ESC, +105°C

Overview

The KEMET ESC single-ended aluminum electrolytic capacitors are designed for low impedance and high frequency applications.

% T T P M G E X M S R W

Typical applications include high frequency switch mode circuits.

& I R I ¼ X W

- Low impedance
- 1,000 – 3,000 hour operating life
- Operating temperature of up to 105°C
- ' E W[WMXfL¶ Q Q
- Safety vent on the capacitor base

4 E V X 2 Y Q F I V 7] W X I Q

ESC	157	M	6R3		A	C3	AA
Series	Capacitance Code (pF)	Tolerance	Rated Voltage (VDC)		Electrical Parameters	Size Code	Packaging
Single-Ended Aluminum Electrolytic	First two digits represent W M K R M ¼ G E R X ¼K Y VJI SW capacitance values. Last H M W W M XG M ¼ I W the number of zeros to be added.	M = ±20%	6R3 = 6.3 010 = 10 016 = 16 025 = 25	035 = 35 050 = 50 063 = 63 100 = 100	A = Standard	See Dimension Table	See Ordering Options Table

3VHIVMRK 3TXMSRW 8EFPI

(MEQIXIV	4EGOEKMRK 8]TI	0IEH 8]TI	0IEH 0IRKXL QQ	Lead and 4EGOEKMRK 'SHI
Standard Bulk Packaging Options				
4 – 22	Bulk (bag)	Straight	20/15 Minimum	AA
Standard Auto-Insertion Packaging Options				
4 – 5	Tape and Reel	Formed to 2.5 mm	H_0 = 16 ±0.75	LA
6.3	Tape and Reel	2.5 mm lead spacing	H_0 = 18.5 ±0.75	KA
8	Tape and Reel	Formed to 5 mm	H_0 = 16 ±0.75	JA
10 – 13	Ammo	5 mm Lead Spacing	H_0 = 18.5 ±0.75	EA
16 – 18	Ammo	7.5 mm lead spacing	H_0 = 18.5 ±0.75	EA
Other Packaging Options				
4 – 8	Ammo	Formed to 5 mm	H_0 = 16 ±0.75	DA
4 – 8	Ammo	Straight	H_0 = 18.5 ±0.75	EA
4 – 5	Ammo	Formed to 2.5 mm	H_0 = 16 ±0.75	FA
4 – 6.3	Tape and Reel	Formed to 5 mm	H_0 = 16 ±0.75	JA
4 – 10	Tape and Reel	Straight	H_0 = 18.5 ±0.75	KA
Contact KEMET for other lead and packaging options				

)RZMVSRQIRXEP 'SQTPMERGI

As an environmentally conscious company, KEMET is working continuously with improvements concerning the environ effects of both our capacitors and their production. In Europe (RoHS Directive) and in some other geographical areas li China, legislation has been put in place to prevent the use of some hazardous materials, such as lead (Pb), in electroni IUYMTQIRX %PP TVSHYGXW MR XLMW GEXEPSK YI TVSHYGIH XS LIPT SYV GYWXSQIVW SFPMKEXMSRW XS KYEVERXII XLEX XLIMV IUYMTQIRX GSQTPMIW these legislative requirements. The only material of concern in our products has been lead (Pb), which has been remove JVSQ EPP HIWMKRW XS JYPJMPP XLI VIUYMVIQIRX XLEX XLI TVSHYGX WLEPP GSRXEMR RS QSVI XLER 8 TTQ SJ PIEH MR LSQSKIRISYW QEXIVMEP %PP closely follow any changes in legislation world wide and make any necessary changes in its products, whenever needed.

Some customer segments such as medical, military and automotive electronics may still require the use of lead in elect coatings. To clarify the situation and distinguish products from each other, a special symbol is used on the packaging la for RoHS compatible capacitors.

Due to customer requirements, there may appear additional markings such as lead free (LF) or lead-free wires (LFW) on t label.

(MQIRWMSRW • 1MPPMQIXIVW

4IVJSVQERGI 'LEVEGXIVMWXMGW

-XIQ	4IVJSVQERGI 'LEVEGXIVMWXMGW
Capacitance Range	4.7 – 15,000 µF
Capacitance Tolerance	±20% at 120 Hz/20°C
Rated Voltage	6.3 – 100 VDC
Life Test	2,000 – 3,000 hours (see conditions in Test Method & Performance)
Operating Temperature	– qXS q'
Leakage Current	-µ ': SVv%[LMGLMZXWIEXIV
	C = rated capacitance (µF), V = rated voltage (VDC). Voltage applied for 2 minutes at 20°C.

-QTIHERGI > 'LEVEGXIVMWXMGW EX ,^

Rated Voltage (VDC)	6	10	16	25	35	50	63	100
> – q' > q'	4	3	3	3	3	2	2	2
> – q' > q'	8	6	4	4	4	4	4	4

'SQTIRWEXMSR *EGXSV SJ 6MTTPI 'YVVIRX 6' ZW *VIU

'ETEGMXERGI 6ERKI v*	,^	,^	,^	O,^	O,^	O,^
4.7	0.30	0.40	0.50	0.70	0.80	1.00
5.6 – 33	0.40	0.50	0.60	0.80		

8IWX 1IXLSH 4IVJSVQERGI

'SRHMXMSRW	0SEH 0MJI 8IWX		7LIPJ 0MJI 8IWX
Temperature	105°C		105°C
Test Duration	'EF¶ \ µ \ QQ	2,000 hours	1,000 hours
	'EF¶ \ QQ	3,000 hours	
	If dimension is down size, endurance will be 1,000 hours less than standard		
Ripple Current	1E\MQYQ VMTTPI GYVVIRX WTIGM¼IH EX 1,^ q'		No ripple current applied
Voltage	The sum of DC voltage and the peak AC voltage must not exceed the rated voltage of the capacitor		No voltage applied
4IVJSVQERGI	8LI JSPPS[MRK WTIGM¼GEXMSRW [MPP FI WEXMW¼		
Capacitance Change	Within ±20% of the initial value		
Dissipation Factor	(SIW RSX I\GIIH SJ XLI WTIGM¼IH PMQMX		
Leakage Current	(SIW RSX I\GIIH XLI WTIGM¼IH PMQMX		

7LIPJ 0MJI

8LI GETEGMXERGI ... WXSVIH [MXLSYX ETTP]MRK ZSPXEKI ... the leakage current will very slowly increase.

The KEMET E aluminum electrolytic capacitors should not be stored in high temperatures or where there is a high leve humidity. The suitable storage condition for KEMET's E aluminum electrolytic capacitors is +5 to +35°C and less than 7 in relative humidity. KEMET's E aluminum electrolytic capacitors should not be stored in damp conditions such as wate saltwater spray or oil spray. KEMET's E aluminum electrolytic capacitors should not be stored in an environment full of hazardous gas (hydrogen sulphide, sulphurous acid gas, nitrous acid, chlorine gas, ammonium, etc.) KEMET's E alumi electrolytic capacitors should not be stored under exposure to ozone, ultraviolet rays or radiation.

-J E GETEGMXSV LEW FIIR WXSVIH JSV QSVI XLER QSRXLW YRHIV XL XLIR E XVIEXQIRX F] ZSPXEKI ETTPMGEXMSR MW VIGSQQIRHIH

6I %KI 6IJSVQMRK 4VSGIHYVI

Apply the rated voltage to the capacitor at room temperature for a period of one hour, or until the leakage current has fa XS E WXIEH] ZEPYI ... WTIGM¼IH PMQMX ... PIEOEKI current or 5 mA (whichever is greater) is suggested.

8EFPI • 6EXMRKW 4EVX 2YQFIV 6IJIVIRGI

VDC	VDC 7YVKI :SPXEKI ,^ v*	6EXIH 'ETEGMXERGI 7M^I ,^ q'(\ 0 QQ XER¹ ¾	(* > O ,> q' º	RC O ,^ q' Q	0' q' 1MRYXI4WEVX 2YQFIV % v%	
6.3	8	150	5 x 11	22	0.420	200	9.0	ESC157M6R3AC3(1)
6.3	8	220	6.3 x 11	22	0.320	250	14.0	ESC227M6R3AE3(1)
6.3	8	270	6.3 x 11	22	0.220	250	17.0	ESC277M6R3AE3(1)
6.3	8	330	6.3 x 11	22	0.230	250	21.0	ESC337M6R3AE3(1)
6.3	8	330	8 x 11	22	0.180	400	21.0	ESC337M6R3AG3(1)
6.3	8	470	*6.3 x 11	22	0.180	440	30.0	ESC477M6R3AE3(1)
6.3	8	470	8 x 11	22	0.140	550	30.0	ESC477M6R3AG3(1)
6.3	8	680	*8 x 11	22	0.120	580	43.0	ESC687M6R3AG3(1)
6.3	8	680	8 x 15	22	0.100	700	43.0	ESC687M6R3AG4(1)
6.3	8	820	8 x 20	22	0.085	750	52.0	ESC827M6R3AG6(1)
6.3	8	1000	*8 x 11	22	0.150	580	63.0	ESC108M6R3AG3(1)
6.3	8	1000	8 x 15	22	0.085	700	63.0	ESC108M6R3AG4(1)
6.3	8	1000	8 x 20	22	0.069	800	63.0	ESC108M6R3AG6(1)
6.3	8	1000	10 x 12.5	22	0.080	690	63.0	ESC108M6R3AH9(1)
6.3	8	1200	10 x 16	22	0.064	1000	76.0	ESC128M6R3AH8(1)
6.3	8	1500	*8 x 15	22	0.085	980	94.0	ESC158M6R3AG4(1)
6.3	8	1500	8 x 20	22	0.051	800	94.0	ESC158M6R3AG6(1)
6.3	8	1500	*10 x 16	22	0.055	1070	94.0	ESC158M6R3AH8(1)
6.3	8	1500	10 x 20	22	0.044	1250	94.0	ESC158M6R3AH4(1)
6.3	8	2200	*10 x 20	22	0.051	1220	139.0	ESC228M6R3AH4(1)
6.3	8	2200	*10 x 25	22	0.048	1310	139.0	ESC228M6R3AH5(1)
6.3	8	2200	13 x 20	22	0.043	1450	139.0	ESC228M6R3AL3(1)
6.3	8	3300	*10 x 25	22	0.043	1400	208.0	ESC338M6R3AH5(1)
6.3	8	3300	13 x 25	22	0.035	1700	208.0	ESC338M6R3AL4(1)
6.3	8	3900	13 x 25	22	0.032	1750	246.0	ESC398M6R3AL4(1)
6.3	8	4700	*13 x 25	22	0.032	1520	296.0	ESC478M6R3AL4(1)
6.3	8	4700	*13 x 30	22	0.033	1570	296.0	ESC478M6R3AL8(1)
6.3	8	4700	16 x 25	22	0.028	1800	296.0	ESC478M6R3AM7(1)
6.3	8	6800	16 x 32	22	0.024	2000	428.0	ESC688M6R3AM2(1)
6.3	8	8200	16 x 32	22	0.019	2350	517.0	ESC828M6R3AM2(1)
6.3	8	10000	16 x 36	22	0.019	2550	630.0	ESC109M6R3AM3(1)
6.3	8	15000	18 x 36	22	0.019	3000	945.0	ESC159M6R3AN2(1)
10	13	100	5 x 11	19	0.420	150	10.0	ESC107M010AC3(1)
10	13	120	5 x 11	19	0.370	200	12.0	ESC127M010AC3(1)
10	13	150	6.3 x 11	19	0.320	250	15.0	ESC157M010AE3(1)
10	13	220	6.3 x 11	19	0.220	300	22.0	ESC227M010AE3(1)
10	13	330	8 x 11	19	0.140	550	33.0	ESC337M010AG3(1)
10	13	470	8 x 11	19	0.120	550	47.0	ESC477M010AG3(1)
10	13	470	8 x 15	19	0.100	750	47.0	ESC477M010AG4(1)
10	13	680	*8 x 11	19	0.110	640	68.0	ESC687M010AG3(1)
10	13	680	10 x 12.5	19	0.085	800	68.0	ESC687M010AH9(1)
10	13	820	10 x 16	19	0.064	1050	82.0	ESC827M010AH8(1)
10	13	1000	8 x 20	19				

(1) Insert packaging code. See Ordering Options Table for available options.

[1] When capacitance exceeds 1,000 µF, the DF value (%) is increased by 2% for every additional 1,000 µF.

** Dimension is down size, Endurance will be less 1,000 hours than standard.*

8EFPI • 6EXMRKW 4EVX 2YQFIV 6IJIVIRGI GSRX H

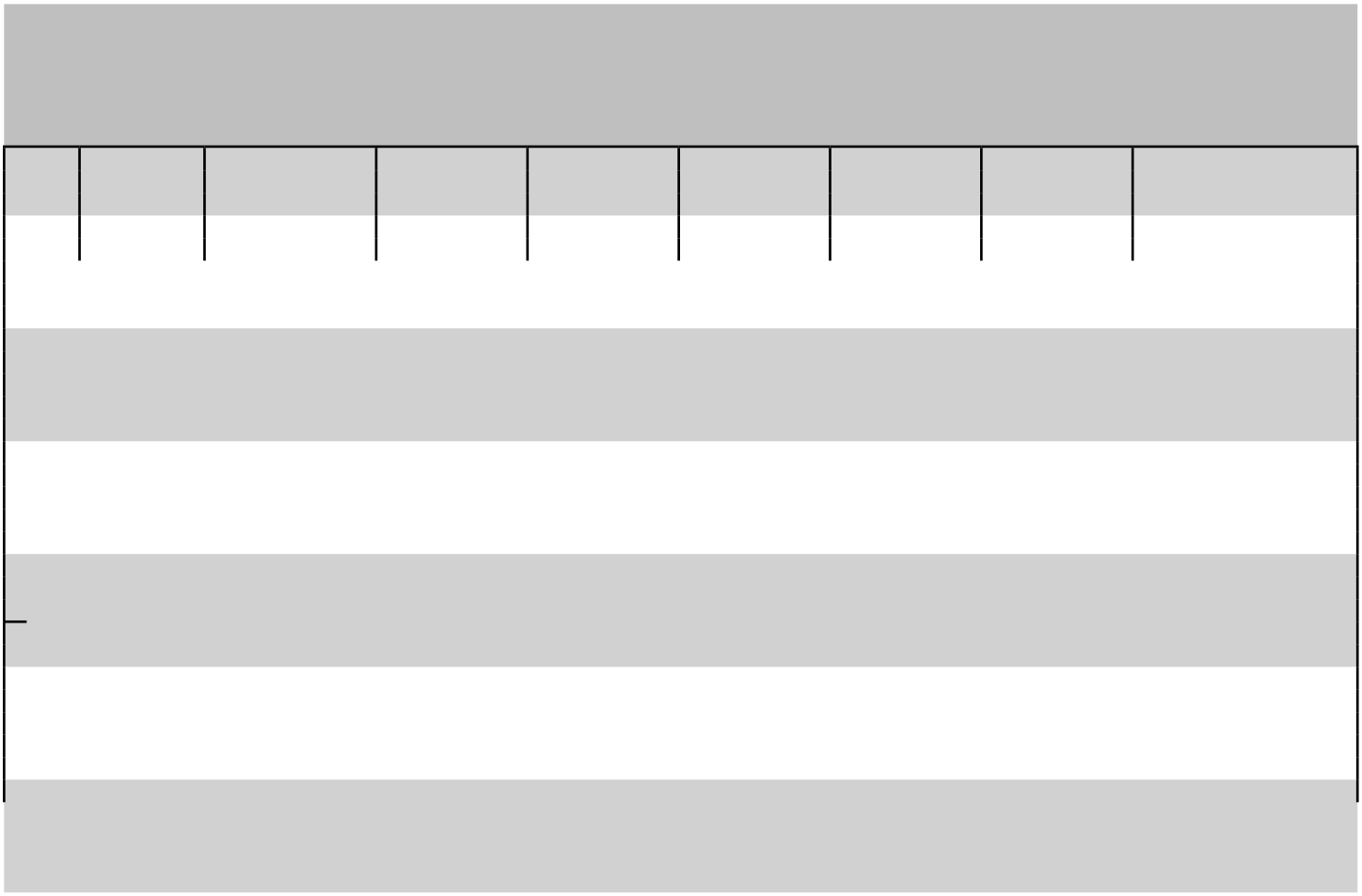
VDC	VDC 7YVKI :SPXEKI ,^ v*	6EXIH 'ETEGMXERGI ,^ q'(\ 0 QQ XER¹ ¾	(* 7M^I ,^ q' o	> O,> q'	RC O,^ Q%	0' q' 1MRYXIW v%	4EVX 2YQFIV
10	13	8200	18 x 36	19	0.019	2800	820.0	ESC828M010AN2(1)
16	20	56	5 x 11	16	0.630	100	11.0	ESC566M016AC3(1)
16	20	68	5 x 11	16	0.420	150	11.0	ESC686M016AC3(1)
16	20	100	5 x 11	16	0.370	200	16.0	ESC107M016AC3(1)
16	20	120	6.3 x 11	16	0.320	250	19.0	ESC127M016AE3(1)
16	20	150	6.3 x 11	16	0.220	300	24.0	ESC157M016AE3(1)
16	20	220	8 x 11	16	0.140	550	35.0	ESC227M016AG3(1)
16	20	330	8 x 11	16	0.120	550	53.0	ESC337M016AG3(1)
16	20	330	8 x 15	16	0.100	750	53.0	ESC337M016AG4(1)
16	20	330	10 x 12.5	16	0.080	688	53.0	ESC337M016AH9(1)
16	20	470	8 x 15	16	0.093	730	75.0	ESC477M016AG4(1)
16	20	470	10 x 12.5	16	0.085	800	75.0	ESC477M016AH9(1)
16	20	680	10 x 16	16	0.064	1050	109.0	ESC687M016AH8(1)
16	20	820	10 x 20	16	0.044	1100	131.0	ESC827M016AH4(1)
16	20	1000	*10 x 16	16	0.043	1140	160.0	ESC108M016AH8(1)
16	20	1000	10 x 20	16	0.039	1250	160.0	ESC108M016AH4(1)
16	20	1200	*10 x 25	16	0.042	1310	192.0	ESC128M016AH5(1)
16	20	1200	13 x 20	16	0.038	1450	192.0	ESC128M016AL3(1)
16	20	1500	*10 x 20	16	0.045	1200	240.0	ESC158M016AH4(1)
16	20	1500	13 x 20	16	0.034	1600	240.0	ESC158M016AL3(1)
16	20	2200	*10 x 30	16	0.032	1780	352.0	ESC228M016AH6(1)
16	20	2200	*13 x 20	16	0.033	1720	352.0	ESC228M016AL3(1)
16	20	2200	13 x 25	16	0.028	2000	352.0	ESC228M016AL4(1)
16	20	3300	*13 x 40	16	0.026	2200	528.0	ESC338M016AL7(1)
16	20	3300	16 x 25	16	0.024	2200	528.0	ESC338M016AM7(1)
16	20	4700	16 x 36	16	0.019	2550	752.0	ESC478M016AM3(1)
16	20	6800	18 x 36	16	0.019	2800	1088.0	ESC688M016AN2(1)
25	32	10	5 x 11	14	0.550	50	12.0	ESC106M025AC3(1)
25	32	47	5 x 11	14	0.450	150	12.0	ESC476M025AC3(1)
25	32	56	5 x 11	14	0.420	150	17.0	ESC566M025AC3(1)
25	32	68	6.3 x 11	14	0.370	200	17.0	ESC686M025AE3(1)
25	32	100	6.3 x 11	14	0.220	250	25.0	ESC107M025AE3(1)
25	32	120	8 x 11	14	0.200	300	30.0	ESC127M025AG3(1)
25	32	150	8 x 11	14	0.140	550	37.0	ESC157M025AG3(1)
25	32	220	8 x 11	14	0.120	550	55.0	ESC227M025AG3(1)
25	32	220	8 x 15	14	0.100	750	55.0	ESC227M025AG4(1)
25	32	330	*8 x 15	14	0.100	660	82.0	ESC337M025AG4(1)
25	32	330	8 x 20	14	0.069	800	82.0	ESC337M025AG6(1)
25	32	330	10 x 16	14	0.086	900	82.0	ESC337M025AH8(1)
25	32	470	8 x 20	14	0.067	800	117.0	ESC477M025AG6(1)
25	32	470	10 x 16	14	0.064	1050	117.0	ESC477M025AH8(1)
25	32	470	10 x 12.5	14	0.086	760	117.0	ESC477M025AH9(1)
25	32	680	10 x 20	14	0.039	1100	170.0	ESC687M025AH4(1)
25	32	820	10 x 20	14	0.039	1250	205.0	ESC827M025AH4(1)
25	32	1000	*10 x 20	14	0.047	1160	250.0	ESC108M025AH4(1)
25	32	1000	*10 x 25	14	0.042	1310	250.0	ESC108M025AH5(1)
25	32	1000	13 x 20	14	0.038	1450	250.0	ESC108M025AL3(1)
25	32	1200	13 x 25	14	0.035	1600	300.0	ESC128M025AL4(1)
25	32	1500	*13 x 30	14	0.032	1750	375.0	ESC158M025AL8(1)
25	32	1500	16 x 25	14	0.028	2000	375.0	ESC158M025AM7(1)
25	32	2200	*13 x 30	14	0.029	1810	550.0	ESC228M025AL8(1)
25	32	2200	*16 x 25	14	0.032	1660	550.0	ESC228M025AM7(1)
25	32	2200	16 x 32	14	0.024	2200	550.0	ESC228M025AM2(1)
25	32	3300	*16 x 36	14	0.019	2540	825.0	ESC338M025AM3(1)
25	32	3300	18 x 36	14	0.019	2550	825.0	ESC338M025AN2(1)
25	32	4700	18 x 36	14	0.019	2800	1175.0	ESC478M025AN2(1)
VDC	:(' 7YVKI	6EXIH 'ETEGMXERGI	('* 7M^I	>	RC	LC	4EVX 2YQFIV

(1) Insert packaging code. See Ordering Options Table for available options.

[1] When capacitance exceeds 1,000 µF, the DF value (%) is increased by 2% for every additional 1,000 µF.

** Dimension is down size, Endurance will be less 1,000 hours than standard.*

8EFPI • 6EXMRKW 4EVX 2YQFIV 6IJIVIRGI GSRX H



(1) Insert packaging code. See Ordering Options Table for available options.

[1] When capacitance exceeds 1,000 µF, the DF value (%) is increased by 2% for every additional 1,000 µF.

** Dimension is down size, Endurance will be less 1,000 hours than standard.*

8EFPI • 6EXMRKW 4EVX 2YQFIV 6IJIVIRGI GSRX H

VDC	VDC 7YVKI :SPXEKI ,^ v*	6EXIH 'ETEGMXERGI 7M^I ,^ q'(\ 0 QQ XER¹ ¾	(* O ,> q' º	> O ,> q' Q	RC O ,^ 1MRYXI4WE	0' q' % v%	4EVX 2YQFIV
63	79	68	8 x 11	9	0.520	550	43.0	ESC686M063AG3(1)
63	79	100	8 x 20	9	0.350	650	63.0	ESC107M063AG6(1)
63	79	120	10 x 16	9	0.300	800	76.0	ESC127M063AH8(1)
63	79	150	10 x 16	9	0.200	1050	94.0	ESC157M063AH8(1)
63	79	220	10 x 20	9	0.150	1300	139.0	ESC227M063AH4(1)
63	79	330	13 x 20	9	0.100	1400	208.0	ESC337M063AL3(1)
63	79	470	13 x 25	9	0.064	1550	296.0	ESC477M063AL4(1)
63	79	680	16 x 25	9	0.052	1700	428.0	ESC687M063AM7(1)
63	79	820	16 x 32	9	0.048	1900	517.0	ESC827M063AM2(1)
63	79	1000	16 x 32	9	0.042	2100	630.0	ESC108M063AM2(1)
63	79	1200	16 x 36	9	0.036	2550	756.0	ESC128M063AM3(1)
63	79	1500	18 x 36	9	0.033	2800	945.0	ESC158M063AN2(1)
100	125	4.7	5 x 11	8	2.000	120	5.0	ESC475M100AC3(1)
100	125	6.8	5 x 11	8	1.850	140	7.0	ESC685M100AC3(1)
100	125	10	6.3 x 11	8	1.500	200	10.0	ESC106M100AE3(1)
100	125	15	6.3 x 11	8	1.200	250	15.0	ESC156M100AE3(1)
100	125	22	8 x 11	8	0.790	300	22.0	ESC226M100AG3(1)
100	125	33	8 x 15	8	0.590	450	33.0	ESC336M100AG4(1)
100	125	47	10 x 16	8	0.350	550	47.0	ESC476M100AH8(1)
100	125	68	10 x 20	8	0.240	650	68.0	ESC686M100AH4(1)
100	125	100	13 x 20	8	0.180	800	100.0	ESC107M100AL3(1)
100	125	120	13 x 25	8	0.150	1050	120.0	ESC127M100AL4(1)
100	125	150	13 x 25	8	0.110	1300	150.0	ESC157M100AL4(1)
100	125	220	16 x 25	8	0.071	1400	220.0	ESC227M100AM7(1)
100	125	330	16 x 32	8	0.049	1550	330.0	ESC337M100AM2(1)
100	125	470	18 x 36	8	0.038	1700	470.0	ESC477M100AN2(1)
VDC	:(' 7YVKI	6EXIH 'ETEGMXERGI	('*EWI	7M^I >	RC	LC	4EVX 2YQFIV	

(1) Insert packaging code. See Ordering Options Table for available options.

¹ When capacitance exceeds 1,000 µF, the DF value (%) is increased by 2% for every additional 1,000 µF.

** Dimension is down size, Endurance will be less 1,000 hours than standard.*

%TTPMGEXMSR ERH 3TIVEXMSR +YMHIPMRIW

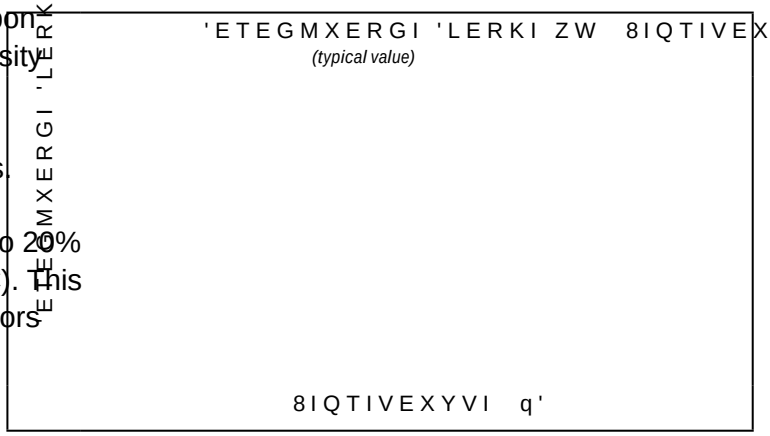
)PIGXVMGEP 6EXMRKW
'ETEGMXERGI)7'

Simplified equivalent circuit diagram of an electrolytic capacitor

The capacitive component of the equivalent series circuit, (equivalent series capacitance - ESC), is determined by appl
ER EPXIVREXI ZSPXEKI SJ µ : EX E JVIUYIRG] SJ SV ,^ ERH

8IQTIVEXYVI (ITIRHIRGI SJ XLI 'ETEGMXERGI

Capacitance of an electrolytic capacitor depends upon temperature: with decreasing temperature the viscosity of the electrolyte increases, thereby reducing its conductivity.
Capacitance will decrease if temperature decreases. Furthermore, temperature drifts cause armature dilatation and, therefore, capacitance changes (up to 20% depending on the series considered, from 0 to 80°C). This phenomenon is more evident for electrolytic capacitors than for other types.

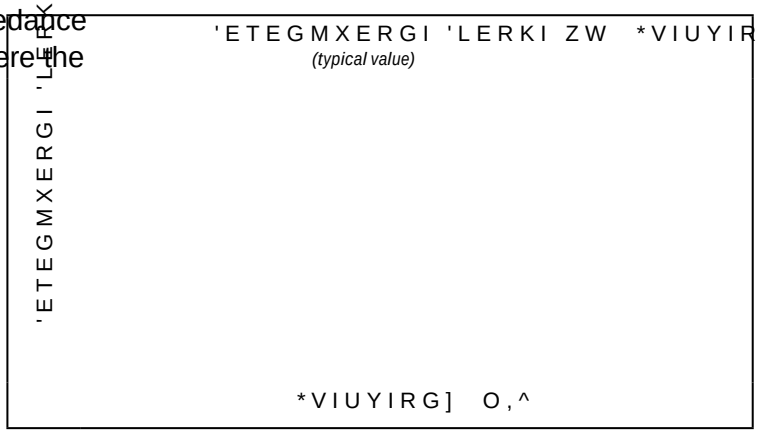


*VIUYIRG] (ITIRHIRGI SJ XLI 'ETEGMXERGI

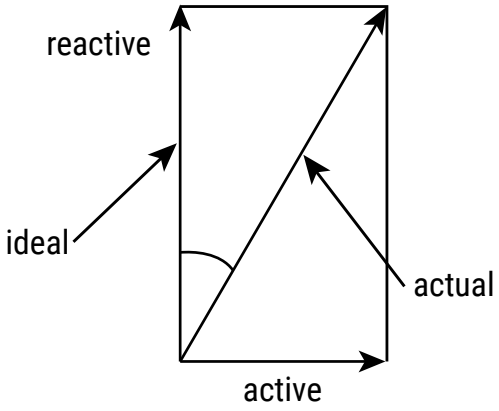
Effective capacitance value is derived from the impedance curve, as long as impedance is still in the range where the capacitance component is dominant.

$$C = \frac{1}{\text{Æ J}}$$

C = capacitance (
f = frequency (Hz
> ! MQTIHE



(MWWMTEXMSR *EGXSV XER ¾ (*
(MWWMTEXMSR *EGXSV XER ¾ MW XLI VEXMS FIX[IIR XLI EGXMZI ERH
thought of as a measurement of the gap between an actual and ideal capacitor.



8ER ¾ MW QIEWYVIH [MXL XLI WEQI WIX YT YWIH JSV XLI WIVMIW GET
8ER ¾ ! Î \ )7' \ )76 [LIVI
ESC = Equivalent series capacitance
ESR = Equivalent series resistance

(MWWMTEXMSR *EGXSV

(MWWMTEXMSR *EGXSV ZW *VIUYIRG]
(typical value)

*VIUYIRG] O,^

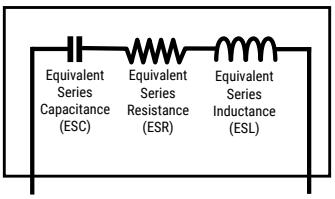
(MWWMTEXMSR *EGXSV

(MWWMTEXMSR *EGXSV ZW 8IQT
(typical value)

8IQTIVEXYVI q'

)UYMZEPIRX 7IVMIW -RHYGXERGI)70
)UYMZEPIRX WIVMIW MRHYGXERGI SV WIPJ MRHYGXERGI VIWYPXW JVS

Capacitor Equivalent Internal Circuit

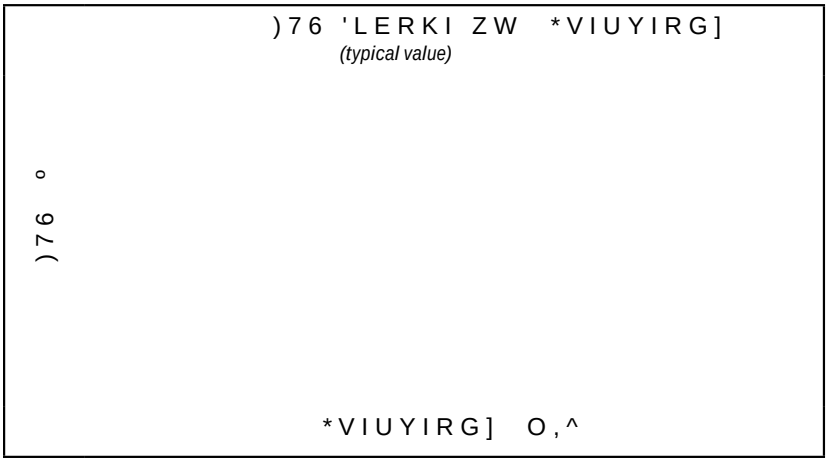


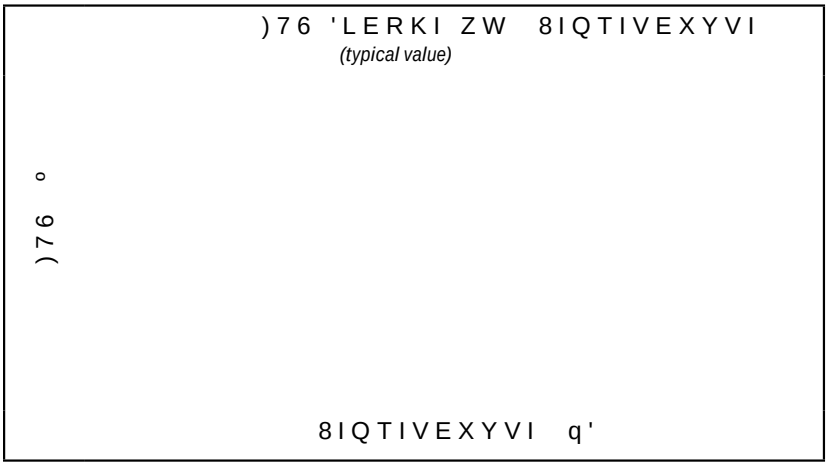
)UYMZEPIRX 7IVMIW 6IWMWXERGI)76
Equivalent series resistance is the resistive component of the equivalent series circuit. ESR value depends on frequenc
XIQTIVEXYVI ERH MW VIPEXIH XS XLI XER ¾ F] XLI JSPPS[MRK IUYEXM

$$ESR = \frac{XER}{Æ J}$$

)76 !)UYMZEPIRX WIV
XER ¾ ! (MWWMTEXM
ESC = Equivalent series capacitance
f = Frequency (Hz)

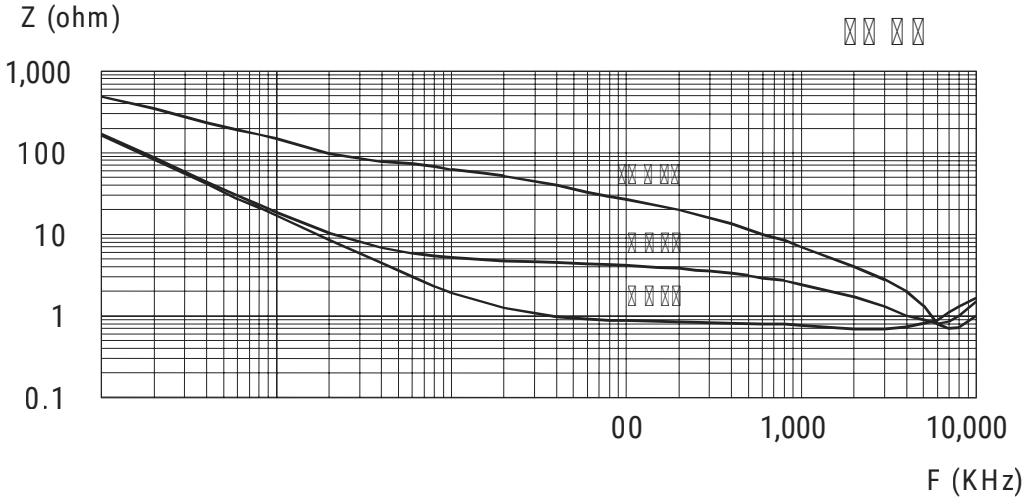
Tolerance limits of the rated capacitance must be taken into account when calculating this value.





-QTIHERGI > GSRX...H

Impedance as a function of frequency (sinusoidal waveform) for different temperature values can be represented as fol
(typical values):



R_e is the most temperature-dependent component of an electrolytic capacitor equivalent circuit. Electrolyte resistivity wil
decrease if temperature rises.

In order to obtain a low impedance value throughout the temperature range, R_e must be as little as possible. However, R_e
values that are too low indicate a very aggressive electrolyte, resulting in a shorter life of the electrolytic capacitor at hig
temperatures. A compromise must be reached.

0IEOEKI 'YVVIRX 0'

(YI XS XLI EPYQMRYQ S\MHI PE]IV XLEX WIVZIW EW E HMIPIGXVMG E
been applied for long periods. This current is called leakage current.

% LMKL PIEOEKI GYVVIRX ½ S[W EJXIV ETTP]MRK ZSPXEKI XS XLI GETE
prolonged storage without any applied voltage. In the course of continuous operation, the leakage current will decrease
reach an almost constant value.

After a voltage-free storage the oxide layer may deteriorate, especially at a high temperature. Since there are no leakag
currents to transport oxygen ions to the anode, the oxide layer is not regenerated. The result is that a higher than norm
PIEOEKI GYVVIRX [MPP ½ S[[LIR ZSPXEKI MW ETTPMIH EJXIV TVSPSRK

4EGOEKMRK 5YERXMXMIW

Size 'SHI	(MEQIX0MRKXL QQ	QQ	&YPO 7XERHEVH 0IEHW	, YX 0IEHW	%YXS MRWIVXMSR WQQS 8ETI	6IIP
C3	5	11	10,000	15,000	2,000	2,600
E3	6.3	11	10,000	15,000	2,000	2,200
+	8	11	6,000	8,000	1,000	1,500
+	8	15	5,000	5,000	1,000	1,500
+	8	20	4,000	4,000	1,000	1,500
,	10	12.5	4,000	4,000	700	1,200
,	10	16	3,000	4,000	700	1,200
,	10	20	2,400	3,000	700	1,200
,	10	25	2,400	2,400	500	
,	10	30	2,000	2,000	500	
L3	13	20	2,000	2,000	500	
0	13	25	1,600	1,600	500	
0	13	30	1,200	1,200	500	
L7	13	40	1,000	500	500	
M7	16	25	1,000	500	300	
1	16	32	800	500	300	
M3	16	36	600	500	300	
2	18	36	500	500		
2	18	40	500	500		

Marking

KEMET Logo →
Polarity Stripe ( ) →
Rated Capacitance ↘
Rated Voltage (VDC) →
Date Code Month*/Year* ↘
Manufacturing Internal Codes →
← Series, Rated Temperature

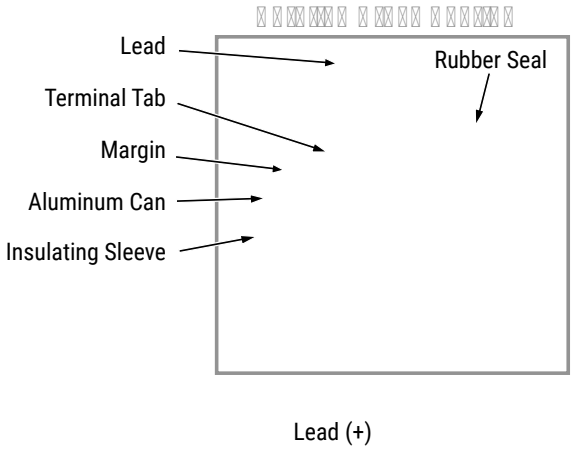
*Y = Year

Code	01	02	03	04	05	06	07	08	09
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019

*M = Month

Code	01	02	03	04	05	06	07	08	09	10	11	12
Month	1	2	3	4	5	6	7	8	9	10	11	12

' S R W X V Y G X M S R

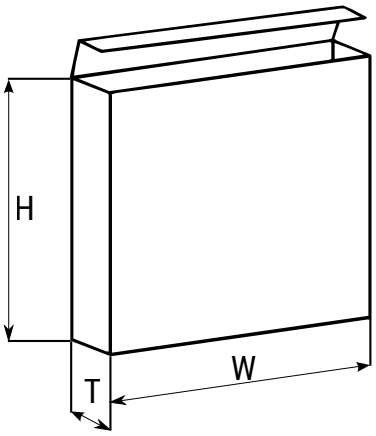


8ETMRK JSV %YXSQEXMG -RWIVXMSR 1EGLMRIW

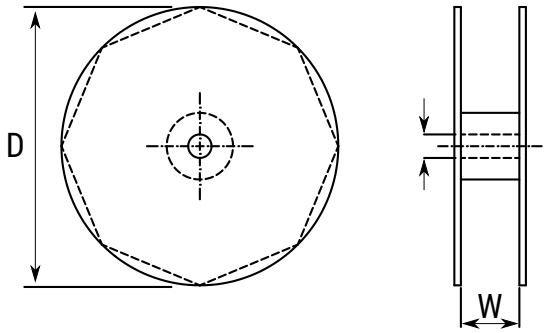
(MQIRW QQ	D	L	p	d	P	P0	P1	4	W	W0	W1	;	,	,	I	D0	X
8SPIVERGI			¯	r	r	r	r	r	+1/¯	r	1E\MQYQ	1E\MQYQ		Y	1E\MQYQ	Y Q	r
Formed to 2.5 mm	4	5–7	2.5	0.45	12.7	12.7	5.1	6.35	18	12	11	3	16	18.5		4	0.7
		µ	2.5	0.45	12.7	12.7	5.1	6.35	18	12	11	3	16	18.5		4	0.7
	5	>7	2.5	0.5	12.7	12.7	5.1	6.35	18	12	11	3	16	18.5		4	0.7

0IEH 8ETMRK 4EGOEKMRK

Ammo Box



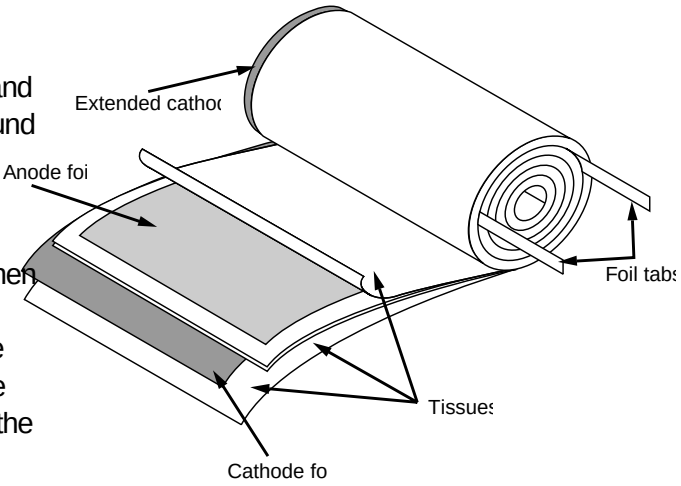
Reel



'EWI 7M^	% Q Q S			Reel		
	,	W	8	D	,	W
		Maximum	Maximum	±2	±0.5	–
4	230	340	42	350	30	50
5 x 5 – 7	230	340	42			
6.3 x 5 – 7	275	340	42			
8 x 5 – 9	235	340	45			
5 x 11	230	340	48			
6.3 x 11	270	340	48			
8 x 11	235	340	48			
8 x 14 – 20	240	340	57			
10 x 12	250	340	52			
10 x 15 – 19	256	340	57			
10 x 22 – 25	250	340	60			
12	270	340	57			
13	285	340	62			
16	265	340	62			

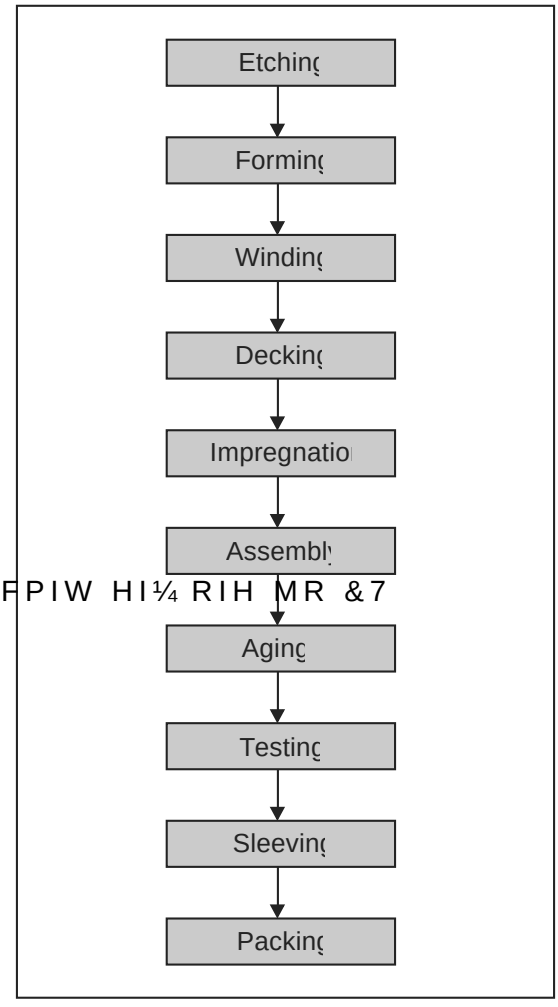
'SRWXVYGXMSR (EXE

The manufacturing process begins with the anode foil being electrochemically etched to increase the surface area and then "formed" to produce the aluminum oxide layer. Both the anode and cathode foils are then interleaved with absorbent paper and wound into a cylinder. During the winding process, aluminum tabs are attached to each foil to provide the electrical contact.



The deck, complete with terminals, is attached to the tabs and then folded down to rest on top of the winding. The complete winding is impregnated with electrolyte before being housed in a suitable container, usually an aluminum can, and sealed. Throughout the process, all materials inside the housing must be maintained at the highest purity and be compatible with the electrolyte.

Each capacitor is aged and tested before being sleeved and packed. The purpose of aging is to repair any damage in the oxide layer and thus reduce the leakage current to a very low level. Aging is normally carried out at the rated temperature of the capacitor and is accomplished by applying voltage to the device while carefully controlling the supply current. The process may take several hours to complete.



Damage to the oxide layer can occur due to variety of reasons:

- Slitting of the anode foil after forming
- Attaching the tabs to the anode foil
- Minor mechanical damage caused during winding

A sample from each batch is taken by the quality department after completion of the production process. This sample size is controlled F] XLI YWI SJ VIGSKRM^IH WEQTPMRK XEFPIW HI¼RIH MR &7

The following tests are applied and may be varied at the request of the customer. In this case the batch, or special procedure, will determine the course of action.

Electrical:

- Leakage current
- Capacitance
- ESR
- Impedance
- Tan Delta

Mechanical/Visual:

- Overall dimensions
- Torque test of mounting stud
- Print detail
- Box labels
- Packaging, including packed quantity

/)1)8)PIGXVSRMGW 'SVTSVEXMSR 7EPIW 3¾ GIW

*SV E GSQTPIXI PMWX SJ SYV KPSFEP WEPIW S¾ GIW TPIEWI ZMWMX

(MWGPEMQIV

%PP TVSHYGX WTIGM¼ GEXMSRW WXEXIQIRXW MRJSVQEXMSR ERH HEXE GSPPIGXMZIP] XLI ˆ
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ETTPMGEXMSRW FYX EVI RSX MRXIRHIH XS GSRWXMXYXI • ERH /)1)8 WTIGM¼ GEPP] HMWGPEM
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