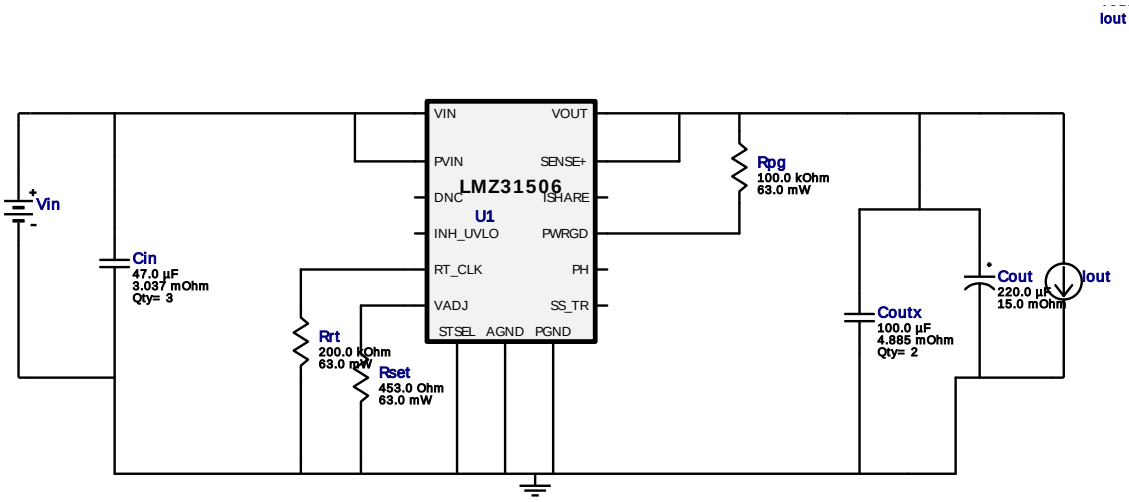
WEBENCH® Design Report

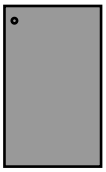
VinMin = 5.0V
VinMax = 12.0V
Vout = 2.5V
Iout = 2.0A

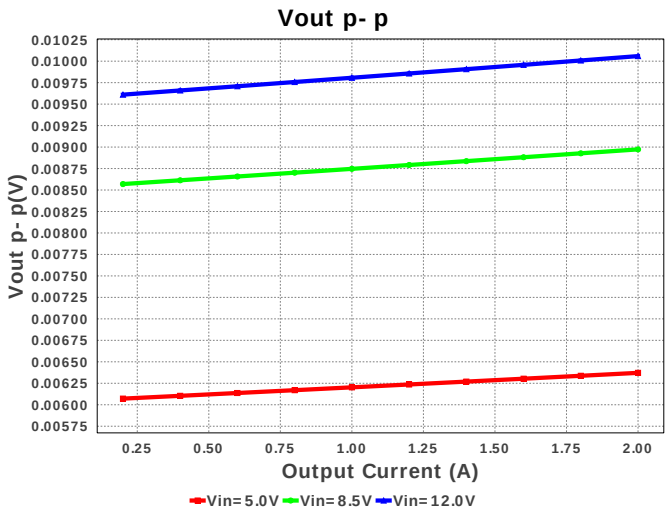
Device = LMZ31506RUQR
Topology = Buck
Created = 9/28/16 6:23:24 AM
BOM Cost = $6.68
BOM Count = 10
Total Pd = 1.19W

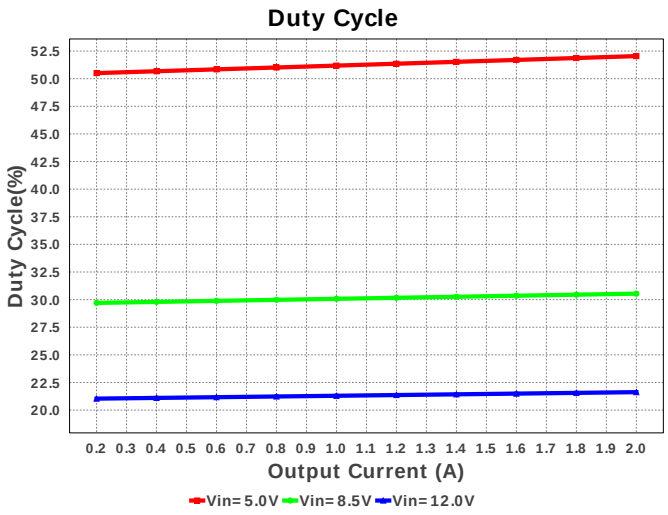
Design : 4652143/9 LMZ31506RUQR
LMZ31506RUQR 5.0V-12.0V to 2.50V @ 2.0A

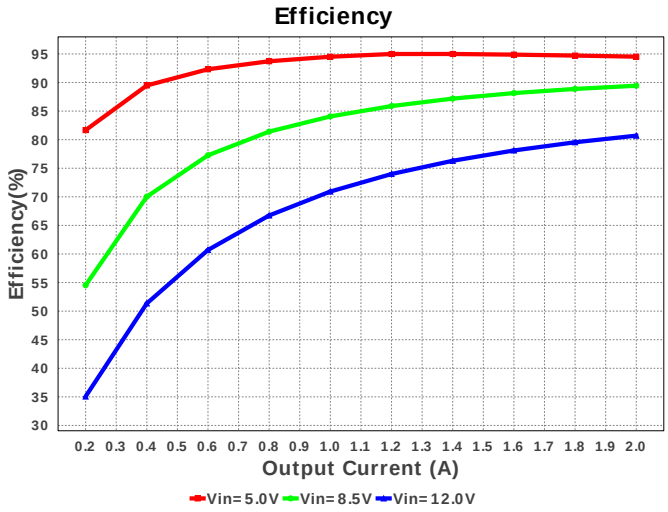


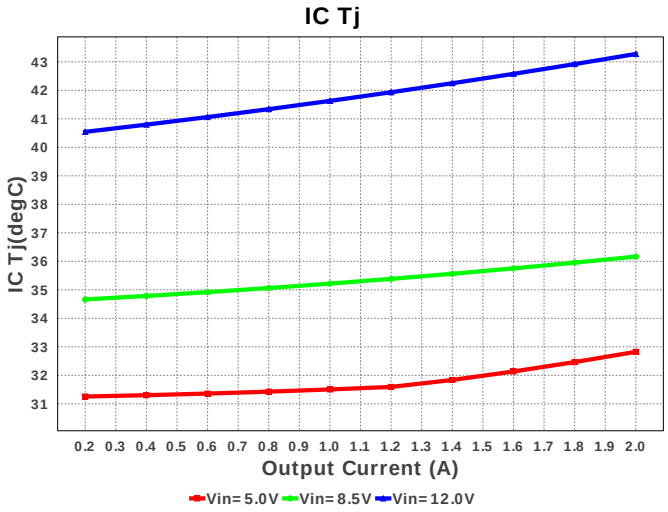
Electrical BOM

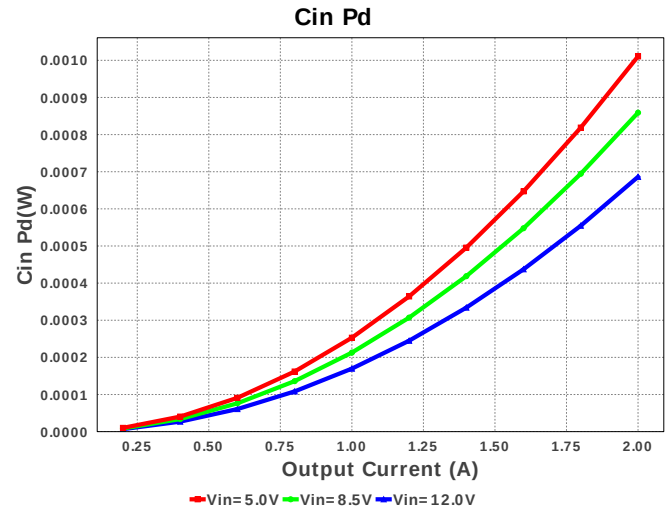
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	3	$0.24	 1210_280 15 mm²
2.	Cout	Panasonic	6SVPE220MW Series= SVPE	Cap= 220.0 uF ESR= 15.0 mOhm VDC= 6.3 V IRMS= 3.15 A	1	$0.20	 CAPSMT_62_E61 53 mm²
3.	Coutx	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	2	$0.14	 1206_190 11 mm²
4.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
5.	Rrt	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
6.	Rset	Vishay-Dale	CRCW0402453RFKED Series= CRCW..e3	Res= 453.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
7.	U1	Texas Instruments	LMZ31506RUQR	Switcher	1	$5.45	 R-PB1QFN-N47 191 mm²

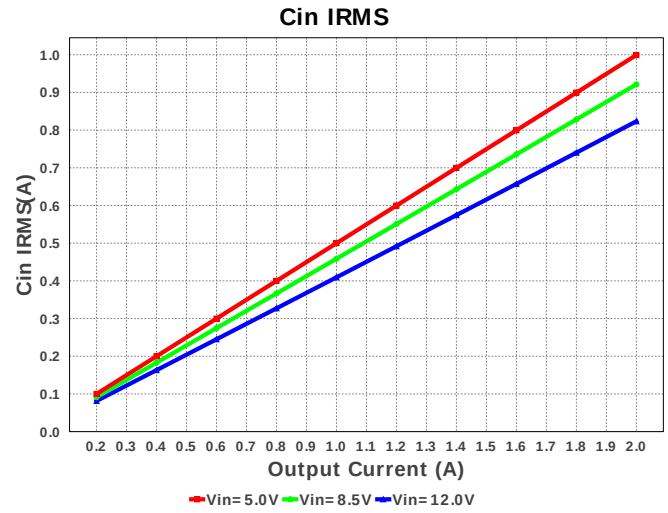


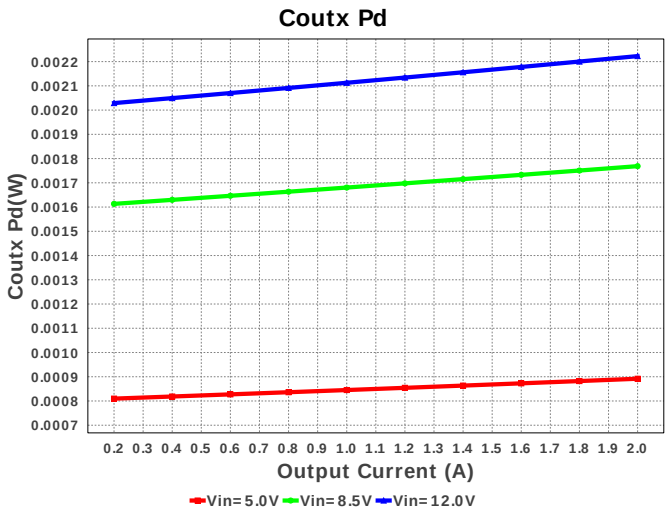


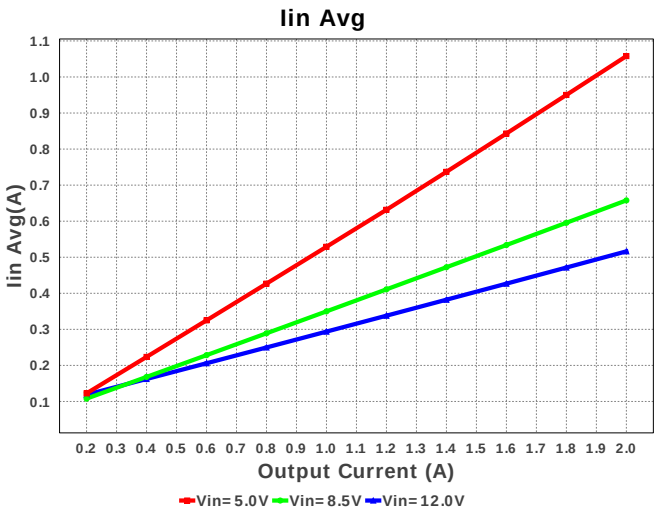


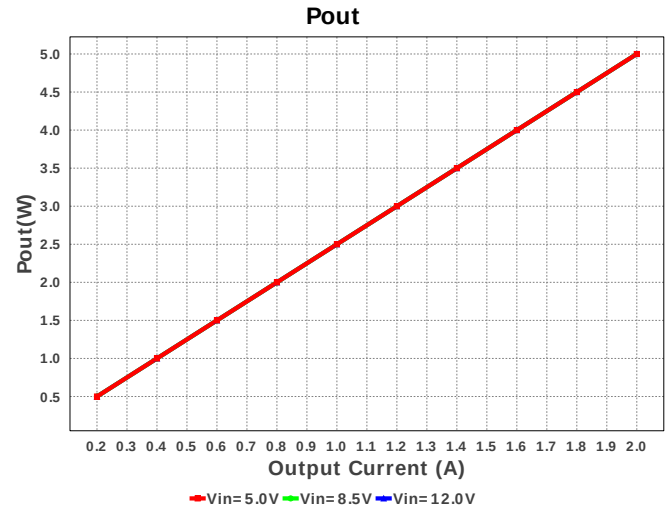


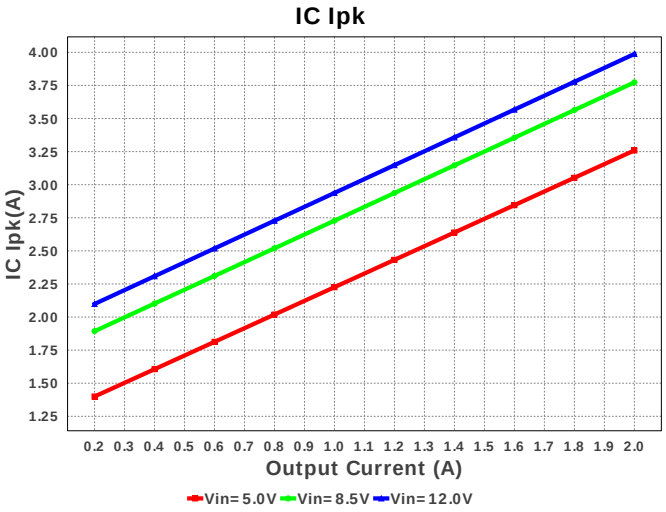


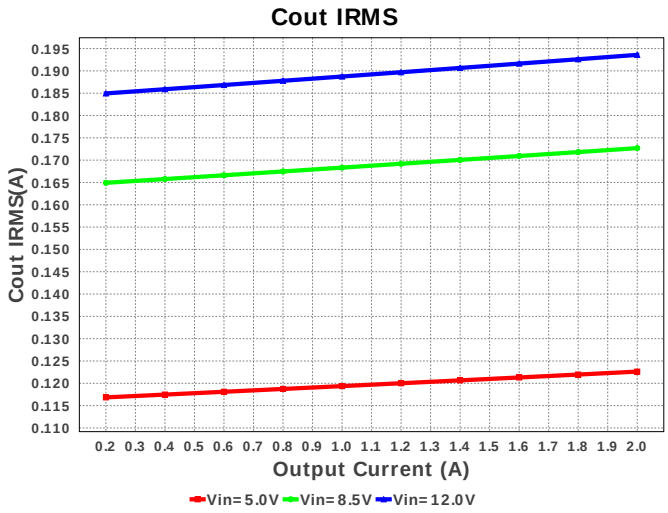


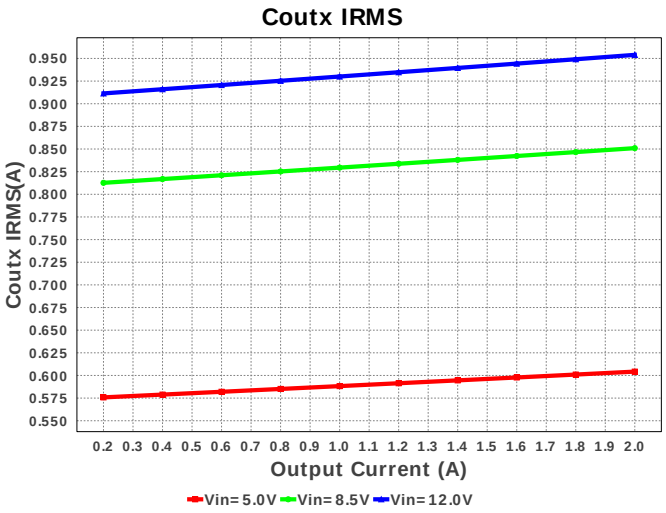


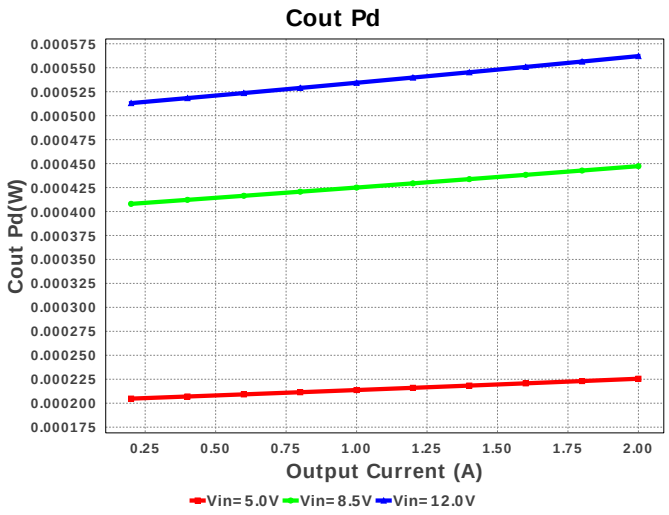


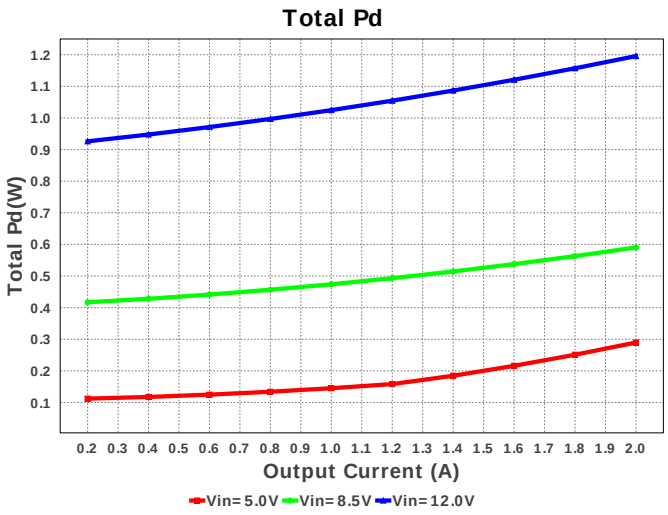


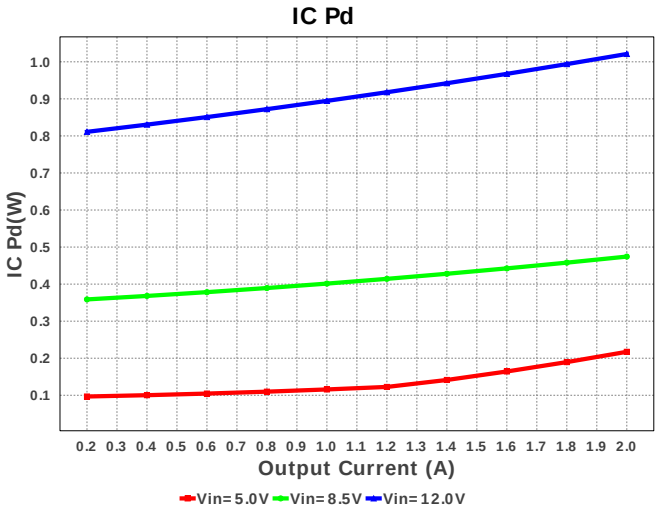


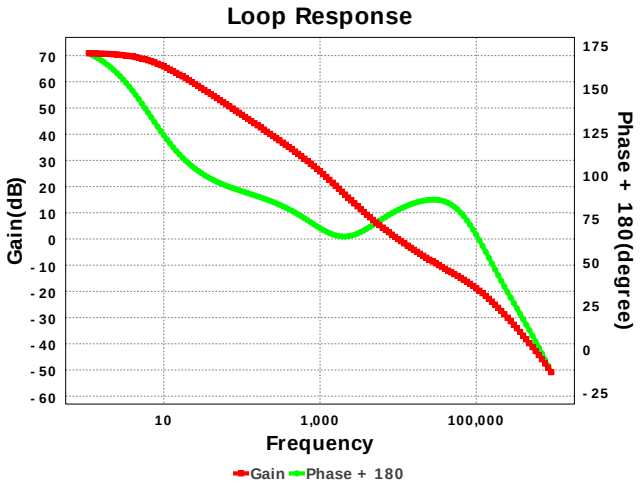












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	823.341 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	193.327 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	952.666 mA	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	3.985 A	Current	Peak switch current in IC
5.	Iin Avg	516.13 mA	Current	Average input current
6.	BOM Count	10	General	Total Design BOM count
7.	FootPrint	319.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	479.357 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	5.0 W	General	Total output power
11.	Total BOM	$6.68	General	Total BOM Cost
12.	Vout OP	2.5 V	Op_Point	Operational Output Voltage
13.	Cross Freq	9.979 kHz	Op_point	Bode plot crossover frequency
14.	Duty Cycle	21.623 %	Op_point	Duty cycle
15.	Efficiency	80.728 %	Op_point	Steady state efficiency
16.	IC Tj	43.248 degC	Op_point	IC junction temperature
17.	ICThetaJA	13.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
18.	IOUT_OP	2.0 A	Op_point	Iout operating point
19.	Phase Marg	80.414 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	12.0 V	Op_point	Vin operating point
21.	Vout p-p	10.046 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	686.251 µW	Power	Input capacitor power dissipation
23.	Cout Pd	560.629 µW	Power	Output capacitor power dissipation
24.	Coutx Pd	2.217 mW	Power	Output capacitor_x power loss
25.	IC Pd	1.019 W	Power	IC power dissipation
26.	Total Pd	1.194 W	Power	Total Power Dissipation
27.	Vout Tolerance	400.0 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	12.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	2.5	Output Voltage
5.	base_pn	LMZ31506	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. External Undervoltage Lockout (UVLO) Control: Internal UVLO is set for Vin=5V nominal. If your minimum Vin is greater than 5.2V, External UVLO can be enabled using the 'ExternalUVLO' option under 'Change Inputs'. Synchronizing Frequency Selection: To set the synchronizing frequency, go to the 'Change Inputs' panel, enter the desired value in the 'Frequency' entry box, and select the option for 'User Preferred Frequency' just above it.

2. **LMZ31506** Product Folder : http://www.ti.com/product/LMZ31506 : contains the data sheet and other resources.