Notice for TAIYO YUDEN Products

Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

Product Information in this Catalog

Product information in this catalog is as of March 2023. All of the contents specified herein and production status of the products listed in this catalog are subject to change without notice due to technical improvement of our products, etc. Therefore, please check for the latest information carefully before practical application or use of our products.

Please note that TAIYO YUDEN shall not be in any way responsible for any damages and defects in products or equipment incorporating our products, which are caused under the conditions other than those specified in this catalog or individual product specification sheets.

Approval of Product Specifications

Please contact TAIYO YUDEN for further details of product specifications as the individual product specification sheets are available. When using our products, please be sure to approve our product specifications or make a written agreement on the product specification with TAIYO YUDEN in advance.

Pre-Evaluation in the Actual Equipment and Conditions

Please conduct validation and verification of our products in actual conditions of mounting and operating environment before using our products.

Limited Application

1. Equipment Intended for Use

The products listed in this catalog are intended for general-purpose and standard use in general electronic equipment for consumer (e.g., AV equipment, OA equipment, home electric appliances, office equipment, information and communication equipment including, without limitation, mobile phone, and PC) and other equipment specified in this catalog or the individual product specification sheets, or the equipment approved separately by TAIYO YUDEN.
TAIYO YUDEN has the product series intended for use in the following equipment. Therefore, when using our products for these equipment, please check available applications specified in this catalog or the individual product specification sheets and use the corresponding products.

Application	Product Series		Quality Grade *3
	Equipment *1	Category (Part Number Code *2)	
Automotive	Automotive Electronic Equipment (POWERTRAIN, SAFETY)	A	1
	Automotive Electronic Equipment (BODY & CHASSIS, INFOTAINMENT)	C	2
Industrial	Telecommunications Infrastructure and Industrial Equipment	B	2
Medical	Medical Devices classified as GHTF Class C (Japan Class III)	M	2
	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	L	3
Consumer	General Electronic Equipment	S	3
	Only for Mobile Devices *4	E	4

*Notes: 1. Based on the general specifications required for electronic components for such equipment, which are recognized by TAIYO YUDEN, the use of each product series for the equipment is recommended. Please be sure to contact TAIYO YUDEN before using our products for equipment other than those covered by the product series.
2. On each of our part number, the 2nd code from the left is a code indicating the “Category” as shown in the above table. For details, please check the explanatory materials regarding the part numbering system of each of our products.
3. Each product series is assigned a “Quality Grade” from 1 to 4 in order of higher quality. Please do not incorporate a product into any equipment with a higher Quality Grade than the Quality Grade of such product without the prior written consent of TAIYO YUDEN.
4. The applications covered by this product series are limited to mobile devices (smartphone, tablet PC, smartwatch, handheld game console, etc.) among general electronic equipment for consumer. The design, specifications and operating environment, etc. differ from those of the product series for "General Electronic Equipment" (Category: S), so please check the individual product specification sheets for details. The product series for "General Electronic Equipment" (Category: S) can also be used for mobile devices.

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our product specification sheets. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our website (http://www.ty-top.com/) .

2. Equipment Requiring Inquiry

Please be sure to contact TAIYO YUDEN for further information before using the products listed in this catalog for the following equipment (excluding intended equipment as specified in this catalog or the individual product specification sheets) which may cause loss of human life, bodily injury, serious property damage and/or serious public impact due to a failure or defect of the products and/or malfunction attributed thereto.

(1) Transportation equipment (automotive powertrain control system, train control system, and ship control system, etc.)
(2) Traffic signal equipment
(3) Disaster prevention equipment, crime prevention equipment
(4) Medical devices classified as GHTF Class C (Japan Class III)
(5) Highly public information network equipment, data-processing equipment (telephone exchange, and base station, etc.)
(6) Any other equipment requiring high levels of quality and/or reliability equal to the equipment listed above

3. Equipment Prohibited for Use

Please do not incorporate our products into the following equipment requiring extremely high levels of safety and/or reliability.

(1) Aerospace equipment (artificial satellite, rocket, etc.)
(2) Aviation equipment *1
(3) Medical devices classified as GHTF Class D (Japan Class IV), implantable medical devices *2
(4) Power generation control equipment (nuclear power, hydroelectric power, thermal power plant control system, etc.)
(5) Undersea equipment (submarine repeating equipment, etc.)
(6) Military equipment
(7) Any other equipment requiring extremely high levels of safety and/or reliability equal to the equipment listed above

*Notes: 1. There is a possibility that our products can be used only for aviation equipment that does not directly affect the safe operation of aircraft (e.g., in-flight entertainment, cabin light, electric seat, cooking equipment) if such use meets requirements specified separately by TAIYO YUDEN. Please be sure to contact TAIYO YUDEN for further information before using our products for such aviation equipment.

2. Implantable medical devices contain not only internal unit which is implanted in a body, but also external unit which is connected to the internal unit.

4. Limitation of Liability

Please note that unless you obtain prior written consent of TAIYO YUDEN, TAIYO YUDEN shall not be in any way responsible for any damages incurred by you or third parties arising from use of the products listed in this catalog for any equipment that is not intended for use by TAIYO YUDEN, or any equipment requiring inquiry to TAIYO YUDEN or prohibited for use by TAIYO YUDEN as described above.

Safety Design

When using our products for high safety and/or reliability-required equipment or circuits, please fully perform safety and/or reliability evaluation. In addition, please install (i) systems equipped with a protection circuit and a protection device and/or (ii) systems equipped with a redundant circuit or other system to prevent an unsafe status in the event of a single fault for a failsafe design to ensure safety.

Intellectual Property Rights

Information contained in this catalog is intended to convey examples of typical performances and/or applications of our products and is not intended to make any warranty with respect to the intellectual property rights or any other related rights of TAIYO YUDEN or any third parties nor grant any license under such rights.

Limited Warranty

Please note that the scope of warranty for our products is limited to the delivered our products themselves conforming to the product specifications specified in the individual product specification sheets, and TAIYO YUDEN shall not be in any way responsible for any damages resulting from a failure or defect in our products. Notwithstanding the foregoing, if there is a written agreement (e.g., supply and purchase agreement, quality assurance agreement) signed by TAIYO YUDEN and your company, TAIYO YUDEN will warrant our products in accordance with such agreement, provided, however, that our products shall be used for general-purpose and standard use in the equipment specified in this catalog or the individual product specification sheets.

TAIYO YUDEN's Official Sales Channel

The contents of this catalog are applicable to our products which are purchased from our sales offices or authorized distributors (hereinafter "TAIYO YUDEN's official sales channel"). Please note that the contents of this catalog are not applicable to our products purchased from any seller other than TAIYO YUDEN's official sales channel.

Caution for Export

Some of our products listed in this catalog may require specific procedures for export according to "U.S. Export Administration Regulations", "Foreign Exchange and Foreign Trade Control Law" of Japan, and other applicable regulations. Should you have any questions on this matter, please contact our sales staff.

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Medical Application Guide

According to the medical devices classified as GHTF Classes A to C (Japan Classes I to III), we have the corresponding product series (the 2nd code from the left side of the part number is “M” or “L”) intended for use in the medical devices. Therefore, when using our products for the medical devices, please be sure to check the classification based on the GHTF Rules and use the corresponding product series.
On the other hand, we don’t have the product series intended for use in (i) all medical devices classified as GHTF Class D (Japan Class IV) and (ii) implantable medical devices (bone-anchored hearing aid, artificial retina system, and external unit which is connected to internal unit which is implanted in a body, etc.). Therefore, please do not incorporate our products into these medical devices. Should you have any questions on this matter, please contact us.

Risk Level		Low → High			
Japan	Classification according to the PMD Act of Japan (based on the GHTF Rules)	**Class I** General Medical Devices (GHTF Class A)	**Class II** Controlled Medical Devices (GHTF Class B)	**Class III** Specially-controlled Medical Devices (GHTF Class C)	**Class IV** Specially-controlled Medical Devices (GHTF Class D)
		Medical devices with extremely low risk to the human body in case of problems	Medical devices with relatively low risk to the human body in case of problems	Medical devices with relatively high risk to the human body in case of problems	Medical devices highly invasive to patients and with life-threatening risk in case of problems
		[Ex.] • In Vitro Diagnostic Devices • Nebulizer • Blood Gas Analyzer • Plethysmographs • Breathing Sensor • AC-powered Operating Table • Surgical Light • Cholesterol Analysis Device • Blood Type Analysis Device, etc.	[Ex.] • Electronic Thermometer • Electronic Blood Pressure Gauge • Electronic Endoscope • Hearing Aid • Electrocardiograph • MRI • Ultrasonic Diagnostic System • Diagnostic Imaging Equipment • X-ray Diagnostic Equipment • Central Monitor • Pulse Oximeter, etc.	[Ex.] • Dialysis Machine • Radiation Therapy Equipment • Infusion Pump • Respirator • Glucose Monitoring System • AED (Automated External Defibrillator) • Skin Laser Scanner • Electric Surgical Unit • Insulin Pump, etc.	[Ex.] • Cardiac Pacemaker • Video Flexible Angioscope • Implantable Infusion Pump • Cardiac Electrosurgical Unit • Inspection Device with Cardiac Catheter • Defibrillator, etc.
U.S.A.	FDA Classification	**Class I** General Controls	**Class II** General Controls and Special Controls		**Class III** General Controls and Premarket Approval
		Medical devices without the possibility of causing serious injury or harm to the patient or user even if there is a defect or malfunction in such medical devices	Medical devices with the possibility of causing injury or harm to the patient or user if there is a defect or malfunction in such medical devices		Medical devices with the possibility of causing serious injury, disability or death to the patient or user if a defect or malfunction occurs in such medical devices
Corresponding TAIYO YUDEN Product Series		**Product Series for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)** (The 2nd Code from the Left Side of the Part Number: “L”)		**Product Series for Medical Devices classified as GHTF Class C (Japan Class III)** (The 2nd Code from the Left Side of the Part Number: “M”) (See the Note below.)	N / A

* Note : It is prohibited that our products are used in some medical devices such as implantable medical devices even if such medical devices are classified as GHTF Class C (Japan Class III).

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Wire-wound Ferrite Bead Inductors for Power Lines LLMC/LLMG series for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

Code in front of Series have been extracted from Part number, which describes the segment of products, such as kinds and characteristics.

WAVE REFLOW

■PART NUMBER

*Operating Temp. : −40〜+125℃(Including self-generated heat)

L	L	M	C	C	3	2	1	6	1	1	T	8	0	0	R	
①				②	③				④		⑤	⑥			⑦	⑧

①Series

Code (1)(2)(3)(4)	
LLMC	Wire-wound Ferrite Bead Inductors for Power Lines for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)
LLMG	Wire-wound Ferrite Bead Inductors for Power Lines for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

(1) Product Group

Code	
L	Inductors

(2) Category

Code	Recommended equipment	Quality Grade
L	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	3

(3) Type

Code	
M	Ferrite Wire-wound bead

(4) Features, Characteristics

Code	
C	High current
G	High frequency

②Features

Code	Feature
A	Standard(20MHz)
C	Wave-shaping
G	For GHz noise

③Dimensions(L×W)

Code	Type(inch)	Dimensions(L×W) [mm]
1608	1608(0603)	1.6×0.8
2012	2012(0805)	2.0×1.25
2016	2016(0806)	2.0×1.6
3216	3216(1206)	3.2×1.6
3225	3225(1210)	3.2×2.5
4516	4516(1806)	4.5×1.6
4525	4525(1810)	4.5×2.5
4532	4532(1812)	4.5×3.2

④Dimensions(T)

Code	Dimensions(T)[mm]
08	0.8
	0.85
11	1.1
16	1.6
25	2.5
32	3.2

⑤Packaging

Code	Packaging
T	Taping
L	Taping

⑥Nominal impedance

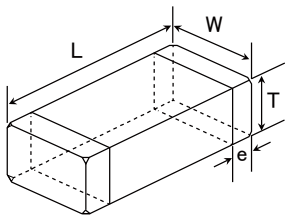
Code (example)	Nominal impedance[Ω]
330	33
221	220
102	1000

⑦Impedance tolerance

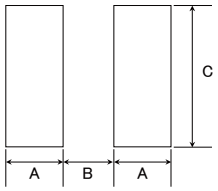
Code	Impedance tolerance
R	±25%
N	±30%

⑧Internal code

■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY



Recommended Land Patterns
Surface Mounting
・Mounting and soldering conditions should be checked beforehand.



Type	A	B	C
1608	1.0	1.0	1.0
2012	1.4	1.2	1.65
2016	1.4	1.2	2.0
3216	1.4	2.2	2.0
3225	1.4	2.2	2.9
4516	1.75	3.5	2.0
4525	1.75	3.5	2.9
4532	1.75	3.5	3.7

Unit : mm

Type	L	W	T	e	Standard quantity [pcs]	
					Paper tape	Embossed tape
160808 *1 (0603)	1.6±0.2 (0.063±0.008)	0.8±0.2 (0.031±0.008)	0.8±0.2 (0.031±0.008)	0.3±0.2 (0.012±0.008)	4000	—
160808 *2 (0603)	1.6±0.1 (0.063±0.004)	0.8±0.1 (0.031±0.004)	0.8±0.1 (0.031±0.004)	0.3±0.15 (0.012±0.006)	4000	—
201208 (0805)	2.0±0.2 (0.079±0.008)	1.25±0.2 (0.049±0.008)	0.85±0.2 (0.033±0.008)	0.5±0.3 (0.020±0.012)	4000	—
201616 (0806)	2.0±0.2 (0.079±0.008)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
321611 (1206)	3.2±0.3 (0.126±0.012)	1.6±0.2 (0.063±0.008)	1.1±0.2 (0.043±0.008)	0.5±0.3 (0.020±0.012)	—	2000
321616 (1206)	3.2±0.3 (0.126±0.012)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
322525 (1210)	3.2±0.3 (0.126±0.012)	2.5±0.3 (0.098±0.012)	2.5±0.3 (0.098±0.012)	0.5±0.3 (0.020±0.012)	—	1000
451611 (1806)	4.5±0.3 (0.177±0.012)	1.6±0.2 (0.063±0.008)	1.1±0.2 (0.043±0.008)	0.5±0.3 (0.020±0.012)	—	2000
451616 (1806)	4.5±0.3 (0.177±0.012)	1.6±0.2 (0.063±0.008)	1.6±0.2 (0.063±0.008)	0.5±0.3 (0.020±0.012)	—	2000
452525 (1810)	4.5±0.4 (0.177±0.016)	2.5±0.3 (0.098±0.012)	2.5±0.3 (0.098±0.012)	0.9±0.6 (0.035±0.024)	—	1000
453232 (1812)	4.5±0.4 (0.177±0.016)	3.2±0.3 (0.126±0.012)	3.2±0.3 (0.126±0.012)	0.9±0.6 (0.035±0.024)	—	2000

*1 LLMC、*2 LLMG

Unit : mm (inch)

■PART NUMBER

Standard type

●1608(0603) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMCC160808T280NG	FB MJ1608HS280NT	RoHS	28	±30%	100	0.007	4.0	0.8 ±0.2
LLMCA160808T230NG	FB MJ1608HM230NT	RoHS	23	±30%	100	0.007	4.0	0.8 ±0.2

●2012(0805) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMCC201208T250NG	FB MJ2125HS250NT	RoHS	25	±30%	100	0.004	6.0	0.85 ±0.2
LLMCC201208T420RG	FB MJ2125HS420-T	RoHS	42	±25%	100	0.008	4.0	0.85 ±0.2
LLMCA201208T210NG	FB MJ2125HM210NT	RoHS	21	±30%	100	0.004	6.0	0.85 ±0.2
LLMCA201208T330RG	FB MJ2125HM330-T	RoHS	33	±25%	100	0.008	4.0	0.85 ±0.2
LLMCG201208T8R0NG	FB MJ2125HL8R0NT	RoHS	8	±30%	100	0.008	4.0	0.85 ±0.2

●3216(1206) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMCC321611T480NG	FB MJ3216HS480NT	RoHS	48	±30%	100	0.005	6.0	1.1 ±0.2
LLMCC321611T800RG	FB MJ3216HS800-T	RoHS	80	±25%	100	0.010	4.0	1.1 ±0.2
LLMCA321611T380NG	FB MJ3216HM380NT	RoHS	38	±30%	100	0.005	6.0	1.1 ±0.2
LLMCA321611T600RG	FB MJ3216HM600-T	RoHS	60	±25%	100	0.010	4.0	1.1 ±0.2
LLMCG321611T160NG	FB MJ3216HL160NT	RoHS	16	±30%	100	0.012	4.0	1.1 ±0.2

●4516(1806) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMCC451611T720NG	FB MJ4516HS720NT	RoHS	72	±30%	100	0.007	6.0	1.1 ±0.2
LLMCC451611T111RG	FB MJ4516HS111-T	RoHS	110	±25%	100	0.014	4.0	1.1 ±0.2
LLMCA451611T560NG	FB MJ4516HM560NT	RoHS	56	±30%	100	0.007	6.0	1.1 ±0.2
LLMCA451611T900RG	FB MJ4516HM900-T	RoHS	90	±25%	100	0.014	4.0	1.1 ±0.2
LLMCG451611T230NG	FB MJ4516HL230NT	RoHS	23	±30%	100	0.014	3.5	1.1 ±0.2

High impedance type GHz Band

●1608(0603) type

New part number	Old part number (for reference)	EHS	Nominal impedance Measuring frequency 100[MHz]		Nominal impedance Measuring frequency 1[GHz]		DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
			(Ω)	tolerance	(Ω)	tolerance			
LLMGA160808T470RG	FB MH1608HM470-T	RoHS	47	±25%	75	±40%	0.020	3.5	0.8 ±0.1
LLMGA160808T600RG	FB MH1608HM600-T	RoHS	60	±25%	100	±40%	0.025	3.0	0.8 ±0.1
LLMGA160808T101RG	FB MH1608HM101-T	RoHS	100	±25%	170	±40%	0.035	2.5	0.8 ±0.1
LLMGA160808T151RG	FB MH1608HM151-T	RoHS	150	±25%	270	±40%	0.050	2.1	0.8 ±0.1
LLMGA160808T221RG	FB MH1608HM221-T	RoHS	220	±25%	370	±40%	0.070	1.8	0.8 ±0.1
LLMGA160808T331RG	FB MH1608HM331-T	RoHS	330	±25%	520	±40%	0.130	1.2	0.8 ±0.1
LLMGA160808T471RG	FB MH1608HM471-T	RoHS	470	±25%	750	±40%	0.150	1.0	0.8 ±0.1
LLMGA160808T601RG	FB MH1608HM601-T	RoHS	600	±25%	900	±40%	0.170	0.9	0.8 ±0.1
LLMGA160808T102RG	FB MH1608HM102-T	RoHS	1000	±25%	1200	±40%	0.350	0.6	0.8 ±0.1
LLMGG160808T300RG	FB MH1608HL300-T	RoHS	30	±25%	120	±40%	0.028	2.6	0.8 ±0.1
LLMGG160808T600RG	FB MH1608HL600-T	RoHS	60	±25%	220	±40%	0.045	2.1	0.8 ±0.1
LLMGG160808T121RG	FB MH1608HL121-T	RoHS	120	±25%	540	±40%	0.130	1.2	0.8 ±0.1
LLMGG160808T221RG	FB MH1608HL221-T	RoHS	220	±25%	950	±40%	0.170	0.9	0.8 ±0.1
LLMGG160808T331RG	FB MH1608HL331-T	RoHS	330	±25%	1200	±40%	0.210	0.8	0.8 ±0.1
LLMGG160808T471RG	FB MH1608HL471-T	RoHS	470	±25%	1500	±40%	0.350	0.6	0.8 ±0.1
LLMGG160808T601RG	FB MH1608HL601-T	RoHS	600	±25%	1800	±40%	0.450	0.5	0.8 ±0.1

※)The rated current is the value of current at which the temperature of the element is increased by 40 deg.

■PART NUMBER

High impedance type

●2012(0805) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA201208T800RG	FB MH2012HM800-T	RoHS	80	±25%	100	0.025	2.7	0.85 ±0.2
LLMGA201208T121RG	FB MH2012HM121-T	RoHS	120	±25%	100	0.032	2.5	0.85 ±0.2
LLMGA201208T221RG	FB MH2012HM221-T	RoHS	220	±25%	100	0.060	2.0	0.85 ±0.2
LLMGA201208T331RG	FB MH2012HM331-T	RoHS	330	±25%	100	0.080	1.8	0.85 ±0.2

●2016(0806) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA201616T121NG	FB MH2016HM121NT	RoHS	120	±30%	100	0.015	4.5	1.6 ±0.2
LLMGA201616T251NG	FB MH2016HM251NT	RoHS	250	±30%	100	0.050	2.0	1.6 ±0.2

●3216(1206) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA321616T221NG	FB MH3216HM221NT	RoHS	220	±30%	100	0.020	4.0	1.6 ±0.2
LLMGA321616T501NG	FB MH3216HM501NT	RoHS	500	±30%	100	0.070	2.0	1.6 ±0.2

●3225(1210) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA322525T601NG	FB MH3225HM601NT	RoHS	600	±30%	100	0.042	3.0	2.5 ±0.3
LLMGA322525T102NG	FB MH3225HM102NT	RoHS	1000	±30%	100	0.100	2.0	2.5 ±0.3
LLMGA322525T202NG	FB MH3225HM202NT	RoHS	2000	±30%	100	0.130	1.2	2.5 ±0.3

●4516(1806) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA451616T851NG	FB MH4516HM851NT	RoHS	850	±30%	100	0.100	1.5	1.6 ±0.2

●4525(1810) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA452525T102NG	FB MH4525HM102NT	RoHS	1000	±30%	100	0.060	3.0	2.5 ±0.3
LLMGA452525T162NG	FB MH4525HM162NT	RoHS	1600	±30%	100	0.130	2.0	2.5 ±0.3

●4532(1812) type

New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMGA453232L681RG	FB MH4532HM681-T	RoHS	680	±25%	100	0.028	4.0	3.2 ±0.3
LLMGA453232L132RG	FB MH4532HM132-T	RoHS	1300	±25%	100	0.060	3.0	3.2 ±0.3
LLMGA453232L202RG	FB MH4532HM202-T	RoHS	2000	±25%	100	0.130	1.3	3.2 ±0.3

●High current type

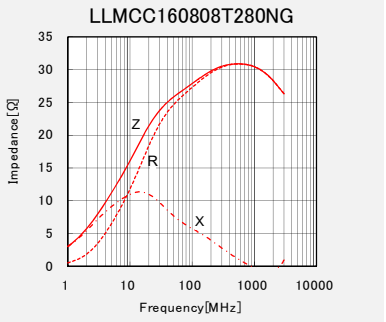
New part number	Old part number (for reference)	EHS	Nominal impedance (Ω)	Impedance tolerance	Measuring frequency [MHz]	DC Resistance [Ω](max.)	Rated current [A](max.)	Thickness [mm]
LLMCC160808T220NGR	FB MJ1608HS220NTR	RoHS	22	±30%	100	0.004	7.5	0.8 ±0.2
LLMCC160808T280NGR	FB MJ1608HS280NTR	RoHS	28	±30%	100	0.006	6.0	0.8 ±0.2
LLMCA160808T180NGR	FB MJ1608HM180NTR	RoHS	18	±30%	100	0.004	7.5	0.8 ±0.2
LLMCA160808T230NGR	FB MJ1608HM230NTR	RoHS	23	±30%	100	0.006	6.0	0.8 ±0.2

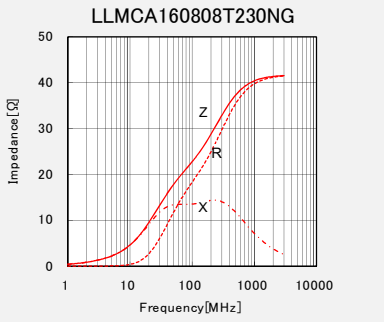
※)The rated current is the value of current at which the temperature of the element is increased by 40 deg.

ELECTRICAL CHARACTERISTICS

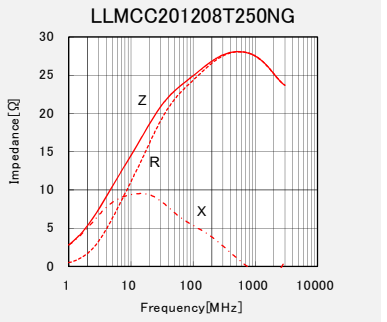
Standard type

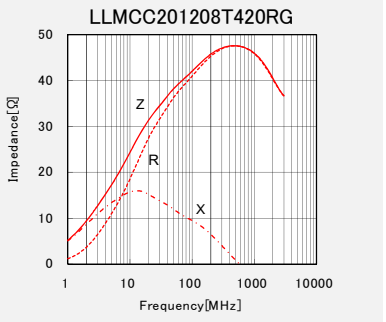
1608 type

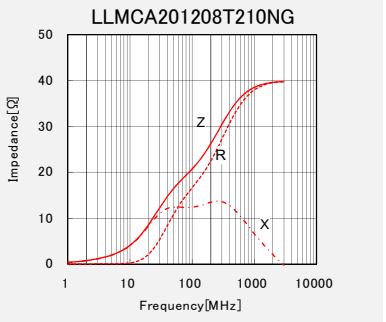


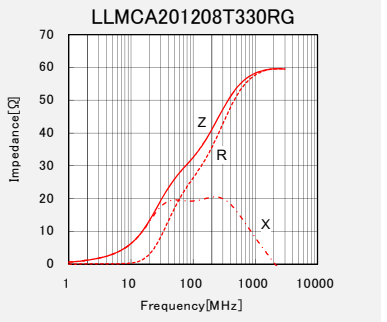


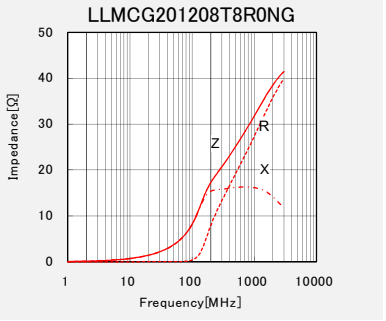
2125 type



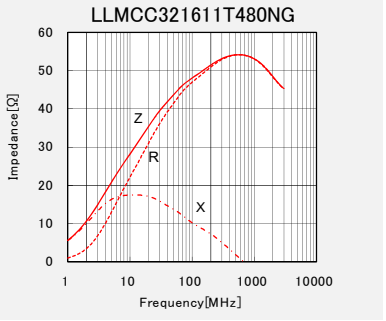


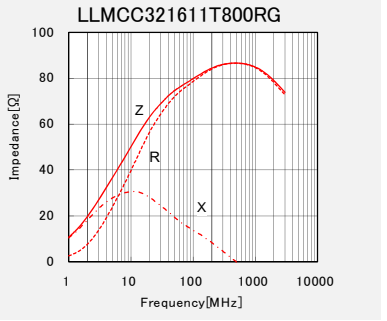


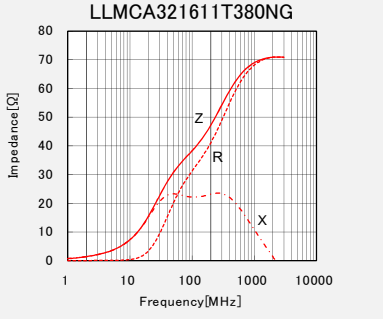


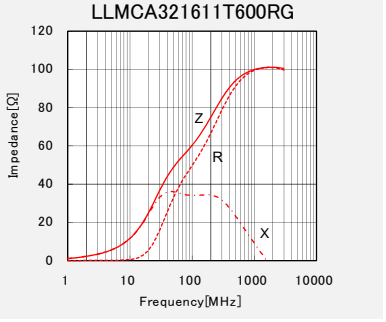


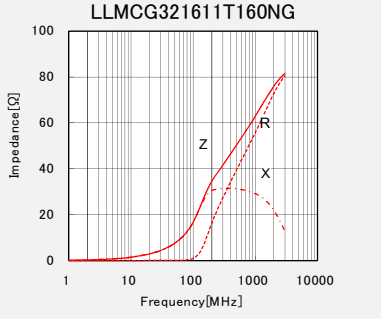
3216 type



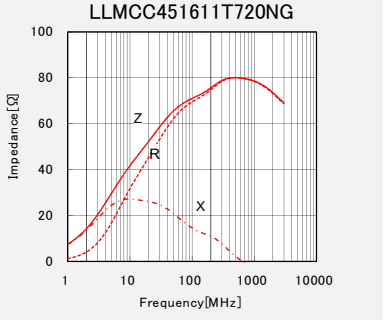


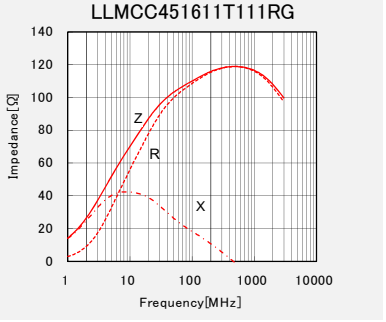


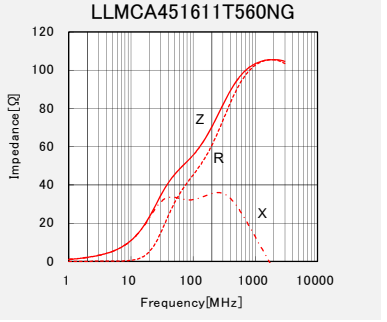




4516 type

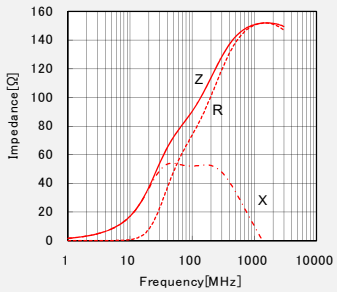




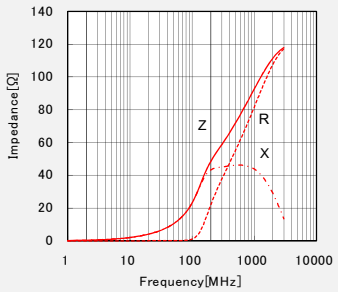


■ELECTRICAL CHARACTERISTICS

LLMCA451611T900RG



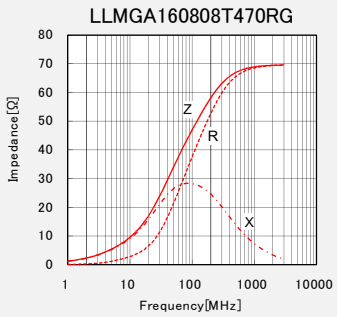
LLMCG451611T230NG



High impedance type GHz Band

■1608 type

LLMGA160808T470RG



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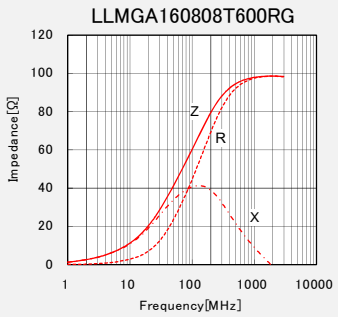

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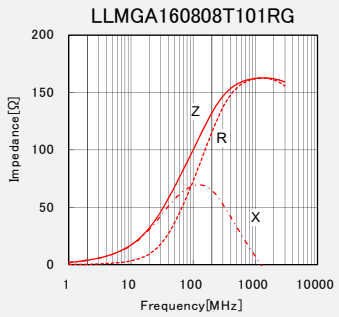

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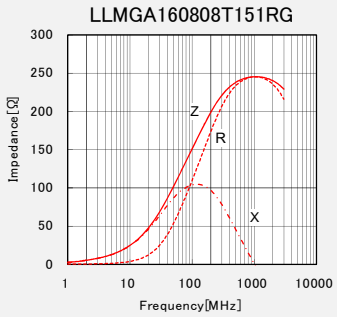

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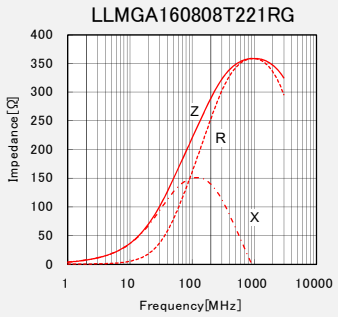

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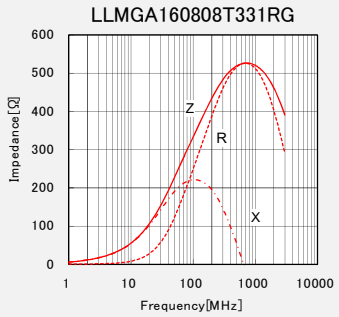

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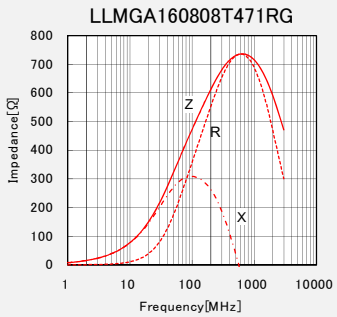

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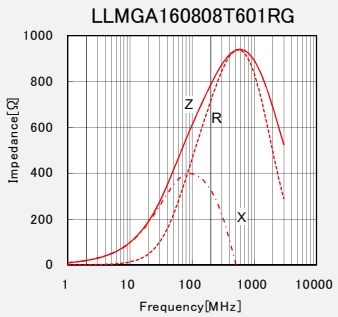

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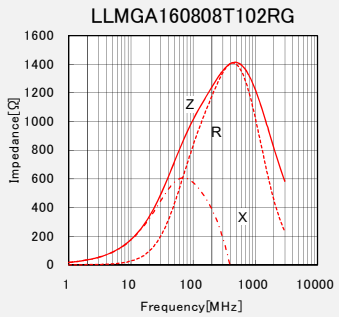
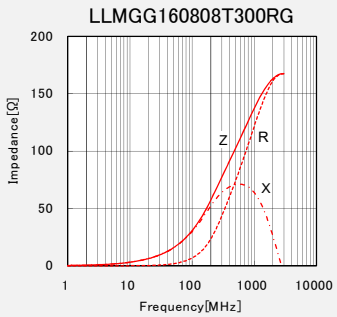


LLMGG160808T300RG



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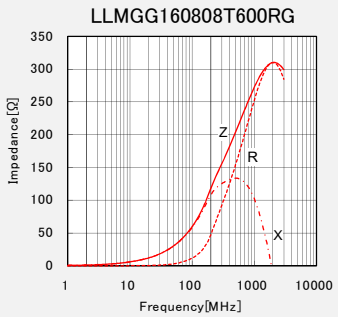
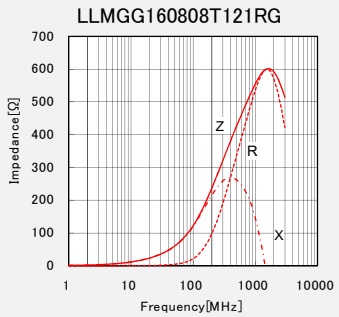
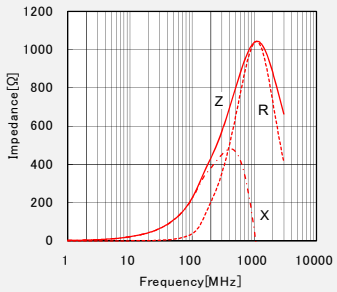


LLMGG160808T121RG



ELECTRICAL CHARACTERISTICS

LLMGG160808T221RG



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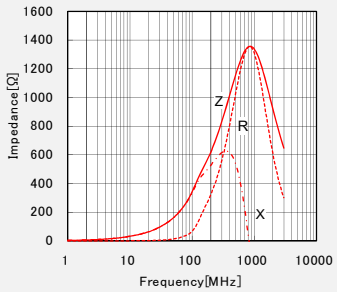

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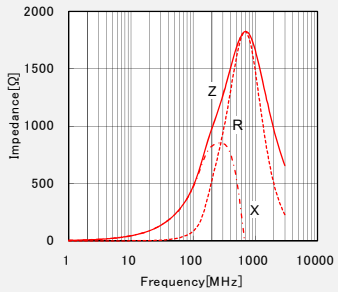

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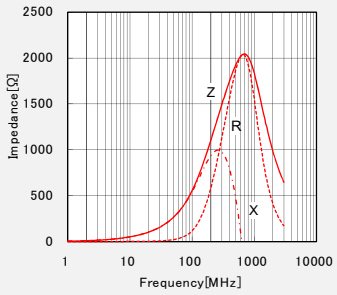
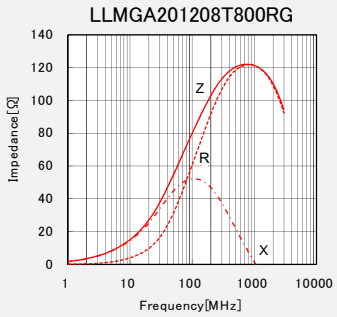


High impedance type

2012 type

LLMGA201208T800RG



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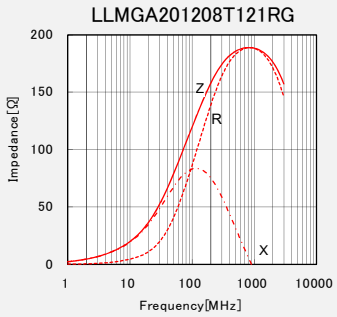

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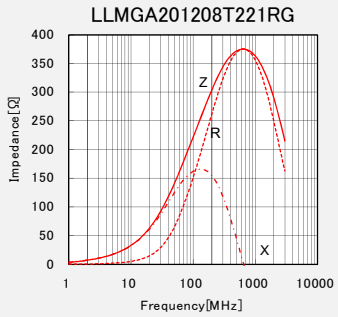

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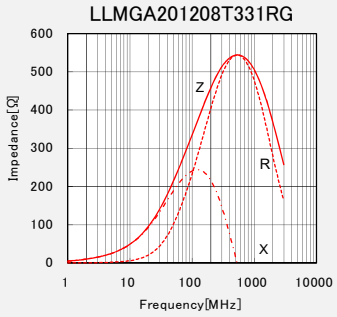
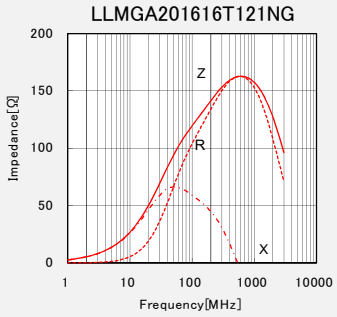
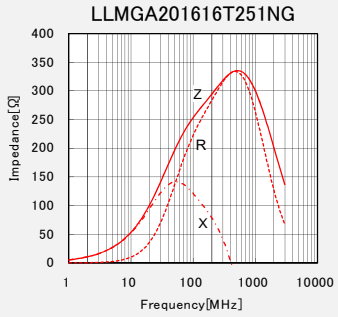


2016 type

LLMGA201616T121NG

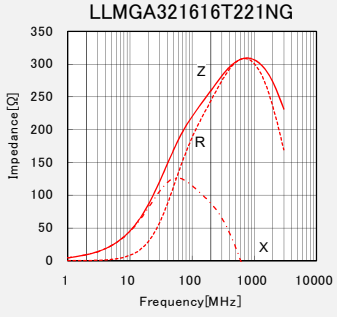


LLMGA201616T251NG

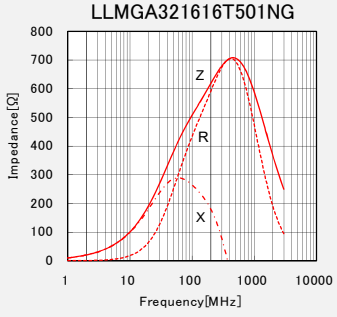


3216 type

LLMGA321616T221NG

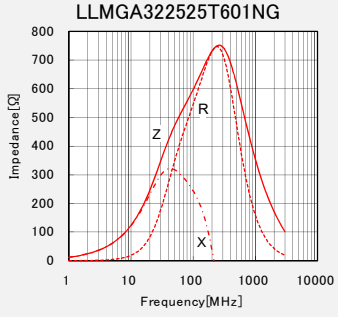


LLMGA321616T501NG



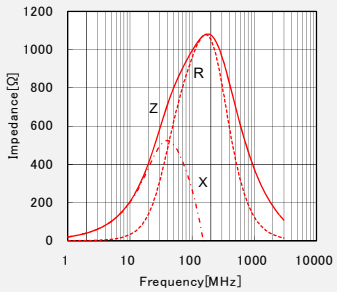
3225 type

LLMGA322525T601NG

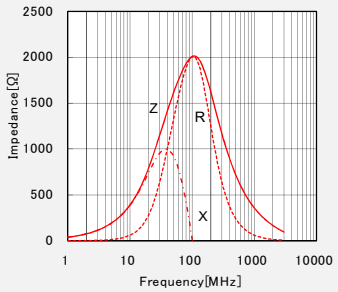


ELECTRICAL CHARACTERISTICS

LLMGA322525T102NG

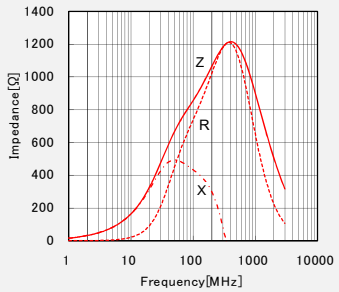


LLMGA322525T202NG



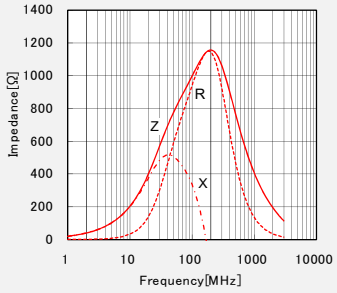
4516 type

LLMGA451616T851NG



4525 type

LLMGA452525T102NG



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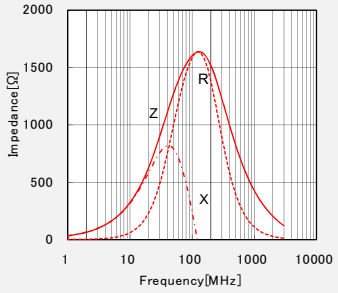
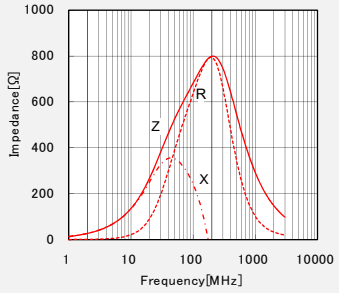
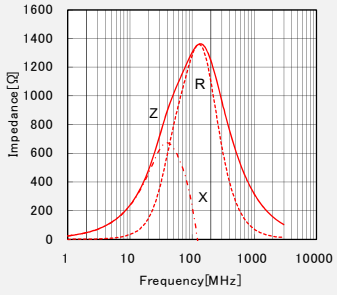


4532 type

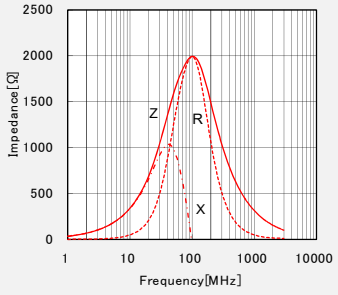
LLMGA453232L681RG



LLMGA453232L132RG

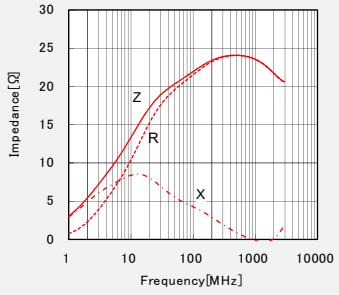


LLMGA453232L202RG

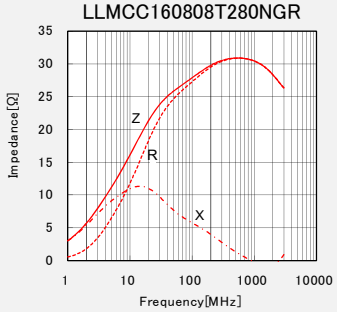


High current type

LLMCC160808T220NGR



LLMCC160808T280NGR



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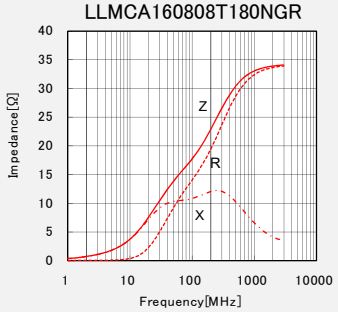
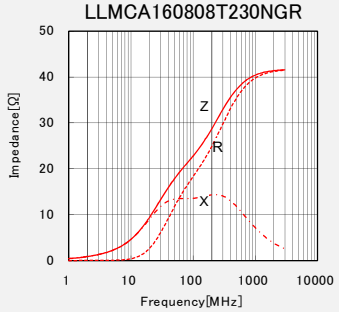


LLMCA160808T230NGR



Wire-wound Ferrite Bead Inductors for Power Lines LSMC/LSMG/LAMG/LCMC/LCMG/LBMC/LBMG/ LLMC/LLMG/LMMC/LMMG series

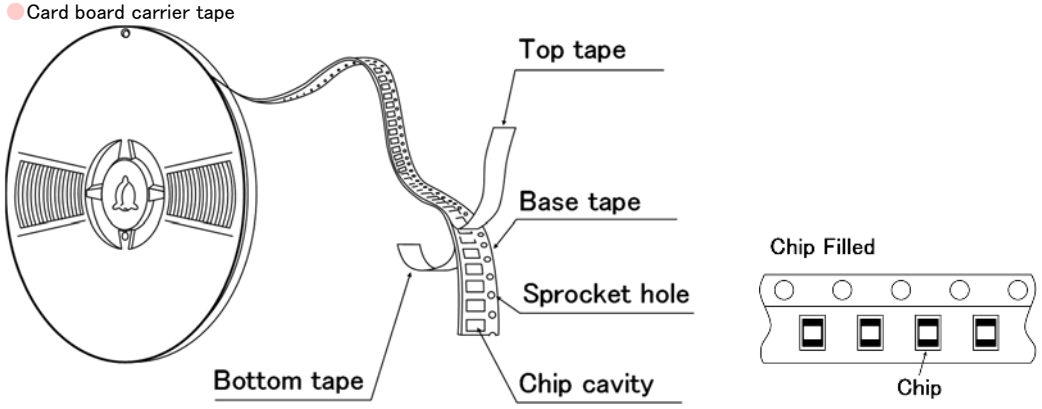
■PACKAGING

①Minimum Quantity

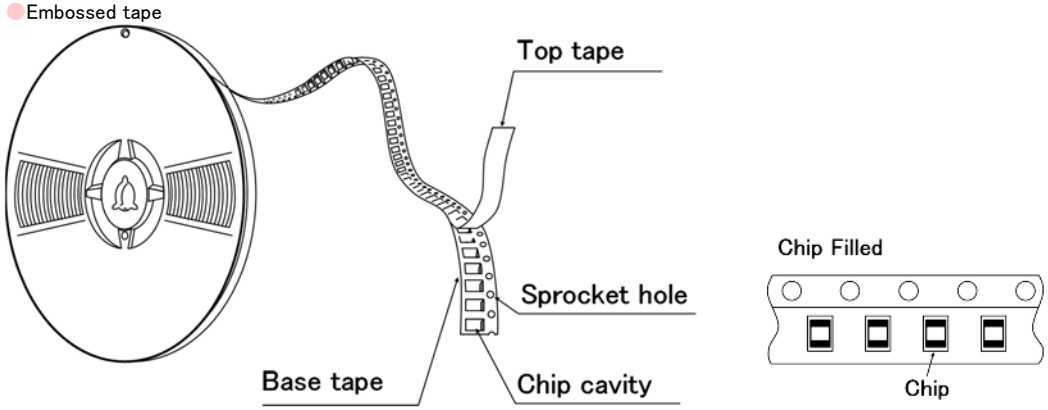
Type	Standard Quantity[pcs]	
	Paper Tape	Embossed Tape
1608(0603)	4000	—
2125(0805)	4000	—
2012(0805)	4000	—
2016(0806)	—	2000
3216(1206)	—	2000
3225(1210)	—	1000
4516(1806)	—	2000
4525(1810)	—	1000
4532(1812)	—	2000

②Tape Material

●Card board carrier tape

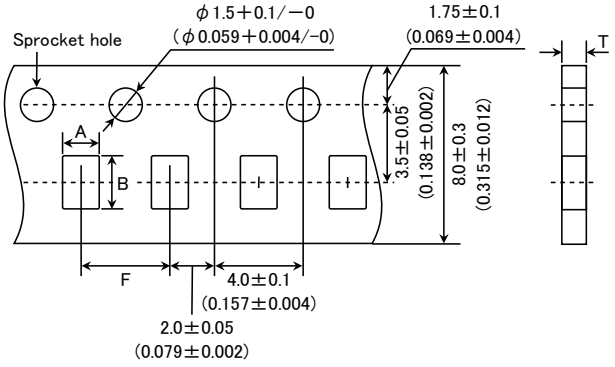


●Embossed tape



③Taping Dimensions

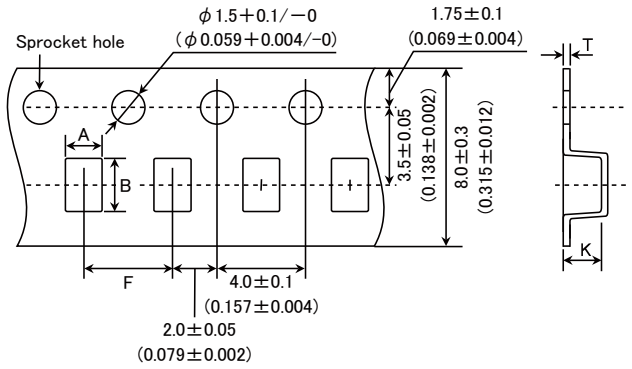
●Paper tape (0.315 inches wide)



Type	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
1608 (0603)	1.0±0.2 (0.039±0.008)	1.8±0.2 (0.071±0.008)	4.0±0.2 (0.157±0.008)	1.1max (0.043max)
2012 (0805)	1.5±0.2 (0.059±0.008)	2.3±0.2 (0.091±0.008)	4.0±0.2 (0.157±0.008)	1.1max (0.043max)

Unit : mm(inch)

●Embossed tape (0.315 inches wide)



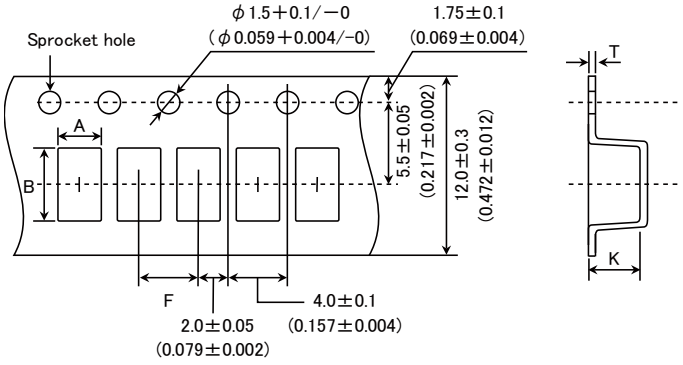
Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
2016 (0806)	1.8±0.2 (0.071±0.008)	2.2±0.2 (0.087±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
3216 ＊1 (1206)	1.9±0.2 (0.075±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	1.5max (0.059max)	0.3max (0.012max)
3216 ＊2 (1206)	1.9±0.2 (0.075±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
3225 (1210)	2.8±0.2 (0.110±0.008)	3.5±0.2 (0.138±0.008)	4.0±0.2 (0.157±0.008)	4.0max (0.157max)	0.6max (0.024max)

＊1 LSMC/LCMC/LBMC/LLMC/LMMC

＊2 LSMG/LAMG/LCMG/LBMG/LLMG/LMMG

Unit : mm(inch)

●Embossed tape (0.472 inches wide)



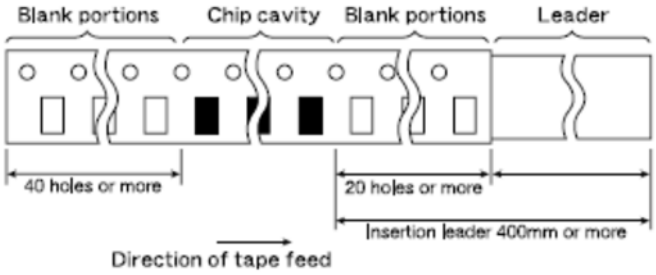
Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
4516 ＊1 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	1.5max (0.059max)	0.3max (0.012max)
4516 ＊2 (1806)	1.9±0.2 (0.075±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	2.6max (0.102max)	0.6max (0.024max)
4525 (1810)	2.9±0.2 (0.114±0.008)	4.9±0.2 (0.193±0.008)	4.0±0.2 (0.157±0.008)	4.0max (0.157max)	0.6max (0.024max)
4532 (1812)	3.6±0.2 (0.142±0.008)	4.9±0.2 (0.193±0.008)	8.0±0.2 (0.315±0.008)	4.0max (0.157max)	0.6max (0.024max)

＊1 LSMC/LCMC/LBMC/LLMC/LMMC

＊2 LSMG/LAMG/LCMG/LBMG/LLMG/LMMG

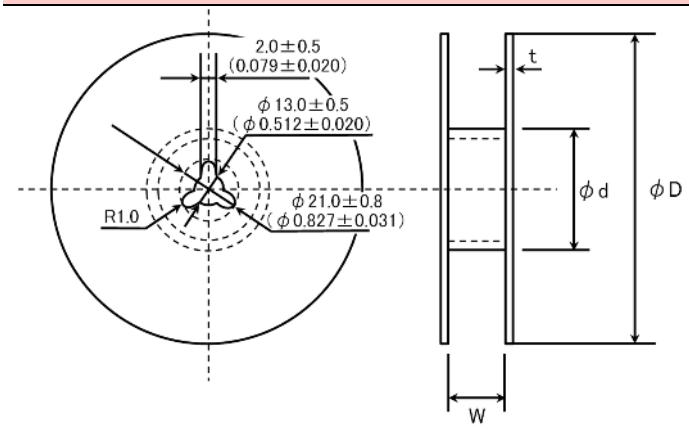
Unit : mm(inch)

④Leader and Blank portion



Insertion leader is 400 mm or more (including 20 empty cavities)
Empty cavities at end of reel: 40 holes or more

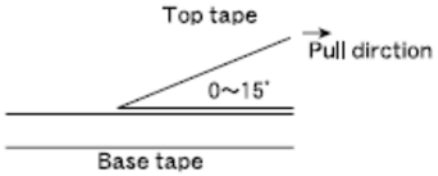
⑤Reel size



Type	φD	φd	W	t
1608(0603) 2012(0805) 2016(0806) 3216(1206) 3225(1210)	180+0/−3 (7.09+0/−0.118)	60+1/−0 (2.36+0.039/−0)	10.0±1.5 (0.394±0.059)	2.5max (0.098max)
4516(1806) 4525(1810)			14.0±1.5 (0.551±0.059)	
4532(1812)	330±2.0 (12.99±0.080)	100±1.0 (3.94±0.039)	14.0±2.0 (0.551±0.080)	3.0max (1.181max)

Unit : mm(inch)

⑥Top tape strength



The top tape requires a peel-off force of 0.1 to 1.0N (0.315 inches wide) / 0.1 to 1.3N (0.472 inches wide) in the direction of the arrow as illustrated below.

Wire-wound Ferrite Bead Inductors for Power Lines LSMC/LSMG series for General Electronic Equipment for Consumer
Wire-wound Ferrite Bead Inductors for Power Lines LLMC/LLMG series for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

■RELIABILITY DATA

1. Operating Temperature Range	
Specified Value	−40℃～＋125℃(Including self-generated heat)

2. Storage Temperature Range	
Specified Value	−40℃～＋85℃
Test Methods and Remarks	*Note: −5 to ＋40℃ in taped packaging

3. Impedance	
Specified Value	Within the specified range
Test Methods and Remarks	Measuring equipment : Impedance analyzer (HP4291A) or its equivalent Measuring frequency : 100±1 MHz

4. DC Resistance	
Specified Value	Within the specified range
Test Methods and Remarks	Four-terminal method Measuring equipment : Milliohm High-Tester 3226 (Hioki Denki) or its equivalent

5. Rated Current	
Specified Value	Within the specified range

6. Vibration	
Specified Value	Appearance : No significant abnormality Impedance change : Within ±30% of the initial value
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions.

Frequency	10～55Hz	
Overall Amplitude	1.5mm (Shall not exceed acceleration 196m/s^2)	
Sweeping Method	1min(10→55→10Hz)	
Time	X	2hours
	Y	
	Z	

7. Solderability	
Specified Value	90% or more of immersed surface of terminal electrode shall be covered with fresh solder.

Test Methods and Remarks	
Solder Temperature	245±5℃
Time	5 秒
Preconditioning	Immersion into flux.
Immersing Speed	25mm/s

8. Resistance to Soldering Heat	
Specified Value	Appearance : No significant abnormality Impedance change : Within ±30% of the initial value
Test Methods and Remarks	The test sample shall be exposed to reflow oven at 230℃ for 40 seconds, with peak temperature at 260＋0/−5℃ for 10 seconds, 2times. Test board material : Glass epoxy-resin Test board thickness : 1.6mm

9. Thermal Shock

Specified Value

Appearance : No significant abnormality
Impedance change : Within＋50/－10% of the initial value

Test Methods and Remarks

Conditions for 1 cycle

Step	Temperature (℃)	Duration (min)
1	－40±3℃	30±3
2	Room Temperature	Within 3
3	85±2℃	30±3
4	Room Temperature	Within 3

Number of cycles : 100
Mounting method : Soldering onto PC board
The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

10. Resistance to Humidity (steady state)

Specified Value

Appearances : No significant abnormality
Impedance change : Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow.
The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.

Temperature	40±2℃
Humidity	90～95%RH
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

11. Loading under Damp Heat

Specified Value

Appearance No significant abnormality
Impedance change Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow soldering.
The test samples shall be placed in thermostatic oven set at specified temperature, humidity, and applied the rated current continuously as shown in below table.

Temperature	40±2℃
Humidity	90～95%RH
Applied current	Rated current
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

12. High Temperature Loading Test

Specified Value

Appearance : No significant abnormality
Impedance change : Within ±30% of the initial value

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow soldering.
The test samples shall be placed in thermostatic oven set at specified temperature and applied the rated current continuously as shown in below table.

Temperature	85±2℃
Applied current	Rated current
Time	500＋24/－0 hour

The measurement, after the test, shall be carried out the test sample has been left for 2 to 3 hours

13. Bending Strength

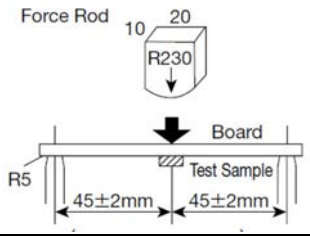
Specified Value

Appearance : No mechanical damage.

Test Methods and Remarks

The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm

Warp : 2mm
Testing board : Glass epoxy-resin substrate
Thickness : 0.8mm



14. Adhesion of Electrode	
Specified Value	No separation or indication of separation of electrode.
Test Methods and Remarks	Applied force : 5N Duration : 10 sec.

Note on standard condition: "standard condition" referred to herein is defined as follows:
5 to 35℃ of temperature, 45 to 85% relative humidity and 86 to 106kPa of air pressure.
When there are questions concerning measurement results:
In order to provide correlation data, the test shall be conducted under condition of 20±2℃ of temperature, 60 to 70% relative humidity and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

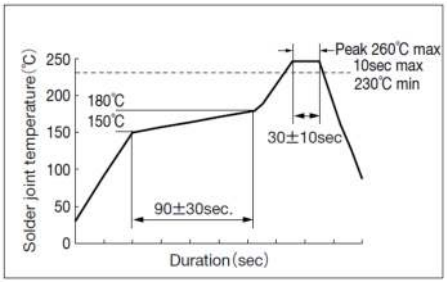
Wire-wound Ferrite Bead Inductors for Power Lines LSMC/LSMG/LAMG/LCMC/LCMG/LBMC/LBMG/ LLMC/LLMG/LMMC/LMMG series

■PRECAUTIONS

1. Circuit Design	
Precautions	◆Verification of operating environment, electrical rating and performance 1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any inductors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications. 2. When inductors are used in places where dew condensation develops and/or where corrosive gas such as hydrogen sulfide, sulfurous acid, or chlorine exists in the air, characteristic deterioration may occur. Please do not use inductors under such environmental conditions. ◆Operating Current (Verification of Rated current) 1. The operating current including inrush current for inductors must always be lower than their rated values. 2. Do not apply current in excess of the rated value because the inductance may be reduced due to the magnetic saturation effect. ◆Temperature rise Temperature rise of power choke coil depends on the installation condition in end products. Make sure that temperature rise of power choke coils in actual end products is within the specified temperature range.

2. PCB Design	
Precautions	◆Land pattern design 1. Please refer to a recommended land pattern.

3. Considerations for automatic placement	
Precautions	◆Adjustment of mounting machine 1. Excessive impact load should not be imposed on the products when mounting onto the PC boards. 2. Mounting and soldering conditions should be checked beforehand.
Technical considerations	◆Adjustment of mounting machine 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.

4. Soldering	
Precautions	◆Wave soldering 1. Please refer to the specifications in the catalog for a wave soldering. ◆Reflow soldering 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified. ◆Lead free soldering 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, etc. sufficiently. ◆Preheating when soldering Heating : The temperature difference between soldering and remaining heat should not be greater than 150℃. Cooling : The temperature difference between the components and cleaning process should not be greater than 100℃. ◆Recommended conditions for using a soldering iron Put the soldering iron on the land-pattern. Soldering iron's temperature – Below 350℃ Duration – 3 seconds or less The soldering iron should not directly touch the inductor.
Technical considerations	◆Wave, Reflow, Lead free soldering 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products. 【Recommended reflow condition】  ◆Preheating when soldering 1. There is a case that products get damaged by a heat shock.

	◆Recommended conditions for using a soldering iron 1. If products are used beyond the range of the recommended conditions, heat stresses may deform the products, and consequently degrade the reliability of the products.

5. Handling	
Precautions	◆Handling 1. Keep the inductors away from all magnets and magnetic objects. ◆Setting PC boards 1. When setting a chip mounted base board, please make sure that there is no residual stress to the chip by distortion in the board or at screw part. ◆Breakaway PC boards (splitting along perforations) 1. When splitting the PC board after mounting inductors, care should be taken not to give any stresses of deflection or twisting to the board. 2. Board separation should not be done manually, but by using the appropriate devices. ◆Mechanical considerations 1. Please do not give the inductors any excessive mechanical shocks.
Technical considerations	◆Handling 1. There is a case that a characteristic varies with magnetic influence. ◆Setting PC boards 1. There is a case that a characteristic varies with residual stress. ◆Breakaway PC boards (splitting along perforations) 1. Planning pattern configurations and the position of products should be carefully performed to minimize stress. ◆Mechanical considerations 1. There is a case to be damaged by a mechanical shock.

6. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled. ・Storage conditions Ambient temperature −5～40℃ Humidity Below 70% RH The recommended ambient temperature is below 30℃. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, inductors should be used within 6 months from the time of delivery.
Technical considerations	◆Storage 1. Under a high temperature and humidity environment, problems such as reduced solderability caused by oxidation of terminal electrodes and deterioration of taping/packaging materials may take place.