

ZAE du Chêne Saint-Fiacre  
1 rue des Temps Modernes  
F-77600 CHANTELOUP EN BRIE • FRANCE  
Tel. : +33 (0)1 60 31 70 00 •  
www.exxelia.com

## HIGH ENERGY DENSITY, HIGH TEMPERATURE CAPACITOR / CONDENSATEUR HAUTE DENSITE D'ENERGIE, HAUTE TEMPERATURE

REFERENCE : **S-Series MML™**

### DESCRIPTION

Miniature Micro-Layer™ Film Capacitor  
with Metallized Polymer Dielectric  
Self-healing  
Thermoplastic case epoxy resin sealed  
Surface mount devise

### DESCRIPTION

Condensateur à film micro-couche  
avec diélectrique polymère métallisé  
Autocicatrisable  
Boîtier thermoplastique obturé résine époxy  
Sorties pour report à plat

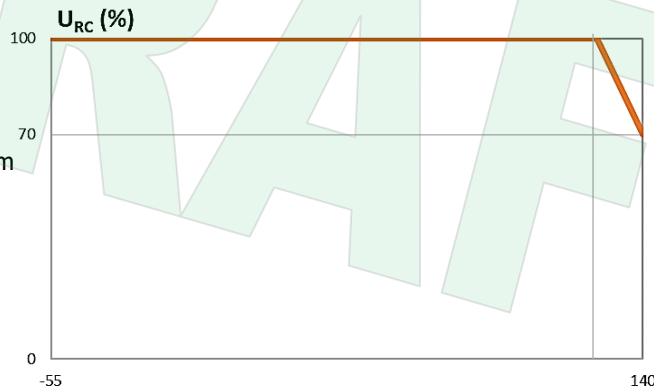
### GENERAL CHARACTERISTICS (25°C)

Capacitance	<b>C<sub>N</sub></b>	0,9 µF to/à 120 µF See page 3 / voir page 3
Tolerance		±10%
Rated voltages DC	<b>U<sub>RC</sub></b>	50V, 350V, 400V, 600V, 850V, 1000V
Insulation resistance under nominal voltage up to 500 Vdc max	<b>R<sub>I</sub></b>	≥ 10 000 MΩ.µF (60s)
Dissipation factor @ 1kHz	<b>Tg δ</b>	≤ 70.10 <sup>-4</sup> (1 kHz)
Test voltage	<b>U<sub>E</sub></b>	1,5 U <sub>RC</sub> /1mn
Operating temperature	<b>T°<sub>OP</sub></b>	-55 °C/+140 °C

### CARACTÉRISTIQUES GÉNÉRALES (25°C)

Capacité		0,9 µF to/à 120 µF See page 3 / voir page 3
Tolérance		±10%
Tension Nominale continue	<b>U<sub>RC</sub></b>	50V, 350V, 400V, 600V, 850V, 1000V
Résistance d'isolement sous tension nominale jusqu'à 500 Vcc max	<b>R<sub>I</sub></b>	≥ 10 000 MΩ.µF (60s)
Tangente de l'angle de perte à 1kHz	<b>Tg δ</b>	≤ 70.10 <sup>-4</sup> (1 kHz)
Tension de tenue	<b>U<sub>E</sub></b>	1,5 U <sub>RC</sub> /1mn
Température d'utilisation	<b>T°<sub>OP</sub></b>	-55 °C/+140 °C

Operating temperature range from  
-55°C at 140°C:  
With a voltage derating over  
125°C



Gamme de température  
d'utilisation de -55°C à 140°C :  
Avec un derating sur la tension  
nominale au-delà de 125°C

### MARKING

EFD  
Modèle  
Capacité – Tolérance  
U<sub>RC</sub>  
Date-code

### MARQUAGE

EFD  
Modèle  
Capacité – Tolérance  
U<sub>RC</sub>  
Date-code

### HOW TO ORDER

### CODIFICATION A LA COMMANDE

Model	R, N, J, L : Outputs	UL : Flame retardant	W : RoHS	Capacitance	Tolerance	Voltage
<b>S-series MML™</b>	<b>R</b>	<b>-</b>	<b>-</b>	<b>12 µF</b>	<b>±10%</b>	<b>50V</b>
Modèle	R, N, J, L : Sorties	UL : Auto-extinguible	W : RoHS	Capacité	Tolérance	Tension

Issue Indice	Date Date	Modif. nb N° modif.	Nature of modification Nature de la modification	Technical Technique	Manufacturing Production	Quality Qualité
A	19/11/2021		First Issue / Création			
EXXELIA – GBU Film Capacitor				Visa	Date / Visa	Date / Visa

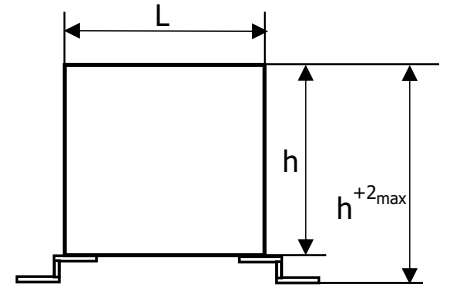
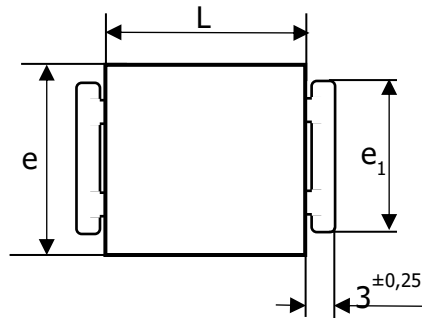
## DRAWING

Dimensions in mm – General tolerance ISO 2768-mK

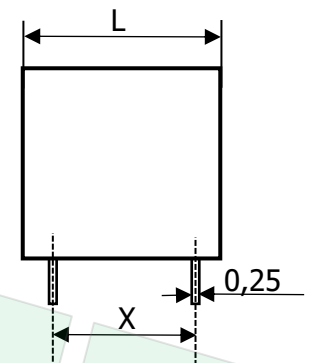
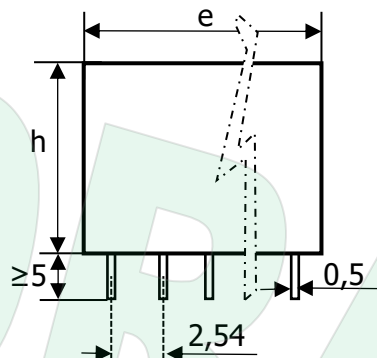
## PRESENTATION

Dimensions en mm – Tolérances générales ISO 2768-mK

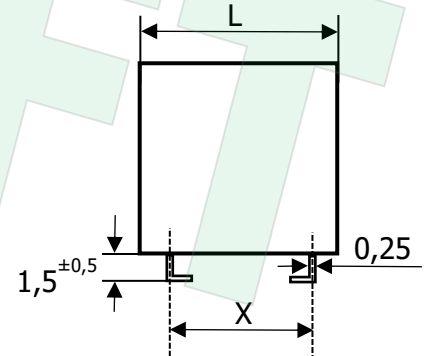
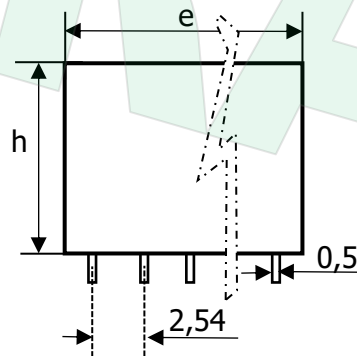
"R" Type / Modèle "R"



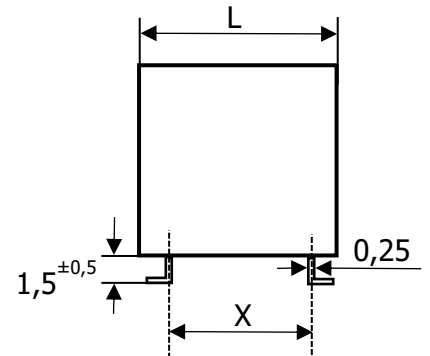
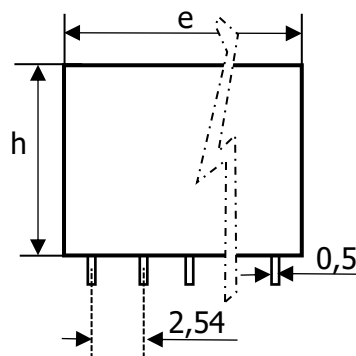
"N" Type / Modèle "N"



"J" Type / Modèle "J"



"L" Type / Modèle "L"



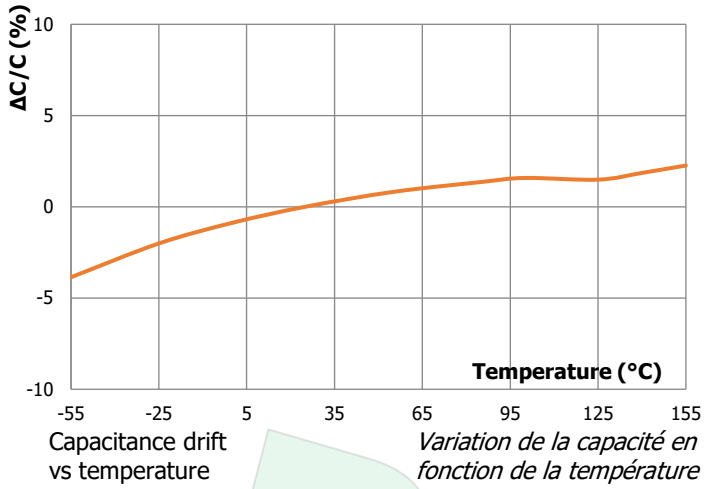
DIL outputs (N, J or L type) / terminaisons DIL (Modèles N, J, L)	No. of leads / Nb. connexions
L x e 16,5 x 15,5	5 x 2
24,5 x 41	15 x 2

**CAPACITANCE AND RATED VOLTAGE VALUES**
**VALEURS DE CAPACITE ET DE TENSION**

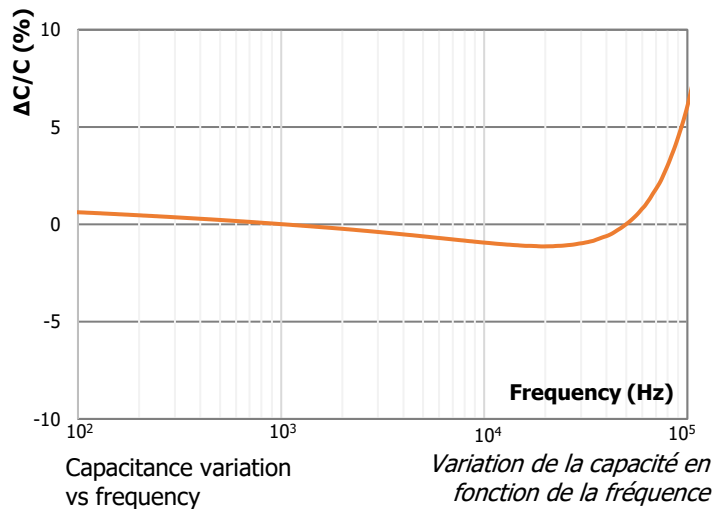
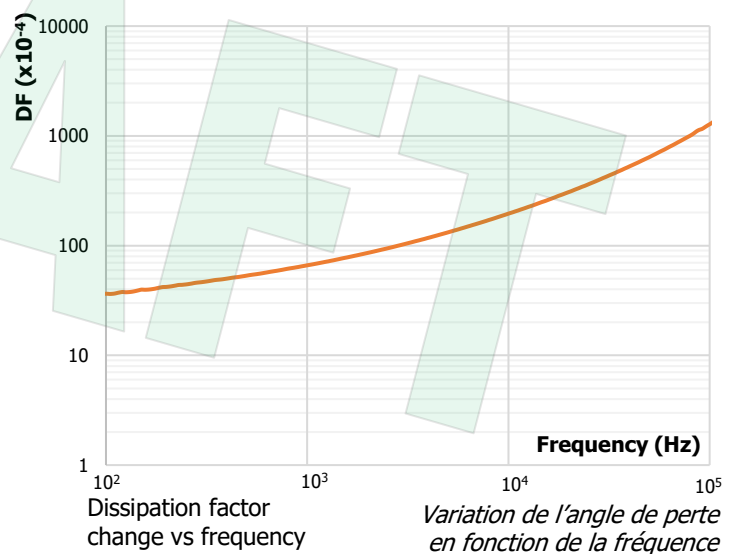
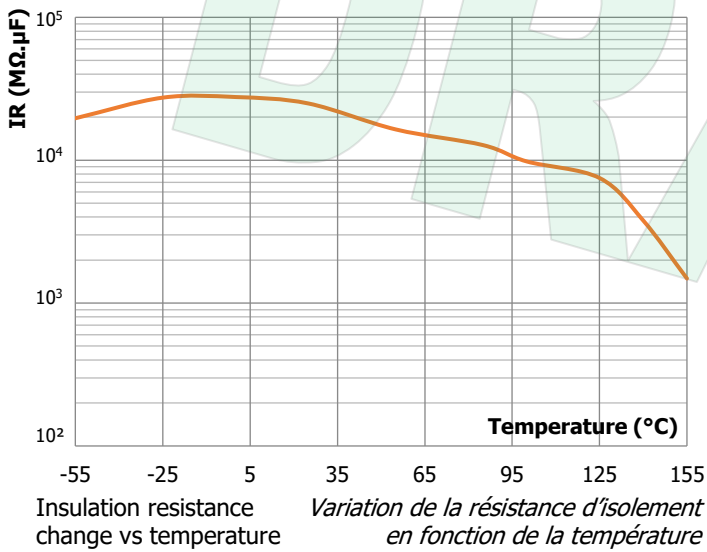
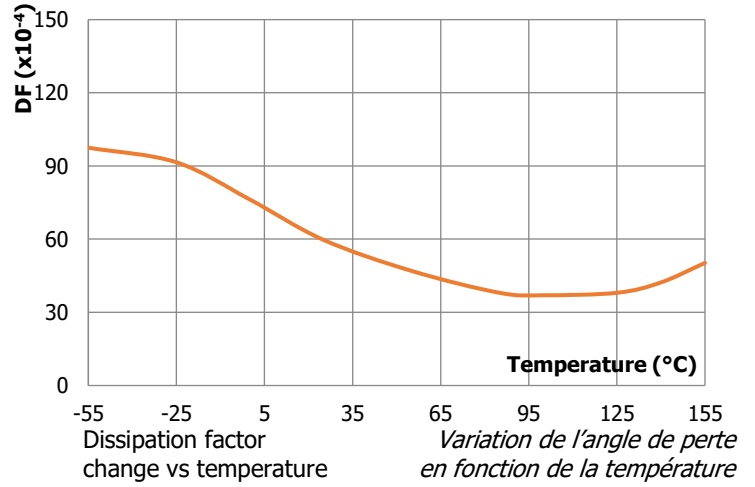
L max	h max	e max	e1±0,2	χ±0,4	50V	300V	450V	600V	850V	1000V
					C <sub>R</sub> (μF)	C <sub>R</sub> (μF)	C <sub>R</sub> (μF)	C <sub>R</sub> (μF)	C <sub>R</sub> (μF)	C <sub>R</sub> (μF)
16,5	6	15,5	12,5	13,7	12					
16,5	6	15,5	12,5	13,7	24					
16,5	8	15,5	12,5	13,7	36					
16,5	8	15,5	12,5	13,7	48					
16,5	10	15,5	12,5	13,7	60					
16,5	12	15,5	12,5	13,7	72					
16,5	12	15,5	12,5	13,7	84					
16,5	14	15,5	12,5	13,7	96					
16,5	17	15,5	12,5	13,7	108					
16,5	17	15,5	12,5	13,7	120					
24,1	6,8	41	24	20,3		8,6	4,1	2,3	1,2	0,9
24,1	6,8	41	24	20,3		17,1	8,1	4,6	2,4	1,8
24,1	9,9	41	24	20,3		25,7	12,2	6,8	3,6	2,6
24,1	9,9	41	24	20,3		34,2	16,2	9,1	4,8	3,5
24,1	13,5	41	24	20,3		42,8	20,3	11,4	6,0	4,4
24,1	13,5	41	24	20,3		51,3	24,4	13,7	7,2	5,3
24,1	13,5	41	24	20,3		59,9	28,4	15,9	8,4	6,1
24,1	16,7	41	24	20,3		68,4	32,5	18,2	9,6	7,0
24,1	16,7	41	24	20,3		77,0	36,5	20,5	10,8	7,9
24,1	20,3	41	24	20,3		85,6	40,6	22,8	12,0	8,8
24,1	20,3	41	24	20,3		94,1	44,6	25,1	13,2	9,6
24,1	20,3	41	24	20,3		102,7	48,7	27,3	14,4	10,5

For any intermediate value, requested from the technical service  
*Pour toute valeur intermédiaire, demandée au service technique*

**GENERAL INFORMATION**



**GENERALITES**



# MML™ M-Series

## Miniature Micro-Layer™ Film Capacitor with Metallized Polymer Dielectric Industry-Leading Performance at Temperatures up to 140°C

### FEATURES

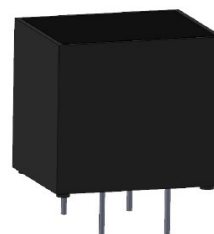
- ◆ Up to 50% size and weight reduction vs traditional technologies
- ◆ High temperature to +140°C
- ◆ Stable Performance through Temperature/Voltage Range
- ◆ Rugged/Lightweight Construction

### APPLICATIONS

Aerospace & Defense, Industrial, Medical, Transportation

### PHYSICAL CHARACTERISTICS

- Construction:** Non-Inductive stacked metallized polymer film encapsulated in flame retardant resin
- Case:** Flame retardant, molded diallyl phthalate (DAP) Housing
- Leads:** 18AWG 60Sn/40Pb Solder Coated Copper Wire  
See page 2 for number of leads and lead spacing



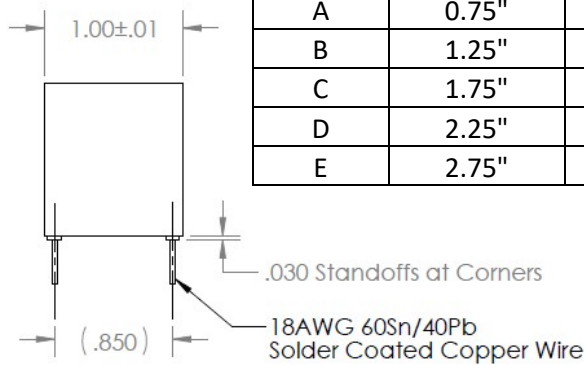
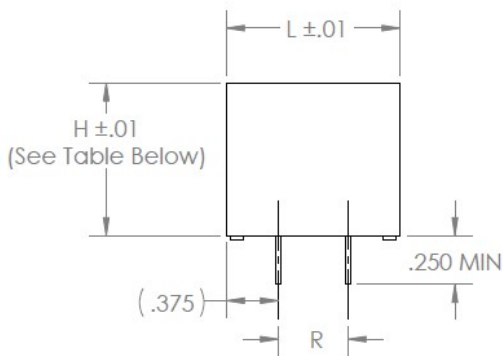
### ELECTRICAL SPECIFICATIONS

- Operating Temp:** -55°C to +125°C (Up to 140°C at 0.7\*U<sub>RDC</sub>)
- Capacitance Range:** 1.1µF to 300µF
- Capacitance Tolerance:** ±10%
- Voltage Range:** 300VDC–1000VDC
- Dissipation Factor:** 1.0% max, when measured at 1kHz @ 25°C
- Insulation Resistance:** 10,000 MΩ-µF minimum, when measured at rated voltage (up to 500VDC max) @ 25°C
- Dielectric Withstanding Voltage:** 1.5\*U<sub>RDC</sub> for 1 minute

### ORDERING GUIDE

<u>MMLM</u>	<u>E</u>	<u>14</u>	<u>Example</u>
<b>Series</b>	<b>Case Code</b> See Capacitance Ratings Table (page 2)	<b>Capacitance Code</b> See Capacitance Ratings Table (page 2)	<b>MMLME14</b>
			Capacitance 20µF
			Voltage 850VDC
			Case Height 0.7 in

**\*\*Custom configurations and extended/intermediary values available upon request.**

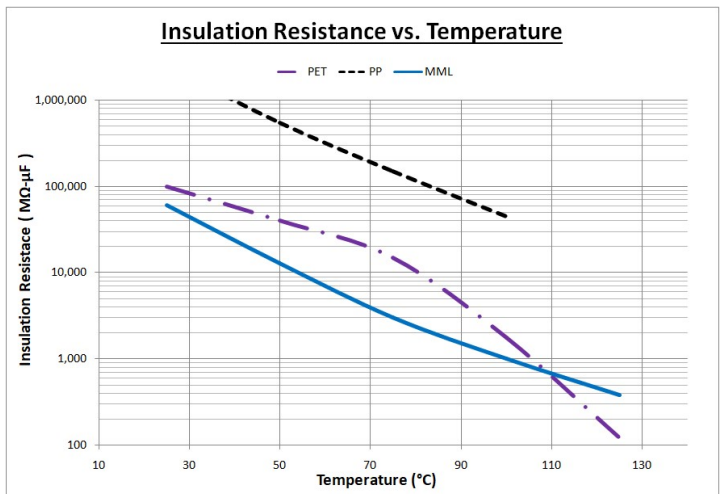
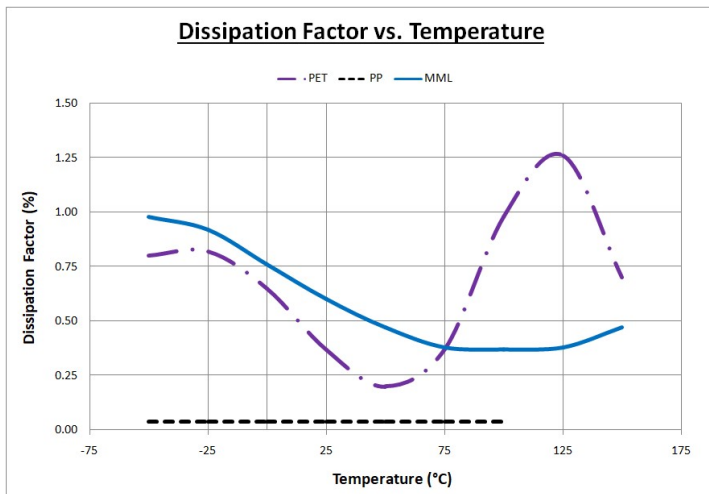
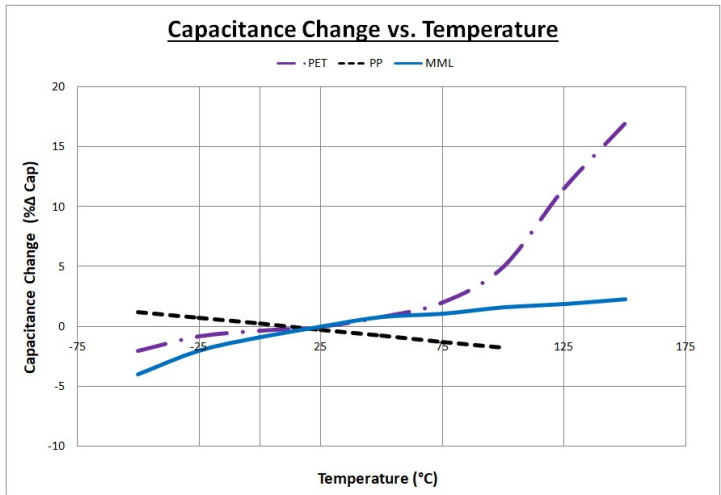
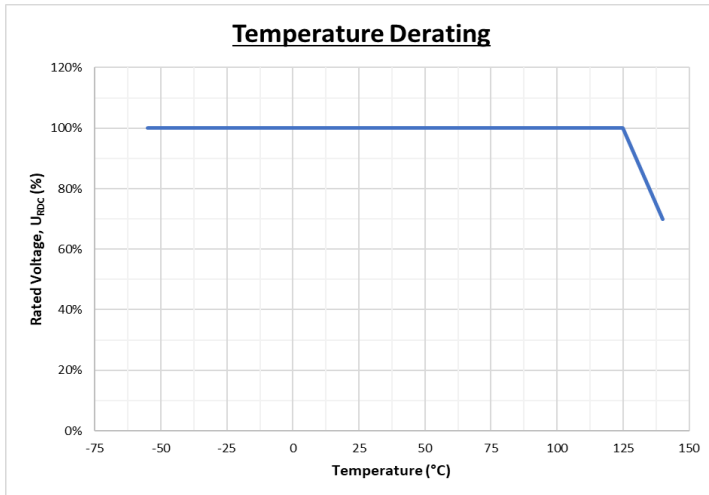


Case Code	Case Length "L"	Lead Spacing "R"	No. Leads per Side
A	0.75"	-	1
B	1.25"	0.50"	2
C	1.75"	1.00"	2
D	2.25"	1.50"	2
E	2.75"	2.00"	2

Rated Voltage (VDC)	Capacitance Code	Case Height "H"	Rated Capacitance by Case Code				
			A (0.75")	B (1.25")	C (1.75")	D (2.25")	E (2.75")
300V	01	0.5"	15 $\mu\text{F}$	30 $\mu\text{F}$	45 $\mu\text{F}$	60 $\mu\text{F}$	75 $\mu\text{F}$
	02	0.7"	30 $\mu\text{F}$	60 $\mu\text{F}$	90 $\mu\text{F}$	120 $\mu\text{F}$	150 $\mu\text{F}$
	03	0.9"	45 $\mu\text{F}$	90 $\mu\text{F}$	135 $\mu\text{F}$	180 $\mu\text{F}$	225 $\mu\text{F}$
	04	1.1"	60 $\mu\text{F}$	120 $\mu\text{F}$	180 $\mu\text{F}$	240 $\mu\text{F}$	300 $\mu\text{F}$
450V	05	0.5"	6 $\mu\text{F}$	12 $\mu\text{F}$	18 $\mu\text{F}$	24 $\mu\text{F}$	30 $\mu\text{F}$
	06	0.7"	12 $\mu\text{F}$	24 $\mu\text{F}$	36 $\mu\text{F}$	48 $\mu\text{F}$	60 $\mu\text{F}$
	07	0.9"	18 $\mu\text{F}$	36 $\mu\text{F}$	54 $\mu\text{F}$	72 $\mu\text{F}$	90 $\mu\text{F}$
	08	1.1"	24 $\mu\text{F}$	48 $\mu\text{F}$	72 $\mu\text{F}$	96 $\mu\text{F}$	120 $\mu\text{F}$
600V	09	0.5"	3 $\mu\text{F}$	6 $\mu\text{F}$	9 $\mu\text{F}$	12 $\mu\text{F}$	16 $\mu\text{F}$
	10	0.7"	6 $\mu\text{F}$	12 $\mu\text{F}$	18 $\mu\text{F}$	25 $\mu\text{F}$	32 $\mu\text{F}$
	11	0.9"	9 $\mu\text{F}$	18 $\mu\text{F}$	27 $\mu\text{F}$	38 $\mu\text{F}$	48 $\mu\text{F}$
	12	1.1"	12 $\mu\text{F}$	24 $\mu\text{F}$	36 $\mu\text{F}$	50 $\mu\text{F}$	64 $\mu\text{F}$
850V	13	0.5"	2 $\mu\text{F}$	4 $\mu\text{F}$	6 $\mu\text{F}$	8 $\mu\text{F}$	10 $\mu\text{F}$
	14	0.7"	4 $\mu\text{F}$	8 $\mu\text{F}$	12 $\mu\text{F}$	16 $\mu\text{F}$	20 $\mu\text{F}$
	15	0.9"	6 $\mu\text{F}$	12 $\mu\text{F}$	18 $\mu\text{F}$	24 $\mu\text{F}$	30 $\mu\text{F}$
	16	1.1"	8 $\mu\text{F}$	16 $\mu\text{F}$	24 $\mu\text{F}$	32 $\mu\text{F}$	40 $\mu\text{F}$
1000V	17	0.5"	1.1 $\mu\text{F}$	2.2 $\mu\text{F}$	3.3 $\mu\text{F}$	4.7 $\mu\text{F}$	5.6 $\mu\text{F}$
	18	0.7"	2.2 $\mu\text{F}$	4.7 $\mu\text{F}$	6.8 $\mu\text{F}$	9 $\mu\text{F}$	12 $\mu\text{F}$
	19	0.9"	3.3 $\mu\text{F}$	6.8 $\mu\text{F}$	10 $\mu\text{F}$	14 $\mu\text{F}$	17 $\mu\text{F}$
	20	1.1"	4.7 $\mu\text{F}$	9 $\mu\text{F}$	14 $\mu\text{F}$	18 $\mu\text{F}$	23 $\mu\text{F}$

**\*\*Custom configurations and extended/Intermediary values available upon request.**

## MML™ Performance Characteristics

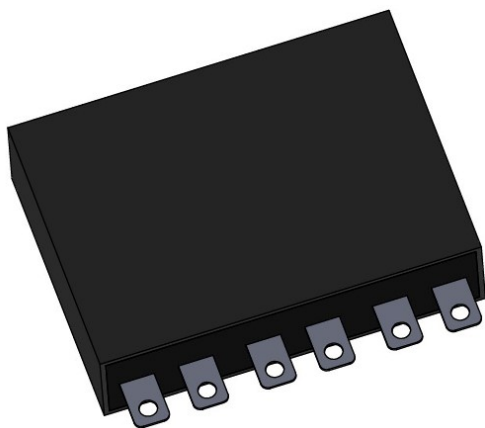


Environmental Test	Standard	Method	Condition
Humidity (Steady-State)	MIL-STD-202	103	C
Barometric Pressure (Reduced)	MIL-STD-202	105	C
Thermal Shock	MIL-STD-202	107	A
Life (at Elevated Ambient Temperature)	MIL-STD-202	108	F

All product drawings, descriptions, specifications, statements, information and data (henceforth referred to as the "information") in this datasheet or other publications are subject to change. The customer is responsible for checking, confirming and verifying the extent to which the information contained in this datasheet or other publication is applicable to an order at the time the order is placed. All information given herein is believed to be accurate and reliable, but it is presented without any guarantee, warranty, representation or responsibility of any kind, expressed or implied.

# MML™ D-Series

**Miniature Micro-Layer™ Film Capacitor with Metallized Polymer Dielectric**  
**Industry-Leading Performance at Temperatures up to 140°C**



## FEATURES

- ◆ Up to 50% size and weight reduction vs traditional technologies
- ◆ High temperature to +140°C
- ◆ Stable Performance through Temperature/Voltage Range
- ◆ Rugged/Lightweight Construction

## ELECTRICAL SPECIFICATIONS

**Operating Temp:** -55°C to +125°C (Up to 140°C at 0.7\*U<sub>RDC</sub>)

**Capacitance Range:** 100µF to 2400µF

**Capacitance Tolerance:** ±10%

**Voltage Range:** 300VDC–1000VDC

**Dissipation Factor:** 1.0% max, when measured at 1kHz @ 25°C

**Insulation Resistance:** 10,000 MΩ-µF minimum, when measured at rated voltage (up to 500VDC max) @ 25°C

**Dielectric Withstanding Voltage:** 1.5\*U<sub>RDC</sub> for 1 minute

## APPLICATIONS

Aerospace & Defense, Industrial, Medical, Transportation

## PHYSICAL CHARACTERISTICS

**Construction:** Non-Inductive stacked metallized polymer film encapsulated in flame retardant high temperature epoxy

**Case:** Flame retardant, plastic housing

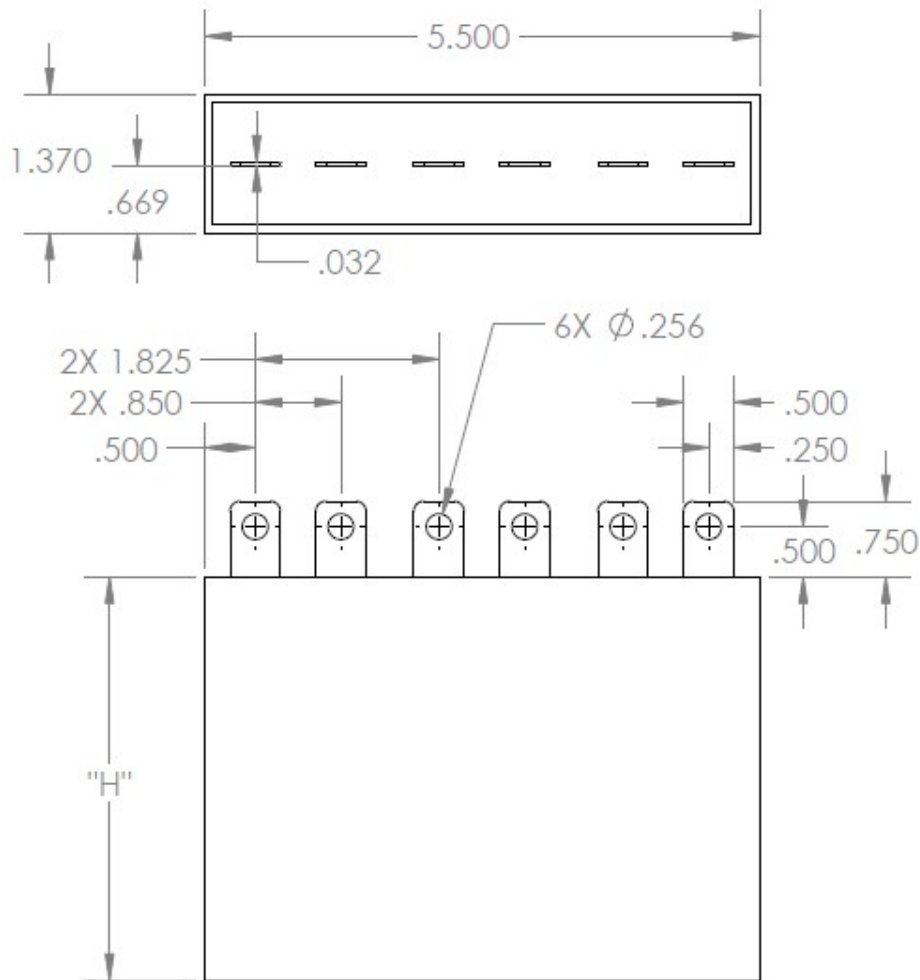
**Leads:** Bolt down tinned copper terminals

## ORDERING GUIDE

MMLD	B	06	Example
<b>Series</b>	<b>Case Code</b> See Capacitance Ratings Table (page 2)	<b>Capacitance Code</b> See Capacitance Ratings Table (page 2)	<b>MMLDB06</b>
			Capacitance 500µF
			Voltage 600VDC
			Case Height 4.0 in

**\*\*Custom configurations and extended/intermediary values available upon request.**

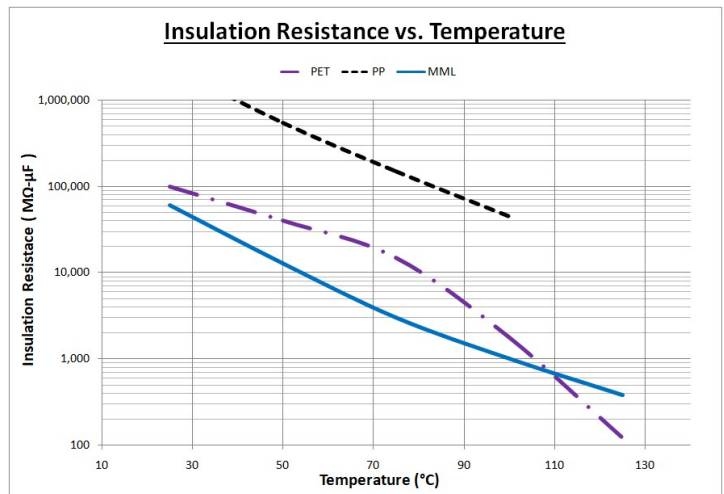
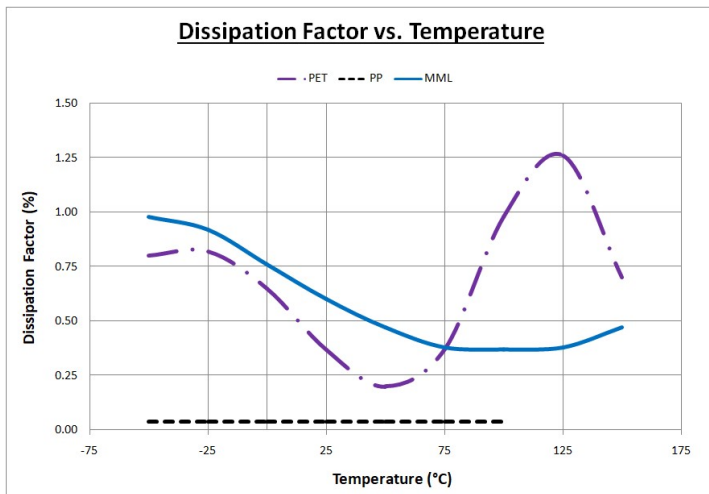
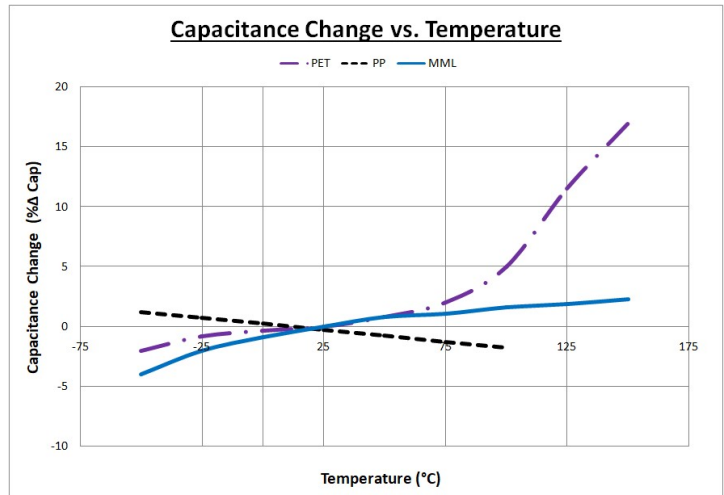
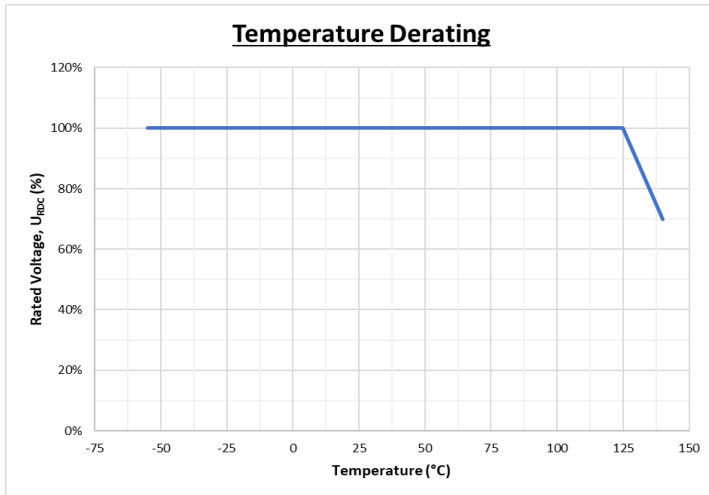




		Capacitance Code	Case Size ("H")	Maximum Capacitance	$R_s$ (m $\Omega$ )	$I_{max}$ (A $_{rms}$ )
Rated Voltage (VDC)	300V	01	A (2 in.)	1200 $\mu$ F	0.54	100
		02	B (4 in.)	2400 $\mu$ F	0.27	200
	450V	03	A (2 in.)	500 $\mu$ F	0.86	100
		04	B (4 in.)	1000 $\mu$ F	0.43	200
	600V	05	A (2 in.)	250 $\mu$ F	1.08	100
		06	B (4 in.)	500 $\mu$ F	0.54	200
	850V	07	A (2 in.)	150 $\mu$ F	1.38	50
		08	B (4 in.)	300 $\mu$ F	0.69	100
	1000V	09	A (2 in.)	100 $\mu$ F	1.90	50
		10	B (4 in.)	200 $\mu$ F	0.95	100

**\*\*Custom configurations and extended/Intermediary values available upon request.**

## MML™ Performance Characteristics



Environmental Test	Standard	Method	Condition
Humidity (Steady-State)	MIL-STD-202	103	C
Barometric Pressure (Reduced)	MIL-STD-202	105	C
Thermal Shock	MIL-STD-202	107	A
Life (at Elevated Ambient Temperature)	MIL-STD-202	108	F

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# MML™ C-Series

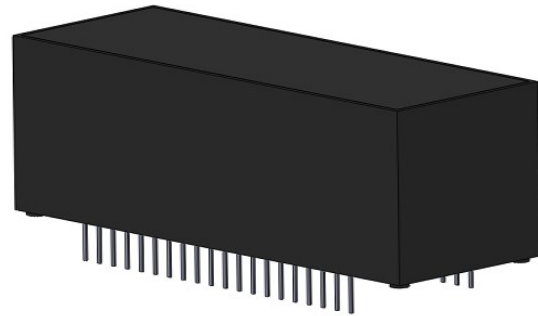
## Miniature Micro-Layer™ Film Capacitor with Metallized Polymer Dielectric Industry-Leading Performance at Temperatures up to 140°C

### FEATURES

- ◆ Up to 50% size and weight reduction vs traditional technologies
- ◆ High temperature to +140°C
- ◆ Stable Performance through Temperature/Voltage Range
- ◆ Rugged/Lightweight Construction

### APPLICATIONS

Aerospace & Defense, Industrial, Medical, Transportation



### PHYSICAL CHARACTERISTICS

**Construction:** Non-Inductive stacked metallized polymer film encapsulated in flame retardant high temperature epoxy

**Case:** Flame retardant, molded diallyl phthalate (DAP) Housing

**Leads:** Tinned copper pins on 0.100" centers. See page 2 for number of pins

### ELECTRICAL SPECIFICATIONS

**Operating Temp:** -55°C to +125°C (Up to 140°C with derating)

**Capacitance Range:** 2.2µF to 300µF

**Capacitance Tolerance:** ±10%

**Voltage Range:** 300VDC–1000VDC

**Dissipation Factor:** 1.0% max, when measured at 1kHz @ 25°C

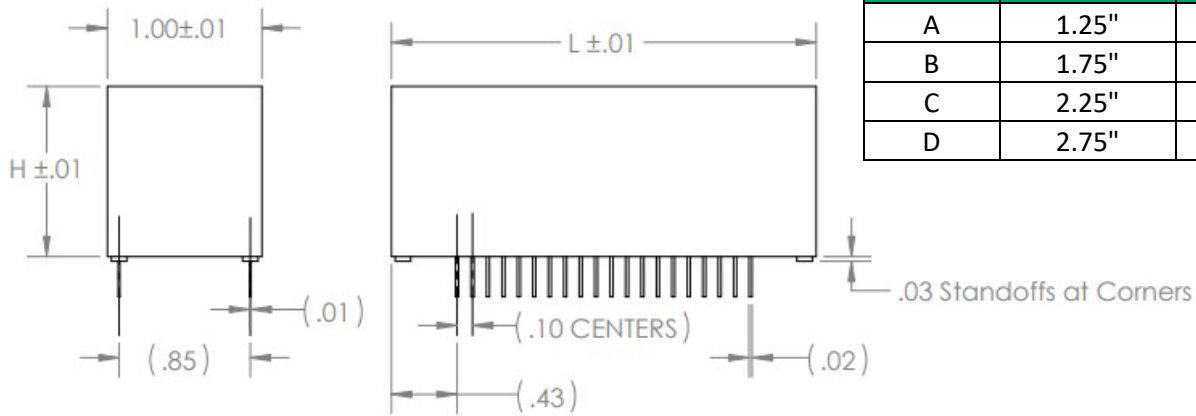
**Insulation Resistance:** 10,000 MΩ-µF minimum, when measured at rated voltage (up to 500VDC max) @ 25°C

**Dielectric Withstanding Voltage:** 1.5\*U<sub>RDC</sub> for 1 minute

### ORDERING GUIDE

<u>MMLC</u>	<u>B</u>	<u>07</u>	<u>Example</u>
<b>Series</b>	<b>Case Code</b> See Capacitance Ratings Table (page 2)	<b>Capacitance Code</b> See Capacitance Ratings Table (page 2)	<b>MMLCB07</b>
			Capacitance 54µF
			Voltage 450VDC
			Case Height 0.9 in

**\*\*Custom configurations and extended/intermediary values available upon request.**

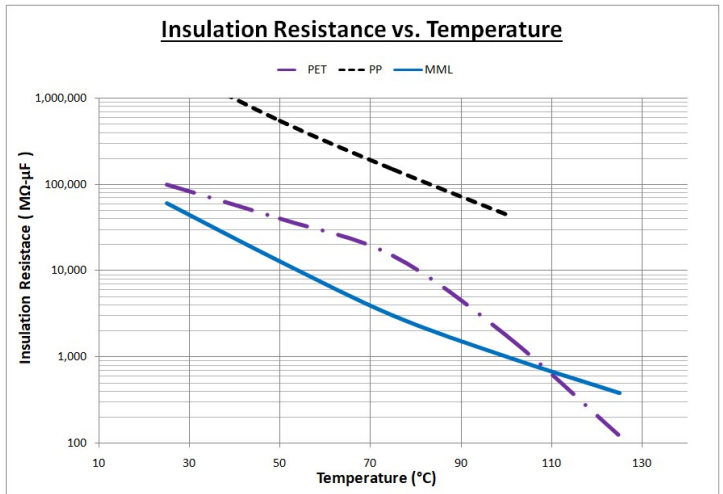
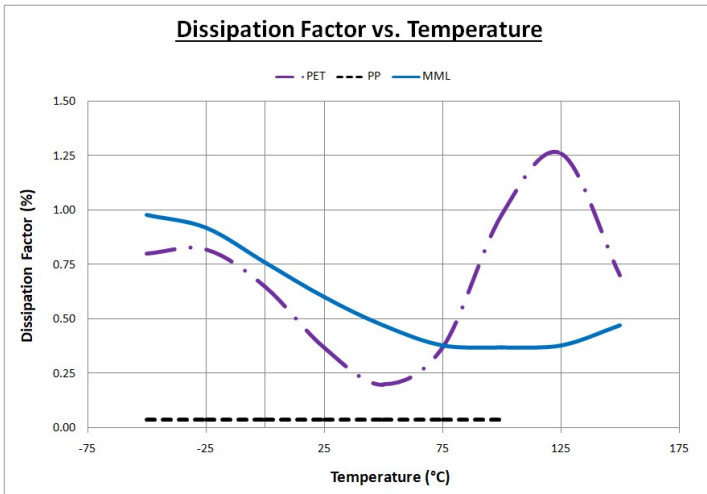
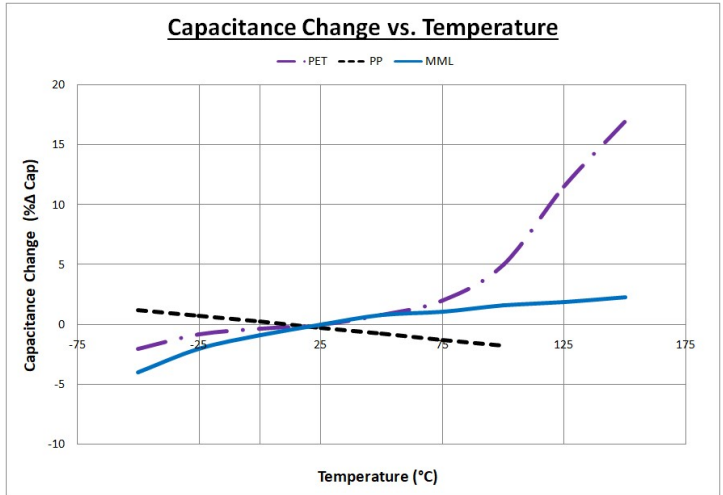
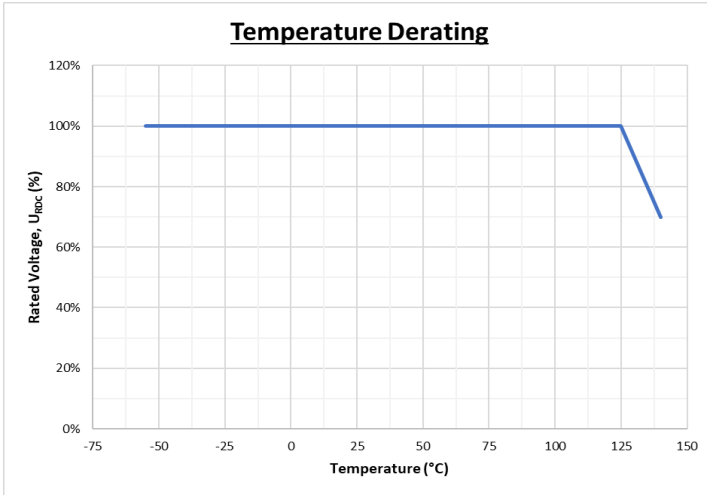


Case Code	Case Length "L"	No. Pins per Side
A	1.25"	5
B	1.75"	10
C	2.25"	15
D	2.75"	20

Rated Voltage (VDC)	Capacitance Code	Case Height "H"	Rated Capacitance by Case Code			
			A (1.25")	B (1.75")	C (2.25")	D (2.75")
300V	01	0.5"	30 µF	45 µF	60 µF	75 µF
	02	0.7"	60 µF	90 µF	120 µF	150 µF
	03	0.9"	90 µF	135 µF	180 µF	225 µF
	04	1.1"	120 µF	180 µF	240 µF	300 µF
450V	05	0.5"	12 µF	18 µF	24 µF	30 µF
	06	0.7"	24 µF	36 µF	48 µF	60 µF
	07	0.9"	36 µF	54 µF	72 µF	90 µF
	08	1.1"	48 µF	72 µF	96 µF	120 µF
600V	09	0.5"	6 µF	9 µF	12 µF	16 µF
	10	0.7"	12 µF	18 µF	25 µF	32 µF
	11	0.9"	18 µF	27 µF	38 µF	48 µF
	12	1.1"	24 µF	36 µF	50 µF	64 µF
850V	13	0.5"	4 µF	6 µF	8 µF	10 µF
	14	0.7"	8 µF	12 µF	16 µF	20 µF
	15	0.9"	12 µF	18 µF	24 µF	30 µF
	16	1.1"	16 µF	24 µF	32 µF	40 µF
1000V	17	0.5"	2.2 µF	3.3 µF	4.7 µF	5.6 µF
	18	0.7"	4.7 µF	6.8 µF	9 µF	12 µF
	19	0.9"	6.8 µF	10 µF	14 µF	17 µF
	20	1.1"	9 µF	14 µF	18 µF	23 µF

**\*\*Custom configurations and extended/Intermediary values available upon request.**

## MML™ Performance Characteristics



Environmental Test	Standard	Method	Condition
Humidity (Steady-State)	MIL-STD-202	103	C
Barometric Pressure (Reduced)	MIL-STD-202	105	C
Thermal Shock	MIL-STD-202	107	A
Life (at Elevated Ambient Temperature)	MIL-STD-202	108	F

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