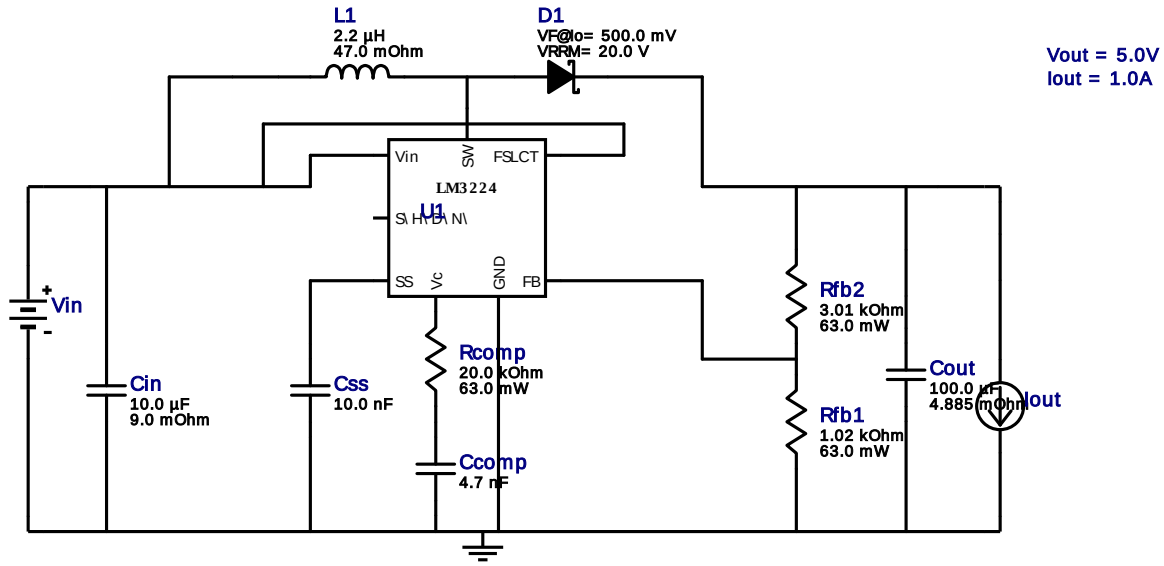
WEBENCH® Design Report

VinMin = 3.6V
VinMax = 4.2V
Vout = 5.0V
Iout = 1.0A

Device = LM3224MM-ADJ/NOPB
Topology = Boost
Created = 7/12/16 11:32:50 PM
BOM Cost = $1.53
BOM Count = 11
Total Pd = 0.7W

Design : 3893481/31 LM3224MM-ADJ/NOPB
LM3224MM-ADJ/NOPB 3.6V-4.2V to 5.00V @ 1.0A



My Comments

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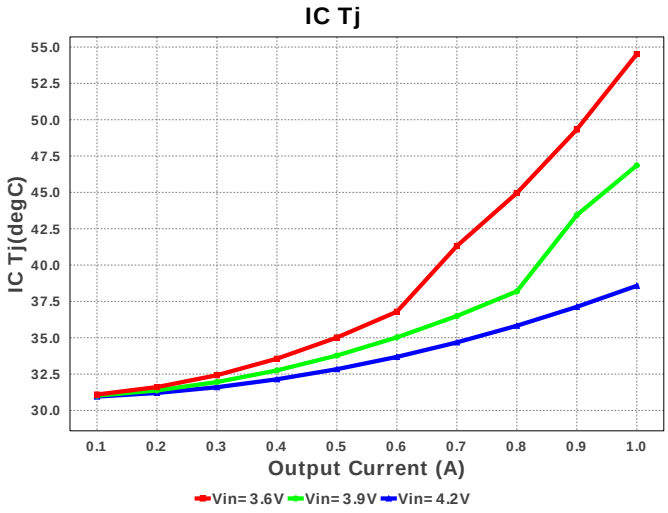
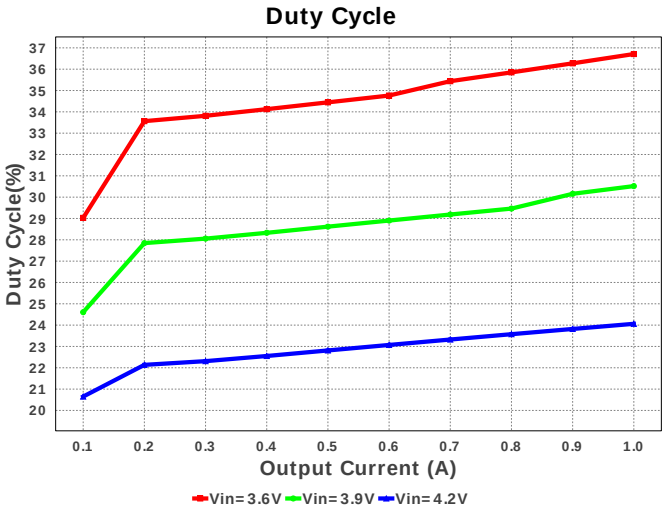
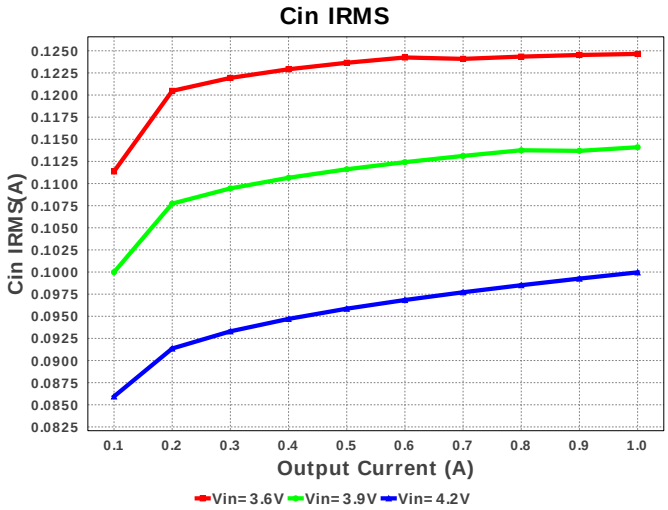
Electrical BOM

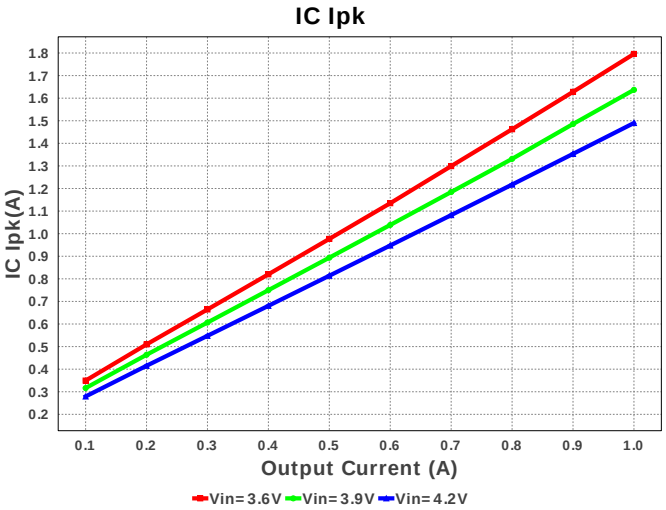
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	Yageo America	CC0805KRX7R9BB472 Series= X7R	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM188R60J106ME47D Series= X5R	Cap= 10.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 2.74 A	1	$0.02	0603 5 mm²
3.	Cinx	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	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 mm²
5.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
6.	D1	Diodes Inc.	B220-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	SMB 44 mm²
7.	L1	Bourns	SDR0403-2R2ML	L= 2.2 µH DCR= 47.0 mOhm	1	$0.18	SDR0403 28 mm²
8.	Rcomp	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

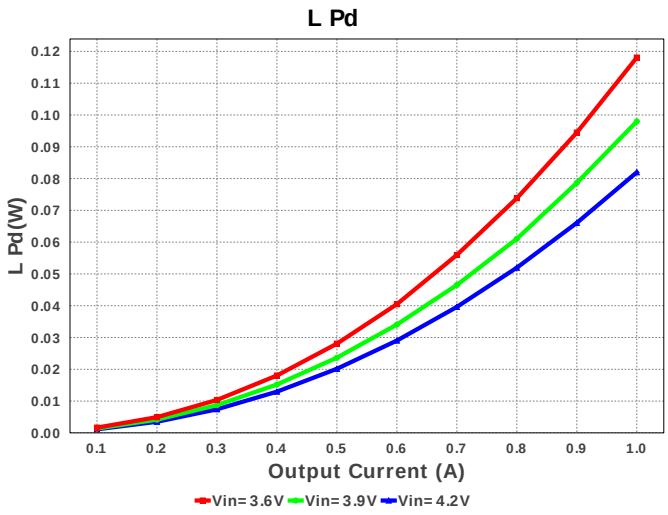
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfb1	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rfb2	Vishay-Dale	CRCW04023K01FKED Series= CRCW..e3	Res= 3.01 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
11.	U1	Texas Instruments	LM3224MM-ADJ/NOPB	Switcher	1	$1.05	MUA08A 24 mm^2

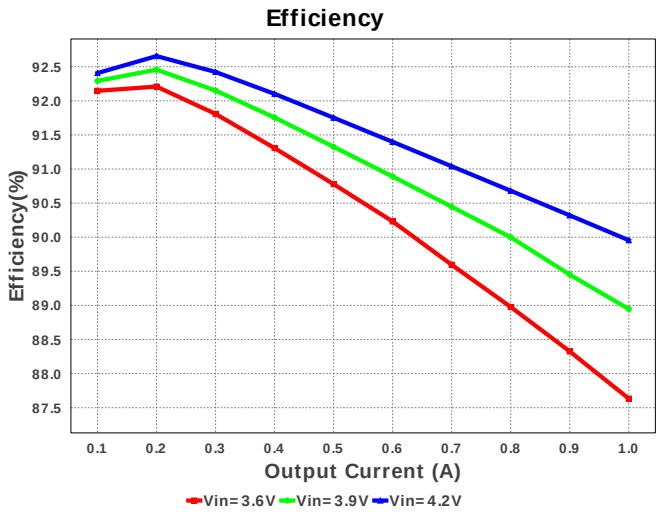


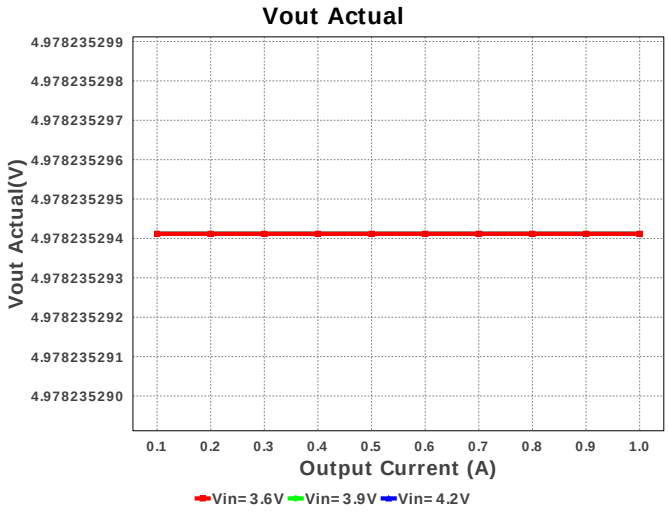


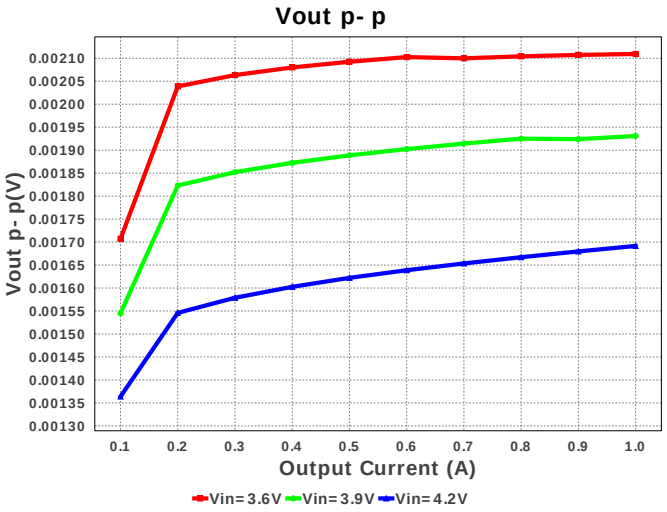


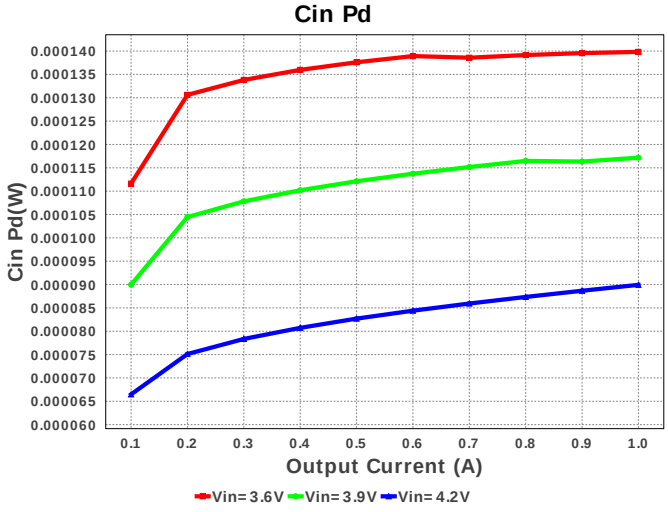


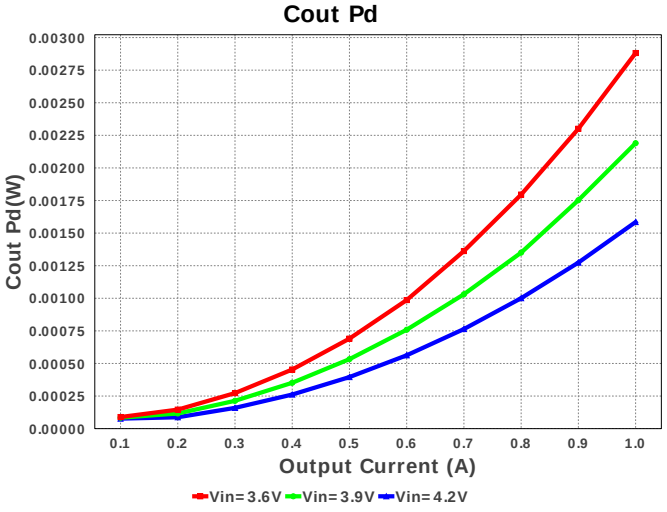


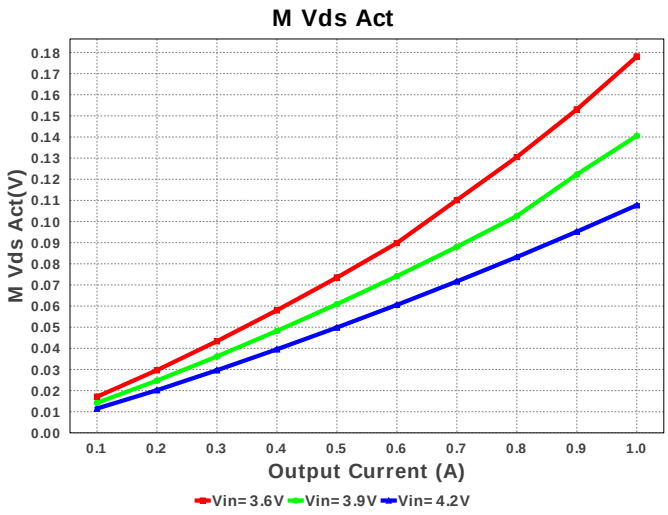


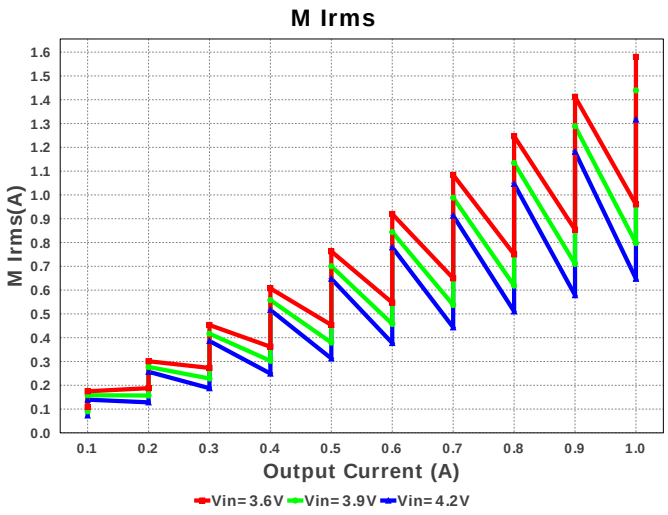


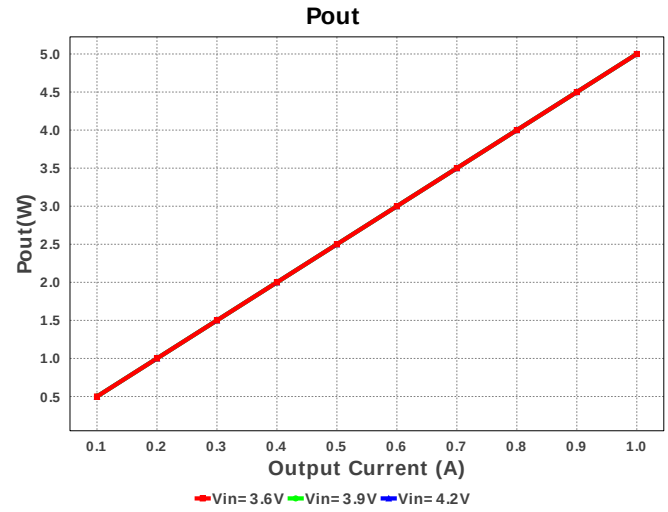


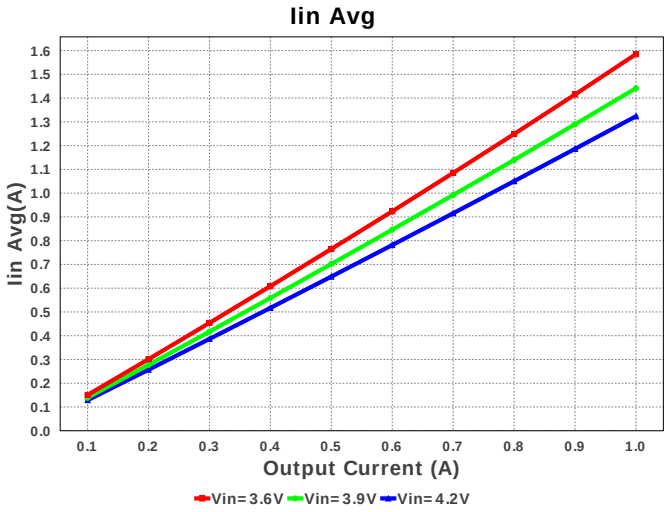


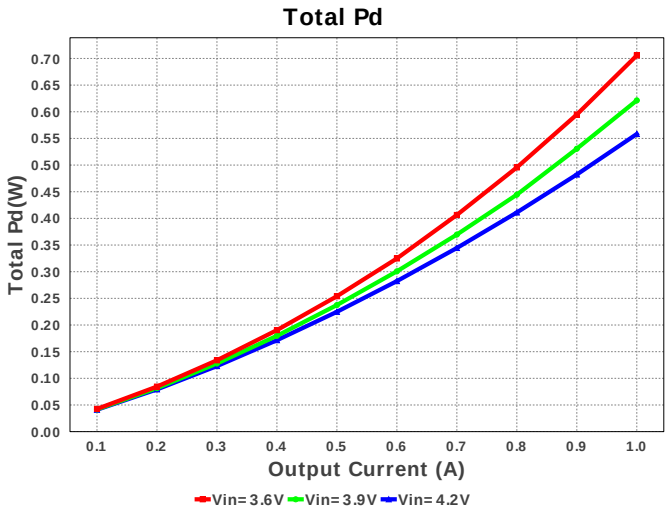


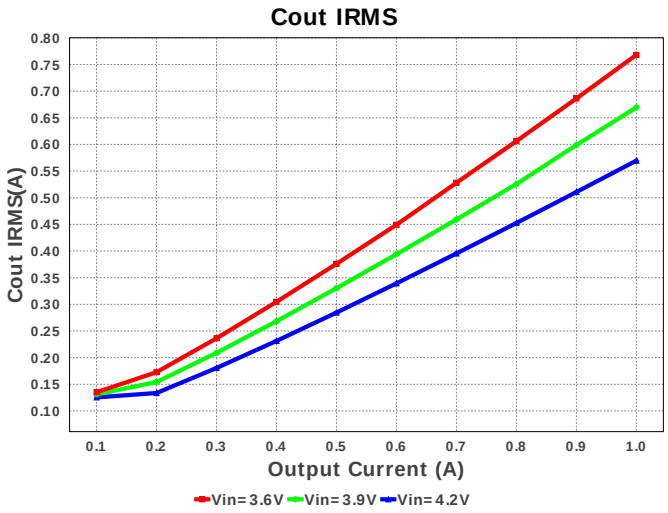


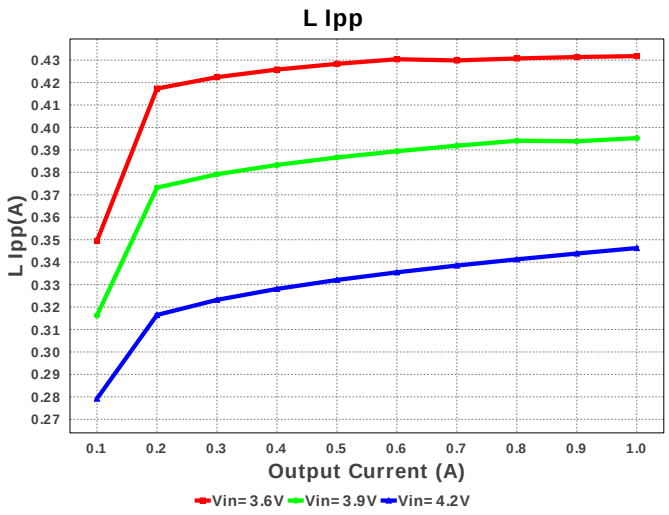


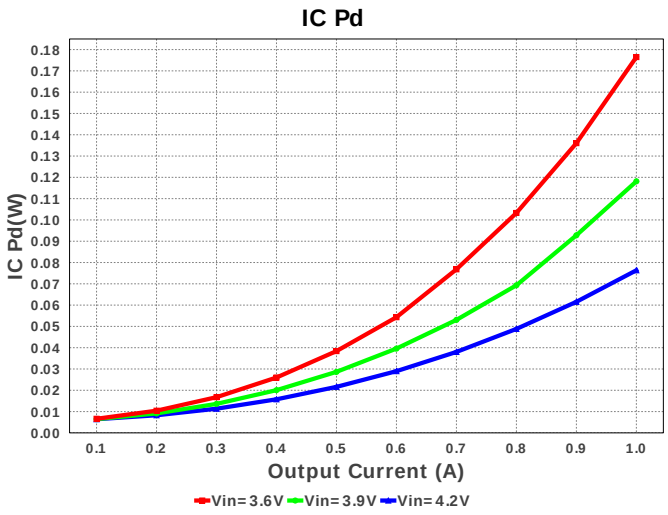


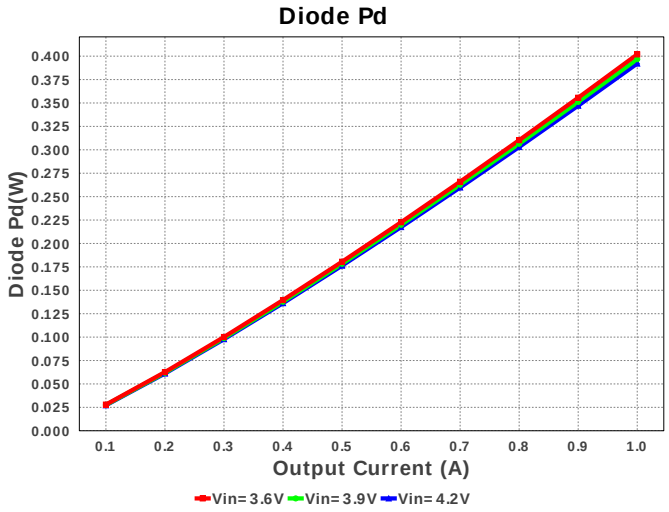












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	124.507 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	767.326 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.795 A	Current	Peak switch current in IC
4.	Iin Avg	1.584 A	Current	Average input current
5.	L Ipp	431.3 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	959.096 mA	Current	MOSFET RMS current
7.	BOM Count	11	General	Total Design BOM count
8.	FootPrint	140.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.25 MHz	General	Switching frequency
10.	IC Tolerance	31.5 mV	General	IC Feedback Tolerance
11.	M Vds Act	177.776 mV	General	
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	$1.53	General	Total BOM Cost
14.	Vout Actual	4.978 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Cross Freq	1.703 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	36.668 %	Op_point	Duty cycle
17.	Efficiency	87.693 %	Op_point	Steady state efficiency
18.	IC Tj	54.465 degC	Op_point	IC junction temperature
19.	ICThetaJA	151.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	1.0 A	Op_point	Iout operating point
21.	Phase Marg	56.471 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	3.6 V	Op_point	Vin operating point
23.	Vout p-p	2.107 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	139.518 µW	Power	Input capacitor power dissipation
25.	Cout Pd	2.876 mW	Power	Output capacitor power dissipation
26.	Diode Pd	398.589 mW	Power	Diode power dissipation
27.	IC Pd	175.994 mW	Power	IC power dissipation
28.	L Pd	117.907 mW	Power	Inductor power dissipation
29.	Total Pd	701.706 mW	Power	Total Power Dissipation
30.	Vout Tolerance	4.047 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	4.2	Maximum input voltage
3.	VinMin	3.6	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM3224	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM3224 Product Folder : http://www.ti.com/product/LM3224 : contains the data sheet and other resources.