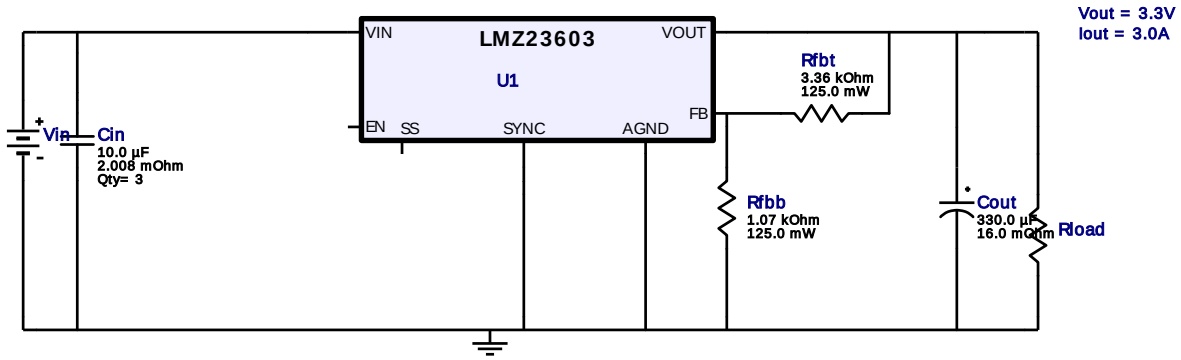
WEBENCH® Design Report

VinMin = 15.0V
VinMax = 25.0V
Vout = 3.3V
Iout = 3.0A

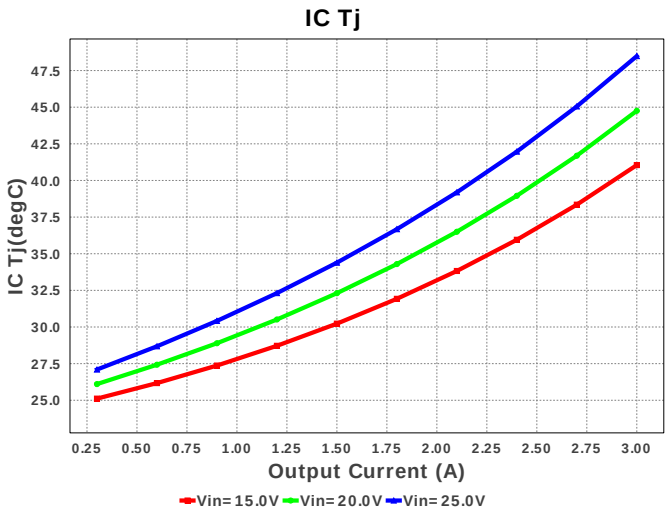
Device = LMZ23603TZ/NOPB
Topology = Buck
Created = 8/23/16 5:29:13 AM
BOM Cost = $9.06
BOM Count = 7
Total Pd = 2.38W

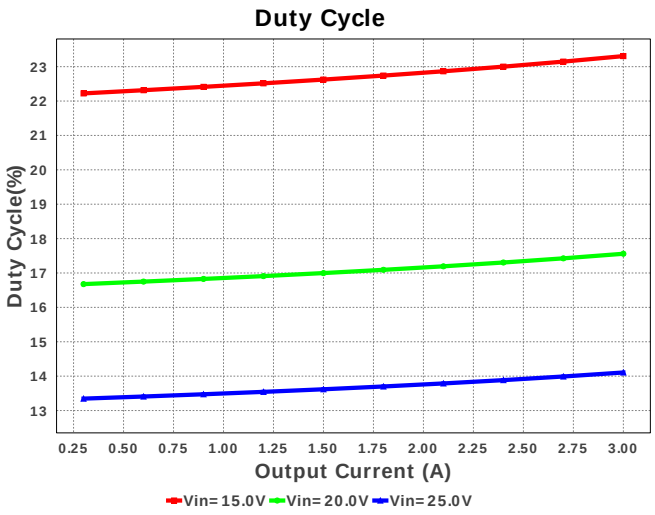
Design : 4728750/23 LMZ23603TZ/NOPB
LMZ23603TZ/NOPB 15.0V-25.0V to 3.30V @ 3.0A

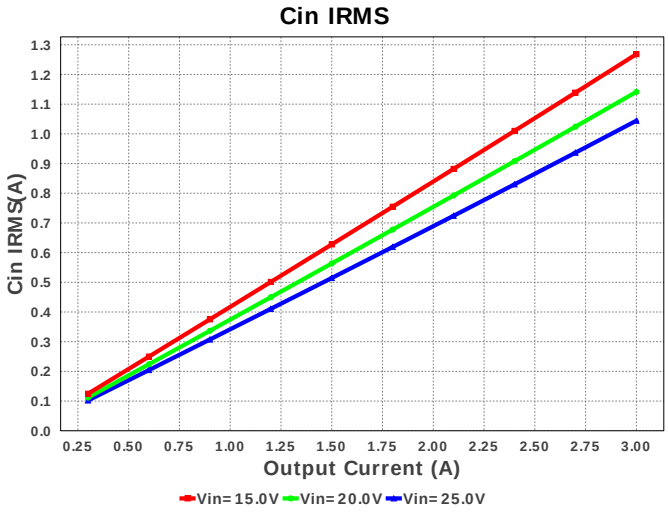


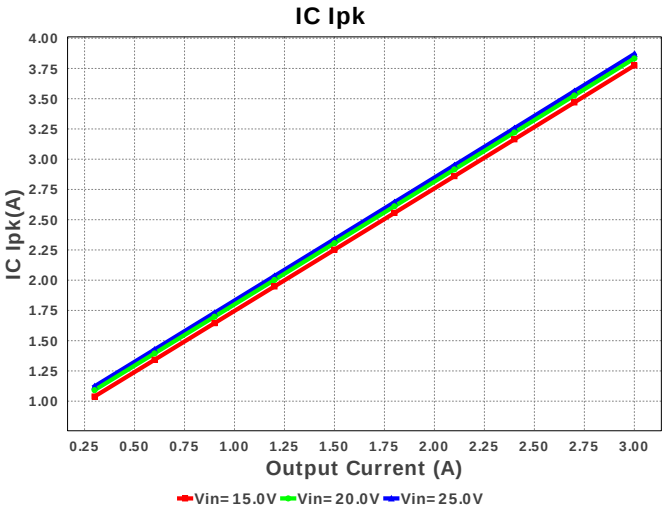
Electrical BOM

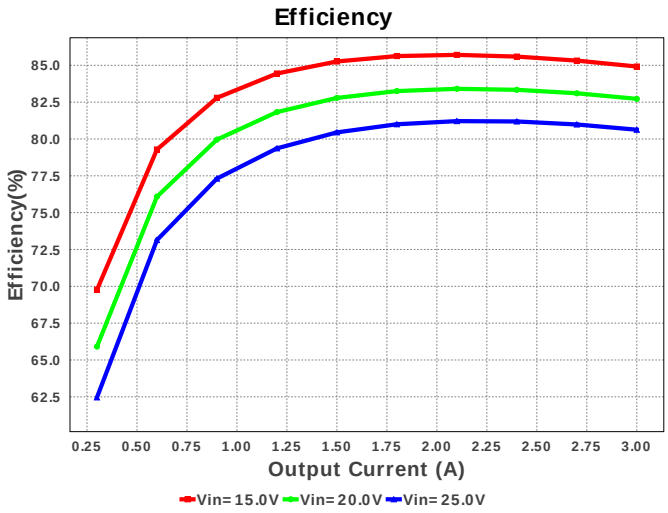
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	3	$0.22	1210_280 15 mm²
2.	Cout	Panasonic	16SVP330M Series= SVP	Cap= 330.0 uF ESR= 16.0 mOhm VDC= 16.0 V IRMS= 4.72 A	1	$0.39	SM_RADIAL_10AMM 160 mm²
3.	Rfbb	Panasonic	ERJ-6ENF1071V Series= ERJ-6E	Res= 1.07 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
4.	Rfbt	Yageo America	RT0805BRD073K36L Series= RT0805	Res= 3.36 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	0805 7 mm²
5.	U1	Texas Instruments	LMZ23603TZ/NOPB	Switcher	1	$7.95	TZA07A 199 mm²

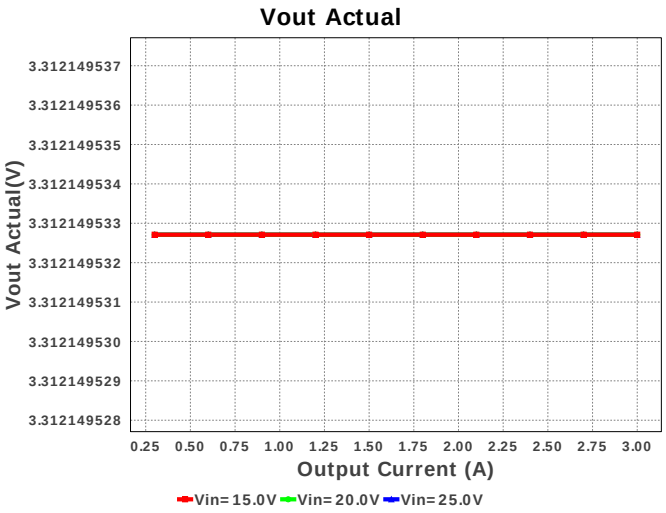


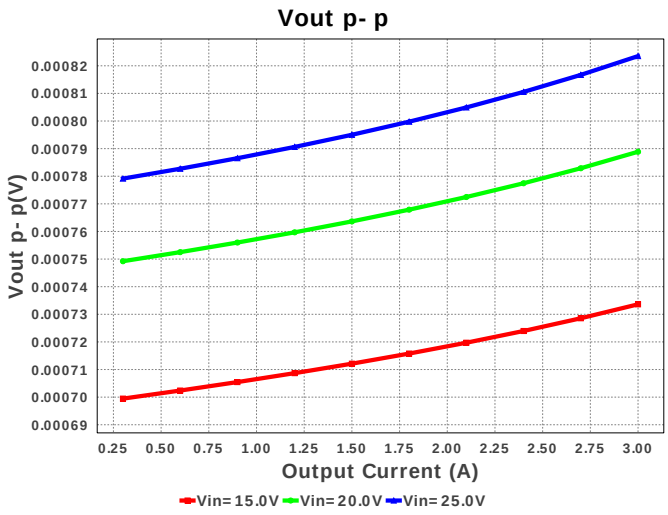


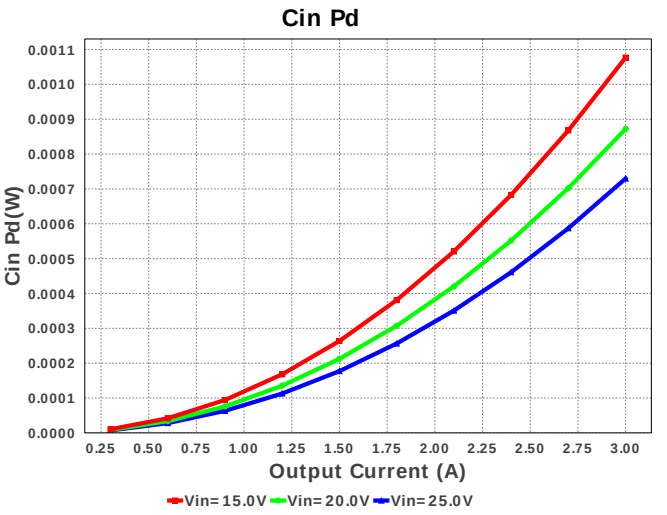


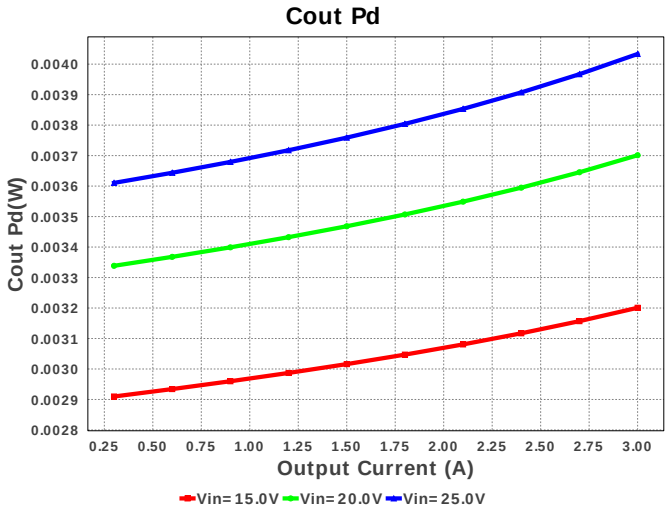


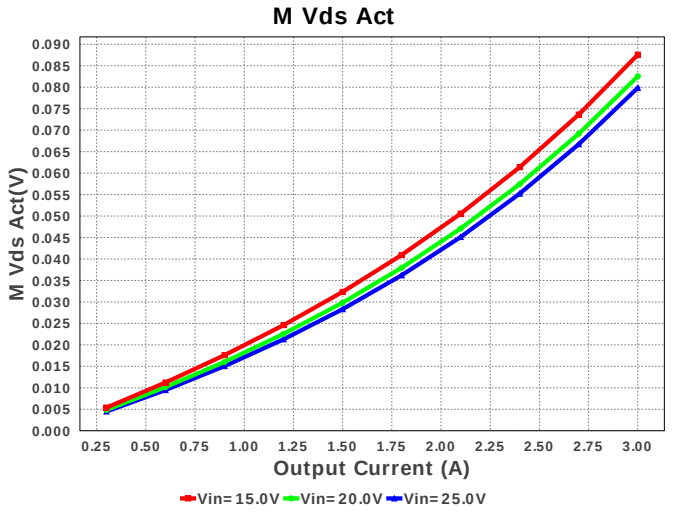


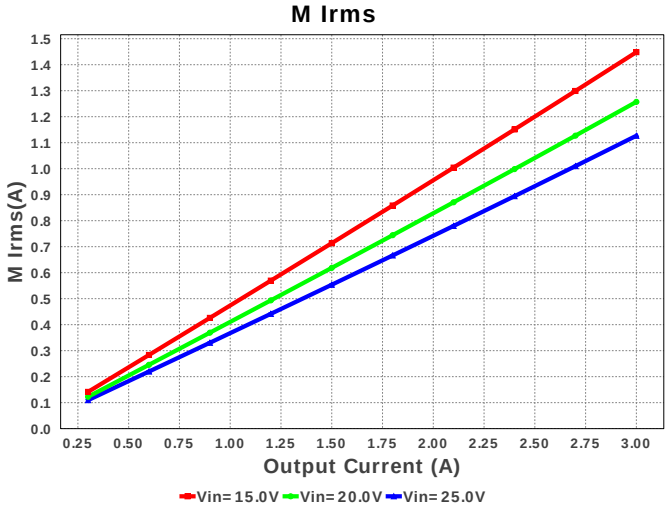


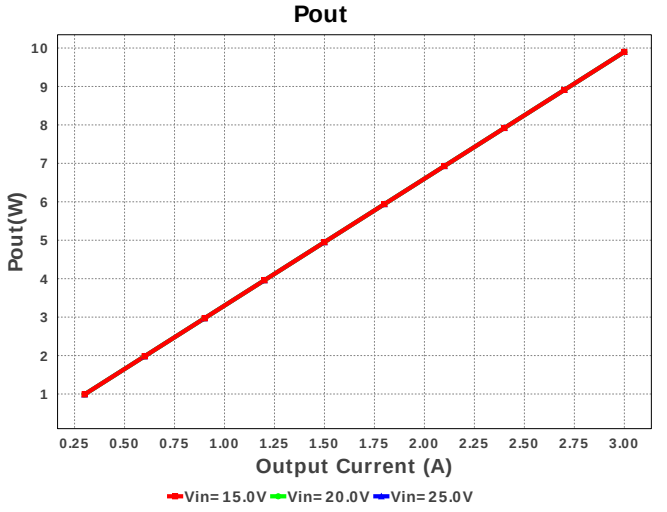


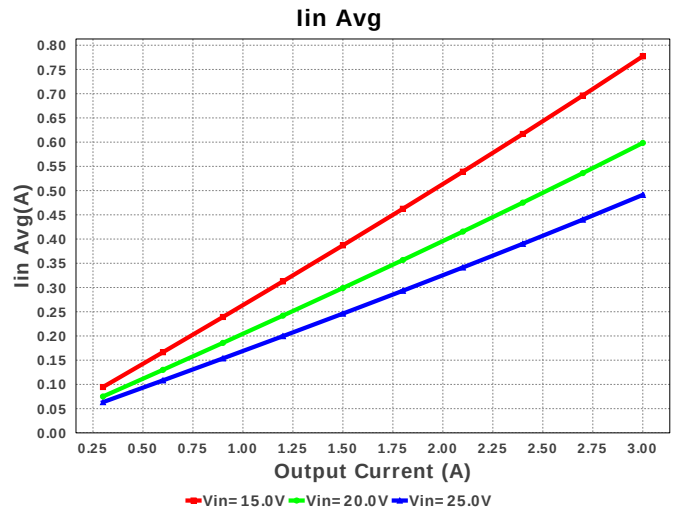


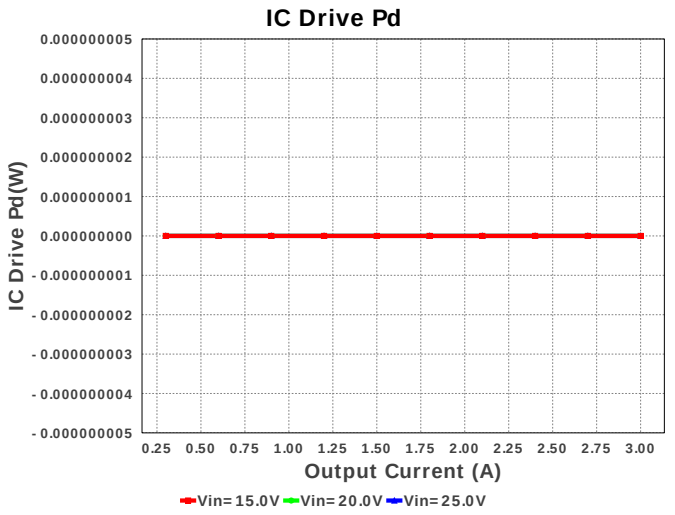


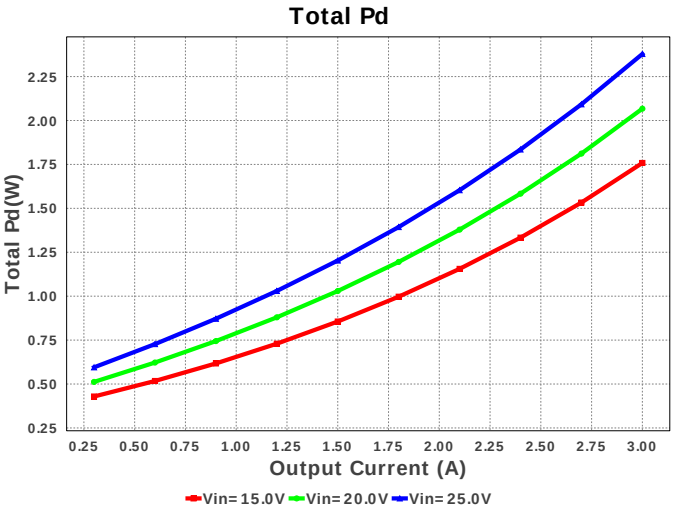


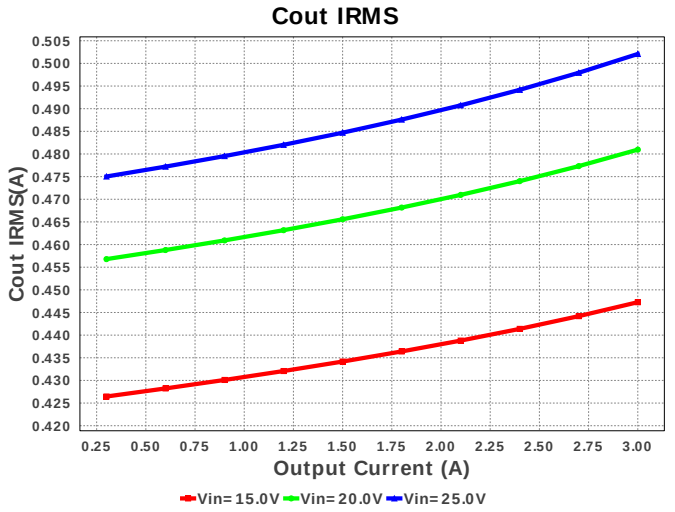


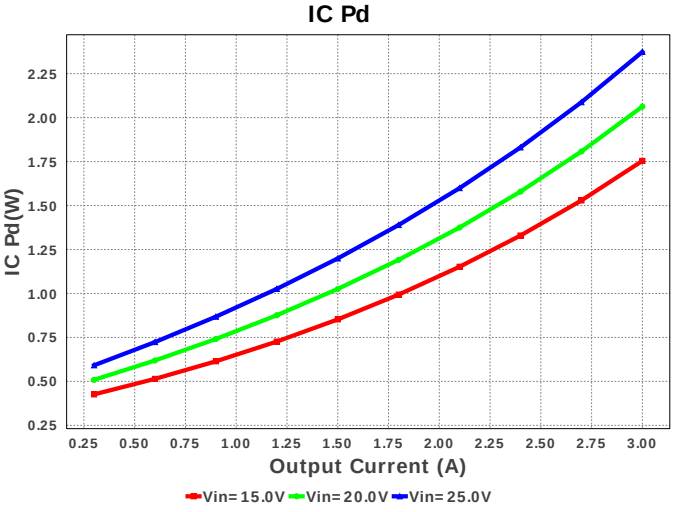


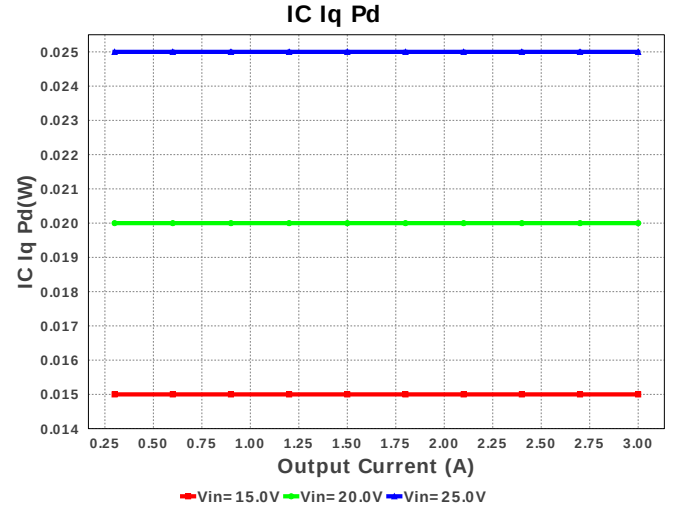












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.044 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	502.079 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.87 A	Current	Peak switch current in IC
4.	Iin Avg	491.14 mA	Current	Average input current
5.	M1 Irms	1.127 A	Current	Q Iavg
6.	BOM Count	7	General	Total Design BOM count
7.	FootPrint	416.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	800.0 kHz	General	Switching frequency
9.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
10.	M Vds Act	79.864 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	9.9 W	General	Total output power
13.	Total BOM	$9.06	General	Total BOM Cost
14.	Vout Actual	3.312 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
16.	Cross Freq	49.087 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	14.106 %	Op_point	Duty cycle
18.	Efficiency	80.628 %	Op_point	Steady state efficiency
19.	IC Tj	48.486 degC	Op_point	IC junction temperature
20.	ICThetaJA	12.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	3.0 A	Op_point	Iout operating point
22.	Phase Marg	63.488 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	25.0 V	Op_point	Vin operating point
24.	Vout p-p	823.51 µV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	729.897 µW	Power	Input capacitor power dissipation
26.	Cout Pd	4.033 mW	Power	Output capacitor power dissipation
27.	IC Drive Pd	0.0 W	Power	Driver power dissipation
28.	IC Iq Pd	25.0 mW	Power	IC Iq Pd
29.	IC Pd	2.374 W	Power	IC power dissipation
30.	Total Pd	2.379 W	Power	Total Power Dissipation
31.	Vout Tolerance	3.364 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	VinMax	25.0	Maximum input voltage
3.	VinMin	15.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LMZ23603	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	20.0	Ambient temperature

Design Assistance

1. The 2nd Gen Modules are very easy to use and just need a basic design using a resistor divider at the feedback and input and output caps to work. To design for UVLO you could click on the drop down menu in the 'Change Inputs' menu and select the 'UVLO Enabled Design'. The internal softstart time is set at 1.6mSec. If a longer softstart time is desired, you could change the preset to the desired amount and click on 'Submit'. Webench will then add an external softstart cap to the schematic.

2. **LMZ23603** Product Folder : http://www.ti.com/product/LMZ23603 : contains the data sheet and other resources.