

## Ø 7.5 mm Film Dielectric Trimmers

### TEST VOLTAGE (DC) FOR 1 MINUTE:

500 V

### MAXIMUM CONTACT RESISTANCE:

10 mΩ

### MINIMUM INSULATION RESISTANCE:

10 000 MΩ

### CATEGORY TEMPERATURE RANGE:

#### PP

- 40 to + 70 °C

#### PE, PC, PTFE, PET

- 40 to + 85 °C

### CLIMATIC CATEGORY (IEC 60068):

#### PP

40/070/21

#### PE, PC, PTFE, PET

40/085/21

### MINIMUM STORAGE TEMPERATURE:

- 55 °C

### RELATED SPECIFICATION:

IEC 60418-1 and 4

### EFFECTIVE ANGLE OF ROTATION:

180° (rotation in 180° only, see "Life of Trimmer")

### OPERATING TORQUE:

#### $C_{max} < 33$ pF

1 to 15 mNm

#### $C_{max} \geq 33$ pF

1 to 25 mNm

### MAXIMUM AXIAL THRUST:

2 N

### FEATURES

- Housing diameter 7.5 mm
- For a basic grid of 2.54 mm (0.1") or 2.50 mm
- Top and bottom or top adjustment
- Vertical and horizontal versions
- Round or hexagonal head


**RoHS**  
COMPLIANT

### APPLICATIONS

- For consumer and industrial equipment

### DESCRIPTION:

The vanes of the trimmer are stacked on a sturdy plastic base. The color of the base indicates the maximum capacitance (see Electrical Data Table). The dielectric is a film of polypropylene (PP), polyethylene (PE), polycarbonate (PC), polytetrafluorethylene (PTFE), or polyethyleneterephthalate (PET) which supports the vanes in such a way that good stability is ensured and no microphony can occur.

Flux absorption between the vanes is prevented.

Cleaning with solvents is not advised.

Versions are available with either a vertical spindle, or a horizontal spindle (see dimensional outlines). Both versions have top adjustment by means of a screwdriver or trimming key and bottom adjustment by means of a key.

### QUALITY LEVEL:

Sampling and data evaluation for quality level in accordance with "MIL-STD-105D" and "IEC 60410":

< 0.15 % major defects

< 0.65 % minor defects

Each capacitor is tested for minimum  $C_{max}$  and is also subjected to the full test voltage.

### $C_{min} / C_{max}$ :

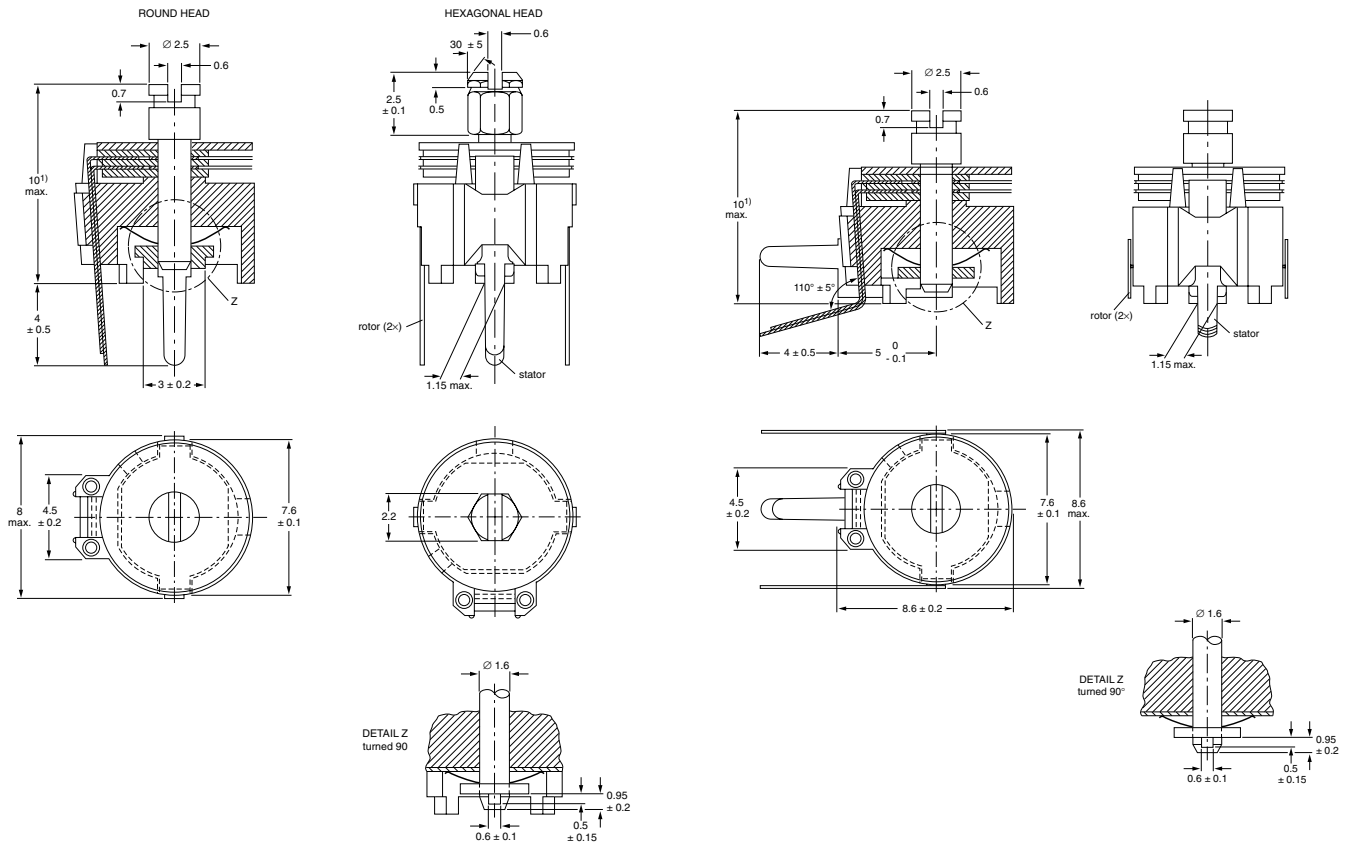
1.4/5.5 to 3/50 pF

### RATED VOLTAGE (DC):

250 V

### LIFE OF TRIMMER:

Maximum 10 cycles: rotation in 180° only (the electrical and mechanical performance is not guaranteed if rotated beyond 10 cycles)



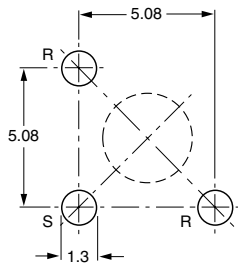
Trimmers 2281 808 ..... series, vertical version

Trimmers 2281 808 ..... series, horizontal version

Dimensions in millimeters

**ADJUSTMENT**

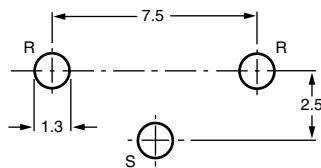
For top adjustment a screwdriver or trimming key can be used; for bottom adjustment a key is required as shown below



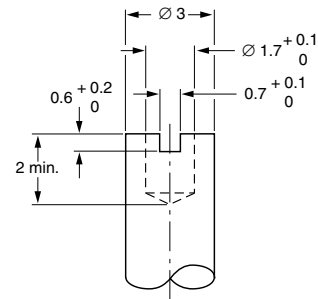
R = rotor, S = stator

The large hole is for bottom adjustment and the diameter is determined by user's requirements.

Hole pattern



R = rotor, S = stator



Bottom adjustment key

## ORDERING INFORMATION

$C_{min}/C_{max}$ (pF)	CATALOG NUMBER 2281 808 ..... OR BFC2 808 .....*			
	VERTICAL VERSION			HORIZONTAL VERSION
	ROUND HEAD		HEXAGONAL HEAD	ROUND HEAD
	TOP AND BOTTOM ADJUSTMENT	TOP ADJUSTMENT ONLY	TOP AND BOTTOM ADJUSTMENT	TOP AND BOTTOM ADJUSTMENT
1.4/5.5	11558	00004	–	51558
2/9	00018	–	–	–
2/10	11109	00005	17109	51109
2/10	–	11004	–	–
2/15	11159	–	–	–
2/18	00016	–	–	–
2.5/20	–	11006	–	–
2.5/22	11229	00006	17229	51229
2.5/27	11279	–	–	51279
3/33	11339	–	–	–
3/40	11409	–	17409	51409
3/50	11509	–	17509	51509

## MOUNTING

The trimmer can be mounted on printed-circuit boards with a grid of 2.50 mm or 2.54 mm and a minimum hole diameter of 1.25 mm.

## PACKAGING

Bulk packaged in cardboard boxes lined with expanded plastic. For smallest packaging quantity (SPQ) see Electrical Data Table.

## ELECTRICAL DATA

GUARANTEED MAX. $C_{min}/$ MIN. $C_{max}$ AT 200 kHz (pF)	SPINDLE	SHAPE OF HEAD	FIG.	ADJ. MODE	DIEL.	TAN $\delta$ AT $C_{max} \times 10^{-4}$		TEMP. COEFF. ( $10^{-6}/K$ )	MIN. $f_{res}$ at $C_{max}$ (MHZ)	COL. OF BASE	SPQ	CATALOG NUMBER 2281 ... .. or BFC2 ... ..*
						1 MHz	100 MHz					
1.4/5.5	vertical	round	1	top + bottom	PE	$\leq 10$	$\leq 25$	$-250 \pm 350$	850	grey	1400	.... 808 11558
			1	top							1400	.... 808 00004
	horizontal	round	2	top + bottom							1200	.... 808 51558
2/9	vertical	round	1	top + bottom	PTFE	$\leq 10$	$\leq 15$	$-150 \pm 800$	400	yellow	1400	.... 808 00018
2/10	vertical	round	1	top + bottom	PP	$\leq 10$	$\leq 25$	$-250 \pm 800$	480	yellow	1400	.... 808 11109
			1	top							1400	.... 808 00005
		hexag.	1	top							1400	.... 808 17109
	horizontal	round	2	top + bottom							1200	.... 808 51109
	vertical	round	1	top							PC	$\leq 70$
2/15	vertical	round	1	top + bottom	PP	$\leq 10$	$\leq 25$	$-250 \pm 600$	450	blue	1400	.... 808 11159
2/18	vertical	round	1	top + bottom	PTFE	$\leq 10$	$\leq 15$	$-250 \pm 350$	350	green	1400	.... 808 00016
2.5/20	vertical	round	1	top	PET	$\leq 160$	–	$0 \pm 1100$	250	green	1000	.... 808 11006
2.5/22	vertical	round	1	top + bottom	PP	$\leq 10$	$\leq 25$	$-200 \pm 500$	350	green	1400	.... 808 11229
			1	top							1400	.... 808 00006
	vertical	hexag.	1	top							1400	.... 808 17229
	horizontal	round	2	top + bottom							1200	.... 808 51229
2.5/27	vertical	round	1	top + bottom	PC	$\leq 70$	–	$-50 \pm 500$	350	red	1400	.... 808 11279
	horizontal	round	2	top + bottom							1200	.... 808 51279
3/33	vertical	round	1	top + bottom	PP	$\leq 10$	–	$-250 \pm 350$	300	brown	1400	.... 808 11339
3/40	vertical	round	1	top + bottom	PC	$\leq 70$	–	$-50 \pm 400$	300	violet	1400	.... 808 11409
	vertical	hexag.	1	top							1400	.... 808 17409
	horizontal	round	2	top + bottom							1200	.... 808 51409
3/50	vertical	round	1	top + bottom	PC	$\leq 70$	–	$-50 \pm 500$	250	black	1400	.... 808 11509
	vertical	hexag.	1	top							1400	.... 808 17509
	horizontal	round	2	top + bottom							1200	.... 808 51509

\* ordering code for SAP system

**TEST PROCEDURES AND REQUIREMENTS**

IEC 60418-1 CLAUSE	IEC 60068 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
4.2		method of mounting	method A	
14		capacitance drift	after TC measurement	$\Delta C/C: \leq 1\%$ for $C_{\max} < 40$ pF; $\Delta C/C: \leq 2.5\%$ for $C_{\max} \geq 40$ pF
19		thrust	axial thrust of 2 N	$\Delta C/C: \leq 0.3\%$
21 21.1 21.2	Ua Ub	robustness of terminations: tensile bending	1 N 1 cycle	no damage no damage
22	Na	rapid change of temperature	1 cycle; 0.5 hours at lower and 0.5 hours at upper category temperature	$\Delta C/C: \leq 2\%$
23	T Ta Tb	soldering: solderability resistance to heat	solder bath immersion 3 mm; 235 °C; 2 s solder bath: 260 °C; 10 s	good wetting no mechanical damage no mechanical damage
24	Eb	impact bump	4000 ± 10 bumps; 40 g; 6 ms	$\Delta C/C: \leq 0.6\%$ ; no mechanical damage
25	Fc	vibration	frequency 10 to 55 Hz; amplitude 0.35 mm; 1.5 hours	$\Delta C/C: \leq 0.6\%$ ; no mechanical damage
26 26.1 26.2 26.3 26.5	B D Aa	climatic sequence: dry heat damp heat accelerated, first cycle cold damp heat accelerated, remaining cycles	16 hours at upper category temperature 1 cycle; 24 hours; + 40 °C; 95 to 100 % RH 16 hours; - 40 °C 1 cycle; 24 hours; + 40 °C; 95 to 100 % RH	$\Delta C/C: \leq 4$ $\tan \delta: \leq 10 \times 10^{-4}$ for $C_{\max} < 27$ pF; $\tan \delta: \leq 70 \times 10^{-4}$ for $C_{\max} \geq 27$ pF; $\tan \delta: \leq 80 \times 10^{-4}$ for $C_{\max} \geq 40$ pF $R_{\text{ins}}: \geq 10\,000$ MΩ; rotor contact R: ≤ 10 mΩ voltage proof: 500 V for 1 minute visual examination: no mechanical damage operating torque: 1 to 15 mNm for $C_{\max} < 33$ pF; 1 to 25 mNm for $C_{\max} \geq 33$ pF
27	Ca	damp heat steady state	21 days; + 40 °C; 90 to 95 % RH	$\Delta C/C: \leq 5\%$ $\tan \delta: \leq 30 \times 10^{-4}$ for $C_{\max} < 27$ pF; $\tan \delta: \leq 70 \times 10^{-4}$ for $C_{\max} \geq 27$ pF; $\tan \delta: \leq 80 \times 10^{-4}$ for $C_{\max} \geq 40$ pF $R_{\text{ins}}: \geq 10\,000$ MΩ; rotor contact R: ≤ 10 mΩ voltage proof: 500 V for 1 minute visual examination: no mechanical damage operating torque: 1 to 15 mNm for $C_{\max} < 33$ pF; 1 to 25 mNm for $C_{\max} \geq 33$ pF
29		mechanical endurance	10 cycles  Maximum 10 cycles: rotation in 180° only (the electrical and mechanical performance is not guaranteed if rotated beyond 10 cycles)	$\Delta C/C: \leq 1.5\%$ $\Delta C/C$ after axial thrust: ≤ 0.3 %; rotor contact R: ≤ 10 mΩ voltage proof: 500 V for 1 minute visual examination: no mechanical damage operating torque: 1 to 15 mNm for $C_{\max} < 33$ pF; 1 to 25 mNm for $C_{\max} \geq 33$ pF



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