



HP3S SERIES

VERY HIGH dV/dt PULSE CAPACITOR

DOUBLE METALLIZED POLYPROPYLENE CAPACITOR ▲ THT type

Low dissipation factor at high frequency

AEC-Q200 on request, contact MGT for more details

Very high pulse strength ▲ Up to 9.5kV/μs

Internal series construction ▲ Excellent corona stability

Temperature range -40°C to +125°C with voltage derating

SPECIFICATION

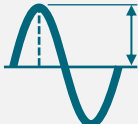
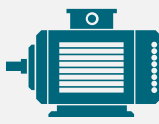
Item		Characteristics				
Related Documents		IEC 60384-16				
Rated Temperature Range		-40°C to +85°C for V _R (DC) ▲ -40°C to +75°C for V _R (AC)				
Usable Temperature Range ^{Note 1}		-40°C to +125°C				
Capacitance Range	C _R	0.001μF to 1.5μF				
Capacitance Tolerance	ΔC	±5% ▲ ±10%				
Rated DC Voltage	V _R DC	400V _{DC} ▲ 630V _{DC} ▲ 1000V _{DC} ▲ 1600V _{DC} ▲ 2000V _{DC}				
Rated AC Voltage	V _R AC	250V _{AC} ▲ 400V _{AC} ▲ 600V _{AC} ▲ 650V _{AC} ▲ 700V _{AC}				
Dissipation Factor	tan δ	f (kHz)	C ≤ 0.1μF	0.1μF < C ≤ 1μF	1μF < C	
		1	≤ 0.06%	≤ 0.06%	≤ 0.07%	
		10	≤ 0.07%	≤ 0.09%	≤ 0.12%	
		100	≤ 0.15%	≤ 0.25%	≤ 0.5%	
Insulation Resistance ^{Note 2}	R _{INS}	C _R ≤ 0.1μF		C _R > 0.1μF		
		≥ 50GΩ		≥ 10GΩ x μF		
Withstand Voltage ^{Note 3}		V _W	1.6 x V _R applied for 2 sec. (cut off current 10mA)			
Maximum Pulse Rise Slope dV/dt	Pitch (mm)	400V _{DC}	630V _{DC}	1000V _{DC}	1600V _{DC}	2000V _{DC}
	10	1500V/μs	3000V/μs	4800V/μs	-	-
	15	900V/μs	2500V/μs	3300V/μs	6000V/μs	9500V/μs
	22.5	500V/μs	1500V/μs	2100V/μs	3000V/μs	3500V/μs
	27.5	300V/μs	900V/μs	1000V/μs	2000V/μs	2300V/μs

Notes:

- Derating ratio of rated voltage +85°C to +125°C
Derating ratio of rated voltage +75°C to +125°C
- Terminal to terminal at 25°C ± 5°C
- Terminal to terminal at 20°C ± 5°C

1.25% per °C for rated DC voltage
1.35% per °C for rated AC voltage
Voltage charge time: 1minute; Voltage charge: 100V_{DC}
Slow-up voltage speed: C ≤ 10μF: 5sec / C > 10μF: 10sec

APPLICATIONS

Electronic Ballast	High Pulse Applications	Motor Control Circuits	Switch Mode Power Supplies
			

ELECTRICAL CHARACTERISTICS

V_R	C_R (μF)	Dimensions (mm)			P (mm)	$\phi d \pm 0.05$ (mm)	Part Number ^{Note}
		W ± 0.3	H ± 0.3	T ± 0.3			
400V _{DC} ▲ 250V _{AC}	0.047	18	11	5	15	0.8	HP3S473□0400DB□15□
	0.056	18	11	5	15	0.8	HP3S563□0400DB□15□
	0.068	18	12	6	15	0.8	HP3S683□0400DB□15□
	0.082	18	12	6	15	0.8	HP3S823□0400DB□15□
	0.1	18	13	7	15	0.8	HP3S104□0400DB□15□
	0.12	18	13.5	7.5	15	0.8	HP3S124□0400DB□15□
	0.15	18	14.5	8.5	15	0.8	HP3S154□0400DB□15□
	0.18	18	16	9	15	0.8	HP3S184□0400DB□15□
	0.22	18	16	10	15	0.8	HP3S224□0400DB□15□
	0.27	18	19	11	15	0.8	HP3S274□0400DB□15□
	0.33	18	21	12	15	0.8	HP3S334□0400DB□15□
	0.1	26	15	6	22.5	0.8	HP3S104□0400DB□22□
	0.12	26	15	6	22.5	0.8	HP3S124□0400DB□22□
	0.15	26	15	6	22.5	0.8	HP3S154□0400DB□22□
	0.18	26	15	6	22.5	0.8	HP3S184□0400DB□22□
	0.22	26	16	7	22.5	0.8	HP3S224□0400DB□22□
	0.27	26	17	8	22.5	0.8	HP3S274□0400DB□22□
	0.33	26	17	9	22.5	0.8	HP3S334□0400DB□22□
	0.39	26	18	9	22.5	0.8	HP3S394□0400DB□22□
	0.47	26	19	10	22.5	0.8	HP3S474□0400DB□22□
	0.56	26	20	11	22.5	0.8	HP3S564□0400DB□22□
	0.68	26	20	11	22.5	0.8	HP3S684□0400DB□22□
	0.33	31	17	8	27.5	0.8	HP3S334□0400DB□27□
	0.39	31	18	9	27.5	0.8	HP3S394□0400DB□27□
	0.47	31	18	9	27.5	0.8	HP3S474□0400DB□27□
	0.56	31	18	9	27.5	0.8	HP3S564□0400DB□27□
	0.68	31	20	10	27.5	0.8	HP3S684□0400DB□27□
	0.82	31	22	13	27.5	0.8	HP3S824□0400DB□27□
	1	31	23.5	14	27.5	0.8	HP3S105□0400DB□27□
	1.2	31	24.5	15	27.5	0.8	HP3S125□0400DB□27□
	1.5	31	28	18	27.5	0.8	HP3S155□0400DB□27□
630V _{DC} ▲ 400V _{AC}	0.01	13	10	5	10	0.6	HP3S103□0630DB□10□
	0.012	13	11	5	10	0.6	HP3S123□0630DB□10□
	0.015	13	12	6	10	0.6	HP3S153□0630DB□10□
	0.018	13	12	6	10	0.6	HP3S183□0630DB□10□
	0.022	13	13	7	10	0.6	HP3S223□0630DB□10□
	0.01	18	11	5	15	0.8	HP3S103□0630DB□15□
	0.012	18	11	5	15	0.8	HP3S123□0630DB□15□
	0.015	18	11	5	15	0.8	HP3S153□0630DB□15□
	0.018	18	11	5	15	0.8	HP3S183□0630DB□15□
	0.022	18	11	5	15	0.8	HP3S223□0630DB□15□
	0.027	18	11	5	15	0.8	HP3S273□0630DB□15□
	0.033	18	12	6	15	0.8	HP3S333□0630DB□15□
	0.039	18	12	6	15	0.8	HP3S393□0630DB□15□
	0.047	18	13	7	15	0.8	HP3S473□0630DB□15□

Note: Enter the appropriate tolerance lead length code and lead configuration □ from the product code table

ELECTRICAL CHARACTERISTICS

V_R	C_R (μF)	Dimensions (mm)			P (mm)	$\phi d \pm 0.05$ (mm)	Part Number ^{Note}
		W ± 0.3	H ± 0.3	T ± 0.3			
630V _{DC} ▲ 400V _{AC}	0.056	18	13.5	7.5	15	0.8	HP3S563□0630DB□15□
	0.068	18	14	8	15	0.8	HP3S683□0630DB□15□
	0.082	18	14.5	8.5	15	0.8	HP3S823□0630DB□15□
	0.1	18	16	10	15	0.8	HP3S104□0630DB□15□
	0.12	18	18	10	15	0.8	HP3S124□0630DB□15□
	0.047	26	15	6	22.5	0.8	HP3S473□0630DB□22□
	0.056	26	15	6	22.5	0.8	HP3S563□0630DB□22□
	0.068	26	15	6	22.5	0.8	HP3S683□0630DB□22□
	0.082	26	15	6	22.5	0.8	HP3S823□0630DB□22□
	0.1	26	15	6	22.5	0.8	HP3S104□0630DB□22□
	0.12	26	16	7	22.5	0.8	HP3S124□0630DB□22□
	0.15	26	17	8	22.5	0.8	HP3S154□0630DB□22□
	0.18	26	17	8	22.5	0.8	HP3S184□0630DB□22□
	0.22	26	18	9	22.5	0.8	HP3S224□0630DB□22□
	0.27	26	20	10	22.5	0.8	HP3S274□0630DB□22□
	0.33	26	20	11	22.5	0.8	HP3S334□0630DB□22□
	0.39	26	22	12	22.5	0.8	HP3S394□0630DB□22□
	0.22	31	18	9	27.5	0.8	HP3S224□0630DB□27□
	0.27	31	18	9	27.5	0.8	HP3S274□0630DB□27□
	0.33	31	20	10	27.5	0.8	HP3S334□0630DB□27□
	0.39	31	20	11	27.5	0.8	HP3S394□0630DB□27□
	0.47	31	22	13	27.5	0.8	HP3S474□0630DB□27□
	0.56	31	23.5	14	27.5	0.8	HP3S564□0630DB□27□
	0.68	31	24.5	15	27.5	0.8	HP3S684□0630DB□27□
	0.82	31	26	18	27.5	0.8	HP3S824□0630DB□27□
	1	31	33	18	27.5	0.8	HP3S105□0630DB□27□
1000V _{DC} ▲ 630V _{AC}	0.0039	13	10	5	10	0.6	HP3S392□1000DB□10□
	0.0047	13	11	5	10	0.6	HP3S472□1000DB□10□
	0.0056	13	11	5	10	0.6	HP3S562□1000DB□10□
	0.0068	13	11	5	10	0.6	HP3S682□1000DB□10□
	0.0082	13	12	6	10	0.6	HP3S822□1000DB□10□
	0.01	13	12	6	10	0.6	HP3S103□1000DB□10□
	0.012	13	13	7	10	0.6	HP3S123□1000DB□10□
	0.0068	18	11	5	15	0.8	HP3S682□1000DB□15□
	0.0082	18	11	5	15	0.8	HP3S822□1000DB□15□
	0.01	18	11	5	15	0.8	HP3S103□1000DB□15□
	0.012	18	11	5	15	0.8	HP3S123□1000DB□15□
	0.015	18	11	5	15	0.8	HP3S153□1000DB□15□
	0.018	18	11	5	15	0.8	HP3S183□1000DB□15□
	0.022	18	12	6	15	0.8	HP3S223□1000DB□15□
	0.027	18	13	7	15	0.8	HP3S273□1000DB□15□
	0.033	18	13.5	7.5	15	0.8	HP3S333□1000DB□15□
	0.039	18	15.5	8	15	0.8	HP3S393□1000DB□15□
	0.047	18	17	8	15	0.8	HP3S473□1000DB□15□
	0.022	26	15	6	22.5	0.8	HP3S223□1000DB□22□
	0.027	26	15	6	22.5	0.8	HP3S273□1000DB□22□

Note: Enter the appropriate tolerance lead length code and lead configuration □ from the product code table

ELECTRICAL CHARACTERISTICS

V_R	C_R (μF)	Dimensions (mm)			P (mm)	$\phi d \pm 0.05$ (mm)	Part Number ^{Note}
		W ± 0.3	H ± 0.3	T ± 0.3			
1000V _{DC} ▲ 630V _{AC}	0.033	26	15	6	22.5	0.8	HP3S333□1000DB□22□
	0.039	26	15	6	22.5	0.8	HP3S393□1000DB□22□
	0.047	26	15	6	22.5	0.8	HP3S473□1000DB□22□
	0.056	26	16	7	22.5	0.8	HP3S563□1000DB□22□
	0.068	26	16.5	7	22.5	0.8	HP3S683□1000DB□22□
	0.082	26	17	8	22.5	0.8	HP3S823□1000DB□22□
	0.1	26	18.5	8.5	22.5	0.8	HP3S104□1000DB□22□
	0.12	26	19	10	22.5	0.8	HP3S124□1000DB□22□
	0.15	26	20	11	22.5	0.8	HP3S154□1000DB□22□
	0.18	26	22	12.5	22.5	0.8	HP3S184□1000DB□22□
	0.22	26	24	14	22.5	0.8	HP3S224□1000DB□22□
	0.1	31	18	9	27.5	0.8	HP3S104□1000DB□27□
	0.12	31	18	9	27.5	0.8	HP3S124□1000DB□27□
	0.15	31	20	10	27.5	0.8	HP3S154□1000DB□27□
	0.18	31	22	13	27.5	0.8	HP3S184□1000DB□27□
	0.22	31	22	13	27.5	0.8	HP3S224□1000DB□27□
	0.27	31	23.5	14	27.5	0.8	HP3S274□1000DB□27□
	0.33	31	24.5	15	27.5	0.8	HP3S334□1000DB□27□
1600V _{DC} ▲ 650V _{AC}	0.001	18	11	5	15	0.8	HP3S102□1600DB□15□
	0.0012	18	11	5	15	0.8	HP3S122□1600DB□15□
	0.0015	18	11	5	15	0.8	HP3S152□1600DB□15□
	0.0018	18	11	5	15	0.8	HP3S182□1600DB□15□
	0.0022	18	11	5	15	0.8	HP3S222□1600DB□15□
	0.0027	18	11	5	15	0.8	HP3S272□1600DB□15□
	0.0033	18	11	5	15	0.8	HP3S332□1600DB□15□
	0.0039	18	11	5	15	0.8	HP3S392□1600DB□15□
	0.0047	18	11	5	15	0.8	HP3S472□1600DB□15□
	0.0056	18	11	5	15	0.8	HP3S562□1600DB□15□
	0.0068	18	11	5	15	0.8	HP3S682□1600DB□15□
	0.0082	18	11	5	15	0.8	HP3S822□1600DB□15□
	0.01	18	12	6	15	0.8	HP3S103□1600DB□15□
	0.012	18	12	6	15	0.8	HP3S123□1600DB□15□
	0.015	18	13	7	15	0.8	HP3S153□1600DB□15□
	0.018	18	13	7	15	0.8	HP3S183□1600DB□15□
	0.022	18	13.5	7.5	15	0.8	HP3S223□1600DB□15□
	0.027	18	14.5	8.5	15	0.8	HP3S273□1600DB□15□
	0.033	18	17	8	15	0.8	HP3S333□1600DB□15□
	0.022	26	15	6	22.5	0.8	HP3S223□1600DB□22□
	0.027	26	15	6	22.5	0.8	HP3S273□1600DB□22□
	0.033	26	15	6	22.5	0.8	HP3S333□1600DB□22□
	0.039	26	16.5	7	22.5	0.8	HP3S393□1600DB□22□

Note: Enter the appropriate tolerance lead length code and lead configuration □ from the product code table

ELECTRICAL CHARACTERISTICS

V_R	C_R (μF)	Dimensions (mm)			P (mm)	$\phi d \pm 0.05$ (mm)	Part Number ^{Note}
		W ± 0.3	H ± 0.3	T ± 0.3			
1600V _{DC} ▲ 650V _{AC}	0.047	26	16.5	7	22.5	0.8	HP3S473□1600DB□22□
	0.056	26	17	8	22.5	0.8	HP3S563□1600DB□22□
	0.068	26	18	9	22.5	0.8	HP3S683□1600DB□22□
	0.082	26	19	10	22.5	0.8	HP3S823□1600DB□22□
	0.1	26	20	11	22.5	0.8	HP3S104□1600DB□22□
	0.047	31	18	9	27.5	0.8	HP3S473□1600DB□27□
	0.056	31	18	9	27.5	0.8	HP3S563□1600DB□27□
	0.068	31	18	9	27.5	0.8	HP3S683□1600DB□27□
	0.082	31	18	9	27.5	0.8	HP3S823□1600DB□27□
	0.1	31	20	10	27.5	0.8	HP3S104□1600DB□27□
	0.12	31	20	11	27.5	0.8	HP3S124□1600DB□27□
	0.15	31	22	13	27.5	0.8	HP3S154□1600DB□27□
	0.18	31	23.5	14	27.5	0.8	HP3S184□1600DB□27□
	0.22	31	24.5	15	27.5	0.8	HP3S224□1600DB□27□
	0.27	31	26	18	27.5	0.8	HP3S274□1600DB□27□
	0.33	31	33	18	27.5	0.8	HP3S334□1600DB□27□
2000V _{DC} ▲ 700V _{AC}	0.001	18	11	5	15	0.8	HP3S102□2000DB□15□
	0.0012	18	11	5	15	0.8	HP3S122□2000DB□15□
	0.0015	18	11	5	15	0.8	HP3S152□2000DB□15□
	0.0018	18	11	5	15	0.8	HP3S182□2000DB□15□
	0.0022	18	11	5	15	0.8	HP3S222□2000DB□15□
	0.0027	18	11	5	15	0.8	HP3S272□2000DB□15□
	0.0033	18	11	5	15	0.8	HP3S332□2000DB□15□
	0.0039	18	11	5	15	0.8	HP3S392□2000DB□15□
	0.0047	18	11	5	15	0.8	HP3S472□2000DB□15□
	0.0056	18	12	6	15	0.8	HP3S562□2000DB□15□
	0.0068	18	12	6	15	0.8	HP3S682□2000DB□15□
	0.0082	18	13	7	15	0.8	HP3S822□2000DB□15□
	0.01	18	13	7	15	0.8	HP3S103□2000DB□15□
	0.012	18	14	8	15	0.8	HP3S123□2000DB□15□
	0.015	18	14.5	8.5	15	0.8	HP3S153□2000DB□15□
	0.018	18	18	9	15	0.8	HP3S183□2000DB□15□
	0.022	18	18	10	15	0.8	HP3S223□2000DB□15□
	0.01	26	15	6	22.5	0.8	HP3S103□2000DB□22□
	0.012	26	15	6	22.5	0.8	HP3S123□2000DB□22□
	0.015	26	15	6	22.5	0.8	HP3S153□2000DB□22□
	0.018	26	15	6	22.5	0.8	HP3S183□2000DB□22□
	0.022	26	16	6	22.5	0.8	HP3S223□2000DB□22□
	0.027	26	16.5	7	22.5	0.8	HP3S273□2000DB□22□
	0.033	26	17	8	22.5	0.8	HP3S333□2000DB□22□
	0.039	26	18	9	22.5	0.8	HP3S393□2000DB□22□
	0.047	26	18.5	10	22.5	0.8	HP3S473□2000DB□22□
	0.056	26	20	11	22.5	0.8	HP3S563□2000DB□22□
	0.068	26	21.5	12	22.5	0.8	HP3S683□2000DB□22□

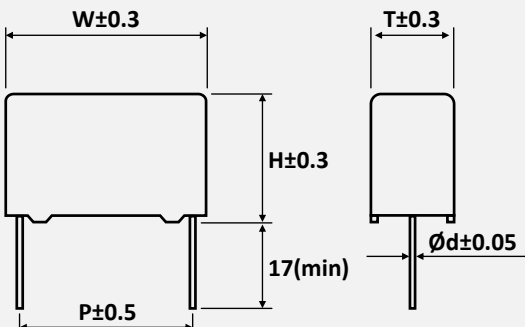
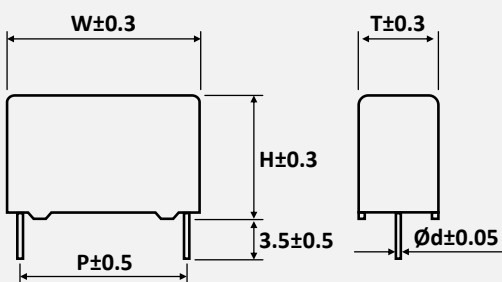
Note: Enter the appropriate tolerance lead length code and lead configuration □ from the product code table

ELECTRICAL CHARACTERISTICS

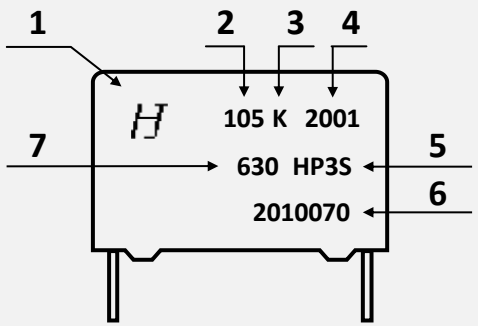
V_R	C_R (μF)	Dimensions (mm)			P (mm)	$\phi d \pm 0.05$ (mm)	Part Number ^{Note}
		W ± 0.3	H ± 0.3	T ± 0.3			
2000V _{DC} ▲ 700V _{AC}	0.082	26	24	14	22.5	0.8	HP3S823□2000DB□22□
	0.1	26	25	15	22.5	0.8	HP3S104□2000DB□22□
	0.033	31	18	9	27.5	0.8	HP3S333□2000DB□27□
	0.039	31	18	9	27.5	0.8	HP3S393□2000DB□27□
	0.047	31	20	10	27.5	0.8	HP3S473□2000DB□27□
	0.056	31	20	11	27.5	0.8	HP3S563□2000DB□27□
	0.068	31	22	13	27.5	0.8	HP3S683□2000DB□27□
	0.082	31	23.5	14	27.5	0.8	HP3S823□2000DB□27□
	0.1	31	24.5	15	27.5	0.8	HP3S104□2000DB□27□
	0.12	31	25.5	16	27.5	0.8	HP3S124□2000DB□27□
	0.15	31	28	18	27.5	0.8	HP3S154□2000DB□27□
	0.18	31	30.5	20	27.5	0.8	HP3S184□2000DB□27□

Note: Enter the appropriate tolerance lead length code and lead configuration □ from the product code table

PACKAGE OUTLINE ▲ All dimensions in mm

Long Leads	Short Leads
 Diagram showing dimensions for Long Leads: W± 0.3, H± 0.3, T± 0.3, P± 0.5, $\phi d \pm 0.05$, and 17(min) for lead length.	 Diagram showing dimensions for Short Leads: W± 0.3, H± 0.3, T± 0.3, P± 0.5, 3.5± 0.5 for lead length, and $\phi d \pm 0.05$.

PRODUCT MARKING

Marking					Details	
					No.	Description
					1	Manufacturer Logo *
					2	Nominal capacitance in μF
					3	Capacitance tolerance
					4	Date code
					5	Series name
					6	Production no.
					7	DC rated voltage

DATE CODE & APPLICATION CATEGORY

Example:

Date code

2001: 2001 = 1st week of 2020

Lot number

2010070: 20 = Year, here 2020
1 = Month, here January
0001 to XXXX = Serial number

20		01	
Year		Week	
19	2019	01	1 st
20	2020	02	2 nd
21	2021	03	3 rd
22	2022	04	4 th
23	2023	05	5 th
...	...	...	...
30	2030	53	53 rd

PRODUCT CODE

Example: HP3S series ▲ 1 μF ▲ 630V_{DC} ▲ $\pm 10\%$ ▲ P=27.5mm ▲ Bulk ▲ Straight leads ▲ 17mm lead length

HP3S		105		K		0630		D		B		1		27		1	
Series		Capacitance Code ^{Note1} (pF)		Capacitance Tolerance (%)		Rated Voltage (V _{DC})		Voltage Type		Packaging Type		Lead Configuration ^{Note2}		Pitch (mm)		Lead Length (mm)	
Code	Series	Code	μF	Code	Tol.	Code	VDC	Code	Type	Code	Type	Code	Style	Code	mm	Code	mm
HP3S	HP3S	102	0.001	J	± 5	0400	400	D	DC	B	Bulk	1	SL	10	10.0	1	17.0
		223	0.022	K	± 10	0630	630							15	15.0	2	3.5
		154	0.15			1000	1000							22	22.5		
		474	0.47			1600	1600							27	27.5		
		105	1.0			2000	2000										
		155	1.5														

Note:

- Capacitance code expressed in pF. The first two digits represent significant figures. The last digit specifies the total number of zeros to be added.
- SL = Straight leads

REFERENCE DATA

Fig. 1 • Capacitance Drift vs. Ambient Temperature

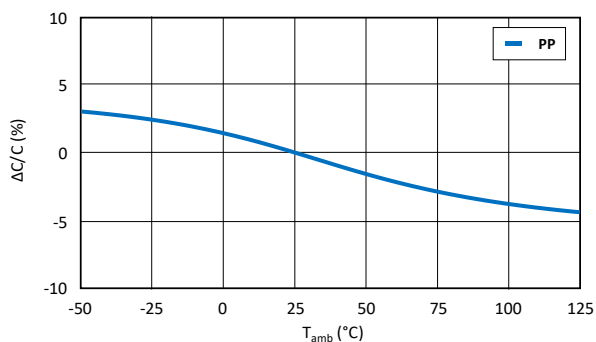


Fig. 2 • Insulation Resistance vs. Ambient Temperature

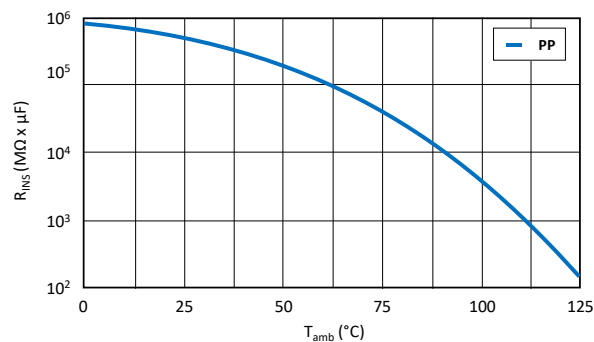


Fig. 3 • Dissipation Factor vs. Ambient Temperature

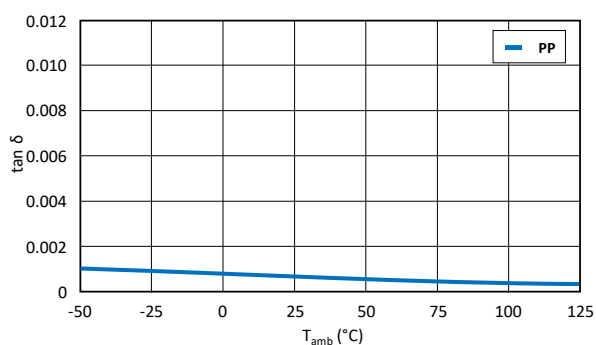


Fig. 4 • Dissipation Factor vs. Frequency

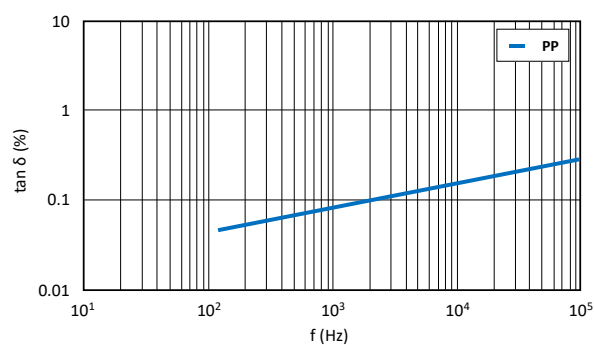


Fig. 5 • Capacitance Drift vs. Frequency

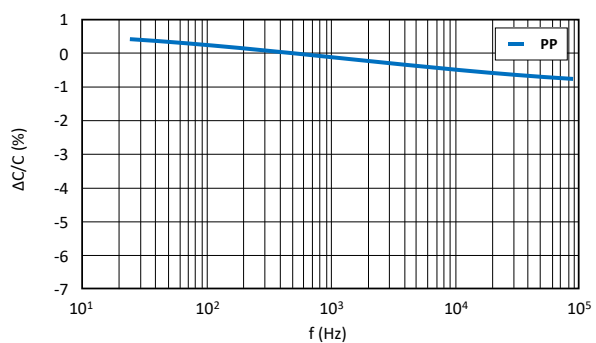
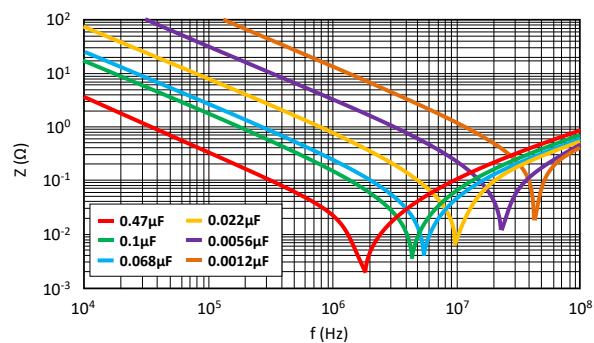
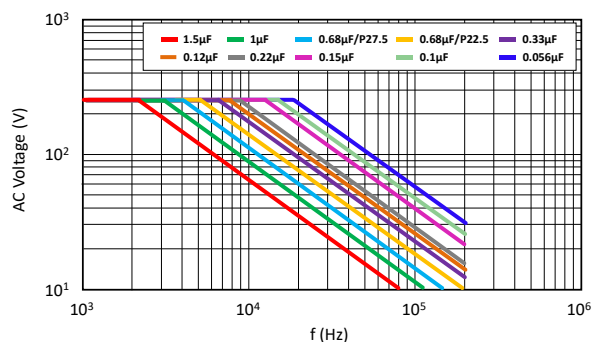
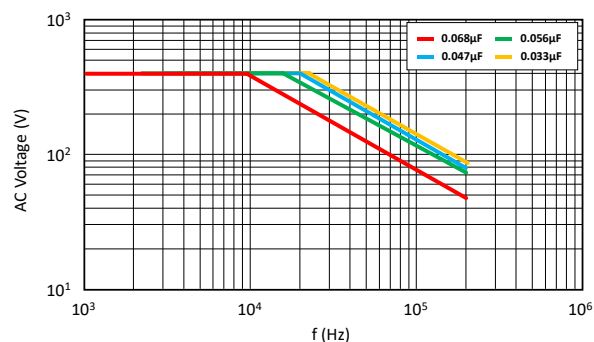


Fig. 6 • Impedance vs. Frequency - Typical Curve


Fig. 7 • Max. RMS Voltage vs. Frequency - 400V_{DC}/250V_{AC}

Fig. 8 • Max. RMS Voltage vs. Frequency - 630V_{DC}/400V_{AC}


REFERENCE DATA

Fig. 9 • Max. RMS Voltage vs. Frequency • 1000V_{DC}/600V_{AC}

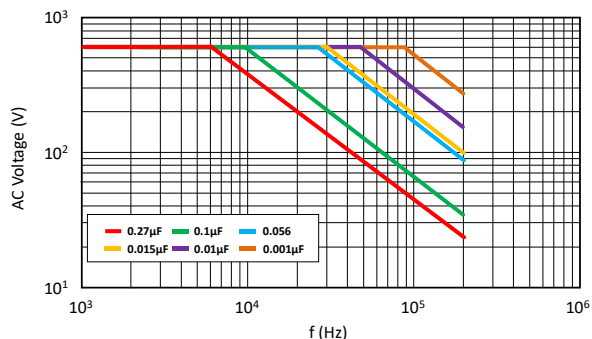


Fig. 10 • Max. RMS Voltage vs. Frequency • 1600V_{DC}/650V_{AC}

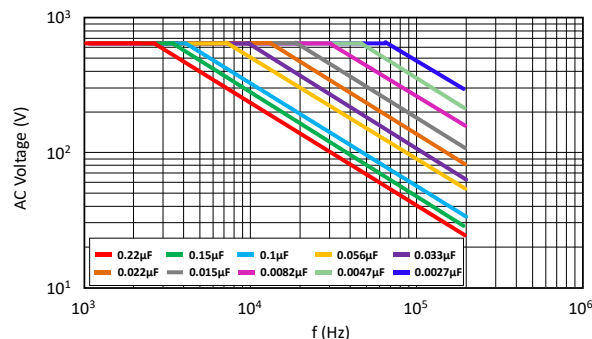


Fig. 11 • Max. RMS Voltage vs. Frequency • 2000V_{DC}/700V_{AC}

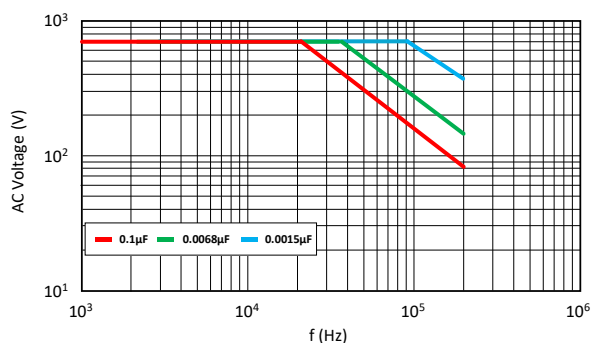


Fig. 12 • Max. DC Voltage vs. Temperature

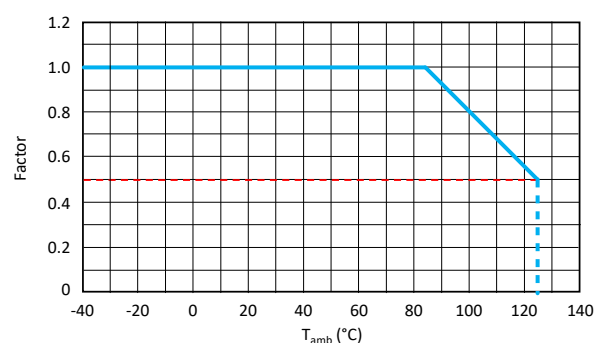


Fig. 13 • Max. AC Voltage vs. Temperature

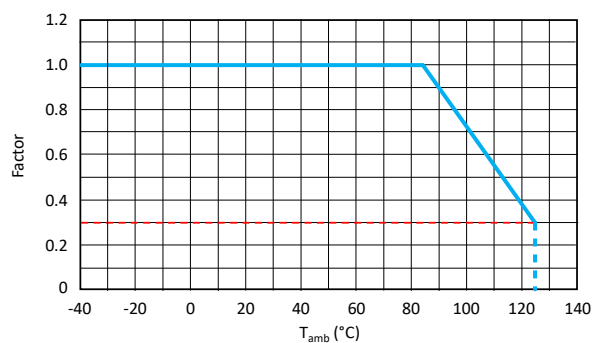


Fig. 14 • Permissible Current Derating by Temperature

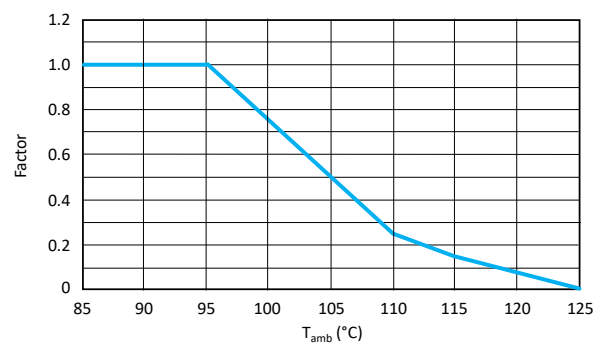
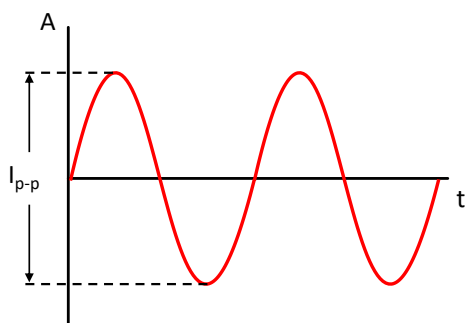


Fig. 15 • Max. RMS Current - Wave Form



MAXIMUM RMS CURRENT

V _R	C _R (μF)	P (mm)	I _{RMS} (A) at f							
			15.75kHz	35kHz	45kHz	65kHz	80kHz	100kHz	130kHz	200kHz
400V _{DC} ▲ 250V _{AC}	0.047	15	0.93	1.20	1.32	1.48	1.61	1.72	1.80	2.00
	0.056	15	1.10	1.36	1.48	1.64	1.80	1.88	1.96	2.16
	0.068	15	1.34	1.52	1.64	1.80	1.96	2.04	2.12	2.36
	0.082	15	1.62	1.76	1.84	2.04	2.12	2.16	2.24	2.40
	0.1	15	1.98	2.08	2.16	2.28	2.32	2.36	2.40	2.64
	0.12	15	2.10	2.30	2.32	2.44	2.52	2.60	2.64	2.80
	0.15	15	2.20	2.36	2.44	2.52	2.60	2.64	2.76	2.92
	0.18	15	2.32	2.44	2.52	2.60	2.68	2.80	2.92	3.08
	0.22	15	2.56	2.68	2.76	2.84	2.92	3.04	3.16	3.36
	0.27	15	2.80	2.92	3.00	3.08	3.16	3.32	3.48	3.68
	0.33	15	3.10	3.36	3.50	3.65	3.75	3.90	4.00	4.20
	0.1	22.5	1.60	1.96	2.16	2.36	2.68	2.92	3.20	3.52
	0.12	22.5	1.84	2.24	2.52	2.84	3.00	3.20	3.60	3.84
	0.15	22.5	2.00	2.40	2.68	3.00	3.20	3.40	3.80	4.04
	0.18	22.5	2.40	2.80	3.08	3.40	3.64	3.76	3.96	4.16
	0.22	22.5	3.04	3.60	3.84	3.92	4.00	4.08	4.16	4.48
	0.27	22.5	3.60	4.00	4.40	4.64	4.76	4.84	4.96	5.28
	0.33	22.5	4.24	4.80	4.88	5.04	5.20	5.36	5.52	5.76
	0.39	22.5	4.48	5.04	5.20	5.36	5.52	5.60	5.84	6.24
	0.47	22.5	5.20	5.60	5.68	5.84	6.00	6.24	6.40	6.80
	0.56	22.5	5.44	6.00	6.24	6.48	6.80	7.04	7.20	7.60
	0.68	22.5	5.84	6.40	6.80	7.04	7.20	7.60	8.00	8.40
	0.33	27.5	4.00	4.40	4.64	4.80	5.00	5.24	5.44	5.60
	0.39	27.5	4.40	4.60	4.80	4.96	5.20	5.44	5.60	5.84
	0.47	27.5	4.64	4.80	5.04	5.20	5.44	5.60	5.76	6.00
	0.56	27.5	4.80	5.20	5.44	5.60	5.76	6.00	6.16	6.32
	0.68	27.5	5.28	5.60	5.72	5.84	5.96	6.08	6.24	6.56
	0.82	27.5	5.60	5.92	6.04	6.24	6.40	6.52	6.60	6.80
	1	27.5	6.00	6.80	7.04	7.20	7.44	7.60	7.76	7.60
	1.2	27.5	6.24	7.04	7.20	7.32	7.56	7.76	7.84	7.68
	1.5	27.5	6.40	7.20	7.36	7.44	7.68	8.00	8.00	7.84

Note: Maximum capacitor surface temperature T_s ≤ 125°C; Maximum body temperature rise ΔT ≤ 10°C

$$I_{RMS} = \frac{I_{p-p}}{2 \cdot \sqrt{2}}$$

MAXIMUM RMS CURRENT

V _R	C _R (μF)	P (mm)	I _{RMS} (A) at f							
			15.75kHz	35kHz	45kHz	65kHz	80kHz	100kHz	130kHz	200kHz
630V _{DC} ▲ 400V _{AC}	0.01	10	0.67	0.95	1.10	1.25	1.40	1.50	1.70	2.05
	0.022	10	1.00	1.43	1.65	1.98	2.09	2.20	2.35	2.65
	0.033	10	1.16	1.54	1.76	2.04	2.20	2.42	2.55	2.85
	0.047	10	1.67	2.17	2.39	2.69	2.91	3.10	3.42	3.96
	0.022	15	1.25	1.80	2.00	2.30	2.50	2.80	3.10	3.70
	0.027	15	1.30	1.95	2.26	2.53	2.70	2.95	3.25	3.85
	0.033	15	1.50	2.15	2.45	2.70	2.95	3.25	3.45	3.88
	0.047	15	1.98	2.42	2.64	2.86	3.08	3.36	3.45	3.65
	0.056	15	2.00	2.48	2.70	2.92	3.14	3.38	3.55	3.80
	0.068	15	2.09	2.64	2.70	3.08	3.30	3.45	3.65	3.95
	0.12	15	2.60	3.60	3.84	4.16	4.48	4.80	5.28	6.00
1000V _{DC} ▲ 600V _{AC}	0.001	10	0.20	0.23	0.24	0.26	0.27	0.28	0.29	0.31
	0.01	10	0.74	1.02	1.15	1.35	1.45	1.60	1.75	2.10
	0.0056	15	0.70	0.80	0.83	0.88	0.93	0.95	1.00	1.10
	0.0068	15	0.85	0.96	1.00	1.05	1.10	1.15	1.20	1.30
	0.01	15	0.95	1.10	1.20	1.30	1.45	1.60	1.80	2.05
	0.012	15	1.00	1.20	1.35	1.45	1.55	1.70	2.00	2.30
	0.015	15	1.40	1.60	1.70	1.80	1.85	1.93	2.20	2.45
	0.022	15	1.42	1.82	2.01	2.30	2.47	2.67	2.94	3.20
	0.027	15	1.45	2.15	2.35	2.60	2.80	2.96	3.15	3.60
	0.033	15	1.50	2.20	2.45	2.75	2.90	3.15	3.40	3.75
	0.039	15	1.60	2.30	2.55	2.85	3.00	3.25	3.55	3.95
	0.047	15	1.76	2.52	2.80	3.13	3.29	3.57	3.90	4.34
	0.068	15	2.50	3.30	3.60	4.10	4.40	4.60	5.10	5.30
	0.033	22.5	1.96	2.79	2.85	2.90	2.94	3.01	3.05	3.11
	0.056	22.5	3.30	3.62	3.80	3.90	3.94	4.05	4.10	4.15
	0.068	22.5	3.63	3.77	3.88	3.95	4.02	4.06	4.15	4.22
	0.1	22.5	3.96	4.07	4.20	4.25	4.27	4.34	4.50	4.80
	0.18	22.5	4.50	4.70	4.80	5.00	5.10	5.20	5.50	6.00
	0.22	22.5	5.00	5.20	5.80	5.50	6.00	6.30	6.40	6.60
	0.27	27.5	5.60	6.50	6.80	7.10	7.50	7.60	7.90	8.60
	0.47	27.5	6.30	7.20	7.50	7.90	8.20	8.50	8.90	9.50

Note: Maximum capacitor surface temperature T_s ≤ 125°C; Maximum body temperature rise ΔT ≤ 10°C

$$I_{RMS} = \frac{I_{p-p}}{2 \cdot \sqrt{2}}$$

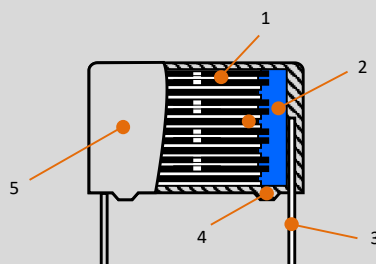
MAXIMUM RMS CURRENT

V _R	C _R (μF)	P (mm)	I _{RMS} (A) at f							
			15.75kHz	35kHz	45kHz	65kHz	80kHz	100kHz	130kHz	200kHz
1600V _{DC} ▲ 650V _{AC}	0.001	15	0.06	0.14	0.18	0.27	0.33	0.41	0.45	0.50
	0.0012	15	0.08	0.17	0.22	0.32	0.39	0.45	0.50	0.56
	0.0015	15	0.10	0.21	0.28	0.40	0.49	0.53	0.58	0.64
	0.0018	15	0.12	0.26	0.33	0.48	0.55	0.60	0.66	0.72
	0.0022	15	0.14	0.31	0.40	0.58	0.65	0.70	0.75	0.85
	0.0027	15	0.17	0.39	0.50	0.72	0.73	0.76	0.84	0.96
	0.0033	15	0.21	0.47	0.61	0.75	0.80	0.88	0.96	1.04
	0.0039	15	0.25	0.56	0.72	0.85	0.88	0.96	1.04	1.16
	0.0047	15	0.30	0.67	0.80	0.92	0.96	1.04	1.12	1.24
	0.0056	15	0.36	0.80	0.95	1.00	1.08	1.15	1.24	1.36
	0.0068	15	0.44	0.95	1.00	1.10	1.16	1.23	1.32	1.48
	0.0082	15	0.53	1.00	1.10	1.20	1.30	1.33	1.45	1.60
	0.01	15	0.64	1.10	1.20	1.28	1.36	1.44	1.56	1.76
	0.012	15	0.77	1.25	1.30	1.40	1.48	1.60	1.72	1.92
	0.015	15	0.96	1.30	1.40	1.50	1.60	1.68	1.84	2.04
	0.018	15	1.16	1.40	1.50	1.65	1.75	1.84	1.96	2.24
	0.022	15	1.30	1.56	1.70	1.85	1.95	2.04	2.20	2.44
	0.027	15	1.54	1.80	1.90	2.10	2.20	2.30	2.50	2.80
	0.033	15	1.70	2.05	2.20	2.38	2.48	2.64	2.84	3.16
	0.022	22.5	1.20	1.50	1.60	1.70	1.80	1.88	2.00	2.24
	0.027	22.5	1.30	1.55	1.70	1.80	1.88	2.04	2.16	2.40
	0.033	22.5	1.40	1.70	1.80	1.95	2.10	2.20	2.32	2.60
	0.039	22.5	1.60	1.90	2.10	2.20	2.35	2.48	2.72	2.96
	0.047	22.5	1.75	2.10	2.20	2.48	2.64	2.80	3.00	3.30
	0.056	22.5	1.95	2.30	2.50	2.80	3.00	3.12	3.40	3.68
	0.068	22.5	2.15	2.56	2.80	3.12	3.28	3.44	3.68	4.08
	0.082	22.5	2.35	2.84	3.04	3.36	3.56	3.76	4.00	4.40
	0.1	22.5	2.50	3.04	3.25	3.60	3.84	4.00	4.32	4.68
	0.047	27.5	1.42	1.70	1.85	2.00	2.08	2.20	2.32	2.56
	0.056	27.5	1.60	1.92	2.08	2.24	2.36	2.44	2.56	2.85
	0.068	27.5	1.70	2.10	2.20	2.40	2.55	2.75	2.96	3.20
	0.082	27.5	2.03	2.40	2.60	2.88	3.05	3.20	3.44	3.76
	0.1	27.5	2.30	2.75	2.90	3.15	3.30	3.50	3.80	4.20
	0.12	27.5	2.50	3.04	3.36	3.60	3.84	4.00	4.20	4.64
	0.15	27.5	2.95	3.50	3.76	4.16	4.40	4.56	4.80	5.20
	0.18	27.5	3.20	3.70	4.00	4.30	4.50	4.90	5.30	5.80
	0.22	27.5	3.60	4.40	4.70	5.20	5.50	5.80	6.24	6.72
	0.27	27.5	4.06	4.80	5.20	5.60	6.00	6.40	6.72	7.30
	0.33	27.5	4.16	5.04	5.50	6.00	6.30	6.60	7.10	7.72
2000V _{DC} ▲ 700V _{AC}	0.0015	15	0.35	0.43	0.46	0.49	0.52	0.55	0.58	0.65
	0.0068	15	0.79	0.97	1.02	1.10	1.16	1.25	1.33	1.45
	0.022	22.5	1.55	1.85	2.00	2.20	2.30	2.40	2.60	2.85

Note: Maximum capacitor surface temperature T_s ≤ 125°C; Maximum body temperature rise ΔT ≤ 10°C

$$I_{RMS} = \frac{I_{p-p}}{2 \cdot \sqrt{2}}$$

TECHNICAL SPECIFICATION

No.	Category	Specification							
1	Scope	This specification applies to capacitors for electronics applications. Reference standards: IEC 60384-16							
2	Product Name	Metallized polypropylene film capacitor, with very high dV/dt, Type HP3S							
3	Construction	Dimensions:		Refer to dimensions drawing					
									
		1 = Element		Polypropylene film and double-sided metallized polyester film					
		2 = Metal spray		Special solder. (Lead Free) compliant to RoHS directive					
		3 = Lead wire		Tinned wire (Cu wire) or tinned copper clad-steel wire (CP wire). (Lead Free) compliant to RoHS directive					
		4 = Inner coating		Epoxy resin filled. (UL-94V-0 Standard)					
5 = Outer coating		Plastic case. (UL-94V-0 Standard)							
4	Atmospheric and Temperature Characteristics	Standard atmospheric conditions. Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:							
		Ambient temperature:		15 to 35°C					
		Relative humidity		45% to 85%					
		Air pressure		86 to 106 kPa					
		If there may be any doubt on the results, measurements shall be made within the following limits.							
		Ambient temperature:		20°C ± 5°C					
		Relative humidity:		60 to 70%					
		Operating temperature range							
		Lowest operating temperature:		-40°C					
		Maximum operating temperature:		+125°C (case-temperature) with specified voltage-derating					
		The capacitor can be operated up to 125°C case-temperature (according to the power to be dissipated). Derating ratio of rated voltage +85°C to +125°C: 1.25% per °C for V_{RDC} Derating ratio of rated voltage +75°C to +125°C: 1.35% per °C for V_{RAC} The temperature is measured at the hottest point of the case when the capacitor has reached its thermal equilibrium.							
		Rated temperature range		-40°C to +85°C					
Rated temperature range is the range of ambient temperature for which the capacitor can be operated continuously at rated voltage.									
5	Electrical Characteristics	Rated voltage V_R at 85°C:		400V _{DC}	630V _{DC}	1000V _{DC}	1600V _{DC}	2000V _{DC}	
				250V _{AC}	400V _{AC}	600V _{AC}	650V _{AC}	700V _{AC}	
		Category voltage:		Up to 85°C $V_C = V_{RDC}$					
		Category voltage:		Up to 75°C $V_C = V_{RAC}$					
		Rated upper limit temperature:		+85°C					
		Usable upper limit temperature:		+125°C					
		Capacitance range:		0.001μF to 1.5μF					
Capacitance tolerance:		±5% (J), ±10% (K)				Measured at 1kHz, 1V			

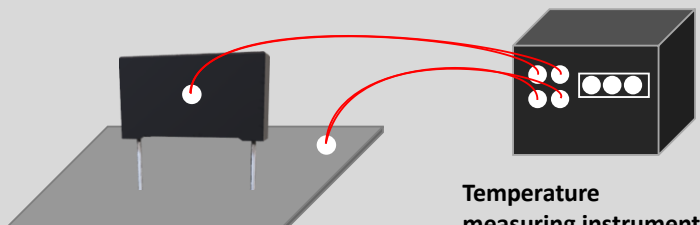
TECHNICAL SPECIFICATION

No.	Category	Specification				
5	Electrical Characteristics	Dissipation factor tanδ (%): LCR meter: HP-4284A, at 20°C ± 5°C				
		f (kHz)	C ≤ 0.1μF	0.1μF < C ≤ 1μF	1μF < C	
		1	≤ 0.06%	≤ 0.06%	≤ 0.07%	
		10	≤ 0.07%	≤ 0.09%	≤ 0.50%	
		100	≤ 0.15%	≤ 0.25%	≤ 1.00%	
		Insulation resistance between terminals				
		Test conditions:				
		Temperature:	25°C ± 5°C			
		Voltage charge:	100V _{DC}			
		Performance:	C ≤ 0.1μF	C > 0.1μF		
			After voltage charge 1 min. ≥ 50GΩ	After voltage charge 1 min. > 10GΩ × μF		
		Test voltage between terminals				
		1.6 × V _{RDC} applied for 2 sec, at 25°C ±5°C				
		Cut off current:	10mA			
		Ramp/rise time:	C ≤ 10μF: 5 sec	C > 10μF: 10 sec		
		Performance:	There shall be no dielectric breakdown or other damage			
		Test Item	The test capacitor shall be kept in the testing oven and kept at condition of following table, and it shall be repeated for 5 cycles successively. After the test, the capacitor shall be let alone at the ordinary condition for 2 hours			
			Conditions			Performance
		Rapid change of temperature (IEC68-2-14 Na)	Step	Temperature	Time	Capacitance change ΔC/C ≤ ± 5% tan δ change ≤ 0.1% at 1kHz R insulation ≥ 50 % of limit value
			1	-40 ± 3°C	30 ± 3 min	
2	Ordinary		3 min or less			
3	+125 ± 2°C		30 ± 3 min			
	4	Ordinary	3 min or less			

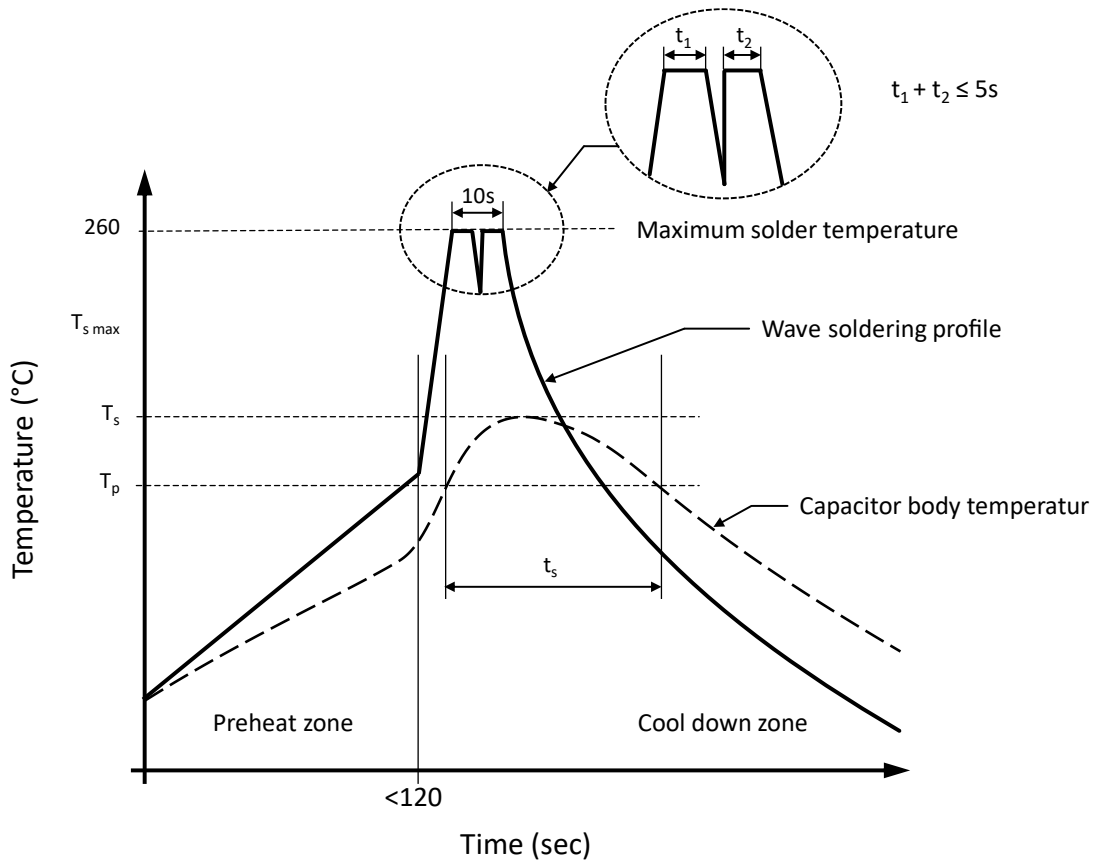
TECHNICAL SPECIFICATION

No.	Category	Specification		
		Test Item	Conditions	Performance
6	Mechanical Characteristics	Robustness of terminations (IEC68-2-21)	Tensile Ua1	There shall be no such mechanical damage as terminal damage etc.
			A load of 10 N (1.0kg) shall be gradually applied to the terminal in the axial direction and held thus for 10 sec	
			Bending Ub methode 1	
			While a load of 500g applied to the lead wire, the body of the capacitor shall be bent 90° and returned to the original position. This operation shall be conducted in a few seconds. Then the body shall be bent 90° at the same speed in the opposite direction and returned to the original position	
7	Endurance Characteristics	Solderability (IEC68-2-20 Ta)	Solder bath: 245°C ± 5°C Immersion time: 2.5±0.5sec Visual examination	At least 95% of the circumferential face of lead wire up to immersed level shall be covered with new solder
		Resistance to soldering heat (IEC 68-2-20 Tb)	Solder bath: 260 °C ± 5 °C Immersion time: 10±1sec Thickness of heat shunt (Printed wiring board): 1.6mm Capacitance at 1kHz tan δ at 1kHz	Capacitance change $ \Delta C/C \leq \pm 1\%$ tan δ change $\leq 0.1\%$ at 1kHz
		Vibration proof (IEC68-2-6 Fc)	The frequency shall be varied form from 10Hz to 55Hz at 1.5mm amplitude and back to 10Hz in approximately 1-minute intervals. This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular directions. During the last 30 min of vibration in each direction, checks shall be made for open or short-circuit and interruption	Bending strength: There shall be no open or short-circuiting and the connections must be stabilized. Appearance: There shall be no such mechanical damage as terminal damage etc.
		Damp heat steady state (IEC68-2-3 Ca)	The capacitor shall be stored at a temperature of 40 ± 2°C and relative humidity of 90% to 95% for 1000 hours. And then the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made	Capacitance change $ \Delta C/C \leq \pm 3\%$ tan δ change $\leq 0.1\%$ at 1kHz R insulation $\geq 50\%$ of limit value

TECHNICAL SPECIFICATION

No.	Category	Specification		
7	Endurance Characteristics	Test Item	Conditions	Performance
		Electrical endurance (IEC 60384-17)	125% of category voltage shall be applied to the capacitor at a temperature of 125 ± 2°C for 1000 hours. Then the capacitor shall be subjected to standard atmospheric conditions for 1 to 2 hours, after which measurement shall be made. The load resistor in series with the capacitor shall be 20Ω to 1kΩ.	Capacitance change ΔC/C ≤ ± 10% tan δ change ≤ 0.4% at 1kHz R insulation ≥ 50 % of limit value
		Method of measuring inherent temperature rise ΔT	Inherent temperature of capacitor shall be measured by keeping away from heat influence of surrounding components after attaching thermocouple to the capacitor as show below. (They shall be measured in normal temperature). Measurement shall be down by soldering capacitor on the opposite side of the printed circuit board etc. in case of being influenced by heat of surrounding components. Besides, they shall be measured in calm condition by putting capacitor into box etc. in case of being influence by convection or wind.	Less than +10°C
		 Temperature measuring instrument		
8	Storage conditions	It should be noted that the solderability of the terminals may be deteriorated when stored barely in an atmosphere for a long period.		
		It should not be located in particularly high temperature and high humidity, it must submit to the following conditions (Keeping in the original package) Temperature: 5°C to 35°C Relative humidity: ≤ 70% Storage period: ≤ 12 months (Following the manufacturing date marked on the label in package bag)		
		Avoid wetting the capacitor by water, oil, salt and/or poisonous gas.		
		If used the capacitor that overdue the storage time, it should be test, the characteristics of the capacitor or contact with our technical engineer.		

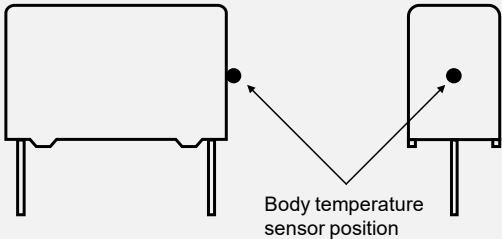
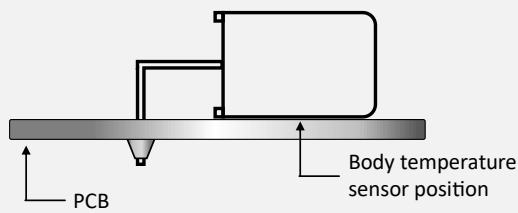
RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE



Capacitor body temperature should follow the description below:

Profile Features		Polypropylene Film Capacitor	Polyester Film Capacitor
Capacitor body maximum temperature at preheating	T_p	$\leq 110^\circ\text{C} / 120 \text{ seconds}$	$\leq 125^\circ\text{C} / 120 \text{ seconds}$
Capacitor body maximum temperature at wave soldering	T_s	$\leq 120^\circ\text{C} / t_s \leq 45 \text{ seconds}$	$\leq 150^\circ\text{C} / t_s \leq 45 \text{ seconds}$

DETERMINING THE CAPACITOR BODY TEMPERATURE

Vertical Mounting	Horizontal Mounting
 Body temperature sensor position	 PCB Body temperature sensor position
The body temperature sensor position is defined as the highest temperature point around the capacitor body.	If there is 90 degree bending product, the sensor position shall be between product and PCB

SOLDERING SUGGESTIONS

When solder a capacitor, heat in soldering is conducted to the element of the capacitor from wire lead and an enclosure, and hence it should be noted that soldering under high temperature and a long period may cause deterioration of breakdown of capacitors. Be sure to solder within the recommended temperature condition range.

HAND SOLDERING

- a.) Soldering iron top temperature: $\leq 350^{\circ}\text{C}$
- b.) Soldering time: $\leq 3\text{sec}$

If re-work or dipping twice is necessary, it should be done after the capacitor returned to the normal temperature. Suggestion time is 24 hours.

THT film capacitors are not suitable for reflow soldering.

When SMD components are used together with film capacitor, the film capacitor should not pass into the SMD adhesive curing oven. The film capacitor should be assembled after the SMD process.

In order to ensure proper conditions for manual or selective soldering, the body (surface) temperature of the film capacitor (T_s) must be $\leq 120^{\circ}\text{C}$.

REVISION TABLE

Revision	Date	Status	Notes
001	01/10/2021	Initial release	Initial publication

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