

## Film Dielectric Trimmers

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

600 V

### MAXIMUM CONTACT RESISTANCE:

5 mΩ

### MINIMUM INSULATION RESISTANCE BETWEEN STATOR AND ROTOR:

10 000 MΩ

### CATEGORY TEMPERATURE RANGE:

- 40 to + 125 °C

### CLIMATIC CATEGORY (IEC 60068):

40/125/21

### 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:

 $C_{\max} < 3.5 \text{ pF}$ 

1 to 15 mNm

 $C_{\max} \geq 3.5 \text{ pF}$ 

1 to 20 mNm

### MAXIMUM AXIAL THRUST:

2 N

### FEATURES

- High temperature type
- Housing dimensions:  
6 mm x 8 mm x 9 mm
- For a basic grid of 2.54 mm
- Top and bottom adjustment
- Round or hexagonal head
- Vertical version

### APPLICATIONS

- For fine adjustment in professional applications

### DESCRIPTION:

The trimmers consist of a polysulphone housing, brass rotor and plated brass stator with PTFE film as the dielectric. The stator plate tags are heat sealed to the housing.

The rotor contact surfaces are plated to ensure a long life and a stable contact even under severe climatic conditions. A coloured dot indicates the maximum capacitance.

Cleaning with solvents is not advised.

Versions are available with either a round head or hexagonal head.

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  $C_{\min}$  and is also subjected to the full test voltage.

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

0.5/2 to 2/18 pF

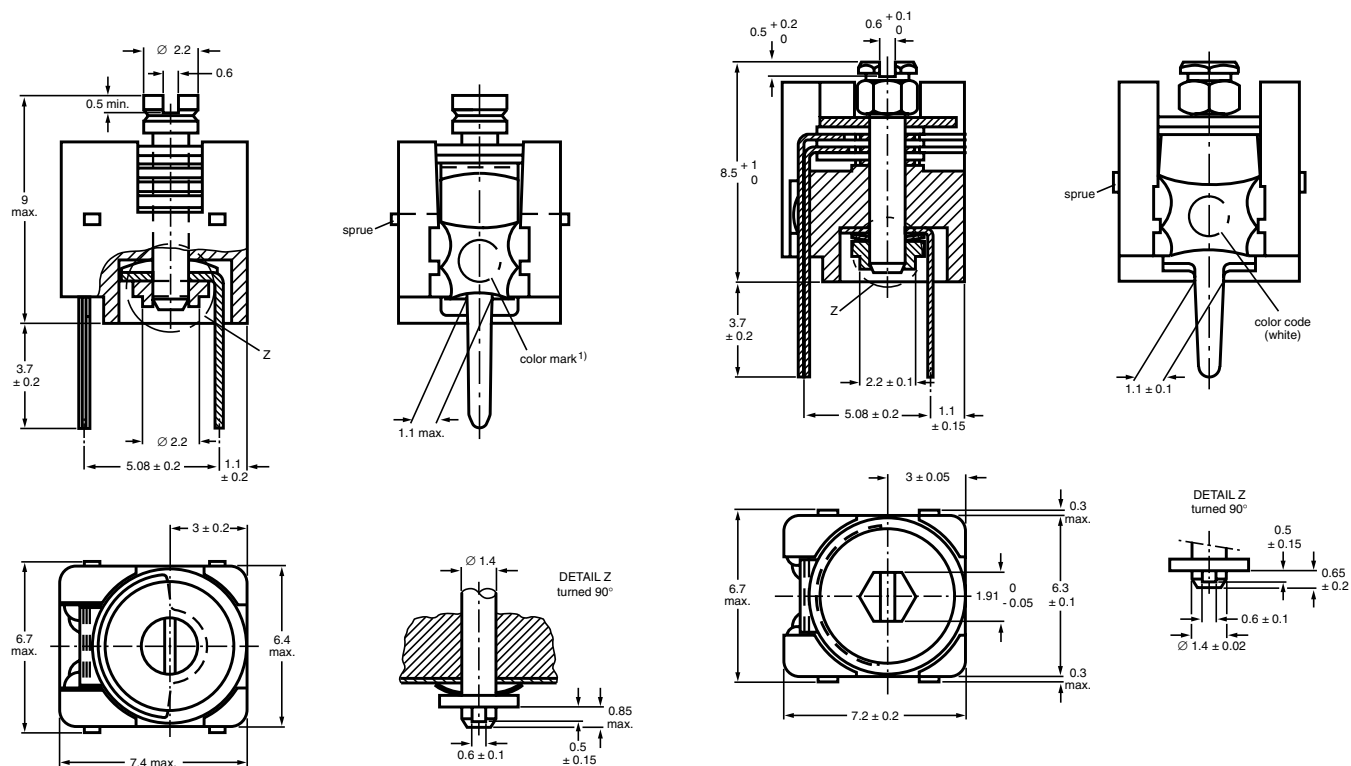
### RATED VOLTAGE (DC):

300 V

### LIFE OF TRIMMER:

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


RoHS  
COMPLIANT



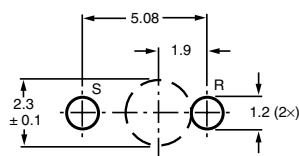
Trimmers 2281 809 05... series, with round heads

Trimmers 2281 808 09... series, with hexagonal heads

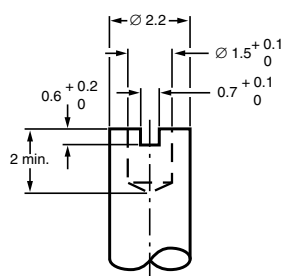
Dimensions in millimeters

## ADJUSTMENT

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



Hole pattern



Bottom adjustment key



## ORDERING INFORMATION

$C_{min}/C_{max}$ (pF)	CATALOG NUMBER 2281 809 05... OR BFC2 809 05...*		
	TOP AND BOTTOM ADJUSTMENT		
	ROUND HEAD	ROUND HEAD AND FLUX GUARD	HEXAGONAL HEAD
0.5/2	011	-	021
1.2/3.5	215	001	225
1.8/10	216	002	226
2/18	217	003	227

## MOUNTING

The trimmer can be mounted on printed-circuit boards with a minimum hole diameter of 2.54 mm.

## PACKAGING

Blister packs of 70 units each. For smallest packaging quantity (SPQ) see Electrical Data Table.

## ELECTRICAL DATA

GUARANTEED MAX. $C_{min}/$ MIN. $C_{max}$ AT 200 kHz (pF)	SHAPE OF HEAD	FIG.	TAN $\delta$ AT $C_{max} \times 10^{-4}$		TEMP. COEFF. <sup>1)</sup> ( $10^{-6}/K$ )	MIN. $f_{res}$ AT $C_{max}$ (MHz)	COL. OF DOT	SPQ	CATALOG NUMBER 2281 ... or BFC2 ... *
			1 MHz	100 MHz					
0.5/2	round	1	$\leq 10$	$\leq 20$	$-250 \pm 350$	1200	none	700	.... 809 05011
	hexag.	2						700	.... 809 05021
1.2/3.5	round	1	$\leq 10$	$\leq 20$	$-250 \pm 350$	850	orange	700	.... 809 05001
	round	1						700	.... 809 05215
	hexag.	2						700	.... 809 05225
1.8/10	round	1	$\leq 10$	$\leq 20$	$-250 \pm 350$	1200	white	700	.... 809 05002
	round	1				580		700	.... 809 05216
	hexag.	2				580		700	.... 809 05226
2/18	round	1	$\leq 10$	$\leq 25$	$-250 \pm 350$	360	red	700	.... 809 05217
	round	1						700	.... 809 05003
	hexag.	2						700	.... 809 05227

## Note

1. C: 60 % to 80 % of  $C_{max}$ ;  $T_{amb}$ : from + 20 °C to + 125 °C

\* 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	$\Delta C/C: \leq 2.5 \%$ ; 4 % for 2 pF
19		thrust	axial thrust of 2 N	$\Delta C/C: \leq 0.3 \%$
21		robustness of terminations:		
21.1	Ua	tensile	1 N	no damage
21.2	Ub	bending	1 cycle	no damage
22	Na	rapid change of temperature	1 cycle; 0.5 hours at lower and 0.5 hours at upper category temperature	$\Delta C/C: \leq 2.5 \%$

IEC 60418-1 CLAUSE	IEC 60068 TEST METHOD	TEST	PROCEDURE	REQUIREMENTS
23	T	soldering:		
	Ta	solderability	solder bath immersion 3 mm; 235 °C; 2 s	good wetting no mechanical damage
	Tb	resistance to heat	solder bath: 260 °C; 10 s	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	B	climatic sequence:		$\Delta C/C: \leq 2.5$
26.1		dry heat	16 hours at upper category temperature	$\tan \delta: \leq 10 \times 10^{-4}$ for $C_{\max} < 18 \text{ pF}$ ; $\tan \delta: \leq 40 \times 10^{-4}$ for $C_{\max} \geq 18 \text{ pF}$ $R_{\text{ins}}: \geq 10\,000 \text{ M}\Omega$ ; rotor contact R: $\leq 5 \text{ m}\Omega$
26.2		damp heat accelerated, first cycle	1 cycle; 24 hours; + 40 °C; 95 to 100 % RH	voltage proof: 600 V for 1 minute
26.3		cold	16 hours; - 40 °C	visual examination: no mechanical damage
26.5	Aa	damp heat accelerated, remaining cycles	1 cycle; 24 hours; + 40 °C; 95 to 100 % RH	operating torque: 1 to 20 mNm
27	Ca	damp heat steady state	21 days; + 40 °C; 90 to 95 % RH	$\Delta C/C: \leq 2.5 \%$ $\tan \delta: \leq 10 \times 10^{-4}$ for $C_{\max} < 18 \text{ pF}$ ; $\tan \delta: \leq 25 \times 10^{-4}$ for $C_{\max} \geq 18 \text{ pF}$ $R_{\text{ins}}: \geq 10\,000 \text{ M}\Omega$ ; rotor contact R: $\leq 5 \text{ m}\Omega$ voltage proof: 600 V for 1 minute visual examination: no mechanical damage operating torque: 1 to 20 mNm
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)	$\Delta C/C: \leq 0.3 \%$ ; $\leq 2.5 \%$ for 2 pF $\Delta C/C$ after axial thrust: $\leq 0.3 \%$ ; rotor contact R: $\leq 5 \text{ m}\Omega$ voltage proof: 600 V for 1 minute visual examination: no mechanical damage operating torque: 1 to 20 mNm



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