



# Disc Type Capacitors with Lead

High Voltage Ceramic Capacitors

Commercial Grade, Safety Standard Approved

## CS45 series

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Type: CS45 [SL, B, E, F characteristics, Eac: X1:440V, Y2:300V]



## REMINDERS FOR USING THESE PRODUCTS

Before using these products, be sure to request the delivery specifications.

### SAFETY REMINDERS

Please pay sufficient attention to the warnings for safe designing when using these products.

#### REMINDERS

- Do not use or store in locations where there are conditions such as gas corrosion (salt, acid, alkali, etc.).
- Before soldering, be sure to preheat components.  
The preheating temperature should be set so that the temperature difference between the solder temperature and product temperature does not exceed 150°C.
- Soldering corrections after mounting should be within the range of the conditions determined in the specifications.  
If overheated, a short circuit, performance deterioration, or lifespan shortening may occur.
- Self heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- Do not use for a purpose outside of the contents regulated in the delivery specifications.
- The products listed on this catalog are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) under a normal operation and use condition.  
The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.  
If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in the each catalog, please contact us.
 

<ul style="list-style-type: none"> <li>(1) Aerospace/Aviation equipment</li> <li>(2) Transportation equipment (cars, electric trains, ships, etc.)</li> <li>(3) Medical equipment</li> <li>(4) Power-generation control equipment</li> <li>(5) Atomic energy-related equipment</li> <li>(6) Seabed equipment</li> <li>(7) Transportation control equipment</li> </ul>	<ul style="list-style-type: none"> <li>(8) Public information-processing equipment</li> <li>(9) Military equipment</li> <li>(10) Electric heating apparatus, burning equipment</li> <li>(11) Disaster prevention/crime prevention equipment</li> <li>(12) Safety equipment</li> <li>(13) Other applications that are not considered general-purpose applications</li> </ul>
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- Please refer to the guideline of notabilia for fixed ceramic capacitors issued by JEITA(Japan Electronics and Information Technology Association, EIAJ RCR-2335).

When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.

# Disc Type Capacitors with Lead

Product compatible with RoHS directive  
Halogen-free

High Voltage Ceramic Capacitors, Commercial Grade, Safety Standard Approved

## Overview of CS45 Series


### FEATURES

- Compliant with IEC and the safety standards of various countries.
- Rated at a withstand voltage of AC.2600V.
- Flame-resistant reinforced outer insulation prevents fires, electrical shock, and other potential hazards.
- These products shall conform to RoHS Directive due to lead(Pb) free of lead wire and internal solder material.
- Compatible with halogen-free external resin coating.

### APPLICATION

For use in Y capacitor for AC adapter, charger, power supplies

### PART NUMBER CONSTRUCTION

CS45	-	E	2GA	102	M	-		K	A		
Series name*		Temperature characteristics	Rated voltage	Nominal capacitance		Capacitance tolerance	Lead type		Application classification	Internal code	
		SL +350 to -1000ppm/°C	2GA X1:440V Y2:300V	100 221	10pF 220pF	J K	±5% ±10%	G N	Long lead Short lead	K Safety standard	A Halogen-free
		B ±10%		472	4,700pF	M	±20%	V	Taping		
		E +20, -55%									
		F +30, -80%									

\* Please refer to P-6~9 about the product dimensions.

### OPERATING TEMPERATURE RANGE

Temperature characteristics	Temperature range*	
	Operating temperature (°C)	Storage temperature** (°C)
SL	-25 to +125	-25 to +125
B	-25 to +125	-25 to +125
E	-25 to +125	-25 to +125
F	-25 to +125	-25 to +125

\* The maximum operating temperature of 125°C includes capacitor self-generated heat of up to 20°C.

\*\* The storage temperature range applies to after MLCC is mounted on board.

- RoHS Directive Compliant Product: See the following for more details related to RoHS Directive compliant products. <http://product.tdk.com/en/environment/rohs/>
- Halogen-free: Indicates that Cl content is less than 900ppm, Br content is less than 900ppm, and that the total Cl and Br content is less than 1500ppm.

 Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.

# Overview of CS45 Series

## PACKAGE QUANTITY

Type	Package quantity	
	Taping (pieces / box)	Bulk (pieces / bag)
CS45	1000	1000

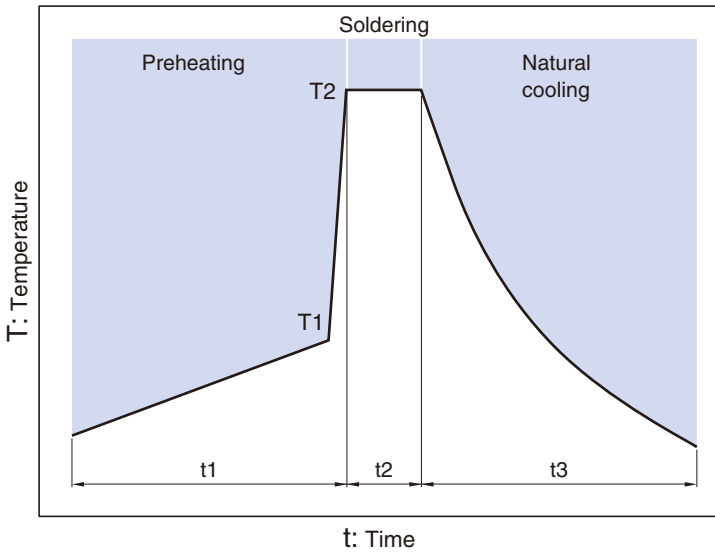
## CERTIFIED STATUS OF VARIOUS COUNTRIES

Safety standard	IEC standard No.	Standard No.	Temperature characteristics	Class	Rated voltage	Approval report No.*	
						Taiwan	Xiamen
ENEC		EN 60384-14				ENEC-01049	
UL		UL60384-14		X1, Y2	X1:440V AC Y2:300V AC	E37861	
cUL/CSA	IEC 60384-14	AS3250	SL,B,E,F			CS6268	
SAA				IEC 60384-14			CQC14001112768
CQC				X1	440V AC	SZ03001-12006	SU03047-12006
KTL		K60384-14		Y2	300V AC	SZ03001-12008	SU03047-12008


\* Certificate numbers shall be changed owing to the revisions of the related standards.

# Overview of CS45

## RECOMMENDED FLOW PROFILE



Preheating		Peak		Natural cooling
Temp.	Time	Temp.	Time	Time
T1	t1	T2	t2	t3
110°C min.	30 to 60s.	260°C	Within 10s.	Over 60s.

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# CS45 Type

## CAPACITANCE AND DIMENSIONS

□ Temperature Characteristics: SL (+350 to -1000ppm/°C)

□ Rated Voltage Eac: X1:440V, Y2:300V

Capacitance (pF)	Capacitance tolerance	Dimensions (mm)		F (Applied to bulk)	F (Applied to taping)	d	Part No.*
		D max.	T max.				
10	±5%	7.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA100J-□KA**
15	±5%	7.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA150J-□KA
22	±5%	7.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA220J-□KA
33	±5%	7.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA330J-□KA
47	±5%	7.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA470J-□KA
68	±5%	7.5	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45SL2GA680J-□KA

\* The part numbers are TDK's standard specification products.

\*\* The "□" of the Part Number contains the lead type, G, N or V. Please refer to the details of each shape is shown below.

• Please refer to P-10 about the taping dimensions.

## LIST OF STANDARD LEAD SHAPES

	Symbol G Bulk/Long lead	Symbol N Bulk/Short lead	Symbol V Taping
Vertical kink			

• TDK's standard product is vertical kink.

• TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

Item	Markings	Specifications	Marking examples
1. Series	CS	CS45 series	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front</p> </div> <div style="text-align: center;"> <p>Back</p> </div> </div> <p>(Marking position is reference.)</p>
2. Nominal capacitance	10	10pF	
3. Capacitance tolerance	J	±5%	
4. Rated voltage Eac	440~X1 300~Y2	X1: AC.440V Y2: AC.300V	
5. TDK's logogram		Production base code	
6. Date code	54	2015.4*	

\* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

\* The expression has become simplified due to a revision in the standards.

# CS45 Type

## CAPACITANCE AND DIMENSIONS

□ Temperature Characteristics: B ( $\pm 10\%$ )

□ Rated Voltage Eac: X1:440V, Y2:300V

Capacitance (pF)	Capacitance tolerance	Dimensions (mm)		F (Applied to bulk)	F (Applied to taping)	d	Part No.*
		D max.	T max.				
100	$\pm 10\%$	6.5	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA101K-□KA**
150	$\pm 10\%$	6.5	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA151K-□KA
220	$\pm 10\%$	6.5	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA221K-□KA
330	$\pm 10\%$	6.5	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA331K-□KA
470	$\pm 10\%$	7.0	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA471K-□KA
680	$\pm 10\%$	8.0	5.0	$7.5 \pm 1.5$	$7.5 \pm 0.8$	$0.6 \pm 0.05$	CS45-B2GA681K-□KA

\* The part numbers are TDK's standard specification products.

\*\* The "□" of the Part Number contains the lead type, G, N or V. Please refer to the details of each shape is shown below.

• Please refer to P-10 about the taping dimensions.

## LIST OF STANDARD LEAD SHAPES

	Symbol G Bulk/Long lead	Symbol N Bulk/Short lead	Symbol V Taping
Vertical kink			

• TDK's standard product is vertical kink.

• TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

Item	Markings	Specifications	Marking examples
1. Series	CS	CS45 series	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Front</p> </div> <div style="text-align: center;"> <p>Back</p> </div> </div> <p>(Marking position is reference.)</p>
2. Nominal capacitance	101	100pF	
3. Capacitance tolerance	K	$\pm 10\%$	
4. Rated voltage Eac	440~X1 300~Y2	X1: AC.440V Y2: AC.300V	
5. TDK's logogram		Production base code	
6. Date code	54	2015.4*	

\* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

\* The expression has become simplified due to a revision in the standards.

# CS45 Type

## CAPACITANCE AND DIMENSIONS

- Temperature Characteristics: E (+20, -55%)
- Rated Voltage Eac: X1:440V, Y2:300V

Capacitance (pF)	Capacitance tolerance	Dimensions (mm)		F (Applied to bulk)	F (Applied to taping)	d	Part No.*
		D max.	T max.				
1,000	±20%	6.5	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-E2GA102M-□KA**
1,500	±20%	7.5	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-E2GA152M-□KA
2,200	±20%	8.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-E2GA222M-□KA
3,300	±20%	10.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-E2GA332M-□KA
4,700	±20%	11.0	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-E2GA472M-□KA

\* The part numbers are TDK's standard specification products.

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- Please refer to P-10 about the taping dimensions.

## LIST OF STANDARD LEAD SHAPES

	Symbol G Bulk/Long lead	Symbol N Bulk/Short lead	Symbol V Taping
Vertical kink			

- TDK's standard product is vertical kink.
- TDK's recommendation is short lead type with the symbol N for bulk products.

## MARKINGS

Item	Markings	Specifications	Marking examples
1. Series	CS	CS45 series	Front
2. Nominal capacitance	102	1000pF	Back
3. Capacitance tolerance	M	±20%	
4. Rated voltage Eac	440~X1 300~Y2	X1: AC.440V Y2: AC.300V	
5. TDK's logogram		Production base code	
6. Date code	54	2015.4*	

(Marking position is reference.)

\* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

\* The expression has become simplified due to a revision in the standards.



# CS45 Type

## CAPACITANCE AND DIMENSIONS

- Temperature Characteristics: F (+30, -80%)
- Rated Voltage Eac: X1:440V, Y2:300V

Capacitance (pF)	Capacitance tolerance	Dimensions (mm)		F (Applied to bulk)	F (Applied to taping)	d	Part No.*
		D max.	T max.				
10,000	±20%	14.5	5.0	7.5±1.5	7.5±0.8	0.6±0.05	CS45-F2GA103M-□KA**

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- Please refer to P-10 about the taping dimensions.

## LIST OF STANDARD LEAD SHAPES

	Symbol G Bulk/Long lead	Symbol N Bulk/Short lead	Symbol V Taping
Vertical kink			

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## MARKINGS

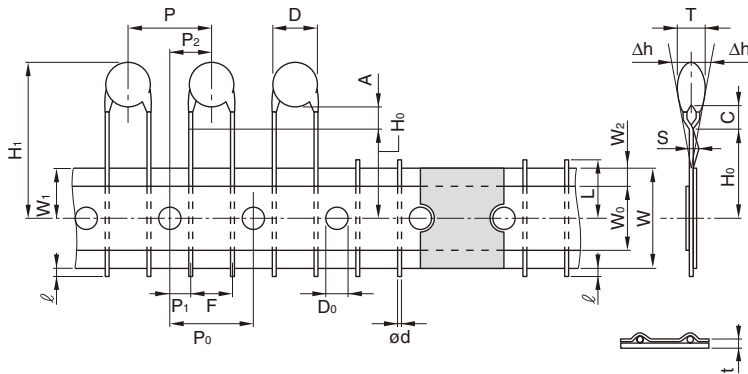
Item	Markings	Specifications	Marking examples
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2. Nominal capacitance	103	10000pF	
3. Capacitance tolerance	M	±20%	
4. Rated voltage Eac	440~X1 300~Y2	X1: AC.440V Y2: AC.300V	
5. TDK's logogram		Production base code	
6. Date code	54	2015.4*	

\* Year and month of production: last digit of year + month denoted by 1, 2, 3, 4, 5, 6, 7, 8, 9, O (October), N (November), or D (December).

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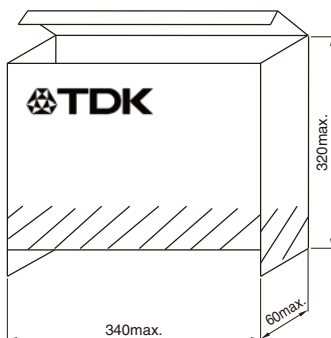
# CS45 Type

## TAPING DIMENSIONS



Item	Symbol	Dimensions(mm)	Remarks
Body diameter	D	Depends on the specification of each product.	
Body thickness	T	Depends on the specification of each product.	
Lead-wire diameter	ød	0.6±0.05	
Pitch of component	P	15.0±1.0	Including the slant of body
Feed hole pitch	P <sub>0</sub>	15.0±0.3	Excepting the tape splicing part
Feed hole center to lead	P <sub>1</sub>	3.75±0.7	
Feed hole center to component center	P <sub>2</sub>	7.5±1.3	
Lead-to lead distance	F	7.5±0.8	Measuring point is bottom kink
Component alignment	Δh	0±2.0	Including the slanting body due to bending lead-wire
Tape width	W	18.0+1.0, -0.5	
Adhesive tape width	W <sub>0</sub>	10.0min.	
Hole position	W <sub>1</sub>	9.0±0.5	
Adhesive tape position	W <sub>2</sub>	4.0max.	Adhesive tape do not stick out the tape
Bottom of kink from tape center	H <sub>0</sub>	16.0+1.5, -0.5	
Height of body from tape center	H <sub>1</sub>	46.0max.	
Lead-wire protrusion	ℓ	1.0max.	
Feed hole diameter	D <sub>0</sub>	4.0±0.2	
Total tape thickness	t	0.6±0.3	Including adhesive tape
Length of snapped lead	L	11.0max.	
Coating on lead	C	4.0max.	
Height of kink	A	4.0max.	Measuring point is bottom kink
Spring action	S	2.0max.	

## AMMO PACK INNER BOX SIZE



Dimensions in mm

• For more information about products with other capacitance or other data, please contact us.

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.

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[DE1E3KX472MJ4BN01F](#) [ECQ-U2A224MLC](#) [04068](#) [46KF268000M1M](#) [46KI3150NDM2M](#) [MKPX2R-1/400/10P27](#)  
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[DE1E3RA102MA4BQ01F](#) [DE6E3KJ332MB3B](#) [MPX21W1100FA00MSSD](#) [VY2103M59Y5VS63V0](#)