



Power-Supply Cookbook

Maxim Power Supply Cookbook
Compiled: November 2008

Available at: <http://www.maxim-ic.com/cookbook/>

Maxim has developed power supplies for a wide range of applications. Choose the specifications that most closely meet your needs. Then view a circuit design, complete with schematic diagram and bill of materials.

Evaluation boards and custom variations of these designs are available to qualified customers. Please contact your local Maxim sales office to request an assembled circuit.

Contact: powerhelp@design.mxim.com

Also See: Isolated Power-Supply Reference Guides, <http://www.maxim-ic.com/isolated-supply-guide>

Page	Topology	V _{IN}	V _{OUT}	I _{OUT}	Features
8	Battery Charger	18.5V to 28V	2, 3 or 4 Li+ cells	5A	300kHz PWM, external FET
10	Inverting	12V	-5V	2A	300kHz PWM, external FET
11	Inverting	3V to 5.5V	-12V	0.4A	300kHz PWM, external FET
12	Inverting	12V	-48V	0.1A	300kHz PWM, external FET
13	Inverting	12V	-72V	0.1A	300kHz PWM, external FET
14	Inverting	3.3V	-3.6V	1.2A	300kHz PWM, external FET
16	Inverting	3.3V	-5.2V	1A	600kHz PWM, Internal FET, uses step-down IC as inverter
17	Inverting	12V	-12V	0.25A	300kHz PWM, external FET
19	Inverting	12V	-48V	0.1A	300kHz PWM, external FET, transformer
21	Inverting	12V	-0.7V	2A	300kHz PWM, external FET
23	Inverting	15V	-200V	0.03A	500kHz PWM, external FET, transformer, MEMS supply
25	Inverting	15V	-15V	0.25A	300kHz PWM, external FET
27	Inverting	5V	-5.2V	0.5A	300kHz PWM, external FET
29	Inverting	12V	-5V	1A	300kHz PWM, external FET
31	Inverting	12V	-5V	0.4A	250kHz PWM, external FET, boost with inverting charge pump
32	Inverting	15V	-150V	0.05A	300kHz PWM, external FET, transformer
34	Inverting	5V	-5.2V	0.5A	300kHz PWM, external FET
36	Inverting	5V	-12V	0.2A	500kHz PWM, external FET
38	Inverting	12V	-80V	0.12A	

					300kHz PWM, external FET, transformer
40	Inverting	3V to 6V	-12V	0.6A	300kHz PWM, external FET
41	Inverting	15V	-180V	0.005A	300kHz PWM, external FET, transformer
43	Inverting	7.5V to 13.5V	-5V	0.5A	300kHz PWM, external FET
45	Inverting	11V to 14V	-64V	0.35A	500kHz PWM, external FET, transformer
47	Inverting	-48V	-60V	0.1A	200kHz PWM, external FET, transformer
48	Inverting	12V	-12V	0.5A	300kHz PWM, external FET
50	Inverting, multi-output	12V	-65V -24V	0.1A 0.52A	250kHz PWM, external FET, transformer, SLIC supply
52	Inverting, multi-output	5V	-72V -24V	0.06A 0.15A	250kHz PWM, external FET, transformer, SLIC supply
54	Inverting, multi-output	5V	-24V -72V +3.3V	0.1A 0.025A 0.1A	100kHz PWM, external FET, transformer, isolated SLIC
55	Inverting, multi-output	12V	-80V -24V	0.25A 0.12A	500kHz PWM, external FET, transformer, SLIC supply
57	Inverting, multi-output	10V to 25V	-62V -25.5V +38V	0.09A 0.08A 0.09A	250kHz PWM, external FET, transformer
58	Inverting, multi-output	5V	-80V -24V	0.12A 0.06A	500kHz PWM, external FET, transformer
60	Inverting, multi-output	5V	-24V -100V	0.12A 0.075A	500kHz PWM, external FET, transformer, SLIC supply
62	Inverting, multi-output	12V	-80V -53V -26V	0.1A 0.12A 0.12A	250kHz PWM, external FET, transformer
64	Linear Regulator, multi-output	3.3V, 6.5V and 12V	5V 2.5V	0.7A 0.735A	external FET, dual linear regulator, for Thomson Jupiter chip set
65	Off-Line	120VAC	28V	0.7A	200kHz PWM, external FET, drives 4 Luxeon high brightness LEDs
68	Step-Down	3.3V	1.8V	4A	1MHz PWM, external FET
70	Step-Down	12V	3.3V	2.5A	1MHz PWM, external FET
72	Step-Down	10V to 20V	5V	1A	200kHz PWM, external FET, 95% efficiency
74	Step-Down	5V	1V	6A	200kHz PWM, external FET, Low Voltage Output
75	Step-Down	5V	1.25V	6A	200kHz PWM, external FET, DDR termination supply sources and sinks current
77	Step-Down	12V	1.0V to 5.5V	12A	200kHz PWM, external FETs, digitally adjustable
79	Step-Down	3.3V	1.5V	6A	1MHz PWM, external FET
81	Step-Down	12V	2.5V	20A	200kHz PWM, external FET, DDR VDDQ
82	Step-Down	2.5V	1.25V	7A	

					550kHz PWM, external FET
84	Step-Down	2.5V or 1.5V	1.25V or 0.75V	3.5A	550kHz PWM, external FET, DDR VTT
87	Step-Down	12V	1.8V	20A	300kHz PWM, external FET
89	Step-Down	22V	1.25V	1.5A	550kHz PWM, external FET, DDR VTT
91	Step-Down	12V	5V	10A	200kHz PWM, external FET
93	Step-Down	3.3V	1.8V	6A	1MHz PWM, external FET
95	Step-Down	3.3V	1V	1.5A	1MHz PWM, external FET
97	Step-Down	3.3V	1.8V	0.8A	1MHz PWM, external FET
99	Step-Down	5V	2.5V	3A	1MHz PWM, external FET
101	Step-Down	5V	2.5V	10A	1MHz PWM, external FET
103	Step-Down	5V	3.3V	4A	1MHz PWM, external FET
105	Step-Down	5V	3.3V	10A	1MHz PWM, external FET
107	Step-Down	3.3V	1.8V	3A	100kHz PWM, external FET, low cost components
109	Step-Down	3.3V	2.5V	10A	100kHz PWM, external FET, low cost components
111	Step-Down	5V	2.5V	0.5A	100kHz PWM, external FET, low cost components
113	Step-Down	5V	3.3V	8A	100kHz PWM, external FET, low cost components
115	Step-Down	12V	2.5V	5A	100kHz PWM, external FET, low cost components
117	Step-Down	12V	3.3V	0.75A	100kHz PWM, external FET, low cost components
119	Step-Down	12V	5V to 12V	2.5A	1MHz PWM, external FET, PWM voltage adjust, Fan Speed Control
126	Step-Down	5V	3.3V	2.2A	1MHz PWM, external FET
128	Step-Down	12.6V to 15.4V	3.3V	2A	100kHz PWM, external FET, low cost components
130	Step-Down	3.3V	1.25V	12A	550kHz PWM, external FET, DDR termination
132	Step-Down	3V to 3.6V	1.5V	2A	1MHz PWM, external FET
134	Step-Down	12V	5V	0.3A	external FET
135	Step-Down	3.3V	1.2V	1A	1.4MHz PWM, internal FET
137	Step-Down	3.3V	1.8V	2A	1MHz PWM, external FET
139	Step-Down	3.3V	1.2V	3A	1MHz PWM, external FET
141	Step-Down	5V	1.2V	2.1A	

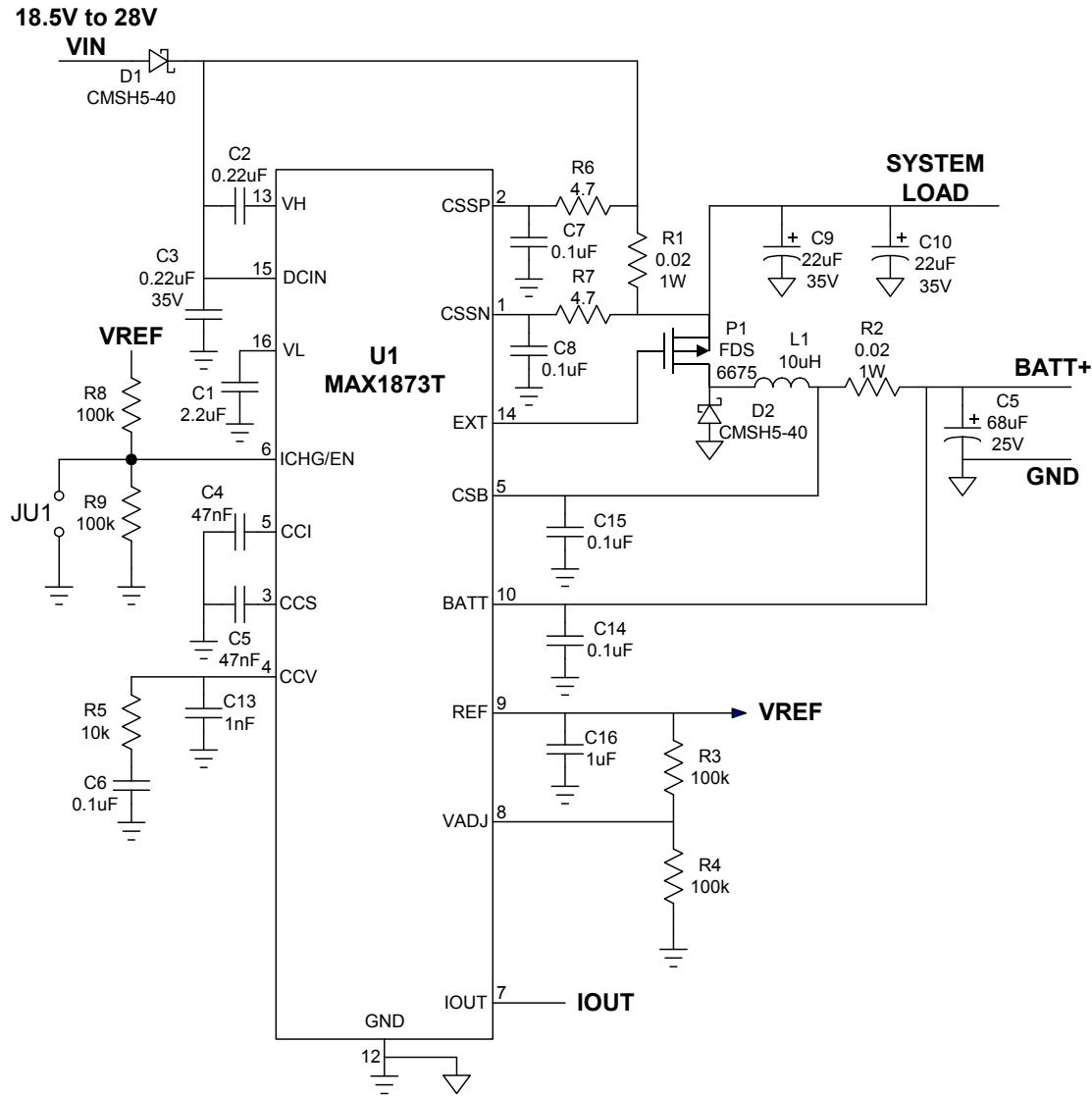
					1MHz PWM, external FET
143	Step-Down	5V	1.5V	4A	1MHz PWM, external FET
145	Step-Down	6.5V to 24V	1.5V	30A	500kHz PWM, external FET, dual-phase, AMD Athlon® XP Mobile power
148	Step-Down	3V to 5.5V	1.8V	5A	1MHz PWM, external FET
150	Step-Down	5V	0.9V to 1.8V	1.8A	300kHz PWM, external FET, XENPAK APS Compliant
152	Step-Down	12V	6V	3A	300kHz PWM, external FET
154	Step-Down	5V	1V or 1.2V	6A	300kHz PWM, external FET, digital select of 1V or 1.2V
156	Step-Down	12V	3.3V	6A	300kHz PWM, external FET, 92% efficiency
158	Step-Down	3.3V	1.8V	5A	300kHz PWM, external FET, 92% efficiency
160	Step-Down	5V	2.5V	4A	300kHz PWM, external FET, 92% efficiency
162	Step-Down	5V	3.3V	4A	1MHz PWM, external FET, 91% efficiency
164	Step-Down	3V to 5.5V	1.5V	2A	1MHz PWM, external FET, ceramic capacitors
166	Step-Down	8V to 20V	2.5V	10A	300kHz PWM, external FET
168	Step-Down	12V to 20V	5V	6A	300kHz PWM, external FET, 93% efficiency
170	Step-Down	12V	3.3V	6A	400kHz PWM, external FET, 94% efficiency
173	Step-Down	12V	2.5V	6A	400kHz PWM, external FET, 93% efficiency
177	Step-Down	11V to 23V	3.7V	1.5A	300kHz PWM, external FET, 93% efficiency
179	Step-Down	5V	3.18V	0.32A	750kHz PWM, internal FET, USB input
180	Step-Down	3V to 3.6V	1.5V	9A	1MHz PWM, external FET
182	Step-Down	3.0V to 5.5V	1.8V	3A	1MHz PWM, external FET
184	Step-Down	3V to 5.5V	1.8V	3A	1MHz PWM, external FET
186	Step-Down	3.3V	1.8V	2A	1MHz PWM, external FET
188	Step-Down	12V	1.8V	25A	300kHz PWM, external FET
190	Step-Down	3V to 5.5V	1.05V	3.5A	300kHz PWM, external FET
192	Step-Down	7V to 13.2V	1.9V	2.5A	300kHz PWM, external FET
194	Step-Down	5V	1.2V	3.5A	300kHz PWM, external FET
196	Step-Down	5V	1.5V	4A	300kHz PWM, external FET
198	Step-Down	3.3V	1.8V	10A	300kHz PWM, external FET
200	Step-Down	3.3V	1.2V	7A	300kHz PWM, external FET

202	Step-Down	3V to 5.5V	1.5V	2A	300kHz PWM, external FET
204	Step-Down	5V	1.8V	6.5A	300kHz PWM, external FET
206	Step-Down	5V	1.2V	6A	300kHz PWM, external FET
208	Step-Down	18V to 24V	12V	2A	300kHz PWM, external FET
210	Step-Down	18V to 20V	12V	4A	300kHz PWM, external FET
212	Step-Down	19V	5V	6A	300kHz PWM, external FET
214	Step-Down	12V	5V	5A	300kHz PWM, external FET
216	Step-Down	8V to 22V	3.3V	1.2A	300kHz PWM, external FET
218	Step-Down	12V	3.3V	4A	300kHz PWM, external FET
220	Step-Down	9V to 20V	2.5V	6A	300kHz PWM, external FET
222	Step-Down	12V	1.5V	5A	300kHz PWM, external FET
224	Step-Down	3V to 5.5V	1.2V	6A	300kHz PWM, external FET
226	Step-Down	5V	1.8V	10A	300kHz PWM, external FET
228	Step-Down	12V to 20V	1.5V	4A	300kHz PWM, external FET
230	Step-Down	12V to 20V	1.2V	4A	300kHz PWM, external FET
232	Step-Down	5.5V to 24V	0.9V	3A	300kHz PWM, external FET
234	Step-Down	3V to 5.5V	0.9V	3A	300kHz PWM, external FET
236	Step-Down	5V	2.5V	1.5A	1MHz PWM, external FET
238	Step-Down	5V	1.05V	3A	300kHz PWM, external FET
241	Step-Down	9V to 19V	1.0V/1.2V	4.5A	100kHz PWM, external FET, dynamic voltage shift
250	Step-Down	12V	1.2V	8.5A	500kHz PWM, external FET
253	Step-Down	12V	1.8V	7.2A	500kHz PWM, external FET
256	Step-Down	10V to 20V	1.05V	4.5A	100kHz PWM, external FET
259	Step-Down, multi-output	24V	3.3V 5V	7A 1A	200kHz PWM, external FET
262	Step-Down, multi-output	9V to 16V	3.3V 2.5V 5V 12V	1.8A 1.4A 0.3A 0.5A	200kHz PWM, external FET
265	Step-Down, multi-output	10V to 18V	3.3V 2.5V 5V -5V	1.3A 0.9A 0.35A 0.18A	200kHz PWM, external FET
268	Step-Down, multi-output	24V	7V 5V -5V	0.5A 1A 0.1A	200kHz PWM, external FET
270	Step-Down, multi-output	9V to 16V	3.3V 1.8V 5V	1.5A 1A 0.5A	200kHz PWM, external FET

			12V –12V	0.4A 0.1A	
273	Step–Down, multi–output	24V	5.15V 7V –5V	0.8A 0.4A 0.08A	200kHz PWM, external FET
277	Step–Down, multi–output	8V to 18V	3.3V 2.5V 5V	1A 1A 0.1A	200kHz PWM, external FET
281	Step–Down, multi–output	12V	3.3V 2.5V 5V	1.5A 0.13A 0.35A	200kHz PWM, external FET
283	Step–Down, multi–output	5V to 28V	3.3V 8V 5V 2.5V	1A 0.05A 0.05A 0.01A	200kHz PWM, external FET
286	Step–Down, multi–output	5V	3.1V 5V 12V	0.4A 0.1A 0.03A	200kHz PWM, external FET
289	Step–Down, multi–output	6V and 3.3V	1.24V 2.5V 1.8V 1.5V	3A 1.4A 0.17A 0.14A	200kHz PWM, external FET, 1 DC–DC plus 3 LDOs
293	Step–Down, multi–output	12V	1.25V 1.25V	8A 8A	700kHz PWM, external FETs, dual out of phase
295	Step–Down, multi–output	7V to 20V	1.8V 3.3V	3A 2A	1.2MHz PWM, external FET, dual out of phase
297	Step–Down, multi–output	10.8V to 13.2V	1.8V 3.3V	0.8A 1.1A	1.2MHz PWM, external FET, dual out of phase, ceramic capacitors
299	Step–Down, multi–output	2.7V to 5.5V	1.8V 2.5V	0.4A 0.1A	750kHz PWM, internal FET
300	Step–Down, multi–output	6V	1.8V 2.5V	3A 3A	1.2MHz PWM, external FET, dual out of phase, ceramic capacitors
302	Step–Down, multi–output	10V to 14V	3.3V 5V	7A 0.15A	200kHz PWM, external FET
304	Step–Down, multi–output	9V to 12V	6V 1.5V	1.5A 3A	600kHz PWM, external FET, dual out of phase
306	Step–Down, multi–output	9V to 12V	3.4V 2.6V	1.75A 3A	1MHz PWM, external FET
308	Step–Down, multi–output	6V to 14V	3.3V 1.8V 5V –48V	0.35A 0.35A 0.35A 0.1A	200kHz PWM, external FET, transformer
312	Step–Up	3.3V to 5.5V	12V	2.3A	250kHz PWM, external FET
314	Step–Up	11V to 14.3V	16V	4.4A	250kHz PWM, external FET, 93% efficient
315	Step–Up	–48V	5V	4A	200kHz PWM, external FET, no transformer, unisolated
316	Step–Up	12V	18.75V	3.1A	500kHz PWM, external FET
317	Step–Up	13.5V to 26.4V	48V	0.2A	500kHz PWM, external FET
319	Step–Up, multi–output	–18V to –24V	+5V +3.3V –6V –24V –85V	0.35A 0.15A 0.006A 0.03A 0.001A	300kHz PWM, external FET, no transformer
321	Step–Up/Down	2.5V to 6V	3.3V	1.5A	250kHz PWM, external FET, SEPIC
322	Step–Up/Down	8V to 20V	12V	2.5A	500kHz PWM, external FET, SEPIC

323	Step-Up/Down	2.7V to 5.5V	3.8V	0.8A	300kHz PWM, internal FET, single inductor, buck-boost
-----	--------------	--------------	------	------	---

5A 2, 3 , or 4-cell Li-Ion Battery Charger

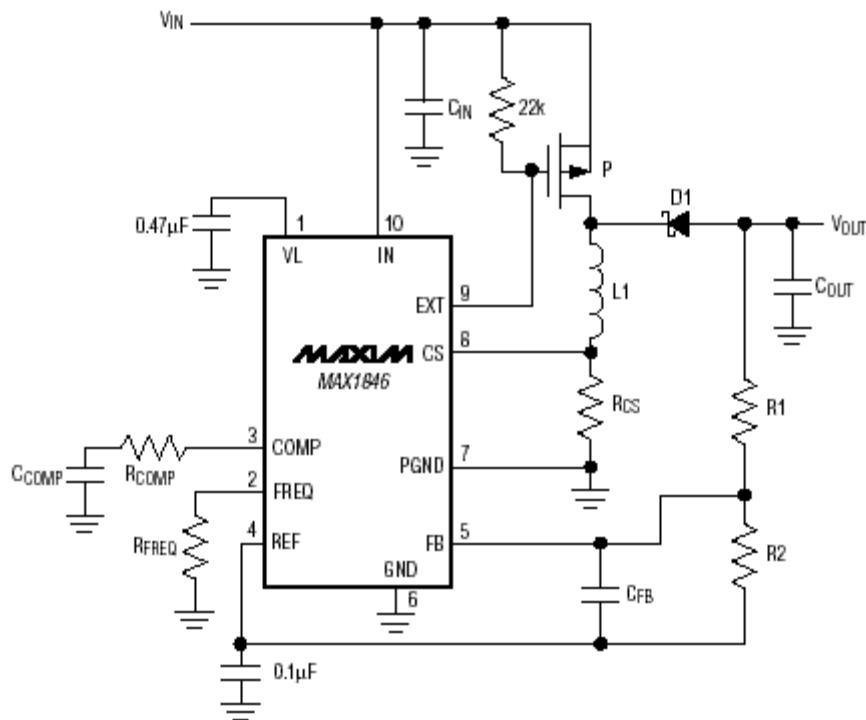


1873T_5A
RWY
9/05/05

BILL OF MATERIALS**18.5V to 28V Input****16.8V @ 5A Output****9/05/05**

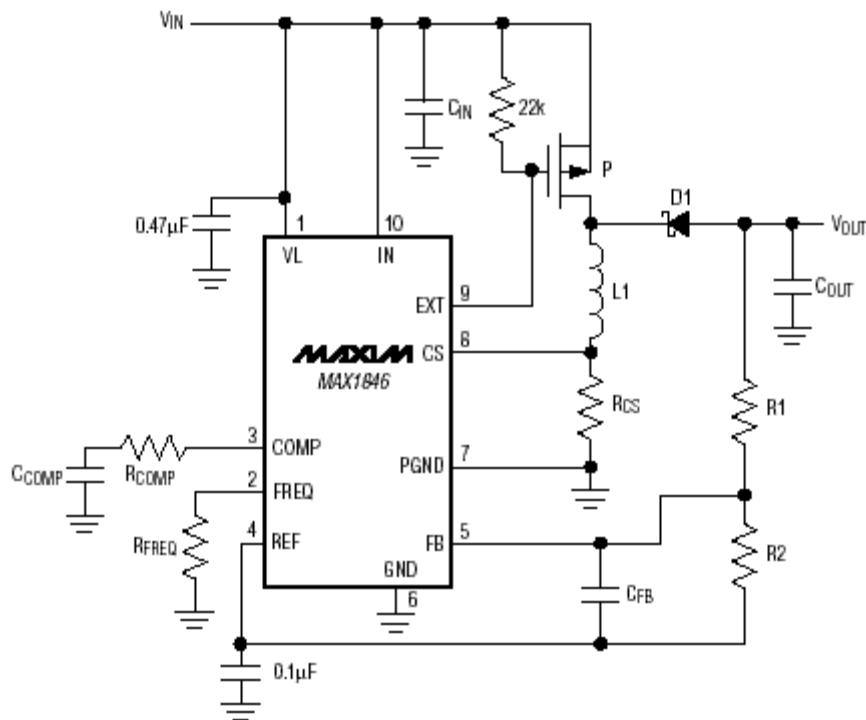
1873T 5A

DESIGNATION	QTY	DESCRIPTION
C1	1	2.2uF 10V X5R ceramic capacitor ((0805) Taiyo Yuden LMK212BJ225MG
C2,C3	2	0.22uF 35V ceramic capacitor (0805) Taiyo Yuden GMK212BJ224KG
C4,C5	2	47nF 50V X7R ceramic capacitor (0805) Taiyo Yuden UMK212BJ473KG
C6,C7,C8,C14, C15	5	0.1uF 50V X7R ceramic capacitor (0805) Taiyo Yuden UMK212BJ104KG
C9,C10	2	22uF 35V tantalum capacitor (E) AVX TPSE226K035R0200
C11	1	68uF 25V tantalum capacitor (E) AVX TPSE686M025R0125
C13	1	1nF ceramic capacitor (0603)
C16	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105KG
D1,D2	2	5A 40V Schottky diode (SMC) Central Semi CMSH5-40
L1	1	10uH 5.4A Power inductor (12.3 x 12.3 x 8) Sumida CDRH127-100
P1	1	20m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS6675
R1,R2	2	0.02 Ohm 1W 5% resistor (2512) Dale
R3,R4,R8,R9	4	100k Ohm 5% resistor (0805)
R5	1	10k Ohm 5% resistor (0805)
R6,R7	2	4.7 Ohm 1% resistor (0603)
U1	1	MAX1873TEEE (16-QSOP)



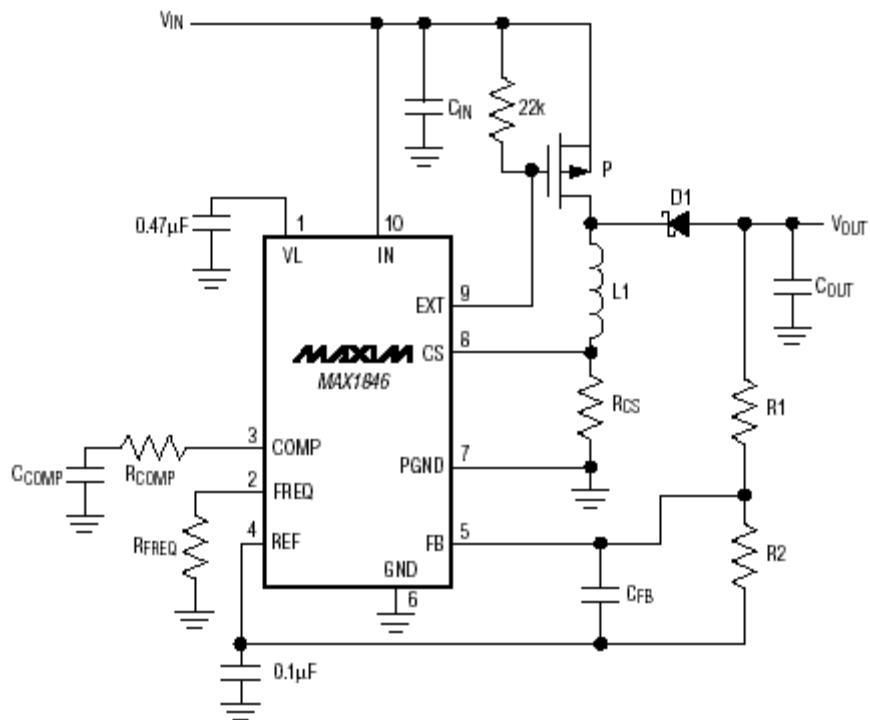
CIRCUIT ID	A	B	C	D
Input (V)	12	3 to 5.5	12	12
Output (V)	-5	-12	-48	-72
Output (A)	2	0.4	0.1	0.1
CCOMP (μF)	0.047	0.22	0.068	0.1
CIN (μF)	3x10	3x22	10	10
COUT (μF)	2 x 100	2 x 47	47	33
CFB (pF)	390	1200	1800	1800
R1(k) (1%)	40.2	95.3	383	576
R2(k) (1%)	10	10	10	10
RCOMP (k)	8.2	10	150	1800
RCS ()	0.02	0.02	0.05	0.05
RFREQ (k)	150	150	150	150
D1	CMSH5-40	CMSH5-40	CMR1U-02	CMR1U-02
L1 (μH)	10	10	47	82
P1	FDS6685	FDS6375	IRFR5410	IRFR5410

Component List for Application Circuits



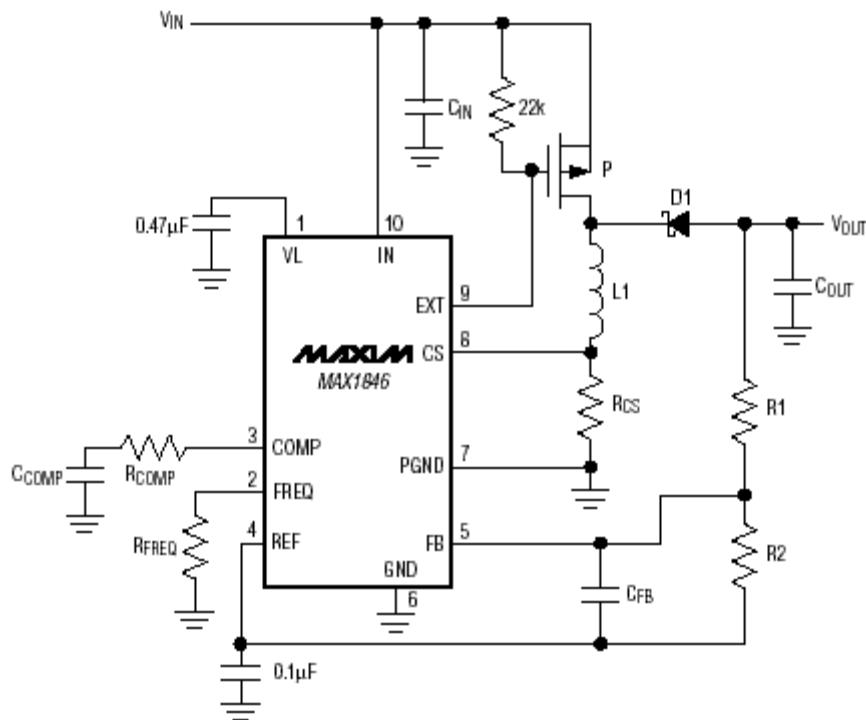
CIRCUIT ID	A	B	C	D
Input (V)	12	3 to 5.5	12	12
Output (V)	-5	-12	-48	-72
Output (A)	2	0.4	0.1	0.1
CCOMP (μF)	0.047	0.22	0.068	0.1
CIN (μF)	3x10	3x22	10	10
COUT (μF)	2 x 100	2 x 47	47	33
CFB (pF)	390	1200	1800	1800
R1(k) (1%)	40.2	95.3	383	576
R2(k) (1%)	10	10	10	10
RCOMP (k)	8.2	10	150	1800
RCS ()	0.02	0.02	0.05	0.05
RFREQ (k)	150	150	150	150
D1	CMSH5-40	CMSH5-40	CMR1U-02	CMR1U-02
L1 (μH)	10	10	47	82
P1	FDS6685	FDS6375	IRFR5410	IRFR5410

Component List for Application Circuits



CIRCUIT ID	A	B	C	D
Input (V)	12	3 to 5.5	12	12
Output (V)	-5	-12	-48	-72
Output (A)	2	0.4	0.1	0.1
CCOMP (μF)	0.047	0.22	0.068	0.1
CIN (μF)	3x10	3x22	10	10
COUT (μF)	2 x 100	2 x 47	47	33
CFB (pF)	390	1200	1800	1800
R1(k) (1%)	40.2	95.3	383	576
R2(k) (1%)	10	10	10	10
RCOMP (k)	8.2	10	150	1800
RCS ()	0.02	0.02	0.05	0.05
RFREQ (k)	150	150	150	150
D1	CMSH5-40	CMSH5-40	CMR1U-02	CMR1U-02
L1 (μH)	10	10	47	82
P1	FDS6685	FDS6375	IRFR5410	IRFR5410

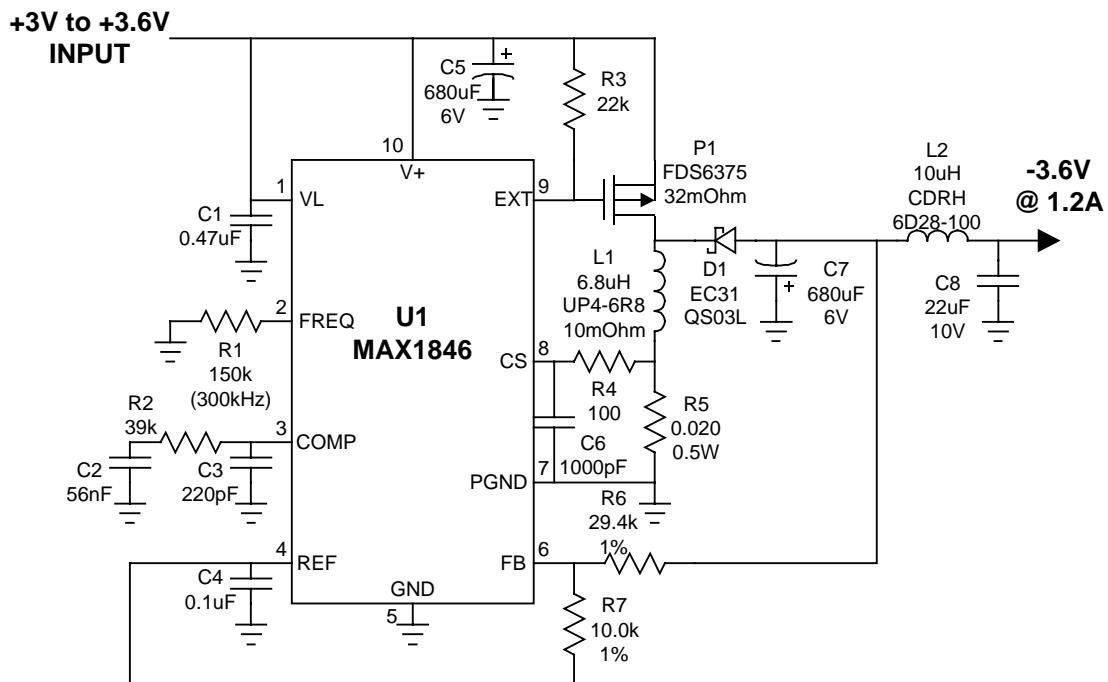
Component List for Application Circuits



CIRCUIT ID	A	B	C	D
Input (V)	12	3 to 5.5	12	12
Output (V)	-5	-12	-48	-72
Output (A)	2	0.4	0.1	0.1
CCOMP (μF)	0.047	0.22	0.068	0.1
CIN (μF)	3x10	3x22	10	10
COUT (μF)	2 x 100	2 x 47	47	33
CFB (pF)	390	1200	1800	1800
R1(k) (1%)	40.2	95.3	383	576
R2(k) (1%)	10	10	10	10
RCOMP (k)	8.2	10	150	1800
RCS ()	0.02	0.02	0.05	0.05
RFREQ (k)	150	150	150	150
D1	CMSH5-40	CMSH5-40	CMR1U-02	CMR1U-02
L1 (μH)	10	10	47	82
P1	FDS6685	FDS6375	IRFR5410	IRFR5410

Component List for Application Circuits

10G Network



1846-3v6
RWY
08/24/01

+3V to -3.6V @ 1.2A

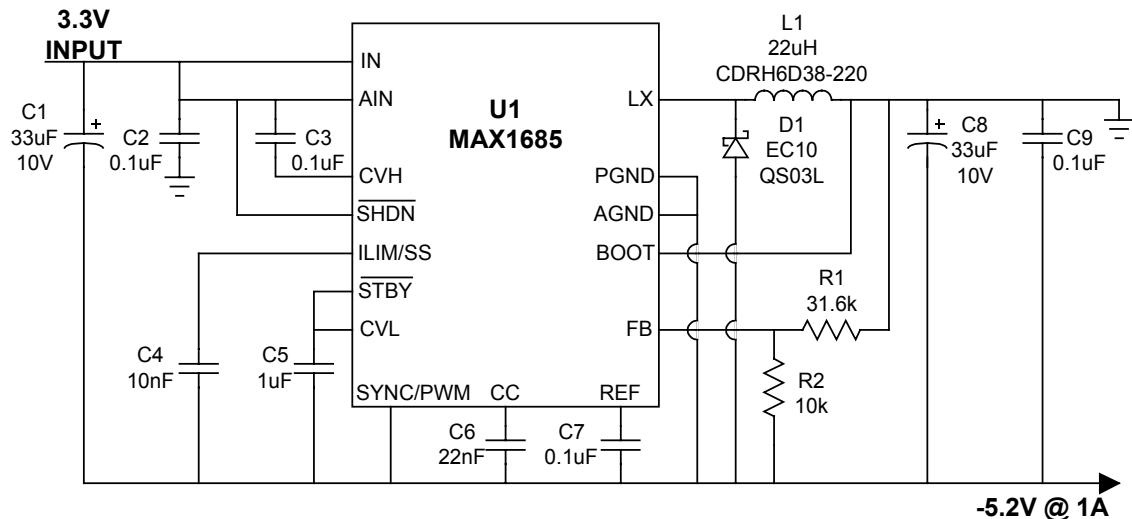
Vin	Iin	Vout	Iout	Efficiency
3.5154	1.642	-3.6159	1.2044	0.754
3.3033	1.761	-3.6159	1.2044	0.749
3.0876	1.905	-3.6158	1.2044	0.740

BILL OF MATERIALS

**3V to 3.6V Input
-3.6V @ 1.2A Output
08/24/01**

1846-3v6

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	56nF ceramic capacitor (0805)
C3	1	220pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5,C7	2	680uF 6V organic semiconductor capacitor Sanyo OS-CON 6SP680M
C6	1	1nF ceramic capacitor (0805)
C8	1	22nF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MN
D1	1	3A 30V Schottky diode Nihon EC31QS03L
L1	1	6.8uH 5A Power Inductor Coiltronics UP4-6R8
L2	1	10uH 1.2A Inductor Sumida CDRH6D28-100
P1	1	32m Ohm -20V P-FET (SO-8) Fairchild FDS6375
R1	1	150k Ohm 5% resistor (0805)
R2	1	39k Ohm 5% resistor (0805)
R3	1	22k Ohm 5% resistor (0805)
R4	1	100 Ohm 5% resistor (0805)
R5	1	20m Ohm 1% 0.5W resistor (2010) Dale WSL-2010-R050F
R6	1	29.4k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1847EEE (16-QSOP)



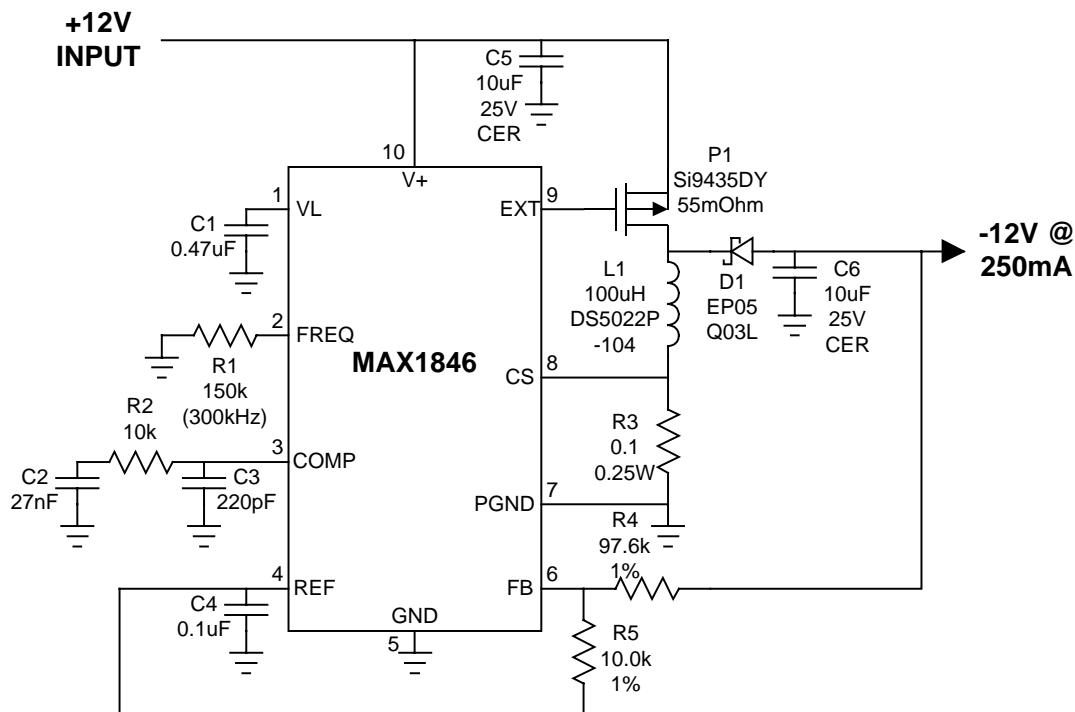
1685-5
RWY
6/7/01

3.3V into -5.2V @ 1A

Notes:

C1,C2 Sanyo 10TPA33M
D1 Nihon
L1 Sumida

Server



1846-12b
RWY
08/10/01

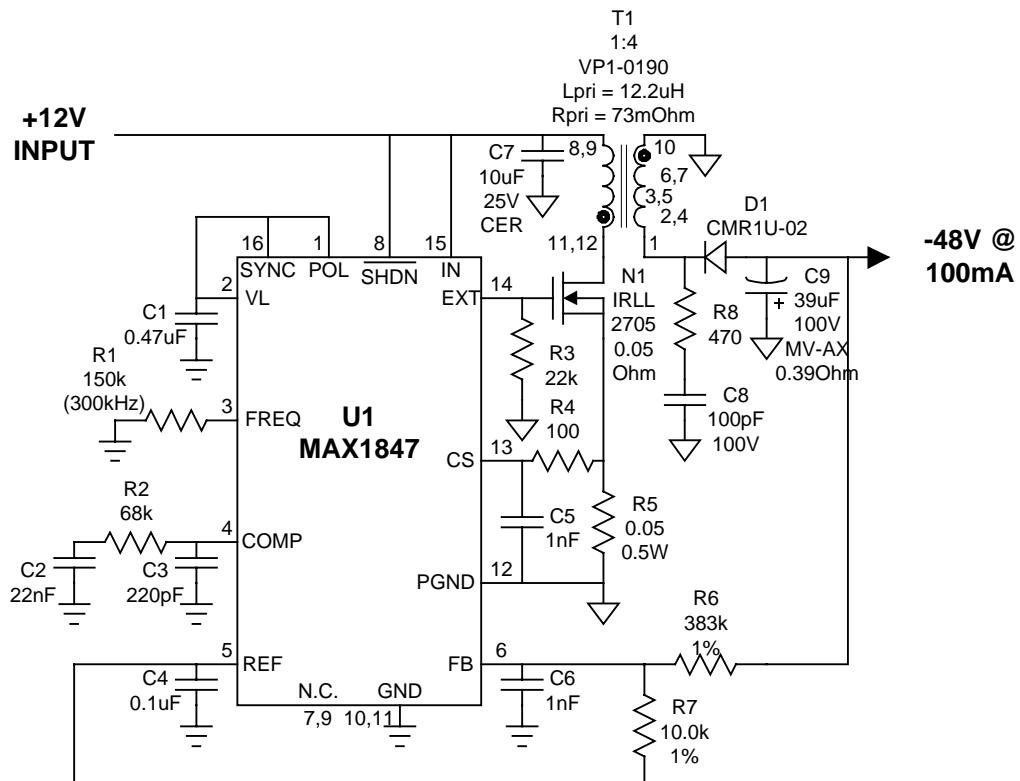
+12V to -12V @ 250mA

BILL OF MATERIALS**11.4V to 12.6V Input****-12V @ 250mA Output****08/10/01**

1846-12b

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	27nF ceramic capacitor (0805)
C3	1	220pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5,C6	2	10uF 25V ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C6	1	1500pF ceramic capacitor (0805)
D1	1	500mA 30V Schottky diode Nihon EP05Q03L
L1	1	100uH 1A Inductor Coilcraft DS5022P-104
P1	1	55m Ohm 30V P-channel MOSFET (SO-8) Siliconix Si9435DY
R1	1	150k Ohm 5% resistor (0805)
R2	1	10k Ohm 5% resistor (0805)
R3	1	100m Ohm 1% 0.25W resistor (1210)
R4	1	97.6k Ohm 1% resistor (0805)
R5	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1846EUB (10-uMAX)

MAX1847 transformer application



1847-48t
RWY
09/17/01

+12V to -48V @ 100mA

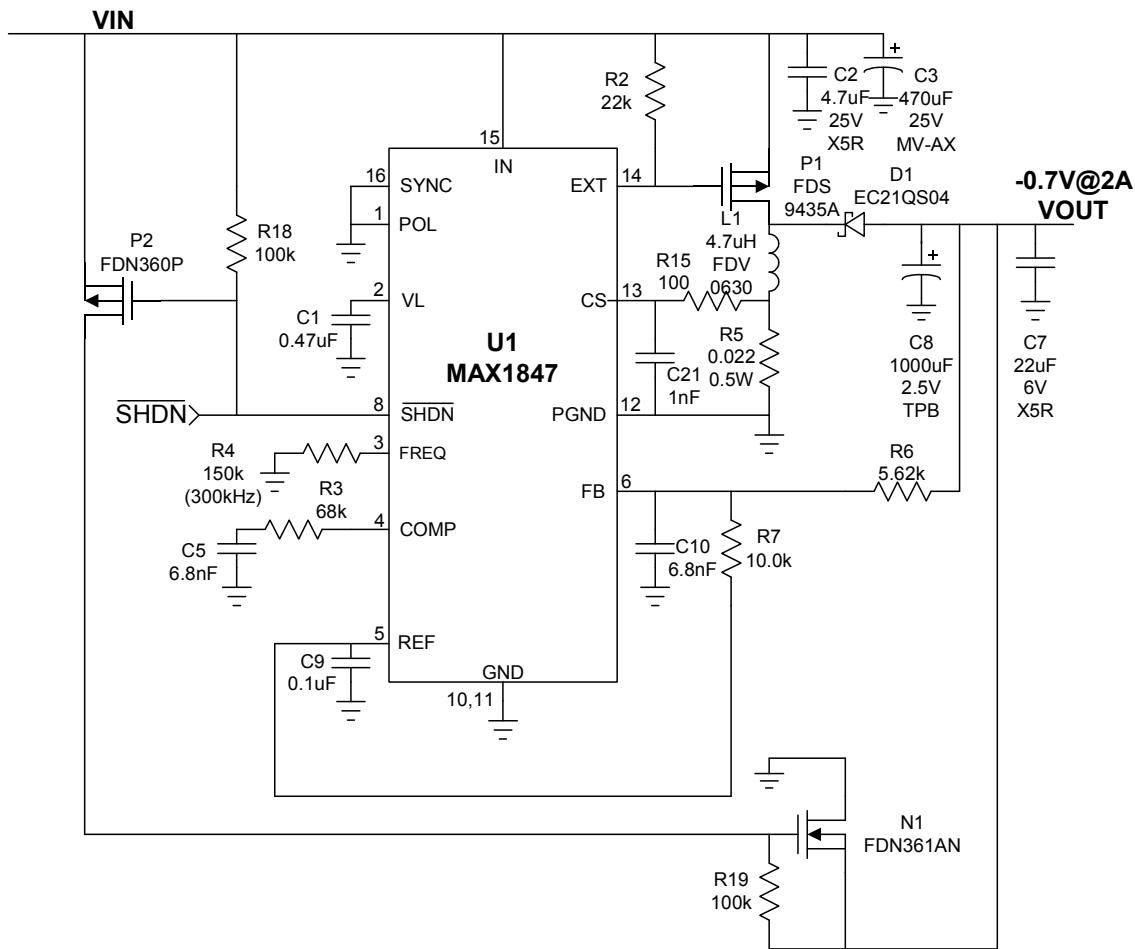
Vin	Iin	Vout	Iout	Efficiency	
10.795	0.499	-47.673	-0.100	0.885	
11.999	0.450	-47.672	-0.100	0.883	<200mVpp
13.202	0.409	-47.671	-0.100	0.883	

BILL OF MATERIALS
10.8V to 13.2V Input
-48V @ 100mA Output
09/18/01

1847-48t

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	22nF ceramic capacitor (0805)
C3	1	220pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5,C6	2	1nF 6V ceramic capacitor (0805)
C7	1	10uF 25V ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C8	1	100pF 100V ceramic capacitor (0805)
C9	1	39uF 100V aluminum electrolytic capacitor Sanyo 100MV39AX
D1	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1	1	50m Ohm 55V N-FET (SOT-223) IRLL2705
R1	1	150k Ohm 5% resistor (0805)
R2	1	68k Ohm 5% resistor (0805)
R3	1	22k Ohm 5% resistor (0805)
R4	1	100 Ohm 5% resistor (0805)
R5	1	50m Ohm 1% 0.5W resistor (2010) Dale WSL-2010-R050F
R6	1	383k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
R8	1	470 Ohm 0.25W resistor (1210)
T1	1	1:4 Transformer Coiltronics VP1-0190
U1	1	MAX1847EEE (16-QSOP)

10.8V to 13.2V



1847-0a7

RWY

2/24/05

Vin	Iin	Vout	Iout	Efficiency
12.01	0.0009	-0.703	0	
10.77	0.26	-0.696	2.04	0.507
12.00	0.25	-0.696	2.11	0.490
13.23	0.23	-0.696	2.08	0.476
20MHz BW		~40mVpp		

Note: 1) C3 is not necessary if there is sufficient bulk bypass capacitance close by.

2) N1 and P2 are included to force the output to 0V in shutdown.

BILL OF MATERIALS**10.8V to 13.2V Input****-0.7V @ 2A Output****2/24/05**

1847-0a7

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0603)
C2	1	4.7uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C3	1	470uF 25V aluminum electrolytic capacitor Sanyo 25MV470AX
C5	1	6.8nF ceramic capacitor (0805)
C7	1	22uF 6V X5R ceramic capacitor Taiyo Yuden JMK325BJ226MM
C8	1	1000uF 2.5V polymer capacitor Sanyo POSCAP 2R5TPB1000M
C9	1	0.1uF ceramic capacitor (0603)
C10	1	6.8nF ceramic capacitor (0603)
C21	1	1nF ceramic capacitor (0603)
D1	1	2A 40V Schottky diode Nihon EC21QS04
L1	1	4.7uH 3.3A Inductor Toko FDV0630-4R7
N1	1	0.1 Ohm 20V N-ch MOSFET (SOT-23) Fairchild FDN361AN
P1	1	50m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS9435A
P2	1	30m Ohm -30V P-ch MOSFET (SOT-23) Fairchild FDN360P
R2	1	22k Ohm 5% resistor (0603)
R3	1	68k Ohm 5% resistor (0603)
R4	1	150k Ohm 5% resistor (0603)
R5	1	0.022 Ohm 0.5W 5% resistor (1812)
R6	1	5.62k Ohm 1% resistor (0603)
R7	1	10.0k Ohm 1% resistor (0603)
R15	1	100 Ohm 5% resistor (0603)
R18,R19	2	100k Ohm 5% resistor (0603)
U1	1	MAX1847EEE (16-QSOP)

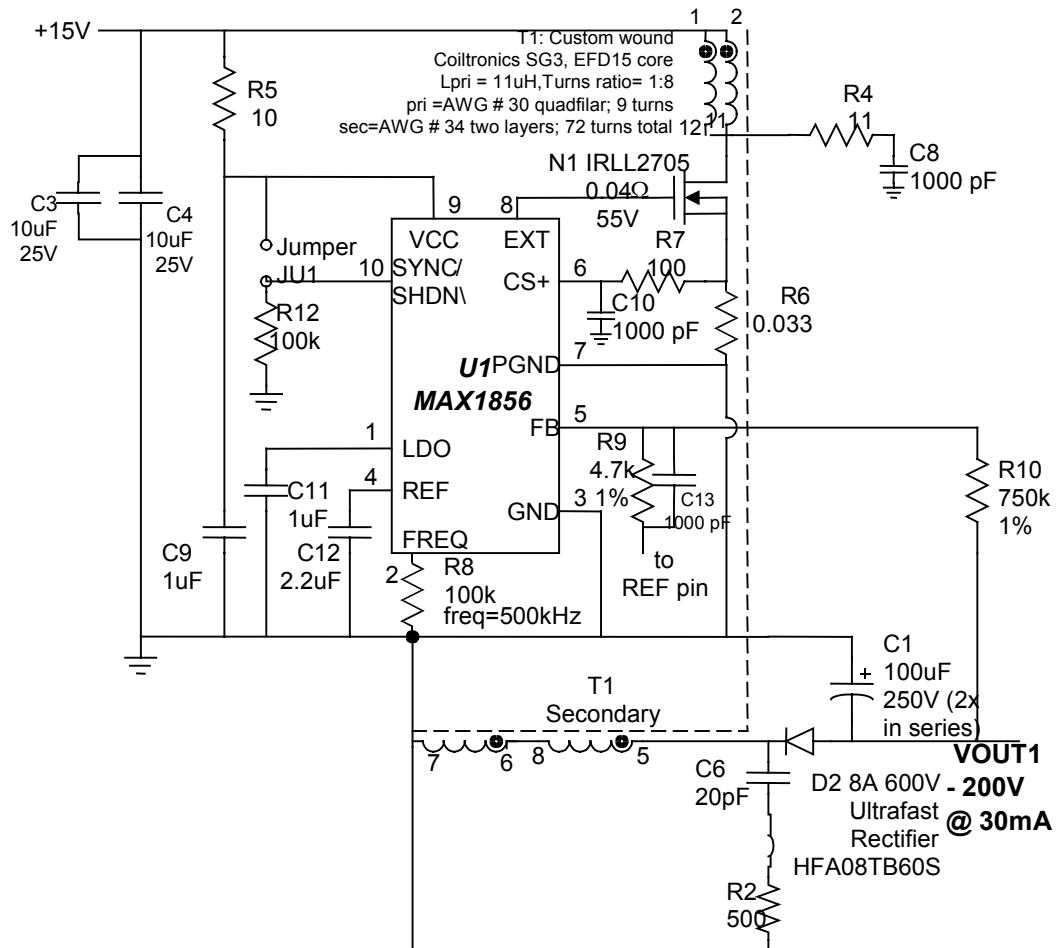
MAX1856 15VIN to -200Vout @0.03A

Table 1: BILL OF MATERIALS

DESIGNATION	QTY	DESCRIPTION
C1	1	100 μ F 250V electrolytic capacitor Sanyo 250MV100FAZ (2x in series)
C3,C4	2	10 μ F 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106KM
C6	2	10 pF 200V capacitor (through hole – connect 2 in parallel)
C8	1	1000pF 50V ceramic capacitor
C9	1	1 μ F X7R ceramic capacitor (1206) Taiyo Yuden TMK316BJ105KL
C10,C13	2	1000 pF, NP0 ceramic capacitors (0805) AVX 0805-5A-102-JAT-2A
C11	1	1 μ F, X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105KG
C12	1	2.2 μ F, 10V ceramic capacitor (1206) MURATA GRM42-6X7R225K010AD
D2	1	8A, 600V Ultra-fast recovery diode International Rectifier HFA08TB60S
D1, D3	2	OPEN
N1	1	N-channel MOSFETs International Rectifier IRLL2705
R2	1	500 Ω , 5% resistor (through hole)
R3	1	SHORT
R4	1	11 Ω , 5% resistor (0805/0603)
R5	1	10 Ω , 5% resistor (1206)
R6	1	0.033 Ω , 1% sense resistor (2010) DALE 0.5W
R7	1	100 Ω , 5% resistor (0805)
R8	1	100 k Ω , 1% resistor (0805)
R9	1	4.7 k Ω , 1% resistor (0805)
R10	1	750k Ω , 1% resistor (0805)
R11	1	OPEN
R12	1	100 k Ω , 5% resistor (0805)
T1	1	Coiltronics transformer custom wound
JU1	1	2-pin header
U1	1	MAX1856EUB (10 μ MAX)

Schematic:

6/6/01
+15V to -200V @30mA This uses the MAX1856 and a transformer (that will need 1 to 8 turns ratio) to make a flyback

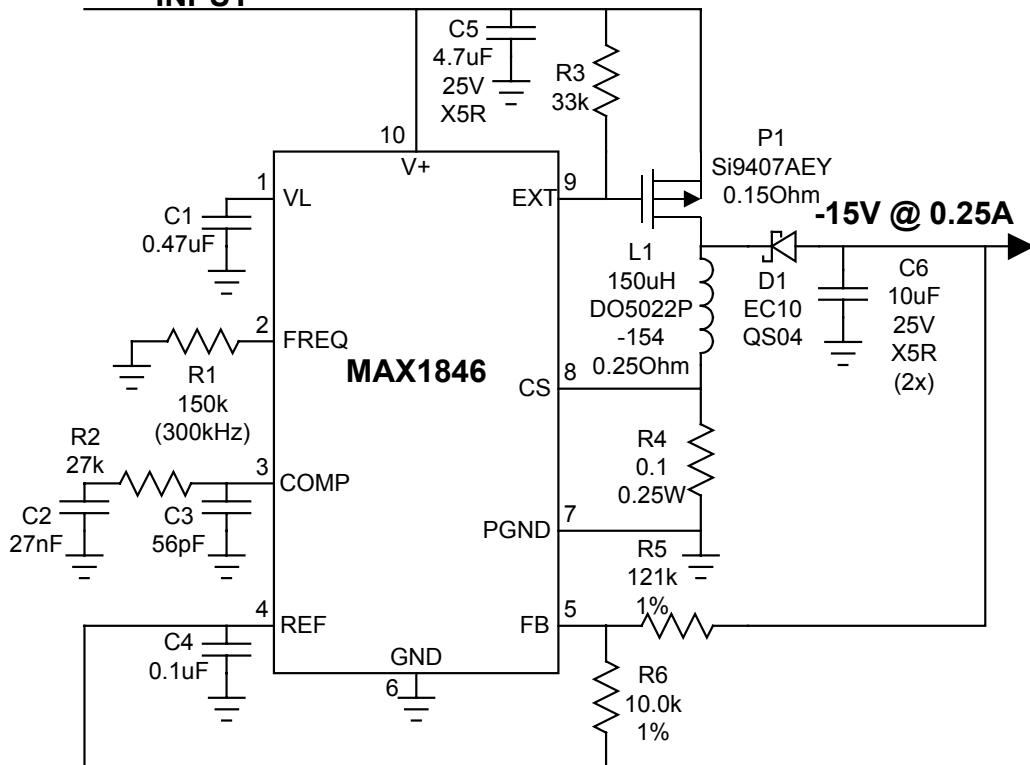


Notes:

- T1: Coiltronics or equivalent. The general specs are: Primary L = 11uH (critical), Primary current rating = >2.5Amps, Turns ratio
- N1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may substituted.

13.5V to 16.5V

INPUT



1846-15c

RWY

8/13/02

Vin	Iin	Vout	Iout	Efficiency
15.001	0.0019	-15.017	0	
13.501	0.3137	-15.013	-0.2505	0.889
15.005	0.2842	-15.015	-0.2505	0.882
16.512	0.2603	-15.017	-0.2505	0.875
		55mVpp		

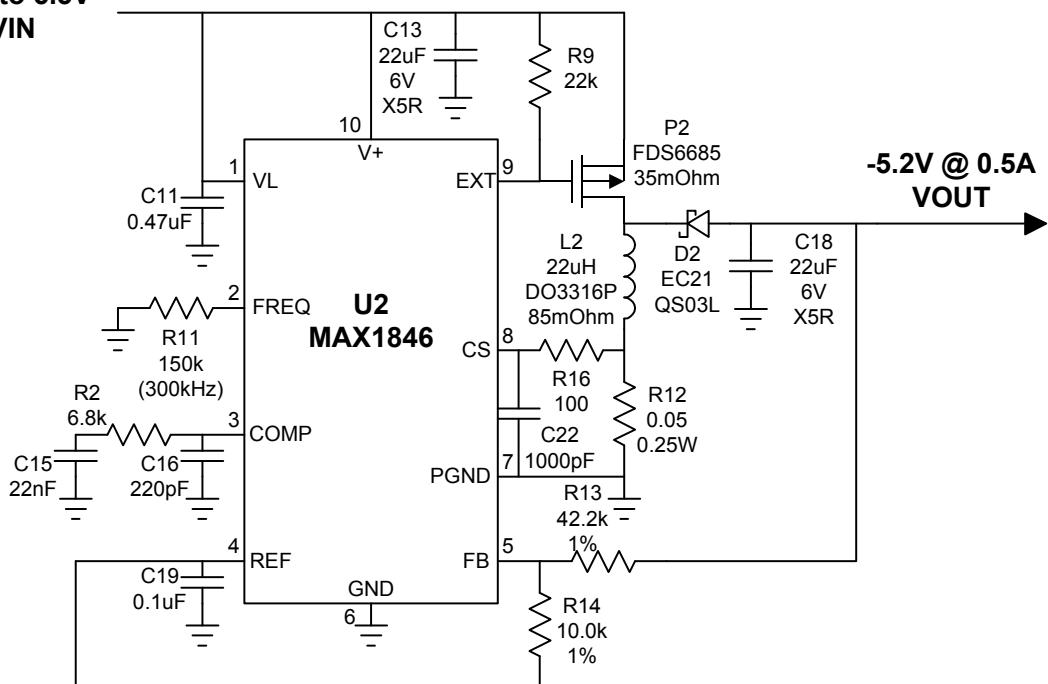
BILL OF MATERIALS**13.5V to 16.5V Input****-1.5V @ 0.25A Output****8/13/02**

1846-15c

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0603)
C2	1	27nF ceramic capacitor (0603)
C3	1	56pF ceramic capacitor (0603)
C4	1	0.1uF ceramic capacitor (0603)
C5	1	4.7uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C6	2	10uF 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
D1	1	1A 40V Schottky diode Nihon EC10QS04
L1	1	150uH 2A Inductor Coilcraft DO5022P-154
P1	1	150m Ohm -60V P-ch MOSFET (SO-8) Siliconix Si9407AEY
R1	1	150k Ohm 5% resistor (0603)
R2	1	27k Ohm 5% resistor (0603)
R3	1	33k Ohm 5% resistor (0603)
R4	1	0.1 Ohm 0.25W 5% resistor (1210)
R5	1	121k Ohm 1% resistor (0603)
R6	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1846EUB (10-uMAX)

4.5V to 5.5V

VIN



1846-5h

RWY

1/28/04

Vin	Iin	Vout	Iout	Efficiency
5.00	0.0018	-5.24	0	
4.47	0.71	-5.24	0.5	0.826
5.00	0.63	-5.24	0.5	0.832
5.53	0.56	-5.24	0.5	0.846
20MHz BW		100mVpp		

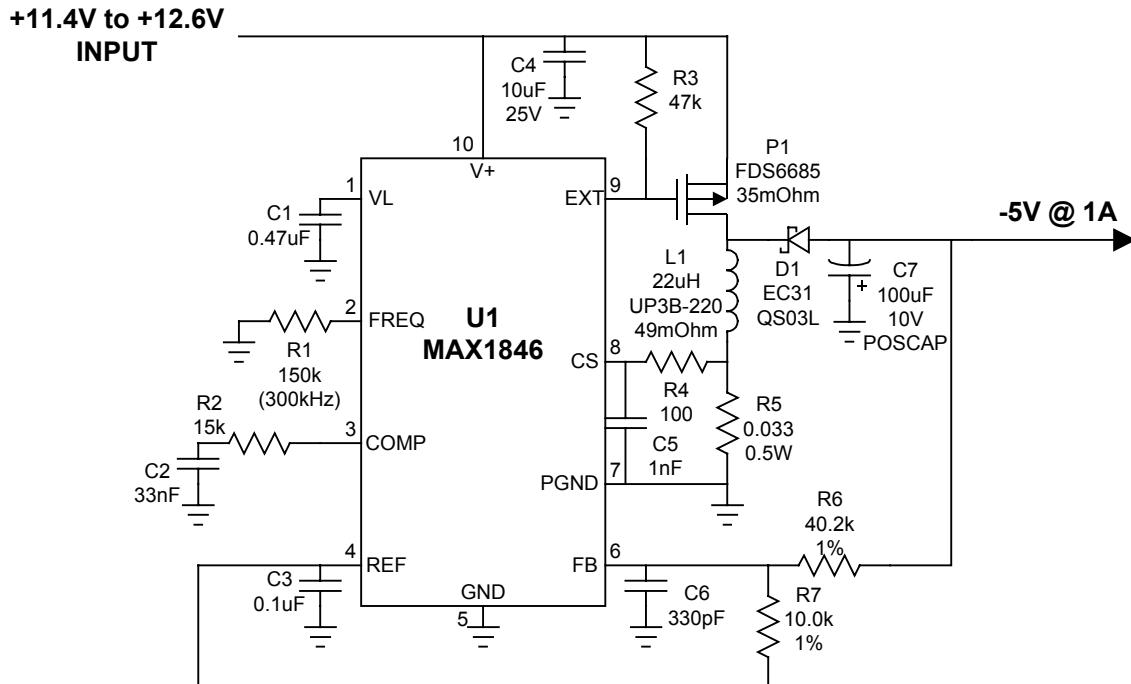
BILL OF MATERIALS

**4.5V to 5.5V Input
-5.2V @ 0.5A Output**

1/28/04

1846-5h

DESIGNATION	QTY	DESCRIPTION
C11	1	0.47uF ceramic capacitor (0805)
C15	1	22nF ceramic capacitor (0805)
C16	1	220pF ceramic capacitor (0805)
C19	1	0.1uF ceramic capacitor (0805)
C13,C18	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C22	1	1nF ceramic capacitor (0805)
D2	1	2A 20V Schottky diode Nihon EC21QS03L
L2	1	22uH 2.6A Inductor Coilcraft DO3316P-223
P2	1	35m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS6685
R11	1	150k Ohm 5% resistor (0805)
R10	1	6.8k Ohm 5% resistor (0805)
R9	1	22k Ohm 5% resistor (0805)
R16	1	100 Ohm 5% resistor (0805)
R12	1	0.05 Ohm 0.25W 5% resistor (1210)
R13	1	42.2k Ohm 1% resistor (0805)
R14	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1846EUB (10-uMAX)



1846-5g
RWY
12/12/01

+11.4V to +12.6V into -5V @ 1A

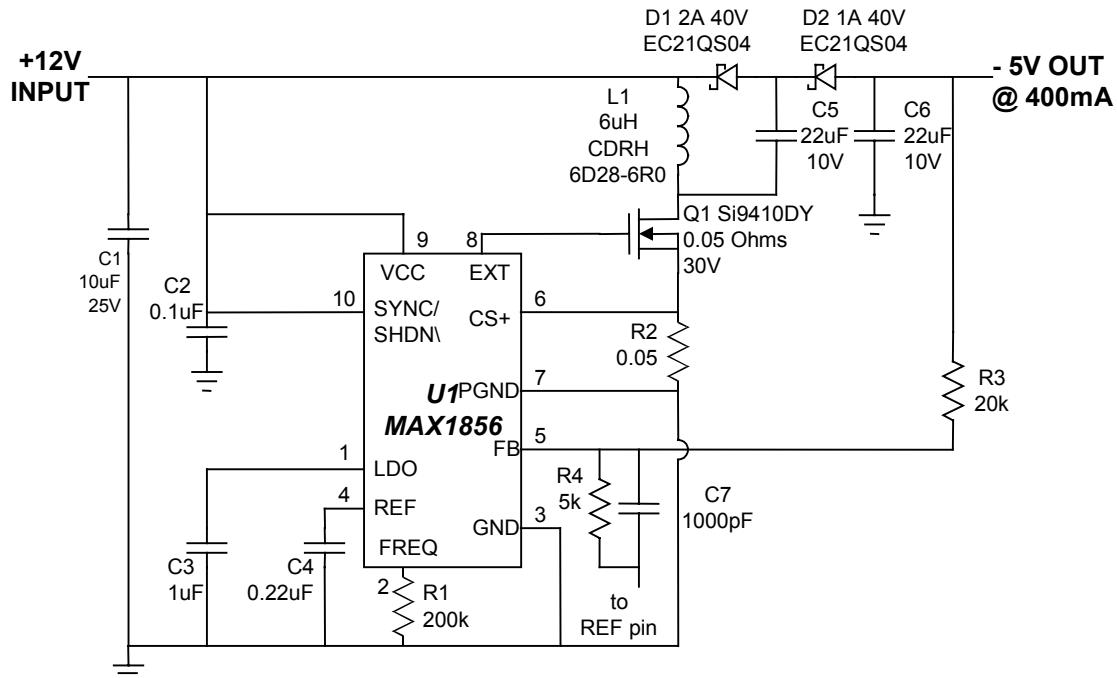
BILL OF MATERIALS**11.4V to 12.6V Input****-5V @ 1A Output****12/12/01**

1846-5g

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	39nF ceramic capacitor (0805)
C3	1	0.1uF ceramic capacitor (0805)
C4	1	10uF 25V ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C5	1	1nF ceramic capacitor (0805)
C6	1	330pF ceramic capacitor (0805)
C7	1	100uF 10V tantalum capacitor Sanyo POSCAP 10TPB100M
D1	1	3.1A 30V Schottky diode Nihon EC31QS03L
L1	1	22uH 3A Inductor Coiltronics UP3B-220
P1	1	35m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS6685
R1	1	150k Ohm 5% resistor (0603)
R2	1	15k Ohm 5% resistor (0603)
R3	1	47k Ohm 5% resistor (0603)
R4	1	100 Ohm 5% resistor (0603)
R5	1	33m Ohm 1% 0.5W resistor (2010)
R6	1	40.2k Ohm 1% resistor (0603)
R7	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1846EUB (10-uMAX)

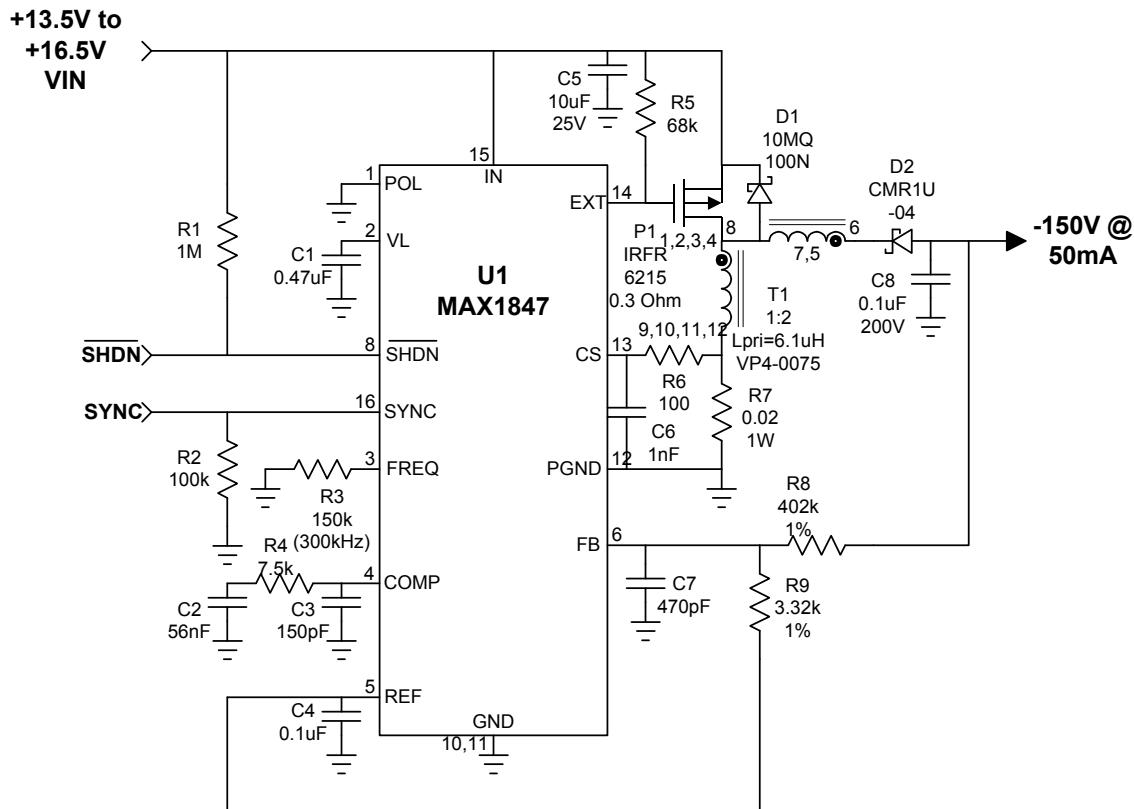
01/05/00 -

+12V to -5V at 400mA. This uses the MAX1856, an inductor, and a capacitor to make a charge pump inverter.



Notes:

Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.



1847-150

RWY

12/19/01

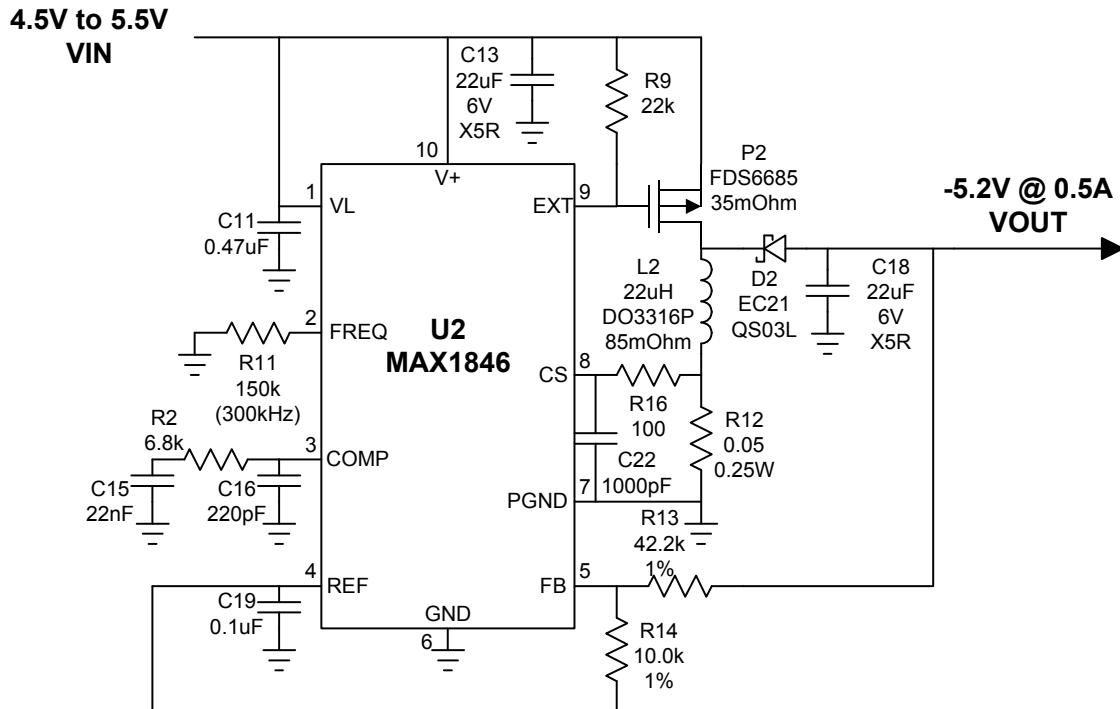
+13.5V to +16.5V into -150V @ 50mA

Vin	Iin	Vout	Iout	Efficiency
16.843	0.660	-150.8	0.05997	0.814
15.03	0.742	-150.8	0.05997	0.811
13.32	0.832	-150.8	0.05997	0.816
20MHz BW		1.95Vpp		

BILL OF MATERIALS**13.5V to 16.5V Input****-150V @ 50mA Output****12/19/01**

1847-180

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	56nF ceramic capacitor (0805)
C3	1	150pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5	1	10uF 25V ceramic capacitor (1210) Taiyo Yuden TMK432BJ106MM
C6	1	1nF ceramic capacitor (0805)
C7	1	470pF ceramic capacitor (0805)
C8	1	0.1uF 200V PEN film capacitor (2420) Panasonic ECWU2104JC9
D1	1	1.5A 100V Schottky diode International Rectifier 10MQ100N
D2	1	1A 400V Ultrafast recovery diode Central Semi CMR1U-04
P1	1	0.3 Ohm -150V P-ch MOSFET (D-PAK) International Rectifier IRFR6215
R1	1	1M Ohm 5% resistor (0603)
R2	1	100k Ohm 5% resistor (0603)
R3	1	150k Ohm 5% resistor (0603)
R4	1	7.5k Ohm 5% resistor (0603)
R5	1	68k Ohm 5% resistor (0603)
R6	1	100 Ohm 5% resistor (0603)
R7	1	20m Ohm 1% 1W resistor (2512)
R8	1	402k Ohm 1% resistor (1206)
R9	1	3.32k Ohm 1% resistor (0603)
T1	1	1:2 Power transformer Lpri = 6.1uH Coiltronics VP4-0075
U1	1	MAX1847EEE (16-QSOP)



1846-5h

RWY

1/28/04

Vin	Iin	Vout	Iout	Efficiency
5.00	0.0018	-5.24	0	
4.47	0.71	-5.24	0.5	0.826
5.00	0.63	-5.24	0.5	0.832
5.53	0.56	-5.24	0.5	0.846
20MHz BW		100mVpp		

BILL OF MATERIALS

**4.5V to 5.5V Input
-5.2V @ 0.5A Output**

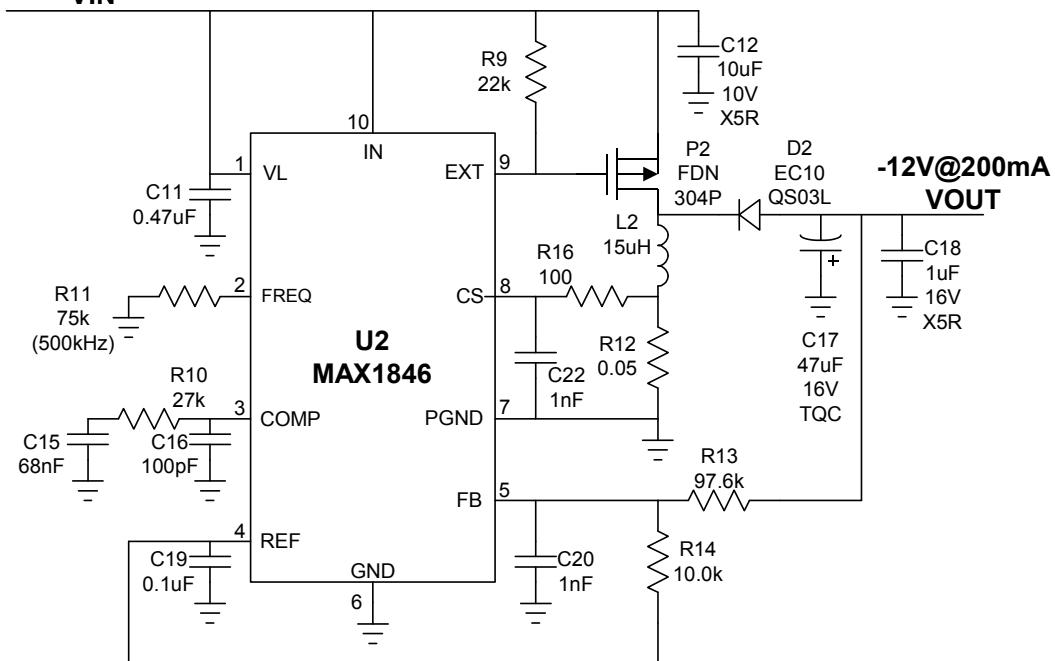
1/28/04

1846-5h

DESIGNATION	QTY	DESCRIPTION
C11	1	0.47uF ceramic capacitor (0805)
C15	1	22nF ceramic capacitor (0805)
C16	1	220pF ceramic capacitor (0805)
C19	1	0.1uF ceramic capacitor (0805)
C13,C18	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C22	1	1nF ceramic capacitor (0805)
D2	1	2A 20V Schottky diode Nihon EC21QS03L
L2	1	22uH 2.6A Inductor Coilcraft DO3316P-223
P2	1	35m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS6685
R11	1	150k Ohm 5% resistor (0805)
R10	1	6.8k Ohm 5% resistor (0805)
R9	1	22k Ohm 5% resistor (0805)
R16	1	100 Ohm 5% resistor (0805)
R12	1	0.05 Ohm 0.25W 5% resistor (1210)
R13	1	42.2k Ohm 1% resistor (0805)
R14	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1846EUB (10-uMAX)

4.5V to 5.5V

VIN



1846-12d

RWY

8/04/04

Vin	Iin	Vout	Iout	Efficiency
5.01	0.0049	-12.16	0	
4.48	0.6595	-12.15	0.203	0.835
5.00	0.5902	-12.15	0.203	0.836
5.51	0.5358	-12.15	0.203	0.835
		70mVpp		

BILL OF MATERIALS

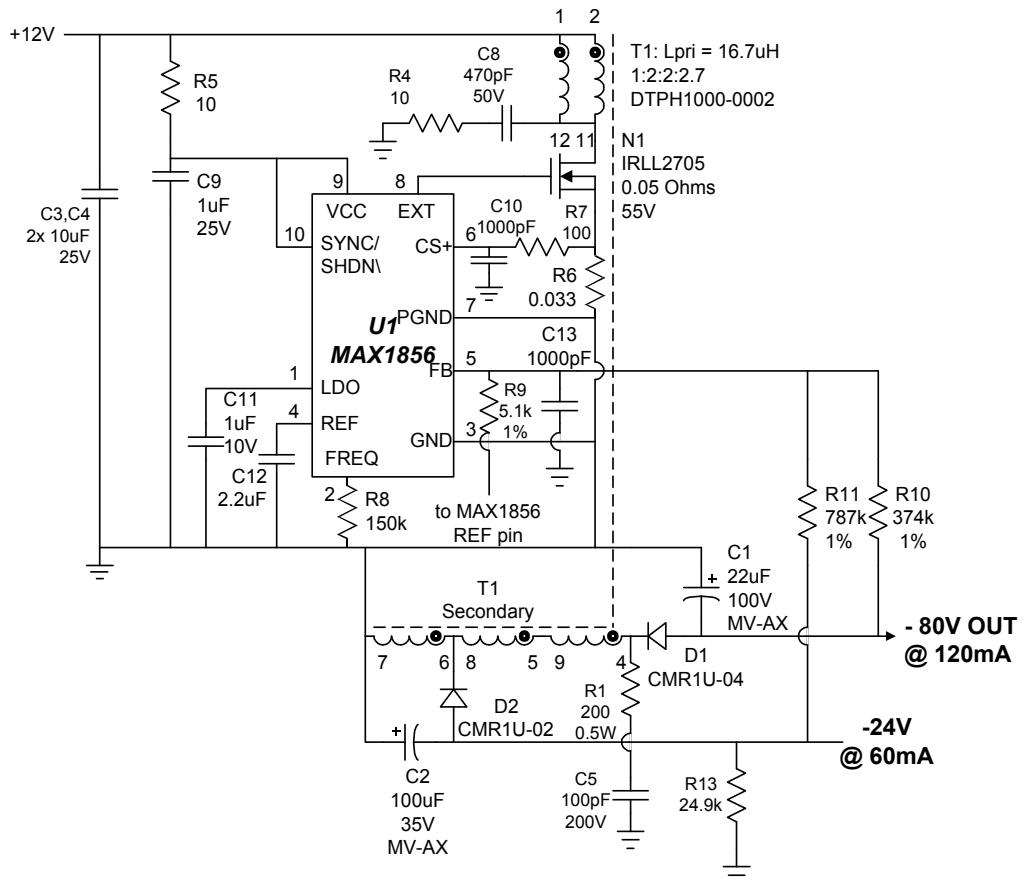
**4.5V to 5.5V Input
-12V @ 200mA Output**
8/04/04

1846-12d

DESIGNATION	QTY	DESCRIPTION
C11	1	0.47uF ceramic capacitor (0603)
C12	1	10uF 10V X5R ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C15	1	68nF ceramic capacitor (0603)
C16	1	100pF ceramic capacitor (0603)
C17	1	47uF 16V 70mOhm polymer capacitor Sanyo 16TQC47M
C18	1	1uF ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C19	1	0.1uF ceramic capacitor (0603)
C20,C22	2	1nF ceramic capacitor (0603)
D1	1	1A 30V Schottky diode Nihon EC10QS03L
L1	1	15uH 1.8A Inductor Coilcraft DT3316P-153
P1	1	50m Ohm -30V P-ch MOSFET (SOT-23) Fairchild FDN304P
R9	1	22k Ohm 5% resistor (0603)
R10	1	27k Ohm 5% resistor (0603)
R11	1	75k Ohm 5% resistor (0603)
R12	1	0.05 Ohm 0.25W 5% resistor (1206)
R13	1	97.6k Ohm 1% resistor (0603)
R14	1	10.0k Ohm 1% resistor (0603)
R16	1	100 Ohm 5% resistor (0603)
U1	1	MAX1846EUB (10-uMAX)

2/15/02 - RWY

+12V to -24V at 60mA, -80V at 120mA. This uses the MAX1856 and a transformer (that will need about a 1:2:2:2.7 turns ratio) to make a flyback converter.



Notes:

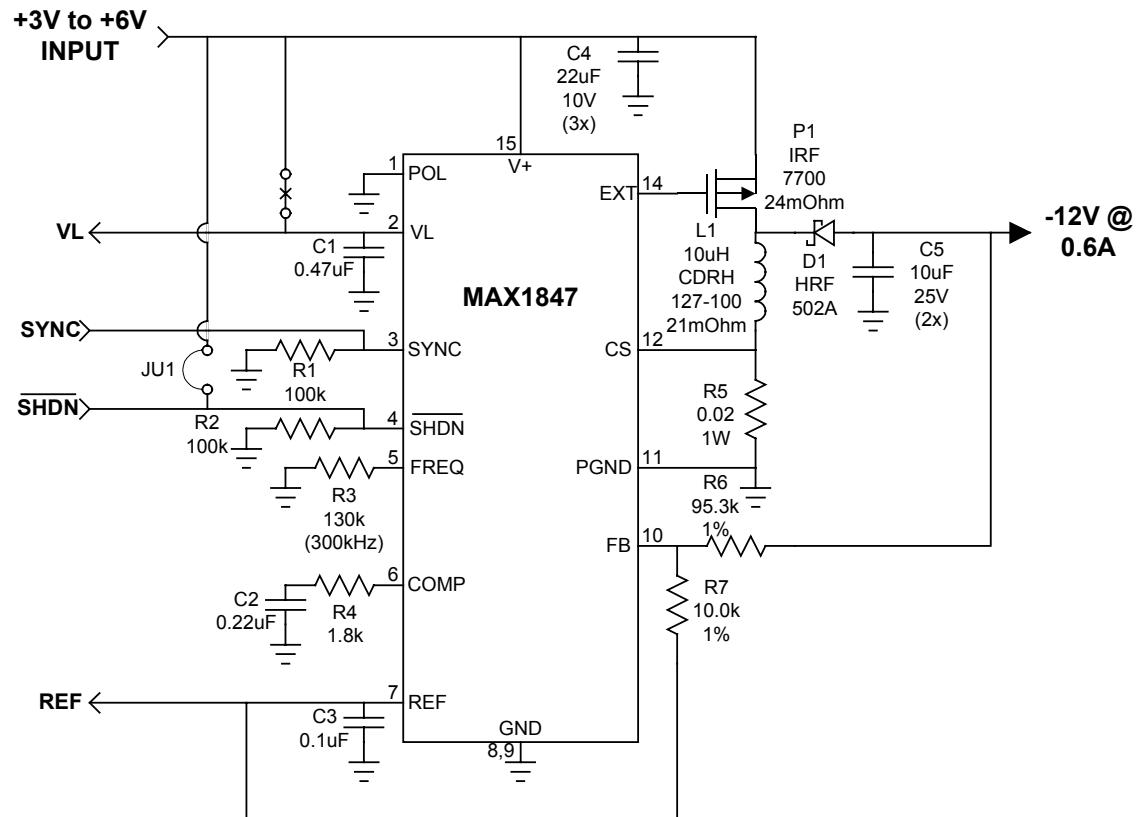
- T1: DT Magnetics DTPH1000-0002 or equivalent. The general specs are:
Primary L = about 16.7uH (not critical), Primary current rating = >3Amps, Turns ratio 1:2:2:2.7.
- Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.
- C5: Compensates for output capacitor ESR zero, if necessary.
- R13: Controls leakage energy when -24V output has no load, if necessary.

Vin	Iin	VOUT1	IOUT1	VOUT2	IOUT2	Efficiency
12.049	0.005	-79.72	0	-23.836	0	
12.032	0.178	-79.61	0	-22.926	0.06031	
12.000	0.950	-78.41	0.1203	-23.874	0	
10.777	1.209	-78.37	0.1203	-23.507	0.06033	0.832
12.001	1.089	-78.45	0.1203	-23.533	0.06033	0.831
13.228	0.994	-78.52	0.1203	-23.558	0.06033	0.826

BILL OF MATERIALS
10.8V to 13.2V Input
-24V @ 60mA, -80V @ 120mA Output
2/15/02

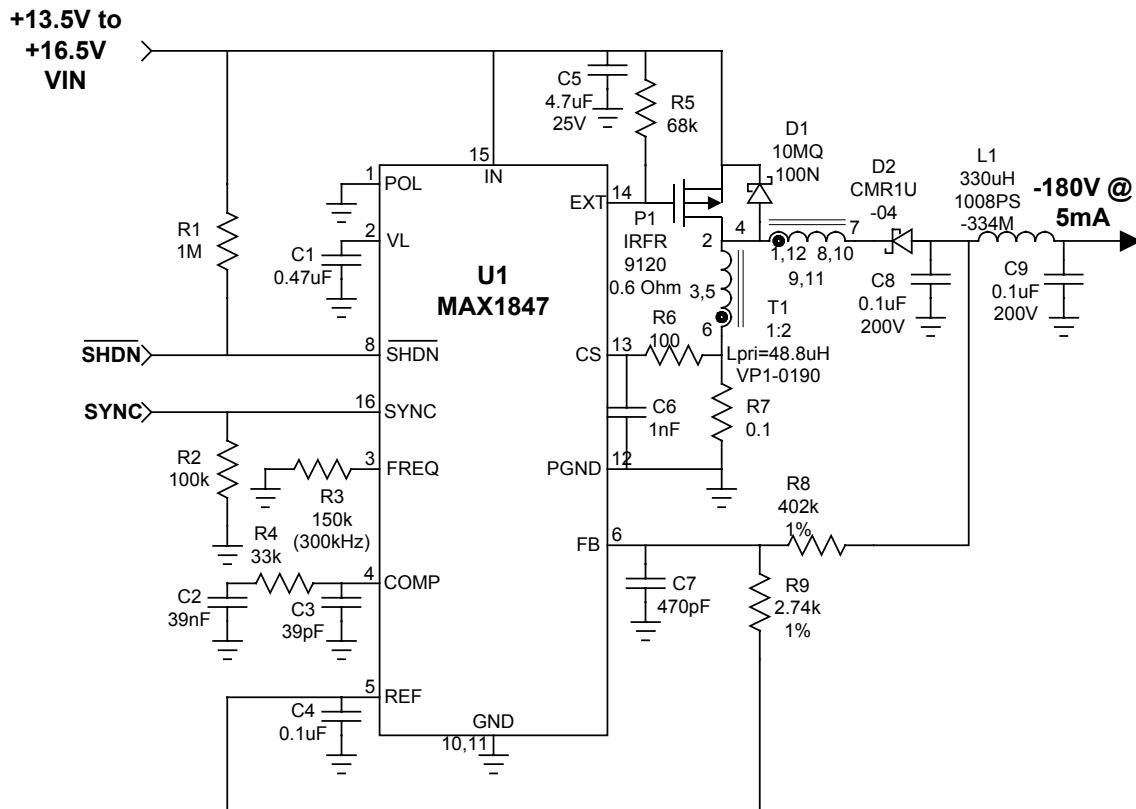
1856-80

DESIGNATION	QTY	DESCRIPTION
C1	1	22uF 100V aluminum electrolytic capacitor Sanyo 100MV22AX
C2	1	100uF 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C3,C4	2	10uF 2V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C5	1	100pF 200V ceramic capacitor (0805)
C6,C7	0	Not installed
C8	1	470pF 50V ceramic capacitor (0805)
C9	1	1uF 25V ceramic capacitor (1206) Taiyo Yuden TMK316BJ105ML
C10,C13	2	1000pF ceramic capacitor (0805)
C11	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C12	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
D1	1	1A 400V Ultra-fast recovery diode Central Semi CMR1U-04
D2	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1		3.8A 55V N-channel MOSFET (SOT-223) International Rectifier IRLL2705
R1	1	200 Ohm 5% resistor (2512)
R2,R3	0	Not installed
R4,R5	2	10 Ohm 5% resistor (1206)
R6	1	33m Ohm 1% 0.5W resistor (2010) Dale WSL 2010 0.033Ω 1%
R7	1	100 Ohm 5% resistor (0805)
R8	1	150k Ohm 5% resistor (0805)
R9	1	5.11k Ohm 1% resistor (0805)
R10	1	374k Ohm 1% resistor (0805)
R11	1	787k Ohm 1% resistor (0805)
R13	1	22k Ohm 5% resistor (0805)
T1	1	1:2:2:2.7 Power Transformer Lpri = 16.7uH DT Magnetics DTPH1000-0002
U1	1	MAX1856EUB (10-uMAX)



RWY
05/11/01

+3V to -12V @ 0.6A



1847-180

RWY

12/19/01

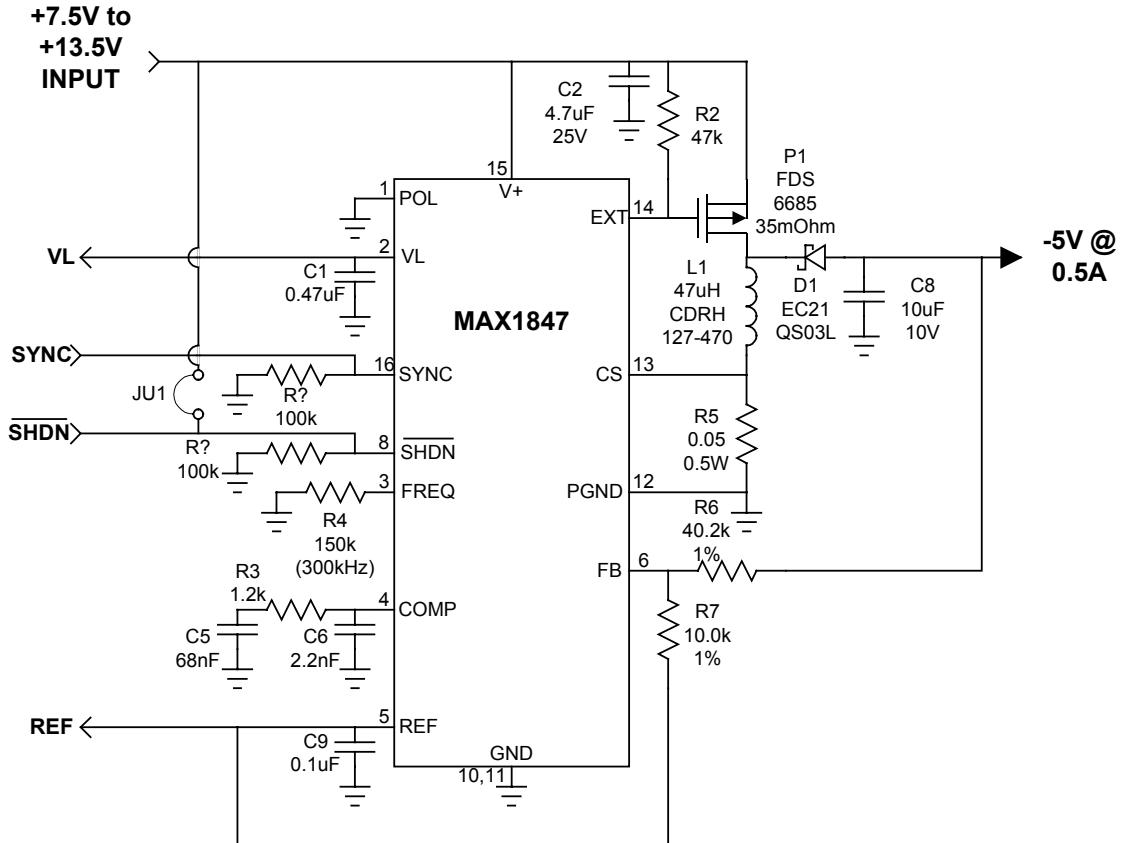
+13.5V to +16.5V into -180V @ 5mA

Vin	Iin	Vout	Iout	Efficiency
16.67	0.09311	-182.6	0.006066	0.714
15.05	0.1040	-182.6	0.006066	0.708
13.33	0.1153	-182.6	0.006066	0.721
		56mVpp		

BILL OF MATERIALS**13.5V to 16.5V Input****-180V @ 5mA Output****12/19/01**

1847-180

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	0.22F ceramic capacitor (0805)
C3	1	39pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5	1	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C6	1	1nF ceramic capacitor (0805)
C7	1	470pF ceramic capacitor (0805)
C8,C9	2	0.1uF 200V PEN film capacitor (2420) Panasonic ECWU2104JC9
D1	1	1.5A 100V Schottky diode International Rectifier 10MQ100N
D2	1	1A 400V Ultrafast recovery diode Central Semi CMR1U-04
L1	1	330uH Inductor Coilcraft 1008PS-334M
P1	1	0.6 Ohm -100V P-ch MOSFET (D-PAK) International Rectifier IRFR9120
R1	1	1M Ohm 5% resistor (0603)
R2	1	100k Ohm 5% resistor (0603)
R3	1	150k Ohm 5% resistor (0603)
R4	1	33k Ohm 5% resistor (0603)
R5	1	68k Ohm 5% resistor (0603)
R6	1	100 Ohm 5% resistor (0603)
R7	1	0.1 Ohm 1% 0.5W resistor (2010)
R8	1	402k Ohm 1% resistor (1206)
R9	1	2.74k Ohm 1% resistor (0603)
T1	1	1:2 Power transformer Lpri = 48.8uH Coiltronics VP1-0190
U1	1	MAX1847EEE (16-QSOP)



1847-5
RWY
02/11/02

+7.5V to +13.5V into -5V @ 0.5A

Vin	Iin	Vout	Iout	Efficiency
10.508	0.001	-5.0058	0	
7.486	0.387	-5.0029	0.5003	0.864
10.509	0.280	-5.0032	0.5003	0.851
13.529	0.223	-5.0037	0.5003	0.830
		50mVpp		

BILL OF MATERIALS**7.5V to 13.5V Input****-5V @ 0.5A Output****2/12/02**

1847-5

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0805)
C2	1	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C5	1	68nF ceramic capacitor (0805)
C6	1	2.2nF ceramic capacitor (0805)
C8	1	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C9	1	0.1uF ceramic capacitor (0805)
D1	1	2A 30V Schottky diode Nihon EC21QS03L
L1	1	47uH 2A Power inductor Sumida CDRH127-470
P1	1	35m Ohm -30V P-FET (SO-8) Fairchild FDS6685
R2	1	47k Ohm 5% resistor (0805)
R3	1	1.2k Ohm 5% resistor (0805)
R4	1	150k Ohm 5% resistor (0805)
R5	1	50m Ohm 1% 0.5W resistor (2010)
R6	1	40.2k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1847EEE (16-QSOP)

5/7/02

SD MAXIM INTEGRATED PRODUCTS

MAX1856 11V to 14VVIN to -64Vout @0.35A

Table 1: BILL OF MATERIALS

DESIGNATION	QTY	DESCRIPTION
C1A, C1B, C1C, C1D	4	10µF, 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C2, C5	2	1µF ceramic capacitor (0805). Taiyo Yuden EMK212BJ105MG
C3	1	220µF, 100V capacitor (through hole) Sanyo 100MV220AX
C6	1	2.2 µF, 10V ceramic capacitors (1206) Taiyo Yuden LMK316BJ225MD
C7	1	1000 pF, X7R ceramic capacitor (0805)
C10	1	220 pF, 200V through hole capacitor
D2	1	1A, 200V ultrafast rectifier Central Semiconductor CMR1U-02
N1	1	N-channel MOSFET International Rectifier IRLR2905
R1	1	0.012 Ω, 1W sense resistor (2512)
R4	1	100k Ω, 5% resistor (0805)
R5	1	270Ω, 2W, power resistor (through hole)
R7	1	287 kΩ, 1% resistor (0805)
R8	1	5.62 kΩ, 1% resistor (0805)
T1	1	Coiltronics transformer (VP5-0083)
U1	1	MAX1856EUB (10-pin μMAX)

No-load Output Voltage:

Vin V	Vout V
10.998	-63.83
12.004	-63.82
12.504	-63.82
13.209	-63.82
14	-63.82

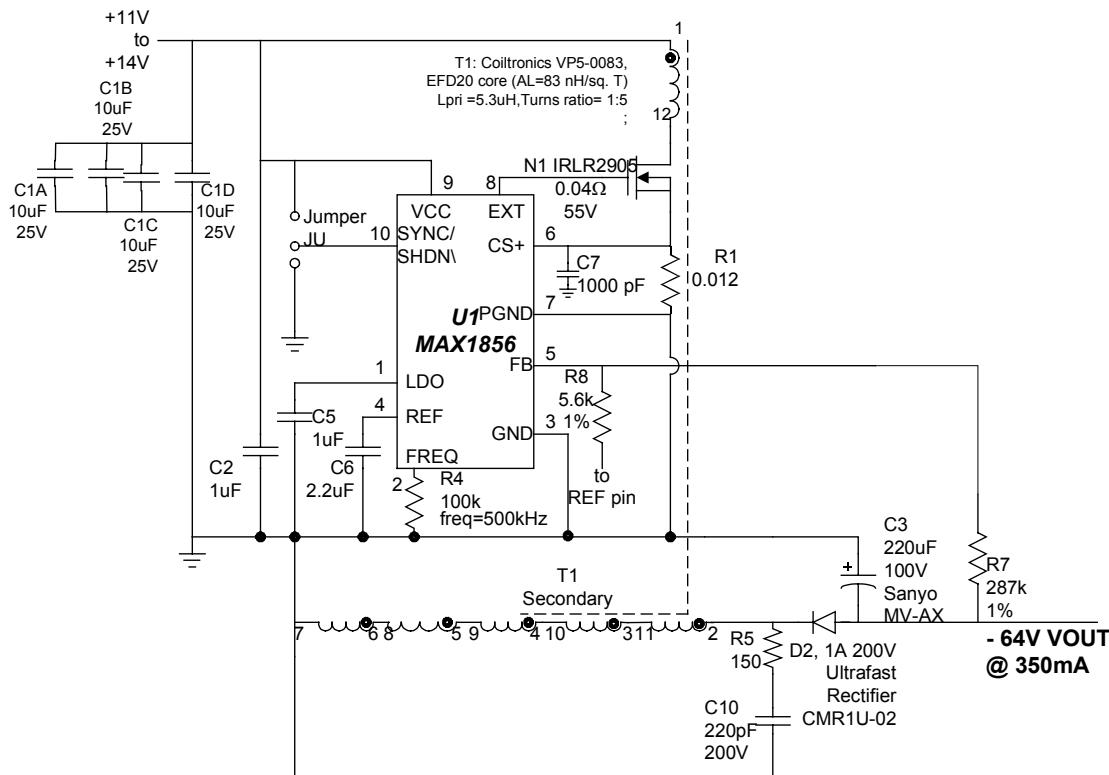
Efficiency: (@ full Load = 0.35A)

Vin V	Iin A	Vout V	Iout A	Eff%
14	1.949	62.87	0.353	81.34
13.195	2.073	62.81	0.355	81.52
12.503	2.189	62.8	0.355	81.46
12.01	2.292	62.79	0.356	81.21
11	2.51	62.77	0.357	81.16

Schematics:

5/6/2002 -

+11V - +14V to -64V @350mA. This uses the MAX1856 and a transformer (that will need about a 1 to 5 turns ratio) to make a flyback converter.



Notes:

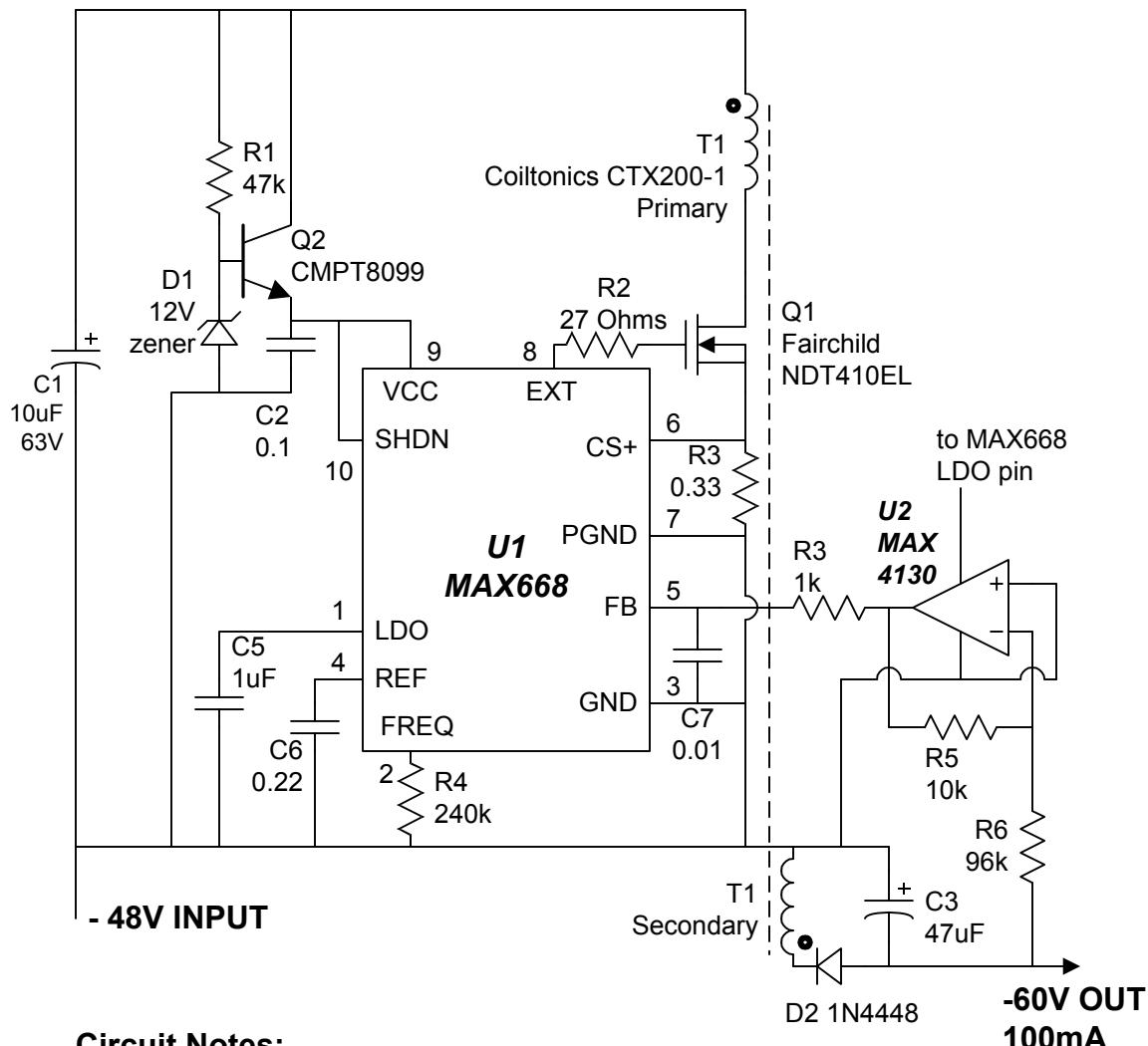
T1: Coiltronics or equivalent. The general specs are: Primary L = 6uH (not critical), Primary current rating = >7Amps, Turns ratio 1:5.

N1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.

Output ripple is 100mV max.

4/23/99 - LHS

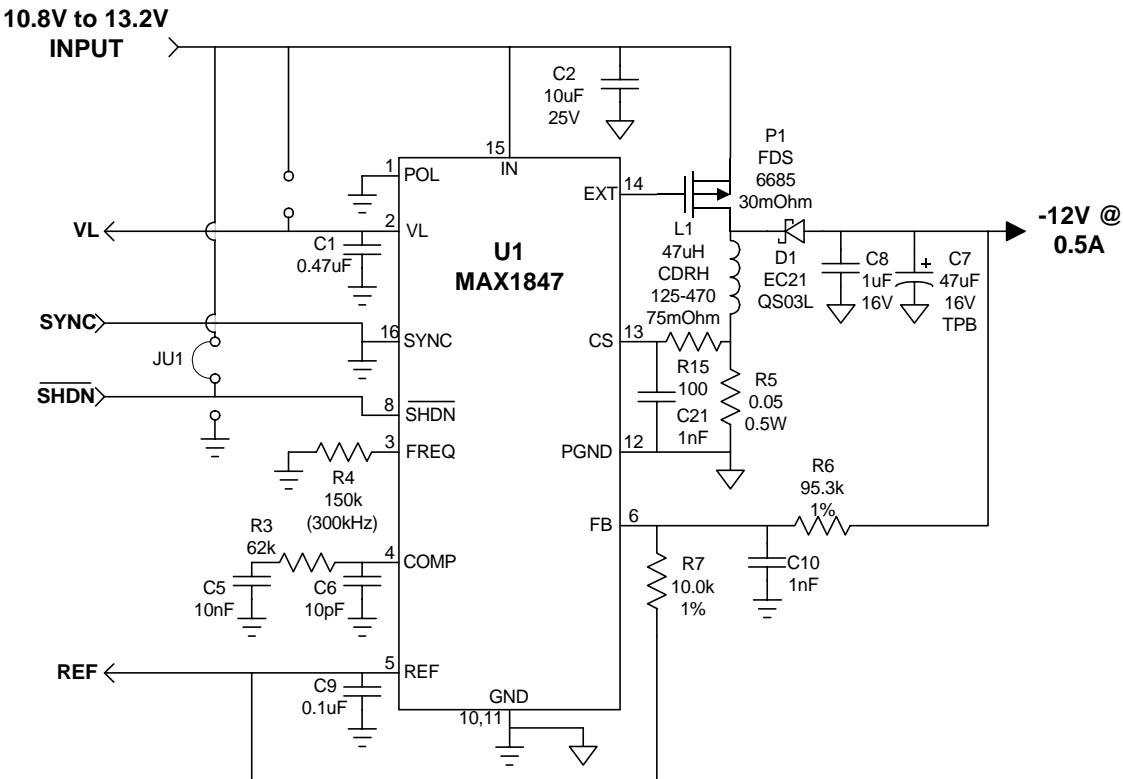
-48V to -60V at 100mA. This design in effect adds a regulated -12V to the -48V input so if the input changes, the output changes by the same amount.



Circuit Notes:

- 1) Output current was tested up to 150mA
- 2) D1, D2, and Q2 are from Central Semiconductor but any similar devices will work fine.
- 3) Q1 is a 0.25 Ohm 100V NFET
- 4) D1 (12V zener) part # from Central Semi is CMP25242B
- 5) C1 needs to be only 10uF but we did not have any small values at 63V, so a 120uF capacitor is used in this example.
- 6) This design adds a regulated -12V to the -48V input so if the input changes the output changes by the same amount.

90% Efficient Inverting DC-DC Generates -12V Bus from 12V Input



1847-12b
RWY
08/26/03

Vin	Iin	Vout	Iout	Efficiency
12.00	0.0011	-11.89	0	
10.77	0.61	-11.88	0.501	0.906
12.00	0.55	-11.88	0.501	0.902
13.25	0.50	-11.88	0.501	0.898
20MHz BW		250mVpp		

90% Efficient Inverting DC-DC Generates -12V Bus from 12V Input

BILL OF MATERIALS

10.8V to 13.2V Input

-12V @ 0.5V Output

8/26/03

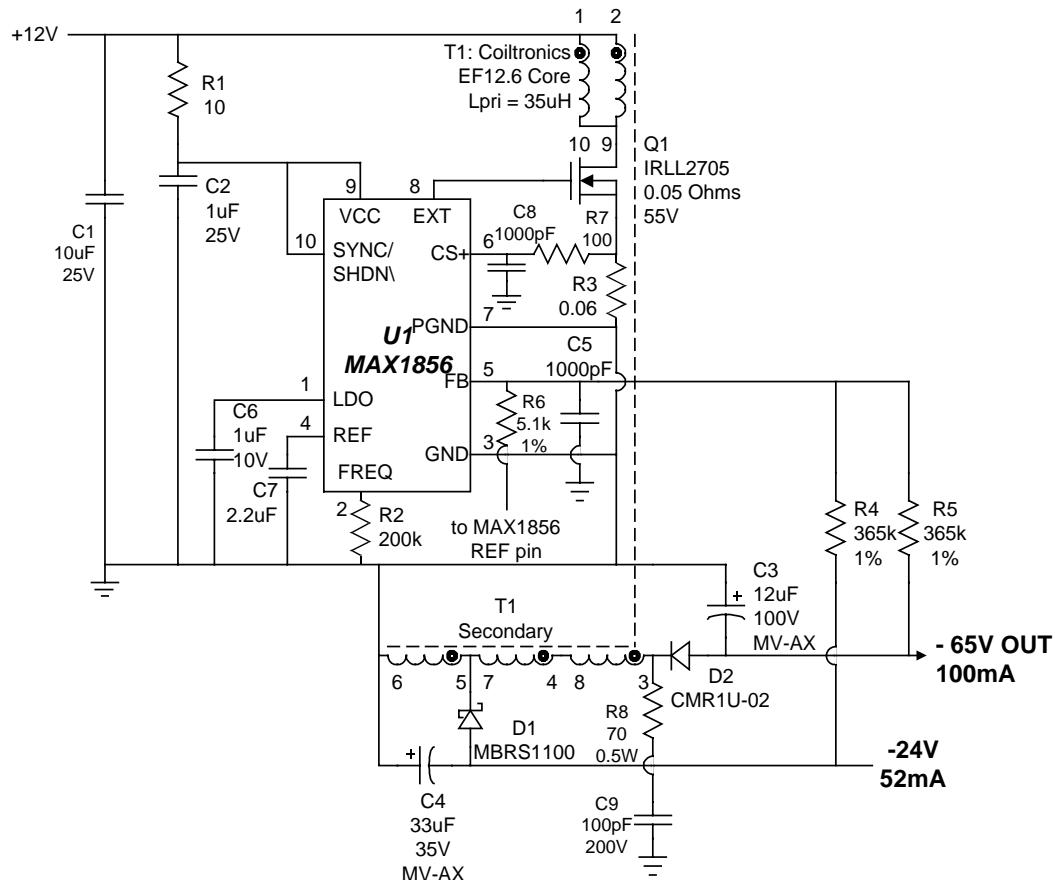
1847-12b

DESIGNATION	QTY	DESCRIPTION
C1	1	0.47uF ceramic capacitor (0603)
C2	1	10uF 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C5	1	10nF ceramic capacitor (0603)
C6	1	10pF ceramic capacitor (0603)
C7	1	47uF 16V polymer capacitor Sanyo 16TPB47M
C8	1	1uF 16V X5R ceramic capacitor (1206) Taiyo Yuden EMK316BJ105ML
C9	1	0.1uF ceramic capacitor (0603)
C10,C21	2	1nF ceramic capacitor (0603)
D1	1	2A 30V Schottky diode Nihon EC21QS03L
L3	1	47uH 1.8A Inductor Sumida CDRH125-470
P2	1	30m Ohm -30V P-ch MOSFET (SO-8) Fairchild FDS6685
R2	1	22k Ohm 5% resistor (0603)
R3	1	62k Ohm 5% resistor (0603)
R4	1	150k Ohm 5% resistor (0603)
R5	1	0.05 Ohm 0.25W 5% resistor (1210)
R6	1	95.3k Ohm 1% resistor (0603)
R7	1	10.0k Ohm 1% resistor (0603)
R15	1	100 Ohm 5% resistor (0603)
U4	1	MAX1847EEE (16-QSOP)

VoIP SLIC Supply

7/19/01 - RWY - 1856-24c

+12V to -24V at 52mA, -65V at 100mA. This uses the MAX1856 and a transformer (that will need about a 1:2:2:1.5 turns ratio) to make a flyback converter.



Notes:

- T1: Coiltronics SG7 core (EF12.6) or equivalent (95nH/N*N). The general specs are:
Primary L = about 35uH (not critical), Primary current rating = >1.5Amps, Turns ratio 1:2:2:1.5.
- Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.
- C5: Compensates for output capacitor ESR zero, if necessary.

Transformer design:

- Layer 1: Pin 5 to pin 6 – 34 turns #34AWG
- Layer 2: Pin 1 to pin 10 – 17 turns #28AWG
- Layer 3: Pin 4 to pin 7 – 34 turns #34AWG
- Layer 4: Pin 2 to pin 9 – 17 turns #28AWG
- Layer 5: Pin 3 to pin 8 – 22 turns #34AWG

Snubber (R8, C9) needs adjustment in circuit.

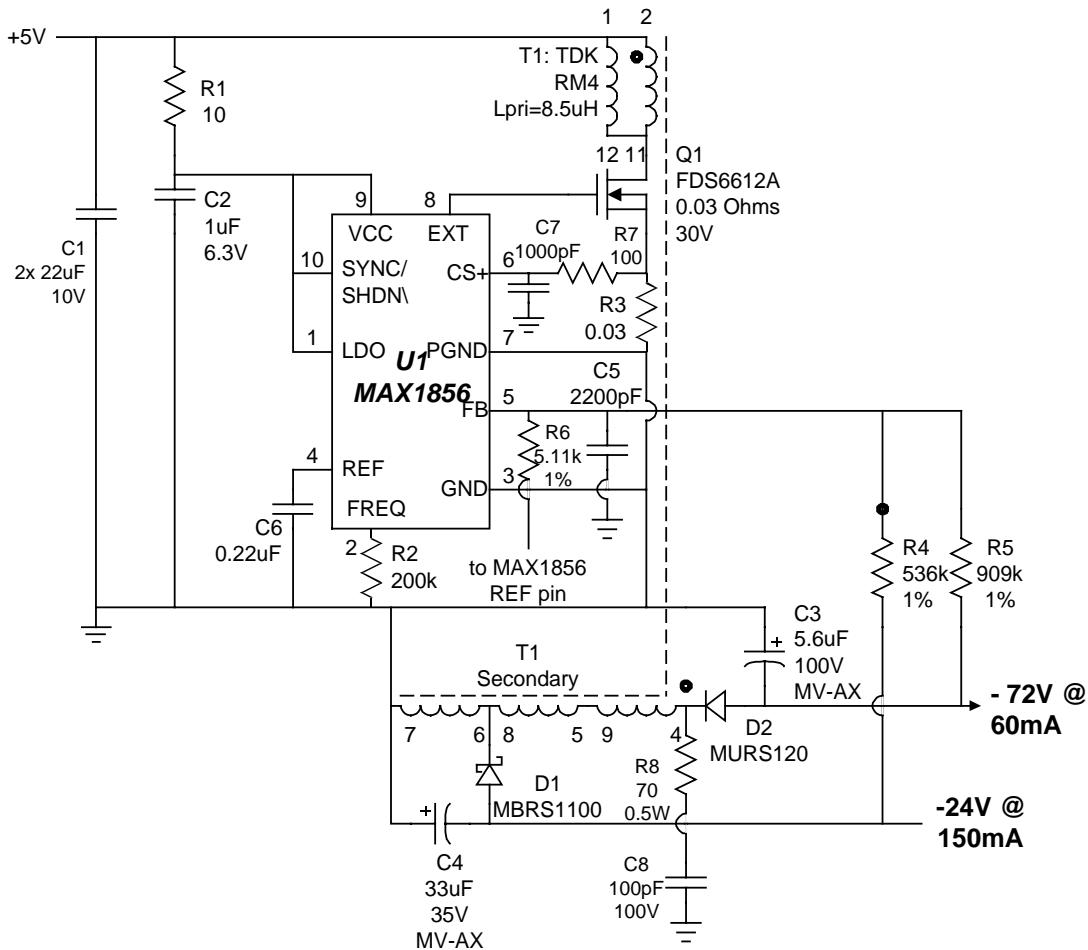
SLIC SUPPLY BILL OF MATERIALS
12V Input
-24V @ 52mA or -65V @ 100mA Output
07/19/01

1856-24c

DESIGNATION	QTY	DESCRIPTION
C1	1	10uF 25V ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C2	1	1uF 25V ceramic capacitor (1206) Taiyo Yuden TMK316BJ105ML
C3	1	12uF 100V aluminum electrolytic Sanyo 100MV12AX
C4	2	33uF 35V aluminum electrolytic cap Sanyo 35CV33AX
C5,C8	2	1000pF ceramic capacitor (0805)
C6	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C7	1	2.2uF ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C9	1	100pF 200V ceramic capacitor (radial)
D1	1	1A 100V Schottky diode Motorola MBRS1100
D2	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1	1	50m Ohm 55V MOSFET (SOT-223) IRLL2705
R1	1	10 Ohm 5% resistor (0805)
R2	1	200k Ohm 5% resistor (0805)
R3	1	0.06 Ohm 0.5W resistor (2010) Dale WSL-2010-R060F
R4,R5	2	365k Ohm 1% resistor (0805)
R6	1	5.11k Ohm 1% resistor (0805)
R7	1	100 Ohm 5% resistor (0805)
R8	1	70 Ohm 0.5W 5% resistor (axial)
T1	1	1:2,2,1.5 transformer Coiltronics SG7Core Lpri = 35uH
U1	1	MAX1856EUB (10-uMAX)

2/6/01 - RWY

+5V to -24V at 150mA, -72V at 60mA. This uses the MAX1856 and a transformer (that will need about a 1:2:2:2 turns ratio) to make a flyback converter.



Notes:

T1: TDK RM4 core or equivalent. The general specs are:

Lpri = about 8.5uH (not critical), Primary current rating = >3.5Amps, Turns ratio 1:2:2:2.

P: 8Turns #32AWG tri-filar S1: 40Turns #38AWG S2: 40Turns #38AWG S3: 40Turns #38AWG

Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.

2/06/2001

RWY MAXIM INTEGRATED PRODUCTS

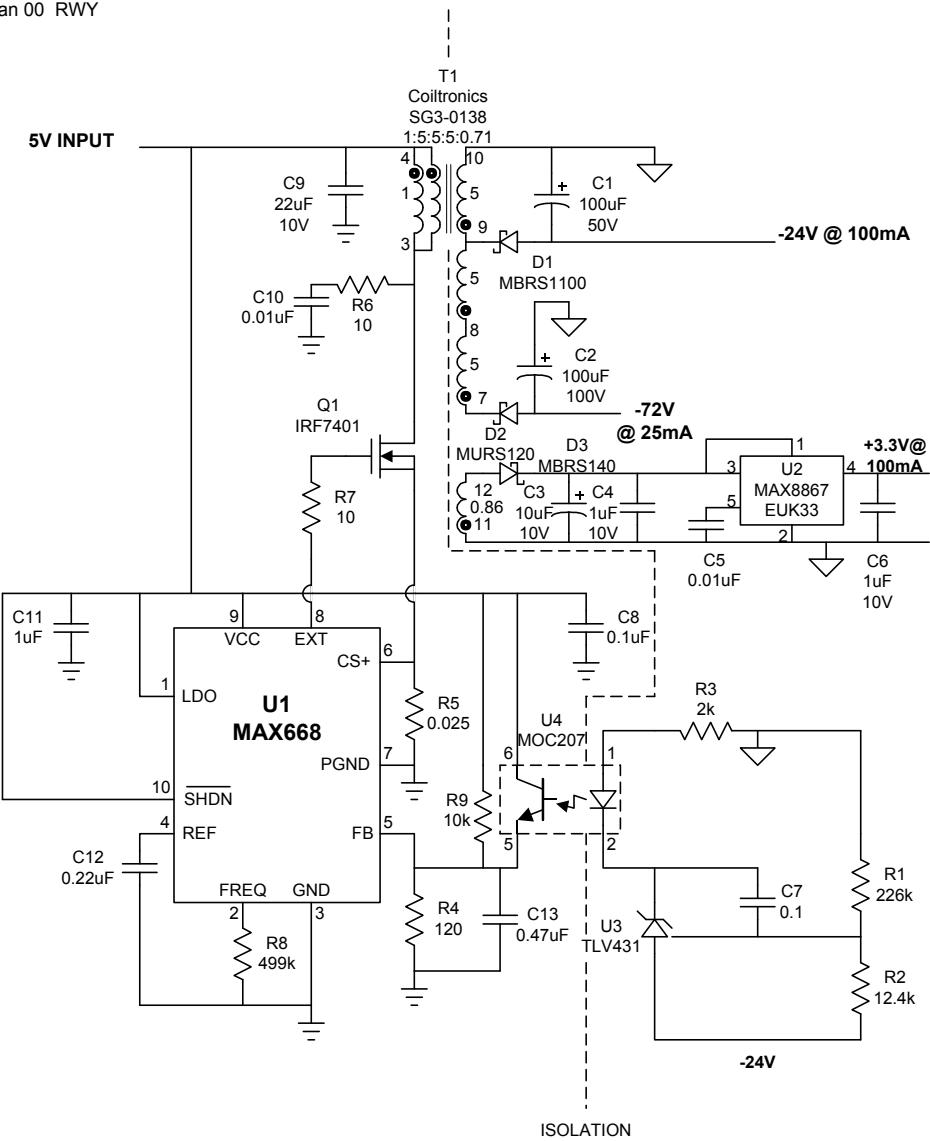
Int01Q3a_bom / 1856-24b

MAX1856 5VIN to -72Vout @60mA or -24V@150mA

Table 1: BILL OF MATERIALS

DESIGNATION	Q'TY	DESCRIPTION
C1A, C1B	2	22µF, 10V X5R ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C2	1	1µF 6.3V ceramic capacitor (0603) Taiyo YudenJMK107BJ105MA
C3	1	5.6µF 100V Electrolytic capacitor (through hole) Sanyo 100MV5.6AX
C4	1	33µF 35V Electrolytic capacitor (through hole) Sanyo 35MV33AX
C5	1	2200 pF X5R ceramic capacitor (0603)
C6	1	0.22 µF X5R ceramic capacitor (0603)
C7	1	1000pF X5R ceramic capacitor (0603)
C8	1	100 pF, 100V ceramic capacitor (0805)
D1	1	1A, 100V Schottky rectifier On Semiconductor MBRS1100
D2	1	1A, 200V ultrafast rectifier On Semiconductor MURS120
Q1	1	30 mOhm 30V N-channel MOSFET Fairchild FDS6612A (SO-8)
R1	1	10 Ω, 5% resistor (0603)
R2	1	200k Ω, 5% resistor (0603)
R3	1	0.03 Ω, sense resistor (1206)
R4	1	536k Ω, 1% resistor (0603)
R5	1	909k Ω, 1% resistor (0603)
R6	1	5.11 kΩ, 1% resistor (0603)
R7	1	100 Ω, 5% resistor (0603)
R8	1	70 Ω, 5%, 0.5W, resistor (2010)
T1	1	Custom transformer (TDK RM4 core)
U1	1	MAX1856EUB (10-uMAX)

668 ISO Supply
5 Jan 00 RWY



Vin (V)	Iin (mA)	Vo (V)	Io (mA)	Vo (V)	Io (mA)	Vo (V)	Io (mA)	Eff. (%)
4.50	1.27	24.01	100.2	73.2	25.2	3.28	103.9	80.3
5.01	1.138	24.01	100.2	73.2	25.2	3.28	103.9	80.5
5.50	1.038	24.01	100.2	73.2	25.2	3.28	103.9	80.4

MAX1856 12VIN to -80Vout @0.25A and -24@0.12A

Table 1: BILL OF MATERIALS

DESIGNATION	QTY	DESCRIPTION
C1A, C1B, C1C, C1D	4	10µF, 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106KM
C2, C5	2	1µF ceramic capacitor (1206). Taiyo Yuden EMK316BJ105MF
C3	1	100µF, 200V capacitor (through hole) Sanyo 200MV100FAZ
C4	1	330 µF, 50V capacitor (through hole) Sanyo50MV330AX
C6	1	4.7 µF, 10V ceramic capacitors (1206) Taiyo Yuden LMK316BJ475ML
C9	1	220 pF, 50V through hole capacitor
C10	1	330 pF, 200V through hole capacitor
D1, D2	2	1A, 200V ultrafast rectifier General Semiconductor MURS120
N1	1	N-channel MOSFET Fairchild FDD3570 (TO-252)
R1	1	0.013 Ω, 1W sense resistor (2512)
R4	1	100k Ω, 5% resistor (0805)
R5	1	100 Ω, 2W, power resistor (through hole)
R6	1	787 kΩ, 1% resistor (0805)
R7	1	374 kΩ, 1% resistor (0805)
R8	1	4.99 kΩ, 1% resistor (0805)
R9	1	33 Ω, 2W, power resistor (through hole)
T1	1	DT magnetics transformer (DTPH1000-0001)
U1	1	MAX1856EUB (10-pin μMAX)

Efficiency Measurements:

VIN = 10.8V (-80V @ 250mA and -24V @ 120mA) = 74.4%

VIN = 12V (-80V @ 250mA and -24V @ 120mA) = 73.3%

VIN = 13.2V (-80V @ 250mA and -24V @ 120mA) = 72.3%

Cross-Regulation: VOUT1= -24V nominal; VOUT2 = -80V nominal

VIN =10.8V (250mA load on VOUT2; no load on VOUT1) VOUT1 = -25.14V; VOUT2 = -80.7V

VIN = 10.8V (no load on VOUT2; 120mA load on VOUT1) VOUT1 = -22.59V; VOUT2 = -82.69V

VIN =12V (250mA load on VOUT2; no load on VOUT1) VOUT1 = -24.8V; VOUT2 = -80.9V

VIN = 12V (no load on VOUT2; 120mA load on VOUT1) VOUT1 = -22.61V; VOUT2 = -82.7V

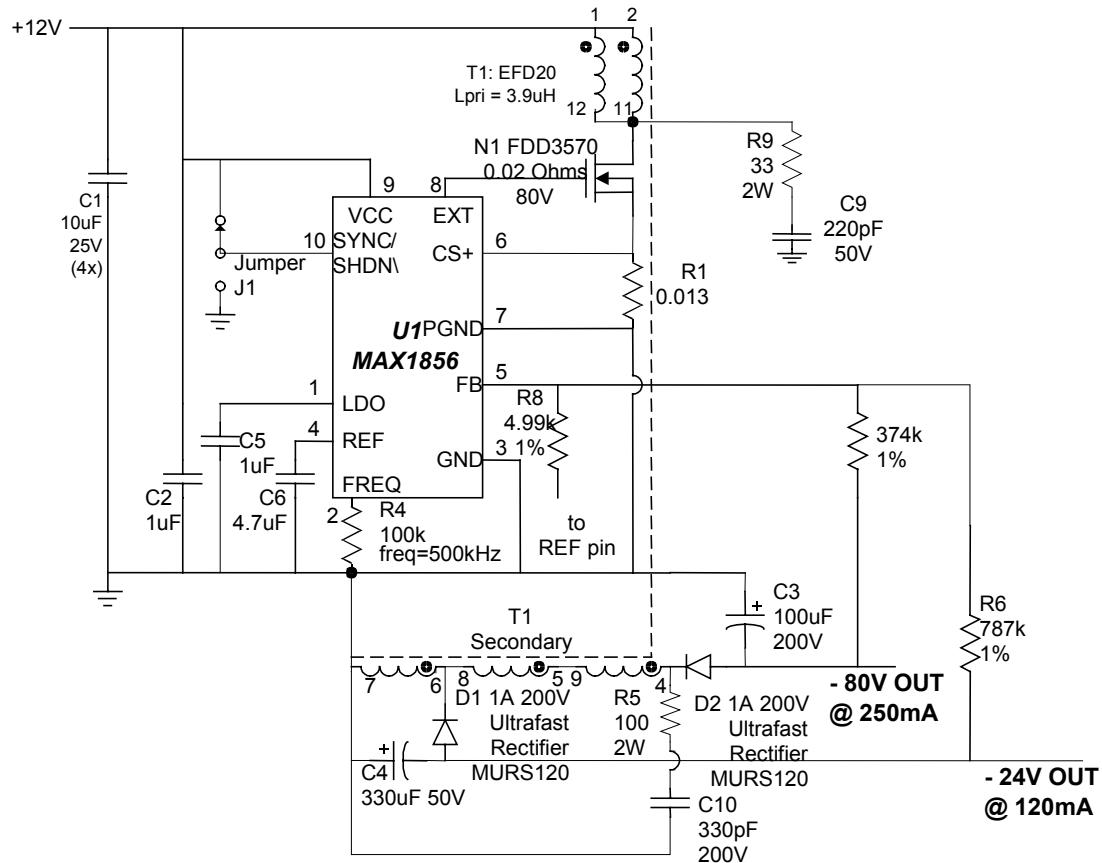
VIN =13.2V (250mA load on VOUT2; no load on VOUT1) VOUT1 = -24.92V; VOUT2 = -80.9V

VIN = 13.2V (no load on VOUT2; 120mA load on VOUT1) VOUT1 = -22.63V; VOUT2 = -82.8V

Schematics:

2/18/02

+12V to -80V at 250mA, -24V @120mA This uses the MAX1856 and a transformer (that will need about a 1 to 7 turns ratio) to make a flyback converter.



Notes:

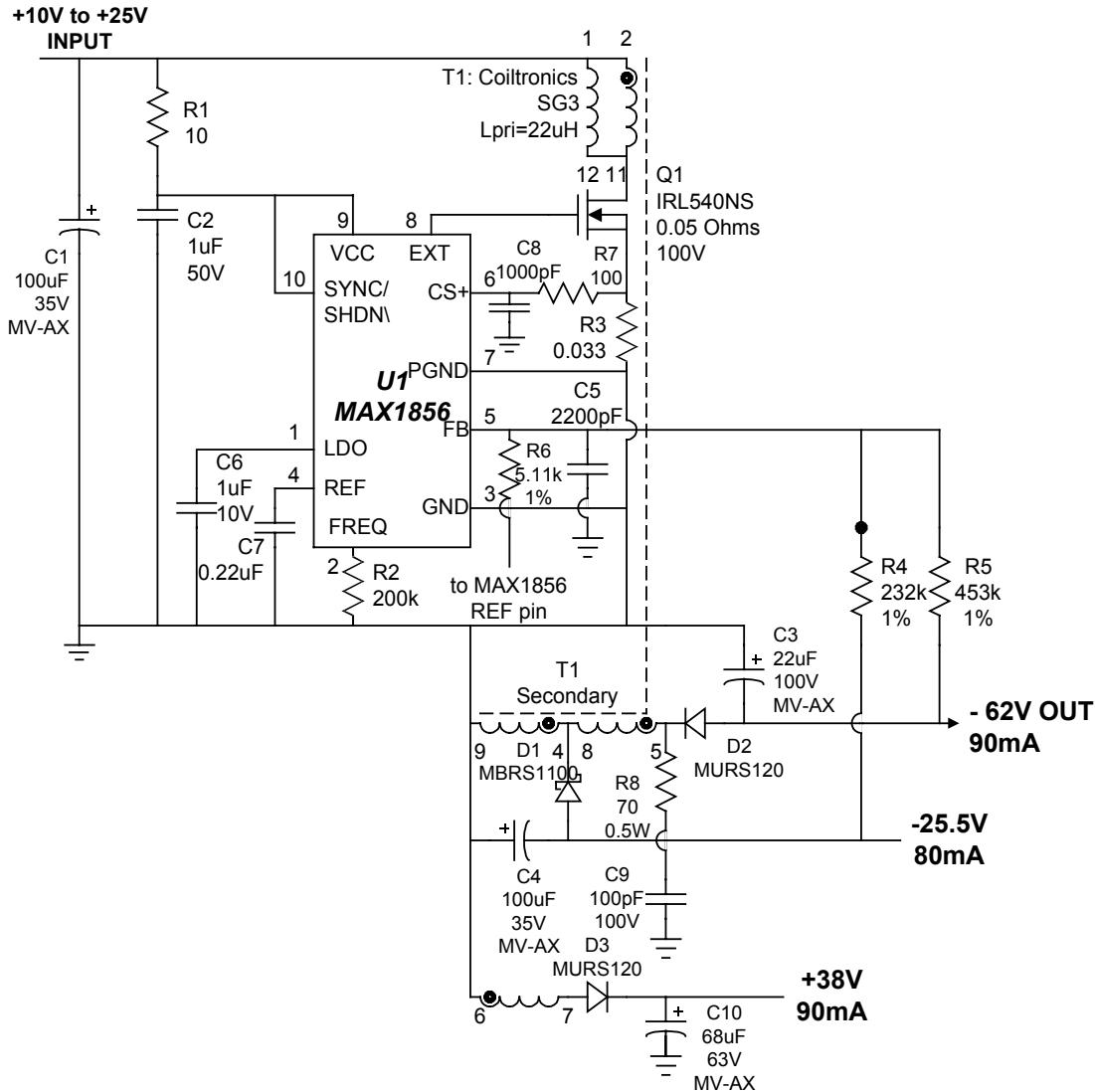
T1: Coiltronics EFD20 or equivalent. The general specs are: Primary L =

3.9uH (not critical), Primary current rating = >7Amps, Turns ratio 1:7.

N1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.

2/6/01 - RWY

+10V to +25V into -25.5V at 80mA, -62V at 90mA, +38V @ 90mA. This uses the MAX1856 and a transformer (that will need about a 1:2:3:3 turns ratio) to make a flyback converter.

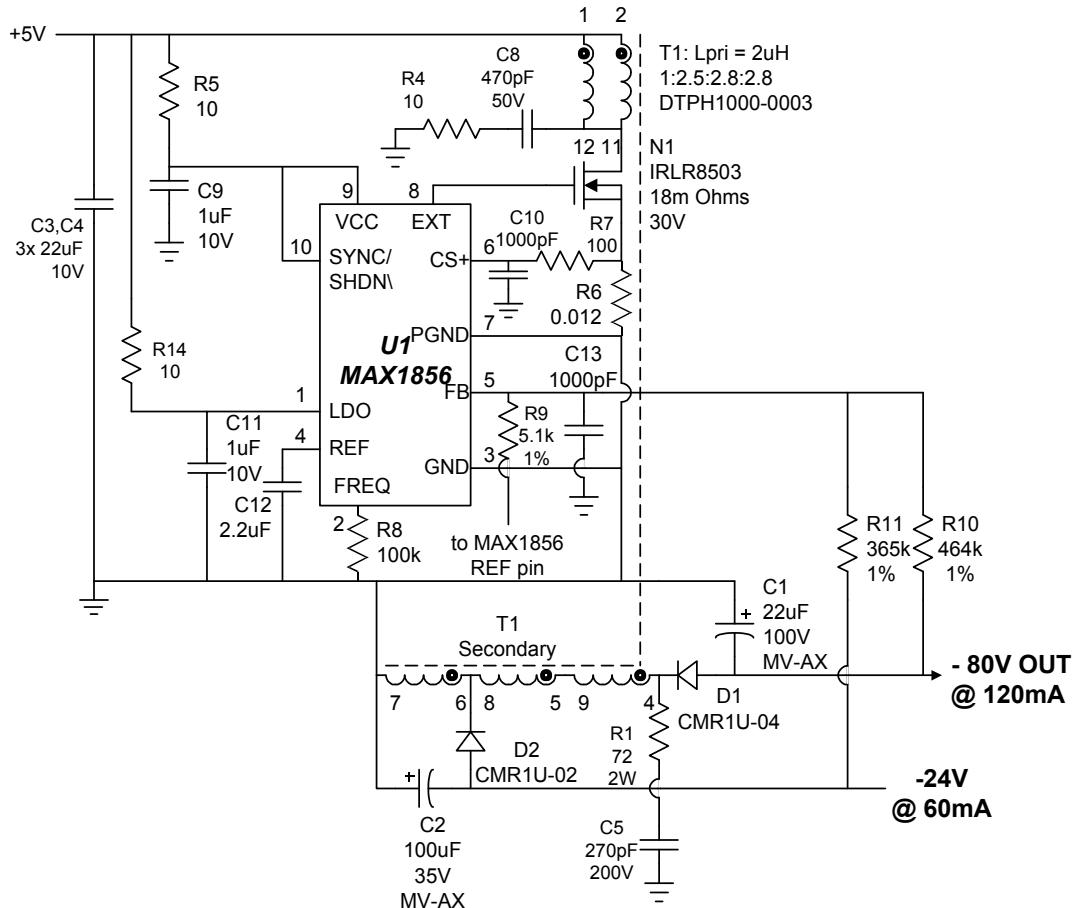


Notes:

T1: Coiltronics Standard Geometry Core SG3 or equivalent. The general specs are:
Primary L = about 22uH (not critical), Primary current rating = >3Amps, Turns ratio 1:2:3:3.
Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.

3/14/02 - RWY 1856-80b

+5V to -24V at 60mA, -80V at 120mA. This uses the MAX1856 and a transformer (that will need about a 1:2.5:2.8:2.8 turns ratio) to make a flyback converter.



Notes:

T1: DT Magnetics DTPH1000-0003 or equivalent. The general specs are:

Primary L = about 2uH (not critical). Primary current rating = >8Amps. Turns ratio 1:2.5:2.8:2.8.

Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted

C5: Compensates for output capacitor ESR zero, if necessary

Vin	Iin	VOUT1	IOUT1	VOUT2	IOUT2	Efficiency
4.9992	0.007	-24.624	0	-81.5	0	
4.9942	0.482	-23.509	0.0602	-82.0	0	
5.0032	2.650	-24.626	0	-79.8	0.1203	
4.4961	3.455	-24.173	0.0602	-80.2	0.1203	0.715
5.0007	3.087	-24.204	0.0602	-80.3	0.1203	0.720
5.511	2.810	-24.231	0.0602	-80.4	0.1203	0.720

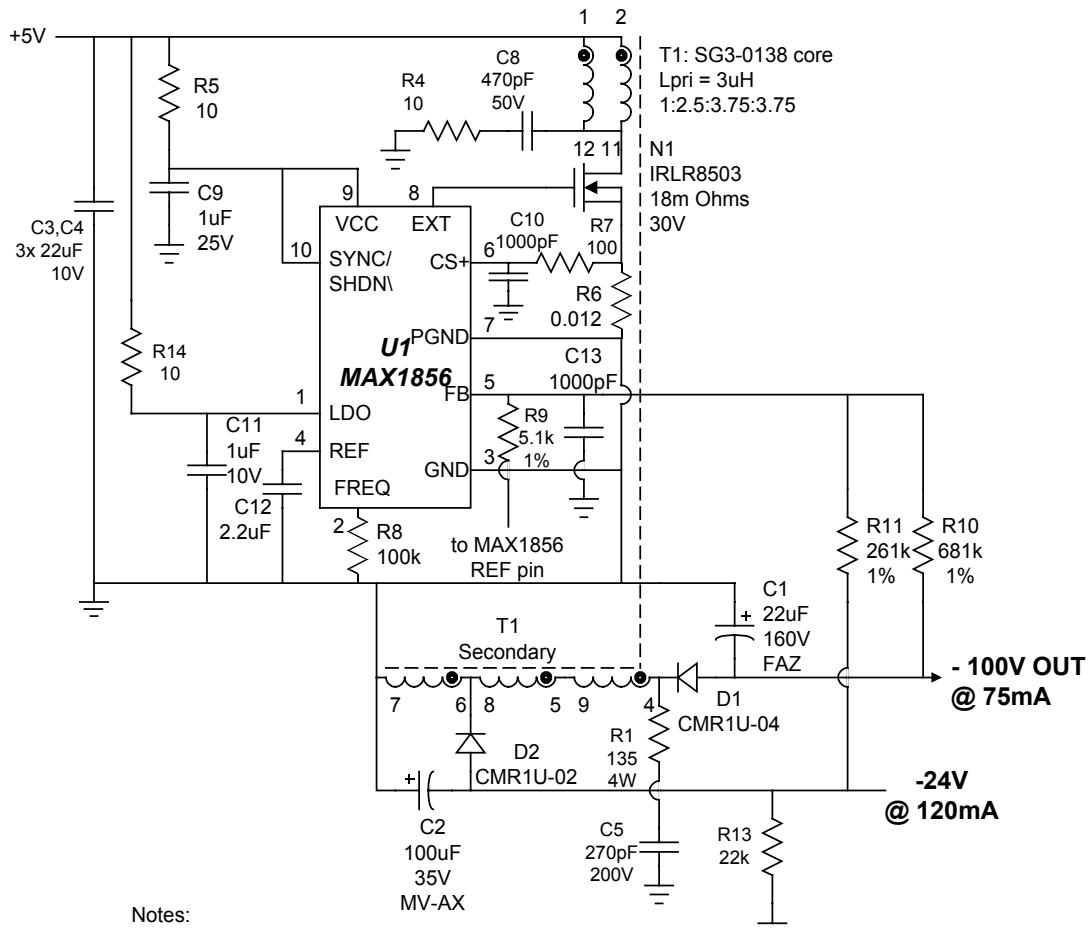
BILL OF MATERIALS
4.5V to 5.5V Input
-24V @ 60mA, -80V @ 120mA Output
3/14/02

1856-80b

DESIGNATION	QTY	DESCRIPTION
C1	1	22uF 100V aluminum electrolytic capacitor Sanyo 100MV22AX
C2	1	100uF 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C3,C4	3	22uF 10V X5R ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C5	1	100pF 200V ceramic capacitor (0805)
C6,C7	0	Not installed
C8	1	470pF 50V ceramic capacitor (0805)
C9,C11	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C10,C13	2	1000pF ceramic capacitor (0805)
C12	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
D1	1	1A 400V Ultra-fast recovery diode Central Semi CMR1U-04
D2	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1		18mOhm 30V N-chan MOSFET (D-PAK) International Rectifier IRLR8503
R1	1	72 Ohm 2W 5% resistor
R2,R3	0	Not installed
R4,R5,R14	3	10 Ohm 5% resistor (0805)
R6	1	12m Ohm 1% 1W resistor (2512) Dale WSL 2512 0.012Ω 1%
R7	1	100 Ohm 5% resistor (0805)
R8	1	100k Ohm 5% resistor (0805)
R9	1	5.11k Ohm 1% resistor (0805)
R10	1	365k Ohm 1% resistor (0805)
R11	1	4.64k Ohm 1% resistor (0805)
T1	1	1:2.5:2.8:2.8 Power Transformer Lpri = 2uH DT Magnetics DTPH1000-0003
U1	1	MAX1856EUB (10-uMAX)

1/29/02 - RWY

+5V to -24V at 120mA, -100V at 75mA. This uses the MAX1856 and a transformer (that will need about a 1:2.5:3.75:3.75 turns ratio) to make a flyback converter.



Notes:

- T1: Coiltronics SG4-0138 or equivalent. The general specs are:
 Primary L = about 3uH (not critical), Primary current rating = >6Amps, Turns ratio 1:2.5:3.75:3.75.
 Layer 1: (1-12) 6 turns trifilar #26AWG
 Layer 2: (4-9,5-8) 23 turns bifilar #36AWG
 Layer 3: (6-7) 15 turns #36AWG
 Layer 5: (2-11) 6 turns trifilar #26AWG
 Q1: Any logic-level (Ron rated at 5V) N-FET with similar ratings may be substituted.
 C5: Compensates for output capacitor ESR zero, if necessary.
 R13: Controls leakage energy when -24V output has no load, if necessary.

Vin	Iin	VOUT1	IOUT1	VOUT2	IOUT2	Efficiency
4.74	0.0346	-104.9	0	-23.375	0	
4.74	1.1154	-108.0	0	-21.637	0.1209	
4.75	2.4545	-98.0	0.0751	-25.215	0	
4.74	3.3200	-104.0	0.0751	-22.753	0.1209	0.671
5.00	3.1500	-104.0	0.0751	-22.807	0.1209	0.671
5.26	3.0109	-104.0	0.0751	-22.839	0.1209	0.667
		220mVpp		50mVpp		

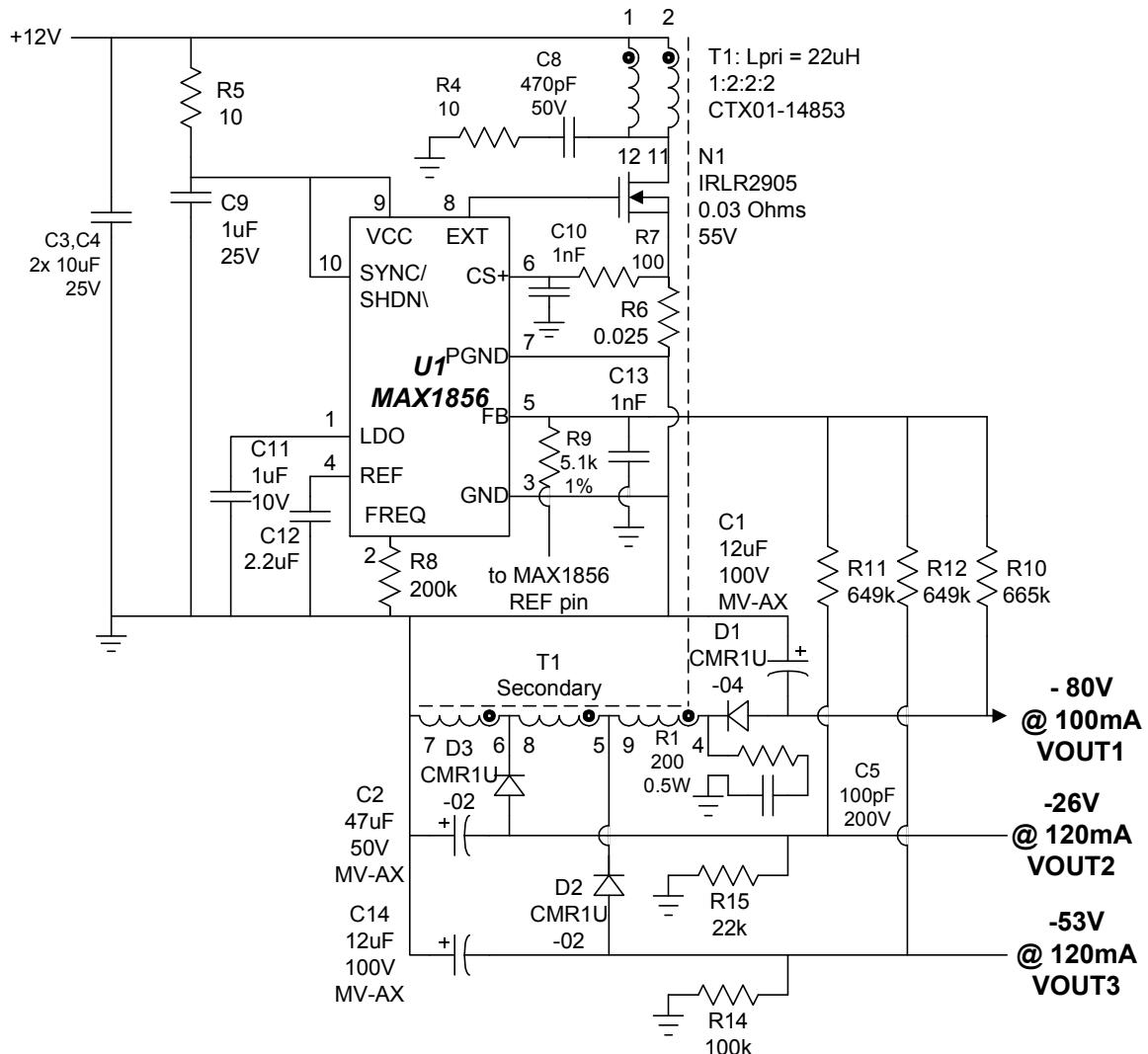
BILL OF MATERIALS
4.75V to 5.25V Input
-24V @ 120mA, -100V @ 75mA Output
1/29/02

1856-100

DESIGNATION	QTY	DESCRIPTION
C1	1	22uF 160V aluminum electrolytic capacitor Sanyo 160MV22FAZ
C2	1	100uF 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C3,C4	3	10uF 2V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C5	1	270pF 200V ceramic capacitor (0805)
C6,C7	0	Not installed
C8	1	470pF 50V ceramic capacitor (0805)
C9	1	1uF 25V ceramic capacitor (1206) Taiyo Yuden TMK316BJ105ML
C10,C13	2	1000pF ceramic capacitor (0805)
C11	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C12	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
D1	1	1A 400V Ultra-fast recovery diode Central Semi CMR1U-04
D2	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1		3.8A 55V N-channel MOSFET (SOT-223) International Rectifier IRLL2705
R1	1	135 Ohm 5% 4W resistor
R2,R3	0	Not installed
R4,R5,R14	2	10 Ohm 5% resistor (1206)
R6	1	12m Ohm 1% 0.5W resistor (2010) Dale WSL 2010 0.012Ω 1%
R7	1	100 Ohm 5% resistor (0805)
R8	1	100k Ohm 5% resistor (0805)
R9	1	5.11k Ohm 1% resistor (0805)
R10	1	261k Ohm 1% resistor (0805)
R11	1	681k Ohm 1% resistor (0805)
R13	1	22k Ohm 5% resistor (0805)
T1	1	1:2.5:3.75:3.75 Transformer Lpri = 3uH Coiltronics SG3-0138 core
U1	1	MAX1856EUB (10-uMAX)

8/19/04 - RWY

+12V to -26V at 120mA, -53V at 120mA, -80V at 100mA . This uses the MAX1856 and a transformer (that will need about a 1:2:2:2 turns ratio) to make a flyback converter.



Notes:

R13: Controls leakage energy when -26V output has no load.

R14: Controls leakage energy when -53V output has no load.

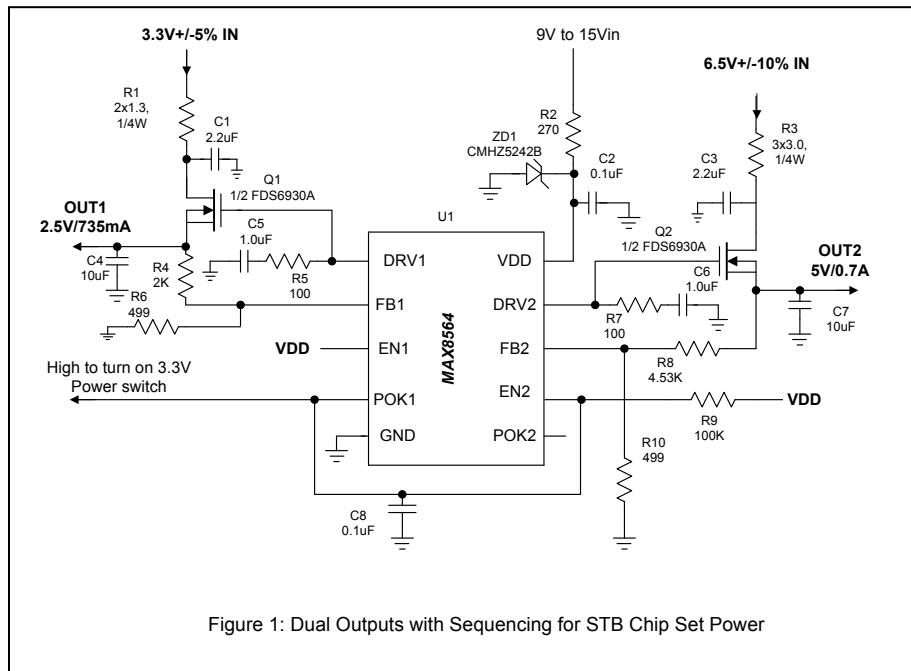
Vin	lin	Vout1	Iout1	Vout2	Iout2	Vout3	Iout3	Eff.
12.02	0.009	-80.62	0	-26.26	0	-53.37	0	
10.79	0.97	-79.80	0.05	-25.98	0.06	-52.81	0.06	0.833
12.03	0.87	-79.89	0.05	-26.01	0.06	-52.85	0.06	0.834
13.23	0.80	-79.90	0.05	-26.03	0.06	-52.98	0.06	0.825
12.03	1.09	-79.30	0.1	-25.75	0.12	-53.30	0	0.840
12.02	0.92	-81.19	0	-25.54	0.12	-52.09	0.12	0.842
12.02	1.40	-79.49	0.1	-26.20	0	-52.53	0.12	0.847

BILL OF MATERIALS
10.8V to 13.2V Input
-26V @ 120mA, -53V @ 120mA, -80V @ 120mA Output
8/19/04

1856-80c

DESIGNATION	QTY	DESCRIPTION
C1,C14	2	12uF 100V aluminum electrolytic capacitor Sanyo 100MV12AX
C2	1	47uF 50V aluminum electrolytic capacitor Sanyo 50MV47AX
C3,C4	2	10uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ106MM
C5	1	100pF 200V ceramic capacitor (0805)
C6,C7	0	Not installed
C8	1	470pF 50V ceramic capacitor (0805)
C9	1	1uF 25V ceramic capacitor (1206) Taiyo Yuden TMK316BJ105ML
C10,C13	2	1nF ceramic capacitor (0805)
C11	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C12	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
D1	1	1A 400V Ultra-fast recovery diode Central Semi CMR1U-04
D2,D3	1	1A 200V Ultra-fast recovery diode Central Semi CMR1U-02
N1		30mOhm 55V N-chan MOSFET (D-PAK) International Rectifier IRLR2905
R1	1	200 Ohm 0.5W 5% resistor (2010)
R2,R3	0	Not installed
R4,R5	2	10 Ohm 5% resistor (1206)
R6	1	25m Ohm 1% 0.5W resistor (2010) Dale WSL 2010 0.025Ω 1%
R7	1	100 Ohm 5% resistor (0805)
R8	1	200k Ohm 5% resistor (0805)
R9	1	5.11k Ohm 1% resistor (0805)
R10	1	665k Ohm 1% resistor (0805)
R11,R12	2	649k Ohm 1% resistor (0805)
R14	1	100k Ohm 5% resistor (0805)
R15	1	22k Ohm 5% resistor (0805)
T1	1	1:2:2:2 Power Transformer Lpri = 22uH Coiltronics CTX01-14853
U1	1	MAX1856EUB (10-uMAX)

MAX8564 for Thomson's Jupiter STB Chip Set



BOM for Figure 1:

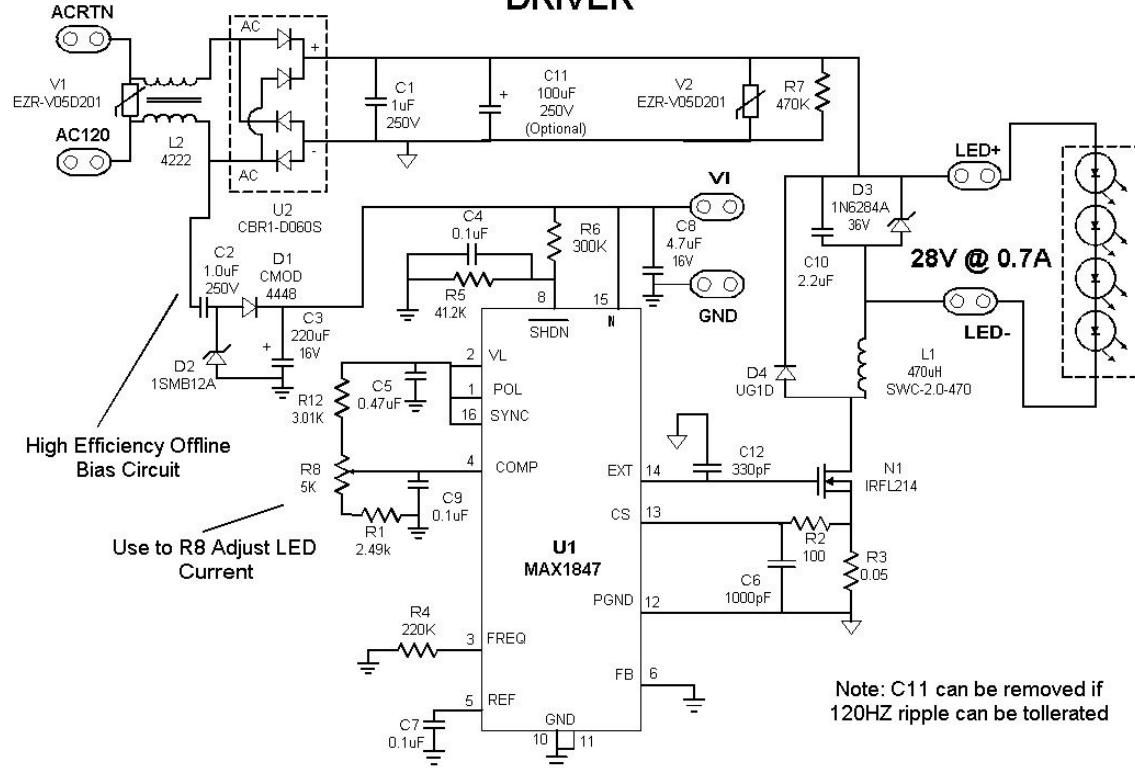
Component	QTY	Description
U1	1	MAX8564EUB Dual LDO Controller
Q1/2	1	Dual MOSFET: 30V, 55mΩ max at 4.5Vgs. Fairchild FSD6930A
ZD1	1	Zener Diode: 12V/500mW. Central: CMHZ5242B
C1, C3	2	Capacitor: 2.2uF/10V, X5R Ceramic
C2, C8	2	Capacitor: 0.1uF/16V, X7R Ceramic
C4, C7	2	Capacitor: 10uF/6.3V,X5R Ceramic
C5, C6	2	Capacitor: 1uF/6.3V,X7R Ceramic
R1	2	Resistor: 1.3Ω, 5%, 1206
R2	1	Resistor: 270Ω, 5%, 0603
R3	3	Resistor: 3.0Ω, 5%, 1206
R4	3	Resistor: 2kΩ, 1%, 0603
R5, R7	2	Resistor: 100Ω, 5%, 0603
R6, R10	2	Resistor: 499Ω, 1%, 0603
R8	1	Resistor: 4.53kΩ, 1%, 0603
R9	3	Resistor: 100kΩ, 5%, 1206

Please note that series resistors have been added to the Drains of the MOSFETs to reduce the power dissipation of the MOSFETs. This allows the use of dual SO-8 for 2 outputs, instead of 2 single SO-8. Multiple 1/4W resistors in parallel are used instead of a more costly higher power single resistor.

All components are labeled on schematic

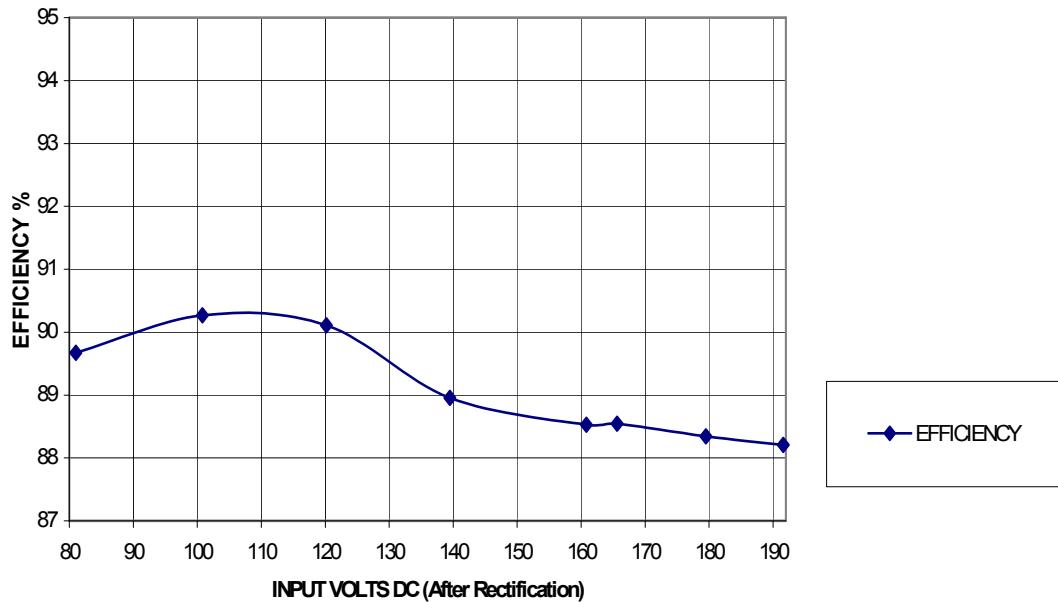
(Note: This file has been updated, 8/29/05)

OFFLINE LED DRIVER



Vin (DC)	Iin (DC)	Vout	Iout1	Pin	Pout	Loss	Eff
81	0.274	28.03	0.71	22.194	19.9013	2.2927	89.66973
100.8	0.217	27.81	0.71	21.8736	19.7451	2.1285	90.26909
120.2	0.185	27.83	0.72	22.237	20.0376	2.1994	90.10928
139.5	0.162	27.92	0.72	22.599	20.1024	2.4966	88.95261
160.8	0.144	28.08	0.73	23.1552	20.4984	2.6568	88.52612
165.6	0.14	28.12	0.73	23.184	20.5276	2.6564	88.5421
179.5	0.13	28.24	0.73	23.335	20.6152	2.7198	88.34455
191.6	0.124	28.32	0.74	23.7584	20.9568	2.8016	88.20796

OFFLINE LED DRIVER
120AC INPUT 28V @ 0.7A DC OUTPUT
MAX1847



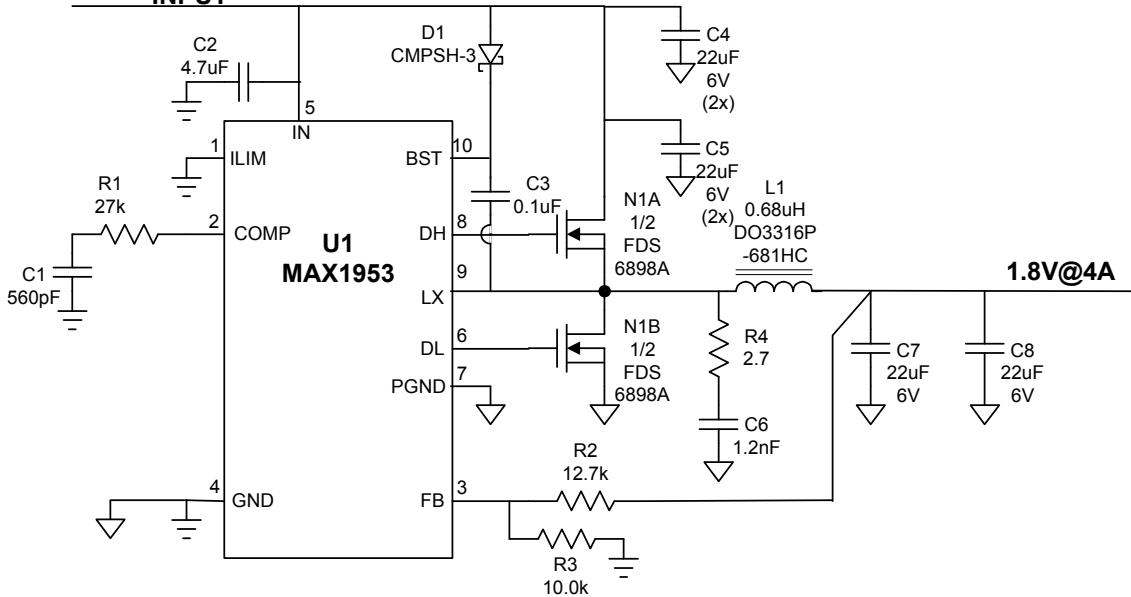
MAX1847 OFFLINE LED DRIVER
120VAC Input
28V @ 0.7A Output
01/14/05

DESIGNATION	QTY	DESCRIPTION
C12	1	330pF Ceramic Cap. NPO (0603)
C6	1	1000pF Ceramic Cap. NPO (0603)
C4, C7, C9	3	0.1uF 16V X7R Ceramic Cap. (0603) Taiyo Yuden EMK107BJ104MA
C5	1	0.47uF 10V X7R Ceramic Cap. (0603) Taiyo Yuden LMK107BJ474MA
C1, C2	2	1.0uF 250V X7R Ceramic Cap. (1812) TDK C5750X7R2E105M
C10	1	2.2uF 35V X5R Ceramic Cap. (1210) Taiyo Yuden GMK325BJ225MN
C8	1	4.7uF 16V X5R Ceramic Cap. (1206) Taiyo Yuden EMK316BJ475ML
C11	1	100uF 250V Electrolytic Cap. Sanyo 250MV100FAZ (Optional if 120HZ)

		ripple can be tolerated)
C3	1	220uF 16V Electrolytic Cap. Sanyo 16MV220AX
D1	1	Diode, 100V 0.15A (SOT-23) Central Semi, CMOD 4448
D2	1	Transorb, 12V (SMB) Central Semi, 1SMB12A
D3	1	Transorb, 36V (1.5KE) General Semi, 1N6284A
D4	1	Diode, 200V 1A (DO-41) General Semi, UG1D
D5-D8	4	LED White, 5W, 700mA, 7 Volt Luxeon LXHL-LW6C
L1	1	470uH, 2A Inductor, Toroid, Powder Iron Talema, SWC-3.0-470
L2	1	Inductor, Common Mode Delevan, 4222
N1	1	250V 2.5 Ohm N-Channel (SOT-223) International Rec, IRFL214
R3	1	0.05 Ohm 1% resistor (0805) Dale WSL0805 0.05 1.0%
R2	1	100 Ohm 1% resistor (0805)
R1	1	2.49k Ohm 5% resistor (0805)
R12	1	3.01 Ohm 5% resistor (0805)
R8	1	5k Potentiometer, 10T
R5	1	41.2k Ohm 1% resistor (0805)
R4	1	220k Ohm 1% resistor (0805)
R6	1	300k Ohm 1% resistor (0805)
R7	1	470k Ohm 5% resistor (0.25W)
U1	1	High Efficiency, Current-Mode PWM Controller (16 QSOP) Maxim MAX1847EEE
U2	1	Rectifier, Bridge, 600V, 0.5A Central Semi CBR1-D060S
V1, V2	2	Metal-Oxide Varistor 130VAC Panasonic, EZR-V05D201

3.135V to 3.465V

INPUT



1953_1m8

RWY

2/07/03

Vin	Iin	Vout	Iout	Efficiency
3.1299	0.0305	1.809	0	
3.1444	2.5532	1.807	4.0037	0.901
3.3014	2.4320	1.808	4.0037	0.901
3.4724	2.3097	1.808	4.0036	0.902
20MHz BW		10mVpp		

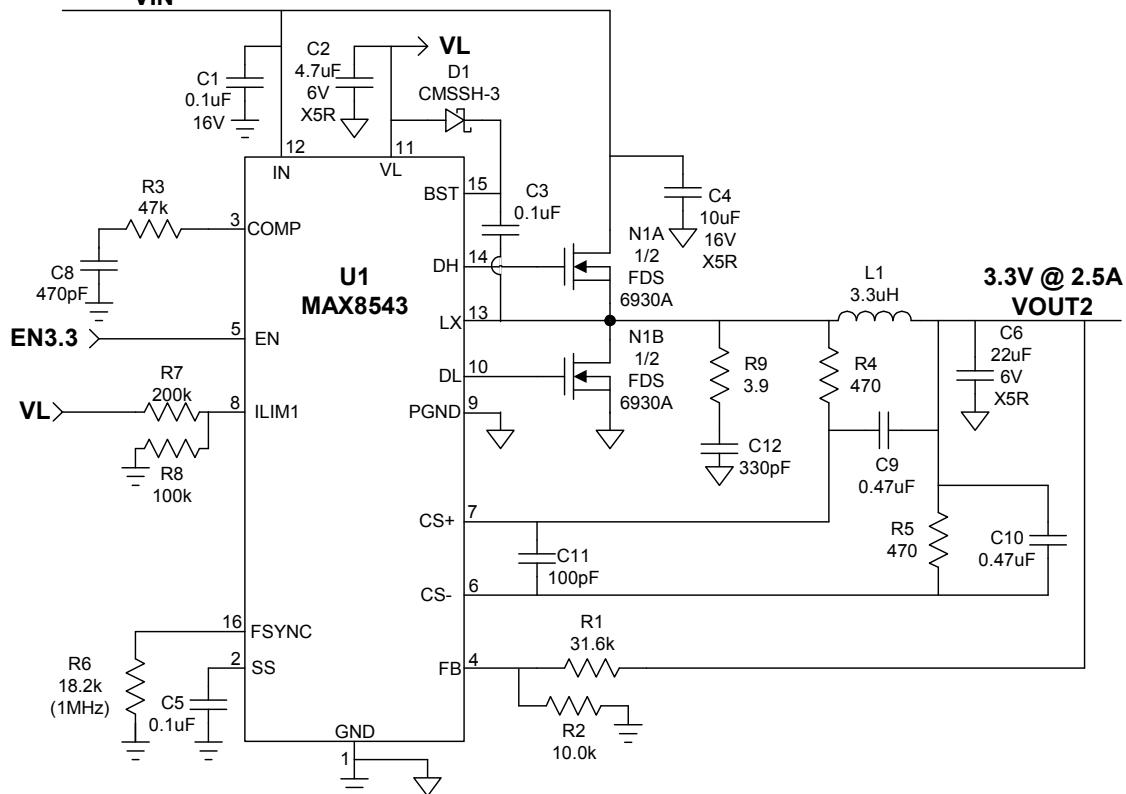
BILL OF MATERIALS
3.135V to 3.465V Input
1.8V @ 4A Output
2/07/03

1953_1m8

DESIGNATION	QTY	DESCRIPTION
C1	1	560pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C5,C7,C8	6	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C6	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	0.68uH Power Inductor Coilcraft DO3316P-681HC
N1	1	14m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6898A
R1	1	27k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)

10.8V to 13.2V

VIN



8543_3b3

RWY

12/20/04

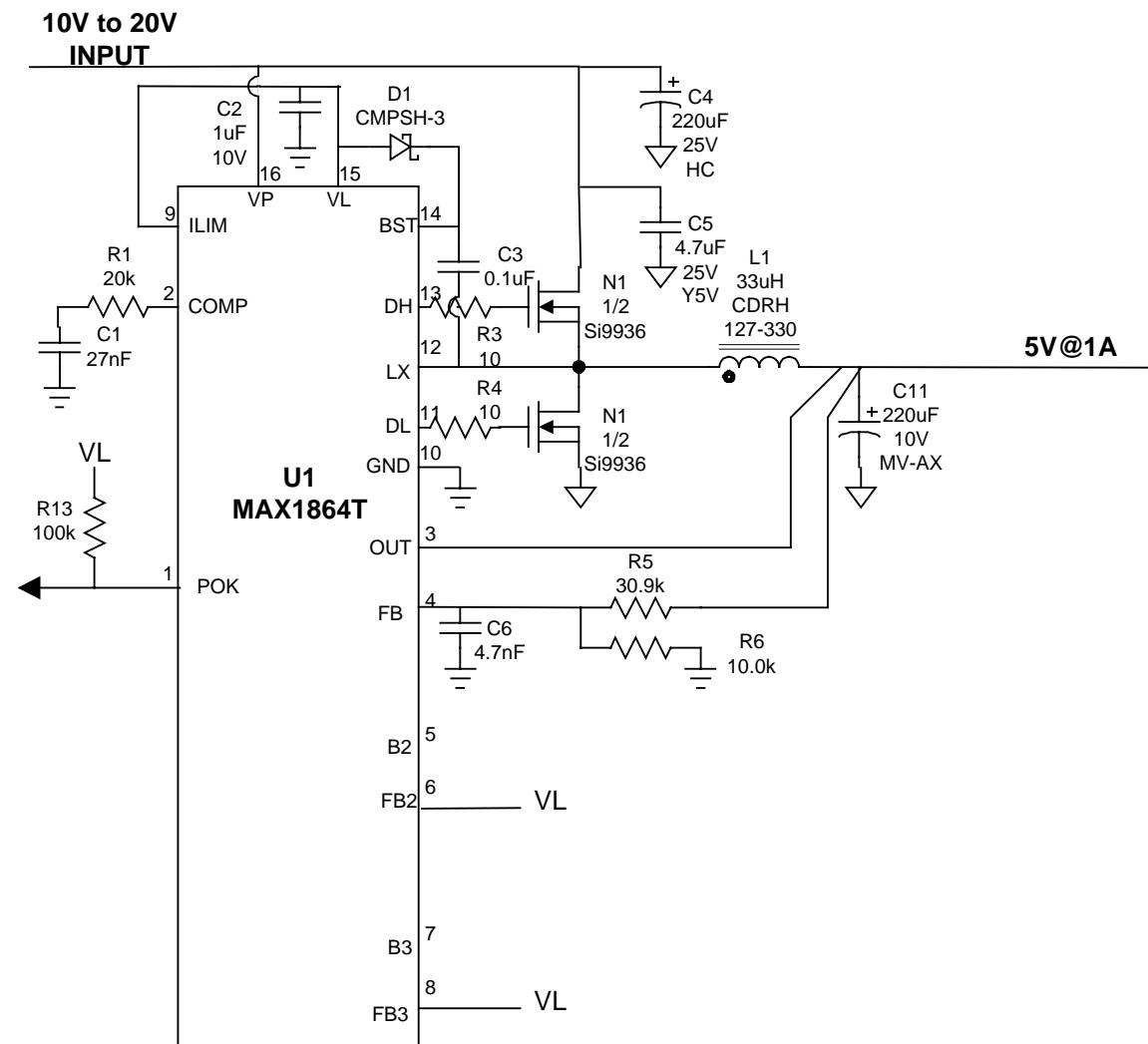
Vin	Iin	Vout	Iout	Efficiency
12.00	0.0205	3.33	0	
10.78	0.86	3.33	2.5	0.898
12.01	0.79	3.33	2.5	0.877
13.23	0.71	3.33	2.5	0.886
		30mVpp		

BILL OF MATERIALS**10.8V to 13.2V Input****3.3V @ 2.5A Output****12/20/04**

8543_3b3

DESIGNATION	QTY	DESCRIPTION
C1,C3,C5	3	0.1uF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C4	1	10uF 16V X5R ceramic capacitor (1210) Taiyo Yuden EMK325BJ106MN
C6	1	22uF 6V ceramic cap (1206) Taiyo Yuden JMK316BJ226ML
C8	1	470pF ceramic capacitor (0603)
C9,C10	2	0.47uF 10V X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ474MA
C11	1	100pF ceramic capacitor (0603)
C12	1	330pF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-323) Central Semi CMSSH-3
L1	1	3.3uH 4.3A Power Inductor Toko FDV0630-3R3
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6930A
R1	1	31.6k Ohm 1% resistor (0603)
R2	1	10.0k Ohm 1% resistor (0603)
R3	1	47k Ohm 5% resistor (0603)
R4,R5	2	470 Ohm 5% resistor (0603)
R6	1	18.2k Ohm 1% resistor (0603)
R7	1	200k Ohm 5% resistor (0603)
R8	1	100k Ohm 5% resistor (0603)
R9	1	3.9 Ohm 5% resistor (0603)
U1	1	MAX8543EEE (16-QSOP)

TFT Monitor



1864_5d
RWY
9/12/01

Vin	Iin	Vout	Iout	Efficiency
9.976	0.539	5.0558	1.005	0.949
14.994	0.365	5.0564	1.005	0.928
20.010	0.278	5.0570	1.005	0.914
200mVpp		100mVpp		

BILL OF MATERIALS**10V to 20V Input****5V @ 1A Output****09/12/01**

1864_5d

DESIGNATION	QTY	DESCRIPTION
C1	1	27nF ceramic capacitor (0805)
C2	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	220uF 25V aluminum electrolytic capacitor Sanyo 25MV220HC
C5	1	4.7uF 25V Y5V ceramic capacitor (1206) Taiyo Yuden TMK316F475MG
C6	1	4.7nF ceramic capacitor (0805)
C7	1	220uF 10V aluminum electrolytic capacitor Sanyo 10MV220AX
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	33uH 3A Power inductor Sumida CDRH127-330
N1	1	50m Ohm 30V Dual MOSFET (8-SO) International Rectifier IR7303
R1	1	20k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3,R4	2	10 Ohm 5% resistor (0805)
R5	1	30.9 k Ohm 1% resistor (0805)
R6	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1864TEEE (16-QSOP)

Jinrong Qian, Corporate Application Engineer

With most regulators, it is usually difficult to generate an output voltage less than the reference voltage. This note describes a way to use the MAX1864 to achieve an output voltage less than its 1.236V reference.

The MAX1864 includes a positive linear regulator gain block. With a few external resistors, it can achieve an output voltage below 1.236V. Fig. 1 shows the schematic of the implementation. Since the voltage at FB pin is the reference voltage, a lower output voltage VOUT1 is obtained if a voltage (V2) higher than the reference voltage is generated. Due to the high input impedance at FB pin, if R5 is chosen to be equal to R6, we have

$$V_2 - V_{FB} = V_{FB} - V_{OUT1},$$

This yields $V_2 = 2V_{FB} - V_{OUT1}$.

To generate a 1.0V output voltage with $V_{FB}=1.236V$, V2 should then be 1.472V. This can be achieved by properly choosing the resistance of R8 and R9

$$R_9 = \frac{V_{FB}}{V_2 - V_{FB}} R_8 ,$$

if $R_8 = 10k$, R_9 will be $52.4k$, Therefore, 1.0V output voltage is generated.

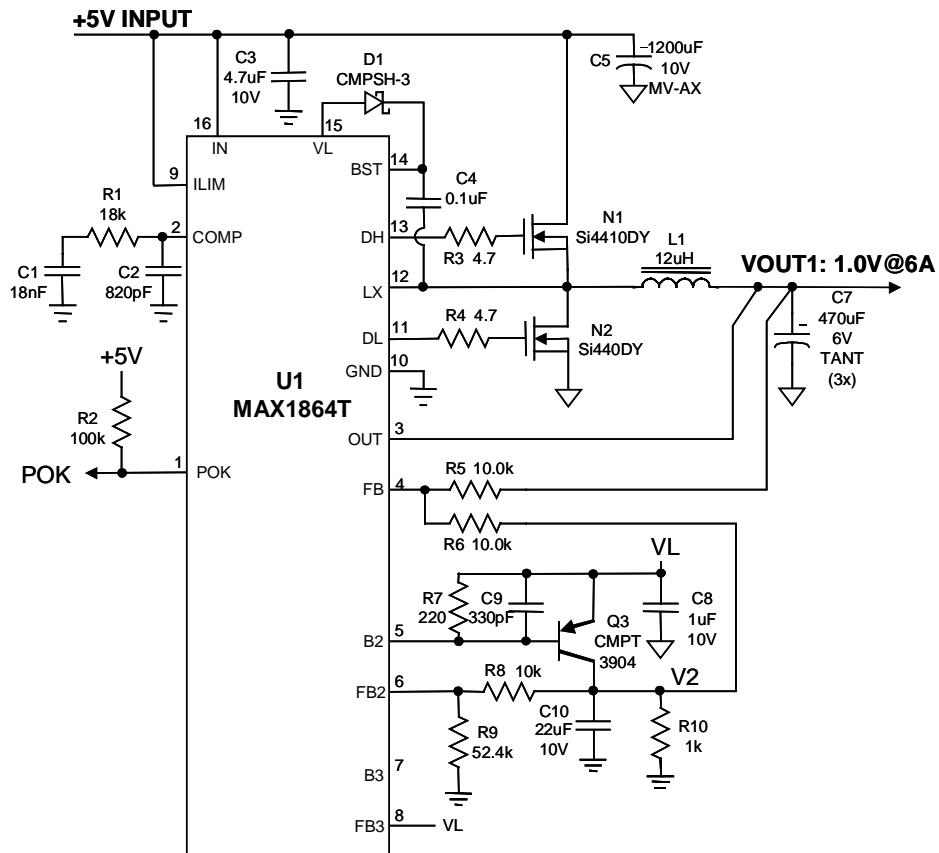
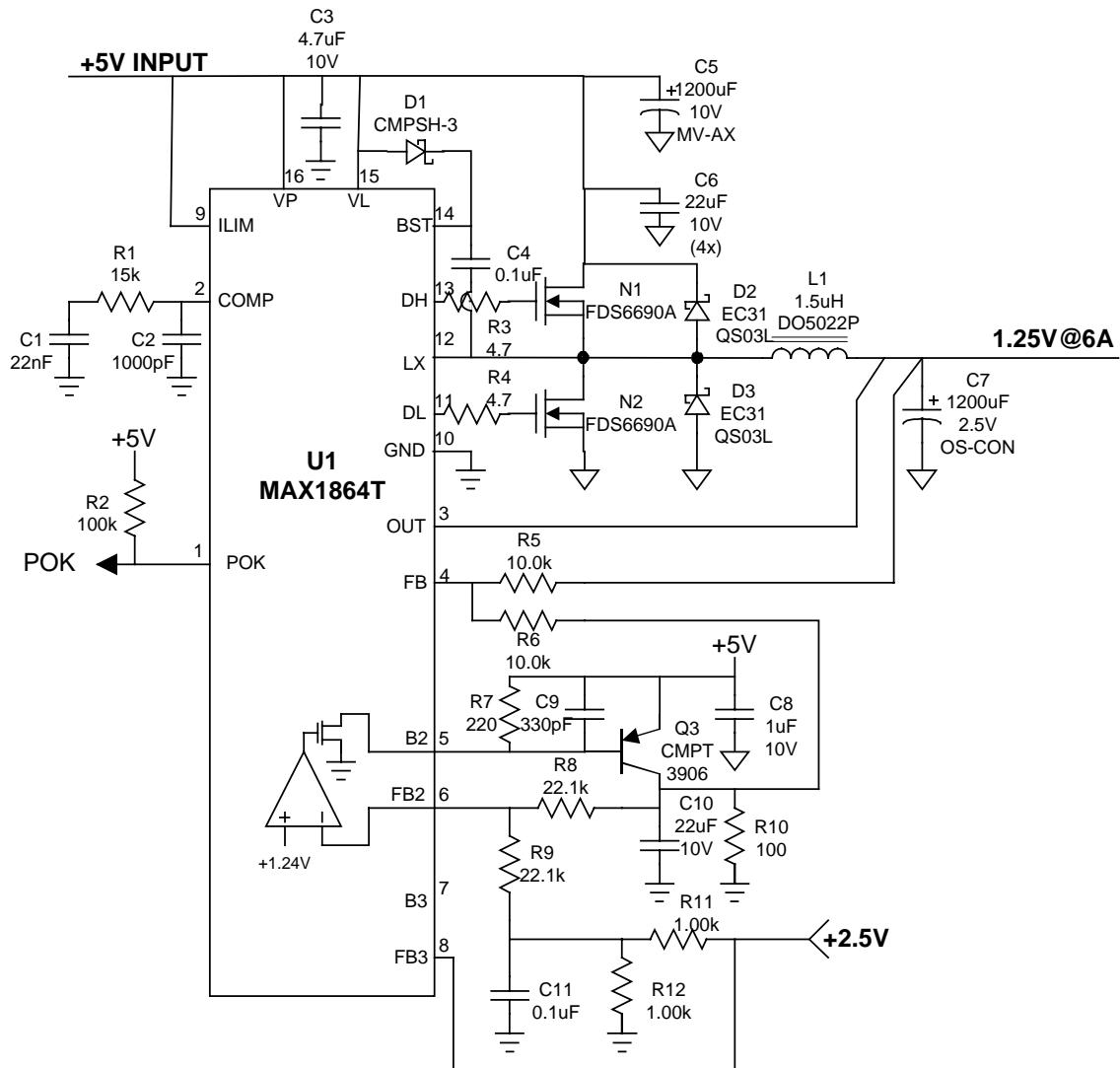


Fig. 1 Schematic of 1.0V power supply with MAX1864



1864_1v2

RWY
8/23/01

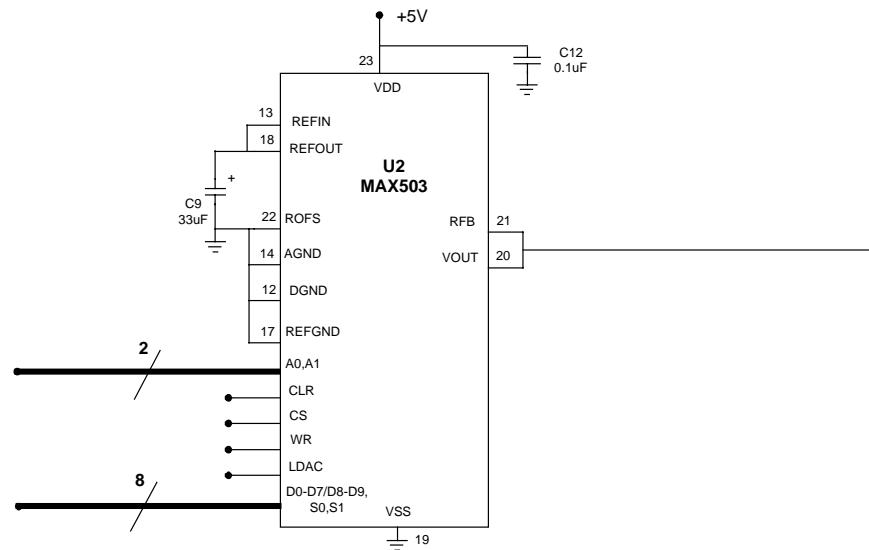
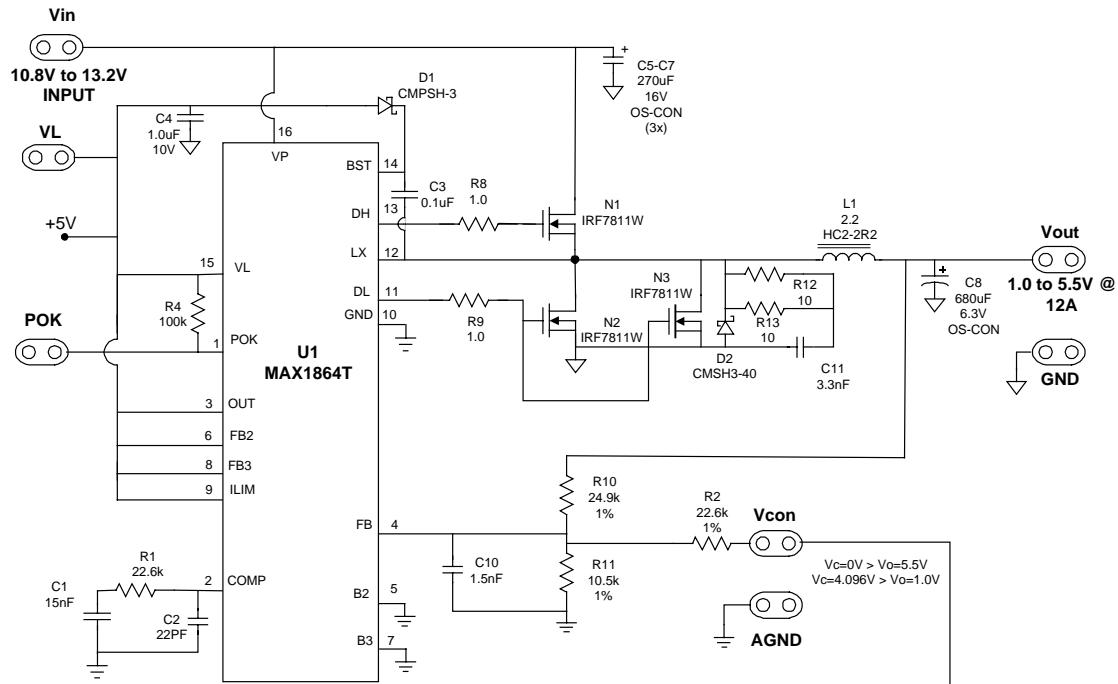
DDR Termination @ 6A

**5V Input, 2.5V Reference
1.25V @ ±6A Output**

1864_1v2

10/22/01

DESIGNATION	QTY	DESCRIPTION
C1	1	22nF ceramic capacitor (0805)
C2	1	1nF ceramic capacitor (0805)
C3	1	4.7uF 10V X7R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4,C11	2	0.1uF ceramic capacitor (0805)
C5	1	1200uF 10V aluminum electrolytic capacitor Sanyo 10MV1200AX
C6,C10	5	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C7	1	1200uF 2.5V organic semiconductor cap Sanyo OS-CON 2R5SP1200M
C8	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C9	1	330pF ceramic capacitor (0805)
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2,D3	2	3A 30V Schottky diode Nihon EC31QS03L
L1	1	1.5uH 10A Power Inductor Coilcraft DO5022P-152HC
N1,N2	1	17m Ohm N-channel MOSFET (SO-8) Fairchild FDS6690A
Q3	1	200mA 40V PNP Transistor (SOT-23) CMPT3906
R1	1	15k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3,R4	2	4.7 Ohm 5% resistor (0603)
R5,R6	2	10.0k Ohm 1% resistor (0805)
R7	1	220 Ohm 5% resistor (0805)
R8,R9	2	22.1k Ohm 1% resistor (0805)
R10	1	100 Ohm 5% resistor (0805)
R11,R12	1	1.00k Ohm 1% resistor (0805)
U1	1	MAX1864TEEE (16-QSOP)



1864_12B
SM
9/27/01

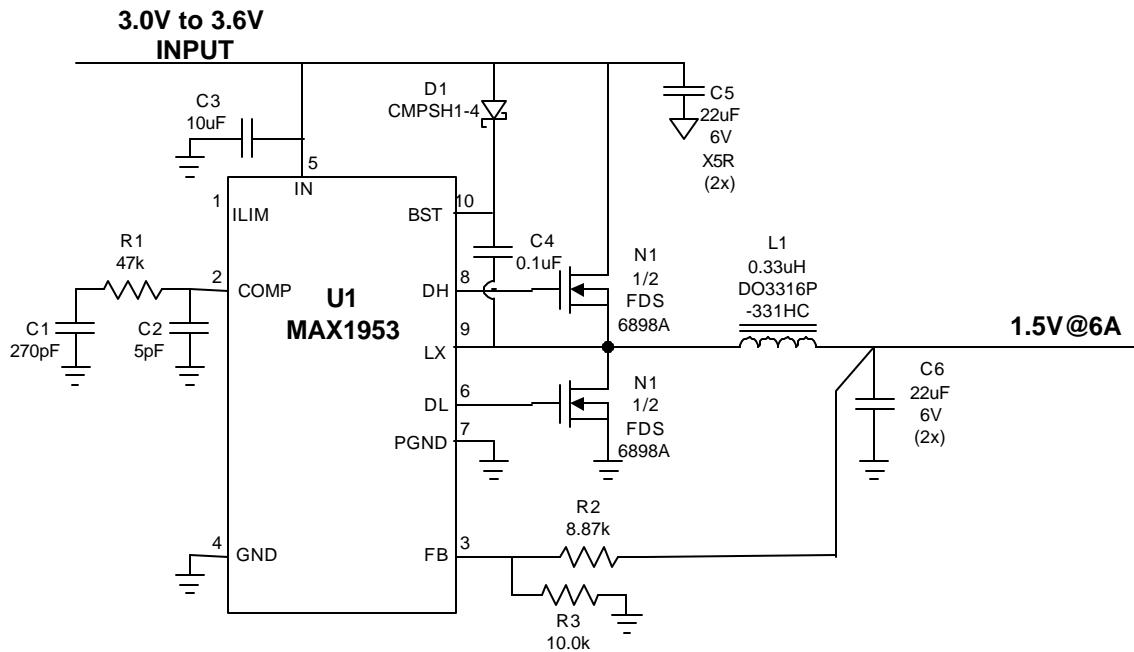
1V to 5.5V @ 12A

**10.8-13.2V Input
1V to 5.5V @ 12A Output
09/26/01**

1864_12B

DESIGNATION	QTY	DESCRIPTION
C2	1	Cap 22pF 50V Ceramic NPO 0805, Panasonic (ECJ-2CV1H220J)
C10	1	Cap 1.5nF 50V Ceramic X7R 0805, Panasonic (ECJ-2VB1H152K)
C11	1	Cap 3.3nF 50V Ceramic X7R 0805, Panasonic (ECJ-2VB1H332K)
C1	1	Cap 15nF 50V Ceramic X7R 0805, Panasonic (ECJ-2VB1H153K)
C3,C12	2	Cap 0.1uF 25V X7R Ceramic 0805, Panasonic (ECJ-2VB1E104K)
C4	1	Cap 1.0uF 10V X7R Ceramic 0805, Taiyoyuden (LMK212BJ105M)
C9	1	Cap 33uF 6.3V Electrolytic, Sanyo (6MV33HC)
C5-C7	3	Cap 270 uF 16V OSConn, Sanyo (16SP270M)
C8	1	Cap 680 uF 6.3V OSConn, Sanyo (6SP680M)
D1	1	Diode 30V 0.1A Schottky SOT-23, Central Semi (CMPSH-3)
D2	1	Diode 40V 3A Schottky SMC, Centralsemi (CMSH3-40)
N1-N3	3	NFET 0.012 Ohm 30V SO-8, International Rectifier (IRF7811W)
R8,R9	2	Resistor 1.0 Ohm 5% 0805
R12,R13	2	Resistor 10 Ohm 5% 1206
R11	1	Resistor 10.5k Ohm 1% 0805
R10	1	Resistor 24.9k Ohm 1% 0805
R1,R2	2	Resistor 22.6k Ohm 1% 0805
R4	1	Resistor 100k Ohm 5% 0805
L1	1	Inductor, 2.2uH Coiltronics (HC2-2R2)
U1	1	IC xDSL/Cable Modem Triple Output Power Supplies 16 QSOP, Maxim (MAX1864TEEP)
U2	1	IC Low-Power, Parallel-Input Voltage-Output, 10-Bit DAC 24 SSOP, Maxim (MAX503CAG)

Base-Station



1953_1b5
RWY
3/04/02

Efficiency Data

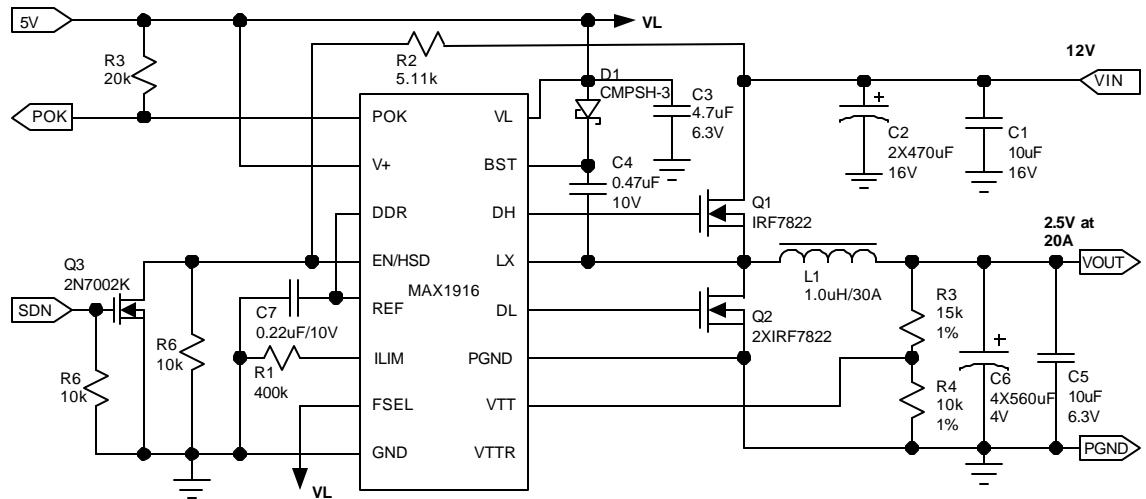
Vin	Iin	Vout	Iout	Efficiency
3.2999	0.056	1.5121	0	
2.9939	3.477	1.5097	6.003	0.870
3.2992	3.149	1.5091	6.003	0.872
3.6030	2.888	1.5103	6.003	0.871

BILL OF MATERIALS**3.0V to 3.6V Input****1.5V @ 6A Output****3/05/02**

1953_1b5

DESIGNATION	QTY	DESCRIPTION
C1	1	270pF ceramic capacitor (0603)
C2	1	5pF ceramic capacitor (0603)
C3	1	10uF 10V X5R ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C4	1	0.1uF ceramic capacitor (0603)
C5,C6	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
D1	1	0.1A 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	0.33uH 20A Power Inductor Coilcraft DO3316P-331HC
N1	1	14m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6898A
R1	1	47k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

12V input, 2.5V/20A output application: (VDDQ)



This circuit has been tested in the lab. The efficiency is about 88.5% at 20A output current. It should be noted that the prototype of this circuit is modified from the 7A VTT EV kit. The copper is only 1 Oz and the bottom two MOSFETs are stacked on top of each other due to single MOSFET layout. For a better layout, the efficiency will be better.

The main component part numbers are:

L1: HM73-301R0, 1uH/23A,
 C6: OS-CON, 4SP560M,
 C2: OS-CON, 16SG470M.

6/19/02

From: Sudha Durvasula

MAX1917

Input: +2.25V to +2.75V; 12V available for V+ supply to chip

Output: 1.25V (+/-3%); Maximum load=7A

Bill of Materials:

DESIGNATION	QTY	DESCRIPTION
C1, C2, C3	3	10 uF 25V ceramic capacitor Taiyo Yuden TMK432BJ106KM
C6, C7, C8, C9	4	270 µF 2V 15 mΩ Al electrolytic capacitors Panasonic EEFUE0E271R
C10, C11	2	10 uF 6.3V ceramic capacitors Taiyo Yuden JMK212BJ106MG
C12	1	0.47 µF, 25V ceramic capacitor Taiyo Yuden TMK316BJ474ML
C13, C14	2	0.47µF, 6.3V ceramic capacitors (0603) Taiyo Yuden JMK107BJ475MG
C15	1	4.7 µF 6.3V ceramic capacitor TAIYO YUDEN JMK212BJ475MG
C16, C17	2	1 µF 6.3V ceramic capacitor TAIYO YUDEN JMK107BJ105MA
D1	1	100 mA 30V Schottky diode Central Semiconductor CMPSH-3
L1	1	0.8µH (16A) Inductor Sumida CDEP105L-0R8
N1, N2	2	N-channel MOSFETs, 30V ($R_{DS(ON)} = 9\text{m}\Omega$ @ $V_{GS}=4.5\text{V}$) International Rectifier IRF7811W
Q1	1	N-channel MOSFET (SOT23) Central Semiconductor 2N7002
R1	1	54.9 kΩ, 1% resistor (0805)
R2	1	5.1 kΩ, 5% resistor (0805)
R3	1	100 kΩ, 5% resistor (0805)
R4, R9	2	Short
R6	1	10 kΩ, 5% resistor (0805)
R7	1	10 kΩ, 1% resistor (0805)
R8	1	2.49 kΩ, 1% resistor (0805)
R10	1	20 kΩ, 1% resistor (0805)
JU2	1	2 pin header
J1	1	Scope probe connector
U1	1	MAX1917EEE (16 pin QSOP)

EFFICIENCY MEASUREMENTS:

Vbias V	Ibias A	Vin V	In A	Vout V	Iout A	Eff. %
JU2 not installed (freq. = 300kHz)						
12	0.015	2.2471	4.266	1.2344	7	88.48
12	0.016	2.4963	3.849	1.2354	7	88.24
12	0.015	2.7589	3.489	1.2364	7	88.26
JU2 installed (freq. = 550kHz)						
12	0.028	2.2457	4.319	1.2266	7	85.56
12	0.028	2.5012	3.884	1.2271	7	85.46
12	0.028	2.7463	3.537	1.2278	7	85.52

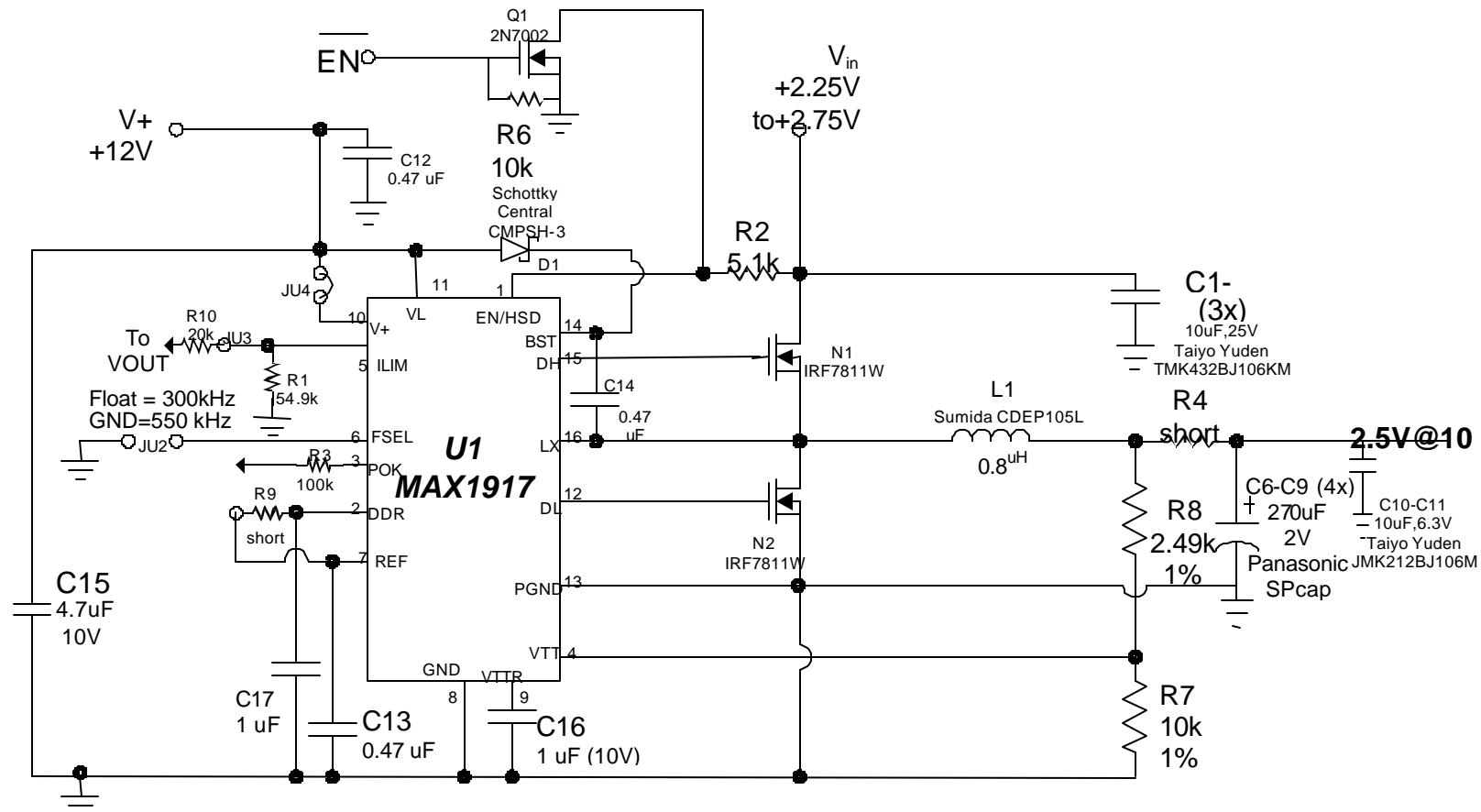
Output Ripple: 10 mV max.

Foldback Current Limit: Peak inductor current is limited to maximum of 2.05A in the event of a short at output.

Schematics:

6/19/2002 - Sudha Durvasula

+2.25V - +2.75V to 1.25V @7A This uses the MAX1917. It also has foldback current limiting.



Generate DDR Memory Termination Voltages with MAX1917 using 3.3V Supply

- I. If the input voltage of the 2.5V or 1.5V dc-dc converter is 5V and is on the same board where MAX1917 is located, use the following schematics for both 1.25V and 0.75V applications.

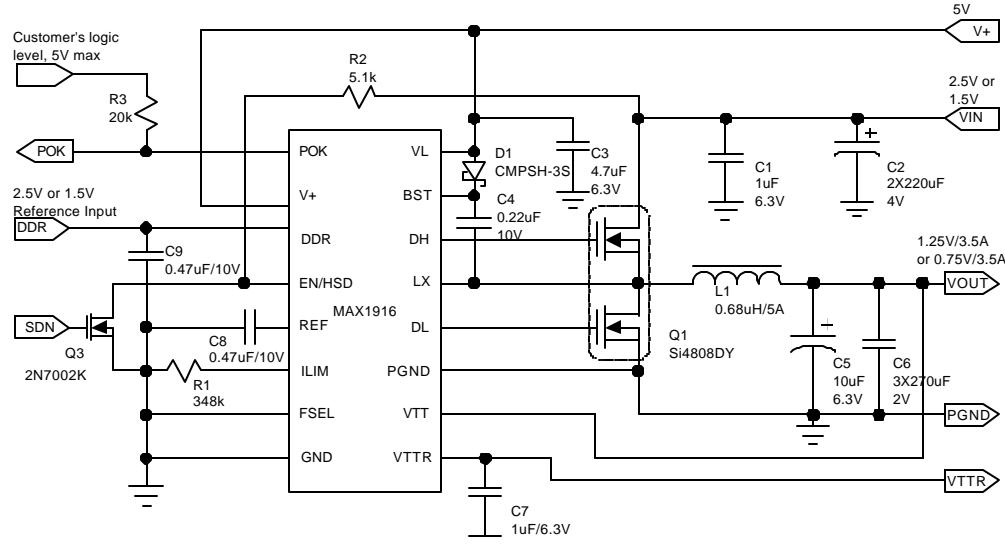


Figure 1 Schematics with 5V V+ supply available.

Table I: Bill of Materials:

Comp.	Description	Comments
C1, C7	1.0uF/6.3V ceramic capacitor, JMK107BJ105MA	Taiyo Yuden
C2	2X220uF/4V POSCAP, 4TPA220M, or 2X330uF/6V tantalum capacitor, T510X337M006AS	SANYO Kemet
C3	4.7uF/10V ceramic capacitor, LMK316BJ475ML	Taiyo Yuden
C4, C8	0.47uF/10V ceramic capacitor, LMK107BJ474MA	Taiyo Yuden
C5	10uF/6.3V ceramic capacitor, JMK316BJ106ML	Taiyo Yuden
C6	3X270uF polymer caps (Panasonic EEFUE0E271R)	Panasonic
C9	0.47uF/25V ceramic capacitor, TMK316BJ474ML	Taiyo Yuden
D1	30V/100mA Schottky diode, CMPSH-3S	Central Semi.
L1	0.68uH/9A, DO3316P681HC (esr, 5mΩ max)	Coilcraft
Q1	Si4808DY or Si4830DY	Vishay Siliconix
R1	348k, 1%	
R2	5.1k, 5%	
R3	20k, 5%	
IC1	MAX1917	MAXIM

- II. If the input voltage of the 2.5V or 1.5V dc-dc converter is 3.3V and is on the same board where MAX1917 is located, and also if the LX switching node is accessible, use the following schematics for both 1.25V and 0.75V applications. D2, C10 and C11 form a voltage doubler to double the 3.3V input voltage to feed the V+.

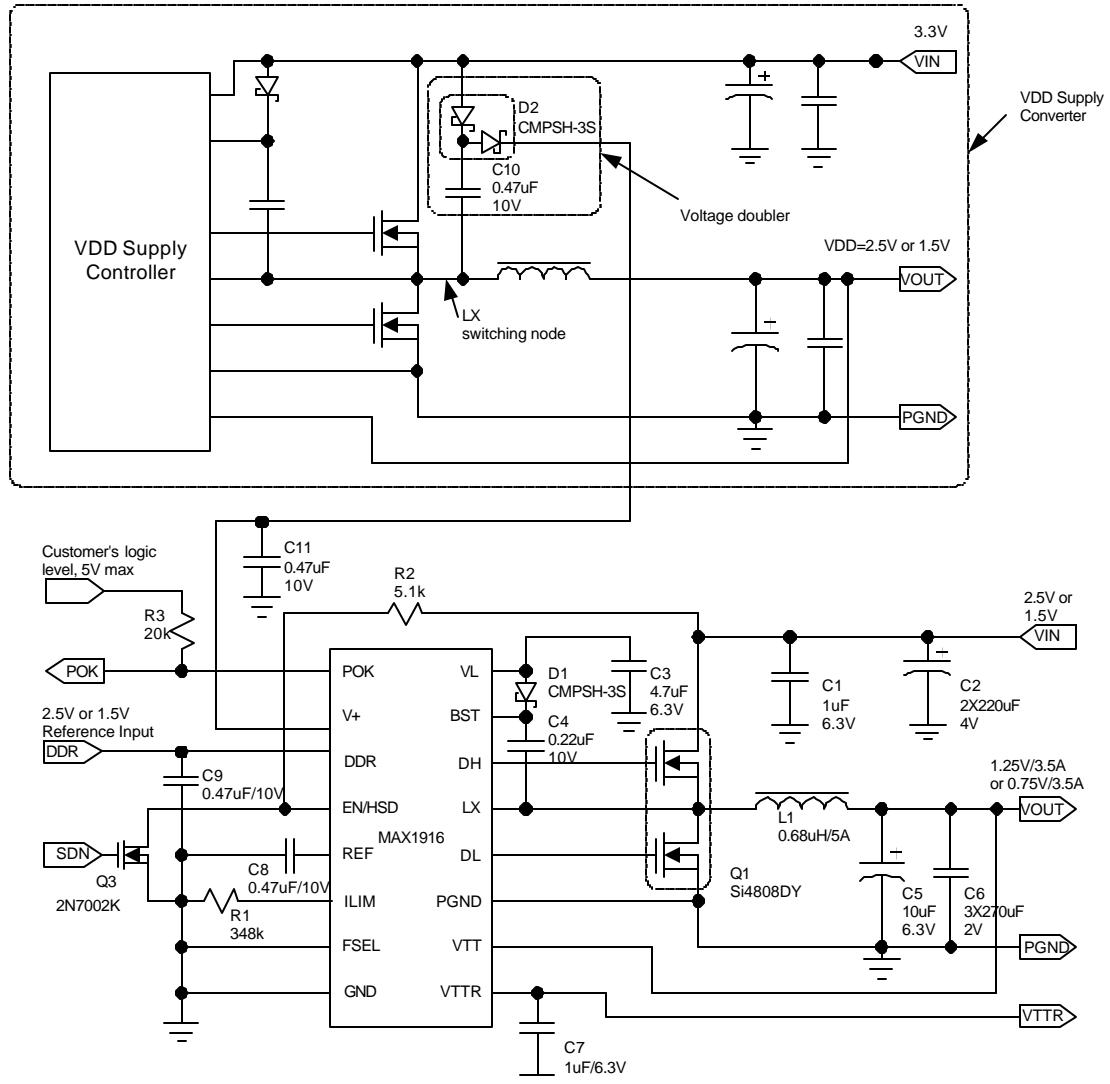


Figure 2 Schematics with a voltage doubler from the 2.5V or 1.5V dc-dc converter.

Table II: Additional Bill of Materials over schematics in Figure 1:

Comp.	Description	Comments
C10, C11	0.47uF/10V ceramic capacitor, LMK107BJ474MA	Taiyo Yuden
D2	30V/100mA Schottky diode, CMPSH-3S	Central Semi.

- III. If the input voltage of the 2.5V or 1.5V dc-dc converter is 3.3V the switching node, LX, is not accessible, a charge pump, such as MAX1683, should be used to double the 3.3V input voltage to supply V+ of the MAX1917. Following schematic shows the MAX1917, together with MAX1683, operates from 3.3V input.

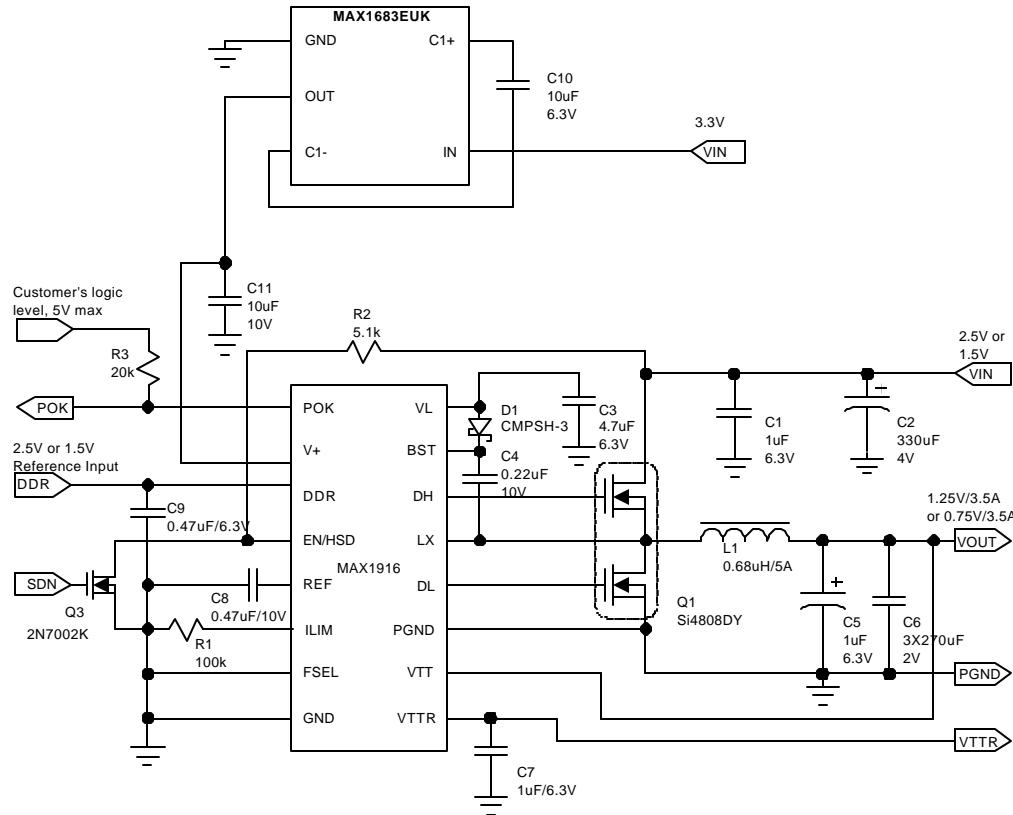


Figure 3 Schematics with MAX1683 charge pump to generate V+ supply for MAX1917.

Table III: Additional Bill of Materials over Figure 1:

Comp.	Description	Comments
C10	10uF/6.3V ceramic capacitor, JMK316BJ106ML	Taiyo Yuden
C11	10uF/10V ceramic capacitor, LMK325BJ106MN	Taiyo Yuden
IC2	MAX1683	MAXIM

MAX1954 Optimized for 20A**Input:** 12V (+/-10%)**Output:** 1.8V (+/-5%); Maximum load=20A**Bill of Materials:**

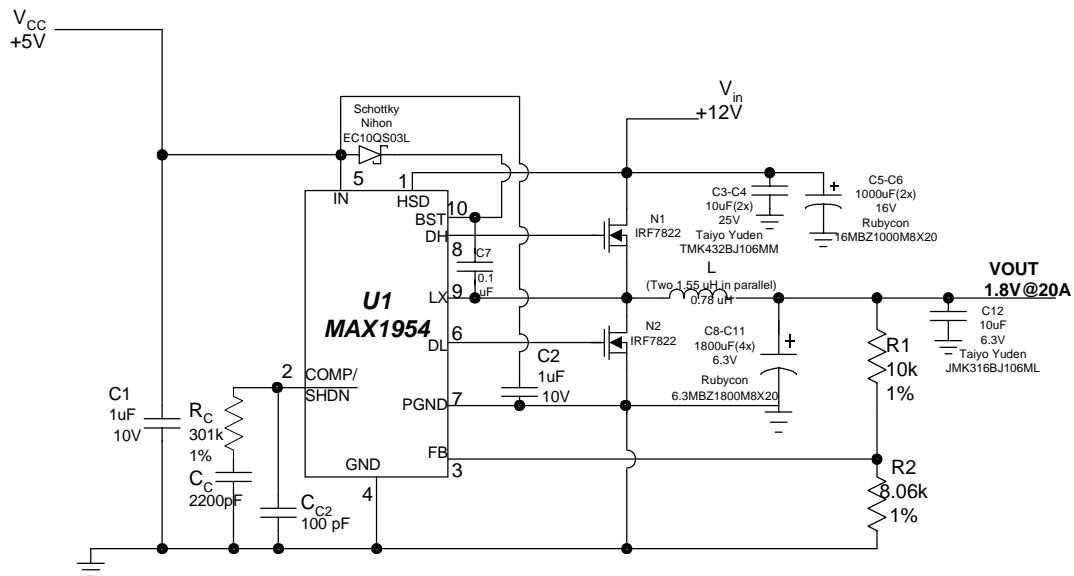
DESIGNATION	QTY	DESCRIPTION
C _{c2}	1	100 pF ceramic capacitor (0603)
C _c	1	2200 pF ceramic capacitor (0603)
C1, C2	2	1μF 10V ceramic capacitor Taiyo Yuden LMK212BJ105MG
C3-C4	2	10 μF 25V ceramic capacitors TAIYO YUDEN TMK432BJ106MM
C5-C6	2	1000 μF 16V electrolytic capacitor Rubycon 16MBZ1000M8X20
C7	1	0.1 μF ceramic capacitor Taiyo Yuden EMK107BJ104MA
C8-C11	4	1800 μF 6.3V 19mΩ ESR capacitors Rubycon 6.3MBZ1800M8X20
C12	1	10 μF 6.3V ceramic capacitor s TAIYO YUDEN JMK316BJ106ML
D1	1	Schottky diode Nihon EC10QS03L
L	2	1.55 μH Inductor (Two in Parallel) Provided by customer
N1, N2	2	N-channel MOSFETs, 30V 5mΩ ON resistance International Rectifier IRF7822
R _c	1	301 kΩ, 1% resistor (0805)
R1	1	10 kΩ, 1% resistor (1206)
R2	1	8.06 kΩ, 1% resistor (0805)
U1	1	MAX1954EUB (10 pin μMax)

Efficiency Measurements:

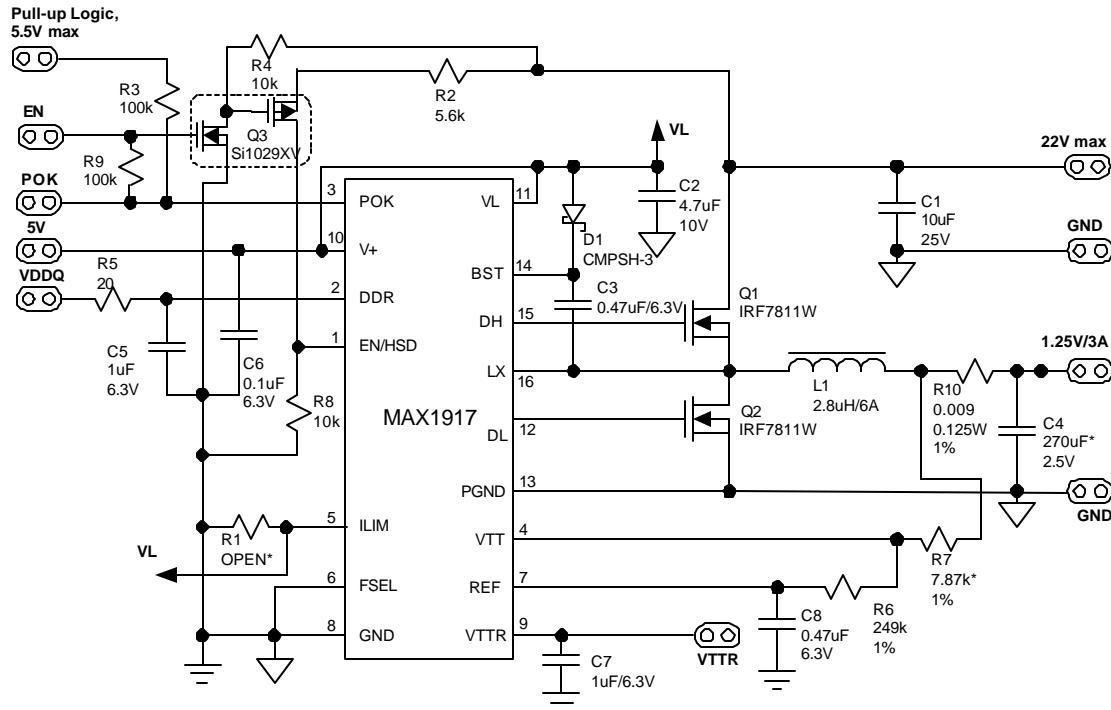
VBATT (V)	IBATT(A)	Vbias(V)	Ibias(mA)	VOUT(V)	IOUT(A)	Eff%
13.18	0.2065	5.001	19	1.792	1.03	66
13.19	0.7947	5	20	1.791	5.03	85
13.19	1.5693	5	24	1.784	10.02	86
13.19	2.3908	4.999	25	1.779	15.02	84
13.19	3.2307	4.999	28	1.726	20.01	81
12.06	0.2205	5.001	19	1.792	1.03	67
12.07	0.8598	5	20	1.791	5.03	86
12.05	1.7129	5	24	1.787	10.02	86
12.03	2.624	4.999	25	1.782	15.02	84
12.03	3.5565	4.999	27	1.744	20.01	81
10.8	0.2437	5.001	19	1.791	1.03	68
10.8	0.9544	5	20	1.792	5.03	87
10.8	1.9	4.999	23	1.793	10.02	87
10.8	2.8985	4.999	24	1.785	15.02	85
10.8	3.9717	4.999	26	1.765	20.01	82

Schematics:

+12V (+/-10%) to 1.8V @20 A. This uses the MAX1954.



22Vmax/3A peak, -1.5A to 1.5A transient VTT supply application circuit: (minor change needed for higher input voltage)
 (Low shutdown input current, less than 10uA)



* The value of R7 may change due to new output inductor.

* In the real applications, need only one 270uF capacitor. However, 2 caps are need to meet JEDEC requirement, for -3A to 3A and -3A, 20A/us load current slew rate, but not the real applicatoins.

* R1 value de:ends on the MOSFET chosen, see datasheet for equation to determine R1 value.
 Please note that if R1 is used, ILIM should be disconnected from VL.

Please note:

1. Higher Rdson MOSFET can be used instead of IRF7811W. For example 20mΩ Rdson MOSFET can be used if the average current is about 1A.
2. Cannot use 10uH inductance. The output voltage deviation at transient response, from 1.5A to -1.5A will not meet JEDEC specification. The maximum voltage deviation is more than 100mV during this transient. If customer used this inductor before and no problem generated, then the 10uH inductor can be used and a 9mΩ droop resistor should be used to stable the operation. MAX1917 uses Quick PWM control architecture. There is no error voltage amplifier; therefore there are no compensation components.
3. The output ripple voltage is about 20mV peak to peak. However, with droop resistor (R10) we meet JEDEC spec for -1.5A to 1.5A to -1.5A load transients with 20A/us load slew rate. It should be pointed out that the lower load current slew rate, the smaller the voltage deviation.

Following waveforms are taken from the transient responses:

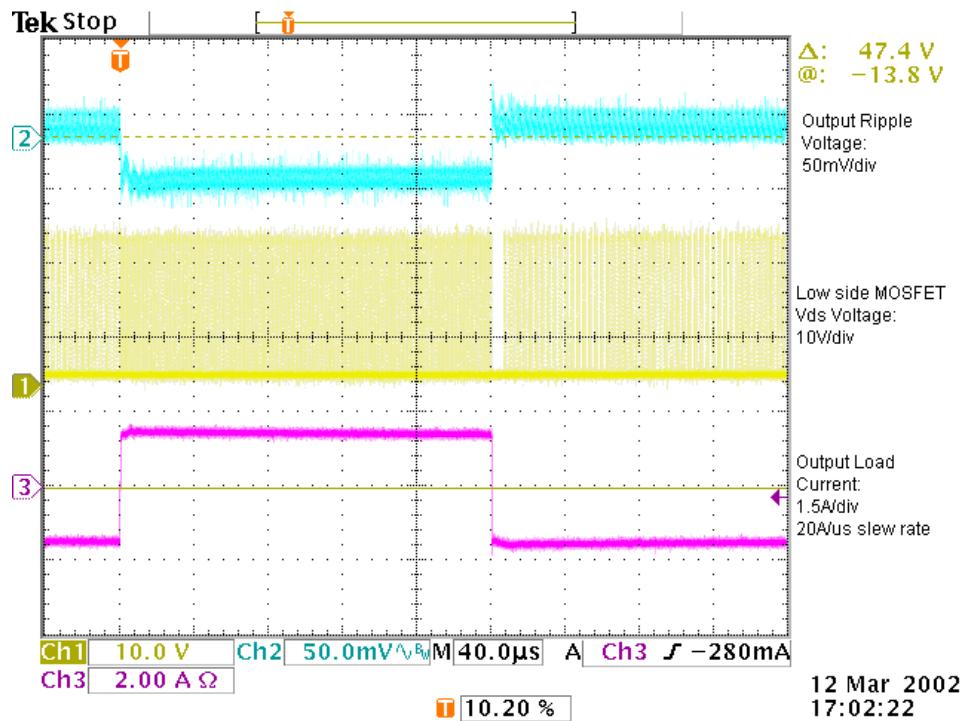


Figure 1 Transient response from $-1.5A$ to $1.5A$ to $-1.5A$ at $20A/\mu s$ load current slew rate.
Meet JEDEC load transient requirement with margin, using $9m\Omega$ droop resistor (R10).

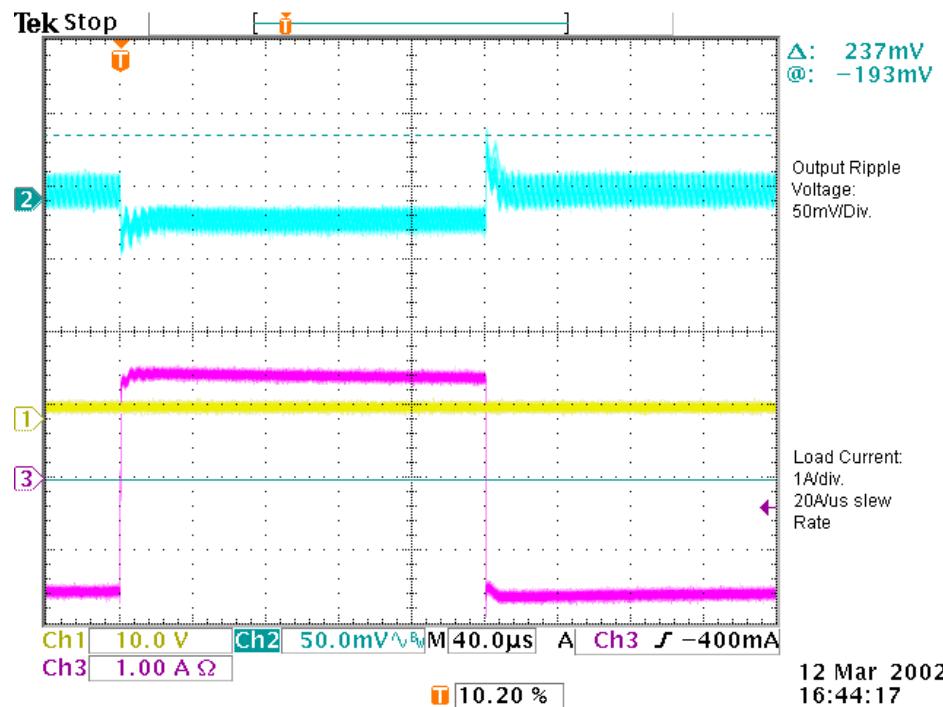


Figure 2 Transient response from $-1.5A$ to $1.5A$ to $-1.5A$ at $20A/\mu s$ load current slew rate.
Meet JEDEC load transient requirement with no margin, using $4m\Omega$ droop resistor (R10).

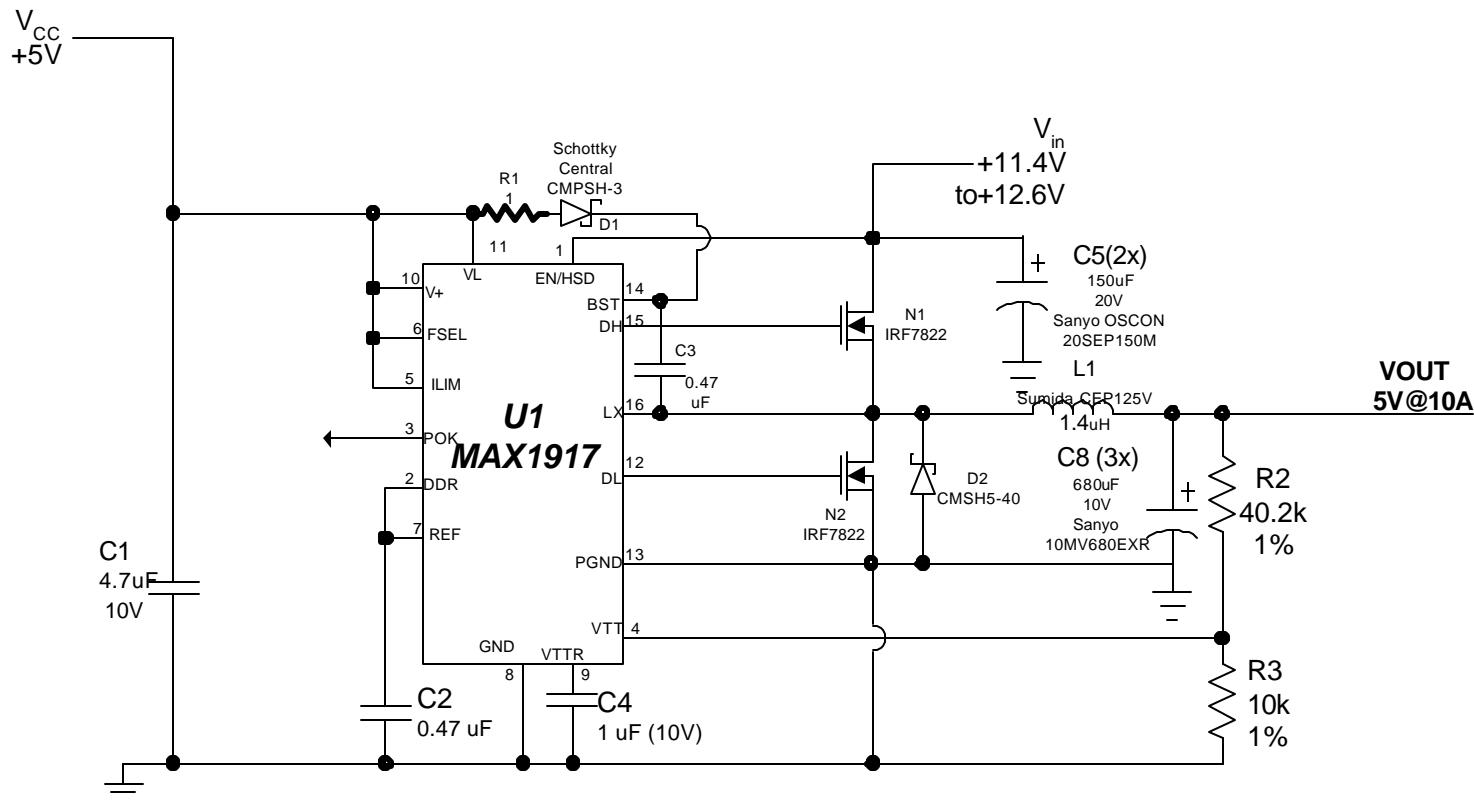
Servers

Input: +11.4V to +12.6V **Output:** 5V (+/-5%); Maximum load=10A

5/1/02 - Sudha Durvasula

+11.4V - +12.6V to 5V @10 A. This uses the MAX1917.

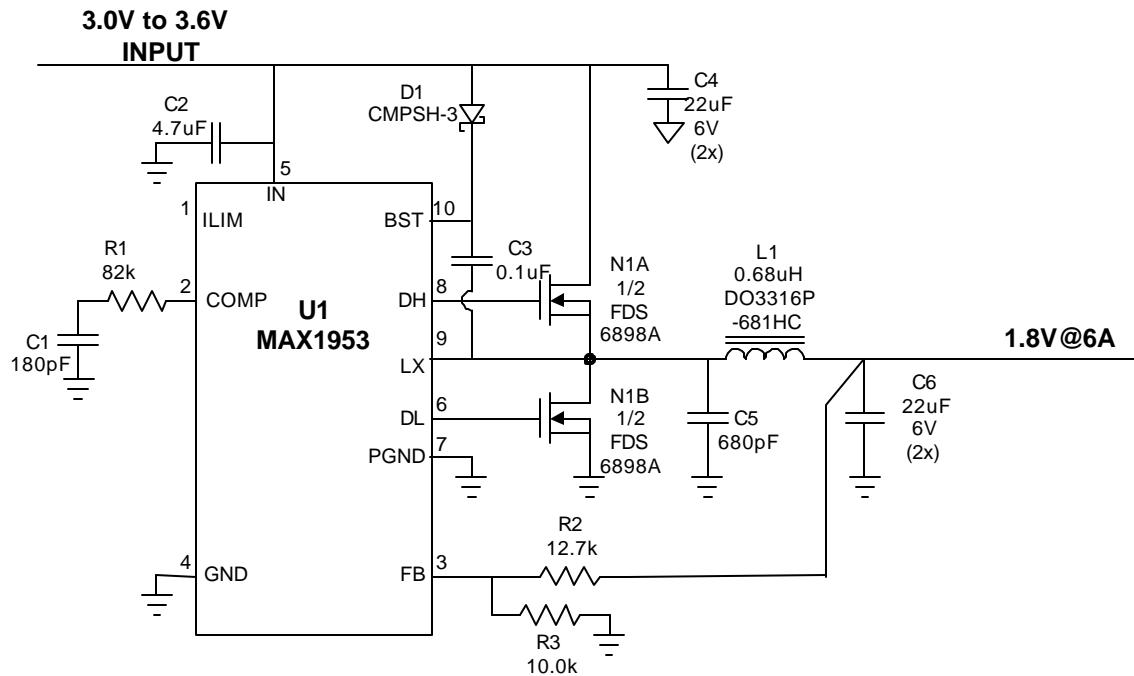
This circuit has not been tested.



Bill of Materials:

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7 μ F 10V ceramic capacitors TAIYO YUDEN LMK316BJ475ML
C2, C3	2	0.47 μ F ceramic capacitor (0805)
C4	1	1 μ F 10V ceramic capacitors TAIYO YUDEN LMK212BJ105MG
C5	2	150 μ F 20V organic semiconductor capacitors Sanyo 20SEP150M
C8	3	680 μ F 10V aluminum electrolytic capacitors Sanyo 10MV680EXR
D1	1	100 mA 30V Schottky diode Central Semiconductor CMPSH-3
D2	1	5A Schottky diode Central Semiconductor CMPSH5-40
L1	1	1.4 μ H (20.8A) Inductor Sumida CEP125V-1R4
N1, N2	2	N-channel MOSFET, 20V ($R_{DS(ON)}=5m\Omega$ @ $V_{GS}=4.5V$) International Rectifier IRF7822
R1	1	1 Ω , 5% resistor (0805)
R2	1	40.2 k Ω , 1% resistor (0805)
R3	1	10 k Ω , 1% resistor (0805)
U1	1	MAX1917EEE (16 pin QSOP)

Base Station



1953_1b8
RWY
3/28/02

MAXIM CONFIDENTIAL

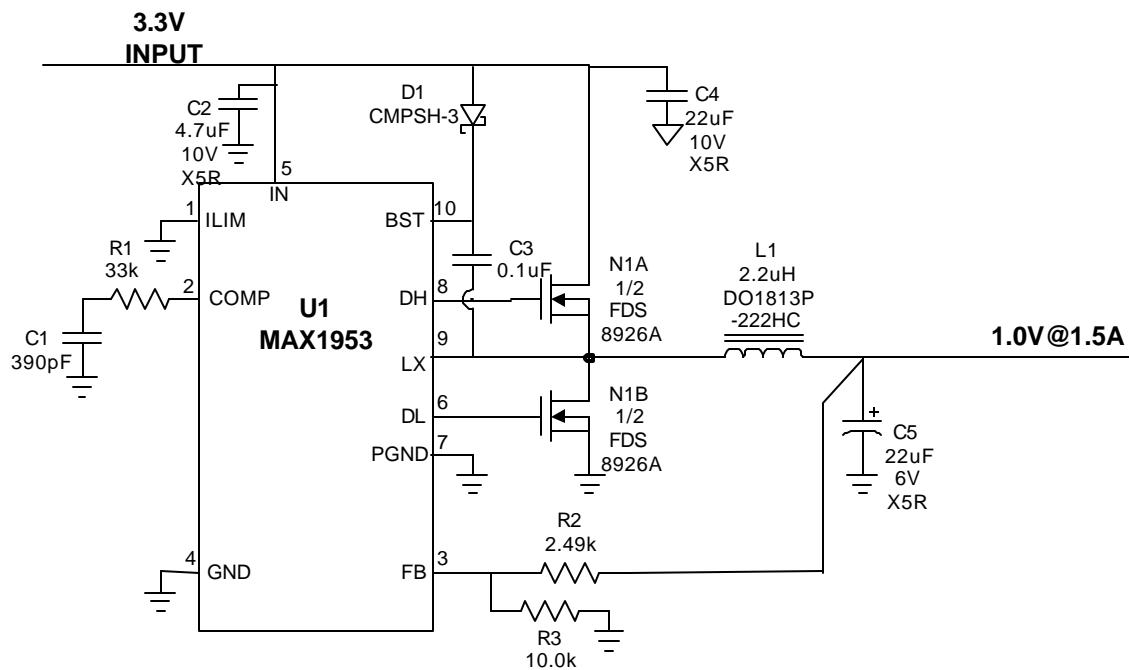
Vin	Iin	Vout	Iout	Efficiency
3.3050	0.029	1.8053	0	
2.9930	4.038	1.8018	6.006	0.895
3.3126	3.645	1.8022	6.007	0.896
3.6073	3.346	1.8016	6.007	0.896
		20mVpp		

BILL OF MATERIALS**3.0V to 3.6V Input****1.8V @ 6A Output****3/28/02**

1953_1b8

DESIGNATION	QTY	DESCRIPTION
C1	1	180pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	4	22uF 6V ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MN
C5	1	680pF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	0.68uH 13A Inductor Coilcraft DO3316P-681HC
N1	1	18m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6898A
R1	1	82k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Ink jet printer



1953_1v

RWY

4/15/02

MAXIM CONFIDENTIAL

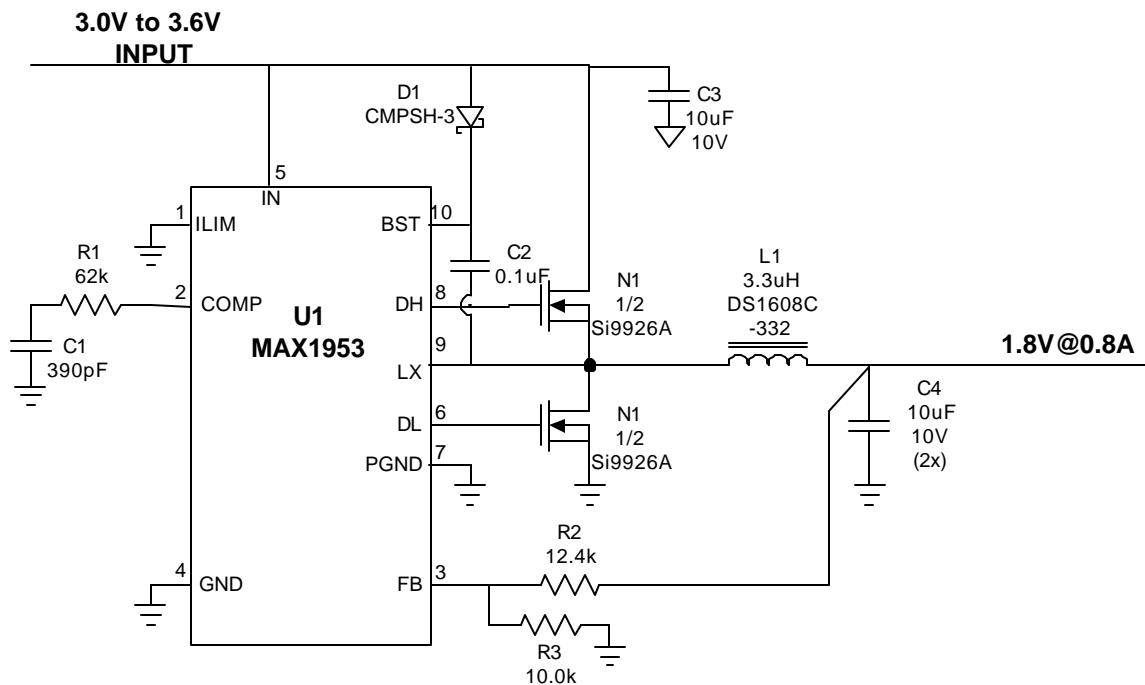
This circuit has not been built and some tweaking may be necessary.

BILL OF MATERIALS
3.3V Input
1.0V @ 1.5A Output
4/15/02

1953_1v

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4	1	22uF 10VX5R ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C5	1	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MN
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	2.2uH 3.5A Power Inductor Coilcraft DO1813P-222HC
N1	1	38m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	33k Ohm 5% resistor (0603)
R2	1	2.49k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

LAN access point



1953_1v8
RWY
12/21/01

MAXIM CONFIDENTIAL

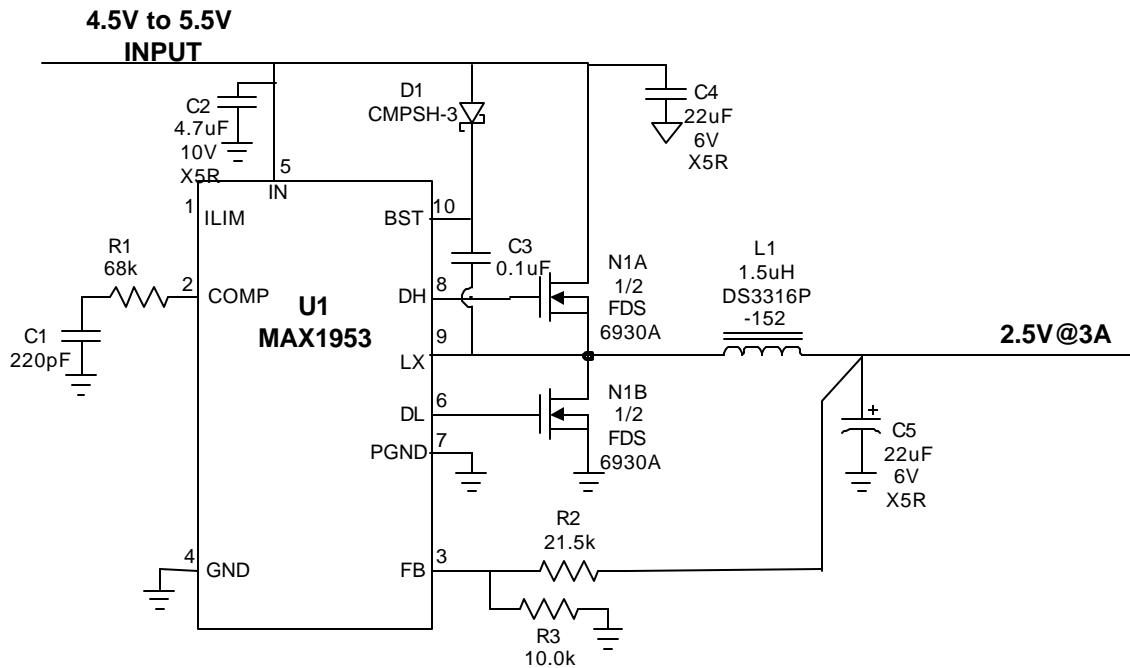
This circuit has not been built and some tweaking may be necessary.

BILL OF MATERIALS
3.0V to 3.6V Input
1.8V @ 0.8A Output
12/21/01

1953_1v8

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	0.1uF ceramic capacitor (0603)
C3,C4	3	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
D1	1	3.1A 30V Schottky diode Nihon EC31QS03L
L1	1	3.3uH 1.2A Inductor Coilcraft DS1608C-332
N1	1	40m Ohm 20V Dual N-ch MOSFET (SO-8) Siliconix Si9926ADY
R1	1	62k Ohm 5% resistor (0603)
R2	1	12.4k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Network card



1953_2d5
RWY
4/30/02

MAXIM CONFIDENTIAL

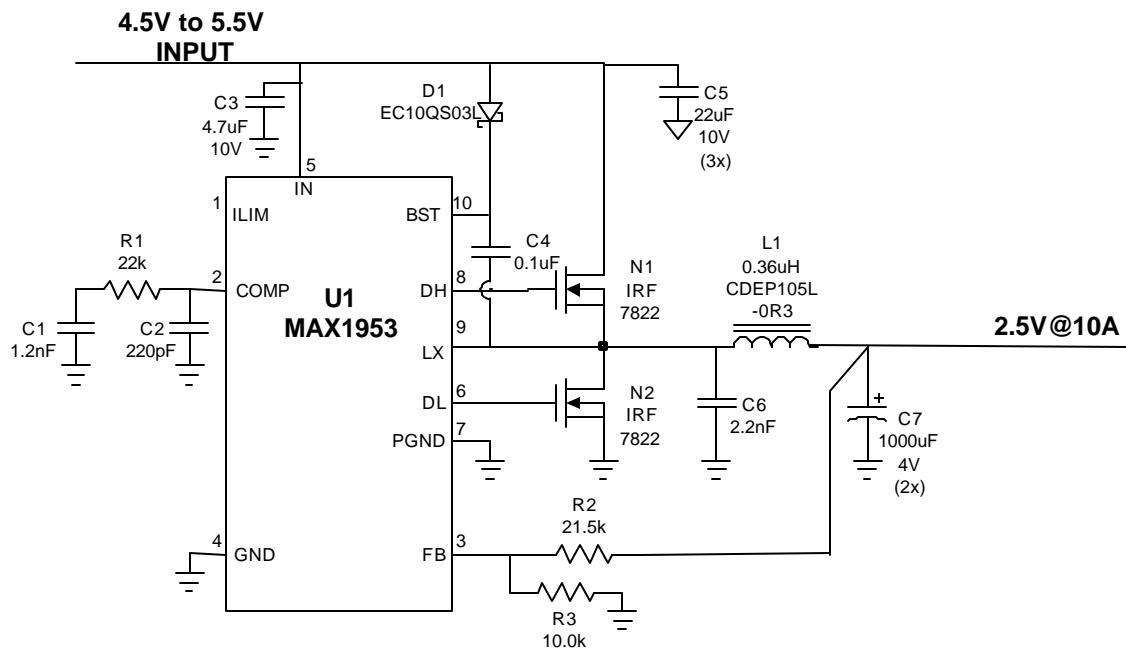
Vin	Iin	Vout	Iout	Efficiency
5.0037	0.016	2.4720		
4.4966	1.855	2.4674	3.014	0.891
5.0040	1.666	2.4637	3.014	0.890
5.507	1.514	2.4603	3.014	0.889
		14mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****2.5V @ 3A Output****5/01/02**

1953_2d5

DESIGNATION	QTY	DESCRIPTION
C1	1	220pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C5	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1.5uH 5A Power Inductor Coilcraft DS3316P-152
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6930A
R1	1	68k Ohm 5% resistor (0603)
R2	1	21.5k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Desktop/Server



1953_2v5

RWY

2/26/02

MAXIM CONFIDENTIAL

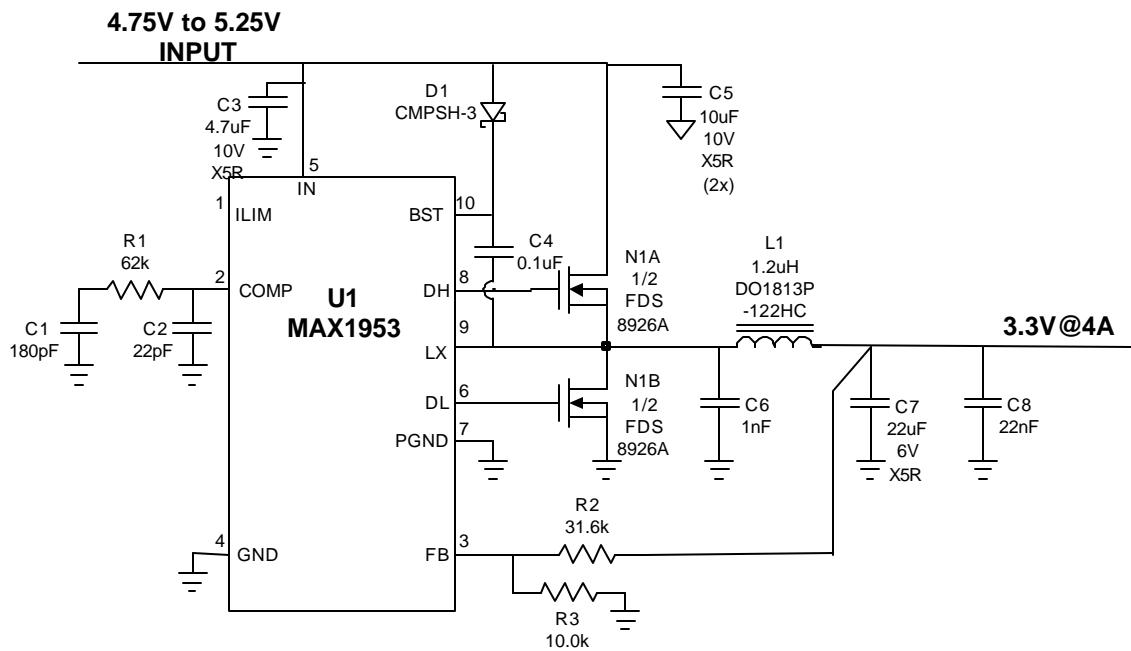
Vin	Iin	Vout	Iout	Efficiency
5.0005	0.084	2.5210	0	
4.5000	6.234	2.5265	10.0	0.900
4.9955	5.633	2.5255	10.0	0.897
5.512	5.115	2.5204	10.0	0.894
		65mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****2.5V @ 10A Output****2/26/02**

1953_2v5

DESIGNATION	QTY	DESCRIPTION
C1	1	1.2nF ceramic capacitor (0603)
C2	1	220pF ceramic capacitor (0603)
C3	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF ceramic capacitor (0603)
C5	3	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C6	1	2.2nF ceramic capacitor (0603)
C7	2	1000uF 4V aluminum electrolytic capacitor Sanyo 4MV1000EXR
D1	1	1A 30V Schottky diode Nihon EC10QS03L
L1	1	0.36uH 12A Inductor Sumida CDEP105L-0R3
N1,N2	2	6.5m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7822
R1	1	22k Ohm 5% resistor (0603)
R2	1	21.5k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Base station



1953_3b3

RWY

4/17/02

MAXIM CONFIDENTIAL

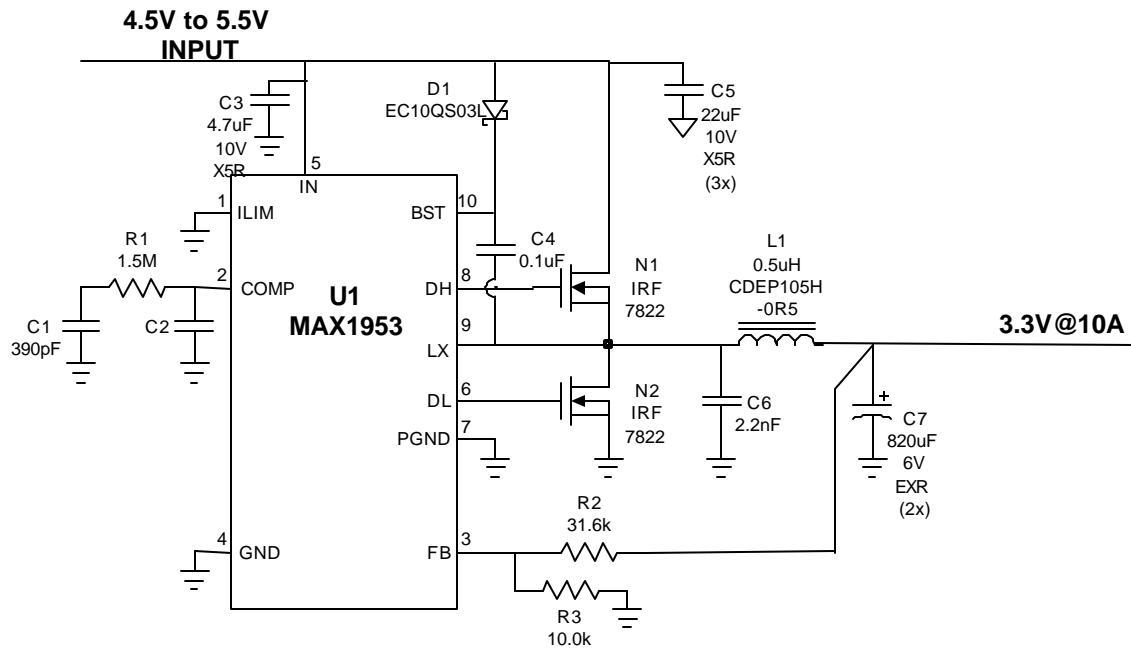
Vin	Iin	Vout	Iout	Efficiency
5.0002	0.044	3.3082	0	
4.4955	3.212	3.3023	4.00026	0.915
4.7476	3.041	3.2899	4.0027	0.912
5.0081	2.882	3.2813	4.0027	0.910
5.2502	2.752	3.2780	4.0027	0.908
5.501	2.630	3.2761	4.0027	0.906
		90mVpp		

BILL OF MATERIALS
4.75V to 5.25V Input
3.3V @ 4A Output
4/17/02

1953_3b3

DESIGNATION	QTY	DESCRIPTION
C1	1	180pF ceramic capacitor (0603)
C2	1	22pF ceramic capacitor (0603)
C3	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF ceramic capacitor (0603)
C5	2	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C6	1	1nF ceramic capacitor (0603)
C7	1	22uF 6V ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C8	1	22nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1.2uH 5A Inductor Coilcraft DO1813P-122HC
N1	1	38m Ohm 30V Dual MOSFET (SO-8) Fairchild FDS8926A
R1	1	62k Ohm 5% resistor (0603)
R2	1	31.6k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Base station



1953_3v3

RWY

3/12/02

MAXIM CONFIDENTIAL

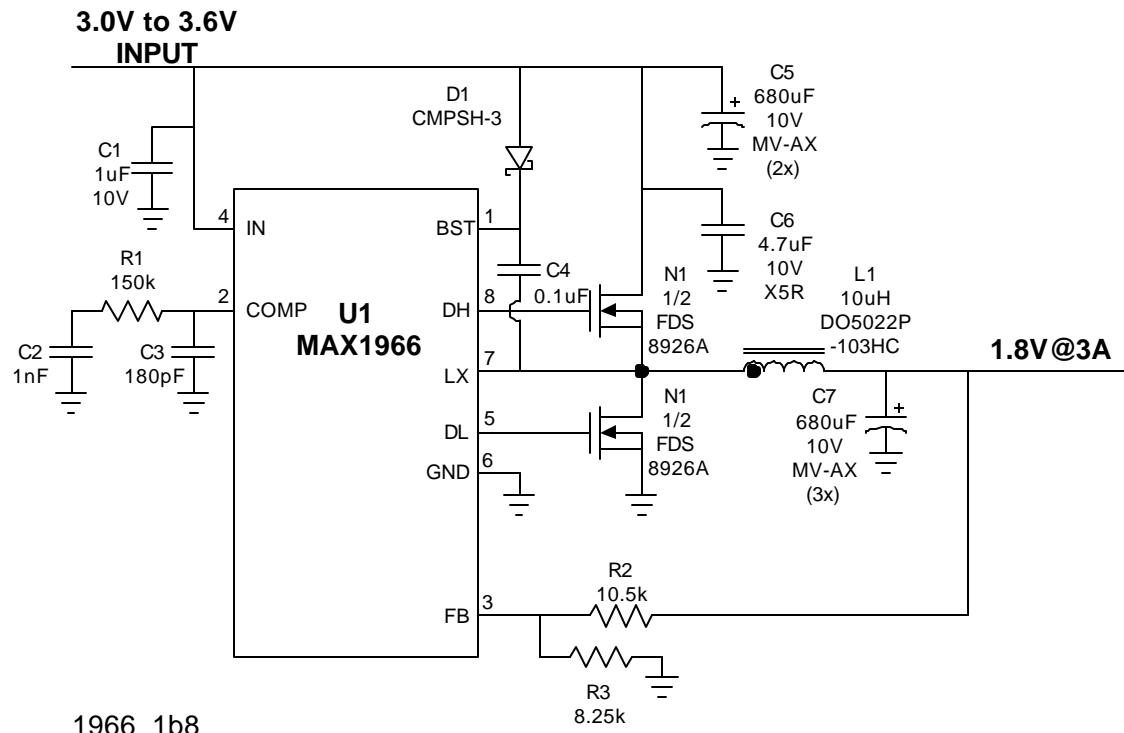
Vin	Iin	Vout	Iout	Efficiency
5.0044	0.088	3.119	0	
4.4845	7.979	3.3112	10.043	0.929
5.0020	7.172	3.3082	10.042	0.926
5.515	6.521	3.3040	10.042	0.922
		50mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****3.3V @ 10A Output****3/12/02**

1953_3v3

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	0	
C3	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF ceramic capacitor (0603)
C5	3	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C6	1	2.2nF ceramic capacitor (0603)
C7	2	820uF 6V aluminum electrolytic capacitor Sanyo 6MV820EXR
D1	1	1A 30V Schottky diode Nihon EC10QS03L
L1	1	0.5uH 12A Inductor Sumida CDEP105L-0R5
N1,N2	2	6.5m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7822
R1	1	1.5M Ohm 5% resistor (0603)
R2	1	31.6k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Set top box



Vin	Iin	Vout	Iout	Efficiency
3.3017	0.037	1.822	0	
2.9960	2.055	1.817	3	0.885
3.2942	1.872	1.818	3	0.884
3.6140	1.708	1.817	3	0.883
		25mVpp		

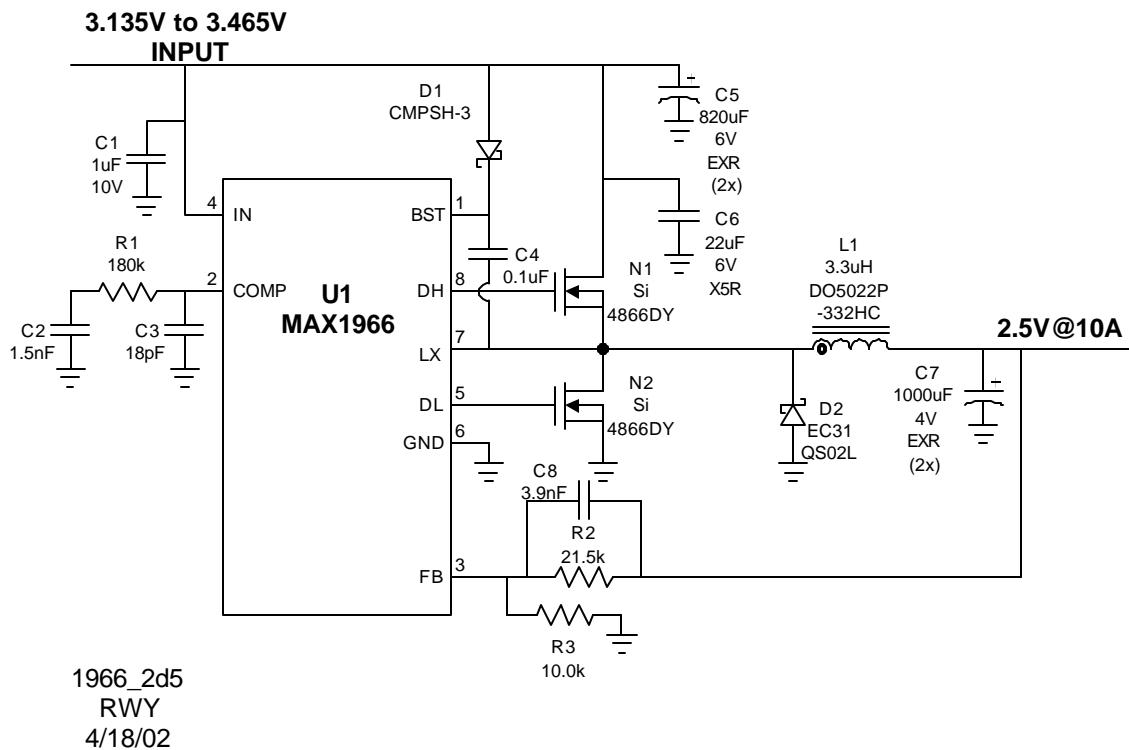
BILL OF MATERIALS**3.0V to 3.6V Input****1.8V @ 2A Output**

4/11/02

1966_1b8

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2	1	1nF ceramic capacitor (0603)
C3	1	180pF ceramic capacitor (0603)
C4	1	0.1uF ceramic capacitor (0603)
C5,C7	5	680uF 10V aluminum electrolytic capacitor Sanyo 10MV680AX
C6	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	10uH Power inductor Coilcraft DO5022P-103HC
N1		Dual N-channel MOSFET (SO-8) Fairchild FDS8926A
R1	1	150k Ohm 5% resistor (0603)
R2	1	10.5k Ohm 1% resistor (0603)
R3	1	8.25k Ohm 1% resistor (0603)
U1	1	MAX1966EUB (10-uMAX)

DDR RAM VDDQ Supply



Vin	Iin	Vout	Iout	Efficiency
3.3037	0.027	2.5208	0	
3.1030	8.833	2.5477	10.020	0.931
3.3027	8.336	2.5567	10.020	0.930
3.5023	7.892	2.5642	10.020	0.929
		50mVpp		

BILL OF MATERIALS
3.135V to 3.465V Input
2.5V @ 10A Output
4/18/02

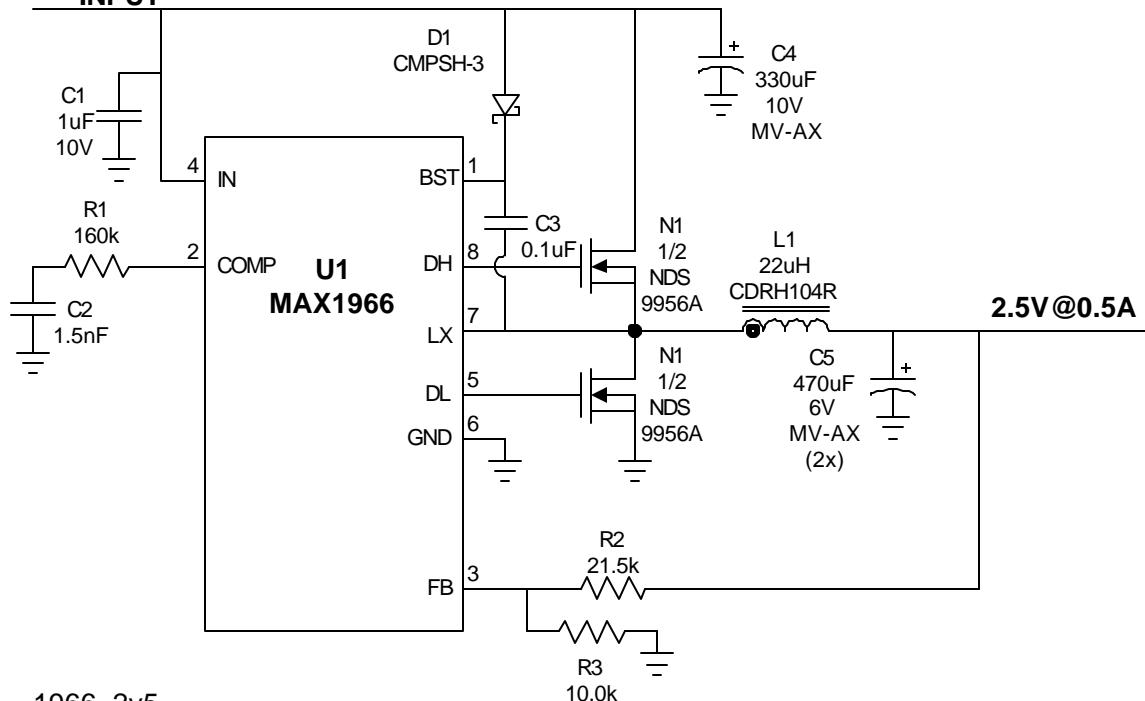
1966_2d5

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2	1	1.5nF ceramic capacitor (0805)
C3	1	18pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5	2	820uF 6V aluminum electrolytic capacitor Sanyo 6MV820EXR
C6	1	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C7	2	1000uF 4V aluminum electrolytic capacitor Sanyo 4MV1000EXR
C8	1	3.9nF ceramic capacitor (0805)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	3A 20V Schottky diode Nihon EC31QS02L
L1	1	3.3uH Power inductor Coilcraft DO5022P-332HC
N1,N2	2	8.5m Ohm N-channel MOSFET (SO-8) Siliconix Si4866DY
R1	1	180k Ohm 5% resistor (0805)
R2	1	21.5k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1966EUB (10-uMAX)

Line Card

4.5V to 5.5V

INPUT



1966_2v5

RWY

2/1/02

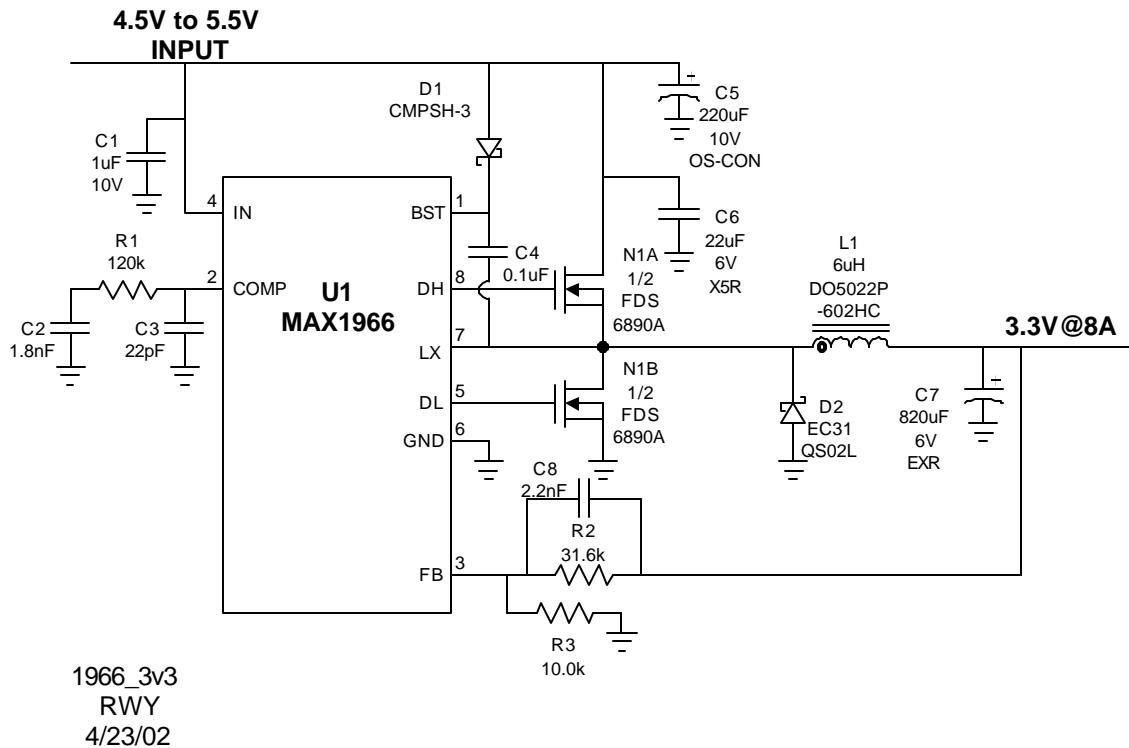
Vin	Iin	Vout	Iout	Efficiency
5.001	0.0056	2.5294	0	
4.484	0.2972	2.5201	0.5024	0.950
5.002	0.2671	2.5195	0.5024	0.947
5.519	0.2427	2.5188	0.5024	0.945
		50mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****2.5V @ 0.5A Output****2/1/02**

1966_2v5

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2	1	1.5nF ceramic capacitor (0805)
C3	1	0.1uF ceramic capacitor (0805)
C4	1	330uF 10V aluminum electrolytic capacitor Sanyo 10MV330AX
C5	1	470uF 6V aluminum electrolytic capacitor Sanyo 6MV470AX
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	22uH Power inductor Sumida CDRH104R-220
N1		Dual N-channel MOSFET (SO-8) Fairchild NDS9956A
R1	1	100k Ohm 5% resistor (0805)
R2	1	21.5k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1966EUB (10-uMAX)

Alphanumeric display



Vin	Iin	Vout	Iout	Efficiency
5.0056	0.027	3.3215	0	
4.4994	6.550	3.3063	8.009	0.898
4.9953	5.899	3.2981	8.009	0.896
5.510	5.346	3.2881	8.009	0.894
		60mVpp		

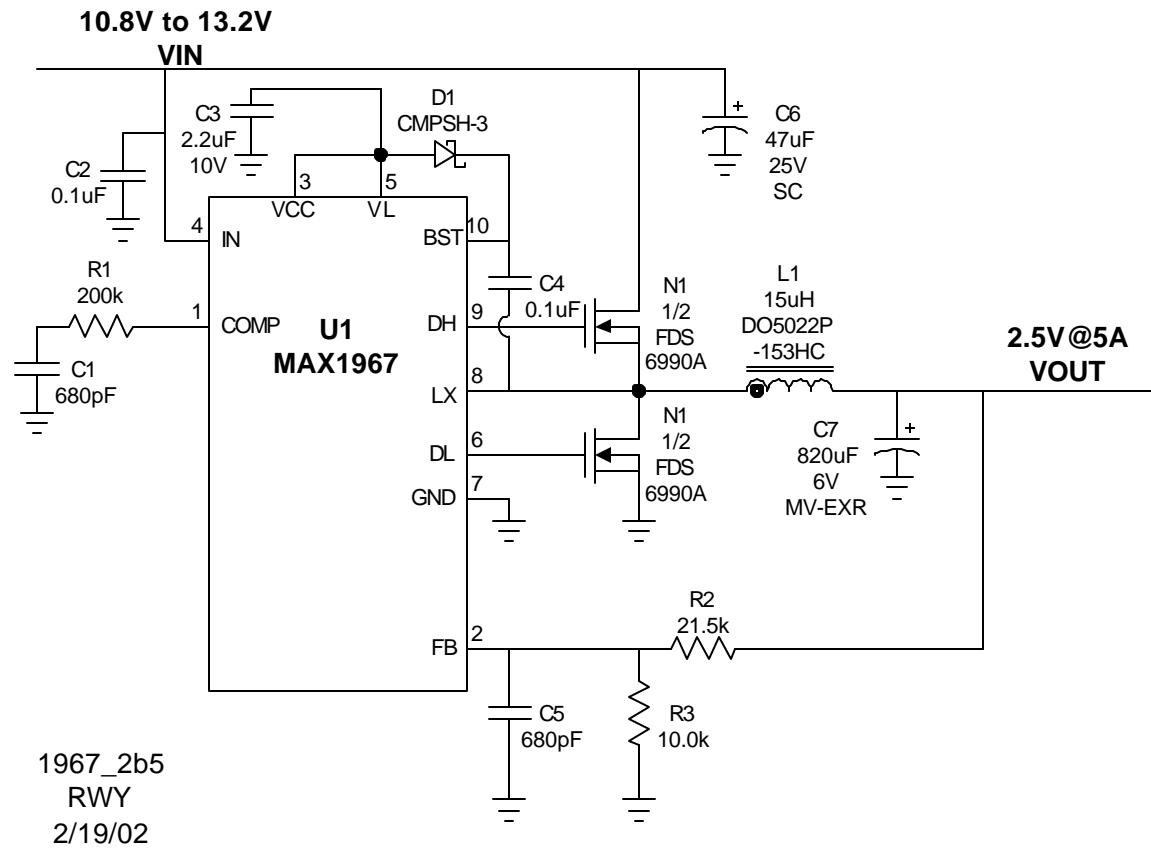
BILL OF MATERIALS**4.5V to 5.5V Input****3.3V @ 8A Output**

4/23/02

1966_3v3

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2	1	1.8nF ceramic capacitor (0805)
C3	1	22pF ceramic capacitor (0805)
C4	1	0.1uF ceramic capacitor (0805)
C5	1	220uF 10V organic semiconductor capacitor Sanyo 10SA220M
C6	1	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C7	1	820uF 6V aluminum electrolytic capacitor Sanyo 6MV820EXR
C8	1	2.2nF ceramic capacitor (0805)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	3A 20V Schottky diode Nihon EC31QS02L
L1	1	6uH Power inductor Coilcraft DO5022P-602HC
N1	1	18m Ohm Dual N-channel MOSFET (SO-8) Fairchild FDS6890A
R1	1	120k Ohm 5% resistor (0805)
R2	1	31.6k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1966EUB (10-uMAX)

Set top box



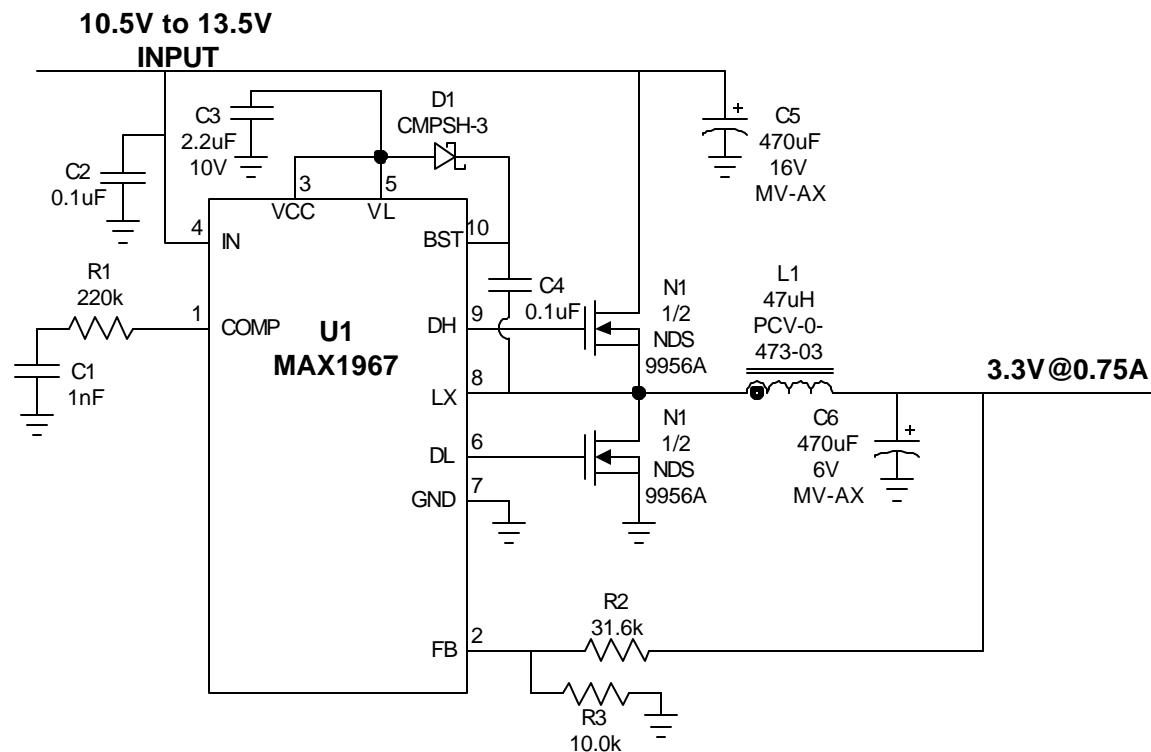
Vin	Iin	Vout	Iout	Efficiency
10.866	0.011	2.5246	0	
10.783	1.313	2.4630	5.0023	0.870
12.009	1.182	2.4588	5.0024	0.866
13.222	1.076	2.4555	5.0024	0.863
		50mVpp		

BILL OF MATERIALS**10.8V to 13.2V Input****2.5V @ 5A Output****2/19/02**

1967_2b5

DESIGNATION	QTY	DESCRIPTION
C1,C5	2	680pF ceramic capacitor (0805)
C2,C4	2	0.1uF ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C6	1	47uF 25V aluminum electrolytic capacitor Sanyo OS-CON 25SC47M
C7	1	820uF 6V aluminum electrolytic capacitor Sanyo 6MV820EXR
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	15uH 8A Power inductor Coilcraft DO5022P-153HC
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6990A
R1	1	200k Ohm 5% resistor (0805)
R2	1	21.5k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1967EUB (10-uMAX)

Cable modem



1967_3a3

RWY

1/29/02

Vin	Iin	Vout	Iout	Efficiency
10.48	0.0108	3.3380	0	
10.47	0.2578	3.3165	0.7510	0.923
12.00	0.2262	3.3121	0.7510	0.916
13.53	0.2018	3.3083	0.7509	0.910
		50mVpp		

BILL OF MATERIALS
10.5V to 13.5V Input
3.3V @ 0.75A Output
1/29/02

1967_3a3

DESIGNATION	QTY	DESCRIPTION
C1	1	1nF ceramic capacitor (0805)
C2,C4	2	0.1uF ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	1	470uF 16V aluminum electrolytic capacitor Sanyo 16MV470AX
C6	1	470uF 6V aluminum electrolytic capacitor Sanyo 6MV470AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	47uH 3A Power inductor Coilcraft PCV-0-473-03
N1	1	Dual N-channel MOSFET (SO-8) Fairchild NDS9956A
R1	1	220k Ohm 5% resistor (0805)
R2	1	31.6k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1967EUB (10-uMAX)

MAXIM

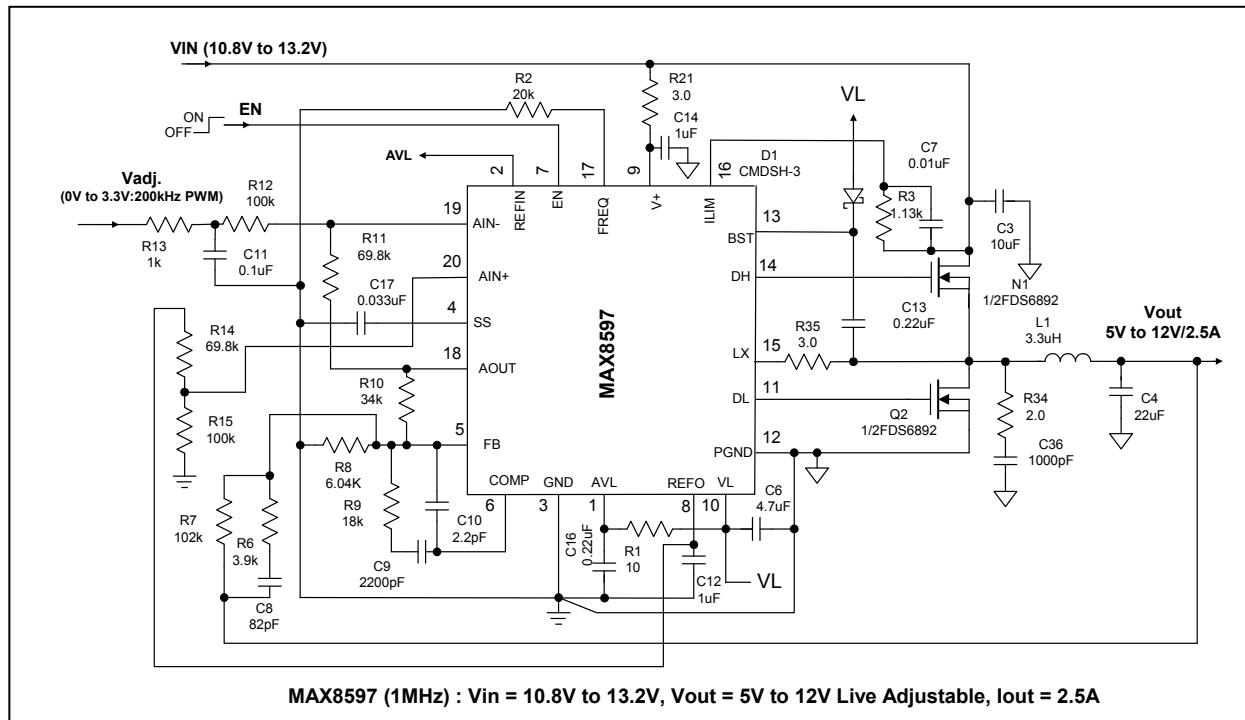
MAX8597 for Fan Control

Date: 12/23/2004

BOM REV: 1

SCHEMATIC REV: 1

BOARD REV: P1



MAX8597 BOM

DESIGNATION	QTY	DESCRIPTION
C3	1	10µF 35V X5R Ceramic Capacitor (1210) Taiyo Yuden GDK325BJ106KN Or Equivalent
C4	1	22µF 16V X5R Ceramic Capacitor (2220) TDK C3225X5R1C226MT Or Equivalent
C6	1	4.7µF 10% 6.3V X5R Ceramic Capacitor (0603) TDK C1608X5R0J475K Or Equivalent
C7	1	0.01µF 10% 25V X7R Ceramic Capacitor (0402) Murata GRP155R71E103K Or Equivalent
C8	1	82pF 5% 50V C0G Ceramic Capacitor (0402) TDK C1005C0G1H820J Or Equivalent
C9	1	2200pF 10% 25V X7R Ceramic Capacitor (0603) TDK C1608X7R1E222KT Or Equivalent

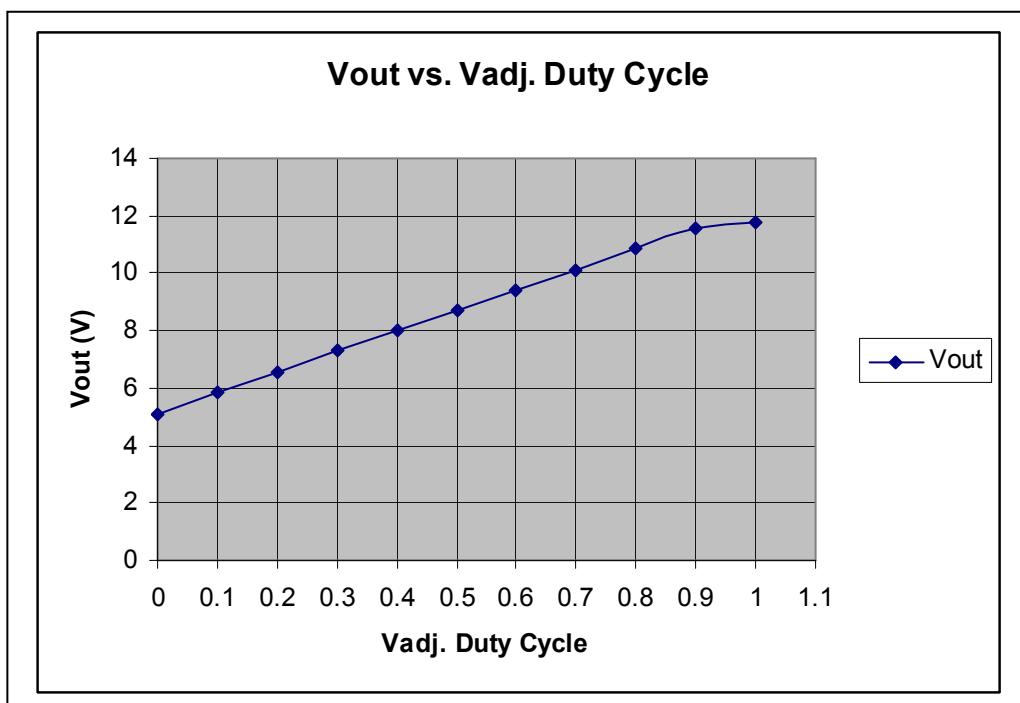
	C10	1	2.2pF 50V C0G Ceramic Capacitor (0402) Murata GJ61555C1H2R2C Or Equivalent
	C11	1	0.1μF 10% 25V X7R Ceramic Capacitor (0603) TDK C1608X7R1E104K Or Equivalent
	C12	1	1μF 10% 10V X7R Ceramic Capacitor (0603) TDK C1608X7R1A105K Or Equivalent
	C13, C16	2	0.22μF 10% 10V X7R Ceramic Capacitor (0603) Taiyo Yuden LMK107 BJ224KA Or Equivalent
	C14	1	1μF 20% 35V X7R Ceramic Capacitor (1206) Taiyo Yuden GMK316BJ105ML Or Equivalent
	C17	1	0.033μF 10% 16V X7R Ceramic Capacitor (0402) TDK C1005X7R1C333K Or Equivalent
	C36	1	1000pF 10% 50V X7R Ceramic Capacitor (0402) TDK C1005X71H102K Or Equivalent
	R1	1	10Ω 5% Resistor (0402)
	R2	1	20kΩ 1% Resistor (0402)
	R3	1	1.13kΩ 1% Resistor (0402)
	R6	1	3.9kΩ 5% Resistor (0402)
	R7	1	102kΩ 1% Resistor (0402)
	R8	1	6.04kΩ 1% Resistor (0402)
	R9	1	18kΩ 5% Resistor (0402)
	R10	1	34kΩ 1% Resistor (0402)
	R11, R14	2	69.8kΩ 1% Resistor (0402)
	R12, R15	2	100kΩ 1% Resistor (0402)
	R21	1	3Ω 5% Resistor (0805)
	R34	1	2Ω 5% Resistor (1206)
	R35	1	3Ω 5% Resistor (0402)
	D1	1	30V 100mA Schottky Diode (SOD-323) Central Semiconductor CMDSH-3
	N1/2	1	30V N-MOSFET (SO-8 Dual) Fairchild FDS6892
	L1		3.3μH 4.1A 17mΩ Inductor TDK: RLF7030T-3R3M4R1
	JU1, JU2	2	3-pin Header 36 PIN HEADER 0.01 CENTERS (COMES IN 36 PIN STRIPS, CUT TO FIT) SULLINS: PTC36SAAN
	See Table for Shunt Locations	2	Shunt
	U1	1	MAX8597ETP

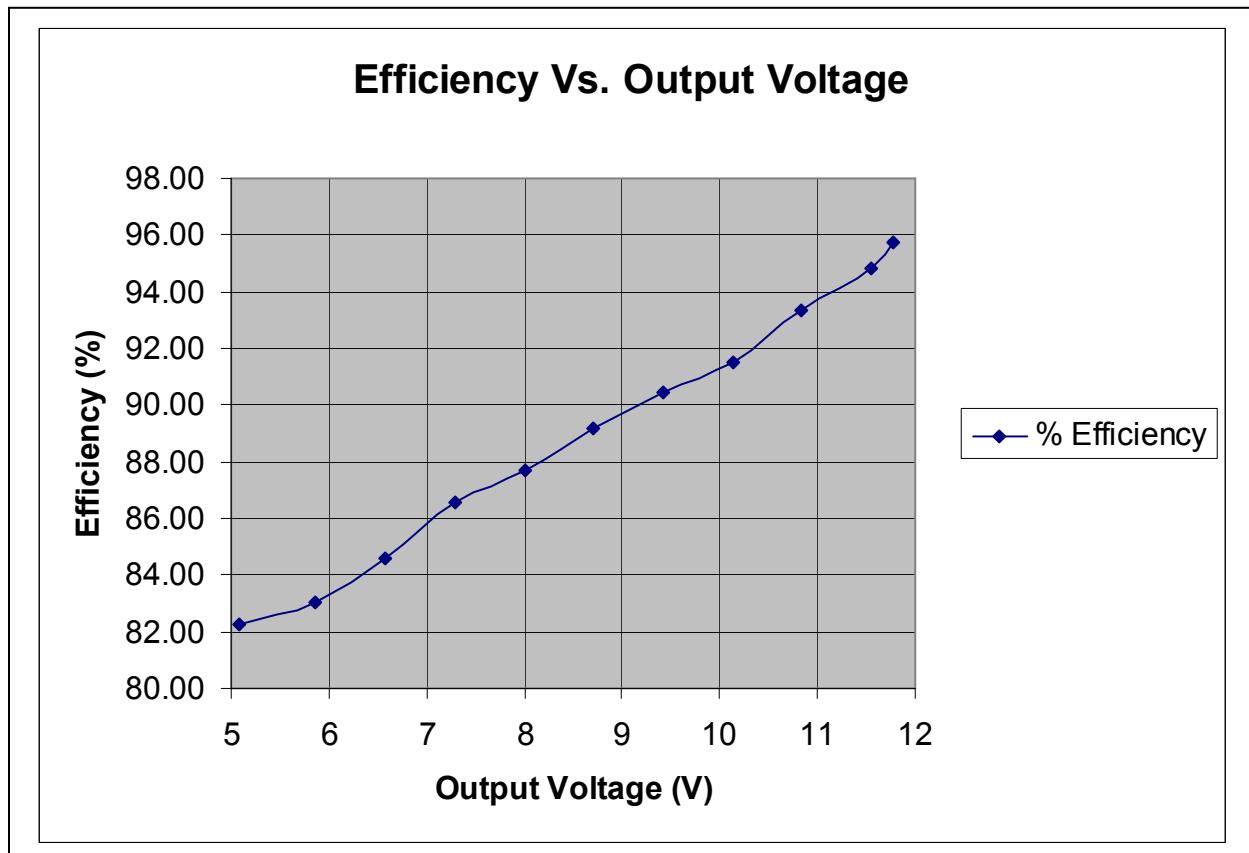
Note: R34 and C36 were moved to near FETs due to changing FETs' package to dual SO-8. R35 is added near pin 15 of MAX8597.

Test results:

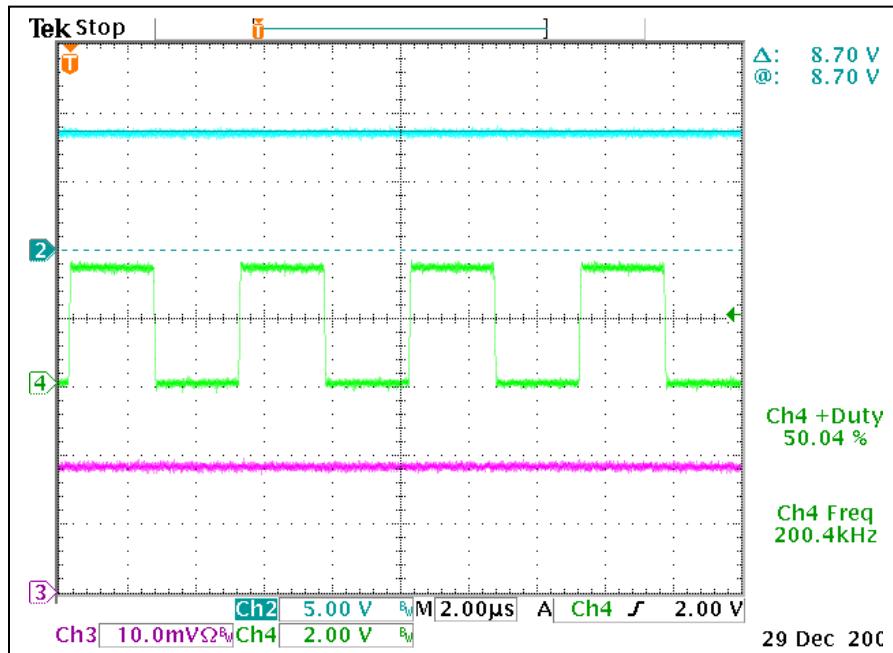
- 1) Output voltage and Efficiency for Vadj. from 0% to 100% duty cycle of 200kHz 3.3V with 4.8Ω load resistor.

Duty Cycle	Vout	% Efficiency	Vin	Iin
0	5.08	82.28	12.1	0.54
0.1	5.85	83.06	12.09	0.71
0.2	6.57	84.59	12.08	0.88
0.3	7.29	86.54	12.07	1.06
0.4	8	87.67	12.07	1.26
0.5	8.71	89.15	12.06	1.47
0.6	9.43	90.44	12.05	1.7
0.7	10.13	91.53	12.04	1.94
0.8	10.84	93.35	12.03	2.18
0.9	11.55	94.84	12.01	2.44
1	11.77	95.74	12.01	2.51





- 2) Figure 1 below shows typical waveforms of Vadj., Vout and Iout at ~50% Duty Cycle: Ch2 = Vout, CH4 = Vadj., CH3 = Iout at 1A/div



- 3) Below are waveforms taken when the output drives two 12V fans (Minebea model 4715KL-04W-B49 rated at 12Vdc, 0.9Adc, 120mm x 120mm x 38mm):

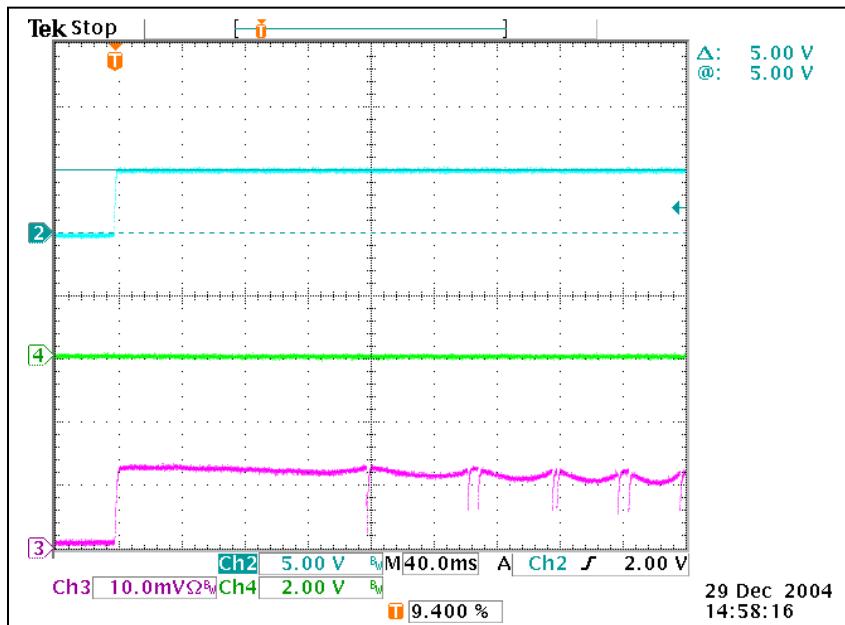


Figure 2: Start up at $V_{adj.} = 0\text{V}$, $V_{out} = 5\text{V}$. CH2 = V_{out} , CH4 = $V_{adj.}$, CH3 = Fans' Current at 1A/div. Fans were stop before start up.

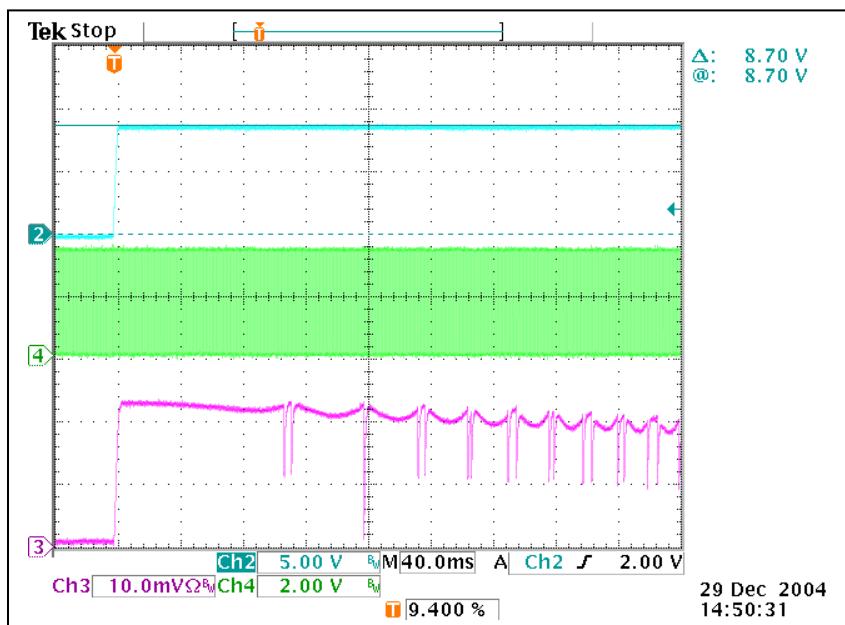


Figure3: Start up at $V_{adj.} = 50\%$ DC of 3.3V, 200kHz, $V_{out} \sim 8.7\text{V}$. CH2 = V_{out} , CH4 = $V_{adj.}$, CH3 = Fans' Current at 1A/div. Fans were stopped before start up.

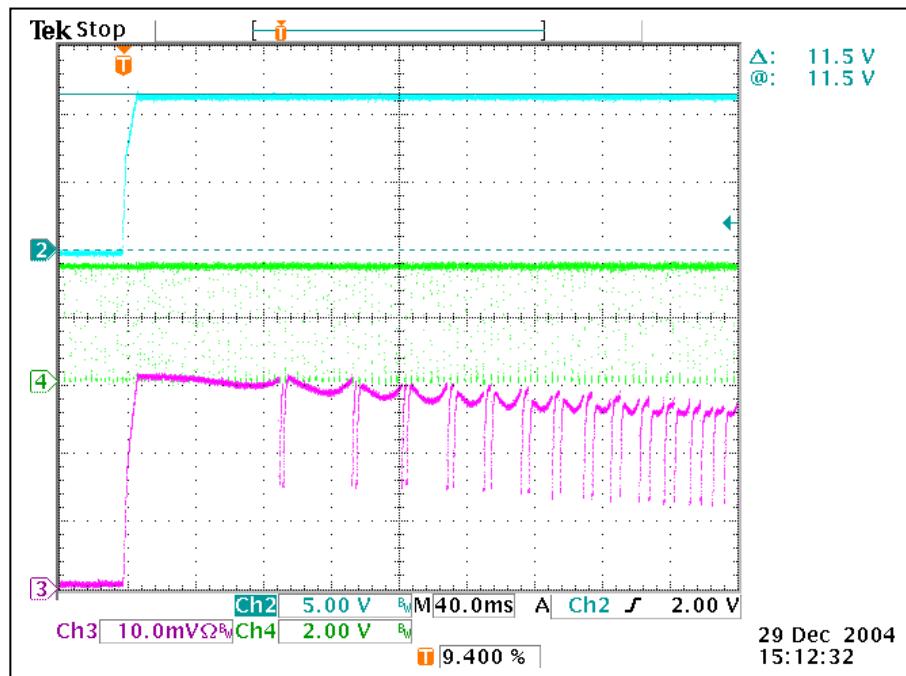


Figure 4: Start up at $V_{adj.} = 90\%$ D of 3.3V, 200kHz, $V_{out} \sim 11.5\text{V}$. CH2 = V_{out} , CH4 = $V_{adj.}$, CH3 = Fans' Current at 1A/div. Fans were stopped before start up.

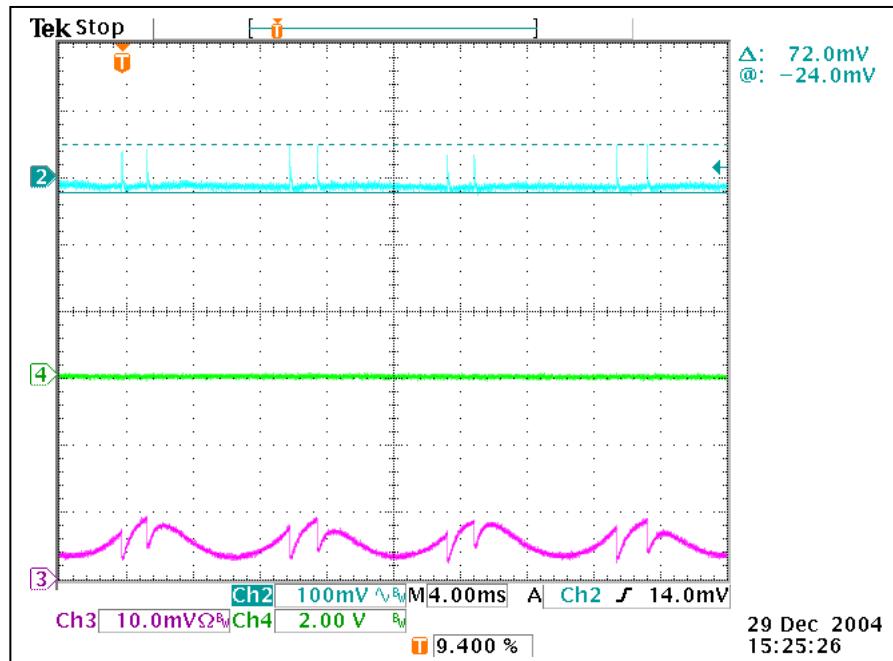
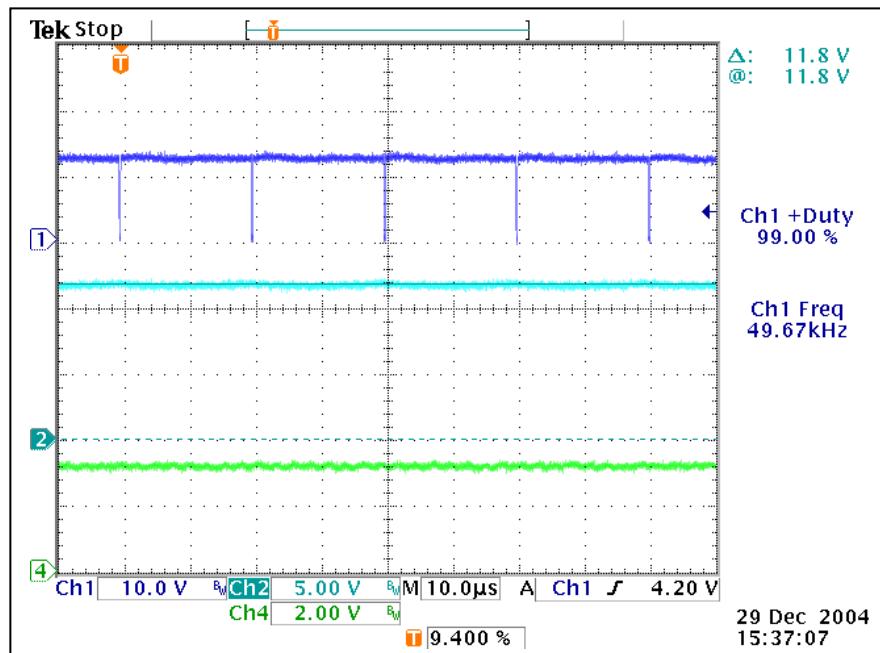
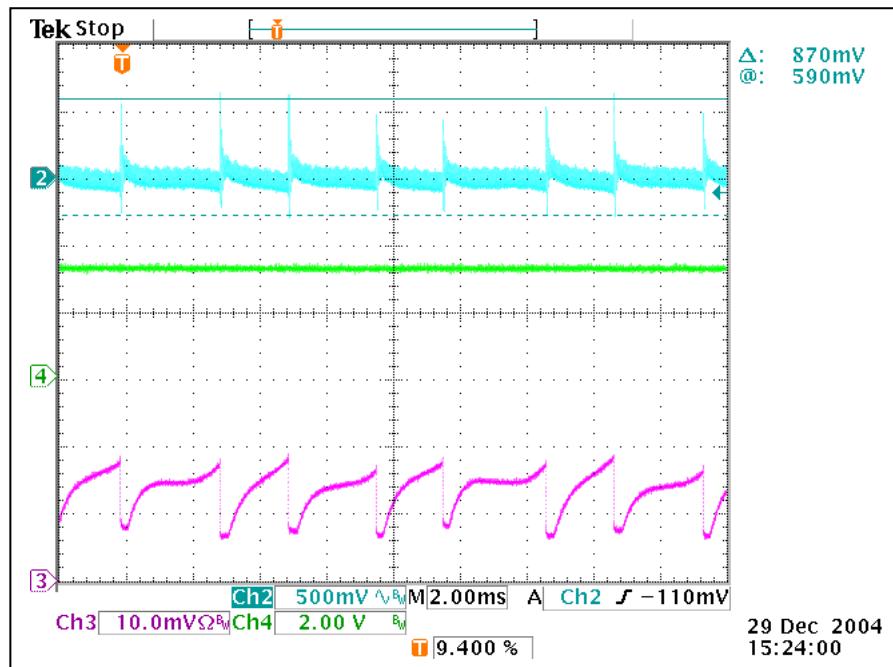
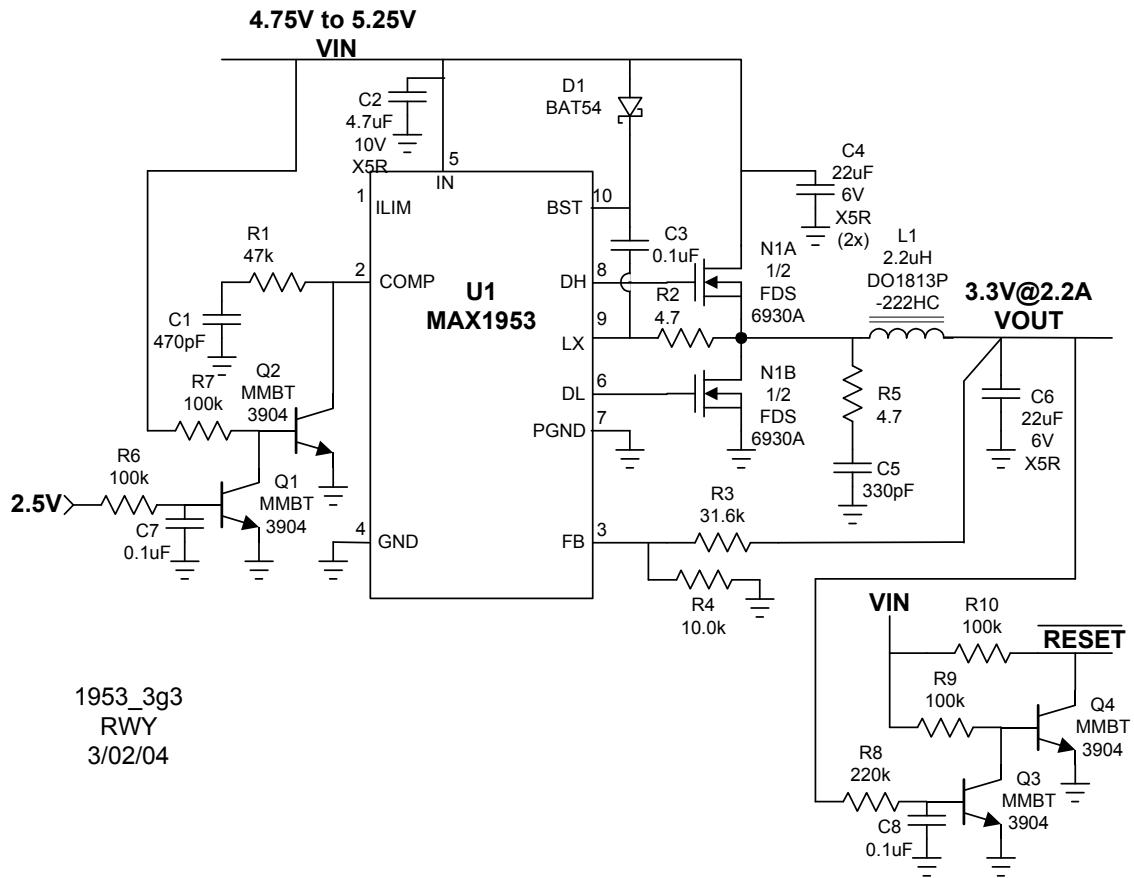


Figure 5: Output Ripple and Noise at $V_{adj.} = 0\%$. CH2 = V_{out} (AC couple), CH4 = $V_{adj.}$, CH3 = Fans' Current at 1A/div.





Vin	Iin	Vout	Iout	Efficiency
5.00	0.0`5	3.`94	0	
4.72	1.64	3.252	2.2	0.924
5.01	1.54	3.240	2.2	0.924
5.26	1.46	3.228	2.2	0.925
20MHz BW		<20mVpp		

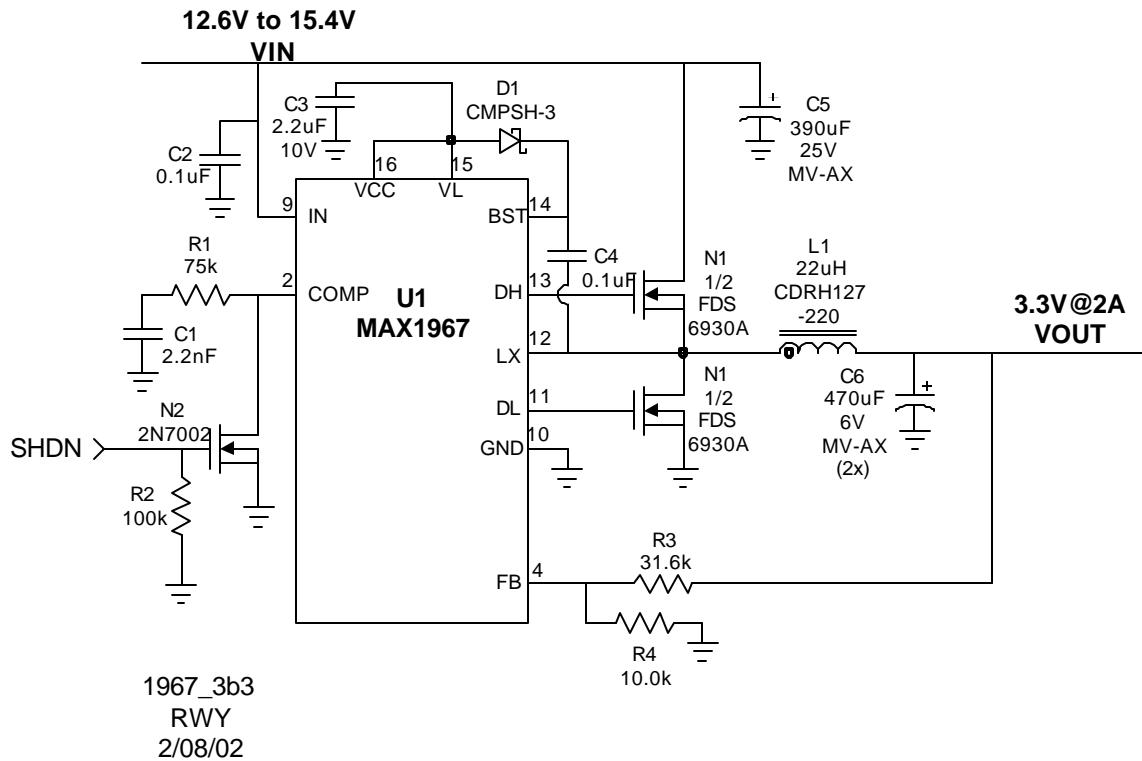
BILL OF MATERIALS**4.75V to 5.25V Input****3.3V @ 2.2A Output**

3/02/04

1953_3g3

DESIGNATION	QTY	DESCRIPTION
C1	1	470pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3,C7,C8	3	0.1uF ceramic capacitor (0603)
C4,C6	3	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	330pF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode BAT54
L1	1	2.2uH 3.5A Power Inductor Coilcraft DO1813P-222HC
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6930A
Q1,Q2,Q3,Q4	4	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	47k Ohm 5% resistor (0603)
R2,R5	1	4.7 Ohm 5% resistor (0603)
R3	1	31.6k Ohm 1% resistor (0603)
R4	1	10.0k Ohm 1% resistor (0603)
R6,R7,R9,R10	4	100k Ohm 5% resistor (0603)
R8	1	220k Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

DVD



Vin	Iin	Vout	Iout	Efficiency
14.033	0.0095	3.3207	0	
12.581	0.5720	3.2706	2.001	0.909
14.002	0.5155	3.2714	2.001	0.907
15.422	0.4697	3.2735	2.001	0.904
		50mVpp		

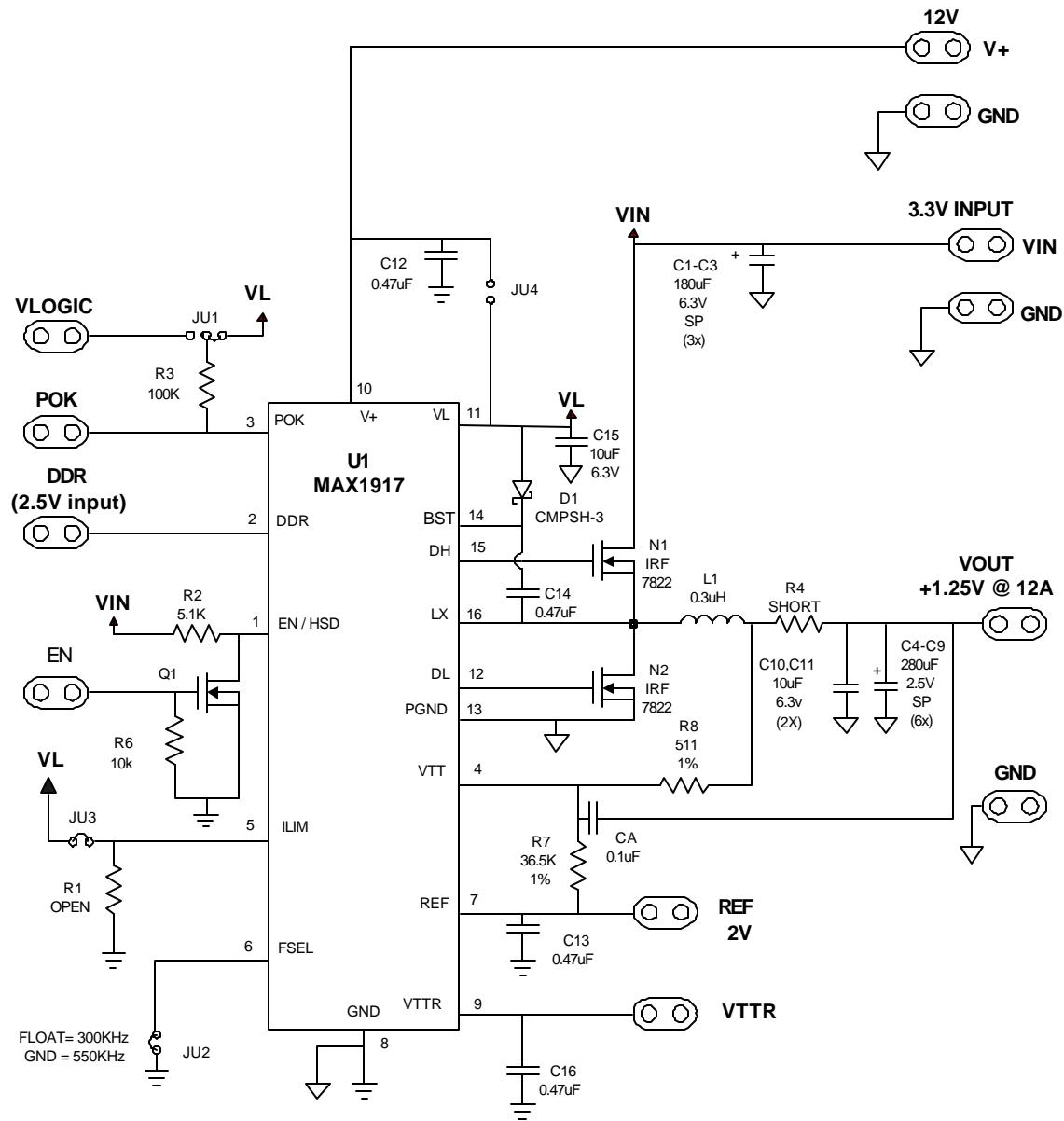
BILL OF MATERIALS**12.6V to 15.4V Input****3.3V @ 2A Output****2/08/02**

1967_3b3

DESIGNATION	QTY	DESCRIPTION
C1	1	3.9nF ceramic capacitor (0805)
C2,C4	2	0.1uF ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	1	390uF 25V aluminum electrolytic capacitor Sanyo 2MV390AX
C6	2	470uF 6V aluminum electrolytic capacitor Sanyo 6MV470AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	47uH 2A Power inductor Sumida CDRH127-470
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6930A
N2	1	2N7002 (SOT-23)
R1	1	75k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3	1	31.6k Ohm 1% resistor (0805)
R4	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1967EUB (10-uMAX)

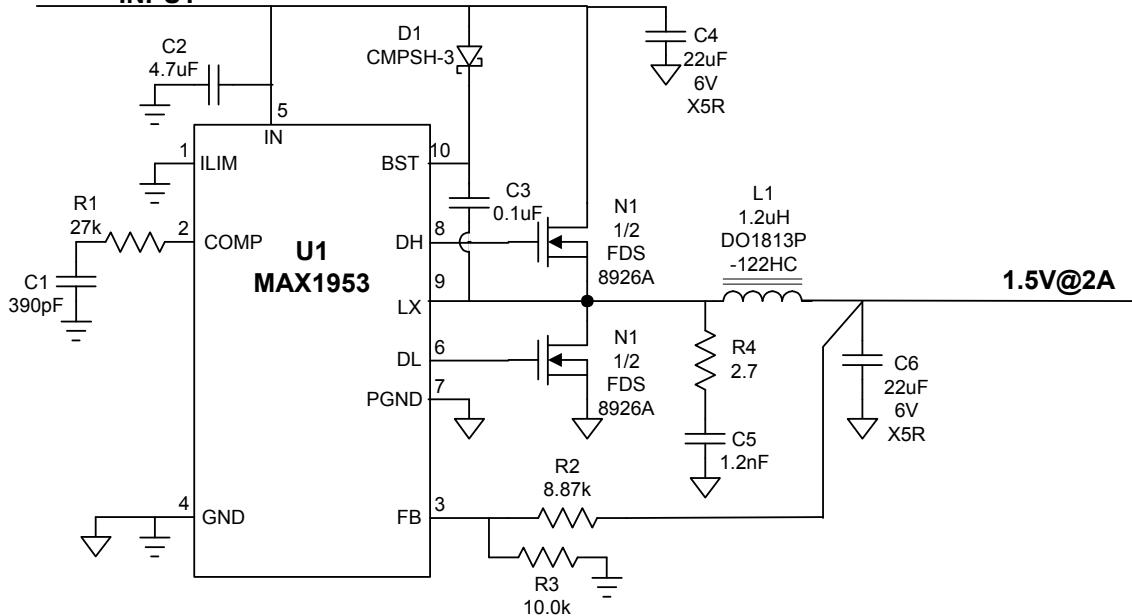
3.3V Input
1.25V @ 12A Output
04/18/02

DESIGNATION	QTY	DESCRIPTION
C4-C9	6	Cap 270 uF 2.5V SP Panasonic (EEFUE0E271XR)
C1-C3	3	Cap 180uF 6.3V SP Panasonic (EEFUE0J181XR)
C10,C11,C15	3	Cap 10uF 6.3V Ceramic X5R 1812, Taiyo Yuden (JMK212BJ106MG)
C13,C14,C16	3	Cap 0.47uF 10V Ceramic X5R 0603, Taiyo Yuden (LMK107BJ474KA)
C12	1	Cap 0.47uF 16V Ceramic X5R 0805, Taiyo Yuden (EMK212BJ474MG)
CA	1	Cap 0.1uF 16V Ceramic X7R 0603, Kemet (C0603C104K4RAC)
D1	1	Diode 30V 0.1A Schottky SOT-23, Centralsemi (CMPSH-3)
N1,N2	2	NFET 0.0065 Ohm 30V SO-8, International Rectifier (IRF7822)
R8	1	Resistor 511 Ohm 1% 0805
R2	1	Resistor 5.1k Ohm 5% 0805
R7	1	Resistor 36.5k Ohm 1% 0805
R3	1	Resistor 100k Ohm 5% 0805
L1	1	Inductor, 0.3uH Sumida (CDEP105-0R3NC-88)
U1	1	DDR Buss Terminator 16 QSOP, Maxim (MAX1917EEE)
OPTIONAL PARTS		
R6	1	Resistor 10k Ohm 5% 0805
Q1	1	NFET SOT-23 Central Semi (2N7002)



SM
04/18/02

3.0V to 3.6V
INPUT



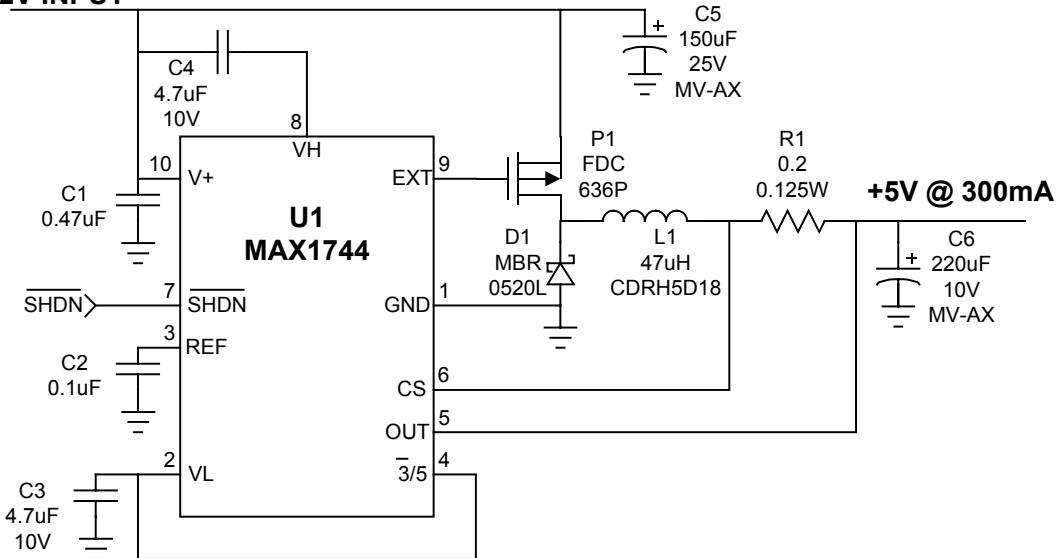
1953_1I5
RWY
9/30/03

Vin	Iin	Vout	Iout	Efficiency
3.299	0.030	1.5020	0	
2.998	1.14	1.5017	2.004	0.881
3.306	1.03	1.4980	2.004	0.882
3.611	0.95	1.4990	2.004	0.876
20MHz BW		<20mVpp		

BILL OF MATERIALS**3.0V to 3.6V Input****1.5V @ 2A Output****9/30/03**

1953_115

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	1.2uH 5.3A Inductor Coilcraft DO3316P-222HC
N1	1	38m Ohm 20V N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	27k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

12V INPUT

RWY
10/5/00

+12V into +5V @ 300mA

Notes:

C3,C4 Taiyo Yuden

C5,C6 Sanyo MV-AX series

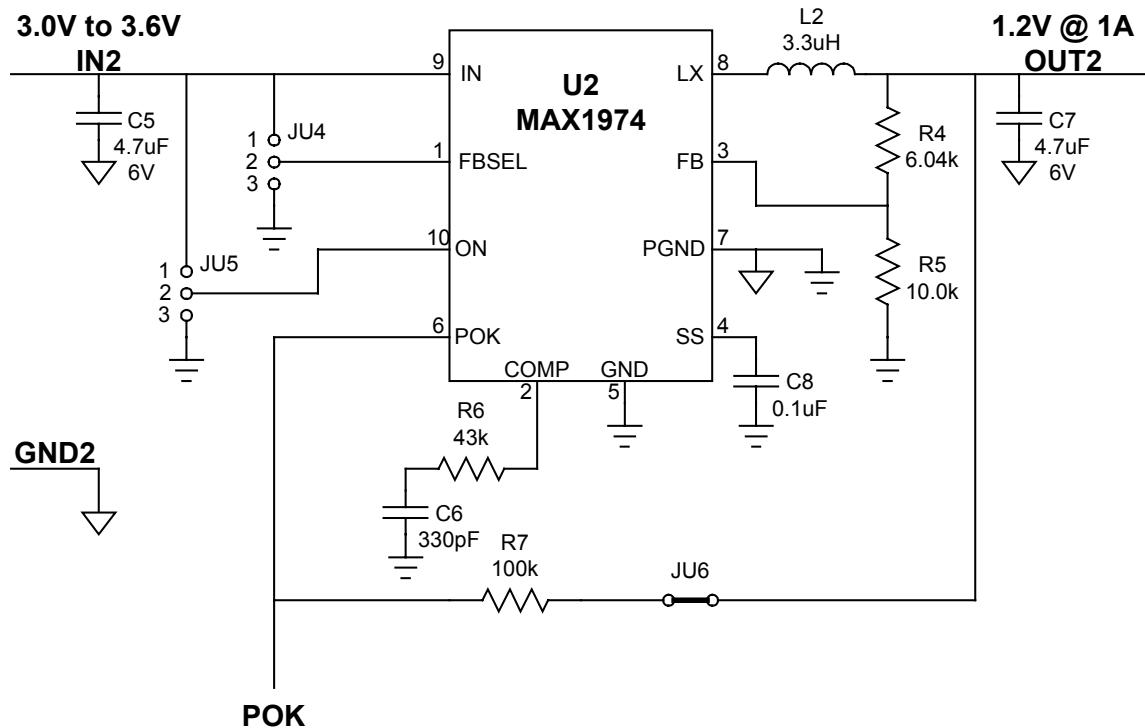
D1 ON Semiconductor (formerly Motorola)

L1 Sumida CDRH5D18 series

P1 Fairchild Semiconductor

U1 Maxim Integrated Products

This circuit operates at about 200kHz and has about 50mVp-p ripple.



1974_1v2
RWY
5/22/02

MAXIM CONFIDENTIAL

Vin	Iin	Vout	Iout	Efficiency
3.3013	0.005	1.2042	0	
2.9965	0.543	1.2034	1.000	0.739
3.3034	0.488	1.2034	1.000	0.746
3.6080	0.444	1.2035	1.000	0.751
		15mVpp		

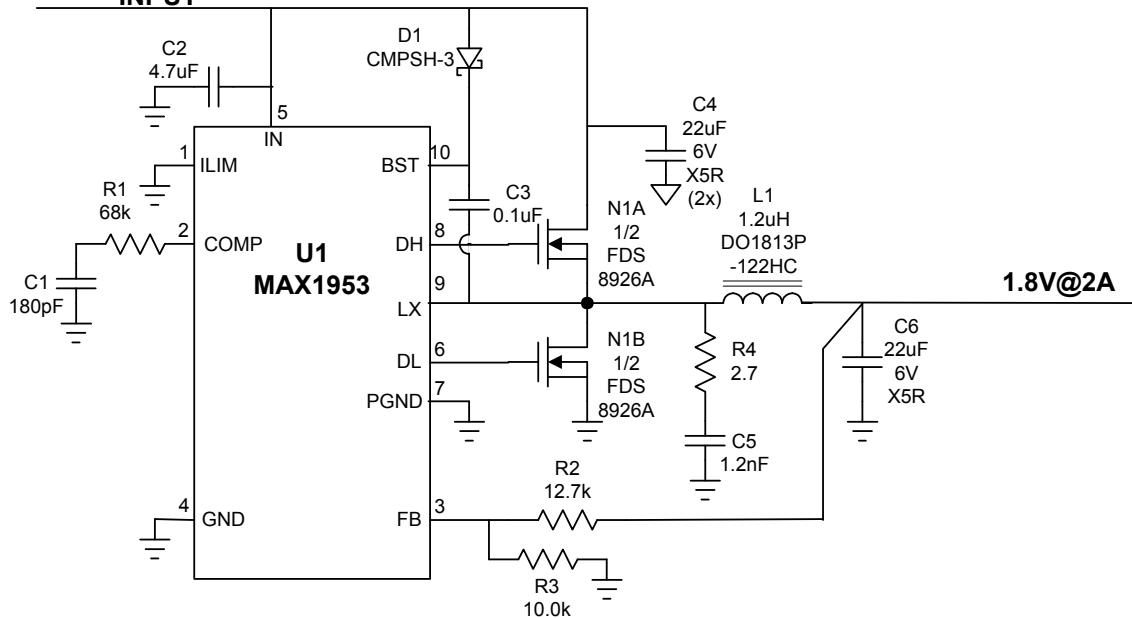
BILL OF MATERIALS**3.0V to 3.6V Input****1.2V @ 1A Output****5/22/01**

1974_1v2

DESIGNATION	QTY	DESCRIPTION
C5,C7	2	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475KG
C6	1	330pF ceramic capacitor (0603) Murata GRM39C0G331J050AD
C8	1	0.1uF 16V X7R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104KA
L2	1	3.3uH 1.1A Power inductor Sumida CDRH3D16-3R3
R4	1	6.04k Ohm 1% resistor (0603)
R5	1	10.0k Ohm 1% resistor (0603)
R6	1	100k Ohm 5% resistor (0603)
U2	1	MAX1974EUB (10-uMAX)

3.135V to 3.465V

INPUT



1953_1o8

RWY

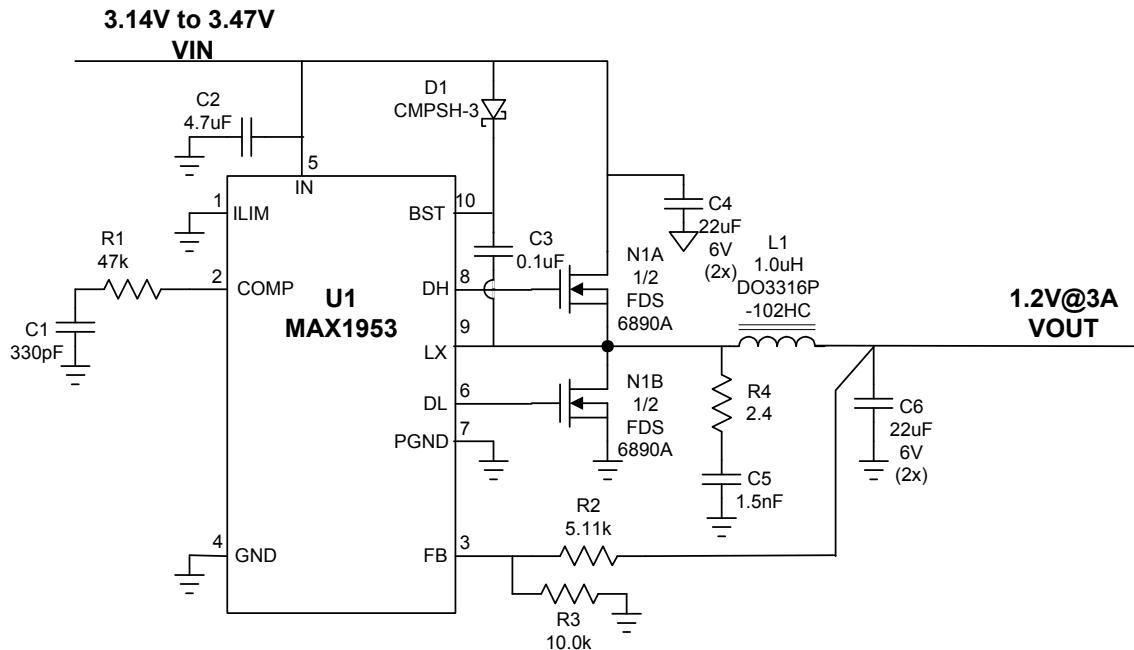
4/30/03

Vin	Iin	Vout	Iout	Efficiency
3.31	0.0324	1.817	0	
3.13	1.3123	1.815	2.006	0.886
3.32	1.2368	1.816	2.006	0.887
3.47	1.8159	1.816	2.006	0.885
20MHz BW		12mVpp		

BILL OF MATERIALS
3.135V to 3.465V Input
1.8V @ 2A Output
4/30/03

1953_1o8

DESIGNATION	QTY	DESCRIPTION
C1	1	180pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	3	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.25nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1.2uH Power Inductor Coilcraft DO1813P-122HC
N1	1	38m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	683k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)



1953_1g2
RWY
3/26/03

Vin	Iin	Vout	Iout	Efficiency
3.3096	0.0362	1.2049	0	
3.1373	1.3503	1.2029	3.0112	0.8550
3.2996	1.2848	1.2028	3.0113	0.8544
3.4745	1.2215	1.2029	3.0113	0.8535
20MHz BW		<10mVpp		

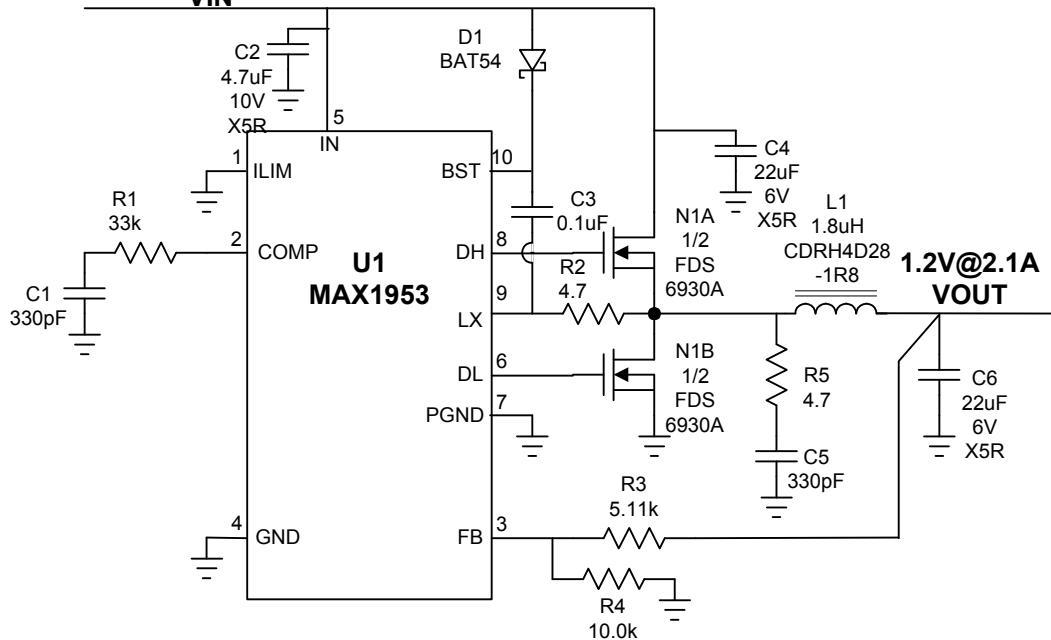
BILL OF MATERIALS**3.14V to 3.47V Input****1.2V @ 3A Output****3/26/02**

1953_1g2

DESIGNATION	QTY	DESCRIPTION
C1	1	330pF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1.0uH 11A Power Inductor Coilcraft DO3316P-102HC
N1	1	22m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6890A
R1	1	47k Ohm 5% resistor (0603)
R2	1	5.11k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.4 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)

4.75V to 5.25V

VIN



1953_1j2

RWY

3/2/04

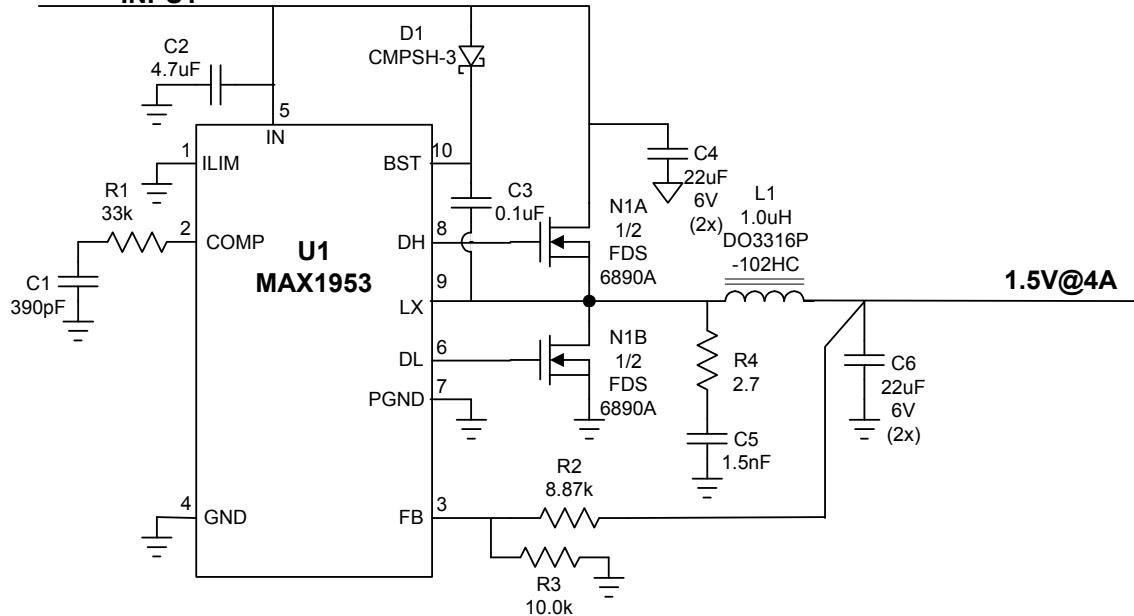
Vin	Iin	Vout	Iout	Efficiency
5.02	0.022	1.177	0	
4.74	0.64	1.190	2.1	0.824
5.03	0.60	1.186	2.1	0.825
5.27	0.58	1.182	2.1	0.812
20MHz BW		<20mVpp		

BILL OF MATERIALS**4.75V to 5.25V Input****1.2V @ 2.1A Output****3/2/04**

1953_1j2

DESIGNATION	QTY	DESCRIPTION
C1,C5	1	330pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
D1	1	100mA 30V Schottky diode BAT54
L1	1	1.8uH 2.2A Power Inductor Sumida CDRH4D28-1R8
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6930A
R1	1	33k Ohm 5% resistor (0603)
R2,R5	1	4.7 Ohm 5% resistor (0603)
R3	1	5.11k Ohm 1% resistor (0603)
R4	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

**4.5V to 5.5V
INPUT**



1953_1k5
RWY
8/11/03

Vin	Iin	Vout	Iout	Efficiency
5.00	0.05	1.506	0	
4.47	1.55	1.504	4	0.868
5.00	1.39	1.503	4	0.865
5.53	1.27	1.500	4	0.854
20MHz BW		<10mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****1.5V @ 4A Output****8/11/03**

1953_1k5

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK2126BJ475MG
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1uH Power Inductor Coilcraft DO3316P-102HC
N1	1	22m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6890A
R1	1	33k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)

MAX1939: AMD Athlon XP Mobile Processor Solution

MAX1939 is a dual-phase DC-DC switching regulator for the AMD AthlonTM Mobile processor. The MAX1939 can be evaluated using the MAX1938 EV kit. Although the board can support 60A of output current, the Athlon XP Mobile processors draw less than 30A of current. Furthermore efficiency is extremely important in the 10A to 30A operating range. In this experiment the existing 60A board has been optimized to obtain high efficiency in the 10A to 30A load range. The following document provides the input and output conditions, BOM, circuit schematic and the resulting efficiency.

Specifications:

Input: +6.5V to +20V;

Output: 1.5V; Maximum load=30A

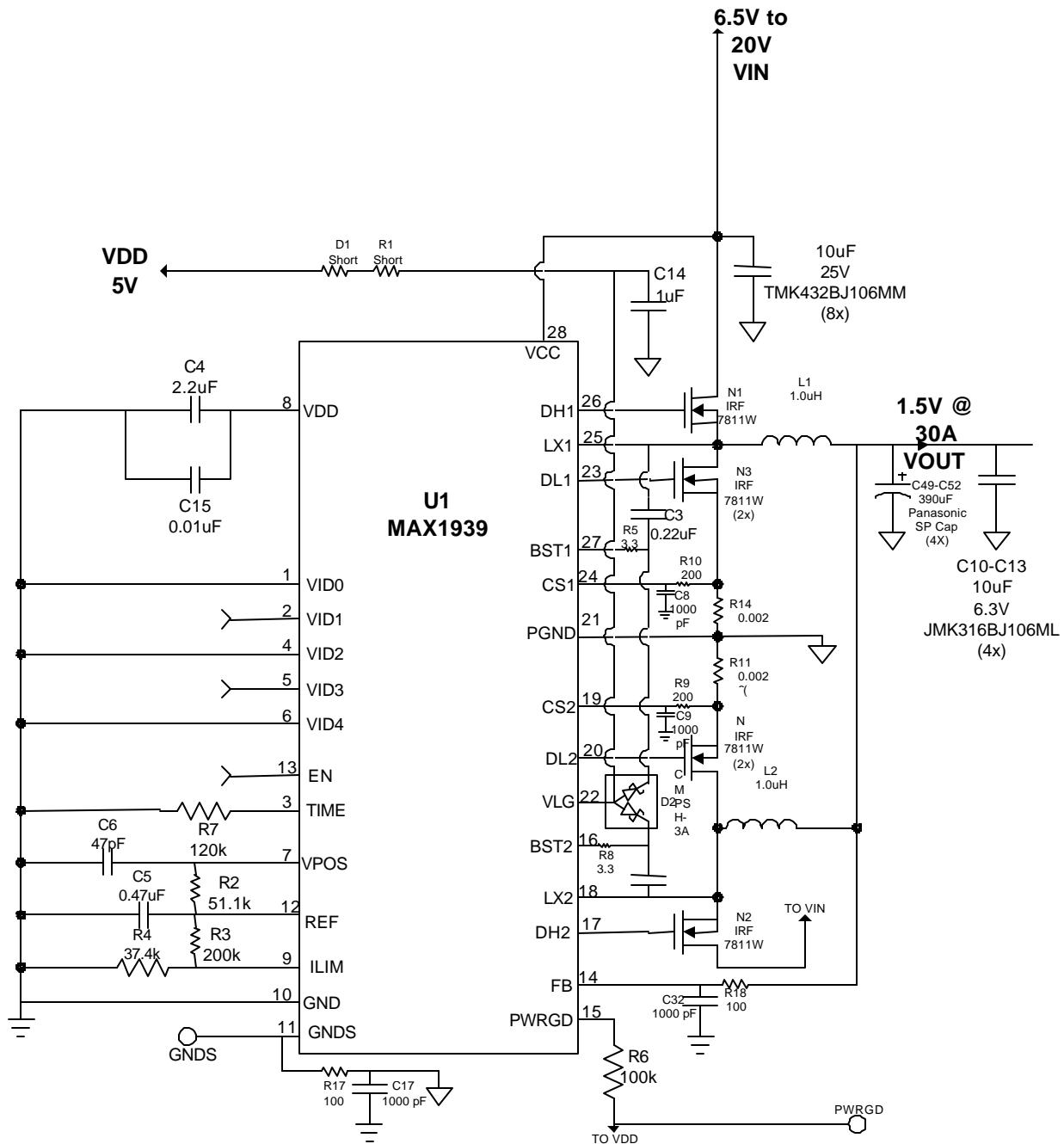
Bill of Materials:

DESIGNATION	QTY	DESCRIPTION
C3, C7	2	0.22 μ F, 10V ceramic capacitor X7R (0603) Taiyo Yuden LMK107BJ224KA
C4	1	2.2 μ F 10V ceramic capacitor X5R (0805) Taiyo Yuden LMK212BJ225KG
C5	1	0.47 μ F, 10V ceramic capacitor X5R (0603) Taiyo Yuden LMK107BJ474KA
C6	1	47 pF, 50V ceramic capacitors COG (0603) Murata GRM39COG470J050AD
C8, C9, C17, C32	4	1000 pF, 6.3V ceramic capacitors X7R (0603) Murata GRM39X7R102K
C10-C13	4	10 μ F, 6.3V ceramic capacitors (0805) Taiyo Yuden JMK212BJ106MG
C14	1	1 μ F, 10V ceramic capacitors X7R (0805) Taiyo Yuden LMK212BJ105MG
C15	1	0.01 μ F 50V ceramic capacitor X7R (0603) Murata GRM18X7R103K50V
C33,34,37,38,41,42, 45,46	8	10 μ F, 25V ceramic capacitors (1812) Taiyo Yuden TMK432BJ106MM
C49-C52	4	390 μ F, 2V Low ESR (10 m Ω) electrolytic capacitors Panasonic EEFUE0D391XR
D2	1	100 mA, 30V Schottky Dual diode Central Semiconductor CMPSH-3A
L1,L2	2	1.0 μ H Inductor Panasonic ETQP6F1R0BFA
N12, N14, N15, N16, N17, N18	6	N-channel MOSFETs, 30V ($R_{DS(ON)}$ = 9m Ω @ V_{GS} =4.5V) International Rectifier IRF7811W
R1,D1	2	0 ohm. Short.
R2	1	51.1 k Ω , 1% resistor
R3	1	200 k Ω , 1% resistor
R4	1	37.4 k Ω , 1% resistor
R5, R8	2	3.3 Ω , 5% resistor
R6	1	100 k Ω , 5% resistor
R7	1	120 k Ω , 5% resistor
R9, R10	2	200 Ω , 5% resistor
R11, R14	2	2 m Ω , 1% sense resistor 1W (2512) Panasonic ERJM1WTF2M0U
R17, R18	1	100 Ω , 5% resistor
U1	1	MAX1939EEI (28 pin QSOP)

Vripple=20mV

TM Athlon is the Trademark of Advanced Micro Devices

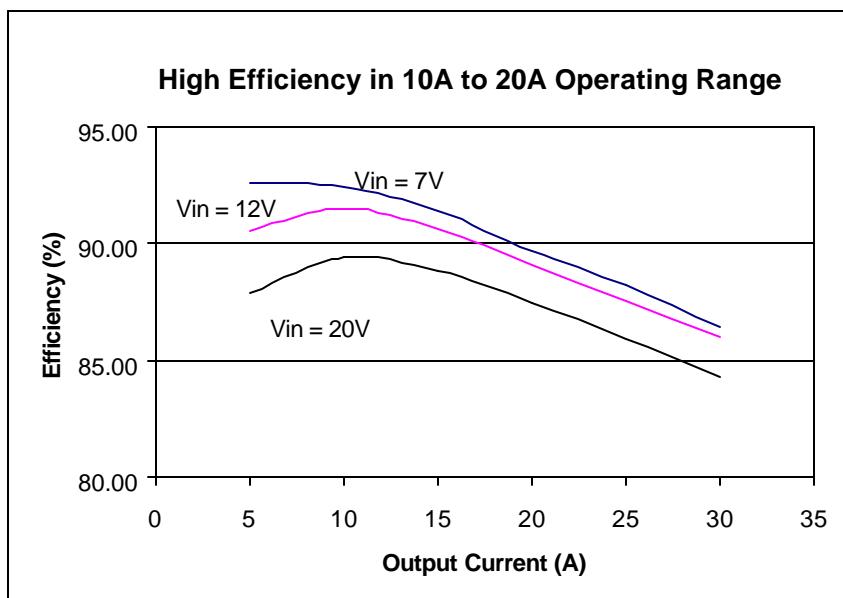
MAX1939 Circuit Schematic:



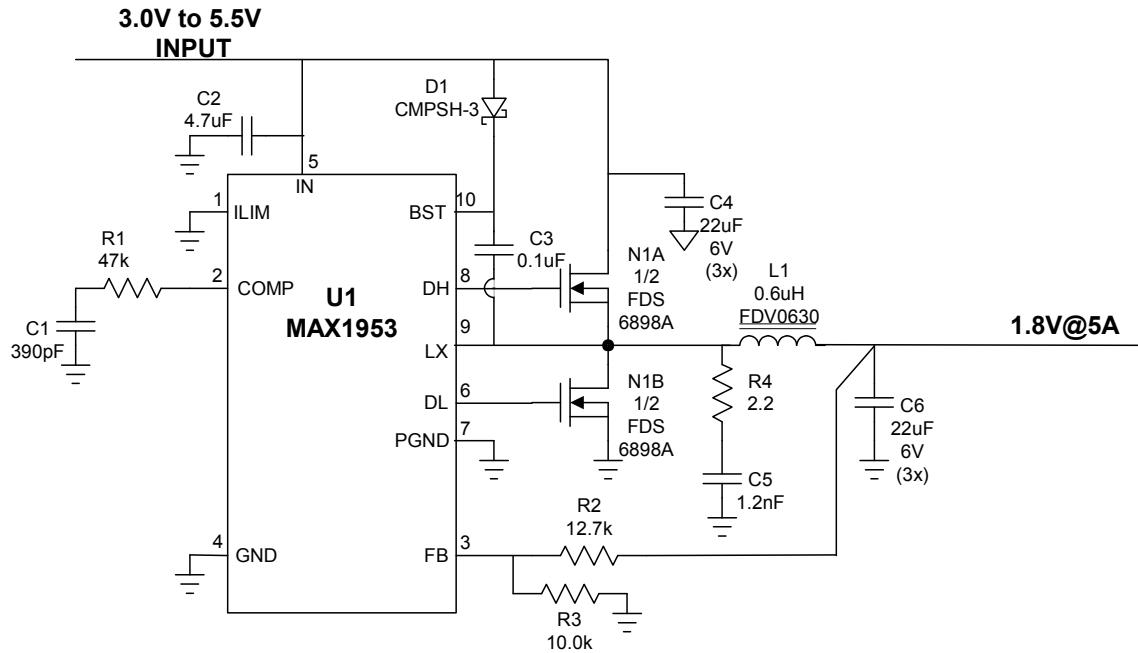
Efficiency Data:

Efficiency data is taken at 3 operating input voltages 7V, 12V and 20V.

Vin	Iin	I_Vdd	Vout	Iout	Efficiency
7.2	1.1114	0.023	1.4945	5.03	92.61
7.12	2.2493	0.024	1.4887	10.02	92.45
7.03	3.4478	0.025	1.4829	15.02	91.42
7.16	4.5847	0.026	1.4774	20.01	89.70
7.05	5.9	0.027	1.4716	25.02	88.23
7.09	7.155	0.028	1.466	30	86.46
Vin	Iin	I_Vdd	Vout	Iout	Efficiency
12.26	0.6649	0.025	1.4962	5.01	90.57
12.21	1.3269	0.025	1.4912	10.02	91.52
12.16	2.0145	0.026	1.4862	15.02	90.65
12.11	2.7345	0.027	1.4809	20.01	89.12
12.06	3.4845	0.027	1.4755	25.02	87.57
12	4.2569	0.028	1.4683	30	85.99
Vin	Iin	I_Vdd	Vout	Iout	Efficiency
20.2	0.4158	0.026	1.4959	5.01	87.87
20.17	0.8215	0.027	1.491	10.02	89.44
20.14	1.2403	0.028	1.4863	15.02	88.87
20.11	1.6775	0.029	1.4815	20.01	87.50
20.08	2.133	0.03	1.4767	25.02	85.96
20.04	2.6063	0.03	1.4716	30	84.28



Conclusion: MAX1939 EV kit exhibits greater than 90% peak efficiency at lower load currents.



1953_1t8
RWY
12/14/04

Vin	Iin	Vout	Iout	Efficiency
3.30	0.0311	1.791	0	
2.97	3.41	1.788	5	0.883
3.30	3.06	1.788	5	0.885
3.62	2.79	1.788	5	0.885
4.50	2.25	1.788	5	0.883
5.53	1.85	1.786	5	0.873
20MHz BW		<10mVpp		

BILL OF MATERIALS**3.0V to 5.5V Input****1.8V @ 5A Output****12/14/04**

1953_1t8

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	6	22uF 6V ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	0.6uH 10A Inductor Toko FDV0630-0R6
N1	1	18m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6898A
R1	1	47k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.2 Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

XENPAK APS power: 5V in 0.9V to 1.8V/0.2A to 1.8A out

Schematic

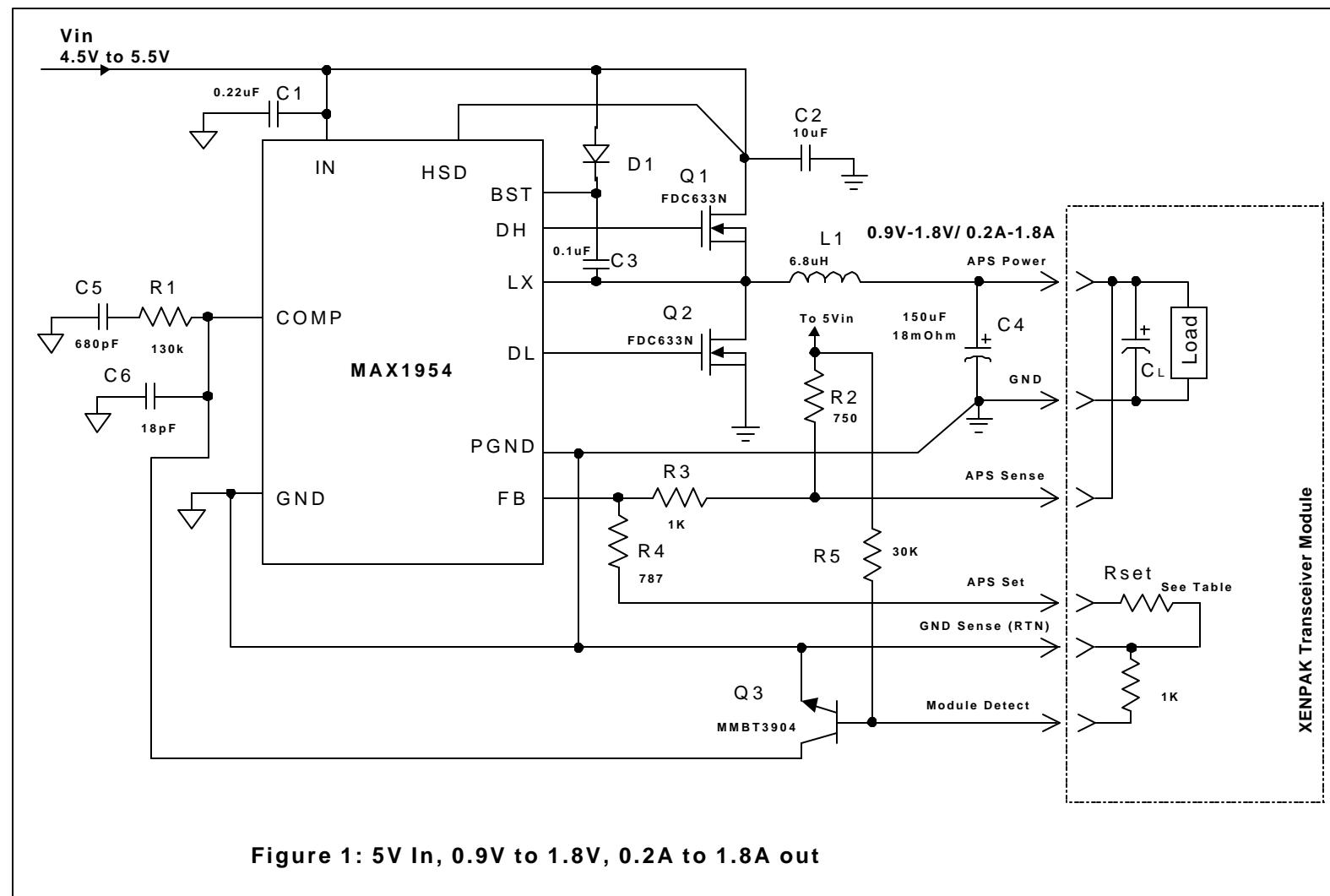


Figure 1: 5V In, 0.9V to 1.8V, 0.2A to 1.8A out

XENPAK APS power: 5V in 0.9V to 1.8V/0.2A to 1.8A out

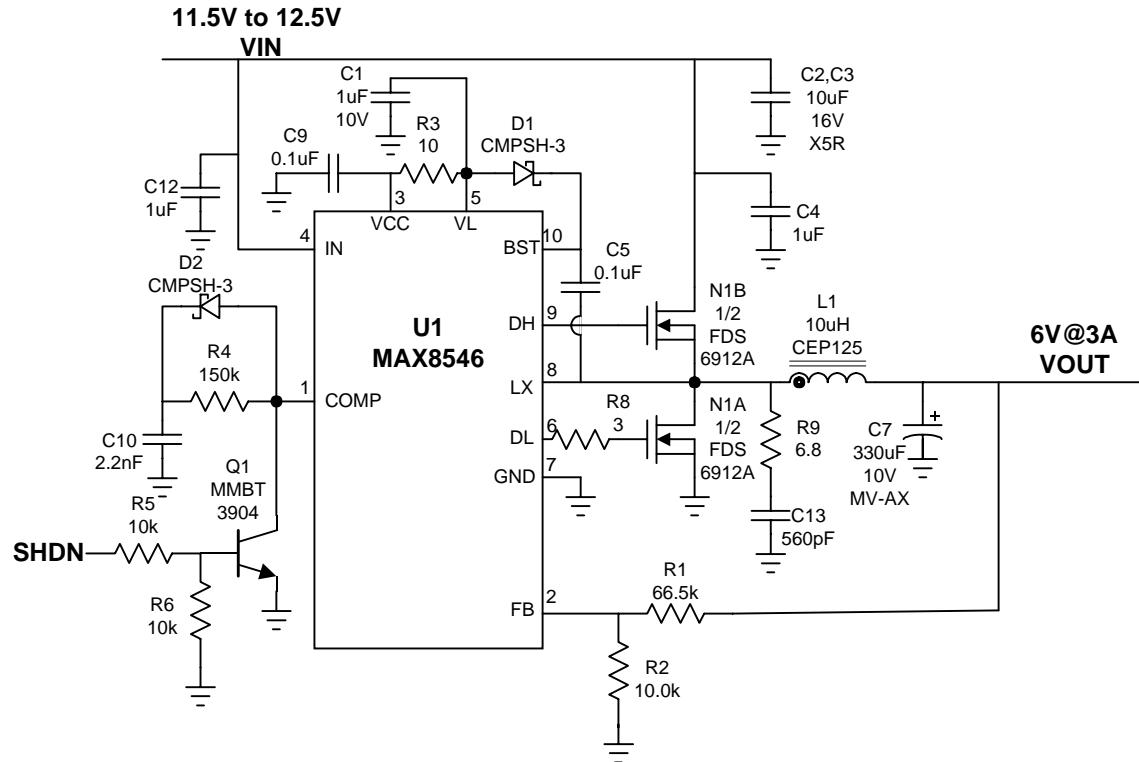
COMPONENT	DESCRIPTION	VENDOR/PART NUMBER	QTY
C1	Capacitor Ceramic: 0.22uF/16V / X7R	TDK: C1608X7R1C224MT	1
C2	Capacitor Ceramic: 10uF/10V/X5R	TDK: C3216X5R1A106M	1
C3	Capacitor Ceramic: 0.1uF/10 / X7R	Kemet: C0603C104M8RAC	1
C4, CL	Capacitor POS: 150uF/4V	Sanyo: 4TPE150MI	2
C5	Capacitor Ceramic: 680pF/10V/X7R	Kemet: C0603C681M8RAC	1
C6	Capacitor Ceramic: 18pF/25V / COG	Kemet: C0603C180M3GAC	1
D1	Schottky diode, 30V, 100mA	Central semiconductor CMPSH-3	1
L1	Inductor: 6.8 μ H, 2.8A	TDK: RLF7030-6R8M2R8	1
Q1, Q2	N Channel SupperSOT-6: 30V, 42mOhms	Fairchild: FDC633N	2
R1	Resistor: 130 KOhns, 5%		1
R2	Resistor: 750, 5%		1
R3	Resistor: 1K, 1%		1
R4	Resistor: 787, 1%		1
R5	Resistor: 30K, 5%		1
Q3	Transistor, NPN: MMBT3904		1

Notes:

The circuit was tested with CL installed at the load through 6" of #16 AWG lead wires:

- 1) Load regulation: 9mV from 0.2A to 1.8A.
- 2) Line Regulation: ~ 0mV from 4.5V to 5.5V in.
- 3) Efficiency: ~88% at 5V in and 1.8V/1.8A out
- 4) Ripple and noise: 2.5mVp-p measured at CL; 15mVp-p measured at C4

12V to 6V Step-Down Converter with Fold-Back Current Limit Protection



8546_6a
RWY
9/02/03

Vin	Iin	Vout	Iout	Efficiency
12.01	0.009	6.053	0	
11.46	1.671	6.049	3.01	0.951
12.01	1.571	6.049	3.01	0.965
12.54	1.505	6.048	3.01	0.965
20MHz BW		100mVpp		

12V to 6V Step-Down Converter with Fold-Back Current Limit Protection

BILL OF MATERIALS

11.5V to 12.5V Input

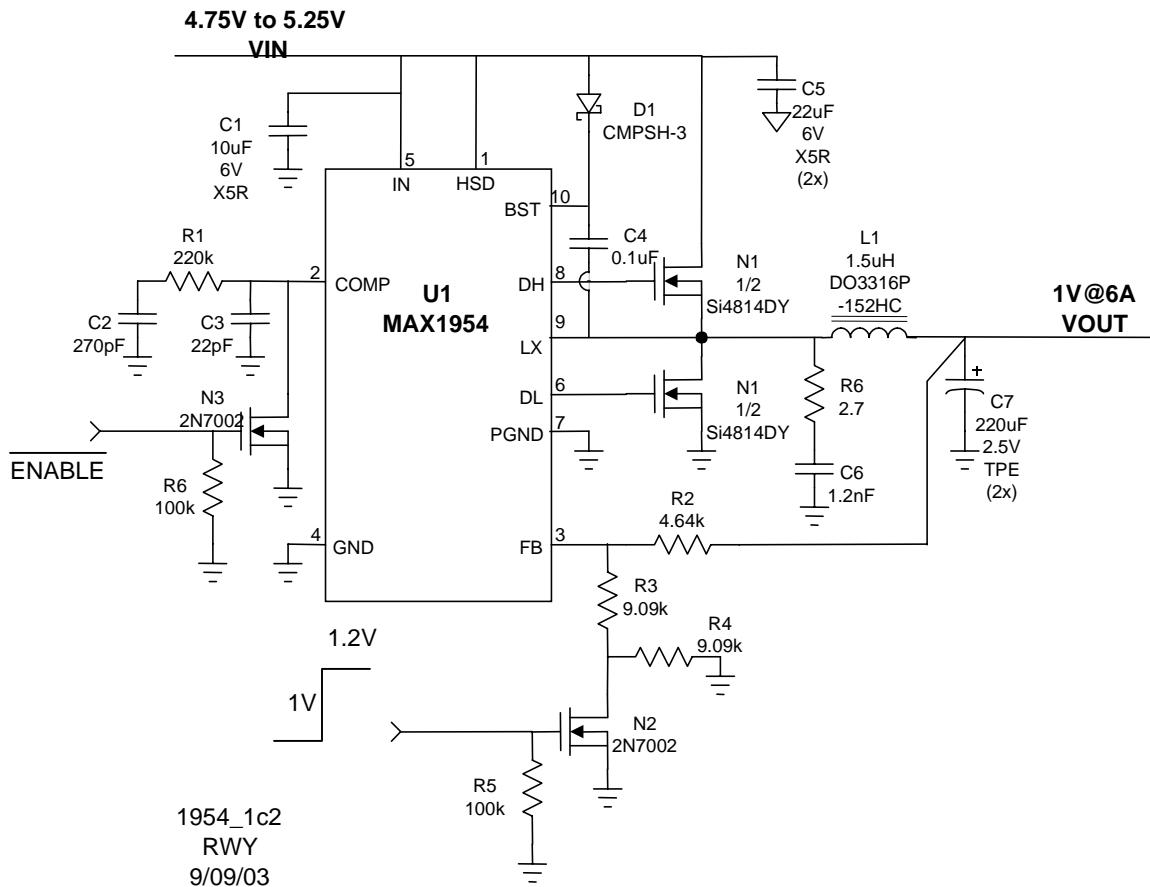
6V @ 3A Output

9/02/03

8546_6a

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2,C3	2	10uF 16V X5R ceramic capacitor (1210) Taiyo Yuden EMK325BJ106MN
C4,C12	2	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C5,C9	2	0.1uF 10V ceramic capacitor (0603)
C7	1	330uF 10V aluminum electrolytic cap Sanyo 10MV330AX
C10	1	2.2nF ceramic capacitor (0805)
C13	1	560pF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	10uH 5A Power inductor Sumida CEP125-100
N1	1	35m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6912A
Q1	1	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	66.5k Ohm 1% resistor (0805)
R2	1	10.0k Ohm 1% resistor (0805)
R3	1	10 Ohm 5% resistor (0805)
R4	1	150k Ohm 5% resistor (0805)
R5,R6	2	10k Ohm 5% resistor (0805)
R8	1	3 Ohm 5% resistor (0603)
R9	1	6.8 Ohm 5% resistor (0603)
U1	1	MAX8546EUB (10-uMAX)

5V Input, Digitally Selectable 1V/1.2V Output at 6A



Efficiency at 1V output

Vin	Iin	Vout	Iout	Efficiency
5.01	0.020	1.001	0	
4.48	1.643	0.994	6	0.810
5.00	1.471	0.995	6	0.812
5.52	1.328	0.995	6	0.814
20MHz BW		30mVpp		

Efficiency at 1.2V output

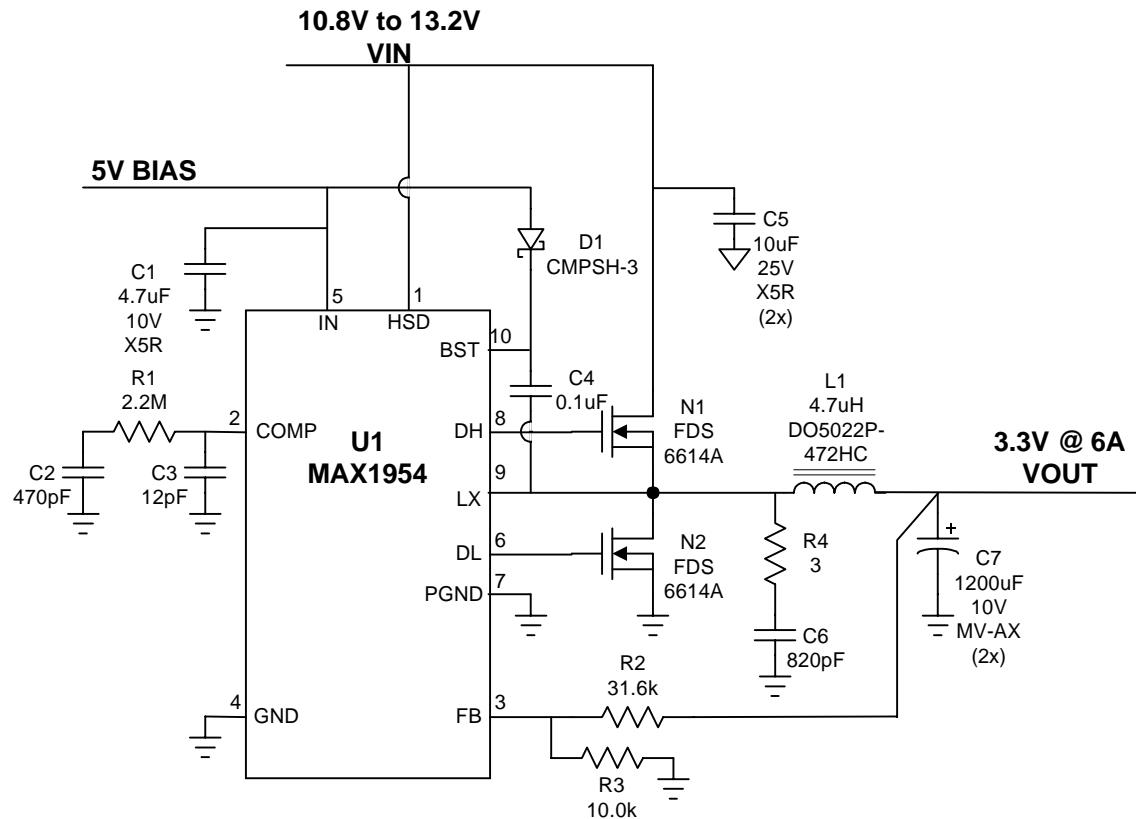
Vin	Iin	Vout	Iout	Efficiency
5.01	0.024	1.206	0	
4.47	1.932	1.199	6	0.833
5.01	1.724	1.200	6	0.834
5.52	1.564	1.200	6	0.834
20MHz BW		30mVpp		

BILL OF MATERIALS**4.75V to 5.25V Input****1V/1.2V @ 6A Output****9/09/03**

1954_1c2

DESIGNATION	QTY	DESCRIPTION
C1	1	10uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ106MN
C2	1	270pF ceramic capacitor (0603)
C3	1	22pF ceramic capacitor (0603)
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	2	22uF 6V X5R ceramic capacitor Taiyo Yuden JMK325BJ226MM
C6	1	1.2nF ceramic capacitor (0603)
C7	2	220uF 2.5V polymer capacitor Sanyo 2R5TPE220M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	1.5uH 9A Inductor Coilcraft DO3316P-152HC
N1	1	32m Ohm 30V N-ch Dual MOSFET (SO-8) Siliconix Si4814DY
N2,N3	1	2N7002
R1	1	220k Ohm 5% resistor (0603)
R2	1	4.64k Ohm 1% resistor (0603)
R3,R4	2	9.09k Ohm 1% resistor (0603)
R5,R7	2	100k Ohm 5% resistor (0603)
R6	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)

91% Efficient 12V to 3.3V, 6A Step-down Converter



1954_3e3

RWY

11/26/02

Vbias	Ibias	Vin	Iin	Vout	Iout	Efficiency
5.0356	0.0064	12.012	0.0118	3.3208	0	
5.0363	0.0067	10.787	2.0145	3.3163	6.034	0.919
5.0363	0.0067	12.011	1.8150	3.3170	6.034	0.917
5.0364	0.0068	13.230	1.6524	3.3173	6.034	0.914
20MHz BW				50mVpp		

91% Efficient 12V to 3.3V, 6A Step-down Converter

BILL OF MATERIALS

10.8V to 13.2V Input

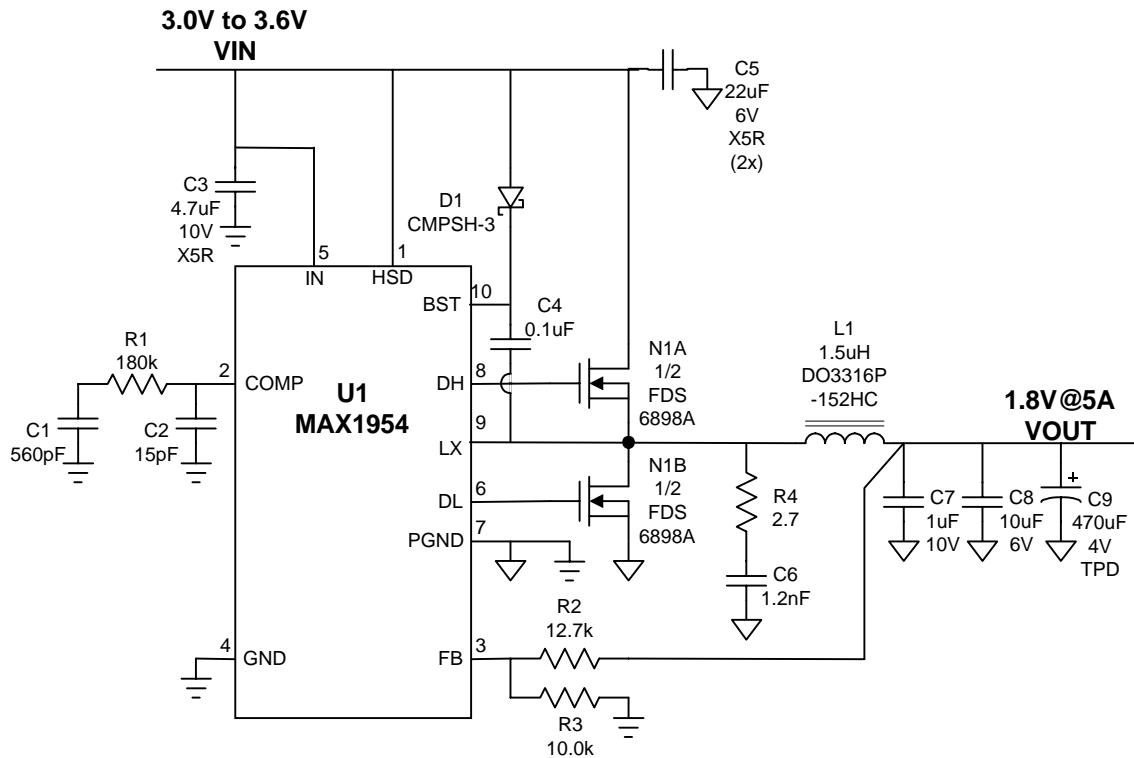
3.3V @ 6A Output

11/26/02

1954_3e3

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C2	1	470pF ceramic capacitor (0603)
C3	1	12pF ceramic capacitor (0603)
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	2	10uF 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C6	1	820pF ceramic capacitor (0603)
C7	2	1200uF 10V aluminum electrolytic cap Sanyo 10MV1200AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	4.7uH 13A Inductor Coilcraft DO5022P-472HC
N1,N2	1	25 Ohm 30V N-ch MOSFET (SO-8) Fairchild FDS6614A
R1	1	2.2M Ohm 5% resistor (0603)
R2	1	31.6k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	3 Ohm 5% resistor (0805)
U1	1	MAX1954EUB (10-uMAX)

92% Efficient 3.3V to 1.8V, 5A Step-Down Converter



1954_1k8
RWY
5/22/03

Vin	Iin	Vout	Iout	Efficiency
3.29	0.032	1.812	0	
2.96	3.296	1.809	5.005	0.928
3.30	2.961	1.809	5.006	0.927
3.65	2.681	1.810	5.006	0.926
20MHz BW		20mVpp		

92% Efficient 3.3V to 1.8V, 5A Step-Down Converter

BILL OF MATERIALS

3.0V to 3.6V Input

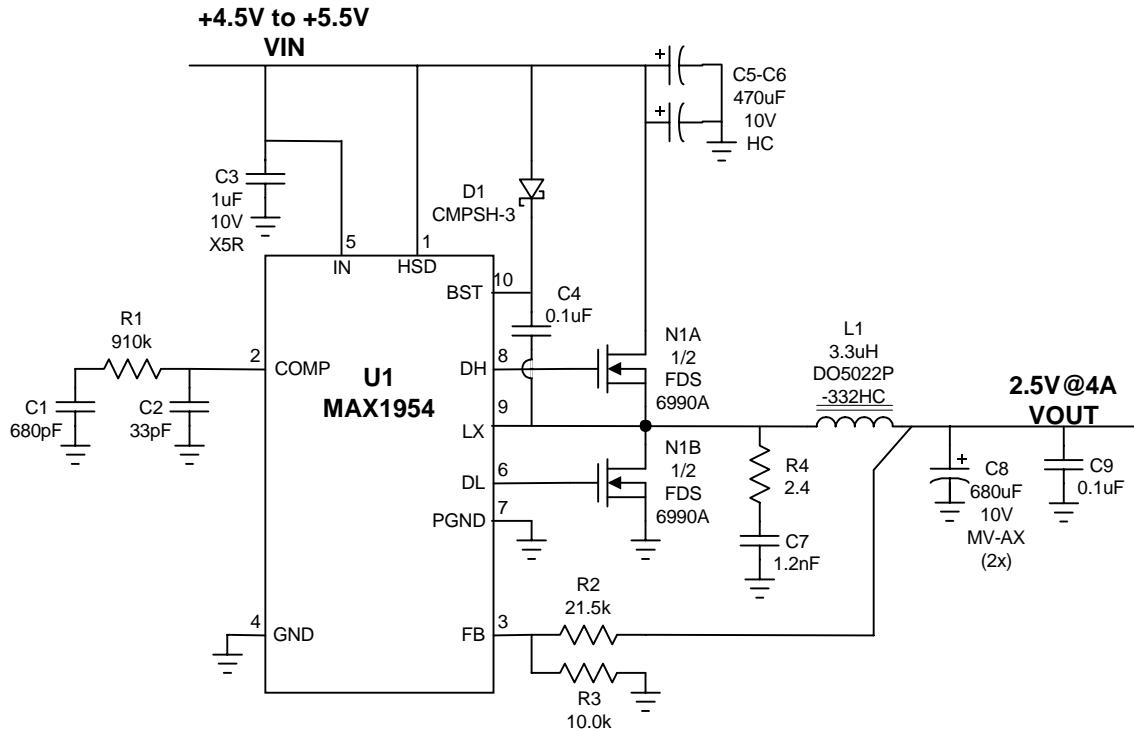
1.8V @ 5A Output

5/22/03

1954_1k8

DESIGNATION	QTY	DESCRIPTION
C1	1	560pF ceramic capacitor (0603)
C2	1	15pF ceramic capacitor (0603)
C3,C7	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C4	1	0.1uF ceramic capacitor (0603)
C5	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C6	1	1.2nF ceramic capacitor (0603)
C8	1	10uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C9	1	470uF 4V polymer capacitor Sanyo 4TPD470M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L2	1	1.5uH 9A Inductor Coilcraft DO3316P-152HC
N1	1	18m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6898A
R1	1	180k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)

92% Efficient, 5V to 2.5V, 6A Step-down Converter



1954_2f5

RWY

10/28/02

Vin	Iin	Vout	Iout	Efficiency
5.0089	0.0194	2.4821	0	
4.4865	2.4133	2.4860	4.0110	0.921
5.0048	2.1643	2.4852	4.0111	0.920
5.502	1.9678	2.4827	4.0111	0.920
20MHz BW		50mVpp		

92% Efficient, 5V to 2.5V, 6A Step-down Converter

BILL OF MATERIALS

4.5V to 5.5V Input

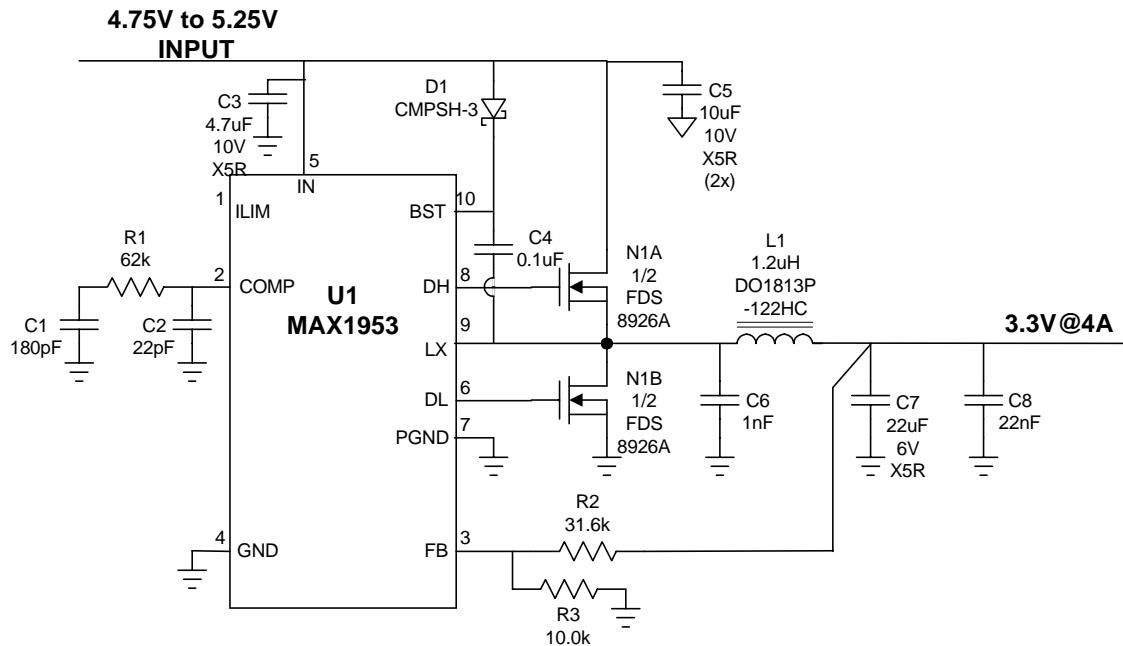
2.5V @ 4A Output

10/28/02

1954_2f5

DESIGNATION	QTY	DESCRIPTION
C1	1	6860pF ceramic capacitor (0603)
C2	1	33pF ceramic capacitor (0603)
C3	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C4,C9	2	0.1uF ceramic capacitor (0603)
C5,C6	2	470uF 10V aluminum electrolytic capacitor Sanyo 10MV470HC
C7	1	1.2nF ceramic capacitor (0603)
C8	2	680uF 10V aluminum electrolytic capacitor Sanyo 10MV680AX
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	3.3uH 17A Power Inductor Coilcraft DO5022P-332HC
N1	1	23m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6990A
R1	1	910k Ohm 5% resistor (0603)
R2	1	21.5k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.4 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)

90% Efficient, All Ceramic, 5V to 3.3V, 4A Step-down Converter



1953_3b3

RWY

4/17/02

Vin	Iin	Vout	Iout	Efficiency
5.0002	0.044	3.3082	0	
4.4955	3.212	3.3023	4.00026	0.915
4.7476	3.041	3.2899	4.0027	0.912
5.0081	2.882	3.2813	4.0027	0.910
5.2502	2.752	3.2780	4.0027	0.908
5.501	2.630	3.2761	4.0027	0.906
	Ripple	90mVpp		

90% Efficient, All Ceramic, 5V to 3.3V, 4A Step-down Converter

BILL OF MATERIALS

4.75V to 5.25V Input

3.3V @ 4A Output

4/17/02

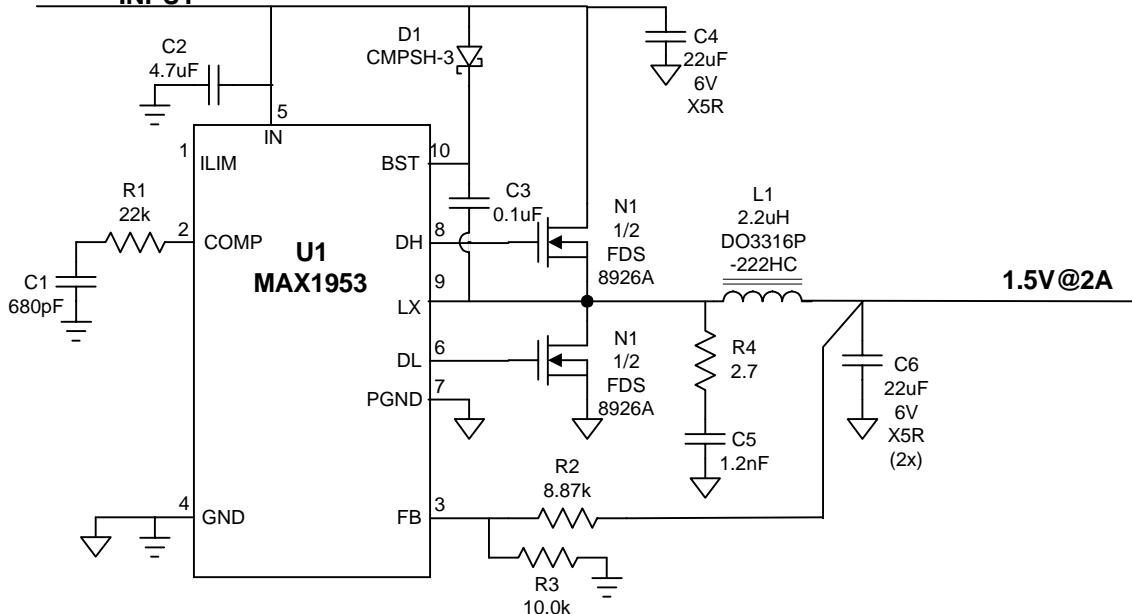
1953_3b3

DESIGNATION	QTY	DESCRIPTION
C1	1	180pF ceramic capacitor (0603)
C2	1	22pF ceramic capacitor (0603)
C3	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF ceramic capacitor (0603)
C5	2	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C6	1	1nF ceramic capacitor (0603)
C7	1	22uF 6V ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C8	1	22nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1.2uH 5A Inductor Coilcraft DO1813P-122HC
N1	1	38m Ohm 30V Dual MOSFET (SO-8) Fairchild FDS8926A
R1	1	62k Ohm 5% resistor (0603)
R2	1	31.6k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

All Ceramic, 3V to 5.5V Input, 1.5V/2A Output Step-Down Converter

3.0V to 5.5V

INPUT



1953_1j5

RWY

1/23/03

Vin	Iin	Vout	Iout	Efficiency
3.2948	0.0281	1.5095	0	
2.9967	1.1514	1.5084	2.010	0.879
3.3032	1.0450	1.5084	2.010	0.878
3.6036	0.9595	1.5072	2.010	0.876
4.4907	0.7810	1.5078	2.010	0.864
5.505	0.6486	1.4940	2.010	0.841
20MHz BW		<10mVpp		

All Ceramic, 3V to 5.5V Input, 1.5V/2A Output Step-Down Converter

BILL OF MATERIALS

3.0V to 5.5V Input

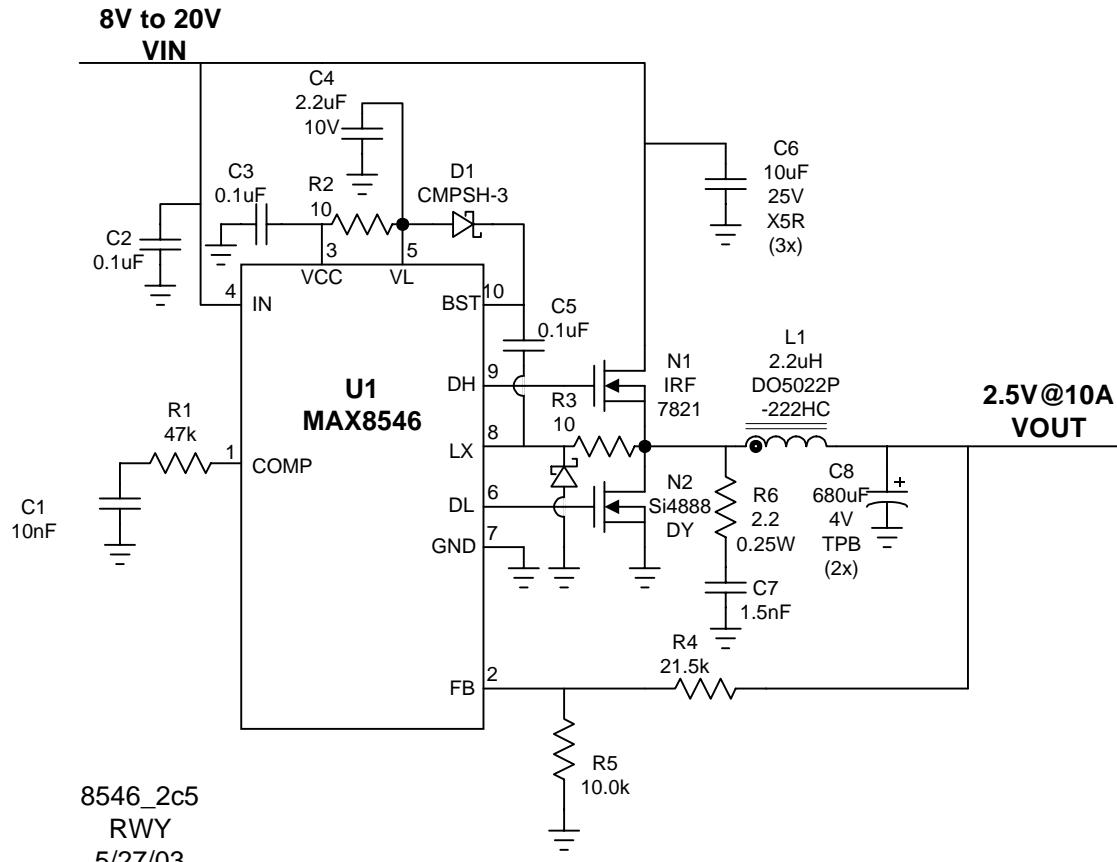
1.5V @ 2A Output

1/23/03

1953_1j5

DESIGNATION	QTY	DESCRIPTION
C1	1	680pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	3	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	2.2uH 7A Inductor Coilcraft DO3316P-222HC
N1	1	38m Ohm 20V N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	22k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

Wide Input, Low Profile, 2.5V/10A Step-Down Converter



Efficiency and ripple data>

Vin	Iin	Vout	Iout	Efficiency
11.99	0.033	2.496	0	
7.96	3.527	2.487	10.00	0.886
11.99	2.388	2.483	10.00	0.867
15.99	1.834	2.479	10.00	0.845
20.06	1.511	2.478	10.00	0.818
	20MHz BW	100mVpp ripple		

Wide Input, Low Profile, 2.5V/10A Step-Down Converter

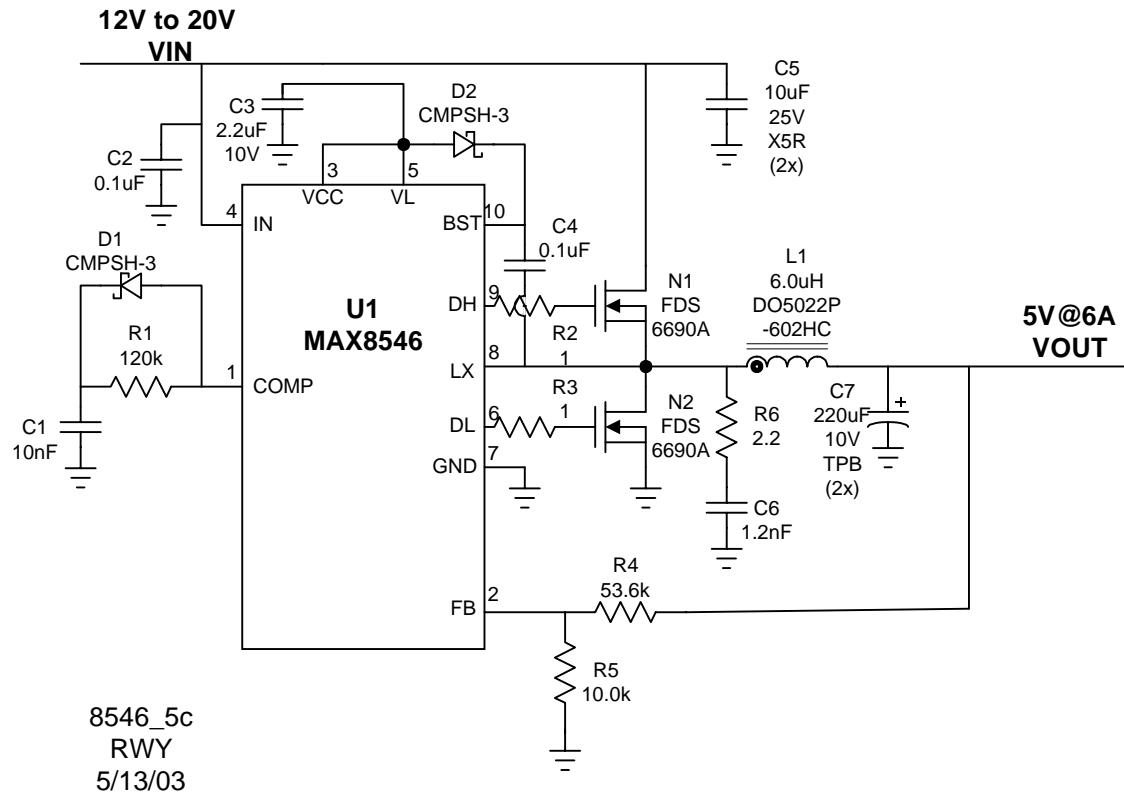
BILL OF MATERIALS

**8V to 20V Input
2.5V @ 10A Output
5/27/03**

8546_2c5

DESIGNATION	QTY	DESCRIPTION
C1	1	10nF ceramic capacitor (0805)
C2,C3,C5	3	0.1uF 25V ceramic capacitor (0805)
C4	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C6	3	10uF 25V X5R ceramic capacitor Taiyo Yuden TMK432BJ106MM
C7	1	1.5nF ceramic capacitor (0805)
C8	2	680uF 4V polymer capacitor Sanyo 4TPB680M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	2.2uH 20A Power inductor Coilcraft DO5022P-222HC
N1	1	12m Ohm 30V N-channel MOSFET (SO-8) International Rectifier IRF7821
N2	1	10m Ohm 30V N-channel MOSFET (SO-8) Siliconix Si4888DY
R1	1	470k Ohm 5% resistor (0805)
R2,R3	2	10 Ohm 5% resistor (0603)
R4	1	21.5k Ohm 1% resistor (0805)
R5	1	10.0k Ohm 1% resistor (0805)
R6	1	2.2 Ohm 0.25W 5% resistor (1206)
U1	1	MAX8546EUB (10-uMAX)

Wide Input, 91% Efficient, Low Profile, 5V/6A Step-Down Converter



Efficiency and ripple measurements

Vin	Iin	Vout	Iout	Efficiency
14.99	0.028	5.049	0	
11.94	2.706	5.036	6.00	0.935
15.00	2.175	5.038	6.00	0.927
20.05	1.650	5.041	6.00	0.914
	20MHz BW	40mVpp ripple		

Wide Input, 91% Efficient, Low Profile, 5V/6A Step-Down Converter

BILL OF MATERIALS

12V to 20V Input

5V @ 6A Output

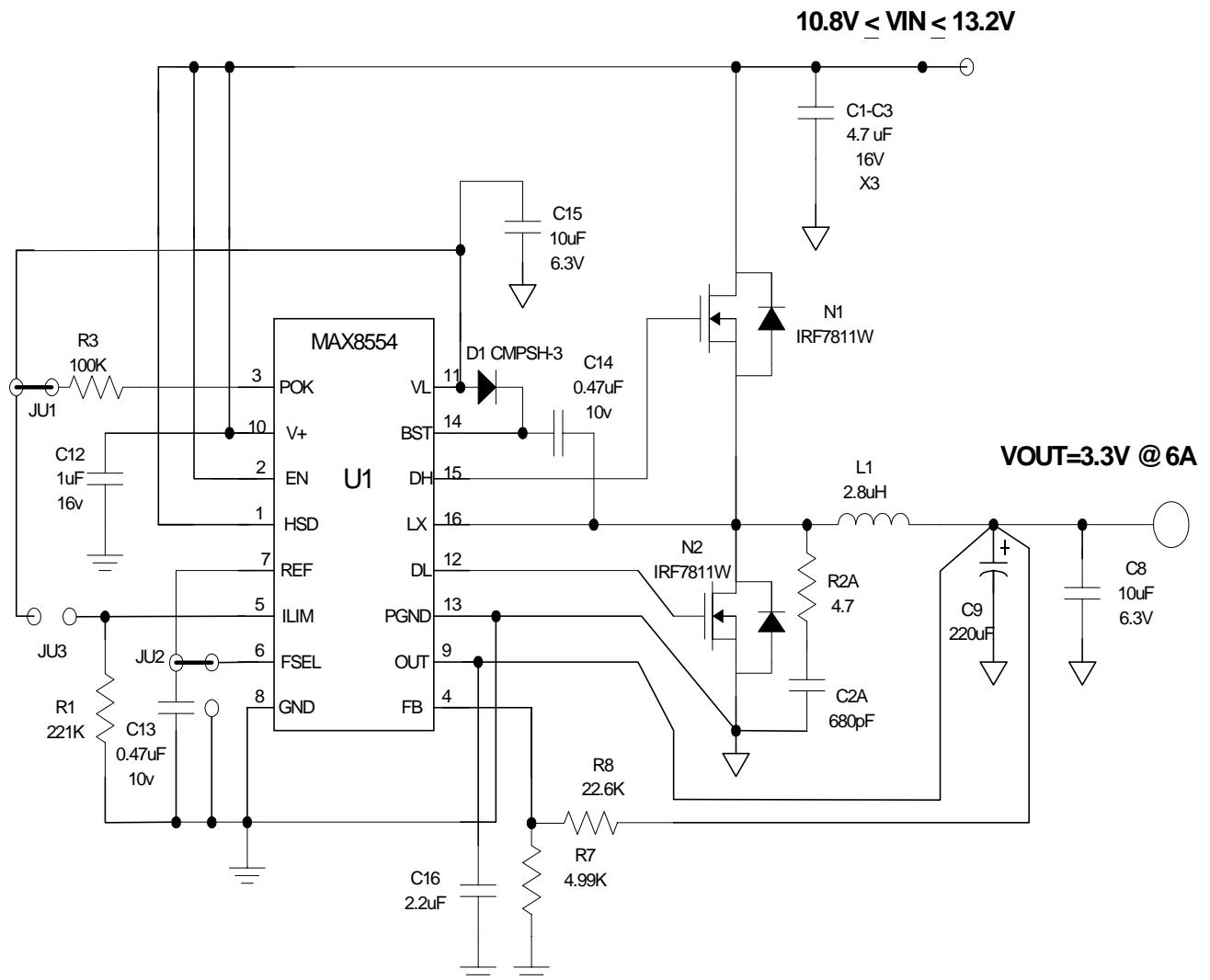
5/13/03

8546_5c

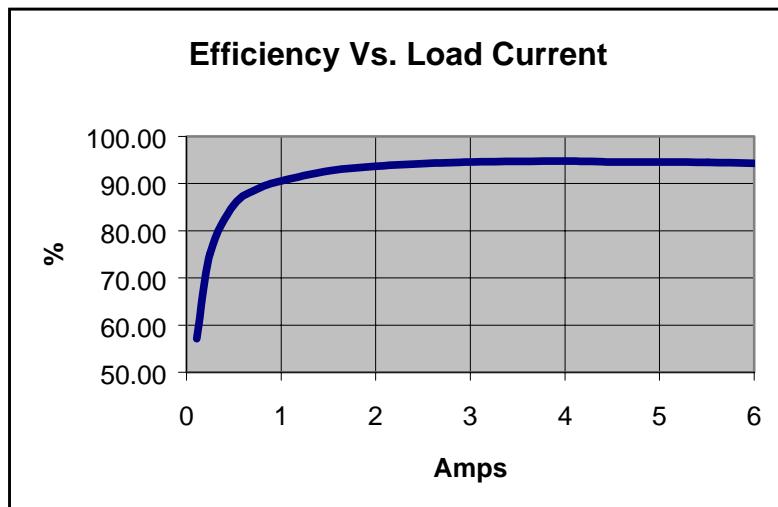
DESIGNATION	QTY	DESCRIPTION
C1	1	10nF ceramic capacitor (0805)
C2,C4	2	0.1uF 25V ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	2	10uF 25V X5R ceramic capacitor Taiyo Yuden TMK432BJ106MM
C6	1	1.2nF ceramic capacitor (0805)
C7	2	220uF 10V polymer capacitor Sanyo 10TPB220M
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	6.0uH 12A Power inductor Coilcraft DO5022P-602HC
N1,N2	2	17m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6690A
R1	1	120k Ohm 5% resistor (0805)
R2,R3	2	1 Ohm 5% resistor (0603)
R4	1	53.6k Ohm 1% resistor (0805)
R5	1	10.0k Ohm 1% resistor (0805)
R6	1	2.2 Ohm 0.25W 5% resistor (1206)
U1	1	MAX8546EUB (10-uMAX)

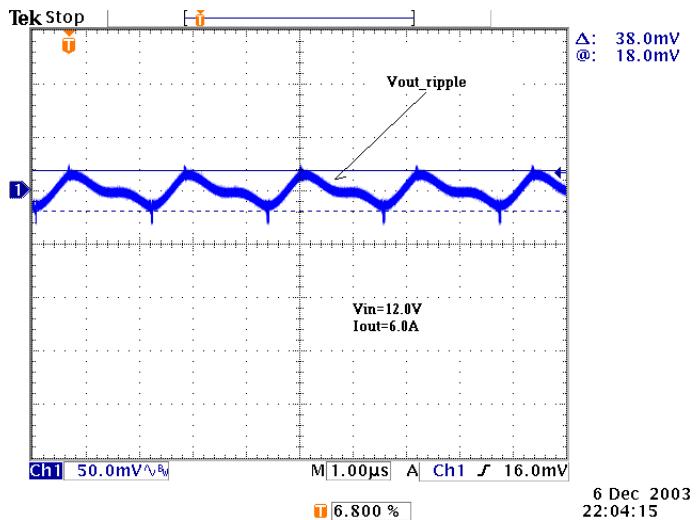
12V to 3.3V Converter is 94% Efficient, Fits in <1.5 Inch²

Input Voltage: 12V +-10%
Output: 3.3V, Maximum load=6A
Switching Frequency=400KHZ



Vin (V)	I_in(A)	Vout (V)	Iout(A)	Efficiency
12.173	0.0224	3.3282	0	
12.166	0.0517	3.3269	0.108	57.12
12.161	0.0909	3.3257	0.25	75.21
12.151	0.1607	3.3242	0.502	85.46
12.141	0.2329	3.3221	0.757	88.94
12.132	0.3038	3.3211	1.005	90.56
12.112	0.4488	3.3198	1.518	92.71
12.094	0.5883	3.3187	2.009	93.71
12.072	0.7475	3.318	2.565	94.31
12.055	0.8737	3.3175	3.003	94.59
12.036	1.0204	3.317	3.507	94.72
12.016	1.1785	3.3165	4.047	94.78
11.998	1.3177	3.3161	4.51	94.60
11.977	1.4787	3.3156	5.05	94.54
11.96	1.6161	3.3152	5.51	94.51
12.002	1.757	3.3146	6	94.31
10.79	1.946	3.3102	6	94.59
13.247	1.5987	3.3176	6	93.99





Bill of Materials:

DESIGNATION	QTY	DESCRIPTION
C1-C3	3	4.7uF 16V ceramic capacitors X5R (1206) TDK C3216X5R1C475K
C9	1	220μF 4V 18mOhm esr PosCap Sanyo 4TPE220MI
C8, C15	2	10uF 6.3V ceramic capacitor X5R (0805) Taiyo Yuden JMK212BJ106MG
C13, C14	2	0.47uF 10V ceramic capacitor X5R (0603) Taiyo Yuden LMK107BJ474MA
C16	1	2.2 μF 6.3V ceramic capacitors X5R (0603) Taiyo Yuden JMK212BJ225MA
C12	1	1 μF 16V ceramic capacitors (0805) X5R TDK C2012X5R1C105K
C2A	1	680pF GRM1885C1H681JA01B 0603, COG 50V Murata
D1	1	100mA 30V Schottky diode Central Semiconductor CMPSH-3
L1	1	2.8uH Inductor Sumida CEP123D38 - 2R8MC
N1, N2	1	International Rectifier IRF7811W SO8
R1	1	221K, 1% SMD resistor (0603)
R7	1	4.99kΩ, 1% resistor (0603)
R3	1	100K, 5% SMD resistor (0603)
R8	1	22.6K, 1% SMD resistor (0603)
R2A	1	4.7Ω, 5% resistor (0805)
JU1	1	Shorted, 3 pin header
JU2, JU3	2	Open, 3 pin header
U1	1	MAX8554EEE (16 pin QSOP)

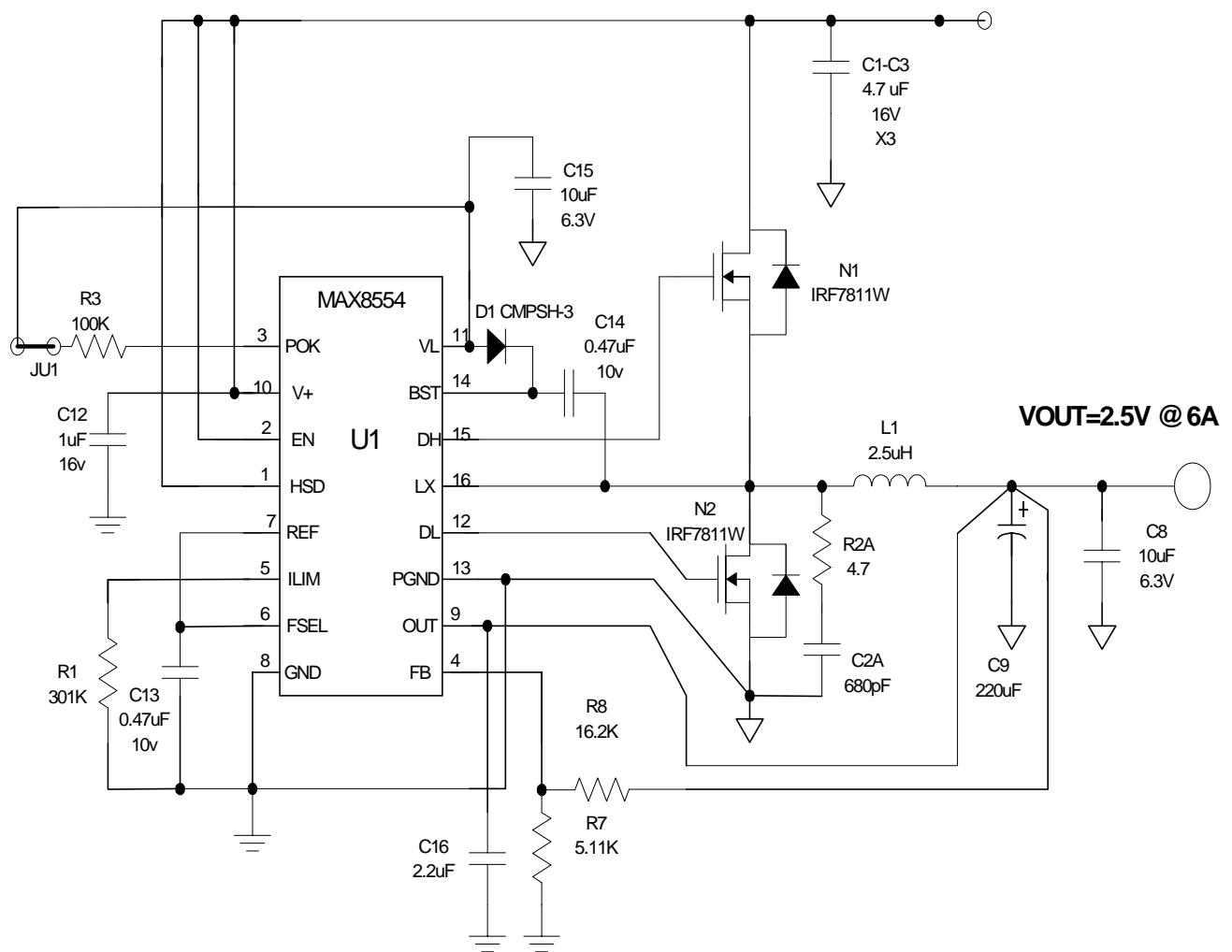
12V to 2.5V Converter is 93% Efficient, Fits in <1.5 Inch²

Input Voltage: 12V +-10%

Output: 2.5V, 6A

Switching Frequency=400KHZ

10.8V < VIN < 13.2V

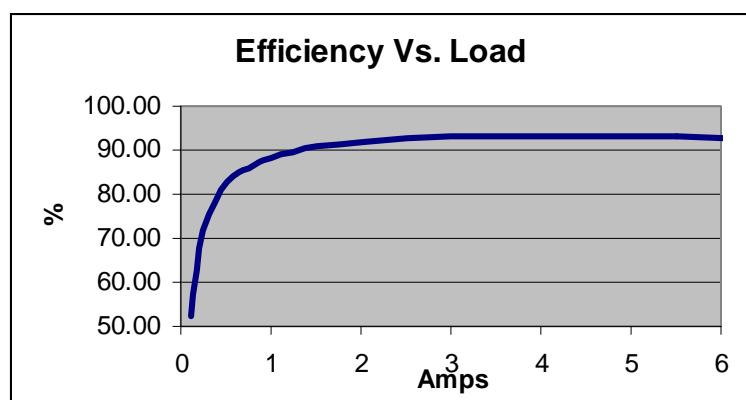


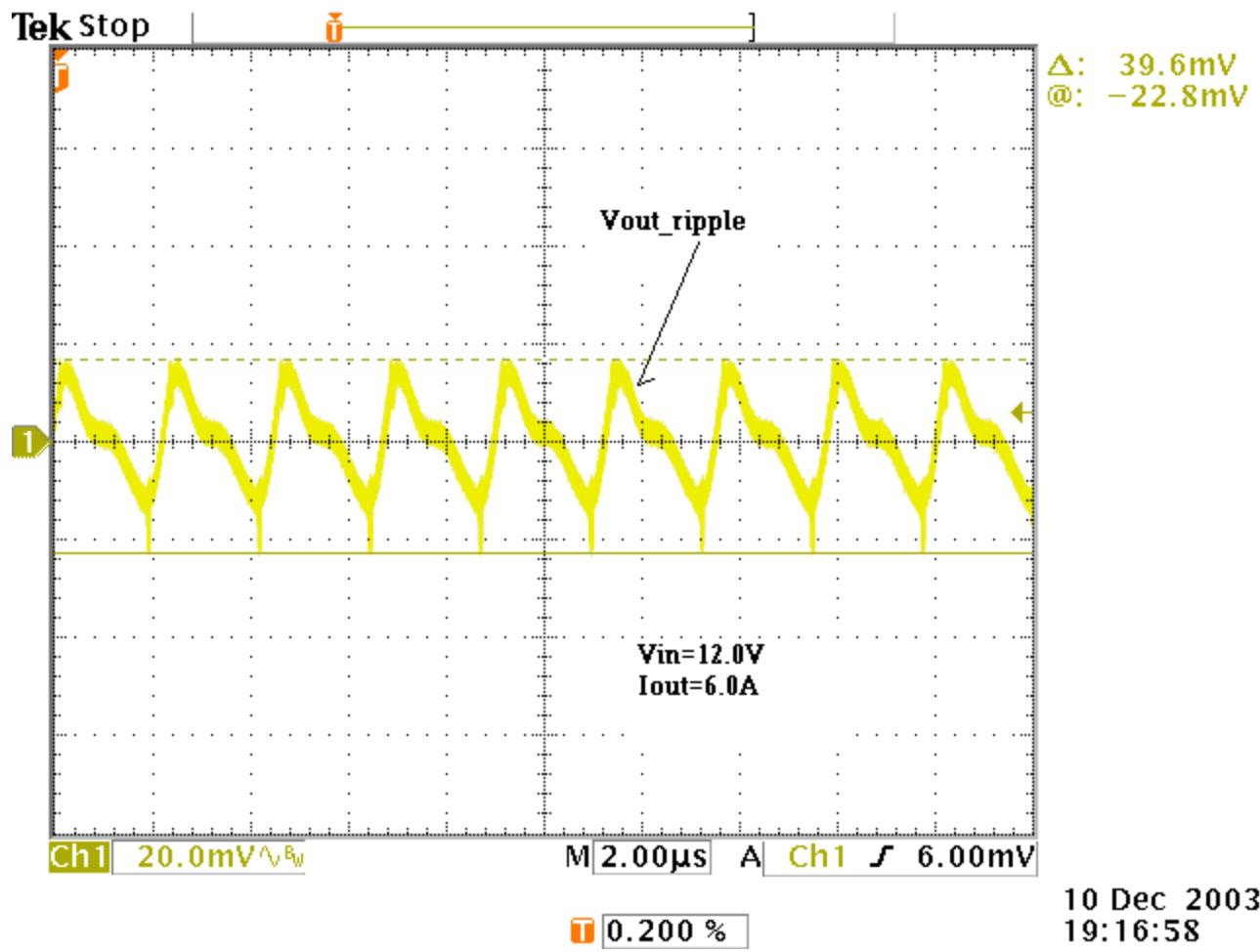
Bill of Materials:

DESIGNATION	QTY	DESCRIPTION
C1-C3	3	4.7uF 16V ceramic capacitors X5R (1206) TDK C3216X5R1C475K
C9	1	220µF 4V 15mOhm esr PosCap Sanyo 4TPE220MF
C8, C15	2	10uF 6.3V ceramic capacitor X5R (0805) Taiyo Yuden JMK212BJ106MG
C13, C14	2	0.47uF 10V ceramic capacitor X5R (0603) Taiyo Yuden LMK107BJ474MA
C16	1	2.2 µF 6.3V ceramic capacitors X5R (0603) Taiyo Yuden JMK212BJ225MA
C12	1	1 µF 16V ceramic capacitors (0805) X5R TDK C2012X5R1C105K
C2A	1	680pF GRP155R71H681KA01B (0603), X7R, 50V Murata
D1	1	100mA 30V Schottky diode Central Semiconductor CMPSH-3
L1	1	2.5uH Inductor Sumida CEP125-2R5
N1, N2	1	International Rectifier IRF7811W SO8
R1	1	301K, 1% SMD resistor (0603)
R7	1	5.11kΩ, 1% resistor (0603)
R3	1	100K, 5% SMD resistor (0603)
R8	1	16.2K, 1% SMD resistor (0603)
R2A	1	4.7Ω, 5% resistor (0805)
JU1	1	Shorted, 3 pin header
JU2, JU3	2	Open, 3 pin header
U1	1	MAX8554EEE (16 pin QSOP)

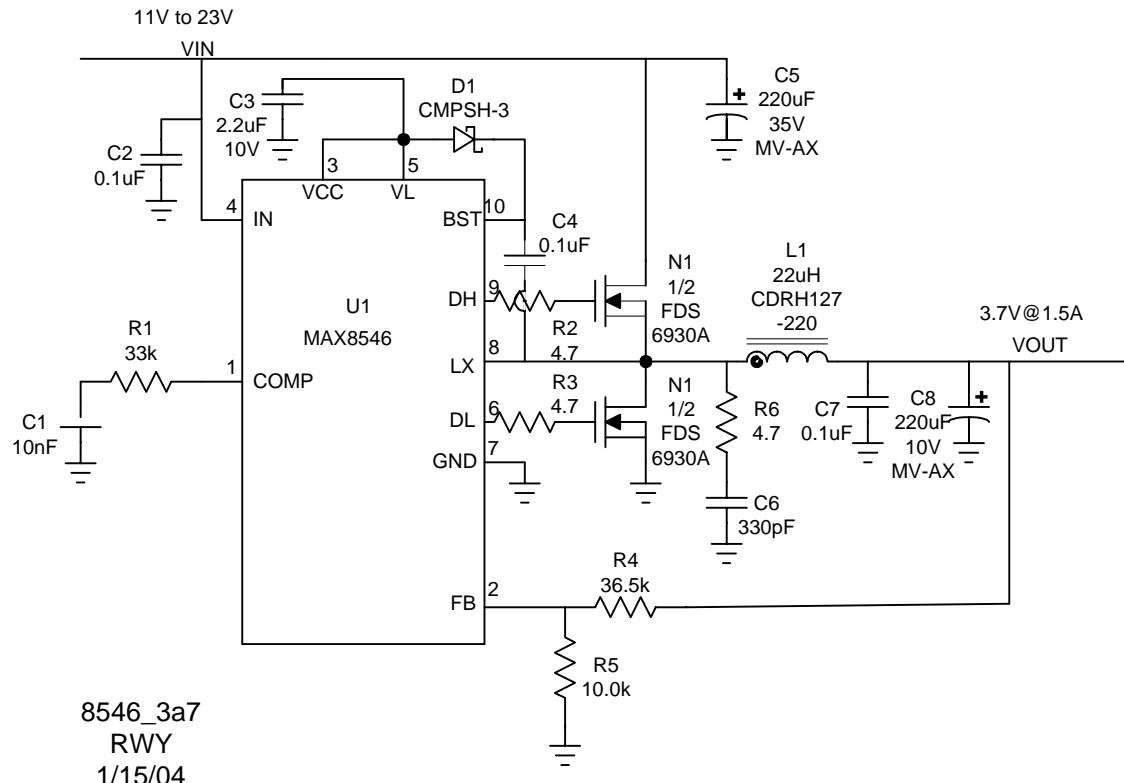
MEASURED DATA:

Vin(v)	I_in(A)	Vout(v)	Iout(A)	Efficiency
12.194	0.0193	2.4853	0	
12.192	0.0403	2.4843	0.103	52.08
12.188	0.0707	2.483	0.25	72.04
12.183	0.1237	2.481	0.502	82.64
12.177	0.1773	2.479	0.75	86.12
12.171	0.2309	2.4781	1.001	88.27
12.159	0.3381	2.4771	1.506	90.75
12.147	0.4461	2.4761	2.012	91.94
12.135	0.5526	2.4755	2.508	92.58
12.124	0.6607	2.4753	3.009	92.98
12.112	0.7685	2.4748	3.504	93.16
12.101	0.8913	2.4738	4.065	93.24
12.089	0.9872	2.4729	4.501	93.27
12.09	0.9873	2.473	4.501	93.25
12.078	1.1	2.4722	5.008	93.19
12.066	1.2102	2.4713	5.5	93.08
12.053	1.332	2.4703	6.04	92.94
10.779	1.4822	2.4679	6.04	93.30
13.237	1.2188	2.4724	6.04	92.56





93% Efficient Wide Input Step-Down Regulator with Fold-Back Current Limit



Efficiency and Ripple Measurements:

Vin	Iin	Vout	Iout	Efficiency
17.01	0.007	3.66	0	
10.98	0.53	3.62	1.5	0.933
17.01	0.34	3.58	1.5	0.929
23.07	0.25	3.59	1.5	0.934
	Ripple	100mVpp (20MHz BW)		

93% Efficient Wide Input Step-Down Regulator with Fold-Back Current Limit

BILL OF MATERIALS

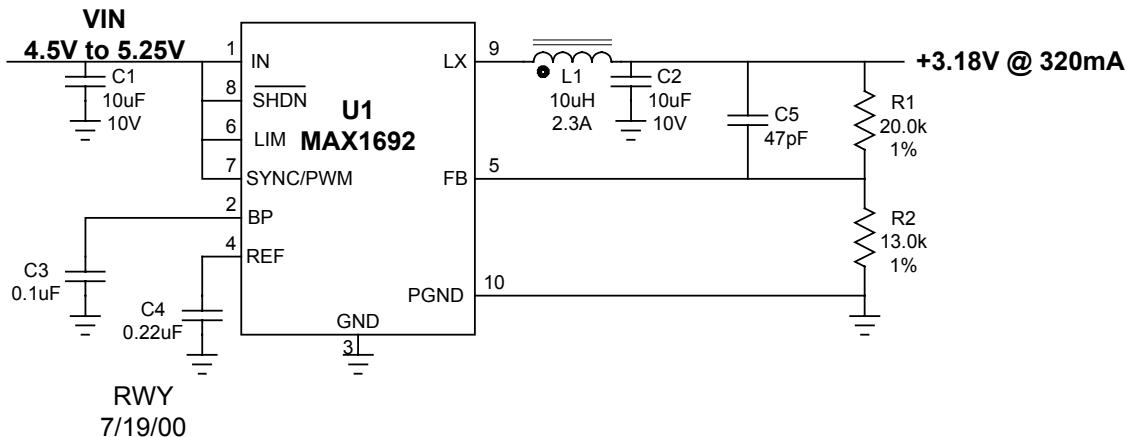
**11V to 23V Input
3.7V @ 1.5A Output**

1/15/04

8546_3a7

DESIGNATION	QTY	DESCRIPTION
C1	1	10nF ceramic capacitor (0603)
C2,C4,C7	3	0.1uF ceramic capacitor (0603)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	1	220uF 35V aluminum electrolytic capacitor Sanyo 35MV220AX
C6	1	330pF ceramic capacitor (0603)
C8	1	220uF 10V aluminum electrolytic capacitor Sanyo 10MV220AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	22uH 3.6A Power inductor Sumida CDRH127-220
N1	1	55m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6930A
R1	1	33k Ohm 5% resistor (0603)
R2,R3	2	4.7 Ohm 5% resistor (0603)
R4	1	36.5k Ohm 1% resistor (0603)
R5	1	10.0k Ohm 1% resistor (0603)
R6	1	4.7 Ohm 5% resistor (0603)
U1	1	MAX8546EUB (10-uMAX)

USB to 3.18V



GSp01Q1a BILL OF MATERIALS

4.5 to 5.25V Input

3.18V @ 320mA Output

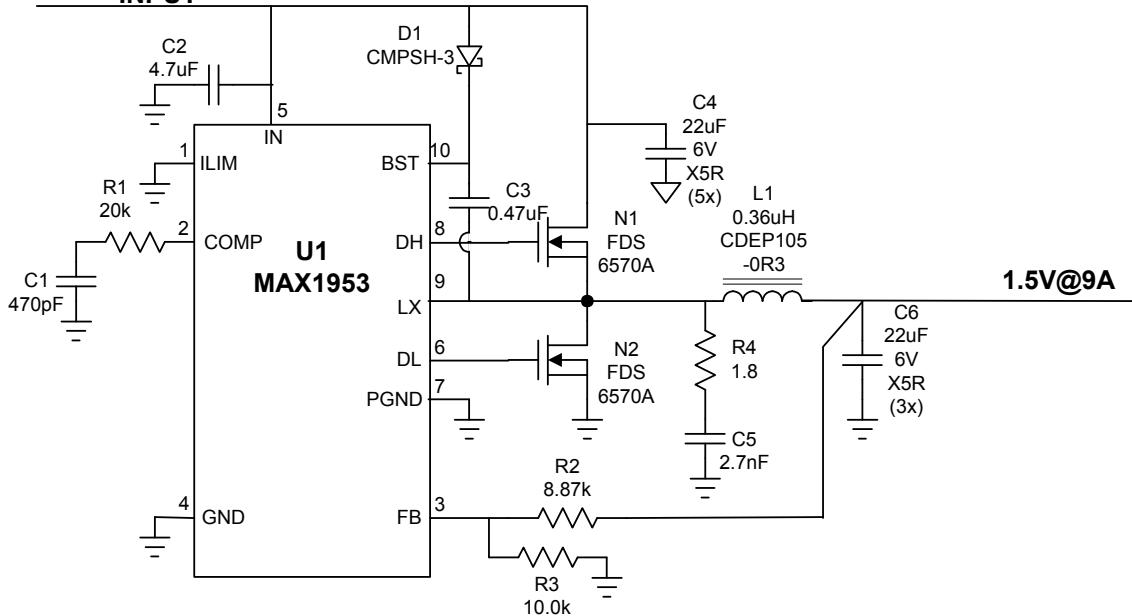
07/19/00

BOM REV: PRELIM (P1) BOARD REV: P1

DESIGNATION	QTY	DESCRIPTION	Est. Cost
C1, C2	2	10uF 10V ceramic capacitor (1210) TAIYO YUDEN LMK325BJ106MN	0.25
C3	1	0.1uF ceramic capacitor (0805)	0.02
C4	1	0.22uF ceramic capacitor (0805)	0.02
C5	1	47pF ceramic capacitor (0805)	0.02
L1	1	10uH Power Inductor Coilcraft DS3316P-103	0.25
R1	1	20.0k Ohm 1% resistor (0805)	0.01
R2	1	13.0k Ohm 1% resistor (0805)	0.01
U1	1	MAX1692EUB (10-uMAX)	1.25

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Efficiency
4.501	0.243	3.1249	0.32	0.914
5.256	0.21	3.130	0.32	0.907

**3.0V to 3.6V
INPUT**



1953_1h5
RWY
12/27/02

Vin	Iin	Vout	Iout	Efficiency
3.3078	0.0965	1.5106	0	
2.9920	5.470	1.5065	9.006	0.829
3.3020	4.948	1.5065	9.006	0.830
3.6066	4.525	1.5065	9.006	0.831
		20mVpp		

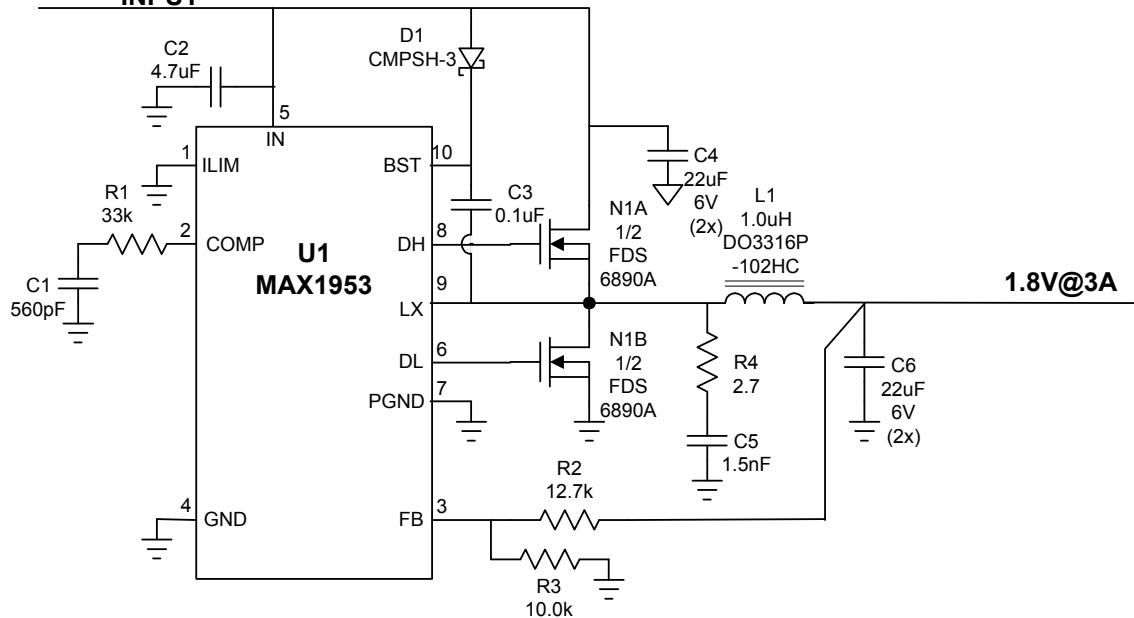
BILL OF MATERIALS**3.0V to 3.6V Input****1.5V @ 9A Output****12/27/02**

1953_1h5

DESIGNATION	QTY	DESCRIPTION
C1	1	470pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.47uF ceramic capacitor (0603)
C4,C6	8	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	2.7nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	0.36uH 17A Inductor Sumida CDEP105-0R3
N1,N2	2	10m Ohm 20V N-ch MOSFET (SO-8) Fairchild FDS65790A
R1	1	20k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	1.8 Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

3.0V to 5.5V

INPUT



1953_1p8

RWY

5/09/03

1953_1p8b 5/14/03

#1

Vin	Iin	Vout	Iout	Efficiency
3.30	0.035	1.811	0	
2.99	2.018	1.809	3.010	0.902
3.31	1.828	1.810	3.010	0.900
3.60	1.679	1.809	3.010	0.901
4.50	1.361	1.811	3.010	0.890
5.00	1.234	1.809	3.010	0.883
5.51	1.128	1.805	3.010	0.874
20MHz BW		<10mVpp		

#2

Vin	Iin	Vout	Iout	Efficiency
3.30	0.035	1.812	0	
2.99	2.029	1.812	3.010	0.899
3.30	1.835	1.812	3.010	0.901
3.61	1.680	1.812	3.010	0.899
4.50	1.362	1.813	3.010	0.890
5.00	1.235	1.812	3.010	0.883
5.52	1.132	1.811	3.010	0.872
20MHz BW		<10mVpp		

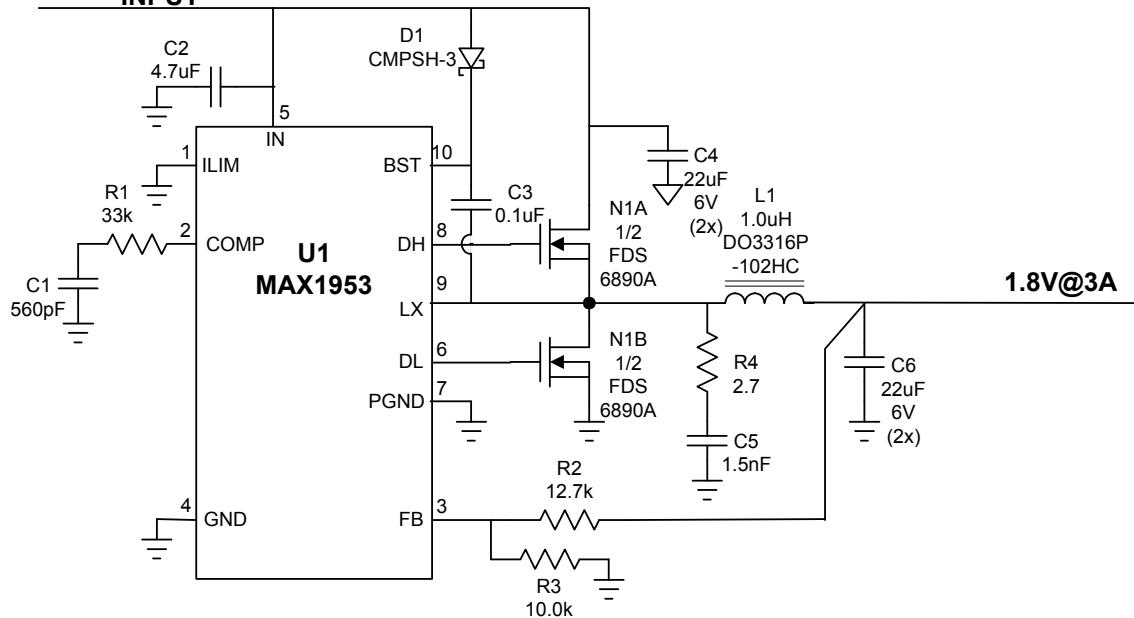
BILL OF MATERIALS**3.0V to 5.5V Input****1.8V @ 3A Output****5/09/03**

1953_1p8

DESIGNATION	QTY	DESCRIPTION
C1	1	560pF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK2126BJ475MG
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1uH Power Inductor Coilcraft DO3316P-102HC
N1	1	22m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6890A
R1	1	33k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)

3.0V to 5.5V

INPUT



1953_1p8

RWY

5/09/03

1953_1p8b 5/14/03

#1

Vin	Iin	Vout	Iout	Efficiency
3.30	0.035	1.811	0	
2.99	2.018	1.809	3.010	0.902
3.31	1.828	1.810	3.010	0.900
3.60	1.679	1.809	3.010	0.901
4.50	1.361	1.811	3.010	0.890
5.00	1.234	1.809	3.010	0.883
5.51	1.128	1.805	3.010	0.874
20MHz BW		<10mVpp		

#2

Vin	Iin	Vout	Iout	Efficiency
3.30	0.035	1.812	0	
2.99	2.029	1.812	3.010	0.899
3.30	1.835	1.812	3.010	0.901
3.61	1.680	1.812	3.010	0.899
4.50	1.362	1.813	3.010	0.890
5.00	1.235	1.812	3.010	0.883
5.52	1.132	1.811	3.010	0.872
20MHz BW		<10mVpp		

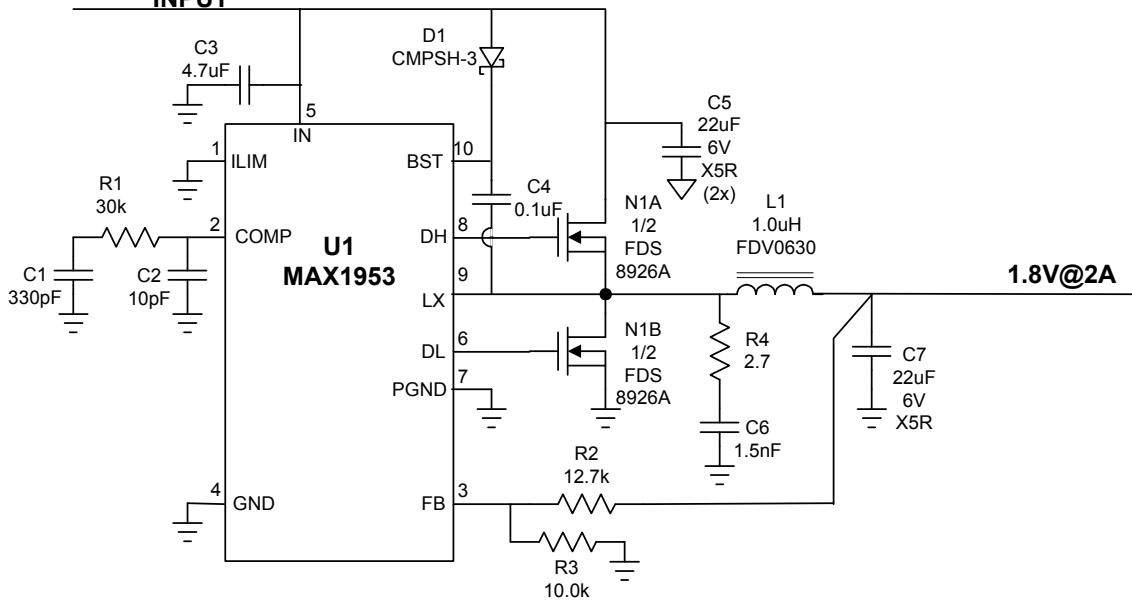
BILL OF MATERIALS**3.0V to 5.5V Input****1.8V @ 3A Output****5/09/03**

1953_1p8

DESIGNATION	QTY	DESCRIPTION
C1	1	560pF ceramic capacitor (0603)
C2	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK2126BJ475MG
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1uH Power Inductor Coilcraft DO3316P-102HC
N1	1	22m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6890A
R1	1	33k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX1953EUB (10-uMAX)

3.135V to 3.465V

INPUT



1953_1q8

RWY

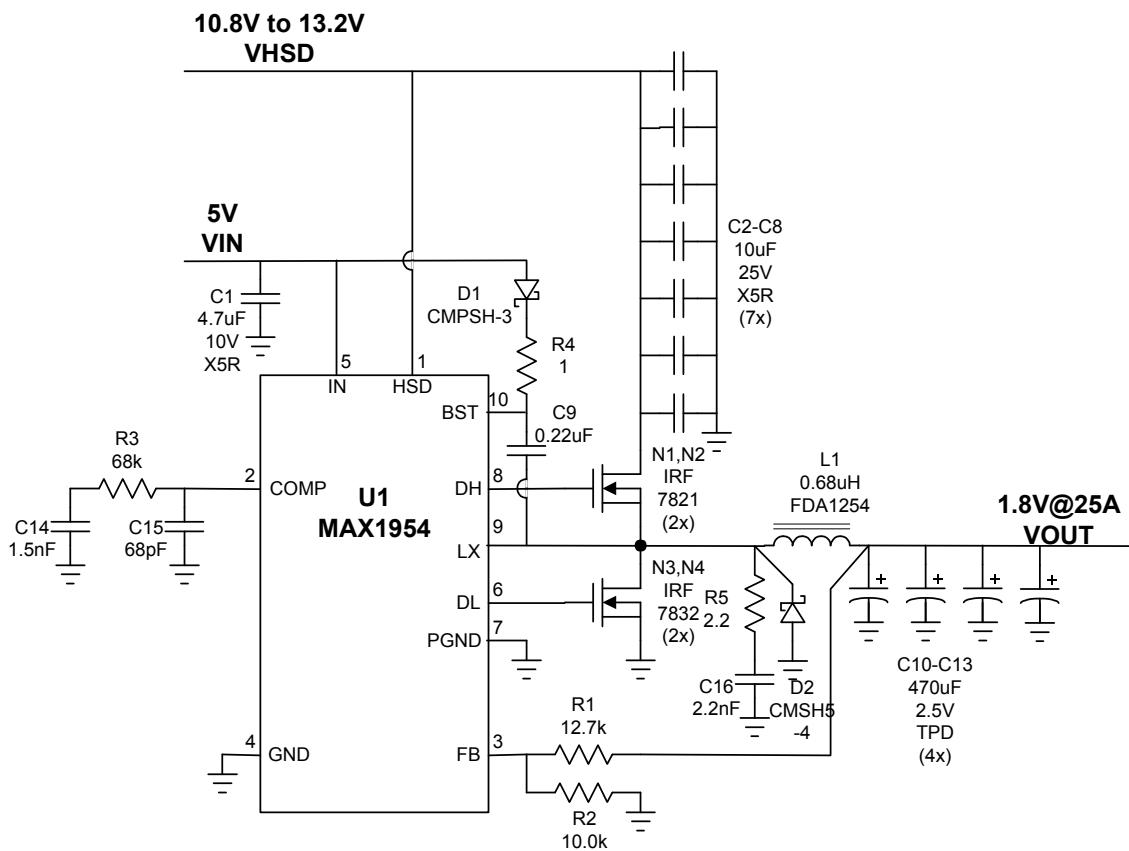
1/07/04

Vin	Iin	Vout	Iout	Efficiency
3.30	0.03	1.808	0	
3.10	1.29	1.807	2.00	0.904
3.31	1.21	1.807	2.00	0.902
3.51	1.14	1.806	2.00	0.903
20MHz BW		<10mVpp		

BILL OF MATERIALS
3.135V to 3.465V Input
1.8V @ 2A Output
1/07/04

1953_1q8

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	10pF ceramic capacitor (0603)
C3	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK2126BJ475MG
C4	1	0.1uF ceramic capacitor (0603)
C5,C7	3	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C6	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
L1	1	1uH 7.7A Power Inductor Toko FDV0630-1R0
N1	1	38m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	30k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)



1954_118
RWY
12/12/03

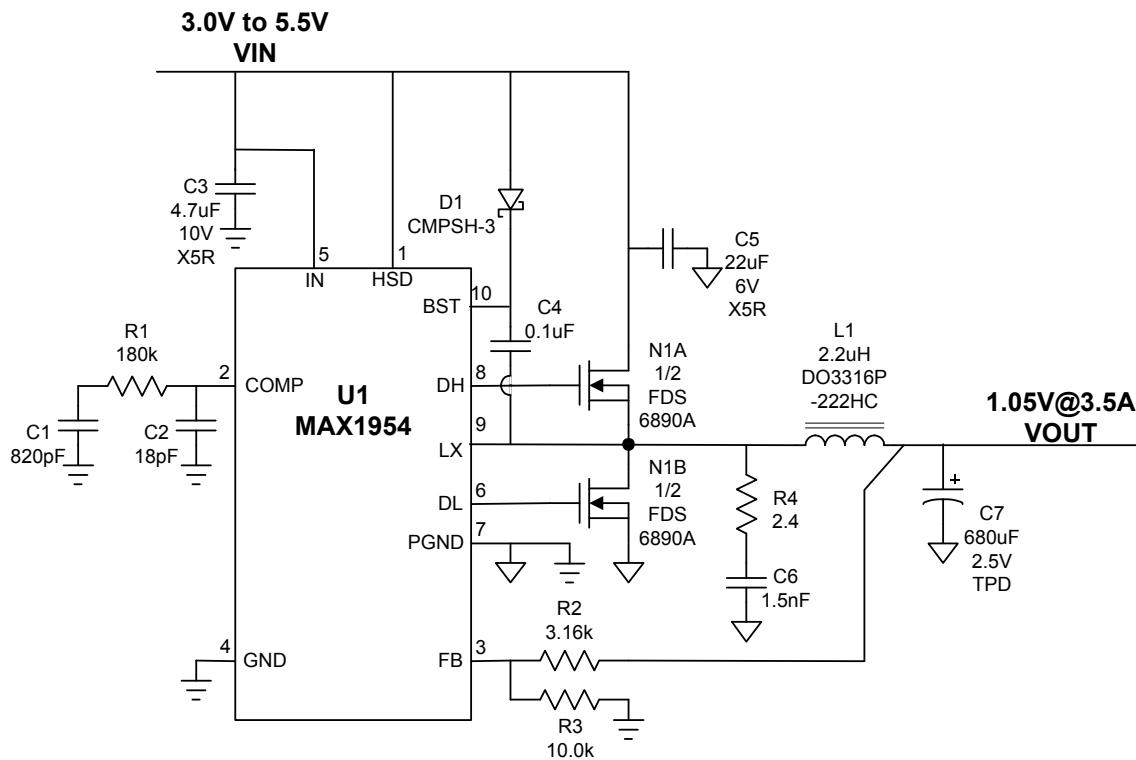
MAXIM CONFIDENTIAL

Vin	Iin	Vout	Iout	Efficiency
12.00	0.029	1.816	0	
10.78	4.76	1.798	25	0.876
12.00	4.29	1.797	25	0.873
13.22	3.89	1.797	25	0.874
20MHz BW		30mVpp		

BILL OF MATERIALS**10.8V to 13.2V Input****1.8V @ 25A Output****12/12/03**

1954_118

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C2-C8	7	10uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ106MM
C9	1	0.22uF ceramic capacitor (0603)
C10-C13	4	470uF 2.5V polymer capacitor Sanyo 2R5TPD470M
C14	1	1.5nF ceramic capacitor (0603) Kemet C0603C152K8RAC
C15	1	68pF ceramic capacitor (0603) Kemet C0603C680K5GAC
C16	1	2.2nF ceramic capacitor (0603) Kemet C0603C222K8RAC
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
D2	1	5A 40V Schottky diode Central Semi CMSH5-4
L1	1	0.68uH 39A Inductor Toko FDA1254-R68
N1,N2	2	12.5m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7821
N3,N4	2	4.8m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7832
R1	1	12.7k Ohm 1% resistor (0603)
R2	1	10.0k Ohm 1% resistor (0603)
R3	1	68k Ohm 5% resistor (0603)
R4	1	1 Ohm 5% resistor (0603)
R5	1	2.2 Ohm 5% resistor (1206)
U1	1	MAX1954EUB (10-uMAX)



1954_1a0

RWY

4/25/03

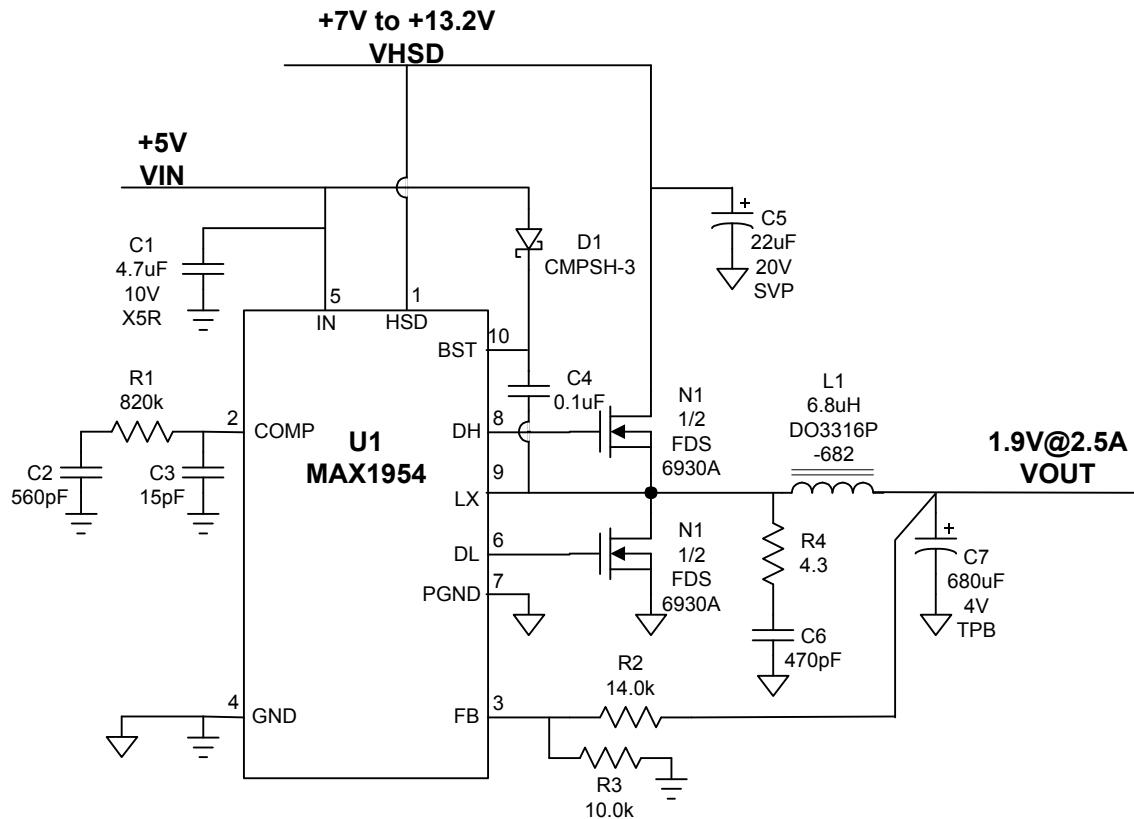
Vin	Iin	Vout	Iout	Efficiency
3.31	0.021	1.048	0	
2.99	1.377	1.045	3.5	0.888
3.31	1.247	1.044	3.5	0.885
3.61	1.145	1.045	3.5	0.882
4.50	0.922	1.045	3.5	0.877
5.00	0.833	1.043	3.5	0.872
5.52	0.757	1.041	3.5	
20MHz BW		40mVpp		

BILL OF MATERIALS

**3.0V to 5.5V Input
1.05V @ 3.5A Output
4/25/03**

1954_1a0

DESIGNATION	QTY	DESCRIPTION
C1	1	820pF ceramic capacitor (0603)
C2	1	18pF ceramic capacitor (0603)
C3	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF ceramic capacitor (0603)
C5	1	22uF 6V X5R ceramic capacitor Taiyo Yuden JMK325BJ226MM
C6	1	1.5nF ceramic capacitor (0603)
C7	1	680uF 2.5V polymer capacitor Sanyo 2R5TPD680M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L2	1	2.2uH 7.8A Inductor Coilcraft DO3316P-222HC
N1	1	22m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS6890A
R1	1	180k Ohm 5% resistor (0603)
R2	1	3.16k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.4 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



1954_1a9

RWY

3/03/03

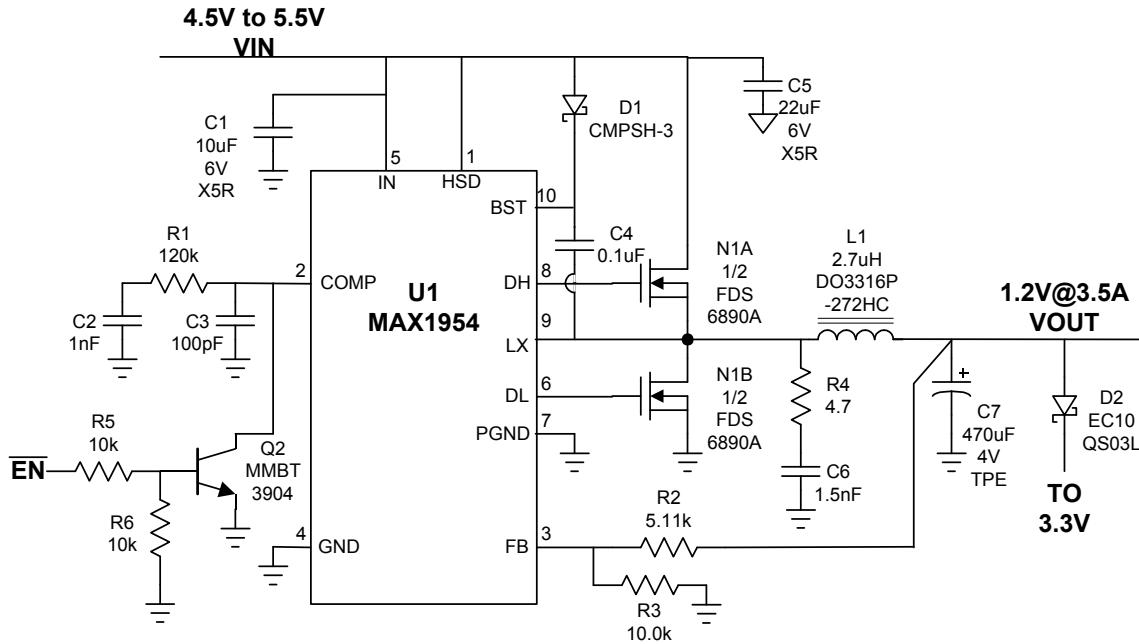
Vin	Iin	Vhsd	Ihsd	Vout	Iout	Efficiency
5.0127	0.0036	8.006	0.0066	1.895	0	
5.0126	0.0040	6.984	0.7654	1.895	2.5059	0.885
5.0126	0.0040	8.014	0.6686	1.894	2.5059	0.883
5.0127	0.0038	12.074	0.4470	1.895	2.5060	0.877
5.0127	0.0038	13.239	0.4087	1.896	2.5060	0.875
20MHz BW				30mVpp		

BILL OF MATERIALS**7V to 13.2V Input****1.9V @ 2.5A Output**

3/03/03

1954_1a9

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C2	1	560pF ceramic capacitor (0603)
C3	1	15pF ceramic capacitor (0603)
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	1	22uF 20V polymer capacitor Sanyo 20SVP22M
C6	1	470pF ceramic capacitor (0603)
C7	1	680uF 4V polymer capacitor Sanyo 4TPB680M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	6.8uH 4.6A Inductor Coilcraft DO3316P-682
N1	1	55m Ohm 30V N-ch MOSFET (SO-8) Fairchild FDS6930A
R1	1	820k Ohm 5% resistor (0603)
R2	1	14.0k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	4.3 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



1954_1d2
RWY
11/26/03

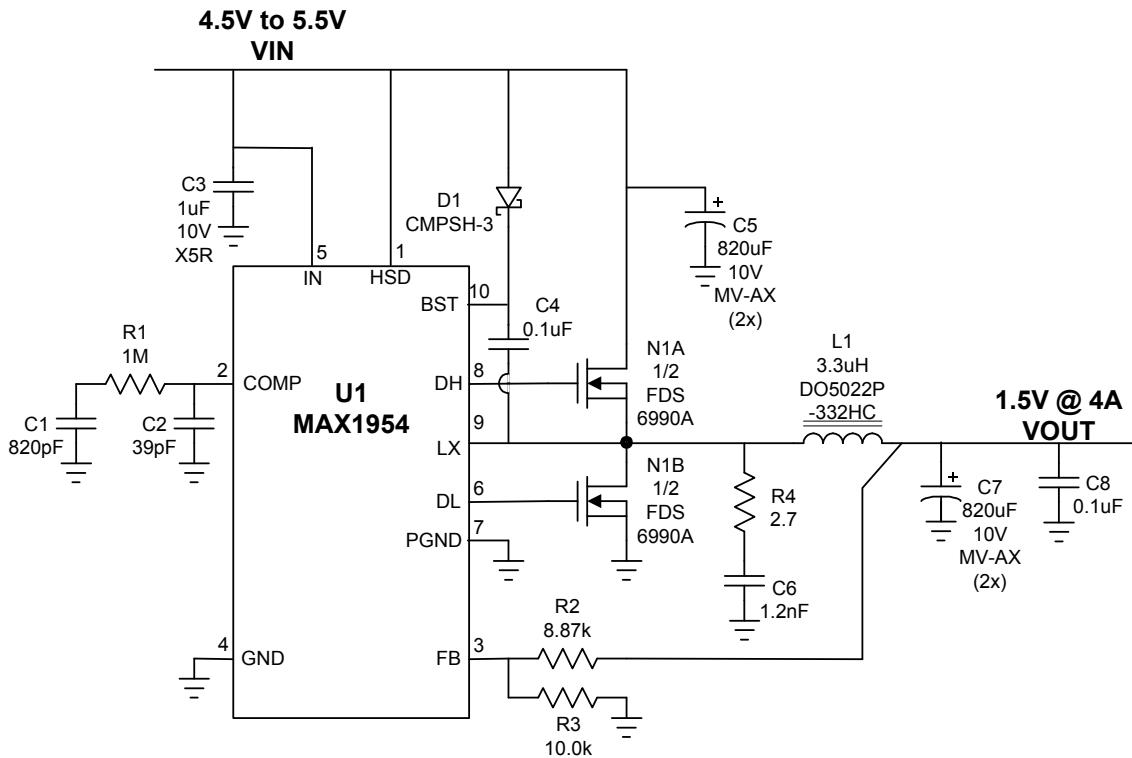
Vin	Iin	Vout	Iout	Efficiency
5.01	0.027	1.216	0	
4.48	1.073	1.214	3.5	0.884
5.01	0.963	1.213	3.5	0.880
5.51	0.878	1.212	3.5	0.877
20MHz BW		30mVpp		

1.2V should be enabled at least 2msec before 3.3V.

BILL OF MATERIALS**4.5V to 5.5V Input****1.2V @ 3.5A Output****11/26/03**

1954_1d2

DESIGNATION	QTY	DESCRIPTION
C1	1	10uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C2	1	1nF ceramic capacitor (0603)
C3	1	100pF ceramic capacitor (0603)
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	1	22uF 6V X5R ceramic capacitor Taiyo Yuden JMK325BJ226MM
C6	1	1.5nF ceramic capacitor (0603)
C7	1	470uF 4V polymer capacitor Sanyo 4TPE470ML
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	1A 30V Schottky diode Nihon EC10QS03L
L1	1	2.7uH 7A Inductor Coilcraft DO3316P-272HC
N1	1	18m Ohm 30V N-ch Dual MOSFET (SO-8) Fairchild FDS6890A
Q2	1	200mA 30V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	120k Ohm 5% resistor (0603)
R2	1	5.11k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	4.7 Ohm 5% resistor (0603)
R5,R6	2	10k Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



1954_1e5

RWY

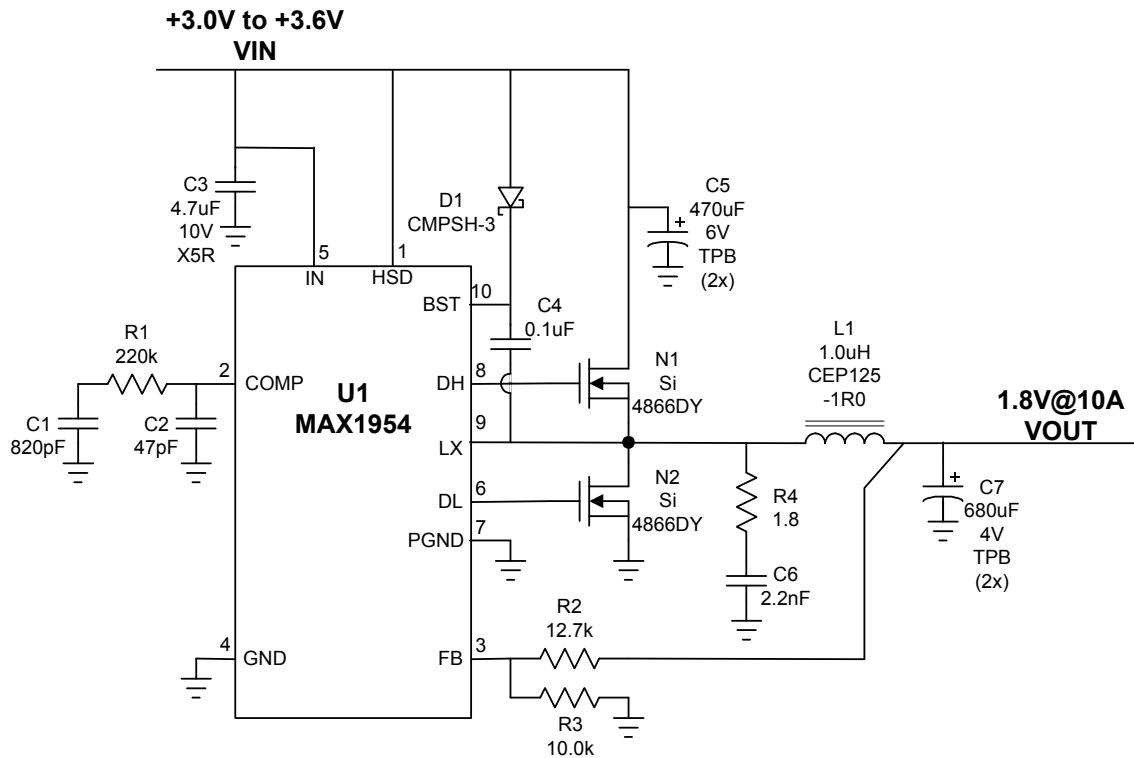
12/30/02

Vin	Iin	Vout	Iout	Efficiency
5.0073	0.0172	1.5064	0	
4.4900	1.5155	1.5041	4.009	0.886
5.0078	1.3591	1.5043	4.009	0.886
5.522	1.2327	1.5041	4.009	0.886
20MHz BW		40mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****1.5V @ 4A Output****12/30/02**

1954_1e5

DESIGNATION	QTY	DESCRIPTION
C1	1	820pF ceramic capacitor (0603)
C2	1	39pF ceramic capacitor (0603)
C3	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C4,C8	2	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5,C7	4	820uF 10V aluminum electrolytic capacitor Sanyo 10MV820AX
C6	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	3.3uH 17A Inductor Coilcraft DO5022P-332HC
N1	1	23m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6990A
R1	1	1M Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



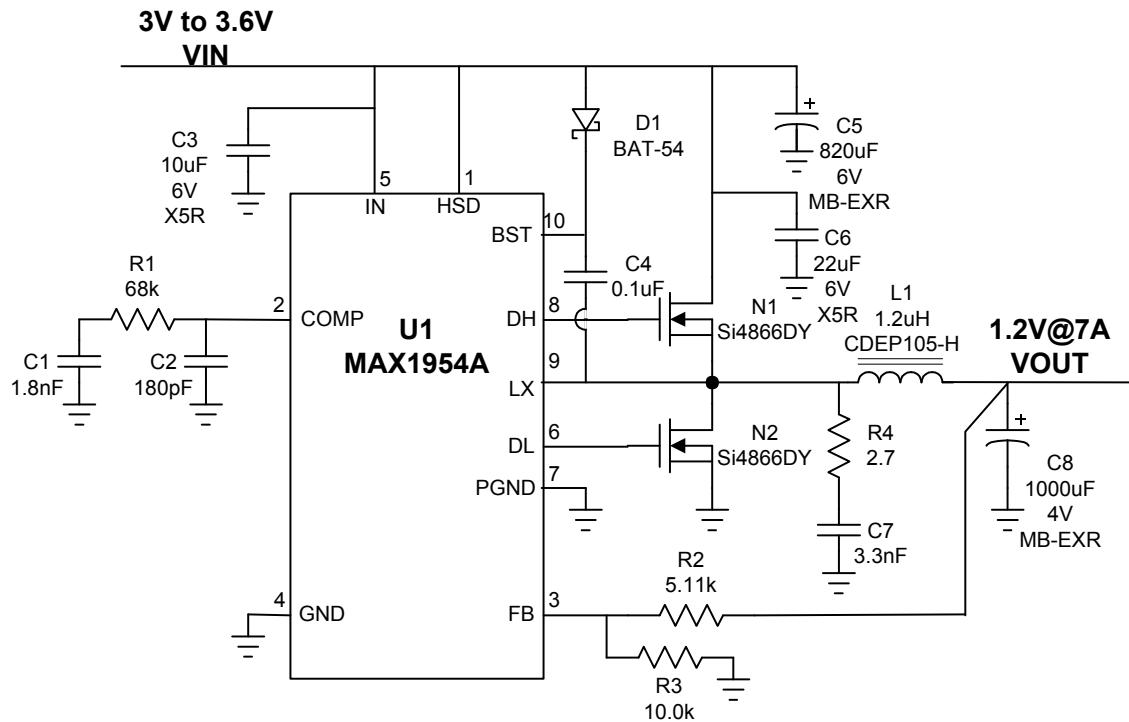
1954_1e8
RWY
11/19/02

Vin	Iin	Vout	Iout	Efficiency
3.2969	0.0275	1.8109	0	
2.9900	6.623	1.8075	10.019	0.914
3.3014	6.012	1.8080	10.020	0.913
3.6020	5.520	1.8083	10.020	0.911
20MHz BW		50mVpp		

BILL OF MATERIALS**3V to 3.6V Input****1.8V @ 10A Output****11/21/02**

1954_1e8

DESIGNATION	QTY	DESCRIPTION
C1	1	820pF ceramic capacitor (0603)
C2	1	47pF ceramic capacitor (0603)
C3	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	2	470uF 6V polymer capacitor Sanyo 6TPB470M
C6	1	2.2nF ceramic capacitor (0603)
C7	2	680uF 4V polymer capacitor Sanyo 4TPB680M
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	1uH 20A Inductor Sumida CEP125-1R0
N1,N2	2	8m Ohm 20V N-ch MOSFET (SO-8) Siliconix Si4866DY
R1	1	220k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	1.8 Ohm 5% resistor (0805)
U1	1	MAX1954EUB (10-uMAX)



1954_1f2

RWY

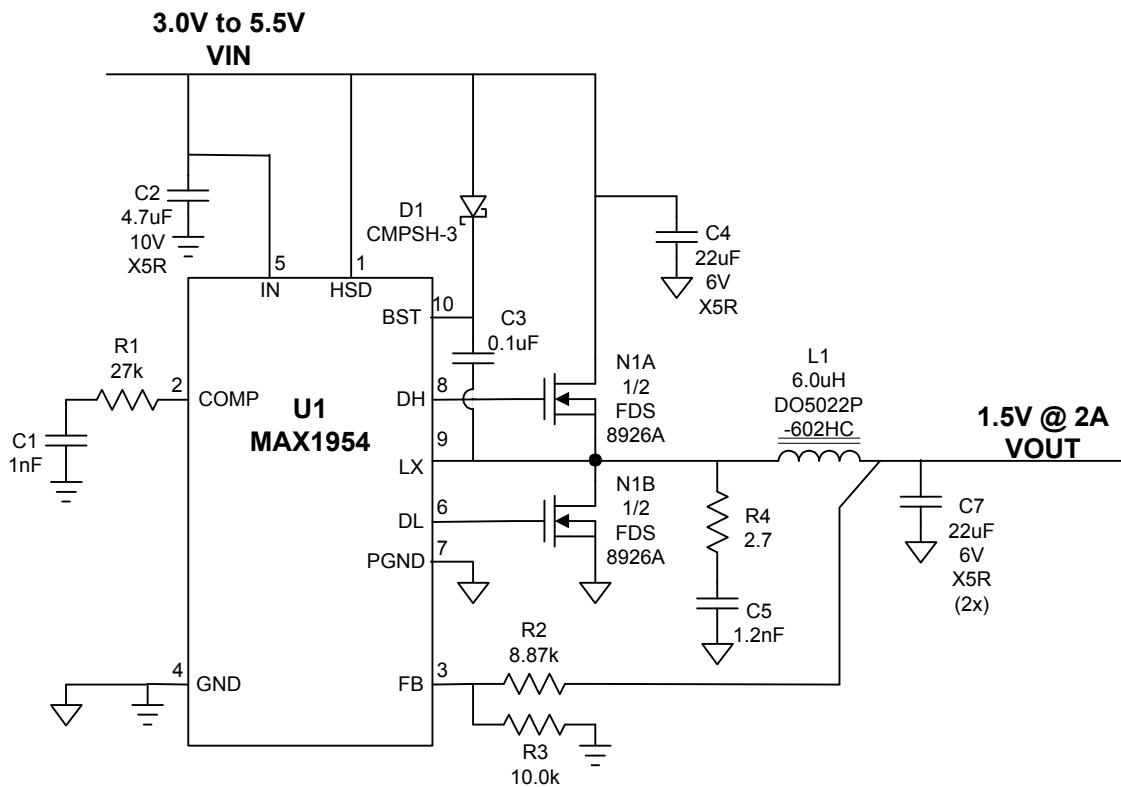
1/27/04

Vin	Iin	Vout	Iout	Efficiency
3.31	0.033	1.207	0	
2.98	3.21	1.202	7	0.880
3.30	2.90	1.201	7	0.879
3.62	2.64	1.201	7	0.880
20MHz BW		60mVpp		

BILL OF MATERIALS**3V to 3.6V Input****1.2V @ 7A Output****1/27/04**

1954_1f2

DESIGNATION	QTY	DESCRIPTION
C1	1	1.8nF ceramic capacitor (0603)
C2	1	180pF ceramic capacitor (0603)
C3	1	10uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C4	1	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	1	820uF 6V polymer electrolytic capacitor Sanyo 6MB820EXR
C6	1	22uF 6V X5R ceramic capacitor Taiyo Yuden JMK325BJ226MM
C7	1	3.3nF ceramic capacitor (0603)
C8	1	1000uF 4V polymer electrolytic capacitor Sanyo 4MB1000EXR
D1	1	200mA 30V Schottky diode (SOT-23) BAT-54
L1	1	1.2uH 21A Inductor Sumida CDEP105-1R2-H
R1	1	68k Ohm 5% resistor (0603)
R2	1	5.11k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954AEUB (10-uMAX)



1954_1f5
 RWY
 1/23/03

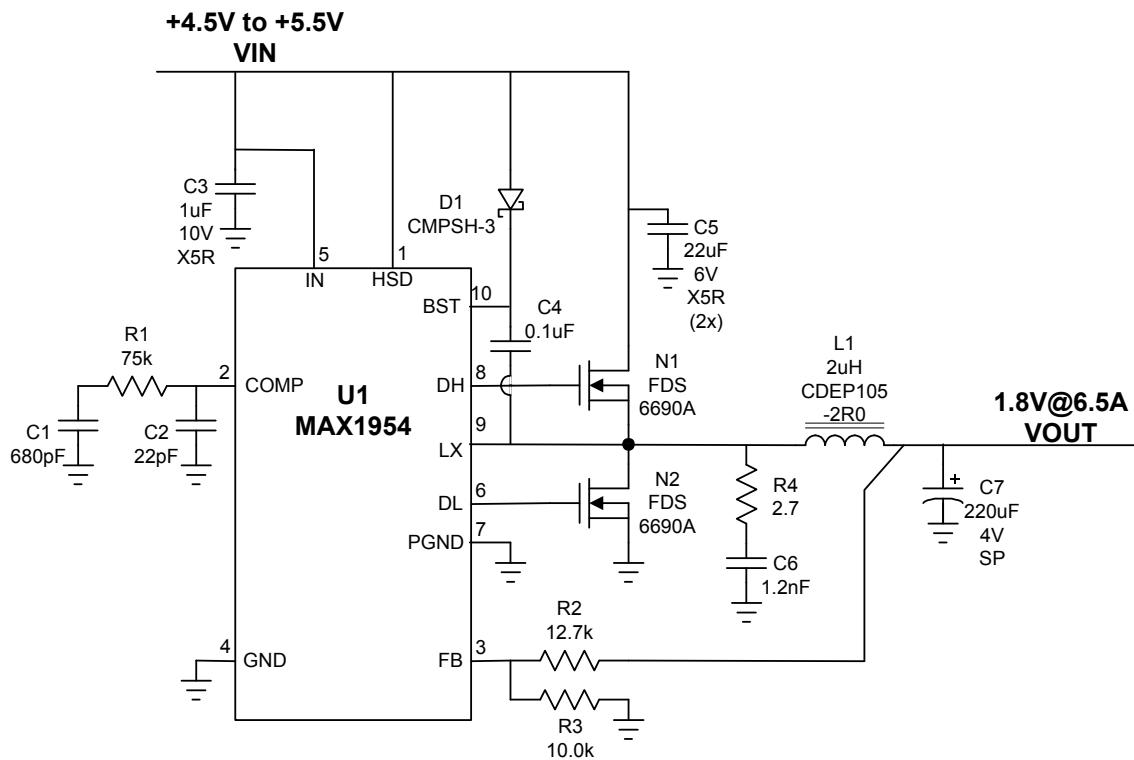
Vin	Iin	Vout	Iout	Efficiency
3.2980	0.0122	1.5071	0	
2.9932	1.0991	1.5056	2.010	0.920
3.2942	0.9993	1.5057	2.010	0.919
3.6076	0.9135	1.5057	2.010	0.918
4.5046	0.7355	1.5053	2.010	0.913
5.514	0.6067	1.5021	2.010	0.903
20MHz BW		10mVpp		

BILL OF MATERIALS**3.0V to 5.5V Input****1.5V @ 2A Output**

1/23/03

1954_1f5

DESIGNATION	QTY	DESCRIPTION
C1	1	1nF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	3	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	1.2nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	6.0uH 12A Inductor Coilcraft DO5022P-602HC
N1	1	38m Ohm 20V N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	27k Ohm 5% resistor (0603)
R2	1	8.87k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



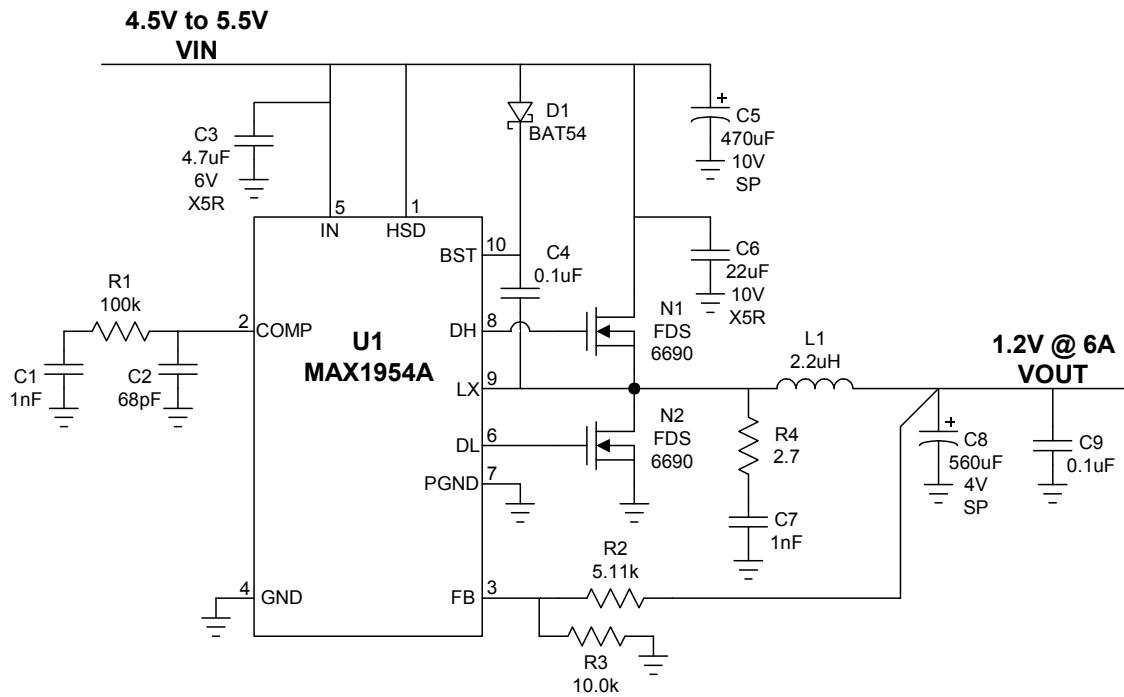
1954_1f8
RWY
12/19/02

Vin	Iin	Vout	Iout	Efficiency
4.9921	0.0246	1.8088	0	
4.4980	2.9554	1.8046	6.515	0.884
4.9955	2.6618	1.8049	6.515	0.884
5.501	2.4183	1.8050	6.515	0.884
20MHz BW		40mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****1.8V @ 6.5A Output****12/20/02**

1954_1f8

DESIGNATION	QTY	DESCRIPTION
C1	1	680pF ceramic capacitor (0603)
C2	1	22pF ceramic capacitor (0603)
C3	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C4	1	0.1uF ceramic capacitor (0603)
C5	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C6	1	1.2nF ceramic capacitor (0603)
C7	1	220uF 4V polymer capacitor Sanyo 4TPE220MF
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L2	1	2uH 15A Inductor Sumida CDEP105-2R0
N1,N2	1	17m Ohm 30V N-ch MOSFET (SO-8) Fairchild FDS6690A
R1	1	75k Ohm 5% resistor (0603)
R2	1	12.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954EUB (10-uMAX)



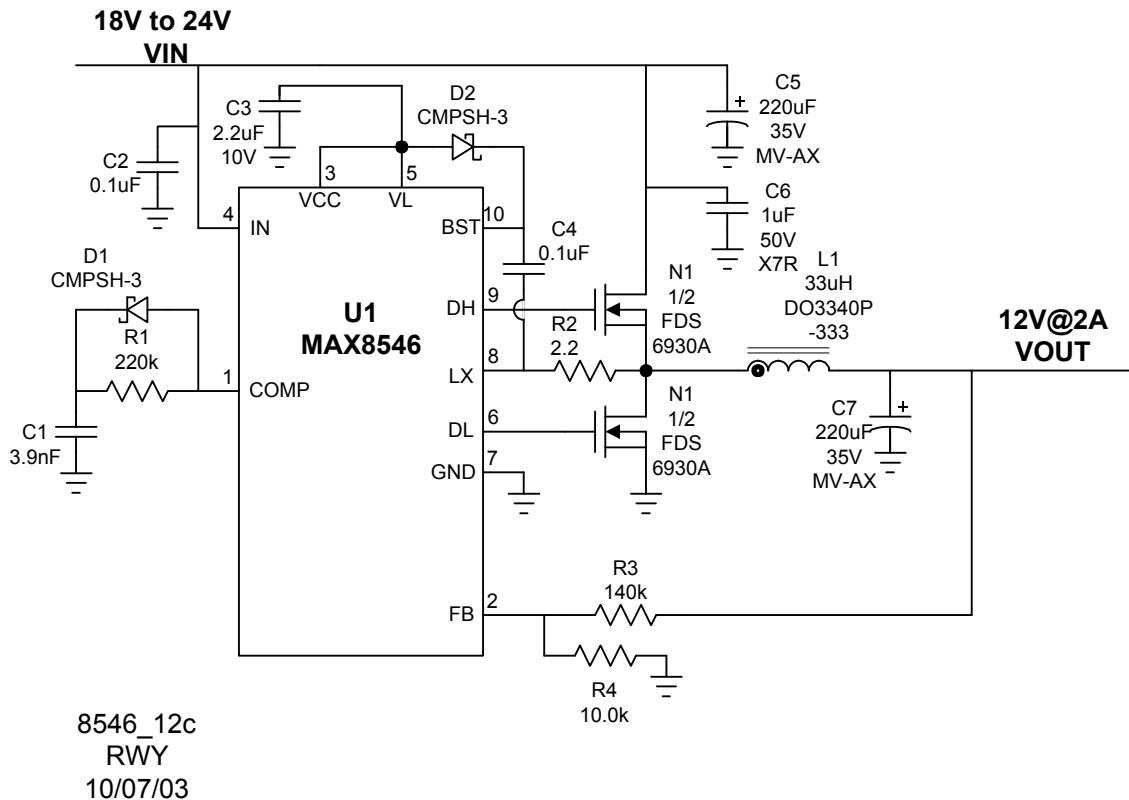
1954_1g2
RWY
7/28/04

Vin	Iin	Vout	Iout	Efficiency
5.007	0.0165	1.208	0	
4.4935	1.8761	1.204	6	0.861
5.009	1.6674	1.203	6	0.866
5.522	1.5084	1.203	6	0.867
20MHz BW		30mVpp		

BILL OF MATERIALS**4.5V to 5.5V Input****1.2V @ 6A Output****7/28/04**

1954_1g2

DESIGNATION	QTY	DESCRIPTION
C1,C7	2	1nF ceramic capacitor (0603)
C2	1	68pF ceramic capacitor (0603)
C3	1	4.7uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ475ML
C4,C9	2	0.1uF 16V X5R ceramic capacitor (0603) Taiyo Yuden EMK107BJ104MA
C5	1	470uF 10V organic semiconductor capacitor Sanyo OS-CON 10SP470M
C6	1	22uF 10V X5R ceramic capacitor (1210) Taiyo Yuden LMK325BJ226MM
C8	1	560uF 4V organic semiconductor capacitor Sanyo OS-CON 4SP560M
D1	1	100mA 30V Schottky diode (SOT-23) BAT54
L1	1	2.2uH 22A Power Inductor Pulse Engineering PG0077.202
N1,N2	2	20m Ohm 30V N-ch MOSFET (SO-8) Fairchild FDS6690
R1	1	100k Ohm 5% resistor (0603)
R2	1	5.11k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	2.7 Ohm 5% resistor (0603)
U1	1	MAX1954AEUB (10-uMAX)

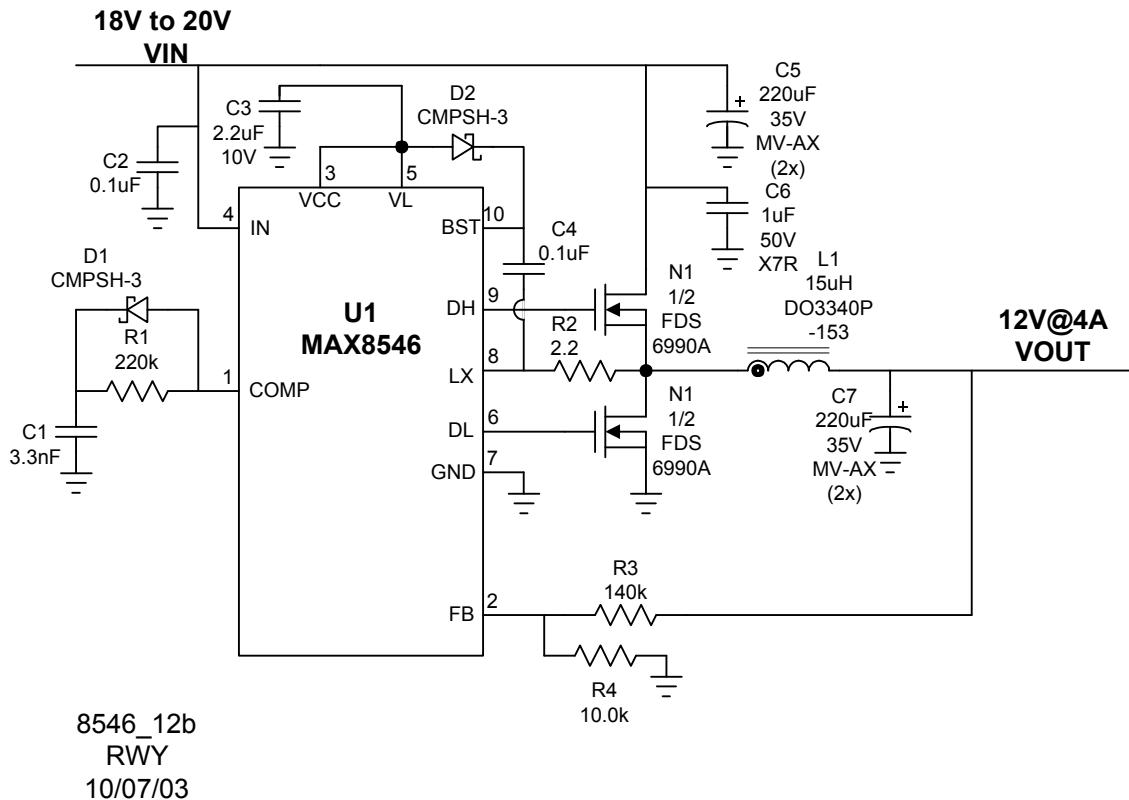


Vin	Iin	Vout	Iout	Efficiency
21.07	0.012	11.88	0	
18.00	1.38	11.75	2	0.946
21.09	1.18	11.75	2	0.944
24.06	1.04	11.77	2	0.941
20MHz BW		30mVpp		

BILL OF MATERIALS**18V to 24V Input****12V @ 2A Output****10/07/03**

8546_12c

DESIGNATION	QTY	DESCRIPTION
C1	1	3.9nF ceramic capacitor (0805)
C2,C4	2	0.1uF 50V ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5,C7	2	220uF 35V aluminum electrolytic capacitor Sanyo 35MV220AX
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	2	33uH 4A Power inductor Coilcraft DO3340P-333
N1	1	55m Ohm Dual N-chan MOSFET (SO-8) Fairchild FDS6930A
R1	1	220k Ohm 5% resistor (0805)
R2	1	2.2 Ohm 5% resistor (0603)
R3	1	140k Ohm 1% resistor (0805)
R4	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)

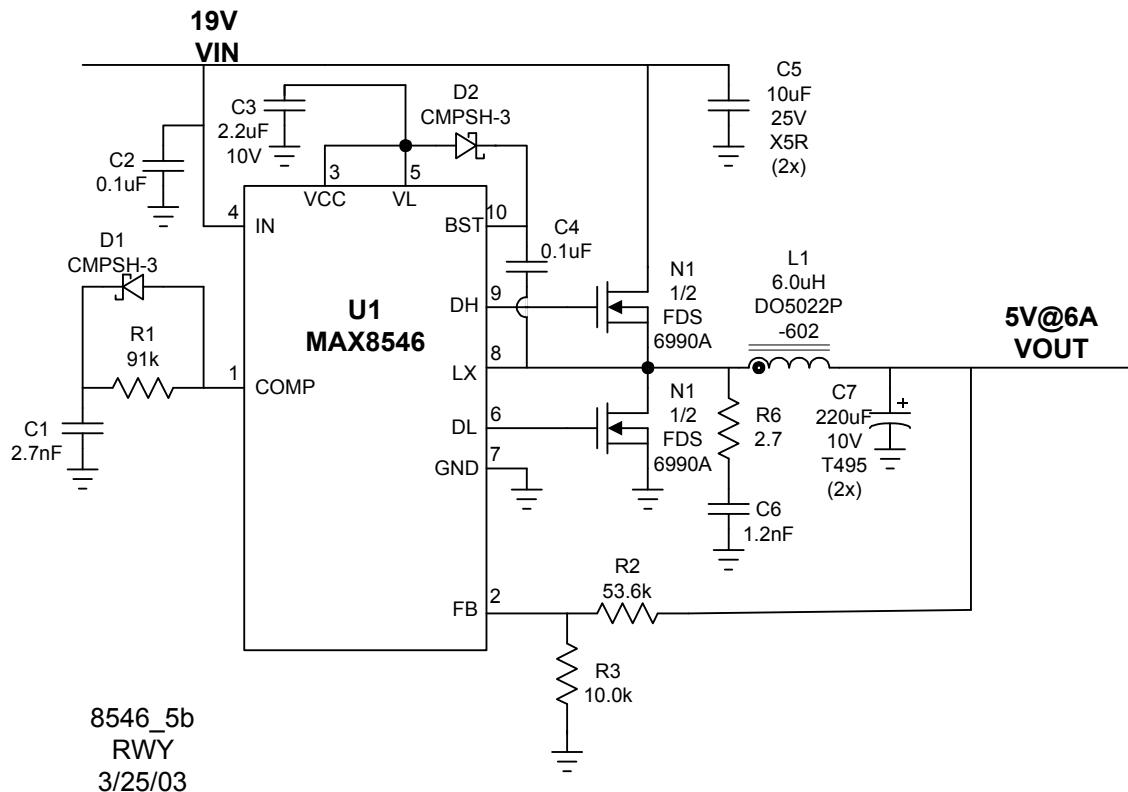


Vin	Iin	Vout	Iout	Efficiency
19.009	0.021	11.87	0	
18.00	2.76	11.81	4	0.951
19.02	2.63	11.81	4	0.944
20.03	2.50	11.81	4	0.943
20MHz BW		20mVpp		

BILL OF MATERIALS**18V to 20V Input****12V @ 4A Output****10/07/03**

8546_12b

DESIGNATION	QTY	DESCRIPTION
C1	1	3.3nF ceramic capacitor (0805)
C2,C4	2	0.1uF 50V ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5,C7	4	220uF 35V aluminum electrolytic capacitor Sanyo 35MV220AX
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	2	15uH 7A Power inductor Coilcraft DO3340P-153
N1	1	23m Ohm Dual N-chan MOSFET (SO-8) Fairchild FDS6990A
R1	1	220k Ohm 5% resistor (0805)
R2	1	2.2 Ohm 5% resistor (0603)
R3	1	140k Ohm 1% resistor (0805)
R4	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)



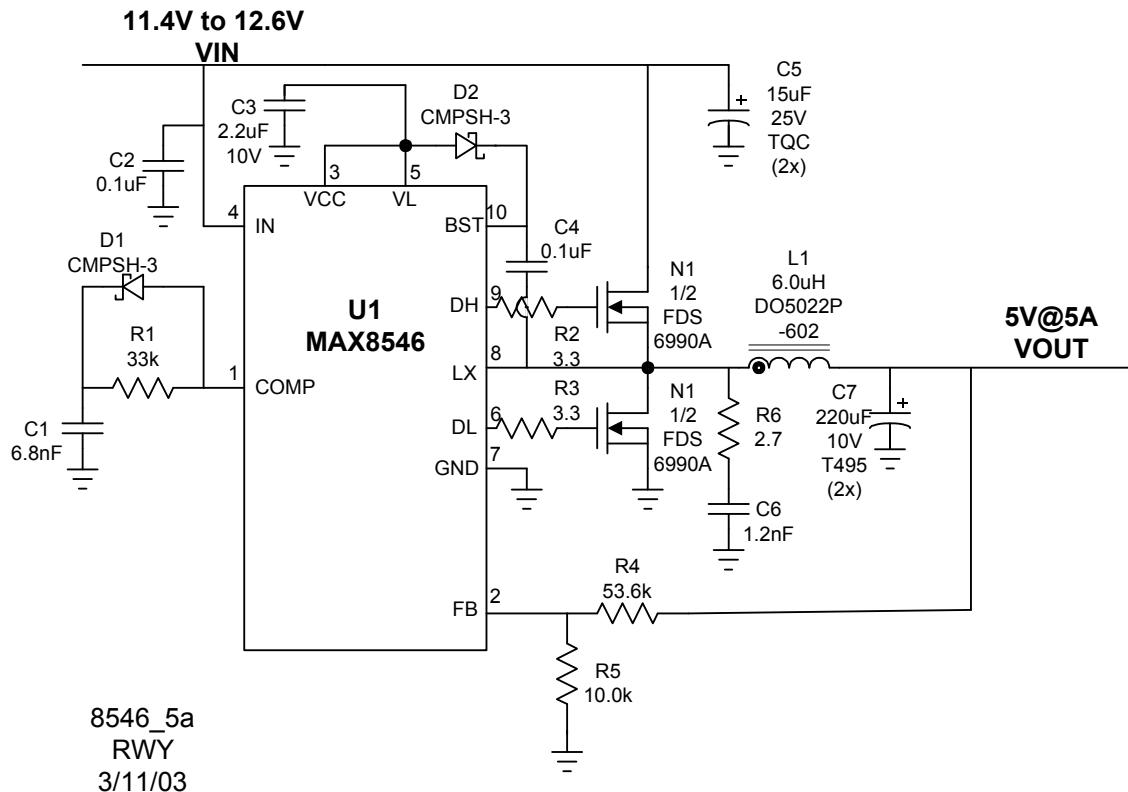
Vin	Iin	Vout	Iout	Efficiency
19.002	0.0259	5.06	0	
19.028	1.7328	5.05	6.007	0.920
20MHz BW		80mVpp		

BILL OF MATERIALS**19V Input****5V @ 6A Output**

3/25/03

8546_5b

DESIGNATION	QTY	DESCRIPTION
C1	1	2.7nF ceramic capacitor (0805)
C2,C4	2	0.1uF ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	2	10uF 25V X5R ceramic capacitor (1812) Taiyo Yuden TMK432BJ106MM
C6	1	1.2nF ceramic capacitor (0805)
C7	2	220uF 10V tantalum capacitor Kemet T495X227M010AS
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	6.0uH 12A Power inductor Coilcraft DO5022P-602HC
N1	1	23m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6990A
R1	1	91k Ohm 5% resistor (0805)
R2	1	53.6k Ohm 1% resistor (0805)
R3	1	10.0k Ohm 1% resistor (0805)
R4	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)

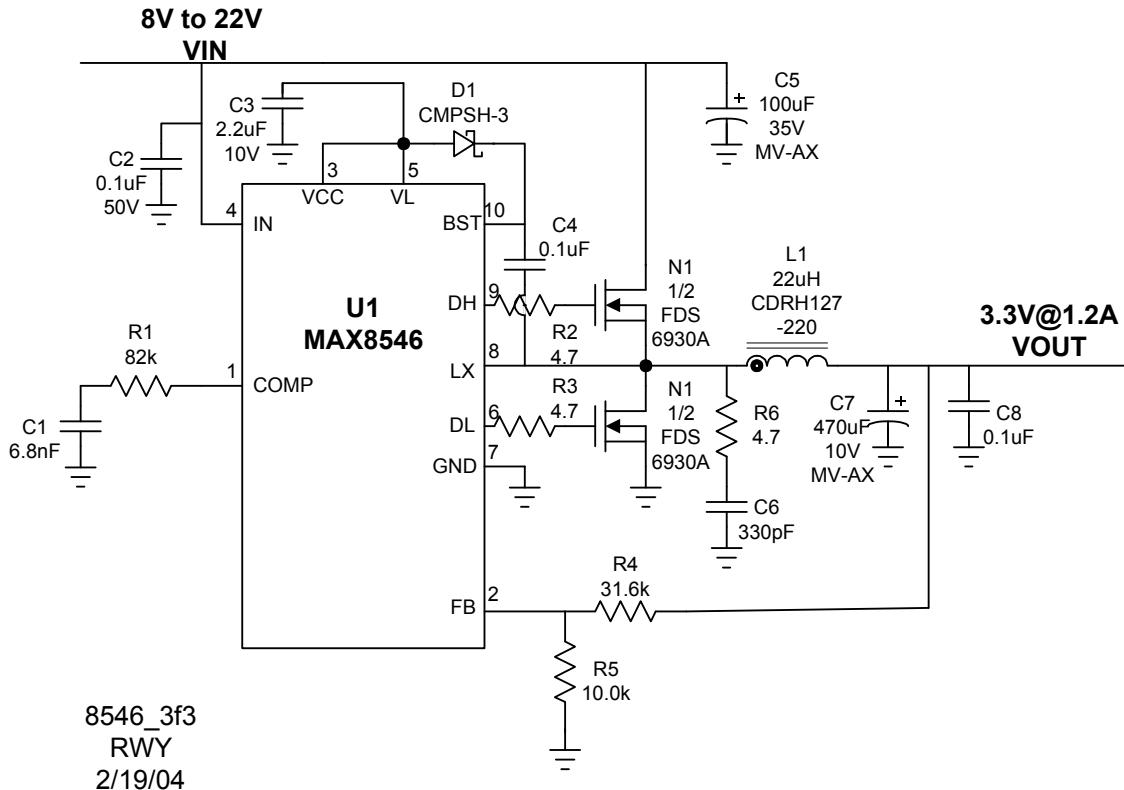


Vin	Iin	Vout	Iout	Efficiency
12.013	0.0217	5.03	0	
11.378	2.3565	5.00	5.0027	0.933
12.010	2.2382	5.00	5.0032	0.931
12.625	2.1329	5.00	5.0032	0.929
20MHz BW		70mVpp		

BILL OF MATERIALS**11.4V to 12.6V Input****5V @ 5A Output****3/11/03**

8546_5a

DESIGNATION	QTY	DESCRIPTION
C1	1	6.8nF ceramic capacitor (0805)
C2,C4	2	0.1uF ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	2	15uF 25V polymer capacitor Sanyo 25TQC15M
C6	1	1.2nF ceramic capacitor (0805)
C7	2	220uF 10V tantalum capacitor Kemet T495X227M010AS
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	6.0uH 12A Power inductor Coilcraft DO5022P-602HC
N1	1	23m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6990A
R1	1	33k Ohm 5% resistor (0805)
R2,R3	2	3.3 Ohm 5% resistor (0603)
R4	1	53.6k Ohm 1% resistor (0805)
R5	1	10.0k Ohm 1% resistor (0805)
R6	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)



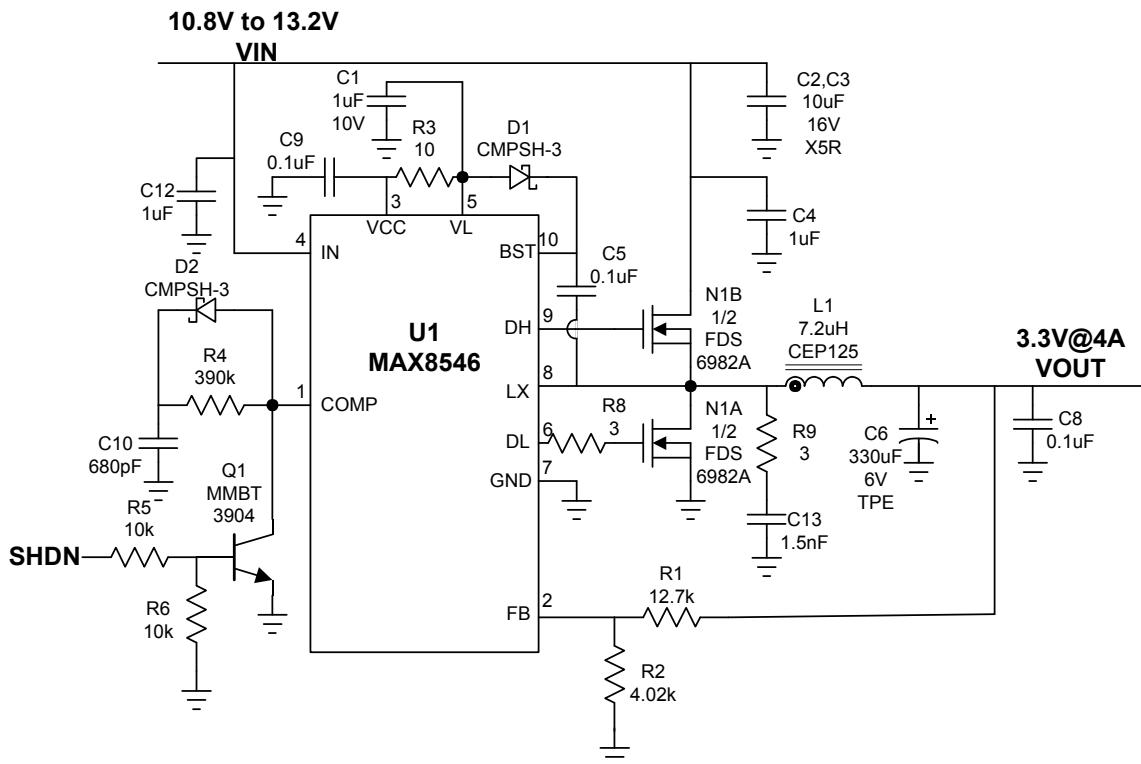
Vin	Iin	Vout	Iout	Efficiency
15.02	0.006	3.29	0	
7.98	0.53	3.27	1.21	0.936
12.05	0.35	3.26	1.21	0.935
15.03	0.29	3.26	1.21	0.905
22.00	0.20	3.26	1.21	0.897
20MHz BW		35mVpp		

BILL OF MATERIALS

**8V to 22V Input
3.3V @ 1.2A Output
2/19/04**

8546_3f3

DESIGNATION	QTY	DESCRIPTION
C1	1	6.8nF ceramic capacitor (0603)
C2	1	0.1uF 50V ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C4,C8	1	0.1uF ceramic capacitor (0603)
C5	1	100uF 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C6	1	330pF ceramic capacitor (0603)
C7	2	470uF 10V aluminum electrolytic capacitor Sanyo 10MV470AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	22uH 3.6A Power inductor Sumida CDRH127-220
N1	1	55m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6930A
R1	1	82k Ohm 5% resistor (0603)
R2,R3,R6	2	4.7 Ohm 5% resistor (0603)
R4	1	31.6k Ohm 1% resistor (0603)
R5	1	10.0k Ohm 1% resistor (0603)
U1	1	MAX8546EUB (10-uMAX)



8546_3b3

RWY

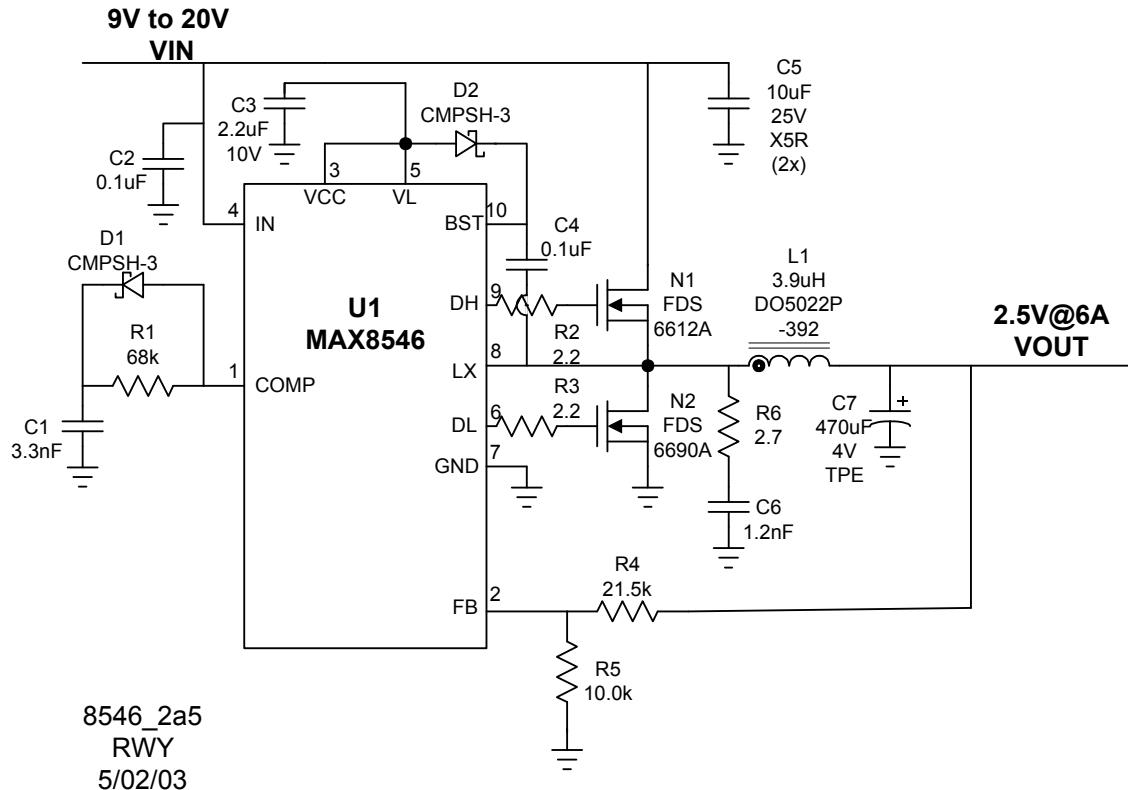
8/19/03

Vin	Iin	Vout	Iout	Efficiency
12.00	0.01	3.26	0	
10.75	1.29	3.25	4	0.937
12.01	1.16	3.26	4	0.936
13.25	1.06	3.26	4	0.928
20MHz BW		30mVpp		

BILL OF MATERIALS**10.8V to 13.2V Input****3.3V @ 4A Output****8/19/03**

8546_3b3

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2,C3	2	10uF 16V X5R ceramic capacitor (1210) Taiyo Yuden EMK325BJ106MN
C4,C12	2	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C6	1	330uF 6V polymer capacitor Sanyo 6TPE330MIL
C5,C8,C9	3	0.1uF 10V ceramic capacitor (0603)
C10	1	680pF ceramic capacitor (0805)
C13	1	1.5nF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	7.2uH 7.6A Power inductor Sumida CEP125-7R2-H
N1	1	20m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6982A
Q1	1	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	12.7k Ohm 1% resistor (0805)
R2	1	4.02k Ohm 1% resistor (0805)
R3	1	10 Ohm 5% resistor (0805)
R4	1	390k Ohm 5% resistor (0805)
R5,R6	2	10k Ohm 5% resistor (0805)
R8	1	3 Ohm 5% resistor (0603)
R9	1	3 Ohm 5% resistor (1206)
U1	1	MAX8546EUB (10-uMAX)



#1 - 5/13/03

Vin	Iin	Vout	Iout	Efficiency
14.99	0.021	2.502	0	
8.96	1.914	2.518	6.01	0.882
15.01	1.160	2.504	6.01	0.864
20.05	0.885	2.500	6.01	0.847
20MHz BW		50mVpp		

#2 - 5/13/03

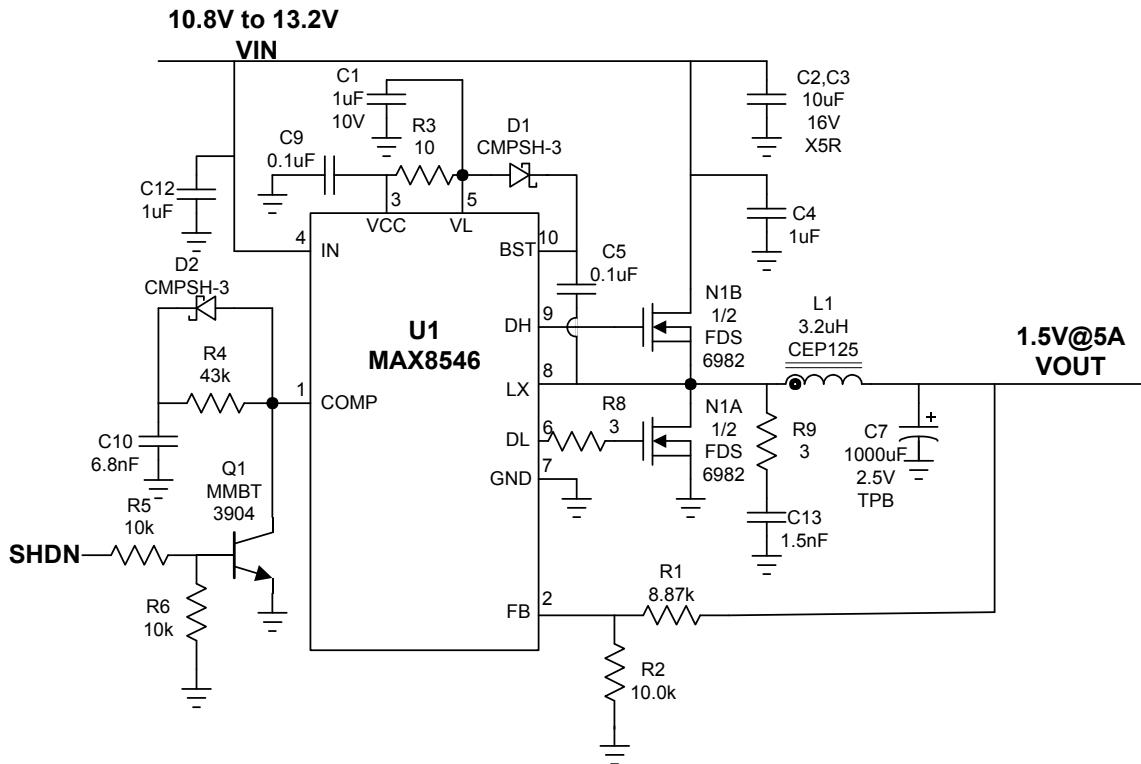
Vin	Iin	Vout	Iout	Efficiency
14.99	0.021	2.492	0	
8.95	1.867	2.492	6.01	0.896
14.99	1.129	2.481	6.01	0.881
20.05	0.857	2.476	6.01	0.866
20MHz BW		50mVpp		

BILL OF MATERIALS

**9V to 20V Input
2.5V @ 6A Output
5/02/03**

8546_2a5

DESIGNATION	QTY	DESCRIPTION
C1	1	3.3nF ceramic capacitor (0805)
C2,C4	2	0.1uF 25V ceramic capacitor (0805)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5	2	10uF 25V X5R ceramic capacitor Taiyo Yuden TMK432BJ106MM
C6	1	1.2nF ceramic capacitor (0805)
C7	1	470uF 4V polymer capacitor Sanyo 4TPE470M
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	3.9uH 15A Power inductor Coilcraft DO5022P-392HC
N1	1	30m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6612A
N2	1	17m Ohm 30V N-channel MOSFET (SO-8) Fairchild FDS6690A
R1	1	68k Ohm 5% resistor (0805)
R2,R3	2	2.2 Ohm 5% resistor (0603)
R4	1	21.5k Ohm 1% resistor (0805)
R5	1	10.0k Ohm 1% resistor (0805)
R6	1	2.7 Ohm 0.25W 5% resistor (1206)
U1	1	MAX8546EUB (10-uMAX)



8546_1b5

RWY

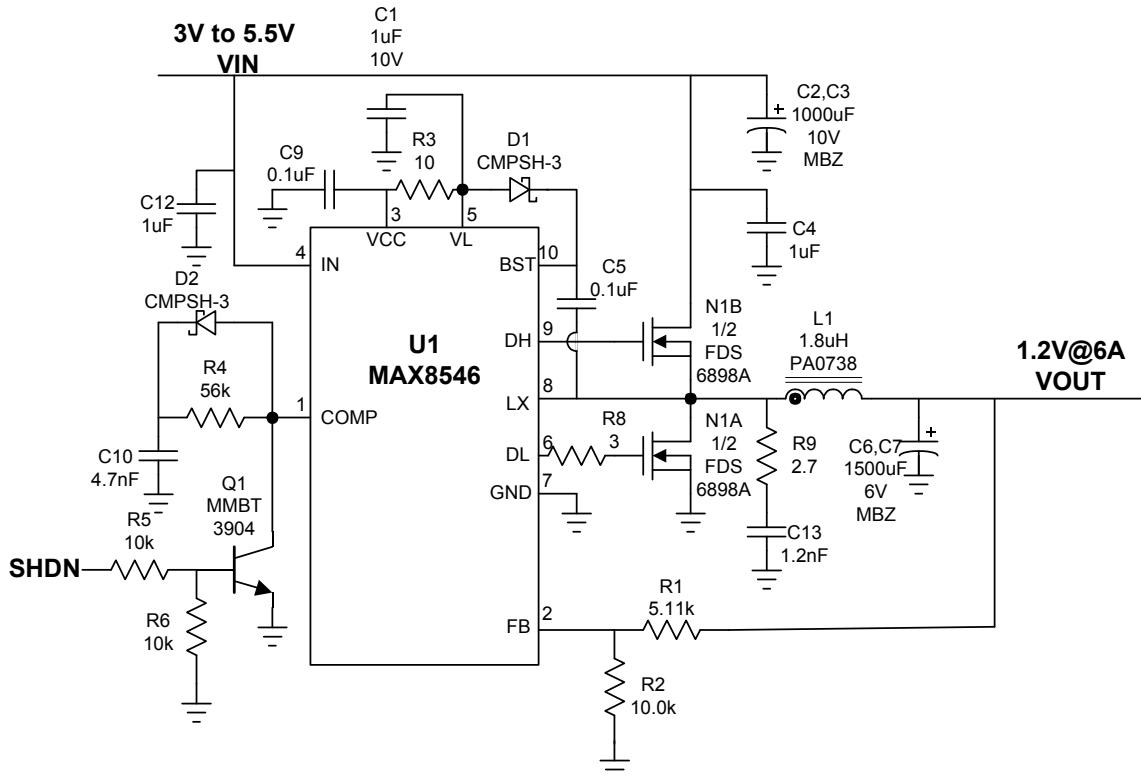
9/04/03

Vin	Iin	Vout	Iout	Efficiency
12.00	0.013	1.503	0	
10.75	0.803	1.501	5.02	0.873
12.01	0.723	1.501	5.02	0.868
13.25	0.660	1.501	5.03	0.863
20MHz BW		60mVpp		

BILL OF MATERIALS**10.8V to 13.2V Input****1.5V @ 5A Output****9/04/03**

8546_1b5

DESIGNATION	QTY	DESCRIPTION
C1	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2,C3	2	10uF 16V X5R ceramic capacitor (1210) Taiyo Yuden EMK325BJ106MN
C4,C12	2	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C5,C9	2	0.1uF 10V ceramic capacitor (0603)
C7	1	1000uF 2.5V polymer capacitor Sanyo 2R5TPB1000M
C10	1	6.8nF ceramic capacitor (0805)
C13	1	1.5nF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	3.2uH 9.9A Power inductor Sumida CEP125-3R2-U
N1	1	20m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6982
Q1	1	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	8.87k Ohm 1% resistor (0805)
R2	1	10.0k Ohm 1% resistor (0805)
R3	1	10 Ohm 5% resistor (0805)
R4	1	43k Ohm 5% resistor (0805)
R5,R6	2	10k Ohm 5% resistor (0805)
R8,R9	1	3 Ohm 5% resistor (0603)
U1	1	MAX8546EUB (10-uMAX)



8546_1b2

RWY

8/01/03

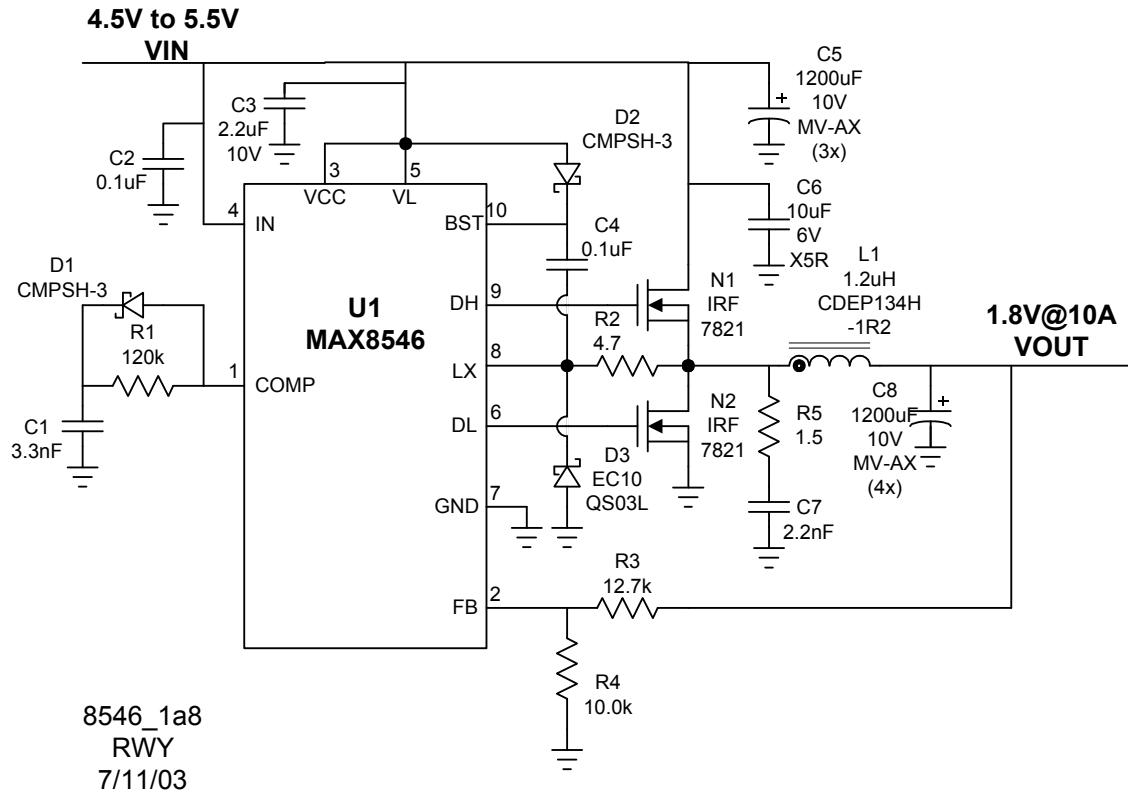
Vin	Iin	Vout	Iout	Efficiency
4.50	0.03	1.207	0	
2.97	2.91	1.214	6	0.843
3.60	2.38	1.203	6	0.842
4.50	1.90	1.202	6	0.844
5.52	1.55	1.202	6	0.843
20MHz BW		25mVpp		

Current limit is ~11A. For 1.3V output change R1 = 6.34k.

BILL OF MATERIALS**3V to 5.5V Input****1.2V @ 6A Output****8/12/03**

8546_1b2

DESIGNATION	QTY	DESCRIPTION
C1,C4,C12	1	1uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C2,C3	2	1000uF 10V aluminum electrolytic cap Rubycon MBZ (10x12.5)
C6,C7	2	1500uF 6V aluminum electrolytic cap Rubycon MBZ (10x12.5)
C5,C9	2	0.1uF 10V ceramic capacitor (0603)
C10	1	4.7nF ceramic capacitor (0805)
C13	1	1.2nF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	1.8uH 6A Power inductor Pulse Engineering PA0738
N1	1	14m Ohm 20V Dual N-ch MOSFET (SO-8) FDS6898A
Q1	1	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	5.11k Ohm 1% resistor (0805)
R2	1	10.0k Ohm 1% resistor (0805)
R3	1	10 Ohm 5% resistor (0805)
R4	1	56k Ohm 5% resistor (0805)
R5,R6	2	10k Ohm 5% resistor (0805)
R8	1	3 Ohm 5% resistor (0603)
R9	1	2.7 Ohm 5% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)



Vin	Iin	Vout	Iout	Efficiency
5.00	0.04	1.793	0	
4.49	4.61	1.785	10.04	0.866
4.99	4.14	1.783	10.04	0.866
5.51	3.74	1.781	10.04	0.868
20MHz BW		50mVpp		

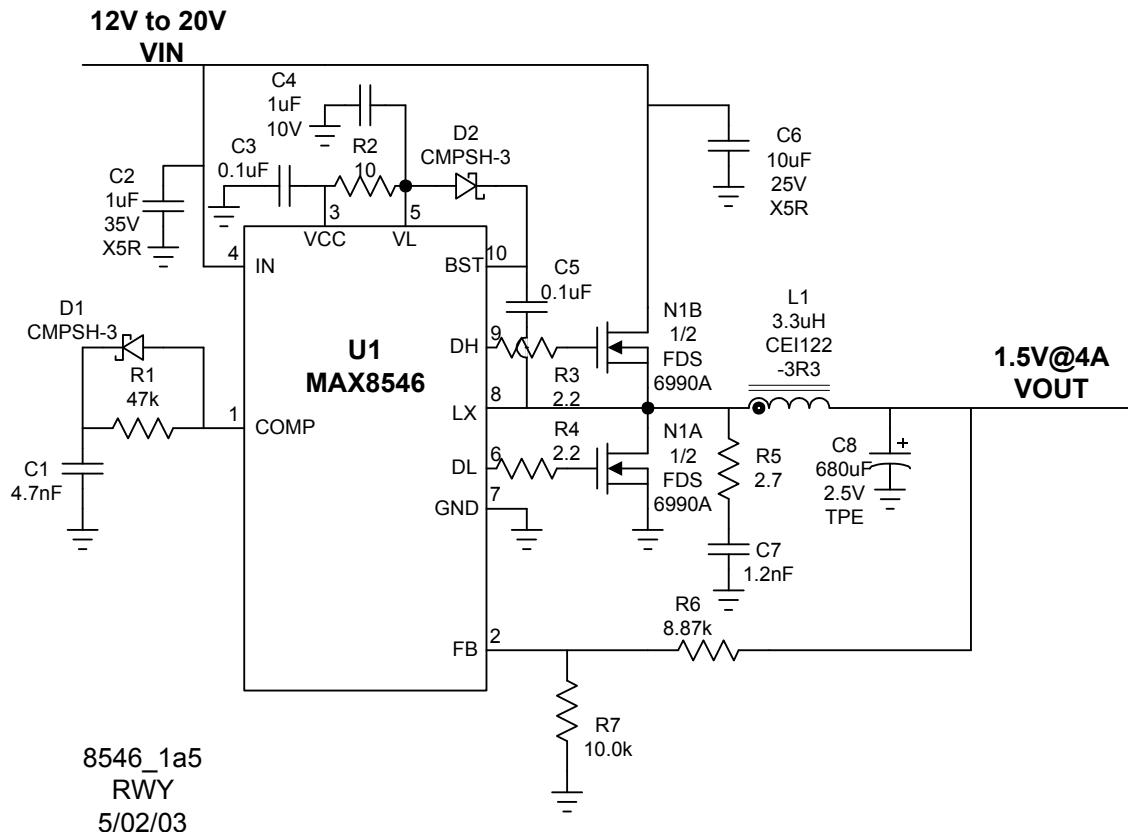
Current limit is ~13A.

BILL OF MATERIALS

**4.5V to 5.5V Input
1.8V @ 10A Output
7/11/03**

8546_1a8

DESIGNATION	QTY	DESCRIPTION
C1	1	3.3nF ceramic capacitor (0805)
C2,C4	2	0.1uF 10V ceramic capacitor (0603)
C3	1	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5,C8	7	1200uF 10V aluminum electrolytic cap Sanyo 10MV1200AX
C6	1	10uF 6V X5R ceramic capacitor Taiyo Yuden JMK316BJ106ML
C7	1	2.2nF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
D3	1	1A 30V Schottky diode Nihon EC10QS03L
L1	1	1.2uH 15A Power inductor Sumida CDEP134H-1R2
N1,N2	2	12m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7821
R1	1	120k Ohm 5% resistor (0805)
R2	1	4.7 Ohm 5% resistor (0603)
R3	1	12.7k Ohm 1% resistor (0805)
R4	1	10.0k Ohm 1% resistor (0805)
R5	1	1.5 Ohm 5% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)

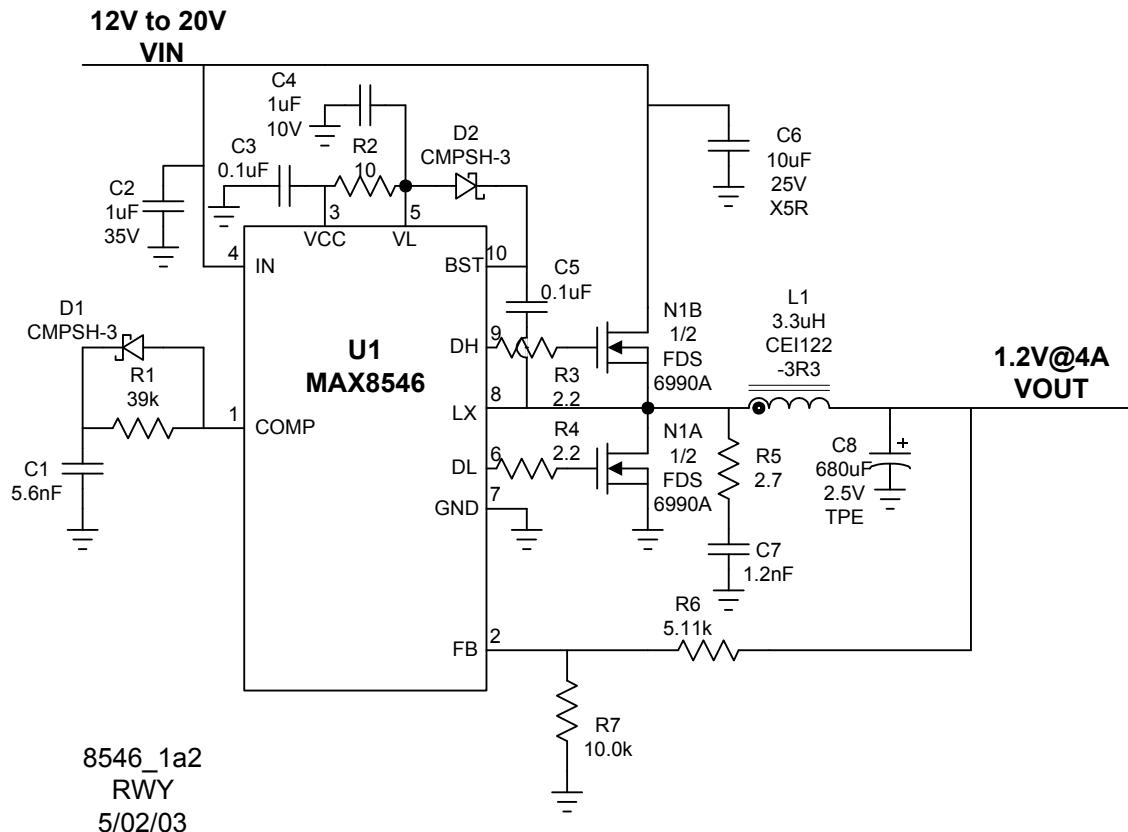


Vin	Iin	Vout	Iout	Efficiency
15.00	0.016	1.504	0	
11.94	0.610	1.489	4	0.818
15.00	0.495	1.487	4	0.801
20.07	0.382	1.486	4	0.752
20MHz BW		50mVpp		

BILL OF MATERIALS**12V to 20V Input****1.5V @ 4A Output****5/02/03**

8546_1a5

DESIGNATION	QTY	DESCRIPTION
C1	1	4.7nF ceramic capacitor (0805)
C2	1	1uF 35V ceramic capacitor (1206) Taiyo Yuden GMK316BJ105ML
C3,C5	2	0.1uF 25V ceramic capacitor (0805)
C4	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C6	1	10uF 25V X5R ceramic capacitor Taiyo Yuden TMK432BJ106MM
C7	1	1.2nF ceramic capacitor (0805)
C8	1	680uF 2.5V polymer capacitor Sanyo 2R5TPE680MIL
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	3.3uH 5.2A Power inductor Sumida CEI122-3R3
N1	1	23m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6990A
R1	1	47k Ohm 5% resistor (0805)
R2	1	10 Ohm 5% resistor (0805)
R3,R4	2	2.2 Ohm 5% resistor (0603)
R5	1	2.7 Ohm 0.25W 5% resistor (1206)
R6	1	8.87k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)

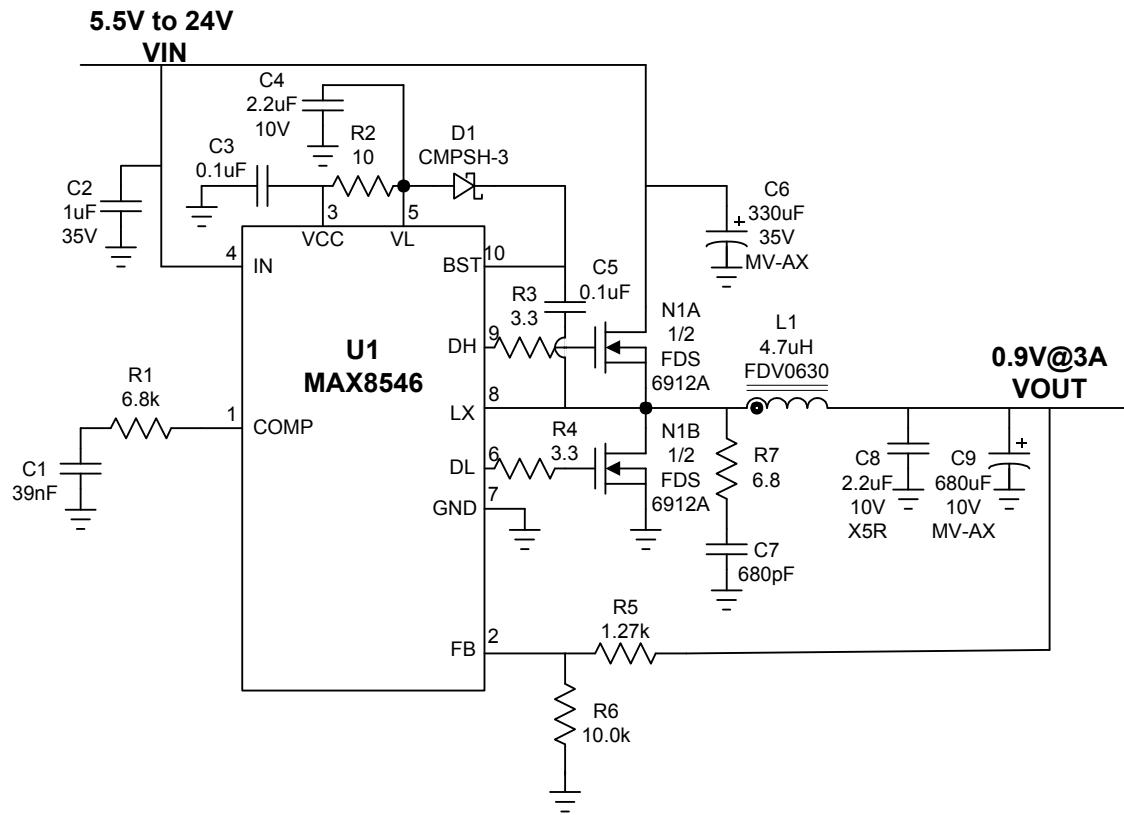


Vin	Iin	Vout	Iout	Efficiency
15.00	0.014	1.204	0	
11.95	0.507	1.193	4	0.788
15.00	0.413	1.191	4	0.769
20.07	0.320	1.190	4	0.741
20MHz BW		40mVpp		

BILL OF MATERIALS**12V to 20V Input****1.2V @ 4A Output****5/02/03**

8546_1a2

DESIGNATION	QTY	DESCRIPTION
C1	1	5.6nF ceramic capacitor (0805)
C2	1	1uF 35V ceramic capacitor (1206) Taiyo Yuden GMK316BJ105ML
C3,C5	2	0.1uF 25V ceramic capacitor (0805)
C4	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C6	1	10uF 25V X5R ceramic capacitor Taiyo Yuden TMK432BJ106MM
C7	1	1.2nF ceramic capacitor (0805)
C8	1	680uF 2.5V polymer capacitor Sanyo 2R5TPE680MIL
D1,D2	2	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	3.3uH 5.2A Power inductor Sumida CEI122-3R3
N1	1	23m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6990A
R1	1	39k Ohm 5% resistor (0805)
R2	1	10 Ohm 5% resistor (0805)
R3,R4	2	2.2 Ohm 5% resistor (0603)
R5	1	2.7 Ohm 0.25W 5% resistor (1206)
R6	1	5.11k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)



8546_0b9
RWY
1/27/04

Vin	Iin	Vout	Iout	Efficiency
12.02	0.007	0.889	0	
5.48	0.65	0.896	3	0.755
12.02	0.30	0.896	3	0.745
18.01	0.20	0.895	3	0.745
20MHz BW		55mVpp		
12.03	0.015	2.480	0	
5.48	1.52	2.478	3	0.893
12.03	0.69	2.476	3	0.895
18.02	0.46	2.475	3	0.896
24.11	0.35	2.475	3	0.880
20MHz BW		110mVpp		

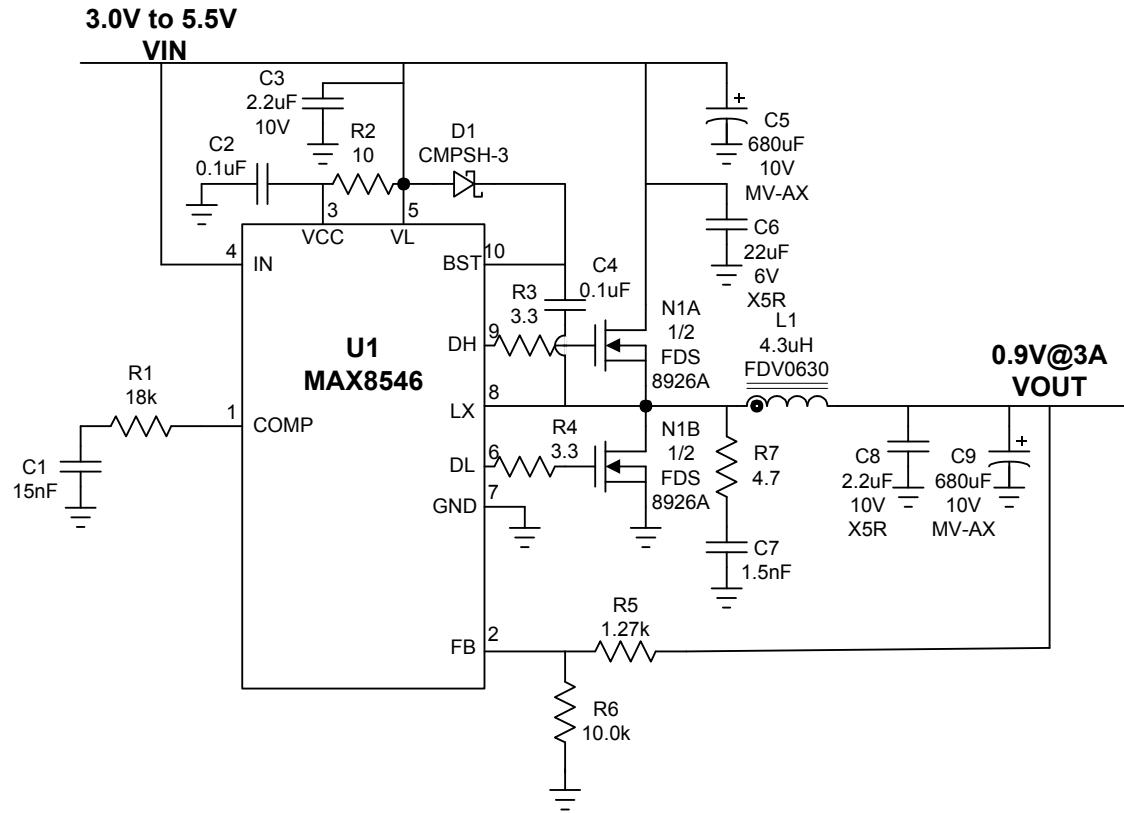
R5 = 21.5k for 2.5V output; circuit is reaching minimum duty cycle above 18V input for 0.9V output.

BILL OF MATERIALS**5.5V to 24V Input****0.9V @ 3A Output**

1/27/04

8546_0b9

DESIGNATION	QTY	DESCRIPTION
C1	1	39nF ceramic capacitor (0603)
C2	1	1uF 35V X5R ceramic capacitor (1206) Taiyo Yuden GMK316BJ105ML
C3,C5	2	0.1uF 10V ceramic capacitor (0603)
C4,C8	1	2.2uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C6	1	330uF 35V aluminum electrolytic capacitor Sanyo 33MV330AX
C7	1	680pF ceramic capacitor (0603)
C9	1	680uF 10V aluminum electrolytic capacitor Sanyo 10MV680AX
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	4.7uH 3.3A Power inductor Toko FDV0630-4R7
N1	1	35m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6912A
R1	1	6.8k Ohm 5% resistor (0603)
R2	1	10 Ohm 5% resistor (0603)
R3,R4	2	3.3 Ohm 5% resistor (0603)
R5	1	1.27k Ohm 1% resistor (0603)
R6	1	10.0k Ohm 1% resistor (0603)
R7	1	6.8 Ohm 5% resistor (0805)
U1	1	MAX8546EUB (10-uMAX)



8546_0a9
 RWY
 1/19/04

Vin	In	Vout	Iout	Efficiency
3.60	0.012	0.899	0	
2.98	1.20	0.906	3	0.760
3.61	0.98	0.897	3	0.761
4.50	0.79	0.897	3	0.757
5.52	0.65	0.896	3	0.749
20MHz BW		50mVpp		
3.60	0.014	2.496	0	
2.98	2.59	2.268	3	0.882
3.30	2.54	2.495	3	0.893
3.60	2.33	2.495	3	0.892
4.50	1.87	2.495	3	0.890
5.52	1.53	2.494	3	0.886
20MHz BW		75mVpp		

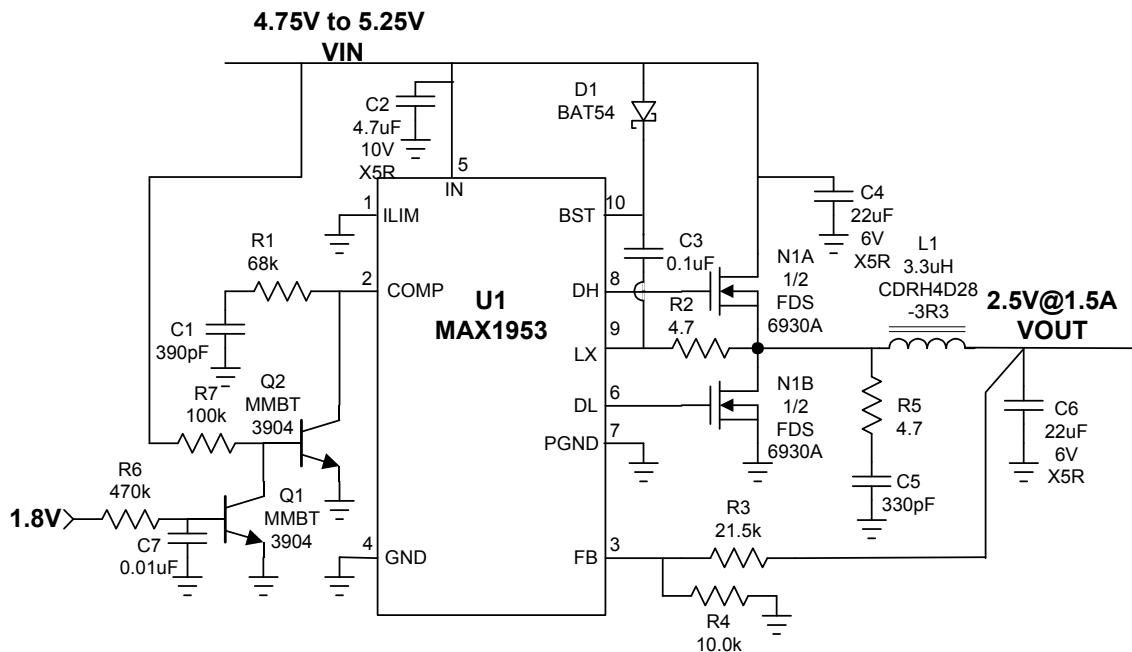
R5 = 21.5k for 2.5V out; circuit is in dropout for 2.98V input and 2.5V output at 3A.

BILL OF MATERIALS**3.0V to 5.5V Input****0.9V @ 3A Output**

1/19/04

8546_0a9

DESIGNATION	QTY	DESCRIPTION
C1	1	15nF ceramic capacitor (0603)
C2,C4	2	0.1uF 10V ceramic capacitor (0603)
C3,C8	2	2.2uF 10V X5R ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
C5,C9	2	680uF 10V aluminum electrolytic capacitor Sanyo 10MV680AX
C6	1	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C7	1	1.5nF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
L1	1	4.3uH 3.4A Power inductor Toko FDV0630-4R3
N1	1	38m Ohm 20V Dual N-ch MOSFET (SO-8) Fairchild FDS8926A
R1	1	18k Ohm 5% resistor (0603)
R2	1	10 Ohm 5% resistor (0603)
R3,R4	2	3.3 Ohm 5% resistor (0603)
R5	1	1.27k Ohm 1% resistor (0603)
R6	1	10.0k Ohm 1% resistor (0603)
R7	1	4.7 Ohm 5% resistor (0603)
U1	1	MAX8546EUB (10-uMAX)



1953_2j5
RWY
3/2/04

Vin	Iin	Vout	Iout	Efficiency
5.01	0.019	2.451	0	
4.74	0.86	2.466	1.5	0.907
5.01	0.81	2.457	1.5	0.908
5.26	0.76	2.447	1.5	0.918
20MHz BW		<20mVpp		

BILL OF MATERIALS**4.75V to 5.25V Input****2.5V @ 1.5A Output****3/2/04**

1953_2j5

DESIGNATION	QTY	DESCRIPTION
C1	1	390pF ceramic capacitor (0603)
C2	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C3	1	0.1uF ceramic capacitor (0603)
C4,C6	2	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C5	1	330pF ceramic capacitor (0603)
C7	1	0.01uF ceramic capacitor (0603)
D1	1	100mA 30V Schottky diode BAT54
L1	1	3.3uH 1.57A Power Inductor Sumida CDRH4D28-3R3
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6930A
Q1,Q2	2	200mA 40V NPN transistor (SOT-23) Fairchild MMBT3904
R1	1	68k Ohm 5% resistor (0603)
R2,R5	1	4.7 Ohm 5% resistor (0603)
R3	1	21.5k Ohm 1% resistor (0603)
R4	1	10.0k Ohm 1% resistor (0603)
R6	1	470k Ohm 5% resistor (0603)
R7	1	100k Ohm 5% resistor (0603)
U1	1	MAX1953EUB (10-uMAX)

MAX8578 5V Input to 1.05V at 3A for Notebook

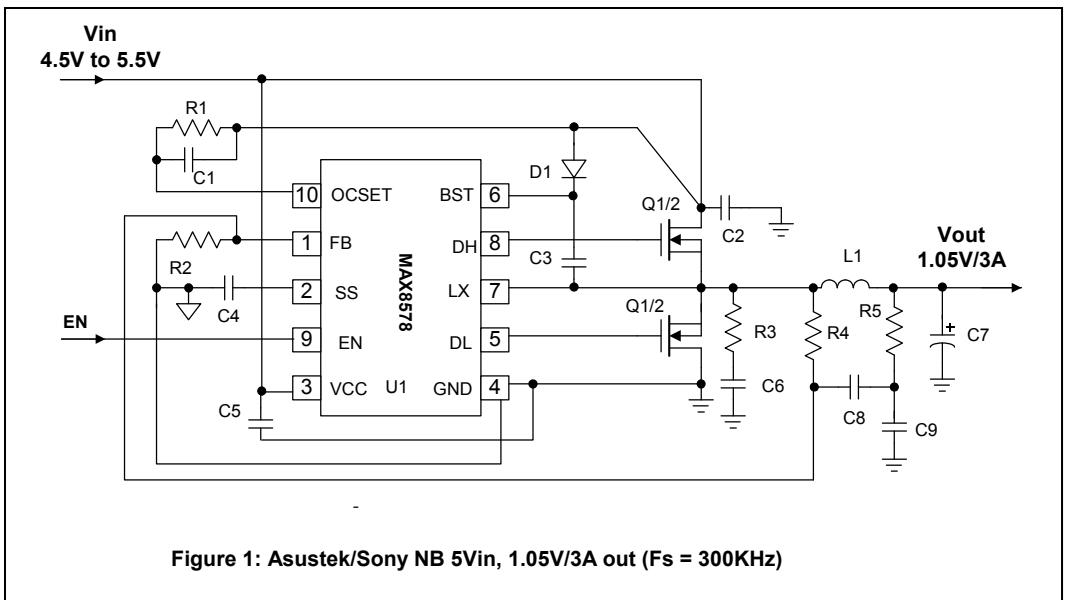


Figure 1: 5V Input 1.05V/3 A Output, $F_s = 300\text{KHz}$

R1	1	Resistor: 4.53k 1%
R2	1	Resistor: 3.09k, 1%
R3 (optional)	1	Resistor: not used
R4	1	Resistor: 4.99k 1%
R5	1	Resistor: 10, 5%
C1,C4	2	Capacitor 0.01uF/10V, X7R Ceramic, 0603
C2	1	Capacitor 10uF/10V, X7R Ceramic, 1206
C3,C9	1	Capacitor 0.1uF/10V, X7R Ceramic, 0603
C6 (optional)	1	Not used
C5	1	Capacitor 4.7uF/10V, X7R Ceramic, 0603
C7	1	Capacitor 100uF/4V/18mOhm POS
C8	1	Capacitor: 0.027uF/10V X7R, 0603
D1	1	Diode Fast Switching 100V/250mA Philip BAS316
L1 (note 2)	1	Inductor, 2.8uH/10.7mOhms, Toko : 919AS-2R8M
Q1,Q2	1	MOSFET Si4814DY
U1	1	MAX8578EUB
Notes		

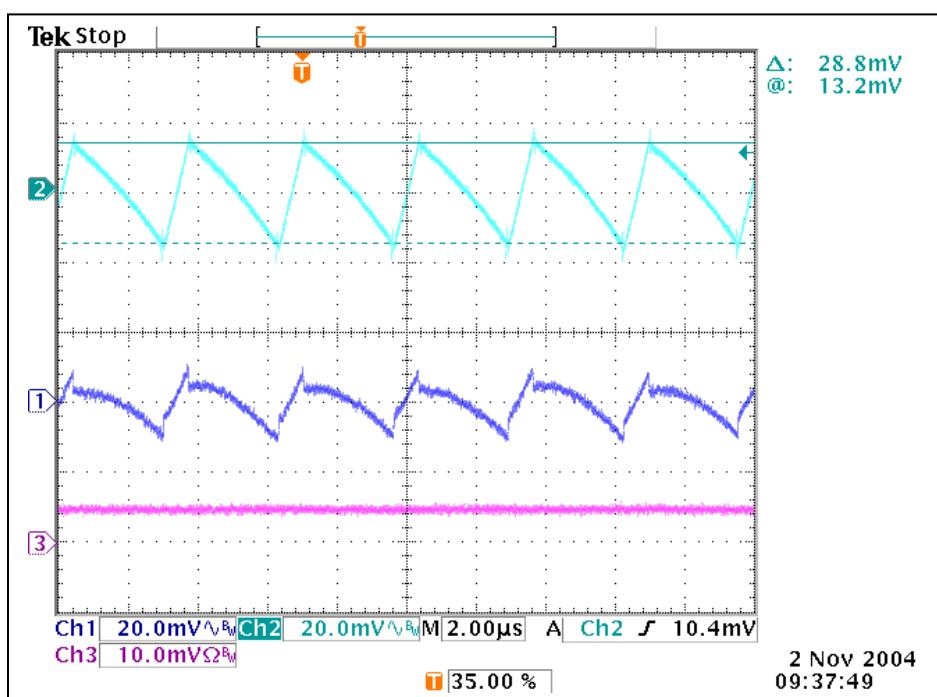
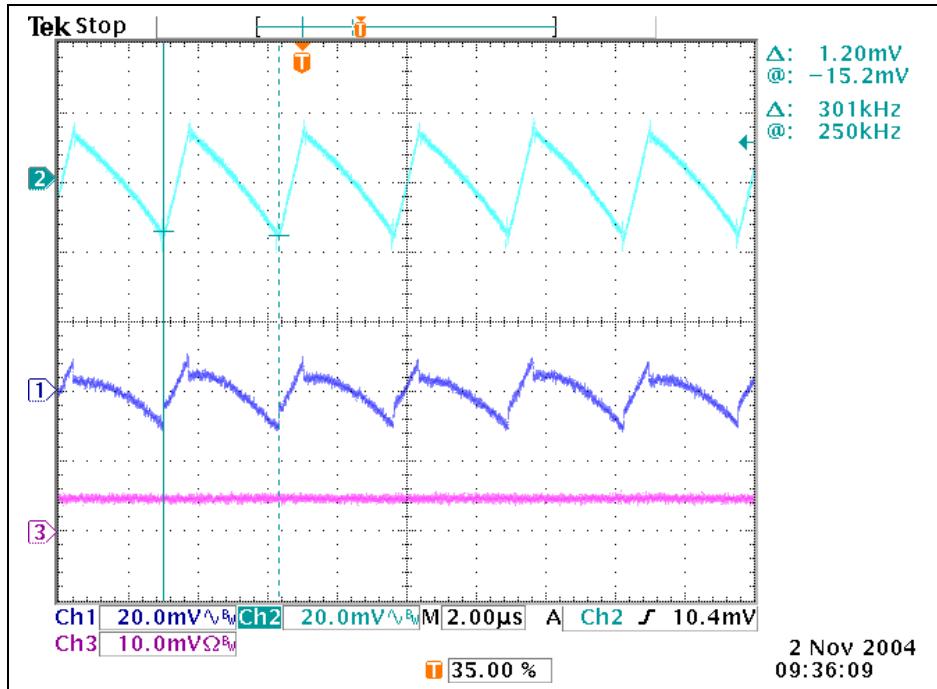


Figure 2: Same as figure 1, but cursor to measure Vfb instead of frequency

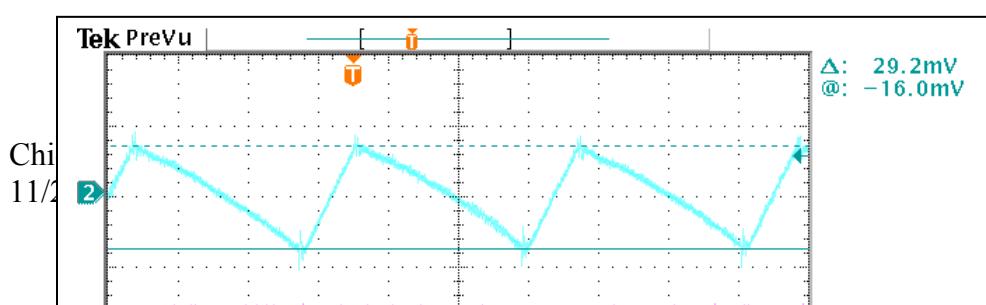


Figure 3: Same as Figure 2, but now Iout is at~3.4A

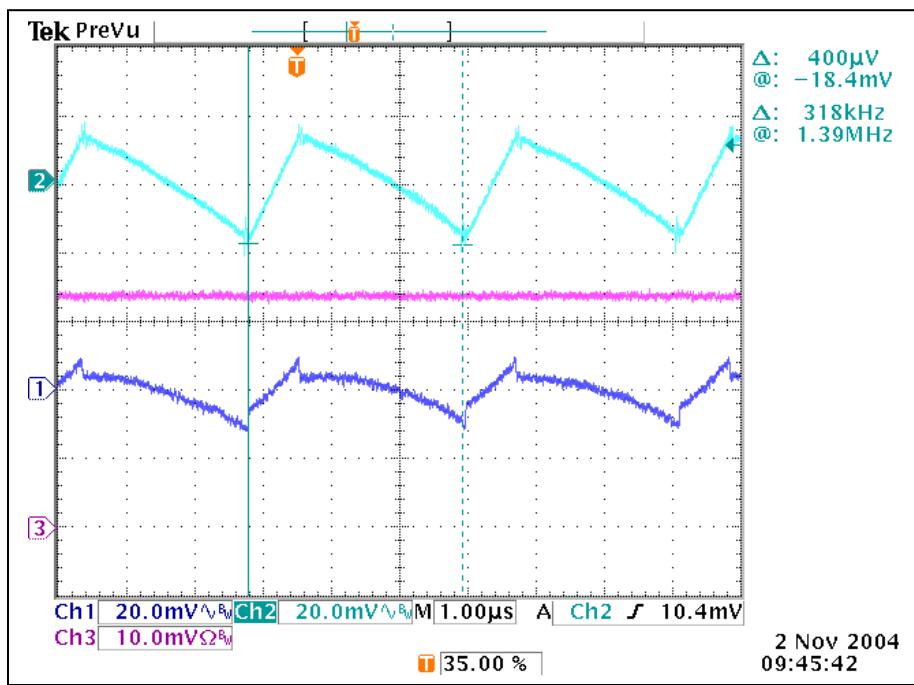
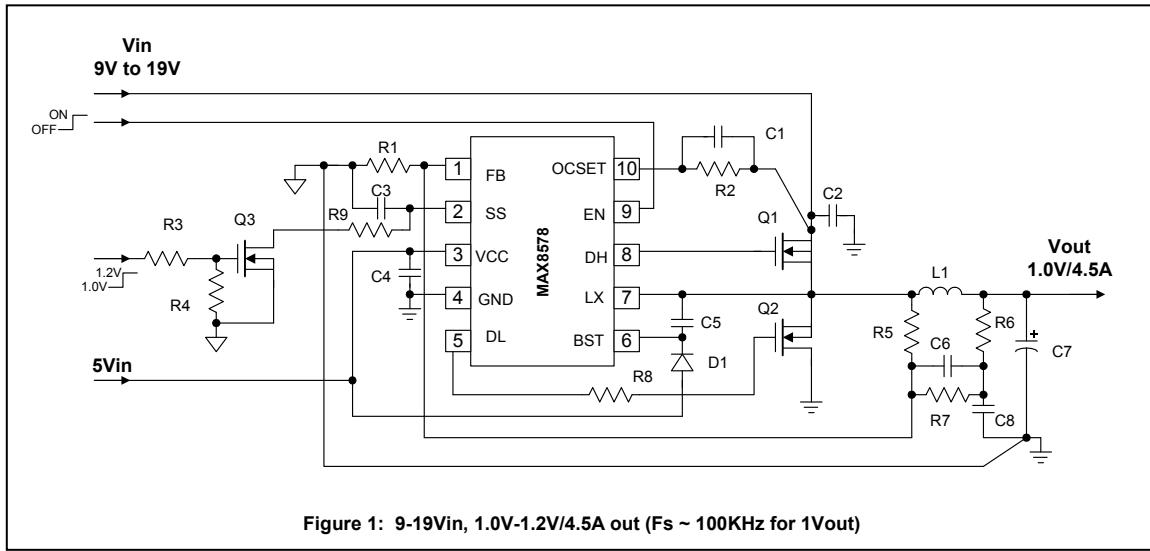


Figure 4: same as Figure 3, but cursor now measure frequency

MAX8578, 9V to 19V Input to 1.0V/1.2V at 4.5A



Typical components for Figure 1:

Component	Qty.	Description/Vendor Part Number
C1, C3, C6	3	Capacitor, 0.01uF, 10V, X7R Ceramic. Kemet: C0603C103M8RAC
C2	1	Capacitor, 10uF, 25V,X5R Ceramic, TDK: C3225X5R1E106M
C4	1	Capacitor, 4.7uF, 6.3V, X5R Ceramic. Taiyo Yuden: JMK212BJ475MG
C5, C8	2	Capacitor, 0.1uF, 10V, X7R Ceramic. Kemet: C0603C104M8RAC
C7	1	Capacitor, 470uF, 2.5V, 10mΩ, POS, Sanyo: 4TPD470M
D1	1	Diode, Switching, 100V, 200mA. Central: CMPD914-HUN
Q1,Q2	1	Transistor, Dual SO-8, NMOSFET: 30V Vishay: Si4816DY
Q3	1	Transistor, NMOSFET 2N7002 SOT-23 Central: 2N7002-HUN
L1	1	Inductor, 4.7 uH/40mΩ/5.5A. Vishay: IHLP2525CZRZ-4R7
R1	1	Resistor, 3.92kΩ, 1%
R2	1	Resistor, 4.75 kΩ, 1%
R3	1	Resistor, 1KΩ, 5%
R4	1	Resistor, 20kΩ, 5%
R5	1	Resistor, 69.8kΩ, 1%
R6	1	Resistor, 10Ω, 5%
R7	1	Resistor, 2.8kΩ, 1%
R8	1	Resistor, 4.7Ω, 5%
R9	1	Resistor, 8.06kΩ, 1%

Load Regulation: (8mV from No load to 4.5A)

Vin	I out	Vout
12V	0A	1.011V
12V	4.5A	1.002V

Line Regulation: (3mV from 9V to 19V)

Vin	I out	Vout
9V	2.25A	1.004V
19V	2.25A	1.007V

Ripple and Noise:

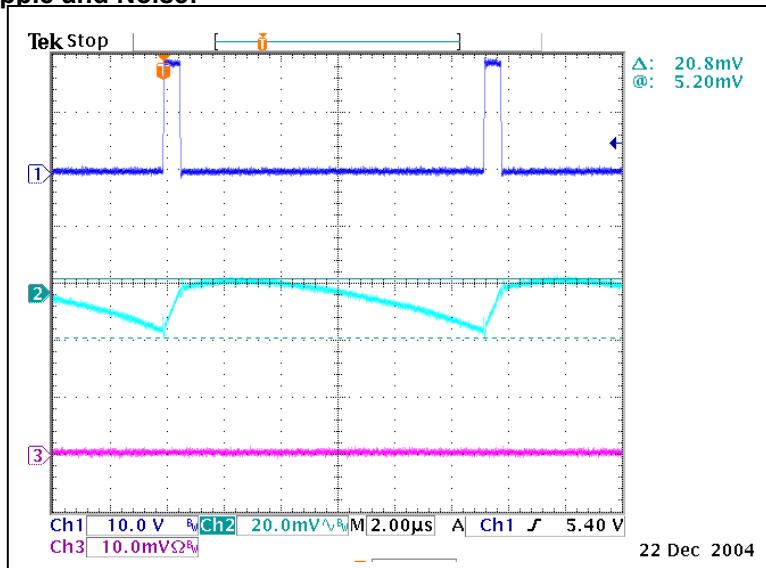


Figure 1: Ripple and noise at 19Vinput and 0A out. Ch1 = VLX, CH2 = Vout (AC couple, Vout=1.0V), CH3 = Iout (1A/div). Switching Frequency = 88.3kHz.

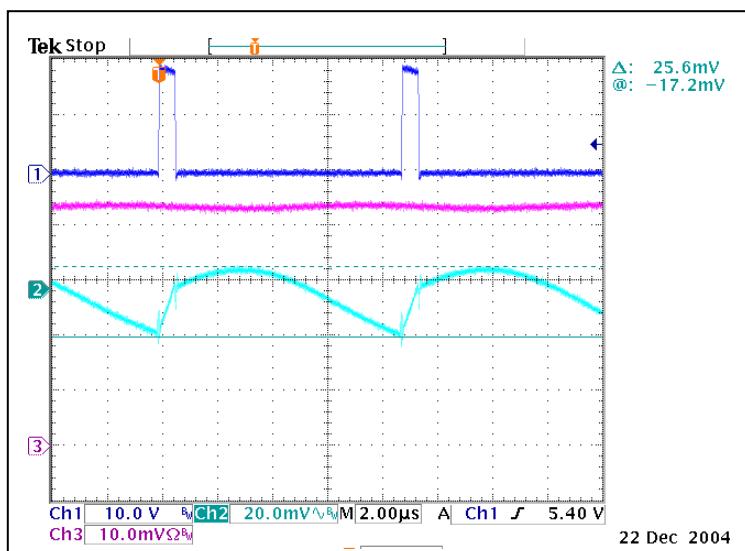
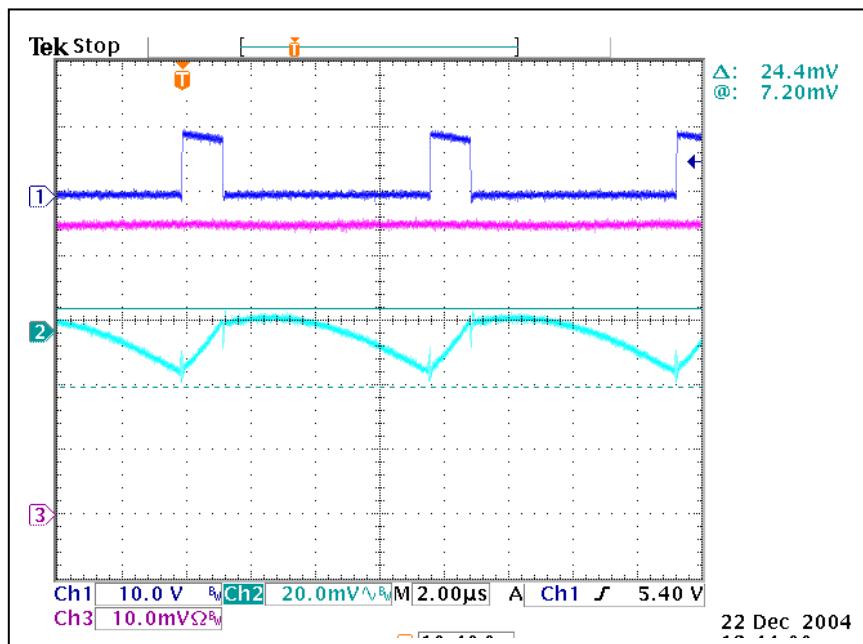
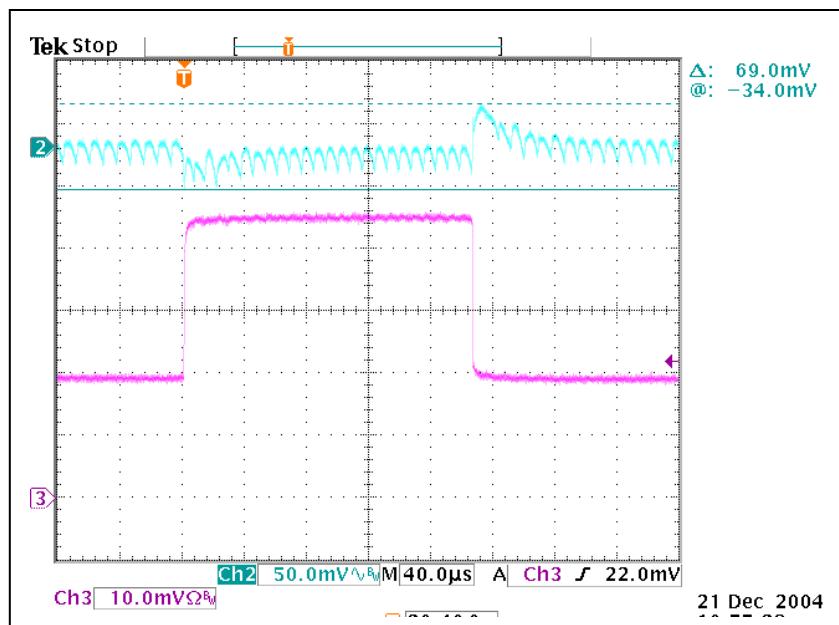


Figure 2: Ripple and noise at 19Vinput and 4.5A out Ch1 = VLX, CH2=Vout (AC couple, Vout=1.0V), CH3 = Iout (1A/div). Switching Frequency = 113kHz



Step Load Response:



Switching Frequency:

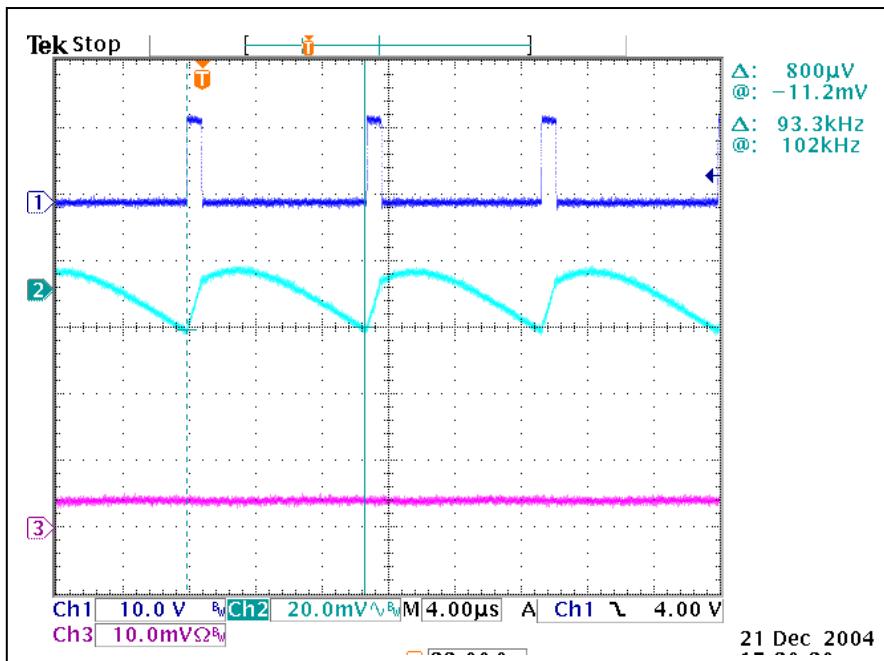


Figure 5: Switching Frequency (93.3kHz) at 12V input and 1.0V/0.5A out. Ch1 = VLX, CH2= Vout (AC couple)
CH3 = Iout (1A/div)

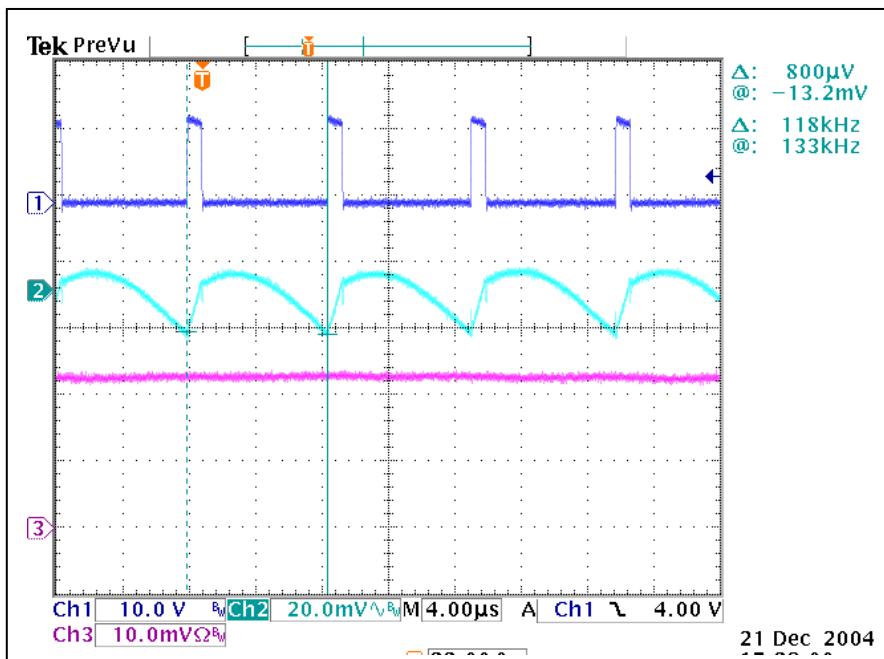


Figure 6: Switching Frequency (118kHz) at 12V input and 1.0V/4.5A out. Ch1 = VLX, CH2= Vout (AC couple)
CH3 = Iout (2A/div)

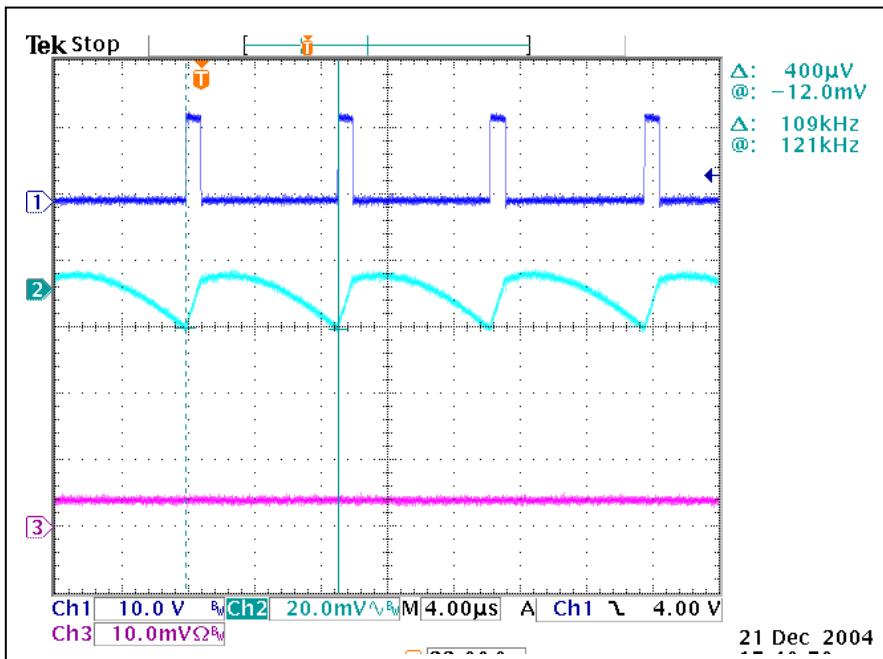


Figure 7: Switching Frequency (109kHz) at 12V input and 1.2V/0.5A out. Ch1 = VLX, CH2= Vout (AC couple) CH3 = Iout (1A/div)

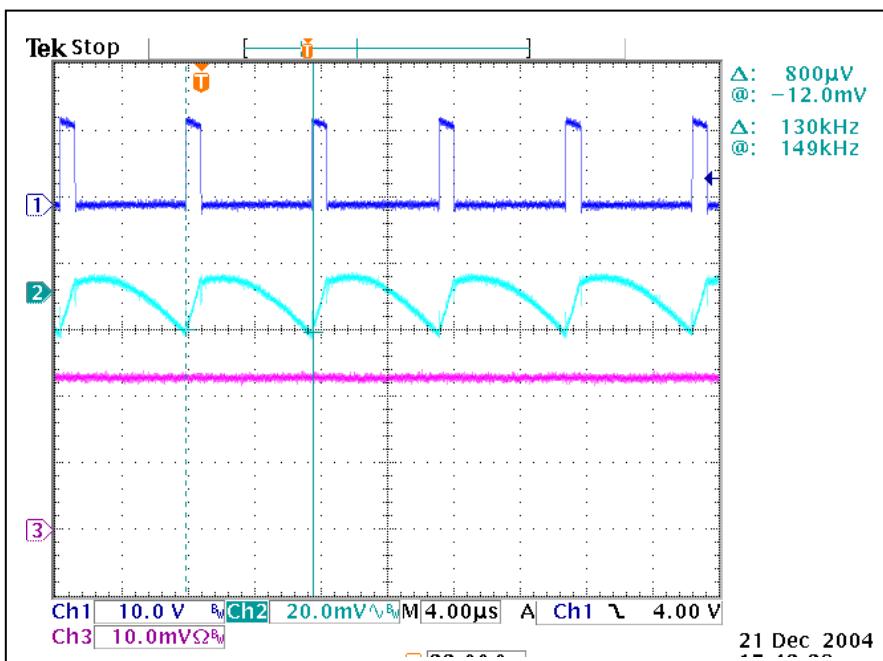


Figure 8: Switching Frequency (130kHz) at 12V input and 1.2V/4.5A out. Ch1 = VLX, CH2= Vout (AC couple) CH3 = Iout (1A/div)

Voltage Transition from 1.0V <->1.2V selection:

CN

12/17/2004

5 of 9

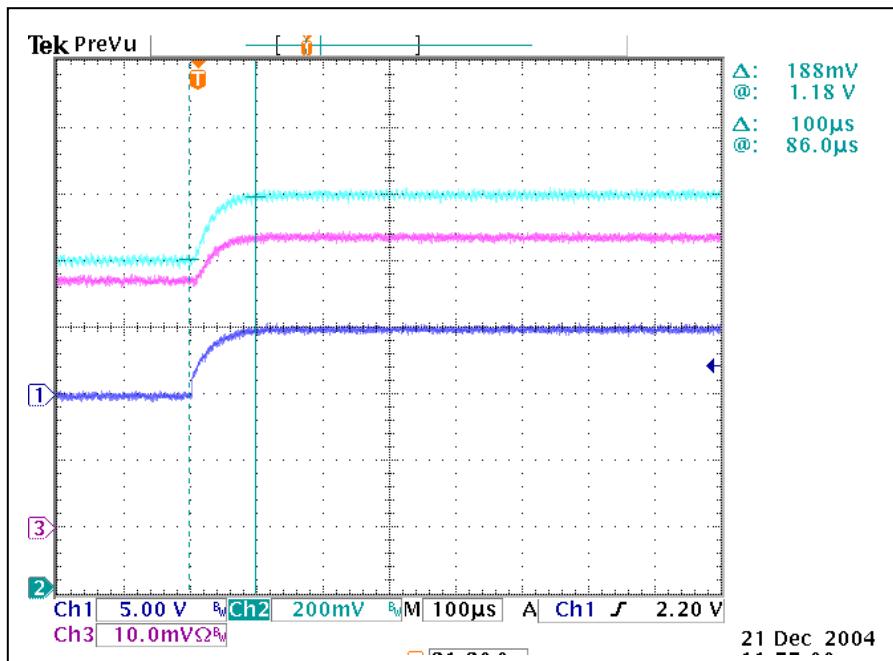


Figure 9: 1.0V to 1.2V Transition at 9V input and full load. CH1 = V at R3 input, CH2 = Vout, CH3 = Iout (1A/div)

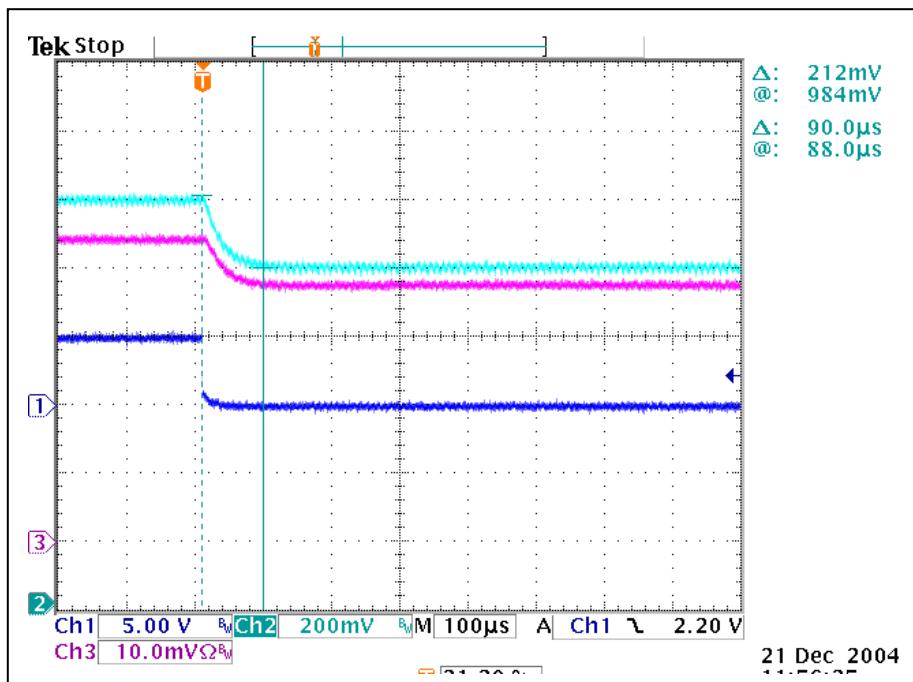


Figure 10: 1.2V to 1.0V Transition at 9V input and full load. CH1 = V at R3 input, CH2 = Vout, CH3 = Iout (1A/div)

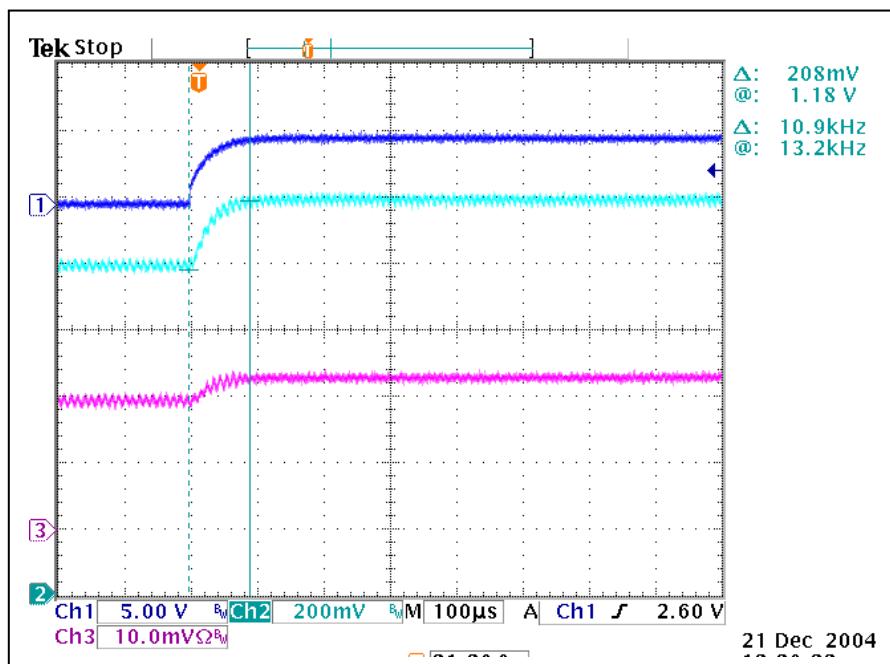


Figure11: 1.0V to 1.2V Transition at 19V input and 50% load. CH1 = V at R3 input, CH2 = Vout, CH3 = Iout (1A/div)

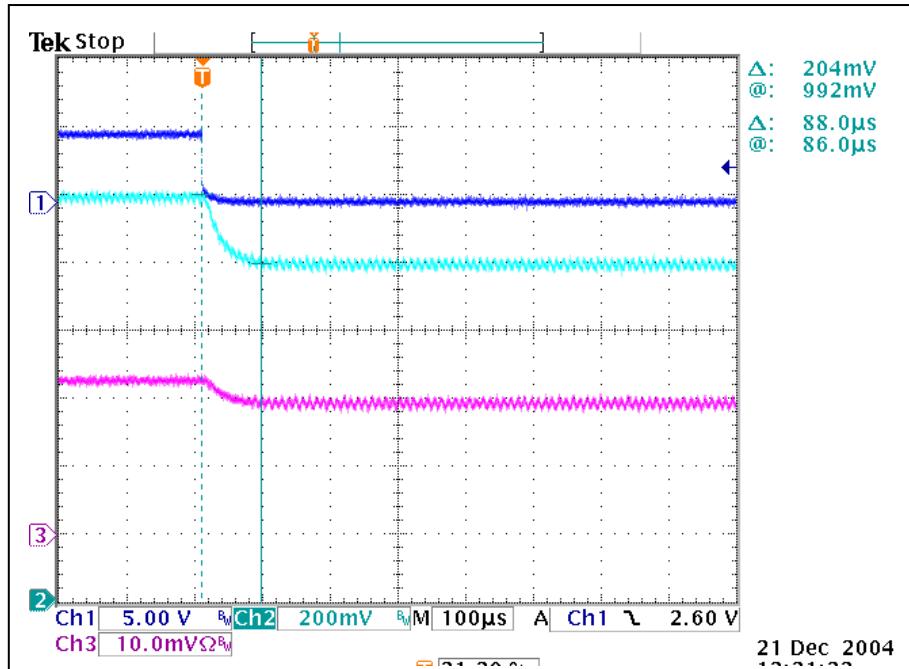


Figure 12: 1.2V to 1.0V Transition at 19V input and 50% load. CH1 = V at R3 input, CH2 = Vout, CH3 = Iout (1A/div)

Short Circuit and Recovery:

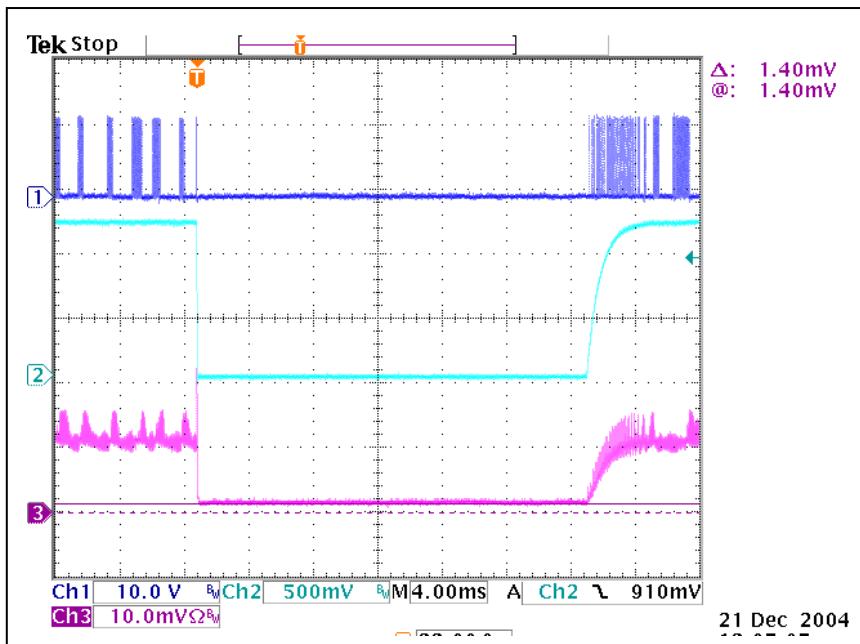


Figure 13: Short circuit and recovery. Vin = 12V, Iout = 4.5A->Short. CH1 = Vlx , CH2 = Vout, CH3 = lin (0.5A/div) The blank spots in Vlx during full load is due to scope aliasing at 4ms/div time base.

Input Current: (Vin = 12V, Vout = 1.2V)

Vin	I in	Iout
12V	580mA	4.5A
12V	10mA	Shorted

Please note that during short circuit input current is only 10mA, which is 0.12W, therefore the circuit can withstand the short circuit indefinitely without any heating issue.

Efficiency Vs. Output Current at 12V input:

Vin	lin	Vo	Io	Efficiency (Vishay IHLP2525CZ-4R7)
12.03	0.06	1.209	0.5	0.837489609
12.03	0.12	1.208	1.02	0.853532835
12.02	0.23	1.205	2	0.871735513
12.01	0.36	1.203	3.03	0.843068276
12.01	0.51	1.201	4.04	0.792156863
12.02	0.58	1.200	4.51	0.776292386

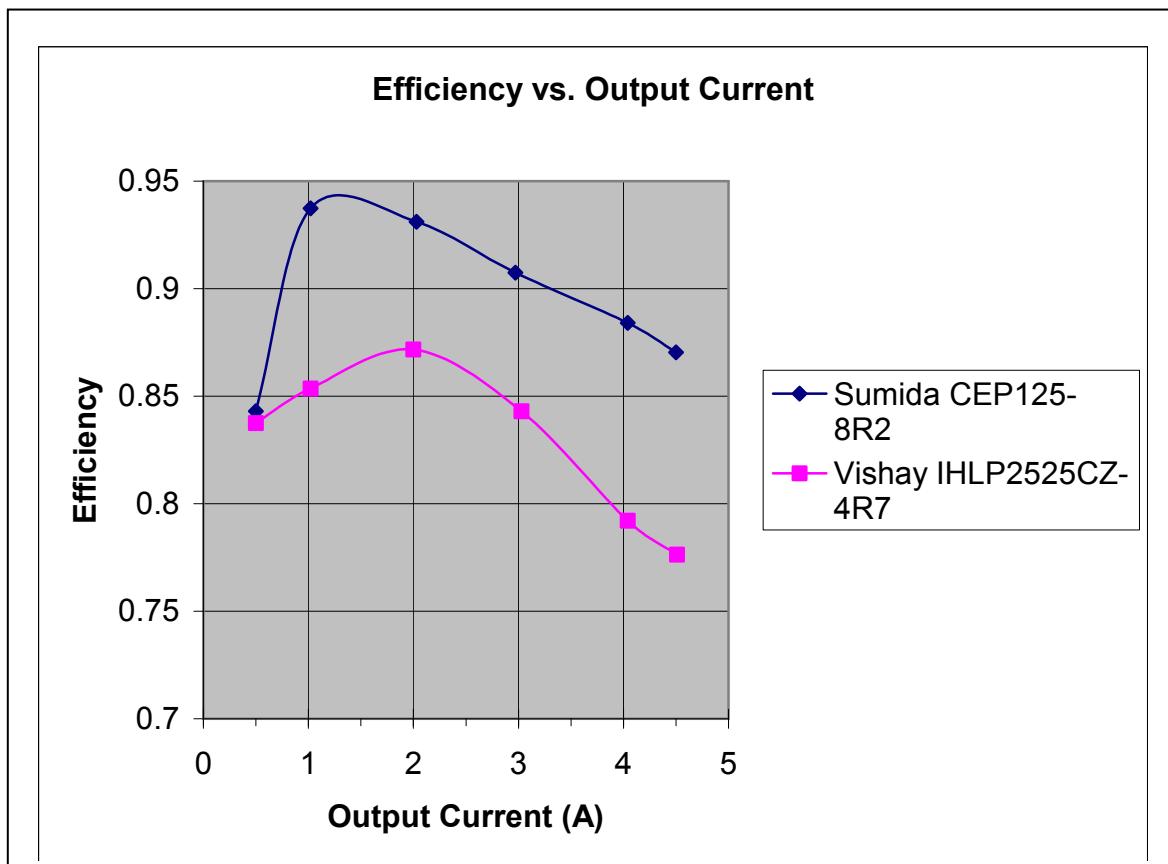
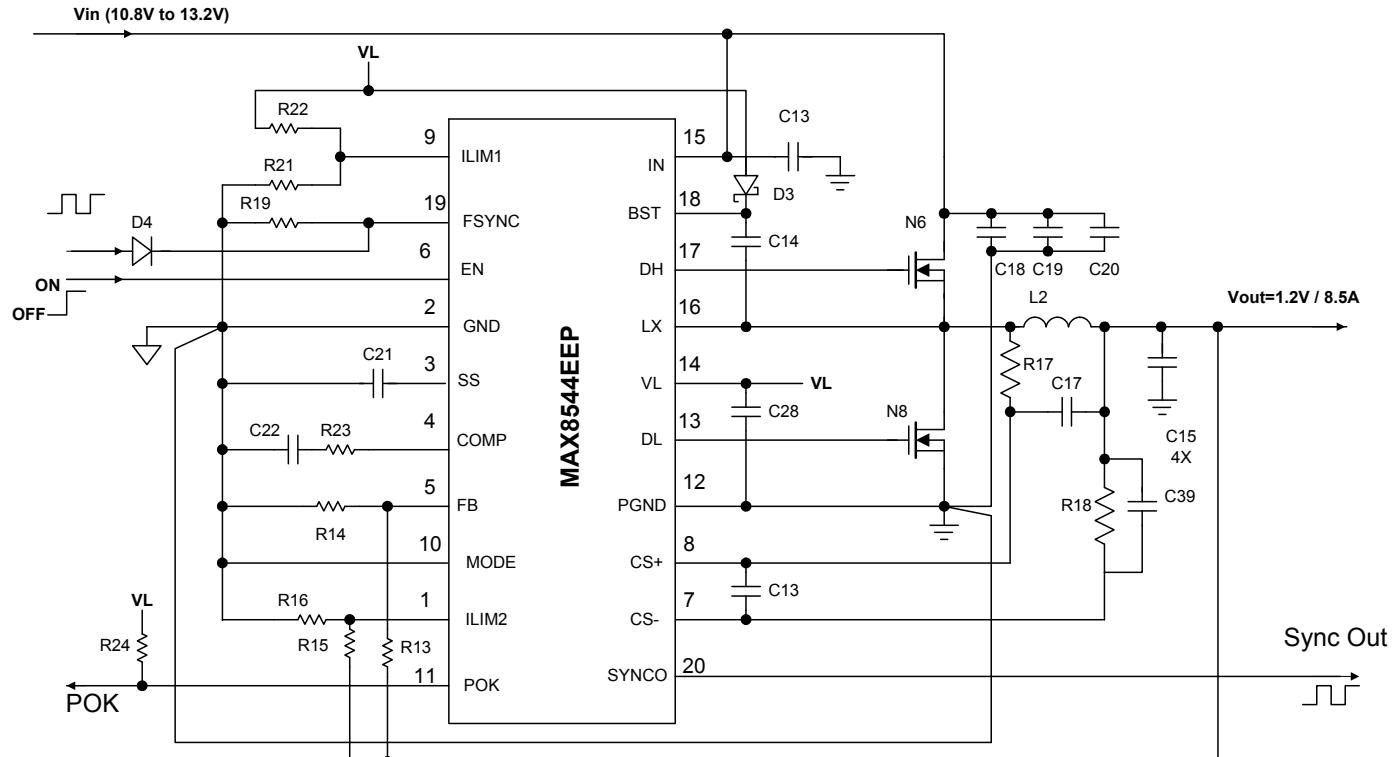


Figure 14: Efficiency Vs. Output Current for two different Inductors.

MAX8544 12V Input to 1.2V/8.5A Output



MAX8544: 500KHz, 10.8V-13.2V Input, 1.2V/8.5A Output

EXTERNAL COMPONENT LIST FOR: 12V in, 1.2V/8.5A Output

Component	Description	Vendor / Part Number	QTY
C13	Cap Ceramic X7R: 1uF, 16V	TDK: C2012X7R1C105M (0805 case size)	1
C14	Cap Ceramic X7R: 0.1uF, 6.3V	Kemet/C0603C104M9RAC (0603 case size)	1
C18,19,20	Cap Ceramic X7R 10uF, 16V	TDK: C3225X7R 1C106M (1210 case size)	3
C21	Cap Ceramic X7R: 0.22uF, 6.3V	Kemet/C0603C224M9RAC (0603 case size)	1
C22	Cap Ceramic X7R, 560pF, 25V	Kemet/C0402C561M3RAC	1
C28	Cap Ceramic X7R 10uF, 6.3V	TDK: C2012X5R0J106M (0805 case size)	1
C17, C39	Cap Ceramic X7R: 0.47uF, 10V	TDK: C1608X5R1A474M (0603 case size)	2
C15 (4x)	Cap Ceramic X5R: 100uF, 6.3V	TDK: C3525X5R0J107M	4
C13	Cap Ceramic X7R, 100pF, 25V	Kemet/C0402C101M3RAC	1
D3	Diode Schottky: 30V, 100mA	Central/CMSSH-3	1
D4 (optional for synchronization)	Diode, Switching: 100V, 200mA	Central/ CMPD914	1
L2	Inductor: 0.82uH, 6.7 mΩ	Vishay: IHLP2525CZ-01 series 0.82uH	1
N6	NMOSFET: 30V, 13.5mΩ	Vishay: Si4390DY	1
N8	NMOSFET: 30V, 6mΩ	Vishay: Si4842DY	1
R22	Resistor, 200k, 1%		1
R21	Resistor, 100k 1%,		1
R19	Resistor, 53.6k 1%		1
R17, 18	Resistor, 510, 5%		2
R23	Resistor, 75k, 5%		1
R14	Resistor, 8.06k, 1%		1
R16	Resistor, 15.4k, 1%		1
R15	Resistor, 66.5k, 1%		1
R13	Resistor, 4.12k, 1%		1
R24	Resistor, 100K, 5%		1

Output Ripple and Step Load Response Waveforms:

1.2V Output:

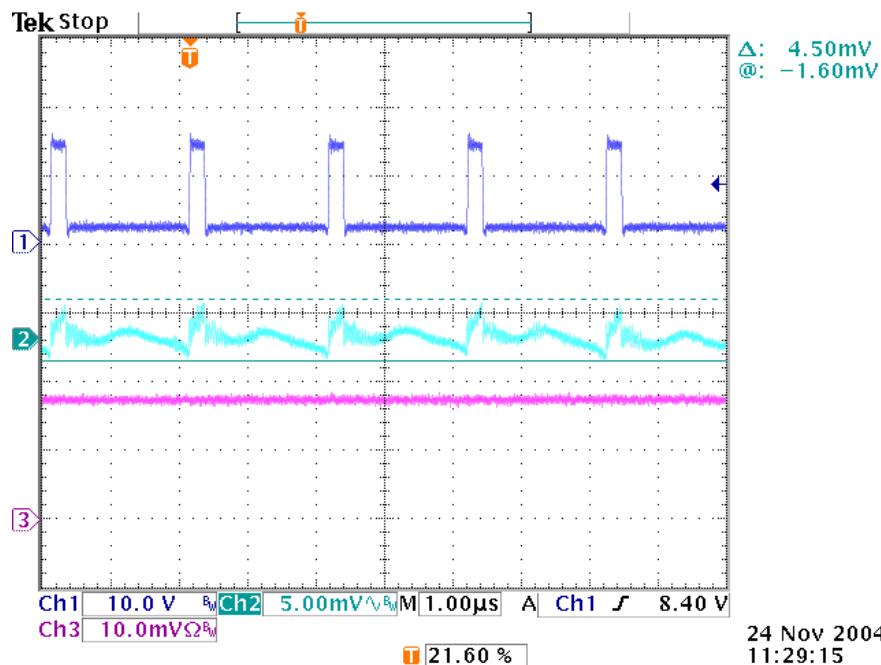


Figure 1: Output ripple at full load.CH1= VLX, CH2 = Vout AC coupled, CH3= Iout at 5A/div

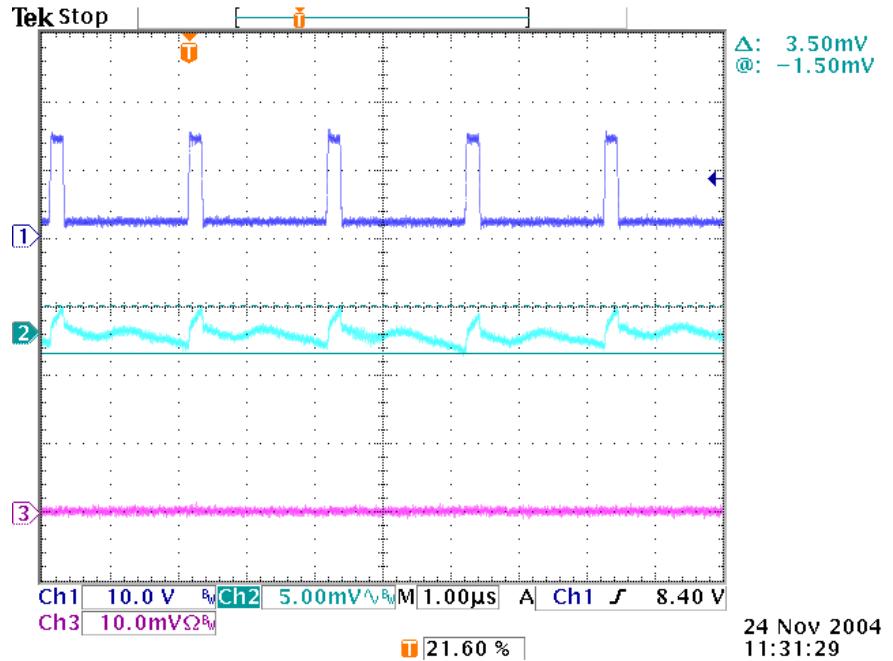


Figure 2: Output ripple at no load.CH1= VLX, CH2 = Vout ac coupleD, CH3= Iout at 5A/div

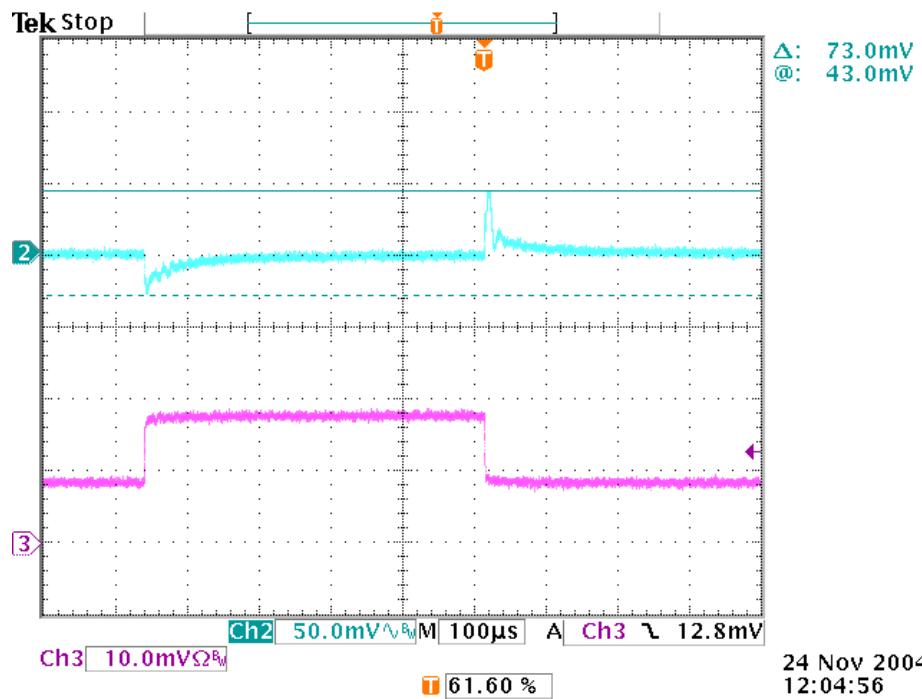
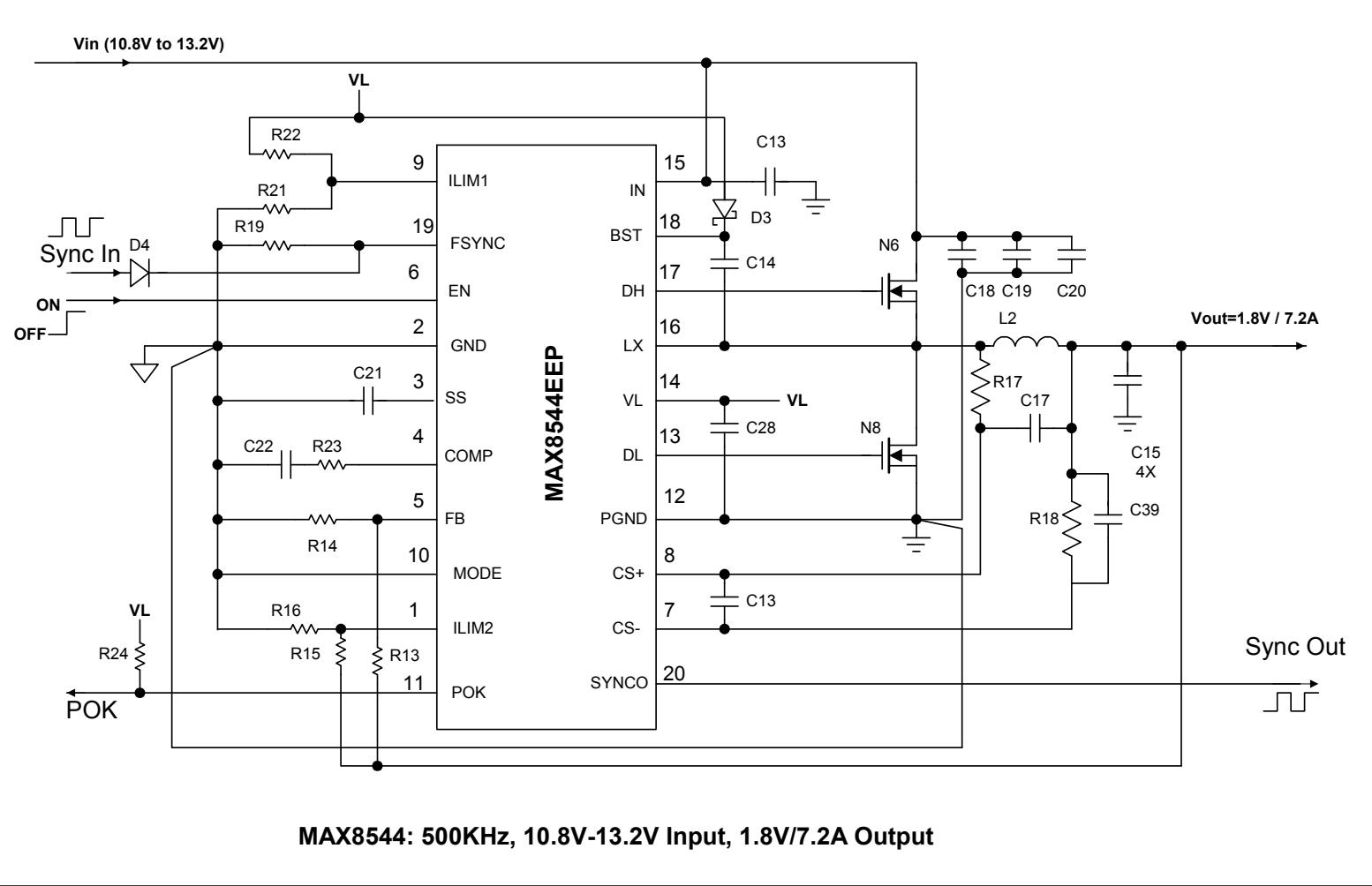


Figure 3: Step Load Response 50% <->100% load step at 5A/uS, CH2 = Vout AC coupled, CH3= Iout at 5A/div

MAX8544 12V Input to 1.8V/7.2A Output



EXTERNAL COMPONENT LIST FOR: 12V in, 1.8V/7.2A Output

Component	Description	Vendor / Part Number	QTY
C13	Cap Ceramic X7R: 1uF, 16V	TDK: C2012X7R1C105M (0805 case size)	1
C14	Cap Ceramic X7R: 0.1uF, 6.3V	Kemet/C0603C104M9RAC (0603 case size)	1
C18,19,20	Cap Ceramic X7R 10uF, 16V	TDK: C3225X7R 1C106M (1210 case size)	3
C21	Cap Ceramic X7R: 0.22uF, 6.3V	Kemet/C0603C224M9RAC (0603 case size)	1
C22	Cap Ceramic X7R, 560pF, 25V	Kemet/C0402C561M3RAC	1
C28	Cap Ceramic X7R 10uF, 6.3V	TDK: C2012X5R0J106M (0805 case size)	1
C17, C39	Cap Ceramic X7R: 0.47uF, 10V	TDK: C1608X5R1A474M (0603 case size)	2
C15 (4x)	Cap Ceramic X5R: 100uF, 6.3V	TDK: C4532X5R0J107M	4
C13	Cap Ceramic X7R, 100pF, 25V	Kemet/C0402C101M3RAC	1
D3	Diode Schottky: 30V, 100mA	Central/CMSSH-3	1
D4 (optional for synchronization)	Diode, Switching: 100V, 200mA	Central/ CMPD914	1
L2	Inductor: 0.82uH, 6.7 mΩ	Vishay: IHLP2525CZ-01 series 0.82uH	1
N6	NMOSFET: 30V, 13.5mΩ	Vishay: Si4390DY	1
N8	NMOSFET: 30V, 6mΩ	Vishay: Si4842DY	1
R22	Resistor, 200k, 1%		1
R21	Resistor, 100k 1%,		1
R19	Resistor, 53.6k 1%		1
R17, 18	Resistor, 510, 5%		2
R23	Resistor, 110k, 5%		1
R14	Resistor, 8.06k, 1%		1
R16	Resistor, 10.2k, 1%		1
R15	Resistor, 100k, 1%		1
R13	Resistor, 10.2k, 1%		1
R24	Resistor, 100K, 5%		1

1.8V Output:

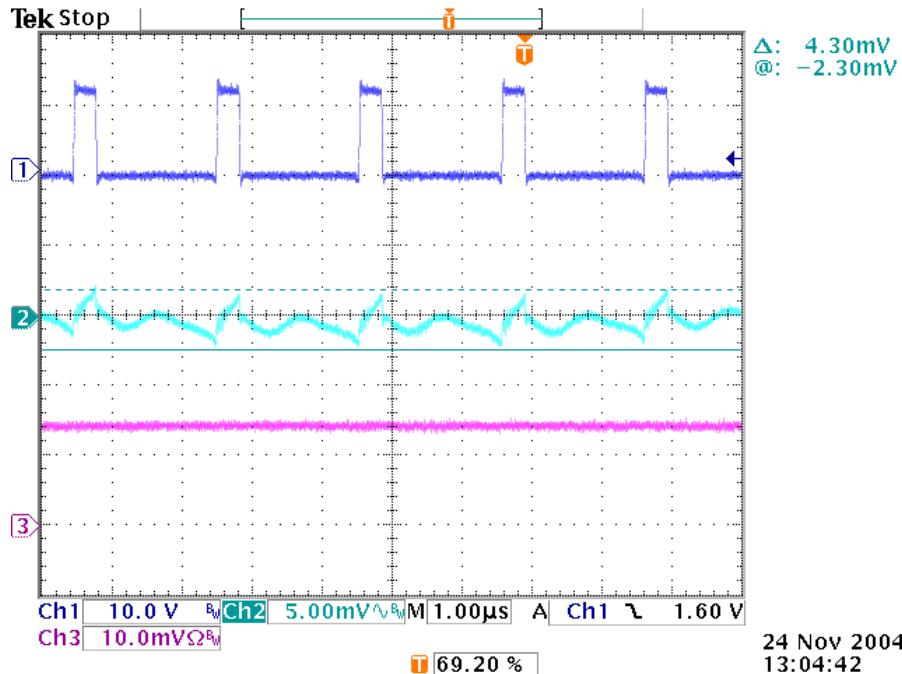


Figure 1 : Output ripple at full load.CH1= VLX, CH2 = Vout ac couple, CH3= lout at 5A/div

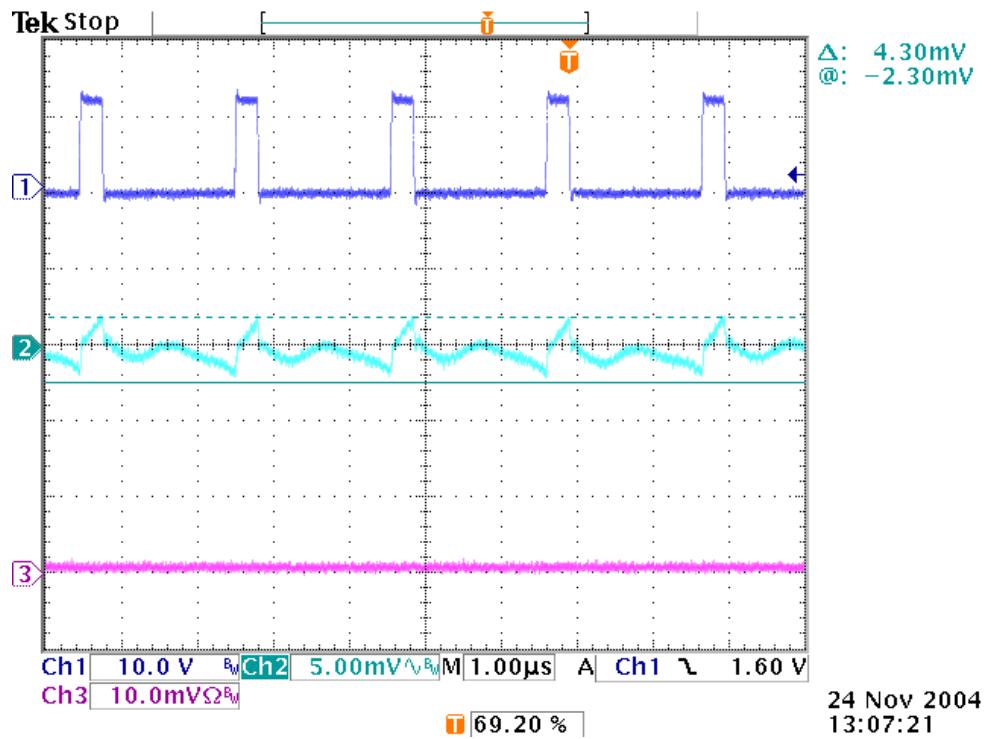


Figure 2: Output ripple at no load. CH1 = VLX, CH2 = Vout ac couple, CH3 = Iout at 5A/div

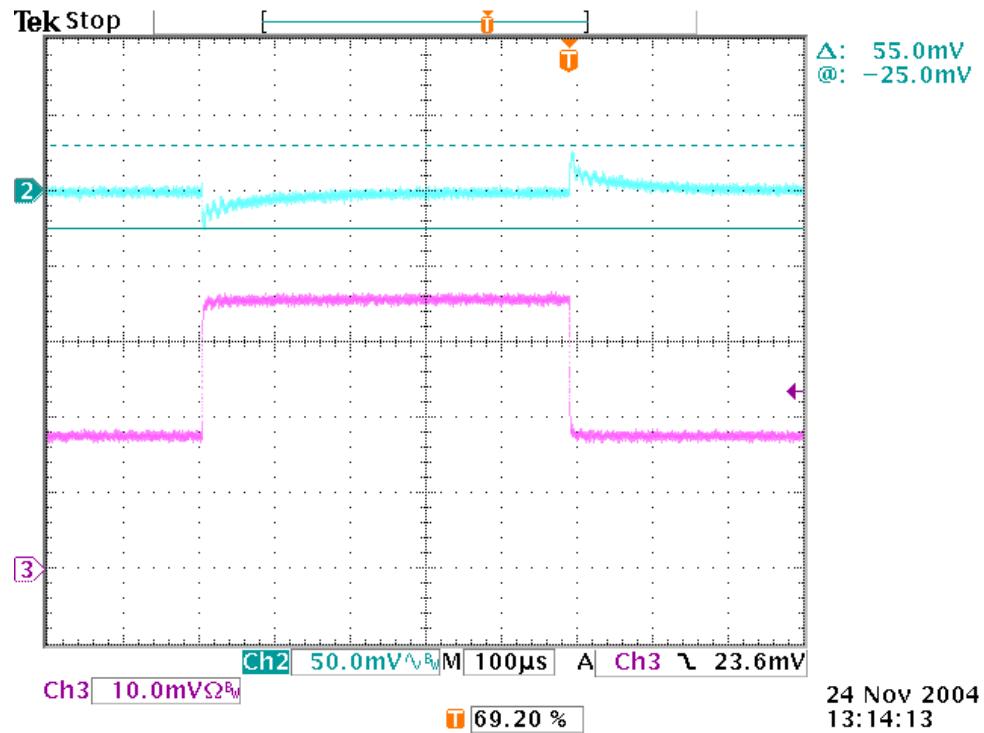


Figure 3 Step Load Response 50% <->100% load step at 5A/uS, CH2 = Vout ac couple, CH3= Iout at 2A/div

MAX8576 10-20V Input to 1.05V at 4.5A

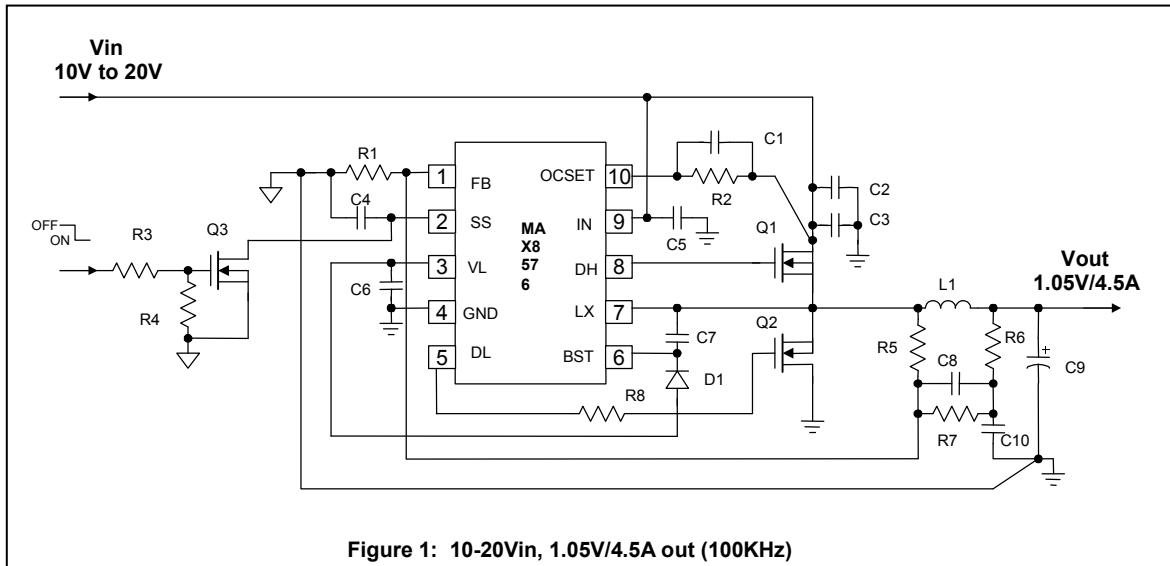


Figure 1: 10-20Vin, 1.05V/4.5A out (100KHz)

Typical components for Figure 1:

Component	Qty.	Description/Vendor Part Number
C1, C4	2	Capacitor, 0.01uF, 10V, X7R Ceramic. Kemet: C0603C103M8RAC
C2, C3 (not used)	1	Capacitor, 10uF, 25V,X5R Ceramic, TDK: C3225X5R1E106M
C5	1	Capacitor, 1uF, 35V, X7R Ceramic. Taiyo Yuden: GMK316BJ105ML
C6	1	Capacitor, 4.7uF, 6.3V, X5R Ceramic. Taiyo Yuden: JMK212BJ475MG
C7, C10	2	Capacitor, 0.1uF, 10V, X7R Ceramic. Kemet: C0603C104M8RAC
C8	1	Capacitor, 0.1uF, 25V, X7R. Kemet: C0603C104M3RAC
C9	1	Capacitor, 470uF, 2.5V, 15mΩ, , POS, Sanyo: 2R5TPE470MF
D1	1	Diode, Switching, 100V, 200mA. Central: CMPD914
Q1,Q2	1	Transistor, Dual SO-8, NMOSFET: 30V Fairchild: FDS6892:Q1 for HSFET, Q2for LSFET
Q3	1	Transistor, NMOSFET 2N7002 SOT-23
L1	1	Inductor, 8.2uH/9.5mΩ/5.8A. Sumida: CEP125-8R2
R1	1	Resistor, 4.53kΩ, 1%
R2	1	Resistor, 4.32 kΩ, 1%
R3	1	Resistor, 1KΩ, 5%
R4	1	Resistor, 20kΩ, 5%
R5, R7	2	Resistor, 6.98kΩ, 1%
R6	1	Resistor, 30Ω, 5%
R8	1	Resistor, 4.7Ω, 5%

Note: C9 is actually 470uF/4V/ 10 mΩ. I do not have the 470uF/2.5V/15mΩ on hand to use.

MAX8576 10-20V Input to 1.05V at 4.5A

Regulation:

Vin	I out	Vout
10V	2.5A	1.040V
20V	2.5A	1.042V
15V	0A	1.056V
15V	4.5A	1.032V

Ripple and Noise:

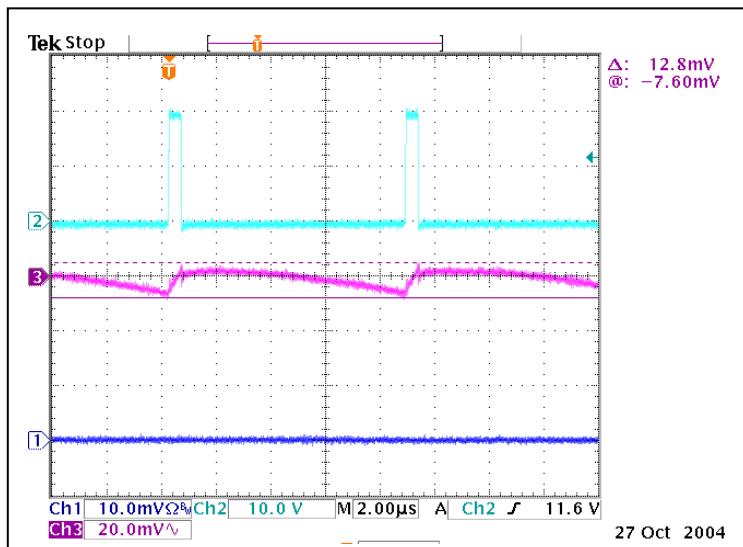


Figure 1: Ripple and noise at 20V input and 0A out. Ch2 = VLX, CH3 3= Vout (AC couple), CH1 = Iout

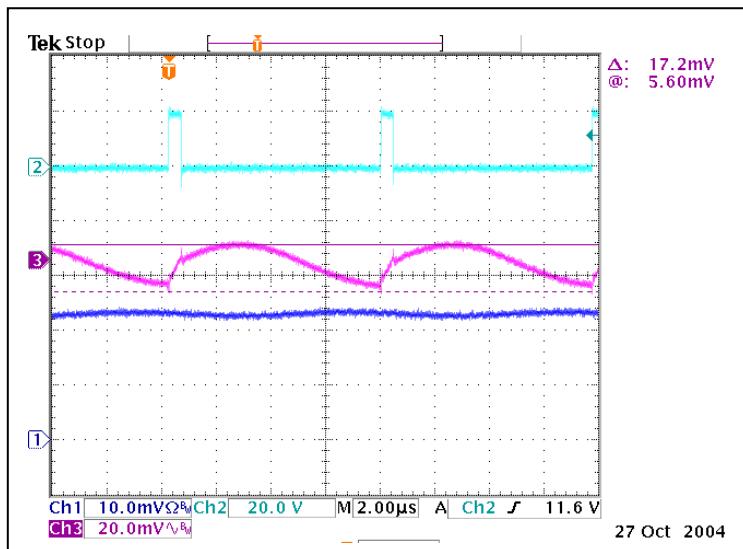


Figure 2: Ripple and noise at 20V input and 4.5A out Ch2 = VLX, CH3 3= Vout (AC couple), CH1 = Iout

MAX8576 10-20V Input to 1.05V at 4.5A

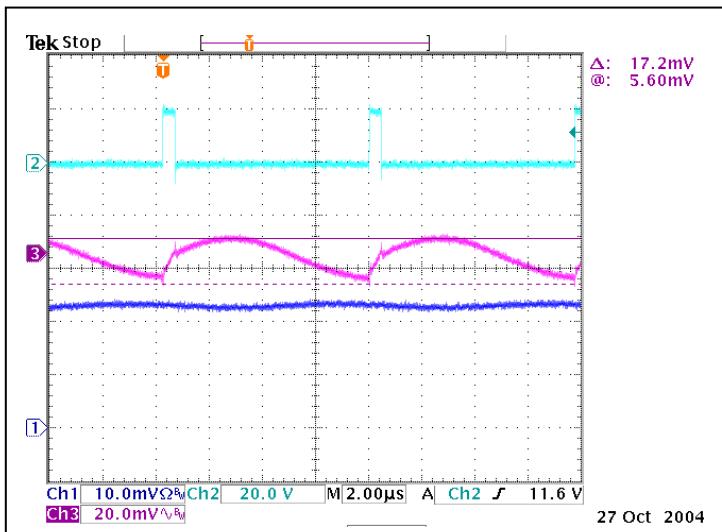


Figure 3: Ripple and noise at 10Vinput and 4.5A out. Ch2 = VLX, CH3 3= Vout (AC couple), CH1 = Iout

Step Load Response:

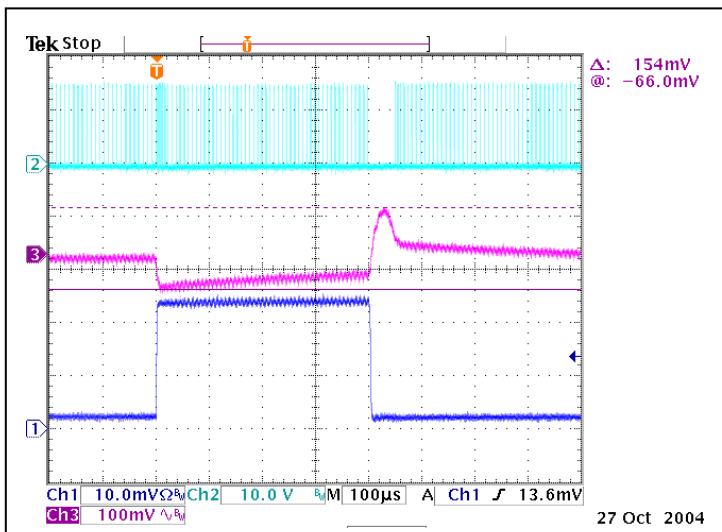
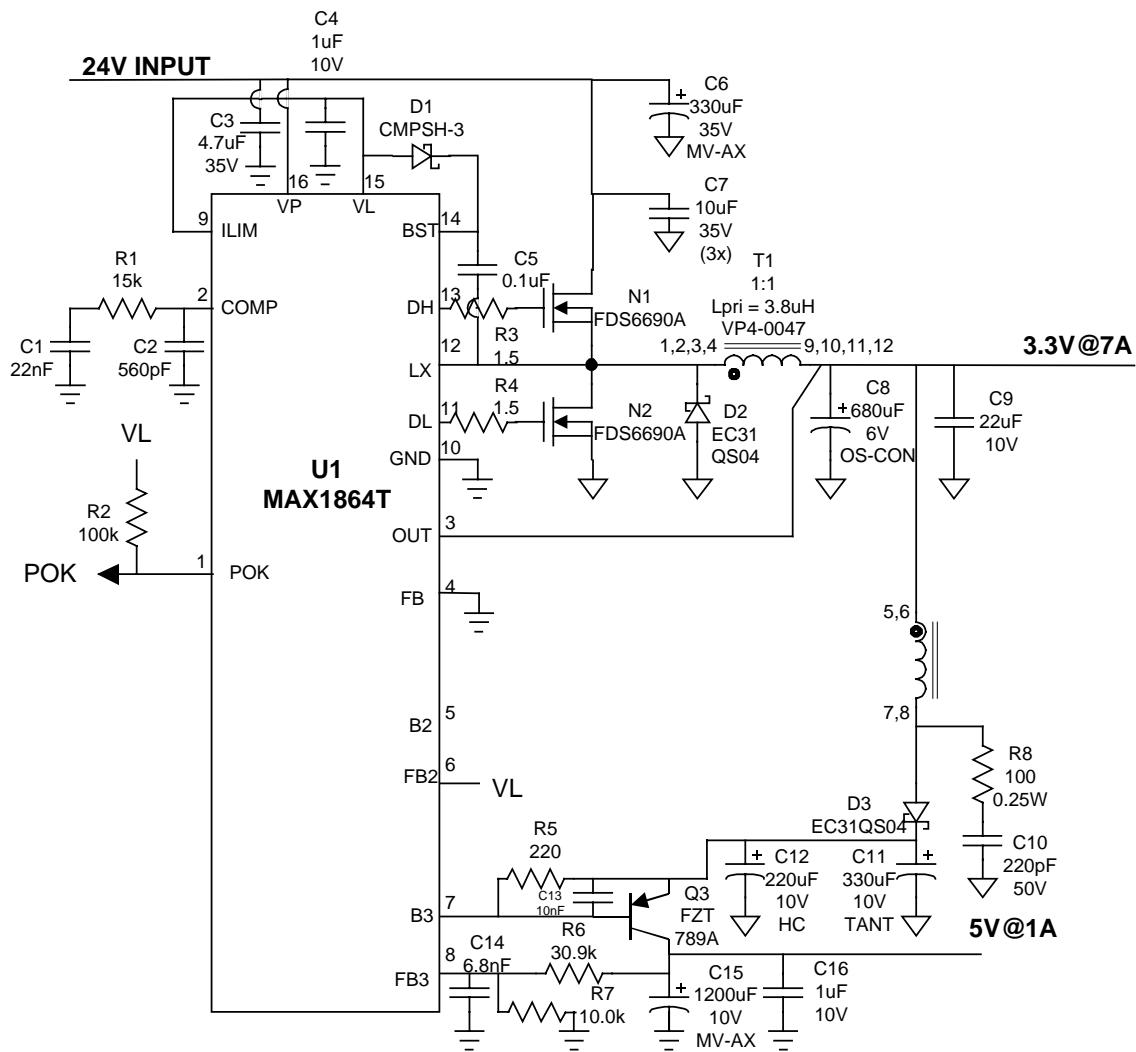


Figure 4: Step Load Response at 15Vinput and 0.5A<->4.5A, 5A/uS. Ch2 = VLX, CH3 3= Vout (AC couple), CH1 = Iout (2A/div)

Network Modem



Vin	Iin	Vout	Iout	V3	I3	Eff.
25.208	1.362	3.3107	7.010	5.0737	1.003	0.824
24.001	1.429	3.3109	7.010	5.0735	1.003	0.825
22.791	1.502	3.3108	7.009	5.0731	1.003	0.826
		100mVpp		200mVpp		

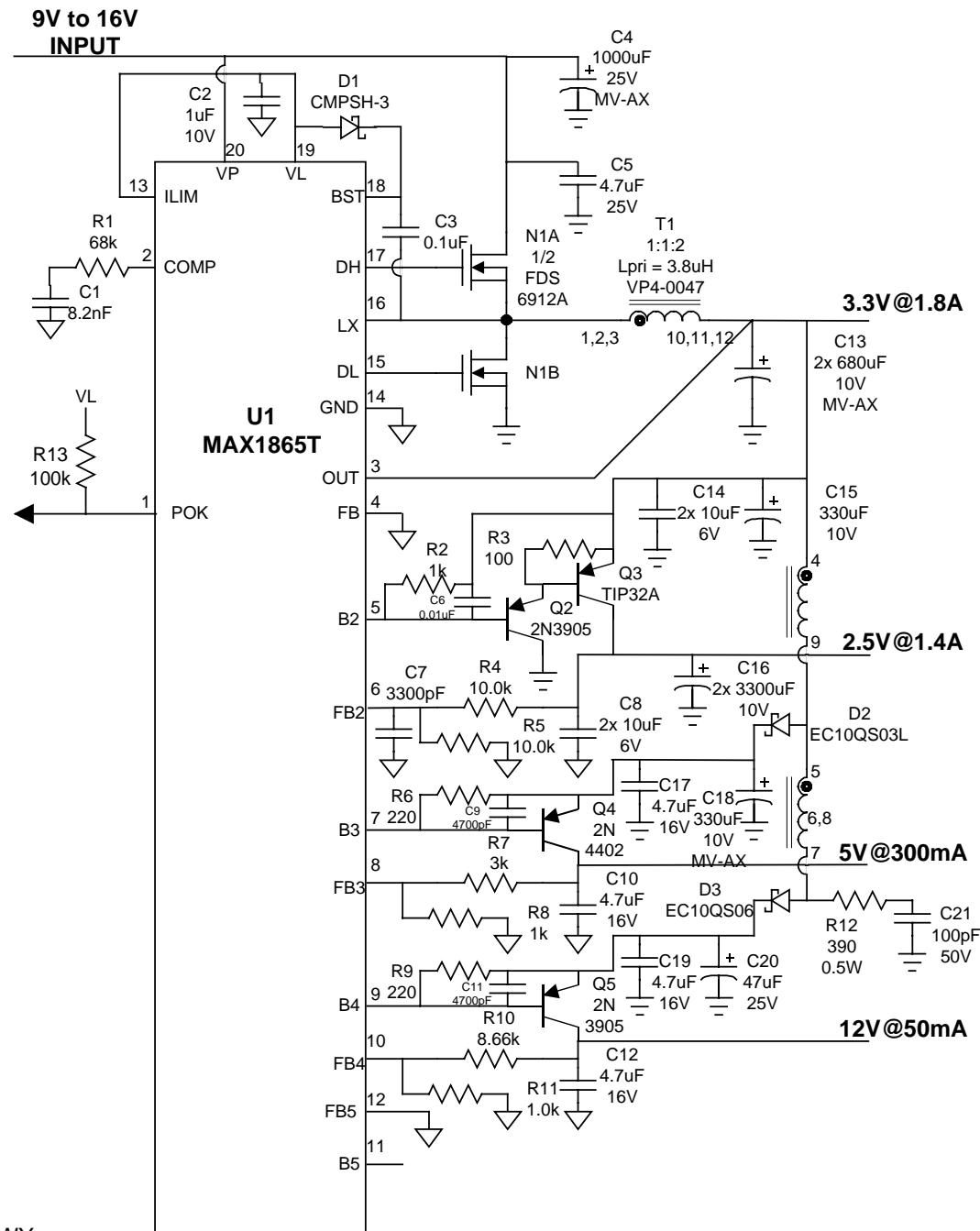
BILL OF MATERIALS
23V to 25V Input
3.3V @ 7A, 5V @ 1A Output
08/21/01

1864_3f3

DESIGNATION	QTY	DESCRIPTION
C1	1	22nF ceramic capacitor (0805)
C2	1	560pF ceramic capacitor (0805)
C3	1	4.7uF 35V Y5V ceramic capacitor (1206) Taiyo Yuden GMK316F475MG
C4,C16	2	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C5	1	0.1uF ceramic capacitor (0805)
C6	1	330uF 35V aluminum electrolytic capacitor Sanyo 35MV330AX
C7	3	10uF 35V Y5V ceramic capacitor (1210) Taiyo Yuden GMK325F106MH
C8	1	680uF 6V organic semiconductor capacitor Sanyo OS-CON 6SP680M
C9	1	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C10	1	220pF 50V ceramic capacitor (0805)
C11	3	330uF 10V tantalum capacitor Kemet T510X337M010AS
C12	1	220uF 10V aluminum electrolytic capacitor Sanyo 10MV220HC
C13	1	10nF ceramic capacitor (0805)
C14	1	6.8nF ceramic capacitor (0805)
C15	1	1200uF 10V aluminum electrolytic capacitor Sanyo 10MV1200AX
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
D2,D3	2	3.1A 40V Schottky diode Nihon EC31QS04
N1,N2	2	17m Ohm 30V MOSFET (8-SO) Fairchild FDS6690A
Q3	1	2A, -25V PNP transistor (SOT-223) Zetex FZT789A
R1	1	15k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3,R4	2	1.5 Ohm 5% resistor (0805)
R5	1	220 Ohm 5% resistor (0805)
R6	1	30.9k Ohm 1% resistor (0805)
R7	1	10.0k Ohm 1% resistor (0805)
R8	1	100 Ohm 5% 0.25W resistor (1210)

T1	1	1:1 Transformer Lpri=3.8uH Coiltronics VP4-0047
U1	1	MAX1864TEEE (16-QSOP)

DSL Modem



RWY
5/11/01

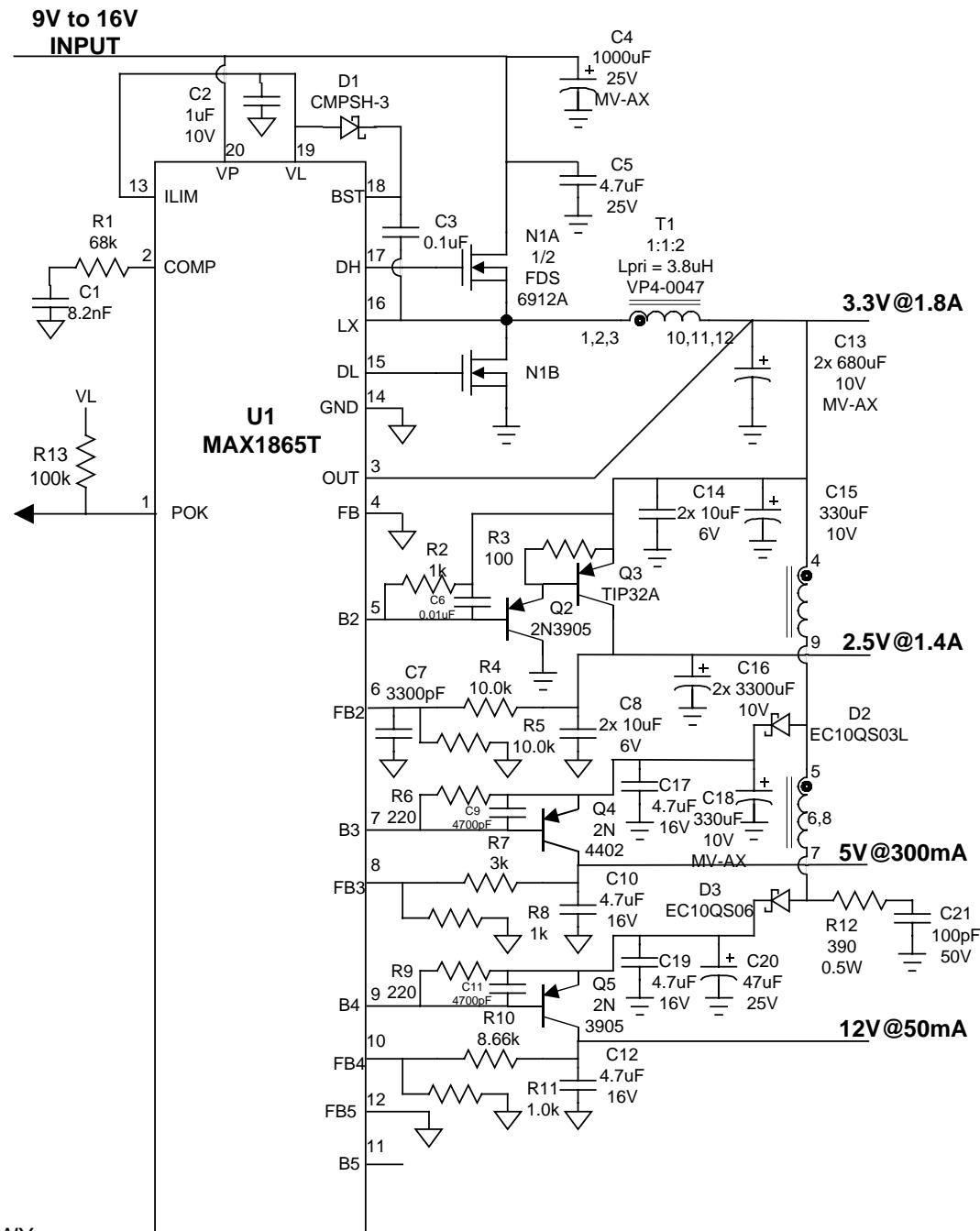
BILL OF MATERIALS
9V to 16V Input
3.3V @ 1.8A, 2.5V @ 1.4A, 5V @ 300mA, 12V @ 50mA Output
5/11/01

1865T_3f

DESIGNATION	QTY	DESCRIPTION
C1	1	8.2nF ceramic capacitor (0805)
C2	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	1000uF 25V aluminum electrolytic cap Sanyo 25MV1000AX
C5	1	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C6	1	0.01uF ceramic capacitor (0805)
C7	1	3300pF ceramic capacitor (0805)
C8,C14	4	10uF 6V ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C9,C11	2	4700pF ceramic capacitor (0805)
C10,C12,C17,C19	4	4.7uF 16V ceramic capacitor (1206) Taiyo Yuden EMK316BJ475ML
C13	2	680uF 10V aluminum electrolytic cap Sanyo 10MV680AX
C15,C18	2	330uF 10V aluminum electrolytic cap Sanyo 10MV330AX
C16	2	3300uF 10V aluminum electrolytic cap
C20	1	47uF 25V aluminum electrolytic cap Sanyo 25MV47AX
C21	1	100pF 50V ceramic capacitor (radial)
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	1A 30V Schottky diode Nihon EC10QS03L
D3	1	1A 60V Schottky diode Nihon EC10QS06
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6912A
Q2,Q5	2	200mA 40V PNP Transistor (TO-92) 2N3905
Q3	1	3A 60V PNP Transistor (TO-220) TIP32A
Q4	1	600mA 40V PNP Transistor (TO-92) 2N4402
R1	1	68k Ohm 5% resistor (0805)
R2	1	1k Ohm 5% resistor (0805)

R3	1	100 Ohm 5% resistor (0805)
R4,R5	2	10.0k Ohm 1% resistor (0805)
R6,R9	2	220 Ohm 5% resistor (0805)
R7	1	3.01k Ohm 1% resistor (0805)
R8	1	1.00k Ohm 1% resistor (0805)
R10	1	8.66k Ohm 1% resistor (0805)
R11	1	1.00k Ohm 1% resistor (0805)
R12	1	390 Ohm 5% 0.5W resistor (axial)
R13	1	100k Ohm 5% resistor (0805)
T1	1	1:1:2 transformer Lpri = 3.8uH Coiltronics VP4-0047
U1	1	MAX1865TEEP (20-QSOP)

DSL Modem



RWY
5/11/01

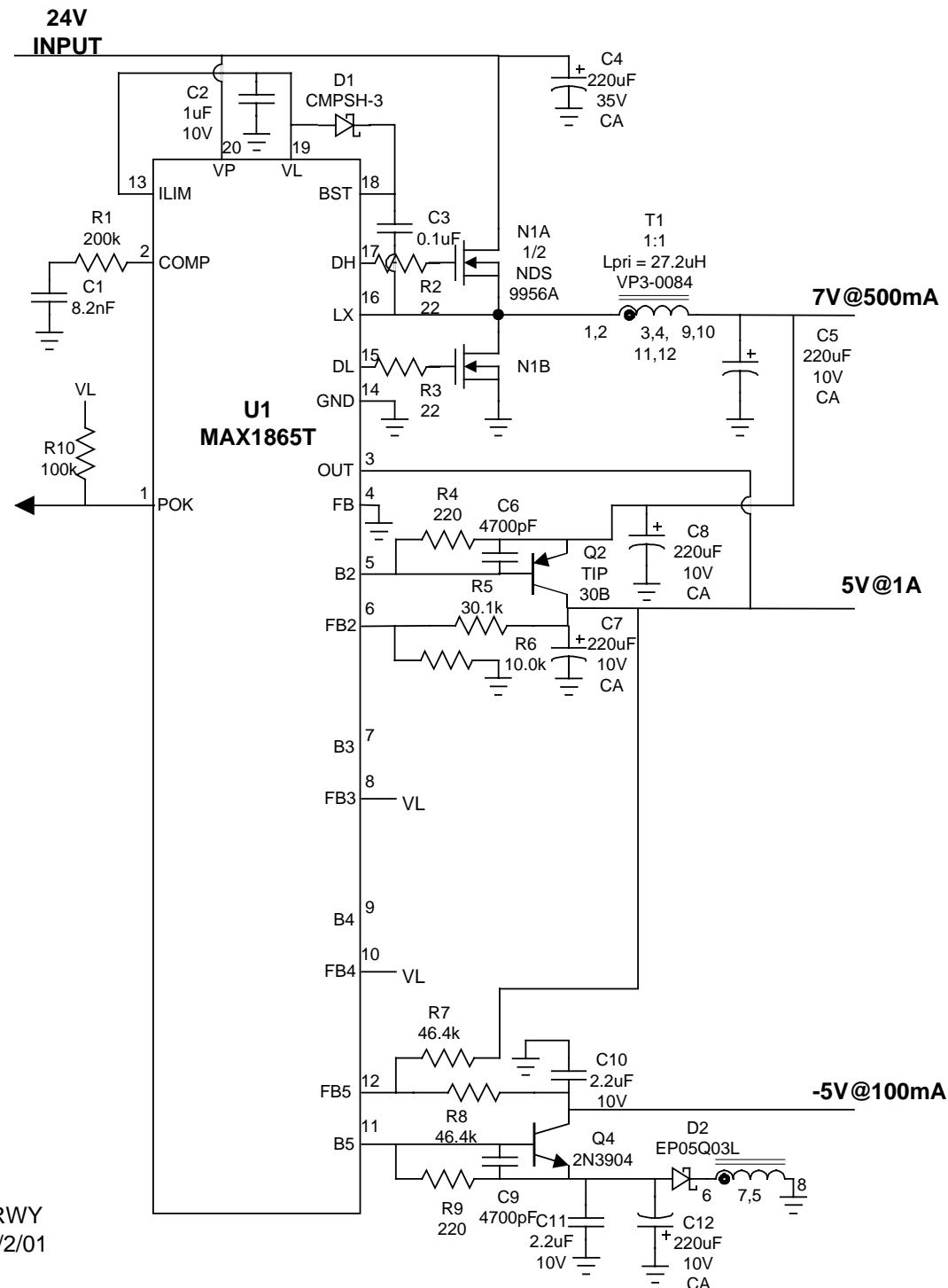
BILL OF MATERIALS
9V to 16V Input
3.3V @ 1.8A, 2.5V @ 1.4A, 5V @ 300mA, 12V @ 50mA Output
5/11/01

1865T_3f

DESIGNATION	QTY	DESCRIPTION
C1	1	8.2nF ceramic capacitor (0805)
C2	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	1000uF 25V aluminum electrolytic cap Sanyo 25MV1000AX
C5	1	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C6	1	0.01uF ceramic capacitor (0805)
C7	1	3300pF ceramic capacitor (0805)
C8,C14	4	10uF 6V ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C9,C11	2	4700pF ceramic capacitor (0805)
C10,C12,C17,C19	4	4.7uF 16V ceramic capacitor (1206) Taiyo Yuden EMK316BJ475ML
C13	2	680uF 10V aluminum electrolytic cap Sanyo 10MV680AX
C15,C18	2	330uF 10V aluminum electrolytic cap Sanyo 10MV330AX
C16	2	3300uF 10V aluminum electrolytic cap
C20	1	47uF 25V aluminum electrolytic cap Sanyo 25MV47AX
C21	1	100pF 50V ceramic capacitor (radial)
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	1A 30V Schottky diode Nihon EC10QS03L
D3	1	1A 60V Schottky diode Nihon EC10QS06
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6912A
Q2,Q5	2	200mA 40V PNP Transistor (TO-92) 2N3905
Q3	1	3A 60V PNP Transistor (TO-220) TIP32A
Q4	1	600mA 40V PNP Transistor (TO-92) 2N4402
R1	1	68k Ohm 5% resistor (0805)
R2	1	1k Ohm 5% resistor (0805)

R3	1	100 Ohm 5% resistor (0805)
R4,R5	2	10.0k Ohm 1% resistor (0805)
R6,R9	2	220 Ohm 5% resistor (0805)
R7	1	3.01k Ohm 1% resistor (0805)
R8	1	1.00k Ohm 1% resistor (0805)
R10	1	8.66k Ohm 1% resistor (0805)
R11	1	1.00k Ohm 1% resistor (0805)
R12	1	390 Ohm 5% 0.5W resistor (axial)
R13	1	100k Ohm 5% resistor (0805)
T1	1	1:1:2 transformer Lpri = 3.8uH Coiltronics VP4-0047
U1	1	MAX1865TEEP (20-QSOP)

CPE modem

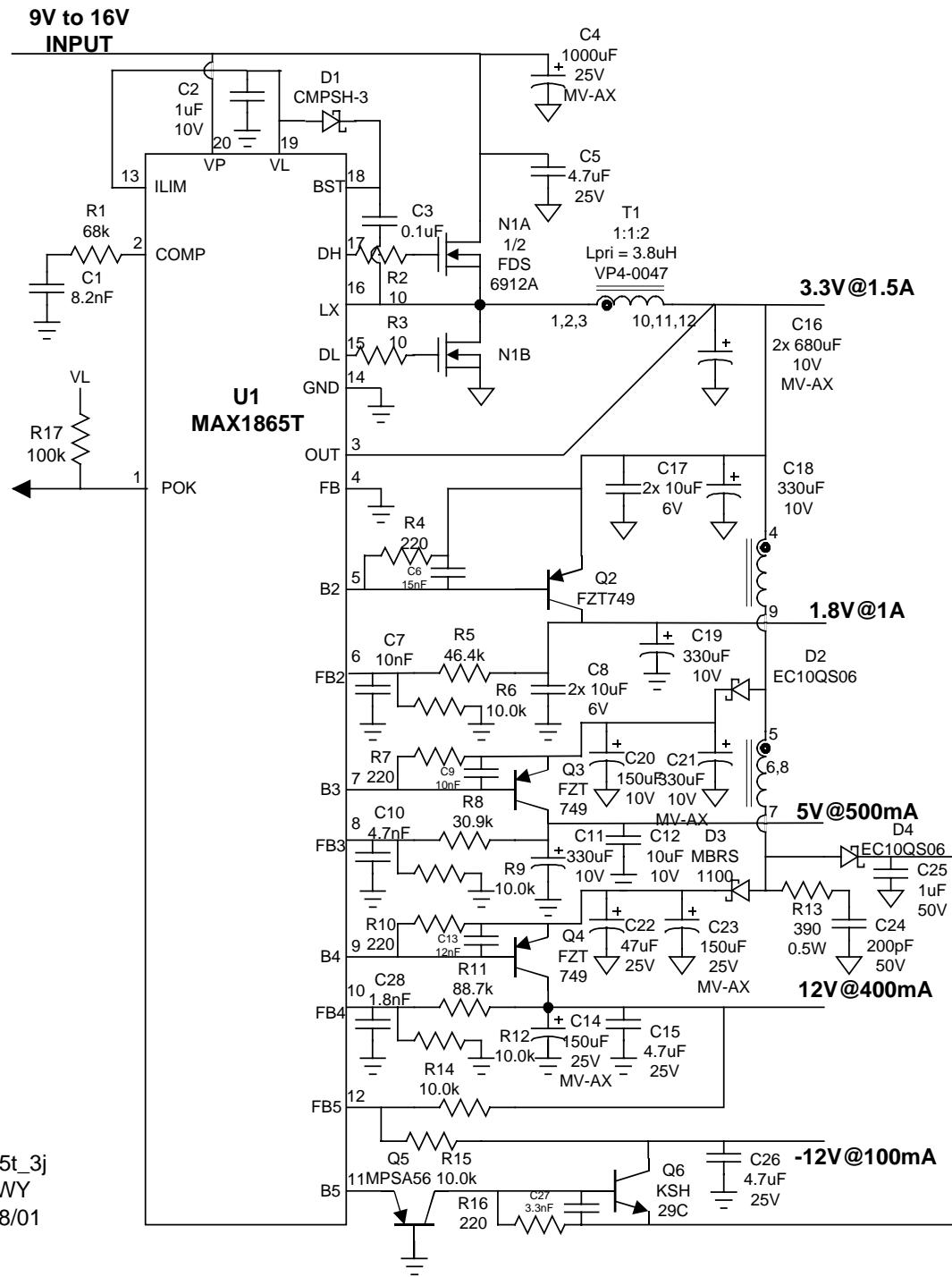


BILL OF MATERIALS**23V to 25V Input****7V @ 500mA, 5V @ 1A, -5V @ 100mA Output****03/15/01**

1865t_7b

DESIGNATION	QTY	DESCRIPTION
C1	1	8.2nF ceramic capacitor (0805)
C2	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	220uF 35V aluminum electrolytic capacitor Sanyo 35MV220CA
C5,C7,C8,C12	4	220uF 10V aluminum electrolytic capacitor Sanyo 10MV220CA
C6,C9	2	4700pF ceramic capacitor (0805)
C10,C11	2	2.2uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ225MG
D2	1	2.1A 60V Schottky diode Nihon EC21QS06
D2	1	1A 100V Schottky diode On Semiconductor MBR1100
N1	1	55m Ohm 30V Dual MOSFET (8-SO) Fairchild Semi NDS6930A
Q2	1	1A, -80V PNP transistor (TO-220) TIP30B
Q3	1	200mA, 40V NPN transistor (TO-92) 2N3904
R1	1	200k Ohm 5% resistor (0805)
R2,R3	2	22 Ohm 5% resistor (0805)
R4,R9,R10	3	46.4k Ohm 1% resistor (0805)
R5,R8	2	10.0k Ohm 1% resistor (0805)
R6,R11	3	220 Ohm 5% resistor (0805)
R7	1	30.1k Ohm 1% resistor (0805)
R12	1	100k Ohm 5% resistor (0805)
T1	1	1:1Transformer Lpri=15.2uH Coiltronics VP3-0047
U1	1	MAX1865TEEP (20-QSOP)

CPE Modem



BILL OF MATERIALS**9V to 16V Input****12V @ 150mA, 5V @ 500mA, 3.3V @ 1.5A, 1.8V @ 1A, -12V @ 20mA Output****6/22/01**

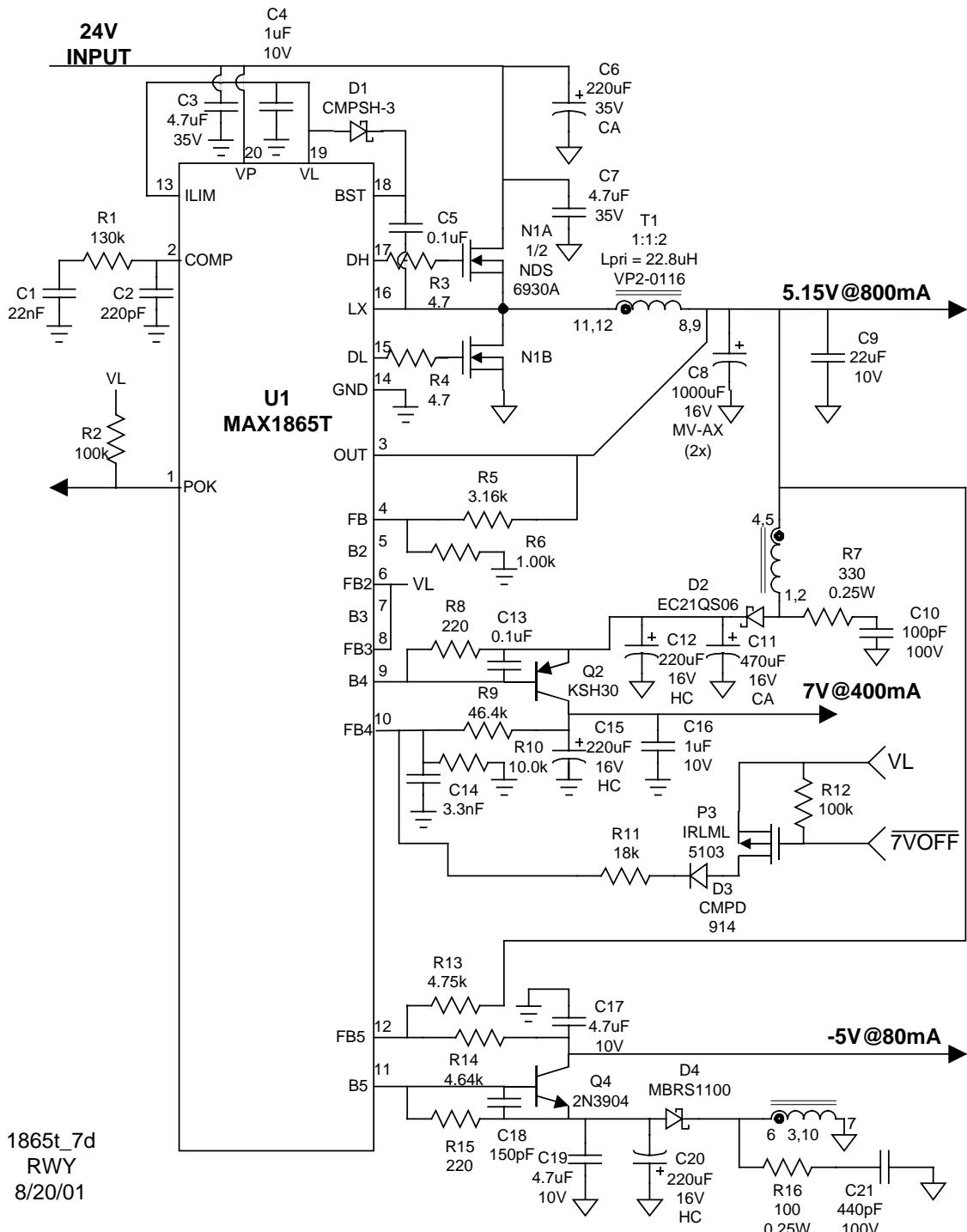
1865t_3h

BOM REV: PRELIM (P1)**BOARD REV: P1**

DESIGNATION	QTY	DESCRIPTION
C1	1	8.2nF ceramic capacitor (0805)
C2	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	1000uF 35V aluminum electrolytic cap Sanyo 35MV1000AX
C5	1	4.7uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C6	1	15nF ceramic capacitor (0805)
C7,C9	2	10nF ceramic capacitor (0805)
C8,C16	4	10uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ106ML
C10	1	4.7nF ceramic capacitor (0805)
C11,C17,C18,C20	4	330uF 10V aluminum electrolytic cap Sanyo 10MV330AX
C12	1	10uF 10V X7R ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C13,C26	2	3300pF ceramic capacitor (0805)
C14,C21,C25	3	4.7uF 16V X5R ceramic capacitor (1206) Taiyo Yuden EMK316BJ475ML
C15	2	680uF 10V aluminum electrolytic cap Sanyo 10MV680AX
C19	1	150uF 10V aluminum electrolytic cap Sanyo 10MV150SAX
C22	1	47uF 25V aluminum electrolytic cap Sanyo 25MV47AX
C23	1	200pF 50V ceramic capacitor (radial)
C24	1	1uF 50Vceramic capacitor (radial)
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	1A 60V Schottky diode Nihon EC10QS06
D3	1	1A 100V Schottky diode On Semiconductor MURS1100
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6912A
Q2,Q3	2	1A 40V PNP Transistor (SOT-223) Zetex FZT749

Q4	1	600mA 40V PNP Transistor (TO-92) 2N4401
Q5	1	500mA 80V PNP Transistor (TO-92) MPSA56
Q6	1	500mA 80V NPN Transistor (TO-92) MPSA06
R1	1	68k Ohm 5% resistor (0805)
R2,R3	1	10 Ohm 5% resistor (0805)
R4,R7,R10,R16	4	220 Ohm 5% resistor (0805)
R5	1	46.4k Ohm 1% resistor (0805)
R6,R9,R14,R15	4	10k Ohm 1% resistor (0805)
R8	1	30.9k Ohm 1% resistor (0805)
R11	1	8.66k Ohm 1% resistor (0805)
R12	1	1.00k Ohm 1% resistor (0805)
R13	1	390 Ohm 0.5W 5% resistor (axial)
T1	1	1:1:2 transformer Lpri = 3.8uH Coiltronics VP4-0047
U1	1	MAX1865TEEP (20-QSOP)

WLL Terminal



Vin	Iin	Vout	Iout	V4	I4	V5	I5	Eff.
25.208	0.403	5.1268	0.8009	6.883	0.401	-5.0021	0.0802	0.715
24.003	0.422	5.1266	0.8009	6.882	0.401	-5.0020	0.0800	0.717
22.796	0.442	5.1265	0.8009	6.882	0.401	-5.0024	0.0801	0.721
50mVpp			10mVpp			50mVpp		

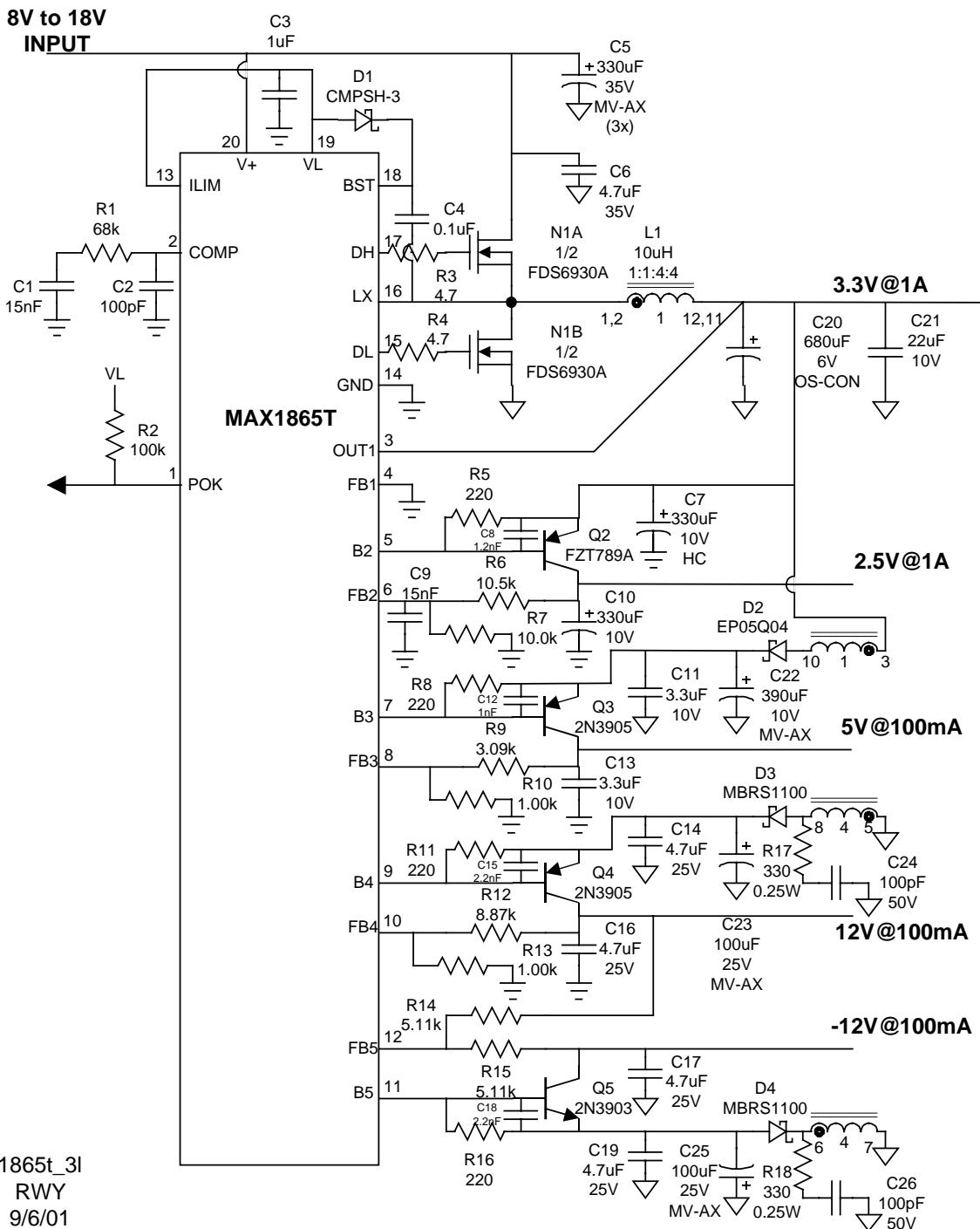
BILL OF MATERIALS
23V to 25V Input
7V @ 400mA, 5.15V @ 800mA, -5V @ 80mA Output
08/21/01

1865t_7d

DESIGNATION	QTY	DESCRIPTION
C1	1	22nF ceramic capacitor (0805)
C2	1	220pF ceramic capacitor (0805)
C3,C7	2	4.7uF 35V Y5V ceramic capacitor (1206) Taiyo Yuden GMK316F475MG
C4,C16	2	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C5,C13	1	0.1uF ceramic capacitor (0805)
C6	1	220uF 35V aluminum electrolytic capacitor Sanyo 35MV220CA
C8,C11	3	470uF 16V aluminum electrolytic capacitor Sanyo 16MV470CA
C9	1	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C10	1	100pF 50V ceramic capacitor (0805)
C12,C15,C20	3	220uF 16V aluminum electrolytic capacitor Sanyo 16MV220HC
C14	1	3.3nF ceramic capacitor (0805)
C17,C19	2	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C18	1	150pF ceramic capacitor (0805)
C21	2	220pF 50V ceramic capacitor (0805)
D1	1	100mA 30V Schottky diode Central Semi CMPSH-3
D2	1	2.1A 40V Schottky diode Nihon EC21QS04
D3	1	10mA 100V signal diode (SOT-23) Central Semi CMPD914
D4	1	1A 60V Schottky diode Central Semi EC10QS06
N1	1	55m Ohm 30V Dual MOSFET (8-SO) Fairchild Semi FDS6930A
P3	1	1 Ohm -30V PFET (SOT-23) IRLML5103
Q2	1	1A, -40V PNP transistor (D-PAK) Fairchild KSH30
Q4	1	200mA, 40V PNP transistor (TO-92) 2N3906
R1	1	130k Ohm 5% resistor (0805)
R2,R12	2	100k Ohm 5% resistor (0805)

R3,R4	2	4.7 Ohm 5% resistor (0805)
R5	1	3.16k Ohm 1% resistor (0805)
R6	1	1.00k Ohm 1% resistor (0805)
R7	1	330 Ohm 5% 0.25W resistor (1210)
R8,R15	2	220 Ohm 5% resistor (0805)
R9	1	46.4k Ohm 1% resistor (0805)
R10	1	10.0k Ohm 1% resistor (0805)
R11	1	18k Ohm 5% resistor (0805)
R13	1	4.75k Ohm 1% resistor (0805)
R14	1	4.64k Ohm 1% resistor (0805)
R16	1	100 Ohm 5% 0.25W resistor (1210)
T1	1	1:1:2 Transformer Lpri=22.8uH Coiltronics VP2-0116
U1	1	MAX1865TEEP (20-QSOP)

ADSL Modem



Vin	Iin	Vout	Iout	V2	I2	V3	I3	V4	I4	V5	I5	Eff.
8.036	1.462	3.322	1.005	2.530	1.002	5.053	0.100	12.17	0.101	-12.07	-0.102	0.752
12.00	1.011	3.321	1.005	2.530	1.002	5.052	0.100	12.17	0.101	-12.17	-0.102	0.729
15.00	0.845	3.321	1.005	2.530	1.002	5.052	0.100	12.18	0.101	-12.17	-0.102	0.698
18.00	0.739	3.320	1.005	2.530	1.002	5.053	0.100	12.18	0.101	-12.18	-0.102	0.665
21.00	0.667	3.320	1.005	2.530	1.002	5.055	0.100	12.18	0.101	-12.18	-0.102	0.632

Transformer Design

EFD15 core AL=84nH/T² (Coiltronics SG3-0084)

Layer 1: (Pin 3-10) 11 turns bifilar #28AWG

Layer 2: (Pin 5-8) 44 turns #34AWG

Layer 3: (Pin 1-12) 11 turns bifilar #28AWG

Layer 4: (Pin 6-7) 44 turns #34AWG

Layer 5: (Pin 2-11) 11 turns bifilar #28AWG

BILL OF MATERIALS

8V to 18V Input

3.3V @ 1A, 2.5V @ 1A, 5V @ 100mA, 12V @ 100mA, -12V@ 100mA Output

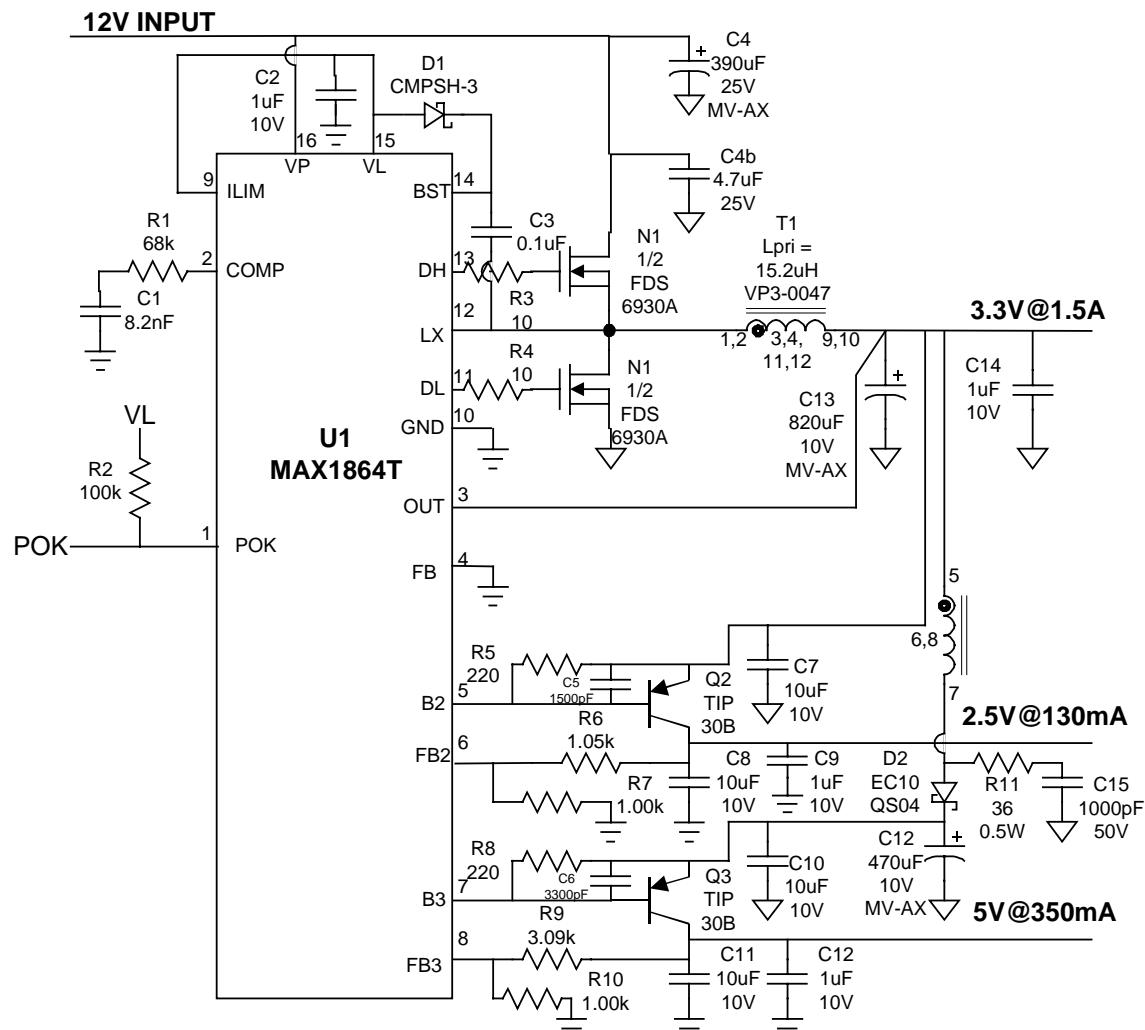
1865t_31

9/6/01 RWY

DESIGNATION	QTY	DESCRIPTION
C1,C9	2	15nF ceramic capacitor (0805)
C2	1	100pF ceramic capacitor (0805)
C3	1	1uF 10V ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C4	1	0.1uF ceramic capacitor (0805)
C5	3	330uF 35V aluminum electrolytic capacitor Sanyo 35MV330AX
C6	1	4.7uF 35V Y5V ceramic capacitor (1206) Taiyo Yuden GMK316F475MG
C7,C10	2	330uF 10V aluminum electrolytic capacitor Sanyo 10MV330HC
C8	1	1.2nF ceramic capacitor (0805)
C11,C13	2	3.3uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ335ML
C12	1	1nF ceramic capacitor (0805)
C14,C16,C17,C19	4	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C15,C18	2	2.2nF ceramic capacitor (0805)
C20	1	680uF 6V organic semiconductor capacitor Sanyo OS-CON 6SP680M
C21	1	22uF 10V ceramic capacitor (1812) Taiyo Yuden LMK432BJ226MM
C22	1	390uF 10V aluminum electrolytic capacitor Sanyo 10MV390AX
C23,C25	2	100uF 25V aluminum electrolytic capacitor Sanyo 25MV100AX
C24,C26	2	100pF 50V ceramic capacitor (0805)
D1	1	100mA Schottky diode Central Semi CMPSH-3
D2	1	0.5A 40V Schottky diode Nihon EC05Q04
D3,D4	2	1A 100V Schottky diode

		On Semiconductor MBRS1100
N1	1	55m Ohm 30V Dual MOSFET (8-SO) Fairchild Semi FDS6930A
Q2	1	2A, -25V PNP transistor (SOT-223) Zetex FZT789A
Q3,Q4	2	200mA, -40V PNP transistor (TO-92) 2N3905
Q5	1	200mA 40V NPN transistor (TO-92) 2N3903
R1	1	100k Ohm 5% resistor (0805)
R2	1	68k Ohm 5% resistor (0805)
R3,R4	2	4.7 Ohm 5% resistor (0805)
R5,R8,R11,R16	4	220 Ohm 5% resistor (0805)
R6	1	10.5k Ohm 1% resistor (0805)
R7,R14,R15	3	10.0k Ohm 1% resistor (0805)
R9	1	3.09k Ohm 1% resistor (0805)
R10,R13	2	1.00k Ohm 1% resistor (0805)
R12	1	8.87k Ohm 1% resistor (0805)
R17,R18	2	330 Ohm 5% 0.25W resistor (1210)
T1	1	1:1:4:4 Transformer Lpri=10uH (SG3) ICE Components ICA-????
U1	1	MAX1865TEEP (20-QSOP)

DSL Modem



1864_3d3
RWY
9/3/01

Vin	Iin	Vout	Iout	Vout2	Iout2	Vout3	Iout3	Eff.
8.908	0.955	3.321	1.502	2.521	0.130	5.015	0.350	0.831
11.93	0.719	3.320	1.502	2.521	0.130	5.013	0.350	0.824
14.94	0.578	3.321	1.502	2.521	0.130	5.015	0.350	0.819

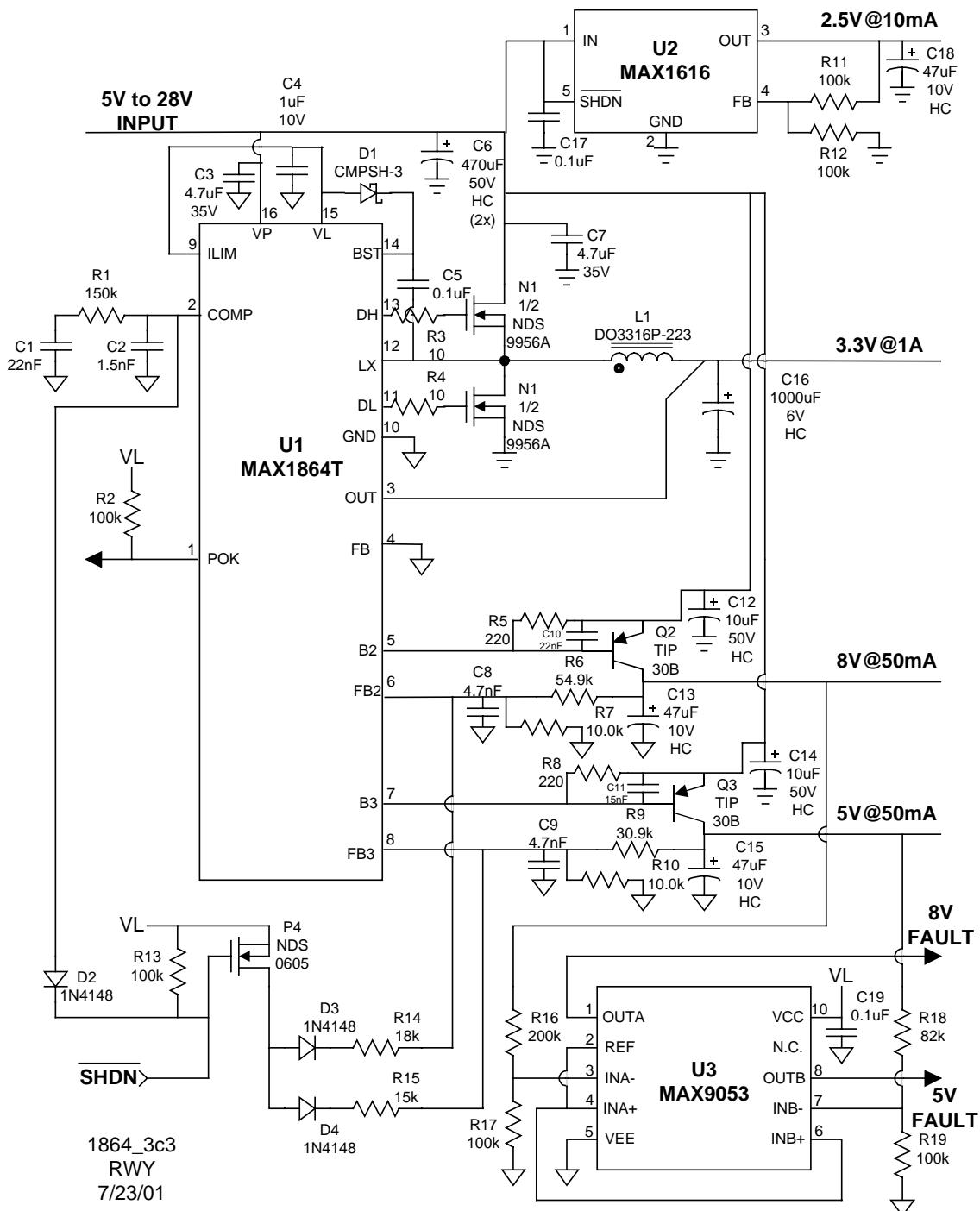
BILL OF MATERIALS**12V Input****3.3V @ 1.5A, 2.5V @ 130mA, 5V @ 350mA Output**

1864_3d3

6/26/01

DESIGNATION	QTY	DESCRIPTION
C1	1	8.2nF ceramic capacitor (0805)
C2,C9,C12,C14	4	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	390uF 25V aluminum electrolytic cap Sanyo 25MV390AX
C4b	1	4.7uF 25V ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C5	1	1.5nF ceramic capacitor (0805)
C6	1	3.3nF ceramic capacitor (0805)
C7,C8,C10,C11	4	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C13	1	820uF 10V aluminum electrolytic cap Sanyo 10MV820AX
C15	1	1nF 50V ceramic capacitor (radial)
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	1A 40V Schottky diode Nihon EC10QS04
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS6930A
Q2,Q3	2	1A 80V PNP Transistor (TO-220) TIP30B
R1	1	68k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3,R4	2	10 Ohm 5% resistor (0603)
R5,R8	2	220 Ohm 5% resistor (0805)
R6	1	1.05k Ohm 1% resistor (0805)
R7,R10	2	1.00k Ohm 1% resistor (0805)
R9	1	3.09k Ohm 1% resistor (0805)
R11	1	36 Ohm 0.5W 5% resistor (axial)
T1	1	1:1 Transformer Lpri = 15.2uH Coiltronics VP3-0047
U1	1	MAX1864TEEE (16-QSOP)

Telematics in car



BILL OF MATERIALS**5V to 28V Input****3.3V @ 1A, 8V @ 50mA, 5V @ 50mA, 2.5V @ 10mA Output**

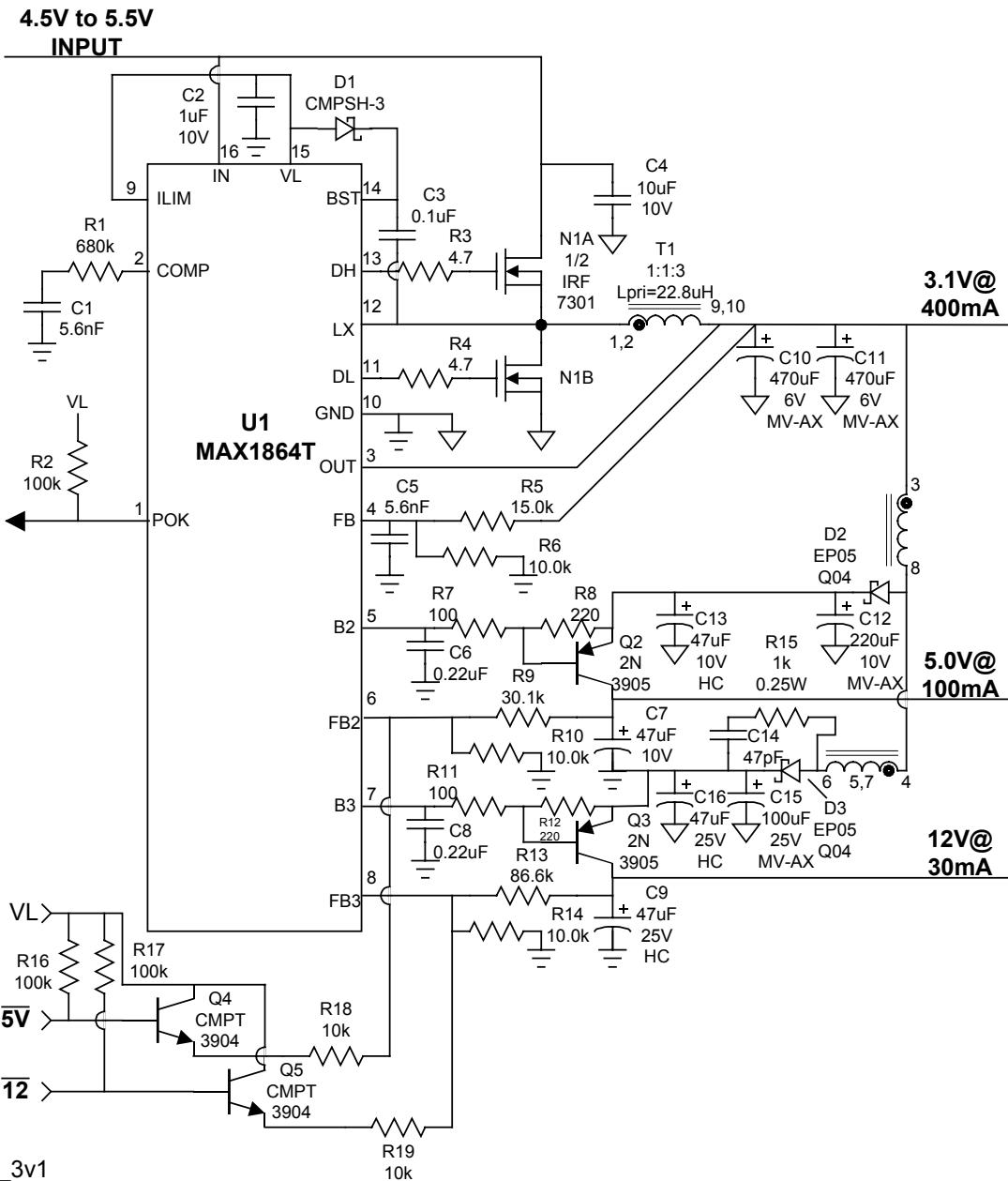
1864_3c3

7/23/01

DESIGNATION	QTY	DESCRIPTION
C1,C10	2	22nF ceramic capacitor (0805)
C2	1	1.5nF ceramic capacitor (0805)
C3,C7	2	4.7uF 35V Y5V ceramic capacitor (1206) Taiyo Yuden GMK316F475MG
C4	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C5,C17,C19	3	0.1uF 50Vceramic capacitor (0805)
C6	2	470uF 50V aluminum electrolytic cap Sanyo 50MV470HC
C8,C9	2	4.7nF ceramic capacitor (0805)
C11	1	15nF ceramic capacitor (0805)
C2, C14	2	10uF 50V aluminum electrolytic cap Sanyo 50MV10HC
C13, C15,C18	3	47uF 10V aluminum electrolytic cap Sanyo 10MV47HC
C16	1	1000uF 6V aluminum electrolytic cap Sanyo 6MV1000HC
D1	1	100mA 30V Schottky diode (SOT-23)
D2,D3,D4	3	10mA 100V silicon diode (DO41) 1N4148
L1	1	22uH 1.5A Power Inductor Coilcraft DO3316P-223
N1	1	Dual N-channel MOSFET (SO-8) Fairchild FDS9956A
P4	1	P-channel MOSFET (SOT-23) Fairchild NDS0605
Q2,Q3	2	1A 80V PNP Transistor (TO-220) TIP30B
R1	1	150k Ohm 5% resistor (0805)
R2,R13,R17,R19	4	100k Ohm 5% resistor (0805)
R3,R4	2	10 Ohm 5% resistor (0603)
R5,R8	2	220 Ohm 5% resistor (0805)
R6	1	54.9k Ohm 1% resistor (0805)
R7,R10	2	10.0k Ohm 1% resistor (0805)
R9	1	30.9k Ohm 1% resistor (0805)
R7,R10	2	220 Ohm 5% resistor (0805)
R11,R12	2	100k Ohm 1% resistor (0805)
R14	1	18k Ohm 5% resistor (0805)
R15	1	15k Ohm 5% resistor (0805)
R16	1	200k Ohm 5% resistor (0805)

R18	1	82k Ohm 5% resistor (0805)
U1	1	MAX1865TEEP (20-QSOP)
U2	1	MAX1616EUK (5-SOT23)
U3	1	MAX9053BEUB (10-uMAX)

USB Modem



Notes:

1. T1 wound on EF12.6 core with $AL = 57\text{nH}/T^*T$, 10-pin surface-mount bobbin.
- Layer 1: (Pin 5-6) 30 turns #32AWG
- Layer 2: (Pin 4-7) 30 turns #32AWG
- Layer 3: (Pin 3-8) 20 turns #30AWG
- Layer 4: (Pin 2-9) 20 turns #30AWG
- Layer 5: (Pin 1-10) 20 turns #30AWG

BILL OF MATERIALS
4.5V to 5.5V Input
12V @ 30mA, 5.0V @ 0.1A, 3.1V @ 0.4A Output
11/08/01

1864_3v1

DESIGNATION	QTY	DESCRIPTION
C1,C5	2	5.6nF ceramic capacitor (0805)
C2	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C3	1	0.1uF ceramic capacitor (0805)
C4	1	10uF 10V ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C6,C8	2	0.22uF ceramic capacitor (0805)
C7,C13	2	47uF 10V aluminum electrolytic cap Sanyo 10MV47HC
C9,C16	2	47uF 25V aluminum electrolytic cap Sanyo 25MV47HC
C10,C11	2	470uF 6V aluminum electrolytic cap Sanyo 6MV470AX
C12	1	220uF 10V aluminum electrolytic cap Sanyo 10MV220AX
C14	1	47pF 50V ceramic capacitor (0805)
C15	1	100uF 25V aluminum electrolytic cap Sanyo 25MV100AX
D1	1	100mA Schottky diode (SOT-23) Central Semi CMPSH-3
D2,D3	2	0.5A 40V Schottky diode Nihon EP05Q04
N1	1	Dual N-channel MOSFET (SO-8) International Rectifier IRF7301
Q2,Q3	2	200mA -40V PNP Transistor (TO-92) 2N3905
Q4,Q5	2	200mA 40V NPN Transistor (SOT-23) Central Semi CMPT3904
R1	1	680k Ohm 5% resistor (0805)
R2,R16,R17	3	100k Ohm 5% resistor (0805)
R3,R4	2	10 Ohm 5% resistor (0603)
R5	1	15.0k Ohm 1% resistor (0805)
R6,R10,R14	3	10.0k Ohm 1% resistor (0805)
R7,R11	2	100 Ohm 5% resistor (0805)
R8,R12	2	220 Ohm 5% resistor (0805)
R9	1	30.1k Ohm 1% resistor (0805)
R13	1	86.6k Ohm 1% resistor (0805)
R15	1	1k Ohm 0.25W 5% resistor (1210)
R18,R19	2	10k Ohm 5% resistor (0805)

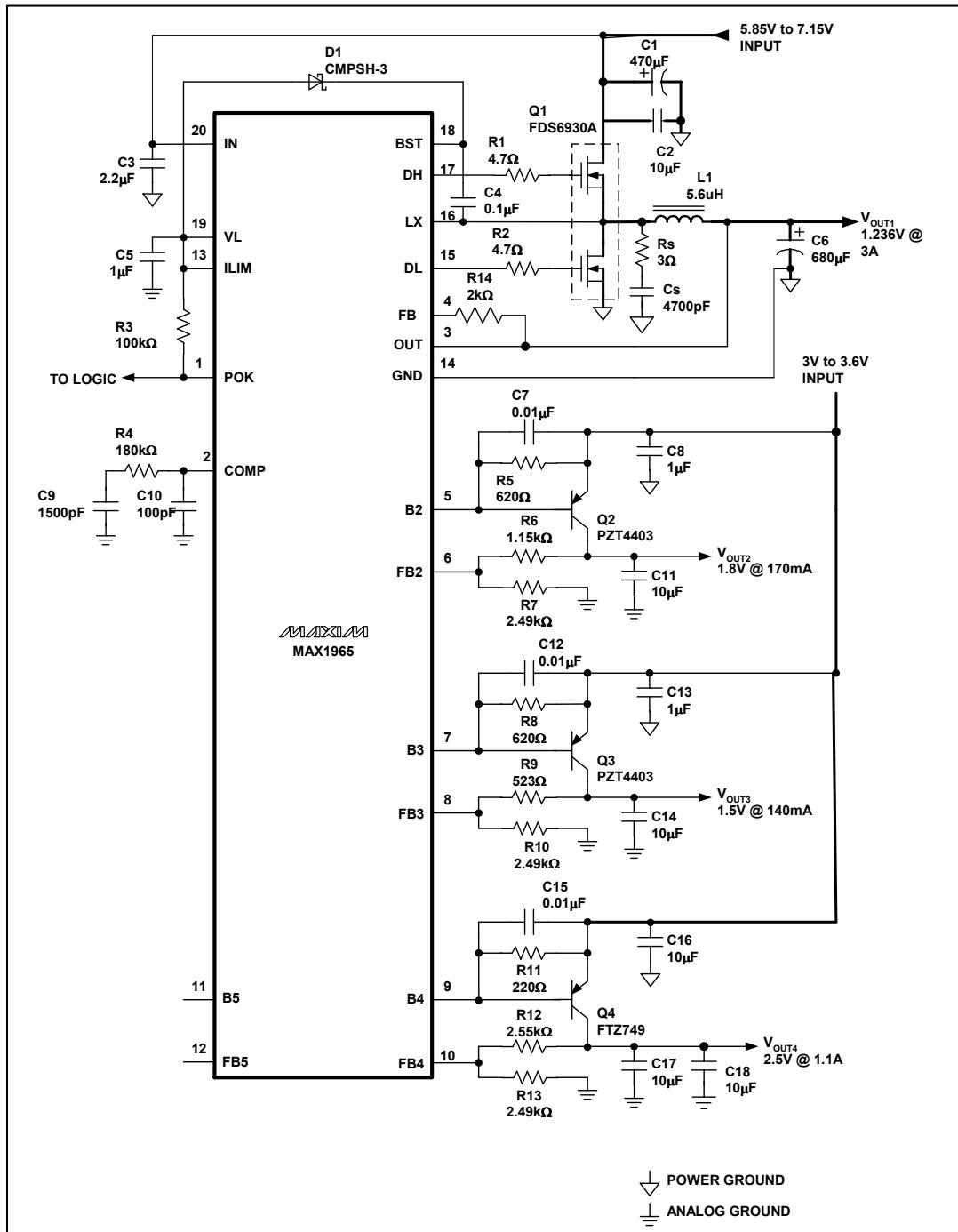
T1	1	1:1:3 transformer Lpri = 22.8uH Coiltronics SG7-0057 core (EF12.6)
U1	1	MAX1864TEEE (16-QSOP)

Vin	Iin	Vout	Iout	V2	I2	V3	I3	Eff.
5.500	0.456	3.0802	0.400	4.9233	0.10005	11.940	0.03025	0.832
4.999	0.498	3.0786	0.400	4.9187	0.10005	11.932	0.03025	0.837
4.4974	0.552	3.0776	0.400	4.9038	0.10004	11.922	0.03025	0.839
		100mVpp		25mVpp		25mVpp		

Cable/DSL Modem Power Supply:

5.85V to 7.15V Input DC-DC Step-Down to 1.24V at 3A

3.3V Input Linearly Regulated to 2.5V at 1.4A, 1.8V at 0.17A and 1.5V at 0.14A



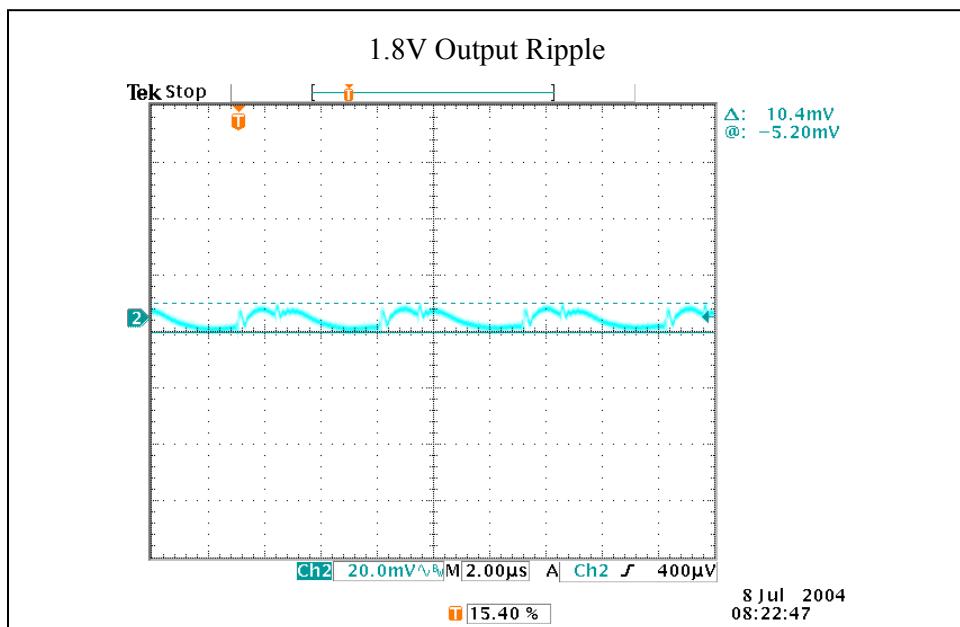
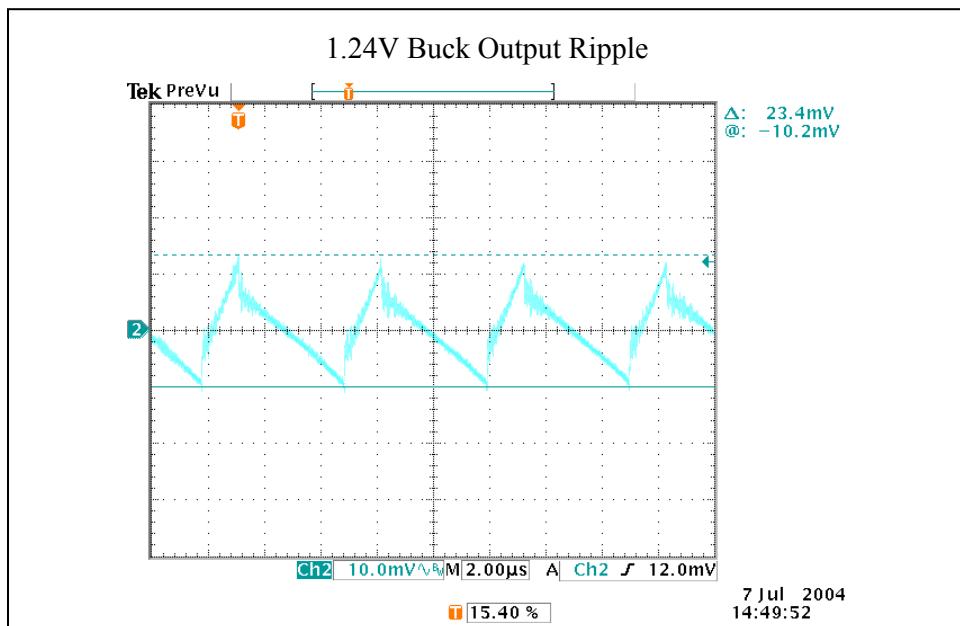
BOM with Estimated Cost based on 500K+ quantity					
Component	QTY.	Description	Cost	Ext. Cost	
R1,R2	2	Resistor 4.7Ω, 5% 0603	0.001	0.002	
R3	1	Resistor 100kΩ, 5% 0603	0.001	0.001	
R4	1	Resistor 180kΩ, 5% 0603	0.001	0.001	
R5,R8	2	Resistor 620Ω, 5% 0603	0.001	0.002	
R6	1	Resistor 1.15kΩ, 1% 0603	0.0025	0.0025	
R7,R10,R13	3	Resistor 2.49kΩ, 1% 0603	0.0025	0.0075	
R9	1	Resistor 523Ω, 1% 0603	0.0025	0.0025	
R12	1	Resistor 2.55kΩ, 1% 0603	0.0025	0.0025	
R13	1	Resistor 220Ω, 5% 0603	0.001	0.001	
R14	1	Resistor 2kΩ, 5% 0603	0.001	0.001	
Rs (optional)	1	Resistor 3Ω, 5% 0805	0.002	0.002	
C1	1	Capacitor 470uF/10V Sanyo: 10MV470AX (8x11.5)	0.05	0.05	
C2,C11, C14,C16, C17,C18	6	Capacitor 10uF/10V, X7R Ceramic, 1206	0.05	0.3	
C3	1	Capacitor 2.2uF/10V, X5R Ceramic, 0603	0.025	0.025	
C4	1	Capacitor 0.1uF/10V, X7R Ceramic, 0603	0.02	0.02	
C5,C8,C13	3	Capacitor 1uF/10V, X5r Ceramic 0603	0.025	0.075	
C6	1	Capacitor 680uF/16V Rubycon: 16MBZ680M 8x 16	0.09	0.09	
C7, C12,C15	3	Capacitor 0.01uF/10V, X7R Ceramic, 0603	0.015	0.045	
C9	1	Capacitor 1500pF/25V, X7R Ceramic, 0603	0.015	0.015	
C10	1	Capacitor 100pF/25V, COG Ceramic, 0603	0.03	0.03	
					0
Cs (optional)	1	Capacitor 1000pF/25V, X7R Ceramic, 0603	0.015	0.015	
D1	1	Diode Schottky 100mA/30V Central CMPSH-3	0.035	0.035	
Q1	1	MOSFET 30V/ 0.044Ω Dual SO-8 Fairchild FSD6930A	0.25	0.25	
Q2,Q3	2	Transistor PNP SOT223 Philip PZT4403	0.07	0.14	
Q4	1	Transistor PNP SOT223 Zetex or Fairchild FTZ749	0.15	0.15	
					0
L1	1	Inductor 15uH, 3.1A Sumida CDRH104R-150	0.1	0.1	
MAX1965	1	IC, PWM + LDO Controllers	0.95	0.95	
					Total 2.315

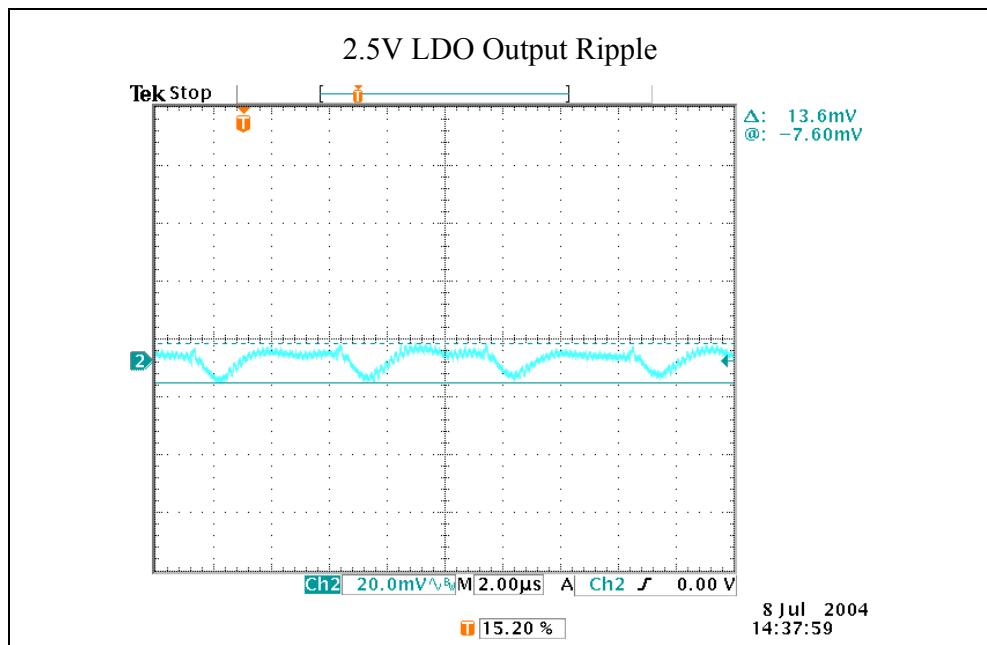
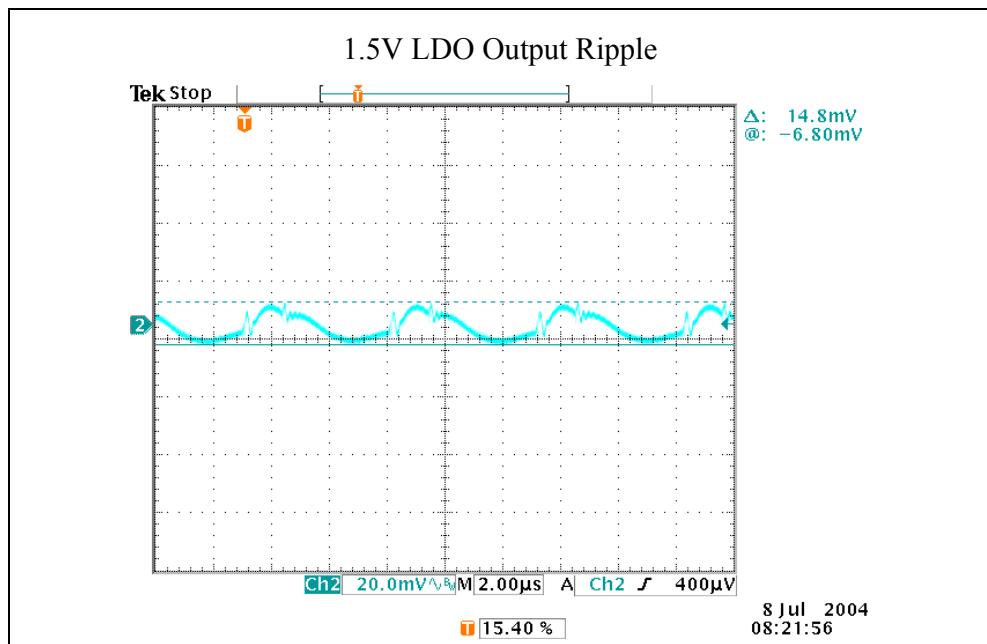
Test results:

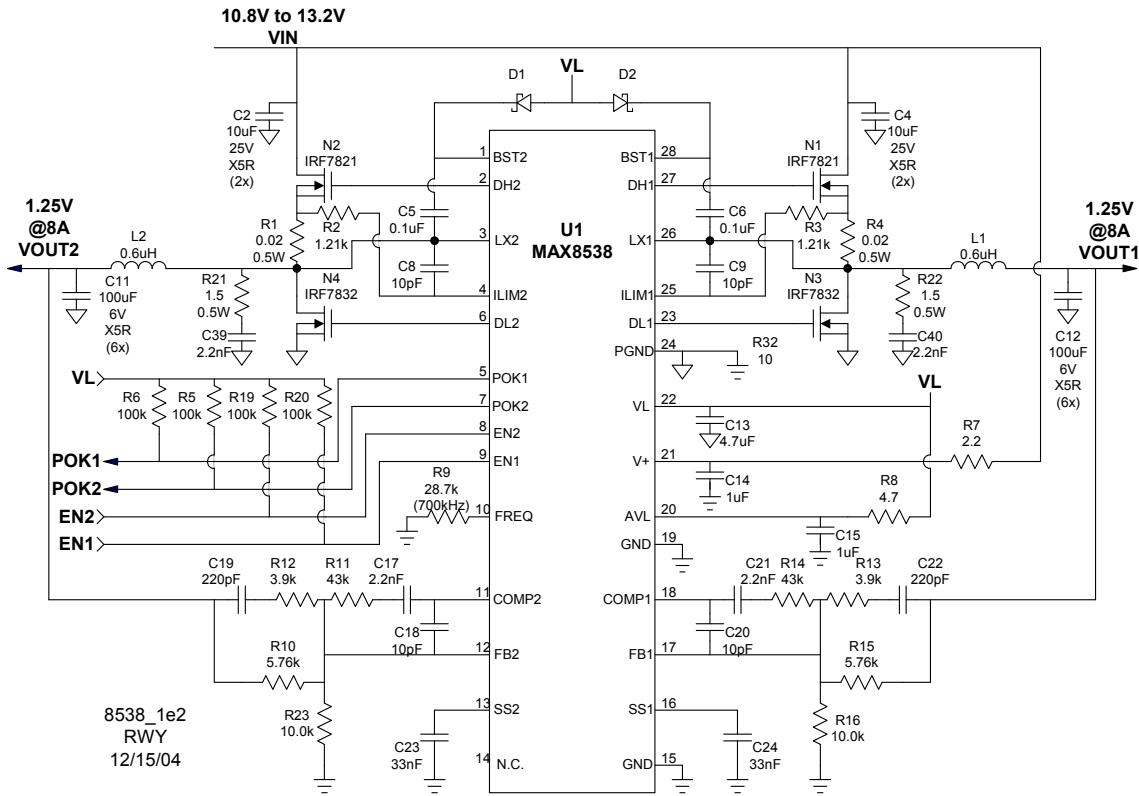
Output	At No Load	At Full Load
Vout1	1.240V	1.239V
Vout2	1.831V	1.816V
Vout3	1.515V	1.507V
Vout4	2.519V	2.490V

Line regulation is negligible.

Output Ripple and Noise (measured with all outputs at full load):







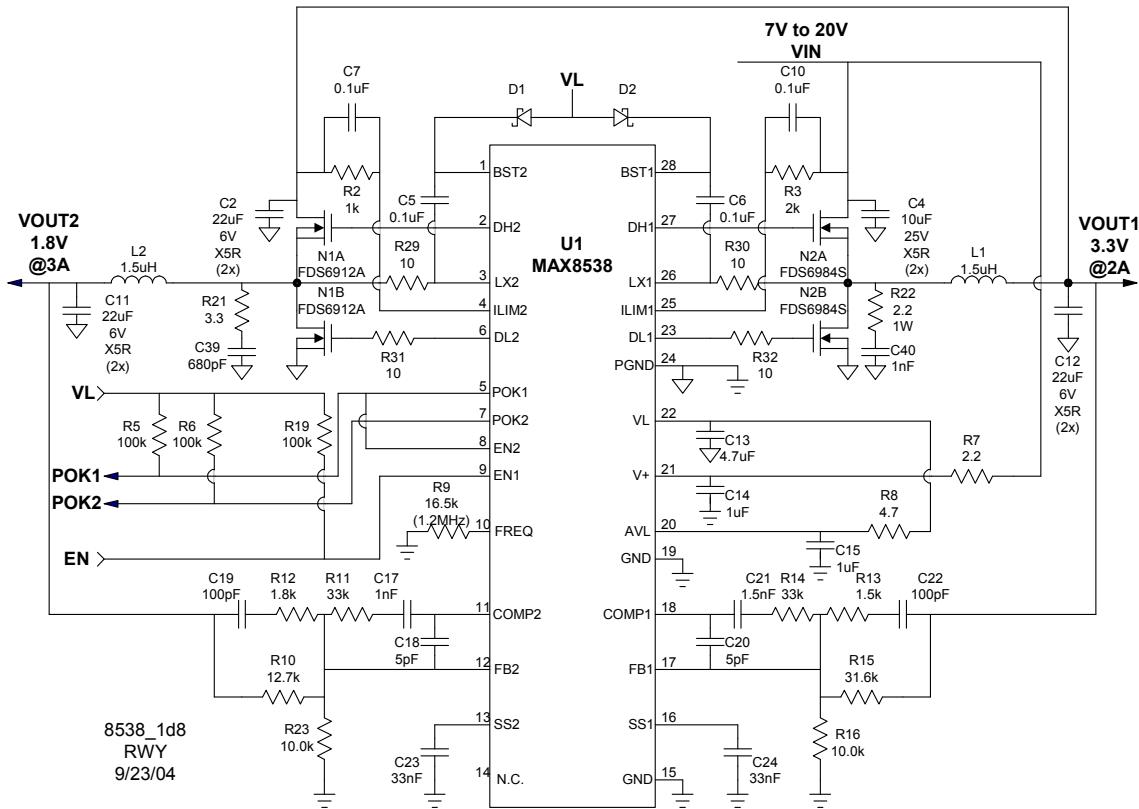
Vin	Iin	Vout1	Iout1	Vout2	Iout2	Efficiency
12.01	0.0973	1.259	0	1.262	0	
10.78	2.30	1.256	8	1.259	8	0.811
12.01	2.09	1.257	8	1.260	8	0.8032
13.22	1.93	1.257	8	1.260	8	0.789
20MHz BW		<10mVpp		<10mVpp		
Current limit			~9.3A		~9.1A	

BILL OF MATERIALS
10.8V to 13.2V Input
1.8V @ 8A, 1.8V @ 8A Output
12/17/04

8538_1e2

DESIGNATION	QTY	DESCRIPTION
C2,C4	4	10uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ106MM
C5,C6	2	0.1uF ceramic capacitor (0603)
C8,C9,C18,C20	4	10pF ceramic capacitor (0603)
C11,C12	12	100uF 6V X5R ceramic capacitor (18125) Taiyo Yuden JMK432BJ107MU
C13	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C14	1	1uF 25V X5R ceramic capacitor (1206) Taiyo Yuden GMK316BJ105ML
C15	1	1uF 10V X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ105MA
C17,C21	2	2.2nF ceramic capacitor (0603)
C19,C22	2	220pF ceramic capacitor (0603)
C23,C24	2	33nF ceramic capacitor (0603)
C39,C40	2	2.2nF ceramic capacitor (0805)
D1,D2	2	100mA 30V Schottky diode (SOD-323) Central Semi CMDSH-3
L1,L2	2	0.6uH 10A Inductor Toko FDV0630-0R6
N1,N3	2	12.5m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRF7821
N6,N8	2	4.8m Ohm 30V N-ch MOSFET (SO-8) International Rectifier IRD7832
R2,R3	2	1.21k Ohm 1% resistor (0603)
R5,R6,R19,R20	4	100k Ohm 5% resistor (0603)
R7	1	2.2 Ohm 5% resistor (0603)
R8	1	4.7 Ohm 5% resistor (0603)
R9	1	28.7k Ohm 1% resistor (0603)
R10,R15	2	5.76k Ohm 1% resistor (0603)
R11,R14	2	43k Ohm 5% resistor (0603)
R12,R13	2	3.9k Ohm 5% resistor (0603)
R13	1	1.5k Ohm 5% resistor (0603)
R16,R23	2	10.0k Ohm 1% resistor (0603)
R21,R22	2	1.5 Ohm 0.5W 5% resistor (2012)
R22	1	2.2 Ohm 1W 5% resistor (2512)
R27,R280,R31, R32	4	Short
U1	1	MAX8538EEI (28-QSOP)

7V to 20V Input
1.8V @ 3A, 3.3V @ 2A Output
9/23/04



Vin	Iin	Vout1	Iout1	Vout2	Iout2	Efficiency
12.01	0.060	3.318	0	1.814	0	
6.97	2.03	3.319	2.00	1.810	3	0.853
12.00	1.21	3.321	2.00	1.811	3	0.832
20.15	0.78	3.324	2.00	1.813	3	0.769
20MHz BW		<80mVpp		20mVpp		
Current limit			~5A		~4A	

BILL OF MATERIALS

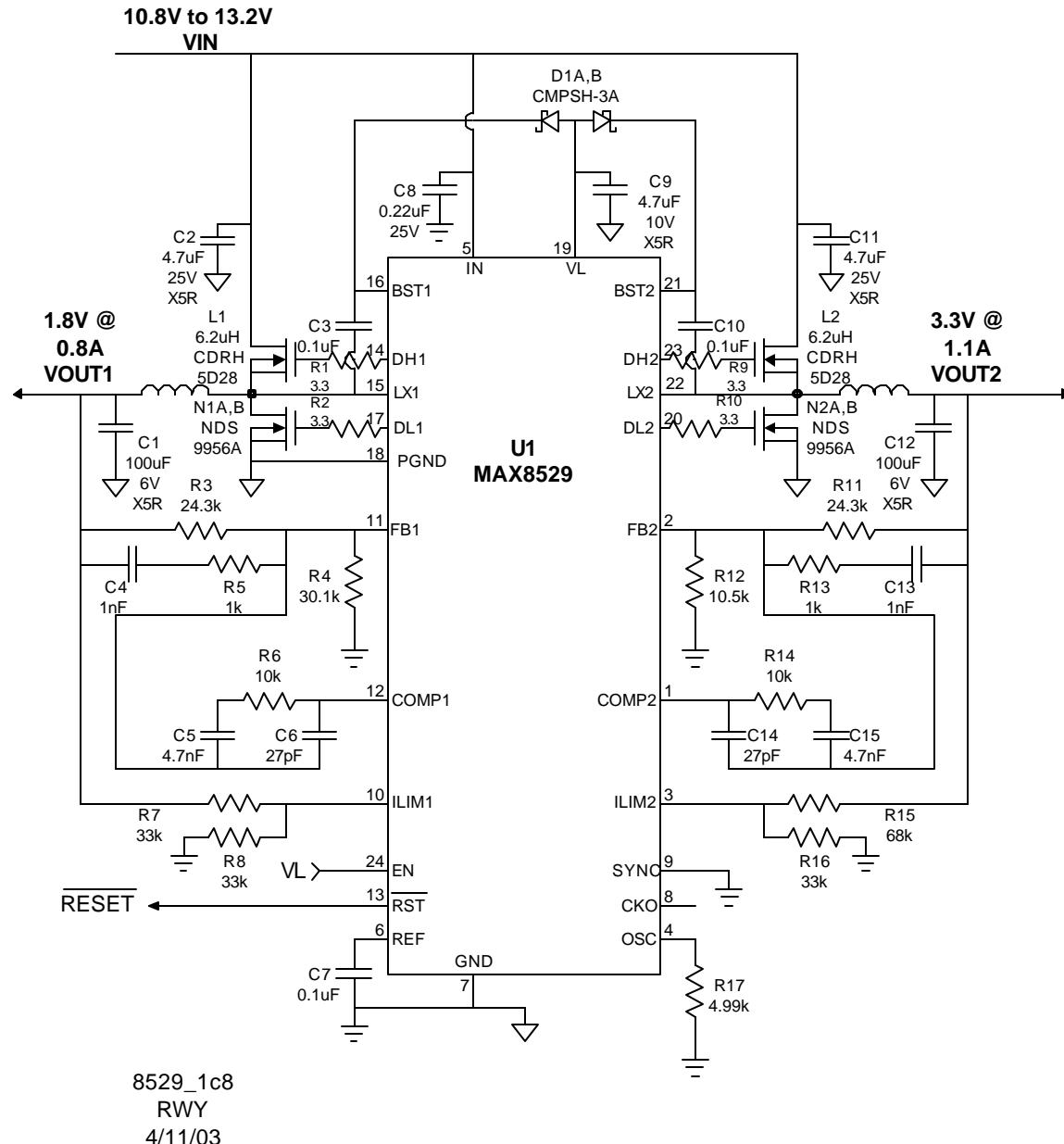
7V to 20V Input
1.8V @ 3A, 3.3V @ 2A Output

8538_1d8

DESIGNATION	QTY	DESCRIPTION
C2,C11,C12	6	22uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ226ML
C4	2	10uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ106MM
C5,C6,C7,C10	4	0.1uF ceramic capacitor (0603)
C13	1	4.7uF 6V X5R ceramic capacitor (0805)

		Taiyo Yuden JMK212BJ475MG
C14,C15	2	1uF 25V X5R ceramic capacitor (0603) Taiyo Yuden TMK107C105MA
C17,C40	2	1nF ceramic capacitor (0603)
C18,C20	2	5pF ceramic capacitor (0603)
C19,C22	1	100pF ceramic capacitor (0603)
C21	1	1.5nF ceramic capacitor (0603)
C23,C24	2	33nF ceramic capacitor (0603)
C39	1	680pF ceramic capacitor (0603)
D1,D2	2	100mA 30V Schottky diode (SOD-323) Central Semi CMDSH-3
L1,L2	2	1.5uH 5.8A Inductor Sumida CDRH103R-1R5
N1	1	35m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6912A
N2	1	28m Ohm 30V Dual N-ch MOSFET (SO-8) Fairchild FDS6984S
R2	1	1k Ohm 5% resistor (0603)
R3	1	2k Ohm 5% resistor (0603)
R5,R6,R19	3	100k Ohm 5% resistor (0603)
R7	1	2.2 Ohm 5% resistor (0603)
R8	1	4.7 Ohm 5% resistor (0603)
R9	1	16.5k Ohm 1% resistor (0603)
R10	1	12.7k Ohm 1% resistor (0603)
R11,R14	2	33k Ohm 5% resistor (0603)
R12	1	1.8k Ohm 5% resistor (0603)
R13	1	1.5k Ohm 5% resistor (0603)
R15	1	31.6k Ohm 1% resistor (0603)
R16,R23	2	10.0k Ohm 1% resistor (0603)
R21	1	3.3 Ohm 5% resistor (0603)
R22	1	2.2 Ohm 1W 5% resistor (2512)
R29,R30,R31,R32	4	10 Ohm 5% resistor (0603)
U1	1	MAX8538EEI (28-QSOP)

1.2MHz, Dual Output, All Ceramic Step-Down Converter for xDSL Modems



Efficiency, Ripple and Current Limit Measurements

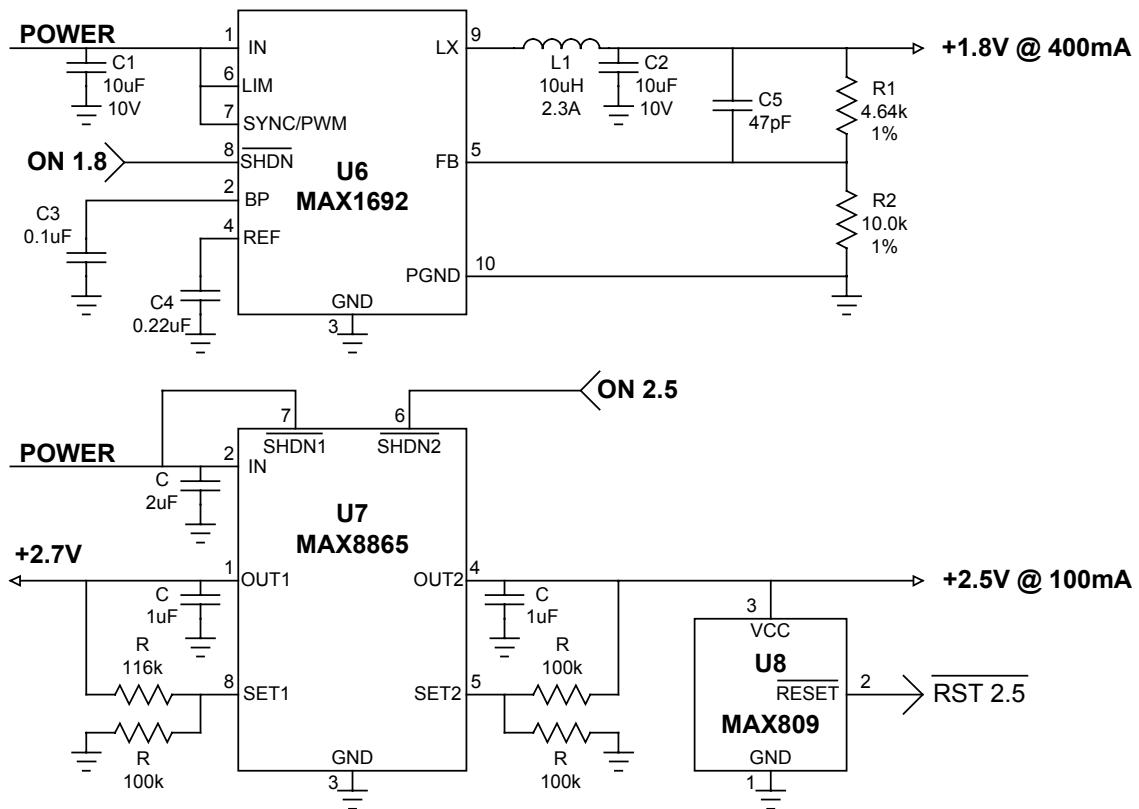
Vin	Iin	V1	I1	V2	I2	Efficiency
11.96	0.0501	1.7972	0	3.3008	0	
10.80	0.5882	1.7952	0.8006	3.2986	1.102	0.799
11.95	0.5432	1.7954	0.8006	3.2992	1.102	0.782
13.27	0.5024	1.7956	0.8006	3.2997	1.102	0.761
20MHz BW		12mVpp		16mVpp		
Ilim			1.4A		1.7A	

1.2MHz, Dual Output, All Ceramic Step-Down Converter for xDSL Modems

BILL OF MATERIALS
10.8V to 13.2V Input
3.3V @ 1.1A, 1.8V @ 0.8A Output
4/11/03

8529_1c8

DESIGNATION	QTY	DESCRIPTION
C1,C12	2	100uF 6V X5R ceramic capacitor (1812) Taiyo Yuden JMK432BJ107MUL
C2,C11	2	4.7uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C3,C7,C10	3	0.1uF ceramic capacitor (0603)
C4,C13	2	1nF ceramic capacitor (0603)
C5,C15	2	4.7nF ceramic capacitor (0603)
C6,C14	2	27pF ceramic capacitor (0603)
C8	1	0.22uF 25V X5R ceramic capacitor (1206) Taiyo Yuden TMK316BJ224MF
C9	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
D1	1	100mA 30V Dual Schottky diode (SOT-23) Central Semi CMPSH-3A
L1,L2	2	6.2uH 1.8A Inductor Sumida CDRH5D28-6R2
N1,N2	2	110m Ohm 30V N-ch MOSFET (SO-8) Fairchild NDS9956A
R1,R2,R9,R10	4	3.3 Ohm 5% resistor (0603)
R3,R11	2	24.3k Ohm 1% resistor (0603)
R4	1	30.1k Ohm 1% resistor (0603)
R5,R13	2	1k Ohm 5% resistor (0603)
R6,R14	2	10k Ohm 5% resistor (0603)
R7,R8,R16	3	33k Ohm 5% resistor (0603)
R12	1	10.5k Ohm 1% resistor (0603)
R15	1	68k Ohm 5% resistor (0603)
R17	1	4.99k Ohm 1% resistor (0603)
U1	1	MAX8529EEG (24-QSOP)



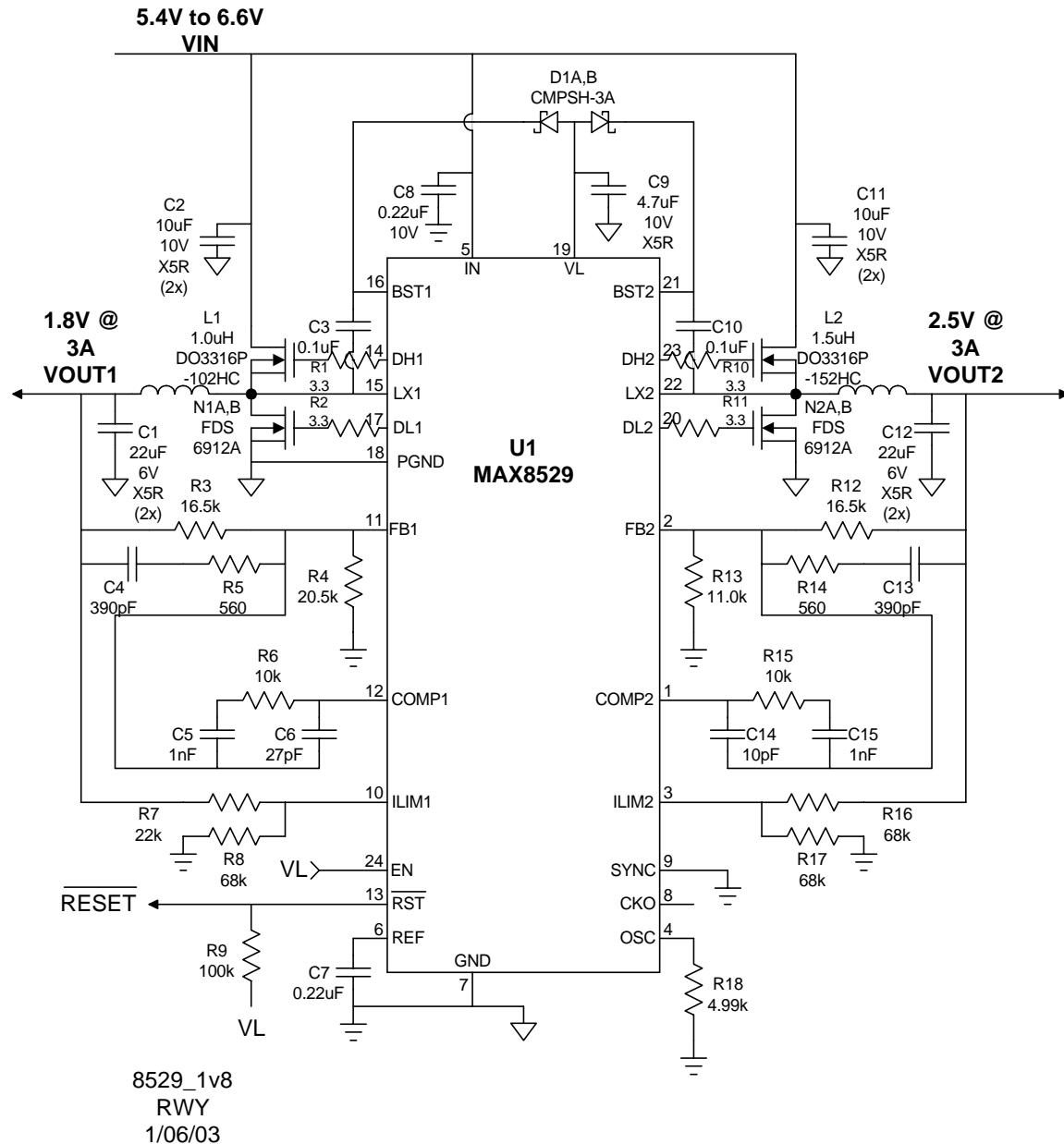
RWY
12/19/00

Li+ to +1.8V@400mA, +2.5V@100mA

1.2MHz, All Ceramic Dual Step-Down Converter with Power-On Reset

6V Input, 1.8V/3A and 2.5V/3A outputs

Full Load Efficiency = 86% at 6V Input



1.2MHz, All Ceramic Dual Step-Down Converter with Power-On Reset

6V Input, 1.8V/3A and 2.5V/3A outputs

Full Load Efficiency = 86% at 6V Input

BILL OF MATERIALS

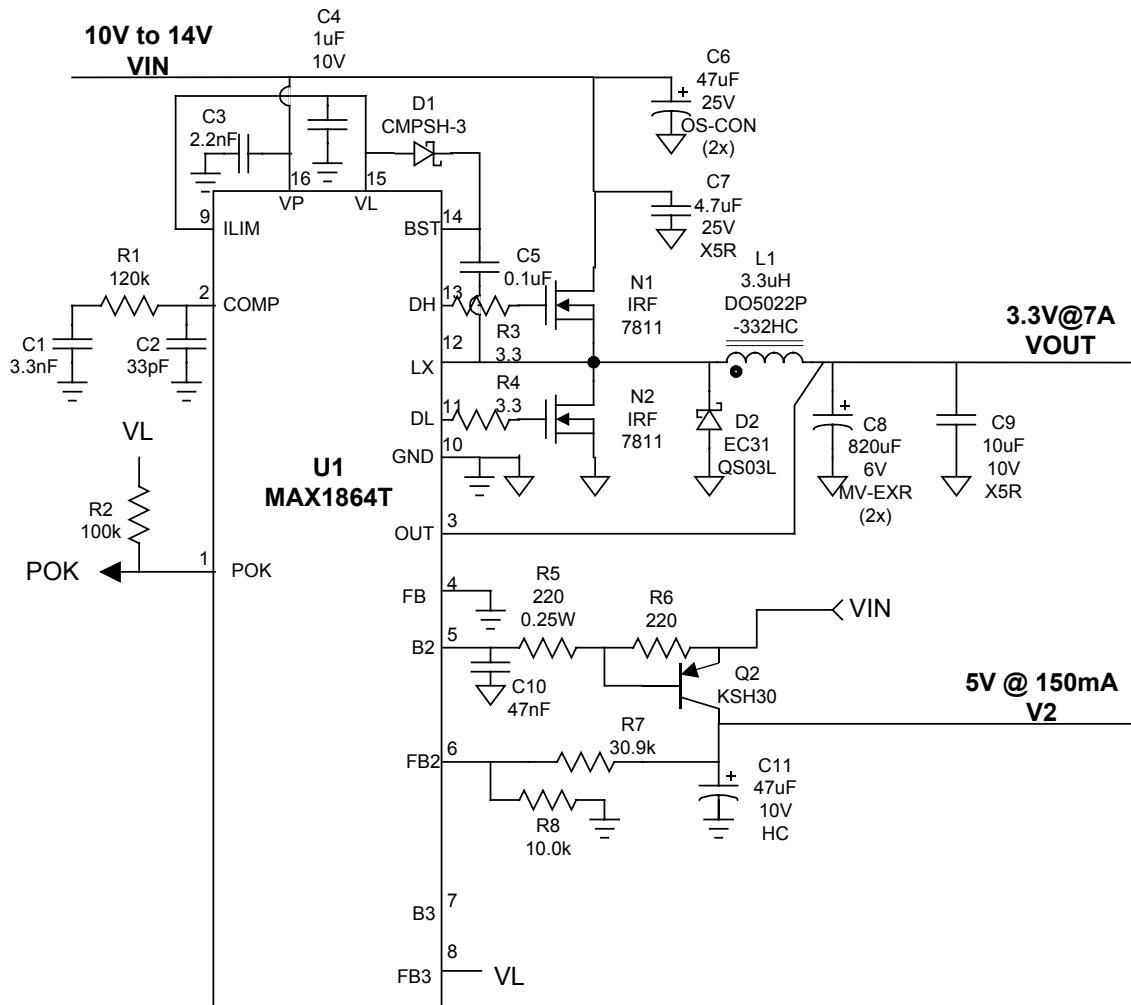
5.4V to 6.6V Input

1.8V @ 3A, 2.5V @ 3A Output

1/06/03

8529_1v8

DESIGNATION	QTY	DESCRIPTION
C1,C12	4	22uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ226MM
C2,C11	4	10uF 10V X5R ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C3,C10	2	0.1uF ceramic capacitor (0603)
C4,C13	2	390pF ceramic capacitor (0603)
C5,C15	2	1nF ceramic capacitor (0603)
C6,C14	2	27pF ceramic capacitor (0603)
C7,C8	2	0.22uF 10V X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ224MA
C9	1	4.7uF 10V ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
D1	1	100mA 30V Dual Schottky diode (SOT-23) Central Semi CMPSH-3A
L1	1	1.0uH 11A Inductor Coilcraft DO3316P-102HC
L2	1	1.5uH 9A Inductor Coilcraft DO3316P-152HC
N1,N2	2	35m Ohm 30V N-ch MOSFET (SO-8) Fairchild FDS6912A
R1,R2,R10,R11	4	3.3 Ohm 5% resistor (0603)
R3	1	16.5k Ohm 1% resistor (0603)
R4	1	20.5k Ohm 1% resistor (0603)
R5,R14	2	560 Ohm 5% resistor (0603)
R6,R15	2	10k Ohm 5% resistor (0603)
R7	1	22k Ohm 5% resistor (0603)
R8,R16,R17	3	68k Ohm 5% resistor (0603)
R18	1	4.99k Ohm 1% resistor (0603)
U1	1	MAX8529EEG (24-QSOP)



1864_3a
RWY
3/27/02

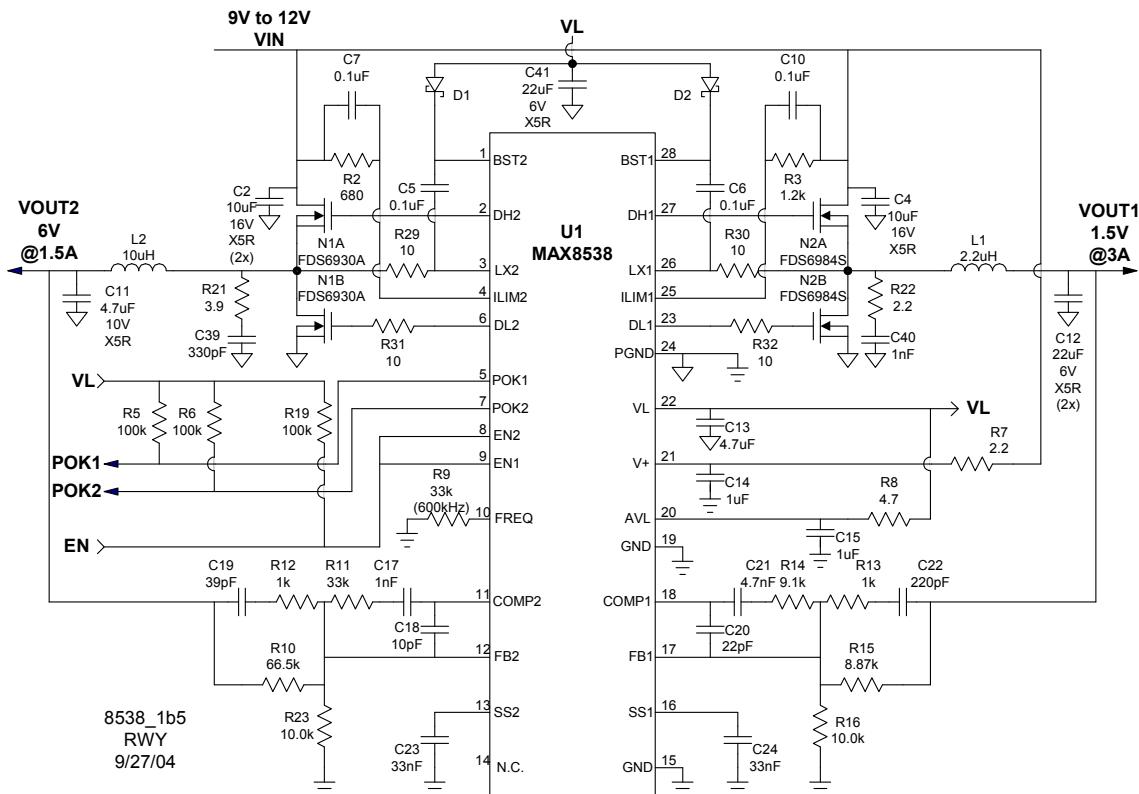
Vin	Iin	Vout	Iout	V2	I2	Efficiency
12.012	0.047	3.3220	0	5.0846	0	
9.989	2.670	3.3262	7.007	5.0722	0.1505	0.902
12.008	2.259	3.3272	7.007	5.0743	0.1505	0.887
14.004	1.969	3.3276	7.007	5.0777	0.1505	0.873
		45mVpp		30mVpp		

10V to 14V Input
3.3V @ 7A, 5V @ 0.15A Output
3/27/02

1864_3a

DESIGNATION	QTY	DESCRIPTION
C1	1	3.3nF ceramic capacitor (0805)
C2	1	33pF ceramic capacitor (0805)
C3	1	2.2nF ceramic capacitor (0805)
C4	1	1uF 10V X7R ceramic capacitor (0805) Taiyo Yuden LMK212BJ105MG
C5	1	0.1uF ceramic capacitor (0805)
C6	2	47uF 25V organic semiconductor cap Sanyo 25SC47M
C7	1	4.7uF 25V X5R ceramic capacitor (1210) Taiyo Yuden TMK325BJ475MN
C8	2	820uF 6V aluminum electrolytic cap Sanyo 6MV820EXR
C9	1	10uF 10V X5R ceramic capacitor (1210) Taiyo Yuden LMK325BJ106MN
C10	1	47nF ceramic capacitor (0805)
C11	1	47uF 10V aluminum electrolytic cap Sanyo 10MV47HC
D1	1	100mA 30V Schottky diode (SOT-23) Central Semi CMPSH-3
D2	1	3A 30V Schottky diode Nihon EC31QS03L
L1	1	3.3uH 15A Power Inductor Coilcraft DO5022P-332HC
N1,N2	1	12m Ohm N-channel MOSFET (SO-8) International Rectifier IRF7811
Q2	1	1A 40V PNP transistor (D-PAK) Fairchild KSH30
R1	1	150k Ohm 5% resistor (0805)
R2	1	100k Ohm 5% resistor (0805)
R3,R4	2	3.3 Ohm 5% resistor (0805)
R5	1	220 Ohm 0.25W 5% resistor (1210)
R6	1	220 Ohm 5% resistor (0805)
R7	1	30.9k Ohm 1% resistor (0805)
R8	1	10.0k Ohm 1% resistor (0805)
U1	1	MAX1864TEEE (16-QSOP)

BILL OF MATERIALS
9V to 12V Input
6V @ 1.5A, 1.5V @ 3A Output
9/27/04



Vin	Iin	Vout1	Iout1	Vout2	Iout2	Efficiency
10.51	0.038	1.504	0	6.12	0	
8.80	1.68	1.505	3	6.12	1.50	0.926
10.51	1.42	1.505	3	6.12	1.50	0.918
12.20	1.23	1.505	3	6.12	1.50	0.913
20MHz BW		20mVpp		40mVpp		
Current limit			~3.9		~2.1	

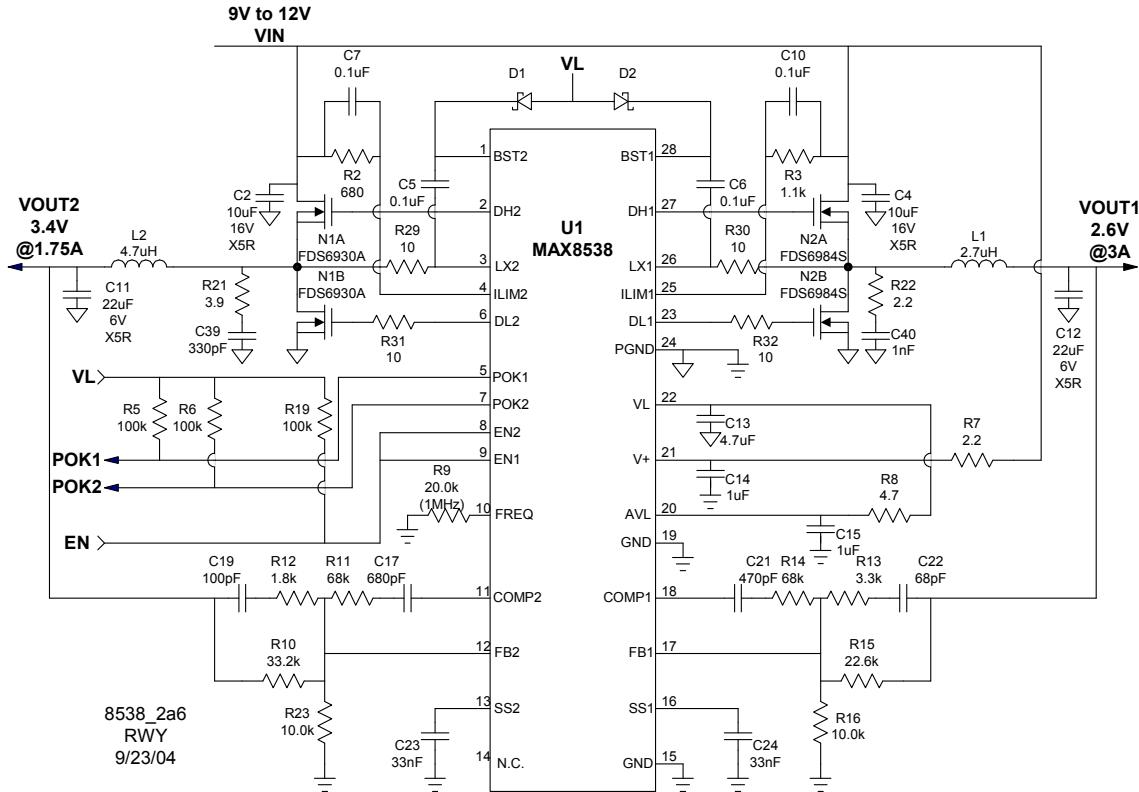
BILL OF MATERIALS
9V to 12V Input
6V @ 1.5A, 1.5V @ 3A Output

8538_1b5

DESIGNATION	QTY	DESCRIPTION
C2,C4	3	10uF 16V X5R ceramic capacitor (1206) Taiyo Yuden EMK325BJ106MN
C5,C6,C7,C10	4	0.1uF ceramic capacitor (0603)
C11	1	4.7uF 10V X5R ceramic capacitor (1206) Taiyo Yuden LMK316BJ475ML
C12,C41	3	22uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ226ML

C13	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C14,C15	2	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C17	1	1nF ceramic capacitor (0603)
C18	1	10pF ceramic capacitor (0603)
C19	1	100pF ceramic capacitor (0603)
C20	1	22pF ceramic capacitor (0603)
C21	1	4.7nF ceramic capacitor (0603)
C22	1	220pF ceramic capacitor (0603)
C23,C24	2	33nF ceramic capacitor (0603)
C39	1	330pF ceramic capacitor (0603)
C40	1	1nF ceramic capacitor (0603)
D1,D2	1	100mA 30V Schottky diode (SOD-523) Central Semi CMOSH-3
L1	1	2.2uH 5.3A Inductor Toko FDV0630-2R2
L2	1	10uH 3A Inductor Sumida CDRH6D38-100
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6930A
N2	1	28m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6984S
R2	1	680 Ohm 5% resistor (0603)
R3	1	1.2k Ohm 5% resistor (0603)
R5,R6,R19	3	100k Ohm 5% resistor (0603)
R7	1	2.2 Ohm 5% resistor (0603)
R8	1	4.7 Ohm 5% resistor (0603)
R9,R11	2	33k Ohm 5% resistor (0603)
R10	1	66.5k Ohm 1% resistor (0603)
R12,R13	2	1k Ohm 5% resistor (0603)
R14	1	9.1k Ohm 5% resistor (0603)
R15	1	8.87k Ohm 1% resistor (0603)
R16,R23	2	10.0k Ohm 1% resistor (0603)
R21	1	3.9 Ohm 5% resistor (0603)
R22	1	2.2 Ohm 0.25W 5% resistor (1210)
R29,R30,R31,R32	4	10 Ohm 5% resistor (0603)
U1	1	MAX8538EEI (28-QSOP)

**9V to 12V Input
3.4V @ 1.75A, 2.6V @ 3A Output
9/23/04**



Vin	Iin	Vout1	Iout1	Vout2	Iout2	Efficiency
10.51	0.045	2.603	0	3.45	0	
8.95	1.71	2.603	3.00	3.45	1.75	0.905
10.50	1.47	2.603	3.00	3.46	1.75	0.898
12.06	1.29	2.603	3.00	3.46	1.75	0.891
20MHz BW		<40mVpp		<40mVpp		
Current limit			~3.6A		~2.1A	

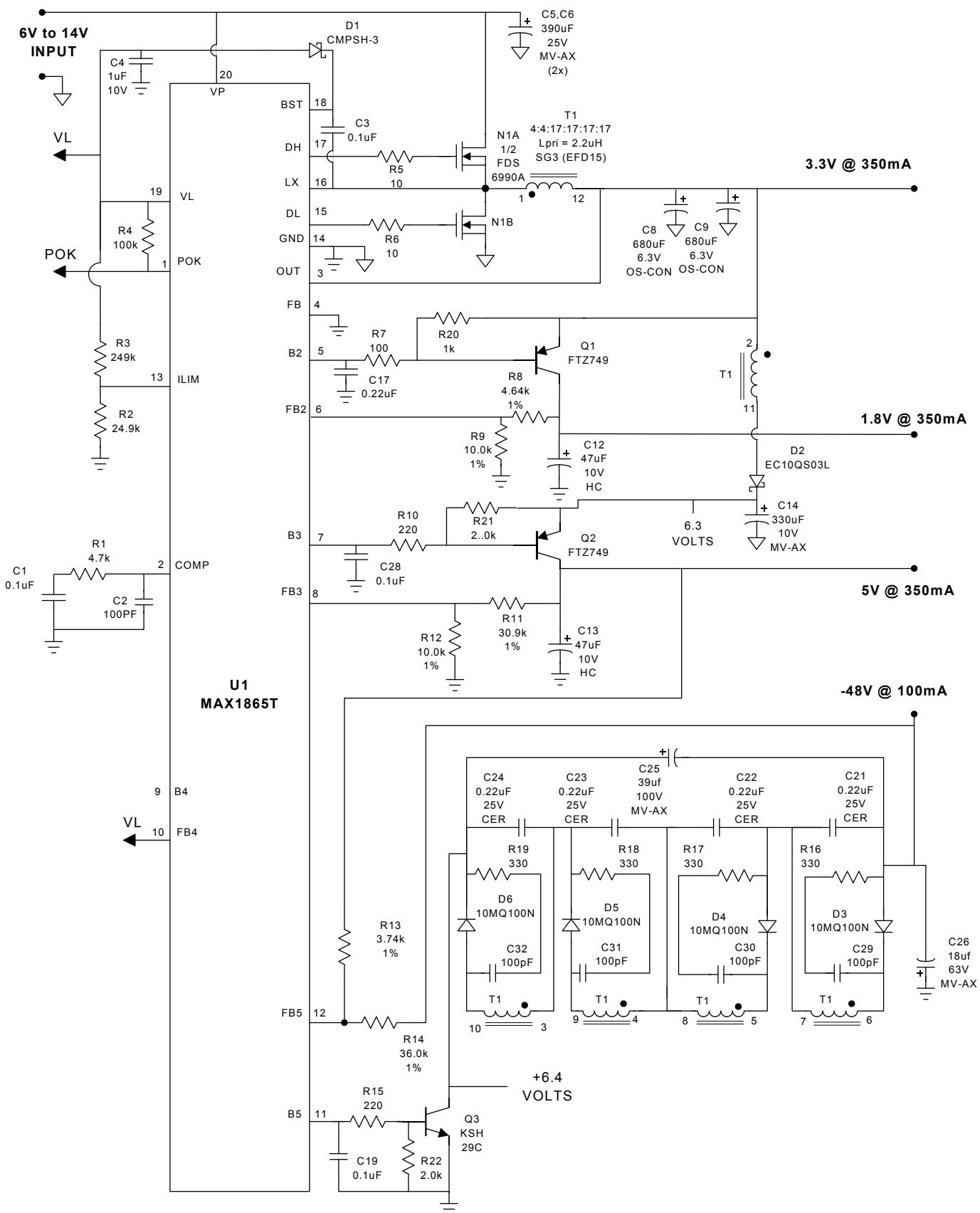
**BILL OF MATERIALS
9V to 12V Input
3.4V @ 1.75A, 2.6V @ 3A Output**

8538_2a6

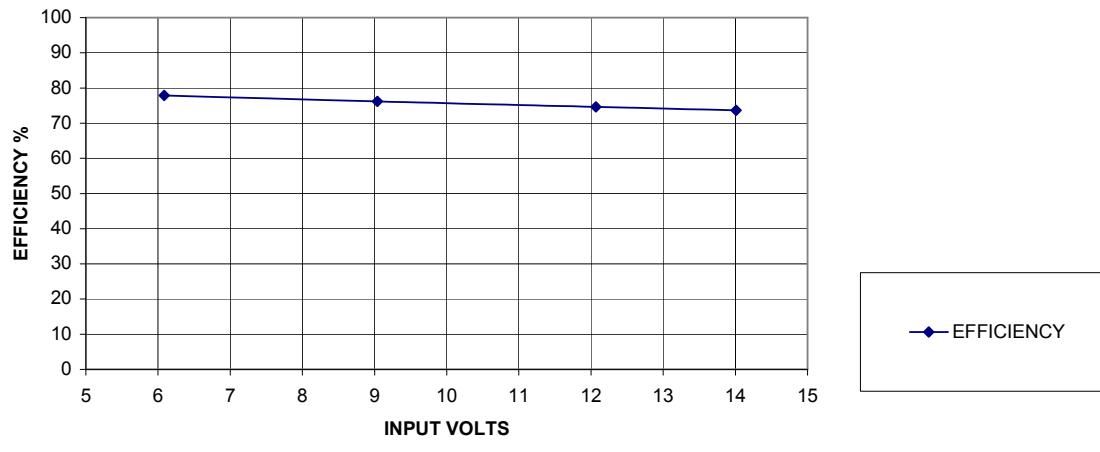
DESIGNATION	QTY	DESCRIPTION
C2,C4	2	10uF 16V X5R ceramic capacitor (1206) Taiyo Yuden EMK325BJ106MN
C5,C6,C7,C10	4	0.1uF ceramic capacitor (0603)
C11,C12	2	22uF 6V X5R ceramic capacitor (1206) Taiyo Yuden JMK316BJ226ML

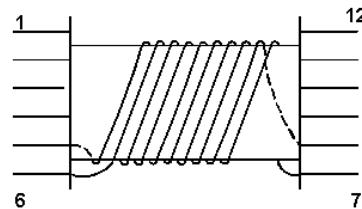
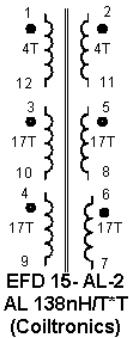
C13	1	4.7uF 6V X5R ceramic capacitor (0805) Taiyo Yuden JMK212BJ475MG
C14,C15	2	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C17	1	680pF ceramic capacitor (0603)
C19	1	100pF ceramic capacitor (0603)
C21	1	470pF ceramic capacitor (0603)
C22	1	68pF ceramic capacitor (0603)
C23,C24	2	33nF ceramic capacitor (0603)
C39	1	330pF ceramic capacitor (0603)
C40	1	1nF ceramic capacitor (0603)
D1,D2	1	100mA 30V Schottky diode (SOD-523) Central Semi CMOSH-3
L1	1	2.7uH 4.4A Inductor Toko FDV0630-2R7
L2	1	4.7uH 3.3A Inductor Toko FDV0630-4R7
N1	1	55m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6930A
N2	1	28m Ohm 30V Dual N-ch MOSFET (SO-8) FDS6984S
R2	1	680 Ohm 5% resistor (0603)
R3	1	1.1k Ohm 5% resistor (0603)
R5,R6,R19	3	100k Ohm 5% resistor (0603)
R7	1	2.2 Ohm 5% resistor (0603)
R8	1	4.7 Ohm 5% resistor (0603)
R9	1	20.0k Ohm 1% resistor (0603)
R10	1	33.2k Ohm 1% resistor (0603)
R11	1	68k Ohm 5% resistor (0603)
R12	1	1.8k Ohm 5% resistor (0603)
R13	1	3.3k Ohm 5% resistor (0603)
R14	1	68k Ohm 5% resistor (0603)
R15	1	22.6k Ohm 1% resistor (0603)
R16,R23	2	10.0k Ohm 1% resistor (0603)
R21	1	3.9 Ohm 5% resistor (0603)
R22	1	2.2 Ohm 0.25W 5% resistor (1210)
R29,R30,R31,R32	4	10 Ohm 5% resistor (0603)
U1	1	MAX8538EEI (28-QSOP)

MAX1865
Vin 6 TO 14 V
Vout 3.3V @ 0.35A, 1.8V @ 0.35A, 5V @ 0.35A, -48V @ 0.1A

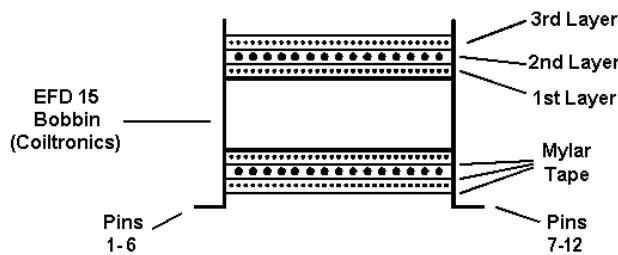


MAX1865
6-14V Input
3.3V @ 0.35A, 1.8V @ 0.35A, 5V @ 0.35A, -48V @ 0.1A Out





EFD 15
Bobbin
(Coiltronics)



1st Layer:

2 Winds (32 AWG), Bifilar, 17 Turns Each.
Wind 1, Pins 6 - 7. Wind 2, Pins 5 - 8.

2nd Layer:

3 Winds (24 AWG), Trifilar, 4 Turns Each.
Winds 3 and 5, Pins 1 - 12 (Two 24 AWG in Parallel).
Wind 4, Pins 2 - 11.

3rd Layer:

2 Winds, (32 AWG), Bifilar, 17 Turns Each.
Wind 6, Pins 4 - 9. Wind 7, Pins 3 - 10.

Use 1 mil Mylar Tape Between 1st and 2nd,
2nd and 3rd and Top Layers

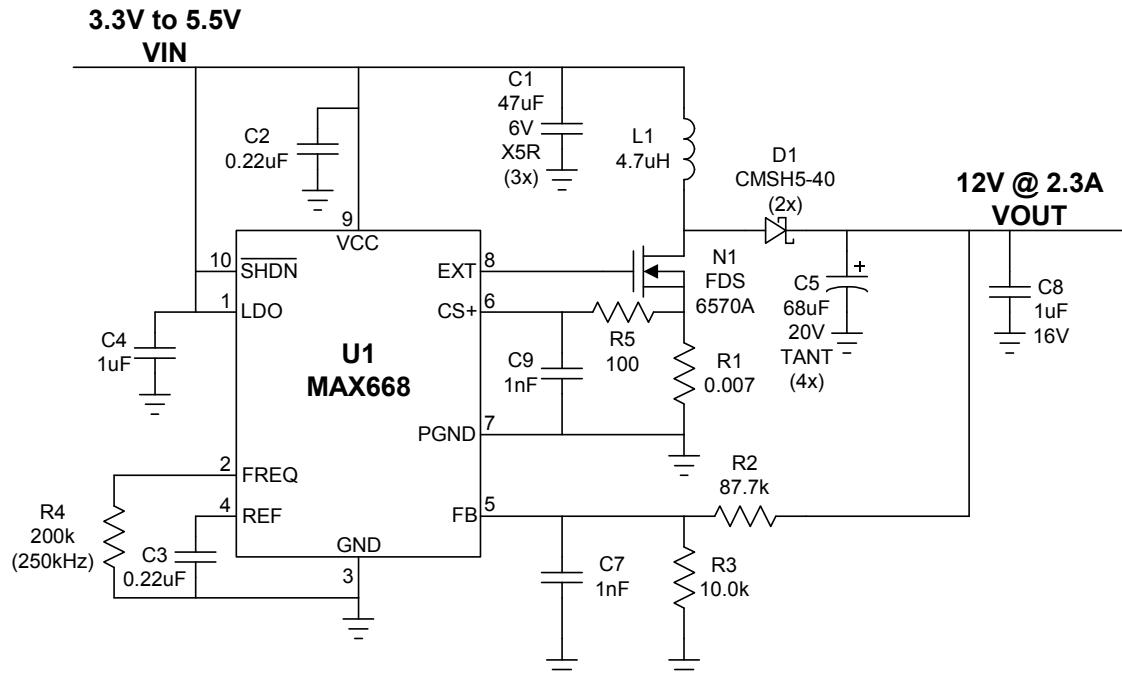
MAX1865
6-14V Input

3.3V @ 350mA, 1.8V @ 350mA, 5V @ 350mA, -48V @ 100mA Output
01/24/05

DESIGNATION	QTY	DESCRIPTION
C2, C29 - C32	5	Cap 100pF 100V Ceramic NPO 0603, Panasonic (ECJ-1VC2A101J)
C1, C3, C19, C28	4	Cap 0.1F 16V Ceramic X7R 0603, Taiyo Yuden (EMK107BJ104MA)
C17	1	Cap 0.22F 16V Ceramic X5R 0603, Taiyo Yuden (EMK107BJ224MA)
C21-C24	4	Cap 0.22uF 25V X7R Ceramic 1206, Panasonic (ECJ-3VB1E224K)
C4	1	Cap 1.0uF 10V X7R Ceramic Cap 0805 Taiyo Yuden (LMK212BJ105MG)
C26	1	18uF 63V Electrolytic, Sanyo (63MV18AX)
C25	1	Cap 39uF 100V Electrolytic, Sanyo (100MV39AX)

C12, C13	2	Cap 47uF 10V Electrolytic, Sanyo (10MV47HC)
C14	1	Cap 330uF 10V Electrolytic, Sanyo (10MV330AX)
C8, C9	2	Cap 680uF 6.3V Organic Semiconductor, Sanyo (6SP680M)
C5, C6	2	Cap 390 UF 25V Electrolytic, Sanyo (25MV390AX)
D1	1	Diode 30V 0.1A Schottky SOT-23, Central Semi (CMPSH-3)
D2	1	Diode 1A 30V Schottky SMA, Nihon (EC10QS03L)
D3 - D6	4	Diode 1A 100V Schottky SMA, International Rectifier (10MQ100N)
N1A, N1B	1	NFET Dual 0.023 Ohm 30V SO-8, Fairchild (FDS6990A)
Q1, Q2	2	Transistor 25V PNP,SOT-223, Fairchild (FTZ749)
Q3	1	Transistor 100V NPN D-PAK, Fairchild (KSH29C)
R5, R6	2	Resistor 10 Ohm 5% 0805
R7	1	Resistor 100 Ohm 5% 0805
R10, R15	2	Resistor 220 Ohm 5% 0805
R16 - R19	4	Resistor 330 Ohm 0.25W 5% 1210
R20	1	Resistor 1.0K Ohm 5% 0805
R21, R22	2	Resistor 2.0K Ohm 5% 0805
R8	1	Resistor 4.64k Ohm 1% 0805
R1	1	Resistor 4.7k Ohm 5% 0805
R13	1	Resistor 3.74k Ohm 1% 0805
R9, R12	2	Resistor 10k Ohm 1% 0805
R2	1	Resistor 24.9k Ohm 1% 0805
R11	1	Resistor 30.9k Ohm 1% 0805
R14	1	Resistor 36.0k Ohm 0.125W 1% 1206
R4	1	Resistor 100k Ohm 5% 0805
R3	1	Resistor 249k Ohm 1% 0805
T1	1	Transformer EFD 15 4:4:17:17:17:17, Coiltronics (SG3 AL-2 138)
U1	1	IC xDSL/Cable Modem Quintuple Output Power Supplies 20 QSOP, Maxim (MAX1865TEEP)

**3.3V to 5.5V Input
12V @ 2.3A Output
9/16/04**



668_12f

RWY

9/16/04

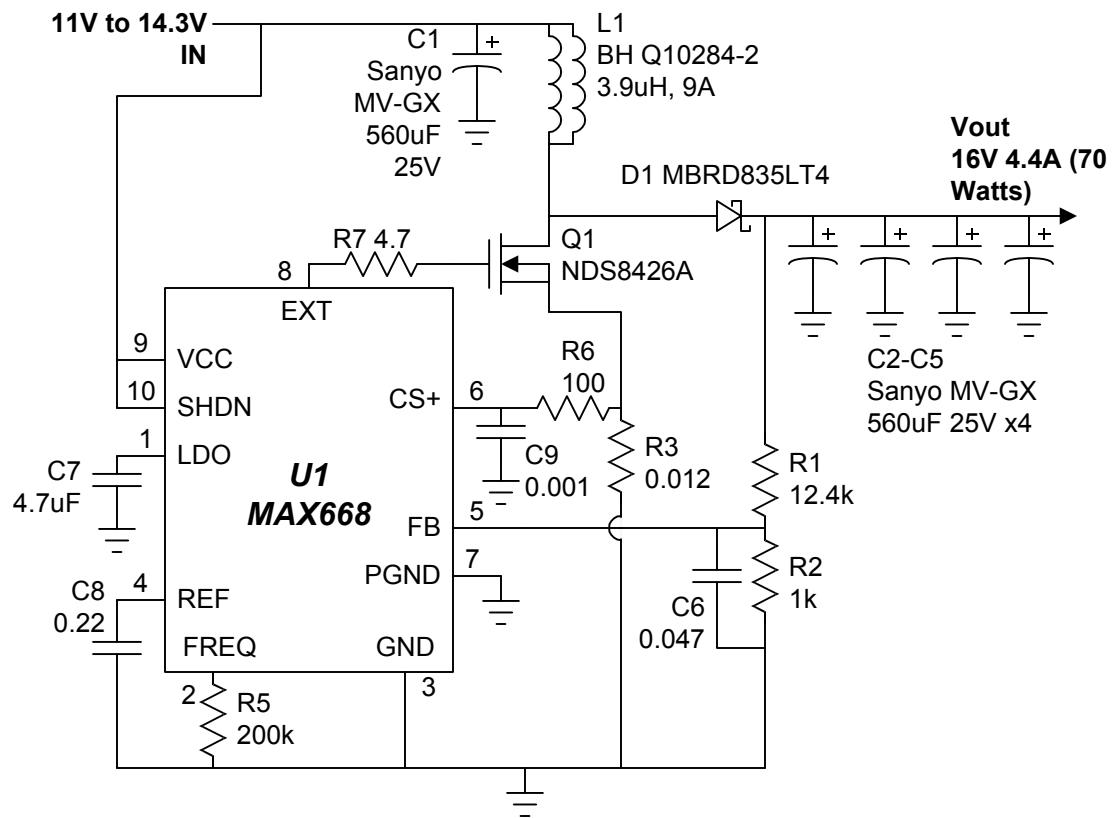
Vin	Iin	Vout	Iout	Efficiency
5.00	0.0006	12.36	0	
3.29	9.77	12.08	2.3	0.864
3.61	8.72	12.11	2.3	0.884
4.49	6.82	12.16	2.3	0.913
5.01	6.05	12.18	2.3	0.924
5.52	5.46	12.20	2.3	0.931
20MHz BW		250mVpp		

BILL OF MATERIALS
3.3V to 5.5V Input
12V @ 2.3A Output

668_12f

DESIGNATION	QTY	DESCRIPTION
C1	3	47uF 6V X5R ceramic capacitor (1210) Taiyo Yuden JMK325BJ476MM
C2,C3	2	0.22uF 10V ceramic capacitor (0603) Taiyo Yuden LMK107BJ224MA
C4	1	1uF 10V X5R ceramic capacitor (0603) Taiyo Yuden LMK107BJ105MA
C5	4	68uF 20V tantalum capacitor (X case) Kemet T494X686M020AS
C7,C9	1	1nF ceramic capacitor (0603)
C8	1	1uF 16V X5R ceramic capacitor (08053) Taiyo Yuden EMK212BJ105MG
D1	2	5A 20V Schottky diode Central Semi CMSH5-40
L1	1	4.7uH 21A Power inductor Coiltronics HC2-4R7
N1	1	10m Ohm 20V N-ch MOSFET (SO-8) Fairchild FDS6570A
R1	1	0.007 Ohm 1W 5% resistor (2512)
R2	1	88.7k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	200k Ohm 5% resistor (0603)
R5	1	100 Ohm 5% resistor (0603)
U1	1	MAX668EUB (10-uMAX)

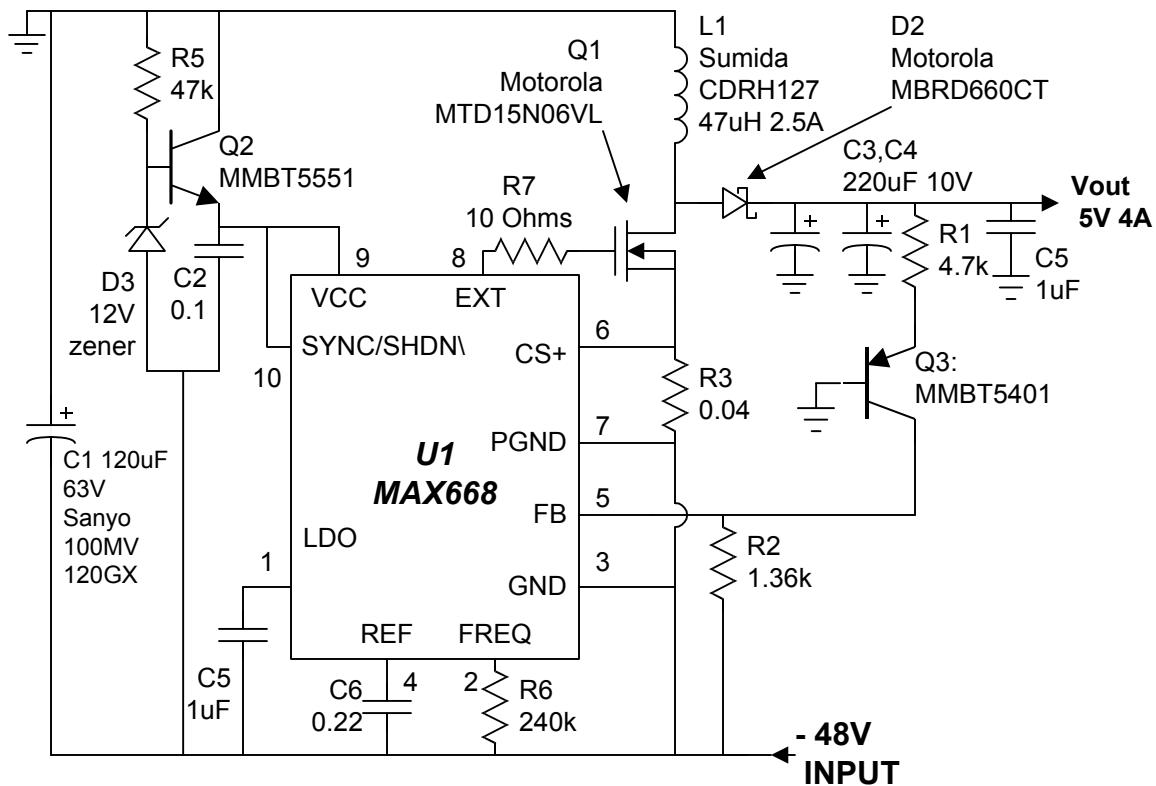
7/20/99 - LHS
+11V to 14.3V Input to 16V at 70 Watts (4.4A)



NOTES:

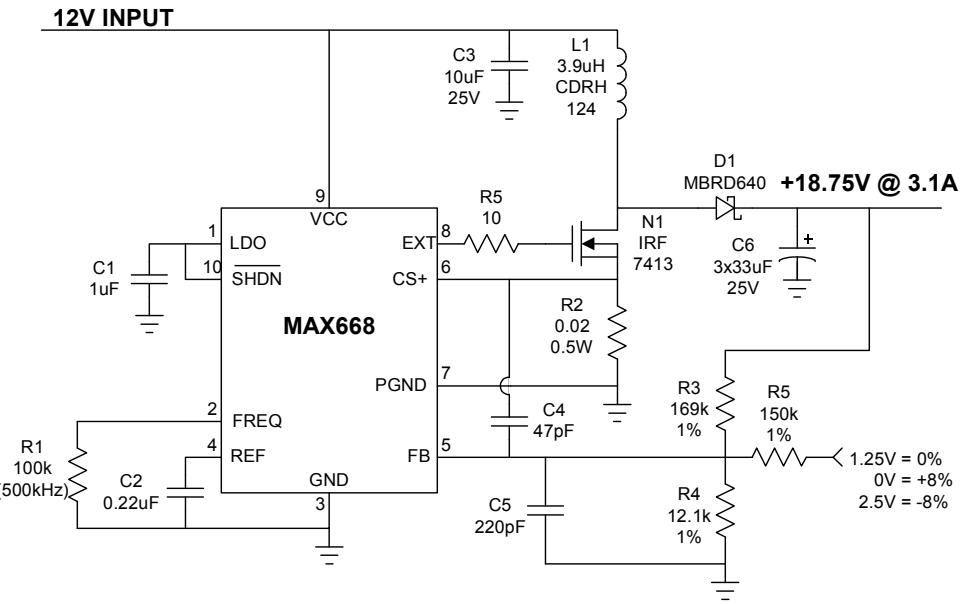
- 1) Capacitor C2-C5 are connected in parallel for ripple current rating. Fewer caps may be used if ripple current ratings allow
- 2) Measured efficiency was 93% at 12V Input and full load

1/31/2000 - LHS
-48V input to +5V, 4A
Unisolated Output



Notes:

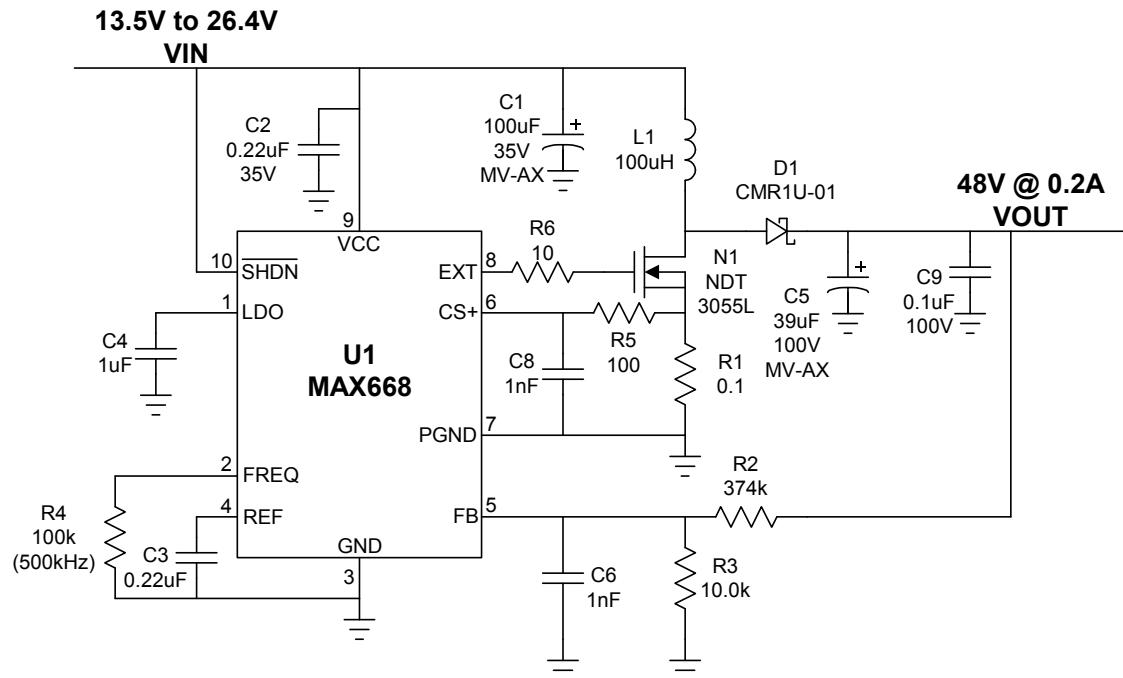
- 1) D2 MBRD660CT is a 6A rated 60V Schottky diode. A 4 Amp rated diode would be sufficient. The diode voltage rating must be greater than $V_{out} - V_{in(max)}$
 - 2) Q1 MTD15N06VL is a 60V rated MOSFET, if the input tolerance requires that the maximum input voltage will exceed -55V, then a MOSFET with a higher voltage rating will be needed. It must exceed $V_{out} - V_{in(max)}$.
 - 3) Q2(NPN) and Q3(PNP) may be any signal transistor that has a rating exceeding $V_{out} - V_{in(max)}$



RWY
3/22/00

+12V to +18.75V

13.5V to 26.4V Input to 48V at 0.2A Output



668_48a

RWY

9/06/05

#1

Vin	Iin	Vout	Iout	Efficiency
15.00		47.79		
13.47	0.78	46.64	0.20	0.888
15.00	0.69	46.74	0.20	0.903
26.57	0.38	47.22	0.20	0.935
20MHz BW		<800mVpp		

#2

Vin	Iin	Vout	Iout	Efficiency
15.00		47.90		
13.47	0.78	46.76	0.20	0.890
15.00	0.69	46.86	0.20	0.906
26.62	0.38	47.34	0.20	0.936
20MHz BW		<700mVpp		

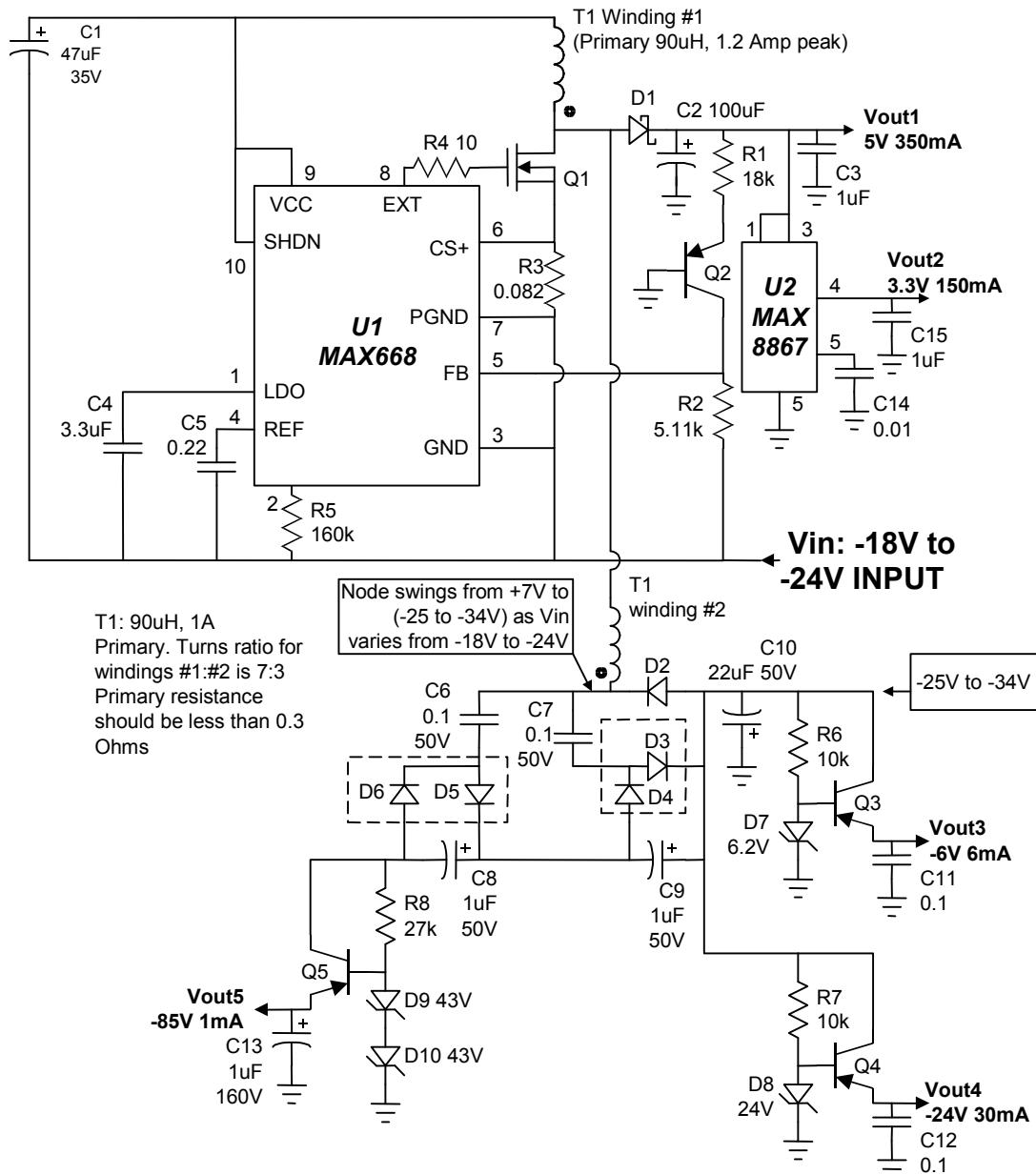
BILL OF MATERIALS**13.5V to 26.4V Input****48V @ 0.2A Output****9/06/05**

668 48a

DESIGNATION	QTY	DESCRIPTION
C1	1	100uF 35V aluminum electrolytic capacitor Sanyo 35MV100AX
C2	1	0.22uF 35V ceramic capacitor (0805) Taiyo Yuden GMK212BJ224MG
C3	1	0.22uF 16V ceramic capacitor (0805) Taiyo Yuden EMK212BJ224MG
C4	1	1uF 16V X5R ceramic capacitor (0805) Taiyo Yuden EMK212BJ105MG
C5	1	39uF 100V aluminum electrolytic capacitor Sanyo 100MV39AX
C6,C8	2	1nF ceramic capacitor (0603)
C9	1	0.1uF 100V X5R ceramic capacitor (1206)
D1	1	1A 100V Ultrafast recovery diode Central Semi CMR1U-01
L1	1	100uH 2.4A Power inductor Coilcraft DS5022P-104
N1	1	120m Ohm 60V N-ch MOSFET (SOT-223) Fairchild NDT3055L
R1	1	0.1 Ohm 5% resistor (0805)
R2	1	374k Ohm 1% resistor (0603)
R3	1	10.0k Ohm 1% resistor (0603)
R4	1	100k Ohm 5% resistor (0603)
R5	1	100 Ohm 5% resistor (0603)
R6	1	10 Ohm 5% resistor (0603)
U1	1	MAX668EUB (10-uMAX)

12/16/98 - LHS

-18V to -24V input to +5V/350mA, +3.3V/150mA, -6V/6mA, -24V/30mA, -85V/1mA
Unisolated Outputs



The transformer specs:
 Primary L=90uH (100uH is fine)
 Primary saturation current = **1.2A**
 Turns ratio: 7:3 as shown on the schematic

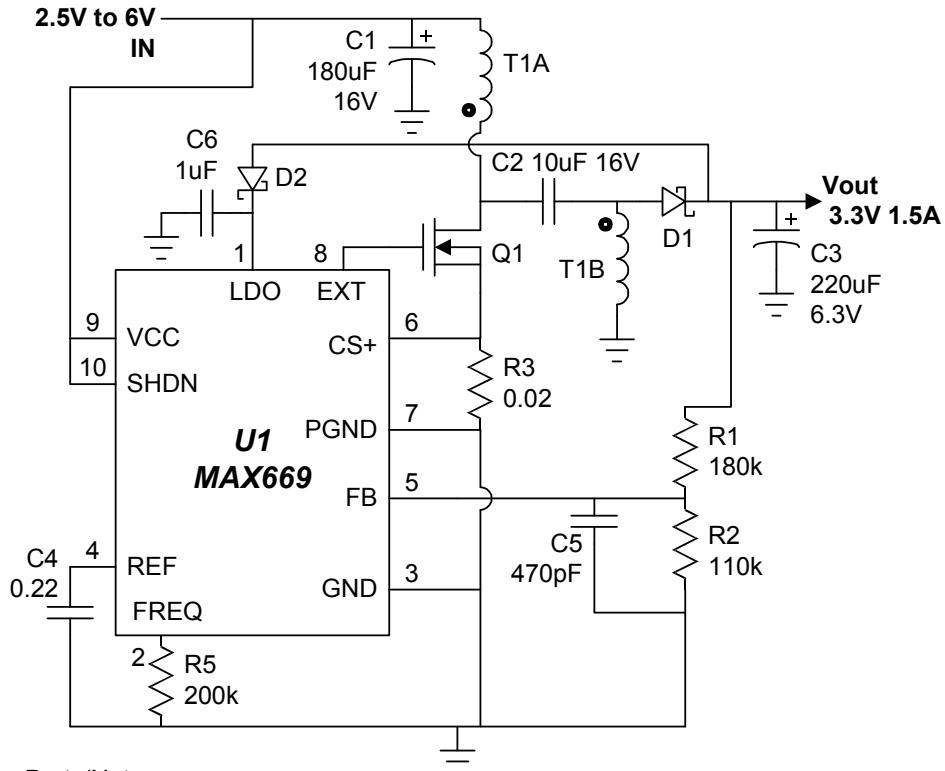
Full Parts List

C1	47uF 35V Sanyo GX (Tantalum not recommended here)
C2	100uF 10V Tantalum (AVX TPS) or Sanyo GX

C3	1uF ceramic
C4	3.3uF ceramic (tantalum OK here)
C5	0.22uF ceramic
C6, C7, C11, C12	0.1uF 50V ceramic
C8, C9	1uF 50V ceramic (polarity is shown on schematic in case the customer wants to substitute electrolytic caps)
C10	22uF 50V aluminum electrolytic
C13	1uF 160V aluminum electrolytic (Panasonic NHG series: ECA-2CHG010)
C14	0.01uF ceramic
C15	1uF ceramic
D1	MBR0540L 40V 0.5A Schottky diode
D2	Central semiconductor CMPB4448 (or any 1N4448 equivalent 60V signal diode)
D3/D4, D5/D6	Central semiconductor CMPD7000 dual diode (These are duals, but four 1N4448 equivalent 60V signal diodes can be substituted for D3+D4 and D5+D6.)
D7	Zetex BZX84C6V8, Panasonic MA3068CT, or other 6.8V SOT-23 zener diode (On this evaluation board this is composed of a 6.2V diode in series with a silicon diode to make a 6.8V zener. It is shown a single 6.8V zener on the schematic)
D8	Zetex BZX84C24, Panasonic MA3240CT, or other 24V SOT-23 zener diode
D9, D10	Zetex BZX84C43 or other 43V SOT-23 zener diode
R1,R2, R4-R8	1% generic surface mount resistors
R3	0.082Ω current sense resistor IRC, Dale or others
T1	Two-winding custom transformer: Primary inductance: 90uH Primary Ipeak: 1.2 Amps Primary/Secondary turns ratio: 7/3 (This board uses a Coiltronics Standard Geometry core part no: SG2 ER14.5/6 with 28 turns of 30awg wire on the primary and 12 turns of 30awg wire on the secondary)
Q1	Fairchild NDT410EL 100V 0.25Ω at 5V Vgs (Any substitute N-FETs should be rated for at least 60V and must have Ron rated at 5V Vgs)
Q2-Q4	2N3906 (any 60V PNP signal transistor is OK)
Q5	Zetex FMMT596 (any 150V PNP signal transistor is OK)
U1	MAX668 PWM DC-DC Controller
U2	MAX8867 linear regulator

2/16/99 - LHS

+2.5V-6V to 3.3V 1.5A DC-DC SEPIC Converter (3.3V at 1.7A output for Vin > 3.3V)



Parts/Notes:

T1A/B: 5.4uH, BH Magnetics #510-1010 (two windings in one octagonal shaped case. General specs: transformer with two 5uH 4Amp windings

D1: Central Semiconductor CMSH2-40 (or any 2Amp Schottky)

D2 Central Semiconductor CMPSH-3 (or any 100mA Schottky)

Q1: Fairchild NDH833N (any 25mOhm 20V NFET)

R1: Dale WSL2512-R020F (any 20mOhm resistor)

C1: 180uF 10V AVX TPS or Sprague 595 (tantalum) or Sanyo GX (low ESR aluminum)

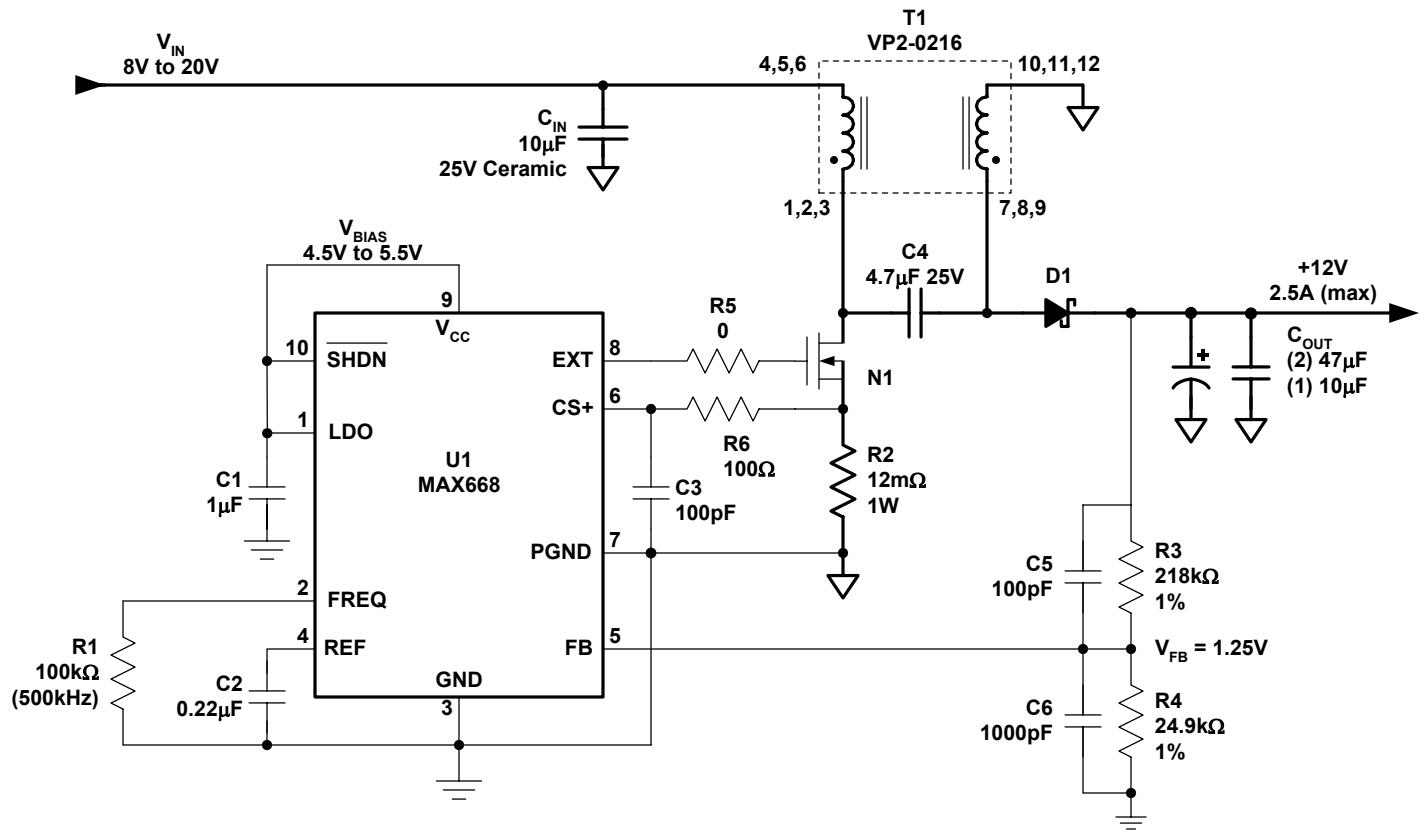
C2: 10uF ceramic capacitor

C3: 220uF 10V AVX TPS or Sprague 595 (tantalum) or Sanyo GX (low ESR aluminum)

Note: This circuit may not start under full load at low input voltages

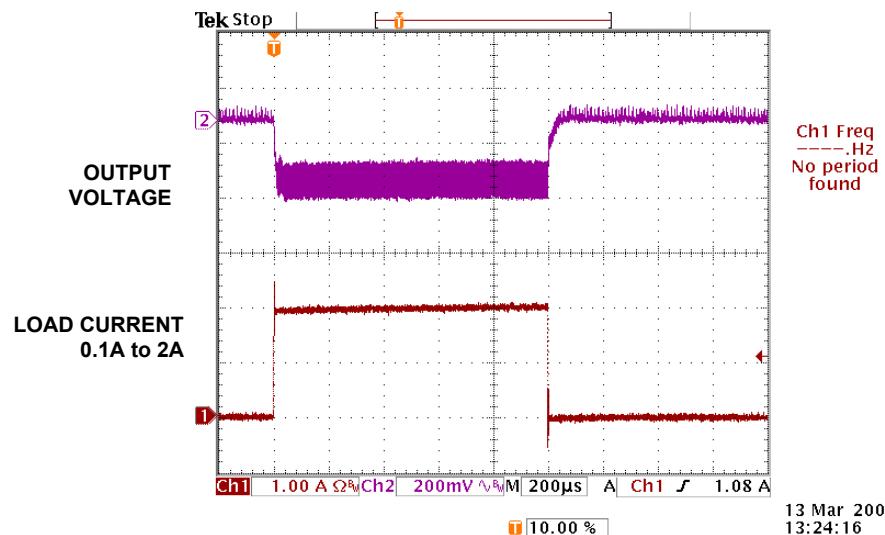
Efficiency data:

Vin (v)	lin (mA)	Vout (V)	Iout (mA)	Eff (%)
2.5.17	806	3.244	500	80.0
2.512	2700	3.210	1502	71.1
3.607	559	3.250	500	80.6
3.610	1755	3.225	1502	76.5
6.013	346	3.261	500	78.4
6.008	1018	3.234	1502	79.4

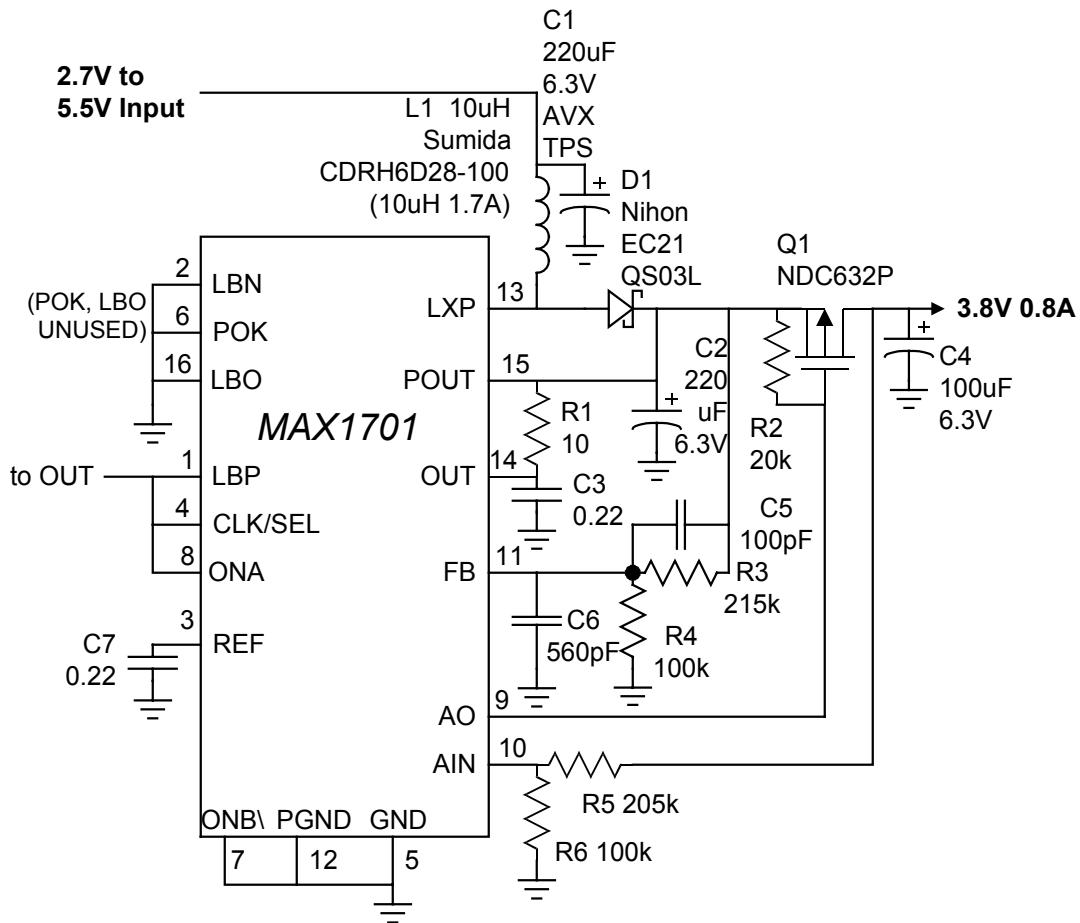


$T1 = 10.6\mu H$ 1:1 COILTRONICS VP2-0216
 $C_{OUT} = (2) 47\mu F$ 16V 70mΩ SANYO 16TPB47M + (1) 10µF
 16V Ceramic
 N1 = 13mΩ 40V N-Channel, Fairchild FDS4672A or
 International Rectifier IRF7468
 D1 = 3A 40V Schottky Diode

Note: T1 may be replaced with two individual inductors



8V to 20V into +12.0V up to 2A
rev B



7/20/00
RWY

Vin (V)	Iin (A)	Vout (V)	Iout (A)	Efficiency
2.702	1.327	3.671	0.800	0.8191
3.001	1.229	3.757	0.800	0.8149
3.588	0.989	3.765	0.800	0.8488
3.800	0.925	3.767	0.800	0.8574
4.199	0.840	3.770	0.800	0.8551
4.501	0.801	3.781	0.800	0.8390
5.001	0.799	3.785	0.800	0.7578