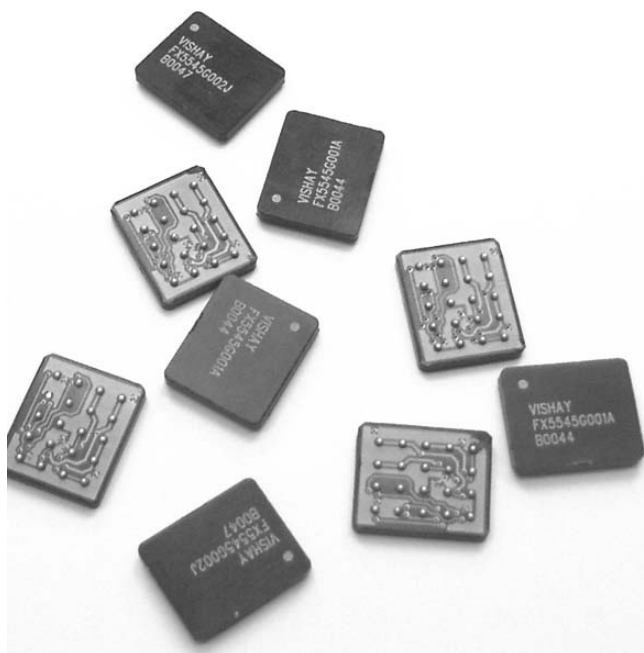


## Industry Smallest and Low Profile 5W 1.5A DC/DC Buck Converter with High Output Power Density



### FEATURES

- Fully integrated DC/DC converter
- High efficiency over large load range
- 100% duty cycle
- Power density - more than 100W/inch<sup>3</sup>
- 1μA shutdown current
- 2.7V to 6V input range (1 Li+ and 3-cell NiCd or NiMH cells)
- 1.35V to 4.5V\* output voltage
- Programmable PWM/PSM controls
- Low output ripple
- BGA/LGA construction
- Temperature range: - 40°C to + 85°C
- Output power 5W
- Maximum current 1.5A
- No external components needed
- Low profile

**\*Note:** For higher output voltage please consult factory at [FunctionPAK@Vishay.com](mailto:FunctionPAK@Vishay.com)

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 2.7V 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 synchronous 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/LGA 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.

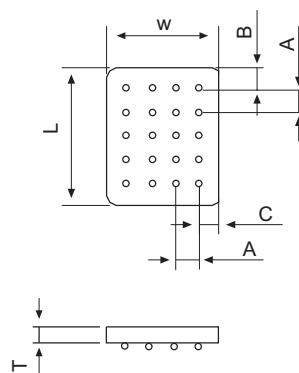
### APPLICATION

- 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

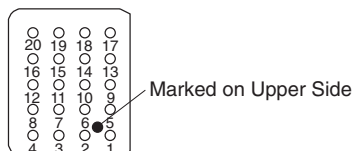
### ORDERING INFORMATION

|                                                                                                                                                               |    |      |      |                          |                          |                          |                          |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| FUNCTION                                                                                                                                                      | FX | 5545 | G005 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 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.                                                                              |    |      |      |                          |                          |                          |                          |                          |
| For lead (Pb)-free solder please add E2 suffix.                                                                                                               |    |      |      |                          |                          |                          |                          |                          |

| DIMENSIONS in inches [millimeters] |                                 |
|------------------------------------|---------------------------------|
| L                                  | 0.58 ± 0.01<br>[14.7 ± 0.25]    |
| W                                  | 0.48 ± 0.01<br>[12.2 ± 0.25]    |
| A                                  | 0.1 ± 0.01<br>[2.54 ± 0.25]     |
| B                                  | 0.09 ± 0.01<br>[2.29 ± 0.25]    |
| C                                  | 0.09 ± 0.01<br>[2.27 ± 0.25]    |
| T                                  | 0.12 max<br>[3 max]             |
| Ball Diameter                      | 0.03 ± 0.001<br>[0.762 ± 0.025] |



## BOTTOM SIDE



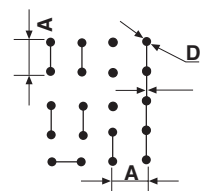
\*Note: Pin Description application note is available at [www.vishay.com/doc?10119](http://www.vishay.com/doc?10119)

\*\*Note: 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/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<br>[2.54 ± 0.25]                     | 0.03 ± 0.001<br>[0.8 ± 0.02] | 0.02 ± 0.001<br>[0.5 ± 0.02] |



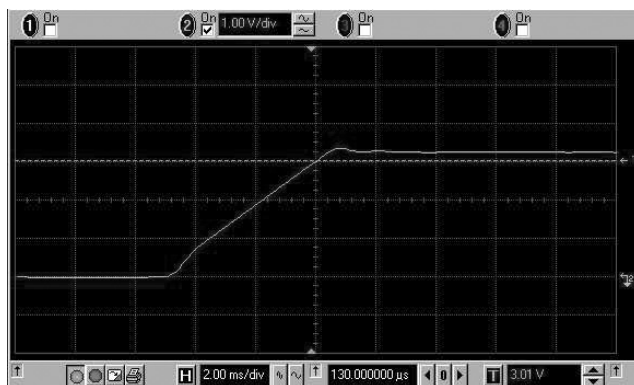
## TAPE AND REEL

See Tape and Reel Information - Type B

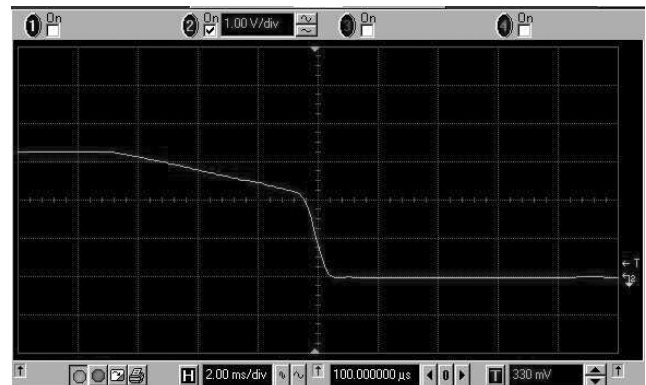
**STANDARD ELECTRICAL SPECIFICATIONS**

| PARAMETER                | UNIT                | CONDITION                              | MIN                  | TYP         | MAX   |
|--------------------------|---------------------|----------------------------------------|----------------------|-------------|-------|
| <b>Input</b>             |                     |                                        |                      |             |       |
| Voltage Range            | V <sub>DC</sub>     |                                        | 2.7                  |             | 6     |
| Quiescent Current        | μA                  | PSM mode                               |                      | 200         |       |
| Soft Start Time          | ms                  | T <sub>SS</sub>                        |                      | 4.3         |       |
| <b>SD, PWM/PSM, SYNC</b> |                     |                                        |                      |             |       |
| Logic High               | V                   | V <sub>H</sub>                         | 2.4                  |             |       |
| Logic Low                | V                   | V <sub>L</sub>                         |                      |             | 0.8   |
| Normal Mode              | μA                  | I <sub>DD</sub>                        |                      |             | 750   |
| PSM Mode                 | μA                  | I <sub>DD</sub>                        |                      |             | 250   |
| Shutdown Mode            | μA                  | I <sub>DD</sub>                        |                      |             | 1     |
| Shutdown Time            | ms                  | T <sub>SS</sub>                        |                      | 5           |       |
| <b>Insulation</b>        |                     |                                        |                      |             |       |
| Test Voltage             | V <sub>AC</sub>     | 60Hz 60sec                             | 750                  |             |       |
| Resistance               | Ω                   | V <sub>ISO</sub> = 500 V <sub>DC</sub> | 1 x 10 <sup>11</sup> |             |       |
| Leakage Current          | nA                  | V <sub>ISO</sub> = 500 V <sub>DC</sub> |                      |             | 5     |
| <b>Output</b>            |                     |                                        |                      |             |       |
| Power                    | W                   |                                        |                      | 5           |       |
| Voltage                  | V <sub>DC</sub>     |                                        |                      | 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 20 MHz                           |                      | 100         |       |
| <b>General</b>           |                     |                                        |                      |             |       |
| Package Weight           | gr.                 |                                        |                      |             | 1.4   |
| <b>Oscillator</b>        |                     |                                        |                      |             |       |
| Frequency                | KHz                 |                                        |                      | 670         |       |
| SYNC Range               |                     | F <sub>SYNC</sub> /F <sub>OSC</sub>    | 1.2                  |             | 1.5   |
| <b>Temperature</b>       |                     |                                        |                      |             |       |
| Operation                | °C                  |                                        | - 40                 |             | + 85  |
| Storage                  | °C                  |                                        | - 55                 |             | + 125 |
| Operating Junction Temp. | °C                  | T <sub>j</sub>                         |                      | 150         |       |
| Thermal Impedance        | °C/W <sub>D</sub> * | θ <sub>JA</sub>                        |                      | 82          |       |

\*Note: W<sub>D</sub> = Power Dissipated

**Rise Time**

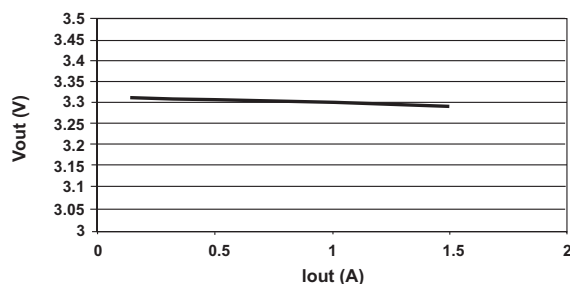
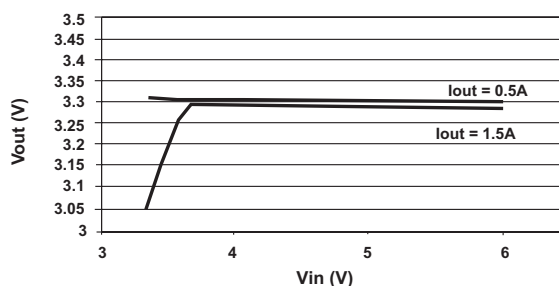
Rise Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 1.5A

**Fall Time**

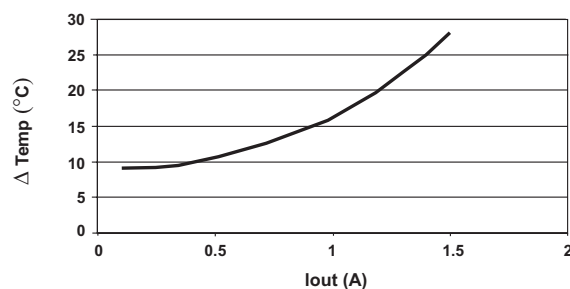
Fall Time (PWM mode): Vin = 6V; Vout = 3.3V; Iout = 1.5A

**PWM MODE****Vout Vs. Iout\***

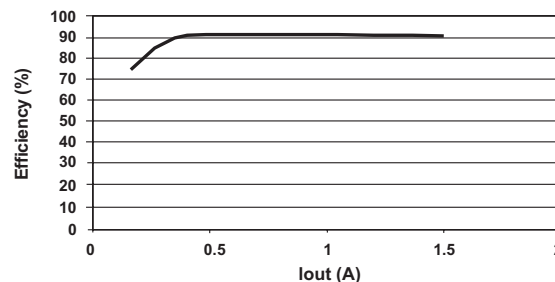
Vin = 3.6V

**Vout Vs. Vin\*****Δ Temp. Vs. Iout\***

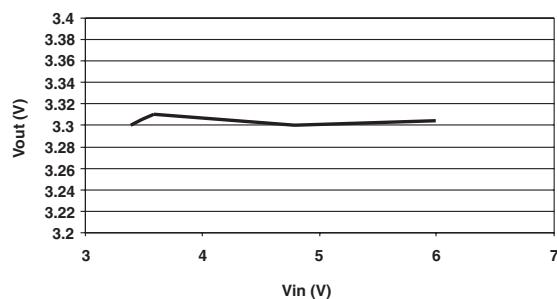
Above 25°C Ambient Temperature: For Vout = 3.3V; Vin = 6V

**Efficiency Vs. Iout\***

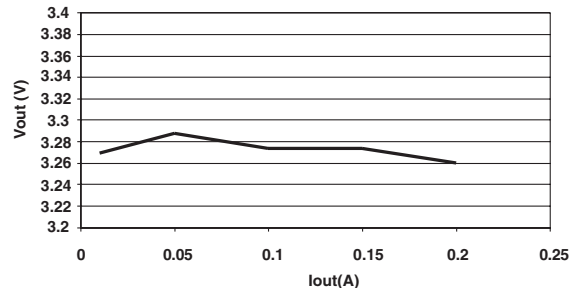
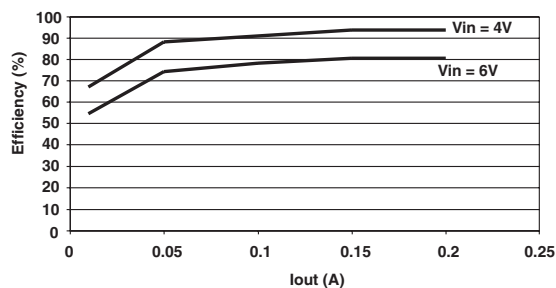
Vout = 3.3V; Vin = 3.6V

**PSM MODE****Vout Vs. Vin\***

Iout = 0.1A

**Vout Vs. Iout\***

Vin = 6V

**Efficiency Vs. Iout\***

\*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.