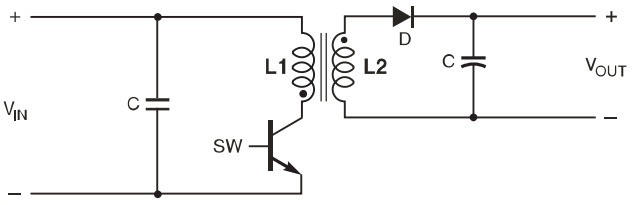
深 圳 市 富 尔 电 子 科 技 有 限 公 司
ADD:广东省深圳市南山区后海工业七路8号 Http://www.frcoil.com
Tel/Fax:0755-21606613/21606608 Email:xy@frcoil.com

SMT Power Inductors–PS4L1278

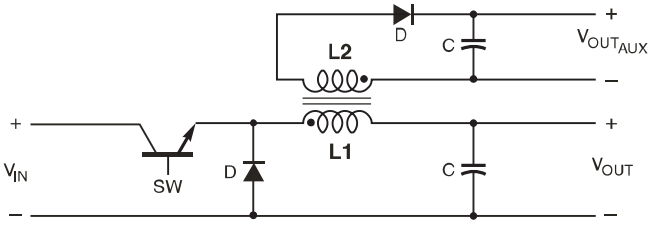
Tight coupling (k ≥ 0.94) and 500 V isolation make the PS4L1278 series of coupled inductors ideal for use in a variety of circuits including flyback, multi-output buck and SEPIC.

These inductors provide high inductance, high efficiency and excellent current handling in a rugged, low cost part.

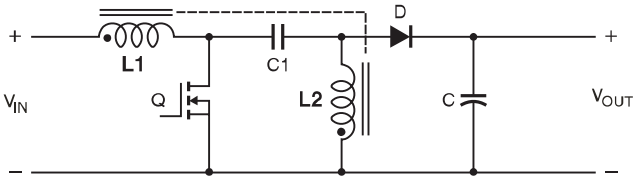
They can also be used as two single inductors connected in series or parallel or as a common mode choke.



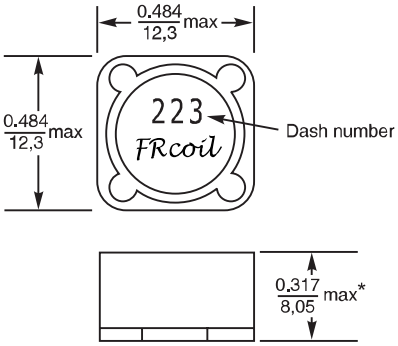
Typical Flyback Converter



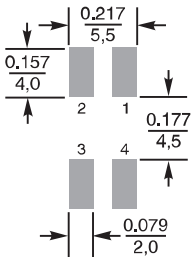
Typical Buck Converter with auxiliary output

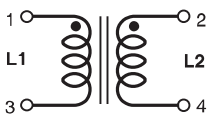


Typical SEPIC schematic



Recommended Land Pattern





1 : 1

* For optional tin-lead and tin-silver-copper terminations, dimensions are for the mounted part. Dimensions before mounting can be an additional 0.012 inch (0,3 mm).

Dimensions are in inches / mm

Designer's Kit C400 contains 3 each of all values.

Core material Ferrite

Terminations RoHS compliant matte tin over nickel over phos bronze. Other terminations available at additional cost.

Weight: 3.7 – 4.4 g

Ambient temperature –40°C to +85°C with Irms current, +85°C to +125°C with derated current

Storage temperature Component: –40°C to +125°C. Tape and reel packaging: –40°C to +80°C

Winding-to-winding and winding-to-core isolation 500 Vrms

Resistance to soldering heat Max three 40 second reflows at +260°C, parts cooled to room temperature between cycles

Moisture Sensitivity Level (MSL) 1 (unlimited floor life at <30°C / 85% relative humidity)

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SMT Power Inductors–PS4L1278

RoHS COMPLIANT

Part number	Inductance[1] (µH)	DCR max[2] (Ohms)	SRF typ[3] (MHz)	coefficient typ	Leakage inductance[4] typ (µH)	Isat[5] (A)	both windings[6]	one winding[7]
PS4L1278-472M	4.7 ±20%	0.038	32.0	0.94	0.22	14.9	3.16	4.47
PS4L1278-562M	5.6 ±20%	0.046	25.0	0.94	0.23	13.4	2.87	4.06
PS4L1278-682M	6.8 ±20%	0.048	24.0	0.94	0.22	13.1	2.81	3.98
PS4L1278-822M	8.2 ±20%	0.050	18.0	0.94	0.34	10.8	2.76	3.90
PS4L1278-103M	10 ±20%	0.058	16.5	0.94	0.34	10.5	2.56	3.62
PS4L1278-123M	12 ±20%	0.062	14.5	0.94	0.36	9.6	2.48	3.50
PS4L1278-153M	15 ±20%	0.072	11.8	0.94	0.41	9.1	2.30	3.25
PS4L1278-183M	18 ±20%	0.080	10.5	0.94	0.37	8.0	2.18	3.08
PS4L1278-223M	22 ±20%	0.096	9.0	0.94	0.41	6.8	1.99	2.81
PS4L1278-273M	27 ±20%	0.120	8.4	0.94	0.43	6.5	1.78	2.52
PS4L1278-333M	33 ±20%	0.150	7.6	0.94	0.56	5.6	1.59	2.25
PS4L1278-393M	39 ±20%	0.160	6.5	0.94	0.64	5.5	1.54	2.18
PS4L1278-473M	47 ±20%	0.180	6.0	0.94	0.70	5.2	1.45	2.05
PS4L1278-563M	56 ±20%	0.190	5.6	0.98	0.76	4.5	1.41	2.00
PS4L1278-683M	68 ±20%	0.210	5.0	0.98	0.88	4.1	1.35	1.90
PS4L1278-823M	82 ±20%	0.280	4.1	0.98	0.85	3.8	1.16	1.65
PS4L1278-104M	100 ±20%	0.300	3.6	0.98	0.90	3.4	1.13	1.59
PS4L1278-124K	120 ±10%	0.410	3.2	0.98	1.31	3.2	0.96	1.36
PS4L1278-154K	150 ±10%	0.460	3.0	0.98	1.46	2.8	0.91	1.29
PS4L1278-184K	180 ±10%	0.510	2.7	0.98	0.93	2.5	0.86	1.22
PS4L1278-224K	220 ±10%	0.690	2.5	0.98	1.54	2.3	0.74	1.05
PS4L1278-274K	270 ±10%	0.900	2.1	0.98	1.17	2.1	0.65	0.92
PS4L1278-334K	330 ±10%	1.02	2.0	0.98	4.14	1.9	0.61	0.86
PS4L1278-394K	390 ±10%	1.12	1.8	0.98	1.64	1.7	0.58	0.82
PS4L1278-474K	470 ±10%	1.43	1.6	0.98	0.25	1.6	0.50	0.70
PS4L1278-564K	560 ±10%	1.69	1.5	0.98	2.68	1.5	0.47	0.67
PS4L1278-684K	680 ±10%	2.29	1.4	0.98	2.11	1.3	0.41	0.58
PS4L1278-824K	820 ±10%	2.55	1.3	0.98	2.39	1.2	0.39	0.55
PS4L1278-105K	1000 ±10%	2.83	1.1	0.98	4.28	1.1	0.37	0.52

1. Inductance shown for each winding, measured at 100 kHz, 0.1 Vrms, 0 Adc on an Agilent/HP 4284A LCR meter or equivalent. When leads are connected in parallel, inductance is the same value. When leads are connected in series, inductance is four times the value.
2. DCR is for each winding. When leads are connected in parallel, DCR is half the value. When leads are connected in series, DCR is twice the value.
3. SRF measured using an Agilent/HP 4191A or equivalent. When leads are connected in parallel, SRF is the same value.
4. Leakage inductance is for L1 and is measured with L2 shorted.
5. DC current, at which the inductance drops 30% (typ) from its value without current. It is the sum of the current flowing in both windings.
6. Equal current when applied to each winding simultaneously that causes a 40°C temperature rise from 25°C ambient. See temperature rise calculation.
7. Maximum current when applied to one winding that causes a 40°C temperature rise from 25°C ambient. See temperature rise calculation.
8. Electrical specifications at 25°C.

Temperature rise calculation based on specified Irms

Winding power loss = $(I_{L1}^2 + I_{L2}^2) \times$ DCR in Watts (W)

Temperature rise (Δt) = Winding power loss $\times \frac{52.6°C}{W}$

$\Delta t = (I_{L1}^2 + I_{L2}^2) \times DCR \times \frac{52.6°C}{W}$

Example 1. PS4L1278-153ML (Equal current in each winding)

Winding power loss = $(2.3^2 + 2.3^2) \times 0.072 = 0.761$ W

$\Delta t = 0.761 \text{ W} \times \frac{52.6°C}{W} = 40°C$

Example 2. PS4L1278-153ML ($I_{L1} = 2.4$ A, $I_{L2} = 1.3$ A)

Winding power loss = $(2.4^2 + 1.3^2) \times 0.072 = 0.536$ W

$\Delta t = 0.536 \text{ W} \times \frac{52.6°C}{W} = 28.2°C$

Coupled Inductor Core and Winding Loss Calculator

This web-based utility allows you to enter frequency, peak-to-peak (ripple) current, and Irms current to predict temperature rise and overall losses, including core loss. Visit www.FRcoil.com

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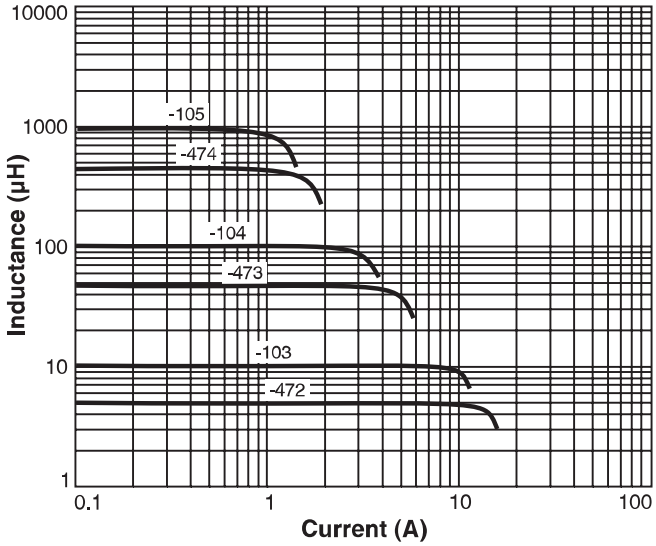
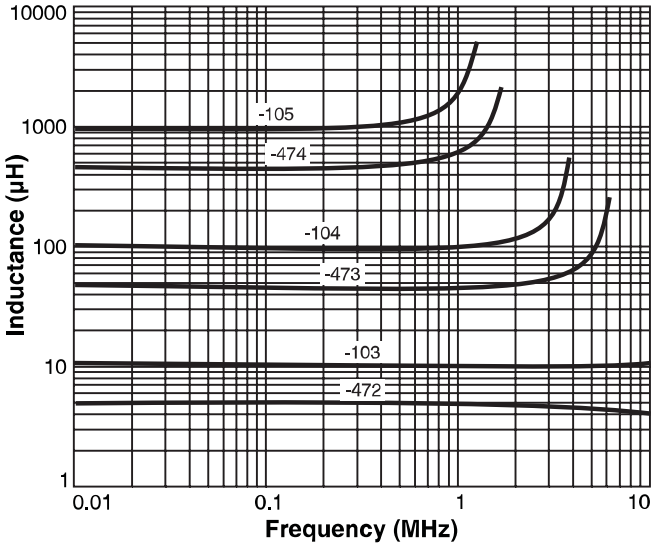
SMT Power Inductors-PS4L1278

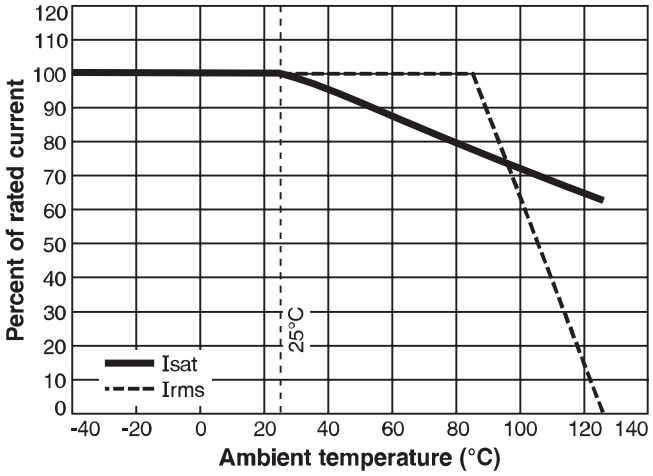
Typical L vs Current



Typical L vs Frequency



Current Derating



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SMT Power Inductors–PS4L1278

High Reliability Fixed Inductors for Surface Mounting 高可靠性表面贴装固定电感器

MEASUREMENTS OF PS Series / PS系列测试方法

1. INDUCTANCE
The inductance is measured with a LCR meter or an imped ance analyzer at 100kHz.

2. DC RESISTANCE
Measured with a digital multimeter.

3. RATED CURRENT (Maximum allowable current)
The ma ximum al lowable cur rent is that which ind uctance decrease current, or temperature rise current, whichever is smaller.
- Inductance decrease current : The inductance value decreases 30% by the excitation of DC curr ent. (environment temperature of 125°C)
- Temperature ris e current : Th e temperatu re rises 20 °C b y excitation of DC current. (environment temperature of 20°C)

4. DIELECTRIC STRENGTH
For specimen coil, apply 100V DC for 5 seconds between the ferrite core and termina ls. There should be no damage o r abnormalities in the inductor.

5. SOLDERABILITY
After immersion of terminals in fl ux for 5 to 1 0 seconds, dip the terminals in the solder bath at +245±5°C for 2±0.5 seconds.
Make certain th at more t han 3/ 4 of the sur face of the te rminals arecoated with solder.

6. RESISTANCE TO SOLDERING HEAT
The change, if any, in inductance is measured after exposure to t he reflow process under the follo wing conditions 3 times and for 1 h our at room temperature.
Condition of reflow process
- Pre-heating: +150~180°C, 90±30 seconds
- Peek-temperature: +250±5°C (230°C, 30±10 seconds)

7. DRY HEAT TEST
The change, if an y, in inductanc e is measured after exposure to +125±2°C in a t est chamber for 1000±12 hours and for 1 to 2hou rs at room temperature.

8. COLD TEST
The change, if any, in inductance is me asured after exposure to –55±3°C in a test chamber for 1000 ±12 hours and for 1 to 2hours at room temperature.

9. TEMPERATURE CYCLE TEST
Condition for one cycle:
(a)–55±3°C.....30minutes.
(b)Room temperature at +20°C.....2minutes.
(c)+125±2°C.....32minutes.
(d)Room temperature at +20°C.....2minutes.
1000cycles are applied in the test.
One h our after full cy cling, th e variation in t he inductance is measured.

10. HUMIDITY TEST
The change, if a ny, in inductanc e is measured a fter e xposure in a test chamber to humidity of 85 % R.H. at +85 ±2°C in a for 1 000±12 hours and for 1hour exposure at room temperature.

11. VIBRATION TEST
The change, if an y, in inductan ce is measured after the follow ing condition:
A specimen coil is mounted on test board to which vibration is applied as follows — overall amplitude at 1.5mm, frequ ency range, 10 to 55Hz, and swept in the order, 10～55～10Hz per 1minute for 2 hours in each directions for total of 6 hours

12. SHOCK TEST
- Free Fall Drop Test

A specimen coil is mounted on test board and dropped 3 times in the perpendicular six directions w ith shock applied f or 0.06 seconds at 1962m/s^2.
The change in inductance, if any, is measured after the test.

1. 电感值
用LCR仪表或阻抗分析仪在100kHz情况下测量电感值。

2. 直流电阻
用数码万用表测量。

3. 额定电流（最大允许电流）
最大允许电流是电感值减小电流，或温度升高电流，两者中比较小的一个。
- 电感值减小电流 ：直流电流砺磁使电感值降低30%。（参考环境温度为125°C）
- 温度升高电流 ：直流电流砺磁使温度升高20°C。（参考环境温度20°C）

4. 耐高压
对于试样线圈，在铁氧体屏蔽和电极之间使用100V直流电5秒钟。在电感器上应该没有损坏和异象出现。

5. 可焊性
在把终端浸泡进焊剂5到10秒之后，把终端插进+245±5°C的焊料缸2±0.5秒。

6. 耐焊热
把终端放置在如下焊接流程中三次，或者在室温下持续1小时之后，测试电感值的变化：
焊接流程条件：
- 预焊接：+150~180°C, 90±30秒
- 峰值温度：+250±5°C (230°C, 30±10秒)

7. 耐热测试
在一个+125±2°C温度的测试室中放置500±12小时，以及在室温下1到2小时，测试电感值的变化。

8. 耐寒测试
在一个-55±3°C温度的测试室中放置1000±12小时，以及在室温下1到2小时，测试电感值的变化。

9. 温度循环
循环一周的条件：
(a) -55±3°C 30分钟
(b) 室温下在+20°C时 2分钟
(c) +125±2°C 32分钟
(d) 室温下在+20°C时 2分钟
在本项测试中使用1000个温度周期。
在完整的循环后一个小时，测试电感值的变化。

10. 湿度测试
在一个+85±2°C温度、湿度为85%R.H.的测试室中放置1000±12小时，以及在室温下1小时，测试电感值的变化。

11. 振动测试
电感值的变化通过如下条件测试：
一个固定电感器贴装在一块测试板上，适用于以下情况 - 整体振幅1.5毫米，频率范围10~55赫兹，有规则的电子扫频；在3个方位的每个方向上每分钟10~55~10赫兹两小时，整个6小时。

12. 震动测试
- 自由落体测试

将试样线圈贴装在一个测试板上，在1米高度上从六个垂直方向，在0.06秒内以1962m/s^{2}的速度震动后自由坠落3次。
然后测试电感值的变化。

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SMT Power Inductors-PS4L1278

REEL PACKAGING / 卷盘包装

Taping for automatic insertion of SMT coils.

自动插入编带的表面贴装线圈

Surface mount devices/adjustable & fixed

This ever expanding assortment of product and unsurpassed quality c ontrol, not onl y give you a c omponent tha t functionally performs, but just as importa ntly, allo ws the use of a variety of placement and soldering equipment necessary for the F LEXIBLE MANUF ACTURING PLANT required in today's competitive world.

表面贴装设备/可调整型和固定型

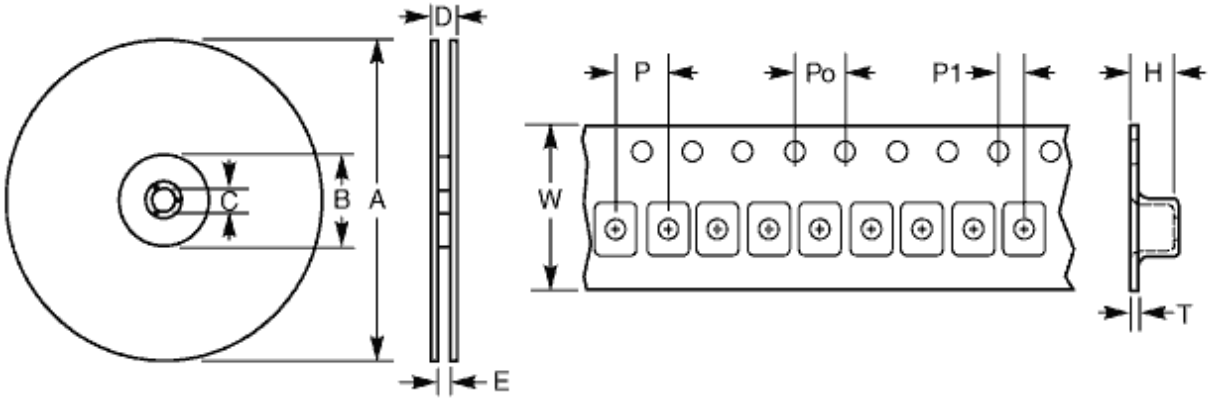
它可以扩展到产品分类和非常突出的质量控制。不只是给你一个构成方面的优良的性能表现，而且最重要的，允许在当今这个竞争世界中要求的灵活制造厂使用多样化的放置和焊接设备。

Various packaging schemes are available. In addition to bulk, tape a nd r eel and m agazine, methods are offered for h igh volume ins ertion equ ipment. The follo wing chart lists the packaging details for FRE's SMD coils:

可以使用多样的包装方案。提供批量散装和卷盘包装供大量插入设备使用。以下图表为成就的SMD线圈罗列包装 细节：

Tape and reel dimensions

编带和卷盘尺寸



Parts per reel	Reel dimensions (mm)					Tape dimensions (mm)					
13" (330 mm)	**A**	**B**	**C**	**D**	**E**	**W**	**P**	**Po**	**P1**	**H**	**T**
500 PCS	330	100	13	30.4	24.4	24	16	4	2	8.1	0.4

Notes:
(1) There are at l east 10 blank spaces (80mm each) at both ends of the tape which do not include the coils.
(2) The protective tape sh ould not cover th e holes nor b e shifted to the sides. F urther, the tape shoul d not be removed during transportation.
(3) The coils are positio ned with the bondi ng s urface facing bottom of the pocket.

注意：
(1) 在没有包括线圈的编带的每个末端至少有10个空白空间（每个80毫米）。
(2) 保护带不能覆盖洞口或者移动到侧面。而且，在运输过程中，带子不能移动。
(3) 线圈设置在焊接表面对着袋子底部。