muRata

Reference Specification

150°C Operation Leaded MLCC for Automotive with AEC-Q200 RHE Series

Product specifications in this catalog are as of Dec. 2017, and are subject to change or obsolescence without notice.

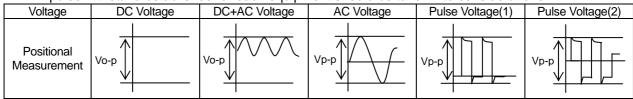
Please consult the approval sheet before ordering.Please read rating and Cautions first.

▲ CAUTION

1. OPERATING VOLTAGE

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range. When the voltage is started to apply to the circuit or it is stopped applying, the irregular voltage may be generated for a transit period because of resonance or switching. Be sure to use a capacitor within rated voltage containing these irregular voltage.

When DC-rated capacitors are to be used in input circuits from commercial power source (AC filter), be sure to use Safety Recognized Capacitors because various regulations on withstand voltage or impulse withstand established for each equipment should be taken into considerations.



2. OPERATING TEMPERATURE AND SELF-GENERATED HEAT

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself.

When the capacitor is used in a high-frequency current, pulse current or the like, it may have the selfgenerated heat due to dielectric-loss. In case of Class 2 capacitors (Temp.Char. : X7R,X7S,X8L, etc.), applied voltage should be the load such as self-generated heat is within 20 °C on <u>the condition of</u> <u>atmosphere temperature 25 °C</u>. Please contact us if self-generated heat is occurred with Class 1 capacitors (Temp.Char. : C0G,U2J,X8G, etc.). When measuring, use a thermocouple of small thermal capacity-K of ϕ 0.1mm and be in the condition where capacitor is not affected by radiant heat of other components and wind of surroundings. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability.

3. Fail-safe

Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.

4. OPERATING AND STORAGE ENVIRONMENT

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 5 to 40 °C and 20 to 70%. Use capacitors within 6 months.

5. VIBRATION AND IMPACT

Do not expose a capacitor or its leads to excessive shock or vibration during use.

6. SOLDERING

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

7. BONDING AND RESIN MOLDING, RESIN COAT

In case of bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance of a bonded or molded product in the intended equipment. In case of the amount of applications, dryness / hardening conditions of adhesives and molding resins containing organic solvents (ethyl acetate, methyl ethyl ketone, toluene, etc.) are unsuitable, the outer coating resin of a capacitor is damaged by the organic solvents and it may result, worst case, in a short circuit.

The variation in thickness of adhesive or molding resin may cause a outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.

8. TREATMENT AFTER BONDING AND RESIN MOLDING, RESIN COAT

When the outer coating is hot (over 100 °C) after soldering, it becomes soft and fragile. So please be careful not to give it mechanical stress.

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

9. LIMITATION OF APPLICATIONS

Please contact us before using our products for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

- 1. Aircraft equipment
- Undersea equipment
 Medical equipment
- 2. Aerospace equipment
- 4. Power plant control equipment
- 6. Transportation equipment (vehicles, trains, ships, etc.)8. Disaster prevention / crime prevention equipment
- 7. Traffic signal equipment
- 9. Data-processing equipment exerting influence on public
- 10. Application of similar complexity and/or reliability requirements to the applications listed in the above.

NOTICE

1. CLEANING (ULTRASONIC CLEANING)

To perform ultrasonic cleaning, observe the following conditions. Rinse bath capacity : Output of 20 watts per liter or less.

Rinsing time : 5 min maximum.

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

2. Soldering and Mounting

Insertion of the Lead Wire

- When soldering, insert the lead wire into the PCB without mechanically stressing the lead wire.
- Insert the lead wire into the PCB with a distance appropriate to the lead space.

3. CAPACITANCE CHANGE OF CAPACITORS

• Class 2 capacitors (Temp.Char. : X7R,X7S,X8L, etc.)

Class 2 capacitors an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor leaves for a long time. Moreover, capacitance might change greatly depending on a surrounding temperature or an applied voltage. So, it is not likely to be able to use for the time constant circuit.

Please contact us if you need a detail information.

- 1. Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2. You are requested not to use our product deviating from this specification.

	ecification i			Leaded MLCC RF		n acc	ordance with	
2. Rating								
• Ap			erature up to 150°(cumulative time to	C 150°C is within 200	00 hours.			
• Pa	art number	configuratio	מר					
ex.) RH		-	H 102	J	0	A2	H03	В
Serie	es Tempe		ated Capacitance	•		Lead code	Individual specification code	Packing style code
• Se	eries							
	Code		Content	t				
	RHE		Epoxy coated, 15	50°C max.				
-								
• le		characteris Temp.		Temp.	Standa	ard	Operating	n
	Code	Char.	Temp. Range	coeff.(ppm/°C)	Temp		Temp. Ran	
	5G	X8G	25~150°C	0+/-30	25°C		-55 ~ 150°	
_								
	atad valtag	<u>~</u>						
• Ra	ated voltag]				
• Ra	Code	Rat	ed voltage					
	Code 1H 2A	Rat	ed voltage DC50V DC100V					
	Code 1H 2A apacitance The first	Rat E two digits c ase of 102.	DC50V DC100V denote significant f	igures ; the last dig	git denotes	s the n	nultiplier of 10) in pF.
• Ca	Code 1H 2A apacitance The first ex.) In c	Rat E two digits c ase of 102. 10×1	DC50V DC100V denote significant f	igures ; the last dig	git denotes	s the n	nultiplier of 10) in pF.
• Ca	Code 1H 2A apacitance The first ex.) In c	Rat two digits c ase of 102. 10×1 tolerance	DC50V DC100V denote significant f $0^2 = 1000$ pF	igures ; the last dig	git denotes	s the n	nultiplier of 10) in pF.
• Ca	Code 1H 2A apacitance The first ex.) In c	Rat two digits c ase of 102. 10×1 tolerance	DC50V DC100V denote significant f	igures ; the last di	git denotes	s the n	nultiplier of 10) in pF.
• Ca • Ca	Code 1H 2A apacitance The first ex.) In c apacitance Code J	Rat E two digits c ase of 102. 10×1 tolerance Capacita	DC50V DC100V denote significant f . $0^2 = 1000$ pF ance tolerance	igures ; the last dig	git denotes	s the n	nultiplier of 10) in pF.
• Ca • Ca	Code 1H 2A apacitance The first ex.) In c apacitance Code J	Rat E two digits c ase of 102. 10×1 tolerance Capacita	DC50V DC100V denote significant f $0^2 = 1000 pF$ ance tolerance +/-5%]	git denotes	s the n	nultiplier of 10) in pF.
• Ca • Ca	Code 1H 2A apacitance The first ex.) In c apacitance Code J mension co Code	Rat E two digits c ase of 102. 10×1 tolerance Capacita	DC50V DC100V denote significant f 0 ² = 1000pF ance tolerance +/-5% ns (LxW) mm max]	git denotes	s the n	nultiplier of 10) in pF.
• Ca • Ca	Code 1H 2A apacitance The first ex.) In c apacitance Code J	Rat E two digits c ase of 102. 10×1 tolerance Capacita	DC50V DC100V denote significant f $0^2 = 1000 pF$ ance tolerance +/-5%]	git denotes	s the n	nultiplier of 10) in pF.

• Lead code

Code	Lead style	Lead spacing (mm)
A2	Straight type	2.5+/-0.8
DB	Straight taping type	2.5+0.4/-0.2
K1	Inside crimp type	5.0+/-0.8
M1	Inside crimp taping type	5.0+0.6/-0.2

Lead wire is solder coated CP wire.

Individual specification code Murata's control code Please refer to [Part number list].

• Packing style code

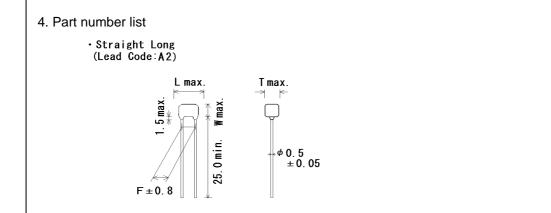
Code	Packing style
А	Taping type of Ammo
В	Bulk type

3. Marking

Temp. char.	: Letter code : 8 (X8G char.)
Capacitance	: 3 digit numbers
Capacitance tolerance	: Code

(Ex.)

Dimension code	Ex.
0,1	8 102J



			DC		Can		Dime	nsion	(mm)		Size	Pad
Customer Part Number	Murata Part Number	T.C.	Rated Volt. (V)	Cap.	Cap. tol.	L	W	W1	F	Т	Lead Code	qt (pc
	RHE5G1H101J0A2H03B	X8G	50	100pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H121J0A2H03B	X8G	50	120pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H151J0A2H03B	X8G	50	150pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H181J0A2H03B	X8G	50	180pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H221J0A2H03B	X8G	50	220pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H271J0A2H03B	X8G	50	270pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H331J0A2H03B	X8G	50	330pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H391J0A2H03B	X8G	50	390pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H471J0A2H03B	X8G	50	470pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H561J0A2H03B	X8G	50	560pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H681J0A2H03B	X8G	50	680pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H821J0A2H03B	X8G	50	820pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H102J0A2H03B	X8G	50	1000pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H122J0A2H03B	X8G	50	1200pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H152J0A2H03B	X8G	50	1500pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H182J0A2H03B	X8G	50	1800pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H222J0A2H03B	X8G	50	2200pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H272J0A2H03B	X8G	50	2700pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H332J0A2H03B	X8G	50	3300pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H392J0A2H03B	X8G	50	3900pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G1H472J1A2H03B	X8G	50	4700pF	±5%	4.0	3.5	-	2.5	2.5	1A2	50
	RHE5G1H562J1A2H03B	X8G	50	5600pF	±5%	4.0	3.5	-	2.5	2.5	1A2	50
	RHE5G1H682J1A2H03B	X8G	50	6800pF	\pm 5%	4.0	3.5	-	2.5	2.5	1A2	50
	RHE5G1H822J1A2H03B	X8G	50	8200pF	±5%	4.0	3.5	-	2.5	2.5	1A2	50
	RHE5G1H103J1A2H03B	X8G	50	10000pF	±5%	4.0	3.5	-	2.5	2.5	1A2	50
	RHE5G2A101J0A2H03B	X8G	100	100pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A121J0A2H03B	X8G	100	120pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A151J0A2H03B	X8G	100	150pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A181J0A2H03B	X8G	100	180pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A221J0A2H03B	X8G	100	220pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A271J0A2H03B	X8G	100	270pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A331J0A2H03B	X8G	100	330pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A391J0A2H03B	X8G	100	390pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A471J0A2H03B	X8G	100	470pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A561J0A2H03B	X8G	100	560pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A681J0A2H03B	X8G	100	680pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A821J0A2H03B	X8G	100	820pF	\pm 5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A102J0A2H03B	X8G	100	1000pF	$\pm 5\%$	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A122J0A2H03B	X8G	100	1200pF	±5%	3.6	3.5	-	2.5	2.5	0A2	50
	RHE5G2A152J0A2H03B	X8G	100	1500pF	±5%	3.6	3.5	-	2.5	2.5	0A2	5(

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•Straight Long (Lead Code:A2)					ide Cr Id Code							
لة بيوسي ب F ± 0.8	$\begin{array}{c} \begin{array}{c} max. \\ \hline \\ \hline \\ \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	05		F	8 .0 f crimp		25.0 min. ₩max. 			• 0.5 ±0.0		
Customer Part Number	Murata Part Number	T.C.	DC Rated Volt.	Сар.	Cap. tol.		Dimer	ision ((mm)		Jnit : Size Lead	Pack qty.
			(V)		101.	L	W	W1	F	Т	Code	(pcs)
	RHE5G2A182J1A2H03B	X8G	100	1800pF	$\pm 5\%$	4.0	3.5	-	2.5	2.5	1A2	500
	RHE5G2A222J1A2H03B	X8G	100	2200pF	\pm 5%	4.0	3.5	-	2.5	2.5	1A2	500
	RHE5G2A272J1A2H03B	X8G	100	2700pF	$\pm 5\%$	4.0	3.5	-	2.5	2.5	1A2	500
	RHE5G2A332J1A2H03B	X8G	100	3300pF	\pm 5%	4.0	3.5	-	2.5	2.5		500
	RHE5G1H101J0K1H03B	X8G	50	100pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H121J0K1H03B	X8G	50	120pF	±5%	3.6	3.5	6.0	5.0	2.5	-	500
	RHE5G1H151J0K1H03B	X8G	50	150pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H181J0K1H03B	X8G	50	180pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H221J0K1H03B	X8G	50	220pF	±5%	3.6	3.5	6.0	5.0	2.5	-	500
	RHE5G1H271J0K1H03B RHE5G1H331J0K1H03B	X8G X8G	50 50	270pF	±5% ±5%	3.6 3.6	3.5 3.5	6.0 6.0	5.0 5.0	2.5 2.5		500 500
	RHE5G1H391J0K1H03B	X8G	50	330pF 390pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H471J0K1H03B	X8G	50	470pF	±5%	3.6	3.5	6.0	5.0	2.5	-	500
	RHE5G1H561J0K1H03B	X8G	50	560pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H681J0K1H03B	X8G	50	680pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H821J0K1H03B	X8G	50	820pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H102J0K1H03B	X8G	50	1000pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H122J0K1H03B	X8G	50	1200pF	±5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H152J0K1H03B	X8G	50	1500pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G1H182J0K1H03B	X8G	50	1800pF	±5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H222J0K1H03B	X8G	50	2200pF	±5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H272J0K1H03B	X8G	50	2700pF	±5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H332J0K1H03B	X8G	50	3300pF	$\pm 5\%$	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H392J0K1H03B	X8G	50	3900pF	$\pm 5\%$	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G1H472J1K1H03B	X8G	50	4700pF	$\pm 5\%$	4.0	3.5	5.0	5.0	2.5	1K1	500
	RHE5G1H562J1K1H03B	X8G	50	5600pF	\pm 5%	4.0	3.5	5.0	5.0	2.5	1K1	500
	RHE5G1H682J1K1H03B	X8G	50	6800pF	$\pm 5\%$	4.0	3.5	5.0	5.0	2.5	1K1	500
	RHE5G1H822J1K1H03B	X8G	50	8200pF	$\pm 5\%$	4.0	3.5	5.0	5.0	2.5	1K1	500
	RHE5G1H103J1K1H03B	X8G	50	10000pF	\pm 5%	4.0	3.5	5.0	5.0	2.5	1K1	500
	RHE5G2A101J0K1H03B	X8G	100	100pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G2A121J0K1H03B	X8G	100	120pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	0K1	500
	RHE5G2A151J0K1H03B	X8G	100	150pF	\pm 5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A181J0K1H03B	X8G	100	180pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A221J0K1H03B	X8G	100	220pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A271J0K1H03B	X8G	100	270pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A331J0K1H03B	X8G	100	330pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A391J0K1H03B	X8G	100	390pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A471J0K1H03B	X8G	100	470pF	±5%	3.6	3.5	6.0	5.0	2.5		500
	RHE5G2A561J0K1H03B RHE5G2A681J0K1H03B	X8G X8G	100 100	560pF 680pF	±5% ±5%	3.6 3.6	3.5 3.5	6.0 6.0	5.0 5.0	2.5 2.5		500 500
	IN IESOZAUO ISUK IEUSD	700	100	Joopt	J /o	5.0	5.5	0.0	5.0	2.0		300

				-								
- Inside Crimp (Lead Code∶Ki Pes Lr ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽ ₽												
9,6 	25.0 min. 27.0 min. 27.0 min.	05										
F±0.8		1								ι	Jnit :	mm
F ± 0. 8	Murata Part Number	T.C.	DC Rated Volt.	Cap.	Cap. tol.	L	Dime	nsion (W1	(mm) F	L T	Jnit : Size Lead Code	Pac qty
			Rated Volt. (V)		tol.	L	W	W1	F	Т	Size Lead Code	Pac qty (pc
	RHE5G2A821J0K1H03B	X8G	Rated Volt. (V) 100	820pF	tol. ±5%	L 3.6 3.6	W 3.5	W1 6.0	F 5.0	T 2.5	Size Lead Code 0K1	Pac qty (pc
			Rated Volt. (V)		tol.	L 3.6 3.6 3.6	W	W1 6.0 6.0	F	Т	Size Lead Code 0K1 0K1	Pac qty (pc 50
	RHE5G2A821J0K1H03B RHE5G2A102J0K1H03B	X8G X8G	Rated Volt. (V) 100 100	820pF 1000pF	tol. ±5% ±5%	3.6	W 3.5 3.5	W1 6.0 6.0 6.0	F 5.0 5.0	T 2.5 2.5 2.5	Size Lead Code 0K1 0K1 0K1	Pac qty (pc 50 50
	RHE5G2A821J0K1H03B RHE5G2A102J0K1H03B RHE5G2A122J0K1H03B	X8G X8G X8G	Rated Volt. (V) 100 100	820pF 1000pF 1200pF	tol. ±5% ±5% ±5%	3.6 3.6	W 3.5 3.5 3.5	W1 6.0 6.0 6.0	F 5.0 5.0 5.0	T 2.5 2.5 2.5	Size Lead OK1 0K1 0K1 0K1	Pac qty (pc 50 50 50
	RHE5G2A821J0K1H03B RHE5G2A102J0K1H03B RHE5G2A122J0K1H03B RHE5G2A152J0K1H03B	X8G X8G X8G X8G	Rated Volt. (V) 100 100 100	820pF 1000pF 1200pF 1500pF	tol. ±5% ±5% ±5% ±5%	3.6 3.6 3.6	W 3.5 3.5 3.5 3.5	W1 6.0 6.0 6.0 6.0	F 5.0 5.0 5.0 5.0	T 2.5 2.5 2.5 2.5	Size Lead OK1 0K1 0K1 0K1 1K1	Pac qty (pc: 500 500 500 500
	RHE5G2A821J0K1H03B RHE5G2A102J0K1H03B RHE5G2A122J0K1H03B RHE5G2A152J0K1H03B RHE5G2A152J0K1H03B	X8G X8G X8G X8G X8G	Rated Volt. (V) 100 100 100 100	820pF 1000pF 1200pF 1500pF 1800pF	tol. ±5% ±5% ±5% ±5%	3.6 3.6 3.6 4.0	W 3.5 3.5 3.5 3.5 3.5	W1 6.0 6.0 6.0 6.0 5.0	F 5.0 5.0 5.0 5.0 5.0	T 2.5 2.5 2.5 2.5 2.5	Size Lead OK1 0K1 0K1 0K1 1K1 1K1	Pad

					-								
• Staight Tapi (Lead Code:D													
H = 0.5	L max.	Tm: → (((ax. ⊭										
											ι	Jnit :	mm
Customer Part Number	Murata Part Number	T.C.	DC Rated volt. (V)	Cap.	Cap. tol.	L	Di W	mensi W1	on (mr F	n) T	H0	Size Lead Code	Pack qty. (pcs)
	RHE5G1H101J0DBH03A	X8G	50	100pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H121J0DBH03A	X8G	50	120pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G1H151J0DBH03A	X8G	50	150pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G1H181J0DBH03A	X8G	50	180pF		3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H221J0DBH03A	X8G	50	220pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H271J0DBH03A	X8G	50	270pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H331J0DBH03A	X8G	50	330pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H391J0DBH03A	X8G	50	390pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H471J0DBH03A	X8G	50	470pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H561J0DBH03A	X8G	50	560pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H681J0DBH03A	X8G	50	680pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H821J0DBH03A	X8G	50	820pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H102J0DBH03A	X8G	50	1000pF	±5%	3.6	3.5	-	2.5	2.5	16.0	0DB	2000
	RHE5G1H122J0DBH03A	X8G	50	1200pF	±5%	3.6	3.5	_	2.5	2.5	16.0	0DB	2000
	RHE5G1H152J0DBH03A	X8G	50	1500pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G1H182J0DBH03A	X8G	50	1800pF		3.6	3.5	-	2.5	2.5	16.0		2000
	RHE5G1H222J0DBH03A	X8G	50	2200pF		3.6	3.5	-	2.5	2.5			2000
	RHE5G1H272J0DBH03A	X8G	50	2700pF		3.6	3.5		2.5	2.5			2000
	RHE5G1H332J0DBH03A	X8G	50	3300pF		3.6	3.5		2.5				2000
	RHE5G1H392J0DBH03A	X8G	50	3900pF		3.6	3.5		2.5			0DB	2000
	RHE5G1H472J1DBH03A	X8G	50	4700pF		4.0	3.5		2.5	2.5			2000
	RHE5G1H562J1DBH03A	X8G	50	5600pF		4.0	3.5		2.5	2.5	16.0		2000
	RHE5G1H682J1DBH03A	X8G	50	6800pF		4.0	3.5		2.5	2.5			2000
	RHE5G1H822J1DBH03A	X8G	50	8200pF		4.0	3.5		2.5	2.5	16.0		2000
	RHE5G1H103J1DBH03A	X8G	50	10000pF		4.0	3.5		2.5				2000
	RHE5G2A101J0DBH03A	X8G	100	10000pr		3.6			2.5				2000
	RHE5G2A121J0DBH03A	X8G	100	120pF		3.6	3.5		2.5	2.5			2000
	RHE5G2A12130DBH03A	X8G	100	150pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G2A181J0DBH03A	X8G	100	180pF		3.6	3.5		2.5	2.5			2000
	RHE5G2A221J0DBH03A	X8G	100	220pF		3.6	3.5		2.5	2.5			2000
	RHE5G2A22130DBH03A	X8G	100	270pF		3.6	3.5		2.5				2000
	RHE5G2A331J0DBH03A	X8G	100	330pF		3.6	3.5		2.5				2000
	RHE5G2A391J0DBH03A	X8G	100	390pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G2A471J0DBH03A	X8G	100	470pF		3.6	3.5		2.5	2.5	16.0		2000
	RHE5G2A561J0DBH03A	X8G	100	560pF		3.6	3.5		2.5	2.5			2000
	RHE5G2A681J0DBH03A	X8G	100	680pF		3.6	3.5		2.5	2.5			2000
	RHE5G2A881J0DBH03A	X8G	100	820pF		3.6			2.5				2000
<u> </u>	RHE5G2A102J0DBH03A	X8G	100	1000pF		3.6			2.5				2000
	RHE5G2A122J0DBH03A	X8G	100	1200pF		3.6			2.5				2000
	RHE5G2A152J0DBH03A	X8G	100	1200pf		3.6	3.5		2.5	2.5			2000
			100		_0/0	0.0	0.0		2.0	2.0	10.0	1,000	

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		1	DC								ι	Jnit : I	mm
Customer Dert Number	Murata Dart Number	то	DC Rated	Con	Con tol		Di	mensi	on (mi	n)		Size	Pack
Customer Part Number	Murata Part Number	T.C.	volt.	Cap.	Cap. tol.	L	W	W1	F	т	HO	Lead Code	qty. (pcs)
	RHE5G2A182J1DBH03A	X8G	(V) 100	1800pF	±5%	4.0	3.5	-	2.5	2.5	16.0	1DB	2000
	RHE5G2A222J1DBH03A	X8G	100	2200pF	 ±5%	4.0	3.5	-	2.5	2.5	16.0	1DB	2000
	RHE5G2A272J1DBH03A	X8G	100	2700pF	±5%	4.0	3.5	-	2.5	2.5	16.0	1DB	2000
	RHE5G2A332J1DBH03A	X8G	100	3300pF	\pm 5%	4.0	3.5	-	2.5	2.5	16.0	1DB	2000
	RHE5G1H101J0M1H03A	X8G	50	100pF	$\pm 5\%$	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H121J0M1H03A	X8G	50	120pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H151J0M1H03A	X8G	50	150pF	±5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H181J0M1H03A	X8G	50	180pF	±5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H221J0M1H03A RHE5G1H271J0M1H03A	X8G X8G	50 50	220pF 270pF	±5% ±5%	3.6 3.6	3.5 3.5	6.0 6.0	5.0 5.0	2.5 2.5	16.0 16.0	0M1 0M1	2000 2000
	RHE5G1H331J0M1H03A	X8G	50	330pF	±5%	3.6	3.5	6.0		2.5	16.0	0M1	2000
	RHE5G1H391J0M1H03A	X8G	50	390pF	±5%	3.6	3.5	6.0		2.5	16.0	0M1	2000
	RHE5G1H471J0M1H03A	X8G	50	470pF	±5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H561J0M1H03A	X8G	50	560pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H681J0M1H03A	X8G	50	680pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H821J0M1H03A	X8G	50	820pF	±5%	3.6	3.5	6.0		2.5	16.0	0M1	2000
	RHE5G1H102J0M1H03A	X8G	50	1000pF	±5%	3.6	3.5	6.0		2.5	16.0	0M1	2000
	RHE5G1H122J0M1H03A RHE5G1H152J0M1H03A	X8G X8G	50 50	1200pF 1500pF	±5% ±5%	3.6 3.6	3.5 3.5	6.0 6.0		2.5 2.5	16.0 16.0		2000 2000
	RHE5G1H182J0M1H03A	X8G	50	1800pF	±5%	3.6	3.5	6.0		2.5	16.0		2000
	RHE5G1H222J0M1H03A	X8G	50	2200pF	±5%	3.6	3.5	6.0		2.5	16.0		2000
	RHE5G1H272J0M1H03A	X8G	50	2700pF		3.6	3.5	6.0					2000
	RHE5G1H332J0M1H03A	X8G	50	3300pF	±5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H392J0M1H03A	X8G	50	3900pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G1H472J1M1H03A	X8G	50	4700pF		4.0	3.5	5.0			16.0		2000
	RHE5G1H562J1M1H03A	X8G	50	5600pF	±5%	4.0	3.5	5.0			16.0		2000
	RHE5G1H682J1M1H03A	X8G	50 50	6800pF	±5%	4.0	3.5 3.5	5.0		2.5 2.5	16.0		2000
	RHE5G1H822J1M1H03A RHE5G1H103J1M1H03A	X8G X8G	50 50	8200pF 10000pF	±5% ±5%	4.0 4.0	3.5 3.5	5.0 5.0		2.5 2.5	16.0 16.0		2000 2000
	RHE5G2A101J0M1H03A	X8G	100	10000pr	±5%	3.6	3.5	6.0		2.5	16.0		2000
	RHE5G2A121J0M1H03A	X8G	100	120pF	±5%	3.6	3.5	6.0		2.5	16.0		2000
	RHE5G2A151J0M1H03A	X8G	100	150pF	±5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G2A181J0M1H03A	X8G	100	180pF	\pm 5%	3.6	3.5	6.0	5.0	2.5	16.0	0M1	2000
	RHE5G2A221J0M1H03A	X8G	100	220pF	$\pm 5\%$	3.6	3.5	6.0		2.5	16.0		2000
	RHE5G2A271J0M1H03A	X8G	100	270pF		3.6	3.5	6.0			16.0		2000
	RHE5G2A331J0M1H03A	X8G	100	330pF	±5%	3.6	3.5	6.0			16.0		2000
	RHE5G2A391J0M1H03A RHE5G2A471J0M1H03A	X8G X8G	100 100	390pF 470pF	±5% ±5%	3.6 3.6	3.5 3.5	6.0 6.0			16.0 16.0		2000 2000
	RHE5G2A561J0M1H03A	X8G	100	560pF		3.6	3.5	6.0			16.0		2000
	RHE5G2A681J0M1H03A	X8G	100	680pF	±5%	3.6	3.5	6.0			16.0		2000
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(Lead Gode: I	o Taping M∗)												
H0 ± 0.5	$F^{\pm 0.6}_{\pm 0.2}$		ax. ← 								L	Jnit : ı	mm
			DC Rated				Di	mensi	on (mn	n)		Size	Pa
Customer Part Number	Murata Part Number	T.C.		Cap.	Cap. tol.							Lead	
Customer Part Number	Murata Part Number	T.C.	volt. (V)	Cap.	Cap. tol.	L	W	W1	F	Т	H0	Lead Code	
Customer Part Number	Murata Part Number RHE5G2A821J0M1H03A	T.C. X8G	volt.	Cap. 820pF		L 3.6	3.5		F 5.0	T 2.5	H0 16.0	Code	(po
Customer Part Number	RHE5G2A821J0M1H03A RHE5G2A102J0M1H03A	X8G X8G	volt. (V) 100 100	Cap. 820pF 1000pF	±5% ±5%	3.6 3.6	3.5	6.0 6.0	5.0 5.0	2.5 2.5	16.0 16.0	Code 0M1 0M1	(po 20 20
Customer Part Number	RHE5G2A821J0M1H03A	X8G X8G X8G	volt. (V) 100	Cap. 820pF	±5% ±5%	3.6	3.5 3.5 3.5	6.0 6.0 6.0	5.0	2.5	16.0	Code 0M1 0M1	(p 20 20
Customer Part Number	RHE5G2A821J0M1H03A RHE5G2A102J0M1H03A	X8G X8G X8G X8G X8G	volt. (V) 100 100	Cap. 820pF 1000pF	±5% ±5% ±5%	3.6 3.6	3.5 3.5 3.5 3.5	6.0 6.0 6.0 6.0	5.0 5.0 5.0 5.0	2.5 2.5 2.5 2.5	16.0 16.0 16.0 16.0	Code 0M1 0M1 0M1 0M1	(p 20 20 20
Customer Part Number	RHE5G2A821J0M1H03A RHE5G2A102J0M1H03A RHE5G2A122J0M1H03A	X8G X8G X8G X8G X8G X8G	volt. (V) 100 100 100	Cap. 820pF 1000pF 1200pF 1500pF 1800pF	$\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$	3.6 3.6 3.6 3.6 4.0	3.5 3.5 3.5 3.5 3.5 3.5	6.0 6.0 6.0 6.0 5.0	5.0 5.0 5.0 5.0 5.0	2.5 2.5 2.5 2.5 2.5 2.5	16.0 16.0 16.0 16.0 16.0	Code 0M1 0M1 0M1 0M1 1M1	(p 20 20 20 20
Customer Part Number	RHE5G2A821J0M1H03A RHE5G2A102J0M1H03A RHE5G2A122J0M1H03A RHE5G2A152J0M1H03A	X8G X8G X8G X8G X8G	volt. (V) 100 100 100	Cap. 820pF 1000pF 1200pF 1500pF	$\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$	3.6 3.6 3.6 3.6 3.6	3.5 3.5 3.5 3.5	6.0 6.0 6.0 6.0 5.0	5.0 5.0 5.0 5.0 5.0 5.0	2.5 2.5 2.5 2.5	16.0 16.0 16.0 16.0 16.0	Code 0M1 0M1 0M1 0M1 1M1	(pd 20 20 20 20 20
Customer Part Number	RHE5G2A821J0M1H03A RHE5G2A102J0M1H03A RHE5G2A122J0M1H03A RHE5G2A152J0M1H03A RHE5G2A152J0M1H03A RHE5G2A182J1M1H03A	X8G X8G X8G X8G X8G X8G	volt. (V) 100 100 100 100	Cap. 820pF 1000pF 1200pF 1500pF 1800pF	$\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$ $\pm 5\%$	3.6 3.6 3.6 3.6 4.0	3.5 3.5 3.5 3.5 3.5 3.5	6.0 6.0 6.0 5.0 5.0	5.0 5.0 5.0 5.0 5.0	2.5 2.5 2.5 2.5 2.5 2.5	16.0 16.0 16.0 16.0 16.0 16.0	Code 0M1 0M1 0M1 1M1 1M1	qt; (pc) 200 200 200 200 200 200 200

Reference only

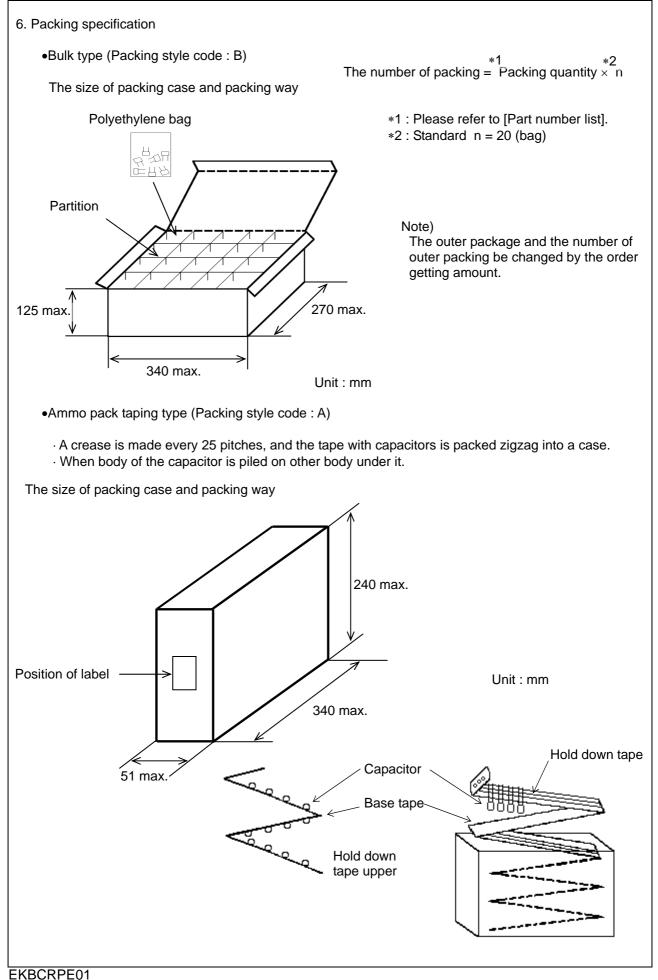
mperature posure torage) mperature coling	Stress Appearance Capacitance Change Q I.R. Appearance Capacitance Change	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	*room condition, then measure.
gh mperature posure torage) mperature rcling	Appearance Capacitance Change Q I.R. Appearance Capacitance Change	Within $\pm 3\%$ or ± 0.3 pF (Whichever is larger) Q ≥ 350 1,000M Ω min. No defects or abnormalities except color	
mperature posure torage) mperature ccling	Capacitance Change Q I.R. Appearance Capacitance Change	Within $\pm 3\%$ or ± 0.3 pF (Whichever is larger) Q ≥ 350 1,000M Ω min. No defects or abnormalities except color	*room condition, then measure.
posure torage) mperature ccling	Change Q I.R. Appearance Capacitance Change	$\begin{array}{l} (Whichever is larger)\\ Q\geq 350\\ 1,000M\Omega \mbox{ min.}\\ No defects or abnormalities except color \end{array}$	
mperature /cling	I.R. Appearance Capacitance Change	1,000MΩ min. No defects or abnormalities except color	
mperature /cling	Appearance Capacitance Change	No defects or abnormalities except color	
rcling	Capacitance Change		Perform the 1,000 cycles according to the four heat treatments
-	Change	Within ±5% or ±0.5pF	listed in the following table. Let sit for 24±2 h at *room condition then measure.
L L		(Whichever is larger)	Step 1 2 3 4
	Q	Q ≥ 350	Temp Room Room
	I.R.	1,000MΩ min.	(°C) -55+0/-3 Temp. 150+3/-0 Temp. Time (min.) 15±3 1 15±3 1
	Appearance	No defects or abnormalities	Apply the 24h heat (25 to 65°C) and humidity (80 to 98%)
	Capacitance	Within \pm 5% or \pm 0.5pF	treatment shown below, 10 consecutive times. Let sit for 24±2 h at *room condition, then measure.
-	<u> </u>	· · · · · · · · · · · · · · · · · · ·	Temperature Humidity Humidity
ŀ			Humidity 80~98% Humidity 80~98% Humidity
		5000052 11011.	
			$\begin{array}{c c c c c c c c c c c c c c c c c c c $
			15 10 Initial measurement
			10 Initial measurement
			-10 One cycle 24 hours 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
ased	Appearance	No defects or abnormalities	Apply the rated voltage and DC1.3+0.2/-0 V (add 100kΩ resist
		Within $\pm 5\%$ or ± 0.5 pF	at $85\pm3^{\circ}$ C and 80 to 85% humidity for 1,000±12h.
	Change	(Whichever is larger)	Remove and let sit for 24±2 h at *room condition, then measured
		Q ≥ 200	The charge/discharge current is less than 50mA.
	I.R.	500MΩ min.	
	Appearance		Apply 150% of the rated voltage for $1,000\pm12h$ at $150\pm3^{\circ}C$. Let sit for $24\pm2h$ at *room condition, then measure.
H	Capacitance		The charge/discharge current is less than 50mA.
	Change	(Whichever is larger)	
		$Q \ge 350$	
		1,000MΩ min.	
			Visual inspection Using calipers and micrometers.
arking			Visual inspection
esistance	Appearance	No defects or abnormalities	Per MIL-STD-202 Method 215
F	-		Solvent 1 : 1 part (by volume) of isopropyl alcohol
		Q ≥ 1,000	3 parts (by volume) of mineral spirits Solvent 2 : Terpene defluxer
	ı. K .	10,000M£2 min.	Solvent 3 : 42 parts (by volume) of water
			1part (by volume) of propylene glycol
			monomethyl ether 1 part (by volume) of monoethanolamine
	ed hidity rational sical Dime king istance olvents	Change Q I.R. I.R. idity Appearance Change Q I.R. rational Appearance Q I.R. rational Appearance Q I.R. sical Dimension Appearance Qa I.R. sical Dimension Appearance Qa I.R. I.R. I.R.	Change (Whichever is larger) Q Q ≥ 200 I.R. 500MΩ min. I.R. Capacitance Vithin ±5% or ± 0.5pF Change (Whichever is larger) Q Q ≥ 200 I.R. 500MΩ min. rational Appearance Appearance No defects or abnormalities except color change of outer coating Capacitance Within ±3% or ±0.3pF Change (Whichever is larger) Q Q ≥ 350 I.R. 1,000MΩ min. rmal Visual No defects or abnormalities sical Dimension Within the specified dimensions king To be easily legible. sistance No defects or abnormalities Capacitance Within the specified tolerance Q Q ≥ 1,000

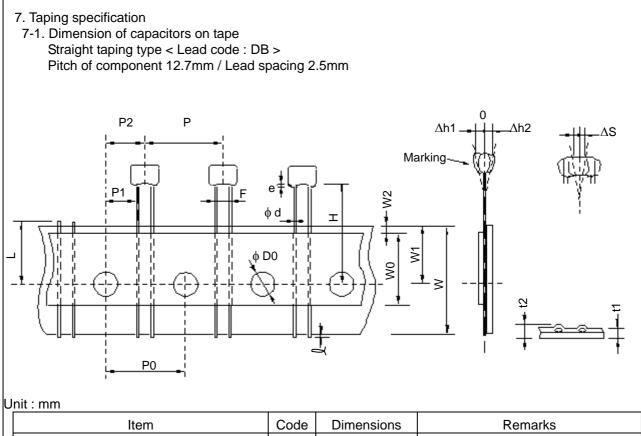
Reference only

- - - - -	Appearance Capacitance Q Appearance Capacitance Q Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance	No defects or abnormalities Within the specified tolerance $Q \ge 1,000$ No defects or abnormalities Within the specified tolerance $Q \ge 1,000$ No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects Within ±2.5% or ±0.25pF (Whichever is larger) No defects	mutually The spec duration : The capa having a uniformly should be should be directions The lead 2.0mm f • Post-tr Capacite First the seconds Then, th 1.5 to 2. seconds • Post-tr Capacite Test cor Termpe Solderin Straigh	perpendicular ified test puls :0.5ms, peak icitor should b total amplitud between the ency range, 1 e traversed in a applied for 1 s (total of 36 t d wires should from the root of eatment or should be s capacitor should be s capacitor should be s. eatment citor should be s capacitor should s.	axes of the test e should be Hal value:1,500G ar e subjected to a e of 1.5mm, the approximate lim from 10 to 2,000 approximately 2 2 items in each imes). d be immersed in of terminal at 26 stored for 24±2 puld be stored a should be immer e root of terminal e stored for 24±2 -tip : 350±10°C ±0.5 seconds	be applied along t specimen (18 s f-sine and should a simple harmoni frequency being its of 10 and 2,0 WHz and return to 20 min. This moti 3 mutually perpe- n the melted sold 0±5°C for 10±1 s hours at *room of t 120+0/-5°C for rsed in the melte al at 260±5°C for	hocks). I have a le: 4.7m c motion varied 00Hz. 10Hz, on endicula ler 1.5 to seconds ondition 60+0/-5 d solder 7.5+0/-1		
nce to ng Heat reheat) nce to ng Heat reheat) nce to ng Heat ng iron	Q Appearance Capacitance Q Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance	$\label{eq:Q} \begin{split} & 2 \pm 1,000 \\ & \text{No defects or abnormalities} \\ & \text{Within the specified tolerance} \\ & \text{Q} \geq 1,000 \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects} \\ & \text{No defects} \\ & \text{No defects} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{No defects or abnormalities} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{Within } \pm 2.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & \text{(Whichever is larger)} \\ & \text{(Whichever is larger)} \\ & \text{(Within } \pm 0.5\% \text{ or } \pm 0.25\text{pF} \\ & \text{(Whichever is larger)} \\ & (Whichev$	The spec duration i The capa having a uniformly The freque should be directions The lead 2.0mm f • Post-tr Capacito First the seconds Then, th 1.5 to 2. seconds • Post-tr Capacito Test cor Termpo Solderin Straigh	ified test puls 0.5ms, peak icitor should b total amplitud between the uency range, 1 e traversed in a applied for 1 s (total of 36 t d wires should from the root of eatment or should be s capacitor should s. te lead wires s 0mm from the s. te atment citor should be dition erature of iron ing time : 3.5: 19 position	e should be Hal value:1,500G ar e subjected to a e of 1.5mm, the approximate lim from 10 to 2,000 approximately 2 2 items in each imes). I be immersed in of terminal at 26 stored for 24±2 puld be stored a should be immer e root of terminal e stored for 24±2 -tip : 350±10°C	f-sine and should nd velocity chang a simple harmoni frequency being its of 10 and 2,0 0Hz and return to 20 min. This moti 3 mutually perper- n the melted sold 0±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte al at 260±5°C for 2 hours at *room c	d have a le: 4.7m c motio varied 00Hz. 10Hz, on endicula ler 1.5 t seconds onditior 60+0/-5 d solde 7.5+0/-		
nce to ng Heat reheat) nce to ng Heat sheat) nce to ng Heat ng iron	Appearance Capacitance Q Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Capacitance Change Dielectric Strength	No defects or abnormalities Within the specified tolerance $Q \ge 1,000$ No defects or abnormalities Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger)	The capa having a uniformly The freque should be should be directions The leas 2.0mm f • Post-tr Capacite First the seconds Then, th 1.5 to 2. seconds • Post-tr Capacite • Post-tr Capacite	icitor should b total amplitud between the uency range, t e traversed in e applied for 1 s (total of 36 t d wires should rom the root of eatment or should be s capacitor should be s. eatment itor should be s. eatment dition erature of iron ing time : 3.5: g position	e subjected to a e of 1.5mm, the approximate lim from 10 to 2,000 approximately 2 2 items in each imes). d be immersed in of terminal at 26 stored for 24±2 build be stored a should be immer e root of terminal e stored for 24±2 -tip : 350±10°C ±0.5 seconds	a simple harmoni frequency being iits of 10 and 2,0 DHz and return to 20 min. This moti 3 mutually perpe- n the melted solo 0±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte I at 260±5°C for	c motio varied 00Hz. 10Hz, on endicula ler 1.5 t seconds ondition 60+0/-{ d solde 7.5+0/-		
nce to ng Heat reheat) nce to ng Heat sheat) nce to ng Heat ng iron	Capacitance Q Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	Within the specified tolerance Q ≥ 1,000 No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects Within ±2.5% or ±0.25pF (Whichever is larger) No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects Within ±2.5% or ±0.25pF (Whichever is larger) No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	having a uniformly The frequeshould be should be directions The lead 2.0mm f • Post-tr Capacito First the seconds Then, th 1.5 to 2. seconds • Post-tr Capaco Test cor Termpo Solderin Straigh	total amplitud between the lency range, 1 e traversed in a applied for 1 s (total of 36 t d wires should from the root of eatment or should be s capacitor should be lead wires s 0mm from the s. e lead wires so 0mm from the s. reatment dition g time : 3.5: 19 position	e of 1.5mm, the approximate lim from 10 to 2,000 approximately 2 2 items in each imes). I be immersed in of terminal at 26 stored for 24±2 build be stored a should be immer e root of terminal e stored for 24±2 -tip : 350±10°C t0.5 seconds	frequency being its of 10 and 2,0 DHz and return to 20 min. This moti 3 mutually perpe n the melted sold 0±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte al at 260±5°C for 2 hours at *room c	varied 00Hz. 10Hz, on endicula ler 1.5 f seconds ondition 60+0/-1 d solde 7.5+0/-		
nce to ng Heat reheat) nce to ng Heat eheat) nce to ng Heat ng iron	Q Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	$Q \ge 1,000$ No defects or abnormalities Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger) No defects Within $\pm 2.5\%$ or $\pm 0.25pF$ (Whichever is larger)	uniformly The frequeshould be should be directions The lead 2.0mm f • Post-tr Capacita First the seconds Then, th 1.5 to 2. seconds • Post-tr Capacita • Post-tr Capacita	between the lency range, i e traversed in a (total of 36 t d wires should rrom the root of eatment or should be s capacitor should be a capacitor should be s. le lead wires s 0mm from the s. reatment citor should be addition erature of iron ing time : 3.5: Ig position	approximate lim from 10 to 2,000 approximately 2 2 items in each imes). d be immersed in of terminal at 26 stored for 24±2 bould be stored a should be immer e root of termina e stored for 24±2 terminal to 26 terminal at 26 a should be immer a stored for 24±2 terminal to 26 a should be immer a stored for 24±2 terminal to 26 a should be immer a stored for 24±2 a should be immer a stored for 24±2 a should be immer a stored for 24±2 a stored for 24±2 b stored for 24±2 a should be immer a stored for 24±2 b stored for 24±2 a should be immer a stored for 24±2 b stored for 24±2 a stored for 24±2 b stored for 24±2 b stored for 24±2 a stored for 24±2 b stored f	hits of 10 and 2,0 Hz and return to 20 min. This moti 3 mutually perpendent n the melted solor 10±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte at 260±5°C for 2 hours at *room c	00Hz. 10Hz, on endicula ler 1.5 seconds onditio 60+0/-1 d solde 7.5+0/-		
nce to ng Heat reheat) nce to ng Heat reheat) nce to ng Heat ng iron	Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	The frequeshould be should be directions. The lead 2.0mm for the lead 2.0mm for the lead 2.0mm for the lead 2.0mm for the lead 1.0mm for the lead	ency range, f e traversed in e applied for 1 s (total of 36 t d wires should from the root of eatment or should be s e lead wires s 0mm from the s. eatment dition erature of iron ing time : 3.5: g position	from 10 to 2,000 approximately 2 2 items in each imes). I be immersed in of terminal at 26 stored for 24±2 build be stored a should be immer e root of terminal e stored for 24±2 -tip : 350±10°C ±0.5 seconds	Hz and return to 20 min. This moti 3 mutually perpe- n the melted solo 0±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte al at 260±5°C for 2 hours at *room c	10Hz, on endicula ler 1.5 second: onditio 60+0/ d solde 7.5+0/-		
ng Heat reheat) nce to ng Heat sheat) nce to ng Heat ng iron	Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	Within ±2.5% or ±0.25pF (Whichever is larger) No defects Within ±2.5% or ±0.25pF (Whichever is larger) No defects Work Within ±2.5% or ±0.25pF (Whichever is larger) No defects Within ±2.5% or ±0.25pF (Whichever is larger)	 2.0mm f Post-tr Capacito First the seconds Then, th 1.5 to 2. seconds Post-tr Capacito Post-tr Capacito Post-tr Capacito Post-tr Capacito Soldering Straight 	rom the root of eatment or should be s capacitor sho s. e lead wires s 0mm from the s. eatment dition erature of iron ing time : 3.5: ug position	of terminal at 26 stored for 24±2 puld be stored a should be immer e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	i0±5°C for 10±1 s hours at *room c t 120+0/-5°C for rsed in the melte al at 260±5°C for 2 hours at *room c	second onditio 60+0/- d solde 7.5+0/-		
nce to ng Heat theat) nce to ng Heat ng iron	Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	(Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	First the seconds Then, th 1.5 to 2. seconds • Post-tr Capac Test cor Termpo Solderin Straigh	or should be s capacitor sho a lead wires a Omm from the a catment <u>itor should be</u> dition erature of iron ing time : 3.5 g position	build be stored a should be immer e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	t 120+0/-5°C for rsed in the melte I at 260±5°C for ? hours at *room (60+0/ d solde 7.5+0/-		
ng Heat eheat) nce to ng Heat ng iron	Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	First the seconds Then, th 1.5 to 2. seconds • Post-tr Capac Test cor Termpo Solderin Straigh	or should be s capacitor sho a lead wires a Omm from the a catment <u>itor should be</u> dition erature of iron ing time : 3.5 g position	build be stored a should be immer e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	t 120+0/-5°C for rsed in the melte I at 260±5°C for ? hours at *room (60+0/- d solde 7.5+0/-		
ng Heat eheat) nce to ng Heat ng iron	Capacitance Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	Within ±2.5% or ±0.25pF (Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	seconds Then, th 1.5 to 2. seconds • Post-tr Capac Test cor Termpo Solder Solderin Straigh	s. omm from the s. eatment dition erature of iron ing time : 3.5 g position	should be immer e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	rsed in the melte Il at 260±5°C for 2 hours at *room o	d solde 7.5+0/-		
nce to ng Heat ng iron	Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	(Whichever is larger) No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	Then, th 1.5 to 2. seconds • Post-tr Capac Test cor Termpo Solderin Straigh	e lead wires : Omm from the s. eatment citor should be ndition erature of iron ing time : 3.5: ug position	e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	I at 260±5°C for	7.5+0/-		
nce to ng Heat ng iron	Change Dielectric Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	No defects No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	 1.5 to 2. seconds Post-tr Capac Test cor Termpe Solderin Straight 	Omm from the s. eatment citor should be adition erature of iron ing time : 3.5= ing position	e root of termina e stored for 24±2 -tip : 350±10°C ±0.5 seconds	I at 260±5°C for	7.5+0/-		
ng Heat ng iron	Strength (Between terminals) Appearance Capacitance Change Dielectric Strength	No defects or abnormalities Within ±2.5% or ±0.25pF (Whichever is larger)	Seconds Post-tr Capac Test cor Termpe Solder Solderin Straigh	eatment itor should be ndition erature of iron ing time : 3.5: ng position	stored for 24±2 -tip : 350±10°C ±0.5 seconds	? hours at *room (
ng Heat ng iron	(Between terminals) Appearance Capacitance Change Dielectric Strength	Within ±2.5% or ±0.25pF (Whichever is larger)	Capac Test cor Termpe Solder Solderin Straigh	bitor should be ndition erature of iron ing time : 3.5 ng position	l-tip : 350±10°C ⊧0.5 seconds		conditio		
ng Heat ng iron	Capacitance Change Dielectric Strength	Within ±2.5% or ±0.25pF (Whichever is larger)	Test cor Termpe Solder Solderin Straigh	ndition erature of iron ing time : 3.5: ng position	l-tip : 350±10°C ⊧0.5 seconds				
ng iron	Capacitance Change Dielectric Strength	(Whichever is larger)	Solder Solderin Straigh	ing time : 3.5: ig position	0.5 seconds	root of terminal			
	Change Dielectric Strength	(Whichever is larger)	Solderin Straigh	g position		root of terminal			
) -	Dielectric Strength		Straigh	• •	2 Omm from the	root of torminal			
	Strength	NU UEIECIS	Ű		Soldering position Straight Lead:1.5 to 2.0mm from the root of terminal.				
	•		Crimp	Crimp Lead:1.5 to 2.0mm from the end of lead					
			_						
	terminals)			eatment	stored for 24+2	2 hours at *room of	conditio		
Shock	Appearance	No defects or abnormalities							
	Capacitance	Within ±5% or ±0.5pF	Perform the 300 cycles according to the two heat tre in the following table(Maximum transfer time is 20s. 24±2 h at *room condition, then measure.			er time is 20s.). L			
1	Change	(Whichever is larger)	24±2 h a	1	1 1		-		
1	Q I.R.	Q ≥ 350					-		
		1,000MΩ min.		(°C)	-55+0/-3	150+3/-0			
				Time (min.)	15±3	15±3			
,	Appearance	No defects or abnormalities	Per AEC-	Q200-002					
1	Capacitance	Within the specified tolerance							
1	Q	Q ≥ 1,000							
	I.R.	10,000MΩ min.							
Solderability		circumferential direction.	propotion) and then into molten solder (JIS-Z-3282) for 2±0.5 s In both cases the depth of dipping is up to about 1.5 to 2mm fr the terminal body. Temp. of solder : 245±5°C Lead Free Solder(Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder						
	sility	I.R. Appearance Capacitance Q I.R.	I.R. 1,000M Ω min. Appearance No defects or abnormalities Capacitance Within the specified tolerance Q Q ≥ 1,000 I.R. 10,000M Ω min. bility Lead wire should be soldered with uniform coating on the axial direction over 95% of the circumferential direction.	$\begin{tabular}{ c c c c c } \hline I.R. & 1,000M\Omega \mbox{ min.} \\ \hline Appearance & No defects or abnormalities \\ \hline Capacitance & Within the specified tolerance \\ \hline Q & Q \ge 1,000 \\ \hline I.R. & 10,000M\Omega \mbox{ min.} \\ \hline Lead wire should be soldered with uniform coating on the axial direction over 95% of the circumferential direction. \\ \hline The term in $	I.R. 1,000MΩ min. Iemp. (°C) Time (min.) Appearance No defects or abnormalities Per AEC-Q200-002 Capacitance Within the specified tolerance Per AEC-Q200-002 Q Q ≥ 1,000 I.R. 10,000MΩ min. ility Lead wire should be soldered with uniform coating on the axial direction over 95% of the circumferential direction. The terminal of a capa (JIS-K-8101) and rosin propotion) and then int In both cases the dept the terminal body. Temp. of solder : 245±5°C Lead Free	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{ c c c c c } \hline Q & Q \geq 350 \\ \hline I.R. & 1,000M\Omega \text{ min.} \\ \hline \hline \text{Temp.} & -55 \pm 0/-3 & 150 \pm 3/-0 \\ \hline \hline \text{Time} & 15 \pm 3 & 15 \pm 3 \\ \hline \hline \text{Time} & 15 \pm 3 & 15 \pm 3 \\ \hline \hline \text{Appearance} & \text{No defects or abnormalities} \\ \hline Q & Q \geq 1,000 \\ \hline I.R. & 10,000M\Omega \text{ min.} \\ \hline \text{billity} \\ \hline & \text{Lead wire should be soldered with uniform coating on the axial direction over 95% of the circumferential direction.} \\ \hline & \text{Temp.} & -55 \pm 0/-3 & 150 \pm 3/-0 \\ \hline & \hline$		

Reference only

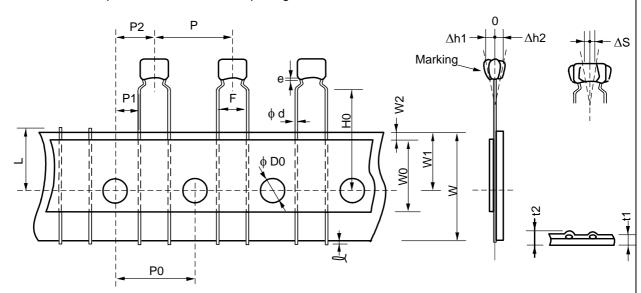
No.	AEC-Q200 Test Item			Specifications	AEC-Q200 Test Method				
17	Electrical	Apperance	No defects or abnormalities		Visual ins	Visual inspection.			
(Characte-		Within the sp	ecified tolerance		The capacitance, Q should be measured at 25°C at the frequen			
	rization	Q	$Q \ge 1,000$		and voltage shown in the table.				
					Nominal Cap. Frequency Voltage				e
					С	C ≤ 1000pF	1±0.1MHz	AC0.5 to 5	
			Room 10,000MΩ min.		С	C > 1000pF	> 1000pF 1±0.1kHz AC1±0.2V(rms)		
		Insulation			The insulation resistance should be measured at 25±3 °C with				
		Resistance (I.R.)	Temperature	-,	DC voltage not exceeding the rated voltage at normal temperate and humidity and within 2 min. of charging.				
			High	100MΩ min.	(Charge/Discharge current ≤ 50mA) The insulation resistance should be measured at 150±3 °C wit				E0+2 °C with
			Temperature		DC voltage not exceeding the rated voltage at normal temperati and humidity and within 2 min. of charging.				
		D				Discharge curr			(
		Dielectric Strength	Between Terminals	No defects or abnormalities			be damaged w		
		Calorigan	Torrininalo		seconds.	ou voltago lo a			
						Discharge curr			
			Body	No defects or abnormalities			in a container v		V
			Insulation				neter so that ea		Ŷ
					,		d 250% of the ra	,	Approx.
					-	DC voltage is impressed for 1 to 5 seconds			
						capacitor term Discharge curr	inals and metal	balls.	<u>*</u>
					(Charge/L	Discharge curi	$ent \leq 30 mA.)$		∙ Metal
									balls
18	Terminal	Tensile	Tormination r	not to be broken or loosened	As in the f	figure fix the		apply the fe	
10	Strength	Strength	Termination	lot to be broken of loosened		As in the figure, fix the capacitor body, apply the force gradually to each lead in the radial direction of the capacitor until reaching			
	0	0			10N and then keep the force applied for 10±1 seconds.				
						П			
						\downarrow			
					F				
		Bending	Termination not to be broken or loosened		Each lead	d wire should b	on subjected to	a force of 2	5N and then
		Strength	Termination	lot to be broken of loosened		Each lead wire should be subjected to a force of 2.5N and then be bent 90° at the point of egress in one direction. Each wire is			
					then returned to the original position and bent 90° in the opposition				
10	0			· · · · · · · · · · · · · · · · · · ·			one bend per 2		
19	Capacitance Temperature			ecified Tolerance. C : 0±30 ppm/°C		cified tempera	e should be me ture step.	asured alter	omin. at
	Characteristi			: 0+30/-72 ppm/°C	ouon opoc	Step	Temperatur	(°C)	
						1	25±2		
						2	-55±3		
						3	25±2		
						4	150±3		
						5	25±2		
					The temp	erature coeffic	cient is determir	nd using the	canacitance
							a reference. Wh		
							1 through 5 (-55		
							be within the sp		
							and capacitanc caluculated by		
							n and minimum		
					step 1, 3 and 5 by the capacitance value in step 3.				
"roon	n condition"	Temperature:1	5 to 35°C, Re	lative humidity:45 to 75%, Atmosph	ere pressure:86	6 to 106kPa			





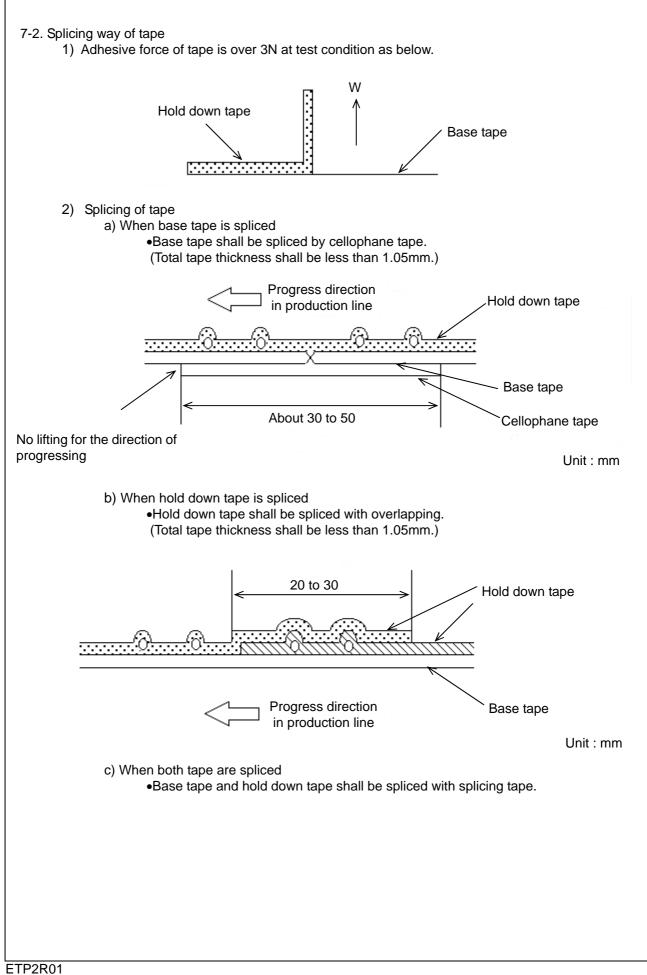
Item	Code	Dimensions	Remarks		
Pitch of component	Р	12.7+/-1.0			
Pitch of sprocket hole	P0	12.7+/-0.2			
Lead spacing	F	2.5+0.4/-0.2			
Length from hole center to component center	P2	6.35+/-1.3			
Length from hole center to lead	P1	5.1+/-0.7	Deviation of progress direction		
Deviation along tape, left or right defect	ΔS	0+/-2.0	They include deviation by lead bend .		
Carrier tape width	W	18.0+/-0.5			
Position of sprocket hole	W1	9.0+0/-0.5	Deviation of tape width direction		
Lead distance between reference and bottom plane	н	16.0+/-0.5			
Protrusion length	l	0.5 max.			
Diameter of sprocket hole	D0	4.0+/-0.1			
Lead diameter	d	0.50+/-0.05			
Total tape thickness	t1	0.6+/-0.3			
Total thickness of tape and lead wire	t2	1.5 max.	They include hold down tape thickn		
-	∆h1	1.0 max.			
Deviation across tape	∆h2	I.U max.			
Portion to cut in case of defect	L	11.0+0/-1.0			
Hold down tape width	W0	9.5 min.			
Hold down tape position	W2	1.5+/-1.5			
Coating extension on lead	е	1.5 max.			

Inside crimp taping type < Lead code : M1 > Pitch of component 12.7mm / Lead spacing 5.0mm



Unit : mm

Item	Code	Dimensions	Remarks		
Pitch of component	Р	12.7+/-1.0			
Pitch of sprocket hole	P0	12.7+/-0.2			
Lead spacing	F	5.0+0.6/-0.2			
Length from hole center to component center	P2	6.35+/-1.3	Deviation of presence direction		
Length from hole center to lead	P1	3.85+/-0.7	Deviation of progress direction		
Deviation along tape, left or right defect	ΔS	0+/-2.0	They include deviation by lead bend .		
Carrier tape width	W	18.0+/-0.5			
Position of sprocket hole	W1	9.0+0/-0.5	Deviation of tape width direction		
Lead distance between reference and bottom plane	HO	16.0+/-0.5			
Protrusion length	l	0.5 max.			
Diameter of sprocket hole	D0	4.0+/-0.1			
Lead diameter	φd	0.50+/-0.05			
Total tape thickness	t1	0.6+/-0.3	They include held down tone thickness		
Total thickness of tape and lead wire	t2	1.5 max.	They include hold down tape thickness.		
Deviation correct topo	∆h1	2.0 max. (Dimension code : W)			
Deviation across tape	∆h2	1.0 max. (except as above)			
Portion to cut in case of defect	L	11.0+0/-1.0			
Hold down tape width	W0	9.5 min.			
Hold down tape position	W2	1.5+/-1.5			
Coating extension on lead	е	Up to the end of crimp			



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EU RoHS and Halogen Free

This products of the following crresponds to EU RoHS and Halogen Free

(1) RoHS

EU RoHs 2011/65/EC compliance

maximum concentration values tolerated by weight in homogeneous materials •1000 ppm maximum Lead

- •1000 ppm maximum Mercury
- •100 ppm maximum Cadmium
- •1000 ppm maximum Hexavalent chromium
- •1000 ppm maximum Polybrominated biphenyls (PBB)
- •1000 ppm maximum Polybrominated diphenyl ethers (PBDE)

(2) Halogen-Free

The International Electrochemical Commission's (IEC) Definition of Halogen-Free (IEC 61249-2-21) compliance

- •900 ppm maximum chlorine
- •900 ppm maximum bromine
- •1500 ppm maximum total chlorine and bromine

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