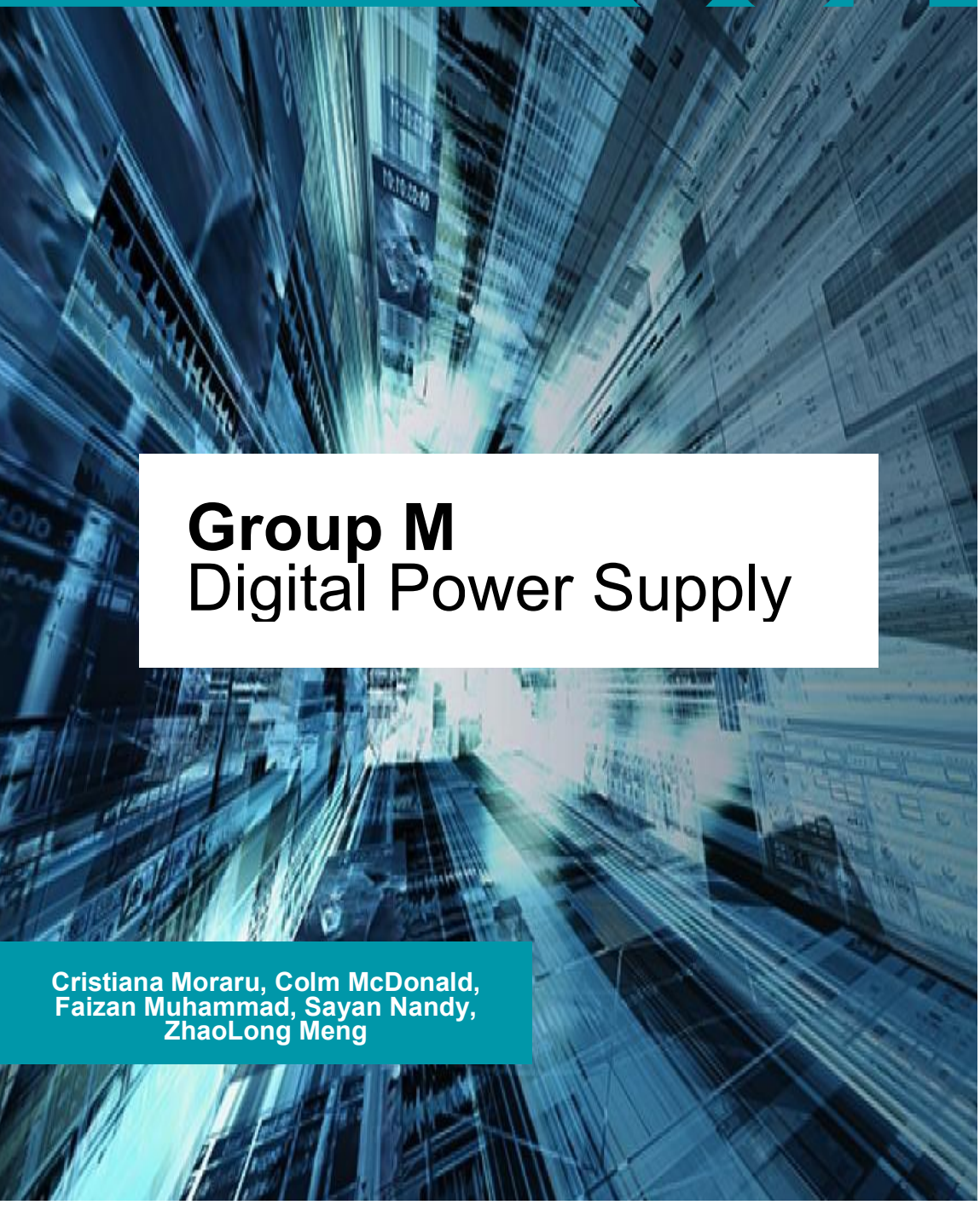
Electronic and Electrical Engineering

UCL



Group M
Digital Power Supply

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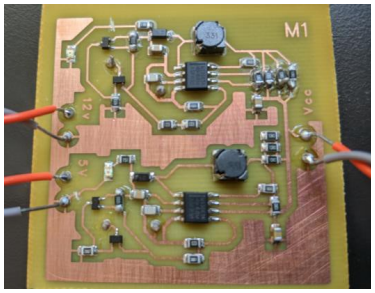
Digital Power Supply

Introduction

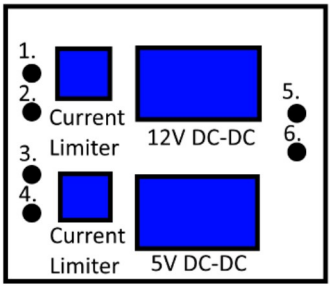
The Digital Power Supply (DPS), is a step-up converter. It produces a dual output of 5V and 12V from a 3-4.5V input. It also features a current limiter on all the outputs.



Product Features

- Input voltage range of 3-4.5V
- Dual outputs of 5V and 12V
- Efficiency of over 60% with a 20mA load
- Voltage drift less of <1% over temperature range of -40 to 30°C
- A current limit of 28mA on each output

System Diagram



Description

The Digital Power Supply is built using low profile SMD components, allowing it to be manufactured in a more consistent and repeatable way than other through hole power supplies that hand solder components.

This helps to ensure the reliability of the Digital Power Supply in more extreme conditions.

The Digital Power Supply uses high efficiency DC-DC converters in order to produce a 5V and 12V output from a 3-4.5V DC input. This input could be a single cell of a Li-ion battery.

The high over 60% efficiency allows remote systems to operate for extended periods of time on a single charge.

If a fault in an external system was to occur, the Digital Power Supply will limit the current to 28mA to ensure that the battery does not drain significantly faster than it otherwise would have. This can allow a remote system to operate in a limited capacity until the system can be repaired.

Pin-out

Pin	Function
Pin 1	12V Output
Pin 3	5V Output
Pin 5	3-4.5V Input
Pin 2,4,6	Common Ground

Absolute Maximum Ratings

Parameter	Rating
Operating Temperature(T)	-40 to 80°C
Output Current	28mA
Input Voltage(Vin)	2.8 to 4.9V

Recommended Operating Conditions

Parameter	Rating
Operating Temperature(T)	-40 to 30°C
Output Current	20mA
Input Voltage(Vin)	3 to 4.5V

Electrical Characteristics

Parameter	Test Condition	Rating
12V Output Voltage	Vin=3V to 4.5VV T=25°C Load=47kΩ	12.2 to 12.6V
12V Output Ripple Voltage	Vin=3V to 4.5VV T=25°C Load=47kΩ	185mV
5V Output Voltage	Vin=3V to 4.5V T=25°C Load=47kΩ	5.1V to 5.3V
5V Output Ripple Voltage	Vin=3V to 4.5VV T=25°C Load=47kΩ	185mV
Short Circuit Current		28mA

Mechanical Specification

Parameter	Rating
Dimension	50x50mm
Mass	9g

Output Characteristics

5V OUTPUT

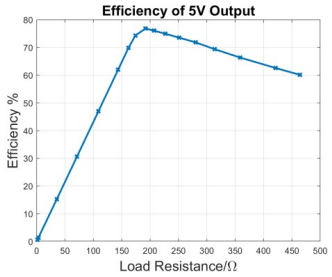


FIGURE 1:EFFICIENCY OF 5V OUTPUT

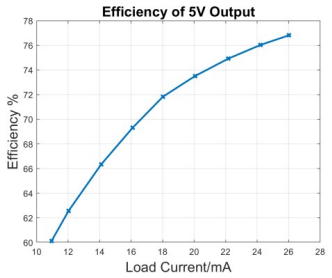


FIGURE 2:EFFICIENCY OF 5V OUTPUT

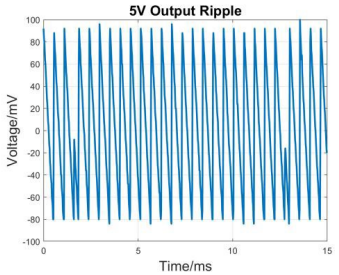


FIGURE 3:5V OUTPUT RIPPLE

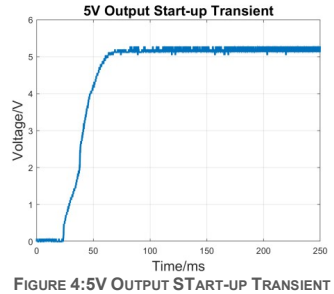


FIGURE 4:5V OUTPUT START-UP TRANSIENT

12V OUTPUT

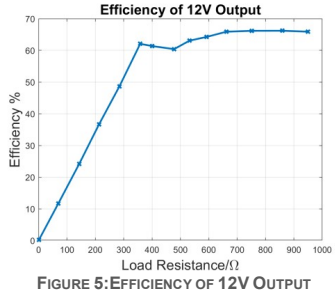


FIGURE 5:EFFICIENCY OF 12V OUTPUT

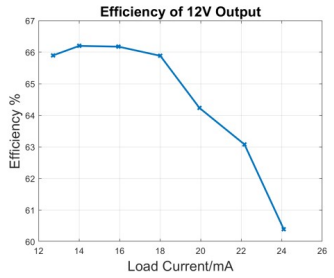


FIGURE 6:EFFICIENCY OF 12V OUTPUT

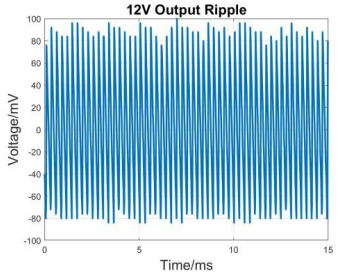


FIGURE 7:12V OUTPUT RIPPLE

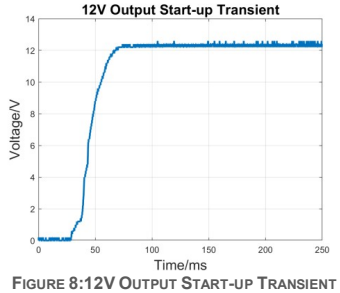
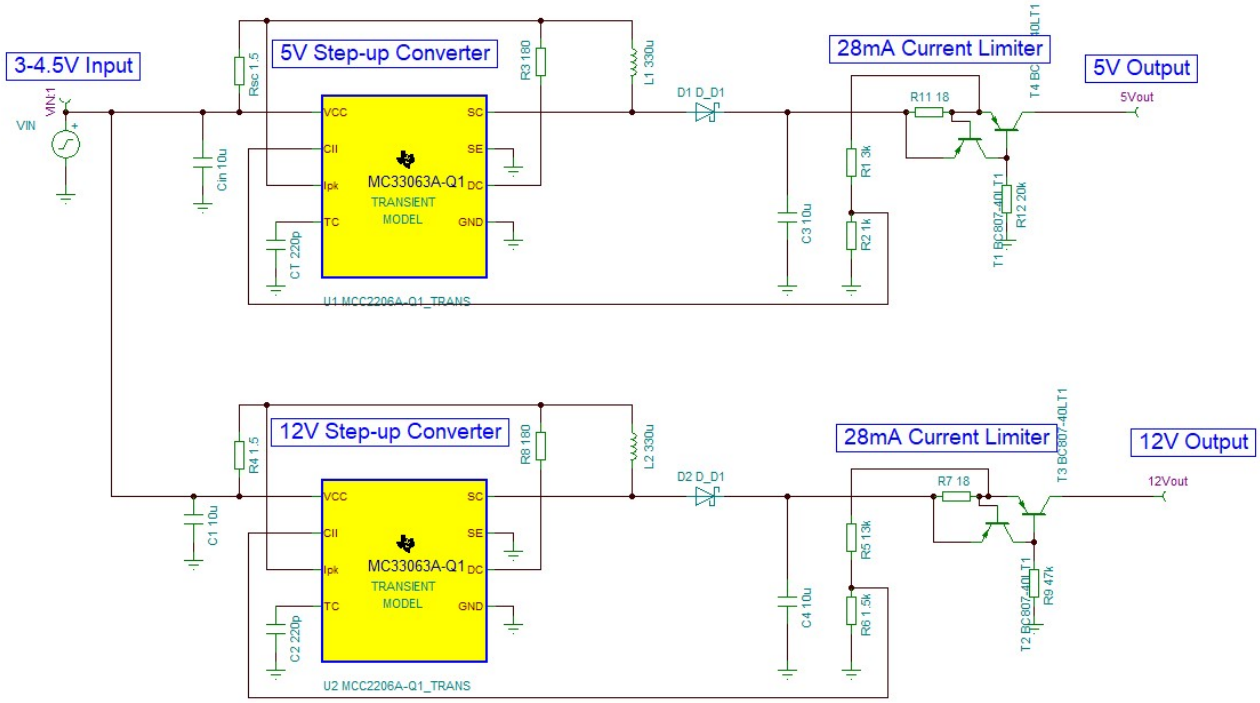
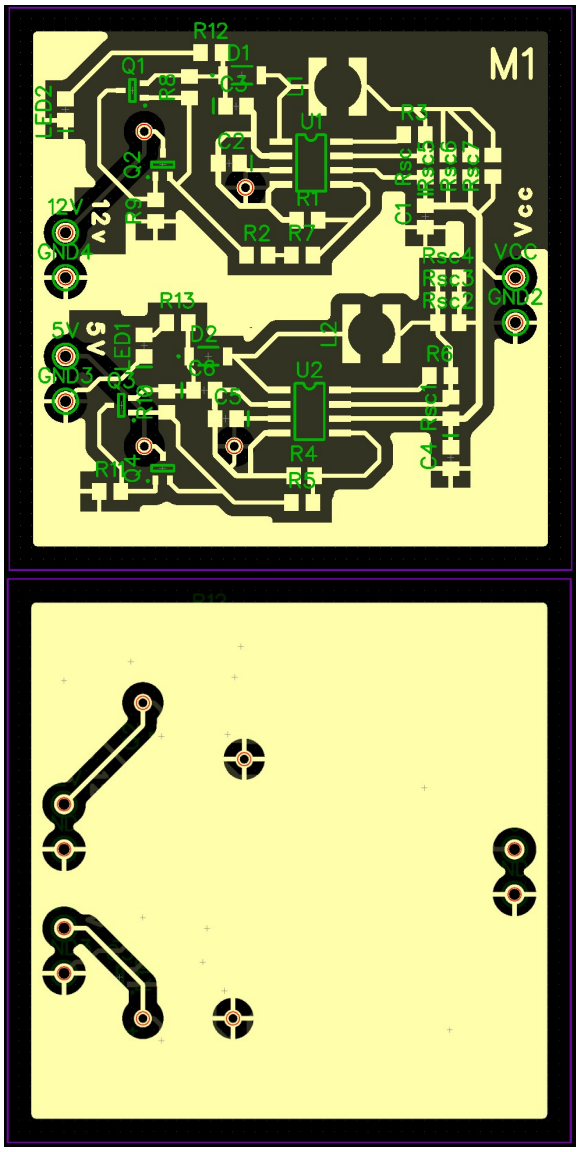


FIGURE 8:12V OUTPUT START-UP TRANSIENT

Hardware Schematic



Board Layout



Bill of Materials

Component	Pattern	Supplier	Qty
MC33063AD (IC)	SOIC-8	Farnell	2
BC807-40W (PNP Transistor)	SOT-323	Farnell	4
LTST-C171KGKT (LED)	805	RS	2
1N5819 (Diode)	SOD-123	Farnell	2
330uH Inductor (20% 0.32A 2.16W)		Farnell	2
10uF Capacitor (10% 50V)	0805	Farnell	4
220pF Capacitor (COG 5% 63V)	0805	RS	2
47K Resistor (5%)	0508	Farnell	1
20K Resistor (5%)	0805	Farnell	1
12K (Resistor) 5%	0805	RS	1
3K0 Resistor (5%)	0805	RS	1
1K5 Resistor (5%)	0805	Farnell	1
1K Resistor (5%)	0805	Farnell	2
510 Resistor (5%)	0805	Farnell	1
180 Resistor (5%)	0805	RS	2
150 Resistor (5%)	0805	RS	1
22 Resistor (5%)	0805	Farnell	2
10 Resistor (5%)	0805	Farnell	11
PCB Board	5cmx5cmx0.16cm	Eurocircuits	1