CHIEFCON ELECTRONIC

ACROSS-THE-LINE AND INTERFERENCE SUPPRESSION CAPACITOR CLASS X1 AND X2 --- CKX

CKX type is self-healing flat style capacitor, which is wound with Metallized Polypropylene film dielectric and encapsulated in a flame retardant plastic (UL94V-0) case and epoxy resin end seal. They provide interference suppression in accordance to international safety standards. They are ideal for applications in across the line antenna coupling, spark killer circuit, EMI filters and switching power supplies.

FEATURES

- The highest possible safety regarding active and passive flammability.
- Self-extinguishing UL 94V-0 encapsulation material.
- High dU/dt capability.
- Excellent self-healing properties.
- Ensures long life even when subject to frequent overvoltages.
- Good resistance to ionization due to impregnated dielectric.
- Small dimensions.
- Safety approvals for worldwide use.
- The capacitors meet the most stringent IEC humidity class, 56 days.
- The impregnated paper ensures excellent stability giving outstanding reliability properties, especially in applications having continuous operation.

REFERENCE STANDARDS

UL 1414 , UL1283 , CSA C22.2 No.1-94

USED FOR ACROSS-THE-LINE CAPACITORS, ANTENNA-COUPLING AND LINE-BY-PASS COMPONENTS.

- VDE VDE 0565 Teil 1/12.79
- SEMKO IEC 60384-14 Second Edition (1993) including AM.1 (1995)
  [Safety tests] / EN 132400 (1994) [Safety tests]
- DEMKO IEC 60384-14 Second Edition (1993) including AM.1 (1995)
  [Safety tests] / EN 132400 (1994) [Safety tests]
- NEMKO IEC 60384-14 Second Edition (1993) including AM.1 (1995)
  [Safety tests] / EN 132400 (1994) [Safety tests]
- FIMKO IEC 60384-14 Second Edition (1993) including AM.1 (1995)
  [Safety tests] / EN 132400 (1994) [Safety tests]
- SEV IEC 60384-14 (ed.2) : 93+A1:95
  [Safety tests] / EN 132400 (1994) [Safety tests]

USED FOR RADIO INTERFERENCE / EMI SUPPRESSION CAPACITORS.

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SPECIFICATION

1. **RATED VOLTAGE** 300 VAC / UL 250 VAC, 50 ~ 60 Hz

2. **CAPACITANCE RANGE** 0.0047 uF ~ 6.8 uF

3. **CAPACITANCE TOLERANCE** J (±5%), K (±10%), M (±20%)

4. **DIELECTRIC** METALLIZED POLYPROPYLENE FILM

5. **DISSIPATION FACTOR TAN δ** LESS THAN 0.1% AT 1K Hz / 20 ℃

6. **INSULATION RESISTANCE** BETWEEN TERMINALS

   (1) LESS THAN OR EQUAL TO 0.33 uF $\geq 3 \times 10^4$ MΩ

   (2) GREATER THAN 0.33 uF $\geq 1 \times 10^4$ MΩ • uF

   MEASURED AT 250 ± 15 VDC, 60 SEC / 20 ℃

7. **WITHSTAND VOLTAGE**

   APPLIED 1,200 VAC, 60 Hz. OR 2,200 VDC FOR 1~2 SEC.

8. **CLIMATIC CATEGORY** IN ACCORDANCE WITH DIN 40040 GMF

   G (MINIMUM LIMIT TEMPERATURE) = - 40 ℃

   M (MAXIMUM LIMIT TEMPERATURE) = +100 ℃

   F (HUMIDITY CATEGORY) = AVERAGE RELATIVE HUMIDITY ≤ 75%

   95% FOR 30 DAYS PER YEAR CONTINUOSLY

   85% FOR THE REMAINING DAYS OCCASIONALLY

9. **DRY HEAT RESISTANCE**

   IN ACCORDANCE WITH DIN 40046 SHEET 1 OR IEC 68-2-2 TEST BA. CONDITIONS

   TEST TEMPERATURE : 100 ± 2 ℃

   TEST DURATION : 16 HOURS

   TEST CRITERIA :

   (1) APPEARANCE : NO VISIBLE DAMAGE AND NO LEAKAGE

   (2) WITHSTAND VOLTAGE : 0.66 x RATED WITHSTAND VOLTAGE 60 SEC.

   (3) CAPACITANCE CHANGE : ≤ ±5% OF THE INITIAL VALUE

   (4) INSULATION RESISTANCE : ≥ 50% OF INITIAL SPECIFIED VALUE

10. **COLD RESISTANCE**

    IN ACCORDANCE WITH DIN 40046 SHEET 1 OR IEC 68-2-1 TEST BA. CONDITIONS

    TEST TEMPERATURE : -40 ± 2 ℃

    TEST DURATION : 2 HOURS

    TEST CRITERIA :

    (1) APPEARANCE : NO VISIBLE DAMAGE

    (2) WITHSTAND VOLTAGE : 0.66 x RATED WITHSTAND VOLTAGE 60 SEC.

    (3) CAPACITANCE CHANGE : ≤ ±5% OF THE INITIAL VALUE

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11. **HUMIDITY TEST CONDITIONS**

TEST TEMPERATURE : 40 ℃ ± 2 ℃

RELATIVE HUMIDITY : 90 - 95%

TEST DURATION : 500 HOURS

TEST CRITERIA :

(1) WITHSTAND VOLTAGE : 0.66 x RATED WITHSTAND VOLTAGE 60 SEC.

(2) CAPACITANCE DRIFT : ≤ ±5% OF THE INITIAL VALUE

(3) DISSIPATION FACTOR : ≤ 200% OF INITIAL SPECIFIED VALUE

(4) INSULATION RESISTANCE : ≥ 50% OF INITIAL SPECIFIED VALUE

12. **LIFE TEST CONDITIONS**

TEST TEMPERATURE : 100 ℃ ± 3 ℃

TEST VOLTAGE : 440 VAC AND 1,000 VAC/60 HZ FOR A PERIOD OF 0.1 SEC.
ONCE EACH HOUR

TEST DURATION : 1,008 HOURS

TEST CRITERIA :

(1) APPEARANCE : NO VISIBLE DAMAGE AND NO LEAKAGE

(2) WITHSTAND VOLTAGE : 0.66 x RATED WITHSTAND VOLTAGE 60 SEC.

(3) CAPACITANCE DRIFT : ≤ ±3% OF THE INITIAL VALUE

(4) DISSIPATION FACTOR : ≤ 0.6 x 10 (0.06%) OF INCREASED VALUE

(5) INSULATION RESISTANCE : ≥ 50% OF SPECIFIED VALUE

13. **VIBRATION RESISTANCE**

IN ACCORDANCE WITH DIN 40046 SHEET 8 OR IEC 68-2-6 TEST FC CONDITIONS

FREQUENCE RANGE : 10 - 55 Hz

DISPLACEMENT AMPLITUDE : 0.75 mm

CONFORMING TO MAX. : 10 g

TEST DURATION : 6 HOURS

TEST CRITERIA :

(1) APPEARANCE : NO VISIBLE DAMAGE

(2) CAPACITANCE CHANGE : ≤ ±2% OF THE INITIAL VALUE

14. **SOLDERING HEAT RESISTANCE**

IN ACCORDANCE WITH DIN 40046 SHEET 18 OR IEC 68-2-20 TEST TA.1 & TB.1 CONDITIONS

SOLDER BATH TEMPERATURE : 260 ± 5 ℃

SOLDER TIME : 5 ± 1 SEC.

CAPACITANCE BODY MAY LIE ON PRINTING CIRCUIT BOARD

TEST CRITERIA :

(1) APPEARANCE : NO DAMAGE AND GOOD TINNING

(2) CAPACITANCE CHANGE : ≤ ±3% OF THE INITIAL VALUE

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15. **SOLERABILITY CONDITIONS**

SOLDER MATERIAL : SAC (Sn 96.5% + Ag 3.0% + Cu 0.5%)

SOLDER BATH TEMPERATURE : 260 ± 5 ℃

SOLDER TIME : 2 ± 0.5 SEC.

TEST CRITERIA : 75% OF THE SURFACE TINNING

16. **TENSILE STRENGTH OF TERMINALS**

IN ACCORDANCE WITH DIN 40046 SHEET 19 OR IEC 68-2-21 TEST UA.1 CONDITIONS

TERMINAL DIA. (mm)	LOAD FORCE KG (N)	HOLDING TIMES SEC.
≤ 0.5	0.5 (5)	10
＞0.5 TO ≤ 0.8	1.0 (10)	10
＞0.8	2.0 (20)	20

TEST CRITERIA :

NO WIRE BREAKAGE AND NO DAMAGE OF CAPACITOR

17. **BENDING OF TERMINALS**

IN ACCORDANCE WITH DIN 40046 SHEET 19 OR IEC 68-2-21 TEST UB. CONDITIONS

LOAD FORCE : 0.5 KG (5N)

BENDING TIME : TWO CONSECUTIVE BENDS (4 x 90 ℃)

TEST CRITERIA :

NO WIRE BREAKAGE AND DAMAGE OF CAPACITOR

18. **APPROVED BY**

UL1414	USA	FILE NO. E209251
UL1283	USA	FILE NO. E210801
CSA	CANADA	FILE NO. E210801 FOXY8
FIMKO	FINLAND	FILE NO. 15571
SEMKO	SWEDEN	FILE NO. 0022009 / 01-02 (SE-16128)
DEMKO	DENMARK	FILE NO. 309980
NEMKO	NORWAY	FILE NO. P00101552
VDE	GERMANY	FILE NO.131782 (China) / 131842 (Taiwan)
SEV	SWISS	FILE NO. 03-BS-0043
CQC	CHINA	FILE NO. 04001010481

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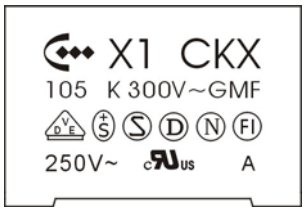
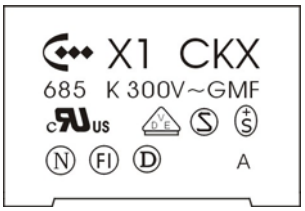
19. **MARKING**

CAPACITORS ARE MARKED WITH TYPE IDENTIFICATION CAPACITANCE, CAPACITANCE TOLERANCE, RATED VOLTAGE, TEMPERATURE RANGE, NAME OF MANUFACTURE, DATE CODE OF MANUFACTURE AND APPROVED CERTIFICATION MARKS.

MARKING EXAMPLE :

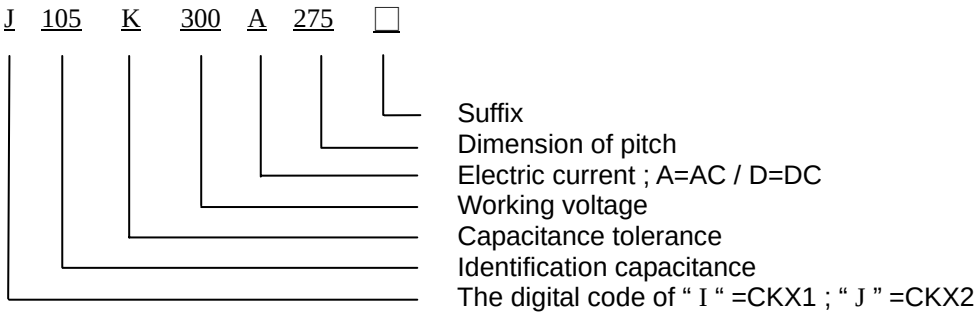


0.0047 ～ 1.0uF



1.2 ～ 6.8 uF

20. **DESIGNATION (Order Code)**



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21. **DIMENSIONS OF X1 and X2 (Max. in mm)**

Capacitance	Identification	Rated-Voltage	Max. Dimensions in mm				
μF	Capacitance	VAC	W	H	T	P	d
0.0047	472	300	13	11	5	10	0.6
0.0047	472	300	18	11	5	15	0.8
0.0056	562	300	13	11	5	10	0.6
0.0056	562	300	18	11	5	15	0.8
0.0068	682	300	13	11	5	10	0.6
0.0068	682	300	18	11	5	15	0.8
0.0082	822	300	13	11	5	10	0.6
0.0082	822	300	18	11	5	15	0.8
0.01	103	300	13	11	5	10	0.6
0.01	103	300	18	11	5	15	0.8
0.012	123	300	13	11	5	10	0.6
0.012	123	300	18	11	5	15	0.8
0.015	153	300	13	11	5	10	0.6
0.015	153	300	18	11	5	15	0.8
0.018	183	300	13	11	5	10	0.6
0.018	183	300	18	11	5	15	0.8
0.022	223	300	13	11	5	10	0.6
0.022	223	300	18	11	5	15	0.8
0.027	273	300	13	11	5	10	0.6
0.027	273	300	18	11	5	15	0.8
0.033	333	300	13	11	5	10	0.6
0.033	333	300	18	11	5	15	0.8
0.047	473	300	13	12	6	10	0.6
0.047	473	300	18	11	5	15	0.8
0.056	563	300	13	12	6	10	0.6
0.056	563	300	18	11	5	15	0.8
0.068	683	300	13	12	6	10	0.6
0.068	683	300	17	11	5.5	15	0.8
0.082	823	300	13	12	6	10	0.6
0.082	823	300	17	11	5.5	15	0.8
0.1	104	300	13	14	8	10	0.6
0.1 (±20%)	104	300	13	12	6	10	0.6
0.1	104	300	17	11	5.5	15	0.8
0.1	104	300	25	14.5	6	22.5	0.8
0.12	124	300	18	12	6	15	0.8
0.15	154	300	18	13.5	6	15	0.8
0.15	154	300	25	14.5	6	22.5	0.8
0.22	224	300	17	15.5	7.5	15	0.8
0.22	224	300	25	14.5	6	22.5	0.8
0.27	274	300	26.5	16.5	7	22.5	0.8
0.33	334	300	17	16.5	9.5	15	0.8
0.33	334	300	26.5	16.5	7	22.5	0.8
0.33	334	300	31.5	16.5	7.5	27.5	0.8
0.39	394	300	26.5	17	8.5	22.5	0.8
0.47	474	300	17	19	11	15	0.8
0.47	474	300	26.5	17	8.5	22.5	0.8

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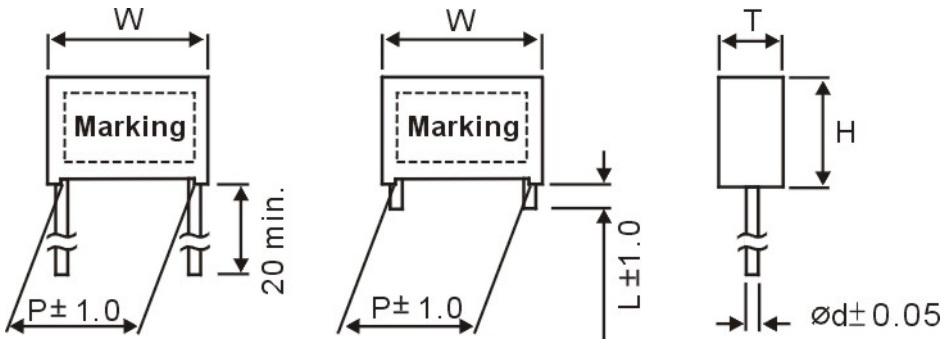
※ 0.56	564	300	26.5	17	8.5	22.5	0.8
0.56	564	300	25.0	19	8.5	22.5	0.8
0.56	564	300	31.5	20	11	27.5	0.8
0.6	604	300	31.5	20	11	27.5	0.8
※ 0.68	684	300	17	19	11	15	0.8
0.68 (±20%)	684	300	17	21	12	15	0.8
0.68	684	300	26.5	19	10	22.5	0.8
0.68	684	300	31.5	20	11	27.5	0.8
0.82	824	300	25	23.5	14	22.5	0.8
0.82	824	300	26.5	19	10	22.5	0.8
0.82	824	300	31.5	20	11	27.5	0.8
1.0	105	300	25	23.5	14	22.5	0.8
※ 1.0	105	300	26.5	19	10	22.5	0.8
1.0	105	300	30	21	11.5	27.5	0.8
1.0	105	300	36	22	12	32.5	0.8
1.0	105	300	37	24	13.5	32.5	0.8
1.2	125	300	31.5	22.5	13	27.5	0.8
1.2	125	300	37	24	13.5	32.5	0.8
1.5	155	300	31.5	22.5	13	27.5	0.8
1.5	155	300	37	24	13.5	32.5	0.8
1.8	185	300	31.5	25	14	27.5	0.8
1.8	185	300	37	26.5	16	32.5	0.8
※ 2.2	225	300	31.5	25	14	27.5	0.8
2.2	225	300	31	31	22	27.5	0.8
2.2	225	300	37	26.5	16	32.5	0.8
2.7	275	300	31	31	22	27.5	0.8
2.7	275	300	37	28.5	18	32.5	0.8
※ 3.3	335	300	31	31	22	27.5	0.8
3.3	335	300	37	34	22	32.5	0.8
3.3	335	300	51	27.5	17.5	47.5	1.0
3.9	395	300	51	27.5	17.5	47.5	1.0
※ 4.7	475	300	37	34	22	32.5	1.0
4.7	475	300	51	30.5	20	47.5	1.0
6.8	685	300	51	34	22	47.5	1.0



※ X2 Only.

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Environmental Test Data

Test	Publication	Procedure	Requirements
Impulse Voltage	IEC 384-14 EN 132400	According to fig.1 Before Endurance	No permanent Breakdown or flashover
Endurance	IEC 384-14 EN 132400	According to fig.2 With U_2=1000VAC X : U_1=1.25 U_R VAC	Voltage proof C. DF and Insulation
Vibration	IEC 68-2-6 Test Fc	3 directions at 2 hours each 10-500 Hz at 0.75mm or 98 m/s2	NO visible damage No open or short circuit
Bump	IEC 68-2-29 Test Eb	4000 bumps at 390 m/s2	No visible damage No open or short circuit
Change of temperature	IEC 68-2-14 Test Na	Upper and lower Rated temperature 5 cycles	No visible damage
Solderability	IEC 68-2-20 Test Ta	Solder globule method	Wetting time for d0.08 1s for d 0.8 1.5s
Passive flammability	IEC 384-14 EN 132400	Flame exposure time depending on severity	3.10 or 30 s burning time depending on flammability class
Active Flammability	EN 132400 (FIG 3.)	Surge pulses+UR AC	No flame
Humidity	IEC 68-2-3 Test Ca	+40 and 90-95% R.H.	21 or 56 days

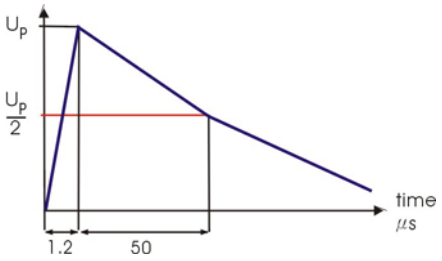
Difference between testing for X2 and X1

TEST/CLAUSE IEC60384-14,EN132 400	CKX X2 / 300V	CKX X1 / 300V
4.2.1 / Voltage Proof. Test A	1182 VDC	1290 VDC
4.2.1 / Voltage Proof. Test C	2050 VAC	2200 VAC
4.12 / Damp Heat. Steady State For Polypropylene Film Cap.	VAC=275V	VAC=300V
4.13 / Impulse Vottage (CR1uF)	(2.5/$\sqrt{C_R}$)KV	(4 /$\sqrt{C_R}$)KV
4.13 / Impulse Vottage (CR1uF)	2.5KV	4.0KV
4.14 / 3 Endurance Test	VAC=343.7V	VAC=375V
4.18 / Active Flammability	VAC=275±5%	VAC=300±5%
UL 1414 Rated Voltage	125V or 250V	250V

Impulse Voltage Test (fig.1)
According to IEC 384-14 and EN 132400

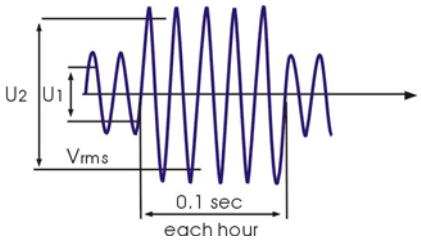
Capacitor class	Up KV
X1	4
X2	2.5
Y1	8
Y2	5

Fig 1.



Endurance Test (fig.2)
According to IEC 384-14 and EN 132400

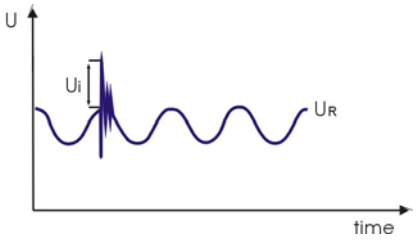
Fig 2.



Active Flammability (fig.3)
According to IEC 384-14 and EN 132400
U_R VAC is connected to the capacitor. With an Interval of 5s, 20 pulses (Ui) are placed on the capacitor. The capacitor must burn.

Capacitor class	Ui KV
X1	4
X2, Y3	2.5
Y2	8

Fig 3.



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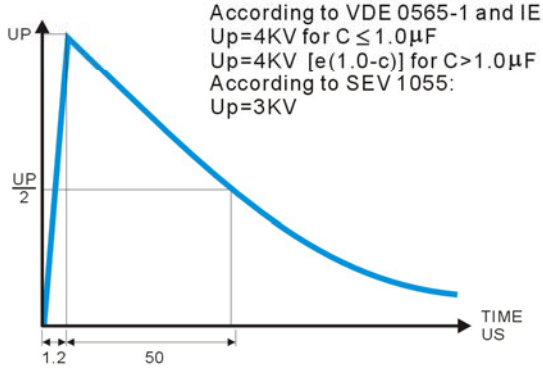
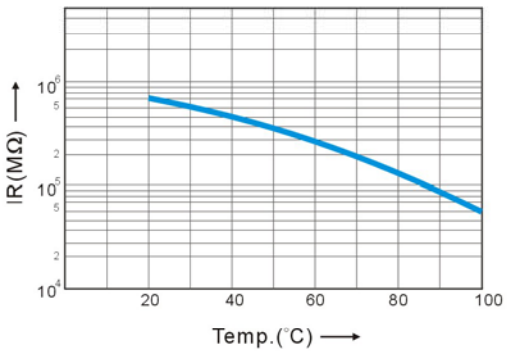
TEMPERATURE AND FREQUENCY CHARACTERISTICS (For CKX Type Only)

SURGE VOLTAGE TEST

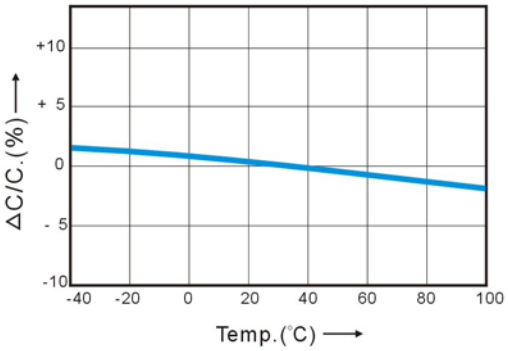
According to VDE 0565-1 and IEC 384-14
Up=4KV for C ≤ 1.0μF
Up=4KV [e(1.0-c)] for C>1.0μF
According to SEV 1055:
Up=3KV



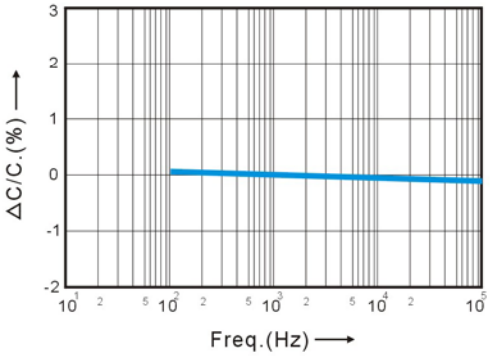
Insulation Resistance vs. Temperature



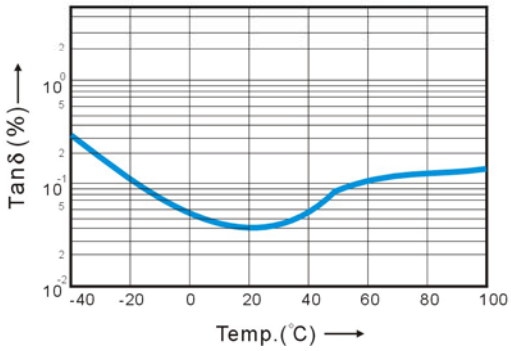
Capacitance Change vs. Temperature



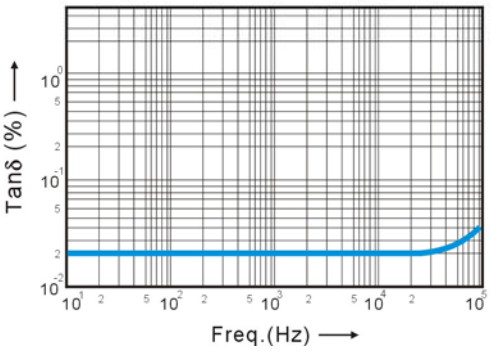
Capacitance Change vs. Frequency



Dissipation Factor vs. Temperature at 10 Khz



Dissipation Factor vs. Frequency



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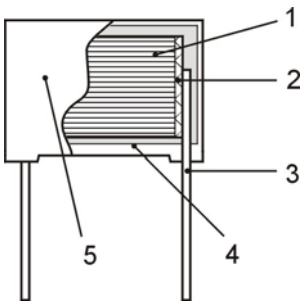
ENVIRONMENTAL POLICY

- Adhering to high standards of environmental quality
- Providing a workplace that protects the health and safety of our employees and the communities surrounding our facilities.
- Supplying products with minimal environmental stress and minimal health risk for the user.

CONSTRUCTION AND MATERIALS



	Components	Materials, Finish / Specifications
1	Element	Metallized Polypropylene Film
2	Metal Spray	Special Solder (Zinc, Tin)
3	Lead Wire	Either Copperply wire or Copper Wire, Solder Plating
4	Potting Compound	Epoxy Resin (UL 94V-0 Standard)
5	Outer Case	Flame Plastic Box (UL 94V-0 Standard)
5.1	Marking	UV Printing Ink

PERNICIOUS MATERIALS TEST REPORT

Agent	Style/Item No.	Report No.	Date
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