

GENERAL DESCRIPTION

The SGM42618 is a bipolar stepper motor driver suitable for automated positioning and movement control in equipment such as printers, scanners and robotic mechanisms. To control the stepper motor, two H-bridges are integrated in the device for the two motor windings along with a microstepping indexer logic. Bridge currents are regulated by chopping the motor supply voltage across the windings.

The step (STEP) and direction (DIR) inputs are provided for simple interfacing to the controller. The device also provides two microstepping input pins (USM0 and USM1) to choose the step size.

Fast, slow and mixed (fast then slow) decay modes are selectable by applying proper voltage to DECAY input. Programmable blanking and off-time of the H-bridge PWM and selectable decay modes make the device very flexible and capable of driving a wide range of stepper motors with up to 2.6A per winding.

A number of protection features are provided in the device including over-current, short-circuit, under-voltage lockout, and over-temperature shutdown.

The device is available in a Green TSSOP-28 (Exposed Pad) package.

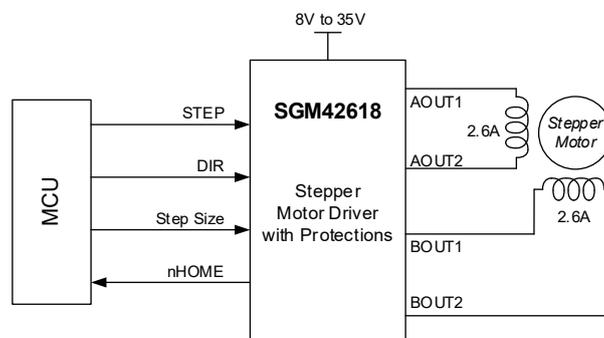
FEATURES

- **Motor Power Supply Voltage Range: 8V to 35V**
- **PWM with up to 2.6A Current for Each Winding**
- **Low On-Resistance: 0.4Ω for HS + LS, @ +25°C**
- **Microstepping Indexer: 1, 1/2, 1/4, 1/8, 1/16 and 1/32**
- **Step and Direction Interface**
- **Programmable Decay, Blanking and Off-Time**
- **Supporting Various Decay Modes Including Auto-Decay**
- **UVLO for VM, VCC, VCP, VGD Voltages**
- **Over-Current Protection (OCP)**
- **Thermal Shutdown (TSD)**
- **Available in a Green TSSOP-28 (Exposed Pad) Package**

APPLICATIONS

- Robotic Mechanisms
- Textile Equipment
- Scanners
- Positioning and Tracking
- Printers

SIMPLIFIED SCHEMATIC

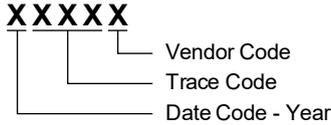


PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM42618	TSSOP-28 (Exposed Pad)	-40°C to +85°C	SGM42618YPTS28G/TR	SGM42618 YPTS28 XXXXX	Tape and Reel, 4000

MARKING INFORMATION

NOTE: XXXXX = Date Code, Trace Code and Vendor Code.



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

Motor Power Supply Voltage Range, V_M (V_{MA} or V_{MB}).....	-0.3V to 38V
Logic Power Supply Voltage Range, V_{CC}	-0.3V to 6V
Digital Pins Input Voltage Range	-0.5V to 6V
VREF Input Voltage, V_{REF}	0V to V_{CC}
ISENx Pins Voltage.....	-0.5V to 0.875V
Peak Output Current (Motor Drive)	Limited Internally
Package Thermal Resistance	
TSSOP-28 (Exposed Pad), θ_{JA}	30.8°C/W
TSSOP-28 (Exposed Pad), θ_{JB}	11°C/W
TSSOP-28 (Exposed Pad), $\theta_{JC(TOP)}$	18.3°C/W
TSSOP-28 (Exposed Pad), $\theta_{JC(BOT)}$	1.6°C/W
Operating Junction Temperature.....	+150°C
Storage Temperature Range.....	-65°C to +150°C
Lead Temperature (Soldering, 10s)	+260°C
ESD Susceptibility ⁽¹⁾⁽²⁾	
HBM.....	±4000V
CDM	±1000V

NOTES:

1. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
2. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Motor Power Supply Voltage Range ⁽¹⁾ , V_M	8V to 35V
Logic Power Supply Voltage Range, V_{CC}	3V to 5.5V
VREF Input Voltage, V_{REF}	0V to V_{CC}
R_X Resistance Value, R_X	5kΩ to 100kΩ
C_X Capacitance Value, C_X	470pF to 3000pF
ISENx Shunt Resistor (for $\geq 2A$ Application).....	50mΩ
Operating Junction Temperature Range.....	-40°C to +150°C

NOTE: 1. VMA and VMB pins must be tied to the same source (VM).

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.

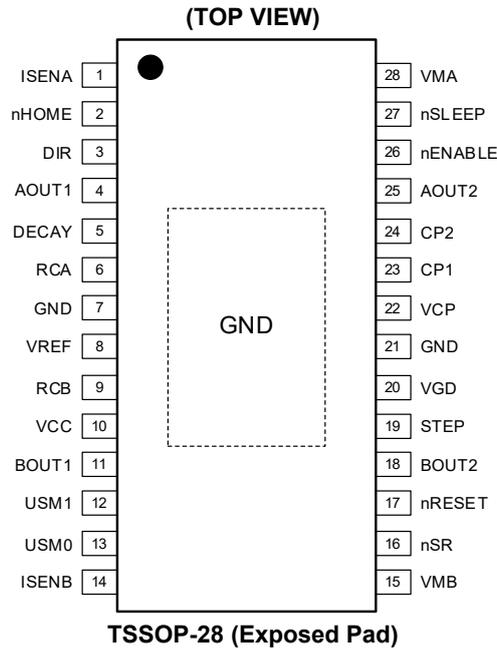
ESD SENSITIVITY CAUTION

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



PIN DESCRIPTIONS

PIN	NAME	TYPE	FUNCTION
1	ISENA	-	Bridge A I _{SENSE} (GND). Connect with a sensing resistor to power ground.
2	nHOME	O	Home Position Logic Output. Pull this pin low when step table is at home state or pull this pin high at other states.
3	DIR	I	Direction Input Pin. Control the direction of stepping. It has a weak internal pull-down.
4	AOUT1	O	Bridge A Node 1. Connect to one end (+) of the stepper motor winding A.
5	DECAY	I	Decay Mode Select with Weak Internal Pull-Down. Voltage applied to this pin sets one of the three decay modes. See details in motor driver description. A 0.1µF ~ 0.22µF capacitor needs to be placed between DECAY and GND pins.
6	RCA	I	Bridge A Blanking and Off-Time Setting. Connect it to the parallel programming resistor (R _A) and capacitor (C _A). See Current Regulation section for the adjustment details and Equations 2, 3 and 4.
7, 21	GND	-	Ground Reference.
8	VREF	I	Reference Voltage for Current Set. Apply the reference voltage to set the full-scale winding current value.
9	RCB	I	Bridge B Blanking and Off-Time Setting. Connect it to the parallel programming resistor (R _B) and capacitor (C _B). See Current Regulation section for the adjustment details and Equations 2, 3 and 4.
10	VCC	-	Digital Logic Supply Voltage (3V to 5.5V). A 0.1µF ceramic decoupling capacitor needs to be placed between VCC and GND pins.
11	BOUT1	O	Bridge B Node 1. Connect it to one end (+) of the stepper motor winding B.
12	USM1	I	Micro-Step Mode Selection Logic Input 1. Please refer to Table 2 about detail description. Internal pull-down and pull-up.
13	USM0	I	Micro-Step Mode Selection Logic Input 0. Please refer to Table 2 about detail description. Internal pull-down and pull-up.
14	ISENB	-	Bridge B I _{SENSE} (GND). Connect it to VM power ground through the current sense resistor for bridge B.
15	VMB	-	Power Supply for Bridge B. Connect it to the motor power supply (8V to 35V). VMA and VMB pins should be tied to the same supply.
16	nSR	I	Synchronous Rectification Enable Input. The nSR pin is configured together with DECAY pin to set IC decay modes, please refer to Table 1 for more details.

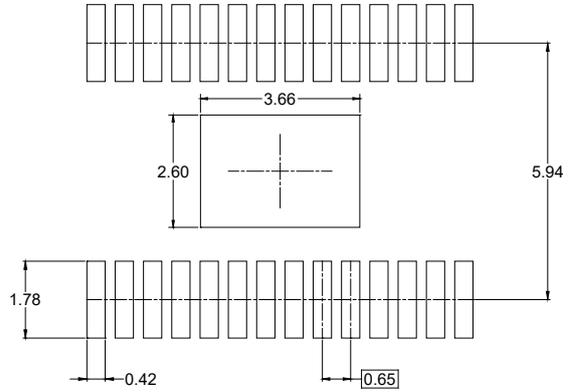
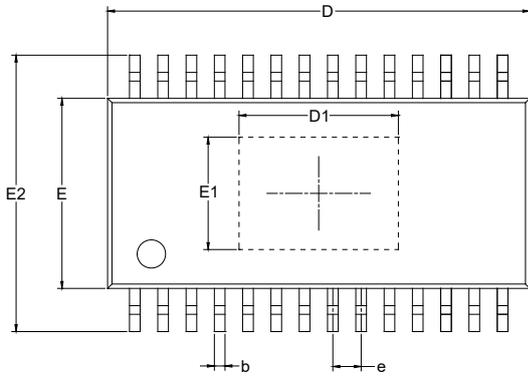
PIN DESCRIPTIONS (continued)

PIN	NAME	TYPE	FUNCTION
17	nRESET	I	Reset Input. Active-low reset with weak internal VCC pulling up to initializes microstepping indexer logic and disables H-bridge outputs.
18	BOUT2	O	Bridge B Node 2. Connect to the other end (-) of the stepper motor winding B. I_B is positive from BOUT1 to BOUT2.
19	STEP	I	Step Logic Input. Rising edge causes the microstepping indexer to move one step. It has a weak internal pull-down.
20	VGD	IO	Gate Drive Voltage of the Low-side Switches. Decouple to GND with a 0.22 μ F ceramic capacitor.
22	VCP	IO	Gate Drive Voltage of the High-side Switches. Decouple with a 0.22 μ F ceramic capacitor to VM pin.
23	CP1	IO	Charge Pump Flying Capacitor. A 0.22 μ F capacitor is used between CP1 and CP2 pins.
24	CP2	IO	
25	AOUT2	O	Bridge A Node 2. Connect it to the other end (-) of the stepper motor winding A. I_A is positive from AOUT1 to AOUT2.
26	nENABLE	I	Enable Input. Active-low enable logic input with weak internal pull-up to VCC. A low enables outputs.
27	nSLEEP	I	Sleep Mode Input. Active-low sleep mode logic input with weak internal pull-down. Apply high to enable device, and low to enter in the low-power sleep mode.
28	VMA	-	Power Supply for Bridge A. Connect to the motor power supply (8V to 35V). VMA and VMB pins should be tied to the same supply.
Exposed Pad	GND	G	Ground.

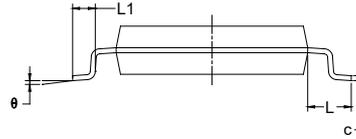
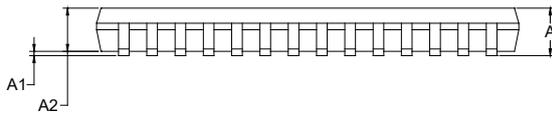
NOTE: I = input, O = output, IO = input or output, G = ground.

PACKAGE OUTLINE DIMENSIONS

TSSOP-28 (Exposed Pad)



RECOMMENDED LAND PATTERN (Unit: mm)



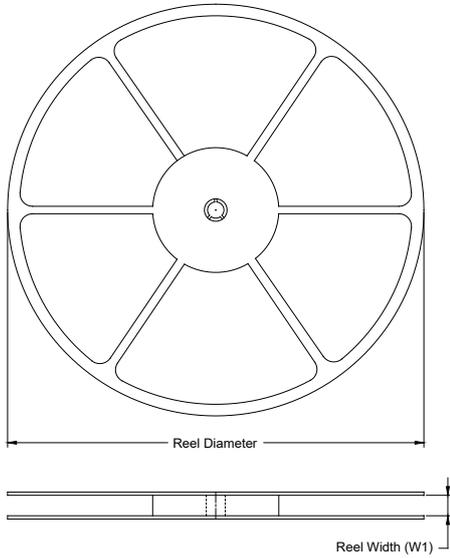
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	9.600	9.800	0.378	0.386
D1	3.460	3.860	0.136	0.152
E	4.300	4.500	0.169	0.177
E1	2.400	2.800	0.094	0.110
E2	6.200	6.600	0.244	0.260
e	0.650 BSC		0.026 BSC	
L	1.000 BSC		0.039 BSC	
L1	0.450	0.750	0.018	0.030
θ	0°	8°	0°	8°

NOTES:

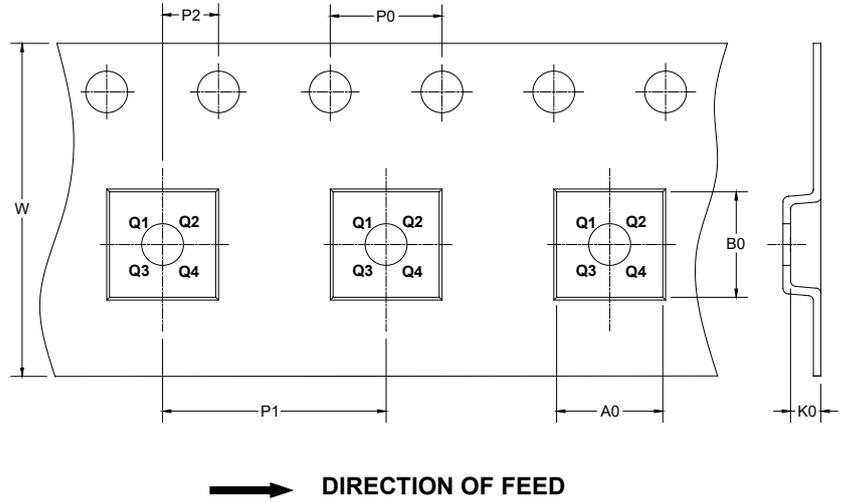
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



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

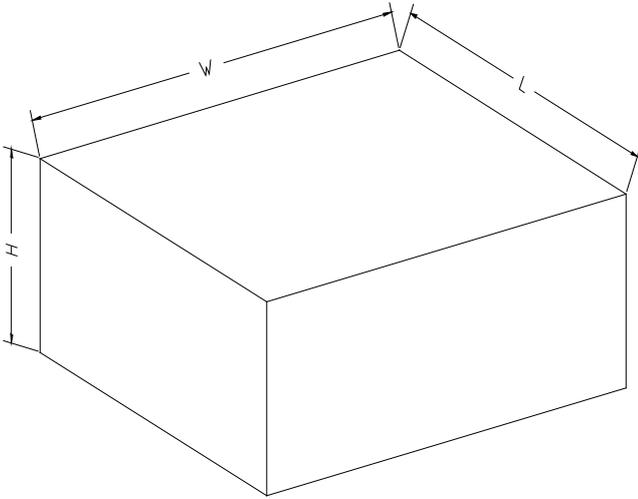
KEY PARAMETER LIST OF TAPE AND REEL

Package Type	Reel Diameter	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
TSSOP-28 (Exposed Pad)	13"	16.4	6.80	10.25	1.60	4.0	8.0	2.0	16.0	Q1

DD0001

PACKAGE INFORMATION

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
13"	386	280	370	5

DD0002