LOW VOLTAGE POWER SUPPLY FOR BELLE II

J. Visniakov, P. Vazquez, J. Caride

Power Supply. DC-DC converter

TRACO POWER. TEN 40WI Series

Features:

- High power density: 40W in 2”x2”x0.4” metal package
- Ultra wide 4:1 input voltage range
- Very high efficiency up to 87%
- No minimum load required for single output models
- Over temperature protection
- Under voltage lockout
- Remote On/Off
- Shielded metal case with insulated baseplate
- Optional heat-sink
- 3-year product warranty

Pin-Out		
Pin	Single	Dual
1	+Vin (Vcc)	+Vin (Vcc)
2	–Vin (GND)	–Vin (GND)
3	Remote On/Off	
4	– Sense*	+ Vout
5	+ Sense*	Common
6	+ Vout	Common
7	– Vout	– Vout
8	Trim	

Ordercode	Input voltage range	Output voltage	Output current max.	Efficiency typ.
TEN 40-2410WI	9 – 36 VDC (24 VDC nominal)	3.3 VDC	10.0 A	86%
TEN 40-2411WI		5.0 VDC	8.0 A	87%
TEN 40-2412WI		12 VDC	3.35 A	87%
TEN 40-2413WI		15 VDC	2.65 A	87%
TEN 40-2422WI		± 12 VDC	± 1.65 A	86%
TEN 40-2423WI		± 15 VDC	± 1.35 A	86%

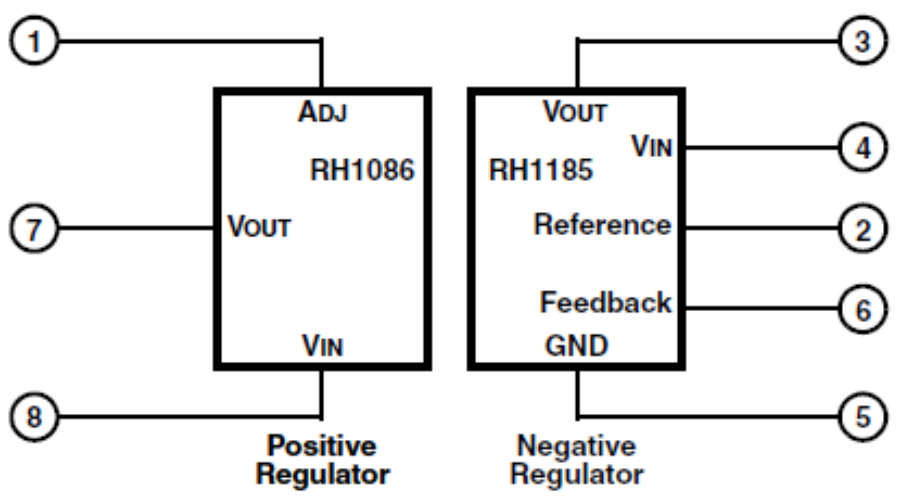
Power Supply. Voltage regulators

Aeroflex VRG8651/VRG8652

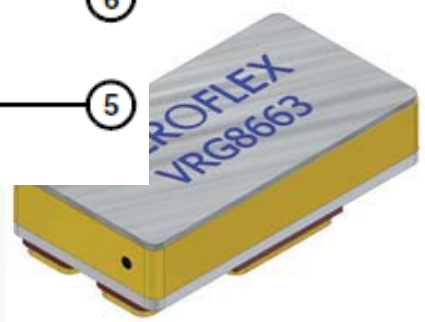
Radiation performance: Total dose > 100 kRad (Si), Two-Independent voltage regulators, Thermal shutdown, Adjustable Output Voltages

Positive regulator features (RH1086)
– Output voltage adjustable: 1.25V to 23V
– Dropout voltage: 1.55V at 1.5Amps
– 3-Terminal
– Output current: 1.0A, See note 13
– Voltage reference: 1.25V +2%, -3.2%
– Load regulation: 0.3% max
– Line regulation: 0.25% max
– Ripple rejection: >60dB

Negative regulator features (RH1185)
– Output voltage adjustable: -2.37 to -25V
– Dropout voltage: 1.05V at 3Amps
– 5-Terminal
– Output current: 3A
– Voltage reference: -2.370V ±3%
– Load regulation: 0.8% max
– Line regulation: 0.02% max
– Ripple rejection: >60dB

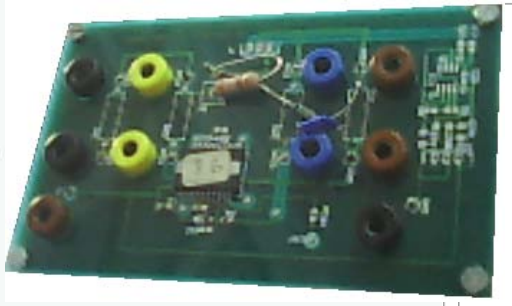


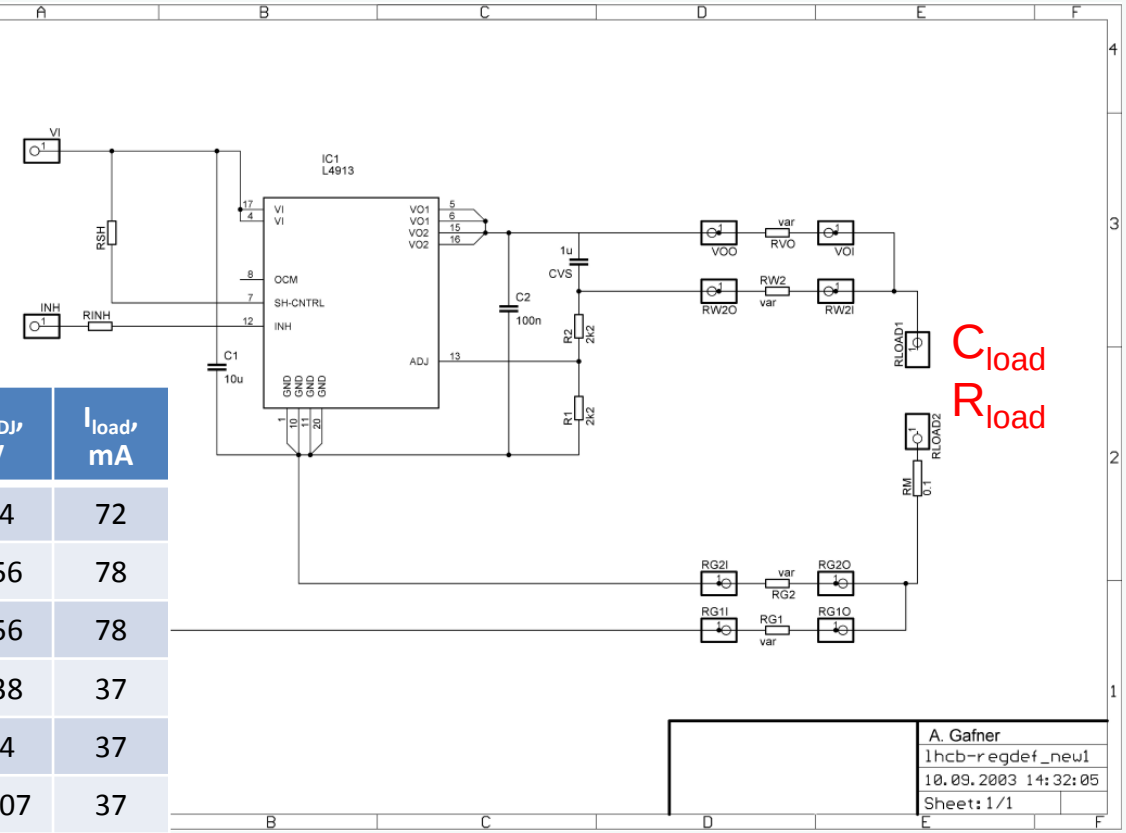
Switcher Vclear_on 17V
Switcher Vclear_off 8V
Switcher Vgate_off 13V
Depfet Vbulk 17V
Depfet Vback_plane -20V



Designed for aerospace and high reliability space applications

LHC VR testboard





C_{load}
R_{load}

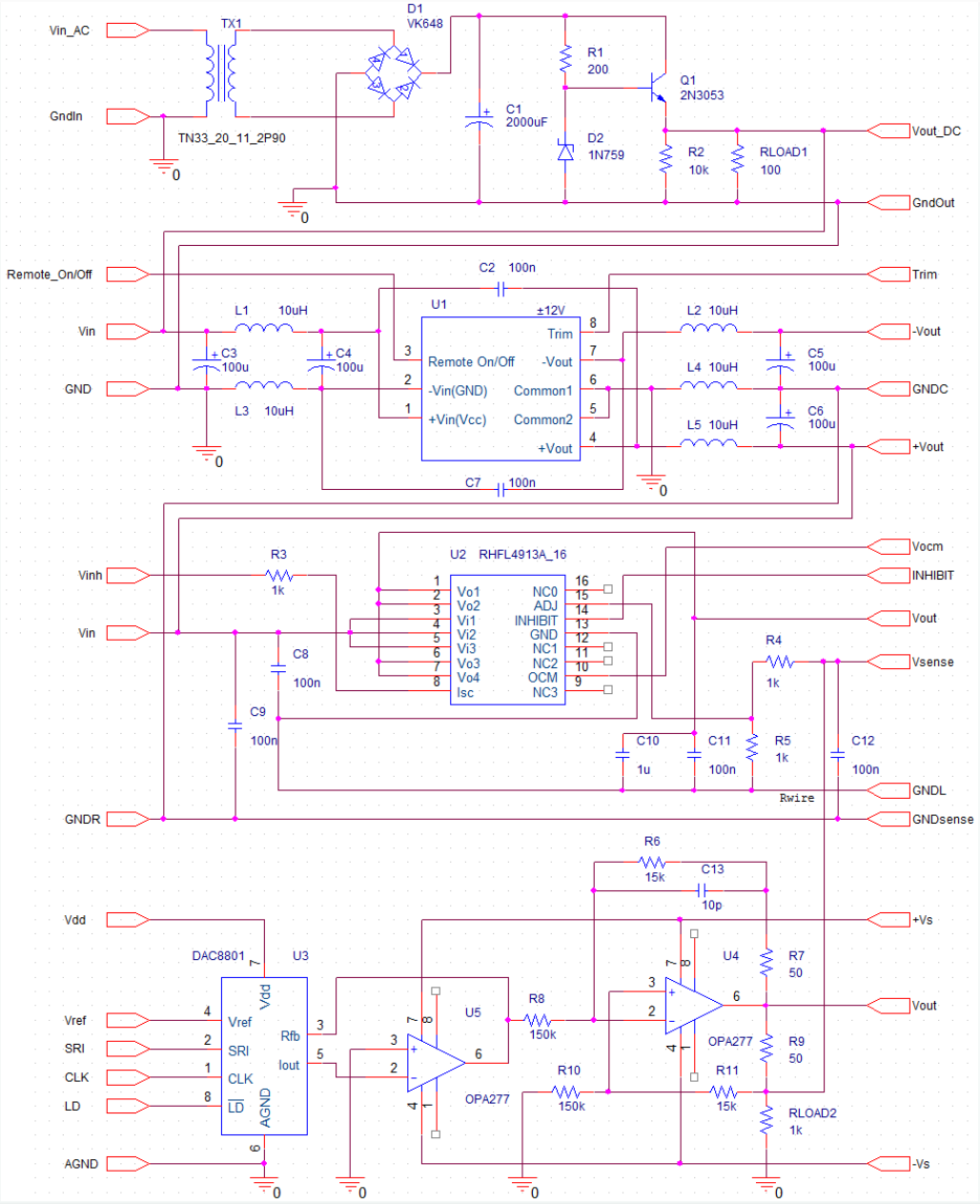
R_{load}, Ω	C_{load}, µF	V_{in}, V	V_{out}, V	V_{ADJ}, V	I_{load}, mA
33.3	1	3	2.53	1.4	72
		5	2.75	1.56	78
		12	2.75	1.56	78
72		3	2.6	1.38	37
		5	2.608	1.4	37
		12	2.611	1.407	37
	4.7	3	2.606	1.38	39
		5	2.608	1.398	37
		12	2.611	1.409	37
52		3	2.63	1.44	49
		5	2.656	1.442	50
		12	2.658	1.451	50

Long Cable (sense and power)
Length 17 m,
Wire resistance 3.9 Ω,

Short Cable (sense and power)
Length 3 cm,
Wire resistance 0.3 Ω,

By choosing a capacitor (CVS) of 1 µF between the regulator output pins and the sense return line, the oscillation disappeared completely.

Schematic



AC to DC voltage conversion schematic. VDC output 12V.

DC to DC voltage converter with dual output. VDC output ±12V.

LHC4913 voltage regulator with adjustable input and sense line. Output voltage up to +9V.

Schematic for adjustable input control with digital to analog converter.

Outlook

- RHFL4913 voltage regulator will be used for most power lines
- Higher voltages should be powered by another regulators
- Aeroflex voltage regulators are going to be tested for stability and regulation opportunity with LHC testboard
- Cable type of 20 m
- Voltage sense will be done for currents >100 mA
- It is necessary to get working switcher-B and DCD prototypes for power supply testing
- Build PS prototype for next TB.