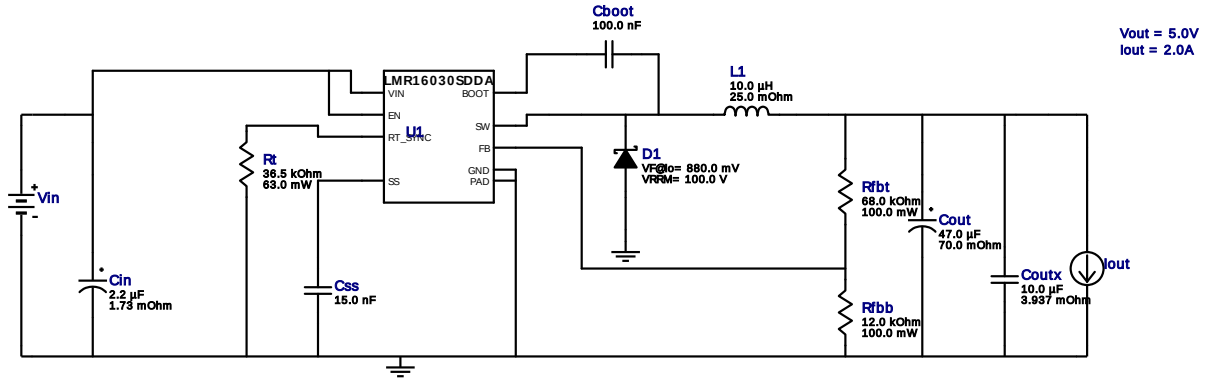
WEBENCH® Design Report

VinMin = 48.0V
VinMax = 48.0V
Vout = 5.0V
Iout = 2.0A

Device = LMR16030SDDAR
Topology = Buck
Created = 7/19/16 8:22:40 PM
BOM Cost = $3.32
BOM Count = 11
Total Pd = 2.68W

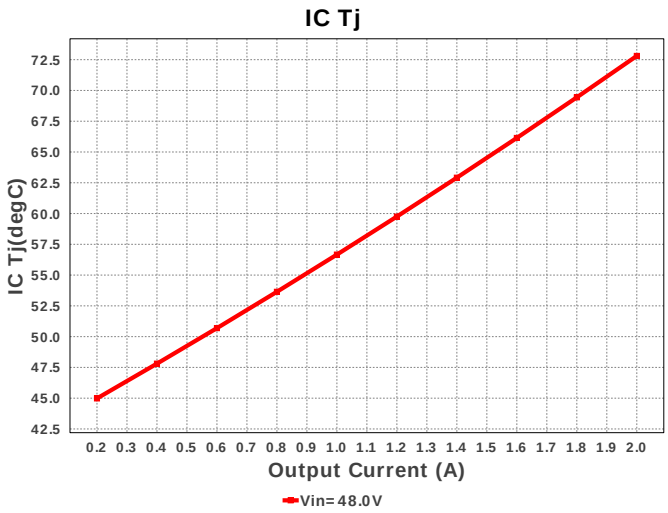
Design : 4730153/24 LMR16030SDDAR
LMR16030SDDAR 48.0V-48.0V to 5.00V @ 2.0001874999999996A

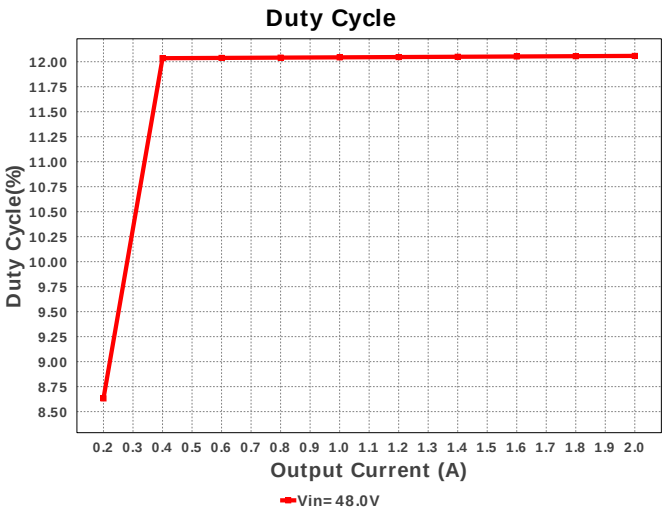


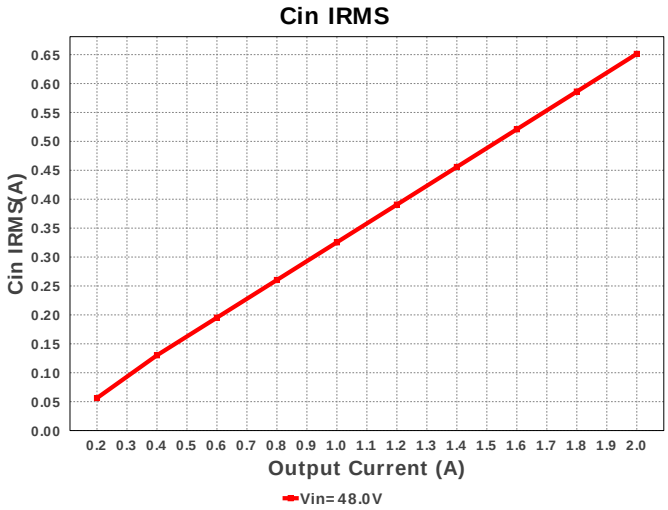
Electrical BOM

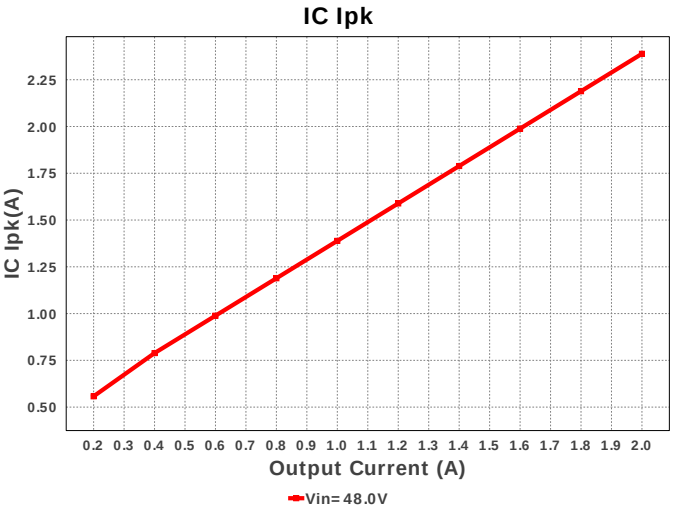
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 uF ESR= 1.73 mOhm VDC= 100.0 V IRMS= 5.5932 A	1	$0.19	1210_250 15 mm²
3.	Cout	Panasonic	10TPG47M Series= ?	Cap= 47.0 uF ESR= 70.0 mOhm VDC= 10.0 V IRMS= 1.0 A	1	$0.46	CAPSMT_6_B1G 17 mm²
4.	Coutx	MuRata	GRM219R61A106KE44D Series= X5R	Cap= 10.0 uF ESR= 3.937 mOhm VDC= 10.0 V IRMS= 2.7713 A	1	$0.03	0805 7 mm²
5.	Css	MuRata	GRM155R71C153KA01D Series= X7R	Cap= 15.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
6.	D1	Vishay-Semiconductor	SS10PH10-M3/86A	VF@Io= 880.0 mV VRRM= 100.0 V	1	$0.29	TO-277A 56 mm²
7.	L1	Bourns	SRU1038-100Y	L= 10.0 µH DCR= 25.0 mOhm	1	$0.33	SRU1038 144 mm²
8.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
9.	Rfbt	Yageo America	RC0603FR-0768KL Series= ?	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
10.	Rt	Vishay-Dale	CRCW040236K5FKED Series= CRCW..e3	Res= 36.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

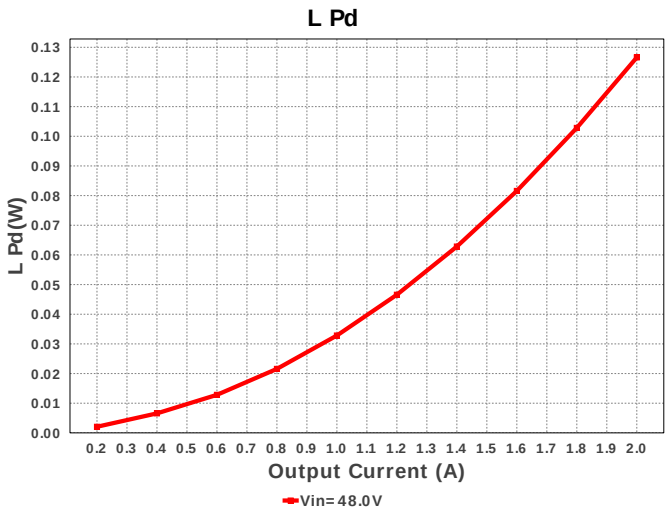
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	U1	Texas Instruments	LMR16030SDDAR	Switcher	1	$1.95	DDA0008E_N 57 mm^2

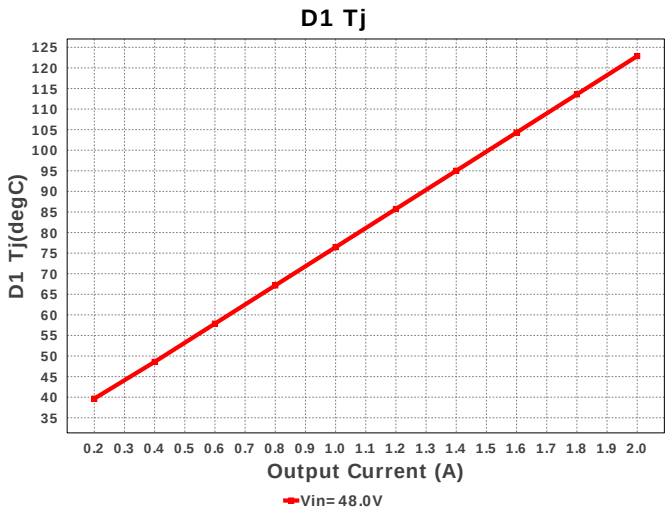


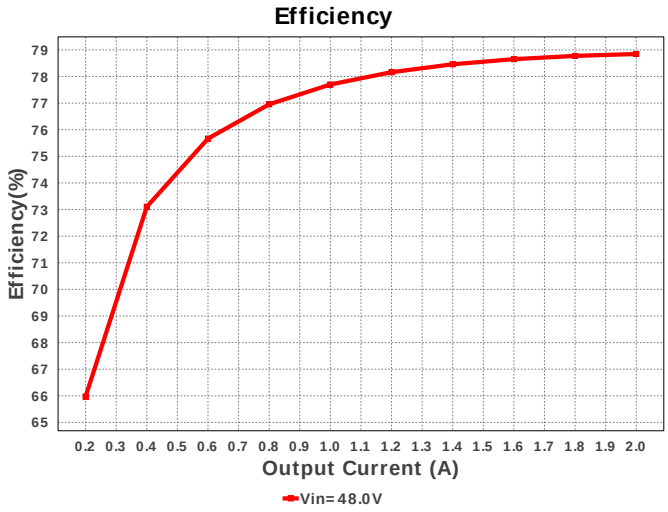


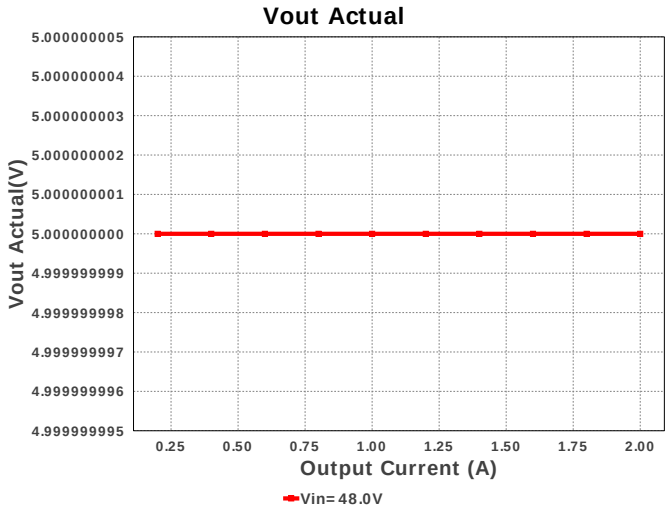


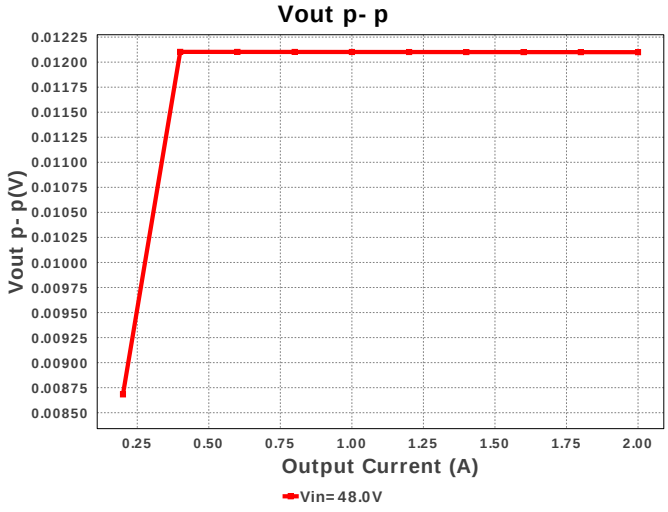


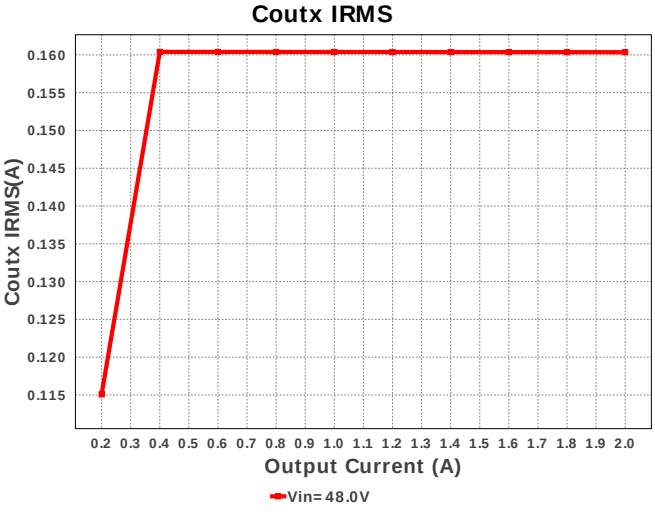


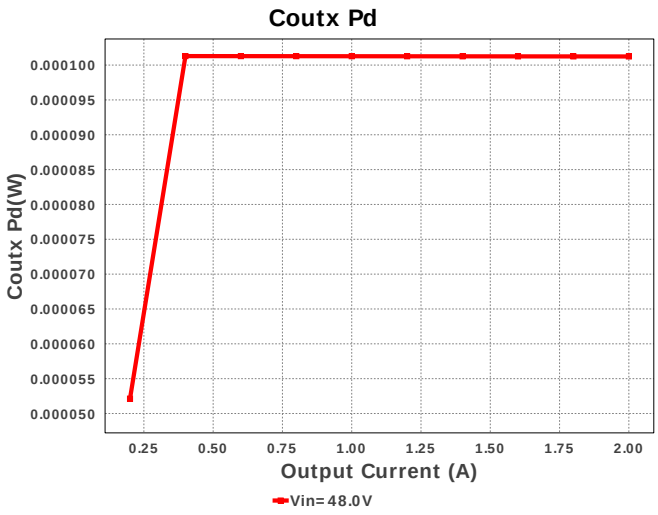


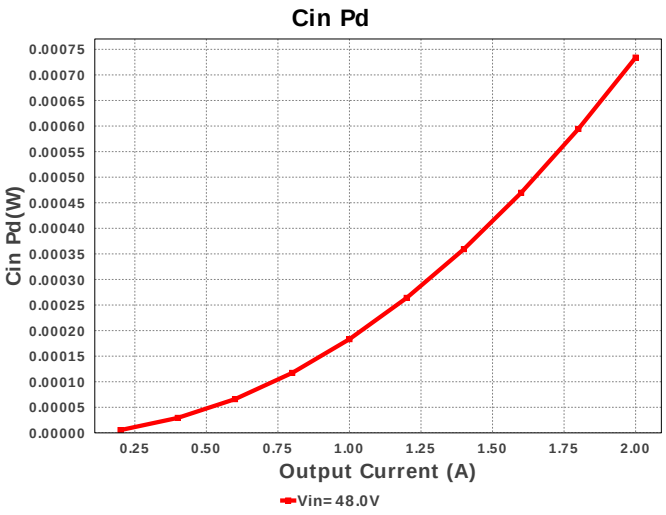


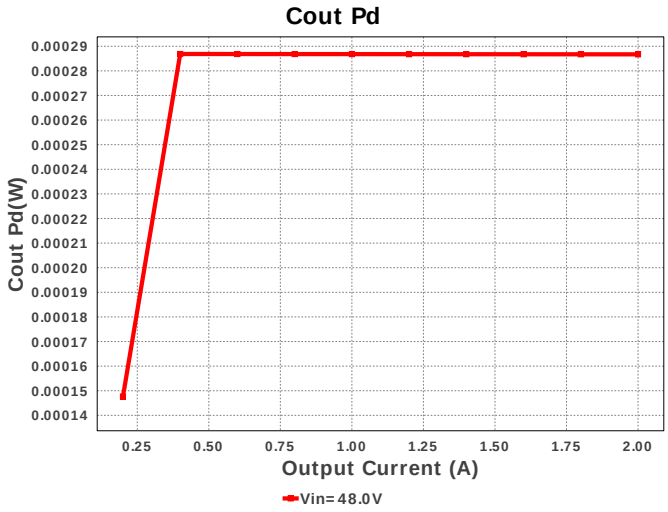


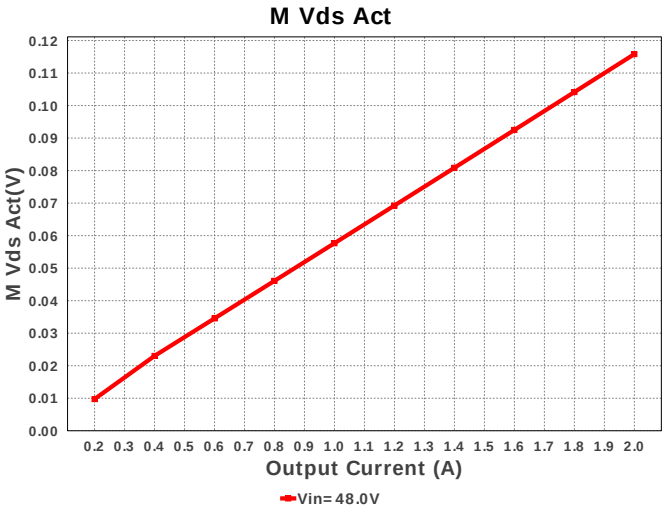


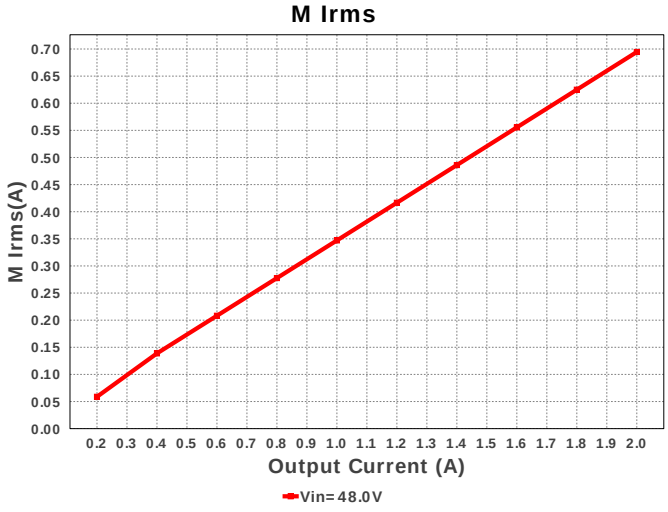


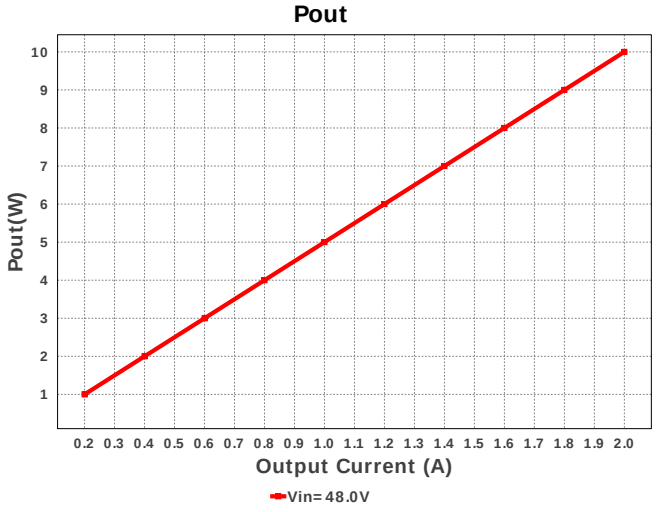


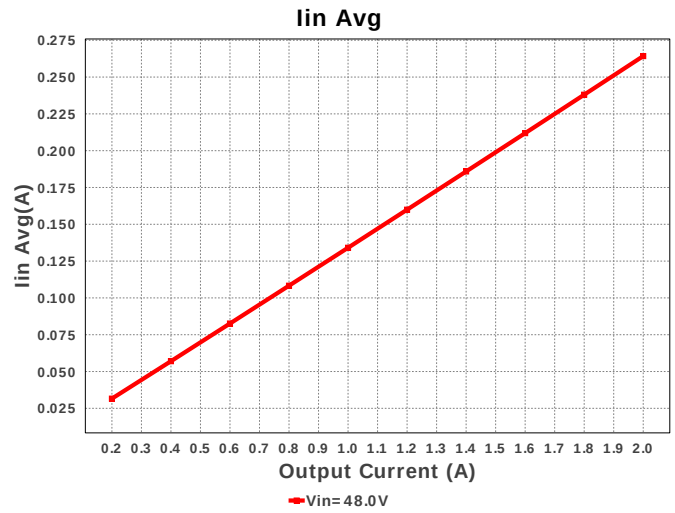


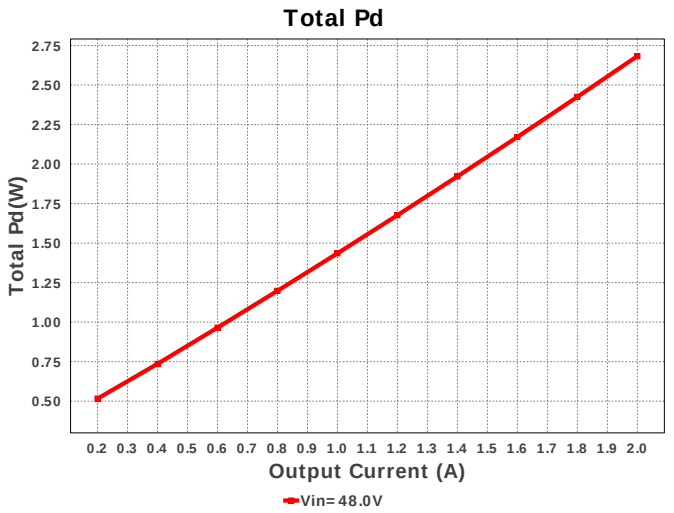


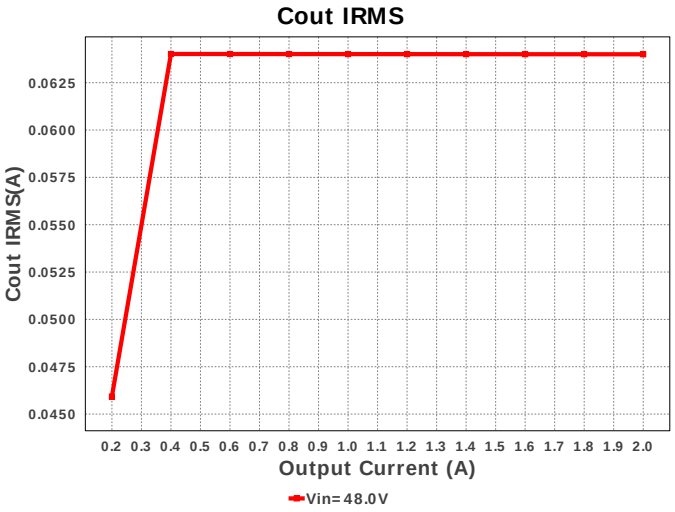


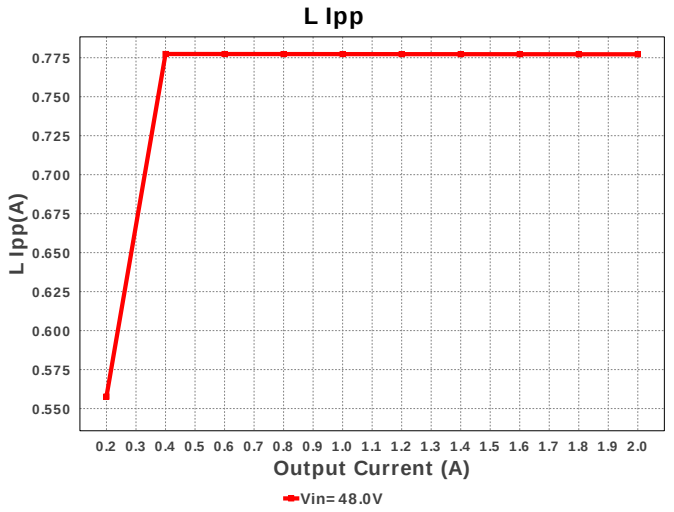


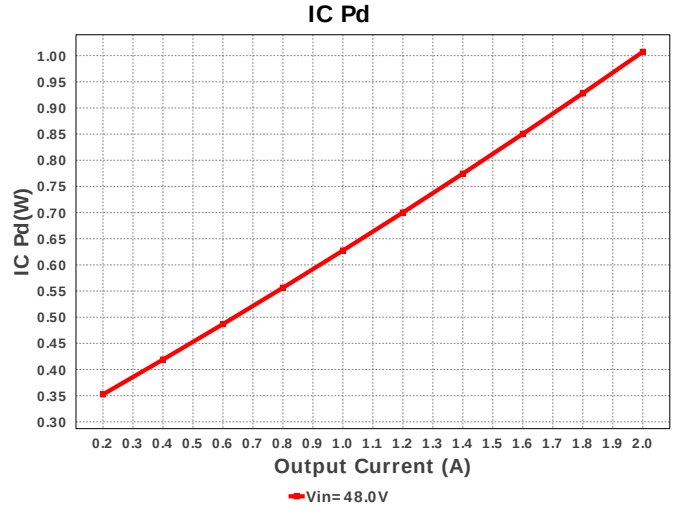


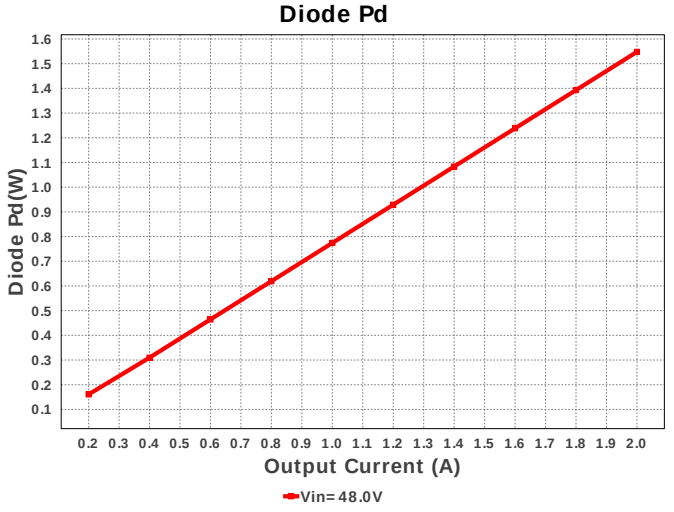


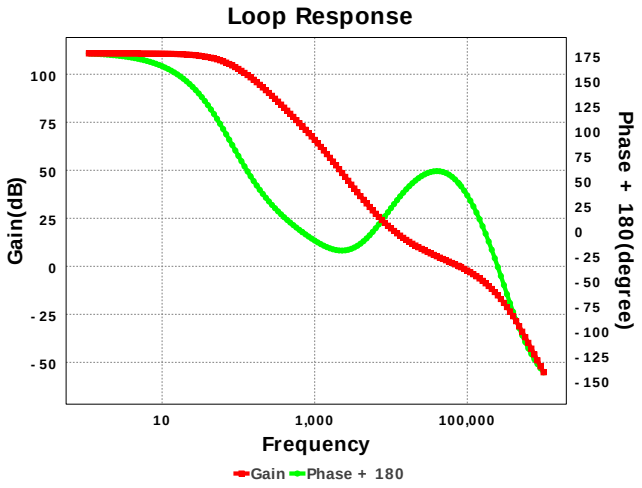












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	651.298 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	63.999 mA	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	160.356 mA	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	2.389 A	Current	Peak switch current in IC
5.	Iin Avg	264.24 mA	Current	Average input current
6.	L Ipp	777.19 mA	Current	Peak-to-peak inductor ripple current
7.	M1 Irms	694.515 mA	Current	Q Iavg
8.	BOM Count	11	General	Total Design BOM count
9.	FootPrint	318.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	665.346 kHz	General	Switching frequency
11.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	115.811 mV	General	Voltage drop across the MosFET
13.	Pout	10.0 W	General	Total output power
14.	Total BOM	$3.32	General	Total BOM Cost
15.	D1 Tj	122.87 degC	Op_Point	D1 junction temperature
16.	Vout Actual	5.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	83.404 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	12.058 %	Op_point	Duty cycle
20.	Efficiency	78.846 %	Op_point	Steady state efficiency
21.	IC Tj	72.302 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	42.544 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	48.0 V	Op_point	Vin operating point
26.	Vout p-p	12.099 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	733.847 µW	Power	Input capacitor power dissipation
28.	Cout Pd	286.713 µW	Power	Output capacitor power dissipation
29.	Coutx Pd	101.236 µW	Power	Output capacitor_x power loss
30.	Diode Pd	1.548 W	Power	Diode power dissipation
31.	IC Pd	1.007 W	Power	IC power dissipation
32.	L Pd	126.581 mW	Power	Inductor power dissipation
33.	Total Pd	2.683 W	Power	Total Power Dissipation
34.	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	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	48.0	Maximum input voltage
4.	VinMin	48.0	Minimum input voltage
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	Vout2	1.0	Output Voltage #2
8.	base_pn	LMR16030S	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR16030S** Product Folder : http://www.ti.com/product/LMR16030 : contains the data sheet and other resources.