Single P-channel MOSFET

KFJ9B0639ZL
Datasheet

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

1. GENERAL DESCRIPTION

Single P-channel MOSFET for automotive.

2. FEATURES

- Drain-source On-state Resistance: RDS(on) typ = 24 mΩ (VGS = - 10 V)
- CSP (Chip Size Package)
- Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)
- AEC-Q101 Qualified

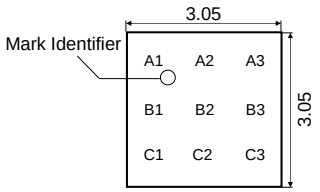
3. MARKING SYMBOL: WE

4. PACKAGING

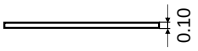
Embossed type (Thermo-compression sealing): 8,000 pcs / reel (standard)

Unit: mm

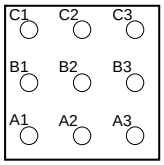
(Top View)



(Front View)



(Bottom View)



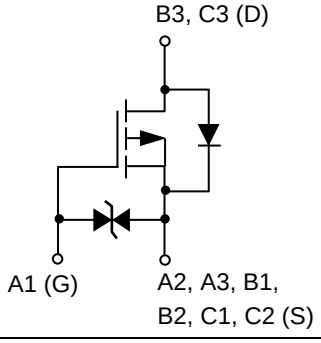
A1. Gate

B3, C3. Drain

A2, A3, B1, B2, C1, C2. Source

Package	TBD

Equivalent Circuit



5. ABSOLUTE MAXIMUM RATINGS Ta = 25 °C

Parameter		Symbol	Rating	Unit
Drain-source Voltage		VDS	- 60	V
Gate-source Voltage		VGS	- 20 / + 10	V
Drain Current	DC *1	ID1	- 5.2	A
	DC *2	ID2	- 7.5	
	DC *3	ID3	- 8.9	
	Pulsed *4	IDp	- 60.0	
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 Ta = 25 °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 mm^2 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 mm^2 area, 36 µm thickness).

*3 Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).

*4 t = 10 µs, Duty Cycle ≤ 1 %.

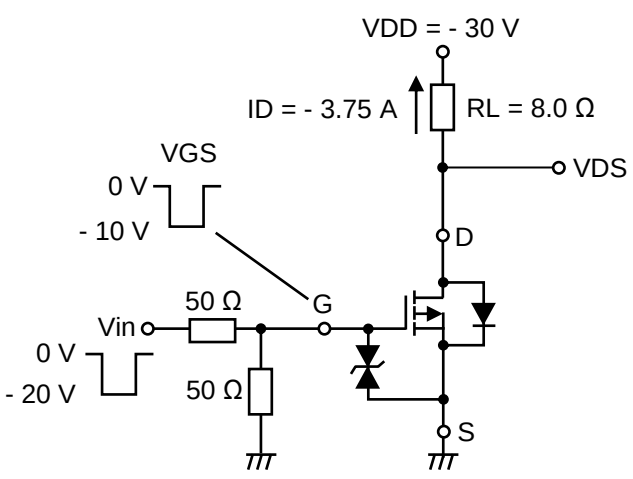
7. ELECTRICAL CHARACTERISTICS Ta = 25 °C ± 3 °C

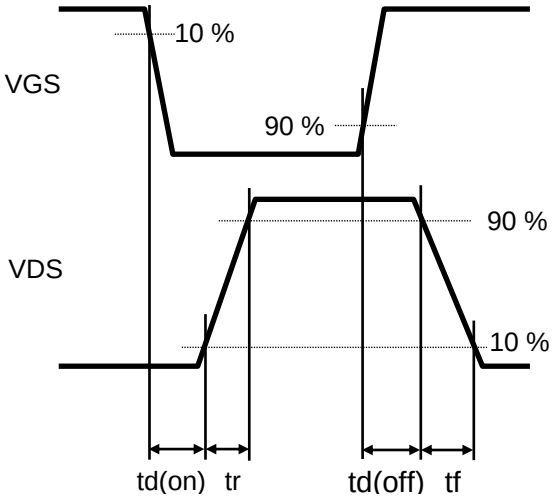
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	VDSS	ID = - 1 mA, VGS = 0 V	- 60			V
Zero Gate Voltage Drain Current	IDSS	VDS = - 60 V, VGS = 0 V			- 1	μA
Gate-source Leakage Current	IGSS	VGS = - 16 V, VDS = 0 V			- 10	μA
		VGS = + 8 V, VDS = 0 V			10	
Gate-source Threshold 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	14	24	31	mΩ
	RDS(on)2	ID = - 2 A, VGS = - 4.5 V	15	26	43	
Body Diode Forward Voltage	VF(s-d)	IF = - 2 A, VGS = 0 V		- 0.77	- 1.2	V
Input Capacitance *1	Ciss	VDS = - 30 V, VGS = 0 V f = 1 MHz		7800		pF
Output Capacitance *1	Coss			300		
Reverse Transfer Capacitance *1	Crss			260		
Turn-on Delay Time *1, *2	td(on)	VDD = - 30 V, VGS = 0 to - 10 V ID = - 3.75 A		50		ns
Rise Time *1, *2	tr			75		
Turn-off Delay Time *1, *2	td(off)	VDD = - 30 V, VGS = - 10 to 0 V ID = - 3.75 A		500		
Fall Time *1, *2	tf			160		
Total Gate Charge *1	Qg1	VDD = - 30 V, VGS = - 4.5 V ID = - 7.5 A		65		nC
	Qg2	VDD = - 30 V, VGS = - 10 V ID = - 7.5 A		140		
Gate-source Charge *1	Qgs			20		
Gate-drain Charge *1	Qgd			27		

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.

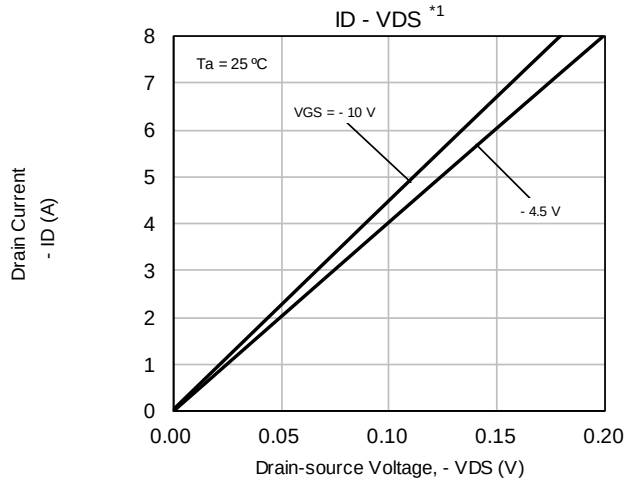


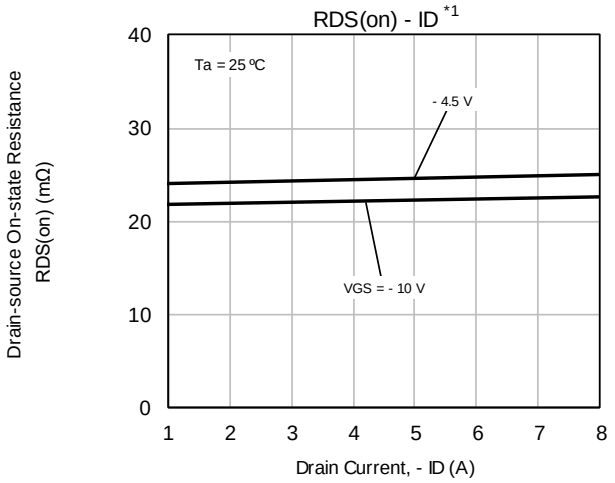


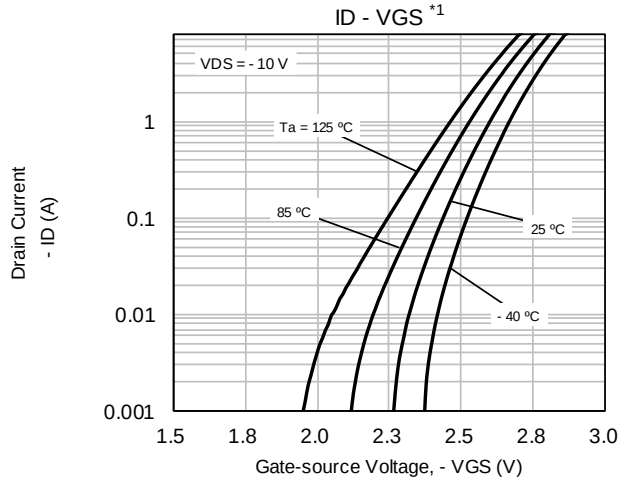
8. ELECTROSTATIC DISCHARGE CHARACTERISTIC Ta = 25 °C ± 3 °C

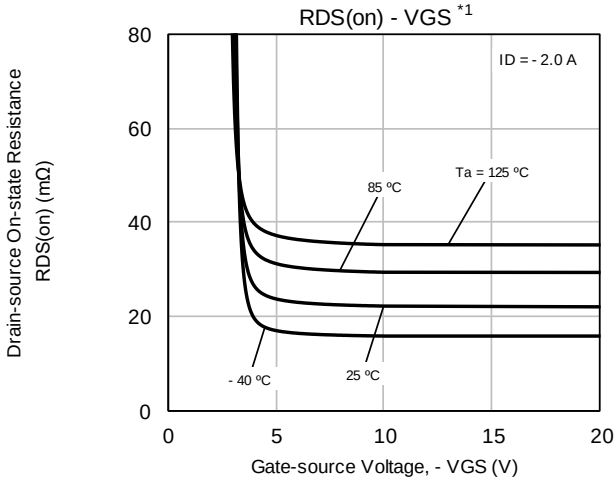
Standard	Test Type	Symbol	Conditions	Class	Value	Unit
AEC-Q101-001	Human Body Model	HBM	C = 100 pF, R = 1.5 kΩ	H3A	> 4 to ≤ 8	kV

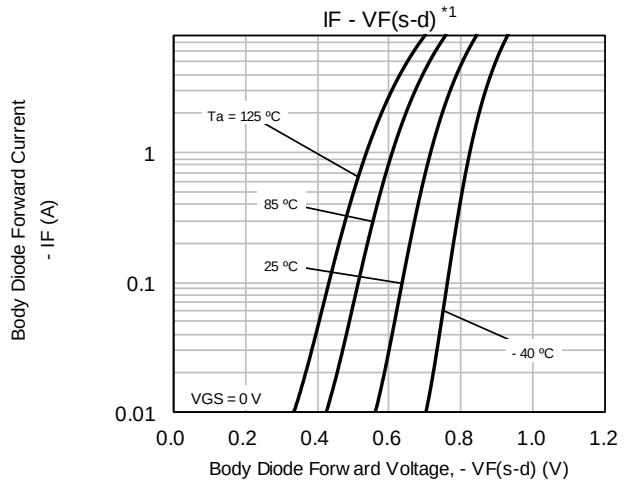
9. TECHNICAL DATA (Reference)

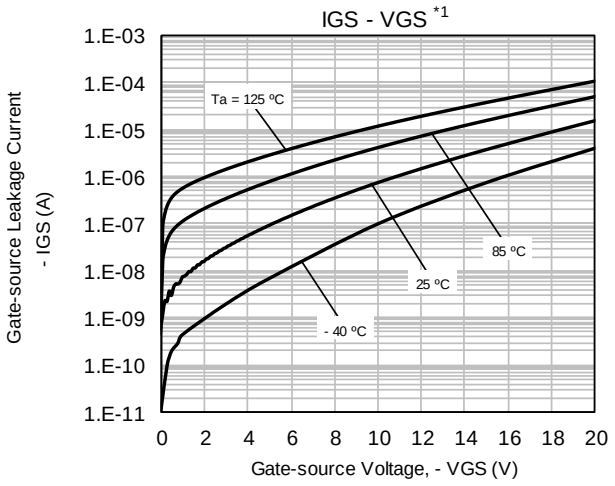












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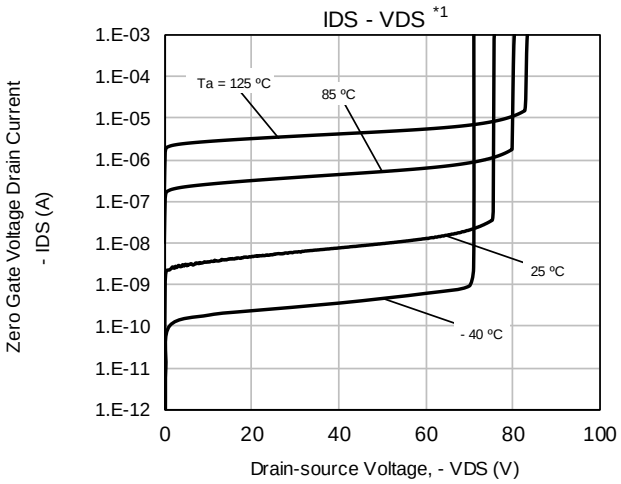
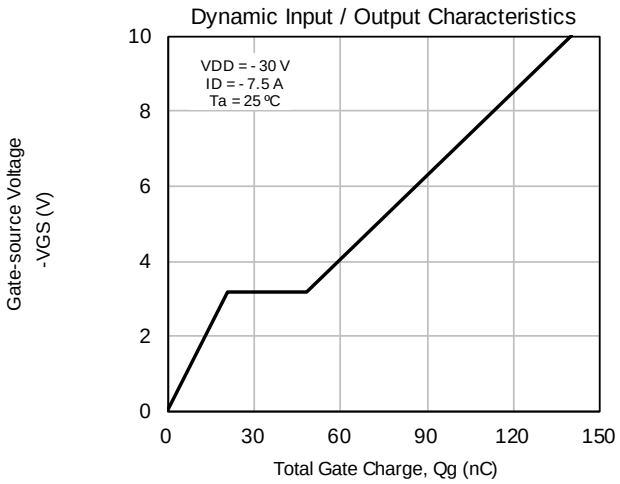
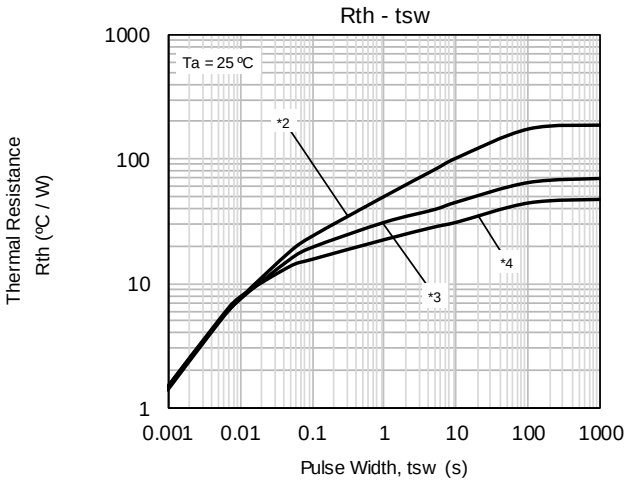
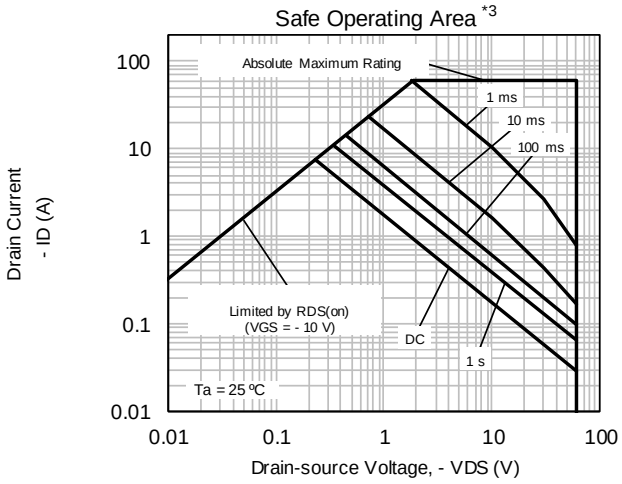








Note

*1 Pulse measurement.

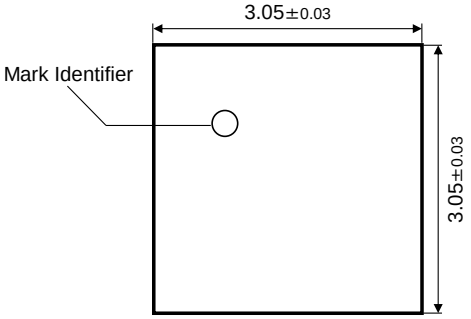
*2 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
FR4 board partially covered with copper pad (79.9 mm^2 area, 36 µm thickness).

*3 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
FR4 board fully covered with copper pad (616 mm^2 area, 36 µm thickness).

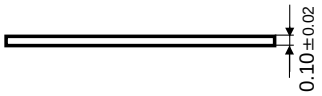
*4 Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).

10. OUTLINE

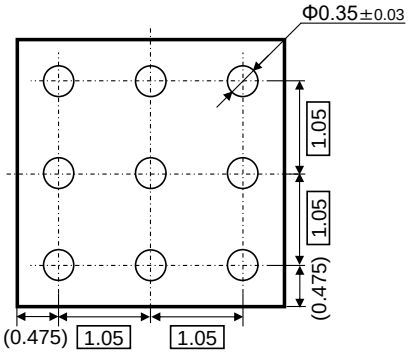
(Top View) Unit: mm



(Front View)

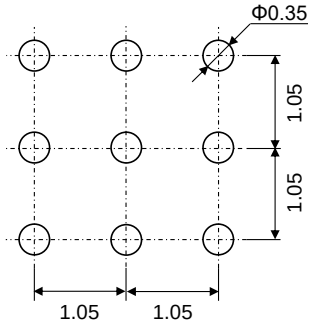


(Bottom View)



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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