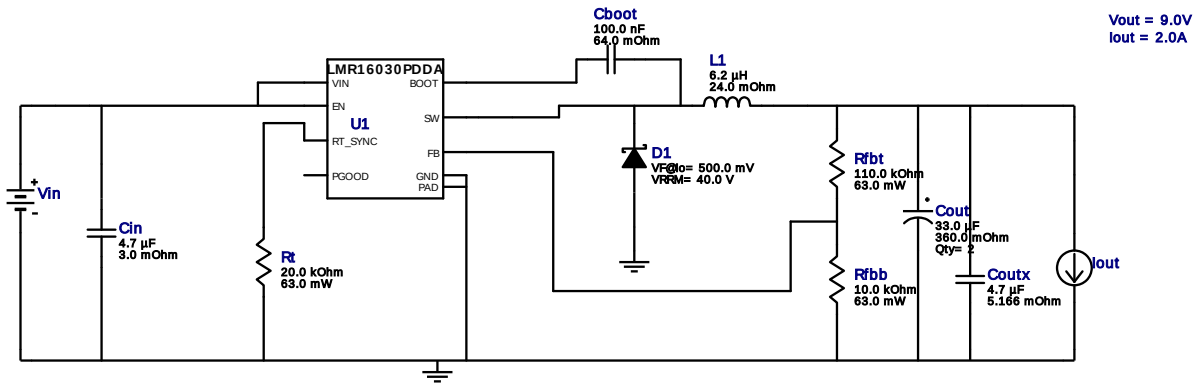
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 9.0V
Iout = 2.0A

Device = LMR16030PDDAR
Topology = Buck
Created = 7/21/16 8:45:14 PM
BOM Cost = $2.91
BOM Count = 11
Total Pd = 1.54W

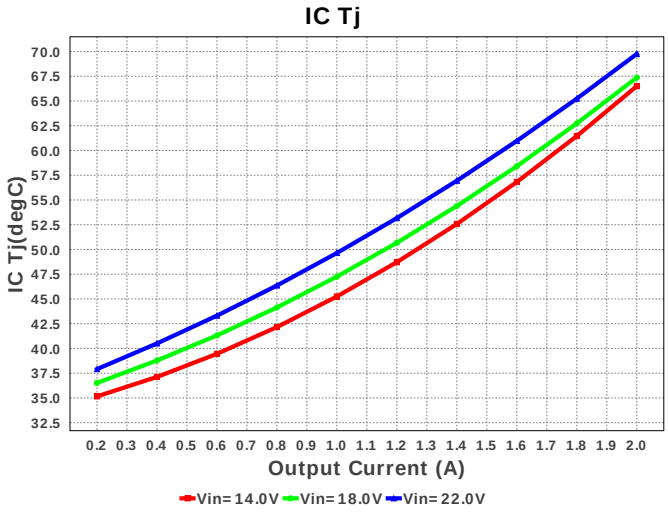
Design : 4748562/1 LMR16030PDDAR
LMR16030PDDAR 14.0V-22.0V to 9.00V @ 2.0002249999999995A

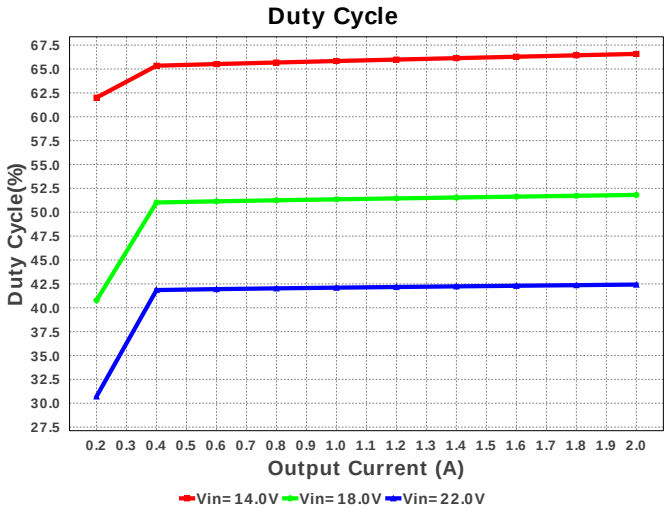


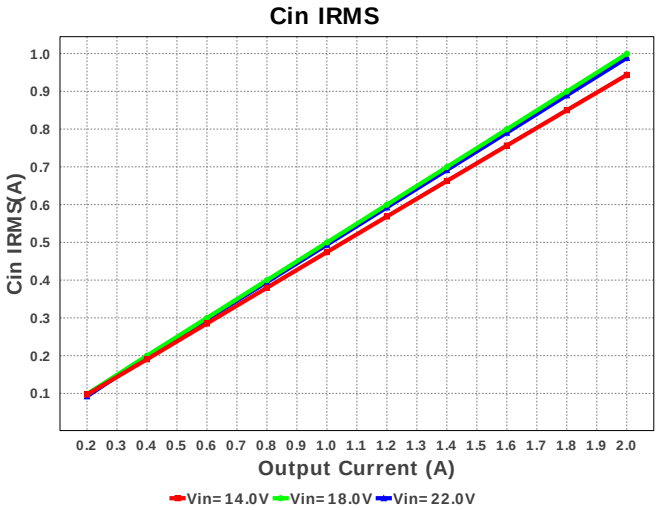
Electrical BOM

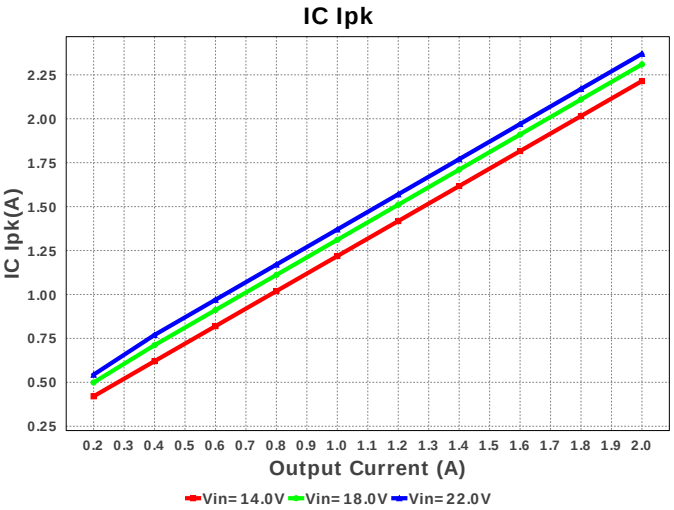
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.07	1206 11 mm²
3.	Cout	Panasonic	EEE-FK1E330P Series= FK	Cap= 33.0 uF ESR= 360.0 mOhm VDC= 25.0 V IRMS= 240.0 mA	2	$0.11	SM_RADIAL_D 84 mm²
4.	Coutx	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	$0.02	0805 7 mm²
5.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.09	SMA 37 mm²
6.	L1	Coilcraft	MSS7341-622NLB	L= 6.2 µH DCR= 24.0 mOhm	1	$0.52	MSS7341 86 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	CRCW0402110KFKED Series= CRCW..e3	Res= 110.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rt	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

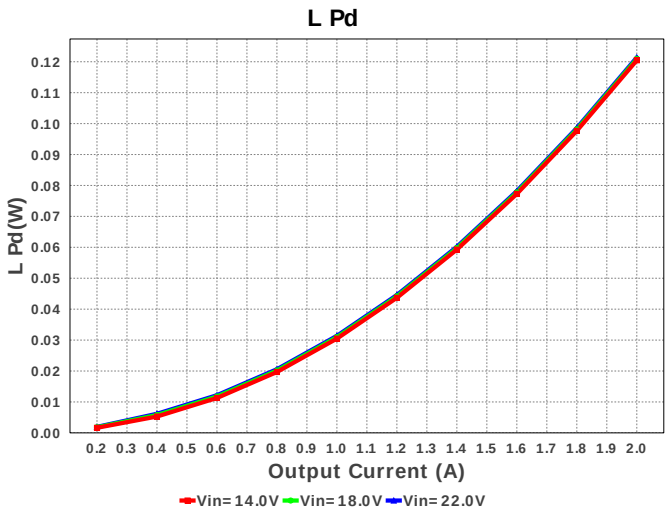
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR16030PDDAR	Switcher	1	$1.95	DDA0008E_N 57 mm²

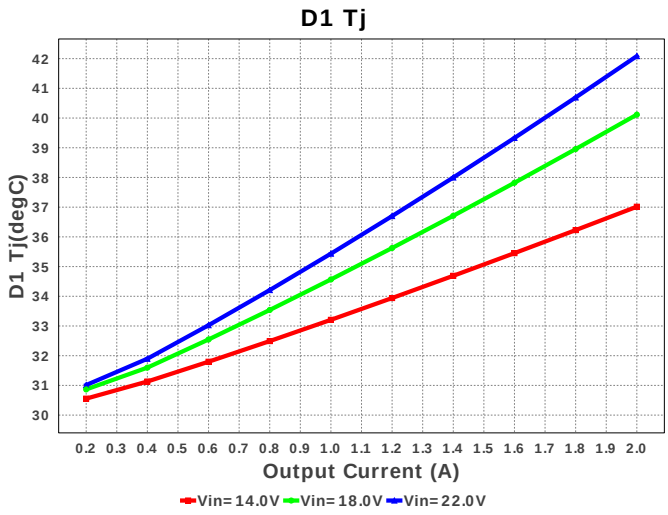


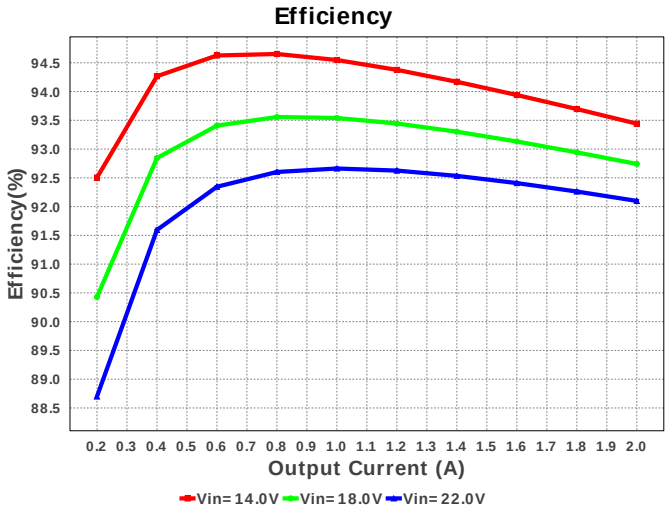


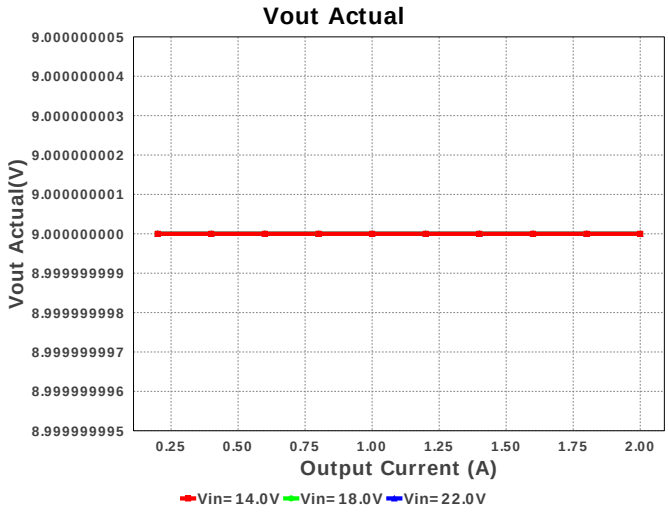


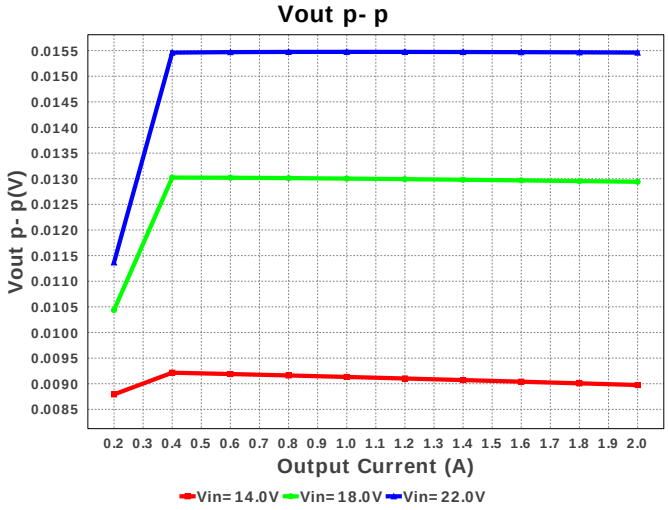


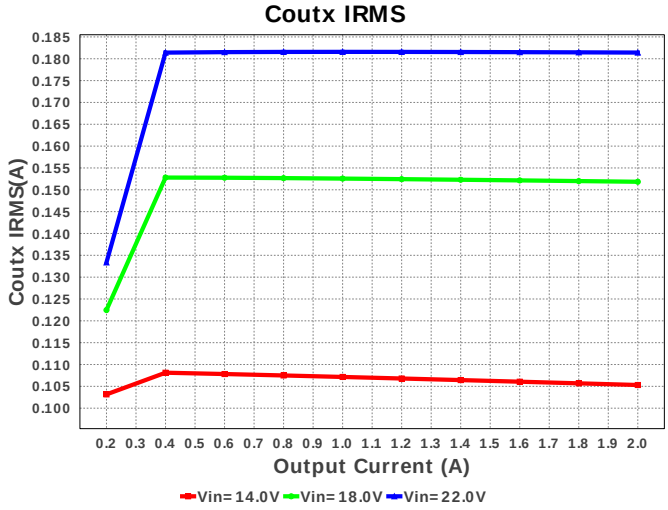


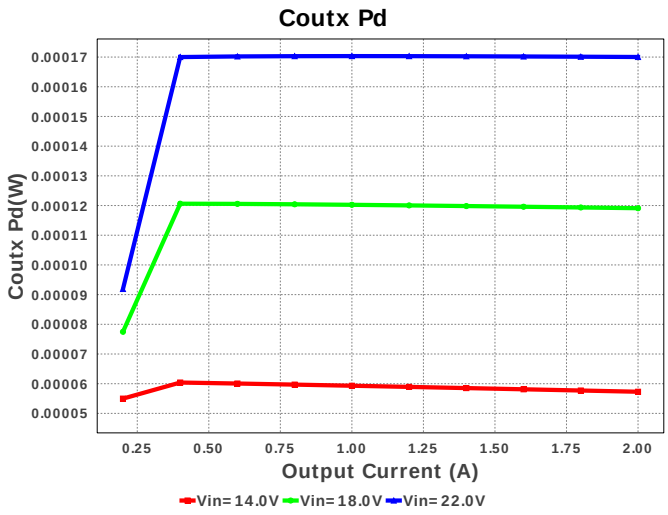


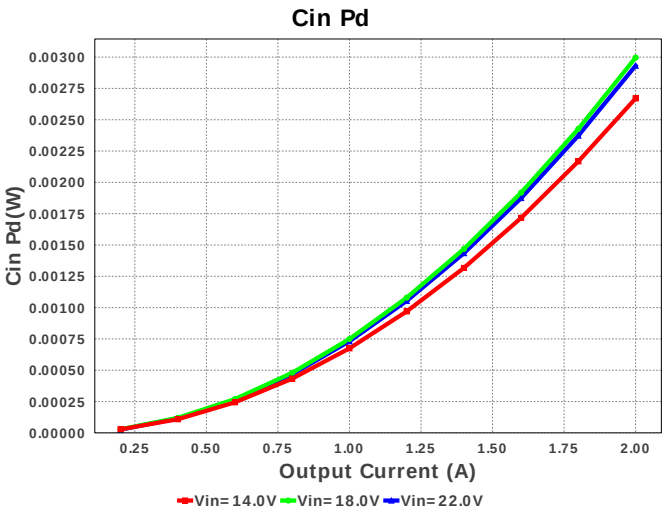


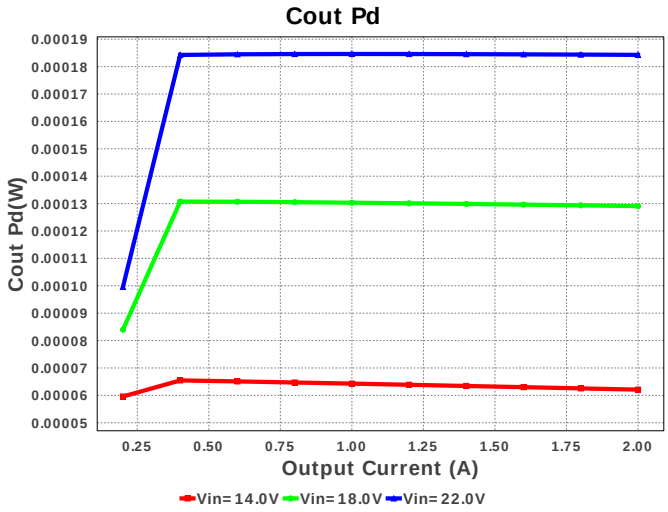


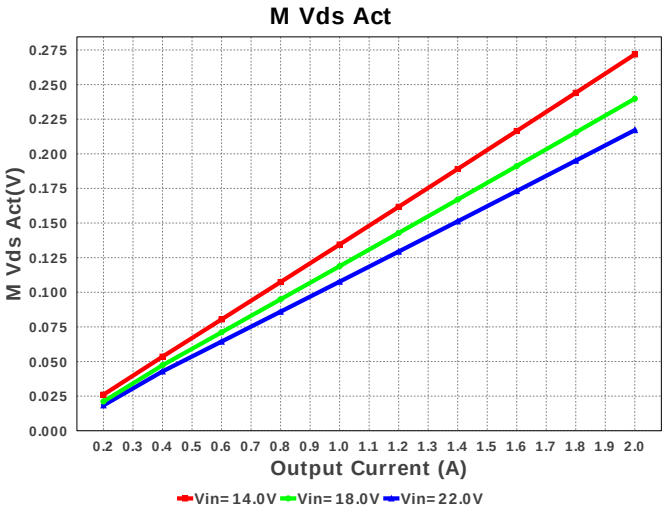


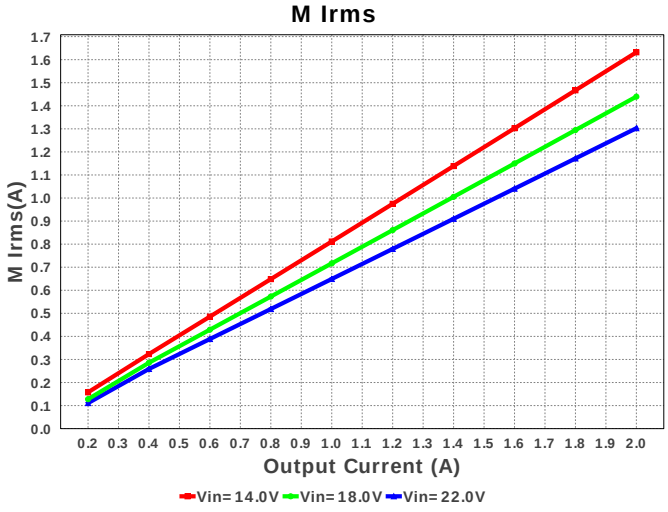


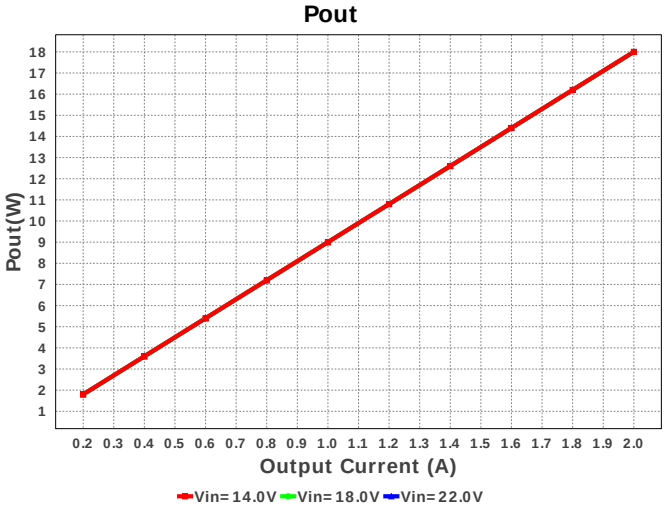


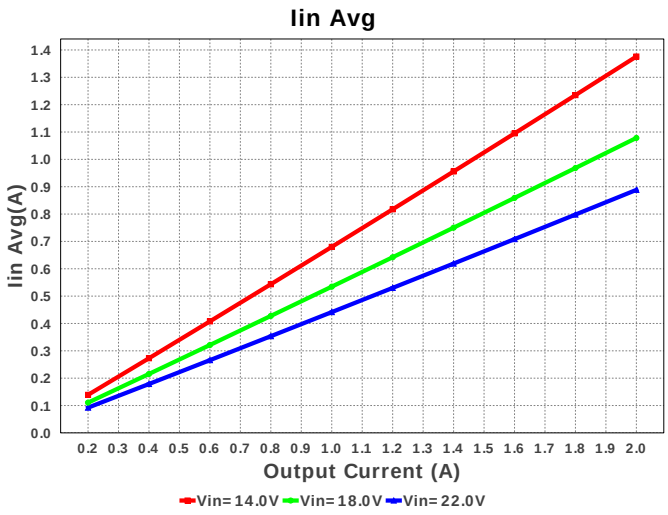


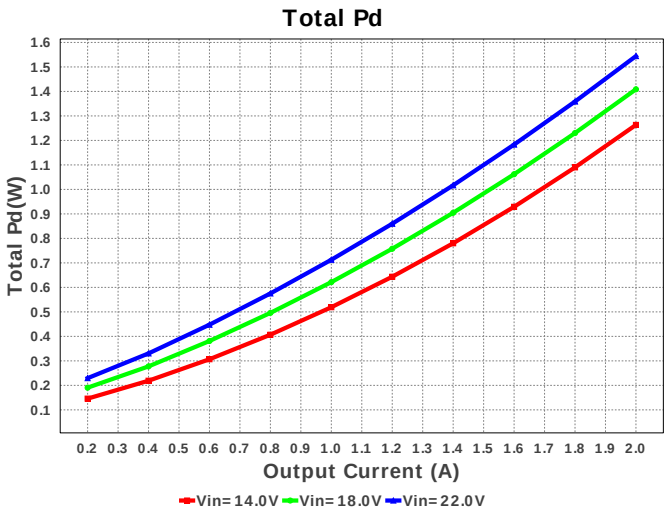


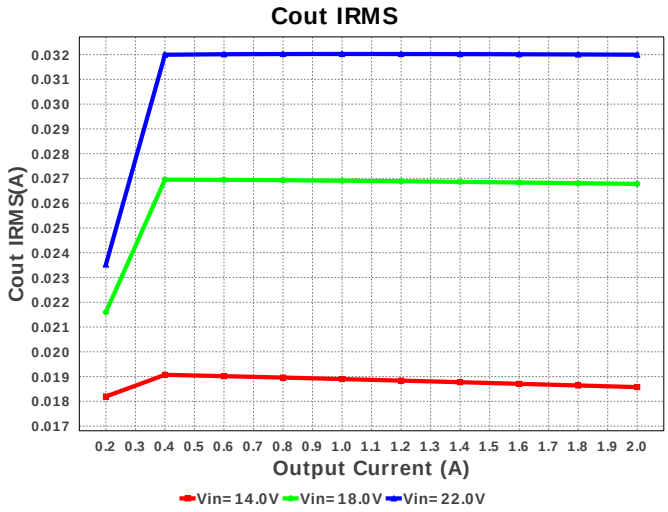


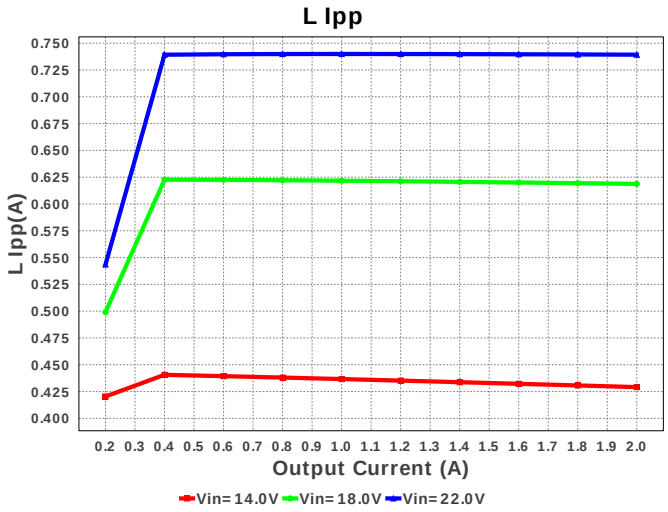


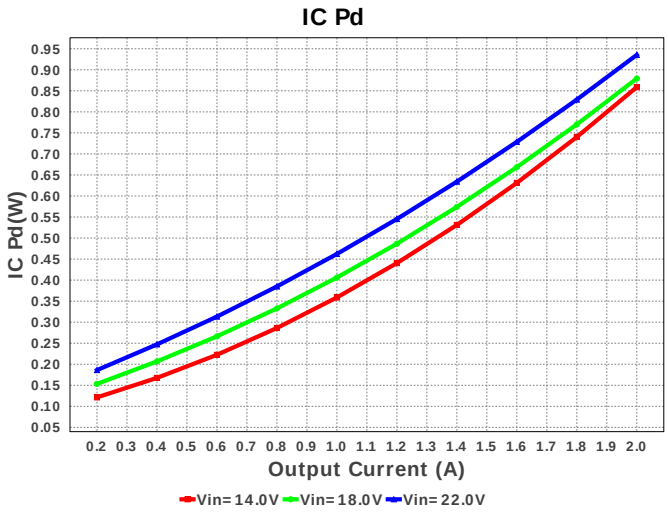


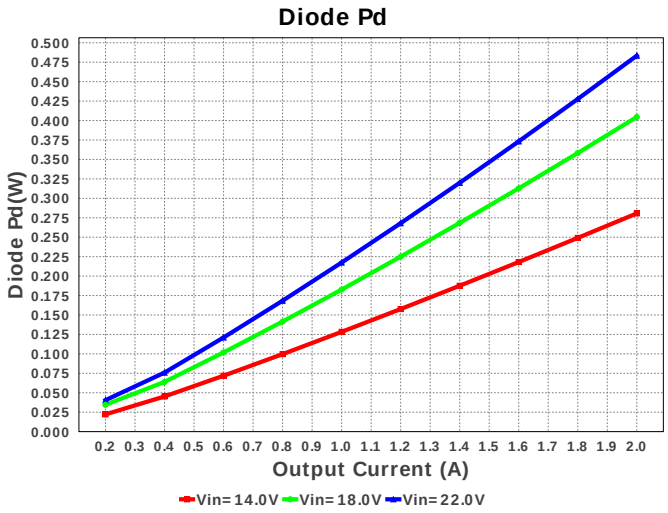


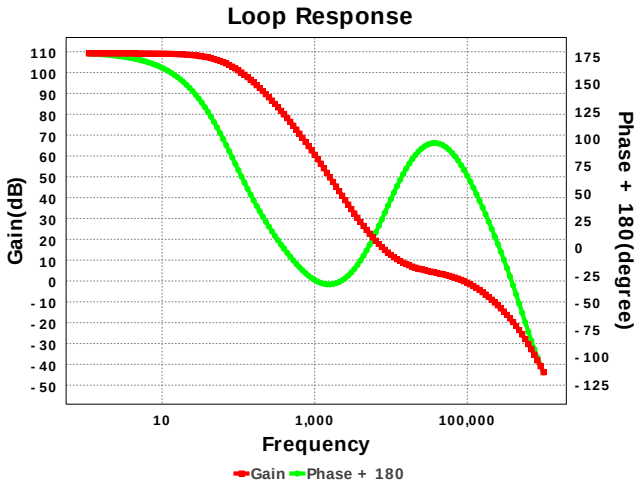












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	988.499 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	31.997 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	181.418 mA	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	2.37 A	Current	Peak switch current in IC
5.	Iin Avg	888.4 mA	Current	Average input current
6.	L Ipp	739.29 mA	Current	Peak-to-peak inductor ripple current
7.	M1 Irms	1.303 A	Current	Q Iavg
8.	BOM Count	11	General	Total Design BOM count
9.	FootPrint	383.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	1.183 MHz	General	Switching frequency
11.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	217.09 mV	General	Voltage drop across the MosFET
13.	Pout	18.0 W	General	Total output power
14.	Total BOM	$2.91	General	Total BOM Cost
15.	D1 Tj	42.085 degC	Op_Point	D1 junction temperature
16.	Vout Actual	9.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	95.862 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	42.426 %	Op_point	Duty cycle
20.	Efficiency	92.099 %	Op_point	Steady state efficiency
21.	IC Tj	69.289 degC	Op_point	IC junction temperature
22.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	Phase Marg	65.806 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	22.0 V	Op_point	Vin operating point
26.	Vout p-p	15.462 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	2.931 mW	Power	Input capacitor power dissipation
28.	Cout Pd	184.282 µW	Power	Output capacitor power dissipation
29.	Coutx Pd	170.025 µW	Power	Output capacitor_x power loss
30.	Diode Pd	483.414 mW	Power	Diode power dissipation
31.	IC Pd	935.446 mW	Power	IC power dissipation
32.	L Pd	121.375 mW	Power	Inductor power dissipation
33.	Total Pd	1.544 W	Power	Total Power Dissipation
34.	Vout Tolerance	4.296 %		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	9.0	Output Voltage
5.	base_pn	LMR16030P	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR16030P** Product Folder : http://www.ti.com/product/LMR16030 : contains the data sheet and other resources.