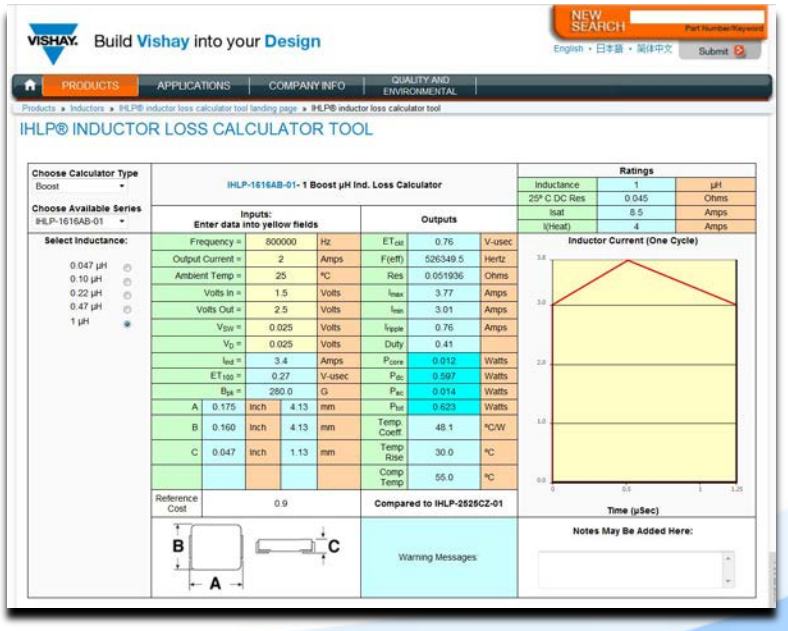
One of the World's Largest Manufacturers of
Discrete Semiconductors and Passive Components

IHLP® Inductor Loss Calculator Tool User Guide

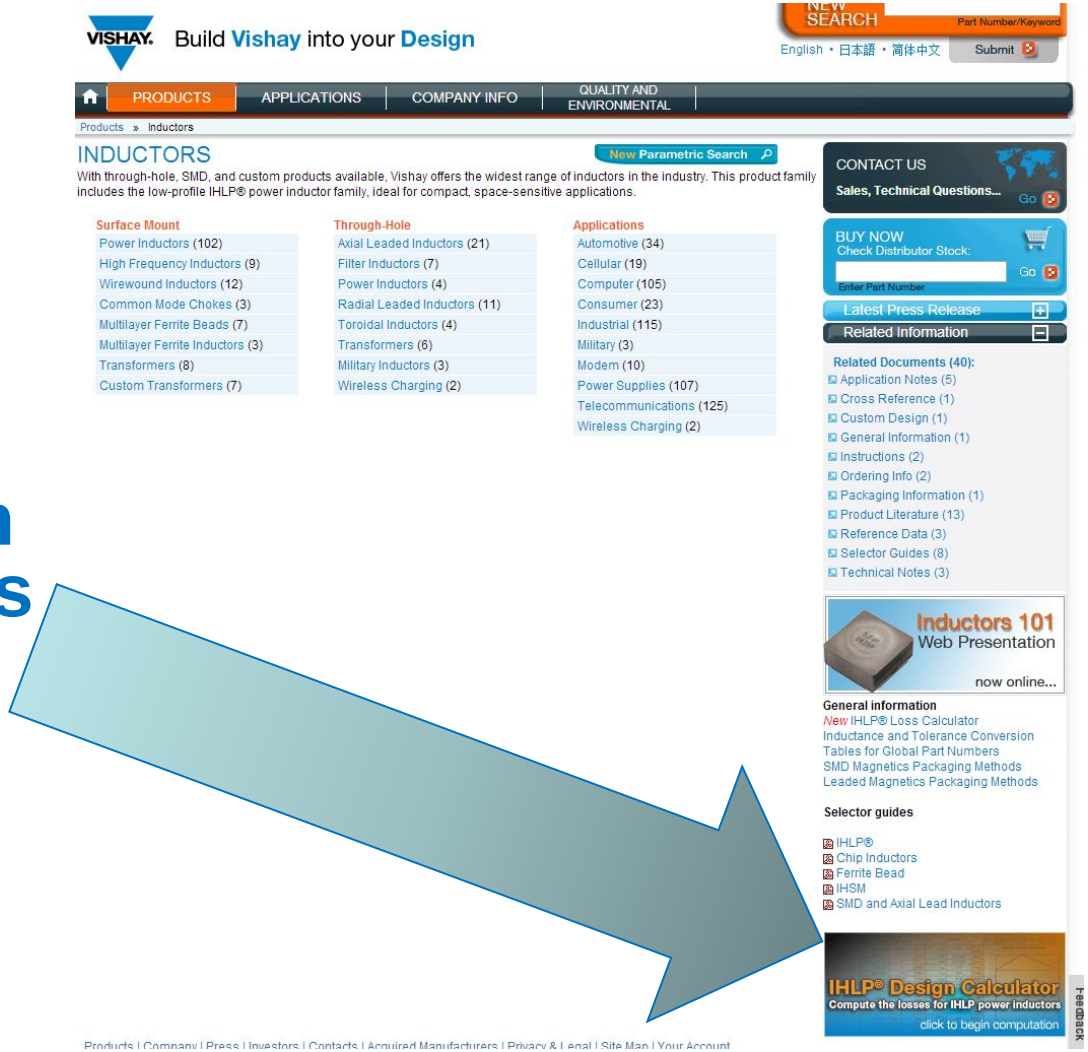


Build Vishay into your Design

How do I get to it?

If You're Already on the Vishay Inductors Page …

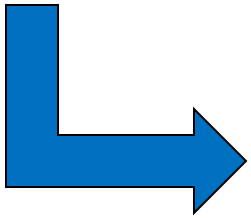
If Not …



How do I get to it?

Start with Vishay's Webpage - WWW.Vishay.com

Scroll down to:



	SPICE models
Rectifiers	SPICE models
TVS and ESD protection devices	SPICE models

PASSIVE COMPONENTS

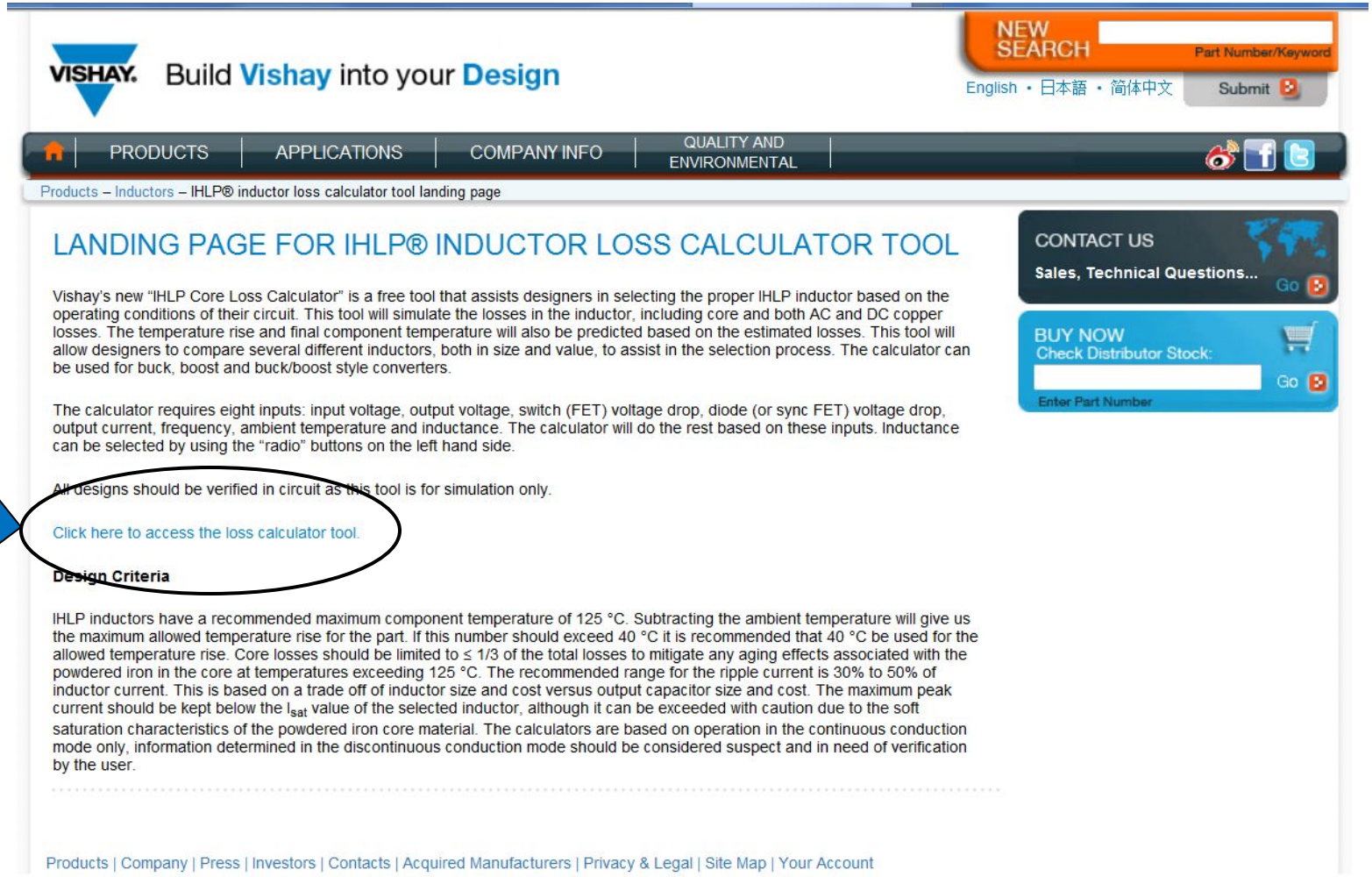
Product Group	Description
Aluminum capacitors	Capacitor selection tool
Inductors	Loss calculator
NTC thermistors	Curve computation program
	Piezo resistive sensor bridge analog temperature compensation calculator
	My VISHAY NTC curve
	3D Models
	Resistor/Thermistor Networks Computation
Resistors	Ohm's Law Calculator
	Pulse Energy Calculator
Tantalum capacitors	Reliability calculator

Click Here

Demo boards and other information

Product Group	Description

You will find the landing page



You have arrived ….

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PRODUCTS | APPLICATIONS | COMPANY INFO | QUALITY AND ENVIRONMENTAL

Products » Inductors » IHLP® inductor loss calculator tool landing page » IHLP® inductor loss calculator tool

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

Select Inductance:

- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH (selected)

IHLP-1616AB-01- 1 Boost µH Ind. Loss Calculator

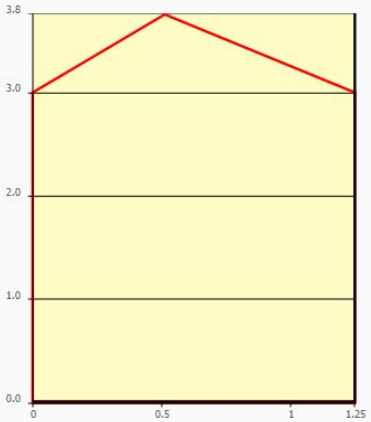
Inputs: Enter data into yellow fields

Frequency =		800000	Hz		ET_{ckt}	0.76	V-usec
Output Current =		2	Amps		F(eff)	526349.5	Hertz
Ambient Temp =		25	°C		Res	0.051936	Ohms
Volts In =		1.5	Volts		I_{max}	3.77	Amps
Volts Out =		2.5	Volts		I_{min}	3.01	Amps
V_{SW} =		0.025	Volts		I_{ripple}	0.76	Amps
V_D =		0.025	Volts		Duty	0.41	
I_{ind} =		3.4	Amps		P_{core}	0.012	Watts
ET_{100} =		0.27	V-usec		P_{dc}	0.597	Watts
B_{pk} =		280.0	G		P_{ac}	0.014	Watts
A	0.175	Inch	4.13	mm	P_{tot}	0.623	Watts
B	0.160	Inch	4.13	mm	Temp. Coeff.	48.1	°C/W
C	0.047	Inch	1.13	mm	Temp Rise	30.0	°C
					Comp Temp	55.0	°C
Reference Cost	0.9				Compared to IHLP-2525CZ-01		

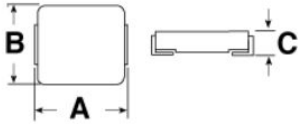
Ratings

Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

Inductor Current (One Cycle)



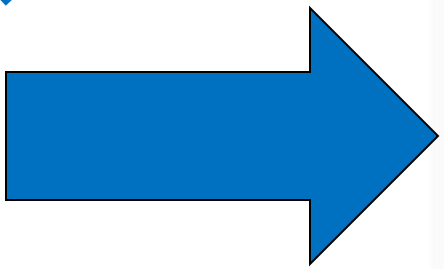
Time (µSec)

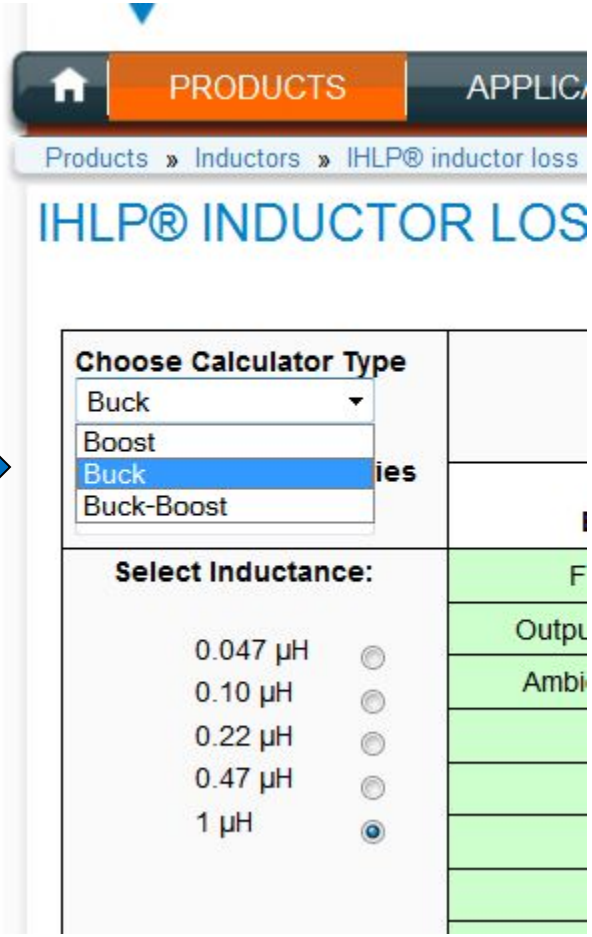


Warning Messages:

Notes May Be Added Here:

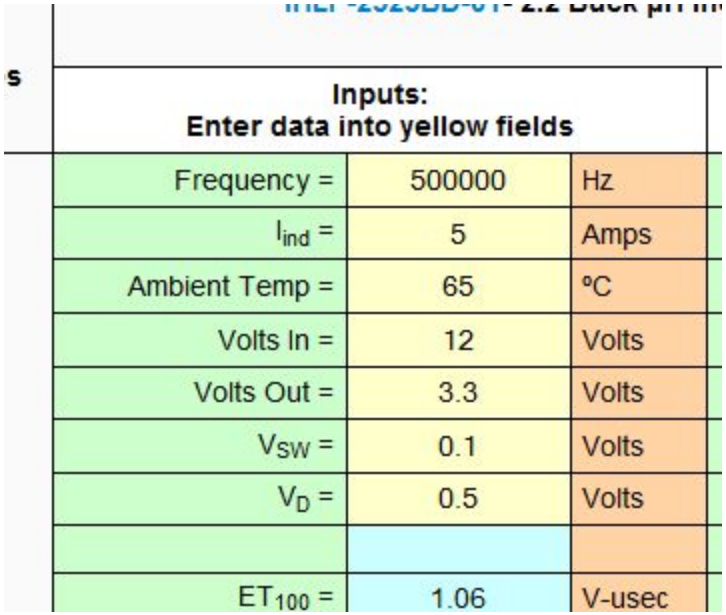
Start by choosing the Calculator Type





Enter your circuit requirements in the YELLOW boxes/fields

(Use the Tab key to change fields)

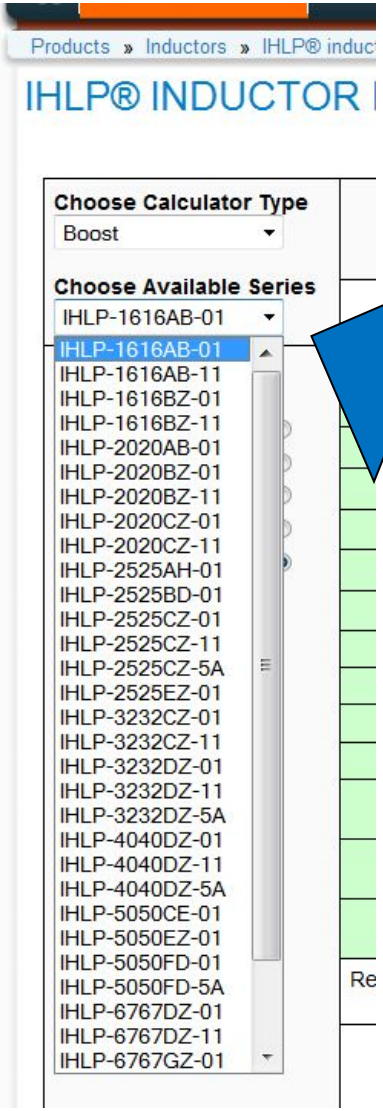


Inputs: Enter data into yellow fields		
Frequency =	500000	Hz
I_{ind} =	5	Amps
Ambient Temp =	65	°C
Volts In =	12	Volts
Volts Out =	3.3	Volts
V_{SW} =	0.1	Volts
V_D =	0.5	Volts
ET_{100} =	1.06	V-usec

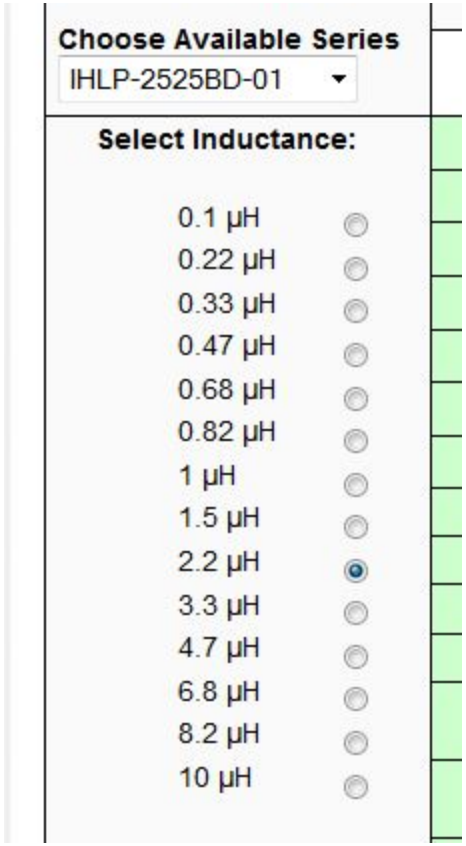
Note: $I_{ind} = I_{out}$ in a Buck converter.

V_{sw} = The voltage drop in the switch (MOSFET).

V_D = The voltage drop in the output diode.



Select which IHLP series you wish to start with …



Use the *RADIO* buttons to select an inductance value …

Calculator Outputs

Outputs		
ET_{ckt}	5.27	V-usec
F(eff)	374413.5	Hertz
Res	0.036632	Ohms
I_{max}	6.20	Amps
I_{min}	3.80	Amps
I_{ripple}	2.40	Amps
Duty	0.31	
P_{core}	0.177	Watts
P_{dc}	0.916	Watts
P_{ac}	0.159	Watts
P_{tot}	1.252	Watts
Temp. Coeff.	29.3	ºC/W
Temp Rise	36.7	ºC
Comp Temp	101.7	ºC

Circuit parameters

Power dissipation

Component temperature

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NEW SEARCH Part Number/Keyword

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Products » Inductors » IHLP® inductor loss calculator tool landing page » IHLP® inductor loss calculator tool

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

Select Inductance:
- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH

IHLP-1616AB-01- 1 Boost µH Ind. Loss Calculator

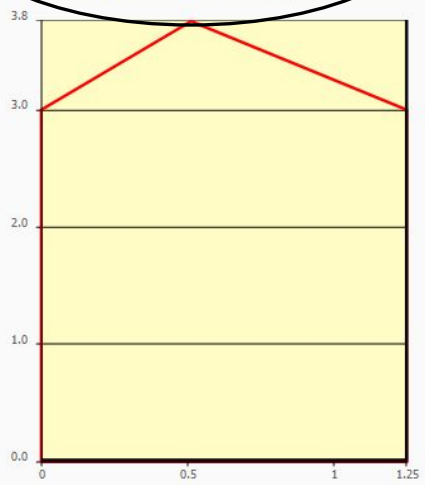
Inputs: Enter data into yellow fields

Frequency =	800000	Hz	ET_{ckt}	0.76	V-usec
Output Current =	2	Amps	F(eff)	526349.5	H
Ambient Temp =	25	°C	Res	0.051936	
Volts In =	1.5	Volts	I_{max}	3.77	Amps
					Amps
					Watts
					Watts
					Watts
A	0.175 Inch	4.13 mm	P_{tot}	0.623	Watts
B	0.160 Inch	4.13 mm	Temp. Coeff.	48.1	°C/W
C	0.047 Inch	1.13 mm	Temp Rise	30.0	°C
			Comp Temp	55.0	°C
Reference Cost	0.9		Compared to IHLP-2525CZ-01		

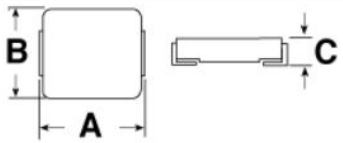
Ratings

Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

Inductor Current (One Cycle)



Time (µSec)



Warning Messages:

Notes May Be Added Here:

Component Information

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

IHLP-1616AB-01- 1 Boost µH Ind. Loss Calculator

Select Inductance:

- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH

Inputs: Enter data into yellow fields

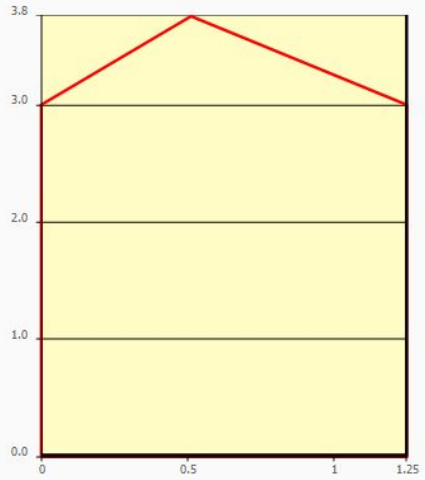
Frequency =	800000	Hz	ET_{ckt}	0.76	V-usec
Output Current =	2	Amps	F(eff)	526349.5	Hertz
Ambient Temp =	25	°C	Res	0.051936	Ohms
Volts In =	1.5	Volts	I_{max}	3.77	Amps
Volts Out =	2.5	Volts	I_{min}	3.01	Amps
V_{SW} =	0.025	Volts	I_{ripple}	0.76	Amps
V_D =	0.025	Volts	Duty	0.41	
I_{ind} =	3.4	Amps	P_{core}	0.012	Watts
ET_{100} =	0.27	V-usec	P_{dc}	0.597	Watts
B_{pk} =	280.0	G	P_{ac}	0.014	Watts
A 0.175	Inch	4.13	mm	P_{tot}	0.623	Watts
B 0.160	Inch	4.13	mm	Temp. Coeff.	48.1	°C/W
C 0.047	Inch	1.13	mm	Temp Rise	30.0	°C
				Comp Temp	55.0	°C

Compared to IHLP-2525CZ-01

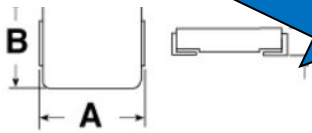
Ratings

Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

Inductor Current (One Cycle)



Time (µSec)



Warning Messages:

Notes May Be Added Here:

Messages

Messages – What do they mean?

There are four possible messages that can be displayed

They are ….

Messages – What do they mean?

1. Warning – Component temperature Exceeds 125°C
2. Inductor Current Exceeds Saturation Current
3. Discontinuous Mode – Model Invalid
4. Caution – Core Losses Greater Than 1/3 of total Losses

The first two are self explanatory (it would be 155°C for -5X parts)

The third indicates that the circuit would be in discontinuous mode – the calculator is based on continuous conduction mode. The results will not be as accurate.

The fourth is just informational, a good rule of thumb is 1/3 core and 2/3 copper losses.

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

IHLP-1616AB-01 - 1 Boost µH Ind. Loss Calculator

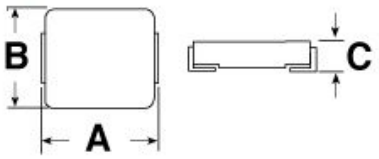
Ratings		
Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

Select Inductance:

- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH

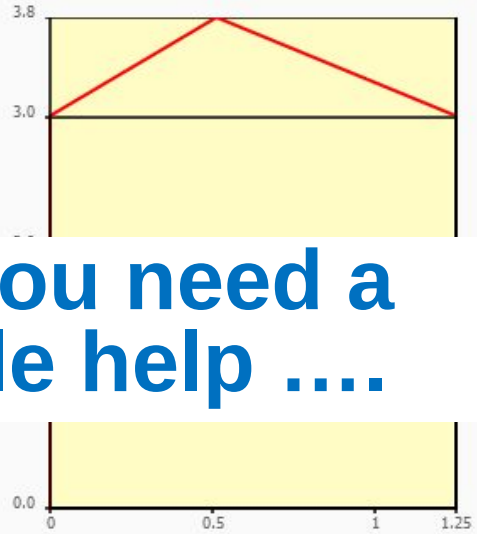
Inputs: Enter data into yellow fields

Frequency =		800000	Hz	ET_{okt}	0.76	V-usec
Output Current =		2	Amps	F(eff)	526349.5	Hertz
Ambient Temp =		25	°C	Res	0.051936	Ohms
Volts In =		1.5	Volts	I_{max}	3.77	Amps
Volts Out =		2.5	Volts	I_{min}	3.01	Amps
V_{SW} =		0.025	Volts	I_{ripple}	0.76	Amps
V_D =		0.025	Volts	Duty	0.41	
I_{ind} =		3.4	Amps	P_{core}		
ET_{100} =		0.27	V-usec	P_{dc}		
B_{pk} =		280.0	G	P_{ac}		
A	0.175	Inch	4.13	mm	P_{tot}	
B	0.160	Inch	4.13	mm	Temp. Coeff.	48.1	C/W
C	0.047	Inch	1.13	mm	Temp Rise		°C
					Comp Temp		
Reference Cost		0.9			Co...re	...Z-01	



Wa... ...es:

Inductor Current (One Cycle)



Notes May Be Added Here:

If you need a little help ....

Click HERE for Help

HELP FILE

IHLP® LOSS CALCULATOR HELP FILE

The purpose of this calculator is to estimate the losses in the Vishay IHLP series inductors used in continuous mode power converters. Both copper and core losses are estimated. The program also may be used to estimate temperature rise, but you may experience results different from what this program predicts.

Inputs: Eight inputs must be supplied by the user of the calculator. Data must be entered into the yellow cells only.

1. Enter the inductance by clicking on one of the radio buttons on the left side.
2. Enter the frequency of the circuit.
3. Enter the DC output current of the converter.
4. Enter the ambient temperature. The program uses this to calculate the final resistance of the inductor and the final component temperature.
5. Enter the input voltage of the converter.
6. Enter the output voltage of the converter.
7. Enter the switch drop voltage V_{SW}.
8. Enter the diode or sync FET voltage drop V_D.

Once entered, your inputs will remain as is until a new input value is entered. To change inductance used, click a different inductance button. Clicking the button sets up the calculator with new internal data for the part specified and immediately updates the calculator, including the graph.

Outputs: The outputs of the calculator are displayed in the blue cells, they are summarized below.

- **ET_{ckt}**: The volt-microsecond product of the converter circuit.
- **F(eff)**: This is the calculated effective frequency of the circuit used for the determination of core loss. The program takes into account the shape and amplitude of the current ripple when it calculates core loss.
- **Res**: Resistance of the inductor at the temperature specified in the inputs.
- **I_{max}**: The peak current of the inductor at the top of the ripple.
- **I_{min}**: The instantaneous current at the bottom of the ripple.
- **I_{ripple}**: The change of inductor current from the bottom of ripple to top of ripple = $I_{max} - I_{min}$.
- **Duty**: The percentage of time that the switch is on.
- **P_{core}**: Core loss in watts.
- **P_{dc}**: Conductor loss due to dc resistance in the inductor in watts.
- **P_{ac}**: Conductor loss due to ac effects in watts.
- **P_{tot}**: Total losses in the inductor = $P_{core} + P_{dc} + P_{ac}$.
- **Temp. Coeff**: The rise in temperature in °C per watt of dissipation. This is based on lab tests performed on sample inductors using the change of resistance method. Your thermal environment and that used in our lab may be different.
- **Temp Rise**: This is the increase in inductor temperature above ambient.
- **Comp Temp**: The ambient temperature plus the temperature rise. This is the estimated temperature of the inductor.
- **I_{ind}**: This is the DC current that the inductor sees in the boost and buck-boost converter topology, in buck converters the inductor current is equal to the output current.
- **ET_{100}**: Volt-microsecond product of the inductor at 100 gauss.
- **B_{pk}**: Peak flux density of the circuit based on operating conditions specified.

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

IHLP-1616AB-01 - 1 Boost µH Ind. Loss Calculator

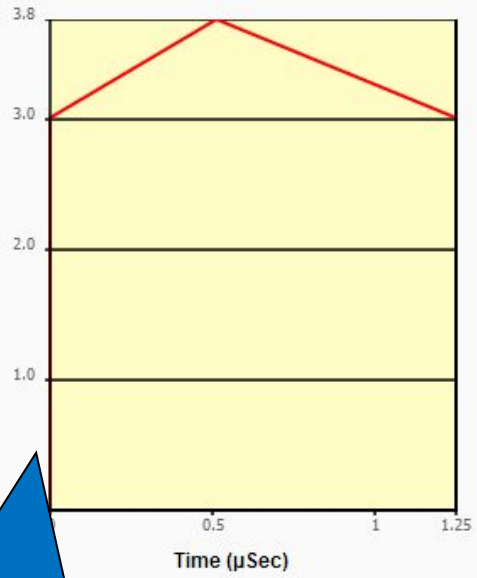
Ratings		
Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

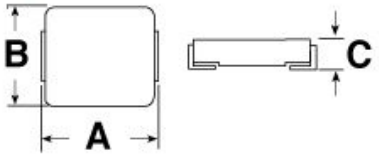
Select Inductance:

- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH

Inputs: Enter data into yellow fields			Outputs		
Frequency =	800000	Hz	ET_{okt}	0.76	V-usec
Output Current =	2	Amps	F(eff)	526349.5	Hertz
Ambient Temp =	25	°C	Res	0.051936	Ohms
Volts In =	1.5	Volts	I_{max}	3.77	Amps
Volts Out =	2.5	Volts	I_{min}	3.01	Amps
V_{SW} =	0.025	Volts	I_{ripple}	0.76	Amps
V_D =	0.025	Volts	Duty	0.41	
			ore	0.012	Watts
			dc	0.597	Watts
			ac	0.014	Watts
			tot	0.623	Watts
B	0.160	Inch	4.13	mm	°C/W
C	0.047	Inch	1.13	mm	
			Temp		
Reference Cost	0.9		Compared to IHLP		

Inductor Current (One Cycle)





Warning Messages:

Notes May Be Added Here:

If you want to add notes ….

Click HERE for Help

IHLP® INDUCTOR LOSS CALCULATOR TOOL

Choose Calculator Type: Boost

Choose Available Series: IHLP-1616AB-01

IHLP-1616AB-01 - 1 Boost µH Ind. Loss Calculator

Ratings		
Inductance	1	µH
25° C DC Res	0.045	Ohms
Isat	8.5	Amps
I(Heat)	4	Amps

Inputs: Enter data into yellow fiel

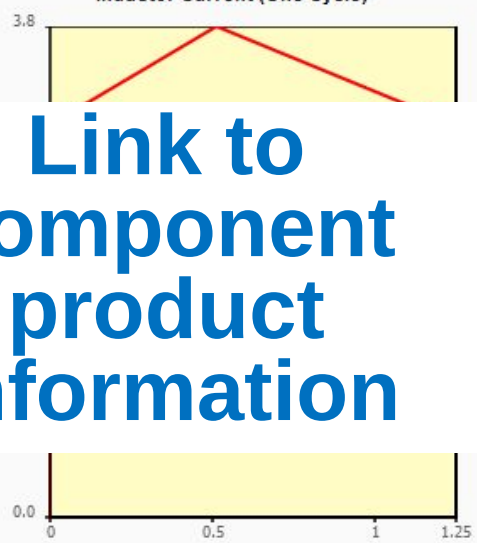
Outputs

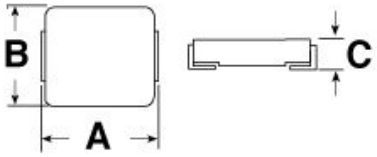
Select Inductance:

- 0.047 µH
- 0.10 µH
- 0.22 µH
- 0.47 µH
- 1 µH

Frequency =	800000					0.76	V-usec
Output Current =	2					349.5	Hertz
Ambient Temp =	25		C			6	Ohms
Volts In =	1.5		Volts				Amps
Volts Out =	2.5		Volts	I_{min}		3.	
V_{SW} =	0.025		Volts	I_{ripple}		0.	
V_D =	0.025		Volts	Duty		0.	
I_{ind} =	3.4		Amps	P_{core}		0.	
ET_{100} =	0.27		V-usec	P_{dc}		0.	
B_{pk} =	280.0		G	P_{ac}		0.	
A	0.175	Inch	4.13	mm	P_{tot}	0.	
B	0.160	Inch	4.13	mm	Temp. Coeff.	48	
C	0.047	Inch	1.13	mm	Temp Rise	30.0	°C
					Comp Temp	55.0	°C
Reference Cost	0.9				Compared to IHLP-2525CZ-01		

Inductor Current (One Cycle)





Warning Messages:

Notes May Be Added Here:

Click HERE for Help

Link to component product information

VISHAY.

IHLP-1616AB-01 - 1 Boost µH Ind. Loss Calculator

Ratings		
Inductance	1	µH
25° C DC Res	0.045	Ohms
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Inputs: Enter data into yellow fields					Outputs		
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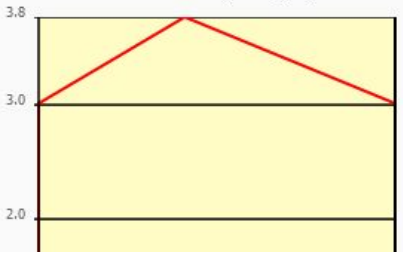
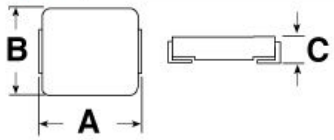
Volts In =	1.5	Volts			I_{max}	3.77	Amps
Volts Out =	2.5	Volts			I_{min}	3.01	Amps
V_{SW} =	0.025	Volts			I_{ripple}	0.76	Amps
V_D =	0.025	Volts			Duty	0.41	
I_{ind} =	3.4	Amps			P_{core}	0.012	Watts
ET_{100} =	0.27	V-usec					
B_{pk} =	280.0	G					
A	0.175	Inch	4.13	mm			
B	0.160	Inch	4.13	mm			
C	0.047	Inch	1.13	mm	Temp		
Reference Cost	0.9				Cor		

Inductor Current (One Cycle)





Warning Messages:

Added Here:

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