Data Sheet

Customer:	
Product:	**Wire Wound Chip Inductor(Ferrite) –NL-M Series**
Sizes.:	**1210/1812**
Issued Date:	**10-Apr-25**
Edition:	**REV.A5**

RoHS Compliant

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10-Apr-25	10-Apr-25	10-Apr-25	10-Apr-25	
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Wire Wound Chip Inductor (Ferrite)

■Features



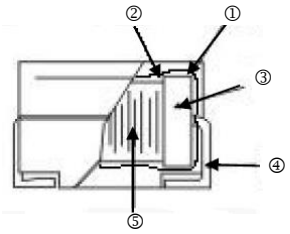
- Lead-free materials is used for the plating on the terminals
- The product uses metal terminals, which realize excellent connection reliability
- High resistance to heat, humidity, mechanical shocks and presser.
  Accurate dimensions for automatically surface mounted
- The product has good heat durability that withstands lead-free compatible reflow soldering conditions.

■Applications



- EM serials high reliable wire would chip inductors for communication , equipment , instrument , video & audio have been developen in response to the trend toward higher density mounting of parts in electric circuits.

■Construction

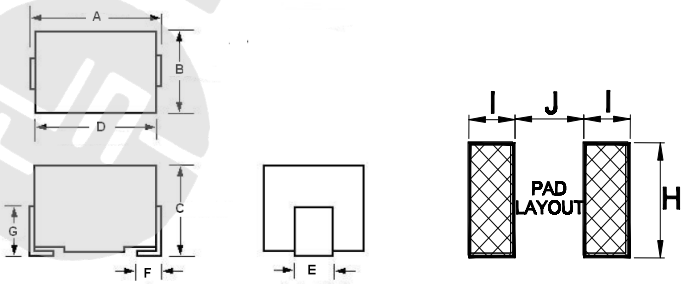


①	Molding material	④	Lead (Tinned wire)
②	Coating	⑤	Enameled wire
③	Core		

■Part Numbering

NL	10	K	T	C	1R0	-M
Product Type	Dimensions (LxW)	Inductance Tolerance	Packaging Code	Current	Inductance	Special
	10: 1210 12: 1812	J: ±5% K: ±10% M: ±20%	T: Taping Reel	: Standard C: Large Current	R12: 120nH R27: 270nH 2R7: 2700nH 100: 10μH	

■Dimensions



Type	Size (Inch)	A mm	B mm	C mm	D mm	E mm	F mm	G mm	H mm	I mm	J mm
NL10(C)-M	1210	3.2±0.4	2.5±0.2	2.2±0.2	2.9±0.3	1.0±0.2	0.6±0.2	1.2±0.2	1.4	1.0	1.8
NL12(C)-M	1812	4.5±0.3	3.2±0.2	3.2±0.2	4.2±0.3	1.1±0.2	1.0±0.2	-	1.6	1.5	2.2

■Standard Electrical Specifications

NL10-M Wire Wound Chip Inductors (Ferrite / Molding Type) / Standard Type(□:Tolerance):

Part No	Inductance (μH)	Tolerance	Q min.	Test Freq. (MHz)	SRF (MHz)		DCR (Ω) max.	IDC (mA) max.
					min.	typ.		
NL10□TR10-M	0.10	±10, ±20%	28	100	700	750	0.44	450
NL10□TR12-M	0.12	±10, ±20%	30	25.2	500	600	0.22	450
NL10□TR15-M	0.15	±10, ±20%	30	25.2	450	500	0.25	450
NL10□TR18-M	0.18	±10, ±20%	30	25.2	400	450	0.28	450
NL10□TR22-M	0.22	±10, ±20%	30	25.2	350	433	0.32	450
NL10□TR27-M	0.27	±10, ±20%	30	25.2	320	426	0.36	450
NL10□TR33-M	0.33	±10, ±20%	30	25.2	300	416	0.40	450
NL10□TR39-M	0.39	±10, ±20%	30	25.2	250	386	0.45	450
NL10□TR47-M	0.47	±10, ±20%	30	25.2	220	352	0.50	450
NL10□TR56-M	0.56	±10, ±20%	30	25.2	180	325	0.55	450
NL10□TR68-M	0.68	±10, ±20%	30	25.2	160	308	0.60	450
NL10□TR82-M	0.82	±10, ±20%	30	25.2	140	289	0.65	450
NL10□T1R0-M	1.0	±5, ±10%	30	7.96	120	256	0.70	400
NL10□T1R2-M	1.2	±5, ±10%	30	7.96	100	205	0.75	390
NL10□T1R5-M	1.5	±5, ±10%	30	7.96	85	125	0.85	370
NL10□T1R8-M	1.8	±5, ±10%	30	7.96	80	99	0.90	350
NL10□T2R2-M	2.2	±5, ±10%	30	7.96	75	100	1.00	320
NL10□T2R7-M	2.7	±5, ±10%	30	7.96	70	80	1.10	290
NL10□T3R3-M	3.3	±5, ±10%	30	7.96	60	69	1.20	260
NL10□T3R9-M	3.9	±5, ±10%	30	7.96	55	63	1.30	250
NL10□T4R7-M	4.7	±5, ±10%	30	7.96	50	58	1.50	220
NL10□T5R6-M	5.6	±5, ±10%	30	7.96	45	52	1.60	200
NL10□T6R8-M	6.8	±5, ±10%	30	7.96	40	46	1.80	180
NL10□T8R2-M	8.2	±5, ±10%	30	7.96	35	40	2.00	170
NL10□T100-M	10	±5, ±10%	30	2.52	30	35	2.10	150
NL10□T120-M	12	±5, ±10%	30	2.52	20	28	2.50	140
NL10□T150-M	15	±5, ±10%	30	2.52	20	25	2.80	130
NL10□T180-M	18	±5, ±10%	30	2.52	20	23	3.30	120
NL10□T220-M	22	±5, ±10%	30	2.52	20	22.6	3.70	110
NL10□T270-M	27	±5, ±10%	30	2.52	20	22	5.00	80
NL10□T330-M	33	±5, ±10%	30	2.52	17	20	5.60	70
NL10□T390-M	39	±5, ±10%	30	2.52	16	18	6.40	65
NL10□T470-M	47	±5, ±10%	30	2.52	15	17	7.00	60
NL10□T560-M	56	±5, ±10%	30	2.52	13	15	8.00	55
NL10□T680-M	68	±5, ±10%	30	2.52	12	13.8	9.00	50
NL10□T820-M	82	±5, ±10%	30	2.52	11	12.7	10.00	45
NL10□T101-M	100	±5, ±10%	20	0.796	10	11.5	10.00	40
NL10□T121-M	120	±5, ±10%	20	0.796	10	11	11.00	70
NL10□T151-M	150	±5, ±10%	20	0.796	8	9.2	15.00	65
NL10□T181-M	180	±5, ±10%	20	0.796	7	8.5	17.00	60
NL10□T221-M	220	±5, ±10%	20	0.796	7	8	21.00	50

Wire Wound Chip Inductor (Ferrite)

NL12-M Wire Wound Chip Inductors (Ferrite / Molding Type) / Standard Type(□:Tolerance):

Part No	Inductance (μH)	Tolerance	Q min.	Test Freq. (MHz)	SRF (MHz)		DCR (Ω) max.	IDC (mA) max.
					min.	typ.		
NL12□TR10-M	0.10	±10, ±20%	35	25.2	300	620	0.18	800
NL12□TR12-M	0.12	±10, ±20%	35	25.2	280	610	0.20	770
NL12□TR15-M	0.15	±10, ±20%	35	25.2	250	590	0.22	730
NL12□TR18-M	0.18	±10, ±20%	35	25.2	220	570	0.24	700
NL12□TR22-M	0.22	±10, ±20%	40	25.2	200	505	0.25	665
NL12□TR27-M	0.27	±10, ±20%	40	25.2	180	450	0.26	635
NL12□TR33-M	0.33	±10, ±20%	40	25.2	165	425	0.28	605
NL12□TR39-M	0.39	±10, ±20%	40	25.2	150	390	0.30	575
NL12□TR47-M	0.47	±10, ±20%	40	25.2	145	350	0.32	545
NL12□TR56-M	0.56	±10, ±20%	40	25.2	140	325	0.36	520
NL12□TR68-M	0.68	±10, ±20%	40	25.2	135	300	0.40	500
NL12□TR82-M	0.82	±10, ±20%	40	25.2	130	275	0.45	475
NL12□T1R0-M	1.0	±5,±10, ±20%	50	7.96	100	250	0.50	450
NL12□T1R2-M	1.2	±5,±10, ±20%	50	7.96	80	240	0.55	430
NL12□T1R5-M	1.5	±5,±10, ±20%	50	7.96	70	210	0.60	410
NL12□T1R8-M	1.8	±5,±10, ±20%	50	7.96	60	190	0.65	390
NL12□T2R2-M	2.2	±5,±10, ±20%	50	7.96	55	160	0.70	380
NL12□T2R7-M	2.7	±5,±10, ±20%	50	7.96	50	150	0.75	370
NL12□T3R3-M	3.3	±5,±10, ±20%	50	7.96	45	110	0.80	355
NL12□T3R9-M	3.9	±5,±10, ±20%	50	7.96	40	100	0.90	330
NL12□T4R7-M	4.7	±5,±10, ±20%	50	7.96	35	80	1.00	315
NL12□T5R6-M	5.6	±5,±10, ±20%	50	7.96	33	50	1.10	300
NL12□T6R8-M	6.8	±5,±10, ±20%	50	7.96	27	35	1.20	285
NL12□T8R2-M	8.2	±5, ±10%	50	7.96	25	28	1.40	270
NL12□T100-M	10	±5, ±10%	50	2.52	20	22	1.60	250
NL12□T120-M	12	±5, ±10%	50	2.52	18	20	2.00	225
NL12□T150-M	15	±5, ±10%	50	2.52	17	18	2.50	200
NL12□T180-M	18	±5, ±10%	50	2.52	15	16	2.80	190
NL12□T220-M	22	±5, ±10%	50	2.52	13	14	3.20	180
NL12□T270-M	27	±5, ±10%	50	2.52	12	13	3.60	170
NL12□T330-M	33	±5, ±10%	50	2.52	11	12	4.00	160
NL12□T390-M	39	±5, ±10%	50	2.52	10	11	4.50	150
NL12□T470-M	47	±5, ±10%	50	2.52	10	10.5	5.00	140
NL12□T560-M	56	±5, ±10%	50	2.52	9	10	5.50	135
NL12□T680-M	68	±5, ±10%	50	2.52	9	9.5	6.00	130
NL12□T820-M	82	±5, ±10%	50	2.52	8	8.5	7.00	120
NL12□T101-M	100	±5, ±10%	40	0.796	8	8.5	8.00	110
NL12□T121-M	120	±5, ±10%	40	0.796	6	7.0	8.00	110
NL12□T151-M	150	±5, ±10%	40	0.796	5	6.0	9.00	105
NL12□T181-M	180	±5, ±10%	40	0.796	5	5.5	9.50	102
NL12□T221-M	220	±5, ±10%	40	0.796	4	5.0	10.0	100
NL12□T271-M	270	±5, ±10%	40	0.796	4	4.5	12.0	92
NL12□T331-M	330	±5, ±10%	40	0.796	3.5	4.0	14.0	85
NL12□T391-M	390	±5, ±10%	40	0.796	3	3.5	18.0	80
NL12□T471-M	470	±5, ±10%	40	0.796	3	3.5	26.0	62
NL12□T561-M	560	±5, ±10%	30	0.796	3	3.45	30.0	50
NL12□T681-M	680	±5, ±10%	30	0.796	3	3.45	30.0	50
NL12□T821-M	820	±5, ±10%	30	0.796	2.5	3	35.0	30
NL12□T102-M	1000	±5, ±10%	20	0.252	2.5	2.8	40.0	30

■Large Current Electrical Specifications

NL10-M Wire Wound Chip Inductors (Ferrite / Molding Type) / Large Current Type(□:Tolerance):

Part No	Inductance (μH)	Tolerance	Q min.	Test Freq. (MHz)	SRF (MHz)		DCR (Ω) max.	IDC (mA) max.
					min.	typ.		
NL10□TC1R0-M	1.0	±5, 10, 20%	10	7.96	100	117	0.156	770
NL10□TC1R5-M	1.5	±5, 10, 20%	10	7.96	80	100	0.195	580
NL10□TC2R2-M	2.2	±5, 10, 20%	10	7.96	65	80	0.260	480
NL10□TC3R3-M	3.3	±5, 10, 20%	10	7.96	55	60	0.325	400
NL10□TC4R7-M	4.7	±5, 10, 20%	10	7.96	45	50	0.520	320
NL10□TC6R8-M	6.8	±5, 10, 20%	10	7.96	35	40	0.650	280
NL10□TC8R2-M	8.2	±5, 10, 20%	10	7.96	31	35	0.878	250
NL10□TC100-M	10	±5, 10, 20%	15	2.52	28	35	1.105	220
NL10□TC150-M	15	±5, 10, 20%	15	2.52	25	30	1.690	180
NL10□TC220-M	22	±5, 10, 20%	15	2.52	20	27	2.600	145
NL10□TC270-M	27	±5, 10, 20%	15	2.52	18	19	3.000	125
NL10□TC330-M	33	±5, 10, 20%	15	2.52	15	22	3.640	115
NL10□TC390-M	39	±5, 10, 20%	15	2.52	14	19	4.500	110
NL10□TC470-M	47	±5, 10, 20%	20	2.52	13	17	5.460	105
NL10□TC560-M	56	±5, 10, 20%	20	2.52	11	13	7.050	95
NL10□TC680-M	68	±5, 10, 20%	20	2.52	10	11	8.450	85
NL10□TC820-M	82	±5, 10, 20%	20	2.52	9	10	8.710	80
NL10□TC101-M	100	±5, 10, 20%	20	0.796	8	9	9.140	75

NL12-M Wire Wound Chip Inductors (Ferrite / Molding Type) / Large Current Type(□:Tolerance):

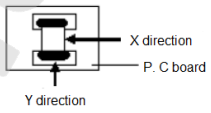
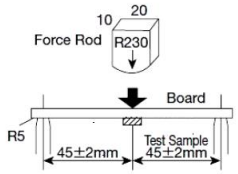
Part No	Inductance (μH)	Tolerance	Q min.	Test Freq. (MHz)	SRF (MHz)		DCR (Ω) max.	IDC (mA) max.
					min.	typ.		
NL12□TC1R0-M	1.0	±5, 10, 20%	10	7.96	180	265	0.11	1050
NL12□TC1R2-M	1.2	±5, 10, 20%	10	7.96	160	180	0.12	1000
NL12□TC1R5-M	1.5	±5, 10, 20%	10	7.96	130	170	0.15	950
NL12□TC1R8-M	1.8	±5, 10, 20%	10	7.96	100	105	0.16	900
NL12□TC2R2-M	2.2	±5, 10, 20%	10	7.96	80	92	0.18	850
NL12□TC2R7-M	2.7	±5, 10, 20%	10	7.96	60	69	0.20	800
NL12□TC3R3-M	3.3	±5, 10, 20%	10	7.96	45	55	0.22	750
NL12□TC3R9-M	3.9	±5, 10, 20%	10	7.96	40	45	0.24	700
NL12□TC4R7-M	4.7	±5, 10, 20%	10	7.96	35	43	0.27	650
NL12□TC5R6-M	5.6	±5, 10, 20%	10	7.96	30	40	0.30	650
NL12□TC6R8-M	6.8	±5, 10, 20%	10	7.96	28	35	0.35	600
NL12□TC8R2-M	8.2	±5, 10, 20%	10	7.96	25	30	0.40	600
NL12□TC100-M	10	±5, 10, 20%	10	2.52	22	27	0.50	550
NL12□TC120-M	12	±5, 10, 20%	10	2.52	21	25	0.60	500
NL12□TC150-M	15	±5, 10, 20%	10	2.52	20	23	0.70	450
NL12□TC180-M	18	±5, 10, 20%	10	2.52	19	22	0.80	400
NL12□TC220-M	22	±5, 10, 20%	10	2.52	18	20.7	0.90	370
NL12□TC270-M	27	±5, 10, 20%	10	2.52	16	18.4	1.20	330
NL12□TC330-M	33	±5, 10, 20%	10	2.52	14	15	1.40	300
NL12□TC390-M	39	±5, 10, 20%	10	2.52	12	13	1.60	280
NL12□TC470-M	47	±5, 10, 20%	10	2.52	11.5	12.5	1.90	260
NL12□TC560-M	56	±5, 10, 20%	10	2.52	11	12	2.20	240
NL12□TC680-M	68	±5, 10, 20%	10	2.52	10	11	2.60	220
NL12□TC820-M	82	±5, 10, 20%	10	2.52	9	10	3.50	200
NL12□TC101-M	100	±5, 10, 20%	20	0.796	8	9	4.00	180
NL12□TC121-M	120	±5, 10, 20%	20	0.796	7.5	8.6	4.50	160
NL12□TC151-M	150	±5, 10, 20%	20	0.796	7	8	6.50	140
NL12□TC181-M	180	±5, 10, 20%	20	0.796	6.5	7.5	7.50	120
NL12□TC221-M	220	±5, 10, 20%	20	0.796	5.5	6.3	9.00	120
NL12□TC271-M	270	±5, 10, 20%	20	0.796	5	5.7	11.0	100
NL12□TC331-M	330	±5, 10, 20%	20	0.796	4	4.6	13.0	90

■Environmental Characteristics

Electrical Performance Test

Item	Requirement	Test Method
Inductance	Refer to standard electrical characteristic spec.	HP4285A+16034E or Equivalent
Q		HP4285A+16034E or Equivalent
SRF		HP8753C Network Analyzer or Equivalent
DC Resistance DCR		AX-111A Digital milliohm meter or Equivalent
Rated Current IDC		Value obtained when current flows and the temperature has risen to 20°C or when DC current flows and the initial value of inductance has fallen by 10%, whichever is smaller

Mechanical Performance Test

Item	Requirement	Test Method
Solderability	The electrodes shall be at least 95% covered with new solder coating	Solder Temperature:250±5℃, Time: 5±0.5 seconds All sides of mounting terminal shall be immersed
Resistance to Soldering Heat	Appearance: No damage L change: within±10%	Method 1:Immerse in the solder of 250±10℃ for 10±1sec, load in room Temperature 2 hours Method 2: The test sample shall be exposed to reflow with peak temperature at 250℃ for 20 to 40 seconds, 2 times. Load in room Temperature 30 min. （Per MIL-STD-202F）
Vibration	Appearance: No damage L change: within±10%	The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below conditions. Frequency Range:10～55Hz; Total Amplitude :1.5mm（May not exceed acceleration 196m/s2）; Sweeping Method: 10→55→10Hz for 1min Time：For 2 hours on each X, Y, and Z axis.
Adhesion of Terminal Electrode	Appearance: No damage L change: within±10%	Applying force: 9.8N(1kg) Duration: 10±2 seconds Direction: X, Y The test samples shall be soldered to the test board by the reflow. 
Resistance to Flexure of Substrate	Appearance: No damage L change: within±10%	The test piece was welded to the test printed circuit board as shown Printed circuit board in the direction of the arrow applied to the load, so that bending 2mm so far. 
Dropping	Appearance: No damage L change: within±10%	Packing ok product, Dropping 1m over the ground of concrete or cement, 3 times

Climatic Test

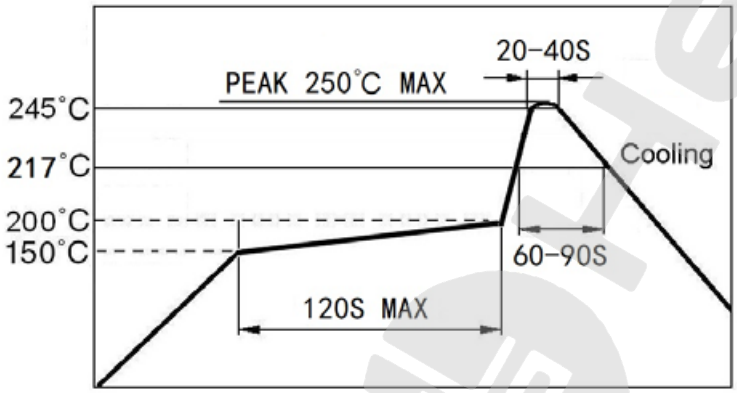
<table>
<tr><th>Item</th><th>Requirement</th><th>Test Method</th></tr>
<tr><td>Thermal Shock</td><td rowspan="4">Appearance: No damage
L change: within±10%</td><td>One cycle:
<table>
<tr><th>Step</th><th>Temperature (°C)</th><th>Time (min.)</th></tr>
<tr><td>1</td><td>-40±3</td><td>30±3</td></tr>
<tr><td>2</td><td>20±2</td><td>3</td></tr>
<tr><td>3</td><td>125±2</td><td>30±3</td></tr>
<tr><td>4</td><td>20±2</td><td>3</td></tr>
</table>
Total: 10 cycles</td></tr>
<tr><td>High Temperature Life Test</td><td>125±3°C, load 1000±6 hrs</td></tr>
<tr><td>Low Temperature Life Test</td><td>-40±2°C, load 1000±6 hrs</td></tr>
<tr><td>Damp Heat</td><td>40±2°C, 90~95% RH, load 1000±6 hrs</td></tr>
<tr><td>Temperature Characteristic</td><td>Appearance: No damage
L change: within±20%</td><td>Measurement of inductance shall be taken at temperature range within -40°C～+125°C.
With reference to inductance value at +20°C., change rate shall be calculated.
Change of maximum inductance deviation in step 1 to 5:
Temperature at step 1: 20°C
Temperature at step 2: Minimum operating temperature
Temperature at step 3: 20°C (Standard temperature)
Temperature at step 4 :Maximum operating temperature
Temperature at step 5 :20°C</td></tr>
</table>

■Storage Temperature: -10~40℃; Humidity < 80%RH

■Operating Temperature Range: -40~+125℃(Including self-heating temperature rise.)

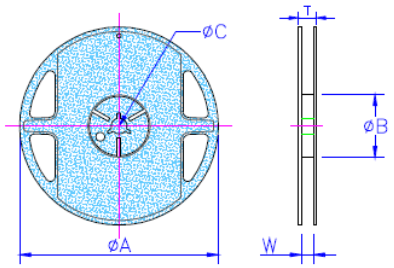
■Shelf life: 2 years Max (It is recommended to use within one week after opening.)

■Reflow



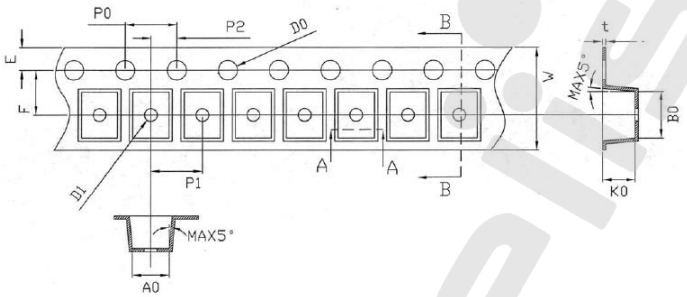
■Packaging

Packaging Quantity & Reel Specifications



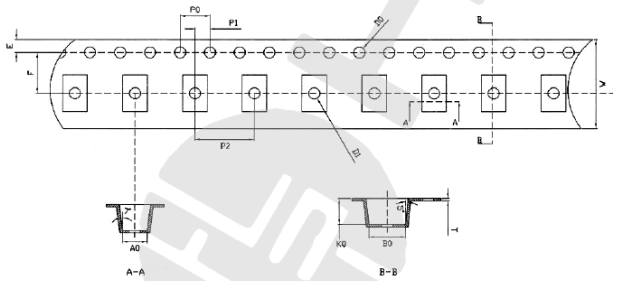
Type	ΦA	ΦB	ΦC	W	T	Quantity (EA)
NL10(C)-M	178±2.0	50 min	13±0.3	10 max	14.4 max	2000
NL12(C)-M	178±2.0	50 min	13±0.3	14 max	18.4 max	500

Embossed Plastic Tape Specifications



Unit: mm

Type	A0	B0	E	F	P0	P1	P2	D0	D1	K0	t
NL10(C)-M	2.88	3.65	1.75	3.50	4.00	4.00	2.00	1.50	1.00	2.50	0.26



Unit: mm

Type	A0	B0	E	F	P0	P1	P2	D0	D1	K0	T
NL12(C)-M	3.31	4.95	1.75	5.50	4.00	2.00	8.00	1.50	1.00	3.50	0.35

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A5	Apr 10,2025		-Add Shelf life.