# SGM62117
# High-Efficiency Buck-Boost Converter

## GENERAL DESCRIPTION

The SGM62117 is a synchronous 4-switch Buck-Boost converter which is suitable for battery operated applications. The device's programmable light load PFM mode and low quiescent current (18μA, TYP) offer above 90% efficiency in the 10mA to 2A output current range. The output voltage is programmable via external feedback resistor divider.

The SGM62117 can operate in Buck, Boost or a novel 4-cycle Buck-Boost mode when the input voltage is close to or equal to the output voltage. The device implements pre-defined mode transition thresholds to avoid undesired toggling within modes to reduce output voltage ripple.

The SGM62117 offers various protection features to improve device robustness such as over-temperature, input over-voltage and output over-current protections. These features can protect the device against unexpected system failure.

The SGM62117 is available in a small Green TDFN-3×2-10L package. High integration provides a compact solution with only six external components.

## TYPICAL APPLICATION

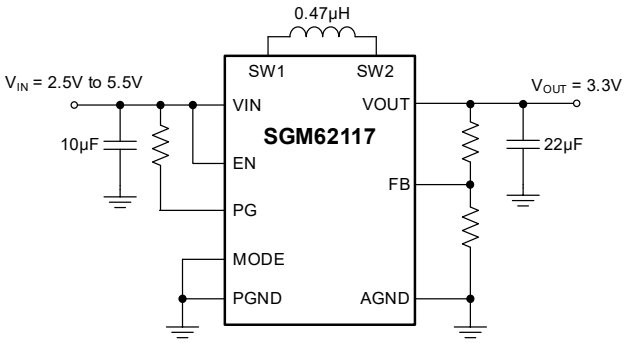



**Figure 1. Typical Application Circuit**

## FEATURES

- **2.2V to 5.5V Input Voltage Range**
- **1.8V to 5.2V Output Voltage Range (Adjustable)**
- **2A Output Current for $V_{IN}$ ≥ 2.5V and $V_{OUT}$ = 3.3V**
- **Above 90% Efficiency for $I_{OUT}$ from 10mA to 2A**
- **High Efficiency over the Entire Load Range**
- **18μA (TYP) Quiescent Current**
- **Programmable Forced PWM Mode and Pulse Frequency Modulation Mode**
- **Real Buck, Boost and Buck-Boost Modes**
- **Power Good**
- **Internal Soft-Start**
- **Start-up into Pre-Biased Outputs**
- **Forward and Reverse Current Operation and Current Limit**
- **OTP, Input OVP and Output OCP Protections**
- **True Shutdown Function with Load Disconnect**
- **Available in a Green TDFN-3×2-10L Package**

## APPLICATIONS

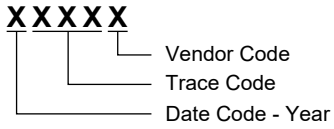
System Pre-Regulator
Point-of-Load Regulation
Thermoelectric Devices
Battery Backup
Voltage Stabilizer and Converter

# PACKAGE/ORDERING INFORMATION

| MODEL | PACKAGE DESCRIPTION | SPECIFIED TEMPERATURE RANGE | ORDERING NUMBER | PACKAGE MARKING | PACKING OPTION |
|---|---|---|---|---|---|
| SGM62117 | TDFN-3×2-10L | -40℃ to +125℃ | SGM62117XTGH10G/TR | 01KGH<br>XXXXX | Tape and Reel, 3000 |

## 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

Input Voltages
VIN, SW1, SW2, EN, MODE, VOUT, FB, PG ..... -0.3V to 6V
SW1, SW2 (AC, less than 10ns) Voltages ..... -0.3V to 8V
Package Thermal Resistance
TDFN-3×2-10L, $\theta_{JA}$ ..... 76℃/W
Junction Temperature ..... +150℃
Storage Temperature Range ..... -65℃ to +150℃
Lead Temperature (Soldering, 10s) ..... +260℃
ESD Susceptibility
HBM ..... 3000V
CDM ..... 1000V

## RECOMMENDED OPERATING CONDITIONS

Input Voltage, $V_{IN}$ ..... 2.2V (1) to 5.5V
Output Voltage, $V_{OUT}$ ..... 1.8V to 5.2V (2)
Effective Capacitance Connected to $V_{IN}$, $C_{IN}$ .....
..... 4μF (MIN), 5μF (TYP)
Effective Inductance, L ..... 0.37μH to 0.57μH, 0.47μH (TYP)
Effective Capacitance Connected to $V_{OUT}$, $C_{OUT}$
1.8V ≤ $V_{OUT}$ ≤ 2.3V ..... 10μF (MIN)
$V_{OUT}$ > 2.3V ..... 7μF (MIN), 8.2μF (TYP)
Operating Junction Temperature, $T_J$ ..... -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 th
ose indicated in the Recommended Operating Conditions section is not implied.

## ESD SENSITIVITY CAUTION

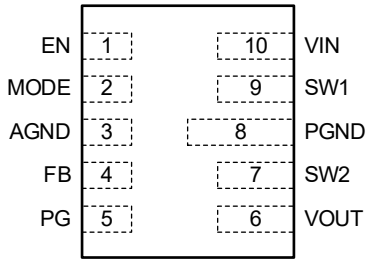
This integrated circuit can be damaged if ESD protections are not considered carefully. SGMICRO recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance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




TDFN-3×2-10L

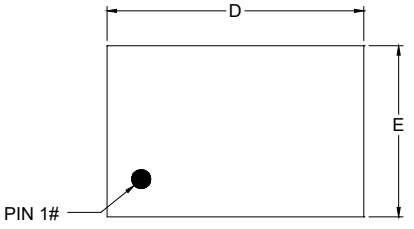
## PIN DESCRIPTION

| PIN | NAME | TYPE | DESCRIPTION |
|---|---|---|---|
| 1 | EN | I | Active High Logic. Device Enable Input. Do not leave it floating. |
| 2 | MODE | I | Logic 0 for PFM Mode and Logic 1 for Forced PWM Mode. Do not leave it floating. |
| 3 | AGND | G | Analog Ground. Connect it to the PGND pin under the chip. |
| 4 | FB | I | Voltage Feedback Pin. Connect a resistor divider at FB pin to program the output voltage. |
| 5 | PG | O | Power Good Indicator. Open-Drain Output. Leave it floating if not used. |
| 6 | VOUT | O | Converter Output. |
| 7 | SW2 | P | Boost Leg Connection for Inductor. |
| 8 | PGND | G | Power Ground. |
| 9 | SW1 | P | Buck Leg Connection for Inductor. |
| 10 | VIN | I | Supply Voltage for Power Stage and Control Stage. |

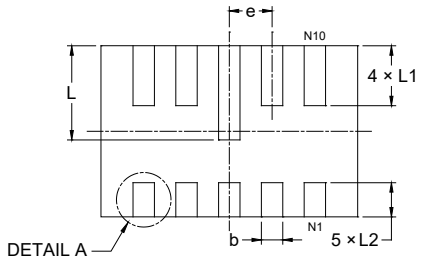
NOTE: I: input, O: output, G: ground, P: power.

# PACKAGE OUTLINE DIMENSIONS

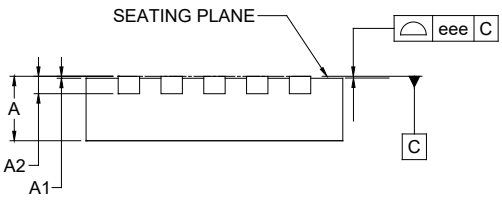
## TDFN-3×2-10L




**TOP VIEW**

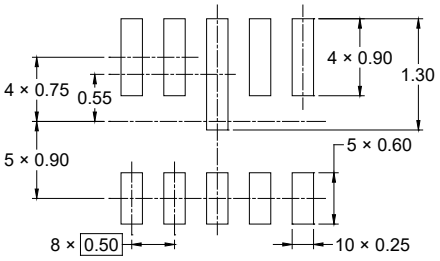



**BOTTOM VIEW**




**SIDE VIEW**


**DETAIL A**
ALTERNATE TERMINAL CONSTRUCTION



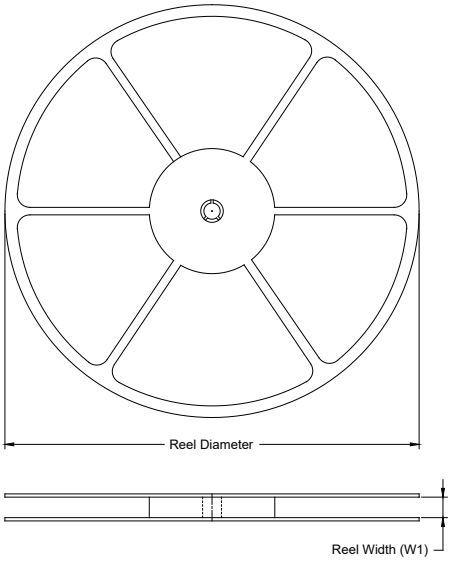

**RECOMMENDED LAND PATTERN** (Unit: mm)

| Symbol | Dimensions In Millimeters | | |
|---|---|---|---|
| | MIN | MOD | MAX |
| A | 0.700 | - | 0.800 |
| A1 | 0.000 | - | 0.050 |
| A2 | 0.203 REF | | |
| b | 0.200 | - | 0.300 |
| D | 2.900 | - | 3.100 |
| E | 1.900 | - | 2.100 |
| e | 0.500 BSC | | |
| L | 1.000 | - | 1.200 |
| L1 | 0.600 | - | 0.800 |
| L2 | 0.300 | - | 0.500 |
| eee | 0.080 | | |

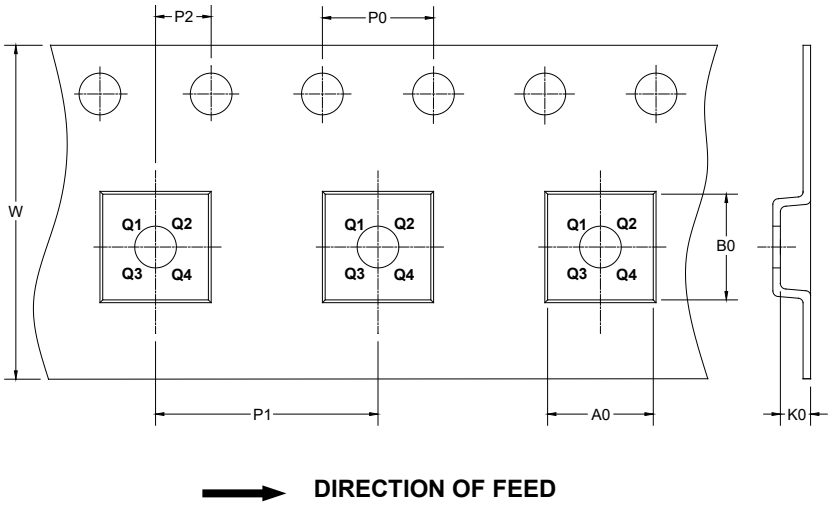
NOTE: This drawing is subject to change without notice.

# 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 |
|---|---|---|---|---|---|---|---|---|---|---|
| TDFN-3×2-10L | 7" | 9.5 | 2.30 | 3.30 | 1.10 | 4.0 | 4.0 | 2.0 | 8.0 | Q1 |

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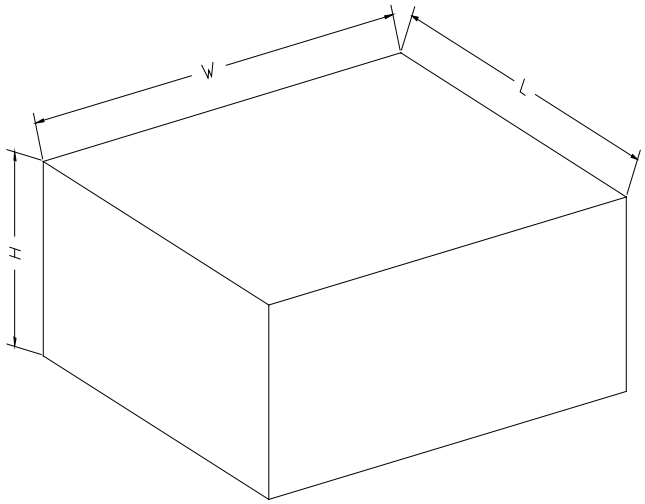
## CARTON BOX DIMENSIONS




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