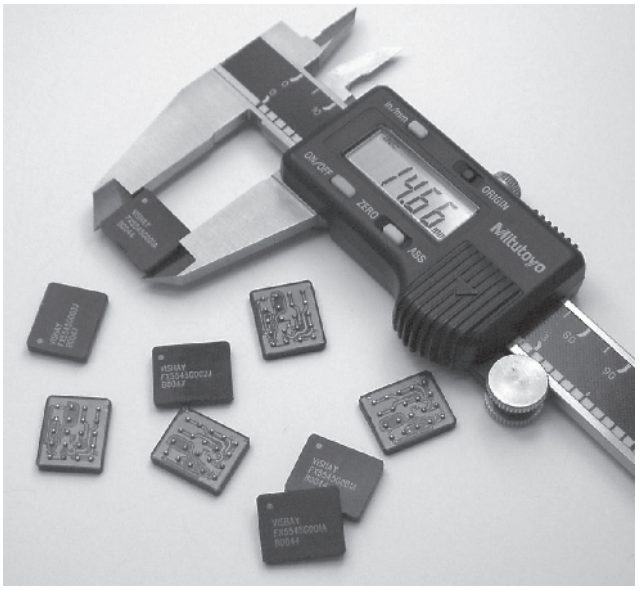
The Smallest and Low Profile 0.9V to 4.5V*, 4A with 570W/in^3 Power Density Efficiency up to 95% DC/DC Buck Converter



FEATURES

- Fully integrated DC/DC converter
- High efficiency over large load range
- 100% duty cycle
- Power density - more than 570W/inch^3
- 1uA shutdown current
- 2.5V to 6V input range (1Li+ and 3-cell NiCd or NiMH cells)
- 0.9V to 4.5V* output voltage
- Programmable PWM/$\overline{\text{PSM}}$ controls
- Low output ripple
- BGA construction
- Temperature range: - 40°C to + 85°C
- No external components required
- Output power 15W
- Maximum current 4A
- Low profile

The DC/DC converter is a programmable topology synchronized Buck converter for today's continuous changing portable electronic market. The DC/DC converter provides flexibility of utilizing various battery configurations and chemistries such as NiCd, NiMH, or Li+ with an input voltage range of 2.5V to 6V. An additional flexibility is provided with topology programmability to power multiple loads such as power amplifiers, microcontrollers, or baseband logic IC's. For ultra-high efficiency, converters are designed to operate in sychronous rectified PWM mode under full load while transforming into externally controlled pulse-skipping mode (PSM) under light load.
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.

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

APPLICATIONS

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

ORDERING INFORMATION

FX **5545** **G108** □□□ □□

FUNCTION

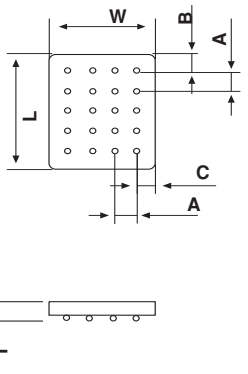
SIZE

CIRCUIT IDENTIFIER

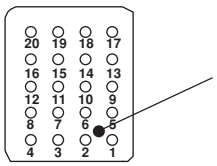
OUTPUT VOLTAGE - Example: 3.3V should be written as 3V3 as the V indicates the decimal point, or ADJ for adjustable version - self selectable output voltage.

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

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	0.126 max [3.2 max]
Ball Diameter	0.03 ± 0.001 [0.762 ± 0.025]



BOTTOM SIDE



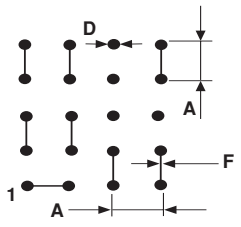
Note:

*Pin Description application note is available on page 52.

**If not used must be connected to Vin.

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

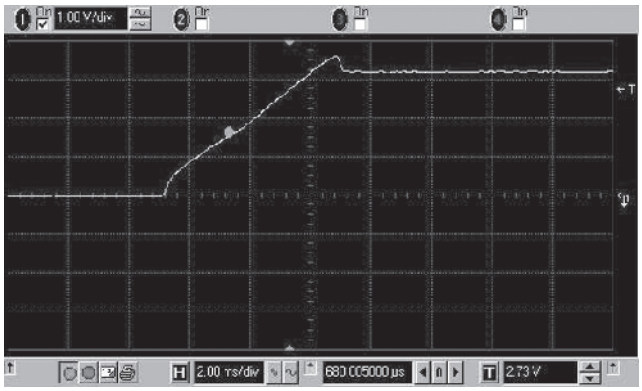
See Tape and Reel Information - Type B

STANDARD ELECTRICAL SPECIFICATIONS

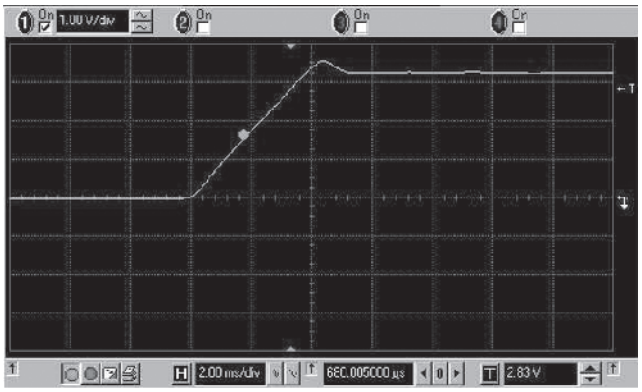
PARAMETER	UNIT	CONDITION	MINIMUM	TYPICAL	MAXIMUM
Input					
Voltage Range	V_{DC}		2.5		6
Quiescent Current	μA	$\overline{PSM}$ mode		200	
Soft Start Time	ms	T_{SS}		6	
SD, PWM/$\overline{PSM}$, SYNC					
Logic High	V	V_H	2.4		
Logic Low	V	V_L			0.8
Normal Mode	μA	I_{DD}			750
$\overline{PSM}$ Mode	μA	I_{DD}			250
Shutdown Mode	μA	I_{DD}			1
Shutdown Time	ms	T_{SS}		5.5	
Insulation					
Test Voltage	V_{AC}	60Hz 60sec	750		
Resistance	Ω	V_{ISO} = 500V_{DC}	1 x 10^{11}		
Leakage Current	nA	V_{ISO} = 500V_{DC}			5
Output					
Power	W			15	
Voltage	V_{DC}			0.9 to 4.5	
Voltage Tolerance	%	at 25°C Ambient Temperature	- 3		+ 3
Temp. Coefficient	%/°C				0.03
Ripple and Noise	mVpp	DC to 20MHz		80	
General					
Package Weight	gr.				1.4
Oscillator					
Frequency	KHz			400	
SYNC Range		F_{SYNC}/F_{OSC}	1.2		1.5
Temperature					
Operation	°C		- 40		+ 85
Storage	°C		- 55		+ 125
Operating Junction Temp.	°C	Tj		150	
Thermal Impedance	°C/W_D*	θ_{JA}		82	

Note:
*W_D = Power Dissipated

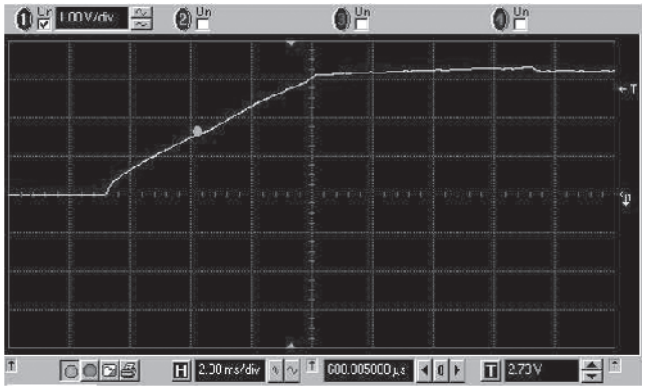
Rise Time



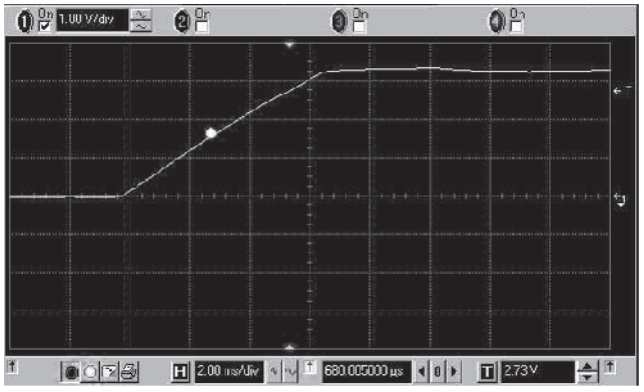
Rise Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 4A



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

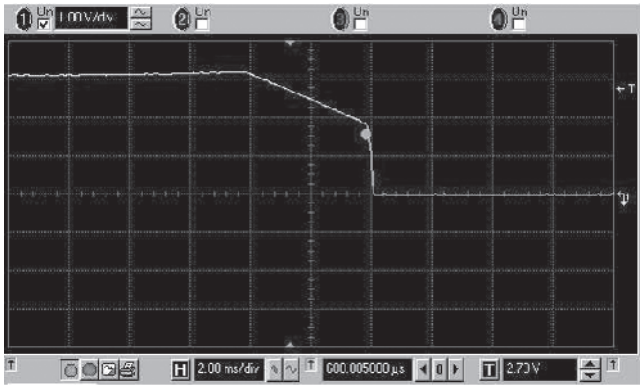


Rise Time (PWM mode): Vin = 4V; Vout = 3.3V; Iout = 4A

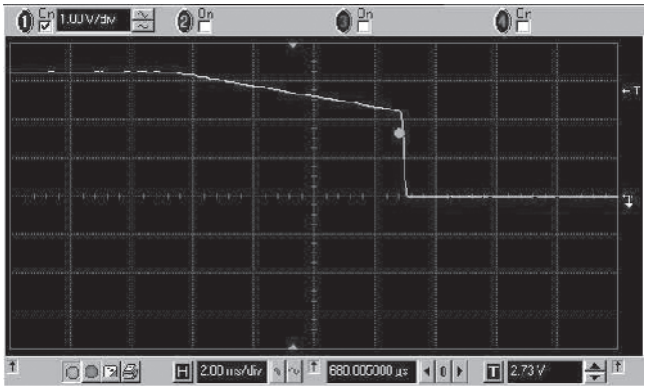


Rise Time (PWM mode): Vin = 4V; Vout = 3.3V; Iout = 1A

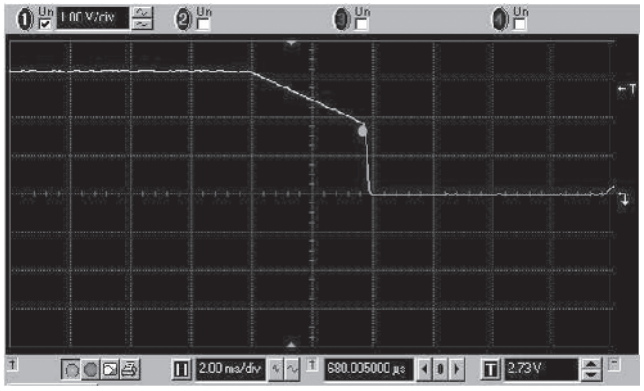
Fall Time



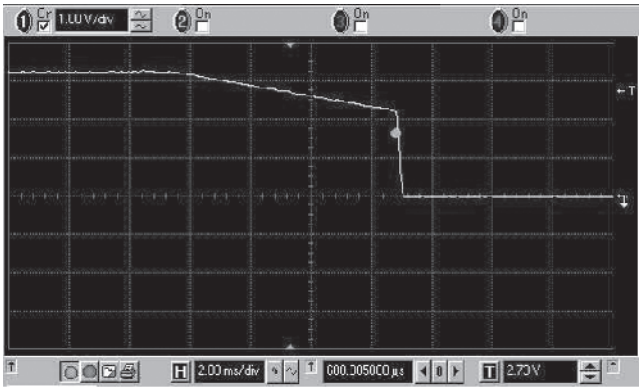
Fall Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 4A



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



Fall Time (PWM mode): Vin = 4V; Vout = 3.3V; Iout = 4A



Fall Time (PWM mode): Vin = 4V; Vout = 3.3V; Iout = 1A

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

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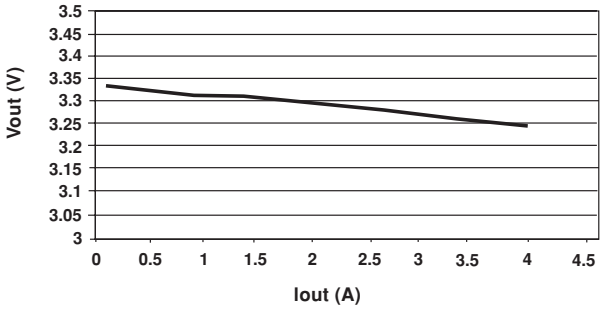
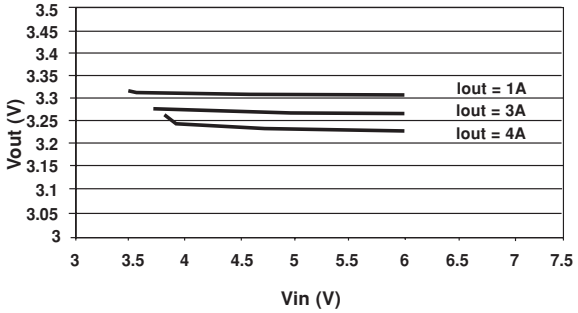
PWM MODE

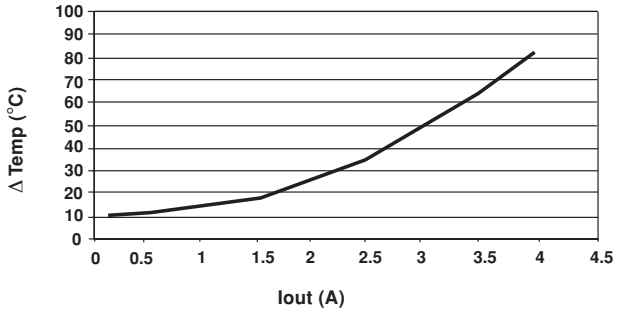
Vout Vs. Iout*
Vin = 4V



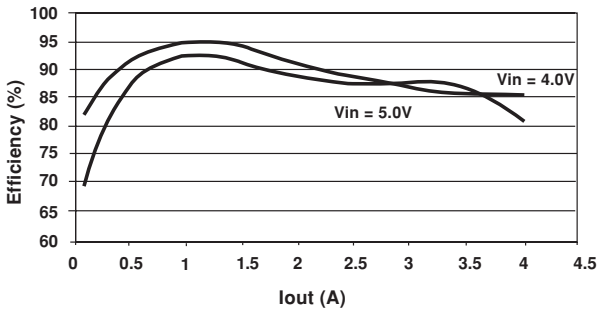
Vout Vs. Vin*



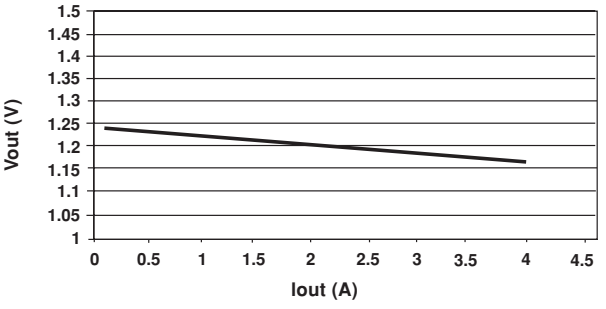
Δ Temp. Vs. Iout*
Above 25°C Ambient Temperature;
Vin = 6.0V; Vout = 3.3V



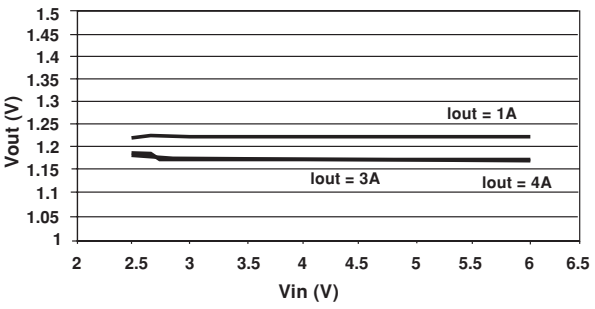
Efficiency Vs. Iout*
Vout = 3.3V



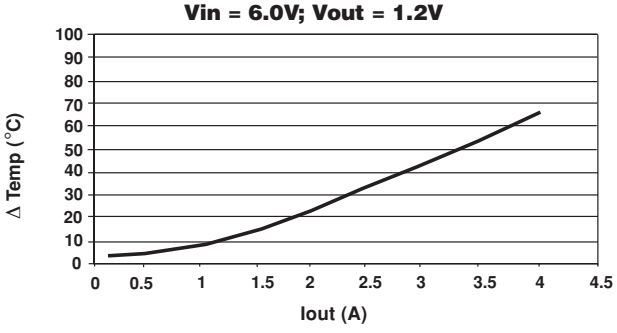
Vout Vs. Iout*
Vin = 4V



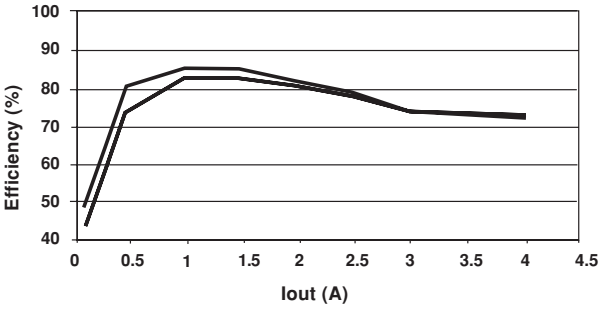
Vout Vs. Vin*



Δ Temp. Vs. Iout*
Above 25°C Ambient Temperature;
Vin = 6.0V; Vout = 1.2V



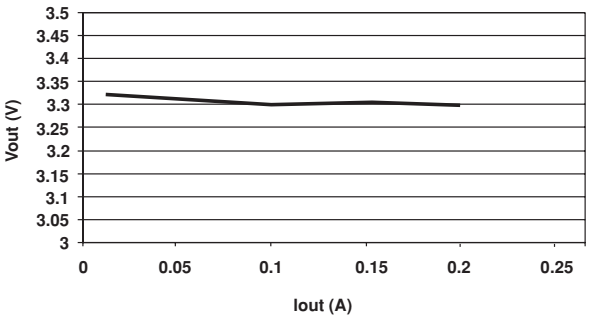
Efficiency Vs. Iout*
Vout = 1.2V



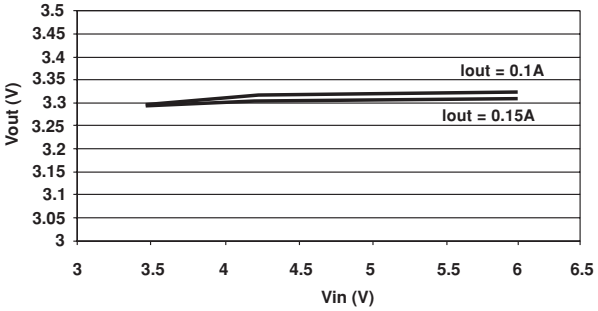
*Note: Measurements were taken with Power supply: ZUP 20-40 from Nemic Lambda; Electronic load: 6063B from Agilent; Multimeter: Fluke 45 from Fluke and 34401 digital multimeter from Agilent; Scope: Infiniium 54815A from Agilent

PSM MODE

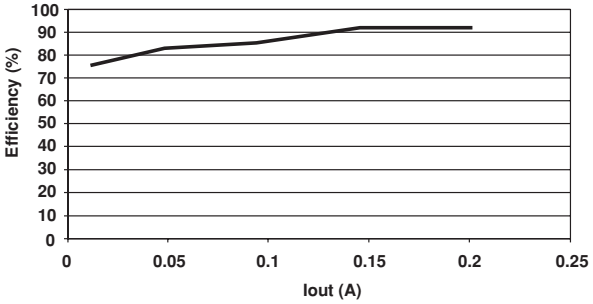
Vout Vs. Iout*
Vin = 4V



Vout Vs. Vin*



Efficiency Vs. Iout*
Vin = 4.0V; Vout = 3.3V



*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

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