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No. JEFL4372-017

Date. MAR. 30. 1994

SPECIFICATION FOR AC 3-TERMINAL CAPACITOR


Type: DSR Series (EA Type)


ODS CLASS I AND CLASS II CHEMICALS AREN'T  
USED FOR/INCLUDED IN THE PRODUCTS UNDER THE  
PROVISIONS OF THE CLEAN AIR ACT OF 1990.

Approved by

Checked by

Written by







Please return this copy with your acceptance with or without  
conditions by MAY. 30. 1994.

In case of no reply by above mentioned date, we will process  
this specification as being accepted as is.  
Thank you for your cooperation.

Product Engineering Section I  
Engineering Department  
EMI Group  
FUKUI MURATA MFG. CO., LTD.

AC 3-Terminal Capacitor  
DSR Series (EA Type)

## 1. Scope

This specification applies to AC 3-terminal Capacitor DSR Series (EA Type).

## 2. Approval Standard

Standard		Type	File No.
UL	1414	EA	E37921
CSA	C22.2 No.1		LR36214
VDE	0565-1		68365
SEMKO	101		8736197
"	SS443 04 14		8736198
BS	415		7354

## 3. Part Numbering

(Ex.) DSR1100 - 56 E 222M VA2 - EA  
Type Lead Type Temperature Characteristics Capacitance Value Rated Voltage Approved Type

## 4. Rating

## 4-1. Common Rating

Table 1

Item	Rating
Maximum Allowable Current	7 A (AC)
Rated Voltage	VA2 (AC) ※
Withstanding Voltage (line to line)	1500 VAC
Insulation Resistance	10000 MΩ min.
Operating Temperature Range	-25 ~ +85 °C

※ VA2 : { VDE, SEMKO, BS ... 250VAC  
UL, CSA ... 125VAC

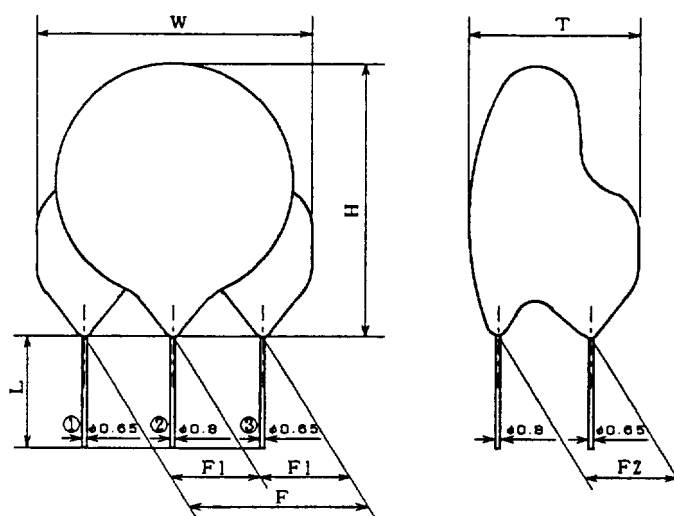
## 4-2. Individual Rating

Table 2

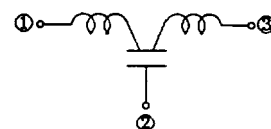
Customer's Part Number	Part Number	Temp. Char.	Cap. Value (pF)	Cap. Tol. (%)	Approval Standard				
					UL	CSA	VDE	SEMKO	BS
	DSR1100-56 E 222M VA2-EA	E	2200	±20	1414	C22.2No.1	0565-1		415
	" 55 "								
	DSR1120-56 E 302M VA2-EA		3000		○	○	○	○	○
	" 55 "								
	DSR1150-56 E 472M VA2-EA	FZ	4700	±10%					
	" 55 "								
	DSR1100-56 FZ 472P VA2-EA		4700		○	○	-	○	○
	" 55 "								

# 5. Appearance, Dimensions and Equivalent Circuit Diagram

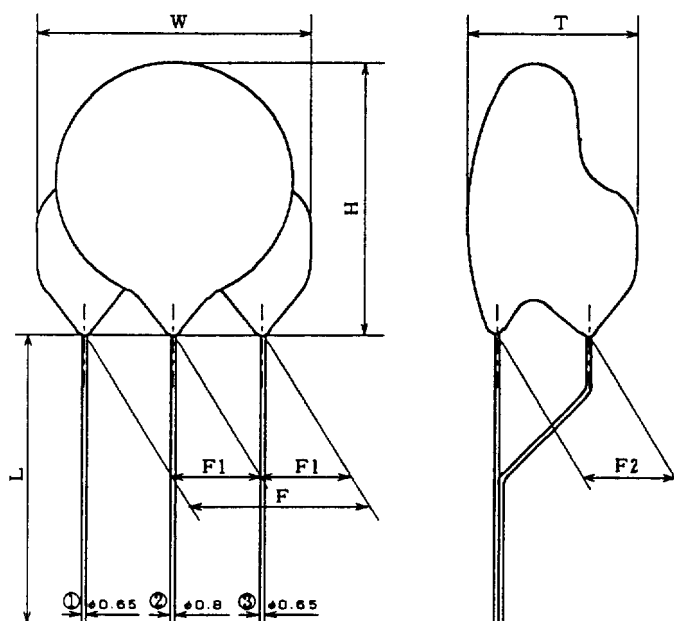
## DSR 1 1 □ □ - 5 6 T y p e



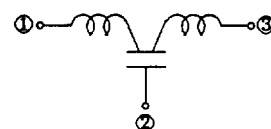
Equivalent Circuit Diagram



## DSR 1 1 □ □ - 5 5 T y p e





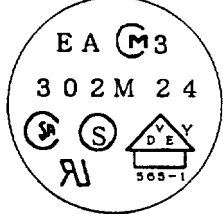


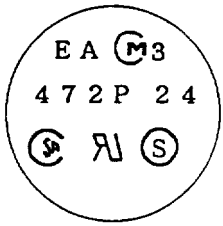


Equivalent Circuit Diagram



Part Number	W	H	T	F	F1	F2	L
DSR1100-56 E 222M VA2-EA	1 6 max.	1 4 max.	1 1 max.	1 0 ± 1	5 ± 1	5 ± 1	6 ± 2
" 55 "							2 5 min.
DSR1120-56 E 302M VA2-EA	1 6 "	1 6 "					6 ± 2
" 55 "							2 5 min.
DSR1150-56 E 472M VA2-EA	1 8 "	1 9 "					6 ± 2
" 55 "							2 5 min.
DSR1100-56 FZ 472P VA2-EA	1 6 "	1 5 "					6 ± 2
" 55 "							2 5 min.

Unit:mm

## 6. Marking

Content	Example
VDE Approval Symbol :  (except 472p)	(ex. DSR1100-56 E 302M VA2-EA)
SEMKO Approval Symbol : 	
UL Approval Symbol : 	
CSA Monogram : 	
Type Designation : EA	
Capacitance Value : 3 digits	
Capacitance Tolerance: Symbolized	
Manufacturer's Name : 	
Manufacture Date :  (24)	
Marking by brack color.	

## 7. Testing Conditions

《 Unless otherwise specified 》

Temperature	: Ordinary Temperature	( 5 to 35 °C )
Humidity	: Ordinary Humidity	(45 to 85 %RH )
Atmospheric Pressure	: Ordinary Atmospheric Pressure	(86 to 106 kPa)
AC Voltage	: Frequency shall be 50 Hz or 60 Hz.	

《 In case of doubt 》

Temperature	: 20±2 °C
Humidity	: 60 to 70 %RH
Atmospheric Pressure	: 86 to 106 kPa

## 8. Electrical Performance

## 8-1. Withstanding Voltage

## 8-1-2. Line to line

Capacitor shall withstand without failure when applied 1500 VAC between terminal (① and ②, or ② and ③) for 1 minute.

## 8-1-2. Line to sheath

Capacitor shall withstand without failure when applied 2000 VAC between each of terminals and metallic foil wound around the capacitor for 1 minute.

## 8-2. Insulation Resistance

Insulation Resistance shall meet Table 1 when measured at 500 VDC for 1 minute through a protective resistor 1 MΩ.

## 8-3. Capacitance

Capacitance shall be within the specified tolerance when measured on the condition of Table 3.

Table 3

Temperature	20°C
Frequency	1±0.1 kHz
Voltage	5 Vrms max.

## 8-4. Dissipation Factor (DF)

Dissipation Factor shall be 2.5% max. when measured on the condition of Table 3.

## 8-5. Temperature Characteristics (TC)

Capacitance shall be measured at each step specified in Table 5 after reaching the thermal equilibrium. The Capacitance change against the capacitance at step 3 shall meet Table 4.

Table 4

T C	Capacitance Change
E	$\pm \frac{20}{55}$ % within
F Z	$\pm \frac{30}{55}$ % within

Table 5

Step	Temperature(°C)	
	E	F Z
1	+ 2 0	+ 2 0
2	- 2 5	- 1 0
3	+ 2 0	+ 2 0
4	+ 8 5	+ 6 0
5	+ 2 0	+ 2 0

## 8-6. Allowable Current

Temperature Rise at the surface of capacitor shall be within 20 °C when measured by thermocouple applying the current of 7A between input and output terminal.

## 8-7. Discharge test I

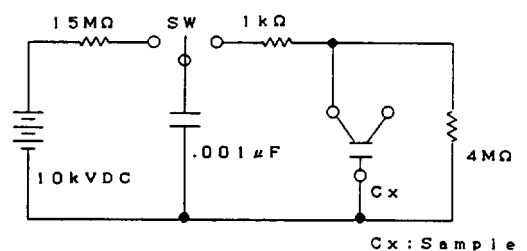
Capacitor shall meet Table 6 after tested as follows by the circuit of Fig.1.

50 discharges from a dump capacitor (0.001μF) are applied successively with an interval of 5 seconds between discharges.

Table 6

Withstanding Voltage	meet item 8-1
Insulation Resistance	1000 MΩ min.

Fig.1



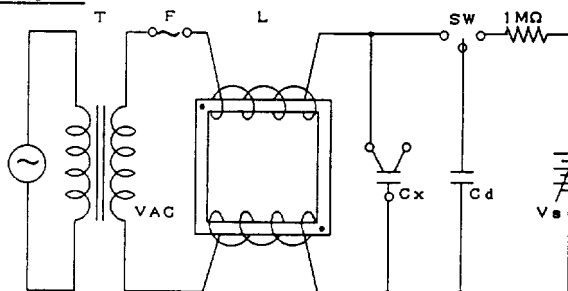
## 8-8. Discharge test II

Capacitor shall withstand after tested as follows by the circuit of Fig.2.

4 discharges from a dump capacitor charged by Vs (Cd) are applied successively with an interval of 5 seconds between discharges.

Keep applying 120 VAC for 30 seconds after 4 discharges.

Fig.2



Vs: Variable direct current voltage source

Cd: Dump capacitor

Cx: Capacitor under test

L: Choke coil (3mH, 0.03Ω)

F: Plug fuse (30A, 125V)

T: Transformer for pulse blocking

(120V, 60Hz, 30A)

$5(Cd+Cx)$

$V_s = \frac{5(Cd+Cx)}{Cd}$  (kV)

Cd

Cx	0 ~ .005 μF	.0051 ~ .05 μF
Cd	.005 μF	.05 μF

## 9. Mechanical Performance

### 9-1. Appearance and Dimensions

There shall not be damaged. (Visual Inspection)

Dimensions shall be as shown in item 4. (Measured with Slide Calipers)

### 9-2. Marking

Marking is able to be read easily. (Visual Inspection)

### 9-3. Terminal strength

#### 9-3-1. Pull Test

Capacitor shall not be damaged (cutting of lead wire etc.) after tested as follows.

The body of specimens shall be fixed, and the force of 10N shall be applied gradually and sustained to each lead wire in the axial direction of the lead wires.

#### 9-3-2. Bend Test

Capacitor shall not be damaged (cutting of lead wire etc.) after tested as follows.

The terminal shall be kept vertical and the force of 5N shall be suspended from the terminal. Then the body shall be bent through 90° and returned to its normal position.

And the body shall be bent through 90° in the opposite direction and returned to its normal position. This being counted as 1 cycle and shall be 2 times.

### 9-4. Resistance to soldering heat

#### 9-4-1. with soldering bath

Capacitor shall meet Table 7 after tested as follows.

All the lead wires shall be dipped in soldering bath on the condition of Table 8 and then measured after exposure in the room condition for 4 to 24 hours.

Table 7

Appearance	No damage	
Capacitance Change	E	$\pm 10\%$ within
	FZ	$\pm 20\%$ within
DF	2.5% max.	
Withstanding Voltage	meet item 8-1	
Insulation Resistance	10000 M $\Omega$ min.	

Table 8

Solder Temperature	$260 \pm 5$ °C
Dipping Time	$10 \pm 1$ sec.
Dipping Depth	1.6 mm from the root of lead wire

#### 9-4-2. with soldering iron

Capacitor shall meet Table 7 after tested as follows.

Soldering iron (80W) shall be applied to the lead wires on the condition of Table 9 and then measured after exposure in the room condition for 4 to 24 hours.

Table 9

Tip Temperature	$350 \pm 10$ °C
Soldering Time	3 sec.
Solder	6×4 solder (Containing flux, $\phi 0.8$ )

### 9-5. Solderability

The lead wires shall be covered with new solder at least 75% along the circumference of the immersed part after tested as follows.

The lead wires shall be dipped for 5 to 10 seconds in the flux (methanol solution of rosin, 25wt% at ordinary temperature) and then shall be dipped in solder on the condition of Table 10.

Table 10

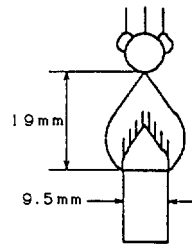
Solder Temperature	$230 \pm 5$ °C
Dipping Time	$2 \pm 0.5$ sec.
Dipping Depth	2~2.5 mm from the root of lead wire

## 9-6. Flaming test

The flame shall be applied as shown in Fig. 3 for 15 seconds 3 times.

The material un-burns for more than 15 seconds in first to second cycle and for more than 1 minute in last cycle. (See Fig. 3.)

Fig. 3



Tirrillbarna

1000Btu (37.6MJ/m)

The diameter of barna : 9.5 mm

The high of a fire : 19.0 mm

## 10. Environmental Performance

## 10-1. Humidity

Capacitor shall meet Table 11 after tested as follows.

It shall be tesetd on the condition of Table 12, and then measured after exposure in the room condition for 1 to 2 hours.

Table 11

Appearance	No damage	
Capacitance Change	E	$\pm 20\%$ within
	FZ	$\pm 30\%$ within
DF	5% max.	
Withstanding Voltage	meet item 8-1-1 (line to line)	
Insulation Resistance	3000 M $\Omega$ min.	

Table 12

Temperature	$40 \pm 2$ °C
Humidity	90~95 %RH
Time	$500 \pm 12$ hours

## 10-2. Humidity Life

Capacitor shall meet Table 11 after tested as follows.

It shall be tesetd on the condition of Table 13, and then measured after exposure in the room condition for 4 to 24 hours.

Table 13

Temperature	$40 \pm 2$ °C
Humidity	90~95 %RH
Applied Voltage	250 VAC
Time	$500 \pm 12$ hours

## 10-3. Heat Life

Capacitor shall meet Table 14 after tested as follows.

It shall be tesetd on the condition of Table 15, and then measured after exposure in the room condition for 4 to 24 hours.

Table 14

Appearance	No damage	
Capacitance Change	E	$\pm 20\%$ within
	FZ	$\pm 30\%$ within
Withstanding Voltage	meet item 8-1	
Insulation Resistance	3000 M $\Omega$ min.	

Table 15

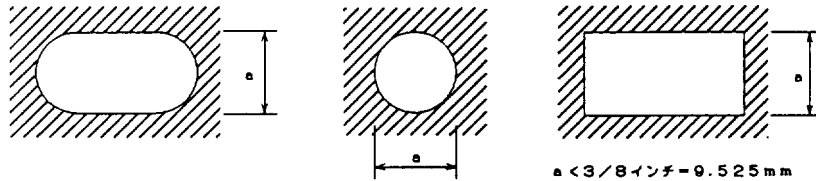
Temperature	$85 \pm 3$ °C
Humidity	50 %RH max.
Applied Voltage	Voltage increased to 1000 VAC for 500 VAC per hour 1 times 1/10 second
Time	1500 hours

## 11. Complement

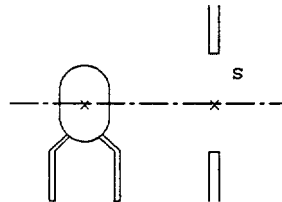
### 11-1. For UL

This capacitor can be used in an appliance employing an enclosure having limited opening as follows.

- The minor dimension of the projected area is not more than  $3/8$  inch (9.525 mm).



- The projected area of any opening in the top, back, sides, or front of the enclosure of the overall appliance, onto a plane perpendicular to a line passing through the center of the opening and any point on the central axis of the capacitor does not exceed 0.2 square inch (129 mm<sup>2</sup>).



### 11-2. For CSA

This can be used in any appliance as a CSA approved parts.

### 11-3. For VDE

This can be used as Y capacitor except DSR1100-□□ FZ 472P VA2-EA.

### 11-4. For SEMKO 101/SS443 0414

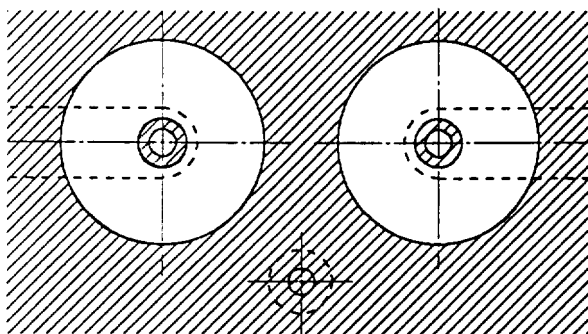
This can be used as Y.

### 11-5. For BS 415

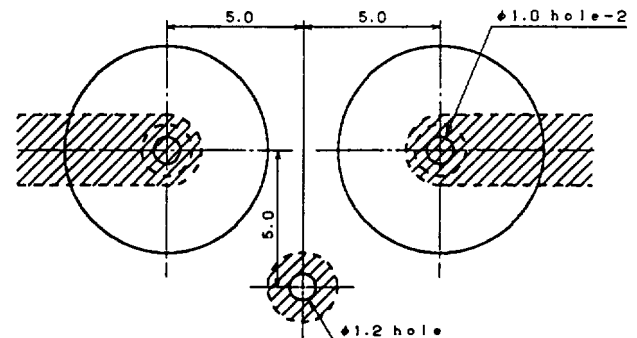
This can be used as Y.

## 12. Standard P. C. Board Patterns

### ● Front side



### ● Rear side



unit:mm

※ Make ground connection as wide as possible but with a distance as close as possible to the frame ground.