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FAIRCHILD

LIMITED DATASHEET

Email mobilepower@fairchildsemi.com to request the full datasheet.

July 2014

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^2C-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

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^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 µF 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 µH 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 µA 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 µA, 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.

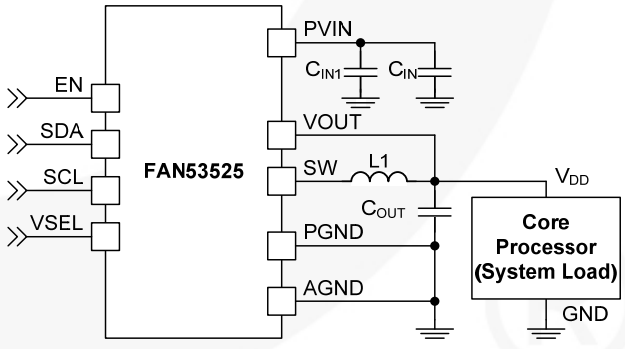


Figure 1. Typical Application

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

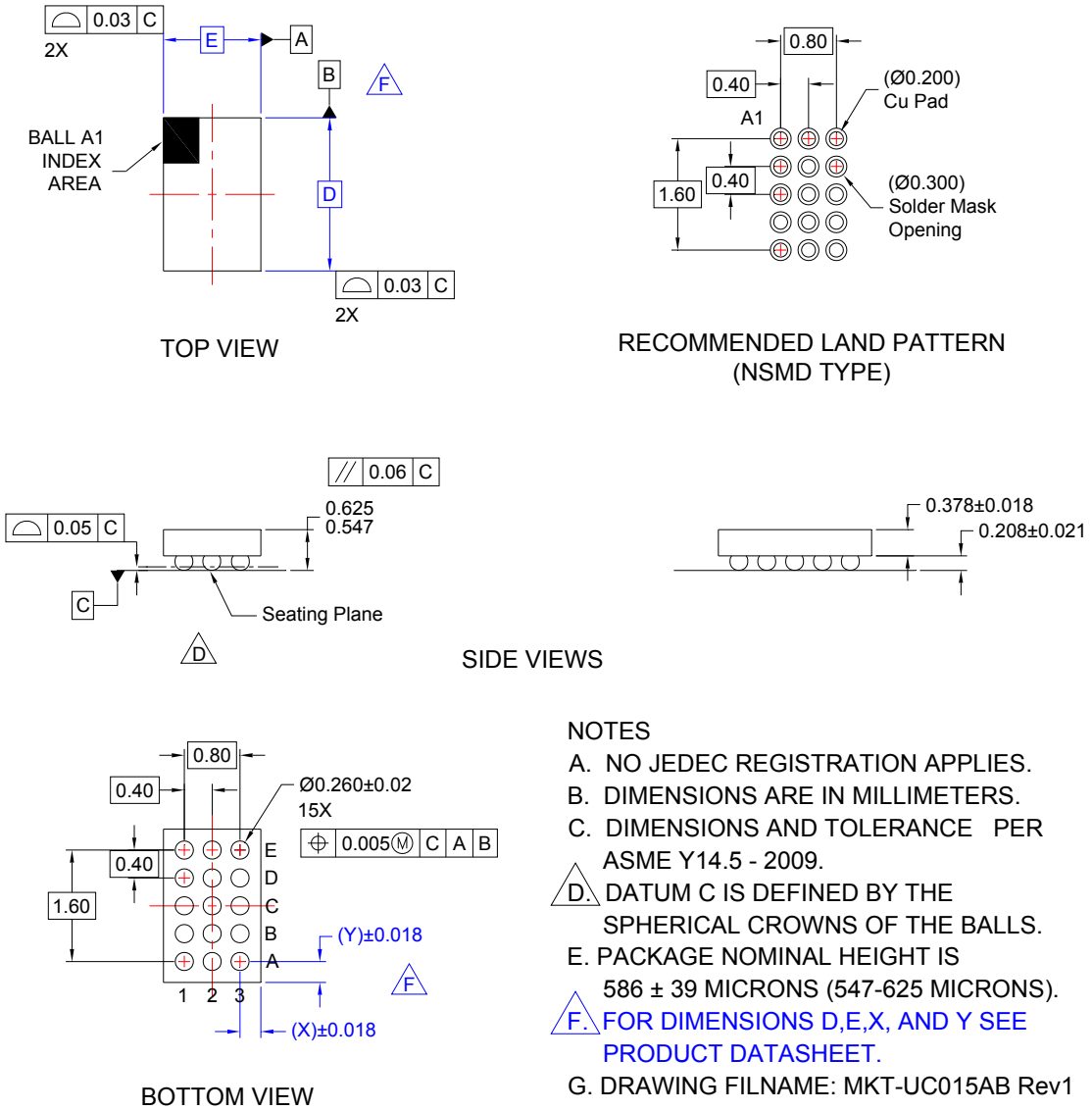
Component	Description	Vendor	Parameter	Typ.	Unit
L1	470 or 330 nH, 2016 Case Size	*See Table 2*			
C_{OUT}	22 µF, 6.3 V, X5R, 0603	C1608X5R0J226M (TDK)	C	22	µF
C_{IN}	1 Piece; 4.7 µF, 10 V, X5R, 0603	C1608X5R1A475K(TDK)	C	4.7	

Table 2. Recommended Inductors

					Component Dimensions		
Manufacturer	Part#	L (nH)	DCR (mΩ Typ.)	I_{MAXDC} (1)	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_{MAXDC} 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 ± 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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Rev. I68

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