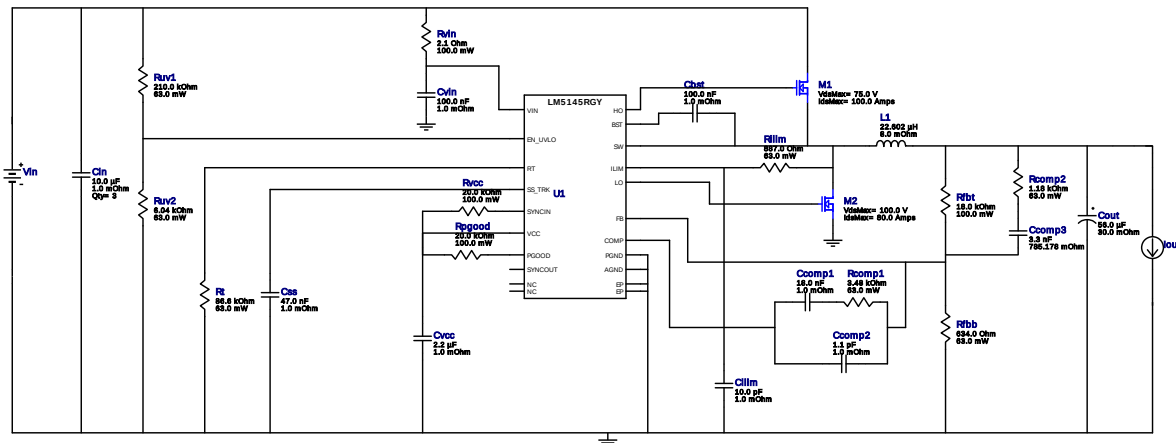




Design : LM5145RGYR
LM5145RGYR 44.0V-50.0V to 24.00V @ 15.0A

VinMin = 44.0V
VinMax = 50.0V
Vout = 24.0V
Iout = 15.0A

Device = LM5145RGYR
Topology = Buck
Created = 2018-08-21 21:23:12.788
BOM Cost = \$0.00
BOM Count = 27
Total Pd = 4.08W



1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application. View WEBENCH(R) Disclaimer.

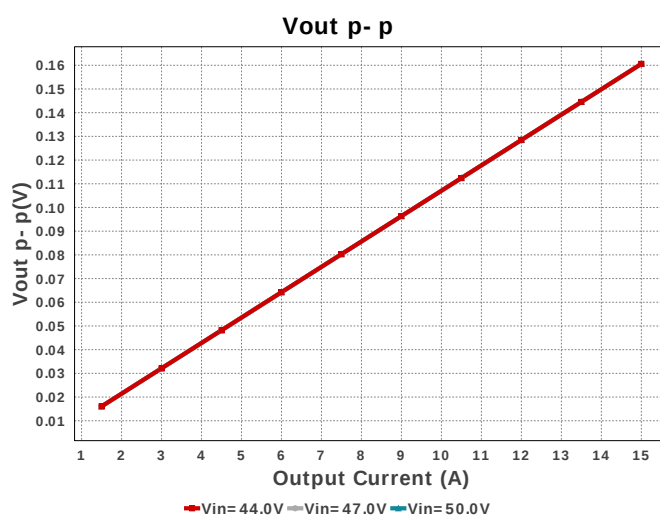
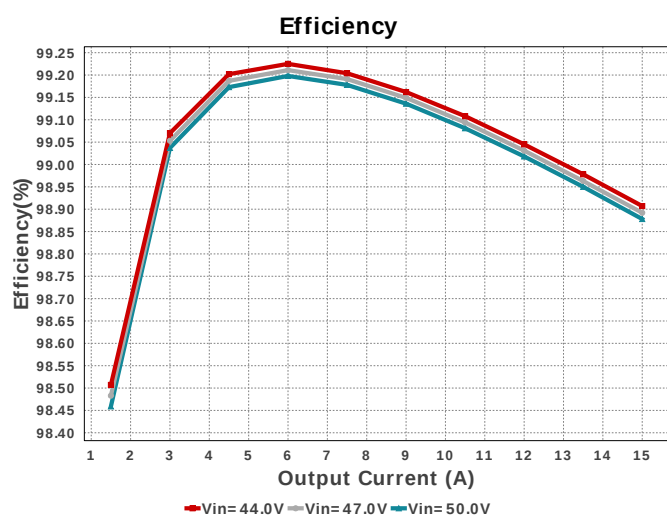
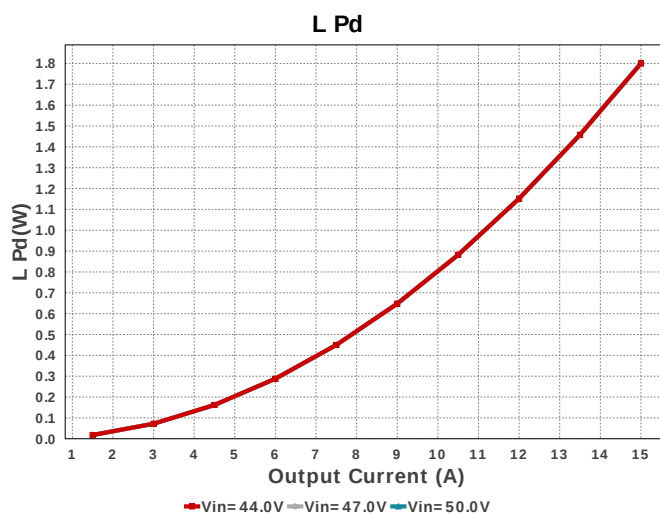
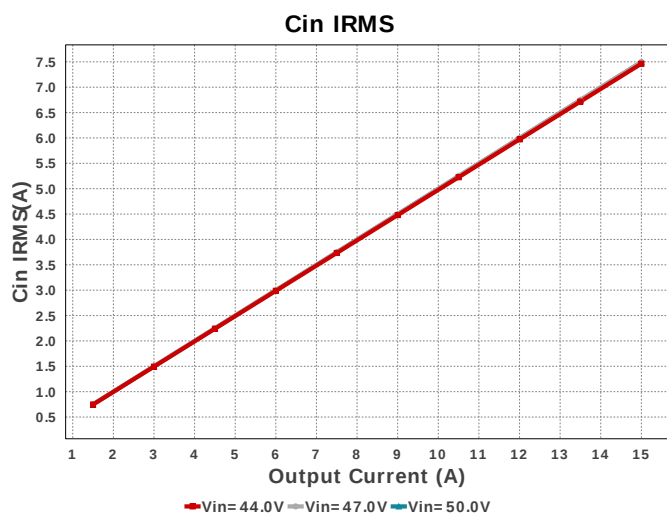
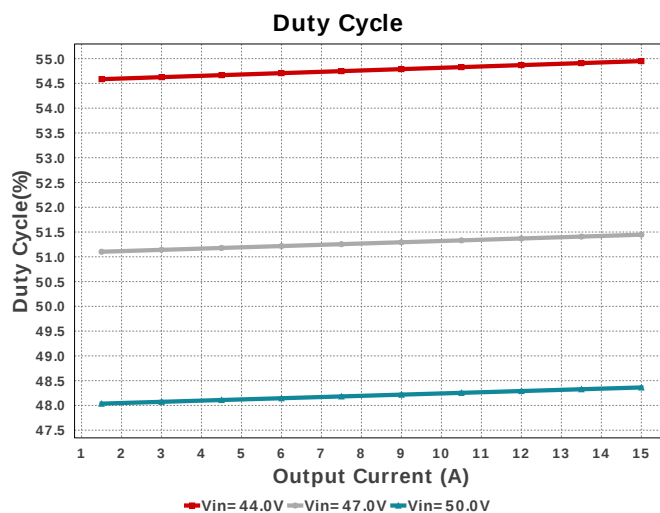
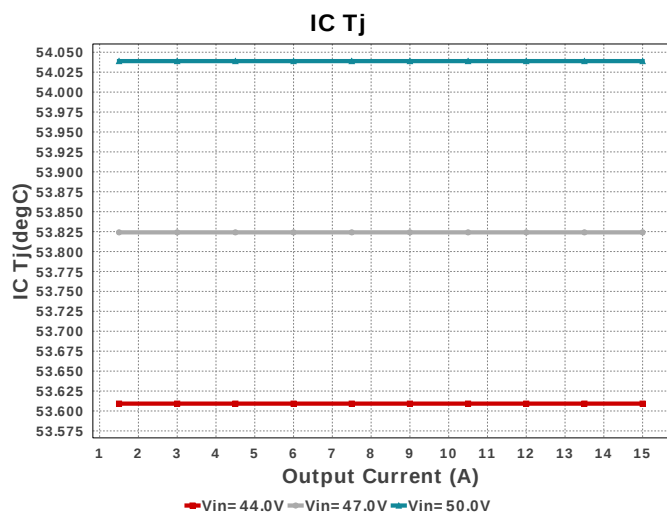
My Comments

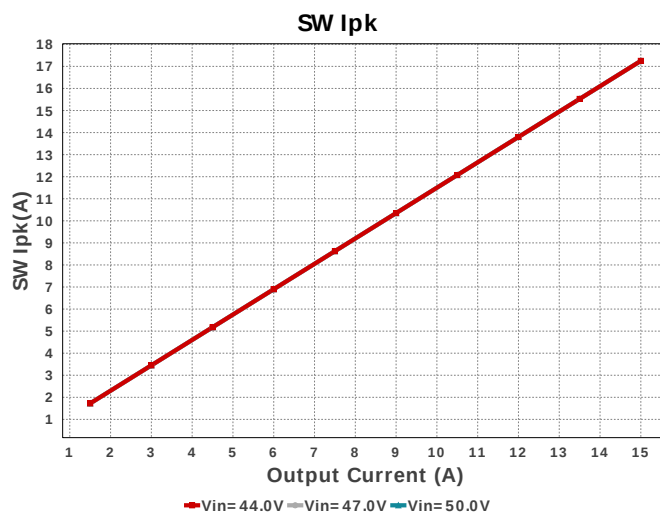
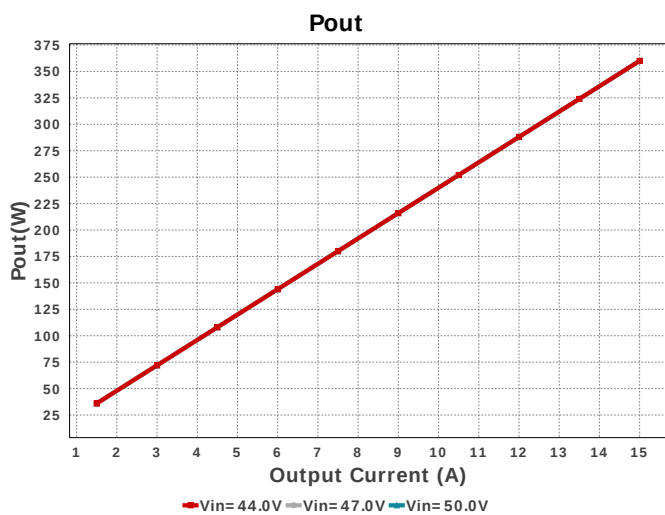
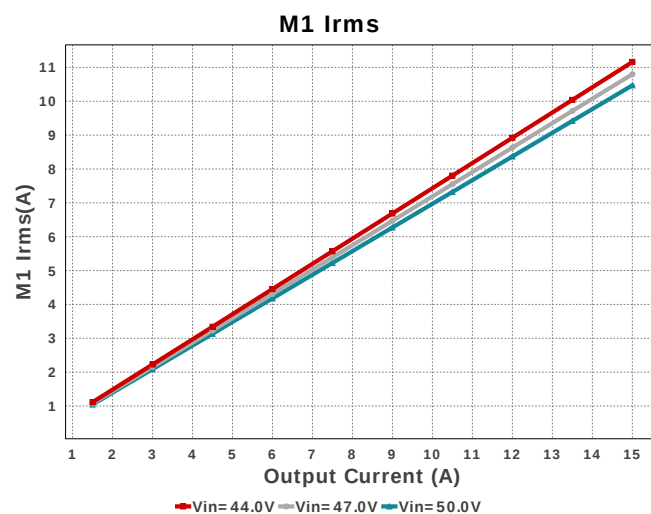
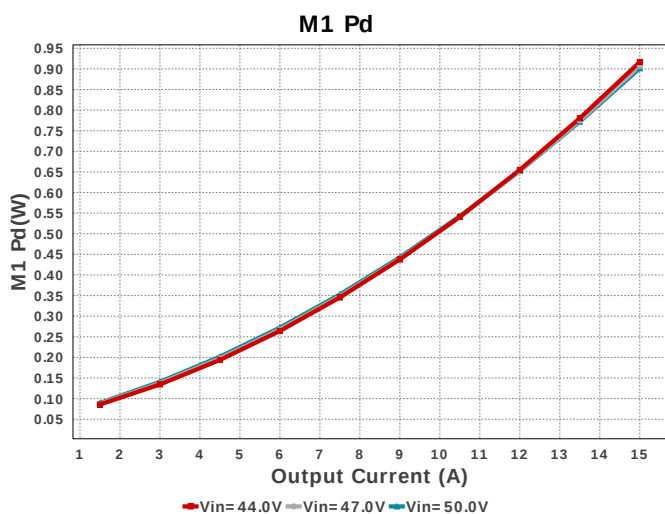
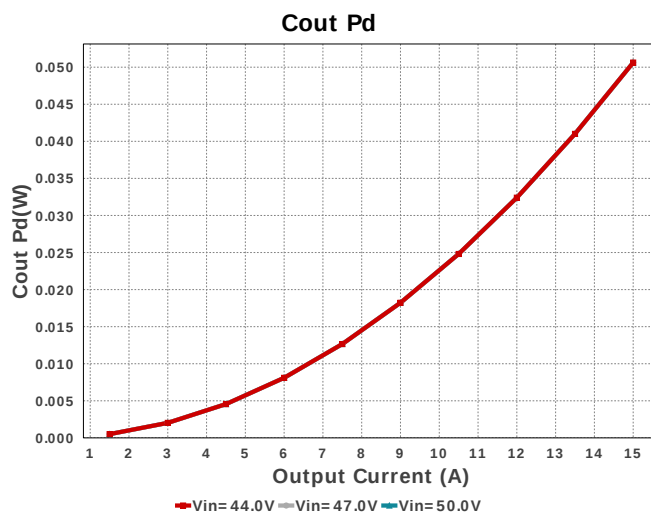
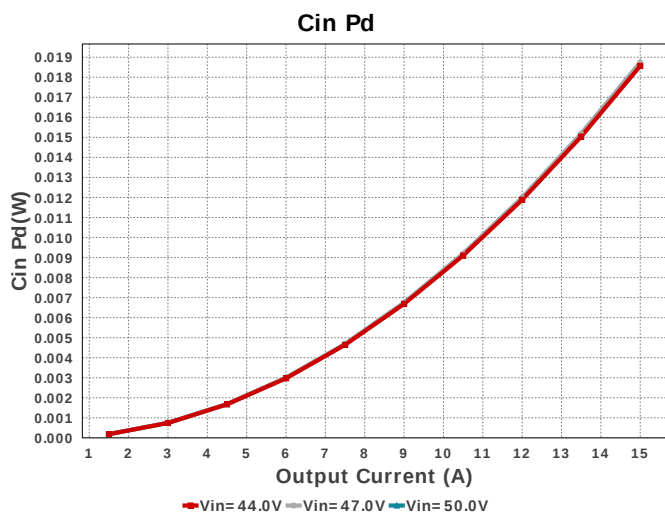
LM5145 - Ta is 45DegC

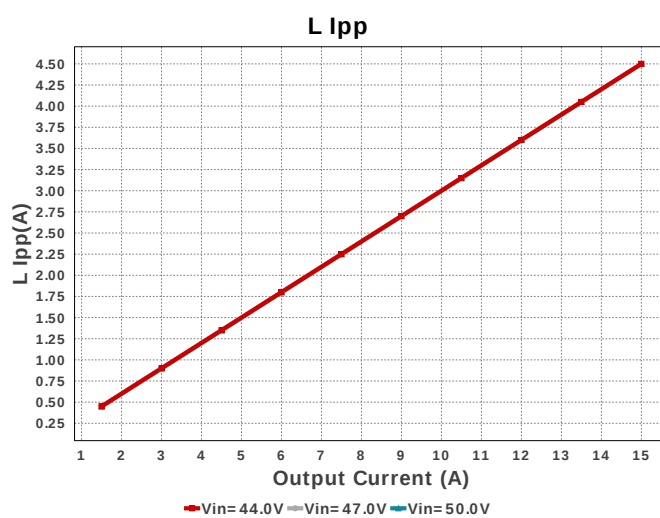
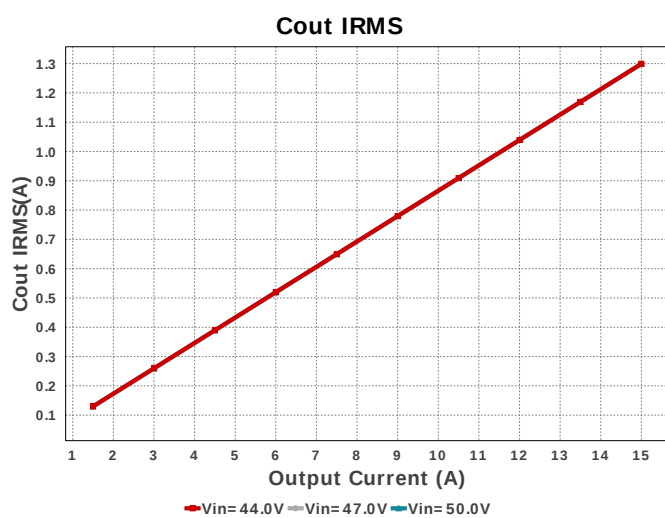
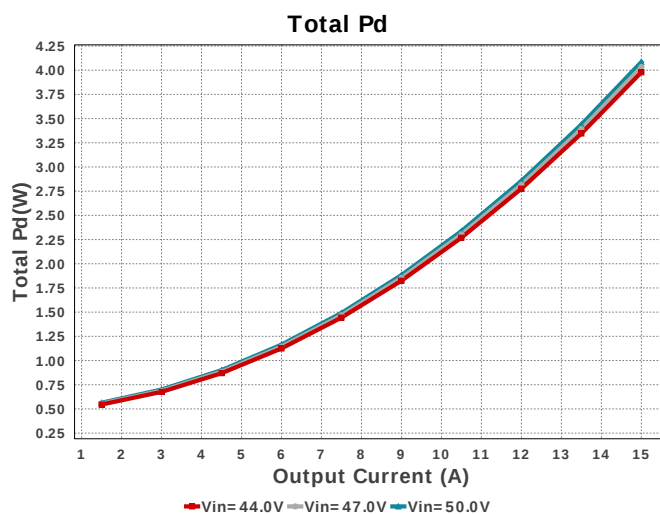
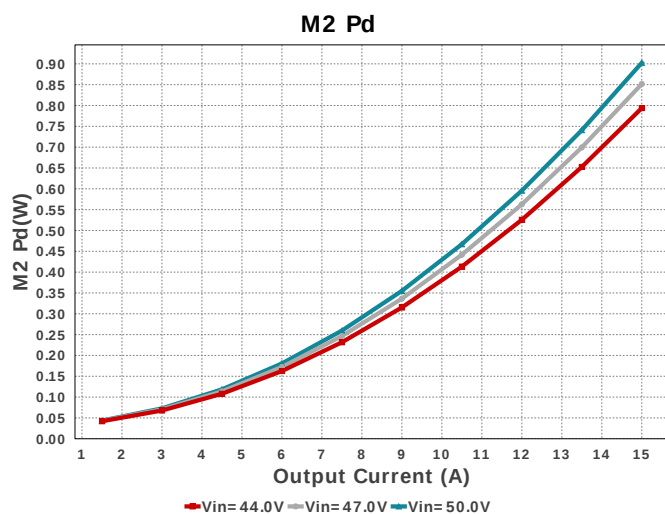
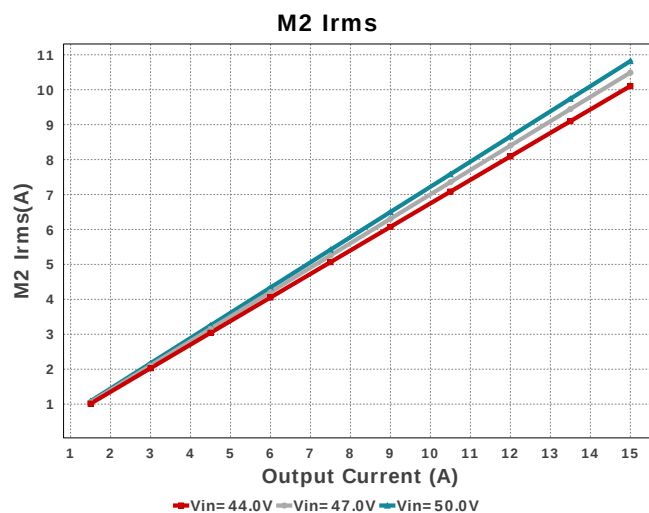
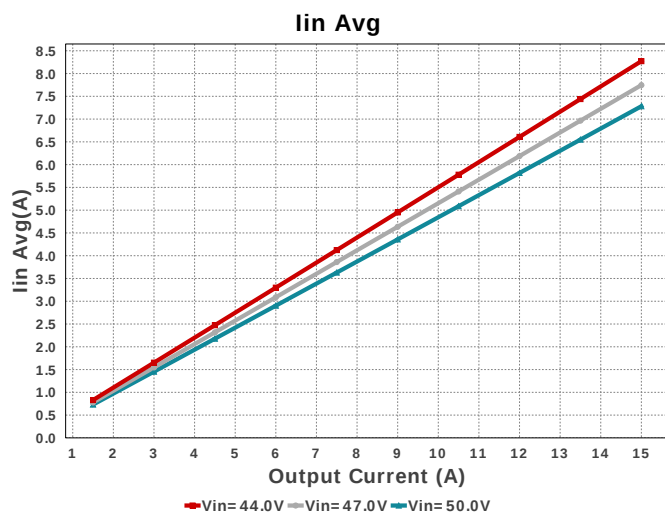
Electrical BOM

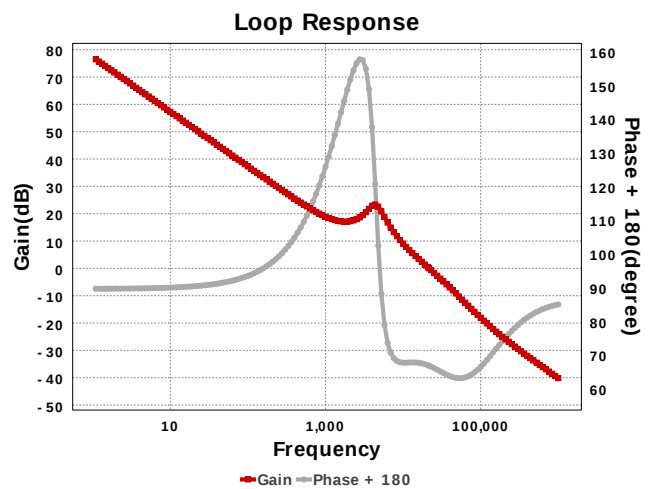
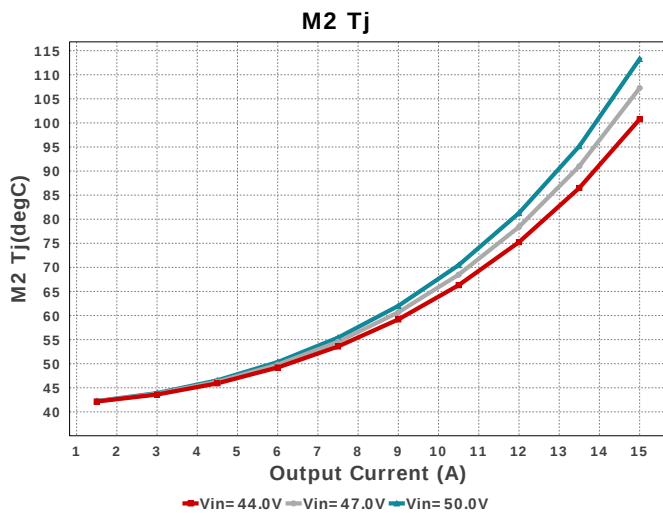
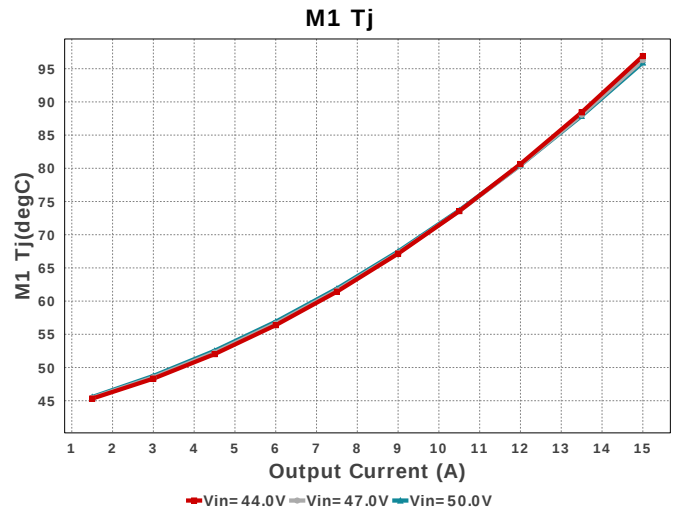
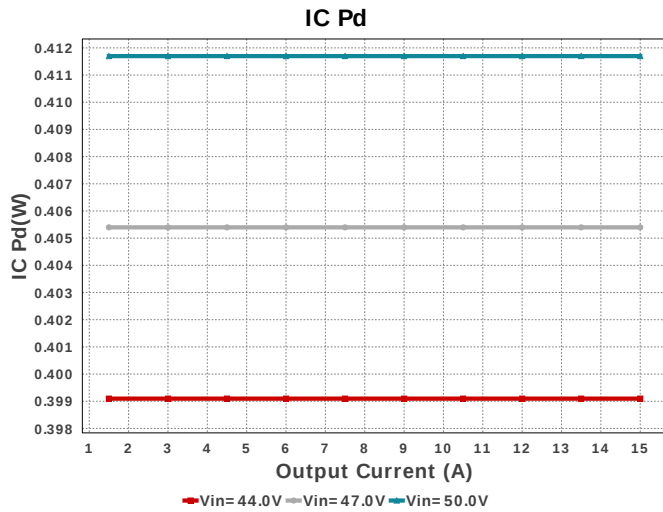
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0603C104Z3VACTU Series= Y5V	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
2.	Ccomp1	MuRata	GRM155R71C183KA01D Series= X7R	Cap= 18.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
3.	Ccomp2	MuRata	GRM1555C1H1R1CA01D Series= C0G/NP0	Cap= 1.1 pF ESR= 1.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
4.	Ccomp3	TDK	CGA2B2X7R1H332K050BA Series= X7R	Cap= 3.3 nF ESR= 785.18 mOhm VDC= 50.0 V IRMS= 272.9 mA	1	\$0.01	 0402 3 mm ²
5.	Cilim	MuRata	GRM1885C2A100JA01D Series= C0G/NP0	Cap= 10.0 pF ESR= 1.0 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.02	 0603 5 mm ²
6.	Cin	TDK	CKG57NX7R2A106M500JH Series= X7R	Cap= 10.0 uF ESR= 1.0 mOhm VDC= 100.0 V IRMS= 4.22 A	3	\$1.96	 CKG57N 56 mm ²
7.	Cout	Panasonic	EEHZA1J560P Series= ZA	Cap= 56.0 uF ESR= 30.0 mOhm VDC= 63.0 V IRMS= 1.8 A	1	\$1.13	Panasonic_G 151 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Css	MuRata	GRM155R61C473KA01D Series= X5R	Cap= 47.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
9.	Cvcc	TDK	C1005X5R1V225K050BC Series= X5R	Cap= 2.2 uF ESR= 1.0 mOhm VDC= 35.0 V IRMS= 0.0 A	1	\$0.08	 0402_065 3 mm ²
10.	Cvin	MuRata	GRM188R72A104KA35D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.06	 0603 5 mm ²
11.	L1	CUSTOM	CUSTOM	L= 22.602 uH DCR= 8.0 mOhm	1	NA	CUSTOM 0 mm ²
12.	M1	Infineon Technologies	BSC042NE7NS3 G	VdsMax= 75.0 V IdsMax= 100.0 Amps	1	\$1.19	 PG-TDSON-8 55 mm ²
13.	M2	ON Semiconductor	FDWS86068-F085	VdsMax= 100.0 V IdsMax= 80.0 Amps	1	\$0.82	PowerDFN56 55 mm ²
14.	Rcomp1	Vishay-Dale	CRCW04023K48FKED Series= CRCW..e3	Res= 3.48 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	Rcomp2	Vishay-Dale	CRCW04021K18FKED Series= CRCW..e3	Res= 1.18 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rfbb	Vishay-Dale	CRCW0402634RFKED Series= CRCW..e3	Res= 634.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rfbt	Susumu Co Ltd	RR1220P-183-D Series= RR12	Res= 18.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	\$0.01	 0805 7 mm ²
18.	Rilim	Vishay-Dale	CRCW0402887RFKED Series= CRCW..e3	Res= 887.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Rpgood	Yageo	RC0603FR-0720KL Series= ?	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
20.	Rt	Yageo	AC0402FR-0786K6L Series= ?	Res= 86.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Ruv1	Vishay-Dale	CRCW0402210KFKE Series= CRCW..e3	Res= 210.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	Ruv2	Vishay-Dale	CRCW04026K04FKED Series= CRCW..e3	Res= 6.04 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
23.	Rvcc	Yageo	RC0603FR-0720KL Series= ?	Res= 20.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
24.	Rvin	Vishay-Dale	CRCW06032R10FKEA Series= CRCW..e3	Res= 2.1 Ohm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
25.	U1	Texas Instruments	LM5145RGYR	Switcher	1	\$2.30	 RGY0020B 25 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	7.496 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.299 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	7.282 A	Current	Average input current
4.	L Ipp	4.5 A	Current	Peak-to-peak inductor ripple current
5.	M1 Irms	10.471 A	Current	MOSFET RMS ripple current
6.	M2 Irms	10.819 A	Current	MOSFET RMS ripple current
7.	SW Ipk	17.25 A	Current	Peak switch current
8.	BOM Count	27	General	Total Design BOM count
9.	FootPrint	1.325 k mm ²	General	Total Foot Print Area of BOM components
10.	Frequency	115.473 kHz	General	Switching frequency
11.	IC Tolerance	8.0 mV	General	IC Feedback Tolerance
12.	Mode	CCM	General	Conduction Mode
13.	Pout	360.0 W	General	Total output power
14.	Total BOM	\$0.0	General	Total BOM Cost
15.	Cross Freq	21.655 kHz	Op Point	Bode plot crossover frequency
16.	Duty Cycle	48.363 %	Op Point	Duty cycle
17.	Efficiency	98.88 %	Op Point	Steady state efficiency
18.	Gain Marg	-74.71 dB	Op Point	Bode Plot Gain Margin
19.	IC Tj	54.039 degC	Op Point	IC junction temperature
20.	IOUT_OP	15.0 A	Op Point	Iout operating point
21.	Low Freq Gain	76.481 dB	Op Point	Gain at 1Hz
22.	M1 Tj	95.552 degC	Op Point	M1 MOSFET junction temperature
23.	M2 Tj	113.21 degC	Op Point	M2 MOSFET junction temperature
24.	Phase Marg	67.224 deg	Op Point	Bode Plot Phase Margin
25.	VIN_OP	50.0 V	Op Point	Vin operating point
26.	Vout Actual	23.513 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
27.	Vout Tolerance	2.478 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
28.	Vout p-p	160.598 mV	Op Point	Peak-to-peak output ripple voltage
29.	Cin Pd	18.73 mW	Power	Input capacitor power dissipation
30.	Cout Pd	50.625 mW	Power	Output capacitor power dissipation

#	Name	Value	Category	Description
31.	IC Pd	411.697 mW	Power	IC power dissipation
32.	L Pd	1.8 W	Power	Inductor power dissipation
33.	M1 Pd	895.219 mW	Power	M1 MOSFET total power dissipation
34.	M2 Pd	901.73 mW	Power	M2 MOSFET total power dissipation
35.	Total Pd	4.078 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	15.0	Maximum Output Current
2.	VinMax	50.0	Maximum input voltage
3.	VinMin	44.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM5145	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	40.0	Ambient temperature

Design Assistance

1. **LM5145** Product Folder : <http://www.ti.com/product/lm5145> : contains the data sheet and other resources.

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