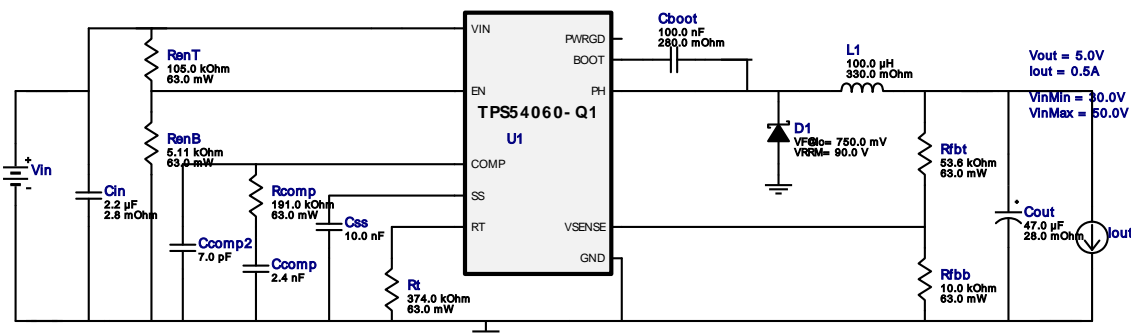


WEBENCH® Design Report






Design : 3893339/1 TPS54060QDGQRQ1
TPS54060QDGQRQ1 30.0V-50.0V to 5.0V @ 0.5A

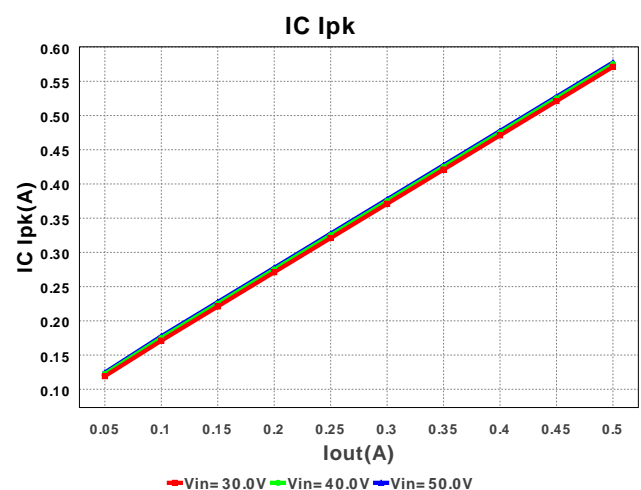
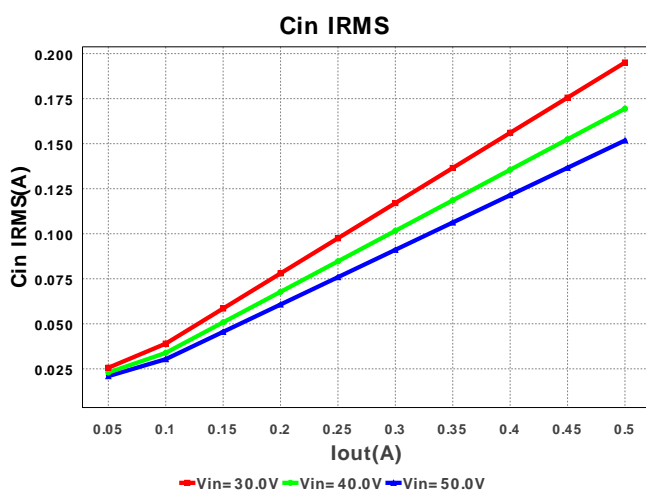
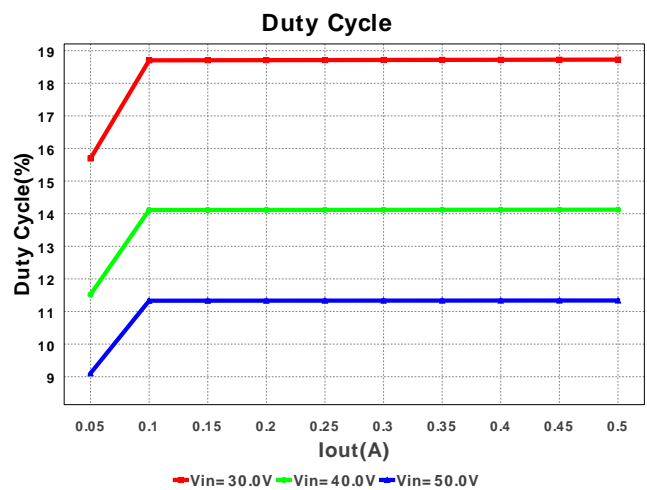
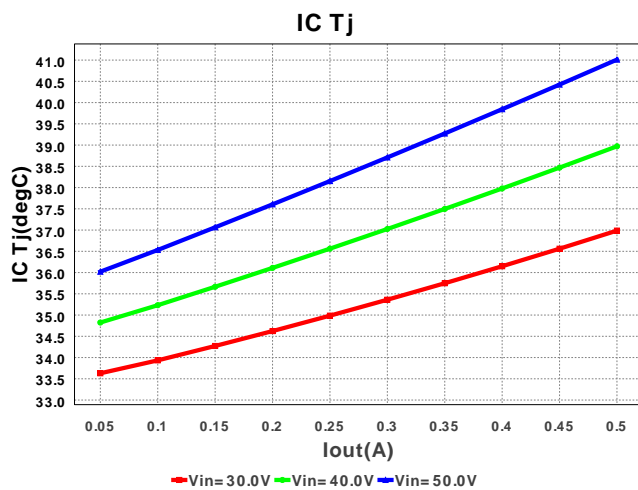


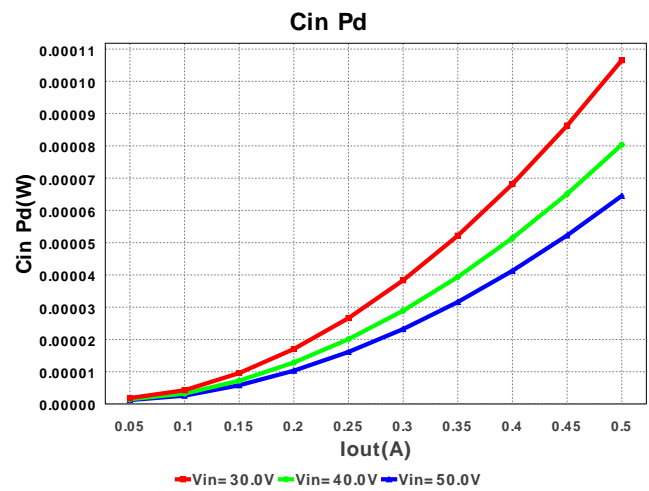
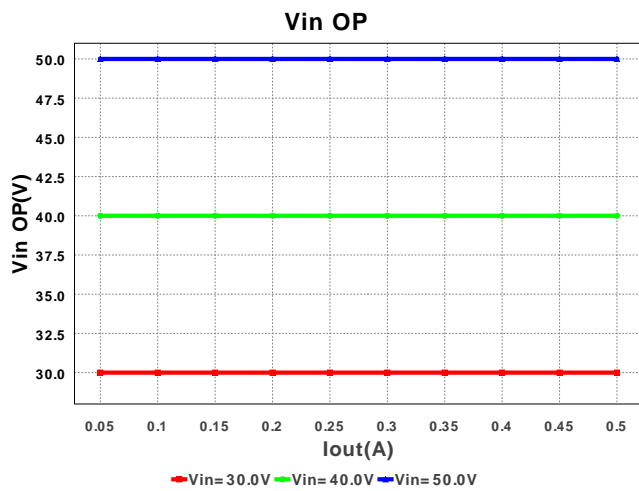
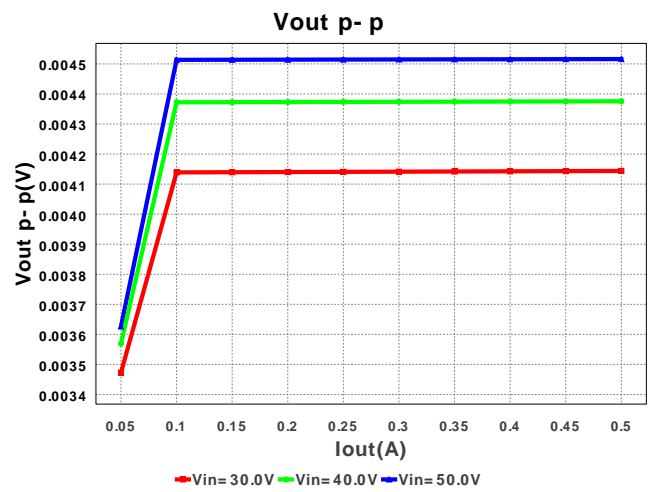
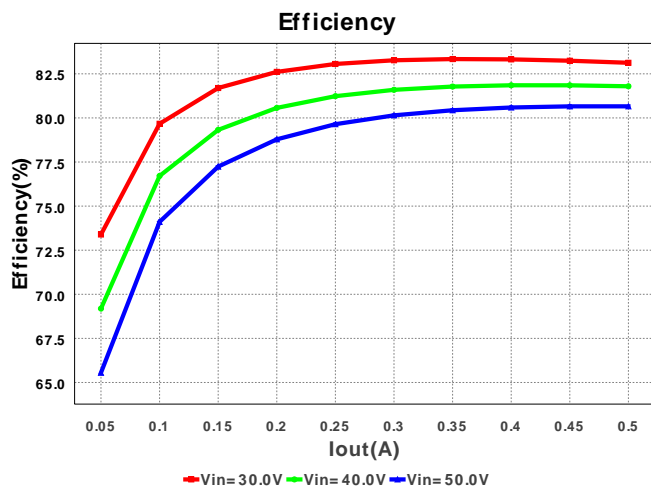
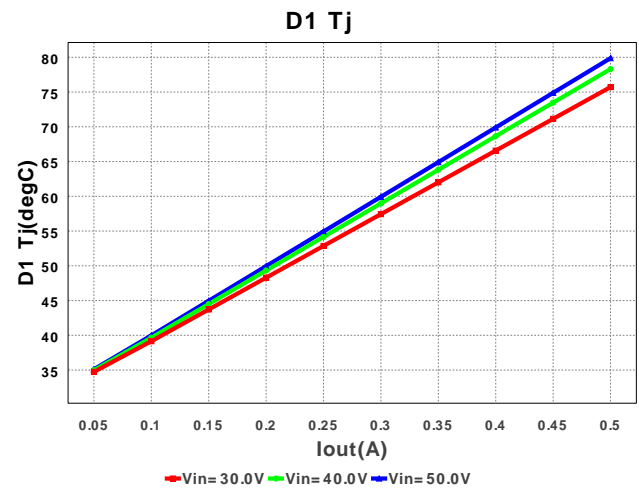
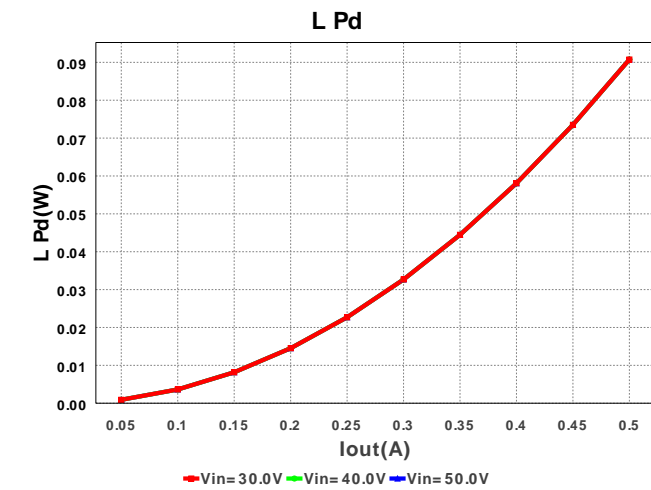
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

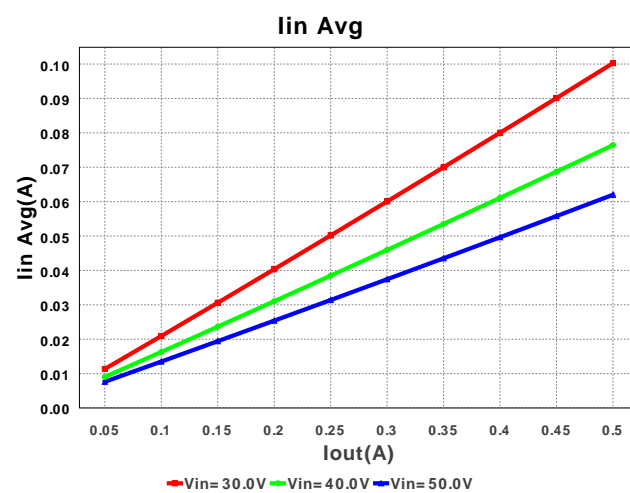
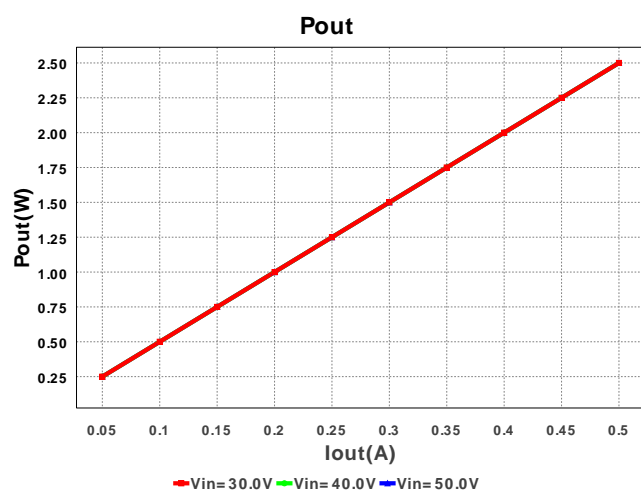
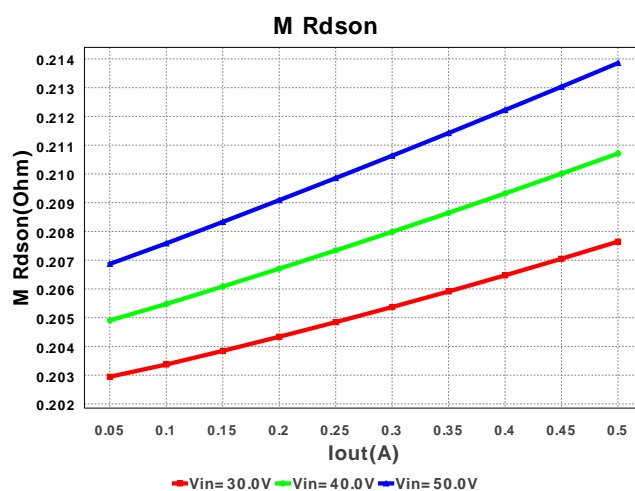
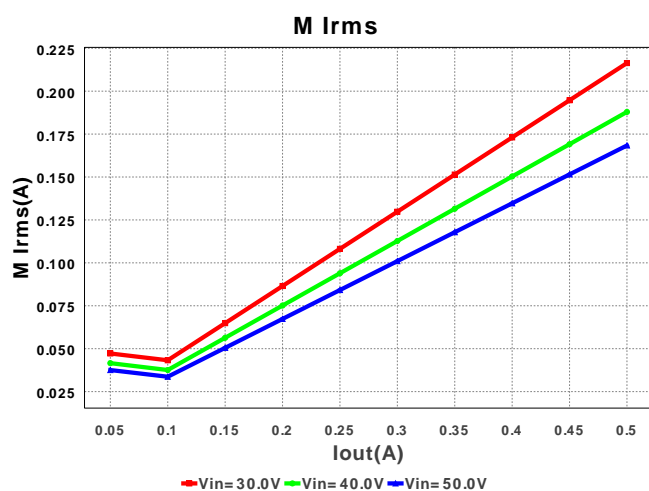
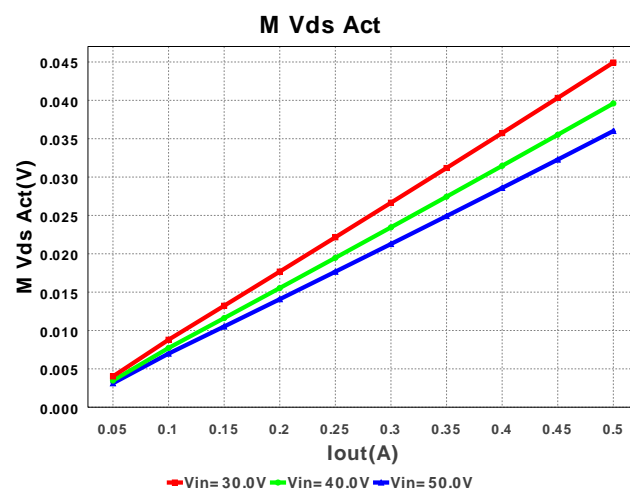
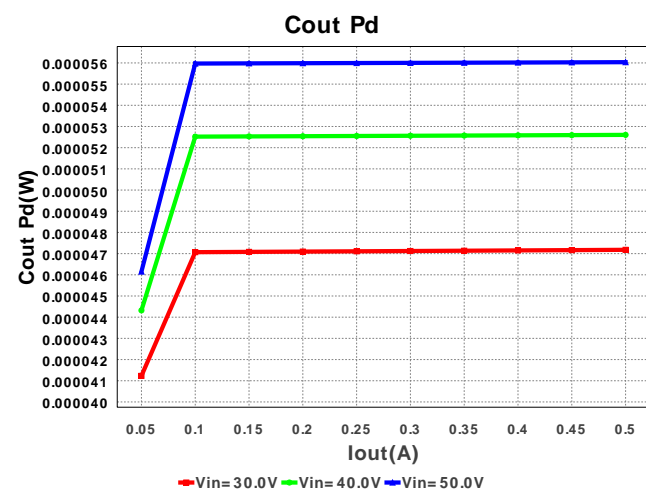
Electrical BOM

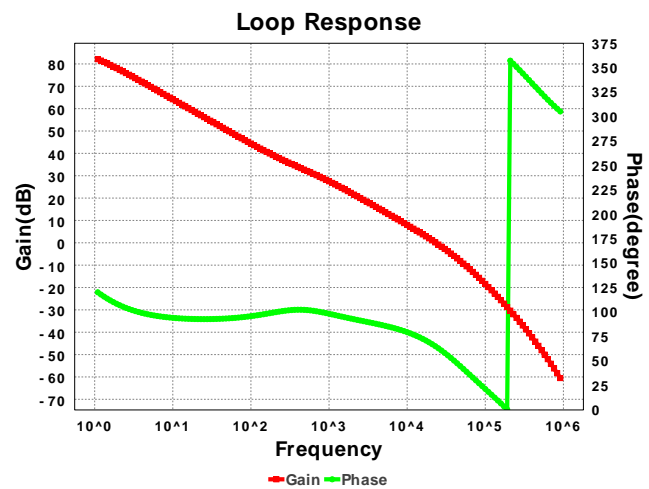
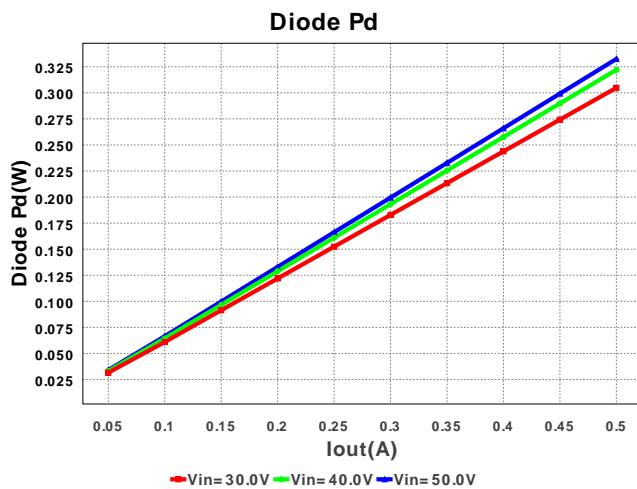
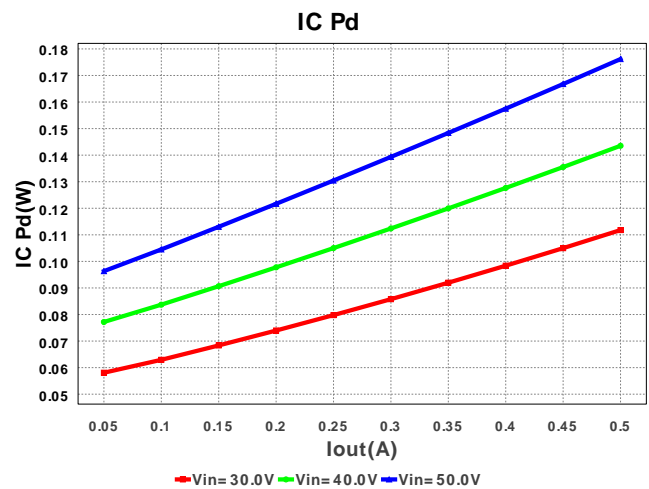
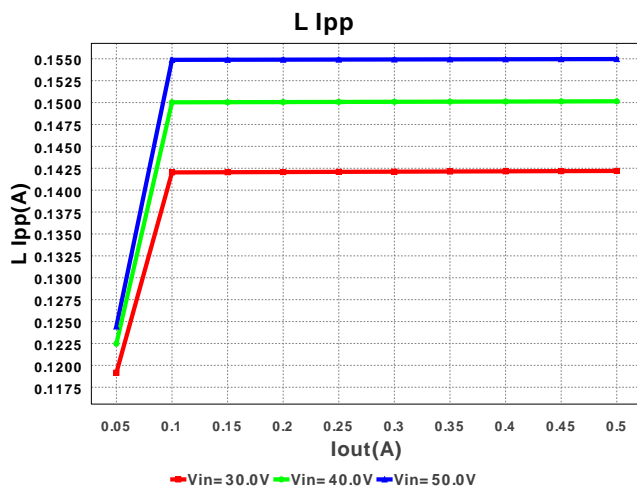
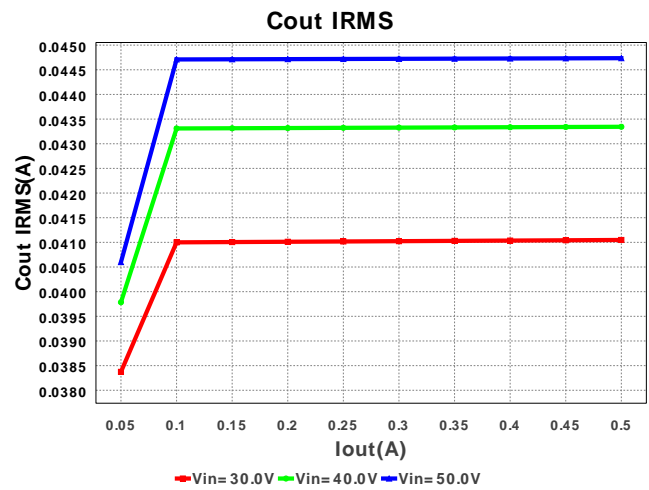
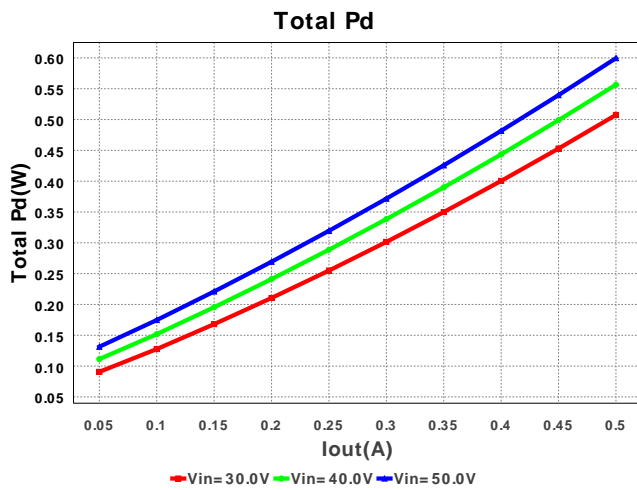
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
2.	Ccomp	MuRata	GRM1885C1H242JA01D Series= C0G/NP0	Cap= 2.4 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 0603 5mm2
3.	Ccomp2	Yageo America	CC0805DRNP09BN7R0 Series= C0G/NP0	Cap= 7.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
4.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 µF ESR= 2.8 mOhm VDC= 100.0 V IRMS= 9.825 A	1	\$0.19	 1210 15mm2
5.	Cout	Nippon Chemi-Con	APXE100ARA470ME61G Series= PXE	Cap= 47.0 µF ESR= 28.0 mOhm VDC= 10.0 V IRMS= 2.31 A	1	\$0.39	 CAPSMT_62_E61 53mm2
6.	Css	MuRata	GRM155R61A103KA01D Series= X5R	Cap= 10.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3mm2
7.	D1	Vishay-Semiconductor	BYS12-90-E3/TR	VF@Io= 750.0 mV VRRM= 90.0 V	1	\$0.08	 SMA 37mm2
8.	L1	TDK	VLP8040T-101M	L= 100.0 µH DCR= 330.0 mOhm	1	\$0.22	 VLP8040 113mm2
9.	Rcomp	Vishay-Dale	CRCW0402191KFKED Series= CRCW..e3	Res= 191.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
10.	RenB	Vishay-Dale	CRCW04025K11FKED Series= CRCW..e3	Res= 5.11 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	RenT	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
13.	Rfbt	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
14.	Rt	Vishay-Dale	CRCW0402374KFKED Series= CRCW..e3	Res= 374.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
15.	U1	Texas Instruments	TPS54060QDGQRQ1	Switcher	1	\$1.70	 S-PDSO-G10 36mm2









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	151.785 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	44.615 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	500.0 mA	Current	Peak switch current in IC
4.	Iin Avg	62.0 mA	Current	Average input current
5.	L Ipp	154.549 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	168.36 mA	Current	Q lavg
7.	BOM Count	15	General	Total Design BOM count
8.	FootPrint	325.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	330.13 kHz	General	Switching frequency
10.	IC Tolerance	8.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	36.012 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	2.5 W	General	Total output power
13.	Total BOM	\$2.69	General	Total BOM Cost
14.	D1 Tj	79.872 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	23.278 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	11.338 %	Op_point	Duty cycle
18.	Efficiency	80.646 %	Op_point	Steady state efficiency
19.	IC Tj	41.039 degC	Op_point	IC junction temperature
20.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	500.0 mA	Op_point	Iout operating point
22.	Phase Marg	64.855 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	50.0 V	Op_point	Vin operating point
24.	Vout p-p	4.503 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	64.508 µW	Power	Input capacitor power dissipation
26.	Cout Pd	55.733 µW	Power	Output capacitor power dissipation
27.	Diode Pd	332.482 mW	Power	Diode power dissipation
28.	IC Pd	176.628 mW	Power	IC power dissipation
29.	L Pd	90.75 mW	Power	Inductor power dissipation
30.	Total Pd	599.974 mW	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 mA	Maximum Output Current
2.	Iout1	500.0 mAmps	Output Current #1
3.	SoftStart	3.0 ms	Soft Start Time (ms)
4.	VinMax	50.0 V	Maximum input voltage
5.	VinMin	30.0 V	Minimum input voltage
6.	Vout	5.0 V	Output Voltage
7.	Vout1	5.0 Volt	Output Voltage #1
8.	base_pn	TPS54060-Q1	Base Product Number
9.	source	DC	Input Source Type
10.	Ta	30.0 degC	Ambient temperature
11.	UserFsw	590.477 kHz	Customer Selected Frequency

Design Assistance

1. The TPS54060-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

2. **TPS54060-Q1** Product Folder : <http://www.ti.com/product/tps54060-q1> : contains the data sheet and other resources.

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