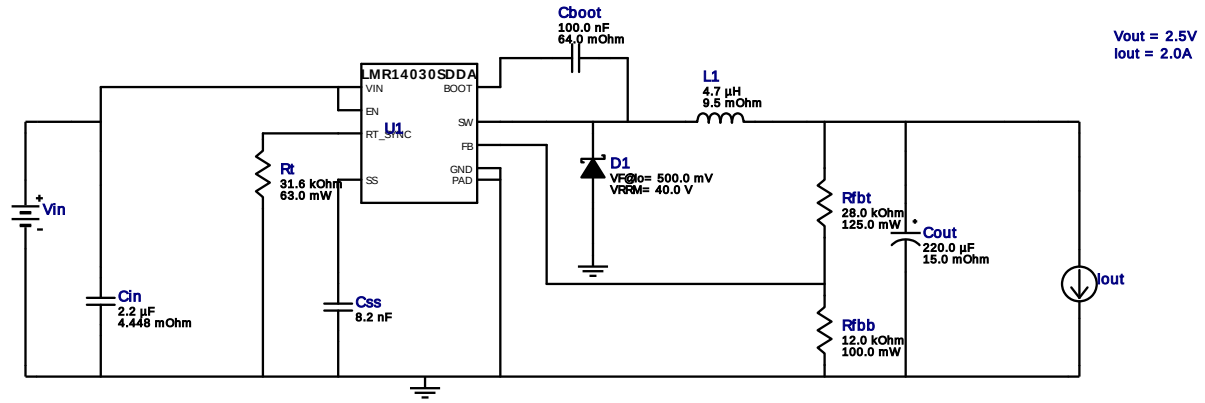
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 21.0V
VinMax = 25.0V
Vout = 2.5V
Iout = 2.0A

Device = LMR14030SDDAR
Topology = Buck
Created = 7/20/16 11:29:10 PM
BOM Cost = $2.42
BOM Count = 10
Total Pd = 1.34W

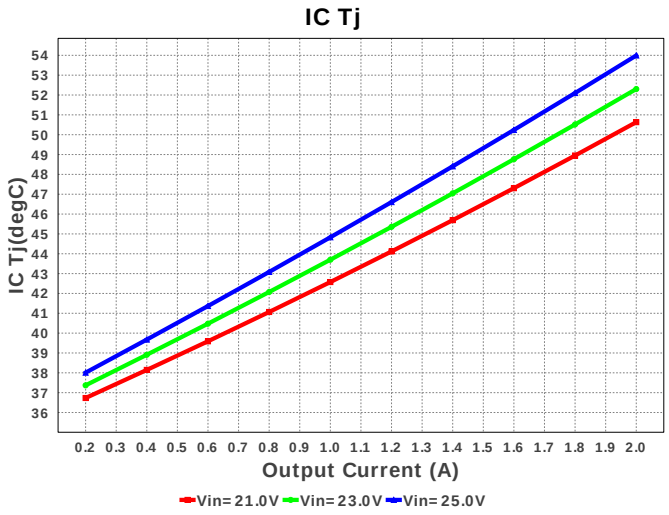
Design : 4742013/193 LMR14030SDDAR
LMR14030SDDAR 21.0V-25.0V to 2.50V @ 2.0001874999999996A

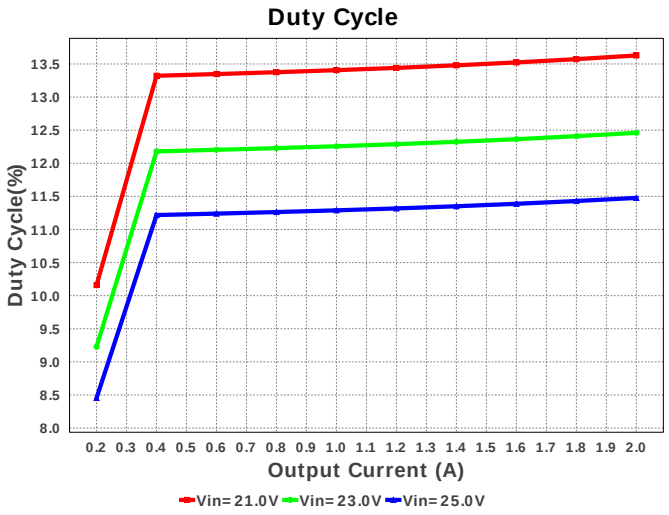


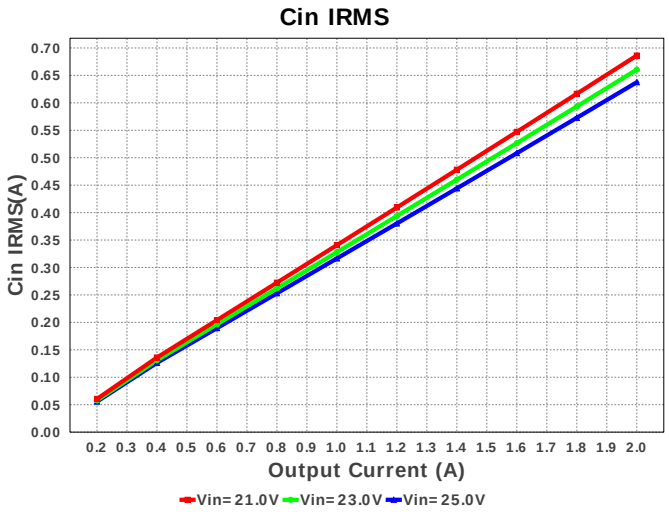
Electrical BOM

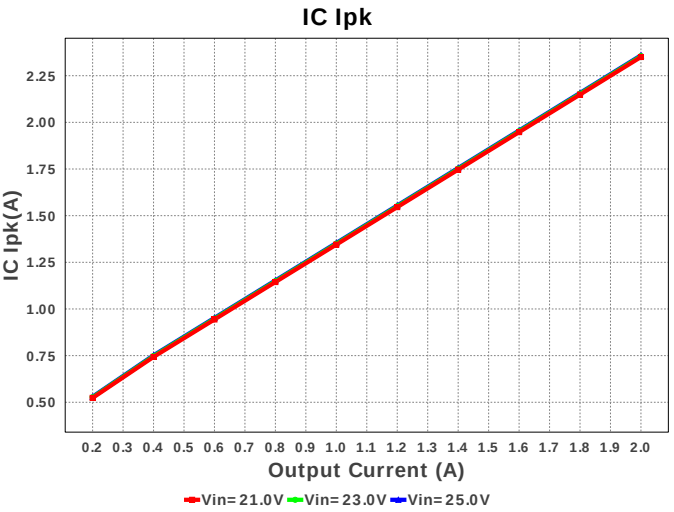
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
3.	Cout	Panasonic	6SVPE220MW Series= SVPE	Cap= 220.0 uF ESR= 15.0 mOhm VDC= 6.3 V IRMS= 3.15 A	1	$0.20	CAPSMT_62_E61 53 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	SRU1048-4R7Y	L= 4.7 µH DCR= 9.5 mOhm	1	$0.33	SRU1048 144 mm²
7.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
8.	Rfbt	Panasonic	ERJ-6ENF2802V Series= ERJ-6E	Res= 28.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
9.	Rt	Vishay-Dale	CRCW040231K6FKED Series= CRCW..e3	Res= 31.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

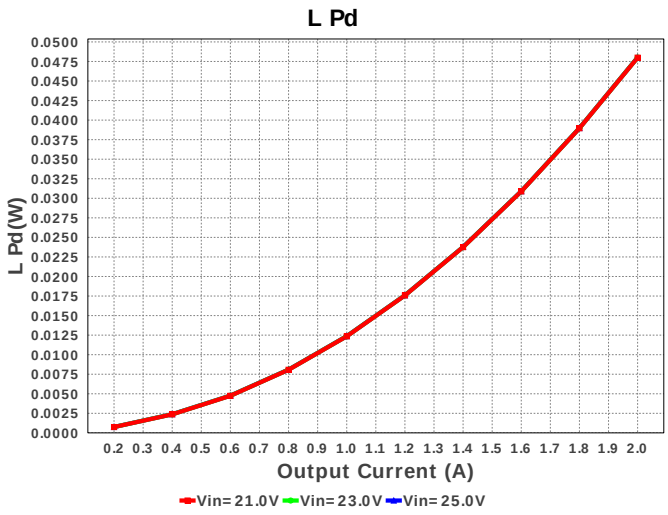
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14030SDDAR	Switcher	1	$1.68	DDA0008E_N 57 mm²

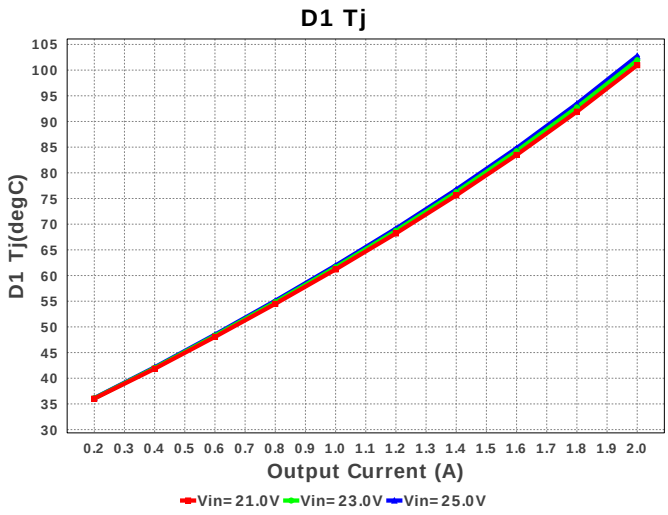


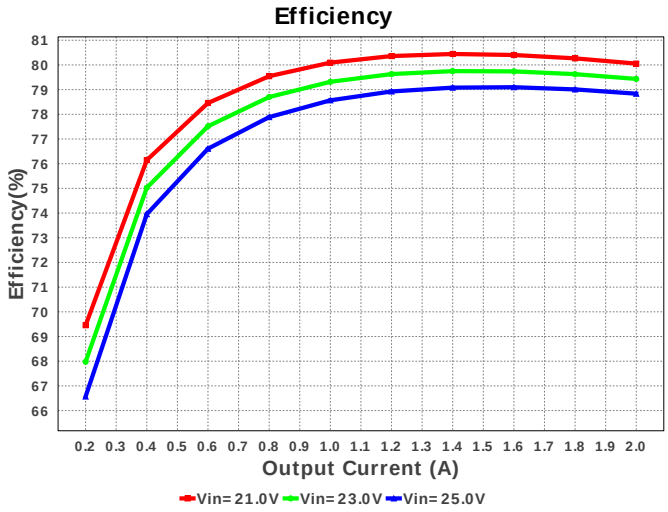


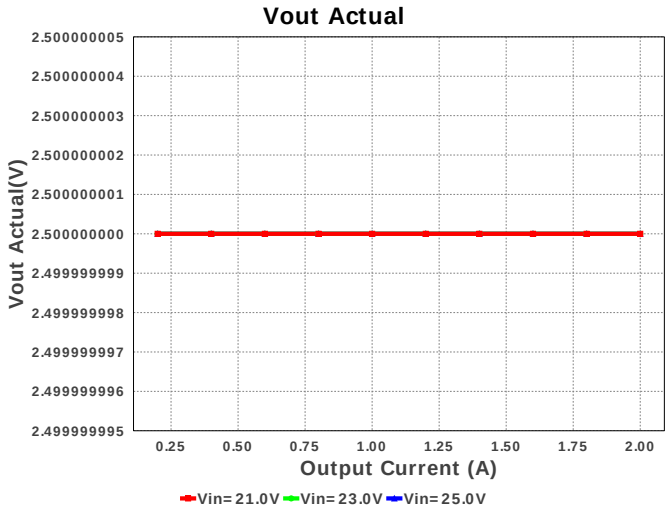


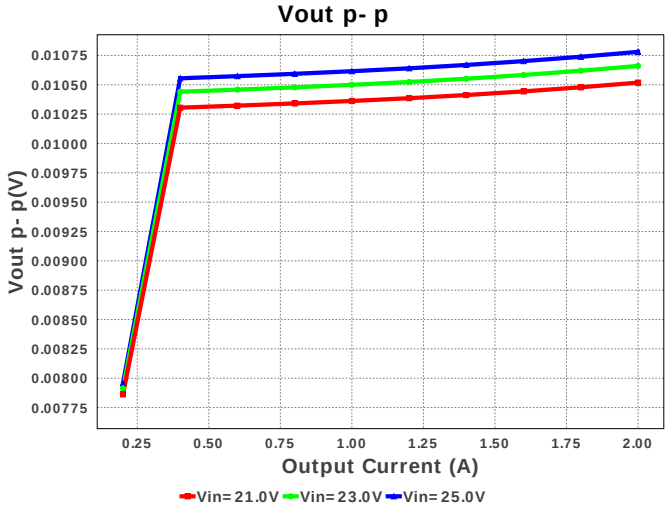


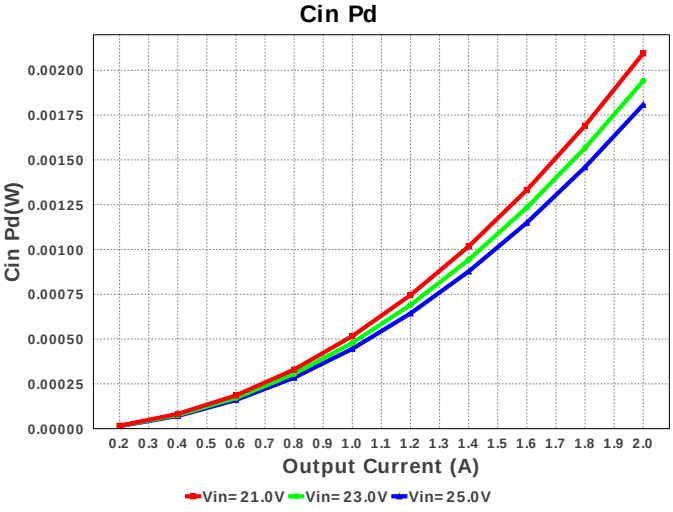


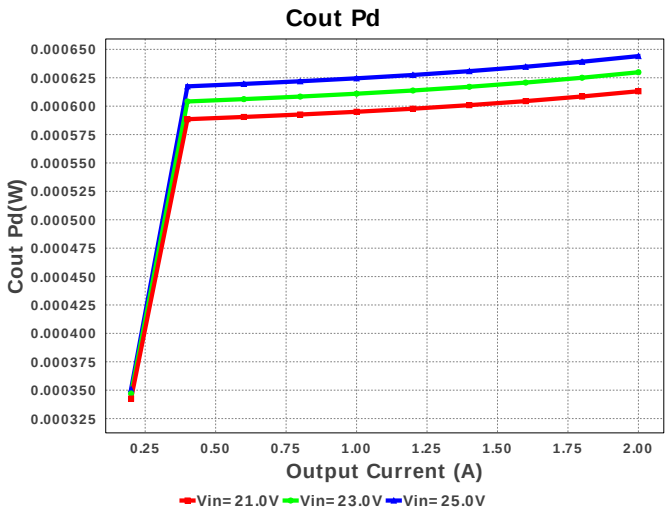


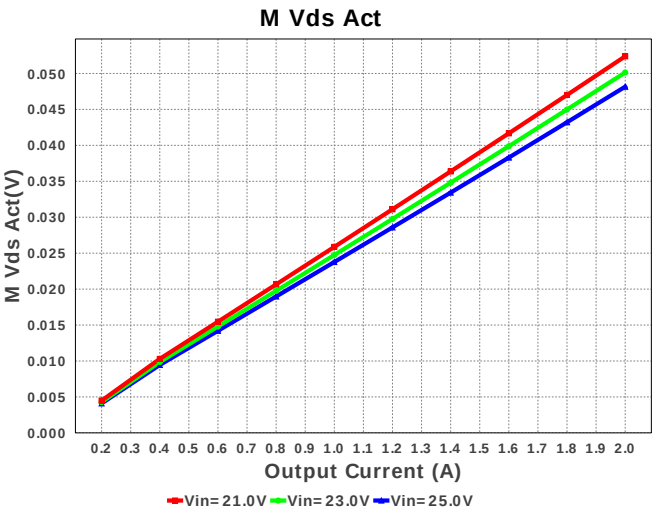


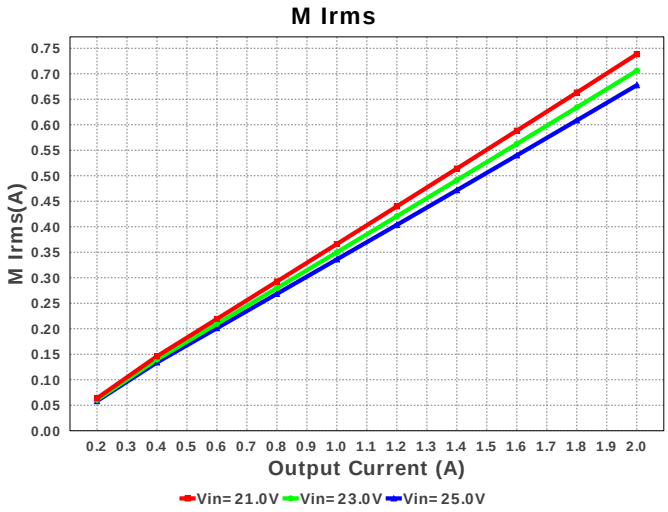


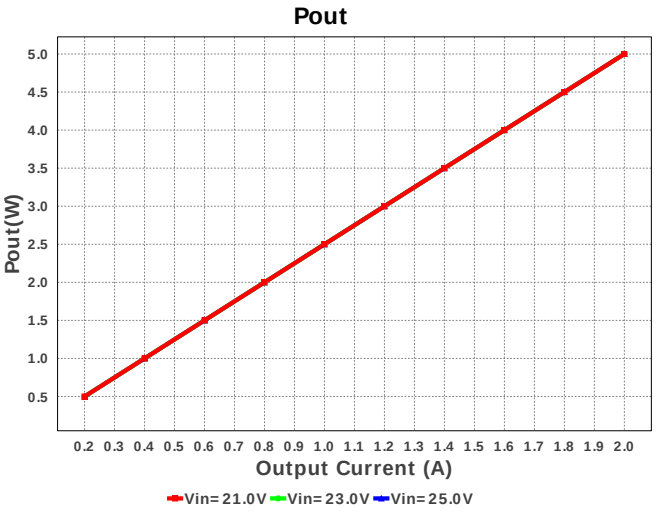


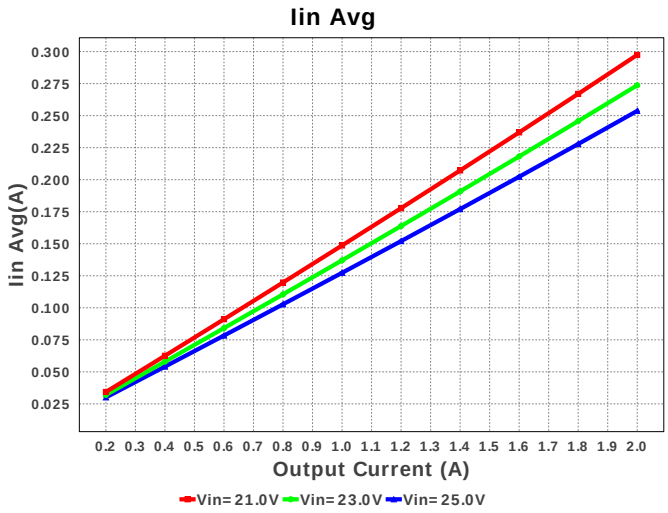


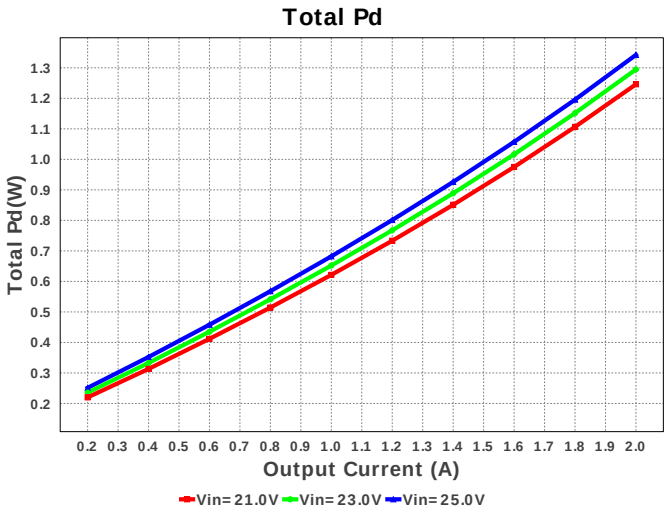


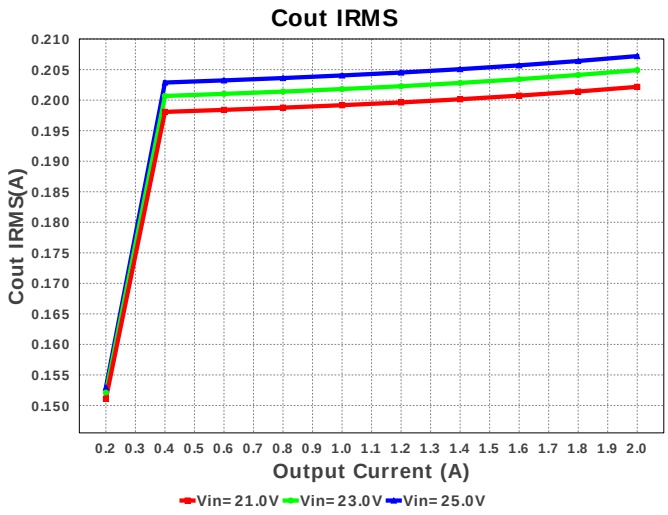


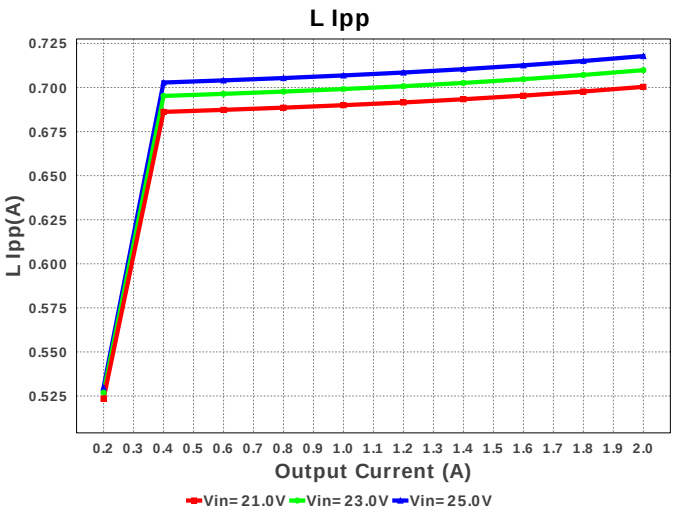


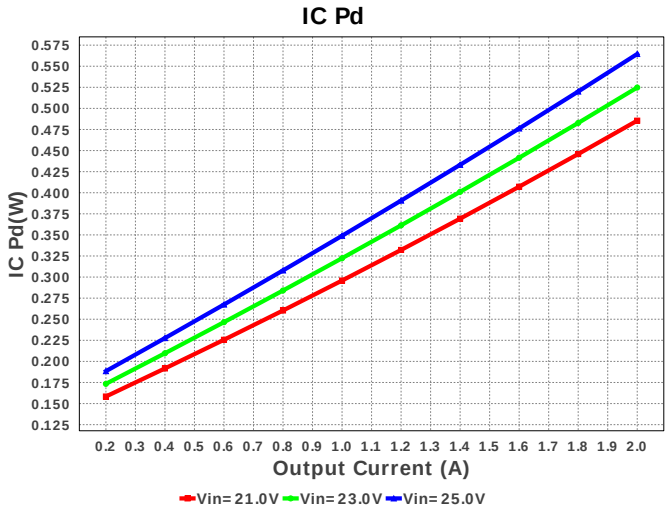


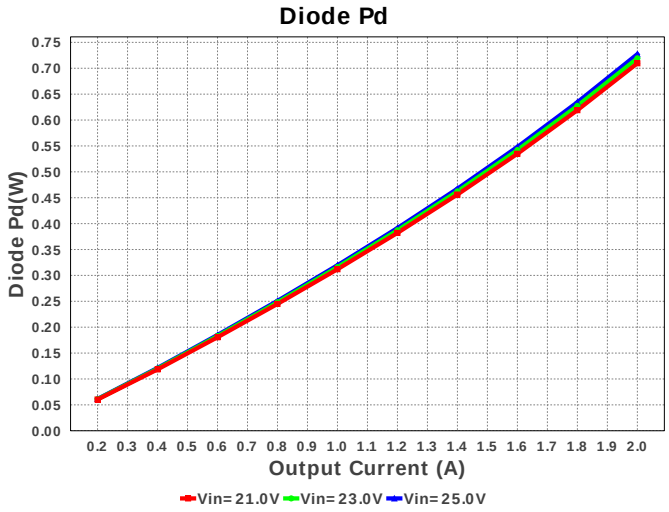


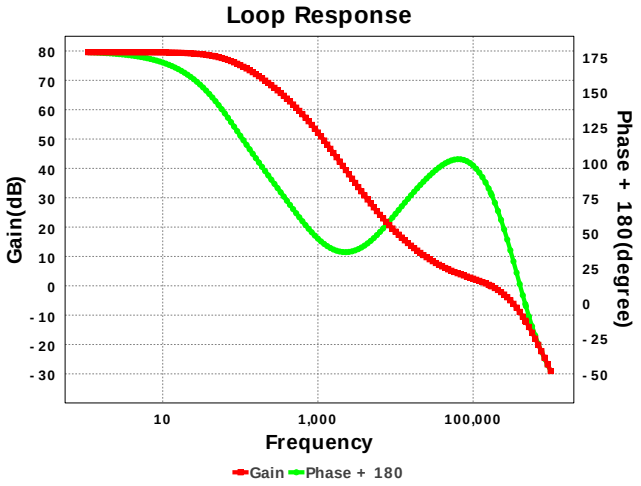












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	637.499 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	207.215 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.359 A	Current	Peak switch current in IC
4.	Iin Avg	253.7 mA	Current	Average input current
5.	L Ipp	717.81 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	677.565 mA	Current	MOSFET RMS current
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	327.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	763.761 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	48.149 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	$2.42	General	Total BOM Cost
14.	D1 Tj	102.729 degC	Op_Point	D1 junction temperature
15.	Vout Actual	2.5 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	2.5 V	Op_Point	Operational Output Voltage
17.	Cross Freq	168.374 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	11.477 %	Op_point	Duty cycle
19.	Efficiency	78.835 %	Op_point	Steady state efficiency
20.	IC Tj	53.71 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	79.119 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	25.0 V	Op_point	Vin operating point
25.	Vout p-p	10.78 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.808 mW	Power	Input capacitor power dissipation
27.	Cout Pd	644.07 µW	Power	Output capacitor power dissipation
28.	Diode Pd	727.288 mW	Power	Diode power dissipation
29.	IC Pd	564.517 mW	Power	IC power dissipation
30.	L Pd	48.013 mW	Power	Inductor power dissipation
31.	Total Pd	1.342 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.848 %		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	25.0	Maximum input voltage
3.	VinMin	21.0	Minimum input voltage
4.	Vout	2.5	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.