

# PHE840

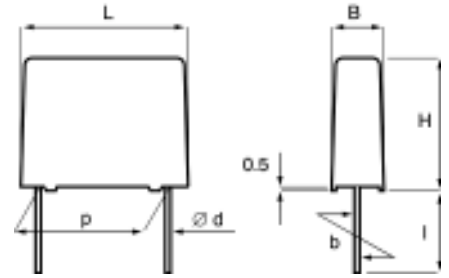
- EMI suppressor, class X2, metallized polypropylene
- 0.01 – 4.7  $\mu\text{F}$ , 275/280 VAC and 300 VAC, +100°C
- For smaller dimensions and larger capacitance values see PHE843

## TYPICAL APPLICATIONS

For worldwide use as electromagnetic interference suppressor in all X2 and across-the-line applications.

## CONSTRUCTION

Metallized polypropylene winding, encapsulated in self-extinguishing material meeting the requirements of UL 94 V-0.



## TECHNICAL DATA

	PHE840M	PHE840E		
Rated voltage	275 VAC 50/60 Hz (280 VAC North America)	300 VAC 50/60 Hz		
Capacitance range	0.01 – 4.7 $\mu\text{F}$	0.01 – 4.7 $\mu\text{F}$		
Capacitance tolerance	$\pm 20\%$ standard, $\pm 10\%$ option			
Temperature range	-40 to +100°C			
Climatic category	40/100/56/C			
Approvals	S, VDE, UL, CSA			
Dissipation factor $\tan\delta$	Maximum values at +23°C			
		$C \leq 0.1 \mu\text{F}$	$0.1 \mu\text{F} < C \leq 0.47 \mu\text{F}$	$C > 0.47 \mu\text{F}$
	1 kHz	0.1%	0.1%	0.1%
	10 kHz	0.1%	0.2%	0.5%
100 kHz	0.6%	0.9%	-	

p	d	std l	max l	b
10.0 $\pm$ 0.4	0.6	17	30	$\pm$ 0.4
15.0 $\pm$ 0.4	0.8	17	30	$\pm$ 0.4
22.5 $\pm$ 0.4	0.8	6	30	$\pm$ 0.4
27.5 $\pm$ 0.4	0.8	6	30	$\pm$ 0.4
37.5 $\pm$ 0.5	1.0	6	30	$\pm$ 0.7

Tolerance in lead length  
 $< 30 \text{ mm}$   $\begin{matrix} +0 \\ -1 \end{matrix} \text{ mm}$   
 $\geq 30 \text{ mm}$   $\begin{matrix} +5 \\ -0 \end{matrix} \text{ mm}$

**Test voltage between terminals** The 100% screening factory test is carried out at 2200 VDC. The voltage level is selected to meet the requirements in applicable equipment standards. All electrical characteristics are checked after the test.

**Resonance frequency** Tabulated self-resonance frequencies  $f_0$  refer to 5 mm lead length.

**Insulation resistance**  $C \leq 0.33 \mu\text{F}$ :  $\geq 30\,000 \text{ M}\Omega$   
 $C > 0.33 \mu\text{F}$ :  $\geq 10\,000 \text{ s}$

**In DC applications** Recommended voltage: PHE840M  $\leq 630 \text{ VDC}$   
PHE840E  $\leq 760 \text{ VDC}$

## ENVIRONMENTAL TEST DATA

<b>Endurance</b>	IEC 60384-14	1.25 x $U_R$ VAC 50 Hz, once every hour increased to 1000 VAC for 0.1 s, 1000 h at upper rated temperature	
<b>Vibration</b>	IEC 60068-2-6 Test Fc	3 directions at 2 hours each, 10-55 Hz at 0.75 mm or 98 m/s <sup>2</sup>	No visible damage No open or short circuit
<b>Bump</b>	IEC 60068-2-29 Test Eb	1000 bumps at 390 m/s <sup>2</sup>	No visible damage No open or short circuit
<b>Change of temperature</b>	IEC 60068-2-14 Test Na	Upper and lower rated temperature 5 cycles	No visible damage
<b>Active flammability</b>	EN 132400		
<b>Passive flammability</b>	IEC 60384-14 (1993) EN 132400 UL1414	Enclosure material of UL94V-0 flammability class	
<b>Humidity</b>	IEC 60068-2-3 Test Ca	+40°C and 90 – 95% R.H.	56 days

## ARTICLE TABLE

Capacitance $\mu\text{F}$	Max dimensions in mm			p	Quantity per package			Weight g	$f_0$ MHz	Max dU/dt V/ $\mu\text{s}$	Approvals				Article code 1 st block
	B	H	L		Bulk pcs	Tray pcs	reel taped pcs				S	VDE	UL	CSA	
<b>275/280 VAC, PHE840 M</b>															
<b>LEAD SPACING 10 MM</b>															
0.010	4.0	9.0	13.0	10.0	1000		900	0.7	11	100	√	√	√	√	PHE840MA5100M
0.012	4.0	9.0	13.0	10.0	1000		900	0.7	10	100	√	√	√	√	PHE840MA5120M
0.015	4.0	9.0	13.0	10.0	1000		900	0.7	9.4	100	√	√	√	√	PHE840MA5150M
0.018	4.5	10.5	13.0	10.0	1000		800	0.9	8.7	100	√	√	√	√	PHE840MA5180M
0.022	4.5	10.5	13.0	10.0	1000		800	0.9	8.1	100	√	√	√	√	PHE840MA5220M
0.027	5.0	11.0	13.0	10.0	800		700	1.0	7.5	100	√	√	√	√	PHE840MA5270M
0.033	5.0	11.0	13.0	10.0	800		700	1.0	6.9	100	√	√	√	√	PHE840MA5330M
0.039	6.0	12.0	13.0	10.0	600		500	1.2	6.5	100	√	√	√	√	PHE840MA5390M
0.047	6.0	12.0	13.0	10.0	600		500	1.2	6.0	100	√	√	√	√	PHE840MA5470M
<b>LEAD SPACING 15 MM</b>															
0.010	5.5	10.5	18.0	15.0	800		600	1.4	10	100	√	√	√	√	PHE840MB5100M
0.012	5.5	10.5	18.0	15.0	800		600	1.4	9.7	100	√	√	√	√	PHE840MB5120M
0.015	5.5	10.5	18.0	15.0	800		600	1.4	8.7	100	√	√	√	√	PHE840MB5150M
0.018	5.5	10.5	18.0	15.0	800		600	1.4	7.9	100	√	√	√	√	PHE840MB5180M
0.022	5.5	10.5	18.0	15.0	800		600	1.4	7.2	100	√	√	√	√	PHE840MB5220M
0.027	5.5	10.5	18.0	15.0	800		600	1.4	6.5	100	√	√	√	√	PHE840MB5270M
0.033	5.5	10.5	18.0	15.0	800		600	1.4	5.9	100	√	√	√	√	PHE840MB5330M
0.039	5.5	10.5	18.0	15.0	800		600	1.4	5.4	100	√	√	√	√	PHE840MB5390M
0.047	5.5	10.5	18.0	15.0	800		600	1.4	5.0	100	√	√	√	√	PHE840MB5470M
0.056	5.5	12.5	18.0	15.0	800		600	1.6	4.6	100	√	√	√	√	PHE840MB5560M
0.068	5.5	12.5	18.0	15.0	800		600	1.6	4.2	100	√	√	√	√	PHE840MB5680M
0.082	6.5	12.5	18.0	15.0	600		500	1.9	3.8	100	√	√	√	√	PHE840MB5820M
0.10	5.5	12.5	18.0	15.0	800		600	1.6	3.7	100	√	√	√	√	PHE840MX6100M *
0.10	6.0	12.0	18.0	15.0	800		500	1.7	3.5	100	√	√	√	√	PHE840MB6100M
0.12	7.5	14.5	18.0	15.0	400		400	2.2	3.2	100	√	√	√	√	PHE840MB6120M
0.15	8.0	15.0	18.0	15.0	400		400	2.5	2.8	100	√	√	√	√	PHE840MB6150M
0.18	8.5	16.0	18.0	15.0	400		400	2.9	2.6	100	√	√	√	√	PHE840MB6180M
0.22	8.5	16.0	18.0	15.0	400		400	2.9	2.5	100	√	√	√	√	PHE840MX6220M *
0.22	9.5	17.5	18.0	15.0	300		350	3.5	2.4	100	√	√	√	√	PHE840MB6220M
0.27	9.5	17.5	18.0	15.0	300		350	3.5	2.1	100	√	√	√	√	PHE840MB6270M
0.33	9.5	17.5	18.0	15.0	300		350	3.5	2.0	100	√	√	√	√	PHE840MX6330M *
<b>LEAD SPACING 22.5 MM</b>															
0.10	6.5	14.5	26.0	22.5		234		2.7	2.7	100	√	√	√	√	PHE840MD6100M
0.12	6.5	14.5	26.0	22.5		234		2.7	2.6	100	√	√	√	√	PHE840MD6120M
0.15	6.5	14.5	26.0	22.5		234		2.7	2.5	100	√	√	√	√	PHE840MD6150M
0.18	6.5	14.5	26.0	22.5		234		2.7	2.3	100	√	√	√	√	PHE840MD6180M
0.22	7.0	16.5	26.0	22.5		216		3.2	2.2	100	√	√	√	√	PHE840MD6220M
0.27	8.0	16.0	26.0	22.5		186		3.8	2.0	100	√	√	√	√	PHE840MD6270M
0.33	8.0	16.0	26.0	22.5		186		3.8	1.9	100	√	√	√	√	PHE840MY6330M *
0.33	9.0	18.5	26.0	22.5		168		5.0	1.7	100	√	√	√	√	PHE840MD6330M
0.39	9.0	18.5	26.0	22.5		168		5.0	1.6	100	√	√	√	√	PHE840MD6390M
0.47	9.0	18.5	26.0	22.5		168		5.0	1.5	100	√	√	√	√	PHE840MY6470M *
0.47	10.5	19.0	26.0	22.5		264		5.8	1.4	100	√	√	√	√	PHE840MD6470M
0.56	11.0	21.5	26.0	22.5		253		6.6	1.3	100	√	√	√	√	PHE840MD6560M
0.68	11.0	21.5	26.0	22.5		253		6.6	1.2	100	√	√	√	√	PHE840MY6680M *
0.82	15.5	24.5	26.0	22.5		176		10.6	1.1	100	√	√	√	√	PHE840MD6820M
1.0	15.5	24.5	26.0	22.5		176		10.0	1.0	100	√	√	√	√	PHE840MD7100M
<b>LEAD SPACING 27.5 MM</b>															
0.47	10.5	20.5	31.5	27.5		216		8.0	1.3	100	√	√	√	√	PHE840MF6470M
0.56	10.5	20.5	31.5	27.5		216		8.0	1.2	100	√	√	√	√	PHE840MF6560M
0.68	10.5	20.5	31.5	27.5		216		8.0	1.1	100	√	√	√	√	PHE840MF6680M
0.82	11.5	22.5	31.5	27.5		198		9.1	1.0	100	√	√	√	√	PHE840MF6820M
1.0	11.5	22.5	31.5	27.5		198		9.1	1.0	100	√	√	√	√	PHE840MZ7100M *
1.0	13.5	23.0	31.5	27.5		171		10.8	0.94	100	√	√	√	√	PHE840MF7100M
1.2	14.5	24.5	31.5	27.5		153		14.5	0.87	100	√	√	√	√	PHE840MF7120M

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Capacitance $\mu\text{F}$	Max dimensions in mm			p	Quantity per package			Weight g	$f_0$ MHz	Max dU/dt V/ $\mu\text{s}$	Approvals				Article code 1 st block
	B	H	L		Bulk pcs	Tray pcs	reel taped pcs				S	VDE	UL	CSA	
<b>275/280 VAC, PHE840 M</b>															
<b>LEAD SPACING 27.5 MM</b>															
1.5	17.5	28.0	31.5	27.5		126	17.0	0.78	100	√	√	√	√	PHE840MF7150M	
1.8	19.0	29.0	31.5	27.5		117	19.5	0.72	100	√	√	√	√	PHE840MF7180M	
2.2	19.0	29.0	31.5	27.5		117	19.5	0.70	100	√	√	√	√	PHE840MZ7220M *	
2.2	21.0	30.0	31.5	27.5		108	22.6	0.66	100	√	√	√	√	PHE840MF7220M	
<b>LEAD SPACING 37.5 MM</b>															
1.0	13.0	24.0	41.0	37.5		140	14.0	0.93	100	√	√	√	√	PHE840MR7100M	
1.2	13.0	24.0	41.0	37.5		140	14.0	0.84	100	√	√	√	√	PHE840MR7120M	
1.5	13.0	24.0	41.0	37.5		140	14.0	0.74	100	√	√	√	√	PHE840MR7150M	
1.8	15.0	26.0	41.0	37.5		119	17.0	0.67	100	√	√	√	√	PHE840MR7180M	
2.2	15.0	26.0	41.0	37.5		119	17.0	0.60	100	√	√	√	√	PHE840MR7220M	
2.7	16.5	32.0	41.0	37.5		105	23.0	0.54	100	√	√	√	√	PHE840MR7270M	
3.3	19.0	36.0	41.0	37.5		91	28.5	0.48	100	√	√	√	√	PHE840MR7330M	
3.9	19.0	36.0	41.0	37.5		91	28.5	0.44	100	√	√	√	√	PHE840MR7390M	
4.7	21.0	38.0	41.0	37.5		84	34.4	0.39	100	√	√	√	√	PHE840MR7470M	
<b>300 VAC, PHE840 E</b>															
<b>LEAD SPACING 10 MM</b>															
0.010	4.0	9.0	13.0	10.0	1000	900	0.7	11	100	√	√	√	√	PHE840EA5100M	
0.012	4.0	9.0	13.0	10.0	1000	900	0.7	10	100	√	√	√	√	PHE840EA5120M	
0.015	4.0	9.0	13.0	10.0	1000	900	0.7	9.4	100	√	√	√	√	PHE840EA5150M	
0.018	4.5	10.5	13.0	10.0	1000	800	0.9	8.7	100	√	√	√	√	PHE840EA5180M	
0.022	4.5	10.5	13.0	10.0	1000	800	0.9	8.1	100	√	√	√	√	PHE840EA5220M	
0.027	5.0	11.0	13.0	10.0	800	700	1.0	7.5	100	√	√	√	√	PHE840EA5270M	
0.033	5.0	11.0	13.0	10.0	800	700	1.0	6.9	100	√	√	√	√	PHE840EA5330M	
0.039	6.0	12.0	13.0	10.0	600	500	1.2	6.5	100	√	√	√	√	PHE840EA5390M	
0.047	6.0	12.0	13.0	10.0	600	500	1.2	6.0	100	√	√	√	√	PHE840EA5470M	
<b>LEAD SPACING 15 MM</b>															
0.010	5.5	10.5	18.0	15.0	800	600	1.4	10	100	√	√	√	√	PHE840EB5100M	
0.012	5.5	10.5	18.0	15.0	800	600	1.4	9.7	100	√	√	√	√	PHE840EB5120M	
0.015	5.5	10.5	18.0	15.0	800	600	1.4	8.7	100	√	√	√	√	PHE840EB5150M	
0.018	5.5	10.5	18.0	15.0	800	600	1.4	7.9	100	√	√	√	√	PHE840EB5180M	
0.022	5.5	10.5	18.0	15.0	800	600	1.4	7.2	100	√	√	√	√	PHE840EB5220M	
0.027	5.5	10.5	18.0	15.0	800	600	1.4	6.5	100	√	√	√	√	PHE840EB5270M	
0.033	5.5	10.5	18.0	15.0	800	600	1.4	5.9	100	√	√	√	√	PHE840EB5330M	
0.039	5.5	10.5	18.0	15.0	800	600	1.4	5.4	100	√	√	√	√	PHE840EB5390M	
0.047	5.5	10.5	18.0	15.0	800	600	1.4	5.0	100	√	√	√	√	PHE840EB5470M	
0.056	5.5	12.5	18.0	15.0	800	600	1.6	4.6	100	√	√	√	√	PHE840EB5560M	
0.068	5.5	12.5	18.0	15.0	800	600	1.6	4.2	100	√	√	√	√	PHE840EB5680M	
0.082	6.5	12.5	18.0	15.0	600	500	1.9	3.8	100	√	√	√	√	PHE840EB5820M	
0.10	6.5	12.5	18.0	15.0	600	500	1.9	3.7	100	√	√	√	√	PHE840EX6100M *	
0.10	7.5	14.5	18.0	15.0	400	400	2.2	3.5	100	√	√	√	√	PHE840EB6100M	
0.12	7.5	14.5	18.0	15.0	400	400	2.2	3.2	100	√	√	√	√	PHE840EB6120M	
0.15	8.0	15.0	18.0	15.0	400	400	2.5	2.8	100	√	√	√	√	PHE840EB6150M	
0.18	8.5	16.0	18.0	15.0	400	400	2.9	2.6	100	√	√	√	√	PHE840EB6180M	
0.22	8.5	16.0	18.0	15.0	400	400	2.9	2.5	100	√	√	√	√	PHE840EX6220M *	
0.22	9.5	17.5	18.0	15.0	300	350	3.5	2.4	100	√	√	√	√	PHE840EB6220M	
<b>LEAD SPACING 22.5 MM</b>															
0.10	6.5	14.5	26.0	22.5		234	2.7	2.7	100	√	√	√	√	PHE840ED6100M	
0.12	6.5	14.5	26.0	22.5		234	2.7	2.6	100	√	√	√	√	PHE840ED6120M	
0.15	6.5	14.5	26.0	22.5		234	2.7	2.5	100	√	√	√	√	PHE840ED6150M	
0.18	6.5	14.5	26.0	22.5		234	2.7	2.3	100	√	√	√	√	PHE840ED6180M	
0.22	7.0	16.5	26.0	22.5		216	3.2	2.2	100	√	√	√	√	PHE840ED6220M	
0.27	8.0	16.0	26.0	22.5		186	3.8	2.0	100	√	√	√	√	PHE840ED6270M	

## ARTICLE TABLE

Capacitance $\mu\text{F}$	Max dimensions in mm			p	Quantity per package		Weight g	f <sub>0</sub> MHz	Max dU/dt V/ $\mu\text{s}$	Approvals				Article code 1 st block
	B	H	L		Bulk pcs	Tray pcs				reel taped pcs	S	VDE	UL	
<b>300 VAC, PHE840 E</b>														
<b>LEAD SPACING 22.5 MM</b>														
0.33	8.0	16.0	26.0	22.5		186	3.8	1.9	100	√	√	√	√	PHE840EY6330M *
0.33	9.0	18.5	26.0	22.5		168	5.0	1.7	100	√	√	√	√	PHE840ED6330M
0.39	9.0	18.5	26.0	22.5		168	5.0	1.6	100	√	√	√	√	PHE840ED6390M
0.47	9.0	18.5	26.0	22.5		168	5.0	1.5	100	√	√	√	√	PHE840EY6470M *
0.47	10.5	19.0	26.0	22.5		264	5.8	1.4	100	√	√	√	√	PHE840ED6470M
0.56	11.0	21.5	26.0	22.5		253	6.6	1.3	100	√	√	√	√	PHE840ED6560M
0.68	11.0	21.5	26.0	22.5		253	6.6	1.2	100	√	√	√	√	PHE840EY6680M *
0.82	15.5	24.5	26.0	22.5		176	10.6	1.1	100	√	√	√	√	PHE840ED6820M
1.0	15.5	24.5	26.0	22.5		176	10.0	1.0	100	√	√	√	√	PHE840ED7100M
<b>LEAD SPACING 27.5 MM</b>														
0.47	10.5	20.5	31.5	27.5		216	8.0	1.3	100	√	√	√	√	PHE840EF6470M
0.56	10.5	20.5	31.5	27.5		216	8.0	1.2	100	√	√	√	√	PHE840EF6560M
0.68	10.5	20.5	31.5	27.5		216	8.0	1.1	100	√	√	√	√	PHE840EF6680M
0.82	11.5	22.5	31.5	27.5		198	9.1	1.0	100	√	√	√	√	PHE840EF6820M
1.0	11.5	22.5	31.5	27.5		198	9.1	1.0	100	√	√	√	√	PHE840EZ7100M *
1.0	13.5	23.0	31.5	27.5		171	10.8	0.94	100	√	√	√	√	PHE840EF7100M
1.2	14.5	24.5	31.5	27.5		153	14.5	0.87	100	√	√	√	√	PHE840EF7120M
1.5	17.5	28.0	31.5	27.5		126	17.0	0.78	100	√	√	√	√	PHE840EF7150M
1.8	19.0	29.0	31.5	27.5		117	19.5	0.72	100	√	√	√	√	PHE840EF7180M
2.2	19.0	29.0	31.5	27.5		117	19.5	0.70	100	√	√	√	√	PHE840EZ7220M *
2.2	21.0	30.0	31.5	27.5		108	22.6	0.66	100	√	√	√	√	PHE840EF7220M
<b>LEAD SPACING 37.5 MM</b>														
1.0	13.0	24.0	41.0	37.5		140	14.0	0.93	100	√	√	√	√	PHE840ER7100M
1.2	13.0	24.0	41.0	37.5		140	14.0	0.84	100	√	√	√	√	PHE840ER7120M
1.5	13.0	24.0	41.0	37.5		140	14.0	0.74	100	√	√	√	√	PHE840ER7150M
1.8	15.0	26.0	41.0	37.5		119	17.0	0.67	100	√	√	√	√	PHE840ER7180M
2.2	15.0	26.0	41.0	37.5		119	17.0	0.60	100	√	√	√	√	PHE840ER7220M
2.7	16.5	32.0	41.0	37.5		105	23.0	0.54	100	√	√	√	√	PHE840ER7270M
3.3	19.0	36.0	41.0	37.5		91	28.5	0.48	100	√	√	√	√	PHE840ER7330M
3.9	19.0	36.0	41.0	37.5		91	28.5	0.44	100	√	√	√	√	PHE840ER7390M
4.7	21.0	38.0	41.0	37.5		84	34.4	0.39	100	√	√	√	√	PHE840ER7470M

\* Only  $\pm 20\%$

APPROVALS/REFERENCE DOCUMENTS				MARKING	
Country	Specification	Approval reference			
		PHE840M	PHE840E		
S = Sweden	EN 132400	9837223-01	9934306/01	<ul style="list-style-type: none"> <li>• RIFA</li> <li>• RIFA article code</li> <li>• Rated capacitance</li> <li>• Capacitance tolerance code</li> <li>• Rated voltage</li> <li>• X2</li> <li>• Approval marks</li> <li>• Manufacturing date code</li> <li>• IEC climatic category</li> <li>• Passive flammability class</li> </ul>	
VDE = Germany	EN 132400	122222	124109		
		115119	123570		
UL = USA	UL 1283	E100117	E100117		
	UL 1414	(U <sub>R</sub> = 280 VAC)	(U <sub>R</sub> = 300 VAC)		
		E73869	E73869		
		(U <sub>R</sub> = 250 VAC)			
CSA = Canada	C 22.2 No. 8	E100117	E100117		
(cUL recognition)	C 22.2 No. 1	(U <sub>R</sub> = 280 VAC)	(U <sub>R</sub> = 300 VAC)		
		E73869	E73869		
		(U <sub>R</sub> = 250 VAC)			

ORDERING INFORMATION		PACKING
<b>Article code</b>		<p>The box dimensions for bulk packaging are 245 x 145 x 80 mm. Quantity/package as per article table.</p> <p>Reels with taped capacitors are packed 10 in a box with dimension 370 x 370 x 560 mm. Quantity/reel according to article table. The standard quantity/reel is for 360 mm reel. If 500 mm reel is required, it must be specified when ordering and the quantity is 2 x the given quantity.</p>
<p><b>1st block</b></p> <p>See article table                      Pos. 13 Capacitance tolerance code:                      M = ± 20% standard                      K = ± 10% option</p>	<p><b>2nd block</b></p> <p>If not standard lead length, add R06 – R30 in pos. 14–16.                      For reel taped, add 17T0 or 17T1 in pos. 14–15.                      For packing on trays (6 mm lead length), add L2 in pos. 17–18.</p>	
<b>P H E 8 4 0 E B 5 3 3 0 M</b>		
1 2 3 4 5 6 7 8 9 10 11 12 13		<b>R 0 6</b>
		14 15 16 17 18 19 20