

General Description

The EA3036 is a 3CH power management IC for applications powered by one Li-Ion battery or a DC 5V adapter. It integrates four synchronous buck converters and can provide high efficiency output at light load and heavy load operation. The internal compensation architecture simplifies the application circuit design. Besides, the independent enable control makes the designer have the greatest flexibility to optimize timing for power sequencing purposes. The EA3036 is available in a 20 pin QFN 3x3 package.

Features

- ▶ 2.7V to 5.5V Input Voltage Range
- ▶ Three Buck Converters
 - Output Voltage Range: 0.6V to V_{in}
 - Maximum Continuous Loading: 2A (3CH total output power consumption must be less than 6W)
 - Fixed 1.5MHz Switching Frequency
 - 100% Duty Cycle Low Dropout Operation
 - <1uA Shutdown Current
 - Independent Enable Control
 - Internal Compensation
 - Cycle-by-Cycle Current Limit
 - Short Circuit Protection
- ▶ Auto Recovery OTP Protection
- ▶ Available in 20-pin 3mm x 3mm QFN Package

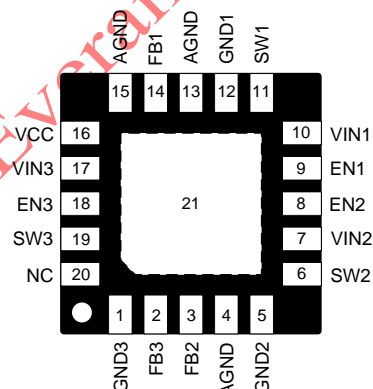
Applications

- ▶ Smart Phone
- ▶ IP Camera
- ▶ OTT
- ▶ Digital Camera



Pin Configurations

(TOP VIEW)



QFN 3x3-20

Pin Description

Pin Name	Function Description	Pin No.
GND3	Power ground pin of CH3.	1
FB3	Feedback input of CH3. Connect to output voltage with a resistor divider.	2
FB2	Feedback input of CH2. Connect to output voltage with a resistor divider.	3
AGND	Analog ground pin.	4, 13, 15
GND2	Power ground pin of CH2.	5
SW2	Internal MOSFET switching output of CH2. Connect SW2 pin with a low pass filter circuit to obtain a stable DC output voltage.	6
VIN2	Power input pin of CH2. Recommended to use a 10uF MLCC capacitor between VIN2 pin and GND2 pin.	7
EN2	CH2 turns on/turns off control input. Don't leave this pin floating.	8
EN1	CH1 turns on/turns off control input. Don't leave this pin floating.	9
VIN1	Power input pin of CH1. Recommended to use a 10uF MLCC capacitor between VIN1 pin and GND1 pin.	10
SW1	Internal MOSFET switching output of CH1. Connect SW1 pin with a low pass filter circuit to obtain a stable DC output voltage.	11
GND1	Power ground pin of CH1.	12
FB1	Feedback input of CH1. Connect to output voltage with a resistor divider.	14
VCC	Input supply pin for internal control circuit.	16
VIN3	Power input pin of CH3. Recommended to use a 10uF MLCC capacitor between VIN3 pin and GND3 pin.	17
EN3	CH3 turns on/turns off control input. Don't leave this pin floating.	18
SW3	Internal MOSFET switching output of CH3. Connect SW3 pin with a low pass filter circuit to obtain a stable DC output voltage.	19
NC	No connect.	20
Exposed Pad	The Exposed Pad must be soldered to a large PCB copper plane and connected to GND for appropriate dissipation.	21

Function Block Diagram

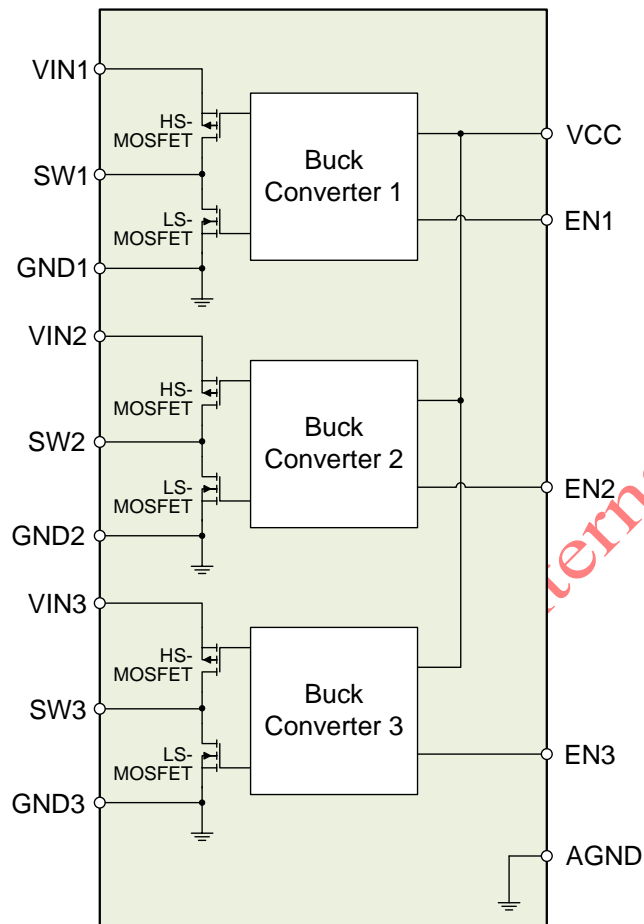


Figure 1. EA3036 internal function block diagram

Absolute Maximum Ratings

Parameter	Value
Input Voltage (V_{VIN1} , V_{VIN2} , V_{VIN3} , V_{VCC})	-0.3V to +6.5V
SW Pin Voltage (V_{SW1} , V_{SW2} , V_{SW3} , V_{SW4})	-0.3V to $V_{VINX}+0.3V$
All Other Pins Voltage	-0.3V to +6.5V
Ambient Temperature operating Range (T_A)	-40°C to +85°C
Maximum Junction Temperature (T_{Jmax})	+150°C
Lead Temperature (Soldering, 10 sec)	+260°C
Storage Temperature Range (T_S)	-65°C to +150°C

Note (1): Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Exposure to "Absolute Maximum Ratings" conditions for extended periods may affect device reliability and lifetime.

Package Thermal Characteristics

Parameter	Value
QFN 3x3-20 Thermal Resistance (θ_{JC})	7.5°C/W
QFN 3x3-20 Thermal Resistance (θ_{JA})	67°C/W
QFN 3x3-20 Power Dissipation at $T_A=25^\circ\text{C}$ (P_{Dmax})	1.87W

Note (1): P_{Dmax} is calculated according to the formula: $P_{Dmax}=(T_{JMAX}-T_A)/\theta_{JA}$.

Recommended Operating Conditions

Parameter	Value
Input Voltage (V_{VIN1} , V_{VIN2} , V_{VIN3} , V_{VCC})	+2.7V to +5.5V
Junction Temperature Range (T_J)	-40°C to +125°C

Electrical Characteristics

$V_{VIN}=3.6V$, $V_{VCC}=3.6V$, $T_A=25^{\circ}C$, unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Input Supply Voltage						
Input Voltage	V_{INX}		2.7		5.5	V
Control Circuit Input Voltage	V_{VCC}		2.7		5.5	V
Buck Converter 1, 2, 3						
Shutdown Supply Current	I_{SD}	$V_{EN} = 0V$		0.1	1	μA
Quiescent Current	I_Q	Non-switching, No Load		40	80	μA
UVLO Threshold	V_{UVLO}	V_{VIN} Rising	1.7	1.9	2.1	V
UVLO Hysteresis	$V_{UV-HYST}$			0.1		V
Output Load Current	I_{LOAD}				2	A
Reference Voltage	V_{REF}		0.588	0.6	0.612	V
Switching Frequency	F_{SW}	$I_{LOAD} = 100mA$	1	1.5	2	MHz
Short Frequency	$F_{SW-SHORT}$	$V_{OUT} = 0V$		300		KHz
PMOS Current Limit	I_{LIM-P}		3	4		A
PMOS On-Resistance	$R_{DS(ON)-P}$	$I_{LOAD} = 100mA$		100		$m\Omega$
NMOS On-Resistance	$R_{DS(ON)-N}$	$I_{LOAD} = 100mA$		90		$m\Omega$
Enable Pin Input Low Voltage	V_{EN-L}				0.4	V
Enable Pin Input High Voltage	V_{EN-H}		2			V
Maximum Duty Cycle	D_{MAX}		100			%
Thermal Shutdown						
Thermal Shutdown Threshold	T_{OTP}			165		$^{\circ}C$
Thermal Shutdown Hysteresis	T_{HYST}			30		$^{\circ}C$

Note (1): MOSFET on-resistance specifications are guaranteed by correlation to wafer level measurements.

(2): Thermal shutdown specifications are guaranteed by correlation to the design and characteristics analysis.

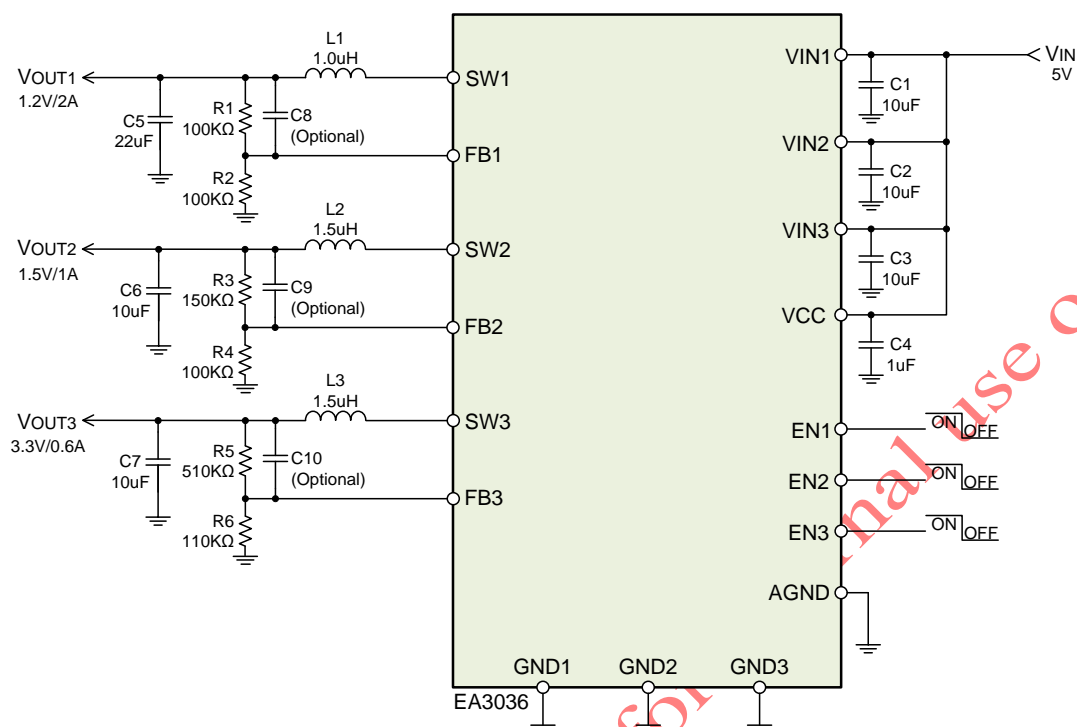
Application Circuit Diagram

Figure 2. Typical application circuit diagram

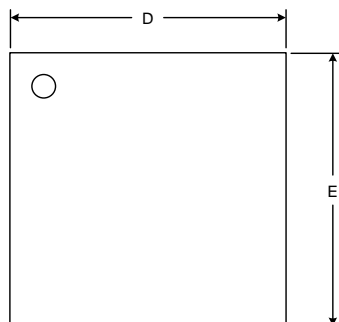
Ordering Information

Part Number	Package Type	Packing Information
EA3036QBR	QFN 3mm x 3mm-20	Tape & Reel / 3000

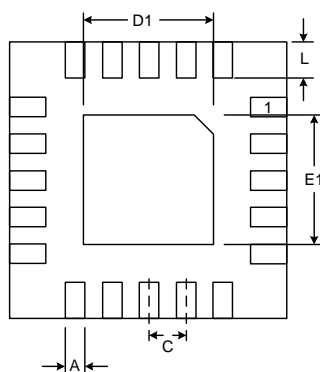
Note (1): "QB": Package type code.
 (2): "R": Tape & Reel.

Package Information

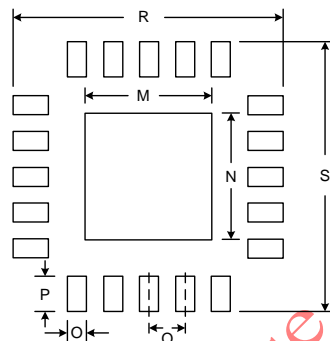
QFN 3mm x 3mm-20 Package



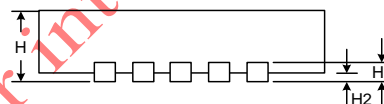
Top View



Bottom View



Recommended Layout Pattern



Side View

Unit: mm

Symbol	Dimension		Symbol	Dimension
	Min	Max		Typ
A	0.15	0.25	M	1.50
C	0.35	0.45	N	1.50
D	2.90	3.10	O	0.30
E	2.90	3.10	P	0.80
D1	1.55	1.75	Q	0.40
E1	1.55	1.75	R	3.90
L	0.35	0.45	S	3.90
H	0.70	0.80		
H1	0.18	0.25		
H2	0.00	0.05		