

### ECN HISTORY LIST

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	15/07/02	新發行	楊祥忠	詹偉特	何秦芝
備					
注					

**1. Features**

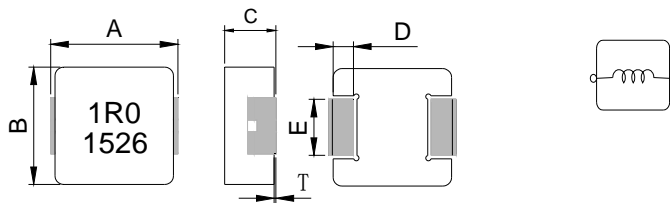
1. Shielded construction.
2. Capable of corresponding high frequency (5MHz).
3. Low loss realized with low DCR.
4. High performance (Isat) realized by metal dust core.
5. Ultra low buzz noise, due to composite construction.
6. 100% Lead(Pb)-Free and RoHS compliant.



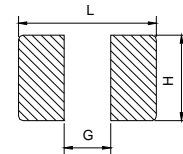
**2. Applications**

1. DC/DC converters in distributed power systems.
2. DC/DC converter for Field Programmable Gate Array(FPGA).
3. Battery powered devices.
4. Thin type on-board power supply module for exchanger.
5. VRM for server.
6. High current, low profile POL converters.
7. PDA/notebook/desktop/server and battery powered devices.

**3. Dimensions**



**Recommend PC Board Pattern**



Series	A	B	C	D	E	T
TMPA0603	7.1±0.3	6.6±0.2	2.8±0.2	1.6±0.3	3.0±0.2	0~0.15

Unit:mm

L(mm)	G(mm)	H(mm)
8.0	3.7	3.4

Note: Only for reference.

**4. Part Numbering**



- A: Series
  - B: Dimension
  - C: Type
  - D: Inductance
  - E: Inductance Tolerance
  - F: Code
- BxC Standard.
  - R10=0.1uh, 1R0=1.0uh, 100=10uh, 101=100uh, 102=1000uh.
  - K=±10%, L=±15%, M=±20%, N=±25%, Y=±30%
  - Marking: Black.1R0 and 1526(15 YY, 26 WW, follow production date).

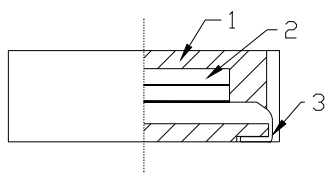
## 5. Specification

Part Number	Inductance L0 A(uH) ±20%	Heat Rating Current DC Typ ( A ) Irms.	Saturation Current DC Typ (A)I sat	DCR (mΩ)Typ	DCR (mΩ)Max
TMPA0603S-R15YN-D	0.15±30%	30	40	1.7	2.1
TMPA0603S-R22MN-D	0.22	23	34	2	2.5
TMPA0603S-R33MN-D	0.33	21	25	2.8	3.4
TMPA0603S-R36MN-D	0.36	20	24	3.3	3.9
TMPA0603S-R47MN-D	0.47	18	20	3.4	4
TMPA0603S-R56MN-D	0.56	16.5	18	3.9	4.5
TMPA0603S-R68MN-D	0.68	16	17	4.7	5.3
TMPA0603S-R82MN-D	0.82	14	16	5.4	6
TMPA0603S-1R0MN-D	1.00	12	15	6.7	7.4
TMPA0603S-1R2MN-D	1.20	10	14	7.7	9.5
TMPA0603S-1R5MN-D	1.50	10	14	10.2	12.1
TMPA0603S-2R2MN-D	2.20	8	10	13.5	15
TMPA0603S-3R3MN-D	3.30	6.5	9.5	19	22
TMPA0603S-4R7MN-D	4.70	5.5	6.5	28	33
TMPA0603S-5R6MN-D	5.60	5.5	6	39	42
TMPA0603S-6R8MN-D	6.80	4.5	6	43	50
TMPA0603S-8R2MN-D	8.20	4.5	6	54	60
TMPA0603S-100MN-D	10.0	4	5.5	62	68
TMPA0603S-150MN-D	15.0	3	4.5	110	140
TMPA0603S-220MN-D	22.0	2.5	3	150	190

Note:

1. Test frequency : Ls : 100KHz /1.0V.
2. All test data referenced to 25°C ambient.
3. Testing Instrument(or equ) : L: HP4284A,CH11025,CH3302,CH1320,CH1320S LCR METER / Rdc:CH16502,Agilent33420A MICRO OHMMETER.
4. Heat Rated Current (Irms) will cause the coil temperature rise approximately ΔT of 40°C
5. Saturation Current (Isat) will cause L0 to drop approximately 30%.
6. The part temperature (ambient + temp rise) should not exceed 125°C under 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. Special inquiries besides the above common used types can be met on your requirement.

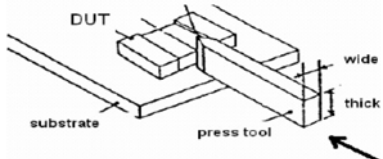
### 6. Material List



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

### 7. Reliability and Test Condition

Item	Performance	Test Condition															
Operating temperature	-40~+125°C (Including self - temperature rise)																
Storage temperature	-40~+125°C (on board)																
<b>Electrical Performance Test</b>																	
Inductance	Refer to standard electrical characteristics list.	HP4284A, CH11025, CH3302, CH1320, CH1320S LCR Meter.															
DCR		CH16502, Agilent33420A Micro-Ohm Meter.															
Saturation Current (Isat)	$\Delta L \leq 30\%$ typical.	Saturation DC Current (Isat) will cause L0 to drop $\Delta L(\%)$ (keep quickly).															
Heat Rated Current (Irms)	Approximately $\Delta T \leq 40^\circ C$	Heat Rated Current (Irms) will cause the coil temperature rise $\Delta T(^\circ C)$ without core loss. 1. Applied the allowed DC current(keep 1 min.). 2. Temperature measured by digital surface thermometer															
<b>Reliability Test</b>																	
Life Test	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : within $\pm 15\%$ of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles) Temperature : 125 $\pm 2^\circ C$ (Bead) Temperature : 85 $\pm 2^\circ C$ (Inductor) Applied current : rated current Duration : 1000 $\pm 12$ hrs Measured at room temperature after placing for 24 $\pm 2$ hrs															
Load Humidity		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles) Humidity : 85 $\pm 2\%$ R.H, Temperature : 85 $\pm 2^\circ C$ Duration : 1000hrs Min. with 100% rated current Measured at room temperature after placing for 24 $\pm 2$ hrs															
Thermal shock		Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles) Condition for 1 cycle Step1 : -40 $\pm 2^\circ C$ 30 $\pm 5$ min Step2 : 25 $\pm 2^\circ C$ $\leq 0.5$ min Step3 : 105 $\pm 2^\circ C$ 30 $\pm 5$ min Number of cycles : 500 Measured at room temperature after placing for 24 $\pm 2$ hrs															
Vibration		Oscillation Frequency: 10 ~ 2K ~ 10Hz for 20 minutes Equipment : Vibration checker Total Amplitude: 1.52mm $\pm 10\%$ Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations).															
Shock		<table border="1"> <thead> <tr> <th>Type</th> <th>Peak value (g's)</th> <th>Normal duration (D) (ms)</th> <th>Wave form</th> <th>Velocity change (Vi)ft/sec</th> </tr> </thead> <tbody> <tr> <td>SMD</td> <td>1500</td> <td>0.5</td> <td>Half-sine</td> <td>15.4</td> </tr> <tr> <td>Lead</td> <td>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> </tbody> </table>	Type	Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec	SMD	1500	0.5	Half-sine	15.4	Lead	100	6	Half-sine	12.3
Type		Peak value (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)ft/sec												
SMD	1500	0.5	Half-sine	15.4													
Lead	100	6	Half-sine	12.3													
Bending	Shall be mounted on a FR4 substrate of the following dimensions: $\geq 0805: 40 \times 100 \times 1.2\text{mm}$ $< 0805: 40 \times 100 \times 0.8\text{mm}$ Bending depth: $\geq 0805: 1.2\text{mm}$ $< 0805: 0.8\text{mm}$ duration of 10 sec.																

Item	Performance	Test Method and Remarks						
Soderability	More than 95% of the terminal electrode should be covered with solder.	Preheat: 150°C, 60sec. Solder: Sn99.5%-Cu0. 5%. Temperature: 245±5°C. Flux for lead free: Rosin. 9.5%. Dip time: 4±1sec. Depth: completely cover the termination						
Resistance to Soldering Heat		Number of heat cycles: 1 <table border="1"> <thead> <tr> <th>Temperature (°C)</th> <th>Time(s)</th> <th>Temperature ramp/immersion and emersion rate</th> </tr> </thead> <tbody> <tr> <td>260 ±5(solder temp)</td> <td>10 ±1</td> <td>25mm/s ±6 mm/s</td> </tr> </tbody> </table>	Temperature (°C)	Time(s)	Temperature ramp/immersion and emersion rate	260 ±5(solder temp)	10 ±1	25mm/s ±6 mm/s
Temperature (°C)	Time(s)	Temperature ramp/immersion and emersion rate						
260 ±5(solder temp)	10 ±1	25mm/s ±6 mm/s						
Terminal Strength	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 2 times.( IPC/JEDEC J-STD-020DClassification Reflow Profiles With the component mounted on a PCB with the device to be tested, apply a force (>0.805:1kg , <=0.805:0.5kg)to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested. 						

## 8. Soldering and Mounting

### (1) Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. 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.

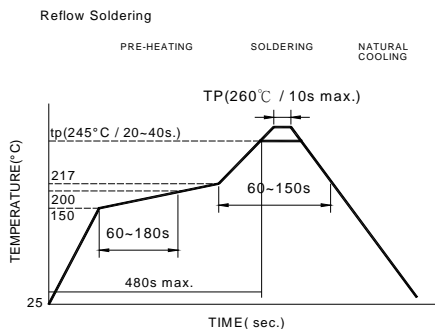
### (2) Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

### (3) Soldering Iron:

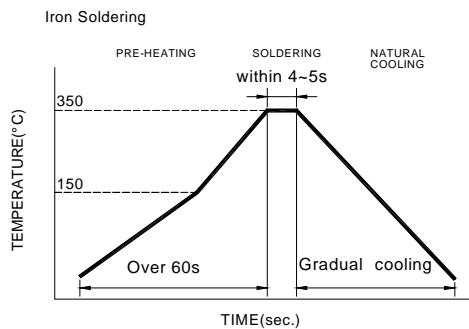
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 355°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4-5sec.



Reflow times: 3 times max.

Fig.1



Iron Soldering times: 1 times max.

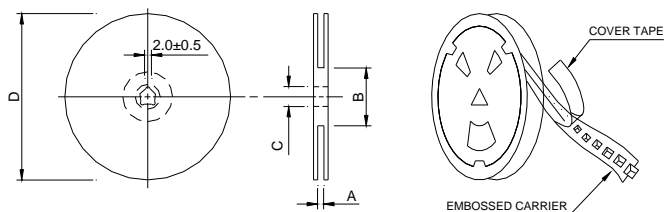
Fig.2

### 9. Friendly reminder

- (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.

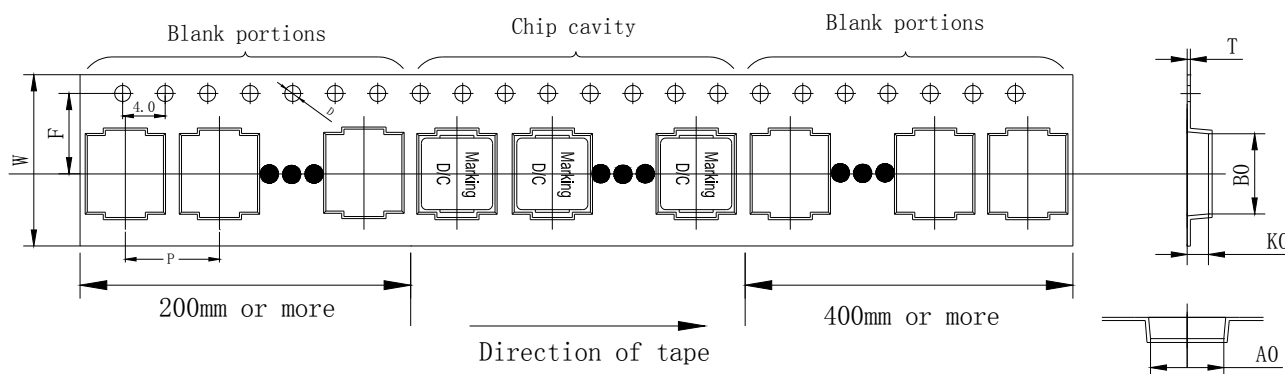
### 10. Packaging Information

#### (1) Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x16mm	16.0±0.5	100±2	13.5±0.5	330

#### (2) Tape Dimension

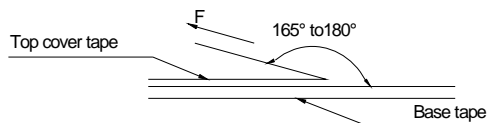


Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	W(mm)	F(mm)	t(mm)	D(mm)
TMPA	0603	7.7±0.1	7.0±0.1	3.3±0.1	12.0±0.1	16±0.3	7.5±0.1	0.35±0.05	1.5±0.1

#### (3) Packaging Quantity

TMPA	0603
Chip / Reel	1000
Inner box	2000
Carton	8000

(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-C-2003 of 4.11 stadnard).

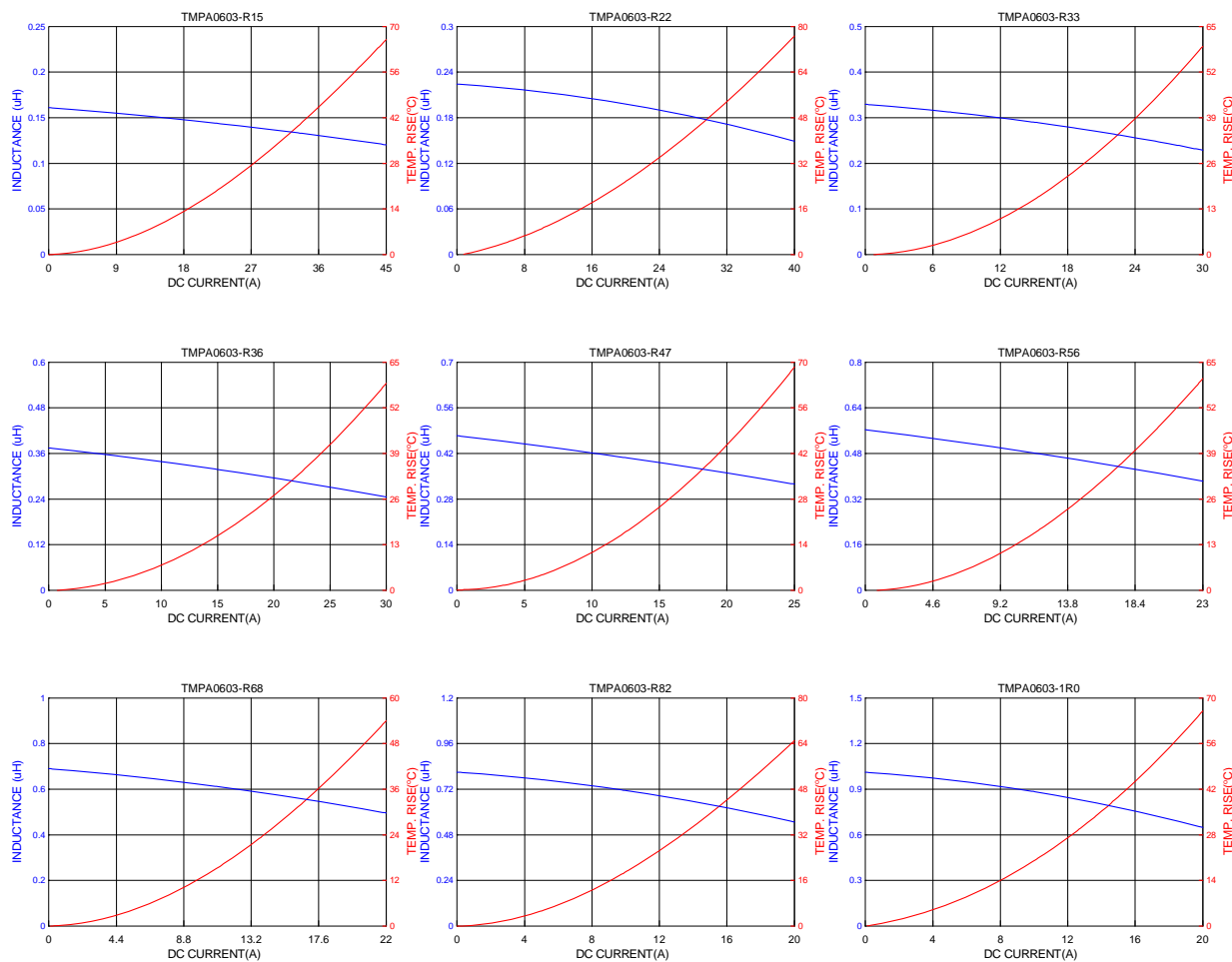
Room Temp. (°C)	Room Humidity (%)	Room atm (hPa)	Tearing Speed mm/min
5~35	45~85	860~1060	300

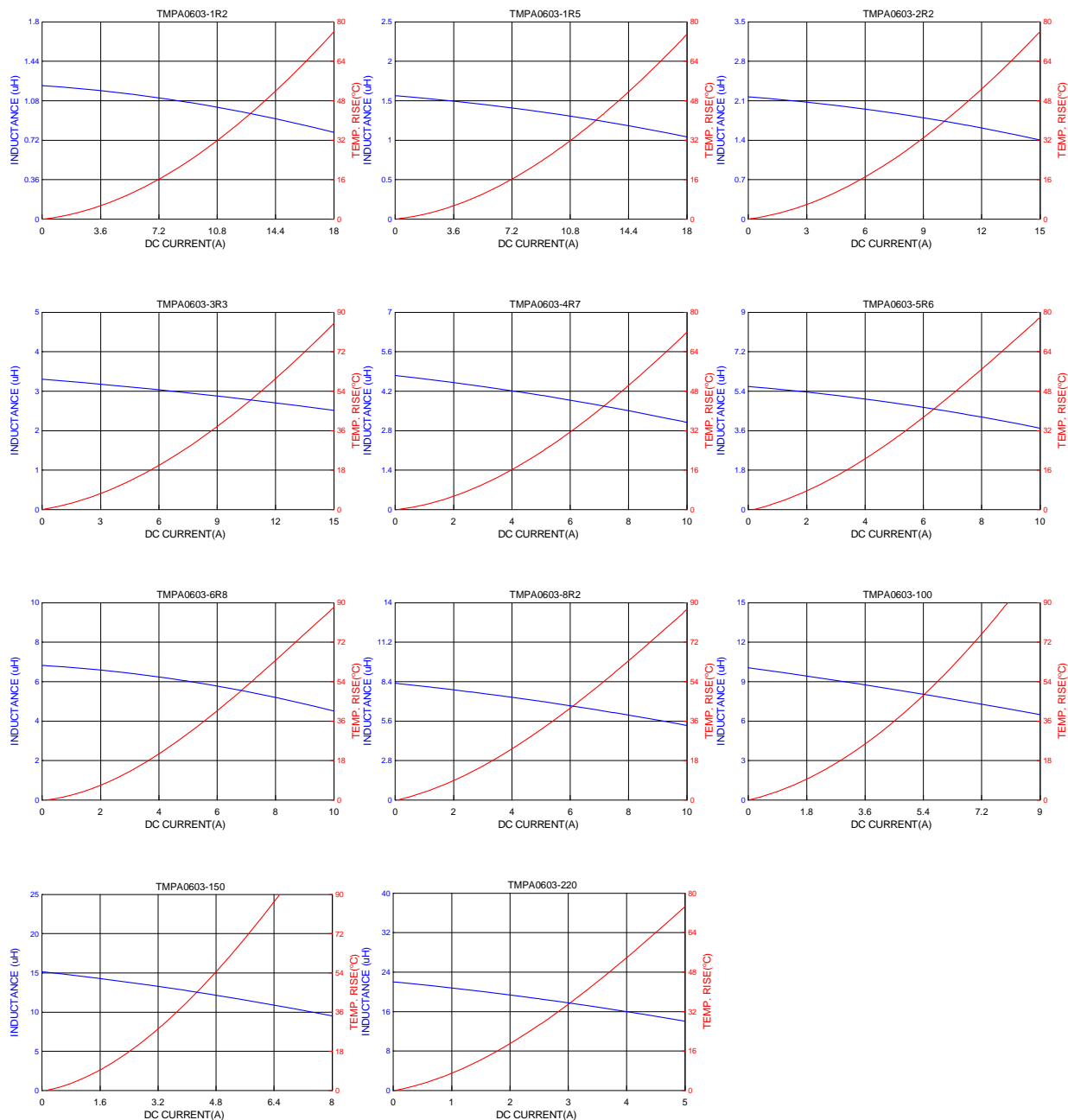
**Application Notice**

- Storage Conditions(component level)
  - To maintain the solderability of terminal electrodes:
    1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
    2. Temperature and humidity conditions: Less than  $40^\circ\text{C}$  and 60% 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.

11. Typical Performance Curves

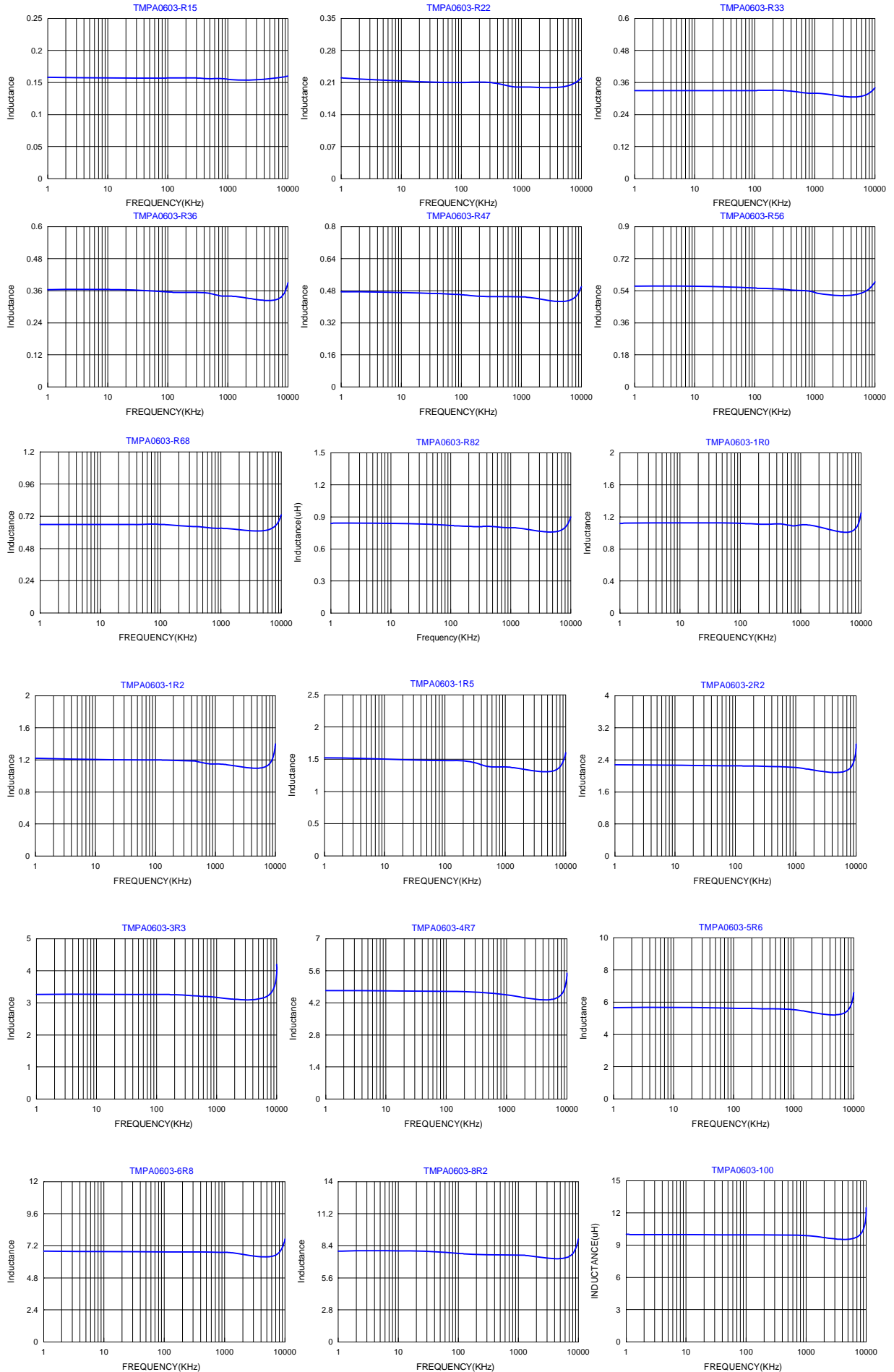
a. Inductance vs. DC Current , Temperature vs. DC Current

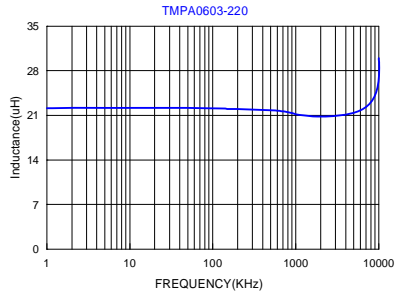
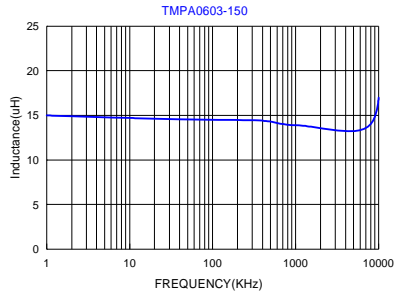






## b. Inductance vs. Frequency





**c. Q vs. Frequency**

