



## LIMITED DATASHEET

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to request the full datasheet.



# FAN53525 3.0A, 2.4MHz, Digitally Programmable TinyBuck® Regulator

## Features

- Fixed-Frequency Operation: 2.4 MHz
- Best-in-Class Load Transient
- Continuous Output Current Capability: 3.0 A
- 2.5 V to 5.5 V Input Voltage Range
- Digitally Programmable Output Voltage:
  - 0.600 V to 1.39375 V in 6.25 mV Steps
- Programmable Slew Rate for Voltage Transitions
- I<sup>2</sup>C-Compatible Interface Up to 3.4 Mbps
- PFM Mode for High Efficiency in Light Load
- Quiescent Current in PFM Mode: 50  $\mu$ A (Typical)
- Input Under-Voltage Lockout (UVLO)
- Thermal Shutdown and Overload Protection
- 15-Bump Wafer-Level Chip Scale Package (WLCSP)

## Applications

- Application, Graphic, and DSP Processors
  - ARM™, Tegra™, OMAP™, NovaThor™, ARMADA™, Krait™, etc.
- Hard Disk Drives, LPDDR3
- Tablets, Netbooks, Ultra-Mobile PCs
- Smart Phones
- Gaming Devices

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## Description

The FAN53525 is a step-down switching voltage regulator that delivers a digitally programmable output from an input voltage supply of 2.5 V to 5.5 V. The output voltage is programmed through an I<sup>2</sup>C interface capable of operating up to 3.4 MHz.

Using a proprietary architecture with synchronous rectification, the FAN53525 is capable of delivering 3.0 A continuous at over 80% efficiency, maintaining that efficiency at load currents as low as 10 mA. The regulator operates at a nominal fixed frequency of 2.4 MHz, which reduces the value of the external components to 330 nH for the output inductor and as low as 20  $\mu$ F for the output capacitor. Additional output capacitance can be added to improve regulation during load transients without affecting stability, allowing inductance up to 1.2  $\mu$ H to be used.

At moderate and light loads, Pulse Frequency Modulation (PFM) is used to operate in Power-Save Mode with a typical quiescent current of 50  $\mu$ A at room temperature. Even with such a low quiescent current, the part exhibits excellent transient response during large load swings. At higher loads, the system automatically switches to fixed-frequency control, operating at 2.4 MHz. In Shutdown Mode, the supply current drops below 1  $\mu$ A, reducing power consumption. PFM Mode can be disabled if fixed frequency is desired. The FAN53525 is available in a 15-bump, 1.310 mm x 2.015 mm, 0.4 mm ball pitch WLCSP.

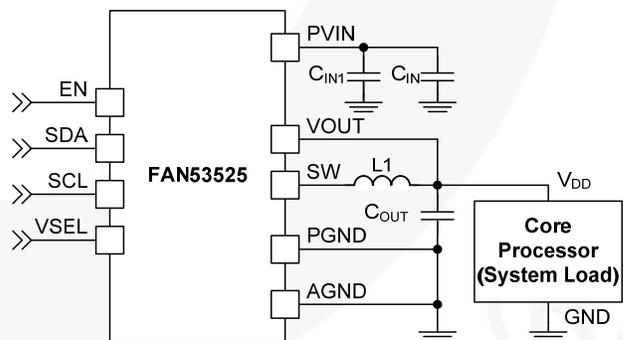


Figure 1. Typical Application

## Ordering Information

Part Number	Power-Up Defaults		DVS Range / Step Size	Max. RMS Current	Temperature Range	Package	Packing Method
	VSEL0	VSEL1					
FAN53525UC96X	1.20	1.225	0.600 V to 1.39375 V / 6.25 mV	3.0 A	-40 to 85°C	WLCSP	Tape & Reel
FAN53525UC48X	0.9	1.225	0.600 V to 1.39375 V / 6.25 mV	3.0 A	-40 to 85°C	WLCSP	Tape & Reel

## Recommended External Components

**Table 1. Recommended External Components for 3.0 A Maximum Load Current**

Component	Description	Vendor	Parameter	Typ.	Unit
L1	470 or 330 nH, 2016 Case Size	See Table 2			
C <sub>OUT</sub>	22 μF, 6.3 V, X5R, 0603	C1608X5R0J226M (TDK)	C	22	μF
C <sub>IN</sub>	1 Piece; 4.7 μF, 10 V, X5R, 0603	C1608X5R1A475K(TDK)	C	4.7	

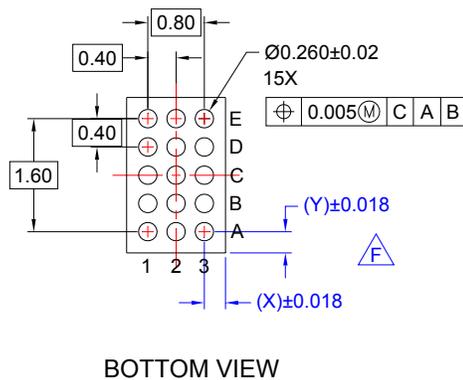
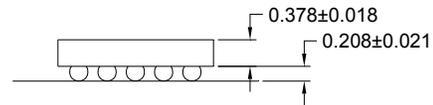
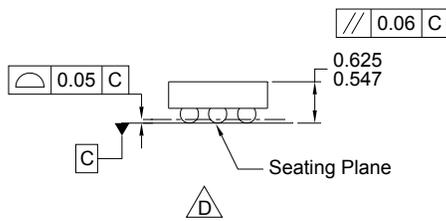
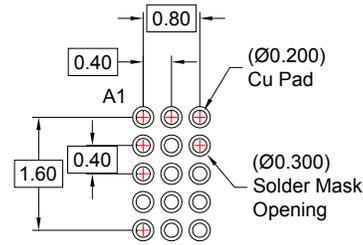
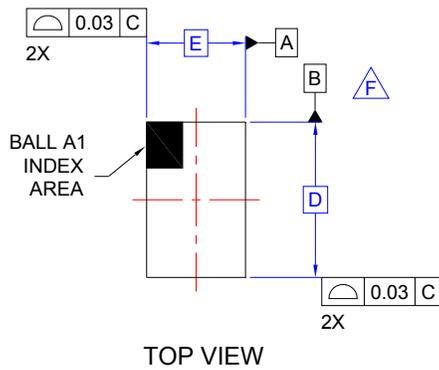
**Table 2. Recommended Inductors**

Manufacturer	Part#	L (nH)	DCR (mΩ Typ.)	I <sub>MAXDC</sub> <sup>(1)</sup>	Component Dimensions		
					L	W	H
Toko	DFR201612 C-R33N	330	23	4.2	2.0	1.6	1.2
Toko	DFE201612 C-R47N	470	40	3.2	2.0	1.6	1.2
Cyntek	PIFE20161B-R47MS-39	470	30	3.1	2.0	1.6	1.2
SEMCO	CIGT201610UMR47MNE	470	30	4.0	2.0	1.6	0.9
SEMCO	CIGT201210UMR47MNE	470	33	3.0	2.0	1.2	0.9

**Note:**

1. I<sub>MAXDC</sub> is the lesser current to produce 40°C temperature rise or 30% inductance roll-off.

## Physical Dimensions



### NOTES

- A. NO JEDEC REGISTRATION APPLIES.
- B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS AND TOLERANCE PER ASME Y14.5 - 2009.
- D. DATUM C IS DEFINED BY THE SPHERICAL CROWNS OF THE BALLS.
- E. PACKAGE NOMINAL HEIGHT IS  $586 \pm 39$  MICRONS (547-625 MICRONS).
- F. FOR DIMENSIONS D, E, X, AND Y SEE PRODUCT DATASHEET.
- G. DRAWING FILNAME: MKT-UC015AB Rev1

Figure 39. 15-Ball, Wafer-Level Chip-Scale Package (WLCSP), 3x5 Array, 0.4 mm Pitch, 250 µm Ball

## Product-Specific Dimensions

D	E	X	Y
2.015 ±0.03 mm	1.310 ±0.03 mm	0.255 mm	0.2075 mm

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| AX-CAP®*                 | FRFET®   | PowerTrench®                          | TinyBoost®       |
| BitSiC™                  | Global Power Resource™                         | PowerXS™                              | TinyBuck®        |
| Build it Now™            | GreenBridge™                                   | Programmable Active Droop™            | TinyCalc™        |
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| CorePOWER™               | Green FPS™ e-Series™                           | QS™                                   | TINYOPTO™        |
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| ESBC™                    | MicroFET™                                      | Solutions for Your Success™           |                  |
|                          | MicroPak™                                      | SPM®                                  | UHC®             |
| Fairchild                | MicroPak2™                                     | STEALTH™                              | Ultra FRFET™     |
| Fairchild Semiconductor® | MillerDrive™                                   | SuperFET®                             | UniFET™          |
| FACT Quiet Series™       | MotionMax™                                     | SuperSOT™-3                           | VCX™             |
| FACT®                    | mWSaver®                                       | SuperSOT™-6                           | VisualMax™       |
| FAST®                    | OptoHiT™                                       | SuperSOT™-8                           | VoltagePlus™     |
| FastvCore™               | OPTOLOGIC®                                     | SupreMOS®                             | XS™              |
| FETBench™                | OPTOPLANAR®                                    | SyncFET™                              | 仙童™              |
| FPS™                     |  | Sync-Lock™                            |                  |

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