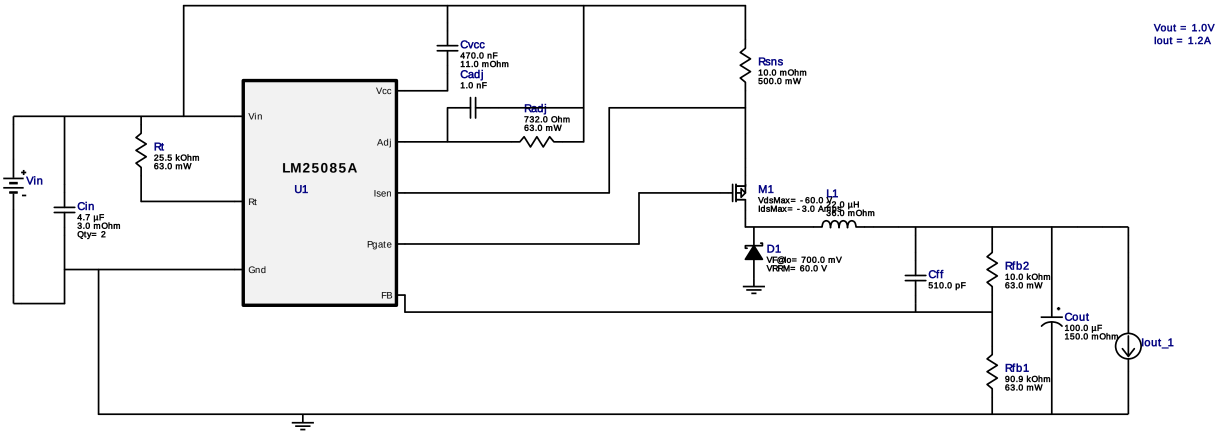
VinMin = 5.0V
VinMax = 30.0V
Vout = 1.0V
Iout = 1.2A

Device = LM25085AMY/NOPB
Topology = Buck
Created = 9/23/16 4:59:58 AM
BOM Cost = $2.35
BOM Count = 15
Total Pd = 0.8W

WEBENCH ® Design Report

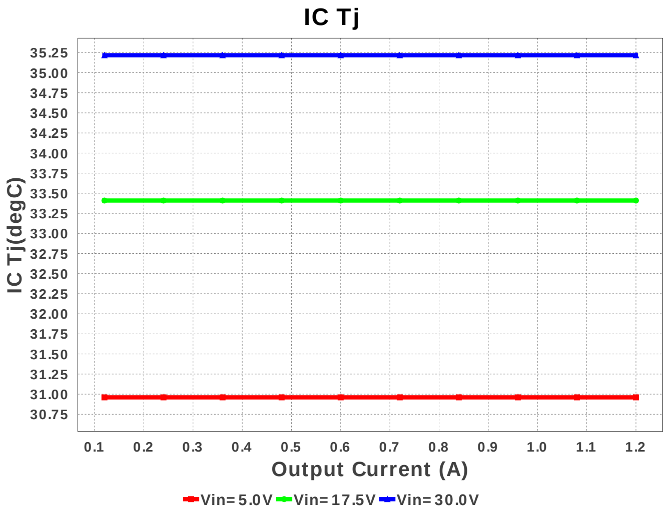
Design : 4790845/29 LM25085AMY/NOPB
LM25085AMY/NOPB 5.0V-30.0V to 1.00V @ 1.2A

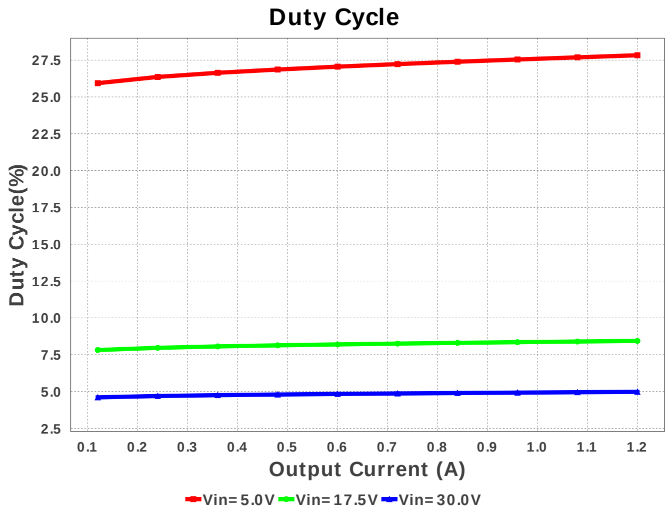


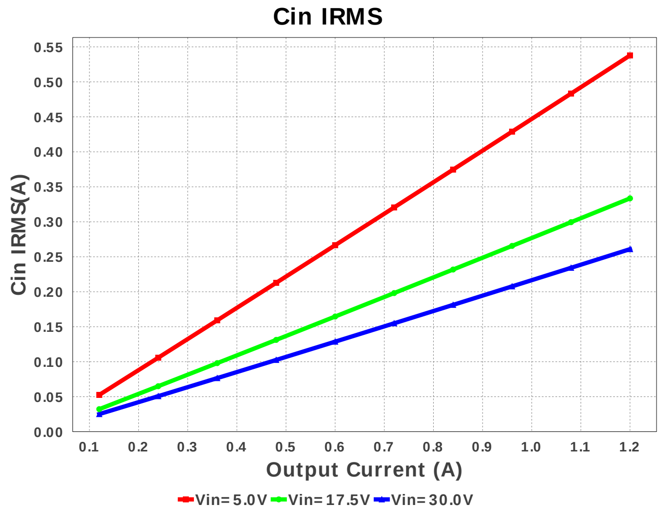
Electrical BOM

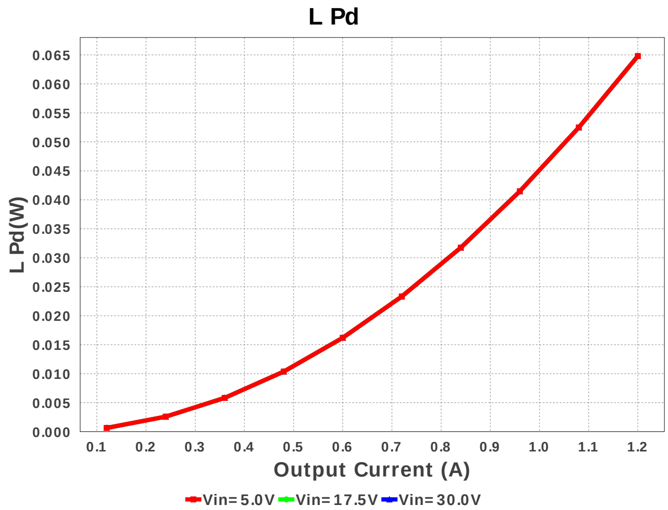
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
2.	Cff	MuRata	GRM1555C1E511JA01D Series= C0G/NP0	Cap= 510.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm^2
3.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	2	$0.07	1206 11 mm^2
4.	Cout	Panasonic	ETPH100MHA Series= ?	Cap= 100.0 uF ESR= 150.0 mOhm VDC= 2.5 V IRMS= 510.0 mA	1	$0.34	CAPSMT_6_A09 11 mm^2
5.	Cvcc	AVX	0805YC474KAT2A Series= X7R	Cap= 470.0 nF ESR= 11.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm^2
6.	D1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.09	SMA 37 mm^2
7.	L1	Sumida	CDRH125NP-220MC	L= 22.0 µH DCR= 36.0 mOhm	1	$0.61	CDRH125 204 mm^2
8.	M1	Fairchild Semiconductor	FDC5614P	VdsMax= -60.0 V IdsMax= -3.0 Amps	1	$0.23	SOT-23-6 15 mm^2
9.	Radj	Vishay-Dale	CRCW0402732RFKED Series= CRCW..e3	Res= 732.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
10.	Rfb1	Vishay-Dale	CRCW040290K9FKED Series= CRCW..e3	Res= 90.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfb2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	Rsns	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.11	1206 11 mm²
13.	Rt	Vishay-Dale	CRCW040225K5FKED Series= CRCW..e3	Res= 25.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
14.	U1	Texas Instruments	LM25085AMY/NOPB	Switcher	1	$0.75	MUY08A 24 mm²

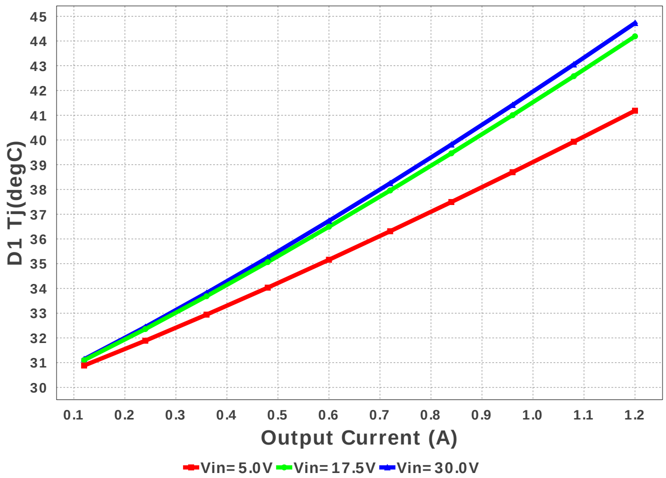




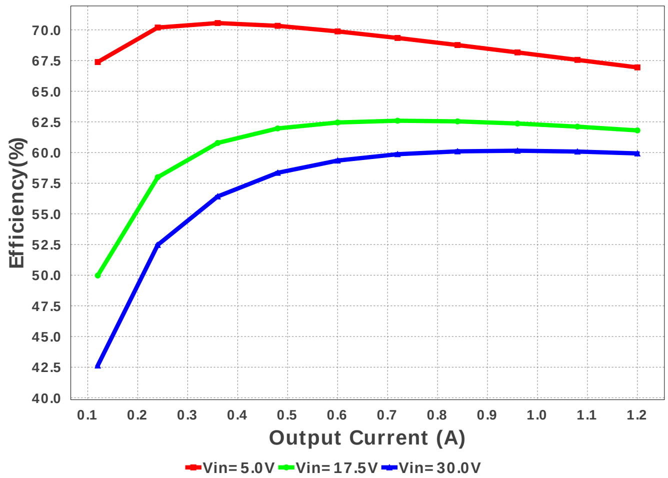




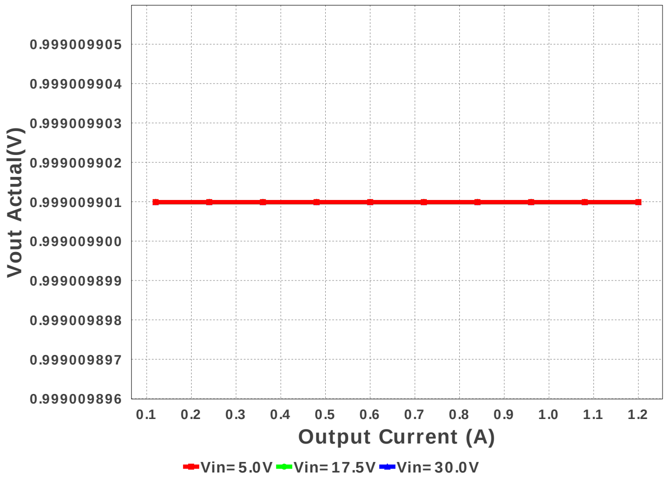
D1 Tj



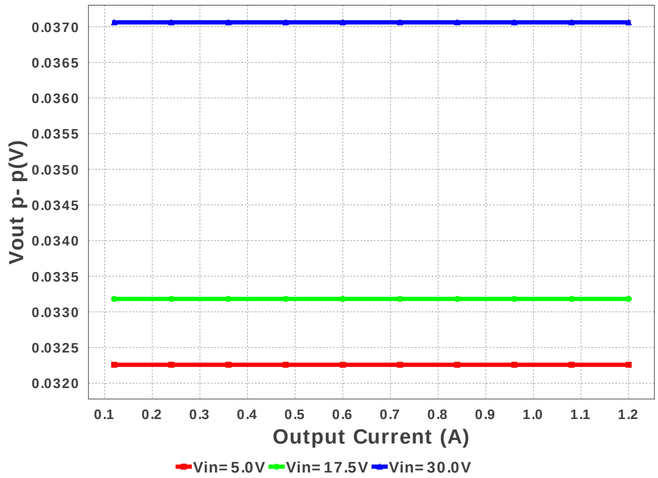
Efficiency



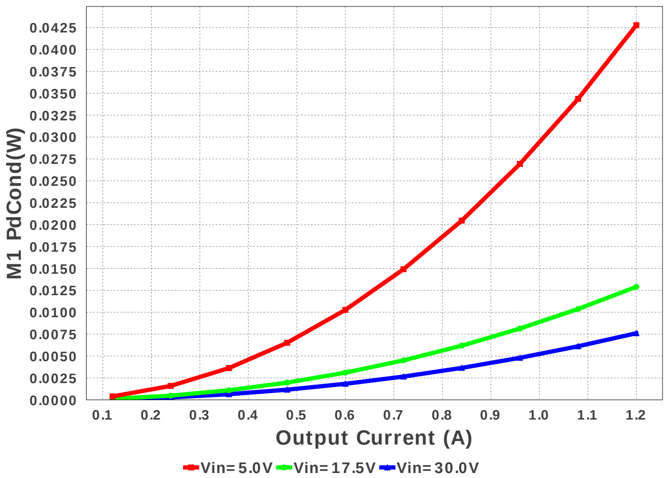
Vout Actual



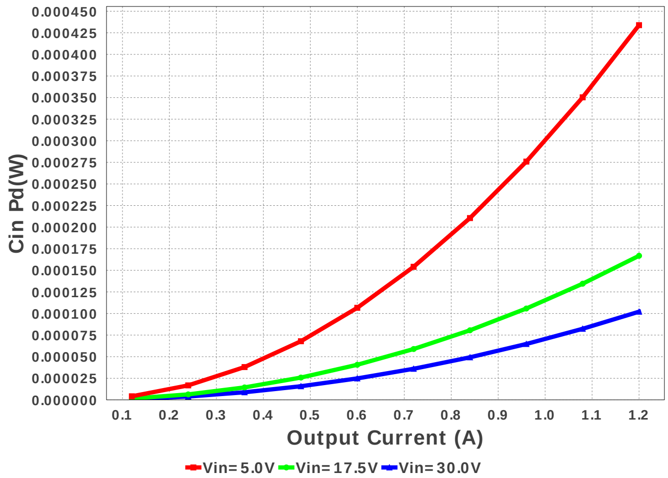
Vout p-p



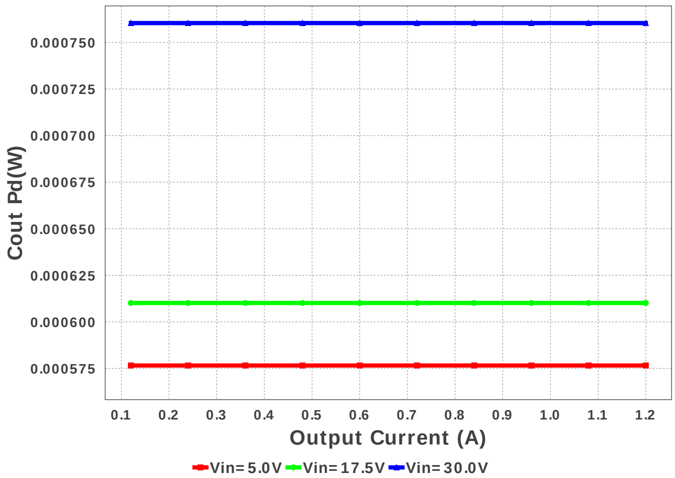
M1 PdCond



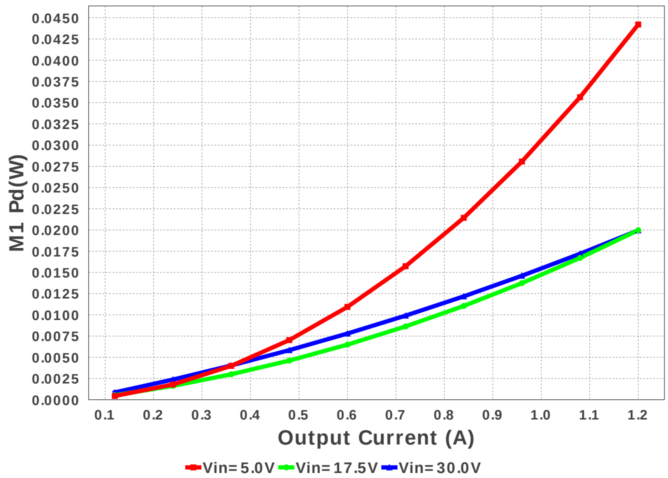
Cin Pd



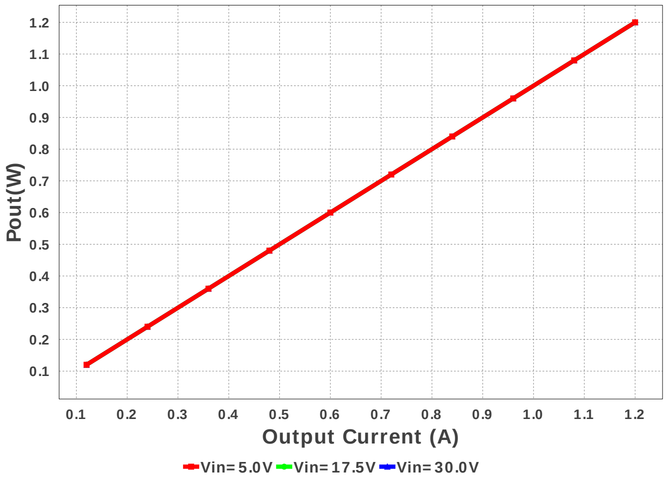
Cout Pd



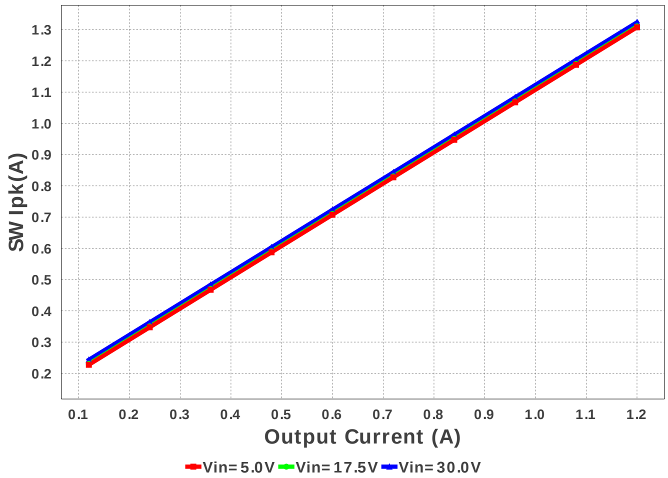
M1 Pd



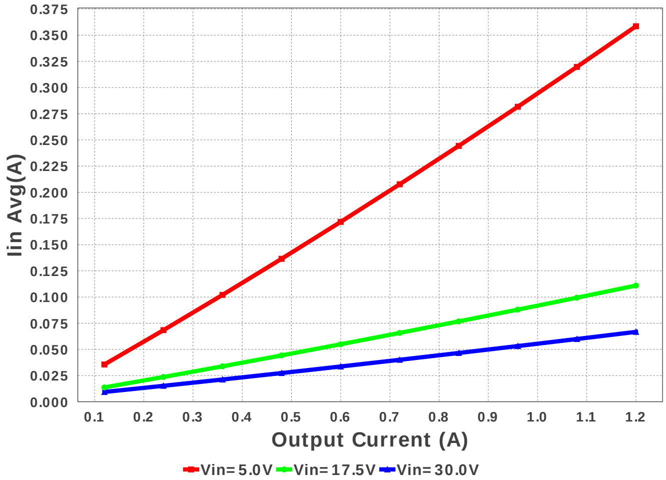
Pout



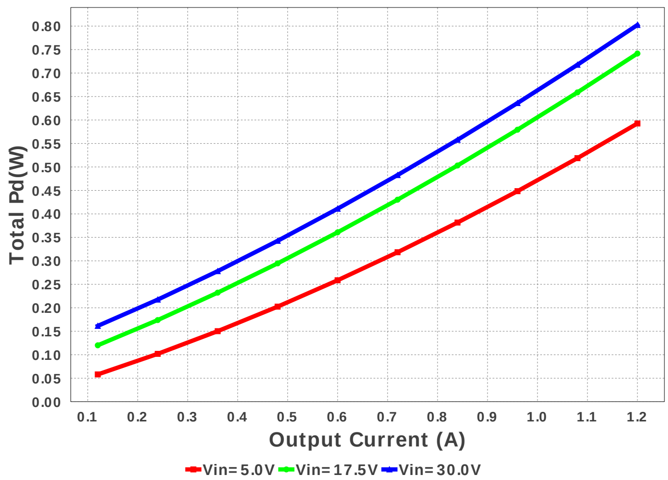
SW Ipk

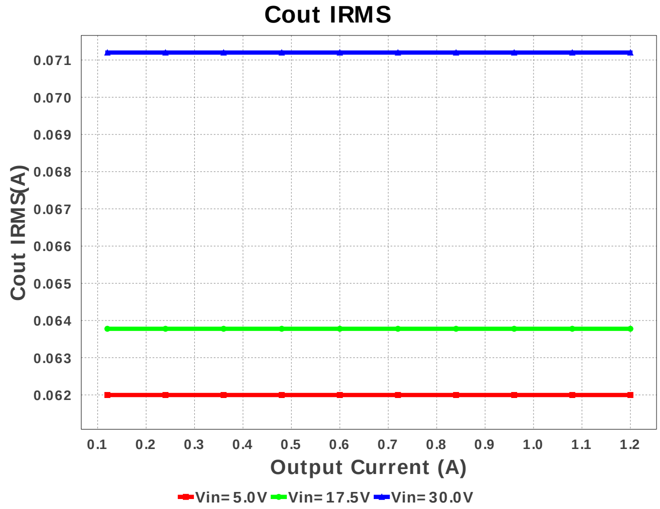


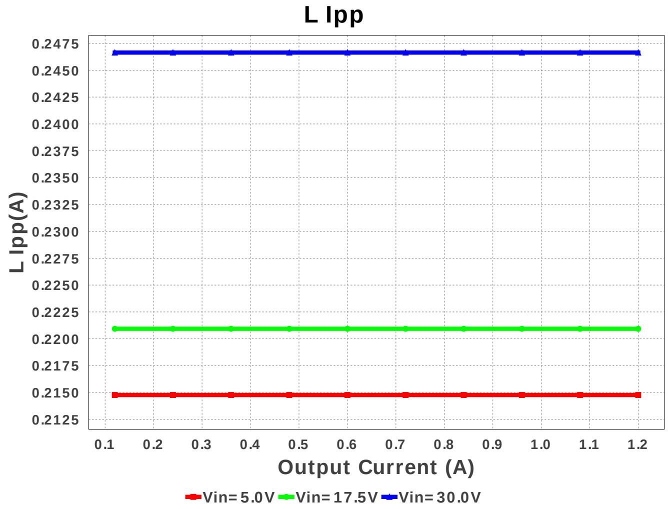
Iin Avg

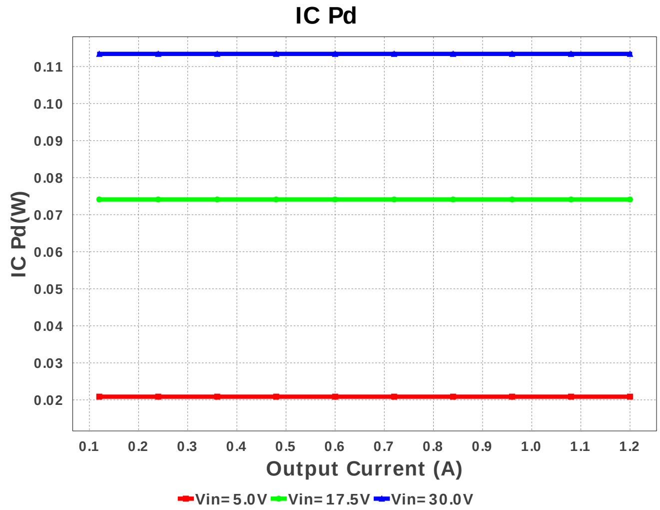


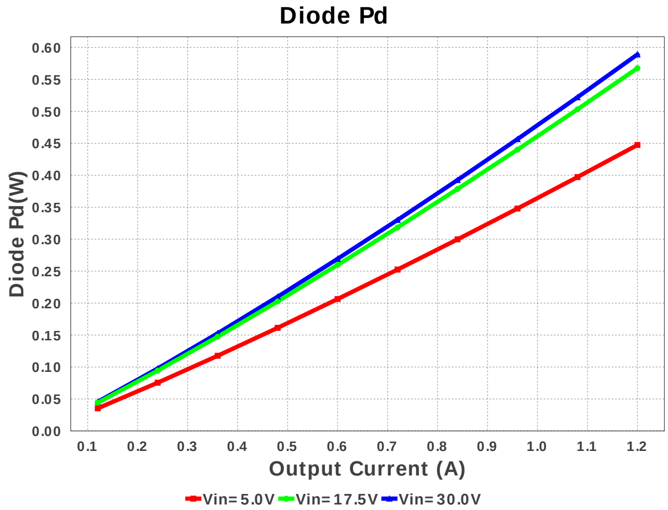
Total Pd

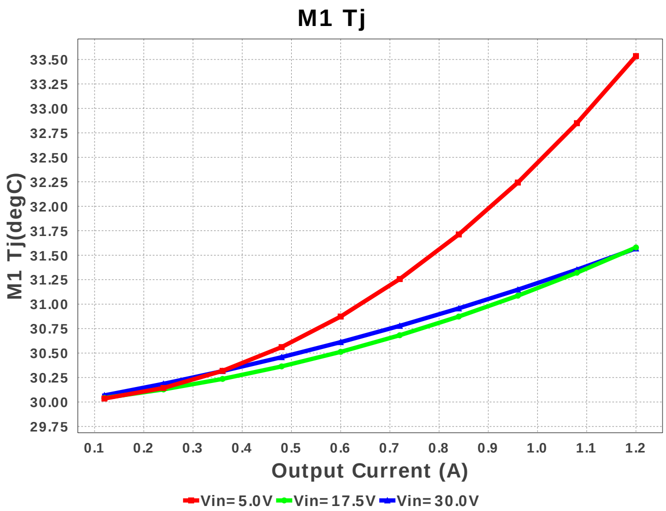


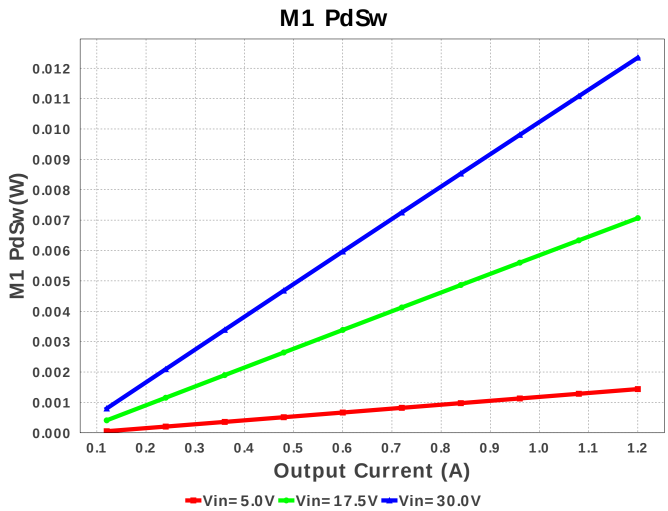












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	260.892 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	71.2 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	66.748 mA	Current	Average input current
4.	L Ipp	246.64 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	1.323 A	Current	Peak switch current
6.	BOM Count	15	General	Total Design BOM count
7.	FootPrint	352.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	140.582 kHz	General	Switching frequency
9.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
10.	Mode	CCM	General	Conduction Mode
11.	Pout	1.2 W	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	$2.35	General	Total BOM Cost
13.	D1 Tj	44.725 degC	Op_Point	D1 junction temperature
14.	Vout Actual	999.01 mV	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	1.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	4.974 %	Op_point	Duty cycle
17.	Efficiency	59.927 %	Op_point	Steady state efficiency
18.	IC Tj	35.217 degC	Op_point	IC junction temperature
19.	ICThetaJA	46.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	1.2 A	Op_point	Iout operating point
21.	M1 Tj	31.569 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	30.0 V	Op_point	Vin operating point
23.	Vout p-p	37.062 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	102.097 µW	Power	Input capacitor power dissipation
25.	Cout Pd	760.418 µW	Power	Output capacitor power dissipation
26.	Diode Pd	588.997 mW	Power	Diode power dissipation
27.	IC Pd	113.414 mW	Power	IC power dissipation
28.	L Pd	64.8 mW	Power	Inductor power dissipation
29.	M1 Pd	19.956 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	7.608 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	12.348 mW	Power	M1 MOSFET switching losses
32.	Total Pd	802.438 mW	Power	Total Power Dissipation
33.	Vout Tolerance	2.204 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.2	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	1.0	Output Voltage
5.	base_pn	LM25085A	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. For a Constant On Time device to be stable, we need to provide a ripple at the feedback comparator. There are various methods to implement the ripple. Depending on the circuit complexity vs. the allowable ripple, we have three options to choose from. The simplest option, 'Low Complexity', would require only a high ESR cap at the output. This means that the BOM count will be small, but the output voltage ripple will be quite large. The 'optimal solution' would require a feed-forward cap in parallel with the upper feedback resistor to AC couple the ripple to the feedback node. This increases the BOM count slightly, but now we have more control over the output voltage ripple. If the output voltage requirement is very tight, then the best option is to go for the 'Low Output Ripple' solution. In this option we can go with very low ESR output caps and have very good control over the output voltage ripple

2. LM25085A Product Folder : http://www.ti.com/product/LM25085A : contains the data sheet and other resources.