



The DNA of tech.™

Product Change Notification

Product Group: CC/Thu Aug 17, 2023/PCN-CC-00005-2023-REV-0



Additional Epoxy Supplier for BCc Line Safety Capacitor Series

For further information, please contact your regional Vishay office.

CONTACT INFORMATION

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Description of Change: To secure the supply chain for our customer we introduce another source for the dry epoxy used as coating for the BCc line safety capacitor series AY1, AY2. This introduction will have no impact on the quality and reliability and is certified by the responsible certification bodies.

Reason for Change: additional source

Expected Influence on Quality/Reliability/Performance: No influence

Part Numbers/Series/Families Affected: Please see materials list on the succeeding page.

Vishay Brand(S): Vishay BCcomponents

Time Schedule:

Start Shipment Date: Mon Jul 1, 2024

Sample Availability: available

Product Identification: By series: AY1 series and AY2 series

Qualification Data: Will be available in Q3/2023

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Sun Jul 23, 2023 or as specified by contract.

Issued By: Florian Weyland, florian.veyland@vishay.com



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AY1-KIT-GA	AY1102M37Y5UC63L0	AY1102M37Y5UC65L0	AY1102M37Y5UC6BV0	AY1102M37Y5UC6TL0
AY1102M37Y5UC6TV0	AY1102M37Y5UC6UV0	AY1152M41Y5UC63L0	AY1152M41Y5UC6TL0	AY1152M41Y5UC6TLX
AY1152M41Y5UC6TVX	AY1222M47Y5UC63L0	AY1222M47Y5UC67L0	AY1222M47Y5UC6TL0	AY1222M47Y5UC6TV0
AY1222M47Y5UC6UL0	AY1222M47Y5UC6UV0	AY1272M53Y5UC63L0	AY1332M57Y5UC63L0	AY1332M57Y5UC6TV0
AY1392M61Y5UC63L0	AY1471M31Y5UC63L0	AY1471M31Y5UC63V0	AY1471M31Y5UC6TL0	AY1471M31Y5UC6TV0
AY1471M31Y5UC6UV0	AY1472M65Y5UC63L0	AY1472M65Y5UC63V0	AY1472M65Y5UC6TL0	AY1472M65Y5UC6TLX
AY1472M65Y5UC6TV0	AY1472M65Y5UC6UV0	AY1681M35Y5UC63L0	AY21-KIT-HF	AY2100K29U2JS
AY2100K29U2JS63L7	AY2100K29U2JS6BV7	AY2100K29U2JS6TL7	AY2100K29U2JS6UL7	AY2101K29Y5SS
AY2101K29Y5SS63L7	AY2101K29Y5SS63V7	AY2101K29Y5SS6BV7	AY2101K29Y5SS6TL0	AY2101K29Y5SS6TL0B
AY2101K29Y5SS6TL7	AY2101K29Y5SS6TV0	AY2101K29Y5SS6TV7	AY2101K29Y5SS6UL7	AY2101K29Y5SS6UV7
AY2102K29Y5US63L0	AY2102K29Y5US63V0	AY2102K29Y5US6TL0B	AY2102K29Y5US6TV0B	AY2102K29Y5US6UV0
AY2102M29Y5US	AY2102M29Y5US63L5	AY2102M29Y5US63L7	AY2102M29Y5US63V0	AY2102M29Y5US6BV7
AY2102M29Y5US6TL7	AY2102M29Y5US6UL7	AY2102M29Y5US6UV0	AY2102M29Y5US6UV7	AY2103M61Y5VS63L0
AY2103M61Y5VS6TL0	AY2103M61Y5VS6TL7	AY2103M61Y5VS6TV0	AY2103M61Y5VS6UV7	AY2150K29U2JS
AY2150K29U2JS63L7	AY2150K29U2JS6TL7	AY2150K29U2JS6UL7	AY2151K29Y5SS	AY2151K29Y5SS63L7
AY2151K29Y5SS6TL0	AY2151K29Y5SS6TL0B	AY2151K29Y5SS6TL7	AY2151K29Y5SS6TV0B	AY2151K29Y5SS6UL7
AY2152M31Y5US	AY2152M31Y5US63L7	AY2152M31Y5US63V0	AY2152M31Y5US6TL7	AY2152M31Y5US6TV5
AY2152M31Y5US6UL5	AY2152M31Y5US6UL7	AY2152M31Y5US6UV0	AY2152M31Y5US6UV7	AY2220K29U2JS
AY2220K29U2JS63L7	AY2220K29U2JS6TL7	AY2220K29U2JS6UL7	AY2221K29Y5SS	AY2221K29Y5SS63L0
AY2221K29Y5SS63L7	AY2221K29Y5SS63V7	AY2221K29Y5SS6TL0	AY2221K29Y5SS6TL7	AY2221K29Y5SS6TV0
AY2221K29Y5SS6TV7	AY2221K29Y5SS6UL7	AY2221K29Y5SS6UV7	AY2222M35Y5US	AY2222M35Y5US63L0
AY2222M35Y5US63L5	AY2222M35Y5US63L7	AY2222M35Y5US63L7A	AY2222M35Y5US63V0	AY2222M35Y5US63V7
AY2222M35Y5US6AV7	AY2222M35Y5US6BV7	AY2222M35Y5US6TL0	AY2222M35Y5US6TL0B	AY2222M35Y5US6TL5
AY2222M35Y5US6TL7	AY2222M35Y5US6TV0B	AY2222M35Y5US6TV7	AY2222M35Y5US6UL7	AY2222M35Y5US6UV7
AY2330K29U2JS	AY2330K29U2JS63L7	AY2330K29U2JS6TL7	AY2330K29U2JS6UL7	AY2331K29Y5SS
AY2331K29Y5SS63L7	AY2331K29Y5SS63V7	AY2331K29Y5SS6TL0	AY2331K29Y5SS6TL7	AY2331K29Y5SS6TV0
AY2331K29Y5SS6TV7	AY2331K29Y5SS6UL7	AY2331K29Y5SS6UV0	AY2331K29Y5SS6UV7	AY2332M41Y5US
AY2332M41Y5US63L5	AY2332M41Y5US63L7	AY2332M41Y5US63V0	AY2332M41Y5US6AV7	AY2332M41Y5US6BV7
AY2332M41Y5US6TL7	AY2332M41Y5US6UL7	AY2332M41Y5US6UV0	AY2332M41Y5US6UV7	AY2392M43Y5US
AY2392M43Y5US63L7	AY2392M43Y5US63V0	AY2392M43Y5US6TL7	AY2392M43Y5US6UL7	AY2470K29U2JS
AY2470K29U2JS63L7	AY2470K29U2JS63V7	AY2470K29U2JS6TL7	AY2470K29U2JS6UL7	AY2470K29U2JS6UV7
AY2471K29Y5SS	AY2471K29Y5SS63L5	AY2471K29Y5SS63L7	AY2471K29Y5SS6BV7	AY2471K29Y5SS6TL0
AY2471K29Y5SS6TL0B	AY2471K29Y5SS6TL5B	AY2471K29Y5SS6TL7	AY2471K29Y5SS6TV0B	AY2471K29Y5SS6UL7
AY2471K29Y5SS6UV7	AY2471M29Y5SS6TL0	AY2471M29Y5SS6TV0	AY2472K49Y5US6TL5	AY2472M49Y5US
AY2472M49Y5US63L5	AY2472M49Y5US63L7	AY2472M49Y5US63V0	AY2472M49Y5US6BV7	AY2472M49Y5US6TL0
AY2472M49Y5US6TL7	AY2472M49Y5US6TV0	AY2472M49Y5US6TV7	AY2472M49Y5US6UL0	AY2472M49Y5US6UL7
AY2472M49Y5US6UV0	AY2472M49Y5US6UV7	AY2680K29Y5SS	AY2680K29Y5SS63L7	AY2680K29Y5SS6TL7
AY2680K29Y5SS6UL7	AY2681K29Y5US6TL0	AY2681M29Y5SU6TV0B	AY2681M29Y5US	AY2681M29Y5US63L7
AY2681M29Y5US63V0	AY2681M29Y5US63V7A	AY2681M29Y5US6TL7	AY2681M29Y5US6TV0B	AY2681M29Y5US6TV7
AY2681M29Y5US6TV7A	AY2681M29Y5US6UL7			



PPAP

Submission Date:

Jul.13, 2023

Description

AEC-Q200 QUALIFIED
AUTOMOTIVE GRADE
SAFETY CAPACITOR

Vishay PN:

VISHAY AY1 SERIES

Manufacturing Site:

Vishay Components (Huizhou) Co., Ltd.



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Section 1

DESIGN RECORDS



Automotive Grade AC Line Rated Ceramic Disc Capacitors

Class X1, 760 V_{AC}, Class Y1, 500 V_{AC}



FEATURES

- AEC-Q200 qualified
- Withstands 85 / 85 / 1000 h test
- Can pass 1000 temperature cycles (from -55 °C to +125 °C)
- Can pass 10 kV pulses (10 per polarity)
- Complying with IEC 60384-14 4th edition
- High reliability
- Singlelayer AC disc safety capacitors
- PPAP (AIAG version) is available
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

AUTOMOTIVE
GRADE

RoHS
COMPLIANT
HALOGEN
FREE
GREEN
(5-2008)

LINKS TO ADDITIONAL RESOURCES



3D Models



Models

Capabilities and
Custom Options

Infographics

Application
NotesRelated
Documents

QUICK REFERENCE DATA		
DESCRIPTION	VALUE	
Ceramic Class	2	
Ceramic Dielectric	Y5U	
Voltage (V _{AC})	500	760
Min. Capacitance (pF)	470	
Max. Capacitance (pF)	4700	
Mounting	Radial	

OPERATING TEMPERATURE RANGE

-55 °C to +125 °C

TEMPERATURE CHARACTERISTICS

Class 2: Y5U

SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)

Class 2: 40 / 125 / 21

COATING

According to UL 94 V-0

Epoxy resin, isolating, flame retardant

APPROVALS

IEC 60384-14.4

UL 60384-14

DIN EN 60384-14

CSA E60384-1:03, CSA E60384-14:09

CQC (IEC 60384-14)

PACKAGING

Bulk, tape and reel, taped ammpack

APPLICATIONS

- X1, Y1 according to IEC 60384-14.4
- Application as Y capacitors for AC line filter and primary-secondary coupling on battery chargers for PHEV/EV
- Application as filter capacitors on DC/DC converters for PHEV/EV and HEV
- EMI / RFI suppression and filtering

DESIGN

The capacitor consists of a ceramic disc which is copper plated on both sides. Connection leads are made of tin plated copper-clad steel having a diameter of 0.6 mm or 0.8 mm.

The capacitors may be supplied with straight and vertical kink leads having a lead spacing of 10.0 mm and 12.5 mm. Encapsulation is made of flame retardant epoxy resin in accordance with UL 94 V-0.

CAPACITANCE RANGE

470 pF to 4700 pF

RATED VOLTAGE U_R

IEC 60384-14.4:

(X1): 760 V_{AC}, 50 Hz(Y1): 500 V_{AC}, 50 Hz1500 V_{DC}

TEST VOLTAGE

Component test (100 %):

4000 V_{AC}, 50 Hz, 2 s

Random sampling test (destructive test):

4000 V_{AC}, 50 Hz, 60 s

Voltage proof of coating (destructive test):

4000 V_{AC}, 50 Hz, 60 s

INSULATION RESISTANCE

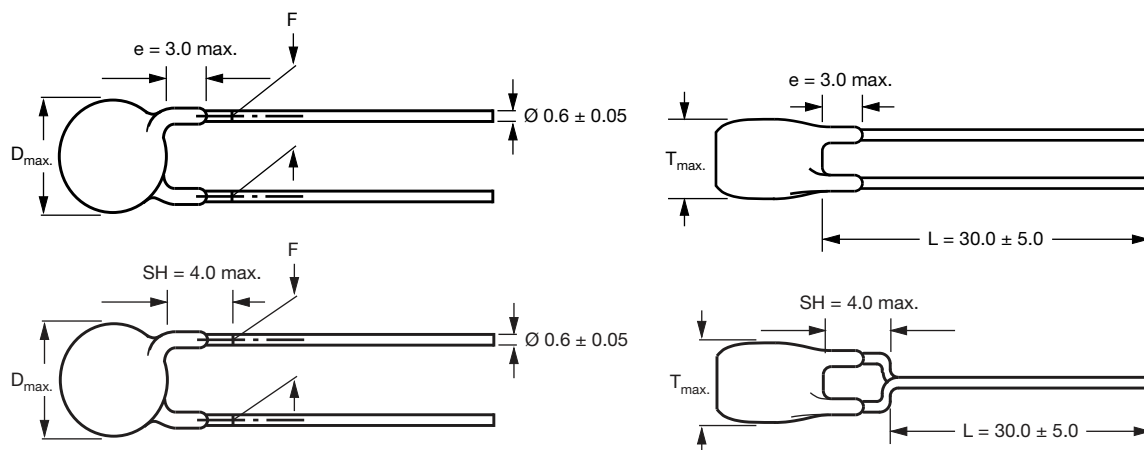
≥ 10 000 MΩ

CAPACITANCE TOLERANCE

± 20 % (code M)

DISSIPATION FACTOR

Class 2: max. 2.5 % (1 kHz)

**DIMENSIONS** in millimeters

Capacitors with 10.0 mm or 12.5 mm lead spacing

TECHNICAL DATA

CAPACITANCE C (pF)	CAPACITANCE TOLERANCE (%)	BODY DIAMETER D _{max.} (mm)	BODY THICKNESS T _{max.} (mm)	LEAD SPACING F (mm) ± 1 mm	PART NUMBER MISSING DIGITS SEE ORDERING CODE BELOW
Y5U (2E3)					
470	± 20	8.0	7.0	10 or 12.5	AY1471M31Y5UC6###
680		9.0		10 or 12.5	AY1681M35Y5UC6###
1000		9.5		10 or 12.5	AY1102M37Y5UC6###
1500		10.5		10 or 12.5	AY1152M41Y5UC6###
2200		12.0		10 or 12.5	AY1222M47Y5UC6###
2700		13.5		10 or 12.5	AY1272M53Y5UC6###
3300		14.5		10 or 12.5	AY1332M57Y5UC6###
3900		15.5		10 or 12.5	AY1392M61Y5UC6###
4700		16.5		10 or 12.5	AY1472M65Y5UC6###

ORDERING CODE

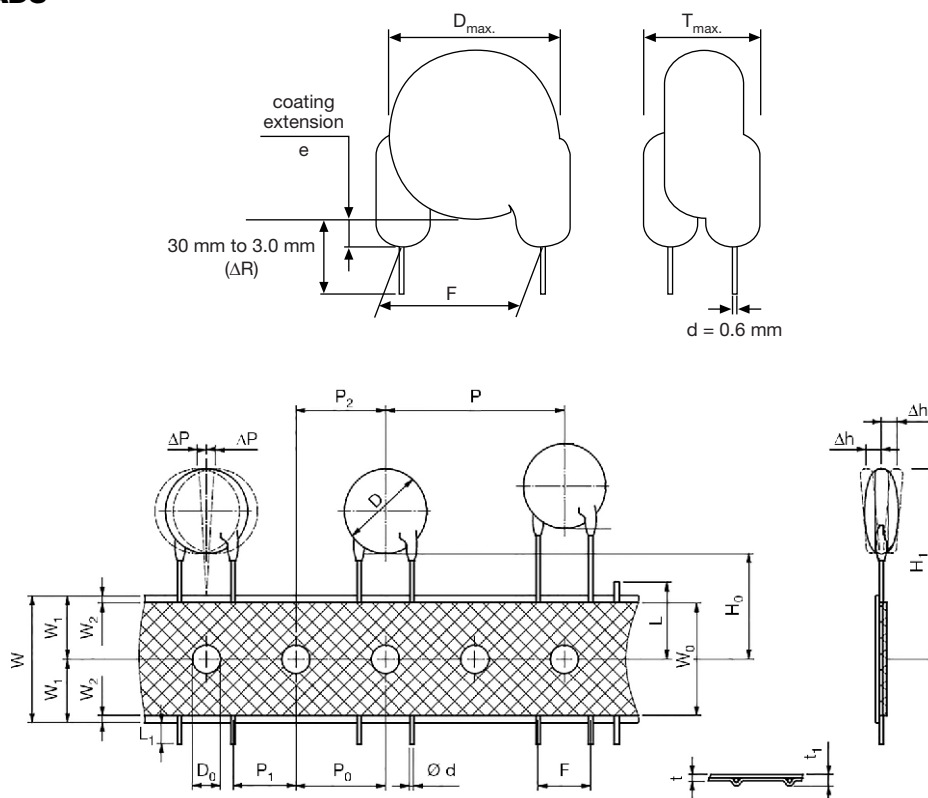
###	15 th to 17 th digit	Lead configuration			Available configurations see below					
Example	AY1	222	M	47	Y5U	C	6	U	L	0
	Series	Capacitance value	Tolerance code	Size code	Temperature coefficient	Compact design	Lead wire diameter	Packaging / lead length	Lead style	Lead spacing
							6 = 0.6 8 = 0.8	3 = bulk T = tape and reel U = ammpack	L = straight V = inline kink	0 = 10.0 X = 12.5

LEADSPACING 10.0 mm AND 12.5 mm**PACKAGING**

CAPACITANCE VALUE	SIZE CODE	BODY DIAMETER D _{max.} (mm)	PACKAGING QUANTITIES		
			BULK	REEL	AMMO
470 pF to 2200 pF	31 to 47	12.0	1000	500	500
2700 pF to 4700 pF	53 to 65	16.5	500	500	500

Note

- The capacitors are supplied in bulk packaging (cardboard boxes), in tape on reel in ammpack


STRAIGHT LEADS


The hole pitch 12.7 mm for lead spacing 10.0 mm (0.4") or 12.5 mm (0.49")

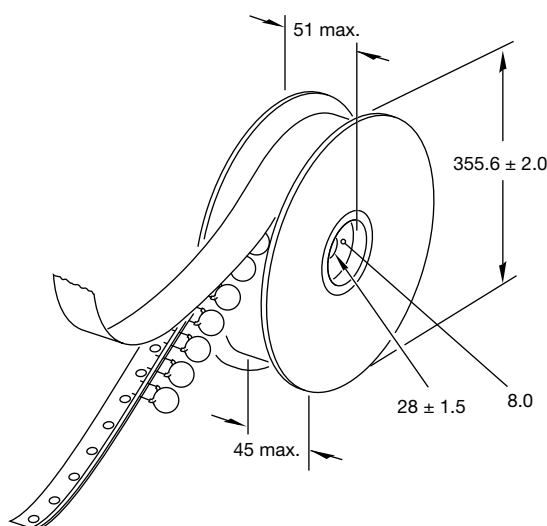
DIMENSION OF TAPE		
SYMBOL	PARAMETER	DIMENSIONS (mm)
		10 mm OR 12.5 mm
D ⁽¹⁾	Body diameter	16.5 max.
d	Lead diameter	0.6 ± 0.05
P	Pitch of component	25.4 ± 1
P ₀ ⁽²⁾	Pitch of sprocket hole	12.7 ± 0.3
P ₁ ⁽³⁾	Distance, hole center to lead	7.7 or 6.5 ± 1.0
P ₂ ⁽³⁾	Distance, hole to center of component	12.7 ± 1.5
F	Lead spacing	10.0 or 12.5 (+ 0.6/- 0.4)
Δh	Average deviation across tape	± 1.0 max.
ΔP	Average deviation in direction of reeling	± 1.0 max.
W	Carrier tape width	18.0 + 1/- 0.5
W ₀	Hold-down tape width	5.0 min.
W ₁	Position of sprocket hole	9.0 + 0.75/- 0.5
W ₂	Distance of hold-down tape	3.0 max.
H ₁	Maximum component height	40
H ₀	Height to seating plane	20.0 ± 0.5 (16.0 ± 0.5 for kinked)
L	Length of cut leads	11.0 max.
L ₁	Length of lead protrusion	1.0 max.
D ₀	Diameter of sprocket hole	4.0 ± 0.2
t	Total tape thickness	0.9 max.
t ₁	Maximum thickness of tape and wires	1.5 max.

Notes

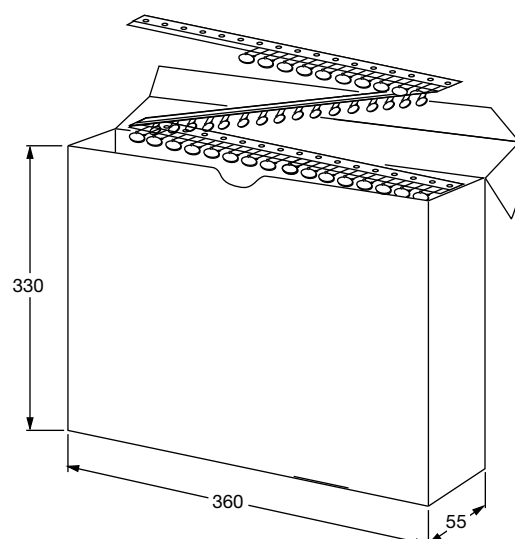
(1) See "Technical Data" table

(2) Cumulative pitch error: ± 1 mm/20 pitches

(3) Obliquity maximum 3°


REEL AND TAPE DATA in millimeters


Reel with capacitors on tape



Ammopack with capacitors on tape

APPROVALS

IEC 60384-14.4 - Safety tests

This approval together with CB test certificate substitutes all national approvals.

CB Certificate

Y1-capacitor: CB test certificate:	US-26163-UL	470 pF to 4.7 nF	500 V _{AC}
X1-capacitor: CB test certificate:	US-26163-UL	470 pF to 4.7 nF	760 V _{AC}


VDE

Y1-capacitor: VDE marks approval:	40012673	470 pF to 4.7 nF	500 V _{AC}
X1-capacitor: VDE marks approval:	40012673	470 pF to 4.7 nF	760 V _{AC}



DIN EN 60384-14 VDE 0565-1-1:2006-04 - Safety tests

Underwriters Laboratories Inc./Canadian Standards Association

Y1-capacitor: UL-test certificate:	E183844	470 pF to 4.7 nF	500 V _{AC}
X1-capacitor: UL-test certificate:	E183844	470 pF to 4.7 nF	760 V _{AC}


UL 60384-14, CSA E60384-1:03 2nd edition, CSA E60384-14:09 2nd edition

Across-the-line, antenna-coupling and line-by-pass component

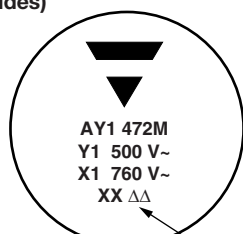
CQC

Y1-capacitor: CQC test certificate:	CQC05001015032	470 pF to 4.7 nF	500 V _{AC}
X1-capacitor: CQC test certificate:	CQC05001015032	470 pF to 4.7 nF	760 V _{AC}





MARKING

Sample
(2 sides)

Front



Back

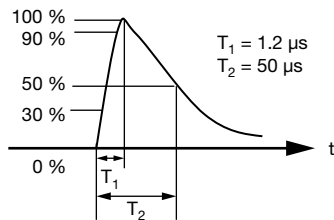
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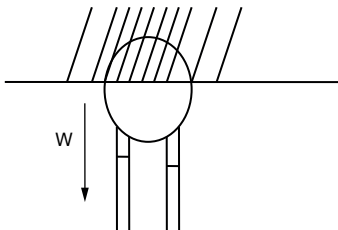
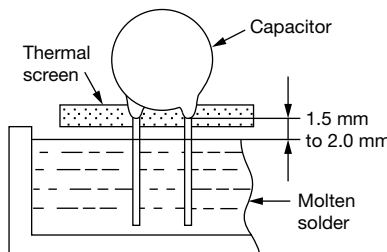
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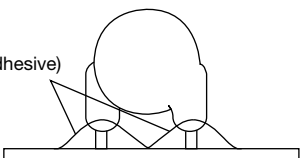
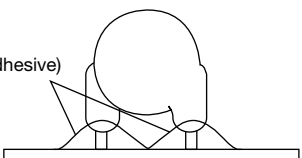
PERFORMANCE

PERFORMANCE					
NO.	ITEMS		SPECIFICATION	TEST METHOD	
1	Visual and mechanical examination		No visible damage. The marking shall be legible. Dimensions are within specification.	Capacitors shall be visually inspected for visible evidence of defect. Dimensions shall be measured with calipers or micrometers.	
2	Capacitance		Within the specified tolerance.	The capacitance shall be measured at 25 °C ± 3 °C, 75 % RH maximum with 1.0 V _{RMS} ± 0.2 V _{RMS} , 1 kHz.	
3	Dissipation factor (D.F.)		2.5 % max.	The dissipation factor shall be measured at 25 °C ± 3 °C, 75 % RH maximum with 1.0 V _{RMS} ± 0.2 V _{RMS} , 1 kHz.	
4	Insulation resistance (I.R.)		10 GΩ min.	Insulation resistance shall be measured within 60 s ± 5 s of charging at 500 V _{DC} .	
5	Dielectric strength (between lead wires)		No damage.	4000 V _{AC} are applied for 60 s. 50 mA max. (destructive test)	
6	Temperature characteristic		Within specification.	The capacitance shall be measured at each step specified in table below. The capacitance change from the value of step 3 shall not exceed the limit specified.	
				Step	Temperature
				1	25 °C ± 3 °C
				2	-30 °C ± 3 °C
				3	25 °C ± 3 °C
				4	85 °C ± 3 °C
5	25 °C ± 3 °C				
7	High temperature operation life	External appearance	No visible damage. The marking shall be legible.	The specimen capacitors shall be submitted to an endurance test of 1000 h + 48 h / - 0 h in a chamber at 125 °C ± 3 °C with a voltage of 760 V _{AC} . Pre-treatment: capacitor shall be backed at 125 °C ± 3 °C for 1 h before initial measurements. Post-treatment: capacitors shall be placed at room condition for 24 h ± 2 h before measurements.	
		Capacitance change	± 15 % max.		
		Dissipation factor	5 % max. at 1 V, 1 kHz		
		Insulation resistance	3 GΩ min. at 500 V _{DC} , 60 s		
		Dielectric strength (between lead wires)	No failure at 4000 V _{AC} , 60 s		



PERFORMANCE				
NO.	ITEMS		SPECIFICATION	TEST METHOD
8	Life test	External appearance	No visible damage. The marking shall be legible.	Test voltage: 4000 V_{AC}, 60 s Impulse voltage: each individual capacitor shall be subjected to a 10 kV impulse for ten times each polarity. Before the capacitors are applied to life test.  The specimen capacitors shall be submitted to an endurance test of 1000 h + 48 h / - 0 h in a chamber at 125 °C ± 3 °C with a voltage of 1500 V_{AC}. Pre-treatment: capacitor shall be backed at 125 °C ± 3 °C for 1 h before initial measurements. Post-treatment: capacitors shall be placed at room condition for 24 h ± 2 h before measurements.
		Capacitance change	± 15 % max.	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	3 GΩ min. at 500 V _{DC} , 60 s	
		Dielectric strength (between lead wires)	No failure at 4000 V _{AC} , 60 s	
9	Humidity test (under steady state)	External appearance	No visible damage.	Ambient temperature: 40 °C ± 2 °C Relative humidity: 90 % to 95 % RH Duration: 500 h + 48 h / - 0 h Without loading Pre-treatment: capacitor shall be stored at 40 °C ± 2 °C for 24 h ± 5 h before initial measurements. Post-treatment: capacitor shall be stored for 2 h at room conditions before final measurements.
		Capacitance change	± 20 %	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	3 GΩ min. at 500 V _{DC} , 60 s	
		Dielectric strength (between lead wires)	No failure at 4000 V _{AC} , 60 s	
10	Humidity test (under load state)	External appearance	No visible damage. The marking shall be legible.	Ambient temperature: 40 °C ± 2 °C Relative humidity: 90 % to 95 % RH Duration: 500 h + 48 h / - 0 h Loading voltage: 760 V_{AC} Pre-treatment: capacitor shall be stored at 40 °C ± 5 °C for 24 h ± 2 h before initial measurements. Post-treatment: capacitor shall be stored for 2 h at room conditions before final measurements.
		Capacitance change	± 15 %	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	3 GΩ min. at 500 V _{DC} , 60 s	
		Dielectric strength (between lead wires)	No failure at 4000 V _{AC} , 60 s	

PERFORMANCE					
NO.	ITEMS		SPECIFICATION	TEST METHOD	
11	Biased humidity	External appearance		No visible damage. The marking shall be legible.	Loading voltage: 760 V _{AC} Ambient temperature: 85 °C ± 3 °C Relative humidity: 85 % RH Duration: 1000 h + 48 h / - 0 h Pre-treatment: capacitor shall be stored at 40 °C ± 5 °C for 24 h ± 2 h, then place at room condition for 24 h ± 2 h before initial measurements. Post-treatment: capacitor shall be stored for 24 h at room conditions before final measurements.
		Capacitance change		± 15 %	
		Dissipation factor		5 % max. at 1 V, 1 kHz	
		Insulation resistance		3 GΩ min. at 500 V _{DC} , 60 s	
		Dielectric strength (between lead wires)		No failure at 4000 V _{AC} , 60 s	
12	Termination strength	Pull test	External appearance	Lead wire should not be cut off, capacitor should not be broken.	As a figure, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 20 N, and keep it for 10 s ± 1 s. 
			Capacitance change	Within specification	
			Dissipation factor	Within specification	
			Insulation resistance	Within specification	
		Bending test	External appearance	Lead wire should not be cut off, capacitor should not be broken.	Bending each lead wire to 90° from the lead egress with 2.5 N force, then back to original position and bent again from the same direction. Totally 3 bends, 3 s each time. 1 bend: bending to 90° the return to normal position is one bend. Start from 1.6 mm to 3.2 mm from the part body.
13	Resistance to solder heat	Visual		No visible damage. The marking shall be legible.	The lead wire shall be immersed into the melted solder of 260 °C ± 5 °C up to about 1.5 mm to 2 mm from the main body for 10 s ± 2 s. Inspect under 10 x magnification 
		Capacitance change		Within ± 10 %	
		Dissipation factor		5 % max. at 1 V, 1 kHz	
		Insulation resistance		1 GΩ min. at 500 V _{DC} , 60 s	
		Dielectric strength (between lead wires)		No failure at 4000 V _{AC} , 60 s	
			Pre-treatment: Capacitor shall be stored at 125 °C ± 5 °C for 1 h, then placed at room condition for 24 h ± 2 h before initial measurements. Post-treatment: Capacitor shall be stored for 24 h ± 2 h at room condition.		

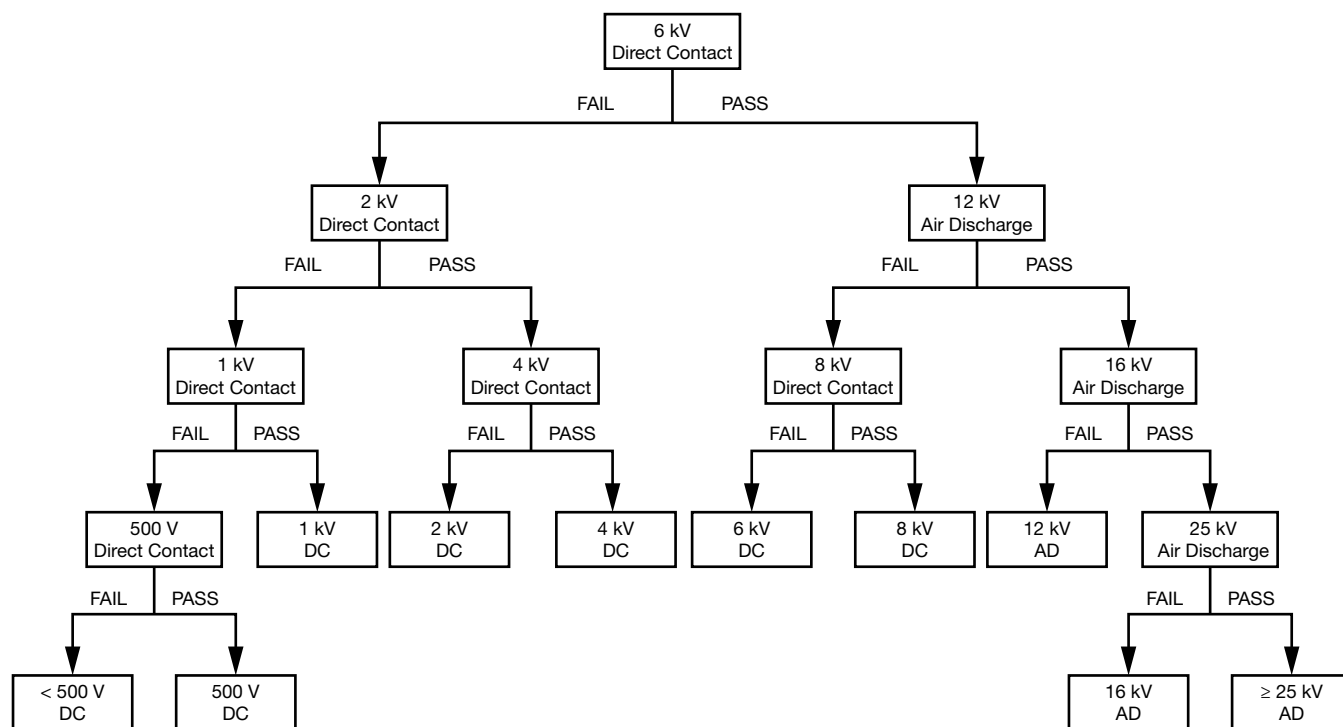
PERFORMANCE				
NO.	ITEMS		SPECIFICATION	TEST METHOD
14	Solderability	External appearance	95 % of terminations evenly covered with solder under 10 x magnification.	Method A at category 3, steam aging for 8 h $\pm$ 15 min. Solder and temperature: a) Lead (Pb)-free solder (Sn-3Ag-0.5Cu) 245 °C $\pm$ 5 °C b) H63 eutectic solder 235 °C $\pm$ 5 °C dip lead wire into an ethanol solution of 25 % $\pm$ 0.5 % rosin and then into molten solder for 5 s + 0 s / - 0.5 s. Depth of immersion within 1.25 mm, immerse and withdraw at 25 mm/s $\pm$ 6 mm/s
15	Vibration test	Visual	No visible damage. The marking shall be legible.	 Solder the capacitor and gum up the body to the test jig by resin (adhesive). The capacitor should be firmly soldered to the supporting lead wire. Vibration change from 10 Hz to 2000 Hz, then back to 10 Hz. Total amplitude: 1.5 mm with 5 g max., 12 cycles, 20 min for each mutually perpendicular directions, 3 directions.
		Capacitance change	Within $\pm$ 10 %	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	10 G Ω min. at 500 V _{DC} , 60 s	
16	Mechanical shock	External appearance	No visible damage. The marking shall be legible.	 Solder the capacitor and gum up the body to the test jig by resin (adhesive). 3 shocks in 2 directions should be applied, totally 3 mutually perpendicular axes, 18 shocks. Shock from: half-sine Duration: 6 ms Acceleration: 100 g
		Capacitance change	Within the specified tolerance.	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	10 G Ω min. at 500 V _{DC} , 60 s	
17	Resistance to solvents	External appearance	No visible damage. The marking shall be legible.	Leave parts in solvent for 3 to 8 min at 25 °C $\pm$ 5 °C, 1 min air-drying Rub parts against wet bristle 10 times (3 x for marking, 10 x for part damage) Solvent 1: 1 part (by volume) of isopropyl alcohol, 3 parts (by volume) of mineral spirits Solvent 2: Terpene defluxer Solvent 3: 42 parts (by volume) of water, 1 part (by volume) of propylene glycol, 1 part (by volume) of monoethanolamine



PERFORMANCE				
NO.	ITEMS		SPECIFICATION	TEST METHOD
18	Temperature cycle	Capacitance change	Within $\pm 20\%$	The capacitor should be run 1000 temperature cycles. Step as below: Step 1-55 °C + 0 °C / - 3 °C, dwell time ≤ 30 min Step 2 Transition time ≤ 1 min Step 3+125 °C + 3 °C / - 0 °C, dwell time ≤ 30 min Step 4 Transition time ≤ 1 min Pre-treatment: capacitor shall be stored at 125 °C ± 3 °C for 1 h, then placed at room condition for 24 h ± 2 h before initial measurement. Post-treatment: capacitor shall be stored for 24 h ± 2 h at room condition.
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	3 G Ω min at 500 V _{DC} , 60 s	
		Dielectric strength	No failure at 4000 V _{AC} , 60 s	
		External appearance	No visible damage. The marking shall be legible.	
19	High temperature exposure (storage)	External appearance	No visible damage. The marking shall be legible.	Storage capacitor at 125 °C ± 3 °C for 1000 h + 48 h / - 0 h without loading. Pre-treatment: capacitor shall be stored at 125 °C ± 3 °C for 1 h, then placed at room condition for 24 h ± 2 h before initial measurement. Post-treatment: capacitor shall be stored for 24 h ± 2 h at room condition.
		Capacitance change	Within $\pm 20\%$	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	1 G Ω min. at 500 V _{DC} , 60 s	
20	ESD	External appearance	No visible damage. The marking shall be legible.	See chart "ESD Test Method" below
		Capacitance change	Within $\pm 10\%$	
		Dissipation factor	5 % max. at 1 V, 1 kHz	
		Insulation resistance	1 G Ω min. at 500 V _{DC} , 60 s	



ESD TEST METHOD

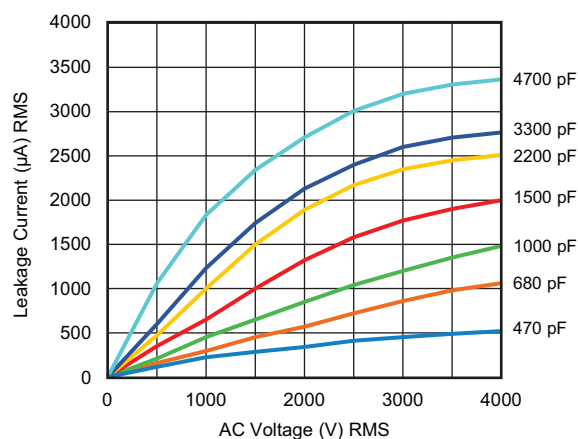


Notes

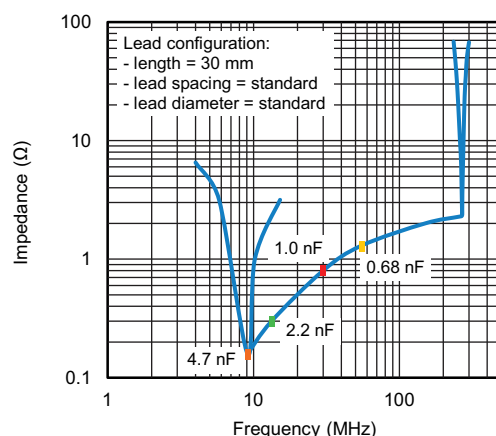
- DC means "direct contact discharge"
- AC means "air discharge"
- Classify the components according to the highest ESD voltage level survived during ESD testing



LEAKAGE CURRENT VS. VOLTAGE (Typical)



IMPEDANCE VS. FREQUENCY (Typical)



Note

- The capacitors meet the essential requirements of "EIA 198". Unless stated otherwise all electrical values apply at an ambient temperature of $25^\circ\text{C} \pm 3^\circ\text{C}$, at normal atmospheric conditions

RELATED DOCUMENTS	
General Information	www.vishay.com/doc?28536
VDE Marks Approval	www.vishay.com/doc?22251
UL Test Certificate	www.vishay.com/doc?22250
CQC Test Certificate	www.vishay.com/doc?22248

SAMPLE KIT	
Part Number	AY1-KIT-GA
Link	www.vishay.com/doc?28567



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Section 2

ENGINEERING CHANGE DOCUMENTS



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Product Change Notification

Product Group: CC/Fri Jun 23, 2023/PCN-CC-00005-2023-REV-0



Additional Epoxy Supplier for BCc Line Safety Capacitor Series

For further information, please contact your regional Vishay office.

CONTACT INFORMATION

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-

Description of Change: To secure the supply chain for our customer we introduce another source for the dry epoxy used as coating for the BCc line safety capacitor series AY1, AY2. This introduction will have no impact on the quality and reliability and is certified by the responsible certification bodies.

Classification of Change: additional source

Expected Influence on Quality/Reliability/Performance: No influence

Part Numbers/Series/Families Affected: Please see materials list on the succeeding page.

Vishay Brand(S): Vishay BCcomponents

Time Schedule:

Start Shipment Date: Mon Jul 1, 2024

Sample Availability: available

Product Identification: By series: AY1 series and AY2 series

Qualification Data: Will be available in Q3/2023

This PCN is considered approved, without further notification, unless we receive specific customer concerns before Sun Jul 23, 2023 or as specified by contract.

Issued By: Florian Weyland, florian.veyland@vishay.com



Product Change Notification



Product Group: CC/Fri Jun 23, 2023/PCN-CC-00005-2023-REV-0

The DNA of tech.

AY1-KIT-GA	AY1102M37Y5UC63L0	AY1102M37Y5UC65L0	AY1102M37Y5UC6BV0	AY1102M37Y5UC6TL0
AY1102M37Y5UC6TV0	AY1102M37Y5UC6UV0	AY1152M41Y5UC63L0	AY1152M41Y5UC6TL0	AY1152M41Y5UC6TLX
AY1152M41Y5UC6TVX	AY1222M47Y5UC63L0	AY1222M47Y5UC67L0	AY1222M47Y5UC6TL0	AY1222M47Y5UC6TV0
AY1222M47Y5UC6UL0	AY1222M47Y5UC6UV0	AY1272M53Y5UC63L0	AY1332M57Y5UC63L0	AY1332M57Y5UC6TV0
AY1392M61Y5UC63L0	AY1471M31Y5UC63L0	AY1471M31Y5UC63V0	AY1471M31Y5UC6TL0	AY1471M31Y5UC6TV0
AY1471M31Y5UC6UV0	AY1472M65Y5UC63L0	AY1472M65Y5UC63V0	AY1472M65Y5UC6TL0	AY1472M65Y5UC6TLX
AY1472M65Y5UC6TV0	AY1472M65Y5UC6UV0	AY1681M35Y5UC63L0	AY21-KIT-HF	AY2100K29U2JS
AY2100K29U2JS63L7	AY2100K29U2JS6BV7	AY2100K29U2JS6TL7	AY2100K29U2JS6UL7	AY2101K29Y5SS
AY2101K29Y5SS63L7	AY2101K29Y5SS63V7	AY2101K29Y5SS6BV7	AY2101K29Y5SS6TL0	AY2101K29Y5SS6TL0B
AY2101K29Y5SS6TL7	AY2101K29Y5SS6TV0	AY2101K29Y5SS6TV7	AY2101K29Y5SS6UL7	AY2101K29Y5SS6UV7
AY2102K29Y5US63L0	AY2102K29Y5US63V0	AY2102K29Y5US6TL0B	AY2102K29Y5US6TV0B	AY2102K29Y5US6UV0
AY2102M29Y5US	AY2102M29Y5US63L5	AY2102M29Y5US63L7	AY2102M29Y5US63V0	AY2102M29Y5US6BV7
AY2102M29Y5US6TL7	AY2102M29Y5US6UL7	AY2102M29Y5US6UV0	AY2102M29Y5US6UV7	AY2103M61Y5VS63L0
AY2103M61Y5VS6TL0	AY2103M61Y5VS6TL7	AY2103M61Y5VS6TV0	AY2103M61Y5VS6UV7	AY2150K29U2JS
AY2150K29U2JS63L7	AY2150K29U2JS6TL7	AY2150K29U2JS6UL7	AY2151K29Y5SS	AY2151K29Y5SS63L7
AY2151K29Y5SS6TL0	AY2151K29Y5SS6TL0B	AY2151K29Y5SS6TL7	AY2151K29Y5SS6TV0B	AY2151K29Y5SS6UL7
AY2152M31Y5US	AY2152M31Y5US63L7	AY2152M31Y5US63V0	AY2152M31Y5US6TL7	AY2152M31Y5US6TV5
AY2152M31Y5US6UL5	AY2152M31Y5US6UL7	AY2152M31Y5US6UV0	AY2152M31Y5US6UV7	AY2220K29U2JS
AY2220K29U2JS63L7	AY2220K29U2JS6TL7	AY2220K29U2JS6UL7	AY2221K29Y5SS	AY2221K29Y5SS63L0
AY2221K29Y5SS63L7	AY2221K29Y5SS63V7	AY2221K29Y5SS6TL0	AY2221K29Y5SS6TL7	AY2221K29Y5SS6TV0
AY2221K29Y5SS6TV7	AY2221K29Y5SS6UL7	AY2221K29Y5SS6UV7	AY2222M35Y5US	AY2222M35Y5US63L0
AY2222M35Y5US63L5	AY2222M35Y5US63L7	AY2222M35Y5US63L7A	AY2222M35Y5US63V0	AY2222M35Y5US63V7
AY2222M35Y5US6AV7	AY2222M35Y5US6BV7	AY2222M35Y5US6TL0	AY2222M35Y5US6TL0B	AY2222M35Y5US6TL5
AY2222M35Y5US6TL7	AY2222M35Y5US6TV0B	AY2222M35Y5US6TV7	AY2222M35Y5US6UL7	AY2222M35Y5US6UV7
AY2330K29U2JS	AY2330K29U2JS63L7	AY2330K29U2JS6TL7	AY2330K29U2JS6UL7	AY2331K29Y5SS
AY2331K29Y5SS63L7	AY2331K29Y5SS63V7	AY2331K29Y5SS6TL0	AY2331K29Y5SS6TL7	AY2331K29Y5SS6TV0
AY2331K29Y5SS6TV7	AY2331K29Y5SS6UL7	AY2331K29Y5SS6UV0	AY2331K29Y5SS6UV7	AY2332M41Y5US
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AY2392M43Y5US63L7	AY2392M43Y5US63V0	AY2392M43Y5US6TL7	AY2392M43Y5US6UL7	AY2470K29U2JS
AY2470K29U2JS63L7	AY2470K29U2JS63V7	AY2470K29U2JS6TL7	AY2470K29U2JS6UL7	AY2470K29U2JS6UV7
AY2471K29Y5SS	AY2471K29Y5SS63L5	AY2471K29Y5SS63L7	AY2471K29Y5SS6BV7	AY2471K29Y5SS6TL0
AY2471K29Y5SS6TL0B	AY2471K29Y5SS6TL5B	AY2471K29Y5SS6TL7	AY2471K29Y5SS6TV0B	AY2471K29Y5SS6UL7
AY2471K29Y5SS6UV7	AY2471M29Y5SS6TL0	AY2471M29Y5SS6TV0	AY2472K49Y5US6TL5	AY2472M49Y5US
AY2472M49Y5US63L5	AY2472M49Y5US63L7	AY2472M49Y5US63V0	AY2472M49Y5US6BV7	AY2472M49Y5US6TL0
AY2472M49Y5US6TL7	AY2472M49Y5US6TV0	AY2472M49Y5US6TV7	AY2472M49Y5US6UL0	AY2472M49Y5US6UL7
AY2472M49Y5US6UV0	AY2472M49Y5US6UV7	AY2680K29Y5SS	AY2680K29Y5SS63L7	AY2680K29Y5SS6TL7
AY2680K29Y5SS6UL7	AY2681K29Y5US6TL0	AY2681M29Y5SU6TV0B	AY2681M29Y5US	AY2681M29Y5US63L7
AY2681M29Y5US63V0	AY2681M29Y5US63V7A	AY2681M29Y5US6TL7	AY2681M29Y5US6TV0B	AY2681M29Y5US6TV7
AY2681M29Y5US6TV7A	AY2681M29Y5US6UL7			



Section 3

CUSTOMER ENGINEER APPROVAL

Not Applicable



Section 4

DESIGN FMEA

Attachment 7

**POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)**

Item: **Ceramic Disc Capacitor**
 Components : **VY & AY Series**
 Core Team : **SM.Li, JH.Deng, MG Deng, Andy.Ye, CY Lin**

Design Responsibility : **Engineering**
 Key Date : **4/10/2017**
 Prepared by : **CY Lin**

FME
Date
Edit

Function	Item	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Design				RPN	
								Controls Prevention	Occurrence	Controls Detection	Detection		
1. Capacitance	Series VY1 VY2 AY2	Rated cap(PF) 10 15 22 33 47 68 100 150 220 330	Cap out of up limit	electrical characteristics lower than spec requirement	6		wrong C value design (K value of ceramic and disc size can't match C value)	1. choose suitable K value of ceramic 2. supplier approve sheet--K in spec 3. capacitance theoretical formulation	3	samples verification (FR and DR)	3	54	
		Tolerance ±10%											
		470											
		±10%(Y5S) / ±20%											
		680											
		1000											
		1500											
		2200											
		2700											
		3300											
2. DF	AY1 AY2 VY2	3900 4700 6800 10000	Cap out of low limit	electrical characteristics lower than spec requirement	6		wrong C value design (K value of ceramic and disc size can't match C value)	1. choose suitable K value of ceramic 2. supplier approve sheet--K in spec 3. capacitance theoretical formulation	3	samples verification (FR and DR)	3	54	
		±20%											
3. IR	DF spec: Class-I ceramic: DF<=0.3%1MHz Class-I ceramic: DF<=2.5%1KHz	IR<10GΩ at 500±50VDC.60s	IR<10GΩ at 500±50VDC.60s	reliability lower than spec requirement	7		1. DF of ceramic out of spec 2. DF of coating out of spec	1. choose suitable materials, DF in spec 2. supplier approve sheet--DF in spec	3	samples verification (FR and DR)	3	63	
4. TC	TC: U2J: -750±120 ppm/°C @ 85°C Y5S: ±22%~-30°C~ 85°C Y5U: +22% ~ -56%~-30°C~ 85°C Y5V: +22% ~ -82%~-30°C~ 85°C	TC out of spec	TC out of spec	electrical characteristics lower than spec requirement	6		TC of ceramic out of spec	1. choose suitable materials, TC in spec 2. supplier approve sheet--TC in spec	3	samples verification (FR and DR)	3	54	
5. TV minute test	coating no failure: 1. VY2&AY2: 2.6KVAC.60s 2. VY1&AY1: 4.0KVAC.60s	TV failure	TV failure	electrical characteristics lost	8		low BDV of coating material	1.design according to IEC-60384-14 2.coating material meet spec, min coating thickness control	2	samples verification (FR and DR)	5	80	
	dielectric no failure: 1. VY2&AY2: 2.6KVAC.60s 2. VY1&AY1: 4.0KVAC.60s	TV failure	TV failure	electrical characteristics lost	8		weak BDV of ceramic material	design according to IEC-60384-14	3	samples verification (FR and DR)	4	96	

Attachment 7

**POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)**

Item: **Ceramic Disc Capacitor**
 Components : **VY & AY Series**
 Core Team : **SM.Li, JH.Deng, MG Deng, Andy.Ye, CY Lin**

Design Responsibility : **Engineering**
 Key Date : **4/10/2017**
 Prepared by : **CY Lin**

FME
Date
Edit

Function	Item	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Design				RPN	
								Controls Prevention	Occurrence	Controls Detection	Detection		
6. Impulse test		No failure in impulse: 1. VY2 & AY2-----5KV. 3times 2. VY1-----8KV. 3times (VY1°C---10KV.3times) 3. AY1-----10KV. ± 10times	impulse failure	electrical characteristics lost	8		weak impulse capacity of ceramic material	design according to IEC-60384-14	3	samples verification (FR and DR)	4	96	
7. size		1. FG diameter meet PN size code spec (FG diameter<=0.254xsize code) 2. FG thickness spec: VY2, AY2 and VY1<=5.0mm(AY2682-103M<=6.0mm) AY1<=7.0mm	size out of spec	effect installation	8		1.diameter of FG>0.254*size code of PN 2.thickness of FG out of spec: VY2, AY2 and 3.disc coating margin not enough	enough coating margin: 1. disc diameter: VY2&VY1: FG-disc>1.5mm AY2&AY1: FG-disc >2.0mm 2. disc thickness	2	samples verification (FR and DR)	5	80	
		lead diameter: VY: Ø0.6±0.05mm or Ø0.8±0.05mm AY:Ø0.6±0.05mm	lead diameter out of spec	effect installation	8		wire diameter out of spec: wire code "6", not within Ø0.6±0.05mm wire code "8", not within in Ø0.8±0.05mm	according to IEC-60384-14 & AEC-Q200	2	samples verification (FR and DR)	5	80	
		lead wire space: VY2&AY2 ≥6.0mm (if<=6.0mm, TV< =2.6KVAC) VY1&AY1≥9.0mm	lead space out of spec	effect installation sparkover	8		Lead space out of spec VY2&AY2<6.0mm VY1&AY1<9.0mm	according to IEC-60384-14	2	samples verification (FR and DR)	5	80	
8. reliability		8.1 thermal shock, no failure@-55°C/+125°C: VY1&VY2-----5cycles AY1-----1000 cycles AY2100-AY2472-----3000 cycles AY2682-AY2103-----1000 cycles	coating crack	electrical characteristics lost	8		1. coating material weak withstanding thermal shock capacity 2. wrong design---coating increment not enough	1. VY---according to IEC-60384-14. 2. AY---according to IEC-60384-14 & AEC-Q200 3. min coating increment:	3	samples verification (FR and DR)	4	96	
		8.2 Humidity, no failure VY1&VY2: 500hr@ 40°C.92 %RH(loading and no loading) AY1&AY2: 1000hr@ 85°C.85 %RH(loading) 500hr@ 40°C.92 %RH (loading and no loading)	1. TV failure 2. cap&DF change out of spec 3. IR failure	electrical characteristics lower than spec requirement / lost(TV failure)	8		coating weak withstanding humidity capacity	1. VY---according to IEC-60384-14. 2. AY---according to IEC-60384-14.&AEC-Q200	3	samples verification (FR and DR)	4	96	
		8.3 Life: 1000hr@ 125°C with loading加压 (AY1&VY1:1500VAC; AY2&VY2: 550VAC)	1. TV failure 2. cap&DF change out of spec 3. IR failure	electrical characteristics lower than spec requirement / lost(TV failure)	8		1.ceramic weak life 2.coating weak life	1. VY---according to IEC-60384-14. 2. AY---according to IEC-60384-14.&AEC-Q200	3	samples verification (FR and DR)	4	96	
		8.4 Mechanical Shock	wire broken---part open	electrical characteristics lost	8		1.un-strong wire designed in 2. capacitor wrong fixed on test jig	1. VY---according to IEC-60384-14. 2. AY---according to IEC-60384-14.&AEC-Q200 3. Solder the capacitor and gum up the body to test jig.	2	samples verification (FR and DR)	5	80	
		8.5 Vibration	wire broken---part open	electrical characteristics lost	8		1.un-strong wire designed in 2. capacitor wrong fixed on test jig	1. VY---according to IEC-60384-14. 2. AY---according to IEC-60384-14.&AEC-Q200 3. Solder the capacitor and gum up the body to test jig.	2	samples verification (FR and DR)	5	80	

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

Item: Ceramic Disc Capacitor
Components : VY & AY Series
Core Team : SM.Li, JH.Deng, MG Deng, Andy.Ye, CY Lin

Design Responsibility : Engineering
Key Date : 4/10/2017
Prepared by : CY Lin

FME
Date
Edit

Function	Item	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Design				RPN	
								Controls Prevention	Occurrence	Controls Detection	Detection		
9. other		meet RoHs requirements	against RoHs	environment pollution	8		materials against RoHs	material spec and MSDS reports confirmation	2	third-party detection institution	5	80	

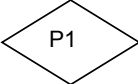
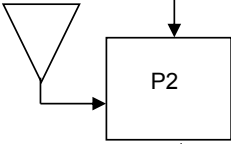
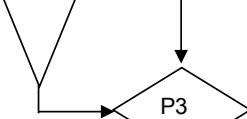
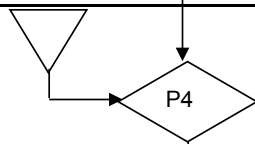
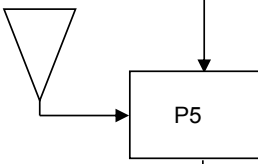
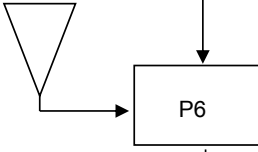
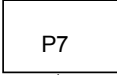
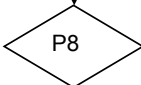
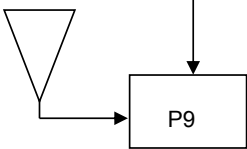
Core Team Members Signing:



Section 5

PROCESS FLOW DIAGRAM

AY1 series process flow chart

Material	Flow	Process
		IQC
Ceramic powder		Pelleting
Zirconium powder		Raw-fire
Electrode paster		Electrode printing
1. Lead wire 2. Solder 3. Flux 4. Inhibited oil 5. Paper tape 6. Plastic tape		Soldering
Epoxy		Coating
		Marking
		Testing
1. Ammo box 2. Bag 3. Tape & reel		Packing



Section 6

PROCESS FMEA

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: Ceramic Disc Capacitor
 Component(s): YY&AY Series
 Core Team : Ye.Andy, Swing Xia, SM.Li, JH.Deng, MG.Deng, JY.Huang, CY.Lin, Wei.Li

Responsibility departments : Production, Engineering, QC
 Key Date : 2017/4/10
 Prepared by : CY Lin

Item Process	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Process		
							Controls Prevention	Occurrence	Controls Detection
1. IQC	qualified ceramic	K value out of spec	scrap	8	un-qualified ceramic	shipment report	shipment report	1	1.check label and c
		other electrical characteristics out of spec	scrap	8				1	2.standard sample inspection (PE-INS-012)
	qualified silver paste/copper paste	electrical characteristics out of spec	scrap	8	un-qualified silver paste/copper paste	shipment report	shipment report	1	1.check label and p
	qualified lead wire	1.wire diameter out of spec 2.thickness of Sn out spec 3.ductility rate out spec	scrap	8	un-qualified lead wire	shipment report	shipment report	1	1.check label and l
	qualified epoxy	1.abnormal color, impurity 2.thermal shock capacity lower than spec requirement	scrap	8	un-qualified epoxy	shipment report	shipment report	2	1.check label and e
	qualified solder	weak adhesion	scrap	8	un-qualified solder	shipment report	shipment report	1	2.sample inspection
	qualified other materials (tape, adhesive tape)	dimensions out of spec	scrap	8	un-qualified materials	shipment report	shipment report	1	1.check label and p
2. Pelleting Press ceramic powder to raw disc	all materials meet RoHs requirements	against RoHs	environment pollution	10	sc	materials against RoHs	supplier approval sheet	1	2.sample inspection
	suitable pressing density	pressing density less than low limitation	TV lower than spec requirement (disc breakdown)	8	against density range to set pressure	1. define suitable pressing spec according to supplier ceramic data.PE-INS-011 2. pressing density on traveler.	1. define suitable pressing spec according to supplier ceramic data.PE-INS-011 2. define suitable pressing spec according to supplier ceramic data.PE-INS-011 3. corresponding mold size on pressing traveler 4.similar size discs, produce dividually	3	1. first /end article a
		pressing density more than up limitation	TV lower than spec requirement (disc layered crack)	8	against density range to set pressure			3	2. QC inspection
	raw disc diameter in spec (for reference): (diameter size code x 1.17)±10 (tolerance:±/-0.5mm)	disc diameter out of up limitation	1. cap out of up limitation(full pattern design) 2. FG diameter out of spec	6	1.wrong pressing mold 2.mix up	1. define suitable pressing spec according to supplier ceramic data.PE-INS-011 2.carve size number on pressing mold 3. corresponding mold size on pressing traveler 4.similar size discs, produce dividually	1.define suitable pressing spec according to supplier ceramic data.PE-INS-011 2.raw disc thickness spec on traveler 3.similar size discs, produce dividually	2	3. FG 100% Cap tes
		disc diameter out of low limitation	cap out of low limitation(full pattern design)	6	1.wrong pressing mold 2.mix up			2	1. first/end article a
	raw disc thickness in spec: (for reference): (thickness size code x 1.17)±100 (tolerance:±/-0.05mm)	disc thickness out of up limitation	cap out of low limitation (full pattern design)	6	1.wrong setting raw disc thickness 2.mix up	1.define suitable pressing spec according to supplier ceramic data.PE-INS-011 2.raw disc thickness spec on traveler 3.similar size discs, produce dividually	1.define suitable pressing spec according to supplier ceramic data.PE-INS-011 2.raw disc thickness spec on traveler 3.similar size discs, produce dividually	2	2.QC inspection
		disc thickness out of low limitation	1. TV lower than spec requirement 2. Cap out of up limitation (full pattern design)	8	1.wrong setting raw disc thickness 2.mix up			2	3. FG 100% Cap/TV
	raw disc perfect surface (no sticking, no chipping, no crack)	sticking mold	TV lower than spec requirement	8	1.damped ceramic 2.weak flowing powder	1.control humidity, seal ceramic before pressing 2.add oil, roll >10 minutes, sieve before pressing (oil:powder=100ml/10kg)	raw disc buffer into box	3	1. first/end article a
		chipping	TV lower than spec requirement	8	impacting			2	2. QC inspection
		layered crack	TV lower than spec requirement	8	no pre-pressure	pre-pressure disc thickness, 1.2~1.3 time raw disc thickness		2	2. QC inspection
3. Loading	load raw disc in firing box	sticking disc in firing	low yield,scrap sticking disc	2	not mix Zr powder	mix Zr sand before loading disc in box		5	100% disc visual af

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: Ceramic Disc Capacitor
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Responsibility departments : Production, Engineering, QC
 Key Date : 2017/4/10
 Prepared by : CY Lin

Item Process	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Process		
							Controls Prevention	Occurrence	Controls Detection
4.Firing: Fire raw disc through high temperature (1200°C~1400°C)	K value in spec	K value less than low limitation	Cap out of low limitation	6		wrong firing condition (low temp or short soaking time)	1.IQC sample pre-firing, and release related batch ceramic and qualified firing condition to production line. PE-INS-011 2.fix furnace speed: block/37min.	3	1. Ring temperature 2. Fired disc QC sa 3. FG 100% Cap tes PE-INS-012
		K value larger than up limitation	1.TC out of spec 2.Cap out of up limitation (full pattern design)	6		wrong firing condition (high temp or long soaking time)		3	1. Ring temperature 2. Fired disc QC sa 3. FG 100% Cap tes PE-INS-012
	DF in spec: Class I ceramic DF≤0.3% @1MHz.1.0VRMS Class II ceramic DF≤2.5% @1KHz.1.0VRMS	DF out of spec	reliability lower than spec requirement	7		1. polluted disc 2. wrong firing condition (temp and soaking time)	1. specialized Zr powder/ loading box 2. Zr board segregation 3. IQC sample pre-firing, and release related batch ceramic and qualified firing condition to production line. PE-INS-011 4. fix furnace speed: block/37min	3	1. Ring temperature 2. Fired disc QC sa 3. FG 100% DF test PE-INS-012
	spec: IR≥10GΩ at 500VDC.60s	IR<10GΩ at 500VDC.60s	reliability lower than spec requirement	7		1. polluted disc 2. wrong firing condition (temp and soaking time)	1. specialized Zr powder/ loading box 2. Zr board segregation 3. IQC sample pre-firing, and release related batch ceramic and qualified firing condition to production line. PE-INS-011 4. fix furnace speed: block/37min	2	1.Fired disc QC sa 2. FG 100% IR test PE-INS-012
	TC requirement: U2J: -750±120 ppm/°C @ 85°C Y5S: ±22%@-30°C~ 85°C Y5U: +22% ~ -56%@-30°C~ 85°C Y5V: +22% ~ -82%@-30°C~ 85°C	TC out of spec	electrical characteristics lower than spec requirement	6		wrong firing condition (temp and soaking time)	1. IQC sample pre-firing, and release related batch ceramic and qualified firing condition to production line. PE-INS-011 2. fix furnace speed: block/37min	1	QC sample inspect
	fired disc perfect surface	disc crack	TV lower than spec requirement	8		wrong firing condition (binder out too quick)	1. IQC sample pre-firing, and release related ceramic and qualified firing condition to production line.PE-INS-011 2. fix furnace speed: block/37min	2	1.fired disc 100% m visual 2. FG 100% TV test PE-INS-012
		Pin hole & melted hole	TV lower than spec requirement	8		1.impurity in Zr powder 2. impurity in loading box	specialized Zr powder/ loading box	2	1.fired disc 100% m visual 2. FG 100% TV test PE-INS-012
		disc sticking	low yield, scrap sticking disc	2		wrong firing condition (high temp or long soaking time)	1. IQC sample pre-firing, and release qualified firing condition to production line.PE-INS-011 2. fix furnace speed: block/37min	3	fired disc 100% ma

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: Ceramic Disc Capacitor
 Component(s): VY&AY Series
 Core Team : Ye.Andy、Swing Xia、SM.Li、JH.Deng、MG.Deng、JY.Huang、CY.Lin、Wei.Li

Responsibility departments : Production, Engineering, QC
 Key Date : 2017/4/10
 Prepared by : CY Lin

Item Process	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Process		
							Controls Prevention	Occurrence	Controls Detection
5. Sorting visual disc	sorting out un-perfect surface disc	un-perfect surface disc leave out	influence electrode printing low yield	2		leave out un-perfect surface disc	1. double sides disc visual 2.operator visual failure mode training (failure mode board)	3	QC inspection
6.1 printing paste and firing: print Ag paste on disc both sides and firing(Ag electrode, ring design)	ring-design---no paste running over disc edge	paste running over disc	TV lower than spec requirement	8		damaged silk screen	1. check silk screen before use 2. pre-printing on film to confirm before disc printing.	2	1. 100% manual vis 2. FG 100% TV test PE-INS-012
	drying enough before firing electrode	un-drying paste touch disc edge	TV lower than spec requirement	8		wrong drying condition	define drying condition according to supplier material spec DF-INS-001	2	1. first article iassu 2. FG 100% TV test PE-INS-012
	good adhesion: 1. not less 8.0LB----disc diameter not less than ø7.0mm; 2. not less 4.5LB---disc diameter less than ø7.0mm. 3. or soldering point ceramic draged out	weak adhesion	part open	8		un-enough rabbling	rabbling more than 4 hours before use	2	FG 100% Cap/DF te PE-INS-012
				8		wrong electrode firing condition	define firing condition according to supplier material spec DF-INS-002	2	FG 100% Cap/DF t PE-INS-012
	Cap in spec	Cap out of spec	low yield	2		wrong electrode diameter setting (wong film)	pre-print 30pcs for cap confirmation before volume printing	3	1. QC sample 2. FG 100% Cap tes PE-INS-012
	perfect electrode surface	incomplete electrode	Cap out of spec---lower	2		1.screen wrong setting 2. weak flow paste (remainder recycle)	pre-print on film before volume printing	3	1.100% visual disc 2.FG 100% Cap tes PE-INS-012
6.2 printing paste and firing: print Cu paste on disc both sides and firing(copper electrode, full pattern design)	paste running over disc edges≤0.1mm	paste running over disc>0.1mm	TV lower than spec requirement	8		wrong operating	every time scrape remain paste on back screen before printing	4	1. 100% disc edge v 2. FG 100% TV test PE-INS-012
	drying enough before firing electrode	un-drying paste touch disc edge	TV lower than spec requirement	8		wrong drying condition	define drying condition according to supplier material spec DF-INS-022	3	1. first article assur 2. FG 100% TV test PE-INS-012
	no electrode oxidation	electrode oxidation	1. DF out of spec 2. K value loss----Cap out of low limitation	7		wrong electrode drying / firing condition	define drying/ firing condition according to supplier material spec DF-INS-022	3	1. 100% manual vis 2. FG 100% Cap/DF PE-INS-012
	good adhesion: 1. not less 8.0LB----disc diameter not less than ø7.0mm; 2. not less 4.5LB---disc diameter less than ø7.0mm. 3. or soldering point ceramic draged out	weak adhesion	part open	8		un-enough aging copper paste	7 days aging before supplier shipping out	2	1. incoming inspec 2. FG 100% Cap/DF PE-INS012
				8		un-enough rabbling	rabbling more than 4 hours before use	2	FG 100% Cap/DF te PE-INS-012
				8		un-enough binder burn out	one layer firing	2	FG 100% Cap/DF te PE-INS-012
				8		wrong firing condition	define drying/ firing condition according to supplier material spec DF-INS-022	2	FG 100% Cap/DF te PE-INS-012
	perfect electrode surface	Cu paste at disc edge	TV lower than spec requirement	8		damaged silk screen	check silk screen before use	3	1. 100% edge visua 2. FG 100% TV test PE-INS-012
		incomplete electrode	Cap out of spec---lower	6		1. screen wrong setting 2. weak flow paste (remainder recycle)	pre-print on film to confirm before volume printing	3	1. 100% manual vis 2. . FG 100% Cap te PE-INS-012

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: Ceramic Disc Capacitor
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Responsibility departments : Production, Engineering, QC
 Key Date : 2017/4/10
 Prepared by : CY Lin

Process \ Item	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Process		
							Controls Prevention	Occurrence	Controls Detection
7. soldering disc wire connect disc	wire hurt not larger than 10% wire diameter	wire hurt larger than 10% wire diameter	wire broken---part open	8		forming model hurt wire	1. forming model evaluation before release. 2. re-evaluation forming model per 3 years.	1	na
	wire forming, min radius not less than 1.0 time wire diameter	min radius less than 1.0 time wire diameter	wire broken---part open	8		forming model hurt wire	forming model evaluation before release.	1	na
	lead space in spec	lead space out of spec	effect installation(customer)	8	sc	wrong forming model	1. forming model evaluation before release. 2. re-evaluation forming model per 3 years.	1	first/end article ass
	good adhesion: 1. not less 8.0LB----disc diameter not less than ø7.0mm; 2. not less 4.5LB----disc diameter less than ø7.0mm. 3. or soldering point ceramic dragged out	un-melted soldering point (weak adhesion)	part open	8		un-suitable soldering condition (low temp and/or fast speed)	pre-solder 5~10pcs samples for confirmation before volumn soldering	2	1. first/end article a 2. FG 100% Cap/DP/ PE-INS-012
		leached soldering ponit (weak adhesion)	part open	8		un-suitable soldering condition (high temp and/or low speed)		2	1. first/end article a 2. FG 100% Cap&D/ PE-INS-012
	right lead wire direction (right lead in front, left lead on back)	wrong lead wire direction (right lead on back, left lead in front)	effect installation(customer)	8		wrong forming model	forming model evaluation before release.	1	first/end article ass
	flatten cross wire (AY series, visual flatten and >0.5mm)	1. no flatten 2. flatten <= 0.5mm	thermal shock capacity lower than spec requirement	8		wrong M/C flatten setting	operator training	1	first/end article ass
8. coating seal disc	good appearance	disc offset	appearance abnormity	3		wrong setting	pre-solder 5~10pcs samples for confirmation before volumn soldering	2	first/end article ass
	coating increment requirement:								
		diameter coating increment less than spec	thermal shock capacity lower than spec requirement	8		wrong coating M/C setting (temp and/or speed)	pre-coat 5~10pcs samples for confirmation before volumn coating	2	first/end article ass
	coating increment uniform	coating increment nonuniform	thermal shock capacity lower than spec requirement	8		high temp / humidity, coarse or caking epoxy	sealed package, low temp stock(<10°C)	2	sample for thermal
						epoxy temperature non-uniform, un-enough frostless period.	not less than 12hrs frostless period after epoxy take out cool warehouse.		
	good coating surface	Pin hole	appearance abnormity	3		1.damped disc after soldering 2.high temp / humidity, coarse or caking epoxy	1.coating within 24hr after disc soldering 2.sealed package, low temp stock(<10°C)	3	1.first article assur 2.QC sample
	L type, epoxy rundown in spec(≤3.0mm)	epoxy rundown out of spec (>3.0mm)	affect soldering in customer side	8		disc dipping in epoxy too deep	pre-coat 5~10pcs samples for confirmation before volumn coating	2	1.first article assur 2.QC sample
	V type, SH in spec and epoxy not exceed up kink (SH≤4.0mm)	1. SH out spec(SH>4.0mm) 2.epoxy exceed up kink	affect soldering / installation in customer side	8		disc soldering, reserved SH ₂ too high or too low	1.disc soldering, reserved SH ₂ =4.5±0.3mm 2.pre-coat 5~10pcs samples for confirmation before volumn coating	2	1.first article assur 2.QC sample
	full coating	un-full coating (bareness disc)	TV lower than spec requirement (flashover)	8		wrong operating (disc un-full dipping in epoxy)	pre-coat 5~10pcs samples for confirmation before volumn coating	2	1. first/end article a 2. FG 100% TV test/ PE-INS-012
	Proper usage epoxy:	incorrect usage epoxy	thermal shock capacity lower than spec requirement un-clear laser marking	8		confused epoxies	clear label mark on packing box. clear label mark on coating machine.	1	sample for thermal test or sec analysis
	enough heat after coating	un-enough heat after coating	thermal shock capacity lower than spec requirement	8		1. wrong temp in coating (wrong setting, tape broken, open cover etc) 2. wrong coating speed setting	1. AY specified M/C, last 2 zones temp 190±5°C 2. AY low coating speed, PE-INS-012	1	sample for thermal

POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (PROCESS FMEA)

Item: Ceramic Disc Capacitor
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 Core Team : Ye.Andy, Swing Xia, SM.Li, JH.Deng, MG.Deng, JY.Huang, CY.Lin, Wei.Li

Responsibility departments : Production, Engineering, QC
 Key Date : 2017/4/10
 Prepared by : CY Lin

Item Process	Requirement	Potential failure mode	Potential effect(s) of failure	Severity	Classification	Potential cause(s) of failure	Current Process		
							Controls Prevention	Occurrence	Controls Detection
9.curing cure coating material	full curing	un-full curing	thermal shock capacity lower than spec requirement	8		wrong curing condition (low temp and/or un-enough time)	according to curing information from supplier to define suitable curing condition	1	QC sample test
10. marking mark on part	clear mark	un-clear mark	appearance abnormality, difficult distinguish	2		un-enough laser power	laser power M/C scheduled maintenance	1	first/end article ass
11. testing 100% test Cap&DF, TV, IR	100% get rid of failure	Cap failure leave out	electrical characteristics lower than spec requirement	8	SC	1. disable equipment 2. wrong setting	1. equipment function confirm before testing 2. equipment scheduled maintenance 3. setting according to traveler spec (class-II ceramic, cap aging factor included)	1	first article ass
		other failure leave out	electrical characteristics lower than spec requirement	8					
12. packing pack FG	meet packing spec	wrong packing	effect installation(customer)	8		wrong operating (against packing spec)	packing spec on traveler	1	1. 100% inspection 2. QA confirm
	moisture proof(SMD only)	damped product	TV lower than spec requirement (flashover)	8		1.wrong operating 2.wrong packing	1.dying before packing 2. desiccant & vacuum packing	1	humidity card in pa

Core Team Members Signing:



Section 7

CONTROL PLAN

Control Plan

No.: APQP-AY&

☐ Sample ☐ Try run ☒ Produce			Control plan Nr.:		Contactor:Zheng.Yanling/Tel Nr 0752-3355373			Original Date: Jul 8, 2014		
Part Nr/Lastest change level			Core team : CY Lin, Andy Ye, SM Li, JY Huang, JH Deng, MG Deng, Swing Xia, Wei Li			Approved date by			Approved date by	
Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other Ap	
Supplier/Plant :Vishay components(Huizhou)			Characterisitic			Special char classify			Methods	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Product/Process tolerance	Evaluation/ Measurement	Size	Sample	Freq
	Environment Temp/RH				Environment Temp/RH	QA-INS-032	Temp/RH tester			Once
	IQC ROHS inspection			RoHS inspection	Inspection report	SC	QA-INS-929	X-Ray	QA-INS-929	QA-II
IQC	Lead wire			Outgoing report			QA-INS-004	Outgoing report	Once	Pe
				Appearance			QA-INS-004	Naked eyes	QA-INS-004	QA-II
				Diameter			QA-INS-004	Micrometer	QA-INS-004	QA-II
				Curing test			QA-INS-004	Oven	QA-INS-004	QA-II
				Solderbility			QA-INS-004	Naked eyes Tin oven	QA-INS-004	QA-II
				Bending test			QA-INS-004	Bending test apparatus 500 g, 250 g weight Naked eyes	QA-INS-004	QA-II
				Capability of pull strength			QA-INS-004	Elongation machine Naked eyes	QA-INS-004	QA-II
				Aging test			QA-INS-004	Steel cooker , electric furnace	QA-INS-004	QA-II
				Solderbility test after aging			QA-INS-004	Tin oven Naked eyes	QA-INS-004	QA-II
				Tin thickness			QA-INS-004	X-Ray Naked eyes	QA-INS-004	QA-II
IQC	Silver/Copper paster			Labeling			QA-INS-933	Naked eyes	Follow working instruction	Pe
				Material receiving inspection table			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Packing			QA-INS-933	Naked eyes	Follow working instruction	Pe
				Outgoing report			QA-INS-933	Outgoing report	Once	Pe
				Production trial			QA-INS-933	Trial report	Follow working instruction	Pe
IQC	Flux			Labeling			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Material receiving inspection table			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Packing			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Outgoing report			QA-INS-933	Outgoing report	QA-INS-933	Pe

Control Plan

No.: APQP-AY&

☐ Sample ☐ Try run ☒ Produce			Control plan Nr.:		Contactor:Zheng.Yanling/Tel Nr 0752-3355373			Original Date: Jul 8, 2014		
Part Nr/Lastest change level			Core team : CY Lin, Andy Ye, SM Li, JY Huang, JH Deng, MG Deng, Swing Xia, Wei Li			Approved date by			Approved date by	
Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other A	
Supplier/Plant :Vishay components(Huizhou)			Methods			Sample			Frec	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Special char classifv	Product/Process tolerance	Evaluation/ Measurement	Size	Frec
IQC	EPOXY			Label			QA-INS-917	Naked eyes	QA-INS-917	Pe
				Material receiving inspection table			QA-INS-917	Naked eyes	QA-INS-917	Pe
				Packaging test (labels, sealing, protection status)			QA-INS-917	Naked eyes	QA-INS-917	Pe
				Outgoing report			QA-INS-917	Outgoing report	QA-INS-917	Pe
				Trial run			QA-INS-917	Trial run report	QA-INS-917	Pe
IQC	SOLDER BAR			Label			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Material receiving inspection table			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Packaging test (labels, sealing, protection status)			QA-INS-933	Naked eyes	QA-INS-933	Pe
				Outgoing report			QA-INS-933	Outgoing report	Once	Pe
IQC	Ceramic powder			Outgoing report			QA-INS-001	Powder inspection report	QA-INS-001	Pe
				K value out of spec			PE-INS-011	Powder inspection report	PE-INS-011	Pe
				other electrical out of spec			PE-INS-011	Powder inspection report	PE-INS-011	Pe
				Ceramics appearance			QA-INS-001	Naked eyes	500PC/Per lot Z.D	QA-INS-001
				Ceramics machinery size			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-011	Caliper Thickness gauge	10PC/Per lot Z.D	Pe
				Ceramics capacitance			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-011	CAP tester	20PC/Per lot Z.D	Pe
				Ceramics DF/Q			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-011	CAP tester	20PC/Per lot Z.D	Pe

Control Plan

No.: APQP-AY&

☐ Sample ☐ Try run ☒ Produce			Control plan Nr.:		Contactor:Zheng.Yanling/Tel Nr 0752-3355373			Original Date: Jul 8, 2014		
Part Nr/Lastest change level			Core team : CY Lin, Andy Ye, SM Li, JY Huang, JH Deng, MG Deng, Swing Xia, Wei Li			Approved date by			Approved date by	
Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other A	
Supplier/Plant :Vishay components(Huizhou)			Methods			Sample			Frequency	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Special char classif	Product/Process tolerance	Evaluation/ Measurement	Size	Frequency
IQC	Ceramic powder			Ceramics TV			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-011	T.V. tester	30PC/Per lot Z.D	Per QA
				Ceramics BDV			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-011	T.V. tester	30PC/Per lot Z.D	Per QA
				Coating capacitance			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-012	CAP tester	20PC/Per lot Z.D	Per QA
				Coating DF/Q			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-012	CAP tester	20PC/Per lot Z.D	Per QA
				Coating TV			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-012	T.V. tester	125PC/Per lot Z.D	Per QA
				Coating BDV			QA-INS-001 PE-PES-001 PE-PES-003 PE-INS-012	T.V. tester	30PC/Per lot Z.D	Per QA
				Coating IR			QA-INS-001	IR tester	10PC/Per lot Z.D	Per QA
				Coating T.C.			QA-INS-001 QA-INS-605	TC tester	5PC/Per lot Z.D	Per QA
IQC	Paper tape			Appearance			QA-INS-020	Naked eyes	2M/10PCS/Per	Per QA
				Size			QA-INS-020	Vernier caliper/ Steel ruler	3PCS	Per QA
				Outgoing report			QA-INS-020	Outgoing report		Once
F01	Dry Pelleting	Dry Pelleting Machine			Humidity/Tempture		DF-INS-003	Temperature & humidity meter		Once
		Rolling mill			Ceramic powder rolling time		DF-INS-003	The timer		per
		Dry type spindle machine			Preloading of porcelain thickness		DF-INS-003 DF-INS-016 DF-INS-021 PE-INS-011	Spiral micrometer	1 grain of each bow	First

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Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other A	
Supplier/Plant :Vishay components(Huizhou)			Methods			Sample				
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	Characteristic			Special char classif	Product/Process tolerance	Evaluation/ Measurement	Methods	
			No.	Product	Process				Size	Freq
F01	Dry Pelleting	Dry Pelleting Machine		Diameter			DF-INS-003 DF-INS-016 DF-INS-021 PE-INS-011	Micrometer caliper	5 pcs or 1pc per punch	First and for e Once
		Dry Pelleting Machine		Thickness			DF-INS-003 DF-INS-016 DF-INS-021 PE-INS-011	Micrometer caliper	1pc per punch Specifications and grain number in the table	First and for e Once Per
		Dry Pelleting Machine		Weight			DF-INS-003 DF-INS-016 PE-INS-011 DF-INS-021	Weighter	Specification table 1pc per punch Specifications and grain number in the	First and for e Once Per
		Dry Pelleting Machine		Density			DF-INS-003 DF-INS-016 PE-INS-011 DF-INS-021	Weighter / Micrometer caliper	1 pcs/hr/punch	First and for l
		Dry Pelleting Machine		Appearance			DF-INS-003 DF-INS-016 PE-INS-011 DF-INS-021	Naked eyes	1 pcs or 1pc per punch	Once
		Dry Pelleting Machine			Pelleting mould maintian		DF-INS-003	Naked eyes		Once /Pe new
		Dry Pelleting Machine			Mould assessment		DF-INS-003	Micrometer caliper	50pcs	Once/P 10MKPCS S 90
F02	Sagger loading	Loading machine			Zirconium powder (ZrO2) sintering temperature		DF-INS-005	thermometer		O
				Appearance	Loading method		DF-INS-005	Naked eyes	Random	Ra
F03	Firing	Firing oven			Temperature measurement ring temperature		DF-INS-016 DF-INS-017 PE-INS-011	Temperature measurement ring		Once
		Firing oven			Temperature		DF-INS-016 DF-INS-017 PE-INS-011	Temperature meter&Temperature measuring ring		One Once
		Firing oven			Speed		DF-INS-016 DF-INS-017 PE-INS-011	stopwatch		Once /
		Firing oven			Current		DF-INS-016 DF-INS-017	Current meter		Once

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								Approved date by		
Part name/Description: AY serial safety capacitor				Supplier/Plant Approved date :				Other Approved date(if req'd)		
Supplier/Plant :Vishay components(Huizhou)										
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	Characteristic			Special char classif	Methods			
			No.	Product	Process		Product/Process tolerance	Evaluation/ Measurement	Sample	
F04	Sorting			Tile appearance (both sides)			DF-INS-007	Magnify/Naked eyes	100%	Per
F05	Q.C. inspection			Appearance			QA-INS-305	Naked eyes	500pcs	Per
				Diameter			QA-INS-305	Vernier caliper	10 pcs	Per
				Thickness			QA-INS-305	Thickness gauge	10 pcs	Per
				Penetration test (only for tiles with thickness less than 1.0mm)			QA-INS-305	Blue ink + Naked eyes	20 pcs	Per
				Capacitance		SC	QA-INS-305	Capacitance tester	20 pcs	Per
				DF/ Q			QA-INS-305	Capacitance tester	20 pcs	Per
				T.V.			QA-INS-305	T.V. tester	30 pcs	Per
		BDV			QA-INS-305	T.V. tester	30 pcs	Per		
S01	Try run test (hand painting)	Single painting		Diameter of electrode surface (not suitable for full electrode)			DF-INS-011	Graduated magnifier	30 pcs	Per
S02	Painting	Roll machine			Paste the scroll		DF-INS-001 DF-INS-023	Timer		Per
					Paste net frame net tension		DF-INS-001	tensiometer		Once /Per
					Check the slurry mesh frame		DF-INS-001	Naked eyes		Once
					Scraper check		DF-INS-001	Naked eyes		Once
		Electrode painting machine		Diameter of electrode (Full electrode discomfort Use)	Mesh frame selection		DF-INS-001 DF-INS-016 PE-INS-011	Magnifier	5 pcs	First Once
		Electrode painting machine		Eccentricity (Full electrode discomfort Use)			DF-INS-001 DF-INS-016	Magnifier	5 pcs	First Once
		Electrode painting machine		Appearance			DF-INS-001 DF-INS-016	Naked eyes	Complete 100%	First Per
		Dryer			Times		DF-INS-001	Second chronograph		Once
		Dryer			Temperature		DF-INS-001	Thermometer		Once

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Part Nr/Lastest change level			Core team : CY Lin, Andy Ye, SM Li, JY Huang, JH Deng, MG Deng, Swing Xia, Wei Li			Approved date by			Approved date by	
Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other A	
Supplier/Plant :Vishay components(Huizhou)			Characterisitic			Methods			Sample	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Special char classif	Product/Process tolerance	Evaluation/ Measurement	Size	Freq
S02	Firing (For silver painting)	Firing oven			Burning temperature curve		DF-INS-022	Thermometer		After re adjust the and th
		Firing oven			Speed		DF-INS-002 DF-INS-016	Chronograph		Once/
		Firing oven			Temperature		DF-INS-002 DF-INS-016	Temperature meter		Once
		Firing oven			Cleaning oven		DF-INS-002 DF-INS-016	Steel brush		Once/P
S02	The electrode reduction (For copper painting)	Nitrogen furnace			Speed		DF-INS-022	Speed detector		Once
		Nitrogen furnace			Burning temperature curve		DF-INS-022	Thermometer		After re adjust the and th
					Presintering zone Settings		DF-INS-022	O2 content tester		Once
					Nitrogen gas flow		DF-INS-022	Flow meter		Once
					Containing O2 test		DF-INS-022	O2 content tester		Once
					Nitrogen furnace time		DF-INS-022	Steel ruler \ stopwatch		Once/
					Nitrogen furnace temperature		DF-INS-022	Thermometer		Once
S03	Sorting			(When QC reject the capacitance) Capaci		SC	DF-INS-010	CAP tester	100%	Separ
				Appearance			DF-INS-010 DF-INS-016	Naked eyes	100%	Pe
S04	QC inspection			Capacitance		SC	QA-INS-306 PE-INS-011	CAP tester	50 pcs	Pe
				D.F./ Q			QA-INS-306 PE-INS-011	CAP tester	50 pcs	Pe
				Appearance			QA-INS-306 PE-INS-011	Magnifier/ Naked eyes	500 pcs	Pe

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								Approved date by				
Part name/Description: AY serial safety capacitor				Supplier/Plant Approved date :								
Supplier/Plant :Vishay components(Huizhou)				Other Approved date(if req'd)				Other A				
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	Characteristic			Special char classifv	Product/Process tolerance	Evaluation/ Measurement Projector Caliper&Steel Ruler Naked eyes	Methods		Sample	
			No.	Product	Process				Size	Frequency		
H01	Wire-forming and Disc insertion soldering machine	Wire-forming mold			Mold review		DA-INS-001		50pcs	New time		
		Wire-forming mold			Mold cleaning		DA-INS-001	Naked eyes		Once		
					Speed		DA-INS-001 PE-INS-012	speed regulator		Once		
		Wire-forming and Disc insertion soldering			Density of flux		DA-INS-001 PE-INS-012	Density meter		Once		
		Wire-forming and Disc insertion soldering			Pre-heat Temperature		DA-INS-001 PE-INS-012	Temperature meter		Once		
		Wire-forming and Disc insertion soldering			Soldering Temperature		DA-INS-001 PE-INS-012	Temperature meter		4 times		
		Wire-forming and Disc insertion soldering			Brush check Brush replacement		DA-INS-001	Naked eyes		Once Once		
		Wire-forming and Disc insertion soldering			Suction nozzle check		DA-INS-001	Naked eyes		Once		
		Wire-forming and Disc insertion soldering			Cutter check Knife grinding		DA-INS-001	Naked eyes		Once Once		
		Wire-forming and Disc insertion soldering			Clear of the stove Maintenance of the stove		DA-INS-001	Naked eyes		Once Once/F		
		Wire-forming and Disc insertion soldering		Lead space F		SC	DA-INS-001 Specification	Vernier caliper	5pcs 1pcs	First and for e Once/h		
		Wire-forming and Disc insertion soldering		K value /Q angle			DA-INS-001 Specification	Projector	1pcs	Once Once/ch		
		Wire-forming and Disc insertion soldering		Lead diameter G (ø0.63±0.02mm wire for AY series product(Size≥51))			DA-INS-001 Specification	Naked eyes	5pcs	First and for e		
		Wire-forming and Disc insertion soldering		Lead type			DA-INS-001 Specification	Naked eyes	5pcs	First and for e		
		Wire-forming and Disc insertion soldering		Flatten the cross nozzle (AY, Flatten the nozzle)			Visual& >0.5mm	Caliper	1pc	First and for e		
		Wire-forming and Disc insertion soldering		H0 SHo(Seat hight)			DA-INS-001 Specification (V wire SHo: 4.5±0.3mm before	Gauge Steel Ruler	P25.4 4pcs P15.0 5pcs P12.7 7pcs SHo: 1pcs	First and for e		
		Wire-forming and Disc insertion soldering		Appearance				DA-INS-001 DA-INS-006 QA-INS-319	Naked eyes	5pcs 50pcs 500pcs	First Per QA twice	

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Part Nr/Lastest change level					Core team : CY Lin, Andy Ye, SM Li, JY Huang, JH Deng, MG Deng, Swing Xia, Wei Li			Approved date by		
								Approved date by		
Part name/Description: AY serial safety capacitor					Supplier/Plant Approved date :			Other Approved date (if req'd)		
Supplier/Plant :Vishay components(Huizhou)										
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	Characteristic			Special char classif	Product/Process tolerance	Methods		Sample Frequency
			No.	Product	Process			Evaluation/ Measurement	Size	
		Wire-forming and Disc insertion soldering		Soldering strength		QA-INS-316 QA-INS-319	Visual reverse ceramics 90 degrees tensile tester	QA-INS-319	QA-INS-319	
		Wire-forming and Disc insertion soldering		Change the flux		DA-INS-001 PE-INS-012	Naked eyes		1time	
H01	Appearance	AOI		Appearance		DA-INS-001	AOI	100%	pe	
H02	Coating			Incorrect usage epoxy		DA-INS-011	Naked eyes		Pe	
				Return temperature of epoxy		DA-INS-011	Label identification		Pe	
		Coating machine		Temperature		PE-INS-012 DA-INS-011	Temperature meter	100%	Once /Con	
		Coating machine		Speed		PE-INS-012 DA-INS-011	Speed meter	Once	2 time	
		Coating machine		Room Temperature & humidity		PE-INS-012 DA-INS-011	Temperature & humidity meter		Once/	
				holding temperature		PE-INS-012 DA-INS-011	Temperature meter	100%	Once/ Con	
		Coating machine		Appearance		DA-INS-011 PE-INS-012 QA-INS-319	Naked eyes	5pcs 500pcs	First ar ar twice/Pe	
				Rundown		DA-INS-011 L-wire types3mm V-wire type:epoxy not excess the first hand	Callipers Naked eyes	1pcs(L-wire) 5pcs	First and	
				SH(V-wire only)		Specification QA-INS-319	Steel ruler	1pcs	Pe twice/Pe	
		Coating machine		Thickness		DA-INS-011 PE-INS-012 QA-INS-319	Callipers	1pcs 1pcs 5pcs	First ar ar twice/sh twice/	
		Coating machine		Chip diameter/coating diameter/coating increment		DA-INS-011 PE-INS-012 QA-INS-319	Callipers	1pcs 5pcs 5pcs	First ar artical2 tir (P twice/	

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Part name/Description: AY serial safety capacitor			Supplier/Plant Approved date :			Other Approved date(if req'd)			Other A	
Supplier/Plant :Vishay components(Huizhou)			Methods			Sample				
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	Characteristic		Special char classif	Product/Process tolerance	Evaluation/ Measurement	Size	Frequency	
H03	Curing	Curing oven	No.	Product	Process	DA-INS-003 PE-INS-012	Temperature meter		Once	/Con
		Curing oven			Time	DA-INS-003 PE-INS-012	Tiem relay		Once	/Con
				Safety Capacitor rundown test		DA-INS-003 QA-INS-319 PE-INS-012	Naked eyes	6Pcs	Per	
				Cured enough		DA-INS-003 QA-INS-319 PE-INS-012	Isopropanol	6Pcs	Pe	
H04	Marking / Appearance/Electrical testing	Marking / Electrical sorting machine			Room humidity and temperature	DA-INS-005	Temperature & humidity meter		Once	
		Marking / Electrical sorting machine			Set electrical parameters of CAP, IR and TV electrical inspection equipment	DA-INS-005 Specification	Naked eyes		Once	
		Marking / Electrical sorting machine			CAP: Distinguish bad from good by the function of cutter activated by the vacuum air	DA-INS-010	Capacitance meter		Once	
		Marking / Electrical sorting machine			CAP, TV Distinguish bad part by the function of cutter activated by the vacuum air	DA-INS-010	Capacitance meter/TV tester		Once	
		Marking / Electrical sorting machine			Degaussing check	DA-INS-005	magnet		Once	
		Marking / Electrical sorting machine			Cutter check	DA-INS-005	Naked eyes		Once	
		Marking / Electrical sorting machine		Appearance		DA-INS-005	Naked eyes	100%	Pe	
		Marking / Electrical sorting machine		Marking		DA-INS-005	Naked eyes	1 pcs	First	
		Marking / Electrical sorting machine		Aging time	Aging rate	DA-INS-005 PE-INS-012	Aging rate calculation	100%	Pe	Last
		Marking / Electrical sorting machine		T.V.		DA-INS-005 PE-INS-012	TV tester	100%	Cont	On
		Marking / Electrical sorting machine		DF		DA-INS-005 PE-INS-012	Capacitance meter	100%	Pe	
		Marking / Electrical sorting machine		Capacitance		DA-INS-005 PE-INS-012	Capacitance meter	100%	Pe	
		Marking / Electrical sorting machine		I .R.		DA-INS-005 PE-INS-012	IR Tester	100%	Pe	
				Confirmation of Defective products		DA-INS-005	Voltage/IR test machine/capacitance testing machine		Pe	

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Supplier/Plant :Vishay components(Huizhou)			Methods			Sample			Frequency	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Special char classif	Product/Process tolerance	Evaluation/ Measurement	Size	Frequency
H05	QC inspection			T.V.			QA-INS-301 PE-INS-012	Hi voltage tester	AQL=S4 0.1(Z.D.)	Pe
				B.D.V			QA-INS-301 PE-INS-012	Hi voltage tester	20pcs (Z.D.)	Pe
				I.R.			QA-INS-301 PE-INS-012	IR tester	AQL=S4 0.1(Z.D.)	Pe
				DF/Q			QA-INS-301 PE-INS-012	Cap tester	AQL=S4 0.1(Z.D.) double sample size	Pe
				Capacitance		SC	QA-INS-301 PE-INS-012	Cap tester	AQL=S4 0.1 double sample size (Z.D.)	Pe
				Appearance			QA-INS-301	Naked eyes	AQL=0.65	Pe
				Diameter			Specification	Vernier caliper	AQL=0.65	Pe
				Thickness			Specification	Thickness gauge	AQL=0.65	Pe
				Lead space		SC	Specification	Vernier caliper	AQL=0.65	Pe
				Lead diameter			Specification	Screw micrometer	AQL=0.65	Pe
				Lead length			Specification	HoGauge Steel rule	AQL=0.65	Pe
				Rundown			Specification	Steel rule	AQL=0.65	Pe
H06	Packaging (in REEL, in AMMO, in BULK)			H (Seat-height)			Specification	Steel rule	AQL=0.65	Pe
		Package packing machine (applicable to REEL)		Appearance			DA-INS-006 DA-INS-008 DA-INS-009	Naked eyes	100%	Cont
		Box installed (applicable to ammo)		Appearance			DA-INS-006 DA-INS-008 DA-INS-009	Naked eyes	100%	Cont
		Sealing machine (applicable to BULK)		Appearance (applicable to BULK)			DA-INS-006 DA-INS-008 DA-INS-009	Naked eyes	100%	Cont
				Quantity			DA-INS-007 DA-INS-008 DA-INS-009 DA-INS-012 QA-PES-003	counter	100%	Cont
				Label			QA-INS-913	Scan-scan	100%	Cont

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Supplier/Plant :Vishay components(Huizhou)			Characterisitic			Special char classify			Methods	
Part/ Process Nr	Process name/ Operation description	Machine/Device /Jig,tool for Mfg	No.	Product	Process	Product/Process tolerance	Evaluation/ Measurement	Size	Sample	Freq
H07	QC final inspection			Label		QA-INS-302 QA-INS-913	Naked eyes / Scan- scan	Scan-scan 1 label		Pe
				Appearance		QA-INS-302 QA-PES-003 QA-INS-913	Naked eyes	AQL 0.65 or Z.D.		Pe
				The taping sizes (including HO, PO, W, etc.)		QA-INS-302 QA-PES-003 QA-INS-913	Steel ruler/Vernier caliper/ HO gauge	AQL 0.65		Pe
				Quantity		QA-INS-302 QA-PES-003 QA-INS-913	Naked eyes	1-2 bag/per lot		2lots/
Reliability test	Reliability test	Life oven		Life test	Temp, time	QA-INS-607	Cap tester IR tester TV tester	QA-INS-607	1 partnum per mont	
		Humidity chamber		Humidity test	Humidity, time	QA-INS-608		QA-INS-608		
		Thermal chamber		Thermal shock	High/low temp, time	QA-INS-602		QA-INS-602		
		Solder bath		Resistance to soldering heat	Temp, time	QA-INS-611		QA-INS-611		
		AECQ-200 test equipment		(Automotive) AECQ- 200 test item		QA-INS-626	Reliability test machine	QA-INS-626		Once/
	Whisker test	Humidity & thermal shock chamber		Whisker test	Humidity/ Temperature/time	Vishay specification (<40um whisker)	Microscope	3pcs/per lot , for 3 lots		Once/p



Section 8

MEASUREMENT SYSTEM ANALYSIS STUDIES



Gage and Test Equipment Evaluation

Vishay Components (Huizhou) Co., Ltd. perform annual Gage R&R studies on items of major test equipment.

The current Gage R&R results as below:

Variable	Gage Type	Gage R&R
Wb(Body diameter)	Digital caliper (500-196-20 11536925)	13.62%
Capacitance	Capacitance tester MY48104233)	13.91%



Section 9

DIMENSION RESULTS



Layout Inspection and Functional Testing

全功能尺寸测试报告

Lot No.: 14Z2306E16

P/N: AY1102M37Y5UC63L0

Test item 测试项目	Diameter 直径	Thickness 厚度	Lead Space 线距	Lead Diameter 线径	Lead length 线长	Rundow 粉脚	Pull test 拉力	BDV
Equipment: 使用仪器	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Micrometer 千分尺	Steel ruler 钢尺	Steel ruler 钢尺	Pull tester 拉力	Hi-pot tester 电压机
Equipment No. 仪器编号	500-196-30 A20131585			293-240- 25132690	TH-5020 SRTH5020-02		20FGN000104 0	7473- 1430459
Tester 测试员	XY, Yan			Test date 测试日期:	Apr 25,2023			

Test data 测试数据如下

NO.	Diameter 直径 (mm)	Thickness 厚度(mm)	Lead Space 线距(mm)	Lead Diameter 线径 (mm)	Lead length 线长	Rundow 粉脚	Pull test 拉力(lb)	BDV(Kvac)
1	8.13	4.50	10.04	0.58	29.4	1.3	13.0	16.7
2	8.15	4.53	10.16	0.58	29.5	1.5	16.0	9.3
3	8.15	4.58	10.01	0.58	29.6	1.8	14.0	16.7
4	8.16	4.56	10.08	0.58	29.4	1.0	18.0	15.6
5	8.11	4.57	10.09	0.58	29.5	1.3	22.0	11.6
6	8.14	4.68	10.27	0.57	29.5	1.5	19.0	13.5
7	8.17	4.58	9.95	0.58	29.3	1.5	15.0	14.4
8	8.13	4.66	10.04	0.58	29.3	2.0	17.0	13.5
9	8.14	4.59	10.14	0.58	29.4	1.4	18.0	16.0
10	8.19	4.57	10.28	0.58	29.5	1.6	21.0	12.7
11	8.10	4.60	10.01	0.58	29.4	1.5	17.0	16.7
12	8.12	4.65	10.05	0.57	29.5	1.6	16.0	16.0
13	8.16	4.58	10.13	0.57	29.4	1.7	15.0	15.6
14	8.11	4.61	10.19	0.58	29.3	1.5	13.0	14.4
15	8.12	4.65	10.05	0.57	29.5	1.8	19.0	18.0
16	8.13	4.63	10.18	0.58	29.4	2.0	21.0	14.4
17	8.16	4.64	9.98	0.57	29.4	1.5	15.0	16.7
18	8.16	4.66	10.26	0.57	29.5	1.8	16.0	11.6
19	8.17	4.53	10.05	0.58	29.5	1.8	19.0	16.7
20	8.11	4.59	10.17	0.58	29.4	1.3	21.0	11.6
21	8.12	4.61	10.06	0.57	29.5	1.5	17.0	14.4
22	8.13	4.45	10.18	0.58	29.4	1.8	23.0	14.0
23	8.14	4.54	10.07	0.57	29.5	1.4	18.0	15.5
24	8.16	4.60	10.20	0.58	29.4	1.5	19.0	16.0
25	8.13	4.47	10.05	0.57	29.3	1.7	16.0	11.6
26	8.15	4.58	10.18	0.58	29.5	1.5	15.0	13.5
27	8.18	4.55	9.98	0.58	29.6	1.7	18.0	14.4
28	8.10	4.60	10.03	0.58	29.4	1.5	20.0	15.5
29	8.14	4.64	10.16	0.57	29.3	1.7	19.0	14.4
30	8.06	4.47	10.20	0.58	29.5	1.0	14.0	16.0
Min	8.06	4.45	9.95	0.57	29.30	1.00	13.00	9.30
Max	8.19	4.68	10.28	0.58	29.60	2.00	23.00	18.00
Mean	8.14	4.58	10.11	0.58	29.44	1.56	17.47	14.57
Stdev	0.03	0.06	0.09	0.00	0.09	0.24	0.00	0.00
Spec	9.5 mm max	7.0 mm max	10±0.8mm	0.6±0.05mm	30.0±5.0mm	3.0mm max	>4.5lb	5.0kvac/min
Result	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed

PREPARED BY : XY, Yan

DATE : Apr 25,2023

APPROVED BY: Swing Xia

DATE : Apr 25,2023



Layout Inspection and Functional Testing

全功能尺寸测试报告

Lot No.: 14Z2249E08

P/N: AY1222M47Y5UC63L0

Test item 测试项目	Diameter 直径	Thickness 厚度	Lead Space 线距	Lead Diameter 线径	Lead length 线长	Rundown 粉脚	Pull test 拉力	BDV
Equipment: 使用仪器	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Micrometer 千分尺	Steel ruler 钢尺	Steel ruler 钢尺	Pull tester 拉力	Hi-pot tester 电压机
Equipment No. 仪器编号	500-196-30 A20011593			293-240- 25132690	678-006F SR678-09		20FGN0001 040	7473- 1430459
Tester 测试员	CH, Yan			Test date 测试日期:	Apr 1,2023			

Test data 测试数据如下

NO.	Diameter 直径 (mm)	Thickness 厚度(mm)	Lead Space 线距(mm)	Lead Diameter 线径 (mm)	Lead length 线长	Rundown 粉脚	Pull test 拉力(lb)	BDV(Kvac)
1	10.71	4.65	9.98	0.58	30.5	2.0	>30	10.6
2	10.68	4.55	10.16	0.57	30.5	1.8	>30	14.0
3	10.70	4.56	10.14	0.57	30.4	1.6	>30	13.0
4	10.72	4.58	10.08	0.58	30.6	1.7	>30	15.5
5	10.66	4.54	10.07	0.58	30.6	2.1	>30	15.0
6	10.71	4.60	10.06	0.57	30.7	1.7	>30	16.5
7	10.67	4.52	10.09	0.58	30.4	1.8	>30	11.3
8	10.74	4.57	10.18	0.58	30.5	1.9	>30	15.5
9	10.65	4.63	10.17	0.57	30.2	1.9	>30	10.3
10	10.71	4.61	10.11	0.57	30.3	1.2	>30	14.3
11	10.65	4.52	10.19	0.57	30.4	1.6	>30	12.0
12	10.67	4.69	10.17	0.57	30.7	1.7	>30	13.0
13	10.64	4.52	10.06	0.57	30.6	1.7	>30	14.6
14	10.64	4.57	10.13	0.58	30.6	1.8	>30	15.9
15	10.65	4.61	10.12	0.57	30.4	2.0	>30	11.7
16	10.64	4.51	10.09	0.57	30.3	1.5	>30	11.7
17	10.73	4.62	10.12	0.57	30.3	1.0	>30	13.8
18	10.69	4.65	10.03	0.58	30.5	1.7	>30	16.1
19	10.64	4.58	10.08	0.58	30.3	1.8	>30	14.6
20	10.62	4.61	10.15	0.58	30.4	2.1	>30	17.0
21	10.64	4.60	10.02	0.57	30.6	2.0	>30	11.8
22	10.72	4.62	10.24	0.58	30.4	2.0	>30	16.3
23	10.74	4.64	10.12	0.57	30.5	1.7	>30	15.8
24	10.68	4.56	10.09	0.58	30.3	1.5	>30	14.8
25	10.69	4.61	10.07	0.57	30.3	2.0	>30	14.8
26	10.72	4.57	10.11	0.58	30.6	1.8	>30	11.8
27	10.67	4.61	10.17	0.58	30.4	1.6	>30	15.8
28	10.70	4.55	10.07	0.58	30.6	2.0	>30	13.3
29	10.70	4.56	10.02	0.57	30.3	1.7	>30	13.3
30	10.65	4.62	10.21	0.57	30.4	1.8	>30	12.6
Min	10.62	4.51	9.98	0.57	30.20	1.00	0.00	10.30
Max	10.74	4.69	10.24	0.58	30.70	2.10	0.00	17.00
Mean	10.68	4.59	10.11	0.57	30.45	1.76	#DIV/0!	13.89
Stdev	0.03	0.04	0.06	0.01	0.14	0.25	0.00	0.00
Spec	12.0 mm max	7.0 mm max	10±0.8mm	0.6±0.05mm	30.0±5.0mm	3.0mm max	>8.0lb	5.0kvac/min
Result	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed

PREPARED BY : CH, Yan

DATE : Apr 1,2023

APPROVED BY: Swing Xia

DATE : Apr 1,2023



Layout Inspection and Functional Testing

全功能尺寸测试报告

Lot No. : 14Z2249E09

P/N: AY1472M65Y5UC63L0

Test item 测试项目	Diameter 直径	Thickness 厚度	Lead Space 线距	Lead Diameter 线径	Lead length 线长	Rundow 粉脚	Pull test 拉力	BDV
Equipment: 使用仪器	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Digital callipers 数显卡尺	Micrometer 千分尺	Steel ruler 钢尺		Pull tester 拉力	Hi-pot tester 电压机
Equipment No. 仪器编号	500-196-20 11536925			293-240- 25132690	TH-5020 SRTH5020-02		20FGN0001040	7473-1430459
Tester 测试员	殷先杨			Test date 测试日期:		Mar 31, 2023		

Test data 测试数据如下

NO.	Diameter 直径 (mm)	Thickness 厚度 (mm)	Lead Space 线距 (mm)	Lead Diameter 线径 (mm)	Lead length 线长 (mm)	Rundow 粉脚 (mm)	Pull test 拉力 (lb)	BDV (kvac)
1	15.85	5.83	10.08	0.63	27.70	1.2	>30	12.4
2	15.87	5.86	10.12	0.63	27.80	1.5	>30	14.7
3	15.89	5.88	10.13	0.63	27.627.6	1.7	>30	12.0
4	15.90	5.82	10.00	0.63	27.70	1.5	>30	12.4
5	15.93	5.84	10.08	0.64	27.50	1.5	>30	12.4
6	15.88	5.85	10.09	0.63	27.60	1.6	>30	12.4
7	15.98	5.81	10.04	0.63	27.70	1.3	>30	14.0
8	15.87	5.84	10.10	0.63	27.80	1.6	>30	12.0
9	15.93	5.87	10.25	0.64	27.70	1.2	>30	9.9
10	15.91	5.76	10.00	0.64	27.60	1.4	>30	13.5
11	15.94	5.81	10.10	0.64	27.80	1.5	>30	10.4
12	15.87	5.85	10.12	0.64	27.70	1.6	>30	13.5
13	15.90	5.83	10.01	0.63	27.90	1.3	>30	13.5
14	15.95	5.84	10.12	0.63	27.80	1.5	>30	12.4
15	15.94	5.87	10.23	0.64	27.70	1.5	>30	13.5
16	15.97	5.80	10.00	0.64	27.70	1.5	>30	12.4
17	15.87	5.82	10.15	0.63	27.80	1.5	>30	9.2
18	15.91	5.88	10.20	0.64	27.90	1.7	>30	12.4
19	15.95	5.83	10.13	0.63	27.70	1.2	>30	12.0
20	15.94	5.86	10.14	0.64	27.80	1.3	>30	13.5
21	15.88	5.84	10.15	0.63	27.70	1.5	>30	12.4
22	15.89	5.85	10.03	0.64	27.80	1.0	>30	13.5
23	15.94	5.77	10.14	0.64	27.70	1.5	>30	13.0
24	15.95	5.81	10.18	0.64	27.60	1.7	>30	10.4
25	15.99	5.82	9.97	0.64	27.70	1.4	>30	13.5
26	15.91	5.76	10.05	0.64	27.80	1.5	>30	12.4
27	15.94	5.78	10.13	0.64	27.70	1.6	>30	12.4
28	15.85	5.81	10.04	0.64	27.80	1.3	>30	13.5
29	15.91	5.83	10.06	0.64	27.70	1.5	>30	14.0
30	15.93	5.84	10.07	0.64	27.70	1.6	>30	13.5
Min	15.85	5.76	9.97	0.63	27.50	1.00	0.00	9.20
Max	15.99	5.88	10.25	0.64	27.90	1.70	0.00	14.70
Avg	15.91	5.83	10.10	0.64	27.73	1.46	#DIV/0!	12.57
Stdev	0.04	0.03	0.07	0.00	0.09	0.17	0.00	0.00
Spec	16.5 mm max	7.0 mm max	10.0±0.8mm	0.65±0.05mm	30±5.0mm	3.0mm Max	>8.01b	5.0kvac/min
Result	Passed	Passed	Passed	Passed	Passed	Passed	Passed	Passed



Section 10

MATERIAL PERFORMANCE TEST RESULTS



Environmental Test Summary

SUPPLIER		USER PART NUMBER : AY1 series			
Vishay Components (Huizhou) Co, Ltd		AY1102M37Y5UC63L0 L/N: 14Z2306E16 ; AY1222M47Y5UC63L0 L/N: 14Z2249E08 AY1472M63Y5UC63L0 L/N: 14Z2249E09			
NAME OF LABORATORY		PART NAME			
Laboratory at Vishay Components (Huizhou) Co, Ltd		Ceramic Capacitor			
Test #	Description	Test Conditions	# Lots Tested	Qty Tested	Number Failed
1	Pre-and Post-Stress Electrical Test	User Spec	3 (3 different PNs)	All qualification parts submitted for testing	0
3	High Temperature Exposure	MIL-STD 202 Method 108	3 (3 different PNs)	3 x 77	0
4	Temperature Cycling	JESD22 Method JA-104	3 (3 different PNs)	3 x 77	0
5	Biased Humidity	MIL-STD 202 Method 103	3 (3 different PNs)	3 x 77	0
6	High Temperature Operating Life	MIL-STD 202 Method 108	3 (3 different PNs)	3 x 77	0
7	External Visual	MIL-STD 883 Method 2009	3 (3 different PNs)	All qualification parts submitted	0
8	Physical Dimensions	JESD22 Method JB-100	3 (3 different PNs)	3 x 30	0
9	Terminal Strength	MIL-STD 202 Method 211	3 (3 different PNs)	3 x 30	0
10	Resistance to Solvent	MIL-STD 202 Method 215	3 (3 different PNs)	3 x 5	0
11	Mechanical Shock	MIL-STD 202 Method 213	3 (3 different PNs)	3 x 30	0
12	Vibration	MIL-STD 202 Method 204	3 (3 different PNs)	3 x 30	0
13	Resistance to Solder Heat	MIL-STD 202 Method 210	3 (3 different PNs)	3 x 30	0
14	ESD	AEC-Q200-002	3 (3 different PNs)	3 x 15	0
15	Solderability	J-STD-002	3 (3 different PNs)	3 x 15	0
16	Electrical Characterization	user spec	3 (3 different PNs)	3 x 30	0
17	Life test	IEC-60384-14	3 (3 different PNs)	3 x 12	0
18	Humidity Test (under steady state)	IEC-60384-14	3 (3 different PNs)	3 x 5	0
19	Humidity Test (under load state)	IEC-60384-14	3 (3 different PNs)	3 x 5	0
20	Flammability	IEC 60384-14:2008 Table 7 Passive flammability test: C			



Section 11

INITIAL PROCESS STUDY



Layout Inspection and Functional Testing

全功能尺寸测试报告

Lot No.:	14Z2306E16	P/N:	AY1102M37Y5UC63L0			
Ambient temperature 测试环境温度:	℃	25	Relative humidity: 测试环境湿度:	48%	Test condition: 测试条件:	1KHZ 1.0vrms
Test result 检验结果						
item	Specification: 规格:	Qty Rejected	Result	Equipment 测量仪器	Equipment No. 仪器编号	Spec. version: 规格版本:
Capacitance 电容	800-1200pf	0/150	Passed	4278A	2740500990	A0
DF	2.5%max	0/150	Passed	4278A	2740500990	
IR	10GΩ	0/150	Passed	1864	8364802018	
TV	4.0Kvac/60s'	0/150	Passed	19021	190210000089	
Visual inspection 外观检查	参考不良样板	0/500	Passed	visual	NA	

Test data 测试数据如下

No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV
1	1067	1.24	>500	Passed	51	1042	1.33	>500	Passed	101	1074	1.36	>500	Passed
2	1077	1.41	>500	Passed	52	1072	1.33	>500	Passed	102	1075	1.43	>500	Passed
3	1061	1.55	>500	Passed	53	1027	1.43	>500	Passed	103	1076	1.25	>500	Passed
4	1055	1.30	>500	Passed	54	1073	1.35	>500	Passed	104	1069	1.48	>500	Passed
5	1055	1.53	>500	Passed	55	1073	1.54	>500	Passed	105	1081	1.48	>500	Passed
6	1045	1.47	>500	Passed	56	1090	1.52	>500	Passed	106	1078	1.43	>500	Passed
7	1078	1.27	>500	Passed	57	1052	1.47	>500	Passed	107	1021	1.43	>500	Passed
8	1075	1.53	>500	Passed	58	1076	1.64	>500	Passed	108	1062	1.35	>500	Passed
9	1052	1.36	>500	Passed	59	1072	1.34	>500	Passed	109	1034	1.34	>500	Passed
10	1034	1.52	>500	Passed	60	1016	1.31	>500	Passed	110	1068	1.33	>500	Passed
11	1037	1.26	>500	Passed	61	1079	1.37	>500	Passed	111	1022	1.36	>500	Passed
12	1075	1.28	>500	Passed	62	1063	1.53	>500	Passed	112	1020	1.43	>500	Passed
13	1067	1.50	>500	Passed	63	1064	1.45	>500	Passed	113	1028	1.25	>500	Passed
14	1026	1.47	>500	Passed	64	1050	1.26	>500	Passed	114	1038	1.48	>500	Passed
15	1069	1.51	>500	Passed	65	1050	1.26	>500	Passed	115	1070	1.48	>500	Passed
16	1045	1.33	>500	Passed	66	1076	1.44	>500	Passed	116	1051	1.43	>500	Passed
17	1060	1.23	>500	Passed	67	1013	1.67	>500	Passed	117	1050	1.43	>500	Passed
18	1056	1.41	>500	Passed	68	1049	1.39	>500	Passed	118	1027	1.35	>500	Passed
19	1068	1.34	>500	Passed	69	1055	1.49	>500	Passed	119	1056	1.34	>500	Passed
20	1059	1.42	>500	Passed	70	1049	1.34	>500	Passed	120	1079	1.33	>500	Passed
21	1083	1.34	>500	Passed	71	1043	1.52	>500	Passed	121	1067	1.42	>500	Passed
22	1071	1.33	>500	Passed	72	1069	1.45	>500	Passed	122	1078	1.37	>500	Passed
23	1061	1.37	>500	Passed	73	1035	1.54	>500	Passed	123	1071	1.29	>500	Passed
24	1055	1.34	>500	Passed	74	1069	1.30	>500	Passed	124	1070	1.42	>500	Passed
25	1065	1.37	>500	Passed	75	1065	1.34	>500	Passed	125	1050	1.54	>500	Passed
26	1054	1.44	>500	Passed	76	1065	1.43	>500	Passed	126	1049	1.60	>500	Passed
27	1054	1.46	>500	Passed	77	1070	1.37	>500	Passed	127	1087	1.24	>500	Passed
28	1078	1.38	>500	Passed	78	1044	1.62	>500	Passed	128	1080	1.37	>500	Passed
29	1054	1.58	>500	Passed	79	1057	1.47	>500	Passed	129	1064	1.30	>500	Passed
30	1082	1.33	>500	Passed	80	1053	1.30	>500	Passed	130	1081	1.29	>500	Passed
31	1065	1.38	>500	Passed	81	1037	1.50	>500	Passed	131	1081	1.43	>500	Passed
32	1039	1.52	>500	Passed	82	1063	1.37	>500	Passed	132	1074	1.28	>500	Passed
33	1048	1.36	>500	Passed	83	1073	1.34	>500	Passed	133	1065	1.39	>500	Passed
34	1051	1.32	>500	Passed	84	1046	1.55	>500	Passed	134	1082	1.31	>500	Passed
35	1058	1.36	>500	Passed	85	1052	1.40	>500	Passed	135	1068	1.37	>500	Passed
36	1074	1.42	>500	Passed	86	1072	1.27	>500	Passed	136	1045	1.54	>500	Passed
37	1050	1.34	>500	Passed	87	1044	1.61	>500	Passed	137	1086	1.34	>500	Passed
38	1085	1.25	>500	Passed	88	1074	1.38	>500	Passed	138	1074	1.25	>500	Passed
39	1053	1.42	>500	Passed	89	1077	1.31	>500	Passed	139	1069	1.37	>500	Passed
40	1078	1.35	>500	Passed	90	1065	1.34	>500	Passed	140	1070	1.27	>500	Passed
41	1078	1.31	>500	Passed	91	1065	1.31	>500	Passed	141	1078	1.48	>500	Passed
42	1054	1.30	>500	Passed	92	1040	1.61	>500	Passed	142	1071	1.51	>500	Passed
43	1068	1.36	>500	Passed	93	1047	1.45	>500	Passed	143	1001	1.49	>500	Passed
44	1037	1.54	>500	Passed	94	1060	1.38	>500	Passed	144	1045	1.53	>500	Passed
45	1080	1.18	>500	Passed	95	1046	1.47	>500	Passed	145	1064	1.31	>500	Passed
46	1076	1.41	>500	Passed	96	1042	1.43	>500	Passed	146	1040	1.45	>500	Passed
47	1049	1.35	>500	Passed	97	1066	1.38	>500	Passed	147	1071	1.27	>500	Passed
48	1077	1.45	>500	Passed	98	1058	1.32	>500	Passed	148	1068	1.46	>500	Passed
49	1053	1.42	>500	Passed	99	1058	1.41	>500	Passed	149	1057	1.54	>500	Passed
50	1065	1.34	>500	Passed	100	1053	1.56	>500	Passed	150	1079	1.30	>500	Passed
										Min	1001	1.18	>10GΩ	/
										Max	1090	1.67	/	/
										Mean	1059	1.40	/	/
										Stdev	17.027	0.10	/	/
										Cpk	2.753	2.82	/	/
										Spec low	800		10 GΩ	
										Spec up	1200	2.50		

PREPARED BY: XY, Yan
DATE : Apr 25, 2023APPROVED BY: Swing Xia
DATE : Apr 25, 2023



Layout Inspection and Functional Testing

全功能尺寸测试报告

Lot No.:		14Z2249E08		P/N:	AY1222M47Y5UC63L0			
Ambient temperature 测试环境温度:		℃	24	Relative humidity: 测试环境温度:	52%	Test condition: 测试条件:	1KHZ 1.0vrms	
Test result 检验结果								
item	Specifiction: 规格：	Qty Rejected	Result	Equipment 测量仪器	Equipment No. 仪器编号	Spec. version: 规格版本:		
Capacitance 电容	1760-2640pf	0/150	Passed	4278A	2740500990	A0		
DF	2.5%max	0/150	Passed	4278A	2740500990			
IR	10GΩ	0/150	Passed	1864	8364802018			
TV	4.0Kvac/60s'	0/150	Passed	19021	190210000089			
Visual inspection 外观检查	参考不良样板	0/500	Passed	visual	NA			

Test data 测试数据如下

No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV
1	2033	1.27	>200	Passed	51	2011	1.14	>200	Passed	101	2019	1.16	>200	Passed
2	2001	1.20	>200	Passed	52	2080	1.05	>200	Passed	102	2015	1.19	>200	Passed
3	2016	1.14	>200	Passed	53	2009	0.99	>200	Passed	103	2019	1.24	>200	Passed
4	2009	1.61	>200	Passed	54	2030	1.18	>200	Passed	104	1988	1.12	>200	Passed
5	2038	1.25	>200	Passed	55	2028	1.15	>200	Passed	105	2057	1.09	>200	Passed
6	1987	1.25	>200	Passed	56	2027	1.25	>200	Passed	106	2035	1.22	>200	Passed
7	2012	1.03	>200	Passed	57	1997	1.21	>200	Passed	107	2045	1.13	>200	Passed
8	2071	1.05	>200	Passed	58	2049	1.11	>200	Passed	108	2056	1.04	>200	Passed
9	2013	1.17	>200	Passed	59	2046	1.14	>200	Passed	109	1994	1.09	>200	Passed
10	1987	1.15	>200	Passed	60	2059	1.28	>200	Passed	110	2011	1.09	>200	Passed
11	2000	1.21	>200	Passed	61	2000	1.08	>200	Passed	111	1963	1.10	>200	Passed
12	1994	1.08	>200	Passed	62	2033	1.12	>200	Passed	112	2027	1.11	>200	Passed
13	1984	1.05	>200	Passed	63	2006	1.21	>200	Passed	113	2032	1.15	>200	Passed
14	1996	1.11	>200	Passed	64	2078	1.18	>200	Passed	114	2022	1.07	>200	Passed
15	2049	1.15	>200	Passed	65	2057	1.14	>200	Passed	115	2026	1.13	>200	Passed
16	2035	1.02	>200	Passed	66	1987	1.22	>200	Passed	116	2005	1.15	>200	Passed
17	2013	1.15	>200	Passed	67	2034	1.19	>200	Passed	117	2024	1.35	>200	Passed
18	2060	1.18	>200	Passed	68	2047	1.07	>200	Passed	118	1989	1.20	>200	Passed
19	1975	1.04	>200	Passed	69	1994	1.19	>200	Passed	119	2047	1.12	>200	Passed
20	2028	1.25	>200	Passed	70	2020	1.18	>200	Passed	120	1994	1.20	>200	Passed
21	2018	1.12	>200	Passed	71	2007	1.11	>200	Passed	121	1997	1.24	>200	Passed
22	2076	1.43	>200	Passed	72	2005	1.10	>200	Passed	122	2044	1.18	>200	Passed
23	2065	1.08	>200	Passed	73	1978	1.08	>200	Passed	123	2027	1.23	>200	Passed
24	2014	1.10	>200	Passed	74	2047	1.32	>200	Passed	124	2000	1.09	>200	Passed
25	1978	1.24	>200	Passed	75	2053	1.04	>200	Passed	125	2008	1.19	>200	Passed
26	1995	1.00	>200	Passed	76	2015	1.24	>200	Passed	126	2001	1.08	>200	Passed
27	2038	1.10	>200	Passed	77	1993	1.16	>200	Passed	127	2014	1.11	>200	Passed
28	2050	1.14	>200	Passed	78	2020	1.09	>200	Passed	128	2057	1.11	>200	Passed
29	1963	1.13	>200	Passed	79	2037	1.17	>200	Passed	129	2014	1.13	>200	Passed
30	2108	1.12	>200	Passed	80	2036	1.22	>200	Passed	130	1953	1.25	>200	Passed
31	2028	1.17	>200	Passed	81	1962	1.35	>200	Passed	131	1969	1.13	>200	Passed
32	2066	1.04	>200	Passed	82	2004	1.33	>200	Passed	132	2016	1.03	>200	Passed
33	1987	1.03	>200	Passed	83	1976	1.13	>200	Passed	133	2019	1.20	>200	Passed
34	2023	1.44	>200	Passed	84	2064	1.11	>200	Passed	134	2036	1.16	>200	Passed
35	2015	1.02	>200	Passed	85	2027	1.10	>200	Passed	135	2019	1.11	>200	Passed
36	2010	1.29	>200	Passed	86	2022	1.14	>200	Passed	136	2011	1.13	>200	Passed
37	2024	1.12	>200	Passed	87	1971	1.21	>200	Passed	137	2023	1.28	>200	Passed
38	2020	1.19	>200	Passed	88	2021	1.05	>200	Passed	138	2004	1.06	>200	Passed
39	2000	1.24	>200	Passed	89	2000	1.09	>200	Passed	139	2004	1.20	>200	Passed
40	2045	1.24	>200	Passed	90	1978	1.12	>200	Passed	140	2022	1.20	>200	Passed
41	2030	1.11	>200	Passed	91	2025	1.16	>200	Passed	141	2014	1.20	>200	Passed
42	2018	1.18	>200	Passed	92	1992	1.29	>200	Passed	142	2029	1.05	>200	Passed
43	2039	1.25	>200	Passed	93	1985	1.30	>200	Passed	143	2042	1.26	>200	Passed
44	2016	1.25	>200	Passed	94	1983	1.03	>200	Passed	144	2002	1.22	>200	Passed
45	2036	1.11	>200	Passed	95	2003	1.22	>200	Passed	145	1969	1.30	>200	Passed
46	2072	1.10	>200	Passed	96	2044	1.10	>200	Passed	146	2029	1.05	>200	Passed
47	2030	1.13	>200	Passed	97	1978	1.06	>200	Passed	147	2012	0.99	>200	Passed
48	1972	1.05	>200	Passed	98	2006	1.21	>200	Passed	148	2022	1.04	>200	Passed
49	2055	1.07	>200	Passed	99	1977	1.02	>200	Passed	149	2017	1.24	>200	Passed
50	2048	1.19	>200	Passed	100	2017	1.08	>200	Passed	150	1981	1.31	>200	Passed
											Min	1952.9	0.99	>10GΩ
											Max	2108	1.61	/
											Mean	2017	1.15	/
											Stdev	27.700	0.10	/
											Cpk	3.097	3.11	/
											Spec low	1760		10 GΩ
											Spec up	2640	2.50	

PREPARED BY : CH, CH, Yan APPROVED BY: Swing Xia
DATE : Apr 1,2023 DATE : Apr 1,2023

Layout Inspection and Functional Testing
全功能尺寸测试报告

Lot No.:	14Z2249E09	P/N:	AY1472M65Y5UC63L0			
Ambient temperature 测试环境温度:	°C	25	Relative humidity: 测试环境湿度:	52%	Test condition: 测试条件:	1KHZ 1.0vrms
Test result 检验结果						
item	Specifiction: 规格:	Qty Rejected	Result	Equipment 测量仪器	Equipment No. 仪器编号	Spec. version: 规格版本:
Capacitance 电容	3760-5640pf	0/150	Passed	E4981A	MY48206717	A1
DF	2.5%max	0/150	Passed	E4981A	MY48206717	
IR	500Vdc/10GΩmin	0/150	Passed	1864	8364802018	
TV	4.0Kvac/60s'	0/150	Passed	19021	190210000067	
Visual inspection 外观检查	参考不良样板	0/500	Passed	visual	NA	

Test data 测试数据如下

No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV	No.	Cap(pF)	DF(%)	IR (GΩ)	TV
1	4390	1.05	>150	Passed	51	4361	1.05	>150	Passed	101	4336	1.24	>150	Passed
2	4373	1.10	>150	Passed	52	4400	1.12	>150	Passed	102	4435	1.09	>150	Passed
3	4467	1.31	>150	Passed	53	4320	1.12	>150	Passed	103	4388	1.08	>150	Passed
4	4361	1.02	>150	Passed	54	4433	1.19	>150	Passed	104	4348	1.11	>150	Passed
5	4441	1.06	>150	Passed	55	4403	1.23	>150	Passed	105	4464	1.29	>150	Passed
6	4421	1.17	>150	Passed	56	4386	1.03	>150	Passed	106	4396	1.07	>150	Passed
7	4368	1.12	>150	Passed	57	4383	0.99	>150	Passed	107	4291	1.14	>150	Passed
8	4384	1.28	>150	Passed	58	4439	1.14	>150	Passed	108	4394	1.13	>150	Passed
9	4336	1.05	>150	Passed	59	4421	1.04	>150	Passed	109	4408	1.02	>150	Passed
10	4394	1.05	>150	Passed	60	4370	1.30	>150	Passed	110	4456	1.17	>150	Passed
11	4404	1.05	>150	Passed	61	4441	1.06	>150	Passed	111	4394	1.16	>150	Passed
12	4289	1.10	>150	Passed	62	4340	1.13	>150	Passed	112	4342	1.02	>150	Passed
13	4435	1.31	>150	Passed	63	4420	1.03	>150	Passed	113	4381	1.15	>150	Passed
14	4374	1.02	>150	Passed	64	4436	1.14	>150	Passed	114	4365	1.12	>150	Passed
15	4386	1.06	>150	Passed	65	4444	1.06	>150	Passed	115	4405	1.24	>150	Passed
16	4313	1.17	>150	Passed	66	4407	1.14	>150	Passed	116	4355	1.11	>150	Passed
17	4287	1.12	>150	Passed	67	4467	1.02	>150	Passed	117	4422	1.01	>150	Passed
18	4421	1.28	>150	Passed	68	4360	1.18	>150	Passed	118	4463	1.12	>150	Passed
19	4367	1.05	>150	Passed	69	4381	1.07	>150	Passed	119	4348	1.08	>150	Passed
20	4358	1.05	>150	Passed	70	4326	1.21	>150	Passed	120	4335	1.26	>150	Passed
21	4364	1.14	>150	Passed	71	4421	1.10	>150	Passed	121	4405	1.25	>150	Passed
22	4423	1.13	>150	Passed	72	4361	1.06	>150	Passed	122	4386	1.06	>150	Passed
23	4378	1.05	>150	Passed	73	4335	1.12	>150	Passed	123	4318	1.03	>150	Passed
24	4321	1.17	>150	Passed	74	4341	1.18	>150	Passed	124	4425	1.13	>150	Passed
25	4307	1.01	>150	Passed	75	4399	1.09	>150	Passed	125	4336	1.11	>150	Passed
26	4391	1.08	>150	Passed	76	4408	1.16	>150	Passed	126	4380	1.14	>150	Passed
27	4372	1.16	>150	Passed	77	4425	1.11	>150	Passed	127	4443	1.07	>150	Passed
28	4406	1.12	>150	Passed	78	4384	1.13	>150	Passed	128	4413	1.13	>150	Passed
29	4295	1.09	>150	Passed	79	4397	1.04	>150	Passed	129	4443	1.02	>150	Passed
30	4411	1.15	>150	Passed	80	4393	1.24	>150	Passed	130	4388	1.14	>150	Passed
31	4436	1.04	>150	Passed	81	4369	1.35	>150	Passed	131	4290	1.25	>150	Passed
32	4339	1.16	>150	Passed	82	4328	1.05	>150	Passed	132	4377	1.06	>150	Passed
33	4459	1.08	>150	Passed	83	4366	1.20	>150	Passed	133	4343	1.03	>150	Passed
34	4388	1.05	>150	Passed	84	4350	1.16	>150	Passed	134	4375	1.13	>150	Passed
35	4350	1.21	>150	Passed	85	4401	1.05	>150	Passed	135	4389	1.11	>150	Passed
36	4373	1.05	>150	Passed	86	4421	1.21	>150	Passed	136	4373	1.14	>150	Passed
37	4377	1.12	>150	Passed	87	4382	1.14	>150	Passed	137	4345	1.07	>150	Passed
38	4313	1.08	>150	Passed	88	4390	1.14	>150	Passed	138	4341	1.13	>150	Passed
39	4440	1.02	>150	Passed	89	4377	1.09	>150	Passed	139	4347	1.02	>150	Passed
40	4340	1.17	>150	Passed	90	4342	1.16	>150	Passed	140	4368	1.14	>150	Passed
41	4397	1.07	>150	Passed	91	4384	1.23	>150	Passed	141	4435	1.09	>150	Passed
42	4365	1.06	>150	Passed	92	4412	1.01	>150	Passed	142	4443	1.17	>150	Passed
43	4451	1.07	>150	Passed	93	4446	1.09	>150	Passed	143	4370	1.12	>150	Passed
44	4424	1.14	>150	Passed	94	4304	1.05	>150	Passed	144	4453	1.02	>150	Passed
45	4405	1.20	>150	Passed	95	4362	1.36	>150	Passed	145	4407	0.99	>150	Passed
46	4467	1.05	>150	Passed	96	4351	1.11	>150	Passed	146	4462	1.20	>150	Passed
47	4408	1.17	>150	Passed	97	4447	1.16	>150	Passed	147	4329	1.37	>150	Passed
48	4363	1.08	>150	Passed	98	4459	1.10	>150	Passed	148	4491	1.15	>150	Passed
49	4401	1.15	>150	Passed	99	4372	1.10	>150	Passed	149	4414	1.10	>150	Passed
50	4360	1.32	>150	Passed	100	4401	1.10	>150	Passed	150	4424	1.13	>150	Passed

PREPARED BY: XY, Yin
DATE: Mar 31, 2023APPROVED BY: Swing Xia
DATE: Mar 31, 2023

Min	4287.0	0.99	>10GΩ	/
Max	4491	1.37	/	/
Avg	4386	1.12	/	/
Stdev	43.907	0.08	/	/
Cpk	4.756	4.71	/	/
Spec low	3760		10 GΩ	
Spec up	5640	2.50		



Section 12

QUALIFIED LABORATORY DOCUMENTATION

INTERNAL LABORATORY & CTI 17025 CERTIFIED LABORATORY

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L1910)

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong

***is accredited in accordance with ISO/IEC 17025: 2005
Requirements for the Competence of Testing and
Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of
Testing and Calibration Laboratories) for the competence to provide
the service described in the schedule attached to this certificate.***

***The scope of accreditation is detailed in the attached schedule
bearing the same registration number as above. The schedule is an
integral part of this certificate.***

Date of Issue: 2018-03-05

Date of Expiry: 2024-03-04

Date of Initial Accreditation: 2005-01-28

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment(CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation scheme for laboratory assessment. CNAS is a signatory of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Laboratory Accreditation Cooperation Mutual Recognition Arrangement. The validity of the certificate can be checked on CNAS website at <http://www.cnas.org.cn/english/findanaccreditation>



Section 13

APPEARANCE APPROVAL REPORT

Not Applicable



Section 14

SAMPLE PRODUCT

Not Required



Section 15

MASTER SAMPLE

Not applicable



Section 16

CHECKING AID

Not Applicable



Section 17

RECORDS OF COMPLIANCE

Not Applicable



Section 18

PART SUBMISSION WARRANT

Part Submission Warrant

No. : APQP- AY1 series -20 edition: A/0

Part name AY1 series Cust. Part Number N/A
 Safety and/Government Regulation ☒ Yes ☐ No Engineering Change level N/A Dated N/A
 Addition Engineering Changes N/A Dated N/A Org. part Number AY2 series
 Shown Drawing No N/A Purchase Order No. N/A Weight N/A kg
 Checking Aid No N/A Checking Aid Engineering Change Level N/A Dated N/A

ORGANIZATION MANUFACTURING INFORMATION

Vishay Components (Huizhou) Co., Ltd.
 Supplier Name& Supplier/Vendor Code

CUSTOMER SUBMITTAL INFORMATION

☒ Dimensions ☒ Material/Functions ☐ Appearance

Customer Name/Division N/A Buyer/Buyer Code N/A IMDS number N/A
 Street Address
46 Renmin 4 Road, Danshui Town, Huiyang Zone, Huizhou City, Guangdong, P.R.China Application Automotive
 City/Region/Postal code Country
 Has customer-required Substances of concern information been reported? ☐ Yes ☒ No
 Are polymeric parts identified with appropriate ISO marking codes? ☐ Yes ☒ No

REASON FOR SUBMISSION (Check one)

- ☐ Initial Submission ☐ Change to optional Construction or Material
☒ Engineering Change(s) ☐ Supplier or material source Change
☐ Tooling: Transfer, replacement, Refurbishment or addition ☐ Change in Part Processing
☐ Correction of Discrepancy ☐ Parts Produced at additional location
☐ Tooling inactive > than 1 year ☐ Other-please specify

REQUESTED SUBMISSION LEVEL (Check one)

- ☐ Level 1—Warrant only (and for designated appearance items, an appearance Approval Report) submitted to customer.
☐ Level 2—Warrant with product samples and limited supporting data submitted to customer.
☒ Level 3—Warrant with Product samples and complete supporting data submitted to customer
☐ Level 4—Warrant and other requirements as defined by customer.
☐ Level 5—Warrant with Product samples and complete supporting data reviewed at organization's manufacturing location.

SUBMISSION RESULTS

The Results for: ☒ Dimensional measurements ☒ Materials and Function Test ☐ Appearance Criteria ☐ Statistical process package: These results meet all design record requirements ☒ Yes, ☐ No (IF "NO" Explanation Required)

Mold/Cavity/Production Process N/A

Declaration

I affirm that the samples represented by this warrant are representative of our parts, which were made by a process that meets all production Part Approval Process manual 4th Edition Requirements, I further affirm that these samples were produced at the production rate of 3.4kpcs / hours. I also certify that documented evidence of such compliance is on file and available for review. I have noted any deviations from this declaration below.

Explanation/Comments: N/A

Is each Customer Tool properly tagged and numbered? ☐ Yes ☐ No ☒ N/A

Print Name Zheng Yanling Title QA Manager Phone no (+86)752-3355373 Fax no (+86)752-3356842

Organization Authorized Signature _____ Date _____ Email address Yanling.Zheng@vishay.com

For CUSTOMER USE ONLY (IF APPLICABLE)

PPAP Warrant Disposition: ☐ Approved ☐ Rejected ☐ Other

Customer Name _____ Customer Signature _____ Date _____

Print Name----- Customer Tracking Number (Optional)