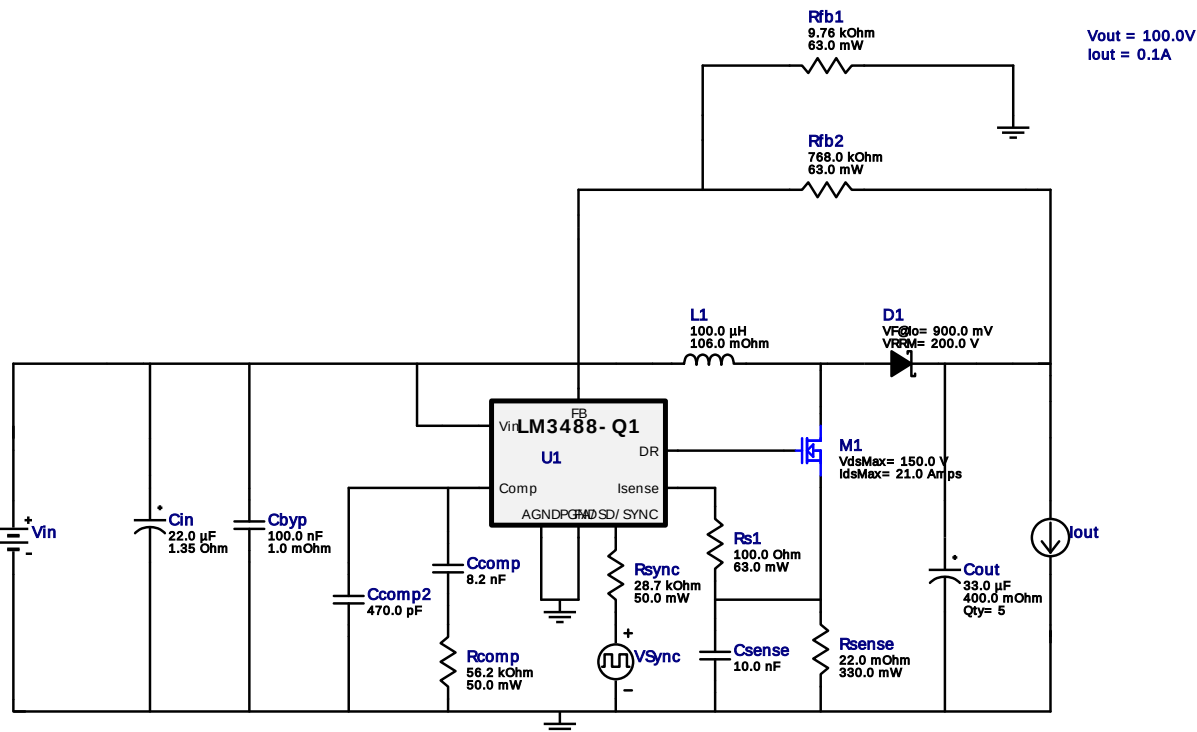


WEBENCH® Design Report

Design : LM3488QMMX/NOPB
LM3488QMMX/NOPB 6.5V-8.2V to 100.00V @ 0.1A



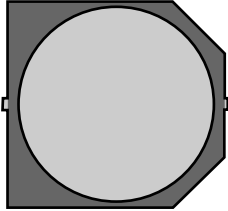
1. With the low turn of voltage of the LM34x8 your power supply may current limit before you reach your working input voltage. If this happens, or to preempt this from happening, you can include a low pass RC filter from input voltage to Vin on the IC. Make sure the rise time on the RC network is slower than your supply's rise time. If you are not using the synchronization feature of the part use the LM3478.

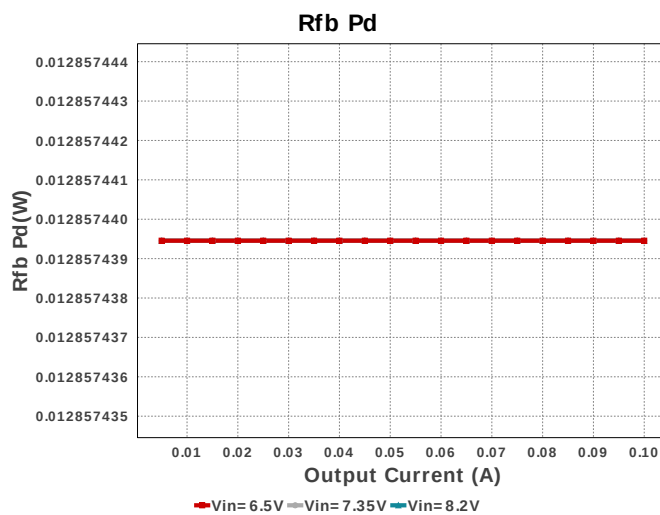
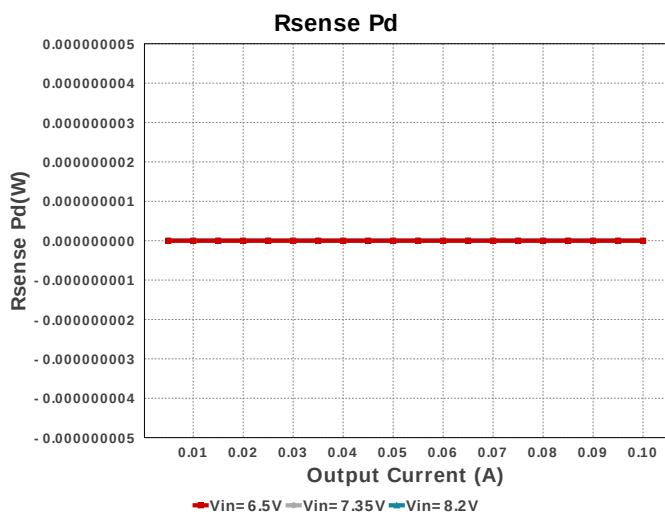
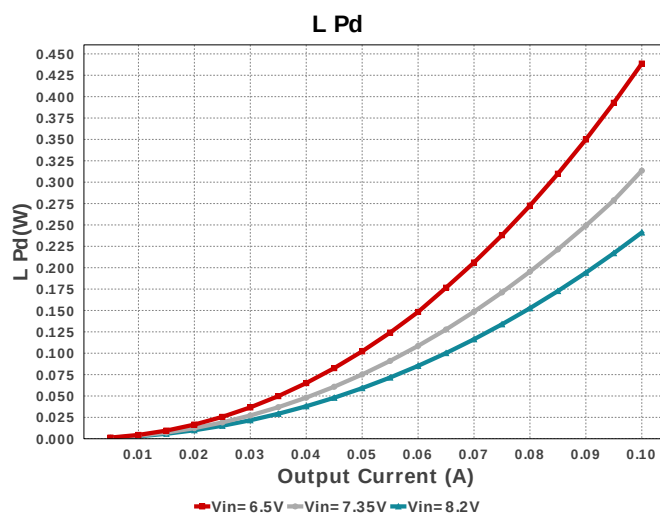
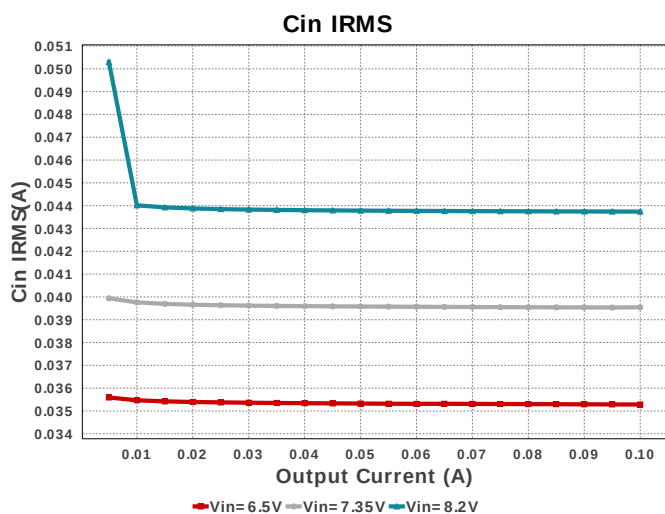
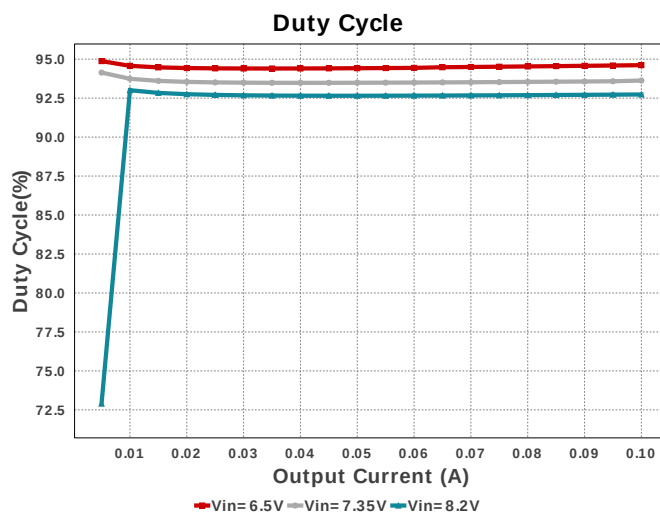
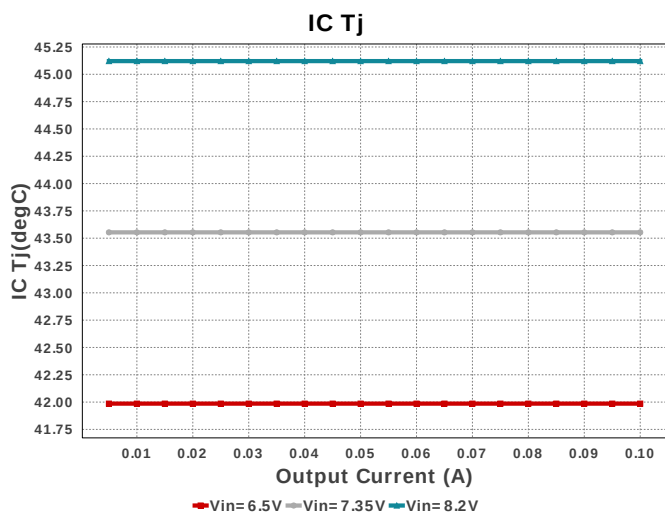
My Comments

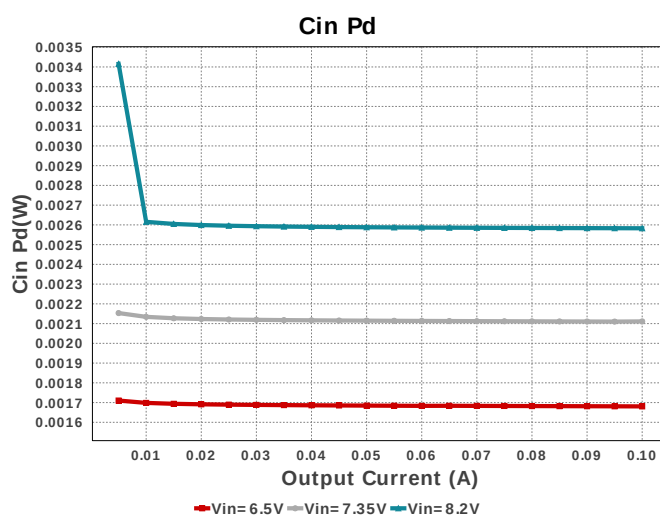
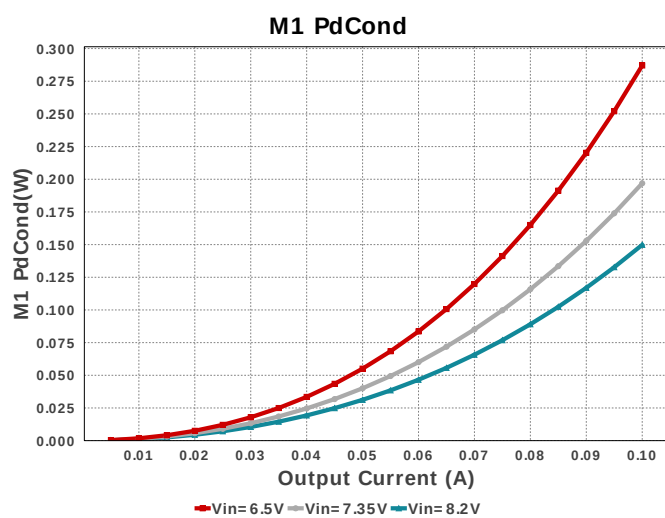
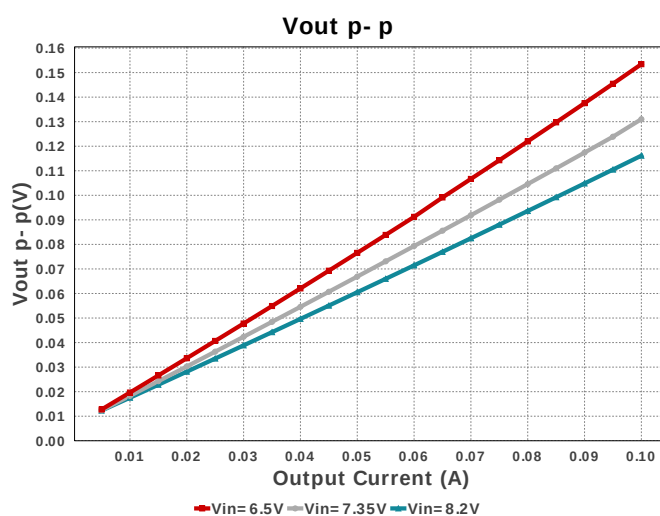
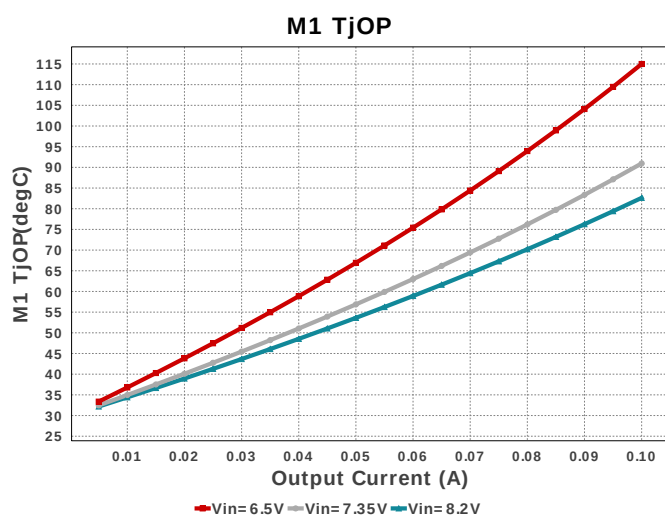
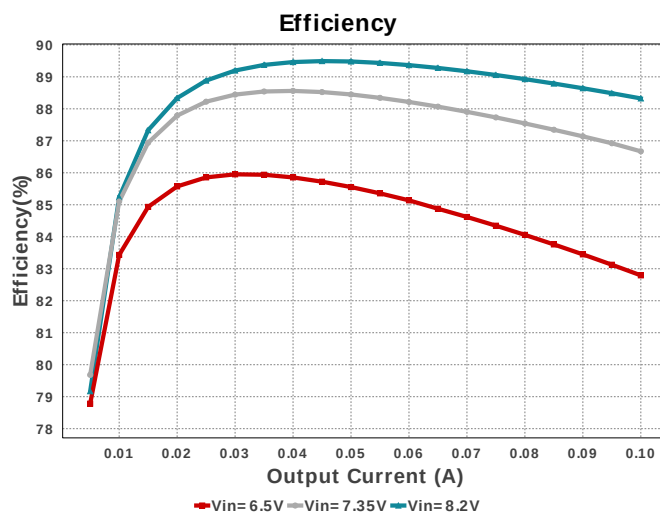
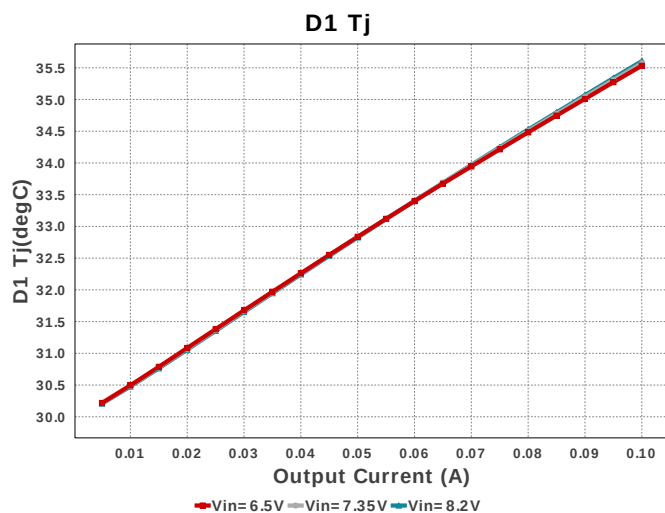
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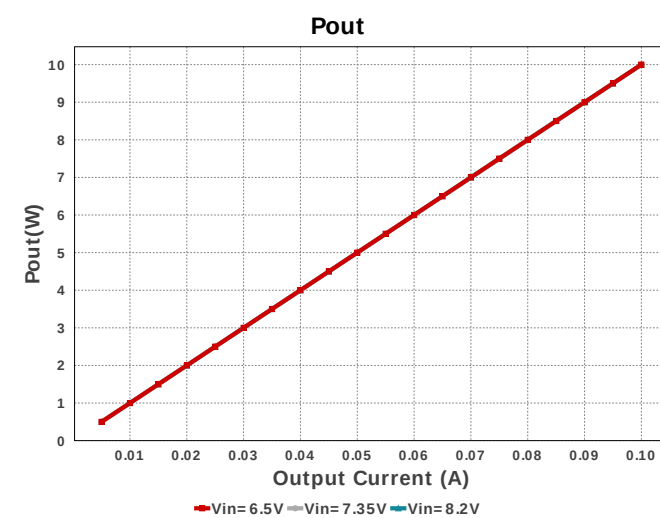
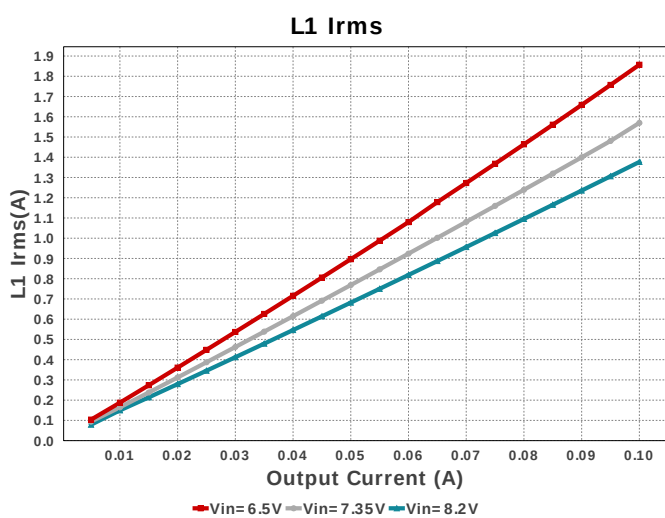
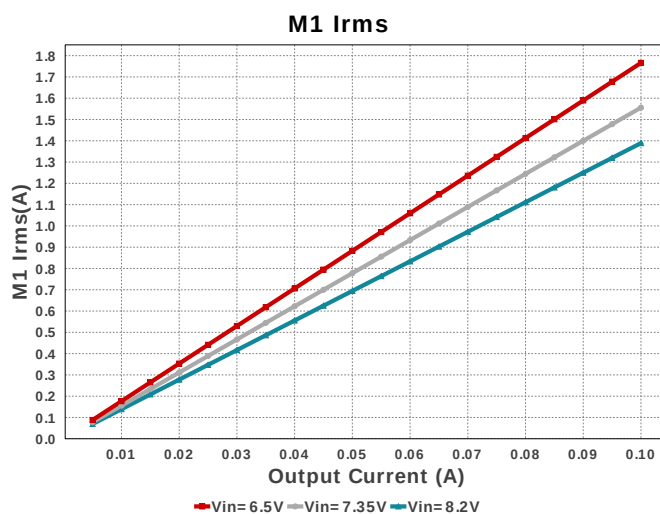
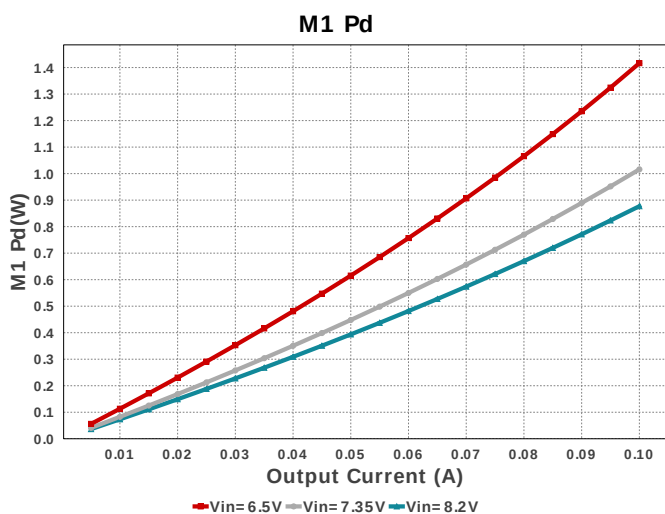
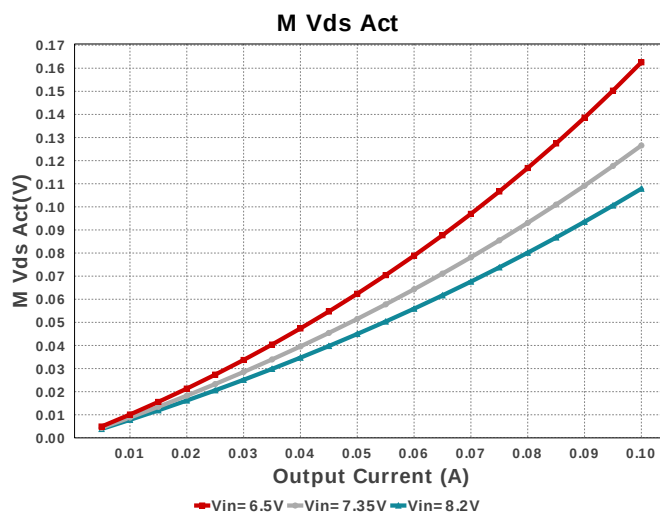
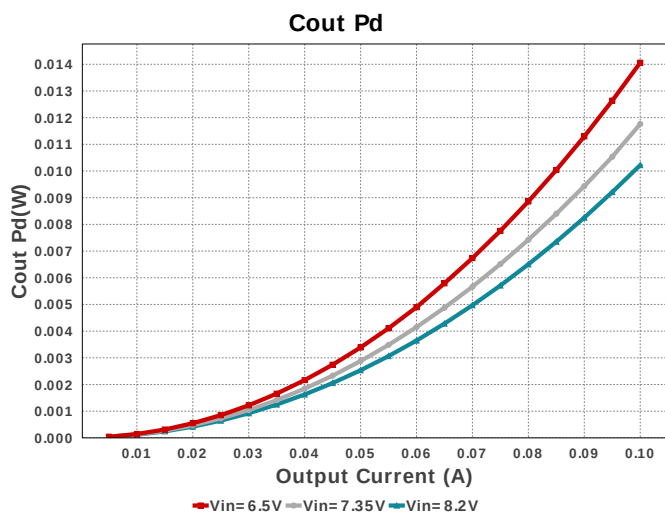
Electrical BOM

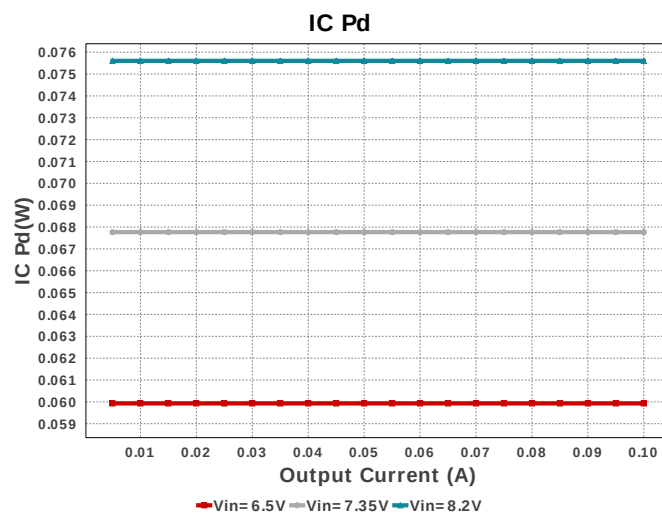
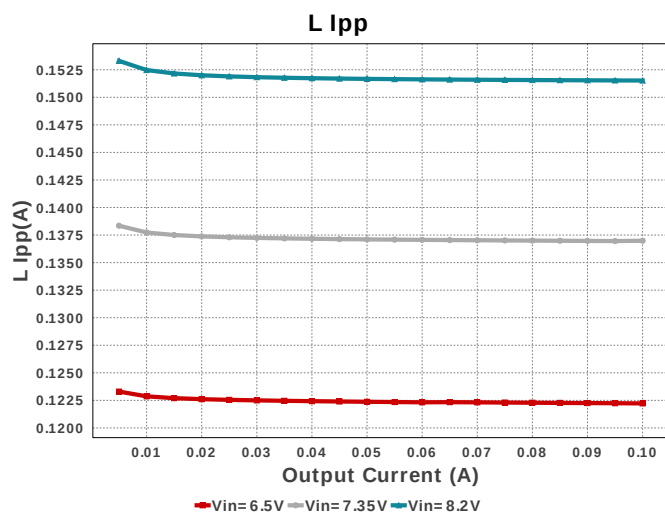
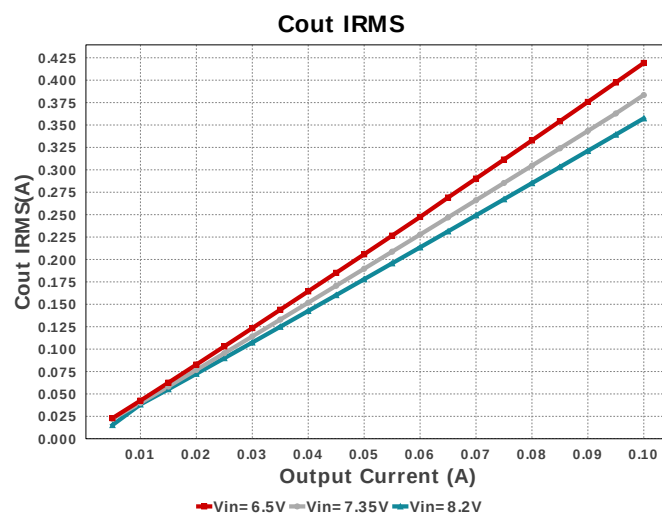
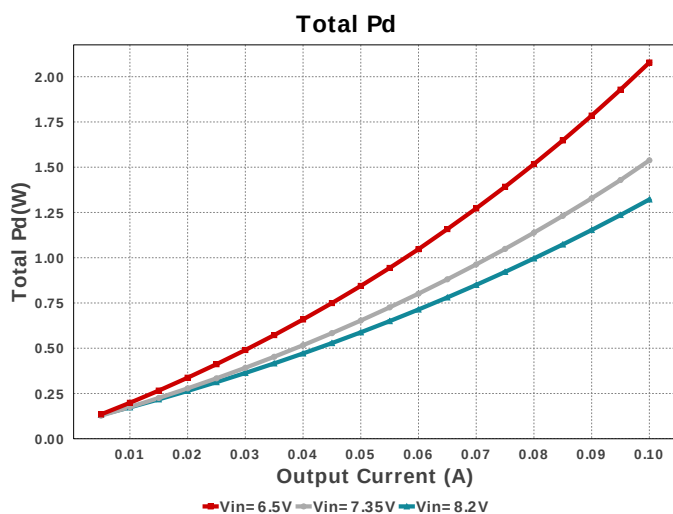
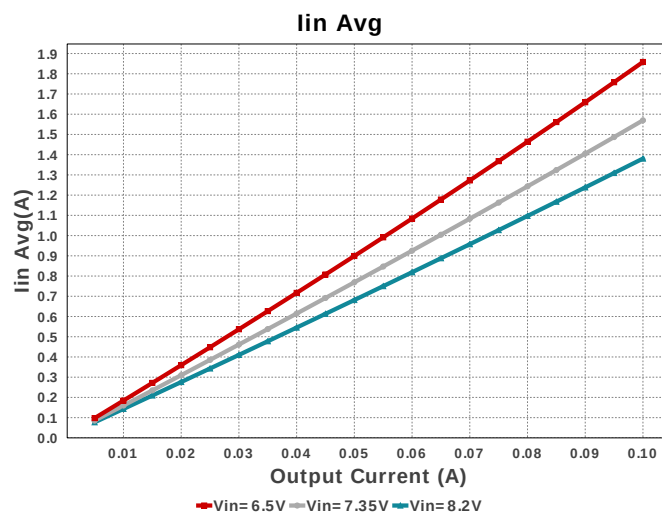
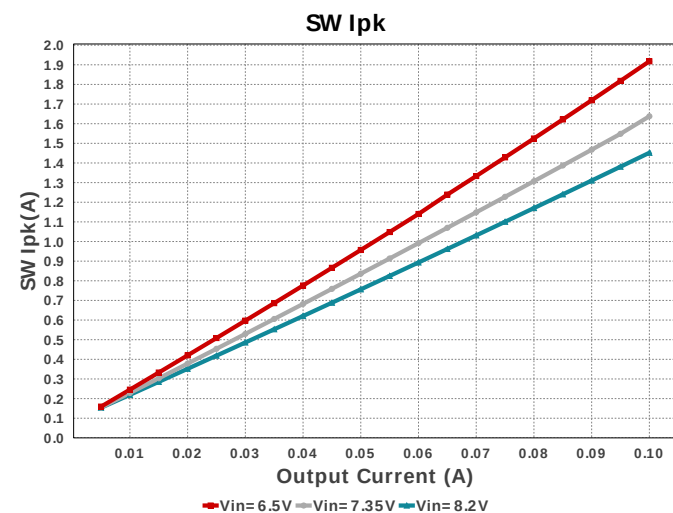
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R61C104KA88D Series= X5R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C822JBFNNE Series= C0G/NP0	Cap= 8.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C471KBANNC Series= C0G/NP0	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
4.	Cin	Panasonic	EEE-FK1C220UR Series= FK	Cap= 22.0 µF ESR= 1.35 Ohm VDC= 16.0 V IRMS= 90.0 mA	1	\$0.08	 SM_RADIAL_B 47 mm ²

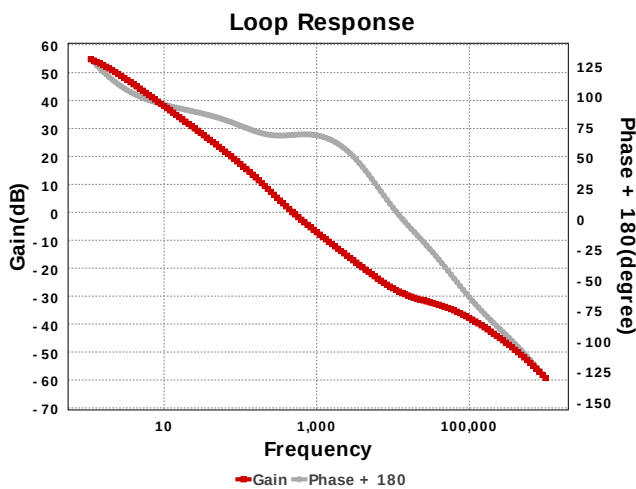
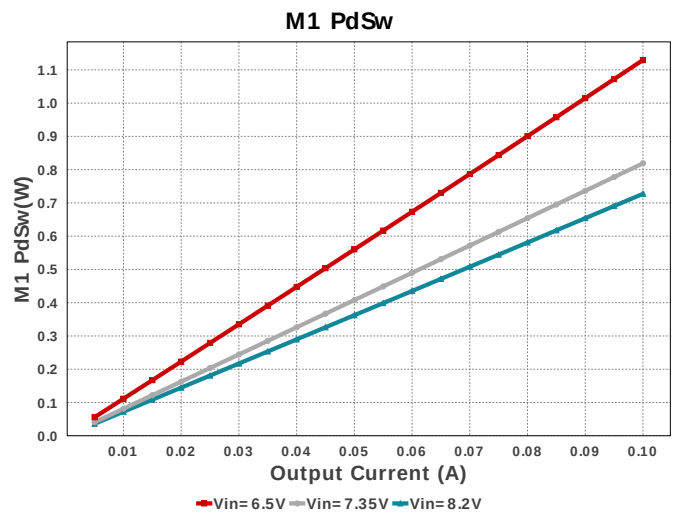
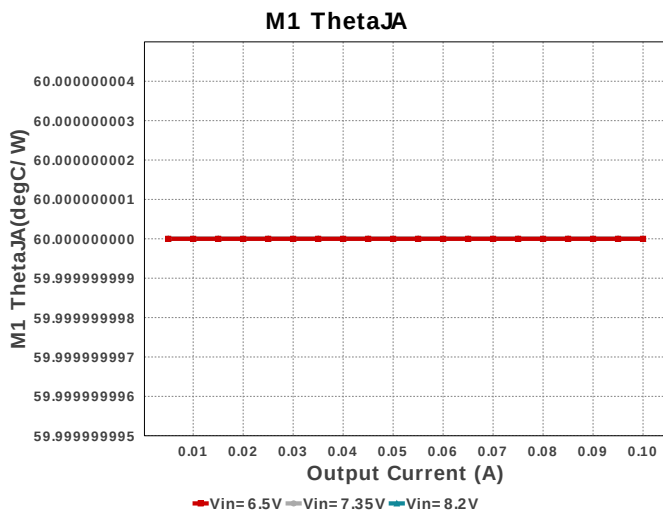
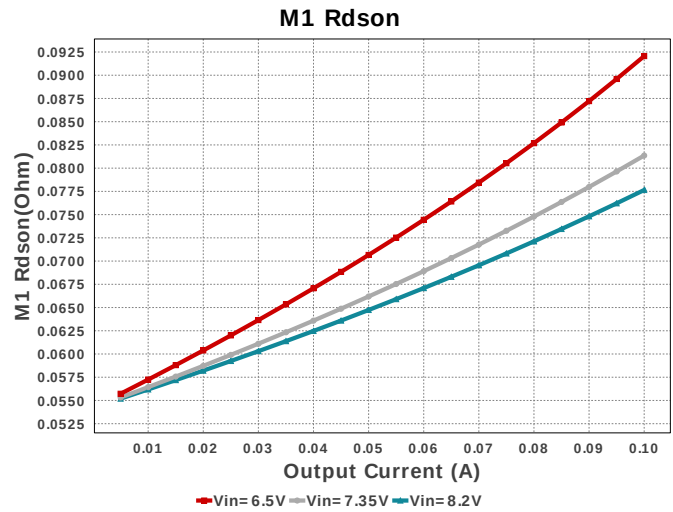
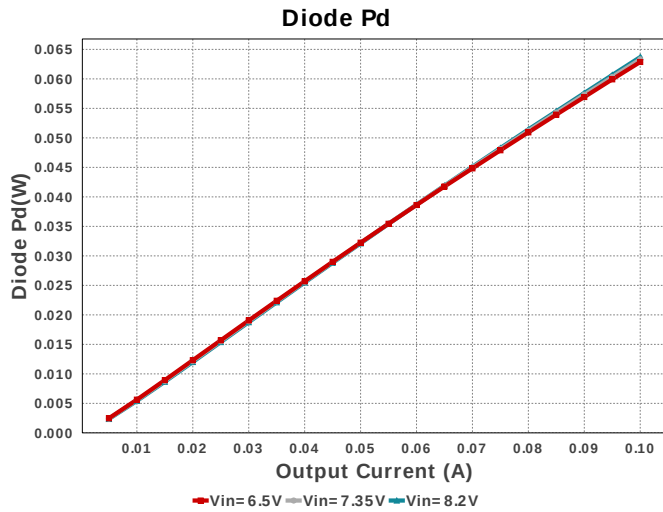
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
5.	Cout	Panasonic	EEV-EB2E330SM Series= ?	Cap= 33.0 uF ESR= 400.0 mOhm VDC= 250.0 V IRMS= 560.0 mA	5	\$1.31	 EB_K16 483 mm ²
6.	Csense	TDK	CGA4C2C0G1H103J060AA Series= C0G/NP0	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.07	 0805 7 mm ²
7.	D1	SMC Diode Solutions	SK220ATR	VF@Io= 900.0 mV VRRM= 200.0 V	1	\$0.04	 SMA 37 mm ²
8.	L1	Coilcraft	MSS1210-104KEB	L= 100.0 uH DCR= 106.0 mOhm	1	\$0.81	 MSS1210 204 mm ²
9.	M1	Infineon Technologies	BSZ520N15NS3 G	VdsMax= 150.0 V IdsMax= 21.0 Amps	1	\$0.55	 PG-TSDSON-8 19 mm ²
10.	Rcomp	Yageo	RC0201FR-0756K2L Series= ?	Res= 56.2 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm ²
11.	Rs1	Vishay-Dale	CRCW0402100RFKED Series= CRCW...e3	Res= 100.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	Rsense	Panasonic	ERJ-L14KF22MU Series= ERJ-L14	Res= 22.0 mOhm Power= 330.0 mW Tolerance= 1.0%	1	\$0.10	 1210 15 mm ²
13.	Rsync	Yageo	RC0201FR-0728K7L Series= ?	Res= 28.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm ²
14.	U1	Texas Instruments	LM3488QMMX/NOPB	Switcher	1	\$0.89	 MUA08A 24 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	35.291 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	420.156 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.866 A	Current	Average input current
4.	L Ipp	122.25 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	1.865 A	Current	Inductor ripple current
6.	M1 Irms	1.762 A	Current	M1 MOSFET Irms
7.	SW Ipk	1.926 A	Current	Peak switch current
8.	BOM Count	20	General	Total Design BOM count
9.	FootPrint	2.798 k mm ²	General	Total Foot Print Area of BOM components
10.	Frequency	500.0 kHz	General	Switching frequency
11.	IC Tolerance	15.3 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	164.461 mV	General	M Vds
13.	M1 Rdson	93.328 mOhm	General	Drain-Source On-resistance
14.	M1 ThetaJA	60.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	10.0 W	General	Total output power
17.	Total BOM	\$9.18	General	Total BOM Cost
18.	Cross Freq	382.515 Hz	Op Point	Bode plot crossover frequency
19.	D1 Tj	35.532 degC	Op Point	D1 junction temperature
20.	Duty Cycle	94.637 %	Op Point	Duty cycle
21.	Efficiency	82.438 %	Op Point	Steady state efficiency
22.	Gain Marg	-25.247 dB	Op Point	Bode Plot Gain Margin
23.	IC Tj	41.986 degC	Op Point	IC junction temperature
24.	ICThetaJA	200.0 degC/W	Op Point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	100.0 mA	Op Point	Iout operating point
26.	Low Freq Gain	52.165 dB	Op Point	Gain at 1Hz
27.	M1 TJOP	117.85 degC	Op Point	M1 MOSFET junction temperature
28.	Phase Marg	66.66 deg	Op Point	Bode Plot Phase Margin
29.	VIN_OP	6.5 V	Op Point	Vin operating point
30.	Vout Actual	100.408 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
31.	Vout OP	100.0 V	Op Point	Operational Output Voltage
32.	Vout Tolerance	3.233 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
33.	Vout p-p	154.061 mV	Op Point	Peak-to-peak output ripple voltage
34.	Cin Pd	1.681 mW	Power	Input capacitor power dissipation
35.	Cout Pd	14.122 mW	Power	Output capacitor power dissipation
36.	Diode Pd	62.863 mW	Power	Diode power dissipation
37.	IC Pd	59.93 mW	Power	IC power dissipation
38.	L Pd	442.418 mW	Power	Inductor power dissipation
39.	M1 Pd	1.464 W	Power	M1 MOSFET total power dissipation
40.	M1 PdCond	289.808 mW	Power	M1 MOSFET conduction losses
41.	M1 PdSw	1.174 W	Power	M1 MOSFET switching losses
42.	Rfb Pd	12.857 mW	Power	Rfb Power Dissipation
43.	Rsense Pd	54.148 mW	Power	LED Current Rsns Power Dissipation
44.	Total Pd	2.13 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	100.0 m	Maximum Output Current
2.	VinMax	8.2	Maximum input voltage
3.	VinMin	6.5	Minimum input voltage
4.	Vout	100.0	Output Voltage
5.	base_pn	LM3488-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature
8.	UserFsw	500.0 k	Customer Selected Frequency

Design Assistance

1. Feature Highlights: Automotive Qualified, 40V Wide Vin Low-Side N-Channel Controller for Switching Regulators
2. **LM3488-Q1** Product Folder : <http://www.ti.com/product/lm3488q%2Dq1> : contains the data sheet and other resources.

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