

WEBENCH® Power Architect

Project Report

Project : 1194016/444 : PA_Project_304 (modified from 301)

Created : 2016-07-24 07:15:25.335

Optimize project optFactor=3

Project Summary

1. Total System Efficiency	91.156 %
2. Total System BOM Count	41.0
3. Total System Footprint	1.198 kmm2
4. Total System BOM Cost	\$7.97
5. Total System Power Dissipation	4.892 W

--> Launch WEBENCH Power Architect.

My Comments

No comments

Sequencer Flag Table

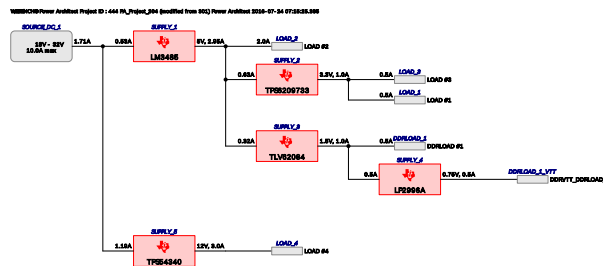
Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_2	LOAD #2
SUPPLY_2	0	LOAD_3	LOAD #3
SUPPLY_2	0	LOAD_1	LOAD #1
SUPPLY_3	0	DDRLOAD_1	DDRLOAD #1
SUPPLY_4	0	DDRLOAD_1_VTT	DDRVTT_DDRLOAD_1
SUPPLY_5	0	LOAD_4	LOAD #4

Power Supplies

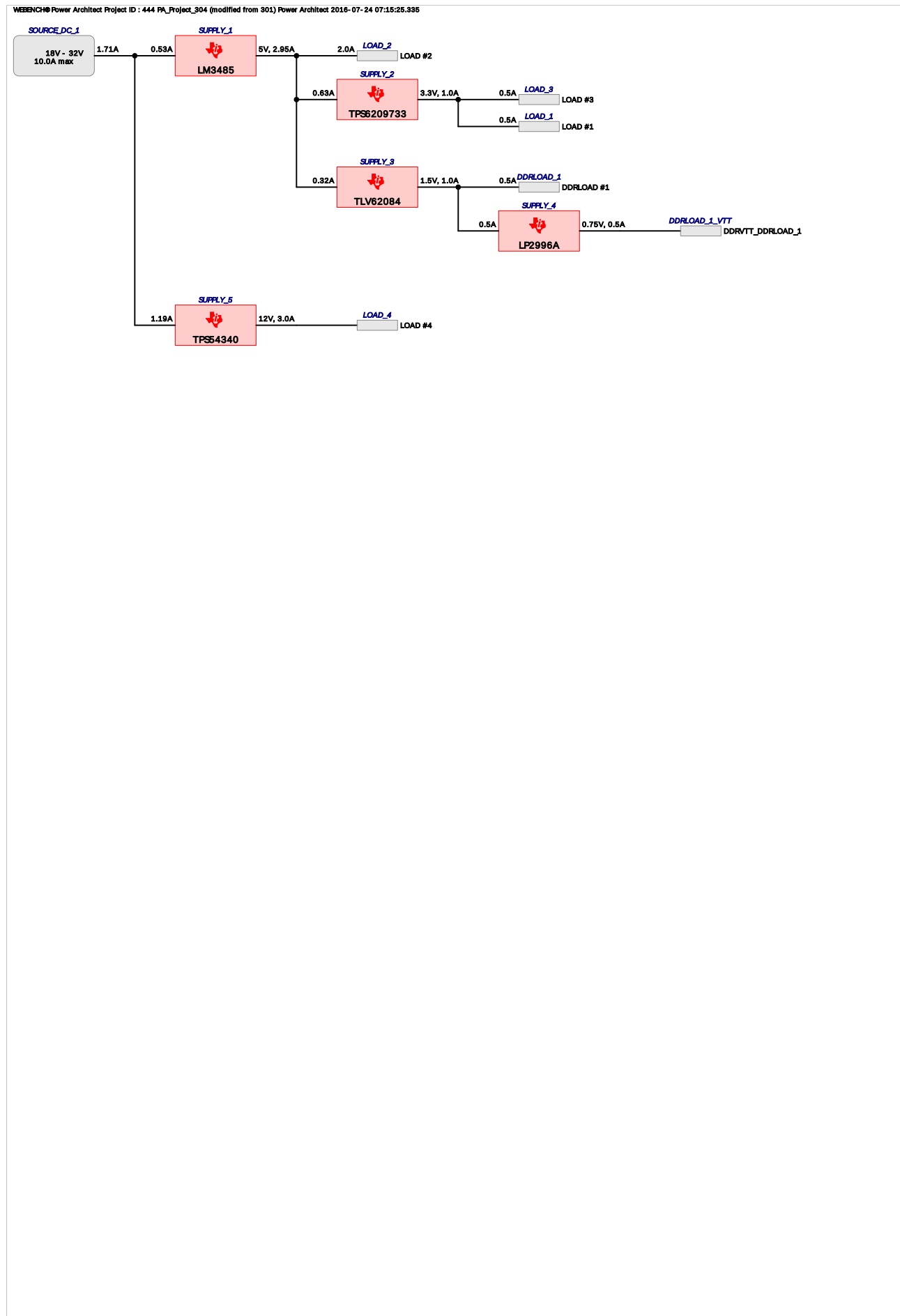
#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	LM3485	Switcher : Hysteretic controller	5 V	2.951 A	87.7%	559	\$1.96	2172	16
2.	SUPPLY_2	TPS6209733	Switcher : 2-A High Efficiency Step Down Converter with DCS Control	3.3 V	1.0 A	94.7%	87	\$1.04	2169	4
3.	SUPPLY_3	TLV62084	Switcher : 2.0A High Efficiency	1.5 V	1.0 A	86%	47	\$1.06	2171	11
4.	SUPPLY_4	LP2996A	DDRLDO : DDR1,DDR2,DDR3,DDR3L	0.75 V	0.5 A	99.8%	87	\$1.35	2170	9
5.	SUPPLY_5	TPS54340	Switcher : Step Down Converter with Eco-Mode	12 V	3.0 A	94.7%	418	\$2.56	2173	23

Power Loads

#	Name	VLoad	ILoad	Description
1.	LOAD #2	5 V	2 A	VoutRipple=10%
2.	LOAD #3	3.3 V	0.5 A	VoutRipple=10%
3.	LOAD #1	3.3 V	0.5 A	VoutRipple=10%
4.	DDRLOAD #1	1.5 V	0.5 A	VoutRipple=10%
5.	DDRVTT_DDRLOAD_1	0.75 V	0.5 A	VoutRipple=10%
6.	LOAD #4	12 V	3 A	VoutRipple=10%



Project Diagram



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
Panasonic	2R5TPE220MAFB	CAPSMT_6_B2S	1	\$0.50	17
Panasonic	6SVP120MV	SM_RADIAL_6.3AMM	1	\$0.46	80
Diodes Inc.	B560C-13-F	SMC	2	\$0.17	167
Kemet	C0805C181K5GACTU	0805	1	\$0.01	7
Yageo America	CC0805KRX7R9BB392	0805	1	\$0.01	7
Samsung Electro-Mechanics	CL21C102JBCNFNC	0805	1	\$0.01	7
Vishay-Dale	CRCW040210K0FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040210K5FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402121KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402147KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402174KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402178KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040230K1FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040235K7FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW040239K2FKED	0402	1	\$0.01	3
Stackpole Electronics Inc	CSR1206FK20L0	1206	1	\$0.10	11
Fairchild Semiconductor	FDD5614P	DPAK	1	\$0.24	102
MuRata	GRM033R61A103KA01D	0201	1	\$0.01	2
MuRata	GRM1555C1H3R0CA01D	0402	1	\$0.01	3
MuRata	GRM155R60J103KA01D	0402	1	\$0.01	3
MuRata	GRM155R60J104KA01D	0402	1	\$0.01	3
MuRata	GRM155R61A104KA01D	0402	1	\$0.01	3
MuRata	GRM188R60J106ME47D	0603	1	\$0.02	5
MuRata	GRM21BR60J226ME39L	0805	1	\$0.04	7
MuRata	GRM31CR71H225KA88L	1206_190	1	\$0.05	11
MuRata	GRM31CR71H475KA12L	1206	1	\$0.07	11
MuRata	GRM32ER61C476ME15L	1210_280	1	\$0.24	15
Taiyo Yuden	JMK212BJ106KD-T	0805	1	\$0.03	7
Taiyo Yuden	JMK212BJ226KG-T	0805	1	\$0.13	7
Taiyo Yuden	JMK212BJ476MG-T	0805	1	\$0.14	7
Texas Instruments	LM3485MM/NOPB	MUA08A	1	\$0.52	24
Texas Instruments	LP2996AMRE/NOPB	DDA0008A	1	\$0.69	57
Coilcraft	PFL3215-102MEB	PFL3215	1	\$0.28	14
Yageo America	RC0603FR-0791KL	0603	1	\$0.01	5
Bourns	SDR1307-100ML	SDR1307	1	\$0.35	227
Bourns	SDR1307-150ML	SDR1307	1	\$0.35	227
Bourns	SRN6045-1R0Y	SRN6045	1	\$0.16	64
Texas Instruments	TLV62084DSGR	DSG0008A	1	\$0.59	9
Texas Instruments	TPS54340DDAR	R-PDSO-G8	1	\$1.68	57
Texas Instruments	TPS6209733RWKR	RWK0011B	1	\$0.81	9
Total			41	\$7.97	1197.6848

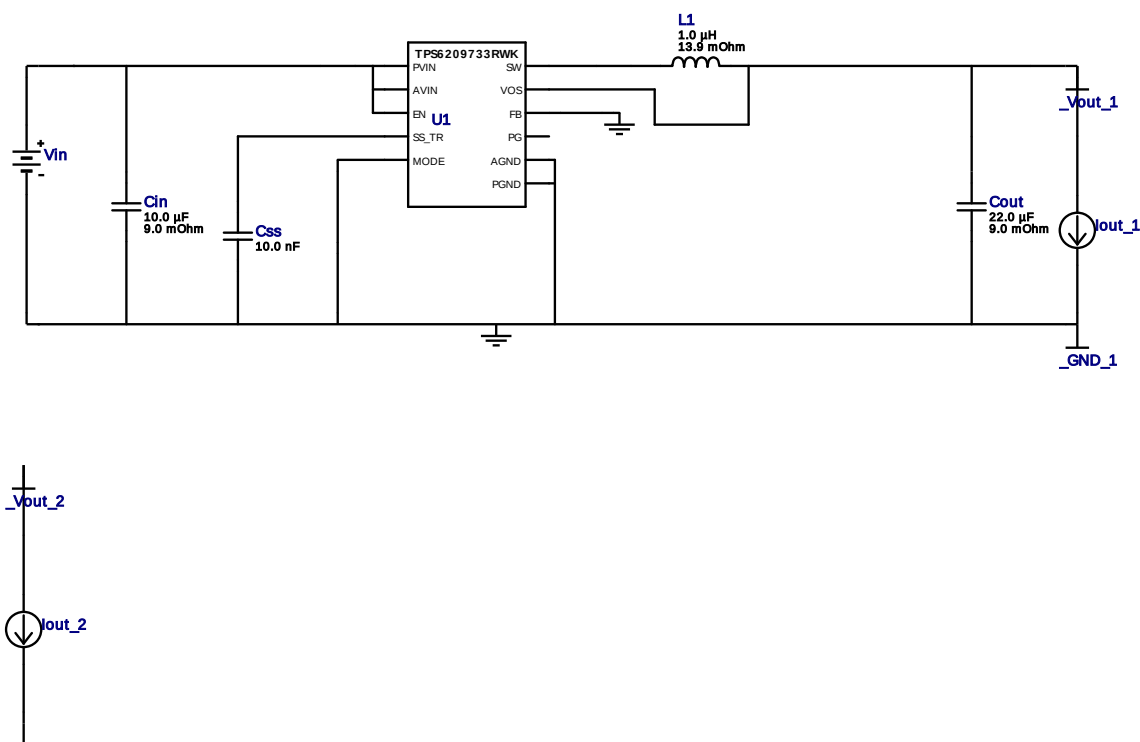


Vout = 3.3V
Iout = 1.0A

Device = TPS6209733RWKR
Topology = Buck
Created = 7/24/16 7:15:22 AM
BOM Cost = \$1.04
BOM Count = 5
Total Pd = 0.19W

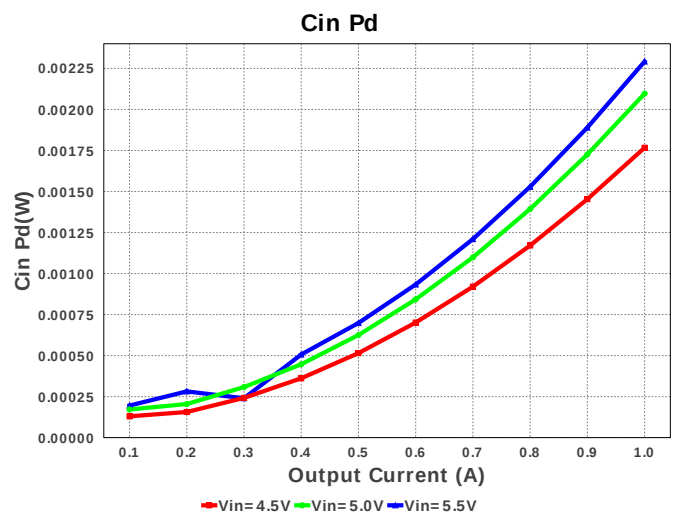
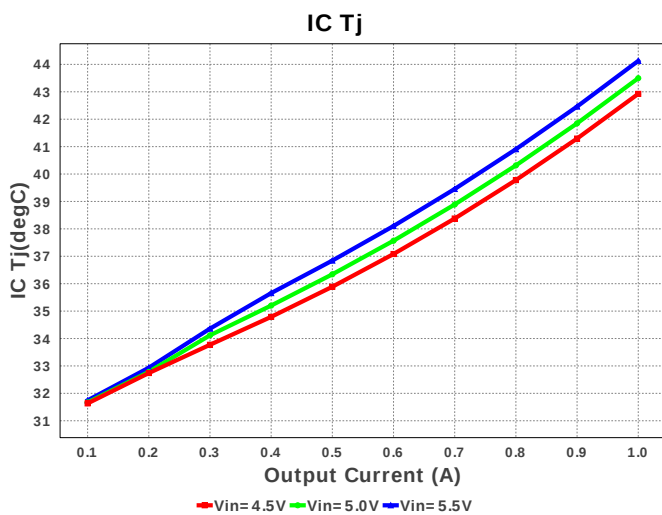
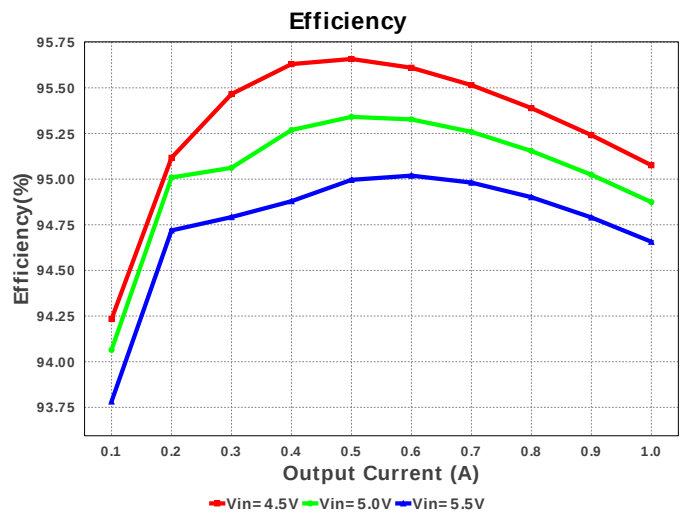
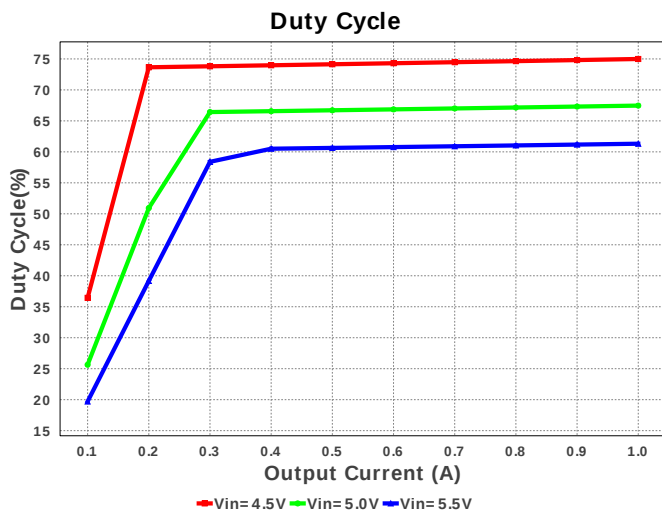
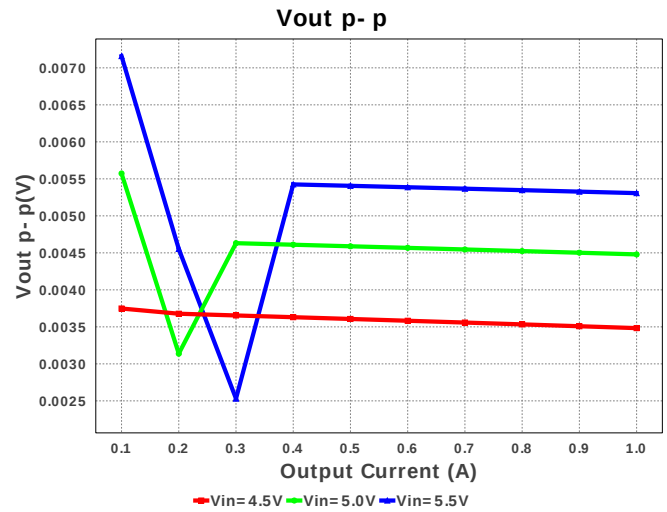
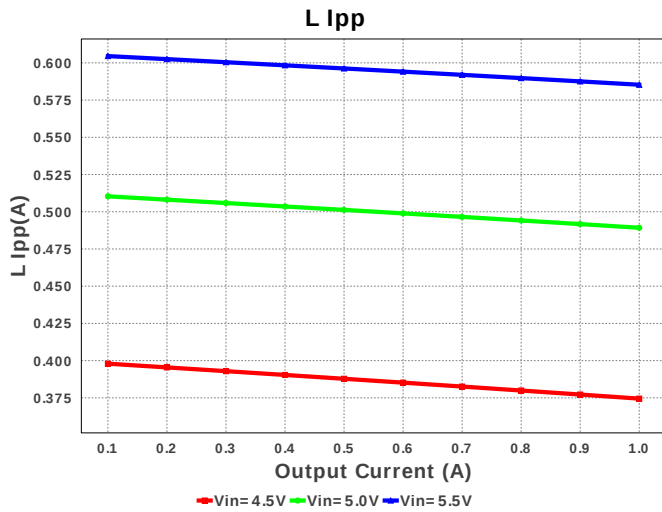
WEBENCH® Design Report

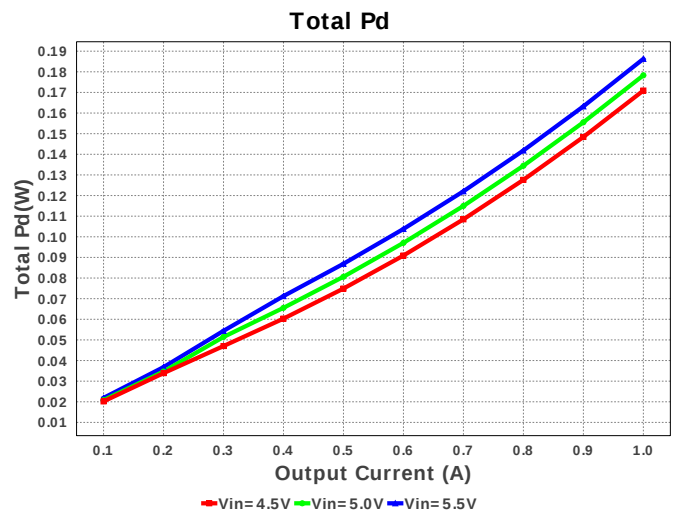
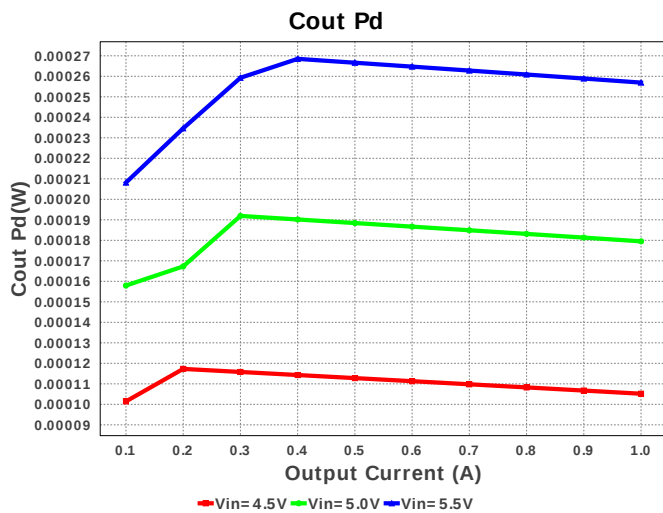
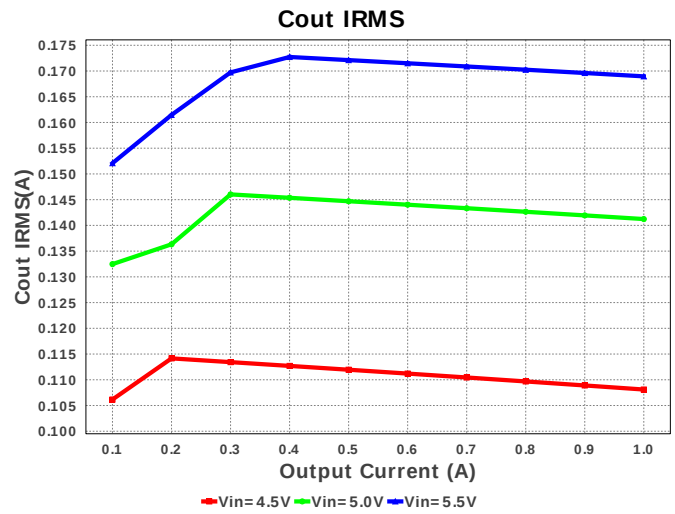
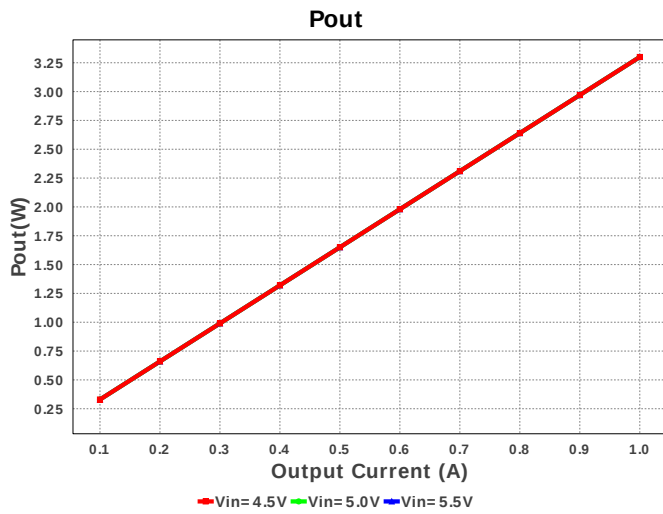
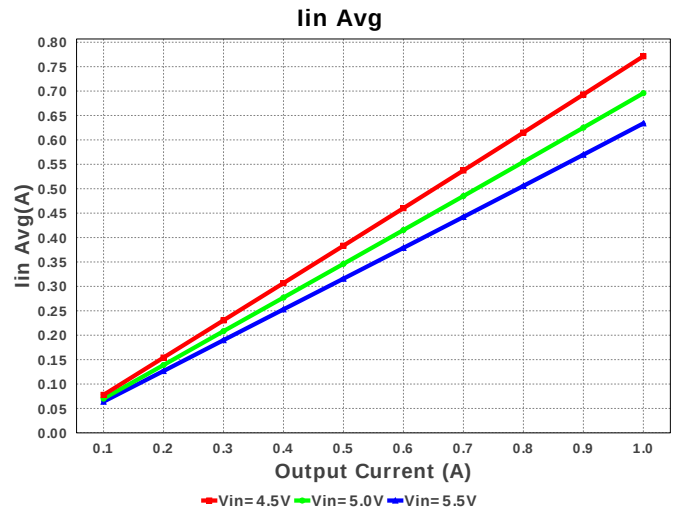
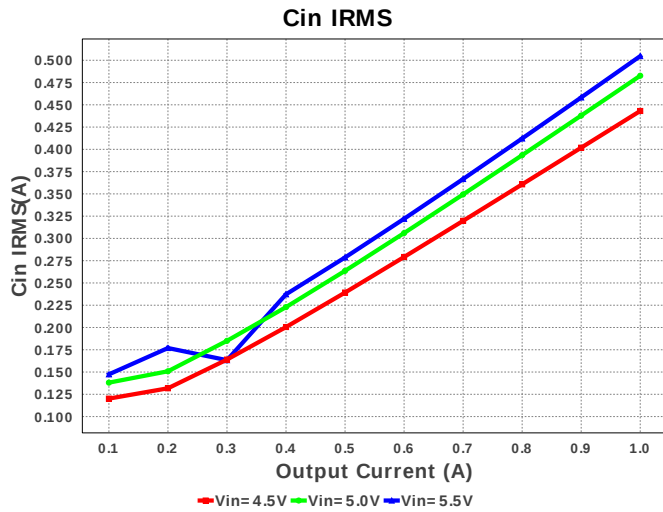
Design : 1194016/2169 TPS6209733RWKR
TPS6209733RWKR 4.5V-5.5V to 3.30V @ 1.0A

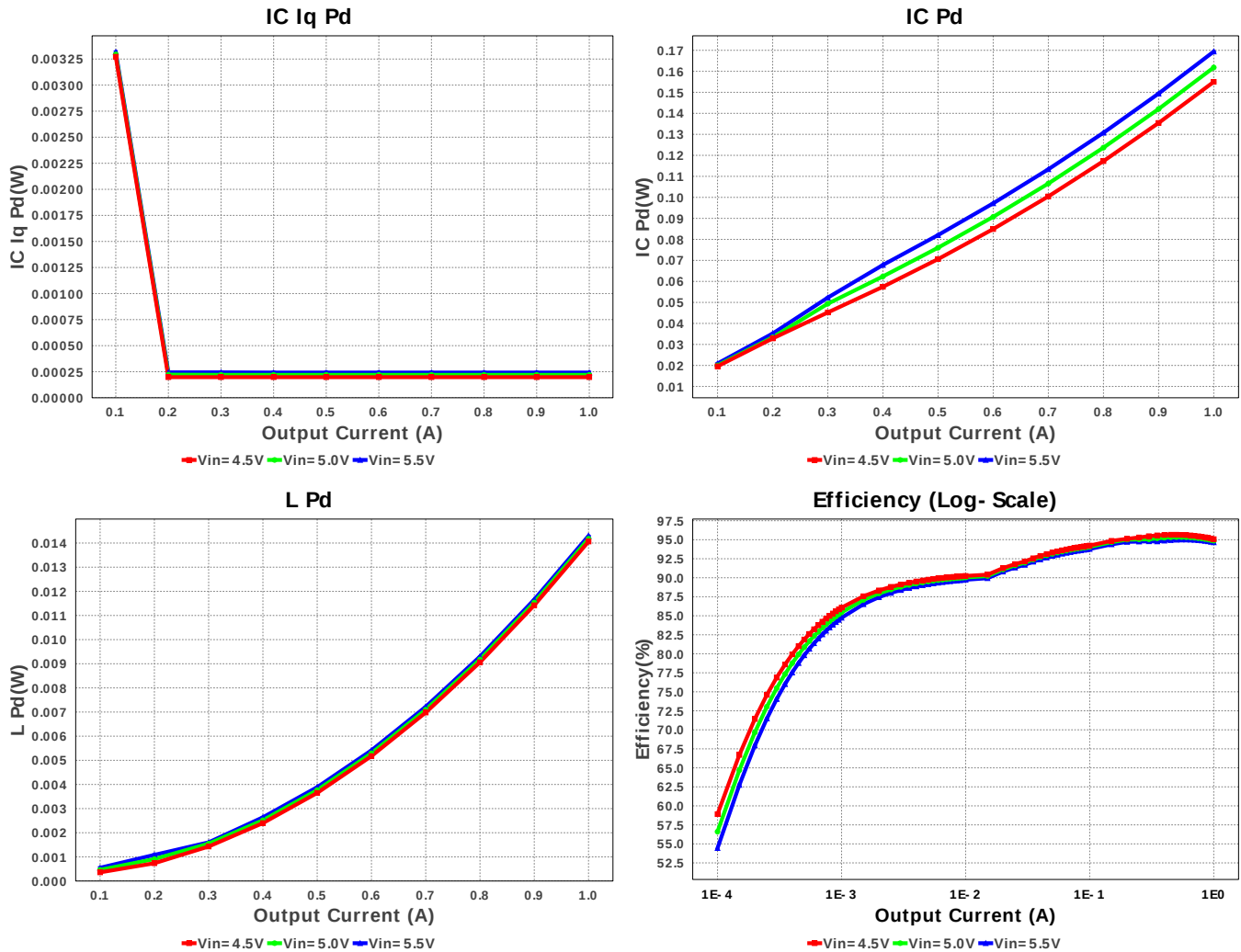


Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	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 mm ²
2.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	Cap= 22.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	1	\$0.04	0805 7 mm ²
3.	Css	MuRata	GRM033R61A103KA01D Series= X5R	Cap= 10.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
4.	L1	Bourns	SRN6045-1R0Y	L= 1.0 µH DCR= 13.9 mOhm	1	\$0.16	SRN6045 64 mm ²
5.	U1	Texas Instruments	TPS6209733RWKR	Switcher	1	\$0.81	RWK0011B 9 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	504.682 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	168.962 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	633.87 mA	Current	Average input current
4.	L Ipp	585.3 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	5	General	Total Design BOM count
6.	FootPrint	87.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.155 MHz	General	Switching frequency
8.	IC Tolerance	69.3 mV	General	IC Feedback Tolerance
9.	Pout	3.3 W	General	Total output power
10.	Total BOM	\$1.04	General	Total BOM Cost
11.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
12.	Duty Cycle	61.314 %	Op_point	Duty cycle
13.	Efficiency	94.657 %	Op_point	Steady state efficiency
14.	IC Tj	44.128 degC	Op_point	IC junction temperature
15.	ICThetaJA	83.4 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	1.0 A	Op_point	Iout operating point
17.	VIN_OP	5.5 V	Op_point	Vin operating point
18.	Vout p-p	5.307 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	2.292 mW	Power	Input capacitor power dissipation
20.	Cout Pd	256.933 μW	Power	Output capacitor power dissipation
21.	IC Iq Pd	242.0 μW	Power	IC Iq Pd
22.	IC Pd	169.403 mW	Power	IC power dissipation
23.	L Pd	14.297 mW	Power	Inductor power dissipation
24.	Total Pd	186.272 mW	Power	Total Power Dissipation
25.	Vout Tolerance	2.1 %		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

#	Name	Value	Description
2.	VinMax	5.5	Maximum input voltage
3.	VinMin	4.5	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS6209733	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS6209733** Product Folder : <http://www.ti.com/product/TPS62097> : contains the data sheet and other resources.

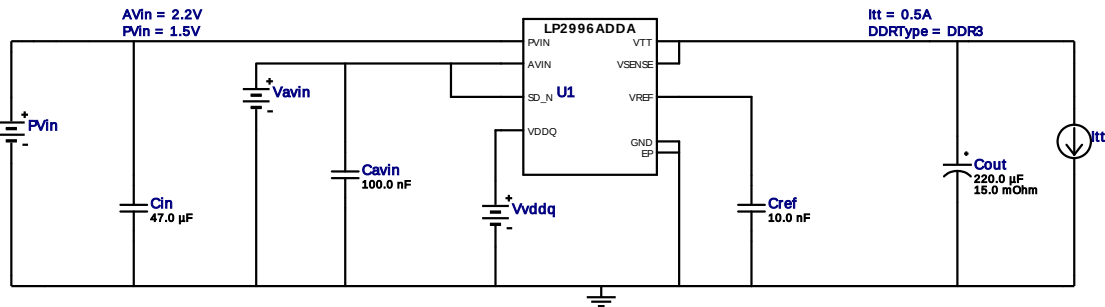


WEBENCH® Design Report

Design : 1194016/2170 LP2996AMRE/NOPB
Design 2170 - LP2996AMRE/NOPB

DDRTYPE = DDR3
Pvin = 1.5V
AVin = 2.2V
I_{tt} = 0.5A
Ta = 30.0degC

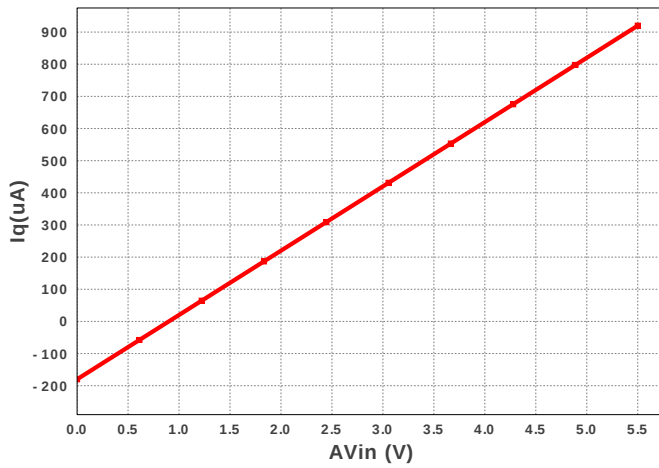
Device = LP2996AMRE/NOPB
Topology = DDRLDO
Created = 7/24/16 7:15:23 AM
BOM Cost = \$1.35
BOM Count = 5
Total Pd = 0.38W



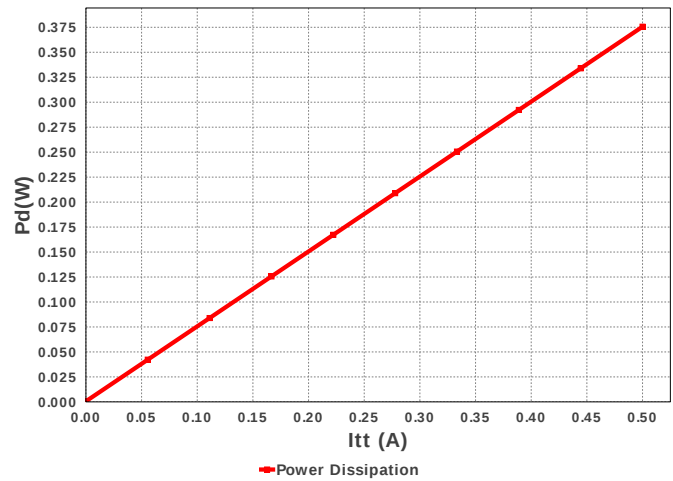
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cavin	MuRata	GRM155R60J104KA01D Series= X5R	Cap= 100.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Cin	Taiyo Yuden	JMK212BJ476MG-T Series= X5R	Cap= 47.0 uF VDC= 6.3 V IRMS= 0.0 A	1	\$0.14	0805 7 mm ²
3.	Cout	Panasonic	2R5TPE220MAFB Series= ?	Cap= 220.0 uF ESR= 15.0 mOhm VDC= 2.5 V IRMS= 2.0 A	1	\$0.50	CAPSMT_6_B2S 17 mm ²
4.	Cref	MuRata	GRM155R60J103KA01D Series= X5R	Cap= 10.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
5.	U1	Texas Instruments	LP2996AMRE/NOPB	Switcher	1	\$0.69	DAA0008A 57 mm ²

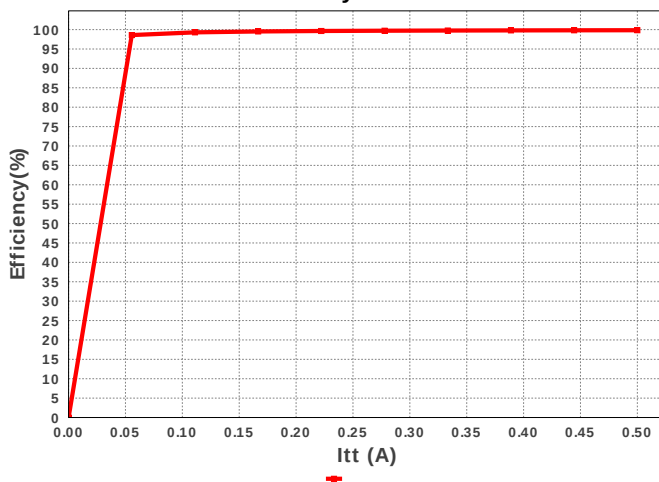
Quiescent Current Iq Vs. AVin



Power Dissipation Vs. Itt



Efficiency Vs. Itt



Operating Values

#	Name	Value	Category	Description
1.	BOM Count	5	General	Total Design BOM count
2.	FootPrint	87.0 mm ²	General	Total Foot Print Area of BOM components
3.	Total BOM	\$1.35	General	Total BOM Cost
4.	AVin_OP	2.2 V	Op_Point	Pvin operating point
5.	Itt_OP	500.0 mA	Op_Point	Itt Operating Point
6.	PVin_OP	1.5 V	Op_Point	Pvin operating point
7.	Ta_OP	30.0 degC	Op_Point	Operating Ambient Temperature
8.	Vddq_OP	1.5 V	Op_Point	Vddq operating point
9.	Vtt_OP	750.0 mV	Op_Point	Vtt operating point
10.	Efficiency	99.842 %	Op_point	Steady state efficiency
11.	IC TJ	46.151 degC	Op_point	IC junction temperature
12.	ICThetaJA	43.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
13.	Total Pd	375.594 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	AVin	2.2 A	AVin
2.	DDRTYPE	DDR3	DDRTYPE
3.	Itt	500.0 mA	Itt
4.	PVin	1.5 A	PVin
5.	application	DDRPower	application
6.	base_pn	LP2996A	Base Product Number
7.	Ta	30.0 A	Ambient temperature

Design Assistance

1. **LP2996A** Product Folder : <http://www.ti.com/product/lp2996a> : contains the data sheet and other resources.

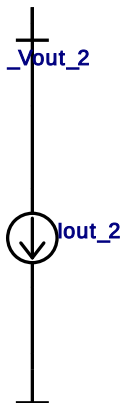
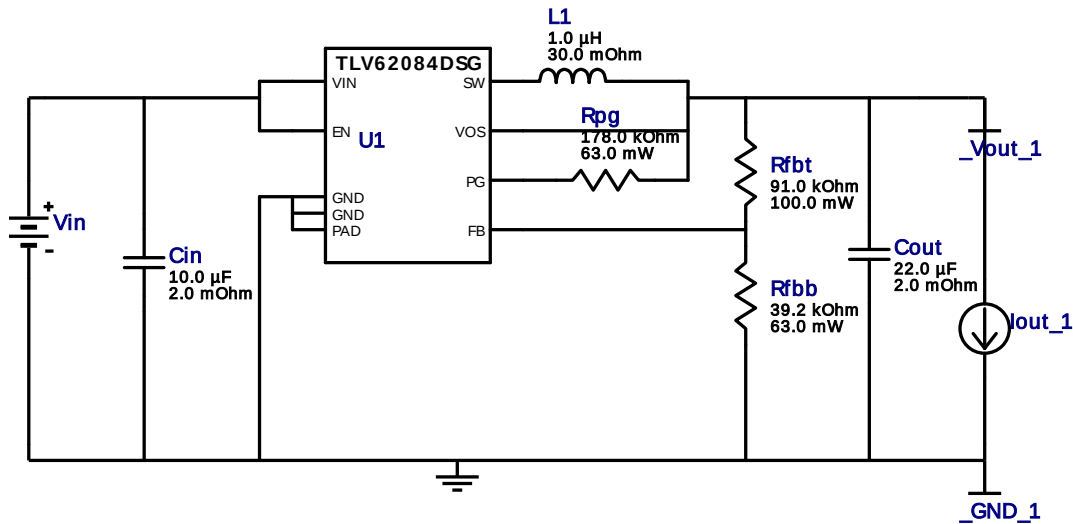


Vout = 1.5V
Iout = 1.0A

Device = TLV62084DSGR
Topology = Buck
Created = 7/24/16 7:15:23 AM
BOM Cost = \$1.06
BOM Count = 7
Total Pd = 0.24W

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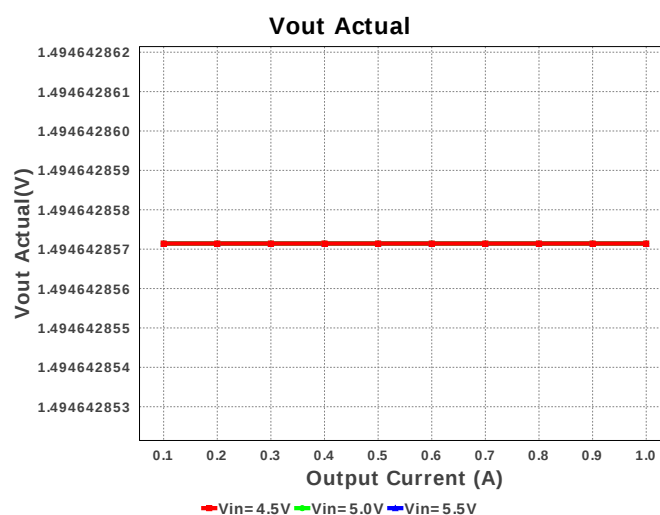
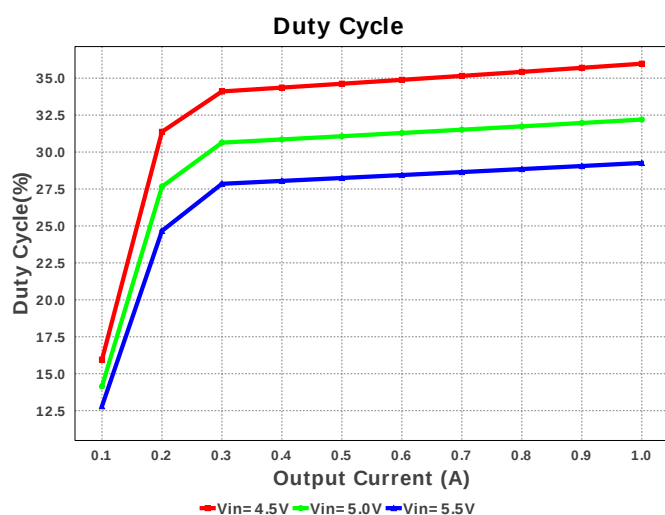
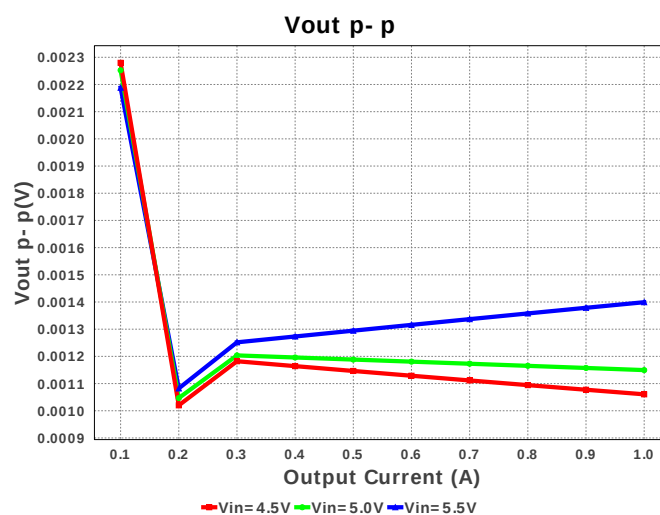
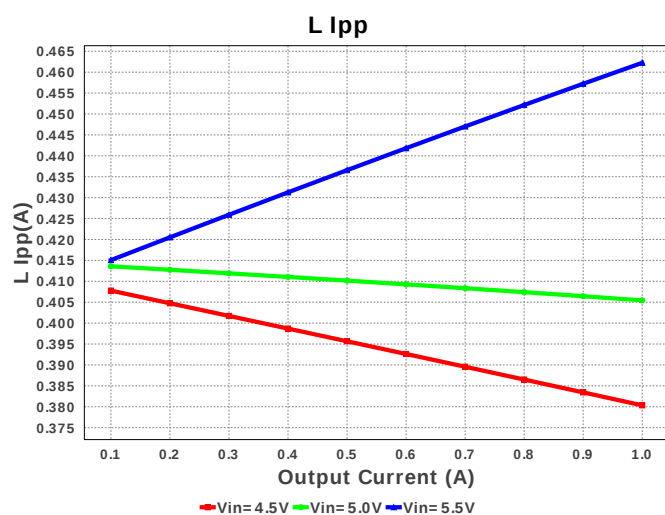
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TLV62084DSGR 4.5V-5.5V to 1.50V @ 1.0A

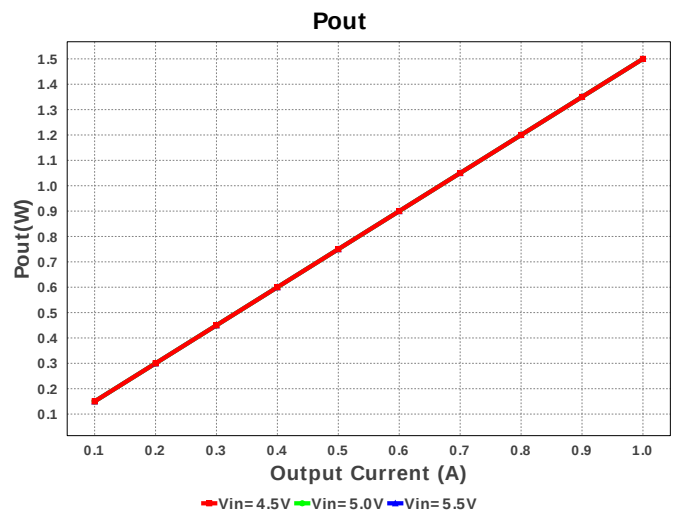
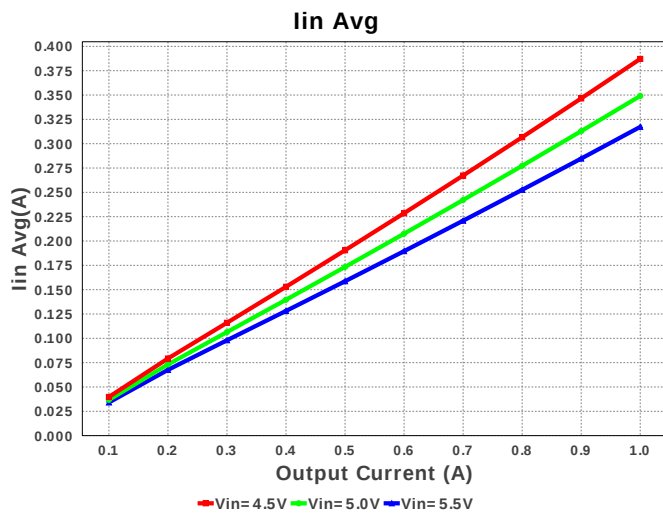
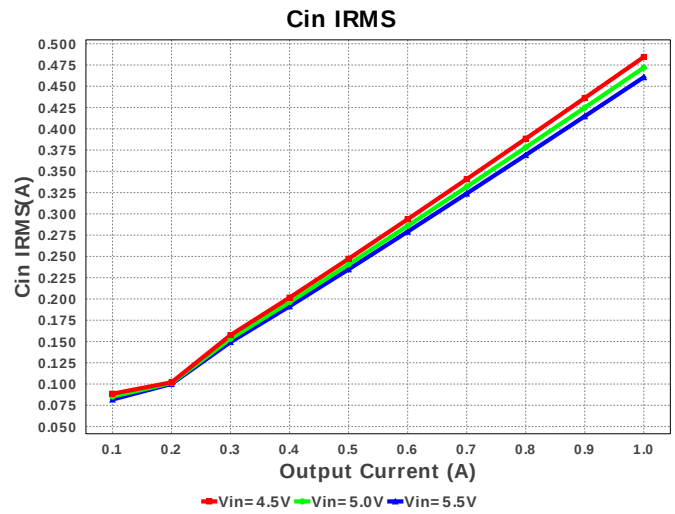
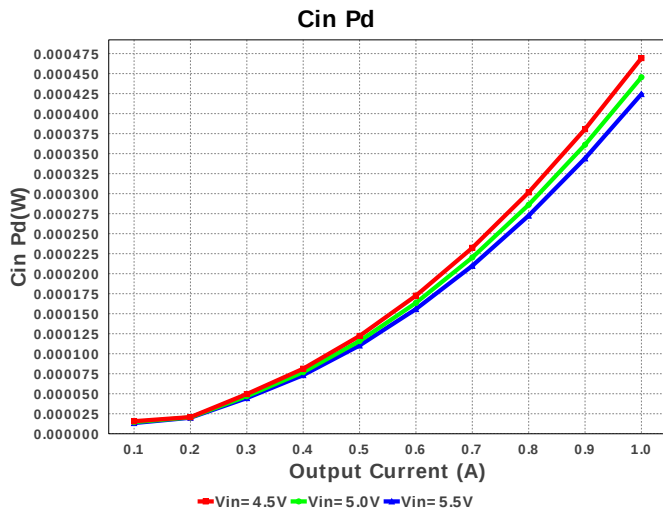
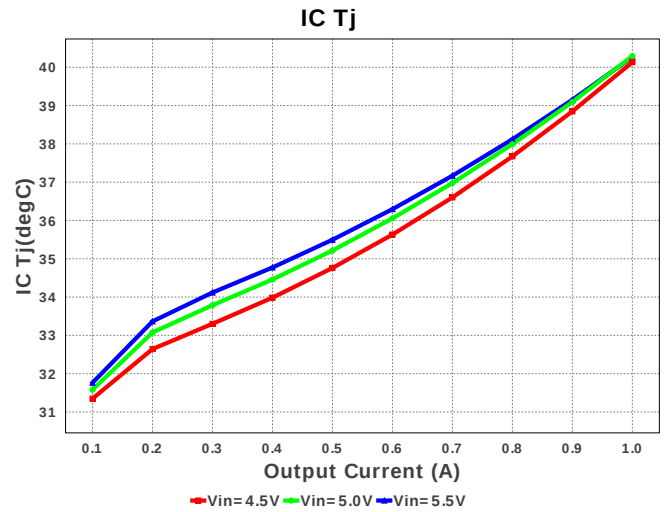
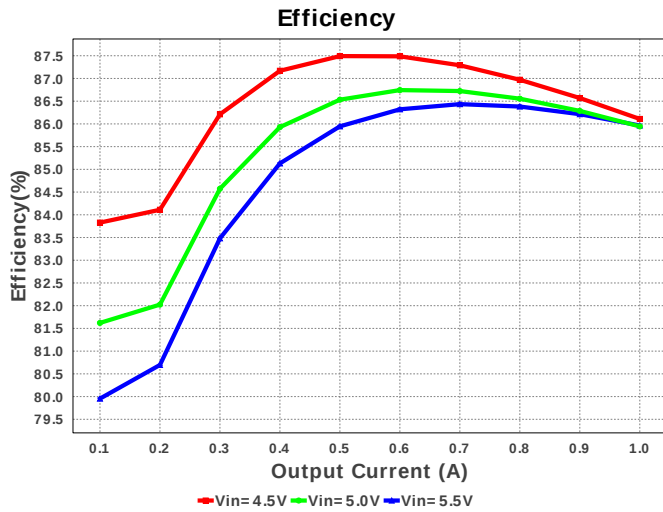


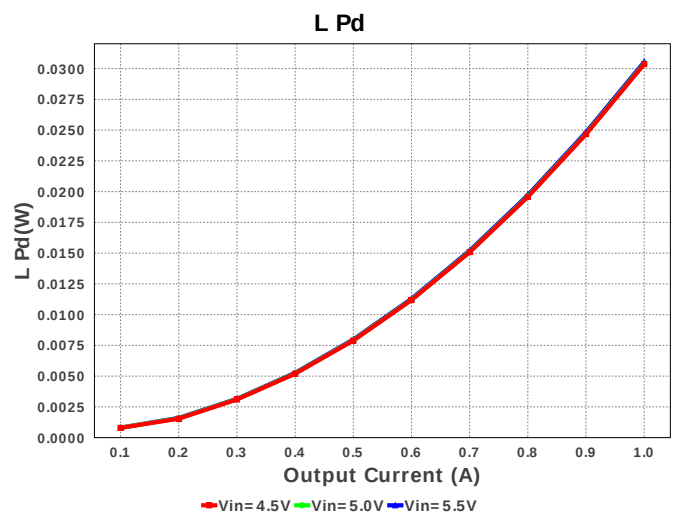
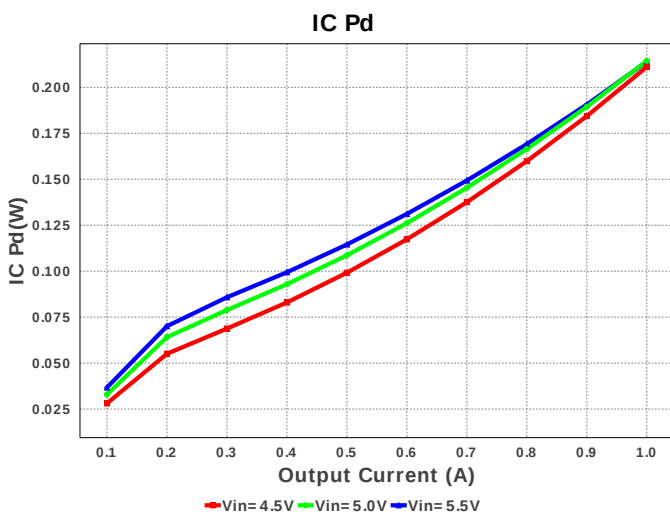
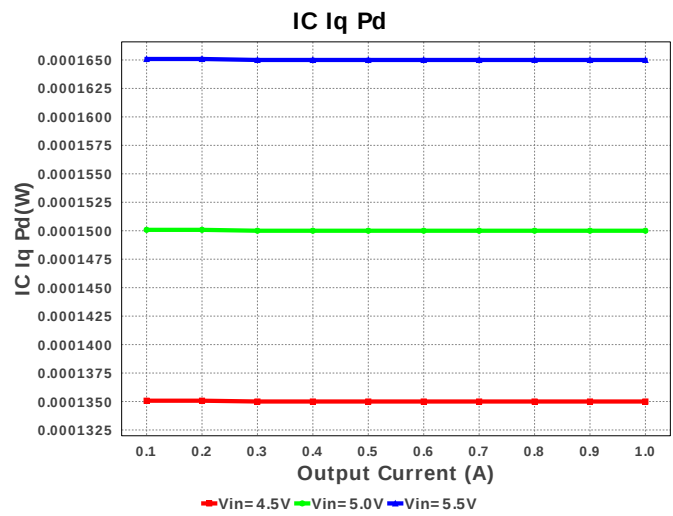
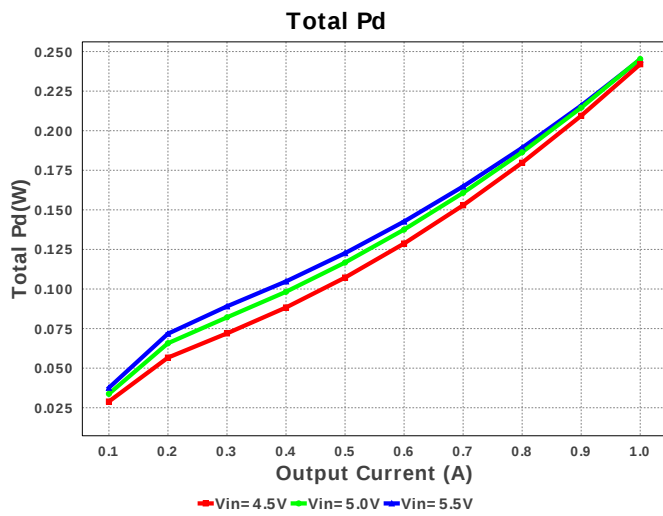
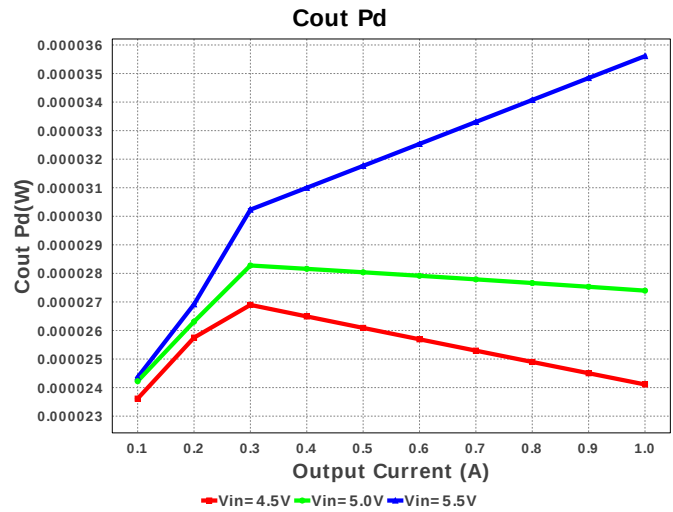
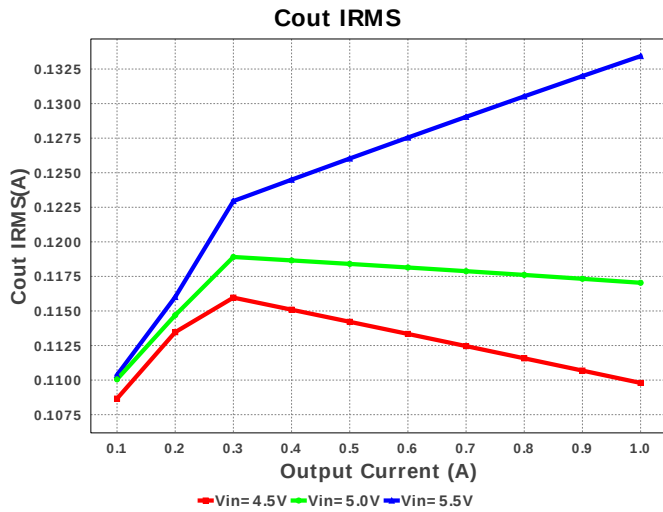
Electrical BOM

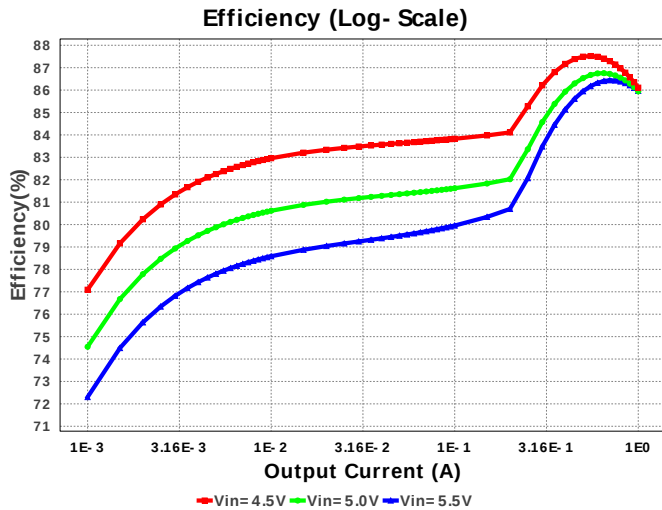
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	Taiyo Yuden	JMK212BJ106KD-T Series= X5R	Cap= 10.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Cout	Taiyo Yuden	JMK212BJ226KG-T Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.13	0805 7 mm ²
3.	L1	Coilcraft	PFL3215-102MEB	L= 1.0 µH DCR= 30.0 mOhm	1	\$0.28	PFL3215 14 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
4.	Rfbb	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
5.	Rfbt	Yageo America	RC0603FR-0791KL Series= ?	Res= 91.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
6.	Rpg	Vishay-Dale	CRCW0402178KFKED Series= CRCW..e3	Res= 178.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	U1	Texas Instruments	TLV62084DSGR	Switcher	1	\$0.59	DSG0008A 9 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	460.662 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	133.436 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	317.26 mA	Current	Average input current
4.	L Ipp	462.24 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	7	General	Total Design BOM count
6.	FootPrint	47.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	2.341 MHz	General	Switching frequency
8.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
9.	Pout	1.5 W	General	Total output power
10.	Total BOM	\$1.06	General	Total BOM Cost
11.	Vout Actual	1.495 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	1.5 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	29.263 %	Op_point	Duty cycle
14.	Efficiency	85.965 %	Op_point	Steady state efficiency
15.	IC Tj	40.267 degC	Op_point	IC junction temperature
16.	ICThetaJA	48.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	1.0 A	Op_point	Iout operating point
18.	VIN_OP	5.5 V	Op_point	Vin operating point
19.	Vout p-p	1.352 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	424.419 μW	Power	Input capacitor power dissipation
21.	Cout Pd	35.61 μW	Power	Output capacitor power dissipation
22.	IC Iq Pd	165.0 μW	Power	IC Iq Pd
23.	IC Pd	213.895 mW	Power	IC power dissipation
24.	L Pd	30.534 mW	Power	Inductor power dissipation
25.	Total Pd	244.901 mW	Power	Total Power Dissipation
26.	Vout Tolerance	4.116 %		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	5.5	Maximum input voltage
3.	VinMin	4.5	Minimum input voltage
4.	Vout	1.5	Output Voltage
5.	base_pn	TLV62084	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TLV62084** Product Folder : <http://www.ti.com/product/TLV62084> : contains the data sheet and other resources.

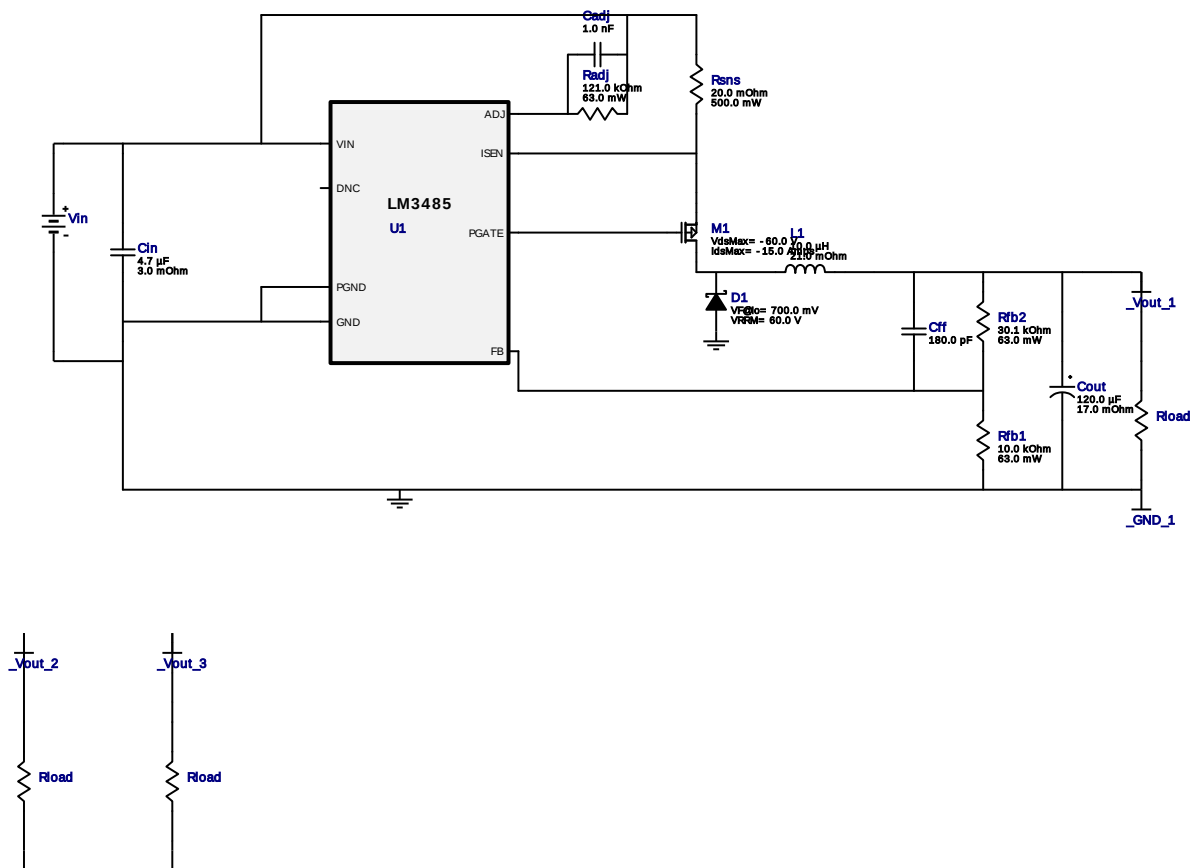


Vout = 5.0V
Iout = 2.95A

Device = LM3485MM/NOPB
Topology = Buck
Created = 7/24/16 7:15:23 AM
BOM Cost = \$1.96
BOM Count = 12
Total Pd = 2.05W

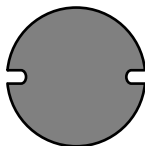
WEBENCH® Design Report

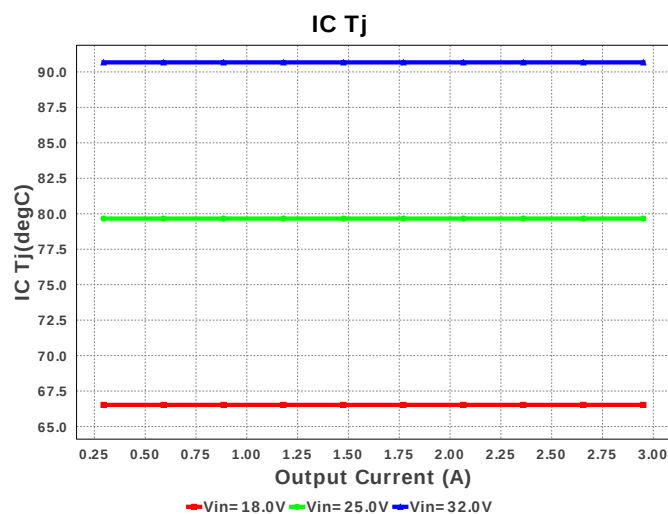
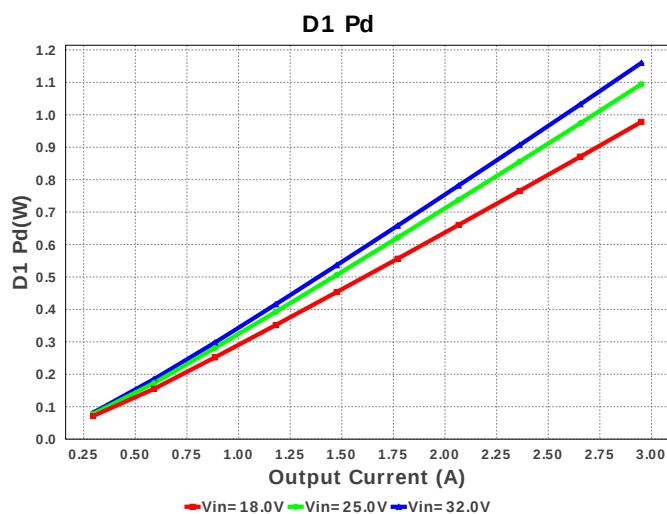
Design : 1194016/2172 LM3485MM/NOPB
LM3485MM/NOPB 18.0V-32.0V to 5.00V @ 2.95113A

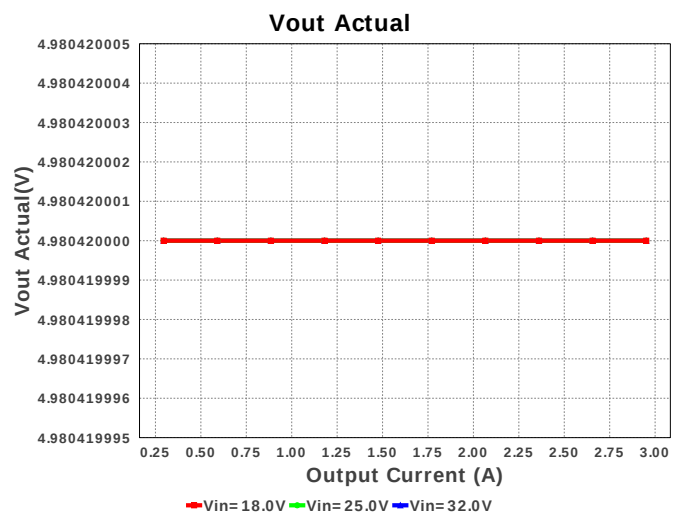
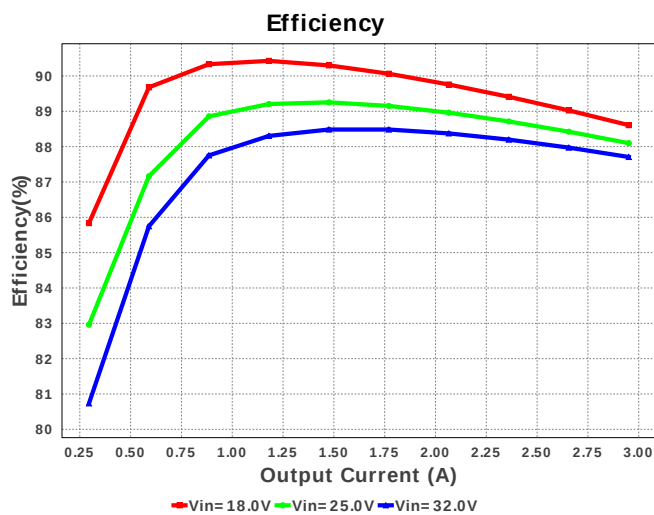
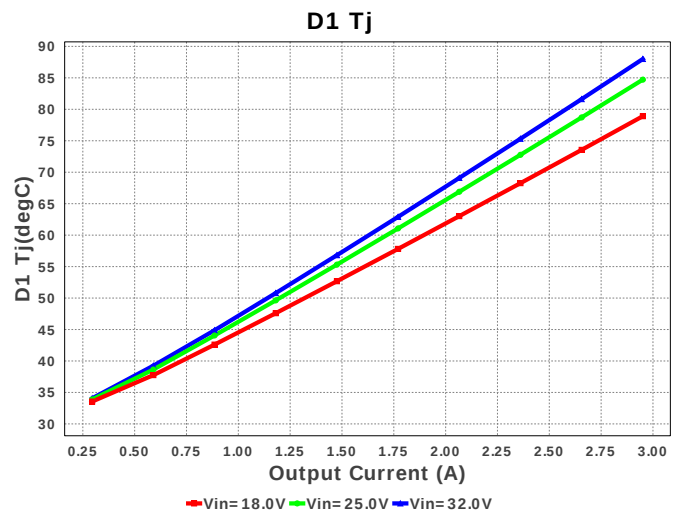
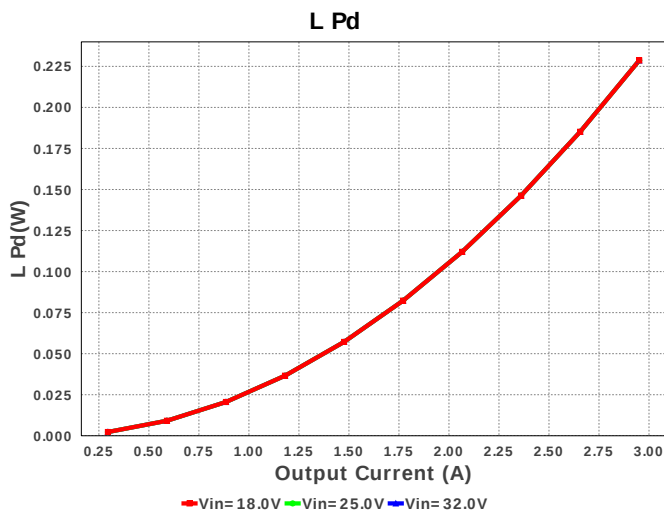
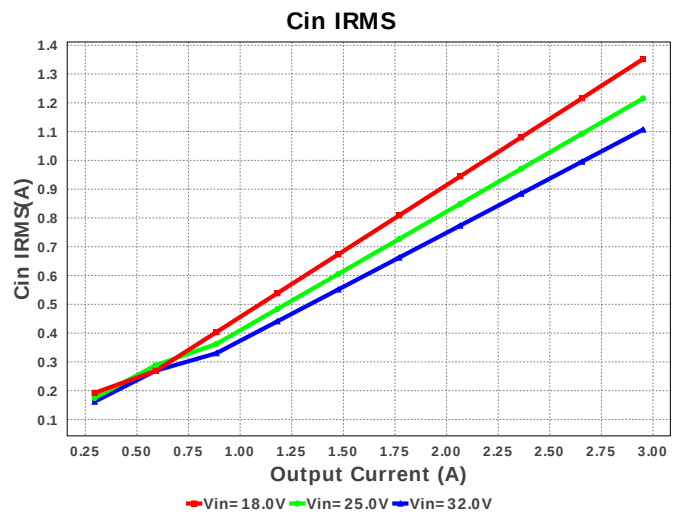
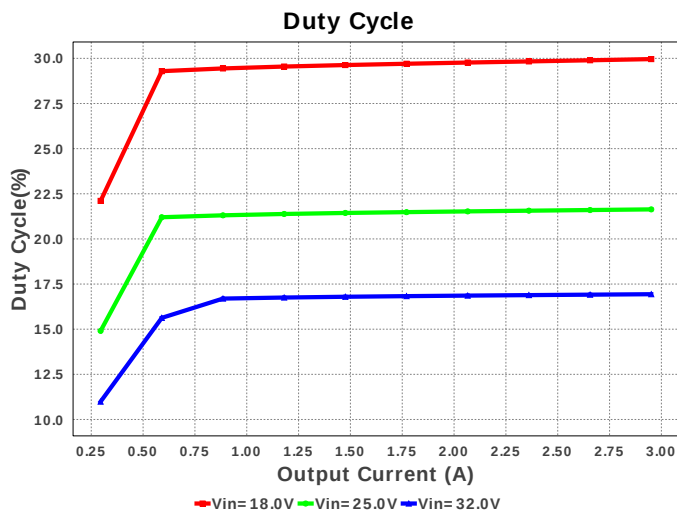


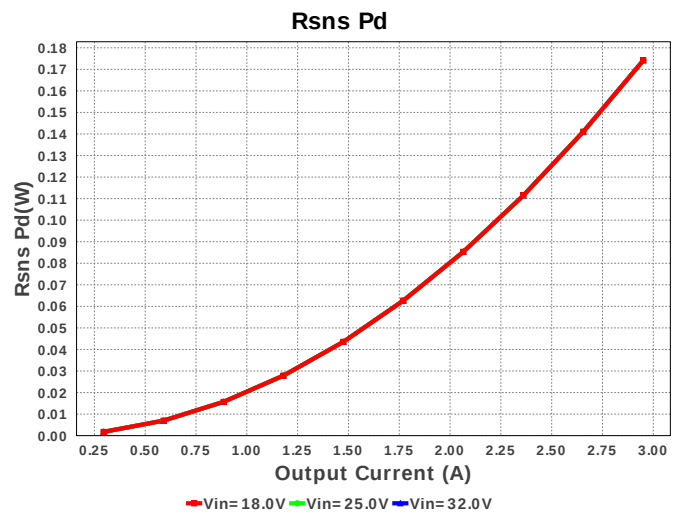
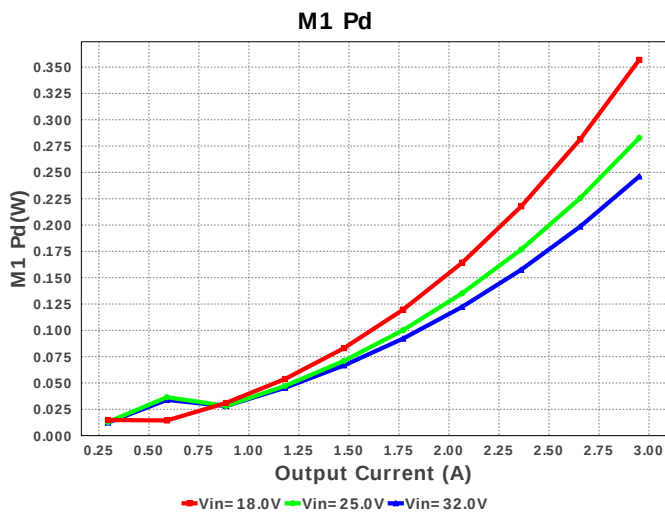
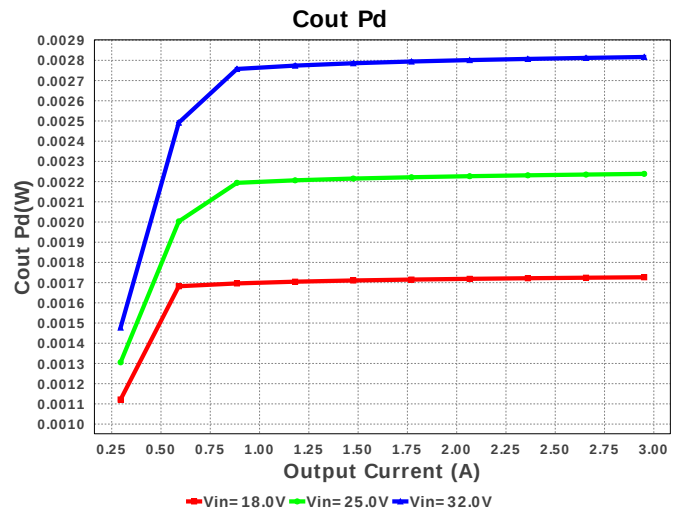
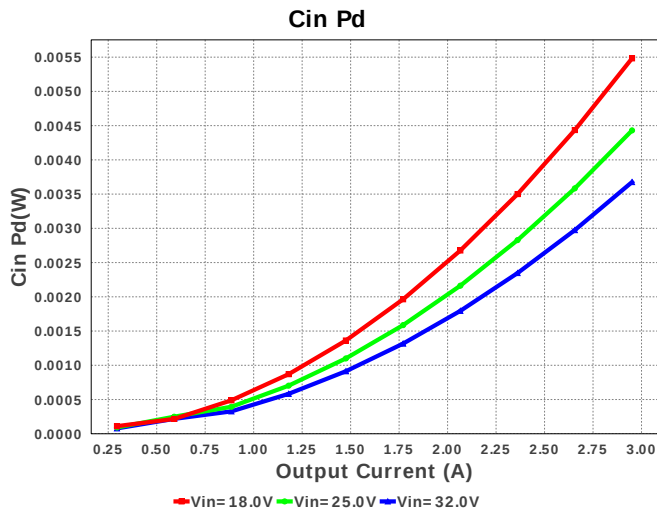
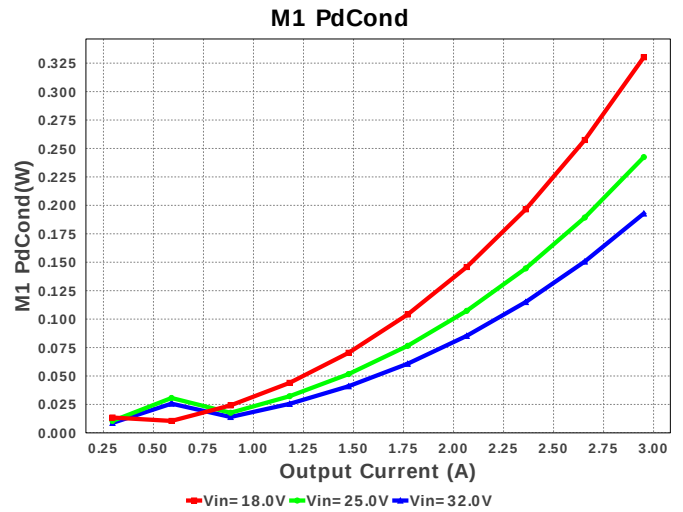
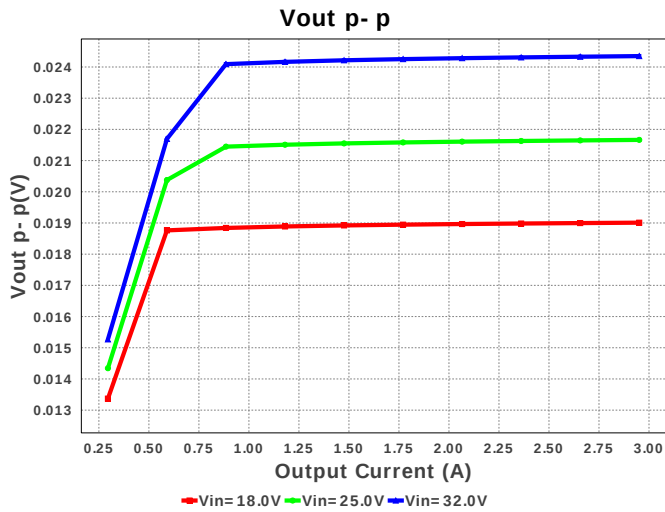
Electrical BOM

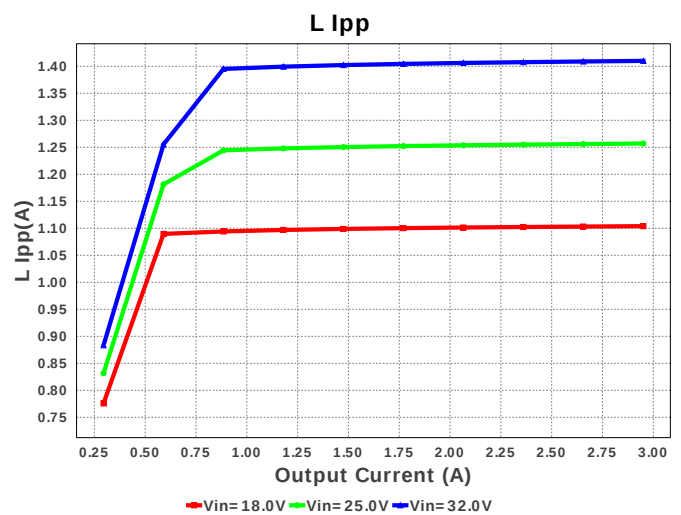
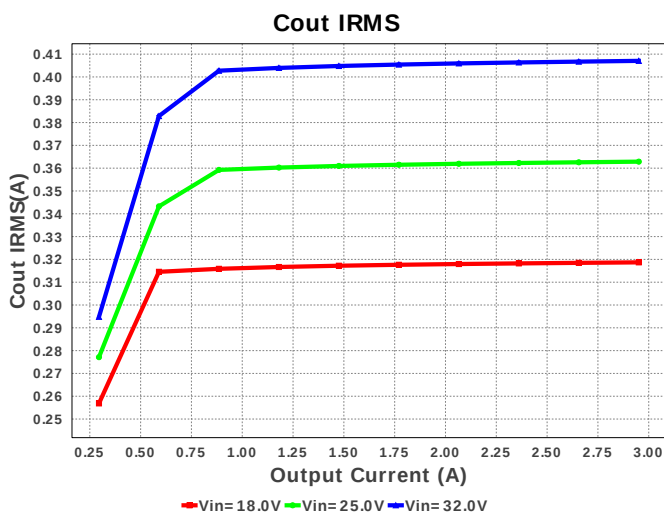
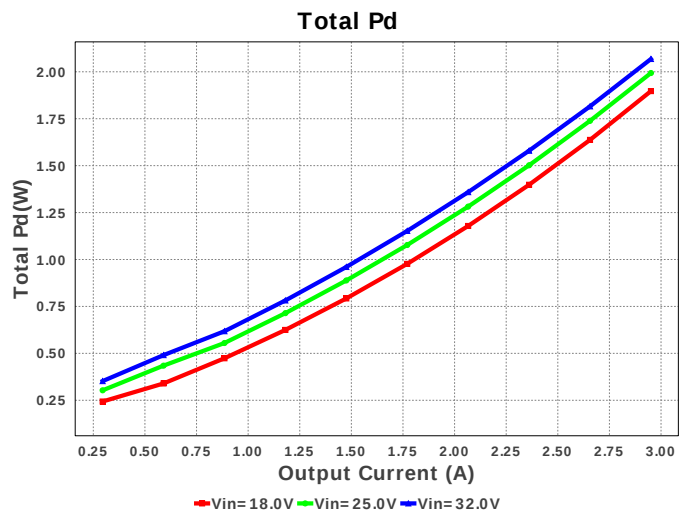
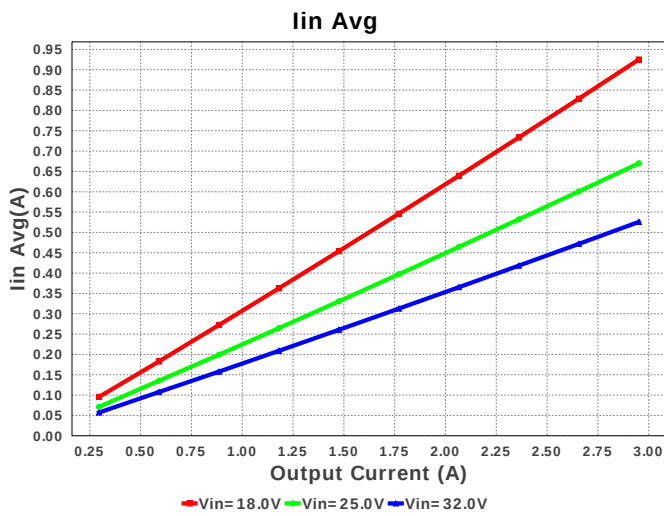
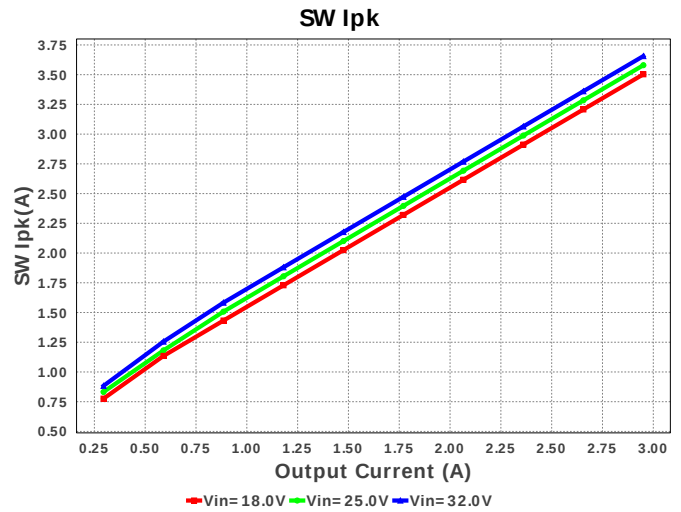
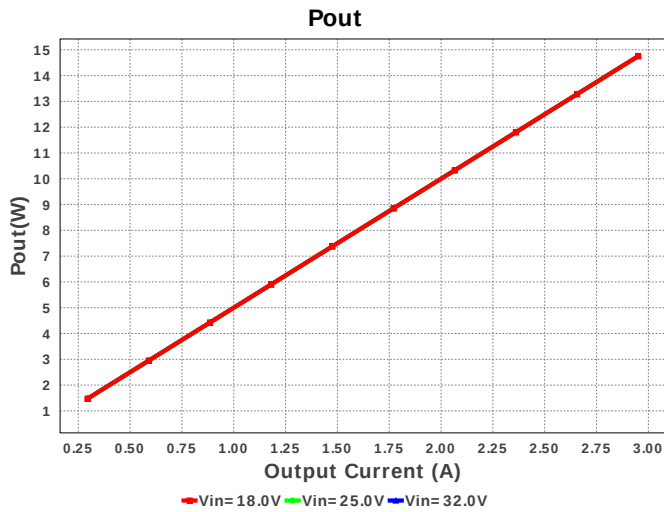
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1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
2.	Cff	Kemet	C0805C181K5GACTU Series= C0G/NP0	Cap= 180.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	\$0.07	 1206 11 mm ²
4.	Cout	Panasonic	6SVP120MV Series= SVP	Cap= 120.0 uF ESR= 17.0 mOhm VDC= 6.3 V IRMS= 2.78 A	1	\$0.46	 SM_RADIAL_6.3AMM 80 mm ²
5.	D1	Diodes Inc.	B560C-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.17	 SMC 83 mm ²

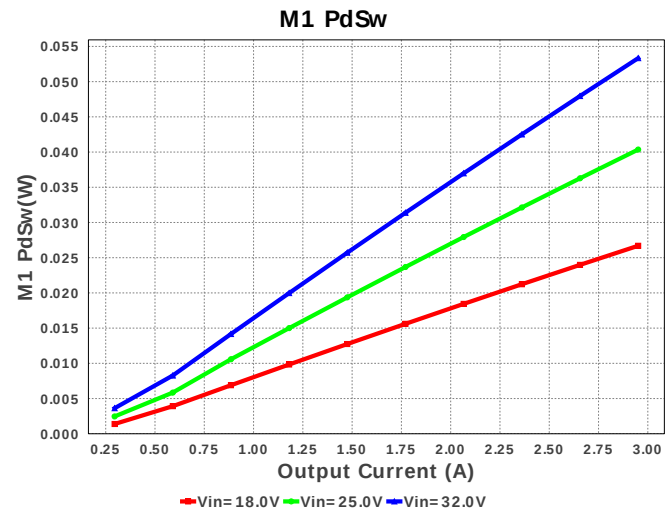
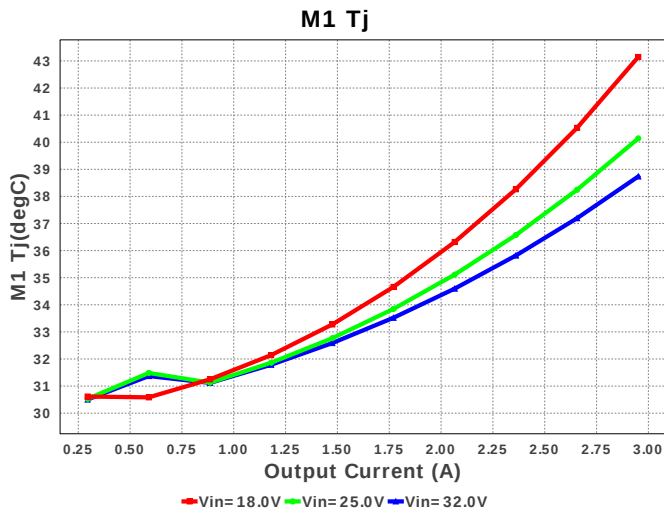
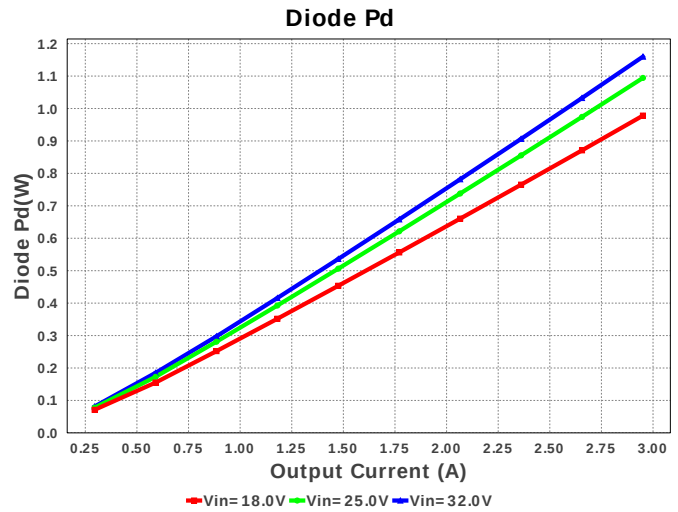
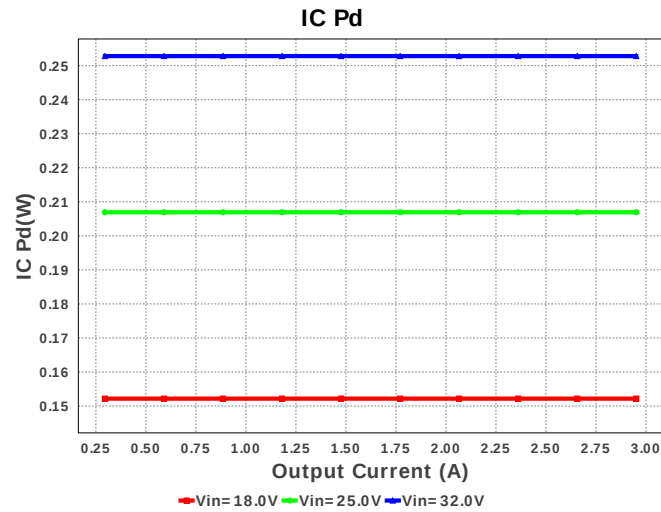
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
6.	L1	Bourns	SDR1307-100ML	L= 10.0 μ H DCR= 21.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
7.	M1	Fairchild Semiconductor	FDD5614P	VdsMax= -60.0 V IdsMax= -15.0 Amps	1	\$0.24	 DPAK 102 mm ²
8.	Radj	Vishay-Dale	CRCW0402121KFKED Series= CRCW..e3	Res= 121.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
9.	Rfb1	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rfb2	Vishay-Dale	CRCW040230K1FKED Series= CRCW..e3	Res= 30.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rsns	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.10	 1206 11 mm ²
12.	U1	Texas Instruments	LM3485MM/NOPB	Switcher	1	\$0.52	 MUA08A 24 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.107 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	441.075 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	525.32 mA	Current	Average input current
4.	L Ipp	1.528 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	3.715 A	Current	Peak switch current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	559.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	343.481 kHz	General	Switching frequency
9.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
10.	Pout	14.756 W	General	Total output power
11.	Total BOM	\$1.96	General	Total BOM Cost
12.	D1 Tj	87.996 degC	Op_Point	D1 junction temperature
13.	Vout Actual	4.98 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	16.939 %	Op_point	Duty cycle
16.	Efficiency	87.777 %	Op_point	Steady state efficiency
17.	IC Tj	77.111 degC	Op_point	IC junction temperature
18.	ICThetaJA	200.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	2.951 A	Op_point	Iout operating point
20.	M1 Tj	38.737 degC	Op_point	M1 MOSFET junction temperature
21.	VIN_OP	32.0 V	Op_point	Vin operating point
22.	Vout p-p	26.385 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	3.676 mW	Power	Input capacitor power dissipation
24.	Cout Pd	3.307 mW	Power	Output capacitor power dissipation
25.	D1 Pd	1.16 W	Power	Output Diode Power Dissipation
26.	Diode Pd	1.16 W	Power	Diode power dissipation
27.	IC Pd	235.553 mW	Power	IC power dissipation
28.	L Pd	228.616 mW	Power	Inductor power dissipation
29.	M1 Pd	249.481 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	196.147 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	53.334 mW	Power	M1 MOSFET switching losses

#	Name	Value	Category	Description
32.	Rsns Pd	174.183 mW	Power	LED Current Rsns Power Dissipation
33.	Total Pd	2.055 W	Power	Total Power Dissipation
34.	Vout Tolerance	1.516 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.951	Maximum Output Current
2.	VinMax	32.0	Maximum input voltage
3.	VinMin	18.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM3485	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. Outline The LM3485 is a hysteretic PFET controller. The hysteretic control architecture provides for a stable design without the use of a control loop. The switching frequency depends on the inductance value, output capacitor ESR, and the input voltage. Therefore depending on the chosen BOM, the frequency at different input voltages would vary.

2. **LM3485** Product Folder : <http://www.ti.com/product/LM3485> : contains the data sheet and other resources.

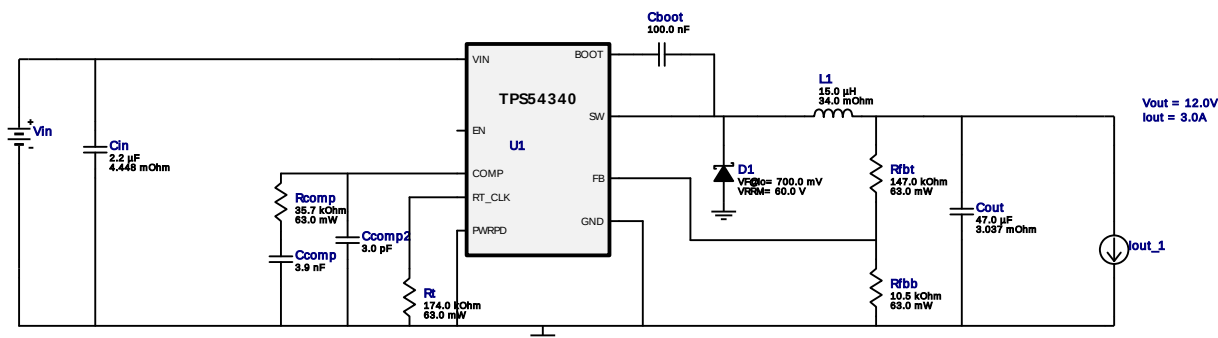


Vout = 12.0V
Iout = 3.0A

Device = TPS54340DDAR
Topology = Buck
Created = 7/24/16 7:15:24 AM
BOM Cost = \$2.56
BOM Count = 12
Total Pd = 2.03W

WEBENCH® Design Report

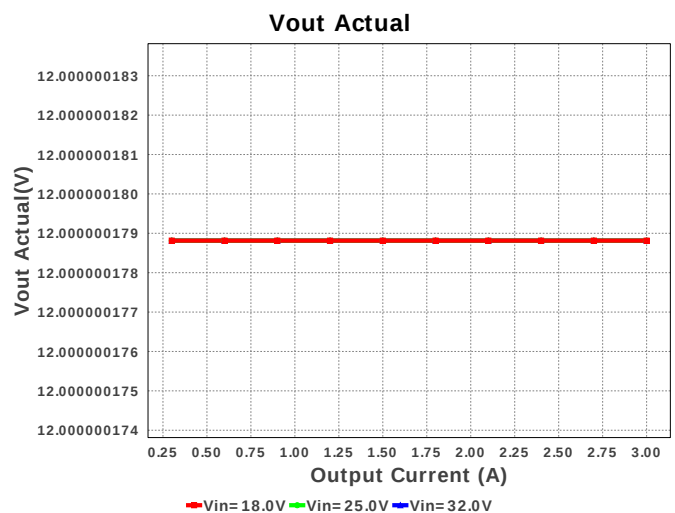
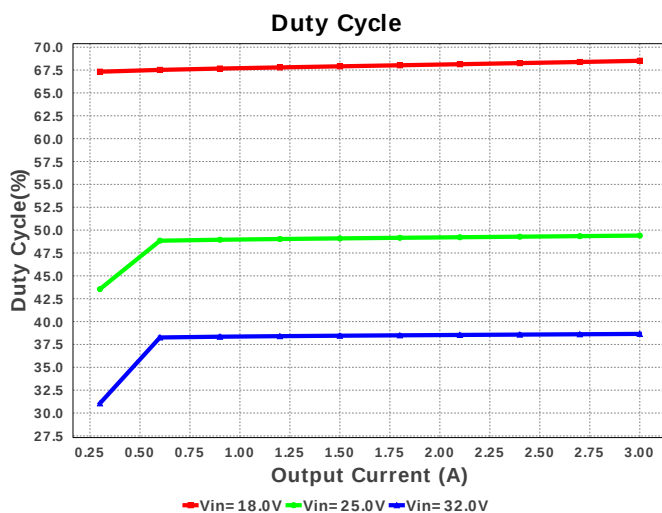
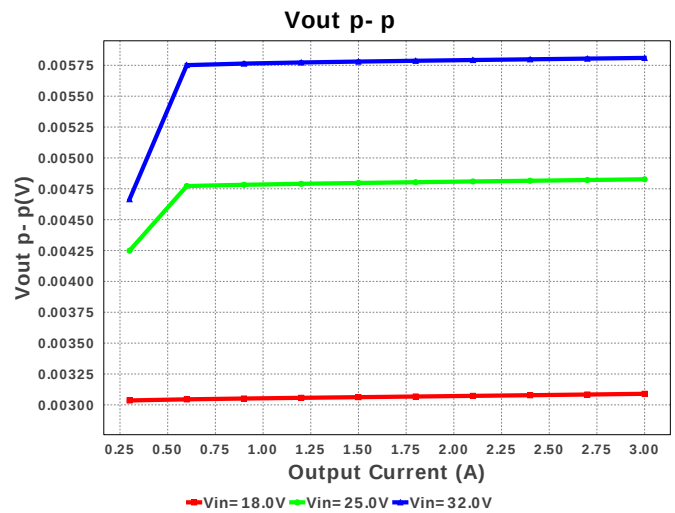
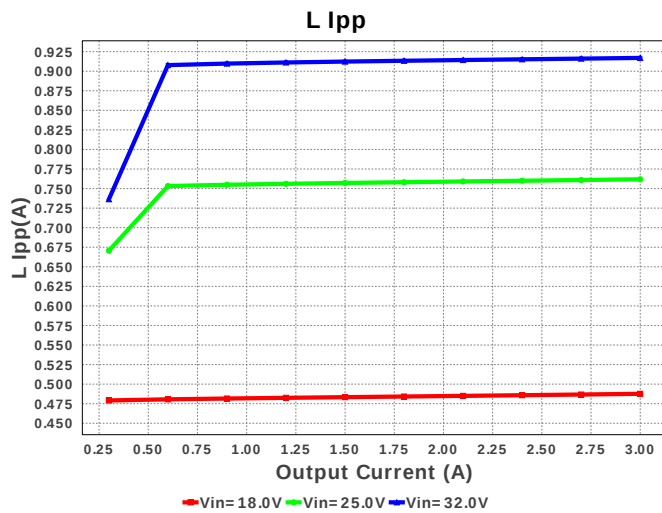
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TPS54340DDAR 18.0V-32.0V to 12.00V @ 3.0A

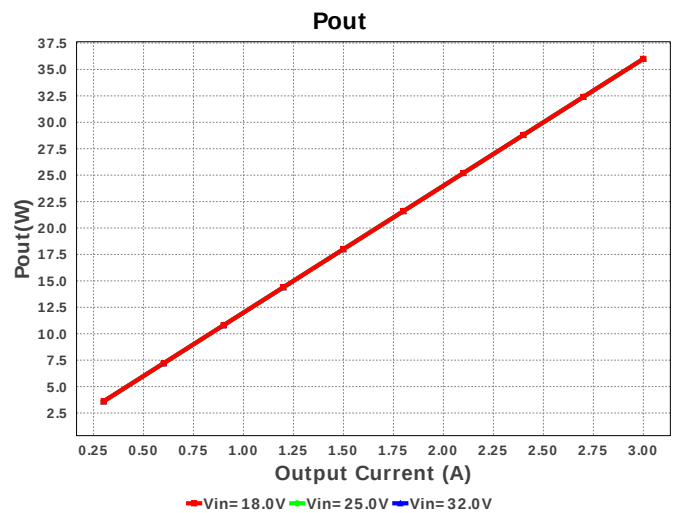
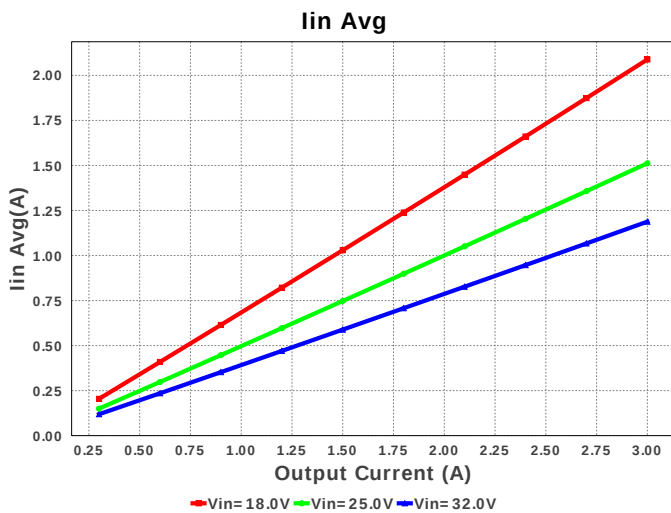
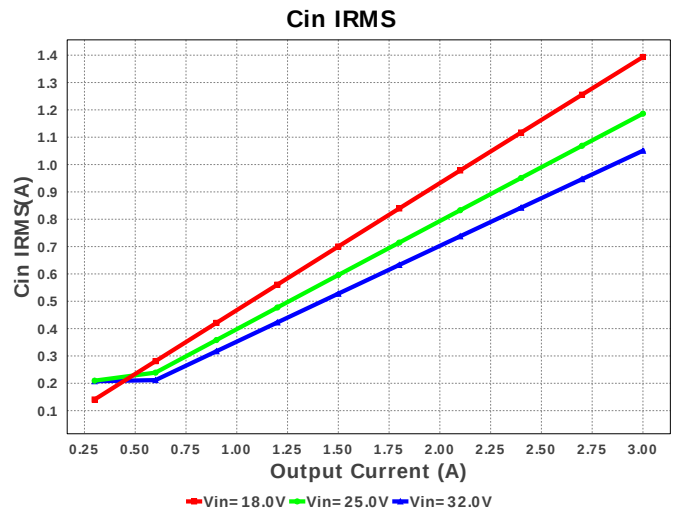
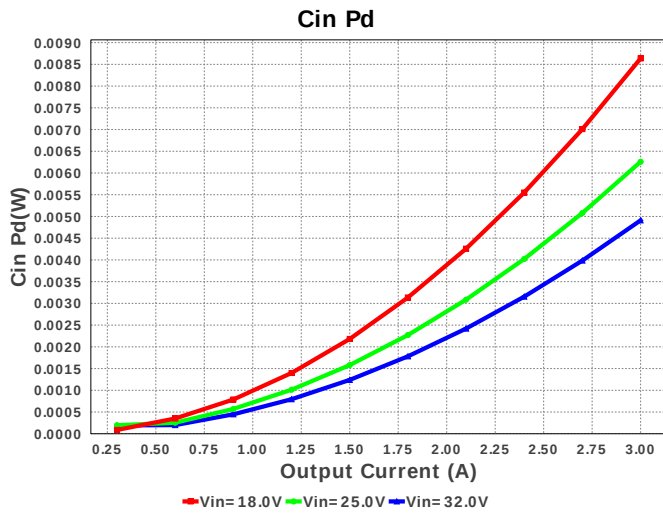
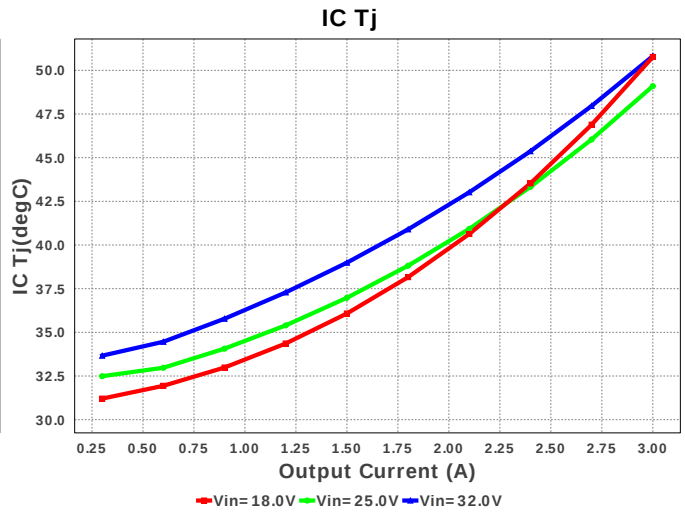
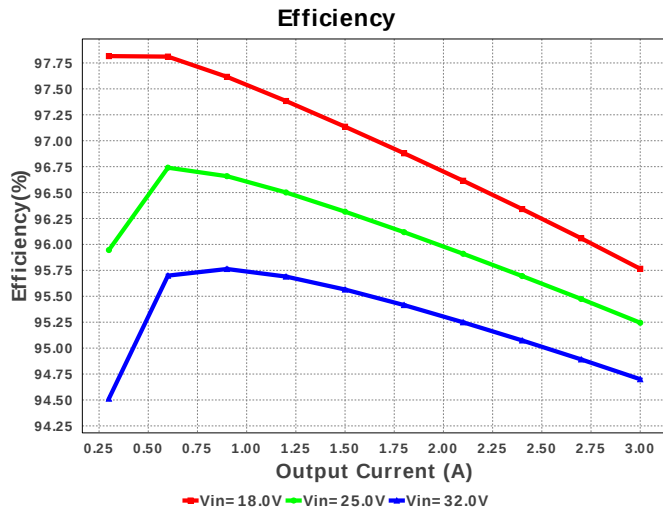


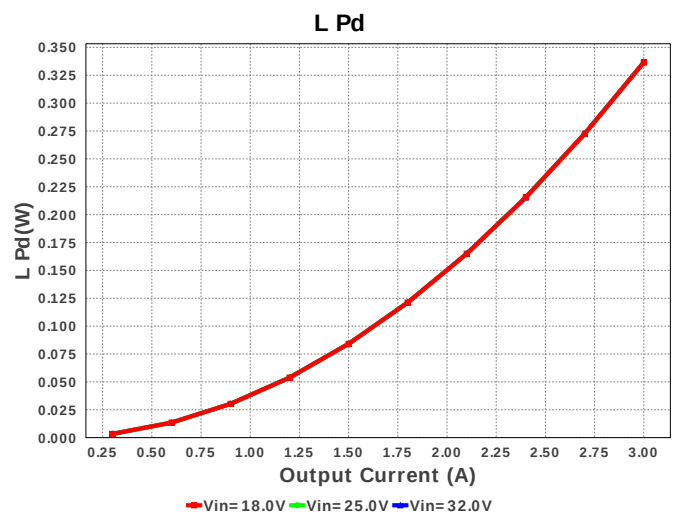
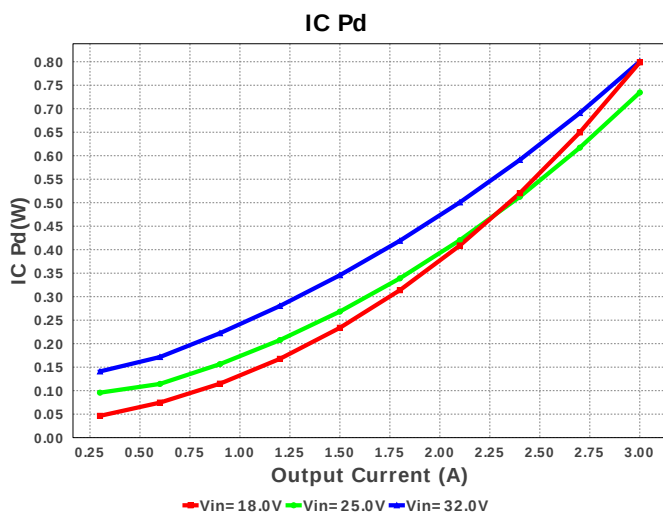
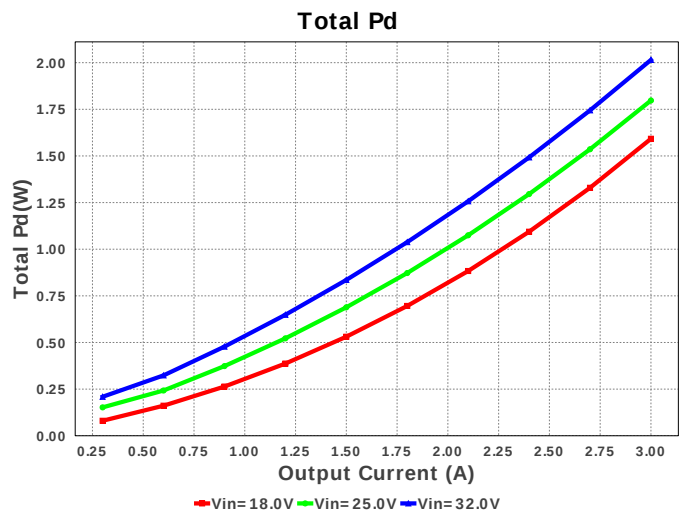
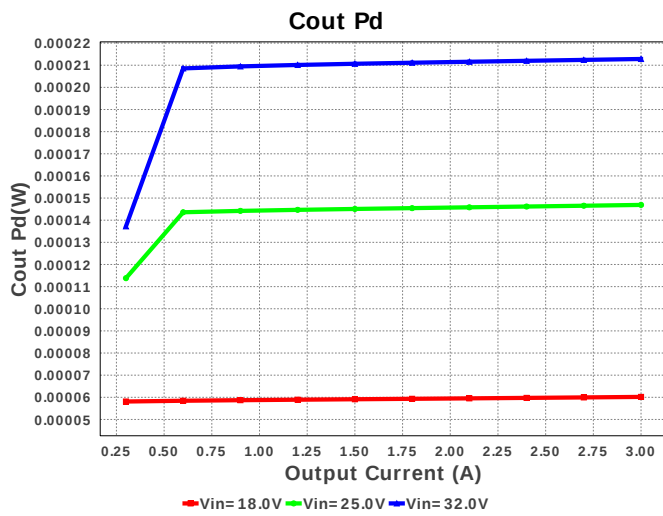
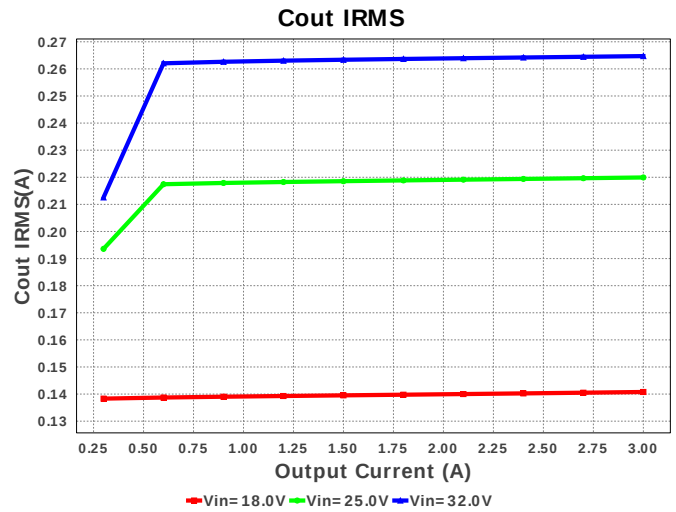
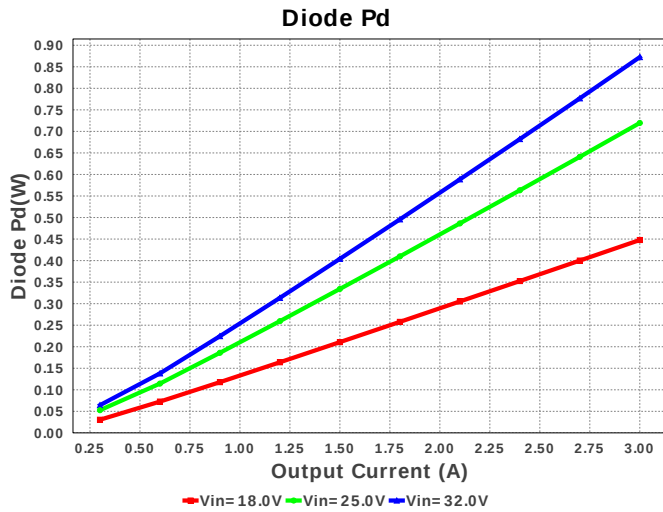
Electrical BOM

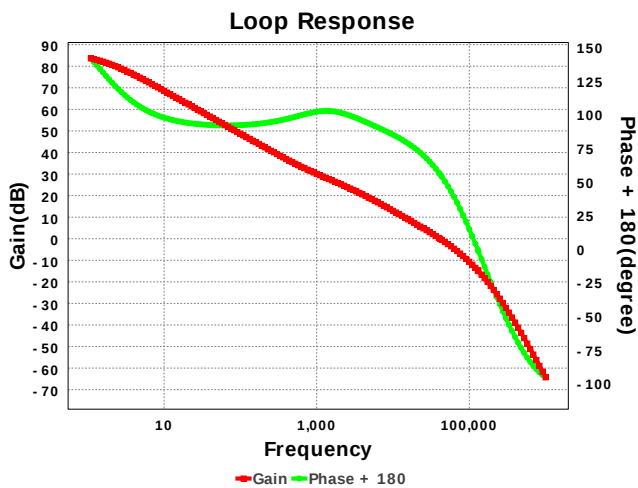
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1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB392 Series= X7R	Cap= 3.9 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Ccomp2	MuRata	GRM1555C1H3R0CA01D Series= C0G/NP0	Cap= 3.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
4.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 µF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	1206_190 11 mm ²
5.	Cout	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 47.0 µF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	\$0.24	1210_280 15 mm ²
6.	D1	Diodes Inc.	B560C-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.17	SMC 83 mm ²
7.	L1	Bourns	SDR1307-150ML	L= 15.0 µH DCR= 34.0 mOhm	1	\$0.35	SDR1307 227 mm ²
8.	Rcomp	Vishay-Dale	CRCW040235K7FKED Series= CRCW..e3	Res= 35.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
9.	Rfbb	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfht	Vishay-Dale	CRCW0402147KFKED Series= CRCW..e3	Res= 147.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rt	Vishay-Dale	CRCW0402174KFKED Series= CRCW..e3	Res= 174.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
12.	U1	Texas Instruments	TPS54340DDAR	Switcher	1	\$1.68	

R-PDSO-G8 57 mm²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.051 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	264.83 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.188 A	Current	Average input current
4.	L Ipp	917.4 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	418.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	561.986 kHz	General	Switching frequency
8.	Pout	36.0 W	General	Total output power
9.	Total BOM	\$2.56	General	Total BOM Cost
10.	ICThetaJA Effective	26.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
11.	Low Freq Gain	83.609 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	12.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	41.319 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	38.667 %	Op_point	Duty cycle
16.	Efficiency	94.661 %	Op_point	Steady state efficiency
17.	Gain Marg	-14.71 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	50.82 degC	Op_point	IC junction temperature
19.	IOUT_OP	3.0 A	Op_point	Iout operating point
20.	Phase Marg	56.162 deg	Op_point	Bode Plot Phase Margin
21.	VIN_OP	32.0 V	Op_point	Vin operating point
22.	Vout p-p	5.813 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	4.91 mW	Power	Input capacitor power dissipation
24.	Cout Pd	213.0 μW	Power	Output capacitor power dissipation
25.	Diode Pd	888.121 mW	Power	Diode power dissipation
26.	IC Pd	800.766 mW	Power	IC power dissipation
27.	L Pd	336.6 mW	Power	Inductor power dissipation
28.	Total Pd	2.031 W	Power	Total Power Dissipation
29.	Vout Tolerance	2.904 %		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	32.0	Maximum input voltage
3.	VinMin	18.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	TPS54340	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54340** Product Folder : <http://www.ti.com/product/TPS54340> : contains the data sheet and other resources.

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