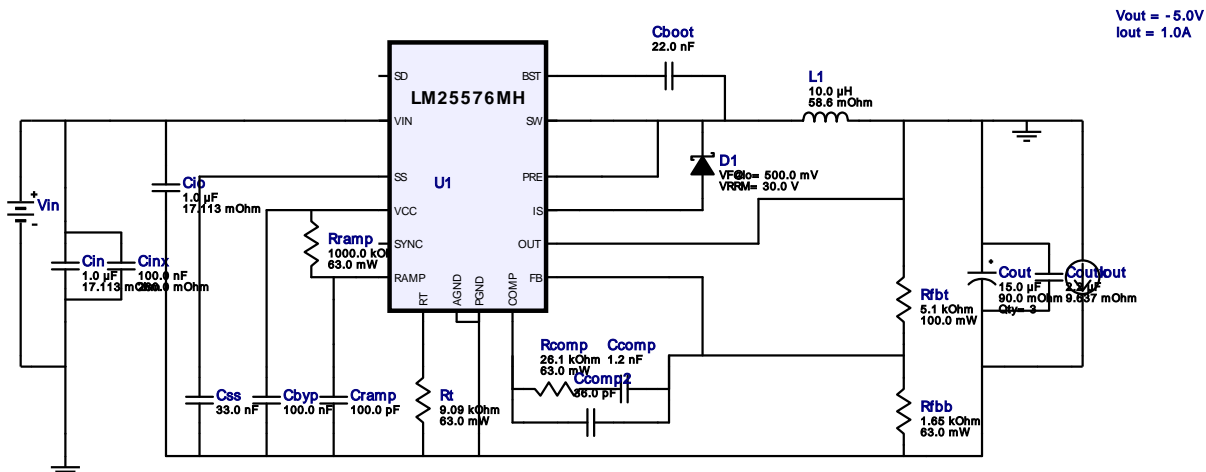











WEBENCH® Design Report

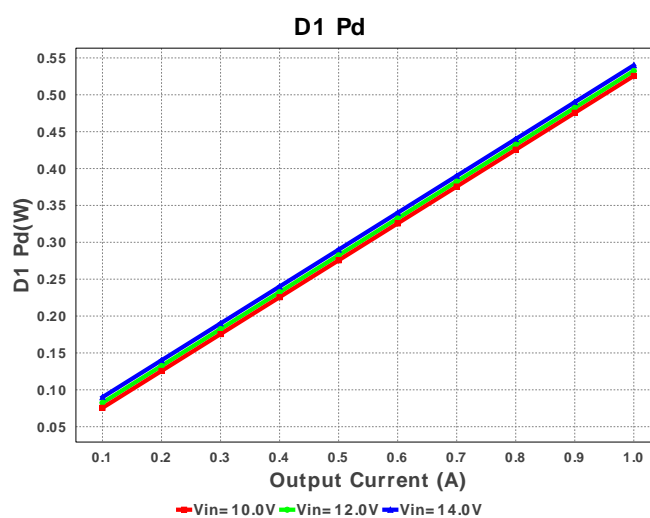
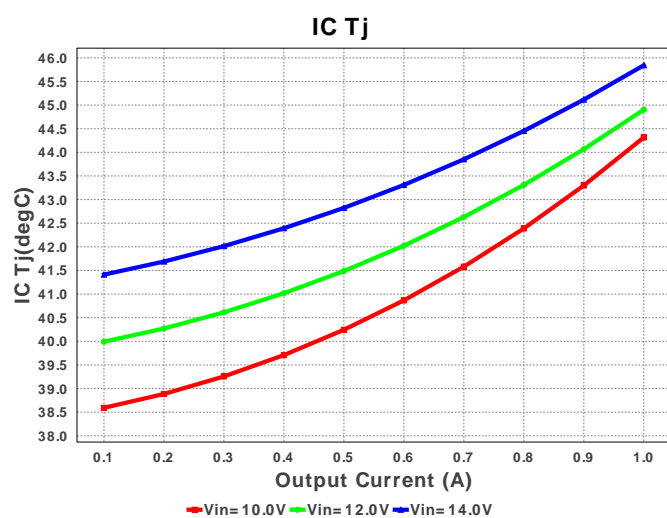
Design : 4079392/14 LM25576MHX/NOPB
LM25576MHX/NOPB 10.0V-14.0V to -5.00V @ 1.0A



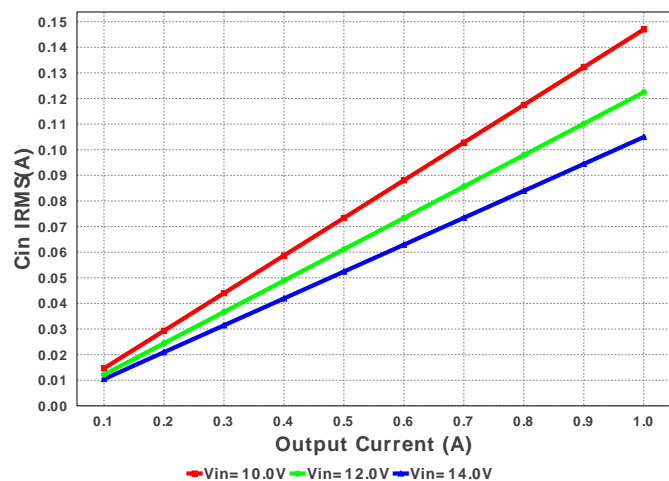
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R71E223KA61D Series= X7R	Cap= 22.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Cbyp	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
3.	Ccomp	MuRata	GRM033R71C122KA01D Series= X7R	Cap= 1.2 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
4.	Ccomp2	Samsung Electro-Mechanics	CL21C360JBANNNC Series= C0G/NP0	Cap= 36.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	Cin	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	\$0.01	0603 5 mm ²
6.	Cinx	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	Cio	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	\$0.01	0603 5 mm ²
8.	Cout	Panasonic	16TQC15M Series= TQC	Cap= 15.0 uF ESR= 90.0 mOhm VDC= 16.0 V IRMS= 1.0 A	3	\$0.66	3528-21 17 mm ²
9.	Coutx	MuRata	GRM188R61A225KE34D Series= X5R	Cap= 2.2 uF ESR= 9.637 mOhm VDC= 10.0 V IRMS= 1.24283 A	1	\$0.02	0603 5 mm ²
10.	Cramp	Yageo America	CC0805JRNPO9BN101 Series= C0G/NP0	Cap= 100.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²

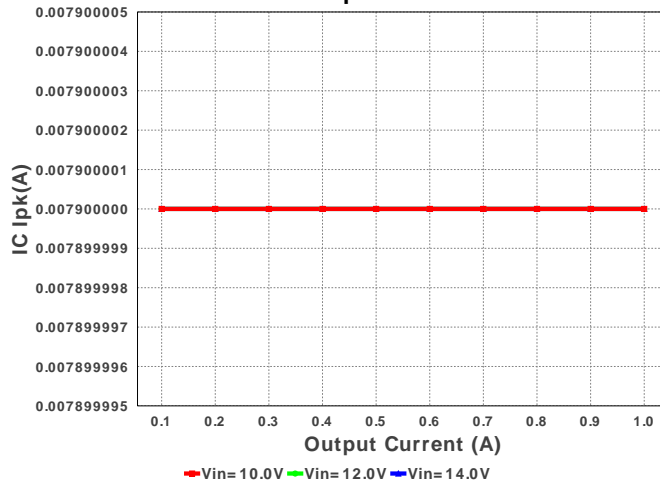
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Css	MuRata	GRM033R60J333KE01D Series= X5R	Cap= 33.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm ²
12.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.09	 SMA 37 mm ²
13.	L1	Bourns	SRN6045-100M	L= 10.0 µH DCR= 58.6 mOhm	1	\$0.16	 SRN6045 64 mm ²
14.	Rcomp	Vishay-Dale	CRCW040226K1FKED Series= CRCW..e3	Res= 26.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	Rfbb	Vishay-Dale	CRCW04021K65FKED Series= CRCW..e3	Res= 1.65 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rfbt	Yageo America	RC0603FR-075K1L Series= ?	Res= 5.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
17.	Rramp	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rt	Vishay-Dale	CRCW04029K09FKED Series= CRCW..e3	Res= 9.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	U1	Texas Instruments	LM25576MHX/NOPB	Switcher	1	\$2.00	 MXA20A 71 mm ²



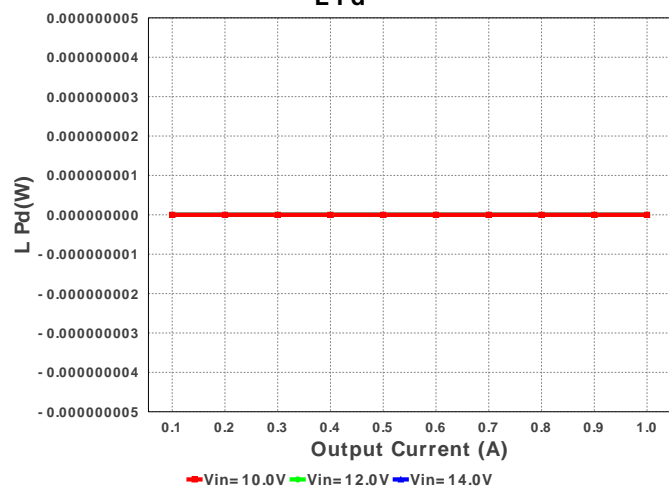
Cin IRMS



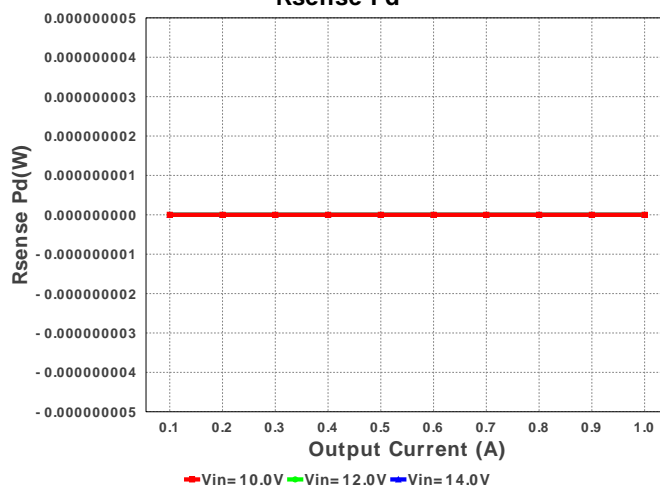
IC Ipk



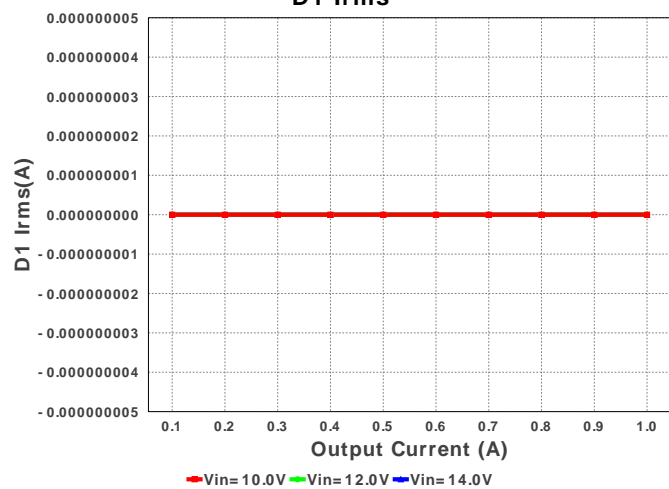
L Pd



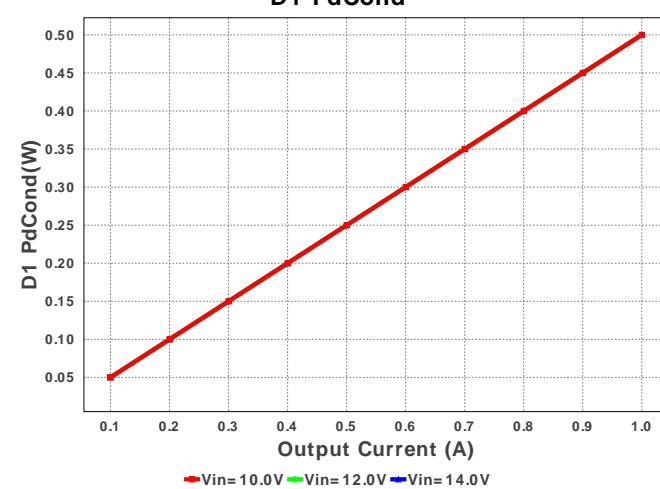
Rsense Pd

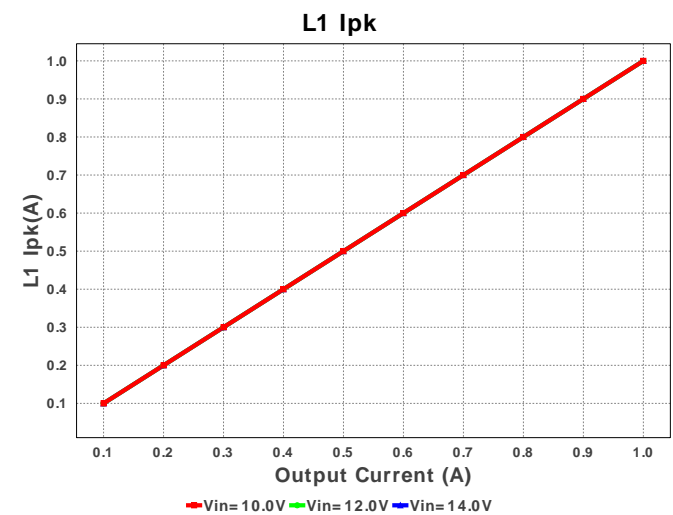
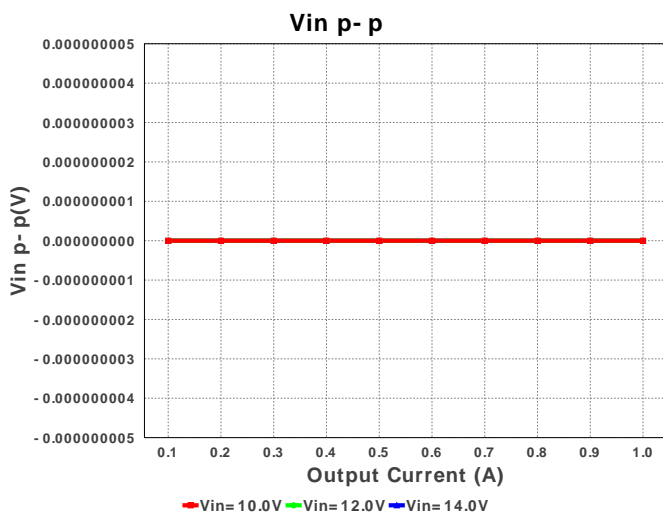
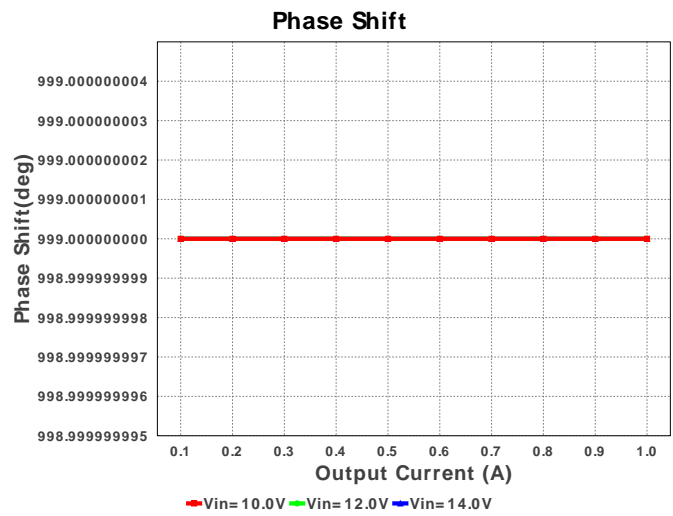
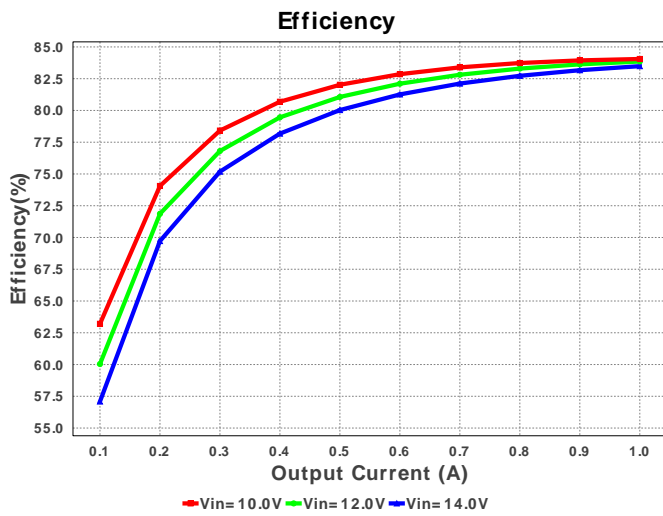
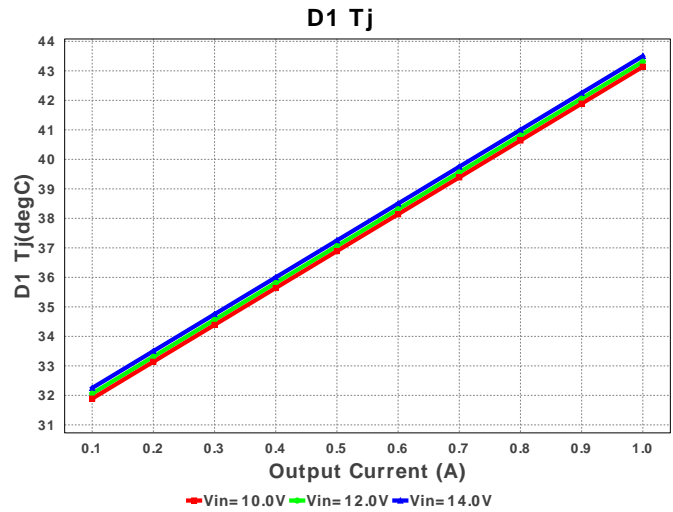
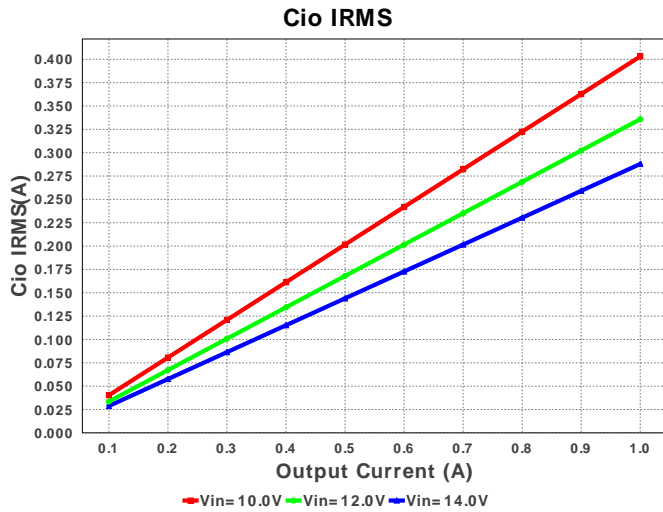


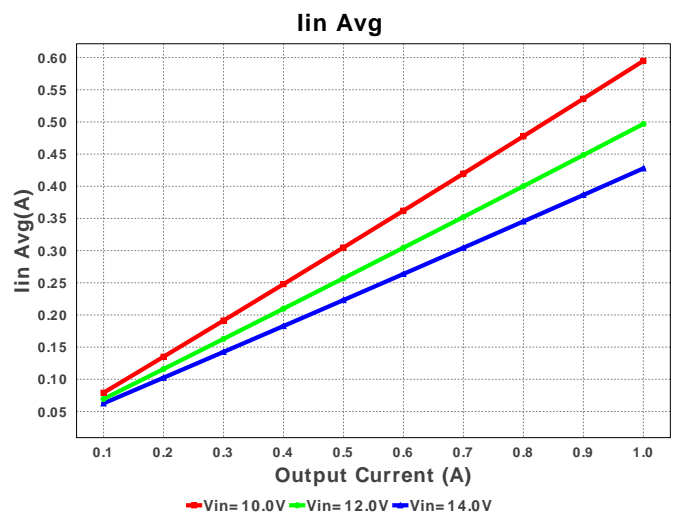
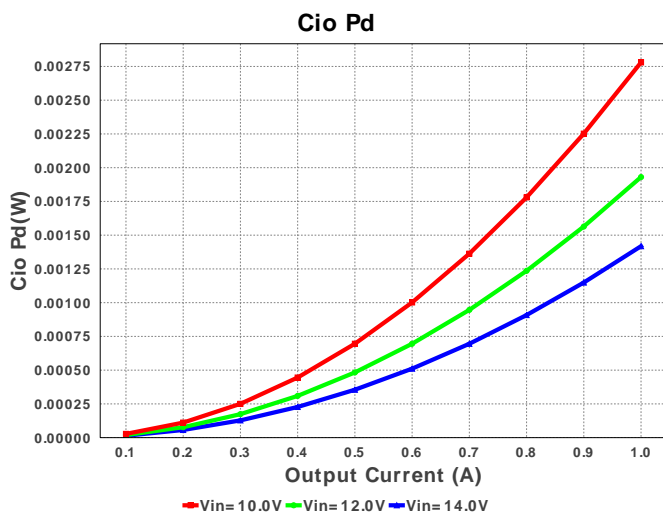
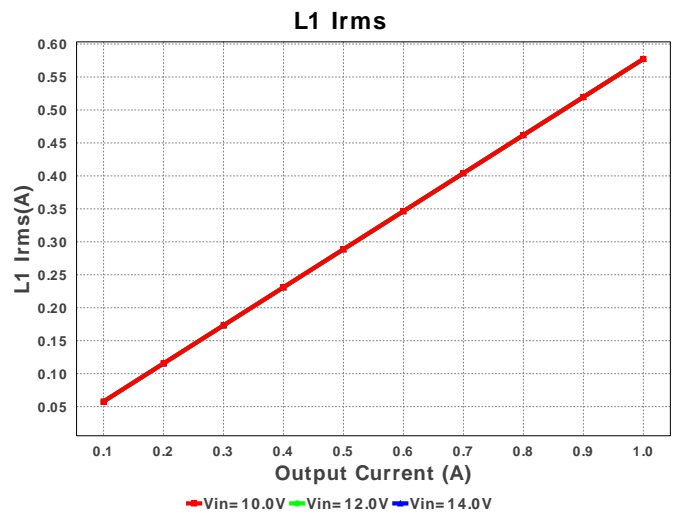
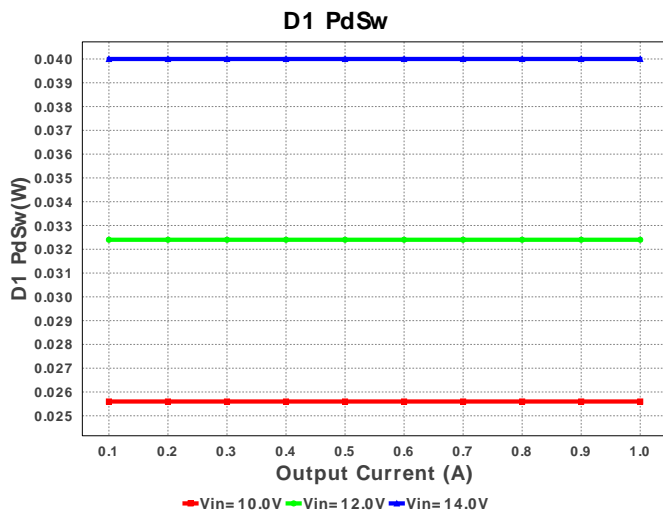
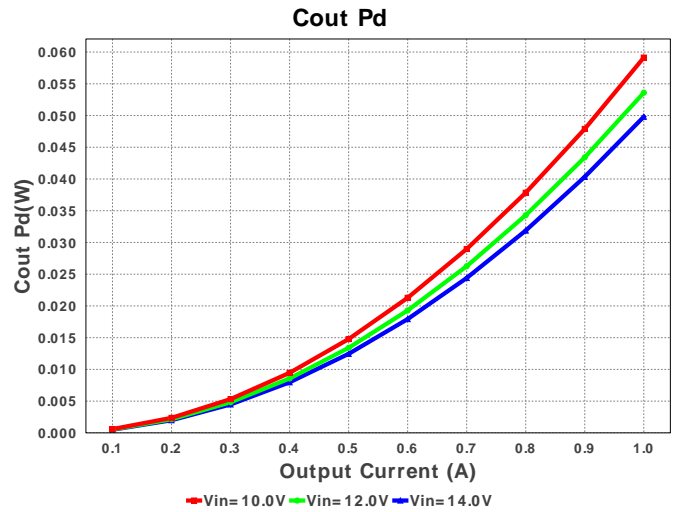
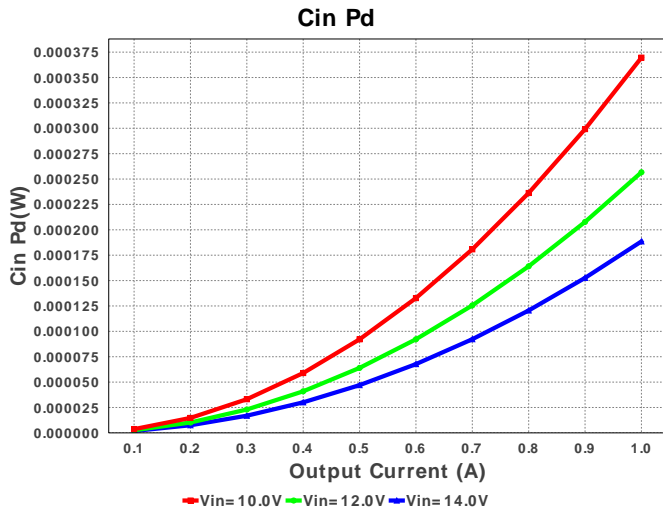
D1 Irms

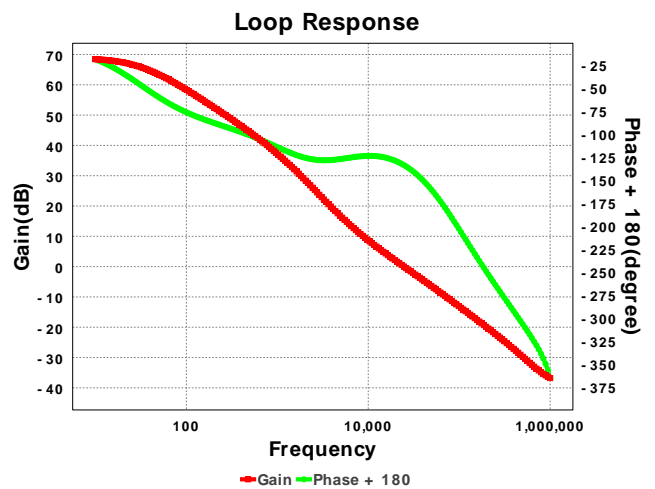
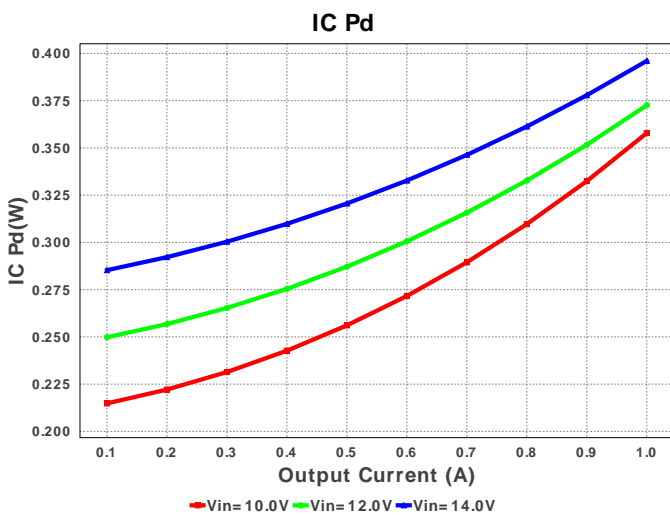
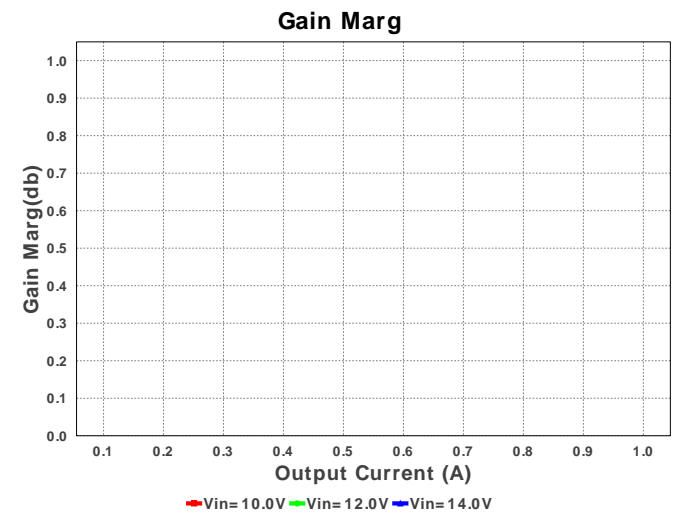
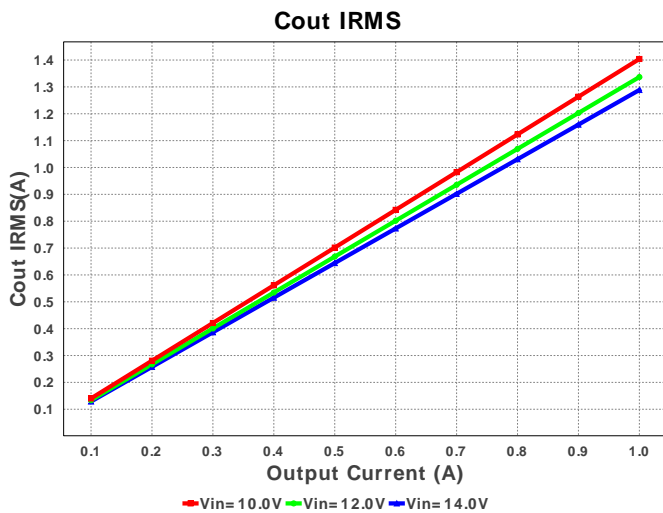
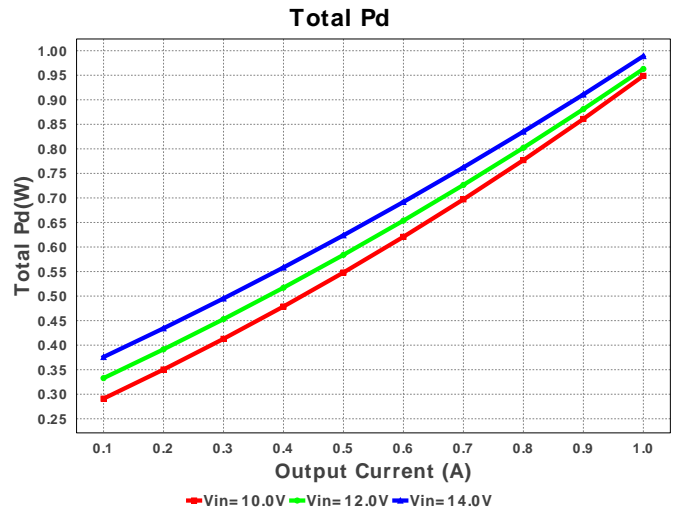
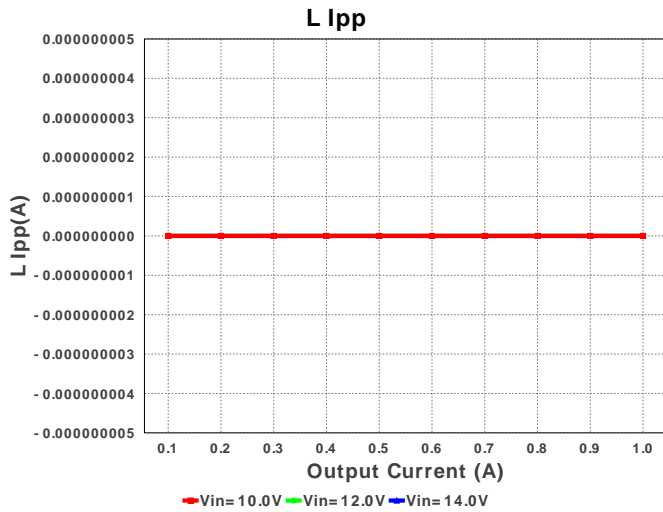


D1 PdCond









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	430.286 mA	Current	Input capacitor RMS ripple current
2.	Cio IRMS	426.808 mA	Current	Input to output capacitor RMS ripple current
3.	Cout IRMS	834.742 mA	Current	Output capacitor RMS ripple current
4.	D1 Irms	670.217 mA	Current	D1 Irms
5.	IC Ipk	5.875 mA	Current	Peak switch current in IC
6.	Iin Avg	604.02 mA	Current	Average input current
7.	L Ipp	642.246 mA	Current	Peak-to-peak output inductor ripple current
8.	L1 Ipk	1.908 A	Current	Inductor peak current
9.	L1 Irms	1.102 A	Current	Inductor ripple current
10.	BOM Count	21	General	Total Design BOM count
11.	FootPrint	285.0 mm ²	General	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
12.	Frequency	550.0 kHz	General	Switching frequency
13.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
14.	Total BOM	\$4.39	General	Total BOM Cost
15.	D1 Tj	42.852 degC	Op_Point	D1 junction temperature
16.	Vin p-p	247.107 mV	Op_Point	Peak-to-peak input voltage
17.	Cross Freq	24.658 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	37.0 %	Op_point	Duty cycle
19.	Efficiency	82.779 %	Op_point	Steady state efficiency
20.	Gain Marg	10.236 db	Op_point	Bode Plot Gain Margin
21.	IC Tj	41.621 degC	Op_point	IC junction temperature
22.	IOUT_OP	1.0 A	Op_point	Iout operating point
23.	Phase Marg	47.056 deg	Op_point	Bode Plot Phase Margin
24.	Phase Shift	48.454 deg	Op_point	Bode Plot Phase Shift
25.	VIN_OP	10.0 V	Op_point	Vin operating point
26.	Vout p-p	81.422 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	3.168 mW	Power	Input capacitor power dissipation
28.	Cio Pd	3.117 mW	Power	Input to output capacitor power dissipation
29.	Cout Pd	20.904 mW	Power	Output capacitor power dissipation
30.	D1 Pd	514.08 mW	Power	Diode power dissipation
31.	D1 PdCond	500.0 mW	Power	Diode conduction losses
32.	D1 PdSw	14.08 mW	Power	Diode switching losses
33.	IC Pd	290.513 mW	Power	IC power dissipation
34.	L Pd	145.324 mW	Power	Inductor power dissipation
35.	Rsense Pd	63.072 mW	Power	LED Current Rsns Power Dissipation
36.	Total Pd	1.04 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	-5.0	Output Voltage
5.	base_pn	LM25576	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM25576** Product Folder : <http://www.ti.com/product/LM25576> : contains the data sheet and other resources.

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