RC5032
5V to 3.3V Step-Down DC-DC Converter

<div style="float:right">**Preliminary Information**</div>

Features

- >85% Efficiency
- Fast transient response
- Soft control power-up
- Short circuit protection
- Output voltage fixed 3.3V
- Low TC reference voltage
- Adjustable oscillator frequency
- Drives N-Channel MOSFET
- 8 pin SOIC, 8 pin DIP package

Applications

- 3.3V power supply for Pentium™ based desktop CPU motherboards
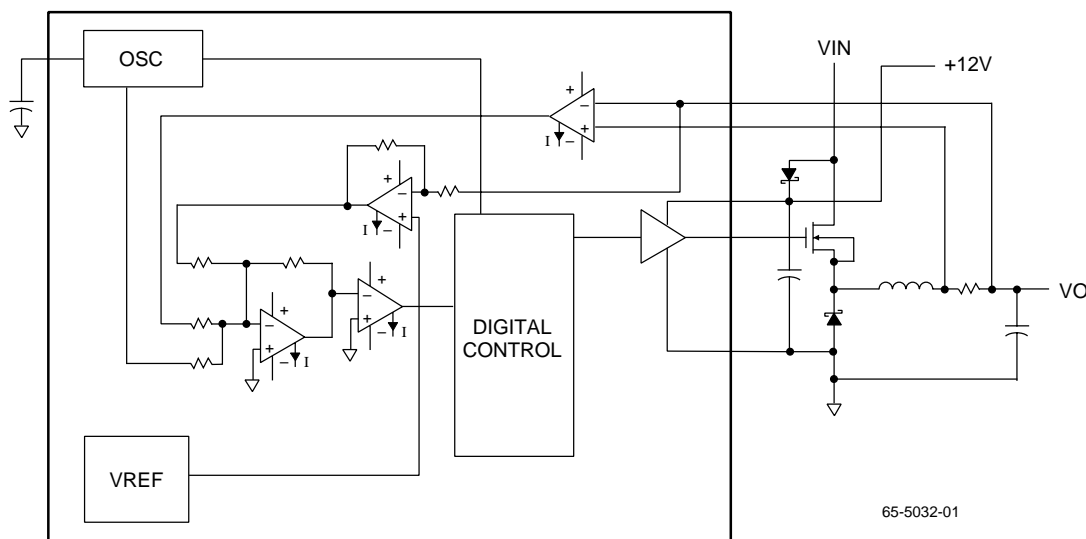- Minimum component DC-DC converters

Description

The RC5032 is a step-down DC-DC controller IC dedicated to providing a 5V to 3.3V conversion for various types of CPU power. It can be configured with the proper applications circuitry to deliver load currents greater than 10 Amps. The RC5032 is designed to operate in a standard PWM control mode under heavy load conditions and as a PFM controller in light load condit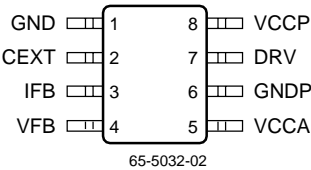ions. Its highly accurate low TC reference eliminates the need for precision external components in order to achieve tight tolerance voltage regulation.

The programmable oscillator can operate from 200KHz to greater than 1MHz to provide for flexibility in choosing external components such as inductors, capacitors, and Power MOSFETs.

Block Diagram

65-5032-01

Rev. 0.9.6

Pin Assignments

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      GND ▭▭ 1        8 ▭▭ VCCP
     CEXT ▭▭ 2        7 ▭▭ DRV
      IFB ▭▭ 3        6 ▭▭ GNDP
      VFB ▭▭ 4        5 ▭▭ VCCA
             65-5032-02
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Pin Definitions

Pin Name	Pin Number	Pin Function Description
GND	1	Ground
CEXT	2	External capacitor for setting oscillator frequency
IFB	3	Current Feedback Input
VFB	4	Voltage Feedback Input
VCCA	5	Analog VCC
GNDP	6	Power ground for high current driver
DRV	7	FET Driver Output
VCCP	8	VCC for FET output drivers

Absolute Maximum Ratings

(beyond which the device may be damaged)[1]

Parameter		Conditions	Min	Typ	Max	Units
VCCP	Driver Supply				13	V

Note:

1. Functional operation under any of these conditions is NOT implied. Performance is guaranteed only if Operating Conditions are not exceeded.

Operating Conditions

Parameter		Conditions	Min	Typ	Max	Units
VCC	Supply Voltage		4.5	5	7	V
VCCP	Driver Supply		9		13	V
VIH	Input Voltage, Logic HIGH		2			V
VIL	Input Voltage, Logic LOW				0.8	V
	Ambient Temp		0		70	°C

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DC Electrical Characteristics

(V_{CC} = 5V, Fosc = 650 KHz, and T_A = 0–70˚C)

Parameter		Conditions	Min	Typ	Max	Units
V_O	Output Voltage		3.1	3.4	3.6	V
I_O	Output Current	See Figure 1 for application		7		A
Vref Acc	Reference Accuracy			1	3	%
VTC	Output Voltage TC			40		ppm
LDR	Load Regulation	0.5 to 7A		0.5		%V_O
LIR	Line Regulation	V_{CC} = ±5%		0.07		%V_O
V_R	Output Voltage Ripple			30		mV
Cum Acc	Cumulative Accuracy[1]	T_A = 0–70°C		3	5	%
Eff	Efficiency	Iload > 4A	85	88		%
Iodr	Output Driver I	Open Loop	0.5	0.7		A
Pd	Power Dissipation			0.1		W

Notes:

1. Output Voltage accuracy, Tempco, load regulation, ripple, and transient performance determine the Cumulative Accuracy.

AC Electrical Characteristics

(V_{CC} = 5V, Fosc = 650 KHz, and T_A = 25˚C)

Parameter		Conditions	Min	Typ	Max	Units
Tr	Response Time	Il=0.5A to 7A		10		μs
Fosc	Oscillator Range		0.2		1.2	MHz
Osc Acc	Fosc Accuracy			10		%
Dtc	Max Duty Cycle	PWM mode	90	95		%
Dtcm	Min Duty Cycle	PFM mode			100	ns
Iscp	Short Circuit Prot			250		mV
Trimax	Response to Imax			15	30	μs
Tssp	Soft start response			1		ms

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Test Circuit

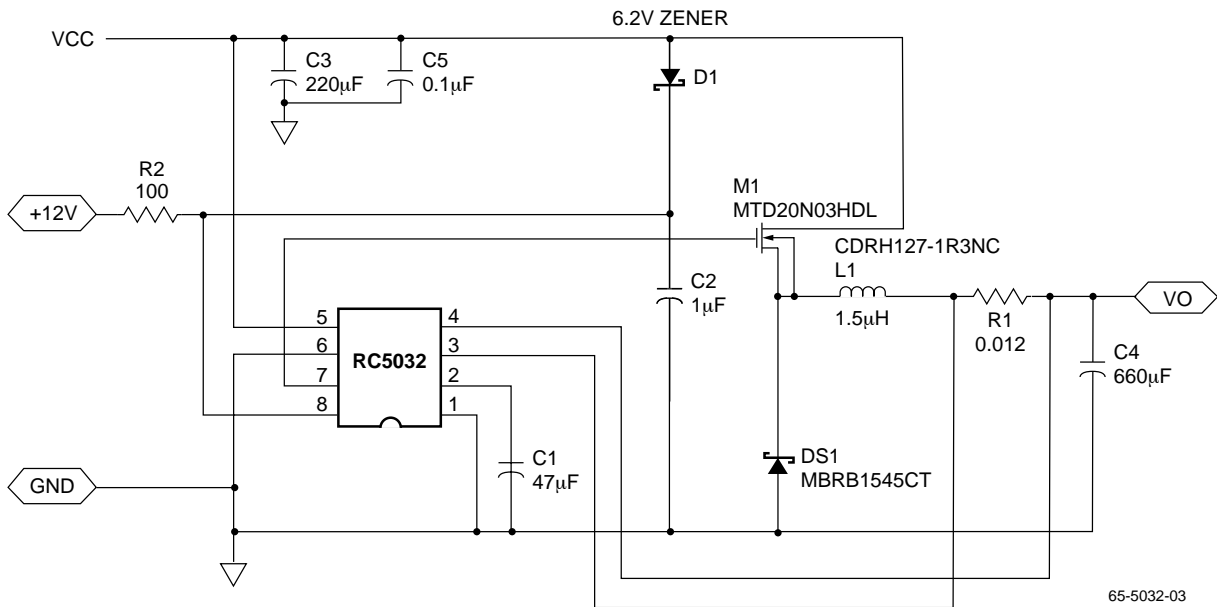**Figure 1. RC5032 7A Schematic**

Table 1. Components for RC5032

RC5032 Standard Application Circuit Bill of Materials			
Ref Designator	**Quantity**	**Part No.**	**Manufacturer**
L1	1	CDRH127-1R3NC	Sumida
M1	1	MTD20N03HDL	Motorola
DS1	1	MBRB1545CT	Motorola
D1	1	6.2V Zener	any
R1	1	LRC-2512	IRC
C3	1	OS-CON 10SA220M	Sanyo
C4	2	OS-CON 10SA330M	Sanyo
C2	1	1uF	Monolithic ceramic Cap
C1	1	47pF	SMD Cap
C5	1	0.1uF	SMD Cap
R2	1	100Ω	SMD Res

Notes:

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Mechanical Dimensions

8 Lead Ceramic DIP Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	—	.200	—	5.08	
b1	.014	.023	.36	.58	8
b2	.045	.065	1.14	1.65	2, 8
c1	.008	.015	.20	.38	8
D	—	.405	—	10.29	4
E	.220	.310	5.59	7.87	4
e	.100 BSC		2.54 BSC		5, 9
eA	.300 BSC		7.62 BSC		7
L	.125	.200	3.18	5.08	
Q	.015	.060	.38	1.52	3
s1	.005	—	.13	—	6
α	90°	105°	90°	105°	

Notes:

1. Index area: a notch or a pin one identification mark shall be located adjacent to pin one. The manufacturer's identification shall not be used as pin one identification mark.

2. The minimum limit for dimension "b2" may be .023 (.58mm) for leads number 1, 4, 5 and 8 only.

3. Dimension "Q" shall be measured from the seating plane to the base plane.

4. This dimension allows for off-center lid, meniscus and glass overrun.

5. The basic pin spacing is .100 (2.54mm) between centerlines. Each pin centerline shall be located within ±.010 (.25mm) of its exact longitudinal position relative to pins 1 and 8.

6. Applies to all four corners (leads number 1, 4, 5, and 8).

7. "eA" shall be measured at the center of the lead bends or at the centerline of the leads when "α" is 90°.

8. All leads – Increase maximum limit by .003 (.08mm) measured at the center of the flat, when lead finish applied.

9. Six spaces.
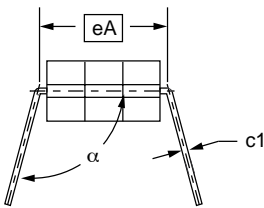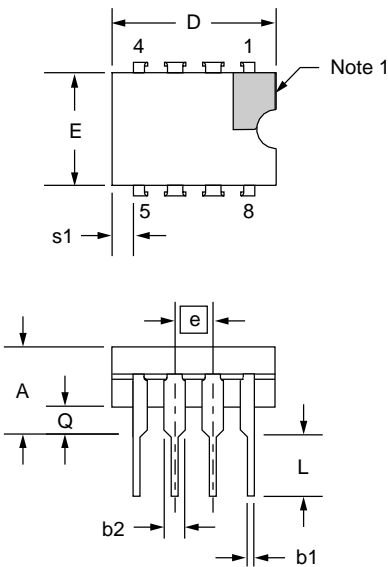
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Mechanical Dimensions (continued)

8 Lead SOIC Package

Symbol	Inches		Millimeters		Notes
	Min.	Max.	Min.	Max.	
A	.053	.069	1.35	1.75	
A1	.004	.010	0.10	0.25	
B	.013	.020	0.33	0.51	
C	.008	.010	0.20	0.25	5
D	.189	.197	4.80	5.00	2
E	.150	.158	3.81	4.01	2
e	.050 BSC		1.27 BSC		
H	.228	.244	5.79	6.20	
h	.010	.020	0.25	0.50	
L	.016	.050	0.40	1.27	3
N	8		8		6
α	0°	8°	0°	8°	
ccc	—	.004	—	0.10	

Notes:

1. Dimensioning and tolerancing per ANSI Y14.5M-1982.
2. "D" and "E" do not include mold flash. Mold flash or protrusions shall not exceed .010 inch (0.25mm).
3. "L" is the length of terminal for soldering to a substrate.
4. Terminal numbers are shown for reference only.
5. "C" dimension does not include solder finish thickness.
6. Symbol "N" is the maximum number of terminals.

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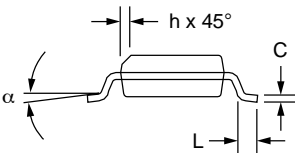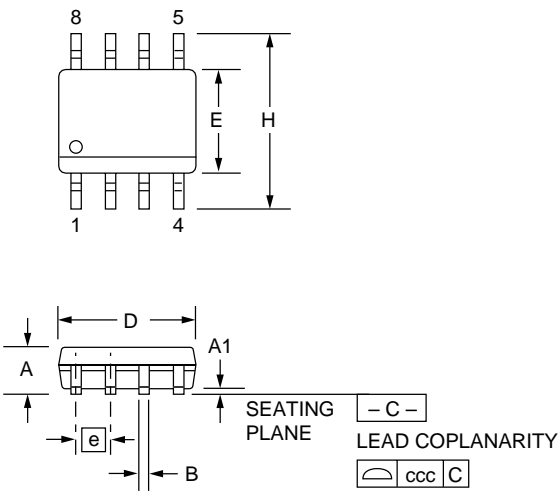
Ordering Information

Product Number	Package	θJA
RC5032M	8 SOIC	85°C/W

Preliminary Information

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