SGM42203
2-Channel High-side Driver with Analog Current Sense for 24V Applications

GENERAL DESCRIPTION

The SGM42203 is a high-side driver intended for a wide range of industrial applications. It is usually used to drive resistive or inductive load with the other terminal connected to GND. The device integrates load current sense function through the current sense pin current out. If overload current, over-temperature or short-to-VCC occurs, the current sense pin will function to report these faults.

The current limit protects the device in case of overload conditions. Built-in output current limit mask-time allows the current limit to foldback to a preset (selectable) lower level after a preset (adjustable) time delay to protect the load more robustly per application demands.

The fault status will be reset by pulling low the fault reset standby pin (nFR_STBY). Pulling all the inputs and nFR_STBY pins low will disable the device and leave it in standby state.

The SGM42203 is available in a Green TSSOP-16A (Exposed Pad) package.

APPLICATIONS

Resistive Loads
Inductive Loads
Capacitive Loads

FEATURES

- **Wide Supply Voltage Range: 5V to 36V**
- **Low R_{DSON}: 80mΩ/Channel (TYP)**
- **Low Off-State Supply Current: 3.5μA (TYP)**
- **Current Sense Gain: 1700**
- **Built-in Variable Over-Current Mask-Time Setting Function**
- **Programmable Over-Current Limit: 2.5A, 5A, 10A, 15A**
- **3V and 5V Compatible Logic Inputs**
- **High Accurate Proportional Load Current Sense for Both Channels**
- **Continues Load Current:**
  - **3.5A, 1-Channel On**
  - **2.5A/CH, 2-Channel On**
- **Open-Load Detection in Off-State**
- **Short-to-GND Protection by Current Limit**
- **Thermal Shutdown with Latch or Restart Option**
- **Inductive Load Negative Voltage Clamp**
- **Loss-of-GND and Loss-of-Battery Protection**
- **Under-Voltage Shutdown**

TYPICAL APPLICATION

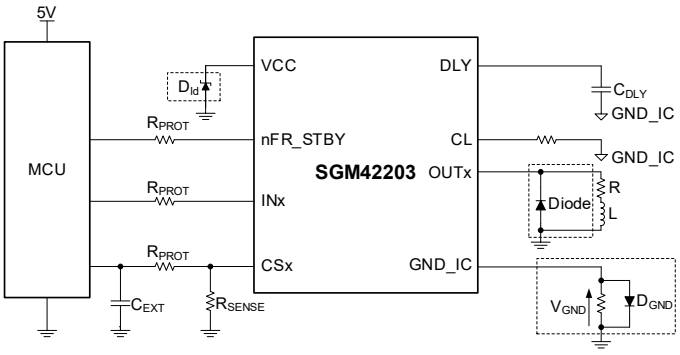


Figure 1. Application Schematic

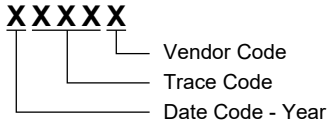
For high voltage applications (≥ 32V), the following application measures are recommended:
1. To ensure robustness against short-circuit/inductive load energy dissipation during hot-plug, a suitable clamping Diode or TVS must be connected externally to the OUTx pin.
2. The current limit is set to 2.5A or 5A through the CL pin.
3. The DLY pin is connected to a 100pF capacitor or left floating.

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM42203	TSSOP-16A (Exposed Pad)	-40℃ to +125℃	SGM42203XPTS16G/TR	SGM42203 XPTS16 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

DC Supply Voltage, V_{CC} 60V
Reverse DC Supply Voltage, $-V_{CC}$ 0.3V
DC Reverse Ground Pin Current, $-I_{GND}$ 200mA (1)
DC Output Current, I_{OUT} ..... Internally limited
DC Input Current, I_{IN} ..... -1mA to 10mA (1)
Fault Reset Standby DC Input Current, I_{nFR_STBY} ..... -1mA to 1.5mA (1)
DC Reverse CS Pin Current, $-I_{CS}$ 200mA (1)
Current Sense Maximum Voltage, V_{CS} ..... V_{CC} - 58V to V_{CC}
Inductive Load Switch-Off Energy Dissipation, Single Pulse, Single Channel (2) 280mJ
Package Thermal Resistance
TSSOP-16A (Exposed Pad), θ_{JA} ..... 29.7℃/W
TSSOP-16A (Exposed Pad), θ_{JB} ..... 9℃/W
TSSOP-16A (Exposed Pad), $\theta_{JC\ (TOP)}$ ..... 22.7℃/W
TSSOP-16A (Exposed Pad), $\theta_{JC\ (BOT)}$ ..... 1.8℃/W
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility (3) (4)
HBM (VCC, OUTx Pins) ..... ±6000V
HBM (All Other Pins) ..... ±4000V
CDM ..... ±1000V

NOTES:

1. Guaranteed by design, and not included in the production testing.
2. Test condition: V_{CC} = 24V, L = 300mH, R = 6.3Ω, I_L = 1.13A, T_A = +125℃. FR4 2s2p board, 2 × 70μm Cu, 2 × 35μm Cu. 600mm^2 thermal pad copper area.
3. For human body model (HBM), all pins comply with ANSI/ESDA/JEDEC JS-001 specifications.
4. For charged device model (CDM), all pins comply with ANSI/ESDA/JEDEC JS-002 specifications.

RECOMMENDED OPERATING CONDITIONS

Operating Ambient 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

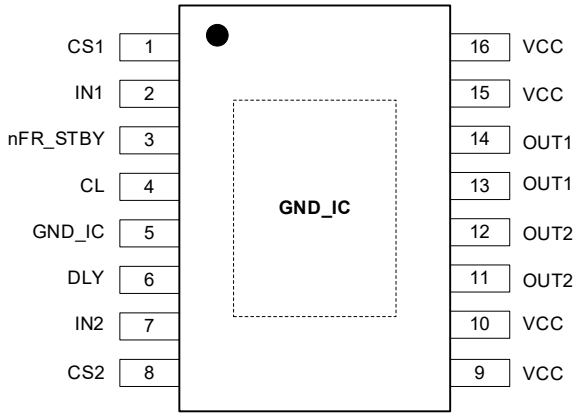
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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



TSSOP-16A (Exposed Pad)

PIN DESCRIPTION

PIN	NAME	FUNCTION
1	CS1	Current Sense Output Pin. The out-going current is proportional to the load current. Connect it to the ground through a 10kΩ resistor if not used. It is not allowed to be floating.
8	CS2	
2	IN1	Voltage Controlled Input Pin. Control the output switch state. Connect it to the ground through a 10kΩ resistor if not used.
7	IN2	
3	nFR_STBY	Active-Low Reset Output/Standby Mode Pin. When over-temperature or over-current occurs and latches, pull nFR_STBY pin down to reset the device. If all the inputs and nFR_STBY pins are low, the device will enter into standby state. Connect it to the ground through a 10kΩ resistor if not used.
4	CL	Adjustable Current Limit. Connect respective resistor to GND_IC to set the current limit foldback level. If the current limit foldback function is not used, short this pin and the DLY pin to GND_IC.
5	GND_IC	Device Ground.
6	DLY	Over-Current Mask-Time Setting Pin. Connect respective capacitor to set the over-current mask-time. If the current limit foldback function is not used, short this pin and the CL pin to GND_IC.
9, 10, 15, 16	VCC	Power Supply. Short all the VCC pins together and connect to the supply. Do not let any of VCC pin floating.
13, 14	OUT1	Power Output. Do not connect to ground if the channel is not used, should leave it floating, there is an internal high-valued resistor as bleeding path.
11, 12	OUT2	
Exposed Pad	GND_IC	Device Ground.

FUNCTIONAL BLOCK DIAGRAM

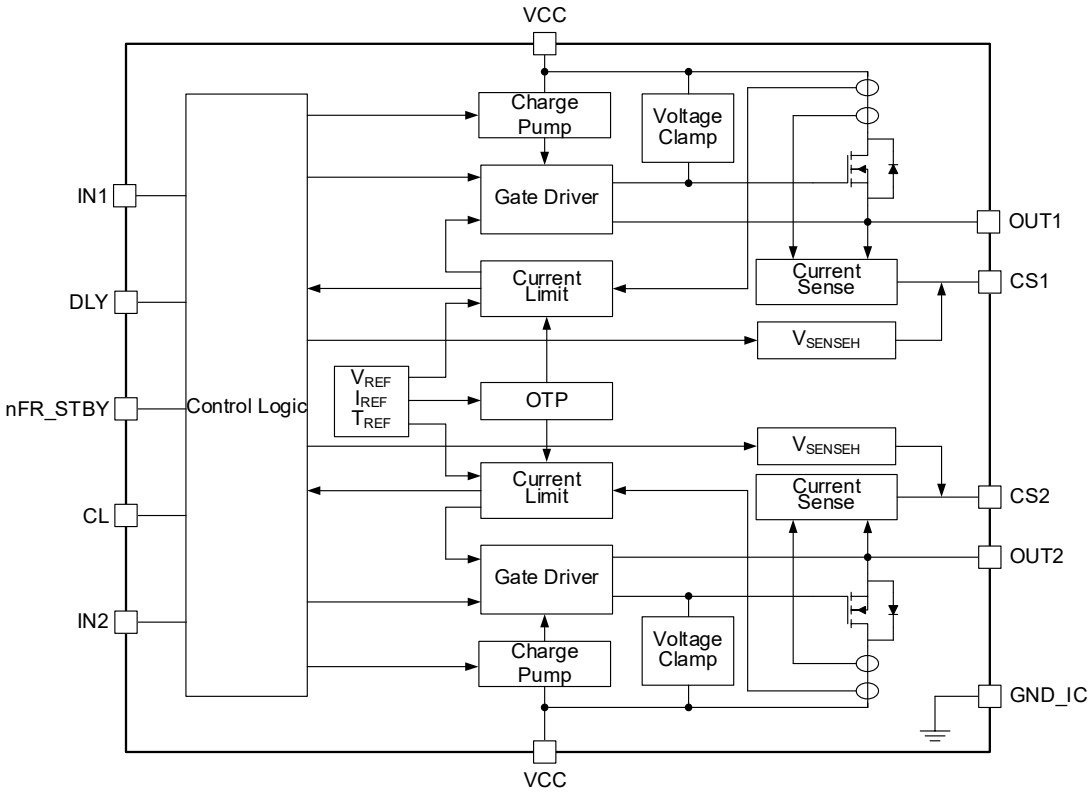
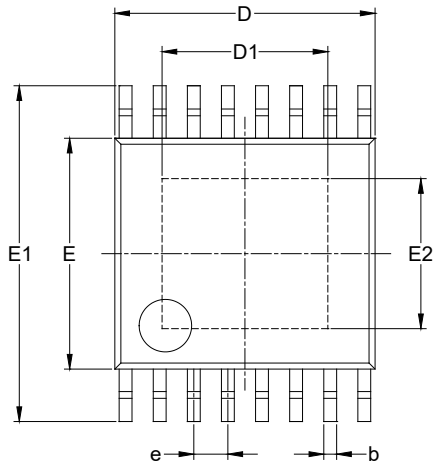
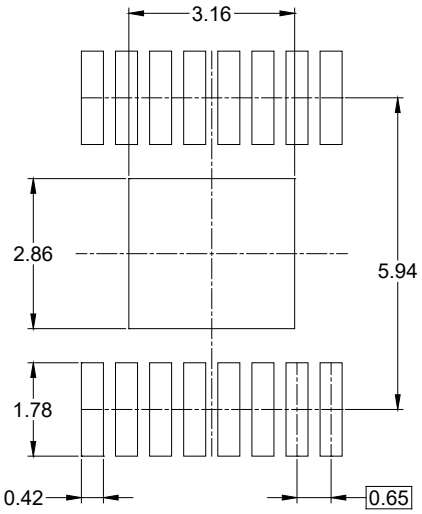


Figure 2. Block Diagram

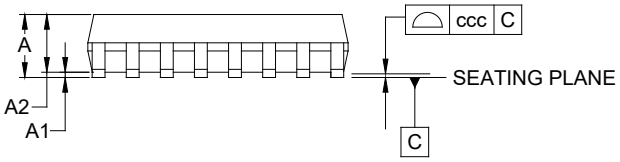
PACKAGE OUTLINE DIMENSIONS

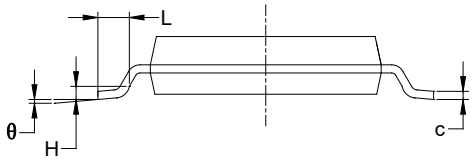
TSSOP-16A (Exposed Pad)





RECOMMENDED LAND PATTERN (Unit: mm)



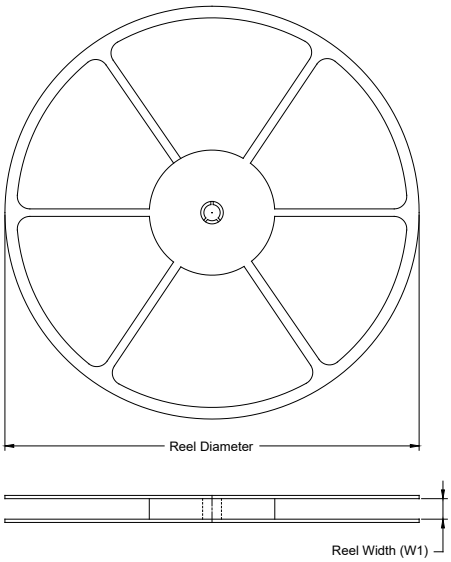


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	-	-	1.200
A1	0.000	-	0.150
A2	0.800	-	1.050
b	0.190	-	0.300
c	0.090	-	0.200
D	4.860	-	5.100
D1	2.960	-	3.360
E	4.300	-	4.500
E1	6.200		6.600
E2	2.660	-	3.060
e	0.650 BSC		
L	0.450	-	0.750
H	0.250 TYP		
θ	0°	-	8°
ccc	0.100		

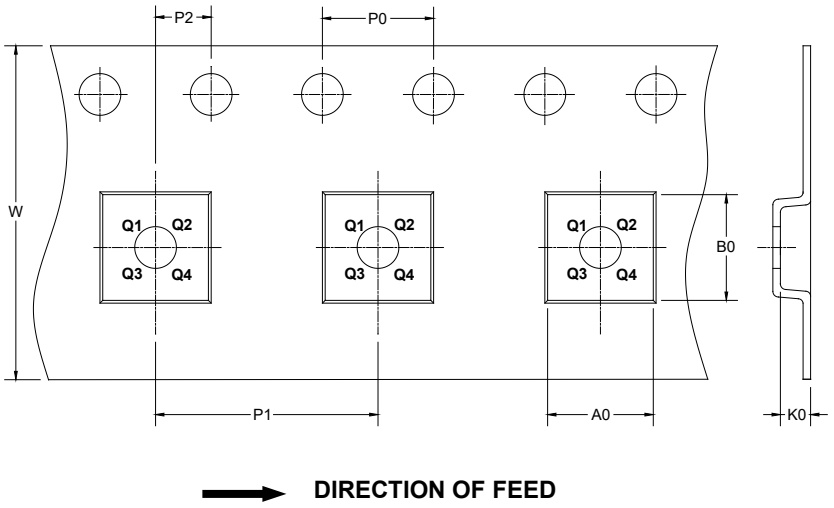
NOTES:
1. This drawing is subject to change without notice.
2. The dimensions do not include mold flashes, protrusions or gate burrs.
3. Reference JEDEC MO-153.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



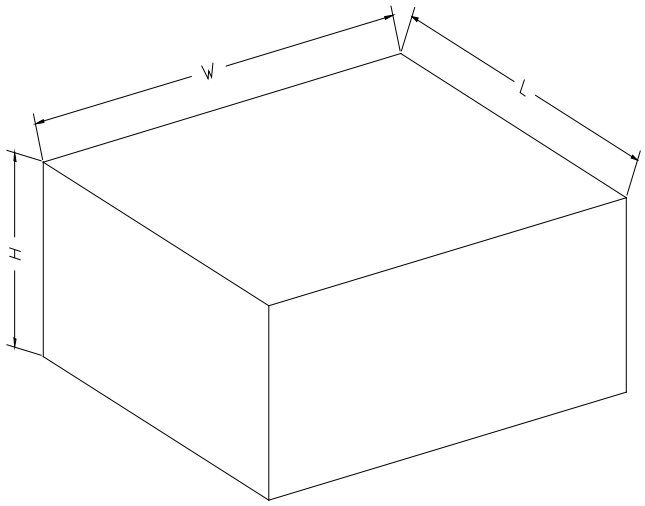
NOTE: The picture is only for reference. Please make the object as the standard.

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-16A (Exposed Pad)	13"	12.4	6.80	5.40	1.50	4.0	8.0	2.0	12.0	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
13″	386	280	370	5

DD0002