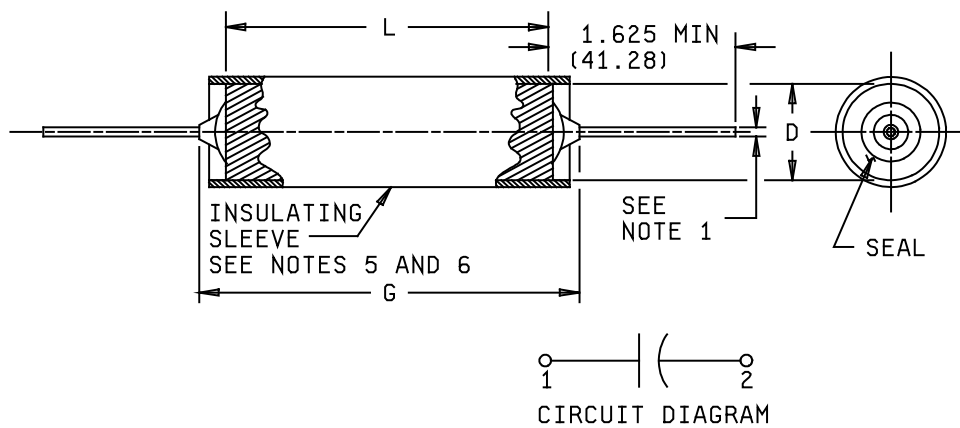


PERFORMANCE SPECIFICATION SHEET

CAPACITOR, FIXED, METALLIZED PLASTIC FILM DIELECTRIC,
(DC, AC, OR DC AND AC), HERMETICALLY SEALED IN METAL CASES,
ESTABLISHED RELIABILITY,
STYLES CRH11, CRH12, AND CRH13 (INSULATED)

This specification sheet is approved for use by all Departments
and Agencies of the Department of Defense.

The requirements for acquiring the product described herein
shall consist of this specification sheet and [MIL-PRF-83421](#).



NOTES:

1. Number 18 AWG wire .040 inch $\pm$.002 inch (1.02 mm $\pm$ 0.05 mm).
2. Dimensions are in inches.
3. Metric equivalents are in parentheses and are given for general information only.
4. See [table I](#) for additional dimensions.
5. Insulating sleeve shall extend beyond the capacitor body. Insulating sleeve thickness shall not exceed .005 inch (0.13 mm).
6. Plastic insulating sleeve shall be transparent; marking shall be applied to the capacitor case.

FIGURE 1. Capacitor configuration.



TABLE I. Electrical characteristics, dimensions, and dash numbers.

Capacitance value (nom) (in μf)	Dimensions <u>1/</u> (in inches with mm in parentheses)			Dash numbers <u>2/</u>						ESR 20 kHz 100 kHz (ohms maximum)	AC rating maximum 400 Hz (volts rms)	Ripple current 20 kHz to 100 kHz (amperes rms) maximum case temperature °C <u>3/</u>		
	L +.030 (0.76) -.090 (2.29)	D +.020 (0.51) -.010 (0.25)	G, max											
				Capacitance tolerance value (in %)										
				±0.25	±0.5	±1.0	±2.0	±5.0	±10.0			+25	+85	+105
CRH11 - 100 volts (dc rating)														
0.47	.875 (22.23)	.400 (10.16)	1.075 (27.31)	1001-	1002-	1003-	1004-	1005-	1006-	0.025	60	5.3	2.6	0.8
0.56	.875 (22.23)	.500 (12.70)	1.075 (27.31)	1007-	1008-	1009-	1010-	1011-	1012-	0.024	60	6.0	3.0	1.0
0.68	.875 (22.23)	.500 (12.70)	1.075 (27.31)	1013-	1014-	1015-	1016-	1017-	1018-	0.023	60	6.2	3.1	1.0
0.82	.875 (22.23)	.500 (12.70)	1.075 (27.31)	1019-	1020-	1021-	1022-	1023-	1024-	0.022	60	6.3	3.2	1.0
1.0	.906 (23.01)	.562 (14.27)	1.106 (28.09)	1025-	1026-	1027-	1028-	1029-	1030-	0.017	60	7.7	3.9	1.2
2.0	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	1031-	1032-	1033-	1034-	1035-	1036-	0.014	60	10.3	5.2	1.6
3.0	1.094 (27.80)	.750 (19.05)	1.294 (32.87)	1037-	1038-	1039-	1040-	1041-	1042-	0.013	60	11.4	5.7	1.8
5.0	1.406 (35.70)	.750 (19.05)	1.606 (40.79)	1043-	1044-	1045-	1046-	1047-	1048-	0.012	60	13.6	6.8	2.1
10.0	1.687 (42.85)	1.000 (25.40)	1.887 (47.93)	1049-	1050-	1051-	1052-	1053-	1054-	0.010	60	15.0	9.1	2.9
20.0	2.437 (61.90)	1.000 (25.40)	2.637 (66.98)	1055-	1056-	1057-	1058-	1059-	1060-	0.009	60	15.0	11.5	3.6
25.0	2.437 (61.90)	1.000 (25.40)	2.637 (66.98)	1061-	1062-	1063-	1064-	1065-	1066-	0.008	60	15.0	11.7	3.7
CRH12 - 200 volts (dc rating)														
0.18	.875 (22.23)	.400 (10.16)	1.075 (27.31)	2001-	2002-	2003-	2004-	2005-	2006-	0.031	120	4.8	2.4	0.8
0.22	.875 (22.23)	.500 (4.32)	1.075 (27.31)	2007-	2008-	2009-	2010-	2011-	2012-	0.030	120	5.4	2.7	0.9
0.27	.875 (22.23)	.500 (4.32)	1.075 (27.31)	2013-	2014-	2015-	2016-	2017-	2018-	0.029	120	5.5	2.8	0.9
0.33	.875 (22.23)	.500 (4.32)	1.075 (27.31)	2019-	2020-	2021-	2022-	2023-	2024-	0.028	120	5.6	2.8	0.9
0.39	.906 (23.01)	.562 (14.27)	1.106 (28.09)	2025-	2026-	2027-	2028-	2029-	2030-	0.026	120	6.2	3.1	1.0
0.47	1.094 (27.80)	.562 (14.27)	1.294 (32.87)	2031-	2032-	2033-	2034-	2035-	2036-	0.025	120	7.0	3.5	1.1
0.56	1.094 (27.80)	.562 (14.27)	1.294 (32.87)	2037-	2038-	2039-	2040-	2041-	2042-	0.024	120	7.2	3.6	1.1
0.68	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	2043-	2044-	2045-	2046-	2047-	2048-	0.023	120	8.0	4.0	1.3
0.82	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	2049-	2050-	2051-	2052-	2053-	2054-	0.022	120	8.2	4.1	1.3
1.0	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	2055-	2056-	2057-	2058-	2059-	2060-	0.021	120	8.4	4.2	1.3
2.0	1.406 (35.70)	.750 (19.05)	1.606 (40.79)	2061-	2062-	2063-	2064-	2065-	2066-	0.017	120	11.1	5.5	1.8
3.0	1.437 (36.50)	1.000 (25.40)	1.637 (41.58)	2067-	2068-	2069-	2070-	2071-	2072-	0.015	120	13.9	7.0	2.2
5.0	1.687 (42.85)	1.000 (25.40)	1.887 (47.93)	2073-	2074-	2075-	2076-	2077-	2078-	0.013	120	15.0	8.2	2.6
CRH13 - 400 volts (dc rating) <u>4/</u>														
0.001	.562 (14.27)	.235 (5.97)	.762 (19.35)	3103	3104	3105	3106	3107	3108	1.00	240	0.49	0.25	0.08
0.0012	.562 (14.27)	.235 (5.97)	.762 (19.35)	3109	3110	3111	3112	3113	3114	0.95	240	0.50	0.25	0.08
0.0015	.562 (14.27)	.235 (5.97)	.762 (19.35)	3115	3116	3117	3118	3119	3120	0.90	240	0.52	0.26	0.08
0.0018	.562 (14.27)	.235 (5.97)	.762 (19.35)	3121	3122	3123	3124	3125	3126	0.85	240	0.53	0.27	0.08
0.002	.562 (14.27)	.235 (5.97)	.762 (19.35)	3127	3128	3129	3130	3131	3132	0.75	240	0.57	0.28	0.09
0.0022	.562 (14.27)	.235 (5.97)	.762 (19.35)	3133	3134	3135	3136	3137	3138	0.70	240	0.59	0.29	0.09
0.0027	.562 (14.27)	.235 (5.97)	.762 (19.35)	3139	3140	3141	3142	3143	3144	0.65	240	0.61	0.30	0.10
0.0033	.562 (14.27)	.235 (5.97)	.762 (19.35)	3145	3146	3147	3148	3149	3150	0.60	240	0.63	0.32	0.10
0.0039	.562 (14.27)	.235 (5.97)	.762 (19.35)	3151	3152	3153	3154	3155	3156	0.55	240	0.66	0.33	0.10
0.0047	.562 (14.27)	.235 (5.97)	.762 (19.35)	3157	3158	3159	3160	3161	3162	0.50	240	0.69	0.35	0.11

See footnotes at end of table.

TABLE I. Electrical characteristics, dimensions, and dash numbers - Continued.

Capacitance value (nom) (in μf)	Dimensions <u>1/</u> (in inches with mm in parentheses)			Dash numbers <u>2/</u>						ESR 20 kHz 100 kHz (ohms maximum)	AC rating maximum 400 Hz (volts rms)	Ripple current 20 kHz to 100 kHz (amperes rms) maximum case temperature °C <u>3/</u>		
	L +.030 (0.76) -.090 (2.29)	D +.020 (0.51) -.010 (0.25)	G, max											
				Capacitance tolerance value (in %)										
				±0.25	±0.5	±1.0	±2.0	±5.0	±10.0			+25	+85	+105
CRH13 - 400 volts (dc rating) <u>4/</u>														
0.0056	.687 (17.45)	.235 (5.97)	.887 (22.53)	3163	3164	3165	3166	3167	3168	0.45	240	0.80	0.40	0.13
0.0068	.687 (17.45)	.235 (5.97)	.887 (22.53)	3169	3170	3171	3172	3173	3174	0.35	240	0.90	0.45	0.14
0.0082	.687 (17.45)	.235 (5.97)	.887 (22.53)	3175	3176	3177	3178	3179	3180	0.30	240	0.97	0.49	0.15
0.01	.687 (17.45)	.235 (5.97)	.887 (22.53)	3181	3182	3183	3184	3185	3186	0.26	240	1.05	0.52	0.17
0.012	.687 (17.45)	.235 (5.97)	.887 (22.53)	3187	3188	3189	3190	3191	3192-	0.20	240	1.19	0.60	0.19
0.15	.813 (20.65)	.312 (7.92)	1.013 (25.73)	3193	3194	3195	3196	3197	3198	0.12	240	1.95	0.97	0.31
0.018	.813 (20.65)	.312 (7.92)	1.013 (25.73)	3199	3200	3201	3202	3203	3204	0.11	240	2.04	1.02	0.32
0.02	.813 (20.65)	.312 (7.92)	1.013 (25.73)	3205	3206	3207	3208	3209	3210	0.10	240	2.14	1.07	0.34
0.022	.813 (20.65)	.312 (7.92)	1.013 (25.73)	3211	3212	3213	3214	3215	3216	0.09	240	2.25	1.13	0.36
0.027	.813 (20.65)	.312 (7.92)	1.013 (25.73)	3217	3218	3219	3220	3221	3222	0.09	240	2.32	1.16	0.37
0.033	.875 (22.23)	.400 (10.16)	1.075 (27.31)	3223-	3224-	3225-	3226-	3227-	3228-	0.08	240	2.85	1.42	0.45
0.039	.875 (22.23)	.400 (10.16)	1.075 (27.31)	3229-	3230-	3231-	3232-	3233-	3234-	0.07	240	3.04	1.52	0.48
0.047	.875 (22.23)	.400 (10.16)	1.075 (27.31)	3235-	3236-	3237-	3238-	3239-	3240-	0.06	240	3.29	1.64	0.52
0.056	.875 (22.23)	.400 (10.16)	1.075 (27.31)	3001-	3002-	3003-	3004-	3005-	3006-	0.058	240	3.5	1.7	0.6
0.068	.875 (22.23)	.500 (12.70)	1.075 (27.31)	3007-	3008-	3009-	3010-	3011-	3012-	0.046	240	4.4	2.2	0.7
0.082	.875 (22.23)	.500 (12.70)	1.075 (27.31)	3013-	3014-	3015-	3016-	3017-	3018-	0.039	240	4.7	2.4	0.7
0.10	.875 (22.23)	.500 (12.70)	1.075 (27.31)	3019-	3020-	3021-	3022-	3023-	3024-	0.035	240	5.0	2.5	0.8
0.12	.906 (23.01)	.562 (14.27)	1.106 (28.09)	3025-	3026-	3027-	3028-	3029-	3030-	0.033	240	5.5	2.8	0.9
0.15	.906 (23.01)	.670 (17.02)	1.106 (28.09)	3031-	3032-	3033-	3034-	3035-	3036-	0.032	240	6.2	3.1	1.0
0.18	.906 (23.01)	.670 (17.02)	1.106 (28.09)	3037-	3038-	3039-	3040-	3041-	3042-	0.031	240	6.3	3.1	1.0
0.22	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	3043-	3044-	3045-	3046-	3047-	3048-	0.030	240	7.0	3.5	1.1
0.27	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	3049-	3050-	3051-	3052-	3053-	3054-	0.029	240	7.2	3.6	1.1
0.33	1.094 (27.80)	.670 (17.02)	1.294 (32.87)	3055-	3056-	3057-	3058-	3059-	3060-	0.028	240	7.3	3.7	1.2
0.39	1.094 (27.80)	.750 (19.05)	1.294 (32.87)	3061-	3062-	3063-	3064-	3065-	3066-	0.026	240	7.9	3.9	1.2
0.47	1.094 (27.80)	.750 (19.05)	1.294 (32.87)	3067-	3068-	3069-	3070-	3071-	3072-	0.025	240	8.1	4.0	1.3
0.56	1.406 (35.70)	.750 (19.05)	1.606 (40.79)	3073-	3074-	3075-	3076-	3077-	3078-	0.025	240	9.2	4.6	1.4
0.68	1.406 (35.70)	.750 (19.05)	1.606 (40.79)	3079-	3080-	3081-	3082-	3083-	3084-	0.024	240	9.4	4.7	1.5
0.82	1.656 (42.06)	.750 (19.05)	1.856 (47.14)	3085-	3086-	3087-	3088-	3089-	3090-	0.023	240	10.4	5.2	1.6
1.0	1.656 (42.06)	.750 (19.05)	1.856 (47.14)	3091-	3092-	3093-	3094-	3095-	3096-	0.022	240	10.7	5.3	1.7
2.0	1.938 (49.23)	1.000 (25.40)	2.138 (54.31)	3097-	3098	3099-	3100-	3101-	3102-	0.017	240	15.0	7.5	2.4

1/ L and D dimensions are bare case dimensions (See [figure 1](#)).2/ The complete dash number will include the applicable letter completing the FR level symbol (M, P, R, or S).3/ This is the ambient case temperature prior to the application of current.4/ 400V PINs with values less than 0.033 μF (dash numbers -3103 through -3222) are no longer available.

REQUIREMENTS:

Dimensions and configuration: See [figure 1](#) and [table I](#).

Dielectric: Normally polypropylene, metallized.

Case material: Nonmagnetic (end seal may be of magnetic material).

Leads: Type designation in accordance with [MIL-STD-1276](#):

L W .040 C 32 N

Capacitance value: See [table I](#).

Capacitance tolerance: See [table I](#).

DC rated voltage: 100 V dc, 200 V dc, and 400 V dc.

Operating temperature range: -55°C to +105°C.

AC current ratings: See [table I](#).

Failure rate (FR) levels (%/1000 hours): M (1.0), P (0.1), R (0.01), and S (0.001).

Thermal shock:

Test condition: B, except that in step 3, sample units shall be tested at +105°C.

Number of cycles: 10..

Seal:

Test condition: C, procedure IIIa with the following exceptions and details:

Bomb pressure of 45 ± 5 lbf/in² (gage).

Exposure time: 1 hour +1, -0 hour.

Dwell time: 1 hour maximum.

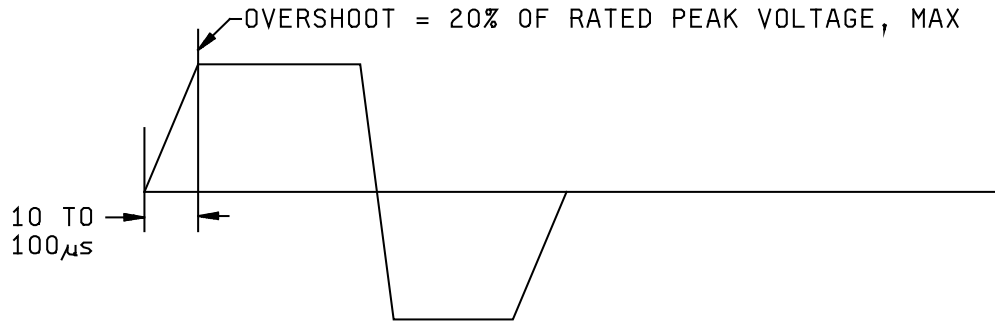
Reject limit: $R_1 = 1 \times 10^{-6}$ atm cm³/s.

Upon completion of test condition C, perform either test condition A at +100°C or test condition B with mineral oil at +100°C.

Dielectric withstanding voltage (DWV): Terminal to terminal.

AC: 100 Hz $\pm$ 10 Hz square wave, peak-to-peak voltage, three times dc rated voltage for 60 to 90 seconds, not to exceed 800 V p/p (see [figure 2](#)).

DC: 200 percent of dc rated voltage for 60 seconds minimum.

FIGURE 2. Waveform characteristics.

Insulation resistance (IR): Charge to rated voltage, +105°C for 5 minutes maximum; however, for capacitance values greater than 1.0 μF , an additional 1 minute per μF is permitted.

Terminal to terminal: See table II.

TABLE II. Insulation resistance versus capacitance value.

Temperature	Capacitance	Minimum insulation resistance (terminal to terminal)
+25°C	0 μF to .1 μF	3,000,000 megohms
	Greater than .1 μF	300,000 megohm-microfarads
+85°C	0 μF to .1 μF	150,000 megohms
	Greater than .1 μF	15,000 megohm-microfarads
+105°C	0 μF to .1 μF	20,000 megohms
	Greater than .1 μF	2,000 megohm-microfarads

Dissipation factor (DF): 0.07 percent maximum.

Barometric pressure (reduced):

Test voltage: 125 percent of dc rated voltage applied. See [MIL-PRF-83421](#) for voltage limitations.

Vibration, random (optional): In accordance with [MIL-PRF-83421](#) when ordered with "-" replaced with "H" in the PIN.

AC burn-in: 40 kHz for 24 hours $\pm$ 8 hours at rms current as specified in [table I](#) at +85°C.

Dielectric absorption: 0.1 percent maximum.

Immersion:

DWV:

Insulating sleeves: Greater than 4,000 volts, dc.

Terminal to terminal: 200 percent of dc rated voltage.

Terminals to case: 200 percent of dc rated voltage.

MIL-PRF-83421/2E

IR:

Insulating sleeves: 10,000 megohms, minimum.

Terminal to terminal: Not less than 50 percent of initial requirement.

Terminal to case: 5,000 megohms, minimum.

ΔC : Maximum of ± 0.25 percent.

DF: 0.15 percent.

Moisture resistance:

DWV, IR, ΔC , and DF: Same as for immersion.

Low temperature life: In accordance with [MIL-PRF-83421](#), except measurements shall be made at the following temperatures:

$t_1 = +25^\circ\text{C}$: Record initial capacitance, DF, and IR.

$t_2 = -65^\circ\text{C}$: 48 hours rated dc voltage applied.

t_3 = Maximum operating temperature: Two hours rated dc voltage applied (allow for derating).

$t_4 = +25^\circ\text{C}$: Record capacitance, DF, and IR. Limits of change shall be as specified in table III.

TABLE III. Post measurement limits.

t_1 to t_4	Styles CRH11 through CRH13
Capacitance	$\pm 0.5\%$
DF	0.15% maximum
IR	Within initial requirements

Resistance to soldering heat:

ΔC : Maximum of ± 0.25 percent.

Temperature coefficient: In accordance with [MIL-PRF-83421](#). Capacitance shall be measured at the temperatures specified in [table IV](#).

TABLE IV. Temperature coefficient.

Temperature <u>1/</u>	Styles CRH11 through CRH13
t ₃ to t ₂	0 to -4%
t ₃ to t ₄	0 to +3%
t ₃ to t ₁ or t ₅	± .25%

1/ t₁ = +25°C ±3°C
 t₂ = +105°C ±3°C
 t₃ = +25°C ±3°C
 t₄ = -55°C +0°C, -3°C
 t₅ = +25°C ±3°C

DC life (at +105°C):

Accelerated condition: 140 percent of dc rated voltage.

Rated condition: 100 percent of dc rated voltage.

IR:

Terminal to terminal: Not less than 33.3 percent of initial requirement.

Terminals to case: 5,000 megohms, minimum.

ΔC: Maximum of ± 2.0 percent.

DF (at +25°C) after life: Maximum of 0.25 percent.

AC conditioning: In accordance with [MIL-PRF-83421](#) with the following exceptions:

The ac performance shall be at the rated ac ripple current at +85°C, 40 kHz for 250 hours, +40, -0 hours (see table V).

TABLE V. AC test samples.

DC rated voltage (volts)	Sample size		Capacitance range for selection of sample (μF)
	Qualification	group B	
100	.47 μF - 4 20.0 μF - 4	15	.47 to 20.0
200	.18 μF - 4 5.0 μF - 4	15	.18 to 5.0
400	.056 μF - 4 2.0 μF - 4	15	.056 to 2.0

Qualification: Four each of the highest and lowest capacitance values in each voltage group (see [table V](#)).

Group B: 15 units shall be selected which are representative of capacitor ratings produced during the current productions period on a semi-annual basis and shall be representative of ratings manufactured during the period (see [table V](#)).

Packaging: Capacitors may be furnished in tape and reel packaging when so specified in the ordering data.

Changes from previous issue: The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Referenced documents: In addition to [MIL-PRF-83421](#), this document also references [MIL-STD-1276](#).

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC
Other - NA

Preparing activity:
DLA - CC

(Project 5910-2017-020)

Review activities:

Army - AR
Navy - AS, MC, OS, SH
Air Force - 19, 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at <https://assist.dla.mil/>.