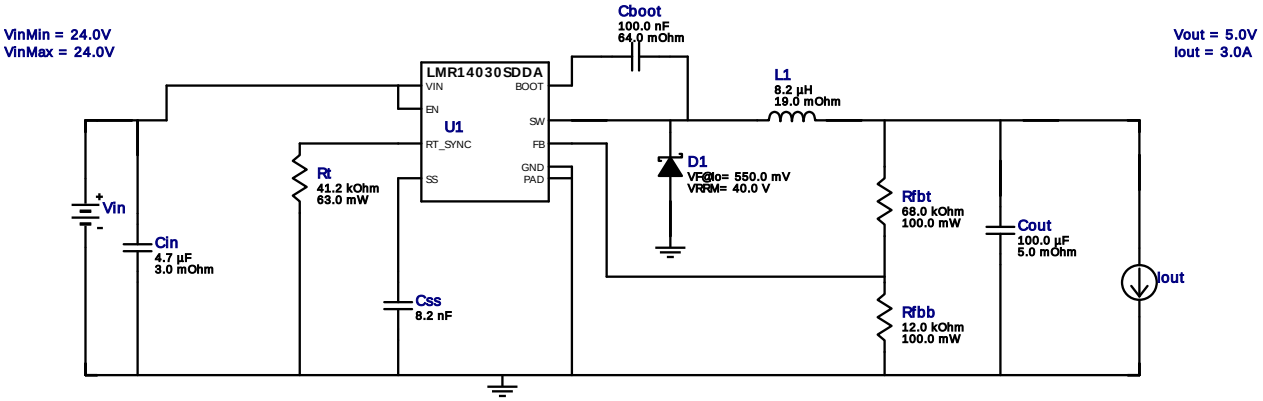
WEBENCH® Design Report

VinMin = 24.0V
VinMax = 24.0V
Vout = 5.0V
Iout = 3.0A

Device = LMR14030SDDAR
Topology = Buck
Created = 8/3/15 2:19:19 AM
BOM Cost = $2.42
Footprint = 489.0 mm²
BOM Count = 10
Total Pd = 2.05W

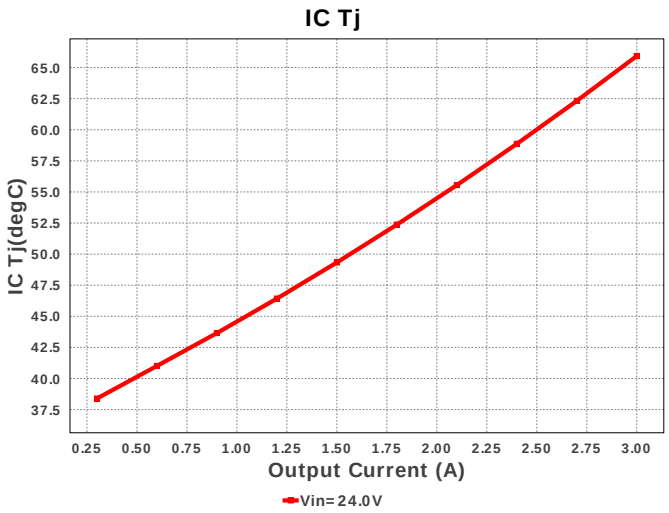
Design : 3450690/1491 LMR14030SDDAR
LMR14030SDDAR 24.0V-24.0V to 5.00V @ 3.0000625A

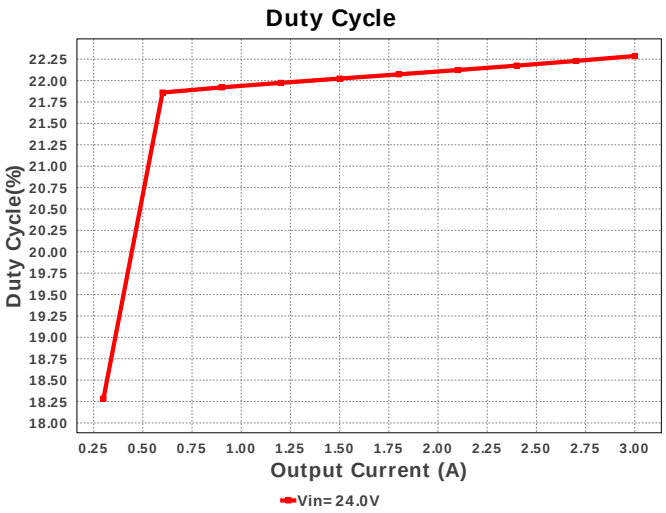


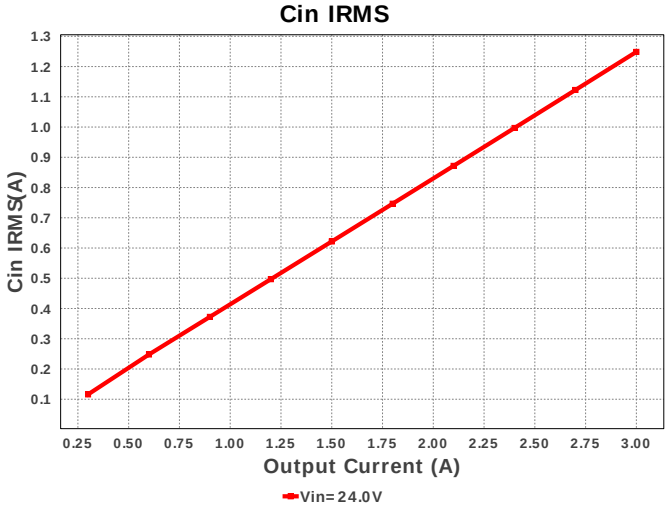
Electrical BOM

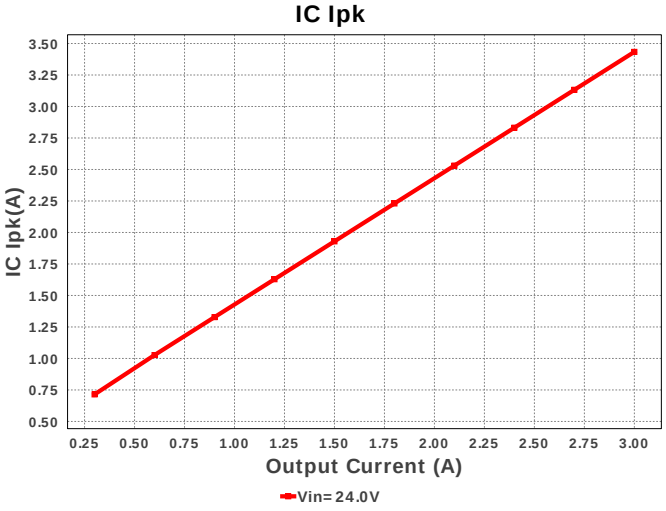
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.07	1206 11 mm²
3.	Cout	CUSTOM	CUSTOM_CAP_MD Series= CUSTOM	Cap= 100.0 uF ESR= 5.0 mOhm VDC= 16.0 V IRMS= 240.0 mA	1	$0.10	1210 51 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.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.17	SMC 83 mm²
6.	L1	Bourns	SDR1307-8R2ML	L= 8.2 µH DCR= 19.0 mOhm	1	$0.35	SDR1307 227 mm²
7.	Rfbb	Susumu Co Ltd	RR1220P-123-D Series= RR12	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 7 mm²
8.	Rfbt	Susumu Co Ltd	RR1220P-683-D Series= RR12	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	0805 7 mm²
9.	Rt	Vishay-Dale	CRCW040241K2FKED Series= CRCW..e3	Res= 41.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

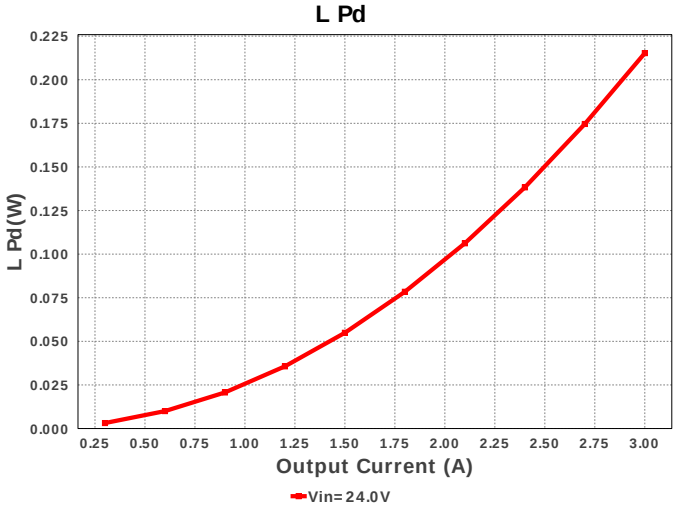
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14030SDDAR	Switcher	1	$1.68	DDA0008E 57 mm²

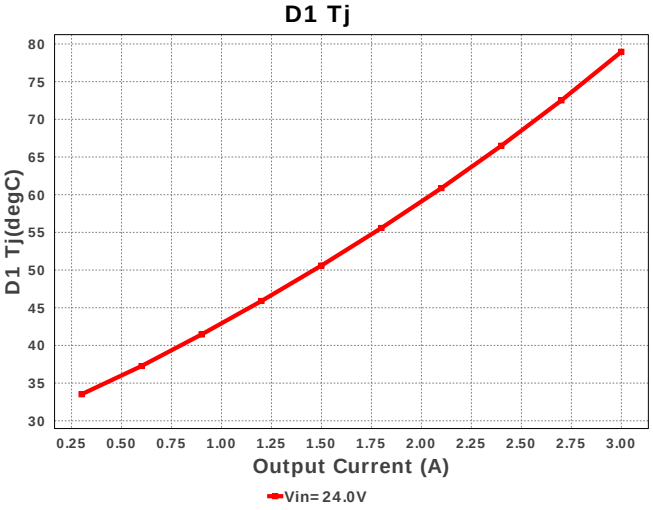




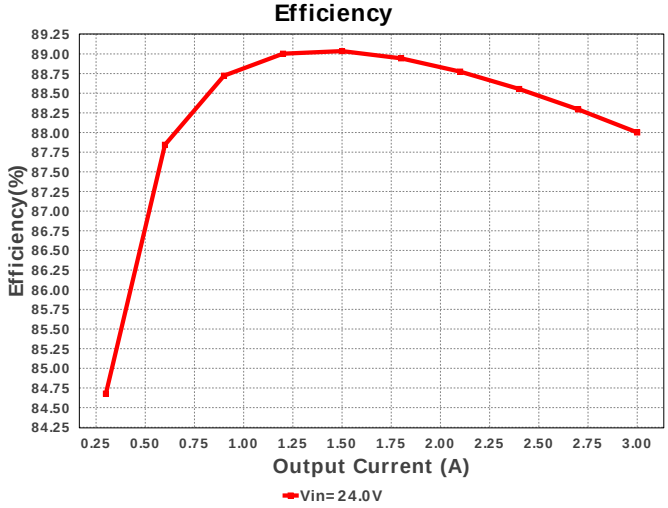




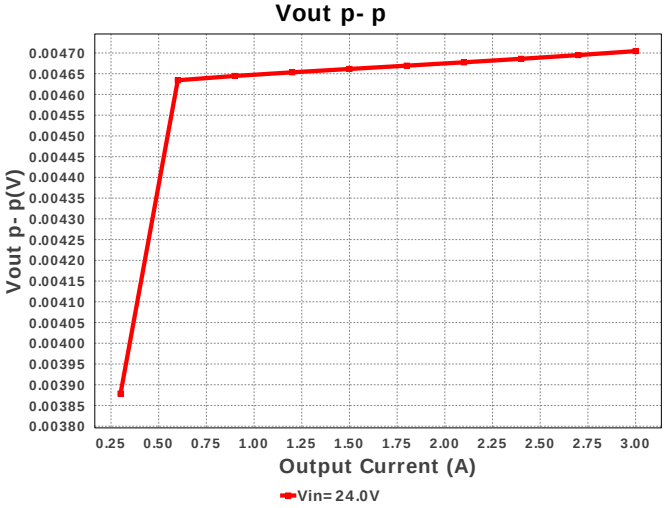




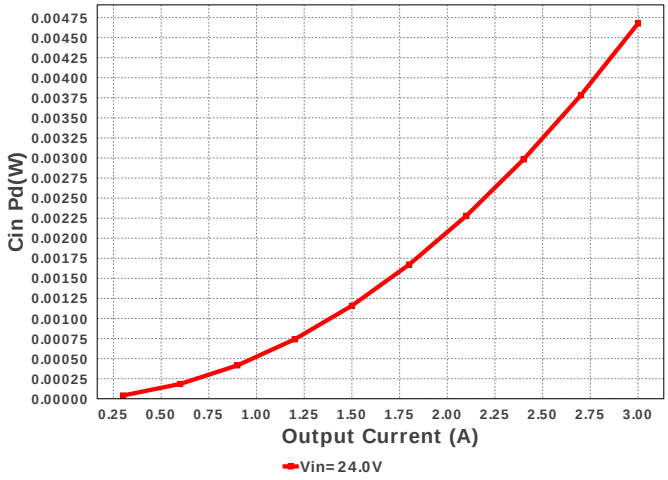
Efficiency



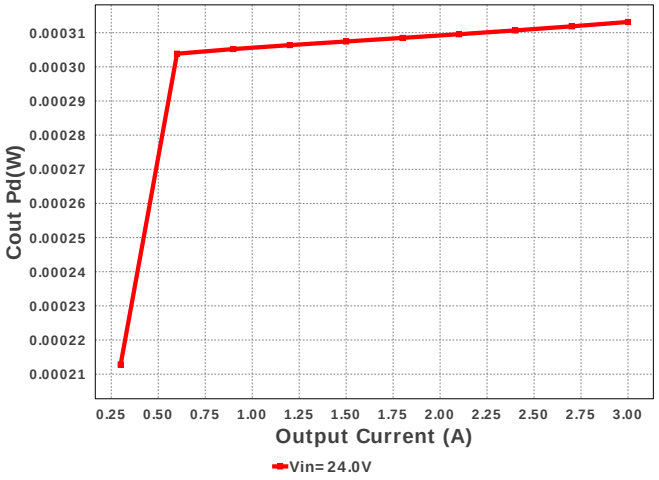
Vout p- p



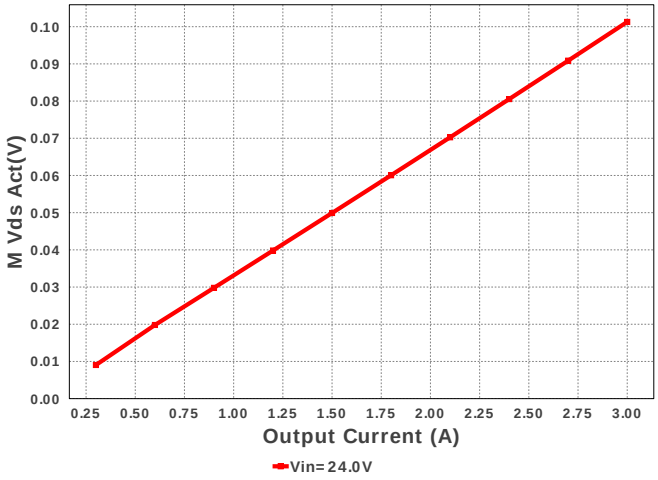
Cin Pd



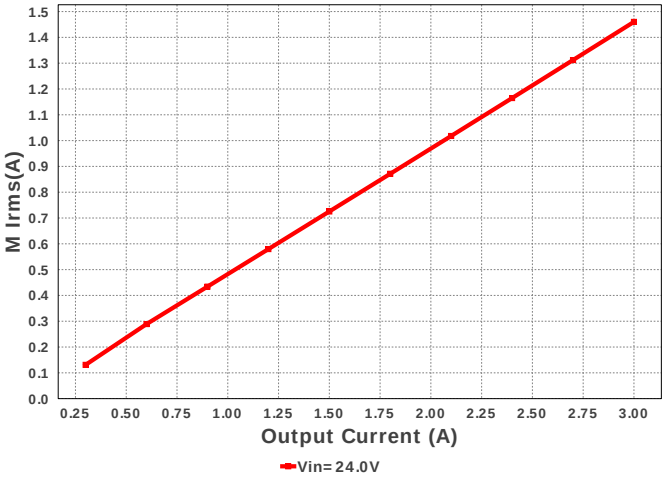
Cout Pd

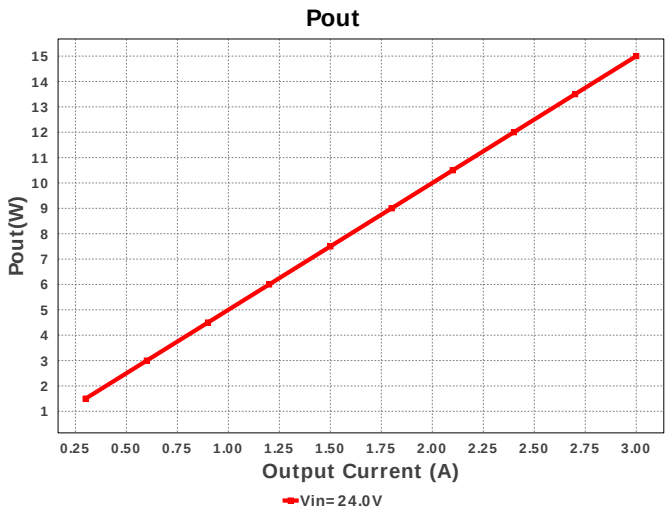


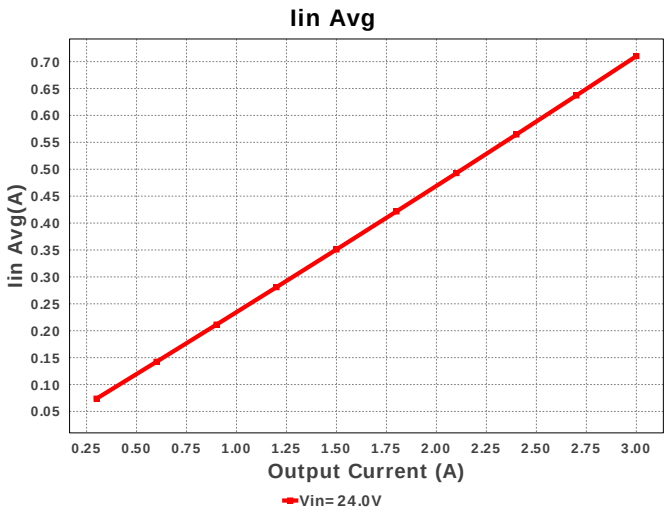
M Vds Act

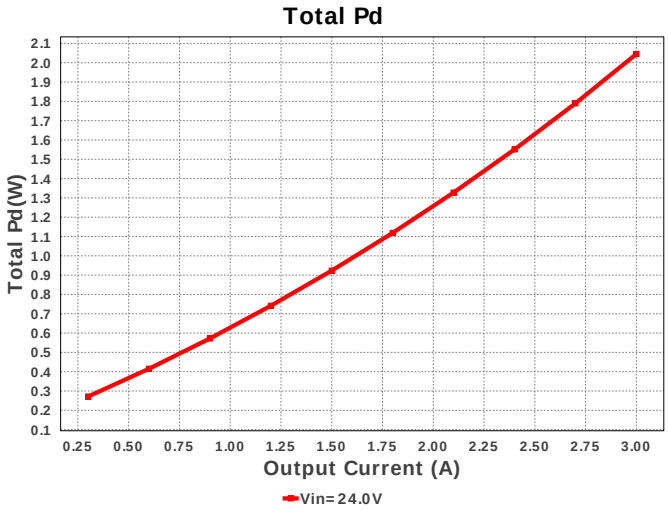


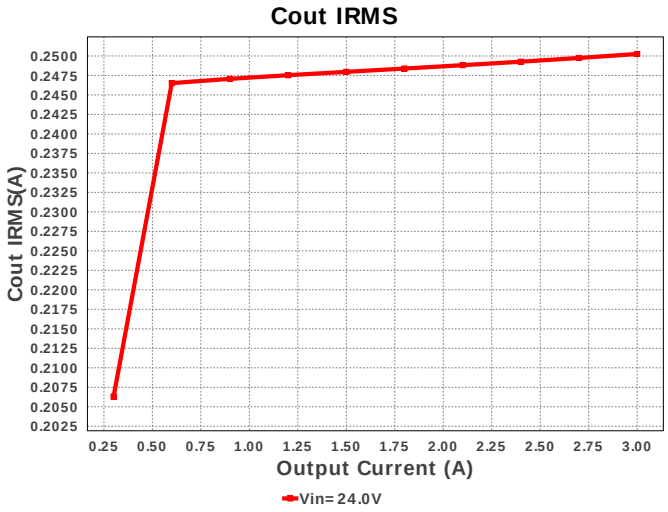
M Irms

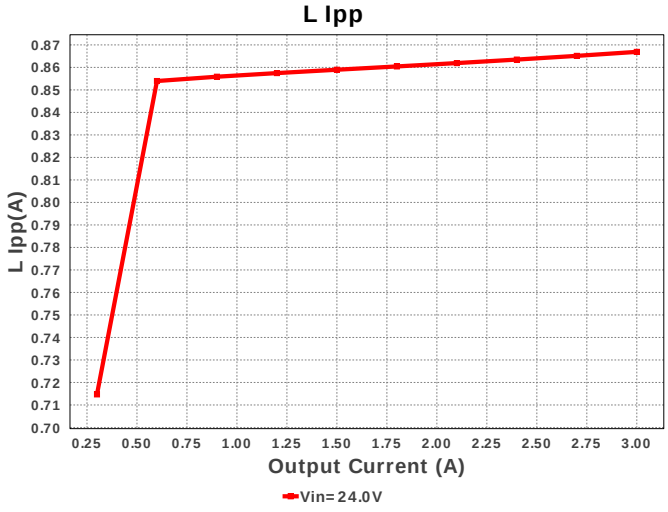


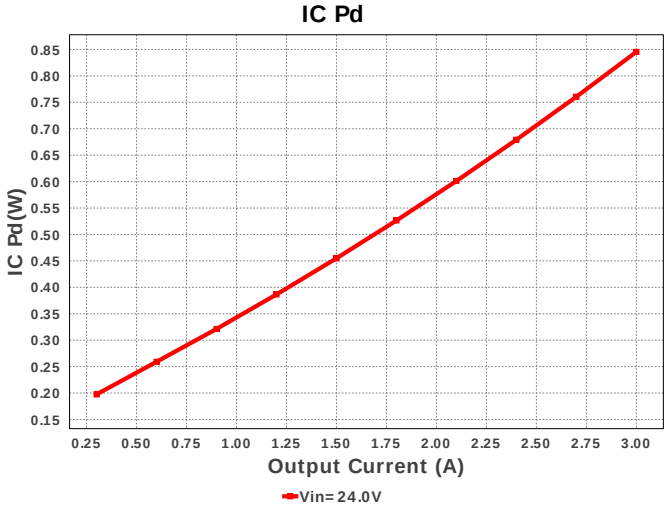


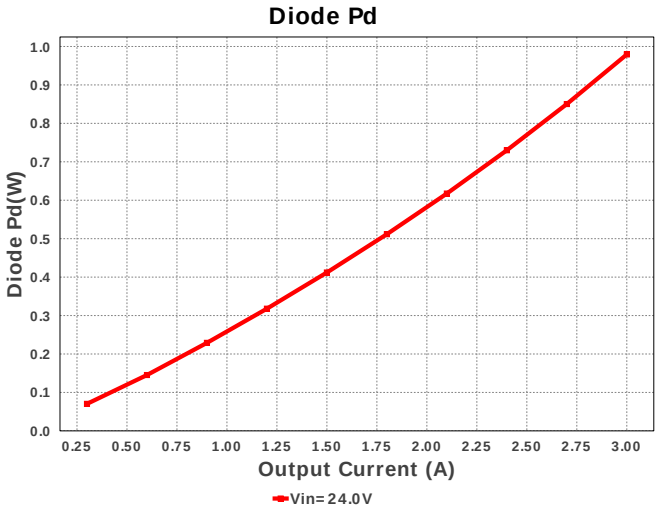


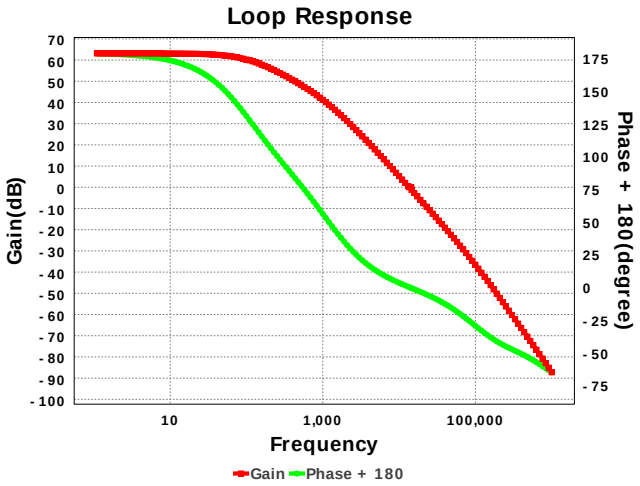


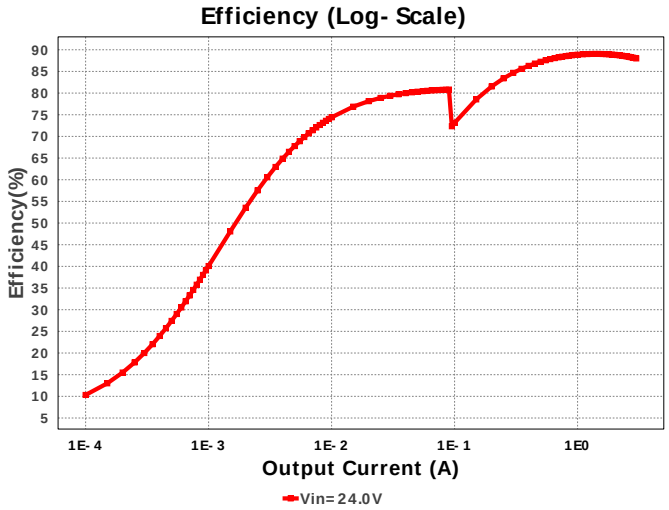












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	10		Total Design BOM count
2.	Total BOM	$2.42		Total BOM Cost
3.	Cin IRMS	1.249 A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	250.254 mA	Current	Output capacitor RMS ripple current
5.	IC Ipk	3.434 A	Current	Peak switch current in IC
6.	Iin Avg	710.23 mA	Current	Average input current
7.	L Ipp	866.904 mA	Current	Peak-to-peak inductor ripple current
8.	M1 Irms	1.46 A	Current	Q Iavg
9.	FootPrint	489.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	592.527 kHz	General	Switching frequency
11.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	101.287 mV	General	Voltage drop across the MosFET
13.	Pout	15.0 W	General	Total output power
14.	D1 Tj	78.964 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	13.562 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	22.287 %	Op_point	Duty cycle
18.	Efficiency	88.001 %	Op_point	Steady state efficiency
19.	IC Tj	65.93 degC	Op_point	IC junction temperature
20.	ICThetaJA	42.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	3.0 A	Op_point	Iout operating point
22.	Phase Marg	749.593 mdeg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	24.0 V	Op_point	Vin operating point
24.	Vout p-p	4.705 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	4.677 mW	Power	Input capacitor power dissipation
26.	Cout Pd	313.134 µW	Power	Output capacitor power dissipation
27.	Diode Pd	979.285 mW	Power	Diode power dissipation
28.	IC Pd	845.422 mW	Power	IC power dissipation
29.	L Pd	215.246 mW	Power	Inductor power dissipation
30.	Total Pd	2.045 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	3.0	Maximum Output Current
2.	Iout1	3.0	Output Current #1
3.	SoftStart	2.0 ms	Soft Start Time (ms)
4.	VinMax	24.0	Maximum input voltage
5.	VinMin	24.0	Minimum input voltage
6.	Vout	5.0	Output Voltage
7.	Vout1	5.0	Output Voltage #1
8.	base_pn	LMR14030S	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0	Ambient temperature
11.	UserFsw	600.0 k	Customer Selected Frequency

Design Assistance

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