

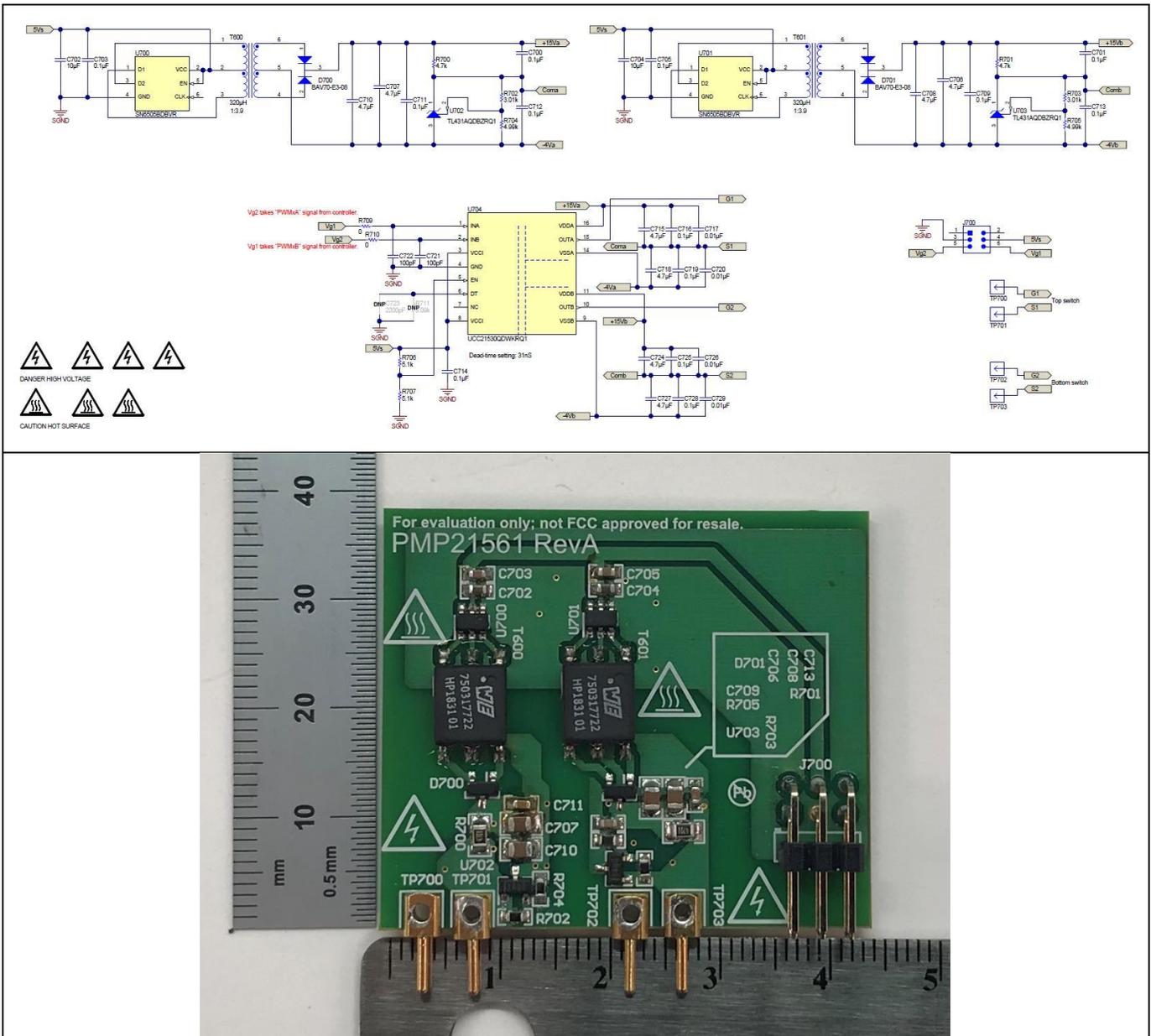
Test Report: PMP21561

Safety Isolated Secondary SiC MOSFET Driver Reference Design



Description

The PMP21561 provides an integrated high and low side isolated secondary gate driver solution for an automotive battery charging system incorporating two push-pull SN6505B transformer drivers and the isolated dual-channel gate driver UCC21530-Q1.



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1 Test Prerequisites

1.1 Voltage and Current Requirements

Table 1. Voltage and Current Requirements

Parameter	Specifications
V_{IN}	5.0V
$V_{OUT 1}$ SN6505B	19.0V @ 120mA Split +15.0V / -4.0V
$V_{OUT 2}$ SN6505B	19.0V @ 120mA Split +15.0V / -4.0V

1.2 Equipment Used

- Lab power supply Agilent 6654A
- Electronic load Kikusui PLZ164WA
- Electronic load PLZ303W
- Multimeter Hewlett Packard 34401A (2x)
- Multimeter Keithley 2700 Integra Series (2x)
- Oscilloscope LeCroy waveSurfer 424

1.3 Board Dimensions

1.500" x 1.750"

2 Testing and Results

2.1 Efficiency Graphs

Efficiency was tested at nominal input voltage with load current sweeping from minimum to maximum designed value.

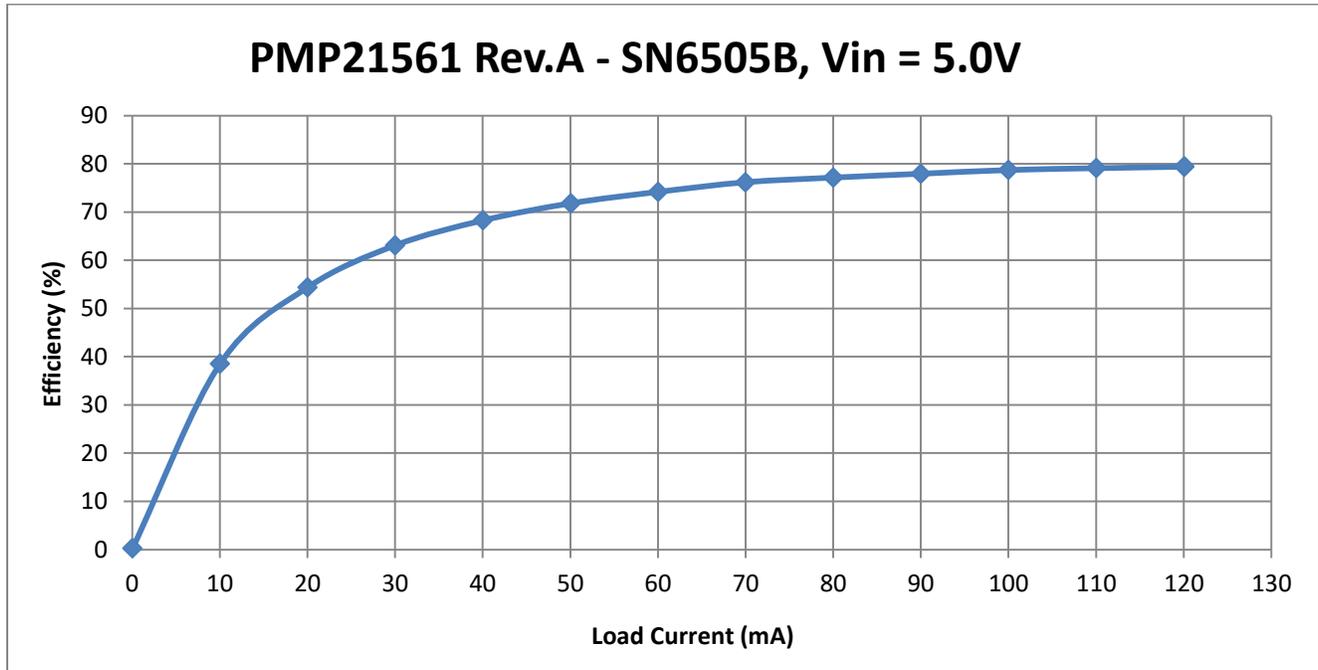


Figure 1. 19.0V Output SN6505B Efficiency with 5.0V Input

2.2 Efficiency Data

Table 2 shows the SN6505B efficiency data for 5V input

Table 2. SN6505B Efficiency Data for 5V Input

Input			Output			Calculations	
Voltage (V)	Current (A)	Power (W)	Voltage (V)	Current (A)	Power (W)	Losses (W)	Efficiency (%)
5.00	0.059	0.293	18.801	0.000	0.001	0.292	0.26
4.98	0.097	0.484	18.574	0.010	0.186	0.298	38.51
5.00	0.136	0.681	18.497	0.020	0.370	0.311	54.36
5.01	0.175	0.877	18.434	0.030	0.553	0.324	63.09
5.01	0.215	1.074	18.315	0.040	0.733	0.341	68.27
5.00	0.254	1.269	18.194	0.050	0.911	0.358	71.82
5.00	0.292	1.462	18.077	0.060	1.085	0.378	74.18
5.00	0.331	1.656	18.022	0.070	1.262	0.394	76.18
5.00	0.370	1.851	17.848	0.080	1.428	0.423	77.15
5.01	0.410	2.054	17.781	0.090	1.601	0.453	77.94
5.01	0.448	2.245	17.667	0.100	1.767	0.478	78.71
5.01	0.488	2.442	17.550	0.110	1.931	0.511	79.09
5.00	0.527	2.636	17.431	0.120	2.093	0.543	79.40

2.3 Load Regulation

Load Regulation was tested at nominal input voltage with the load current sweeping from minimum to maximum designed value.

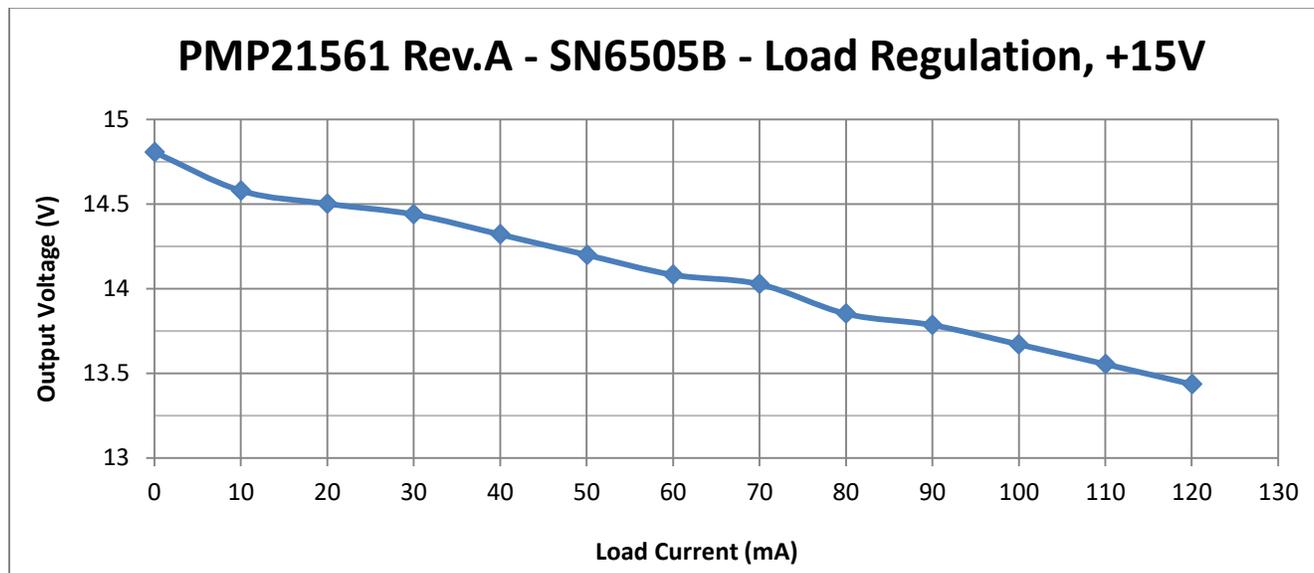


Figure 2. SN6505B Load Regulation for 5V Input, +15V Output

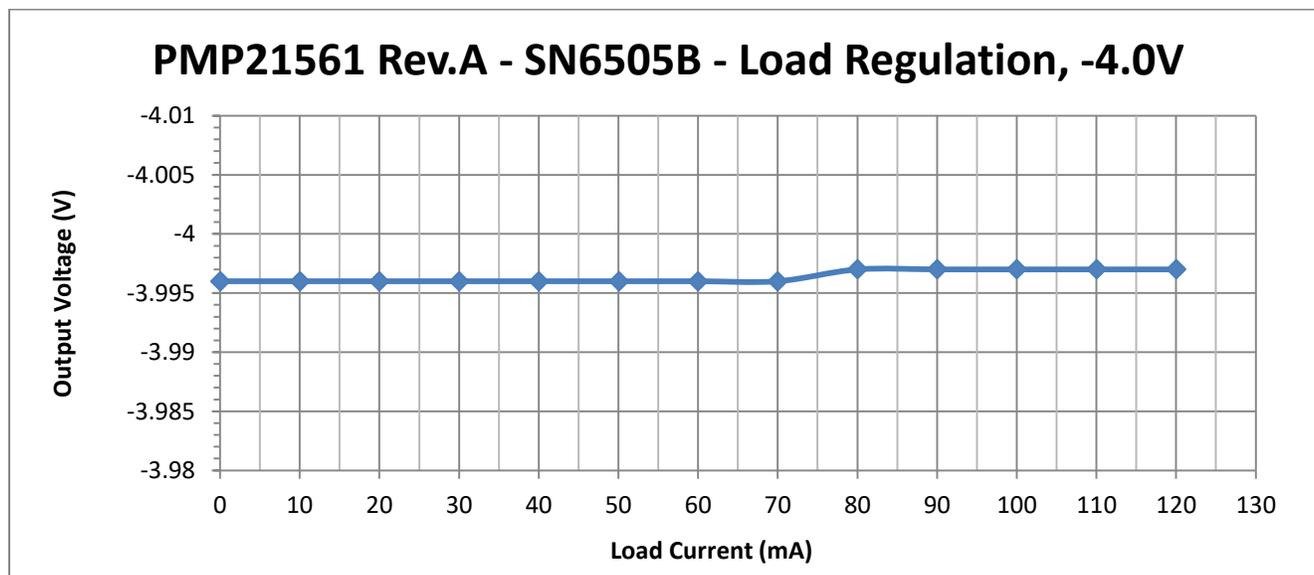


Figure 3. SN6505B Load Regulation for 5V Input, -4V Output

2.4 Thermal Images

Figure 4 shows the circuit at ambient temperature of 20°C with an input voltage of 5.0V and no load on the output. Figure 5 shows the circuit at ambient temperature of 20°C with an input voltage of 5.0V and 120mA load on the output.

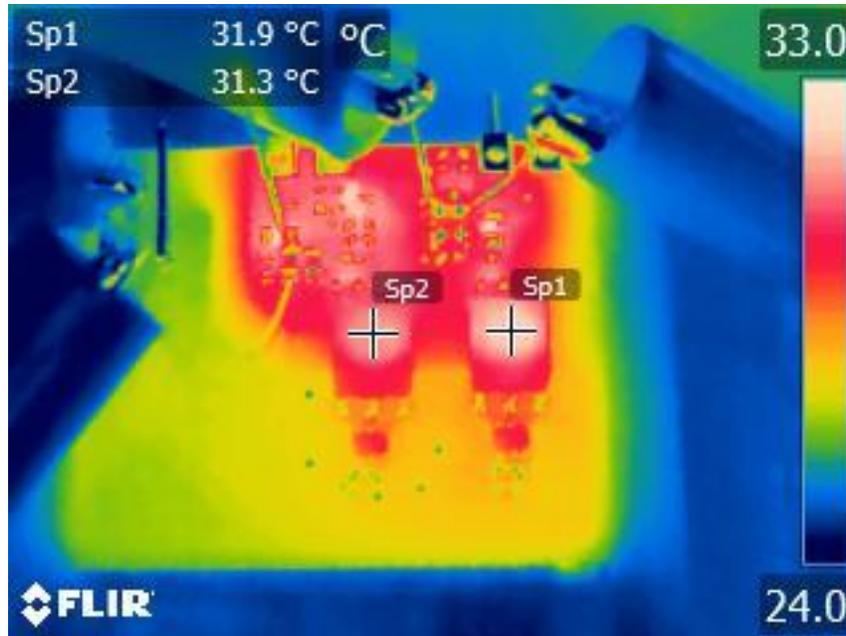


Figure 4. SN6505B Thermal Image at No Load



Figure 5. SN6505B Thermal Image at 120mA Load

3 Waveforms

3.1 Output Voltage Ripple

Figure 6 shows the output voltage ripple of the SN6505B for 5.0V input measured at 120mA load. Figure 7 shows the output voltage ripple of the SN6505B for 5.0V input measured at no load. Output voltage ripple measurements taken with AC 1MΩ coupled, 20MHz bandwidth.

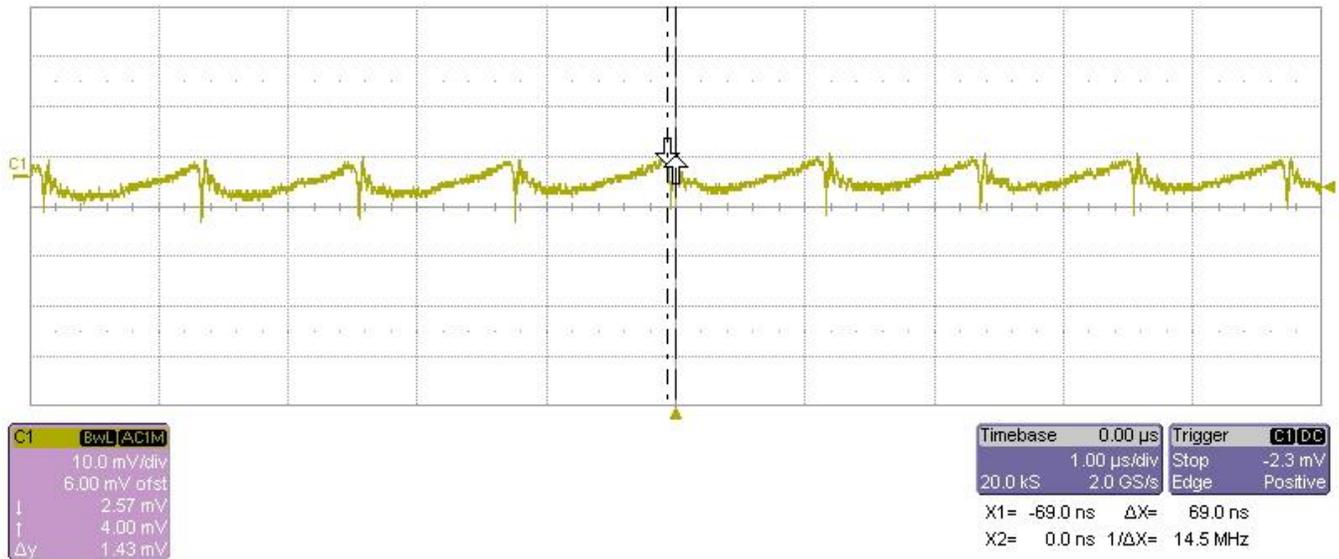


Figure 6. SN6505B Output Voltage Ripple for 5.0V Input at 120mA Load

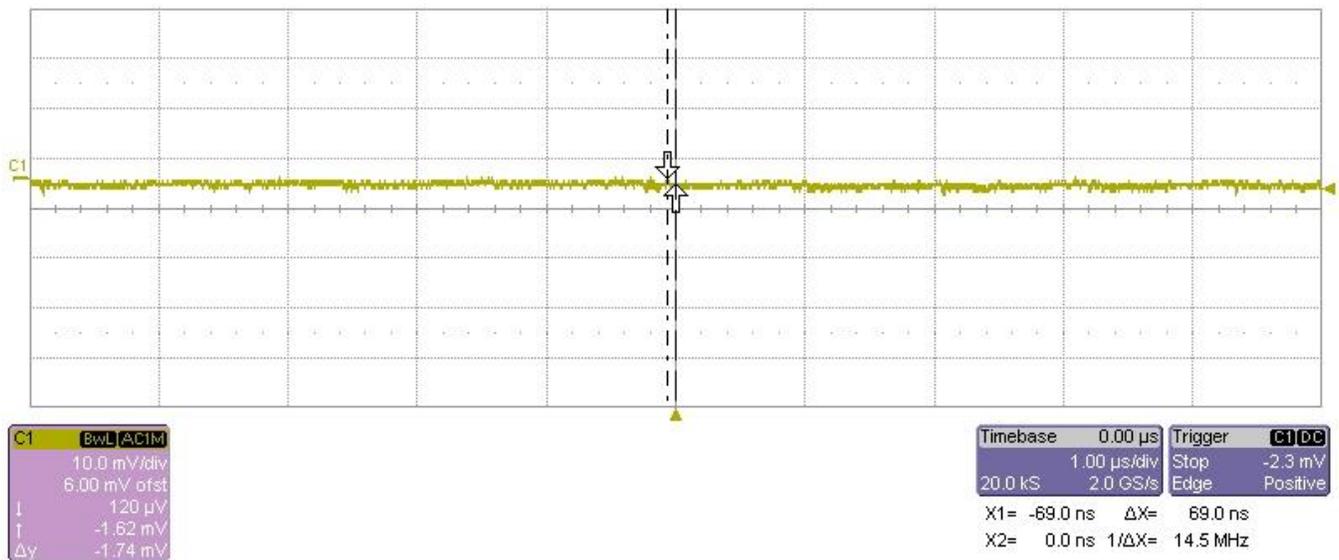


Figure 7. SN6505B Output Voltage Ripple for 5.0V Input at No Load

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