SGM42541A
Dual H-Bridge Driver IC

GENERAL DESCRIPTION

The SGM42541A is a dual H-bridge motor driver suitable for automated positioning and movement control in equipment such as printers, scanners and robotic mechanisms. The SGM42541A has two H-bridge drivers, and can drive a bipolar stepper motor or two DC motors. The output driver block for each consists of N-MOSFETs configured as full H-bridge to drive the motor windings. With proper heatsinking, the SGM42541A can deliver up to 2.5A peak output current per channel (at V_M = 24V and T_J = +25℃).

A simple parallel digital control interface is compatible with industry-standard devices. Decay mode is programmable. Fast, slow and mixed decay modes can be provided according application requirements. A 2-bit current control scheme allows up to 4 discrete current levels.

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

The SGM42541A is available in a Green TSSOP-28 (Exposed Pad) package.

FEATURES

- **Motor Supply Voltage Range: 8V to 50V**
- **Dual H-Bridge Motor Driver**
- **PWM Control Interface**
- **2-Bit Current Control Supports up to 4 Current Levels**
- **Low On-Resistance: 0.43Ω for HS + LS, T_J = +25℃**
- **Up to 2.5A Drive Current at V_M = 24V, T_J = +25℃**
- **Low Current Sleep Mode**
- **Built-in 3.3V Reference Output**
- **Full Set of Protections**
  - **Under-Voltage Lockout (UVLO)**
  - **Over-Current Protection (OCP)**
  - **Thermal Shutdown (TSD)**
  - **Fault Condition Indication Pin (nFAULT)**
- **Available in a Green TSSOP-28 (Exposed Pad) Package**

APPLICATIONS

Printer and Scanner

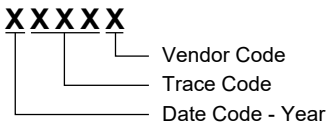
Stage Lighting

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM42541A	TSSOP-28 (Exposed Pad)	-40℃ to +125℃	SGM42541AXPTS28G/TR	SGM42541A XPTS28 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

Power Supply Voltage Range, V_M ..... -0.3V to 60V
Power Supply Ramp Rate 1V/μs
Digital Pin Voltage ..... -0.5V to 6V
xVREF Input Voltage Range, V_{REF} ..... -0.3V to 5.5V
ISENx Pin Voltage Range (1) ..... -0.5V to 0.7V
Package Thermal Resistance
TSSOP-28 (Exposed Pad), θ_{JA} ..... 26.4℃/W
TSSOP-28 (Exposed Pad), θ_{JB} ..... 7.2℃/W
TSSOP-28 (Exposed Pad), $\theta_{JC\ (TOP)}$ ..... 15.2℃/W
TSSOP-28 (Exposed Pad), $\theta_{JC\ (BOT)}$ ..... 1℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (2) (3)
HBM ..... ±4000V
CDM ..... ±1000V

RECOMMENDED OPERATING CONDITIONS

Power Supply Voltage Range, V_M ..... 8V to 50V
xVREF Input Voltage (4), V_{REF} ..... 1V to 3.5V
V3P3 Load Current, I_{V3P3} ..... 0mA to 10mA
Externally Applied PWM Frequency, f_{PWM} ..... 0kHz to 100kHz
Operating Junction Temperature Range ..... -40℃ to +125℃

1. Transients of ±1V for less than 25ns are acceptable.
2. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
3. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.
4. Operational at V_{REF} from 0V to 1V, but accuracy is degraded.

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

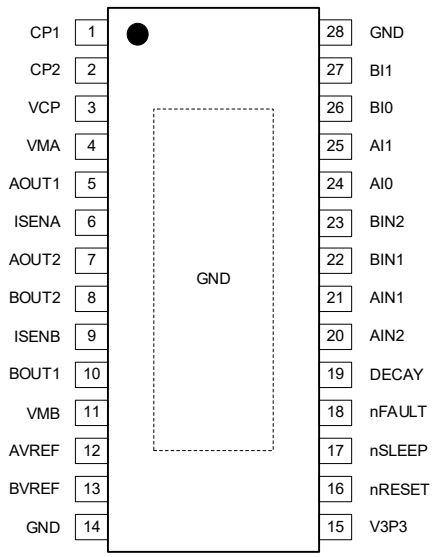
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance 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)



TSSOP-28 (Exposed Pad)

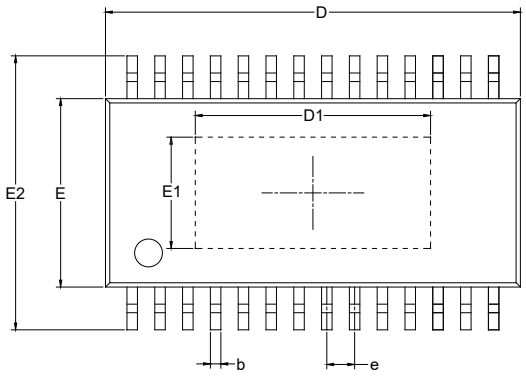
PIN DESCRIPTION

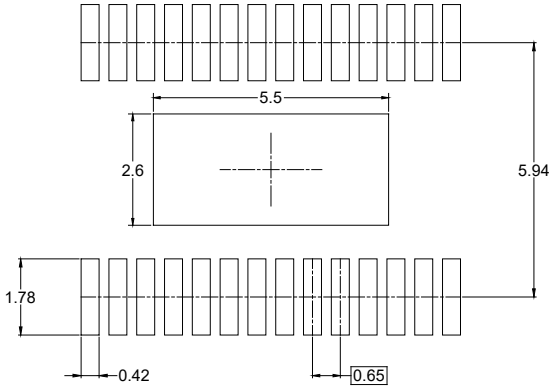
PIN	NAME	TYPE	FUNCTION	
1	CP1	I/O	Charge Pump Flying Capacitor Connection Pins. A 0.01μF/50V capacitor is used between CP1 and CP2 pins.	
2	CP2	I/O		
3	VCP	I/O	Gate Drive Voltage of the High-side Switches. Decouple with a 0.1μF/16V ceramic capacitor and a 1MΩ to VM pin.	
4	VMA	-	Power Supply for Bridge A.	Connect these pins to the same motor supply (8V to 50V) and bypass with a 0.1μF ceramic capacitor to GND. Connect sufficient bulk capacitance to the common supply line.
11	VMB	-	Power Supply for Bridge B.	
5	AOUT1	O	Output 1 of Bridge A.	Connect to motor winding A terminals 1 and 2 respectively.
7	AOUT2	O	Output 2 of Bridge A.	
10	BOUT1	O	Output 1 of Bridge B.	Connect to motor winding B terminals 1 and 2 respectively.
8	BOUT2	O	Output 2 of Bridge B.	
9	ISENB	I/O	Bridge B I_{SENSE} (GND). Connect through a current sense resistor to GND for bridge B.	
6	ISENA	I/O	Bridge A I_{SENSE} (GND). Connect through a current sense resistor to GND for bridge A.	
12	AVREF	I	Bridge A Current Setting Reference Voltage Input. It can be driven independently with a DAC for microstepping, or tied to a fixed reference like V3P3.	
13	BVREF	I	Bridge B Current Setting Reference Voltage Input. It can be driven independently with a DAC for microstepping, or tied to a fixed reference like V3P3.	
15	V3P3	O	3.3V Regulator Output. A 0.47μF/6.3V ceramic capacitor is used between V3P3 and GND pins. This source can be used to supply AVREF or BVREF reference inputs.	
16	nRESET	I	Reset Input. Active-low reset input with weak internal pull-down initializes internal logic and disables H-bridge outputs.	
17	nSLEEP	I	Sleep Mode Input. Active-low logic input with weak internal pull-down. Apply high to enable device, and low to enter into the low-power sleep mode.	
18	nFAULT	OD	Fault Indication Pin. Go low when a fault occurs (over-temperature, over-current).	
19	DECAY	I	Decay Mode Selection Input. Low = slow decay, open = mixed decay, high = fast decay. The pin is pulled down and pulled up internally inside the device.	
20	AIN2	I	Input 2 of Bridge A. Logic input for AOUT2. Internal pull-down.	
21	AIN1	I	Input 1 of Bridge A. Logic input for AOUT1. Internal pull-down.	
22	BIN1	I	Input 1 of Bridge B. Logic input for BOUT1. Internal pull-down.	
23	BIN2	I	Input 2 of Bridge B. Logic input for BOUT2. Internal pull-down.	
24	AI0	I	A Channel H-Bridge Current Set Inputs. 00 is for 100% full scale, 01 is for 71% full scale, 10 is for 38% full scale, 11 is for 0%. Internal pull-down.	
25	AI1	I		
26	BI0	I	B Channel H-Bridge Current Set Inputs. 00 is for 100% full scale, 01 is for 71% full scale, 10 is for 38% full scale, 11 is for 0% full scale. Internal pull-down.	
27	BI1	I		
14, 28	GND	-	Ground.	
Exposed Pad	GND	-	Ground.	

NOTE: I = input, O = output, OD = open-drain output, I/O = input/output.

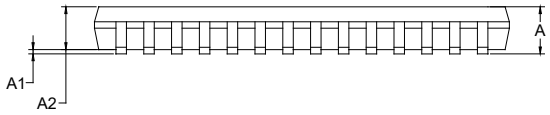
PACKAGE OUTLINE DIMENSIONS

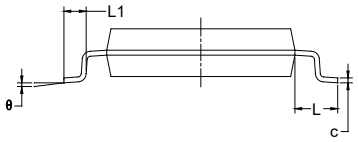
TSSOP-28 (Exposed Pad)





RECOMMENDED LAND PATTERN (Unit: mm)





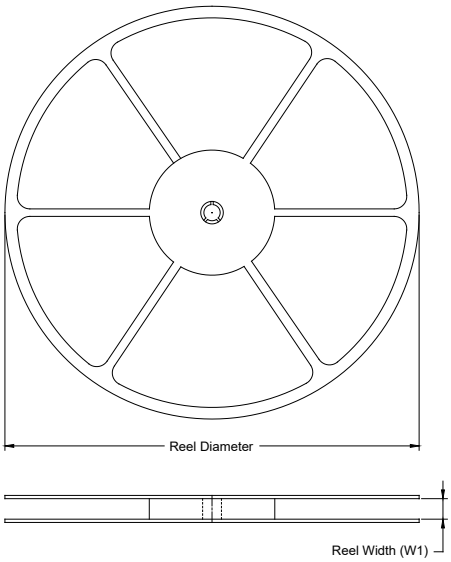
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A		1.200		0.047
A1	0.050	0.150	0.002	0.006
A2	0.800	1.050	0.031	0.041
b	0.190	0.300	0.007	0.012
c	0.090	0.200	0.004	0.008
D	9.600	9.800	0.378	0.386
D1	5.300	5.700	0.209	0.224
E	4.300	4.500	0.169	0.177
E1	2.400	2.800	0.094	0.110
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:

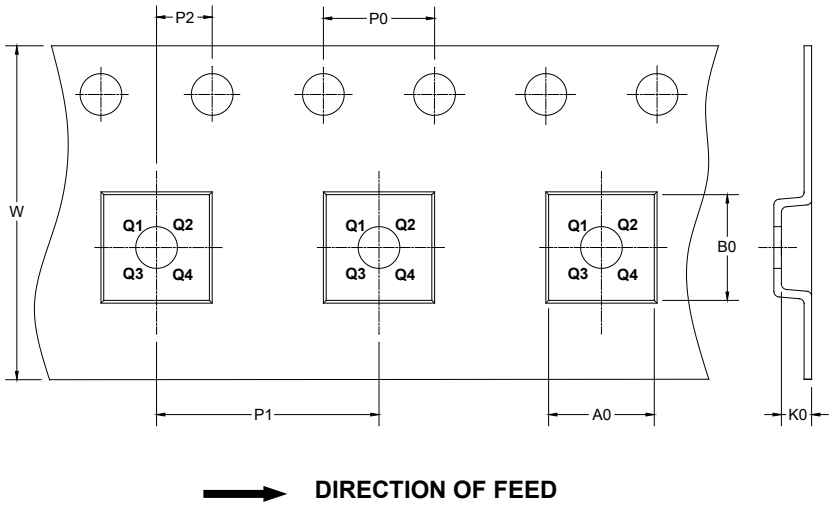
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.
3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



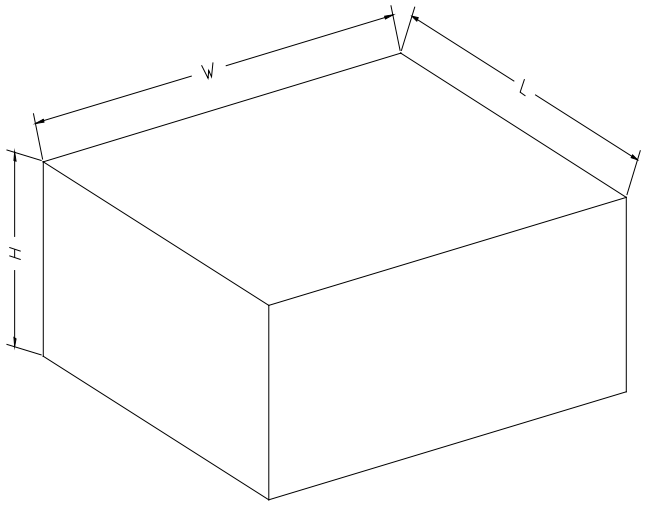
NOTE: The picture is only for reference. Please make the object as the standard.

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

CARTON BOX DIMENSIONS



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KEY PARAMETER LIST OF CARTON BOX

Reel Type	Length (mm)	Width (mm)	Height (mm)	Pizza/Carton
13″	386	280	370	5

DD0002