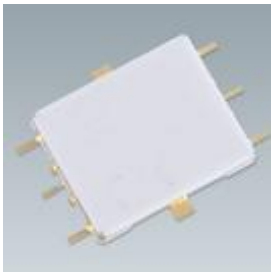
## ■ Features

- High Output Power: Psat=45.3dBm (Typ.)
- High Gain: Gp=23.3dB (Typ.)
- Frequency Band: 8.5 to 10.1GHz
- Impedance Matched Zin/Zout = 50ohm
- Hermetically Sealed SMT Package



## ■ Description

The SGM6901VU is a 24W GaN-HEMT Module that is internally matched for X-band radar bands to provide optimum power and gain in a 50ohm system.

**ABSOLUTE MAXIMUM RATING (Case Temperature $T_c$=25 deg.C)**

| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 55 | V |
| Gate-Source Voltage | $V_{GS}$ | -15 | V |
| Storage Temperature | $T_{stg}$ | -55 to +125 | deg.C |
| Channel Temperature | $T_{ch}$ | +250 | deg.C |

**RECOMMENDED OPERATING CONDITION**

| Item | Symbol | Condition | Limit | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | | <=50 | V |
| Forward Gate Current | $I_{GF}$ | 1st stage Rg=750ohm<br>2nd stage Rg=150ohm | <=4.7<br><=22.5 | mA |
| Reverse Gate Current | $I_{GR}$ | 1st stage Rg=750ohm<br>2nd stage Rg=150ohm | >=-0.3<br>>=-1.3 | mA |
| Channel Temperature | $T_{ch}$ | | <+200 | deg.C |

**ELECTRICAL CHARACTERISTICS (Case Temperature $T_c$=25 deg.C)**

| Item | Symbol | Condition | Limit | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Pinch-off Voltage | $V_P$ (1st stage) | $V_{DS}$=50V, $I_{DS}$=0.4mA | - | -4.5 | - | V |
| | $V_P$ (2nd stage) | $V_{DS}$=50V, $I_{DS}$=2mA | - | -4.5 | - | V |
| Frequency Range | Freq. | $V_{DS}$=50V(Typ.)<br>$I_{DS(DC)1}$=40mA(Typ.)<br>$I_{DS(DC)2}$=160mA(Typ.)<br>$V_{GG1}$=2.88V(Typ.)<br>$V_{GG2}$=2.88V(Typ.)<br>Pulse Width=100µsec.<br>Duty=10%<br>Pin=22dBm | 8.5 | - | 10.1 | GHz |
| Output Power | $P_{sat}$ (8.5GHz, 8.9GHz, 9.3GHz, 9.55GHz, 9.8GHz) | | 43.8 | 45.3 | - | dBm |
| | $P_{sat}$ (10.1GHz) | | 43.3 | 44.8 | - | dBm |
| Power Gain | $G_P$ | | - | 23.3 | - | dB |
| Drain Current | $I_{DSR}$ | | - | 1.8 | 2.4 | A |
| Power Added Efficiency | PAE | | - | 38 | - | % |
| Gain Flatness | ΔG | | - | 0.8 | - | dB |
| Thermal Resistance | $R_{th}$ | Channel to Case at 40W $P_{dc}$ | - | 2.1 | 2.7 | deg.C/W |

| | | |
|---|---|---|
| CASE STYLE | VU | |
| RoHS Compliance | YES | |
| ESD | Class 1B | 500V to <1000V |

Note: Based on ANSI/ESDA/JEDEC JS-001-2012(C=100pF, R=1.5kohm)

**ORDERING INFORMATION**

| Part Number | Order Unit | Packing |
|---|---|---|
| SGM6901VU | No limitation | 48 pcs./Tray x 4 Tray = 192 pcs. / Packing |
| SGM6901VUT | 500pcs. | 500 pcs./Reel x 1 Reel = 500 pcs. / Packing |

## ● TYPICAL PERFORMANCE

**Figure 1.**
**Output Power vs. Frequency**
**$V_{DS}$=50V, $I_{DS(DC)}$=0.2A**
**PW=100μsec, Duty=10%**

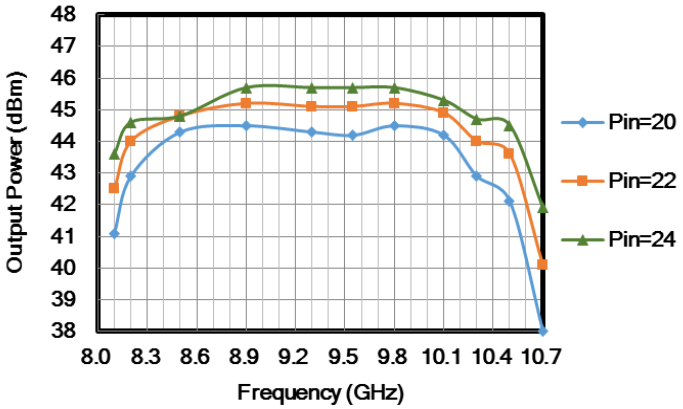



**Figure 2.**
**Power Added Efficiency vs. Frequency**
**$V_{DS}$=50V, $I_{DS(DC)}$=0.2A**
**PW=100μsec, Duty=10%**

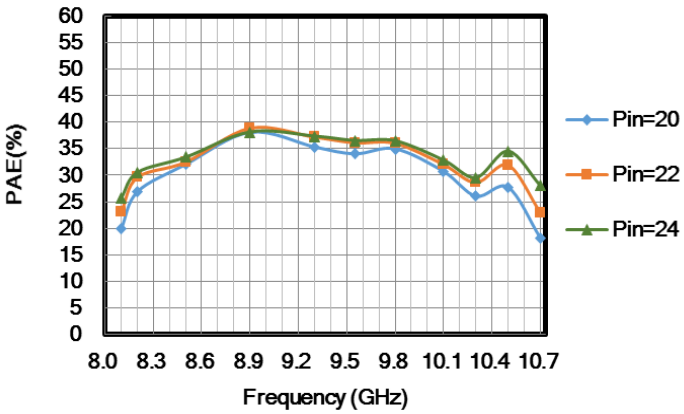



**Figure 3.**
**Output Power vs. Input Power**
**$V_{DS}$=50V, $I_{DS(DC)}$=0.2A**
**PW=100μsec, Duty=10%**

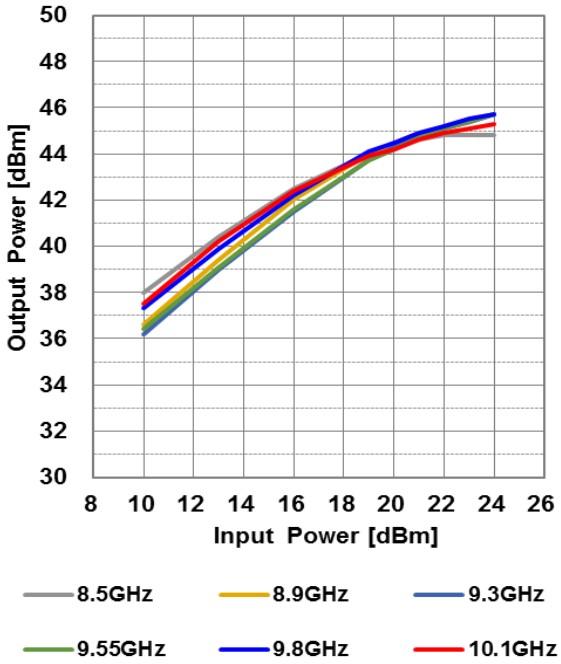
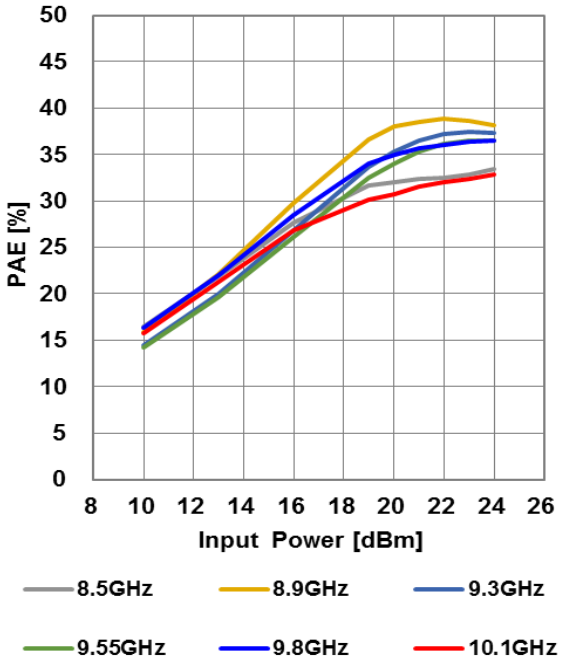
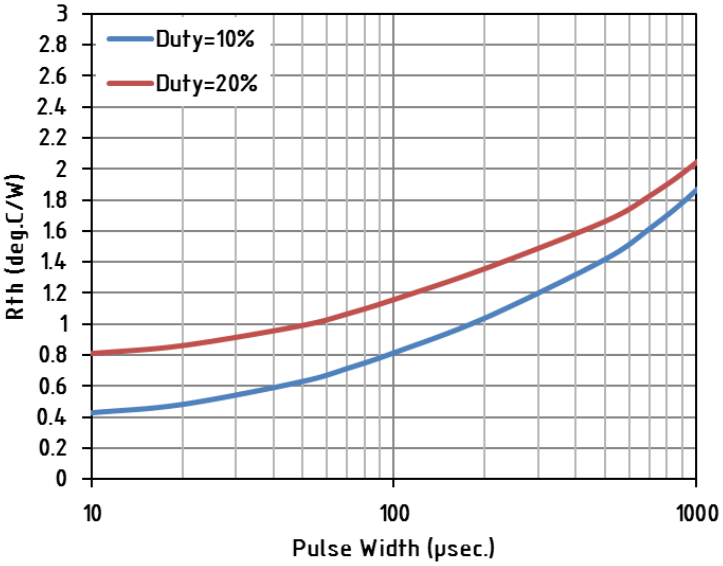



**Figure 4.**
**Power Added Efficiency vs. Input Power**
**$V_{DS}$=50V, $I_{DS(DC)}$=0.2A**
**PW=100μsec, Duty=10%**

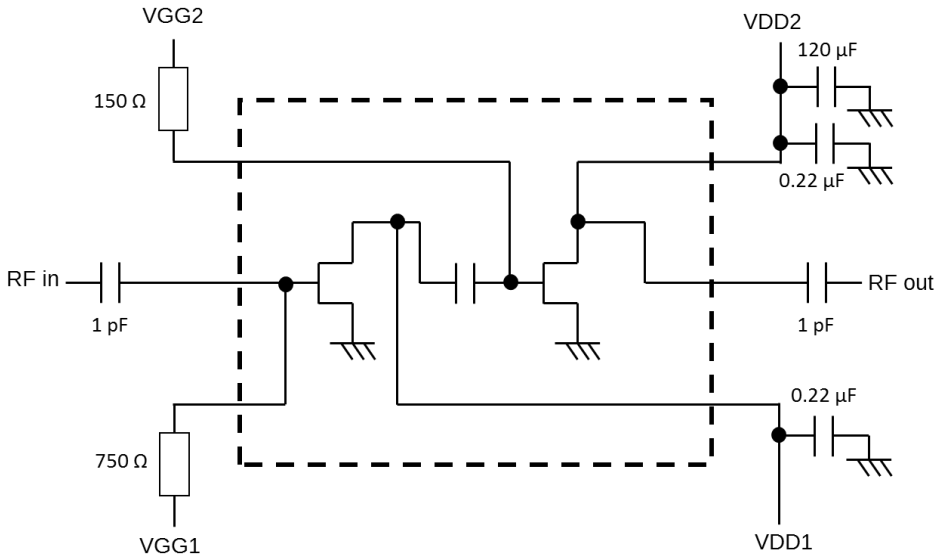


- **Thermal Characteristics**

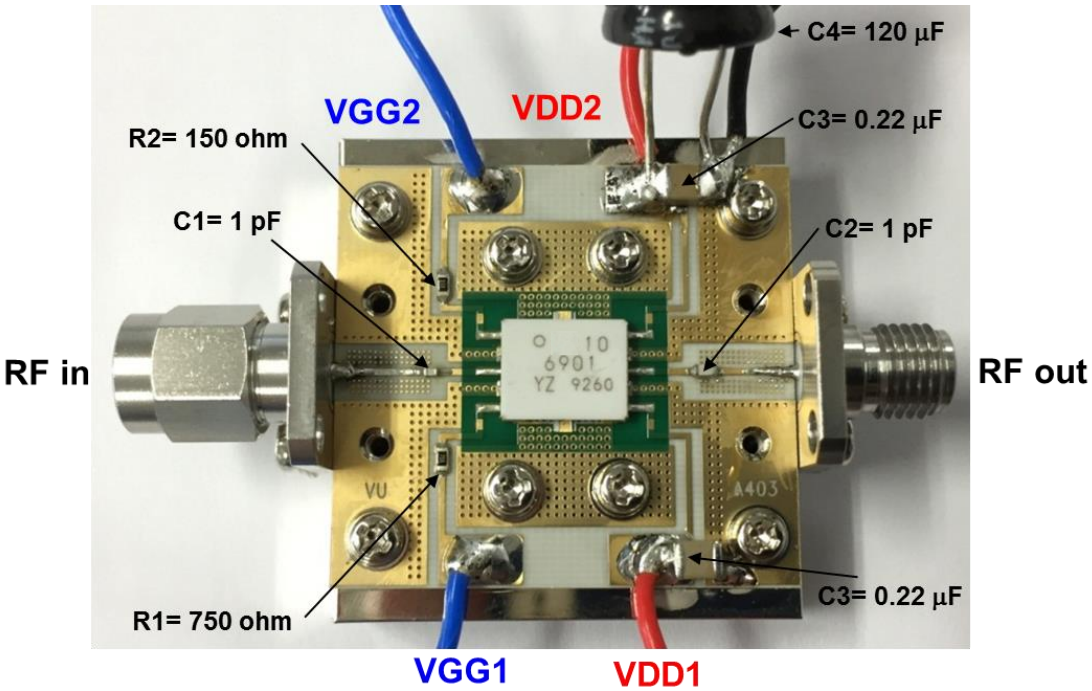
**Figure 5.**
**Rth vs. Pulse Width**
**Tc=75deg.C, Pdiss=42W**



## Block Diagram



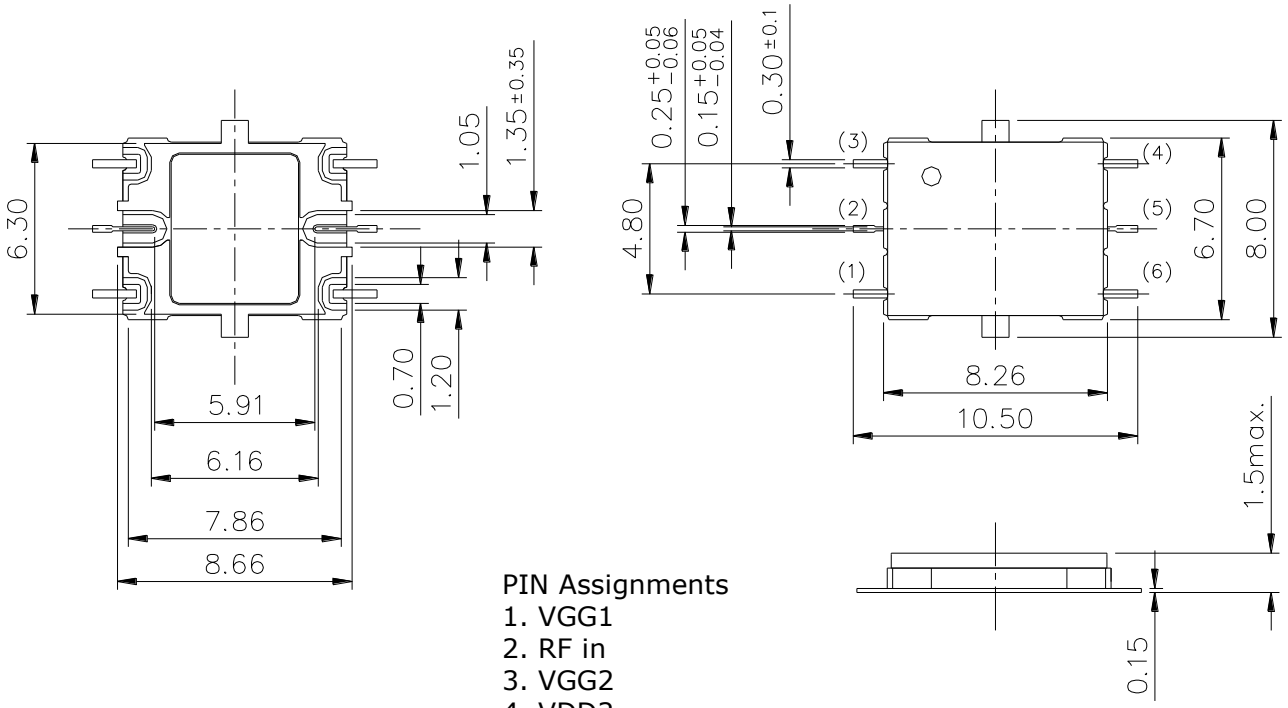

## Evaluation Board




| Microchip Condencer | Type | Maker |
|---|---|---|
| C1= 1.0pF | GRM1552C1H1R0BA01D | muRata |
| C2= 1.0pF | GQM1884C2A1R0BB01B | muRata |

## Package Outline

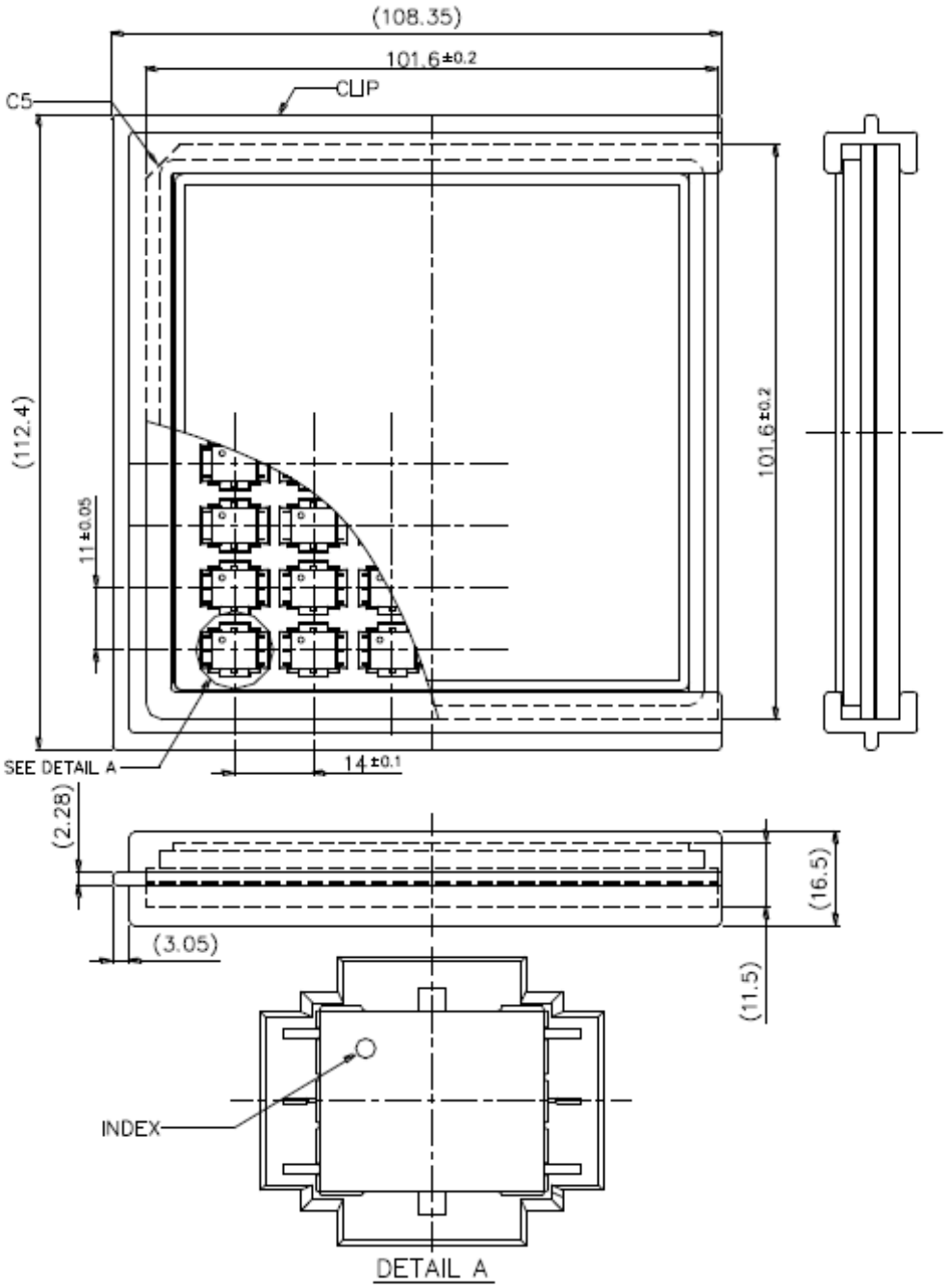
**Case Style : VU**




PIN Assignments
1. VGG1
2. RF in
3. VGG2
4. VDD2
5. RF out
6. VDD1

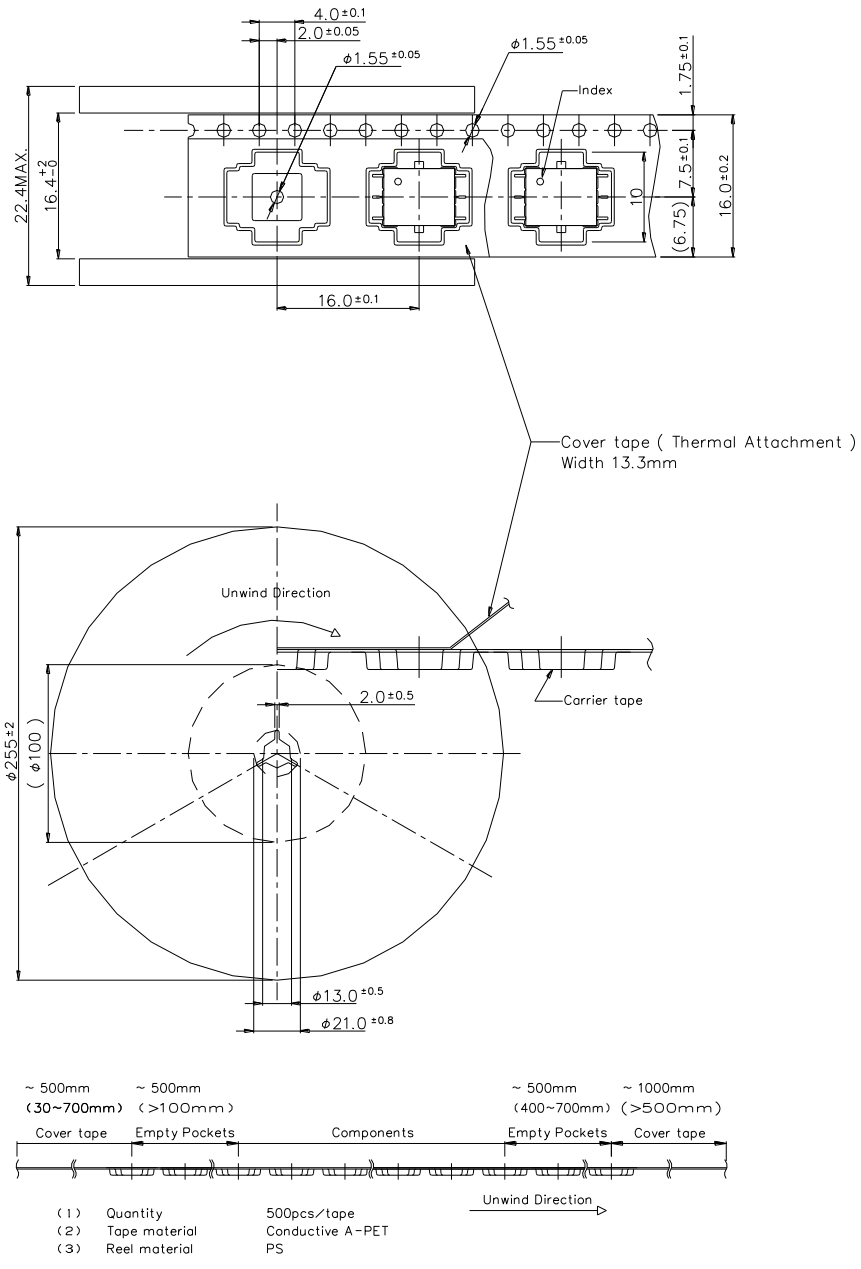
Tolerance : ±0.15
Unit : mm

- **4-inch Tray Packing (Part No.: SGM6901VU)**




(1) Maximum Quantity : 48 pcs./Tray
(2) Tray Material : Conductive PS

## ● Tape and Reel Packing(Part No.: SGM6901VUT)



## ● Mounting Method of SMD(Surface Mount Devices) for Lead-free solder

**Mounting Condition**

(1) For soldering, Lead-free solder (Sn-3.0Ag-0.5Cu)*1 or equivalent shall be used.
(*1: The figure displays with weight %. A predominantly tin-rich alloy with 3.0% silver and 0.5% copper.)

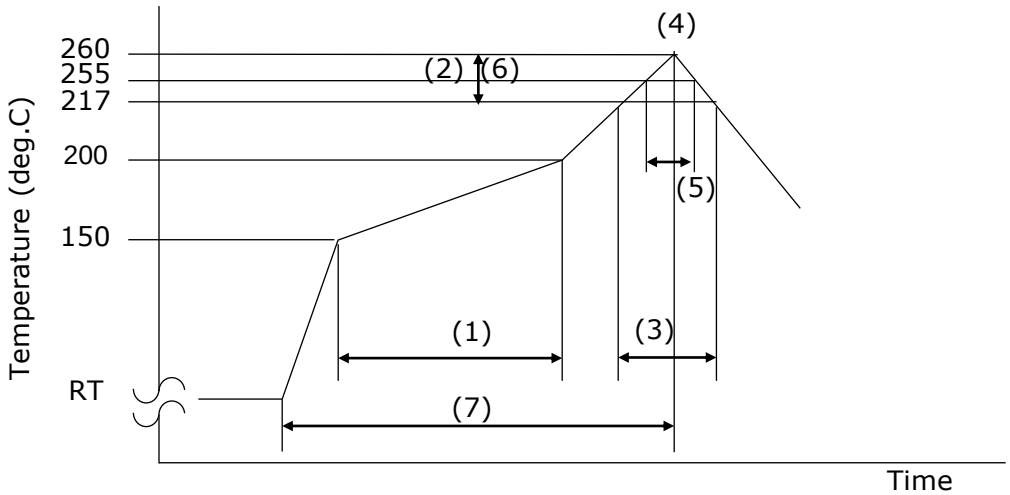
(2) A rosin type flux with a chlorine content of 0.2% or less shall be used. The rosin flux with low halogen content is recommended.

(3) When soldering, use one of the following time / temperature methods for acceptable solder joints. Make sure the devices have been properly prepared with flux prior soldering.

*** Reflow soldering method (Infrared reflow / Heat circulation reflow / Hot plate reflow):**

Limit solder to 3 reflow cycles because resin is used in the modules manufacturing process. Excessive reflow cycles will effect the resin resulting in a potential failure or latent defect. The recommended reflow temperature profile is shown below. The temperature of the reflow profile must be measured at the device body surface.

**Reflow temperature profile and condition:**




| | |
|---|---|
| (1) Preheating: | 150 to 200 deg.C, 60 to 120 seconds |
| (2) Ramp-up Rate: | 3 deg.C /seconds max |
| (3) Liquidus temperature and time: | 217 deg.C, 60 to 150 seconds |
| (4) Peak Temperature: | 260 deg.C |
| (5) Time Peak Temperature: | 255deg.C, 30seconds max |
| (6) Ramp-down Rate: | 6 deg.C /seconds max |
| (7) Time RT to peak temperature: | 8 minutes max |

* Measurement point: Center of the package body surface

(4) The above-recommended conditions were confirmed using the manufacture's equipment and materials. However, when soldering these products, the soldering condition should be verified by customer using their equipment and materials.

## For Safety, Observe the Following Procedures Environmental Management

- Do not put this product into the mouth.
- Do not alter the form of this product into a gas, powder, or liquid through burning, crushing, or chemical processing as these by-products are dangerous to the human body if inhaled, ingested, or swallowed.
- Respect all applicable laws of the country when discarding this product.
  This product must be disposed in accordance with methods specified by applicable hazardous waste procedures.

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