

# Notice for TAIYO YUDEN Products

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Please read this notice before using the TAIYO YUDEN products.

## REMINDERS

### Product Information in this Catalog

Product information in this catalog is as of October 2021. All of the contents specified herein and production status of the products listed in this catalog are subject to change without notice due to technical improvement of our products, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

### Approval of Product Specifications

Please contact TAIYO YUDEN for further details of product specifications as the individual product specification sheets are available. When using our products, please be sure to approve our product specifications or make a written agreement on the product specification with TAIYO YUDEN in advance.

### Pre-Evaluation in the Actual Equipment and Conditions

Please conduct validation and verification of our products in actual conditions of mounting and operating environment before using our products.

### Safety Design

When using our products for high safety and/or reliability-required equipment or circuits, please fully perform safety and/or reliability evaluation. In addition, please install (i) systems equipped with a protection circuit and a protection device and/or (ii) systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault for a failsafe design to ensure safety.

### Intellectual Property Rights

Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

### Limited Warranty

Please note that the scope of warranty for our products is limited to the delivered our products themselves conforming to the product specifications specified in the individual product specification sheets, and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a failure or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement, provided, however, that our products shall be used for general-purpose and standard use in the equipment specified in this catalog or the individual product specification sheets.

### TAIYO YUDEN's Official Sales Channel

The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "TAIYO YUDEN's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN's official sales channel.

### Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to "U.S. Export Administration Regulations", "Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

## ■ Limited Application

### 1. Equipment Intended for Use

The products listed in this catalog are intended for general-purpose and standard use in general electronic equipment for consumer (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and other equipment specified in this catalog or the individual product specification sheets, or the equipment approved separately by TAIYO YUDEN.

TAIYO YUDEN has the product series intended for use in the following equipment. Therefore, when using our products for these equipment, please check available applications specified in this catalog or the individual product specification sheets and use the corresponding products.

Application	Product Series		Quality Grade <sup>*3</sup>
	Equipment <sup>*1</sup>	Category (Part Number Code <sup>*2</sup> )	
Automotive	Automotive Electronic Equipment (POWERTRAIN, SAFETY)	A	1
	Automotive Electronic Equipment (BODY & CHASSIS, INFOTAINMENT)	C	2
Industrial	Telecommunications Infrastructure and Industrial Equipment	B	2
Medical	Medical Devices classified as GHTF Class C (Japan Class III)	M	2
	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	L	3
Consumer	General Electronic Equipment	S	3

\*Notes: 1. Based on the general specifications required for electronic components for such equipment, which are recognized by TAIYO YUDEN, the use of each product series for the equipment is recommended. Please be sure to contact TAIYO YUDEN before using our products for equipment other than those covered by the product series.

2. On each of our part number, the 2nd code from the left is a code indicating the "Category" as shown in the above table. For details, please check the explanatory materials regarding the part numbering system of each of our products.

3. Each product series is assigned a "Quality Grade" from 1 to 3 in order of higher quality. Please do not incorporate a product into any equipment with a higher Quality Grade than the Quality Grade of such product without the prior written consent of TAIYO YUDEN.

### 2. Equipment Requiring Inquiry

Please be sure to contact TAIYO YUDEN for further information before using the products listed in this catalog for the following equipment (excluding intended equipment as specified in this catalog or the individual product specification sheets) which may cause loss of human life, bodily injury, serious property damage and/or serious public impact due to a failure or defect of the products and/or malfunction attributed thereto.

- (1) Transportation equipment (automotive powertrain control system, train control system, and ship control system, etc.)
- (2) Traffic signal equipment
- (3) Disaster prevention equipment, crime prevention equipment
- (4) Medical devices classified as GHTF Class C (Japan Class III)
- (5) Highly public information network equipment, data-processing equipment (telephone exchange, and base station, etc.)
- (6) Any other equipment requiring high levels of quality and/or reliability equal to the equipment listed above

### 3. Equipment Prohibited for Use

Please do not incorporate our products into the following equipment requiring extremely high levels of safety and/or reliability.

- (1) Aerospace equipment (artificial satellite, rocket, etc.)
- (2) Aviation equipment <sup>\*1</sup>
- (3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices <sup>\*2</sup>
- (4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
- (5) Undersea equipment (submarine repeating equipment, etc.)
- (6) Military equipment
- (7) Any other equipment requiring extremely high levels of safety and/or reliability equal to the equipment listed above

\*Notes: 1. There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by TAIYO YUDEN. Please be sure to contact TAIYO YUDEN for further information before using our products for such aviation equipment.

2. Implantable medical devices contain not only internal unit which is implanted in a body, but also external unit which is connected to the internal unit.

### 4. Limitation of Liability

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment that is not intended for use by TAIYO YUDEN, or any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

# Multilayer Ceramic Capacitors for General Electronic Equipment for Consumer

REFLOW

## PART NUMBER

M	S	A	S	U	3	1	L	B	B	5	1	0	6	K	T	N	A	0	1
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩										

## ①Series

Code (1)(2)(3)(4)	
MSAS	Multilayer Ceramic Capacitor (High dielectric type) for General Electronic Equipment for Consumer Multilayer Ceramic Capacitor (Temperature compensating type) for General Electronic Equipment for Consumer Medium-High Voltage Multilayer Ceramic Capacitor for General Electronic Equipment for Consumer
MSAR	High frequency/Low loss Multilayer Ceramic Capacitor for General Electronic Equipment for Consumer
MSAY	Low distortion design/Audible/Good bias Multilayer Ceramic Capacitor for General Electronic Equipment for Consumer
MSRL	LW Reversal Decoupling Low ESL Capacitor (LWDC™) for General Electronic Equipment for Consumer

## (1) Product Group

Code	
M	Multilayer Ceramic Capacitor

## (2) Category

Code	Recommended equipment	Quality Grade
S	General Electronic Equipment for Consumer	3

## (3) Type

Code	
A	2 terminals
R	LW reversal

## (4) Features, Characteristics

Code	
S	Standard/General
R	High frequency/Low loss
Y	Low distortion design/Audible/Good bias
L	Low ESL

## ②Rated voltage

Code	Rated voltage [VDC]
P	2.5
A	4
J	6.3
L	10
E	16
T	25
G	35
U	50
H	100
Q	250
S	630
X	2000

## ③Dimension

Code	(L × W) [mm]	JIS(mm)	EIA(inch)
02	0.25 × 0.125	0201	008004
04	0.4 × 0.2	0402	01005
06	0.6 × 0.3	0603	0201
1L	1.0 × 0.5	1005	0402
10	1.0 × 0.5	1005	0402
	0.52 × 1.0 ※	0510	0204
16	1.6 × 0.8	1608	0603
	0.8 × 1.6 ※	0816	0306
21	2.0 × 1.25	2012	0805
	1.25 × 2.0 ※	1220	0508
31	3.2 × 1.6	3216	1206
32	3.2 × 2.5	3225	1210
45	4.5 × 3.2	4532	1812

Note : ※LW reverse type (MSRL)

## ④Thickness

Code	Thickness [mm]
1	0.125
H	0.13 (1.5 max ※)
E	0.18 (1.1 max ※)
2	0.2
3	0.3
K	0.45
5	0.5
8	0.8
9	0.85
Q	1.15
G	1.25
L	1.6
N	1.9 (0.088 ※)
Y	2.0 max
M	2.5

Note : ※LW reverse type (MSRL)

## ⑤Dimension tolerance

Code	Dimension code	L[mm]	W[mm]	T[mm]	Thickness code
A	06	0.6±0.05	0.3±0.05	0.3±0.05	3
	10	1.0±0.10	0.5±0.10	0.5±0.10	5
	16	1.6+0.15/-0.05	0.8+0.15/-0.05	0.8+0.15/-0.05	8
	21	2.0+0.15/-0.05	1.25+0.15/-0.05	1.25+0.15/-0.05	G
	31	3.2±0.20	1.6±0.20	1.6±0.20	L
	32	3.2±0.30	2.5±0.30	2.5±0.30	M
	45	4.5±0.40	3.2±0.30	2.0+0/-0.30	Y
B	06	0.6±0.09	0.3±0.09	0.3±0.09	3
	10	1.0+0.15/-0.05	0.5+0.15/-0.05	0.5+0.15/-0.05	5
	16	1.6+0.20/-0	0.8+0.20/-0	0.8+0.20/-0	8
	21	2.0+0.20/-0	1.25+0.20/-0	1.25+0.20/-0	G
	31	3.2±0.30	1.6±0.30	1.6±0.30	L
	32	3.2±0.30	2.5±0.20	1.9+0.1/-0.20	Y
C	10	1.0+0.20/-0	0.5+0.20/-0	0.5+0.20/-0	5
E	06	0.6+0.25/-0	0.3+0.25/-0	0.3+0.25/-0	3
	10	1.0+0.30/-0	0.5+0.30/-0	0.5+0.30/-0	5
H	31	3.2±0.15	1.6±0.15	0.85±0.10	9
				1.15±0.10	Q
J	16	1.6+0.20/-0	0.8+0.20/-0	0.45±0.05	K
	21	2.0+0.15/-0.05	1.25+0.15/-0.05	0.85±0.10	9
	32	3.2±0.30	2.5±0.20	0.85±0.10	9
				1.15±0.10	Q
L	21	2.0+0.20/-0	1.25+0.20/-0	0.85±0.10	9
	31	3.2±0.20	1.6±0.20	0.85±0.10	9
S	02	0.25±0.013	0.125±0.013	0.125±0.013	1
	04	0.4±0.02	0.2±0.02	0.2±0.02	2
	06	0.6±0.03	0.3±0.03	0.3±0.03	3
	10	1.0±0.05	0.5±0.05	0.5±0.05	5
		0.52±0.05 ※	1.0±0.05	0.3±0.05	3
	16	1.6±0.10	0.8±0.10	0.8±0.10	8
		0.8±0.10 ※	1.6±0.10	0.5±0.05	5
	21	2.0±0.10	1.25±0.10	0.85±0.10	9
		1.25±0.15 ※	2.0±0.15	1.25±0.10	G
				0.85±0.10	9
	31	3.2±0.15	1.6±0.15	1.6±0.20	L
	32	3.2±0.30	2.5±0.20	2.5±0.20	M
				1.9±0.20	N
				2.5±0.20	M
45	4.5±0.40	3.2±0.30	2.5±0.20	M	
T	16	1.6±0.10	0.8±0.10	0.45±0.05	K
X	1L	1.0±0.05	0.5±0.05	0.13±0.02	H
				0.18±0.02	E
				0.2±0.02	2
Y	1L	1.0±0.05	0.5±0.05	0.3±0.03	3

Note :※LW reverse type (MSRL)

## ⑥ Temperature characteristics code

■ High dielectric type (SD: Excluding Low distortion design/Audible/Good bias Multilayer Ceramic Capacitor)

Code	Applicable standard		Temperature range [°C]	Ref. Temp. [°C]	Capacitance change	Capacitance tolerance	Tolerance code
B5	JIS	B	-25 ~ + 85	20	±10%	±10%	K
						±20%	M
B7	EIA	X5R	-55 ~ + 85	25	±15%	±10%	K
						±20%	M
C6	EIA	X7R	-55 ~ +125	25	±15%	±10%	K
						±20%	M
C7	EIA	X6S	-55 ~ +105	25	±22%	±10%	K
						±20%	M
LD(※)	EIA	X7S	-55 ~ +125	25	±22%	±10%	K
						±20%	M
LD(※)	EIA	X5R	-55 ~ + 85	25	±15%	±10%	K
						±20%	M

Note : ※.LD: Low distortion design/Audible/Good bias Multilayer Ceramic Capacitor

## ■ Temperature compensating type

Code	Applicable standard		Temperature range [°C]	Ref. Temp. [°C]	Capacitance change	Capacitance tolerance	Tolerance code
CG	JIS	CG	-55 ~ +125	20	0 ± 30ppm/°C	±0.05pF	A
						±0.1pF	B
	±0.25pF	C					
	EIA	C0G		25		±0.5pF	D
						±2%	G
CH	JIS	CH	-55 ~ +125	20	0 ± 60ppm/°C	±0.05pF	A
						±0.1pF	B
	±0.25pF	C					
	EIA	C0H		25		±0.5pF	D
						±2%	G
CJ	JIS	CJ	-55 ~ +125	20	0 ± 120ppm/°C	±0.05pF	A
				25		±0.1pF	B
	EIA	C0J				±0.25pF	C
CK	JIS	CK	-55 ~ +125	20	0 ± 250ppm/°C	±0.05pF	A
				25		±0.1pF	B
	EIA	C0K				±0.25pF	C

## ⑥ Series code

• Low distortion design/Audible/Good bias Multilayer Ceramic Capacitor

Code	Series code
SD	Standard

• Medium-High Voltage Multilayer Ceramic Capacitor

Code	Series code
SD	Standard

## ⑦ Nominal capacitance

Code (example)	Nominal capacitance
0R5	0.5pF
010	1pF
100	10pF
101	100pF
102	1,000pF
103	0.01μF
104	0.1μF
105	1μF
106	10μF
107	100μF

Note : R=Decimal point

## ⑧ Capacitance tolerance

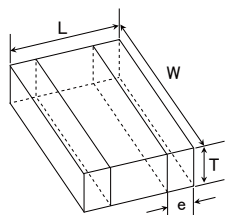
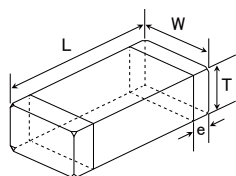
Code	Capacitance tolerance
A	±0.05pF
B	±0.1pF
C	±0.25pF
D	±0.5pF
G	±2%
J	±5%
K	±10%
M	±20%

## ⑨ Packaging

Code	Packaging
F	φ178mm Taping (2mm pitch)
T	φ178mm Taping (4mm pitch)
P	φ178mm Taping (4mm pitch, 1000 pcs/reel) 3225 type (Thickness code M)
R	φ178mm Embossed Taping 1005type (2mm pitch) 1608type (4mm pitch)
W	φ178mm Embossed Taping (1mm pitch) 0201/0402type

## ⑩ Internal code

## STANDARD EXTERNAL DIMENSIONS



※LW reverse type

Type	JIS (mm)	EIA (inch)	Dimension [mm]				
			L	W	T	*1	e
MSAS□02	0201	008004	0.25±0.013	0.125±0.013	0.125±0.013	1	0.0675±0.0275
MSAR□02	0201	008004	0.25±0.013	0.125±0.013	0.125±0.013	1	0.0675±0.0275
MSAS□04	0402	01005	0.4±0.02	0.2±0.02	0.2±0.02	2	0.1±0.03
MSAR□04	0402	01005	0.4±0.02	0.2±0.02	0.2±0.02	2	0.1±0.03
MSAS□06	0603	0201	0.6±0.03	0.3±0.03	0.3±0.03	3	0.15±0.05
MSAS□1L	1005	0402	1.0±0.05	0.5±0.05	0.13±0.02	H	0.25±0.10
					0.18±0.02	E	
					0.2±0.02	2	
					0.3±0.03	3	
MSAS□10	1005	0402	1.0±0.05	0.5±0.05	0.5±0.05	5	0.25±0.10
MSAY□1L	1005	0402	1.0±0.05	0.5±0.05	0.3±0.03	3	0.25±0.10
MSAY□10	1005	0402	1.0±0.05	0.5±0.05	0.5±0.05	5	0.25±0.10
MSRL□10 ※	0510	0204	0.52±0.05	1.0±0.05	0.3±0.05	3	0.18±0.08
MSAS□16	1608	0603	1.6±0.10	0.8±0.10	0.45±0.05	K	0.35±0.25
					0.8±0.10	8	
MSAY□16	1608	0603	1.6±0.10	0.8±0.10	0.8±0.10	8	0.35±0.25
MSRL□16 ※	0816	0306	0.8±0.10	1.6±0.10	0.5±0.05	5	0.25±0.15
MSAS□21	2012	0805	2.0±0.10	1.25±0.10	0.85±0.10	9	0.5±0.25
					1.25±0.10	G	
MSRL□21 ※	1220	0508	1.25±0.15	2.0±0.15	0.85±0.10	9	0.3±0.2
MSAS□31	3216	1206	3.2±0.15	1.6±0.15	0.85±0.10	9	0.5+0.35/-0.25
					1.15±0.10	Q	
					1.6±0.20	L	
MSAY□31	3216	1206	3.2±0.15	1.6±0.15	1.15±0.10	Q	0.5+0.35/-0.25
					1.6±0.20	L	
					0.85±0.10	9	
MSAS□32	3225	1210	3.2±0.30	2.5±0.20	1.15±0.10	Q	0.6±0.3
					1.9±0.20	N	
					1.9+0.1/-0.20	Y	
					2.5±0.20	M	
MSAY□32	3225	1210	3.2±0.30	2.5±0.20	1.9±0.20	N	0.6±0.3
					2.5±0.20	M	
MSAS□45	4532	1812	4.5±0.40	3.2±0.30	2.0+0/-0.30	Y	0.6±0.4
					2.5±0.20	M	

Note :※LW reverse type (MSRL), \*1.Thickness code

## ■ STANDARD QUANTITY

Type			Thickness		Standard quantity [pcs]	
Code	JIS(mm)	EIA(inch)	[mm]	Code	Paper tape	Embossed tape
02	0201	008004	0.125	1	—	50000
04	0402	01005	0.2	2	—	40000
06	0603	0201	0.3	3	15000	—
1L	1005	0402	0.13	H	—	20000
			0.18	E	—	15000
			0.2	2	20000	—
			0.3	3	15000	—
10	1005	0402	0.5	5	10000	—
	0510 ※	0204 ※	0.3	3		
16	1608	0603	0.45	K	4000	—
			0.8	8		
	0816 ※	0306 ※	0.5	5	—	4000
21	2012	0805	0.85	9	4000	—
			1.25	G	—	3000
	1220 ※	0508 ※	0.85	9	4000	—
31	3216	1206	0.85	9	4000	—
			1.15	Q	—	3000
			1.6	L	—	2000
32	3225	1210	0.85	9	—	2000
			1.15	Q		
			1.9	N		
			2.0 max	Y		
			2.5	M		
45	4532	1812	2.0 max	Y	—	1000
			2.5	M	—	500

Note : ※:LW Reverse type (MSRL)

## PARTS NUMBER

## Multilayer Ceramic Capacitors (Temperature compensating type) for General Electronic Equipment for Consumer

## 0201TYPE

【Temperature Characteristic  $C\Delta : C\Delta/C0\Delta (-55\sim +125^{\circ}C)$ 】 0.125mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness*3 [mm]	Note
							Rated voltage x %		
MSAST021SCK0R2B[WNA01	TMK021 CK0R2BK-W	25	CK C0K	0.2 p	±0.1pF	404	200	0.125±0.013	
MSAST021SCK0R3[WNA01	TMK021 CK0R3K-W	25	CK C0K	0.3 p	±0.1pF,±0.25pF	406	200	0.125±0.013	
MSAST021SCK0R4[WNA01	TMK021 CK0R4K-W	25	CK C0K	0.4 p	±0.1pF,±0.25pF	408	200	0.125±0.013	
MSAST021SCK0R5[WNA01	TMK021 CK0R5K-W	25	CK C0K	0.5 p	±0.1pF,±0.25pF	410	200	0.125±0.013	
MSAST021SCK0R6[WNA01	TMK021 CK0R6K-W	25	CK C0K	0.6 p	±0.1pF,±0.25pF	412	200	0.125±0.013	
MSAST021SCK0R7[WNA01	TMK021 CK0R7K-W	25	CK C0K	0.7 p	±0.1pF,±0.25pF	414	200	0.125±0.013	
MSAST021SCKR75[WNA01	TMK021 CKR75K-W	25	CK C0K	0.75 p	±0.1pF,±0.25pF	415	200	0.125±0.013	
MSAST021SCK0R8[WNA01	TMK021 CK0R8K-W	25	CK C0K	0.8 p	±0.1pF,±0.25pF	416	200	0.125±0.013	
MSAST021SCK0R9[WNA01	TMK021 CK0R9K-W	25	CK C0K	0.9 p	±0.1pF,±0.25pF	418	200	0.125±0.013	
MSAST021SCK010[WNA01	TMK021 CK010K-W	25	CK C0K	1 p	±0.1pF,±0.25pF	420	200	0.125±0.013	
MSAST021SCK1R1[WNA01	TMK021 CK1R1K-W	25	CK C0K	1.1 p	±0.1pF,±0.25pF	422	200	0.125±0.013	
MSAST021SCK1R2[WNA01	TMK021 CK1R2K-W	25	CK C0K	1.2 p	±0.1pF,±0.25pF	424	200	0.125±0.013	
MSAST021SCK1R3[WNA01	TMK021 CK1R3K-W	25	CK C0K	1.3 p	±0.1pF,±0.25pF	426	200	0.125±0.013	
MSAST021SCK1R4[WNA01	TMK021 CK1R4K-W	25	CK C0K	1.4 p	±0.1pF,±0.25pF	428	200	0.125±0.013	
MSAST021SCK1R5[WNA01	TMK021 CK1R5K-W	25	CK C0K	1.5 p	±0.1pF,±0.25pF	430	200	0.125±0.013	
MSAST021SCK1R6[WNA01	TMK021 CK1R6K-W	25	CK C0K	1.6 p	±0.1pF,±0.25pF	432	200	0.125±0.013	
MSAST021SCK1R7[WNA01	TMK021 CK1R7K-W	25	CK C0K	1.7 p	±0.1pF,±0.25pF	434	200	0.125±0.013	
MSAST021SCK1R8[WNA01	TMK021 CK1R8K-W	25	CK C0K	1.8 p	±0.1pF,±0.25pF	436	200	0.125±0.013	
MSAST021SCK1R9[WNA01	TMK021 CK1R9K-W	25	CK C0K	1.9 p	±0.1pF,±0.25pF	438	200	0.125±0.013	
MSAST021SCK020[WNA01	TMK021 CK020K-W	25	CK C0K	2 p	±0.1pF,±0.25pF	440	200	0.125±0.013	
MSAST021SCK2R1[WNA01	TMK021 CK2R1K-W	25	CK C0K	2.1 p	±0.1pF,±0.25pF	442	200	0.125±0.013	
MSAST021SCK2R2[WNA01	TMK021 CK2R2K-W	25	CK C0K	2.2 p	±0.1pF,±0.25pF	444	200	0.125±0.013	
MSAST021SCK2R3[WNA01	TMK021 CK2R3K-W	25	CK C0K	2.3 p	±0.1pF,±0.25pF	446	200	0.125±0.013	
MSAST021SCK2R4[WNA01	TMK021 CK2R4K-W	25	CK C0K	2.4 p	±0.1pF,±0.25pF	448	200	0.125±0.013	
MSAST021SCK2R5[WNA01	TMK021 CK2R5K-W	25	CK C0K	2.5 p	±0.1pF,±0.25pF	450	200	0.125±0.013	
MSAST021SCK2R6[WNA01	TMK021 CK2R6K-W	25	CK C0K	2.6 p	±0.1pF,±0.25pF	452	200	0.125±0.013	
MSAST021SCK2R7[WNA01	TMK021 CK2R7K-W	25	CK C0K	2.7 p	±0.1pF,±0.25pF	454	200	0.125±0.013	
MSAST021SCK2R8[WNA01	TMK021 CK2R8K-W	25	CK C0K	2.8 p	±0.1pF,±0.25pF	456	200	0.125±0.013	
MSAST021SCK2R9[WNA01	TMK021 CK2R9K-W	25	CK C0K	2.9 p	±0.1pF,±0.25pF	458	200	0.125±0.013	
MSAST021SCJ030[WNA01	TMK021 CJ030K-W	25	CH C0H	3 p	±0.1pF,±0.25pF	460	200	0.125±0.013	
MSAST021SCJ3R1[WNA01	TMK021 CJ3R1K-W	25	CH C0H	3.1 p	±0.1pF,±0.25pF	462	200	0.125±0.013	
MSAST021SCJ3R2[WNA01	TMK021 CJ3R2K-W	25	CH C0H	3.2 p	±0.1pF,±0.25pF	464	200	0.125±0.013	
MSAST021SCJ3R3[WNA01	TMK021 CJ3R3K-W	25	CH C0H	3.3 p	±0.1pF,±0.25pF	466	200	0.125±0.013	
MSAST021SCJ3R4[WNA01	TMK021 CJ3R4K-W	25	CH C0H	3.4 p	±0.1pF,±0.25pF	468	200	0.125±0.013	
MSAST021SCJ3R5[WNA01	TMK021 CJ3R5K-W	25	CH C0H	3.5 p	±0.1pF,±0.25pF	470	200	0.125±0.013	
MSAST021SCJ3R6[WNA01	TMK021 CJ3R6K-W	25	CH C0H	3.6 p	±0.1pF,±0.25pF	472	200	0.125±0.013	
MSAST021SCJ3R7[WNA01	TMK021 CJ3R7K-W	25	CH C0H	3.7 p	±0.1pF,±0.25pF	474	200	0.125±0.013	
MSAST021SCJ3R8[WNA01	TMK021 CJ3R8K-W	25	CH C0H	3.8 p	±0.1pF,±0.25pF	476	200	0.125±0.013	
MSAST021SCJ3R9[WNA01	TMK021 CJ3R9K-W	25	CH C0H	3.9 p	±0.1pF,±0.25pF	478	200	0.125±0.013	
MSAST021SCH040[WNA01	TMK021 CH040K-W	25	CH C0H	4 p	±0.1pF,±0.25pF	480	200	0.125±0.013	
MSAST021SCH4R1[WNA01	TMK021 CH4R1K-W	25	CH C0H	4.1 p	±0.1pF,±0.25pF	482	200	0.125±0.013	
MSAST021SCH4R2[WNA01	TMK021 CH4R2K-W	25	CH C0H	4.2 p	±0.1pF,±0.25pF	484	200	0.125±0.013	
MSAST021SCH4R3[WNA01	TMK021 CH4R3K-W	25	CH C0H	4.3 p	±0.1pF,±0.25pF	486	200	0.125±0.013	
MSAST021SCH4R4[WNA01	TMK021 CH4R4K-W	25	CH C0H	4.4 p	±0.1pF,±0.25pF	488	200	0.125±0.013	
MSAST021SCH4R5[WNA01	TMK021 CH4R5K-W	25	CH C0H	4.5 p	±0.1pF,±0.25pF	490	200	0.125±0.013	
MSAST021SCH4R6[WNA01	TMK021 CH4R6K-W	25	CH C0H	4.6 p	±0.1pF,±0.25pF	492	200	0.125±0.013	
MSAST021SCH4R7[WNA01	TMK021 CH4R7K-W	25	CH C0H	4.7 p	±0.1pF,±0.25pF	494	200	0.125±0.013	
MSAST021SCH4R8[WNA01	TMK021 CH4R8K-W	25	CH C0H	4.8 p	±0.1pF,±0.25pF	496	200	0.125±0.013	
MSAST021SCH4R9[WNA01	TMK021 CH4R9K-W	25	CH C0H	4.9 p	±0.1pF,±0.25pF	498	200	0.125±0.013	
MSAST021SCH050[WNA01	TMK021 CH050K-W	25	CH C0H	5 p	±0.1pF,±0.25pF	500	200	0.125±0.013	
MSAST021SCH5R1[WNA01	TMK021 CH5R1K-W	25	CH C0H	5.1 p	±0.25pF,±0.5pF	502	200	0.125±0.013	
MSAST021SCH5R2[WNA01	TMK021 CH5R2K-W	25	CH C0H	5.2 p	±0.25pF,±0.5pF	504	200	0.125±0.013	
MSAST021SCH5R3[WNA01	TMK021 CH5R3K-W	25	CH C0H	5.3 p	±0.25pF,±0.5pF	506	200	0.125±0.013	
MSAST021SCH5R4[WNA01	TMK021 CH5R4K-W	25	CH C0H	5.4 p	±0.25pF,±0.5pF	508	200	0.125±0.013	
MSAST021SCH5R5[WNA01	TMK021 CH5R5K-W	25	CH C0H	5.5 p	±0.25pF,±0.5pF	510	200	0.125±0.013	
MSAST021SCH5R6[WNA01	TMK021 CH5R6K-W	25	CH C0H	5.6 p	±0.25pF,±0.5pF	512	200	0.125±0.013	
MSAST021SCH5R7[WNA01	TMK021 CH5R7K-W	25	CH C0H	5.7 p	±0.25pF,±0.5pF	514	200	0.125±0.013	
MSAST021SCH5R8[WNA01	TMK021 CH5R8K-W	25	CH C0H	5.8 p	±0.25pF,±0.5pF	516	200	0.125±0.013	
MSAST021SCH5R9[WNA01	TMK021 CH5R9K-W	25	CH C0H	5.9 p	±0.25pF,±0.5pF	518	200	0.125±0.013	
MSAST021SCH060[WNA01	TMK021 CH060K-W	25	CH C0H	6 p	±0.25pF,±0.5pF	520	200	0.125±0.013	
MSAST021SCH6R1[WNA01	TMK021 CH6R1K-W	25	CH C0H	6.1 p	±0.25pF,±0.5pF	522	200	0.125±0.013	
MSAST021SCH6R2[WNA01	TMK021 CH6R2K-W	25	CH C0H	6.2 p	±0.25pF,±0.5pF	524	200	0.125±0.013	
MSAST021SCH6R3[WNA01	TMK021 CH6R3K-W	25	CH C0H	6.3 p	±0.25pF,±0.5pF	526	200	0.125±0.013	
MSAST021SCH6R4[WNA01	TMK021 CH6R4K-W	25	CH C0H	6.4 p	±0.25pF,±0.5pF	528	200	0.125±0.013	
MSAST021SCH6R5[WNA01	TMK021 CH6R5K-W	25	CH C0H	6.5 p	±0.25pF,±0.5pF	530	200	0.125±0.013	
MSAST021SCH6R6[WNA01	TMK021 CH6R6K-W	25	CH C0H	6.6 p	±0.25pF,±0.5pF	532	200	0.125±0.013	
MSAST021SCH6R7[WNA01	TMK021 CH6R7K-W	25	CH C0H	6.7 p	±0.25pF,±0.5pF	534	200	0.125±0.013	
MSAST021SCH6R8[WNA01	TMK021 CH6R8K-W	25	CH C0H	6.8 p	±0.25pF,±0.5pF	536	200	0.125±0.013	
MSAST021SCH6R9[WNA01	TMK021 CH6R9K-W	25	CH C0H	6.9 p	±0.25pF,±0.5pF	538	200	0.125±0.013	
MSAST021SCH070[WNA01	TMK021 CH070K-W	25	CH C0H	7 p	±0.25pF,±0.5pF	540	200	0.125±0.013	
MSAST021SCH7R1[WNA01	TMK021 CH7R1K-W	25	CH C0H	7.1 p	±0.25pF,±0.5pF	542	200	0.125±0.013	
MSAST021SCH7R2[WNA01	TMK021 CH7R2K-W	25	CH C0H	7.2 p	±0.25pF,±0.5pF	544	200	0.125±0.013	
MSAST021SCH7R3[WNA01	TMK021 CH7R3K-W	25	CH C0H	7.3 p	±0.25pF,±0.5pF	546	200	0.125±0.013	
MSAST021SCH7R4[WNA01	TMK021 CH7R4K-W	25	CH C0H	7.4 p	±0.25pF,±0.5pF	548	200	0.125±0.013	
MSAST021SCH7R5[WNA01	TMK021 CH7R5K-W	25	CH C0H	7.5 p	±0.25pF,±0.5pF	550	200	0.125±0.013	
MSAST021SCH7R6[WNA01	TMK021 CH7R6K-W	25	CH C0H	7.6 p	±0.25pF,±0.5pF	552	200	0.125±0.013	
MSAST021SCH7R7[WNA01	TMK021 CH7R7K-W	25	CH C0H	7.7 p	±0.25pF,±0.5pF	554	200	0.125±0.013	
MSAST021SCH7R8[WNA01	TMK021 CH7R8K-W	25	CH C0H	7.8 p	±0.25pF,±0.5pF	556	200	0.125±0.013	
MSAST021SCH7R9[WNA01	TMK021 CH7R9K-W	25	CH C0H	7.9 p	±0.25pF,±0.5pF	558	200	0.125±0.013	
MSAST021SCH080[WNA01	TMK021 CH080K-W	25	CH C0H	8 p	±0.25pF,±0.5pF	560	200	0.125±0.013	
MSAST021SCH8R1[WNA01	TMK021 CH8R1K-W	25	CH C0H	8.1 p	±0.25pF,±0.5pF	562	200	0.125±0.013	
MSAST021SCH8R2[WNA01	TMK021 CH8R2K-W	25	CH C0H	8.2 p	±0.25pF,±0.5pF	564	200	0.125±0.013	

\* This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.  
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).



■ PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>*3</sup> [mm]	Note
								Rated voltage x %		
MSAST021SCH8R3[WNA01	TMK021 CH8R3[K-W	25	CH	C0H	8.3 p	±0.25pF,±0.5pF	566	200	0.125±0.013	
MSAST021SCH8R4[WNA01	TMK021 CH8R4[K-W	25	CH	C0H	8.4 p	±0.25pF,±0.5pF	568	200	0.125±0.013	
MSAST021SCH8R5[WNA01	TMK021 CH8R5[K-W	25	CH	C0H	8.5 p	±0.25pF,±0.5pF	570	200	0.125±0.013	
MSAST021SCH8R6[WNA01	TMK021 CH8R6[K-W	25	CH	C0H	8.6 p	±0.25pF,±0.5pF	572	200	0.125±0.013	
MSAST021SCH8R7[WNA01	TMK021 CH8R7[K-W	25	CH	C0H	8.7 p	±0.25pF,±0.5pF	574	200	0.125±0.013	
MSAST021SCH8R8[WNA01	TMK021 CH8R8[K-W	25	CH	C0H	8.8 p	±0.25pF,±0.5pF	576	200	0.125±0.013	
MSAST021SCH8R9[WNA01	TMK021 CH8R9[K-W	25	CH	C0H	8.9 p	±0.25pF,±0.5pF	578	200	0.125±0.013	
MSAST021SCH090[WNA01	TMK021 CH090[K-W	25	CH	C0H	9 p	±0.25pF,±0.5pF	580	200	0.125±0.013	
MSAST021SCH9R1[WNA01	TMK021 CH9R1[K-W	25	CH	C0H	9.1 p	±0.25pF,±0.5pF	582	200	0.125±0.013	
MSAST021SCH9R2[WNA01	TMK021 CH9R2[K-W	25	CH	C0H	9.2 p	±0.25pF,±0.5pF	584	200	0.125±0.013	
MSAST021SCH9R3[WNA01	TMK021 CH9R3[K-W	25	CH	C0H	9.3 p	±0.25pF,±0.5pF	586	200	0.125±0.013	
MSAST021SCH9R4[WNA01	TMK021 CH9R4[K-W	25	CH	C0H	9.4 p	±0.25pF,±0.5pF	588	200	0.125±0.013	
MSAST021SCH9R5[WNA01	TMK021 CH9R5[K-W	25	CH	C0H	9.5 p	±0.25pF,±0.5pF	590	200	0.125±0.013	
MSAST021SCH9R6[WNA01	TMK021 CH9R6[K-W	25	CH	C0H	9.6 p	±0.25pF,±0.5pF	592	200	0.125±0.013	
MSAST021SCH9R7[WNA01	TMK021 CH9R7[K-W	25	CH	C0H	9.7 p	±0.25pF,±0.5pF	594	200	0.125±0.013	
MSAST021SCH9R8[WNA01	TMK021 CH9R8[K-W	25	CH	C0H	9.8 p	±0.25pF,±0.5pF	596	200	0.125±0.013	
MSAST021SCH9R9[WNA01	TMK021 CH9R9[K-W	25	CH	C0H	9.9 p	±0.25pF,±0.5pF	598	200	0.125±0.013	
MSAST021SCH100[WNA01	TMK021 CH100[K-W	25	CH	C0H	10 p	±0.25pF,±0.5pF	600	200	0.125±0.013	
MSAST021SCH120JWNA01	TMK021 CH120JK-W	25	CH	C0H	12 p	±5%	640	200	0.125±0.013	
MSAST021SCH150JWNA01	TMK021 CH150JK-W	25	CH	C0H	15 p	±5%	700	200	0.125±0.013	
MSAST021SCH180JWNA01	TMK021 CH180JK-W	25	CH	C0H	18 p	±5%	760	200	0.125±0.013	
MSAST021SCH220JWNA01	TMK021 CH220JK-W	25	CH	C0H	22 p	±5%	840	200	0.125±0.013	
MSAST021SCH270JWNA01	TMK021 CH270JK-W	25	CH	C0H	27 p	±5%	940	200	0.125±0.013	
MSASE021SCH330JWNA01	EMK021 CH330JK-W	16	CH	C0H	33 p	±5%	1000	150	0.125±0.013	
MSASE021SCH390JWNA01	EMK021 CH390JK-W	16	CH	C0H	39 p	±5%	1000	150	0.125±0.013	
MSASE021SCH470JWNA01	EMK021 CH470JK-W	16	CH	C0H	47 p	±5%	1000	150	0.125±0.013	
MSASE021SCH560JWNA01	EMK021 CH560JK-W	16	CH	C0H	56 p	±5%	1000	150	0.125±0.013	
MSASL021SCH680JWNA01	LMK021 CH680JK-W	10	CH	C0H	68 p	±5%	1000	200	0.125±0.013	
MSASL021SCH820JWNA01	LMK021 CH820JK-W	10	CH	C0H	82 p	±5%	1000	200	0.125±0.013	
MSASL021SCH101JWNA01	LMK021 CH101JK-W	10	CH	C0H	100 p	±5%	1000	200	0.125±0.013	

【Temperature Characteristic CG : CG/C0G (−55~+125°C)】 0.125mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>*3</sup> [mm]	Note
								Rated voltage x %		
MSAST021SCG0R2BWNA01	TMK021 CG0R2BK-W	25	CG	C0G	0.2 p	±0.1pF	404	200	0.125±0.013	
MSAST021SCG0R3[WNA01	TMK021 CG0R3[K-W	25	CG	C0G	0.3 p	±0.1pF,±0.25pF	406	200	0.125±0.013	
MSAST021SCG0R4[WNA01	TMK021 CG0R4[K-W	25	CG	C0G	0.4 p	±0.1pF,±0.25pF	408	200	0.125±0.013	
MSAST021SCG0R5[WNA01	TMK021 CG0R5[K-W	25	CG	C0G	0.5 p	±0.1pF,±0.25pF	410	200	0.125±0.013	
MSAST021SCG0R6[WNA01	TMK021 CG0R6[K-W	25	CG	C0G	0.6 p	±0.1pF,±0.25pF	412	200	0.125±0.013	
MSAST021SCG0R7[WNA01	TMK021 CG0R7[K-W	25	CG	C0G	0.7 p	±0.1pF,±0.25pF	414	200	0.125±0.013	
MSAST021SCG0R75[WNA01	TMK021 CG0R75[K-W	25	CG	C0G	0.75 p	±0.1pF,±0.25pF	415	200	0.125±0.013	
MSAST021SCG0R8[WNA01	TMK021 CG0R8[K-W	25	CG	C0G	0.8 p	±0.1pF,±0.25pF	416	200	0.125±0.013	
MSAST021SCG0R9[WNA01	TMK021 CG0R9[K-W	25	CG	C0G	0.9 p	±0.1pF,±0.25pF	418	200	0.125±0.013	
MSAST021SCG010[WNA01	TMK021 CG010[K-W	25	CG	C0G	1 p	±0.1pF,±0.25pF	420	200	0.125±0.013	
MSAST021SCG1R1[WNA01	TMK021 CG1R1[K-W	25	CG	C0G	1.1 p	±0.1pF,±0.25pF	422	200	0.125±0.013	
MSAST021SCG1R2[WNA01	TMK021 CG1R2[K-W	25	CG	C0G	1.2 p	±0.1pF,±0.25pF	424	200	0.125±0.013	
MSAST021SCG1R3[WNA01	TMK021 CG1R3[K-W	25	CG	C0G	1.3 p	±0.1pF,±0.25pF	426	200	0.125±0.013	
MSAST021SCG1R4[WNA01	TMK021 CG1R4[K-W	25	CG	C0G	1.4 p	±0.1pF,±0.25pF	428	200	0.125±0.013	
MSAST021SCG1R5[WNA01	TMK021 CG1R5[K-W	25	CG	C0G	1.5 p	±0.1pF,±0.25pF	430	200	0.125±0.013	
MSAST021SCG1R6[WNA01	TMK021 CG1R6[K-W	25	CG	C0G	1.6 p	±0.1pF,±0.25pF	432	200	0.125±0.013	
MSAST021SCG1R7[WNA01	TMK021 CG1R7[K-W	25	CG	C0G	1.7 p	±0.1pF,±0.25pF	434	200	0.125±0.013	
MSAST021SCG1R8[WNA01	TMK021 CG1R8[K-W	25	CG	C0G	1.8 p	±0.1pF,±0.25pF	436	200	0.125±0.013	
MSAST021SCG1R9[WNA01	TMK021 CG1R9[K-W	25	CG	C0G	1.9 p	±0.1pF,±0.25pF	438	200	0.125±0.013	
MSAST021SCG020[WNA01	TMK021 CG020[K-W	25	CG	C0G	2 p	±0.1pF,±0.25pF	440	200	0.125±0.013	
MSAST021SCG2R1[WNA01	TMK021 CG2R1[K-W	25	CG	C0G	2.1 p	±0.1pF,±0.25pF	442	200	0.125±0.013	
MSAST021SCG2R2[WNA01	TMK021 CG2R2[K-W	25	CG	C0G	2.2 p	±0.1pF,±0.25pF	444	200	0.125±0.013	
MSAST021SCG2R3[WNA01	TMK021 CG2R3[K-W	25	CG	C0G	2.3 p	±0.1pF,±0.25pF	446	200	0.125±0.013	
MSAST021SCG2R4[WNA01	TMK021 CG2R4[K-W	25	CG	C0G	2.4 p	±0.1pF,±0.25pF	448	200	0.125±0.013	
MSAST021SCG2R5[WNA01	TMK021 CG2R5[K-W	25	CG	C0G	2.5 p	±0.1pF,±0.25pF	450	200	0.125±0.013	
MSAST021SCG2R6[WNA01	TMK021 CG2R6[K-W	25	CG	C0G	2.6 p	±0.1pF,±0.25pF	452	200	0.125±0.013	
MSAST021SCG2R7[WNA01	TMK021 CG2R7[K-W	25	CG	C0G	2.7 p	±0.1pF,±0.25pF	454	200	0.125±0.013	
MSAST021SCG2R8[WNA01	TMK021 CG2R8[K-W	25	CG	C0G	2.8 p	±0.1pF,±0.25pF	456	200	0.125±0.013	
MSAST021SCG2R9[WNA01	TMK021 CG2R9[K-W	25	CG	C0G	2.9 p	±0.1pF,±0.25pF	458	200	0.125±0.013	
MSAST021SCG030[WNA01	TMK021 CG030[K-W	25	CG	C0G	3 p	±0.1pF,±0.25pF	460	200	0.125±0.013	
MSAST021SCG3R1[WNA01	TMK021 CG3R1[K-W	25	CG	C0G	3.1 p	±0.1pF,±0.25pF	462	200	0.125±0.013	
MSAST021SCG3R2[WNA01	TMK021 CG3R2[K-W	25	CG	C0G	3.2 p	±0.1pF,±0.25pF	464	200	0.125±0.013	
MSAST021SCG3R3[WNA01	TMK021 CG3R3[K-W	25	CG	C0G	3.3 p	±0.1pF,±0.25pF	466	200	0.125±0.013	
MSAST021SCG3R4[WNA01	TMK021 CG3R4[K-W	25	CG	C0G	3.4 p	±0.1pF,±0.25pF	468	200	0.125±0.013	
MSAST021SCG3R5[WNA01	TMK021 CG3R5[K-W	25	CG	C0G	3.5 p	±0.1pF,±0.25pF	470	200	0.125±0.013	
MSAST021SCG3R6[WNA01	TMK021 CG3R6[K-W	25	CG	C0G	3.6 p	±0.1pF,±0.25pF	472	200	0.125±0.013	
MSAST021SCG3R7[WNA01	TMK021 CG3R7[K-W	25	CG	C0G	3.7 p	±0.1pF,±0.25pF	474	200	0.125±0.013	
MSAST021SCG3R8[WNA01	TMK021 CG3R8[K-W	25	CG	C0G	3.8 p	±0.1pF,±0.25pF	476	200	0.125±0.013	
MSAST021SCG3R9[WNA01	TMK021 CG3R9[K-W	25	CG	C0G	3.9 p	±0.1pF,±0.25pF	478	200	0.125±0.013	
MSAST021SCG040[WNA01	TMK021 CG040[K-W	25	CG	C0G	4 p	±0.1pF,±0.25pF	480	200	0.125±0.013	
MSAST021SCG4R1[WNA01	TMK021 CG4R1[K-W	25	CG	C0G	4.1 p	±0.1pF,±0.25pF	482	200	0.125±0.013	
MSAST021SCG4R2[WNA01	TMK021 CG4R2[K-W	25	CG	C0G	4.2 p	±0.1pF,±0.25pF	484	200	0.125±0.013	
MSAST021SCG4R3[WNA01	TMK021 CG4R3[K-W	25	CG	C0G	4.3 p	±0.1pF,±0.25pF	486	200	0.125±0.013	
MSAST021SCG4R4[WNA01	TMK021 CG4R4[K-W	25	CG	C0G	4.4 p	±0.1pF,±0.25pF	488	200	0.125±0.013	
MSAST021SCG4R5[WNA01	TMK021 CG4R5[K-W	25	CG	C0G	4.5 p	±0.1pF,±0.25pF	490	200	0.125±0.013	
MSAST021SCG4R6[WNA01	TMK021 CG4R6[K-W	25	CG	C0G	4.6 p	±0.1pF,±0.25pF	492	200	0.125±0.013	
MSAST021SCG4R7[WNA01	TMK021 CG4R7[K-W	25	CG	C0G	4.7 p	±0.1pF,±0.25pF	494	200	0.125±0.013	
MSAST021SCG4R8[WNA01	TMK021 CG4R8[K-W	25	CG	C0G	4.8 p	±0.1pF,±0.25pF	496	200	0.125±0.013	
MSAST021SCG4R9[WNA01	TMK021 CG4R9[K-W	25	CG	C0G	4.9 p	±0.1pF,±0.25pF	498	200	0.125±0.013	
MSAST021SCG050[WNA01	TMK021 CG050[K-W	25	CG	C0G	5 p	±0.1pF,±0.25pF	500	200	0.125±0.013	
MSAST021SCG5R1[WNA01	TMK021 CG5R1[K-W	25	CG	C0G	5.1 p	±0.25pF,±0.5pF	502	200	0.125±0.013	

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.  
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

## PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>3</sup> [mm]	Note
								Rated voltage x %		
MSAST021SCG5R2[WNA01	TMK021 CG5R2[K-W	25	CG	C0G	5.2 p	±0.25pF,±0.5pF	504	200	0.125±0.013	
MSAST021SCG5R3[WNA01	TMK021 CG5R3[K-W	25	CG	C0G	5.3 p	±0.25pF,±0.5pF	506	200	0.125±0.013	
MSAST021SCG5R4[WNA01	TMK021 CG5R4[K-W	25	CG	C0G	5.4 p	±0.25pF,±0.5pF	508	200	0.125±0.013	
MSAST021SCG5R5[WNA01	TMK021 CG5R5[K-W	25	CG	C0G	5.5 p	±0.25pF,±0.5pF	510	200	0.125±0.013	
MSAST021SCG5R6[WNA01	TMK021 CG5R6[K-W	25	CG	C0G	5.6 p	±0.25pF,±0.5pF	512	200	0.125±0.013	
MSAST021SCG5R7[WNA01	TMK021 CG5R7[K-W	25	CG	C0G	5.7 p	±0.25pF,±0.5pF	514	200	0.125±0.013	
MSAST021SCG5R8[WNA01	TMK021 CG5R8[K-W	25	CG	C0G	5.8 p	±0.25pF,±0.5pF	516	200	0.125±0.013	
MSAST021SCG5R9[WNA01	TMK021 CG5R9[K-W	25	CG	C0G	5.9 p	±0.25pF,±0.5pF	518	200	0.125±0.013	
MSAST021SCG060[WNA01	TMK021 CG060[K-W	25	CG	C0G	6 p	±0.25pF,±0.5pF	520	200	0.125±0.013	
MSAST021SCG6R1[WNA01	TMK021 CG6R1[K-W	25	CG	C0G	6.1 p	±0.25pF,±0.5pF	522	200	0.125±0.013	
MSAST021SCG6R2[WNA01	TMK021 CG6R2[K-W	25	CG	C0G	6.2 p	±0.25pF,±0.5pF	524	200	0.125±0.013	
MSAST021SCG6R3[WNA01	TMK021 CG6R3[K-W	25	CG	C0G	6.3 p	±0.25pF,±0.5pF	526	200	0.125±0.013	
MSAST021SCG6R4[WNA01	TMK021 CG6R4[K-W	25	CG	C0G	6.4 p	±0.25pF,±0.5pF	528	200	0.125±0.013	
MSAST021SCG6R5[WNA01	TMK021 CG6R5[K-W	25	CG	C0G	6.5 p	±0.25pF,±0.5pF	530	200	0.125±0.013	
MSAST021SCG6R6[WNA01	TMK021 CG6R6[K-W	25	CG	C0G	6.6 p	±0.25pF,±0.5pF	532	200	0.125±0.013	
MSAST021SCG6R7[WNA01	TMK021 CG6R7[K-W	25	CG	C0G	6.7 p	±0.25pF,±0.5pF	534	200	0.125±0.013	
MSAST021SCG6R8[WNA01	TMK021 CG6R8[K-W	25	CG	C0G	6.8 p	±0.25pF,±0.5pF	536	200	0.125±0.013	
MSAST021SCG6R9[WNA01	TMK021 CG6R9[K-W	25	CG	C0G	6.9 p	±0.25pF,±0.5pF	538	200	0.125±0.013	
MSAST021SCG070[WNA01	TMK021 CG070[K-W	25	CG	C0G	7 p	±0.25pF,±0.5pF	540	200	0.125±0.013	
MSAST021SCG7R1[WNA01	TMK021 CG7R1[K-W	25	CG	C0G	7.1 p	±0.25pF,±0.5pF	542	200	0.125±0.013	
MSAST021SCG7R2[WNA01	TMK021 CG7R2[K-W	25	CG	C0G	7.2 p	±0.25pF,±0.5pF	544	200	0.125±0.013	
MSAST021SCG7R3[WNA01	TMK021 CG7R3[K-W	25	CG	C0G	7.3 p	±0.25pF,±0.5pF	546	200	0.125±0.013	
MSAST021SCG7R4[WNA01	TMK021 CG7R4[K-W	25	CG	C0G	7.4 p	±0.25pF,±0.5pF	548	200	0.125±0.013	
MSAST021SCG7R5[WNA01	TMK021 CG7R5[K-W	25	CG	C0G	7.5 p	±0.25pF,±0.5pF	550	200	0.125±0.013	
MSAST021SCG7R6[WNA01	TMK021 CG7R6[K-W	25	CG	C0G	7.6 p	±0.25pF,±0.5pF	552	200	0.125±0.013	
MSAST021SCG7R7[WNA01	TMK021 CG7R7[K-W	25	CG	C0G	7.7 p	±0.25pF,±0.5pF	554	200	0.125±0.013	
MSAST021SCG7R8[WNA01	TMK021 CG7R8[K-W	25	CG	C0G	7.8 p	±0.25pF,±0.5pF	556	200	0.125±0.013	
MSAST021SCG7R9[WNA01	TMK021 CG7R9[K-W	25	CG	C0G	7.9 p	±0.25pF,±0.5pF	558	200	0.125±0.013	
MSAST021SCG080[WNA01	TMK021 CG080[K-W	25	CG	C0G	8 p	±0.25pF,±0.5pF	560	200	0.125±0.013	
MSAST021SCG8R1[WNA01	TMK021 CG8R1[K-W	25	CG	C0G	8.1 p	±0.25pF,±0.5pF	562	200	0.125±0.013	
MSAST021SCG8R2[WNA01	TMK021 CG8R2[K-W	25	CG	C0G	8.2 p	±0.25pF,±0.5pF	564	200	0.125±0.013	
MSAST021SCG8R3[WNA01	TMK021 CG8R3[K-W	25	CG	C0G	8.3 p	±0.25pF,±0.5pF	566	200	0.125±0.013	
MSAST021SCG8R4[WNA01	TMK021 CG8R4[K-W	25	CG	C0G	8.4 p	±0.25pF,±0.5pF	568	200	0.125±0.013	
MSAST021SCG8R5[WNA01	TMK021 CG8R5[K-W	25	CG	C0G	8.5 p	±0.25pF,±0.5pF	570	200	0.125±0.013	
MSAST021SCG8R6[WNA01	TMK021 CG8R6[K-W	25	CG	C0G	8.6 p	±0.25pF,±0.5pF	572	200	0.125±0.013	
MSAST021SCG8R7[WNA01	TMK021 CG8R7[K-W	25	CG	C0G	8.7 p	±0.25pF,±0.5pF	574	200	0.125±0.013	
MSAST021SCG8R8[WNA01	TMK021 CG8R8[K-W	25	CG	C0G	8.8 p	±0.25pF,±0.5pF	576	200	0.125±0.013	
MSAST021SCG8R9[WNA01	TMK021 CG8R9[K-W	25	CG	C0G	8.9 p	±0.25pF,±0.5pF	578	200	0.125±0.013	
MSAST021SCG090[WNA01	TMK021 CG090[K-W	25	CG	C0G	9 p	±0.25pF,±0.5pF	580	200	0.125±0.013	
MSAST021SCG9R1[WNA01	TMK021 CG9R1[K-W	25	CG	C0G	9.1 p	±0.25pF,±0.5pF	582	200	0.125±0.013	
MSAST021SCG9R2[WNA01	TMK021 CG9R2[K-W	25	CG	C0G	9.2 p	±0.25pF,±0.5pF	584	200	0.125±0.013	
MSAST021SCG9R3[WNA01	TMK021 CG9R3[K-W	25	CG	C0G	9.3 p	±0.25pF,±0.5pF	586	200	0.125±0.013	
MSAST021SCG9R4[WNA01	TMK021 CG9R4[K-W	25	CG	C0G	9.4 p	±0.25pF,±0.5pF	588	200	0.125±0.013	
MSAST021SCG9R5[WNA01	TMK021 CG9R5[K-W	25	CG	C0G	9.5 p	±0.25pF,±0.5pF	590	200	0.125±0.013	
MSAST021SCG9R6[WNA01	TMK021 CG9R6[K-W	25	CG	C0G	9.6 p	±0.25pF,±0.5pF	592	200	0.125±0.013	
MSAST021SCG9R7[WNA01	TMK021 CG9R7[K-W	25	CG	C0G	9.7 p	±0.25pF,±0.5pF	594	200	0.125±0.013	
MSAST021SCG9R8[WNA01	TMK021 CG9R8[K-W	25	CG	C0G	9.8 p	±0.25pF,±0.5pF	596	200	0.125±0.013	
MSAST021SCG9R9[WNA01	TMK021 CG9R9[K-W	25	CG	C0G	9.9 p	±0.25pF,±0.5pF	598	200	0.125±0.013	
MSAST021SCG100[WNA01	TMK021 CG100[K-W	25	CG	C0G	10 p	±0.25pF,±0.5pF	600	200	0.125±0.013	
MSAST021SCG120JWNA01	TMK021 CG120JK-W	25	CG	C0G	12 p	±5%	640	200	0.125±0.013	
MSAST021SCG150JWNA01	TMK021 CG150JK-W	25	CG	C0G	15 p	±5%	700	200	0.125±0.013	
MSAST021SCG180JWNA01	TMK021 CG180JK-W	25	CG	C0G	18 p	±5%	760	200	0.125±0.013	
MSAST021SCG220JWNA01	TMK021 CG220JK-W	25	CG	C0G	22 p	±5%	840	200	0.125±0.013	
MSAST021SCG270JWNA01	TMK021 CG270JK-W	25	CG	C0G	27 p	±5%	940	200	0.125±0.013	
MSASE021SCG330JWNA01	EMK021 CG330JK-W	16	CG	C0G	33 p	±5%	1000	150	0.125±0.013	
MSASE021SCG390JWNA01	EMK021 CG390JK-W	16	CG	C0G	39 p	±5%	1000	150	0.125±0.013	
MSASE021SCG470JWNA01	EMK021 CG470JK-W	16	CG	C0G	47 p	±5%	1000	150	0.125±0.013	
MSASE021SCG560JWNA01	EMK021 CG560JK-W	16	CG	C0G	56 p	±5%	1000	150	0.125±0.013	
MSASL021SCG680JWNA01	LMK021 CG680JK-W	10	CG	C0G	68 p	±5%	1000	200	0.125±0.013	
MSASL021SCG820JWNA01	LMK021 CG820JK-W	10	CG	C0G	82 p	±5%	1000	200	0.125±0.013	
MSASL021SCG101JWNA01	LMK021 CG101JK-W	10	CG	C0G	100 p	±5%	1000	200	0.125±0.013	

■ PARTS NUMBER

● 0402TYPE

【Temperature Characteristic  $C\Delta : C\Delta/C0\Delta (-55\sim +125^{\circ}C)$ 】 0.2mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness*3 [mm]	Note
							Rated voltage x %		
MSAST042SCK0R4[WNA01]	TMK042 CK0R4[D-W]	25	CK C0K	0.4 p	±0.05pF, ±0.1pF, ±0.25pF	408	200	0.2±0.02	
MSAST042SCK0R5[WNA01]	TMK042 CK0R5[D-W]	25	CK C0K	0.5 p	±0.05pF, ±0.1pF, ±0.25pF	410	200	0.2±0.02	
MSAST042SCK0R6[WNA01]	TMK042 CK0R6[D-W]	25	CK C0K	0.6 p	±0.05pF, ±0.1pF, ±0.25pF	412	200	0.2±0.02	
MSAST042SCK0R7[WNA01]	TMK042 CK0R7[D-W]	25	CK C0K	0.7 p	±0.05pF, ±0.1pF, ±0.25pF	414	200	0.2±0.02	
MSAST042SCKR75[WNA01]	TMK042 CKR75[D-W]	25	CK C0K	0.75 p	±0.05pF, ±0.1pF, ±0.25pF	415	200	0.2±0.02	
MSAST042SCK0R8[WNA01]	TMK042 CK0R8[D-W]	25	CK C0K	0.8 p	±0.05pF, ±0.1pF, ±0.25pF	416	200	0.2±0.02	
MSAST042SCK0R9[WNA01]	TMK042 CK0R9[D-W]	25	CK C0K	0.9 p	±0.05pF, ±0.1pF, ±0.25pF	418	200	0.2±0.02	
MSAST042SCK010[WNA01]	TMK042 CK010[D-W]	25	CK C0K	1 p	±0.05pF, ±0.1pF, ±0.25pF	420	200	0.2±0.02	
MSAST042SCK1R1[WNA01]	TMK042 CK1R1[D-W]	25	CK C0K	1.1 p	±0.05pF, ±0.1pF, ±0.25pF	422	200	0.2±0.02	
MSAST042SCK1R2[WNA01]	TMK042 CK1R2[D-W]	25	CK C0K	1.2 p	±0.05pF, ±0.1pF, ±0.25pF	424	200	0.2±0.02	
MSAST042SCK1R3[WNA01]	TMK042 CK1R3[D-W]	25	CK C0K	1.3 p	±0.05pF, ±0.1pF, ±0.25pF	426	200	0.2±0.02	
MSAST042SCK1R4[WNA01]	TMK042 CK1R4[D-W]	25	CK C0K	1.4 p	±0.05pF, ±0.1pF, ±0.25pF	428	200	0.2±0.02	
MSAST042SCK1R5[WNA01]	TMK042 CK1R5[D-W]	25	CK C0K	1.5 p	±0.05pF, ±0.1pF, ±0.25pF	430	200	0.2±0.02	
MSAST042SCK1R6[WNA01]	TMK042 CK1R6[D-W]	25	CK C0K	1.6 p	±0.05pF, ±0.1pF, ±0.25pF	432	200	0.2±0.02	
MSAST042SCK1R7[WNA01]	TMK042 CK1R7[D-W]	25	CK C0K	1.7 p	±0.05pF, ±0.1pF, ±0.25pF	434	200	0.2±0.02	
MSAST042SCK1R8[WNA01]	TMK042 CK1R8[D-W]	25	CK C0K	1.8 p	±0.05pF, ±0.1pF, ±0.25pF	436	200	0.2±0.02	
MSAST042SCK1R9[WNA01]	TMK042 CK1R9[D-W]	25	CK C0K	1.9 p	±0.05pF, ±0.1pF, ±0.25pF	438	200	0.2±0.02	
MSAST042SCK020[WNA01]	TMK042 CK020[D-W]	25	CK C0K	2 p	±0.05pF, ±0.1pF, ±0.25pF	440	200	0.2±0.02	
MSAST042SCK2R1[WNA01]	TMK042 CK2R1[D-W]	25	CK C0K	2.1 p	±0.05pF, ±0.1pF, ±0.25pF	442	200	0.2±0.02	
MSAST042SCK2R2[WNA01]	TMK042 CK2R2[D-W]	25	CK C0K	2.2 p	±0.05pF, ±0.1pF, ±0.25pF	444	200	0.2±0.02	
MSAST042SCK2R3[WNA01]	TMK042 CK2R3[D-W]	25	CK C0K	2.3 p	±0.05pF, ±0.1pF, ±0.25pF	446	200	0.2±0.02	
MSAST042SCK2R4[WNA01]	TMK042 CK2R4[D-W]	25	CK C0K	2.4 p	±0.05pF, ±0.1pF, ±0.25pF	448	200	0.2±0.02	
MSAST042SCK2R5[WNA01]	TMK042 CK2R5[D-W]	25	CK C0K	2.5 p	±0.05pF, ±0.1pF, ±0.25pF	450	200	0.2±0.02	
MSAST042SCK2R6[WNA01]	TMK042 CK2R6[D-W]	25	CK C0K	2.6 p	±0.05pF, ±0.1pF, ±0.25pF	452	200	0.2±0.02	
MSAST042SCK2R7[WNA01]	TMK042 CK2R7[D-W]	25	CK C0K	2.7 p	±0.05pF, ±0.1pF, ±0.25pF	454	200	0.2±0.02	
MSAST042SCK2R8[WNA01]	TMK042 CK2R8[D-W]	25	CK C0K	2.8 p	±0.05pF, ±0.1pF, ±0.25pF	456	200	0.2±0.02	
MSAST042SCK2R9[WNA01]	TMK042 CK2R9[D-W]	25	CK C0K	2.9 p	±0.05pF, ±0.1pF, ±0.25pF	458	200	0.2±0.02	
MSAST042SCK030[WNA01]	TMK042 CJ030[D-W]	25	CJ C0J	3 p	±0.05pF, ±0.1pF, ±0.25pF	460	200	0.2±0.02	
MSAST042SCKJ3R1[WNA01]	TMK042 CJ3R1[D-W]	25	CJ C0J	3.1 p	±0.1pF, ±0.25pF	462	200	0.2±0.02	
MSAST042SCKJ3R2[WNA01]	TMK042 CJ3R2[D-W]	25	CJ C0J	3.2 p	±0.1pF, ±0.25pF	464	200	0.2±0.02	
MSAST042SCKJ3R3[WNA01]	TMK042 CJ3R3[D-W]	25	CJ C0J	3.3 p	±0.1pF, ±0.25pF	466	200	0.2±0.02	
MSAST042SCKJ3R4[WNA01]	TMK042 CJ3R4[D-W]	25	CJ C0J	3.4 p	±0.1pF, ±0.25pF	468	200	0.2±0.02	
MSAST042SCKJ3R5[WNA01]	TMK042 CJ3R5[D-W]	25	CJ C0J	3.5 p	±0.1pF, ±0.25pF	470	200	0.2±0.02	
MSAST042SCKJ3R6[WNA01]	TMK042 CJ3R6[D-W]	25	CJ C0J	3.6 p	±0.1pF, ±0.25pF	472	200	0.2±0.02	
MSAST042SCKJ3R7[WNA01]	TMK042 CJ3R7[D-W]	25	CJ C0J	3.7 p	±0.1pF, ±0.25pF	474	200	0.2±0.02	
MSAST042SCKJ3R8[WNA01]	TMK042 CJ3R8[D-W]	25	CJ C0J	3.8 p	±0.1pF, ±0.25pF	476	200	0.2±0.02	
MSAST042SCKJ3R9[WNA01]	TMK042 CJ3R9[D-W]	25	CJ C0J	3.9 p	±0.1pF, ±0.25pF	478	200	0.2±0.02	
MSAST042SCH040[WNA01]	TMK042 CH040[D-W]	25	CH C0H	4 p	±0.1pF, ±0.25pF	480	200	0.2±0.02	
MSAST042SCH4R1[WNA01]	TMK042 CH4R1[D-W]	25	CH C0H	4.1 p	±0.1pF, ±0.25pF	482	200	0.2±0.02	
MSAST042SCH4R2[WNA01]	TMK042 CH4R2[D-W]	25	CH C0H	4.2 p	±0.1pF, ±0.25pF	484	200	0.2±0.02	
MSAST042SCH4R3[WNA01]	TMK042 CH4R3[D-W]	25	CH C0H	4.3 p	±0.1pF, ±0.25pF	486	200	0.2±0.02	
MSAST042SCH4R4[WNA01]	TMK042 CH4R4[D-W]	25	CH C0H	4.4 p	±0.1pF, ±0.25pF	488	200	0.2±0.02	
MSAST042SCH4R5[WNA01]	TMK042 CH4R5[D-W]	25	CH C0H	4.5 p	±0.1pF, ±0.25pF	490	200	0.2±0.02	
MSAST042SCH4R6[WNA01]	TMK042 CH4R6[D-W]	25	CH C0H	4.6 p	±0.1pF, ±0.25pF	492	200	0.2±0.02	
MSAST042SCH4R7[WNA01]	TMK042 CH4R7[D-W]	25	CH C0H	4.7 p	±0.1pF, ±0.25pF	494	200	0.2±0.02	
MSAST042SCH4R8[WNA01]	TMK042 CH4R8[D-W]	25	CH C0H	4.8 p	±0.1pF, ±0.25pF	496	200	0.2±0.02	
MSAST042SCH4R9[WNA01]	TMK042 CH4R9[D-W]	25	CH C0H	4.9 p	±0.1pF, ±0.25pF	498	200	0.2±0.02	
MSAST042SCH050[WNA01]	TMK042 CH050[D-W]	25	CH C0H	5 p	±0.1pF, ±0.25pF	500	200	0.2±0.02	
MSAST042SCH5R1[WNA01]	TMK042 CH5R1[D-W]	25	CH C0H	5.1 p	±0.1pF, ±0.25pF, ±0.5pF	502	200	0.2±0.02	
MSAST042SCH5R2[WNA01]	TMK042 CH5R2[D-W]	25	CH C0H	5.2 p	±0.1pF, ±0.25pF, ±0.5pF	504	200	0.2±0.02	
MSAST042SCH5R3[WNA01]	TMK042 CH5R3[D-W]	25	CH C0H	5.3 p	±0.1pF, ±0.25pF, ±0.5pF	506	200	0.2±0.02	
MSAST042SCH5R4[WNA01]	TMK042 CH5R4[D-W]	25	CH C0H	5.4 p	±0.1pF, ±0.25pF, ±0.5pF	508	200	0.2±0.02	
MSAST042SCH5R5[WNA01]	TMK042 CH5R5[D-W]	25	CH C0H	5.5 p	±0.1pF, ±0.25pF, ±0.5pF	510	200	0.2±0.02	
MSAST042SCH5R6[WNA01]	TMK042 CH5R6[D-W]	25	CH C0H	5.6 p	±0.1pF, ±0.25pF, ±0.5pF	512	200	0.2±0.02	
MSAST042SCH5R7[WNA01]	TMK042 CH5R7[D-W]	25	CH C0H	5.7 p	±0.1pF, ±0.25pF, ±0.5pF	514	200	0.2±0.02	
MSAST042SCH5R8[WNA01]	TMK042 CH5R8[D-W]	25	CH C0H	5.8 p	±0.1pF, ±0.25pF, ±0.5pF	516	200	0.2±0.02	
MSAST042SCH5R9[WNA01]	TMK042 CH5R9[D-W]	25	CH C0H	5.9 p	±0.1pF, ±0.25pF, ±0.5pF	518	200	0.2±0.02	
MSAST042SCH060[WNA01]	TMK042 CH060[D-W]	25	CH C0H	6 p	±0.1pF, ±0.25pF, ±0.5pF	520	200	0.2±0.02	
MSAST042SCH6R1[WNA01]	TMK042 CH6R1[D-W]	25	CH C0H	6.1 p	±0.1pF, ±0.25pF, ±0.5pF	522	200	0.2±0.02	
MSAST042SCH6R2[WNA01]	TMK042 CH6R2[D-W]	25	CH C0H	6.2 p	±0.1pF, ±0.25pF, ±0.5pF	524	200	0.2±0.02	
MSAST042SCH6R3[WNA01]	TMK042 CH6R3[D-W]	25	CH C0H	6.3 p	±0.1pF, ±0.25pF, ±0.5pF	526	200	0.2±0.02	
MSAST042SCH6R4[WNA01]	TMK042 CH6R4[D-W]	25	CH C0H	6.4 p	±0.1pF, ±0.25pF, ±0.5pF	528	200	0.2±0.02	
MSAST042SCH6R5[WNA01]	TMK042 CH6R5[D-W]	25	CH C0H	6.5 p	±0.1pF, ±0.25pF, ±0.5pF	530	200	0.2±0.02	
MSAST042SCH6R6[WNA01]	TMK042 CH6R6[D-W]	25	CH C0H	6.6 p	±0.1pF, ±0.25pF, ±0.5pF	532	200	0.2±0.02	
MSAST042SCH6R7[WNA01]	TMK042 CH6R7[D-W]	25	CH C0H	6.7 p	±0.1pF, ±0.25pF, ±0.5pF	534	200	0.2±0.02	
MSAST042SCH6R8[WNA01]	TMK042 CH6R8[D-W]	25	CH C0H	6.8 p	±0.1pF, ±0.25pF, ±0.5pF	536	200	0.2±0.02	
MSAST042SCH6R9[WNA01]	TMK042 CH6R9[D-W]	25	CH C0H	6.9 p	±0.1pF, ±0.25pF, ±0.5pF	538	200	0.2±0.02	
MSAST042SCH070[WNA01]	TMK042 CH070[D-W]	25	CH C0H	7 p	±0.1pF, ±0.25pF, ±0.5pF	540	200	0.2±0.02	
MSAST042SCH7R1[WNA01]	TMK042 CH7R1[D-W]	25	CH C0H	7.1 p	±0.1pF, ±0.25pF, ±0.5pF	542	200	0.2±0.02	
MSAST042SCH7R2[WNA01]	TMK042 CH7R2[D-W]	25	CH C0H	7.2 p	±0.1pF, ±0.25pF, ±0.5pF	544	200	0.2±0.02	
MSAST042SCH7R3[WNA01]	TMK042 CH7R3[D-W]	25	CH C0H	7.3 p	±0.1pF, ±0.25pF, ±0.5pF	546	200	0.2±0.02	
MSAST042SCH7R4[WNA01]	TMK042 CH7R4[D-W]	25	CH C0H	7.4 p	±0.1pF, ±0.25pF, ±0.5pF	548	200	0.2±0.02	
MSAST042SCH7R5[WNA01]	TMK042 CH7R5[D-W]	25	CH C0H	7.5 p	±0.1pF, ±0.25pF, ±0.5pF	550	200	0.2±0.02	
MSAST042SCH7R6[WNA01]	TMK042 CH7R6[D-W]	25	CH C0H	7.6 p	±0.1pF, ±0.25pF, ±0.5pF	552	200	0.2±0.02	
MSAST042SCH7R7[WNA01]	TMK042 CH7R7[D-W]	25	CH C0H	7.7 p	±0.1pF, ±0.25pF, ±0.5pF	554	200	0.2±0.02	
MSAST042SCH7R8[WNA01]	TMK042 CH7R8[D-W]	25	CH C0H	7.8 p	±0.1pF, ±0.25pF, ±0.5pF	556	200	0.2±0.02	
MSAST042SCH7R9[WNA01]	TMK042 CH7R9[D-W]	25	CH C0H	7.9 p	±0.1pF, ±0.25pF, ±0.5pF	558	200	0.2±0.02	
MSAST042SCH080[WNA01]	TMK042 CH080[D-W]	25	CH C0H	8 p	±0.1pF, ±0.25pF, ±0.5pF	560	200	0.2±0.02	
MSAST042SCH8R1[WNA01]	TMK042 CH8R1[D-W]	25	CH C0H	8.1 p	±0.1pF, ±0.25pF, ±0.5pF	562	200	0.2±0.02	
MSAST042SCH8R2[WNA01]	TMK042 CH8R2[D-W]	25	CH C0H	8.2 p	±0.1pF, ±0.25pF, ±0.5pF	564	200	0.2±0.02	
MSAST042SCH8R3[WNA01]	TMK042 CH8R3[D-W]	25	CH C0H	8.3 p	±0.1pF, ±0.25pF, ±0.5pF	566	200	0.2±0.02	
MSAST042SCH8R4[WNA01]	TMK042 CH8R4[D-W]	25	CH C0H	8.4 p	±0.1pF, ±0.25pF, ±0.5pF	568	200	0.2±0.02	
MSAST042SCH8R5[WNA01]	TMK042 CH8R5[D-W]	25	CH C0H	8.5 p	±0.1pF, ±0.25pF, ±0.5pF	570	200	0.2±0.02	
MSAST042SCH8R6[WNA01]	TMK042 CH8R6[D-W]	25	CH C0H	8.6 p	±0.1pF, ±0.25pF, ±0.5pF	572	200	0.2±0.02	

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

■ PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>3)</sup> [mm]	Note
								Rated voltage x %		
MSAST042SCH8R7[WNA01	TMK042 CH8R7[D-W	25	CH	C0H	8.7 p	±0.1pF, ±0.25pF, ±0.5pF	574	200	0.2±0.02	
MSAST042SCH8R8[WNA01	TMK042 CH8R8[D-W	25	CH	C0H	8.8 p	±0.1pF, ±0.25pF, ±0.5pF	576	200	0.2±0.02	
MSAST042SCH8R9[WNA01	TMK042 CH8R9[D-W	25	CH	C0H	8.9 p	±0.1pF, ±0.25pF, ±0.5pF	578	200	0.2±0.02	
MSAST042SCH900[WNA01	TMK042 CH900[D-W	25	CH	C0H	9 p	±0.1pF, ±0.25pF, ±0.5pF	580	200	0.2±0.02	
MSAST042SCH9R1[WNA01	TMK042 CH9R1[D-W	25	CH	C0H	9.1 p	±0.1pF, ±0.25pF, ±0.5pF	582	200	0.2±0.02	
MSAST042SCH9R2[WNA01	TMK042 CH9R2[D-W	25	CH	C0H	9.2 p	±0.1pF, ±0.25pF, ±0.5pF	584	200	0.2±0.02	
MSAST042SCH9R3[WNA01	TMK042 CH9R3[D-W	25	CH	C0H	9.3 p	±0.1pF, ±0.25pF, ±0.5pF	586	200	0.2±0.02	
MSAST042SCH9R4[WNA01	TMK042 CH9R4[D-W	25	CH	C0H	9.4 p	±0.1pF, ±0.25pF, ±0.5pF	588	200	0.2±0.02	
MSAST042SCH9R5[WNA01	TMK042 CH9R5[D-W	25	CH	C0H	9.5 p	±0.1pF, ±0.25pF, ±0.5pF	590	200	0.2±0.02	
MSAST042SCH9R6[WNA01	TMK042 CH9R6[D-W	25	CH	C0H	9.6 p	±0.1pF, ±0.25pF, ±0.5pF	592	200	0.2±0.02	
MSAST042SCH9R7[WNA01	TMK042 CH9R7[D-W	25	CH	C0H	9.7 p	±0.1pF, ±0.25pF, ±0.5pF	594	200	0.2±0.02	
MSAST042SCH9R8[WNA01	TMK042 CH9R8[D-W	25	CH	C0H	9.8 p	±0.1pF, ±0.25pF, ±0.5pF	596	200	0.2±0.02	
MSAST042SCH9R9[WNA01	TMK042 CH9R9[D-W	25	CH	C0H	9.9 p	±0.1pF, ±0.25pF, ±0.5pF	598	200	0.2±0.02	
MSAST042SCH100D[WNA01	TMK042 CH100DD-W	25	CH	C0H	10 p	±0.5pF	600	200	0.2±0.02	
MSAST042SCH110J[WNA01	TMK042 CH110JD-W	25	CH	C0H	11 p	±5%	620	200	0.2±0.02	
MSAST042SCH120J[WNA01	TMK042 CH120JD-W	25	CH	C0H	12 p	±5%	640	200	0.2±0.02	
MSAST042SCH130J[WNA01	TMK042 CH130JD-W	25	CH	C0H	13 p	±5%	660	200	0.2±0.02	
MSAST042SCH150J[WNA01	TMK042 CH150JD-W	25	CH	C0H	15 p	±5%	700	200	0.2±0.02	
MSAST042SCH160J[WNA01	TMK042 CH160JC-W	25	CH	C0H	16 p	±5%	720	200	0.2±0.02	
MSAST042SCH180J[WNA01	TMK042 CH180JC-W	25	CH	C0H	18 p	±5%	760	200	0.2±0.02	
MSAST042SCH200J[WNA01	TMK042 CH200JC-W	25	CH	C0H	20 p	±5%	800	200	0.2±0.02	
MSAST042SCH220J[WNA01	TMK042 CH220JC-W	25	CH	C0H	22 p	±5%	840	200	0.2±0.02	
MSAST042SCH240J[WNA01	TMK042 CH240JC-W	25	CH	C0H	24 p	±5%	880	200	0.2±0.02	
MSAST042SCH270J[WNA01	TMK042 CH270JC-W	25	CH	C0H	27 p	±5%	940	200	0.2±0.02	
MSAST042SCH300J[WNA01	TMK042 CH300JC-W	25	CH	C0H	30 p	±5%	1000	200	0.2±0.02	
MSAST042SCH330J[WNA01	TMK042 CH330JC-W	25	CH	C0H	33 p	±5%	1000	200	0.2±0.02	
MSAST042SCH360J[WNA01	TMK042 CH360JC-W	25	CH	C0H	36 p	±5%	1000	200	0.2±0.02	
MSAST042SCH390J[WNA01	TMK042 CH390JC-W	25	CH	C0H	39 p	±5%	1000	200	0.2±0.02	
MSAST042SCH430J[WNA01	TMK042 CH430JC-W	25	CH	C0H	43 p	±5%	1000	200	0.2±0.02	
MSAST042SCH470J[WNA01	TMK042 CH470JC-W	25	CH	C0H	47 p	±5%	1000	200	0.2±0.02	
MSAST042SCH510J[WNA01	TMK042 CH510JC-W	25	CH	C0H	51 p	±5%	1000	200	0.2±0.02	
MSAST042SCH560J[WNA01	TMK042 CH560JC-W	25	CH	C0H	56 p	±5%	1000	200	0.2±0.02	
MSAST042SCH620J[WNA01	TMK042 CH620JC-W	25	CH	C0H	62 p	±5%	1000	200	0.2±0.02	
MSAST042SCH680J[WNA01	TMK042 CH680JC-W	25	CH	C0H	68 p	±5%	1000	200	0.2±0.02	
MSAST042SCH750J[WNA01	TMK042 CH750JC-W	25	CH	C0H	75 p	±5%	1000	200	0.2±0.02	
MSAST042SCH820J[WNA01	TMK042 CH820JC-W	25	CH	C0H	82 p	±5%	1000	200	0.2±0.02	
MSAST042SCH910J[WNA01	TMK042 CH910JC-W	25	CH	C0H	91 p	±5%	1000	200	0.2±0.02	
MSAST042SCH101J[WNA01	TMK042 CH101JC-W	25	CH	C0H	100 p	±5%	1000	200	0.2±0.02	

【Temperature Characteristic  $\Delta C : \Delta C / C0 \Delta (-55 \sim +125^{\circ}\text{C})$ 】 0.2mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>3)</sup> [mm]	Note
								Rated voltage x %		
MSASE042SCK0R4[WNA01	EMK042 CK0R4[D-W	16	CK	C0K	0.4 p	±0.05pF, ±0.1pF, ±0.25pF	408	200	0.2±0.02	
MSASE042SCK0R5[WNA01	EMK042 CK0R5[D-W	16	CK	C0K	0.5 p	±0.05pF, ±0.1pF, ±0.25pF	410	200	0.2±0.02	
MSASE042SCK0R6[WNA01	EMK042 CK0R6[D-W	16	CK	C0K	0.6 p	±0.05pF, ±0.1pF, ±0.25pF	412	200	0.2±0.02	
MSASE042SCK0R7[WNA01	EMK042 CK0R7[D-W	16	CK	C0K	0.7 p	±0.05pF, ±0.1pF, ±0.25pF	414	200	0.2±0.02	
MSASE042SCKR75[WNA01	EMK042 CKR75[D-W	16	CK	C0K	0.75 p	±0.05pF, ±0.1pF, ±0.25pF	415	200	0.2±0.02	
MSASE042SCK0R8[WNA01	EMK042 CK0R8[D-W	16	CK	C0K	0.8 p	±0.05pF, ±0.1pF, ±0.25pF	416	200	0.2±0.02	
MSASE042SCK0R9[WNA01	EMK042 CK0R9[D-W	16	CK	C0K	0.9 p	±0.05pF, ±0.1pF, ±0.25pF	418	200	0.2±0.02	
MSASE042SCK010[WNA01	EMK042 CK010[D-W	16	CK	C0K	1 p	±0.05pF, ±0.1pF, ±0.25pF	420	200	0.2±0.02	
MSASE042SCK1R1[WNA01	EMK042 CK1R1[D-W	16	CK	C0K	1.1 p	±0.05pF, ±0.1pF, ±0.25pF	422	200	0.2±0.02	
MSASE042SCK1R2[WNA01	EMK042 CK1R2[D-W	16	CK	C0K	1.2 p	±0.05pF, ±0.1pF, ±0.25pF	424	200	0.2±0.02	
MSASE042SCK1R3[WNA01	EMK042 CK1R3[D-W	16	CK	C0K	1.3 p	±0.05pF, ±0.1pF, ±0.25pF	426	200	0.2±0.02	
MSASE042SCK1R4[WNA01	EMK042 CK1R4[D-W	16	CK	C0K	1.4 p	±0.05pF, ±0.1pF, ±0.25pF	428	200	0.2±0.02	
MSASE042SCK1R5[WNA01	EMK042 CK1R5[D-W	16	CK	C0K	1.5 p	±0.05pF, ±0.1pF, ±0.25pF	430	200	0.2±0.02	
MSASE042SCK1R6[WNA01	EMK042 CK1R6[D-W	16	CK	C0K	1.6 p	±0.05pF, ±0.1pF, ±0.25pF	432	200	0.2±0.02	
MSASE042SCK1R7[WNA01	EMK042 CK1R7[D-W	16	CK	C0K	1.7 p	±0.05pF, ±0.1pF, ±0.25pF	434	200	0.2±0.02	
MSASE042SCK1R8[WNA01	EMK042 CK1R8[D-W	16	CK	C0K	1.8 p	±0.05pF, ±0.1pF, ±0.25pF	436	200	0.2±0.02	
MSASE042SCK1R9[WNA01	EMK042 CK1R9[D-W	16	CK	C0K	1.9 p	±0.05pF, ±0.1pF, ±0.25pF	438	200	0.2±0.02	
MSASE042SCK020[WNA01	EMK042 CK020[D-W	16	CK	C0K	2 p	±0.05pF, ±0.1pF, ±0.25pF	440	200	0.2±0.02	
MSASE042SCK2R1[WNA01	EMK042 CK2R1[D-W	16	CK	C0K	2.1 p	±0.05pF, ±0.1pF, ±0.25pF	442	200	0.2±0.02	
MSASE042SCK2R2[WNA01	EMK042 CK2R2[D-W	16	CK	C0K	2.2 p	±0.05pF, ±0.1pF, ±0.25pF	444	200	0.2±0.02	
MSASE042SCK2R3[WNA01	EMK042 CK2R3[D-W	16	CK	C0K	2.3 p	±0.05pF, ±0.1pF, ±0.25pF	446	200	0.2±0.02	
MSASE042SCK2R4[WNA01	EMK042 CK2R4[D-W	16	CK	C0K	2.4 p	±0.05pF, ±0.1pF, ±0.25pF	448	200	0.2±0.02	
MSASE042SCK2R5[WNA01	EMK042 CK2R5[D-W	16	CK	C0K	2.5 p	±0.05pF, ±0.1pF, ±0.25pF	450	200	0.2±0.02	
MSASE042SCK2R6[WNA01	EMK042 CK2R6[D-W	16	CK	C0K	2.6 p	±0.05pF, ±0.1pF, ±0.25pF	452	200	0.2±0.02	
MSASE042SCK2R7[WNA01	EMK042 CK2R7[D-W	16	CK	C0K	2.7 p	±0.05pF, ±0.1pF, ±0.25pF	454	200	0.2±0.02	
MSASE042SCK2R8[WNA01	EMK042 CK2R8[D-W	16	CK	C0K	2.8 p	±0.05pF, ±0.1pF, ±0.25pF	456	200	0.2±0.02	
MSASE042SCK2R9[WNA01	EMK042 CK2R9[D-W	16	CK	C0K	2.9 p	±0.05pF, ±0.1pF, ±0.25pF	458	200	0.2±0.02	
MSASE042SCJ030[WNA01	EMK042 CJ030[D-W	16	CJ	C0J	3 p	±0.05pF, ±0.1pF, ±0.25pF	460	200	0.2±0.02	
MSASE042SCJ3R1[WNA01	EMK042 CJ3R1[D-W	16	CJ	C0J	3.1 p	±0.1pF, ±0.25pF	462	200	0.2±0.02	
MSASE042SCJ3R2[WNA01	EMK042 CJ3R2[D-W	16	CJ	C0J	3.2 p	±0.1pF, ±0.25pF	464	200	0.2±0.02	
MSASE042SCJ3R3[WNA01	EMK042 CJ3R3[D-W	16	CJ	C0J	3.3 p	±0.1pF, ±0.25pF	466	200	0.2±0.02	
MSASE042SCJ3R4[WNA01	EMK042 CJ3R4[D-W	16	CJ	C0J	3.4 p	±0.1pF, ±0.25pF	468	200	0.2±0.02	
MSASE042SCJ3R5[WNA01	EMK042 CJ3R5[D-W	16	CJ	C0J	3.5 p	±0.1pF, ±0.25pF	470	200	0.2±0.02	
MSASE042SCJ3R6[WNA01	EMK042 CJ3R6[D-W	16	CJ	C0J	3.6 p	±0.1pF, ±0.25pF	472	200	0.2±0.02	
MSASE042SCJ3R7[WNA01	EMK042 CJ3R7[D-W	16	CJ	C0J	3.7 p	±0.1pF, ±0.25pF	474	200	0.2±0.02	
MSASE042SCJ3R8[WNA01	EMK042 CJ3R8[D-W	16	CJ	C0J	3.8 p	±0.1pF, ±0.25pF	476	200	0.2±0.02	
MSASE042SCJ3R9[WNA01	EMK042 CJ3R9[D-W	16	CJ	C0J	3.9 p	±0.1pF, ±0.25pF	478	200	0.2±0.02	
MSASE042SCH040[WNA01	EMK042 CH040[D-W	16	CH	C0H	4 p	±0.1pF, ±0.25pF	480	200	0.2±0.02	
MSASE042SCH4R1[WNA01	EMK042 CH4R1[D-W	16	CH	C0H	4.1 p	±0.1pF, ±0.25pF	482	200	0.2±0.02	
MSASE042SCH4R2[WNA01	EMK042 CH4R2[D-W	16	CH	C0H	4.2 p	±0.1pF, ±0.25pF	484	200	0.2±0.02	
MSASE042SCH4R3[WNA01	EMK042 CH4R3[D-W	16	CH	C0H	4.3 p	±0.1pF, ±0.25pF	486	200	0.2±0.02	
MSASE042SCH4R4[WNA01	EMK042 CH4R4[D-W	16	CH	C0H	4.4 p	±0.1pF, ±0.25pF	488	200	0.2±0.02	
MSASE042SCH4R5[WNA01	EMK042 CH4R5[D-W	16	CH	C0H	4.5 p	±0.1pF, ±0.25pF	490	200	0.2±0.02	

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■ PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>3)</sup> [mm]	Note
								Rated voltage x %		
MSASE042SCH4R6[WNA01	EMK042 CH4R6[D-W	16	CH	C0H	4.6 p	±0.1pF, ±0.25pF	492	200	0.2±0.02	
MSASE042SCH4R7[WNA01	EMK042 CH4R7[D-W	16	CH	C0H	4.7 p	±0.1pF, ±0.25pF	494	200	0.2±0.02	
MSASE042SCH4R8[WNA01	EMK042 CH4R8[D-W	16	CH	C0H	4.8 p	±0.1pF, ±0.25pF	496	200	0.2±0.02	
MSASE042SCH4R9[WNA01	EMK042 CH4R9[D-W	16	CH	C0H	4.9 p	±0.1pF, ±0.25pF	498	200	0.2±0.02	
MSASE042SCH050[WNA01	EMK042 CH050[D-W	16	CH	C0H	5 p	±0.1pF, ±0.25pF	500	200	0.2±0.02	
MSASE042SCH5R1[WNA01	EMK042 CH5R1[D-W	16	CH	C0H	5.1 p	±0.1pF, ±0.25pF, ±0.5pF	502	200	0.2±0.02	
MSASE042SCH5R2[WNA01	EMK042 CH5R2[D-W	16	CH	C0H	5.2 p	±0.1pF, ±0.25pF, ±0.5pF	504	200	0.2±0.02	
MSASE042SCH5R3[WNA01	EMK042 CH5R3[D-W	16	CH	C0H	5.3 p	±0.1pF, ±0.25pF, ±0.5pF	506	200	0.2±0.02	
MSASE042SCH5R4[WNA01	EMK042 CH5R4[D-W	16	CH	C0H	5.4 p	±0.1pF, ±0.25pF, ±0.5pF	508	200	0.2±0.02	
MSASE042SCH5R5[WNA01	EMK042 CH5R5[D-W	16	CH	C0H	5.5 p	±0.1pF, ±0.25pF, ±0.5pF	510	200	0.2±0.02	
MSASE042SCH5R6[WNA01	EMK042 CH5R6[D-W	16	CH	C0H	5.6 p	±0.1pF, ±0.25pF, ±0.5pF	512	200	0.2±0.02	
MSASE042SCH5R7[WNA01	EMK042 CH5R7[D-W	16	CH	C0H	5.7 p	±0.1pF, ±0.25pF, ±0.5pF	514	200	0.2±0.02	
MSASE042SCH5R8[WNA01	EMK042 CH5R8[D-W	16	CH	C0H	5.8 p	±0.1pF, ±0.25pF, ±0.5pF	516	200	0.2±0.02	
MSASE042SCH5R9[WNA01	EMK042 CH5R9[D-W	16	CH	C0H	5.9 p	±0.1pF, ±0.25pF, ±0.5pF	518	200	0.2±0.02	
MSASE042SCH060[WNA01	EMK042 CH060[D-W	16	CH	C0H	6 p	±0.1pF, ±0.25pF, ±0.5pF	520	200	0.2±0.02	
MSASE042SCH6R1[WNA01	EMK042 CH6R1[D-W	16	CH	C0H	6.1 p	±0.1pF, ±0.25pF, ±0.5pF	522	200	0.2±0.02	
MSASE042SCH6R2[WNA01	EMK042 CH6R2[D-W	16	CH	C0H	6.2 p	±0.1pF, ±0.25pF, ±0.5pF	524	200	0.2±0.02	
MSASE042SCH6R3[WNA01	EMK042 CH6R3[D-W	16	CH	C0H	6.3 p	±0.1pF, ±0.25pF, ±0.5pF	526	200	0.2±0.02	
MSASE042SCH6R4[WNA01	EMK042 CH6R4[D-W	16	CH	C0H	6.4 p	±0.1pF, ±0.25pF, ±0.5pF	528	200	0.2±0.02	
MSASE042SCH6R5[WNA01	EMK042 CH6R5[D-W	16	CH	C0H	6.5 p	±0.1pF, ±0.25pF, ±0.5pF	530	200	0.2±0.02	
MSASE042SCH6R6[WNA01	EMK042 CH6R6[D-W	16	CH	C0H	6.6 p	±0.1pF, ±0.25pF, ±0.5pF	532	200	0.2±0.02	
MSASE042SCH6R7[WNA01	EMK042 CH6R7[D-W	16	CH	C0H	6.7 p	±0.1pF, ±0.25pF, ±0.5pF	534	200	0.2±0.02	
MSASE042SCH6R8[WNA01	EMK042 CH6R8[D-W	16	CH	C0H	6.8 p	±0.1pF, ±0.25pF, ±0.5pF	536	200	0.2±0.02	
MSASE042SCH6R9[WNA01	EMK042 CH6R9[D-W	16	CH	C0H	6.9 p	±0.1pF, ±0.25pF, ±0.5pF	538	200	0.2±0.02	
MSASE042SCH070[WNA01	EMK042 CH070[D-W	16	CH	C0H	7 p	±0.1pF, ±0.25pF, ±0.5pF	540	200	0.2±0.02	
MSASE042SCH7R1[WNA01	EMK042 CH7R1[D-W	16	CH	C0H	7.1 p	±0.1pF, ±0.25pF, ±0.5pF	542	200	0.2±0.02	
MSASE042SCH7R2[WNA01	EMK042 CH7R2[D-W	16	CH	C0H	7.2 p	±0.1pF, ±0.25pF, ±0.5pF	544	200	0.2±0.02	
MSASE042SCH7R3[WNA01	EMK042 CH7R3[D-W	16	CH	C0H	7.3 p	±0.1pF, ±0.25pF, ±0.5pF	546	200	0.2±0.02	
MSASE042SCH7R4[WNA01	EMK042 CH7R4[D-W	16	CH	C0H	7.4 p	±0.1pF, ±0.25pF, ±0.5pF	548	200	0.2±0.02	
MSASE042SCH7R5[WNA01	EMK042 CH7R5[D-W	16	CH	C0H	7.5 p	±0.1pF, ±0.25pF, ±0.5pF	550	200	0.2±0.02	
MSASE042SCH7R6[WNA01	EMK042 CH7R6[D-W	16	CH	C0H	7.6 p	±0.1pF, ±0.25pF, ±0.5pF	552	200	0.2±0.02	
MSASE042SCH7R7[WNA01	EMK042 CH7R7[D-W	16	CH	C0H	7.7 p	±0.1pF, ±0.25pF, ±0.5pF	554	200	0.2±0.02	
MSASE042SCH7R8[WNA01	EMK042 CH7R8[D-W	16	CH	C0H	7.8 p	±0.1pF, ±0.25pF, ±0.5pF	556	200	0.2±0.02	
MSASE042SCH7R9[WNA01	EMK042 CH7R9[D-W	16	CH	C0H	7.9 p	±0.1pF, ±0.25pF, ±0.5pF	558	200	0.2±0.02	
MSASE042SCH080[WNA01	EMK042 CH080[D-W	16	CH	C0H	8 p	±0.1pF, ±0.25pF, ±0.5pF	560	200	0.2±0.02	
MSASE042SCH8R1[WNA01	EMK042 CH8R1[D-W	16	CH	C0H	8.1 p	±0.1pF, ±0.25pF, ±0.5pF	562	200	0.2±0.02	
MSASE042SCH8R2[WNA01	EMK042 CH8R2[D-W	16	CH	C0H	8.2 p	±0.1pF, ±0.25pF, ±0.5pF	564	200	0.2±0.02	
MSASE042SCH8R3[WNA01	EMK042 CH8R3[D-W	16	CH	C0H	8.3 p	±0.1pF, ±0.25pF, ±0.5pF	566	200	0.2±0.02	
MSASE042SCH8R4[WNA01	EMK042 CH8R4[D-W	16	CH	C0H	8.4 p	±0.1pF, ±0.25pF, ±0.5pF	568	200	0.2±0.02	
MSASE042SCH8R5[WNA01	EMK042 CH8R5[D-W	16	CH	C0H	8.5 p	±0.1pF, ±0.25pF, ±0.5pF	570	200	0.2±0.02	
MSASE042SCH8R6[WNA01	EMK042 CH8R6[D-W	16	CH	C0H	8.6 p	±0.1pF, ±0.25pF, ±0.5pF	572	200	0.2±0.02	
MSASE042SCH8R7[WNA01	EMK042 CH8R7[D-W	16	CH	C0H	8.7 p	±0.1pF, ±0.25pF, ±0.5pF	574	200	0.2±0.02	
MSASE042SCH8R8[WNA01	EMK042 CH8R8[D-W	16	CH	C0H	8.8 p	±0.1pF, ±0.25pF, ±0.5pF	576	200	0.2±0.02	
MSASE042SCH8R9[WNA01	EMK042 CH8R9[D-W	16	CH	C0H	8.9 p	±0.1pF, ±0.25pF, ±0.5pF	578	200	0.2±0.02	
MSASE042SCH090[WNA01	EMK042 CH090[D-W	16	CH	C0H	9 p	±0.1pF, ±0.25pF, ±0.5pF	580	200	0.2±0.02	
MSASE042SCH9R1[WNA01	EMK042 CH9R1[D-W	16	CH	C0H	9.1 p	±0.1pF, ±0.25pF, ±0.5pF	582	200	0.2±0.02	
MSASE042SCH9R2[WNA01	EMK042 CH9R2[D-W	16	CH	C0H	9.2 p	±0.1pF, ±0.25pF, ±0.5pF	584	200	0.2±0.02	
MSASE042SCH9R3[WNA01	EMK042 CH9R3[D-W	16	CH	C0H	9.3 p	±0.1pF, ±0.25pF, ±0.5pF	586	200	0.2±0.02	
MSASE042SCH9R4[WNA01	EMK042 CH9R4[D-W	16	CH	C0H	9.4 p	±0.1pF, ±0.25pF, ±0.5pF	588	200	0.2±0.02	
MSASE042SCH9R5[WNA01	EMK042 CH9R5[D-W	16	CH	C0H	9.5 p	±0.1pF, ±0.25pF, ±0.5pF	590	200	0.2±0.02	
MSASE042SCH9R6[WNA01	EMK042 CH9R6[D-W	16	CH	C0H	9.6 p	±0.1pF, ±0.25pF, ±0.5pF	592	200	0.2±0.02	
MSASE042SCH9R7[WNA01	EMK042 CH9R7[D-W	16	CH	C0H	9.7 p	±0.1pF, ±0.25pF, ±0.5pF	594	200	0.2±0.02	
MSASE042SCH9R8[WNA01	EMK042 CH9R8[D-W	16	CH	C0H	9.8 p	±0.1pF, ±0.25pF, ±0.5pF	596	200	0.2±0.02	
MSASE042SCH9R9[WNA01	EMK042 CH9R9[D-W	16	CH	C0H	9.9 p	±0.1pF, ±0.25pF, ±0.5pF	598	200	0.2±0.02	
MSASE042SCH100DWNA01	EMK042 CH100DW	16	CH	C0H	10 p	±0.5pF	600	200	0.2±0.02	
MSASE042SCH110JWNA01	EMK042 CH110JW	16	CH	C0H	11 p	±5%	620	200	0.2±0.02	
MSASE042SCH120JWNA01	EMK042 CH120JW	16	CH	C0H	12 p	±5%	640	200	0.2±0.02	
MSASE042SCH130JWNA01	EMK042 CH130JW	16	CH	C0H	13 p	±5%	660	200	0.2±0.02	
MSASE042SCH150JWNA01	EMK042 CH150JW	16	CH	C0H	15 p	±5%	700	200	0.2±0.02	
MSASE042SCH160JWNA01	EMK042 CH160JC-W	16	CH	C0H	16 p	±5%	720	200	0.2±0.02	
MSASE042SCH180JWNA01	EMK042 CH180JC-W	16	CH	C0H	18 p	±5%	760	200	0.2±0.02	
MSASE042SCH200JWNA01	EMK042 CH200JC-W	16	CH	C0H	20 p	±5%	800	200	0.2±0.02	
MSASE042SCH220JWNA01	EMK042 CH220JC-W	16	CH	C0H	22 p	±5%	840	200	0.2±0.02	
MSASE042SCH240JWNA01	EMK042 CH240JC-W	16	CH	C0H	24 p	±5%	880	200	0.2±0.02	
MSASE042SCH270JWNA01	EMK042 CH270JC-W	16	CH	C0H	27 p	±5%	940	200	0.2±0.02	
MSASE042SCH300JWNA01	EMK042 CH300JC-W	16	CH	C0H	30 p	±5%	1000	200	0.2±0.02	
MSASE042SCH330JWNA01	EMK042 CH330JC-W	16	CH	C0H	33 p	±5%	1000	200	0.2±0.02	
MSASE042SCH360JWNA01	EMK042 CH360JC-W	16	CH	C0H	36 p	±5%	1000	200	0.2±0.02	
MSASE042SCH390JWNA01	EMK042 CH390JC-W	16	CH	C0H	39 p	±5%	1000	200	0.2±0.02	
MSASE042SCH430JWNA01	EMK042 CH430JC-W	16	CH	C0H	43 p	±5%	1000	200	0.2±0.02	
MSASE042SCH470JWNA01	EMK042 CH470JC-W	16	CH	C0H	47 p	±5%	1000	200	0.2±0.02	
MSASE042SCH510JWNA01	EMK042 CH510JC-W	16	CH	C0H	51 p	±5%	1000	200	0.2±0.02	
MSASE042SCH560JWNA01	EMK042 CH560JC-W	16	CH	C0H	56 p	±5%	1000	200	0.2±0.02	
MSASE042SCH620JWNA01	EMK042 CH620JC-W	16	CH	C0H	62 p	±5%	1000	200	0.2±0.02	
MSASE042SCH680JWNA01	EMK042 CH680JC-W	16	CH	C0H	68 p	±5%	1000	200	0.2±0.02	
MSASE042SCH750JWNA01	EMK042 CH750JC-W	16	CH	C0H	75 p	±5%	1000	200	0.2±0.02	
MSASE042SCH820JWNA01	EMK042 CH820JC-W	16	CH	C0H	82 p	±5%	1000	200	0.2±0.02	
MSASE042SCH910JWNA01	EMK042 CH910JC-W	16	CH	C0H	91 p	±5%	1000	200	0.2±0.02	
MSASE042SCH101JWNA01	EMK042 CH101JC-W	16	CH	C0H	100 p	±5%	1000	200	0.2±0.02	
MSASE042SCH221JWNA01	EMK042 CH221JC-W	16	CH	C0H	220 p	±5%	1000	200	0.2±0.02	
MSASE042SCH241JWNA01	EMK042 CH241JC-W	16	CH	C0H	240 p	±5%	1000	200	0.2±0.02	
MSASE042SCH271JWNA01	EMK042 CH271JC-W	16	CH	C0H	270 p	±5%	1000	200	0.2±0.02	
MSASE042SCH331JWNA01	EMK042 CH331JC-W	16	CH	C0H	330 p	±5%	1000	200	0.2±0.02	

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## PARTS NUMBER

## 【Temperature Characteristic CG : CG/C0G (−55~+125°C)】 0.2mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT		Thickness <sup>*)</sup> [mm]	Note
							Rated voltage x %			
MSAST042SCG0R4[WNA01	TMK042 CG0R4[D-W	25	CG C0G	0.4 p	±0.05pF, ±0.1pF, ±0.25pF	408	200		0.2±0.02	
MSAST042SCG0R5[WNA01	TMK042 CG0R5[D-W	25	CG C0G	0.5 p	±0.05pF, ±0.1pF, ±0.25pF	410	200		0.2±0.02	
MSAST042SCG0R6[WNA01	TMK042 CG0R6[D-W	25	CG C0G	0.6 p	±0.05pF, ±0.1pF, ±0.25pF	412	200		0.2±0.02	
MSAST042SCG0R7[WNA01	TMK042 CG0R7[D-W	25	CG C0G	0.7 p	±0.05pF, ±0.1pF, ±0.25pF	414	200		0.2±0.02	
MSAST042SCGR75[WNA01	TMK042 CGR75[D-W	25	CG C0G	0.75 p	±0.05pF, ±0.1pF, ±0.25pF	415	200		0.2±0.02	
MSAST042SCG0R8[WNA01	TMK042 CG0R8[D-W	25	CG C0G	0.8 p	±0.05pF, ±0.1pF, ±0.25pF	416	200		0.2±0.02	
MSAST042SCG0R9[WNA01	TMK042 CG0R9[D-W	25	CG C0G	0.9 p	±0.05pF, ±0.1pF, ±0.25pF	418	200		0.2±0.02	
MSAST042SCG010[WNA01	TMK042 CG010[D-W	25	CG C0G	1 p	±0.05pF, ±0.1pF, ±0.25pF	420	200		0.2±0.02	
MSAST042SCG1R1[WNA01	TMK042 CG1R1[D-W	25	CG C0G	1.1 p	±0.05pF, ±0.1pF, ±0.25pF	422	200		0.2±0.02	
MSAST042SCG1R2[WNA01	TMK042 CG1R2[D-W	25	CG C0G	1.2 p	±0.05pF, ±0.1pF, ±0.25pF	424	200		0.2±0.02	
MSAST042SCG1R3[WNA01	TMK042 CG1R3[D-W	25	CG C0G	1.3 p	±0.05pF, ±0.1pF, ±0.25pF	426	200		0.2±0.02	
MSAST042SCG1R4[WNA01	TMK042 CG1R4[D-W	25	CG C0G	1.4 p	±0.05pF, ±0.1pF, ±0.25pF	428	200		0.2±0.02	
MSAST042SCG1R5[WNA01	TMK042 CG1R5[D-W	25	CG C0G	1.5 p	±0.05pF, ±0.1pF, ±0.25pF	430	200		0.2±0.02	
MSAST042SCG1R6[WNA01	TMK042 CG1R6[D-W	25	CG C0G	1.6 p	±0.05pF, ±0.1pF, ±0.25pF	432	200		0.2±0.02	
MSAST042SCG1R7[WNA01	TMK042 CG1R7[D-W	25	CG C0G	1.7 p	±0.05pF, ±0.1pF, ±0.25pF	434	200		0.2±0.02	
MSAST042SCG1R8[WNA01	TMK042 CG1R8[D-W	25	CG C0G	1.8 p	±0.05pF, ±0.1pF, ±0.25pF	436	200		0.2±0.02	
MSAST042SCG1R9[WNA01	TMK042 CG1R9[D-W	25	CG C0G	1.9 p	±0.05pF, ±0.1pF, ±0.25pF	438	200		0.2±0.02	
MSAST042SCG020[WNA01	TMK042 CG020[D-W	25	CG C0G	2 p	±0.05pF, ±0.1pF, ±0.25pF	440	200		0.2±0.02	
MSAST042SCG2R1[WNA01	TMK042 CG2R1[D-W	25	CG C0G	2.1 p	±0.05pF, ±0.1pF, ±0.25pF	442	200		0.2±0.02	
MSAST042SCG2R2[WNA01	TMK042 CG2R2[D-W	25	CG C0G	2.2 p	±0.05pF, ±0.1pF, ±0.25pF	444	200		0.2±0.02	
MSAST042SCG2R3[WNA01	TMK042 CG2R3[D-W	25	CG C0G	2.3 p	±0.05pF, ±0.1pF, ±0.25pF	446	200		0.2±0.02	
MSAST042SCG2R4[WNA01	TMK042 CG2R4[D-W	25	CG C0G	2.4 p	±0.05pF, ±0.1pF, ±0.25pF	448	200		0.2±0.02	
MSAST042SCG2R5[WNA01	TMK042 CG2R5[D-W	25	CG C0G	2.5 p	±0.05pF, ±0.1pF, ±0.25pF	450	200		0.2±0.02	
MSAST042SCG2R6[WNA01	TMK042 CG2R6[D-W	25	CG C0G	2.6 p	±0.05pF, ±0.1pF, ±0.25pF	452	200		0.2±0.02	
MSAST042SCG2R7[WNA01	TMK042 CG2R7[D-W	25	CG C0G	2.7 p	±0.05pF, ±0.1pF, ±0.25pF	454	200		0.2±0.02	
MSAST042SCG2R8[WNA01	TMK042 CG2R8[D-W	25	CG C0G	2.8 p	±0.05pF, ±0.1pF, ±0.25pF	456	200		0.2±0.02	
MSAST042SCG2R9[WNA01	TMK042 CG2R9[D-W	25	CG C0G	2.9 p	±0.05pF, ±0.1pF, ±0.25pF	458	200		0.2±0.02	
MSAST042SCG030[WNA01	TMK042 CG030[D-W	25	CG C0G	3 p	±0.05pF, ±0.1pF, ±0.25pF	460	200		0.2±0.02	
MSAST042SCG3R1[WNA01	TMK042 CG3R1[D-W	25	CG C0G	3.1 p	±0.1pF, ±0.25pF	462	200		0.2±0.02	
MSAST042SCG3R2[WNA01	TMK042 CG3R2[D-W	25	CG C0G	3.2 p	±0.1pF, ±0.25pF	464	200		0.2±0.02	
MSAST042SCG3R3[WNA01	TMK042 CG3R3[D-W	25	CG C0G	3.3 p	±0.1pF, ±0.25pF	466	200		0.2±0.02	
MSAST042SCG3R4[WNA01	TMK042 CG3R4[D-W	25	CG C0G	3.4 p	±0.1pF, ±0.25pF	468	200		0.2±0.02	
MSAST042SCG3R5[WNA01	TMK042 CG3R5[D-W	25	CG C0G	3.5 p	±0.1pF, ±0.25pF	470	200		0.2±0.02	
MSAST042SCG3R6[WNA01	TMK042 CG3R6[D-W	25	CG C0G	3.6 p	±0.1pF, ±0.25pF	472	200		0.2±0.02	
MSAST042SCG3R7[WNA01	TMK042 CG3R7[D-W	25	CG C0G	3.7 p	±0.1pF, ±0.25pF	474	200		0.2±0.02	
MSAST042SCG3R8[WNA01	TMK042 CG3R8[D-W	25	CG C0G	3.8 p	±0.1pF, ±0.25pF	476	200		0.2±0.02	
MSAST042SCG3R9[WNA01	TMK042 CG3R9[D-W	25	CG C0G	3.9 p	±0.1pF, ±0.25pF	478	200		0.2±0.02	
MSAST042SCG040[WNA01	TMK042 CG040[D-W	25	CG C0G	4 p	±0.1pF, ±0.25pF	480	200		0.2±0.02	
MSAST042SCG4R1[WNA01	TMK042 CG4R1[D-W	25	CG C0G	4.1 p	±0.1pF, ±0.25pF	482	200		0.2±0.02	
MSAST042SCG4R2[WNA01	TMK042 CG4R2[D-W	25	CG C0G	4.2 p	±0.1pF, ±0.25pF	484	200		0.2±0.02	
MSAST042SCG4R3[WNA01	TMK042 CG4R3[D-W	25	CG C0G	4.3 p	±0.1pF, ±0.25pF	486	200		0.2±0.02	
MSAST042SCG4R4[WNA01	TMK042 CG4R4[D-W	25	CG C0G	4.4 p	±0.1pF, ±0.25pF	488	200		0.2±0.02	
MSAST042SCG4R5[WNA01	TMK042 CG4R5[D-W	25	CG C0G	4.5 p	±0.1pF, ±0.25pF	490	200		0.2±0.02	
MSAST042SCG4R6[WNA01	TMK042 CG4R6[D-W	25	CG C0G	4.6 p	±0.1pF, ±0.25pF	492	200		0.2±0.02	
MSAST042SCG4R7[WNA01	TMK042 CG4R7[D-W	25	CG C0G	4.7 p	±0.1pF, ±0.25pF	494	200		0.2±0.02	
MSAST042SCG4R8[WNA01	TMK042 CG4R8[D-W	25	CG C0G	4.8 p	±0.1pF, ±0.25pF	496	200		0.2±0.02	
MSAST042SCG4R9[WNA01	TMK042 CG4R9[D-W	25	CG C0G	4.9 p	±0.1pF, ±0.25pF	498	200		0.2±0.02	
MSAST042SCG050[WNA01	TMK042 CG050[D-W	25	CG C0G	5 p	±0.1pF, ±0.25pF	500	200		0.2±0.02	
MSAST042SCG5R1[WNA01	TMK042 CG5R1[D-W	25	CG C0G	5.1 p	±0.1pF, ±0.25pF, ±0.5pF	502	200		0.2±0.02	
MSAST042SCG5R2[WNA01	TMK042 CG5R2[D-W	25	CG C0G	5.2 p	±0.1pF, ±0.25pF, ±0.5pF	504	200		0.2±0.02	
MSAST042SCG5R3[WNA01	TMK042 CG5R3[D-W	25	CG C0G	5.3 p	±0.1pF, ±0.25pF, ±0.5pF	506	200		0.2±0.02	
MSAST042SCG5R4[WNA01	TMK042 CG5R4[D-W	25	CG C0G	5.4 p	±0.1pF, ±0.25pF, ±0.5pF	508	200		0.2±0.02	
MSAST042SCG5R5[WNA01	TMK042 CG5R5[D-W	25	CG C0G	5.5 p	±0.1pF, ±0.25pF, ±0.5pF	510	200		0.2±0.02	
MSAST042SCG5R6[WNA01	TMK042 CG5R6[D-W	25	CG C0G	5.6 p	±0.1pF, ±0.25pF, ±0.5pF	512	200		0.2±0.02	
MSAST042SCG5R7[WNA01	TMK042 CG5R7[D-W	25	CG C0G	5.7 p	±0.1pF, ±0.25pF, ±0.5pF	514	200		0.2±0.02	
MSAST042SCG5R8[WNA01	TMK042 CG5R8[D-W	25	CG C0G	5.8 p	±0.1pF, ±0.25pF, ±0.5pF	516	200		0.2±0.02	
MSAST042SCG5R9[WNA01	TMK042 CG5R9[D-W	25	CG C0G	5.9 p	±0.1pF, ±0.25pF, ±0.5pF	518	200		0.2±0.02	
MSAST042SCG060[WNA01	TMK042 CG060[D-W	25	CG C0G	6 p	±0.1pF, ±0.25pF, ±0.5pF	520	200		0.2±0.02	
MSAST042SCG6R1[WNA01	TMK042 CG6R1[D-W	25	CG C0G	6.1 p	±0.1pF, ±0.25pF, ±0.5pF	522	200		0.2±0.02	
MSAST042SCG6R2[WNA01	TMK042 CG6R2[D-W	25	CG C0G	6.2 p	±0.1pF, ±0.25pF, ±0.5pF	524	200		0.2±0.02	
MSAST042SCG6R3[WNA01	TMK042 CG6R3[D-W	25	CG C0G	6.3 p	±0.1pF, ±0.25pF, ±0.5pF	526	200		0.2±0.02	
MSAST042SCG6R4[WNA01	TMK042 CG6R4[D-W	25	CG C0G	6.4 p	±0.1pF, ±0.25pF, ±0.5pF	528	200		0.2±0.02	
MSAST042SCG6R5[WNA01	TMK042 CG6R5[D-W	25	CG C0G	6.5 p	±0.1pF, ±0.25pF, ±0.5pF	530	200		0.2±0.02	
MSAST042SCG6R6[WNA01	TMK042 CG6R6[D-W	25	CG C0G	6.6 p	±0.1pF, ±0.25pF, ±0.5pF	532	200		0.2±0.02	
MSAST042SCG6R7[WNA01	TMK042 CG6R7[D-W	25	CG C0G	6.7 p	±0.1pF, ±0.25pF, ±0.5pF	534	200		0.2±0.02	
MSAST042SCG6R8[WNA01	TMK042 CG6R8[D-W	25	CG C0G	6.8 p	±0.1pF, ±0.25pF, ±0.5pF	536	200		0.2±0.02	
MSAST042SCG6R9[WNA01	TMK042 CG6R9[D-W	25	CG C0G	6.9 p	±0.1pF, ±0.25pF, ±0.5pF	538	200		0.2±0.02	
MSAST042SCG070[WNA01	TMK042 CG070[D-W	25	CG C0G	7 p	±0.1pF, ±0.25pF, ±0.5pF	540	200		0.2±0.02	
MSAST042SCG7R1[WNA01	TMK042 CG7R1[D-W	25	CG C0G	7.1 p	±0.1pF, ±0.25pF, ±0.5pF	542	200		0.2±0.02	
MSAST042SCG7R2[WNA01	TMK042 CG7R2[D-W	25	CG C0G	7.2 p	±0.1pF, ±0.25pF, ±0.5pF	544	200		0.2±0.02	
MSAST042SCG7R3[WNA01	TMK042 CG7R3[D-W	25	CG C0G	7.3 p	±0.1pF, ±0.25pF, ±0.5pF	546	200		0.2±0.02	
MSAST042SCG7R4[WNA01	TMK042 CG7R4[D-W	25	CG C0G	7.4 p	±0.1pF, ±0.25pF, ±0.5pF	548	200		0.2±0.02	
MSAST042SCG7R5[WNA01	TMK042 CG7R5[D-W	25	CG C0G	7.5 p	±0.1pF, ±0.25pF, ±0.5pF	550	200		0.2±0.02	
MSAST042SCG7R6[WNA01	TMK042 CG7R6[D-W	25	CG C0G	7.6 p	±0.1pF, ±0.25pF, ±0.5pF	552	200		0.2±0.02	
MSAST042SCG7R7[WNA01	TMK042 CG7R7[D-W	25	CG C0G	7.7 p	±0.1pF, ±0.25pF, ±0.5pF	554	200		0.2±0.02	
MSAST042SCG7R8[WNA01	TMK042 CG7R8[D-W	25	CG C0G	7.8 p	±0.1pF, ±0.25pF, ±0.5pF	556	200		0.2±0.02	
MSAST042SCG7R9[WNA01	TMK042 CG7R9[D-W	25	CG C0G	7.9 p	±0.1pF, ±0.25pF, ±0.5pF	558	200		0.2±0.02	
MSAST042SCG080[WNA01	TMK042 CG080[D-W	25	CG C0G	8 p	±0.1pF, ±0.25pF, ±0.5pF	560	200		0.2±0.02	
MSAST042SCG8R1[WNA01	TMK042 CG8R1[D-W	25	CG C0G	8.1 p	±0.1pF, ±0.25pF, ±0.5pF	562	200		0.2±0.02	
MSAST042SCG8R2[WNA01	TMK042 CG8R2[D-W	25	CG C0G	8.2 p	±0.1pF, ±0.25pF, ±0.5pF	564	200		0.2±0.02	
MSAST042SCG8R3[WNA01	TMK042 CG8R3[D-W	25	CG C0G	8.3 p	±0.1pF, ±0.25pF, ±0.5pF	566	200		0.2±0.02	
MSAST042SCG8R4[WNA01	TMK042 CG8R4[D-W	25	CG C0G	8.4 p	±0.1pF, ±0.25pF, ±0.5pF	568	200		0.2±0.02	
MSAST042SCG8R5[WNA01	TMK042 CG8R5[D-W	25	CG C0G	8.5 p	±0.1pF, ±0.25pF, ±0.5pF	570	200		0.2±0.02	
MSAST042SCG8R6[WNA01	TMK042 CG8R6[D-W	25	CG C0G	8.6 p	±0.1pF, ±0.25pF, ±0.5pF	572	200		0.2±0.02	
MSAST042SCG8R7[WNA01	TMK042 CG8R7[D-W	25	CG C0G	8.7 p	±0.1pF, ±0.25pF, ±0.5pF	574	200		0.2±0.02	

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.  
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

■ PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT		Thickness <sup>*3</sup> [mm]	Note
								Rated voltage x %			
MSAST042SCG8R8[WNA01	TMK042 CG8R8[D-W	25	CG	C0G	8.8 p	±0.1pF, ±0.25pF, ±0.5pF	576	200		0.2±0.02	
MSAST042SCG8R9[WNA01	TMK042 CG8R9[D-W	25	CG	C0G	8.9 p	±0.1pF, ±0.25pF, ±0.5pF	578	200		0.2±0.02	
MSAST042SCG090[WNA01	TMK042 CG090[D-W	25	CG	C0G	9 p	±0.1pF, ±0.25pF, ±0.5pF	580	200		0.2±0.02	
MSAST042SCG9R1[WNA01	TMK042 CG9R1[D-W	25	CG	C0G	9.1 p	±0.1pF, ±0.25pF, ±0.5pF	582	200		0.2±0.02	
MSAST042SCG9R2[WNA01	TMK042 CG9R2[D-W	25	CG	C0G	9.2 p	±0.1pF, ±0.25pF, ±0.5pF	584	200		0.2±0.02	
MSAST042SCG9R3[WNA01	TMK042 CG9R3[D-W	25	CG	C0G	9.3 p	±0.1pF, ±0.25pF, ±0.5pF	586	200		0.2±0.02	
MSAST042SCG9R4[WNA01	TMK042 CG9R4[D-W	25	CG	C0G	9.4 p	±0.1pF, ±0.25pF, ±0.5pF	588	200		0.2±0.02	
MSAST042SCG9R5[WNA01	TMK042 CG9R5[D-W	25	CG	C0G	9.5 p	±0.1pF, ±0.25pF, ±0.5pF	590	200		0.2±0.02	
MSAST042SCG9R6[WNA01	TMK042 CG9R6[D-W	25	CG	C0G	9.6 p	±0.1pF, ±0.25pF, ±0.5pF	592	200		0.2±0.02	
MSAST042SCG9R7[WNA01	TMK042 CG9R7[D-W	25	CG	C0G	9.7 p	±0.1pF, ±0.25pF, ±0.5pF	594	200		0.2±0.02	
MSAST042SCG9R8[WNA01	TMK042 CG9R8[D-W	25	CG	C0G	9.8 p	±0.1pF, ±0.25pF, ±0.5pF	596	200		0.2±0.02	
MSAST042SCG9R9[WNA01	TMK042 CG9R9[D-W	25	CG	C0G	9.9 p	±0.1pF, ±0.25pF, ±0.5pF	598	200		0.2±0.02	
MSAST042SCG100DWNA01	TMK042 CG100DD-W	25	CG	C0G	10 p	±0.5pF	600	200		0.2±0.02	
MSAST042SCG110JWNA01	TMK042 CG110JD-W	25	CG	C0G	11 p	±5%	620	200		0.2±0.02	
MSAST042SCG120JWNA01	TMK042 CG120JD-W	25	CG	C0G	12 p	±5%	640	200		0.2±0.02	
MSAST042SCG130JWNA01	TMK042 CG130JD-W	25	CG	C0G	13 p	±5%	660	200		0.2±0.02	
MSAST042SCG150JWNA01	TMK042 CG150JD-W	25	CG	C0G	15 p	±5%	700	200		0.2±0.02	
MSAST042SCG160JWNA01	TMK042 CG160JC-W	25	CG	C0G	16 p	±5%	720	200		0.2±0.02	
MSAST042SCG180JWNA01	TMK042 CG180JC-W	25	CG	C0G	18 p	±5%	760	200		0.2±0.02	
MSAST042SCG200JWNA01	TMK042 CG200JC-W	25	CG	C0G	20 p	±5%	800	200		0.2±0.02	
MSAST042SCG220JWNA01	TMK042 CG220JC-W	25	CG	C0G	22 p	±5%	840	200		0.2±0.02	
MSAST042SCG240JWNA01	TMK042 CG240JC-W	25	CG	C0G	24 p	±5%	880	200		0.2±0.02	
MSAST042SCG270JWNA01	TMK042 CG270JC-W	25	CG	C0G	27 p	±5%	940	200		0.2±0.02	
MSAST042SCG300JWNA01	TMK042 CG300JC-W	25	CG	C0G	30 p	±5%	1000	200		0.2±0.02	
MSAST042SCG330JWNA01	TMK042 CG330JC-W	25	CG	C0G	33 p	±5%	1000	200		0.2±0.02	
MSAST042SCG360JWNA01	TMK042 CG360JC-W	25	CG	C0G	36 p	±5%	1000	200		0.2±0.02	
MSAST042SCG390JWNA01	TMK042 CG390JC-W	25	CG	C0G	39 p	±5%	1000	200		0.2±0.02	
MSAST042SCG430JWNA01	TMK042 CG430JC-W	25	CG	C0G	43 p	±5%	1000	200		0.2±0.02	
MSAST042SCG470JWNA01	TMK042 CG470JC-W	25	CG	C0G	47 p	±5%	1000	200		0.2±0.02	
MSAST042SCG510JWNA01	TMK042 CG510JC-W	25	CG	C0G	51 p	±5%	1000	200		0.2±0.02	
MSAST042SCG560JWNA01	TMK042 CG560JC-W	25	CG	C0G	56 p	±5%	1000	200		0.2±0.02	
MSAST042SCG620JWNA01	TMK042 CG620JC-W	25	CG	C0G	62 p	±5%	1000	200		0.2±0.02	
MSAST042SCG680JWNA01	TMK042 CG680JC-W	25	CG	C0G	68 p	±5%	1000	200		0.2±0.02	
MSAST042SCG750JWNA01	TMK042 CG750JC-W	25	CG	C0G	75 p	±5%	1000	200		0.2±0.02	
MSAST042SCG820JWNA01	TMK042 CG820JC-W	25	CG	C0G	82 p	±5%	1000	200		0.2±0.02	
MSAST042SCG910JWNA01	TMK042 CG910JC-W	25	CG	C0G	91 p	±5%	1000	200		0.2±0.02	
MSAST042SCG101JWNA01	TMK042 CG101JC-W	25	CG	C0G	100 p	±5%	1000	200		0.2±0.02	

【Temperature Characteristic CG : CG/C0G (-55~+125°C)】 0.2mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT		Thickness <sup>*3</sup> [mm]	Note
								Rated voltage x %			
MSASE042SCG0R4[WNA01	EMK042 CG0R4[D-W	16	CG	C0G	0.4 p	±0.05pF, ±0.1pF, ±0.25pF	408	200		0.2±0.02	
MSASE042SCG0R5[WNA01	EMK042 CG0R5[D-W	16	CG	C0G	0.5 p	±0.05pF, ±0.1pF, ±0.25pF	410	200		0.2±0.02	
MSASE042SCG0R6[WNA01	EMK042 CG0R6[D-W	16	CG	C0G	0.6 p	±0.05pF, ±0.1pF, ±0.25pF	412	200		0.2±0.02	
MSASE042SCG0R7[WNA01	EMK042 CG0R7[D-W	16	CG	C0G	0.7 p	±0.05pF, ±0.1pF, ±0.25pF	414	200		0.2±0.02	
MSASE042SCG0R75[WNA01	EMK042 CG0R75[D-W	16	CG	C0G	0.75 p	±0.05pF, ±0.1pF, ±0.25pF	415	200		0.2±0.02	
MSASE042SCG0R8[WNA01	EMK042 CG0R8[D-W	16	CG	C0G	0.8 p	±0.05pF, ±0.1pF, ±0.25pF	416	200		0.2±0.02	
MSASE042SCG0R9[WNA01	EMK042 CG0R9[D-W	16	CG	C0G	0.9 p	±0.05pF, ±0.1pF, ±0.25pF	418	200		0.2±0.02	
MSASE042SCG010[WNA01	EMK042 CG010[D-W	16	CG	C0G	1 p	±0.05pF, ±0.1pF, ±0.25pF	420	200		0.2±0.02	
MSASE042SCG1R1[WNA01	EMK042 CG1R1[D-W	16	CG	C0G	1.1 p	±0.05pF, ±0.1pF, ±0.25pF	422	200		0.2±0.02	
MSASE042SCG1R2[WNA01	EMK042 CG1R2[D-W	16	CG	C0G	1.2 p	±0.05pF, ±0.1pF, ±0.25pF	424	200		0.2±0.02	
MSASE042SCG1R3[WNA01	EMK042 CG1R3[D-W	16	CG	C0G	1.3 p	±0.05pF, ±0.1pF, ±0.25pF	426	200		0.2±0.02	
MSASE042SCG1R4[WNA01	EMK042 CG1R4[D-W	16	CG	C0G	1.4 p	±0.05pF, ±0.1pF, ±0.25pF	428	200		0.2±0.02	
MSASE042SCG1R5[WNA01	EMK042 CG1R5[D-W	16	CG	C0G	1.5 p	±0.05pF, ±0.1pF, ±0.25pF	430	200		0.2±0.02	
MSASE042SCG1R6[WNA01	EMK042 CG1R6[D-W	16	CG	C0G	1.6 p	±0.05pF, ±0.1pF, ±0.25pF	432	200		0.2±0.02	
MSASE042SCG1R7[WNA01	EMK042 CG1R7[D-W	16	CG	C0G	1.7 p	±0.05pF, ±0.1pF, ±0.25pF	434	200		0.2±0.02	
MSASE042SCG1R8[WNA01	EMK042 CG1R8[D-W	16	CG	C0G	1.8 p	±0.05pF, ±0.1pF, ±0.25pF	436	200		0.2±0.02	
MSASE042SCG1R9[WNA01	EMK042 CG1R9[D-W	16	CG	C0G	1.9 p	±0.05pF, ±0.1pF, ±0.25pF	438	200		0.2±0.02	
MSASE042SCG020[WNA01	EMK042 CG020[D-W	16	CG	C0G	2 p	±0.05pF, ±0.1pF, ±0.25pF	440	200		0.2±0.02	
MSASE042SCG2R1[WNA01	EMK042 CG2R1[D-W	16	CG	C0G	2.1 p	±0.05pF, ±0.1pF, ±0.25pF	442	200		0.2±0.02	
MSASE042SCG2R2[WNA01	EMK042 CG2R2[D-W	16	CG	C0G	2.2 p	±0.05pF, ±0.1pF, ±0.25pF	444	200		0.2±0.02	
MSASE042SCG2R3[WNA01	EMK042 CG2R3[D-W	16	CG	C0G	2.3 p	±0.05pF, ±0.1pF, ±0.25pF	446	200		0.2±0.02	
MSASE042SCG2R4[WNA01	EMK042 CG2R4[D-W	16	CG	C0G	2.4 p	±0.05pF, ±0.1pF, ±0.25pF	448	200		0.2±0.02	
MSASE042SCG2R5[WNA01	EMK042 CG2R5[D-W	16	CG	C0G	2.5 p	±0.05pF, ±0.1pF, ±0.25pF	450	200		0.2±0.02	
MSASE042SCG2R6[WNA01	EMK042 CG2R6[D-W	16	CG	C0G	2.6 p	±0.05pF, ±0.1pF, ±0.25pF	452	200		0.2±0.02	
MSASE042SCG2R7[WNA01	EMK042 CG2R7[D-W	16	CG	C0G	2.7 p	±0.05pF, ±0.1pF, ±0.25pF	454	200		0.2±0.02	
MSASE042SCG2R8[WNA01	EMK042 CG2R8[D-W	16	CG	C0G	2.8 p	±0.05pF, ±0.1pF, ±0.25pF	456	200		0.2±0.02	
MSASE042SCG2R9[WNA01	EMK042 CG2R9[D-W	16	CG	C0G	2.9 p	±0.05pF, ±0.1pF, ±0.25pF	458	200		0.2±0.02	
MSASE042SCG030[WNA01	EMK042 CG030[D-W	16	CG	C0G	3 p	±0.05pF, ±0.1pF, ±0.25pF	460	200		0.2±0.02	
MSASE042SCG3R1[WNA01	EMK042 CG3R1[D-W	16	CG	C0G	3.1 p	±0.1pF, ±0.25pF	462	200		0.2±0.02	
MSASE042SCG3R2[WNA01	EMK042 CG3R2[D-W	16	CG	C0G	3.2 p	±0.1pF, ±0.25pF	464	200		0.2±0.02	
MSASE042SCG3R3[WNA01	EMK042 CG3R3[D-W	16	CG	C0G	3.3 p	±0.1pF, ±0.25pF	466	200		0.2±0.02	
MSASE042SCG3R4[WNA01	EMK042 CG3R4[D-W	16	CG	C0G	3.4 p	±0.1pF, ±0.25pF	468	200		0.2±0.02	
MSASE042SCG3R5[WNA01	EMK042 CG3R5[D-W	16	CG	C0G	3.5 p	±0.1pF, ±0.25pF	470	200		0.2±0.02	
MSASE042SCG3R6[WNA01	EMK042 CG3R6[D-W	16	CG	C0G	3.6 p	±0.1pF, ±0.25pF	472	200		0.2±0.02	
MSASE042SCG3R7[WNA01	EMK042 CG3R7[D-W	16	CG	C0G	3.7 p	±0.1pF, ±0.25pF	474	200		0.2±0.02	
MSASE042SCG3R8[WNA01	EMK042 CG3R8[D-W	16	CG	C0G	3.8 p	±0.1pF, ±0.25pF	476	200		0.2±0.02	
MSASE042SCG3R9[WNA01	EMK042 CG3R9[D-W	16	CG	C0G	3.9 p	±0.1pF, ±0.25pF	478	200		0.2±0.02	
MSASE042SCG040[WNA01	EMK042 CG040[D-W	16	CG	C0G	4 p	±0.1pF, ±0.25pF	480	200		0.2±0.02	
MSASE042SCG4R1[WNA01	EMK042 CG4R1[D-W	16	CG	C0G	4.1 p	±0.1pF, ±0.25pF	482	200		0.2±0.02	
MSASE042SCG4R2[WNA01	EMK042 CG4R2[D-W	16	CG	C0G	4.2 p	±0.1pF, ±0.25pF	484	200		0.2±0.02	
MSASE042SCG4R3[WNA01	EMK042 CG4R3[D-W	16	CG	C0G	4.3 p	±0.1pF, ±0.25pF	486	200		0.2±0.02	
MSASE042SCG4R4[WNA01	EMK042 CG4R4[D-W	16	CG	C0G	4.4 p	±0.1pF, ±0.25pF	488	200		0.2±0.02	
MSASE042SCG4R5[WNA01	EMK042 CG4R5[D-W	16	CG	C0G	4.5 p	±0.1pF, ±0.25pF	490	200		0.2±0.02	
MSASE042SCG4R6[WNA01	EMK042 CG4R6[D-W	16	CG	C0G	4.6 p	±0.1pF, ±0.25pF	492	200		0.2±0.02	

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■ PARTS NUMBER

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HTLT	Thickness <sup>3)</sup> [mm]	Note
								Rated voltage x %		
MSASE042SCG4R7[WNA01	EMK042 CG4R7[D-W	16	CG	C0G	4.7 p	±0.1pF, ±0.25pF	494	200	0.2±0.02	
MSASE042SCG4R8[WNA01	EMK042 CG4R8[D-W	16	CG	C0G	4.8 p	±0.1pF, ±0.25pF	496	200	0.2±0.02	
MSASE042SCG4R9[WNA01	EMK042 CG4R9[D-W	16	CG	C0G	4.9 p	±0.1pF, ±0.25pF	498	200	0.2±0.02	
MSASE042SCG050[WNA01	EMK042 CG050[D-W	16	CG	C0G	5 p	±0.1pF, ±0.25pF	500	200	0.2±0.02	
MSASE042SCG5R1[WNA01	EMK042 CG5R1[D-W	16	CG	C0G	5.1 p	±0.1pF, ±0.25pF, ±0.5pF	502	200	0.2±0.02	
MSASE042SCG5R2[WNA01	EMK042 CG5R2[D-W	16	CG	C0G	5.2 p	±0.1pF, ±0.25pF, ±0.5pF	504	200	0.2±0.02	
MSASE042SCG5R3[WNA01	EMK042 CG5R3[D-W	16	CG	C0G	5.3 p	±0.1pF, ±0.25pF, ±0.5pF	506	200	0.2±0.02	
MSASE042SCG5R4[WNA01	EMK042 CG5R4[D-W	16	CG	C0G	5.4 p	±0.1pF, ±0.25pF, ±0.5pF	508	200	0.2±0.02	
MSASE042SCG5R5[WNA01	EMK042 CG5R5[D-W	16	CG	C0G	5.5 p	±0.1pF, ±0.25pF, ±0.5pF	510	200	0.2±0.02	
MSASE042SCG5R6[WNA01	EMK042 CG5R6[D-W	16	CG	C0G	5.6 p	±0.1pF, ±0.25pF, ±0.5pF	512	200	0.2±0.02	
MSASE042SCG5R7[WNA01	EMK042 CG5R7[D-W	16	CG	C0G	5.7 p	±0.1pF, ±0.25pF, ±0.5pF	514	200	0.2±0.02	
MSASE042SCG5R8[WNA01	EMK042 CG5R8[D-W	16	CG	C0G	5.8 p	±0.1pF, ±0.25pF, ±0.5pF	516	200	0.2±0.02	
MSASE042SCG5R9[WNA01	EMK042 CG5R9[D-W	16	CG	C0G	5.9 p	±0.1pF, ±0.25pF, ±0.5pF	518	200	0.2±0.02	
MSASE042SCG060[WNA01	EMK042 CG060[D-W	16	CG	C0G	6 p	±0.1pF, ±0.25pF, ±0.5pF	520	200	0.2±0.02	
MSASE042SCG6R1[WNA01	EMK042 CG6R1[D-W	16	CG	C0G	6.1 p	±0.1pF, ±0.25pF, ±0.5pF	522	200	0.2±0.02	
MSASE042SCG6R2[WNA01	EMK042 CG6R2[D-W	16	CG	C0G	6.2 p	±0.1pF, ±0.25pF, ±0.5pF	524	200	0.2±0.02	
MSASE042SCG6R3[WNA01	EMK042 CG6R3[D-W	16	CG	C0G	6.3 p	±0.1pF, ±0.25pF, ±0.5pF	526	200	0.2±0.02	
MSASE042SCG6R4[WNA01	EMK042 CG6R4[D-W	16	CG	C0G	6.4 p	±0.1pF, ±0.25pF, ±0.5pF	528	200	0.2±0.02	
MSASE042SCG6R5[WNA01	EMK042 CG6R5[D-W	16	CG	C0G	6.5 p	±0.1pF, ±0.25pF, ±0.5pF	530	200	0.2±0.02	
MSASE042SCG6R6[WNA01	EMK042 CG6R6[D-W	16	CG	C0G	6.6 p	±0.1pF, ±0.25pF, ±0.5pF	532	200	0.2±0.02	
MSASE042SCG6R7[WNA01	EMK042 CG6R7[D-W	16	CG	C0G	6.7 p	±0.1pF, ±0.25pF, ±0.5pF	534	200	0.2±0.02	
MSASE042SCG6R8[WNA01	EMK042 CG6R8[D-W	16	CG	C0G	6.8 p	±0.1pF, ±0.25pF, ±0.5pF	536	200	0.2±0.02	
MSASE042SCG6R9[WNA01	EMK042 CG6R9[D-W	16	CG	C0G	6.9 p	±0.1pF, ±0.25pF, ±0.5pF	538	200	0.2±0.02	
MSASE042SCG070[WNA01	EMK042 CG070[D-W	16	CG	C0G	7 p	±0.1pF, ±0.25pF, ±0.5pF	540	200	0.2±0.02	
MSASE042SCG7R1[WNA01	EMK042 CG7R1[D-W	16	CG	C0G	7.1 p	±0.1pF, ±0.25pF, ±0.5pF	542	200	0.2±0.02	
MSASE042SCG7R2[WNA01	EMK042 CG7R2[D-W	16	CG	C0G	7.2 p	±0.1pF, ±0.25pF, ±0.5pF	544	200	0.2±0.02	
MSASE042SCG7R3[WNA01	EMK042 CG7R3[D-W	16	CG	C0G	7.3 p	±0.1pF, ±0.25pF, ±0.5pF	546	200	0.2±0.02	
MSASE042SCG7R4[WNA01	EMK042 CG7R4[D-W	16	CG	C0G	7.4 p	±0.1pF, ±0.25pF, ±0.5pF	548	200	0.2±0.02	
MSASE042SCG7R5[WNA01	EMK042 CG7R5[D-W	16	CG	C0G	7.5 p	±0.1pF, ±0.25pF, ±0.5pF	550	200	0.2±0.02	
MSASE042SCG7R6[WNA01	EMK042 CG7R6[D-W	16	CG	C0G	7.6 p	±0.1pF, ±0.25pF, ±0.5pF	552	200	0.2±0.02	
MSASE042SCG7R7[WNA01	EMK042 CG7R7[D-W	16	CG	C0G	7.7 p	±0.1pF, ±0.25pF, ±0.5pF	554	200	0.2±0.02	
MSASE042SCG7R8[WNA01	EMK042 CG7R8[D-W	16	CG	C0G	7.8 p	±0.1pF, ±0.25pF, ±0.5pF	556	200	0.2±0.02	
MSASE042SCG7R9[WNA01	EMK042 CG7R9[D-W	16	CG	C0G	7.9 p	±0.1pF, ±0.25pF, ±0.5pF	558	200	0.2±0.02	
MSASE042SCG080[WNA01	EMK042 CG080[D-W	16	CG	C0G	8 p	±0.1pF, ±0.25pF, ±0.5pF	560	200	0.2±0.02	
MSASE042SCG8R1[WNA01	EMK042 CG8R1[D-W	16	CG	C0G	8.1 p	±0.1pF, ±0.25pF, ±0.5pF	562	200	0.2±0.02	
MSASE042SCG8R2[WNA01	EMK042 CG8R2[D-W	16	CG	C0G	8.2 p	±0.1pF, ±0.25pF, ±0.5pF	564	200	0.2±0.02	
MSASE042SCG8R3[WNA01	EMK042 CG8R3[D-W	16	CG	C0G	8.3 p	±0.1pF, ±0.25pF, ±0.5pF	566	200	0.2±0.02	
MSASE042SCG8R4[WNA01	EMK042 CG8R4[D-W	16	CG	C0G	8.4 p	±0.1pF, ±0.25pF, ±0.5pF	568	200	0.2±0.02	
MSASE042SCG8R5[WNA01	EMK042 CG8R5[D-W	16	CG	C0G	8.5 p	±0.1pF, ±0.25pF, ±0.5pF	570	200	0.2±0.02	
MSASE042SCG8R6[WNA01	EMK042 CG8R6[D-W	16	CG	C0G	8.6 p	±0.1pF, ±0.25pF, ±0.5pF	572	200	0.2±0.02	
MSASE042SCG8R7[WNA01	EMK042 CG8R7[D-W	16	CG	C0G	8.7 p	±0.1pF, ±0.25pF, ±0.5pF	574	200	0.2±0.02	
MSASE042SCG8R8[WNA01	EMK042 CG8R8[D-W	16	CG	C0G	8.8 p	±0.1pF, ±0.25pF, ±0.5pF	576	200	0.2±0.02	
MSASE042SCG8R9[WNA01	EMK042 CG8R9[D-W	16	CG	C0G	8.9 p	±0.1pF, ±0.25pF, ±0.5pF	578	200	0.2±0.02	
MSASE042SCG090[WNA01	EMK042 CG090[D-W	16	CG	C0G	9 p	±0.1pF, ±0.25pF, ±0.5pF	580	200	0.2±0.02	
MSASE042SCG9R1[WNA01	EMK042 CG9R1[D-W	16	CG	C0G	9.1 p	±0.1pF, ±0.25pF, ±0.5pF	582	200	0.2±0.02	
MSASE042SCG9R2[WNA01	EMK042 CG9R2[D-W	16	CG	C0G	9.2 p	±0.1pF, ±0.25pF, ±0.5pF	584	200	0.2±0.02	
MSASE042SCG9R3[WNA01	EMK042 CG9R3[D-W	16	CG	C0G	9.3 p	±0.1pF, ±0.25pF, ±0.5pF	586	200	0.2±0.02	
MSASE042SCG9R4[WNA01	EMK042 CG9R4[D-W	16	CG	C0G	9.4 p	±0.1pF, ±0.25pF, ±0.5pF	588	200	0.2±0.02	
MSASE042SCG9R5[WNA01	EMK042 CG9R5[D-W	16	CG	C0G	9.5 p	±0.1pF, ±0.25pF, ±0.5pF	590	200	0.2±0.02	
MSASE042SCG9R6[WNA01	EMK042 CG9R6[D-W	16	CG	C0G	9.6 p	±0.1pF, ±0.25pF, ±0.5pF	592	200	0.2±0.02	
MSASE042SCG9R7[WNA01	EMK042 CG9R7[D-W	16	CG	C0G	9.7 p	±0.1pF, ±0.25pF, ±0.5pF	594	200	0.2±0.02	
MSASE042SCG9R8[WNA01	EMK042 CG9R8[D-W	16	CG	C0G	9.8 p	±0.1pF, ±0.25pF, ±0.5pF	596	200	0.2±0.02	
MSASE042SCG9R9[WNA01	EMK042 CG9R9[D-W	16	CG	C0G	9.9 p	±0.1pF, ±0.25pF, ±0.5pF	598	200	0.2±0.02	
MSASE042SCG100DWNA01	EMK042 CG100D[W-W	16	CG	C0G	10 p	±0.5pF	600	200	0.2±0.02	
MSASE042SCG110JWNA01	EMK042 CG110J[W-W	16	CG	C0G	11 p	±5%	620	200	0.2±0.02	
MSASE042SCG120JWNA01	EMK042 CG120J[W-W	16	CG	C0G	12 p	±5%	640	200	0.2±0.02	
MSASE042SCG130JWNA01	EMK042 CG130J[W-W	16	CG	C0G	13 p	±5%	660	200	0.2±0.02	
MSASE042SCG150JWNA01	EMK042 CG150J[W-W	16	CG	C0G	15 p	±5%	700	200	0.2±0.02	
MSASE042SCG160JWNA01	EMK042 CG160J[W-W	16	CG	C0G	16 p	±5%	720	200	0.2±0.02	
MSASE042SCG180JWNA01	EMK042 CG180J[W-W	16	CG	C0G	18 p	±5%	760	200	0.2±0.02	
MSASE042SCG200JWNA01	EMK042 CG200J[W-W	16	CG	C0G	20 p	±5%	800	200	0.2±0.02	
MSASE042SCG220JWNA01	EMK042 CG220J[W-W	16	CG	C0G	22 p	±5%	840	200	0.2±0.02	
MSASE042SCG240JWNA01	EMK042 CG240J[W-W	16	CG	C0G	24 p	±5%	880	200	0.2±0.02	
MSASE042SCG270JWNA01	EMK042 CG270J[W-W	16	CG	C0G	27 p	±5%	940	200	0.2±0.02	
MSASE042SCG300JWNA01	EMK042 CG300J[W-W	16	CG	C0G	30 p	±5%	1000	200	0.2±0.02	
MSASE042SCG330JWNA01	EMK042 CG330J[W-W	16	CG	C0G	33 p	±5%	1000	200	0.2±0.02	
MSASE042SCG360JWNA01	EMK042 CG360J[W-W	16	CG	C0G	36 p	±5%	1000	200	0.2±0.02	
MSASE042SCG390JWNA01	EMK042 CG390J[W-W	16	CG	C0G	39 p	±5%	1000	200	0.2±0.02	
MSASE042SCG430JWNA01	EMK042 CG430J[W-W	16	CG	C0G	43 p	±5%	1000	200	0.2±0.02	
MSASE042SCG470JWNA01	EMK042 CG470J[W-W	16	CG	C0G	47 p	±5%	1000	200	0.2±0.02	
MSASE042SCG510JWNA01	EMK042 CG510J[W-W	16	CG	C0G	51 p	±5%	1000	200	0.2±0.02	
MSASE042SCG560JWNA01	EMK042 CG560J[W-W	16	CG	C0G	56 p	±5%	1000	200	0.2±0.02	
MSASE042SCG620JWNA01	EMK042 CG620J[W-W	16	CG	C0G	62 p	±5%	1000	200	0.2±0.02	
MSASE042SCG680JWNA01	EMK042 CG680J[W-W	16	CG	C0G	68 p	±5%	1000	200	0.2±0.02	
MSASE042SCG750JWNA01	EMK042 CG750J[W-W	16	CG	C0G	75 p	±5%	1000	200	0.2±0.02	
MSASE042SCG820JWNA01	EMK042 CG820J[W-W	16	CG	C0G	82 p	±5%	1000	200	0.2±0.02	
MSASE042SCG910JWNA01	EMK042 CG910J[W-W	16	CG	C0G	91 p	±5%	1000	200	0.2±0.02	
MSASE042SCG101JWNA01	EMK042 CG101J[W-W	16	CG	C0G	100 p	±5%	1000	200	0.2±0.02	
MSASE042SCG221JWNA01	EMK042 CG221J[W-W	16	CG	C0G	220 p	±5%	1000	200	0.2±0.02	
MSASE042SCG241JWNA01	EMK042 CG241J[W-W	16	CG	C0G	240 p	±5%	1000	200	0.2±0.02	
MSASE042SCG271JWNA01	EMK042 CG271J[W-W	16	CG	C0G	270 p	±5%	1000	200	0.2±0.02	
MSASE042SCG331JWNA01	EMK042 CG331J[W-W	16	CG	C0G	330 p	±5%	1000	200	0.2±0.02	

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 For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).



## PARTS NUMBER

## 0603TYPE

【Temperature Characteristic  $C\Delta : C\Delta/C0\Delta (-55\sim +125^{\circ}C)$ 】 0.3mm thickness

New part number	Old part number (for reference)	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance	Q (at 1MHz) (min)	HLLT		Thickness <sup>3</sup> [mm]	Note
							Rated voltage x %			
MSASU063SCH200JFNA01	UMK063 CH200JT-F	50	CH C0H	20 p	±5%	800	200		0.3±0.03	
MSASU063SCH220JFNA01	UMK063 CH220JT-F	50	CH C0H	22 p	±5%	840	200		0.3±0.03	
MSASU063SCH240JFNA01	UMK063 CH240JT-F	50	CH C0H	24 p	±5%	880	200		0.3±0.03	
MSASU063SCH270JFNA01	UMK063 CH270JT-F	50	CH C0H	27 p	±5%	940	200		0.3±0.03	
MSASU063SCH300JFNA01	UMK063 CH300JT-F	50	CH C0H	30 p	±5%	1000	200		0.3±0.03	
MSASU063SCH330JFNA01	UMK063 CH330JT-F	50	CH C0H	33 p	±5%	1000	200		0.3±0.03	
MSASU063SCH360JFNA01	UMK063 CH360JT-F	50	CH C0H	36 p	±5%	1000	200		0.3±0.03	
MSASU063SCH390JFNA01	UMK063 CH390JT-F	50	CH C0H	39 p	±5%	1000	200		0.3±0.03	
MSASU063SCH430JFNA01	UMK063 CH430JT-F	50	CH C0H	43 p	±5%	1000	200		0.3±0.03	
MSASU063SCH470JFNA01	UMK063 CH470JT-F	50	CH C0H	47 p	±5%	1000	200		0.3±0.03	
MSASU063SCH510JFNA01	UMK063 CH510JT-F	50	CH C0H	51 p	±5%	1000	200		0.3±0.03	
MSASU063SCH560JFNA01	UMK063 CH560JT-F	50	CH C0H	56 p	±5%	1000	200		0.3±0.03	
MSASU063SCH620JFNA01	UMK063 CH620JT-F	50	CH C0H	62 p	±5%	1000	200		0.3±0.03	
MSASU063SCH680JFNA01	UMK063 CH680JT-F	50	CH C0H	68 p	±5%	1000	200		0.3±0.03	
MSASU063SCH750JFNA01	UMK063 CH750JT-F	50	CH C0H	75 p	±5%	1000	200		0.3±0.03	
MSASU063SCH820JFNA01	UMK063 CH820JT-F	50	CH C0H	82 p	±5%	1000	200		0.3±0.03	
MSASU063SCH910JFNA01	UMK063 CH910JT-F	50	CH C0H	91 p	±5%	1000	200		0.3±0.03	
MSASU063SCH101JFNA01	UMK063 CH101JT-F	50	CH C0H	100 p	±5%	1000	200		0.3±0.03	
MSASU063SCH111JFNA01	UMK063 CH111JT-F	50	CH C0H	110 p	±5%	1000	200		0.3±0.03	
MSASU063SCH121JFNA01	UMK063 CH121JT-F	50	CH C0H	120 p	±5%	1000	200		0.3±0.03	
MSASU063SCH131JFNA01	UMK063 CH131JT-F	50	CH C0H	130 p	±5%	1000	200		0.3±0.03	
MSASU063SCH151JFNA01	UMK063 CH151JT-F	50	CH C0H	150 p	±5%	1000	200		0.3±0.03	
MSASU063SCH181JFNA01	UMK063 CH181JT-F	50	CH C0H	180 p	±5%	1000	200		0.3±0.03	
MSASU063SCH201JFNA01	UMK063 CH201JT-F	50	CH C0H	200 p	±5%	1000	200		0.3±0.03	
MSASU063SCH221JFNA01	UMK063 CH221JT-F	50	CH C0H	220 p	±5%	1000	200		0.3±0.03	
MSAST063SCH241JFNA01	TMK063 CH241JT-F	25	CH C0H	240 p	±5%	1000	200		0.3±0.03	
MSAST063SCH271JFNA01	TMK063 CH271JT-F	25	CH C0H	270 p	±5%	1000	200		0.3±0.03	
MSAST063SCH301JFNA01	TMK063 CH301JT-F	25	CH C0H	300 p	±5%	1000	200		0.3±0.03	
MSAST063SCH331JFNA01	TMK063 CH331JT-F	25	CH C0H	330 p	±5%	1000	200		0.3±0.03	
MSAST063SCH361JFNA01	TMK063 CH361JT-F	25	CH C0H	360 p	±5%	1000	200		0.3±0.03	
MSAST063SCH391JFNA01	TMK063 CH391JT-F	25	CH C0H	390 p	±5%	1000	200		0.3±0.03	
MSAST063SCH431JFNA01	TMK063 CH431JT-F	25	CH C0H	430 p	±5%	1000	200		0.3±0.03	
MSAST063SCH471JFNA01	TMK063 CH471JT-F	25	CH C0H	470 p	±5%	1000	200		0.3±0.03	
MSAST063SCH511JFNA01	TMK063 CH511JT-F	25	CH C0H	510 p	±5%	1000	200		0.3±0.03	
MSAST063SCH561JFNA01	TMK063 CH561JT-F	25	CH C0H	560 p	±5%	1000	200		0.3±0.03	
MSAST063SCH621JFNA01	TMK063 CH621JT-F	25	CH C0H	620 p	±5%	1000	200		0.3±0.03	
MSAST063SCH681JFNA01	TMK063 CH681JT-F	25	CH C0H	680 p	±5%	1000	200		0.3±0.03	
MSAST063SCH751JFNA01	TMK063 CH751JT-F	25	CH C0H	750 p	±5%	1000	200		0.3±0.03	
MSAST063SCH821JFNA01	TMK063 CH821JT-F	25	CH C0H	820 p	±5%	1000	200		0.3±0.03	
MSAST063SCH911JFNA01	TMK063 CH911JT-F	25	CH C0H	910 p	±5%	1000	200		0.3±0.03	
MSAST063SCH102JFNA01	TMK063 CH102JT-F	25	CH C0H	1000 p	±5%	1000	200		0.3±0.03	
MSASU063SCG200JFNA01	UMK063 CG200JT-F	50	CG C0G	20 p	±5%	800	200		0.3±0.03	
MSASU063SCG220JFNA01	UMK063 CG220JT-F	50	CG C0G	22 p	±5%	840	200		0.3±0.03	
MSASU063SCG240JFNA01	UMK063 CG240JT-F	50	CG C0G	24 p	±5%	880	200		0.3±0.03	
MSASU063SCG270JFNA01	UMK063 CG270JT-F	50	CG C0G	27 p	±5%	940	200		0.3±0.03	
MSASU063SCG300JFNA01	UMK063 CG300JT-F	50	CG C0G	30 p	±5%	1000	200		0.3±0.03	
MSASU063SCG330JFNA01	UMK063 CG330JT-F	50	CG C0G	33 p	±5%	1000	200		0.3±0.03	
MSASU063SCG360JFNA01	UMK063 CG360JT-F	50	CG C0G	36 p	±5%	1000	200		0.3±0.03	
MSASU063SCG390JFNA01	UMK063 CG390JT-F	50	CG C0G	39 p	±5%	1000	200		0.3±0.03	
MSASU063SCG430JFNA01	UMK063 CG430JT-F	50	CG C0G	43 p	±5%	1000	200		0.3±0.03	
MSASU063SCG470JFNA01	UMK063 CG470JT-F	50	CG C0G	47 p	±5%	1000	200		0.3±0.03	
MSASU063SCG510JFNA01	UMK063 CG510JT-F	50	CG C0G	51 p	±5%	1000	200		0.3±0.03	
MSASU063SCG560JFNA01	UMK063 CG560JT-F	50	CG C0G	56 p	±5%	1000	200		0.3±0.03	
MSASU063SCG620JFNA01	UMK063 CG620JT-F	50	CG C0G	62 p	±5%	1000	200		0.3±0.03	
MSASU063SCG680JFNA01	UMK063 CG680JT-F	50	CG C0G	68 p	±5%	1000	200		0.3±0.03	
MSASU063SCG750JFNA01	UMK063 CG750JT-F	50	CG C0G	75 p	±5%	1000	200		0.3±0.03	
MSASU063SCG820JFNA01	UMK063 CG820JT-F	50	CG C0G	82 p	±5%	1000	200		0.3±0.03	
MSASU063SCG910JFNA01	UMK063 CG910JT-F	50	CG C0G	91 p	±5%	1000	200		0.3±0.03	
MSASU063SCG101JFNA01	UMK063 CG101JT-F	50	CG C0G	100 p	±5%	1000	200		0.3±0.03	
MSASU063SCG111JFNA01	UMK063 CG111JT-F	50	CG C0G	110 p	±5%	1000	200		0.3±0.03	
MSASU063SCG121JFNA01	UMK063 CG121JT-F	50	CG C0G	120 p	±5%	1000	200		0.3±0.03	
MSASU063SCG131JFNA01	UMK063 CG131JT-F	50	CG C0G	130 p	±5%	1000	200		0.3±0.03	
MSASU063SCG151JFNA01	UMK063 CG151JT-F	50	CG C0G	150 p	±5%	1000	200		0.3±0.03	
MSASU063SCG181JFNA01	UMK063 CG181JT-F	50	CG C0G	180 p	±5%	1000	200		0.3±0.03	
MSASU063SCG201JFNA01	UMK063 CG201JT-F	50	CG C0G	200 p	±5%	1000	200		0.3±0.03	
MSASU063SCG221JFNA01	UMK063 CG221JT-F	50	CG C0G	220 p	±5%	1000	200		0.3±0.03	
MSAST063SCG241JFNA01	TMK063 CG241JT-F	25	CG C0G	240 p	±5%	1000	200		0.3±0.03	
MSAST063SCG271JFNA01	TMK063 CG271JT-F	25	CG C0G	270 p	±5%	1000	200		0.3±0.03	
MSAST063SCG301JFNA01	TMK063 CG301JT-F	25	CG C0G	300 p	±5%	1000	200		0.3±0.03	
MSAST063SCG331JFNA01	TMK063 CG331JT-F	25	CG C0G	330 p	±5%	1000	200		0.3±0.03	
MSAST063SCG361JFNA01	TMK063 CG361JT-F	25	CG C0G	360 p	±5%	1000	200		0.3±0.03	
MSAST063SCG391JFNA01	TMK063 CG391JT-F	25	CG C0G	390 p	±5%	1000	200		0.3±0.03	
MSAST063SCG431JFNA01	TMK063 CG431JT-F	25	CG C0G	430 p	±5%	1000	200		0.3±0.03	
MSAST063SCG471JFNA01	TMK063 CG471JT-F	25	CG C0G	470 p	±5%	1000	200		0.3±0.03	
MSAST063SCG511JFNA01	TMK063 CG511JT-F	25	CG C0G	510 p	±5%	1000	200		0.3±0.03	
MSAST063SCG561JFNA01	TMK063 CG561JT-F	25	CG C0G	560 p	±5%	1000	200		0.3±0.03	
MSAST063SCG621JFNA01	TMK063 CG621JT-F	25	CG C0G	620 p	±5%	1000	200		0.3±0.03	
MSAST063SCG681JFNA01	TMK063 CG681JT-F	25	CG C0G	680 p	±5%	1000	200		0.3±0.03	
MSAST063SCG751JFNA01	TMK063 CG751JT-F	25	CG C0G	750 p	±5%	1000	200		0.3±0.03	
MSAST063SCG821JFNA01	TMK063 CG821JT-F	25	CG C0G	820 p	±5%	1000	200		0.3±0.03	
MSAST063SCG911JFNA01	TMK063 CG911JT-F	25	CG C0G	910 p	±5%	1000	200		0.3±0.03	
MSAST063SCG102JFNA01	TMK063 CG102JT-F	25	CG C0G	1000 p	±5%	1000	200		0.3±0.03	

# Multilayer Ceramic Capacitors

## ■ PACKAGING

### ① Minimum Quantity

#### ● Taped package

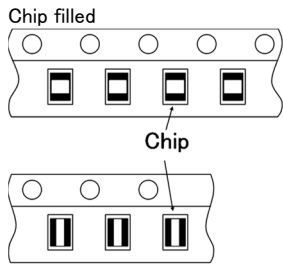
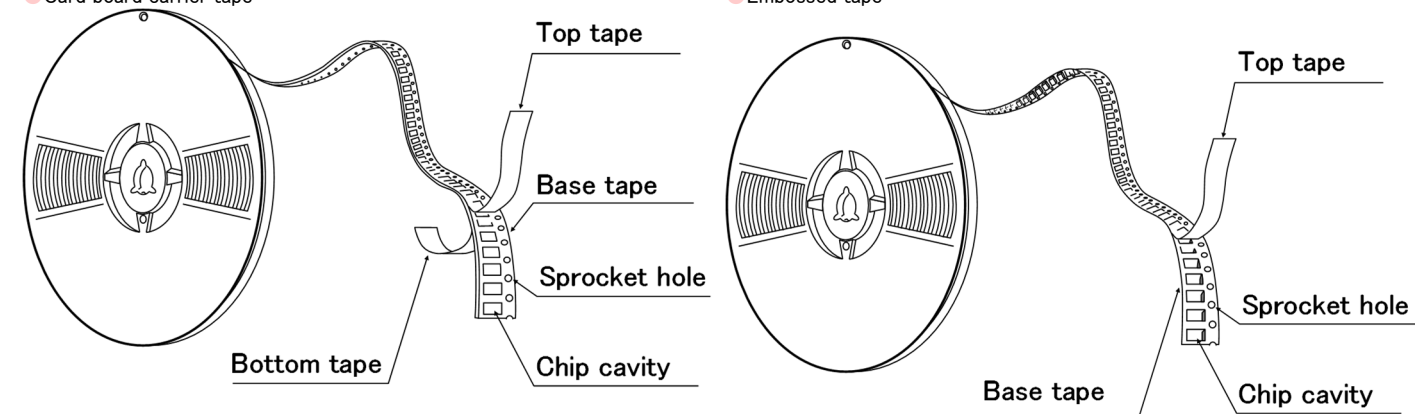
Type			Thickness		Standard Quantity [pcs]	
Code	JIS(mm)	EIA(inch)	[mm]	Code	Paper tape	Embossed tape
02	0201	008004	0.125	1	—	50000
04	0402	01005	0.2	2	—	40000
06	0603	0201	0.3	3	15000	—
1L	1005	0402	0.13	H	—	20000
			0.18	E	—	15000
			0.2	2	20000	—
			0.3	3	15000	—
10	1005	0402	0.5	5	10000	—
	0510 ※	0204	0.3	3	10000	—
16	1608	0603	0.45	K	4000	—
			0.7	7		
			0.8	8		
			0.8	8	3000 (Soft Termination)	3000 (Soft Termination)
	0816 ※	0306	0.5	5	—	4000
21	2012	0805	0.85	9	4000	—
			1.25	G	—	3000
			1.25	G	—	2000 (Soft Termination)
	1220 ※	0508	0.85	9	4000	—
31	3216	1206	0.85	9	4000	—
			1.15	Q	—	3000
			1.6	L	—	2000
32	3225	1210	0.85	9	—	2000
			1.15	Q		
			1.9	N		
			2.0 max	Y		
			2.5	M	—	500(T), 1000(P)
45	4532	1812	2.0 max	Y	—	1000
			2.5	M	—	500

注: ※LW Reverse type (MSRL, MCRL, MBRL, MLRL, MMRL)

## ② Taping material

※ No bottom tape for pressed carrier tape

- Card board carrier tape
- Embossed tape

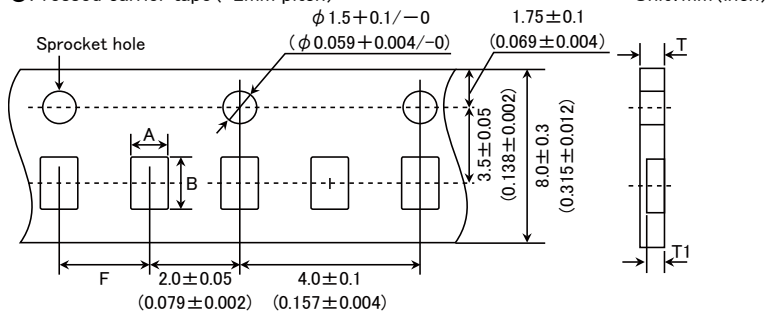


※ LW Reverse type.

## ③ Representative taping dimensions

● Paper Tape (8mm wide)

● Pressed carrier tape ( 2mm pitch)

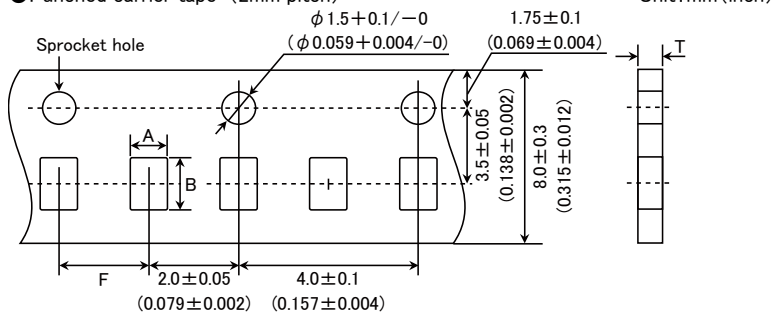


Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness	
	A	B		T	T1
0603 (0201)	0.37	0.67	2.0±0.05	0.45max.	0.42max.
0510 (0204) ※	0.65	1.15		0.4max.	0.3max.
1005 (0402) (*1 2)				0.45max.	0.42max.
1005 (0402) (*1 3)					

Note \*1 Thickness, 2:0.2mm, 3:0.3mm. ※ LW Reverse type.

Unit: mm

● Punched carrier tape (2mm pitch)

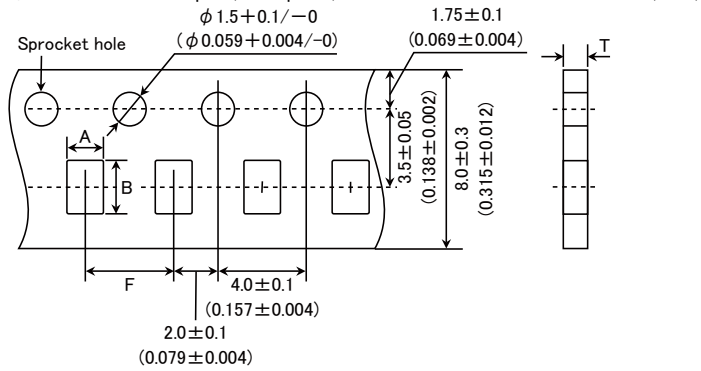


Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness
	A	B		T
1005 (0402)	0.65	1.15	2.0±0.05	0.8max.

Unit: mm

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● Punched carrier tape (4mm pitch)

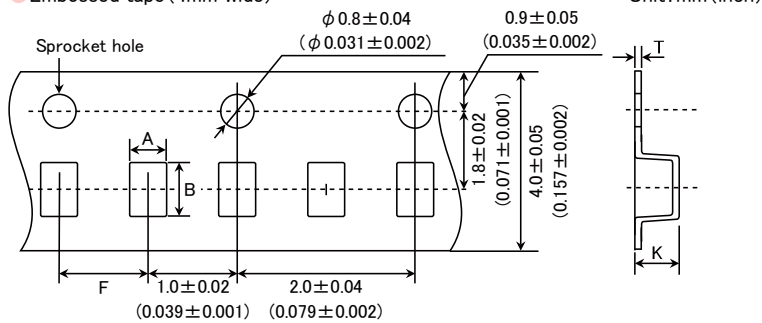


Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness	
	A	B		K	T
1608 (0603)	1.0	1.8	4.0 ± 0.1	1.1max.	1.1max.
0816 (0306) ※					
2012 (0805)					
1220 (0508) ※	1.65	2.4	4.0 ± 0.1	1.1max.	1.1max.
3216 (1206)	2.0	3.6			

Note: Taping size might be different depending on the size of the product. ※ LW Reverse type.

Unit: mm

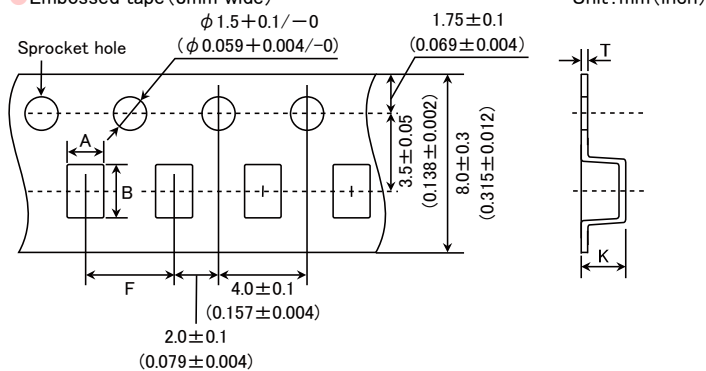
● Embossed tape (4mm wide)



Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness	
	A	B		K	T
0201 (008004)	0.135	0.27	1.0 ± 0.02	0.5max.	0.25max.
0402 (01005)	0.23	0.43			

Unit: mm

● Embossed tape (8mm wide)



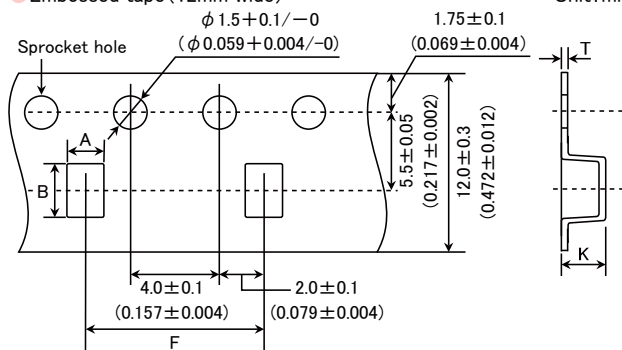
Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness	
	A	B		K	T
1005 (0402)	0.6	1.1	2.0 ± 0.1	0.6max	0.2 ± 0.1
0816 (0306) ※	1.0	1.8	4.0 ± 0.1	1.3max.	0.25 ± 0.1
2012 (0805)	1.65	2.4			
3216 (1206)	2.0	3.6		3.4max.	0.6max.
3225 (1210)	2.8	3.6			

Note: ※ LW Reverse type.

Unit: mm

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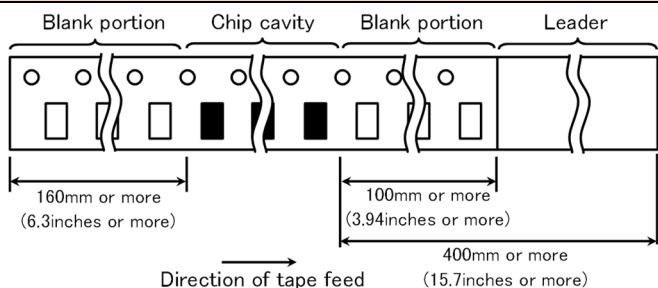
● Embossed tape (12mm wide) Unit: mm (inch)



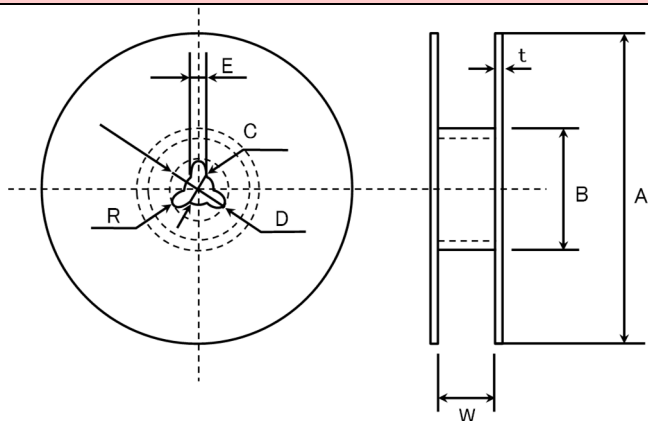
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B		K	T
3225 (1210)	3.1	4.0	$8.0 \pm 0.1$	4.0max.	0.6max.
4532 (1812)	3.7	4.9	$8.0 \pm 0.1$	4.0max.	0.6max.

Unit: mm

④ Trailer and Leader



⑤ Reel size



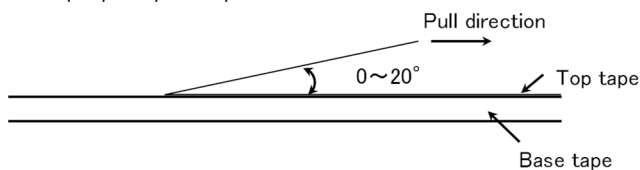
A	B	C	D	E	R
$\phi 178 \pm 2.0$	$\phi 50$ min.	$\phi 13.0 \pm 0.2$	$\phi 21.0 \pm 0.8$	$2.0 \pm 0.5$	1.0

	T	W
4mm wide tape	1.5max.	$5 \pm 1.0$
8mm wide tape	2.5max.	$10 \pm 1.5$
12mm wide tape	2.5max.	$14 \pm 1.5$

Unit: mm

⑥ Top Tape Strength

The top tape requires a peel-off force of 0.1 to 0.7N in the direction of the arrow as illustrated below.



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**Multilayer Ceramic Capacitors for General Electronic Equipment for Consumer**  
**Multilayer Ceramic Capacitors**  
**for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)**

■ RELIABILITY DATA

1. Operating Temperature Range

Specified Value	Temperature Compensating (Class1)	Standard	-55 to +125°C	
		High Frequency Type		
Specified Value	High Permittivity (Class2)		Specification	Temperature Range
		B5	B	-25 to +85°C
			X5R	-55 to +85°C
		B7	X7R	-55 to +125°C
		C6	X6S	-55 to +105°C
C7	X7S	-55 to +125°C		

2. Storage Conditions

Specified Value	Temperature Compensating (Class1)	Standard	-55 to +125°C	
		High Frequency Type		
Specified Value	High Permittivity (Class2)		Specification	Temperature Range
		B5	B	-25 to +85°C
			X5R	-55 to +85°C
		B7	X7R	-55 to +125°C
		C6	X6S	-55 to +105°C
C7	X7S	-55 to +125°C		

3. Rated Voltage

Specified Value	Temperature Compensating (Class1)	Standard	50VDC, 25VDC, 16VDC
		High Frequency Type	25VDC, 16VDC
	High Permittivity (Class2)		50VDC, 35VDC, 25VDC, 16VDC, 10VDC, 6.3VDC, 4VDC, 2.5VDC

4. Withstanding Voltage (Between terminals)

Specified Value	Temperature Compensating (Class1)	Standard	No breakdown or damage
		High Frequency Type	
Test Methods and Remarks	High Permittivity (Class2)		
		Class 1	Class 2
	Applied voltage	Rated voltage × 3	Rated voltage × 2.5
	Duration	1 to 5 sec.	
	Charge/discharge current	50mA max.	

5. Insulation Resistance

Specified Value	Temperature Compensating (Class1)	Standard	10000 MΩ min.
		High Frequency Type	
	High Permittivity (Class2)	Note 1	$C \leq 0.047 \mu F$ : 10000 MΩ min. $C > 0.047 \mu F$ : $500 M\Omega \cdot \mu F$ (C: Nominal capacitance)
Test Methods and Remarks	Applied voltage	: Rated voltage	
	Duration	: 60±5 sec.	
	Charge/discharge current	: 50mA max.	

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**6. Capacitance (Tolerance)**

Specified Value	Temperature Compensating (Class1)	Standard	$0.2\text{pF} \leq C \leq 5\text{pF} : \pm 0.25\text{pF}$ $5\text{pF} \leq C \leq 10\text{pF} : \pm 0.5\text{pF}$ $C > 10\text{pF} : \pm 5\%$		
		High Frequency Type	Refer to detailed specification		
	High Permittivity (Class2)		$\pm 10\%$ or $\pm 20\%$		
Test Methods and Remarks		Class 1		Class 2	
		Standard	High Frequency Type	$C \leq 10 \mu\text{F}$	$C > 10 \mu\text{F}$
	Preconditioning	None		Thermal treatment (at 150°C for 1hr) Note 2	
	Measuring frequency	1MHz $\pm 10\%$	1GHz	1kHz $\pm 10\%$	120 $\pm 10\text{Hz}$
	Measuring voltage Note 1	0.5 to 5Vrms		1 $\pm 0.2\text{Vrms}$	0.5 $\pm 0.1\text{Vrms}$
	Bias application	None			

**7. Q or Dissipation Factor**

Specified Value	Temperature Compensating (Class1)	Standard	$C < 30\text{pF} : Q \geq 400 + 20C$ $C \geq 30\text{pF} : Q \geq 1000$ (C: Nominal capacitance)		
		High Frequency Type	Refer to detailed specification		
	High Permittivity (Class2) Note 1		2.5% max.		
Test Methods and Remarks		Class 1		Class 2	
		Standard	High Frequency Type	$C \leq 10 \mu\text{F}$	$C > 10 \mu\text{F}$
	Preconditioning	None		Thermal treatment (at 150°C for 1hr) Note 2	
	Measuring frequency	1MHz $\pm 10\%$	1GHz	1kHz $\pm 10\%$	120 $\pm 10\text{Hz}$
	Measuring voltage Note 1	0.5 to 5Vrms		1 $\pm 0.2\text{Vrms}$	0.5 $\pm 0.1\text{Vrms}$
	Bias application	None			

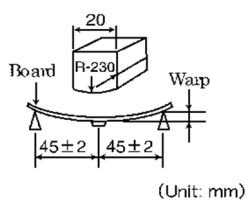
**8. Temperature Characteristic (Without voltage application)**

Specified Value	Temperature Compensating (Class1)	Standard	Temperature Characteristic [ppm/°C]		Tolerance [ppm/°C]	
			$C \square : 0$	CG(C0G) CH(C0H) CJ(C0J) CK(C0K)	G: $\pm 30$ H: $\pm 60$ J: $\pm 120$ H: $\pm 250$	
	High Frequency Type	Temperature Characteristic [ppm/°C]		Tolerance [ppm/°C]		
			$C \square : 0$	CG(C0G) CH(C0H)	G: $\pm 30$ H: $\pm 60$	
	High Permittivity (Class2)		Specification	Capacitance change	Reference temperature	Temperature Range
			B5	B X5R $\pm 10\%$	20°C 25°C	-25 to +85°C -55 to +85°C
			B7	X7R $\pm 15\%$	25°C	-55 to +125°C
			C6	XS $\pm 22\%$	25°C	-55 to +105°C
			C7	X7S $\pm 22\%$	25°C	-55 to +125°C

Test Methods and Remarks	Class 1 Capacitance at 20°C and 85°C shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.				
	$\frac{(C_{85} - C_{20})}{C_{20} \times \Delta T} \times 10^6 (\text{ppm}/^\circ\text{C}) \quad \Delta T = 65$				
	Class 2 Capacitance at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.				
	Step	B	X5R, X7R, X6S, X7S		
	1	Minimum operating temperature			
2	20°C	25°C			
3	Maximum operating temperature				
	$\frac{(C - C_2)}{C_2} \times 100 (\%) \quad C : \text{Capacitance in Step 1 or Step 3}$ $C_2 : \text{Capacitance in Step 2}$				
	※Measuring frequency and voltage: Refer to detailed specification				

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## 9. Deflection

Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 5\%$ or $\pm 0.5$ pF, whichever is larger.	
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 0.5$ pF	
	High Permittivity (Class2)		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$	
Test Methods and Remarks	Multilayer Ceramic Capacitors		 <p>(Unit: mm) Capacitance measurement shall be conducted with the board bent</p>	
		0201, 0402, 0603, ※1005 Type		The other types
	Board	Glass epoxy-resin substrate		
	Thickness	0.8mm		1.6mm
	Warp	1mm		
	Duration	10 sec.		
	※1005 Type thickness, 2: 0.2mm, 3: 0.3mm.			

## 10. Adhesive Strength of Terminal Electrodes

Specified Value	Temperature Compensating (Class1)	Standard	No terminal separation or its indication.	
		High Frequency Type		
	High Permittivity (Class2)			
Test Methods and Remarks		0201Type	0402, 0603Type	1005Type or more
	Applied force	1N	2N	5N
	Duration	10 ± 1 sec		30 ± 5 sec

## 11. Vibration

Specified Value	Temperature Compensating (Class1)	Standard	Initial performance shall be satisfied.
		High Frequency Type	
	High Permittivity (Class2)		
Test Methods and Remarks	Preconditioning	: Thermal treatment (at 150°C for 1hr) Note2 (Only High permittivity)	
	Frequency range	: 10 to 55 Hz	
	Overall amplitude	: 1.5 mm	
	Sweeping method	: 10 to 55 to 10 Hz for 1 min	
		Two hours each in X, Y, Z directions: 6 hrs in total	

## 12. Solderability

Specified Value	Temperature Compensating (Class1)	Standard	At least 95% of terminal electrode is covered by new solder.
		High Frequency Type	
	High Permittivity (Class2)		
Test Methods and Remarks		Eutectic solder	Lead-free solder
	Solder type	H60A or H63A	Sn-3.0Ag-0.5Cu
	Solder temperature	230 ± 5°C	
	Duration	4 ± 1 sec.	



### 13. Resistance to Soldering

Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ , whichever is larger. Q : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ , whichever is larger. Q : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
Test Methods and Remarks	Class 1			
		0201, 0402, 0603 Type	1005 Type	
	Preconditioning	None		
	Preheating	150°C, 1 to 2 min.	80 to 100°C, 2 to 5 min. 150 to 200°C, 2 to 5 min.	
	Solder temp.	270 $\pm$ 5°C		
	Duration	3 $\pm$ 0.5 sec.		
	Recovery	24 $\pm$ 2 hrs (Standard condition) Note 5		
	Class 2			
		0201, 0402, 0603 Type	1005, 1608, 2012 Type	3216, 3225, 4532 Type
	Preconditioning	Thermal treatment (at 150°C for 1 hr) Note 2		
	Preheating	150°C, 1 to 2 min.	80 to 100°C, 2 to 5 min. 150 to 200°C, 2 to 5 min.	80 to 100°C, 5 to 10 min. 150 to 200°C, 5 to 10 min.
	Solder temp.	270 $\pm$ 5°C		
	Duration	3 $\pm$ 0.5 sec.		
	Recovery	24 $\pm$ 2 hrs (Standard condition) Note 5		

### 14. Temperature Cycle (Thermal Shock)

Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ , whichever is larger. Q : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ , whichever is larger. Q : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality	
Test Methods and Remarks	Class 1		Class 2	
	Preconditioning	None	Thermal treatment (at 150°C for 1 hr) Note 2	
	1 cycle	Step	Temperature (°C)	Time (min.)
		1	Minimum operating temperature	30 $\pm$ 3
		2	Normal temperature	2 to 3
		3	Maximum operating temperature	30 $\pm$ 3
	4	Normal temperature	2 to 3	
Number of cycles	5 times			
Recovery	24 $\pm$ 2 hrs (Standard condition) Note 5			

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15. Humidity (Steady State)			
Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 5\%$ or $\pm 0.5\text{pF}$ , whichever is larger. Q : $C < 10\text{pF} : Q \geq 200 + 10C$ $10 \leq C < 30\text{pF} : Q \geq 275 + 2.5C$ $C \geq 30\text{pF} : Q \geq 350$ (C: Nominal capacitance) Insulation resistance : 1000 M $\Omega$ min.
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 5\%$ or $\pm 0.5\text{pF}$ , whichever is larger. Insulation resistance : 1000 M $\Omega$ min.
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ Dissipation factor : 5.0% max. Insulation resistance : 50 M $\Omega$ $\mu\text{F}$ or 1000 M $\Omega$ whichever is smaller.
Test Methods and Remarks	Preconditioning : Thermal treatment (at 150°C for 1hr) Note2 (Only High permittivity) Temperature : 40 $\pm$ 2°C Humidity : 90 to 95%RH Duration : 500 +24/−0 hrs Recovery : 24 $\pm$ 2hrs under the standard condition Note 1,5		

16. Humidity Loading			
Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ or $\pm 0.75\text{pF}$ , whichever is larger. Q : $C < 30\text{pF} : Q \geq 100 + 10C/3$ $C \geq 30\text{pF} : Q \geq 200$ (C: Nominal capacitance) Insulation resistance : 500 M $\Omega$ min.
		High Frequency Type	Appearance : No abnormality Capacitance change : $C \leq 2\text{pF} : \text{Within } \pm 0.4 \text{ pF}$ $C > 2\text{pF} : \text{Within } \pm 0.75 \text{ pF}$ $C > 10\text{pF} : \text{Within } \pm 0.75\%$ (C: Nominal capacitance) Insulation resistance : 500 M $\Omega$ min.
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ Dissipation factor : 5.0% max. Insulation resistance : 25 M $\Omega$ $\mu\text{F}$ or 500 M $\Omega$ , whichever is smaller.
Test Methods and Remarks	Preconditioning : Voltage treatment (Rated voltage are applied for 1 hour at 40°C) Note 1,3 (Only High permittivity) Temperature : 40 $\pm$ 2°C Humidity : 90 to 95%RH Duration : 500 +24/−0 hrs Applied voltage : Rated voltage Charge/discharge current : 50mA max. Recovery : 24 $\pm$ 2hrs under the standard condition Note 1,5		

## 17. High Temperature Loading

Specified Value	Temperature Compensating (Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3\text{pF}$ , whichever is larger. Q : $C < 10\text{pF}$ : $Q \geq 200 + 10C$ $10 \leq C < 30\text{pF}$ : $Q \geq 275 + 2.5C$ $C \geq 30\text{pF}$ : $Q \geq 350$ (C: Nominal capacitance) Insulation resistance : $1000 \text{ M}\Omega$ min.
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3\text{pF}$ , whichever is larger. Insulation resistance : $1000 \text{ M}\Omega$ min.
	High Permittivity (Class2) Note 1	Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ Dissipation factor : $5.0\%$ max. Insulation resistance : $50 \text{ M}\Omega \mu\text{F}$ or $1000 \text{ M}\Omega$ , whichever is smaller.	
Test Methods and Remarks	Preconditioning : Voltage treatment (Twice the rated voltage shall be applied for 1 hour at $85^\circ\text{C}$ , $105^\circ\text{C}$ or $125^\circ\text{C}$ ) Note 1,3,4 (Only High permittivity) Temperature : Maximum operating temperature Duration : $1000 +24/-0$ hrs Applied voltage : Rated voltage $\times 2$ Note 4 Charge/discharge current : $50\text{mA}$ max. Recovery : $24 \pm 2$ hrs under the standard condition Note 1,5		

Note 1 The figures indicate typical specifications. Please refer to individual specifications in detail.

Note 2 Thermal treatment : Initial value shall be measured after test sample is heat-treated at  $150 \pm 0 / -10^\circ\text{C}$  for an hour and kept at room temperature for  $24 \pm 2$  hours.

Note 3 Voltage treatment : Initial value shall be measured after test sample is voltage-treated for an hour at both the temperature and voltage specified in the test conditions, and kept at room temperature for  $24 \pm 2$  hours.

Note 4 150% of rated voltage is applicable to some items. Please refer to their specifications for further information.

Note 5 Standard condition: Temperature:  $5$  to  $35^\circ\text{C}$ , Relative humidity:  $45$  to  $85\%$  RH, Air pressure:  $86$  to  $106\text{kPa}$  When there are questions concerning measurement results, in order to provide correlation data, the test shall be conducted under the following condition.

Temperature:  $20 \pm 2^\circ\text{C}$ , Relative humidity:  $60$  to  $70\%$  RH, Air pressure:  $86$  to  $106\text{kPa}$  Unless otherwise specified, all the tests are conducted under the "standard condition".

# Multilayer Ceramic Capacitors

## PRECAUTIONS

### 1. Circuit Design

- Precautions**
- ◆ Verification of operating environment, electrical rating and performance
    1. A malfunction of equipment in fields such as medical, aerospace, nuclear control, etc. may cause serious harm to human life or have severe social ramifications. Therefore, any capacitors to be used in such equipment may require higher safety and reliability, and shall be clearly differentiated from them used in general purpose applications.
  - ◆ Operating Voltage (Verification of Rated voltage)
    1. The operating voltage for capacitors must always be their rated voltage or less.
      - If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages shall be the rated voltage or less.
      - For a circuit where an AC or a pulse voltage may be used, the sum of their peak voltages shall also be the rated voltage or less.
    2. Even if an applied voltage is the rated voltage or less reliability of capacitors may be deteriorated in case that either a high frequency AC voltage or a pulse voltage having rapid rise time is used in a circuit.

### 2. PCB Design

- Precautions**
- ◆ Pattern configurations (Design of Land-patterns)
    1. When capacitors are mounted on PCBs, the amount of solder used (size of fillet) can directly affect the capacitor performance. Therefore, the following items must be carefully considered in the design of land patterns:
      - (1) Excessive solder applied can cause mechanical stresses which lead to chip breaking or cracking. Therefore, please consider appropriate land-patterns for proper amount of solder.
      - (2) When more than one component are jointly soldered onto the same land, each component's soldering point shall be separated by solder-resist.
  - ◆ Pattern configurations (Capacitor layout on PCBs)
 

After capacitors are mounted on boards, they can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering of the boards, etc.). For this reason, land pattern configurations and positions of capacitors shall be carefully considered to minimize stresses.

**Technical considerations**

- ◆ Pattern configurations (Design of Land-patterns)
 

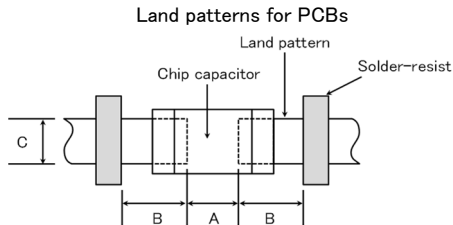
The following diagrams and tables show some examples of recommended land patterns to prevent excessive solder amounts.

(1) Recommended land dimensions for typical chip capacitors

  - Multilayer Ceramic Capacitors : Recommended land dimensions (unit: mm)

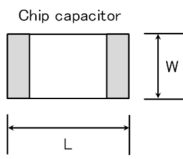
**Wave-soldering**

Type	1608	2012	3216	3225	
Size	L	1.6	2.0	3.2	3.2
	W	0.8	1.25	1.6	2.5
A	0.8 to 1.0	1.0 to 1.4	1.8 to 2.5	1.8 to 2.5	
B	0.5 to 0.8	0.8 to 1.5	0.8 to 1.7	0.8 to 1.7	
C	0.6 to 0.8	0.9 to 1.2	1.2 to 1.6	1.8 to 2.5	



**Reflow-soldering**

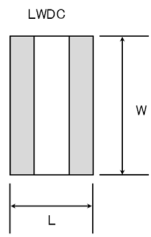
Type	0201	0402	0603	1005	1608	2012	3216	3225	4532	
Size	L	0.25	0.4	0.6	1.0	1.6	2.0	3.2	3.2	4.5
	W	0.125	0.2	0.3	0.5	0.8	1.25	1.6	2.5	3.2
A	0.095~0.135	0.15~0.25	0.20~0.30	0.45~0.55	0.6~0.8	0.8~1.2	1.8~2.5	1.8~2.5	2.5~3.5	
B	0.085~0.125	0.10~0.20	0.20~0.30	0.40~0.50	0.6~0.8	0.8~1.2	1.0~1.5	1.0~1.5	1.5~1.8	
C	0.110~0.150	0.15~0.30	0.25~0.40	0.45~0.55	0.6~0.8	0.9~1.6	1.2~2.0	1.8~3.2	2.3~3.5	



Note: Recommended land size might be different according to the allowance of the size of the product.

  - LWDC: Recommended land dimensions for reflow-soldering (unit: mm)

Type	0510	0816	1220	
Size	L	0.52	0.8	1.25
	W	1.0	1.6	2.0
A	0.18~0.22	0.25~0.3	0.5~0.7	
B	0.2~0.25	0.3~0.4	0.4~0.5	
C	0.9~1.1	1.5~1.7	1.9~2.1	



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(2) Examples of good and bad solder application

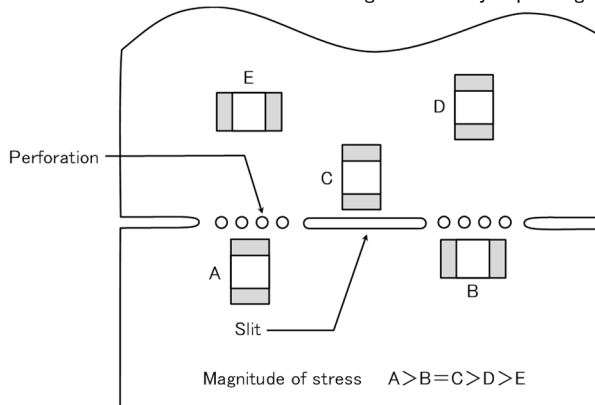
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆ Pattern configurations (Capacitor layout on PCBs)

1-1. The following is examples of good and bad capacitor layouts ; capacitors shall be located to minimize any possible mechanical stresses from board warp or deflection.

Items	Not recommended	Recommended
Deflection of board		 Place the product at a right angle to the direction of the anticipated mechanical stress.

1-2. The amount of mechanical stresses given will vary depending on capacitor layout. Please refer to diagram below.



1-3. When PCB is split, the amount of mechanical stress on the capacitors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, please consider the PCB, split methods as well as chip location.

3. Mounting

Precautions

◆ Adjustment of mounting machine

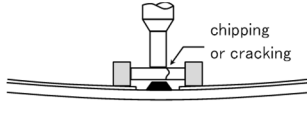
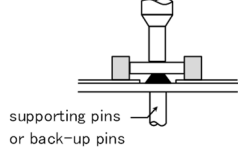
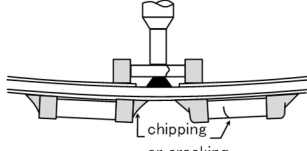
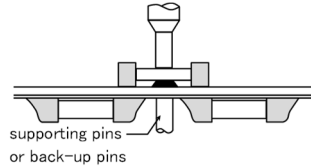
- When capacitors are mounted on PCB, excessive impact load shall not be imposed on them.
- Maintenance and inspection of mounting machines shall be conducted periodically.

◆ Selection of Adhesives

- When chips are attached on PCBs with adhesives prior to soldering, it may cause capacitor characteristics degradation unless the following factors are appropriately checked : size of land patterns, type of adhesive, amount applied, hardening temperature and hardening period. Therefore, please contact us for further information.

◆ Adjustment of mounting machine

1. When the bottom dead center of a pick-up nozzle is too low, excessive force is imposed on capacitors and causes damages. To avoid this, the following points shall be considerable.
  - (1) The bottom dead center of the pick-up nozzle shall be adjusted to the surface level of PCB without the board deflection.
  - (2) The pressure of nozzle shall be adjusted between 1 and 3 N static loads.
  - (3) To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins shall be used on the other side of the PCB. The following diagrams show some typical examples of good and bad pick-up nozzle placement:

Item	Improper method	Proper method
Single-sided mounting		
Double-sided mounting		

Technical considerations

2. As the alignment pin is worn out, adjustment of the nozzle height can cause chipping or cracking of capacitors because of mechanical impact on the capacitors. To avoid this, the monitoring of the width between the alignment pins in the stopped position, maintenance, check and replacement of the pin shall be conducted periodically.

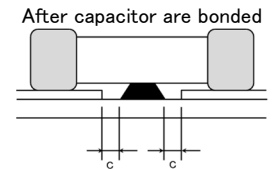
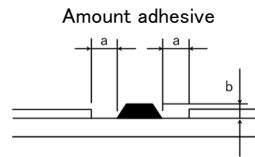
◆ Selection of Adhesives

Some adhesives may cause IR deterioration. The different shrinkage percentage of between the adhesive and the capacitors may result in stresses on the capacitors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect components. Therefore, the following precautions shall be noted in the application of adhesives.

- (1) Required adhesive characteristics
  - a. The adhesive shall be strong enough to hold parts on the board during the mounting & solder process.
  - b. The adhesive shall have sufficient strength at high temperatures.
  - c. The adhesive shall have good coating and thickness consistency.
  - d. The adhesive shall be used during its prescribed shelf life.
  - e. The adhesive shall harden rapidly.
  - f. The adhesive shall have corrosion resistance.
  - g. The adhesive shall have excellent insulation characteristics.
  - h. The adhesive shall have no emission of toxic gasses and no effect on the human body.
- (2) The recommended amount of adhesives is as follows:

[Recommended condition]

Figure	2012/3216 case sizes as examples
a	0.3mm min
b	100 to 120 μm
c	Adhesives shall not contact land



4. Soldering

◆ Selection of Flux

- Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use;
- (1) Flux used shall be less than or equal to 0.1 wt% ( in Cl equivalent) of halogenated content. Flux having a strong acidity content shall not be applied.
  - (2) When shall capacitors are soldered on boards, the amount of flux applied shall be controlled at the optimum level.
  - (3) When water-soluble flux is used, special care shall be taken to properly clean the boards.

Precautions

◆ Soldering

Temperature, time, amount of solder, etc. shall be set in accordance with their recommended conditions. Sn-Zn solder paste can adversely affect MLCC reliability. Please contact us prior to usage of Sn-Zn solder.

◆ Selection of Flux

- 1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate flux, or highly acidic flux is used, it may lead to corrosion of terminal electrodes or degradation of insulation resistance on the surfaces of the capacitors.
- 1-2. Flux is used to increase solderability in wave soldering. However if too much flux is applied, a large amount of flux gas may be emitted and may adversely affect the solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.
- 1-3. Since the residue of water-soluble flux is easily dissolved in moisture in the air, the residues on the surfaces of capacitors in high humidity conditions may cause a degradation of insulation resistance and reliability of the capacitors. Therefore, the cleaning methods

Technical considerations

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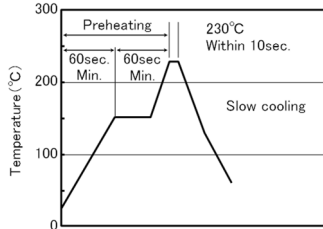
and the capability of the machines used shall also be considered carefully when water-soluble flux is used.

◆Soldering

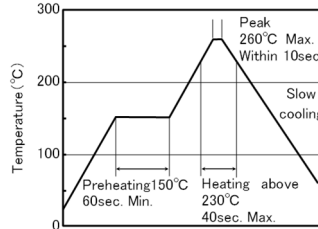
- Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling.
- Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.
- Preheating : Capacitors shall be preheated sufficiently, and the temperature difference between the capacitors and solder shall be within 130°C.
- Cooling : The temperature difference between the capacitors and cleaning process shall not be greater than 100°C.

[Reflow soldering]

【Recommended conditions for eutectic soldering】

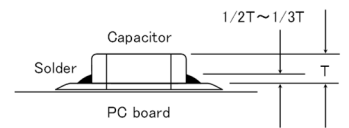


【Recommended condition for Pb-free soldering】



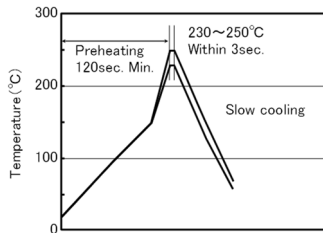
Caution

- ①The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of a capacitor.
- ②Because excessive dwell times can adversely affect solderability, soldering duration shall be kept as close to recommended times as possible. soldering for 2 times.

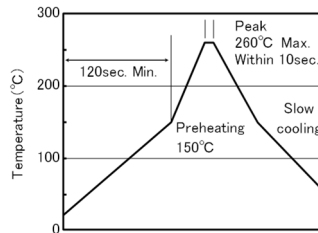


[Wave soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】

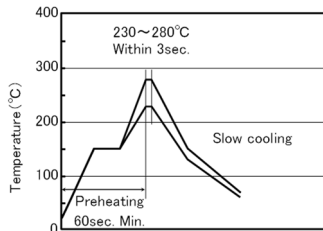


Caution

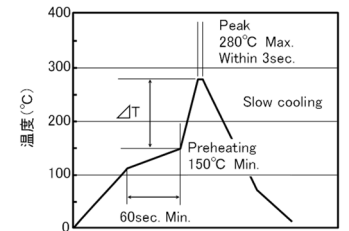
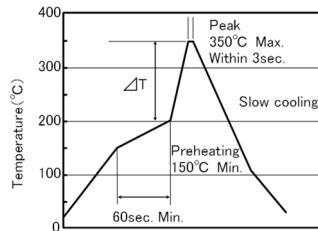
- ①Wave soldering must not be applied to capacitors designated as for reflow soldering only. soldering for 1 times.

[Hand soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



	$\Delta T$
3216type or less	$\Delta T \leq 150^{\circ}\text{C}$

	$\Delta T$
3225type or more	$\Delta T \leq 130^{\circ}\text{C}$

Caution

- ①Use a 50W soldering iron with a maximum tip diameter of 1.0 mm.
- ②The soldering iron shall not directly touch capacitors. soldering for 1 times.

5. Cleaning	
Precautions	<p>◆Cleaning conditions</p> <ol style="list-style-type: none"> <li>When PCBs are cleaned after capacitors mounting, please select the appropriate cleaning solution in accordance with the intended use of the cleaning. (e.g. to remove soldering flux or other materials from the production process.)</li> <li>Cleaning condition shall be determined after it is verified by using actual cleaning machine that the cleaning process does not affect capacitor's characteristics.</li> </ol>
Technical considerations	<ol style="list-style-type: none"> <li>The use of inappropriate cleaning solutions can cause foreign substances such as flux residue to adhere to capacitors or deteriorate their outer coating, resulting in a degradation of the capacitor's electrical properties (especially insulation resistance).</li> <li>Inappropriate cleaning conditions (insufficient or excessive cleaning) may adversely affect the performance of the capacitors. In the case of ultrasonic cleaning, too much power output can cause excessive vibration of PCBs which may lead to the cracking of capacitors or the soldered portion, or decrease the terminal electrodes' strength. Therefore, the following conditions shall be carefully checked:            Ultrasonic output : 20 W/l or less      Ultrasonic frequency : 40 kHz or less            Ultrasonic washing period : 5 min. or less</li> </ol>
6. Resin coating and mold	
Precautions	<ol style="list-style-type: none"> <li>With some type of resins, decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while left under normal storage conditions resulting in the deterioration of the capacitor's performance.</li> <li>When a resin's hardening temperature is higher than capacitor's operating temperature, the stresses generated by the excessive heat may lead to damage or destruction of capacitors. The use of such resins, molding materials etc. is not recommended.</li> </ol>
7. Handling	
Precautions	<p>◆Splitting of PCB</p> <ol style="list-style-type: none"> <li>When PCBs are split after components mounting, care shall be taken so as not to give any stresses of deflection or twisting to the board.</li> <li>Board separation shall not be done manually, but by using the appropriate devices.</li> </ol> <p>◆Mechanical considerations</p> <p>Be careful not to subject capacitors to excessive mechanical shocks.</p> <ol style="list-style-type: none"> <li>If ceramic capacitors are dropped onto a floor or a hard surface, they shall not be used.</li> <li>Please be careful that the mounted components do not come in contact with or bump against other boards or components.</li> </ol>
8. Storage conditions	
Precautions	<p>◆Storage</p> <ol style="list-style-type: none"> <li>To maintain the solderability of terminal electrodes and to keep packaging materials in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible.           <ul style="list-style-type: none"> <li>Recommended conditions                Ambient temperature : Below 30°C      Humidity : Below 70% RH</li> </ul>           The ambient temperature must be kept below 40°C. Even under ideal storage conditions, solderability of capacitor is deteriorated as time passes, so capacitors shall be used within 6 months from the time of delivery.           <ul style="list-style-type: none"> <li>Ceramic chip capacitors shall be kept where no chlorine or sulfur exists in the air.</li> </ul> </li> <li>The capacitance values of high dielectric constant capacitors will gradually decrease with the passage of time, so care shall be taken to design circuits. Even if capacitance value decreases as time passes, it will get back to the initial value by a heat treatment at 150°C for 1hour.</li> </ol>
Technical considerations	<p>If capacitors are stored in a high temperature and humidity environment, it might rapidly cause poor solderability due to terminal oxidation and quality loss of taping/packaging materials. For this reason, capacitors shall be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.</p>

※RCR-2335B (Safety Application Guide for fixed ceramic capacitors for use in electronic equipment) is published by JEITA.

Please check the guide regarding precautions for deflection test, soldering by spot heat, and so on.