

Single P-channel MOSFET

KFJ9B0458ZL

Datasheet

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1. GENERAL DESCRIPTION

Single P-channel MOSFET for automotive.

2. FEATURES

- Drain-source On-state Resistance: $R_{DS(on)}$ typ = 10 m Ω ($V_{GS} = -10$ V)
- CSP (Chip Size Package)
- Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)
- AEC-Q101 Qualified

3. MARKING SYMBOL: WV

4. PACKAGING

Embossed type (Thermo-compression sealing): 8,000 pcs / reel (standard)

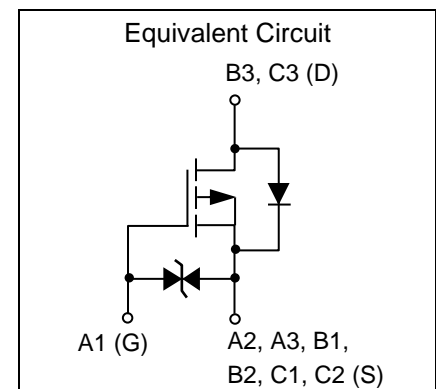
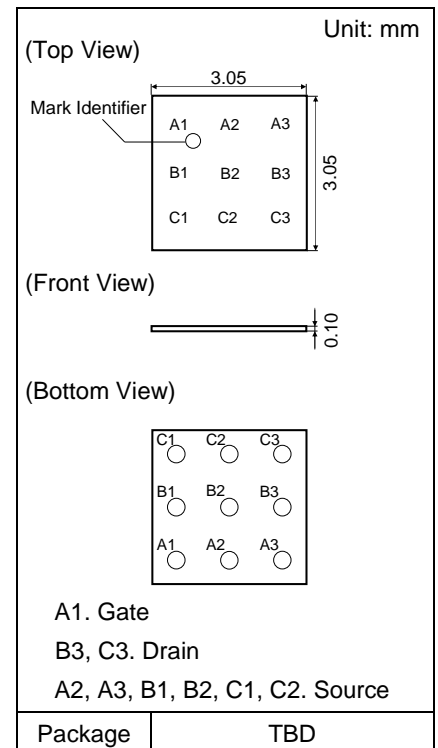
5. ABSOLUTE MAXIMUM RATINGS $T_a = 25^\circ\text{C}$

| Parameter | | Symbol | Rating | Unit |
|--|----------------------|----------|---------------|------|
| Drain-source Voltage | | VDS | - 40 | V |
| Gate-source Voltage | | VGS | - 20 / + 10 | V |
| Drain Current | DC ^{*1} | ID1 | - 8.1 | A |
| | DC ^{*2} | ID2 | - 11.6 | |
| | DC ^{*3} | ID3 | - 13.8 | |
| | Pulsed ^{*4} | IDp | - 92.8 | |
| Total Power Dissipation | DC ^{*1} | PD1 | 0.86 | W |
| | DC ^{*2} | PD2 | 1.75 | |
| | DC ^{*3} | PD3 | 2.50 | |
| Operating Junction and Storage Temperature Range | | Tj, Tstg | - 55 to + 150 | °C |

6. THERMAL CHARACTERISTICS $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Rating | Unit |
|---------------------------|--------------------|--------|--------|
| Thermal Resistance (ch-a) | Rth1 ^{*1} | 145 | °C / W |
| | Rth2 ^{*2} | 72 | |
| | Rth3 ^{*3} | 50 | |

- Note
- *1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
FR4 board partially covered with copper pad (79.9 mm² area, 36 μm thickness).
 - *2 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
FR4 board fully covered with copper pad (616 mm² area, 36 μm thickness).
 - *3 Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).
 - *4 $t = 10$ μs , Duty Cycle $\leq 1\%$.



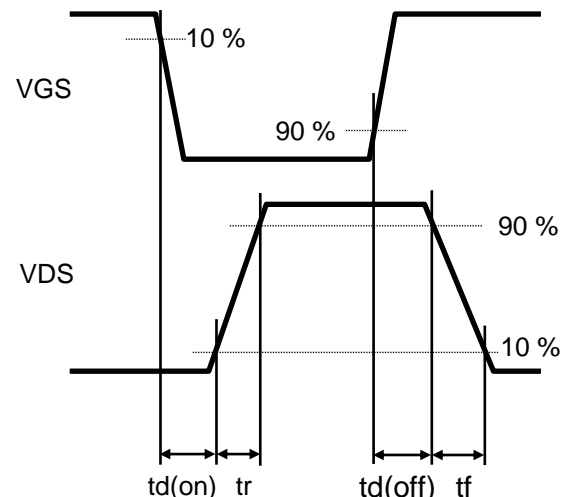
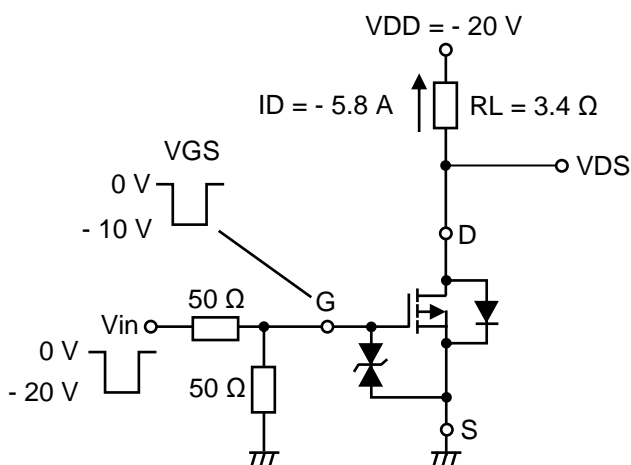
7. ELECTRICAL CHARACTERISTICS $T_a = 25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$

| Parameter | Symbol | Conditions | Min | Typ | Max | Unit |
|--|----------|--|------|-------|-------|---------------|
| Drain-source Breakdown Voltage | VDSS | ID = - 1 mA, VGS = 0 V | - 40 | | | V |
| Zero Gate Voltage Drain Current | IDSS | VDS = - 40 V, VGS = 0 V | | | - 1 | μA |
| Gate-source Leakage Current | IGSS | VGS = - 16 V, VDS = 0 V | | | - 10 | μA |
| | | VGS = + 8 V, VDS = 0 V | | | 10 | |
| Gate-source Threshold Voltage | Vth | ID = - 28.6 mA, VDS = - 10 V | - 1 | - 2 | - 3 | V |
| Drain-source On-state Resistance | RDS(on)1 | ID = - 2 A, VGS = - 10 V | 6 | 10 | 13 | m Ω |
| | RDS(on)2 | ID = - 2 A, VGS = - 4.5 V | 7 | 12 | 20 | |
| Body Diode Forward Voltage | VF(s-d) | IF = - 2 A, VGS = 0 V | | - 0.8 | - 1.0 | V |
| Input Capacitance ^{*1} | Ciss | VDS = - 20 V, VGS = 0 V f = 1 MHz | | 7500 | | pF |
| Output Capacitance ^{*1} | Coss | | | 500 | | |
| Reverse Transfer Capacitance ^{*1} | Crss | | | 450 | | |
| Turn-on Delay Time ^{*1, *2} | td(on) | VDD = - 20 V, VGS = 0 to - 10 V | | 40 | | ns |
| Rise Time ^{*1, *2} | tr | ID = - 5.8 A | | 70 | | |
| Turn-off Delay Time ^{*1, *2} | td(off) | VDD = - 20 V, VGS = - 10 to 0 V | | 580 | | |
| Fall Time ^{*1, *2} | tf | ID = - 5.8 A | | 200 | | |
| Total Gate Charge ^{*1} | Qg1 | VDD = - 20 V, VGS = - 4.5 V ID = - 11.6 A | | 70 | | nC |
| | Qg2 | VDD = - 20 V, VGS = - 10 V ID = - 11.6 A | | 140 | | |
| Gate-source Charge ^{*1} | Qgs | | | 20 | | |
| Gate-drain Charge ^{*1} | Qgd | | | 26 | | |

Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.

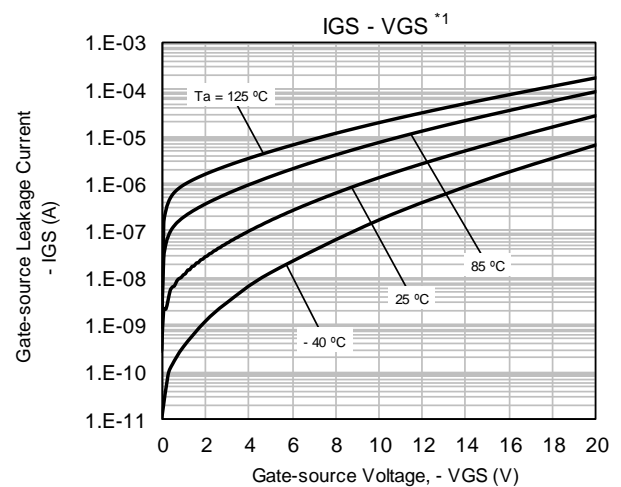
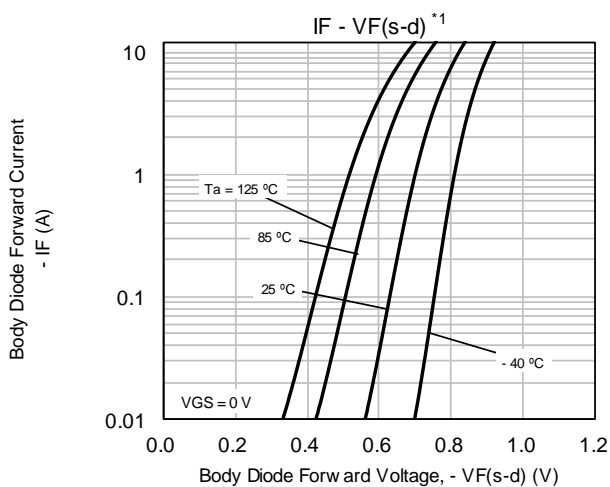
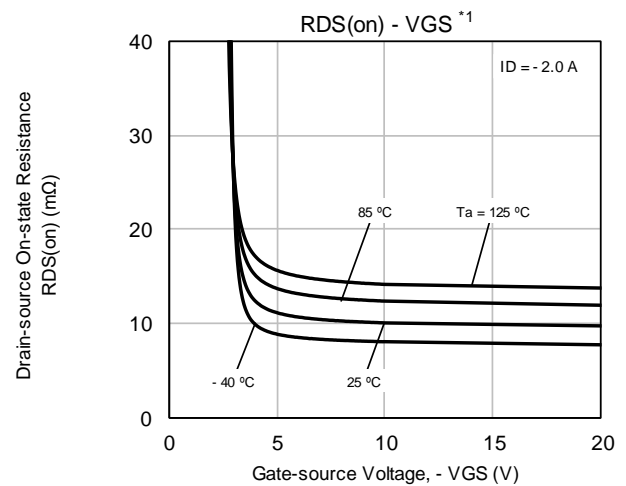
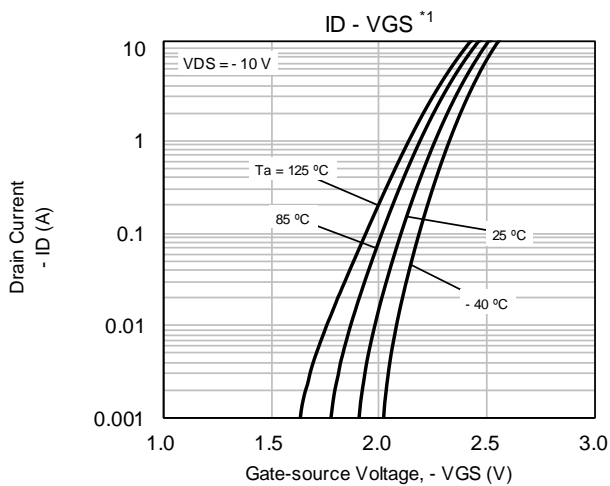
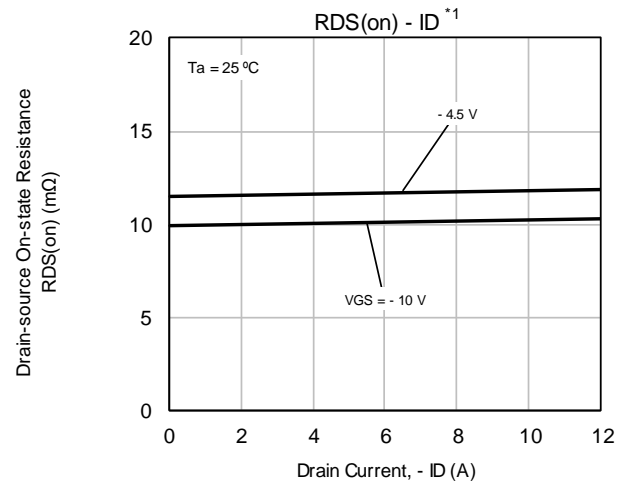
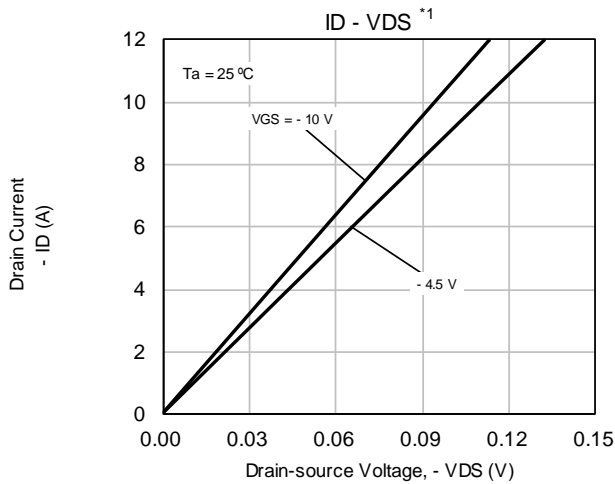
^{*1} Guaranteed by design, not subject to production testing.

^{*2} Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time.

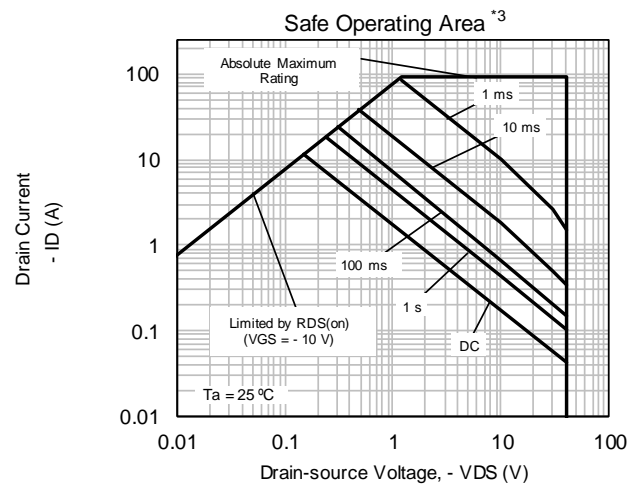
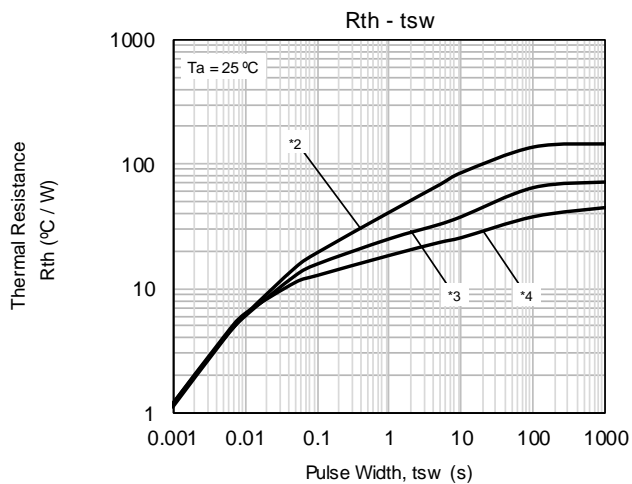
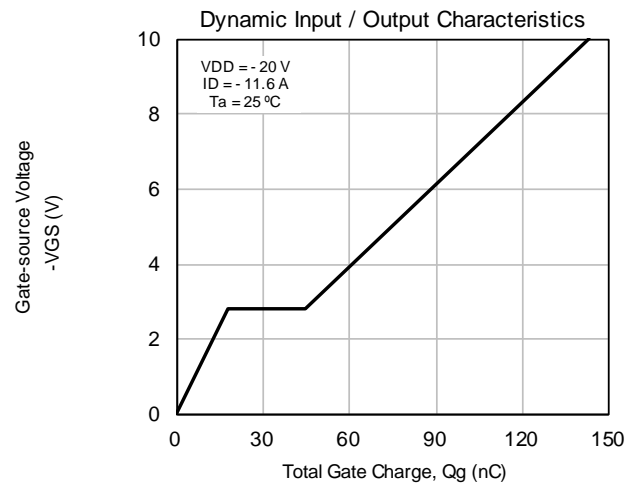
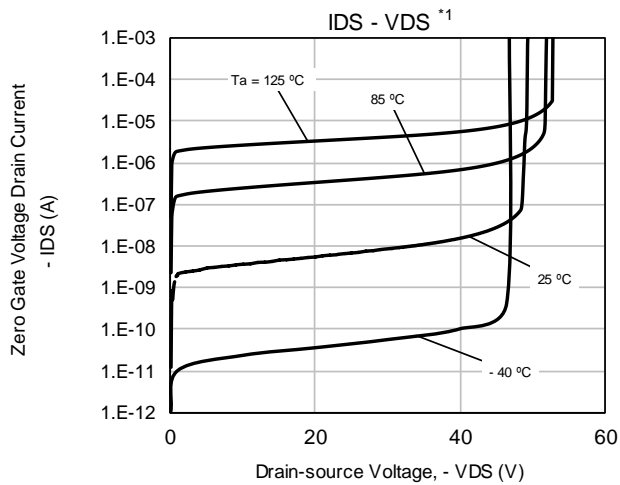
**8. ELECTROSTATIC DISCHARGE CHARACTERISTIC** $T_a = 25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$

| Standard | Test Type | Symbol | Conditions | Class | Value | Unit |
|--------------|------------------|--------|--------------------------------|-------|-----------------|------|
| AEC-Q101-001 | Human Body Model | HBM | C = 100 pF, R = 1.5 k Ω | H3A | > 4 to \leq 8 | kV |

9. TECHNICAL DATA (Reference)



TECHNICAL DATA (Reference)



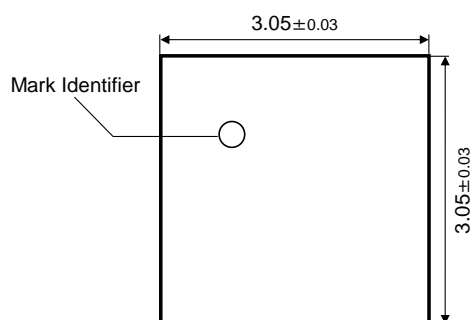
Note

- *1 Pulse measurement.
- *2 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
FR4 board partially covered with copper pad (79.9 mm² area, 36 μm thickness).
- *3 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
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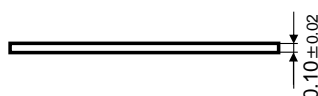
10. OUTLINE

(Top View)

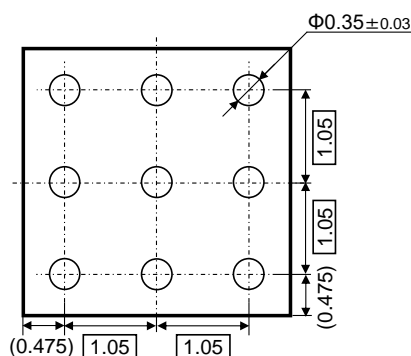
Unit: mm



(Front View)

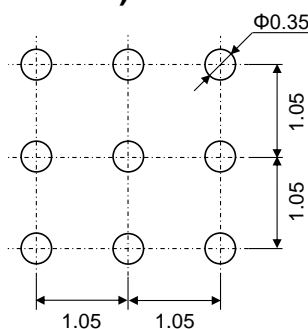


(Bottom View)



11. LAND & STENCIL PATTERN (Reference)

Unit: mm



Important notice:

Solder Mask Defined (SMD) pattern is strongly recommended for pad design.

Please check the information in the Nuvoton WL-CSP Application Notes about mounting process.

12. REVISION HISTORY

| Date | Revision | Description |
|------------|----------|----------------------|
| 2021.11.19 | 1.00 | 1. Initially issued. |
| | | |
| | | |

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