"Power Star" DRT Series IGBT Drive Transformer

LI003V5/2016

The DRT Series IGBT drive transformer is the latest product developed by our company for driving IGBTs and MOSFETs. It uses new materials as the magnetic core and can meet multiple application requirements.

1. Features:

① Low coupling capacitance makes it have high anti-interference ability;

② Small leakage inductance ensures better output pulse waveform;

③ No switching delay, high instantaneous transmission power;

④ High electric strength, safe and reliable;

⑤ Fully enclosed, good mechanical and environmental resistance;

⑥ Small size, compact structure, beautiful appearance, pin-hole installation, easy to use.

2. Ambient Conditions:

① Ambient temperature: -40℃ ~+85℃;

② Relative humidity: ≤ 90% at 40 ℃;

③ Atmospheric pressure: 860~1060mbar (about 650~800mmHg).

3. Insulation Rating: Class B (130 ℃)

4. Safety Features:

① Insulation resistance: >1000MΩ in normal conditions;

② Fire retardancy: In conformity with UL94-V0.

5. Comparison table of typical characteristics of various models of DRT Series drive transformers:

SN	Model	Ratio (u)	∫udt (μVs)	Withstand Voltage VP (kV)	Dimensions Tolerance ±0.3 (mm) [3]	Weight(g)
1	DRT801/101A	1:1	280	3.1	16.6×12.5×13.5	4.9
2	DRT801/201A	2:1	280	3.1	16.6×12.5×13.5	4.6
3	DRT801/301A	3:1	280	3.1	16.6×12.5×13.5	4.8
4	DRT801/111B	1:1:1	280	3.1	16.6×12.5×13.5	5.0
5	DRT801/211B	2:1:1	280	3.1	16.6×12.5×13.5	4.6
6	DRT801/311B	3:1:1	280	3.1	16.6×12.5×13.5	4.6
7	DRT802/101A	1:1	310	3.1	20.2×20×14.5	7.8
8	DRT802/201A	2:1	310	3.1	20.2×20×14.5	7.5
9	DRT802/301A	3:1	310	3.1	20.2×20×14.5	8
10	DRT802/111B	1:1:1	310	3.1	20.2×20×14.5	7.6
11	DRT802/211B	2:1:1	310	3.1	20.2×20×14.5	7.5
12	DRT802/311B	3:1:1	310	3.1	20.2×20×14.5	7.3

SN	Model	Ratio (u)	∫udt (μVs)	Withstand Voltage VP (kV)	Dimensions Tolerance ±0.3 (mm) ^{3}	Weight（g)
13	DRT803/101A	1:1	1000	6	30.14×27.94×25	36.5
14	DRT803/201A	2:1	1000	6	30.14×27.94×25	34.3
15	DRT803/301A	3:1	1000	6	30.14×27.94×25	35
16	DRT803/111B	1:1:1	1000	6	30.14×27.94×25	35
17	DRT803/211B	2:1:1	1000	6	30.14×27.94×25	34.3
18	DRT803/311B	3:1:1	1000	6	30.14×27.94×25	34.8
19	DRT804/101A	1:1	480	4.5	23×23×22	17.8
20	DRT804/201A	2:1	480	4.5	23×23×22	17.8
21	DRT804/301A	3:1	480	4.5	23×23×22	17.3
22	DRT804/111B	1:1:1	480	4.5	23×23×22	18.1
23	DRT804/211B	2:1:1	480	4.5	23×23×22	18.3
24	DRT804/311B	3:1:1	480	4.5	23×23×22	18.5
25	DRT805/101A	1:1	1000	4.5	27.6×25.1×20	23.5
26	DRT805/201A	2:1	1000	4.5	27.6×25.1×20	23.5
27	DRT805/301A	3:1	1000	4.5	27.6×25.1×20	23.8
28	DRT805/111B	1:1:1	1000	4.5	27.6×25.1×20	24
29	DRT805/211B	2:1:1	1000	4.5	27.6×25.1×20	23.3
30	DRT805/311B	3:1:1	1000	4.5	27.6×25.1×20	23.5
31	DRT806/101A	1:1	40	3.1	14×9.5×15	3.0
32	DRT806/201A	2:1	40	3.1	14×9.5×15	3.8
33	DRT806/301A	3:1	40	3.1	14×9.5×15	3.8
34	DRT807/101A	1:1	110	3.1	14×13.7×12	3.9
35	DRT807/201A	2:1	110	3.1	14×13.7×12	3.8
36	DRT807/301A	3:1	110	3.1	14×13.7×12	2.8
37	DRT807/111B	1:1:1	110	2.5	14×13.7×12	3.9
38	DRT807/211B	2:1:1	110	2.5	14×13.7×12	3.8
39	DRT807/311B	3:1:1	110	2.5	14×13.7×12	3.8
40	DRT808/101A	1:1	150	3.1	16.6×14.8×14.3	3.8
41	DRT808/201A	2:1	150	3.1	16.6×14.8×14.3	4.1
42	DRT808/301A	3:1	150	3.1	16.6×14.8×14.3	4.3
43	DRT808/111B	1:1:1	150	2.5	16.6×14.8×14.3	5.8
44	DRT808/211B	2:1:1	150	2.5	16.6×14.8×14.3	5.9
45	DRT808/311B	3:1:1	150	2.5	16.6×14.8×14.3	6
46	DRT811/101A	1:1	80	4.5	22.5 × 22.5 × 16	7.5
47	DRT811/201A	2:1	150	4.5	22.5 × 22.5 × 16	6.8
48	DRT811/301A	3:1	240	4.5	22.5 × 22.5 × 16	6.0
49	DRT811/111B	1:1:1	90	4.5	22.5 × 22.5 × 16	7.0
50	DRT811/211B	2:1:1	150	4.5	22.5 × 22.5 × 16	6.5
51	DRT811/311B	3:1:1	240	4.5	22.5 × 22.5 × 16	6.2
52	DRT8 13-101A	1:1	35	2	15×12.5×8	2.9
53	DRT8 13-201A	2:1	70	2	15×12.5×8	2.9
54	DRT8 13-301A	3:1	110	2	15×12.5×8	2.9

Note:

① The parameters given in the above table are typical values measured at room temperature.

② The meaning of each parameter:

u— Transformation ratio = I:II:III

V_P — the effective value of the dielectric strength test voltage applied between each winding, and the duration is 60s

∫udt— Rated volt-microsecond product ≈$V_1 \cdot t_n$ (its value basically remains unchanged within a certain Frequency)

L_P —Coil primary inductance f=1000Hz V=0.3V

L_S —Leakage inductance (measured after the secondary winding is short-circuited) f=1000Hz V=1V

C_K —Distributed capacitance f=1000Hz V=1V

6. Selection Guide:

① First according to the operating voltage V of the system. (effective value) to determine the required dielectric strength Vp, which can be selected according to the recommendation in Table 1:

Table 1:

Operating Voltage Vo	220V	380V	500V	800V
Dielectric strength Vp	1.9kV	3.1kV	4.5kV	6kV

② Select the transformation ratio according to the power supply voltage of the control stage and the driving voltage required by the IGBT.

For example: if the primary pulse amplitude is 15V, in order to drive the IGBT reliably, it is necessary to select a driving transformer with a transformation ratio of 1:1, such as DRT801/101A, DRT801/111B or DRT802/101A. If the primary pulse amplitude is 24-30V, in order to drive the IGBT reliably, it is necessary to select a driving transformer with a transformation ratio of 2:1, such as DRT801/201A, DRT801/211B or DRT802/201A.

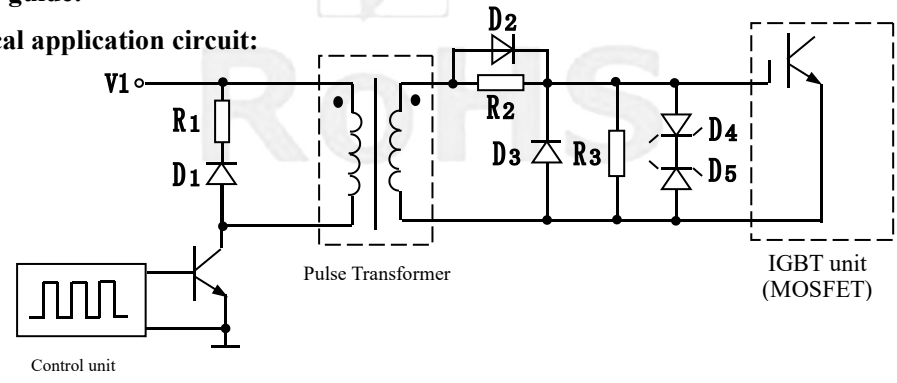
③ According to the volt-microsecond product (∫udt) and the frequency of the driving pulse (f p), the type selection is based on the principle that the volt-microsecond product of the known driving pulse should be less than or equal to the rated volt-microsecond product of the DRT drive transformer within the Frequency.

For example: if the frequency of the modulating pulse is 20k Hz, the pulse amplitude is 15V, and the pulse width is 20μs, then its volt-microsecond product ∫udt=15×20=300 μVs, according to the known volt-microsecond product of the driving pulse The principle selection

should be less than or equal to the rated volt-microsecond product of the DRT drive transformer in the Frequency, and the DRT802 Series products can be selected. If the frequency of the modulated pulse is 50kHz, the pulse amplitude is 24V, and the pulse width is 10μs, then its volt-microsecond product ∫udt=24×10=240μVs, according to the known driving pulse, the volt-microsecond product should be less than or equal to this frequency The principle selection of the rated volt-microsecond product of the DRT drive transformer within the range, the DRT801 series products can be selected.

7. Usage guide:

① Typical application circuit:



② Note:

i. R_1 and D_1 mainly play the role of freewheeling. D_1 can generally choose 1N4007, R_1 can choose 1kΩ~2 kΩ;

ii. D_2, D_3, R_2, and R_3 are mainly used for shaping and preventing IGBT gate from opening and providing a discharge circuit. D_2 and D_3 can choose speed-up diodes to increase the switching speed of IGBT, and R_2 and R_3 can choose dozens of ohms to hundreds of ohms.

iii. D_4 and D_5 are mainly used to limit the voltage applied to the IGBT (ge) terminal to avoid breakdown of the gate due to excessive grid-to-emitter voltage.

iv. The operating frequency of the driving transformer can be between a few kHz and tens of kHz.

8. The meaning of each parameter of DRT series IGBT drive transformer and outline drawing, installation dimension, coil diagram and main technical parameters (typical values)

① The meaning of each parameter:

u— transformation ratio = I: II: III.

V_P — the effective value of the dielectric strength test voltage applied between each winding,

and the duration is 60s.

∫udt— Rated volt-microsecond product ≈V_1 ·t_n (the value basically does not change within a certain Frequency).

V_1 —input pulse amplitude (primary pulse voltage).

t_n —— Drive the rated transmission pulse width of the transformer under the corresponding V_1 and f_P.

V_2 — output pulse amplitude (secondary pulse amplitude).

R_L —IGBT module or MOSFET control stage equivalent resistance.

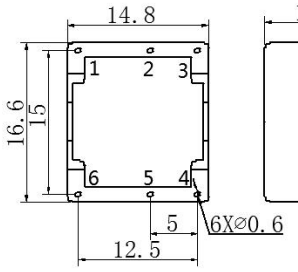
L_P —coil primary inductance f=1000Hz V=0.3V

L_S —Leakage inductance (measured after the secondary winding is short-circuited) f=1000Hz V=1V

C_K —distributed capacitance f=1000Hz V=1V

② DRT Series IGBT drive transformer outline drawing, installation dimensions, Coil Diagram and main technical parameters

DRT801 Series (Tolerance ±0.3mm)



2,5 suspended
Fig1

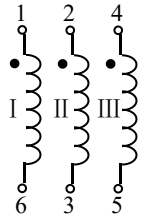
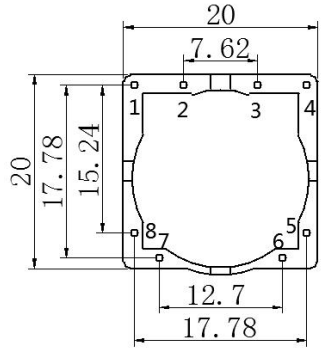
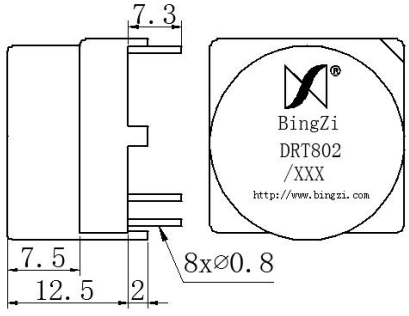


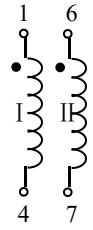
Fig2

Model	u	Vp (kV)	f_p (kHz)	∫udt (μVs)	V_1 (V)	t_n (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT801/101	1:1	3.1	1	≥280	15	19	13	100	100Hz~ 50kHz	Figure 1
DRT801/201	2:1				20	14	9			
DRT801/301	3:1				30	9	9			
DRT801/111	1:1:1				15	19	13			Figure 2
DRT801/211	2:1:1				20	14	9			
DRT801/311	3:1:1				30	10	9			

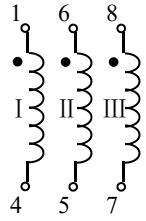
DRT802 Series (Tolerance ±0.3mm)







5,8 Suspended
2,3 not used
Fig3

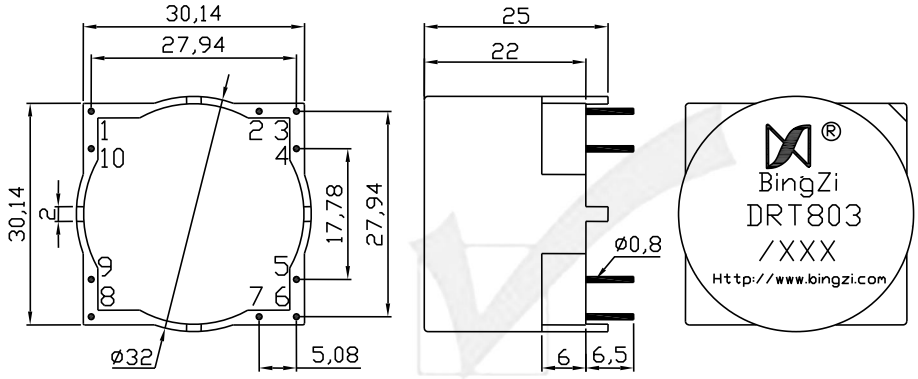


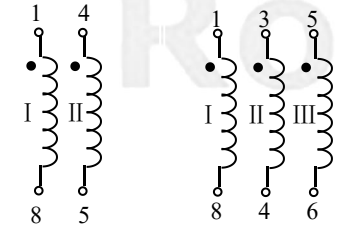
2,3 not used

Fig4

Model	u	VP (kV)	f (kHz)	∫udt (μVs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT802/101A	1:1	3.1	1	≥310	15	21	13	100	100Hz~5 0kHz	Figure 3
DRT802/201A	2:1				20	15.5	9			
DRT802/301A	3:1				30	11	9			
DRT802/111B	1:1:1				15	21	13			Figure 4
DRT802/211B	2:1:1				20	15.5	9			
DRT802/311B	3:1:1				30	11	9			

DRT803 Series (Tolerance ±0.3mm)



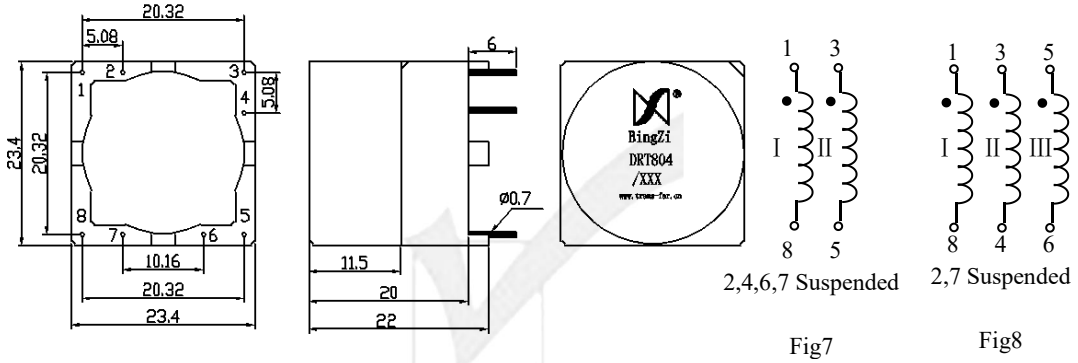


2,3,6,7,9,10
Suspended
Fig5

2,7,9,10
Suspended
Fig6

Model	u	Vp (kV	fp (kHz)	∫udt (μVs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT803/101A	1:1	6.0	1	≥1000	15	66.6	13	100	100Hz~ 50kHz	Figure 5
DRT803/201A	2:1				20	50	9			
DRT803/301A	3:1				30	33.3	9			
DRT803/111B	1:1:1				15	66.6	13			Figure 6
DRT803/211B	2:1:1				20	50	9			
DRT803/311B	3:1:1				30	33.3	9			

DRT80 4 Series (Tolerance ±0.3mm)



2,4,6,7 Suspended

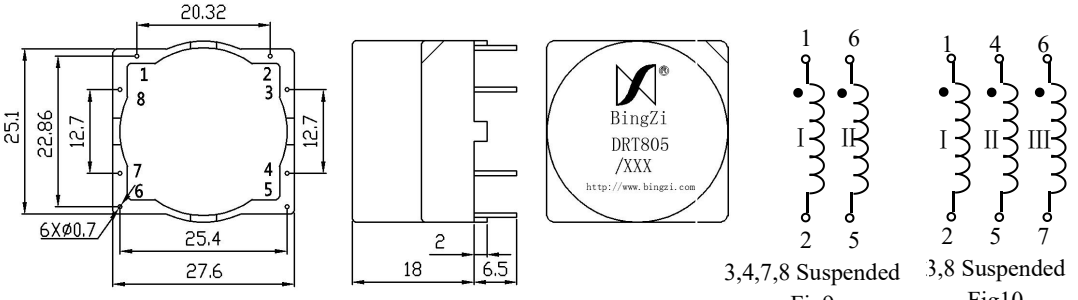
Fig7

2,7 Suspended

Fig8

Model	u	Vp (kV	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V	R_L (Ω)	Frequency	Coil Diagram
DRT804/101A	1:1	4.5	1	≥480	1 5	32	12	7	1kHz~ 100kHz	Figure 7
DRT804/201A	2:1				20	24	8			
DRT804/301A	3:1				30	16	8			
DRT804/111B	1:1:1				15	32	12			Figure 8
DRT804/211B	2:1:1				20	24	8			
DRT804/311B	3:1:1				30	16	8			

DRT805 Series (Tolerance ±0.3mm)



3,4,7,8 Suspended

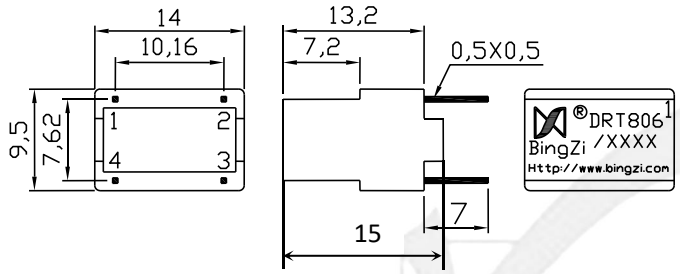
Fig9

3,8 Suspended

Fig10

Model	u	Vp (kV)	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT805/101A	1:1	4.5	1	≥1000	1 5	66.6	12	7	1kHz~100kHz	Figure 9
DRT805/201A	2:1				20	50	8			
DRT805/301A	3:1				30	33.3	8			
DRT805/111B	1:1:1				15	66.6	12			Figure 10
DRT805/211B	2:1:1				20	50	8			
DRT805/311B	3:1:1				30	33.3	8			

DRT806 Series (Tolerance ±0.3mm)



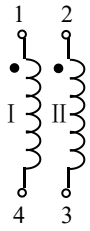
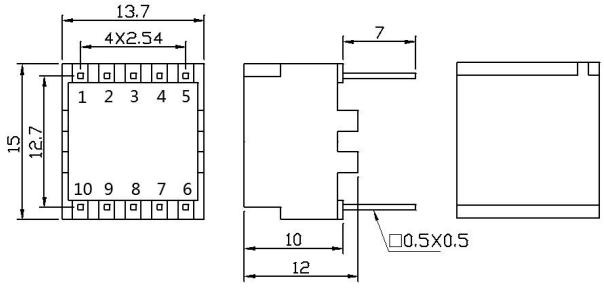
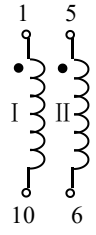


Fig11

Model	u	Vp (kV)	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT806/101A	1:1	3.1	10	≥40	1	2.7	13	100	10kHz~100kHz	Figure 11
DRT806/201A	2:1				20	2	8.8			
DRT806/301A	3:1				30	1.	8.8			

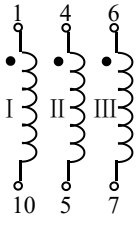
DRT80 7 Series (Tolerance ±0.3mm)





2,3,4,7,8,9Suspended

Fig 12

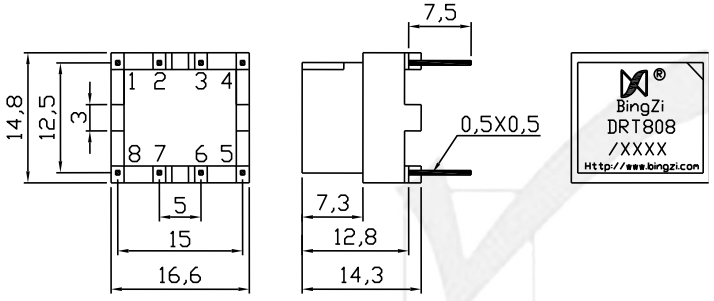


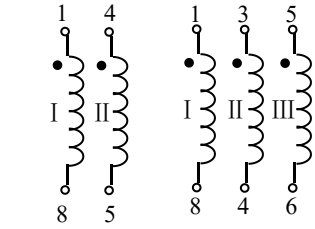
2,3,8,9Suspended

Fig13

Model	u	Vp (kV)	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT807/101A	1:1	3.1	10	≥110	1	7.3	13	100	1kHz~100kHz	Figure 12
DRT807/201A	2:1				20	5.5	8.8			
DRT807/301A	3:1				30	3.6	8.8			
DRT807/111B	1:1:1	2.5			1	7.3	13			Figure 13
DRT807/211B	2:1:1				20	5.5	8.8			
DRT807/311B	3:1:1				30	3.6	8.8			

DRT808 Series (Tolerance ±0.3mm)





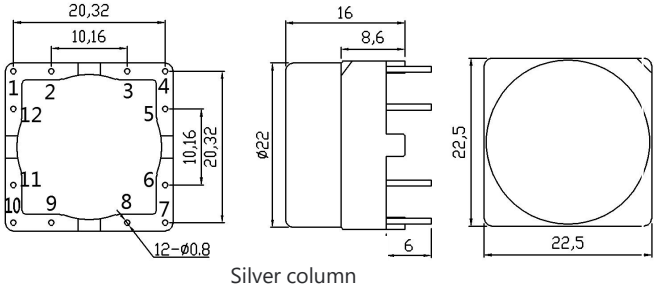
2,3,6,7Suspend d

2,7Suspended

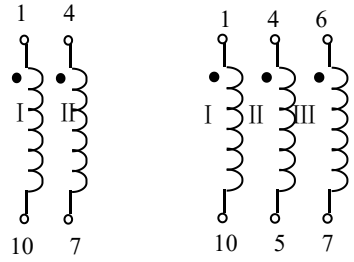
Fig15

Model	u	Vp (kV)	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT808/101	1:1	3.1	10	≥150	15	10	13	100	1kHz~ 100kHz	Figure 14
DRT808/201	2:1				20	7.5	8.8			
DRT808/301	3:1				30	5	8.8			
DRT808/111	1:1:1	2.5			15	10	13			Figure 15
DRT808/211	2:1:1				20	7.5	8.8			
DRT808/311	3:1:1				30	5	8.8			

DRT811 Series (Tolerance ±0.3mm)



Silver column



2,3,5,6,8,9,11,12 Suspended

Fig16

2,3,8,9,11,12 Suspended

Fig17

Model	mu	Vp (kV)	fp (kHz)	∫udt (Vμs)	V_1 (V)	tn (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT811/101A	1:1	4.5	20	≥ 8	8	10	8	100	1kHz~100kHz	Figure 16
DRT811/201A	2:1			≥ 15	15	10	7.5			
DRT811/301A	3:1			≥ 24	24	10	8			
DRT811/111B	1:1:1			≥ 90	8	10	8			Figure 17
DRT811/211B	2:1:1			≥15	15	10	7.5			
DRT811/311B	3:1:1			≥ 24	24	10	8			

DRT813 Series (Tolerance ±0.3mm)

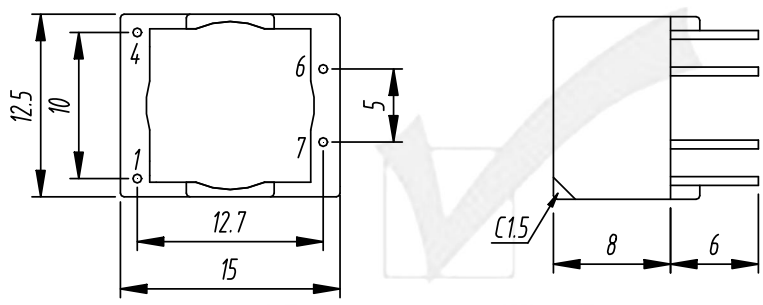


Fig 18

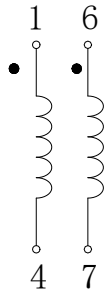


Fig 19

Model	u	Vp (kV)	f_p (kHz)	∫udt (μVs)	V_1 (V)	t_n (μs)	V_2 (V)	R_L (Ω)	Frequency	Coil Diagram
DRT813-101A	1:1	2	10	≥35	15	2.4	12	100	1KHz~50kHz	Fig 19
DRT813-201A	2:1	2	10	≥70	20	3.6	8	100	1KHz~50kHz	Fig 19
DRT813-301A	3:1	2	10	≥110	30	3.8	8	100	1KHz~50kHz	Fig 19