

Surface mount type **TPU Series**

- RoHS compliance
- Small size · Low profile
- Face down terminal type

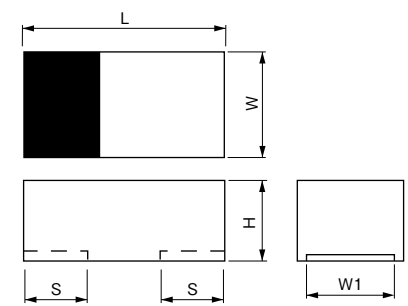
TPU series is designed with size-sensitive applications in mind by using a face down terminal structure.



**Specifications**

Items	Condition	Specifications			
Rated voltage (V)	—	2.5	4.0	6.3	10
Surge voltage (V)	—	2.9	4.6	7.2	12
Category temperature range (°C)	—	-55 to +85			
Capacitance tolerance (%)	120Hz/20°C	M : ±20			
Rated capacitance range (μF)	120Hz/20°C	4.7 to 150			
Dissipation Factor (DF)	120Hz/20°C	Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes	Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20°C	Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20°C	-55°C Z/Z <sub>20°C</sub>	0.6 to 2.0		
		+85°C Z/Z <sub>20°C</sub>	0.6 to 2.0		
Endurance	85°C, 1,000h, rated voltage applied	ΔC/C	Within±20% of the initial value		
		DF	≤ 1.5 times of the initial limit		
		LC	Within the initial limit		
Damp heat (Steady State)	60°C, 90 to 95%RH, 500h, No-applied voltage	ΔC/C	Within+40%, -20% of the initial value		
		DF	≤ 1.5 times of the initial limit		
		LC	≤ 3 times of the initial limit		
Surge	85°C, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied	ΔC/C	Within±5% of the initial value		
		DF	Within the initial limit		
		LC	≤ 3 times of the initial limit		

**Dimensions**



(unit: mm)

Size code	L ±0.1*1	W ±0.1*1	H ±0.1	S ±0.1*1	W1 ±0.1
S09	2.0	1.25	0.9	0.5	0.9
S11	2.0	1.25	1.1	0.5	0.9
B09	3.5	2.8	0.9	0.8	2.2

\*1 ±0.2:B09

**Size list**

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	10
4.7				S09
10			S09	S09
22			S11	
33			S09	
47	S09	S11	S09	
68	S11	S09		
100	S09			
150			B09	

**TPU series characteristics list**

Size code	Part number	Rated voltage (V)	Rated temperature (°C)	Rated capacitance (μF)	Category voltage (V)	Category temperature (°C)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz*1	MSL	
											Reflow temp. ≤ 260°C	Reflow temp. ≤ 250°C
S09	10TPU4R7MSI	10	85	4.7	10	85	10.0	4.7	300	360	3	3
	6TPU47MSI	6.3	85	47	6.3	85	10.0	59.2	150	510	—	3
	6TPU22MSI	6.3	85	22	6.3	85	10.0	27.7	150	510	—	3
	6TPU10MSI	6.3	85	10	6.3	85	10.0	6.3	250	400	—	3
	4TPU68MSI	4.0	85	68	4.0	85	10.0	54.4	150	510	—	3
	ETPU100MSI	2.5	85	100	2.5	85	10.0	50.0	150	510	—	3
S11	2R5TPU47MSI	2.5	85	47	2.5	85	10.0	23.5	150	510	—	3
	6TPU33MSK	6.3	85	33	6.3	85	10.0	41.6	150	510	—	3
	4TPU47MSK	4.0	85	47	4.0	85	10.0	37.6	150	510	—	3
	2R5TPU68MSK	2.5	85	68	2.5	85	10.0	34.0	150	510	—	3
	B09	6TPU150MBI	6.3	85	150	6.3	85	10.0	94.5	100	670	3

\*1 100k to 500kHz,45°C

Surface mount type **TPH Series**

- RoHS compliance
- Small size · Low ESR
- Face down terminal type

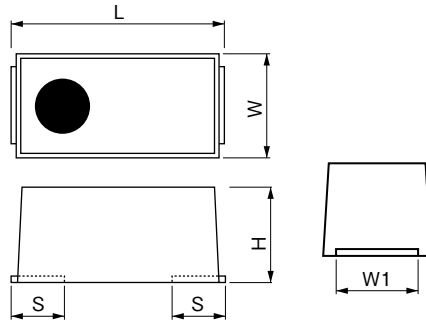
TPH series is designed to save space by its face down terminal structure and respond to lower ESR needs.



**Specifications**

Items	Condition	Specifications			
Rated voltage (V)	—	2.5	4.0	6.3	10
Surge voltage (V)	—	2.9	4.6	7.2	12
Category temperature range (°C)	—	-55 to +105			
Capacitance tolerance (%)	120Hz/20°C	M : ±20			
Rated capacitance range (μF)	120Hz/20°C	33 to 220			
Dissipation Factor (DF)	120Hz/20°C	Please see the attached characteristics list			
Leakage current	Rated voltage applied, after 5 minutes	Please see the attached characteristics list			
Equivalent series resistance (ESR)	100kHz/20°C	Please see the attached characteristics list			
Characteristics of impedance ratio at high temp. and low temp.	100kHz/+20°C	-55°C Z/Z <sub>20°C</sub>	0.6 to 2.0		
		+85°C Z/Z <sub>20°C</sub>	0.6 to 2.0		
Endurance	105°C, 1,000h rated voltage applied *Rated temp, 85°C Products: 85°C, 1,000h, rated voltage applied	ΔC/C	Within±20% of the initial value		
		DF	≤ 1.5 times of the initial limit		
		LC	Within the initial limit		
Damp heat (Steady State)	60°C, 90 to 95%RH, 500h, No-applied voltage	ΔC/C	Within+50%, -20% of the initial value(ETPH220MABC)		
		ΔC/C	Within+40%, -20% of the initial value(Except for above model)		
		DF	≤ 1.5 times of the initial limit		
Surge	105°C, 1,000 cycles, 1kΩ discharge resistance, surge voltage applied *Rated temp, 85°C Products:85°C	ΔC/C	Within±5% of the initial value		
		DF	Within the initial limit		
		LC	≤ 3 times of the initial limit		

**Dimensions**



(unit: mm)

Size code	L ±0.3	W ±0.2	H ±0.2	S ±0.2	W1 ±0.1
A09	3.2	1.6	0.9	0.8	1.2
A14	3.2	1.6	1.4	0.8	1.2

**Size list**

RV : Rated voltage

μF \ RV	2.5	4.0	6.3	10
33				A09
47			A09	
68		A09		
100	A09		A14,A09	
150		A14		
220	A14			

**TPH series characteristics list**

Size code	Part number	Rated voltage (V)	Rated temperature (°C)	Rated capacitance (μF)	Category voltage (V)	Category temperature (°C)	DF (% max)	LC (μA) max/5min.	ESR (mΩmax) 100kHz/20°C	Maximum allowable ripple current (mArms) 100kHz*1	MSL	
											Reflow temp. ≤ 260°C	Reflow temp. ≤ 250°C
A09	ATPH33MAHA	10	85	33	10	85	10.0	33.0	150	510	3	3
	6TPH100MAEA	6.3	85	100	5.0	85	10.0	63.0	100	670	3	3
	6TPH47MHA	6.3	105	47	6.3	105	10.0	29.6	150	510	3	3
	4TPH68MHA	4.0	105	68	4.0	105	10.0	27.2	150	510	3	3
	ETPH100MHA	2.5	105	100	2.5	105	10.0	25.0	150	510	3	3
A14	6TPH100MABC	6.3	85	100	6.3	85	10.0	126.0	70	740	3	3
	4TPH150MABC	4.0	85	150	4.0	85	10.0	120.0	70	740	3	3
	ETPH220MABC	2.5	85	220	2.5	85	10.0	110.0	70	740	3	3
	ETPH220MAZC*2	2.5	85	220	2.5	85	10.0	110.0	35	1040	3	3

\*1 100k to 500kHz,45°C \*2 Under development