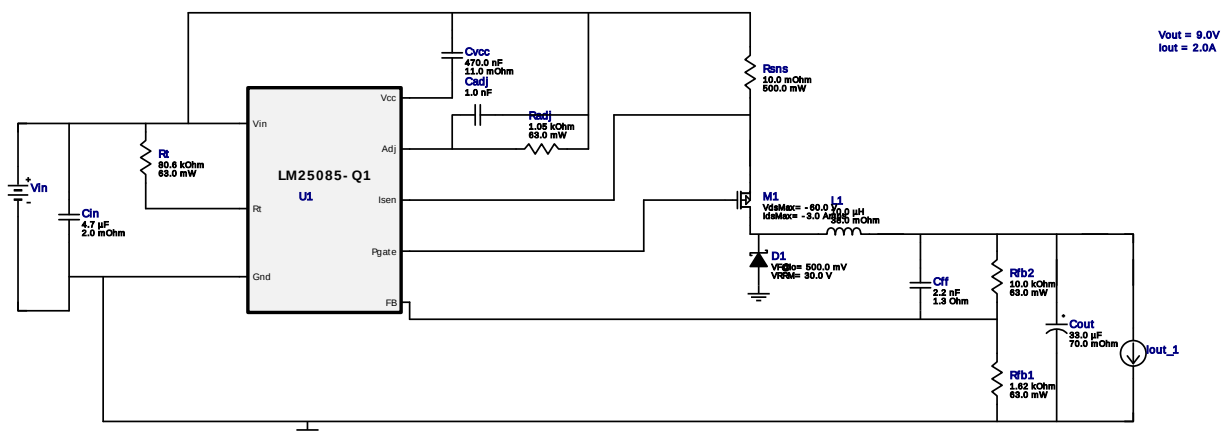


WEBENCH® Design Report

Design : 4801973/3 LM25085QMY/NOPB
LM25085QMY/NOPB 15.0V-18.0V to 9.00V @ 2.0A

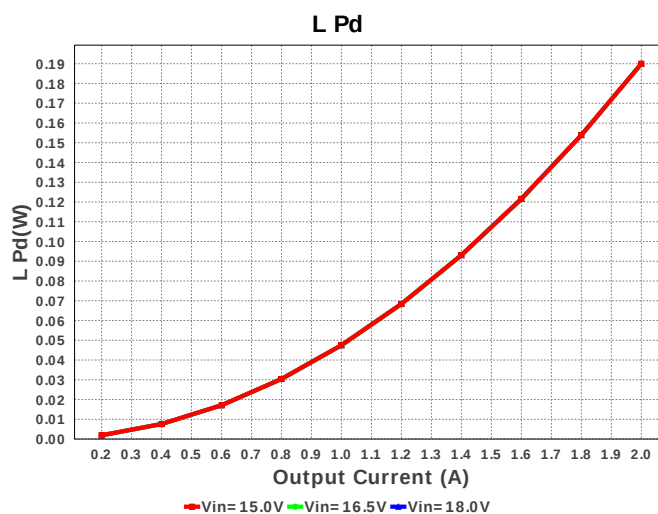
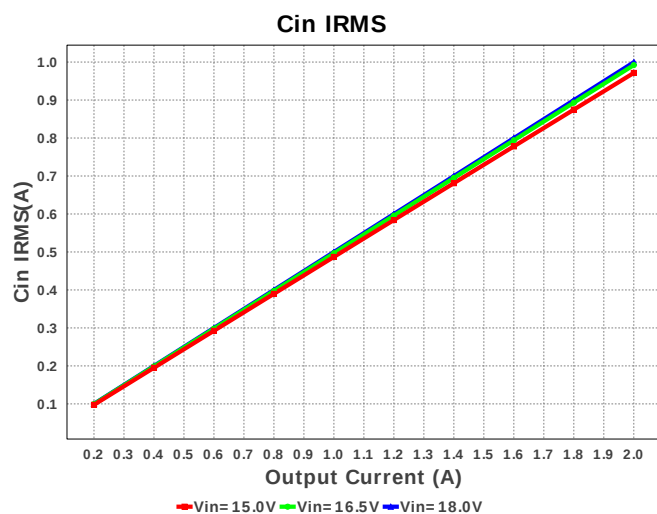
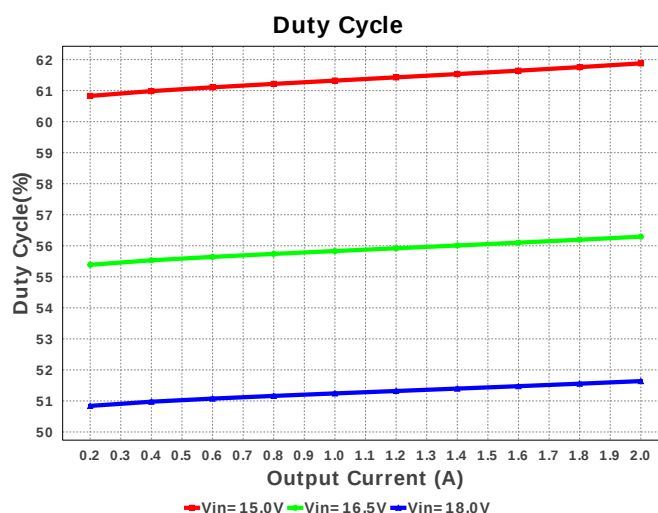
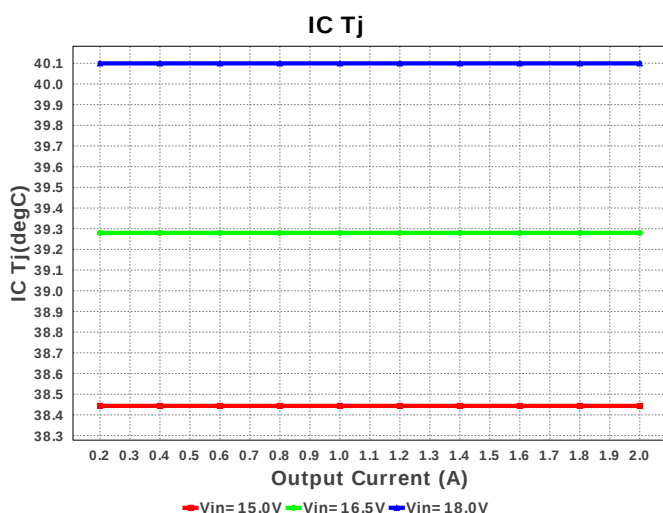


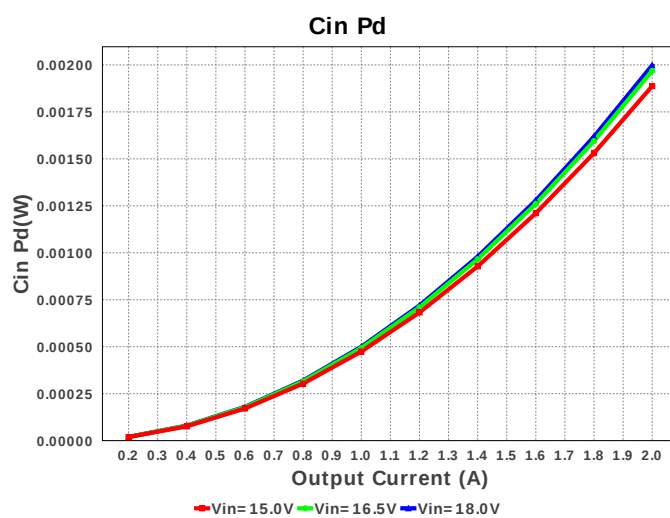
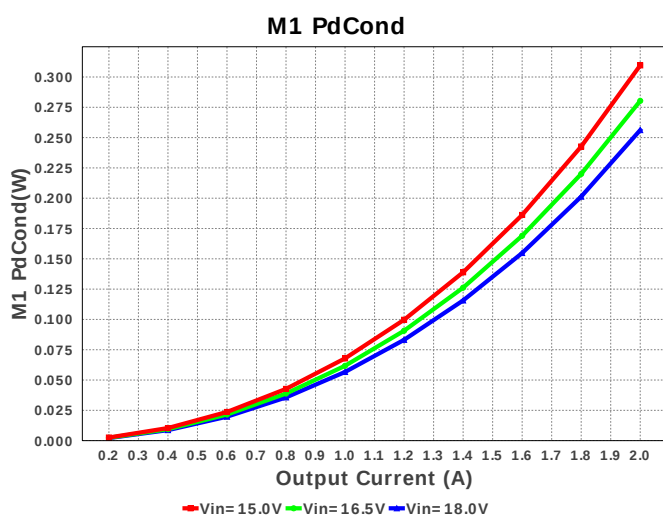
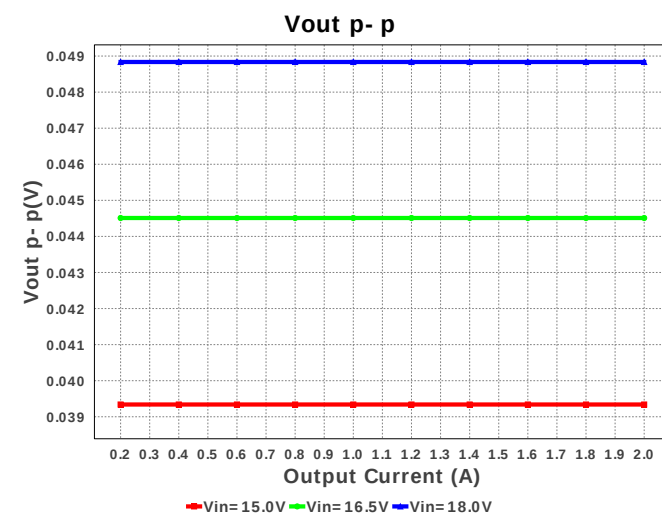
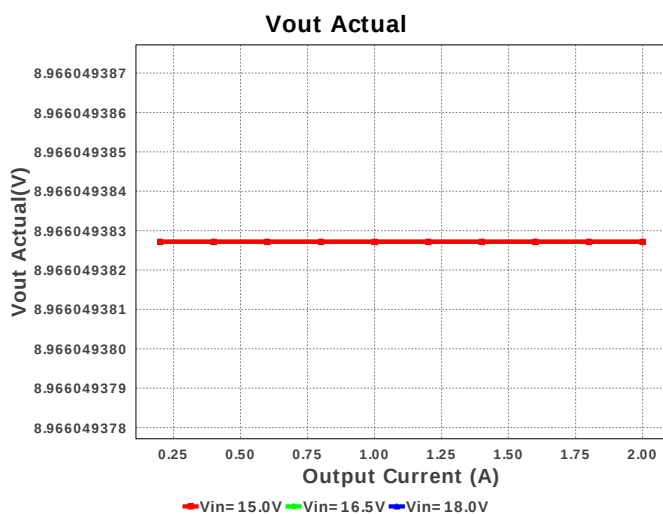
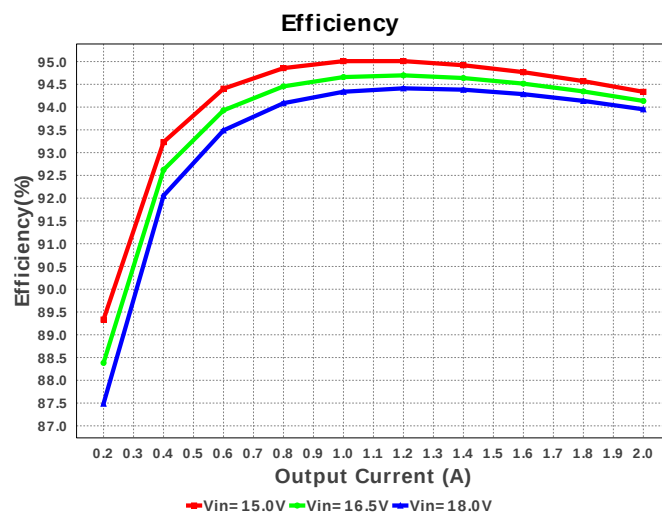
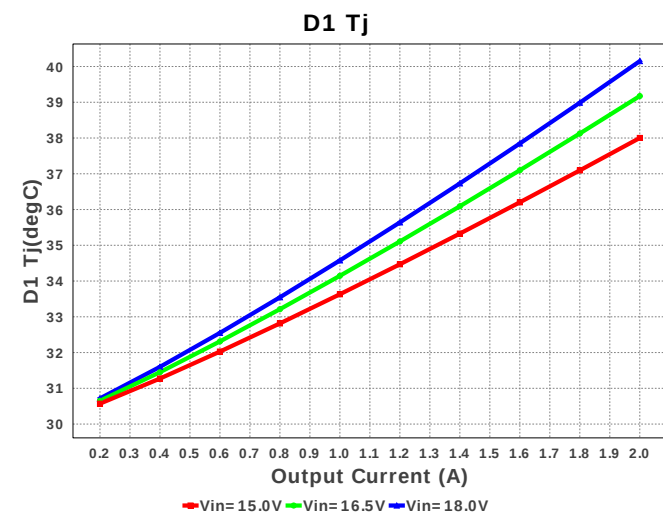
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application. View WEBENCH(R) Disclaimer.

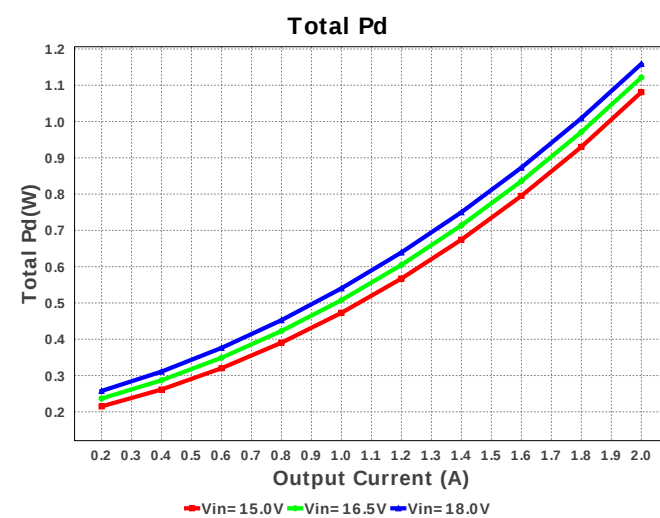
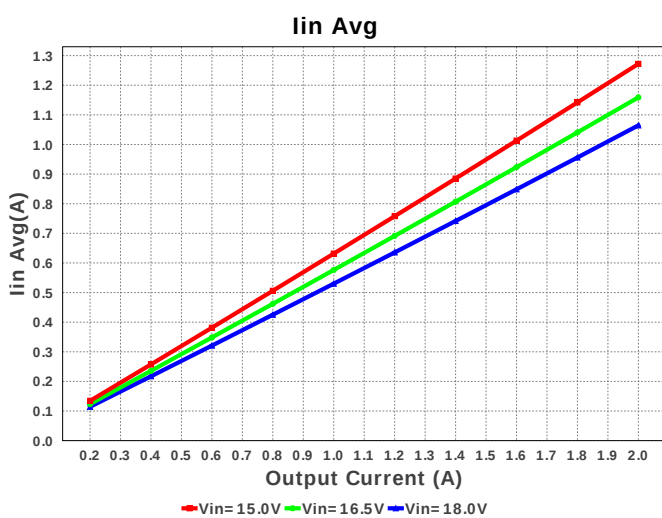
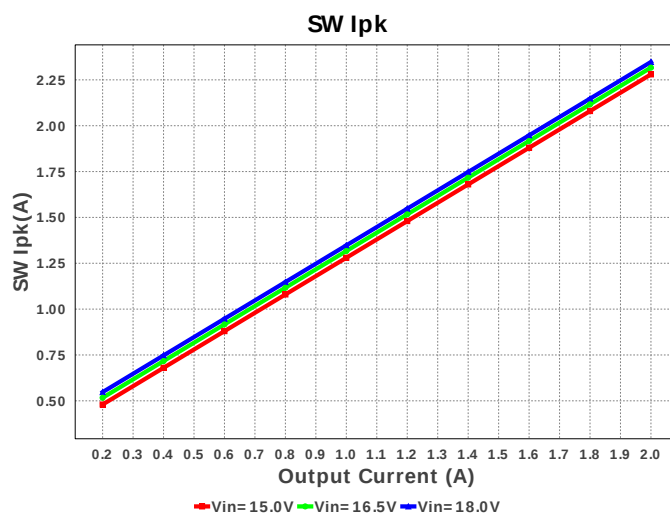
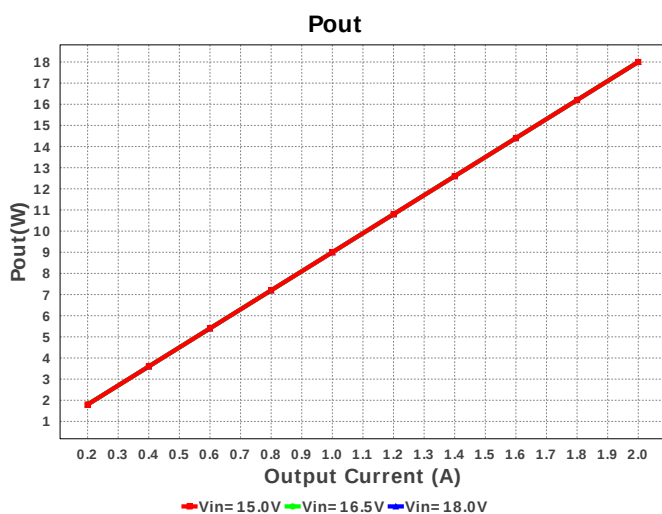
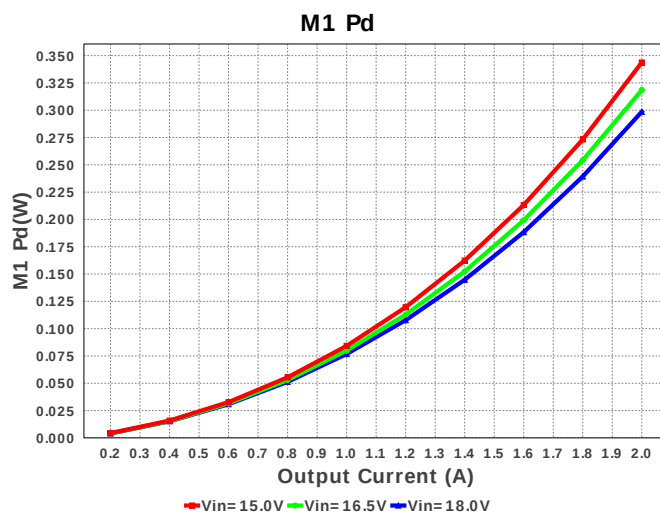
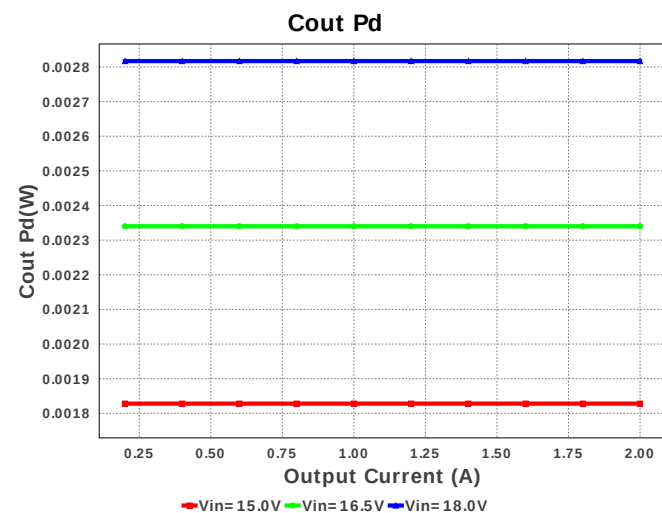
Electrical BOM

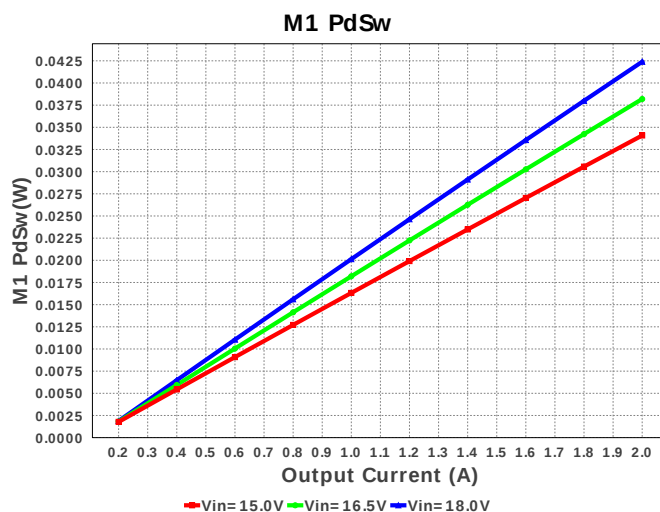
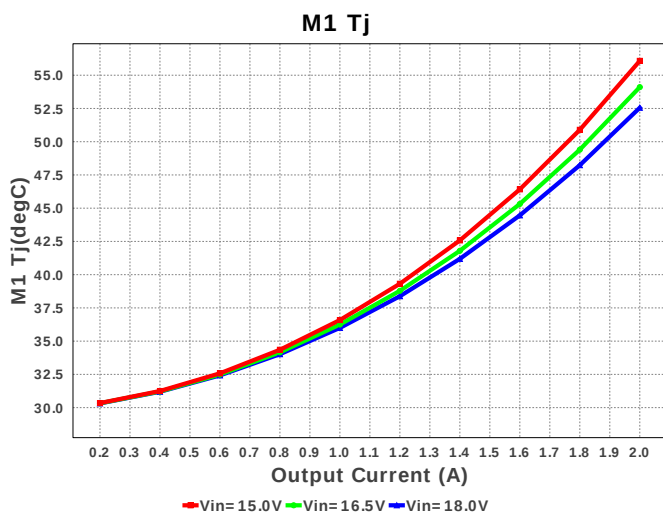
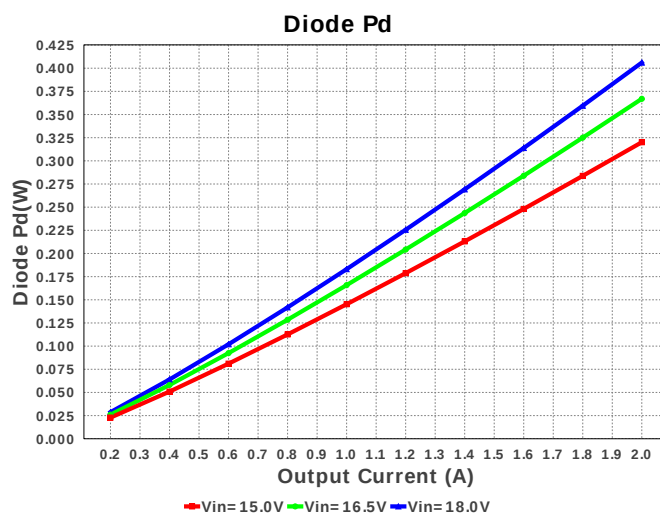
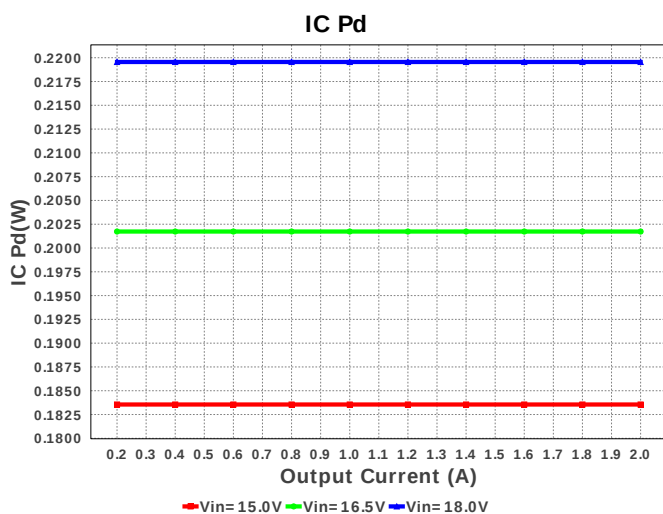
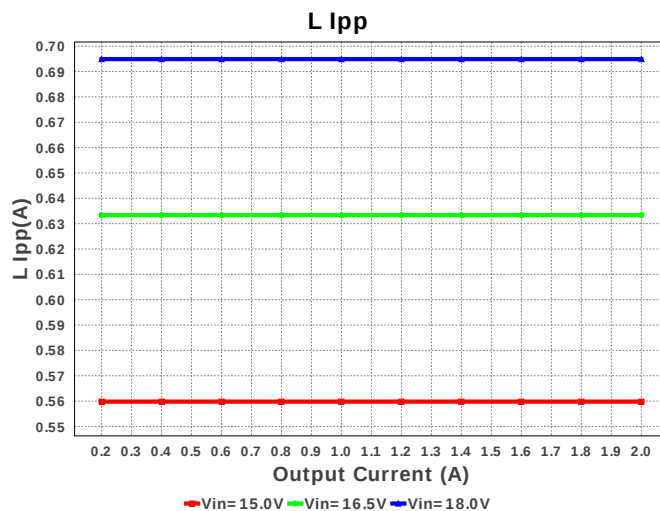
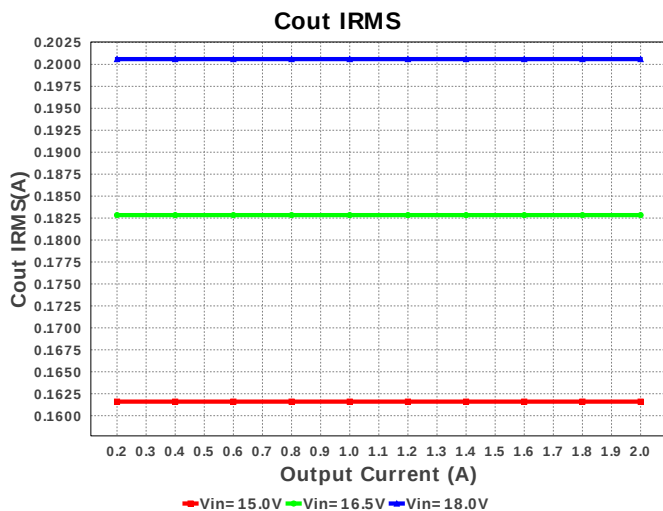
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cadj	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Cff	MuRata	GRM188R71E222KA01D Series= X7R	Cap= 2.2 nF ESR= 1.3 Ohm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
3.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	\$0.02	0805 7 mm ²
4.	Cout	Panasonic	12TPG33M Series= ?	Cap= 33.0 uF ESR= 70.0 mOhm VDC= 12.5 V IRMS= 1.0 A	1	\$0.46	CAPSMT_6_B1G 17 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.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.09	SMA 37 mm ²
7.	L1	TDK	VLP8040T-100M	L= 10.0 uH DCR= 38.0 mOhm	1	\$0.22	VLP8040 113 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	CRCW04021K05FKED Series= CRCW..e3	Res= 1.05 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfb1	Vishay-Dale	CRCW04021K62FKED Series= CRCW..e3	Res= 1.62 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rfb2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	Rsns	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm ²
13.	Rt	Vishay-Dale	CRCW040280K6FKED Series= CRCW..e3	Res= 80.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	U1	Texas Instruments	LM25085QMY/NOPB	Switcher	1	\$0.79	 MUY08A 24 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	999.464 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	200.602 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.064 A	Current	Average input current
4.	L Ipp	694.91 mA	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	2.347 A	Current	Peak switch current
6.	BOM Count	14	General	Total Design BOM count
7.	FootPrint	254.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	608.185 kHz	General	Switching frequency
9.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
10.	Mode	CCM	General	Conduction Mode
11.	Pout	18.0 W	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	\$2.0	General	Total BOM Cost
13.	D1 Tj	40.152 degC	Op_Point	D1 junction temperature
14.	Vout Actual	8.966 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	51.637 %	Op_point	Duty cycle
17.	Efficiency	93.956 %	Op_point	Steady state efficiency
18.	IC Tj	40.099 degC	Op_point	IC junction temperature
19.	ICThetaJA	46.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	M1 Tj	52.554 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	18.0 V	Op_point	Vin operating point
23.	Vout p-p	48.836 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	1.998 mW	Power	Input capacitor power dissipation
25.	Cout Pd	2.817 mW	Power	Output capacitor power dissipation
26.	Diode Pd	406.064 mW	Power	Diode power dissipation
27.	IC Pd	219.552 mW	Power	IC power dissipation
28.	L Pd	190.0 mW	Power	Inductor power dissipation
29.	M1 Pd	297.529 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	255.134 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	42.395 mW	Power	M1 MOSFET switching losses
32.	Total Pd	1.158 W	Power	Total Power Dissipation
33.	Vout Tolerance	3.773 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	18.0	Maximum input voltage
3.	VinMin	15.0	Minimum input voltage
4.	Vout	9.0	Output Voltage
5.	base_pn	LM25085-Q1	Base Product 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. Feature Highlights: Automotive Qualified 75V Wide Vin Constant On-Time PFET Buck Switching Controller

3. The LM25085-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application

4. **LM25085-Q1 Product Folder** : <http://www.ti.com/product/LM25085%2DQ1> : contains the data sheet and other resources.

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You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

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