REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

Prepared in accordance with ASME Y14.24

Vendor item drawing

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PMIC N/A	**PREPARED BY** Phu H. Nguyen	**DLA LAND AND MARITIME** **COLUMBUS, OHIO 43218-3990** **http://www.landandmaritime.dla.mil/**
Original date of drawing YY MM DD 18-08-01	**CHECKED BY** Phu H. Nguyen	**TITLE** MICROCIRCUIT, LINEAR-DIGITAL, LOW NOISE, LOW POWER, 3-AXIS MEMS ACCELEROMETER, MONOLITHIC SILICON
	APPROVED BY Thomas M. Hess	
	SIZE **A** / **CODE IDENT. NO.** **16236**	**DWG NO.** **V62/18610**
	REV	**PAGE** 1 **OF** 10

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AMSC N/A

5962-V099-18

1. SCOPE

1.1 Scope. This drawing documents the general requirements of a high performance Low Noise, Low Drift, Low Power, 3-Axis MEMS Accelerometer microcircuit, with an operating temperature range of -55°C to +125°C.

1.2 Vendor Item Drawing Administrative Control Number. The manufacturer's PIN is the item of identification. The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation:

V62/18610	-	01	X	E
Drawing number		Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish (See 1.2.3)

1.2.1 Device type(s).

Device type	Generic	Circuit function
01	ADXL356 –EP	Low Noise, Low Drift, Low Power, 3-Axis MEMS Accelerometer

1.2.2 Case outline(s). The case outlines are as specified herein.

Outline letter	Number of pins	Package style
X	14	Ceramic Leadless Chip Carrier (LCC) Package

1.2.3 Lead finishes. The lead finishes are as specified below or other lead finishes as provided by the device manufacturer:

Finish designator	Material
A	Hot solder dip
B	Tin-lead plate
C	Gold plate
D	Palladium
E	Gold flash palladium
F	Tin-lead alloy (BGA/CGA)
Z	Other

1.3 Absolute maximum ratings. 1/

Acceleration (Any Axis, 0.1 ms)	5000 *g*
V_{SUPPLY}, V_{DDIO}	5.4 V
V1P8ANA, V1P8DIG Configured as Inputs	1.98 V
Digital Inputs (RANGE, ST1, ST2, $\overline{STBY}$)	-0.3 V to V_{DDIO} + 0.3 V
Analog Outputs (X_{OUT}, Y_{OUT}, Z_{OUT}, TEMP)	-0.3 V to V_{1P8ANA} + 0.3 V
Operating temperature range:	-55°C to +125°C
Storage temperature range	-65°C to 150°C

1.4 Thermal characteristics.

Thermal resistance

Case outline	θ_{JA}	Unit
Case X 2/	42	°C/W

2. APPLICABLE DOCUMENTS

JEDEC – SOLID STATE TECHNOLOGY ASSOCIATION (JEDEC)

JESD51 – Methodology for the Thermal Measurement of Component Packages (Single Semiconductor Device).

(Applications for copies should be addressed to the Electronic Industries Alliance, 3103 North 10th Street, Suite 240–S, Arlington, VA 22201-2107 or online at https://www.jedec.org)

1/ Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

2/ Thermal impedance simulated values are based on a JEDEC 2S2P thermal test board with four thermal vias. See JEDEC JESD51.

3. REQUIREMENTS

3.1 Marking. Parts shall be permanently and legibly marked with the manufacturer's part number as shown in 6.3 herein and as follows:

A. Manufacturer's name, CAGE code, or logo
B. Pin 1 identifier
C. ESDS identification (optional)

3.2 Unit container. The unit container shall be marked with the manufacturer's part number and with items A and C (if applicable) above.

3.3 Electrical characteristics. The maximum and recommended operating conditions and electrical performance characteristics are as specified in 1.3, 1.4, and table I herein.

3.4 Design, construction, and physical dimension. The design, construction, and physical dimensions are as specified herein.

3.5 Diagrams.

3.5.1 Case outline. The case outline shall be as shown in 1.2.2 and figure 1.

3.5.2 Terminal connections. The terminal connections shall be as shown in figure 2.

3.5.3 Terminal function. The terminal function shall be as shown in figure 3.

3.5.4 Functional block diagram. The functional block diagram shall be as shown in figure 4.

TABLE I. Electrical performance characteristics. 1/

Test	Test conditions 2/	Limits			Unit
		Min	Typ	Max	
SENSOR INPUT (Each Axis)					
Output Full-Scale Range (FSR)	Supports two ranges		±10/±40		*g*
Resonant Frequency 3/			5.5		kHz
Nonlinearity	±10 *g*		0.1		%
Cross Axis Sensitivity			1		%
SENSITIVITY (Ratiometric to V_{1P8ANA})					
Sensitivity at XOUT, YOUT, and ZOUT	±10 *g*	73.6	80	86.4	mV/*g*
	±40 *g*	18.4	20	21.6	mV/*g*
Sensitivity Change Due to Temperature	T_A = −55°C to +125°C		±0.01		%/°C
0 *g* OFFSET (Each axis, ±10 *g*)					
0 *g* Output for XOUT, YOUT, and ZOUT	Referred to V1P8ANA/2	-375	±125	+375	m*g*
0 *g* Offset vs. Temperature (X-Axis, Y-Axis, and Z-Axis) 4/	T_A = −55°C to +125°C	-0.75	±0.5	0.75	mg/°C
Vibration Rectification Error (VRE) 5/	Offset due to 7.5 *g* rms vibration, ±10 *g* range, in a 1 *g* orientation		<0.1		*g*
NOISE DENSITY (±10 *g*)					
X-Axis, Y-Axis, and Z-Axis			80		µg/√Hz
Velocity Random Walk	X-axis and y-axis		45		µm/sec/√Hr
	Z-axis		65		µm/sec/√Hr
BANDWIDTH					
Internal Low-Pass Filter Frequency	Fixed frequency, 50% response attenuation		1500		Hz
SELF TEST					
Output change Z-Axis	±10 *g* range		1.25		*g*

See footnote at end of table.

TABLE I. Electrical performance characteristics - Continued. 1/

Test	Test conditions	Limits			Unit
		Min	Typ	Max	
POWER SUPPLY: Voltage Range					
V_{SUPPLY} 6/		2.25	2.5	3.6	V
Digital Interface Supply Voltage (V_{DDIO})		V_{1P8DIG}	2.5	3.6	V
Analog Supply (V_{1P8ANA}), Digital Supply (V_{1P8DIG}) with Internal Low Dropout (LDO) Regulator Bypassed	V_{SUPPLY} = 0 V	1.62	1.8	1.98	V
POWER SUPPLY: Current					
Measurement Mode					
V_{SUPPLY} (LDO Enabled)			150		µA
V_{1P8ANA} (LDO Disabled)			138		
V_{1P8DIG} (LDO Disabled)			12		
Standby Mode					
V_{SUPPLY} (LDO Enabled)			21		µA
V_{1P8ANA} (LDO Disabled)			7		
V_{1P8DIG} (LDO Disabled)			10		
Turn On Time 7/	10 *g* range		<10		ms
	Power-off to standby		<10		ms
OUTPUT AMPLIFIER					
Swing	No load	0.03		V_{1P8ANA} − 0.03	V
Output Series Resistance			32		kΩ
TEMPERATURE SENSOR					
Output at 25°C			963.3		mV
Scale Factor			3.0		mV/°C
TEMPERATURE					
Operating Temperature Range		-55		+125	°C

1/ Testing and other quality control techniques are used to the extent deemed necessary to assure product performance over the specified temperature range. Product may not necessarily be tested across the full temperature range and all parameters may not necessarily be tested. In the absence of specific parametric testing, product performance is assured by characterization and/or design.

2/ T_A = 25°C, supply voltage (V_{SUPPLY}) = 3.3 V, x-axis acceleration and y-axis acceleration = 0 *g*, z-axis acceleration = 1 *g*, and full-scale range = ±10 *g*, unless otherwise noted.

3/ The resonant frequency is a sensor characteristic. An integrated analog 1.5 kHz (−6 dB) since low-pass filter that cannot be bypassed limits the actual output response.

4/ The temperature change is −55°C to +25°C or +25°C to +125°C.

5/ The VRE measurement is the shift in dc offset while the device is subject to 12.5 *g* rms of random vibration from 50 Hz to 2 kHz. The device under test (DUT) is configured for the ±10 *g* range and an output data rate of 4 kHz. The VRE scales with the range setting.

6/ When V_{1P8ANA} and V_{1P8DI}G are generated internally, V_{SUPPLY} is valid. To disable the LDO and drive V_{1P8ANA} and V_{1P8DI}G externally, connect V_{SUPPLY} to V_{SS}.

7/ Standby to measurement mode; valid when the output is within 5 m*g* of the final value.

Case X

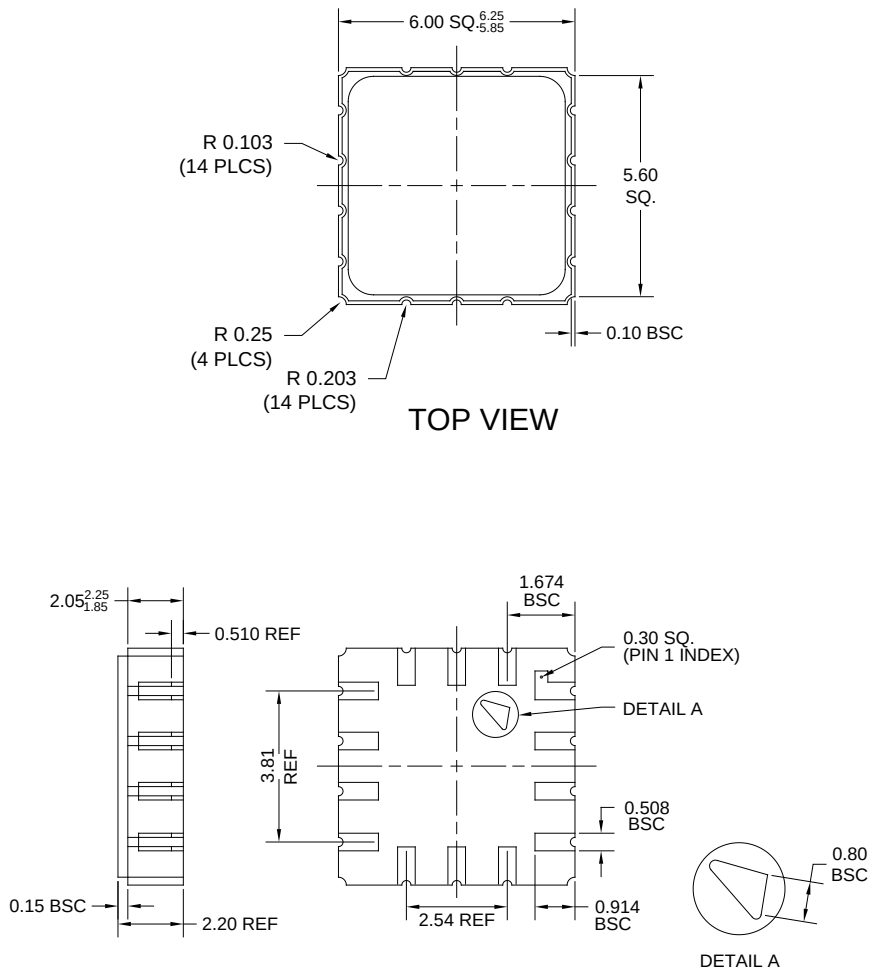

FIGURE 1. Case outline.

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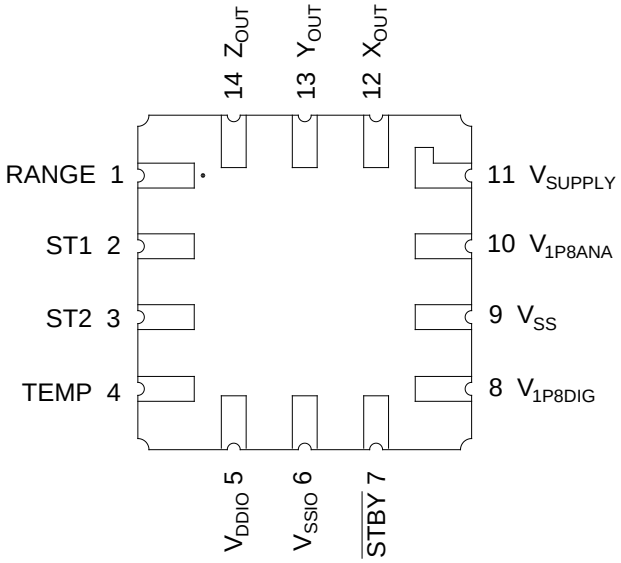

FIGURE 2. Terminal connections.

Pin No.	Mnemonic	Description
1	RANGE	Range Selection Pin. Set this pin to ground to select the ±10 *g* range, or set RANGE to VDDIO to select the ±40 *g* range.
2	ST1	Self Test Pin 1. This pin enables self test mode.
3	ST2	Self Test Pin 2. This pin activates the electromechanical self test actuation.
4	TEMP	Temperature Sensor Output.
5	V_{DDIO}	Digital Interface Supply Voltage.
6	V_{SSIO}	Digital Ground.
7	$\overline{STBY}$	Standby or Measurement Mode Selection Pin. Set $\overline{STBY}$ to ground to enter standby mode, or set $\overline{STBY}$ to V_{DDIO} to enter measurement mode.
8	V_{1P8DIG}	Digital Supply. This pin requires a decoupling capacitor. If V_{SUPPLY} connects to V_{SS}, supply the voltage to this pin externally.
9	V_{SS}	Analog Ground.
10	V_{1P8ANA}	Analog Supply. This pin requires a decoupling capacitor. If V_{SUPPLY} connects to VSS, supply the voltage to this pin externally.
11	V_{SUPPLY}	Supply Voltage. When V_{SUPPLY} equals 2.25 V to 3.6 V, V_{SUPPLY} enables the internal LDO regulators to generate V_{1P8DIG} and V_{1P8ANA}. For V_{SUPPLY} = V_{SS}, V_{1P8DIG} and V_{1P8ANA} are externally supplied.
12	X_{OUT}	X-Axis Output.
13	Y_{OUT}	Y-Axis Output.
14	Z_{OUT}	Z-Axis Output.

FIGURE 3. Terminal function.

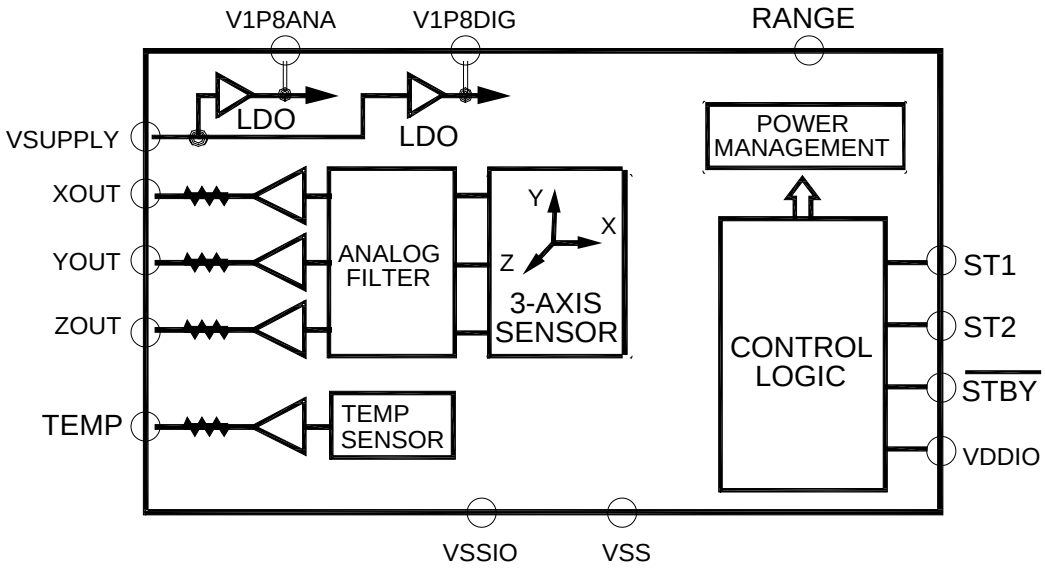

FIGURE 4. Functional block diagram.

4. VERIFICATION

4.1 Product assurance requirements. The manufacturer is responsible for performing all inspection and test requirements as indicated in their internal documentation. Such procedures should include proper handling of electrostatic sensitive devices, classification, packaging, and labeling of moisture sensitive devices, as applicable.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Preservation, packaging, labeling, and marking shall be in accordance with the manufacturer's standard commercial practices for electrostatic discharge sensitive devices.

6. NOTES

6.1 ESDS. Devices are electrostatic discharge sensitive and are classified as ESDS class 1 minimum.

6.2 Configuration control. The data contained herein is based on the salient characteristics of the device manufacturer's data book. The device manufacturer reserves the right to make changes without notice. This drawing will be modified as changes are provided.

6.3 Suggested source(s) of supply. Identification of the suggested source(s) of supply herein is not to be construed as a guarantee of present or continued availability as a source of supply for the item. DLA Land and Maritime maintains an online database of all current sources of supply at https://landandmaritimeapps.dla.mil/programs/smcr/default.aspx

Vendor item drawing administrative control number 1/	Device manufacturer CAGE code	Order Quantity	Vendor part number
V62/18610-01XE	24355	Tray = 280	ADXL356TEZ-EP
		-RL quantity = 2000	ADXL356TEZ-EP-RL
		-R7 quantity = 500	ADXL356TEZ-EP-RL7

1/ The vendor item drawing establishes an administrative control number for identifying the item on the engineering documentation.

CAGE code	Source of supply
24355	Analog Devices 1 Technology Way P.O. Box 9106 Norwood, MA 02062-9106