## **CCD**<sub>Series</sub>

#### **Safety Standard Recognized Ceramic Capacitors**





#### **FEATURES**

- Complying with IEC60384-14 4th Edition
- Class X1Y1 and Class X1Y2
- Dielectric Strength: AC2600V (r.m.s) for X1Y2 and AC4000V (r.m.s) for X1Y1
- High Reliability
- Coated With Flame-Retardant Epoxy Resin (Conforming to UL94V-0 Standard)
- RoHS Compliant

### **APPLICATIONS**

- Ideal for use as X/Y capacitor for AC Line Filter and Primary/Secondary Coupling on Switching Power Supplies and AC adapters
- Across-The-Line
- · Antenna-Coupling
- Line-By-Pass

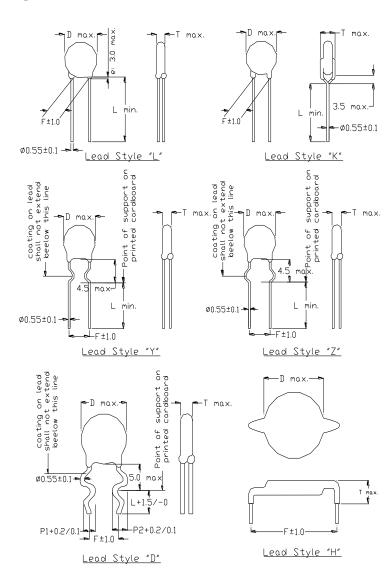
#### ORDERING CODE

## $\frac{\textbf{CCD}}{\tiny (1)} - \frac{1}{\tiny (2)} \, \frac{\textbf{09}}{\tiny (3)} \, \frac{\textbf{B}}{\tiny (4)} \, \frac{\textbf{101}}{\tiny (5)} \, \frac{\textbf{K}}{\tiny (6)} \, \frac{\textbf{H}}{\tiny (7)} \, \frac{\textbf{7}}{\tiny (8)} \, \frac{\textbf{2}}{\tiny (9)}$

- (1) Ceramic Disc Capacitor
- (2) Class Type
- (3) Diameter Code
- (4) Ceramic Dielectric
- (5) Capacitance Code
- (6) Tolerance Code
- (7) Lead Style
- (8) Lead Spacing
- (9) Lead Length or Taping

※ Please refer to Ordering Code document CCD\_Safety-Order for more ordering options.

#### Configuration



**Approval Standard and Recognized Number** 

Approval Agency	Number	X1/Y1	X1/Y2
	40040454	CCD-1	-
VDE/ENEC10	40046396		
VDL/LINECTO	40040445	_	CCD-2
	40046520		
CSA	222903	CCD-1	CCD-2
UL	E197459	CCD-1	CCD-2

Rev. B4 Sheet 1 of 12





#### **Specification**

Characteristics	Class X1, Y1	Class X1, Y2	
Capacitance Range	100pF to 4700pF	5.1pF to 10000pF	
Operating Temperature Range	-40°C to 125°C	Y5P, Y5V, Y5U: -40°C to 125°C COG, X7R: -55°C to 125°C SL: +40°C to +125°C	
Rated Voltage	X1: 760/400VAC, Y1: 500/250VAC	X1: 440/400VAC, Y2: 300/250VAC	
Dielectric Withstanding Voltage	4000VAC for 1 minute	2600VAC for 1 minute	
Capacitance	Within the specified tolerance Y5P, Y5U, Y5V, X7R measured at 1KHz ± 20% COG measured at 1MHz ± 20% Both are 1 Vrms, 25°C		
Dissipation Factor (tan δ)	Tanδ $\leq$ 2.5% for char. Y5P, Y5U, Y5V, X7R measured at 1KHz ± 20% COG measured at 1MHz ± 20% Both are 1 Vrms, 25°C, Quality Factor $\geq$ 600 for char.		
Insulation Resistance	10,000 MΩ min. at 500VDC		

#### Class X1, Y1

Part Number	Temp. Char.	Cap.(pF)	Cap. Tol.	D (Max. mm)	F (mm)	T (Max. mm)	Φd (mm)
CCD-107S100J		10		7.0			
CCD-107S150J		15		7.0			
CCD-107S200J		20		7.0			
CCD-107S220J	S (SL)	22	± 5%	7.0	10	5	
CCD-107S330J	(02)	33		7.0			
CCD-108S470J		47		8.0			
CCD-109S680J		68		9.0			
CCD-109B101KK0		100					0.55.04
CCD-109B151KK0□		150					0.55±0.1
CCD-109B221KK0		220		0.0		8	
CCD-109B331KK0	В	330		9.0		8	
CCD-109B471KK0	(Y5P)	470	± 10%		10		
CCD-109B561K	± 10%	560					
CCD-110B821K		820		40.0			
CCD-110B681KK0		680		10.0		5	
CCD-111B102K		1000		11.0			

Rev. B4 Sheet 2 of 12

## **Safety Standard Recognized Ceramic Capacitors**

TRIGON COMPONENTS

Part Number	Temp. Char.	Cap.(p F)	Cap. Tol.	D (Max. mm)	F (mm)	T (Max. mm)	Φd (mm)
CCD-109E102MK0		1000		9.0			
CCD-111E152MK0	E	1500		11.0			
CCD-112E222MK0	(Y5U)	2200	± 20%	12.0		8	
CCD-114E332MK0	+ 20%	3300	± 20%	14.0		0	
CCD115E392MK0□	-55%	3900		15.0			
CCD-116E472MK0		4700	]	16.0	10		0.55±0.1
CCD-107F102K□□□		1000		7.0			
CCD-108F152K		1500		8.0			
CCD-109F222K	Y5V	2200	± 20%	9.0		5.5	
CCD-110F332K		3300		10.0			
CCD-112F472K		4700		12.0			

#### Class X1, Y2

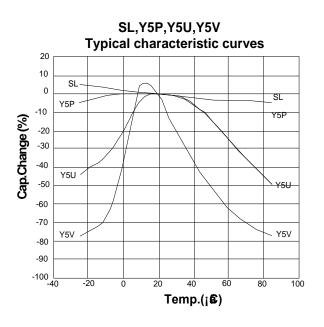
Part Number	Temp. Char.	Cap. (pF)	Cap. Tol.	D (Max. mm)	F (mm)	T (Max. mm)	Φd (mm)
CCD-208C100JK	C(COG)	10	±5%				
CCD-208B5R1CK□□		5.1					
CCD-208B100KK		10				7	
CCD-208B150KK		15				1	
CCD-208B180KK		18					
CCD-208B220KK		22		8.0			
CCD-208B101K	] _	100			7.5		
CCD-208B151K	B (Y5P)	150	±0.25pF				
CCD-208B221K	±10%	220	±10%				
CCD-208B331K	11070	330				8	
CCD-208B471K		470					
CCD-209B561K		560					
CCD-209B681K		680		9.0			
CCD-209B821K		820			5.0 / 7.5	5	
CCD-210B102K		1000		10.0	7.5	8	
CCD-207S150J		15					
CCD-207S200J		20					
CCD-207S220J	S	22	. 50/	7.0	7.5	5	0.55±0.1
CCD-207S330J□□□	(SL)	33	±5%	7.5	7.5	3	
CCD-207S470J		47					
CCD-208S680J		68		8.0			
CCD-208E102M		1000		8.0			
CCD-209E152M	_	1500		9.0			
CCD-210E222M	E	2200		10.0			
CCD-211E252M	(Y5U) +20%	2500	±20%	11.0			
CCD-212E332M	-55%	3300		12.0			
CCD-213E392M		3900		13.0			
CCD-214E472M		4700		14.0	7.5	8	
CCD-208F102M		1000		8.0		O	
CCD-208F152M	_	1500		9.0			
CCD-209F222M	F	2200		9.0			
CCD-210F332M	(Y5V) +30%	3300	±20%	10.0			
CCD-211F392M	-80%	3900		11.0			
CCD-212F472M		4700		12.0			1
CCD-216F103M		10000		16.0	10		

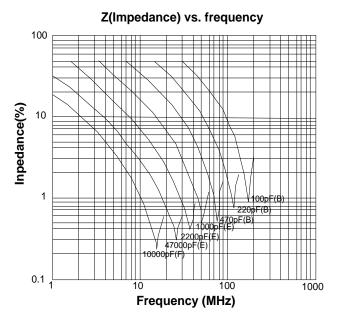
Rev. B4 Sheet 3 of 12

## Safety Standard Recognized Ceramic Capacitors



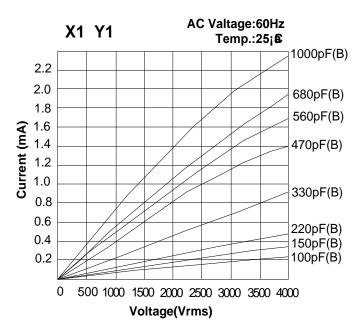
#### Typical characteristic curves £°

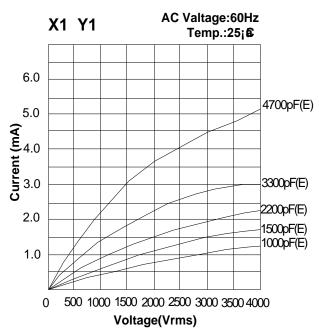




Note: Above data are just for reference not asurred ones.

#### Leakage current characteristics (Type X1 Y1: 0~4000Vac):





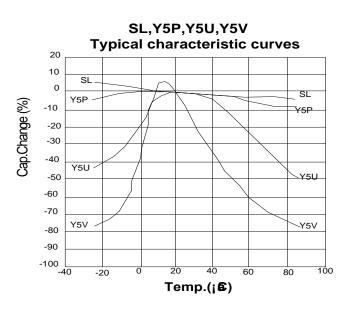
Note: Above data are just for reference not asurred ones.

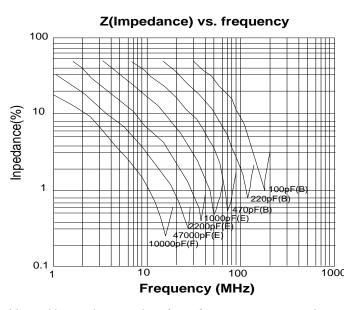
Rev. B4 Sheet 4 of 12

## Safety Standard Recognized Ceramic Capacitors



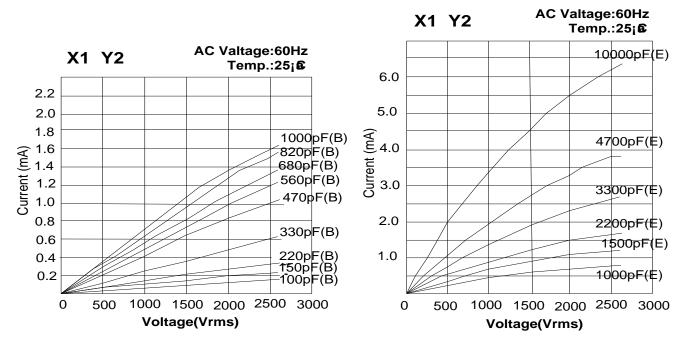
#### Typical characteristic curves £°





Note: Above data are just for reference not asurred one:

#### Leakage current characteristics (Type X1 Y2: 0~2600Vac):



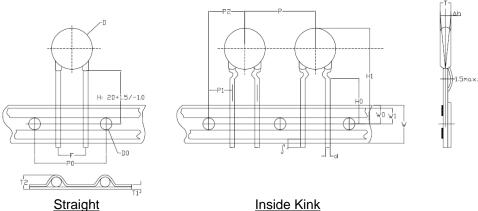
Note: Above data are just for reference not asurred ones.

Rev. B4 Sheet 5 of 12

## **Safety Standard Recognized Ceramic Capacitors**



#### **Packing Information**



Inside Kink

	0	Specification (mm)				
Item	Symbol	5T1/5R1	7T1/7R1	7T5/7R5	0T2/0R2	Tolerance
Pitch of component	Р	12.7	12.7	15	25.4	
Feed hole pitch	P0	12.7	12.7	15	12.7	+/-0.3
Lead to lead distance	F	5+0.8/-0.2	$7.5 \pm 1.0$	7.5±1.0	10±1.0	
Feed hole center to lead	P1	3.85	8.95	3.75	7.62	+/-0.7
Hold center to component center	P2	6.35	-	-	-	+/-1.3
Body diameter	D	11Max.	11Max.	11 <d≤16< td=""><td>16Max.</td><td>Max.</td></d≤16<>	16Max.	Max.
Body thickness	Т	5.0		8		Max.
Lead-wire diameter	D	0.6		0.6+1/-0.5		
Component alignment F-R	Δh		0			+/-2.0
Tape width	W		18.	0		+1.0/0.5
Hold-down tape width	WO		5.0	)		Min.
Hold position	W1		9.0	)		+/-0.5
Hold-down tape position	W2		3.0	)		Max.
Height of component from tape center	Н		20.	0		+1.5/-1.0
Lead wire clinch	H0		16.	0		+/-0.5
Component height	H1	32.25		37		Max.
Lead wire protrusion	ſ	1.0			Max.	
Feed hole diameter	D0		4.0	)		+/-0.2
Total tape thickness	T1		0.6	6		+/-0.3
Maximum thickness of tape and wire	T2	•	1.5	5		Max.

#### Bulk

Capacitance	Notes	Bag	Box
3300pF max		200pcs	200*10
3900pF~10000pF	Lead length≥24mm	100pcs	100*10
	Lead length<24mm	200pcs	200*10

Taping

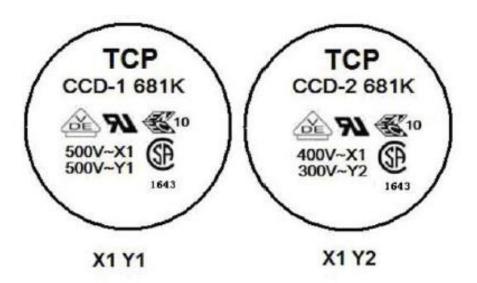
Pitch	D(max)	Р	Reel	Ammo
5	8	12.7	1500*2	1000
	8 <d≤11< td=""><td>12.7</td><td>1000*2</td><td>1000</td></d≤11<>	12.7	1000*2	1000
7.5	≤8	12.7	1500*2	1000
	9≤D≤11	12.7	1500*2	1000
	>11	15.0	1500*2	1000
10	8≤D≤16	25.4	500*2	500
12.5	8≤D≤16	25.4	300*2	300

Rev. B4 Sheet 6 of 12





#### **Marking Example**



#### **Label Example**



#### Shipping

Capacitors shall be packaged prior to shipment so as to prevent damage during transportation and storage. Shipping carton contains the following information on the label.

Rev. B4 Sheet 7 of 12



TRIGON COMPONENTS

#### Specification and Testing Method

	Item		Specification	Testing Method			
1	Dielectric Strength	Between lead wires	No failure	The capacitors shall not be damage when test voltage of Table 1 are applied between the lead wires for 60 sec (charge / discharge <= 50mA)  Table 1  Type Test Voltage  CCD-1 4000VAC  CCD-2 2600VAC			
		Body insulation	No failure	First. The terminals of the capacitor shall be connected together. Then, as show in the figure to the right, a metal foil shall be closely wrapped around the body of the capacitor to the distance of about 3 to 4mm from each terminal. Then, the capacitor shall be inserted into a container filled with metal balls of about 1mm diameter. Finally AC voltage of Table 1 is applied for 60sec. Between the capacitor lead wires and metal balls. (charge / discharge <= 50mA)			
2	Insulation Resistance	(I.R.)	10000Mohms min.	The insulation resistance shall be measure with 500±50VDC within 60±5sec. of charging.			
3	Capacitance	?	Within specified tolerance.	The capacitance shall be measured at 25°C with 1±0.1KHz and 5Vrms max.(COG with 1MHz±20% 1Vrms)			
4	Dissipation Factor (D.F.) Quality Factor (Q)		Char.         Spec.           B,E         D.F.<<2.5%	The dissipation factor shall be measured at 25°C with 1±0.1KHz and 5Vrms max.(CDG with 1MHz±20% 1Vrms)			
5	Temperature Characteristic		Char. Cap.Change  B ±10%  E -56%~+22%  F -82%~+22%  R ±15%  S -1000~+350ppm/°C  COG 0±60ppm/°C	The capacitance measuremint shall be made at each step specified in table 2.  Table 1  Step Temperature(°C)  1 +25±2  2 -25±2(JR: -55±2)  3 +25±2  4 -85±2(JR: -125±2)  5 +20±2  Pre-treatment: Capacitor shall be stored at 85±2°C(JR: 125±2) for 1 hour Then placed at room condition for (*)24±2 hours before measurements.			
6	Robustness of Termination	Tensile Bending	Lead wire shall not cut off. Capacitor shall not be broken.  Lead wire shall not cut off. Capacitor shall not be broken.	With the termination in its normal position. The specimen is held by its body in such a manner that the axis of the terminations is vertical the tensile the tensile force of 10N shall be applied to termination in the direction of its axis and acting in direction from the body of the specimen.  With the termination in its normal position. The specimen is held by its body in such a manner that the axis of the terminations is vertical: a mass applying a force of 5N is then suspended from the end of the termination. The body of the specimen is then inclined within a period of 2 to 3 sec., through an angle of a approximately 90 in the vertical plane and then returned to its initial position over the same period of time; this operation constitutes one bend. [Ine bend immediately followed by a second in the opposite			

<sup>\* &</sup>quot;room condition" temperature:  $15\sim35^{\circ}$ C, humidity:  $45\sim75\%$ , atmospheric:  $86\sim106$ kPa

Rev. B4 Sheet 8 of 12

## **Safety Standard Recognized Ceramic Capacitors**



	Ite	≥m	Specification	Testing Method
7	Soldering	Appearance	No marked defect.	Solder temperature: 350±10°C of 260±5°C
	Effect	I.R.	1000M ohms min.	Immersion time: 3.5±0.5sec. (10±1sec. for 260±5°C)
		Dielectric Strength	Per Item 1.	The depth of immersion Shall be a position 2+0/-0.5mm from the Scating plane. Using a Screen
		Capacitance	Within ± 10%	thermal insulating screen of 1.5±0.5mm thickens.
				Pre-treatment:
				Capacitor shall be stored at 85±2°C for 1 hour, then placed at room condition for (*)24±2 hours before initial measurements.
				Post-treatment:
				Capacitor shall be store for 1 to 2 hours at room condition.
8	Humidity	Appearance	No marked defect.	
	(Under Steady State)	Capacitance Change	B: Within 10%, R: 15% E,F: Within 15%,30%,C: 5%	Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% humidity.  Pre-treatment:
		D.F.	B,E,R: D.F.<=5.0% F: D.F.<=7.5%, C: Q>=135	Capacitor shall be stored at 85±2°C for 1 hour, then placed at room condition for (*)24±2 hours before initial measurements.
		I.R.	3000M ohms min.	Post-treatment:
		Dielectric Strength	Per Item 1.	Capacitor shall be store for 1 to 2 hours at room condition.
9	Humidity	Appearance	No marked defect.	
	Loading	Capacitance Change	B: Within 10%, R: 15% E,F: Within 15%,30%,C: 5%	Apply the rate voltage for 500±12 hours at 40±2°C, in 90 to 95% humidity.  Pre-treatment:
		D.F.	B,E,R: D.F.<=5.0% F: D.F.<=7.5%, C: Q>=135	Capacitor shall be stored at 85±2°C for 1 hour, then placed at room condition for (*)24±2 hours before initial measurements.
		I.R.	3000M ohms min.	Post-treatment:
		Dielectric Strength	Per Item 1.	Capacitor shall be store for 1 to 2 hours at room condition.
10	Life	Appearance	No marked defect.	Impulse Voltage
		Capacitance Change	B: Within 10%, R: 15% E,F: Within 15%,30%,C: 5%	
		I.R.	3000M ohms min.	1000hrs 90 T1=120 cos1=167T
		Dielectric Strength	Per Item 1.	T1=1.2u sec1.=1.67T T2=50u sec1
		Discharge Test(II)	No failure	0
				The specimen capacitors are placed in a circulating air oven a period of 1000 hours. The air in the over is maintained at a temperature of 125±2°C. Throughout the test. The capacitors are subjected to a 425Vrms alternating voltage of mains frequency. Except that once each hour the voltage is increased to 1000Vrms for 0.1 sec.

<sup>\*\* &</sup>quot;room condition" temperature: 15~35°C, humidity: 45~75%, atmospheric: 86~106kPa

Rev. B4 Sheet 9 of 12

## **Safety Standard Recognized Ceramic Capacitors**

TRIGON COMPONENTS

	Ite	 ≥m	Specification	Testing Method
11		Appearance	No marked defect.	As in Figure 1, discharge is made 50 times at 5 sec.
	Test (I)	I.R.	1000M ohms min.	intervals from the capacitor (Cd) charged DC voltage of specified.
		Dielectric Strength	Per Item 1.	R2 S R1 Ct
				Ct: Caapacitor under test Cd: 0.001uF S1: High-voltage switch R1: 1000 ohms R2: 100M ohms R3: Surge resistance Vs: 10KVDC
12	2 Discharge The cheesecloth around capacitors Test (II) shall not glow of flame			A single layer cheesecloth is to be placed around the body of the test capacitor. Each sample is to be subjected to four discharges from a dump capacitor charged to a voltage that when discharged placed DC5KV across the capacitor under test. The interval between successive discharges is to be 5 sec. AC240V, 60Hz potential is to be applied across the capacitor under test and is to be maintained for 30 sec. after the fourth discharge. Unless the circuit is opened in a shorter time by breakdown of the test capacitor. The direct current supply is to be adjusted to provide a potential in accordance with the following.
				$Vac = \frac{5000(Ca-Ct)}{Ca} (V)$
				Vac (Figure 2)
				Vdc: Variable direct-current voltage source S: High-voltage switch L: Choke coil of approximately 3mH and 0.03 ohm F: Plug fuse rated 30A and 250V Vac: Supply source rated 240V, 60Hz and 30A Ct: Capacitor under test Cd: Dump capacitor
				Capacitance value and D.F. are as follows:
				Cap.Value of Ct 0 to 0.005uF         0.0051 to 0.05uF           Cap.Value of Ct         0.005uF         0.005uF           D.F. of Cd         0.5% max.         0.5% max.
13	Flame Test  The capacitor flame discontinue as follows:  Cycle Cycle  1 to 4 30 sec. max.  5 60 sec. max.		Cycle Cycle 1 to 4 30 sec. max.	The capacitor shall be subjected to applied for 15 sec. and then removed for 15 sec. until 5 cycle.  Capacitor Flame  Gas.Burner

Rev. B4 Sheet 10 of 12





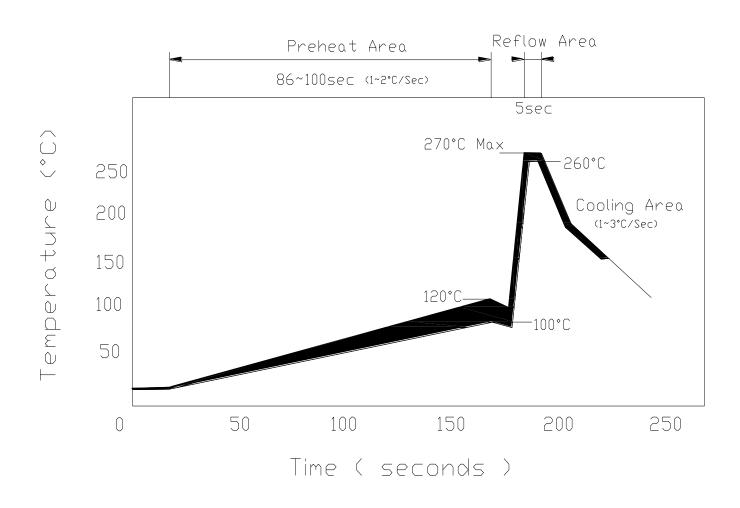
	Item	Specification	Testing Method
14	Active Flammability	The cheesecloth shall not be on fire.	The specimens shall be individually wrapped in least one but more than two complete layers of cheese-cloth. The specimens shall be subjected to 20 discharges. The interval between successive discharges shall be 5 sec. The Uac shall be maintained for 2 min. after the last discharge.  Fig.  Fig.  C2+ C2+ C3+ CX+ Ct+ Ut  S2 UAC
15	Passive Flammeability	The burning time shall not be exceeded the time 30 sec. The tissue paper shall not ignite.	The capacitor under test shall be held in the flame in the position, which best promotes burning. Each specimen shall only be exposed one to the flame. Time of exposure to flame: 30 sec.  Length of flame: 12±1mm Gasburner: Length 35mm min. Inside Diameter: 0.5±0.1mm Dutside Diameter: 0.9mm max. Gas: Butane gas Purity 95% min.

Rev. B4 Sheet 11 of 12

## **SOLDERING PROFILE**

#### **Safety Standard Recognized Ceramic Capacitors**





(Pb-Free Assembly)

Rev. B4 Sheet 12 of 12