# Dual N-Channel Enhancement Mode MOSFET

## 1. Product Information

### 1.1 Features

- ☑ CSP package
- ☑ Advanced trench cell design
- ☑ Extremely low threshold voltage
- ☑ ESD protected

### 1.2 Applications

- ☑ Portable appliances
- ☑ Battery management

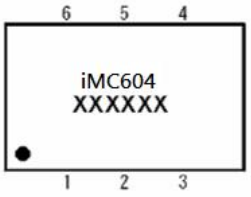
### 1.3 Quick reference

- ☑ BV ≧ 12 V
- ☑ $P_{tot}$ ≦ 3.8 W
- ☑ $I_S$ ≦ 20 A
- ☑ $R_{SS(ON)}$ ≦ 6.0 mΩ @ $V_{GS}$ = 4.5 V
  $R_{SS(ON)}$ ≦ 7.0 mΩ @ $V_{GS}$ = 3.9 V
  $R_{SS(ON)}$ ≦ 8.5 mΩ @ $V_{GS}$ = 2.5 V

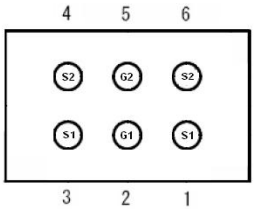
## 2. Pin Description

| Pin | Description |
|---|---|
| 1,3 | Source(S1) |
| 2 | Gate(G1) |
| 4,6 | Source(S2) |
| 5 | Gate(G2) |

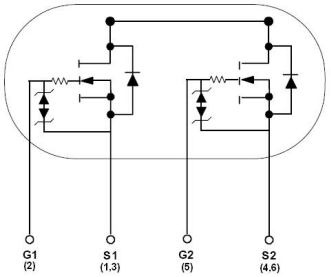
**CSP Package**




Top View




Bottom



# 3. Limiting Values

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{SS}$ | Source-Source Voltage | $T_A$ = 25 ℃ | 12 | - | V |
| $V_{GS}$ | Gate-Source Voltage | $T_A$ = 25 ℃ | - | ± 10 | V |
| $I_S$* | Source Current | $T_A$ = 25 ℃, $V_{GS}$ = 4.5 V | - | 20 | A |
| $I_{SM}$*,** | Pulsed Source Current | $T_A$ = 25 ℃, $V_{GS}$ = 4.5 V | - | 80 | A |
| $P_{tot}$* | Total Power Dissipation | $T_A$ = 25 ℃ | - | 3.8 | W |
| | | $T_A$ = 70 ℃ | - | 2.4 | |
| $T_{stg}$ | Storage Temperature | | - 55 | 150 | ℃ |
| $T_J$ | Junction Temperature | | - | 150 | ℃ |
| $R_{\theta JA}$* | Thermal Resistance- Junction to Ambient | | - | 32.8 | ℃ / W |

Notes：

* Surface Mounted on 1 $in^2$ pad area, t ≤ 10 sec

** Pulse width ≤ 10 μs, duty cycle ≤ 1 %

# 4. Marking Information

| Product Name | Marking |
|---|---|
| **KJ604C** | [redacted] |

# 5. Ordering Code

| Product Name | Package | Reel Size | Tape width | Quantity | Note |
|---|---|---|---|---|---|
| **KJ604C** | **CSP** | | | **3000** | |

Note: KUAIJIEXIN defines " Green " as lead-free ( RoHS compliant ) and halogen free ( Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C )

## 6. Electrical Characteristics ($T_A$ = 25 °C Unless Otherwise Noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| $BV_{SSS}$ | Source-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_S$ = 250 μA | 12 | – | – | V |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{SS}$ = 10V, $I_S$ = 250 μA | 0.5 | – | 1.0 | V |
| $I_{SSS}$ | Zero Gate Voltage Source Current | $V_{SS}$ = 10 V, $V_{GS}$ = 0 V | - | - | 1 | μA |
| | | $T_J$ = 85 ℃ | - | - | 30 | μA |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$ = ± 10 V, $V_{DS}$ = 0 V | - | - | ± 10 | μA |
| $R_{SS(ON)}$[a] | Source-source On-State Resistance | $V_{GS}$ = 4.5 V, $I_S$ = 5 A | - | 5 | 6 | mΩ |
| | | $V_{GS}$ = 3.9 V, $I_S$ = 4 A | - | 5.3 | 7 | |
| | | $V_{GS}$ = 2.5 V, $I_S$ = 3 A | - | 6.8 | 8.5 | |
| **Diode Characteristics** | | | | | | |
| $V_{FSS}$[a] | Diode Forward Voltage | $I_S$ = 5 A, $V_{GS}$ = 0 V | - | - | 1.3 | V |
| **Dynamic Characteristics**[b] | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{GS}$ = 0 V, $V_{SS}$ = 6 V<br>Frequency = 1 MHz | - | 3118 | - | pF |
| $C_{oss}$ | Output Capacitance | | - | 648 | - | |
| $C_{rss}$ | Reverse Transfer Capacitance | | - | 554 | - | |
| $t_{d}$(on) | Turn-on Delay Time | $V_{SS}$ = 6 V, $V_{GEN}$ = 4.5 V,<br>$R_G$ = 4.5 Ω, $R_L$ = 1.2 Ω,<br>$I_S$ = 5 A | - | 849 | - | nS |
| $t_r$ | Turn-on Rise Time | | - | 1798 | - | |
| $t_{d}$(off) | Turn-off Delay Time | | - | 1216 | - | |
| $t_f$ | Turn-off Fall Time | | - | 5710 | - | |
| **Gate Charge Characteristics**[b] | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{GS}$ = 4.5 V, $V_{SS}$ = 10 V,<br>$I_S$ = 5 A | - | 54 | - | nC |
| $Q_{gs}$ | Gate-Source Charge | | - | 5.9 | - | |
| $Q_{gd}$ | Gate-Drain Charge | | - | 9.7 | - | |

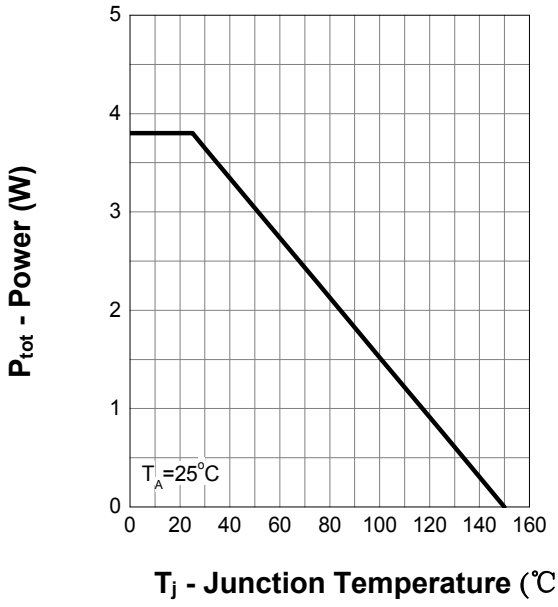
Notes :

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %

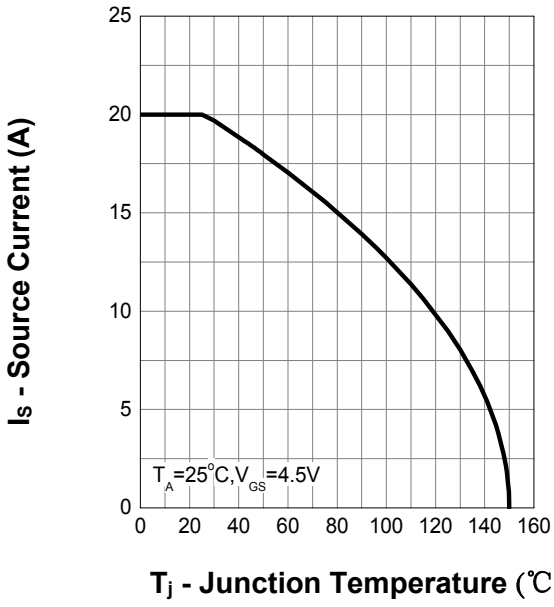
b : Guaranteed by design, not subject to production testing

# 7. Typical Characteristics

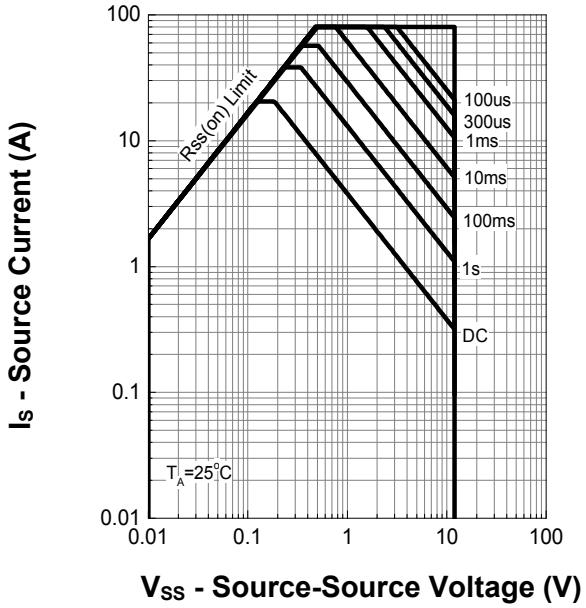
**Power Dissipation**



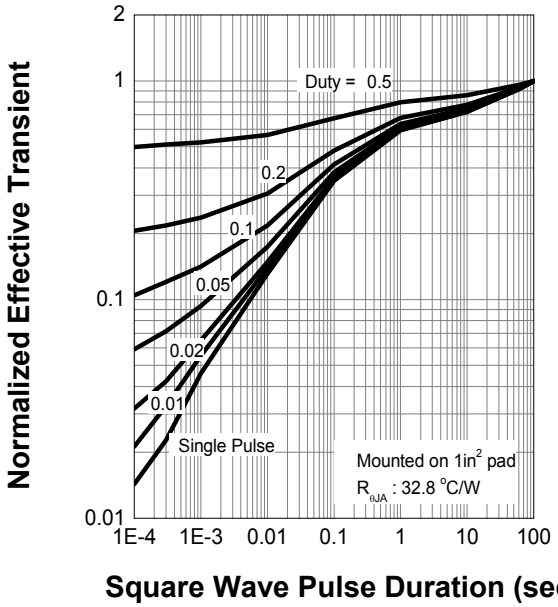

**Source Current**




**Safe Operation Area**

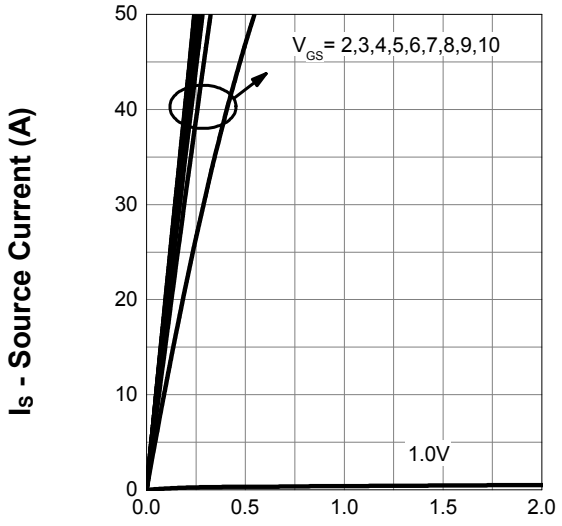



**Thermal Transient Impedance**

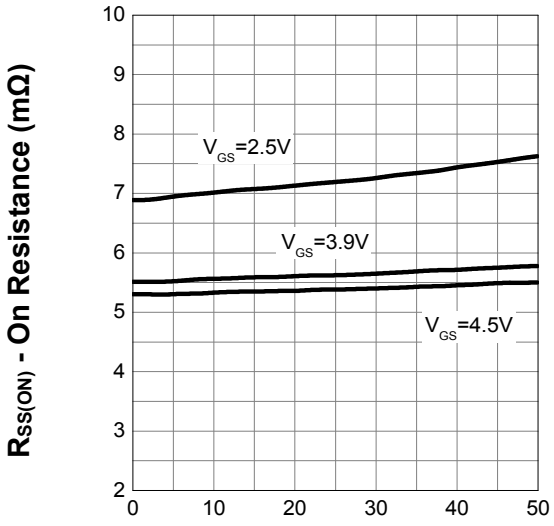


# 7. Typical Characteristics (cont.)

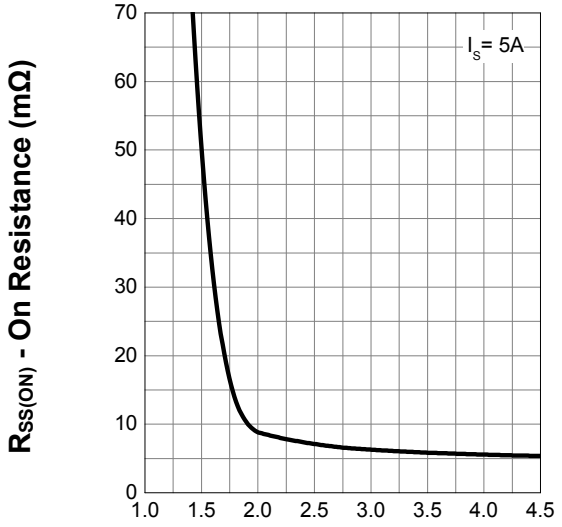
**Output Characteristics**



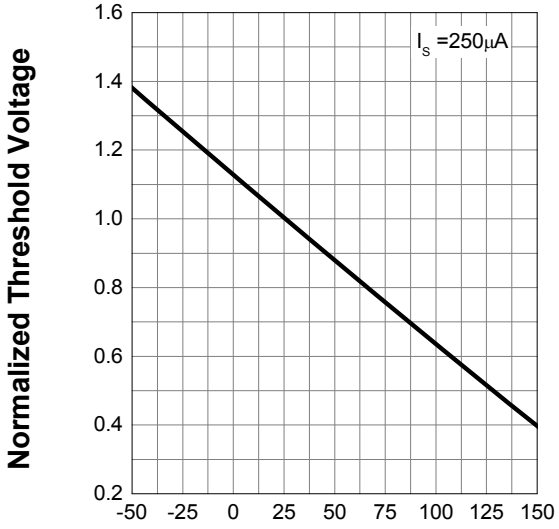

**Source-Source On Resistance**




**Transfer Characteristics**

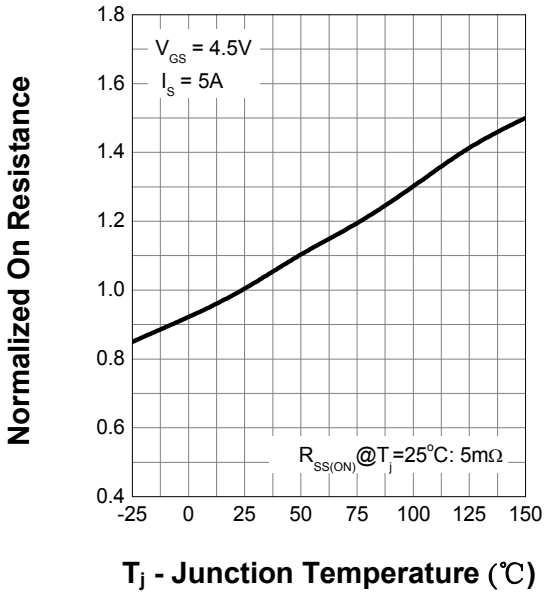



**Gate Threshold Voltage**

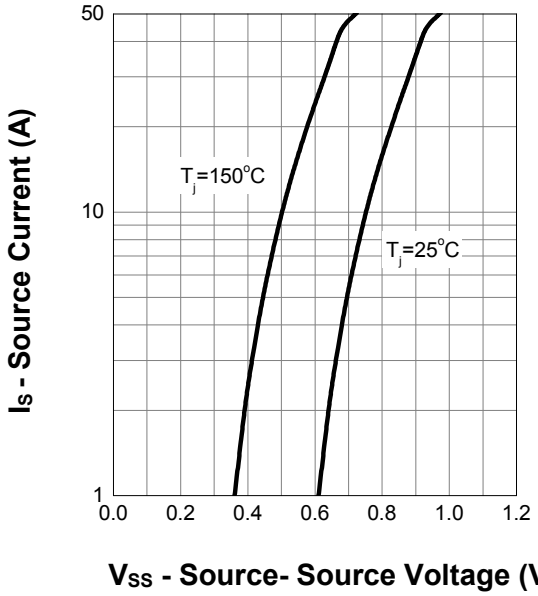


# 7. Typical Characteristics (cont.)

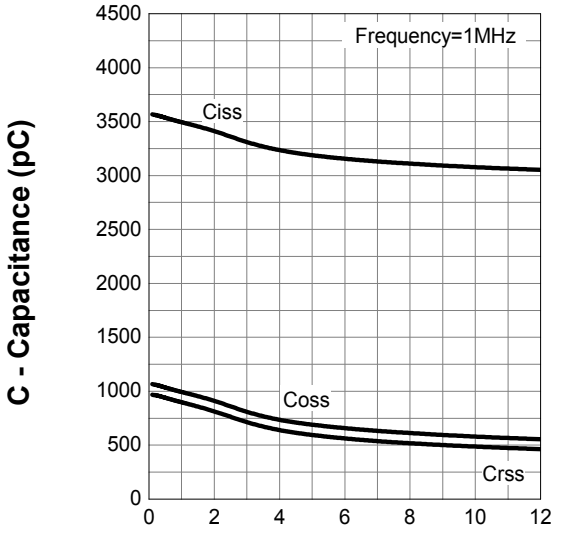
**Source-Source On Resistance**



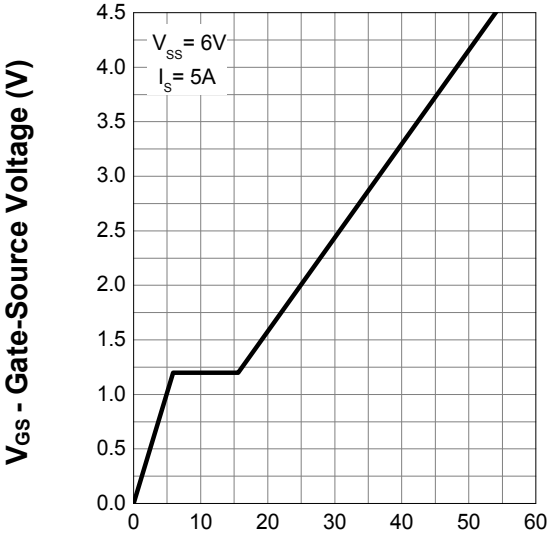

**Body Diode Characteristics**




**Capacitance**



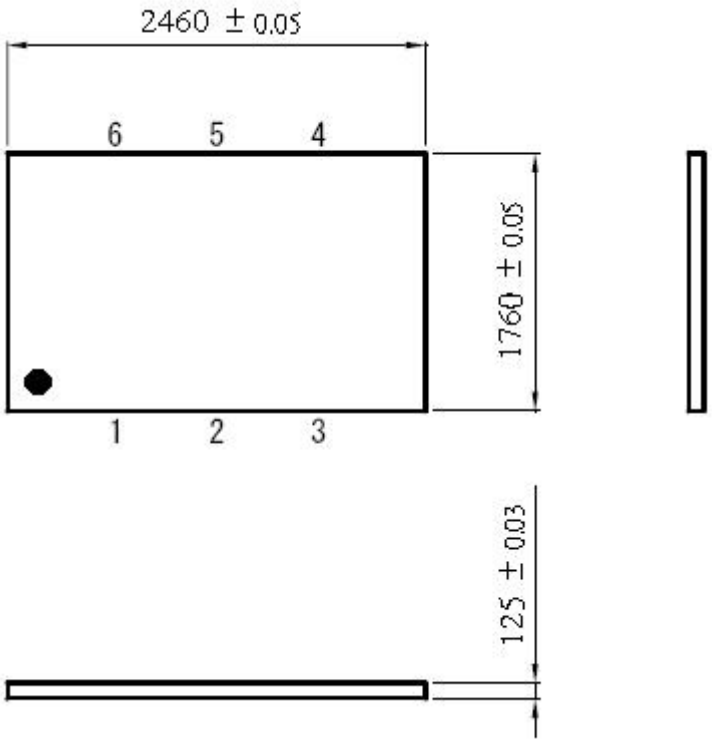

**Gate Charge**



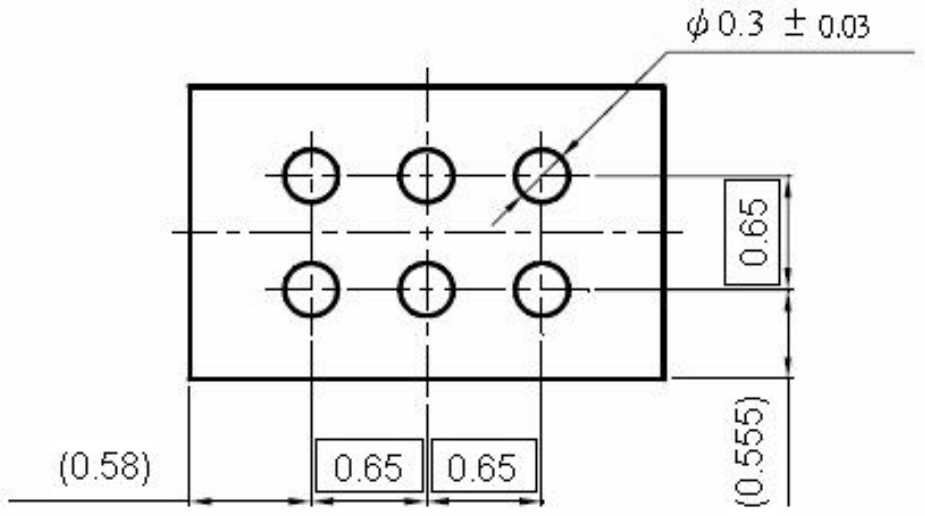
# 8.Package Dimensions

- **Design Information**

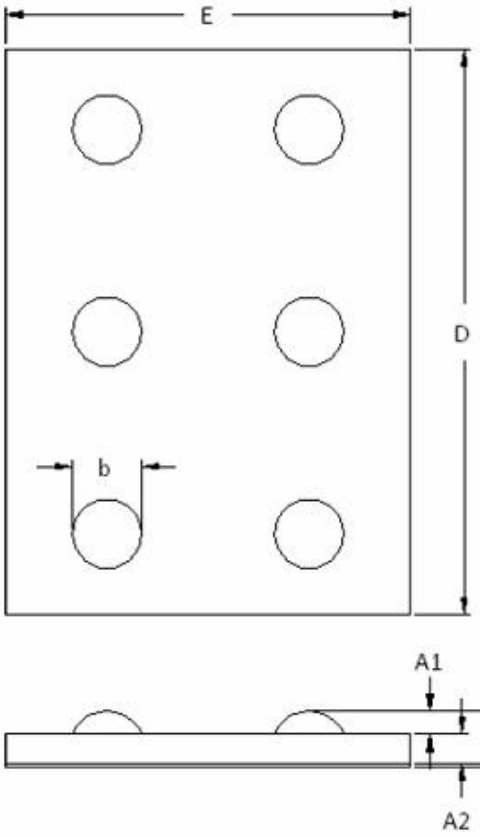
**Unit: um**




**Unit: mm**

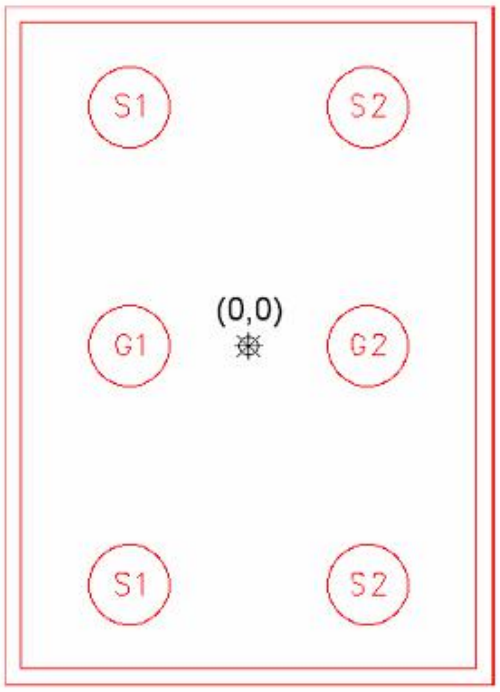


- **Structure Information**




| SYMBOL | DIMENSION(mm) | | |
|---|---|---|---|
| | MIN | NOM | MAX |
| A | 0.145 | 0.195 | 0.245 |
| A1 | 0.035 | 0.050 | 0.065 |
| A2 | 0.095 | 0.125 | 0.155 |
| A3 | 0.010 | 0.020 | 0.030 |
| b | 0.285 | 0.300 | 0.315 |
| E | 1.710 | 1.760 | 1.810 |
| D | 2.410 | 2.460 | 2.510 |
| Min. Ball pitch：0.650 | | | |

- **Ball Map (View : Chip side Up)**




| Pin Number | X Coord | Y Coord |
|---|---|---|
| S1 | -325.00 | 650.00 |
| S2 | 325.00 | 650.00 |
| G1 | -325.00 | 0.00 |
| G2 | 325.00 | 0.00 |
| S1 | -325.00 | -650.00 |
| S2 | 325.00 | -650.00 |