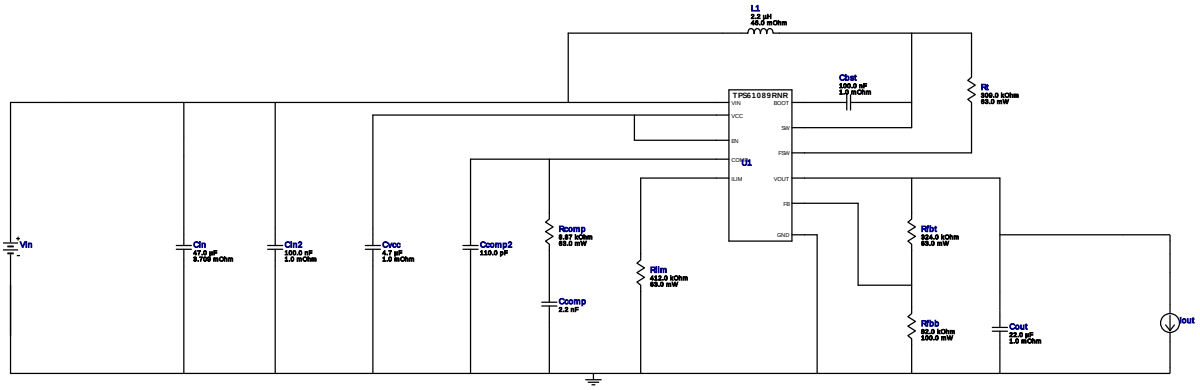
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 4.2V
Vout = 6.0V
Iout = 0.42A

Device = TPS61089RNRR
Topology = Boost
Created = 2021-07-26 17:52:41.195
BOM Cost = $2.37
BOM Count = 14
Total Pd = 0.12W

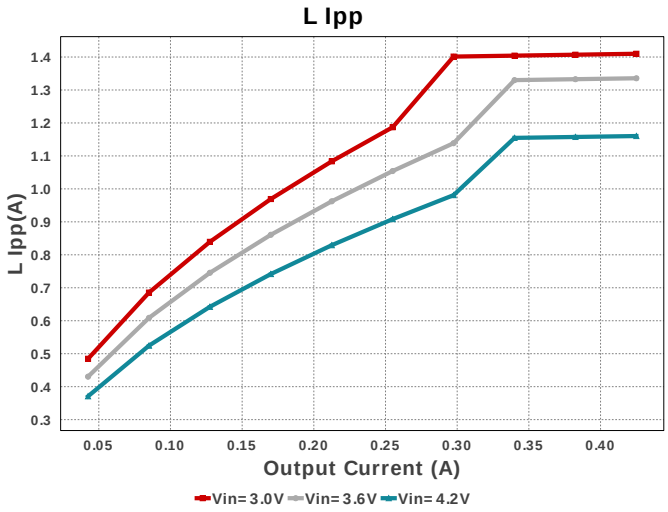
TPS61089RNRR 3V-4.2V to 6.00V @ 0.425A

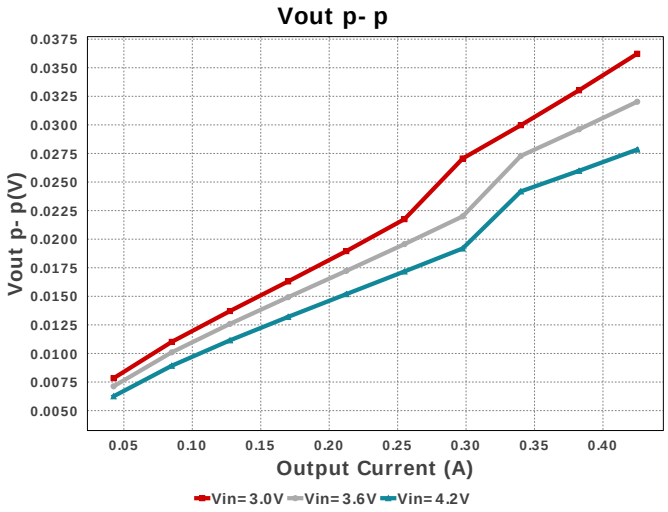


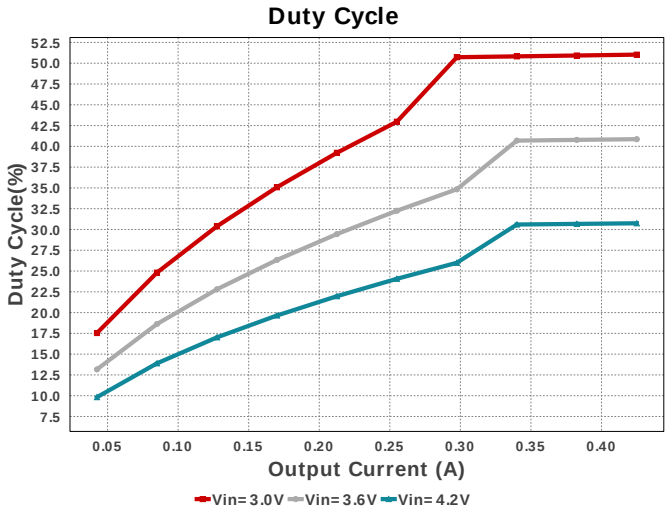
Electrical BOM

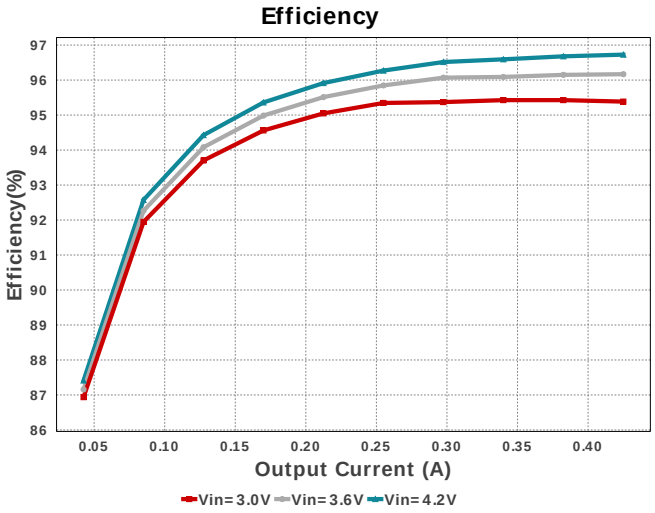
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	MuRata	GRM155R71A104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	Samsung Electro-Mechanics	CL21C222JBFNNNE Series= C0G/NP0	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
3.	Ccomp2	MuRata	GRM1555C1H111GA01D Series= C0G/NP0	Cap= 110.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm²
4.	Cin	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	1	$0.26	1206_190 11 mm²
5.	Cin2	MuRata	GRM155R71C104KA88D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
6.	Cout	Taiyo Yuden	TMK325B7226KMHP Series= X7R	Cap= 22.0 uF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.34	1210_270 15 mm²
7.	Cvcc	MuRata	GRM155R61A475MEAAD Series= X5R	Cap= 4.7 uF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.03	0402_065 3 mm²
8.	L1	Vishay-Dale	IHLP1212BZER2R2M11	L= 2.2 µH DCR= 46.0 mOhm	1	$0.56	IHLP-1212BZ 19 mm²
9.	Rcomp	Vishay-Dale	CRCW04028K87FKED Series= CRCW..e3	Res= 8870.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbb	Yageo	RC0603FR-0782KL Series= ?	Res= 82000.0Ohm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
11.	Rfbt	Vishay-Dale	CRCW0402324KFKED Series= CRCW..e3	Res= 324000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

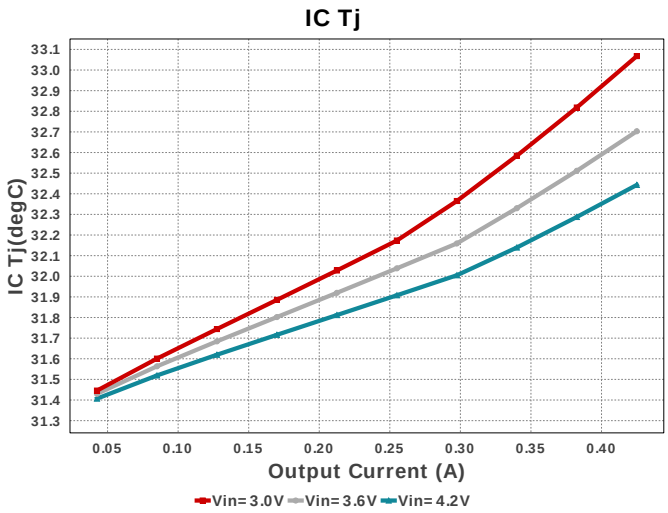
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rlim	Vishay-Dale	CRCW0402412KFKED Series= CRCW..e3	Res= 412000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	Rt	Vishay-Dale	CRCW0402309KFKED Series= CRCW..e3	Res= 309000.0Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	U1	Texas Instruments	TPS61089RNRR	Switcher	1	$1.06	RNR0011A 10 mm^2

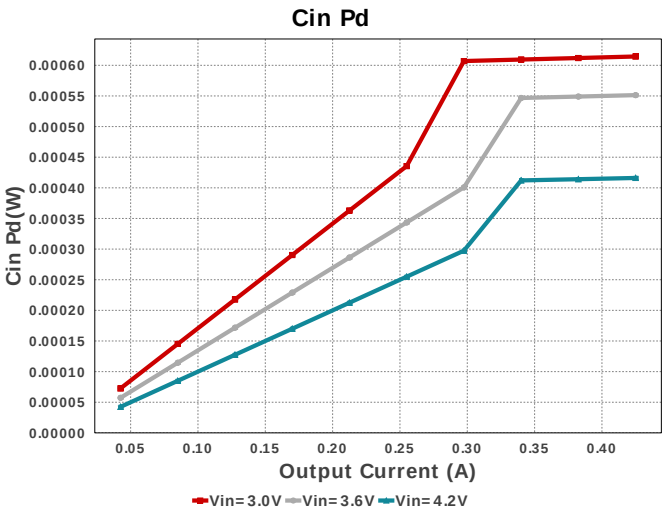


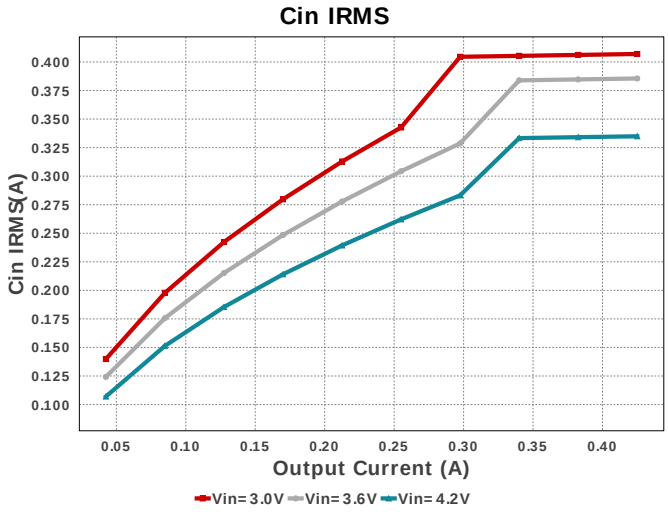


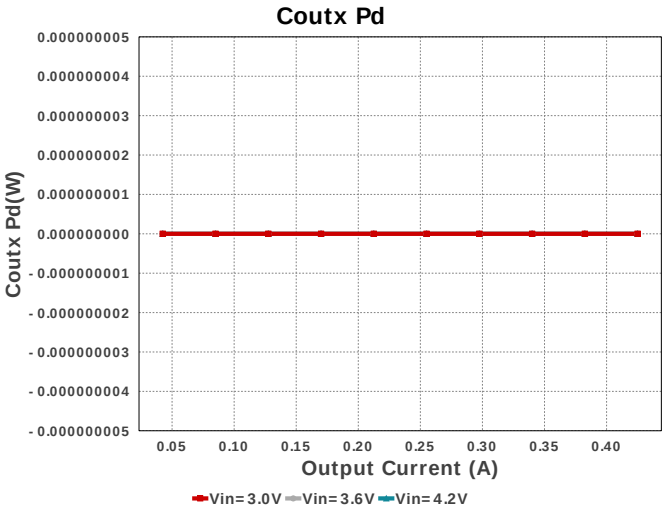


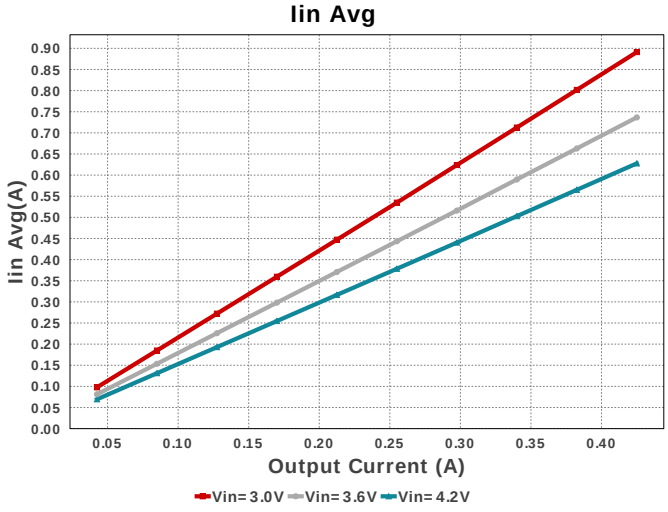


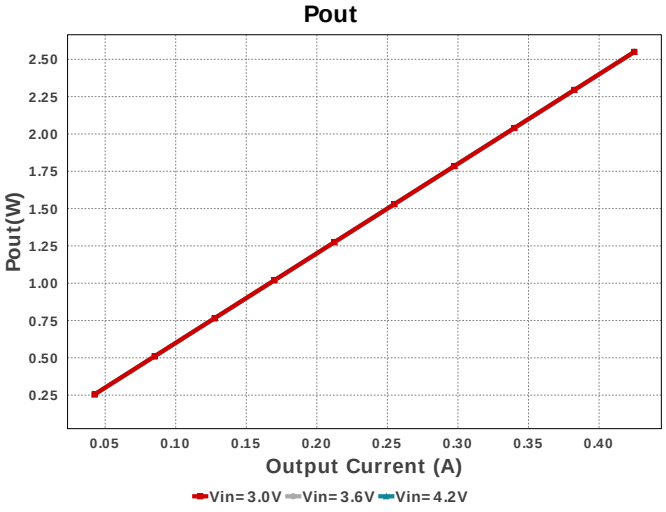


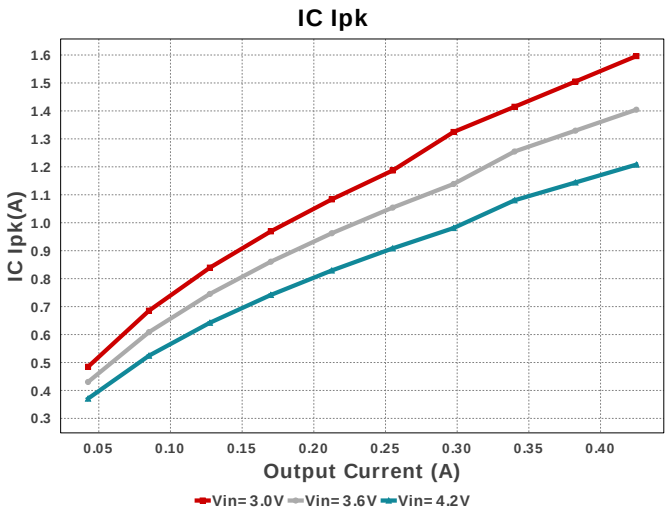


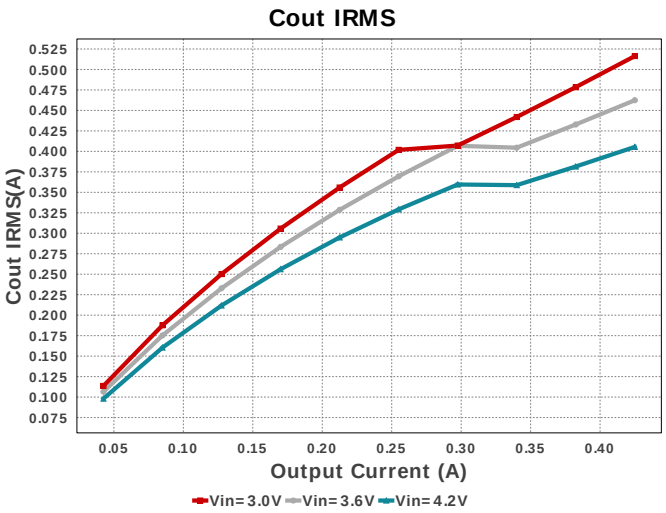


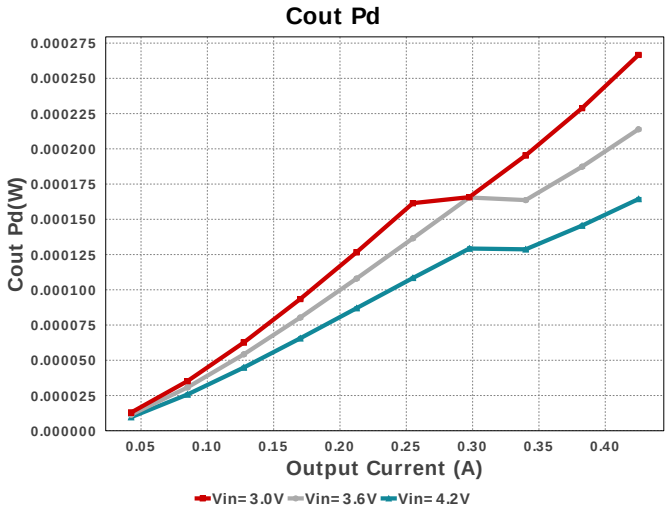


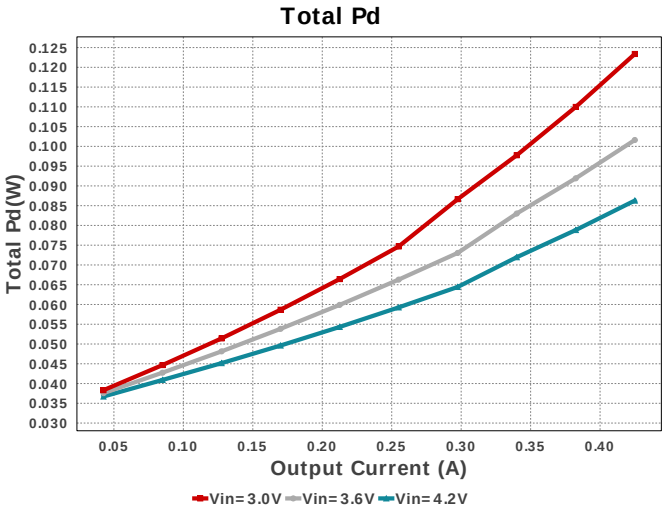


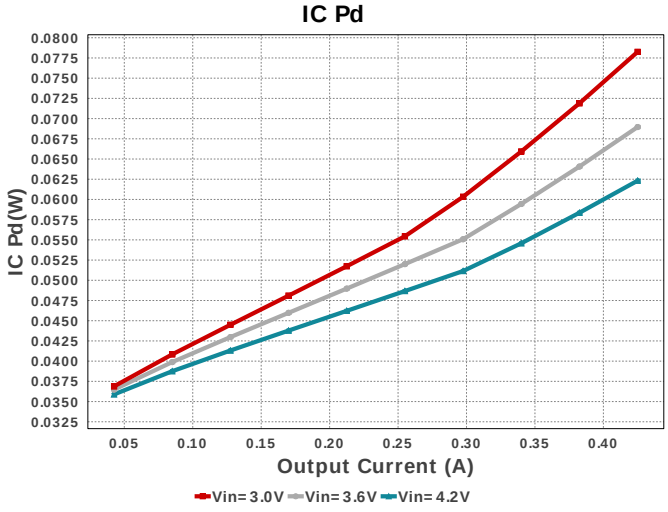


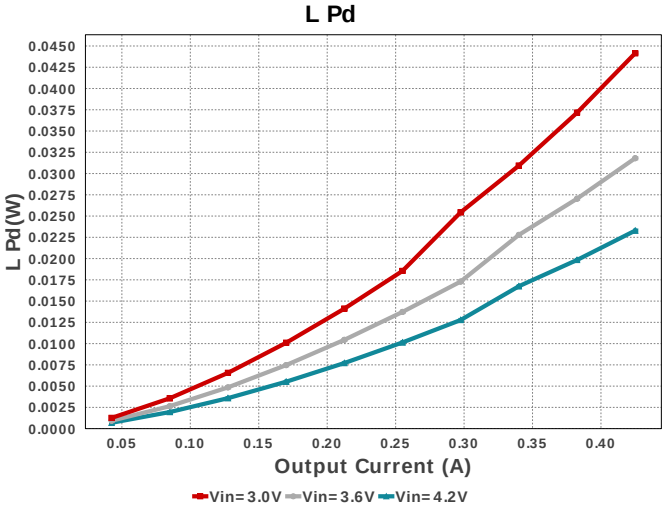


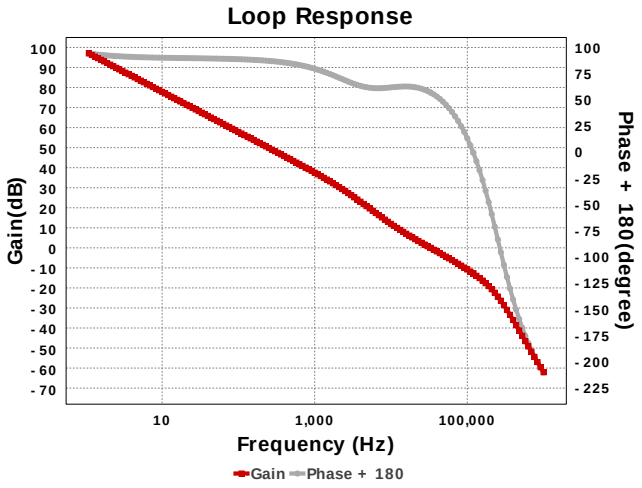


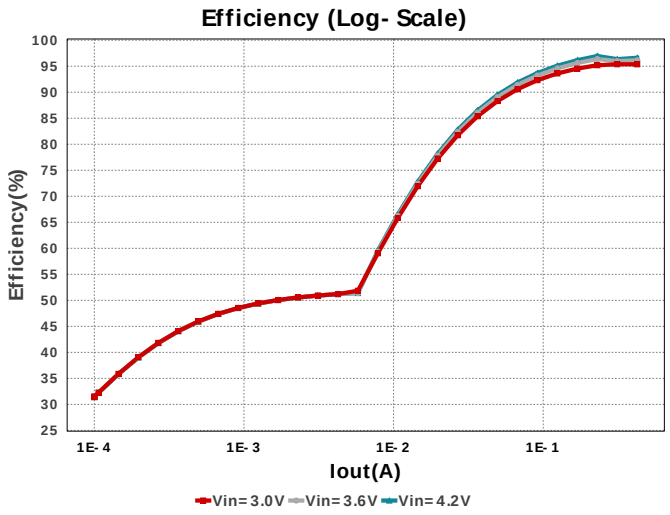












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	407.002 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	614.4 µW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	516.325 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	266.59 µW	Capacitor	Output capacitor power dissipation
5.	Coutx Pd	0.0 W	Capacitor	Output capacitor_x power loss
6.	IC Ipk	1.596 A	IC	Peak switch current in IC
7.	IC Pd	78.254 mW	IC	IC power dissipation
8.	IC Tj	33.068 degC	IC	IC junction temperature
9.	ICThetaJA Effective	39.2 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
10.	Iin Avg	891.12 mA	IC	Average input current
11.	L Ipp	1.41 A	Inductor	Peak-to-peak inductor ripple current
12.	L Pd	44.15 mW	Inductor	Inductor power dissipation
13.	Cin Pd	614.4 µW	Power	Input capacitor power dissipation
14.	Cout Pd	266.59 µW	Power	Output capacitor power dissipation
15.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
16.	IC Pd	78.254 mW	Power	IC power dissipation
17.	L Pd	44.15 mW	Power	Inductor power dissipation
18.	Total Pd	123.376 mW	Power	Total Power Dissipation
19.	BOM Count	14	System Information	Total Design BOM count
20.	Cross Freq	32.697 kHz	System Information	Bode plot crossover frequency
21.	Duty Cycle	51.033 %	System Information	Duty cycle
22.	Efficiency	95.385 %	System Information	Steady state efficiency
23.	FootPrint	91.0 mm^2	System Information	Total Foot Print Area of BOM components
24.	Frequency	493.583 kHz	System Information	Switching frequency
25.	Gain Marg	-12.665 dB	System Information	Bode Plot Gain Margin
26.	Iout	425.0 mA	System Information	Iout operating point
27.	Low Freq Gain	98.44 dB	System Information	Gain at 1Hz
28.	Mode	BOOST CCM	System Information	PWM/PFM Mode
29.	Phase Marg	56.139 deg	System Information	Bode Plot Phase Margin
30.	Pout	2.55 W	System Information	Total output power
31.	Total BOM	$2.37	System Information	Total BOM Cost
32.	Vin	3.0 V	System Information	Vin operating point
33.	Vout Actual	6.001 V	System Information	Vout Actual calculated based on selected voltage divider resistors
34.	Vout Tolerance	4.253 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
35.	Vout p-p	36.223 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

#	Name	Value	Description
1.	Iout	425.0 m	Maximum Output Current
2.	VinMax	4.2	Maximum input voltage
3.	VinMin	3.0	Minimum input voltage
4.	VinTyp	3.7	Typical input voltage
5.	Vout	6.0	Output Voltage
6.	acFrequency	60.0	AC Frequency
7.	base_pn	TPS61089	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS61089** Product Folder : http://www.ti.com/product/TPS61089 : contains the data sheet and other resources.