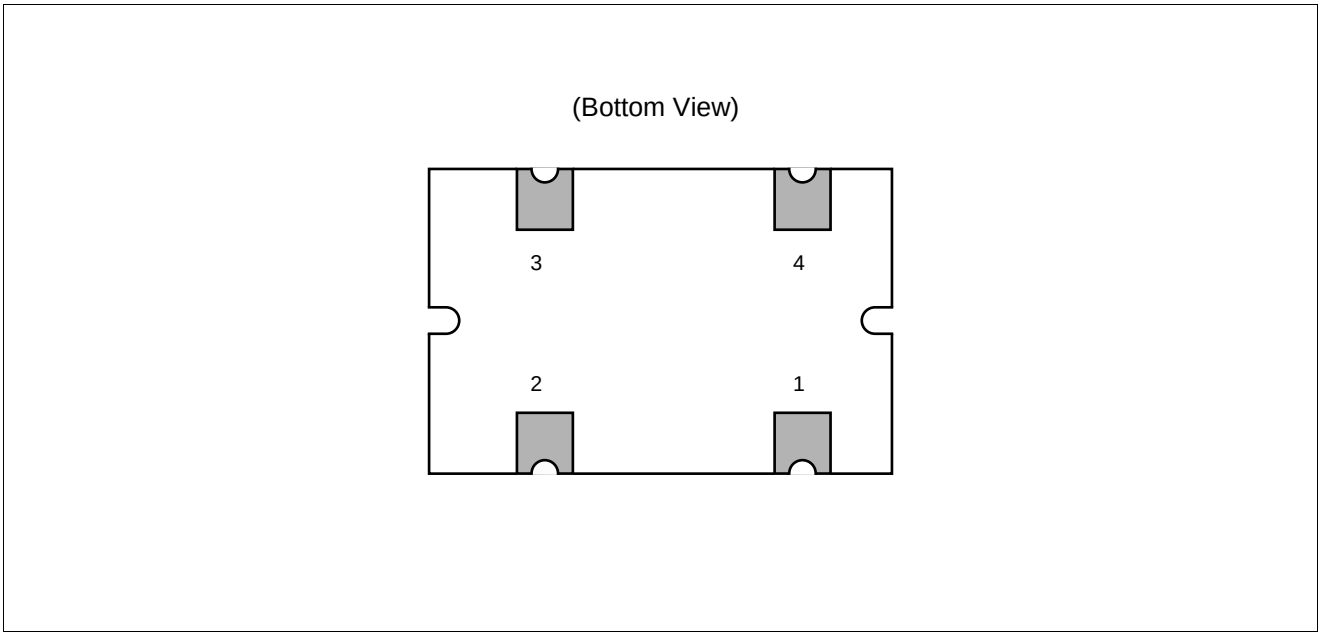
- Wide frequency controllable range (Over than ±2000 ppm)
- High carrier noise ratio
- Excellent temperature stability
- CMOS output level
- Compact package (8 × 11 × 2.6 mm)
- Surface mountable package (SMD)

### ■ 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 |

## ■ 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 |

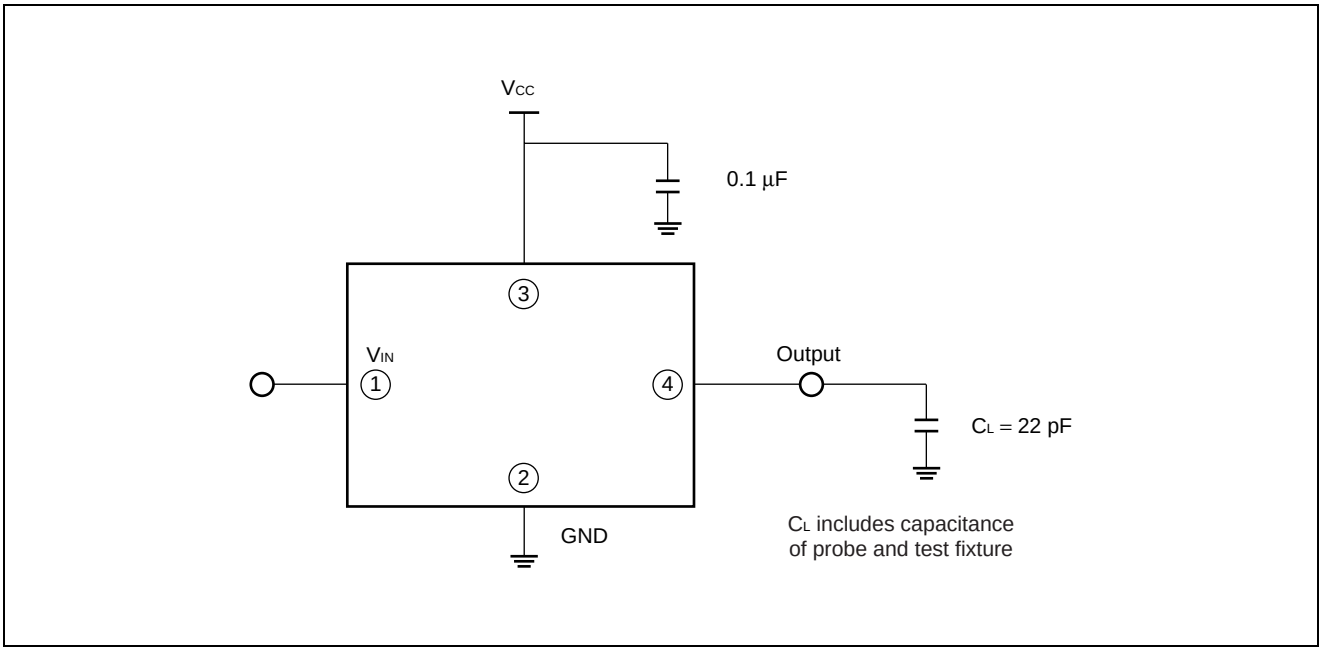
# M2 Series (F150)

## ■ 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 V | $V_{CC}$ – 0.5 | 5.0 | — | V | |
| | "L" | $V_{OL}$ | | — | 0 | +0.5 | V | |
| Oscillation frequency | | $f_H$ | $V_{IN}$ = 5.0 V | +2000 | — | — | ppm | Nominal frequency reference |
| | | $f_L$ | $V_{IN}$ = 0.0 V | — | — | –2000 | ppm | |
| Frequency stability | | $\Delta f(V_{CC})$ | $V_{CC}$ = 4.75 V to 5.25 V<br>$V_{IN}$ = 2.5 V | –150 | — | +150 | ppm | $V_{CC}$ = 5.0 V reference |
| Frequency stability with temperature | | $\Delta f(Ta)$ | $V_{IN}$ = 2.5 V<br>Ta = –10 to +70 °C | –500 | — | +500 | ppm | 25°C reference |

Unless otherwise specified Ta = +25 °C, $V_{CC}$ = 5.0 V

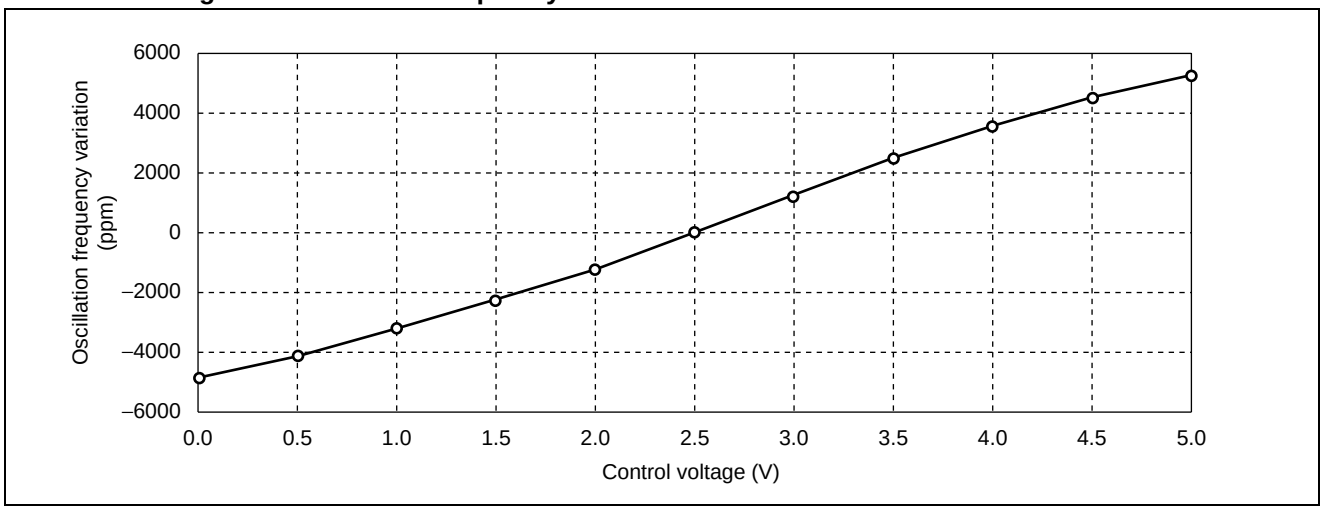
## ■ MEASURMENT CIRCUIT



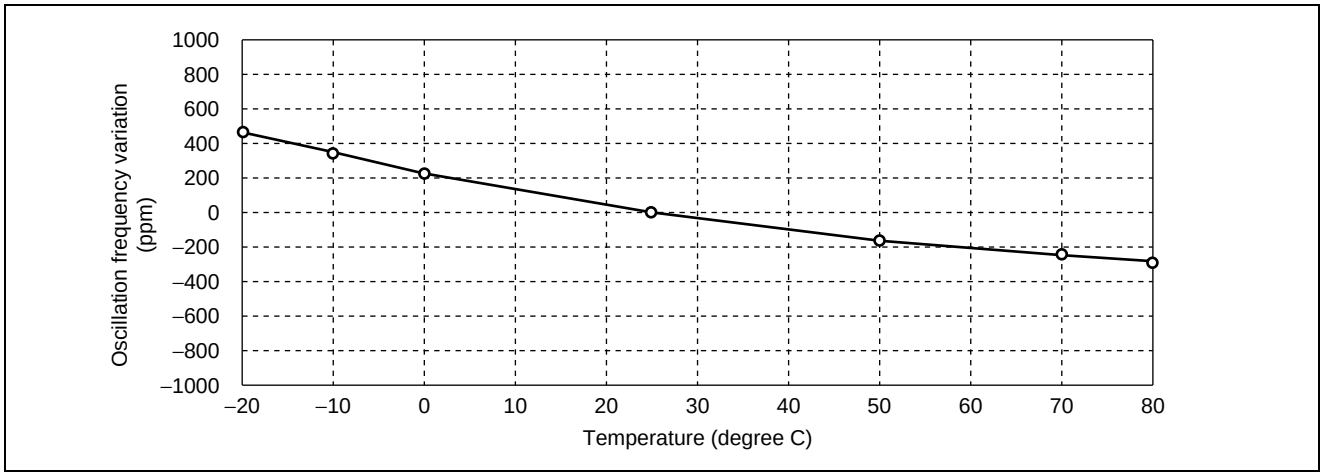
## ■ TYPICAL CHARACTERISTICS

Part number: FAR-M2CC-16M934-F150

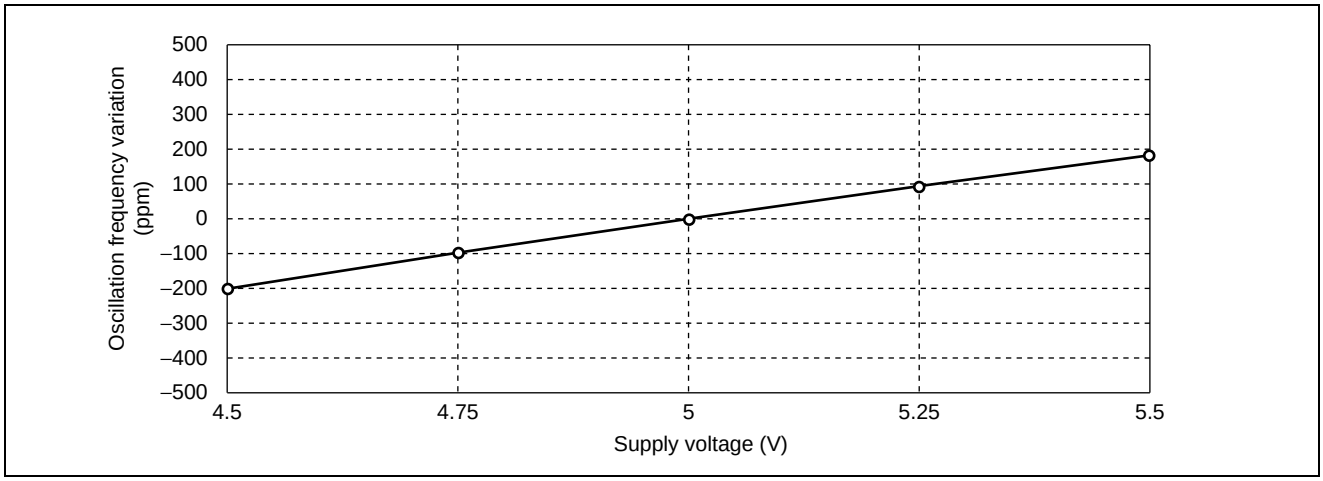
### 1. Control Voltage vs. Oscillation Frequency Variation




### 2. Temperature Characteristics




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



# M2 Series (F150)

## ■ PART NUMBER DESIGNATION

[Designation example]

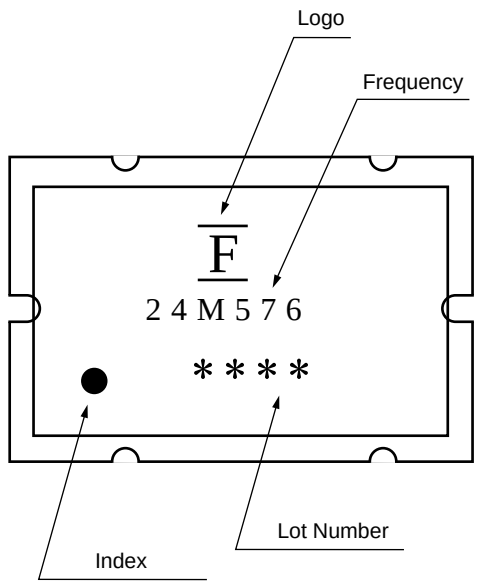
FAR – M2CC – □□□□□□ – F150 – R
(1) (2)

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

[Example] 24.576 MHz → 24M576

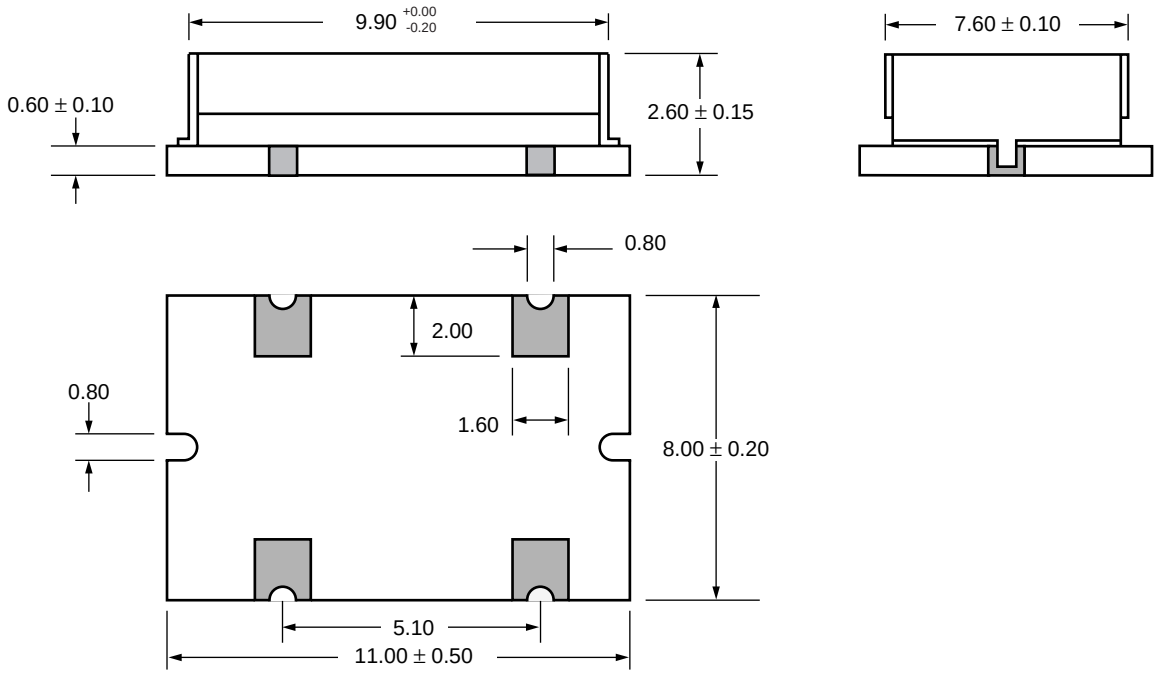
(2) : Taping : "–R" means 1000 pcs/reel

## ■ MARKING



# M2 Series (F150)

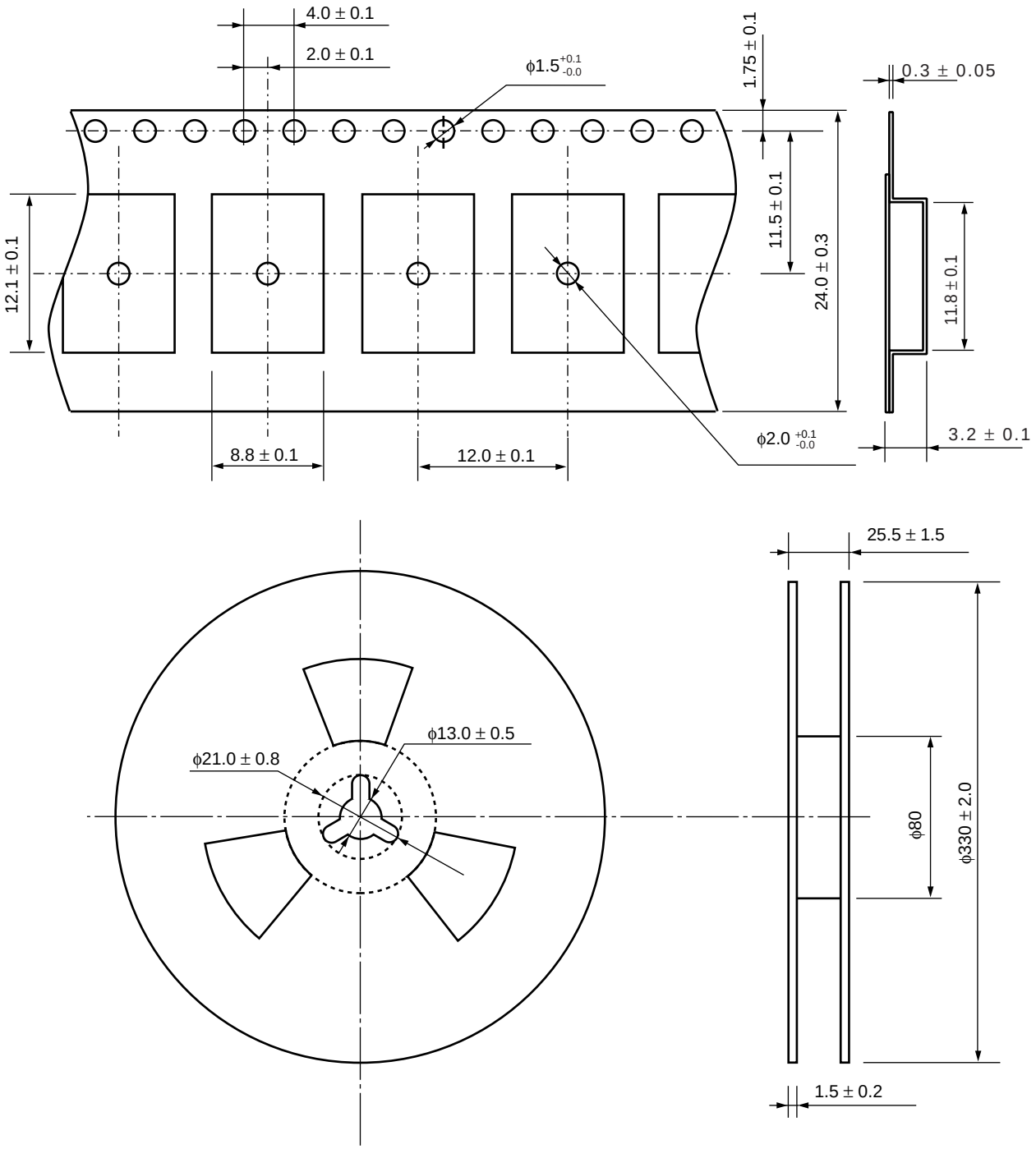
## ■ PACKAGE DIMENSION




Dimensions in mm.

# M2 Series (F150)

## ■ PACKAGE: Reel type




| Type | Quantity |
|---|---|
| R | 1 k pcs |

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