

WE ARE RECOGNIZED AS A MARKET LEADER IN THE DESIGN OF LLC INTEGRATED RESONANT TRANSFORMERS

What we provide our Customers is not only the most efficient magnetics.

We provide the best and faster solution possible to a critical part of the resonant project, taking into account skin effect, proximity effect, structural limitations, full ZVS behaviour and so on.

In fact, thanks to our long experience in transformers' design&manufacturing and to the investments on a modelling software platform done along the years, we can propose an extended range of standard off-the-shelf resonant tanks based on our LLC resonant transformers.



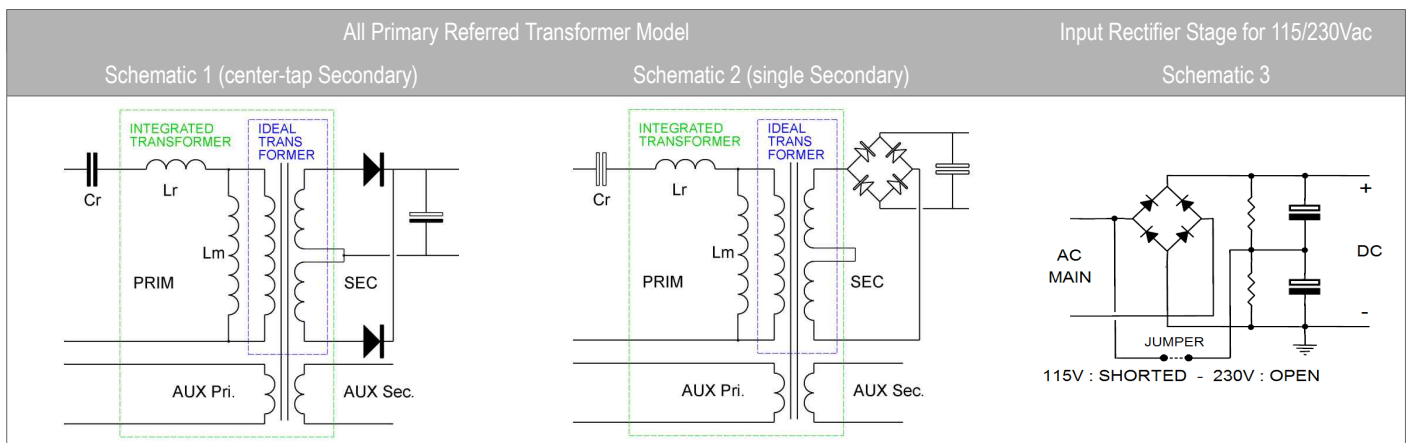
If you need help in resonant converter design we can provide a valuable technical support providing a just in time solution that fits your requirements.

We take also care of the PFC regulation stage designing optimized Inductors for active PFC Transition Mode, together with any other kind of magnetic component.

RESONANT BENEFITS VS. OTHER SMPS TOPOLOGIES

- Typical efficiency range of 94-96%. With synchronous rectification higher efficiency can be achieved;
- EMI friendly due to nearly sinusoidal waveforms;
- ZVS Zero-Voltage-Switching (soft-switching /ON transition) of the power MOSFET, with associated elimination of switching loss and component stress reduction;
- High efficiency also at no load with "burst mode" and "adaptive dead time" functions;
- High power peak easily supplied;
- Compact sizes.

LLC BASIC SCHEMATICS



RESONANT CUSTOMIZATION

In case no resonant tank matches your design requirements, we propose three options:

1. Tank customization

Using a standard transformer, when possible, we can design the tank, adapting it to the Customer's working conditions. At the end of the design we provide the theoretical functional data of the tank.

2. Full resonant customization

If tank customization is not possible or if best performances are a must, the resonant transformer is designed from scratch taking into consideration the Customer requirements and design targets. The size of the transformer selected will be one in the Sizes Table (see next page). The design and the samples will be performed in few working days.

3. SMPS design consultancy

In addition to the design of all magnetic components, we can provide our Customers a specific consultancy on the LLC resonant SMPS design.

	SMPS design	Full Customization	Tank Customization	Standard Tanks
Efficiency	++	++	+	+
Size	++	++	-	-
Temperature	++	++	+	+
Small Quantities	-	-	++	++
Pin-out adaptation	++	++	-	-
Additional windings (Aux, Sec,...)	++	++	-	-
Technical Support	SMPS consultancy	Magnetics and Tank design	Tank design	-
Resonant Design Form	N	Y	Y	N
SMPS specs	Y	N	N	N

RESONANT CONTROLLERS

Our resonant transformers have been successfully used with all the most common resonant controllers*:



L6699	FAN7688	TEA1610T	UCC25600	PLC810PG	NCP1395x	IRS27951	ICE1HS01G
L6599	FAN7631	TEA1611T	UCC256301	LCS700HG	NCP1396x	IRS27952	ICE2HS01G
L6598	FAN7621	TEA1612T	UCC256303	LCS701HG	NCP1397	IRS279524	ICL5101
L6585	FAN7621S	TEA1713T	UCC256304	LCS702HG	NCP1910	IRS2548D	ICL5102
	FAN7621B	TEA1716T	UCC29950	LCS703HG	NCL30051	IRS2153	
	FSFR2100	SSL4120T	UCD3138	LCS705HG	MC34067	IRS21531	
	FSFR1600US			LCS708HG	MC33067		
	FSFR1700US						
	FSFR1800US						
	FSFR2100US						
	FSFR1800HS						
	FSFR1700HS						
	FSFR1600XS						
	FSFR1700XS						
	FSFR1800XS						
	FSFR2100XS						
	FLS1600XS						
	FLS1700XS						
	FLS1800XS						
	FLS2100XS						

For more information about resonant switching power supplies see following link/QR code:

<https://www.itacoilweb.com/llc-resonant-power-supplies/>



*All brands and trademarks mentioned are property of their respective owners.

Resonant transformers sizes table

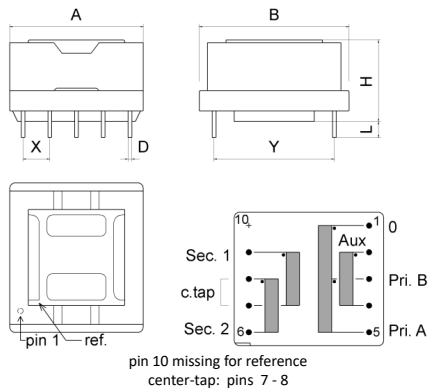
- Size table for standard and custom transformers for best performances on high efficiency LLC resonant power supply
- Suitable for converters based on any controller present in today's markets as shown in the Integrated resonant transformers introduction page
- High creepage/clearance/DTI for reinforced insulation to meet your safety needs
- Operating frequency 40KHz to 500KHz
- Integrated resonant inductor



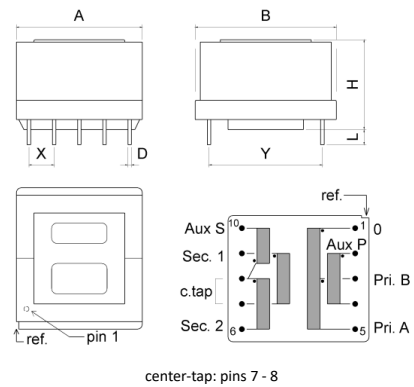
size table 115 - 240W

Max Continuous Power ¹	Layout	Dimensions (mm)								Basic Characteristics	
		A max	B max	H max	H1 max	X typ	Y typ	L min	D typ	Dielectric Strength ²	Creepage & Clearance ²
115W	Dwg. 24A	26,4	28,9	16,1	--	5,0	22,5	2,5	□ 0,64	5.0KV	>6mm
190W	Dwg. 26B	26,7	28,9	20,7	--	5,0	22,5	2,5	□ 0,7	5.0KV	>6mm
230W	Dwg. 31A	47,3	56,9	10,6	13,6	6,0	69,6	2,5	□ 0,8	5.0KV	>6mm
240W	Dwg. 34A	36,1	36,6	25,6	--	5,5	28,0	3,0	∅ 0,8	5.0KV	>6mm

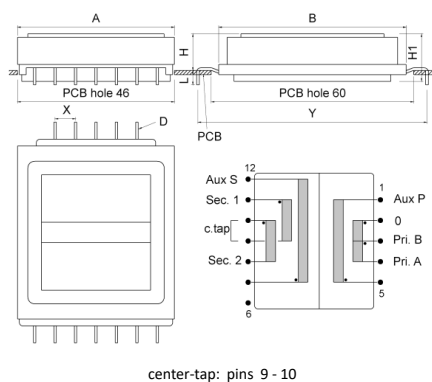
Drawing 24A (Pin layout bottom view)



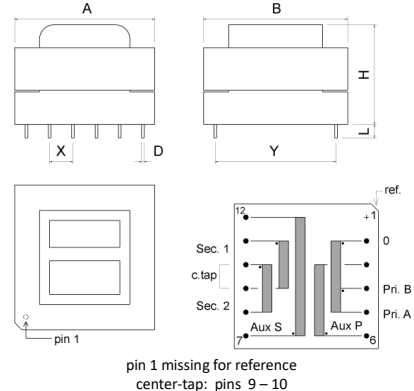
Drawing 26B (pin layout bottom view)



Drawing 31A (pin layout bottom view)



Drawing 34A (Pin layout bottom view)



- The PCB layouts are referred to the standard products on next pages. The same layouts are strongly suggested for customized products too.
- For a consistent and customized design of the resonant converter and its magnetic components or for a check on the full tank consistency of a standard product in your actual working condition, please, require the "Resonant tank request form".
- Windings temperature should not exceed 100°C continuous and 115°C for brief times.
- In general, the resonant converters and transformers can be designed to supply temporary overload.
- All our standard resonant transformers meet the most common safety standards (EN60950, EN61558, etc.).
- We support our Customers to achieve Safety Agency approval of their final product providing the safety data of the transformers.
- For dual polarity output voltage the tank to be selected shall be with the same voltage and same total power. I.e. for ±24V 100W each branch use the tank with 24V 200W rating.

¹ Max output power as reference only, the design requirements can affect it. Higher peak power is possible.

² Between primary+aux to secondary, referred to the standard series. Improvable on customized products, the actual needs should be specified.

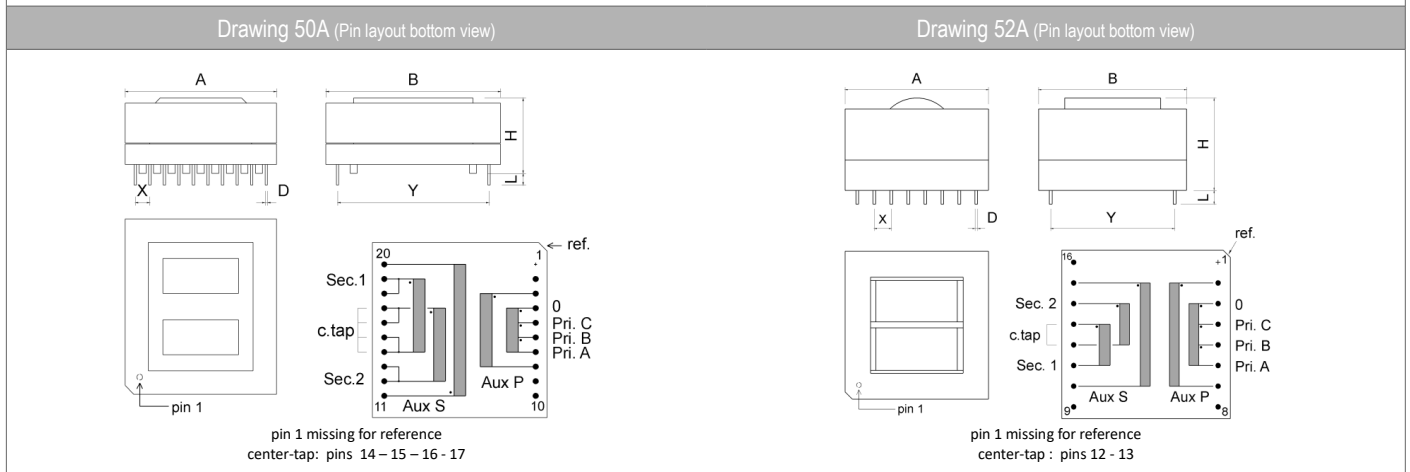
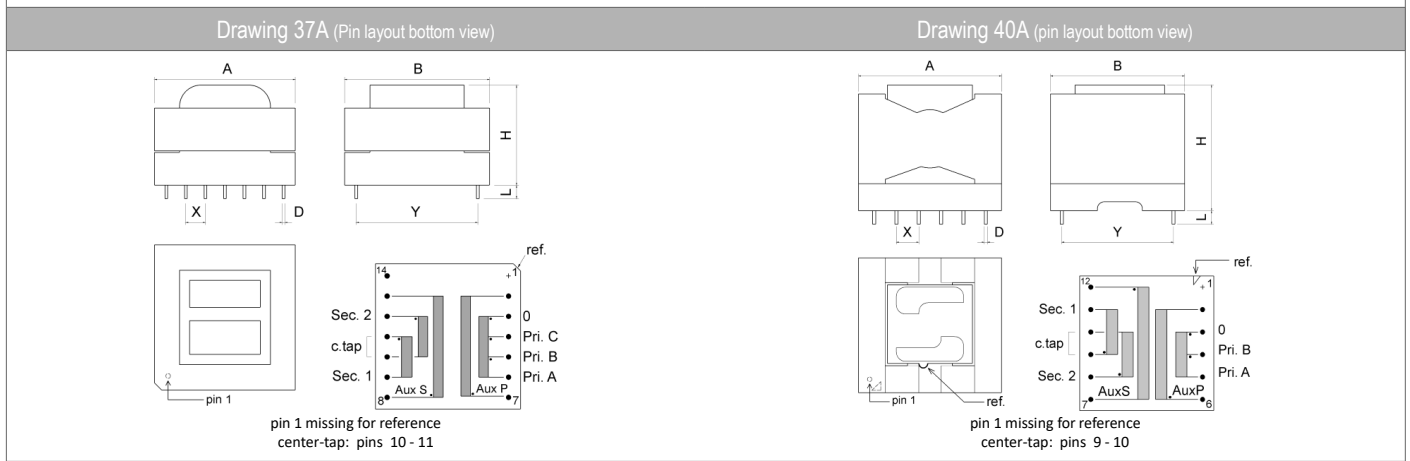
^{nb} The necessary tests and verifications of compliance with the technical and safety standard requirements lie within the exclusive competence of the customer.

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- Suitable for converters based on any controller present in today's markets as shown in the Integrated resonant transformers introduction page
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- Operating frequency 40KHz to 500KHz
- Integrated resonant inductor



size table 300 - 700W

Max Continuous Power ¹	Layout	Dimensions (mm)								Basic Characteristics	
		A max	B max	H max	H1 max	X typ	Y typ	L min	D typ	Dielectric Strength ²	Creepage & Clearance ²
300W	Dwg. 37A	43,2	44,5	31,5 ³	--	5,8	36,0	3,0	∅ 0,8	5.0KV	>6mm
400W	Dwg. 40A	33,6	32,8	33,4	--	5,0	25,0	2,5	∅ 0,8	5.0KV	>6mm
450W	Dwg. 50A	53,0	62,3	26,3	--	5,0	52,0	3,5	∅ 1,0	5.0KV	>6mm
700W	Dwg. 52A	53,6	56,7	38,3	--	5,5	44,8	3,5	∅ 1,0	5.0KV	>6mm



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² Between primary+aux to secondary, referred to the standard series. Improvable on customized products, the actual needs should be specified.
³ Output voltage lower than 36Vdc could increase the max height up to 2mm.

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