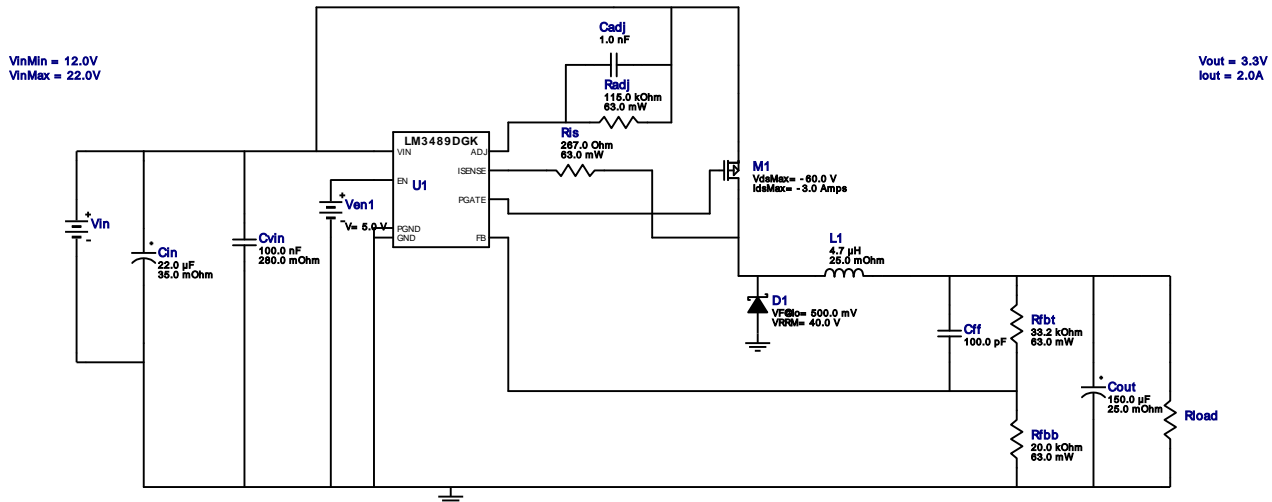
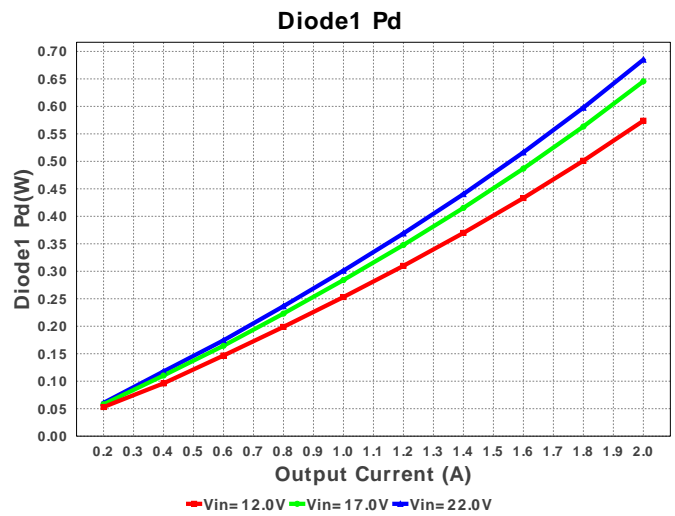
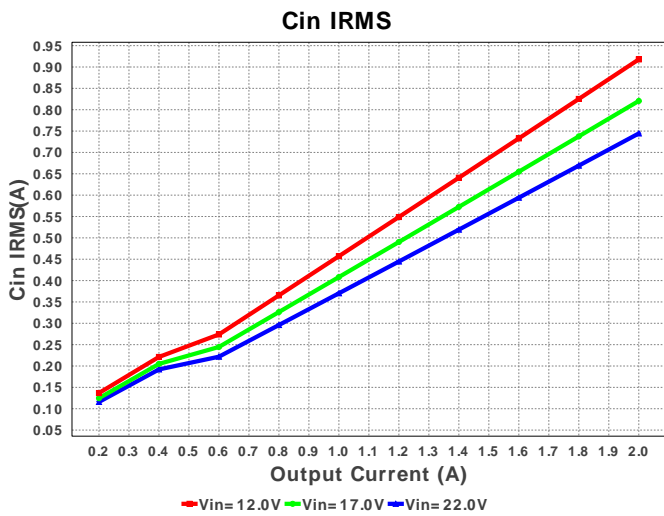
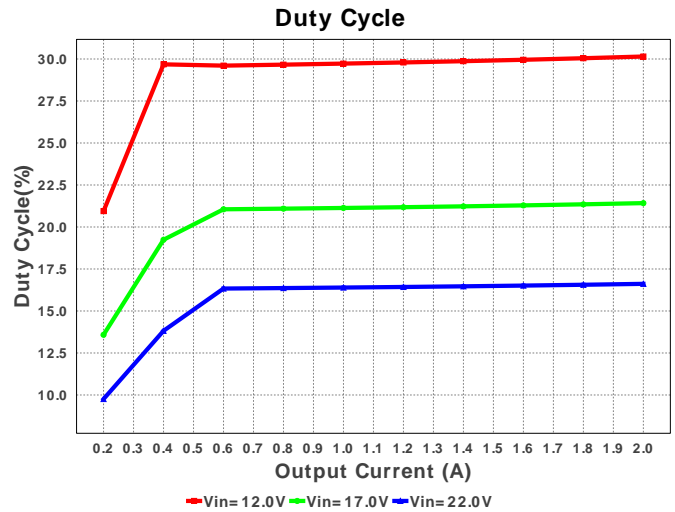
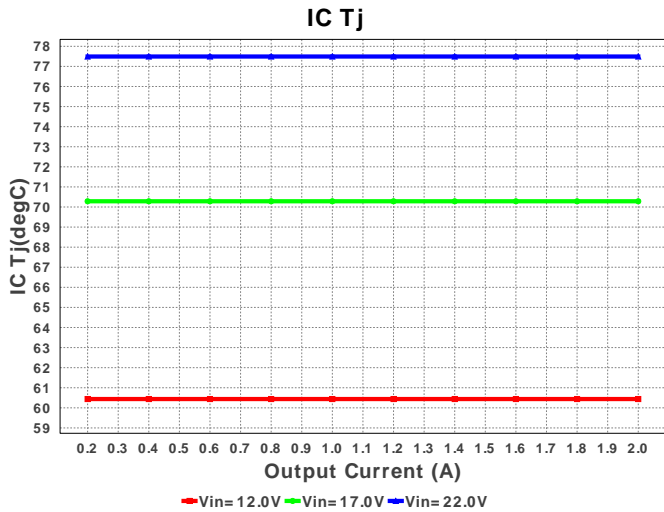


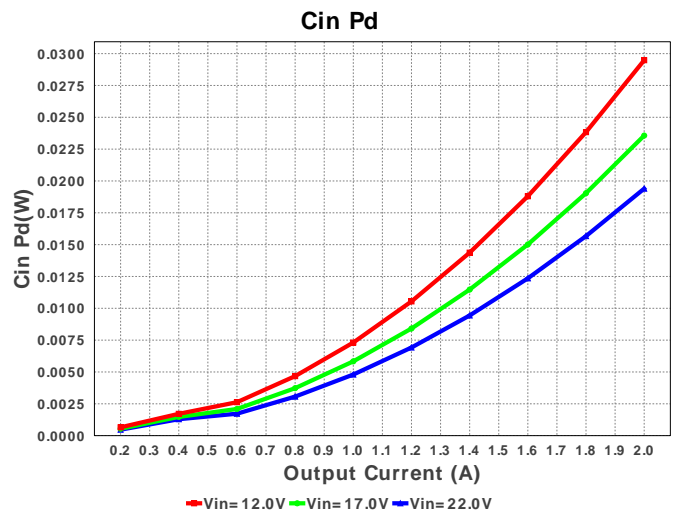
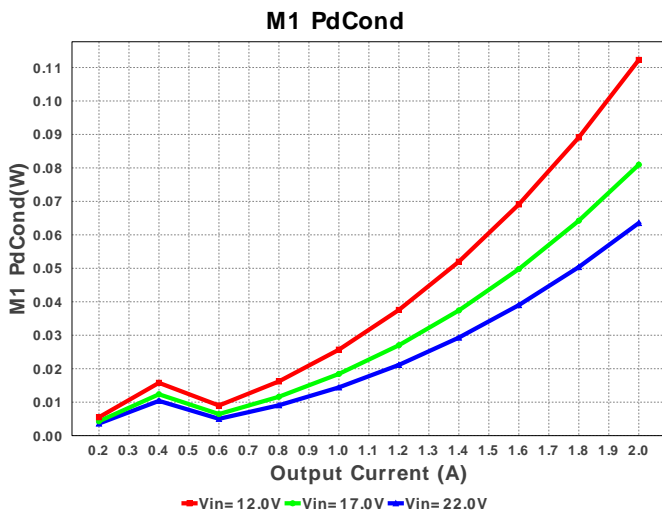
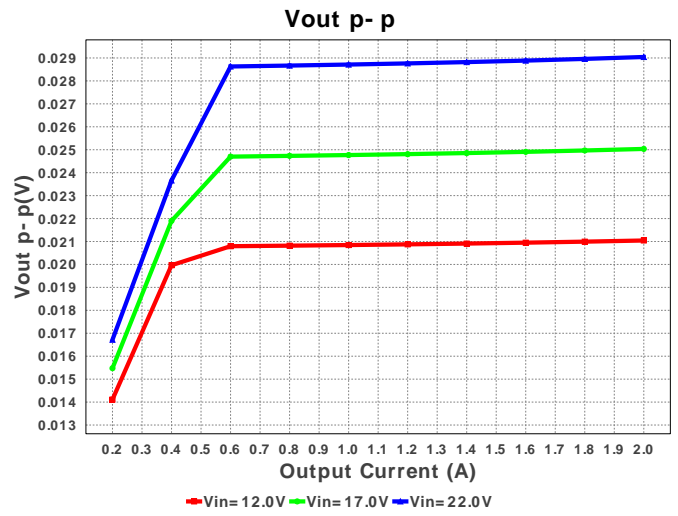
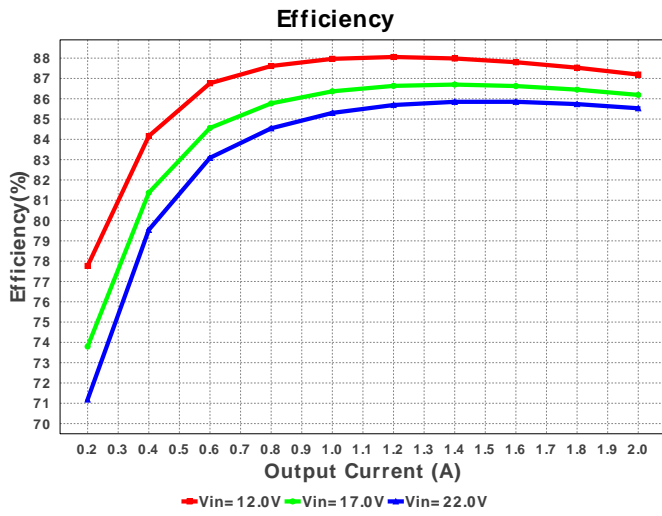
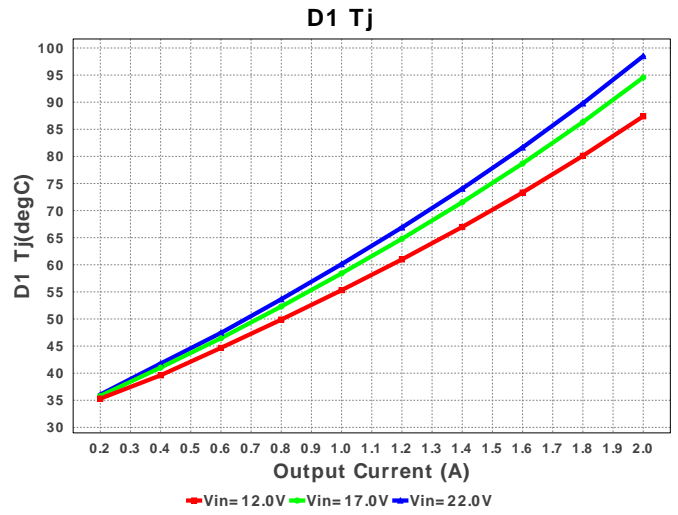
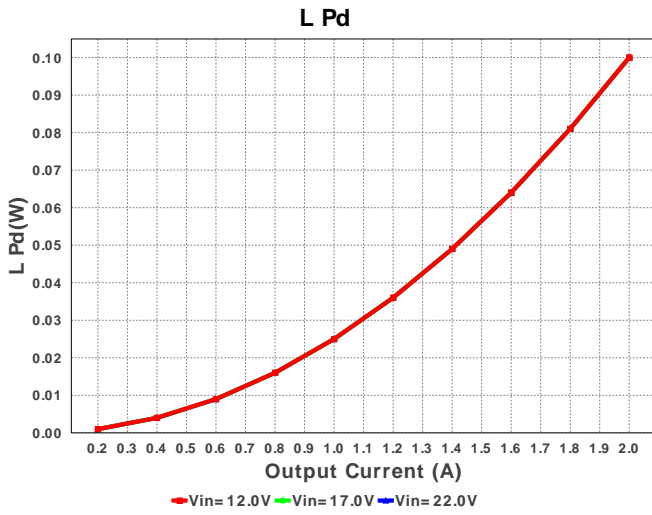
WEBENCH[®] Design Report

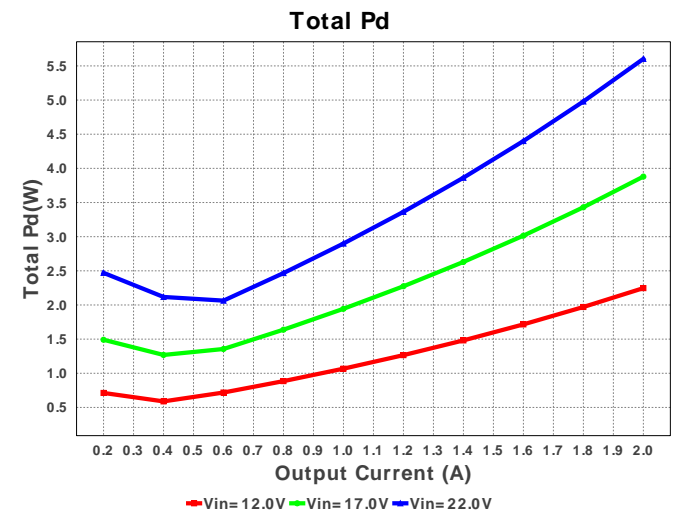
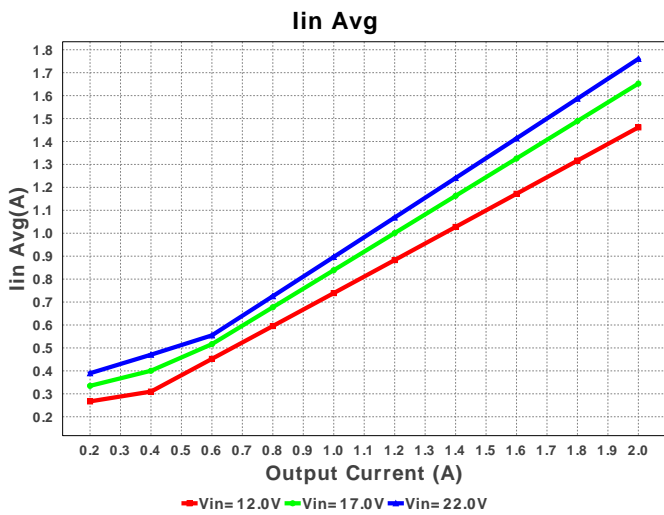
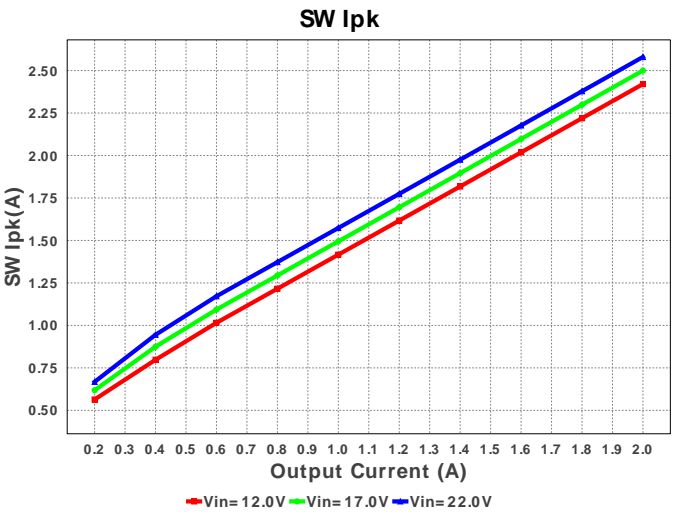
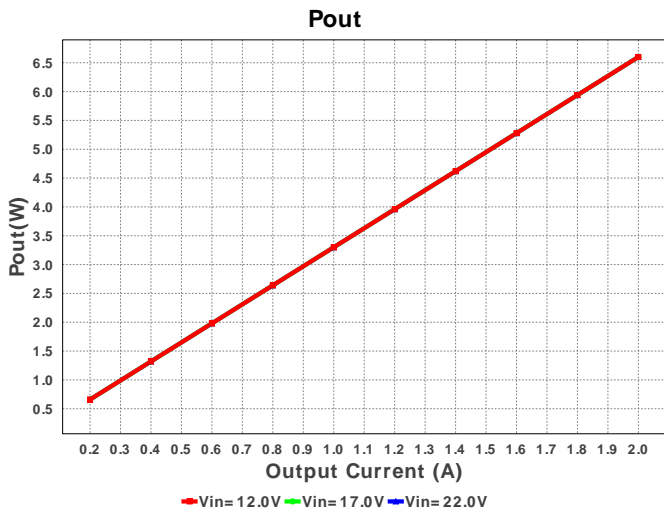
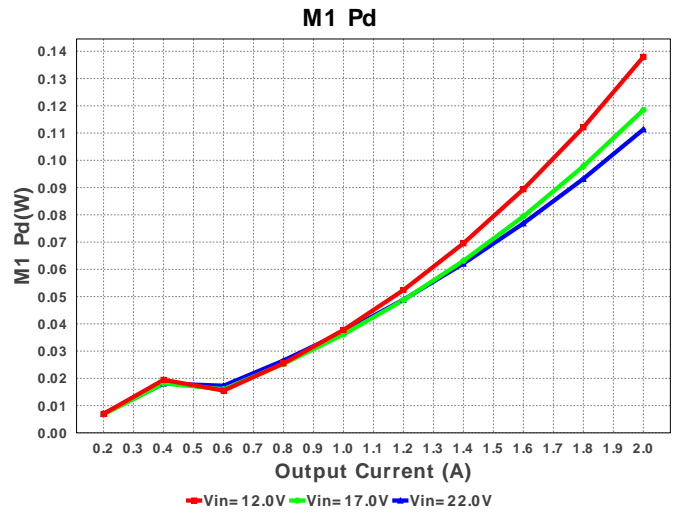
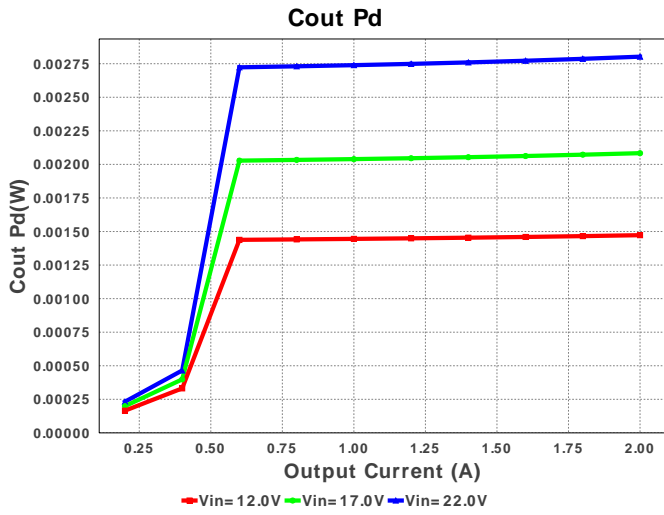
 Design : 4199614/1 LM3489MM/NOPB
 LM3489MM/NOPB 12.0V-22.0V to 3.30V @ 2.0A

Electrical BOM

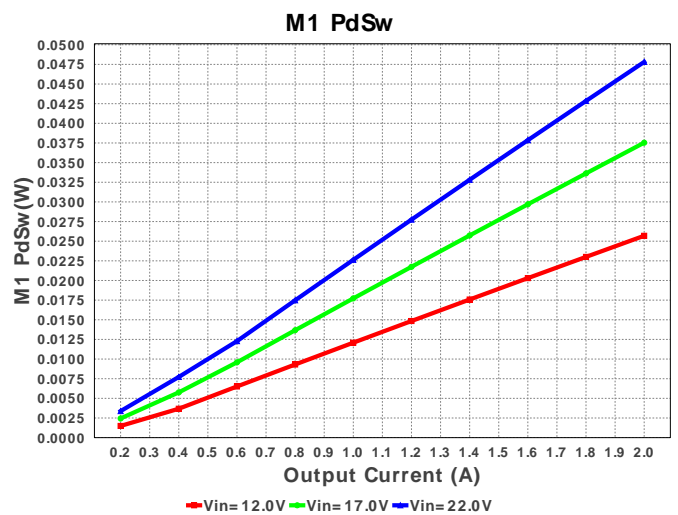
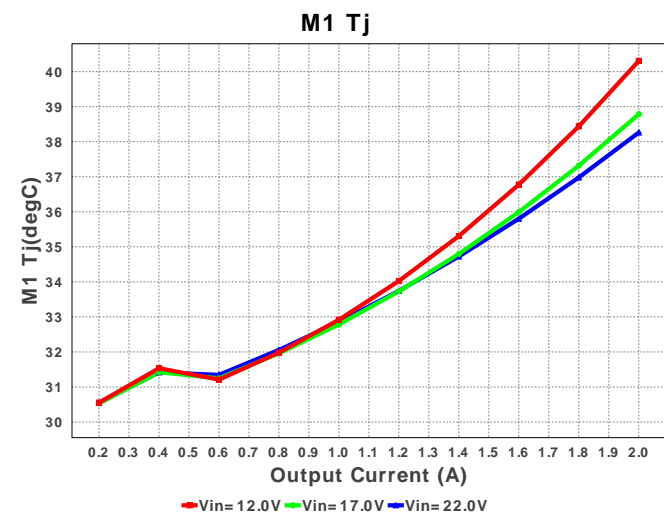
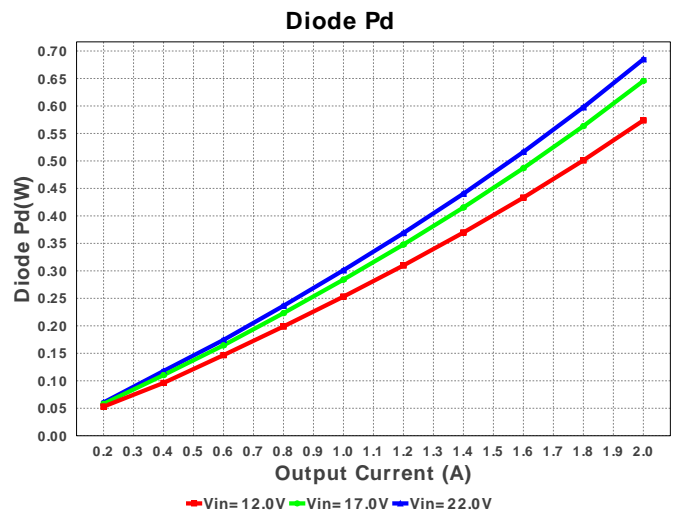
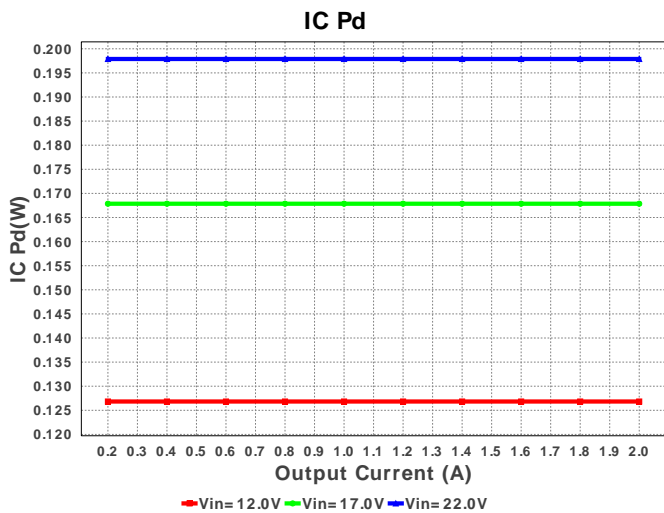
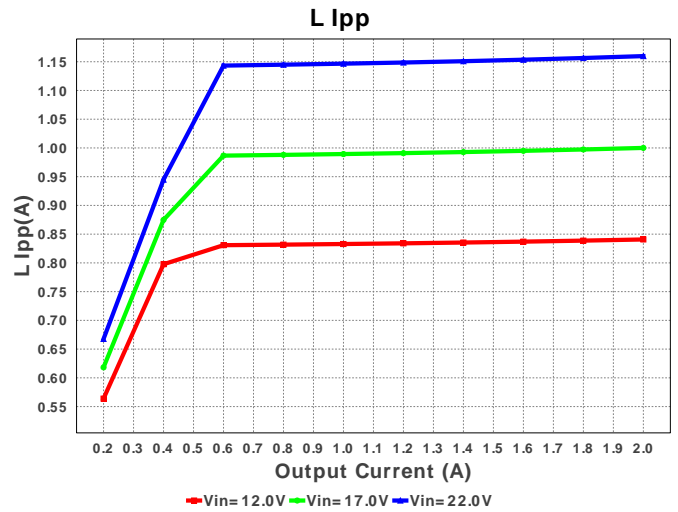
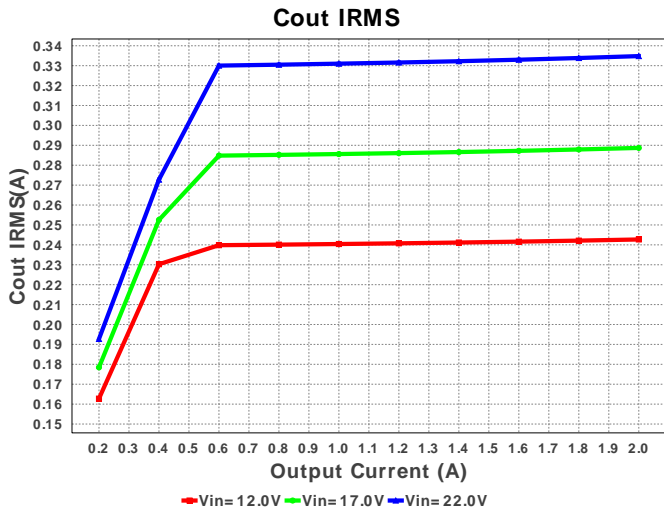
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Yageo America	CC0805JRNPO9BN102 Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
2.	Cff	Yageo America	CC0805JRNPO9BN101 Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Cin	Panasonic	35SVPF22M Series= 1273	Cap= 22.0 uF ESR= 35.0 mOhm VDC= 35.0 V IRMS= 2.6 A	1	\$0.43	 CAPSMT_62_F61 74 mm ²
4.	Cout	Panasonic	6TPE150MAPB Series= 1281	Cap= 150.0 uF ESR= 25.0 mOhm VDC= 6.3 V IRMS= 1.6 A	1	\$0.51	 3528-21 17 mm ²
5.	Cvin	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
6.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.11	 SMA 37 mm ²
7.	L1	TDK	VLP8040T-4R7M	L= 4.7 uH DCR= 25.0 mOhm	1	\$0.22	 VLP8040 113 mm ²
8.	M1	Fairchild Semiconductor	FDC5614P	VdsMax= -60.0 V IdsMax= -3.0 Amps	1	\$0.23	 SOT-23-6 15 mm ²
9.	Radj	Vishay-Dale	CRCW0402115KFKED Series= CRCW..e3	Res= 115.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfbb	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
11.	Rfbt	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
12.	Ris	Vishay-Dale	CRCW0402267RFKED Series= CRCW..e3	Res= 267.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
13.	U1	Texas Instruments	LM3489MM/NOPB	Switcher	1	\$0.54	mpds028d 16 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	745.762 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	425.749 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.758 A	Current	Average input current
4.	L Ipp	1.475 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.737 A	Current	Peak switch current
6.	BOM Count	13	General	Total Design BOM count
7.	FootPrint	305.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	580.986 kHz	General	Switching frequency
9.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
10.	Pout	6.6 W	General	Total output power
11.	Total BOM	\$2.11	General	Total BOM Cost

#	Name	Value	Category	Description
12.	D1 Tj	101.765 degC	Op_Point	D1 junction temperature
13.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
14.	Duty Cycle	16.689 %	Op_point	Duty cycle
15.	Efficiency	85.159 %	Op_point	Steady state efficiency
16.	IC Tj	77.492 degC	Op_point	IC junction temperature
17.	ICThetaJA	240.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
18.	IOUT_OP	2.0 A	Op_point	Iout operating point
19.	M1 Tj	38.284 degC	Op_point	M1 MOSFET junction temperature
20.	VIN_OP	22.0 V	Op_point	Vin operating point
21.	Vout p-p	36.932 mV	Op_point	Peak-to-peak output ripple voltage
22.	Cin Pd	19.466 mW	Power	Input capacitor power dissipation
23.	Cout Pd	4.532 mW	Power	Output capacitor power dissipation
24.	Diode Pd	717.651 mW	Power	Diode power dissipation
25.	Diode Pd	717.651 mW	Power	Diode power dissipation
26.	Diode1 Pd	717.651 mW	Power	Diode1 power dissipation
27.	IC Pd	197.885 mW	Power	IC power dissipation
28.	L Pd	100.0 mW	Power	Inductor power dissipation
29.	L Pd	100.0 mW	Power	Inductor power dissipation
30.	M1 Pd	110.689 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	62.856 mW	Power	M1 MOSFET conduction losses
32.	M1 PdSw	47.833 mW	Power	M1 MOSFET switching losses
33.	Total Pd	5.742 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	22.0	Maximum input voltage
4.	VinMin	12.0	Minimum input voltage
5.	Vout	3.3	Output Voltage
6.	Vout1	3.3	Output Voltage #1
7.	base_pn	LM3489	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. Outline The LM3489 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. **LM3489** Product Folder : <http://www.ti.com/product/LM3489> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).