

## MKP89 型 IGBT 吸收电容器

### MKP89 Type Snubber Capacitor for IGBT

< 60°C/93%RH/1000h /  $U_{NDC}$  >

#### ◆ 外形尺寸图及产品结构 Outline Drawing and Capacitor Construction

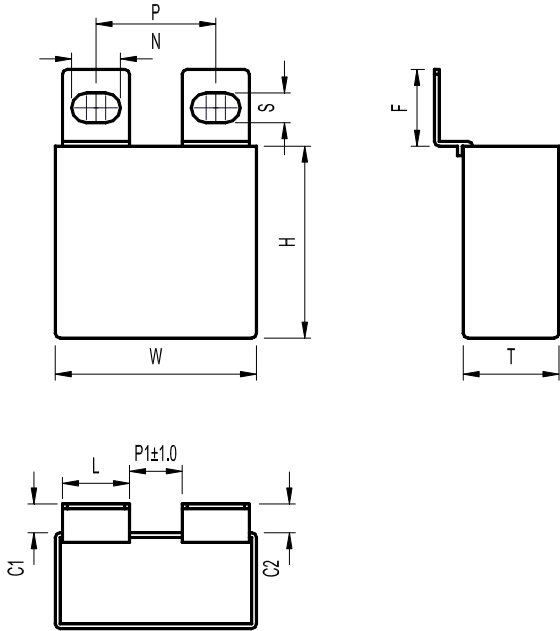


图 1:引出类型 1 (Style 1)

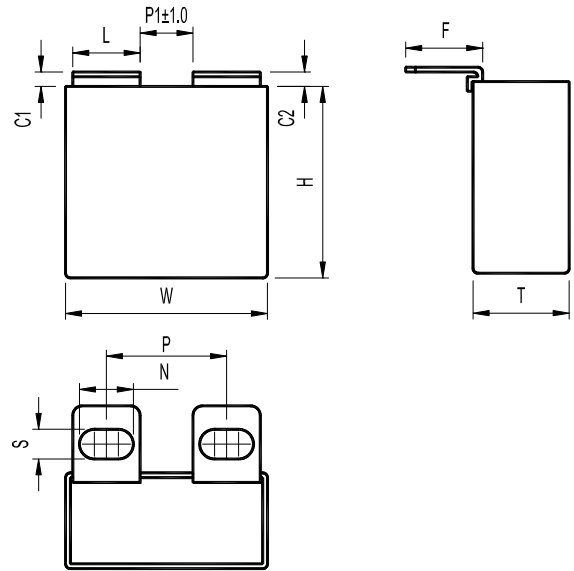


图 2: 引出类型 2 (Style 2)

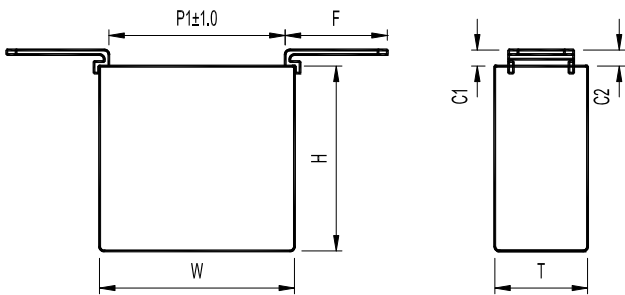


图 3:引出类型 3 (Style 3)

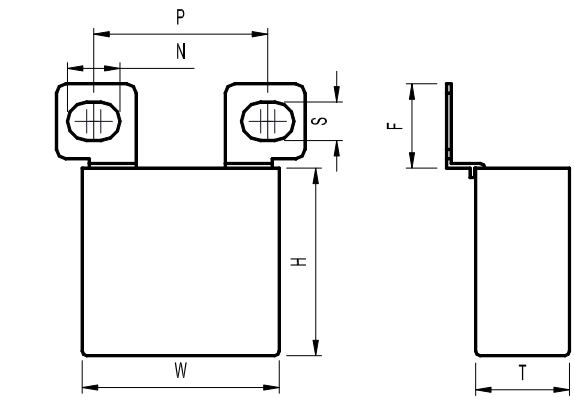


图 4: 引出类型 4 (Style 4)

#### ◆ 特点及用途 Application and Feature

自感小，内部温升小，广泛应用于高压高频脉冲电路，适合作为 IGBT 吸收电容。

Low inductance and small inherent temperature rise, Widely used in high voltage, high frequency circuit, especially designed as snubber capacitor for IGBT.




# MKP89

## MKP89 series

### ◆ 技术要求 Specifications

参照标准 Reference Standard	GB/T 17702, IEC 61071
气候类别 Climatic Category	40/85/56
额定电压 Rated Voltage	700Vdc/420Vac、900Vdc/450Vac、1000Vdc/500Vac、 1250Vdc/600Vac、1600Vdc/650Vac、2000Vdc/700Vac
工作温度范围(热点) Operation Temperature Range(Hot Spot)	-40℃~110℃ (+85℃~+110℃: 1.25% /°C of U <sub>OP</sub> derating compared to U <sub>NDC</sub> at 85℃)
电容量 Capacitance Range	0.1μF~9.0μF
电容量偏差 Capacitance Tolerance	±5%(J)、±10%(K) (20℃, 1kHz)
耐电压 Voltage Proof	U=1.5U <sub>NDC</sub> (20℃, 10s)
绝缘电阻 Insulation Resistance	C <sub>R</sub> ≤0.33μF, IR≥100 000MΩ C <sub>R</sub> >0.33μF, IR×C≥30 000s (20℃, 100V, 1min)
损耗角正切 Dissipation Factor	1kHz: Tan δ≤0.0005
工作寿命 Operation Life Time	100 000 hours at U <sub>NDC</sub> , Θ <sub>max</sub> =70℃

### ◆ 安全认证 Safety Approvals

	UL-CUL (美国/加拿大)	UL810, CSA C22.2 No. 190, (construction only) 证书号 (File No.) :E477437
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### ◆ 产品代码编写说明: Part number code system:

16 位产品代码如下: The 16 digits part number is formed as follow:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
M	K	8	9												

第 1~4 位	薄膜电容器系列代码 MK89=MKP89	Digit 1~4	Series code of film capacitor MK89=MKP89
第 5~7 位	标称容量代码 举例: 104=10×10 <sup>4</sup> pF=0.1μF	Digit 5~7	Rated capacitance value code For example: 104=10×10 <sup>4</sup> pF=0.1μF
第 8 位	容量等级代码 J=±5% K=±10%	Digit 8	Capacitance tolerance code J=±5% K=±10%
第 9~10 位	直流额定电压代码 1V=700V 1X=900V 3A=1000V 3B=1250V 3C=1600V 3D=2000V	Digit 9~10	DC rated voltage code 1V=700V 1X=900V 3A=1000V 3B=1250V 3C=1600V 3D=2000V
第 11 位	安装孔距代码 见表 1	Digit 11	Distance of hole for fixing Referring to table 1
第 12 位	内部特征码	Digit 12	Internal use
第 13 位	外壳宽度 1=37mm 2=42mm 3=57mm	Digit 13	Wide of case 1=37mm 2=42mm 3=57mm
第 14~16 位	引出端代码 (接线片式) 见表 2	Digit 14~16	Terminals code (lug terminals) Referring to table 2

表1 安装孔距（接线片式）

Table 1 Distance of hole for fixing (lug terminals)

焊片引出方式 Style for solder slice	外壳宽度 Width of case	安装孔距(mm) Distance of hole for fixing		焊片间距(mm)P1 Distance between solder slice	
	W	P	代码 Code		
style 1	37	16~24	1	6	
		21~29	D	12	
style 2		16~24	2	6	
		21~29	E	12	
style 3		52~62	3	32	
style 4		29~36	A	14	
style 1		42	21~29	4	11
style 2			21~29	5	11
style 3	57~67		6	37	
style 4	33~41		B	18	
style 1	57	35~43	7	25	
style 2		35~43	8	25	
style 3		71~81	9	52	
style 4		33~41	C	18	

表2 引出端代码（接线片式）

Table 2 Terminals code (lug terminals)

第14位 Digit14		第15位 Digit15		第16位 Digit16	
C高度 Height for C		焊片引出方式 Style for solder slice		焊片尺寸 Size for solder slice(mm)	
代码 Code	说明 explanation	代码 Code	说明 explanation	代码 Code	说明 explanation
3	C1=C2=3	1	图1 Style1	1	$L \times F \times N \times S = 14 \times 16 \times 10.2 \times 6.2$
6	C1=C2=6	2	图2 Style2	2	$L \times F \times N \times S = 14 \times 22 \times 11.2 \times 6.2$
		3	图3 Style3	3	$L \times F \times N \times S = 12 \times 22 \times 11.2 \times 6.2$
		4	图4 Style4	4	$L \times F \times N \times S = 17 \times 18 \times 11.2 \times 8.2$



MKP89

MKP89 series

◆ 产品尺寸及性能参数: Product Dimension and Characteristic Data:

700Vdc/420Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.68	37.0	25.0	15.0	900	612	13	5.0	MK89684-1V~01***
1.0	37.0	30.0	16.0	900	900	14	5.0	MK89105-1V~01***
1.2	37.0	30.0	16.0	900	1080	16	4.5	MK89125-1V~01***
1.5	37.0	34.0	20.0	900	1350	17	4.5	MK89155-1V~01***
1.8	37.0	34.0	20.0	900	1620	18	4.5	MK89185-1V~01***
2.0	42.0	40.0	20.0	600	1200	18	4.0	MK89205-1V~02***
2.2	42.0	40.0	20.0	600	1320	18.5	4.0	MK89225-1V~02***
2.5	42.0	40.0	20.0	600	1500	19	4.0	MK89255-1V~02***
3.0	42.0	44.0	24.0	600	1800	20	4.0	MK89305-1V~02***
3.3	42.0	44.0	24.0	600	1980	20	3.5	MK89335-1V~02***
4.0	42.0	44.0	24.0	600	2400	21	3.5	MK89405-1V~02***
4.7	42.0	45.0	30.0	600	2820	23	3.5	MK89475-1V~02***
5.0	42.0	45.0	30.0	600	3000	23.5	3.0	MK89505-1V~02***
6.0	42.0	43.0	42.0	600	3600	25	3.0	MK89605-1V~02***
6.5	42.0	43.0	42.0	600	3900	26	3.0	MK89655-1V~02***
6.5	57.0	45.0	30.0	360	2340	24	2.5	MK89655-1V~03***
7.0	57.0	45.0	30.0	360	2520	25	2.5	MK89705-1V~03***
8.0	57.0	50.0	35.0	360	2880	27	2.5	MK89805-1V~03***
9.0	57.0	50.0	35.0	360	3240	29	2.5	MK89905-1V~03***

900Vdc/450Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.47	37.0	25.0	15.0	1200	564	15	5.0	MK89474-1X~01***
0.68	37.0	30.0	16.0	1200	816	16	5.0	MK89684-1X~01***
1.0	37.0	34.0	20.0	1200	1200	17	5.0	MK89105-1X~01***
1.2	37.0	34.0	20.0	1200	1440	17.5	5.0	MK89125-1X~01***
1.5	37.0	34.0	20.0	1200	1800	18	5.0	MK89155-1X~01***
1.5	42.0	40.0	20.0	750	1125	18.5	4.5	MK89155-1X~02***
2.0	42.0	40.0	20.0	750	1500	19	4.5	MK89205-1X~02***
2.2	42.0	40.0	20.0	750	1650	19.5	4.5	MK89225-1X~02***
2.5	42.0	44.0	24.0	750	1875	20	4.5	MK89255-1X~02***
3.0	42.0	44.0	24.0	750	2250	21	4.5	MK89305-1X~02***
3.3	42.0	45.0	30.0	750	2475	21.5	4.5	MK89335-1X~02***
4.0	42.0	43.0	42.0	750	3000	22	4.5	MK89405-1X~02***
4.0	57.0	45.0	30.0	450	1800	23	4.0	MK89405-1X~03***
4.7	57.0	45.0	30.0	450	2115	24.5	4.0	MK89475-1X~03***
5.0	57.0	45.0	30.0	450	2250	25	4.0	MK89505-1X~03***
6.0	57.0	50.0	35.0	450	2700	26	4.0	MK89605-1X~03***
6.5	57.0	50.0	35.0	450	2925	27	4.0	MK89655-1X~03***

◆ 产品尺寸及性能参数: Product Dimension and Characteristic Data:

1000Vdc/500Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.47	37.0	25.0	15.0	1300	611	14	5.0	MK89474-3A~01***
0.68	37.0	30.0	16.0	1300	884	15	5.0	MK89684-3A~01***
0.82	37.0	30.0	16.0	1300	1066	16	5.0	MK89824-3A~01***
1.0	37.0	34.0	20.0	1300	1300	17	4.5	MK89105-3A~01***
1.2	37.0	34.0	20.0	1300	1560	17	4.5	MK89125-3A~01***
1.2	42.0	40.0	20.0	850	1020	16	4.5	MK89125-3A~02***
1.5	42.0	40.0	20.0	850	1275	16	4.5	MK89155-3A~02***
2.0	42.0	44.0	24.0	850	1700	17	4.5	MK89205-3A~02***
2.2	42.0	44.0	24.0	850	1870	20	4.0	MK89225-3A~02***
2.5	42.0	45.0	30.0	850	2125	21	4.0	MK89255-3A~02***
3.0	42.0	45.0	30.0	850	2550	21.5	4.0	MK89305-3A~02***
3.3	42.0	43.0	42.0	850	2805	22	4.0	MK89335-3A~02***
3.3	57.0	45.0	30.0	500	1650	20	4.0	MK89335-3A~03***
4.0	57.0	45.0	30.0	500	2000	21	4.0	MK89405-3A~03***
4.7	57.0	50.0	35.0	500	2350	22	4.0	MK89475-3A~03***
5.0	57.0	50.0	35.0	500	2500	23	4.0	MK89505-3A~03***

1250Vdc/600Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.33	37.0	25.0	15.0	1500	495	15	4.5	MK89334-3B~01***
0.47	37.0	30.0	16.0	1500	705	16	4.5	MK89474-3B~01***
0.68	37.0	34.0	20.0	1500	1020	17	4.5	MK89684-3B~01***
0.75	37.0	34.0	20.0	1500	1125	18	4.5	MK89754-3B~01***
0.82	42.0	40.0	20.0	950	779	18	4.0	MK89824-3B~02***
1.0	42.0	40.0	20.0	950	950	19	4.0	MK89105-3B~02***
1.2	42.0	44.0	24.0	950	1140	19	4.0	MK89125-3B~02***
1.5	42.0	44.0	24.0	950	1425	19.5	4.0	MK89155-3B~02***
2.0	42.0	45.0	30.0	950	1900	20	4.0	MK89205-3B~02***
2.2	42.0	43.0	42.0	950	2090	21	4.0	MK89225-3B~02***
2.5	42.0	43.0	42.0	950	2375	22	4.0	MK89255-3B~02***
2.2	57.0	45.0	30.0	600	1320	20	3.8	MK89225-3B~03***
2.5	57.0	45.0	30.0	600	1500	21	3.8	MK89255-3B~03***
3.0	57.0	45.0	30.0	600	1800	22	3.8	MK89305-3B~03***
3.3	57.0	50.0	35.0	600	1980	23	3.8	MK89335-3B~03***
4.0	57.0	50.0	35.0	600	2400	24	3.8	MK89405-3B~03***



# MKP89

## MKP89 series

### ◆ 产品尺寸及性能参数: Product Dimension and Characteristic Data:

1600Vdc/650Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.22	37.0	25.0	15.0	1800	396	15	6.0	MK89224-3C~01***
0.33	37.0	30.0	16.0	1800	594	15.5	6.0	MK89334-3C~01***
0.39	37.0	34.0	20.0	1800	702	16	5.5	MK89394-3C~01***
0.47	37.0	34.0	20.0	1800	846	17	5.5	MK89474-3C~01***
0.47	42.0	40.0	20.0	1200	564	17	4.0	MK89474-3C~02***
0.68	42.0	40.0	20.0	1200	816	18	4.0	MK89684-3C~02***
0.82	42.0	44.0	24.0	1200	984	19	4.0	MK89824-3C~02***
1.0	42.0	45.0	30.0	1200	1200	19.5	4.0	MK89105-3C~02***
1.2	42.0	45.0	30.0	1200	1440	20	4.0	MK89125-3C~02***
1.5	42.0	43.0	42.0	1200	1800	21	4.0	MK89155-3C~02***
1.5	57.0	45.0	30.0	750	1125	22	3.5	MK89155-3C~03***
2.0	57.0	50.0	35.0	750	1500	24	3.5	MK89205-3C~03***
2.2	57.0	50.0	35.0	750	1650	25	3.5	MK89225-3C~03***

2000Vdc/700Vac								
C ( $\mu$ F)	W $\pm 1.0$	H $\pm 1.0$	T $\pm 1.0$	dv/dt (V/ $\mu$ s)	I <sub>peak</sub> (A)	I <sub>RMS</sub> (A)	ESR (m $\Omega$ )	产品代码 Part number
0.10	37.0	25.0	15.0	2100	210	14	8.0	MK89104-3D~01***
0.15	37.0	25.0	15.0	2100	315	15	8.0	MK89154-3D~01***
0.22	37.0	30.0	16.0	2100	462	15.5	6.0	MK89224-3D~01***
0.33	37.0	34.0	20.0	2100	693	16	6.0	MK89334-3D~01***
0.47	42.0	40.0	20.0	1250	588	17	4.0	MK89474-3D~02***
0.56	42.0	44.0	24.0	1250	700	18	4.0	MK89564-3D~02***
0.68	42.0	44.0	24.0	1250	850	18.5	3.5	MK89684-3D~02***
0.82	42.0	45.0	30.0	1250	1025	19	3.5	MK89824-3D~02***
1.0	42.0	43.0	42.0	1250	1250	21	3.5	MK89105-3D~02***
1.0	57.0	45.0	30.0	850	850	24	4.0	MK89105-3D~03***
1.2	57.0	45.0	30.0	850	1020	23	4.0	MK89125-3D~03***
1.5	57.0	50.0	35.0	850	1275	24	4.0	MK89155-3D~03***

备注:

“-”: 容量偏差

“~”: 引线安装孔距 (见表 1)

“\*\*\*”: 引出端代码 (见表 2)

ESR 是在频率 100KHz 时的典型值

I<sub>RMS</sub> 值为 f=100KHz、T<sub>amb</sub>=85℃、散热条件 10W/m<sup>2</sup>/℃、 $\Delta$ T<sub>case</sub>≤15℃的最大电流有效值。

“-”= tolerance code, J=±5%, K=±10%, M=±20%

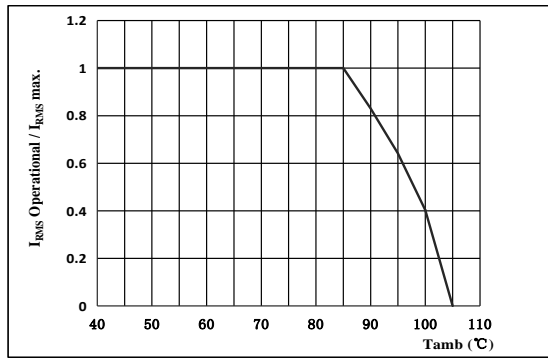
“~”= distance of hole for fixing (refer to table 1)

“\*\*\*”=Terminals code (refer to table 2)

ESR is the typical value at 100KHz.

I<sub>RMS</sub> is the maximum R.M.S current at 100KHz、T<sub>amb</sub>=85℃、 $\Delta$ T<sub>case</sub>≤15℃.(Coefficient of heat dissipation: 10W/m<sup>2</sup>/℃)

◆纹波电流降额曲线  $I_{RMS}$  Derating vs Ambient Temperature:



◆可靠性: Reliability

Test description	Reference	Test conditions	Determine criteria
极间耐压 Voltage test between terminals	IEC 61071	1.5 x U <sub>NDC</sub> at T <sub>amb</sub> Duration: 60 s	No visible damage  ΔC/C : ≤ 0.5 % tan δ: ≤ 1.2 initial tan δ + 1×10 <sup>-4</sup> at 10KHz R <sub>ins</sub> : ≥ 50% of IR limit
放电实验 Surge discharge test	IEC 61071	1.1 x U <sub>NDC</sub> Number of discharges: 5(within 10 minutes)	No visible damage  ΔC/C : ≤ 1.0 % tan δ: ≤ 1.2 initial tan δ + 1×10 <sup>-4</sup> at 10KHz R <sub>ins</sub> : ≥ 50% of IR limit
温度变化 Change of temperature	IEC 60068-2-14	T <sub>max.</sub> = 85 °C / T <sub>min.</sub> = - 40 °C Transition time: 1 h, equivalent to 1°C/min 5 cycles	No visible damage  ΔC/C : ≤ 2.0 % Increase of tan δ: ≤ 20 × 10 <sup>-4</sup> at 10KHz R <sub>ins</sub> : ≥ 50% of IR limit
耐湿性 Damp heat steady	IEC 60068-2-78	T <sub>max.</sub> = 40 °C RH = 93 % Duration 56 days	No visible damage  ΔC/C : ≤ 3.0 % Increase of tan δ: ≤ 20 × 10 <sup>-4</sup> at 10KHz R <sub>ins</sub> : ≥ 50% of IR limit
耐湿负荷 Biased humidity	AEC-Q200	T = 40 °C RH = 93% at U <sub>NDC</sub> Duration: 1000h (No dew in epoxy surface)	NO visible damage  ΔC/C : ≤ 5 %  Δtan δ / tan δ : ≤ 200% at 10KHz R <sub>ins</sub> : ≥ 200M Ω
		T = 60 °C RH = 93% at U <sub>NDC</sub> Duration: 1000h (No dew in epoxy surface)	NO visible damage  ΔC/C : ≤ 5 %  Δtan δ / tan δ : ≤ 200% at 10KHz R <sub>ins</sub> : ≥ 200M Ω
耐久性 Endurance	IEC 61071	1.3 × U <sub>NDC</sub> at T <sub>max.</sub> = 85 °C Duration 500 h 1000 × discharge at 1.4 × I (repetitive peak current in continuous operation) 1.3 × U <sub>NDC</sub> at T <sub>max.</sub> = 85 °C Duration 500 h.	No visible damage  ΔC/C : ≤ 3 % Increase of tan δ : ≤ 20×10 <sup>-4</sup> at 10KHz R <sub>ins</sub> : ≥ 50% of IR limit
振动 Vibration	IEC 60068	f=10 Hz to 55 Hz a=±0.35mm Test duration per axis = 10 frequency cycles (3 axes offset from each other by 90°) 1 octave/min, the total times are 135 min for 3axes	No visible damage