





# 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 µA (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

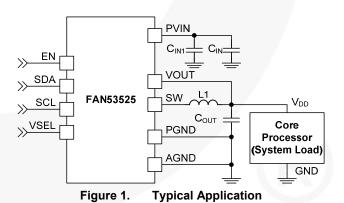
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### Description

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  $\rm I^2C$  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.



# **Ordering Information**

Part Number	Power-Up Defaults		DVS Range	Max. RMS	Temperature	Package	Packing	
Fait Number	VSEL0	VSEL1	/ Step Size	Current	Range	Package	Method	
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	Тур.	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)	С	22		
C <sub>IN</sub>	1 Piece; 4.7 μF, 10 V, X5R, 0603	C1608X5R1A475K(TDK)	С	4.7	μF	

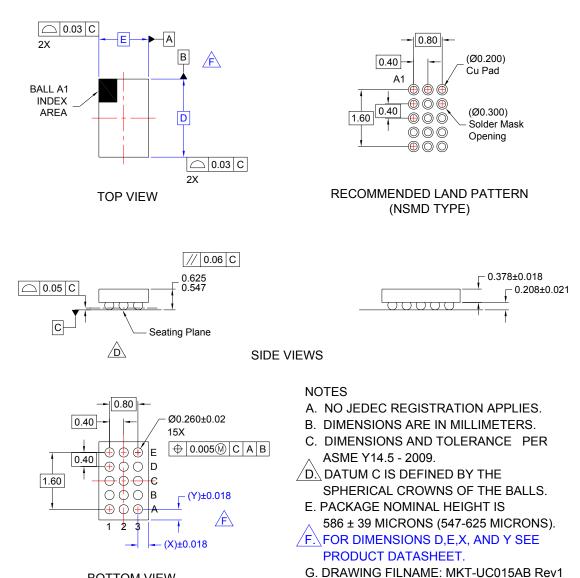
### Table 2. Recommended Inductors

						<b>Component Dimensions</b>			
Manufacturer	Part#	L (nH)	DCR (mΩ Typ.)	I <sub>MAXDC</sub> <sup>(1)</sup>	L	W	Н		
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:

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

### **Physical Dimensions**



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

### **Product-Specific Dimensions**

**BOTTOM VIEW** 

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

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Definition of Terms					
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Rev. 168