

FL SERIES ▪ LONG LIFE, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 8 000 hours up to 12 000 hours
- High voltage up to 500V
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +105°C					-25 ~ +105°C				
Rated Voltage Range	V _R	160 ~ 450V DC					500V DC				
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R					(V _R > 315V): V _S = 1.10·V _R				
Capacitance Range	C _R	1 ~ 680μF					10 ~ 68μF				
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)									
Leakage Current (20°C ▪ V _R applied)	I _{LEAK}	C _R ·V _R ≤ 1000					≤ 0.1·C _R ·V _R + 40μA (After 1 minute)				
		C _R ·V _R > 1000					≤ 0.04·C _R ·V _R + 100μA (After 1 minute)				
		[I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]									
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V _R (V DC)	160	200	220	250	350	400	420	450	500
		tanδ (%)	15	15	15	15	20	20	20	20	24
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	160	200	220	250	350	400	420	450	500
		Z-25°C/Z+20°C	3	3	3	3	5	5	6	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	6	-	-	-

Lifetime Test			
Endurance 105°C (V _R & I _R applied)	Test	8 000 hours	ø D 6.3 ~ 8 mm
		10 000 hours	ø D 10 mm
		12 000 hours	ø D ≥ 13 mm ▪ ≤450V
		10 000 hours	ø D ≥ 13 mm ▪ 500V
	ΔC/C _R	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I _{Leak}	≤ the initial specified value	
Shelf Life 105°C (V _R = 0)	Test	1 000 hours	
	ΔC/C _R	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I _{Leak}	≤ the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4		

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
160	1	6.3	11	18.4	46	FL010M160E110A □
	1.5	6.3	11	20.4	51	FL1R5M160E110A □
	2.2	6.3	11	24.8	62	FL2R2M160E110A □
	3.3	6.3	11	37.2	93	FL3R3M160E110A □
	4.7	8	11.5	38	95	FL4R7M160F115A □
	5.6	8	11.5	40	100	FL5R6M160F115A □
	6.8	8	11.5	50	125	FL6R8M160F115A □
	6.8	8	16	59.2	148	FL6R8M160F160A □
	10	8	11.5	72	180	FL100M160F115A □
	15	8	16	100	250	FL150M160F160A □
	15	10	12.5	100	250	FL150M160G125A □
	22	10	16	140	350	FL220M160G160A □
	22	10	20	150	375	FL220M160G200A □
	33	10	16	190	475	FL330M160G160A □
	33	10	20	210	525	FL330M160G200A □
	39	10	16	240	600	FL390M160G160A □
	47	10	20	300	750	FL470M160G200A □
	56	10	20	310	775	FL560M160G200A □
	68	13	20	480	1200	FL680M160I200A □
	68	13	25	520	1300	FL680M160I250A □
	82	10	25	440	1100	FL820M160G250A □
	82	13	20	510	1275	FL820M160I200A □
	100	13	20	590	1328	FL101M160I200A □
	100	13	25	630	1418	FL101M160I250A □
	100	16	20	630	1418	FL101M160J200A □
	150	13	25	730	1643	FL151M160I250A □
	150	16	20	770	1733	FL151M160J200A □
	150	16	25	820	1845	FL151M160J250A □
	180	16	20	870	1958	FL181M160J200A □
	220	16	25	1020	2295	FL221M160J250A □
	220	18	20	1000	2250	FL221M160K200A □
	220	18	25	1040	2340	FL221M160K250A □
	330	16	31.5	1350	3038	FL331M160J315A □
	330	18	31.5	1380	3105	FL331M160K315A □
	390	16	35.5	1510	3398	FL391M160J355A □
	470	16	40	1710	3848	FL471M160J400A □
	470	18	35.5	1720	3870	FL471M160K355A □
	560	18	40	1910	4298	FL561M160K400A □
	680	18	45	2130	4793	FL681M160K450A □

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□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
200	1	6.3	11	26	65	FL010M200E110A
	1.5	6.3	11	28	70	FL1R5M200E110A
	2.2	6.3	11	34	85	FL2R2M200E110A
	3.3	6.3	11	46	115	FL3R3M200E110A
	4.7	8	11.5	64	160	FL4R7M200F115A
	5.6	8	11.5	66.4	166	FL5R6M200F115A
	6.8	8	11.5	70	175	FL6R8M200F115A
	6.8	10	12.5	76	190	FL6R8M200G125A
	10	8	16	92	230	FL100M200F160A
	10	10	16	100	250	FL100M200G160A
	12	10	12.5	100	250	FL120M200G125A
	15	8	20	140	350	FL150M200F200A
	22	10	16	180	450	FL220M200G160A
	22	10	20	200	500	FL220M200G200A
	27	10	16	200	500	FL270M200G160A
	33	10	20	260	650	FL330M200G200A
	33	13	20	300	750	FL330M200I200A
	47	10	20	310	775	FL470M200G200A
	47	13	20	400	1000	FL470M200I200A
	56	10	25	380	950	FL560M200G250A
	68	13	20	470	1175	FL680M200I200A
	68	13	25	520	1300	FL680M200I250A
	68	16	20	520	1300	FL680M200J200A
	82	16	20	560	1400	FL820M200J200A
	100	13	25	640	1440	FL101M200I250A
	100	16	20	670	1508	FL101M200J200A
	100	16	25	690	1553	FL101M200J250A
	100	18	20	710	1598	FL101M200K200A
	120	16	20	720	1620	FL121M200J200A
	150	16	20	790	1778	FL151M200J200A
	150	16	25	840	1890	FL151M200J250A
	150	18	25	890	2003	FL151M200K250A
	180	16	25	910	2048	FL181M200J250A
	180	18	20	910	2048	FL181M200K200A
	220	18	25	1050	2363	FL221M200K250A
	220	18	31.5	1160	2610	FL221M200K315A
	270	16	35.5	1250	2813	FL271M200J355A
	330	16	40	1430	3218	FL331M200J400A
	330	18	31.5	1400	3150	FL331M200K315A
	330	18	35.5	1440	3240	FL331M200K355A
	390	18	35.5	1520	3420	FL391M200K355A
	470	18	40	1750	3938	FL471M200K400A
	470	18	45	1820	4095	FL471M200K450A

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STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
220	27	10	16	200	500	FL270M220G160A
	39	10	20	270	675	FL390M220G200A
	68	13	20	480	1200	FL680M220I200A
	150	16	25	850	1913	FL151M220J250A
	220	16	31.5	1110	2498	FL221M220J315A
	270	18	31.5	1260	2835	FL271M220K315A
	330	16	45	1450	3263	FL331M220J450A
	390	18	45	1620	3645	FL391M220K450A
	470	18	50	1840	4140	FL471M220K500A
250	1	6.3	11	26	65	FL010M250E110A
	1.5	6.3	11	28	70	FL1R5M250E110A
	2.2	6.3	11	34	85	FL2R2M250E110A
	3.3	6.3	11	46	115	FL3R3M250E110A
	3.3	8	11.5	60	150	FL3R3M250F115A
	4.7	8	11.5	68	170	FL4R7M250F115A
	5.6	8	11.5	76	190	FL5R6M250F115A
	6.8	8	16	96	240	FL6R8M250F160A
	6.8	10	12.5	96	240	FL6R8M250G125A
	8.2	8	20	120	300	FL8R2M250F200A
	10	8	16	120	300	FL100M250F160A
	10	10	16	130	325	FL100M250G160A
	15	8	20	150	375	FL150M250F200A
	22	10	16	200	500	FL220M250G160A
	22	10	20	220	550	FL220M250G200A
	22	13	20	250	625	FL220M250I200A
	33	10	20	270	675	FL330M250G200A
	33	13	16	270	675	FL330M250I160A
	33	13	20	320	800	FL330M250I200A
	47	13	20	400	1000	FL470M250I200A
	47	13	25	410	1025	FL470M250I250A
	47	16	20	450	1125	FL470M250J200A
	56	13	20	430	1075	FL560M250I200A
	68	13	25	500	1250	FL680M250I250A
	68	16	20	530	1325	FL680M250J200A
	68	16	25	570	1425	FL680M250J250A
	68	18	20	570	1425	FL680M250K200A
	82	13	25	570	1425	FL820M250I250A
	82	16	20	580	1450	FL820M250J200A
	100	16	25	760	1710	FL101M250J250A
	100	16	31.5	800	1800	FL101M250J315A
	100	18	20	720	1620	FL101M250K200A
	100	18	25	780	1755	FL101M250K250A

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STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
250	120	16	25	780	1755	FL121M250J250A □
	120	18	20	780	1755	FL121M250K200A □
	150	18	25	890	2003	FL151M250K250A □
	150	18	31.5	980	2205	FL151M250K315A □
	180	16	31.5	1020	2295	FL181M250J315A □
	180	18	25	980	2205	FL181M250K250A □
	220	16	35.5	1130	2543	FL221M250J355A □
	220	18	31.5	1130	2543	FL221M250K315A □
	270	16	40	1290	2903	FL271M250J400A □
	270	18	35.5	1310	2948	FL271M250K355A □
	330	18	40	1460	3285	FL331M250K400A □
350	1	8	11.5	30	75	FL010M350F115A □
	1.5	8	11.5	32	80	FL1R5M350F115A □
	2.2	10	12.5	44	110	FL2R2M350G125A □
	3.3	10	12.5	60	150	FL3R3M350G125A □
	4.7	10	16	80	200	FL4R7M350G160A □
	6.8	10	16	100	250	FL6R8M350G160A □
	10	10	20	130	325	FL100M350G200A □
	15	10	20	160	400	FL150M350G200A □
	18	10	20	180	450	FL180M350G200A □
	22	10	20	200	500	FL220M350G200A □
	22	13	20	260	650	FL220M350I200A □
	27	10	25	260	650	FL270M350G250A □
	33	13	20	330	825	FL330M350I200A □
	33	13	25	360	900	FL330M350I250A □
	33	16	20	380	950	FL330M350J200A □
	47	13	25	430	1075	FL470M350I250A □
	47	16	20	440	1100	FL470M350J200A □
	47	18	20	470	1175	FL470M350K200A □
	56	16	20	480	1200	FL560M350J200A □
	68	16	25	570	1425	FL680M350J250A □
	68	16	31.5	620	1550	FL680M350J315A □
	68	18	20	570	1425	FL680M350K200A □
	68	18	25	620	1550	FL680M350K250A □
	82	16	25	620	1550	FL820M350J250A □
	82	18	25	640	1600	FL820M350K250A □
	100	16	31.5	800	1800	FL101M350J315A □
	100	18	25	780	1755	FL101M350K250A □
	120	16	35.5	860	1935	FL121M350J355A □
	120	18	31.5	870	1958	FL121M350K315A □
	150	16	40	1020	2295	FL151M350J400A □
	150	18	35.5	1020	2295	FL151M350K355A □
	180	18	40	1080	2430	FL181M350K400A □

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V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
400	1	8	9	26	65	FL010M400F090A
	1	8	11.5	30	75	FL010M400F115A
	1.5	8	9	30.4	76	FL1R5M400F090A
	1.5	8	11.5	36.4	91	FL1R5M400F115A
	1.5	8	16	40.4	101	FL1R5M400F160A
	2.2	8	11.5	40	100	FL2R2M400F115A
	2.2	8	16	56	140	FL2R2M400F160A
	3.3	8	11.5	52	130	FL3R3M400F115A
	3.3	8	16	60	150	FL3R3M400F160A
	3.3	8	20	61.2	153	FL3R3M400F200A
	3.3	10	12.5	60.4	151	FL3R3M400G125A
	3.3	10	16	72.8	182	FL3R3M400G160A
	3.9	8	16	66	165	FL3R9M400F160A
	4.7	8	11.5	72	180	FL4R7M400F115A
	4.7	8	20	92	230	FL4R7M400F200A
	4.7	10	16	96	240	FL4R7M400G160A
	5.6	8	20	100	250	FL5R6M400F200A
	5.6	10	16	100	250	FL5R6M400G160A
	5.6	10	20	110	275	FL5R6M400G200A
	6.8	8	20	120	300	FL6R8M400F200A
	6.8	10	16	120	300	FL6R8M400G160A
	8.2	10	16	120	300	FL8R2M400G160A
	8.2	10	20	130	325	FL8R2M400G200A
	10	10	16	130	325	FL100M400G160A
	10	10	20	140	350	FL100M400G200A
	15	10	20	180	450	FL150M400G200A
	15	13	20	200	500	FL150M400I200A
	22	13	20	280	700	FL220M400I200A
	22	13	25	310	775	FL220M400I250A
	22	16	20	320	800	FL220M400J200A
	27	13	20	300	750	FL270M400I200A
	33	13	25	330	825	FL330M400I250A
	33	16	20	340	850	FL330M400J200A
	39	13	25	390	975	FL390M400I250A
	47	16	25	480	1200	FL470M400J250A
	47	16	31.5	530	1325	FL470M400J315A
	47	18	20	470	1175	FL470M400K200A
	47	18	25	510	1275	FL470M400K250A
	56	16	25	500	1250	FL560M400J250A
	56	18	20	500	1250	FL560M400K200A
	68	16	25	580	1450	FL680M400J250A
	68	18	25	630	1575	FL680M400K250A
	68	18	31.5	700	1750	FL680M400K315A

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V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
400	82	16	31.5	660	1650	FL820M400J315A □
	82	18	25	650	1625	FL820M400K250A □
	82	18	31.5	710	1775	FL820M400K315A □
	100	16	35.5	760	1710	FL101M400J355A □
	100	18	31.5	770	1733	FL101M400K315A □
	120	16	40	870	1958	FL121M400J400A □
	120	18	35.5	870	1958	FL121M400K355A □
	150	18	40	1020	2295	FL151M400K400A □
420	180	18	45	1100	2475	FL181M400K450A □
	6.8	10	16	120	300	FL6R8M420G160A □
	12	10	20	150	375	FL120M420G200A □
	15	10	25	190	475	FL150M420G250A □
	22	13	20	290	725	FL220M420I200A □
	27	13	25	340	850	FL270M420I250A □
	33	16	20	390	975	FL330M420J200A □
	47	16	25	500	1250	FL470M420J250A □
	47	18	20	500	1250	FL470M420K200A □
	68	16	31.5	650	1625	FL680M420J315A □
	68	18	25	620	1550	FL680M420K250A □
	82	16	35.5	730	1825	FL820M420J355A □
	82	18	31.5	730	1825	FL820M420K315A □
	100	16	40	830	1868	FL101M420J400A □
	100	18	35.5	840	1890	FL101M420K355A □
	120	18	40	930	2093	FL121M420K400A □
	120	18	45	950	2138	FL121M420K450A □
	150	18	50	1060	2385	FL151M420K500A □
450	1	8	9	26	65	FL010M450F090A □
	1	8	11.5	33.2	83	FL010M450F115A □
	1.5	8	11.5	36.8	92	FL1R5M450F115A □
	1.5	10	9	37.2	93	FL1R5M450G090A □
	1.8	8	11.5	38.8	97	FL1R8M450F115A □
	1.8	10	9	39.2	98	FL1R8M450G090A □
	2.2	8	16	56.4	141	FL2R2M450F160A □
	3.3	8	16	61.2	153	FL3R3M450F160A □
	4.7	10	16	92	230	FL4R7M450G160A □
	5.6	10	16	100	250	FL5R6M450G160A □
	6.8	10	16	130	325	FL6R8M450G160A □
	6.8	10	20	140	350	FL6R8M450G200A □
	8.2	10	20	140	350	FL8R2M450G200A □
	10	10	20	140	350	FL100M450G200A □
	10	10	25	160	400	FL100M450G250A □
	10	13	16	150	375	FL100M450I160A □

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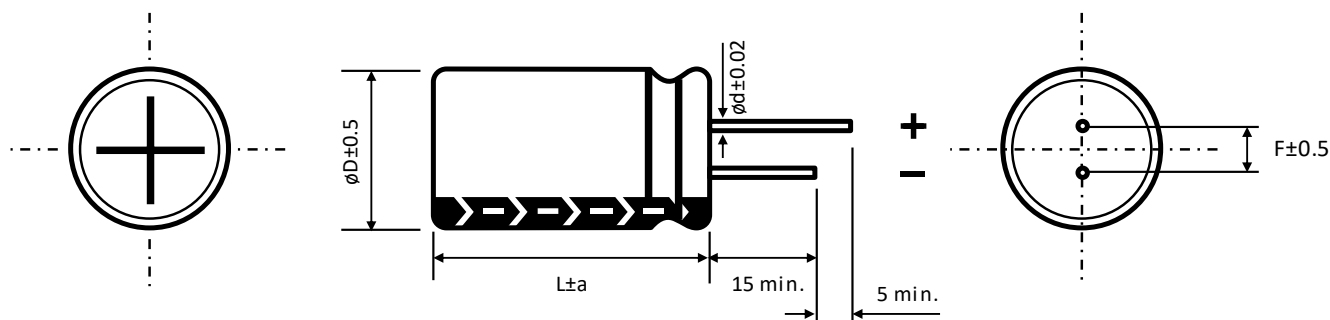
V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
450	15	10	25	190	475	FL150M450G250A □
	15	13	20	200	500	FL150M450I200A □
	18	13	20	260	650	FL180M450I200A □
	22	13	25	290	725	FL220M450I250A □
	22	16	20	300	750	FL220M450J200A □
	22	18	20	320	800	FL220M450K200A □
	27	13	25	340	850	FL270M450I250A □
	33	16	20	390	975	FL330M450J200A □
	33	16	25	420	1050	FL330M450J250A □
	33	16	31.5	460	1150	FL330M450J315A □
	33	18	20	420	1050	FL330M450K200A □
	33	18	25	450	1125	FL330M450K250A □
	39	18	20	440	1100	FL390M450K200A □
	47	16	25	500	1250	FL470M450J250A □
	47	16	31.5	560	1400	FL470M450J315A □
	47	18	25	540	1350	FL470M450K250A □
	47	18	31.5	590	1475	FL470M450K315A □
	56	16	31.5	590	1475	FL560M450J315A □
	56	18	25	560	1400	FL560M450K250A □
	56	18	31.5	630	1575	FL560M450K315A □
	68	16	35.5	660	1650	FL680M450J355A □
	68	18	31.5	660	1650	FL680M450K315A □
	82	16	40	750	1875	FL820M450J400A □
	82	18	31.5	720	1800	FL820M450K315A □
	82	18	35.5	750	1875	FL820M450K355A □
	100	18	35.5	840	1890	FL101M450K355A □
	100	18	40	900	2025	FL101M450K400A □
	120	18	45	950	2138	FL121M450K450A □
	150	18	50	1070	2408	FL151M450K500A □
500	10	13	20	130	325	FL100M500I200A □
	12	13	20	140	350	FL120M500I200A □
	15	13	25	180	450	FL150M500I250A □
	15	16	20	180	450	FL150M500J200A □
	22	16	25	230	575	FL220M500J250A □
	22	18	20	220	550	FL220M500K200A □
	33	16	31.5	290	725	FL330M500J315A □
	33	18	25	280	700	FL330M500K250A □
	47	18	31.5	360	900	FL470M500K315A □
	56	18	35.5	390	975	FL560M500K355A □
	68	18	40	420	1050	FL680M500K400A □

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See “PACKAGING INFORMATION” to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	6.3	8	10	13	16	18
F	2.5	3.5	5	5	7.5	7.5
ϕd	0.5	L < 20 0.5	L ≥ 20 0.6	0.6		0.8

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

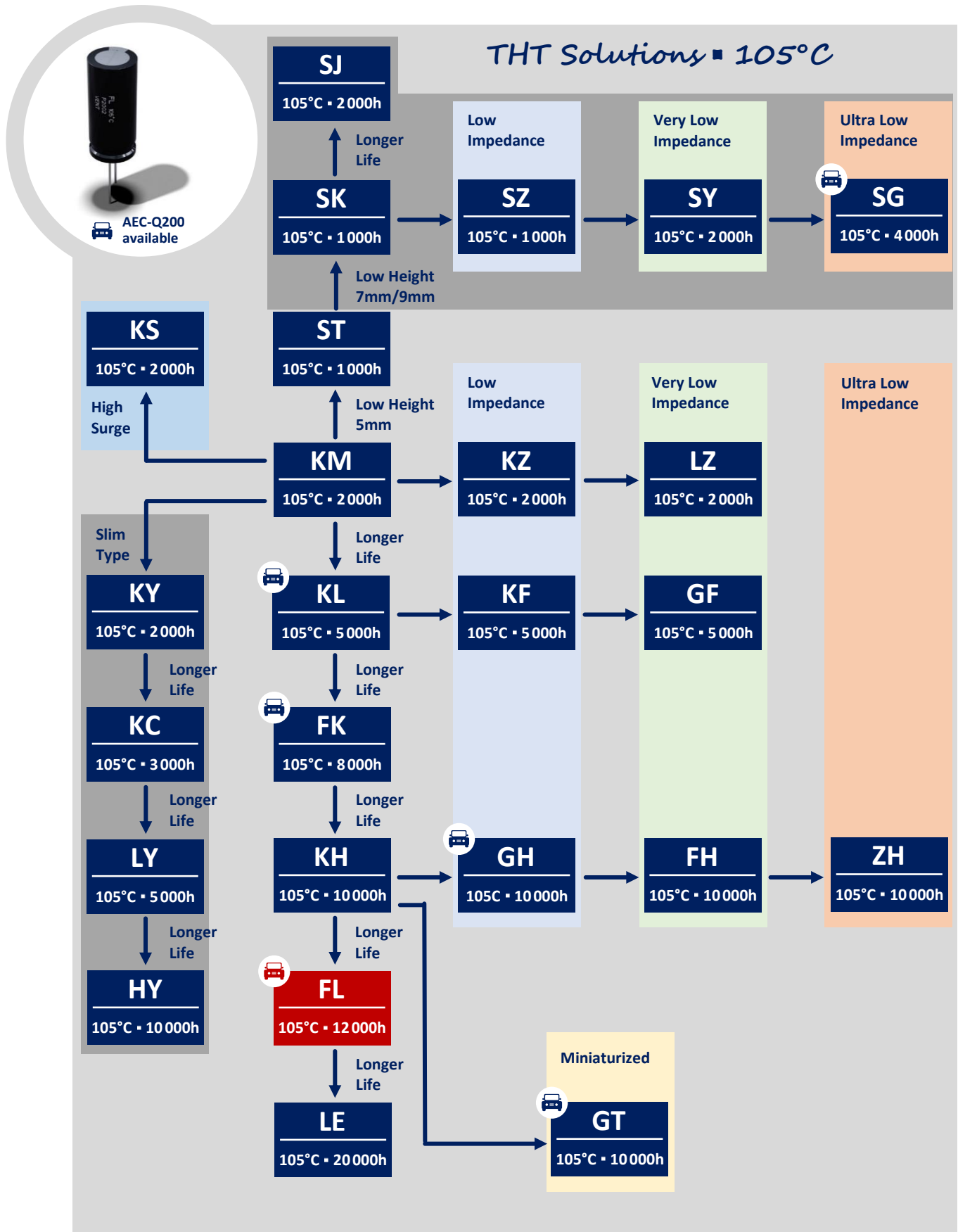
CAP (μF) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 82	1	1.75	2.25	2.5
≥ 100	1	1.67	2.05	2.25

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions & Guidelines	Packaging Information	3D Models	Reliability Tests

GROUP CHART



DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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