VISHAY

# Industry Smallest and Low Profile
3W 1000mA DC/DC Buck Converter
with High Output Power Density

FEATURES

- Fully integrated DC/DC converter
- High efficiency over large load range
- 2MHz switching frequency
- 100% duty cycle
- Power density - more than 100W/inch^3
- 1uA shutdown current
- 2.7V to 6V input range (1Li+ and 3-cell NiCd or NiMH cells)
- 1.35V to 4.5V* output voltage
- Programmable PWM/$\overline{PSM}$ controls
- Low output ripple
- BGA/LGA construction
- Temperature range: - 40°C to + 85°C
- No external components needed
- Output power 3W
- Maximum current 1.0A
- Low profile

*Note: For higher output voltage please consult factory at FunctionPAK@Vishay.com

The DC/DC converter provides fully integrated synchronous buck converter solution for the latest one-cell lithium ion cellular phones. Its input voltage is between 2.7V to 6V, capable of delivering up to 1000mA of output current at 1.5V to 3.6V. The DC/DC converter combines the 2MHz-switching controller with fully integrated passive components needed to deliver the smallest and most efficient converter available today. The high switching frequency minimizes the output capacitance with peak to peak output ripple as low as 25mV. The DC/DC converter delivers efficiency up to 95%.

The programmable pulse-skipping mode (PSM) maintains this high efficiency even during the standby and idle modes to increase overall battery life and talktime. In order to extract the last ounce of power from the battery, the DC/DC converter is designed with 100% duty cycle control for this mode. This function enables the DC/DC converter to operate like a saturated linear regulator delivering the highest potential output voltage for longer talk time.

The DC/DC converter is available in 20-ports BGA package. In order to satisfy the stringent ambient temperature requirements, the DC/DC converter is designed to handle the industrial temperature range of - 40°C to + 85°C.

APPLICATION

- Point of Load (POL) applications such as drivers for FPGA's, microprocessors, DSP's amplifiers, etc.
- Cordless phones, PDAs and others
- Supply voltage source for low-voltage chip sets
- Portable computers
- Battery back-up supplies
- Cameras
- Routers
- Fiber optics
- LANS
- Image processing

ORDERING INFORMATION

FX	5545	G201	☐☐☐	☐☐

FUNCTION

SIZE

CIRCUIT IDENTIFIER

OUTPUT VOLTAGE-Example: 2.7V should be written as 2V7 as the V indicates the decimal point, or ADJ for adjustable version - self selectable output voltage.

PACKAGING-B1 = 10pcs in bulk; B5 = 50pcs in bulk; T1 = 13" reel; T2 = 7" reel.

Document Number: 10104
Revision 14-Jun-04

For technical questions, contact FunctionPAK@vishay.com
For marketing questions, contact FunctionPAK.marketing@vishay.com

www.vishay.com
31

DIMENSIONS in inches [millimeters]

L	0.58 ± 0.01 [14.7 ± 0.25]
W	0.48 ± 0.01 [12.2 ± 0.25]
A	0.1 ± 0.01 [2.54 ± 0.25]
B	0.09 ± 0.01 [2.29 ± 0.25]
C	0.09 ± 0.01 [2.27 ± 0.25]
T	0.12 max [3 max]
Ball Diameter	0.03 ± 0.001 [0.762 ± 0.025]
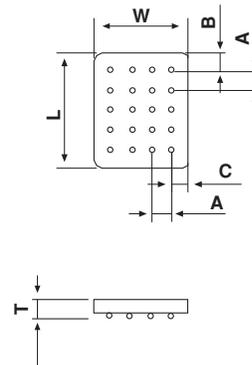
BOTTOM SIDE
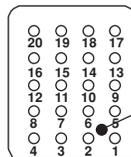
Marked on Upper Side

*Note: Pin Description application note is available on page 52.

PIN CONFIGURATION*

PIN	CONNECTION
1, 2	$\overline{SD}$
3, 7	SYNC
4, 8	N/C
5, 9	Vin
6, 10	PWM/$\overline{PSM}$
11, 12	N/C
13, 17	GND
14, 18	Vout
15, 19	N/C
16, 20	GND

RECOMMENDED PAD PATTERN in inches [millimeters]

A	D	F
0.1 ± 0.01 [2.54 ± 0.25]	0.03 ± 0.001 [0.8 ± 0.02]	0.02 ± 0.001 [0.5 ± 0.02]
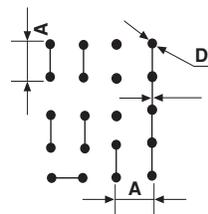
TAPE AND REEL

See Tape and Reel Information - Type B

www.vishay.com
32

For technical questions, contact FunctionPAK@vishay.com
For marketing questions, contact FunctionPAK.marketing@vishay.com

Document Number: 10104
Revision 14-Jun-04

STANDARD ELECTRICAL SPECIFICATIONS

| PARAMETER	UNIT	CONDITION	MIN	TYP	MAX
Input					
Voltage Range	V_{DC}		2.7		6
Quiescent Current	μA	$\overline{PSM}$ mode		200	
Soft Start Time	ms	T_{ss}		5	
SD, PWM/PSM, SYNC					
Logic High	V	V_H	2.4		
Logic Low	V	V_L			0.8
Normal Mode	μA	I_{DD}			750
PSM Mode	μA	I_{DD}			250
Shutdown Mode	μA	I_{DD}			1
Shutdown Time	ms	T_{SS}		9	
Insulation					
Test Voltage	V_{AC}	60Hz 60sec	750		
Resistance	Ω	$V_{ISO} = 500V_{DC}$	1×10^{11}		
Leakage Current	nA	$V_{ISO} = 500V_{DC}$			5
Output					
Power	W			3	
Voltage	V_{DC}			1.35 to 4.5	
Voltage Tolerance	%	at 25°C Ambient Temperature	- 3		3
Temp. Coefficient	%/°C				0.03
Ripple and Noise	mVpp	DC to 20MHz		35	
General					
Package Weight	gr.				1.3
Oscillator					
Frequency	MHz			2	
SYNC Range		F_{SYNC}/F_{OSC}	1.2		1.5
Temperature					
Operation	°C		- 40		+ 85
Storage	°C		- 55		+ 125
Operating Junction Temp.	°C	T_j		150	
Thermal Impedance	°C/W_D*	θ_{JA}		82	

Note: W_D = Power Dissipated

Rise Time
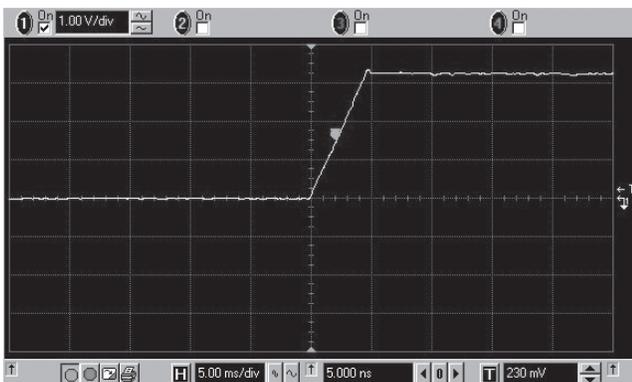
Rise Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 1A

Fall Time

**Fall Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 1A**

Document Number: 10104
Revision 14-Jun-04

For technical questions, contact FunctionPAK@vishay.com
For marketing questions, contact FunctionPAK.marketing@vishay.com

www.vishay.com
33
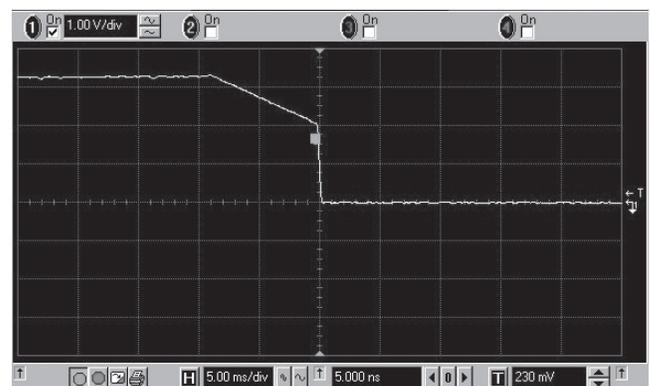
PWM MODE

Vout Vs. Iout*
Vin = 3.6V
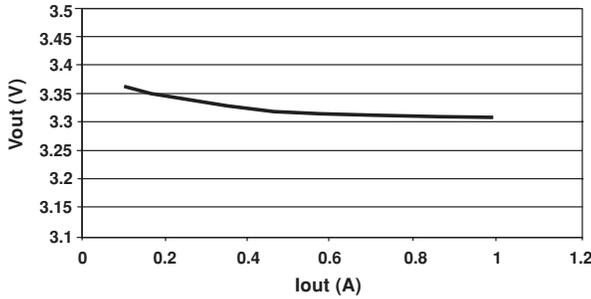
Vout Vs. Vin*
Iout = 600mA
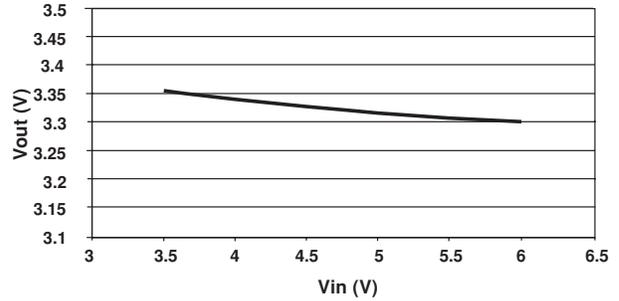
Δ Temp. Vs. Iout*
Above 25°C Ambient Temperature
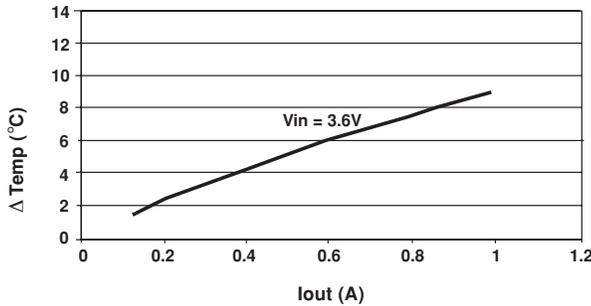
Vin = 3.6V

Efficiency Vs. Iout*
Vin = 3.6V; Vout = 3.3V
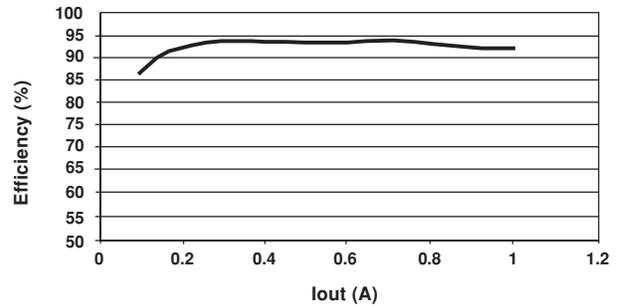
PSM MODE

Vout Vs. Vin*
Iout = 0.05A
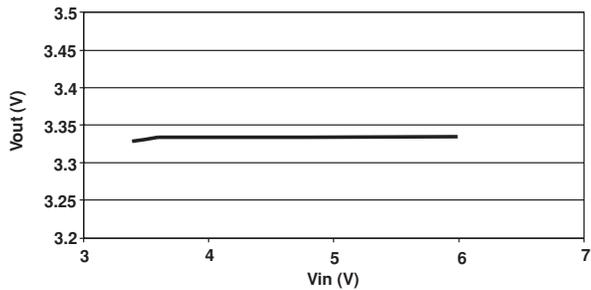
Vout Vs. Iout*
Vin = 6V

Efficiency Vs. Iout*

Vin = 4V
Vin = 6V
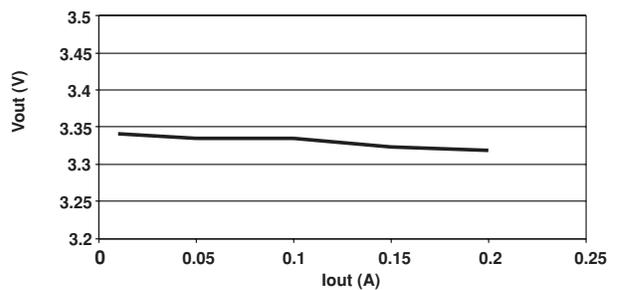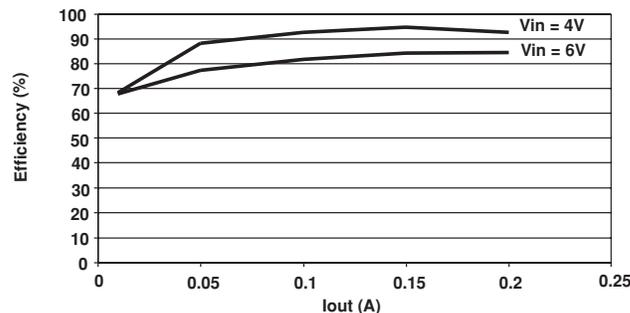
*Note: Measurements were taken with Power supply: ZUP 20-40 from Nemic Lambda; Electronic load: 6063B from Agilent; Multimeter: Fluke 45 from Fluke and 34401 digital multimeter from Agilent; Scope: Infiniium 54815A from Agilent

www.vishay.com
34

For technical questions, contact FunctionPAK@vishay.com
For marketing questions, contact FunctionPAK.marketing@vishay.com

Document Number: 10104
Revision 14-Jun-04