



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： ZEPIM201610T 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

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◆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-Fi module.
- 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 2016 10 T 1R0 M LF

④ ⑤ ⑥ ⑦

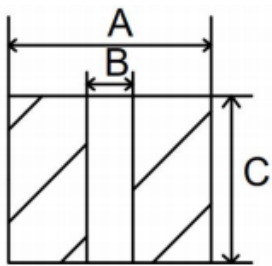
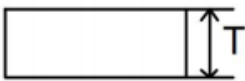
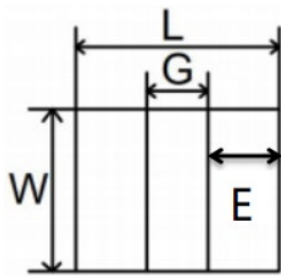
- ①Series Name: Mini Molding Power Inductors
- ② External Dimensions(L×W):2016=2.0*1.6 mm
- ③External Dimensions(H):10=1.0 mm
- ④package: T=编带
- ⑤nductance value:1R0=1.0uH
- ⑥Tolerance:M=±20%
- ⑦Lead free products:环保产品



◆产品外观尺寸：

Shape and Dimensions (dimensions are in mm) :

Outline Dimensions



Recommend Land Pattern Dimensions

SCHEMATIC



Units:mm

Series	L	G/Typ	W	E	T	A/Typ	B/Typ	C/Typ
ZEPIM201610	2.0±0.2	0.6±0.2	1.6±0.2	0.70±0.2	1.00Max.	2.10	0.50	1.70

◆产品构造：

Material List



环境：

Environmental Data:

●工作温度：-55 至+125
(包括线圈自身温升)

● Operating Temperature:-55 to+125 (Including coil self-temperature rise)



Electrical Characteristics电气性能

ZEPIM201610T Series

P/N	L0 (μH) @ (0A) 1MHz	Rdc (mΩ)		Heat rating current		Saturation current	
		Typical	Max	Typical	Max	Typical	Max
ZEPIM201610TR10MLF	0.10	7.00	12.00	8.70	8.20	9.20	8.60
ZEPIM201610TR15MLF	0.15	8.00	14.00	7.80	7.20	8.90	8.20
ZEPIM201610TR22MLF	0.22	11.00	18.00	7.10	6.50	8.40	7.70
ZEPIM201610TR24MLF	0.24	12.00	19.00	7.00	6.40	8.20	7.60
ZEPIM201610TR33MLF	0.33	17.00	22.00	5.90	5.50	7.20	6.70
ZEPIM201610TR47MLF	0.47	22.00	25.00	5.70	5.20	6.50	5.70
ZEPIM201610TR68MLF	0.68	25.00	32.00	4.80	4.50	5.40	4.90
ZEPIM201610T1R0MLF	1.00	35.00	43.00	4.70	4.30	4.80	4.40
ZEPIM201610T1R5MLF	1.50	80.00	100.00	2.80	2.50	3.40	3.10
ZEPIM201610T2R2MLF	2.20	120.00	130.00	2.70	2.30	3.20	3.00
ZEPIM201610T3R3MLF	3.30	140.00	170.00	1.90	1.70	2.50	2.20
ZEPIM201610T4R7MLF	4.70	190.00	220.00	1.80	1.60	2.20	2.00
ZEPIM201610T100MLF	10.00	483.00	580.00	1.20	0.90	1.60	1.30

Test remarks

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

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

Note 3.: Irms:DC current (A) that will cause an approximate ΔT of 40 °C.

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

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

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Note 6.: The part temperature (ambient + temp rise) should not exceed 125 under °C 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.

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



The graph displays two data series against DC Bias (Amps) on the x-axis (0 to 13). The left y-axis represents Inductance (uH) from 0 to 0.12, and the right y-axis represents Temperature Rise (°C) from 0 to 120. The Inductance (red line) starts at approximately 0.105 uH at 0A and decreases to about 0.055 uH at 13A. The Temperature Rise (blue line) starts at 0°C at 0A and increases to approximately 65°C at 13A.

DC BIAS (Amps)	INDUCTANCE (uH)	TEMP. RISE (°C)
0	0.105	0
3	0.100	5
6	0.090	10
8	0.075	15
10	0.065	25
12	0.060	50
13	0.055	65

A line graph with two y-axes. The x-axis is labeled 'DC BIAS (Amps)' and ranges from 0 to 12. The left y-axis is labeled 'INDUCTANCE(μH)' and ranges from 0 to 0.16. The right y-axis is labeled 'TEMP. RISE(°C)' and ranges from 0 to 120. A red line represents 'INDUCTANCE(μH)' and starts at approximately 0.155 at 0A, decreasing to about 0.10 at 12A. A blue line represents 'TEMP. RISE(°C)' and starts at 0 at 0A, increasing to about 85 at 12A. The two lines intersect at approximately 11.5A.

DC BIAS (Amps)	INDUCTANCE(μH)	TEMP. RISE(°C)
0	0.155	0
3	0.145	5
6	0.135	15
8	0.125	25
10	0.115	40
11.5	0.105	75
12	0.10	85

A line graph with two y-axes. The x-axis is 'DC BIAS (Amps)' from 0 to 10. The left y-axis is 'INDUCTANCE(µH)' from 0 to 0.3. The right y-axis is 'TEMP. RISE(°C)' from 0 to 120. A red line represents 'INDUCTANCE(µH)' and a blue line represents 'TEMP. RISE(°C)'. Inductance starts at ~0.25 µH at 0A and decreases to ~0.16 µH at 10A. Temperature rise starts at 0°C at 0A and increases to ~75°C at 10A.

DC BIAS (Amps)	INDUCTANCE(µH)	TEMP. RISE(°C)
0	0.25	0
1	0.245	0.5
2	0.24	1
3	0.235	2
4	0.23	3.5
5	0.225	5
6	0.22	7
7	0.215	10
8	0.21	15
9	0.205	25
10	0.20	35

DC BIAS (Amps)	INDUCTANCE (uH)	TEMP. RISE (°C)
0	0.235	0
1	0.225	0.5
2	0.215	1.5
3	0.205	3.0
4	0.195	5.0
5	0.185	7.5
6	0.175	12.0
7	0.165	18.0
8	0.155	25.0
9	0.145	35.0
10	0.135	65.0

DC Bias (Amps)	Inductance (uH)	Temp. Rise (°C)
0	0.35	0
1	0.34	1
2	0.33	2
3	0.32	4
4	0.31	7
5	0.30	11
6	0.29	16
7	0.28	23
8	0.26	33
9	0.23	45

The graph plots Inductance (uH) and Temperature Rise (°C) against DC Bias (Amps). The Inductance (red line) starts at approximately 0.45 uH at 0A and decreases to about 0.25 uH at 8A. The Temperature Rise (blue line) starts at 0°C at 0A and increases to approximately 65°C at 8A.

DC BIAS (Amps)	INDUCTANCE (uH)	TEMP. RISE (°C)
0	0.45	0
1	0.42	0
2	0.40	2
3	0.38	5
4	0.36	10
5	0.34	15
6	0.32	25
7	0.28	45
8	0.25	65

This graph shows the relationship between DC Bias (Amps) and two other variables: Inductance (µH) and Temperature Rise (°C). The x-axis represents DC Bias from 0 to 8 Amps. The left y-axis represents Inductance from 0 to 0.8 µH, and the right y-axis represents Temperature Rise from 0 to 120 °C. The red line shows Inductance decreasing from approximately 0.65 µH at 0 Amps to about 0.42 µH at 8 Amps. The blue line shows Temperature Rise increasing from 0 °C at 0 Amps to approximately 75 °C at 8 Amps.

DC BIAS (Amps)	INDUCTANCE (µH)	TEMP. RISE (°C)
0	0.65	0
1	0.63	2
2	0.61	5
3	0.59	10
4	0.57	18
5	0.54	28
6	0.51	40
7	0.48	55
8	0.42	75

DC Bias (Amps)	Inductance (uH)	Temp. Rise (°C)
0	0.95	0
1	0.90	2
2	0.85	5
3	0.80	10
4	0.75	18
5	0.70	28
6	0.60	45
6.5	0.55	75

DC BIAS (Amps)	INDUCTANCE (uH)	TEMP. RISE (°C)
0	1.6	0
0.5	1.55	1
1	1.5	2
1.5	1.45	4
2	1.4	7
2.5	1.35	12
3	1.3	18
3.5	1.25	25
4	0.9	60

INDUCTANCE(μ H) TEMP. RISE($^{\circ}$ C)

DC BIAS (Amps)

The graph shows two trends as DC bias increases from 0 to 3 Amps. The inductance (red line) starts at 3.5 μH and decreases to 2.1 μH . The temperature rise (blue line) starts at 0 $^{\circ}\text{C}$ and increases to 85 $^{\circ}\text{C}$.

DC BIAS (Amps)	INDUCTANCE (μH)	TEMP. RISE ($^{\circ}\text{C}$)
0	3.5	0
0.5	3.4	10
1.0	3.2	20
1.5	2.9	35
2.0	2.6	50
2.5	2.3	65
3.0	2.1	85

A line graph with two y-axes. The x-axis is labeled 'DC BIAS (Amps)' and ranges from 0 to 3. The left y-axis is labeled 'INDUCTANCE(μH)' and ranges from 0 to 5. The right y-axis is labeled 'TEMP. RISE(°C)' and ranges from 0 to 120. A red line represents 'INDUCTANCE(μH)' and starts at approximately 4.4 at 0A, decreasing to about 2.5 at 3A. A blue line represents 'TEMP. RISE(°C)' and starts at 0 at 0A, increasing to about 90 at 3A.

DC BIAS (Amps)	INDUCTANCE(μH)	TEMP. RISE(°C)
0	4.4	0
0.5	4.2	5
1	4.0	10
1.5	3.8	20
2	3.5	40
2.5	3.2	65
3	2.5	90

DC BIAS (Amps)	INDUCTANCE (uH)	TEMP. RISE (°C)
0.0	10.8	0
0.2	10.2	12.5
0.4	9.6	25
0.6	9.0	37.5
0.8	8.4	50
1.0	7.8	62.5
1.2	7.2	75



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: $245 \pm 5^{\circ}\text{C}$. ②Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free). ③Sample immersion tin furnace $5 \pm 0.5\text{s}$.	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°C Reflow 3 times ②Inductors shall be subjected to $(260+0/-5^{\circ}\text{C})^{\circ}\text{C}$ for $(10 \pm 5)\text{s}$ 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) $ \Delta L_0/L_0 \leq 10\%$	① The peak temperature: $260+0/-5^{\circ}\text{C}$. ② Reflow: 3 times. ③ Temperature curve is as below 	AEC-Q200 (MIL-STD-202 Method 210)	32
4	High temperature	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: Bake at $125+5^{\circ}\text{C}$ for $24 \pm 0.5\text{H}$, 245°C Reflow 3 times ②Temperature: $125 \pm 2^{\circ}\text{C}$. 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) $ \Delta L_0/L_0 \leq 10\%$	①Preconditioning: Bake at $125+5^{\circ}\text{C}$ for $24 \pm 0.5\text{H}$, 245°C Reflow 3 times ②Temperature: $-55 \pm 2^{\circ}\text{C}$. ③Time : 1000 hours. ④ Measurement at 24 ± 4 hours after test conclusion 	JESD22-A119A	77
6	Thermal shock	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	①Preconditioning: Bake at $125+5^{\circ}\text{C}$ for $24 \pm 0.5\text{H}$, 245°C Reflow 3 times ②Repeat 500 cycle as follow : ($-55 \pm 2^{\circ}\text{C}$, $30 \pm 3\text{minutes}$) 、 (Room temperature, 5 minutes)、 ($+125 \pm 2^{\circ}\text{C}$, $30 \pm 3\text{minutes}$)、 (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) $ \Delta L_0/L_0 \leq 10\%$	① Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free). ② Solder Temperature: $260 \pm 5^\circ\text{C}$. ③ Immersion Time: 10 ± 1 sec.	AEC-Q200 (MIL-STD-202 Method 210)	32
8	Static Humidity	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: Bake at $125 \pm 5^\circ\text{C}$ for $24 \pm 0.5\text{H}$, 245°C Reflow 3 times ② 1000 hours, $85^\circ\text{C}/85\%\text{RH}$. ③ Unpowered. ④ Measurement at 24 ± 4 hours after test conclusion 	AEC-Q200 (MIL-STD-202 Method 103)	77
9	Board Flex	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: 245°C Reflow 3 times ② Part mounted on a $100\text{mm} \times 40\text{mm}$ FR4 PCB board, which is 1.6 ± 0.2 mm thick and as a Layer-thickness $35 \mu\text{m} \pm 10 \mu\text{m}$. ③ Bending speed is 1mm/s. ④ Keeping the P.C Board 2 mm minimum for 60 seconds.  Unit: mm	AEC-Q200 (AEC-Q200-005)	30
10	Vibration	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: 245°C Reflow 3 times ② Frequency range : 10~2000Hz. ③ Amplitude: 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) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: 245°C Reflow 3 times ② Peak acceleration: 100G/S ③ Duration of pulse: 6ms ④ 3times in each of 6($\pm X, \pm Y, \pm Z$) axes.	AEC-Q200 (MIL-STD-202 Method 213)	32
12	Loading at High Temperature	(1) No physical damage. (2) $ \Delta L_0/L_0 \leq 10\%$	① Preconditioning: Bake at $125 \pm 5^\circ\text{C}$ for $24 \pm 0.5\text{H}$, 245°C Reflow 3 times ② Temperature: $85 \pm 2^\circ\text{C}$. ③ Time : 1000 hours. ④ Applied Current : Rated current. ⑤ Measurement 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 (T_{smin})	150°C
Temperature Max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60 -120 seconds
Average ramp-up rate: (T_{smax} to T_p)	3°C / second max.
Time maintained above :	
Temperature (T_L)	217°C
Time (t_L)	60-150 seconds
Peak Temperature (T_p)	260°C
Time within $+0_{-5}^{\circ}\text{C}$ of actual peak Temperature (t_p) ²	10 seconds
Ramp-down Rate	6°C/second max.
Time 25°C to Peak Temperature	8minutes max.

Allowed Re-flow times : 2 times

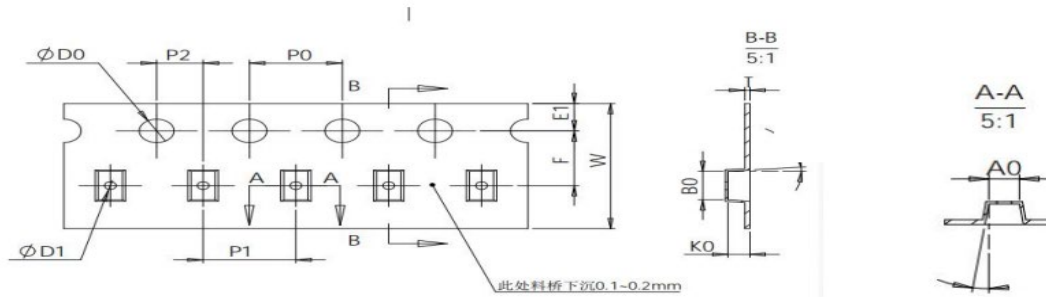
Remark : To avoid discoloration phenomena of chip on terminal electrodes, please use N₂ Re-flow furnace .



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	± 0.10	$+0.10/-0.05$	$+0.10/-0.05$	$+0.1/-0$	± 0.20	± 0.10
201610	8.0	1.95	2.35	1.5	1.0	1.75

Series	F	K0	P0	P2	P1	T	包装 数量
Tolerance	± 0.10	± 0.10	± 0.10	± 0.10	± 0.10	± 0.05	
201610	3.5	1.15	4.0	2.0	4.0	0.25	3K

2 Dimension of Reel : (Unit: mm)

Type	A ± 2.0	B ± 2.0	C ± 2.0
All	178	60	13

