增 益 实 业

零 件 承 认 书

SPECIFICATION FOR APPROVAL

客户名称: 0110

客户料号：

增益型号：

规格描述： ZEPIM404012T 小一体成型电感系列规格书

日　　期: 2022/05/08

版　　本: A

增益签核:

制订	审核	核准
夏琳		李万

客户签核:

工程	审核	核准

东莞市增益实业有限公司
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物料类型：	小一体成型电感
日　　期:	2022/05/08
版　　本:	A

◆特征： Features:

1.1 Metal material for large current and low loss.

1.2 High performance (Isat) realized by metal dust core.

1.3 Low loss realized with low Rdc.

1.4 Closed magnetic circuit design reduces leakage flux.

1.5 Vinyl thermal spray, better surface compactness.

1.6 Environmental requirements must comply with the QESP-44 document

1.7 100% lead (Pb) free meet RoHS2.0 and Halogen，
Reach and other legal and regulatory requirements standard.

◆用途： Applications:

2.1 DC/DCconverters.

2.2 Pad,Smartphone.

2.3 Portablegamingdevices,Smartwear,Wi-Fimodule.

2.4 Notebooks,VR,AR.

2.5 LCDdisplays,HDDs,DVCs,DSCs,etc.

2.6 Basebandpowersupply,Amplifier,Powermanagement,
Modulepowersupply,Camerapowermanageme.

◆产品型号： ProductIdentification：

ZEPIM	4040	12	T	1R0	M	LF
①	②	③	④	⑤	⑥	⑦

①Series Name: Mini Molding Power Inductors

② External Dimensions(L×W):4040=4.1*4.1 mm

③External Dimensions(H):12=1.2 mm

④package:T=编带

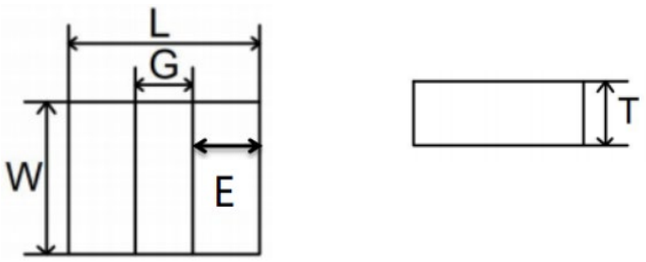
⑤nductance value:1R0=1.0uH

⑥Tolerance:M=±20%

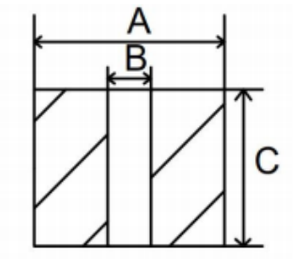
⑦Lead free products:环保产品

◆产品外观尺寸： ShapeandDimensions(dimensionsareinmm)：

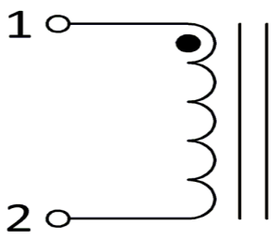
Outline Dimensions



Recommend Land Pattern Dimensions



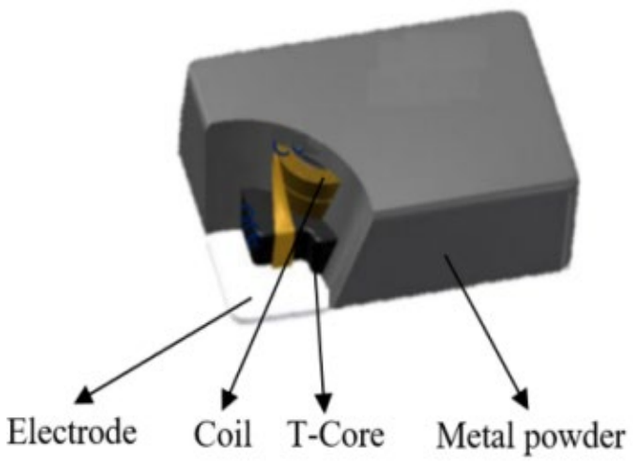
SCHEMATIC



Units:mm

Series	L	G/Typ	W	E	T	A/Typ	B/Typ	C/Typ
ZEPIM404012T	4.1±0.2	1.3±0.2	4.1±0.2	1.40±0.2	1.20Max.	4.10	1.10	4.10

◆产品构造： Material List



◆环境： EnvironmentalData:

●工作温度：-55℃至+125℃
（包括线圈自身温升）

●OperatingTemperature:-55℃ to+125 ℃(Includingcoilsself-temperaturerise)

Electrical Characteristics电气性能

ZEPIM404012T Series

P/N	L0(μH) @(0A)1MHz	Rdc(mΩ)		Heat rating current		Saturation current	
		Typical	Max	Typical	Max	Typical	Max
ZEPIM404012TR47MLF	0.47	11.50	14.00	9.20	8.70	12.20	11.70
ZEPIM404012TR68MLF	0.68	15.00	18.00	8.70	7.70	10.20	9.20
ZEPIM404012T1R0MLF	1.00	21.00	25.00	6.50	5.70	11.20	10.20
ZEPIM404012T1R5MLF	1.50	29.00	34.50	6.20	5.20	8.20	7.20
ZEPIM404012T2R2MLF	2.20	45.00	55.00	5.20	4.70	6.70	6.20
ZEPIM404012T3R3MLF	3.30	67.00	80.00	4.70	4.20	5.70	5.20
ZEPIM404012T4R7MLF	4.70	90.00	110.00	3.70	3.20	5.20	4.70
ZEPIM404012T5R6MLF	5.60	116.00	140.00	3.20	2.70	4.70	4.20
ZEPIM404012T6R8MLF	6.80	132.00	160.00	3.00	2.50	4.00	3.70
ZEPIM404012T100MLF	10.00	200.00	235.00	2.70	2.20	3.00	2.70

Test remarks

Note 1.: All test data is referenced to 25 ℃ ambient.

Note 2.: Test Condition:1MHz, 1.0Vrms.

Note 3.: Irms:DC current (A) that will cause an approximate △T of 40 ℃.

Note 4.: Isat:DC current (A) that will cause L0 to drop approximately 30%.

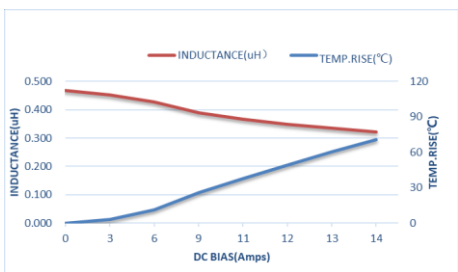
Note 5.: Operating Temperature Range -55℃ to + 125℃.

Note 6.: The part temperature (ambient + temp rise) should not exceed 125 under ℃ the worst case operating conditions.
Circuit design, component placement, PCB trace size and thickness, airflow and other cooling provision all affect the part temperature. Part temperature should be verified in the end application.

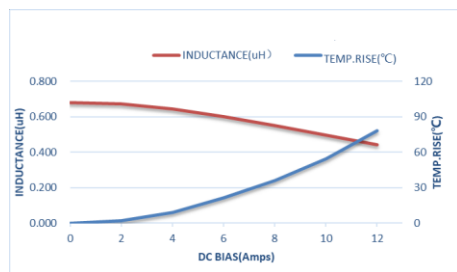
Note 7.: The rated current as listed is either the saturation current or the heating current depending on which value is lowe.

Characteristic curve 特性曲线

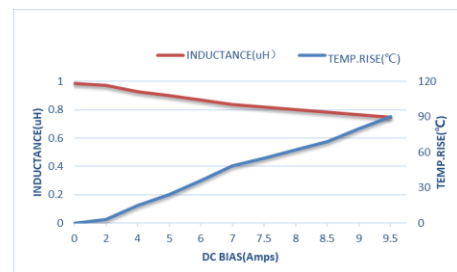
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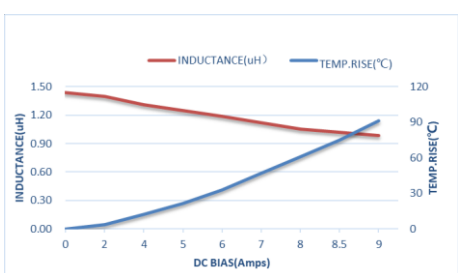
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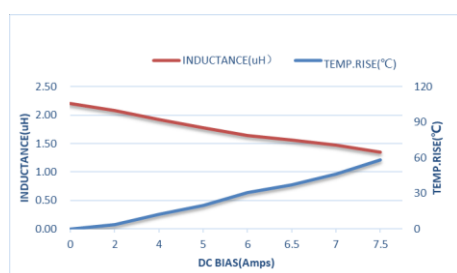
ZEPIM404012T1R0MLF



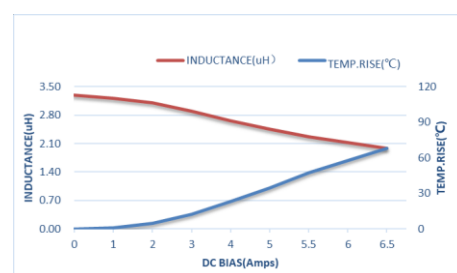
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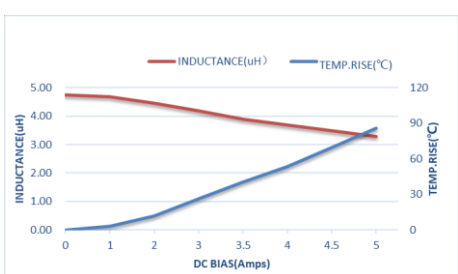
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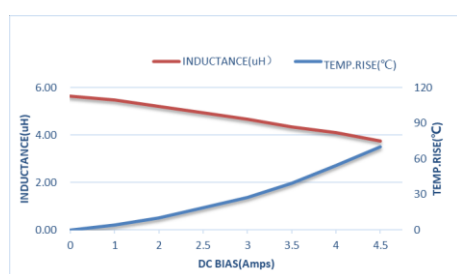
ZEPIM404012T3R3MLF



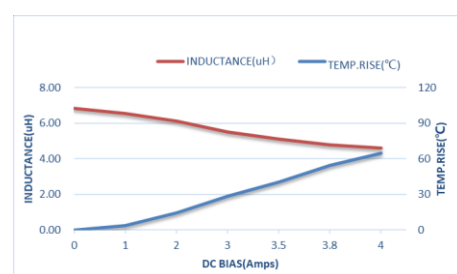
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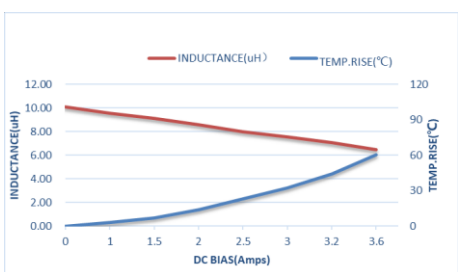
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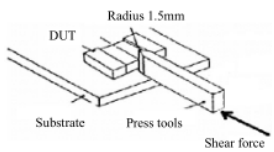
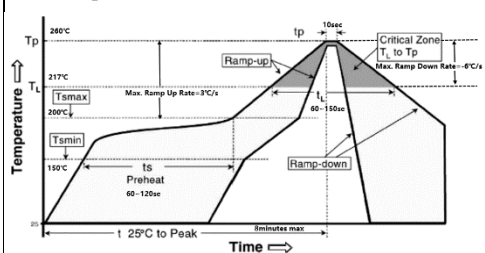
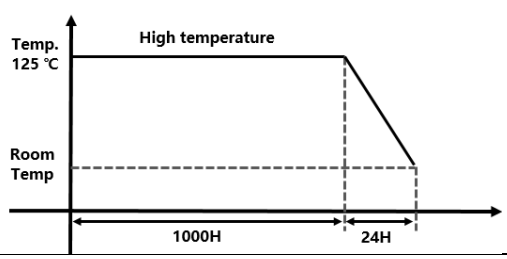
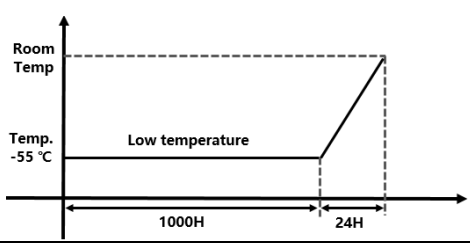
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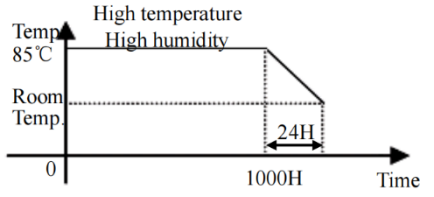
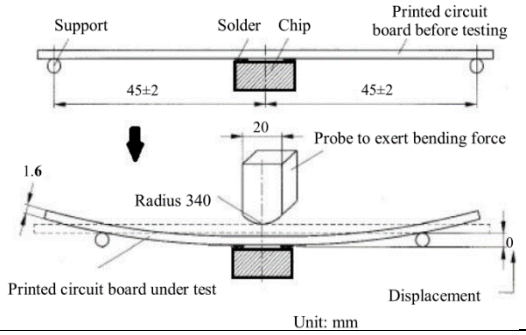
ZEPIM404012T100MLF



◆ 可靠性测试

No.	Item	Requirements	Test Methods and Remarks	Reference	Sample Size
1	Solderability	(1) No case deformation or change in appearance. (2) Terminal area must have 95% min. Solder coverage.	①Temperature:245± 5℃. ②Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free). ③Sample immersion tin furnace 5 ±0.5s.	AEC-Q200 (J-STD 002)	32
2	Adhesion of teral electrode	(1)Strong bond between the pad and the core, without come off PCB.	①Preconditioning：245℃Reflow 3 times ②Inductors shall be subjected to (260+0/-5℃.)℃ for (10±5)s Soldering in the base whit 0.3mm solder. ③Aplombelectrode way plus tax 12 N for (10±1) seconds. 	AEC-Q200 (AEC-Q200-006)	32
3	Reflow test	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	① The peak temperature: 260+0/-5℃. ② Reflow:3times. ③ Temperature curve is as below 	AEC-Q200 (MIL-STD-202 Method 210)	32
4	High temperature	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	① Preconditioning: Bake at 125+5℃ for 24±0.5H，245℃Reflow 3 times ②Temperature: 125±2℃. ③ Time : 1000 hours. ④Measurement at 24±4 hours after test conclusion 	AEC-Q200 (MIL-STD -202 Method 108)	77
5	Low temperature	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning: Bake at 125+5℃ for 24±0.5H，245℃Reflow 3 times ②Temperature: -55±2℃. ③Time : 1000 hours. ④ Measurement at 24±4 hours after test conclusion 	JESD22-A119A	77
6	Thermal shock	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning: Bake at 125+5℃ for 24±0.5H，245℃Reflow 3 times ②Repeat 500 cycle as follow : (-55±2 ℃ ,30±3minutes) 、(Room temperature, 5 minutes)、(+125±2 ℃ ,30±3minutes)、(Room temperature, 5 minutes) ③Measurement at 24±4 hours after test conclusion	MIL-STD -202 Method 107	77

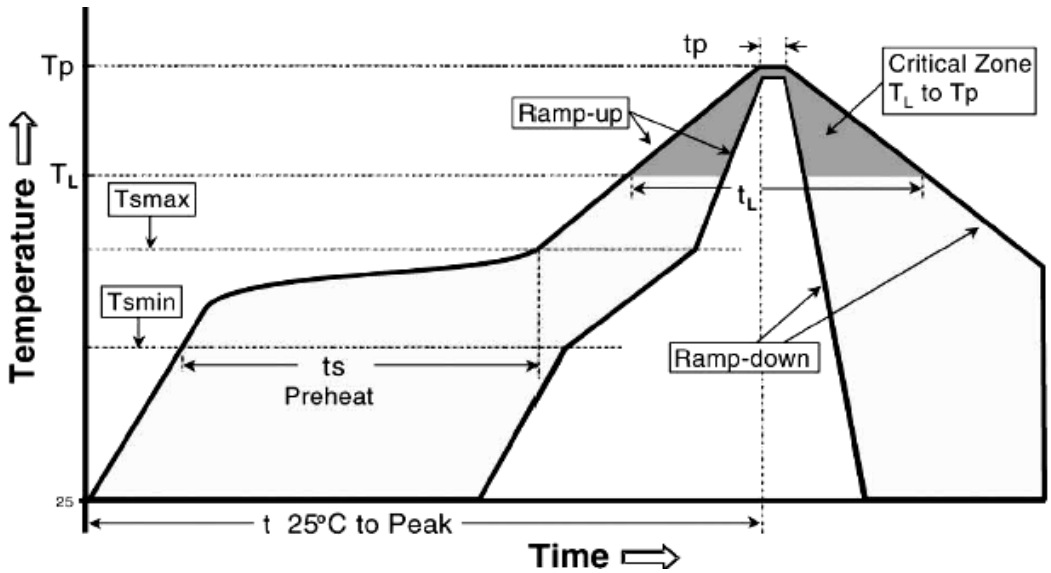
◆ 可靠性测试

No.	Item	Requirements	Test Methods and Remarks	Reference	Sample Size
7	Resistance to Soldering Heat	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free). ②Solder Temperature: 260±5℃. ③Immersion Time: 10±1sec.	AEC-Q200（MIL-STD-202 Method 210）	32
8	Static Humidity	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning: Bake at 125+5℃ for 24±0.5H，245℃Reflow 3 times ②1000 hours, 85°C/85%RH. ③ Unpowered. ④Measurement at 24±4 hours after test conclusion 	AEC-Q200 (MIL-STD-202 Method 103)	77
9	Board Flex	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning：245℃Reflow 3 times ②Part mounted on a 100mm*40mm FR4 PCB board, which is 1.6±0.2 mm thick and as a Layer-thickness 35 μm ± 10 μm. ③ Bending speed is 1mm/s. ④ Keeping the P.C Board 2 mm minimum for 60 seconds. 	AEC-Q200 (AEC-Q200-005)	30
10	Vibration	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning：245℃Reflow 3 times ②Frequency range : 10~2000Hz. ③Amplitude: 1.5mm or 20g. ④ Sweep time and duration: 10~2000~10Hz for 20 minutes. ⑤ Each four hours in X,Y,Z direction, 12hours in total.	AEC-Q200 (MIL-STD-202 Method 204)	32
11	Mechanical Shock	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	① Preconditioning：245℃Reflow 3 times ②Peak acceleration:100G/S ③Duration of pulse:6ms ④3times in each of 6(±X, ±Y, ±Z) axes.	AEC-Q200 (MIL-STD-202 Method 213)	32
12	Loading at High Temperature	(1) No physical damage. (2) | ΔL0/L0 | ≤10%	①Preconditioning: Bake at 125+5℃ for 24±0.5H，245℃Reflow 3 times ②Temperature: 85±2°C. ③ Time : 1000 hours. ④ Applied Current : Rated current. ⑤Measurement at 24±4 hours after test conclusion	AEC-Q200 (MIL-STD-202 Method 108)	77

Soldering Condition

(This is for recommendation, please customer perform adjustment according to actual application)

Recommend Reflow Soldering Profile：(solder : Sn96.5 / Ag3 / Cu0.5)



Profile Feature	Lead (Pb)-Free solder
Preheat： Temperature Min (Ts_{min}) Temperature Max (Ts_{max}) Time (Ts_{min} to Ts_{max}) (ts)	 150℃ 200℃ 60 -120 seconds
Average ramp-up rate： (Ts max to Tp)	 3℃ / second max.
Time maintained above : Temperature (T_L) Time (t_L)	 217℃ 60-150 seconds
Peak Temperature (Tp)	260℃
Time within $^{+0}_{-5}$℃ of actual peak Temperature (tp)[2]	10 seconds
Ramp-down Rate	6℃/second max.
Time 25℃ to Peak Temperature	8minutes max.

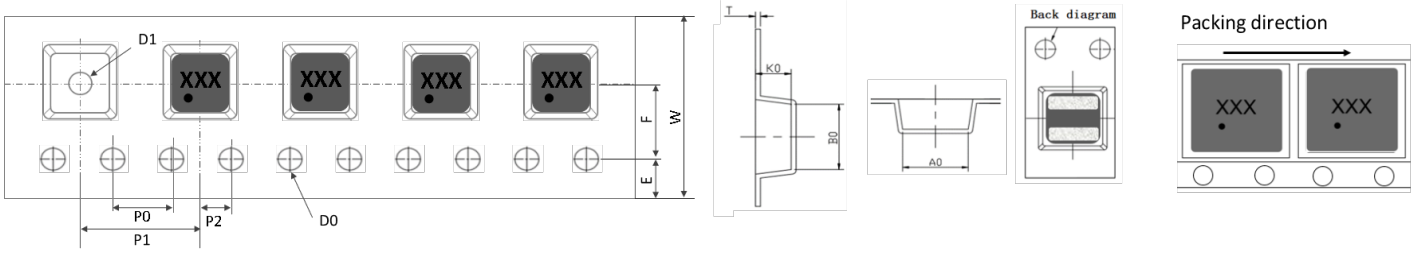
Allowed Re-flow times : 2 times

Remark : To avoid discoloration phenomena of chip on terminal electrodes, please use N_2 Re-flow furnace .

Packing

1 Dimension of plastic taping: (Unit: mm)

The following dimensions are related to the actual fit of the machine， for reference only.



Series	W	A0	B0	D0	D1	E
Tolerance	±0.30	+0.10	+0.10	+0.1	±0.20	±0.10
404012	12.0	4.40	4.40	1.5	1.5	1.75

Series	F	K0	P0	P2	P1	T	包装
Tolerance	±0.10	±0.10	±0.10	±0.10	±0.10	±0.05	数量
404012	5.5	1.30	4.0	2.0	8.0	0.30	3K

2 Dimension of Reel：(Unit: mm)

Type	A ±2.0	B ±2.0	C ±2.0
All	330	100	13.0

