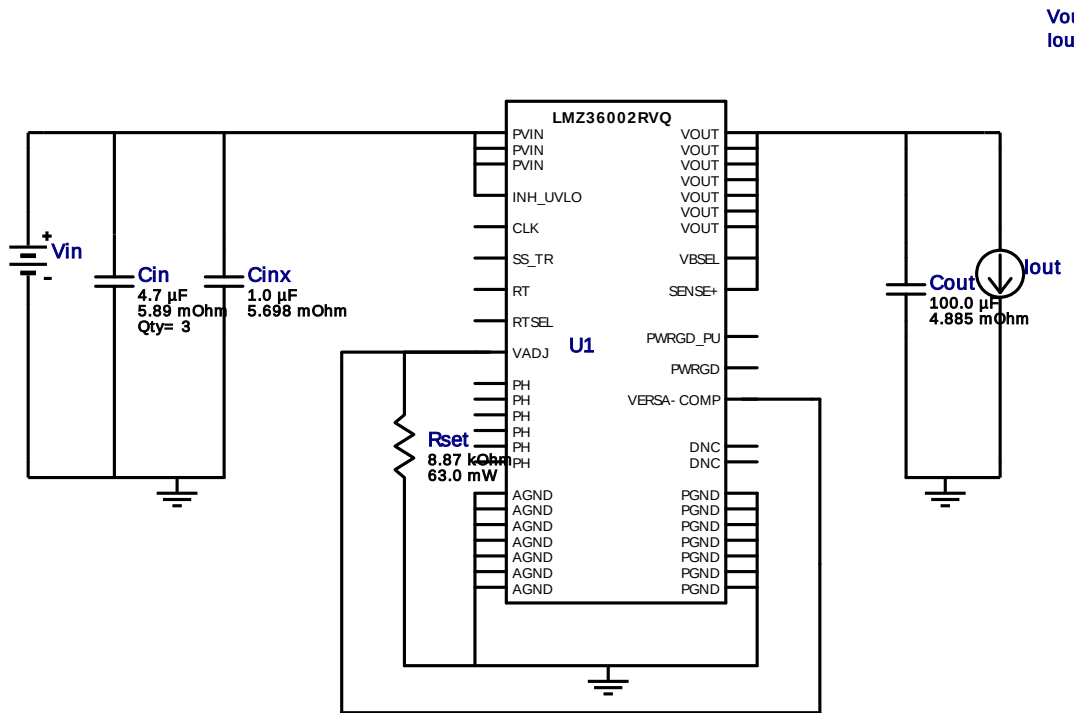
WEBENCH® Design Report

VinMin = 5.0V
VinMax = 50.0V
Vout = 3.3V
Iout = 2.0A

Device = LMZ36002RVQR
Topology = Buck
Created = 8/10/16 8:08:50 PM
BOM Cost = $9.43
BOM Count = 7
Total Pd = 2.58W

Design : 4765003/1 LMZ36002RVQR
LMZ36002RVQR 5.0V-50.0V to 3.30V @ 2.0A

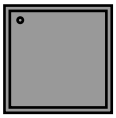


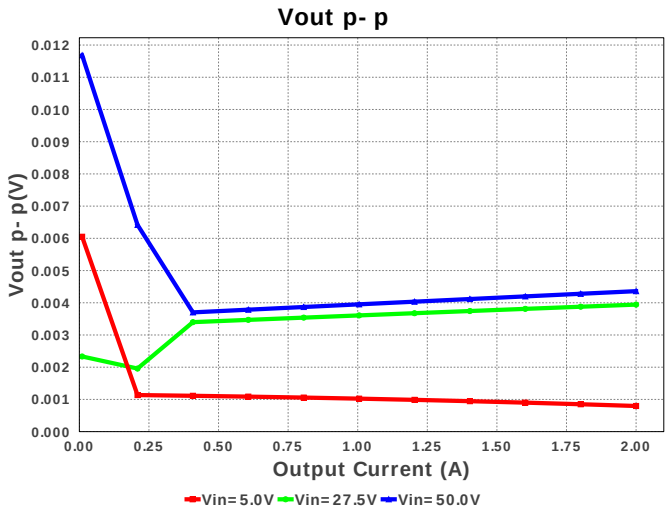
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

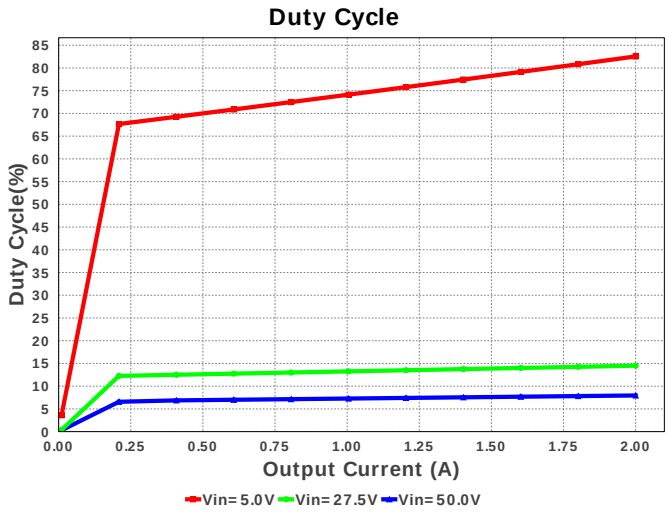
2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating at a much lower voltage than the maximum input voltage. Sizing the inductor based on the maximum input voltage may yield an inductance much larger than typically needed, causing a larger footprint for the overall design. At the same time, components such as the input capacitor must be rated based on the maximum input voltage. WEBENCH now supports the use of this additional input voltage specification.

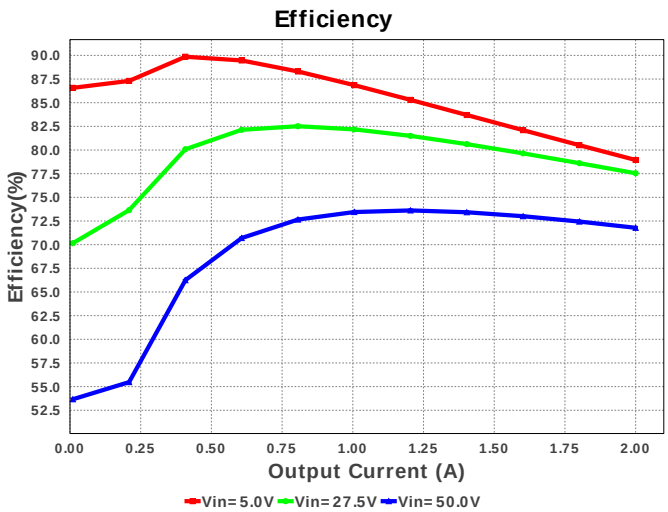
Electrical BOM

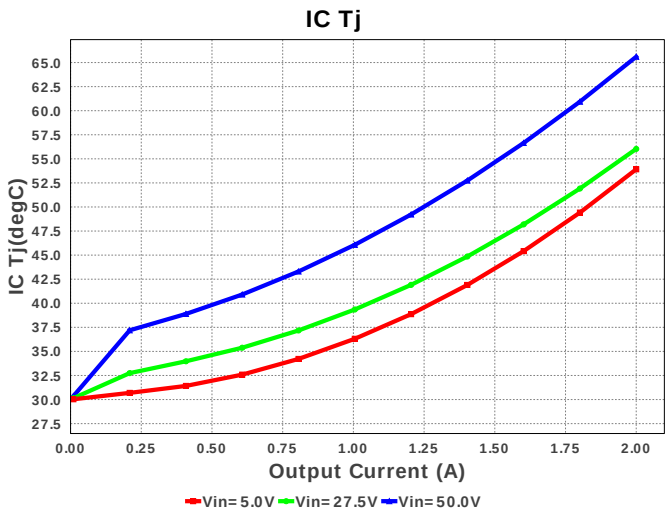
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	TDK	C3225X7S2A475M200AB Series= X7S	Cap= 4.7 uF ESR= 5.89 mOhm VDC= 100.0 V IRMS= 6.7739 A	3	$0.42	1210 15 mm^2
2.	Cinx	TDK	C3216X5R2A105K Series= X5R	Cap= 1.0 uF ESR= 5.698 mOhm VDC= 100.0 V IRMS= 0.0 A	1	$0.07	1206 11 mm^2
3.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	1	$0.14	1206_190 11 mm^2
4.	Rset	Vishay-Dale	CRCW04028K87FKED Series= CRCW..e3	Res= 8.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

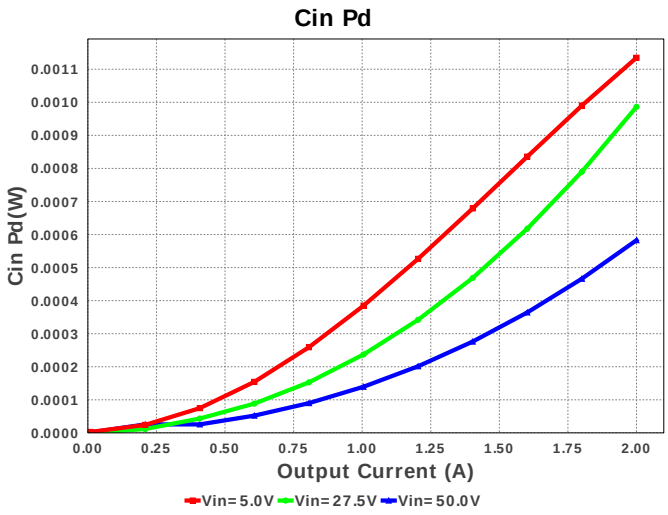
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
5.	U1	Texas Instruments	LMZ36002RVQR	Switcher	1	$7.95	 RVQ0043A 144 mm^2

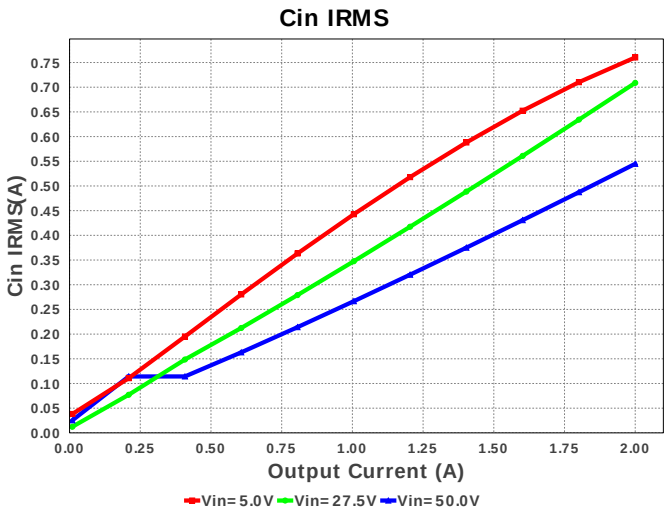


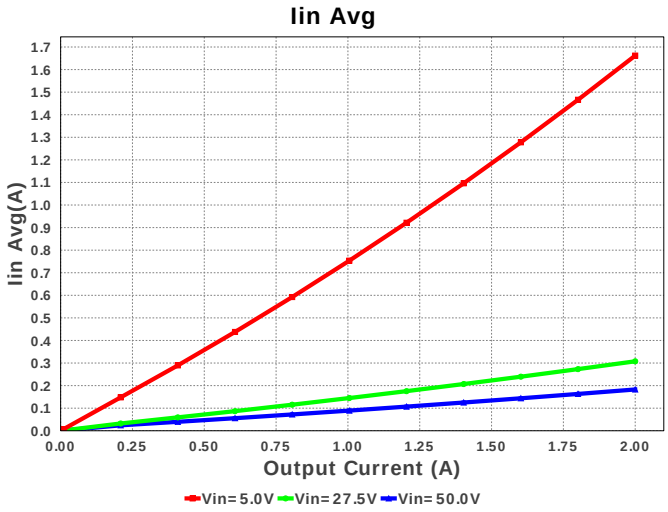


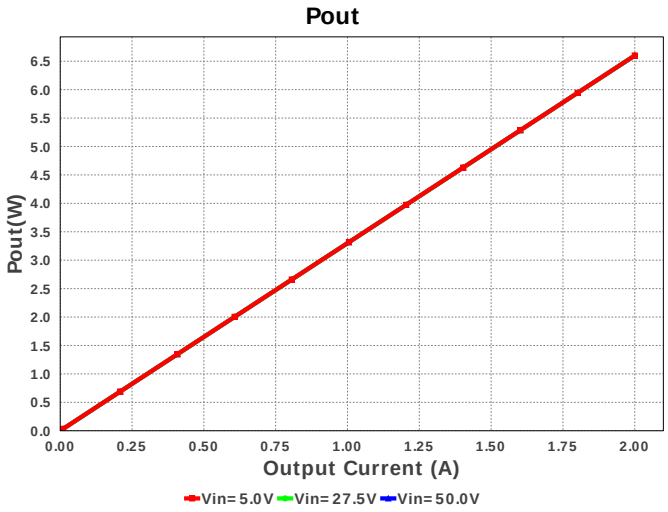


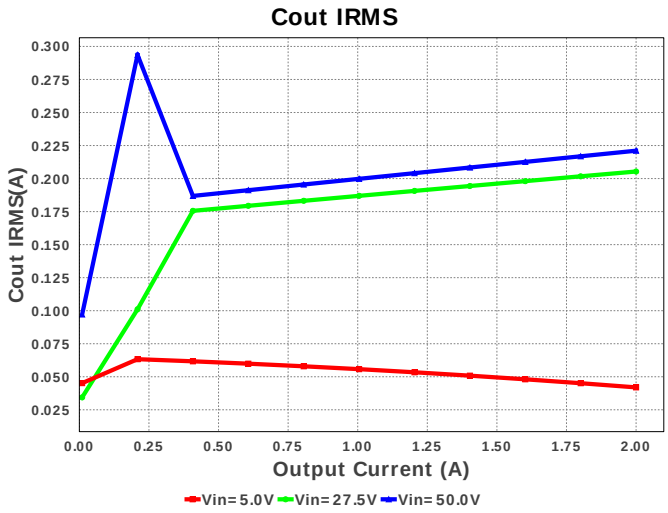


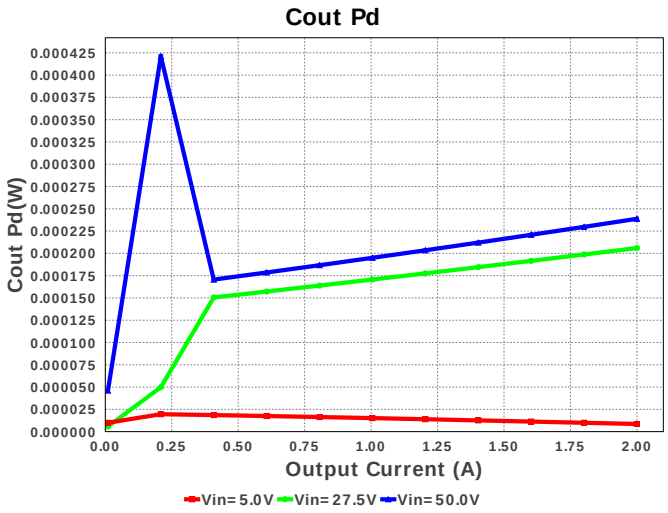


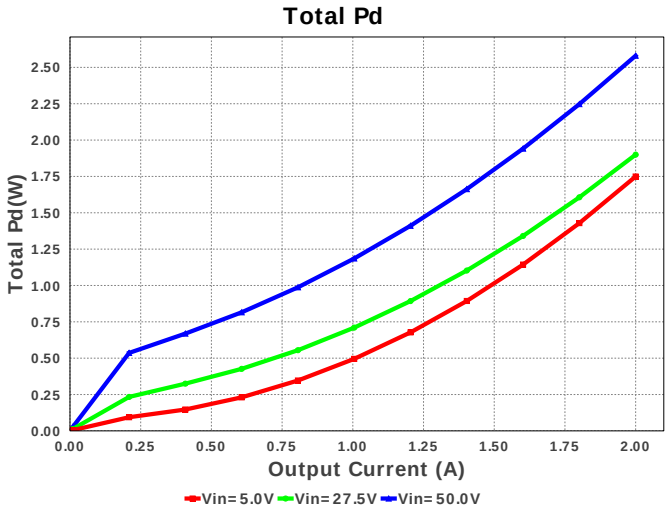


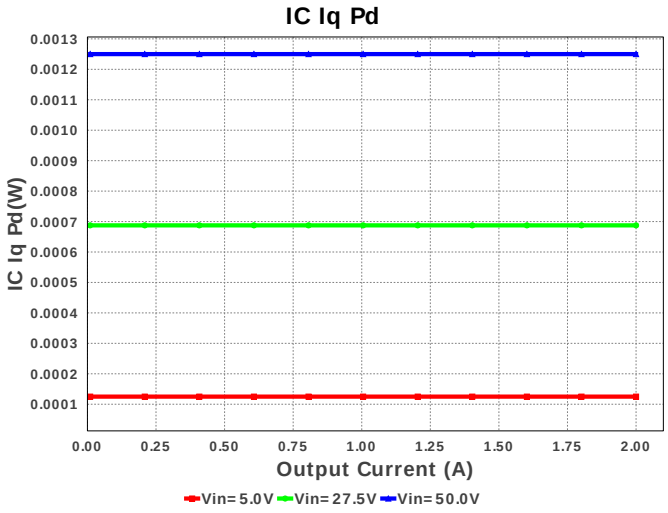


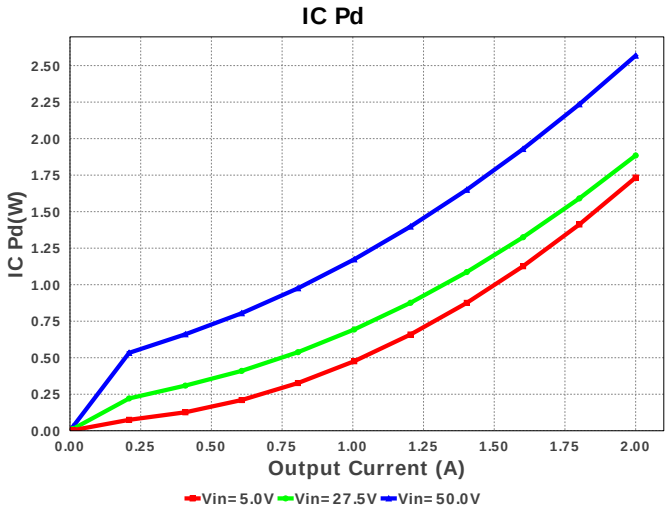


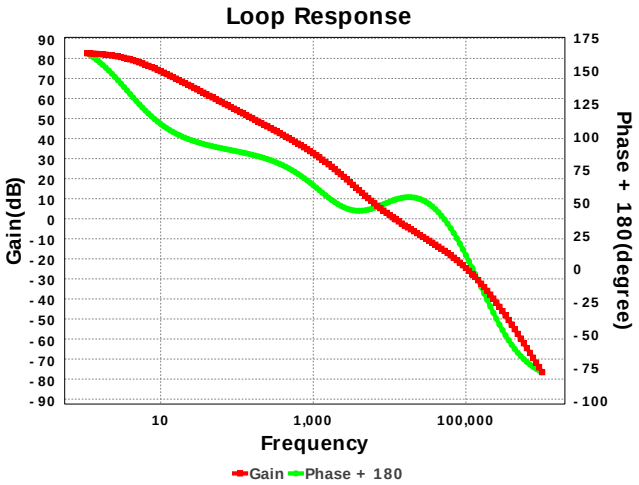


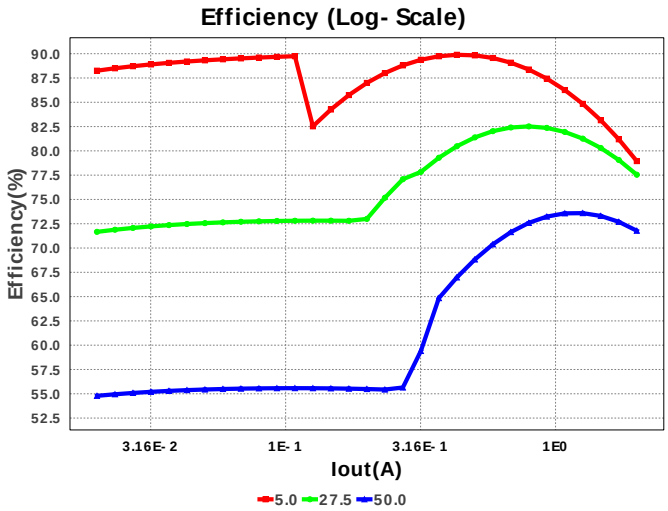












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	544.824 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	221.083 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	182.88 mA	Current	Average input current
4.	BOM Count	7	General	Total Design BOM count
5.	FootPrint	213.0 mm^2	General	Total Foot Print Area of BOM components
6.	Frequency	500.0 kHz	General	Switching frequency
7.	Mode	CCM	General	Conduction Mode
8.	Pout	6.6 W	General	Total output power
9.	Total BOM	$9.43	General	Total BOM Cost
10.	Low Freq Gain	82.545 dB	Op_Point	Gain at 10Hz
11.	Vout OP	3.3 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Cross Freq	12.73 kHz	Op_point	Bode plot crossover frequency
13.	Duty Cycle	7.957 %	Op_point	Duty cycle
14.	Efficiency	71.781 %	Op_point	Steady state efficiency
15.	Gain Marg	-24.007 dB	Op_point	Bode Plot Gain Margin
16.	IC Tj	65.603 degC	Op_point	IC junction temperature
17.	ICThetaJA	14.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
18.	IOUT_OP	2.0 A	Op_point	Iout operating point
19.	Phase Marg	71.596 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	50.0 V	Op_point	Vin operating point
21.	Vout p-p	4.36 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	582.783 µW	Power	Input capacitor power dissipation
23.	Cout Pd	238.768 µW	Power	Output capacitor power dissipation
24.	IC Iq Pd	1.25 mW	Power	IC Iq Pd
25.	IC Pd	2.568 W	Power	IC power dissipation
26.	Total Pd	2.58 W	Power	Total Power Dissipation
27.	Vout Tolerance	303.03 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	50.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LMZ36002	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMZ36002** Product Folder : http://www.ti.com/product/LMZ36002 : contains the data sheet and other resources.