



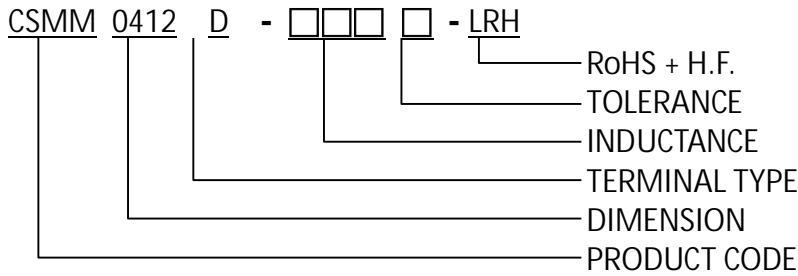
**INPAQ**

# PRODUCT SPECIFICATION

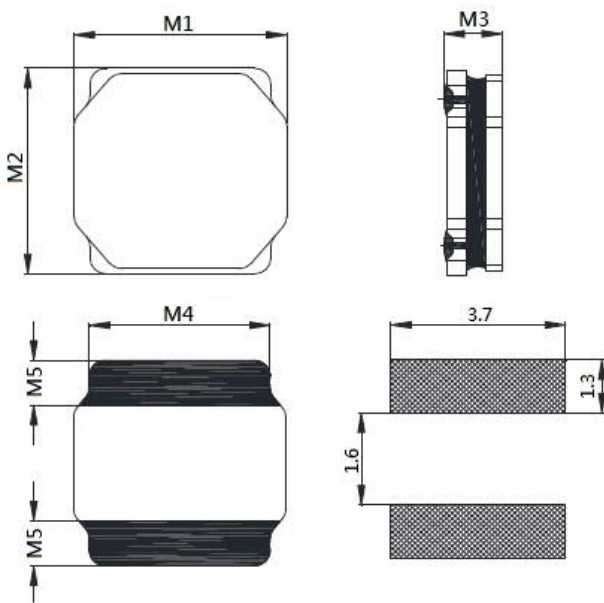
DOCUMENT NO. ENS000152530

DESCRIPTION	DRAWN BY	DESIGNED BY	CHECKED BY	APPROVED BY
CSMM0412D-XXXX-LRH	Angeline Lin	Shengjun Zhou	Shengjun Zhou	Dick Wang

1. PART NUMBER IDENTIFICATION



2. MECHANICAL DIMENSION



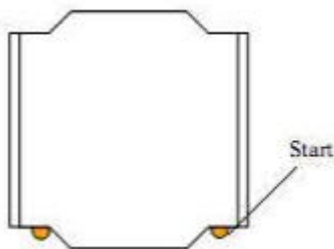
UNIT: mm

	DIM.	TOL.
M1	4.0	±0.2
M2	4.0	±0.2
M3	1.2	MAX.
M4	3.3	±0.3
M5	1.2	REF.

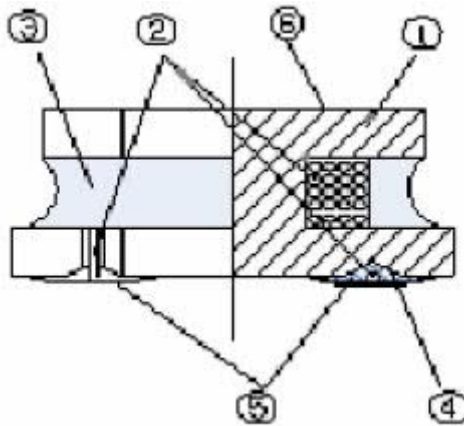
3. RATING TEMPERATURE

Operating temperature range (individual chip without packing): -40°C ~+125°C (Including Self-heating)  
 Storage temperature range (packaging conditions): -10°C ~+40°C and RH 70% (Max.).

4. MARKING



5. STRUCTURE



6. MATERIAL LIST

NO.	Components	Material
1	Core	Soft magnetic Metal
2	Wire	Polyurethane system enameled copper wire
3	Magnetic Glue	Epoxy resin and magnetic powder
4	Substrate	FeNiCu/Ag
5	Top Electrodes	Sn alloy
6	Marking	Nitrocellulose

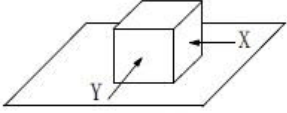
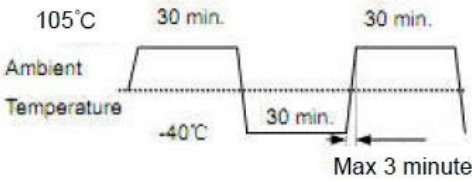
## 7. ELECTRICAL SPECIFICATION

Part number	Inductance ( $\mu$ H) $\pm 20\%$	Test Frequency (MHz/V)	DC Resistance ( $\Omega$ ) MAX.	DC Resistance ( $\Omega$ ) TYP.	Isat (A) MAX.	Isat (A) TYP.	Irms (A) MAX.	Irms (A) TYP.
CSMM0412D-R47M-LRH	0.47	1/1	0.041	0.033	7.20	8.20	3.80	4.30
CSMM0412D-R56M-LRH	0.56	1/1	0.050	0.040	6.00	7.00	3.20	3.80
CSMM0412D-R68M-LRH	0.68	1/1	0.055	0.042	5.20	6.20	3.25	3.80
CSMM0412D-1R0M-LRH	1.0	1/1	0.059	0.049	3.80	4.60	3.00	3.50
CSMM0412D-1R5M-LRH	1.5	1/1	0.075	0.060	3.80	4.50	2.80	3.20
CSMM0412D-2R2M-LRH	2.2	1/1	0.090	0.075	2.80	3.30	2.50	3.00
CSMM0412D-3R3M-LRH	3.3	1/1	0.130	0.106	2.80	3.30	2.00	2.50
CSMM0412D-4R7M-LRH	4.7	1/1	0.175	0.145	2.30	2.60	1.80	2.10
CSMM0412D-6R8M-LRH	6.8	1/1	0.230	0.190	1.60	2.20	1.50	1.75
CSMM0412D-8R2M-LRH	8.2	1/1	0.273	0.210	1.58	1.95	1.46	1.68
CSMM0412D-100M-LRH	10	1/1	0.360	0.300	1.55	1.85	0.85	1.00
CSMM0412D-220M-LRH	22	1/1	0.800	0.650	1.00	1.25	0.80	0.90

## NOTE:

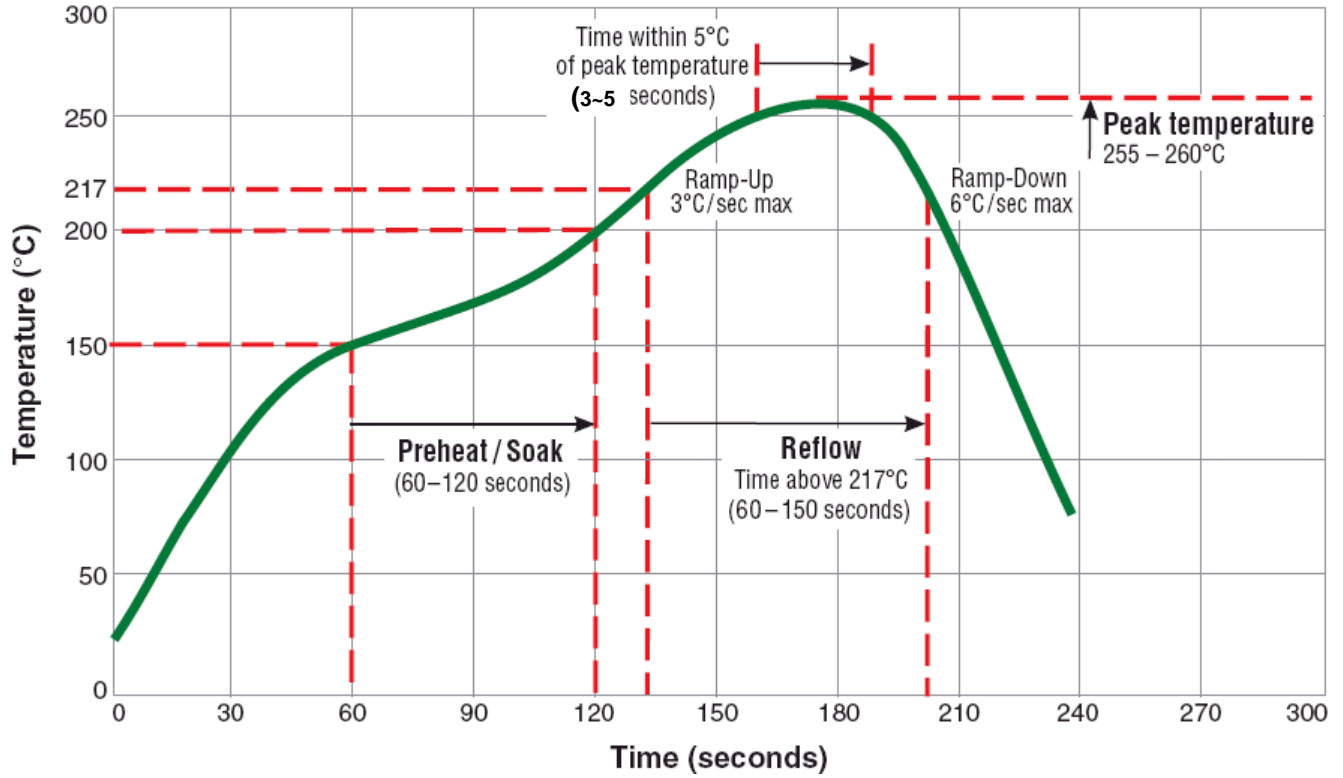
1. Rated current: Isat (max.) or Irms (max.), whichever is smaller.
2. Saturation Current: Max. Value, DC current at which the inductance drops less than 30% from its value without current; Typ. Value, DC current at which the inductance drops 30% from its value without current.
3. Irms: DC current that causes the temperature rise ( $\Delta T$ ) from 20°C ambient. For Max. Value,  $\Delta T < 40^\circ\text{C}$ ; For Typ. Value,  $\Delta T$  is approximate 40°C.
4. The part temperature (ambient + temp. rise) should not exceed 125°C under worst case operating conditions. Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
5. Absolute maximum voltage: DC 40V.
6. MSL: Level 1

8. RELIABILITY PERFORMANCE

Items	Requirements	Test Methods and Remarks
Terminal Strength	No removal or split of the termination or other defects shall occur.  Fig.7.1-1	1. Solder the inductor to the testing jig (glass epoxy board shown in Fig.7.1-1) using eutectic solder. Then apply a force in the direction of the arrow. 2. 10N force. 3. Keep time: 5±2s
High Temperature	1. No visible mechanical damage. 2. Inductance change: Within ±10%	1. Storage Temperature: 125+/-5°C 2. Duration: 96 ±4 Hours 3. Recovery: then measured at room ambient temperature after placing 24 hours.
Low Temperature	1. No visible mechanical damage. 2. Inductance change: Within ±10%	1. Temperature and time: -40±5°C 2. Duration: 96±4 hours 3. Recovery: then measured at room ambient temperature after placing 24 hours.
Vibration test	1. No visible mechanical damage. 2. Inductance change: Within ±10%	1. Frequency range: 10HZ~55HZ~10HZ 2. Amplitude: 1.5mm p-p 3. Direction: X, Y, Z 4. Time: 1 minute/cycle, 2hours per axis
High Temperature Storage Tested	1. No visible mechanical damage. 2. Inductance change: Within ±10%	1. Storage Temperature: 60+/-2°C 2. Relative Humidity: 90-95% RH 3. Duration: 96 ±4 Hours 4. Recovery: then measured at room ambient temperature after placing 24 hours.
Thermal Shock	1. No visible mechanical damage. 2. Inductance change: Within ±10%  Fig.7.7-1	1. Temperature and time: -40±3°C for 30±3 min→105°C for 30±3min, please refer to Fig.7.7-1. 2. Transforming interval: Max, 3 minute 3. Tested cycle: 100 cycles 4. The chip shall be stabilized at normal condition for 1~2 hours before measuring

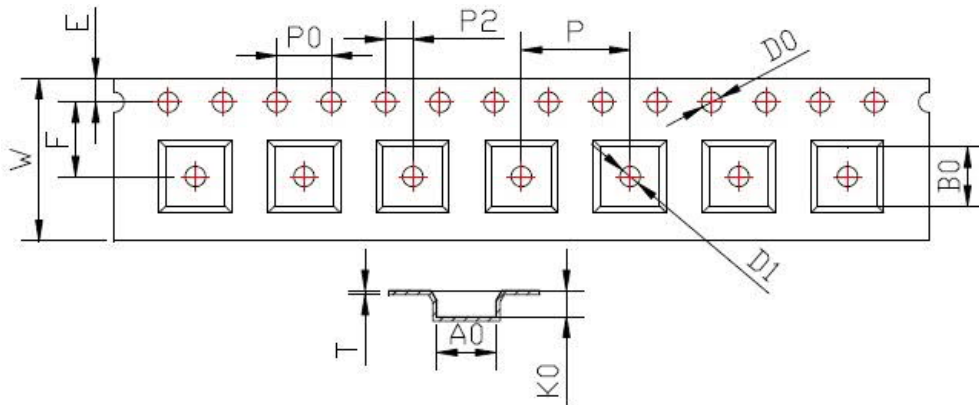
9. REFLOW CHART

### Typical RoHS Reflow Profile



10. PACKING

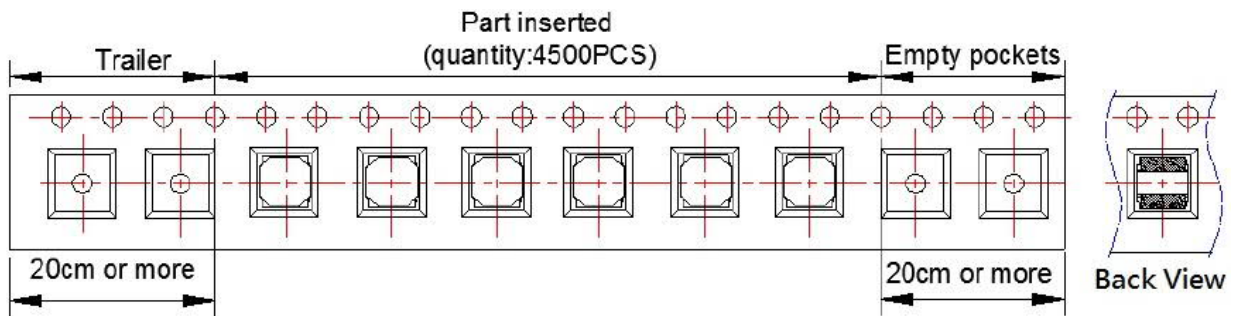
10-1. Carrier Tape Dimensions



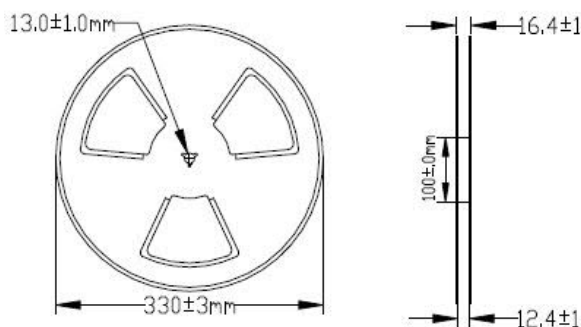
UNIT: mm

	W	A0	B0	K0	P	F	E	D0	D1	P0	P2	T
DIM.	12.00	4.3	4.3	1.6	8.00	5.50	1.75	1.50	1.50	4.00	2.00	0.30
TOL.	+0.30-0.10	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.05

10-2. Taping Dimensions



10-3. Reel Dimensions



10-4. Packaging Quantity

4.5KPCS/Reel, 13.5KPCS/Inner Box, 40.5KPCS/Outer Box