

Digital Power Supply, 5V and 12V

1. Features

- Dual fixed output voltages of 5 V and 12 V
- Input voltage requirement of 2.8 V
- Low output ripple voltage
- Adjustable current load
- Output short-circuit protection
- Large operating temperature range
- Mass: 8 g
- Dimensions of 50 mm x 50 mm
- Low Output Impedance



Figure 1: Front of PCB

2. Applications

- Portable power supply
- CPU
- RAM Circuit
- Flash Memory Circuit
- Sensors Circuit



Figure 2: Back of PCB

3. Description

The Digital Power Supply is a versatile power source engineered for general-purpose applications. It delivers a stable output voltage of 5V and 12V through the utilization of two boost switching regulators, ensuring consistent performance across various loads.

Featuring robust output short-circuit current protection rated at 26mA, this power supply offers enhanced safety and reliability. Operating efficiently within a wide temperature range of 0 to 70°C, it is well-suited for diverse environmental conditions. Additionally, users have the flexibility to adjust the output current by connecting an external resistor or potentiometer to the 12V or 5V output.

With its compact and lightweight design, this power supply is an ideal choice for portable applications, capable of being powered by regular batteries thanks to its ability to operate on low voltages starting from 2.7V.

4. Schematic Diagram

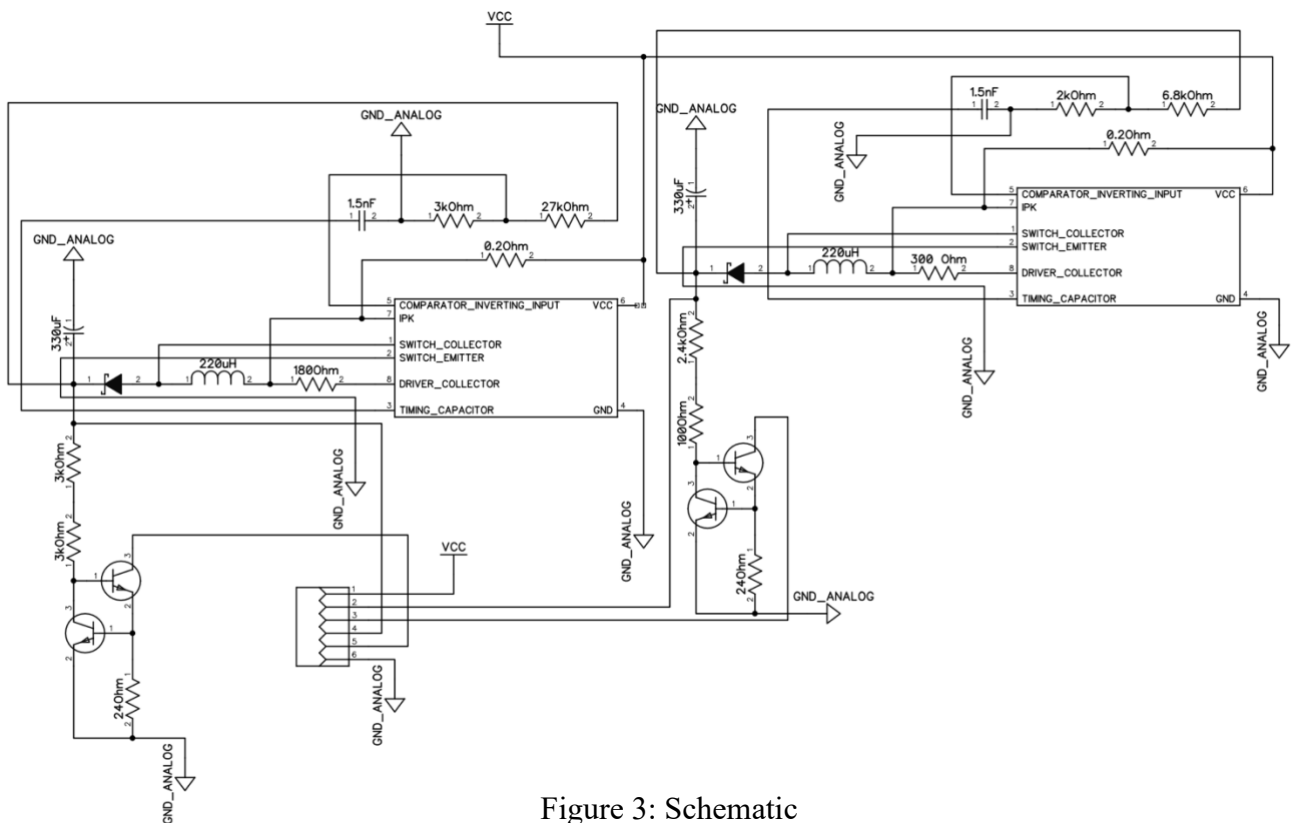


Figure 3: Schematic

5. Footprint

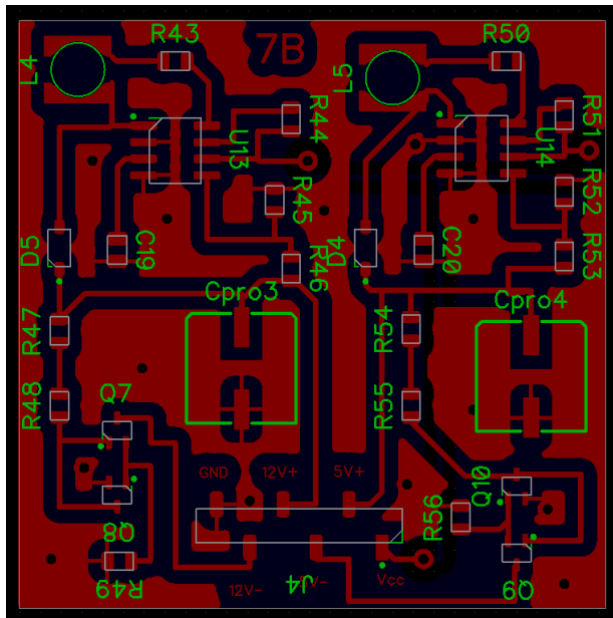


Figure 4: Front of PCB

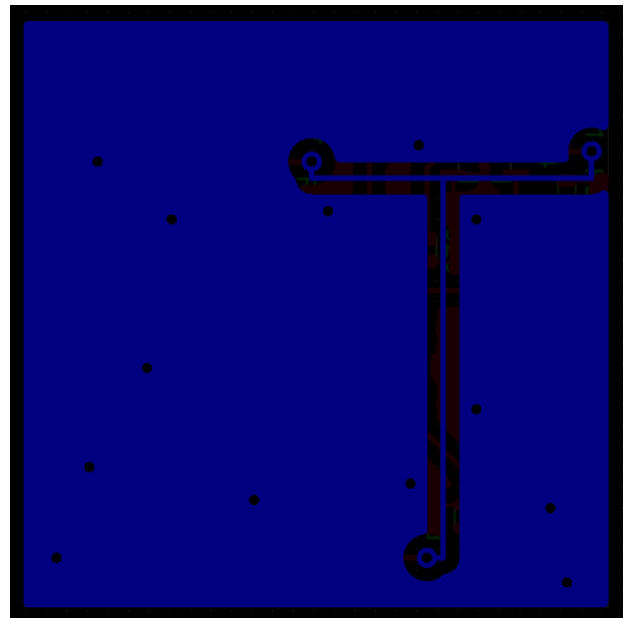


Figure 5: Back of PCB

6. Functional Block Diagram

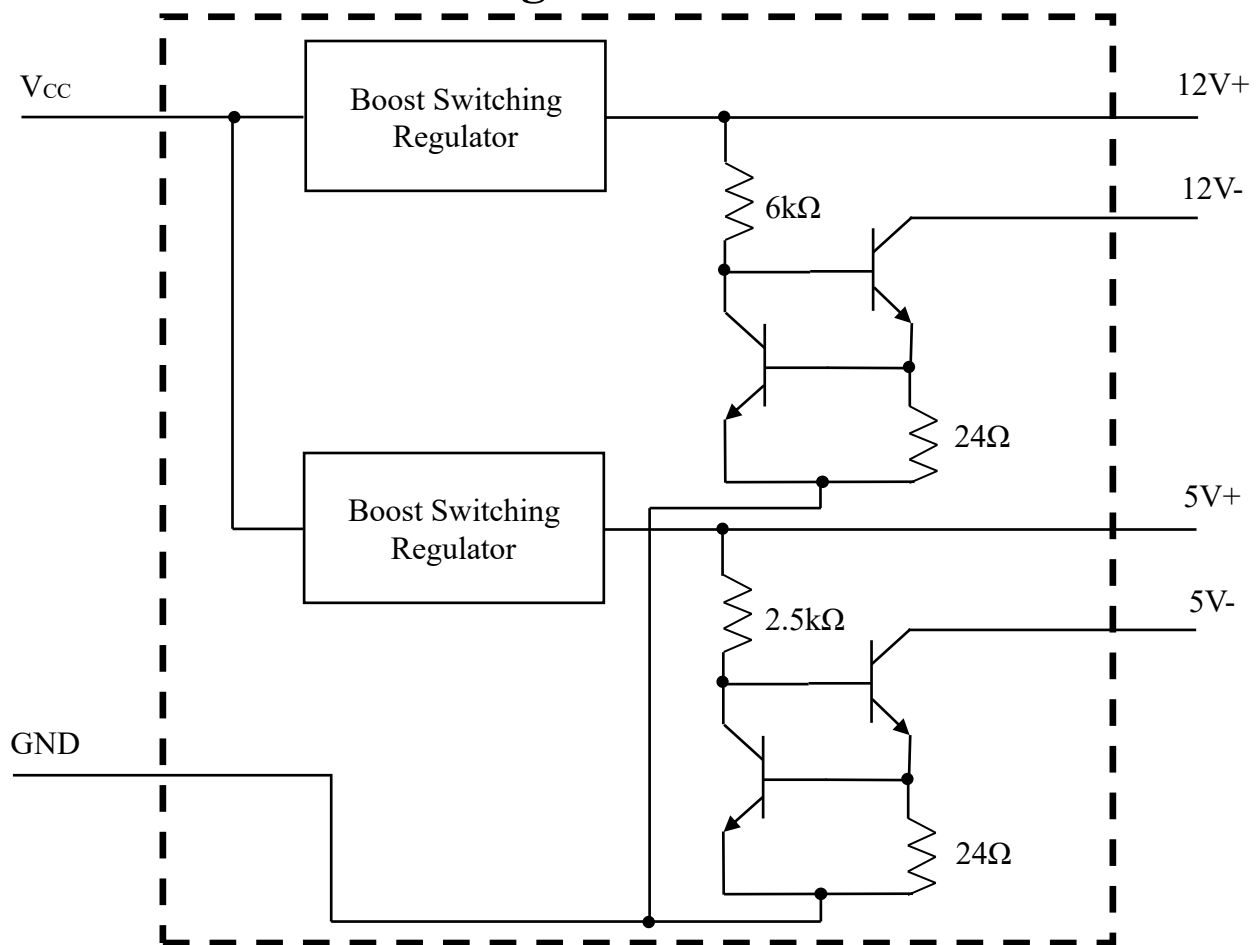


Figure 6: Functional Block Diagram

7. Pin Configurations and Functions

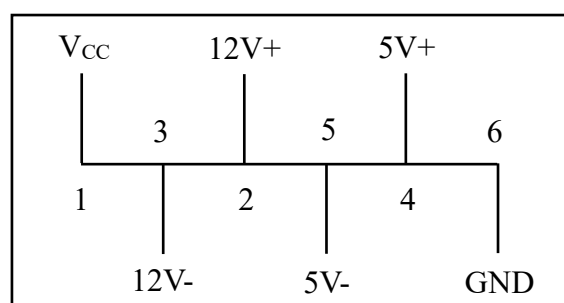


Figure 7: Pin Configurations

Pin Name	Pin Number	Type	Description
V_{CC}	1	Input	Input Voltage
12V-	2	Output	12V port positive terminal
12V+	3	Output	12V port negative terminal
5V-	4	Output	5V port positive terminal
5V+	5	Output	5V port negative terminal
GND	6	-	Ground

8. Specifications

8.1. Absolute Maximum Ratings

PARAMETERS	MIN	MAX	UNIT
Input Supply Voltage, V_{in}	0	30	V
Operating Ambient Temperature, T_A	0	70	°C
Storage Temperature	-40	70	°C

8.2. Recommended Operating Conditions

PARAMETERS	MIN	TYP	MAX	UNIT
Input Supply Voltage for operating both 5V and 12V ports, V_{in}	2.7	3	5.8	V
Operating free-air temperature, T_A	0	25	70	°C

8.3. Electrical Characteristics

PARAMETERS	Test Conditions	MIN	TYP	MAX	UNIT
Efficiency	$I_O = 20\text{mA}$	49	52	53	%
Short Circuit Current	$R_{sc} = 1\Omega$ $V_{in} = 3.5\text{V}$		25	26	mA
Input Impedance	$V_{in} = 3.5\text{V to } 5.5\text{V}$	9	22	47	Ω

8.4. 5V Output Port

PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage, V_{in}	$I_O = 20\text{mA}$	2.5		5.5	V
Output Voltage	$V_{in} = 3.5\text{V}$	4.8	5	5.1	V
Output Ripple Voltage	$V_{in} = 3.5\text{V}$		147		mV _{pp}
Load Current, I_O	$V_{in} = 3.5\text{V}$	0		25.37	mA
Efficiency	$V_{in} = 2.5\text{V to } 5.5\text{V}$	30	35	45	%
Transient Time	$V_{in} = 3.5\text{V}$		7		ms
Output Impedance	$V_{in} = 3.5\text{V}$		0.02		Ω

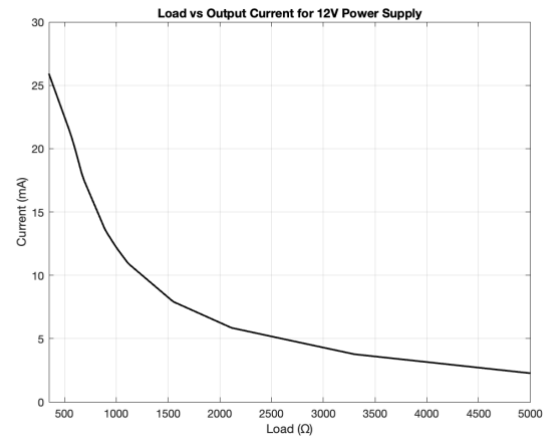
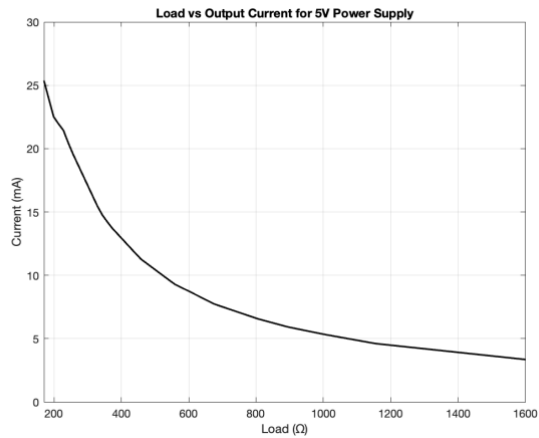
All of the parameters are tested at $T_A = 25^\circ\text{C}$

8.5. 12V Output Port

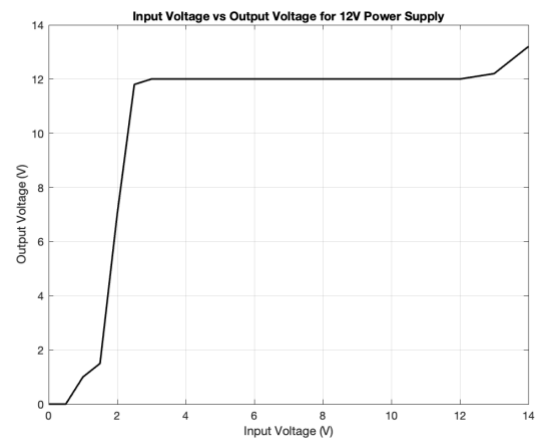
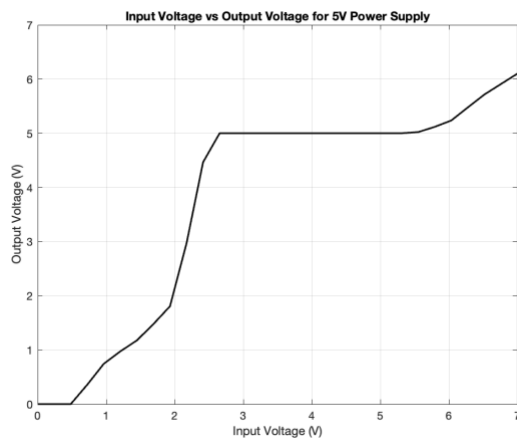
PARAMETERS	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage, V_{in}	$I_O = 20\text{mA}$	2.5		11.5	V
Output Voltage	$V_{in} = 3.5\text{V}$	11.8	5	12.2	V
Output Ripple Voltage	$V_{in} = 3.5\text{V}$		146		mV _{pp}
Load Current, I_O	$V_{in} = 3.5\text{V}$	0		25.02	mA
Efficiency	$V_{in} = 2.7\text{V to } 12\text{V}$	39	40	53	%
Transient Time	$V_{in} = 3.5\text{V}$		15		ms
Output Impedance	$V_{in} = 3.5\text{V}$		0.03		Ω

All of the parameters are tested at $T_A = 25^\circ\text{C}$

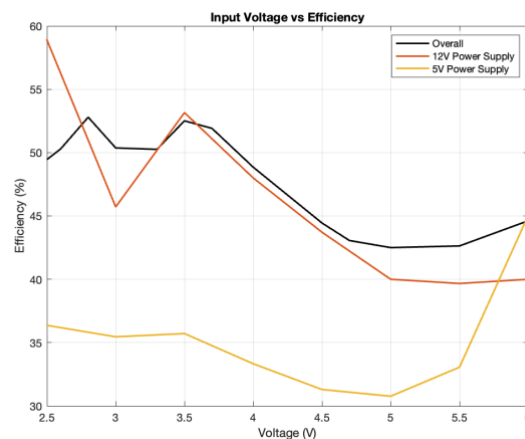
9. Typical Characteristics (graphs)



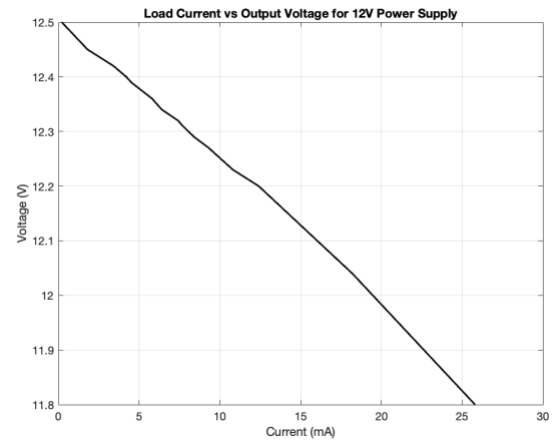
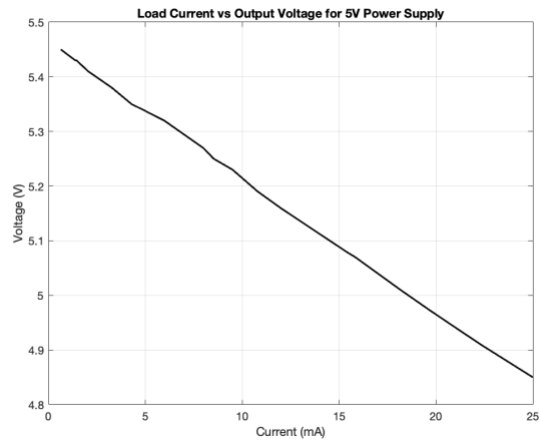
Graph of load current against load resistor for $V_{in} = 3.5V$ at $25^{\circ}C$



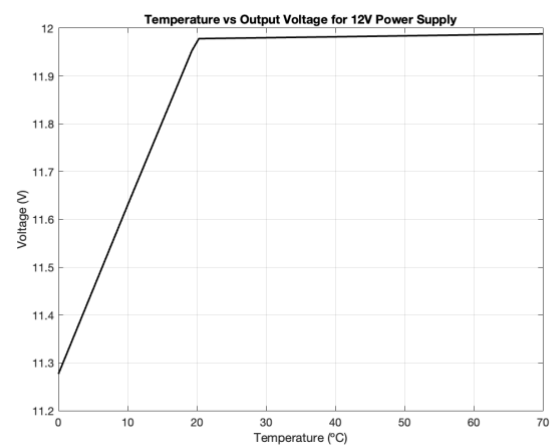
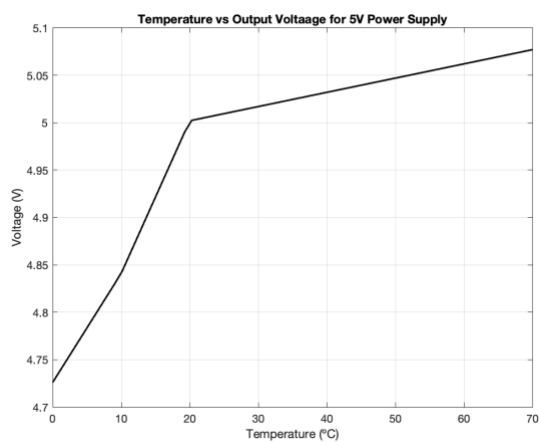
Graph of output voltage against input voltage for $I_o = 20mA$ at $25^{\circ}C$



Graph of efficiency against input voltage for $I_o = 20mA$ at $25^{\circ}C$



Graph of output voltage against load current for $V_{in} = 3.5V$ at $25^{\circ}C$



Graph of output voltage against temperature for $V_{in} = 3.5V$ and $I_o = 20mA$