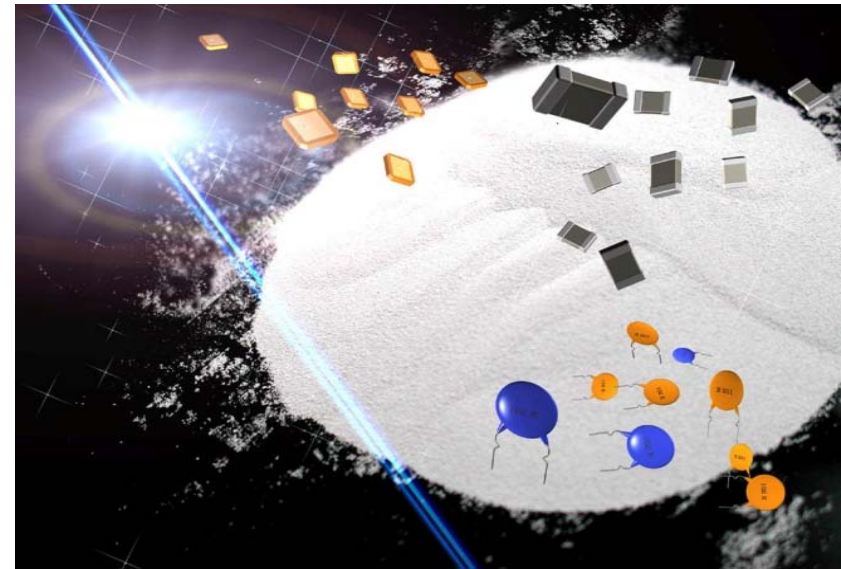


# Ceramic Dielectric Materials Product List

June, 2013

# MAIN PRODUCTS

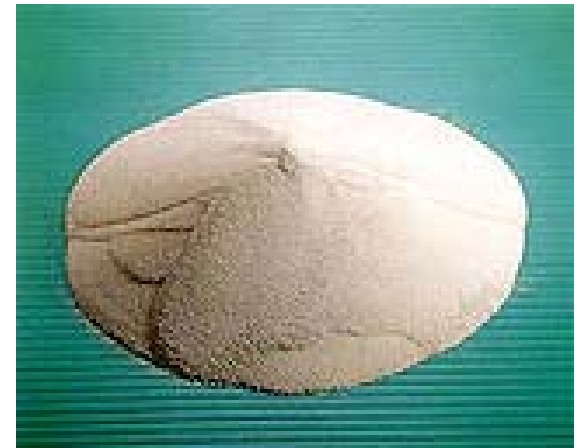
- ◆ For Disc Type Wet Extrusion Process
- ◆ For Disc Type Dry Pressing Process
- ◆ For Microwave Applications
- ◆ MLCC Formulations
- ◆ Barium Titanates



# For Disc Type Wet Extrusion Process

## 濕式擠出成型用

Type	Temperature Compensation Type (溫度補償型)
	High-K Typ (高介電常數型)
	Semiconductive Type (第三類高介電常數型)



# For Disc Type Wet Extrusion Process

## 濕式擠出成型用

### Temperature Compensation Type

Designation	Electric Properties			Reference Code		Reference Firing Temperature, °C	Addition of Low Melt Additive
	K-value at 1MHz	Q Factor Min.	I.R. Min. MΩ	JIS	EIA		
NPO-10	10.0±1.0	2000	10 <sup>5</sup>	CH	COH	1320±10	-
NPO-13	13.0±1.0	3000	10 <sup>5</sup>	CG	COG	1330±10	-
NPO-20	23.0±1.0	3000	10 <sup>5</sup>	CG	COG	1330±10	-
NPO-40	44.0±1.5	3000	10 <sup>5</sup>	CG	COG	1210±10	-
NPO-110	107±3	3000	10 <sup>5</sup>	CG	COG	1270±10	O
N750	100±15	2000	10 <sup>5</sup>	UH	U2H	1230±10	-
SL-330	325±15	2000	10 <sup>5</sup>	SL	-	1355±10	O

# For Disc Type Wet Extrusion Process

## 濕式擠出成型用

### High-K Type

Designation	Electric Properties			Reference Code		Reference Firing Temperature, °C	Addition of Low Melt Additive
	K-value at 25°C	D.F. Max. %	I.R. Min. $\Omega$	JIS	EIA		
Z5U	11500±1500	1.0	10 <sup>4</sup>	ZE	Z5U	1360±10	-
Z5V	20000±3000	1.0	10 <sup>4</sup>	ZF	Z5V	1380±10	-
Y5U	8500±850	1.0	10 <sup>4</sup>	YE	Y5U	1330±10	-
Y5E	1710±100	1.0	10 <sup>4</sup>	YA	Y5E	1255±10	O
Y5P	3650±200	1.5	10 <sup>4</sup>	YB	Y5P	1390±10	O
Y5V	15500±2000	1.0	10 <sup>4</sup>	YF	Y5V	1380±10	-
Y5P-XHT	3650±350	2.0	10 <sup>4</sup>	YB	Y5P	1390±10	O
X7R	3300±330	2.0	10 <sup>4</sup>		X7R	1355±10	O

# For Disc Type Wet Extrusion Process

## 濕式擠出成型用

### Semi-conductive Type

Designation	Electric Properties			Reference Code		Reference Firing Temperature, °C	Addition of Low Melt Additive
	K-value at 25°C	D.F.Max.%	I.R. Min. Ω	JIS	EIA		
SBL— Y5V	12000±1000	0.45	10 <sup>4</sup>	YF	Y5V	1300±10	-
SBL— Y5U	8500±500	0.50	10 <sup>4</sup>	YE	Y5U	1325±10	-

# For Disc Type Dry Pressing Process

## 乾式加壓成型用

Type

Temperature Compensation Type  
(溫度補償型)

High-K Typ  
(高介電常數型)



# For Disc Type Dry Pressing Process

## 乾式加壓成型用

### Temperature Compensation Type

Designation	Electric Properties			Reference Code		Reference Firing Temperature, °C	Addition of Low Melt Additive
	K-value at 1MHz	Q Factor Min.	I.R. Min. $\Omega$	JIS	EIA		
NPO-20B	23±1	3000	10 <sup>5</sup>	CG	COG	1330±10	-
NPO-40B	48.0±1.5	3000	10 <sup>5</sup>	CG	COG	1210±10	-
NPO-110B	100±10	3000	10 <sup>5</sup>	CG	COG	1270±10	0
SL-330B	325±25	2000	10 <sup>5</sup>	SL	-	1360±10	0
SL-290B	285±25	3000	10 <sup>5</sup>	SL	-	1360±20	0



# For Disc Type Dry Pressing Process

## 乾式加壓成型用

### High-K Type

Designation	Electric Properties			Reference Code		Reference Firing Temperature, °C	Addition of Low Melt Additive
	K-value at 25°C	D.F. Max. %	I.R. Min. Ω	JIS	EIA		
Z5U103B	10000±1000	0.6	10 <sup>4</sup>	ZE	Z5U	1360±10	-
Z5V213B	20000±3000	0.7	10 <sup>4</sup>	ZF	Z5V	1380±10	-
Y5U852B	11000±1000	0.7	10 <sup>4</sup>	YE	Y5U	1390±20	-
Y5V163B	17000±1000	0.6	10 <sup>4</sup>	YF	Y5V	1360±20	-
Y5E162B	1675±125	0.65	10 <sup>4</sup>	YA	Y5E	1255±10	O
Y5P302B	3000±300	1.0	10 <sup>4</sup>	YB	Y5P	1375±10	O
Y5P402B	3900±500	1.5	10 <sup>4</sup>	YB	Y5P	1390±10	O
X7R342B	3600±300	1.5	10 <sup>4</sup>	-	X7R	1360±10	O

# Microwave Applications

## 微波瓷粉

### Features

Specific tuning capability of ceramic characteristics

依設計需求可調整材料特性

A wide variety of K value

多種介電常數組成成份

High Q value

高品質係數

Stable tem

穩定的溫度係數perature coefficient

### Application

Dielectric resonator/filter

陶瓷共振器、濾波器

Patch Antenna

陶瓷天線

Substrate for MIC

微波積體回路用基板

Single layered capacitor for HF

圓板型高頻電容器

# Microwave Applications

## 微波瓷粉

Designation	$\epsilon_r^*$	$\tau_f$ (ppm/°C)	$Q \times f$ (1GHz)	I.R. ( $\Omega$ -cm)	$\rho_s$ (g/c.c)	Reference Firing Temperature, °C
NPO-10M	~ 8	-15~+15	>12,000	>1×10 <sup>13</sup>	3.2	1355°C
NPO-13M	~13	-15~+15	>40,000	>1×10 <sup>13</sup>	3.4	1355°C
NPO-20MS	~20	-10~+10	>50,000	>1×10 <sup>13</sup>	3.7	1365°C
NPO-37M	~36	-5~+5	>40,000	>1×10 <sup>13</sup>	4.5	1180°C
NPO-40M	~38	-10~+10	>50,000	>1×10 <sup>13</sup>	4.5	1375°C
NPO-45M	~45	-10~+10	>15,000	>1×10 <sup>13</sup>	5.0	1335°C
NPO-45MF	~47	-10~+10	>15,000	>1×10 <sup>13</sup>	4.7	1300°C
NPO-65M	~65	-10~+10	>10,000	>1×10 <sup>13</sup>	5.2	1305°C
NPO-90M	~87	-10~+10	>5,500	>1×10 <sup>13</sup>	5.5	1295°C
NPO-90ML	~95	-10~+10	>5,500	>1×10 <sup>13</sup>	5.6	1290°C
NPO-100M	~100	-20~+20	>4,000	>1×10 <sup>13</sup>	5.6	1325°C
NPO-130M	~130	-30~+30	>1,500	>1×10 <sup>13</sup>	5.8	1255°C

# MLCC Formulations

## 積層電容瓷粉

### Features

Full series with Cd and Pb free (All Green)

全系列為綠色產品

Narrow particles size distribution

粒度分布窄

Broad firing temperature range

燒結溫度區間大

Lot to lot consistency

批間穩定性佳

High performance with reasonable cost

高效能

# MLCC Formulations

## 積層電容瓷粉

Designation	Electric Properties			Electrode compatible	Reference Firing Temperature, °C
	K value	D.F.	TCC		
LF-X7R282F	2300	≤ 2.5%	X7R	Pd30 Ag70	1140°C
LF-X7R302	2800	≤ 2.5%	X7R	Pd30 Ag70	1140°C
CG880	80	≤ 0.1%	COG	Pd30 Ag70	1125°C
CG101G	100	≤ 0.1%	COG	Pd30 Ag70	1140°C
UCG110	11	≤ 0.1%	COH	Pd10 Ag90	980°C
UCG290	29	≤ 0.05%	COG	Pd10 Ag90	980°C
UCG400	40	≤ 0.1%	COG	Pd10 Ag90	980°C
UCG990/980	99	≤ 0.1%	COG	Pd10 Ag90	980°C
ECG840	80	≤ 0.1%	COG	Pd 5 Ag95	925°C
ECG970	95	≤ 0.1%	COG	Pd 5 Ag95	925°C
BME-Y5V	15000	≤ 7.0%	Y5V	Ni	1250°C
BME-X7R	3400	≤ 3.5%	X7R	Ni	1320°C
BME-NPO	31	≤ 0.1%	COG	Ni	1300°C

# Barium Titanate

## 鈦酸鋇基材

### Features

Narrow particle size distribution  
粒度分布窄

Excellent sinterability  
燒結特性佳

Relatively inert to manufacturing process  
製程條件寬

Excellent workability for forming  
成型特性優

Consistent lot-to-lot uniformity  
批間穩定好

# Barium Titanate

## 鈦酸鋇基材

Designation	BaO/TiO <sub>2</sub>	Purity	Impurities(Max.%)				SEM Size (D <sub>50</sub> -μm)
	Mole ratio	Min.%	SrO	Nb <sub>2</sub> O <sub>5</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	
BTP-B	1.005	98.0	1.50	0.15	0.20	0.20	1.0 - 1.5
BTP-M	1.000	98.0	1.50	0.15	0.20	0.20	1.0 - 1.5
BTP-T	0.996	98.0	1.50	0.15	0.20	0.20	1.0 - 1.5
BTP-HB	1.003	99.5	0.05	0.01	0.10	0.10	0.8 - 1.0
BTP-HM	1.000	99.5	0.05	0.01	0.10	0.10	0.8 - 1.0
BTP-HT	0.996	99.5	0.05	0.01	0.10	0.10	0.8 - 1.0
BTP-2H	0.996	99.5	0.05	0.01	0.10	0.05	0.8 - 1.0
BTP-4H	0.996	99.5	0.05	0.01	0.10	0.05	0.6 - 0.8
BTP-6H	0.996	99.5	0.05	0.01	0.10	0.05	0.4 - 0.5
BTP-7H	Customer Spec	99.8	0.05	0.00	0.05	0.05	0.3 - 0.4
BTP-8H	Customer Spec	99.8	0.05	0.00	0.05	0.05	0.2 - 0.3