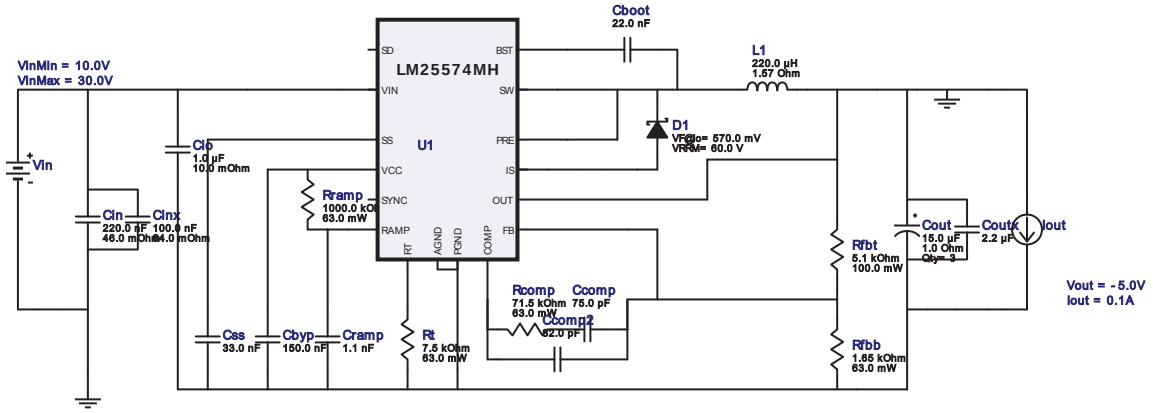
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 30.0V
Vout = -5.0V
Iout = 0.1A

Device = LM25574MT/NOPB
Topology = Inverting_Buck_Boost
Created = 10/2/13 3:16:47 PM
BOM Cost = $2.53
Total Pd = 0.47W
Footprint = 315.0mm2
BOM Count = 21

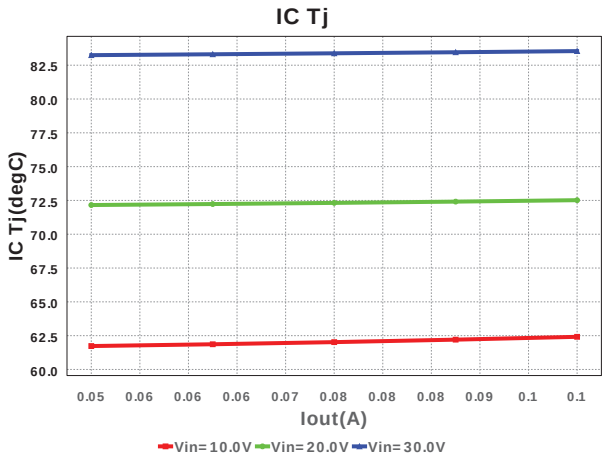
Design : 456819/30 LM25574MT/NOPB
Marine -5

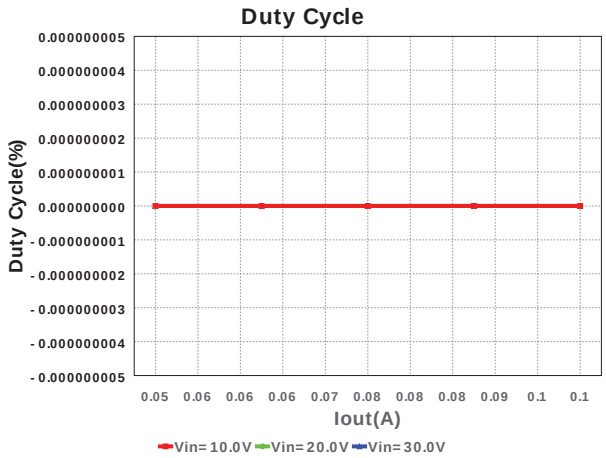


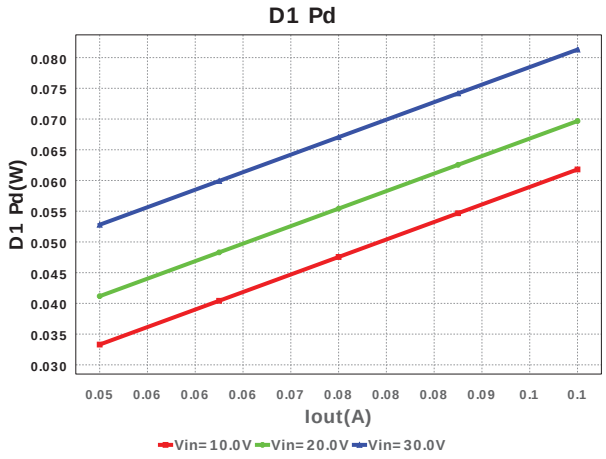
Electrical BOM

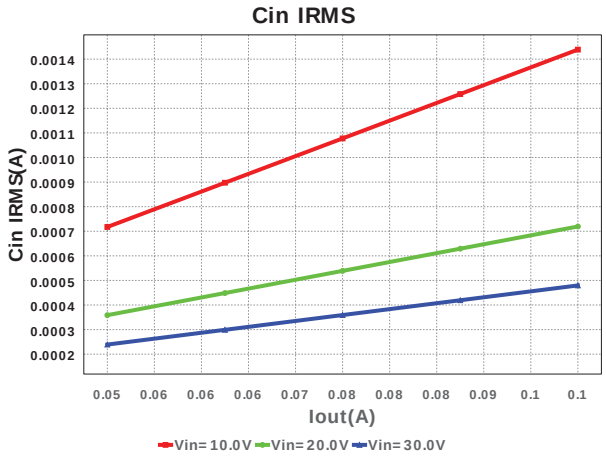
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R71H223KA12D Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
2.	Cbyp	MuRata	GRM155R61A154KE19D Series= X5R	Cap= 150.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
3.	Ccomp	MuRata	GRM1885C1H750JA01D Series= C0G/NP0	Cap= 75.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
4.	Ccomp2	Yageo America	CC0805JRNP09BN820 Series= C0G/NP0	Cap= 82.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
5.	Cin	Kemet	C0805C224K5RACTU Series= X7R	Cap= 220.0 nF ESR= 46.0 mOhm VDC= 50.0 V IRMS= 2.65 A	1	$0.02	0805 7mm2
6.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7mm2
7.	Cio	TDK	C3216X7R1H105K Series= X7R	Cap= 1.0 µF ESR= 10.0 mOhm VDC= 50.0 V IRMS= 3.2 A	1	$0.04	1206 11mm2
8.	Cout	AVX	TPSA156K010R1000 Series= TPS	Cap= 15.0 µF ESR= 1.0 Ohm VDC= 10.0 V IRMS= 246.0 mA	3	$0.23	3216-18 11mm2
9.	Coutx	MuRata	GRM188R61A225KE34D Series= X5R	Cap= 2.2 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0603 5mm2
10.	Cramp	MuRata	GRM1885C1H112JA01D Series= C0G/NP0	Cap= 1.1 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0603 5mm2
11.	Css	MuRata	GRM033R60J333KE01D Series= X5R	Cap= 33.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2mm2

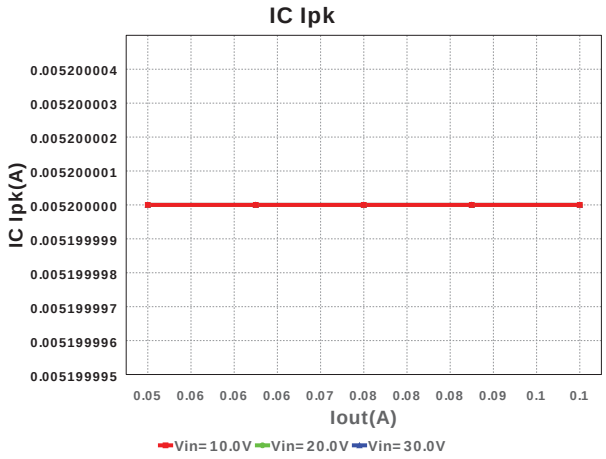
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.11	 SOD-123F 12mm2
13.	L1	Bourns	SDR0604-221KL	L= 220.0 µH DCR= 1.57 Ohm	1	$0.17	 SDR0604 61mm2
14.	Rcomp	Vishay-Dale	CRCW040271K5FKED Series= CRCW..e3	Res= 71.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
15.	Rfbb	Vishay-Dale	CRCW04021K65FKED Series= CRCW..e3	Res= 1.65 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
16.	Rfbt	Susumu Co Ltd	RR1220P-512-D Series= 264	Res= 5.1 kOhm Power= 100.0 mW Tolerance= 0.5%	1	$0.01	 0805 7mm2
17.	Rramp	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
18.	Rt	Vishay-Dale	CRCW04027K50FKED Series= CRCW..e3	Res= 7.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3mm2
19.	U1	Texas Instruments	LM25574MT/NOPB	Switcher	1	$1.35	 MTC16 59mm2

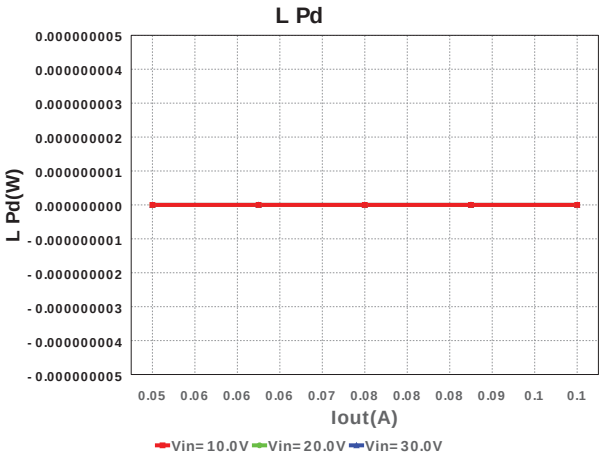


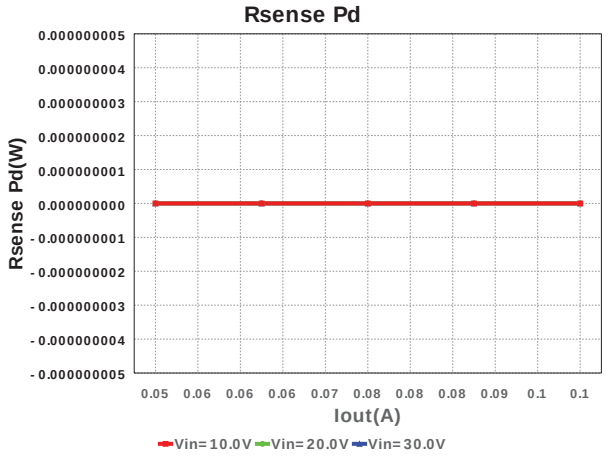


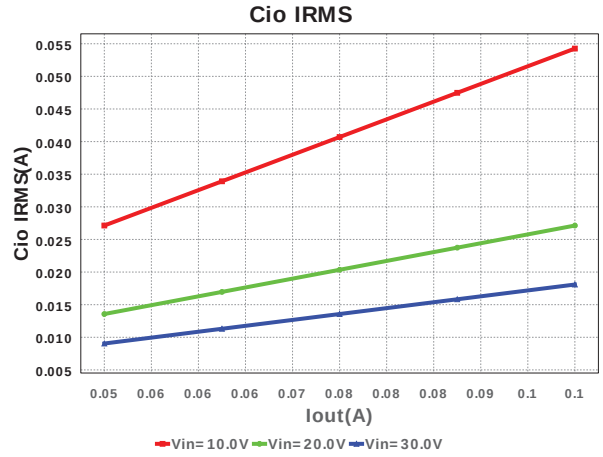


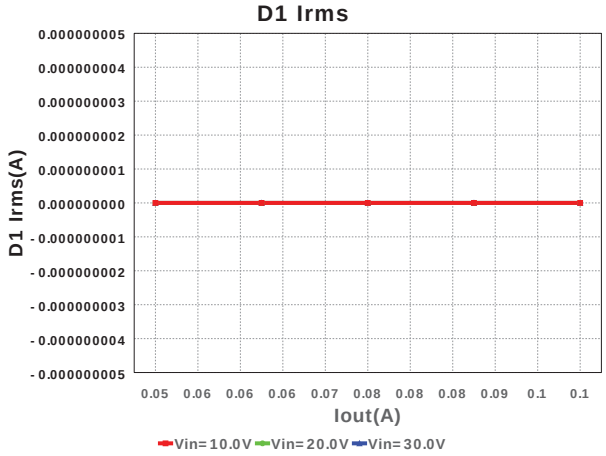


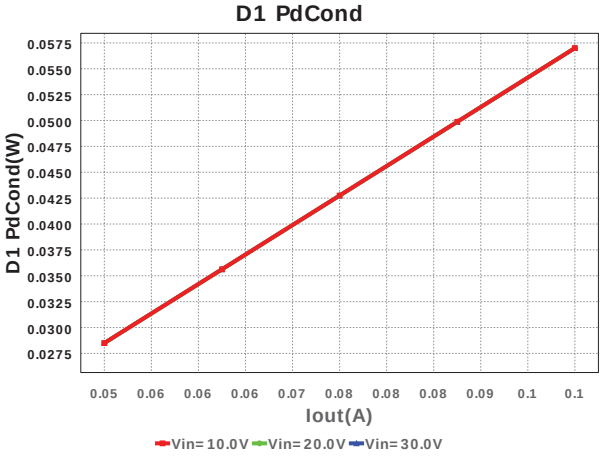


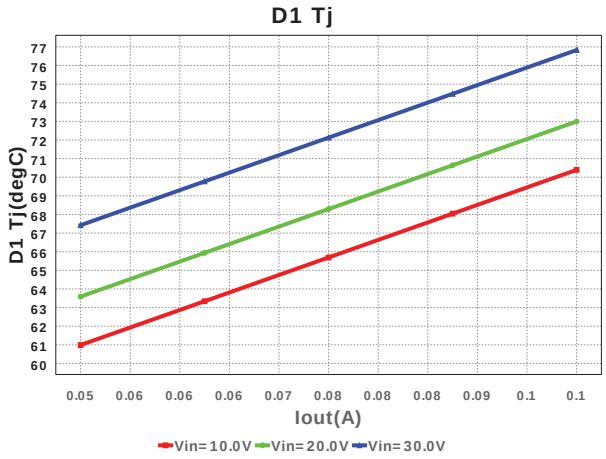


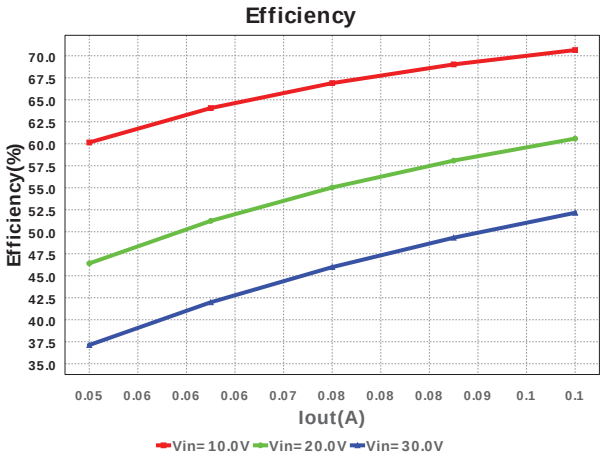


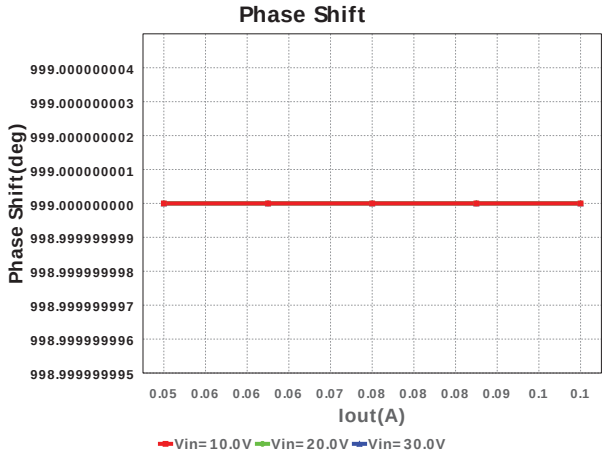


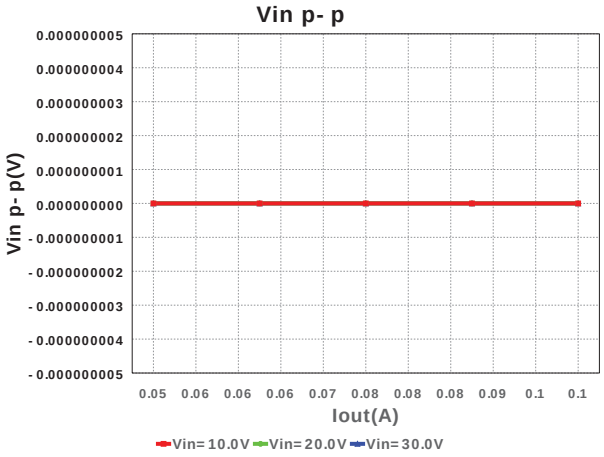


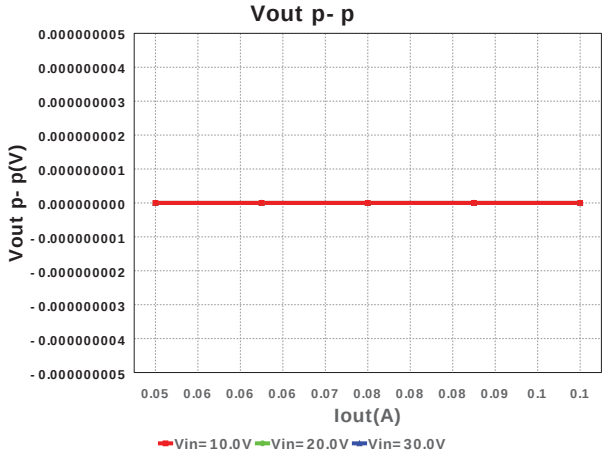


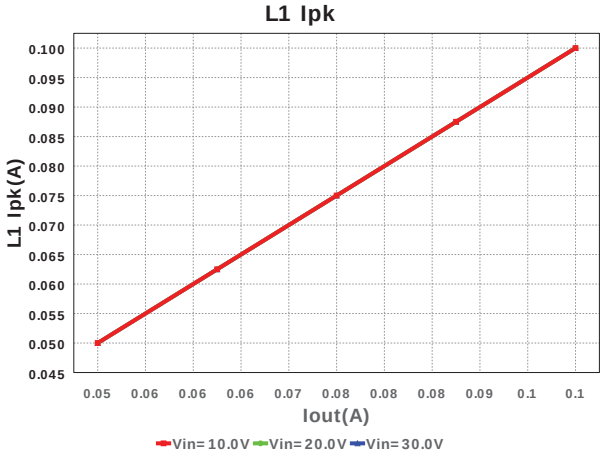


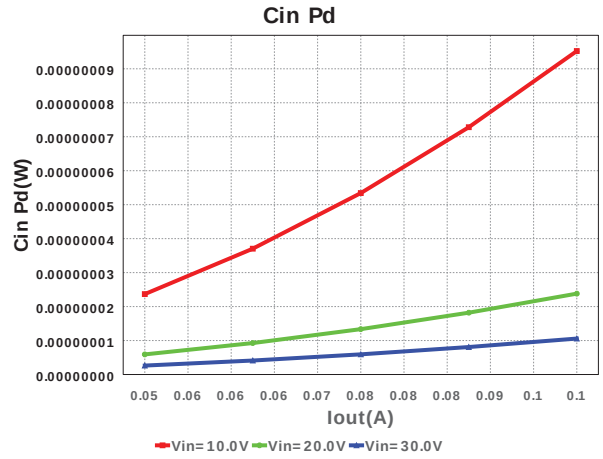


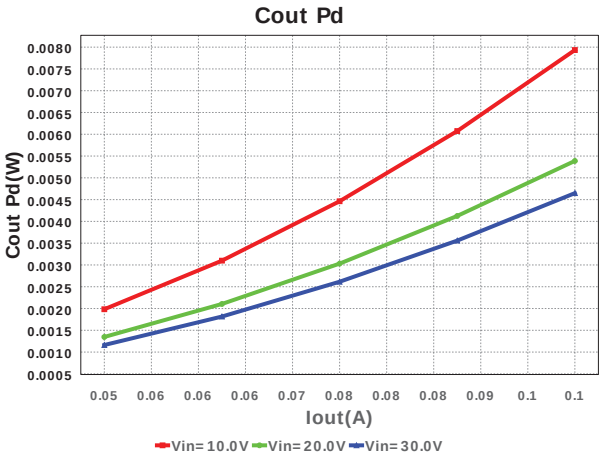


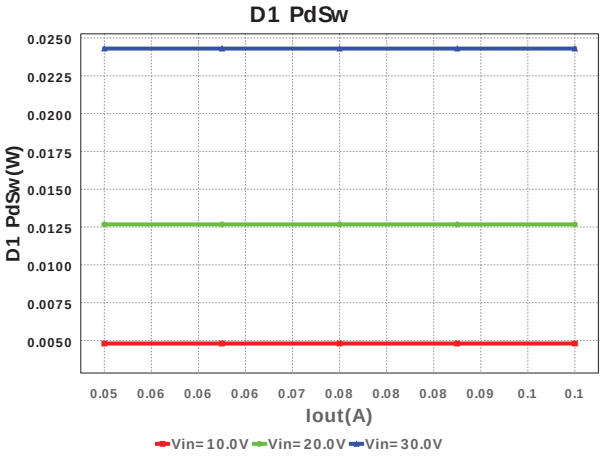


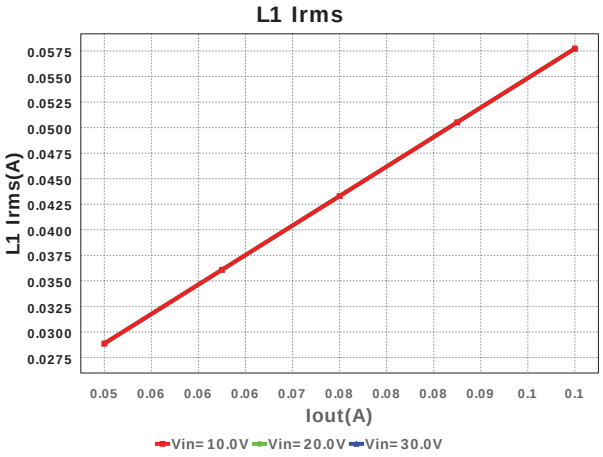


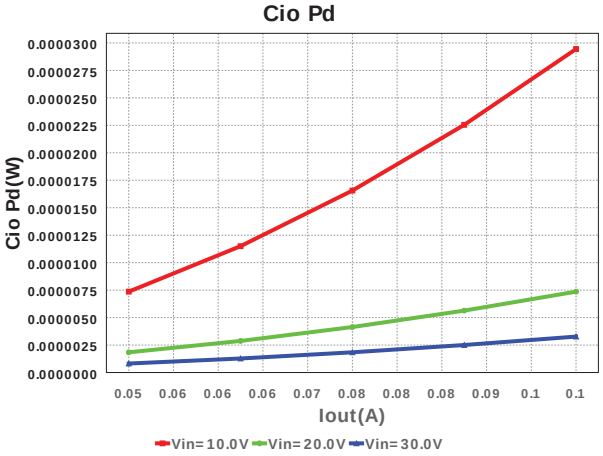


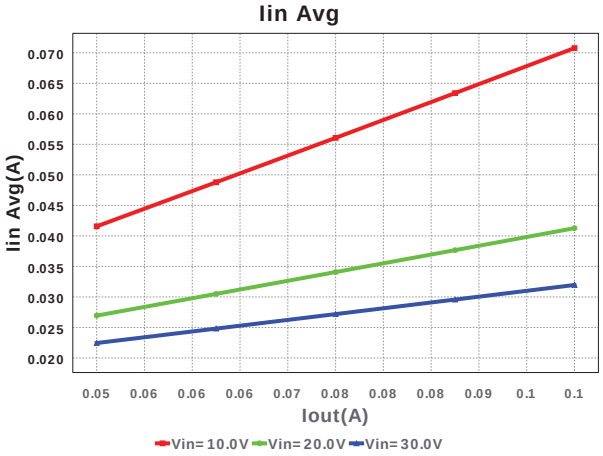


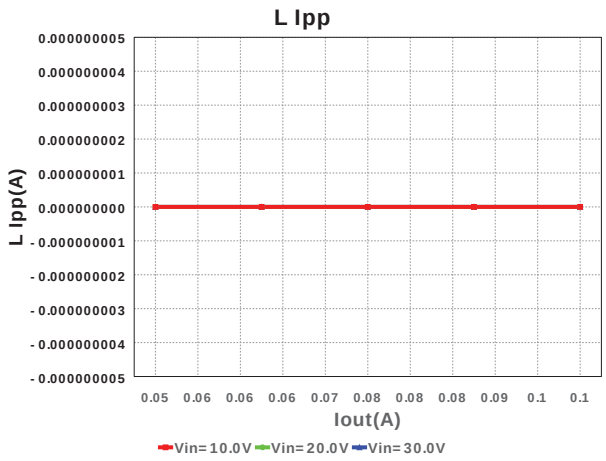


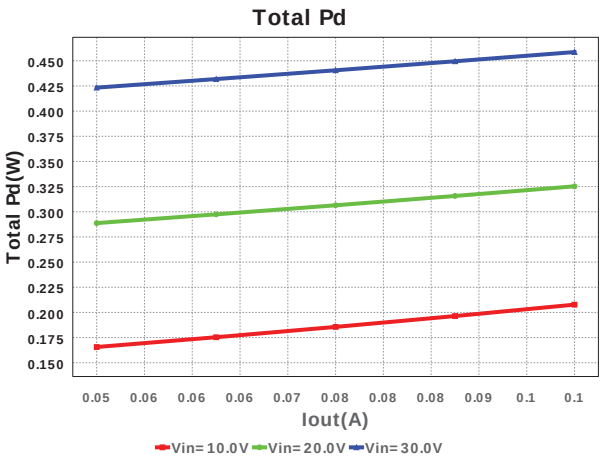


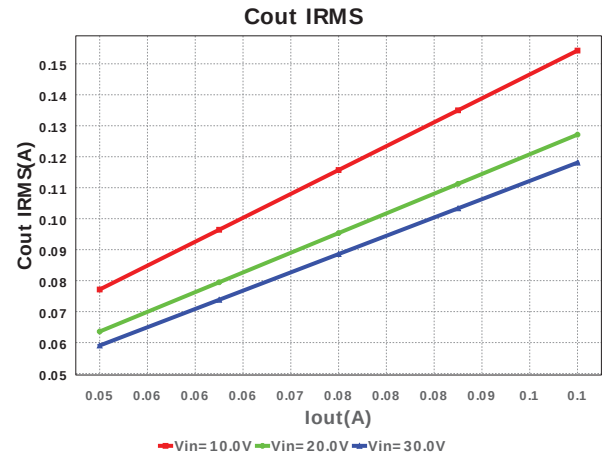


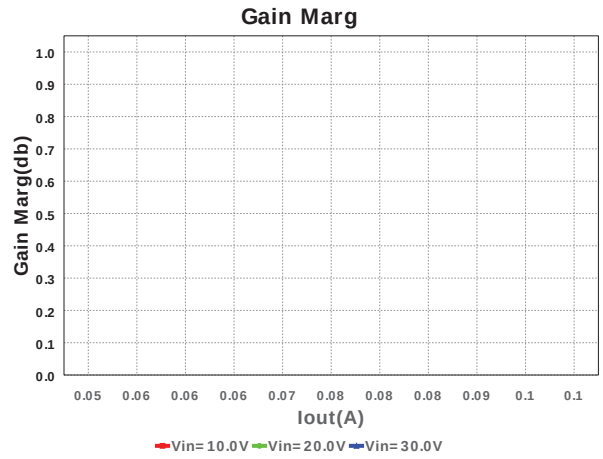


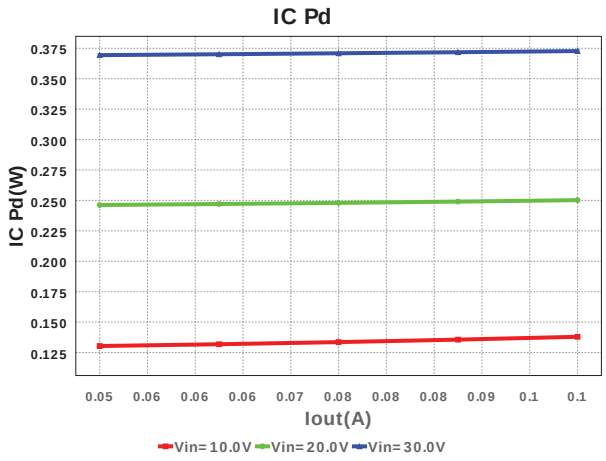


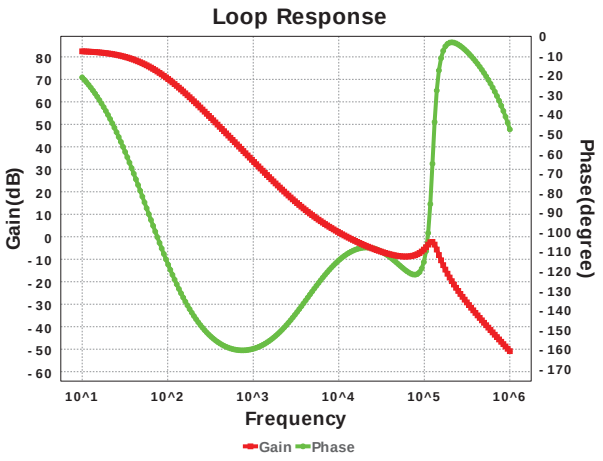












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	5.72 mA	Current	Input capacitor RMS ripple current
2.	Cio IRMS	33.601 mA	Current	Input to output capacitor RMS ripple current
3.	Cout IRMS	28.139 mA	Current	Output capacitor RMS ripple current
4.	D1 Irms	32.144 mA	Current	D1 Irms
5.	IC Ipk	5.2 mA	Current	Peak switch current in IC
6.	Iin Avg	32.39 mA	Current	Average input current
7.	L Ipp	34.603 mA	Current	Peak-to-peak output inductor ripple current
8.	L1 Ipk	137.062 mA	Current	Inductor peak current
9.	L1 Irms	79.133 mA	Current	Inductor ripple current
10.	BOM Count	21	General	Total Design BOM count
11.	FootPrint	315.0 mm2	General	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
12.	Frequency	625.0 kHz	General	Switching frequency
13.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
14.	Total BOM	$2.53	General	Total BOM Cost
15.	D1 Tj	76.829 degC	Op_Point	D1 junction temperature
16.	Vin p-p	12.881 mV	Op_Point	Peak-to-peak input voltage
17.	Cross Freq	26.127 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	16.5 %	Op_point	Duty cycle
19.	Efficiency	51.456 %	Op_point	Steady state efficiency
20.	Gain Marg	36.553 db	Op_point	Bode Plot Gain Margin
21.	IC Tj	83.544 degC	Op_point	IC junction temperature
22.	IOUT_OP	100.0 mA	Op_point	Iout operating point
23.	Phase Marg	69.372 deg	Op_point	Bode Plot Phase Margin
24.	Phase Shift	18.543 deg	Op_point	Bode Plot Phase Shift
25.	VIN_OP	30.0 V	Op_point	Vin operating point
26.	Vout p-p	27.448 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	1.505 µW	Power	Input capacitor power dissipation
28.	Cio Pd	11.291 µW	Power	Input to output capacitor power dissipation
29.	Cout Pd	263.941 µW	Power	Output capacitor power dissipation
30.	D1 Pd	81.3 mW	Power	Diode power dissipation
31.	D1 PdCond	57.0 mW	Power	Diode conduction losses
32.	D1 PdSw	24.3 mW	Power	Diode switching losses
33.	IC Pd	372.707 mW	Power	IC power dissipation
34.	L Pd	15.374 mW	Power	Inductor power dissipation
35.	Rsense Pd	2.042 mW	Power	LED Current Rsns Power Dissipation
36.	Total Pd	471.712 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	100.0 mA	Maximum Output Current
2.	Iout1	100.0 mAmps	Output Current #1
3.	SoftStart	3.0 ms	Soft Start Time (ms)
4.	VinMax	30.0 V	Maximum input voltage
5.	VinMin	10.0 V	Minimum input voltage
6.	Vout	-5.0 V	Output Voltage
7.	Vout1	-5.0 Volt	Output Voltage #1
8.	base_pn	LM25574	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	50.0 degC	Ambient temperature
11.	UserFsw	625.0 kHz	Customer Selected Frequency

Design Assistance

1. **LM25574** Product Folder : http://www.ti.com/product/lm25574 : contains the data sheet and other resources.