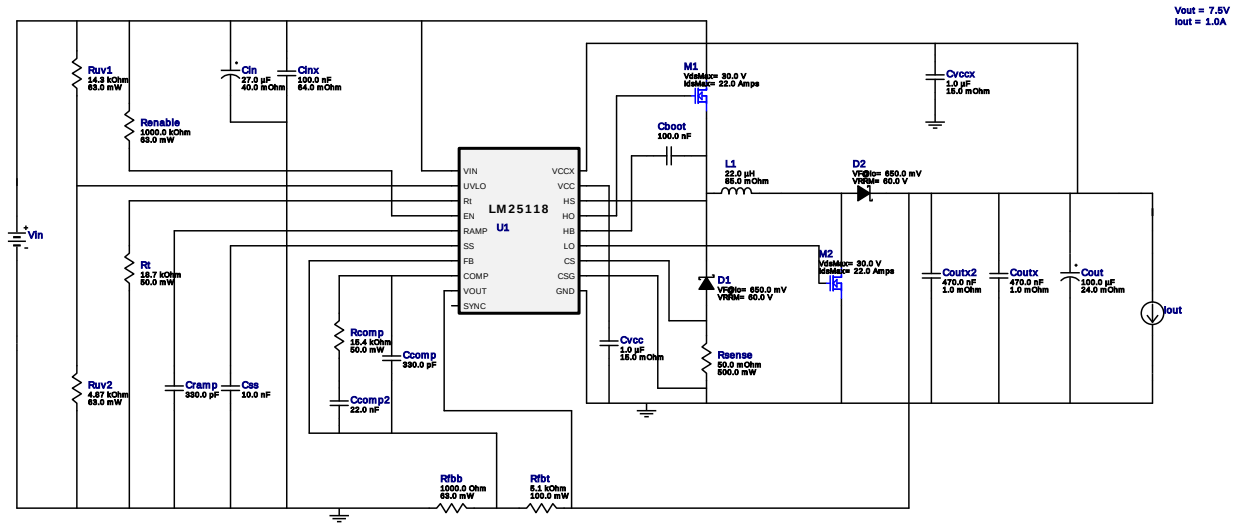
VinMin = 6.0V
VinMax = 13.0V
Vout = 7.5V
Iout = 1.0A

Device = LM25118MH/NOPB
Topology = Buck_Boost
Created = 2021-09-30 13:06:46.337
BOM Cost = $4.33
BOM Count = 26
Total Pd = 0.69W

WEBENCH® Design Report

Design : 16 LM25118MH/NOPB
LM25118MH/NOPB 6V-15V to 7.50V @ 3A

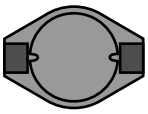


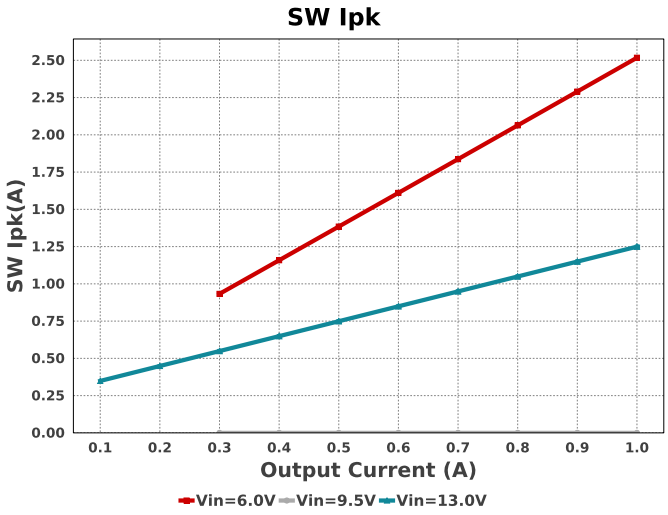
Design Alerts

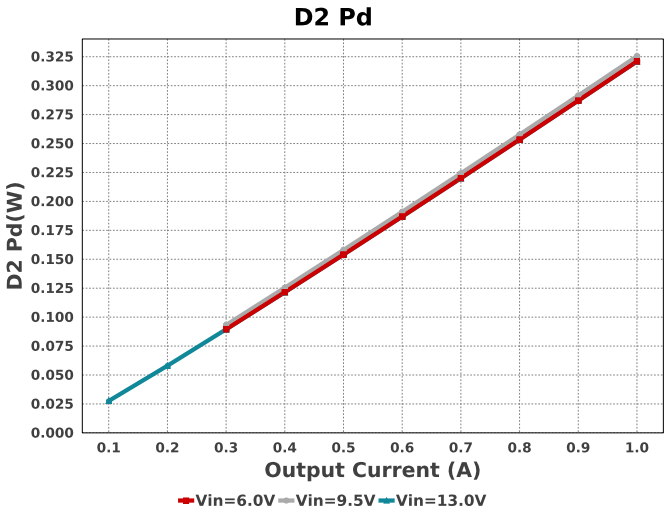
LM25118 Design
Tool Tip for Keep selected FETs during Redesign Configuration Option: By Default if you hit REDESIGN button, Webench re-designs all the external components including Fets. But if we have checked this configuration option, currently selected fets in schematic will get locked and re-design happens for only other external components. This helps to update the desing by keeping Fets unchanged.

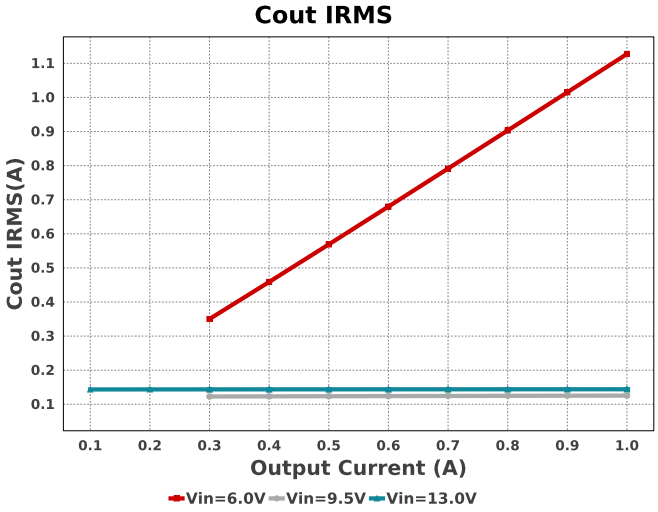
Electrical BOM

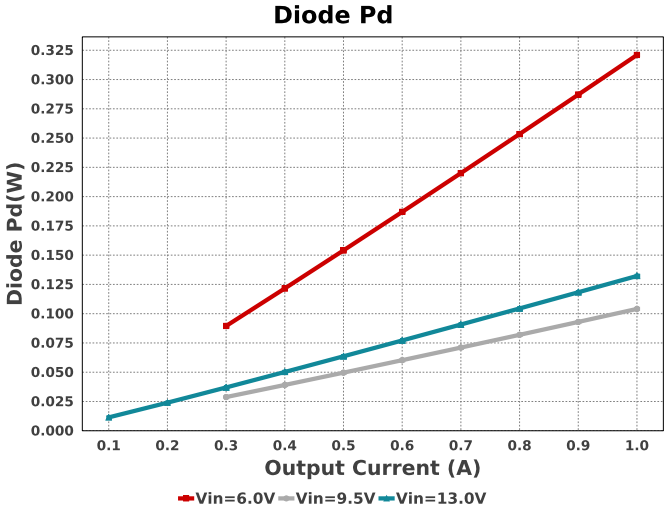
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	AVX	08053C104JAZ2A Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.06	0805 7 mm^2
Ccomp	Samsung Electro-Mechanics	CL21C331JBANNNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm^2
Ccomp2	TDK	CGA4J2C0G1H223J125AA Series= C0G/NP0	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.08	0805 7 mm^2
Cin	Panasonic	25SVPF27MX Series= SVPF	Cap= 27.0 uF ESR= 40.0 mOhm VDC= 25.0 V IRMS= 2.45 A	1	$0.36	CAPSMT_62_E61 53 mm^2
Cinx	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 mm^2
Cout	Chemi-Con	APXE160ARA101MF80G Series= PXE	Cap= 100.0 uF ESR= 24.0 mOhm VDC= 16.0 V IRMS= 2.7 A	1	$0.52	CAPSMT_62_F80 74 mm^2
Coutx	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm^2

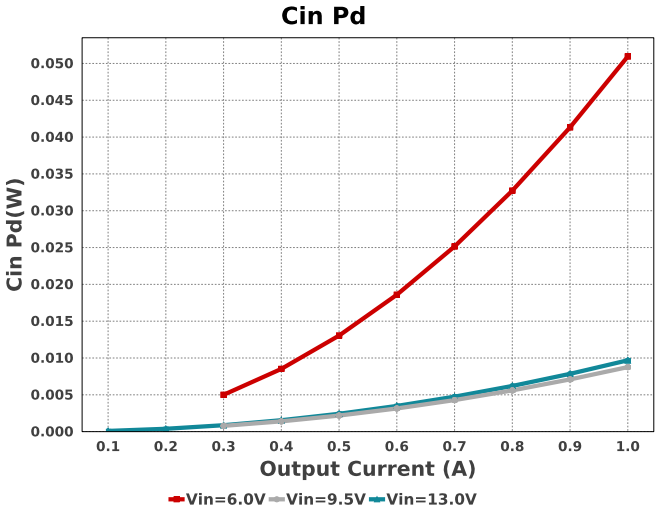
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Coutx2	MuRata	GRM155R61A474KE15D Series= X5R	Cap= 470.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.02	0402 3 mm²
Cramp	Samsung Electro-Mechanics	CL21C331JBANNNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
Css	TDK	CGA4C2C0G1H103J060AA Series= C0G/NP0	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.06	0805 7 mm²
Cvcc	Kemet	C0805C105K4RACTU Series= X7R	Cap= 1.0 uF ESR= 15.0 mOhm VDC= 16.0 V IRMS= 8.19 A	1	$0.02	0805 7 mm²
Cvccx	Kemet	C0805C105K4RACTU Series= X7R	Cap= 1.0 uF ESR= 15.0 mOhm VDC= 16.0 V IRMS= 8.19 A	1	$0.02	0805 7 mm²
D1	Fairchild Semiconductor	FSV360FP	VF@Io= 650.0 mV VRRM= 60.0 V	1	$0.10	SOD-123HE 13 mm²
D2	Fairchild Semiconductor	FSV360FP	VF@Io= 650.0 mV VRRM= 60.0 V	1	$0.10	SOD-123HE 13 mm²
L1	NIC Components	NPI31W220MTRF	L= 22.0 µH 85.0 mOhm	1	$0.23	 IND_NPI31W 172 mm²
M1	Texas Instruments	CSD17571Q2	VdsMax= 30.0 V IdsMax= 22.0 Amps	1	$0.11	DQK0006C 9 mm²
M2	Texas Instruments	CSD17571Q2	VdsMax= 30.0 V IdsMax= 22.0 Amps	1	$0.11	DQK0006C 9 mm²
Rcomp	Yageo	RC0201FR-0715K4L Series= ?	Res= 15.4 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Renable	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbb	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbt	Yageo	RC0603FR-075K1L Series= ?	Res= 5.1 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
Rsense	Stackpole Electronics Inc	CSR1206FK50L0 Series= ?	Res= 50.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206 11 mm²
Rt	Yageo	RC0201FR-0718K7L Series= ?	Res= 18.7 kOhm Power= 50.0 mW Tolerance= 1.0%	1	$0.01	0201 2 mm²
Ruv1	Vishay-Dale	CRCW040214K3FKED Series= CRCW..e3	Res= 14.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Ruv2	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
U1	Texas Instruments	LM25118MH/NOPB	Switcher	1	$2.32	 MXA20A 71 mm²

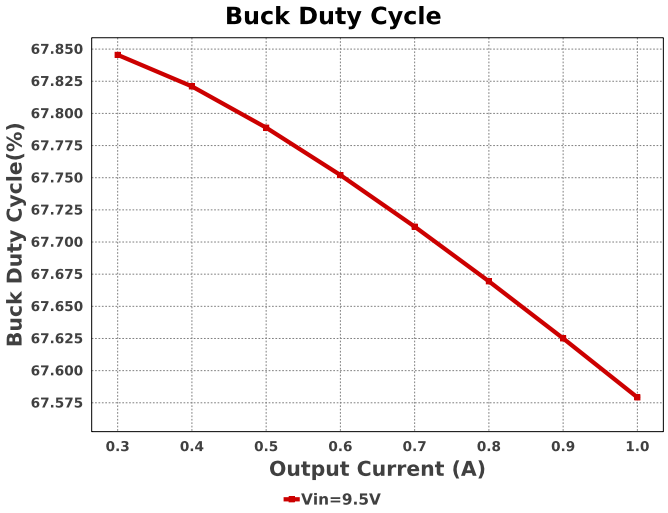


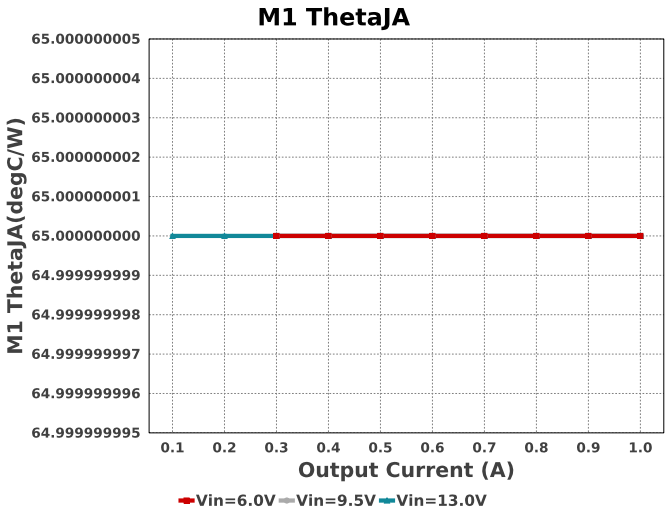


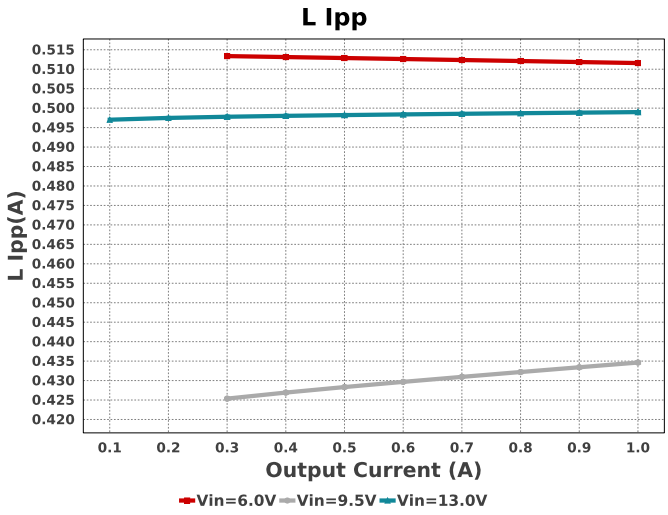


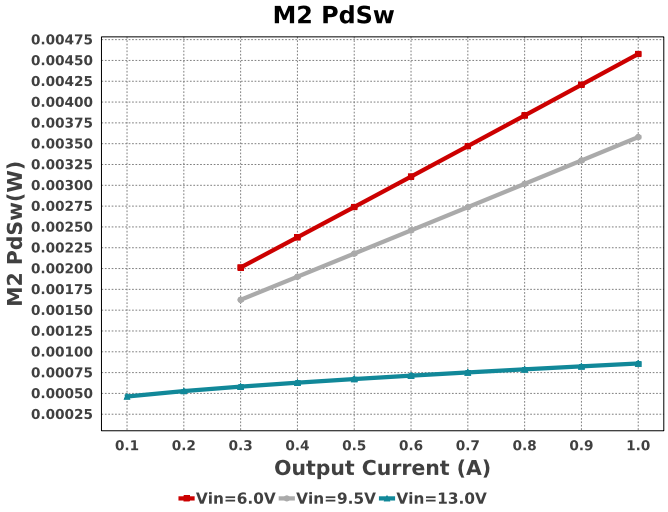


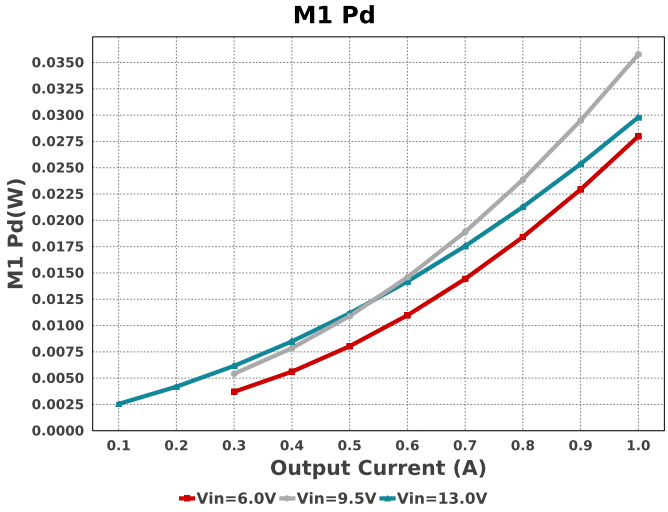


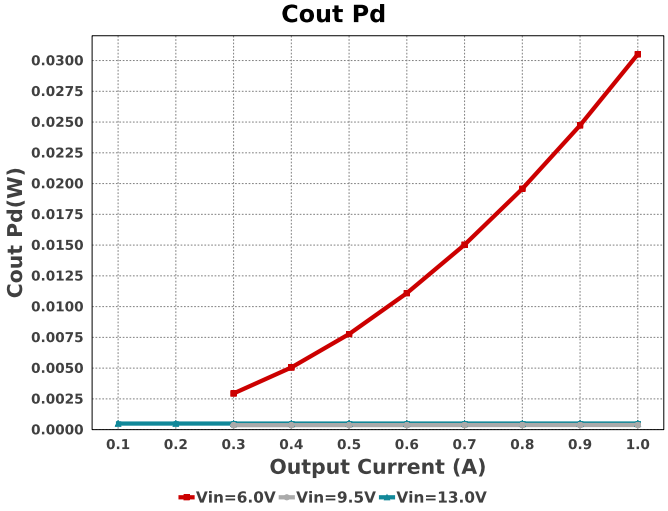


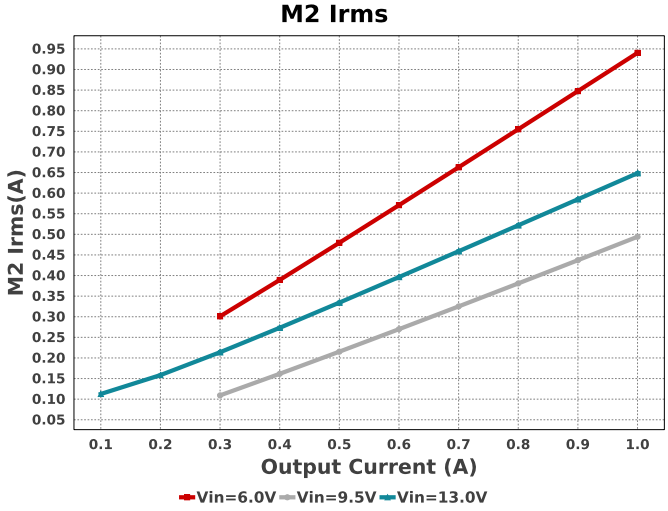


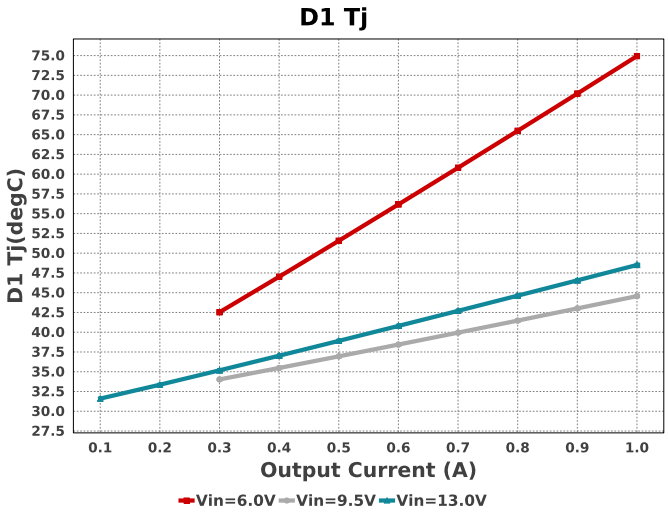


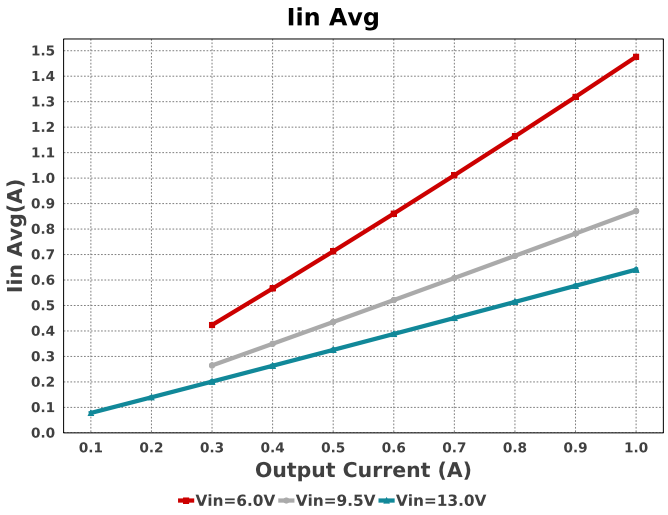


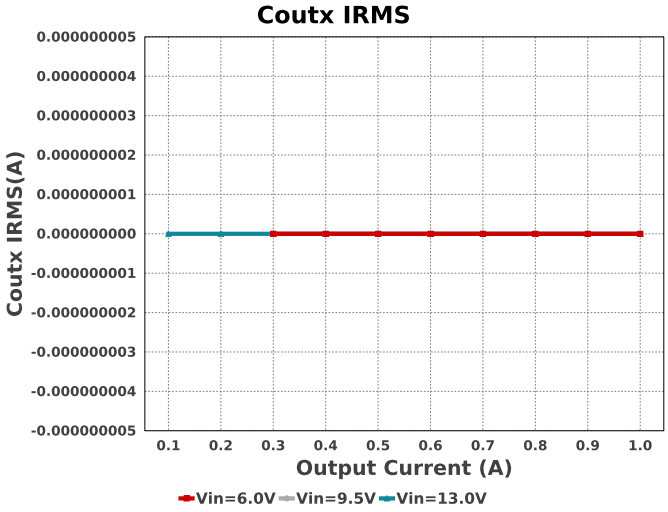


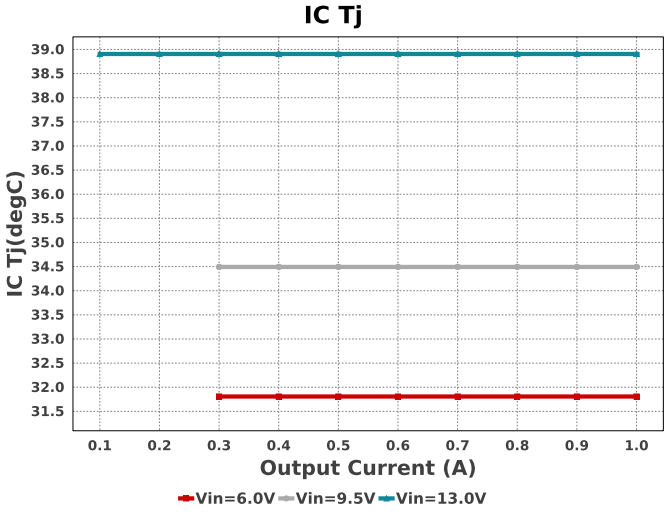


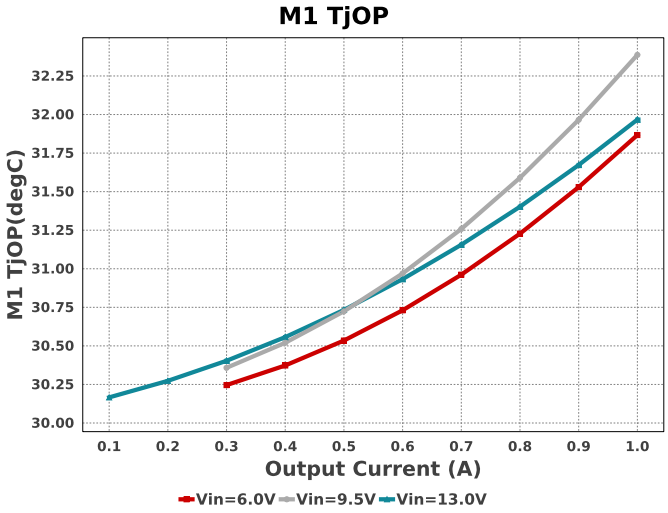


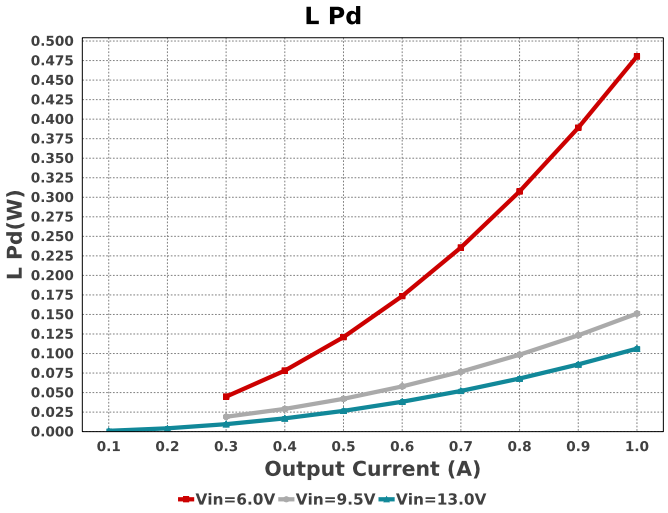


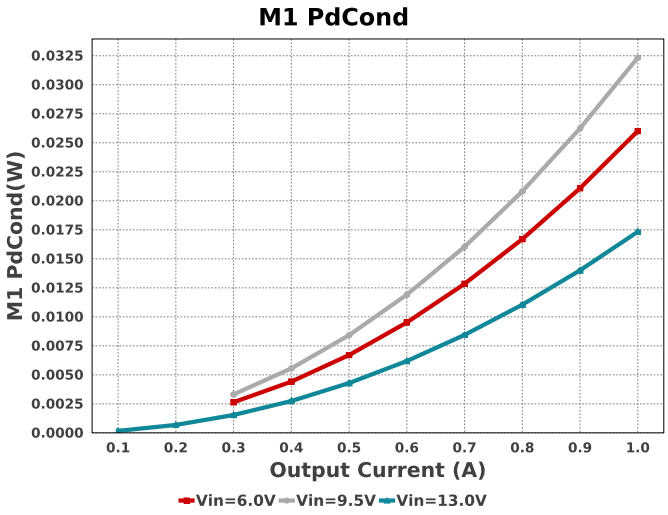


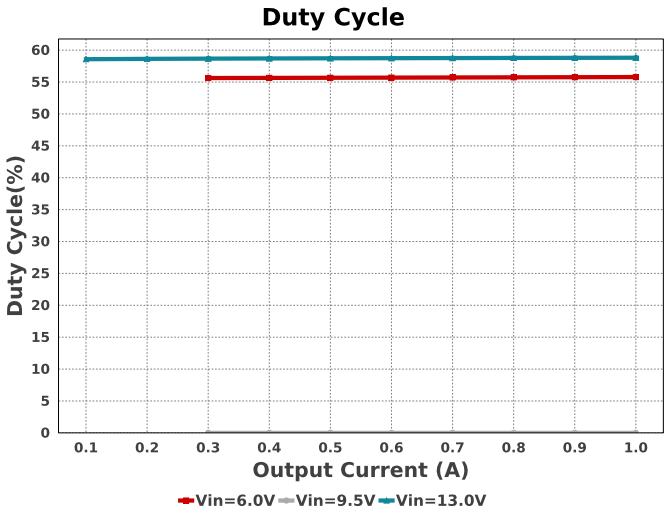


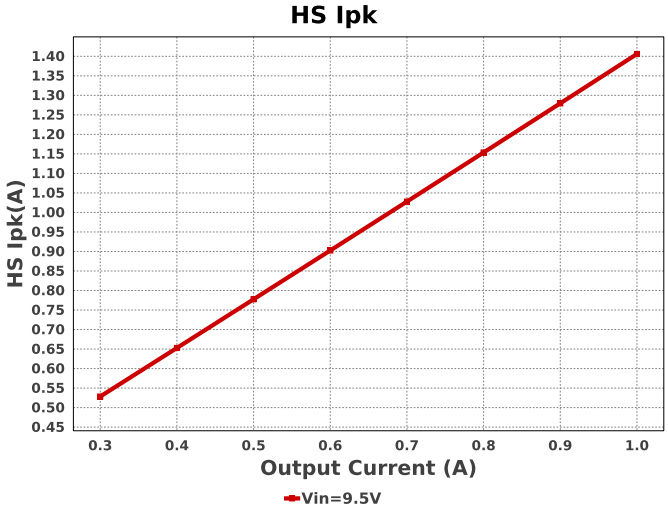


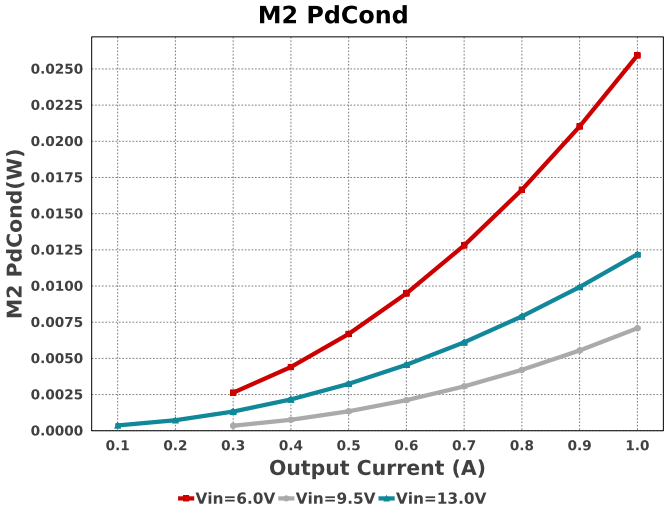


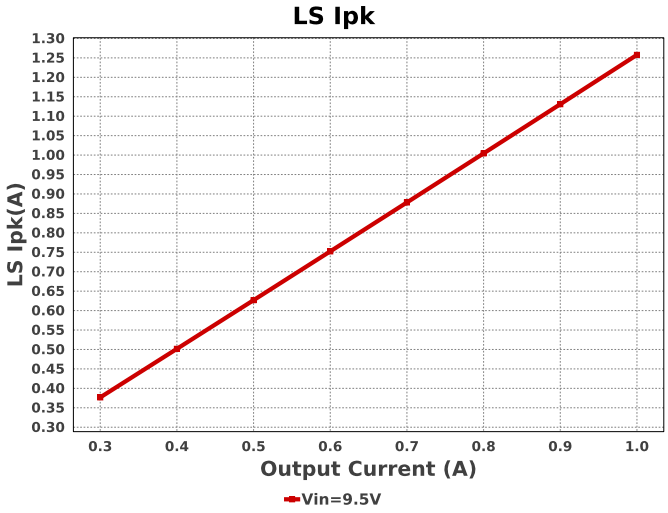


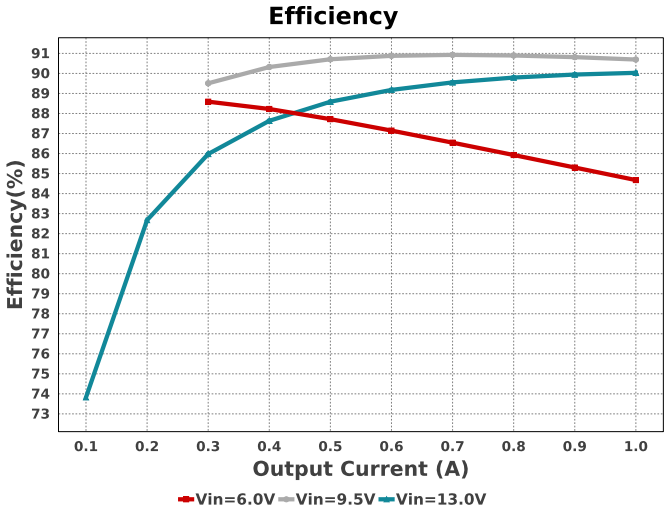


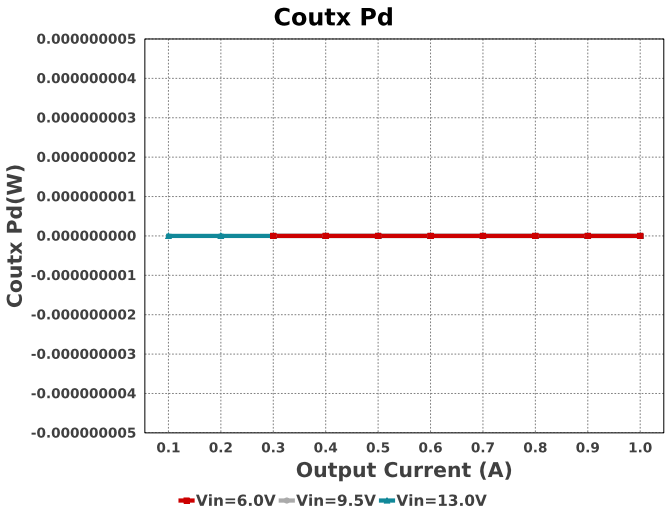


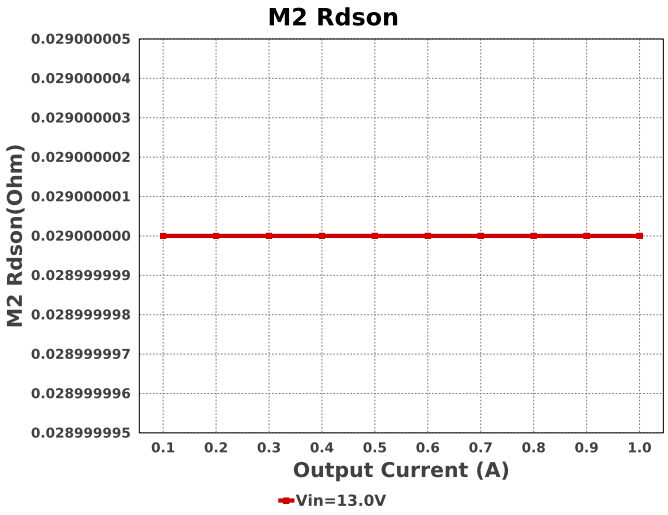


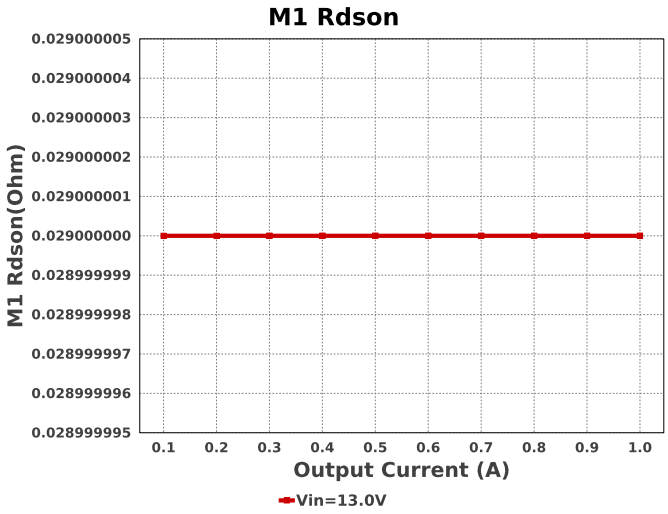


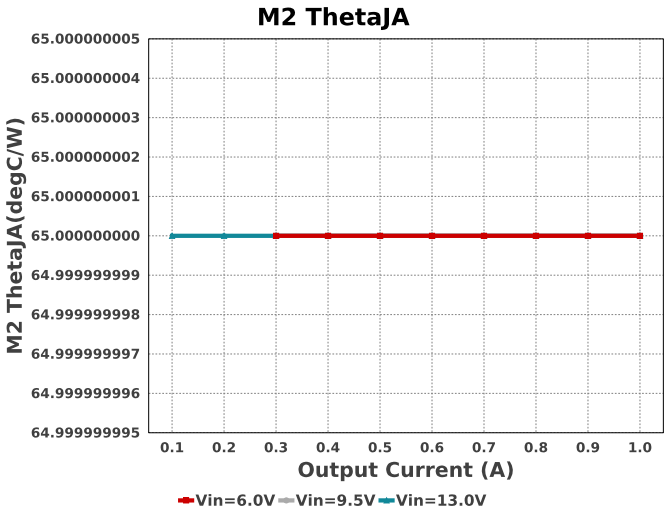


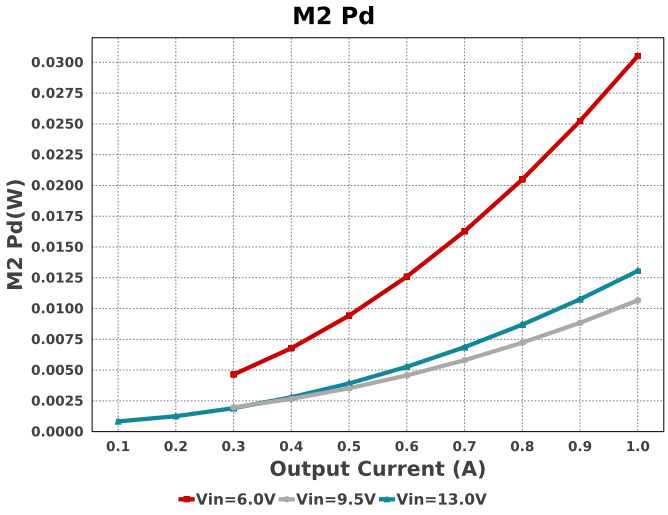


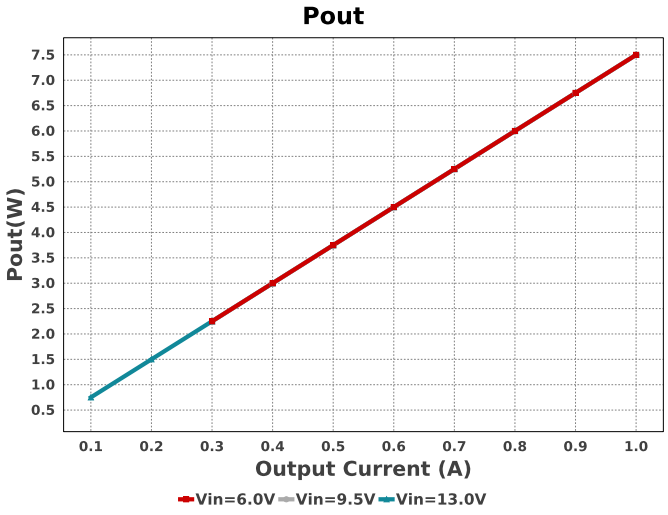


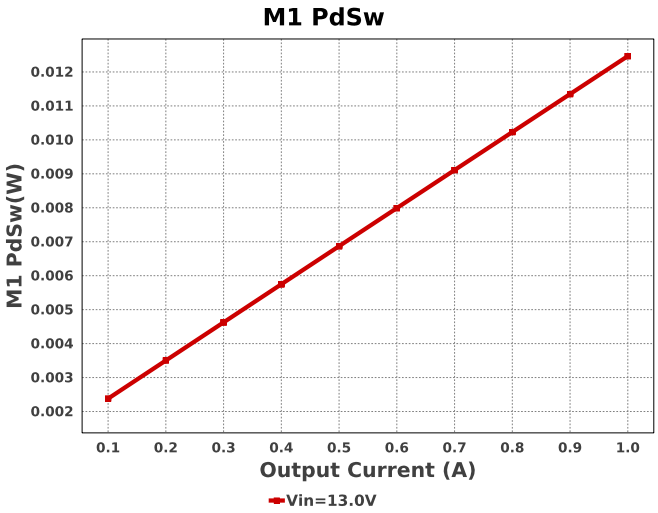


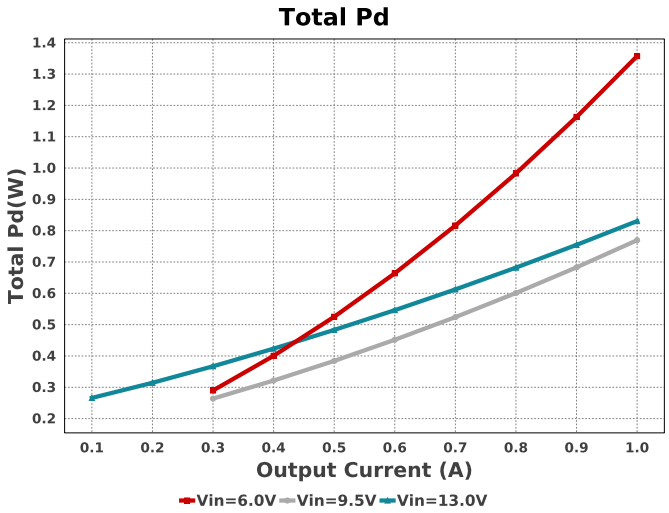


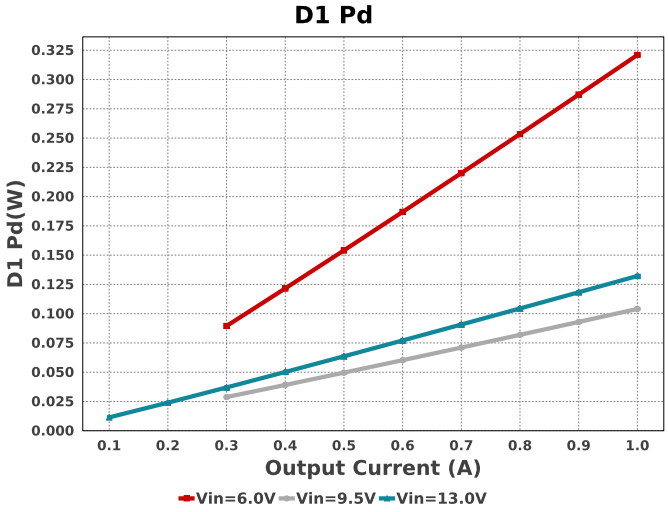


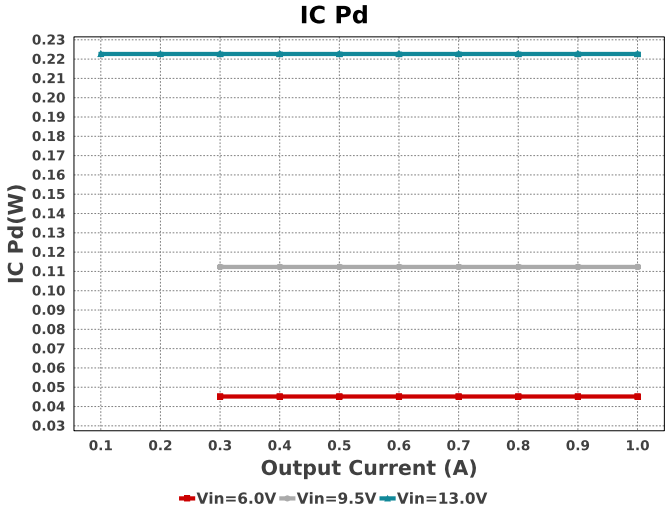


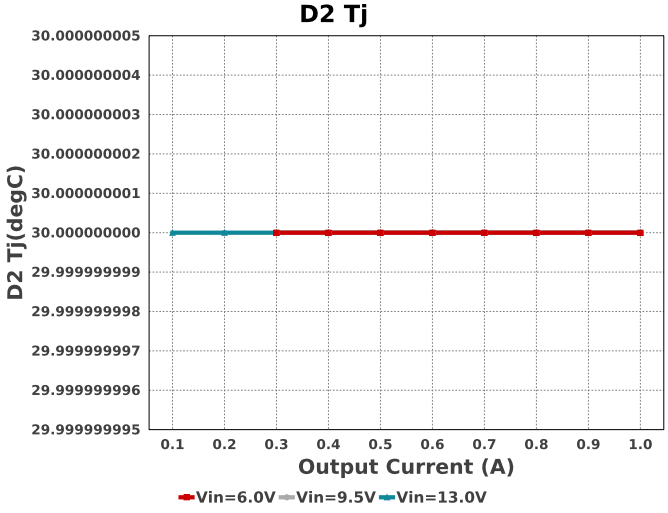


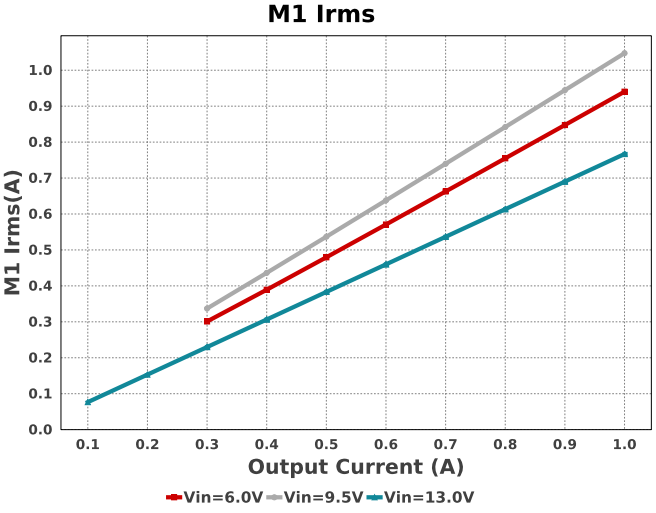


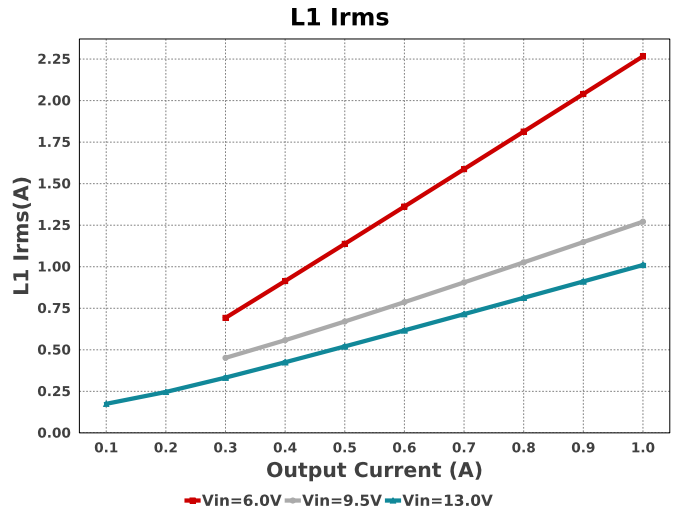


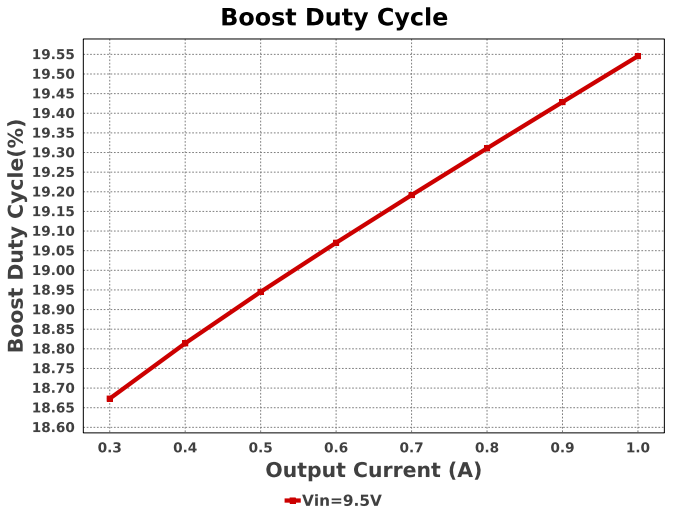


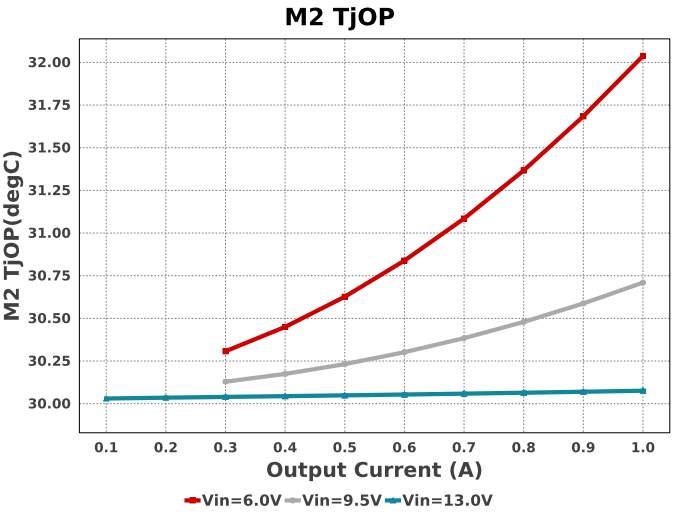


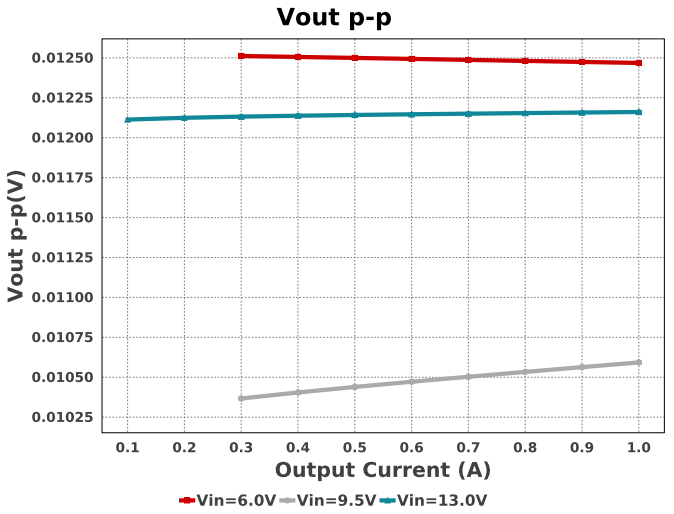


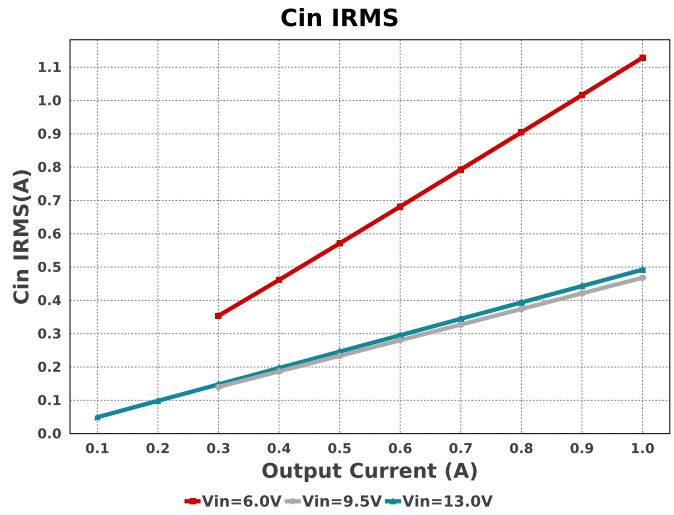


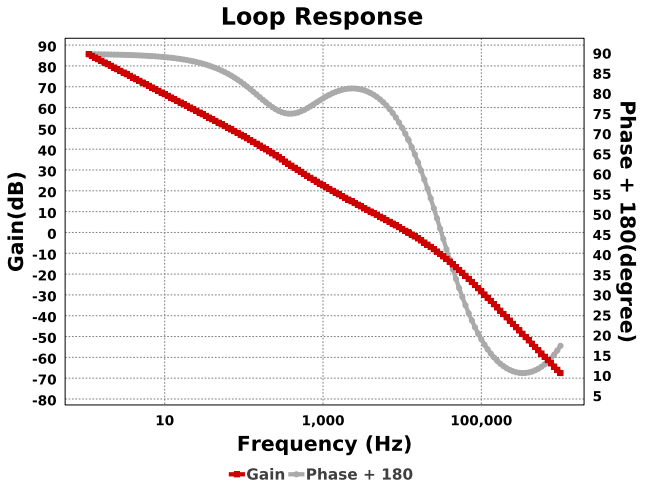












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	492.086 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	9.686 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	144.163 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	498.79 µW	Capacitor	Output capacitor power dissipation
5.	Coutx IRMS	0.0 A	Capacitor	Output capacitor_x RMS ripple current
6.	Coutx Pd	0.0 W	Capacitor	Output capacitor_x power loss
7.	D1 Pd	138.55 mW	Diode	Diode power dissipation
8.	D1 Tj	49.397 degC	Diode	D1 junction temperature
9.	D1 Tj	49.397 degC	Diode	D1 junction temperature
10.	D2 Pd	336.78 mW	Diode	Diode2 power dissipation
11.	Diode Pd	138.55 mW	Diode	Diode power dissipation

#	Name	Value	Category	Description
12.	IC Pd	57.651 mW	IC	IC power dissipation
13.	IC Tj	32.306 degC	IC	IC junction temperature
14.	IC Tolerance	18.0 mV	IC	IC Feedback Tolerance
15.	ICThetaJA	40.0 degC/W	IC	IC junction-to-ambient thermal resistance
16.	Iin Avg	629.83 mA	IC	Average input current
17.	L Ipp	499.4 mA	Inductor	Peak-to-peak inductor ripple current
18.	L Pd	106.25 mW	Inductor	Inductor power dissipation
19.	L1 Irms	1.01 A	Inductor	Inductor ripple current
20.	M1 Irms	767.207 mA	Mosfet	MOSFET RMS ripple current
21.	M1 Pd	29.857 mW	Mosfet	MOSFET power dissipation
22.	M1 PdCond	17.388 mW	Mosfet	M1 MOSFET conduction losses
23.	M1 PdSw	12.47 mW	Mosfet	M1 MOSFET switching losses
24.	M1 Rdson	29.0 mOhm	Mosfet	Drain-Source On-resistance
25.	M1 ThetaJA	65.0 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
26.	M1 TjOP	31.968 degC	Mosfet	MOSFET junction temperature
27.	M2 Irms	648.03 mA	Mosfet	MOSFET RMS ripple current
28.	M2 Pd	13.444 mW	Mosfet	MOSFET power dissipation
29.	M2 PdCond	12.185 mW	Mosfet	M2 MOSFET conduction losses
30.	M2 PdSw	1.259 mW	Mosfet	M2 MOSFET switching losses
31.	M2 Rdson	29.0 mOhm	Mosfet	Drain-Source On-resistance
32.	M2 ThetaJA	65.0 degC/W	Mosfet	MOSFET junction-to-ambient thermal resistance
33.	M2 TjOP	30.09 degC	Mosfet	MOSFET junction temperature
34.	Cin Pd	9.686 mW	Power	Input capacitor power dissipation
35.	Cout Pd	498.79 µW	Power	Output capacitor power dissipation
36.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
37.	D1 Pd	138.55 mW	Power	Diode power dissipation
38.	D2 Pd	336.78 mW	Power	Diode2 power dissipation
39.	Diode Pd	138.55 mW	Power	Diode power dissipation
40.	IC Pd	57.651 mW	Power	IC power dissipation
41.	L Pd	106.25 mW	Power	Inductor power dissipation
42.	M1 Pd	29.857 mW	Power	MOSFET power dissipation
43.	M1 PdCond	17.388 mW	Power	M1 MOSFET conduction losses
44.	M1 PdSw	12.47 mW	Power	M1 MOSFET switching losses
45.	M2 Pd	13.444 mW	Power	MOSFET power dissipation
46.	M2 PdCond	12.185 mW	Power	M2 MOSFET conduction losses
47.	M2 PdSw	1.259 mW	Power	M2 MOSFET switching losses
48.	Total Pd	687.774 mW	Power	Total Power Dissipation
49.	BOM Count	26	System Information	Total Design BOM count
50.	Cross Freq	11.909 kHz	System Information	Bode plot crossover frequency
51.	D2 Tj	77.149 degC	System Information	D2 junction temperature
52.	Duty Cycle	58.861 %	System Information	Duty cycle
53.	Efficiency	91.6 %	System Information	Steady state efficiency
54.	FootPrint	507.0 mm^2	System Information	Total Foot Print Area of BOM components
55.	Frequency	294.659 kHz	System Information	Switching frequency
56.	Gain Marg	-49.274 dB	System Information	Bode Plot Gain Margin
57.	Iout	1.0 A	System Information	Iout operating point
58.	Low Freq Gain	85.629 dB	System Information	Gain at 1Hz
59.	Mode	CCM	System Information	Conduction Mode
60.	Operating Topology	Buck	System Information	The current operating topology of the device
61.	Phase Marg	68.765 deg	System Information	Bode Plot Phase Margin
62.	Pout	7.5 W	System Information	Total output power
63.	SW Ipk	1.25 A	System Information	Peak switch current
64.	Total BOM	$4.33	System Information	Total BOM Cost
65.	Vin	13.0 V	System Information	Vin operating point
66.	Vout	7.5 V	System Information	Operational Output Voltage
67.	Vout Actual	7.503 V	System Information	Vout Actual calculated based on selected voltage divider resistors

#	Name	Value	Category	Description
68.	Vout Tolerance	3.177 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
69.	Vout p-p	12.171 mV	System Information	Peak-to-peak output ripple voltage

Design Inputs

Name	Value	Description
Iout	1.0	Maximum Output Current
SoftStart	1.0 ms	Soft Start Time (ms)
VinMax	13.0	Maximum input voltage
VinMin	6.0	Minimum input voltage
Vout	7.5	Output Voltage
base_pn	LM25118	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature
UserFsw	294.659 k	Customer Selected Frequency

WEBENCH® Assembly

Design Assistance

1. The LM25118 is a wide range buck-boost controller which is operable in an ultra wide input range of 3 to 75V. A buck-boost regulator can maintain regulation for input voltages either higher or lower than the output voltage. The challenge is that buck-boost power converters are not as efficient as buck regulators. The LM5118 has been designed as a dual mode controller whereby the power converter acts as a buck regulator while the input voltage is above the output. As the input voltage approaches the output voltage, a gradual transition to the buck-boost mode occurs. This gradual transition between modes eliminates disturbances at the output during transitions.

2. Master key : 6807F00B48ED35DC[v1]

3. **LM25118** Product Folder : http://www.ti.com/product/LM25118 : contains the data sheet and other resources.