

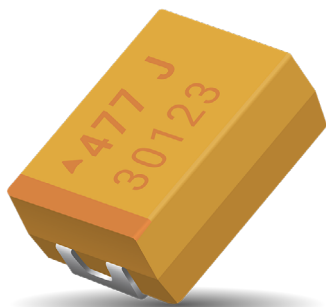


**THE DATASHEET OF  
TPME477M010R0023**



# TPM Multianode

## Tantalum Ultra Low ESR Capacitor



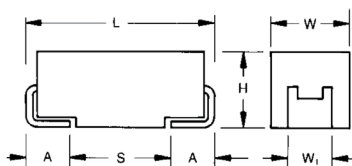
### FEATURES

- Multi-anode Construction
- Super Low ESR
- 100% Surge Current Tested
- CV Range: 10-2200 $\mu$ F / 2.5-50V
- 5 Case Sizes Available
- "Mirror" Multi-anode Construction Used with D, Y Case Capacitors Reduces ESL to Half

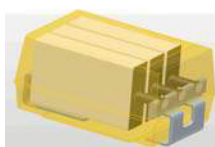


### APPLICATIONS

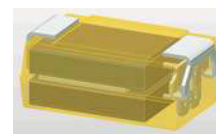
- High Power DC/DC General Applications



### MULTIANODE CONSTRUCTION



### MULTIANODE TPM D, Y LOW SELF INDUCTANCE CONSTRUCTION "MIRROR" DESIGN



### MARKING

#### D, E, U, V, Y CASE

### CASE DIMENSIONS:

millimeters (inches)

Code	EIA Code	EIA Metric	L $\pm$ 0.20 (0.008)	W $\pm$ 0.20 (0.008) -0.10 (0.004)	H $\pm$ 0.20 (0.008) -0.10 (0.004)	W $\pm$ 0.20 (0.008)	A $\pm$ 0.30 (0.012) -0.20 (0.008)	S Min.
D	2917	7343-31	7.30 (0.287)	4.30 (0.169)	2.90 (0.114)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
E	2917	7343-43	7.30 (0.287)	4.30 (0.169)	4.10 (0.162)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
U	2924	7361-43	7.30 (0.287)	6.10 (0.240)	4.10 (0.162)	3.10 (0.122)	1.30 (0.051)	4.40 (0.173)
V	2924	7361-38	7.30 (0.287)	6.10 (0.240)	3.55 (0.140)	3.10 (0.122)	1.30 (0.051)	4.40 (0.173)
Y	2917	7343-20	7.30 (0.287)	4.30 (0.169)	2.00 (0.079) max	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)

W1 dimension applies to the termination width for A dimensional area only.

### HOW TO ORDER

**TPM**

Type

**E**

Case Size  
See table above

**108**

Capacitance Code  
pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

**M**

Tolerance  
K =  $\pm$ 10%  
M =  $\pm$ 20%

**004**

Rated DC Voltage  
002=2.5Vdc  
004=4Vdc  
006=6.3Vdc  
010=10Vdc  
016=16Vdc  
020=20Vdc  
025=25Vdc  
035=35Vdc  
050=50Vdc

**R**

Packaging  
R = Pure Tin 7" Reel  
S = Pure Tin 13" Reel  
H = Tin Lead 7" Reel  
K = Tin Lead 13" Reel  
H, K = Non RoHS  
H, K = Please Contact Manufacturer

**0018**

ESR in m $\Omega$

### TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C										
Capacitance Range:	10 $\mu$ F to 2200 $\mu$ F										
Capacitance Tolerance:	$\pm$ 10%, $\pm$ 20%										
Rated Voltage ( $V_R$ )	$\leq$ +85°C:	2.5	4	6.3	10	16	20	25	35	50	
Category Voltage ( $V_C$ )	$\leq$ +125°C:	1.7	2.7	4	7	10	13	17	23	33	
Surge Voltage ( $V_S$ )	$\leq$ +85°C:	3.3	5.2	8	13	20	26	32	46	65	
Surge Voltage ( $V_S$ )	$\leq$ +125°C:	2.2	3.4	5	8	13	16	20	28	40	
Temperature Range:	-55°C to +125°C										
Reliability:	1% per 1000 hours at 85°C, $V_R$ with 0.1 $\Omega$ /V series impedance, 60% confidence level										

# TPM Multianode

## Tantalum Ultra Low ESR Capacitor



### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V <sub>R</sub> ) to 85°C								
µF	Code	2.5V (e)	4V (G)	6.3V (J)	10V (A)	16V (C)	20V (D)	25V (E)	35V (V)	50V (T)
6.8	685									
10	106									D(140)/E(120)
15	156									E(75,100)
22	226								D(70) E(60,100)	E(75,100)
33	336							D(65)	E(50,65)	
47	476					D(100)	D(45,55)	D(55)/E(65)	E(55,65)	
68	686					D(40,50)		E(45,55)		
100	107				Y(45) <sup>(M)</sup>	D(40,50)	E(35,45)	E(45,60)		
150	157				Y(45) <sup>(M)</sup>	E(30,40)	E(35)			
220	227			Y(30) <sup>(M)</sup>	D(35)	E(25,40) U(30,40)				
330	337		D(25,35)	D(25,35)	D(35)/E(23,35)	E(50)				
470	477		D(25,35)	D(30) E(18,23,30)	E(23,30) U(23,30)					
680	687		D(25)/E(18,23)	E(18,23) U(18,23)/V(23)						
1000	108	D(25)	D(25,45) E(18,23) U(18,23)/V(18)	E(25) <sup>(M)</sup> /V(20) <sup>(M)</sup>						
1500	158	E(12,15,18) U(18,23)	E(15,18)							
2200	228	E(18) <sup>(M)</sup>								

Released ratings <sup>(M tolerance only)</sup>, (ESR ratings in mOhms in parentheses)

Note: Voltage ratings are minimum values. KYOCERA AVX reserves the right to supply higher voltage ratings in the same case size, to the same reliability standards.

# TPM Multianode

## Tantalum Ultra Low ESR Capacitor



### RATINGS & PART NUMBER REFERENCE

Part Number	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (A)			MSL
										25°C	85°C	125°C	
<b>2.5 Volt @ 85°C</b>													
TPMD108*002#0025	D	1000	2.5	85	1.7	125	25	8	25	3.194	2.874	1.277	3
TPME158*002R0012	E	1500	2.5	85	1.7	125	38	6	12	4.743	4.269	1.897	3
TPME158*002#0015	E	1500	2.5	85	1.7	125	38	6	15	4.243	3.818	1.697	3
TPME158*002#0018	E	1500	2.5	85	1.7	125	38	6	18	3.873	3.486	1.549	3
TPMU158*002R0018	U	1500	2.5	85	1.7	125	30	6	18	4.048	3.643	1.619	3
TPMU158*002R0023	U	1500	2.5	85	1.7	125	30	6	23	3.581	3.223	1.433	3
TPME228M002#0018	E	2200	2.5	85	1.7	125	44	10	18	3.873	3.486	1.549	3
<b>4 Volt @ 85°C</b>													
TPMD337*004#0025	D	330	4	85	2.7	125	13.2	8	25	3.194	2.874	1.277	3
TPMD337*004#0035	D	330	4	85	2.7	125	13.2	8	35	2.699	2.429	1.080	3
TPMD477*004#0025	D	470	4	85	2.7	125	18.8	8	25	3.194	2.874	1.277	3
TPMD477*004#0035	D	470	4	85	2.7	125	18.8	8	35	2.699	2.429	1.080	3
TPMD687*004#0025	D	680	4	85	2.7	125	27.2	8	25	3.194	2.874	1.277	3
TPME687*004#0018	E	680	4	85	2.7	125	27	6	18	3.873	3.486	1.549	3
TPME687*004#0023	E	680	4	85	2.7	125	27	6	23	3.426	3.084	1.370	3
TPMD108*004#0025	D	1000	4	85	2.7	125	40	8	25	3.194	2.874	1.277	3
TPMD108*004#0045	D	1000	4	85	2.7	125	40	8	45	2.380	2.142	0.952	3
TPME108*004#0018	E	1000	4	85	2.7	125	40	6	18	3.873	3.486	1.549	3
TPME108*004#0023	E	1000	4	85	2.7	125	40	6	23	3.426	3.084	1.370	3
TPMU108*004R0018	U	1000	4	85	2.7	125	40	6	18	4.048	3.643	1.619	3
TPMU108*004R0023	U	1000	4	85	2.7	125	40	6	23	3.581	3.223	1.433	3
TPMV108*004#0018	V	1000	4	85	2.7	125	40	6	18	3.979	3.581	1.592	3
TPME158*004#0015	E	1500	4	85	2.7	125	60	6	15	4.243	3.818	1.697	3
TPME158*004#0018	E	1500	4	85	2.7	125	60	6	18	3.873	3.486	1.549	3
<b>6.3 Volt @ 85°C</b>													
TPMY227M006#0030	Y	220	6.3	85	4	125	13.2	6	30	2.646	2.381	1.058	3
TPMD337*006#0025	D	330	6.3	85	4	125	19.8	8	25	3.194	2.874	1.277	3
TPMD337*006#0035	D	330	6.3	85	4	125	19.8	8	35	2.699	2.429	1.080	3
TPMD477*006#0030	D	470	6.3	85	4	125	28.2	8	30	2.915	2.624	1.166	3
TPME477*006#0018	E	470	6.3	85	4	125	28	6	18	3.873	3.486	1.549	3
TPME477*006#0023	E	470	6.3	85	4	125	28	6	23	3.426	3.084	1.370	3
TPME477*006#0030	E	470	6.3	85	4	125	28	6	30	3.000	2.700	1.200	3
TPME687*006#0018	E	680	6.3	85	4	125	41	6	18	3.873	3.486	1.549	3
TPME687*006#0023	E	680	6.3	85	4	125	41	6	23	3.426	3.084	1.370	3
TPMU687*006R0018	U	680	6.3	85	4	125	41	6	18	4.048	3.643	1.619	3
TPMU687*006R0023	U	680	6.3	85	4	125	41	6	23	3.581	3.223	1.433	3
TPMV687*006#0023	V	680	6.3	85	4	125	41	6	23	3.520	3.168	1.408	3
TPME108M006#0025	E	1000	6.3	85	4	125	63	8	25	3.286	2.958	1.315	3
TPMV108M006#0020	V	1000	6.3	85	4	125	63	8	20	3.775	3.397	1.510	3
<b>10 Volt @ 85°C</b>													
TPMY107M010#0045	Y	100	10	85	7	125	10	8	45	2.160	1.944	0.864	3
TPMY157M010#0045	Y	150	10	85	7	125	15	8	45	2.160	1.944	0.864	3
TPMD227*010#0035	D	220	10	85	7	125	22	8	35	2.699	2.429	1.080	3
TPMD337*010#0035	D	330	10	85	7	125	33	8	35	2.699	2.429	1.080	3
TPME337*010#0023	E	330	10	85	7	125	33	6	23	3.426	3.084	1.370	3
TPME337*010#0035	E	330	10	85	7	125	33	6	35	2.777	2.500	1.111	3
TPME477*010#0023	E	470	10	85	7	125	47	6	23	3.426	3.084	1.370	3
TPME477*010#0030	E	470	10	85	7	125	47	6	30	3.000	2.700	1.200	3
TPMU477*010R0023	U	470	10	85	7	125	47	8	23	3.581	3.223	1.433	3
TPMU477*010R0030	U	470	10	85	7	125	47	8	30	3.136	2.822	1.254	3
<b>16 Volt @ 85°C</b>													
TPMD476*016#0100	D	47	16	85	10	125	7.5	8	100	1.597	1.437	0.639	3
TPMD686*016#0040	D	68	16	85	10	125	10.9	8	40	2.525	2.272	1.010	3
TPMD686*016#0050	D	68	16	85	10	125	10.9	8	50	2.258	2.032	0.903	3
TPMD107*016#0040	D	100	16	85	10	125	16	8	40	2.525	2.272	1.010	3
TPMD107*016#0050	D	100	16	85	10	125	16	8	50	2.258	2.032	0.903	3
TPME157*016#0030	E	150	16	85	10	125	24	6	30	3.000	2.700	1.200	3
TPME157*016#0040	E	150	16	85	10	125	24	6	40	2.598	2.338	1.039	3
TPME227*016#0025	E	220	16	85	10	125	35	6	25	3.286	2.958	1.315	3
TPME227*016#0040	E	220	16	85	10	125	35	6	40	2.598	2.338	1.039	3
TPMU227*016R0030	U	220	16	85	10	125	35	8	30	3.136	2.822	1.254	3
TPMU227*016R0040	U	220	16	85	10	125	35	8	40	2.716	2.444	1.086	3
TPME337*016#0050	E	330	16	85	10	125	52.8	10	50	2.324	2.091	0.930	3
<b>20 Volt @ 85°C</b>													
TPMD476*020#0045	D	47	20	85	13	125	9.4	8	45	2.380	2.142	0.952	3
TPMD476*020#0055	D	47	20	85	13	125	9.4	8	55	2.153	1.938	0.861	3
TPME107*020#0035	E	100	20	85	13	125	20	6	35	2.777	2.500	1.111	3
TPME107*020#0045	E	100	20	85	13	125	20	6	45	2.449	2.205	0.980	3
TPME157*020#0035	E	150	20	85	13	125	30	10	35	2.777	2.500	1.111	3

# TPM Multianode

## Tantalum Ultra Low ESR Capacitor



### RATINGS & PART NUMBER REFERENCE

Part Number	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (A)			MSL
										25°C	85°C	125°C	
<b>25 Volt @ 85°C</b>													
TPMD336*025#0065	D	33	25	85	17	125	8.3	8	65	1.981	1.783	0.792	3
TPMD476*025#0055	D	47	25	85	17	125	11.8	8	55	2.153	1.938	0.861	3
TPME476*025#0065	E	47	25	85	17	125	11.8	6	65	2.038	1.834	0.815	3
TPME686*025#0045	E	68	25	85	17	125	17	6	45	2.449	2.205	0.980	3
TPME686*025#0055	E	68	25	85	17	125	17	6	55	2.216	1.994	0.886	3
TPME107*025#0045	E	100	25	85	17	125	25	14	45	2.449	2.205	0.980	3
TPME107*025#0060	E	100	25	85	17	125	25	14	60	2.121	1.909	0.849	3
<b>35 Volt @ 85°C</b>													
TPMD226*035#0070	D	22	35	85	23	125	7.7	8	70	1.909	1.718	0.763	3
TPME226*035#0060	E	22	35	85	23	125	8	6	60	2.121	1.909	0.849	3
TPME226*035#0100	E	22	35	85	23	125	8	6	100	1.643	1.479	0.657	3
TPME336*035#0050	E	33	35	85	23	125	12	6	50	2.324	2.091	0.930	3
TPME336*035#0065	E	33	35	85	23	125	12	6	65	2.038	1.834	0.815	3
TPME476*035#0055	E	47	35	85	23	125	16	6	55	2.216	1.994	0.886	3
TPME476*035#0065	E	47	35	85	23	125	16	6	65	2.038	1.834	0.815	3
<b>50 Volt @ 85°C</b>													
TPMD106*050#0140	D	10	50	85	33	125	5	8	140	1.350	1.215	0.540	3
TPME106*050#0120	E	10	50	85	33	125	5	6	120	1.500	1.350	0.600	3
TPME156*050#0075	E	15	50	85	33	125	7.5	6	75	1.897	1.708	0.759	3
TPME156*050#0100	E	15	50	85	33	125	7.5	6	100	1.643	1.479	0.657	3
TPME226*050#0075	E	22	50	85	33	125	11	8	75	1.897	1.708	0.759	3
TPME226*050#0100	E	22	50	85	33	125	11	8	100	1.643	1.479	0.657	3

Moisture Sensitivity Level (MSL) is defined according to J-STD-020

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5V RMS with a maximum DC bias of 2.2 volts.

DCL is measured at rated voltage after 5 minutes.

The EIA & CECC standards for low ESR Solid Tantalum Capacitors allow an ESR movement to 1.25 times catalogue limit post mounting.

For typical weight and composition see page 259.

**NOTE: KYOCERA AVX reserves the right to supply higher voltage ratings or tighter tolerance part in the same case size, to the same reliability standards.**

### QUALIFICATION TABLE

TEST	TPM series (Temperature range -55°C to +125°C)									
	Condition			Characteristics						
Endurance	Apply rated voltage (Ur) at 85°C and / or category-voltage (Uc) at 125°C for 2000 hours through a circuit impedance of ≤0.1Ω/V. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±10% of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
Humidity	Store at 65°C and 95% relative humidity for 500 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	1.5 x initial limit					
				ΔC/C	within ±10% of initial value					
				DF	1.2 x initial limit					
				ESR	1.25 x initial limit					
Temperature Stability	Step	Temperature°C	Duration(min)		+20°C	-55°C	+20°C	+85°C	+125°C	+20°C
	1	+20	15							
	2	-55	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
	3	+20	15	ΔC/C	n/a	+0/-10%	±5%	+10/-0%	+12/-0%	±5%
	4	+85	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*
	5	+125	15	ESR	1.25 x IL*	2.5 x IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*
	6	+20	15							
Surge Voltage	Apply 1.3x category voltage (Uc) at 125°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000Ω			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±5% of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
Mechanical Shock	MIL-STD-202, Method 213, Condition C			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±5% of initial value					
				DF	initial limit					
				ESR	initial limit					
Vibration	MIL-STD-202, Method 204, Condition D			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±5% of initial value					
				DF	initial limit					
				ESR	initial limit					

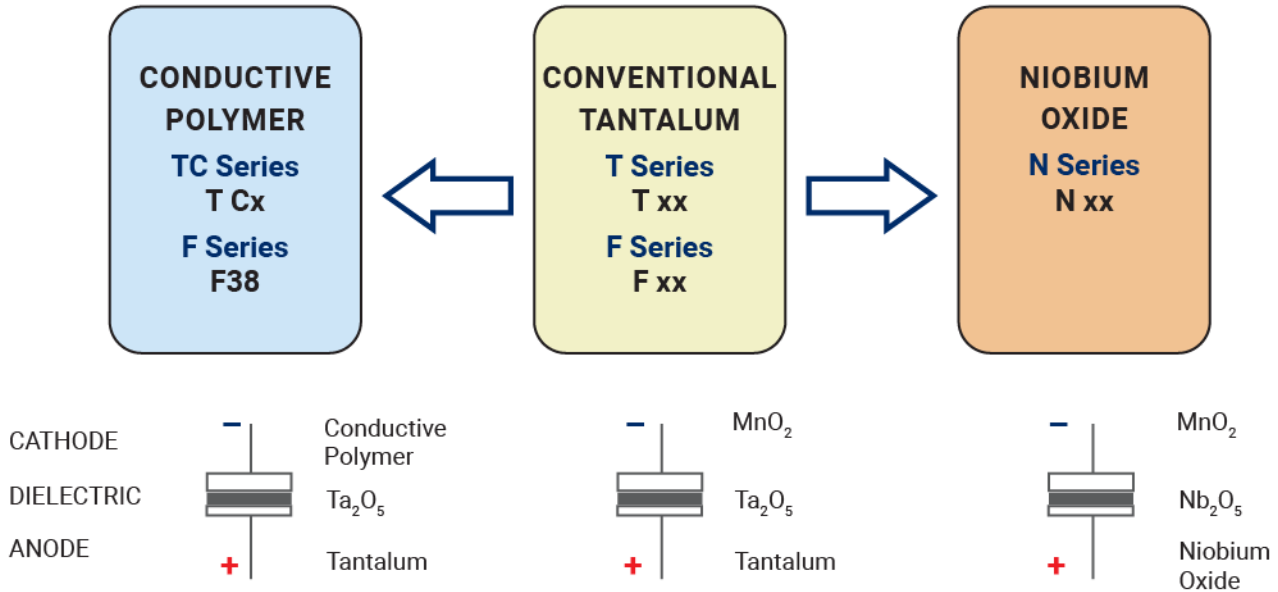
\*Initial Limit



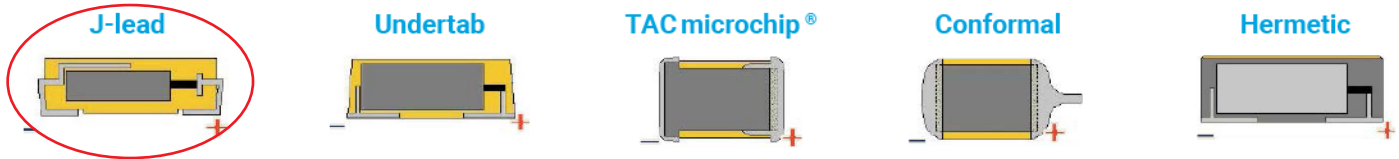
The Important Information/Disclaimer is incorporated in the catalog where these specifications came from or available online at [www.kyocera-avx.com/disclaimer/](http://www.kyocera-avx.com/disclaimer/) by reference and should be reviewed in full before placing any order.

# TPM Multianode Tantalum Ultra Low ESR Capacitor

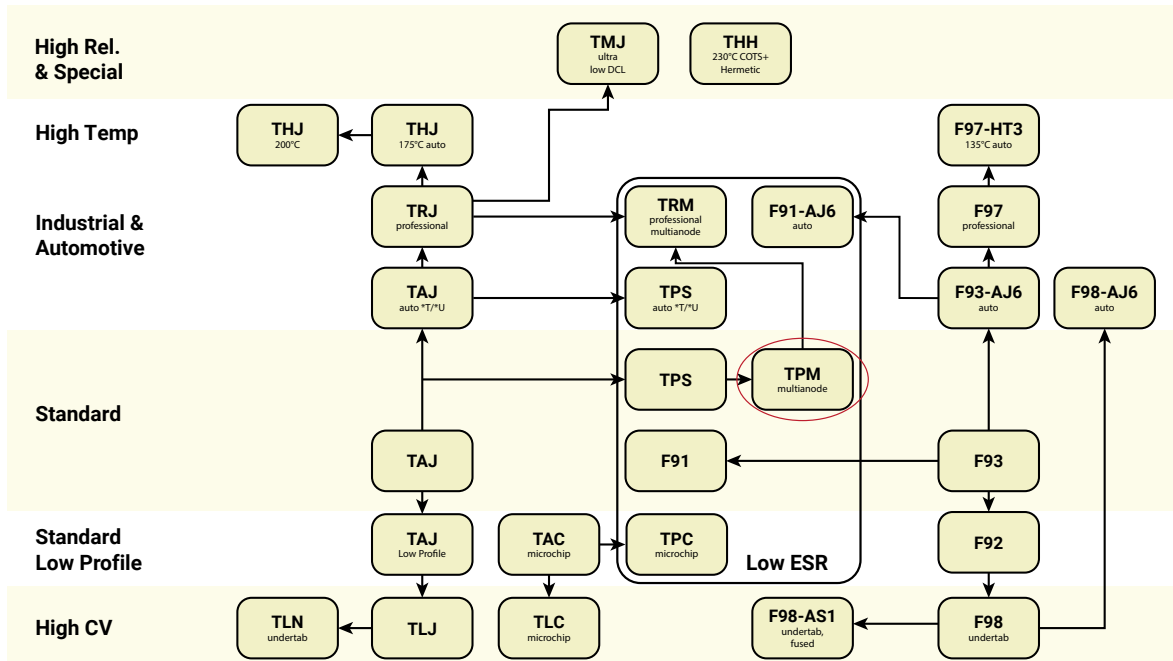
## SOLID ELECTROLYTIC CAPACITOR ROADMAP



## FIVE CAPACITOR CONSTRUCTION STYLES



## SERIES LINE UP : CONVENTIONAL SMD MnO<sub>2</sub>



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