3.0 Applications

The AMIS-30624 is ideally suited for small positioning applications. Target markets include: automotive (headlamp alignment, HVAC, idle control, cruise control), industrial equipment (lighting, fluid control, labeling, process control, XYZ tables, robots) and building automation (HVAC, surveillance, satellite dish, renewable energy systems). Suitable applications typically have multiple axes or require mechatronic solutions with the driver chip mounted directly on the motor.

4.0 Ordering Information

Table 1: Ordering Information

Part Number	Package	Shipping Configuration	Temperature Range	Peak Current
AMIS30624C6244G	SOIC-20	Tube/Tray	-40°C…..125°C	800mA
AMIS30624C6244RG	SOIC-20	Tape & Reel	-40°C…..125°C	800mA
AMIS30624C6245G	NQFP-32 (7 x 7 mm)	Tube/Tray	-40°C…..125°C	800mA
AMIS30624C6245RG	NQFP-32 (7 x 7 mm)	Tape & Reel	-40°C…..125°C	800mA

5.0 Quick Reference Data

Table 2: Absolute Maximum Ratings

Parameter		Min.	Max.	Unit
Vbb	Supply voltage	-0.3	+40 (1)	V
Tamb	Ambient temperature under bias (2)	-50	+150	°C
Tst	Storage temperature	-55	+160	°C
Vesd (3)	Electrostatic discharge voltage on pins	-2	+2	kV

Notes:
(1) For limited time <0.5s
(2) The circuit functionality is not guaranteed.
(3) Human body model (100pF via 1.5 kΩ, according to JEDEC EIA-JESD22-A114-B)

Table 3: Operating Ranges

Parameter			Min.	Max.	Unit
Vbb	Supply voltage		+8	+29	V
Top	Operating temperature range	Vbb ≤ 18V	-40	+125	°C
		Vbb ≤ 29V	-40	+85	°C

6.0 Block Diagram

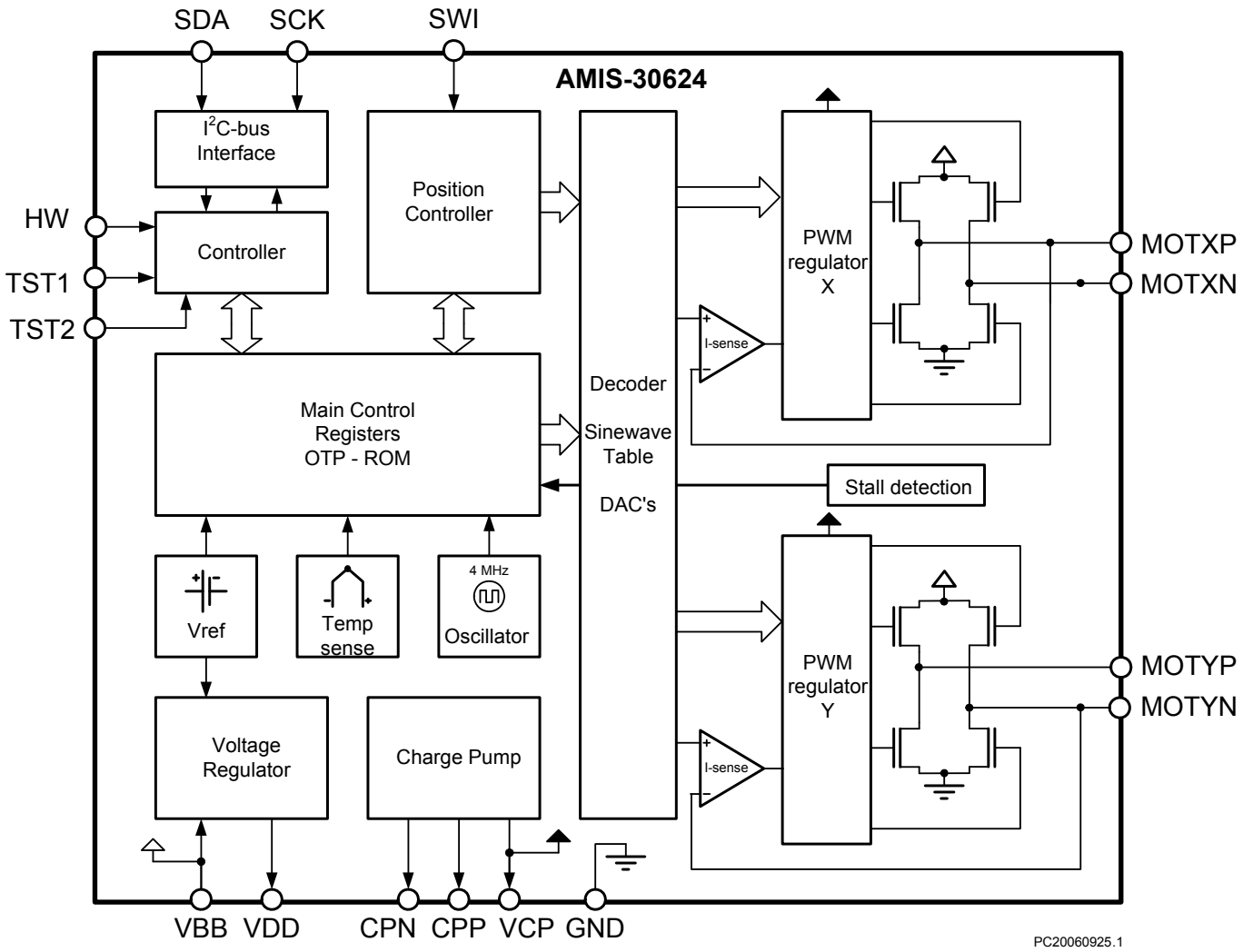

Figure 1: Block Diagram

7.0 Pin Out

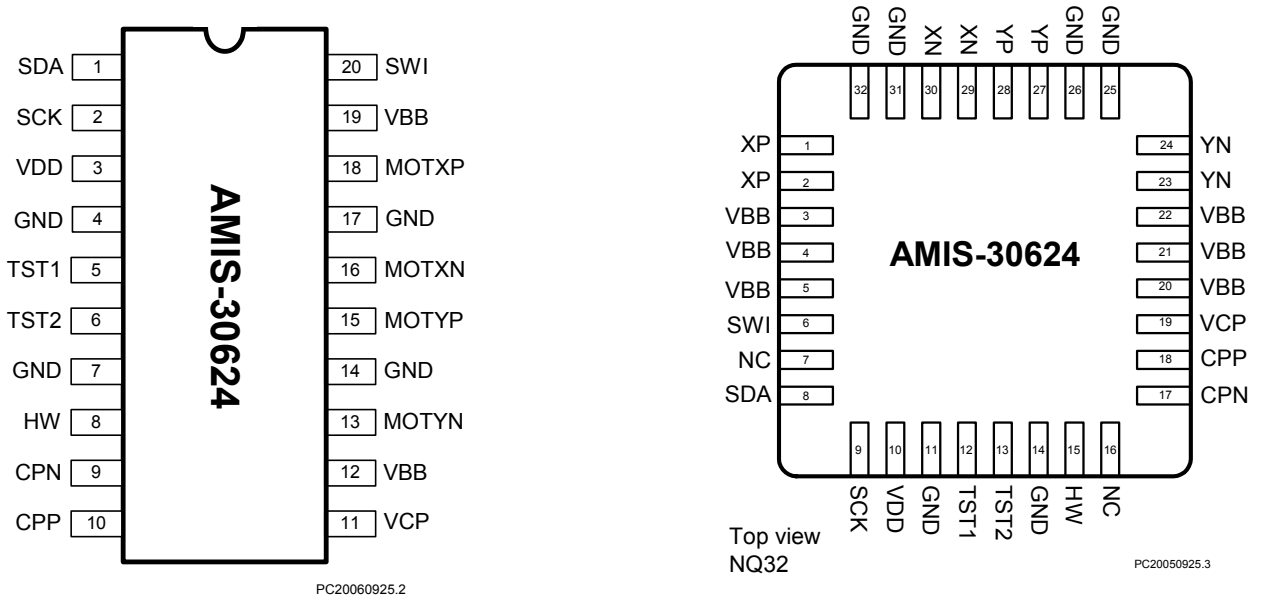

Figure 2: SOIC 20 and NQFP-32 Pin-out

Table 4: Pin Description

Pin Name	Pin Description	SOIC-20	NQFP-32
SDA	I^2C serial data line	1	8
SCK	I^2C serial clock line	2	9
VDD	Internal supply (needs external decoupling capacitor)	3	10
GND	Ground, heat sink	4,7,14,17	11, 14, 25, 26, 31, 32
TST1	Test pin (to be tied to ground in normal operation)	5	12
TST2	Test pin (to be left open in normal operation: internally pulled up)	6	13
HW	Hard wired address bit	8	15
CPN	Negative connection of pump capacitor (charge pump)	9	17
CPP	Positive connection of pump capacitor (charge pump)	10	18
VCP	Charge-pump filter-capacitor	11	19
VBB	Battery voltage supply	12,19	3, 4, 5, 20, 21, 22
MOTYN	Negative end of phase Y coil	13	23, 24
MOTYP	Positive end of phase Y coil	15	27, 28
MOTXN	Negative end of phase X coil	16	29, 30
MOTXP	Positive end of phase X coil	18	1, 2
SWI	Switch input	20	6
NC	Not connected (to be tied to ground)		7, 16

8.0 Package Thermal Resistance

8.1 SOIC-20

To lower the junction-to-ambient thermal resistance, it is recommended to connect the ground leads to a printed circuit board (PCB) ground plane layout as illustrated in Figure 3. The junction-to-case thermal resistance is dependent on the copper area, copper thickness, PCB thickness and number of copper layers. Calculating with a total area of 460 mm^2, 35µm copper thickness, 1.6mm PCB thickness and 1 layer, the thermal resistance is 28°C/W; leading to a junction-ambient thermal resistance of 63°C/W.

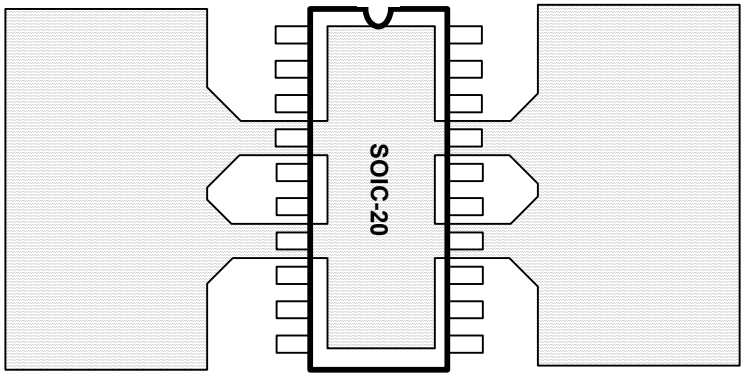

Figure 3: PCB Ground Plane Layout Condition

8.2 NQFP-32

The NQFP is designed to provide superior thermal performance, and using an exposed die pad on the bottom surface of the package partly contributes to this. In order to take full advantage of this thermal performance, the PCB must have features to conduct heat away from the package. A thermal grounded pad with thermal vias can achieve this. With a layout as shown in Figure 4, the thermal resistance junction – to – ambient can be brought down to a level of 25°C/W.

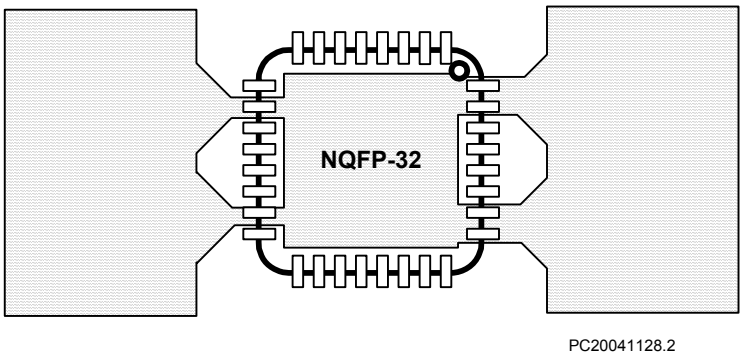

Figure 4: PCB Ground Plane Layout Condition

9.0 DC Parameters

The DC parameters are given for Vbb and temperature in their operating ranges. Currents flowing in the circuit are defined as positive.

Table 5: DC Parameters

Symbol	Pin(s)	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Motor Driver							
$I_{MSmax,Peak}$	MOTXP MOTXN MOTYP MOTYN	Max. current through motor coil in normal operation			800		mA
$I_{MSmax,RMS}$		Max. RMS current through coil in normal operation			570		mA
I_{MSabs}		Absolute error on coil current		-10		10	%
I_{MSrel}		Error on current ratio I_{coilx} / I_{coily}		-7		7	%
R_{DSon}		On resistance for each motor pin (including bond wire) at I_{MSmax}	V_{bb} = 12V, T_j = 50 °C		0.50	1	Ω
			V_{bb} = 8V, T_j = 50 °C		0.55	1	Ω
			V_{bb} = 12V, T_j = 150 °C		0.70	1	Ω
			V_{bb} = 8V, T_j = 150 °C		0.85	1	Ω
I_{MSL}		Pull down current	HiZ mode		2		mA
Thermal Warning & Shutdown							
T_{tw}		Thermal warning		138	145	152	°C
T_{tsd} (1) (2)		Thermal shutdown			T_{tw} + 10		°C
T_{low} (2)		Low temperature warning			T_{tw} - 155		°C
Supply and Voltage Regulator							
V_{bb}	VBB	Nominal operating supply range	T_{amb} ≤ 125 °C	6.5		18	V
			T_{amb} ≤ 85 °C	6.5		29	V
V_{bbOTP}		Supply voltage for OTP zapping (3)		9.0		10.0	V
I_{bat}		Total current consumption	Unloaded outputs		3.50	10.0	mA
I_{bat_s}		Sleep mode current consumption			50	100	µA
UV_1		Stop voltage high threshold		7.8	8.4	8.9	V
UV_2		Stop voltage low threshold		7.1	7.5	8.0	V
V_{dd}	VDD	Internal regulated output (4)	8V < V_{bb} < 29V	4.75	5	5.50	V
I_{ddStop}		Digital current consumption	V_{bb} < UV_2		2		mA
$V_{ddReset}$		Digital supply reset level @ power down (5)				4.5	V
I_{ddLim}		Current limitation	Pin shorted to ground			42	mA
Switch Input and Hardwire Address Input							
Rt_{OFF}	SWI HW	Switch OFF resistance (6)	Switch to Gnd or V_{bat},	10			kΩ
Rt_{ON}		Switch ON resistance (6)				2	kΩ
V_{bb_sw}		Vbb range for guaranteed operation of SWI and HW		6		29	V
V_{max_sw}		Maximum voltage	T < 1s			40V	V
I_{lim_sw}		Current limitation	Short to Gnd or V_{bat}		30		mA
I^2C Serial Interface							
V_{IL}	SDA SCK	Input level low (7)		- 0.5		0.3 * V_{dd}	V
V_{IH}		Input level high (8)		0.7 * V_{dd}		V_{dd} + 0.5	V
V_{nL}		Noise margin at the LOW level for each connected device (including hysteresis)		0.1 * V_{dd}			V
V_{nH}		Noise margin at the HIGH level for each connected device (including hysteresis)		0.2 * V_{dd}			

Table 5: DC Parameters (cont.)

Charge Pump							
V_{cp}	VCP	Output voltage	V_{bb} > 15V	V_{bb}+10	V_{bb}+12.5	V_{bb}+15	V
			8V < V_{bb} < 15V	2 * V_{bb} – 5	2 * V_{bb} – 2.5	2 * V_{bb}	V
C_{buffer}		External buffer capacitor		220		470	nF
C_{pump}	CPP CPN	External pump capacitor		220		470	nF
Motion Qualification Mode Output							
V_{OUT}	SWI	Output voltage swing	TestBemf I^2C command		0 - 4,85		V
R_{OUT}		Output impedance	Service mode I^2C command		2		kΩ
Av		Gain = V_{SWI} / V_{BEMF}	Service mode I^2C command		0,50		

Notes:

(1) No more than 100 cumulated hours in life time above T_{tsd}.
(2) Thermal shutdown and a low temperature warning are derived from thermal warning.
(3) A 10μF buffer capacitor of between VBB and GND is the minimum needed. Short connections to the power supply are recommended.
(4) Pin VDD must not be used for any external supply
(5) The RAM content will not be altered above this voltage.
(6) External resistance value seen from pin SWI or HW, including 1kΩ series resistor.
(7) If input voltages < - 0.3V, than a resistor between 22Ω to 100Ω needs to be put in series
(8) If the I^2C-bus is operated in Fast Mode V_{IHmin} = 0.7 * Vdd