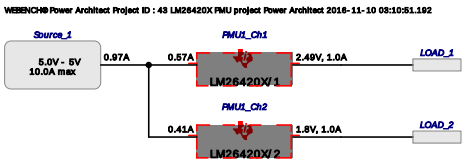
WEBENCH® Power Architect



Project Report

Project : 4372849/43 : LM26420X PMU project
Created : 2016-11-10 03:10:51.192

Project Summary

1.	Total System Efficiency	88.056 %
2.	Total System BOM Count	19.0
3.	Total System Footprint	156.0 mm2
4.	Total System BOM Cost	$2.71
5.	Total System Power Dissipation	581.9 mW

--> Launch WEBENCH Power Architect.

My Comments

No comments

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
PMU1_Ch1	0	LOAD_1	
PMU1_Ch2	0	LOAD_2	
PMU1	NA		

Power Supplies

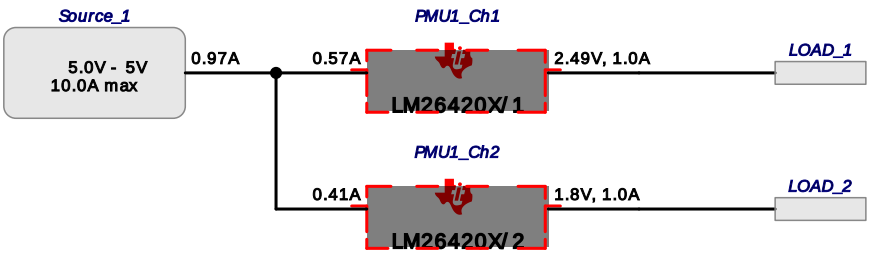
#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	PMU1_Ch1	LM26420X/1	Buck : Dual High-Frequency Step Down DC-DC regulator	2.49 V	1.0 A	87.8%	93	$2.18	434	8
2.	PMU1_Ch2	LM26420X/2	Buck : Dual High-Frequency Step Down DC-DC regulator	1.8 V	1.0 A	88.3%	82	$2.24	435	13
3.	PMU1	LM26420X	PMU : NA	V	NaN A	88.1%	156	$2.71	433	4

Power Loads

#	Name	VLoad	ILoad	Description
1.	LOAD_1	2.49 V	1.0 A	VoutRipple=10%
2.	LOAD_2	1.8 V	1.0 A	VoutRipple=10%

Project Diagram

WEBENCH® Power Architect Project ID : 43 LM26420X PMU project Power Architect 2016-11-10 03:10:51.192



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm^2)
Vishay-Dale	CRCW040210K0FKED	0402	4	$0.01	12
Vishay-Dale	CRCW040210K2FKED	0402	4	$0.01	12
Vishay-Dale	CRCW040212K7FKED	0402	2	$0.01	6
Vishay-Dale	CRCW040221K5FKED	0402	2	$0.01	6
Vishay-Dale	CRCW040249K9FKED	0402	4	$0.01	12
Vishay-Dale	CRCW04025R11FKED	0402	1	$0.01	3
MuRata	GRM155R61A474KE15D	0402	1	$0.01	3
MuRata	GRM219R61A106KE44D	0805	4	$0.03	27
MuRata	GRM21BC80G226ME39L	0805	4	$0.04	14
MuRata	GRM31CC80J476KE18L	1206_190	4	$0.10	22
Texas Instruments	LM26420XSQ/NOPB	RUM0016A	3	$1.73	75
Bourns	SDR0403-5R6ML	SDR0403	2	$0.18	55
TDK	VLCF4028T-4R7N1R5-2	VLCF4028	2	$0.36	50
Total			37	$7.29	296.34000000000003

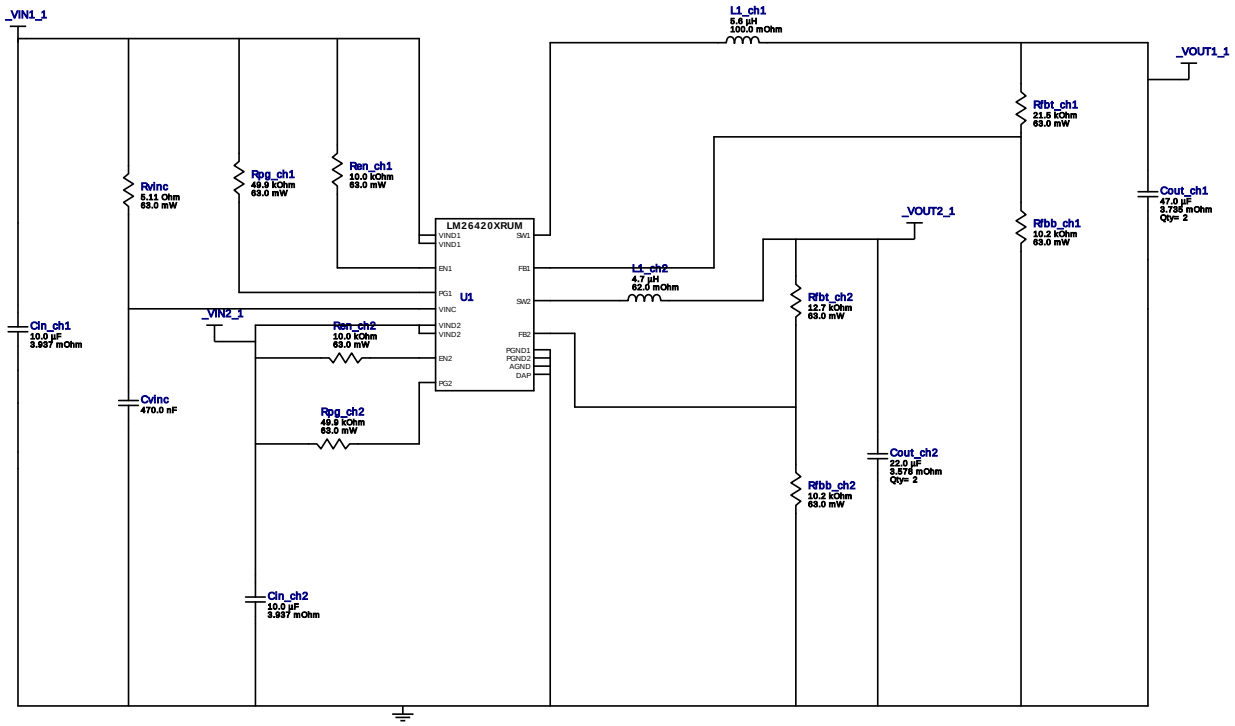
TEXAS INSTRUMENTS

WEBENCH® Design Report

Vout = 2.5V
Iout = 1.0A

Device = LM26420XSQ/NOPB
Topology = PMU
Created = 11/10/16 3:10:50 AM
BOM Cost = $2.71
BOM Count = 19
Total Pd = 0.58W

Design : 4372849/433 LM26420XSQ/NOPB
Design 433 - LM26420XSQ/NOPB

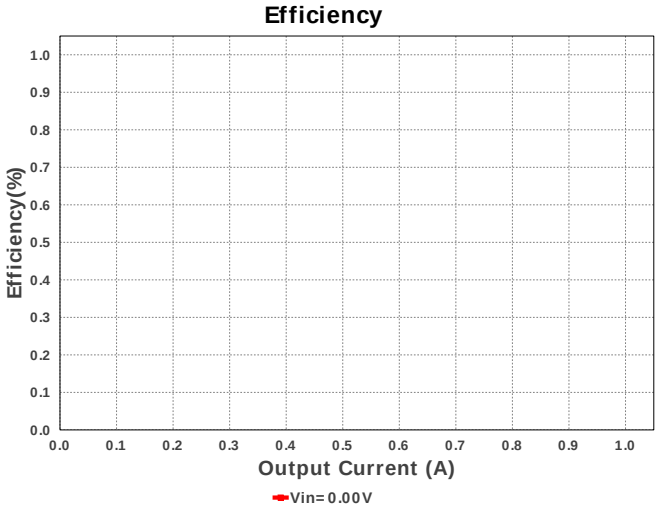


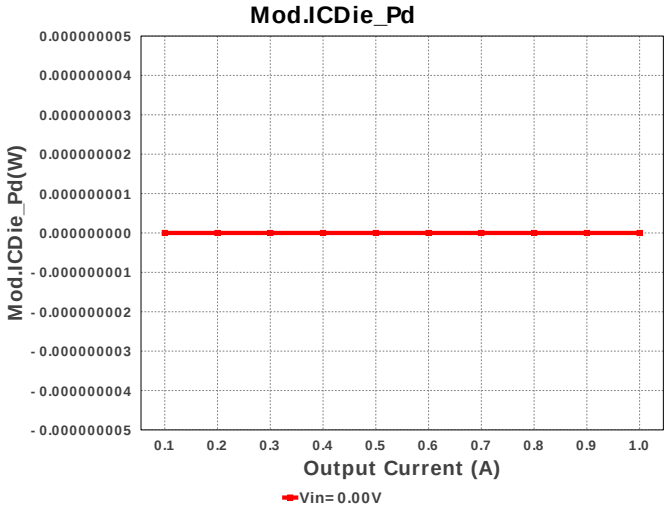
1. This schematic shows all the components for this Power Management Unit. The block diagram on the left shows how the channels are connected. Use the drop down PMU Options selector below the optimization dial on the summary page to get the details for each channel. Or click on the block diagram on the left to select a specific channel.

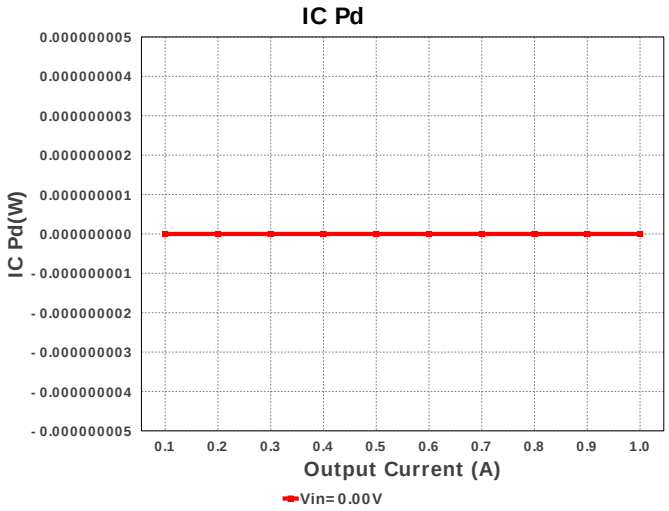
Electrical BOM

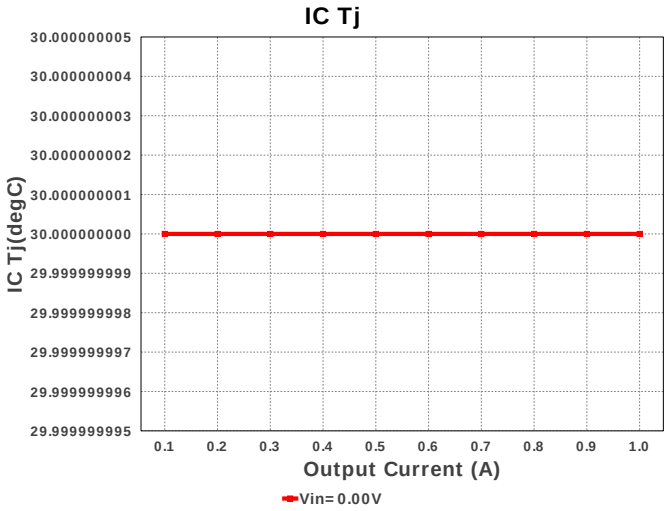
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin_ch1	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm^2
2.	Cin_ch2	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm^2
3.	Cout_ch1	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	2	$0.10	1206_190 11 mm^2
4.	Cout_ch2	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	2	$0.04	0805 7 mm^2
5.	Cvinc	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
6.	L1_ch1	Bourns	SDR0403-5R6ML	L= 5.6 µH DCR= 100.0 mOhm	1	$0.18	SDR0403 28 mm^2

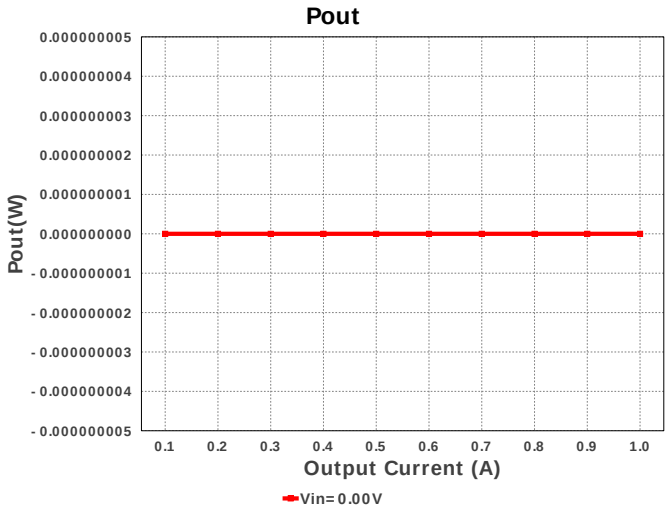
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	L1_ch2	TDK	VLCF4028T-4R7N1R5-2	L= 4.7 µH DCR= 62.0 mOhm	1	$0.36	 VLCF4028 25 mm²
8.	Ren_ch1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
9.	Ren_ch2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
10.	Rfbb_ch1	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
11.	Rfbb_ch2	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rfbt_ch1	Vishay-Dale	CRCW040221K5FKED Series= CRCW..e3	Res= 21.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rfbt_ch2	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
14.	Rpg_ch1	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	Rpg_ch2	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
16.	Rvinc	Vishay-Dale	CRCW04025R11FKED Series= CRCW..e3	Res= 5.11 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	U1	Texas Instruments	LM26420XSQ/NOPB	Switcher	1	$1.73	 RUM0016A 25 mm²

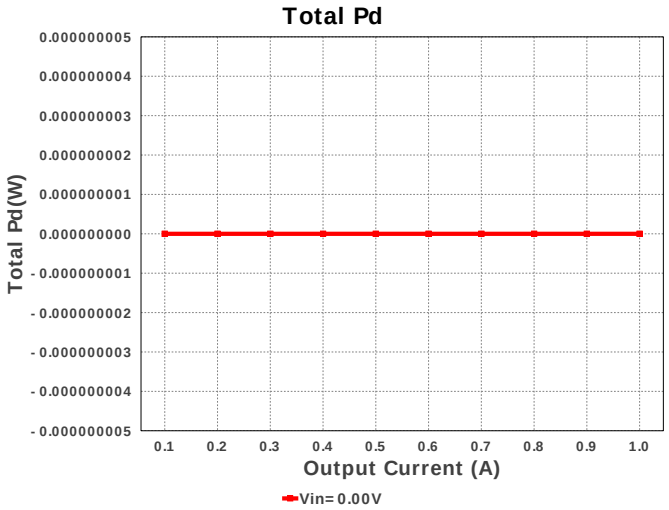












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	19	General	Total Design BOM count
2.	FootPrint	156.0 mm^2	General	Total PMU footprint area of BOM components
3.	Pout	4.29 W	General	Total PMU output power
4.	Total BOM	$2.71	General	Total BOM Cost
5.	Efficiency	88.055 %	Op_point	PMU steady state efficiency
6.	IC Tj	45.079 degC	Op_point	PMU IC junction temperature
7.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
8.	Cout_ch1 Pd	1.504 μW	Power	Output capacitor power dissipation
9.	Cout_ch2 Pd	1.816 μW	Power	Output capacitor power dissipation
10.	IC Pd	376.984 mW	Power	IC Pd
11.	L1_ch1 Pd	125.12 mW	Power	Inductor power dissipation
12.	L1_ch2 Pd	77.591 mW	Power	Inductor power dissipation
13.	Mod.ICDie_Pd	376.984 mW	Power	IC Pd
14.	Total Pd	581.929 mW	Power	PMU total power dissipation
15.	Total Pd	581.929 mW	Power	PMU total power dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	Iout1	1.0	Output Current #1
3.	Iout2	1.0	Output Current #2
4.	Vin1Max	5.0	Maximum Input Voltage #1
5.	Vin1Min	5.0	Minimum Input Voltage #1
6.	Vin2Max	5.0	Maximum Input Voltage #2
7.	Vin2Min	5.0	Minimum Input Voltage #2
8.	Vout	2.5	Output Voltage
9.	Vout1	2.5	Output Voltage #1
10.	Vout2	1.8	Output Voltage #2
11.	base_pn	LM26420X	Texas Instruments Base Part Number
12.	source	DC	Input Source Type

#	Name	Value	Description
13.	ta	30.0	Ambient temperature

Design Assistance

1. LM26420X Product Folder : http://www.ti.com/product/lm26420 : contains the data sheet and other resources.

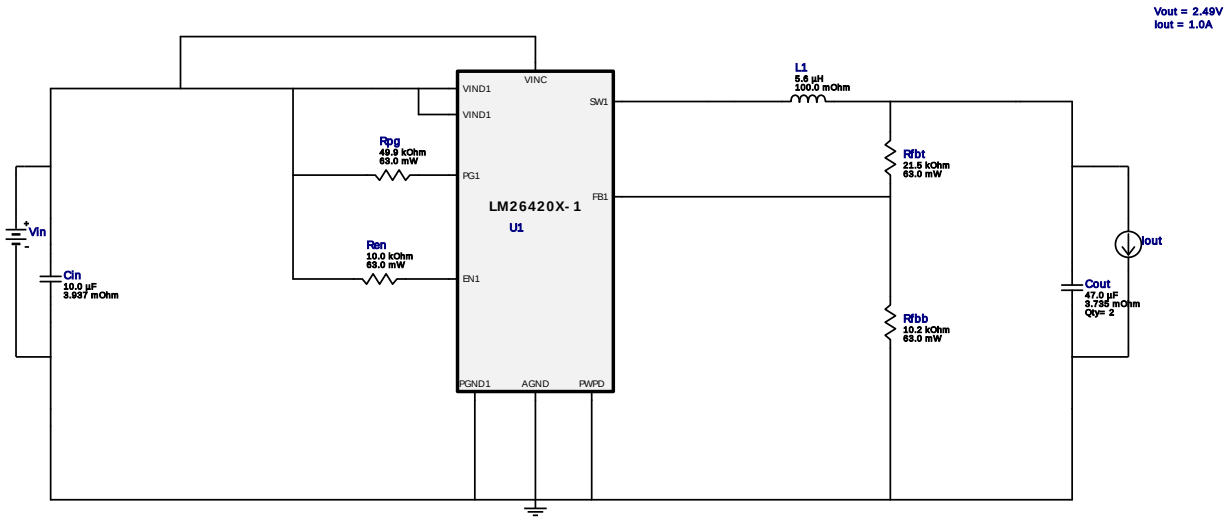
TEXAS INSTRUMENTS

WEBENCH® Design Report

Vout = 2.49V
Iout = 1.0A

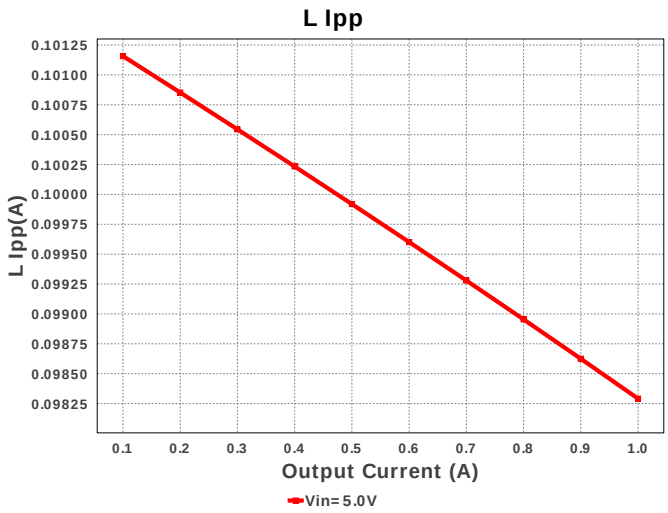
Device = LM26420XSQ/NOPB
Topology = Buck
Created = 11/10/16 3:10:50 AM
BOM Cost = $NaN
BOM Count = NaN
Total Pd = 0.34W

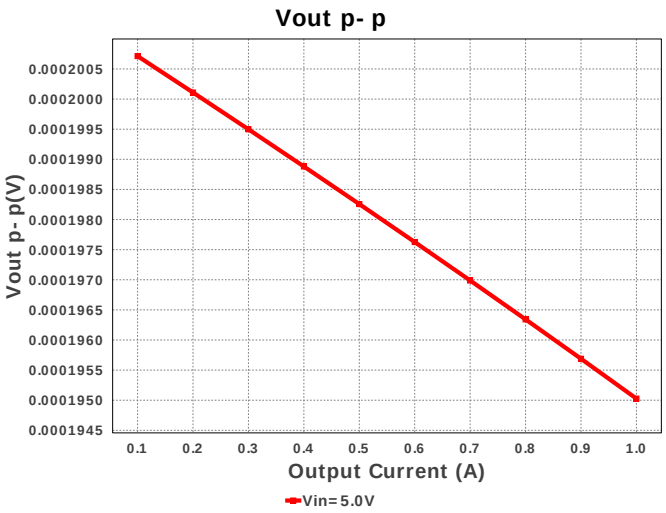
Design : 4372849/434 LM26420XSQ/NOPB
LM26420XSQ/NOPB 5.0V-5.0V to 2.49V @ 1.0A

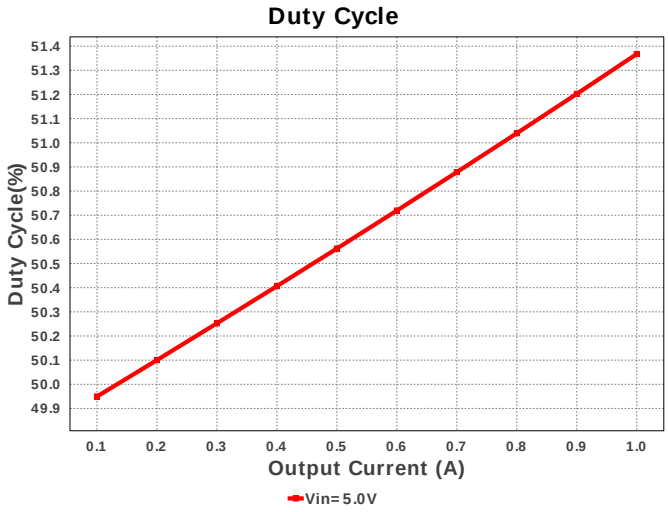


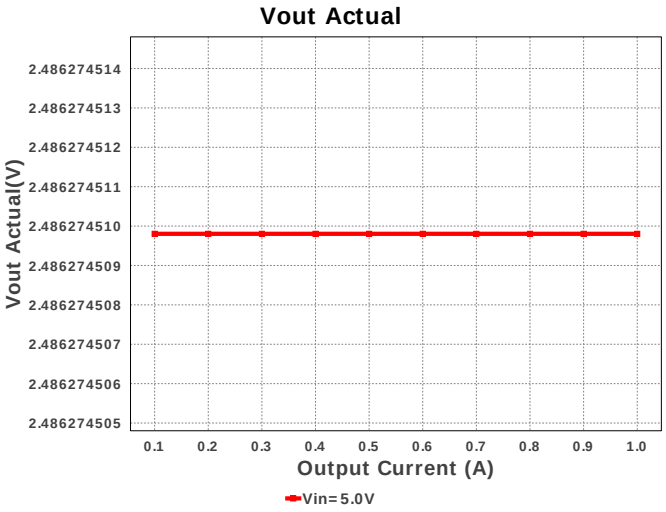
Electrical BOM

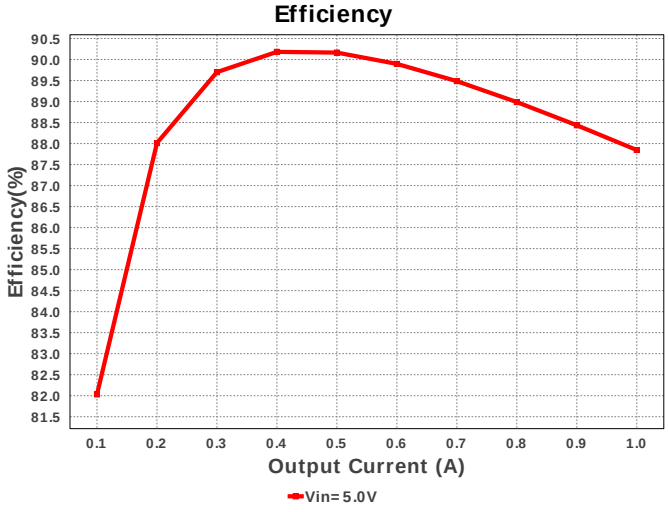
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm^2
2.	Cout	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	2	$0.10	1206_190 11 mm^2
3.	L1	Bourns	SDR0403-5R6ML	L= 5.6 µH DCR= 100.0 mOhm	1	$0.18	SDR0403 28 mm^2
4.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	Rfbb	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
6.	Rfbt	Vishay-Dale	CRCW040221K5FKED Series= CRCW..e3	Res= 21.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
7.	Rpg	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
8.	U1	Texas Instruments	LM26420XSQ/NOPB	Switcher	0	$1.73	RUM0016A 25 mm^2

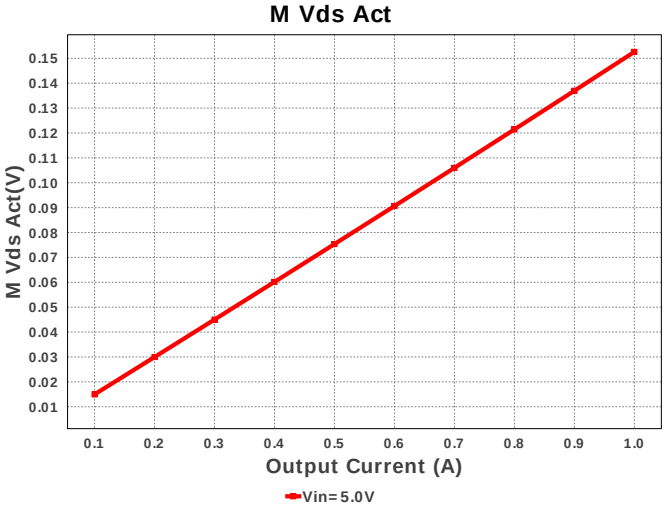


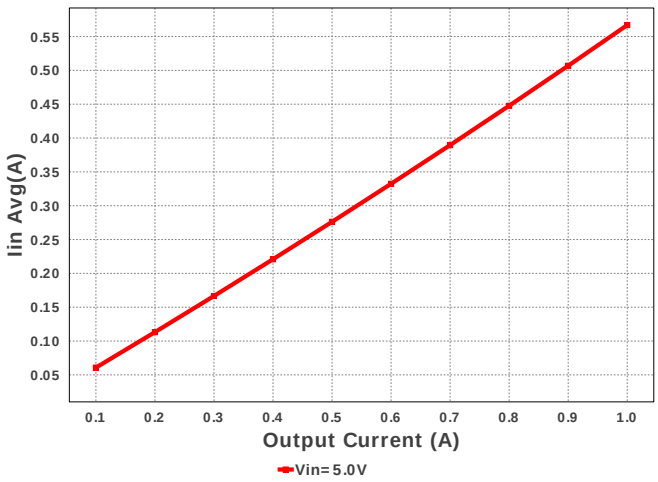


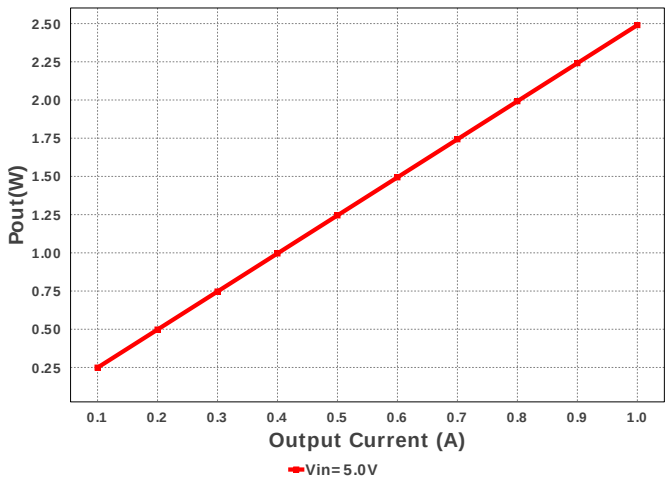


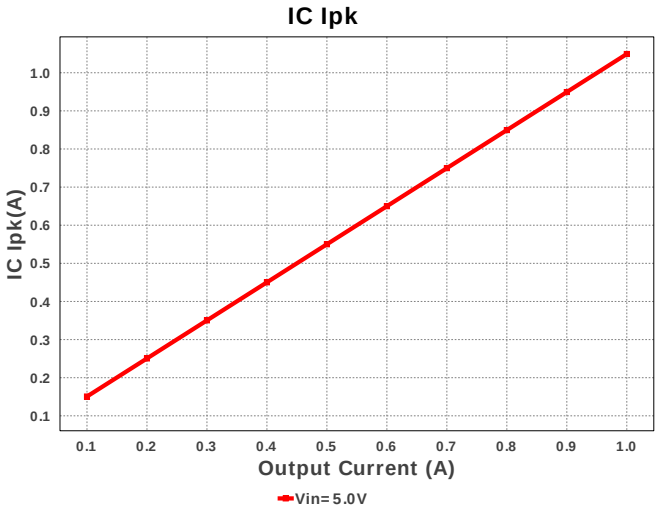


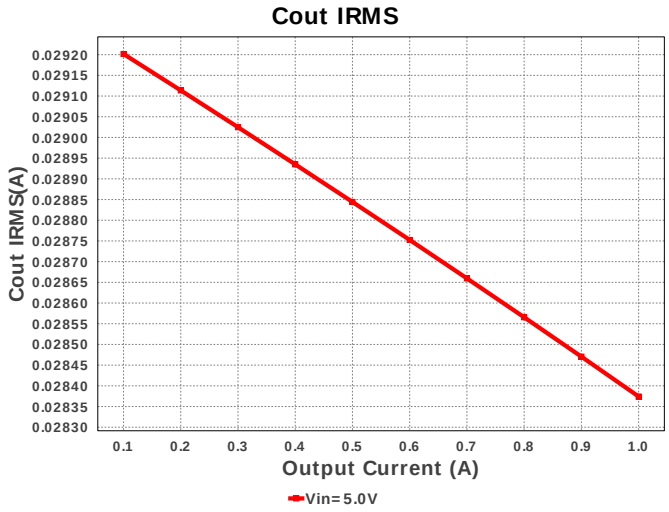


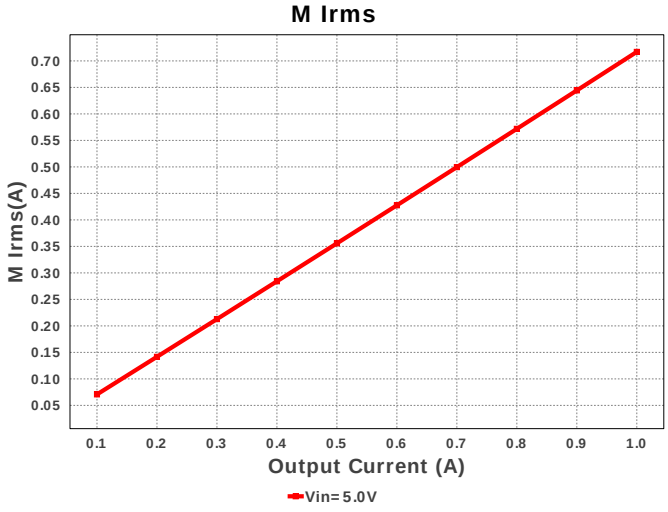


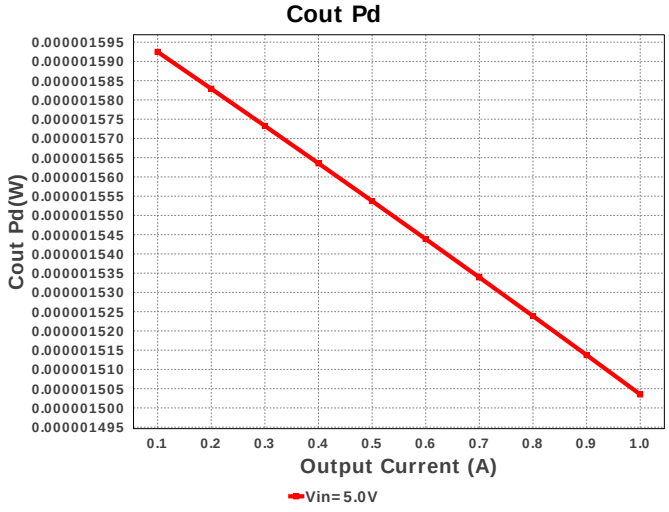


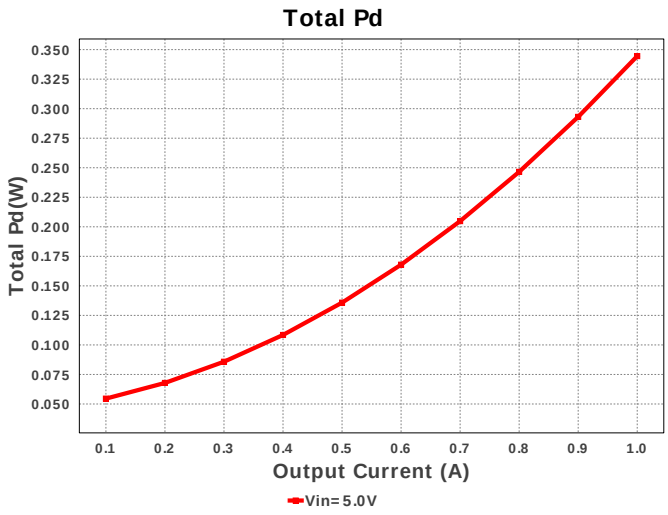


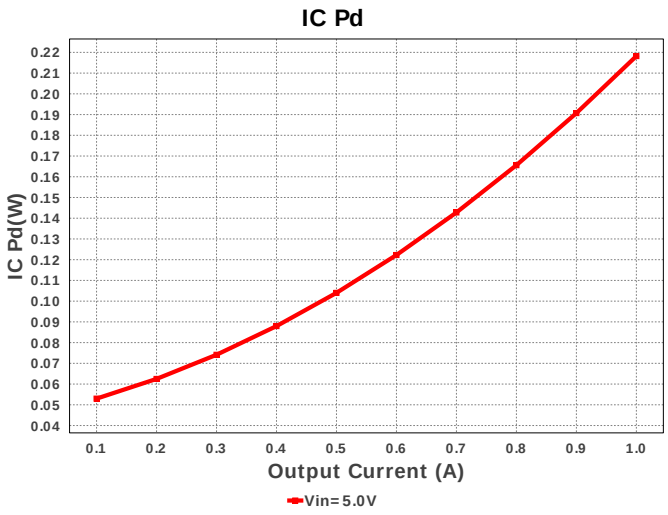


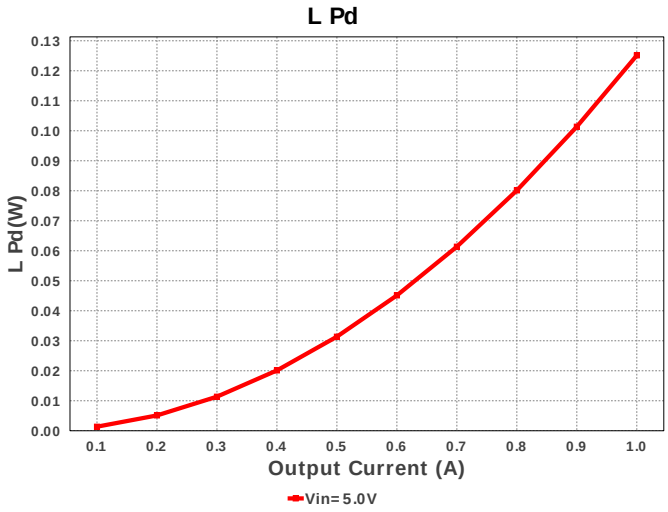


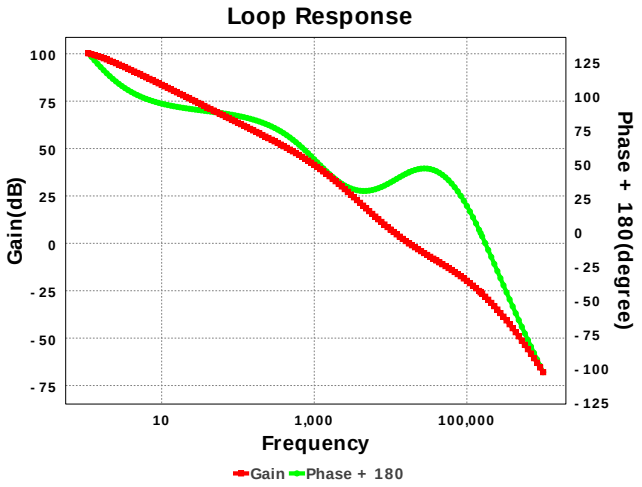












Operating Values

#	Name	Value	Category	Description
1.	Cout IRMS	28.374 mA	Current	Output capacitor RMS ripple current
2.	IC Ipk	1.049 A	Current	Peak switch current in IC
3.	Iin Avg	566.9 mA	Current	Average input current
4.	L Ipp	98.291 mA	Current	Peak-to-peak inductor ripple current
5.	M Irms	717.057 mA	Current	MOSFET RMS current
6.	Frequency	2.2 MHz	General	Switching frequency
7.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
8.	M Vds Act	152.587 mV	General	Voltage drop across the MosFET
9.	Mode	CCM	General	Conduction Mode
10.	Pout	2.49 W	General	Total output power
11.	Low Freq Gain	100.229 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	2.486 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	2.49 V	Op_Point	Operational Output Voltage
14.	Cross Freq	17.487 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	51.368 %	Op_point	Duty cycle
16.	Efficiency	87.846 %	Op_point	PMU channel steady state efficiency
17.	Gain Marg	-25.854 dB	Op_point	Bode Plot Gain Margin
18.	IOUT_OP	1.0 A	Op_point	Iout operating point
19.	Phase Marg	44.736 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	5.0 V	Op_point	Vin operating point
21.	Vout p-p	195.027 µV	Op_point	Peak-to-peak output ripple voltage
22.	Cout Pd	1.504 µW	Power	Output capacitor power dissipation
23.	IC Pd	218.203 mW	Power	IC power dissipation
24.	L Pd	125.12 mW	Power	Inductor power dissipation
25.	Total Pd	344.505 mW	Power	PMU channel power dissipation
26.	Vout Tolerance	3.904 %		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	5.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	2.49	Output Voltage
5.	base_pn	LM26420X/1	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

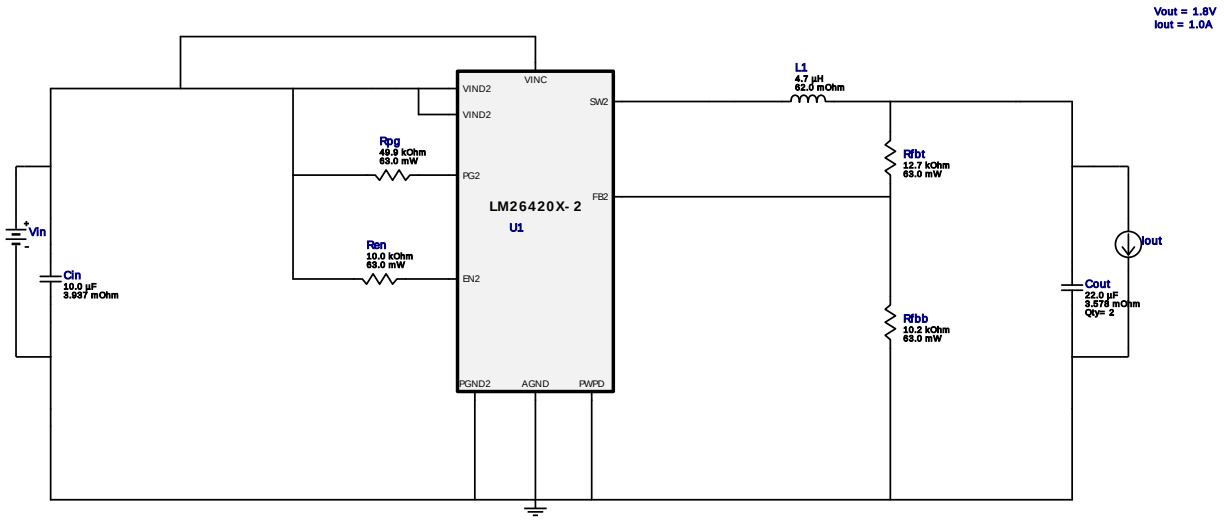
1. LM26420X/1 Product Folder : http://www.ti.com/product/LM26420X : contains the data sheet and other resources.

Vout = 1.8V
Iout = 1.0A

Device = LM26420XSQ/NOPB
Topology = Buck
Created = 11/10/16 3:10:50 AM
BOM Cost = $NaN
BOM Count = NaN
Total Pd = 0.24W

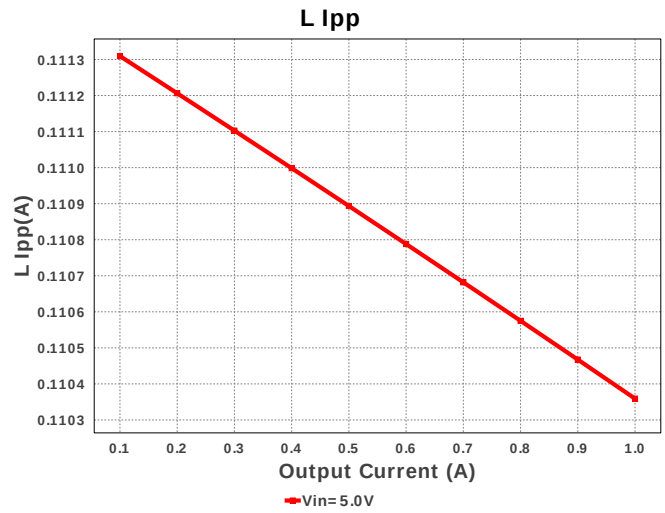
WEBENCH® Design Report

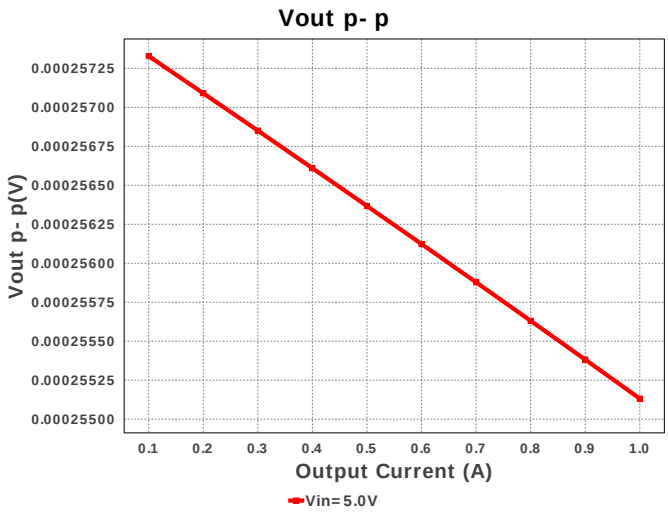
Design : 4372849/435 LM26420XSQ/NOPB
LM26420XSQ/NOPB 5.0V-5.0V to 1.80V @ 1.0A

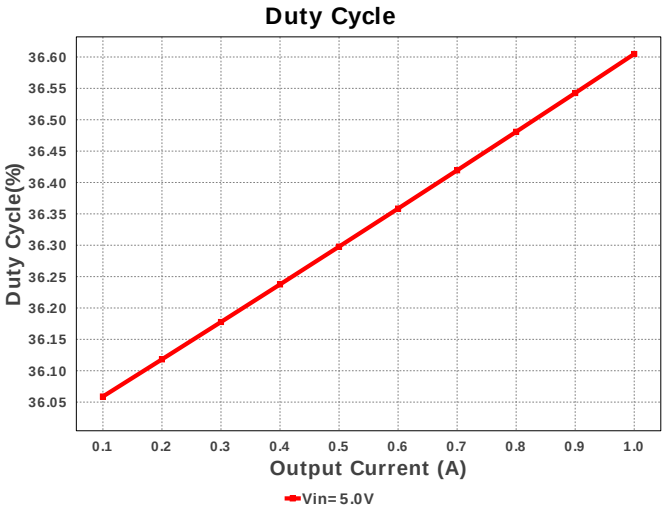


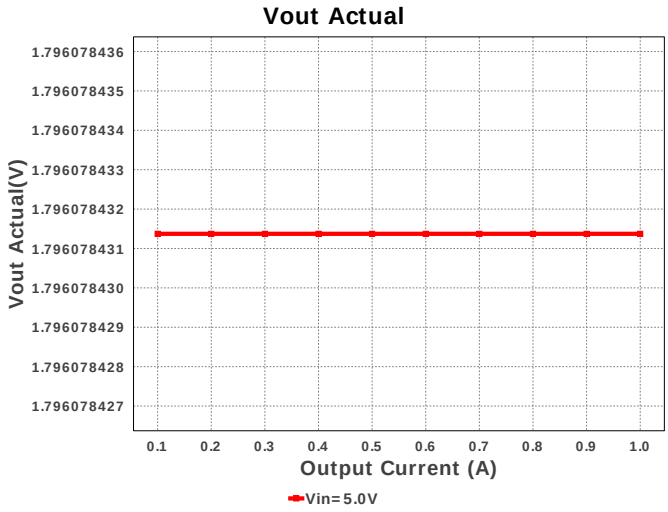
Electrical BOM

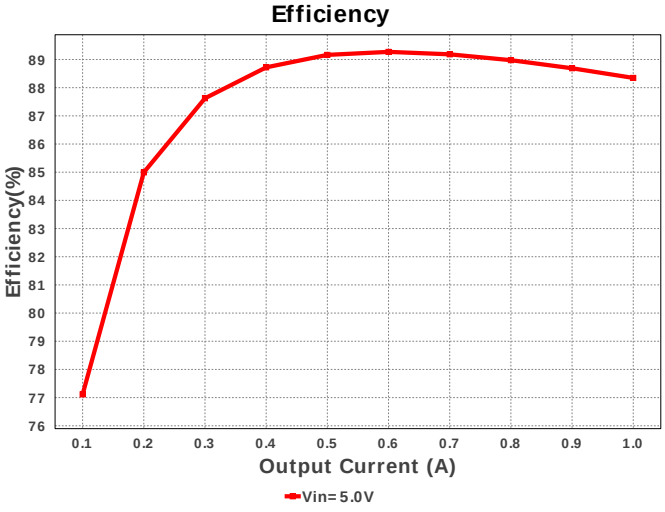
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm^2
2.	Cout	MuRata	GRM21BC80G226ME39L Series= X6S	Cap= 22.0 uF ESR= 3.578 mOhm VDC= 4.0 V IRMS= 3.29633 A	2	$0.04	0805 7 mm^2
3.	L1	TDK	VLCF4028T-4R7N1R5-2	L= 4.7 µH DCR= 62.0 mOhm	1	$0.36	VLCF4028 25 mm^2
4.	Ren	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
5.	Rfbb	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
6.	Rfbt	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
7.	Rpg	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
8.	U1	Texas Instruments	LM26420XSQ/NOPB	Switcher	0	$1.73	RUM0016A 25 mm^2

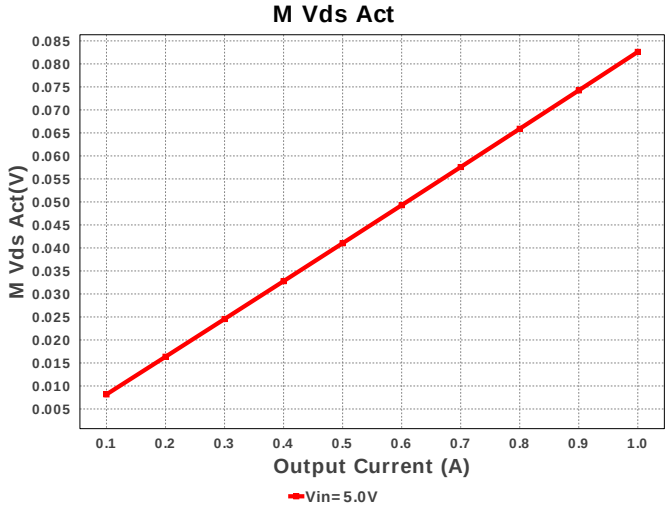


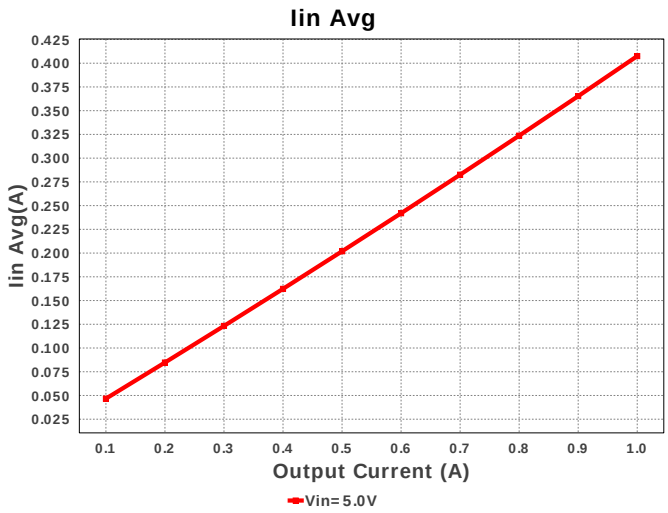


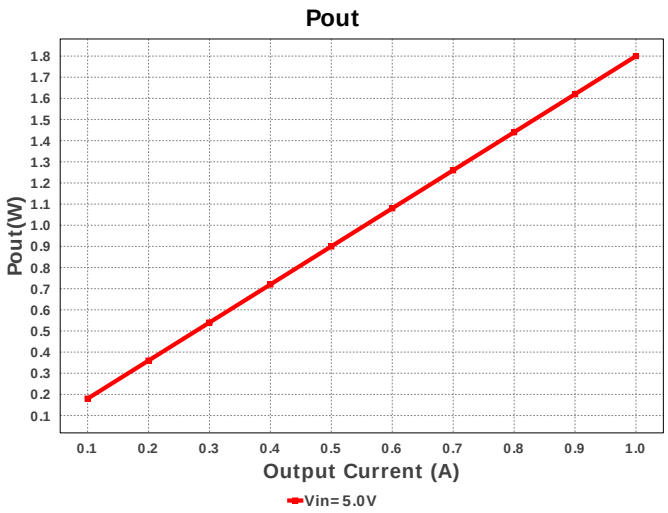


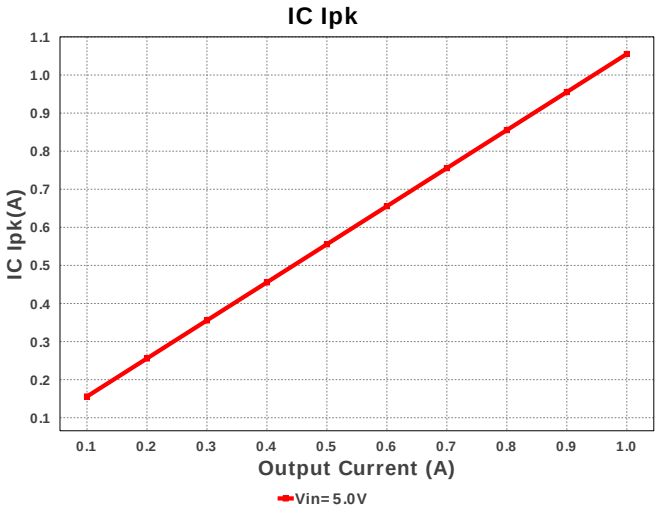


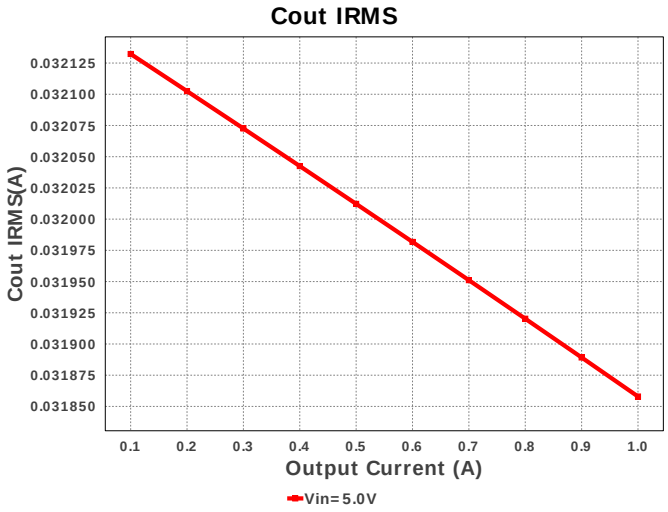


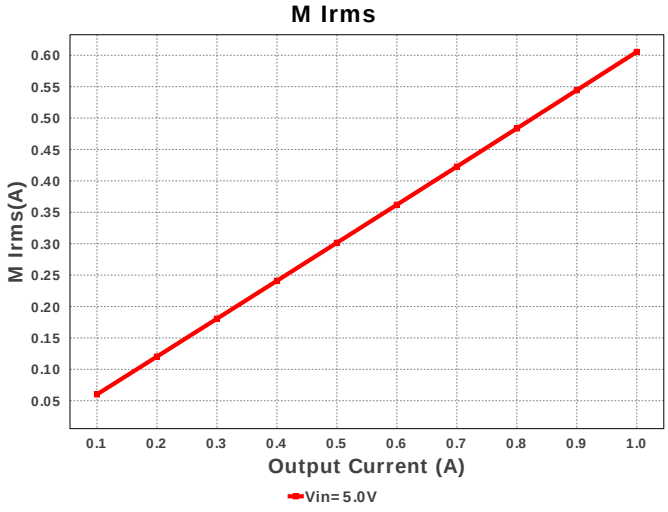


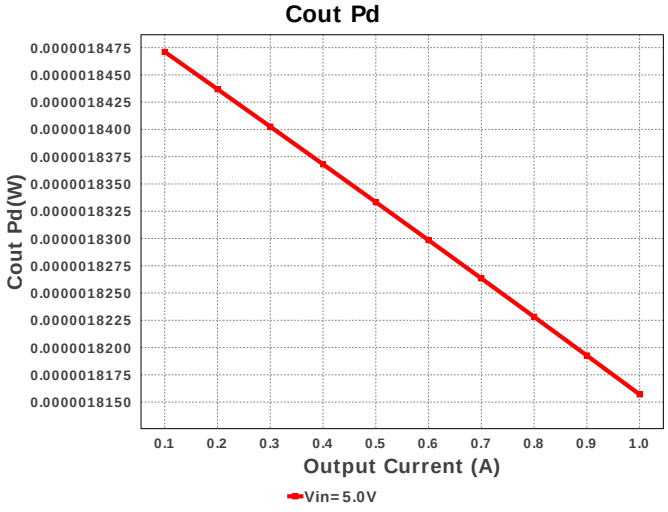


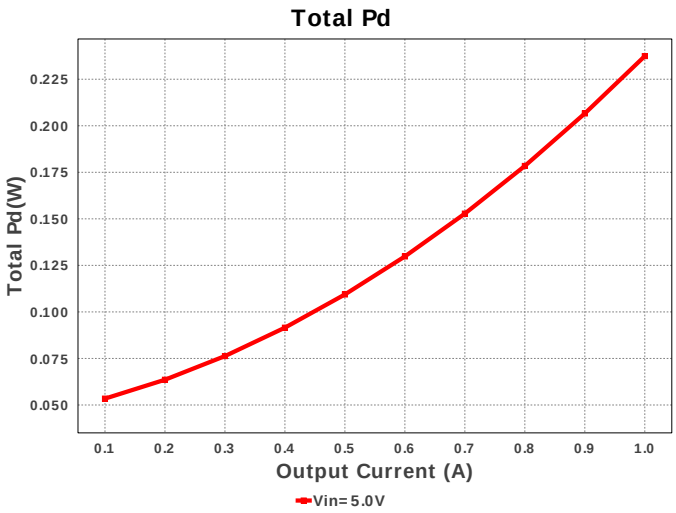


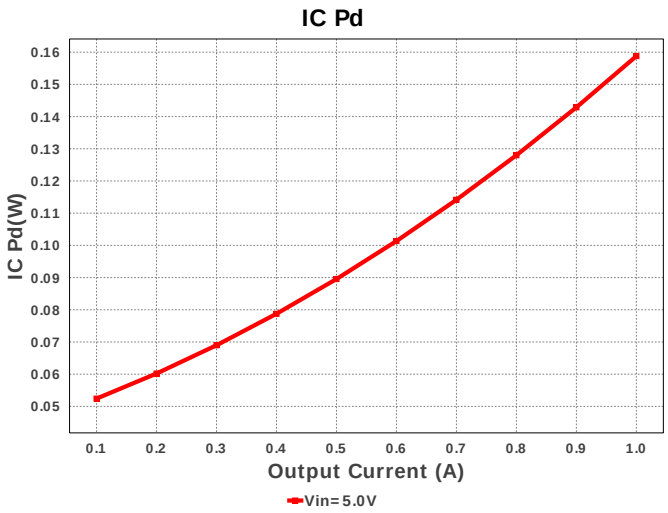


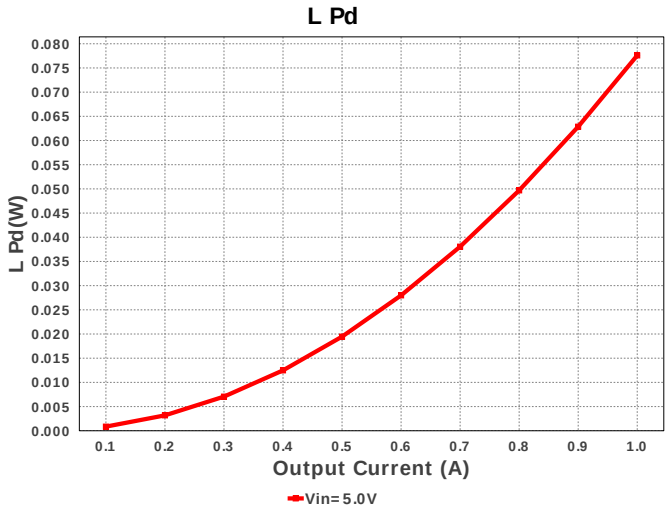


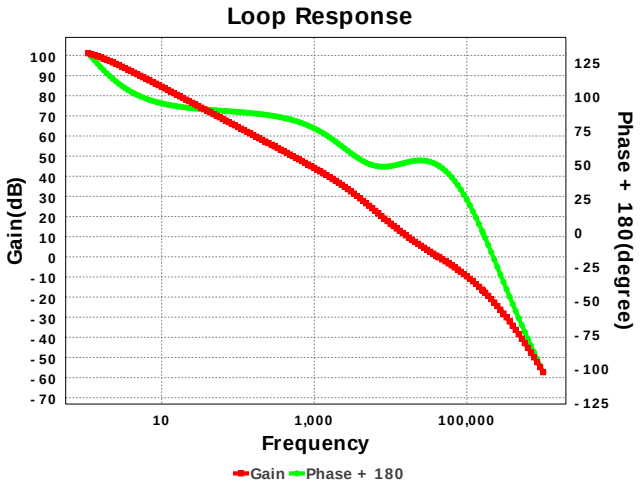












Operating Values

#	Name	Value	Category	Description
1.	Cout IRMS	31.858 mA	Current	Output capacitor RMS ripple current
2.	IC Ipk	1.055 A	Current	Peak switch current in IC
3.	Iin Avg	407.49 mA	Current	Average input current
4.	L Ipp	110.36 mA	Current	Peak-to-peak inductor ripple current
5.	M Irms	605.374 mA	Current	MOSFET RMS current
6.	Frequency	2.2 MHz	General	Switching frequency
7.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance
8.	M Vds Act	82.612 mV	General	Voltage drop across the MosFET
9.	Mode	CCM	General	Conduction Mode
10.	Pout	1.8 W	General	Total output power
11.	Low Freq Gain	101.05 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	1.796 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	1.8 V	Op_Point	Operational Output Voltage
14.	Cross Freq	42.339 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	36.605 %	Op_point	Duty cycle
16.	Efficiency	88.347 %	Op_point	PMU channel steady state efficiency
17.	Gain Marg	-16.823 dB	Op_point	Bode Plot Gain Margin
18.	IOUT_OP	1.0 A	Op_point	Iout operating point
19.	Phase Marg	49.794 deg	Op_point	Bode Plot Phase Margin
20.	VIN_OP	5.0 V	Op_point	Vin operating point
21.	Vout p-p	255.132 µV	Op_point	Peak-to-peak output ripple voltage
22.	Cout Pd	1.816 µW	Power	Output capacitor power dissipation
23.	IC Pd	158.781 mW	Power	IC power dissipation
24.	L Pd	77.591 mW	Power	Inductor power dissipation
25.	Total Pd	237.424 mW	Power	PMU channel power dissipation
26.	Vout Tolerance	3.648 %		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	5.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	1.8	Output Voltage
5.	base_pn	LM26420X/2	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM26420X/2 Product Folder : http://www.ti.com/product/LM26420X : contains the data sheet and other resources.