Power Chip Inductors

Type LPC

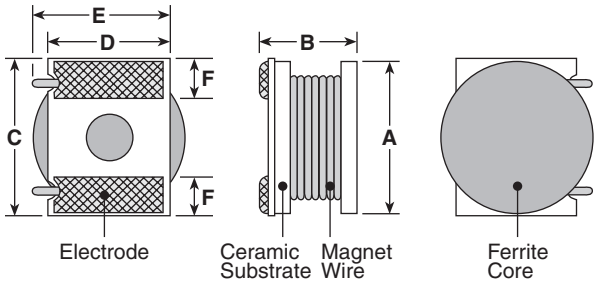
ISO 9001:2008 CERTIFIED
TS-16949 CERTIFIED

1. Scope

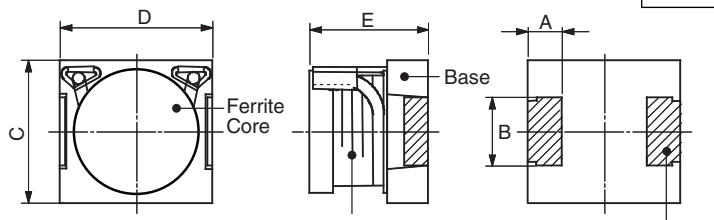
This specification shall be applied to the LPC manufactured by KOA Corporation.

2. Dimensions and Construction

Size	Dimensions inches *(mm)*					
	A	B	C	D	E	F
4045	ø.157±.008 *(ø4.0±0.2)*	.169±.009 *(4.3±0.2)*	.177±.008 *(4.5±0.2)*	.118±.008 *(3.0±0.2)*	.138 *(3.5)*	.039±.112 *(1.0±0.3)*
4235	.039±.008 *(1.0±0.2)*	.079±.008 *(2.0±0.2)*	.165±.008 *(4.2±0.2)*	.177±.008 *(4.5±0.2)*	.138 Max. *(3.5 Max.)*	—
4545	.126±.012 *(3.2±0.3)*	—	.181±.016 *(4.6±0.4)*	.161±.012 *(4.1±0.3)*	.181 Max. *(4.6 Max.)*	—
9040N	ø.354±.004 *(ø9.0±0.1)*	.193 Max. *(4.9 Max.)*	.402 Max. *(10.2 Max.)*	.079±.008 *(2.0±0.2)*	—	.071±.008 *(1.8±0.2)*
9040E	ø.354±.004 *(ø9.0±0.1)*	.193 Max. *(4.9 Max.)*	.402 Max. *(10.2 Max.)*	.079±.008 *(2.0±0.2)*	—	.071±.008 *(1.8±0.2)*
10065	ø.394±.008 *(ø10.0±0.2)*	.295 Max. *(7.5 Max.)*	.409±.008 *(10.4±0.2)*	.315±.008 *(8.0±0.2)*	.354 *(9.0)*	.098±.008 *(2.5±0.2)*
12065	ø.472±.008 *(ø12.0±0.2)*	.295 Max. *(7.5 Max.)*	.488±.008 *(12.4±0.2)*	.472±.008 *(10.0±0.2)*	.433 *(11.0)*	.146±.112 *(3.7±0.3)*



4045, 10065, 12065



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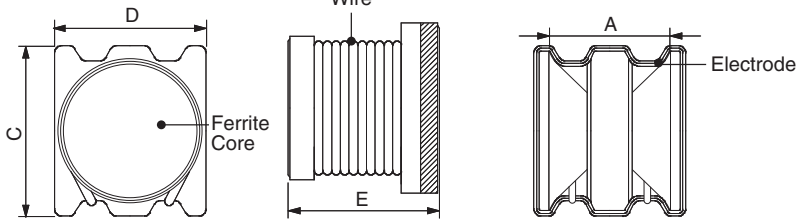

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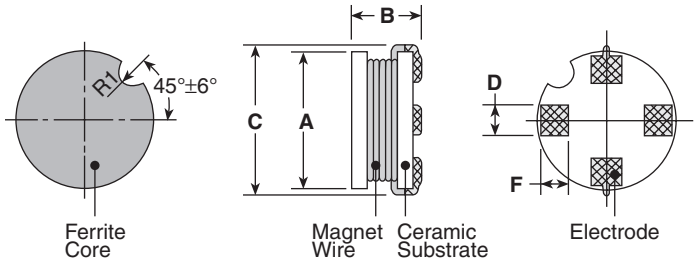

9040N, 9040E

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3. Type Designation

The type designation shall be the following form:

New Type

LPC	4045	A	TED	101	K
Type	Size	Termination Material	Packaging	Nominal Inductance	Tolerance
	4045 4235 4545 9040N 9040E 10065 12065	A: SnAg T: Sn (4235 only) C: Sn/Cu (4545 only)	TED: 10" Embossed Plastic (4045 - 1,000 pcs/reel) (9040N - 500 pcs/reel) (9040E - 500 pcs/reel) (10065 - 300 pcs/reel) (12065 - 300 pcs/reel) TM: Taping (4235) TE: Taping (4545)	101: 100µH 221: 220µH 152: 1500µH	K: ±10% M: ±20% N: ±30%

4. Standard Applications

Part Designation	Inductance (µH)	Inductance Tolerance	Quality Factor Minimum (MHz)	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (Amps)	Measured Frequency (Hz)
LPC4045ATED1R0M	1.0	M: ±20%	20	90.0	0.015	3.10	1000
LPC4045ATED1R5M	1.5			70.0	0.020	2.80	
LPC4045ATED2R2M	2.2			55.0	0.023	2.50	
LPC4045ATED3R3M	3.3			45.0	0.044	1.80	
LPC4045ATED4R7M	4.7			35.0	0.062	1.45	
LPC4045ATED6R8M	6.8			25.0	0.075	1.30	
LPC4045ATED100K	10	K: ±10%		23.5	0.10	1.02	
LPC4045ATED150K	15			18.5	0.15	0.84	
LPC4045ATED220K	22			14.0	0.21	0.70	
LPC4045ATED330K	33			12.0	0.41	0.52	
LPC4045ATED470K	47			10.5	0.52	0.46	
LPC4045ATED680K	68			8.0	0.67	0.40	
LPC4045ATED101K	100			6.3	0.92	0.28	
LPC4045ATED151K	150		40	5.2	1.80	0.25	
LPC4045ATED221K	220			3.9	2.25	0.18	
LPC4045ATED331K	330			3.0	4.27	0.15	
LPC4045ATED471K	470			2.7	5.23	0.14	
LPC4045ATED681K	680			2.2	6.67	0.12	
LPC9040NATED100M	10	M: ±20%	40	25.0	0.07	1.55	10 kHz
LPC9040NATED150K	15	K: ±10%	30	21.0	0.09	1.40	
LPC9040NATED220K	22			15.0	0.11	1.25	
LPC9040NATED330K	33		20	13.5	0.14	1.10	
LPC9040NATED470K	47			11.5	0.20	0.99	
LPC9040NATED680K	68		10	10.0	0.27	0.91	
LPC9040NATED101K	100			8.0	0.41	0.70	
LPC9040NATED151K	150			7.0	0.55	0.60	
LPC9040NATED221K	220			5.0	0.81	0.50	
LPC9040NATED331K	330			3.3	1.86	0.29	
LPC9040NATED471K	470			2.8	2.07	0.22	
LPC9040NATED681K	680			1.2	2.65	0.14	

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4. Standard Applications (continued)

Part Designation	Inductance (µH)	Inductance Tolerance	Quality Factor Minimum (MHz)	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (Amps)	Measured Frequency (Hz)
LPC9040EATED100M	10	M: ±20%	40	25.0	0.07	2.40	10 kHz
LPC9040EATED150K	15	K: ±10%	30	21.0	0.09	2.20	
LPC9040EATED220K	22			15.0	0.11	2.00	
LPC9040EATED330K	33		20	13.5	0.14	1.80	
LPC9040EATED470K	47			11.5	0.20	1.40	
LPC9040EATED680K	68		10	10.0	0.27	1.20	
LPC9040EATED101K	100			8.0	0.41	1.00	
LPC9040EATED151K	150			7.0	0.55	0.80	
LPC9040EATED221K	220			5.0	0.81	0.60	
LPC9040EATED331K	330			3.3	1.86	0.45	
LPC9040EATED471K	470			2.8	2.07	0.40	
LPC9040EATED681K	680			1.2	2.65	0.35	
LPC10065ATEDR68M	0.68	M: ±20%	40	75.0	6.0 m	9.50	L Meas. Freq. 1 MHz Q Meas. Freq. 2.52 MHz
LPC10065ATED1R0M	1.0			65.0	7.0 m	9.00	
LPC10065ATED1R5M	1.5			50.0	8.0 m	8.50	
LPC10065ATED2R2M	2.2		30	40.0	9.0 m	7.50	
LPC10065ATED3R3M	3.3			30.0	0.012	6.80	
LPC10065ATED4R7M	4.7			25.0	0.017	5.70	
LPC10065ATED6R8M	6.8		20	20.0	0.024	4.70	
LPC10065ATED100K	10	K: ±10%		15.0	0.036	3.90	
LPC10065ATED150K	15			12.0	0.054	3.15	
LPC10065ATED220K	22		15	9.0	0.080	2.60	
LPC10065ATED330K	33			8.0	0.120	2.30	
LPC10065ATED470K	47			6.0	0.175	1.79	
LPC10065ATED680K	68	K: ±10%	30	5.0	0.255	1.48	100 MHz
LPC10065ATED101K	100			4.0	0.380	1.22	
LPC10065ATED151K	150			3.0	0.580	1.00	
LPC10065ATED221K	220			2.5	0.850	0.82	
LPC10065ATED331K	330			2.0	1.30	0.67	
LPC10065ATED471K	470			1.5	1.85	0.57	
LPC10065ATED681K	680			1.0	2.70	0.47	
LPC10065ATED102K	1.0 mH			0.95	4.00	0.38	
LPC10065ATED152K	1.5 mH			0.85	6.10	0.31	
LPC10065ATED222K	2.2 mH			0.70	9.00	0.26	
LPC10065ATED332K	3.3 mH			0.55	13.5	0.21	
LPC12065ATEDR68N	0.68	N: ±30%	40	77.0	5.0 m	10.0	2.52 MHz
LPC12065ATED1R0N	1.0			60.0	7.0 m	9.50	
LPC12065ATED1R5N	1.5			47.0	8.0 m	9.00	
LPC12065ATED2R2N	2.2			38.0	10.0 m	8.00	
LPC12065ATED3R3M	3.3	M: ±20%	30	30.0	0.012	7.00	
LPC12065ATED4R7M	4.7			24.0	0.016	6.50	
LPC12065ATED6R8M	6.8			19.0	0.022	5.40	
LPC12065ATED100K	10	K: ±10%		15.0	0.031	4.50	
LPC12065ATED150K	15		20	12.0	0.046	3.63	
LPC12065ATED220K	22			9.5	0.065	3.00	
LPC12065ATED330K	33			7.5	0.093	2.40	
LPC12065ATED470K	47			6.2	0.130	2.05	
LPC12065ATED680K	68			4.9	0.182	1.70	
LPC12065ATED101K	100		15	4.0	0.260	1.38	100 KHz
LPC12065ATED151K	150			3.2	0.380	1.14	
LPC12065ATED221K	220			2.5	0.540	0.94	
LPC12065ATED331K	330			2.0	0.790	0.77	
LPC12065ATED471K	470			1.6	1.08	0.65	
LPC12065ATED681K	680			1.3	1.55	0.53	
LPC12065ATED102K	1.0 mH		30	1.0	2.21	0.44	
LPC12065ATED152K	1.5 mH			0.83	3.20	0.35	
LPC12065ATED222K	2.2 mH			0.67	4.60	0.29	
LPC12065ATED332K	3.3 mH			0.53	6.60	0.23	
LPC12065ATED472K	4.7 mH			0.43	9.30	0.19	
LPC12065ATED682K	6.8 mH			0.34	13.2	0.16	

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4. Standard Applications (continued)

Part Designation	Inductance (µH)	Inductance Tolerance	Self Resonant Frequency Minimum (MHz)	DC Resistance Maximum (Ω)	Allowable DC Current Maximum (Amps)
LPC4235TTM R82M	0.82	M: ±20%	146.6	0.017	3.34
LPC4235TTM 1R0M	1.0		125.1	0.020	3.27
LPC4235TTM 1R2M	1.2		114.7	0.023	3.10
LPC4235TTM 1R5M	1.5		101.4	0.031	2.53
LPC4235TTM 2R2M	2.2		78.8	0.039	2.28
LPC4235TTM 3R3M	3.3		66.7	0.070	1.63
LPC4235TTM 4R7M	4.7		52.0	0.090	1.44
LPC4235TTM 6R8M	6.8		43.5	0.109	1.29
LPC4235TTM 100K	10	K: ±10%	33.5	0.190	0.91
LPC4235TTM 150K	15		29.1	0.230	0.87
LPC4235TTM 220K	22		21.7	0.366	0.69
LPC4235TTM 330K	33		13.9	0.542	0.52
LPC4235TTM 470K	47		12.0	0.688	0.47
LPC4235TTM 680K	68		12.7	1.30	0.34
LPC4235TTM 101K	100		10.4	1.66	0.31
LPC4235TTM 151K	150		7.5	2.96	0.22
LPC4235TTM 221K	220		6.7	3.77	0.20
LPC4545CTE 1R0M	1.0	M: ±20%	90.0	0.015	3.66
LPC4545CTE 1R5M	1.5		65.0	0.02	3.21
LPC4545CTE 2R2M	2.2		50.0	0.023	2.96
LPC4545CTE 3R3M	3.3		40.0	0.044	2.19
LPC4545CTE 4R7M	4.7		35.0	0.062	1.81
LPC4545CTE 6R8M	6.8		25.0	0.075	1.60
LPC4545CTE 100K	10	K: ±10%	23.0	0.1	1.43
LPC4545CTE 150K	15		15.0	0.15	1.04
LPC4545CTE 220K	22		13.0	0.21	0.88
LPC4545CTE 330K	33		10.0	0.41	0.60
LPC4545CTE 470K	47		9.0	0.52	0.53
LPC4545CTE 680K	68		7.5	0.67	0.49
LPC4545CTE 101K	100		5.5	0.92	0.41
LPC4545CTE 151K	150		5.0	1.8	0.29
LPC4545CTE 221K	220		4.0	2.25	0.26
LPC4545CTE 331K	330		2.5	4.27	0.19
LPC4545CTE 471K	470		2.0	5.23	0.17
LPC4545CTE 681K	680		1.8	6.67	0.15
LPC4545CTE 152K	1500		1.3	17.04	0.10
LPC4545CTE 222K	2200		0.9	35.0	0.07

Operating temperature range: -40°C – +125°C (the self-temperature rise is contained)
Allowable current is a DC Current which causes initial inductance to decrease by 10%. Or coil temperature to rise by 40°C, whichever is smaller

5. Performance Characteristics

Parameter	Maximum Δ L	Test Method
High Temperature Exposure	±5%	LPC4045, LPC9040N, LPC10065, LPC12065: +85°C ± 2°C, 500 hours LPC9040E: +125°C ± 2°C, 500 hours LPC4235, LPC4545: +125°C ± 2°C, 1000 hours
Low Temperature Exposure	±5%	LPC4045, LPC9040N, LPC9040E, LPC10065, LPC12065: -40°C, 500 hours LPC4235, LPC4545: -40°C, 1000 Hours
Moisture Exposure	±5%	LPC4045, LPC9040N, LPC9040E, LPC10065, LPC12065: +40°C, 90 - 95% RH, 500 hours LPC4235, LPC4545: +40°C ± 2°C, 90 - 95% RH, 1000 hours
Temperature Cycling	±5%	LPC4045, LPC9040N, LPC10065, LPC12065: -40°C (30 minutes)/+85°C (30 minutes), 100 cycles LPC4235, LPC4545, LPC9040E: -40°C (30 minutes)/+125°C (30 minutes), 100 cycles

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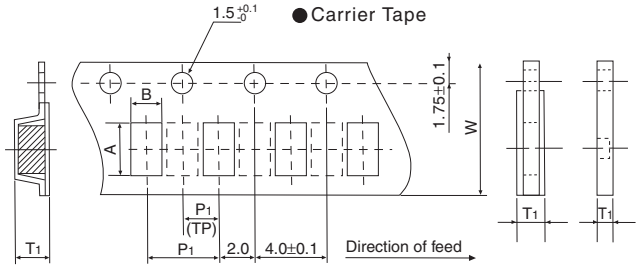
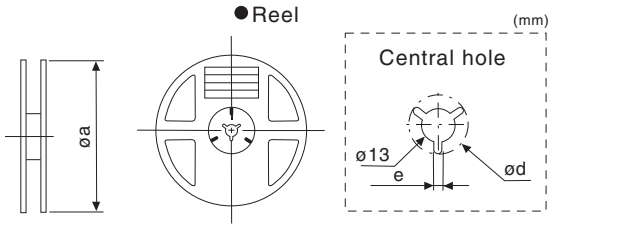
6. Packaging

6.1 Dimensions of Taping

Type		Component Size (mm)			Carrier Tape	Quantity/ Reel (Pieces)	Taping (mm)					Reel Size
		L	W	T			A	B	W	P1	T1	
LPC	4545	4.6	4.1	4.6	TE	2500	4.85±0.2	4.25±0.2	12	8	5.1±0.2	380
	4045	4.50	4	4.5	TED	1000	4.15±0.2	4.75±0.2	12.0±0.1	8.0±0.2	5±0.2	380
	4235	4.5	4.2	3.5	TM	2000	4.4±0.2	4.75±0.2	12.0±0.1	8.0±0.1	4.0±0.2	330
	9040N/E	9.00	10.2	4.9	TED	500	Ø9.4±0.2		16±.01	12±.01	7.5±0.2	380
	12065	12.40	12	7.5	TED	300	12.5±0.2	13±0.2	24±.01	16±.02	8.2±0.2	380
	10065	10.40	10	7.5	TED	300	11±0.2	11.5±0.2	24±.01	16±.02	8.2±0.2	380





Type	ød (mm)	e (mm)
LPC	21	2

6.2 Packaging Method

A specially designed cardboard box is used for the external packaging and can hold a maximum of 20 reels.

6.3 Markings

The following information is provided on the reel.

(1) Product name (2) Part number (3) Quality
(4) Lot number (5) Manufacture origin

6.4 Lot Number

(Example) January 21, 2006

41	21	D	K
Year and Month of Manufacture	Day of Manufacture	Manufacture Plant	Additional Number

41···2006.1 42···2006.2 43···2006.3

7. General Information

7.1 Storage

Chip inductors shall not be stored under high temperature and high humidity conditions. Especially, do not store taping where they are exposed to heat or direct sunlight. Otherwise, material may be deformed, causing problems during mounting.

7.2 Mounting

Placement force should not be excessive.

7.3 Soldering

Soldering should be done at 250°C for less than 6 seconds. When using a soldering iron, temperature shall not exceed 350°C and within 3 seconds. Soldering iron time shall be allowed only one time. After soldering, chip inductors shall not be stressed excessively.

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7.4 Cleaning

There is no problem using organic solvents. Since these chip inductors are a coil of ultra-thin wire, they are susceptible to vibration. If an ultrasonic cleaning unit is used, check for any possibility of problem generation before practical use, since such cleaning units differ considerably in vibration level and mode. Although the conditions vary depending on the printed board size, Ultrasonic cleaning is generally used in the conditions described in the following examples:

Power: Within 20W/L
Cleaning times: Within 5 minutes

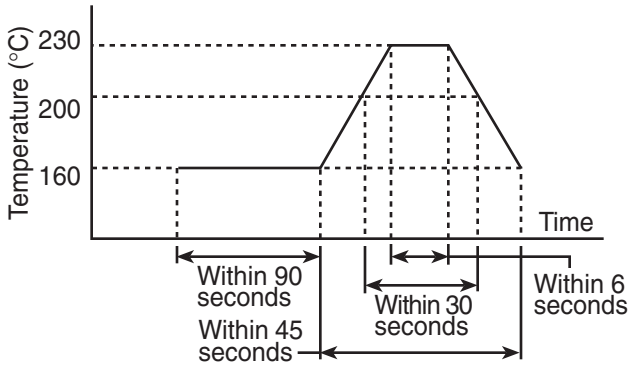
7.5 Pattern Design

A land pattern gap is recommended of 2.0 mm to 2.5 mm. When low or more chip inductors are closely mounted, they must be separated by means of solder resists to prevent excessive solder.

8. Soldering

8.1 Conditions for Reflow Soldering

The time and temperature for reflow solder applications are as shown below.



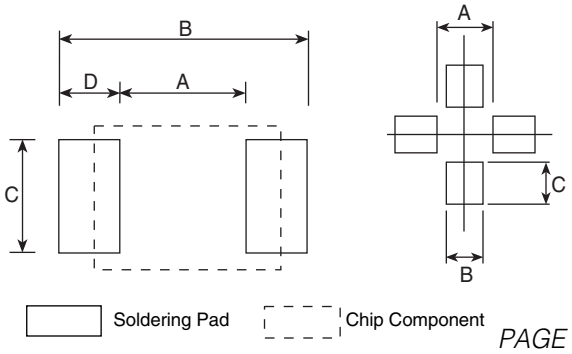
9. Land Pattern Design

9.1 Pattern Design

The optimum soldering pad dimensions may differ depending on soldering conditions, however, the following land dimensions are generally recommended.

Type	Style	Dimensions millimeters				
		Component Size	A	B	C	D
LPC	4045	4.5 X 4.0	1.5	5.1	3.5	1.8
	4235	4.5 X 4.2	1.9	5.5	2.6	1.8
	4545	4.1 X 4.6	2.0	4.6	4.7	1.3
	9040N	9.0 X 4.8	4.0	2.6	3.0	—
	9040E	9.0 X 4.8	4.0	2.6	3.0	—
	10065	10.0 X 10.4	5.0	13.0	6.0	4.0
	12065	12 X 12.4	5.0	15.0	7.5	5.0

Flat Type Components **LPC 9040N**



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