

Specification for Approval

Date: 2024/11/09

Customer: 信和達

	TAI-TECH P/N:	TMPF0403LRV-Serie	s(N)-ABD-HD	
	CUSTOMER P/N:			
	DESCRIPTION:			
	QUANTITY:	pcs	<u> </u>	
REM	MARK:			
	Cu	stomer Approval Feedba	ack	

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SMD Power Inductor

TMPF0403LRV-Series(N)-ABD-HD

ECN HISTORY LIST								
REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN			
1.0	24/11/09	New Issue	Sky Luo	Mr.Liang	Cui lingling			
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SMD Power Inductor

1. Features

- 1. Low loss realized with low DCR.
- 2. High performance realized by metal dust core.
- 3. Ultra low buzz noise, due to composite construction.
- 4. 100% Lead(Pb)-Free and RoHS compliant.
- 5. High reliability -Reliability test complied to AEC-Q200.



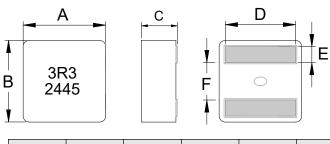




2. Applications

Automotive applications.

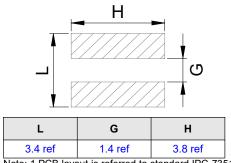
3. Dimensions



Α	В	С	D	E	F
4.40±0.20	4.40±0.20	2.80 ± 0.20	3.40 ± 0.30	0.88 ± 0.20	1.60 ± 0.25

Unit:mm

Recommend PC Board Pattern



Note: 1.PCB layout is referred to standard IPC-7351B
2. The above PCB layout reference only.
3. Recommend solder paste thickness at

- 0.12mm and above.

4. Part Numbering



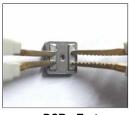
A: Series

B: Dimension BxC C: Type Material. 3R3=3.30uH D: Inductance M=±20% E: Inductance Tolerance

Marking: Black.3R3 and 2445 (24 YY,45 WW,follow production date). F: DateCode

AB:oversize

G: Code



DCR Test

5. Specification

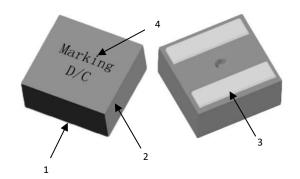
	Inductance	I rms (A) Typ		I sat (A)				DCR (mΩ)	
Part Number	(uH) ±20%	20℃	40℃		Тур		Max	DCK	(11152)
	@ 0 A	rise	rise	1	2	3	3	Тур	Max
TMPF0403LRV-R90MN-ABD-HD	0.90	8.2	11.2	5.2	7.0	10.0	9.0	9.1	10.1
TMPF0403LRV-1R0MN-ABD-HD	1.00	8.0	11.0	5.0	6.8	9.8	9.2	9.1	10.1
TMPF0403LRV-1R2MN-ABD-HD	1.20	7.8	9.8	4.6	6.4	9.2	8.7	10.4	11.5
TMPF0403LRV-1R5MN-ABD-HD	1.50	7.0	9.0	4.1	5.6	8.0	7.0	12.0	13.2
TMPF0403LRV-1R8MN-ABD-HD	1.80	6.5	8.2	3.8	5.3	7.5	6.6	17.4	19.2
TMPF0403LRV-2R2MN-ABD-HD	2.20	6.0	7.8	3.6	5.1	7.0	6.1	20.5	22.6
TMPF0403LRV-3R3MN-ABD-HD	3.30	5.0	6.6	3.3	4.8	6.2	5.3	26.0	28.6
TMPF0403LRV-4R7MN-ABD-HD	4.70	3.9	5.1	2.8	4.2	5.5	4.8	40.1	44.1

Note:

- 1. Test frequency: L: 100KHz /0.1V.
- 3. Testing Instrument(or equ): Agilent 4284A,E4991A,4339B,KEYSIGHT E4980A/AL,chroma3302,3250,16502.
- 4. Current that causes the specified temperature rise from 25 $^\circ\,$ C ambient.
- Saturation Current (Isat 1) will cause L0 to drop approximately 10%.
 Saturation Current (Isat 2) will cause L0 to drop approximately 20%.
 Saturation Current (Isat 3) will cause L0 to drop approximately 30%.
- 6. The part temperature (ambient + temp rise) should not exceed 155°Cunder worst case operating conditions. Circuit design, component, PCB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.
- 7. Irms Testing: Temperature rise is highly dependent on many factors including pcb land pattern, trace size, and proximity to other components.

 Therefore temperature rise should be verified in application conditions.
- 8. Rated DC current: The lower value of Irms and Isat.

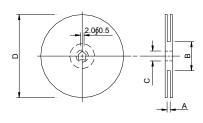
6. Material List

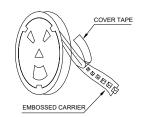


NO	Items	Materials
1	Core	Alloy powder.
2	Wire	Polyester Wire or equivalent.
3	Solder	100% Pb free solder
4	Ink	Halogen-free ketone

7. Packaging Information

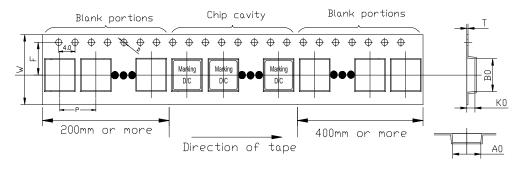
(1) Reel Dimension





Туре	A(mm)	B(mm)	C(mm)	D(mm)
13"x12mm	12.4+2/-0	100±2	13+0.5/-0.2	330

(2) Tape Dimension

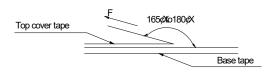


	В0	A0	K0	Р	W	F	Т	D	
	4.7±0.1	4.7±0.1	3.3±0.1	8.0±0.1	12±0.3	5.5±0.1	0.35±0.1	1.5±0.1	
ι	Unit:mm								

(3) Packaging Quantity

TMPF	0403
Chip / Reel	2000

(4) Tearing Off Force



The force for tearing off cover tape is 10 to 130 grams in the arrow direction under the following conditions(referenced ANSI/EIA-481-D-2008 of 4.11 stadnard).

Tearing Speed	Room Temp.	Room Humidity	Room atm
mm	(℃)	(%)	(hPa)
300±10%	5~35	45~85	

8. Reliability and Test Condition

	Item	Performance	Test	Condition			
Opera	ating temperature	-55~+155°C(Including self - temperature rise)		NA			
	ge temperature and dity range	110~+40°C, 50~60%RH (Product with taping) 255~+155°C(on board)		NA			
	trical Performance Test		I				
Induc	tance		HP4284A, CH11025, CH3302, CH132	20, CH1320S LCR Meter.			
DCR		Refer to standard electrical characteristics list.	CH16502, Agilent33420A Micro-Ohm	Meter.			
Satur	ation Current (Isat)	Approximately △L30%	Saturation DC Current (Isat) will cause L0 to drop \triangle L(%).				
Heat	Heat Rated Current (Irms) will cause the coil temperature rise △T(°C eat Rated Current (Irms)) Approximately △T40°C 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer.			(°C).			
Relia	ability Test(For AEC-Q2	200-E)					
8.1	Pre- and Post-Stress Electrical Test	User Specification	Test is performed at room temperatur reference and the additional requirem Preconditioning : run through reflow fo (IPC/JEDECJ-STD-020F Classification	ents in this Table (e.g. 8.3, 8 or 3 times.			
8.2	High Temperature Exposure(Storage) Reference MIL-STD-202 Method 108		Unpowered. Temperature: 155±2°C Upper Temperature: maximum specifi specified storage temperature (which Duration: 1000hrs Min. Measured at room temperature after p Conduct Temperature Cycling testing Post-Stress Electrical Tests as specifi	ied operating temperature or ever is higher). olacing for 24±4 hrs. on the product after performi			
8.3	Temperature Cycling Reference JESD22-A104	Appearance : no damage. Inductance : within±10% of initial value DCR : within±15% of initial value and shall not exceed the specification value.	Unpowered Lower Temperature of the Chamber: -40°C(For Inductors/Transformers) Upper Temperature of the Chamber: maximum specified operating temperature and shall not exceed 125°C Condition for 1 cycle Step1: -40±2°C 30min Min. Step2: 125±2°C transition time 1min MAX Step3: 125±2°C 30min Min. Step4: Dwell Time (Soak Time) -15 minutes minimum, -30 minutes minimum if component weighs above 28g Transition Time: 1 minute maximum Number of cycles: 1000 Measured at room temperature at least 24 hours after test conclusion.				
8.4	Humidity Bias Reference MIL-STD-202 Method 103		Conduct Humidity Bias testing on th Post-Stress Electrical Tests as specifi Unpowered(For Inductors/Transforme Humidity: 85±3% R.H, Temperature: 85°C±2°C Duration: 1000hrs Min. Measured at room temperature after programmers	testing on the product after performing the Pre- and ests as specified in section 8.1 ors/Transformers)			
8.5	High Temperature Operating Life Reference MIL-STD-202 Method 108		Conduct High Temperature Operating Life testing on the product after performing the Pre- and Post-Stress Electrical Tests as specified in section 8.1 Temperature: 115±2°C Upper Temperature of the Chamber: maximum specified operating temperature (not including heat rise) at maximum rated power and shall not exceed 125°C. (For Inductors/Transformers) Duration: 1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±4 hrs.				
8.6	External Visual Reference MIL-STD-883 Method 2009	Appearance : no damage.	Inspect device construction, marking a				
8.7	Physical Dimension Reference JESD22-B100	According to the product specification size measurement.	Verify physical dimensions to the app Pre and Post Electrical Test not requi		cification.		
8.8	Terminal Strength (for axial and radial THT components) Reference MIL-STD-202 Method 211	Appearance : no damage. Inductance : within±10% of initial value DCR : within±15% of initial value and shall not exceed the specification value.	Test THT component lead integrity or Test Condition A (pull test) Nominal cross- sectional area(m²) ≤0.05 0.06 to 0.10 0.11 to 0.20 0.21 to 0.50 0.51 to 1.20 ≥1.20 Test Condition C (wire-lead bend test Section Modulus (ZX) (mm³) ≤1.5x10³ 1.6x10³ to 4.2x10³	Force (N) 1 2.5 5 10 20 40			
			4.3x10 ⁻³ to 1.2x10 ⁻² 1.3x10 ⁻² to 0.5x10 ⁻¹ 0.6x10 ⁻¹ to 1.9x10 ⁻¹ > 1.9x10 ⁻¹ For round terminations: ZX = (πd3)/3 For strip terminations: ZX = (ba2)/6 w perpendicular to the bending axis, b is	here is the thickness of the r	ectangular strip		

	Item	Performance					Test C	ondit	ion			
8.9	Resistance to Solvents Reference MIL-STD-202 Method 215		Add an Aqueous wash chemical and follow chemical manufacturer's recommended parameters (i.e. solution temperature and immersion time). Applicable to ink marked components and not laser marked components									
Ω 10			Туре	Peak value		Normal ıration (D) (Wave form	Ve change	locity (Vi)ft/s	sec	
	Mechanical Shock		SMD	100		6				2.3		
	Reference MIL-STD-202 Method 213		THT	100		6	Н	alf-sine	1	2.3		
			3 shocks in (18 shocks	n each direc s).	tion a	along 3 per	pendicula	ar axes.				
	Vibration Reference MIL-STD-202 Method 204	Oscillation Frequency: 10Hz~2kHz~10Hz for 20 minutes Equipment: Vibration checker Total Amplitude: 5g Testing Time: 12 hours(20 minutes, 12 cycles each of 3 orientations)										
		Appearance : no damage.	Test condi	tion : ditions B or	С							
	Inductance : within±10% of initial value		Solder technique simulatio	Icondition	1	emperature (°C)	Time(s) Temperature ramp/immersion and emersion rate		^າ of h	Number of heat cycles		
			Dip Wave :	В		260 ±5 older temp)	10±1		imm/s :6mm/s	,	1	
		DCR : within \pm 15% of initial value and shall not	Topside board-mo nt produc	c c		260 ±5 older temp)	20±1			,	1	
			Depth: completely cover the termination SMD: Condition K, time above 217° C, 60s-150s, Number of heat cycles: 3 Continental									
			Temperature time 25°C to peak temperature □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □									
	Resistance to Soldering Heat Reference		compon	ent		T _{Smax} -	τ		ip	_		
				T _{Smin}	t	ts	-		i	-\		
0.40			ramp down									
	MIL-STD-202 Method 210			ramp up reflow process								
			Componer	nt Ramp up	to T	Tsmin Ts	Tsmax	TL t	L Tpeak*	Tp**	Time 25°C to	Ramp down
			Thickness < 1.6mm Thickness 1.6mm-2.5n and Volume	nm					≥ 260℃	≥ 40s	peak	
			350mm3 Thickness 1.6mm-2.5n and Volume 350-2000mr or Thickness	3.0±0.1% (The compone shall be	nt				≥			6.0±0.1°C/s (The component shall be
			> 2.5mm an Volume <350mm3		e 19	≥ ≥ ≥ 110s		≥ 217℃ 90			≥300s	in serial
			Thickness 1.6mm-2.5n and Volume 2000mm ³ Thickness 2.5mm and Volume	with up t 3.0°C/s e> or	0				≽ 245℃	≫ 30s		production with up to 6.0°C/s)
			*peak temp	linimum requerature is requerature is requerature.	neasu	ured on the				ent pad	ckage	
		Direct Contact and Air Discharge PASSIVE COMPONENT HBM ESD Discharge Waveform to a Coaxial Target Test method : AEC-Q200-002 Test mode : Contact Discharge Discharge level : 4 KV (Level : 2)										
8.13	ESD Reference AEC-Q200-002	90%										
			10%	tr		Time	(ns)					

	Item	Performance	Test Condition							
	Solderability Reference J-STD-002	More than 95% of the terminal electrode should be covered with solder.	Through-hole Technology (THT : Method A1, Coating Durability Category 2) • SMD : Method B1, Coating Durability Category 2 Method D, Coating Durability Category 2 • Magnification 50x • Pre and Post Electrical Test not required. • Non-soldered type mounting/attach are not applicable.							
			Reference	Method A1	Method B1 Method D					
			Welding Process	Reflow Soldering	Reflow Soldering for Other Components	Lead-free Soldering				
			Type of Solder	Tin-Silver- Copper Solder	Tin-Silver- Copper Solder	Tin-Silver- Copper Solder				
8.14			Flux Immersion Time	5-10s	5-10s	5-10s				
			Immersion Angle	20°~45°	20°~45°	20°~45°	-			
			Solder Temperature	245±5° C	245±5° C	260±5° C	-			
			Solder Immersion Time Speed of	5+0/-0.5s	5+0/-0.5s	30+5/-0s	_			
			Immersion and Withdrawal	25±6mm/s	25±6mm/s	25±6mm/s				
8.15	Electrical Characterization	Refer Specification for Approval.	Parametrically test per lot and sample size requirements, summary to show Min, Max, Mean and Standard deviation at room as well as Min and Max operating temperatures. Pre and Post Electrical Test not required							
8.16	Board Flex(SMD) Reference AEC-Q200-005	Appearance: no damage.	(IPC/JEDEC J-STD-020F Classification Reflow Profiles) Place the 100mm X 40mm board into a fixture similar to the one shown in below Figu with the component facing down. The apparatus shall consist of mechanical means apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board. Support Solder Chip Printed circuit board before testing Printed circuit board under test Radius 340 Printed circuit board under test Displacement							
8.17	Terminal Strength(SMD) Reference AEC-Q200-006	Inductance: within±10% of initial value DCR: within±15% of initial value and shall not exceed the specification value.	With the component mounted on a PCB with the device to be tested, apply a 17.7 N Kg) force to the side of a device being tested. This force shall be applied for 6 seconds. Also the force shall be applied gradually as not to apply a shock to component being tested. radius 0,5 mm DUT wide thickness shear force							

Note: When there are questions concerning measurement result: measurement shall be made after 48 ± 2 hours of recovery under the standard condition.

9. Soldering Specifications

(1) Soldering

Mildly activated rosin fluxes are preferred. TAI-TECH terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

(2) Soldering Reflow:

Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020F)

(3) Iron Reflow:

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended. (Fig. 2)

- · Preheat circuit and products to 150 $^{\circ}\mathrm{C}$
- · Never contact the ceramic with the iron tip
- · Use a 20 watt soldering iron with tip diameter of 1.0mm

· Limit soldering time to 4~5sec.

- · 355℃ tip temperature (max)
- · 1.0mm tip diameter (max)

Fig.1 Soldering Reflow

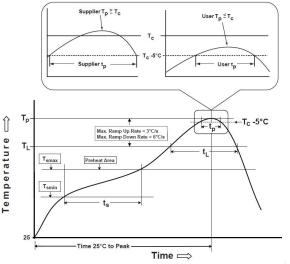
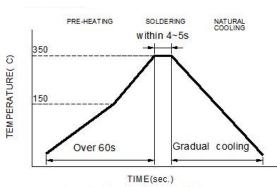


Fig.2 Iron soldering temperature profiles



Iron Soldering times: 1 times max.

Soldering iron Method : 350± 5℃ max

Reflow times: 3 times max

Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly			
Preheat -Temperature Min(T _{smin}) -Temperature Max(T _{smax}) -Time(t _s)from(T _{smin} to T _{smax})	150℃ 200℃ 60-120seconds			
Ramp-up rate(T_L to T_p)	3℃/second max.			
Liquidus temperature(T _L) Time(t _L)maintained above T _L	217°C 60-150 seconds			
Classification temperature(T _c)	See Table (1.2)			
$\label{eq:top} \mbox{Time}(t_p) \mbox{ at Tc-} \mbox{ 5^{\circ}\!$	*< 30 seconds			
Ramp-down rate(T _p to T _L)	6℃ /second max.			
Time 25℃ to peak temperature	8 minutes max.			

Tp: maximum peak package body temperature, **Tc**: the classification temperature.

Table (1.2) Package Thickness/Volume and Classification Temperature (Tc)

	Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
	<1.6mm	260℃	260℃	260℃
PB-Free Assembly	1.6-2.5mm	260℃	250℃	245℃
	≥2.5mm	250℃	245℃	245℃

Reflow is referred to standard IPC/JEDEC J-STD-020F.

For user (customer) **Tp** should be equal to or less than **Tc.**

^{*} Tolerance for peak profile temperature (Tp) is defined as a supplier minimum and a user maximum.

10. Notes

(1) When there are questions concerning measurement result : measurement shall be made after 48 \pm 2 hours of recovery under the standard condition

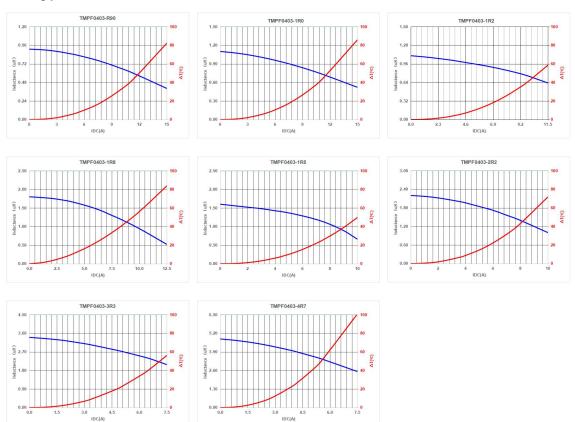
- (2) This power choke coil itself does not have any protective function in abnormal condition such as overload, short-circuit and open-circuit conditions, etc. Therefore, it shall be confirmed as the end product that there is no risk of smoking, fire, dielectric withstand voltage, insulation resistance, etc. in abnormal conditions to provide protective devices and/or protection circuit in the end product.
- (3) When this power choke coil was used in a similar or new product to the original one, sometimes it might not be able to satisfy the specifications due to different condition of use.
- (4) Dielectric withstanding test with higher voltage than specific value will damage insulating material and shorten its life.
- (5) This power choke coil must not be used in wet condition by water, coffee or any liquid because insulation strength becomes very low in this condition.
- (6) Please consult our company to confirm the reliability of the process required to wash or use or exposure to a chemical solvent used in this product. PCB washing tested to MIL-STD-202 Method, and dry it off immediately.
- (7) The rated current as listed is either the saturation current or the heating current depending on which value is lower.
- (8) If this power choke is dipped in the cleaning agent, such as toluene, xylene, ketone, and ether system, there is a possibility that the performance decreases greatly, and marking disappearnc.
- (9) The high power ultrasonic washing may damage the choke body.
- (10) Before use, the user should determine whether this product is suitable for their own design, Our company only guarantees that the product meets the requirements of this specification.

Application Notice

- · Storage Conditions
 - To maintain the solderability of terminal electrodes:
 - 1. TAI-TECH products meet IPC/JEDEC J-STD-020F standard-MSL, level 1.
 - 2. Temperature and humidity conditions: Less than 40 $^\circ\!\mathbb{C}$ $\,$ and 85% RH.
 - 3. Recommended products should be used within 12 months form the time of delivery.
 - 4. The packaging material should be kept where no chlorine or sulfur exists in the air.
- Transportation
 - 1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
 - 2. The use of tweezers or vacuum pick up is strongly recommended for individual components
 - 3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

TAI-TECH

11. Typical Performance Curves



单击下面可查看定价,库存,交付和生命周期等信息

>>TAI-TECH(台庆)