Fairchild Reference Design RD-557

The following reference design supports inclusion of FOD2741BTV in design of an auxiliary power supply. It should be used in conjunction with the FOD2741BTV datasheet as well as Fairchild's application notes and technical support team. Please visit Fairchild's website at www.fairchildsemi.com.

Application	Fairchild Device	Input Voltage Range	Rated Output Power	Output Voltage (Rated Current)	Topology
Auxiliary Power	FOD2741BTV	8-16 V_{DC}	11.5 W	4.2 V (2.5 A) 3.3 V or 5 V (0.2 A)	Self-Oscillating Flyback

Key Features

- Optocoupler, precision reference and error amplifier in single package
- 2.5 V reference
- CTR 100% to 200%
- 5,000 V RMS Isolation
- UL approved E90700, Volume 2; CSA approval 1296837; VDE approval 40002463; BSI approval 8702, 8703
- Low Temperature Coefficient 50 ppm/°C Max.
- FOD2741A: tolerance 0.5%; FOD2741B: tolerance 1%; FOD2741C: tolerance 2%

1. Schematics

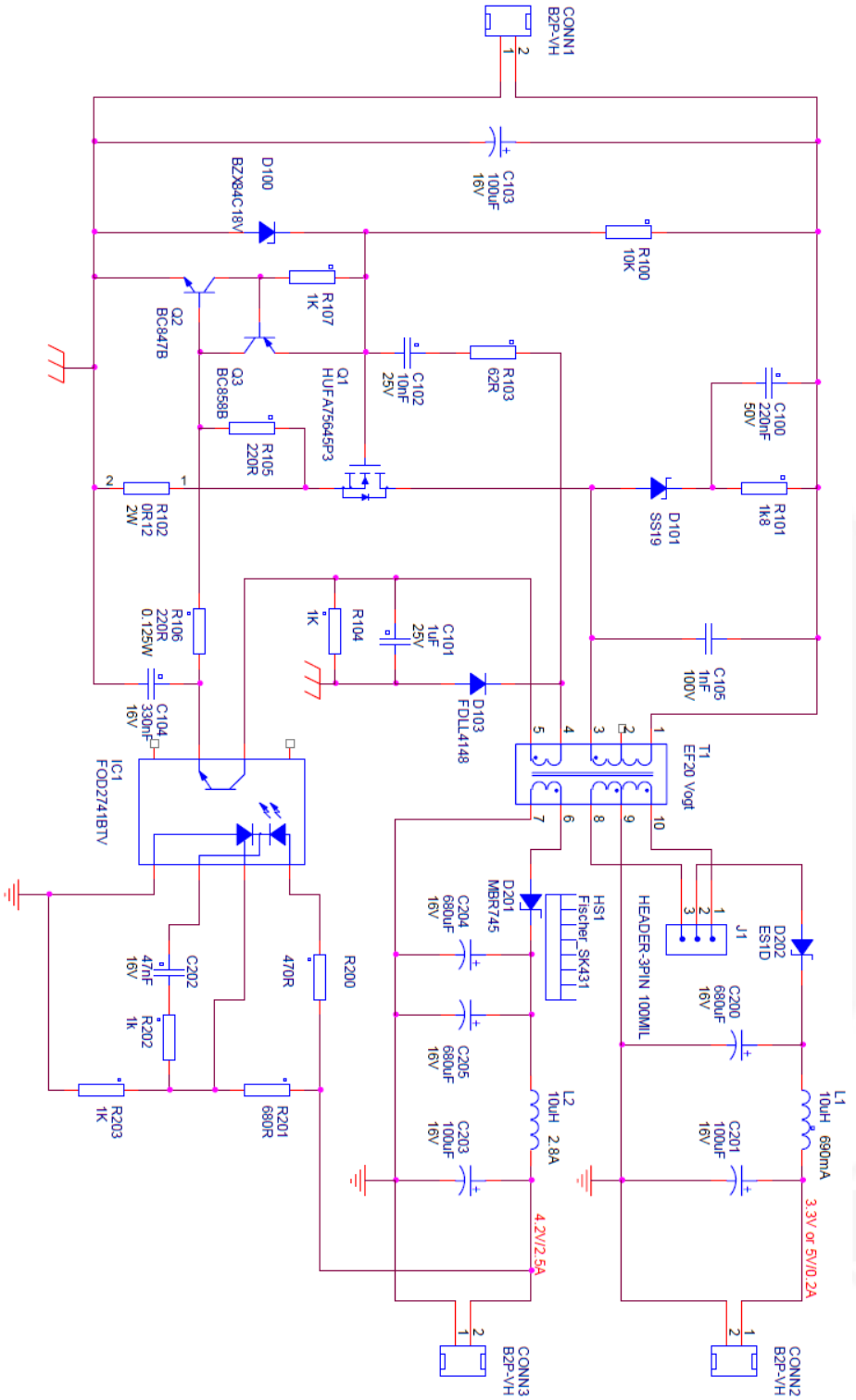

Figure 1. Schematic

2. Transformer

2.1. Transformer Schematic Diagram

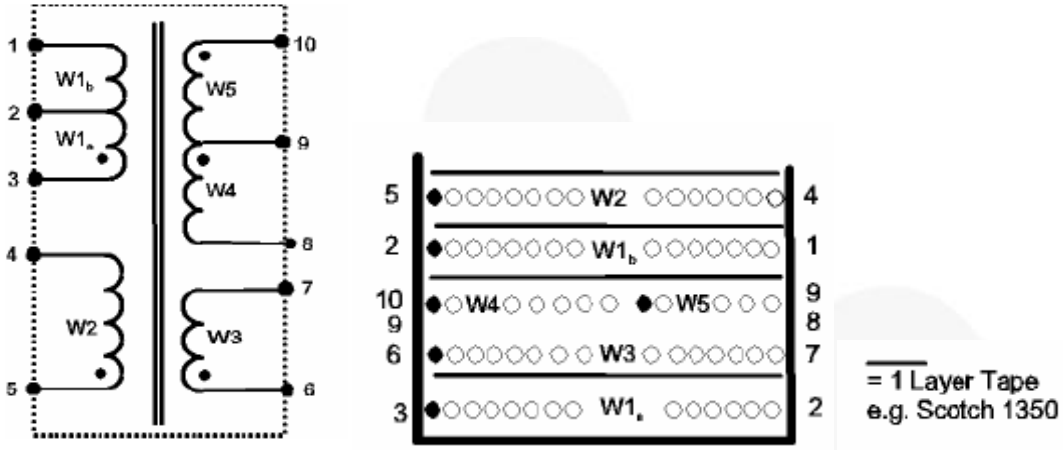

Figure 2. Transformer Configuration and Winding Stackup

2.2. Winding Specification

Winding	Pins (S→F)	Strands x Wire ø	Turns	Layers	Winding Method
W1a	3→2	4 x 0.35 mm	6	1	Solenoid
W3	6→7	6 x 0.4 mm	5	1	Solenoid
W4(1)	9→8	1 x 0.3 mm	4	1	Spaced
W5(1)	10→9	1 x 0.3 mm	2	1	Spaced
W1b	2→1	4 x 0.35 mm	6	1	Solenoid
W2	5→4	1 x 0.15 mm	11	1	Spaced

Note:
1. W4, W5 form one layer.

Core: EF20 Vogt
Material: PC40 (TDK) or equivalent
Bobbin: EF20 horizontal / 10 pins
Gap in center leg: approx. 0.7 mm for A_L of 90 nH/Turns^2

2.3. Electrical Characteristics

	Pin	Specification	Remark
Inductance	1→3	13 mH ± 5%	10 kHz, 100 mV
Leakage	1→3	<0.65 µH	Short all other pins

3. Bill of Materials

Reference	Part	Qty.	Manufacturer / Type
CONN1, CONN2, CONN3	B2P-VH	3	any
C100	220 nF / 50 V	1	CAP SMD 0805 any
C101	1 µF / 25 V	1	CAP SMD 0805 any
C102	10nF / 25 V	1	CAP SMD 0805 any
C103, C201, C203	100 µF / 16 V	3	Samwha SD-Series
C104	330 nF / 16 V	1	CAP SMD 0805 any
C105	1 nF / 100 V	1	Film Capacitor any
C200, C204, C205	680 µF / 16 V	3	Nichicon PW-Series
C202	47 nF / 16 V	1	CAP SMD 0805 any
D100	BZX84C18V	1	Fairchild
D101	SS19	1	Fairchild
D103	FDLL4148	1	Fairchild
D201	MBR745	1	Fairchild
D202	ES1D	1	Fairchild
HS1	Fischer_SK431	1	FISCHER_SK431
IC1	FOD2741BTV	1	Fairchild
J1	HEADER-3PIN	1	any
L1	10 µH / 690 mA	1	CHOKE SMD TDK NL/NLC5650
L2	10 µH / 2.8 A	1	CHOKE radial Coilcraft RFB0810
Q1	HUFA75645P3	1	Fairchild
Q2	BC847B	1	Fairchild
Q3	BC858B	1	Fairchild
R100	10 K	1	RESISTOR SMD 0805 any
R101	1k8	1	RESISTOR SMD 1206 any
R102	0R12	1	RESISTOR 2W Low Inductance
R103	62R	1	RESISTOR SMD 0805 any
R104, R107, R202	1 k	3	RESISTOR SMD 0805 any
R105, R106	220R	2	RESISTOR SMD 1206 any
R200	470R	1	RESISTOR SMD 0805 any
R201	680R	1	RESISTOR SMD 0805 any
R203	1 K	1	RESISTOR SMD 1206 any
T1	EF20 Vogt	1	EF20 Vogt Horizontal 10 Pin

4. Performance

4.1. Full Load Regulation

I1 [mA]	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5
V1 [V]	4.19	4.19	4.18	4.18	4.18	4.18	4.18	4.18	4.18	4.18
V2a [V]	2.7	2.87	2.98	3.05	3.11	3.17	3.21	3.26	3.33	3.36
V2b [V]	4.43	4.67	4.81	4.92	5	5.08	5.14	5.22	5.3	5.37

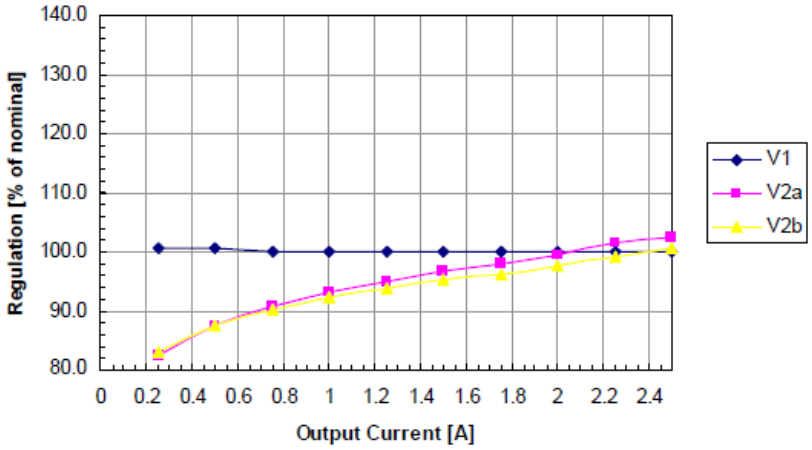

Figure 3. Load Current Output Condition

4.2. Efficiency

Vin [V]	8	10	12	14	16
Pout [W]	10.8	11.1	11.1	11.1	11.1
Pin [W]	17.5	16.7	16.2	16	15.8
Eff [%]	61.7	66.5	68.5	69.4	70.3

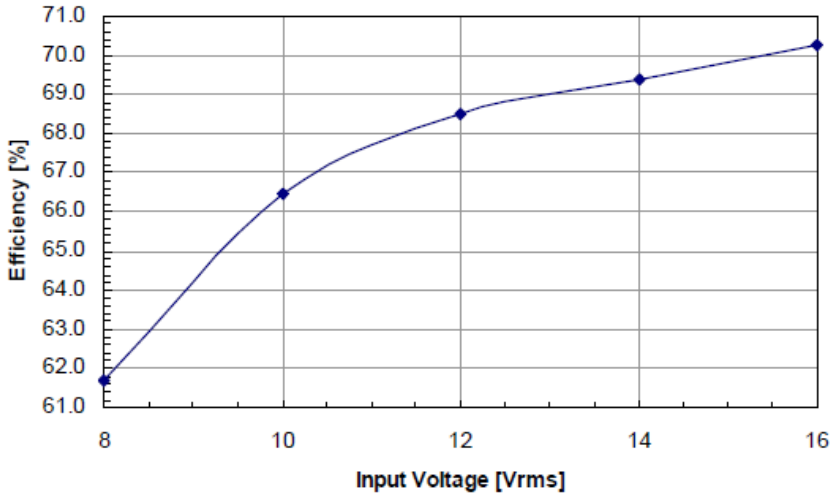

Figure 4. Efficiency

5. Related Resources

FOD2741BTV – Product Folder