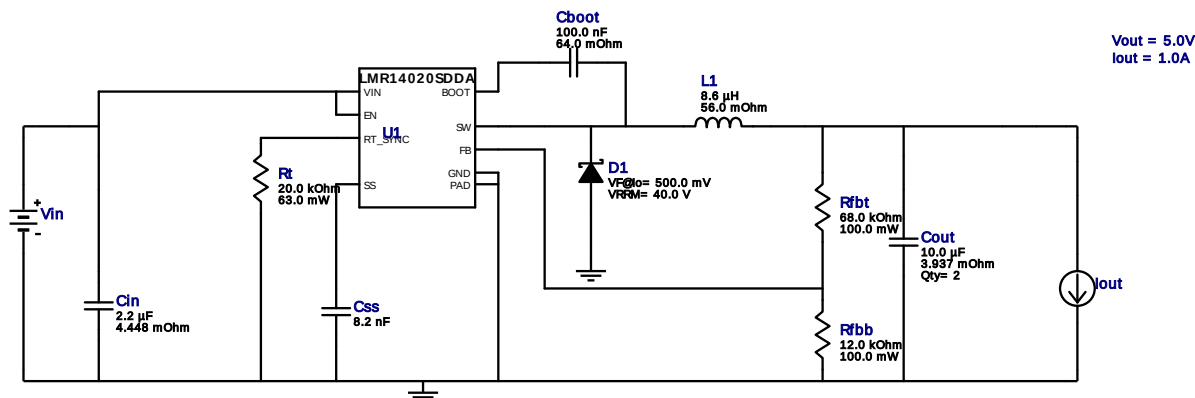


WEBENCH® Design Report

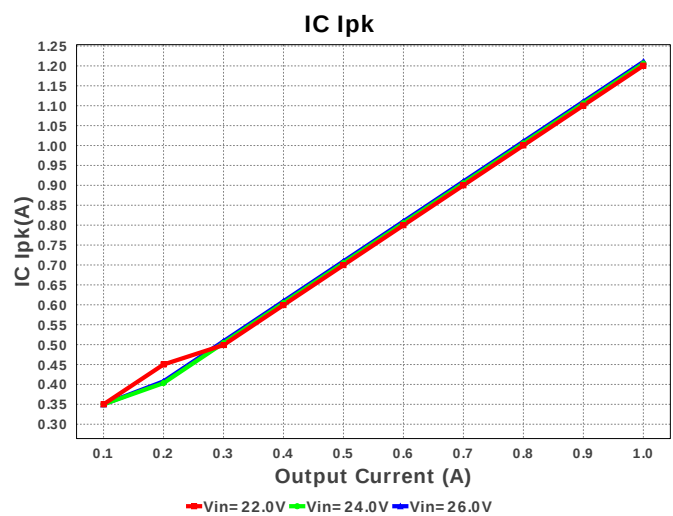
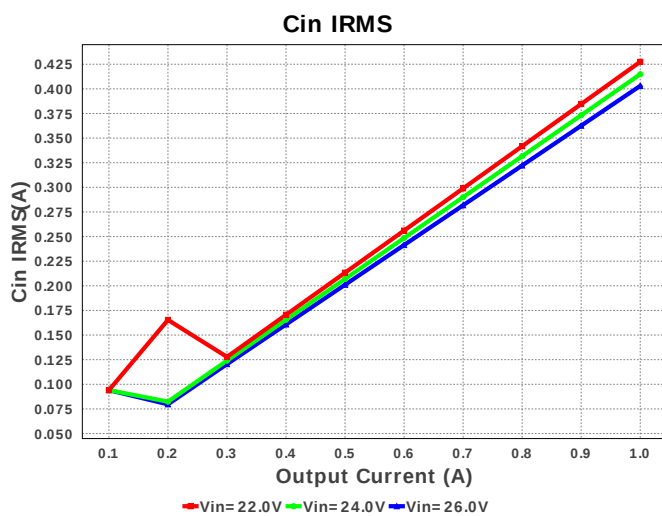
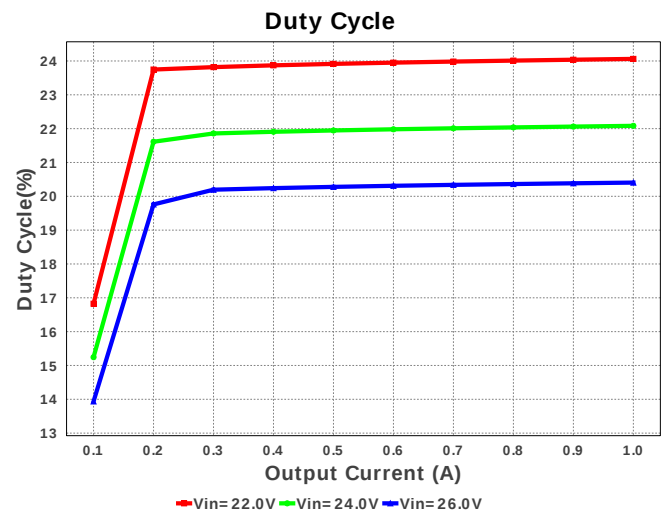
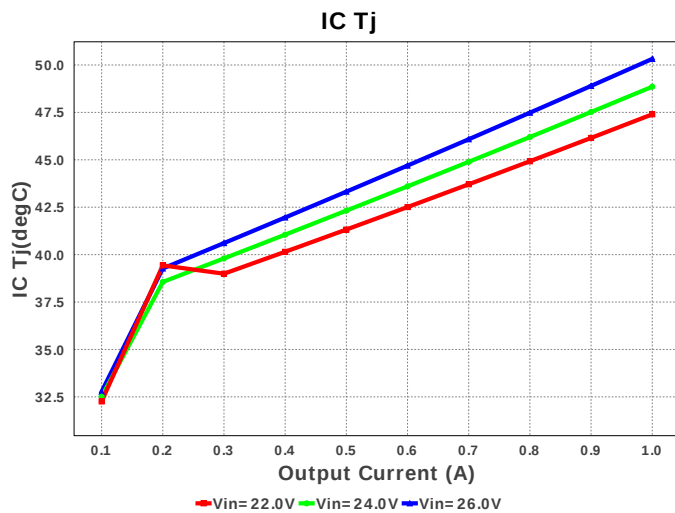
Design : 4743042/4 LMR14020SDDAR
LMR14020SDDAR 22.0V-26.0V to 5.00V @ 1.0001875000000002A

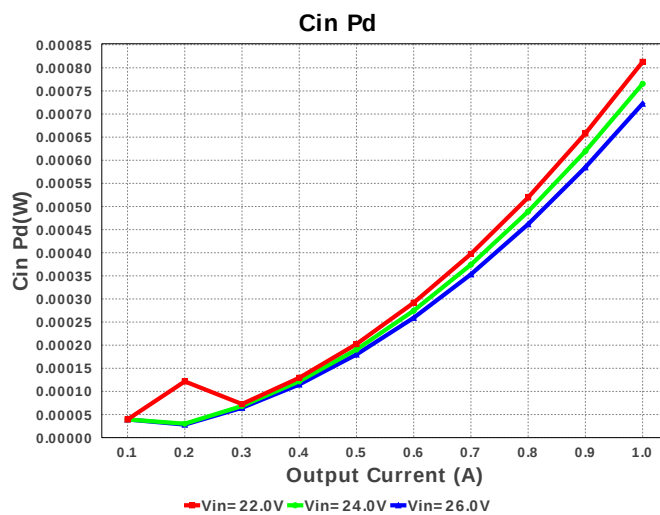
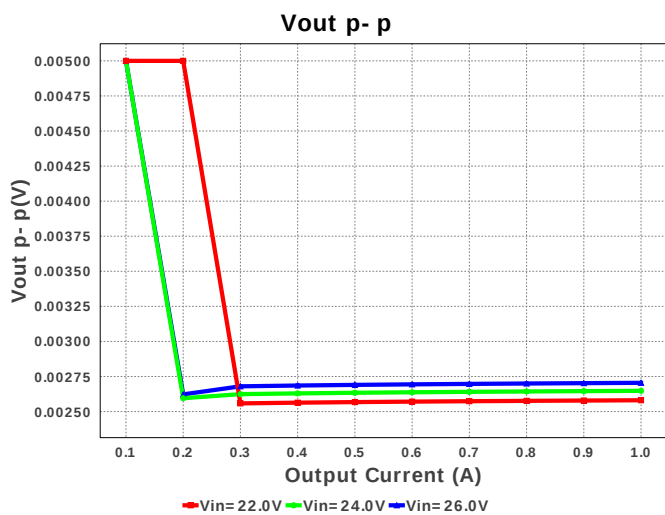
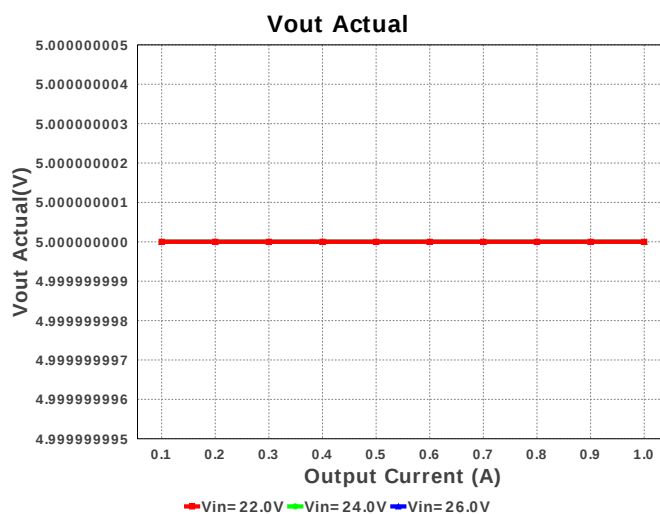
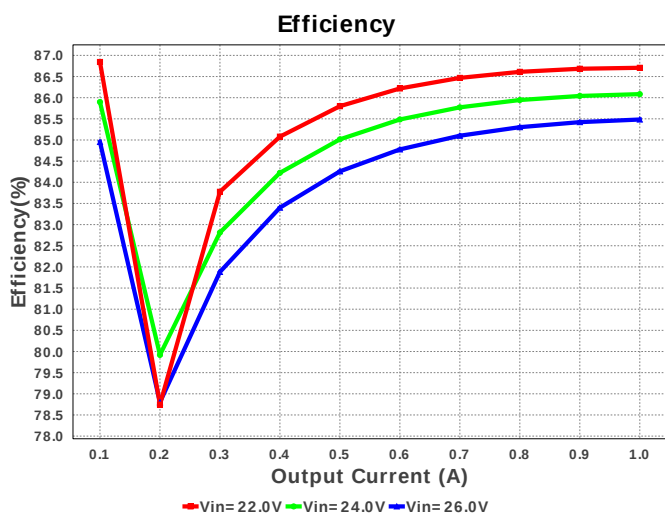
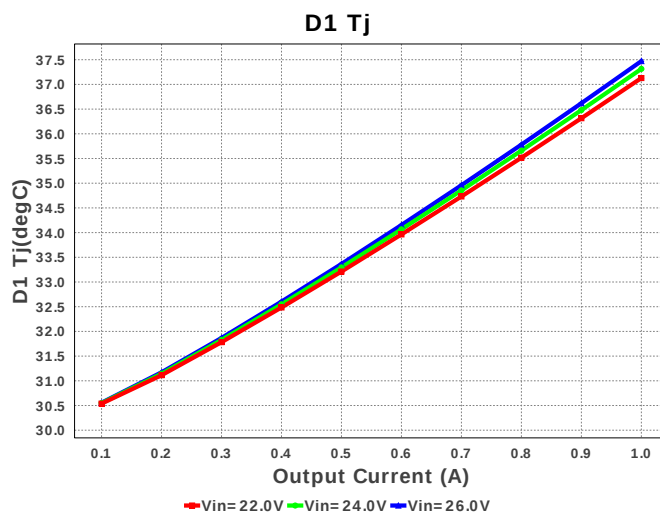
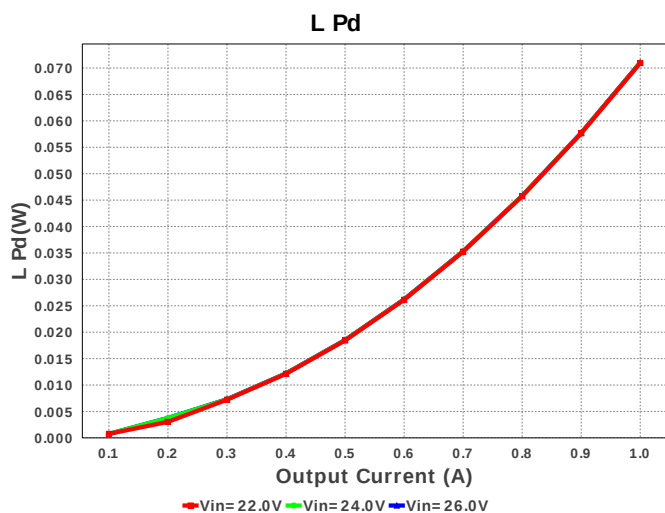


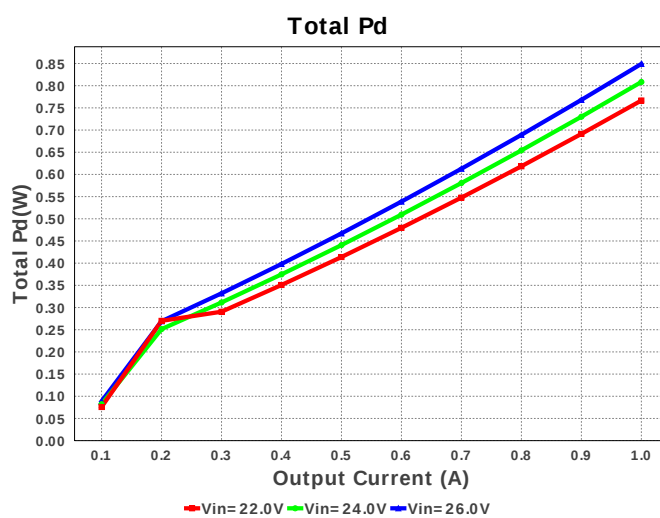
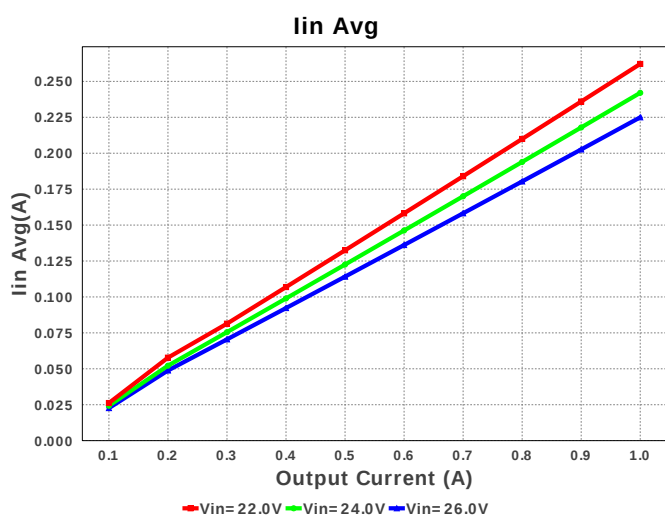
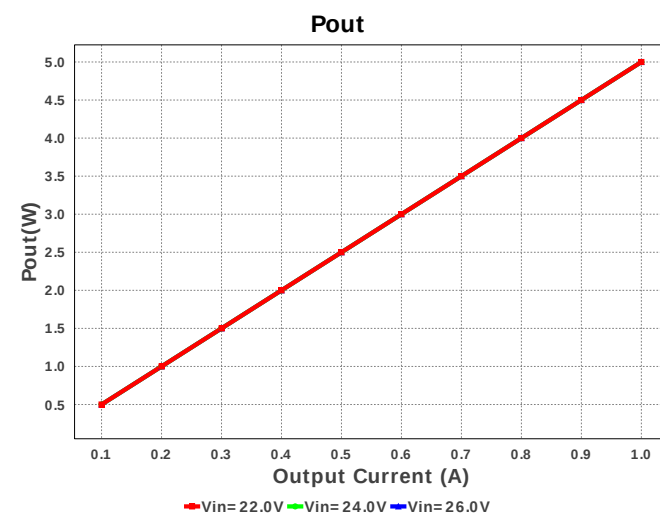
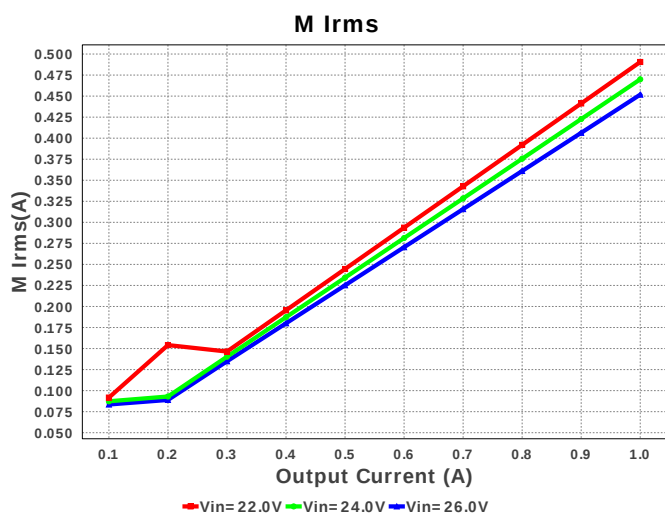
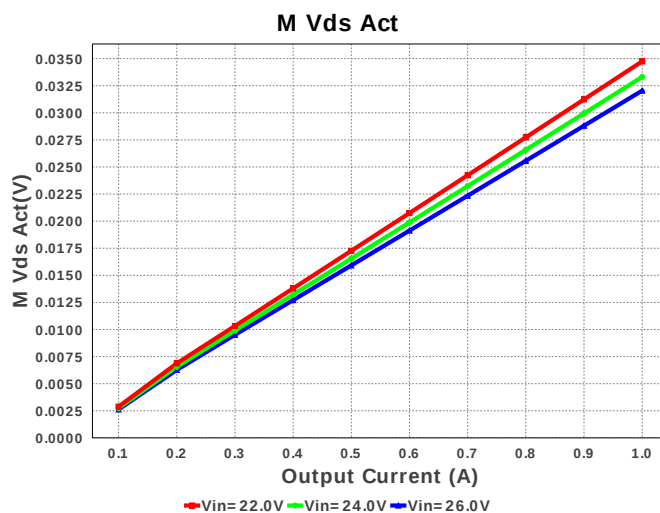
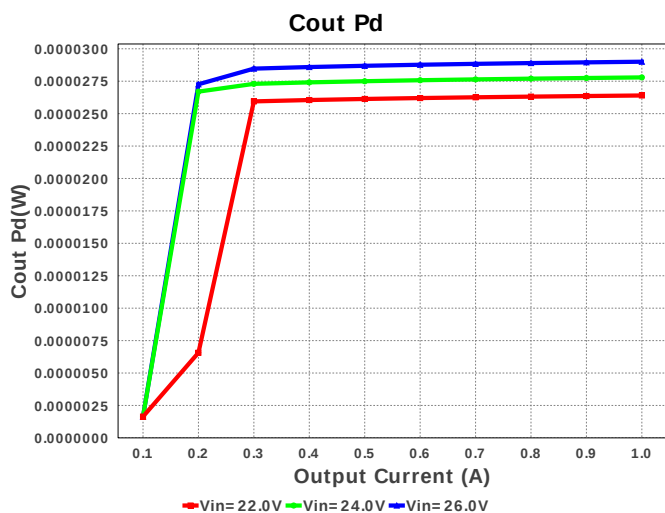
Electrical BOM

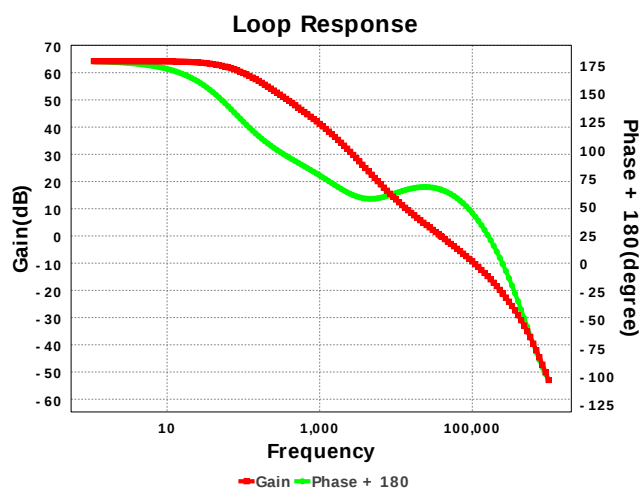
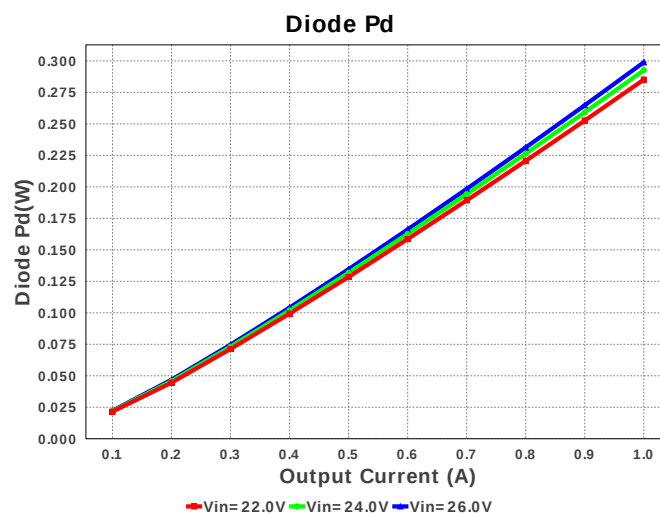
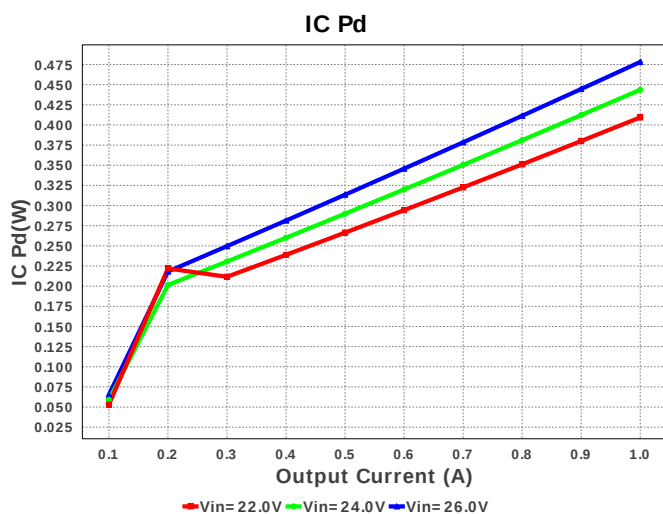
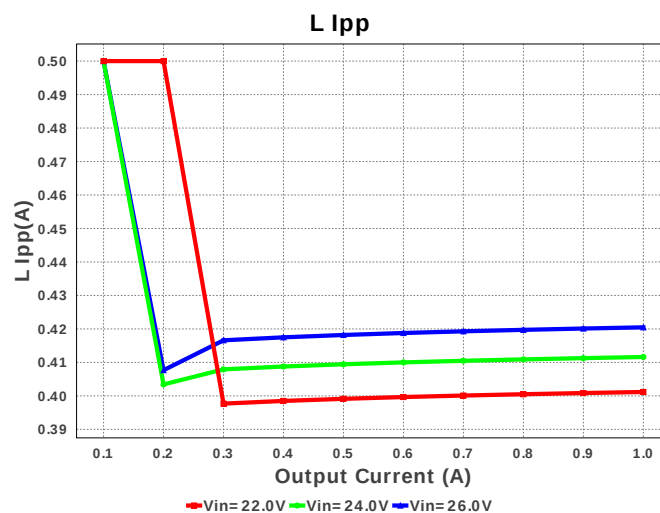
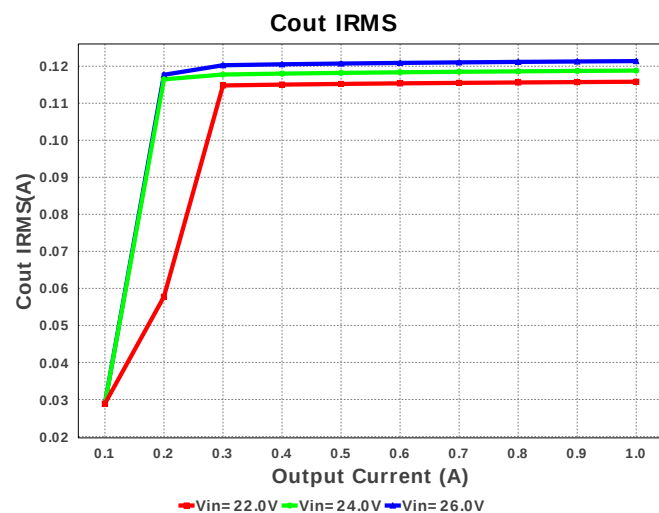
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	 0805 7 mm ²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	 1206_190 11 mm ²
3.	Cout	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	2	\$0.03	 0805 7 mm ²
4.	Css	MuRata	GRM155R71C822KA01D Series= X7R	Cap= 8.2 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
5.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	 SMA 37 mm ²
6.	L1	Bourns	SRR6028-8R6Y	L= 8.6 uH DCR= 56.0 mOhm	1	\$0.26	 SRR6028 77 mm ²
7.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
8.	Rfbbt	Yageo America	RC0603FR-0768KL Series= ?	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
9.	Rt	Vishay-Dale	CRCW040220K0FKED Series= CRCW...e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10. U1		Texas Instruments	LMR14020SDDAR	Switcher	1	\$1.46	 DDA0008E_N 57 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	403.033 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	121.381 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.21 A	Current	Peak switch current in IC
4.	Iin Avg	224.98 mA	Current	Average input current
5.	L Ipp	420.48 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	451.751 mA	Current	Q lavg
7.	BOM Count	11	General	Total Design BOM count
8.	FootPrint	219.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.183 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	32.042 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	\$1.97	General	Total BOM Cost
14.	D1 Tj	37.472 degC	Op_Point	D1 junction temperature
15.	Vout Actual	5.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	38.521 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	20.405 %	Op_point	Duty cycle
19.	Efficiency	85.484 %	Op_point	Steady state efficiency
20.	IC Tj	50.081 degC	Op_point	IC junction temperature
21.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.0 A	Op_point	Iout operating point
23.	Phase Marg	65.661 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	26.0 V	Op_point	Vin operating point
25.	Vout p-p	2.705 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	722.515 μ W	Power	Input capacitor power dissipation
27.	Cout Pd	29.003 μ W	Power	Output capacitor power dissipation
28.	Diode Pd	298.873 mW	Power	Diode power dissipation
29.	IC Pd	478.127 mW	Power	IC power dissipation
30.	L Pd	71.04 mW	Power	Inductor power dissipation
31.	Total Pd	849.111 mW	Power	Total Power Dissipation
32.	Vout Tolerance	4.158 %		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	26.0	Maximum input voltage
3.	VinMin	22.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LMR14020S	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14020S** Product Folder : <http://www.ti.com/product/LMR14020> : 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](#).