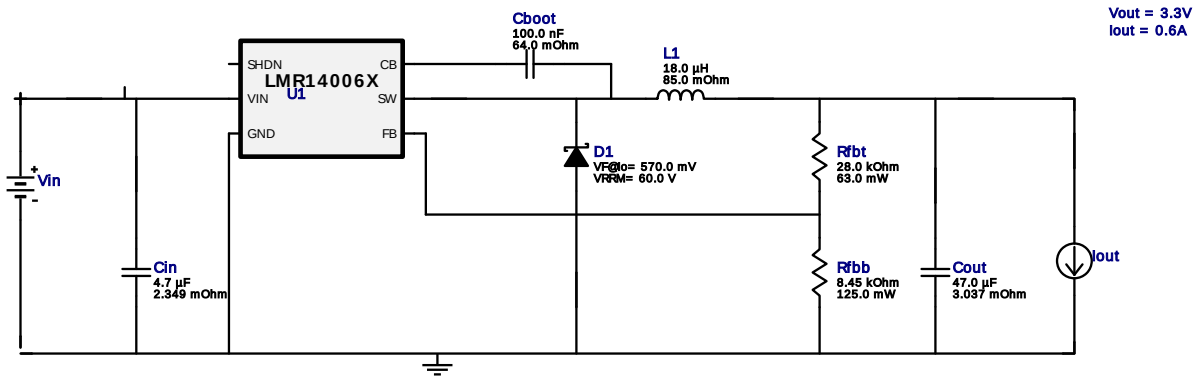
WEBENCH® Design Report

VinMin = 9.0V
VinMax = 35.0V
Vout = 3.3V
Iout = 0.6A

Device = LMR14006XDDCR
Topology = Buck
Created = 2019-04-16 23:01:13.528
BOM Cost = $2.63
BOM Count = 8
Total Pd = 0.49W

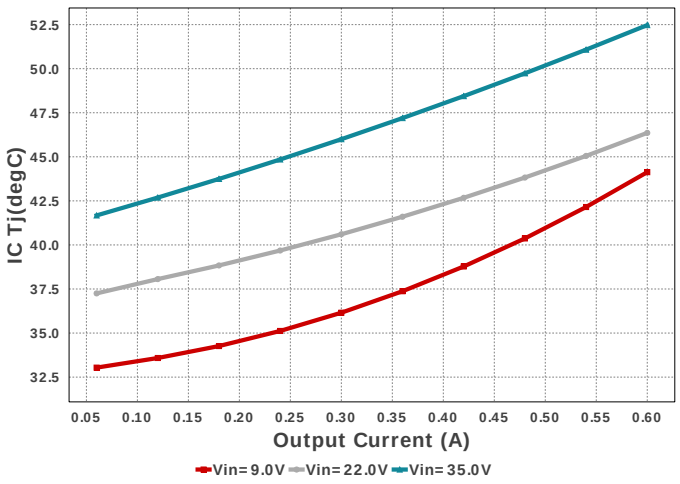
Design : LMR14006XDDCR
LMR14006XDDCR 9V-30V to 3.30V @ 0.6A



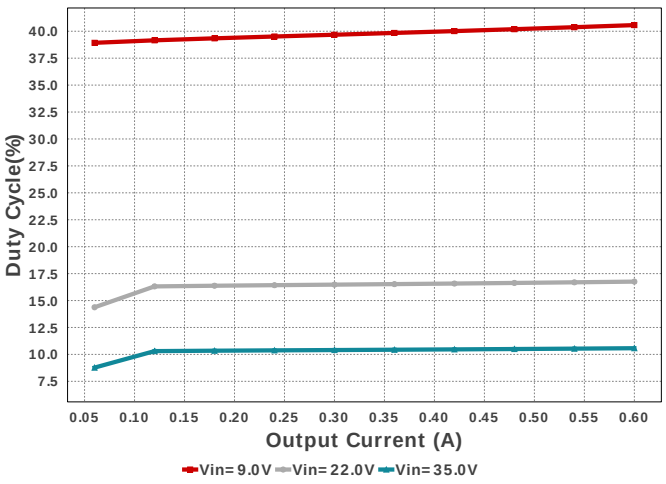
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104M5RACTU 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	TDK	CGA9N2X7R2A475K230KA Series= X7R	Cap= 4.7 uF ESR= 2.349 mOhm VDC= 100.0 V IRMS= 5.9572 A	1	$1.06	2220_250 54 mm²
3.	Cout	MuRata	GRM32ER61C476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	$0.38	1210_280 15 mm²
4.	D1	Nexperia	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
5.	L1	Bourns	SRR6028-180Y	L= 18.0 µH DCR= 85.0 mOhm	1	$0.32	SRR6028 77 mm²
6.	Rfbb	Panasonic	ERJ-6ENF8451V Series= ERJ-6E	Res= 8450.0Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
7.	Rfbt	Vishay-Dale	CRCW040228K0FKED Series= CRCW..e3	Res= 28000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
8.	U1	Texas Instruments	LMR14006XDDCR	Switcher	1	$0.80	MK06A 11 mm²

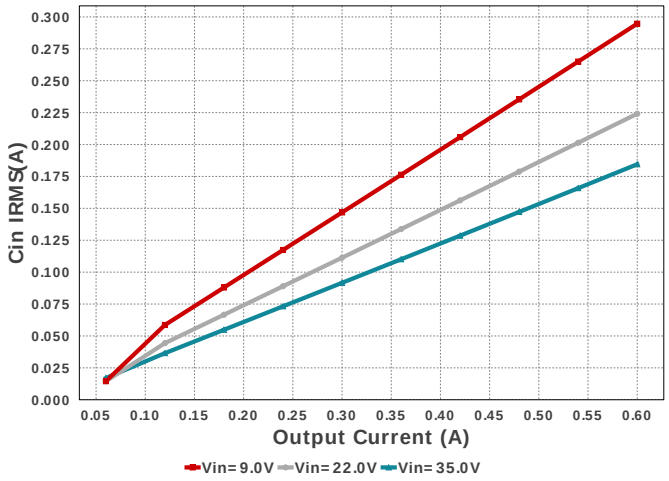
IC Tj



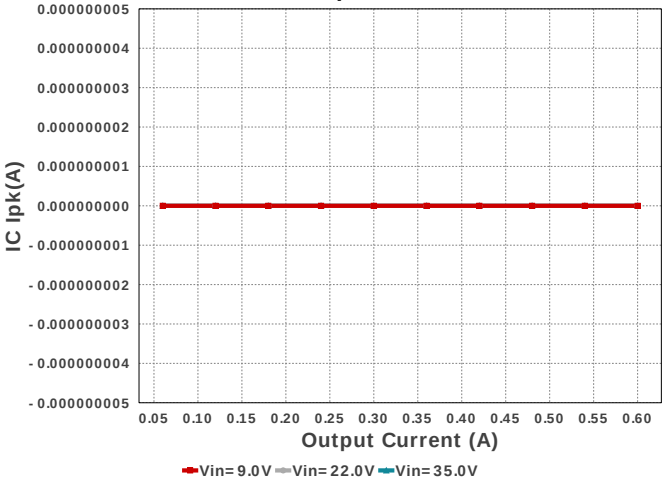
Duty Cycle



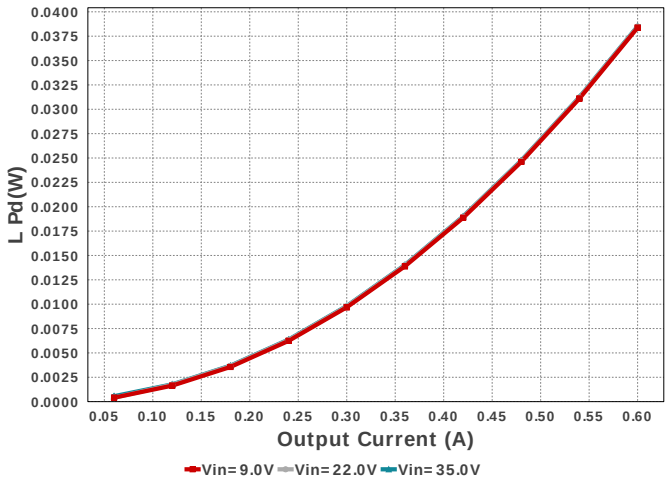
Cin IRMS



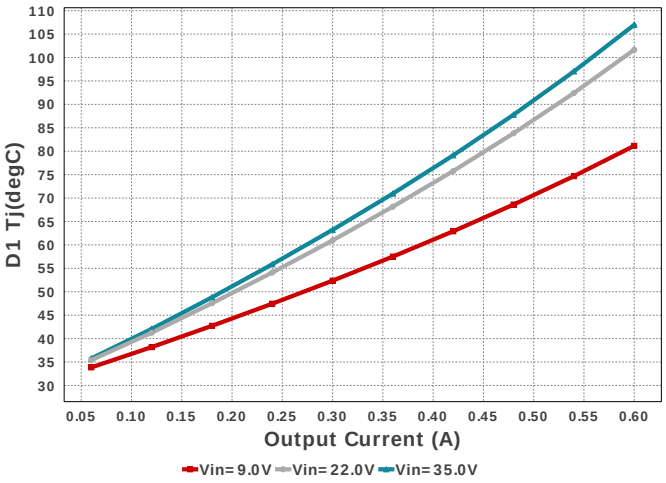
IC Ipk

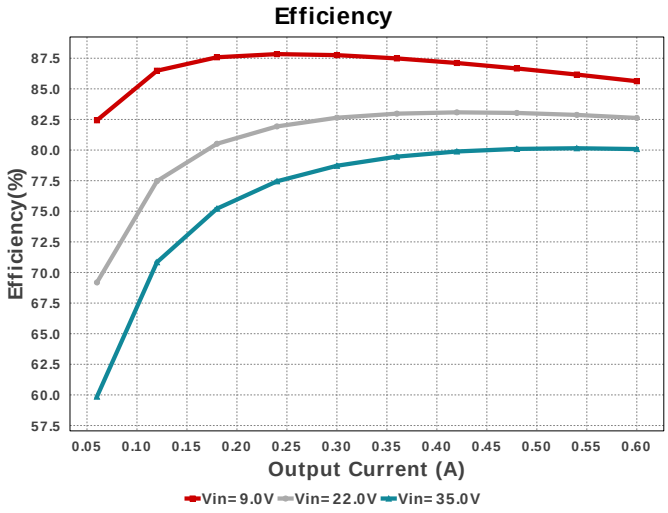


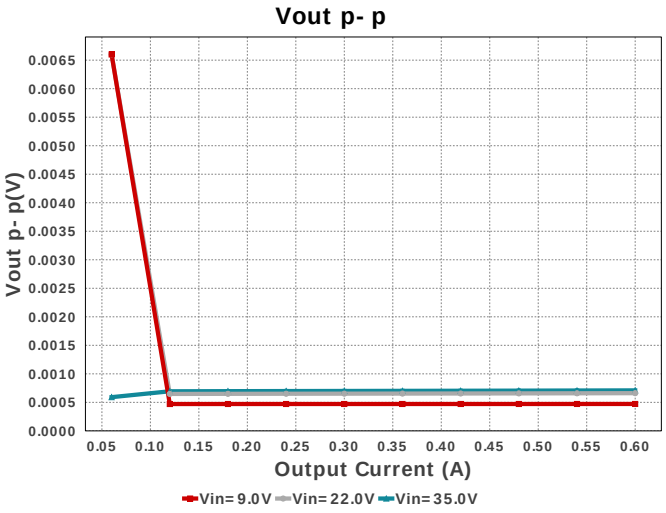
L Pd

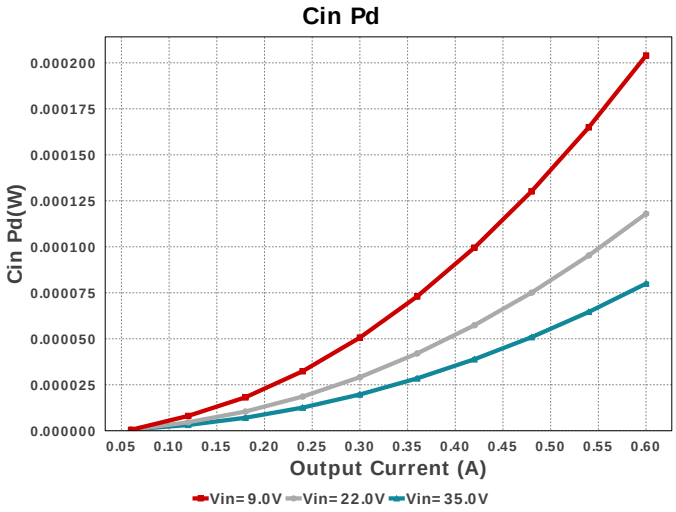


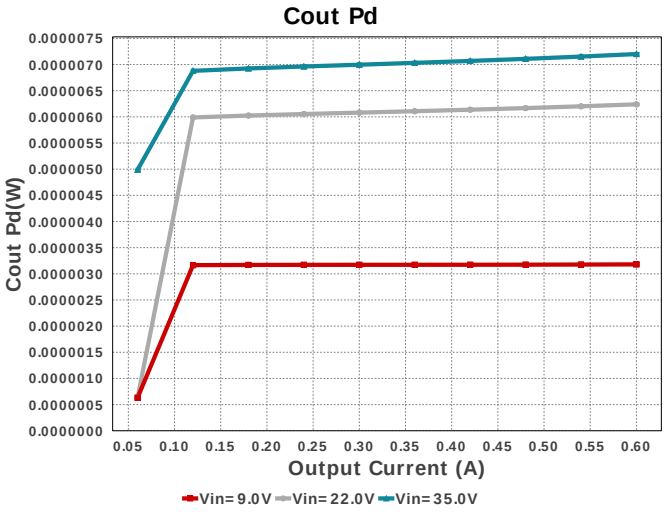
D1 Tj

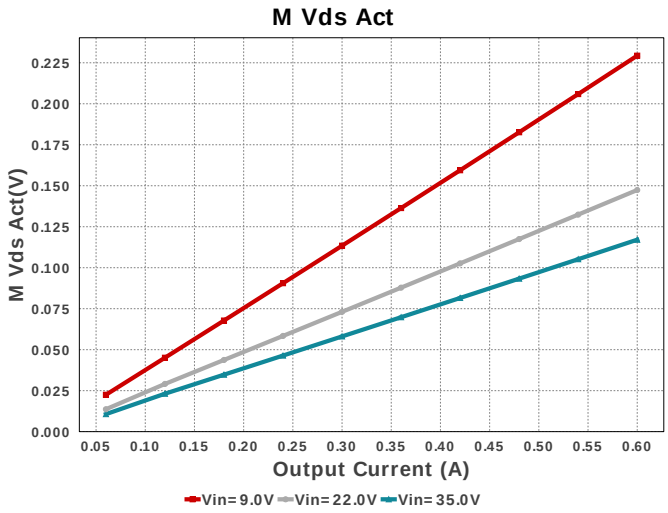


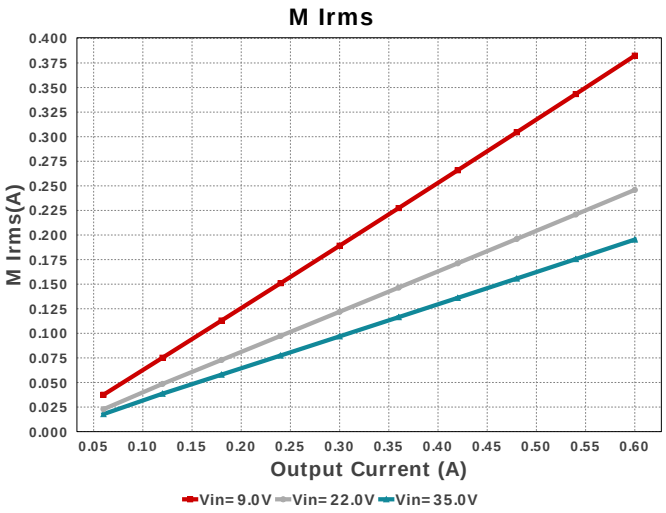


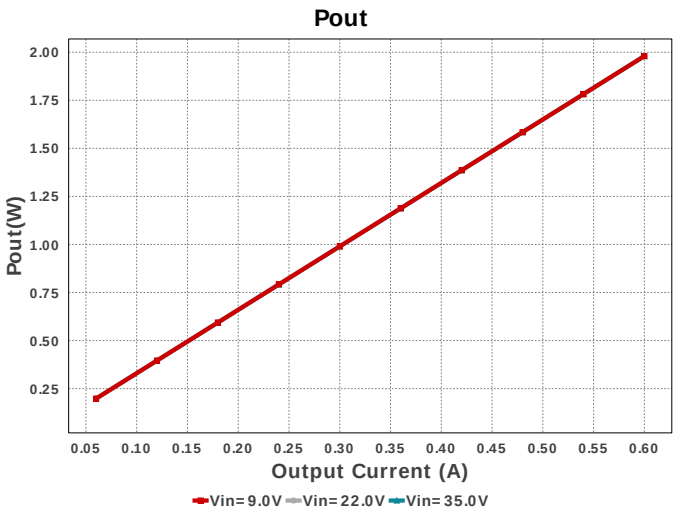


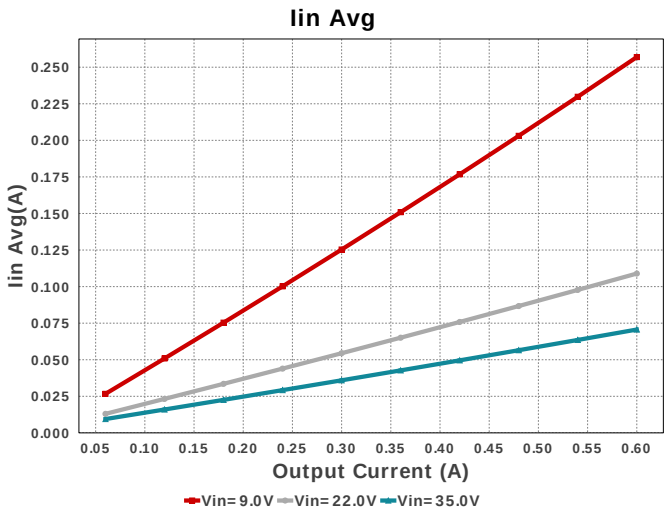


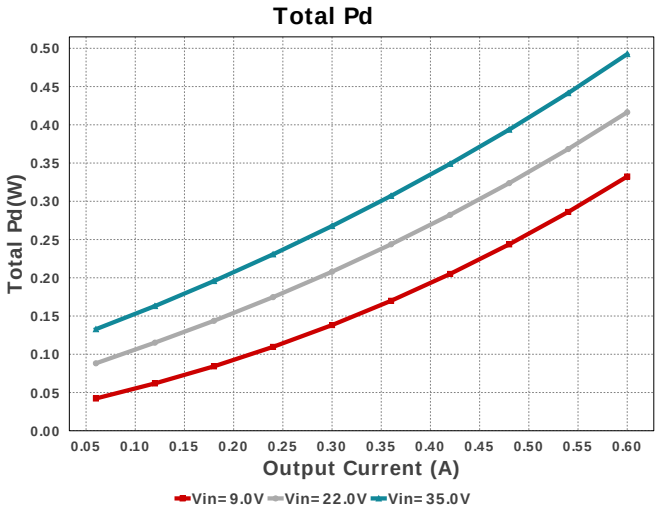


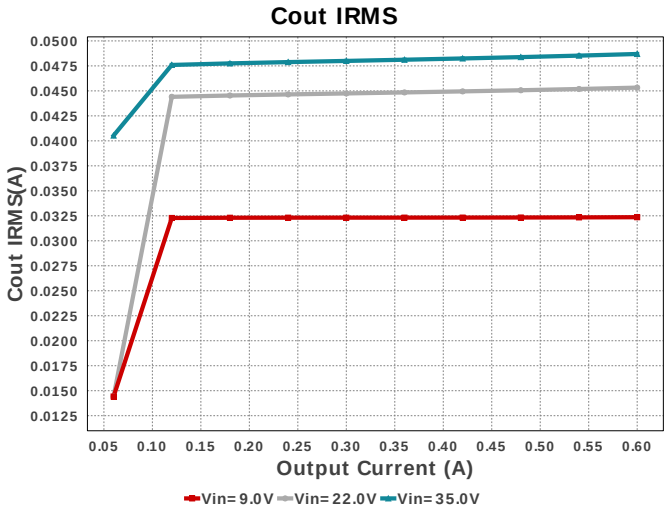


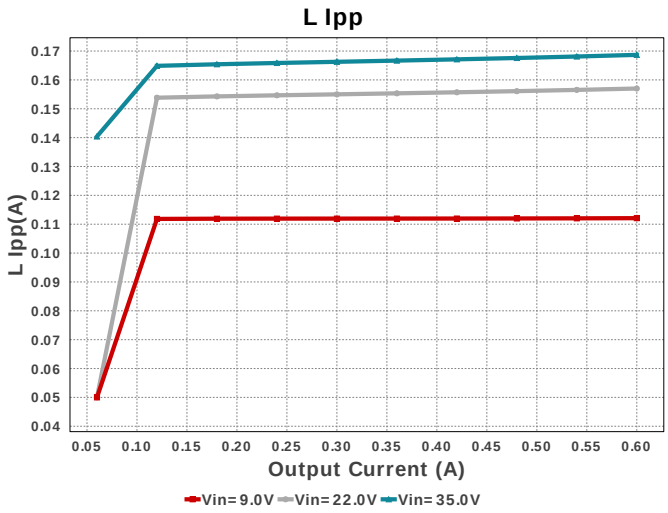


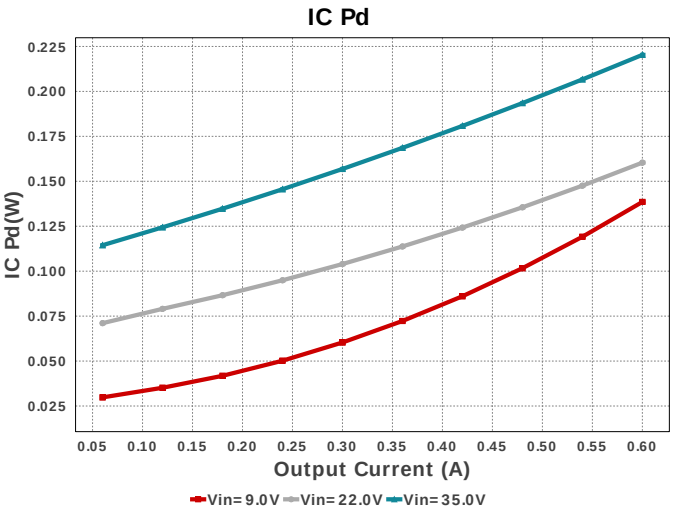


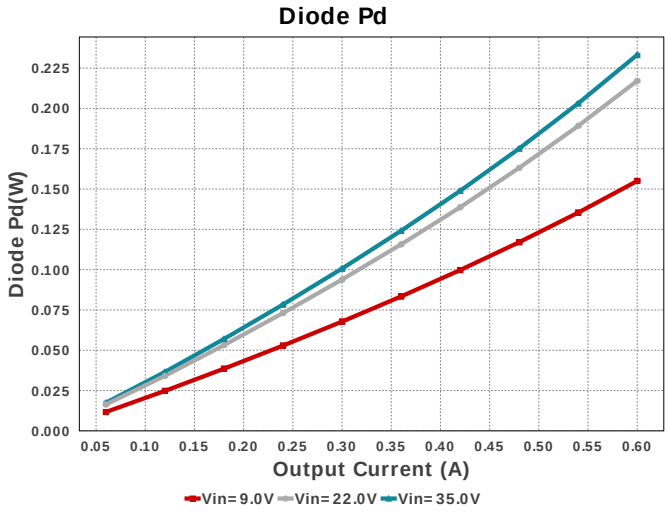


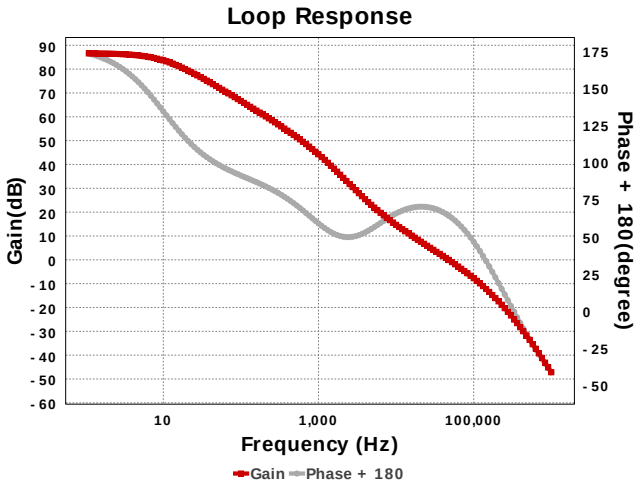


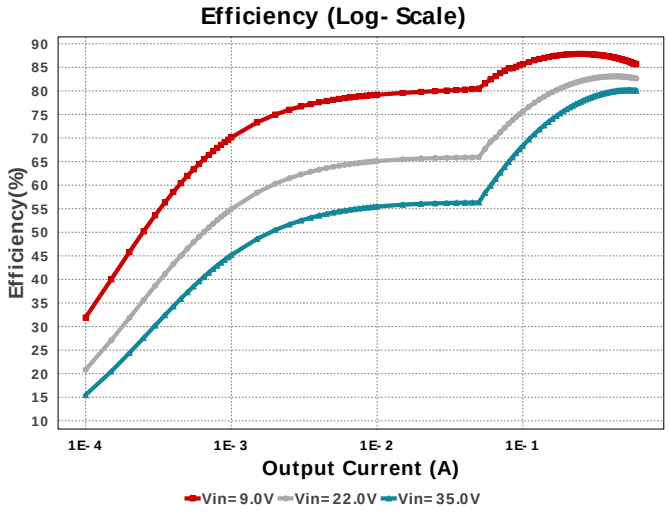












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	8		Total Design BOM count
2.	Total BOM	$2.632		Total BOM Cost
3.	Cin IRMS	184.534 mA	Capacitor	Input capacitor RMS ripple current
4.	Cin Pd	79.99 µW	Capacitor	Input capacitor power dissipation
5.	Cout IRMS	48.692 mA	Capacitor	Output capacitor RMS ripple current
6.	Cout Pd	7.2 µW	Capacitor	Output capacitor power dissipation
7.	D1 Tj	106.969 degC	Diode	D1 junction temperature
8.	Diode Pd	233.24 mW	Diode	Diode power dissipation
9.	IC Ipk	0.0 A	IC	Peak switch current in IC
10.	IC Pd	220.32 mW	IC	IC power dissipation
11.	IC Tj	52.472 degC	IC	IC junction temperature
12.	IC Tolerance	18.0 mV	IC	IC Feedback Tolerance
13.	ICThetaJA	102.0 degC/W	IC	IC junction-to-ambient thermal resistance
14.	Iin Avg	70.642 mA	IC	Average input current
15.	L Ipp	168.673 mA	Inductor	Peak-to-peak inductor ripple current
16.	L Pd	38.513 mW	Inductor	Inductor power dissipation
17.	M Irms	195.371 mA	Mosfet	MOSFET RMS ripple current
18.	M Vds Act	117.084 mV	Mosfet	Voltage drop across the MosFET
19.	Cin Pd	79.99 µW	Power	Input capacitor power dissipation
20.	Cout Pd	7.2 µW	Power	Output capacitor power dissipation
21.	Diode Pd	233.24 mW	Power	Diode power dissipation
22.	IC Pd	220.32 mW	Power	IC power dissipation
23.	L Pd	38.513 mW	Power	Inductor power dissipation
24.	Total Pd	492.467 mW	Power	Total Power Dissipation
25.	Cross Freq	47.358 kHz	System Information	Bode plot crossover frequency
26.	Duty Cycle	10.574 %	System Information	Duty cycle
27.	Efficiency	80.082 %	System Information	Steady state efficiency
28.	FootPrint	185.0 mm^2	System Information	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
29.	Frequency	1.1 MHz	System Information	Switching frequency
30.	Iout	600.0 mA	System Information	Iout operating point
31.	Mode	CCM	System Information	Conduction Mode
32.	Phase Marg	64.795 deg	System Information	Bode Plot Phase Margin
33.	Pout	1.98 W	System Information	Total output power
34.	Vin	35.0 V	System Information	Vin operating point
35.	Vout	3.3 V	System Information	Operational Output Voltage
36.	Vout Actual	3.3 V	System Information	Vout Actual calculated based on selected voltage divider resistors
37.	Vout Tolerance	3.941 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
38.	Vout p-p	710.02 µV	System Information	Peak-to-peak output ripple voltage

Design Inputs

#	Name	Value	Description
1.	Iout	600.0 m	Maximum Output Current
2.	VinMax	35.0	Maximum input voltage
3.	VinMin	9.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LMR14006X	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LMR14006X** Product Folder : http://www.ti.com/product/LMR14006 : contains the data sheet and other resources.