

# **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 October 2021. 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.

#### 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.

#### 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		
Application	Equipment *1	Category (Part Number Code *2)	Quality Grade	
Automotive	Automotive Electronic Equipment (POWERTRAIN, SAFETY)	А	1	
Automotive	Automotive Electronic Equipment (BODY & CHASSIS, INFOTAINMENT)	С	2	
Industrial	Telecommunications Infrastructure and Industrial Equipment	В	2	
Medical	Medical Devices classified as GHTF Class C (Japan Class III)	М	2	
iviedical	Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)	L	3	
Consumer	General Electronic Equipment	S	3	

<sup>\*</sup>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 3 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.

#### 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
  - 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.

# Wire-wound Metal Power Inductors MCOIL<sup>™</sup> LSDN series for General Electronic Equipment for Consumer

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

REFLOW

#### ■PART NUMBER

\* Operating Temp.: -40~+125°C (Including self-generated heat)

L	S	D	N	D	1	6	1	6	K	K	Т	1	R	0	М	М	
	(-	$\overline{\mathbf{D}}$		(2)		(3	3)		(2	1)	(5)		<b>6</b> )		(7)	(8)	(9)

#### (1)Series

Useries		
Code		
(1)(2)(3)(4)		
LSDN	Wire-wound Metal Power Industor for General Flectronic Equipment for Consumer	

#### (1) D | 1 | 0

(1) I Toddot droup		
Code		
L	Inductors	

#### (2) Category

Code	Recommended equipment	Quality Grade
S	General Electronic Equipment for Consumer	3

# (3) Type

Code	
D	Metal Wire-wound (Drum type)

#### (4) Features, Characteristics

(,, , , , , , , , , , , , , , , , , , ,						
Code						
N	Standard Power choke					

#### ②Features

Code	Feature
D	Bottom electrode (Ag × solder)

#### 3Dimensions (L × W)

Code	Dimensions (L × W) [mm]
1616	1.6 × 1.6
2020	2.0 × 2.0
3030	3.0 × 3.0
4040	4.0 × 4.0
5050	4.9 × 4.9

#### 4Dimensions (H)

Code	Dimensions (H) [mm]
JE	0.95
KK	1.0
MK	1.2
PK	1.4
WK	2.0

#### **5**Packaging

Code	Packaging
Т	Taning

#### 6 Nominal inductance

© Normal made and				
Code (example)	Nominal inductance[μH]			
R47	0.47			
1R0	1.0			
4R7	4.7			

#### 

#### 7 Inductance tolerance

Code	Inductance tolerance
М	±20%
N	±30%

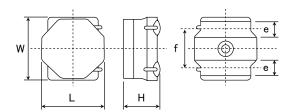
#### ®Special code

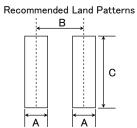
~ '	
Code	Special code
F	Ferrite coating
М	Metal coating

9Internal code

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

#### ■STANDARD EXTERNAL DIMENSIONS / STANDARD QUANTITY





Туре	Α	В	С
1616	0.5	1.10	1.65
2020	0.65	1.35	2.0
3030	0.8	2.2	2.7
4040	1.2	2.8	3.7
5050	1.5	3.6	4.2

 $\mathsf{Unit}\!:\!\mathsf{mm}$ 

Туре	L	W	Н	е	f	Standard quantity [pcs]Taping
1616KK	1.64±0.1 (0.065±0.004)	1.64±0.1 (0.065±0.004)	1.0 max (0.039 max)	0.40 +0.2/-0.1 (0.016 +0.008/-0.004)	1.0±0.2 (0.039±0.008)	2500
2020JE	2.0±0.15 (0.079±0.006)	2.0±0.15 (0.079±0.006)	0.95 max (0.037 max)	0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
2020KK	2.0±0.15 (0.079±0.006)	2.0±0.15 (0.079±0.006)	1.0 max (0.039 max)	0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
2020MK	2.0±0.15 (0.079±0.006)	2.0±0.15 (0.079±0.006)	1.2 max (0.047 max)	0.50±0.2 (0.02±0.008)	1.25±0.2 (0.049±0.008)	2500
3030KK	3.0±0.1 (0.118±0.004)	3.0±0.1 (0.118±0.004)	1.0 max (0.039 max)	0.90±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
3030MK	3.0±0.1 (0.118±0.004)	3.0±0.1 (0.118±0.004)	1.2 max (0.047 max)	0.90±0.2 (0.035±0.008)	1.9±0.2 (0.075±0.008)	2000
4040JE	4.0±0.2 (0.157±0.008)	4.0±0.2 (0.157±0.008)	0.95 max (0.037 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	1000
4040MK	4.0±0.2 (0.157±0.008)	4.0±0.2 (0.157±0.008)	1.2 max (0.047 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	1000
4040WK	4.0±0.2 (0.157±0.008)	4.0±0.2 (0.157±0.008)	2.0 max (0.079 max)	1.1±0.2 (0.043±0.008)	2.5±0.2 (0.098±0.008)	700
5050PK	4.9±0.2 (0.193±0.008)	4.9±0.2 (0.193±0.008)	1.4 max (0.055 max)	1.20±0.2 (0.047±0.008)	3.3±0.2 (0.130±0.008)	1000

Unit:mm(inch)

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

#### ■PART NUMBER

1616KK type	[Thickness: 1.0mm	max.]											
	Old part number		Nominal inductance		DC Basis	101		Rated currer	nt ※)[mA]		Managemen		
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DC Resis	DC Resistance[Ω]		Saturation current: Ide		current: Idc1	Temperature rise current: Idc2		Measuring
	(101 Telefolioc)		[ [ [ ]		Max.	Тур.	Max.	Тур.	Max.	Тур.	ir equency [iiii iz]		
LSDND1616KKTR47MM	MDKK1616TR47MM	RoHS	0.47	±20%	0.095	0.080	3,300	4,100	1,500	1,780	1		
LSDND1616KKT1R0MM	MDKK1616T1R0MM	RoHS	1.0	±20%	0.140	0.120	2,200	2,750	1,200	1,490	1		
LSDND1616KKT1R5MM	MDKK1616T1R5MM	RoHS	1.5	±20%	0.185	0.160	1,750	2,200	1,100	1,330	1		
LSDND1616KKT2R2MM	MDKK1616T2R2MM	RoHS	2.2	±20%	0.250	0.215	1,500	1,800	950	1,110	1		
LSDND1616KKT3R3MM	MDKK1616T3R3MM	RoHS	3.3	±20%	0.515	0.450	1,150	1,450	650	730	1		
LSDND1616KKT4R7MM	MDKK1616T4R7MM	RoHS	4.7	±20%	0.640	0.550	950	1,200	550	630	1		
LSDND1616KKT6R8MM	MDKK1616T6R8MM	RoHS	6.8	±20%	0.820	0.710	630	880	520	600	1		
LSDND1616KKT100MM	MDKK1616T100MM	RoHS	10	±20%	1.120	0.970	550	800	450	500	1		
LSDND1616KKT150MM	MDKK1616T150MM	RoHS	15	±20%	1.800	1.600	460	640	400	440	1		

2020JE type	[Thickness: 0.95mm max.]

	Old part number	Nominal inductance			DC Resis	tonac [ O ]	Rated current ※) [mA]				Measuring
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DO Resis	DO Resistance[ 12 ]		Saturation current: Idc1		Temperature rise current: Idc2	
			[μπ]		Max.	Тур.	Max.	Typ.	Max.	Typ.	in oquonoy [iiii iz]
LSDND2020JET1R0MM	MDJE2020T1R0MM	RoHS	1.0	±20%	0.121	0.106	3,100	3,800	1,550	1,800	1
LSDND2020JET2R2MM	MDJE2020T2R2MM	RoHS	2.2	±20%	0.266	0.230	1,550	1,900	1,050	1,200	1
LSDND2020JET3R3MM	MDJE2020T3R3MM	RoHS	3.3	±20%	0.340	0.290	1,350	1,600	950	1,100	1
LSDND2020JET4R7MM	MDJE2020T4R7MM	RoHS	4.7	±20%	0.475	0.410	1,200	1,550	850	950	1
LSDND2020JET6R8MM	MDJE2020T6R8MM	RoHS	6.8	±20%	0.630	0.550	800	1,100	750	850	1
LSDND2020JET100MM	MDJE2020T100MM	RoHS	10	±20%	1.040	0.910	700	900	550	600	1

#### 

	t the dream the drawn										
	Old mark marks		Nominal inductance		DC Resis	101		Rated curren	t ※)[mA]		Managemen
New part number	Old part number (for reference)	EHS	Nominal Inductance [ μ H]	Inductance tolerance	DC Resis	DO Resistance[ 1: ]		Saturation current: Idc1		Temperature rise current: Idc2	
	(for reference)		[μπ]		Max.	Тур.	Max.	Typ.	Max.	Typ.	ir equericy [Wir i2]
LSDND2020KKTR47MM	MDKK2020TR47MM	RoHS	0.47	±20%	0.046	0.040	3,500	4,150	2,200	2,500	1
LSDND2020KKTR68MM	MDKK2020TR68MM	RoHS	0.68	±20%	0.060	0.052	3,200	3,650	2,000	2,100	1
LSDND2020KKT1R0MM	MDKK2020T1R0MM	RoHS	1.0	±20%	0.085	0.074	2,900	3,400	1,700	1,900	1
LSDND2020KKT1R5MM	MDKK2020T1R5MM	RoHS	1.5	±20%	0.133	0.115	1,900	2,250	1,350	1,500	1
LSDND2020KKT2R2MM	MDKK2020T2R2MM	RoHS	2.2	±20%	0.165	0.139	1,650	1,950	1,200	1,350	1
LSDND2020KKT3R3MM	MDKK2020T3R3MM	RoHS	3.3	±20%	0.275	0.240	1,300	1,550	940	1,050	1
LSDND2020KKT4R7MM	MDKK2020T4R7MM	RoHS	4.7	±20%	0.435	0.375	1,050	1,250	750	850	1
LSDND2020KKT100MM	MDKK2020T100MM	RoHS	10	±20%	0.690	0.600	750	900	630	680	1
LSDND2020KKT150MM	MDKK2020T150MM	RoHS	15	±20%	1.180	1.020	550	750	480	550	1

#### 

	Old part number	number	Nominal inductance		DC Desire	DC Resistance[ $\Omega$ ]		Rated current ※) [mA]				
New part number	(for reference)	EHS	IS [μH]	Inductance tolerance	DC Resis			Saturation current: Idc1		Temperature rise current: Idc2		
					Max.	Тур.	Max.	Тур.	Max.	Тур.	in equality [ivii i2]	
LSDND2020MKTR47MM	MDMK2020TR47MM	RoHS	0.47	±20%	0.046	0.040	4,200	4,800	2,300	2,450	1	
LSDND2020MKTR68MM	MDMK2020TR68MM	RoHS	0.68	±20%	0.058	0.050	3,500	4,100	2,000	2,200	1	
LSDND2020MKT1R0MM	MDMK2020T1R0MM	RoHS	1.0	±20%	0.064	0.056	2,550	2,900	1,900	2,050	1	
LSDND2020MKT1R5MM	MDMK2020T1R5MM	RoHS	1.5	±20%	0.086	0.075	2,000	2,300	1,650	1,750	1	
LSDND2020MKT2R2MM	MDMK2020T2R2MM	RoHS	2.2	±20%	0.109	0.095	1,750	2,000	1,450	1,550	1	
LSDND2020MKT3R3MM	MDMK2020T3R3MM	RoHS	3.3	±20%	0.178	0.155	1,350	1,550	1,150	1,200	1	
LSDND2020MKT4R7MM	MDMK2020T4R7MM	RoHS	4 7	+20%	0.242	0.210	1 150	1 300	950	1 050	1	

#### ●3030KK type 【Thickness:1.0mm max.】

	Old part number	mber 5110	Nominal inductance		DC Resis	LO Jacque		Measuring			
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DC Resis	DO Resistance[ 1: ]		current: Idc1	Temperature rise current: Idc2		frequency[MHz]
	· ·		C /4 1.13		Max.	Тур.	Max.	Typ.	Max.	Тур.	moquonoy [mni2]
LSDND3030KKTR47MM	MDKK3030TR47MM	RoHS	0.47	±20%	0.039	0.033	5,400	6,500	3,900	4,500	1
LSDND3030KKT1R0MM	MDKK3030T1R0MM	RoHS	1.0	±20%	0.086	0.074	4,400	5,200	2,400	2,800	1
LSDND3030KKT1R5MM	MDKK3030T1R5MM	RoHS	1.5	±20%	0.100	0.087	3,000	3,500	2,100	2,400	1
LSDND3030KKT2R2MM	MDKK3030T2R2MM	RoHS	2.2	±20%	0.144	0.125	2,500	3,000	1,900	2,200	1
LSDND3030KKT3R3MM	MDKK3030T3R3MM	RoHS	3.3	±20%	0.248	0.215	2,000	2,400	1,350	1,500	1
LSDND3030KKT4R7MM	MDKK3030T4R7MM	RoHS	4.7	±20%	0.345	0.300	1,700	2,000	1,150	1,300	1
LSDND3030KKT6R8MM	MDKK3030T6R8MM	RoHS	6.8	±20%	0.437	0.380	1,400	1,700	1,000	1,150	1
LSDND3030KKT100MM	MDKK3030T100MM	RoHS	10	±20%	0.575	0.500	1,100	1,300	850	1,000	1

#### ●3030MK type 【Thickness:1.2mm max.】

- ooooiviik type	THIORIESS. I.ZIIII	i ilian.									
	Old part number		Nominal inductance	nductance DC Resistance Ω		tanca[0]			Measuring		
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DO Resis	Do nesistanoe[1:1		Saturation current: Idc1		Temperature rise current: Idc2	
	(101 1010101100)		2,111		Max.	Тур.	Max.	Тур.	Max.	Typ.	in oquonoy [iiii iz]
LSDND3030MKTR30MM	MDMK3030TR30MM	RoHS	0.30	±20%	0.020	0.017	7,600	9,200	5,500	6,400	1
LSDND3030MKTR33MM	MDMK3030TR33MM	RoHS	0.33	±20%	0.020	0.017	6,400	8,700	5,500	6,400	1
LSDND3030MKTR47MM	MDMK3030TR47MM	RoHS	0.47	±20%	0.027	0.023	6,300	7,500	4,700	5,500	1
LSDND3030MKT1R0MM	MDMK3030T1R0MM	RoHS	1.0	±20%	0.050	0.043	4,300	5,100	3,300	3,900	1
LSDND3030MKT1R5MM	MDMK3030T1R5MM	RoHS	1.5	±20%	0.074	0.064	3,400	4,100	2,500	3,000	1
LSDND3030MKT2R2MM	MDMK3030T2R2MM	RoHS	2.2	±20%	0.112	0.097	2,800	3,600	2,100	2,400	1
LSDND3030MKT3R3MM	MDMK3030T3R3MM	RoHS	3.3	±20%	0.167	0.145	2,100	2,700	1,650	1,900	1
LSDND3030MKT4R7MM	MDMK3030T4R7MM	RoHS	4.7	±20%	0.263	0.228	1,800	2,300	1,350	1,550	1

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

#### PART NUMBER

4040JE type	[Thickness: 0.95mi	m max.	]								
	Old part number		Nominal inductance		DC Posis	1012222	Rated current ※)[mA]				Measuring
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DC Resistance[Ω]		Saturation current: Idc1		Temperature rise current: Idc2		frequency[MHz]
	(101 1010101100)		2,11		Max.	Тур.	Max.	Тур.	Max.	Typ.	oquonoy [
LSDND4040JETR47MM	MDJE4040TR47MM	RoHS	0.47	±20%	0.040	0.035	6,000	7,900	4,000	4,500	1
LSDND4040JET1R0MM	MDJE4040T1R0MM	RoHS	1.0	±20%	0.069	0.060	4,700	5,700	3,000	3,500	1
LSDND4040JET1R5MM	MDJE4040T1R5MM	RoHS	1.5	±20%	0.084	0.073	3,000	4,000	2,700	3,100	1
LSDND4040JET2R2MM	MDJE4040T2R2MM	RoHS	2.2	±20%	0.115	0.100	2,400	3,100	2,400	2,700	1
LSDND4040JET3R3MM	MDJE4040T3R3MM	RoHS	3.3	±20%	0.200	0.175	2,000	2,600	1,800	2,000	1
LSDND4040JET4R7MM	MDJE4040T4R7MM	RoHS	4.7	±20%	0.250	0.220	1,900	2,300	1,600	1,900	1
LSDND4040JET6R8MM	MDJE4040T6R8MM	RoHS	6.8	±20%	0.370	0.320	1,500	1,800	1,300	1,500	1
LSDND4040JET100MM	MDJE4040T100MM	R₀HS	10	±20%	0.510	0.440	1.400	1.700	1.100	1.300	1

4040MK F type [Thickness:1.2mm max.]

	Old part number	Nominal inductance		DC Resistance[Ω]		Rated current ※) [mA]				Manageria	
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DC Resis	rance[32]	Saturation of	urrent: Idc1	Temperature ri	se current: Idc2	Measuring frequency[kHz]
	(for reference)		[μη]		Max.	Тур.	Max.	Тур.	Max.	Тур.	irequency[kH2]
LSDND4040MKTR47MF	MDMK4040TR47MF	RoHS	0.47	±20%	0.029	0.025	7,500	10,000	4,600	5,400	100
LSDND4040MKT1R0MF	MDMK4040T1R0MF	RoHS	1.0	±20%	0.047	0.041	5,200	7,500	3,500	4,200	100
LSDND4040MKT1R2MF	MDMK4040T1R2MF	RoHS	1.2	±20%	0.047	0.041	4,200	6,200	3,500	4,200	100
LSDND4040MKT1R5MF	MDMK4040T1R5MF	RoHS	1.5	±20%	0.065	0.056	3,700	5,400	3,300	3,600	100
LSDND4040MKT2R2MF	MDMK4040T2R2MF	RoHS	2.2	±20%	0.092	0.080	3,200	4,500	2,500	2,900	100

4040MK type [Thickness: 1.2mm max.]

	L										
	Old part number		Nominal inductance		DC Resis	tongo[0]			t ※)[mA]		Measuring
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DO Resis	tance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[MHz]
	(101 1010101100)		2,11		Max.	Тур.	Max.	Тур.	Max.	Тур.	oquonoy [
LSDND4040MKTR68MM	MDMK4040TR68MM	RoHS	0.68	±20%	0.029	0.025	6,700	7,800	5,000	5,700	1
LSDND4040MKT1R0MM	MDMK4040T1R0MM	RoHS	1.0	±20%	0.036	0.031	5,000	6,200	4,500	5,100	1
LSDND4040MKT1R5MM	MDMK4040T1R5MM	RoHS	1.5	±20%	0.065	0.056	4,500	5,600	3,200	3,600	1
LSDND4040MKT2R2MM	MDMK4040T2R2MM	RoHS	2.2	±20%	0.079	0.069	3,800	4,500	2,800	3,200	1
LSDND4040MKT3R3MM	MDMK4040T3R3MM	RoHS	3.3	±20%	0.130	0.113	3,200	4,000	2,200	2,500	1
LSDND4040MKT4R7MM	MDMK4040T4R7MM	RoHS	4.7	±20%	0.160	0.140	2,500	3,000	1,900	2,200	1
LSDND4040MKT6R8MM	MDMK4040T6R8MM	RoHS	6.8	±20%	0.230	0.200	1,900	2,200	1,600	1,800	1
LSDND4040MKT100MM	MDMK4040T100MM	RoHS	10	±20%	0.330	0.280	1,700	2,000	1,400	1,600	1

4040WK type [Thickness: 2.0mm max.]

	Old part number		Nominal inductance		DC Resis	101		Rated curren	t ※)[mA]		Managerian
New part number	(for reference)	EHS	[ $\mu$ H]	Inductance tolerance	DC Resis	rance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[MHz]
	(for forerende)		LμIII		Max.	Typ.	Max.	Typ.	Max.	Typ.	irequeriey [iiiri2]
LSDND4040WKTR33NM	MDWK4040TR33NM	RoHS	0.33	±30%	0.013	0.011	16,000	21,000	7,800	8,800	1
LSDND4040WKTR47NM	MDWK4040TR47NM	RoHS	0.47	±30%	0.013	0.011	10,000	15,000	7,800	8,800	1
LSDND4040WKTR56NM	MDWK4040TR56NM	RoHS	0.56	±30%	0.016	0.014	9,000	13,000	6,500	7,500	1
LSDND4040WKTR68MM	MDWK4040TR68MM	RoHS	0.68	±20%	0.016	0.014	8,000	12,000	7,300	8,300	1
LSDND4040WKT1R0MM	MDWK4040T1R0MM	RoHS	1.0	±20%	0.027	0.023	7,000	9,400	5,100	5,800	1
LSDND4040WKT1R5MM	MDWK4040T1R5MM	RoHS	1.5	±20%	0.041	0.035	7,000	9,400	4,100	4,700	1
LSDND4040WKT2R2MM	MDWK4040T2R2MM	RoHS	2.2	±20%	0.054	0.047	5,400	7,500	3,500	4,000	1
LSDND4040WKT3R3MM	MDWK4040T3R3MM	RoHS	3.3	±20%	0.075	0.066	3,700	5,200	3,000	3,300	1
LSDND4040WKT4R7MM	MDWK4040T4R7MM	RoHS	4.7	±20%	0.107	0.093	3,500	5,000	2,500	2,800	1
LSDND4040WKT6R8MM	MDWK4040T6R8MM	RoHS	6.8	±20%	0.158	0.138	2,900	4,000	2,000	2,300	1
LSDND4040WKT100MM	MDWK4040T100MM	RoHS	10	±20%	0.194	0.169	2,200	3,100	1,600	1,900	1
LSDND4040WKT220MM	MDWK4040T220MM	RoHS	22	±20%	0.460	0.400	1,500	2,100	1,200	1,400	1
LSDND4040WKT330MM	MDWK4040T330MM	RoHS	33	±20%	0.720	0.625	1.200	1.700	800	1.000	1

●5050PK type	[Thickness: 1.4mm	max.]	

	Old part number		Nominal inductance		DC Resistance [Ω]		Rated current ※) [mA]				Measuring
New part number	(for reference)	EHS	Γ μ H]	Inductance tolerance	DO Nesisi	rance[32]	Saturation of	current: Idc1	Temperature ri	se current: Idc2	Measuring frequency[MHz]
	(101 1010101100)				Max.	Тур.	Max.	Тур.	Max.	Тур.	moquonoy [mm2]
LSDND5050PKT1R0MM	MDPK5050T1R0MM	RoHS	1.0	±20%	0.040	0.034	8,500	10,000	4,300	4,700	1
LSDND5050PKT2R2MM	MDPK5050T2R2MM	RoHS	2.2	±20%	0.055	0.047	4,100	5,000	3,600	4,200	1
LSDND5050PKT3R3MM	MDPK5050T3R3MM	RoHS	3.3	±20%	0.086	0.073	3,800	4,500	2,900	3,400	1
LSDND5050PKT4R7MM	MDPK5050T4R7MM	RoHS	4.7	±20%	0.102	0.088	3,500	4,200	2,500	3,000	1
LSDND5050PKT6R8MM	MDPK5050T6R8MM	RoHS	6.8	±20%	0.138	0.12	2,700	3,200	2,200	2,500	1
LSDND5050PKT100MM	MDPK5050T100MM	RoHS	10	±20%	0.225	0.19	2,200	2,600	1,700	2,000	1

- %) The saturation current value (Idc1) is the DC current value having inductance decrease down to 30%. (at 20°C) %) The temperature rise current value (Idc2) is the DC current value having temperature increase up to 40°C. (at 20°C)
- XX) The rated current is the DC current value that satisfies both of current value saturation current value and temperature rise current value.

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

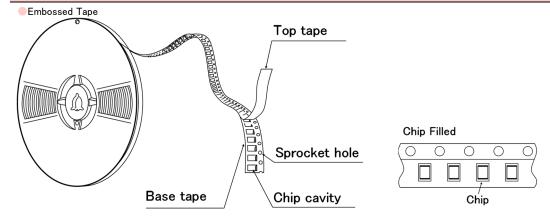
### Wire-wound Metal Power Inductors MCOIL™ LSDN/LCDN/LBDN/LLDN/LMDN series

#### PACKAGING

#### **1**Minimum Quantity

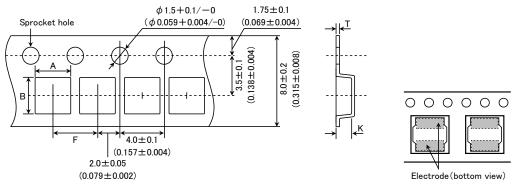
Туре	Standard Quantity [pcs]
туре	Tape & Reel
1616KK	2500
2020JE	
2020KK	2500
2020MK	
3030KK	2000
3030MK	2000
4040JE	1000
4040MK	1000
4040WK	700
5050PK	1000

#### **2**Tape Material



#### 3 Taping dimensions

Embossed tape 8mm wide (0.315 inches wide)

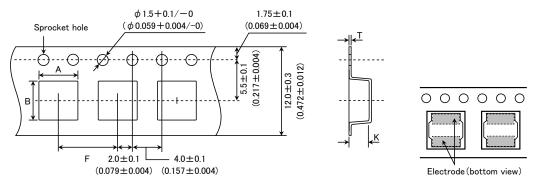


Type	Chip	cavity	Insertion pitch	Tape thickness			
туре	Α	В	F	Т	K		
1616VV	1.79±0.1	1.79±0.1	4.0±0.1	0.25±0.05	1.1±0.1		
1616KK	$(0.071 \pm 0.004)$	$(0.071 \pm 0.004)$	$(0.157 \pm 0.004)$	$(0.010\pm0.002)$	$(0.043 \pm 0.004)$		
2020JE 2020KK 2020MK	2.2±0.1 (0.102±0.004)	2.2±0.1 (0.102±0.004)	4.0±0.1 (0.157±0.004)	0.25±0.05 (0.009±0.002)	1.3±0.1 (0.051±0.004)		
3030KK 3030MK	3.2±0.1 (0.126±0.004)	3.2±0.1 (0.126±0.004)	4.0±0.1 (0.157±0.004)	0.3±0.05 (0.012±0.002)	1.4±0.1 (0.055±0.004)		

Unit:mm(inch)

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

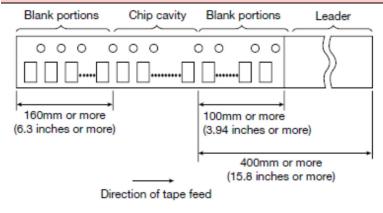
#### Embossed tape 12mm wide (0.47 inches wide)



Type	Chip o	cavity	Insertion pitch	Tape thickness			
туре	Α	В	F	Т	K		
4040JE	4.3±0.1	4.3±0.1	8.0±0.1	0.3±0.05	1.6±0.1		
4040MK	$(0.169 \pm 0.004)$	$(0.169 \pm 0.004)$	$(0.315 \pm 0.004)$	$(0.012\pm0.002)$	$(0.063 \pm 0.004)$		
4040WK	4.3±0.1 (0.169±0.004)	4.3±0.1 (0.169±0.004)	8.0±0.1 (0.315±0.004)	0.3±0.05 (0.012±0.002)	2.3±0.1 (0.091±0.004)		
5050PK	5.25±0.1 (0.207±0.004)	5.25±0.1 (0.207±0.004)	8.0±0.1 (0.315±0.004)	0.3±0.1 (0.012±0.004)	1.6±0.1 (0.063±0.004)		

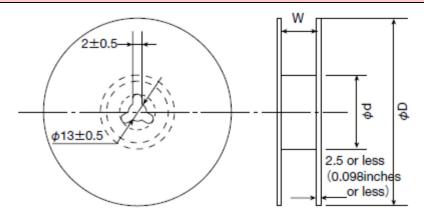
Unit:mm(inch)

#### 4 Leader and Blank portion



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

#### ⑤Reel size



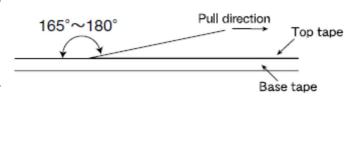
Type	R	leel size (Reference value	s)
Туре	ΦD	Ød	W
1616KK			
2020JE			
2020KK	180±0.5	60±1.0	$10.0 \pm 1.5$
2020MK	$(7.087 \pm 0.019)$	$(2.36 \pm 0.04)$	$(0.394 \pm 0.059)$
3030KK			
3030MK			
4040JE			
4040MK	180±3.0	60±2.0	$14.0 \pm 1.5$
4040WK	$(7.087 \pm 0.118)$	$(2.36 \pm 0.08)$	$(0.551 \pm 0.059)$
5050PK			

Unit:mm(inch)

#### **6**Top Tape Strength

#### Top tape strength

Type	Peel-off strength
MDKK1616	
MDJE2020	0.1N∼1.0N 0.1N∼1.3N
MDKK2020	0.1N1.0N
MDMK2020	0.1N~1.0N
MDKK3030	
MDMK3030	
MDJE4040	
MDMK4040	0.1N1.2N
MDWK4040	0.1N~1.3N
MDPK5050	



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

# Wire-wound Metal Power Inductors MCOIL<sup>™</sup> LSDN series for General Electronic Equipment for Consumer Wire-wound Metal Power Inductors MCOIL<sup>™</sup> LLDN series for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)

#### RELIABILITY DATA

1. Operating Temp	erature Range
Specified Value	-40~+125°C
Test Methods and Remarks	Including self-generated heat
2. Storage Temper	
Specified Value	-40~+85°C
Test Methods and Remarks	-5 to 40°C for the product with taping.
3. Rated current	
Specified Value	Within the specified tolerance
Specifical value	
4. Inductance	
Specified Value	Within the specified tolerance
Test Methods	Measuring equipment : LCR Meter (HP 4285A or equivalent)
and Remarks	Measuring condition : Please see item list.
	1
5. DC Resistance	
Specified Value	Within the specified tolerance
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3227 or equivalent)
6. Self resonance t	requency
Specified Value	_
7. Temperature ch	aracteristic
Specified Value	Inductance change: Within ±10%
Test Methods and Remarks	Measurement of inductance shall be taken at temperature range within $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ . With reference to inductance value at $+20^{\circ}\text{C}$ ., change rate shall be calculated.
8. Resistance to fl	exure of substrate
Specified Value	No 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.  Test board size : 100 × 40 × 1.0 mm  Test board material : Glass epoxy-resin  Solder cream thickness : 0.10 mm  Board  Board  Board  45±2mm  45±2mm
9. Insulation resist	ance : between wires
Specified Value	_
10. Insulation resis	tance : between wire and core
Specified Value	_
<del></del>	

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

11. Withstanding vo	oltage : between wire and core							
Specified Value	_							
12. Adhesion of ter	rminal electrode							
Specified Value	Shall not come off PC board							
- CPCOCu Value	The test samples shall be soldered to the test board by the reflow.							
Test Methods	Applied force : 10N to X and Y directions.							
and Remarks	Duration : 5s.							
	Solder cream thickness : 0.10mm.							
13. Resistance to	vibration							
Specified Value	Inductance change : Within ±10%							
Specified Value	No significant abnormality in appearance.							
	The test samples shall be soldered to the test board by the reflow.							
	Then it shall be submitted to below test conditions.							
	Frequency Range 10~55Hz							
Test Methods	Total Amplitude 1.5mm (May not exceed acceleration 196m/s²)  Sweeping Method 10Hz to 55Hz to 10Hz for 1min.							
and Remarks	X							
	Time Y For 2 hours on each X, Y, and Z axis.							
	Z							
	Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.							
14. Solderability								
Specified Value	At least 90% of surface of terminal electrode is covered by new solder.							
	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table.							
Test Methods and	Flux: Ethanol solution containing rosin 25%.							
Remarks	Solder Temperature $245\pm5^{\circ}$ C       Time $5\pm1.0$ sec.							
	Yard   Yard							
	William Cook appar. 7 in class of mountaing community of minior cod.							
15. Resistance to s	coldering heat							
To. Nesistance to s	Inductance change: Within ±10%							
Specified Value	No significant abnormality in appearance.							
	The test sample shall be exposed to reflow oven at 230±5°C for 40 seconds, with peak temperature at 260±5°C for 5 seconds.	nds. 2 times						
Test Methods	Test board material : Glass epoxy-resin	,						
and Remarks	Test board thickness : 1.0mm							
16. Thermal shock								
Specified Value	Inductance change : Within ±10%							
Opecified Value	No significant abnormality in appearance.							
	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature to	for specified						
	time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated 100 cycles.							
Test Methods	Conditions of 1 cycle  Step Temperature (°C) Duration (min)							
and Remarks	1 -40±3 30±3							
	2 Room temperature Within 3							
	3 +85±2 30±3							
	4 Room temperature Within 3							
17. Damp heat								
	Inductance change : Within ±10%							
Specified Value								
Specified Value	No significant abnormality in appearance.							
•	The test samples shall be soldered to the test board by the reflow.							
Specified Value  Test Methods and Remarks								

90~95%RH 500+24/-0 hour

Humidity

Time

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

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.		
Test Methods	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 and applied the rated current continuously as shown in below table.		
and Remarks	Temperature	60±2°C	
	Humidity	90~95%RH	
	Applied current	Rated current	
	Time	500+24/-0 hour	

19. Low temperatur	e life test		
Specified Value	Inductance change : Within ±10%  No significant abnormality in appearance.		
Test Methods	The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below table.		
and Remarks	Temperature	-40±2°C	
	Time	500+24/-0 hour	

Specified Value	_		
21. Loading at high	temperature life test		
Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.		
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 applied the rated current continuously as shown in below table.  Temperature  85±2°C		

20. High temperature life test

Applied current

Time

Rated current

500+24/-0 hour

22. Standard condition			
Specified Value	Standard test condition: Unless otherwise specified, temperature is 20±15°C and 65±20% of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of 20±2°C of temperature, 65±5% relative humidity.  Inductance is in accordance with our measured value.		

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

#### Wire-wound Metal Power Inductors MCOIL™ LSDN/LCDN/LBDN/LLDN/LMDN 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.

#### 

#### 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

- ◆Reflow soldering
- 1. Please contact any of our offices for a reflow soldering, and refer to the recommended condition specified.
- 2. The product shall be used reflow soldering only.
- 3. Please do not add any stress to a product until it returns in normal temperature after reflow soldering.
- ◆Lead free soldering

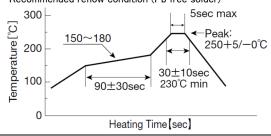
#### Precautions

- 1. When using products with lead free soldering, we request to use them after confirming adhesion, temperature of resistance to soldering heat, soldering etc sufficiently.
- ◆Recommended conditions for using a soldering iron (NR10050 Type)
  - Put the soldering iron on the land-pattern.
  - Soldering iron's temperature Below 350°C
  - Duration 3 seconds or less
  - The soldering iron should not directly touch the inductor.

#### ◆Reflow 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.
  - •NR30/40/50/60/80, NRV20/30, NRH24/30, NRS20/40/50/60/80 Type, NR10050 Type, NS101/125 Type Recommended reflow condition (Pb free solder)

# Technical considerations



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

5. Cleaning	
Precautions	♦ Cleaning conditions 1. Washing by supersonic waves shall be avoided.
Technical considerations	◆Cleaning conditions  1. If washed by supersonic waves, the products might be broken.

considerations	1. If washed by supersonic waves, the products might be broken.		
6. Handling			
Precautions	<ul> <li>✦ Handling</li> <li>1. Keep the product away from all magnets and magnetic objects.</li> <li>✦ Breakaway PC boards (splitting along perforations)</li> <li>1. When splitting the PC board after mounting product, care should be taken not to give any stresses of deflection or twisting to the board.</li> <li>2. Board separation should not be done manually, but by using the appropriate devices.</li> <li>✦ Mechanical considerations</li> <li>1. Please do not give the product any excessive mechanical shocks.</li> <li>2. Please do not add any shock and power to a product in transportation.</li> <li>✦ Pick-up pressure</li> <li>1. Please do not push to add any pressure to a winding part. Please do not give any shock and push into a ferrite core exposure part.</li> <li>✦ Packing</li> <li>1. Please avoid accumulation of a packing box as much as possible.</li> <li>✦ Board mounting</li> <li>1. There shall be no pattern or via between terminals at the bottom of product.</li> <li>2. Components which are located in peripheral of product shall not make contact with surface (top, side) of product.</li> </ul>		
Technical considerations	<ul> <li>✦ Handling</li> <li>1. There is a case that a characteristic varies with magnetic influence.</li> <li>✦ Breakaway PC boards (splitting along perforations)</li> <li>1. The position of the product on PCBs shall be carefully considered to minimize the stress caused from splitting of the PCBs.</li> <li>✦ Mechanical considerations</li> <li>1. There is a case to be damaged by a mechanical shock.</li> <li>2. There is a case to be broken by the handling in transportation.</li> <li>✦ Pick-up pressure</li> <li>1. Damage and a characteristic can vary with an excessive shock or stress.</li> <li>✦ Packing</li> <li>1. If packing boxes are accumulated, that could cause a deformation on packing tapes or a damage on the products.</li> <li>✦ Board mounting</li> <li>1. If there is pattern or via between terminals at the bottom of product, it may cause characteristics change.</li> <li>2. If components which are located in peripheral of product make contact with surface (top, side) of product, it may cause damage or characteristics change.</li> </ul>		

7.	Storage	conditions
----	---------	------------

# ◆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. • Recommended conditions

Precautions

Ambient temperature: -5~40°C

Humidity : Below 70% RH

• The ambient temperature must be kept below 30°C. Even under ideal storage conditions, solderability of products electrodes may decrease as time passes.

For this reason, product should be used within 6 months from the time of delivery.

In case of storage over 6 months, solderability shall be checked before actual usage.

# 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.

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

## **X-ON Electronics**

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Power Inductors - SMD category:

Click to view products by Taiyo Yuden manufacturer:

Other Similar products are found below:

IHLP1616BZRZR10ML1 IDC5020ER681M VLBUC12060120R12LF3 LCRNJ12575GL470MN LLQPB201214T1R0M LLXND3030QKT470MNG LLQPB160807T4R7M LLAPB2016KKTR33M LBXND4040TKL330MDG LLXNE3030KKT4R7MN LSQEA201212T1R0M LSQEA201212T100M IHLP5050CEER4R7M06 7445402 74459010 SPB0705-R12M SPB0705-R10M SPB1005-R10M SPB1005-R15M SPB1005-R12M SPB1007-R22M SPB1007-R23M SPB1007-R17M SPB1007-R15M SPB1012-R15Y SPB1012-R13Y SPB1308-R44M SPB1308-R21M SPB1308-R32M SRN2012T-1R0K SRN2012T-220K SRN2012T-100K SRN2012T-4R7K SRN2012T-6R8K SRN2012T-2R2K SRN2012T-150K SRN3015C-3R3M SRN3015C-220M SRN3015C-2R2M SRN3015C-4R7M SRN3015C-470M SRN3015C-R68M SRN3015C-150M SRN3015C-1R0M SRN3015C-180M SRN3030HA-101M SRN3030HA-2R2Y SRN3030HA-470M SRN3030HA-4R7Y SRN3030HA-220M