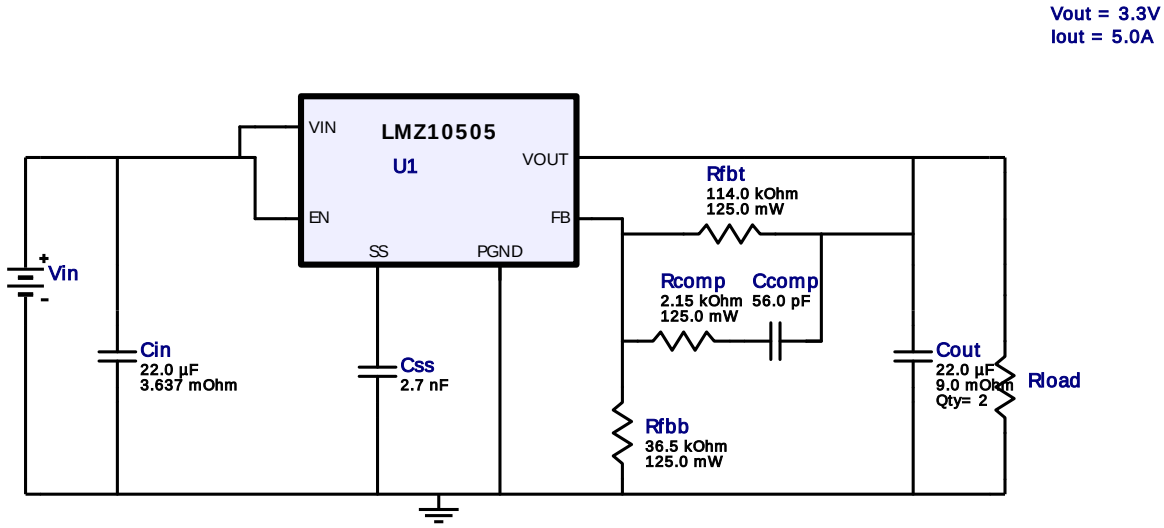
WEBENCH® Design Report

VinMin = 4.5V
VinMax = 5.5V
Vout = 3.3V
Iout = 5.0A

Device = LMZ10505TZX-ADJ/NOPB
Topology = Buck
Created = 1/31/17 1:52:48 AM
BOM Cost = $4.94
BOM Count = 9
Total Pd = 1.59W

Design : 4875907/11 LMZ10505TZX-ADJ/NOPB
LMZ10505TZX-ADJ/NOPB 4.5V-5.5V to 3.30V @ 5.0A

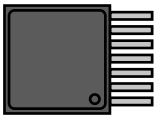


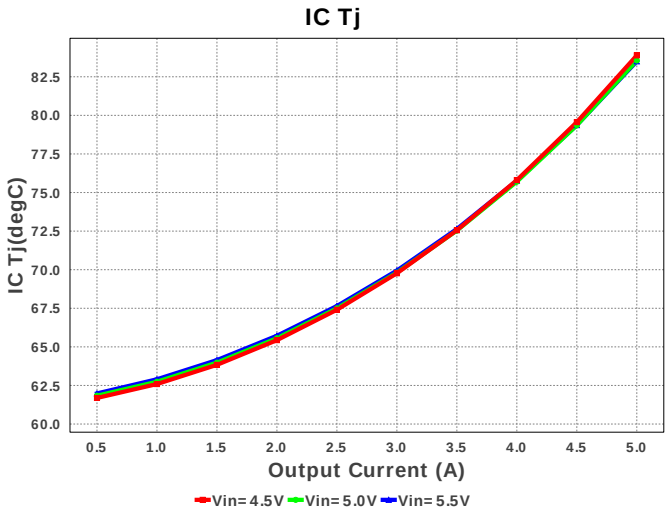
My Comments

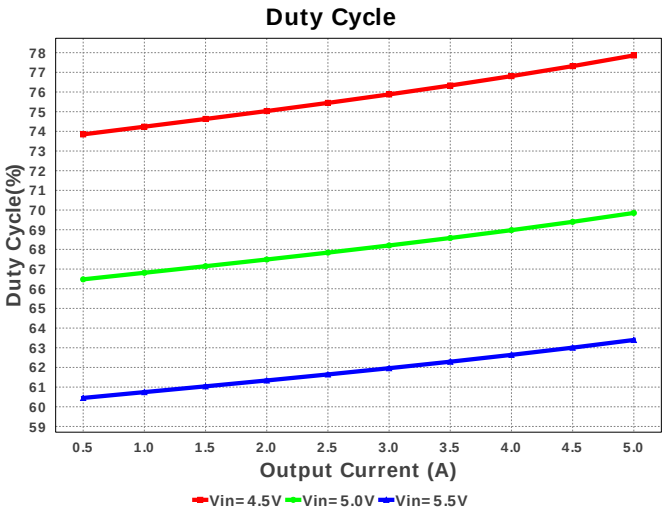
No comments

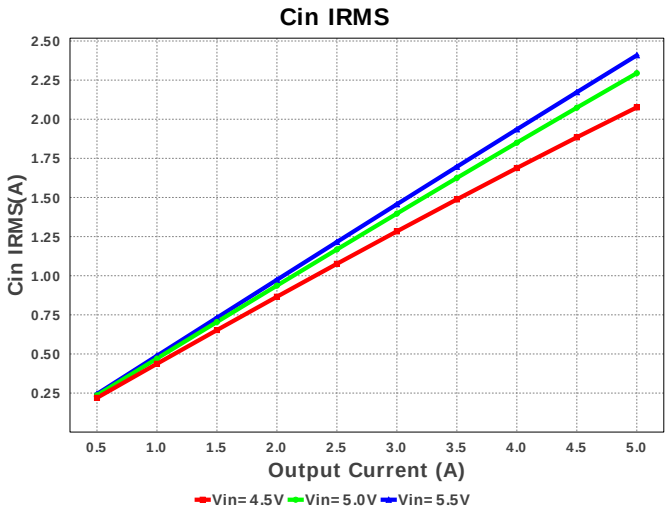
Electrical BOM

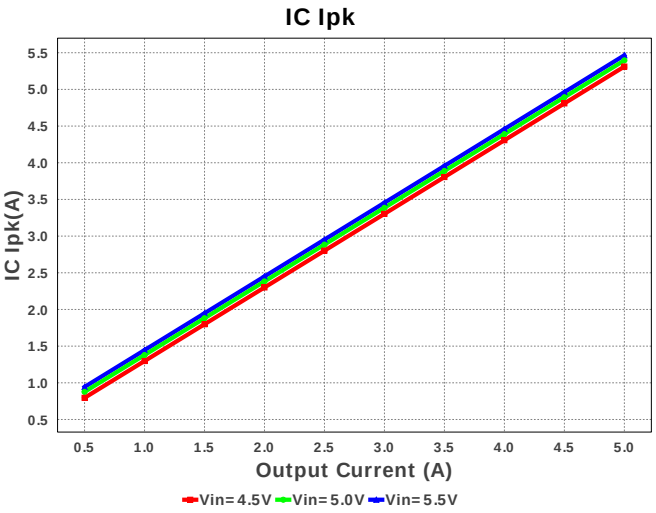
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	Yageo America	CC0805JRNPO9BN560 Series= C0G/NP0	Cap= 56.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	1	$0.07	1206_190 11 mm²
3.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	2	$0.04	0805 7 mm²
4.	Css	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Rcomp	Panasonic	ERJ-6ENF2151V Series= ERJ-6E	Res= 2.15 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
6.	Rfbb	Panasonic	ERJ-6ENF3652V Series= ERJ-6E	Res= 36.5 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
7.	Rfbt	Yageo America	RT0805BRD07114KL Series= RT0805	Res= 114.0 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	0805 7 mm²

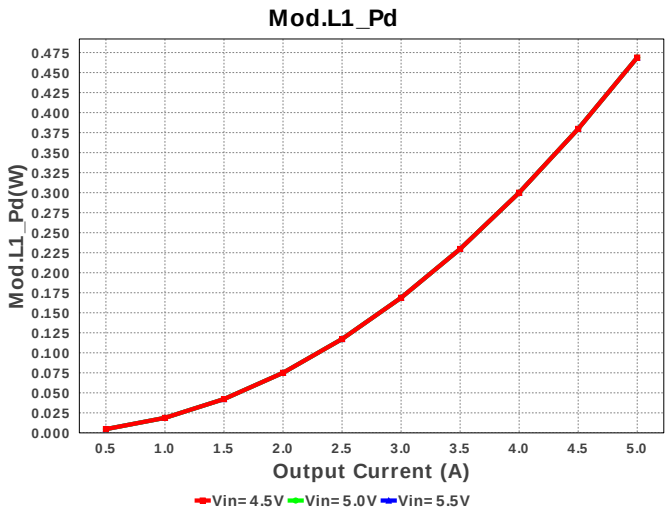
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	LMZ10505TZX-ADJ/NOPB	Switcher	1	$4.70	 TZA07A 199 mm^2

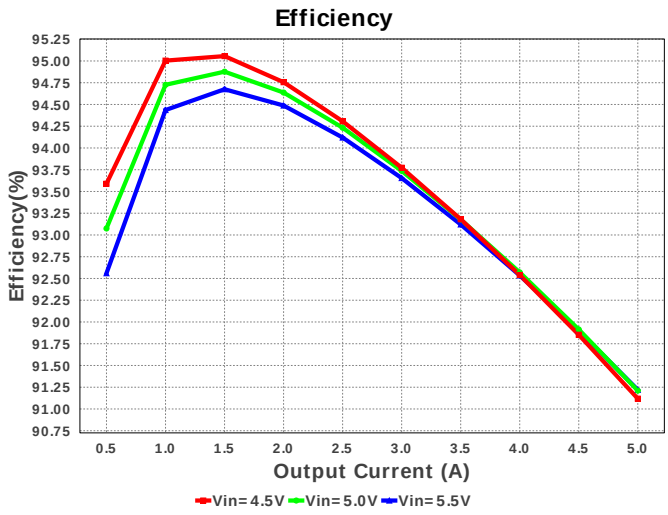


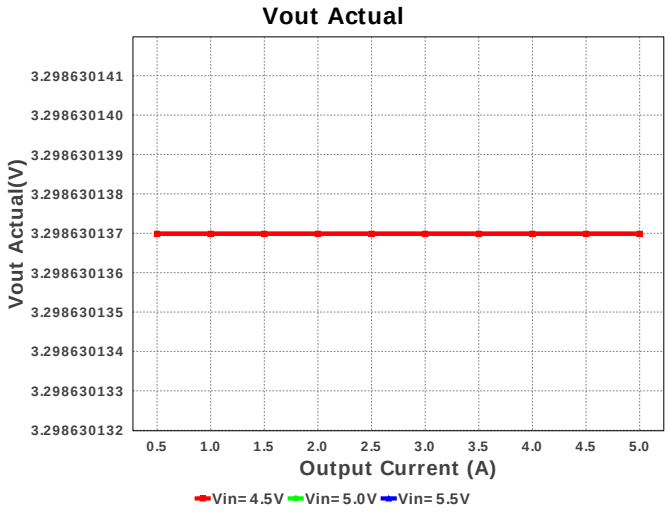


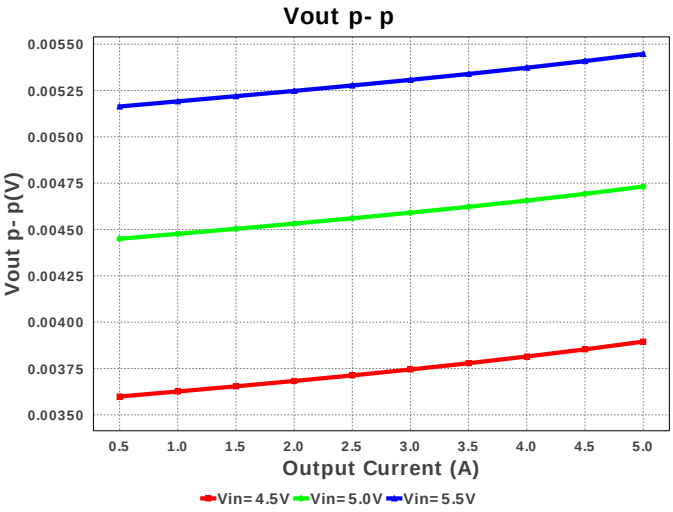


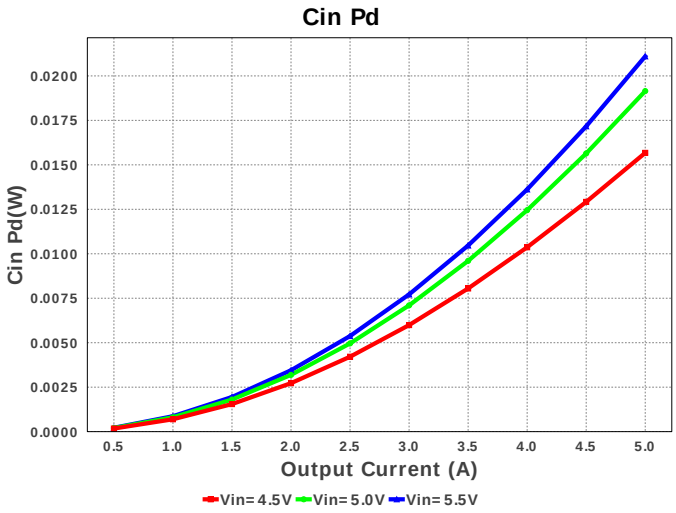


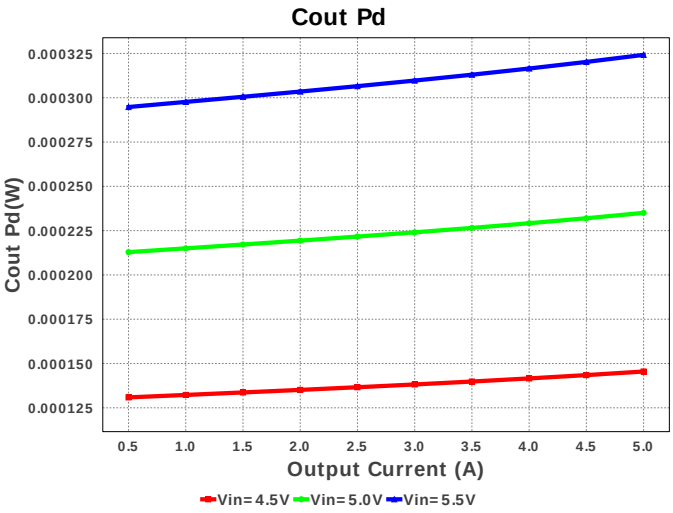


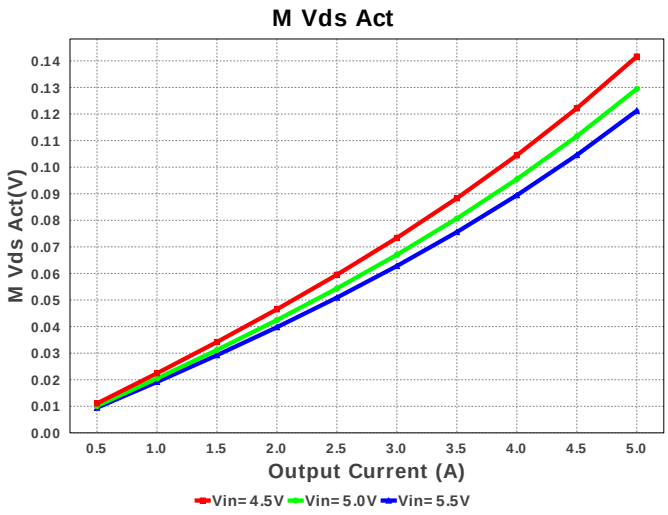


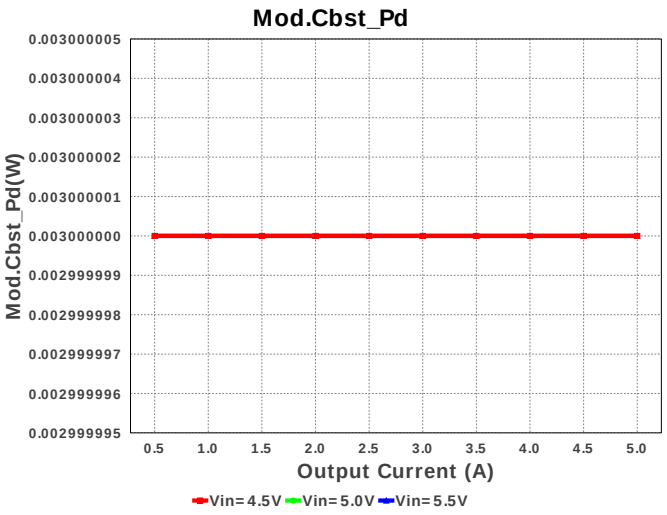


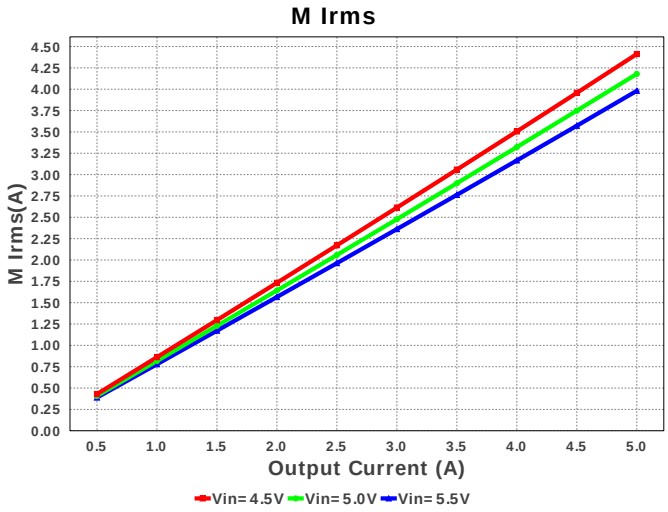


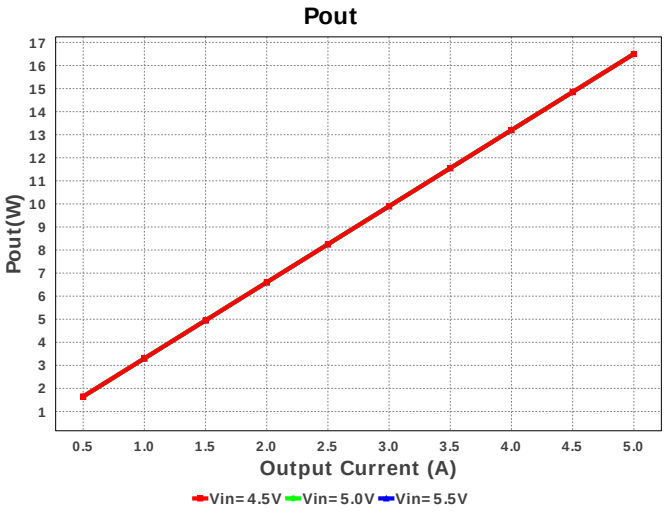


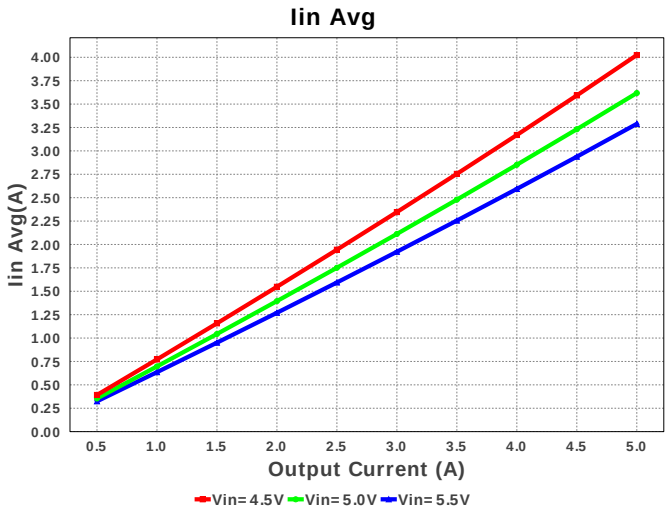


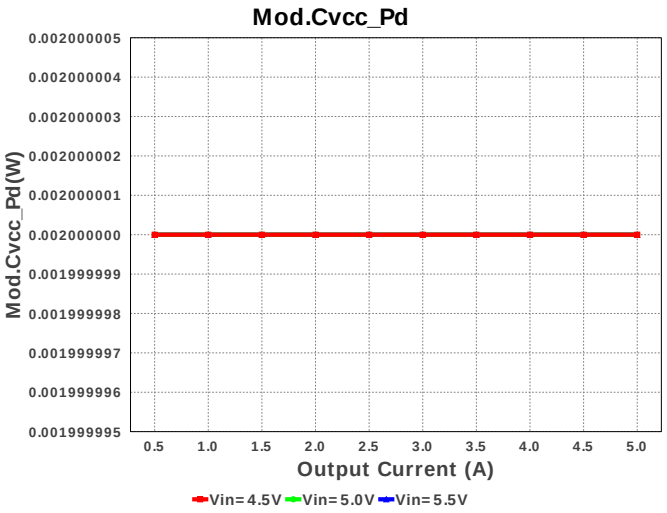


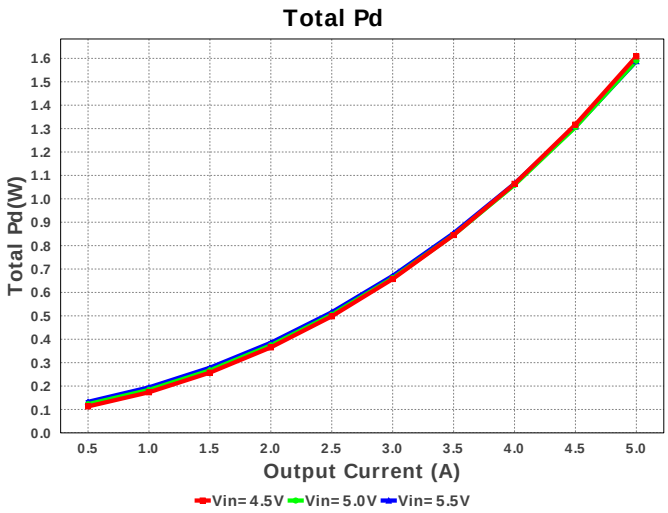


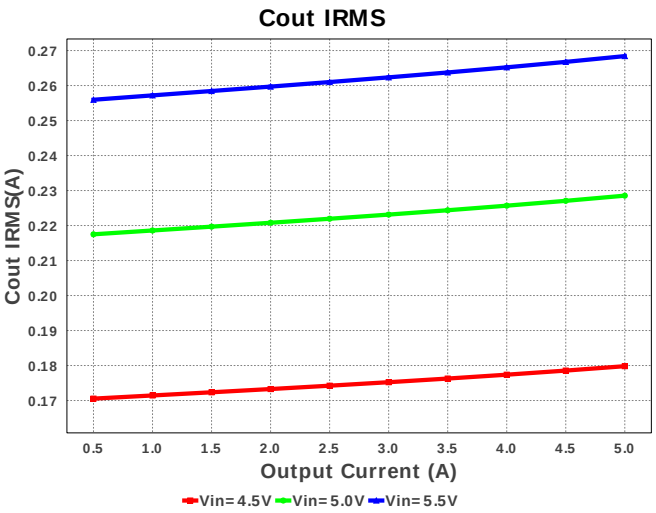


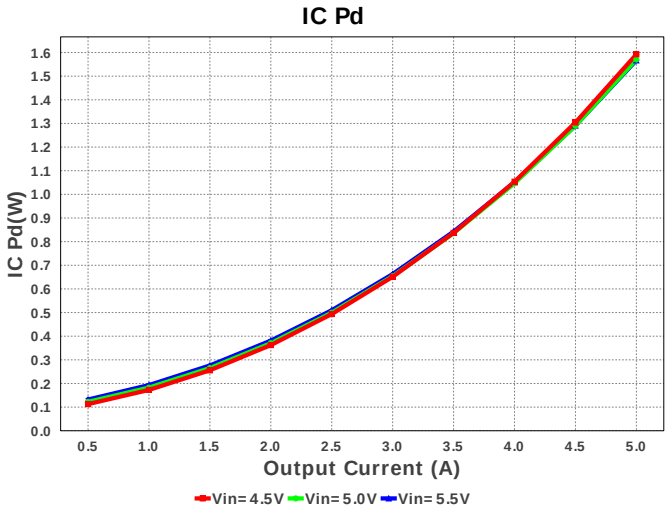


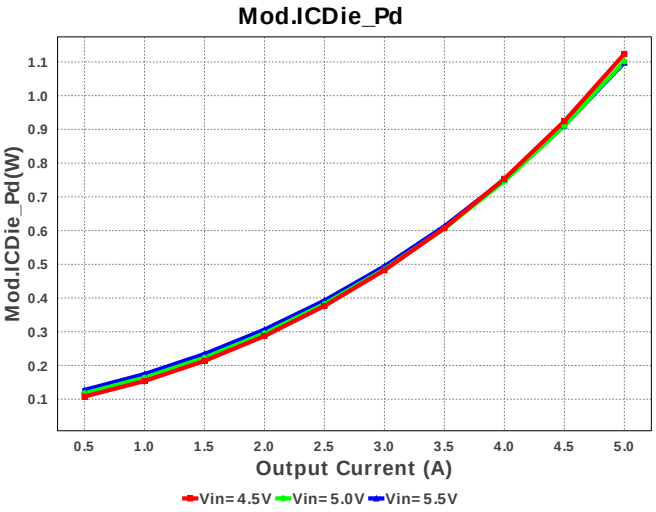


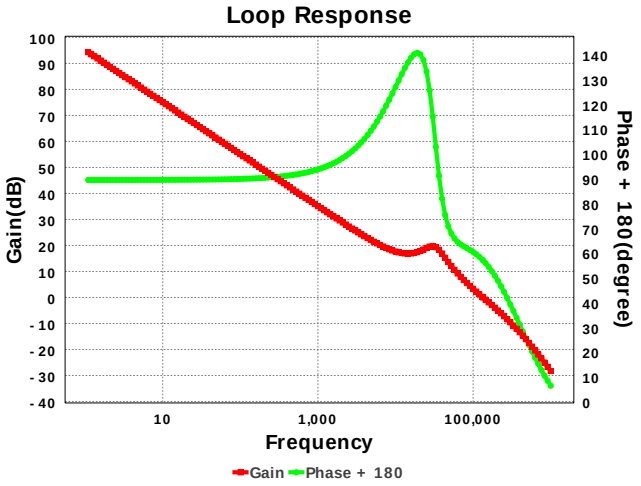












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.409 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	268.412 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.465 A	Current	Peak switch current in IC
4.	Iin Avg	3.289 A	Current	Average input current
5.	M1 Irms	3.981 A	Current	Q Iavg
6.	BOM Count	9	General	Total Design BOM count
7.	FootPrint	257.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	1000.0 kHz	General	Switching frequency
9.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
10.	M Vds Act	121.228 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	16.5 W	General	Total output power
13.	Total BOM	$4.94	General	Total BOM Cost
14.	Low Freq Gain	94.316 dB	Op_Point	Gain at 10Hz
15.	Vout Actual	3.299 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
17.	Cross Freq	134.424 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	63.396 %	Op_point	Duty cycle
19.	Efficiency	91.22 %	Op_point	Steady state efficiency
20.	Gain Marg	-33.226 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	83.5 degC	Op_point	IC junction temperature
22.	ICThetaJA	15.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	5.0 A	Op_point	Iout operating point
24.	Phase Marg	57.539 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	5.5 V	Op_point	Vin operating point
26.	Vout p-p	5.447 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	21.1 mW	Power	Input capacitor power dissipation
28.	Cout Pd	324.203 µW	Power	Output capacitor power dissipation
29.	IC Pd	1.567 W	Power	IC power dissipation
30.	Module CbstPd	3.0 mW	Power	Internal Module Cbst Power Dissipation
31.	Module CvccPd	2.0 mW	Power	Internal Module Cvcc Power Dissipation
32.	Module ICPd	1.098 W	Power	Internal Module IC Power Dissipation
33.	Module L1Pd	468.75 mW	Power	Internal Module Inductor Power Dissipation
34.	Total Pd	1.588 W	Power	Total Power Dissipation
35.	Vout Tolerance	3.363 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	SoftStart	1.0 ms	Soft Start Time (ms)
3.	VinMax	5.5	Maximum input voltage
4.	VinMin	4.5	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	base_pn	LMZ10505	Base Product Number
7.	source	DC	Input Source Type
8.	Ta	60.0	Ambient temperature

Design Assistance

1. **LMZ10505** Product Folder : http://www.ti.com/product/LMZ10505 : contains the data sheet and other resources.