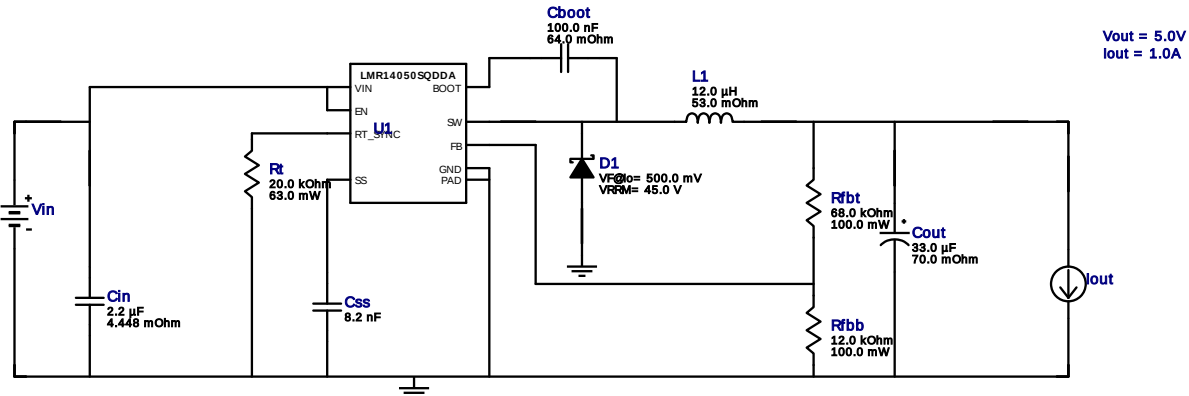


WEBENCH® Design Report

Design : 1852521/21 LMR14050SQDDARQ1
LMR14050SQDDARQ1 6.0V-30.0V to 5.00V @ 1.0001875000000002A



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.

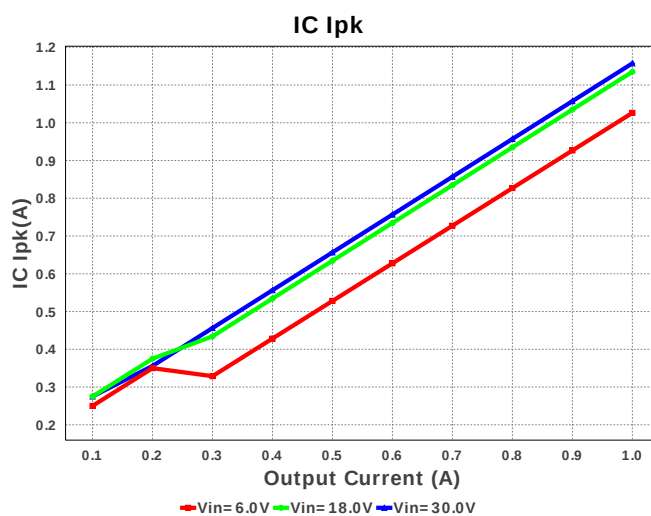
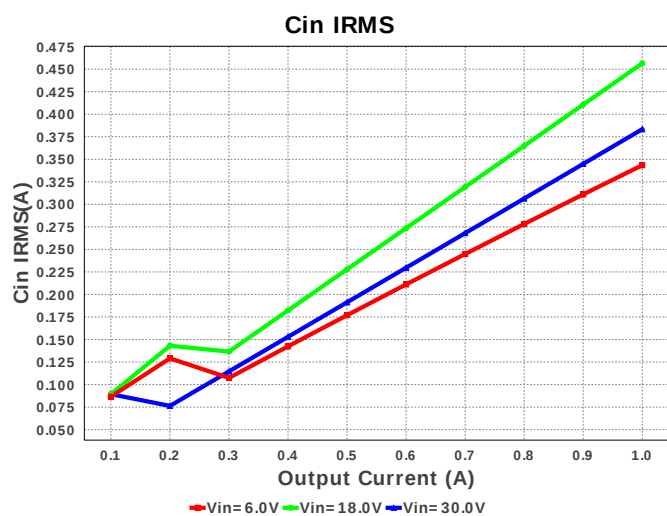
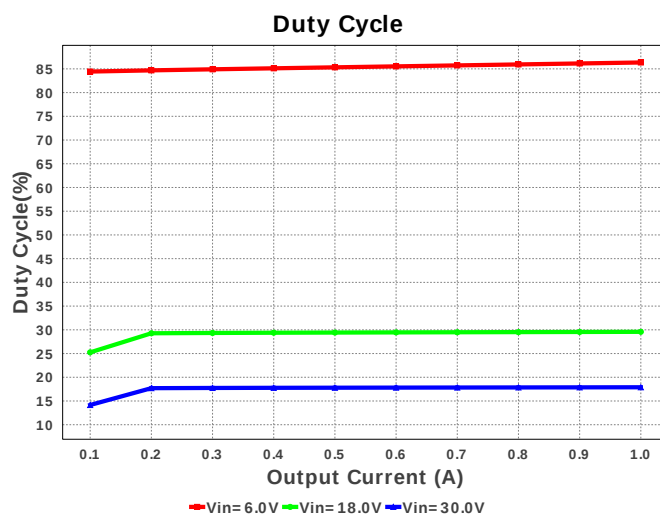
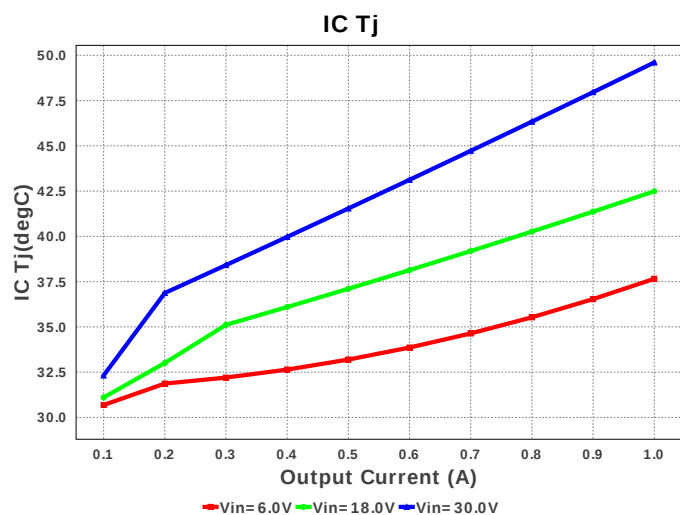
My Comments

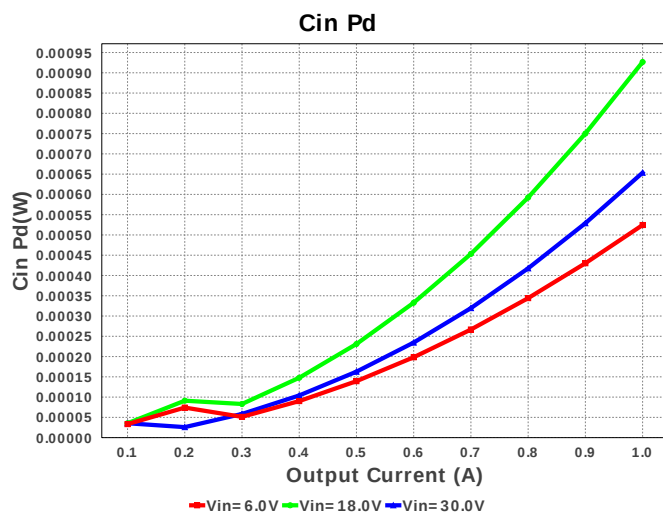
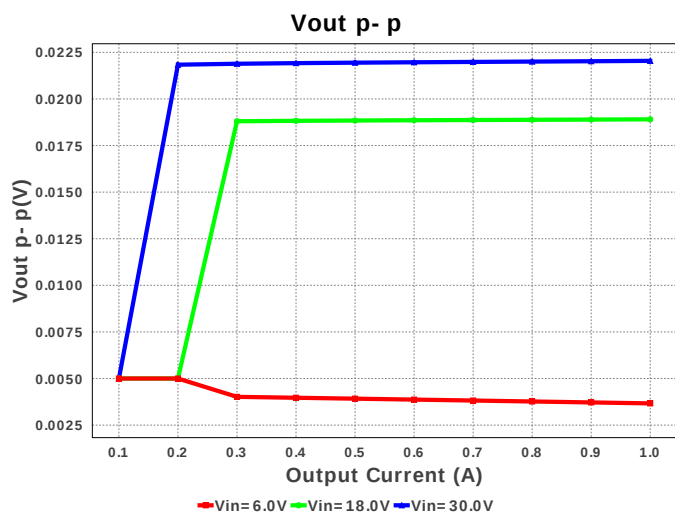
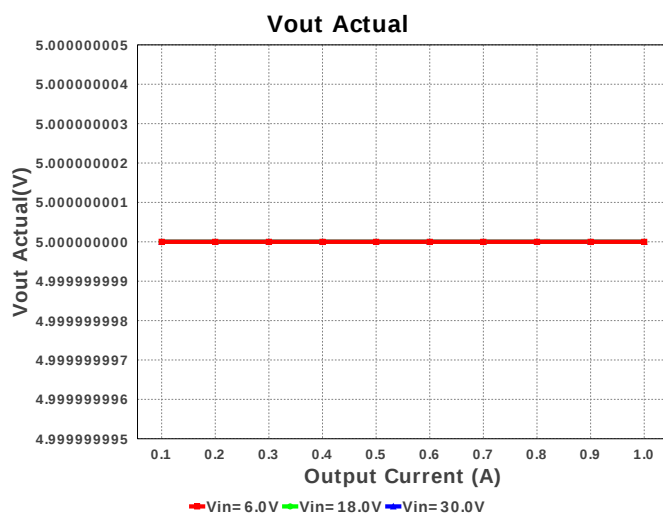
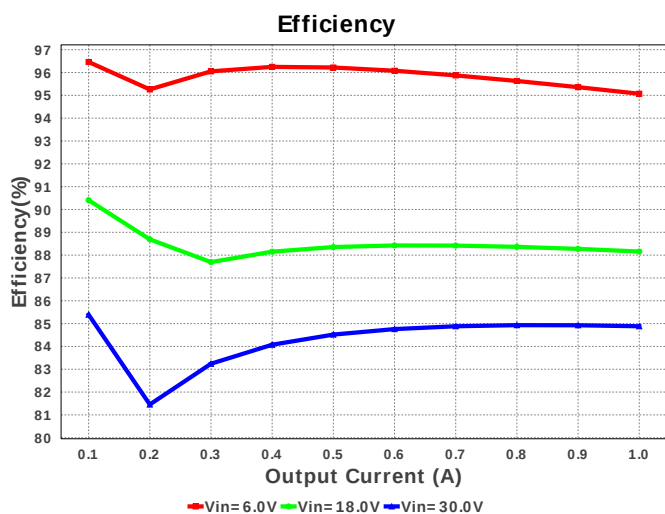
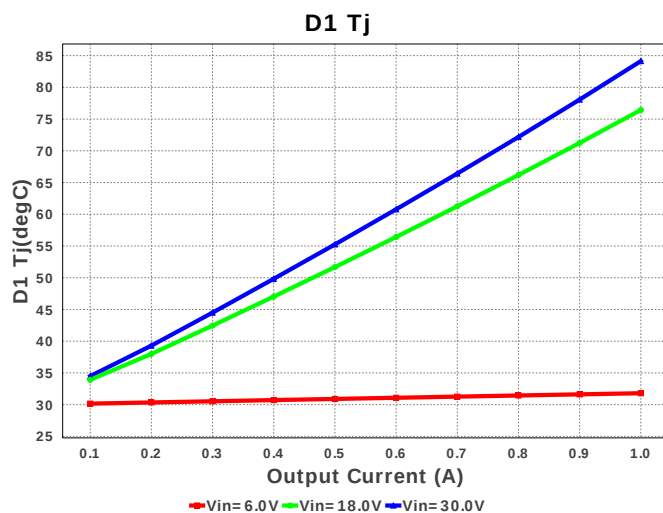
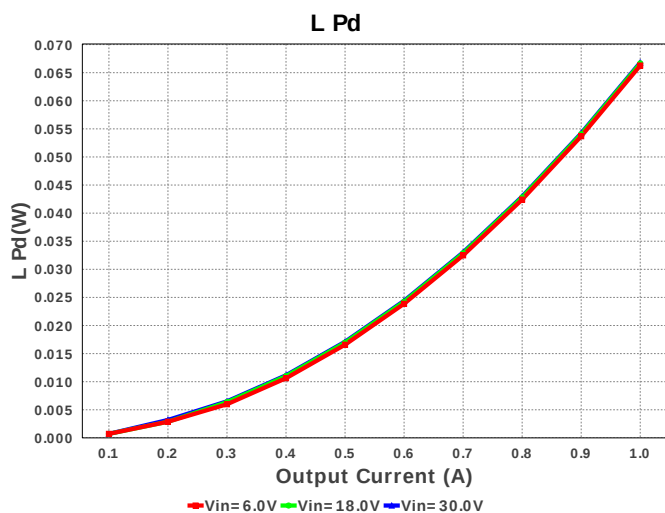
No comments

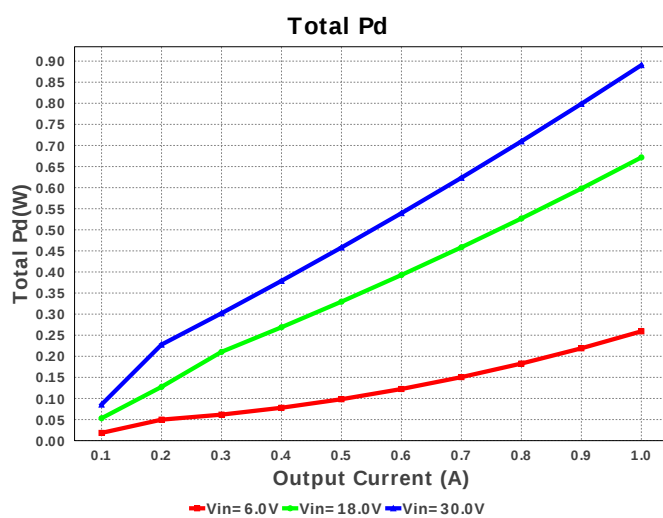
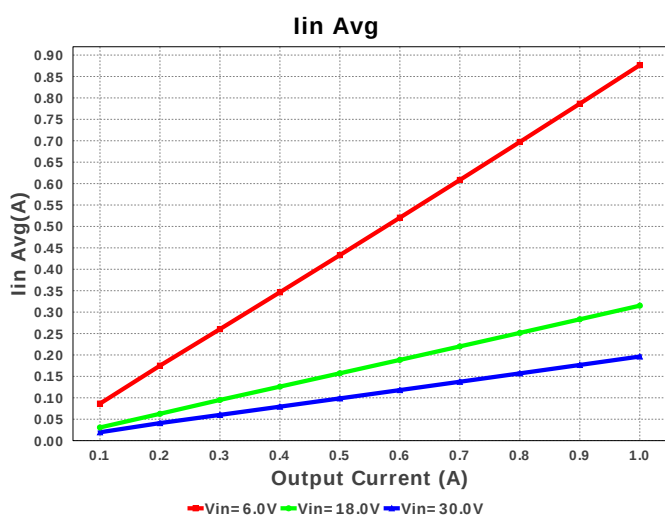
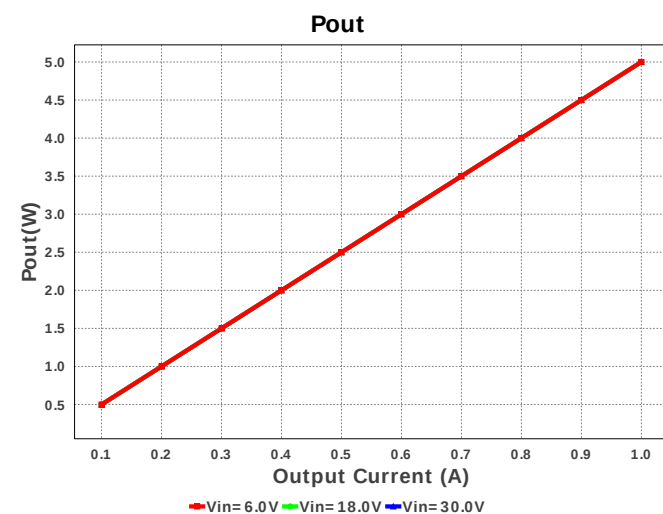
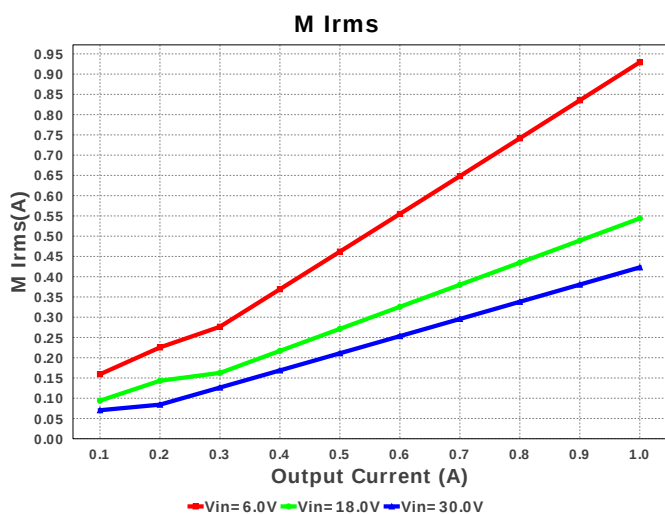
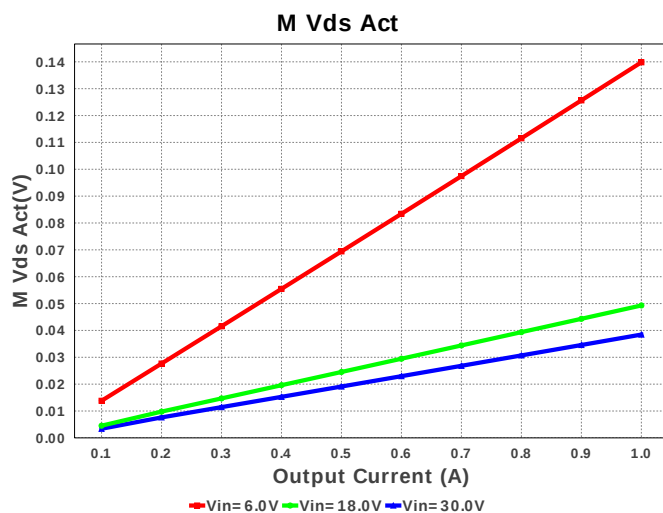
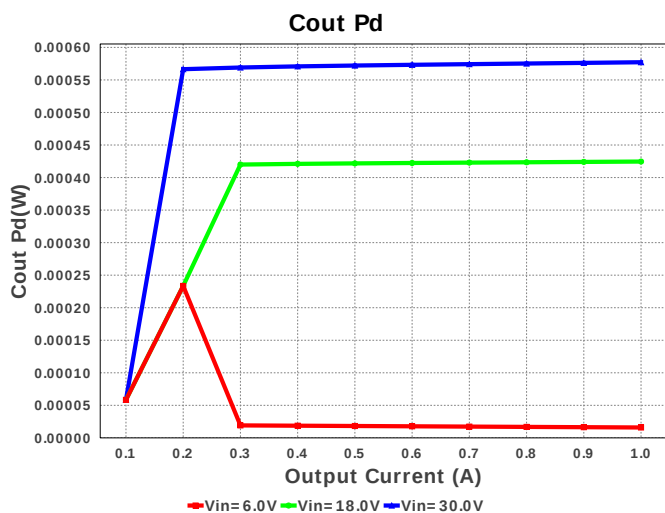
Electrical BOM

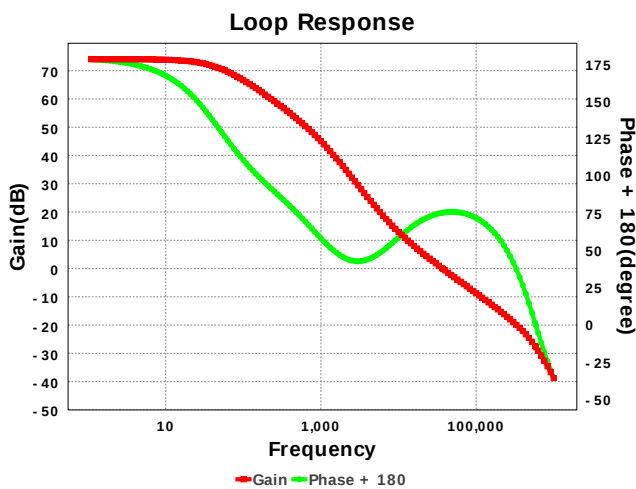
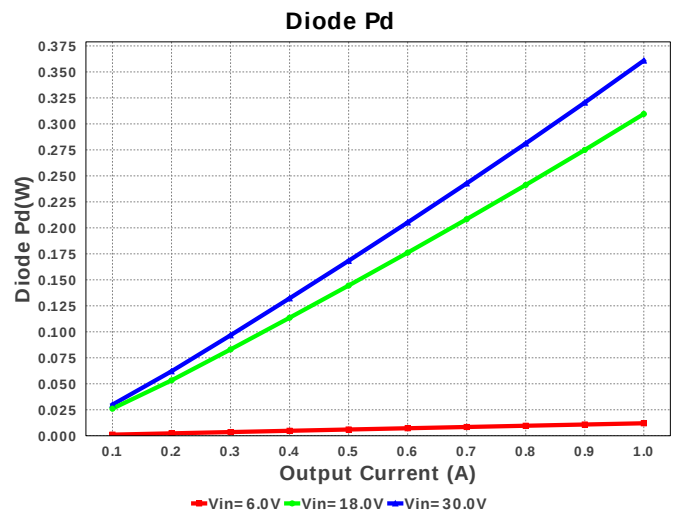
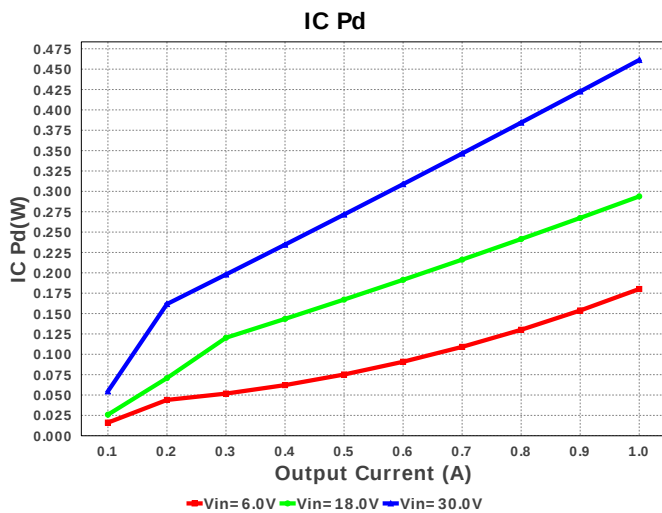
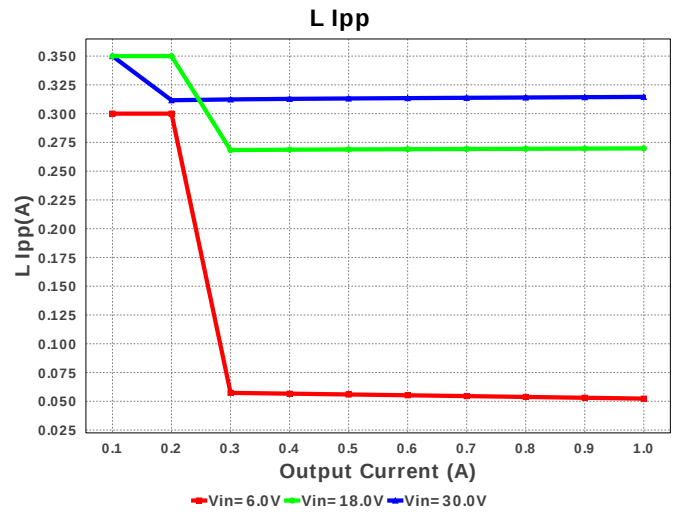
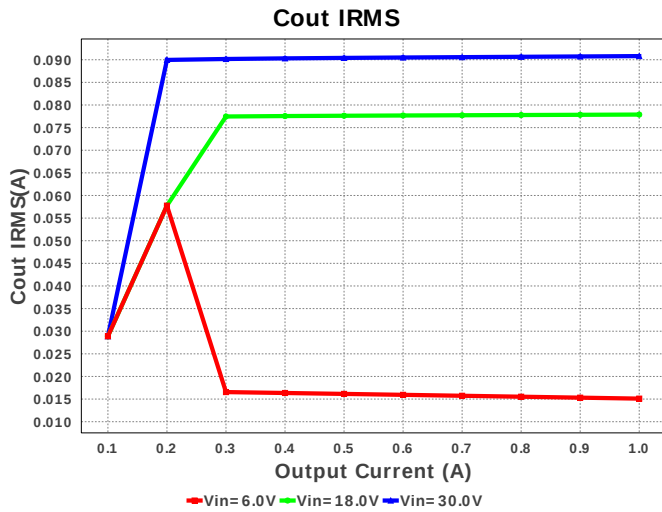
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	 0805 7 mm ²
2.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	\$0.05	 1206_190 11 mm ²
3.	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
4.	Css	MuRata	GRM155R71C822KA01D Series= X7R	Cap= 8.2 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
5.	D1	Vishay-Semiconductor	BYS10-45-E3/TR	VF@Io= 500.0 mV VRRM= 45.0 V	1	\$0.10	 SMA 37 mm ²
6.	L1	Bourns	SRR6038-120Y	L= 12.0 uH DCR= 53.0 mOhm	1	\$0.26	 SRR6038 77 mm ²
7.	Rfbb	Yageo America	RC0603FR-0712KL Series= ?	Res= 12.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
8.	Rfbbt	Yageo America	RC0603FR-0768KL Series= ?	Res= 68.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
9.	Rt	Vishay-Dale	CRCW040220K0FKED Series= CRCW..e3	Res= 20.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LMR14050SQDDARQ1	Switcher	1	\$2.30	 DDA0008E_N 57 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	383.314 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	90.806 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.157 A	Current	Peak switch current in IC
4.	Iin Avg	196.36 mA	Current	Average input current
5.	L Ipp	314.56 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	423.023 mA	Current	MOSFET RMS current
7.	BOM Count	10	General	Total Design BOM count
8.	FootPrint	222.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.183 MHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	38.454 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	\$3.22	General	Total BOM Cost
14.	D1 Tj	84.138 degC	Op_Point	D1 junction temperature
15.	Vout Actual	5.0 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	37.024 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	17.893 %	Op_point	Duty cycle
19.	Efficiency	84.883 %	Op_point	Steady state efficiency
20.	IC Tj	49.373 degC	Op_point	IC junction temperature
21.	ICThetaJA	42.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.0 A	Op_point	Iout operating point
23.	Phase Marg	75.648 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	30.0 V	Op_point	Vin operating point
25.	Vout p-p	22.042 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	653.544 µW	Power	Input capacitor power dissipation
27.	Cout Pd	577.197 µW	Power	Output capacitor power dissipation
28.	Diode Pd	360.919 mW	Power	Diode power dissipation
29.	IC Pd	461.25 mW	Power	IC power dissipation
30.	L Pd	66.805 mW	Power	Inductor power dissipation
31.	Total Pd	890.512 mW	Power	Total Power Dissipation
32.	Vout Tolerance	4.158 %		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	LMR14050S-Q1	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LMR14050S-Q1 Product Folder : <http://www.ti.com/product/LMR14050%2DQ1> : contains the data sheet and other resources.

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