SGM48524D
Dual 5A, High-Speed, Low-Side Gate Driver with Negative Input Voltage Capability

GENERAL DESCRIPTION

The SGM48524D is a dual high-speed low-side gate driver for power switches. It has rail-to-rail driving capability and can sink or source up to 5A peak current with capacitive loads. The propagation delays are very short and well matched between the two channels that make the device well suited for applications that need accurate dual gate driving such as synchronous rectifiers. The matched propagation delays also allow for paralleling the two channels when higher driving current is required (such as for paralleled switches). The input voltage thresholds are fixed, independent of supply voltage (V_{DD}), and compatible with low voltage TTL and CMOS logic. Noise immunity is excellent due to the wide hysteresis window between the input low and high thresholds. The device has internal pull-up/pull-down resistors on the input pins to ensure low state on the driver output when the input is floating.

The SGM48524D is available in Green SOIC-8, TDFN-3×3-8L and MSOP-8 (Exposed Pad) packages.

APPLICATIONS

DC/DC Converters
Solar Power, Motor Drivers
Switched-Mode Power Supplies
Gate Drive for Emerging Wide Bandgap Devices

FEATURES

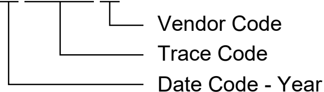
- **Two Independent Gate Drive Channels**
- **5A Source and 5A Sink Peak Currents**
- **Wide Supply Voltage Range: 4.5V to 18V**
- **TTL and CMOS Compatible Logic Threshold**
- **Logic Levels Independent of Supply Voltage**
- **Hysteretic Input Logic for High Noise Immunity**
- **Outputs Held Low when Inputs are Floating**
- **Fast Propagation Delays: 18ns (TYP)**
- **Fast Rise Time: 7ns (TYP)**
- **Fast Fall Time: 7ns (TYP)**
- **Ringing Suppression**
- **Negative Voltage Capability on INx Pins: -10V when (V_{DD} - V_{INx}) ≤ 20V**
- **Negative Voltage Capability on ENx Pins: -10V when (V_{DD} - V_{ENx}) ≤ 20V**
- **Negative Voltage Capability on OUTx Pin: -2V (Pulse < 200ns)**
- **Protection Features**
  - **Thermal Shutdown Protection**
  - **Under-Voltage Lockout**
- **-40℃ to +125℃ Operating Temperature Range**
- **Available in Green SOIC-8, MSOP-8 (Exposed Pad) and TDFN-3×3-8L Packages**

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM48524D	SOIC-8	-40℃ to +125℃	SGM48524DXS8G/TR	SGM 48524DXS8 XXXXX	Tape and Reel, 4000
	MSOP-8 (Exposed Pad)	-40℃ to +125℃	SGM48524DXPMS8G/TR	SGM03F XPMS8 XXXXX	Tape and Reel, 4000
	TDFN-3×3-8L	-40℃ to +125℃	SGM48524DXTDB8G/TR	SGM 03CDB 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

VDD .... -0.3V to 20V
Continuous INA, INB when (V_{DD} - V_{INx}) ≤ 20V
....-10V to V_{DD} + 0.3V
Continuous ENA, ENB when (V_{DD} - V_{ENx}) ≤ 20V
....-10V to V_{DD} + 0.3V
Continuous OUTA, OUTB (DC) ....-0.3V to V_{DD} + 0.3V
Pulse OUTA, OUTB (Pulse < 200ns)..........-2V to V_{DD} + 0.3V
Package Thermal Resistance
SOIC-8, $θ_{JA}$ .... 121℃/W
MSOP-8 (Exposed Pad), $θ_{JA}$..................................... 55℃/W
TDFN-3×3-8L, $θ_{JA}$ .... 70℃/W
Junction Temperature...+150℃
Storage Temperature Range ....-65℃ to +150℃
Lead Temperature (Soldering, 10s) ....+260℃
ESD Susceptibility
HBM..7000V
CDM 1000V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage Range ....4.5V to 18V
Operating Junction 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.

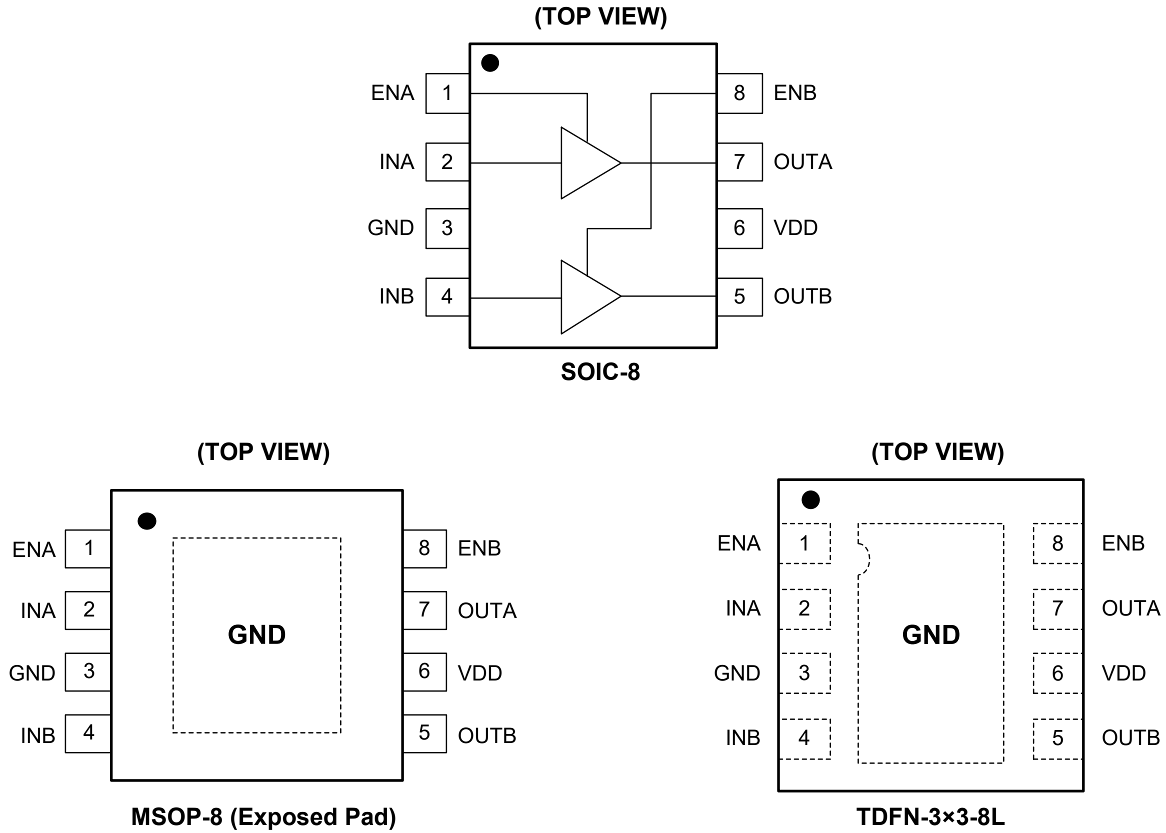
ESD SENSITIVITY CAUTION

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 CONFIGURATIONS



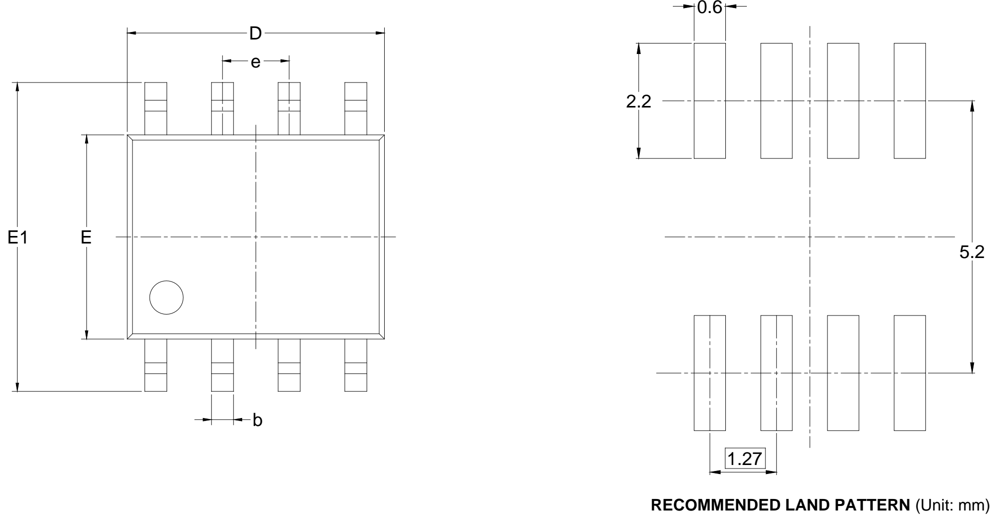
PIN DESCRIPTION

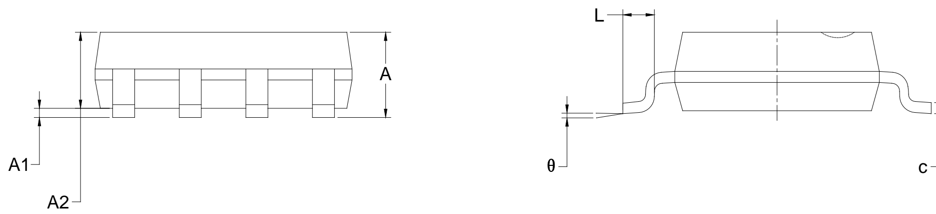
PIN	NAME	I/O	FUNCTION
1	ENA	I	Channel A Enable Input. Pull ENA high or leave it floating to enable OUTA output. Pull ENA low to disable OUTA output, ignoring INA state.
2	INA	I	Non-Inverting Input to Channel A. OUTA is held low if INA is unbiased or left floating.
3	GND	—	Ground. Reference pin for all signals.
4	INB	I	Non-Inverting Input to Channel B. OUTB is held low if INB is unbiased or left floating.
5	OUTB	O	Channel B Output.
6	VDD	I	Power Supply Input.
7	OUTA	O	Channel A Output.
8	ENB	I	Channel B Enable Input. Pull ENB high or leave it floating to enable OUTB output. Pull ENB low to disable OUTB output, ignoring INB state.
Exposed Pad	GND	—	Exposed Pad. It is internally connected to GND. Connect it to a large ground plane to maximize thermal performance; not intended as an electrical connection point.

NOTE: I: input, O: output.

PACKAGE OUTLINE DIMENSIONS

SOIC-8



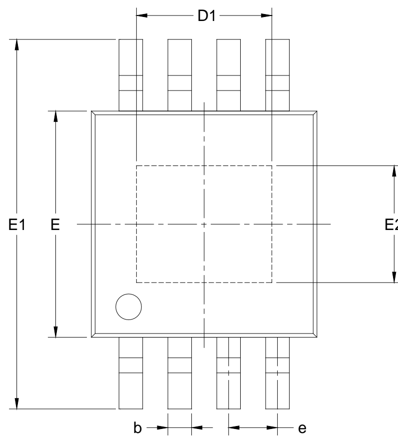


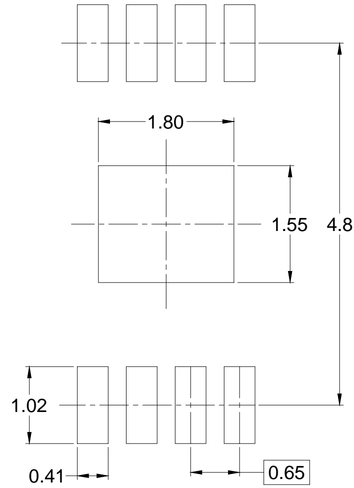
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	1.270	0.016	0.050
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.

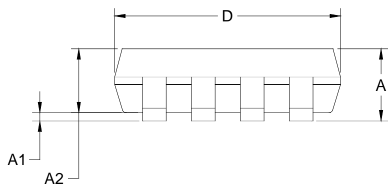
PACKAGE OUTLINE DIMENSIONS

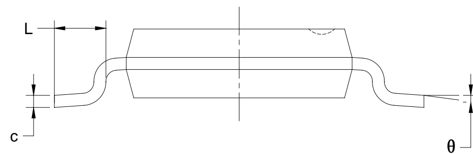
MSOP-8 (Exposed Pad)





RECOMMENDED LAND PATTERN (Unit: mm)



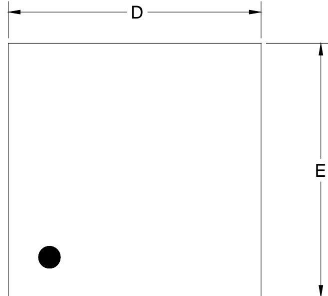


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
D1	1.700	1.900	0.067	0.075
e	0.65 BSC		0.026 BSC	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
E2	1.450	1.650	0.057	0.065
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

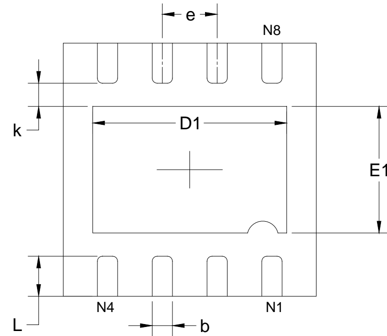
NOTES:
1. Body dimensions do not include mode flash or protrusion.
2. This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

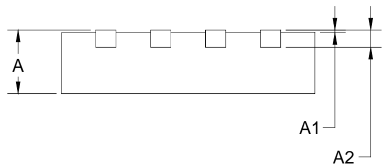
TDFN-3×3-8L



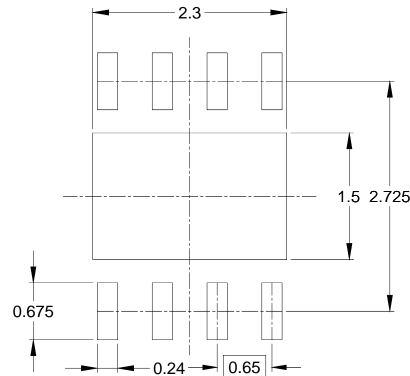
TOP VIEW



BOTTOM VIEW



SIDE VIEW



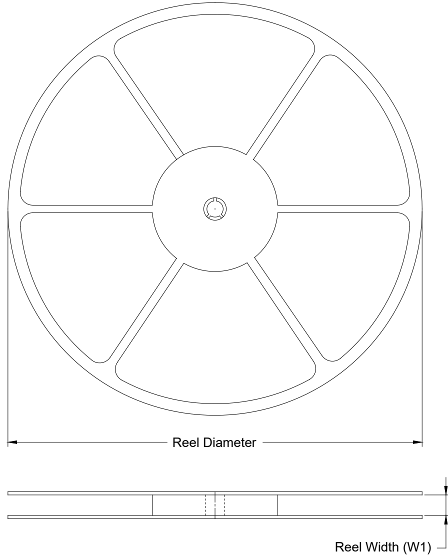
RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	2.200	2.400	0.087	0.094
E	2.900	3.100	0.114	0.122
E1	1.400	1.600	0.055	0.063
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.650 TYP		0.026 TYP	
L	0.375	0.575	0.015	0.023

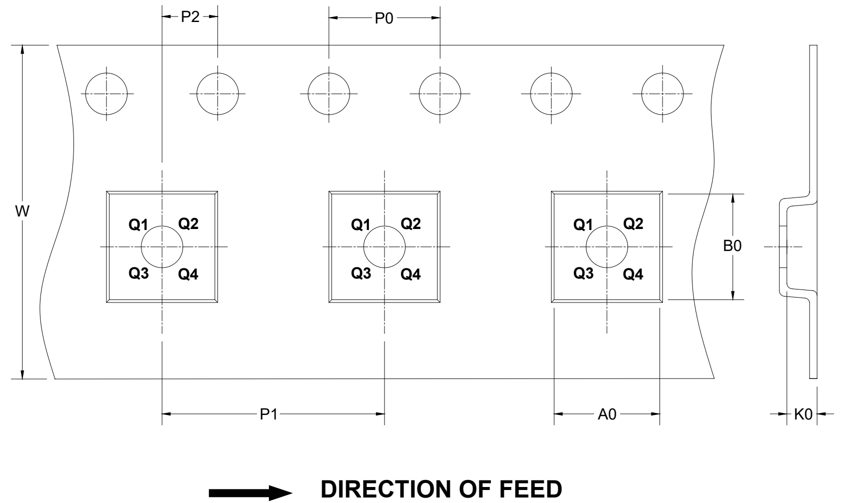
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

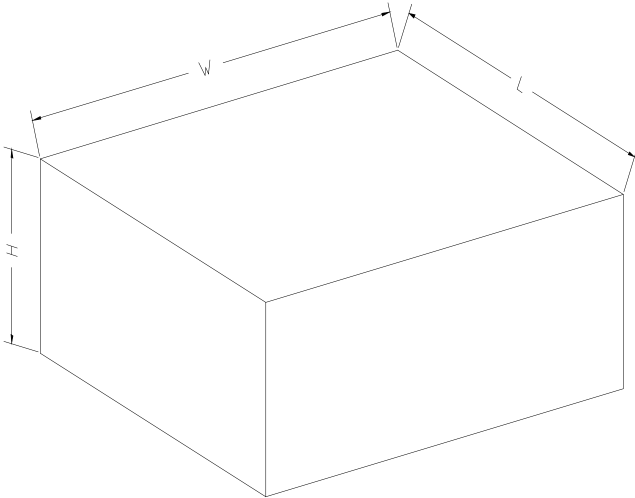
NOTE: The picture is only for reference. Please make the object as the standard.

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
SOIC-8	13″	12.4	6.40	5.40	2.10	4.0	8.0	2.0	12.0	Q1
MSOP-8 (Exposed Pad)	13″	12.4	5.20	3.30	1.50	4.0	8.0	2.0	12.0	Q1
TDFN-3×3-8L	13″	12.4	3.35	3.35	1.13	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