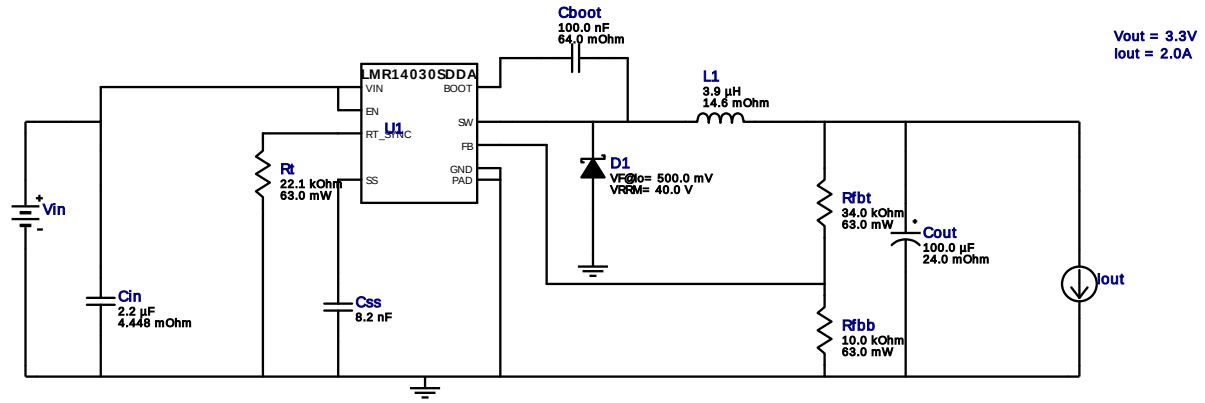
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = LMR14030SDDAR
Topology = Buck
Created = 7/12/16 1:28:55 AM
BOM Cost = $2.51
BOM Count = 10
Total Pd = 1.42W

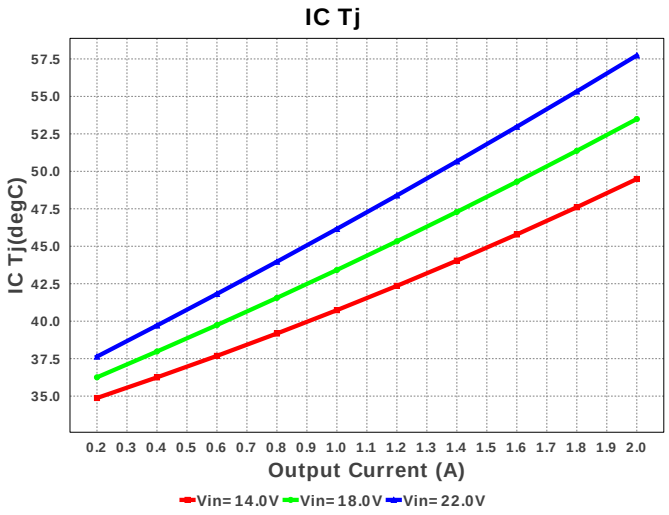
Design : 4737567/29 LMR14030SDDAR
LMR14030SDDAR 14.0V-22.0V to 3.30V @ 2.0002249999999995A

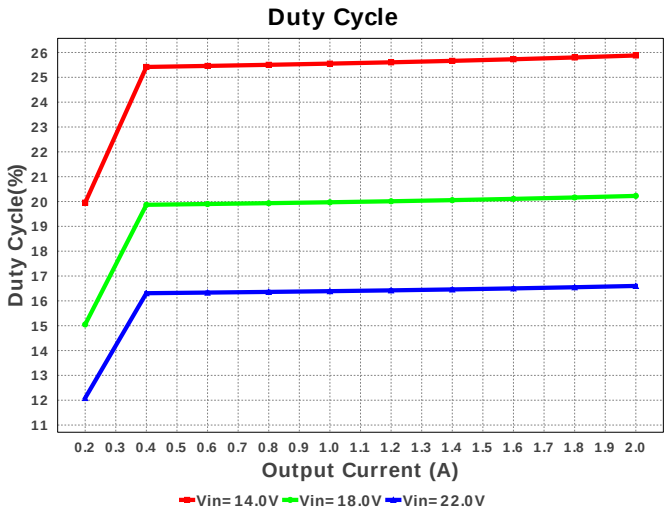


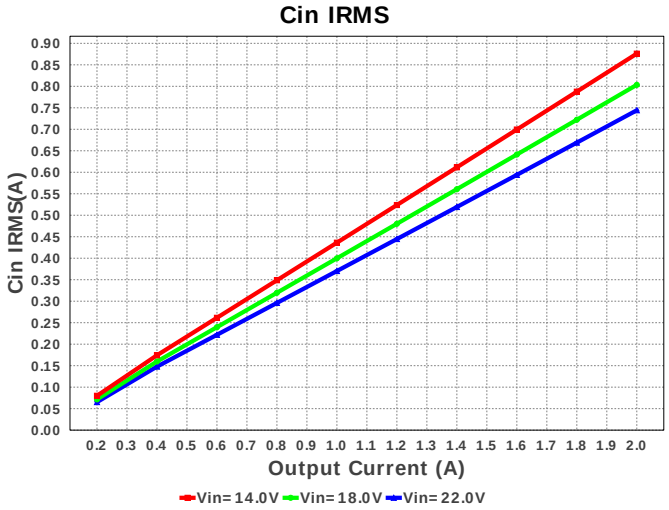
Electrical BOM

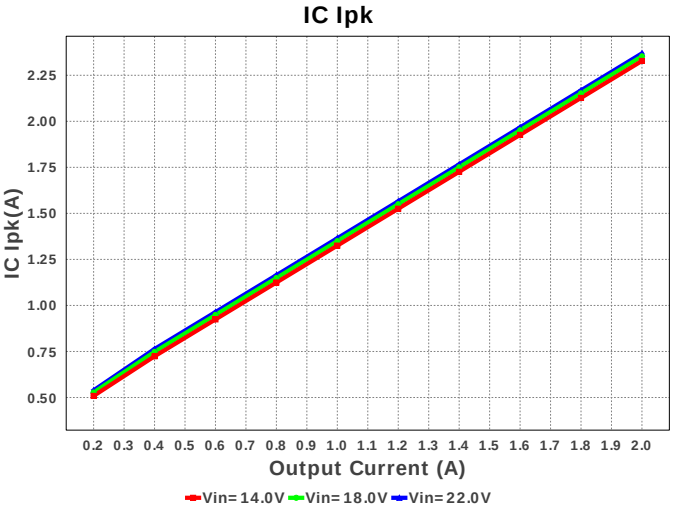
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
3.	Cout	Panasonic	16SVPC100M Series= SVPC	Cap= 100.0 uF ESR= 24.0 mOhm VDC= 16.0 V IRMS= 2.49 A	1	$0.29	SM_RADIAL_6.3AMM 80 mm²
4.	Css	MuRata	GRM155R71C822KA01D Series= X7R	Cap= 8.2 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
5.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
6.	L1	Bourns	SRU8043-3R9Y	L= 3.9 µH DCR= 14.6 mOhm	1	$0.33	SRU8043 100 mm²
7.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rt	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

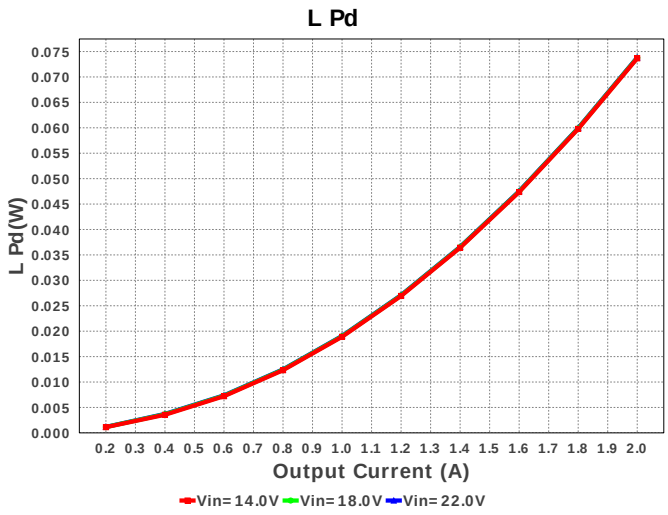
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14030SDDAR	Switcher	1	$1.68	DDA0008E_N 57 mm^2

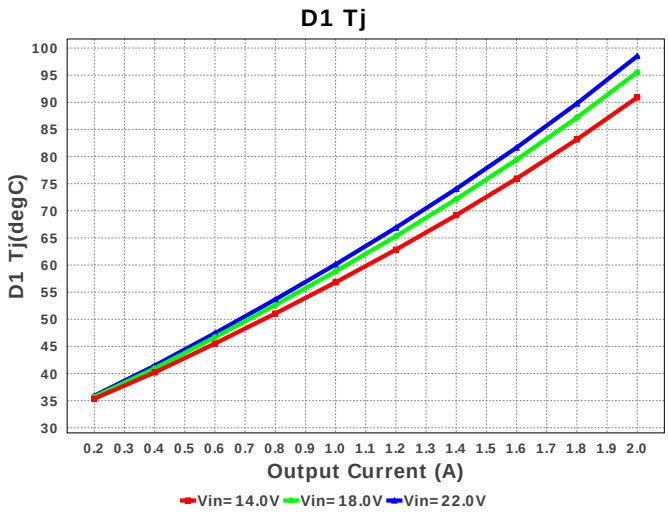


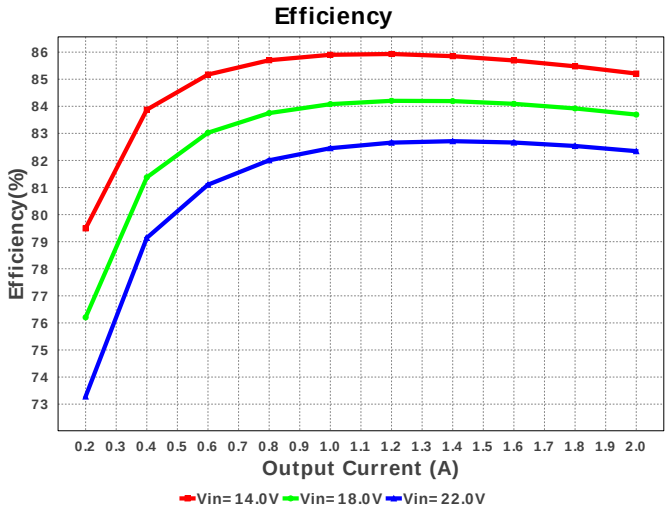


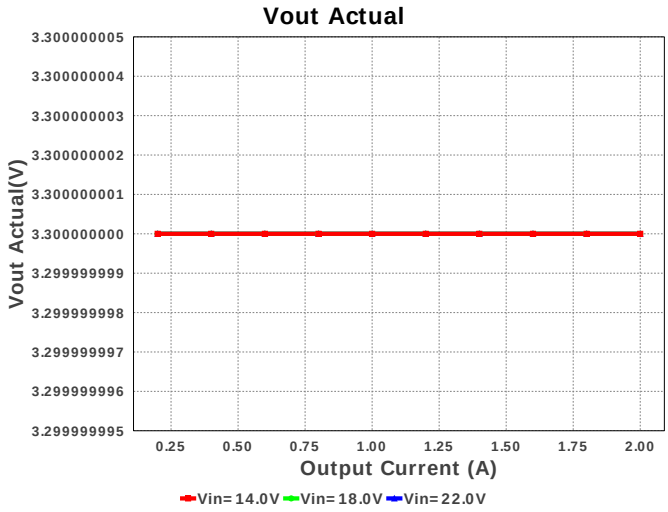


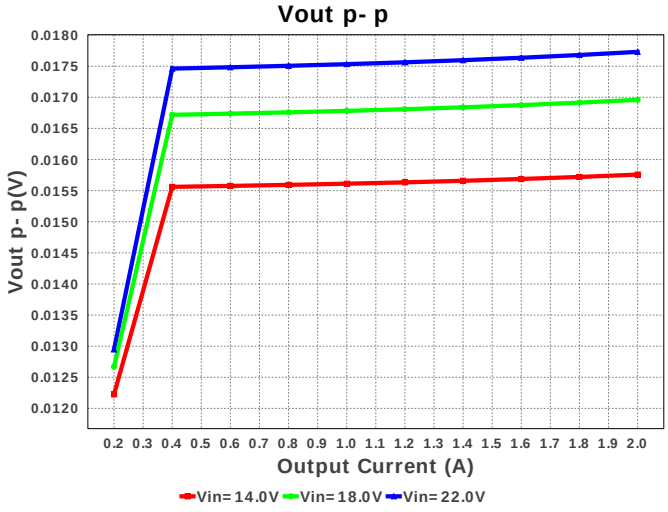


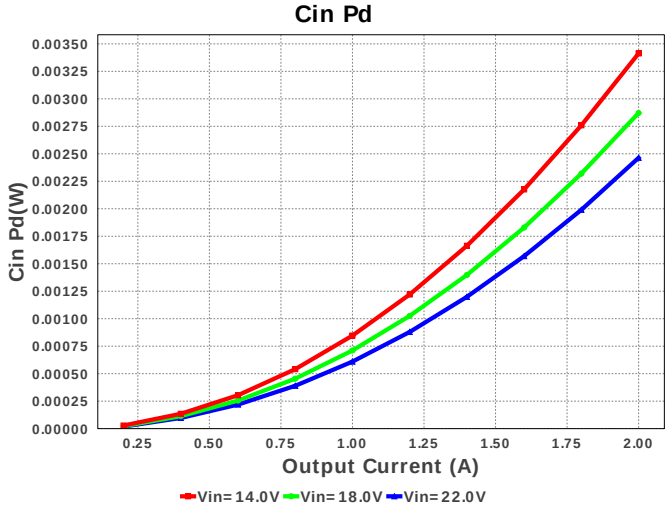


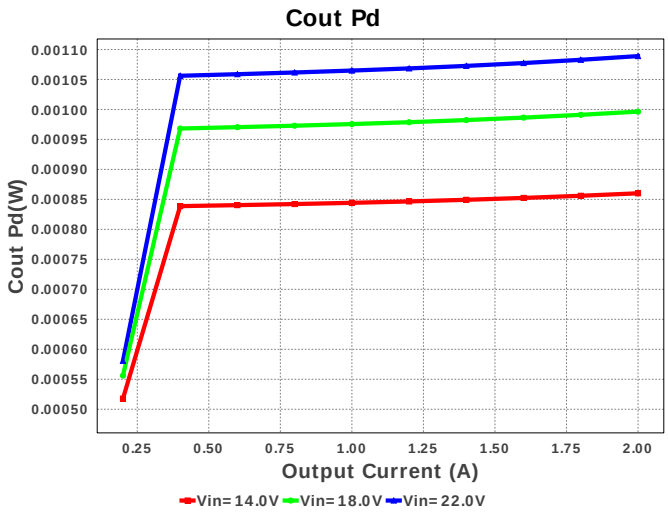


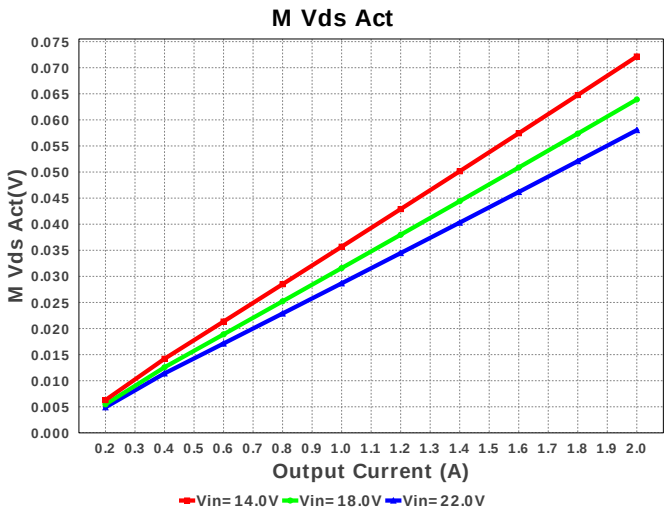


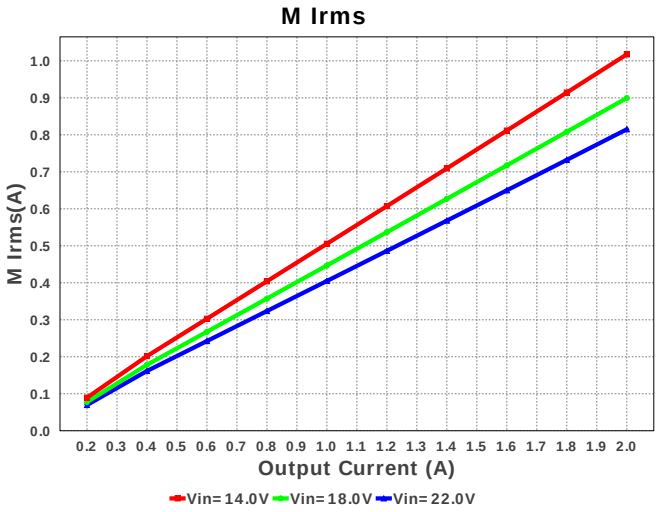


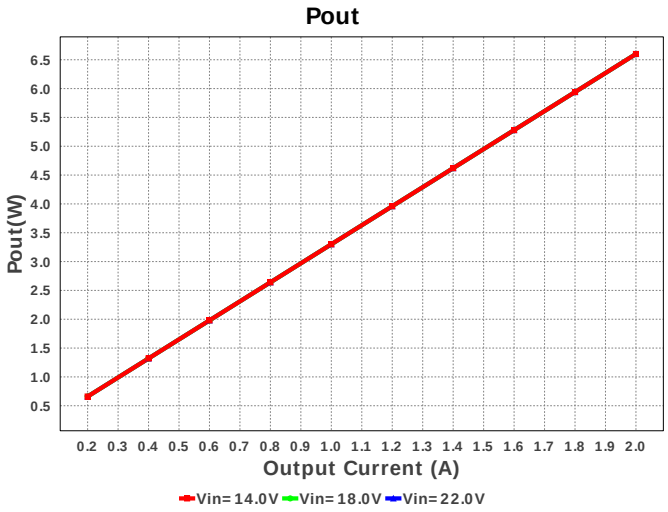


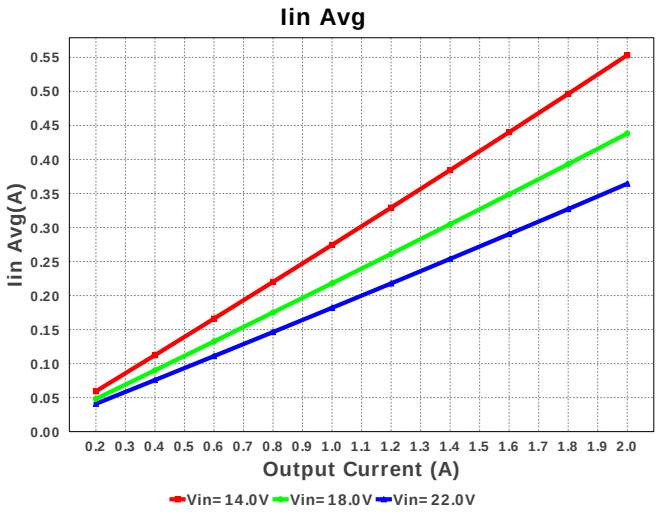


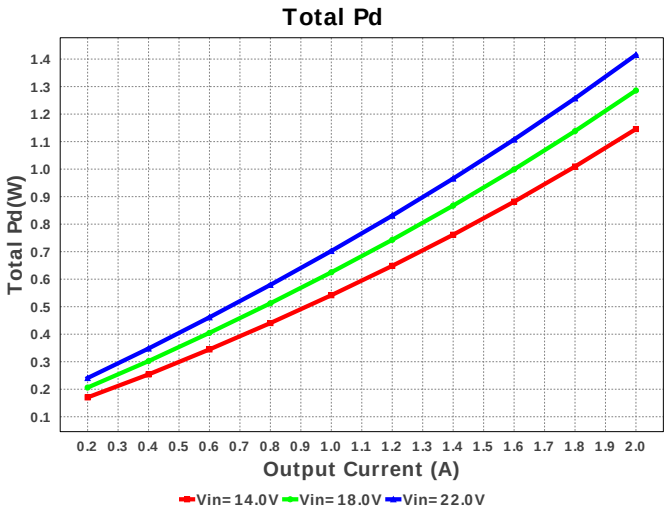


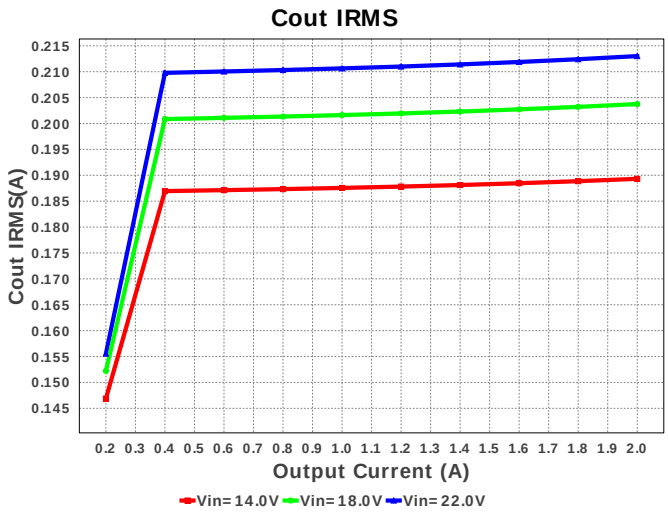


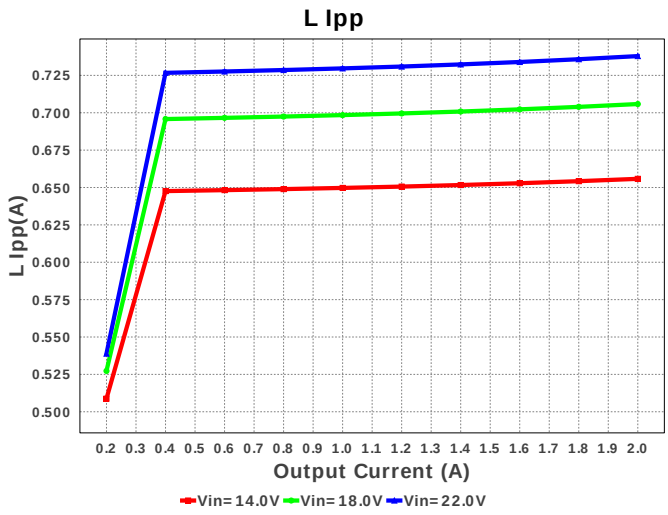


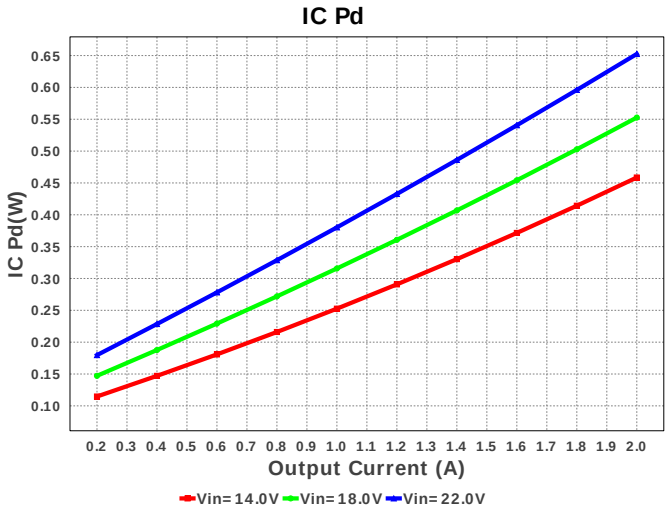


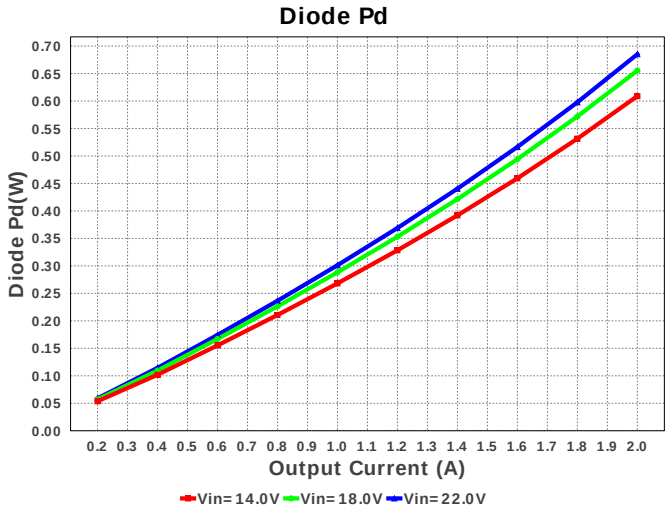


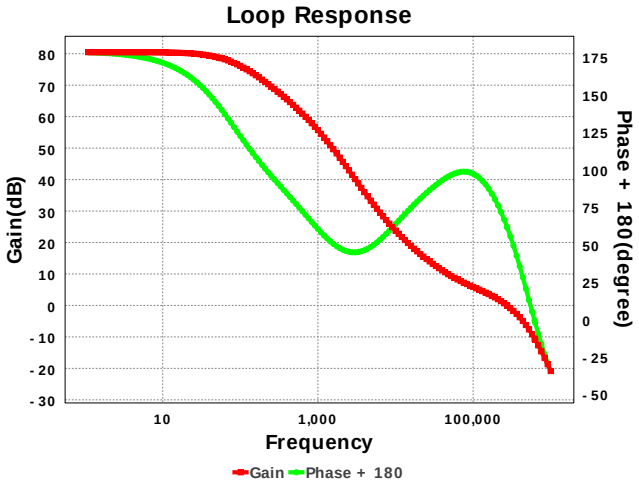












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	744.207 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	213.013 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.369 A	Current	Peak switch current in IC
4.	Iin Avg	364.34 mA	Current	Average input current
5.	L Ipp	737.9 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	814.917 mA	Current	MOSFET RMS current
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	304.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1.075 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	58.021 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	6.6 W	General	Total output power
13.	Total BOM	$2.51	General	Total BOM Cost
14.	D1 Tj	98.519 degC	Op_Point	D1 junction temperature
15.	Vout Actual	3.3 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
17.	Cross Freq	273.351 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	16.601 %	Op_point	Duty cycle
19.	Efficiency	82.343 %	Op_point	Steady state efficiency
20.	IC Tj	57.404 degC	Op_point	IC junction temperature
21.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	2.0 A	Op_point	Iout operating point
23.	Phase Marg	62.477 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	22.0 V	Op_point	Vin operating point
25.	Vout p-p	17.73 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	2.463 mW	Power	Input capacitor power dissipation
27.	Cout Pd	1.089 mW	Power	Output capacitor power dissipation
28.	Diode Pd	685.192 mW	Power	Diode power dissipation
29.	IC Pd	652.47 mW	Power	IC power dissipation
30.	L Pd	73.834 mW	Power	Inductor power dissipation
31.	Total Pd	1.415 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.999 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	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	LMR14030S	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LMR14030S Product Folder : http://www.ti.com/product/LMR14030 : contains the data sheet and other resources.