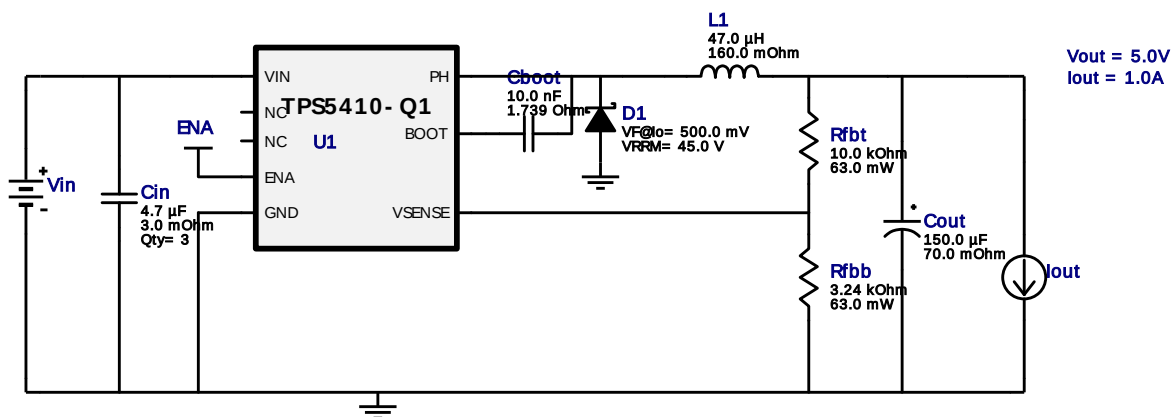


WEBENCH® Design Report

Design : 1852521/22 TPS5410QDRQ1
TPS5410QDRQ1 6.0V-30.0V to 5.00V @ 1.0A



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.

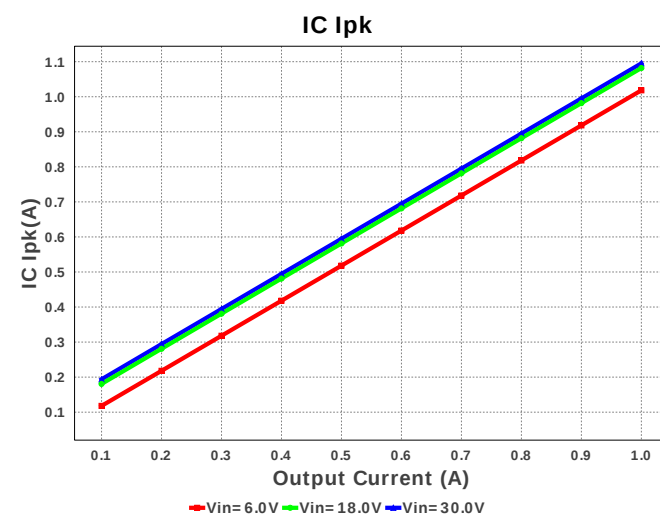
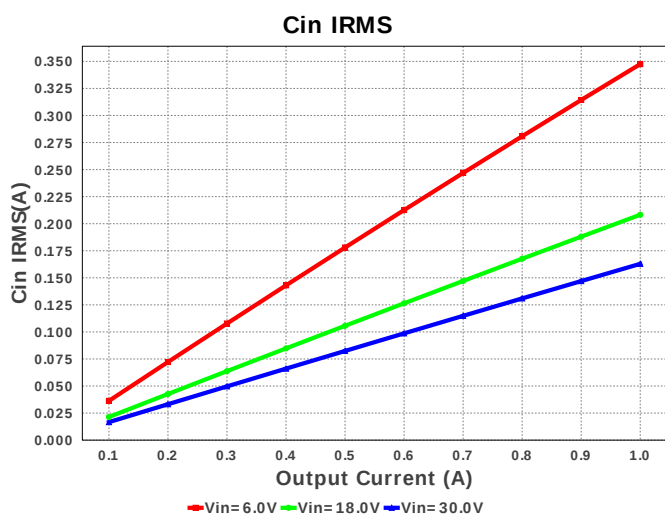
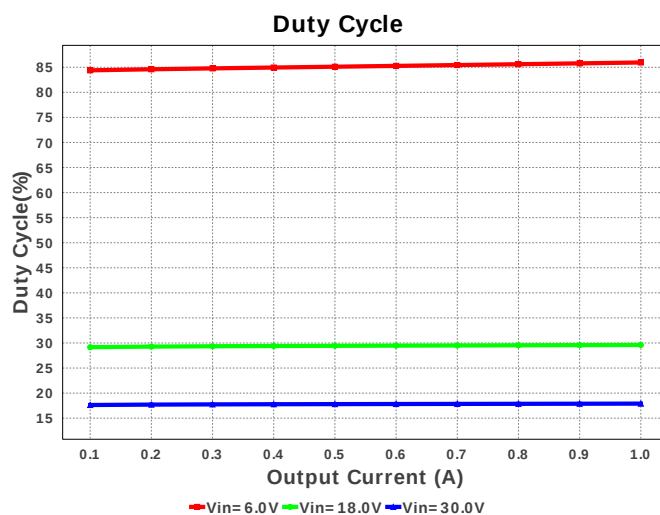
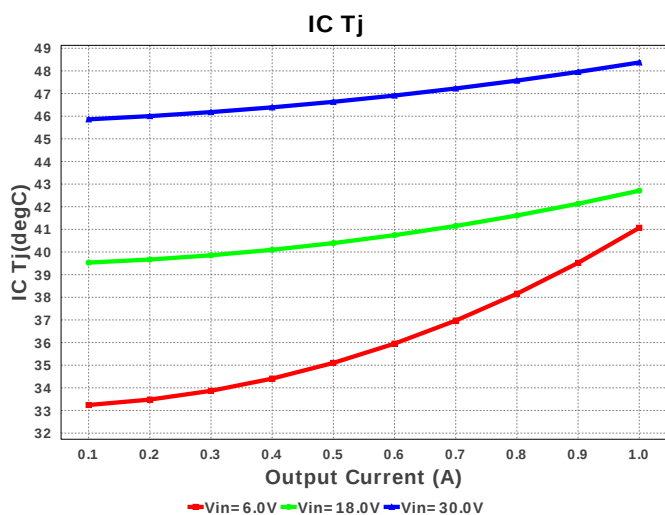
My Comments

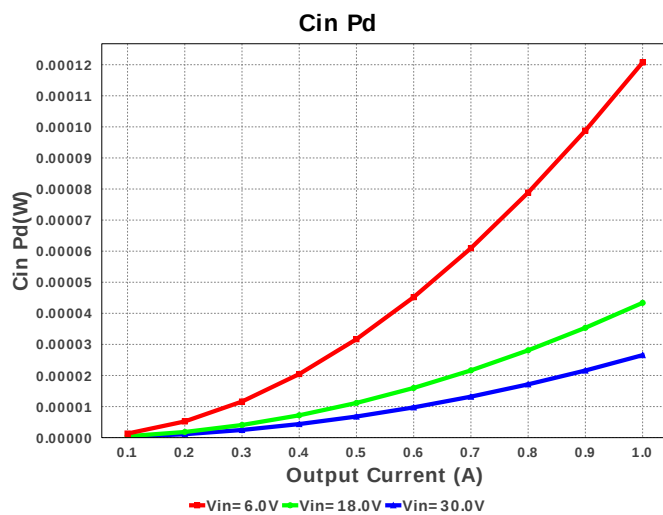
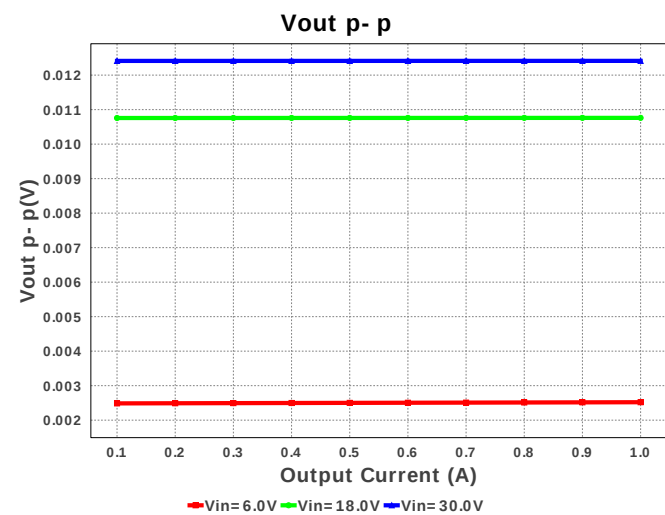
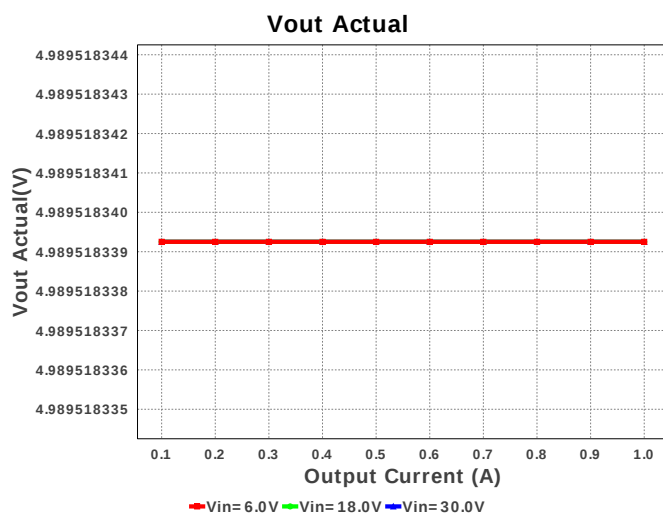
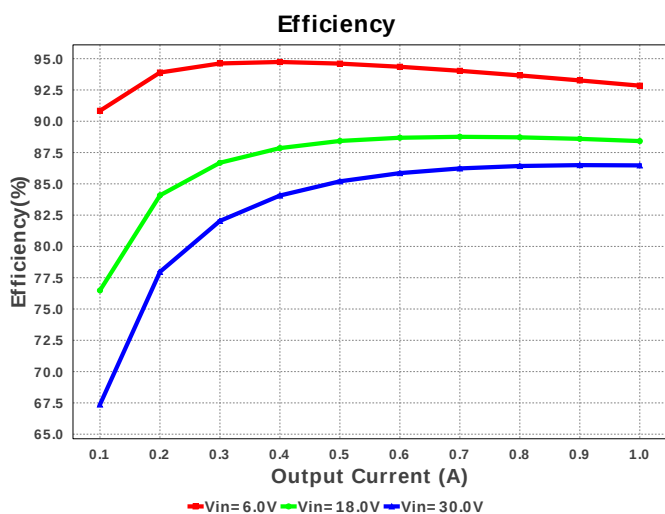
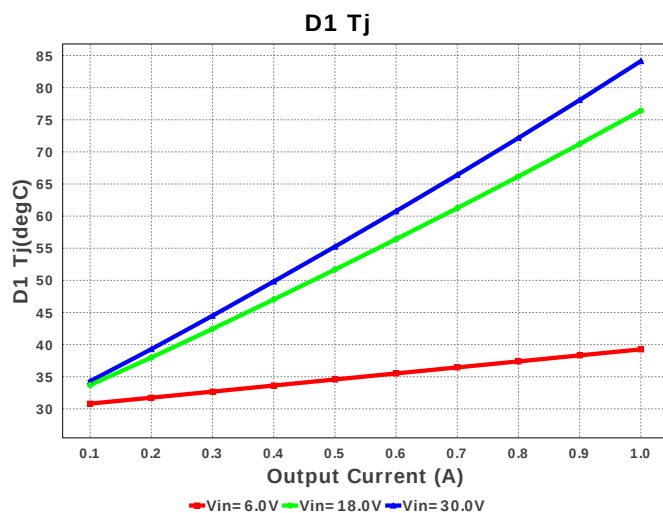
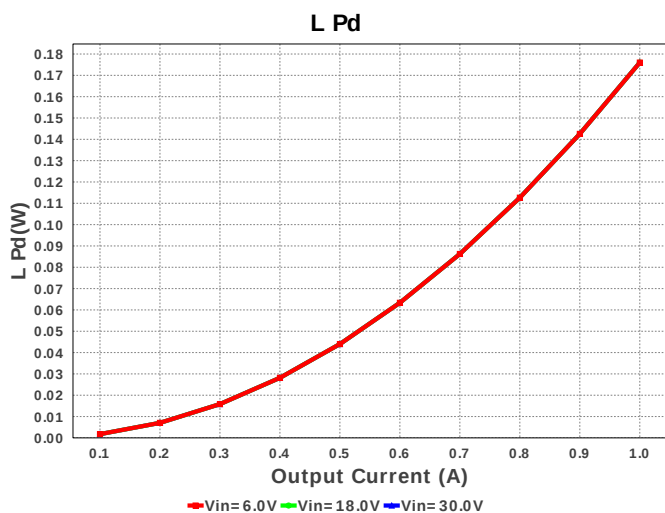
No comments

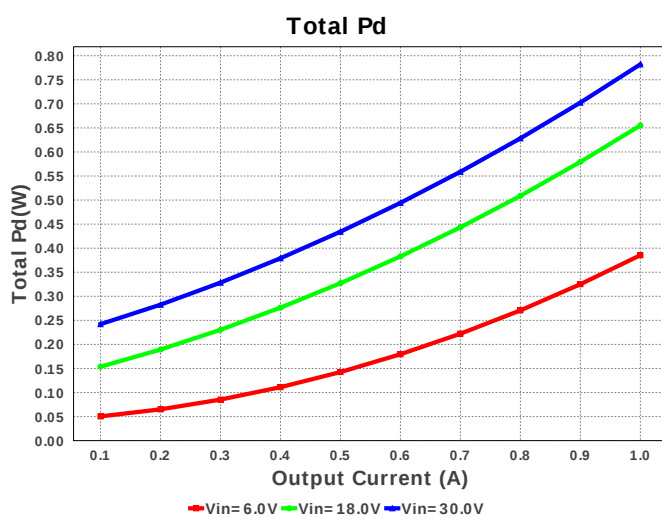
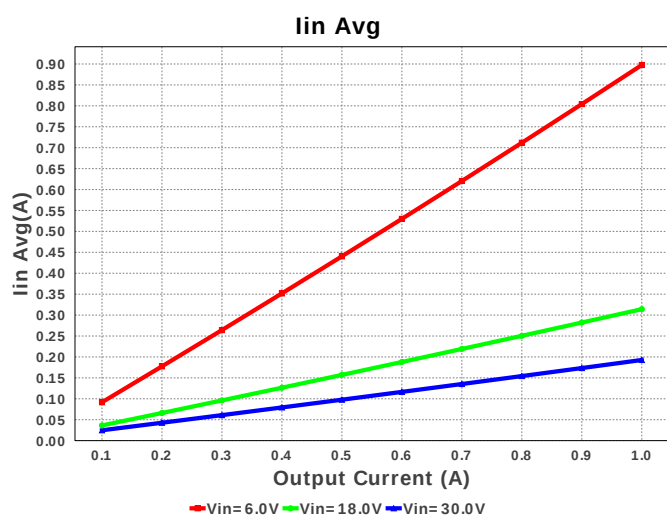
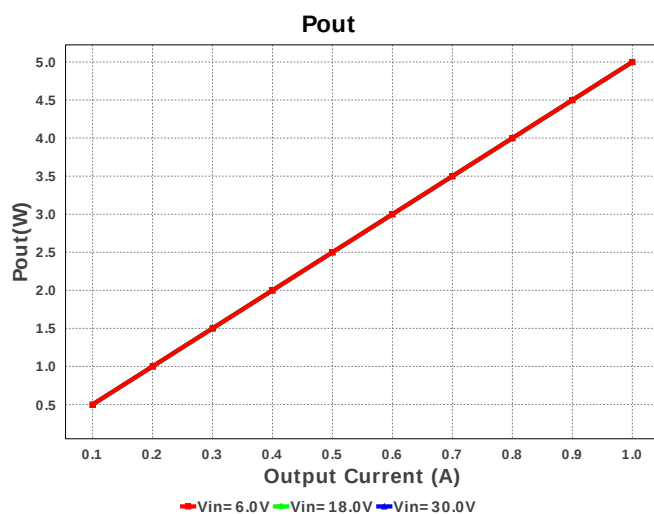
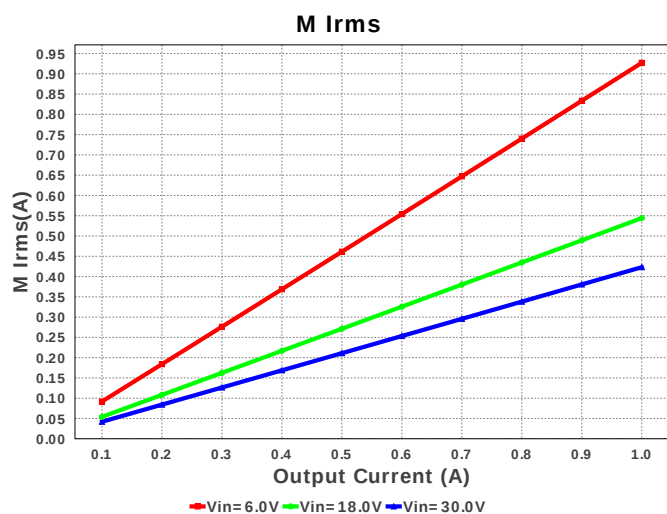
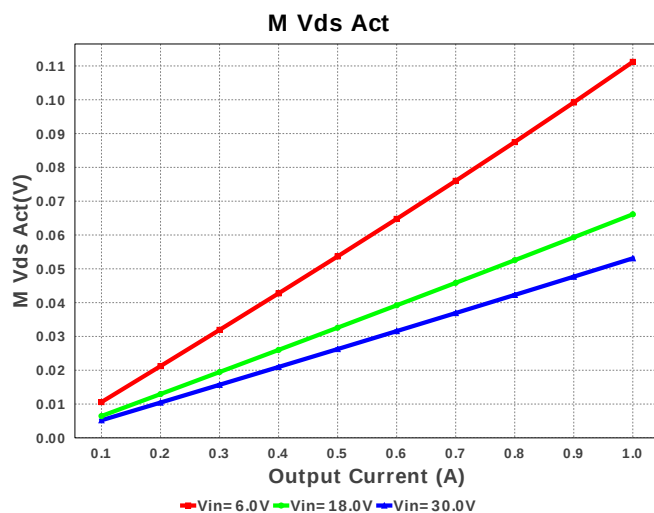
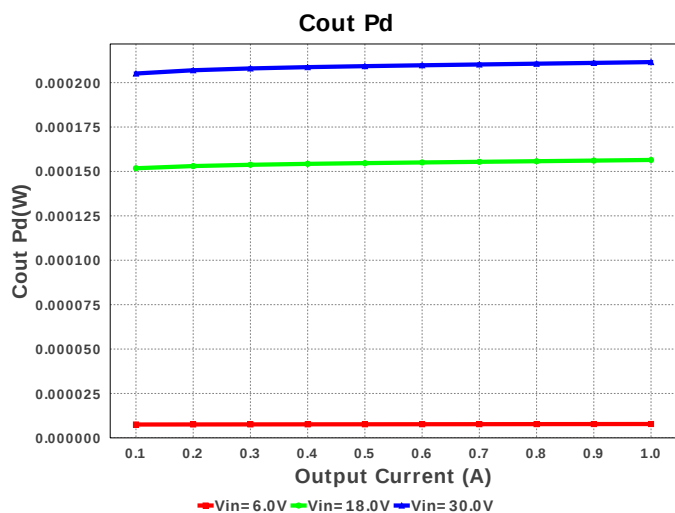
Electrical BOM

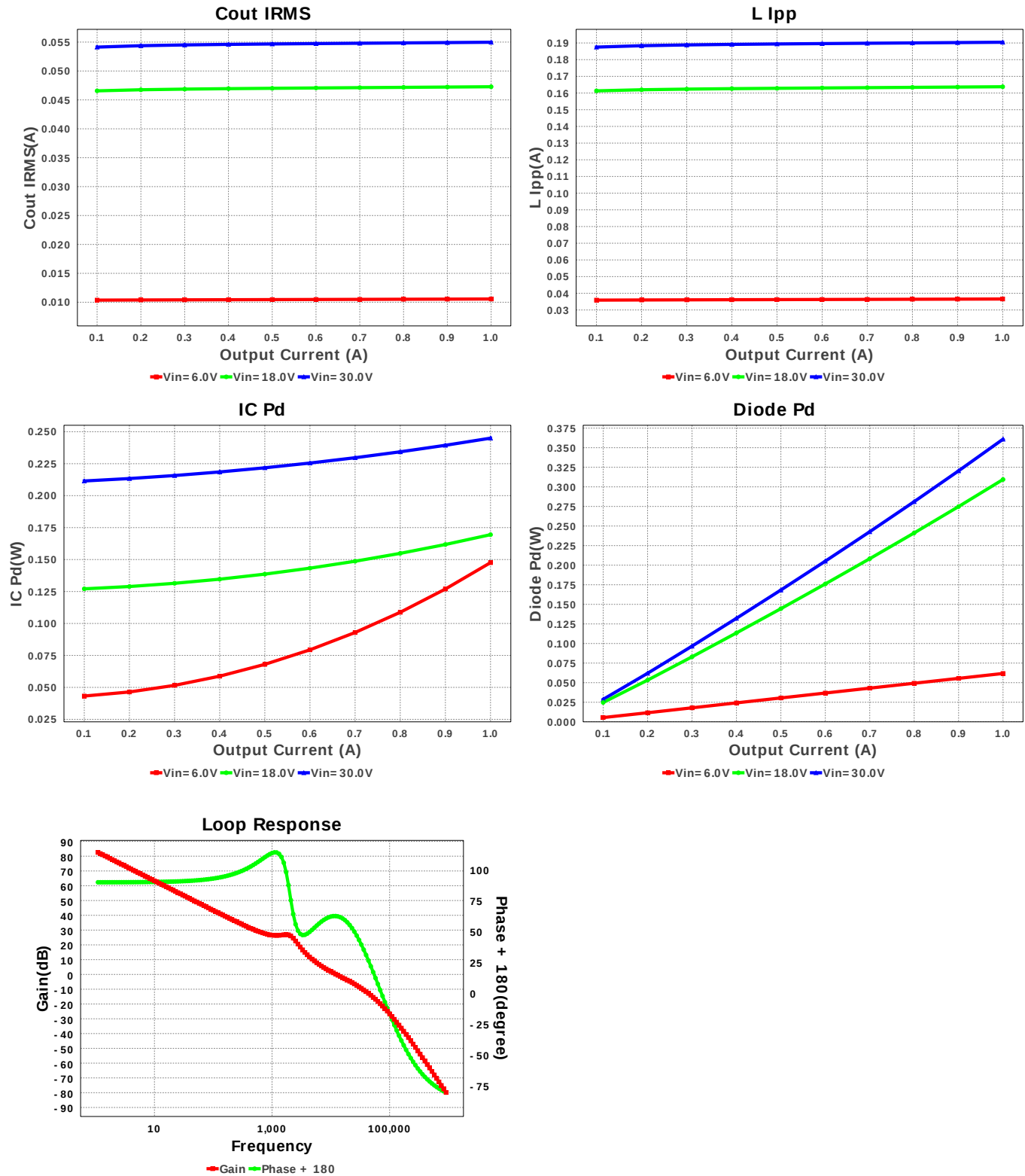
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	\$0.01	0805 7 mm ²
2.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	3	\$0.07	1206 11 mm ²
3.	Cout	Panasonic	6TPG150M Series= ?	Cap= 150.0 uF ESR= 70.0 mOhm VDC= 6.3 V IRMS= 1.0 A	1	\$0.48	CAPSMT_6_B15G 17 mm ²
4.	D1	Vishay-Semiconductor	BYS10-45-E3/TR	VF@Io= 500.0 mV VRRM= 45.0 V	1	\$0.10	SMA 37 mm ²
5.	L1	TDK	VLP8040T-470M	L= 47.0 µH DCR= 160.0 mOhm	1	\$0.22	VLP8040 113 mm ²
6.	Rfbb	Vishay-Dale	CRCW04023K24FKED Series= CRCW..e3	Res= 3.24 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
7.	Rfht	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	TPS5410QDRQ1	Switcher	1	\$1.90	 M08A 55 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	162.916 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	54.975 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.095 A	Current	Peak switch current in IC
4.	Iin Avg	192.74 mA	Current	Average input current
5.	L Ipp	190.44 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	423.098 mA	Current	MOSFET RMS current
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	269.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	18.315 mV	General	IC Feedback Tolerance
11.	M Vds Act	53.102 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	\$2.94	General	Total BOM Cost
14.	D1 Tj	84.129 degC	Op_Point	D1 junction temperature
15.	Vout Actual	4.99 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	12.37 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	17.901 %	Op_point	Duty cycle
19.	Efficiency	86.474 %	Op_point	Steady state efficiency
20.	IC Tj	48.373 degC	Op_point	IC junction temperature
21.	ICThetaJA	75.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.0 A	Op_point	Iout operating point
23.	Phase Marg	62.666 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	30.0 V	Op_point	Vin operating point
25.	Vout p-p	13.334 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	26.542 µW	Power	Input capacitor power dissipation
27.	Cout Pd	211.556 µW	Power	Output capacitor power dissipation
28.	Diode Pd	360.858 mW	Power	Diode power dissipation
29.	IC Pd	244.968 mW	Power	IC power dissipation
30.	L Pd	176.0 mW	Power	Inductor power dissipation
31.	Total Pd	782.1 mW	Power	Total Power Dissipation
32.	Vout Tolerance	3.049 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS5410-Q1	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. Feature Highlights: Automotive Qualified 1A, 500kHz Fixed Switching Frequency, Internal Compensation
2. The TPS5410-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
3. TPS5410-Q1 Product Folder : <http://www.ti.com/product/TPS5410%2DQ1> : contains the data sheet and other resources.

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