SGM3835
Triple-Output 1A AMOLED Display Power Supply

GENERAL DESCRIPTION

The SGM3835 is designed for powering AMOLED displays which require V_{ELVDD}, V_{ELVSS} and V_{AVDD}. The device integrates two Boost converters, VO1 for V_{ELVDD} and VO3 for V_{AVDD}, and a dual-phase inverting Buck-Boost converter VO2 for V_{ELVSS}. Output voltages of all the three converters can be programmed in digital steps through the digital interface control pin (SWIRE).

The SGM3835 is available in a Green WLCSP-2.37×2.37-36B package.

FEATURES

- **2.5V to 4.8V Input Supply Voltage Range**
- **Synchronous Boost Converter (VO1 = ELVDD)**
  - **4.6V to 5.0V Output Voltage with 100mV Steps**
  - **4.6V Default Output Voltage**
  - **0.7% Accuracy at 4.6V**
  - **Output Voltage Sensing Pin for Path Loss Compensation (FBS)**
- **Synchronous Inverting Buck-Boost Converter (VO2 = ELVSS)**
  - **-6.0V to -0.8V Output Voltage with 100mV Steps**
  - **-3.0V Default Output Voltage**
  - **1% Accuracy at -3V**
- **ELVDD-ELVSS Combined Output Current Capability (V_{VO1} = 4.6V)**
  - **1A @ V_{IN} = 2.5V, V_{VO2} = -3V**
  - **1A @ V_{IN} = 2.6V, V_{VO2} = -4V**
  - **1A @ V_{IN} = 2.8V, V_{VO2} = -5V**
  - **1A @ V_{IN} = 3.1V, V_{VO2} = -6V**
- **Synchronous Boost Converter (AVDD)**
  - **5.5V to 7.9V Output Voltage with 100mV Steps**
  - **7.3V Default Output Voltage**
  - **0.8% Accuracy at 7.3V**
  - **150mA Output Current Capability**
- **V_{IN} and V_{OUT} Bi-Directional Isolation**
- **Short-Circuit Protection (SCP)**
- **Overload Protection**
- **Thermal Shutdown**
- **V_{ELVSS} Start-Up Delay: 6ms**
- **Short-Circuit and OLP Detection Time: 0.7ms**
- **Available in a Green WLCSP-2.37×2.37-36B Package**

APPLICATIONS

Smartphones & Tablets
Active Matrix OLED Displays

TYPICAL APPLICATION

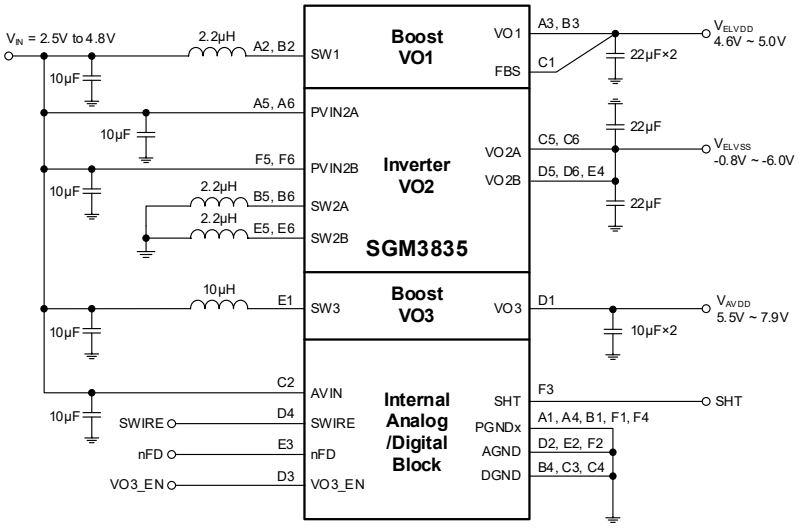


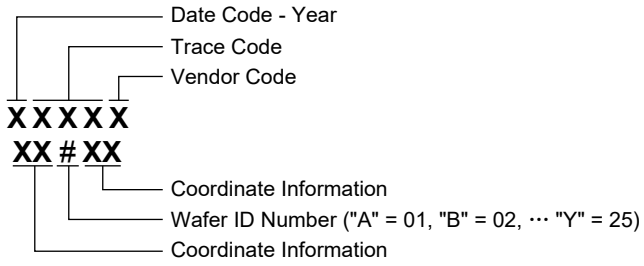
Figure 1. Typical Application Circuit

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM3835	WLCSP-2.37×2.37-36B	-40℃ to +85℃	SGM3835YG/TR	17B XXXXX XX#XX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.



Green (RoHS & HSF): SG Micro Corp defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your SGMICRO representative directly.

ABSOLUTE MAXIMUM RATINGS

Voltage Range (with Respect to Ground Pin)

PVIN2A, PVIN2B, AVIN, VO3_EN, SWIRE, nFD, VO1, FBS, SHT ..... -0.3V to 6V

SW1 ..... -0.3V to 6V

SW3, VO3 ..... -0.3V to 9V

VO2A, VO2B ..... -8V to 0.3V

SW2A, SW2B ..... -8.5V to 6V

Package Thermal Resistance

WLCSP-2.37×2.37-36B, θ_{JA} ..... 37℃/W

WLCSP-2.37×2.37-36B, θ_{JB} ..... 7.1℃/W

WLCSP-2.37×2.37-36B, θ_{JC} ..... 12.2℃/W

Junction Temperature ..... +150℃

Storage Temperature Range ..... -65℃ to +150℃

Lead Temperature (Soldering, 10s) ..... +260℃

ESD Susceptibility

HBM 2000V

CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Operating Ambient Temperature Range ..... -40℃ to +85℃

Operating Junction Temperature Range ..... -40℃ to +125℃

OVERSTRESS CAUTION

Stresses beyond those listed in Absolute Maximum Ratings may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect reliability. Functional operation of the device at any conditions beyond those indicated in the Recommended Operating Conditions section is not implied.

ESD SENSITIVITY CAUTION

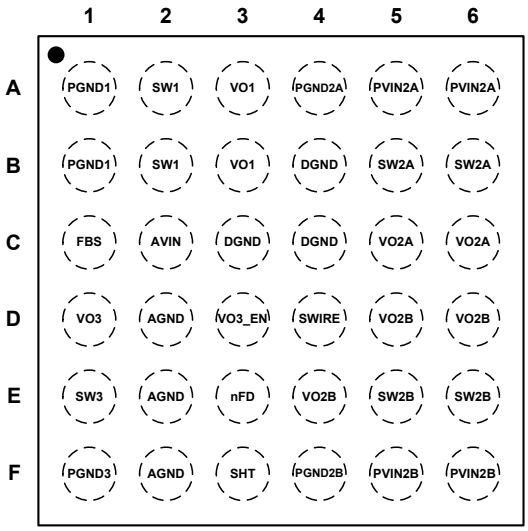
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because even small parametric changes could cause the device not to meet the published specifications.

DISCLAIMER

SG Micro Corp reserves the right to make any change in circuit design, or specifications without prior notice.

PIN CONFIGURATION

(TOP VIEW)



WLCSP-2.37×2.37-36B

PIN DESCRIPTION

PIN	NAME	TYPE	FUNCTION
A1, B1	PGND1	G	VO1 Boost Converter Power Ground.
C1	FBS	I	VO1 Boost Converter Output Sense Input. It should be connected to VO1 pin or to the far-end VO1 output capacitor.
D1	VO3	O	VO3 Boost Converter Output.
E1	SW3	I	VO3 Boost Converter Switching Node.
F1	PGND3	G	VO3 Boost Converter Power Ground.
A2, B2	SW1	I	VO1 Boost Converter Switching Node.
C2	AVIN	I	Analog Input Pin.
D2, E2, F2	AGND	G	Analog Ground Pin.
A3, B3	VO1	O	VO1 Boost Converter Output.
C3	DGND	G	Digital Ground Pin.
D3	VO3_EN	I	VO3 Boost Converter Enable Pin.
E3	nFD	I	Output Discharge Enable/Disable During Shutdown. Logic low level enables the discharge and logic high level disables the discharge.
F3	SHT	O	Fault Protection (SCP, UVLO) Status Pin.

PIN DESCRIPTION (continued)

PIN	NAME	TYPE	FUNCTION
A4	PGND2A	G	Power Ground Pin.
B4, C4	DGND	G	Digital Ground Pin.
D4	SWIRE	I	VO1/VO2 Converter Enable Pin.
E4	VO2B	O	VO2 Inverting Buck-Boost Converter B Output Pin.
F4	PGND2B	G	Power Ground Pin.
A5	PVIN2A	I	VO2 Inverting Buck-Boost Converter A Power Supply Input Pin.
B5	SW2A	I	VO2 Inverting Buck-Boost Converter A Switching Node.
C5	VO2A	O	VO2 Inverting Buck-Boost Converter A Output Pin.
D5	VO2B	O	VO2 Inverting Buck-Boost Converter B Output Pin.
E5	SW2B	I	VO2 Inverting Buck-Boost Converter B Switching Node.
F5	PVIN2B	I	VO2 Inverting Buck-Boost Converter B Power Supply Input Pin.
A6	PVIN2A	I	VO2 Inverting Buck-Boost Converter A Power Supply Input Pin.
B6	SW2A	I	VO2 Inverting Buck-Boost Converter A Switching Node.
C6	VO2A	O	VO2 Inverting Buck-Boost Converter A Output Pin.
D6	VO2B	O	VO2 Inverting Buck-Boost Converter B Output Pin.
E6	SW2B	I	VO2 Inverting Buck-Boost Converter B Switching Node.
F6	PVIN2B	I	VO2 Inverting Buck-Boost Converter B Power Supply Input Pin.

NOTE: I: input, O: output, I/O: input or output, G: ground.

FUNCTIONAL BLOCK DIAGRAM

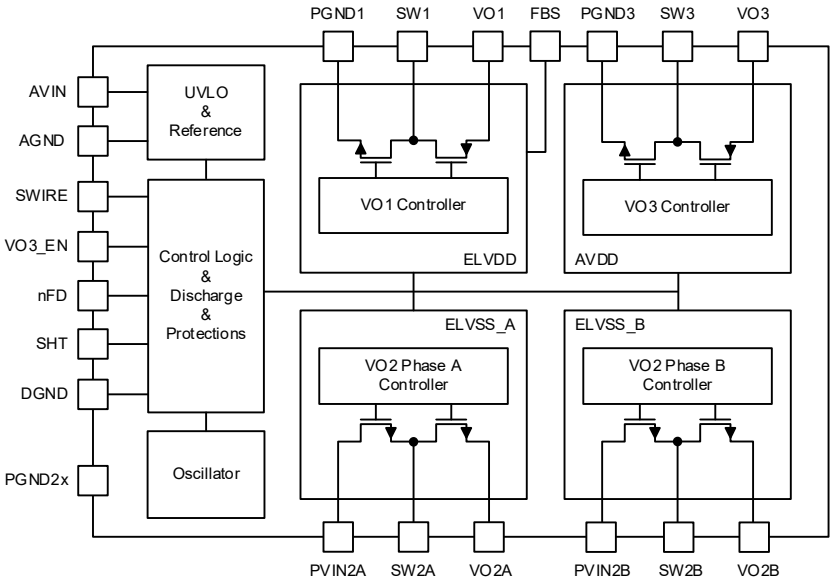


Figure 2. Functional Block Diagram

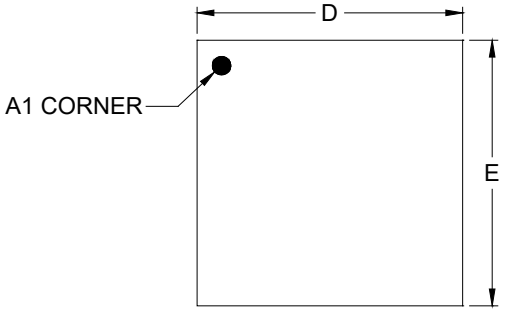
RECOMMENDED COMPONENT SELECTION

Table 1. Recommended Component Selection

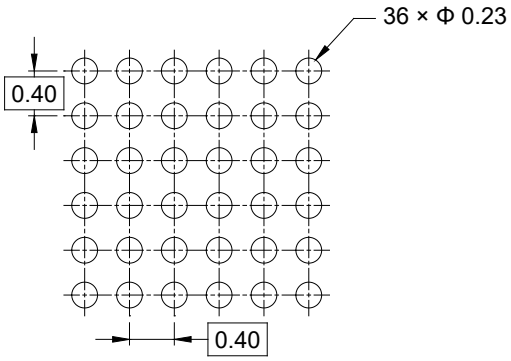
Converter	Component	Value	Total Number	Electrical Spec	Part Number	Manufacturer
ELVDD	C_{IN1}	10μF	1	X5R, 6.3V, 0402	GRM155R60J106ME05	Murata
	C_{VO1}	22μF	2	X5R, 6.3V, 0603	GRM188R60J226MEA0	Murata
	L_{VO1}	2.2μH	1	4A, 70mΩ, 322512	HMLQ32251B-2R2MS	Cyntec
ELVSS	C_{PVIN2A} C_{PVIN2B}	10μF	2	X5R, 6.3V, 0402	GRM155R60J106ME05	Murata
	C_{VO2A} C_{VO2B}	22μF	2	X5R, 10V, 0603	GRM187R61A226ME15	Murata
	L_{VO2A} L_{VO2B}	2.2μH	2	4A, 70mΩ, 322512	HMLQ32251B-2R2MS	Cyntec
AVDD	C_{IN3}	10μF	1	X5R, 6.3V, 0402	GRM155R60J106ME05	Murata
	C_{VO3}	10μF	2	X5R, 16V, 0603	GRM188R61C106KAAL	Murata
	L_{VO3}	10μH	1	1.3A, 390mΩ, 252012	SDEM25201B-100MS	Cyntec

PACKAGE OUTLINE DIMENSIONS

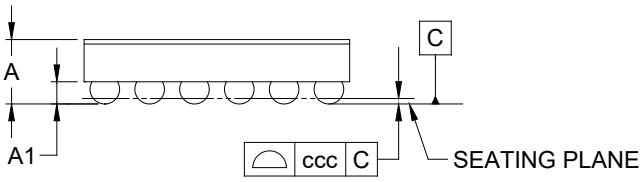
WLCSP-2.37×2.37-36B



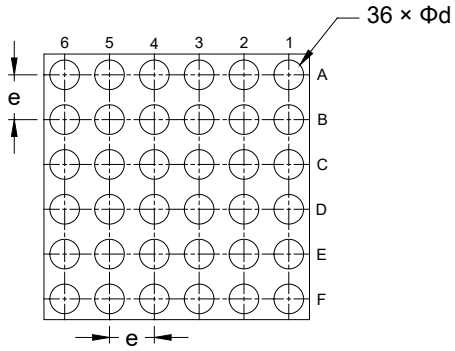
TOP VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



SIDE VIEW



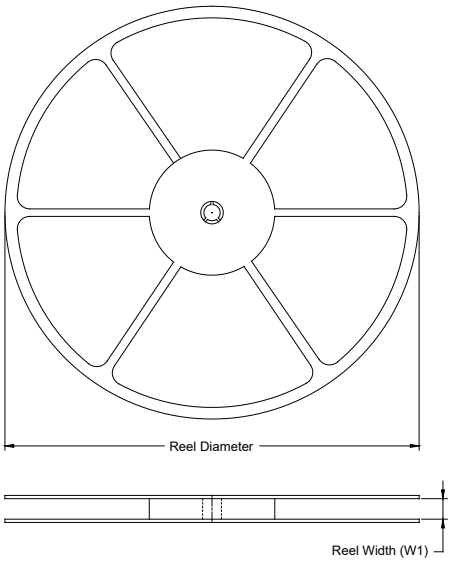
BOTTOM VIEW

Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	0.620
A1	0.178	-	0.218
D	2.340	-	2.400
E	2.340	-	2.400
d	0.234	-	0.294
e	0.400 BSC		
ccc	0.050		

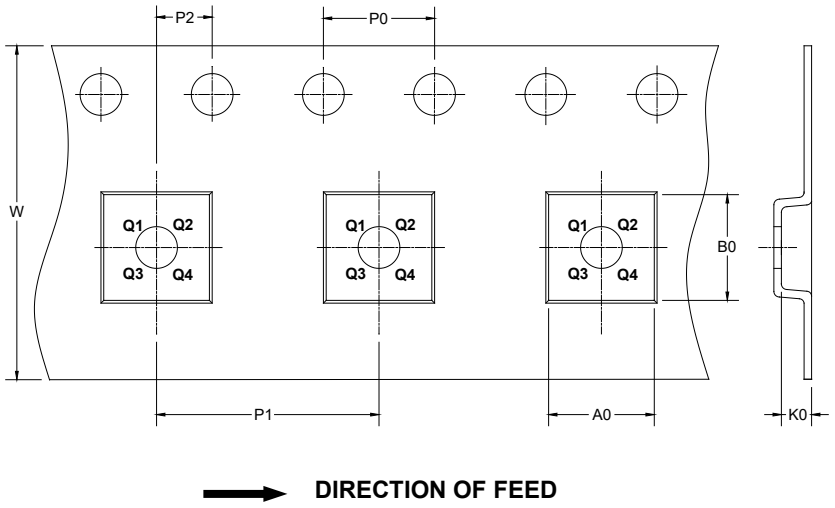
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



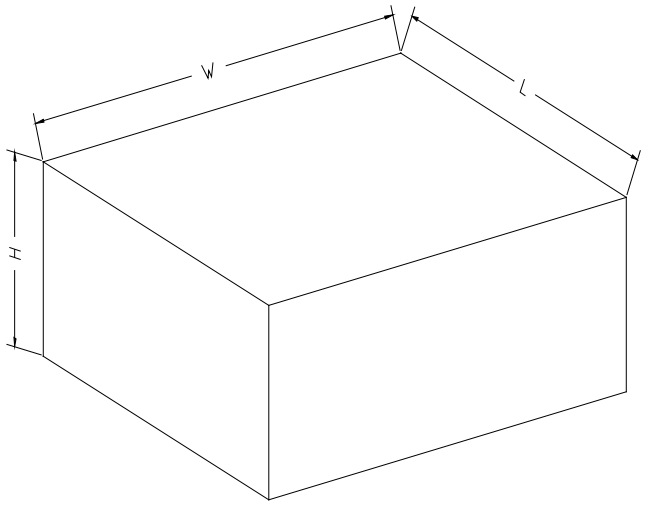
NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
WLCSP-2.37×2.37-36B	7"	9.5	2.55	2.55	0.80	4.0	4.0	2.0	8.0	Q1

DD0001

CARTON BOX DIMENSIONS



NOTE: The picture is only for reference. Please make the object as the standard.

KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002