



## Film Capacitors

### Metallized Polypropylene Film Capacitors (MFP)

**Series/Type:** B32686S  
**Date:** August 2004

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**Snubbing (wound)**
**Typical applications**

- Snubbing
- Filtering
- IGBT

**Climatic**

- Max. operating temperature: 100 °C
- Climatic category (IEC 60068-1): 55/100/56

**Construction**

- Dielectric: polypropylene (PP)
- Film metallized on one side and metal foils internally connected in series
- Plastic case, epoxy resin sealing (UL 94 V-0)

**Features**

- Very high pulse strength
- High current
- Highest possible contact reliability

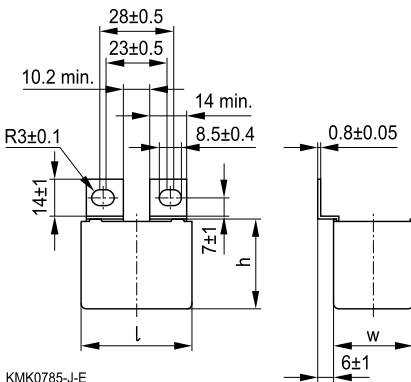
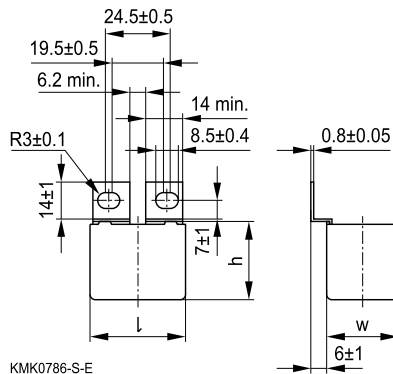
**Terminals**

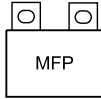
- Strap terminals, tinned copper (max. torque 10 Nm)

**Marking**

Manufacturer's logo, ordering code, style (MFP) rated capacitance (coded), cap. tolerance (code letter), rated DC voltage, date of manufacture (coded)

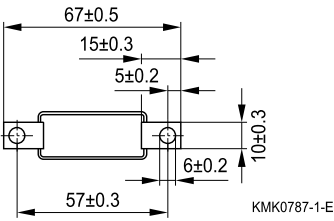
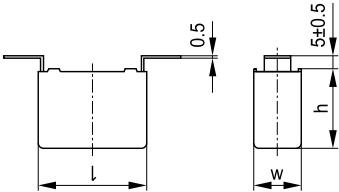
**Delivery mode:** Bulk

**Dimensional drawings**
**T1 (code no. 561)**

**T2 (code no. 562)**


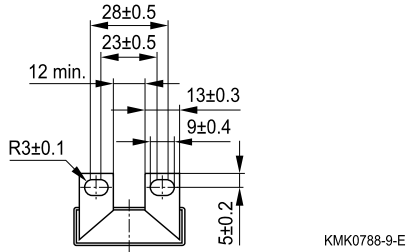
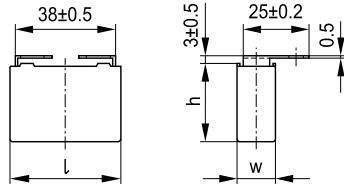


Dimensional drawings (continued)

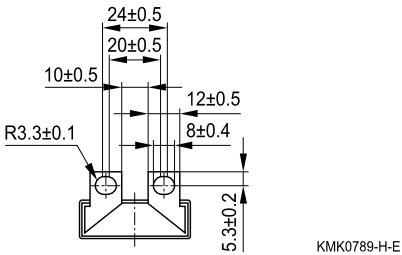
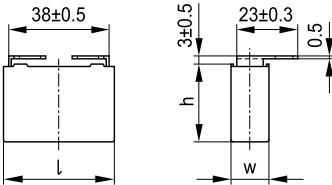
T3 (code no. 563)



T4 (code no. 564)



T5 (code no. 565)





**B32686S**

**Snubbing (wound)**

**Overview of available types**

Type	B32686S			
$V_R$ (VDC)	1000	1250	1600	2000
$V_{rms}$ (VAC)	400	450	450	500
$C_R$ (nF)				
22				
33				
47				
68				
100				
120				
150				
220				
270				
330				
390				
470				
560				
680				

**Electrical specifications, ordering codes and packing units**

$V_R$	$V_{rms}$ $f \leq 1\text{kHz}$	$C_R$	Max. dimensions $w \times h \times l$ mm	$I_{rms}$ 100 kHz A	ESR 100 kHz $m\Omega$	Ordering code (composition see below)	Ter- minal	pcs./ unit
VDC	VAC	nF						
1000	400	68	12.0 × 22.5 × 42.0	4.0	20	B32686S0683+563	T3	56
		68	12.0 × 22.5 × 42.0	4.0	20	B32686S0683+564	T4	96
		100	12.0 × 22.5 × 42.0	4.5	15	B32686S0104+563	T3	56
		100	12.0 × 22.5 × 42.0	4.5	15	B32686S0104+564	T4	96
		120	12.0 × 22.5 × 42.0	4.5	13	B32686S0124+563	T3	56
		120	12.0 × 22.5 × 42.0	4.5	13	B32686S0124+564	T4	96
		150	14.0 × 25.0 × 42.0	5.5	10	B32686S0154+563	T3	48
		150	14.0 × 25.0 × 42.0	5.5	10	B32686S0154+564	T4	72
		150	14.0 × 25.0 × 42.0	5.5	10	B32686S0154+565	T5	72
		220	16.0 × 28.5 × 42.0	7.0	7	B32686S0224+563	T3	40
		220	16.0 × 28.5 × 42.0	7.0	7	B32686S0224+564	T4	48
		220	16.0 × 28.5 × 42.0	7.0	7	B32686S0224+565	T5	48
		270	18.0 × 32.5 × 42.0	7.5	7	B32686S0274+563	T3	36
		270	18.0 × 32.5 × 42.0	7.5	7	B32686S0274+564	T4	32
		270	18.0 × 32.5 × 42.0	7.5	7	B32686S0274+565	T5	32
		330	20.0 × 39.5 × 42.0	8.5	5	B32686S0334+561	T1	24
		330	20.0 × 39.5 × 42.0	8.5	5	B32686S0334+562	T2	24
		330	20.0 × 39.5 × 42.0	8.5	5	B32686S0334+563	T3	26
		330	20.0 × 39.5 × 42.0	8.5	5	B32686S0334+564	T4	24
		330	20.0 × 39.5 × 42.0	8.5	5	B32686S0334+565	T5	24
		390	20.0 × 39.5 × 42.0	9.0	5	B32686S0394+561	T1	24
		390	20.0 × 39.5 × 42.0	9.0	5	B32686S0394+562	T2	24
		390	20.0 × 39.5 × 42.0	9.0	5	B32686S0394+563	T3	26
		390	20.0 × 39.5 × 42.0	9.0	5	B32686S0394+564	T4	24
		390	20.0 × 39.5 × 42.0	9.0	5	B32686S0394+565	T5	24
		470	28.0 × 37.0 × 42.0	10.0	3	B32686S0474+561	T1	27
		470	28.0 × 37.0 × 42.0	10.0	3	B32686S0474+562	T2	27
		470	28.0 × 37.0 × 42.0	10.0	3	B32686S0474+563	T3	18
		560	28.0 × 37.0 × 42.0	11.0	3	B32686S0564+561	T1	27
		560	28.0 × 37.0 × 42.0	11.0	3	B32686S0564+562	T2	27
		560	28.0 × 37.0 × 42.0	11.0	3	B32686S0564+563	T3	18

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

M = ±20%

K = ±10%

J = ±5%


**B32686S**
**Snubbing (wound)**
**Electrical specifications, ordering codes and packing units**

$V_R$	$V_{rms}$ $f \leq 1\text{kHz}$ VAC	$C_R$ nF	Max. dimensions $w \times h \times l$ mm	$I_{rms}$ 100 kHz A	ESR 100 kHz m $\Omega$	Ordering code (composition see below)	Ter- minal	pcs./ unit
1000	400	680	30.0 × 45.0 × 42.0	12.0	3	B32686S0684+561	T1	12
		680	30.0 × 45.0 × 42.0	12.0	3	B32686S0684+562	T2	12
		680	30.0 × 45.0 × 42.0	12.0	3	B32686S0684+563	T3	18
1250	450	68	12.0 × 22.5 × 42.0	4.5	20	B32686S7683+563	T3	56
		68	12.0 × 22.5 × 42.0	4.5	20	B32686S7683+564	T4	96
		100	14.0 × 25.0 × 42.0	5.0	15	B32686S7104+563	T3	48
		100	14.0 × 25.0 × 42.0	5.0	15	B32686S7104+564	T4	72
		100	14.0 × 25.0 × 42.0	5.0	15	B32686S7104+565	T5	72
		120	14.0 × 25.0 × 42.0	5.5	13	B32686S7124+563	T3	48
		120	14.0 × 25.0 × 42.0	5.5	13	B32686S7124+564	T4	72
		120	14.0 × 25.0 × 42.0	5.5	13	B32686S7124+565	T5	72
		150	16.0 × 28.5 × 42.0	6.5	10	B32686S7154+563	T3	40
		150	16.0 × 28.5 × 42.0	6.5	10	B32686S7154+564	T4	48
		150	16.0 × 28.5 × 42.0	6.5	10	B32686S7154+565	T5	48
		220	18.0 × 32.5 × 42.0	8.5	7	B32686S7224+563	T3	36
		220	18.0 × 32.5 × 42.0	8.5	7	B32686S7224+564	T4	32
		220	18.0 × 32.5 × 42.0	8.5	7	B32686S7224+565	T5	32
		270	20.0 × 39.5 × 42.0	9.0	7	B32686S7274+561	T1	24
		270	20.0 × 39.5 × 42.0	9.0	7	B32686S7274+562	T2	24
		270	20.0 × 39.5 × 42.0	9.0	7	B32686S7274+563	T3	26
		270	20.0 × 39.5 × 42.0	9.0	7	B32686S7274+564	T4	24
		270	20.0 × 39.5 × 42.0	9.0	7	B32686S7274+565	T5	24
		330	28.0 × 37.0 × 42.0	10.0	5	B32686S7334+561	T1	27
		330	28.0 × 37.0 × 42.0	10.0	5	B32686S7334+562	T2	27
		330	28.0 × 37.0 × 42.0	10.0	5	B32686S7334+563	T3	18
		390	28.0 × 37.0 × 42.0	11.0	5	B32686S7394+561	T1	27
		390	28.0 × 37.0 × 42.0	11.0	5	B32686S7394+562	T2	27
		390	28.0 × 37.0 × 42.0	11.0	5	B32686S7394+563	T3	18
		470	30.0 × 45.0 × 42.0	12.0	5	B32686S7474+561	T1	12
		470	30.0 × 45.0 × 42.0	12.0	5	B32686S7474+562	T2	12
		470	30.0 × 45.0 × 42.0	12.0	5	B32686S7474+563	T3	18

Further E series and intermediate capacitance values on request.

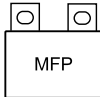
**Composition of ordering code**

+ = Capacitance tolerance code:

M = ±20%

K = ±10%

J = ±5%


**Electrical specifications, ordering codes and packing units**

$V_R$	$V_{rms}$ $f \leq 1\text{kHz}$	$C_R$	Max. dimensions $w \times h \times l$ mm	$I_{rms}$ 100 kHz A	ESR 100 kHz $m\Omega$	Ordering code (composition see below)	Ter- minal	pcs./ unit
VDC	VAC	nF						
1600	450	47	12.0 × 22.5 × 42.0	5.0	30	B32686S1473+563	T3	56
		47	12.0 × 22.5 × 42.0	5.0	30	B32686S1473+564	T4	96
		68	14.0 × 25.0 × 42.0	6.0	20	B32686S1683+563	T3	48
		68	14.0 × 25.0 × 42.0	6.0	20	B32686S1683+564	T4	72
		68	14.0 × 25.0 × 42.0	6.0	20	B32686S1683+565	T5	72
		100	18.0 × 32.5 × 42.0	7.0	15	B32686S1104+563	T3	36
		100	18.0 × 32.5 × 42.0	7.0	15	B32686S1104+564	T4	32
		100	18.0 × 32.5 × 42.0	7.0	15	B32686S1104+565	T5	32
		120	18.0 × 32.5 × 42.0	7.5	13	B32686S1124+563	T3	36
		120	18.0 × 32.5 × 42.0	7.5	13	B32686S1124+564	T4	32
		120	18.0 × 32.5 × 42.0	7.5	13	B32686S1124+565	T5	32
		150	20.0 × 39.5 × 42.0	8.5	10	B32686S1154+561	T1	24
		150	20.0 × 39.5 × 42.0	8.5	10	B32686S1154+562	T2	24
		150	20.0 × 39.5 × 42.0	8.5	10	B32686S1154+563	T3	26
		150	20.0 × 39.5 × 42.0	8.5	10	B32686S1154+564	T4	24
		150	20.0 × 39.5 × 42.0	8.5	10	B32686S1154+565	T5	24
		220	28.0 × 37.0 × 42.0	10.5	7	B32686S1224+561	T1	27
		220	28.0 × 37.0 × 42.0	10.5	7	B32686S1224+562	T2	27
		220	28.0 × 37.0 × 42.0	10.5	7	B32686S1224+563	T3	18
		270	30.0 × 45.0 × 42.0	11.5	7	B32686S1274+561	T1	12
		270	30.0 × 45.0 × 42.0	11.5	7	B32686S1274+562	T2	12
		270	30.0 × 45.0 × 42.0	11.5	7	B32686S1274+563	T3	18

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

M = ±20%

K = ±10%

J = ±5%


**B32686S**
**Snubbing (wound)**
**Electrical specifications, ordering codes and packing units**

$V_R$	$V_{rms}$ $f \leq 1\text{kHz}$	$C_R$	Max. dimensions $w \times h \times l$ mm	$I_{rms}$ 100 kHz A	ESR 100 kHz $m\Omega$	Ordering code (composition see below)	Ter- minal	pcs./ unit
VDC	VAC	nF						
2000	500	22	12.0 × 22.5 × 42.0	4.0	70	B32686S2223+563	T3	56
		22	12.0 × 22.5 × 42.0	4.0	70	B32686S2223+564	T4	96
		33	14.0 × 25.0 × 42.0	5.0	50	B32686S2333+563	T3	48
		33	14.0 × 25.0 × 42.0	5.0	50	B32686S2333+564	T4	72
		33	14.0 × 25.0 × 42.0	5.0	50	B32686S2333+565	T5	72
		47	16.0 × 28.5 × 42.0	6.0	30	B32686S2473+563	T3	40
		47	16.0 × 28.5 × 42.0	6.0	30	B32686S2473+564	T4	48
		47	16.0 × 28.5 × 42.0	6.0	30	B32686S2473+565	T5	48
		68	18.0 × 32.5 × 42.0	7.5	20	B32686S2683+563	T3	36
		68	18.0 × 32.5 × 42.0	7.5	20	B32686S2683+564	T4	32
		68	18.0 × 32.5 × 42.0	7.5	20	B32686S2683+565	T5	32
		100	20.0 × 39.5 × 42.0	8.5	15	B32686S2104+561	T1	24
		100	20.0 × 39.5 × 42.0	8.5	15	B32686S2104+562	T2	24
		100	20.0 × 39.5 × 42.0	8.5	15	B32686S2104+563	T3	26
		100	20.0 × 39.5 × 42.0	8.5	15	B32686S2104+564	T4	24
		100	20.0 × 39.5 × 42.0	8.5	15	B32686S2104+565	T5	24
		120	28.0 × 37.0 × 42.0	9.0	13	B32686S2124+561	T1	24
		120	28.0 × 37.0 × 42.0	9.0	13	B32686S2124+562	T2	24
		120	28.0 × 37.0 × 42.0	9.0	13	B32686S2124+563	T3	26
		150	28.0 × 37.0 × 42.0	10.0	10	B32686S2154+561	T1	27
		150	28.0 × 37.0 × 42.0	10.0	10	B32686S2154+562	T2	27
		150	28.0 × 37.0 × 42.0	10.0	10	B32686S2154+563	T3	18

Further E series and intermediate capacitance values on request.

**Composition of ordering code**

+ = Capacitance tolerance code:

M = ±20%

K = ±10%

J = ±5%



**Technical data**

Operating temperature range	Max. operating temperature $T_{op,max}$	+100 °C	
	Upper category temperature $T_{max}$	+100 °C	
	Lower category temperature $T_{min}$	-55 °C	
	Rated temperature $T_R$	+85 °C	
Dissipation factor $\tan \delta$ at 20 °C (upper limit values)	1.0 · 10 <sup>-3</sup> (at 10 kHz)		
	3.0 · 10 <sup>-3</sup> (at 10 kHz)		
Insulation resistance $R_{ins}$ or time constant $\tau = C_R \cdot R_{ins}$ at 20 °C, rel. humidity ≤ 65% (minimum as-delivered values)	$C_R \leq 0.33 \mu F$	$C_R > 0.33 \mu F$	
	100 GΩ	30000 s	
DC test voltage	2.0 · $V_R$ , 2 s		
Category voltage $V_C$ (continuous operation with $V_{DC}$ or $V_{AC}$ at $f \leq 1$ kHz)	$T_A$ (°C)	DC voltage derating	AC voltage derating
	$T_A \leq 85$ $85 < T_A \leq 100$	$V_C = V_R$ $V_C = V_R \cdot (165 - T_A) / 80$	$V_{C,rms} = V_{rms}$ $V_{C,rms} = V_{rms} \cdot (165 - T_A) / 80$
Operating voltage $V_{op}$ for short operating periods ( $V_{DC}$ or $V_{AC}$ at $f \leq 1$ kHz)	$T_A$ (°C)	DC voltage (max. hours)	AC voltage (max. hours)
	$T_A \leq 85$ $85 < T_A \leq 100$	$V_{op} = 1.25 \cdot V_C$ (2000 h) $V_{op} = 1.25 \cdot V_C$ (1000 h)	$V_{op} = 1.0 \cdot V_{C,rms}$ (2000 h) $V_{op} = 1.0 \cdot V_{C,rms}$ (1000 h)
Damp heat test Limit values after damp heat test	56 days/40 °C/93% relative humidity		
	Capacitance change $ \Delta C/C $	≤ 2%	
	Dissipation factor change $\Delta \tan \delta$	≤ 1.0 · 10 <sup>-3</sup> (at 10 kHz)	
	Insulation resistance $R_{ins}$ or time constant $\tau = C_R \cdot R_{ins}$	≥ 50% of minimum as-delivered values	
Reliability: Failure rate $\lambda$ Service life $t_{SL}$	1 fit (≤ 1 · 10 <sup>-9</sup> /h) at 0.5 · $V_R$ , 40 °C 200 000 h at 1.0 · $V_R$ , 40 °C For conversion to other operating conditions and temperatures, refer to chapter "Quality assurance", page .		
Failure criteria: Total failure Failure due to variation of parameters	Short circuit or open circuit Capacitance change $ \Delta C/C $ > 10% Dissipation factor $\tan \delta$ 4 · upper limit value Insulation resistance $R_{ins}$ < 1500 MΩ ( $C_R \leq 0.33 \mu F$ ) or time constant $\tau = C_R \cdot R_{ins}$ < 500 s ( $C_R > 0.33 \mu F$ )		



**B32686S**

**Snubbing (wound)**

**Pulse handling capability**

"dV/dt" represents the maximum permissible voltage change per unit of time for non-sinusoidal voltages, expressed in V/μs.

"k<sub>0</sub>" represents the maximum permissible pulse characteristic of the waveform applied to the capacitor, expressed in V<sup>2</sup>/μs.

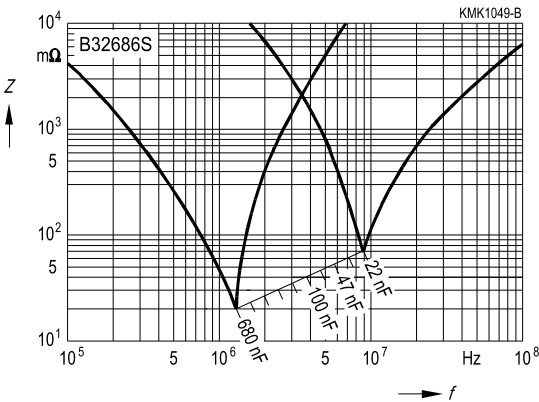
*Note:*

*The values of dV/dt and k<sub>0</sub> provided below must not be exceeded in order to avoid damaging the capacitor.*

**dV/dt and k<sub>0</sub> values**

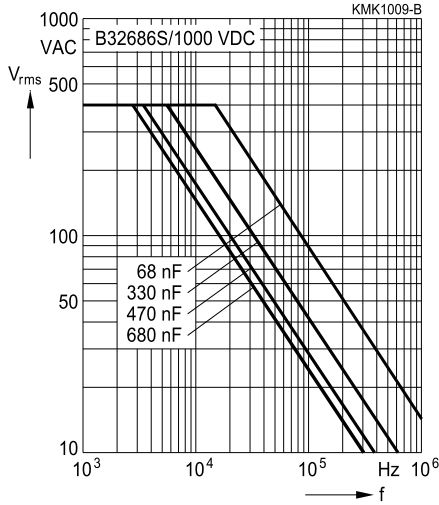
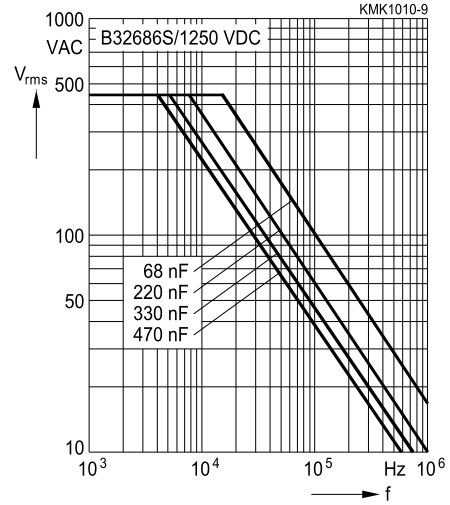
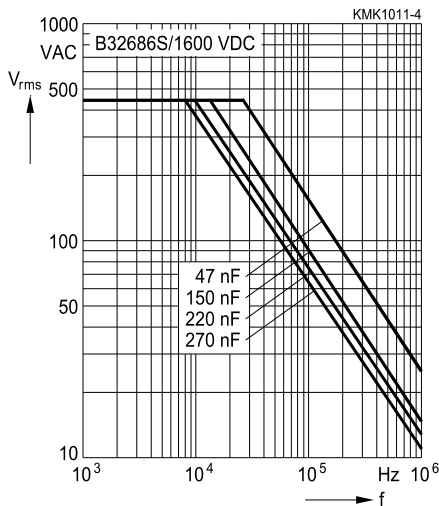
V <sub>R</sub> (VDC)	V <sub>rms</sub> (VAC)	dV/dt in V/μs	k <sub>0</sub> in V <sup>2</sup> /μs
1000	400	2 000	4 000 000
1250	450	2 800	7 000 000
1600	450	3 500	11 000 000
2000	500	4 500	18 000 000

**Impedance Z versus frequency f**  
(typical values)



**Permissible AC voltage  $V_{rms}$  versus frequency  $f$  (for sinusoidal waveforms,  $T_A \leq 90^\circ\text{C}$ )**

 For  $T_A > 90^\circ\text{C}$ , please refer to "General technical information", section 3.2.3.

**1000 VDC/400 VAC**

**1250 VDC/450 VAC**

**1600 VDC/450 VAC**

**2000 VDC/500 VAC**
