

### Ceramic Resonators, Chip Type (2 Array Type)

Type: **EFOP**

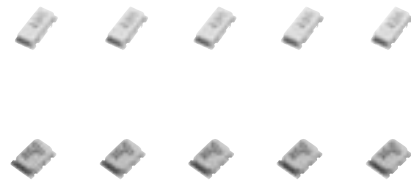
Type: **EFOD**

Type: **EFOPS**

Type: **EFOPM**

Type: **EFODM**

Type: **EFOLM**



#### ■ Features

- Encased in a ceramic package
- High reliability against soldering heat and mechanical stress
- Moisture-proof sealing
- 1.2 mm maximum in thickness (PS/PM/DM/LM)
- Designed for reflow soldering
- Flat-bottom plate for better mounting
- RoHS compliant

#### ■ Recommended Applications

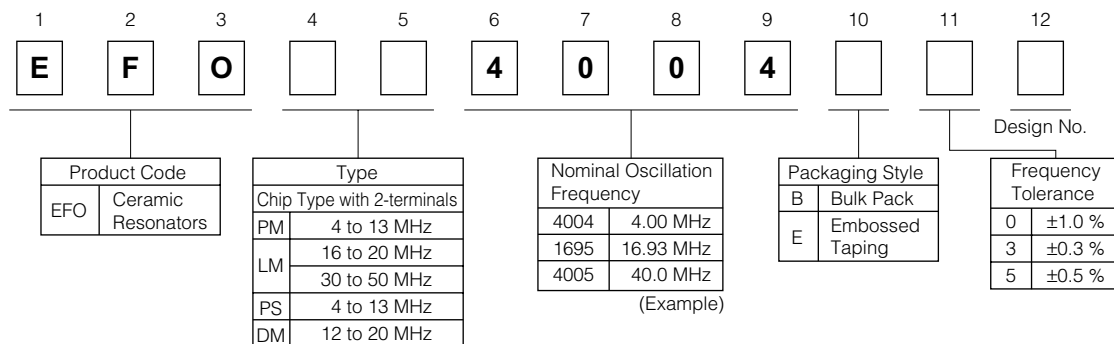
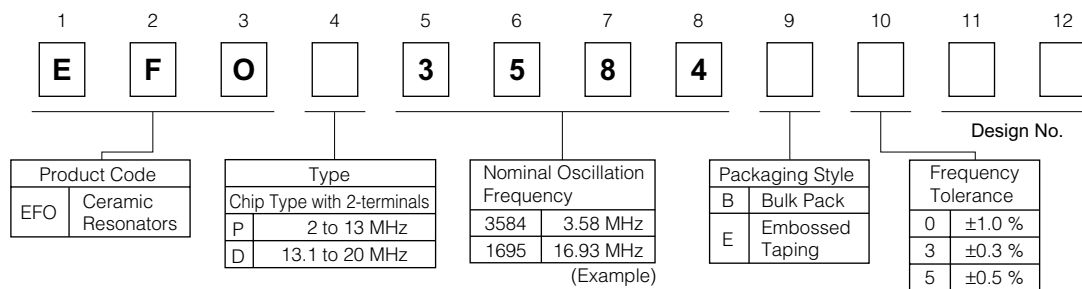
- Clock generator for microprocessors
- Carrier circuit between telecommunication equipment (Telephone to telephone, personal computer to printer)

#### ■ Handling Precautions (See Page 175 to 176)

#### ■ Packaging Specifications

See Page 174, 177

#### ■ Explanation of Part Numbers



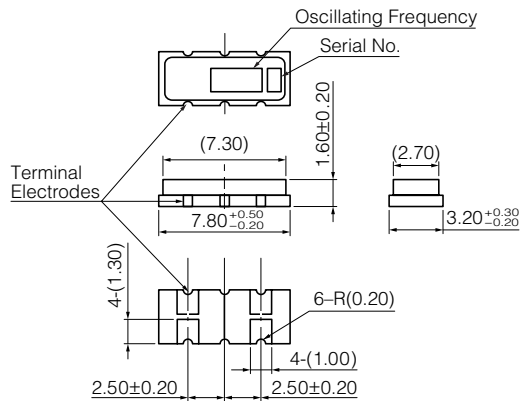
Part Number	Frequency range (MHz)	Frequency Temperature Characteristics (-20 to +80 °C)	Attached Capacitors (Reference)
EFOP	2.00 to 8.39	±0.3 %	33 pF
	8.40 to 13.0	±1.0 %	
EFOD	13.1 to 20.0	±1.0 %	33 pF
EFOPS	4.00 to 8.39	±0.6 %	21 pF
	8.40 to 13.0	±1.0 %	
EFOPM	4.00 to 8.39	±0.3 %	33 pF
	8.40 to 13.0	±1.0 %	
EFODM	12.0 to 20.0	±1.0 %	18 pF
EFOLM	16.0 to 20.0	±1.0 %	10 pF
	30.0 to 50.0	±0.3 %	

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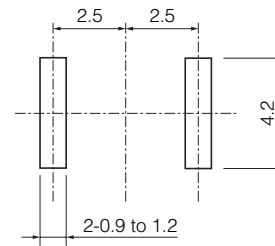
■ Dimensions in mm (not to scale)

Recommended Land Dimensions

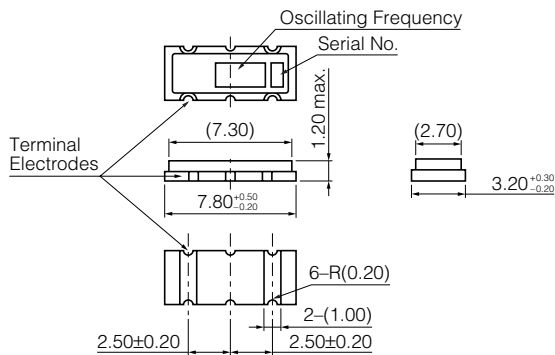
[Type EFOP].....2.0 to 13.0 MHz



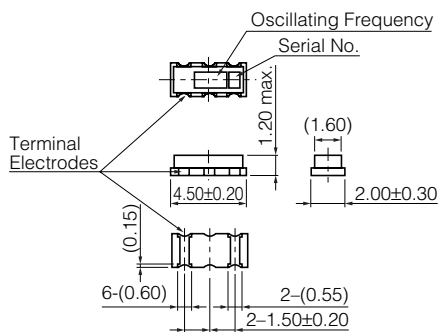
[Type EFOP, EFOPM]



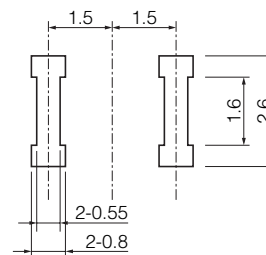
[Type EFOPM].....4.0 to 13.0 MHz



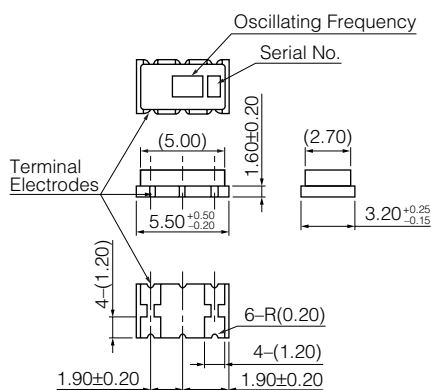
[Type EFOPS].....4.0 to 13.0 MHz



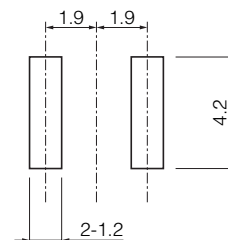
[Type EFOPS]



[Type EFOD].....13.1 to 20.0 MHz



[Type EFOD]

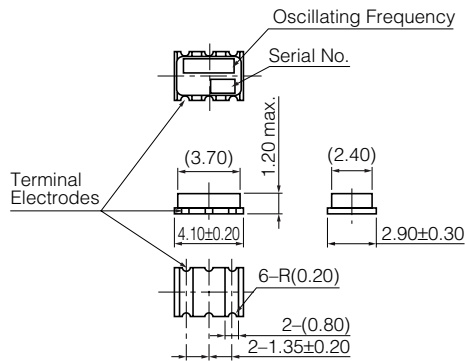


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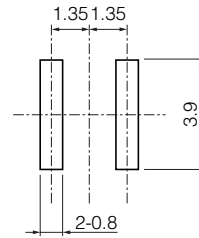
### ■ Dimensions in mm (not to scale)

#### Recommended Land Dimensions

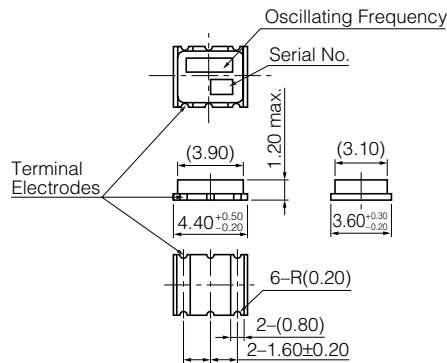
[Type EFODM].....12.0 to 20.0MHz



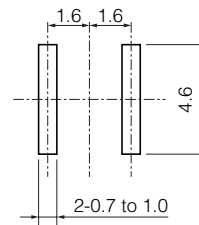
[Type EFODM]



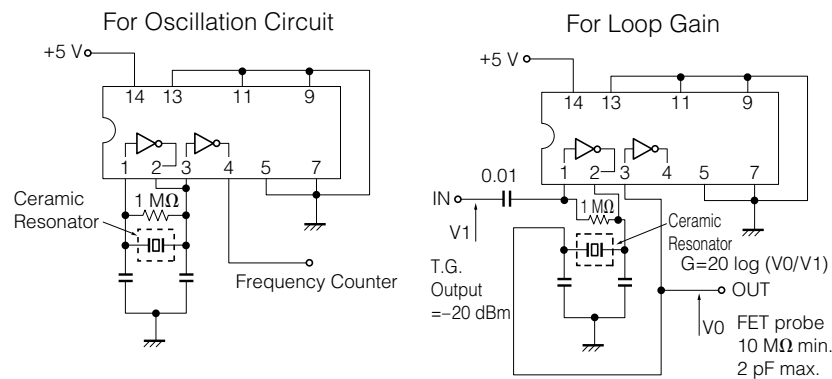
[Type EFOLM].....16.0 to 20.0, 30.0 to 50.0 MHz



[Type EFOLM]



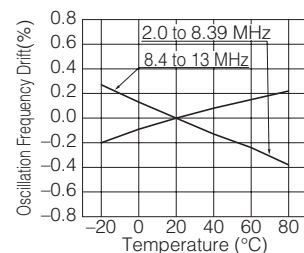
### ■ Test Circuits Diagram



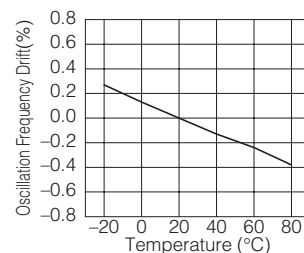
Frequency	IC
2.00 to 8.39 MHz	μPD4069UBC, TC4069UBP or similar
8.40 to 50.0 MHz	μPD74HCU, TC74HCU04AP or similar

### ■ Typical Characteristics ..... Temperature Characteristics

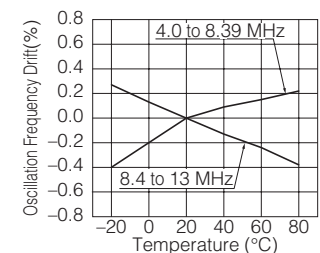
Type EFOP



Type EFOD



Type EFOPS

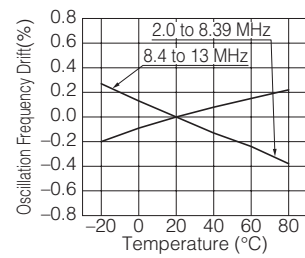


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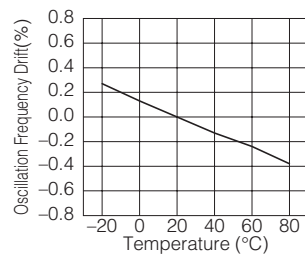
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### Typical Characteristics ..... Temperature Characteristics

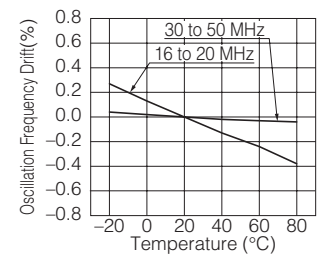
Type EFOPM



Type EFODM



Type EFOLM



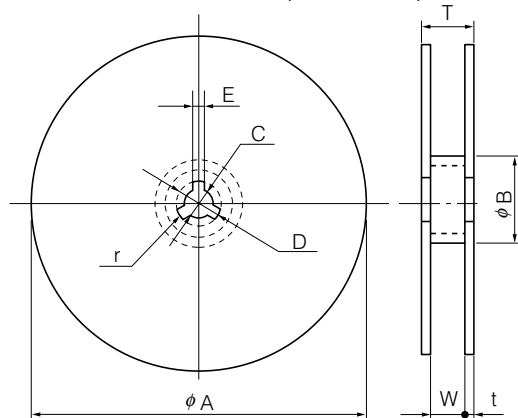
### Packaging Specifications

Supplied in bulk or taped & reel packing style

#### Standard Packing Quantity

Type	Embossed Taping	Bulk
EFOP, EFOPM	2500 pcs./reel	500 pcs./bag
EFOPS	2000 pcs./reel	
EFOD, EFODM, EFOLM	1000 pcs./reel	

#### Dimensions for Reel in mm (not to scale)



#### [Type EFOP, EFOPM]

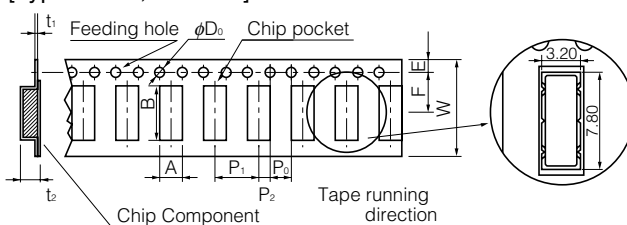
Dim. (mm)	$\phi A$	$\phi B$	C	D	E
	330±5	80 min.	13.0±0.5	21.0±0.8	2.0±0.5
Dim. (mm)	W	T	t	r	
	16.4 <sup>+2.0</sup> <sub>0</sub>	22.4 max.	3 max.	1.0	

#### [Type EFOPS, EFOD, EDODM, EFOLM]

Dim. (mm)	$\phi A$	$\phi B$	C	D	E
	180±5	60 min.	13.0±0.5	21.0±0.8	2.0±0.5
Dim. (mm)	W	T	t	r	
	12.4 <sup>+2.0</sup> <sub>0</sub>	18.4 max.	3 max.	1.0	

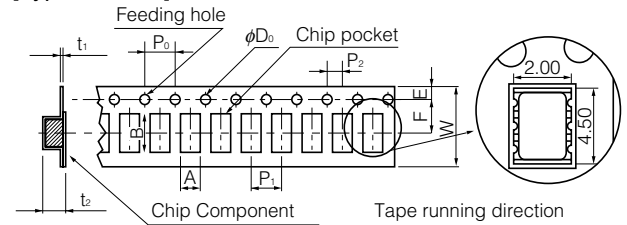
### Embossed Taping

#### [Type EFOP, EFOPM]



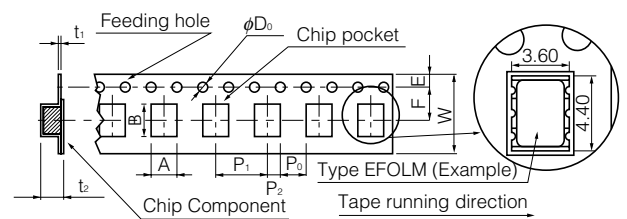
Dim. (mm)	A	B	W	F	E	P <sub>1</sub>
	3.7±0.2	8.3±0.2	16.0±0.3	7.5±0.1	1.75±0.10	8.0±0.1
Dim. (mm)	P <sub>2</sub>	P <sub>0</sub>	$\phi D_0$	t <sub>1</sub>	t <sub>2</sub>	
	2.0±0.1	4.0±0.1	1.5 <sup>+0.1</sup> <sub>0</sub>	0.3	3.5 max.	

#### [Type EFOPS]



Dim. (mm)	A	B	W	F	E	P <sub>1</sub>
	2.6±0.2	5.1±0.2	12.0±0.3	5.5±0.1	1.75±0.10	4.0±0.1
Dim. (mm)	P <sub>2</sub>	P <sub>0</sub>	$\phi D_0$	t <sub>1</sub>	t <sub>2</sub>	
	2.0±0.1	4.0±0.1	1.5 <sup>+0.1</sup> <sub>0</sub>	0.6 max.	3.0 max.	

#### [Type EFOD, EFODM, EFOLM]



Dim. (mm)	A	B	W	F	E	P <sub>1</sub>
	①	②	12.0±0.3	5.5±0.1	1.75±0.10	8.0±0.1
Dim. (mm)	P <sub>2</sub>	P <sub>0</sub>	$\phi D_0$	t <sub>1</sub>	t <sub>2</sub>	
	2.0±0.1	4.0±0.1	1.5 <sup>+0.1</sup> <sub>0</sub>	0.6 max.	3.0 max.	

Dim. (mm)	A	B
	①	②
Type EFOD	3.7±0.2	6.0±0.2
Type EFODM	3.4±0.2	4.6±0.2
Type EFOLM	4.1±0.2	4.9±0.2

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