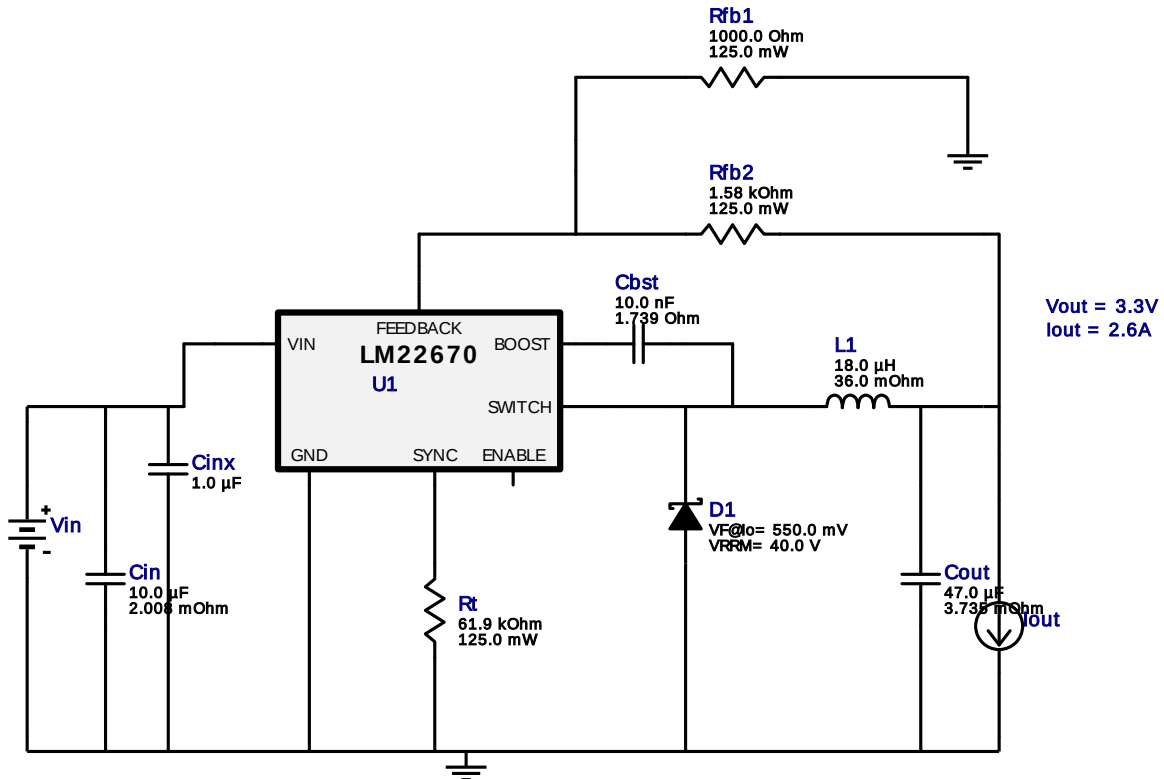


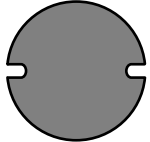
WEBENCH® Design Report

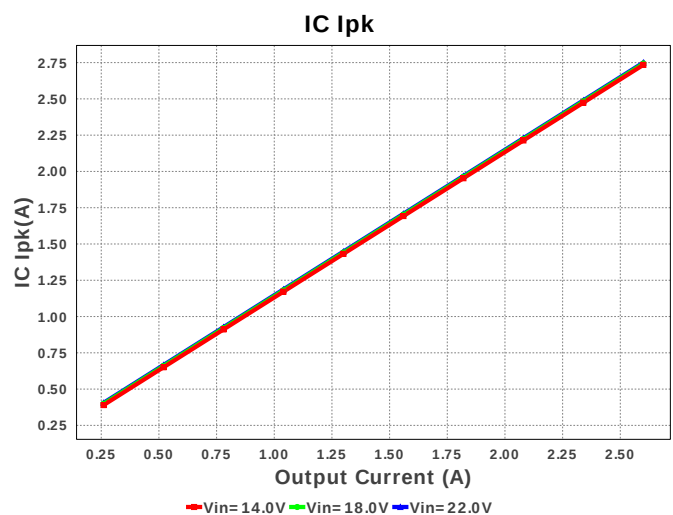
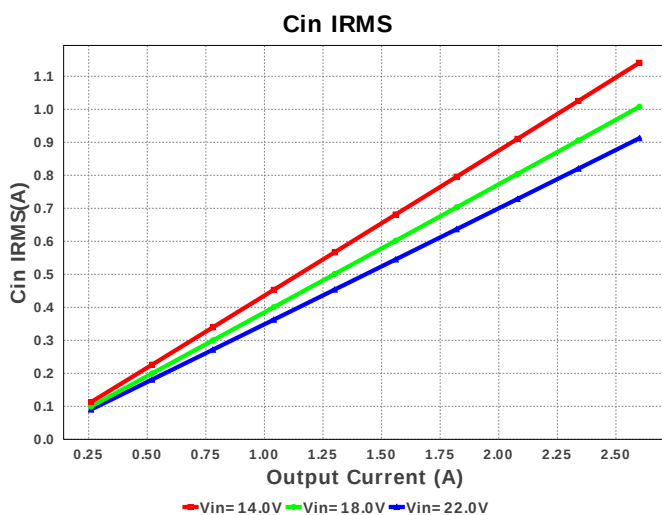
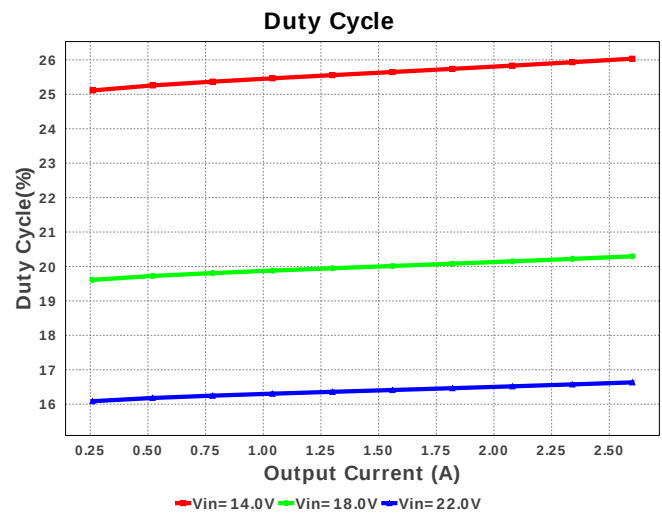
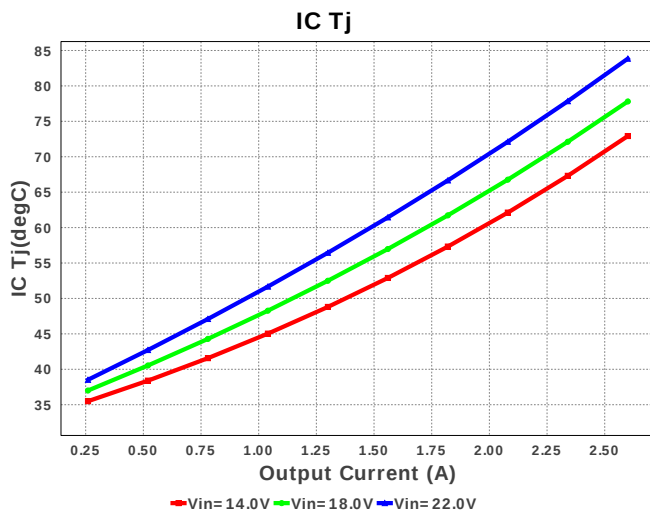
Design : 4652143/6 LM22670MRE-ADJ/NOPB
LM22670MRE-ADJ/NOPB 14.0V-22.0V to 3.30V @ 2.6A

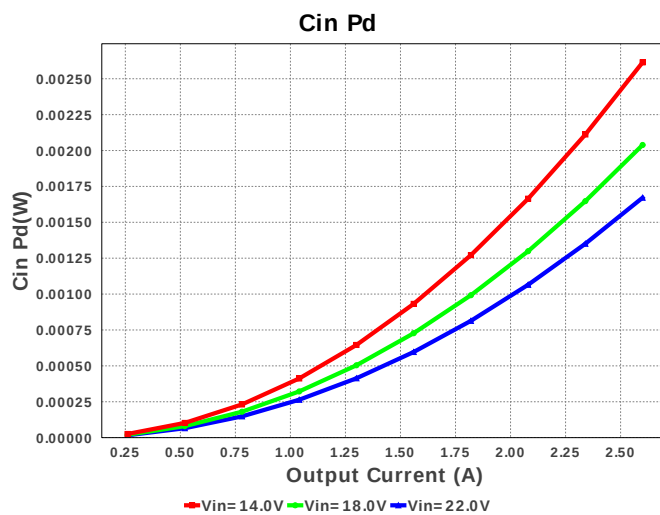
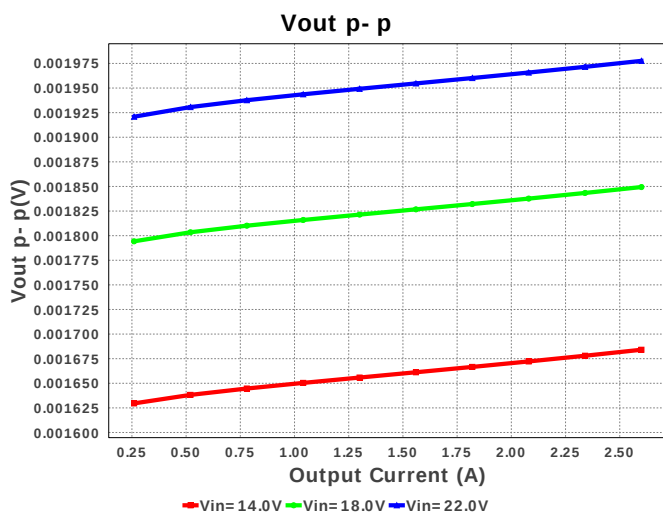
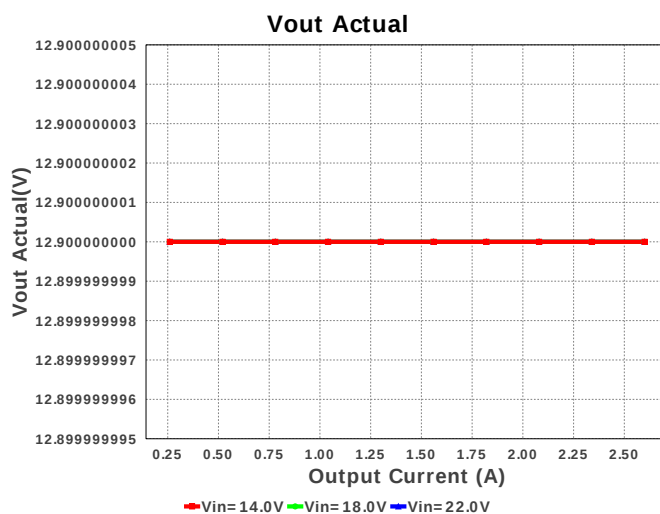
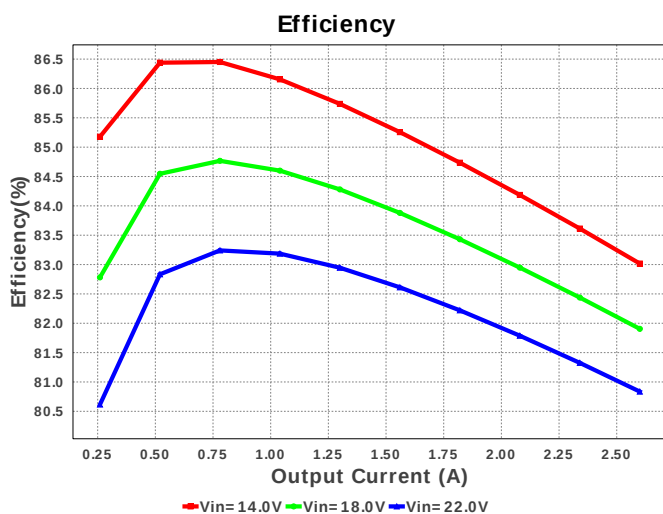
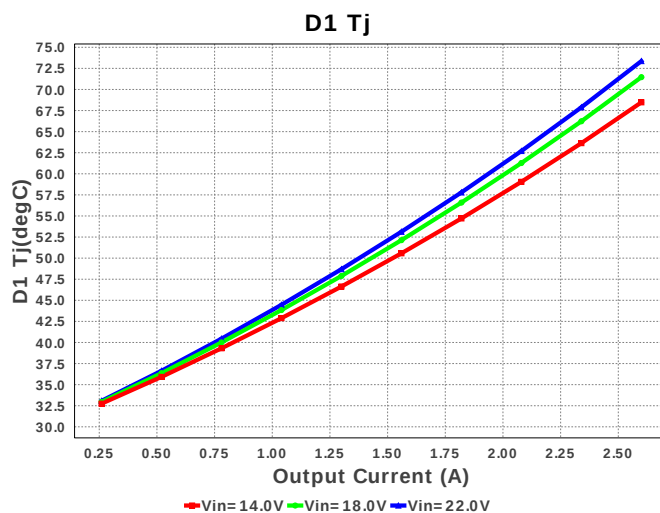
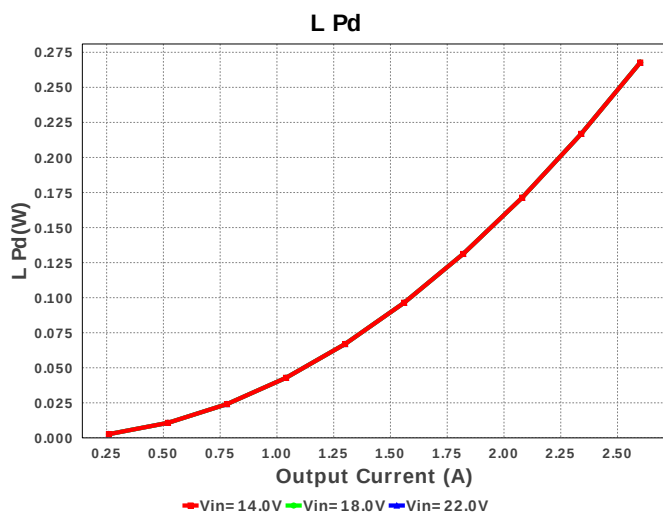


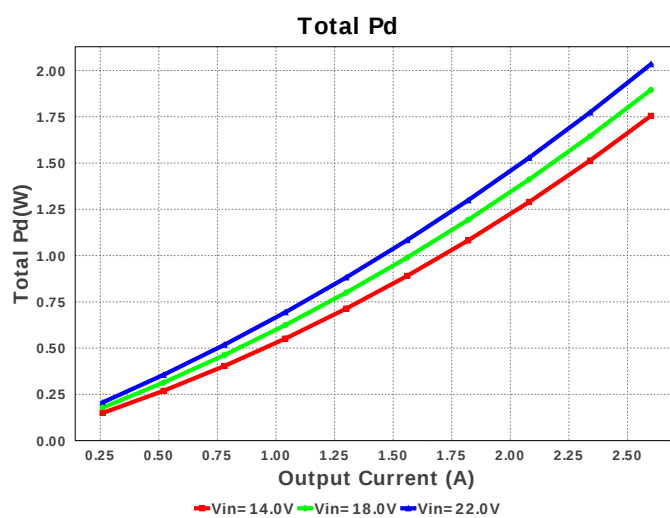
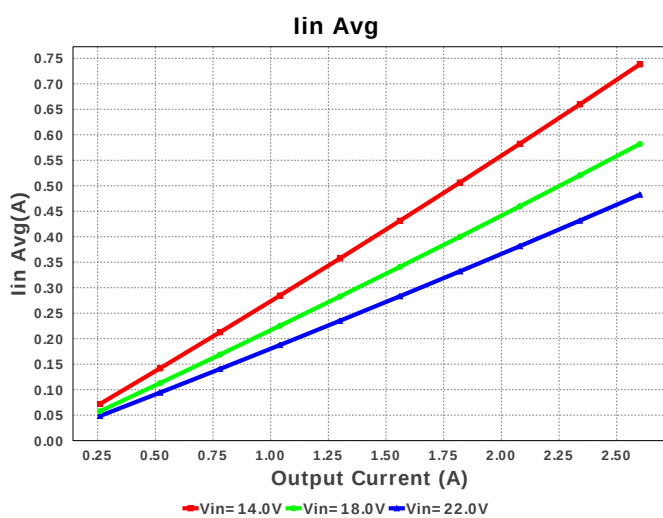
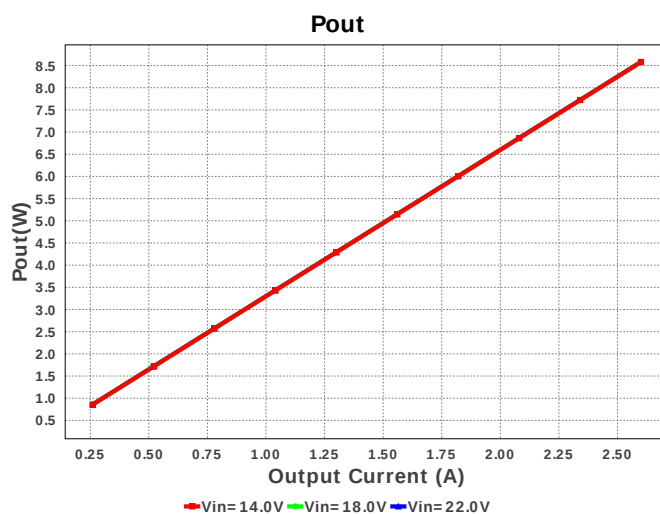
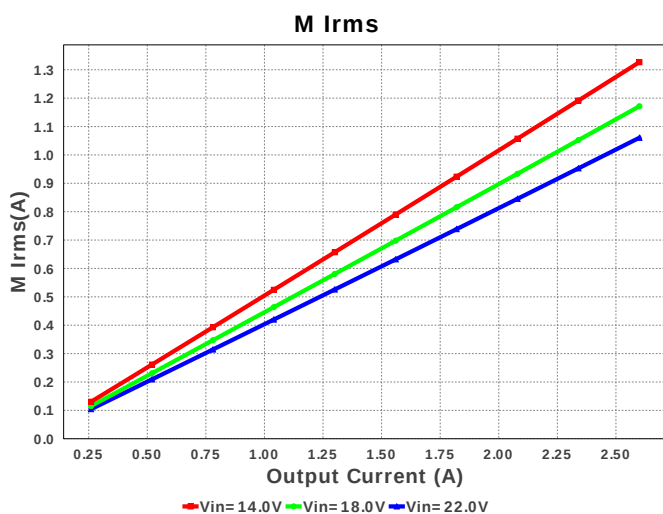
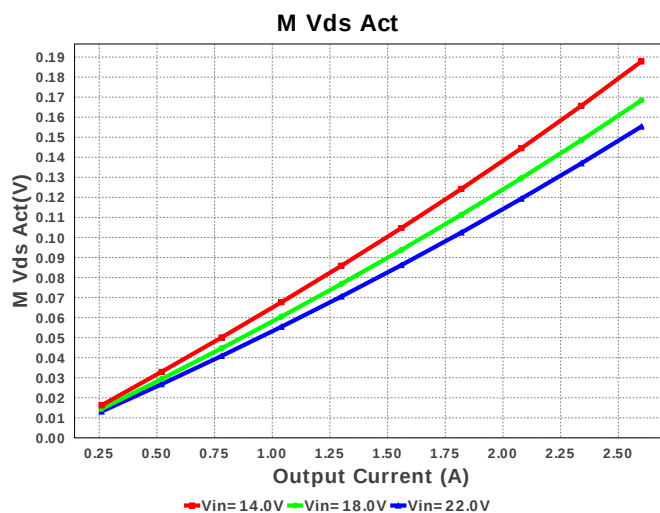
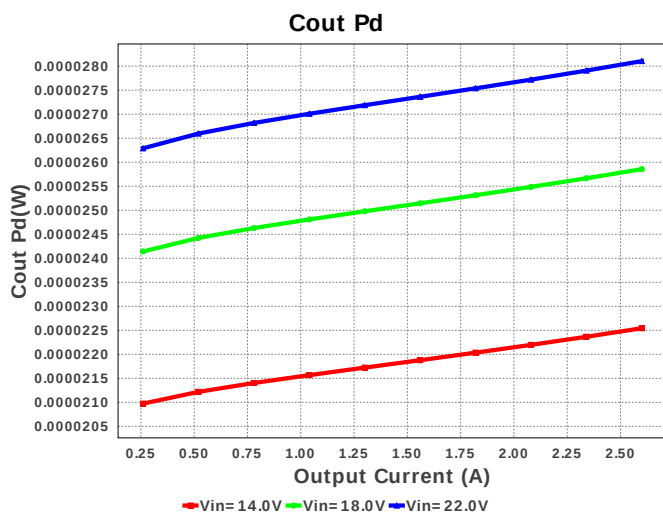
Electrical BOM

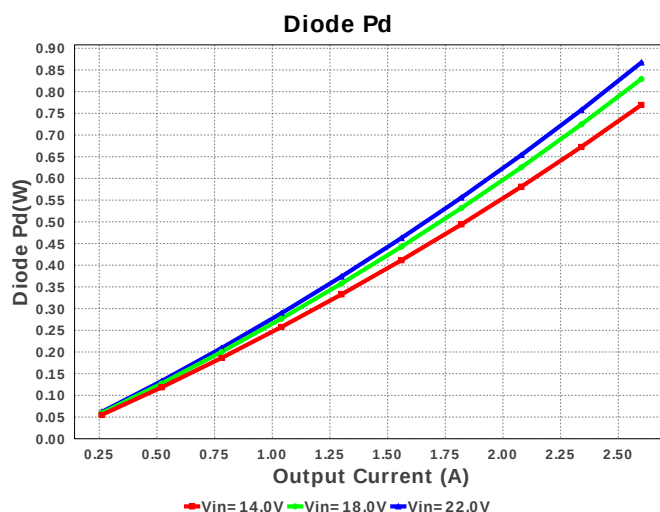
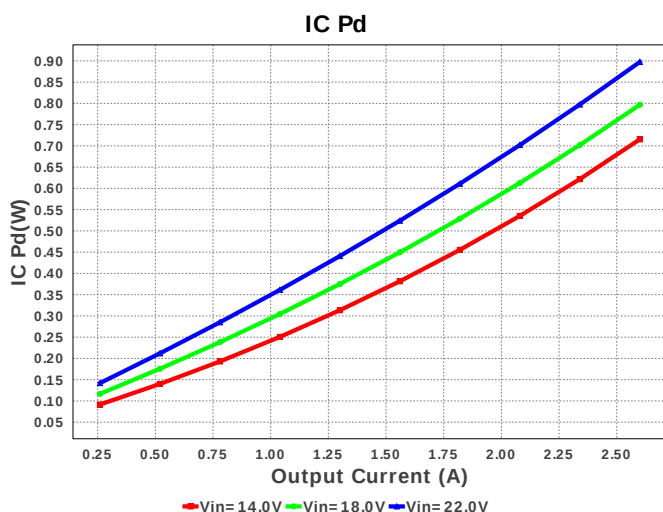
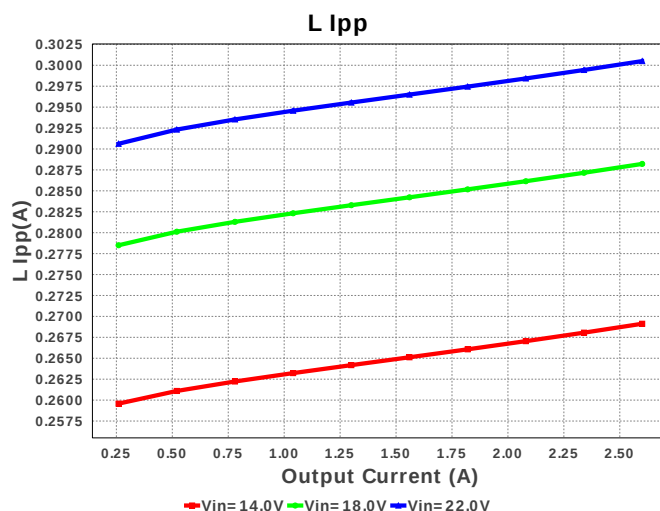
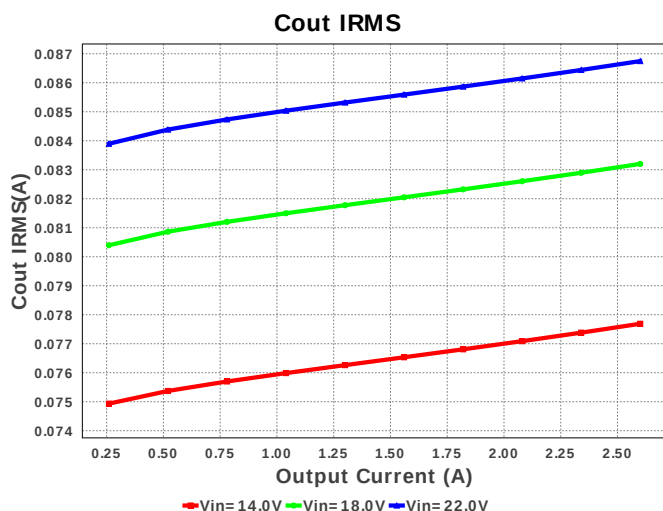
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	\$0.01	0805 7 mm ²
2.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	\$0.22	1210_280 15 mm ²
3.	Cinx	Taiyo Yuden	GMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 35.0 V IRMS= 0.0 A	1	\$0.05	0805 7 mm ²
4.	Cout	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	\$0.10	1206_190 11 mm ²
5.	D1	Diodes Inc.	B540C-13-F	Vf@Io= 550.0 mV VRRM= 40.0 V	1	\$0.17	SMC 83 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
6.	L1	Bourns	SDR1307-180ML	L= 18.0 μ H DCR= 36.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
7.	Rfb1	Panasonic	ERJ-6ENF1001V Series= ERJ-6E	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
8.	Rfb2	Panasonic	ERJ-6ENF1581V Series= ERJ-6E	Res= 1.58 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
9.	Rt	Panasonic	ERJ-6ENF6192V Series= ERJ-6E	Res= 61.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
10.	U1	Texas Instruments	LM22670MRE-ADJ/NOPB	Switcher	1	\$2.13	 MRA08B 56 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	912.337 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	86.746 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.75 A	Current	Peak switch current in IC
4.	Iin Avg	482.46 mA	Current	Average input current
5.	L Ipp	300.5 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.06 A	Current	Q lavg
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	425.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	575.061 kHz	General	Switching frequency
10.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	155.325 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	8.58 W	General	Total output power
14.	Total BOM	\$3.06	General	Total BOM Cost
15.	D1 Tj	73.363 degC	Op_Point	D1 junction temperature
16.	Vout Actual	3.315 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
18.	Cross Freq	43.757 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	16.634 %	Op_point	Duty cycle
20.	Efficiency	80.836 %	Op_point	Steady state efficiency
21.	IC Tj	83.843 degC	Op_point	IC junction temperature
22.	ICThetaJA	60.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.6 A	Op_point	Iout operating point
24.	Phase Marg	50.446 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	22.0 V	Op_point	Vin operating point
26.	Vout p-p	1.978 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	1.671 mW	Power	Input capacitor power dissipation
28.	Cout Pd	28.106 μ W	Power	Output capacitor power dissipation
29.	Diode Pd	867.253 mW	Power	Diode power dissipation
30.	IC Pd	897.376 mW	Power	IC power dissipation
31.	L Pd	267.696 mW	Power	Inductor power dissipation

#	Name	Value	Category	Description
32.	Total Pd	2.034 W	Power	Total Power Dissipation
33.	Vout Tolerance	2.734 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.6	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LM22670	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. Part Description The LM22670 is a monolithic integrated circuit that provides all of the active functions for a step-down (buck) switching regulator capable of driving up to 3.0A loads with excellent line and load regulation characteristics. High efficiency (>90%) is obtained through the use of a low ON-resistance N-channel MOSFET.

2. **LM22670** Product Folder : <http://www.ti.com/product/LM22670> : 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](#).