Film Capacitors

Series/Type: Metallized PP EMI suppression Capacitors Class -Y2
Series code: 33

33 – Metallized PP EMIsuppression Capacitors Class -Y2

Overview

The 33 series capacitor is a polypropylene metallized film capacitor with a rectangular, plastic box-type design, filled with resin, and uses 2 tinned wires.

Applications

Typical applications include line-to-ground Interference suppression in SMPS, Converters, and automotive applications.

Benefits

- Compact size
- Good self-healing properties
- High voltage capability
- RoHS-compatible
- Long useful life
- Automotive grade[1]

33	224	K	16	1	A
Series Code	Rated Capacitance Value	Rated Cap. Tolerance	Rated AC Voltage	Packing Type*	Design Reference
Metallized PP EMI suppression Capacitors Class-Y2 (Automotive Grade)	Three-digit (224) indicate rated capacitance in Pico Farad (First two digits indicate value & third digit indicates number of zeroes to be suffixed to first two digits)	K = ±10% M = ±20%	16= 300VAC	See packing type details	Internal code

1. Automotive grade available on request.

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***Packing Type details:**

1: Bulk packing (original pitch)
2: Bulk packing (after forming & cutting)
3: Ammo packing (after forming & taping)
4: Bulk packing (after forming in original pitch without cut)
5: Bulk packing (after formed & without cut)
6: Ammo packing (Straight lead)
7: Bulk packing (Straight lead cut)
8: Reel packing (Straight lead)

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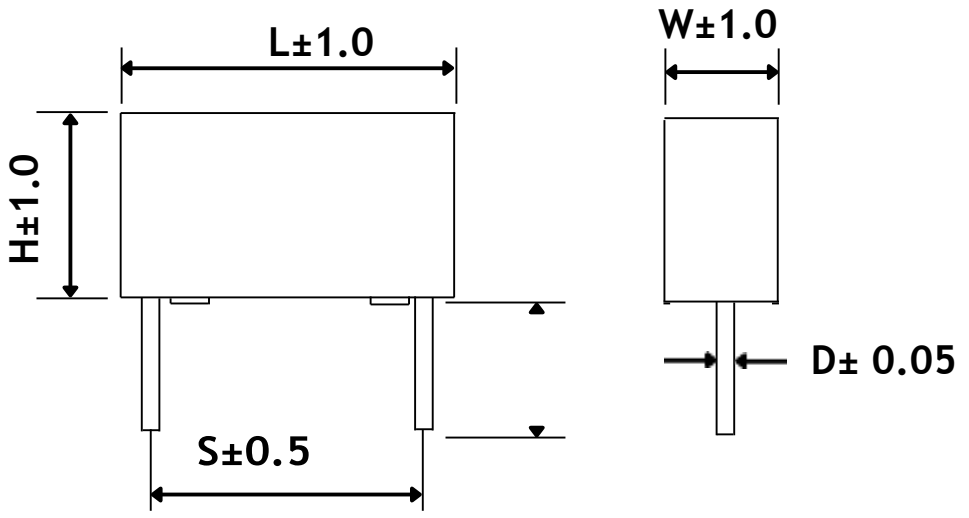
Dimensions – in mm



D Lead dia (±0.05mm)	0.6	0.8	0.8	0.8	1.0
S Pitch (± 0.5mm)	10.0	15.0	22.5	27.5	37.5

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General Technical Data

Dielectric	Metallized Polypropylene film, Self-healing property
Application	EMI suppression
Climatic Category	40/110/56 (IEC 60068 –1)
Operating Temperature Range	-40˚C to +110˚C
Passive flammability Category	B (IEC 60384-14)
Standard	(IEC 60384-14)
Protection	Solvent resistance plastic case UL 94 V-0 compliant Thermosetting Epoxy resin sealing UL 94 V-0 compliant
Leads	Tinned wires
RoHS Compliance	RoHS

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Electrical Parameters

Rated Capacitance range	0.001µf ~ 1µf	
Capacitance Tolerance	± 10% , ± 20% measured at T= 20˚C ± 5˚C	
Rated AC Voltage	300VAC	
Maximum continuous DC voltage	1000VDC	
Tan δ @ 20˚C	≤ $2X10^{-3}$ at 1KHz, 20˚C	
Insulation resistance Rins given as time constant τ= $C_{R.}R_{ins}$ at 100VDC 20˚C,relative humidity ≤ 65% RH and for 60sec	C_R≤0.33µf	C_R>0.33µf
	100,000MΩ	30,000sec
Voltage proof test between terminals	4000VDC for 60 sec	
Voltage proof between terminal and case	2000VAC for 60 sec	
Biased Humidity Test*	40˚C ± 2˚C / (93±3)%RH / 1000Hours at rated AC voltage Limit after the test: ΔC/C≤ ±5% Increase of tan delta C_N≤1µF: ≤0.008(10KHz) C_N>1µF: ≤0.005(1KHz) I.R: ≥ 50% of the initial value	

*Available on request

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Pitch	Rated Capacitance (µF)	Dimensions (WxHxL) In mm	Part Number
10 mm	0.0010	4x9x13	33 102 K 16 1 *
	0.0012	4x9x13	33 122 K 16 1 *
	0.0015	4x9x13	33 152 K 16 1 *
	0.0018	4x9x13	33 182 K 16 1 *
	0.0022	4x9x13	33 222 K 16 1 *
	0.0027	4x9x13	33 272 K 16 1 *
	0.0033	4x9x13	33 332 K 16 1 *
	0.0039	4x9x13	33 392 K 16 1 *
	0.0047	5x11x13	33 472 K 16 1 *
	0.0056	5x11x13	33 562 K 16 1 *
	0.0068	5x11x13	33 682 K 16 1 *
	0.0082	6x12x13	33 822 K 16 1 *
	0.01	6x12x13	33 103 K 16 1 *
	0.015	6x12x13	33 153 K 16 1 *
15mm	0.0022	5x11x18	33 222 K 16 1 *
	0.0027	5x11x18	33 272 K 16 1 *
	0.0039	5x11x18	33 392 K 16 1 *
	0.0047	5x11x18	33 472 K 16 1 *
	0.0056	5x11x18	33 562 K 16 1 *
	0.0068	5x11x18	33 682 K 16 1 *
	0.0082	5x11x18	33 822 K 16 1*
	0.01	5x11x18	33 103 K 16 1 *
	0.012	5x11x18	33 123 K 16 1 *
	0.015	5x11x18	33 153 K 16 1 *
	0.018	5x11x18	33 183 K 16 1 *
	0.018	6x12x18	33 183 M 16 1 *
	0.022	6x12x18	33 223 K 16 1 *
	0.027	6x12x18	33 273 K 16 1 *
	0.027	7x13x18	33 273 M 16 1 *
	0.033	7.5x13.5x18	33 333 K 16 1 *
	0.039	7.5x13.5x18	33 393 K 16 1 *
	0.047	8.5x14.5x18	33 473 K 16 1 *
	0.047	10x16x18	33 473 M 16 1 *
	0.056	10x16x18	33 563 K 16 1 *
	0.068	10x16x18	33 683 K 16 1 *
	0.082	11X19X18	33 823 K 16 1 *
22.5 MM	0.033	6x15x26.5	33 333 K 16 1 *
	0.039	6x15x26.5	33 393 K 16 1 *
	0.047	6x15x26.5	33 473 K 16 1 *
	0.056	6x15x26.5	33 563 K 16 1 *
	0.068	6x15x26.5	33 683 K 161 *
	0.068	7x16x26.5	33 683 M 16 1 *
	0.082	7x16x26.5	33 823 K 16 1 *
	0.1	8.5x17x26.5	33 104 K 16 1 *

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	0.15	10x19x26.5	33 154 K 16 1 *
	0.18	11x20x26.5	33 184 K 16 1 *
	0.22	12x22x26.5	33 224 K 16 1 *
	0.27	15x25x26.5	33 274 M 16 1 *
	0.33	15x25x26.5	33 334 K 16 1 *
27.5 MM	0.1	9x18x32	33 104 K 16 1 *
	0.12	9x18x32	33 124 K 16 1 *
	0.15	9x18x32	33 154 K 16 1 *
	0.18	11x20x32	33 184 K 16 1 *
	0.22	11X20X32	33 224 K 16 1*
	0.27	11x20x32	33 274 K 16 1 *
	0.27	13x22x32	33 274 M 16 1 *
	0.33	13x22x32	33 334 K16 1 *
	0.39	14x28x32	33 394 K 16 1 *
	0.47	14x28x32	33 474 K 16 1 *
	0.47	18x30x32	33 474 M 16 1 *
	0.56	18x30x32	33 564 K 16 1 *
	0.56	18x30x32	33 564 K 16 1 *
	0.68	18x30x32	33 684 K 16 1 *
	0.68	20x32x32	33 684 M 16 1 *
	0.68	18x33x32	33 684 K 16 1 *
	0.82	18x33x32	33 824 K 16 1 *
	0.82	22x37x32	33 824 K 16 1 *
	1.0	22x37x32	33 105 K 16 1 *
37.5 MM	0.33	12x22x42	33 334 K 16 1 *
	0.39	12x22x42	33 394 K 16 1 *
	0.47	14x25x42	33 474 K 16 1 *
	0.56	16x30x42	33 564 K 16 1 *
	0.68	16x30x42	33 684 K 16 1 *
	0.82	20x40x42	33 824 K 16 1 *
	1.0	20x40x42	33 105 K 16 1 *

* Internal code
Note: 1. Intermediate values available on request
2. Other tolerances available on request.

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Testing and performance as per IEC 60384-14

S.NO	TEST	TEST METHOD(Conditions of test) As per IEC 60384-14		PERFORMANCE
1	**Solderability**	Solder bath temperature : 245 ±5°C, Immersion Time: 2 second Immersion Depth : 2+0/-0.5 mm from capacitor body		Tinning that meets quality standards
2	**Robustness of termination**	Wire outer diameter	Tensile force	There shall be no externally observable damage.
		0.5≤od≤0.8	10N	
		0.8≤od≤1.25	20N	
3	**Resistance to Soldering Heat**	Solder temperature:260˚C±5˚C Immersion time: 10s ±1s		ΔC/C≤ ±5% Tan delta within specified limits
4	**Solvent resistance of the marking**	Solvent: Industrial isopropanol. Solvent temperature:23˚C±5˚C Dipping time: 5min±0.5min Condition: scrub Scrub material: absorbent cotton Reverting time: No		The marking must be clearly legible.
5	**Rapid Change of Temperature**	T_A=Lower Category temperature (-40°C) T_B=Upper Category temperature (+110°C) Five Cycles, Duration t=30 min		No visible damage occur
6	**Vibration**	Test FC: vibration sinusoidal Displacement:0.75mm Accleration:98m/s^2 Frequency:10Hz...500Hz Test duration: 3 orthogonal axes,2 hour each axes		No visible damage occur
7	**Bump**	Total Number of bumps: 4000 Acceleration:400m/s^2 Pulse Duration:6ms		No visible damage occur ΔC/C≤ ±5% Tan delta within specified limits
8	**Damp Heat, Steady state**	Temperature: 40°C ± 2°C Relative Humidity: (93±3)% Duration: 56 days		No visible damage occur ΔC/C≤ ±5% Increase of tan delta C_N≤1μF:≤0.008(10Khz) C_N>1μF:≤0.005(1Khz) Voltage proof : No permanent breakdown or flashover occur I.R: ≥ 50% of the initial value
9	**Impulse Endurance Test**	3 Impulses Temperature: 110°C(Upper category T_B) Applied Voltage: 1.7XV_R(Rated voltage) The voltage shall be subjected to 1000 V_{rms} for 0.1sec every one hour during test Duration: 1000hrs		No visible damage occur ΔC/C≤ ±10% Increase of tan delta C_N≤1μF:≤0.008(10Khz) C_N>1μF:≤0.005(1Khz) Voltage proof : No permanent breakdown or flashover occur I.R: ≥ 50% of the initial value
10	**Charging and discharging**	Times:10000 Cycles Charge Voltage: 438vdc Discharge resistance: 438Vdc/C_N*dv/dt Ω Charging Resistance: 220x10^{-6}/C_N Ω or current≤1A(Whichever is minor) Duration of charging : 0.5s Duration of discharging : 0.5s		No visible damage occur ΔC/C≤ ±10% Increase of tan delta C_N≤1μF:≤0.008(10Khz) C_N>1μF:≤0.005(1Khz) I.R: ≥ 50% of the initial value

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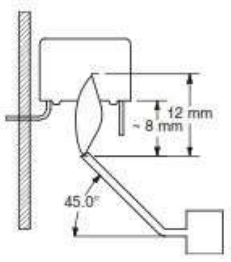
11	**Passive Flammability**	Bore of gas jet: Ø 0.5 mm Fuel: butane Capacitor Volume exposing time 250<V(mm^3)≤500 : 20s 500<V(mm^3)≤1700 : 30s V(mm^3)≥1750 : 60s One flame application 	After removing test flame from the capacitor, the capacitor must not continue to burn for more than 10 sec. no burning particle drop from the sample
12	**Active flammability**	20 cycles of 5.0 kV discharges on the test capacitor connected to V_R	The cheese cloth around the capacitor shall not burn with a flame

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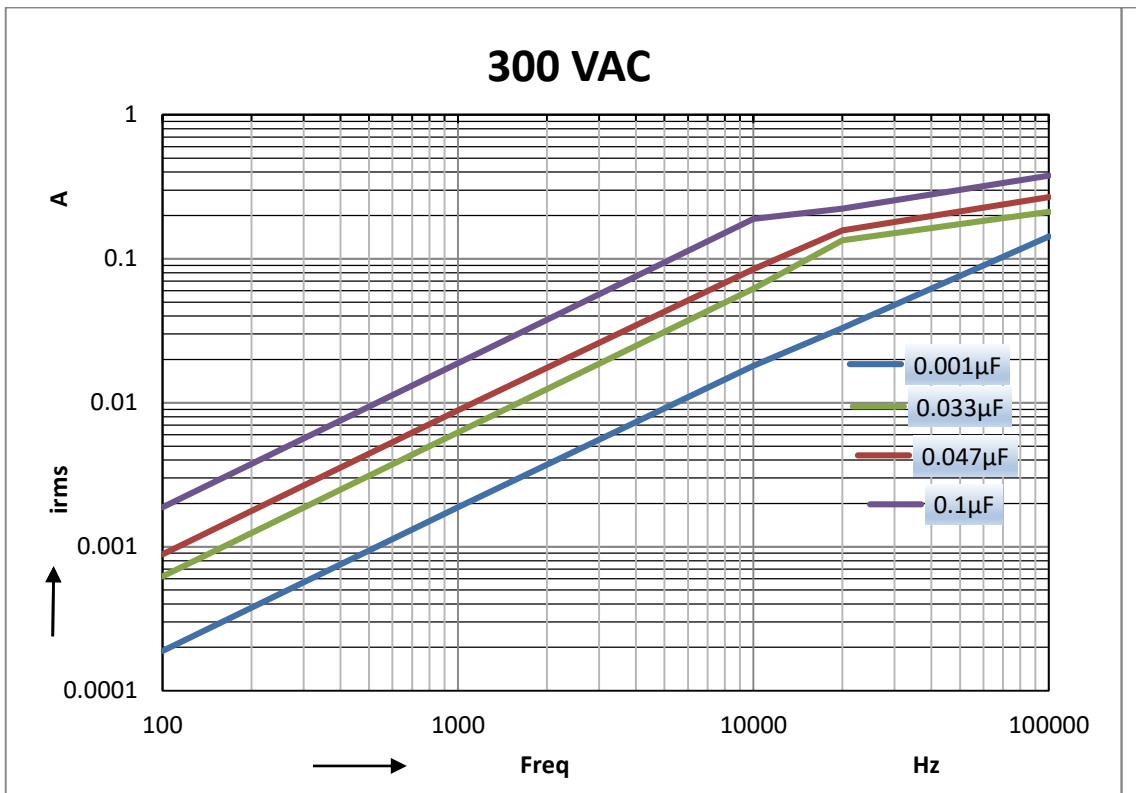
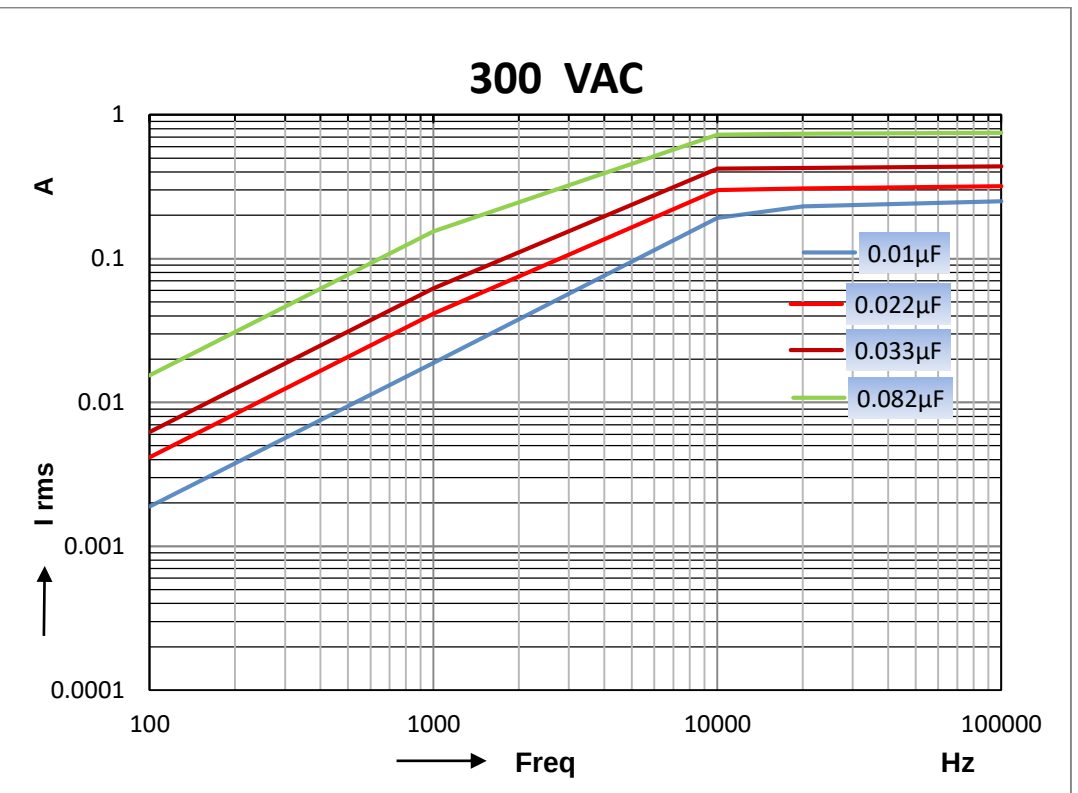
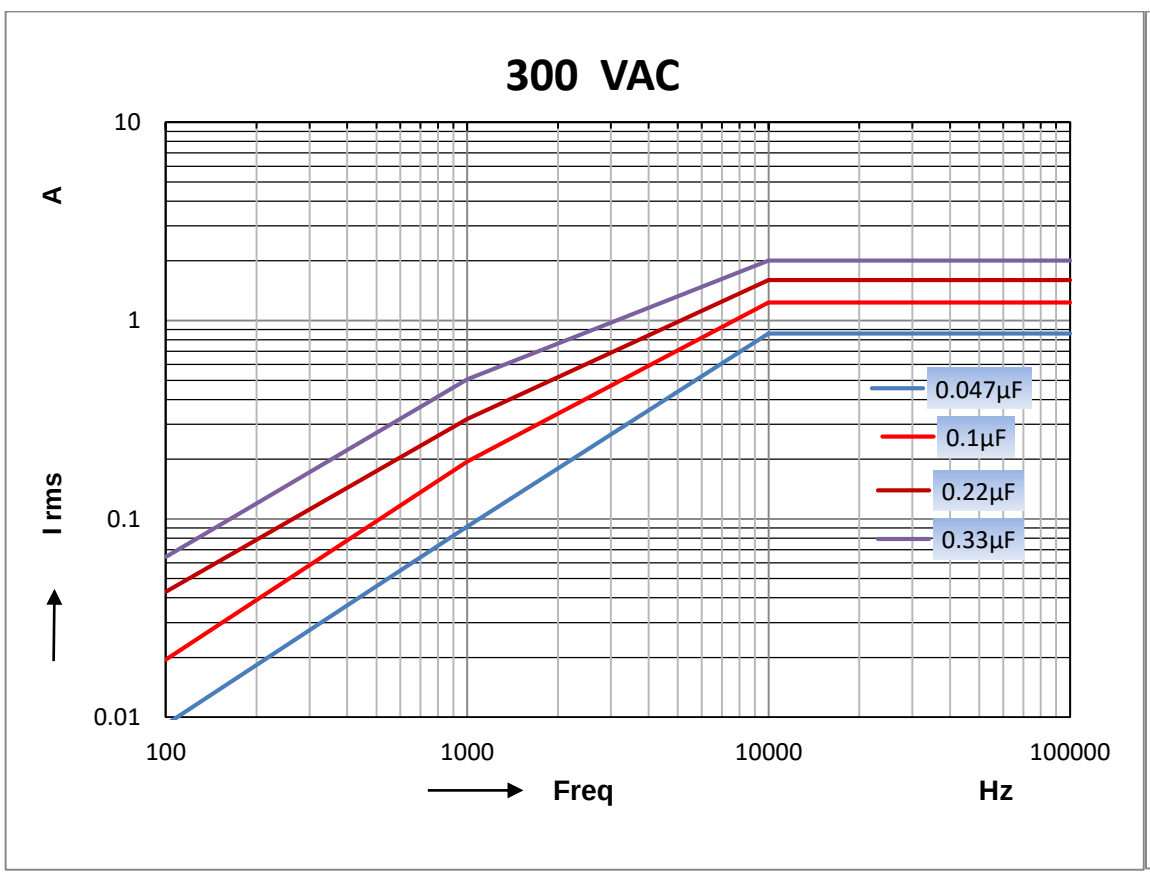
Irms (A) vs frequency (f) graph



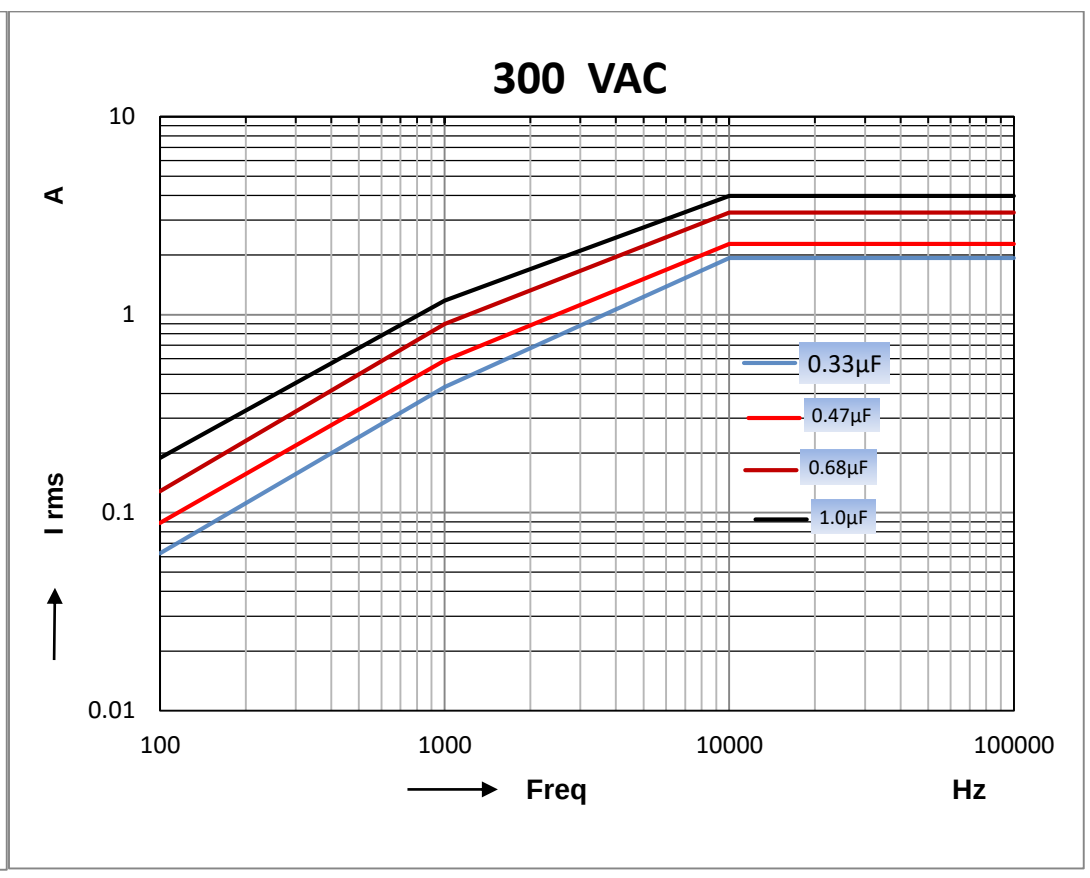
10 MM



15 MM



22.5 MM



27.5 MM

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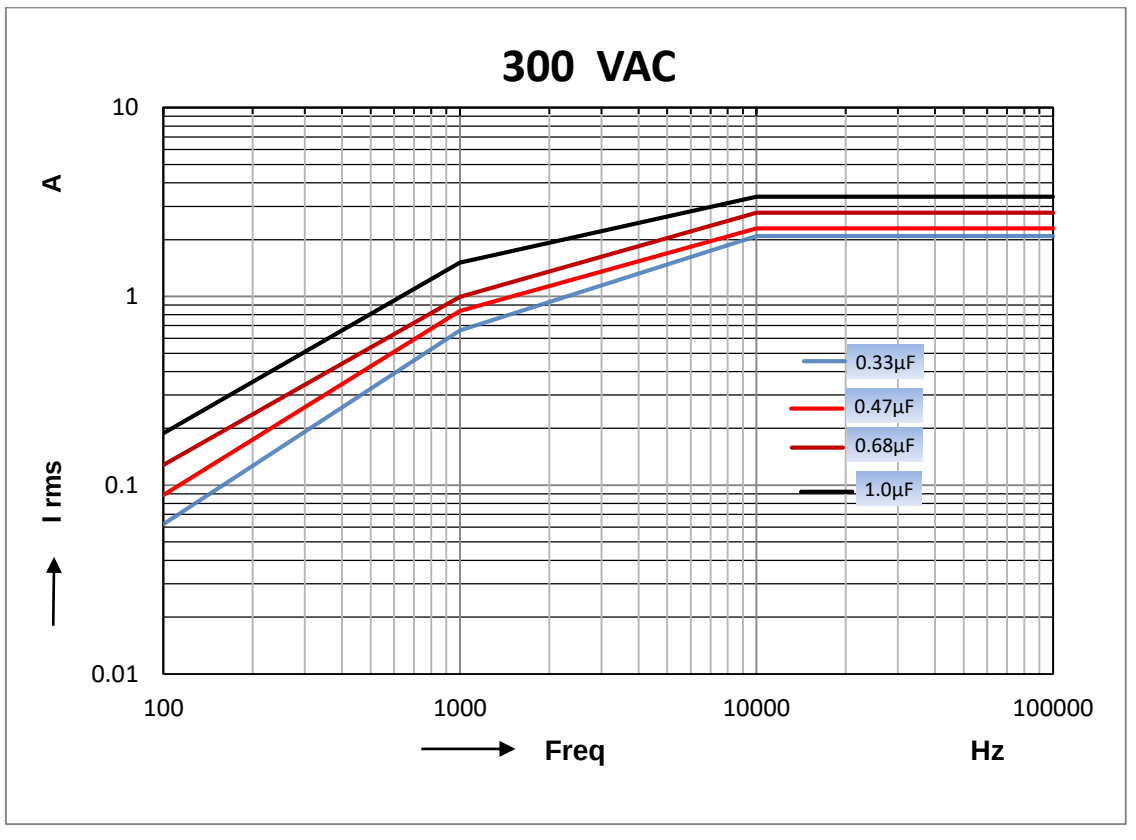
Irms (A) vs frequency (f) graph



37.5 MM

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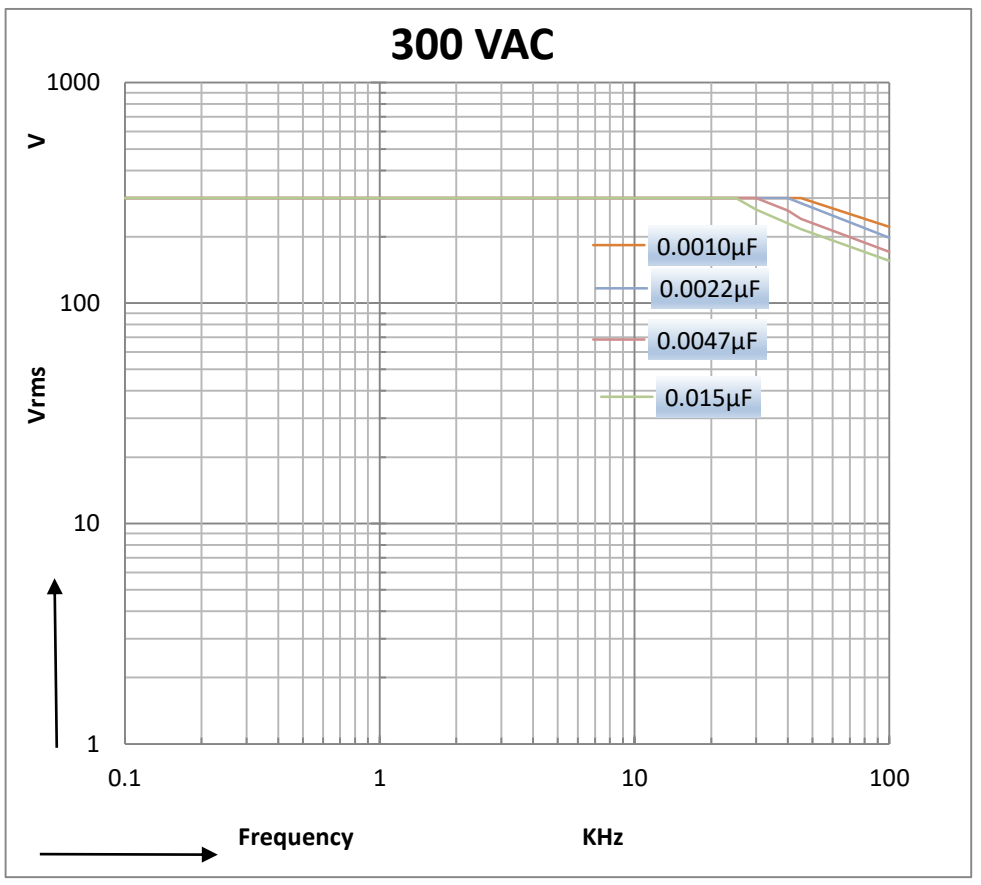
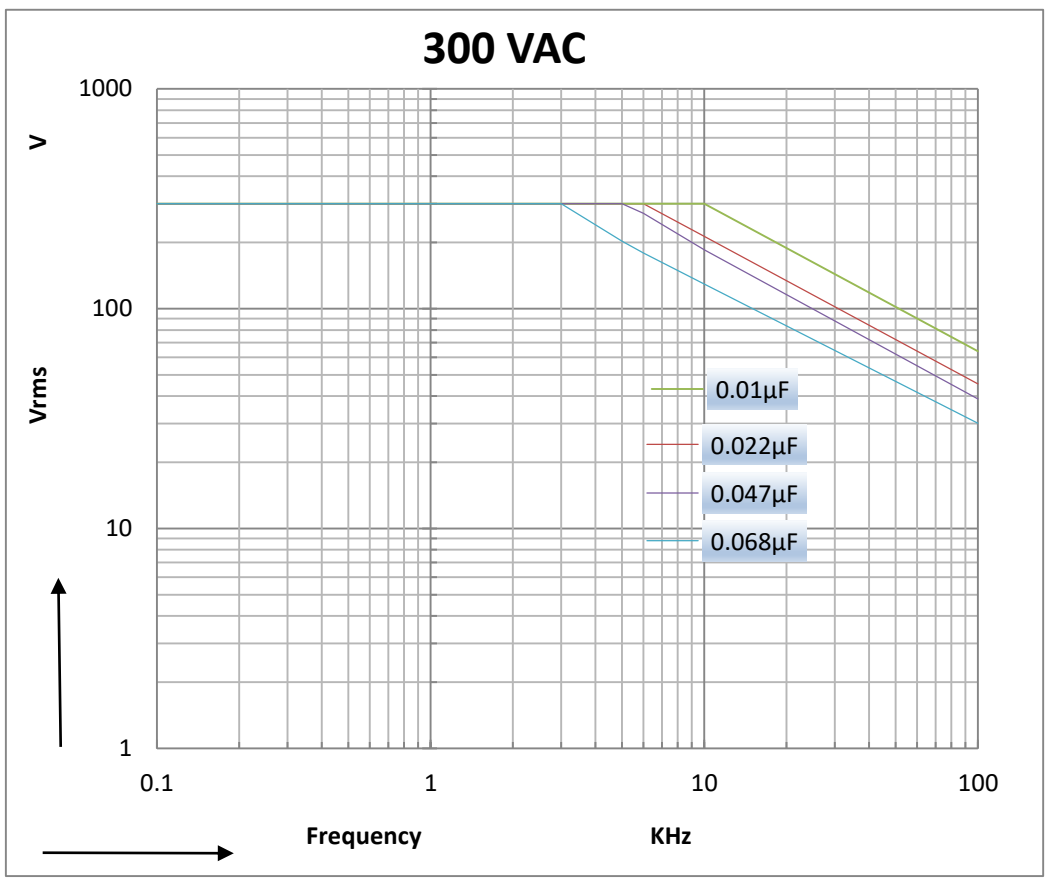
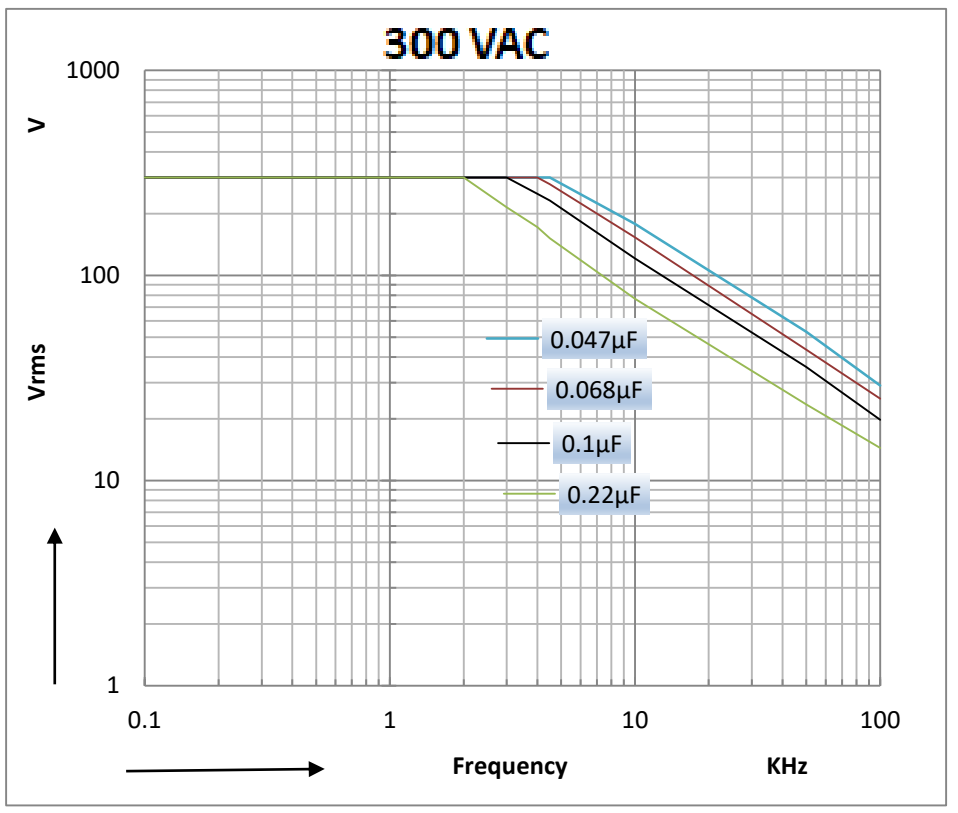
Vrms (V) vs frequency (f) graph



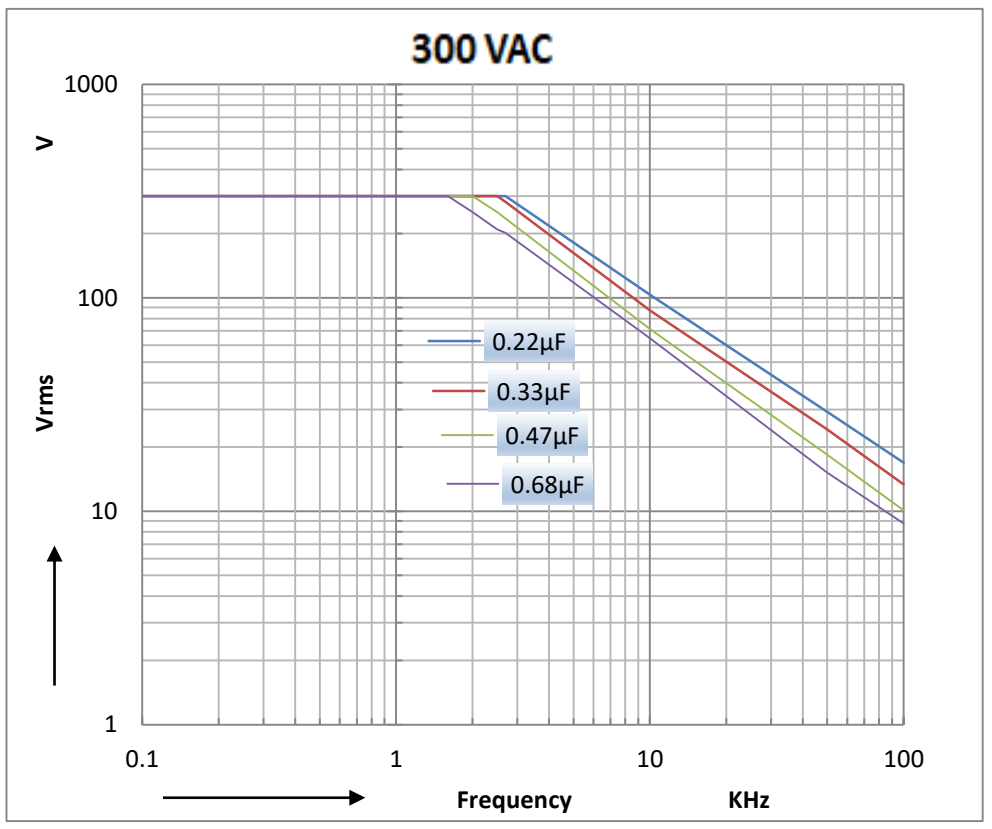
10 MM



15 MM



22.5 MM



27.5 MM

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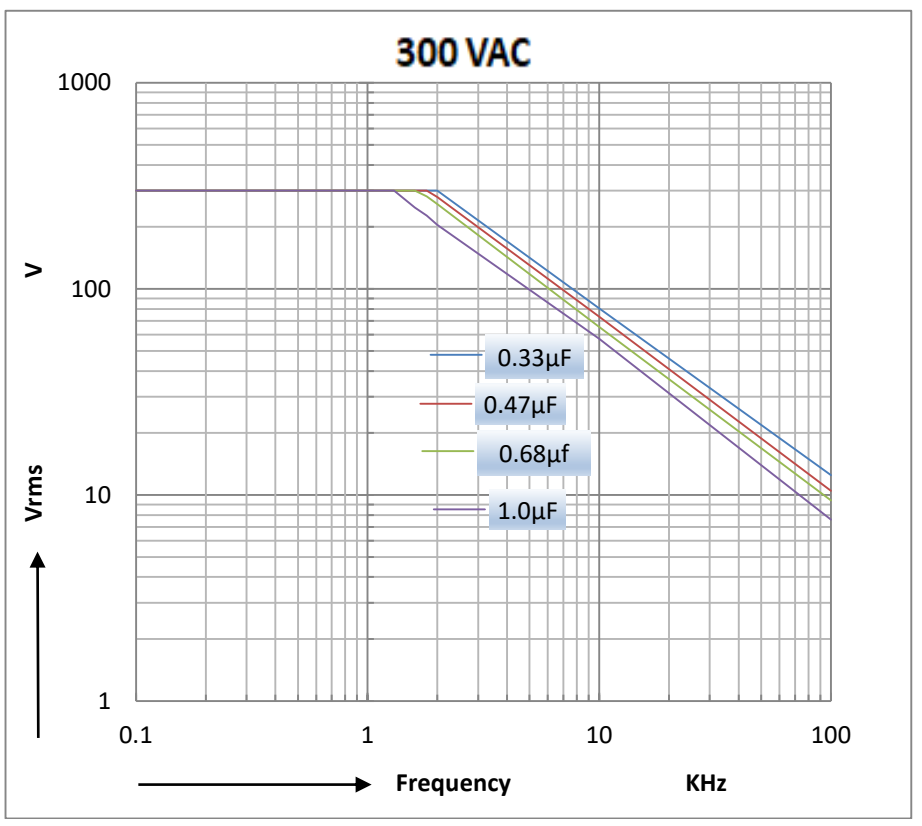
Vrms (V) vs frequency (f) graph



37.5 MM

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Disclaimer

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