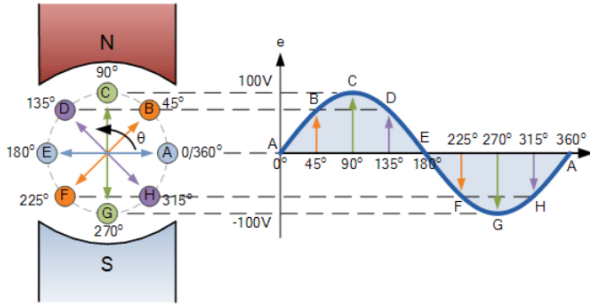


## Sinusoidal Waveform Construction

Coil Angle ( $\theta$ )	0	45	90	135	180	225	270	315	360
$e = V_{max} \cdot \sin\theta$	0	70.71	100	70.71	0	-70.71	-100	-70.71	0



In the above picture the peak voltage is 100 so the RMS voltage is 70.7V.

So to make the maths easier at the peak lets use 140V as the peak and 100V as the RMS.

We will use a resistive load of 14 ohm to the AC generator which has a peak current of 10A. To determine the instantaneous voltage anywhere on the sinewave we can use  $V_i = V_{max} \times \sin\theta$ . Likewise we can express the current at the 22.5 degree increments and then the Power increments

$\theta$	0	22.5	45	67.5	90	A
Vinstantaneous	0V	53.6V	99V	129V	140V	B
Tweaked V	0	54V	100V	130V	140V	C
Instantaneous (14R)	0	3.86A	7.14A	9.3A	10A	D
Tweaked Inst	0	4A	7A	9A	10A	E
Tweaked Pwrinst	0	216W	700W	1170W	1400W	F
Pri peakVinst		16V	30V	39V	42V	G
Inst from 48V		4.5A	14.5A	24.375A	29.16A	H
DC48V in Choke Inst current		11A	22A	27A	32.5A	I
Graph Plots on next page		Fig1	Fig2	Fig3	Fig4	

Assume pri voltage 30V RMS therefore peak 42.5 – yes can be supplied from 48V.

Transformer ratio 1:3.33 for 100V RMS out from 30VRMS primary

In the above WORKED example for a power of 700WRMS the instantaneous peak choke current is 32.5A

However lets assume inverter and components are 100% efficient the 48V current input will be 14.6A

The ratio from 32.5A to 14.6A is 2.22 times greater.

In my given example in the opening post the ratio is 282A to 125A which is 2.256

So Nicks here it is with buck regulator topology and worked examples at various points in the cycle.

BTW I first coined the phrase in these columns that the inverter can be modelled as an overgrown buck regulator with synchronous FET flywheel diode fed with a modulated 50Hz reference – I still think this holds true !

I think I will go with my initial calculations which I believe are proven here.

Please see the buck regulator waveforms on the next page showing 40uH choke with various real current & voltage measurements plotted.

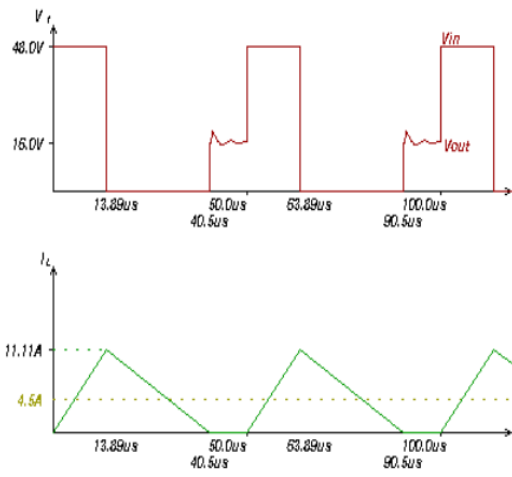


Fig1

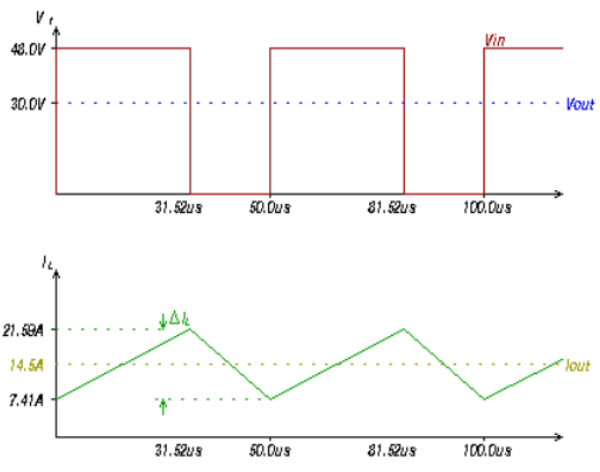


Fig2

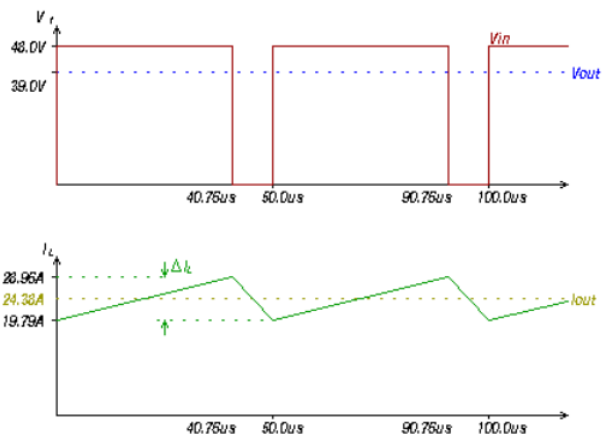


Fig3

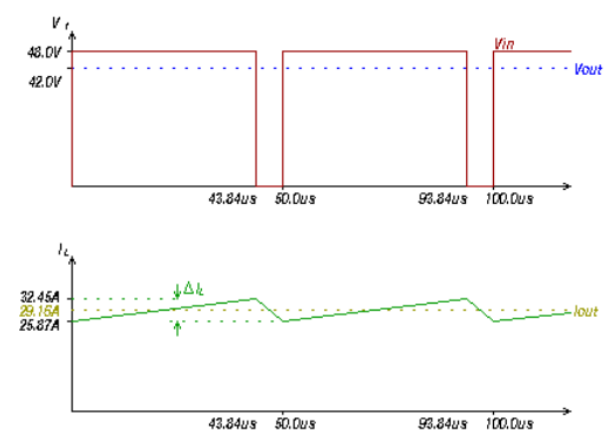


Fig4