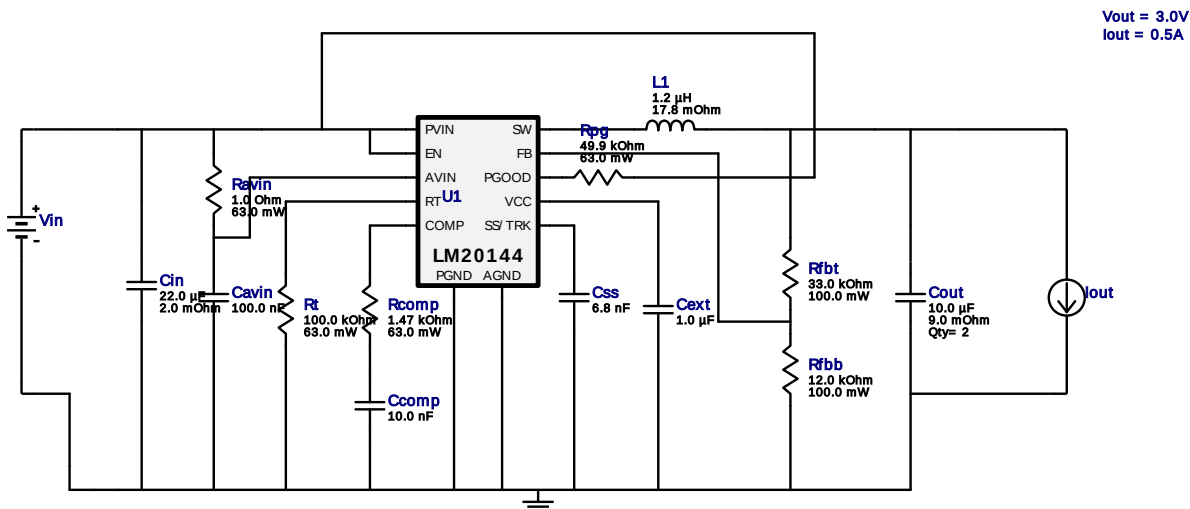


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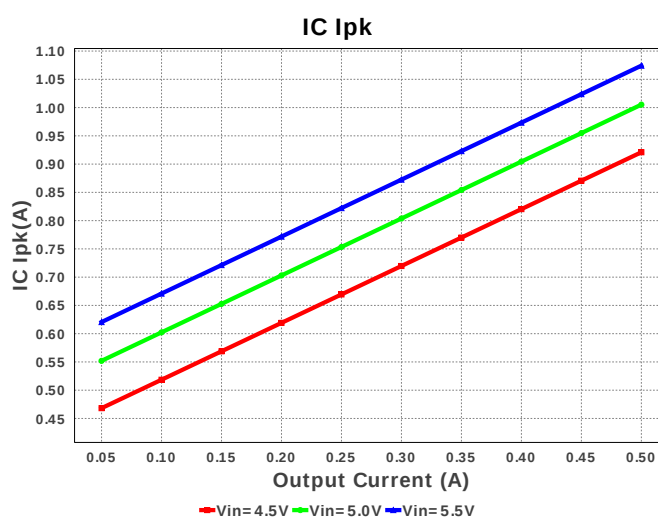
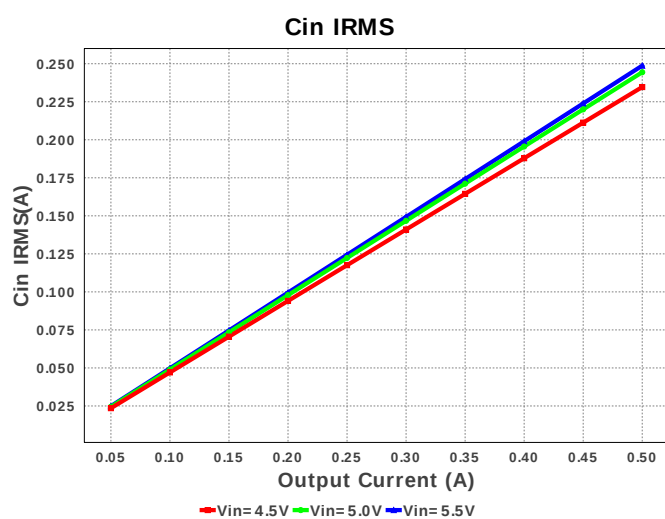
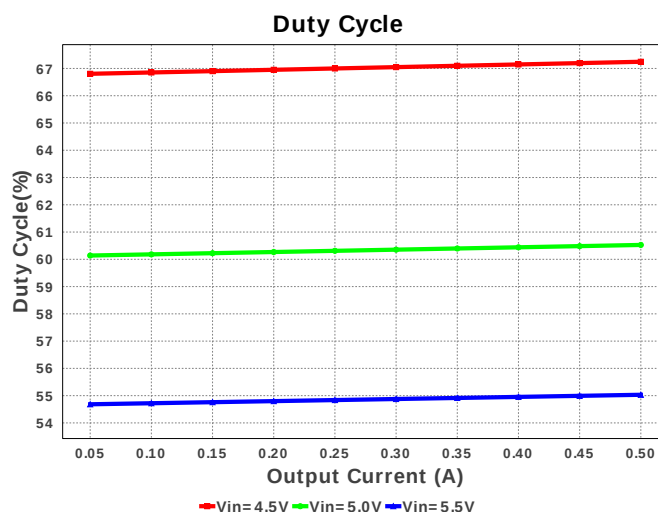
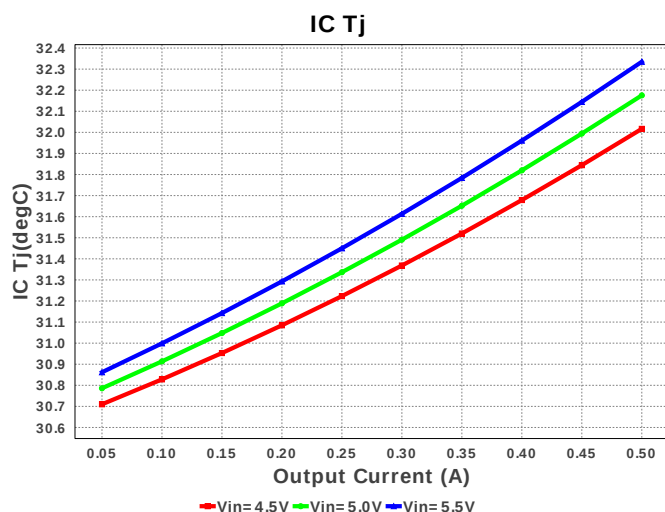
Design : 4742013/171 LM20144MH/NOPB
LM20144MH/NOPB 4.5V-5.5V to 3.00V @ 0.5A

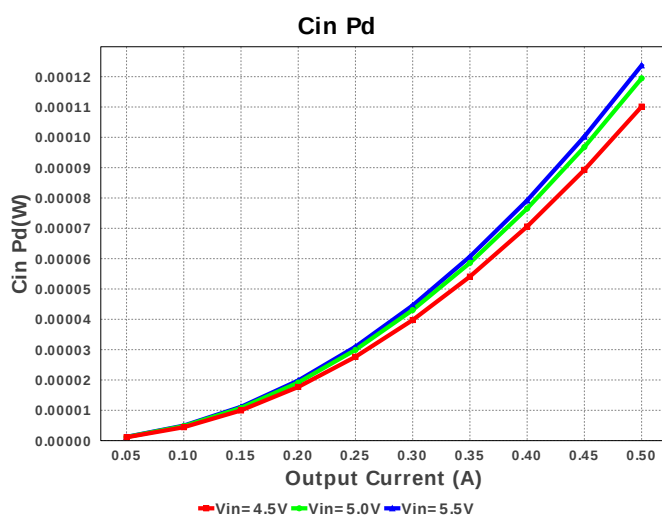
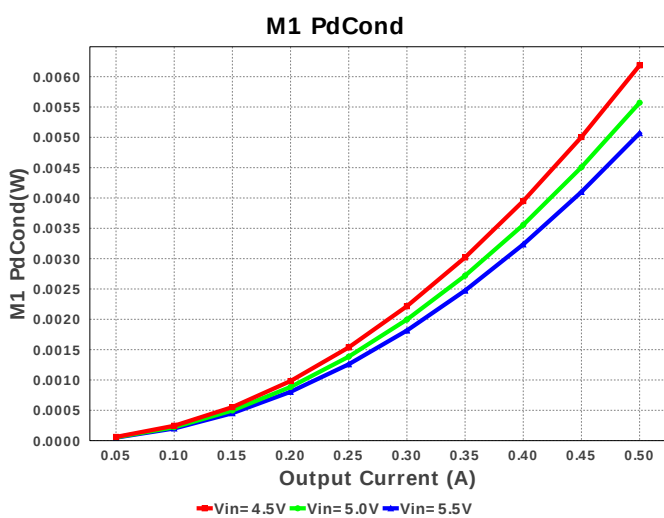
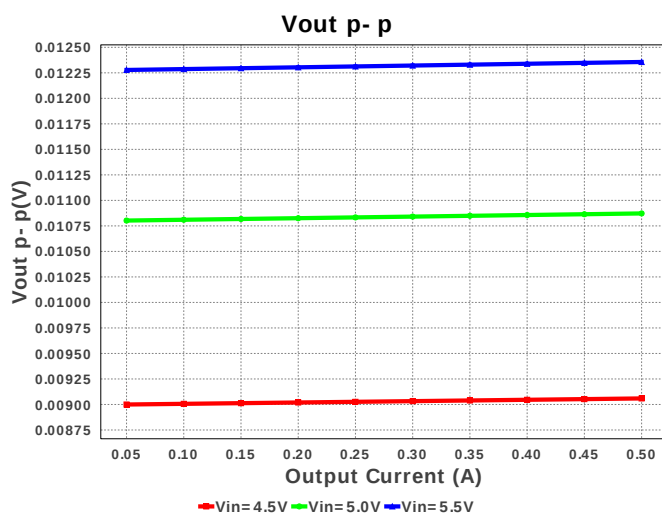
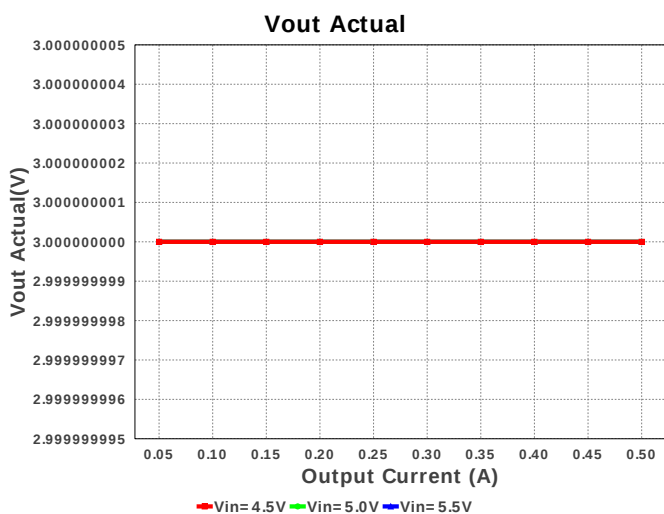
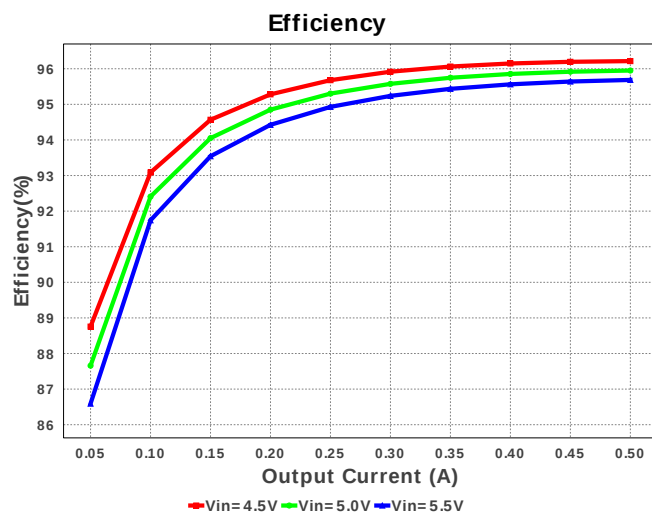
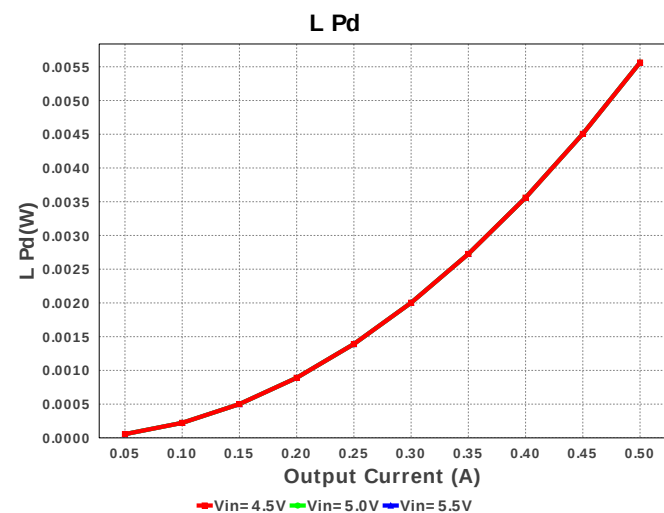


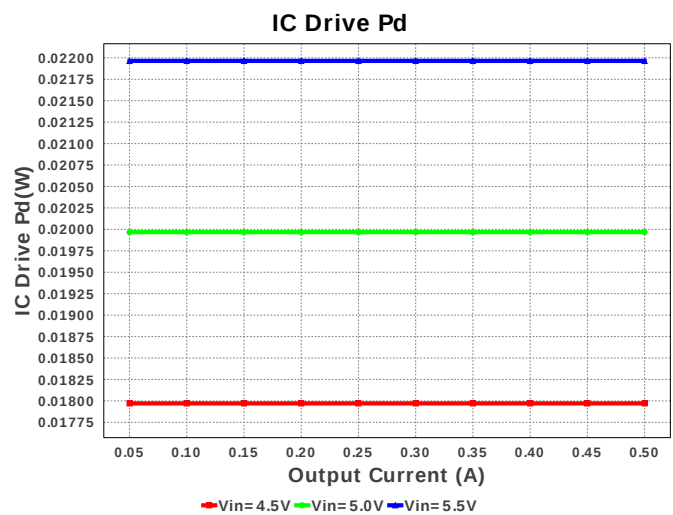
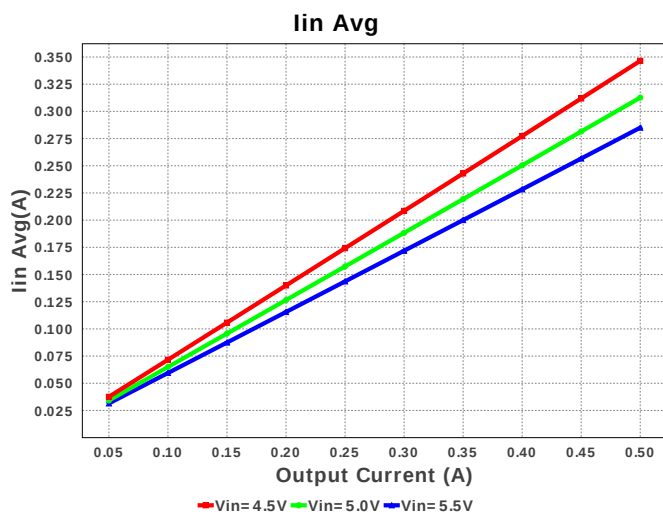
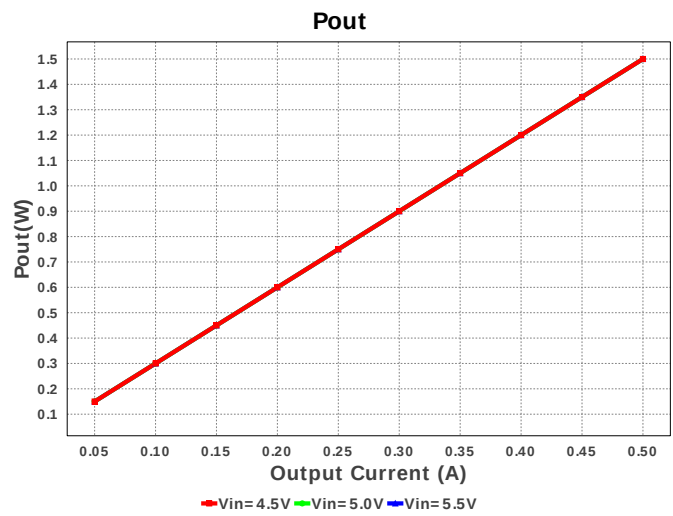
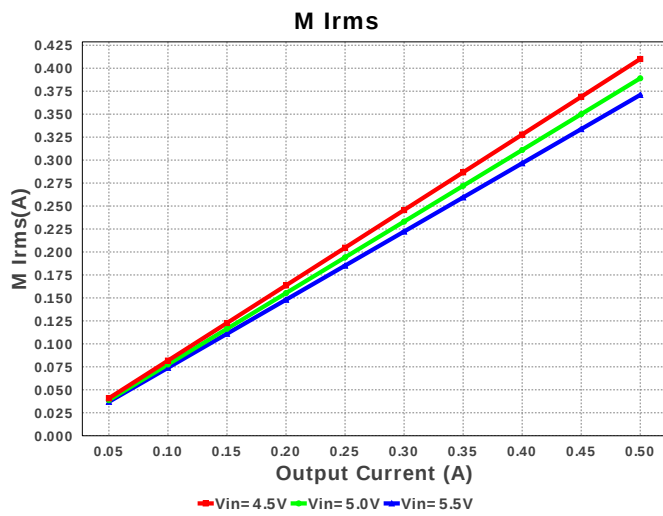
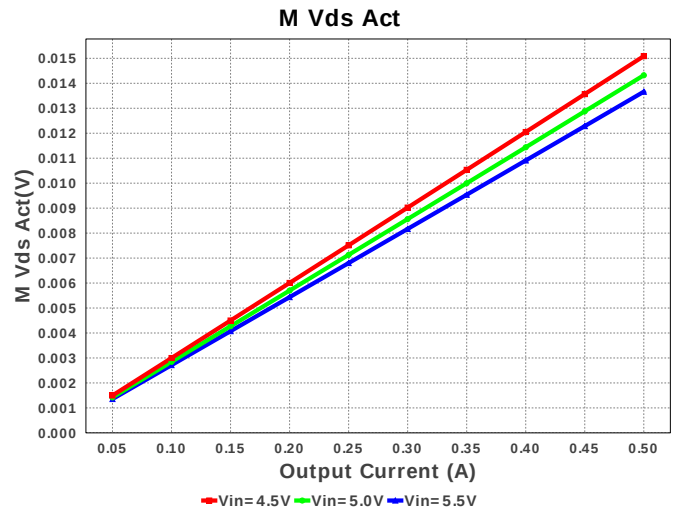
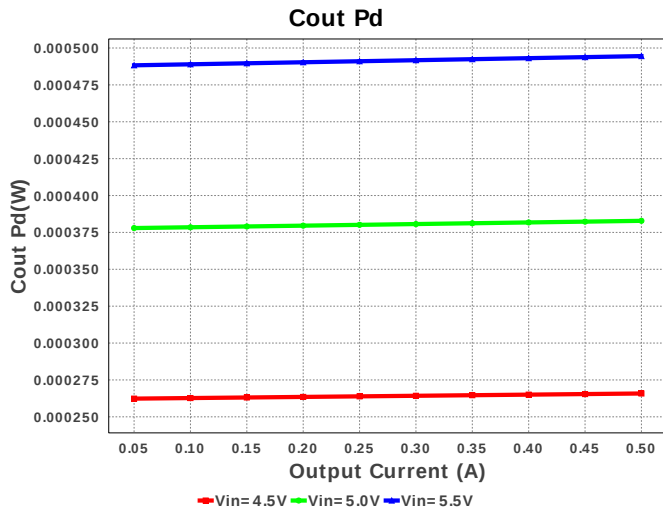
Electrical BOM

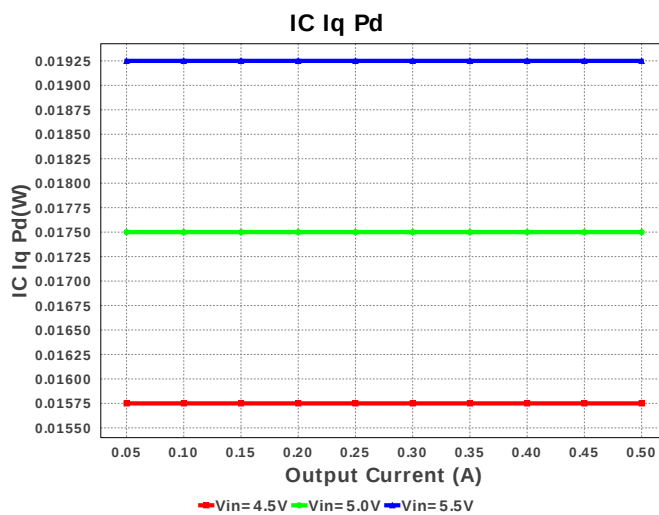
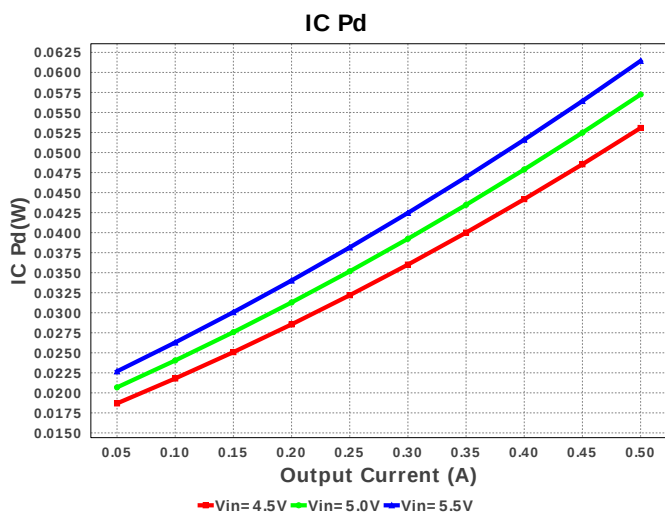
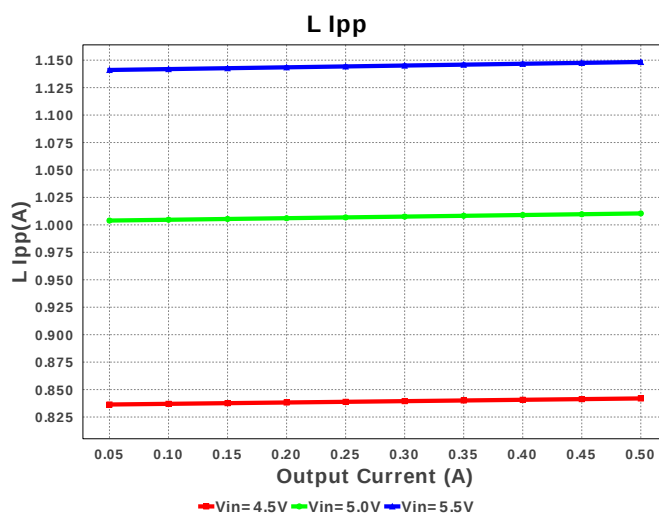
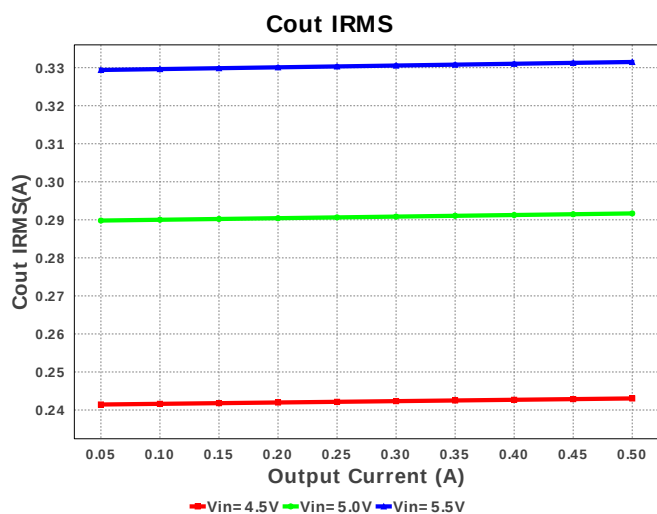
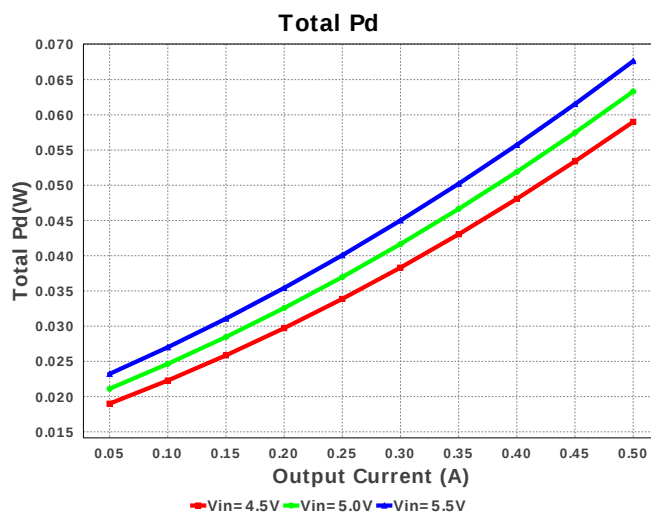
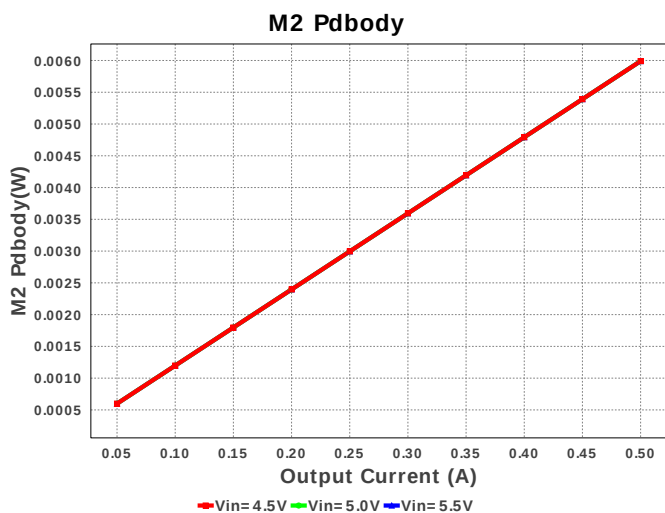
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cavin	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Ccomp	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Cext	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm ²
4.	Cin	MuRata	GRM32ER61C226ME20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	\$0.12	1210 15 mm ²
5.	Cout	MuRata	GRM188R60J106ME47D Series= X5R	Cap= 10.0 uF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 2.74 A	2	\$0.02	0603 5 mm ²
6.	Css	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	L1	Coilcraft	XAL4020-122MEB	L= 1.2 uH DCR= 17.8 mOhm	1	\$0.60	XAL4020 28 mm ²
8.	Ravin	Vishay-Dale	CRCW04021R00FKED Series= CRCW..e3	Res= 1.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
9.	Rcomp	Vishay-Dale	CRCW04021K47FKED Series= CRCW..e3	Res= 1.47 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²

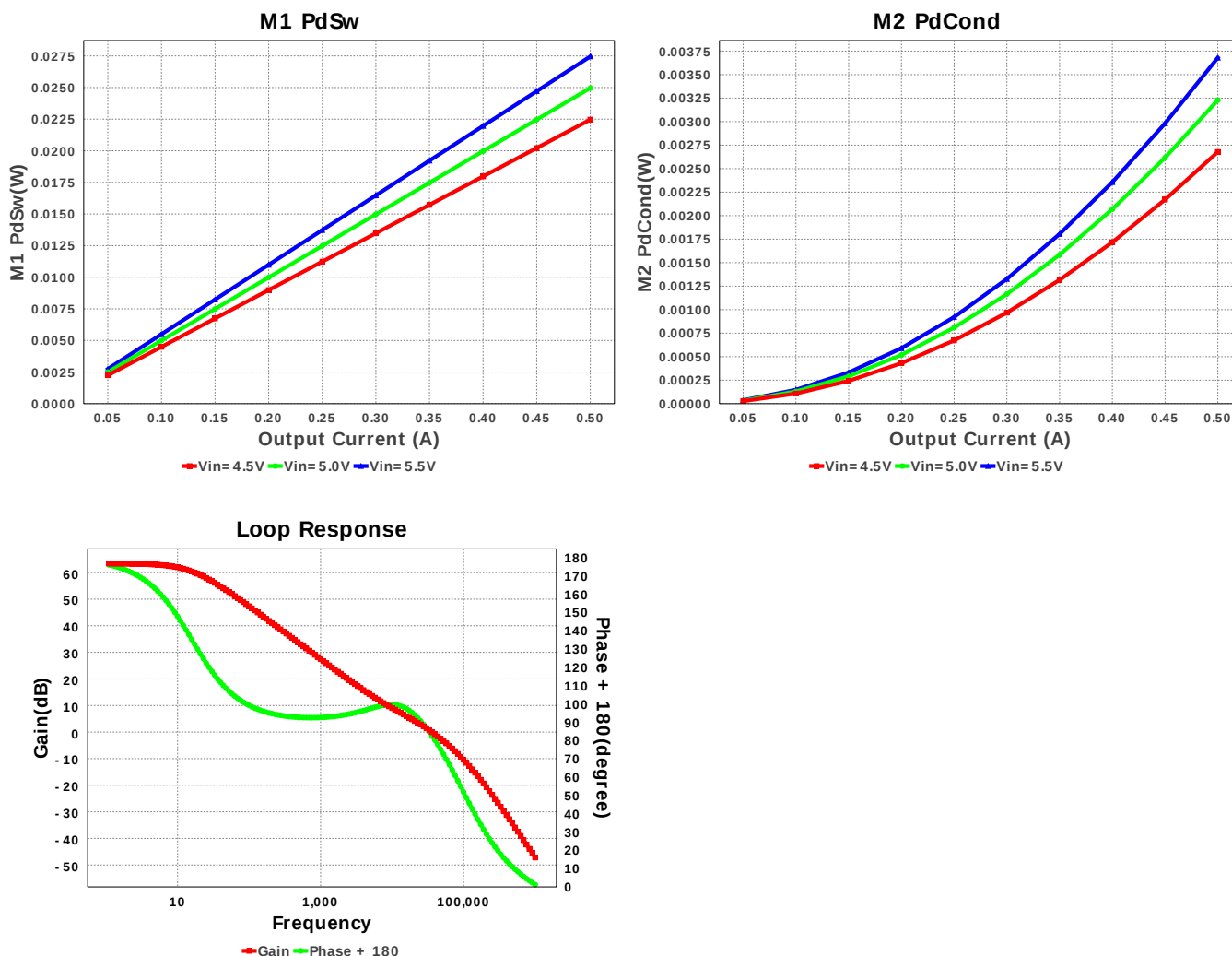
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbt	Yageo America	RC0603FR-0733KL Series= ?	Res= 33.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
12.	Rpg	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	Rt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	LM20144MH/NOPB	Switcher	1	\$1.80	 MXA16A 59 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	248.731 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	331.499 mA	Current	Output capacitor RMS ripple current
3.	IC IpK	1.074 A	Current	Peak switch current in IC
4.	Iin Avg	285.02 mA	Current	Average input current
5.	L Ipp	1.148 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	370.917 mA	Current	Q lavg
7.	BOM Count	15	General	Total Design BOM count
8.	FootPrint	159.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	998.387 kHz	General	Switching frequency
10.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	13.663 mV	General	Voltage drop across the MosFET
12.	Pout	1.5 W	General	Total output power
13.	Total BOM	\$2.67	General	Total BOM Cost
14.	Low Freq Gain	63.394 dB	Op_Point	Gain at 10Hz
15.	Vout Actual	3.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	36.141 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	55.032 %	Op_point	Duty cycle
19.	Efficiency	95.686 %	Op_point	Steady state efficiency
20.	Gain Marg	-49.056 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	32.335 degC	Op_point	IC junction temperature
22.	ICThetaJA	38.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	500.0 mA	Op_point	Iout operating point
24.	Phase Marg	82.621 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	5.5 V	Op_point	Vin operating point
26.	Vout p-p	12.356 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	123.734 μW	Power	Input capacitor power dissipation
28.	Cout Pd	494.511 μW	Power	Output capacitor power dissipation
29.	IC Drive Pd	21.965 mW	Power	Driver power dissipation
30.	IC Iq Pd	19.25 mW	Power	IC Iq Pd
31.	IC Pd	61.444 mW	Power	IC power dissipation

#	Name	Value	Category	Description
32.	L Pd	5.562 mW	Power	Inductor power dissipation
33.	M1 PdCond	5.068 mW	Power	M1 MOSFET switching losses
34.	M1 PdSw	27.456 mW	Power	M1 MOSFET switching losses
35.	M1 PdCond	3.68 mW	Power	M2 MOSFET switching losses
36.	M2 Pdbody	5.99 mW	Power	Power dissipation through lower FET
37.	Total Pd	67.627 mW	Power	Total Power Dissipation
38.	Vout Tolerance	3.004 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 m	Maximum Output Current
2.	VinMax	5.5	Maximum input voltage
3.	VinMin	4.5	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	base_pn	LM20144	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM20144** Product Folder : <http://www.ti.com/product/LM20144> : contains the data sheet and other resources.

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