Single P-channel

MOSFET

# KFJ4B01120L
# Data Sheet



For additional information or question, please contact Nuvoton Technology Corporation Japan.
**www.nuvoton.co.jp**

## 1. GENERAL DESCRIPTION

Single P-channel MOSFET

## 2. FEATURES

- Drain-source On-state resistance: RDS(on) typ. = 40 mΩ (VGS = -2.5 V)
- CSP (Chip Size Package)
- Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)

## 3. MARKING SYMBOL: 1F

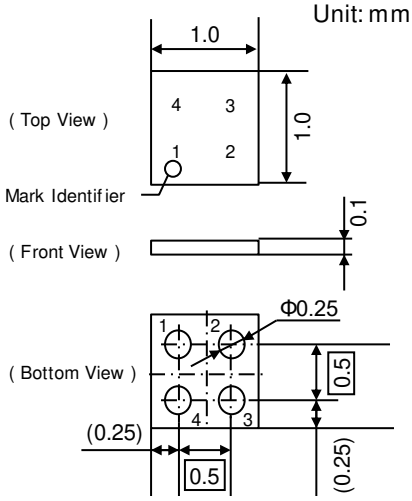
## 4. PACKAGING

Embossed type (Thermo-compression sealing): 20,000 pcs / reel (standard)

## 5. ABSOLUTE MAXIMUM RATINGS Ta = 25 °C

| Parameter | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Drain-Source Voltage | | VDS | -12 | V |
| Gate-Source Voltage | | VGS | ±8 | V |
| Drain Current | DC | ID1*1 | -2.6 | A |
| | | ID2*2 | -4.2 | A |
| | | ID3*3 | -5.4 | A |
| | Pulsed *4 | IDp1 | -20 | A |
| | | IDp2 | -33 | A |
| | | IDp3 | -43 | A |
| Total Power Dissipation | | PD1*1 | 0.37 | W |
| | | PD2*2 | 0.94 | W |
| | | PD3*3 | 1.5 | W |
| Channel Temperature | | Tch | 150 | °C |
| Operating Ambient Temperature | | Topr | -40 to +85 | °C |
| Storage Temperature Range | | Tstg | -55 to +150 | °C |

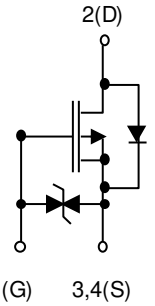
Note *1 FR4 board (25.4 mm x 25.4 mm x t1.0 mm), Min Cu 36mm$^2$ Copper.
*2 FR4 board (25.4 mm x 25.4 mm x t1.0 mm), Full Cu.
*3 Ceramic substrate (70 mm x 70 mm x t1.0 mm).
*4 t = 10 μs, Duty Cycle ≤ 1 %




1. Gate
2. Drain
3. Source
4. Source

| Package | ULGA004-W-1010-RA01 |
|---|---|
| JEITA | — |
| Code | — |

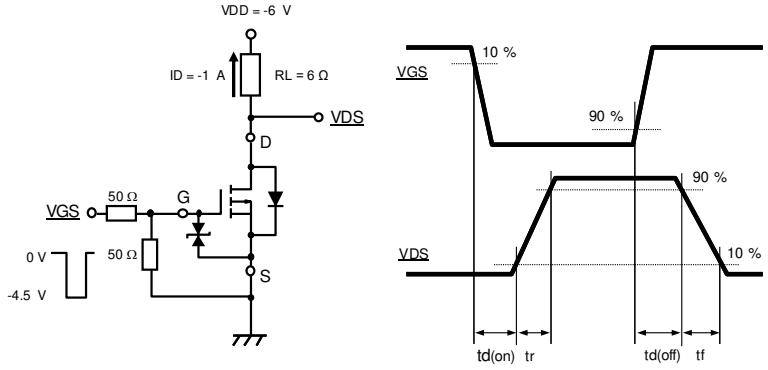
Equivalent circuit



## 6. ELECTRICAL CHARACTERISTICS Ta = 25 °C ± 3 °C

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Drain-Source Breakdown Voltage | VDSS | ID = -1 mA, VGS = 0 | -12 | | | V |
| Zero Gate Voltage Drain Current | IDSS | VDS = -12 V, VGS = 0 | | | -1 | μA |
| Gate-Source Leakage Current | IGSS | VGS = ±8 V, VDS = 0 V | | | ±10 | μA |
| Gate-Source Threshold Voltage | Vth | ID = -2 mA, VDS =-10 V | -0.3 | | -1.0 | V |
| Drain-Source On-state Resistance | RDS(on)1 | ID = -2 A, VGS = -4.5 V | | 34 | 51 | mΩ |
| | RDS(on)2 | ID = -2 A, VGS = -2.5 V | | 40 | 61 | |
| | RDS(on)3 | ID = -0.2 A, VGS = -1.8 V | | 48 | 85 | |
| | RDS(on)4 | ID = -0.1 A, VGS = -1.5 V | | 57 | 170 | |
| Body Diode Forward Voltage | VF(s-d) | IF = -0.2 A, VGS = 0 V | | -0.7 | -1.2 | V |
| Input Capacitance *1 | Ciss | VDS = -10 V | | 814 | | pF |
| Output Capacitance *1 | Coss | VGS = 0 V | | 201 | | |
| Reverse Transfer Capacitance *1 | Crss | f = 1MHz | | 187 | | |
| Turn-on Delay Time *1,*2 | td(on) | VDD = -6 V | | 6 | | ns |
| Rise Time *1,*2 | tr | VGS = 0 to -4.5 V ID = -1.0 A | | 4 | | |
| Turn-off Delay Time *1,*2 | td(off) | VDD = -6 V | | 63 | | |
| Fall Time *1,*2 | tf | VGS = -4.5 to 0 V ID = -1.0 A | | 46 | | |
| Total Gate Charge *1 | Qg | VDD = -6 V | | 10.7 | | nC |
| Gate-Source Charge *1 | Qgs | VGS = 0 to -4.5 V | | 1.4 | | |
| Gate-Drain Charge *1 | Qgd | ID = -1.0 A | | 2.1 | | |

Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.
*1 Guaranteed by design, not subject to production testing
*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time

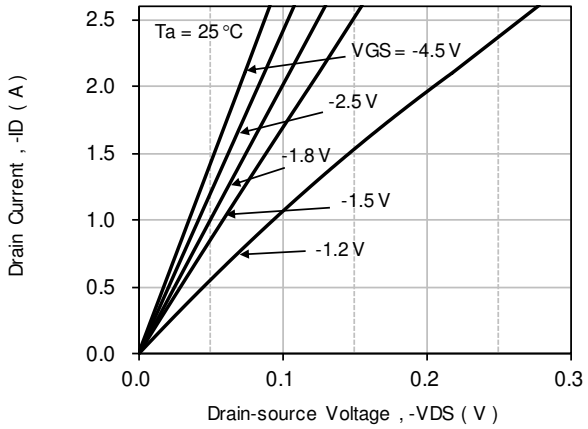



## 7. ELECTRICAL STATE DISCHARGE CHARACTERISTICS

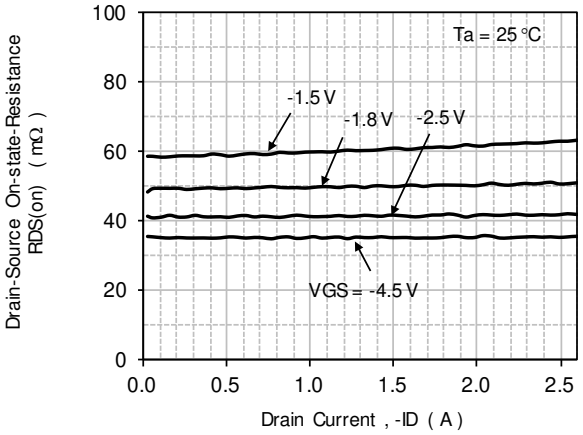
| Standard | Test Type | Symbol | Conditions | Class | Value | Unit |
|---|---|---|---|---|---|---|
| AEC-Q101 | Human Body Model | HBM | C = 100 pF, R = 1.5 kΩ | H1C | > 1k to ≤ 2k | V |
| | Machine Model | MM | C = 200 pF, R = 0 Ω | M2 | > 100 to ≤ 200 | V |

## 8. TECHNICAL DATA (Reference)

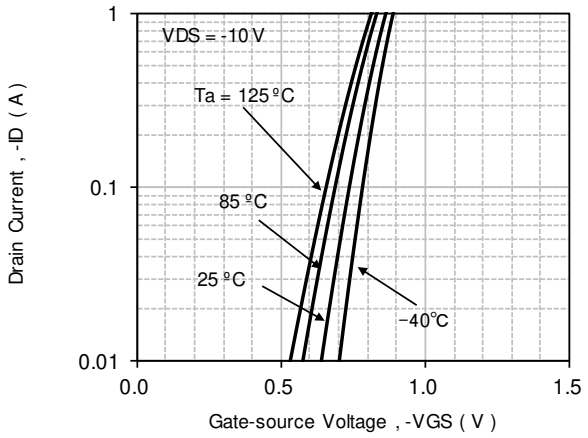
ID - VDS*1



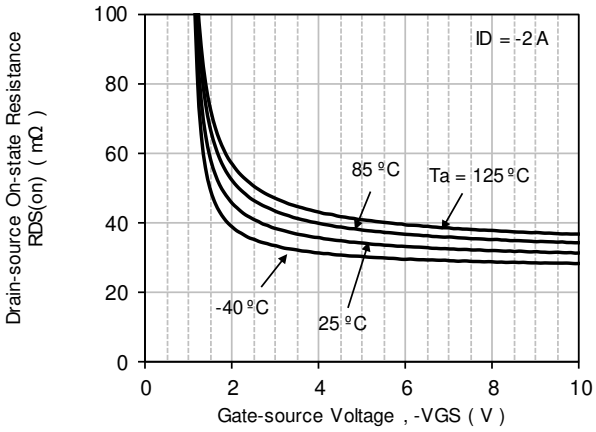

RDS(on) - ID*1



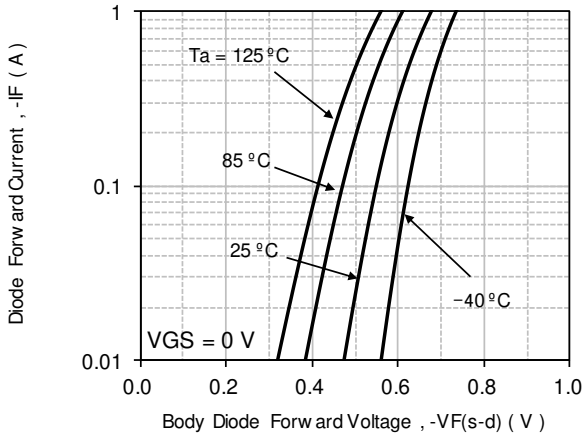

ID - VGS*1



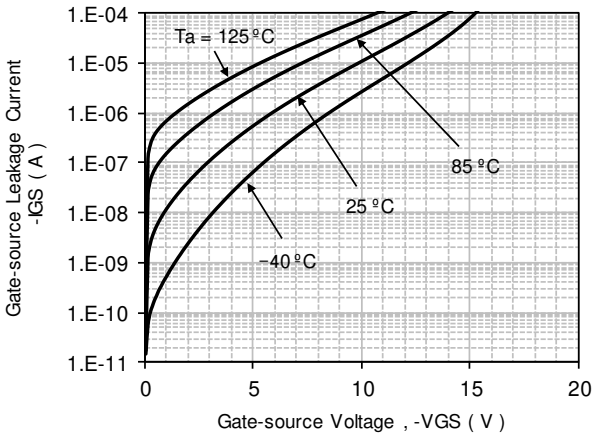

RDS(on) - VGS*1




IF - VF(s-d)*1

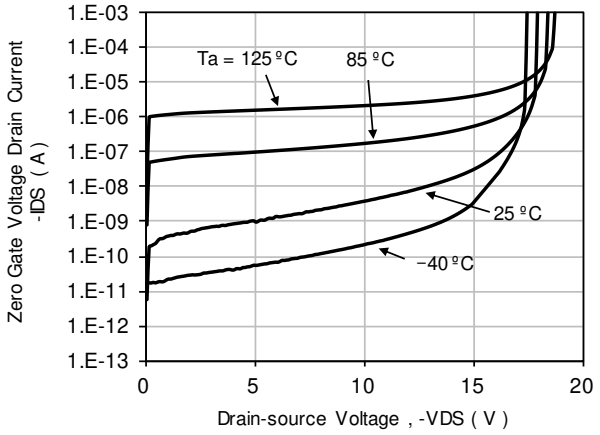



IGS - VGS*1

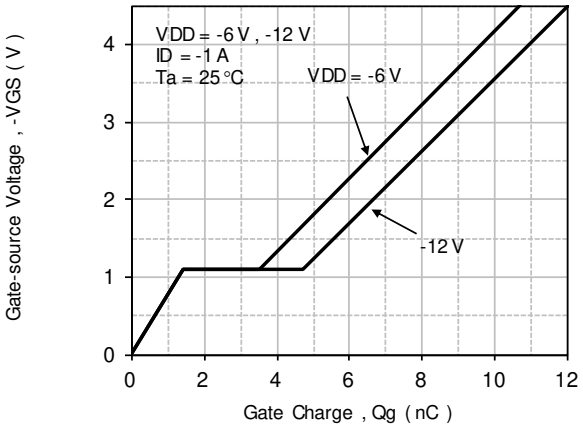


## TECHNICAL DATA (Reference)

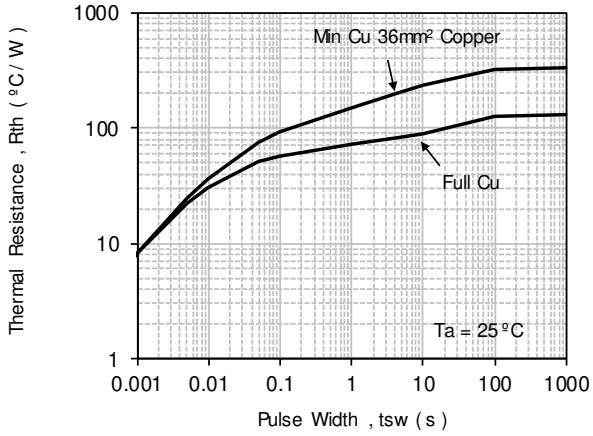
IDS - VDS*1



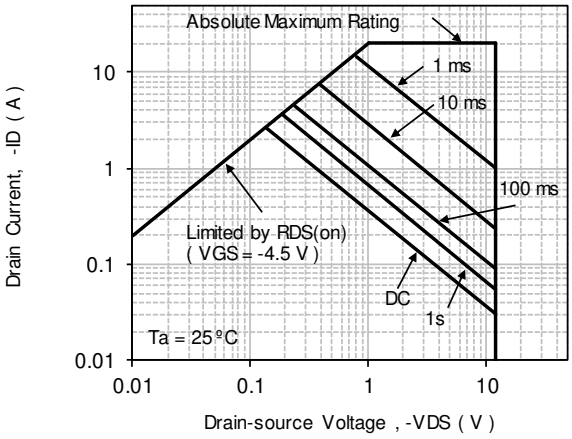

Dynamic Input / Output Characteristics




Rth - tsw*2*3



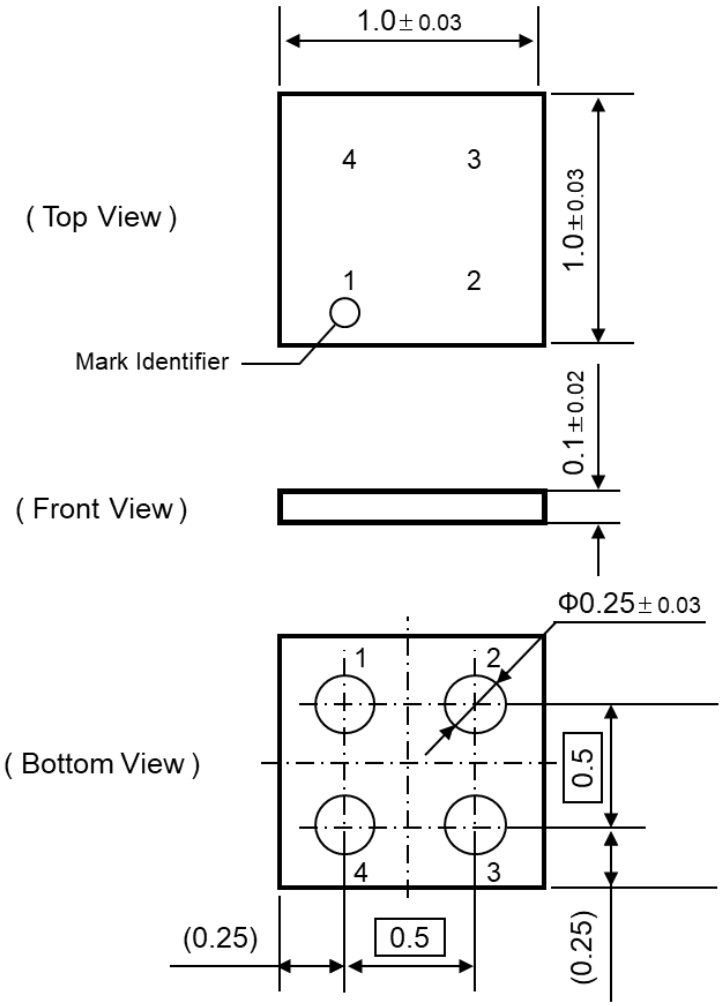

Safe Operating Area*2




Note
*1 Pulse measurement
*2 FR4 board (25.4mm×25.4mm×t1.0mm)、Min Cu 36mm$^2$ Copper.
*3 FR4 board (25.4mm×25.4mm×t1.0mm)、Full Cu.

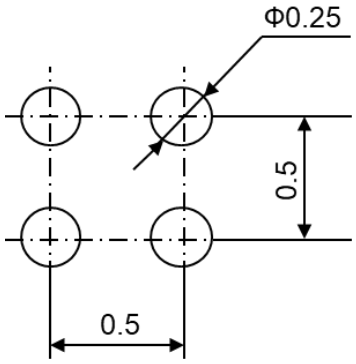
## 9. OUTLINE

Unit : mm




## 10. LAND & STENCIL PATTERN (Reference)

Unit : mm



## 11. REVISION HISTORY

| Date | Revision | Description |
|---|---|---|
| 2021.2.5 | 1.00 | 1. initially issued. |
| | | |

## Important Notice

**Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".**

**Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.**

**All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.**