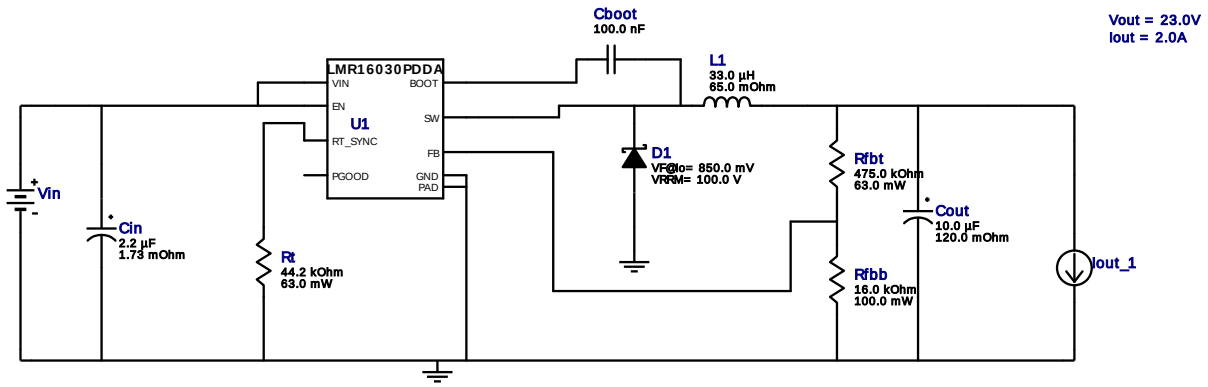
WEBENCH® Design Report

VinMin = 44.0V
VinMax = 50.0V
Vout = 23.0V
Iout = 2.0A

Device = LMR16030PDDAR
Topology = Buck
Created = 7/18/16 1:37:56 AM
BOM Cost = $3.16
BOM Count = 10
Total Pd = 2.05W

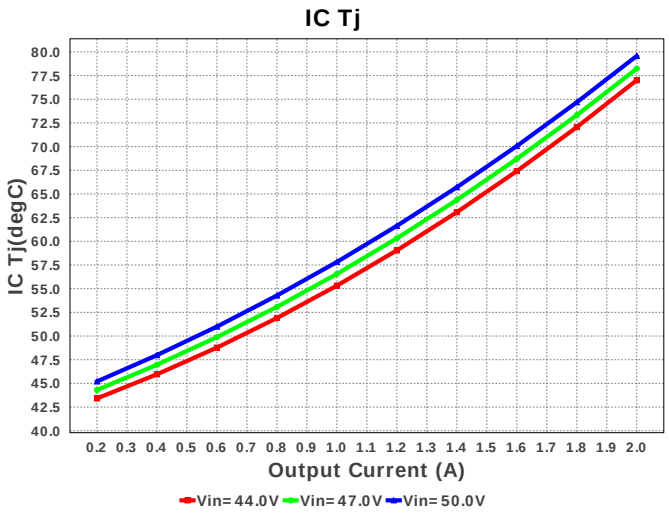
Design : 906020/2257 LMR16030PDDAR
LMR16030PDDAR 44.0V-50.0V to 23.02V @ 2.0001406517311606A

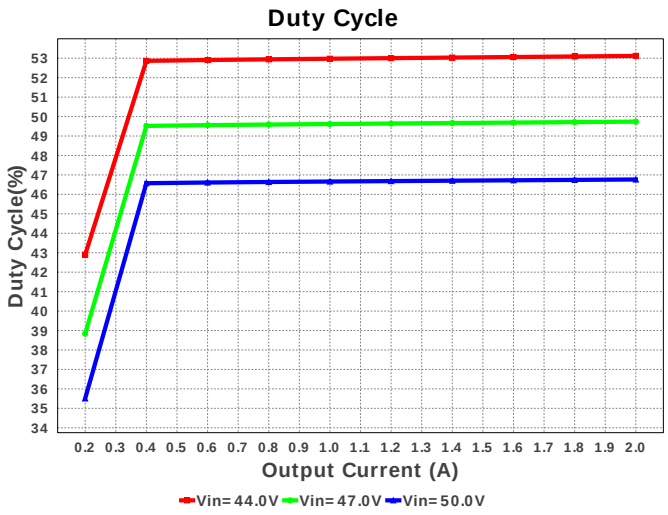


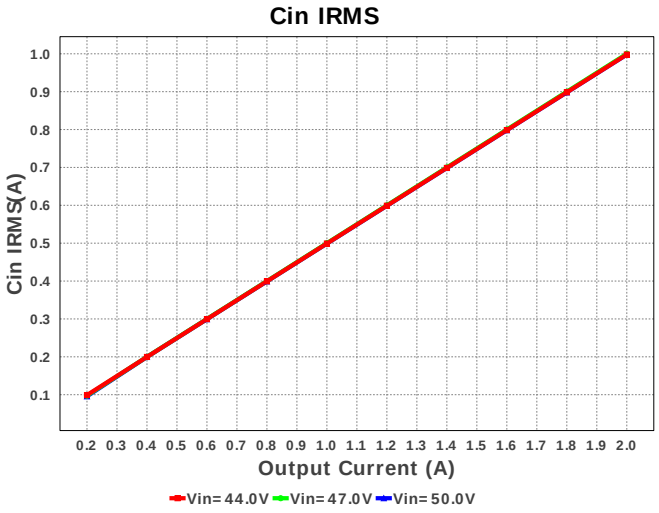
Electrical BOM

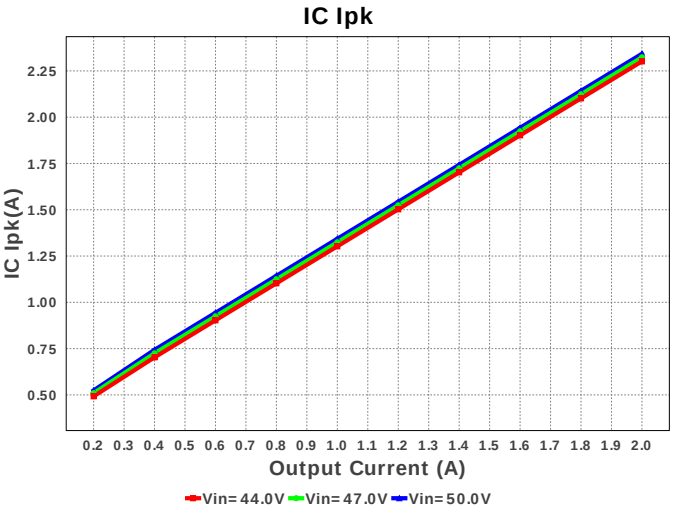
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 uF ESR= 1.73 mOhm VDC= 100.0 V IRMS= 5.5932 A	1	$0.19	1210_250 15 mm²
3.	Cout	Panasonic	EEHZA1H100R Series= ?	Cap= 10.0 uF ESR= 120.0 mOhm VDC= 50.0 V IRMS= 750.0 mA	1	$0.46	SM_RADIAL_5MM 58 mm²
4.	D1	Micro Commercial Components	SK310A-TP	VF@Io= 850.0 mV VRRM= 100.0 V	1	$0.10	SMA 37 mm²
5.	L1	Bourns	SDR1307-330KL	L= 33.0 µH DCR= 65.0 mOhm	1	$0.35	SDR1307 227 mm²
6.	Rfbb	Yageo America	RC0603FR-0716KL Series= ?	Res= 16.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
7.	Rfbt	Vishay-Dale	CRCW0402475KFKED Series= CRCW..e3	Res= 475.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rt	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

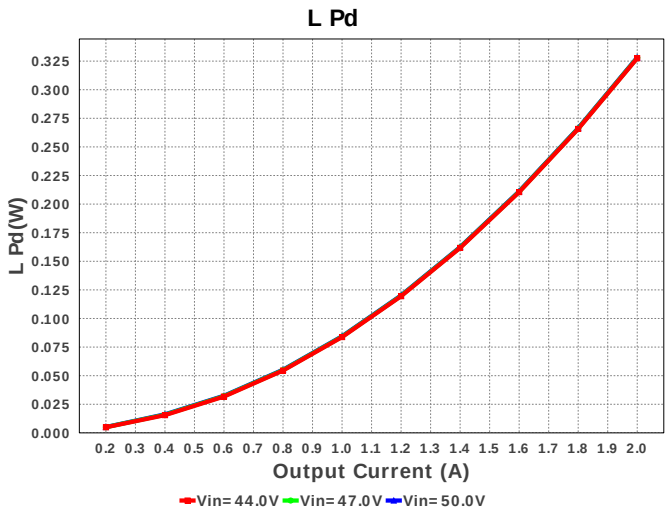
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	U1	Texas Instruments	LMR16030PDDAR	Switcher	1	$1.95	DDA0008E_N 57 mm²

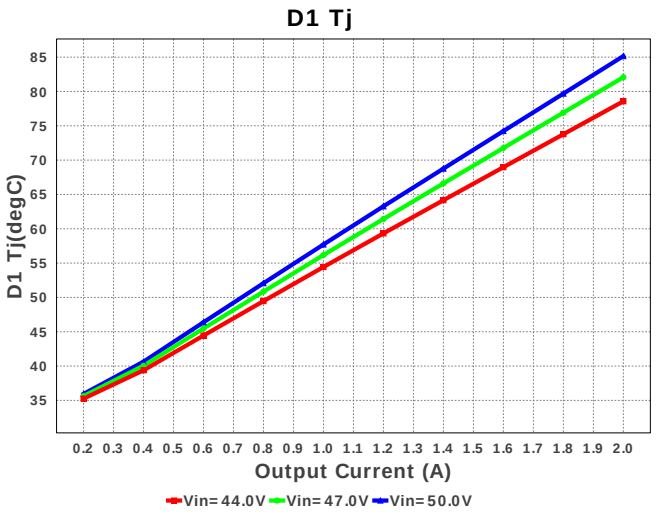


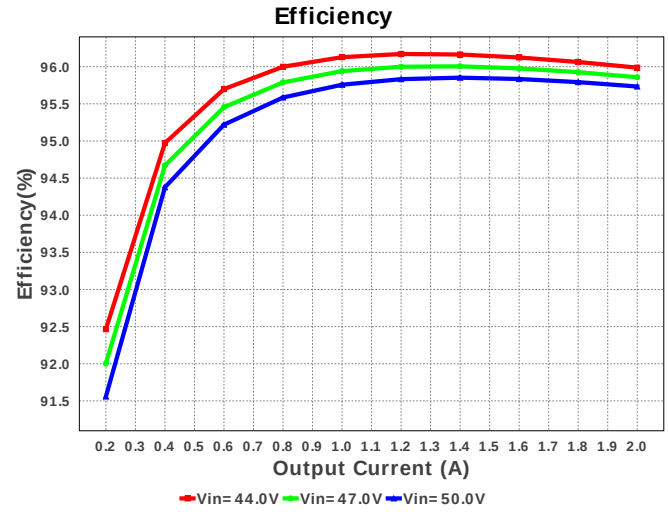


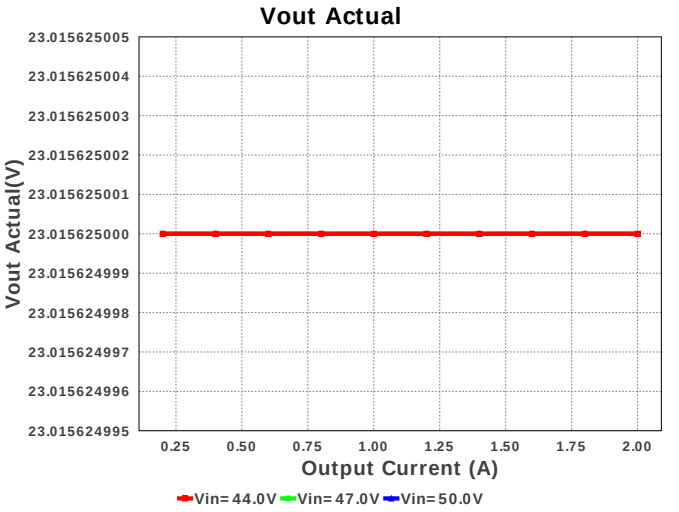


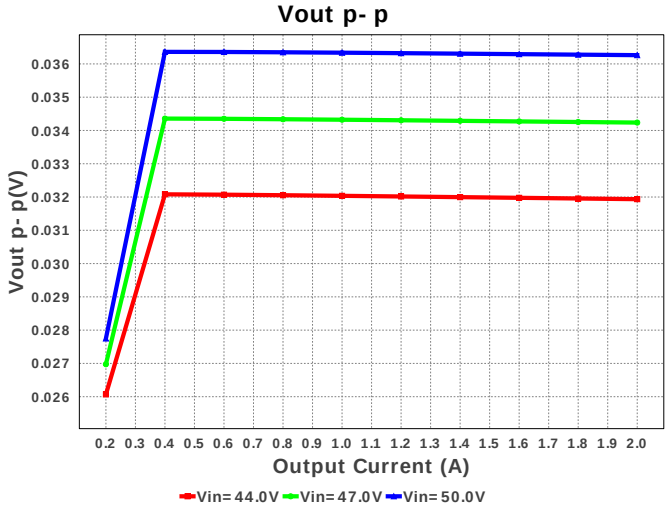


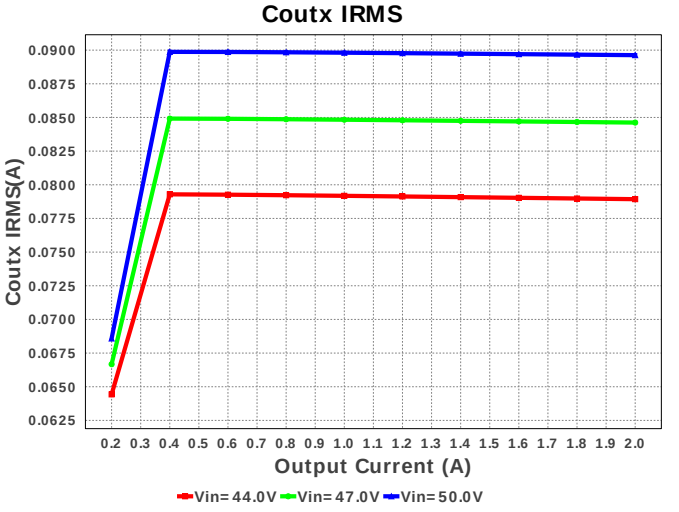




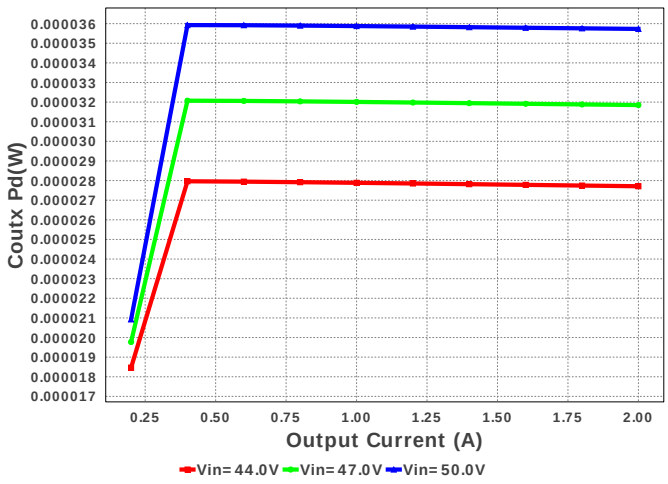




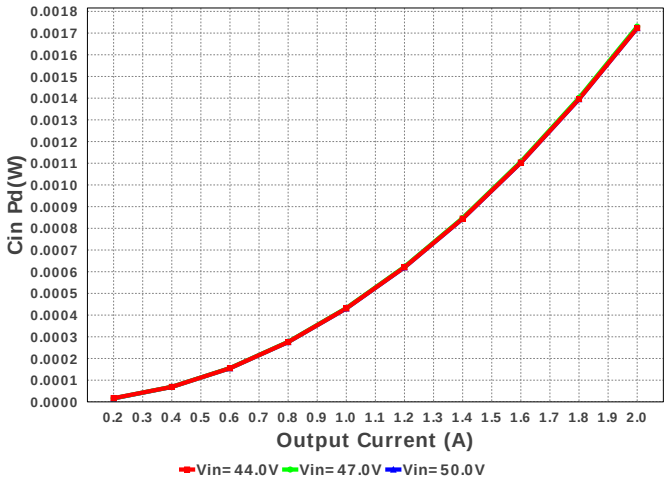




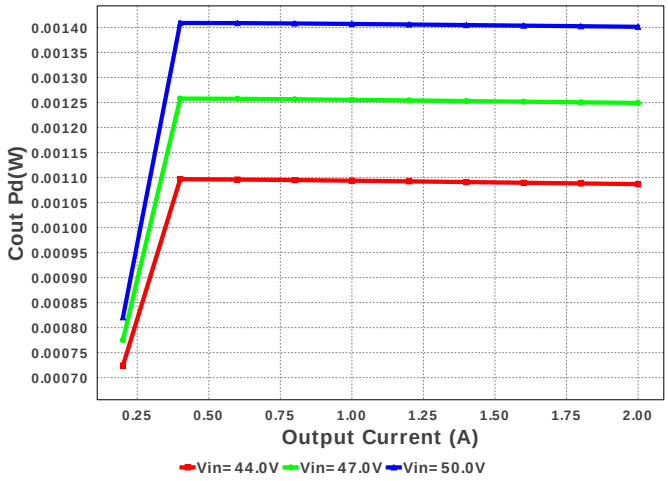
Coutx Pd



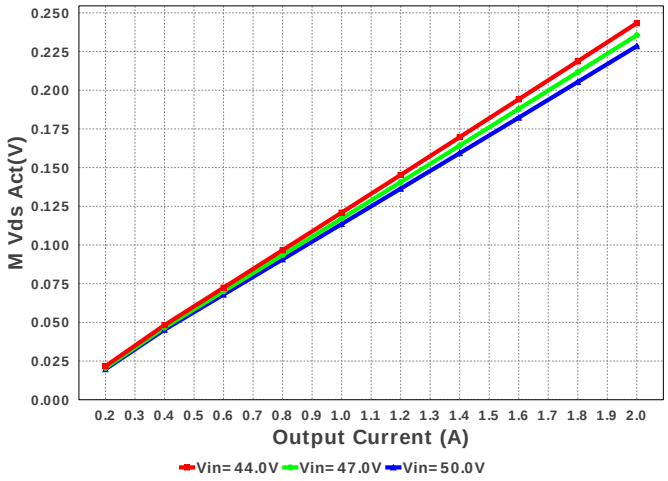
Cin Pd



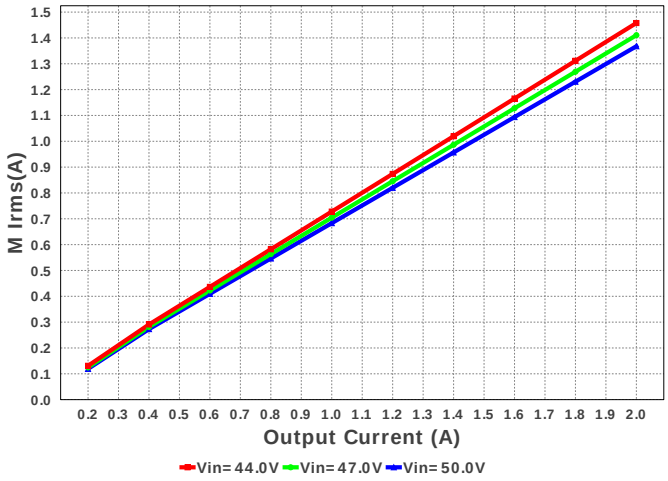
Cout Pd



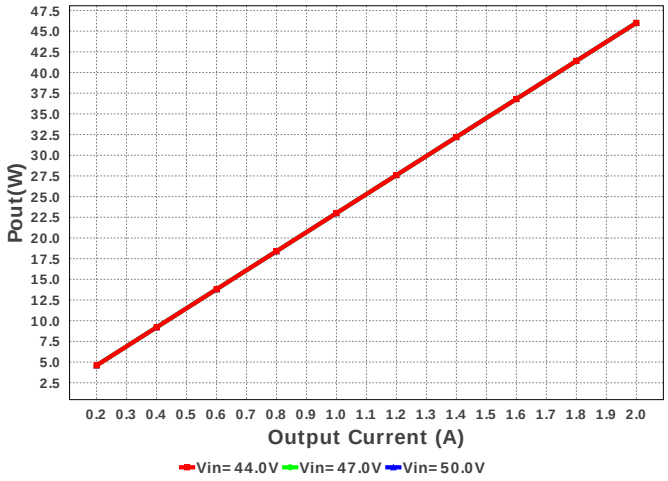
M Vds Act

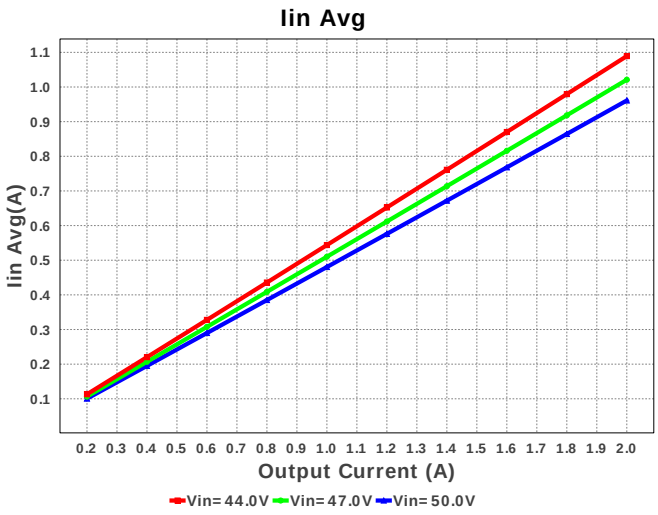


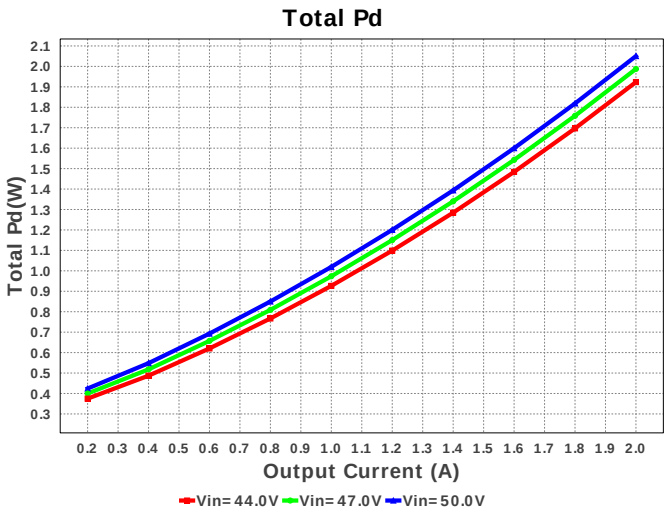
M Irms

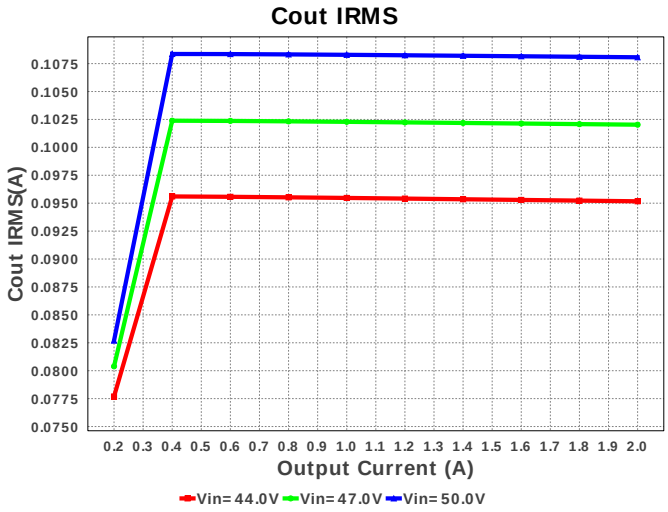


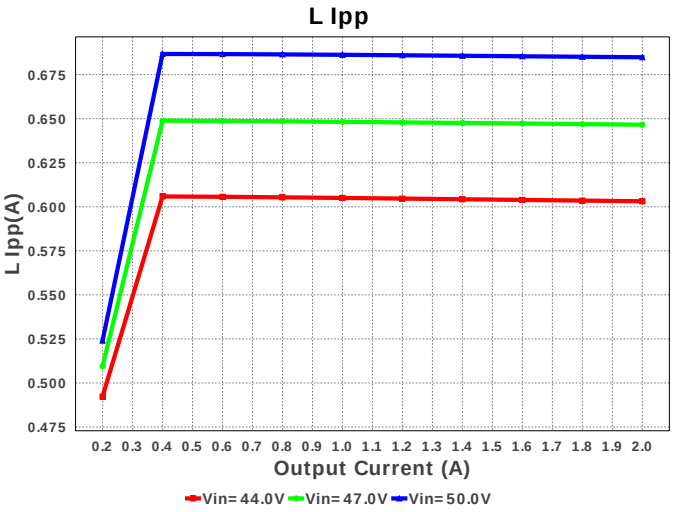
Pout

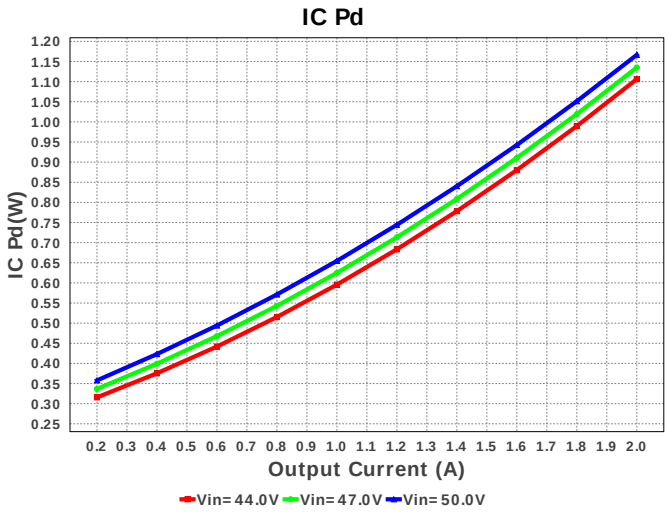


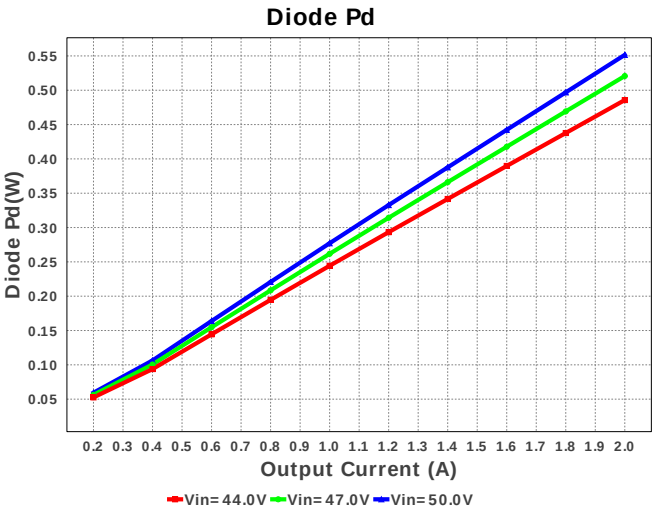


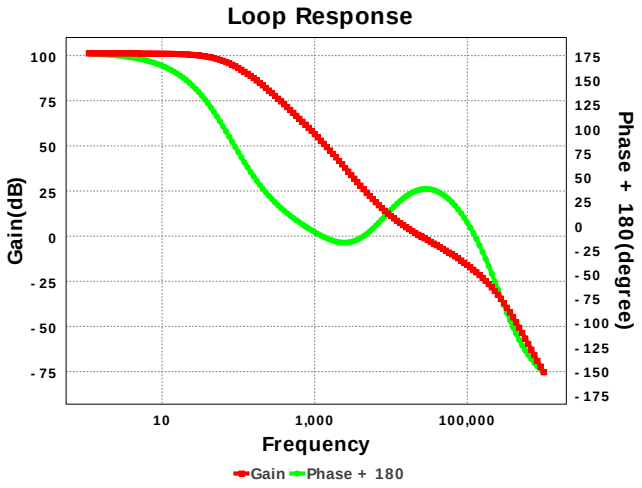












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	997.98 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	197.714 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.342 A	Current	Peak switch current in IC
4.	Iin Avg	961.89 mA	Current	Average input current
5.	L Ipp	684.9 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.368 A	Current	Q Iavg
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	423.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	553.985 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	228.506 mV	General	Voltage drop across the MosFET
12.	Pout	46.04 W	General	Total output power
13.	Total BOM	$3.16	General	Total BOM Cost
14.	D1 Tj	85.112 degC	Op_Point	D1 junction temperature
15.	Vout Actual	23.016 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	23.02 V	Op_Point	Operational Output Voltage
17.	Cross Freq	26.556 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	46.805 %	Op_point	Duty cycle
19.	Efficiency	95.73 %	Op_point	Steady state efficiency
20.	IC Tj	79.0 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	36.206 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	50.0 V	Op_point	Vin operating point
25.	Vout p-p	83.629 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.723 mW	Power	Input capacitor power dissipation
27.	Cout Pd	4.691 mW	Power	Output capacitor power dissipation
28.	Diode Pd	551.121 mW	Power	Diode power dissipation
29.	IC Pd	1.167 W	Power	IC power dissipation
30.	L Pd	328.191 mW	Power	Inductor power dissipation
31.	Total Pd	2.054 W	Power	Total Power Dissipation
32.	Vout Tolerance	4.401 %		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	50.0	Maximum input voltage
3.	VinMin	44.0	Minimum input voltage
4.	Vout	23.0	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.