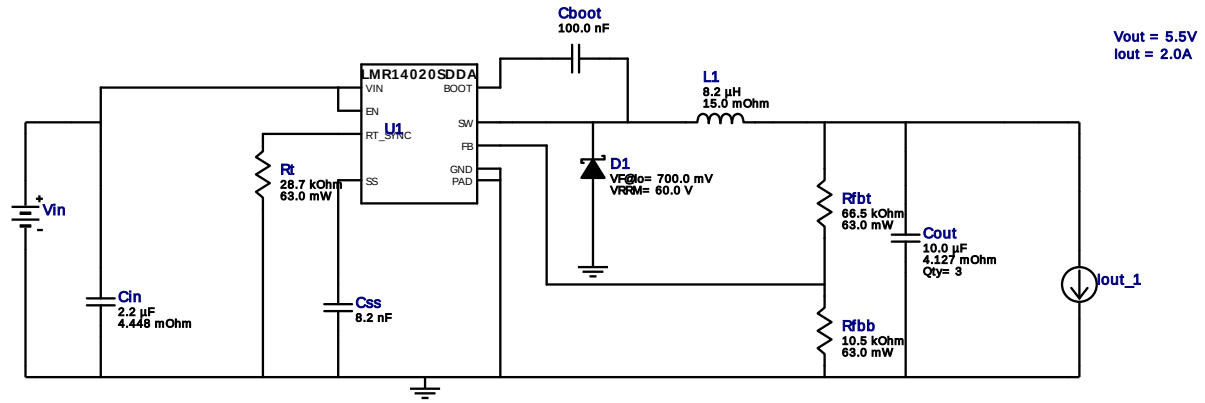
WEBENCH® Design Report

VinMin = 35.0V
VinMax = 36.0V
Vout = 5.5V
Iout = 2.0A

Device = LMR14020SDDAR
Topology = Buck
Created = 7/18/16 1:36:34 AM
BOM Cost = $2.12
BOM Count = 12
Total Pd = 1.65W

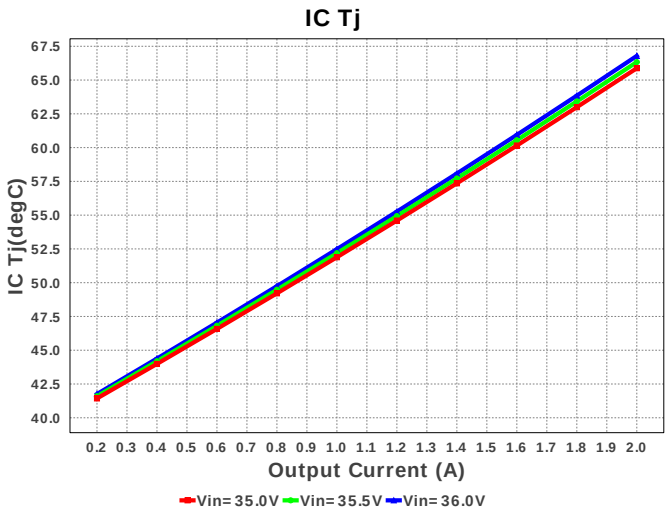
Design : 906020/2256 LMR14020SDDAR
LMR14020SDDAR 35.0V-36.0V to 5.50V @ 2.000214285714286A

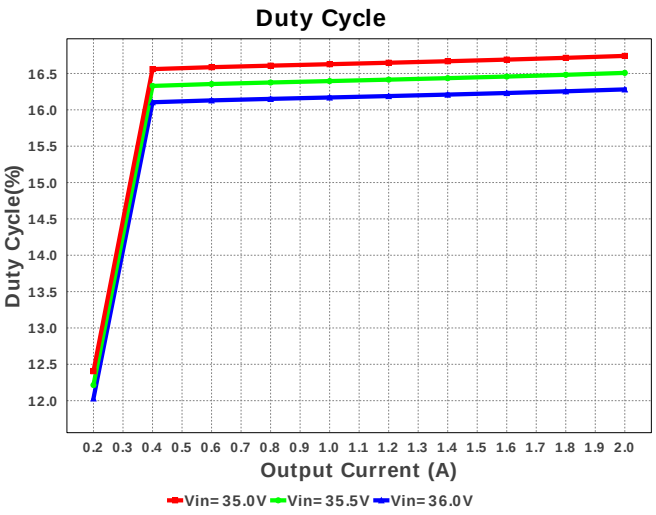


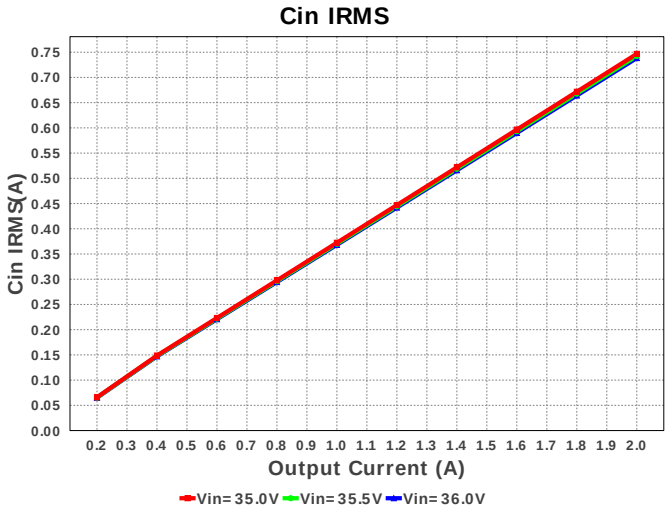
Electrical BOM

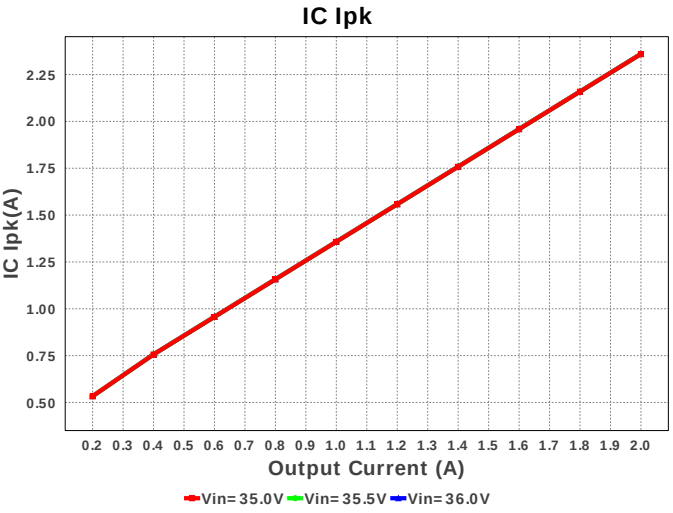
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
3.	Cout	MuRata	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	3	$0.03	0805 7 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.	B360A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.12	SMA 37 mm²
6.	L1	Bourns	SRU1048-8R2Y	L= 8.2 µH DCR= 15.0 mOhm	1	$0.33	SRU1048 144 mm²
7.	Rfbb	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	Rfbt	Vishay-Dale	CRCW040266K5FKED Series= CRCW..e3	Res= 66.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rt	Vishay-Dale	CRCW040228K7FKED Series= CRCW..e3	Res= 28.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

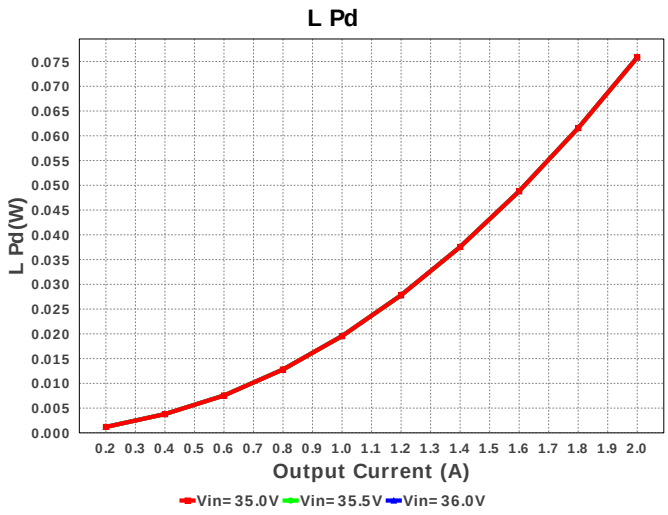
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14020SDDAR	Switcher	1	$1.46	DDA0008E_N 57 mm²

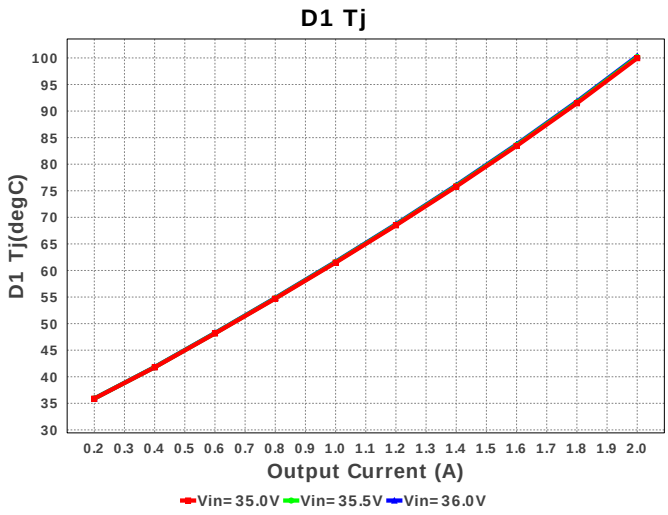


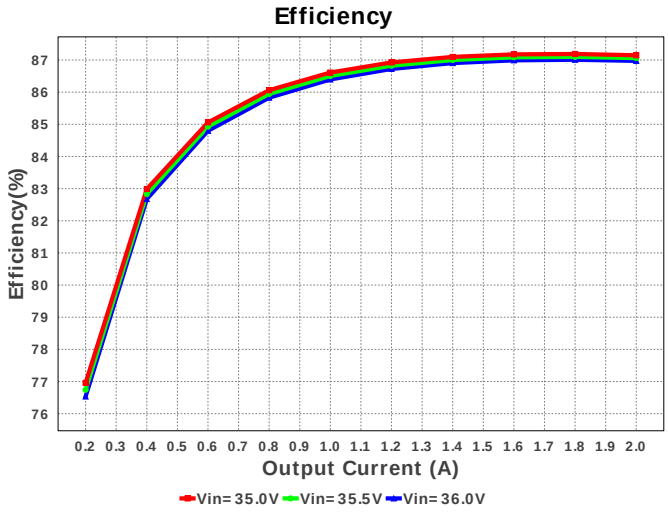


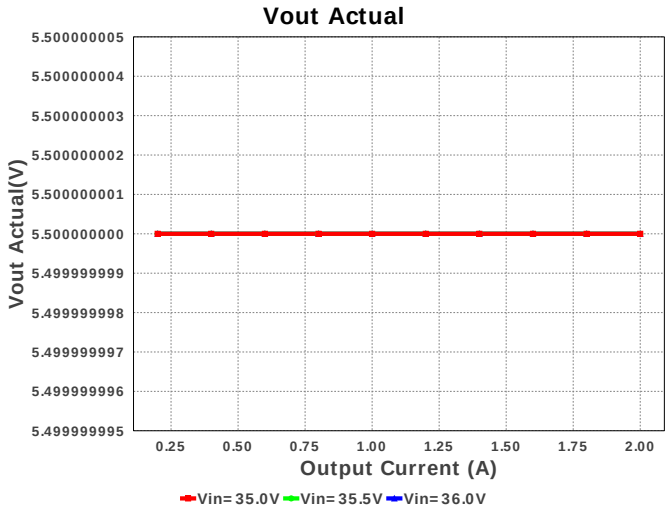


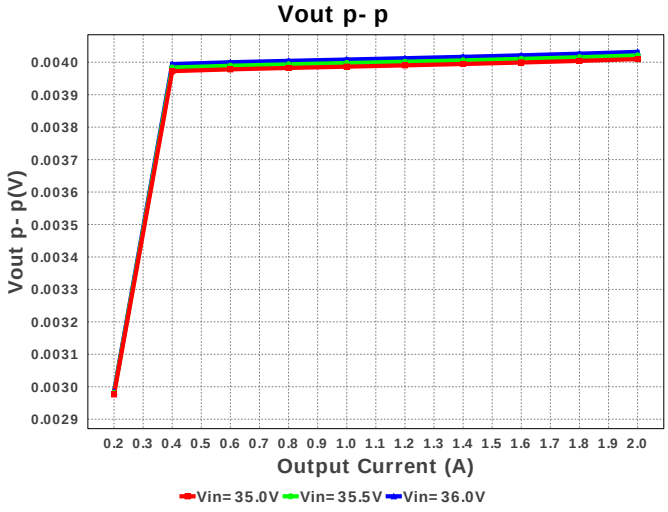


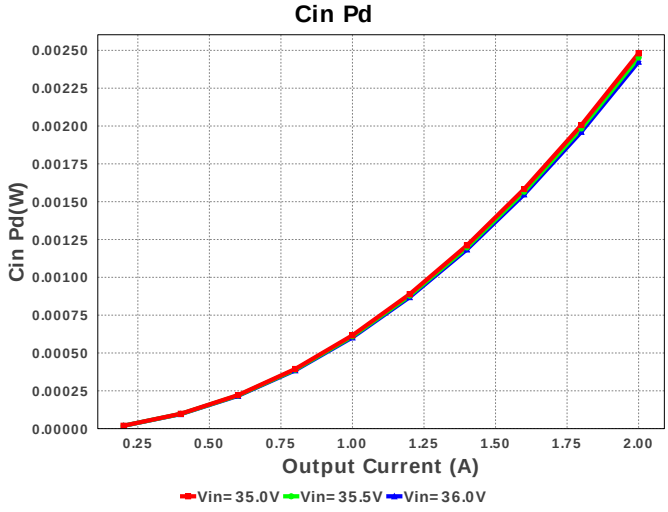


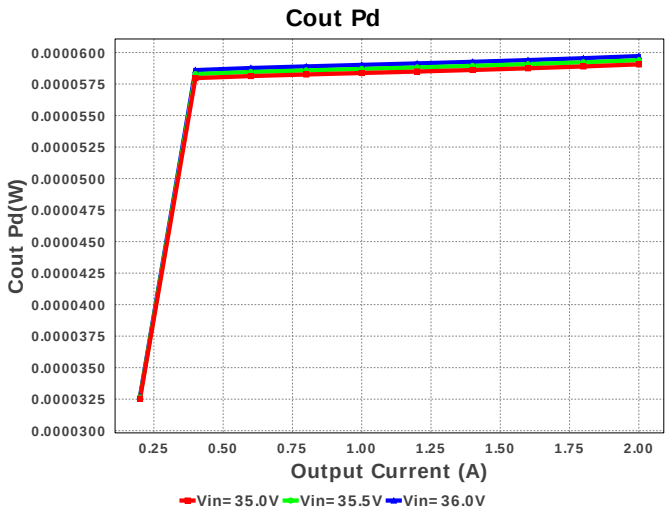


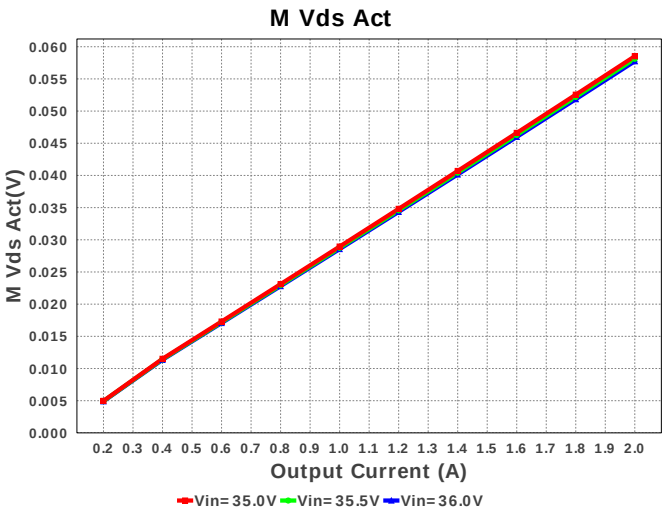


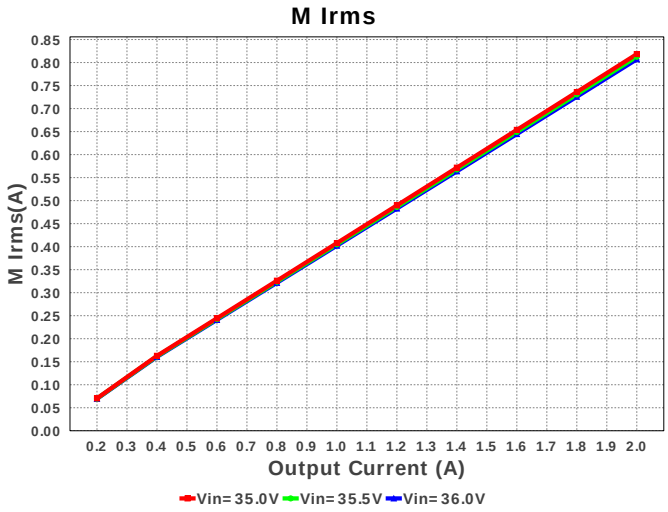


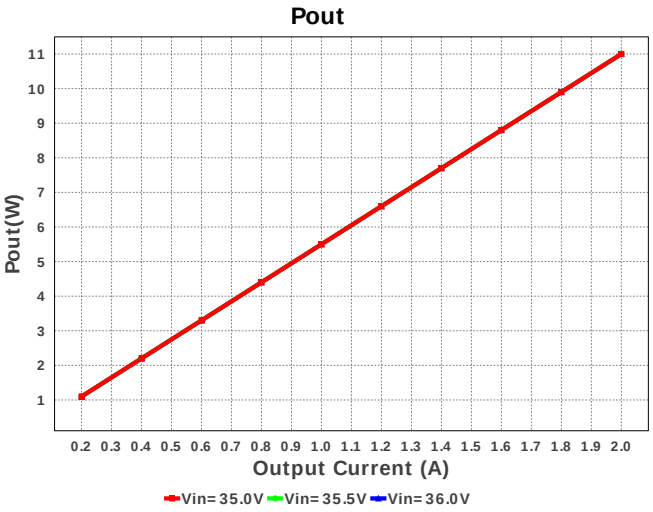


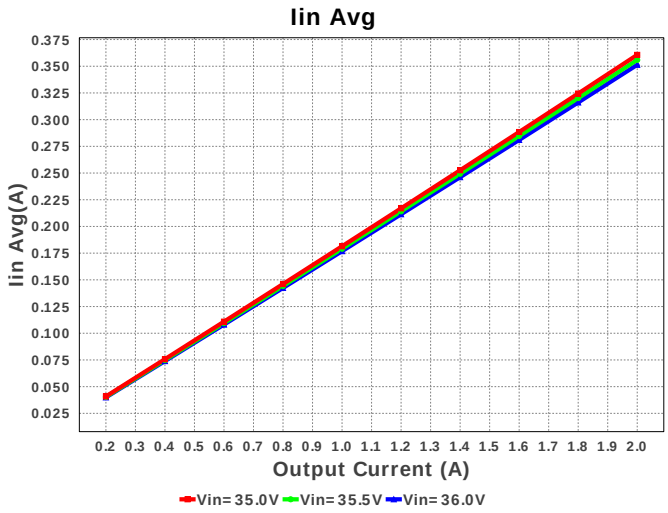


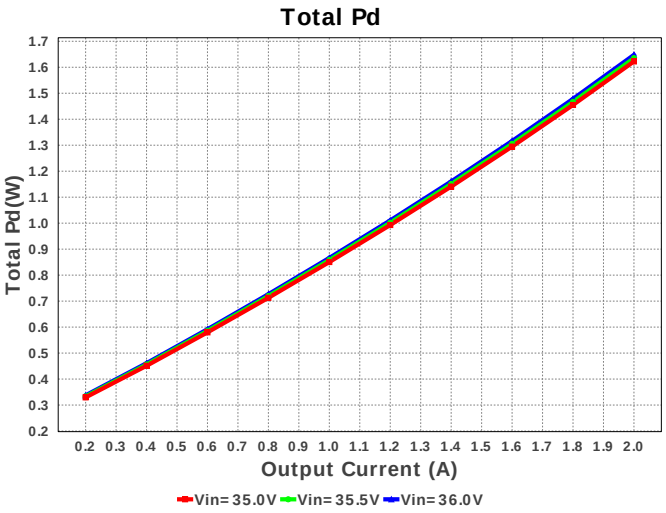


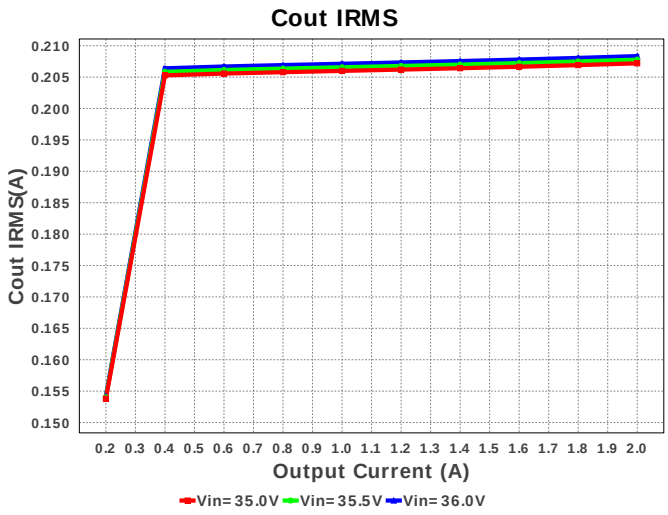


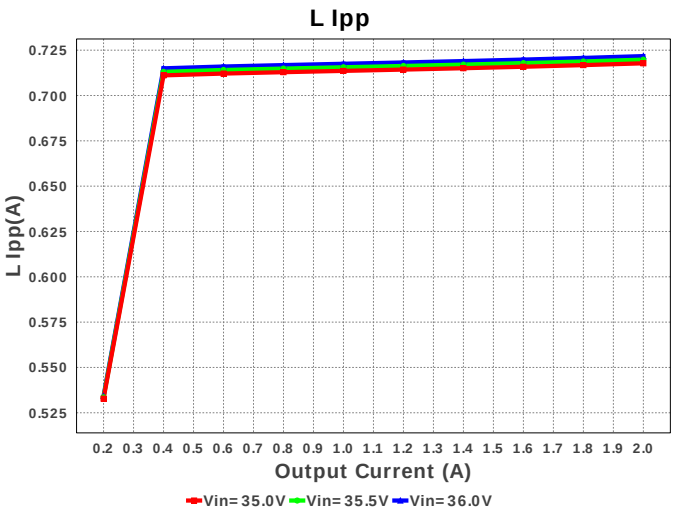


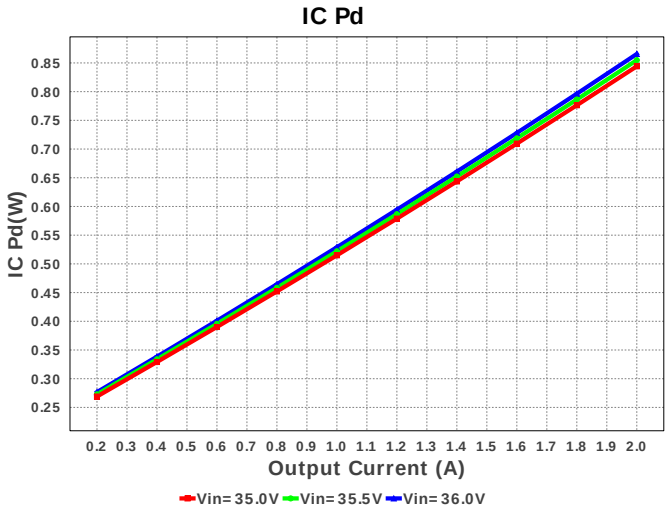


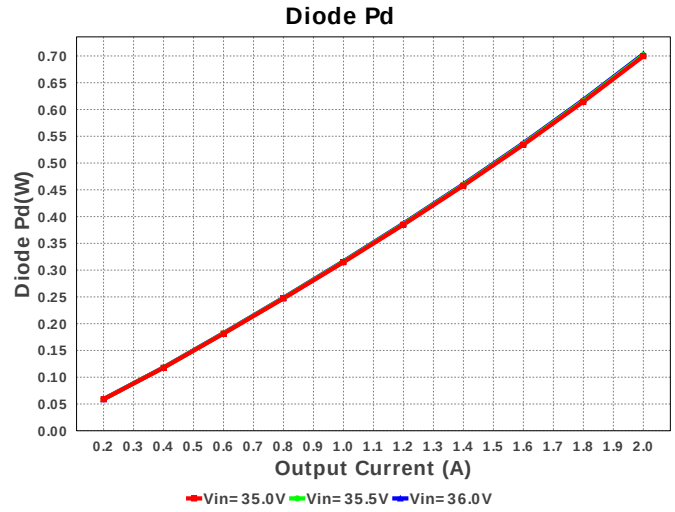


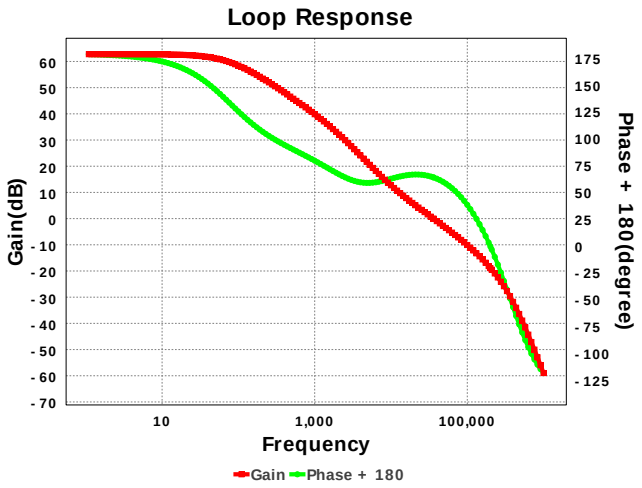












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	738.408 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	208.347 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.361 A	Current	Peak switch current in IC
4.	Iin Avg	351.34 mA	Current	Average input current
5.	L Ipp	721.74 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	807.02 mA	Current	Q Iavg
7.	BOM Count	12	General	Total Design BOM count
8.	FootPrint	289.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	837.457 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	57.726 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	11.0 W	General	Total output power
13.	Total BOM	$2.12	General	Total BOM Cost
14.	D1 Tj	100.344 degC	Op_Point	D1 junction temperature
15.	Vout Actual	5.5 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.5 V	Op_Point	Operational Output Voltage
17.	Cross Freq	35.908 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	16.281 %	Op_point	Duty cycle
19.	Efficiency	86.973 %	Op_point	Steady state efficiency
20.	IC Tj	66.354 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	64.422 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	36.0 V	Op_point	Vin operating point
25.	Vout p-p	4.032 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	2.425 mW	Power	Input capacitor power dissipation
27.	Cout Pd	59.716 µW	Power	Output capacitor power dissipation
28.	Diode Pd	703.445 mW	Power	Diode power dissipation
29.	IC Pd	865.576 mW	Power	IC power dissipation
30.	L Pd	75.819 mW	Power	Inductor power dissipation
31.	Total Pd	1.648 W	Power	Total Power Dissipation
32.	Vout Tolerance	4.187 %		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	36.0	Maximum input voltage
3.	VinMin	35.0	Minimum input voltage
4.	Vout	5.5	Output Voltage
5.	base_pn	LMR14020S	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14020S** Product Folder : http://www.ti.com/product/LMR14020 : contains the data sheet and other resources.