

PHE428 **Obsolete. See PHE450**

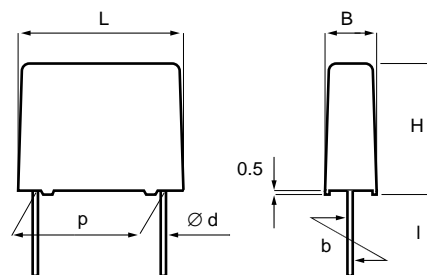
- **LAST ORDER DATE 31 MARCH, 2003.**
- **Double metallized film pulse capacitor, polypropylene dielectric**

TYPICAL APPLICATIONS

High frequency and high voltage applications with high current stress, such as deflection circuits in TV-sets, protection circuits in SMPS and in electronic ballasts.

CONSTRUCTION

Series winding with polypropylene dielectric and double metallized polyester film as electrodes. Encapsulation in self-extinguishing material meeting the requirements of UL 94V-0.



TECHNICAL DATA

Rated voltage U_R , VDC	630	1000	1600	2000	2500
Rated voltage U_R , VAC	400	500	630	650	1000
Capacitance range, μF	0.01– 1.2	0.0039– 0.68	0.0027– 0.33	0.00033– 0.27	0.001– 0.15

Capacitance values In accordance with IEC E12-series.

Capacitance tolerance $\pm 5\%$ standard. Other tolerances on request

Category temperature range -55°C to $+105^\circ\text{C}$

Rated temperature $+85^\circ\text{C}$
Voltage derating The rated voltage is decreased with $1.3\% / ^\circ\text{C}$ between $+85^\circ\text{C}$ and $+105^\circ\text{C}$

Climatic category 55/105/56

Insulation resistance Measured at 23°C , 100 VDC 60s
Between terminals:
 $C \leq 0.33 \mu\text{F}$: 100 000 $\text{M}\Omega$
 $C > 0.33 \mu\text{F}$: 30 000 s
Between terminals and case:
100 000 $\text{M}\Omega$

Dissipation factor $\tan\delta$ Maximum values at 23°C

	$C \leq 0.1 \mu\text{F}$	$C > 0.1 \mu\text{F}$
1 kHz	0.03 %	0.03 %
10 kHz	0.04 %	0.06 %
100 kHz	0.15 %	

Inductance Approximately 6 nH/cm for the total length of capacitor winding and the leads.

Pulse rise time The capacitors can withstand an unlimited number of pulses with a dU/dt according to the article table. For peak to peak voltages lower than the rated voltage ($U_{pp} < U_R$), the specified dU/dt can be multiplied by U_R/U_{pp} .

p	d	std l	max l	b
15.0 ± 0.4	0.8	6^{-1}	30	± 0.4
22.5 ± 0.4	0.8	6^{-1}	30	± 0.4
27.5 ± 0.4	0.8	6^{-1}	30	± 0.4
37.5 ± 0.5	1.0	6^{-1}	30	± 0.7

ENVIRONMENTAL TEST DATA

Vibration According to IEC 60068-2-6 test Fc. 10–500 Hz for lead space ≤ 22.5 mm, 10–55 Hz for lead space > 22.5 mm. 6 h with 0.75 mm amplitude or 98 m/s^2 (depending on frequency) with the capacitor mounted on PCB with the supporting area in contact with the PCB.

Climatic sequence According to IEC 60384-1.

Bump According to IEC 60068-2-29 test Eb. 4000 bumps at 390 m/s^2 with the capacitor mounted on a printed circuit board with the supporting area in contact with the printed circuit board.

Humidity According to IEC 60068-2-3 test Ca, severity 56 days.

ARTICLE TABLE

Capacitance μF	Max dimensions in mm				Quantity per package			Weight g	Max dU/dt V/ μs	Rthha °C/W 85 °C 0.2 m/s	Article code 1st block
	B	H	L	p	Bulk	Tray	Reel				
630 VDC/400 VAC											
LEAD SPACING 15 MM											
0.010	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428MB5100J
0.012	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428MB5120J
0.015	5.5	12.5	18.0	15.0	1000		600	1.7	2500	89	PHE428MB5150J
0.018	6.5	12.5	18.0	15.0	1000		500	2.0	2500	86	PHE428MB5180J
0.022	7.5	14.5	18.0	15.0	800		400	2.7	2500	77	PHE428MB5220J
0.027	7.5	14.5	18.0	15.0	800		400	2.7	2500	77	PHE428MB5270J
0.033	8.5	16.0	18.0	15.0	600		400	3.0	2500	70	PHE428MB5330J
LEAD SPACING 22.5 MM											
0.033	6.5	14.5	26.0	22.5		234		3.2	1800	59	PHE428MD5330J
0.039	6.5	14.5	26.0	22.5		234		3.2	1800	59	PHE428MD5390J
0.047	7.0	16.5	26.0	22.5		216		3.9	1800	55	PHE428MD5470J
0.056	8.0	16.0	26.0	22.5		186		4.3	1800	55	PHE428MD5560J
0.068	9.0	18.5	26.0	22.5		168		5.6	1800	50	PHE428MD5680J
0.082	9.0	18.5	26.0	22.5		168		5.6	1800	50	PHE428MD5820J
0.10	10.5	19.0	26.0	22.5		264		6.7	1800	48	PHE428MD6100J
0.12	11.0	21.5	26.0	22.5		253		8.0	1800	44	PHE428MD6120J
LEAD SPACING 27.5 MM											
0.15	10.5	20.5	31.5	27.5		216		8.8	1100	40	PHE428MF6150J
0.18	11.5	22.5	31.5	27.5		198		10.6	1100	37	PHE428MF6180J
0.22	14.5	24.5	31.5	27.5		153		14.5	1100	34	PHE428MF6220J
0.27	14.5	24.5	31.5	27.5		153		14.5	1100	33	PHE428MF6270J
0.33	17.5	28.0	31.5	27.5		126		19.7	1100	30	PHE428MF6330J
0.39	17.5	28.0	31.5	27.5		126		19.7	1100	29	PHE428MF6390J
LEAD SPACING 37.5 MM											
0.33	13.0	24.0	41.0	37.5		140		16.6	700	29	PHE428MR6330J
0.39	15.0	26.0	41.0	37.5		119		20.8	700	27	PHE428MR6390J
0.47	15.0	26.0	41.0	37.5		119		20.8	700	27	PHE428MR6470J
0.56	16.5	32.0	41.0	37.5		105		28.1	700	24	PHE428MR6560J
0.68	16.5	32.0	41.0	37.5		105		28.1	700	22	PHE428MR6680J
0.82	19.0	36.0	41.0	37.5		91		36.5	700	20	PHE428MR6820J
1.0	19.0	36.0	41.0	37.5		91		36.5	700	20	PHE428MR7100J
1.2	21.0	38.0	41.0	37.5		84		42.5	700	18	PHE428MR7120J
1000 VDC/500 VAC											
LEAD SPACING 15 MM											
0.0039	5.5	10.5	18.0	15.0	1000		600	1.5	2500	104	PHE428PB4390J
0.0047	5.5	10.5	18.0	15.0	1000		600	1.5	2500	104	PHE428PB4470J
0.0056	5.5	10.5	18.0	15.0	1000		600	1.5	2500	104	PHE428PB4560J
0.0068	5.5	10.5	18.0	15.0	1000		600	1.5	2500	104	PHE428PB4680J
0.0082	5.5	12.5	18.0	15.0	1000		600	1.7	2500	90	PHE428PB4820J
0.010	6.5	12.5	18.0	15.0	1000		500	1.7	2500	87	PHE428PB5100J
0.012	7.5	14.5	18.0	15.0	800		400	2.0	2500	79	PHE428PB5120J
0.015	7.5	14.5	18.0	15.0	800		400	2.0	2500	78	PHE428PB5150J
0.018	8.0	15.0	18.0	15.0	600		400	3.0	2500	75	PHE428PB5180J
0.022	8.5	16.0	18.0	15.0	600		400	3.4	2500	70	PHE428PB5220J
LEAD SPACING 22.5 MM											
0.022	6.5	14.5	26.0	22.5		234		3.2	1800	60	PHE428PD5220J
0.027	6.5	14.5	26.0	22.5		234		3.2	1800	60	PHE428PD5270J
0.033	7.0	16.5	26.0	22.5		216		3.9	1800	55	PHE428PD5330J
0.039	8.0	16.0	26.0	22.5		186		4.3	1800	55	PHE428PD5390J
0.047	9.0	18.5	26.0	22.5		168		5.6	1800	51	PHE428PD5470J
0.056	9.0	18.5	26.0	22.5		168		5.6	1800	49	PHE428PD5560J
0.068	10.5	19.0	26.0	22.5		264		6.7	1800	49	PHE428PD5680J
0.082	11.0	21.5	26.0	22.5		253		8.0	1800	44	PHE428PD5820J
LEAD SPACING 27.5 MM											
0.068	10.5	20.5	31.5	27.5		216		8.8	1300	40	PHE428PF5680J
0.082	10.5	20.5	31.5	27.5		216		8.8	1300	40	PHE428PF5820J
0.10	11.5	22.5	31.5	27.5		198		10.6	1300	38	PHE428PF6100J

ARTICLE TABLE

Capacitance μF	Max dimensions in mm				Quantity per package			Weight g	Max dU/dt V/ μs	Rthha °C/W 85 °C 0.2 m/s	Article code 1st block
	B	H	L	p	Bulk	Tray	Reel				
1000 VDC/500 VAC											
LEAD SPACING 27.5 MM											
0.12	11.5	22.5	31.5	27.5			198	10.6	1300	37	PHE428PF6120J
0.15	14.5	24.5	31.5	27.5			153	14.5	1300	34	PHE428PF6150J
0.18	14.5	24.5	31.5	27.5			153	14.5	1300	34	PHE428PF6180J
0.22	17.5	28.0	31.5	27.5			126	19.7	1300	30	PHE428PF6220J
LEAD SPACING 37.5 MM											
0.15	13.0	24.0	41.0	37.5			140	16.6	800	29	PHE428PR6150J
0.18	13.0	24.0	41.0	37.5			140	16.6	800	29	PHE428PR6180J
0.22	13.0	24.0	41.0	37.5			140	16.6	800	29	PHE428PR6220J
0.27	15.0	26.0	41.0	37.5			119	20.8	800	27	PHE428PR6270J
0.33	16.5	32.0	41.0	37.5			105	28.1	800	24	PHE428PR6330J
0.39	16.5	32.0	41.0	37.5			105	28.1	800	24	PHE428PR6390J
0.47	19.0	36.0	41.0	37.5			91	36.5	800	20	PHE428PR6470J
0.56	19.0	36.0	41.0	37.5			91	36.5	800	20	PHE428PR6560J
0.68	21.0	38.0	41.0	37.5			84	42.5	800	18	PHE428PR6680J
1600 VDC/630 VAC											
LEAD SPACING 15 MM											
0.0027	5.5	10.5	18.0	15.0	1000		600	1.5	2500	106	PHE428RB4270J
0.0033	5.5	10.5	18.0	15.0	1000		600	1.5	2500	106	PHE428RB4330J
0.0039	5.5	12.5	18.0	15.0	1000		600	1.7	2500	91	PHE428RB4390J
0.0047	5.5	12.5	18.0	15.0	1000		600	1.7	2500	91	PHE428RB4470J
0.0056	6.5	12.5	18.0	15.0	1000		500	2.0	2500	89	PHE428RB4560J
0.0068	7.5	14.5	18.0	15.0	800		400	2.7	2500	80	PHE428RB4680J
0.0082	7.5	14.5	18.0	15.0	800		400	2.7	2500	80	PHE428RB4820J
0.010	8.5	16.0	18.0	15.0	600		400	3.4	2500	73	PHE428RB5100J
0.012	8.5	16.0	18.0	15.0	600		400	3.4	2500	73	PHE428RB5120J
LEAD SPACING 22.5 MM											
0.010	6.5	14.5	26.0	22.5			234	3.2	1800	61	PHE428RD5100J
0.012	6.5	14.5	26.0	22.5			234	3.2	1800	61	PHE428RD5120J
0.015	7.0	16.5	26.0	22.5			216	3.9	1800	57	PHE428RD5150J
0.018	7.0	16.5	26.0	22.5			216	3.9	1800	55	PHE428RD5180J
0.022	9.0	18.5	26.0	22.5			168	5.6	1800	52	PHE428RD5220J
0.027	9.0	18.5	26.0	22.5			168	5.6	1800	50	PHE428RD5270J
0.033	10.5	19.0	26.0	22.5			264	6.7	1800	50	PHE428RD5330J
0.039	11.0	21.5	26.0	22.5			253	8.0	1800	45	PHE428RD5390J
LEAD SPACING 27.5 MM											
0.033	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428RF5330J
0.039	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428RF5390J
0.047	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428RF5470J
0.056	11.5	22.5	31.5	27.5			198	10.6	1300	39	PHE428RF5560J
0.068	11.5	22.5	31.5	27.5			198	10.6	1300	38	PHE428RF5680J
0.082	14.5	24.5	31.5	27.5			153	14.5	1300	35	PHE428RF5820J
0.10	17.5	28.0	31.5	27.5			126	19.7	1300	32	PHE428RF6100J
0.12	17.5	28.0	31.5	27.5			126	19.7	1300	31	PHE428RF6120J
LEAD SPACING 37.5 MM											
0.10	13.0	24.0	41.0	37.5			140	16.6	800	30	PHE428RR6100J
0.12	15.0	26.0	41.0	37.5			119	20.8	800	28	PHE428RR6120J
0.15	15.0	26.0	41.0	37.5			119	20.8	800	28	PHE428RR6150J
0.18	16.5	32.0	41.0	37.5			105	28.1	800	24	PHE428RR6180J
0.22	16.5	32.0	41.0	37.5			105	28.1	800	23	PHE428RR6220J
0.27	19.0	36.0	41.0	37.5			91	36.5	800	21	PHE428RR6270J
0.33	21.0	38.0	41.0	37.5			84	42.5	800	19	PHE428RR6330J

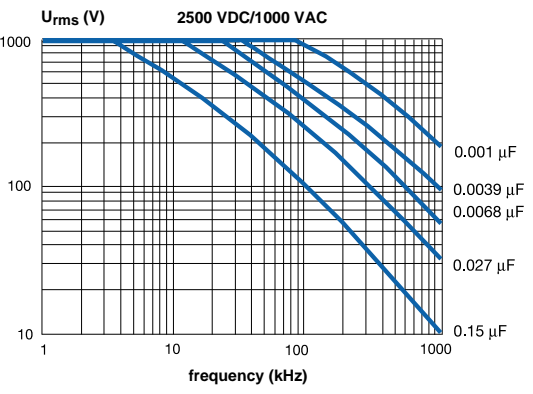
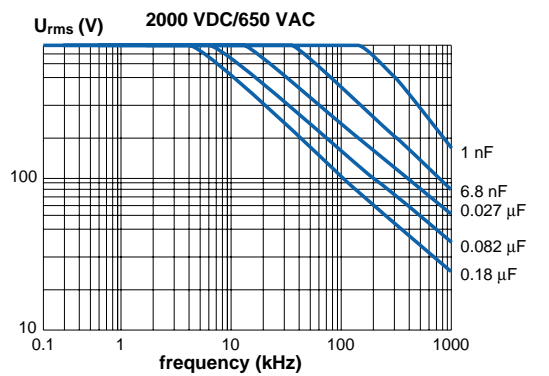
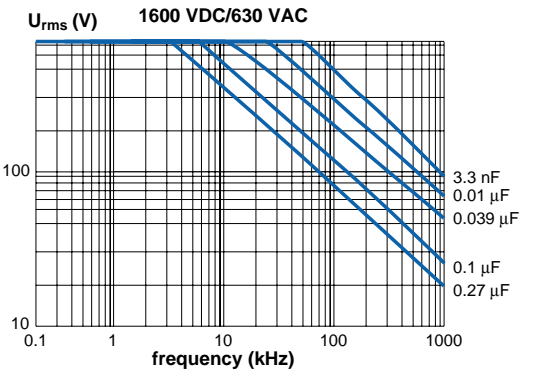
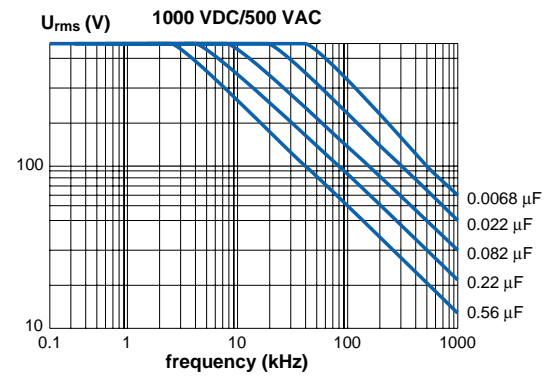
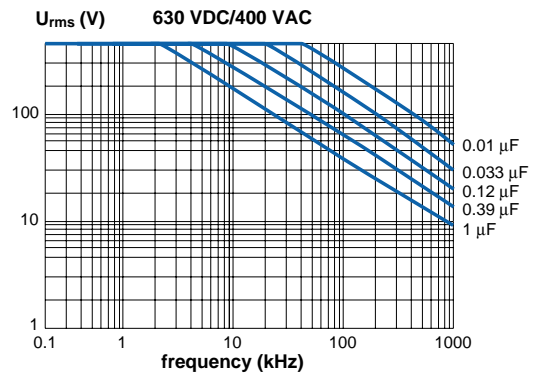
ARTICLE TABLE

Capacitance μF	Max dimensions in mm				Quantity per package			Weight g	Max dU/dt V/ μs	Rthha °C/W 85 °C 0.2 m/s	Article code 1st block
	B	H	L	p	Bulk	Tray	Reel				
2000 VDC/650 VAC											
LEAD SPACING 15 MM											
0.00033	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB3330J
0.00047	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB3470J
0.00056	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB3560J
0.00068	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB3680J
0.00082	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB3820J
0.0010	5.5	10.5	18.0	15.0	1000		600	1.5	2500	103	PHE428SB4100J
0.0012	5.5	10.5	18.0	15.0	1000		600	1.5	2500	104	PHE428SB4120J
0.0015	5.5	10.5	18.0	15.0	1000		600	1.5	2500	105	PHE428SB4150J
0.0018	5.5	10.5	18.0	15.0	1000		600	1.5	2500	106	PHE428SB4180J
0.0022	5.5	10.5	18.0	15.0	1000		600	1.5	2500	107	PHE428SB4220J
0.0027	5.5	12.5	18.0	15.0	1000		600	1.7	2500	91	PHE428SB4270J
0.0033	6.5	12.5	18.0	15.0	1000		500	2.0	2500	89	PHE428SB4330J
0.0039	6.5	12.5	18.0	15.0	1000		500	2.0	2500	90	PHE428SB4390J
0.0047	7.5	14.5	18.0	15.0	800		400	2.7	2500	81	PHE428SB4470J
0.0056	7.5	14.5	18.0	15.0	800		400	2.7	2500	81	PHE428SB4560J
0.0068	8.5	16.0	18.0	15.0	600		400	3.4	2500	74	PHE428SB4680J
LEAD SPACING 22.5 MM											
0.0033	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4330J
0.0039	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4390J
0.0047	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4470J
0.0056	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4560J
0.0068	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4680J
0.0082	6.5	14.5	26.0	22.5			234	3.2	1800	62	PHE428SD4820J
0.010	7.0	16.5	26.0	22.5			216	3.9	1800	57	PHE428SD5100J
0.012	7.0	16.5	26.0	22.5			216	3.9	1800	55	PHE428SD5120J
0.015	9.0	18.5	26.0	22.5			168	5.6	1800	53	PHE428SD5150J
0.018	9.0	18.5	26.0	22.5			168	5.6	1800	51	PHE428SD5180J
0.022	10.5	19.0	26.0	22.5			264	6.7	1800	50	PHE428SD5220J
0.027	11.0	21.5	26.0	22.5			253	8.0	1800	45	PHE428SD5270J
LEAD SPACING 27.5 MM											
0.012	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428SF5120J
0.015	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428SF5150J
0.018	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428SF5180J
0.022	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428SF5220J
0.027	10.5	20.5	31.5	27.5			216	8.8	1300	41	PHE428SF5270J
0.033	11.5	22.5	31.5	27.5			198	10.6	1300	39	PHE428SF5330J
0.039	11.5	22.5	31.5	27.5			198	10.6	1300	38	PHE428SF5390J
0.047	14.5	24.5	31.5	27.5			153	14.5	1300	36	PHE428SF5470J
0.056	14.5	24.5	31.5	27.5			153	14.5	1300	36	PHE428SF5560J
0.068	17.5	28.0	31.5	27.5			126	19.7	1300	32	PHE428SF5680J
0.082	17.5	28.0	31.5	27.5			126	19.7	1300	32	PHE428SF5820J
0.10	17.5	28.0	31.5	27.5			126	19.7	1300	32	PHE428SF6100J
LEAD SPACING 37.5 MM											
0.068	13.0	24.0	41.0	37.5			140	16.6	800	30	PHE428SR5680J
0.082	15.0	26.0	41.0	37.5			119	20.8	800	29	PHE428SR5820J
0.10	15.0	26.0	41.0	37.5			119	20.8	800	28	PHE428SR6100J
0.12	16.5	32.0	41.0	37.5			105	28.1	800	25	PHE428SR6120J
0.15	16.5	32.0	41.0	37.5			105	28.1	800	24	PHE428SR6150J
0.18	19.0	36.0	41.0	37.5			91	36.5	800	21	PHE428SR6180J
0.22	19.0	36.0	41.0	37.5			91	36.5	800	19	PHE428SR6220J
0.27	21.0	38.0	41.0	37.5			84	42.5	800	18	PHE428SR6270J

ARTICLE TABLE

Capacitance μF	Max dimensions in mm				Quantity per package			Weight g	Max dU/dt V/ μs	Rthha °C/W 85 °C 0.2 m/s	Article code 1st block
	B	H	L	p	Bulk	Tray	Reel				
2500 VDC/1000 VAC											
LEAD SPACING 15 MM											
0.0010	5.5	10.5	18.0	15.0	1000		600	1.5	2500	109	PHE428TB4100J
0.0012	5.5	10.5	18.0	15.0	1000		600	1.5	2500	109	PHE428TB4120J
0.0015	5.5	12.5	18.0	15.0	1000		600	1.7	2500	92	PHE428TB4150J
0.0018	5.5	12.5	18.0	15.0	1000		600	1.7	2500	91	PHE428TB4180J
0.0022	6.5	12.5	18.0	15.0	1000		500	2.0	2500	90	PHE428TB4220J
0.0027	7.5	14.5	18.0	15.0	800		400	2.7	2500	82	PHE428TB4270J
0.0033	7.5	14.5	18.0	15.0	800		400	2.7	2500	82	PHE428TB4330J
0.0039	8.0	15.0	18.0	15.0	600		400	3.0	2500	81	PHE428TB4390J
LEAD SPACING 22.5 MM											
0.0033	6.5	14.5	26.0	22.5		234		3.2	1800	63	PHE428TD4330J
0.0039	6.5	14.5	26.0	22.5		234		3.2	1800	63	PHE428TD4390J
0.0047	6.5	14.5	26.0	22.5		234		3.2	1800	63	PHE428TD4470J
0.0056	7.0	16.5	26.0	22.5		216		3.9	1800	57	PHE428TD4560J
0.0068	7.0	16.5	26.0	22.5		216		3.9	1800	57	PHE428TD4680J
0.0082	8.0	16.0	26.0	22.5		186		4.3	1800	55	PHE428TD4820J
0.010	9.0	18.5	26.0	22.5		168		5.6	1800	53	PHE428TD5100J
0.012	10.5	19.0	26.0	22.5		264		6.7	1800	50	PHE428TD5120J
0.015	11.0	21.5	26.0	22.5		253		8.0	1800	47	PHE428TD5150J
LEAD SPACING 27.5 MM											
0.012	10.5	20.5	31.5	27.5		216		8.8	1300	42	PHE428TF5120J
0.015	10.5	20.5	31.5	27.5		216		8.8	1300	42	PHE428TF5150J
0.018	10.5	20.5	31.5	27.5		216		8.8	1300	42	PHE428TF5180J
0.022	11.5	22.5	31.5	27.5		198		10.6	1300	39	PHE428TF5220J
0.027	14.5	24.5	31.5	27.5		153		14.5	1300	36	PHE428TF5270J
0.033	14.5	24.5	31.5	27.5		153		14.5	1300	36	PHE428TF5330J
0.039	17.5	28.0	31.5	27.5		126		19.7	1300	34	PHE428TF5390J
0.047	17.5	28.0	31.5	27.5		126		19.7	1300	33	PHE428TF5470J
LEAD SPACING 37.5 MM											
0.047	13.0	24.0	41.0	37.5		140		16.6	800	24	PHE428TR5470J
0.056	15.0	26.0	41.0	37.5		119		20.8	800	23	PHE428TR5560J
0.068	16.5	32.0	41.0	37.5		105		28.1	800	23	PHE428TR5680J
0.082	16.5	32.0	41.0	37.5		105		28.1	800	23	PHE428TR5820J
0.10	19.0	36.0	41.0	37.5		91		36.5	800	22	PHE428TR6100J
0.12	21.0	38.0	41.0	37.5		84		42.5	800	21	PHE428TR6120J
0.15	21.0	38.0	41.0	37.5		84		42.5	800	18	PHE428TR6150J

DERATING OF U_{RMS} VS FREQUENCY, +85°C AMBIENT TEMPERATURE AND 10°C INTERNAL HEATING, TYPICAL VALUES



More simulation possibilities in PCCAD software package. See page 184.

ORDERING INFORMATION

Article code

1st block	2nd block
P H E 4 2 8 P B 5 1 5 0 J	R 1 7 T 0
1 2 3 4 5 6 7 8 9 10 11 12 13	14 15 16 17 18

1st block, see article table
2nd block, If not standard lead length, add R06 to R30 in pos. 14–16.
 For taped add T0 in pos. 17–18. For packing on trays (6 mm lead length), add L2 in pos. 17–18.

PACKING

The box dimensions for bulk packaging are 245 x 145 x 80 mm. Quantity/package as in article table, based on standard lead length, R06. Reels with taped capacitors are packed 10 in a box with the dimensions 370 x 370 x 560 mm. Quantity per reel as in 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.

MARKING

- RIFA
- Article code
- Rated capacitance according to IEC 60062
- Rated voltage
- Capacitance tolerance code
- Manufacturing code (year, month)