

## ▶ Product Introduction

### ||| Token Offers Dielectric RF Filters for Telecoms.

#### Features :

- Suitable for surface mount and reflow soldering.
- Excellent mechanical structure and temperature stability.
- Good selectivity, low insertion loss for using high Q-value resonators.

Token has extended the capabilities of its filter product line with the introduction of a new range of dielectric microwave filters to the available frequency range up to 5.8GHz. Token designs and manufactures custom electronic filters for defense, telecommunications and similar application increasing the range of products available to customers.

Two block-type dielectric RF filters for telecoms base station applications have been added to Token's DF range. The filters have been designed for cellular base station applications that use a digital pre-distortion amplifier (DPD), as they feature a wide pass band and flat ripple performance, which are required for DPD PA design.



Applications also include RF and microwave communications such as GSM, 3G, GPS, satellite and TV transmission, wireless security systems, radar, CT1, CT2, 900MHz, 1.8GHz, 2.4GHz, 5.8GHz Cordless Phone, wireless earphone, wireless microphone, aerospace and military.

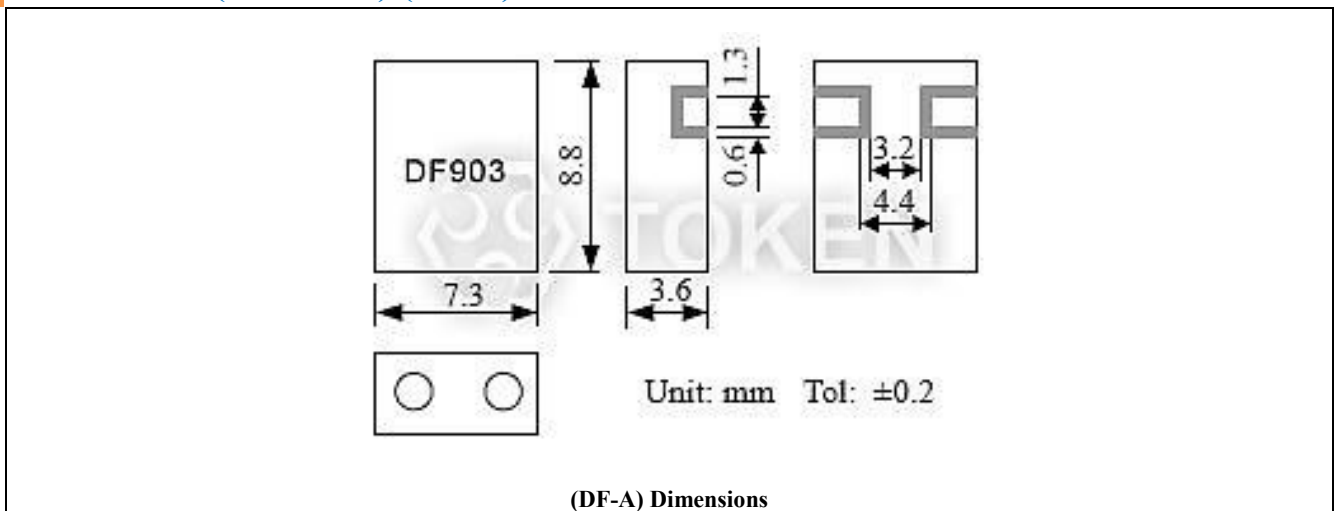
The (DF-A) filter's small size (8.8 × 7.3 × 3.6 mm) means they require more less mounting space compared to Token's previous generation of filters for this application. The filters' highly sophisticated multi-pole design ensures high attenuation and good selectivity. Both the two members of the DF series have a ripple of 1.0 dB max.

In addition, Token enhances custom design capabilities for specialist applications. Our customers will benefit from the additional frequency ranges now available and from the excellent quality and lower costs achievable

Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](http://www.token.com.tw)".

## Dimensions

### Dimensions (Unit: mm) (DF-A)



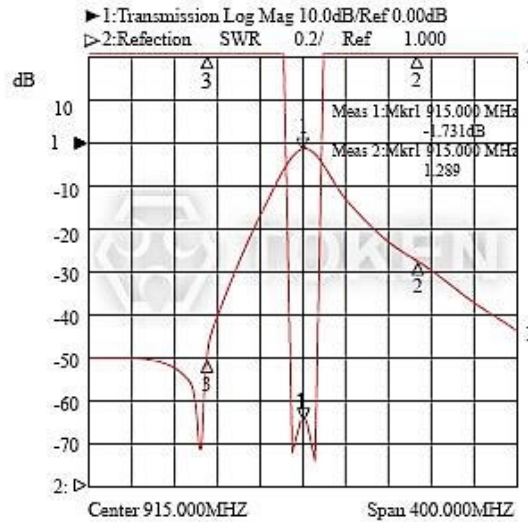
## Typical Specifications

### Typical Specifications (DF-A)

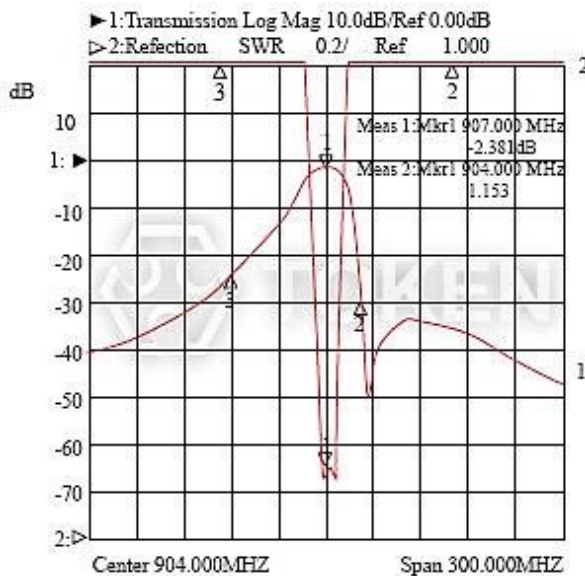
Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB) max.	Ripple in Band Width (dB) max.	V.S.W.R max.	Attenuation (dB) min. (MHz)
DF457S30A	457	fo±15	3.0	1.0	2.0	17 at fo+50; 30 at fo-50
DF522S10A	522	fo±5	3.0	0.5	1.6	23 at fo+40; 40 at fo-40
DF683S30A	683	fo±15	2.5	1.0	2.0	20 at fo+64; 30 at fo-64
DF740S30A	740	fo±15	2.0	0.5	1.8	14 at fo+64; 20 at fo-64
DF864S10A	864	fo±5	2.5	0.5	1.5	15 at fo+24; 17 at fo-24
DF915S25A	915	fo±12.5	2.0	1.0	2.0	20 at fo+100; 35 at fo-100
DF903S6A	903	fo±3	3.5	0.5	1.5	32 at fo+24
DF927S6A	927	fo±3	3.5	0.5	1.5	32 at fo-24
DF1890S80A	1890	fo±40	1.5	1.0	2.0	15 at fo+200; 35 at fo-200
DF2403S20A	2403	fo±10	3.0	0.5	1.5	35 at fo+75
DF2475S20A	2475	fo±10	3.0	0.5	1.5	35 at fo-75

## Typical Characteristic

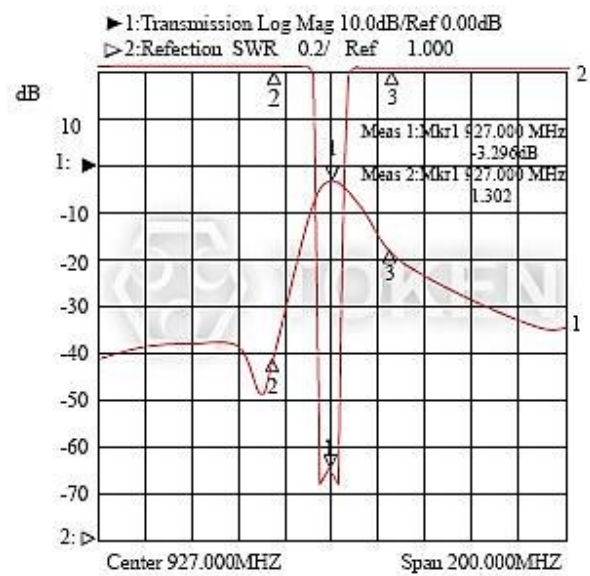
### Typical Characteristic (DF-A)



(DF-A) Type I Typical Characteristic  
(Center 915.000MHz Span 400.000MHz)



(DF-A) Type II Typical Characteristic  
(Center 904.000MHz Span 300.000MHz)



(DF-A) Type III Typical Characteristic  
(Center 927.000MHz Span 200.000MHz)

## Order Codes

### Order Codes (DF-A)

DF	864	S	10	A	
Part Number	Center Frequency	Connect Type	Bandwidth	Size	
		S		A	7.3 × 3.6 mm
		SMD type		B	6.0 × 3.0 mm
				C	4.5 × 2.0 mm
				D	3.6 × 1.8 mm

### ▶ Product Introduction

#### Token Dielectric Filter (DF-B) has a Ripple in Band Width (dB) 0.5 max.

Token (DF-B) filter manufactures with a fine-grained, high density, high purity dielectric material to keep the best performance with a ripple in band width (dB) 0.5 max.

The (DF-B) filter's small size (8.5 × 6.0 × 3.0 mm) means they require more less mounting space.

Available Center Frequency 650 MHz to 916 MHz with V.S.W.R 1.5 max., insertion loss 2.0 ~ 5.0 (dB) max.

RF dielectric filters are mounted in a surface mount package which assures mechanical stability and excellent lead planarity. RF filters can be customized designs and tighter tolerances available on request.

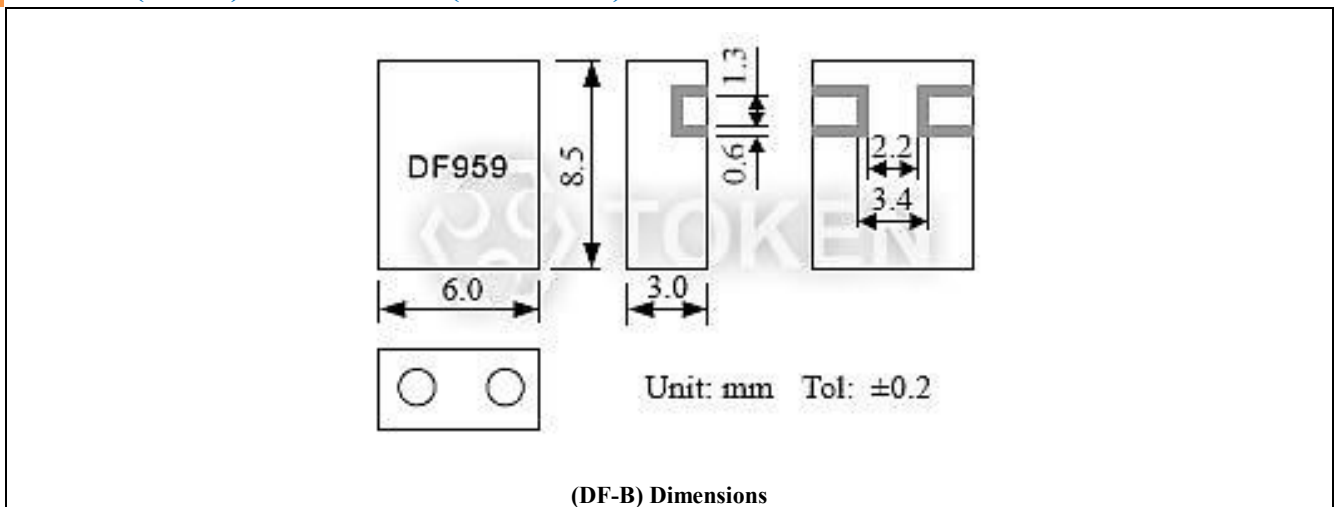
Products conform to the RoHS directive. Application of specific designs also available including different Dielectric values and Q specifications adjusted to frequency requirements.

Contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](http://www.token.com.tw)".



## Dimensions

### Filters (DF-B) Dimensions (Unit: mm)



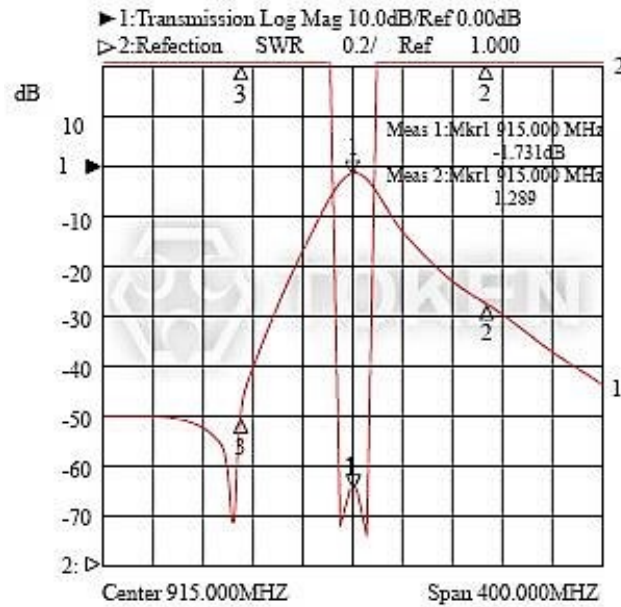
## Typical Specifications

### Typical Specifications (DF-B)

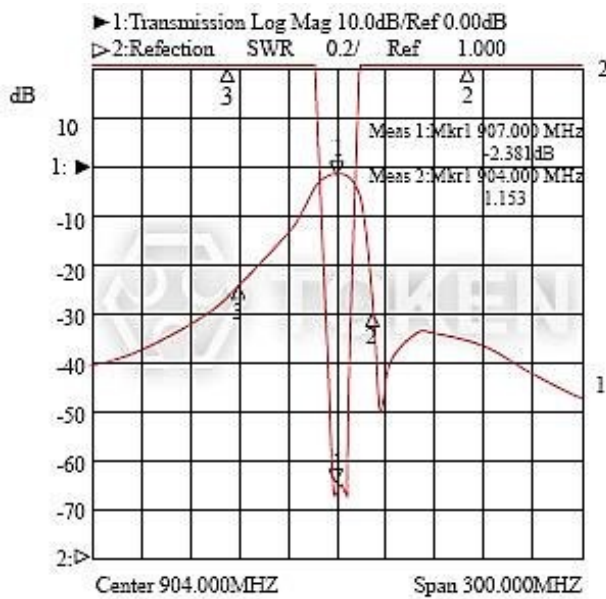
Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB) max.	Ripple in Band Width (dB) max.	V.S.W.R max.	Attenuation (dB) min. (MHz)
DF650S30B	650	fo±15	2.5	0.5	1.5	19 at fo±64
DF700S20B	700	fo±10	2.5	0.5	1.5	19 at fo±64
DF710S08B	710	fo±4	5.0	0.5	1.5	35 at fo+100; 28 at fo+50
DF746S20B	746	fo±10	2.5	0.5	1.5	12 at fo-20
DF758S16B	758	fo±8	2.5	0.5	1.5	19 at fo±64
DF794S20B	794	fo±10	2.5	0.5	1.5	19 at fo±64
DF800S08B	800	fo±4	5.0	0.5	1.5	35 at fo+100; 28 at fo+50
DF836S20B	836	fo±10	2.5	0.5	1.5	19 at fo+52
DF850S08B	850	fo±4	5.0	0.5	1.5	30 at fo+100; 40 at fo-200
DF863S22B	863	fo±11	2.0	0.5	1.5	50 at fo-90; 20 at fo+90
DF875S24B	875	fo±12	2.3	0.5	1.5	30 at fo-70
DF903S09B	903	fo±4.5	3.5	0.5	1.5	34 at fo-64; 41 at fo+64
DF906S20B	906	fo±10	2.5	0.5	1.5	19 at fo±64
DF916S30B	916	fo±15	2.7	0.5	1.5	20.5 at fo±70

## Typical Characteristic

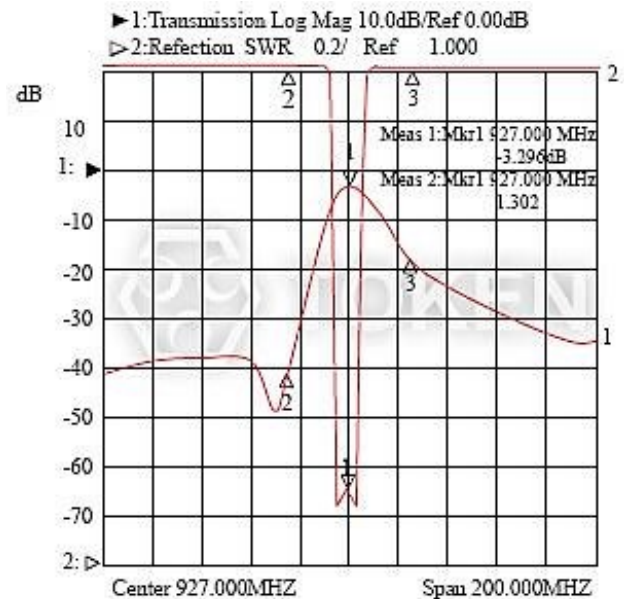
### Typical Characteristic (DF-B)



(DF-B) Type I Typical Characteristic  
(Center 915.000MHz Span 400.000MHz)



(DF-B) Type II Typical Characteristic  
(Center 904.000MHz Span 300.000MHz)



(DF-B) Type III Typical Characteristic  
(Center 927.000MHz Span 200.000MHz)

## Order Codes

### Order Codes (DF-B)

DF	836	S	20	B	
Part Number	Center Frequency	Connect Type	Bandwidth	Size	
		S		A	7.3 × 3.6 mm
		SMD type		B	6.0 × 3.0 mm
				C	4.5 × 2.0 mm
				D	3.6 × 1.8 mm



### ▶ Product Introduction

## Token Two Block-Type Dielectric Filters (DF-C/D) range up to 5.8GHz.

Token two block-type dielectric RF filters have been designed for cellular base station applications that use a digital pre-distortion amplifier (DPD), as they feature a wide pass band and flat ripple performance, which are required for DPD PA design.

Applications also include RF and microwave communications such as satellite and TV transmission, wireless security systems, radar, GSM, 3G, GPS, CT1, CT2, 900MHz, 1.8GHz, 2.4GHz, 5.8GHz Cordless Phone, wireless earphone, wireless microphone, aerospace and military.

The (DF-C/D) filter's small size ( $4.5 \times 4.5 \times 2.0$  mm) means they require more less mounting space with a ripple of 1.0 dB max and insertion loss 2.0 (dB) max. Center frequency range from 1575 MHz to 5800 MHz with V.S.W.R 2.0 max.

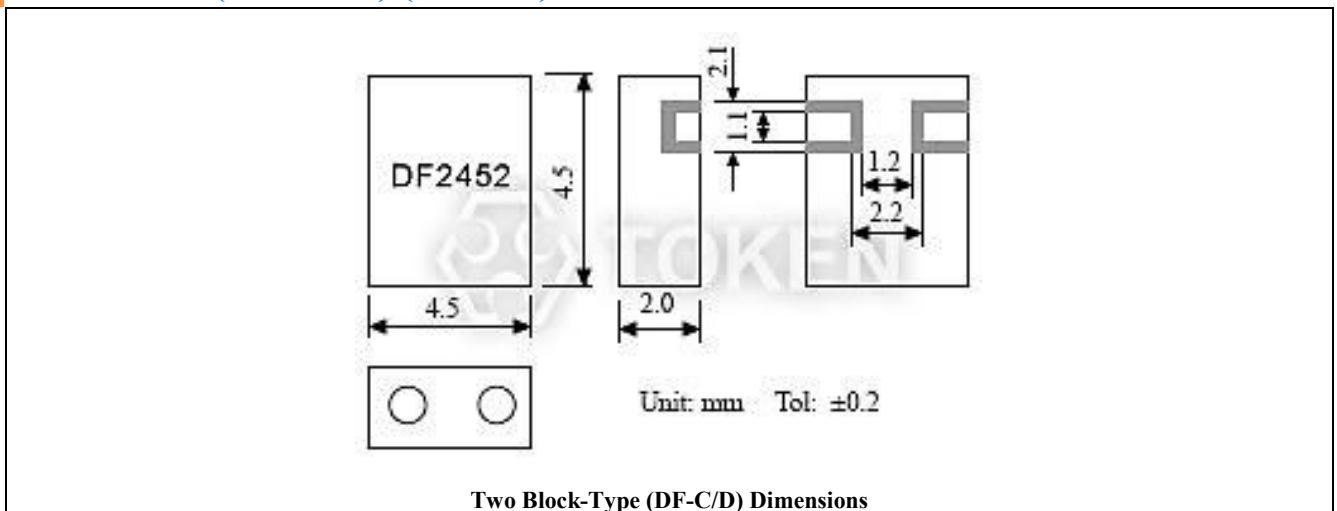
The surface mount RF Dielectric Filters (DF-C/D) conform to the RoHS directive and package is suitable for automatic pick and place equipment which assures mechanical stability and excellent lead planarity. Customed designs and tighter tolerances are available on request. Application of specific designs also available including different Dielectric values and Q specifications adjusted to frequency requirements.

Contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](#)".



## Dimensions

### Dimensions (Unit: mm) (DF-C/D)



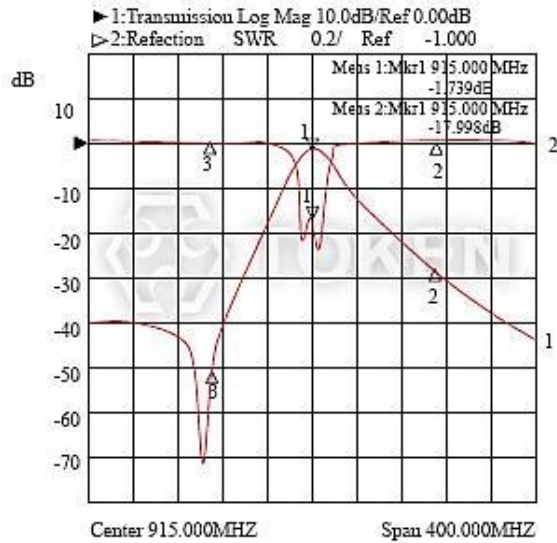
## Typical Specifications

### Typical Specifications (DF-C/D)

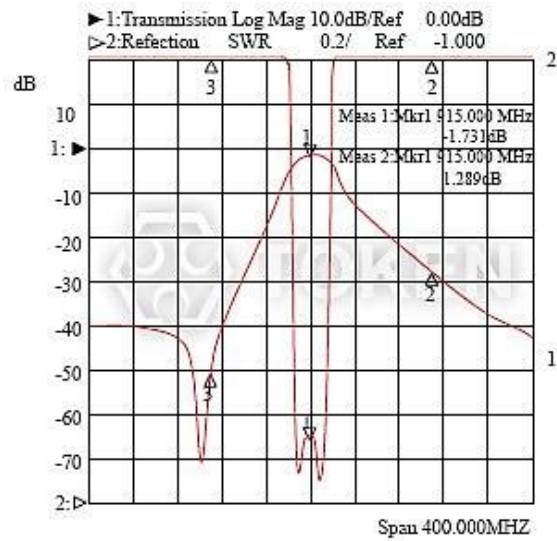
Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB) max.	Ripple in Band Width (dB) max.	V.S.W.R max.	Attenuation (dB) min. (MHz)
DF1575S40C	1575	fo±20	2.0	0.7	2.0	20 at fo-100; 18 at fo+100
DF1855S70C	1855	fo±35	2.0	0.7	2.0	20 at fo+300; 20 at fo-300
DF1890S80C	1890	fo±40	2.0	0.7	2.0	15 at fo+250; 35 at fo-250
DF1950S90C	1950	fo±45	3.0	0.7	2.0	45 at fo+975; 45 at fo-975
DF2332S100C	2332	fo±50	2.5	0.7	2.0	25 at fo+500; 40 at fo-500
DF2450S100C	2450	fo±50	2.0	0.7	2.0	12 at fo+250; 15 at fo-250
DF3066S170D	3066	fo±85	2.0	1.0	2.0	10 at fo+300; 15 at fo-300
DF3480S120D	3480	fo±60	2.0	1.0	2.0	10 at fo+500; 20 at fo-500
DF3650S150D	3650	fo±75	2.0	1.0	2.0	15 at fo+750; 25 at fo-750
DF4880S160D	4880	fo±80	2.0	1.0	2.0	5 at fo+350; 15 at fo-350
DF5800S200D	5800	fo±100	2.0	1.0	2.0	5 at fo+400; 15 at fo-400

## Typical Characteristic

### Typical Characteristic (DF-C/D)



**(DF-C/D) Type I Typical Characteristic**  
Center 915.000MHz (-1.739dB) & (-17.998dB) Span 400.000MHz



**(DF-C/D) Type II Typical Characteristic**  
Center 904.000MHz (-1.731dB) & (1.289dB) Span 300.000MHz

## Order Codes

### Order Codes (DF-C/D) For 2 Pole

DF	1950	S	90	C
Part Number	Center Frequency	Connect Type	Bandwidth	Size
		S	SMD type	A
				B
				C
				D

## ▶ Product Introduction

### ||| Dielectric Filters (DF) 3 or multi-pole range up to 5.8GHz.

#### Features :

- MBP 42R Series.
- Murata DFC Series Compatible.
- Application for CT1, CT2, 900MH, 1.8GHz, 2.4G WLL Cordless phone.

The dielectric technology based on ceramic material of high Dielectric Constant (K) has been contributing great size reduction of mobile telecommunication equipment, especially cellular handset and base station. That is superior in electrical performances and reliability. Furthermore it has good mass productivity and low cost.



Token (DF) filters' highly sophisticated multi-pole design ensures high attenuation and good selectivity. The (DF) multi-pole series filter's small size (8.6 × 9.0 × 3.0 mm) means they require more less mounting space with a ripple of 1.0 dB max. Insertion loss is from 2.0 ~ 3.5 (dB) max. Center frequency range from 860 MHz to 5800 MHz with V.S.W.R 2.0 max.

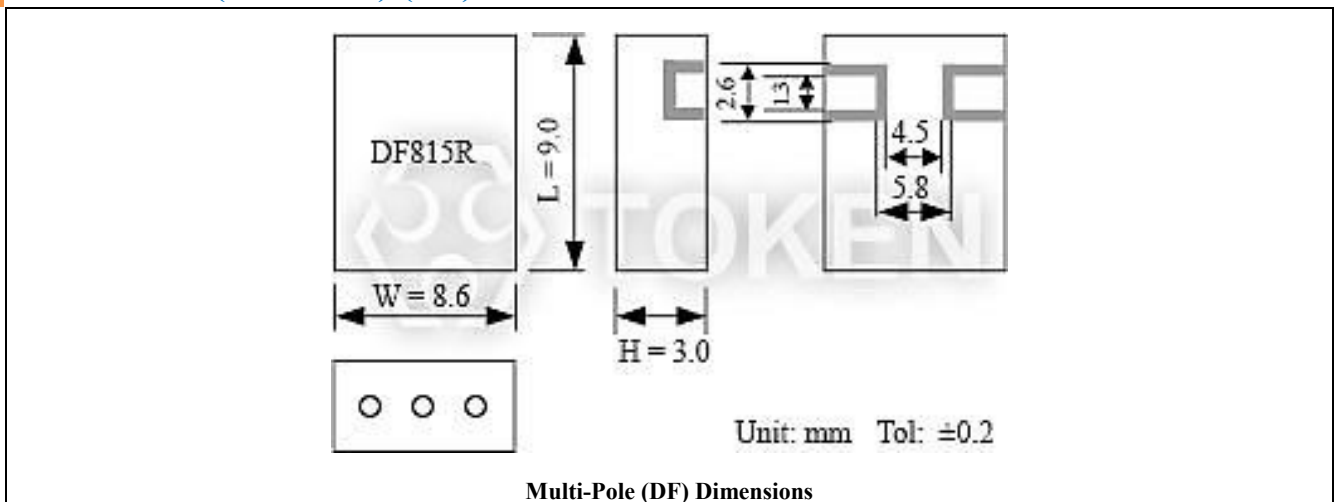
Coaxial dielectric filter is the most popular and commercially successful technology. Token takes this advance technology to manufacture coaxial type duplexer. This features high unloaded Q, excellent high power performance, flexible design capability, size reduction, low profile, and lighter weight.

Surface mount multi-pole (DF) series RF filter package is suitable for automatic pick and place equipment which assures mechanical stability and excellent lead planarity. Custom designs and tighter tolerances are available on request. Products conform to the RoHS directive.

Token will also produce devices outside these specifications to meet specific customer requirements, contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](http://www.token.com.tw)".

## Dimensions

### Dimensions (Unit: mm) (DF)



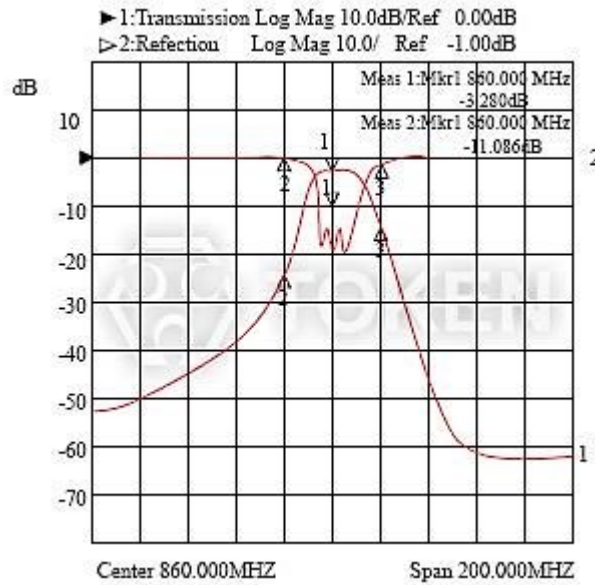
## Typical Specifications

### Typical Specifications (DF)

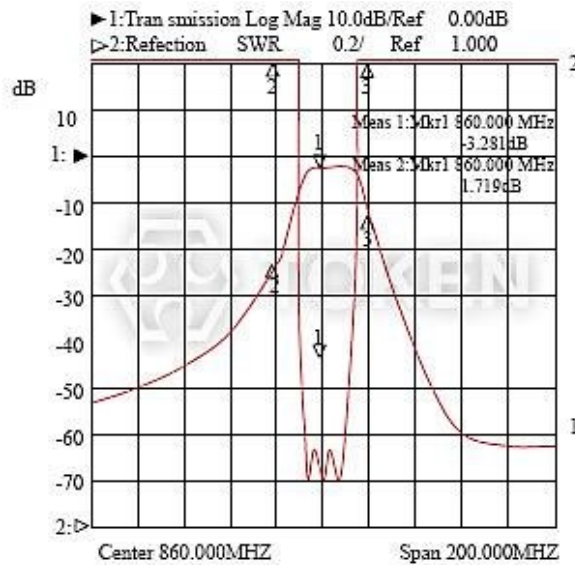
Part No.	Center Frequency (MHz)	Bandwidth (MHz)	Insertion Loss (dB) max.	Ripple in Bandwidth (dB) max.	V.S.W.R max.	Attenuation (dB)min.(MHz)
DF43R860S20A	860	fo±10	3.0	0.8	2.0	-25 at fo+30; -22 at fo-30
DF43R1855S10A	1855	fo±5	3.5	1.0	2.0	-30 at fo+100; -28 at fo-100
DF43R950S20A	950	fo±10	3.5	0.8	2.0	-40 at fo+30; -35 at fo-30
DF44R3120S60A	3120	fo±30	3.0	1.0	1.5	-58 at fo+355; -55 at fo-375
DF45R1120S40A	1120	fo±20	2.5	1.0	2.0	-50 at fo+50; -50 at fo-50
DF33R815S20B	815	fo±10	2.5	0.8	2.0	-18 at fo+40; -25 at fo-40
DF33R1880S50B	1880	fo±25	3.5	1.0	2.0	-40 at fo+150; -40 at fo-150
DF23R1480S40C	1480	fo±20	2.5	1.0	2.0	-20 at fo+150; -20 at fo-150
DF23R1960S60C	1960	fo±30	2.0	1.0	2.0	-20 at fo+200; -20 at fo-200
DF23R2480S30C	2480	fo±15	2.5	1.0	2.0	-20 at fo+250; -20 at fo-250
DF23R5800S200D	5800	fo±100	2.0	1.0	2.0	-5 at fo+400; -15 at fo-400

## Typical Characteristic

### Typical Characteristic (DF)



(DF) Type I Typical Characteristic  
Center 860.000MHz (-3.280dB) & (-11.086dB) Span 200.000MHz



(DF) Type II Typical Characteristic  
Center 860.000MHz (-3.281dB) & (1.719dB) Span 200.000MHz

## Order Codes

### Order Codes (DF)

DF	3	3R	815	S	20	B
Part Number	Thickness	Number of Resonator	Center Frequency (MHz)	Connect Type	BandWidth (MHz)	Size (W×H) (mm)
	4   3.8mm			S   SMD type		A   11.8 × 3.8
	3   3.0mm					B   8.6 × 3.0
	2   2.0mm					C   5.8 × 2.0



## ▶ Product Introduction

### Dielectric Band pass Filters (BP-R) Have a Low Ripple In Bandwidth 0.5 (dB) Max.

#### Features :

- Low insertion loss.
- Size small and light.
- High frequency selectivity.
- Temperature compensated.

#### Applications :

- Trunked radio system.
- Cellular, cordless phone.
- Military affairs, Base station.

Dielectric band pass filter, known as ceramic band pass filter, dielectric ceramic filter, or microwave ceramic filter in standard resonator sizes. Token (BP-R) series center frequency range is from 915 MHz to 1220 MHz basic rules of ceramic band-pass filters and diplexer. Insertion loss is from 2.0 ~ 3.5 (dB) max and a ripple in bandwidth 0.5 (dB) max.



The higher the Q-factor of a resonators/band pass filters, the better electrical performance for insertion loss. The more dielectric resonators combined together for a band pass ceramic filters, the better rejection, attenuation, and stop band will be. Determinant factor for Insertion Loss Q factor of a resonator, the bandwidth of a filter, and the number of resonators Determinant factor for Attenuation/rejection the number of resonators, connection type of resonators.

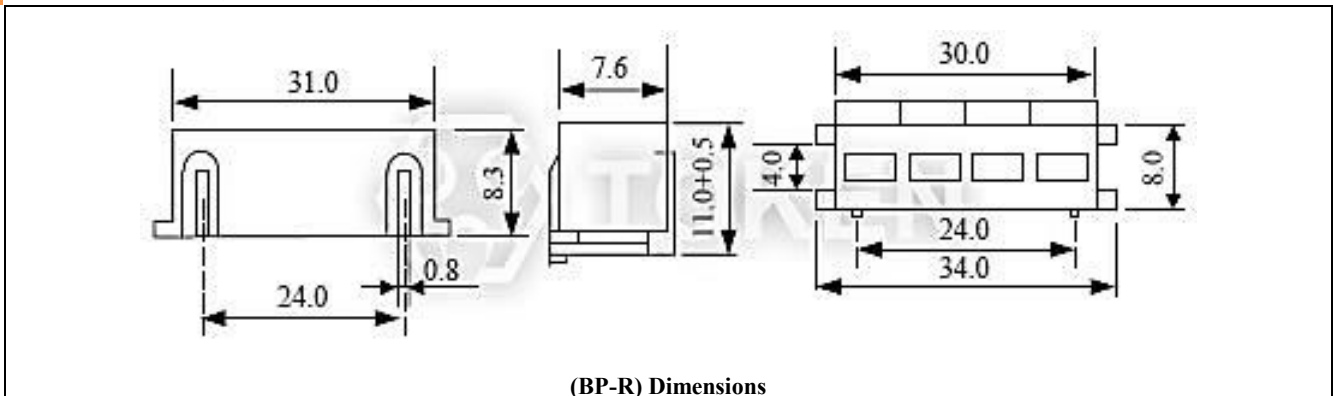
Token (BP-R) RF filters can be customized designs and tighter tolerances available on request. Token (BP-R) series are primarily designed for high dielectric constant lines and conform to the RoHS directive.

The (BP-R) series feature with high permittivity, high dielectric constants, extremely temperature stability and high Q that enables the design of stable microwave oscillators and filters. High dielectric constant (K) materials and associated products are also available for custom application requirements.

Contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](#)".

## Dimensions

### Dimensions (Unit: mm) (BP-R)



## Typical Specifications

### Typical Specifications (BP-R)

Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB)max.	Ripple in Bandwidth (dB)max.	V.S.W.R max.	Attenuation (dB)min.(MHz)
BP63R915-01	915	$f_0 \pm 5$	2.5	0.5	1.5	45 at $f_0 \pm 100$
BP64R881-02	881	$f_0 \pm 10$	2.0	0.5	2.0	60 at $f_0 \pm 100$
BP84R650-01	650	$f_0 \pm 5$	2.5	0.5	1.5	70 at $f_0 \pm 55$
BP84R1200-03	1200	$f_0 \pm 15$	2.0	0.5	2.0	70 at $f_0 \pm 60$
BP74R959-02	959	$f_0 \pm 10$	2.0	0.5	2.0	70 at $f_0 \pm 80$
BP75R836-01	836	$f_0 \pm 5$	3.5	0.5	1.5	80 at $f_0 \pm 50$
BP76R1220-02	1220	$f_0 \pm 10$	2.5	0.5	2.0	80 at $f_0 \pm 50$

## Order Codes

### Order Codes (BP-R)

BP	3	4R	1765	-	01
Part Number	Thickness	Number of Resonator	Center Frequency (MHz)	Bandwidth	
				01	10MHz
				02	20MHz
				03	30MHz

## ▶ Product Introduction

### ||| Low Insertion Loss Type Dielectric Filters (LJ) Series.

#### Features :

- Low insertion loss.
- Temperature compensated.
- High frequency selectivity.
- small and lightweight.

#### Applications :

- Base station.
- Military affairs.
- Trunked radio system.
- Cellular, Cordless phone.

Token electronics manufacturing microwave dielectric filters, multi-layer filters, cavity filters, band-pass filter, military filters, high-frequency filters and so on, using high dielectric coefficient material and dielectric ceramics to meet specific design requirements, in line with RoHS standard.

Surface mount dielectric RF filters are mounted in a through hole package which assures mechanical stability and excellent lead planarity. Dielectric RF filters can be customized designs and tighter tolerances available on request. Products conform to the RoHS directive and Lead-free.

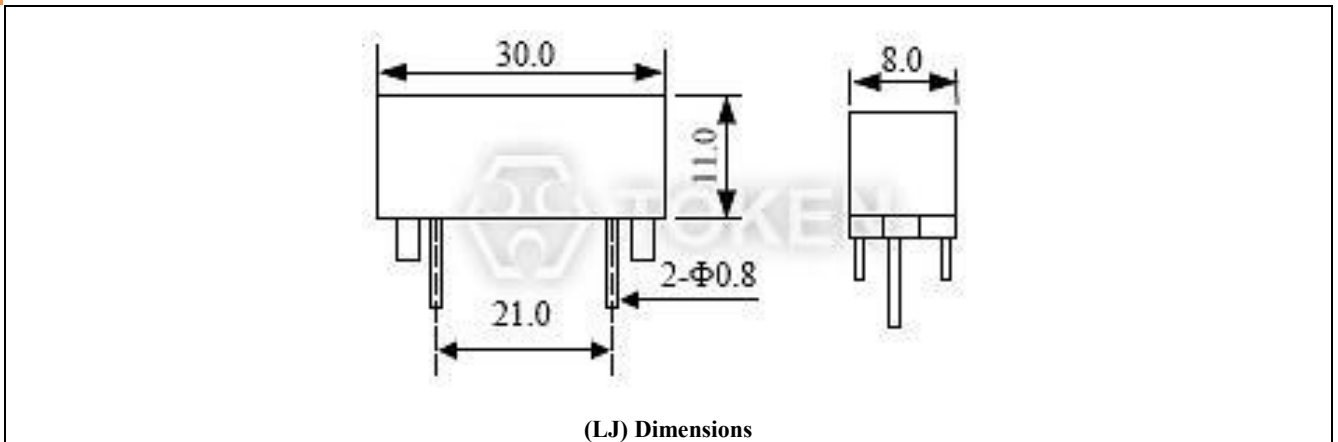
LJ Series with a stable temperature coefficient, small size, high stability, low insertion loss, good weld ability. Dielectric band-pass filters for use in microwave communications, data transmission, radar, and electronic warfare, military, aerospace and other fields.

Contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](#)".



## Dimensions

### Dimensions (Unit: mm) (LJ)



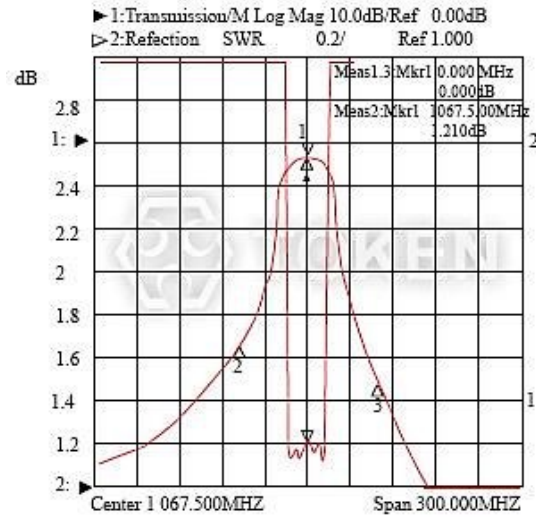
## Typical Specifications

### Typical Specifications (LJ)

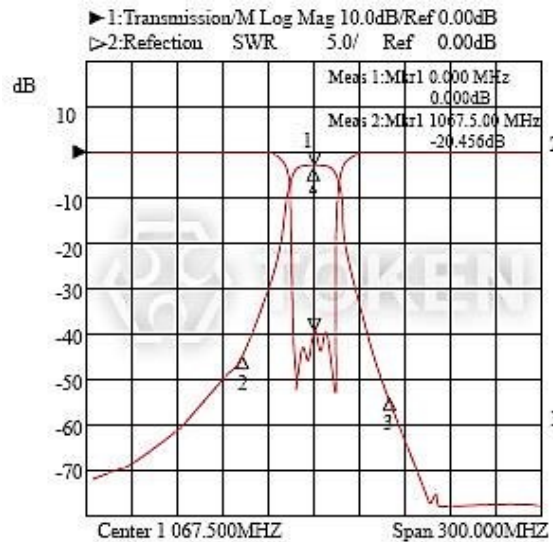
Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB)max.	Ripple in BandWidth (dB)max.	V.S.W.R max.	Attenuation (dB)min.(MHz)
LJ900-C-A	900	fo±10	2.5	0.5	1.5	50 at fo±100
LJ1200-C-B	1200	fo±15	2.0	0.8	2.0	50 at fo±110
LJ950-D-B	950	fo±10	2.5	0.5	1.5	60 at fo±100
LJ1250-D-B	1250	fo±15	2.0	0.8	2.0	60 at fo±110

## Typical Characteristic

### Typical Characteristic (LJ)



(LJ) Series I Typical Characteristic  
Center 1067.500MHz (0.000dB) & (1.210dB) Span 300.000MHz



(LJ) Series II Typical Characteristic  
Center 1067.500MHz (0.000dB) & (-20.456dB) Span 300.000MHz

## Order Codes

### Order Codes (LJ)

LJ	900	-	C		-	A	
Part Number	Center Frequency (MHz)		Number of Resonator			bandwidth	
			C	3		A	10MHz
			D	4		B	20MHz

## ▶ Product Introduction

### Token Dielectric Band pass Filters (BP-S) for high performance microwave filters and oscillators.

#### Features :

- Low insertion loss.
- High frequency selectivity.
- Temperature compensated.
- SMD Package, small and light.

#### Applications :

- Base station.
- Military affairs.
- Trunked radio system.
- Cellular, Cordless phone.

(BP-S) series with a high dielectric constant is the best microwave filters and oscillators.

Token Ceramic Dielectric material has a high dielectric constant and high Q values, and high temperature stability, especially for the design and stability of the microwave oscillations and filtering. German bond ceramic media for CT1, CT2, 900MHz, 1.8GHz, 2.4GHz, 5.8GHz cordless phones, wireless headsets, wireless microphones.

Token electronics manufacturing microwave dielectric filters, multi-layer filters, cavity filters, band-pass filter, military filters, and high-frequency filters, using low insertion loss, high Q, high frequency selectivity, and microwave dielectric ceramics to meet specific design requirements. Comply with RoHS standards.

(BP-S) series of dielectric filters and stable temperature coefficient, small size and high stability, low insertion loss and good weld ability. Dielectric band-pass filters for use in microwave communications, data transmission, radar, and electronic warfare, military, aerospace and other fields.

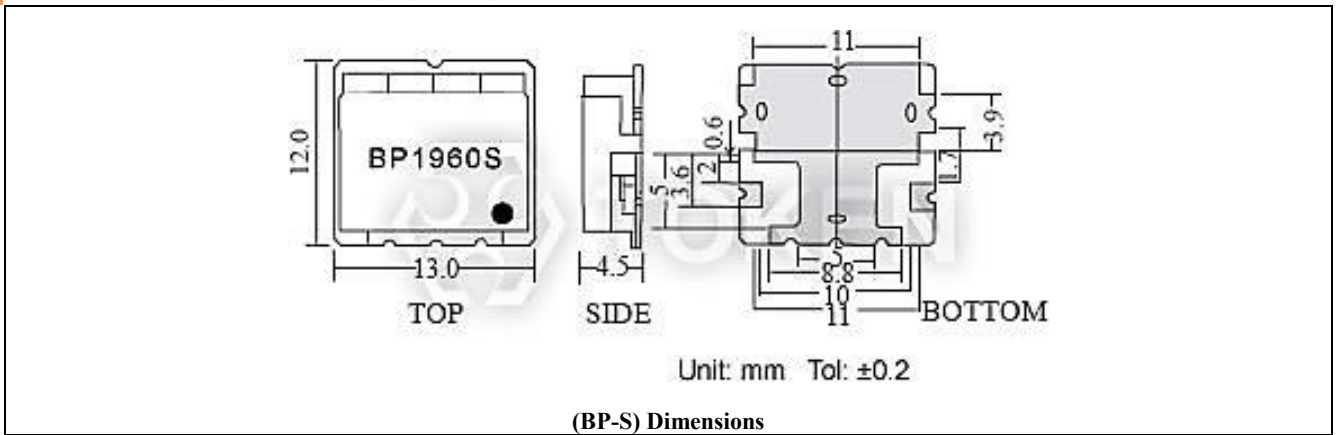
Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, contact us with your specific needs. For more information, please link to Token official website "[Dielectric resonators](http://www.token.com.tw)".





## Dimensions

### Dimensions (Unit: mm) (BP-S)



## Typical Specifications

### Typical Specifications (BP-S)

Part No.	Center Frequency (MHz)	Band Width (MHz)	Insertion Loss (dB) max.	Ripple in bandwidth (dB) max.	V.S.W.R max.	Attenuation (dB)min.(MHz)
BP33R881S30A	881.5	fo±12.5	2.5	1.0	1.8	53 at fo±779
BP64R836S30A	836.5	fo±15	3.0	1.2	1.7	18 at fo±32.5
BP64R881S30A	881.5	fo±15	3.0	1.2	1.7	18 at fo ±32.5
BP34R1765S30A	1765	fo±15	3.5	1.0	1.8	30 at fo ±90
BP34R1855S30A	1855	fo±15	3.5	1.0	1.8	30 at fo ±90
BP55R1750S60A	1750	fo±30	3.0	1.5	1.7	30 at fo ±1810
BP55R1765S10A	1765	fo±5	5.0	1.0	1.8	20 at fo ±20
BP55R1765S30A	1765	fo±15	3.0	1.3	1.6	40 at fo ±80
BP55R1855S10A	1855	fo±5	5.0	1.0	1.8	20 at fo ±20
BP55R1855S30A	1855	fo±15	3.8	1.3	1.6	40 at fo ±80
BP66R1755S10A	1755	fo±5	10.0	1.0	2.0	22at fo ±1765
BP66R1845S10A	1845	fo±4.5	13.0	3.0	2.0	28 at fo ±1855
BP34R2315S30A	2315	fo±15	2.7	1.0	1.7	40 at fo ±160
BP34R2385S30A	2385	fo±15	2.7	1.0	1.7	40 at fo ±160
BP34R2442S80A	2442	fo±42	2.5	1.0	1.7	40 at fo ±160
BP64R409S10A	409.5	fo±3.5	3.0	0.8	1.7	30 at fo ±423
BP64R426S10A	426.5	fo±3.5	3.0	0.8	1.7	30 at fo ±413
BP66R1410S30A	1410	fo±14.5	3.0	1.0	1.5	18 at fo ±34.5
BP86R1474S10A	1474	fo±2.5	12.0	2.8	2.0	15 at fo ±10
BP34R1880S60A	1880	fo±32.5	2.5	1.0	1.5	18 at fo ±100
BP34R1960S60A	1960	fo±32.5	3.0	1.0	1.4	45 at fo ±130
BP34R1950S60A	1950	fo±30	3.0	1.0	1.8	38 at fo ±60
BP34R2140S60A	2140	fo±30	3.0	1.0	1.8	38 at fo ±60

## Order Codes

### Order Codes (BP-S)

<b>BP</b>	<b>3</b>	<b>4R</b>	<b>1765</b>	<b>S</b>	<b>30</b>	<b>A</b>	
Part Number	Thickness	Number of Resonator	Center Frequency (MHz)	Connect Type	Bandwidth		Version
				S	SMD type	10 10MHz	
						30 30MHz	
						60 60MHz	

## ▶ General Information

### Advantage of Token's Microwave Dielectric Components

New Microwave Dielectric Materials for Wireless Communication from Token Electronics

"Everything from the electromagnetic properties to microstructure of the material is important for the final result"

A small ceramic component made from a dielectric material is fundamental to the operation of filters and oscillators in several microwave systems, such as satellite TV receivers, military radar systems, Global Positioning System (GPS) devices, and mobile communications. Token Electronics had been able to develop specialized piezoelectric materials which lead to more reliable and clearer microwave communication signals.

In microwave communications, dielectric components are used to discriminate between wanted and unwanted signal frequencies in the transmitted and received signal. When the wanted frequency is extracted and detected it is necessary to maintain a strong signal nevertheless. For clarity it is also critical that the wanted signal frequencies are not affected by seasonal temperature changes.

The resonator materials for practical applications have to have certain key properties. A high relative dielectric constant is needed so that the materials can be miniaturized and a high quality factor (Q) is needed for improved selectivity. Low temperature variation of the material's resonant frequency is also required so that the microwave circuits remain stable.

Although large numbers of ceramic dielectric materials have been developed, it has proven difficult to satisfy all these requirements in a single material at a reasonable cost. "Token takes the advantages of these new materials that they are relatively cheap compared with some of the compounds currently used and in the future they can be improved even further by suitable additives and by optimizing the preparation conditions."

### Dielectric Material Composition & Study

The new dielectric materials developed by Token, are based on ceramics formed by baking the pressed powdered starting material mixture in a furnace at between 1200 and 1550 degrees Celsius.

Token Engineers used X-ray diffraction studies, Raman spectroscopy and scanning electron microscopy to reveal the structure of the ceramics. The materials have the general formula  $Ce(M_{1/2}Ti_{1/2})O_{3.5}$ . Ce is the element cerium, Ti is titanium and O is oxygen. "M" represents any one of the metals magnesium, zinc, calcium, cobalt, manganese, nickel or tungsten. The numbers refer to the proportions of each element in the ceramic.

"Further work is in progress to find the exact composition, internal structure and secondary phases in the ceramics".

### Token's Service & PDF Catalogue Download

Token reliably deliver high-quality microwave dielectric components according to the each customer special needs with respect to performance, costs, and technology modifications.

For marketing discontinuations or sourcing activities concerning dielectric products, you are encouraged to contact our Sales Department so the request can be properly directed within Token.

