SGM48521Q
5V, 7A/6A Low-Side GaN and MOSFET Driver with 1ns Pulse Width

GENERAL DESCRIPTION

The high-speed, single-channel low-side driver SGM48521Q is designed to drive GaN FETs and logic level MOSFETs. Application areas include LiDAR, time of flight, facial recognition, and power converters using low-side drivers. The SGM48521Q provides 7A source and 6A sink output current capability. Split output configuration allows individual turn-on and turn-off time optimization depending on FET. Package and pinout with minimum parasitic inductances reduce the rise and fall time and limit the ringing. Additionally, the 2.2ns propagation delay with minimized tolerances and variations allows efficient operation at high frequencies.

The driver has internal under-voltage lockout and over-temperature protection against overload and fault events.

This device is AEC-Q100 qualified (Automotive Electronics Council (AEC) standard Q100 Grade 1) and it is suitable for automotive applications.

The SGM48521Q is available in Green WLCSP-0.88×1.28-6B and TDFN-2×2-6DL packages.

FEATURES

- **AEC-Q100 Qualified for Automotive Applications**
  Device Temperature Grade 1
  T_A = -40℃ to +125℃
- **5V Supply Voltage**
- **7A Peak Source and 6A Peak Sink Currents**
- **Ultra-Fast, Low-side Gate Driver for GaN and Si FETs**
- **Minimum Input Pulse Width: 1ns**
- **Up to 60MHz Operation**
- **Propagation Delay: 2.2ns (TYP), 3.5ns (MAX)**
- **Rise Time:**
  - **WLCSP-0.88×1.28-6B: 500ps (TYP)**
  - **TDFN-2×2-6DL: 600ps (TYP)**
- **Fall Time:**
  - **WLCSP-0.88×1.28-6B: 460ps (TYP)**
  - **TDFN-2×2-6DL: 590ps (TYP)**
- **Protection Features:**
  - **Under-Voltage Lockout (UVLO)**
  - **Over-Temperature Protection (OTP)**
- **Available in Green WLCSP-0.88×1.28-6B and TDFN-2×2-6DL Packages**

APPLICATIONS

Automotive Applications
Laser Distance Measuring System
5G RF Communication System
Wireless Charging System
GaN DC/DC Conversion System

TYPICAL APPLICATION

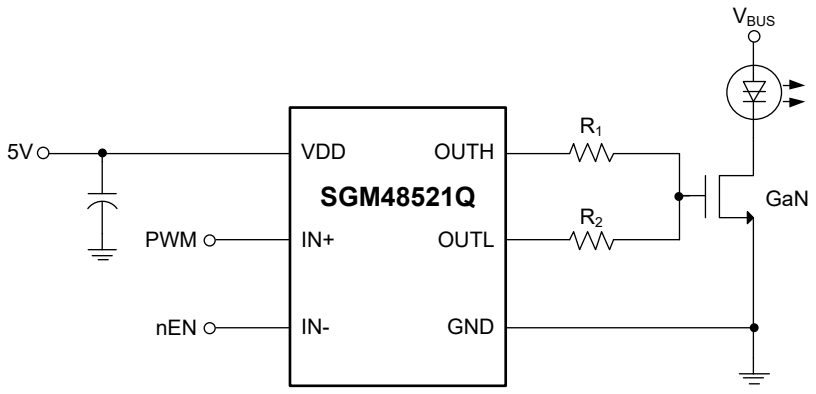


Figure 1. Typical Application Circuit

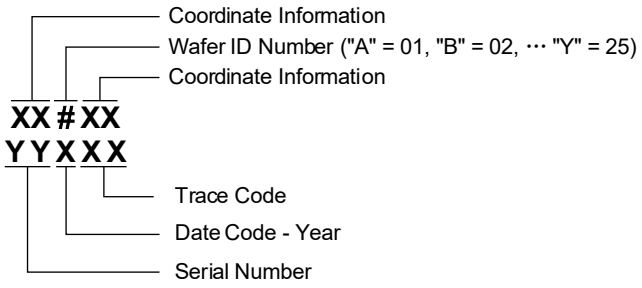
PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE DESCRIPTION	SPECIFIED TEMPERATURE RANGE	ORDERING NUMBER	PACKAGE MARKING	PACKING OPTION
SGM48521Q	WLCSP-0.88×1.28-6B	-40℃ to +125℃	SGM48521QG/TR	XX#XX 00XXX	Tape and Reel, 3000
	TDFN-2×2-6DL	-40℃ to +125℃	SGM48521QTGC6G/TR	060 XXXX	Tape and Reel, 3000

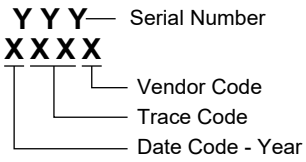
MARKING INFORMATION

NOTE: XXX = Date Code and Trace Code. XXXX = Date Code, Trace Code and Vendor Code. XX#XX = Coordinate Information and Wafer ID Number.

WLCSP-0.88×1.28-6B



TDFN-2×2-6DL



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

Supply Voltage, V_{DD} 6V
IN+, IN- Pin Voltage, V_{INx} ..... -0.3V to 6V
OUTH Pin Voltage, V_{OUTH} ..... -0.3V to V_{DD} + 0.3V
OUTL Pin Voltage, V_{OUTL} ..... -0.3V to 6V
Package Thermal Resistance
WLCSP-0.88×1.28-6B, θ_{JA} ..... 133℃/W
TDFN-2×2-6DL, θ_{JA} ..... 63℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM 4000V
CDM 1500V

RECOMMENDED OPERATING CONDITIONS

Supply Voltage, V_{DD} ..... 4.5V to 5.5V
IN+, IN- Pin Voltage, V_{INx} ..... 0V to 5.5V
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

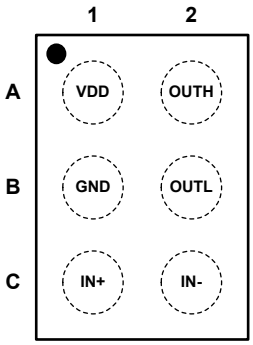
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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

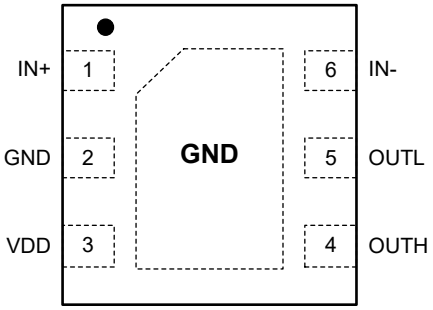
PIN CONFIGURATIONS

(TOP VIEW)



WLCSP-0.88×1.28-6B

(TOP VIEW)



TDFN-2×2-6DL

PIN DESCRIPTION

PIN		NAME	I/O	FUNCTION
WLCSP-0.88×1.28-6B	TDFN-2×2-6DL			
A1	3	VDD	I	Input Voltage Supply. Bypass to GND with a low inductance ceramic capacitor.
A2	4	OUTH	O	Pull-Up Gate Drive Output. Connect it to the gate of the target transistor with an optional resistor.
B1	2	GND	—	Ground.
B2	5	OUTL	O	Pull-Down Gate Drive Output. Connect it to the gate of the target transistor with an optional resistor.
C1	1	IN+	I	Non-Inverting Logic Input.
C2	6	IN-	I	Inverting Logic Input.
—	Exposed Pad	GND	—	Exposed Pad. It is internally connected to GND through substrate. Connect this pad to large copper area, which is generally a ground plane.

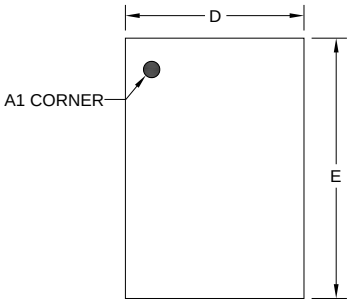
NOTE: I: input, O: output.

FUNCTION TABLE

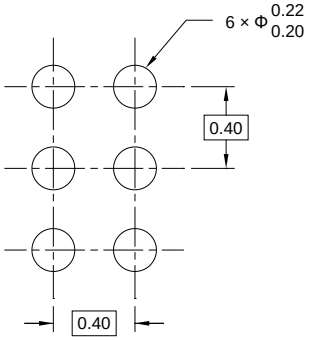
IN- Pin	IN+ Pin	OUTH Pin	OUTL Pin
L	L	Open	L
L	H	H	Open
H	L	Open	L
H	H	Open	L

PACKAGE OUTLINE DIMENSIONS

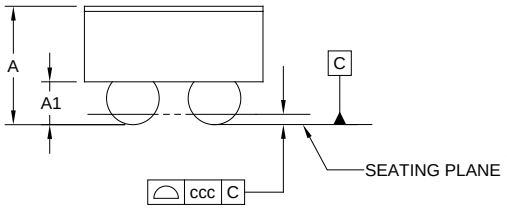
WLCSP-0.88×1.28-6B



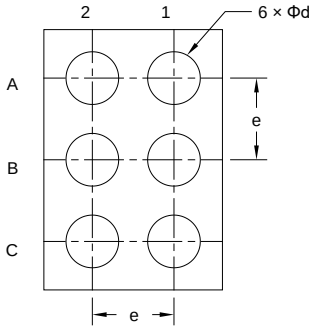
TOP VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



SIDE VIEW



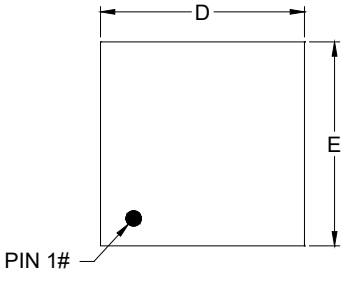
BOTTOM VIEW

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.535	0.580	0.625
A1	0.190	0.210	0.230
D	0.845	0.875	0.905
E	1.245	1.275	1.305
d	0.238	0.258	0.278
e	0.400 BSC		
ccc	0.050		

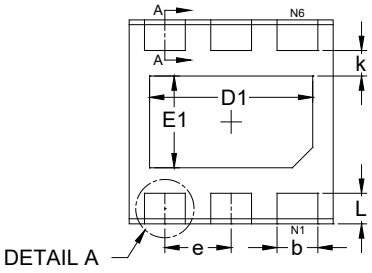
NOTE: This drawing is subject to change without notice.

PACKAGE OUTLINE DIMENSIONS

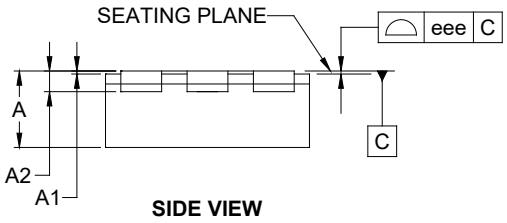
TDFN-2×2-6DL



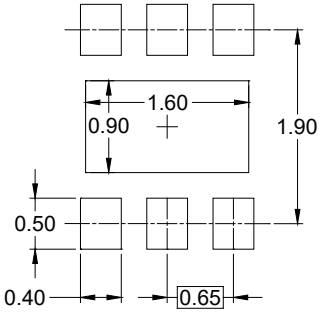
TOP VIEW



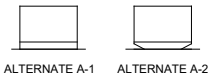
BOTTOM VIEW



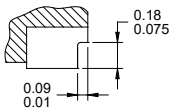
SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)



DETAIL A
ALTERNATE TERMINAL CONSTRUCTION



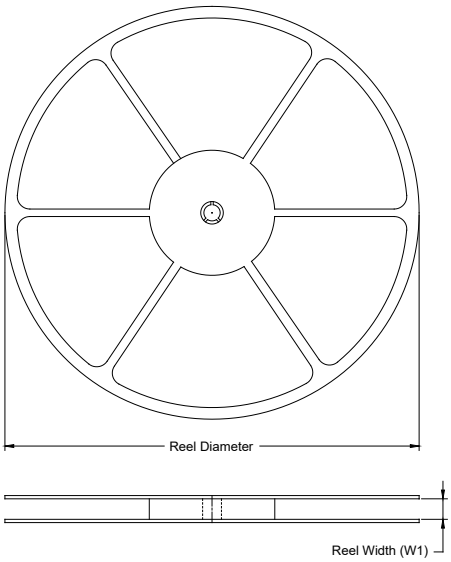
SECTION A-A
TERMINAL CROSS SECTION

Symbol	Dimensions In Millimeters		
	MIN	MOD	MAX
A	0.700	-	0.800
A1	0.000	-	0.050
A2	0.203 REF		
b	0.350	-	0.450
D	1.900	-	2.100
E	1.900	-	2.100
D1	1.500	-	1.700
E1	0.800	-	1.000
e	0.650 BSC		
L	0.250	-	0.350
k	0.250 REF		
eee	0.080		

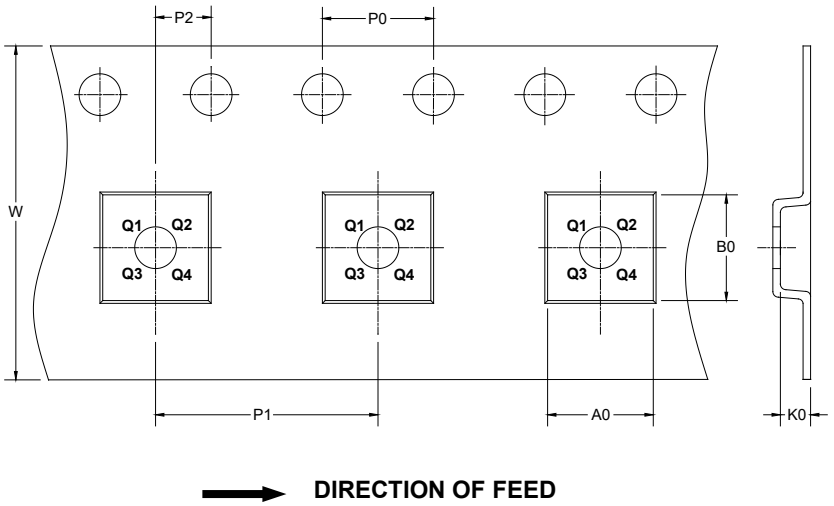
NOTE: This drawing is subject to change without notice.

TAPE AND REEL INFORMATION

REEL DIMENSIONS



TAPE DIMENSIONS



DIRECTION OF FEED

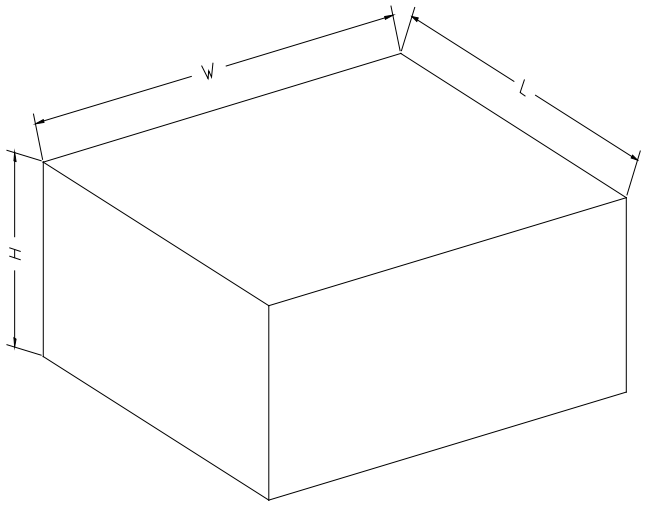
NOTE: The picture is only for reference. Please make the object as the standard.

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
WLCSP-0.88×1.28-6B	7"	9.5	0.99	1.38	0.69	4.0	4.0	2.0	8.0	Q1
TDFN-2×2-6DL	7"	9.5	2.30	2.30	1.10	4.0	4.0	2.0	8.0	Q2

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
7″ (Option)	368	227	224	8
7″	442	410	224	18

DD0002