

IRU3048 EVALUATION BOARD USER GUIDE

INTRODUCTION

The IRU3048 IC combines a dual synchronous PWM controller and a linear regulator controller, providing a cost-effective, high performance and flexible solution for multi-output applications. The dual synchronous controller is configured as 2-independent. IRU3048 provides a separate adjustable output by driving a switch as a linear regulator. The evaluation board is designed to provide three outputs (see the IRU3048 data sheet for detailed description).

SPECIFICATION DATA

Switcher:

$V_{IN1} = 12V$
 $V_{OUT1} = 3.3V$
 $I_{OUT1} = 4A$
 $V_{IN2} = 5V$
 $V_{OUT2} = 1.8V$
 $I_{OUT2} = 4A$
 $\Delta V_{OUT} = 75mV$
 $FS = 200KHz$

Linear Regulator:

$LDO_{IN} = 3.3V$
 $LDO_{OUT} = 2.5V$
 $I_{OUT} = 2A$

INPUT/OUTPUT CONNECTIONS

The following is the input/output connections:

Inputs:

JP4: +5V and Gnd.
 JP3: +12V and Gnd.
 JP5: +3.3V and Gnd.

Outputs:

JP1: +3.3V and Gnd.
 JP2: +1.8V and Gnd.
 JP6: +2.5V and Gnd.

The connection points is shown in Figure 1. Connect the power supply cables according to this figure, minimize wire lengths to reduce losses in the wire. Test point JP7 and JP8 provide easy connections for oscilloscope voltage probe to monitor the output voltages.

CONNECTION DIAGRAM

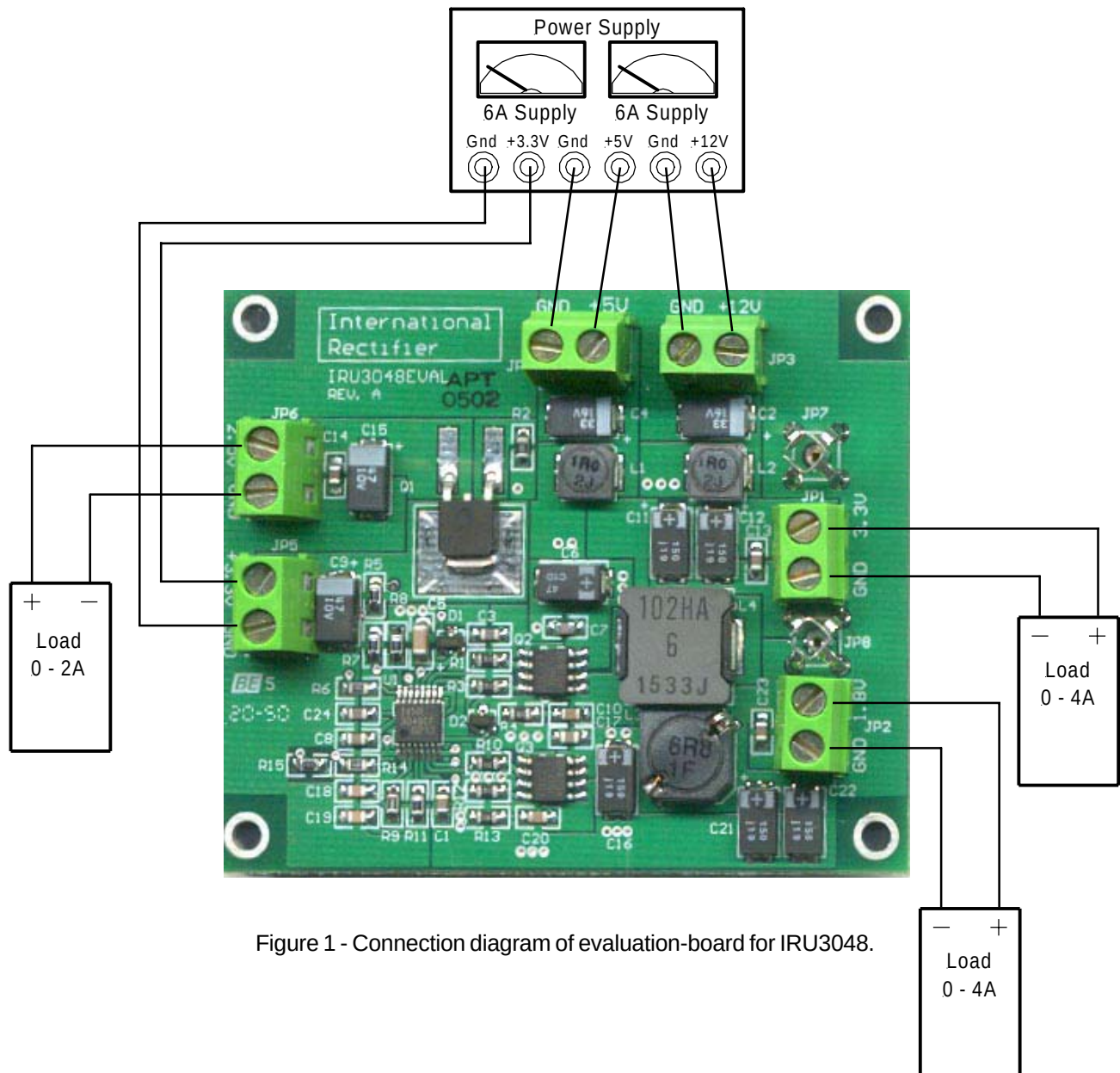


Figure 1 - Connection diagram of evaluation-board for IRU3048.

LAYOUT

The top side (component) layer for IRU3048 Eval board is shown in Figure 2. The input capacitors are all located close to the MOSFETs. All the decoupling capacitors, charge pump capacitor and feedback components are located close to IC. The feedback resistors are tied to

the output voltage at the point of regulation.

The PCB is 4-layers board, one layer is dedicated to Power GND and the analog GND is kept separated from the PGND and it is connected at a single point.

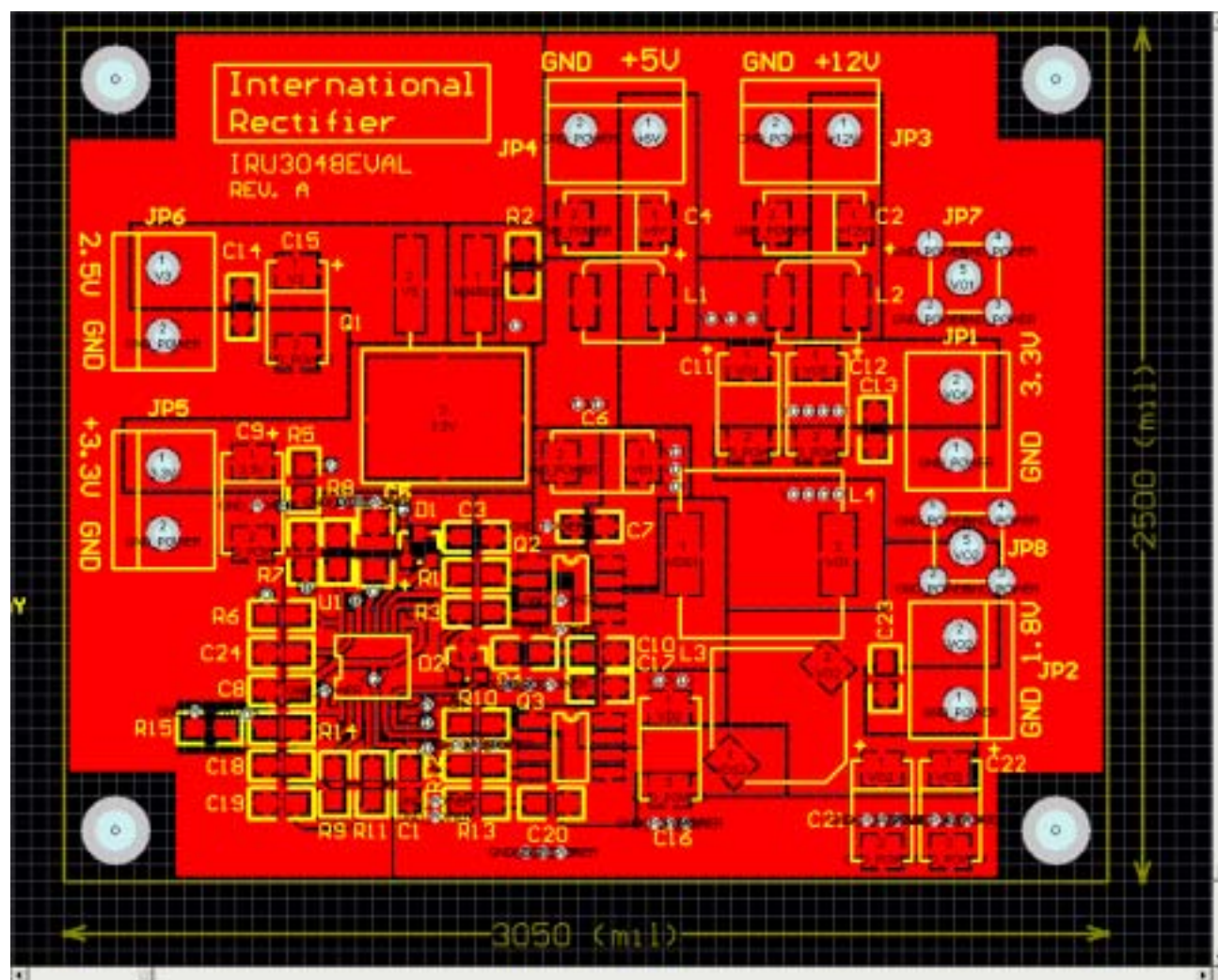
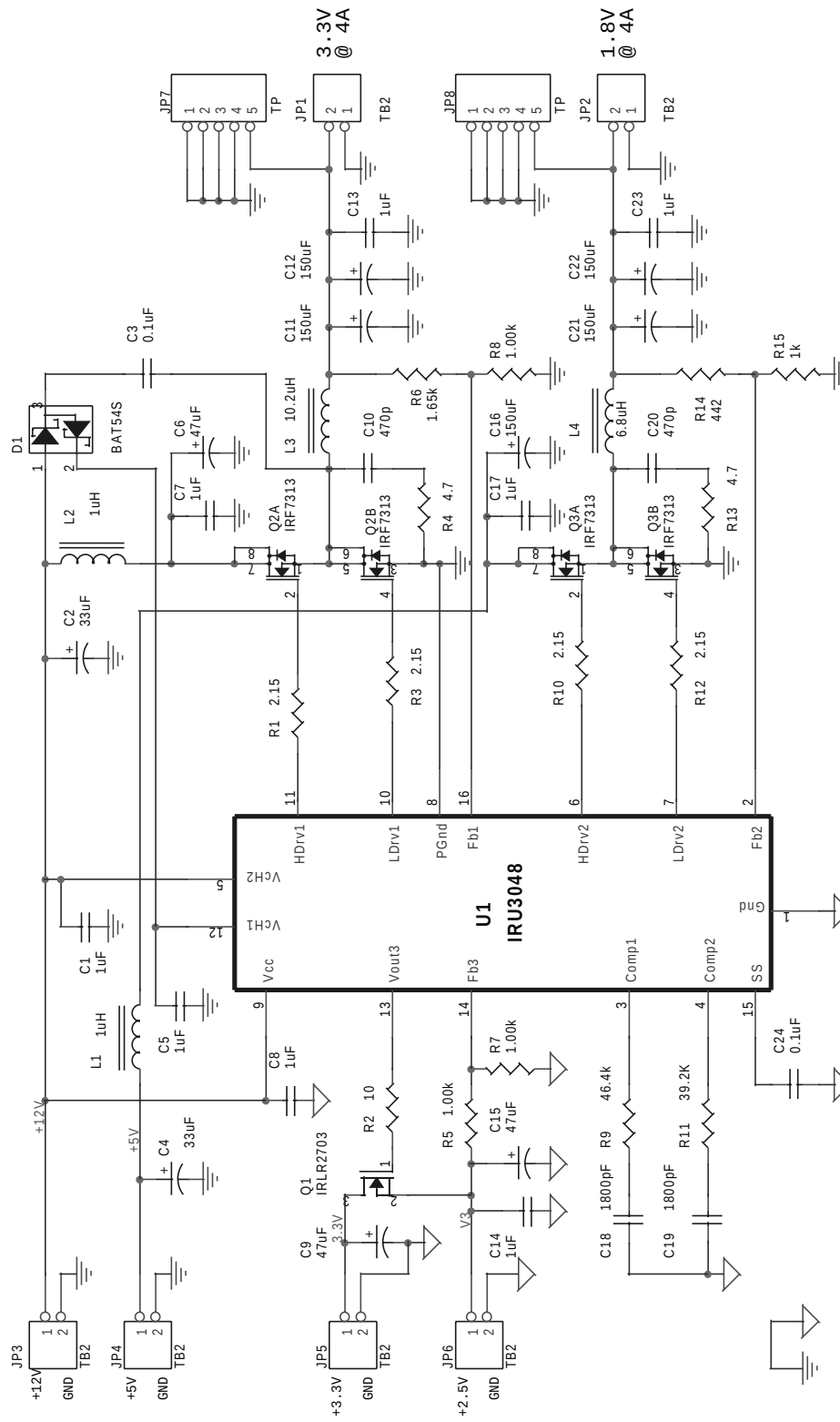


Figure 2 - Top layer of evaluation-board for IRU3048.

SCHEMATIC



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Figure 3 - Schematic of evaluation-board for IRU3048.

BILL OF MATERIAL

Ref Desig	Description	Value	Qty	Part#	Manuf	Web site (www.)
Q1	MOSFET	30V, 45mΩ	1	IRLR2703	IR	irf.com
Q2, Q3	MOSFET	30V, 29mΩ, 5.2A	2	IRF7313	IR	
U1	Controller	Synchronous PWM	1	IRU3048CF	IR	
D1	Diode	Fast Switching	1	BAT54S	IR	
L1, L2	Inductor	1μH, 2.9A	2	ELL6SH1R0M	Panasonic	maco.panasonic.co.jp
L3	Inductor	10.2μH, 4A	1	ETQP6F102HFA	Panasonic	
L4	Inductor	6.8μH, 4A	1	ELLATV6R8M	Panasonic	
C1,7,8,13, 14,17,23	Cap, Ceramic	1μF, Y5V, 16V	7	ECJ-2VF1C105Z	Panasonic	
C2, C4	Cap, Tantalum	33μF, 16V	2	ECS-T1CD336R	Panasonic	
C3, C24	Cap, Ceramic	0.1μF, Y5V, 25V	2	ECJ-2VF1E104Z	Panasonic	
C5	Cap, Ceramic	1μF, X7R, 25V	1	ECJ-3YB1E105K	Panasonic	
C9, C15	Cap, Tantalum	47μF, 10V	2	ECS-T1AD476R	Panasonic	
C10, C20	Cap, Ceramic	470pF, X7R, 50V	2	ECJ-2VC1H471J	Panasonic	
C18, C19	Cap, Ceramic	1800pF, X7R, 50V	2	ECJ-2VB1H182K	Panasonic	
C6	Cap, Poscap	47μF, 16V, 70mΩ	1	16TPB47M	Sanyo	sanyo.com/industrial
C11,12,16 21,22	Cap, Poscap	150μF, 6.3V, 40mΩ	5	6TPC150M	Sanyo	
R1,3,10,12	Resistor	2.15Ω	4			
R2	Resistor	10Ω	1			
R4, R13	Resistor	4.7Ω	2			
R5,7,8,15	Resistor	1K, 1%	4			
R6	Resistor	1.65K, 1%	1			
R9	Resistor	46.4K	1			
R11	Resistor	39.2K	1			
R14	Resistor	442Ω, 1%	1			

TEST DATA

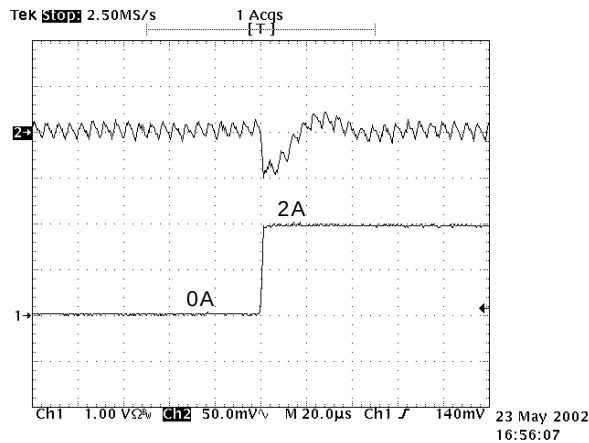


Figure 4 - Transient response @ $I_{OUT} = 0$ to 2A for 3.3V output.

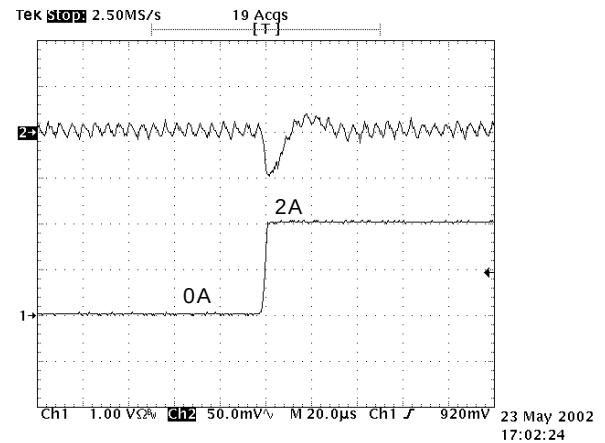


Figure 5 - Transient response @ $I_{OUT} = 0$ to 2A for 1.8V output.

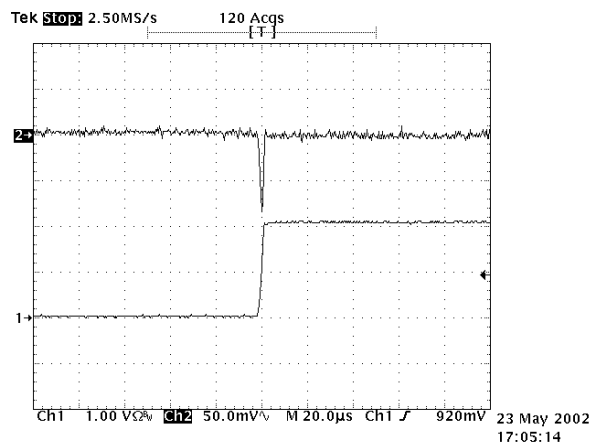


Figure 6 - Transient response @ $I_{OUT} = 0$ to 2A for 2.5V output.

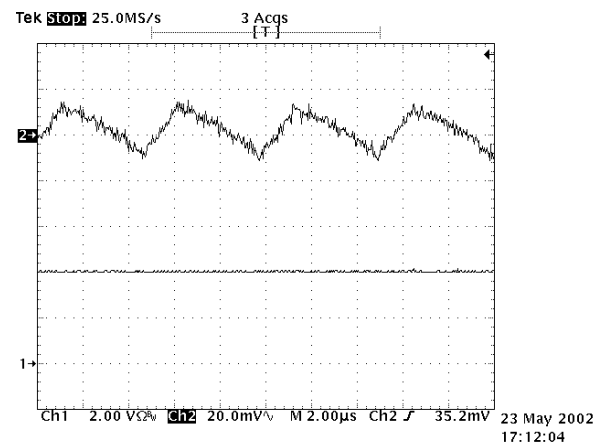


Figure 7 - Output voltage ripple for 3.3V @ 4A.

TEST DATA

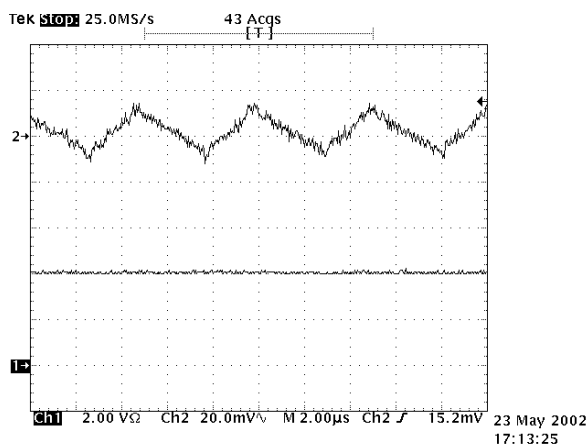


Figure 8 - Output voltage ripple for 1.8V @ 4A.

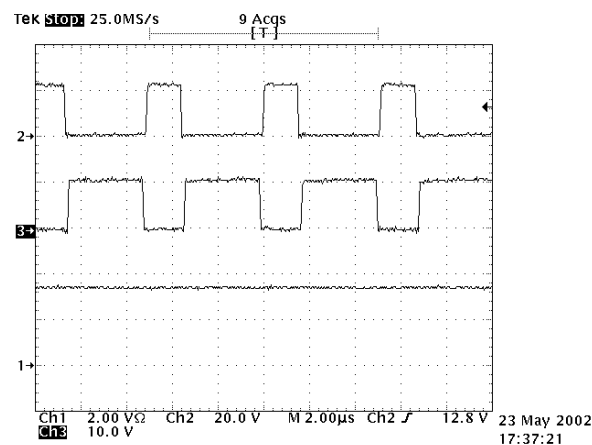


Figure 9 - Gate signals for 3.3V output.
Ch1: Output current 2A/div.
Ch2: Gate signal for control FET 20V/div.
Ch3: Gate signal for sync FET 10V/div.

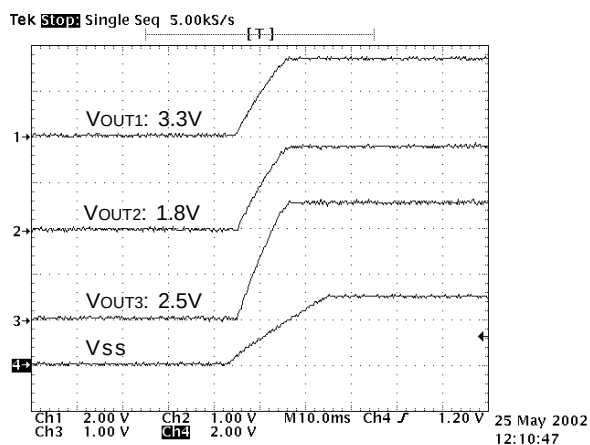


Figure 10 - Soft-start voltage Vs. output voltages.

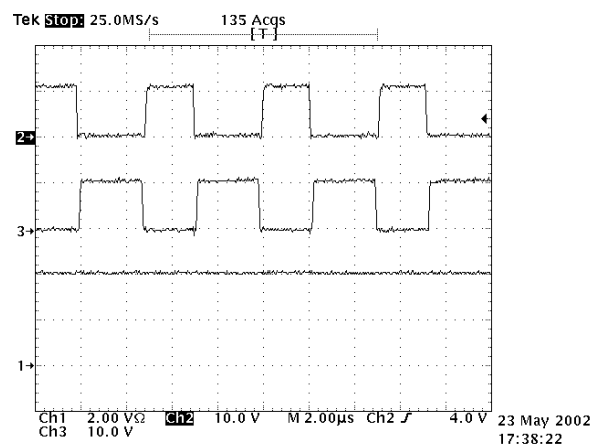


Figure 11 - Gate signals for 1.8V output.
Ch1: Output current 2A/div.
Ch2: Gate signal for control FET 10V/div.
Ch3: Gate signal for sync FET 10V/div.