

Line Filters

Series: **V** (Type 290, 450, 650, 850, 21V, 24V)

Series: **H** (Type 200, 270, 400, 600)

Series: **F** (Type 23F, 25F)

Series: **M** (Type 11M, 14M, 16M)

Series: **N** (Type 15N, 18N, 20N)

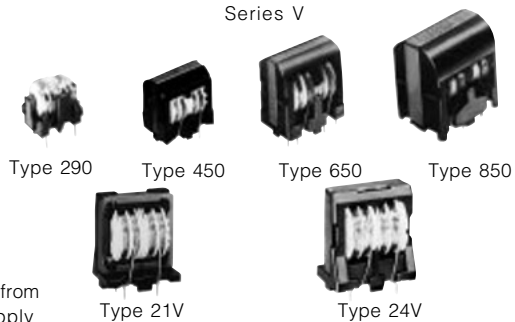
Series: **High N** (Type 17N, 19N, 21N)

Line filters for suppressing conductive noise ranging from low to high frequencies generated from power supply circuits of various electronic equipment

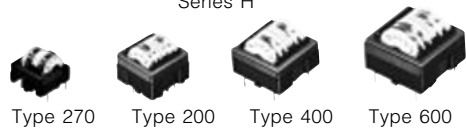
Industrial Property: Patents 22 (incl.pending)

Japan
Singapore
Indonesia

Series V



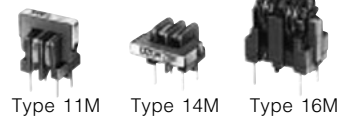
Series H



Series F



Series M



Series N, High N



■ Features

Series	Types	Features	
V	290, 450, 650, 850, 21V*, 24*	Vertical Structure	● Excellent attenuation in high frequency characteristics
H	200, 270, 400, 600	Horizontal Structure	● Greatly decreases leakage flux
F	23F, 25F	Thin Structure	● 15 mm height max.
M	11M, 14M, 16M	Small Structure	● Small size and lightweight
N	15N, 18N, 20N	Vertical Structure	● Suitable for high-density automatic insertion
High N	17N, 19N, 21N	High L Structure	● High inductance (same size with series N)

* Type 21V is developed product of Type 650. Type 24V is Type 850.

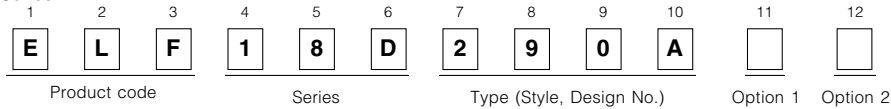
■ Recommended Applications

- CTV, VTR, Audios, PC, Facsimiles

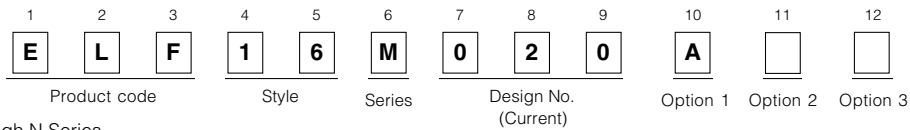
Design and specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use. Whenever a doubt about safety arises from this product, please contact us immediately for technical consultation.

Explanation of Part Numbers

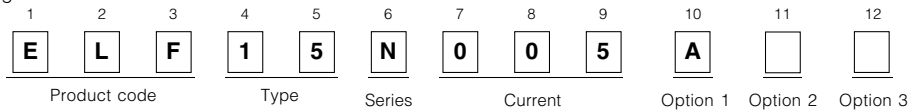
● V, H Series



● F, M Series



● N, High N Series

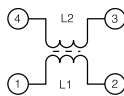


Performance Characteristics

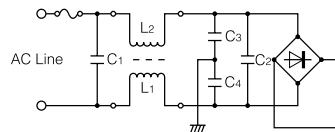
Item	Series		V Serie		H Serie		F Series		M Series		N Serie			High N Series		Notes
	Type		290	450 650/21V 850/24V	270	200 400 600	23F	25F	11M/14M	16M	15N	18N	20N	17N	19N	
Operating Temperature	-20 °C to 105 °C (115 °C)						-20 °C to 115 °C									
voltage							AC 250 Vrms max.									
Current							Refer to "Examples"									
Inductance							Refer to "Examples"									
Dielectric Withstanding Voltage							AC 2 kV 1min									
Temperature Rise							45 K max.									
Applicable Safety Standards							** Denki Yohin*, UL, CSA, IEC								Resistance method	

- * The Electrical Appliance and Material Law of Japan
- ** Line filter does not acquire, only, the safety standards recognition

Connection Schematic

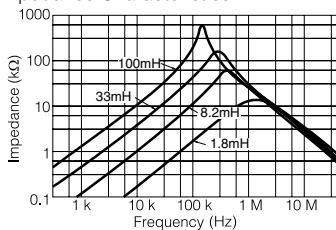


Circuit Example

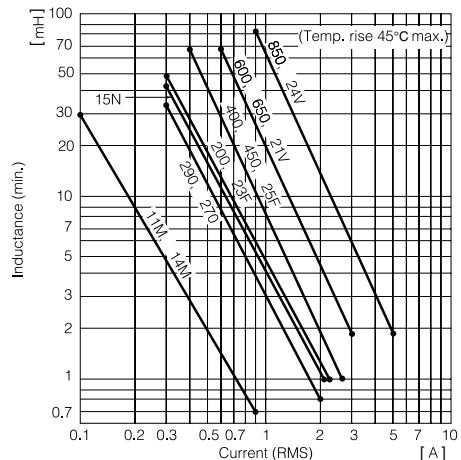
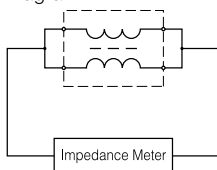


Impedance and Attenuation Characteristics (Typical) ■ Current-Inductance (min.) Characteristics (Reference only)

● Impedance Characteristics



● Test Circuit Diagram



■ Examples

Series V								
Type	Part No.	Inductance (mH) min.	Current max. (A rms.)	Type	Part No.	Marking	Inductance (mH) min.	Current max. (A rms.)
290	ELF18D290B	0.82	2.0	21V	ELF21V006A	683 06A	68.0	0.6
	ELF18D290D	1.20	1.6		ELF21V007A	563 07A	56.0	0.7
	ELF18D290V	1.80	1.5		ELF21V008A	333 08A	33.0	0.8
	ELF18D290T	2.20	1.3		ELF21V010A	273 10A	27.0	1.0
	ELF18D290E	2.70	1.1		ELF21V012A	183 12A	18.0	1.2
	ELF18D290S	3.30	1.1		ELF21V013A	153 13A	15.0	1.3
	ELF18D290R	3.90	1.0		ELF21V016A	123 16A	12.0	1.6
	ELF18D290M	5.60	0.8		ELF21V018A	822 18A	8.20	1.8
	ELF18D290P	6.80	0.7		ELF21V020A	682 20A	6.80	2.0
	ELF18D290L	8.20	0.6		ELF21V022A	562 22A	5.60	2.2
	ELF18D290G	10.0	0.6		ELF21V025A	452 25A	4.50	2.5
	ELF18D290A	18.0	0.5		ELF21V027A	272 27A	2.70	2.7
	ELF18D290C	22.0	0.4		ELF21V030A	222 30A	2.20	3.0
	ELF18D290H	33.0	0.3		ELF24V008A	823 08A	82.0	0.8
450	ELF18D450M	1.20	3.0	24V	ELF24V010A	563 10A	56.0	1.0
	ELF18D450C	2.20	2.2		ELF24V012A	473 12A	47.0	1.2
	ELF18D450A	2.70	2.0		ELF24V014A	333 14A	33.0	1.4
	ELF18D450K	3.90	1.8		ELF24V015A	273 15A	27.0	1.5
	ELF18D450D	5.60	1.4		ELF24V018A	223 18A	22.0	1.8
	ELF18D450L	6.80	1.2		ELF24V019A	183 19A	18.0	1.9
	ELF18D450G	8.20	1.1		ELF24V020A	153 20A	15.0	2.0
	ELF18D450J	10.0	1.0		ELF24V025A	103 25A	10.0	2.5
	ELF18D450B	18.0	0.8		ELF24V028A	902 28A	9.00	2.8
	ELF18D450H	39.0	0.5		ELF24V030A	822 30A	8.20	3.0
	ELF18D450Q	56.0	0.4		ELF24V034A	562 34A	5.60	3.4
650	ELF18D650M	1.50	3.1	ELF24V035A	472 35A	4.70	3.5	
	ELF18D650G	1.80	2.8	ELF24V037A	392 37A	3.90	3.7	
	ELF18D650B	3.30	2.4	ELF24V042A	332 42A	3.30	4.2	
	ELF18D650C	8.20	1.7	ELF24V045A	272 45A	2.70	4.5	
	ELF18D650W	10.0	1.4	ELF24V050A	152 50A	1.50	5.0	
	ELF18D650J	12.0	1.3	ELF24V070A	801 70A	0.80	7.0	
	ELF18D650D	15.0	1.1	ELF24V080A	401 80A	0.40	8.0	
	ELF18D650H	33.0	0.8	ELF24V090A	261 90A	0.26	9.0	
	ELF18D650U	47.0	0.7	ELF24V100A	151 100A	0.15	10.0	
	ELF18D666A	2.20	2.8					
	ELF18D666Z	2.70	2.7					
	ELF18D666Y	4.70	2.5					
	ELF18D666X	5.60	2.2					
	ELF18D666K	6.80	2.0					
	ELF18D666J	12.0	1.6					
	ELF18D666V	27.0	1.0					
	ELF18D666S	68.0	0.6					
850	ELF18D850M	1.50	5.0					
	ELF18D860B	2.20	4.5					
	ELF18D850B	3.30	4.2					
	ELF18D850P	3.90	3.7					
	ELF18D850Y	4.70	3.5					
	ELF18D850X	5.60	3.4					
	ELF18D850C	8.20	3.0					
	ELF18D850W	10.0	2.5					
	ELF18D850D	15.0	2.0					
	ELF18D850Q	18.0	1.9					
	ELF18D860C	22.0	1.8					
	ELF18D850Z	27.0	1.5					
	ELF18D850H	33.0	1.4					
	ELF18D850U	47.0	1.2					
	ELF18D850T	56.0	1.1					
ELF18D850R	82.0	0.8						

■ Examples

Series H				Series F			
Type	Part No.	Inductance (mH) min.	Current max. (A rms.)	Type	Part No.	Inductance (mH) min.	Current max. (A rms.)
200	ELF18D217	1.50	1.60	23F	ELF23F003A	50.0	0.3
	ELF18D219	2.70	1.30		ELF23F004A	30.0	0.4
	ELF18D216	3.90	1.00		ELF23F005A	20.0	0.5
	ELF18D225	6.80	0.80		ELF23F906A	14.0	0.6
	ELF18D214	8.20	0.70		ELF23F007A	10.0	0.7
	ELF18D210	18.0	0.50		ELF23F008A	8.0	0.8
	ELF18D218	22.0	0.40		ELF23F009A	6.0	0.9
	ELF18D212F	1.00	2.10		ELF23F010A	5.0	1.0
	ELF18D230F	1.20	2.00		ELF23F012A	3.5	1.2
	ELF18D228F	2.20	1.50		ELF23F014A	2.5	1.4
	ELF18D227F	4.70	1.00		ELF23F016A	2.0	1.6
	ELF18D221F	33.0	0.40		ELF23F018A	1.5	1.8
	ELF18D235F	47.0	0.30		ELF23F020A	1.2	2.0
	ELF18D222F	68.0	0.25		ELF23F022A	1.0	2.2
270	ELF18D270C	1.80	1.5	25F	ELF25F004A	50.0	0.4
	ELF18D270D	2.70	1.1		ELF25F005A	30.0	0.5
	ELF18D270Q	5.60	0.8		ELF25F006A	20.0	0.6
	ELF18D270A	6.80	0.7		ELF25F007A	16.0	0.7
	ELF18D270G	10.0	0.6		ELF25F008A	12.0	0.8
	ELF18D270H	18.0	0.5		ELF25F009A	10.0	0.9
	ELF18D270B	22.0	0.4		ELF25F010A	8.0	1.0
	ELF18D270J	33.0	0.3		ELF25F012A	5.5	1.2
400	ELF18D419	1.50	2.4		ELF25F014A	4.0	1.4
	ELF18D414	3.30	1.8		ELF25F016A	3.0	1.6
	ELF18D433	3.90	1.5		ELF25F018A	2.5	1.8
	ELF18D412	6.80	1.2		ELF25F020A	2.0	2.0
	ELF18D415	8.20	1.0		ELF25F022A	1.6	2.2
	ELF18D430	12.0	0.9		ELF25F025A	1.3	2.5
	ELF18D423	27.0	0.6		ELF25F106A	28.0	0.6
	ELF18D428	33.0	0.5		ELF25F107A	20.0	0.7
	ELF18D441F	0.56	3.4		ELF25F108A	15.0	0.8
	ELF18D420F	1.20	3.0		ELF25F109A	12.0	0.9
	ELF18D435F	2.20	2.2	ELF25F110A	10.0	1.0	
	ELF18D434F	2.70	2.0	ELF25F112A	7.0	1.2	
	ELF18D424F	5.60	1.4	ELF25F114A	5.0	1.4	
	ELF18D431F	10.0	1.0	ELF25F116A	4.0	1.6	
	ELF18D417F	18.0	0.8	ELF25F118A	3.0	1.8	
	ELF18D427F	39.0	0.5				
ELF18D437F	68.0	0.4					
600	ELF18D608	1.0	3.4				
	ELF18D610	1.5	3.1				
	ELF18D614	1.8	2.8				
	ELF18D611	2.7	2.6				
	ELF18D605	3.3	2.5				
	ELF18D613	3.9	2.2				
	ELF18D604	4.7	2.0				
	ELF18D603	5.6	1.8				
	ELF18D602	8.2	1.7				
	ELF18D612	22.0	1.0				
	ELF18D618	27.0	0.8				
	ELF18D615	39.0	0.7				
	ELF18D607	68.0	0.5				
	ELF18D617F	2.2	2.8				
	ELF18D604F	4.7	2.5				
	ELF18D603F	5.6	2.1				
	ELF18D601F	10.0	1.6				
	ELF18D609F	12.0	1.6				
ELF18D606F	18.0	1.2					
ELF18D624F	33.0	0.8					

Examples

Series M				Series N				
Type	Part No.	Inductance (mH) min.	Current max. (A rms.)	Type	Part No.	Marking	Inductance (mH) min.	Current max. (A rms.)
11M	ELF11M010E	30.0	0.1	15N	ELF15N002A	104 02	104.0	0.2
	ELF11M020E	12.0	0.2		ELF15N003A	433 03	43.0	0.3
	ELF11M030E	6.0	0.3		ELF15N004A	263 04	26.0	0.4
	ELF11M040E	3.5	0.4		ELF15N005A	193 05	19.0	0.5
	ELF11M050E	2.5	0.5		ELF15N006A	123 06	12.0	0.6
	ELF11M060E	1.5	0.6		ELF15N007A	103 07	10.0	0.7
	ELF11M070E	1.0	0.7		ELF15N008A	682 08	6.8	0.8
	ELF11M080E	0.8	0.8		ELF15N010A	532 10	5.3	1.0
	ELF11M090E	0.7	0.9		ELF15N011A	402 11	4.0	1.1
	ELF11M100E	0.5	1.0		ELF15N013A	272 13	2.7	1.3
14M	ELF14M010E	30.0	0.1	ELF15N015A	212 15	2.1	1.5	
	ELF14M020E	12.0	0.2	ELF15N017A	172 17	1.7	1.7	
	ELF14M030E	6.0	0.3	ELF15N022A	102 22	1.0	2.2	
	ELF14M040E	3.5	0.4	ELF15N030A	601 30	0.6	3.0	
	ELF14M050E	2.5	0.5	18N	ELF18N004A	803 04	80.0	0.4
	ELF14M060E	1.5	0.6		ELF18N005A	503 05	50.0	0.5
	ELF14M070E	1.0	0.7		ELF18N006A	353 06	35.0	0.6
	ELF14M080E	0.8	0.8		ELF18N008A	203 08	20.0	0.8
	ELF14M090E	0.7	0.9		ELF18N010A	153 10	15.0	1.0
	ELF14M100E	0.5	1.0		ELF18N012A	952 12	9.5	1.2
16M	ELF16M020A	28.0	0.2		ELF18N016A	602 16	6.0	1.6
	ELF16M030A	20.0	0.3		ELF18N020A	422 20	4.2	2.0
	ELF16M040A	15.0	0.4		ELF18N025A	242 25	2.4	2.5
	ELF16M050A	8.0	0.5		ELF18N032A	142 32	1.4	3.2
	ELF16M060A	7.0	0.6	20N	ELF20N006A	693 06	69.0	0.6
	ELF16M070A	5.0	0.7		ELF20N008A	433 08	43.0	0.8
	ELF16M080A	3.5	0.8		ELF20N010A	283 10	28.0	1.0
	ELF16M100A	2.0	1.0		ELF20N013A	183 13	18.0	1.3
	ELF16M130A	1.0	1.3		ELF20N015A	143 15	14.0	1.5
	ELF16M150A	0.8	1.5		ELF20N016A	123 16	12.0	1.6
ELF16M170A	0.6	1.7	ELF20N018A		752 18	7.5	1.8	
ELF16M200A	0.5	2.0	ELF20N020A		702 20	7.0	2.0	
			ELF20N022A		622 22	6.2	2.2	
			ELF20N024A		492 24	4.9	2.4	
			ELF20N027A	472 27	4.7	2.7		
			ELF20N030A	292 30	2.9	3.0		
			ELF20N035A	202 35	2.0	3.5		
			ELF20N040A	152 40	1.5	4.0		

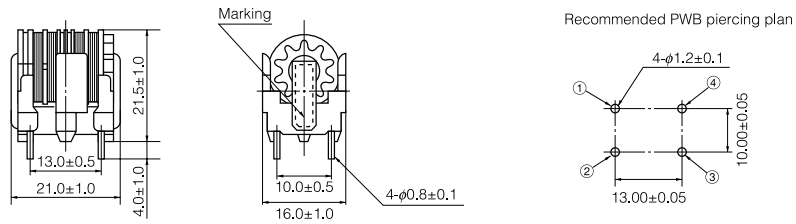
■ Examples

Serie High N				
Type	Part No.	Marking	Inductance (mH) min.	Current max. (A rms.)
17N	ELF17N002A	144 02	142.0	0.2
	ELF17N003A	603 03	60.0	0.3
	ELF17N004A	353 04	35.0	0.4
	ELF17N005A	263 05	26.0	0.5
	ELF17N006A	163 06	16.0	0.6
	ELF17N007A	143 07	14.0	0.7
	ELF17N008A	922 08	9.2	0.8
	ELF17N010A	722 10	7.2	1.0
	ELF17N011A	542 11	5.4	1.1
	ELF17N013A	372 13	3.7	1.3
	ELF17N015A	292 15	2.9	1.5
	ELF17N017A	232 17	2.3	1.7
ELF17N022A	132 22	1.3	2.2	
ELF17N030A	801 30	0.8	3.0	
19N	ELF19N004A	993 04	99.0	0.4
	ELF19N005A	623 05	62.0	0.5
	ELF19N006A	433 06	43.0	0.6
	ELF19N008A	253 08	25.0	0.8
	ELF19N010A	193 10	19.0	1.0
	ELF19N012A	123 12	12.0	1.2
	ELF19N016A	742 16	7.4	1.6
	ELF19N020A	512 20	5.1	2.0
	ELF19N025A	302 25	3.0	2.5
ELF19N032A	172 32	1.7	3.2	
21N	ELF21N006A	873 06	87.0	0.6
	ELF21N008A	543 08	54.0	0.8
	ELF21N010A	363 10	36.0	1.0
	ELF21N013A	223 13	22.0	1.3
	ELF21N015A	183 15	18.0	1.5
	ELF21N016A	153 16	15.0	1.6
	ELF21N018A	942 18	9.4	1.8
	ELF21N020A	872 20	8.7	2.0
	ELF21N022A	782 22	7.8	2.2
	ELF21N024A	612 24	6.1	2.4
	ELF21N027A	582 27	5.8	2.7
	ELF21N030A	372 30	3.7	3.0
	ELF21N035A	252 35	2.5	3.5
ELF21N040A	192 40	1.9	4.0	

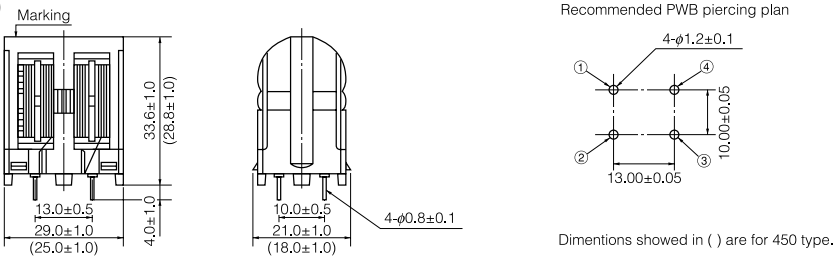
■ Dimensions in mm (not to scale)

Series V

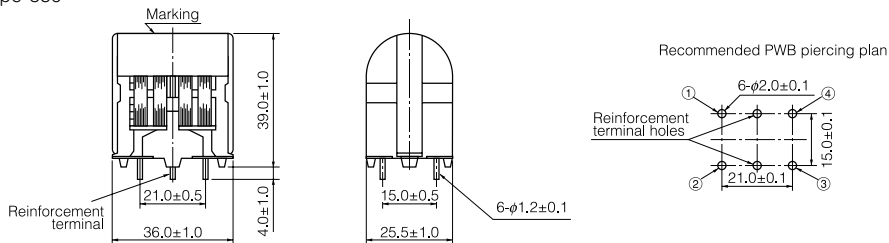
● Type 290



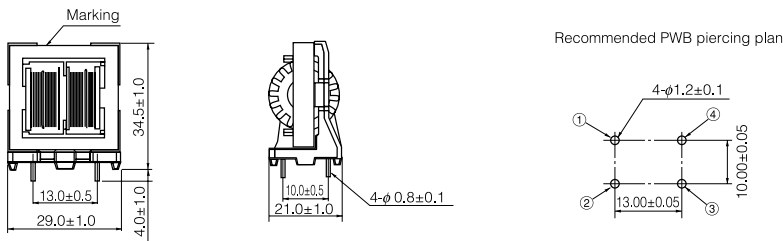
● Type 450, 650



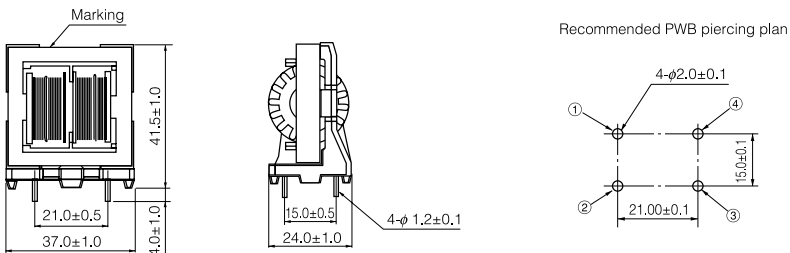
● Type 850



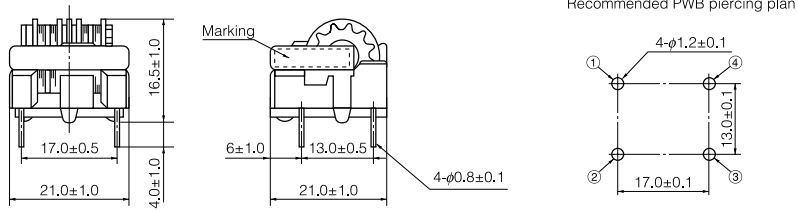
● Type 21V



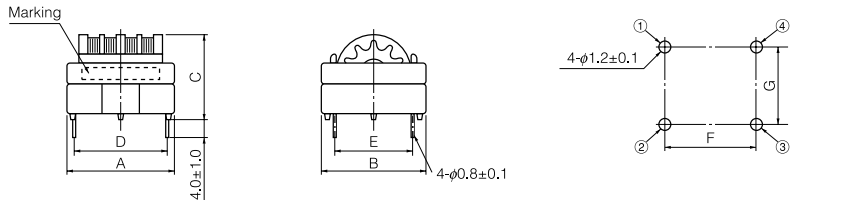
● Type 24V



■ Dimensions in mm (not to scale)



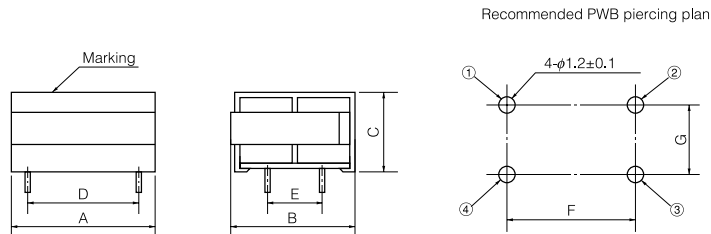
● Type 200, 400, 600



Type	A	B	C	D	E	F	G
200	20±1	21±1	20 max.	13.0±0.5	10.0±0.5	13.0±0.1	10.0±0.1
400	24±1	25±1	19.5±1.0	21.0±0.5	15.0±0.5	21.0±0.1	15.0±0.1
600	28.5±1.0	29±1	22.5±1.0	24.0±0.5	20.0±0.5	24.0±0.1	20.0±0.1

Series F

● Type 23F, 25F

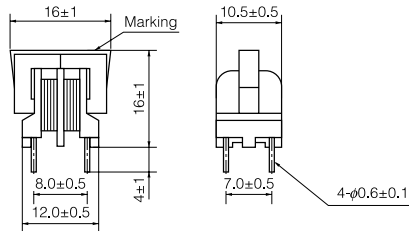


Type	A	B	C	D	E	F	G
23F	24 max.	23 max.	14 max.	16.0±0.5	10.0±0.5	16.0±0.1	10.0±0.1
25F	28 max.	25 max.	15 max.	21.0±0.5	11.0±0.5	21.0±0.1	11.0±0.1

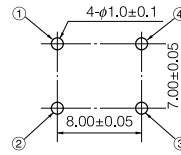
■ Dimensions in mm (not to scale)

Series M

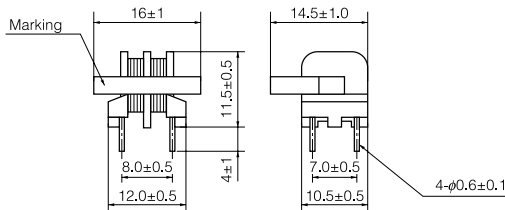
● Type 11M



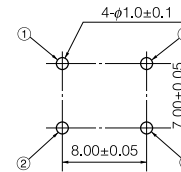
Recommended PWB piercing plan



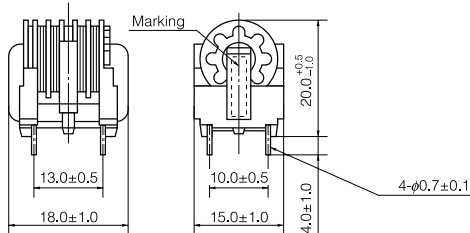
● Type 14M



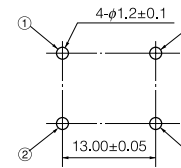
Recommended PWB piercing plan



● Type 16M

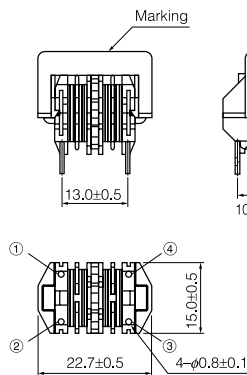


Recommended PWB piercing plan

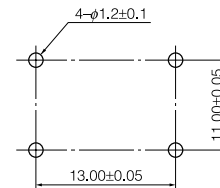


Series N, High N

● Type 15N, 17N

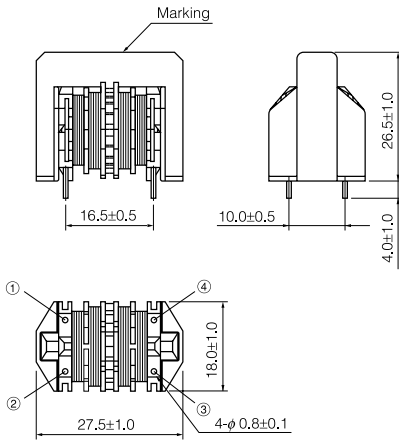


Recommended PWB piercing plan

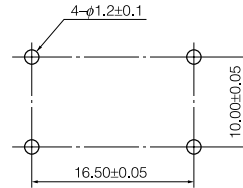


■ Dimensions in mm (not to scale)

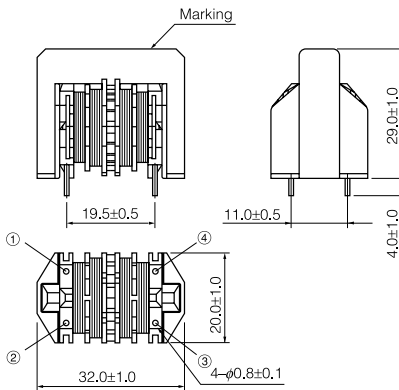
● Type 18N, 19N



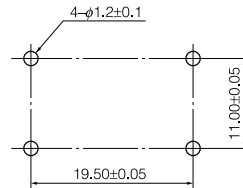
Recommended PWB piercing plan



● Type 20N, 21N



Recommended PWB piercing plan



Usage Precautions

For assured reliability and safety, consider following these caution items.

1. General

① Main part: ferrite core is a sintered body.

If excessive force or shock is applied directly, the electric and magnetic characteristics change.

- Do not use products that have been dropped.
- Do not apply a shock of over 20N to the core at mounting.

② If applying overcurrent (2 times rated current, for 2 minutes min.) to the products, a safety defect may occur due to smoking and transformation.

- Do not use them over the rated current.
- Do not apply DC bias current.

③ Avoid cleaning to avoid disconnections or deterioration of the coils.

2. Mounting

① The products with large power capacity are heavy.

- Fix the PWB near the mounting place, or add eyelets.

② The products are magnetically influenced easily by other inductors and likewise, influence others.

- Arrange them far from other inductors, lead wires and noise sources, or in the opposite direction to each other.

③ From the effect of other heat sources, the temperature of the products rise.

- Distance them from the switching circuit parts such as heat-sinks or cement resistors to prevent inrush current. etc.

3. Temperature rise

① The rated current is specified at the point of the self-temperature rise: 45°C max.

- Measure by a resistance method.
- When measuring by a thermo-couple method, set the sensor in the depths of the coil.

② The operation temperature indicates "surround temperature" plus "self-generated heat".

4. Safety standards

① The core of the products are designed as non-earthing.

② There is no single worldwide safety standard, but the structure is conformable to most.

- Keep safe distances between them and other parts on the basis of the applicable standard.

5. Countermeasure for noise

① These products are not suitable for noise suppression more than 10 MHz. Using other filters or arranging the PWB pattern and leads position, etc are more effective.

② The inductance of these products is effective for common-mode noise, and the leakage inductance is effective for normal-mode noise.