

Input High Withstand Voltage 1A Linear Lithium Battery Charger

 Check for Samples: [LGS4056H](#)

Features

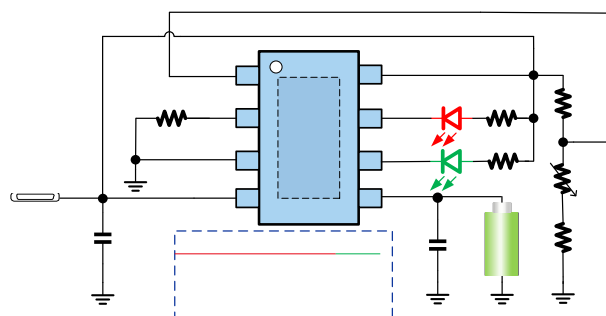
NEW Built in Linear Charger with High Input Voltage and Adjustable Charging Current:

- Input Voltage Range: 4V~24V (surge voltage up to 28V)
- The Maximum Charging Current Under Constant Current can reach 1A, and It supports Real-time Configuration of Charging Current by External Resistance
- Compatible with 5V USB Power Source and AC Adapter, and provides Hot Plug Protection
- Supports 4.2V/4.35V lithium battery types (default 4.2V version without suffix)
- Intelligent Regulation of Charging Current according to Battery Temperature and Input Voltage
- With Anti Backflow Function of Battery, The Leakage of Battery Terminal is less than 1uA
- Perfect Charge State Indication and Abnormal Indication such as Battery not connected
- Protection function: UVLO/OTP/OVP/ Charging Current Thermal Regulation/ Constant Current Charging Soft Start
- Junction Temperature Range From -40°C To +85°C
- All Pin Have $\pm 2000V$ (HBM) ESD Protection

Applications

- Mobile multimedia device, MP3, MP4
- Portable device with lithium battery power and USB input

Typical Application



Description

LGS4056H is a linear lithium battery charge management chip integrating lithium battery charge management and battery charge status indication, providing a complete power supply solution for a single lithium battery. LGS4056H has four charging processes: short-circuit current (SC), trickle current (TC), constant current (CC) and constant voltage (CV): short circuit charging (SC) can charge 0V battery; Trickle charging (TC) can pre charge the fully discharged battery; Constant current charging (CC) can quickly charge the battery; Constant voltage charging (CV) ensures safe charging of the battery. The charging cutoff voltage of LGS4056H is 4.2V by default. The charging current can be set through an external resistor. The maximum charging current is 1A. When the charging current drops to 1 / 10 of the set charging cutoff voltage, LGS4056H will automatically end the charging process, continuously detect the battery voltage, and automatically recharge when it falls to a certain threshold. When the input voltage (USB source or AC adapter) is removed, it will automatically enter the low power consumption mode, and the leakage at the battery end is below 1uA.

Purchasing Information

LGS4056H□□-□□□

Package

EP: ESOP8

DA: DFN2x2-8

DB: DFN3x3-8

Battery Voltage

Default :4.20V

4.35:4.35V

Part	Package	Top Mark
LGS4056HEP	ESOP8	LGS4056H YYWWX
LGS4056HDA	DFN2x2-8	4056H
LGS4056HDB	DFN3x3-8	4056H

YY: Production year. WW: Production week

X: Version number

Revision History ^(†)

Rev. C V0.1 16. Aug. 2021	Page
※ Version B begins. The relevant parameters in this manual are only for the description and recognition of the relevant indicators in version B	ALL
Rev. C V0.2 14. Feb. 2022	Page
※ Revision B. The content error correction and parameter adjustment are made for the initial version of version B.	ALL
Rev. C V0.3 18. Feb. 2022	Page
※ Revision B. Adjust the model of NTC function and add the resistance configuration of NTC model.	ALL
Rev. C V0.4 12. Mar. 2022	Page
※ Revision B. Add DFN package size information.	ALL

[†] NOTE: The page number of the previous version may be different from that of the current version.

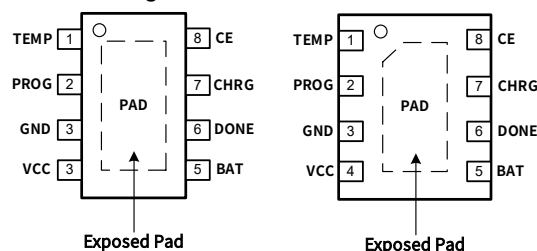
Absolute Maximum Ratings (†)

Table 3.1

Parameters	Range
Pin to GND Voltage (VCC, CHRG ,DONE, CE)	-0.3V~28V
Pin to GND Voltage (BAT, TEMP, PROG)	-0.3V~6V
Storage temperature	-65℃ to 150℃
Operating temperature	-40℃ to 125℃
ESD Rated Value (HBM)	±2000V
ESD Rated Value (CDM)	±1000V

† Note: if the working condition of the device exceeds the above "absolute maximum value", it may cause permanent damage to the device. This is only a limit parameter, and it is not recommended that the device work at or above the limit value. The reliability of the device may be affected if it works under the limit conditions for a long time.

Package Information

Picture 3. Pin Arrangement


ESD (electrostatic discharge) sensitive device

Live devices and circuit boards can be electrically charged without being noticed. Although this product has a patented or proprietary protection circuit, the device may be damaged in the event of high energy ESD. Therefore, appropriate ESD preventive measures should be taken to avoid device performance degradation or function loss.

Table 3.2 Pin Function Description

Pin	Name	Description
1	TEMP	Battery temperature detection pin. Connect the TEMP pin to the output terminal of the NTC sensor of the battery. If the voltage of the TEMP pin is less than 45% of the input voltage or greater than 80% of the input voltage, which means that the battery temperature is too low or too high, the charging is suspended. If the TEMP pin is grounded or floating, the battery temperature detection function is canceled and other charging functions are normal.
2	PROG	Constant current charging current setting and charging current monitoring pins. Connect an external 1% precision resistor to ground to set the charging current. The formula for setting values above 300mA is set as follows: $I_{BAT} = 1000 / R_{PROG}$, while for values below 300mA, it is set as $I_{BAT} = 900 / R_{PROG}$. Example: 1K corresponds to 1A charging; 2K corresponds to 0.5A charging; 9K corresponds to 0.1A charging.
3	GND	Chip ground.
4	VCC	Power input pin. Connect to the positive electrode of the power supply, and use a ceramic capacitor of at least 10uF effective value to bypass VCC and GND as close as possible.
5	BAT	Battery charging output pin. Connect to the positive electrode of the battery and place a ceramic capacitor with an effective value of at least 10uF to the ground.
6	DONE	Full indicator pin. Connected to the negative electrode of the LED lamp, when the battery is full, the pin outputs low level and the indicator light is on.
7	CHRG	Charging indicator pin. Connected to the negative electrode of the LED lamp. When the battery is charged, the pin outputs low level and the indicator light is on.
8	CE	Enable input pin. Connected to VCC or MCU control, high level enables charging and low level turns off charging.
EP	PAD	The heat dissipation pad at the bottom of the package can be connected with the chip GND and connected to the large copper-clad plane to achieve better heat dissipation.

Technical Specifications

Unless otherwise specified, the following data only represent the most possible parameter specifications when $T_J = 25^\circ\text{C}$, for reference only. All voltages are relative to GND. The minimum and maximum limits are specified by test, verification and statistical correlation.

Table 4.

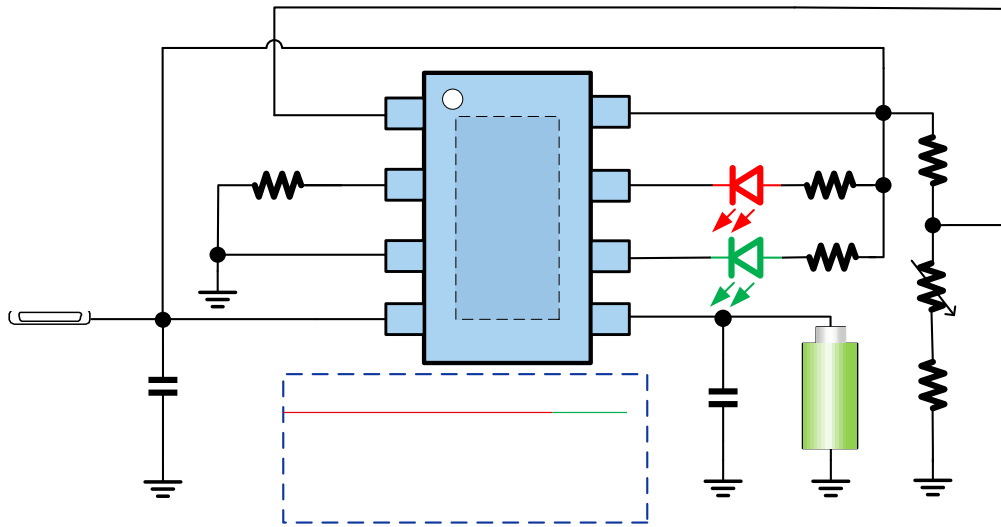
Parameter		Test Conditions	MIN	TYE	MAX	UNIT
(Linear Charging Characteristics)						
V _{CC}	VCC Operation Voltage			5		V
	VCC Threshold Voltage	Rising, V _{BAT} =3V, EN=1		4.0		V
		Falling, V _{BAT} =3V, EN=1		3.9		V
V _{OVP}	Input Overvoltage Protection			6.5		V
I _Q	VCC Quiescent Current	VCC=5V, EN=1, BAT Suspended		150		μA
	VCC Current	VCC=5V, EN=0, BAT Suspended		40		μA
	BAT current	VCC=0V, V _{BAT} =4.0V			1	μA
I _{SHORT} ⁽¹⁾	Short circuit charging (SC) current	V _{BAT} <V _{SHORT}		5%	7%	I _{CC}
V _{SHORT}	Short circuit charging (SC) threshold voltage	Less than this threshold		0.6		V
V _{SHORT_HYS}	Short circuit charging (SC) hysteresis voltage			0.1		V
I _{TC} ⁽¹⁾	Trickle charging (TC) current	V _{SHORT} <V _{BAT} <V _{PRE}		10%	14%	I _{CC}
V _{TC}	Trickle charge (TC) threshold voltage	Less than this threshold	2.65	2.90	3.15	V
V _{TC_HYS}	Trickle charging (TC) hysteresis voltage			0.5		V
I _{CC} ⁽¹⁾	Constant current charging (CC) (V _{BAT} =3.7V)	R _{PROG} =1K		1000		mA
		R _{PROG} =1.2K		800		mA
		R _{PROG} =2K		500		mA
		R _{PROG} =9K		100		mA
V _{CV} ⁽¹⁾	Constant voltage charging (CV) floating charge voltage	T _J =25℃		4.20		V
I _{TERM}	Constant voltage charging (CV) cut-off charging current			1/10		I _{CC}
V _{RECHRG}	Recharging threshold after full battery			95.7%		V _{CV}
R _{DS(ON)}	PMOS R _{DS(ON)}			1200		mΩ
Control logic signal						
V _{CE}	CE high level input voltage	CE Rising		1.37		V
	CE low level input voltage	CE Falling		1.16		V
Global thermal protection and battery temperature control characteristics						
V _{TEMP-H} ⁽²⁾	Battery overheat NTC threshold	Greater than this threshold, turn off charging		80%		VCC
V _{TEMP-L} ⁽²⁾	Battery overheat NTC threshold	Less than this threshold, turn off charging		45%		VCC
	Turn off NTC function	NTC pin floating or grounded				
T _{OTP}	Over temperature protection	T _J		150		℃
Indicator Light (LED)						
I _{CHRG}	LED drive current			5		mA
I _{DONE}	LED drive current			5		mA

(1) In order to protect the battery during charging, the chip will detect the battery voltage and perform four different charging stages, short

charge → trickle charge → constant current charge → constant voltage charge → charging stop.

- (2) For battery temperature control, the chip will detect the voltage on the temp pin to determine the temperature of the battery. Wherein the NTC resistor used is generally located inside the battery. In typical NTC applications, the NTC resistor built in the battery is connected in series with the resistor R2 and then connected in series with the resistor R1 to the VCC to the ground. Other combinations can be used according to NTC cold and hot thresholds. Please refer to NTC voltage and temperature thresholds for design.

Application Information: Typical Application Circuit



Picture 5 Typical Application Topology

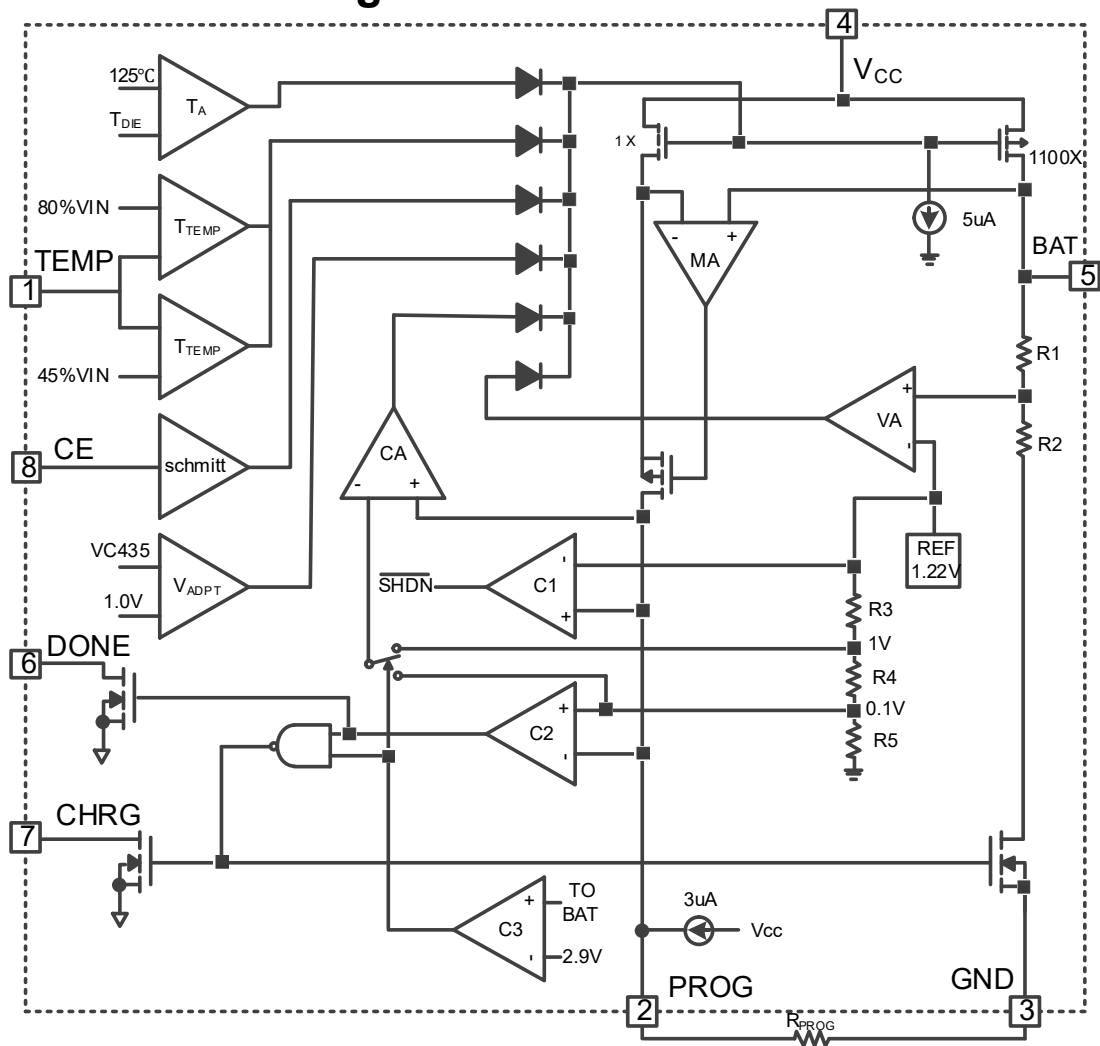
NOTE:

- Charging input pin VCC. A 10 μ F stabilizing ceramic capacitor is required, but due to certain startup conditions, extremely high transient voltage signals may be generated. Adding a 1 Ω resistor in series with the ceramic capacitor will minimize the transient signal of the startup voltage to the greatest extent possible. It is optional and not necessary.
- NTC function is not used, ground the TEMP pin. NTC resistors are generally located inside the battery, but can also be located outside. In typical applications, a 100K resistance NTC resistor with a B value of 4250K is used in series with a 62K resistor and then connected in series with a 100K resistor to VCC to ground. This combination ensures that the battery is turned off for charging below 0 $^{\circ}$ C and above 60 $^{\circ}$ C, protecting the battery. If using other combinations or models, please refer to the battery temperature detection function description on page 8 for reasonable design or consult our FAE for reasonable suggestions on combinations. Attention: As the VCC pin is a high voltage pin, and the TEMP pin is connected to ground through a VCC voltage divider resistor, it is necessary to ensure that the resistance between the VCC and TEMP pins is greater than 10K. This can ensure that when the VCC is subjected to high voltage, the TEMP circuit current is limited, and the TEMP potential clamp is at a safe voltage.
- For the heat dissipation pad at the bottom of the chip, a large copper-clad area should be used to connect to the PCB ground plane, which helps to minimize the PCB conduction loss and thermal stress, and prevent the charging current drop due to the high chip temperature.
- When using the LED indicator light, it is recommended to connect a 1K current limiting resistor to VCC. Do not use the charging indicator function, the corresponding pin needs to be grounded. If CHRГ and DONE are connected to other power supplies through resistors, it is necessary to ensure that the power supply will not have pulses or fluctuations when VCC is powered on. If there are pulses at the DONE pin when starting VCC power on, the system will not work. Current limiting resistors must be used separately.

Component Selection Recommendation

Symbol	Meaning	Requirement
C _{VCC}	USB charging input constant voltage capacitor	10μF (effective value) ceramic capacitor
C _{BAT}	Battery charging output voltage stabilizing capacitor	10μF(effective value) ceramic capacitor
R _{CHRG} R _{DONE}	LED Current limiting resistor	Choose according to the brightness demand of the lamp, 1K or more
R _{PROG}	Constant current charging current setting resistance	Accuracy: 1%, by formula $I_{BAT} = (V_{PROG} / R_{PROG}) \times 1000$ setting is completed.
R _{NTC}	NTC Thermistor	100K, B-Value: 4250K, Accuracy: 1%

Functional Block Diagram



Picture 6. Internal Functional Block Diagram

Application Information: Linear Lithium Battery Charger

Summary

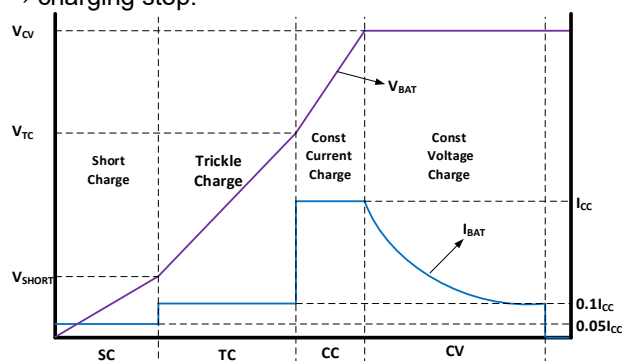
LGS4056H is a lithium battery linear charge management IC that integrates lithium battery charge management, battery charge state indication and 24V input withstand voltage, providing a complete power supply solution for a single lithium battery. LGS4056H has four charging processes: short circuit (SC), trickle current (TC), constant current (CC) and constant voltage (CV): short circuit charging (SC) can charge 0V battery; Trickle charging (TC) can pre charge the fully discharged battery; Constant current charging (CC) can quickly charge the battery; Constant voltage charging (CV) ensures safe charging of the battery.

The charging cutoff voltage of LGS4056H is 4.2V by default. The charging current can be set through an external resistor. The maximum charging current is 1A. When the charging current drops to 1 / 10 of the set value, the LGS4056H will automatically end the charging process, then continuously detect the battery voltage, and automatically recharge when it falls to a certain threshold. When the input voltage (USB source or AC adapter) is removed, it will automatically enter the low power consumption mode, and the leakage at the battery end is below 1uA. LGS4056H integrates charging and full charge prompts, and battery not connected indication.

Normal Charging Cycle

When the V_{CC} voltage of LGS4056H is greater than UVLO, wait for the internal power supply of the chip to start, and then start a charging cycle.

In order to protect the battery during charging, the chip will detect the battery voltage and perform different charging stages, such as short charge → trickle charge → constant current charge → constant voltage charge → charging stop.



Picture 7. Battery Charging Cycle

When the voltage on BAT is lower than V_{SHORT} (typical value 0.6V), in order to prevent the deep discharged lithium-ion battery from being damaged or even dangerous during fast charging, 5% preset charging current will be used to wake up at this stage.

When the voltage on the BAT is lower than V_{TC} (typical value 2.9v) and higher than V_{SHORT} (typical value 0.6V), the charging cell will enter the trickle charging mode (also known as the pre charging mode of lithium battery) to recover the battery cell. In this mode, the charging current will be reduced to 10% of the preset charging current.

When the battery voltage rises above V_{PRE} (typical value 2.9v), the charging current will rise to the full speed preset current for constant current charging mode.

When the preset charging voltage V_{CV} (4.2 / 4.3 / 4.35) is reached, the LGS4056H will enter into constant voltage charging, and the charging current will start to drop until it reaches I_{TERM} (typical value 1 / 10 I_{CC}), then the charging will be stopped.

After the charging is stopped, the chip enters the standby state and continuously detects the BAT voltage. When the bat voltage drops to V_{RECHRG} (recharging

threshold), it will automatically enter a new charging cycle to ensure that the battery is at the full charge level.

Set Output Current

The charging current of LGS4056H can be set through a resistor connected between the ROG pin and ground. Determine the resistance of the resistor based on the required charging current. In all modes of the charging process, the charging current can be estimated by measuring the voltage of this pin. Formula for setting above 300mA: Formula:

$$I_{BAT} = (V_{PROG} / R_{PROG}) \times 1000 \text{ (mA)}$$

Formula for setting below 300mA: Formula:

$$I_{BAT} = (V_{PROG} / R_{PROG}) \times 900 \text{ (mA)}$$

Example: 1K corresponds to 1A charging; 2K corresponds to 0.5A charging; 9K corresponds to 0.1A charging.

To achieve 1A charging, the input/output voltage difference needs to be greater than 1.2V and sufficient heat dissipation is required to maintain maximum current charging.

Charge Status Indicator

LGS4056H integrates charging and full charge prompts, as well as three charging status indicators for unconnected batteries. When the battery is not connected, the LED light will enter a flashing alarm state. LGS4056H has two open drain output terminals: CHRG and DONE. When charging is in progress, CHRG is pulled to a low level and DONE is in a high resistance state; After the charging is completed, CHRG is in a high resistance state and DONE is pulled to a low level. **If the status indication function is not used, the output terminal of the unused status indication will be grounded. The DONE pin cannot have pulses when powered on to VCC.**

STATE	CHRG	DONE
Charge	ON	OFF
Done	OFF	ON
Abnormal	Twinkle	ON
Undervoltage、Temperature Too High Or Too Low	OFF	OFF

Application Information: Linear Lithium Battery Charger

CE Controlled Charging

At any time in the charging cycle, the LGS4056H can be placed in the shutdown mode by setting the CE terminal to the low potential or removing the R_{PROG} (thereby floating the PROG pin). This reduces the battery leakage current to 1 μA or less, and the power supply current drops to 40 μA or less. Reset the CE terminal to high potential or connect the setting resistor to start a new charging cycle.

Thermal Considerations For Packaging

ESOP8 package is small in size, so it is very important to adopt a PCB layout with good thermal design to maximize the available charging current. The heat dissipation path for dissipating the heat generated by the IC is from the chip to the lead frame, and reaches the copper clad surface of the PCB through the heat sink at the bottom. The copper clad surface of PCB board is a radiator. The area of the copper foil connected to the heat sink shall be as wide as possible and extend outward to a larger copper area so as to dissipate heat to the surrounding environment. Through holes to the inner or back copper circuit layer are also useful in improving the overall thermal

performance of the charger. When the PCB layout is designed, other heat sources unrelated to the charger on the circuit board also. They must be considered because they will have an impact on the overall temperature rise and the maximum charging current.

High voltage hot plugging

If a spike higher than the input VCC withstand voltage can be seen when the USB interface is powered on in the overall plan, a 1 Ω resistor can be connected in series with the VCC capacitor to filter out the spike.

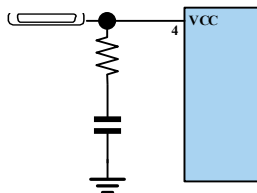


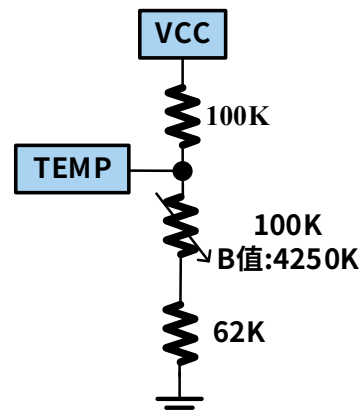
Figure 5. Hot swappable Type-C high-voltage interface

NTC resistor selection (series type)

In order to prevent damage to the battery caused by too high or too low temperature, the LGS4056H integrates a battery temperature monitoring circuit. Battery temperature monitor the measurement is realized by monitoring the voltage of the TEMP pin. The voltage of the TEMP pin is realized by the NTC thermistor and a resistance voltage dividing network in the battery, as shown in the typical application circuit or the figure below. LGS4056H compares the voltage of the TEMP pin with the two thresholds VTEMP-H and VTEMP-L inside the chip to confirm whether the temperature of the battery exceeds the normal range. $V_{TEMP-L} = 45\% \times V_{CC}$, $V_{TEMP-H} = 80\% \times V_{CC}$.

If the voltage of the TEMP pin $V_{TEMP} < V_{TEMP-L}$ or $V_{TEMP} > V_{TEMP-H}$, it indicates that the temperature of the battery is too high or too low, and the charging process will be terminated; **If the battery temperature monitoring function is not required, the TEMP pin must be grounded.**

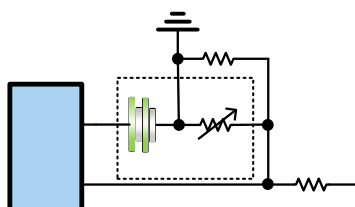
Set the low temperature threshold of the battery to 0 °C and the high temperature threshold to 60 °C through the resistance selection in the following figure.



Picture 9. TEMP Pin Resistance Configuration

Application information: NTC resistor selection (parallel type)

To prevent damage to the battery caused by high or low temperatures, LGS4056H monitors the battery temperature by measuring the NTC voltage. When the rate K ($K=V_{NTC}/V_{DD}$) reaches the UTP (K_{UT}) or OTP (K_{OT}) threshold, the controller triggers UTP or OTP. If the voltage of the NTC pin is less than 45% of the VDD voltage or greater than 80% of the VDD voltage, it means that the battery temperature is too high or too low, and charging is paused. Compatible with the commonly used 4056 parallel temperature sensing network on the market, as shown in the following figure. Choose R2 and R1 to program appropriate UTP and OTP temperature threshold points.



Calculation steps:

1. Define K_{UT} , $K_{UT}=73\%\sim 83\%$, typical value 80%
2. Define K_{OT} , $K_{OT}=42\%\sim 48\%$, typical value 45%
3. Assuming that the NTC thermistor of the battery is R_{UT} at the UTP threshold and R_{OT} at the OTP threshold.
4. Calculate R1

$$R_1 = \frac{R_{OT}R_{UT}(K_{UT} - K_{OT})}{(R_{UT} - R_{OT})K_{UT}K_{OT}}$$

5. Calculate R2

$$R_2 = \frac{R_{OT}R_{UT}(K_{UT} - K_{OT})}{R_{OT}(K_{OT} - K_{OT}K_{UT}) - R_{UT}(K_{UT} - K_{OT}K_{UT})}$$

If the typical values $K_{UT}=80\%$ and $K_{OT}=45\%$ are selected, then

$$R_1 = \frac{0.97R_{OT}R_{UT}}{(R_{UT} - R_{OT})}$$

$$R_2 = \frac{0.35R_{OT}R_{UT}}{0.09R_{OT} - 0.44R_{UT}}$$

We choose the market

T/°C	R _{NTC}	Resistance B value	R1	R2	模型
0°C~60°C	10K, accuracy of 1%	3380K	3.9K	51K	
0°C~60°C	100K, accuracy of 1%	4250K	27K	180K	
-10°C~60°C	10K, accuracy of 1%	3380K	3.6K	24K	
0°C~45°C	10K, accuracy of 1%	3380K	6.2K	330K	
0°C~45°C	100K, accuracy of 1%	4250K	47K	470K	
0°C~45°C	10K, accuracy of 1%	3380K	6.2K	0K	

Application Information: Linear Lithium Battery Charge Management Chip (Chart)

Figure 9. Electrical Characteristics (Unless Otherwise Specified, $T_A = 25^\circ\text{C}$)

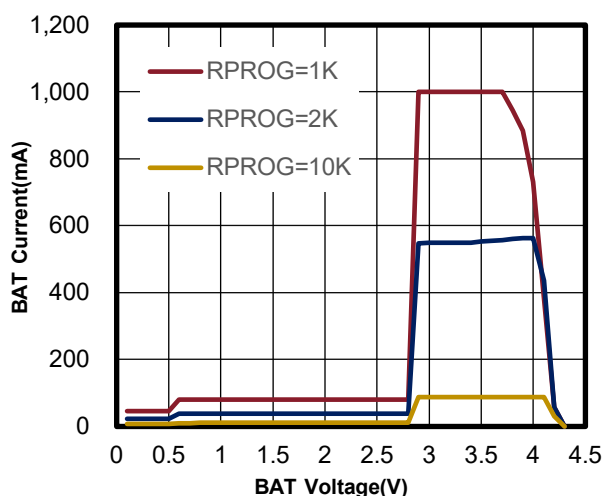


Figure 9.a BAT Current vs BAT Voltage

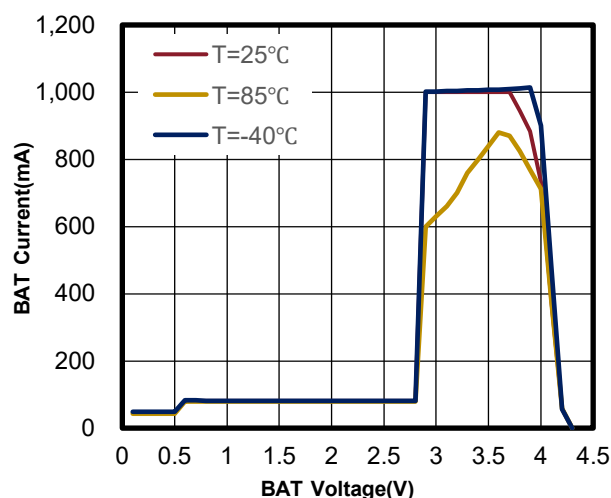


Figure 9.b BAT Current vs Temperature

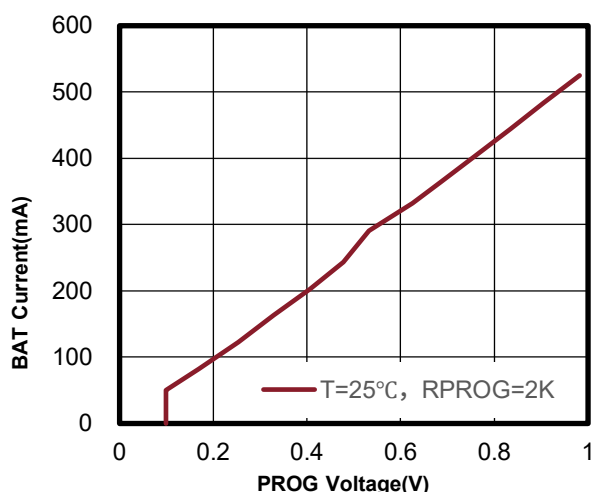


Figure 9.c PROG Voltage vs Temperature

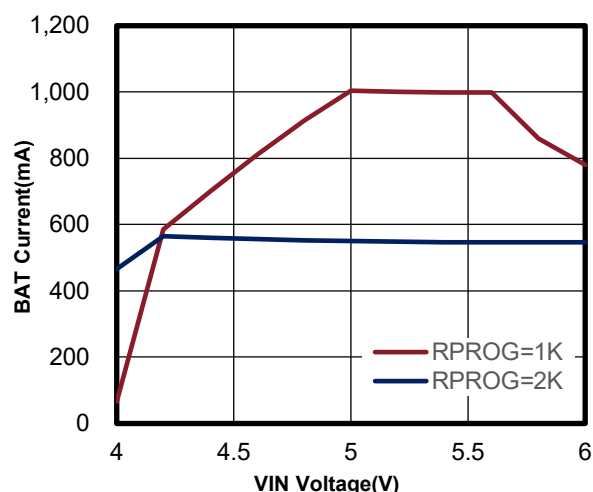


Figure 9.d VIN Voltage vs RPROG

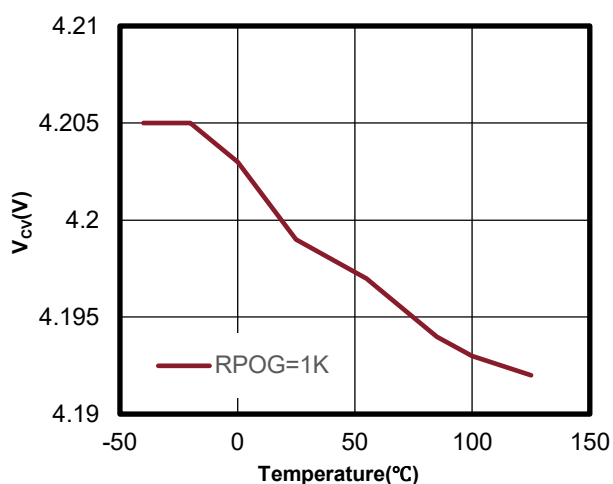


Figure 9.e V_{CV} vs Temperature

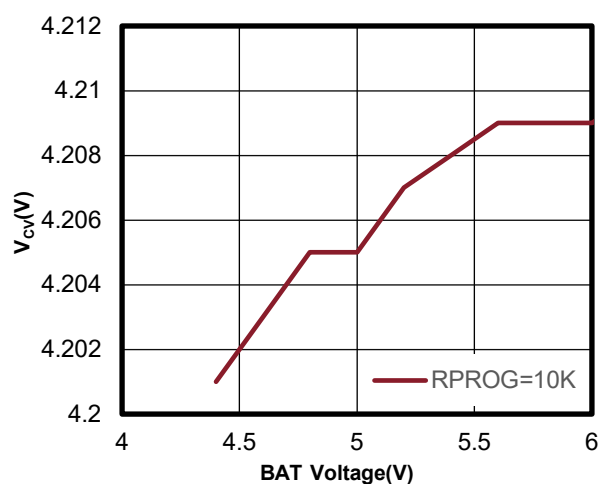


Figure 9.f V_{CV} vs VIN Voltage

Application Information: Reference Layout Example

Summary

Poor layout will affect the performance of LGS4056H, resulting in electromagnetic interference (EMI), poor electromagnetic compatibility (EMC), ground jump and voltage loss, which will further affect voltage regulation and stability. In order to optimize its electrical and thermal performance, the following rules should be applied to achieve good PCB layout and wiring to ensure the best performance:

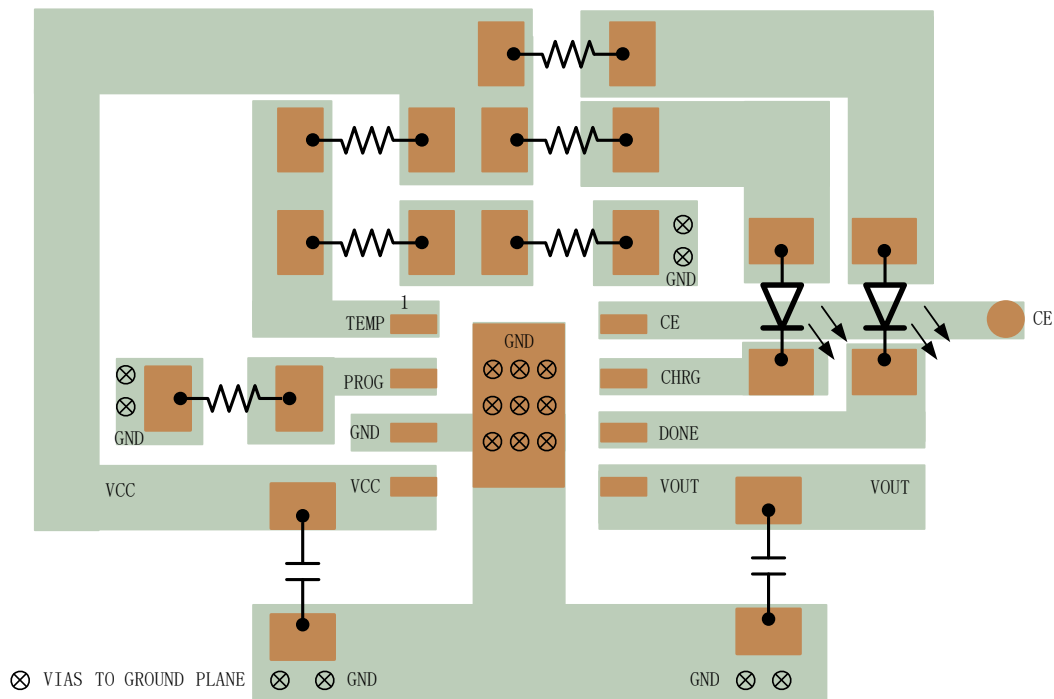
■ Place the input capacitor C_{IN} as close as possible

to the VCC (PIN4) and GND (PIN3) pins. To minimize high-frequency noise, it is recommended to place ceramic capacitors close to the BAT and VCC input terminals, with wiring very close to the chip pins.

■ For high current paths, a larger PCB copper-clad area and direct connection to solder pads should be used, including the GND pin (PIN3). This helps to minimize PCB conduction losses and thermal stress to the greatest extent possible.

■ To minimize via conduction loss and reduce module thermal stress, multiple vias should be used to achieve interconnection between the top layer and other power layers or strata. (Adding via windows to the bottom solder pads of the chip helps with heat dissipation and improves performance)

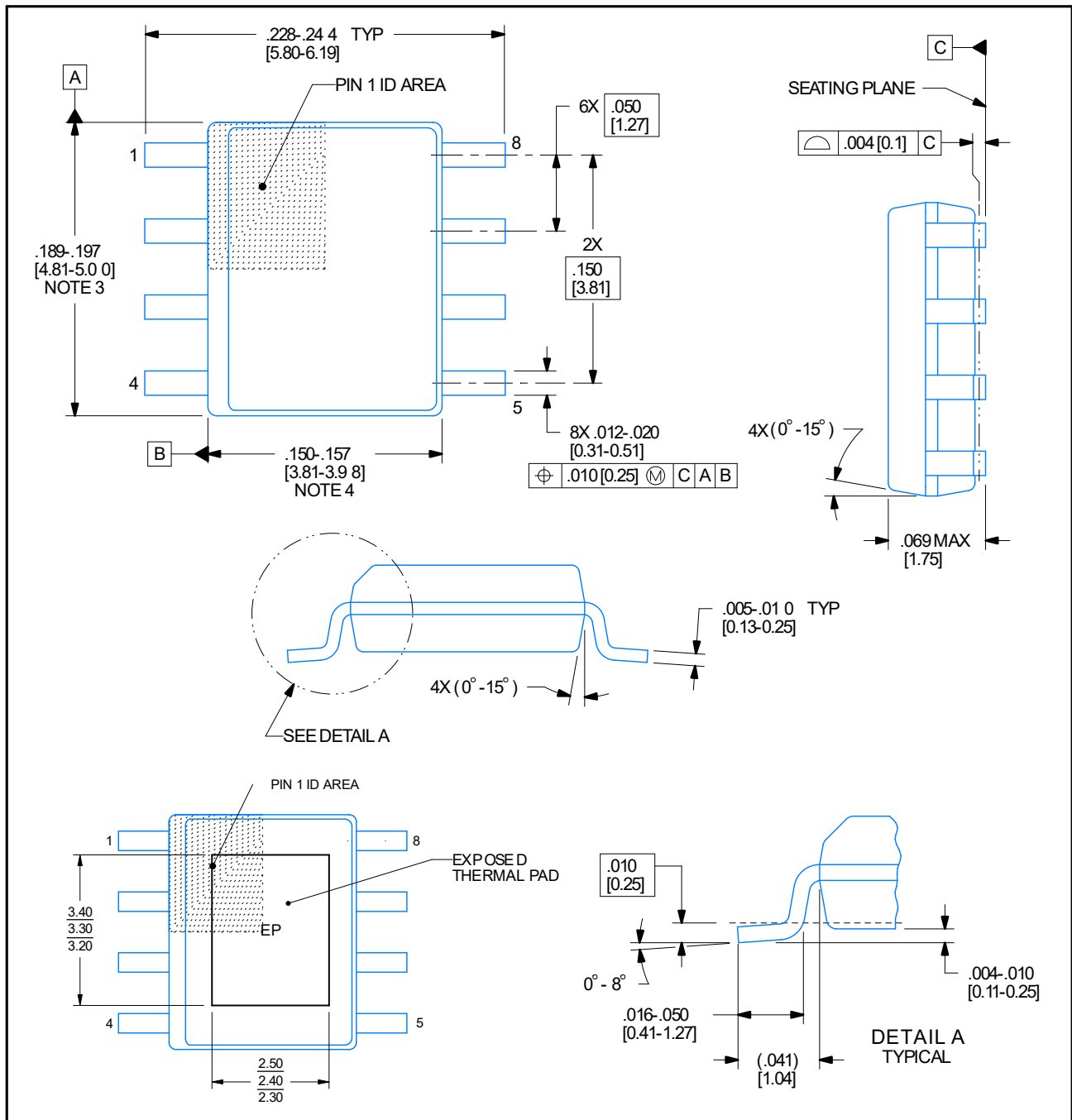
■ The impedance of the R_{PROG} pin is relatively high, and the lead trajectory of the R_{PROG} should be as short as possible when away from the heat source of the chip to reduce interference with the charging current setting.



Picture 10 Recommended PCB Layout Example

Footprint Description (ESOP8)

8-Pin Plastic Encapsulated SOIC With Bottom EPAD

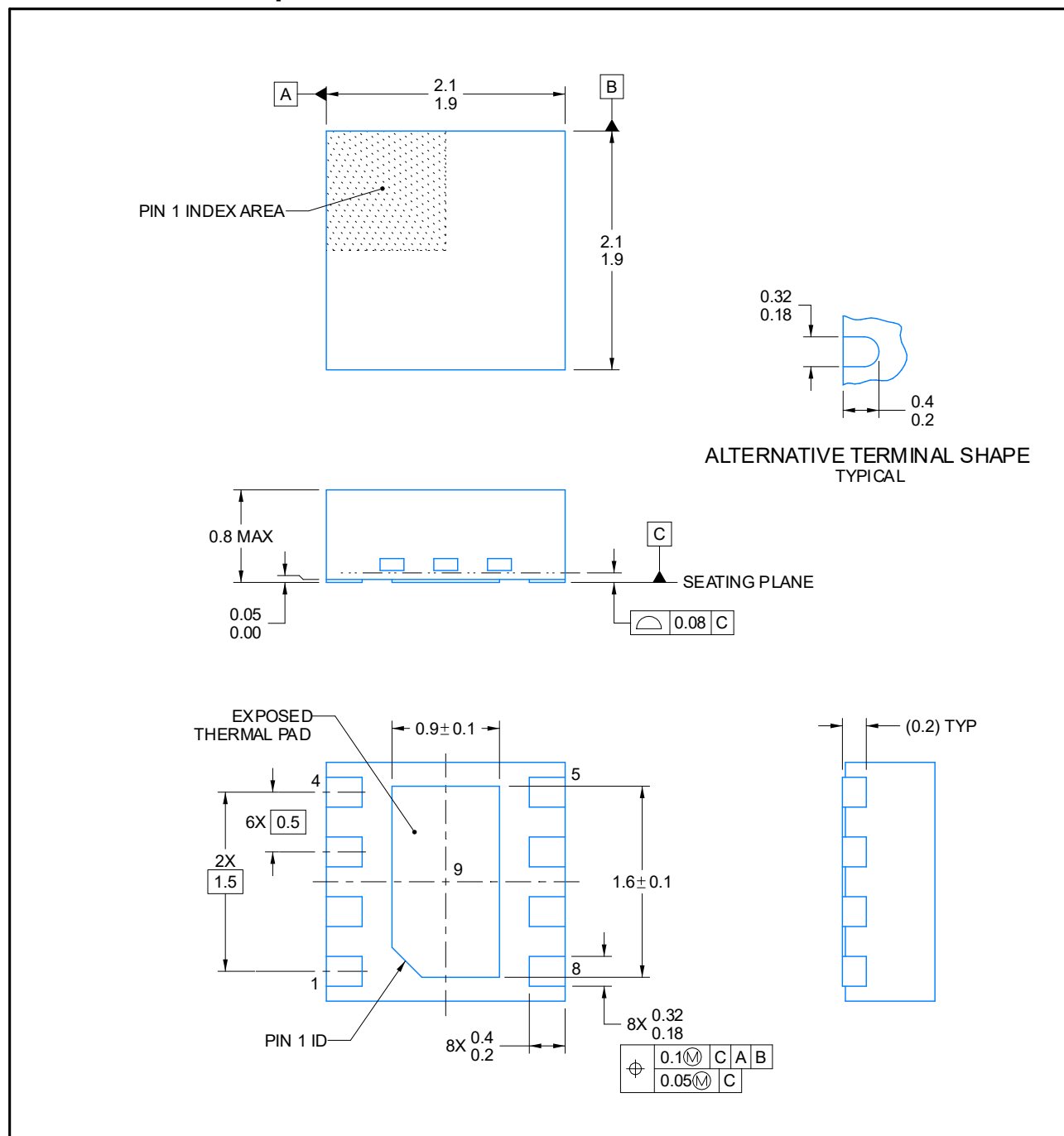


NOTE:

- 1) Any size in brackets is for reference only. Dimensions and tolerances shall conform to ASME Y14.5M
- 2) This drawing is subject to change without notice.
- 3) This size does not include mold burrs, projections, or nozzle burrs. The burrs or protrusions on each side of the mold shall not exceed 0.15mm.
- 4) This dimension does not include the burr of the mold, and the burr or protrusion on each side of the mold shall not exceed 0.25 mm.

Footprint Description (DFN8-2.0 * 2.0)

8-Pin Plastic Encapsulated SOIC With Bottom Pad

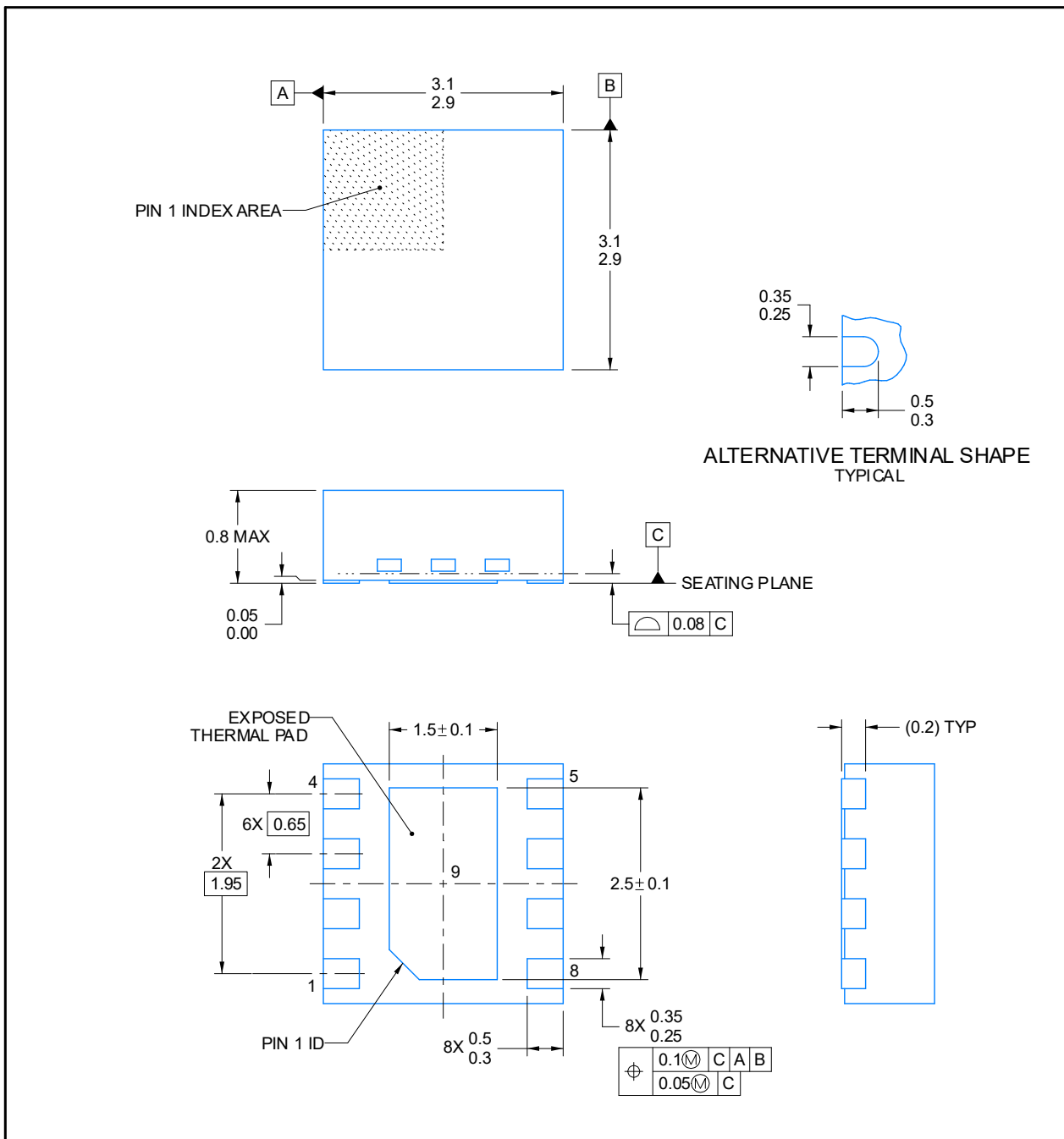


NOTE:

- 1) All data units are in mm. Any size in brackets is for reference only. Dimensions and tolerances shall conform to ASME Y14.5M
- 2) This drawing is subject to change without notice.
- 3) This size does not include mold burrs, projections, or nozzle burrs. The burrs or protrusions on each side of the mold shall not exceed 0.15mm.
- 4) This dimension does not include the burr of the mold, and the burr or protrusion on each side of the mold shall not exceed 0.25 mm.

Footprint Description (DFN8-3.0*3.0)

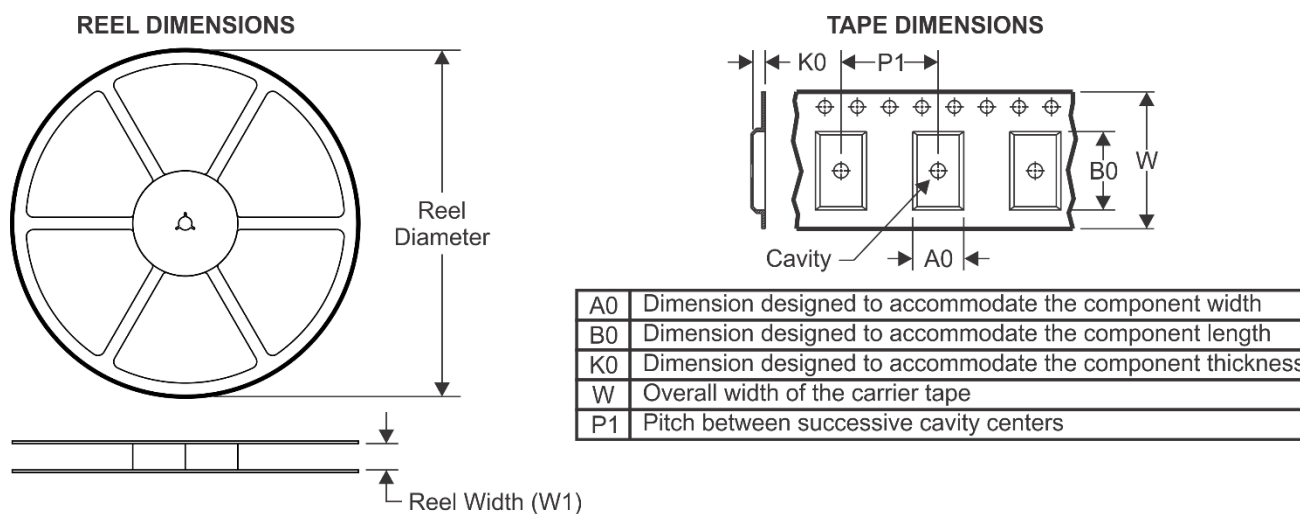
8-Pin Plastic Encapsulated SOIC With Bottom Pad



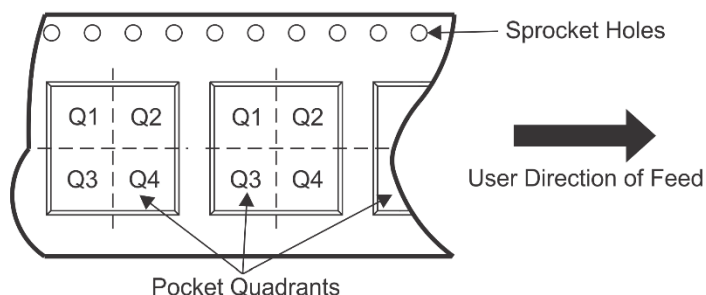
NOTE:

- 1) All data units are in mm. Any size in brackets is for reference only. Dimensions and tolerances shall conform to ASME Y14.5M
- 2) This drawing is subject to change without notice.
- 3) This size does not include mold burrs, projections, or nozzle burrs. The burrs or protrusions on each side of the mold shall not exceed 0.15mm.
- 4) This dimension does not include the burr of the mold, and the burr or protrusion on each side of the mold shall not exceed 0.25 mm.

TAPE AND REEL INFORMATION



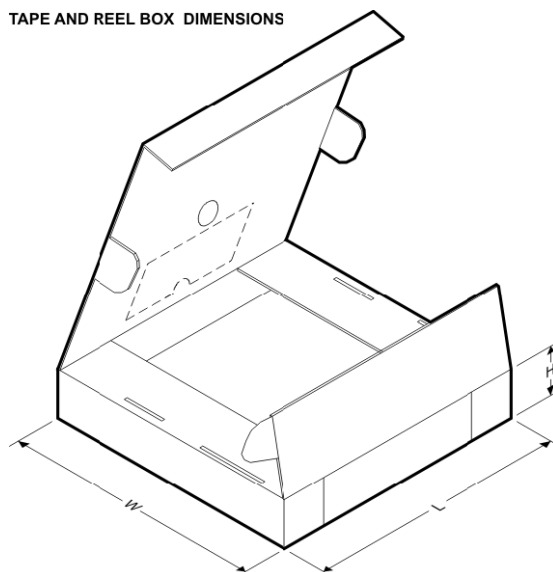
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*ALL dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
LGS4056H	ESOP8	EP	8	4000	330	15	6	8	1.5	8	12	Q1
LGS4056H	DFN8-2*2	DA	8	3000	175	10	2.5	2.5	0.8	3.5	8	Q1
LGS4056H	DFN8-3*3	DB	8	3000	490	10.5	3.25	3.40	0.85	4.0	8	Q1

TAPE AND REEL BOX DIMENSIONS



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Mailing address: Rm 1403, Tengfei Suite C Bldg., No.88 jiangmiao Rd., Pukou Dist., Nanjing, Jiangsu Prov.

Telephone: 025-58838327

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