



TECHNICAL DATA SHEET

Electronic Components - assortment Book Kit (SMD Capacitor series)

- Item No.: T1806P018 - Book 9 - 0402, 50V, $\pm 10\%$
- Item No.: T1806P019 - Book 10 - 0603, 16V, $\pm 10\%$
- Item No.: T1806P020 - Book 11 - 0603, 50V, $\pm 10\%$
- Item No.: T1806P021 - Book 12 - 0603, 50V, $\pm 5\%$
- Item No.: T1806P022 - Book 13 - 0805, 50V, $\pm 10\%$
- Item No.: T1806P023 - Book 14 - 0805, 50V, $\pm 10\%$
- Item No.: T1806P024 - Book 15 - 0805, 50V, $\pm 5\%$
- Item No.: T1806P025 - Book 16 - 1206, 50V, $\pm 5\%$
- Item No.: T1806P026 - Book 17 - 1206, 50V, $\pm 10\%$



	Item no.	Book no.	SMD package	Capacitance value	Rated voltage	Tolerance	Contents
2163356	T1806P018	9	0402	100pF, 220pF, 470pF, 1.0nF, 2.2nF, 4.7nF, 10nF, 22nF, 47nF, 100nF	50 V	$\pm 10\%$	1000pcs (100pcs@value)
2163358	T1806P019	10	0603	220pF, 470pF, 33nF, 47nF, 68nF, 100nF, 220nF, 470nF, 1µF, 2.2µF	16 V	$\pm 10\%$	500pcs (50pcs@value)
2163357	T1806P020	11	0603	100pF, 150pF, 220pF, 330pF, 470pF, 680pF, 1.0nF, 1.5nF, 2.2nF, 3.3nF, 4.7nF, 6.8nF, 10nF, 22nF, 47nF, 100nF, 150nF, 220nF, 470nF, 1.0µF	50 V	$\pm 10\%$	1000pcs (50pcs@value)
2163362	T1806P021	12	0603	100pF, 150pF, 220pF, 330pF, 470pF, 680pF, 1nF, 2.2nF, 4.7nF, 10nF	50 V	$\pm 5\%$	1000pcs (100pcs@value)
2163360	T1806P022	13	0805	10nF, 22nF, 33nF, 47nF, 68nF, 100nF, 220nF, 680nF, 1µF, 2.2µF	50 V	$\pm 10\%$	500pcs (50pcs@value)
2163361	T1806P023	14	0805	220pF, 330pF, 470pF, 680pF, 1.0nF, 1.5nF, 2.2nF, 3.3nF, 4.7nF, 6.8nF, 10nF, 22nF, 100nF, 150nF, 220nF, 330nF, 470nF, 680nF, 1.0µF, 2.2µF	50 V	$\pm 10\%$	1000pcs (50pcs@value)
2163359	T1806P024	15	0805	100pF, 150pF, 220pF, 330pF, 470pF, 680pF, 1nF, 2.2nF, 4.7nF, 10nF	50 V	$\pm 5\%$	1000pcs (100pcs@value)
2163355	T1806P025	16	1206	220pF, 470pF, 1.0nF, 2.2nF, 4.7nF, 10nF, 22nF, 47nF, 68nF, 100nF	50 V	$\pm 5\%$	500pcs (50pcs@value)
2163363	T1806P026	17	1206	1.0nF, 2.2nF, 4.7nF, 10nF, 22nF, 47nF, 100nF, 220nF, 470nF, 1.0µF	50 V	$\pm 10\%$	500pcs (50pcs@value)



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CONSTRUCTION

The capacitor consists of a rectangular block of ceramic dielectric in which a number of interleaved metal electrodes are contained. This structure gives rise to a high capacitance per unit volume.

The inner electrodes are connected to the two end terminations and finally covered with a layer of plated tin (NiSn). The terminations are lead-free. A cross section of the structure is shown in Fig. 1.

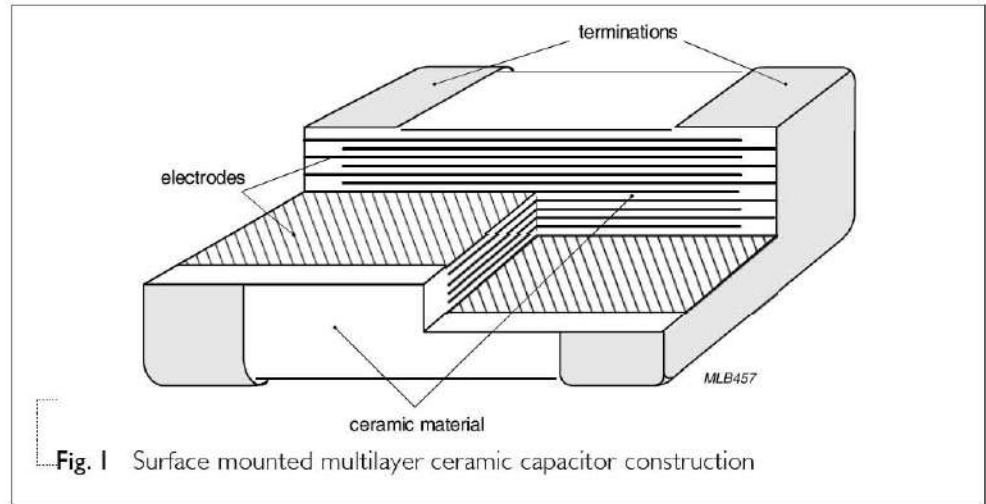


Fig. 1 Surface mounted multilayer ceramic capacitor construction

DIMENSION

Table 1 For outlines see fig. 2

TYPE	L ₁ (mm)	W (mm)	T (MM)	L ₂ / L ₃ (mm)		L ₄ (mm)	DIMENSION CODE
				min.	Max.		
0201	0.6 ±0.03	0.3 ±0.03	0.3 ±0.03	0.1	0.2	0.2	BA
0402	1.0 ±0.05	0.5 ±0.05	0.5 ±0.05	0.15	0.35	0.4	CA
	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2	0.6	0.4	DA
0603	1.6 ±0.15	0.8 ±0.15	0.8 ±0.15	0.2	0.6	0.4	DB
	1.6 ±0.2	0.8 ±0.2	0.8 ±0.2	0.2	0.6	0.4	DC
0805	2.0 ±0.1	1.25 ±0.1	0.6 ±0.1	0.25	0.75	0.7	E0
	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.25	0.75	0.7	EA
0805	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2	0.25	0.75	0.7	EB
	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.25	0.75	1.4	F0
1206	3.2 ±0.2	1.6 ±0.2	1.0 ±0.1	0.25	0.75	1.4	F1
	3.2 ±0.2	1.6 ±0.2	1.15 ±0.1	0.25	0.75	1.4	FA
	3.2 ±0.3	1.6 ±0.2	1.6 ±0.2	0.25	0.8	1.4	FC
	3.2 ±0.3	1.6 ±0.3	1.6 ±0.3	0.3	0.9	1.4	FD
1210	3.2 ±0.2	2.5 ±0.2	0.85 ±0.1	0.25	0.75	1.4	G0
	3.2 ±0.4	2.5 ±0.3	1.15 ±0.1	0.25	0.75	1.4	G1
	3.2 ±0.4	2.5 ±0.3	1.25 ±0.2	0.25	0.75	1.4	GA
	3.2 ±0.4	2.5 ±0.3	1.6 ±0.2	0.25	0.75	1.4	G2
	3.2 ±0.4	2.5 ±0.3	1.9 ±0.2	0.25	0.75	1.4	GB
	3.2 ±0.4	2.5 ±0.3	2.0 ±0.2	0.25	0.75	1.4	G3
	3.2 ±0.4	2.5 ±0.3	2.5 ±0.2	0.25	0.75	1.0	GC
	3.2 ±0.4	2.5 ±0.3	2.5 ±0.3	0.25	0.75	1.0	GD
1812	4.5 ±0.2	3.2 ±0.2	0.85 ±0.1	0.25	0.75	2.2	JA
	4.5 ±0.2	3.2 ±0.2	1.15 ±0.1	0.25	0.75	2.2	JB
	4.5 ±0.4	3.2 ±0.4	1.6 ±0.2	0.25	0.75	2.2	JC

OUTLINES

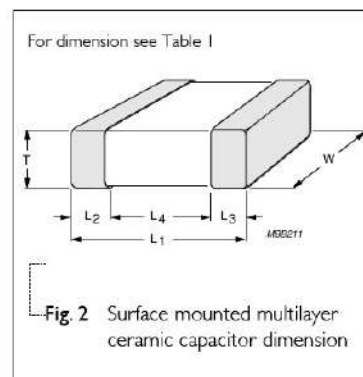


Fig. 2 Surface mounted multilayer ceramic capacitor dimension



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SIZE CODE	THICKNESS CLASSIFICATION	TAPE WIDTH QUANTITY PER REEL	Ø180 MM / 7 INCH		Ø330 MM / 13 INCH	
			Paper	Blister	Paper	Blister
0201	0.3 ±0.03 mm	8 mm	15,000	---	50,000	---
0402	0.5 ±0.05 mm	8 mm	10,000	---	50,000	---
0603	0.8 ±0.1 mm	8 mm	4,000	---	15,000	---
0805	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000
1206	0.6 ±0.1 mm	8 mm	4,000	---	20,000	---
	0.85 ±0.1 mm	8 mm	4,000	---	15,000	---
	1.00 / 1.15 ±0.1 mm	8 mm	---	3,000	---	10,000
	1.25 ±0.2 mm	8 mm	---	3,000	---	10,000
	1.6 ±0.15 mm	8 mm	---	2,500	---	10,000
	1.6 ±0.2 mm	8 mm	---	2,000	---	8,000

ELECTRICAL CHARACTERISTICS

X7R DIELECTRIC CAPACITORS; NISN TERMINATIONS

Unless otherwise specified, all test and measurements shall be made under standard atmospheric conditions for testing as given in 5.3 of IEC 60068-1:

- Temperature: 15 °C to 35 °C
- Relative humidity: 25% to 75%
- Air pressure: 86 kPa to 106 kPa

Before the measurements are made, the capacitor shall be stored at the measuring temperature for a time sufficient to allow the entire capacitor to reach this temperature.

The period as prescribed for recovery at the end of a test is normally sufficient for this purpose.

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DESCRIPTION							VALUE
Capacitance range							100 pF to 47 μF
Capacitance tolerance							±5%, ±10%, ±20%
Dissipation factor (D.F.)							
X7R	0201	0402	0603	0805	1206	1210	
≤10V	100pF to 10nF	100pF to 100nF	100pF to 1μF	150pF to 2.2μF	220pF to 2.2μF	2.2nF to 2.2μF	≤5%
		100nF 220nF to 470nF	2.2μF to 4.7μF	4.7μF to 10μF	4.7μF to 22μF	4.7μF to 47μF	≤10%
		1μF					≤12.5%
16V	100pF to 1.2nF	100pF to 22nF	100pF to 220nF	150pF to 470nF	220pF to 1μF	2.2nF to 1μF	≤3.5%
	1.5nF to 10nF	27nF to 100nF	470nF to 1.0μF	680 nF to 2.2μF	2.2μF	2.2μF	≤5%
		220nF	2.2μF	4.7μF to 10μF	4.7μF to 22μF	4.7μF to 22μF	≤10%
25V	100pF to 470pF	100pF to 10nF	100pF to 39nF	150pF to 180nF	220pF to 680nF	2.2nF to 1μF	≤2.5%
		12 nF to 47nF	47nF to 220nF	220nF to 470nF	1μF		≤3.5%
	560pF to 10nF	56nF to 100nF		680nF to 1μF	2.2μF	2.2μF	≤5%
			270nF to 1μF	2.2μF to 4.7μF	4.7μF to 22μF	4.7μF to 22μF	≤10%
50V	100pF to 1nF	100pF to 10nF	100pF to 39nF	150pF to 180nF	220pF to 470nF	2.2nF to 1μF	≤2.5%
		12 nF to 47nF	47nF to 220nF	220nF to 470nF	680nF to 1μF		≤3.5%
				680nF			≤5%
		100nF	470nF to 1μF	1μF to 2.2μF	2.2μF to 4.7μF	2.2μF to 10μF	≤10%
Insulation resistance after 1 minute at U_r (DC)							$R_{ins} \geq 10 \text{ G}\Omega$ or $R_{ins} \times C_r \geq 500/100/50^*$ seconds whichever is less
Maximum capacitance change as a function of temperature (temperature characteristic/coefficient):							±15%
Operating temperature range:							-55 °C to +125 °C

NOTE

* $R_{ins} \geq 10 \text{ G}\Omega$ or $R_{ins} \times C_r \geq 500\Omega.F$:

0201 : 100pF to 10nF

0402 : 100pF to 220nF

0603 : 100pF to 1uF

0805 : 220pF to 1uF, 2.2uF/6.3V to 16V

1206/1210 : 220pF to 1uF, 2.2uF/6.3V to 25V, 4.7uF/6.3V to 16V

1812 : 4.7nF to 1uF

* $R_{ins} \times C_r \geq 100\Omega.F$:

0201 : 100nF/6.3V

0402 : 470nF/6.3V to 10V

0603 : 2.2uF/6.3V to 16V

0805 : 2.2uF/25V to 50V, 4.7uF/6.3V to 25V

10uF/6.3V to 16V

1206 : 2.2uF/50V, 4.7uF/25V to 50V, 10uF/6.3V to 25V, 22uF/6.3V to 16V

1210 : 2.2uF/50V, 4.7uF/25V to 50V, 10uF/6.3V to 50V, 22uF/6.3V to 16V, 47uF/6.3V to 10V

* $R_{ins} \times C_r \geq 50\Omega.F$:

0402 : 1uF/6.3V

0603 : 4.7uF/6.3V



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Size 0201 10 nF / 16 V
Solid lines: Impedance / Dotted lines: ESR

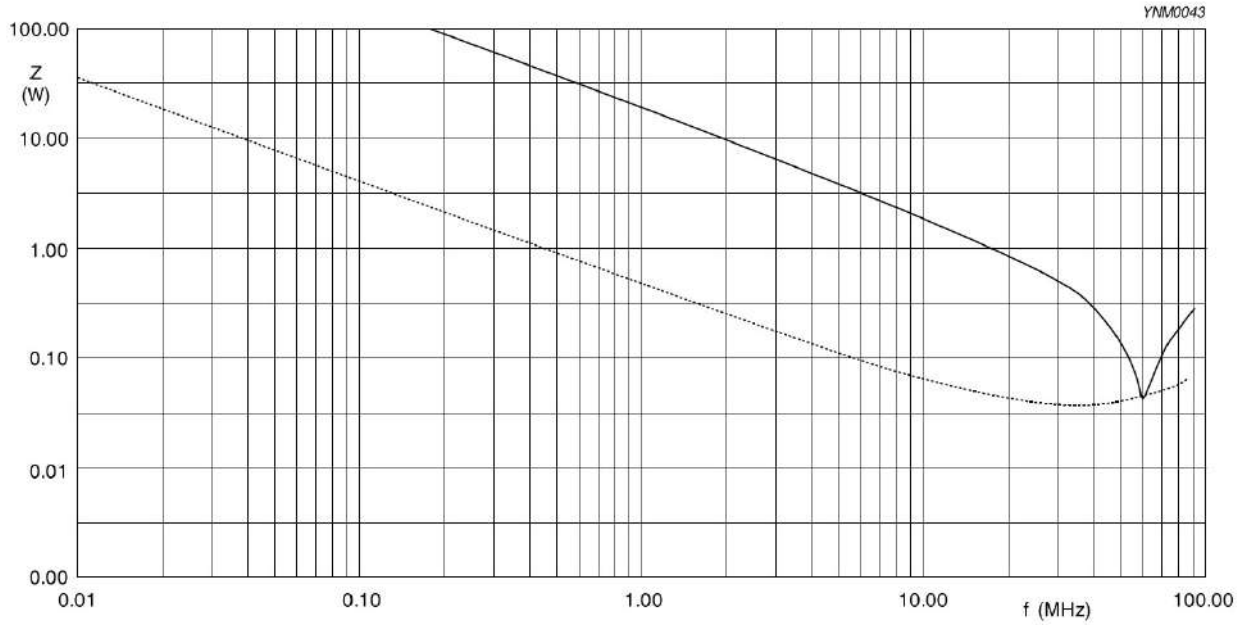


Fig. 4 Impedance ESR vs. frequency characteristics for multilayer chip capacitors

Size 0402 100 nF / 16 V
Solid lines: Impedance / Dotted lines: ESR

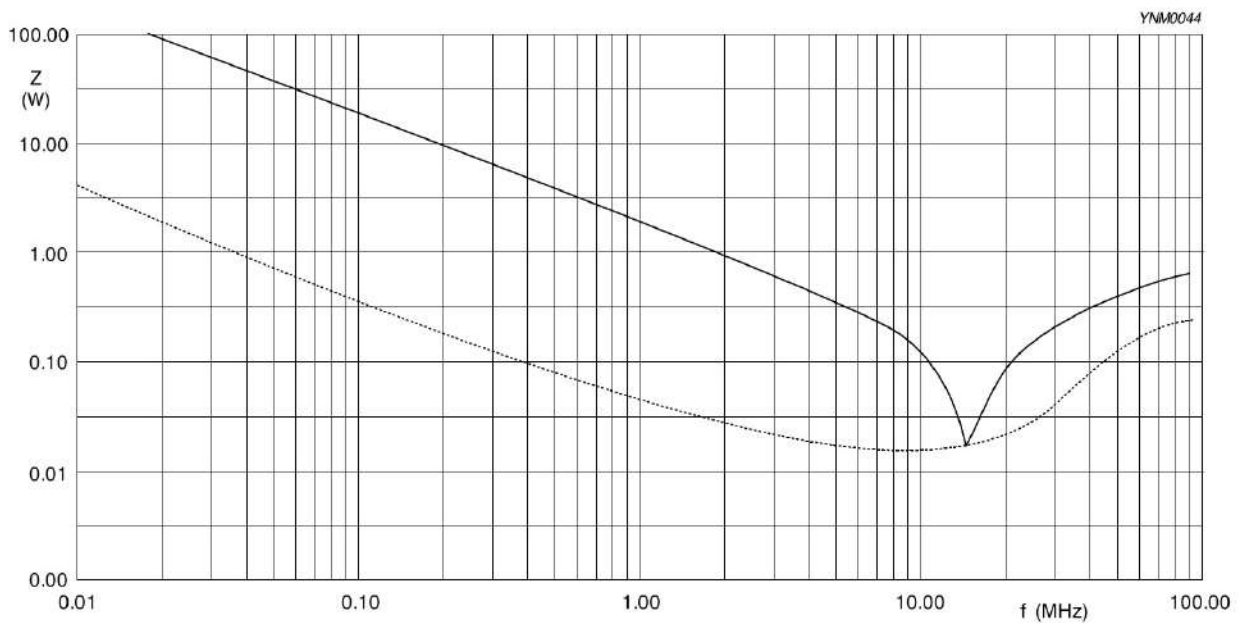
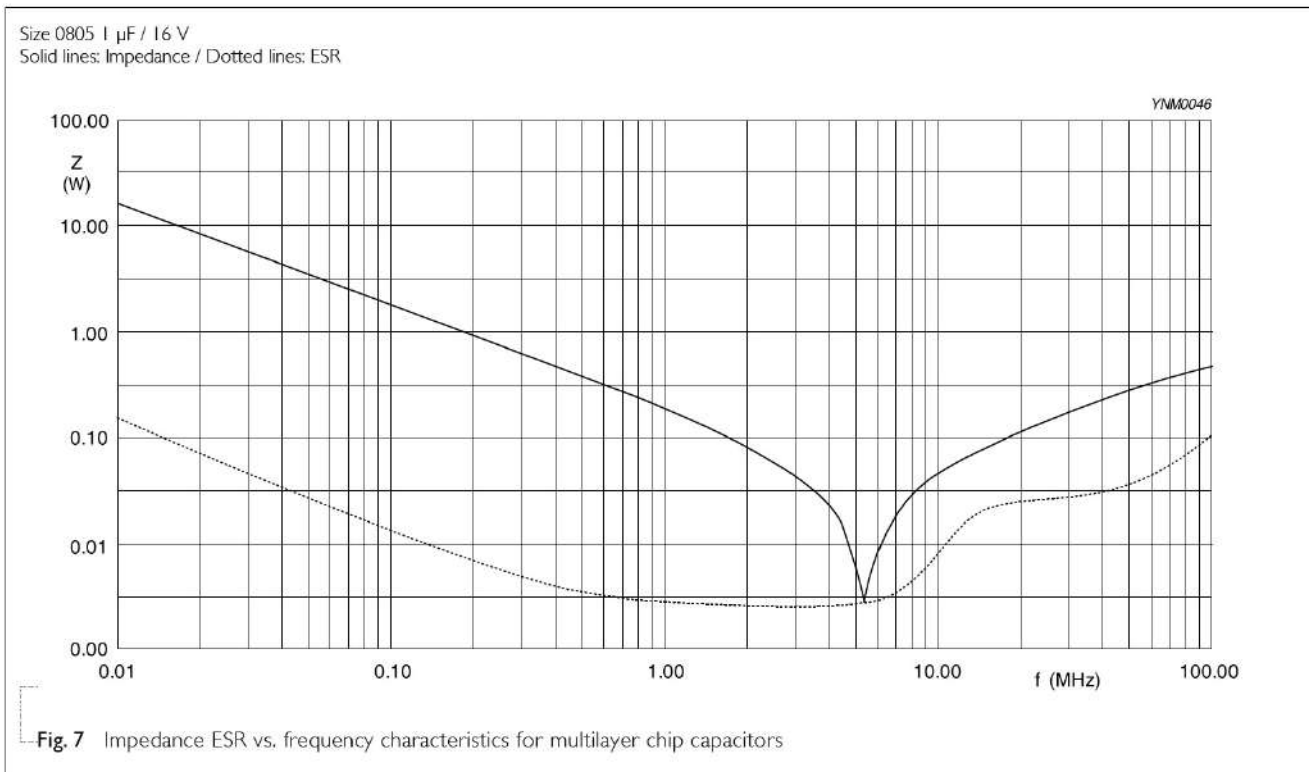
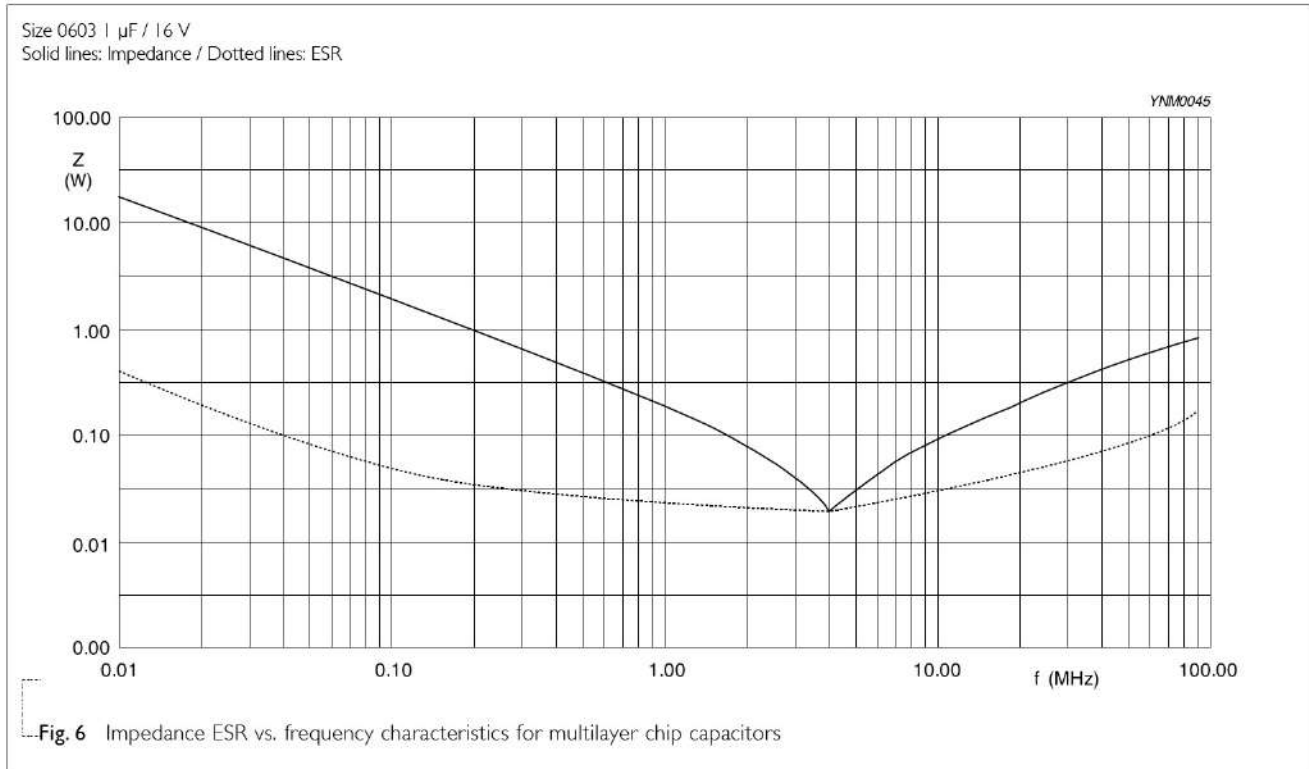
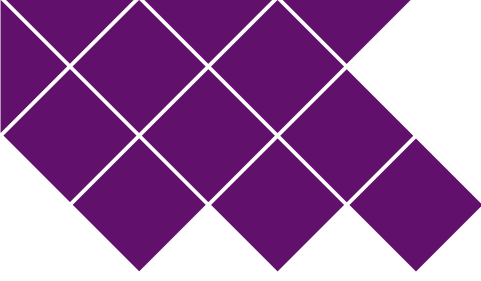


Fig. 5 Impedance ESR vs. frequency characteristics for multilayer chip capacitors



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