Chip Inductor

■ INTRODUCTION

Multilayer Chip Inductor is an electronic part that uses in resonance circuit, for noise suppression and for impedance matching in the electrical circuit.
SAMSUNG Electro-mechanics has 2 series of chip inductors; CIL and CIH series.
CIL series is ordinary type chip inductor. It composed of magnetic body (ferrite material), conducting material (Ag) and electrodes (solder plating). It has excellent Q characteristics ans eliminate crosstalk.
CIH series is high frequency type chip inductor. It composed of ceramic body (dielectric material), conducting material (Ag) and electrodes (solder plating). It has high Q and |Z| at high frequencies. It is possible to use for high frequencies over 100 MHz.

■ FEATURE AND APPLICATION

● Feature

▶ CIL Series

- Highly Reliable Performance.
- Excellent solderability and high heat resistance for either flow and reflow soldering.
- Closed magnetic circuit configuration avoids crosstalk and is suitable for high density PCBs.

▶ CIH Series

- Highly Reliable Performance.
- Lowest value of specific resistivity, good property of Q and SRF.
- Possible to use at range above 100 MHz.

● Application

▶ CIL Series

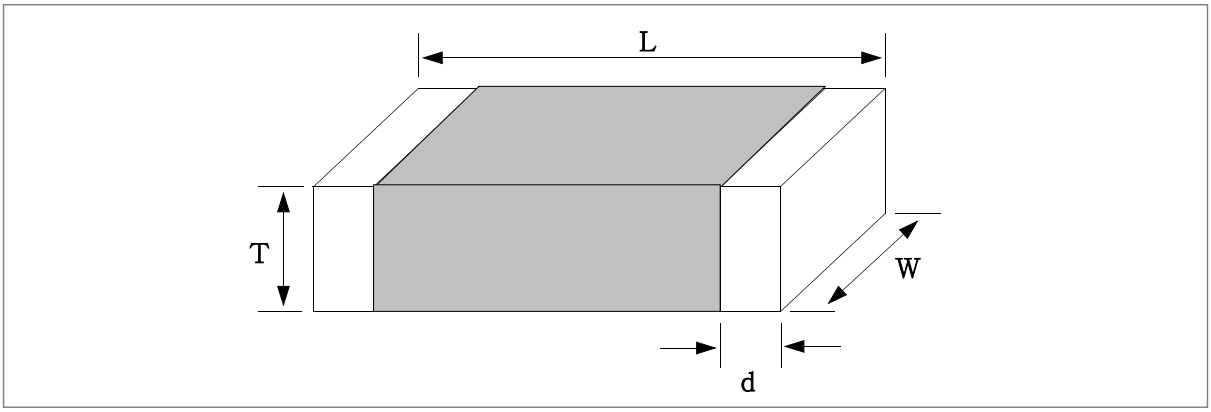
- General electronic equipments.
- Resonance circuits, PLL circuits, Noise suppression etc.

▶ CIH Series

- Mobile communication systems.
- Noise suppression at high frequency.
- Impedance matching.

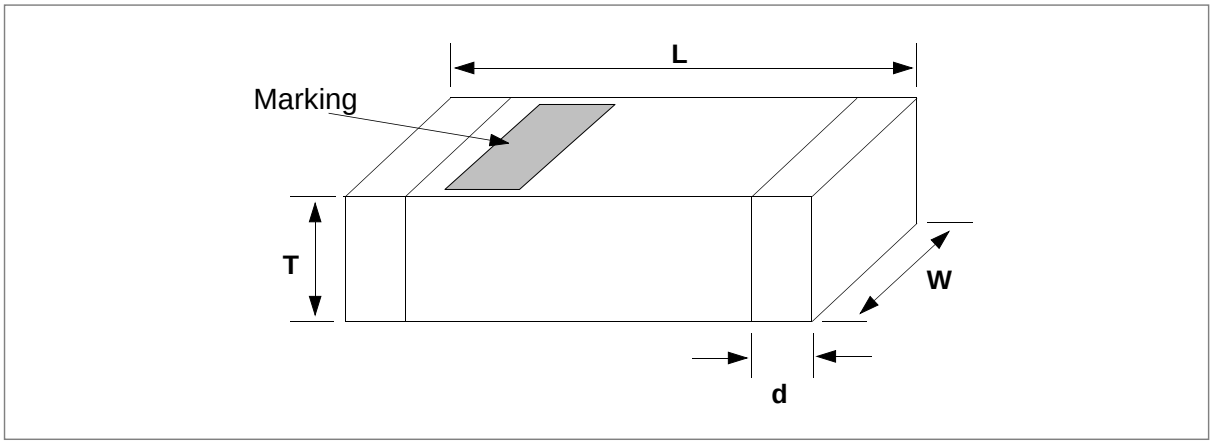
■ APPEARANCE AND DIMENSION

● CIL Series



CODE	EIA CODE	DIMENSION (mm)			
		L	W	T	d
10	0603	1.6 ± 0.15	0.8 ± 0.15	0.8 ± 0.15	0.3 ± 0.2
21	0805	2.0 ± 0.2	1.25 ± 0.2	0.85 ± 0.2 1.25 ± 0.2	0.5+0.2/-0.3
31	1206	3.2 ± 0.2	1.6 ± 0.2	0.6 ± 0.2 1.1 ± 0.2	0.5+0.2/-0.3

● CIH Series



CODE	EIA CODE	DIMENSION (mm)			
		L	W	T	d
05	0402	1.0 ± 0.05	0.5 ± 0.05	0.5 ± 0.05	0.25 ± 0.1
10	0603	1.6 ± 0.15	0.8 ± 0.15	0.8 ± 0.15	0.3 ± 0.2
21	0805	2.0+0.3/-0.1	1.25 ± 0.2	0.85 ± 0.2 1.0+0.2/-0.3	0.5 ± 0.3

■ PART NUMBERING

CI	L	10	J	1R5	K	N	C
❶	❷	❸	❹	❺	❻	❼	❽

❶ SAMSUNG Multilayer Chip Inductor/Bead
❷ Series Code
❸ Dimension
❹ Material Code
❺ Nominal Inductance
❻ Tolerance
❼ Thickness Option
❽ Packaging Type

❷ SERIES CODE

CODE	DESCRIPTION OF CODE
L	Chip Inductor for Low frequency
H	Chip Inductor for High frequency

❸ DIMENSION

CODE	DIMENSION(L×T)
05	1.0×0.5
10	1.6×0.8
21	2.0×1.25
31	3.2×1.6

❹ MATERIAL CODE

CODE	DESCRIPTION OF CODE	APPLICATION
N	Characteristics of Ferrite materials	CIL series
J		
Y		
S		
T	Characteristics of Dielectric glass powder	CIH series

❺ NOMINAL INDUCTANCE

The nominal inductance value is expressed in micro-Henry(μH) or nano-Henry(nH) and identified by three-digit number, first two digits represent significant figures and last digit specifies the number of zeros to follow. The letter 'R' means the μH and is used as the decimal point. The letter 'N' means the nH.

example)

100 : 10 × 10^0 = 11μH
1R5 : 1.5 μH
R10 : 0.1 μH = 100 nH
4N7 : 4.7 nH

❻ INDUCTANCE TOLERANCE

CODE	DESCRIPTION OF CODE	CODE	DESCRIPTION OF CODE
S	± 0.3 nH	**J**	± 5%
K	± 10%	**M**	± 20%

❼ THICKNESS OPTION

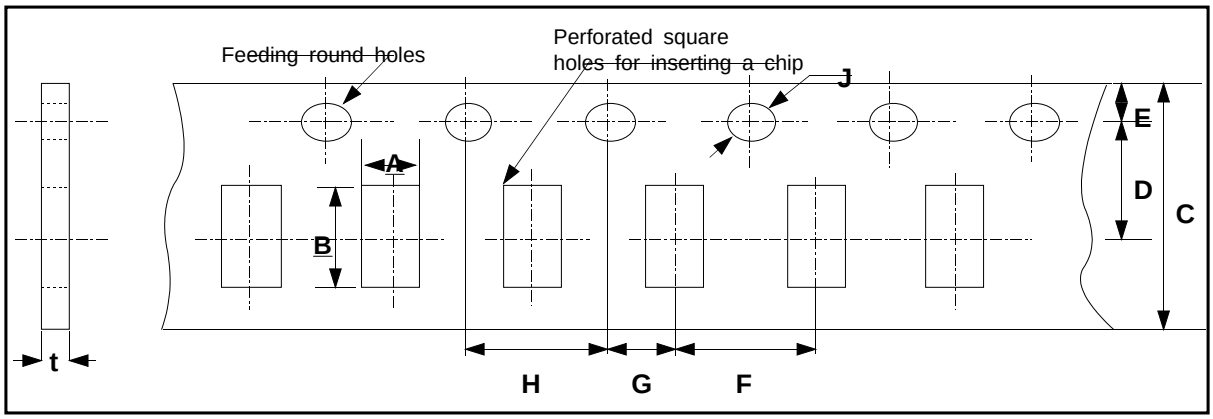
CODE	DESCRIPTION OF CODE
N	Standard thickness
A	Thinner than standard thickness
B	Thicker than standard thickness

❽ PACKAGING TYPE

CODE	DESCRIPTION OF CODE
C	Paper taping type
E	Embossed (Plastic) taping type

■ PACKAGING

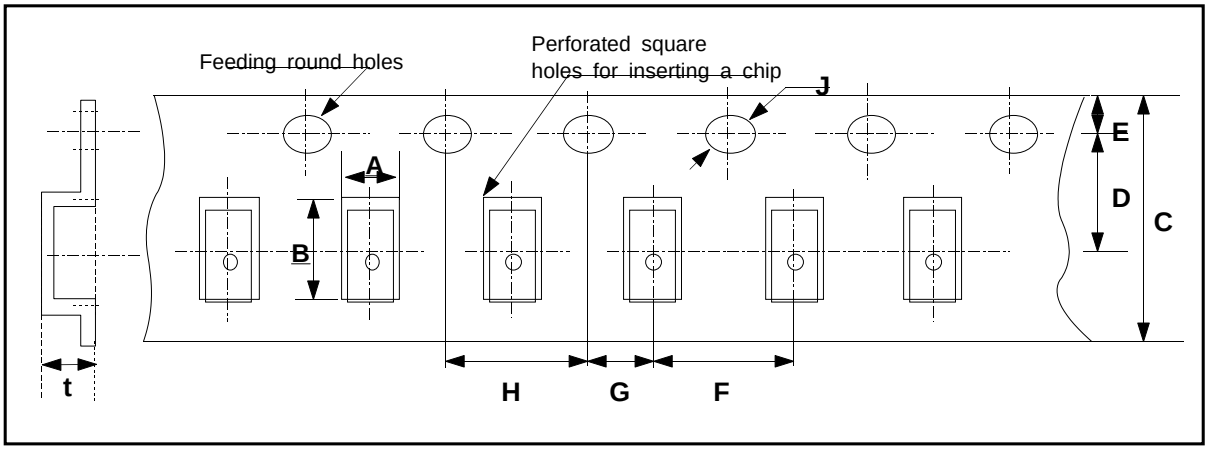
● CARDBOARD PAPER TAPE



unit : mm

TYPE	A	B	C	D	E	F	G	H	J	t max.
05	0.65 ±0.1	1.15 ±0.1	8.0 ±0.2	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	2.0 ±0.1	4.0 ±0.1	Φ1.5 +0.1/-0	0.8
10	1.0 ±0.2	1.80 ±0.2				4.0 ±0.1				1.1

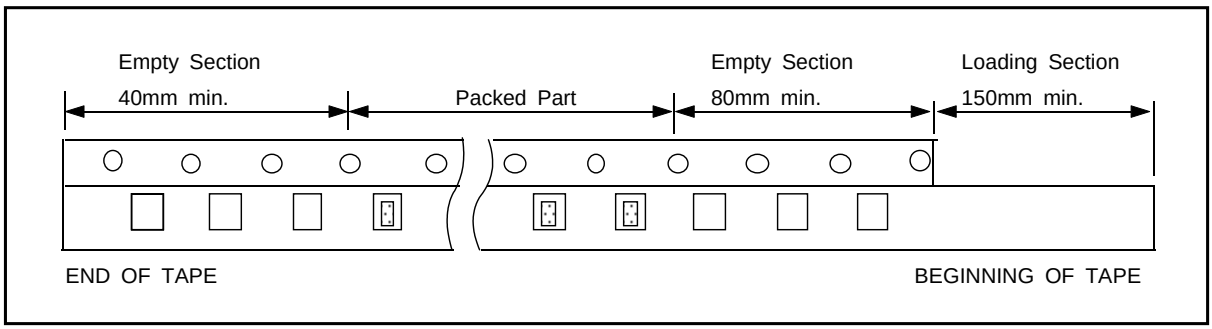
● EMBOSSED PLASTIC TAPE



unit : mm

TYPE		A	B	C	D	E	F	G	H	J	t max.
21	0.85T	1.50 ±0.2	2.3 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.1	4.0 ±0.1	Φ1.5 +0.1/-0	1.5
	1.0T										2.0
	1.25T										2.0
31	0.6T	1.90 ±0.2	4.9 ±0.2	12.0 ±0.3	5.5 ±0.05						1.15
	1.1T										1.4

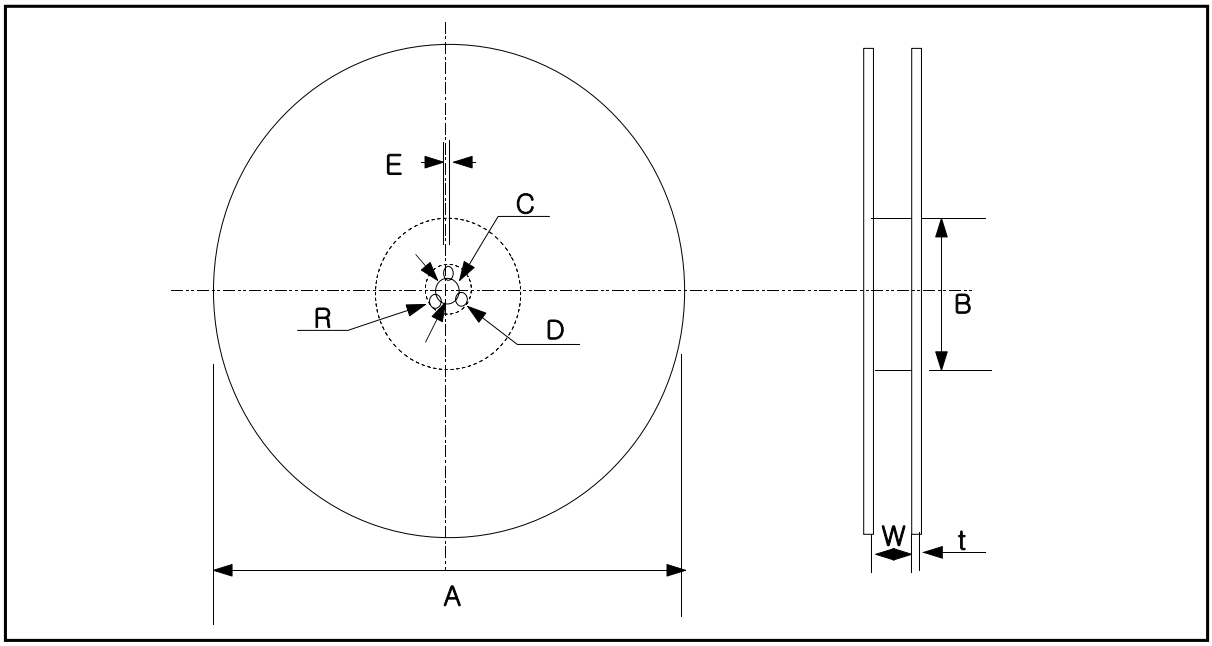
● TAPING SIZE



unit : pcs

Symbol	05	10	21			31	
			0.85T	1.0T	1.25T	0.6T	1.1T
7" Reel	10,000	4,000	4,000	3,000	2,000	4,000	3,000

● REEL DIMENSION



unit : mm

Tape Width	A	B	C	D	E	W	t	R
8 mm	ϕ178± 2.0	ϕ50±1.0	ϕ13±0.5	21±0.8	2.0±0.5	10±1.5	1.2±0.5	1.0

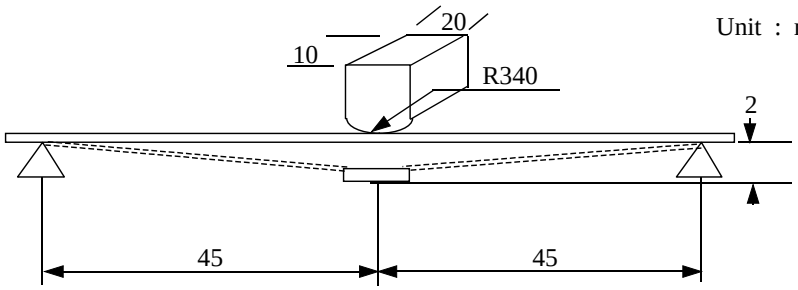
■ CHARACTERISTIC MAP

● INDUCTANCE RANGE

SERIES	SIZE	INDUCTANCE RANGE (Ω) 1nH 10nH 100nH 1μH 10μH
CIH	05 (0402)	120nH
	10 (0603)	270nH
	21 (0805)	470nH
CIL	10 (0603)	33μH
	21 (0805)	33μH
	31 (1206)	33μH

■ RELIABILITY TEST DATA

ITEM	PERFORMANCE			TEST CONDITION
	CIL	CIH10/21	CIH05	
1. OPERATING TEMPERATURE RANGE	-40 to +85℃		-55 to +125℃	-
2. STORAGE TEMPERATURE RANGE	-40 to +85℃		-55 to +125℃	-
3. INDUCTANCE / Q	SEE THE SECTION OF ELECTRICAL PROPERTIES.			- MEASURING FREQUENCY : 1 to 100MHz (DEPENDS ON THE ITEMS) - MEASURING EQUIPMENT, TEST FIXTURE : HP4291A/B + HP16193A (CIL SERIES) HP4291A/B + HP16092A + IN-HOUSE MADE JIG (CIH 10/21 SERIES) HP4291A/B + HP16192A (CIH 05 SERIES) - SOURCE OSC LEVEL : 30 mV (CIL SERIES) 112 mV (CIH SERIES)
4. DC RESISTANCE	SEE THE SECTION OF ELECTRICAL PROPERTIES.			- MEASURING EQUIPMENT : HP4338A/B
5. SELF RESONANCE FREQUENCY (SRF)	SEE THE SECTION OF ELECTRICAL PROPERTIES.			- MEASURING EQUIPMENT : HP4291A + HP16193A (CIL SERIES) HP8719C (CIH SERIES)
6. HIGH TEMPERATURE TEST	NO APPARENT DAMAGE. INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.			SOLDER THE SAMPLE ON PCB. EXPOSURE AT **(T)***℃ FOR 500 HOURS. 1-2 HOURS EXPOSURE AT ROOM TEMPERATURE AND HUMIDITY PRIOR TO MEASUREMENT. **(*) T**= 85±3 (CIL, CIH10/21) 125±3 (CIH05)
	Q VARIATION : WITHIN ±30%.	Q VARIATION : WITHIN ±20%.		
7. SOLDER HEAT RESISTANCE	NO MECHANICAL DAMAGE. REMAINING TERMINAL ELECTRODE : 70% MIN. INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.			AFTER BEING DIPPED IN FLUX FOR 4±1 SECONDS, AND PREHEATED AT 150~180℃ FOR 2~3 MIN , THE SPECIMEN SHALL BE IMMERSED IN 60/40 TIN-LEAD ALLOY SOLDER AT 260±5℃ FOR 10 ± 0.5 SECONDS.
	Q VARIATION : WITHIN ±30%.	Q VARIATION : WITHIN ±20%.		
8. SOLDERABILITY	MORE THAN 95% OF TERMINAL ELECTRODE SHOULD BE SOLDERED NEWLY.			AFTER BEING DIPPED IN FLUX FOR 4±1 SECONDS, AND PREHEATED AT 150~180℃ FOR 2~3 MIN , THE SPECIMEN SHALL BE IMMERSED IN SOLDER AT 230 ±5℃ FOR 4±1 SECONDS.

<table>
<tr><th rowspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th rowspan="2">TEST CONDITION</th></tr>
<tr><th>CIL</th><th>CIH10/21</th><th>CIH05</th></tr>
<tr><td rowspan="2">9. THERMAL SHOCK</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">- CIL SERIES
-25 ↔ +85℃, 60 MINUTES EACH. 100 CYCLES.
- CIH 10/21 SERIES
-40 ↔ +85℃, 60 MINUTES EACH. 100 CYCLES.
- CIH 05 SERIES
-55 ↔ +125℃, 60 MINUTES EACH. 100 CYCLES.</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="2">10. MOISTURE LOADING TEST</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">- TEMPERATURE : 40±2℃ (CIL, CIH 10/21)
60±2℃ (CIH 05)
- HUMIDITY : 90 ~ 95 %RH
- DURATION : 500±5 HRS.
- CURRENT : RATED CURRENT</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="2">11. HIGH TEMPERATURE LOADING</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">- TEMPERATURE : 85±2℃ (CIL, CIH 10/21)
125±2℃ (CIH 05)
- DURATION : 500±5 HRS.
- CURRENT : RATED CURRENT</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="2">12. LOW TEMPERATURE RESISTANCE</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">- TEMPERATURE : -40±2℃ (CIL, CIH 10/21)
-55±2℃ (CIH 05)
- DURATION : 500±5 HRS.</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="2">13. BENDING TEST</td><td colspan="3">NO APPARENT DAMAGE.</td><td>SOLDER THE SAMPLE ON PCB, BEND TO 2mm.</td></tr>
<tr><td colspan="4"> 

Unit : mm</td></tr>
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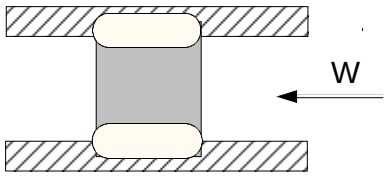
<table>
<tr><th rowspan="2">ITEM</th><th colspan="3">PERFORMANCE</th><th rowspan="2">TEST CONDITION</th></tr>
<tr><th>CIL</th><th>CIH10/21</th><th>CIH05</th></tr>
<tr><td rowspan="2">14. VIBRATION TEST</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">APPLY VIBRATIONS IN EACH OF THE X, Y AND Z DIRECTIONS.
- FREQUENCY : 10 ~ 55 ~ 10Hz
- TOTAL AMPLITUDE : 1.52mm
- TIME : 2 HRS. EACH (TOTAL 6 HRS.)</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="2">15. DROP TEST</td><td colspan="3">NO APPARENT DAMAGE.
INDUCTANCE CHANGE TO BE WITHIN ±10% TO THE INITIAL.</td><td rowspan="2">DROP THE SAMPLE FROM A HEIGHT OF 1m TO CONCRETE GROUND 10 TIMES.</td></tr>
<tr><td>Q VARIATION : WITHIN ±30%.</td><td colspan="2">Q VARIATION : WITHIN ±20%.</td></tr>
<tr><td rowspan="5">16. TERMINAL TEST</td><td colspan="3" rowspan="5">NO INDICATION OF PEELING SHALL OCCUR ON THE TERMINAL ELECTRODE.</td><td>SIZE / W(Kgf) / TIME(SEC)</td></tr>
<tr><td>05 / 0.1 / 30±5</td></tr>
<tr><td>10 / 0.5 / 10±1</td></tr>
<tr><td>21</td></tr>
<tr><td>31</td></tr>
<tr><td colspan="4"> 
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