IRU3037 / IRU3037A

8-PIN SYNCHRONOUS PWM CONTROLLER

PRELIMINARY DATA SHEET

FEATURES

- Synchronous Controller in 8 Pin Package
- Operation from 4V to 25V Input
- Single 5V Supply Operation
- Internal 200KHz Oscillator (400KHz for IRU3037A)
- Soft Start Function
- Fixed Frequency Voltage Mode
- 500mA Peak Output Drive Capability

APPLICATIONS

- DDR memory source sink Vtt application
- Low cost on board DC to DC such as 5V to 3.3V, 2.5V or 1.8V
- Graphic Card
- Hard Disk Drive

DESCRIPTION

The IRU3037 controller IC is designed to provide a low cost synchronous Buck regulator for on board DC to DC converter applications. With the migration of today's ASIC products requiring low supply voltages such as 1.8V and lower, together with currents in excess of 3A, traditional linear regulators are simply too lossy to be used when input supply is 5V or even in some cases with 3.3V input supply. The IRU3037 together with dual N channel MOSFETs such as IRF7313, provide a low cost solution for such applications. This device features an internal 200KHz oscillator (400KHz for "A" version), under voltage lockout for both Vcc and Vc supplies, an external programmable soft start function as well as output undervoltage detection that latches off the device when an output short is detected.

TYPICAL APPLICATION

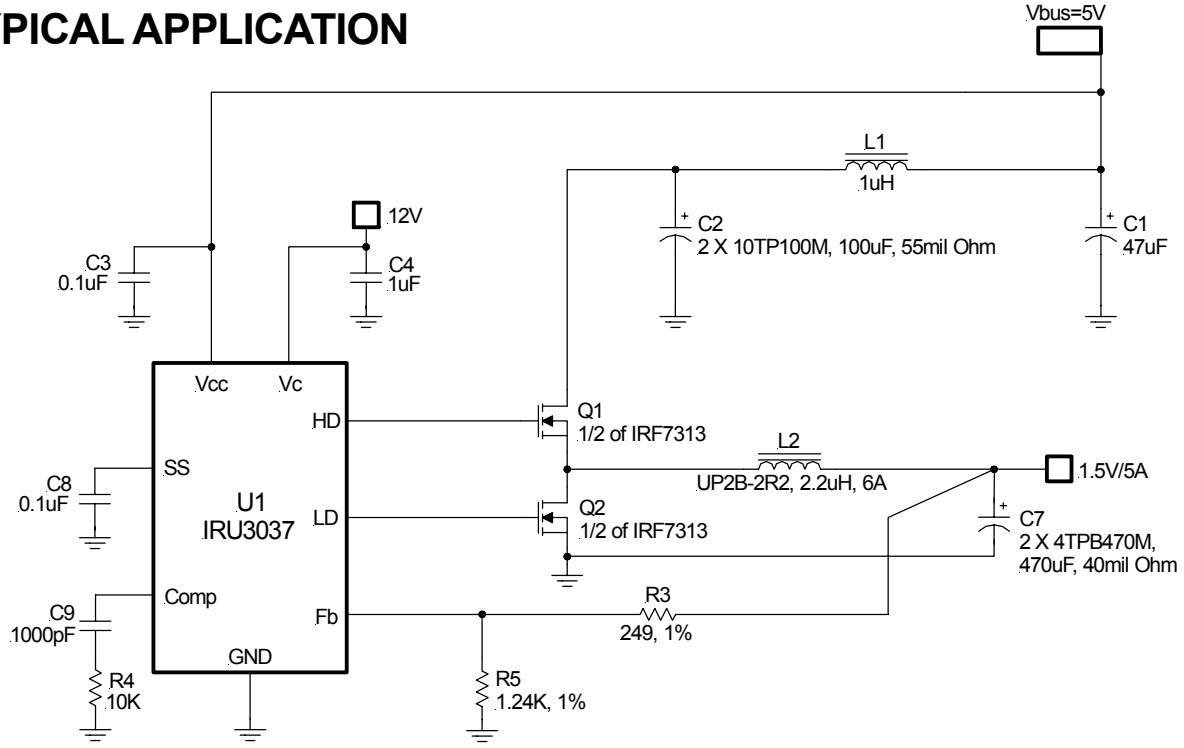


Figure 1 - Typical application of IRU3037 or IRU3037A

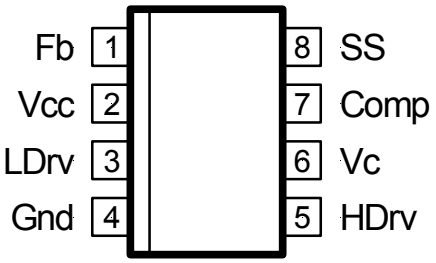
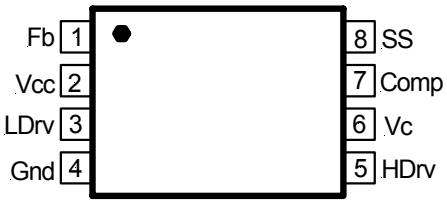
PACKAGE ORDER INFORMATION

Ta (°C)	Device	Package	Frequency
0 To 70	IRU3037CS	8-Pin Plastic SOIC	200KHz
0 To 70	IRU3037CF	8-Pin Plastic TSSOP	200KHz
0 To 70	IRU3037ACS	8-Pin Plastic SOIC	400KHz
0 To 70	IRU3037ACF	8-Pin Plastic TSSOP	400KHz

ABSOLUTE MAXIMUM RATINGS

Vcc Supply Voltage 30V
Vc Supply Voltage 30V
Storage Temperature Range ..... -65°C To 150°C
Operating Junction Temperature Range ..... 0°C To 125°C

PACKAGE INFORMATION

8-PIN WIDE BODY PLASTIC SOIC (W)	8-PIN WIDE BODY PLASTIC TSSOP (F)
TOP VIEW  θ_{JA} =160°C/W	TOP VIEW  θ_{JA} =124°C/W

ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over Vcc = 5V, Vc = 12V and Ta = 0 to 70°C. Typical values refer to Ta = 25°C. Low duty cycle pulse testing is used which keeps junction and case temperatures equal to the ambient temperature.

PARAMETER	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Reference Voltage						
FB Voltage		IRU3037	1.225	1.250	1.275	
		IRU3037A	0.784	0.800	0.816	V
FB Voltage Line Regulation		5 < Vcc < 12		0.2		%
UVLO						
UVLO Threshold - Vcc		Supply Ramping Up		4.2		V
UVLO Hysteresis - Vcc				0.25		V
UVLO Threshold - Vc		Supply Ramping Up		3.3		V
UVLO Hysteresis - Vc				0.2		V
UVLO Threshold - FB		FB Ramping Down (IRU3037)		0.6		
		(IRU3037A)		0.4		V
UVLO Hysteresis - FB				0.1		V
Supply Current						
Vcc Dynamic Supply Current		Freq = 200KHz, Cl = 1500pF		5		mA
Vc Dynamic Supply Current		Freq = 200KHz, Cl = 1500pF		7		mA
Vcc Static Supply Current		SS = 0V		3.5		mA
Vc Static Supply Current		SS = 0V		2.5		mA
Soft Start Section						
Charge Current		SS = 0V		20		μA

PARAMETER	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Error Amp						
FB Voltage Input Bias Current		SS = 3V		-0.1		µA
FB Voltage Input Bias Current		SS = 3V		-64		µA
Transconductance				500		umho
Oscillator						
Frequency		IRU3037	180	200	220	KHz
		IRU3037A	360	400	440	KHz
Ramp Amplitude				1.25		Vpp
Output Drivers						
Rise Time		Cload = 1500pF		50		nS
Fall Time		Cload = 1500pF		50		nS
Dead Band Time				250		nS
Max Duty Cycle		FB = 1V, Freq = 200KHz	85	90		%
Min Duty Cycle		FB = 1.5V	0			%

PIN DESCRIPTIONS

PIN#	PIN SYMBOL	PIN DESCRIPTION
1	Fb	This pin is connected directly to the output of the switching regulator via resistor divider to provide feedback to the Error amplifier.
8	SS	This pin provides soft start for the switching regulator. An internal current source charges an external capacitor that is connected from this pin to GND which ramps up the output of the switching regulator, preventing it from overshooting as well as limiting the input current.
4	Gnd	This pin serves as the ground pin and must be connected directly to the ground plane. A high frequency capacitor (0.1 to 1uF) must be connected from V5 and V12 pins to this pin for noise free operation.
3	LDrv	Output driver for the synchronous power MOSFET.
5	HDrv	Output driver for the high side power MOSFET.
6	Vc	This pin is connected to a voltage that must be at least 4V higher than the bus voltage of the switcher (assuming 5V threshold MOSFET) and powers the high side output driver. A minimum of 1uF, high frequency capacitor must be connected from this pin to GND to provide peak drive current capability.
7	Comp	Compensation pin of the error amplifier. An external resistor and capacitor network is typically connected from this pin to GND to provide loop compensation.
2	Vcc	This pin provides biasing for the internal blocks of the IC as well as power for the low side driver. A minimum of 1uF, high frequency capacitor must be connected from this pin to GND to provide peak drive current capability.

BLOCK DIAGRAM

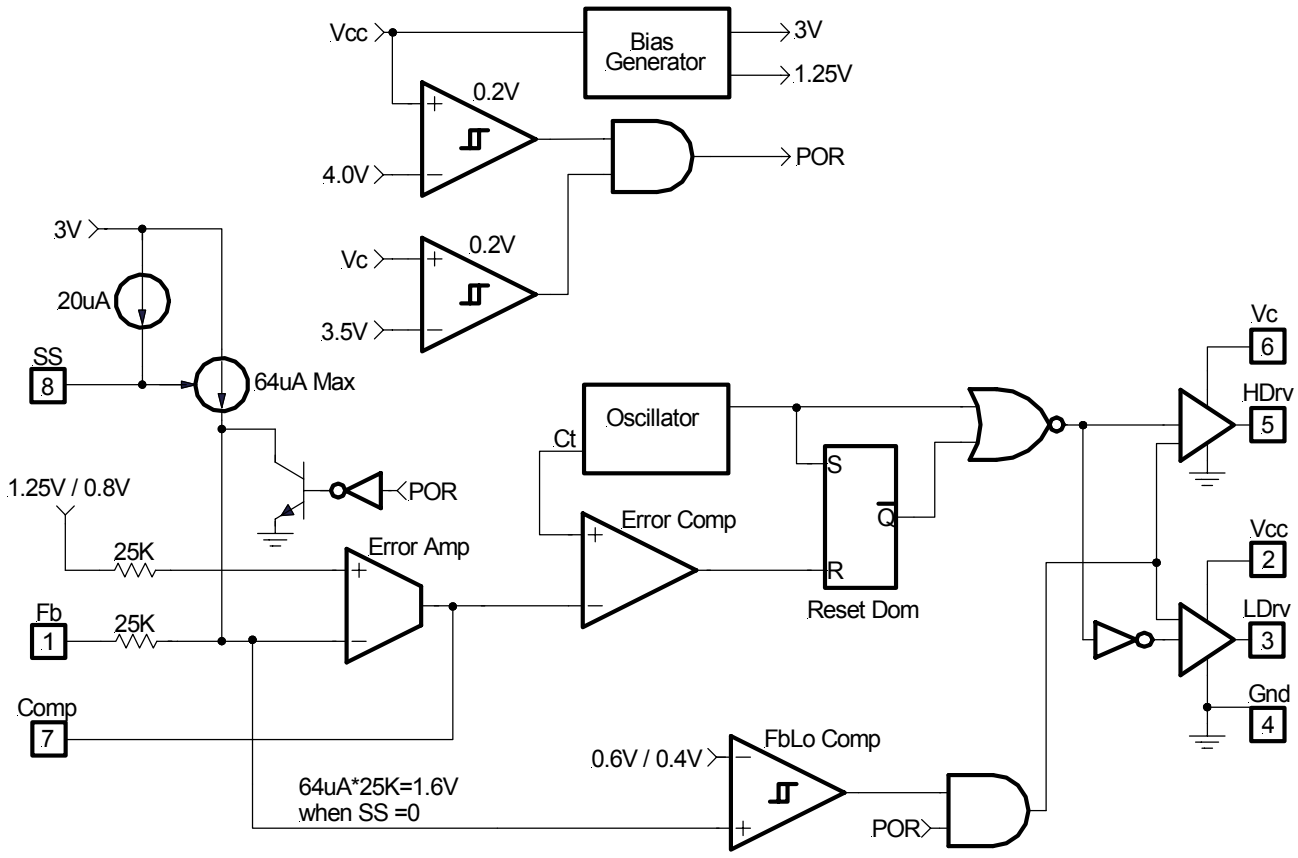


Figure 2 - Simplified block diagram of the IRU3037

TYPICAL APPLICATION

Single Supply 5V Input

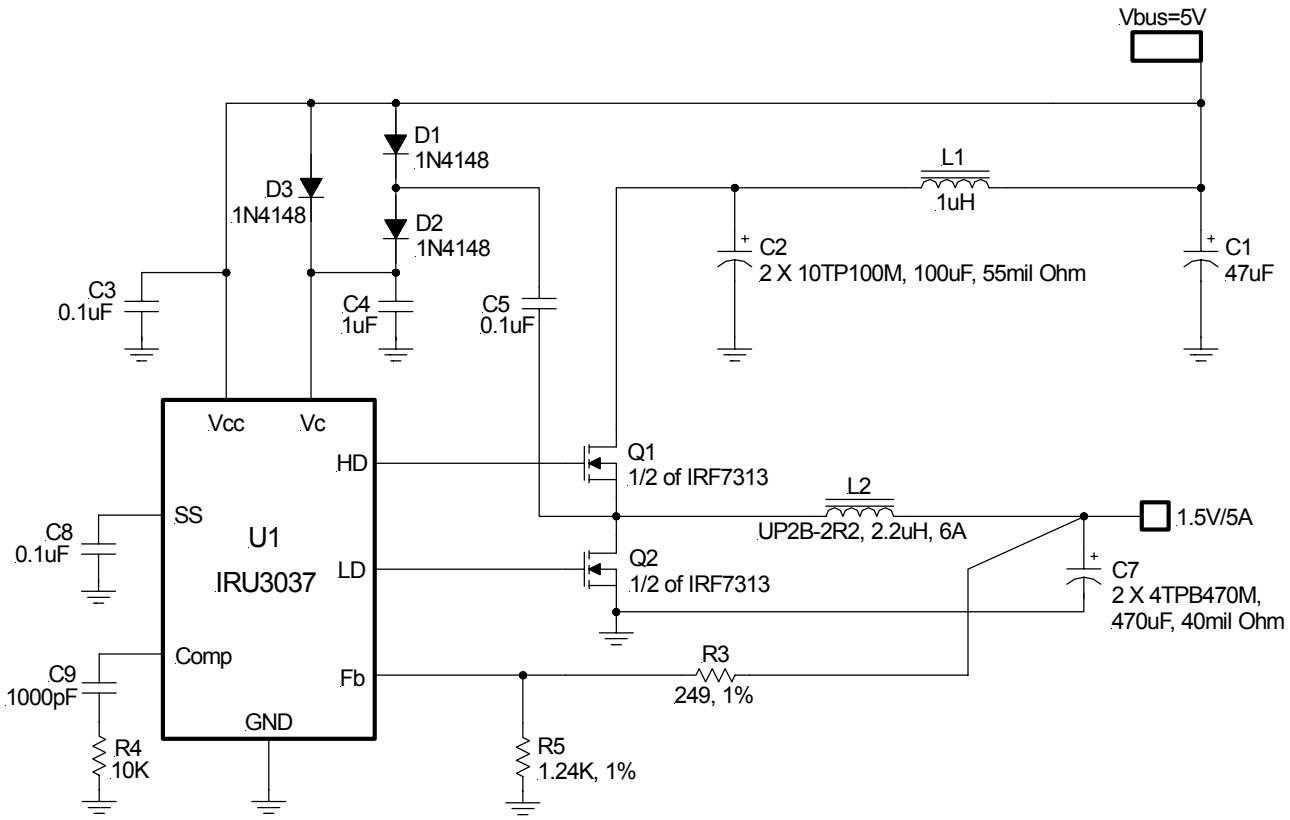


Figure 3 - Typical application of IRU3037 or IRU3037A in an on-board DC-DC converter using a single 5V supply.

TYPICAL APPLICATION

Dual Supply, 5V Bus and 12V Bias Input

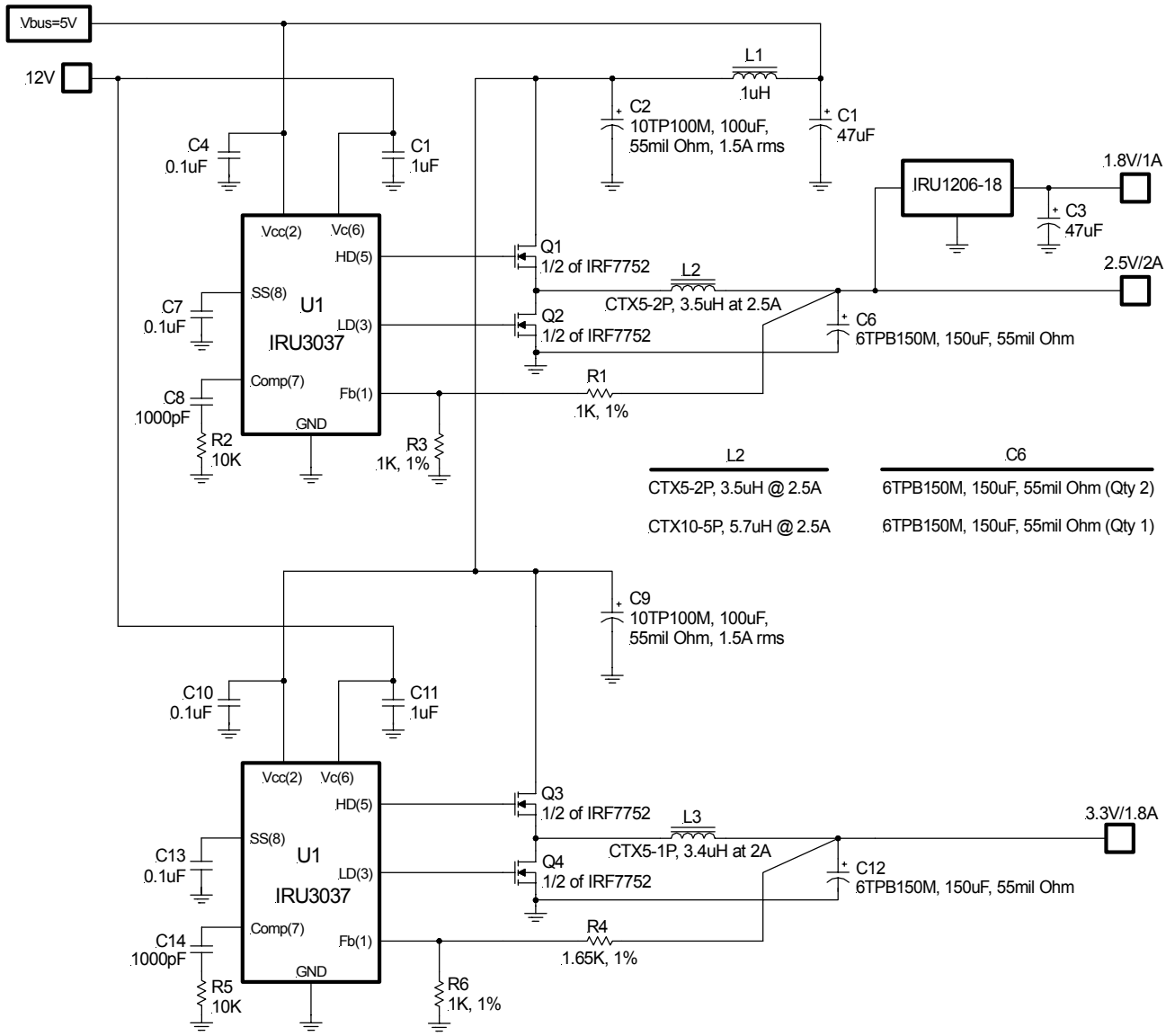


Figure 4 - Typical application of IRU3037 or IRU3037A in an on-board DC-DC converter providing the Core, GTL+, and Clock supplies for the Pentium II microprocessor

TYPICAL APPLICATION

1.8V to 7.5V / 0.5A Boost Converter

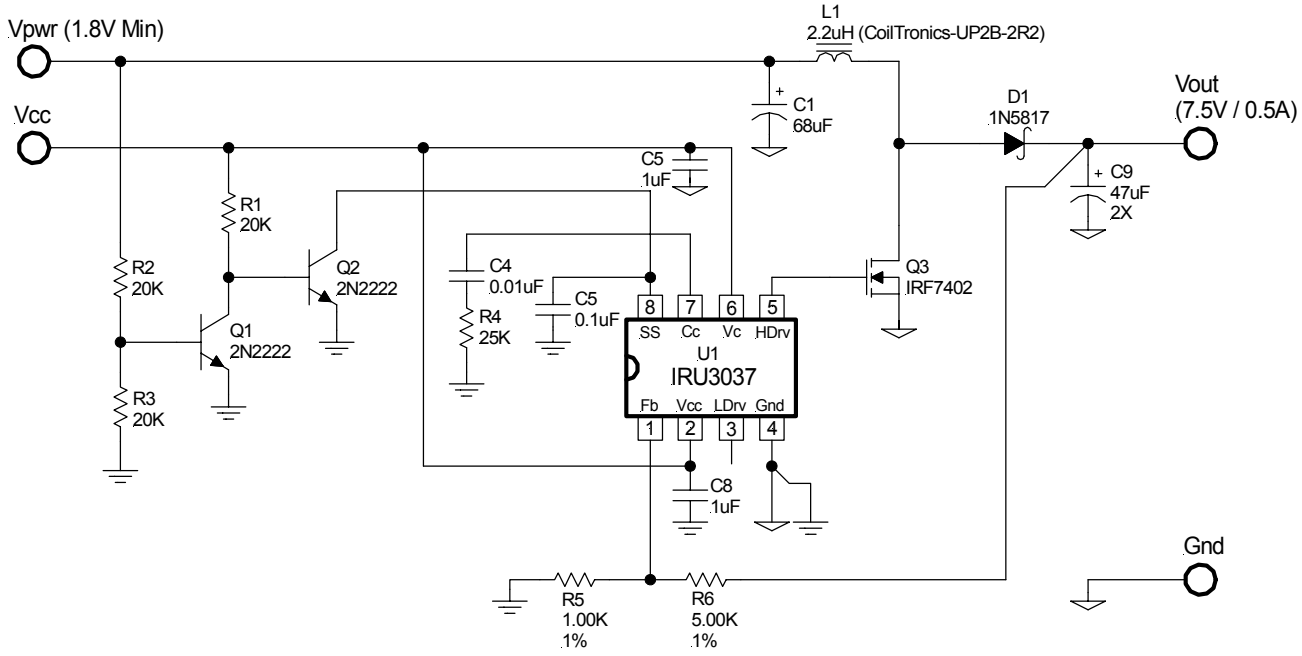


Figure 5 - Typical application of IRU3037 or IRU3037A

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