

# 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			
					2			
					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	1.25±0.10	0.85±0.10	9		
					1.25±0.10	G		
					1.25±0.15 ※	2.0±0.15	0.85±0.10	9
					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	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
EIA	X5R			25	±15%	±10%	K
						±20%	M
B7	EIA	X7R	-55 ~ +125	25	±15%	±10%	K
						±20%	M
C6	EIA	X6S	-55 ~ +105	25	±22%	±10%	K
						±20%	M
C7	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		±0.5pF		D	
				±2%		G	
±5%			J				
CH	JIS	CH	-55 ~ +125	20	0 ± 60ppm/°C	±0.05pF	A
						±0.1pF	B
	±0.25pF	C					
	EIA	C0H		±0.5pF		D	
				±2%		G	
±5%			J				
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

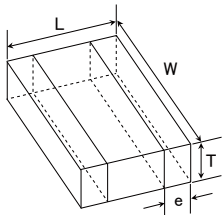
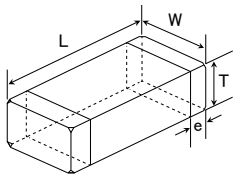
Code	Capacitance tolerance
A	±0.05pF
B	±0.1pF
C	±0.25pF
D	±0.5pF
G	±2%
J	±5%
K	±10%
M	±20%

## 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	
MSAS□32	3225	1210	3.2±0.30	2.5±0.20	0.85±0.10	9	0.6±0.3
					1.15±0.10	Q	
					1.9±0.20	N	
					1.9+0.1/-0.20	Y	
MSAY□32	3225	1210	3.2±0.30	2.5±0.20	2.5±0.20	M	0.6±0.3
					1.9±0.20	N	
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)