Gate resistor installed
Dual N-channel MOSFET

FC6B21100L
Datasheet

For additional information or question, please contact Nuvoton Technology Corporation Japan.

www.nuvoton.co.jp

1. GENERAL DESCRIPTION

Gate resistor installed Dual N-channel MOSFET
for lithium-ion secondary battery protection circuits.

2. FEATURES

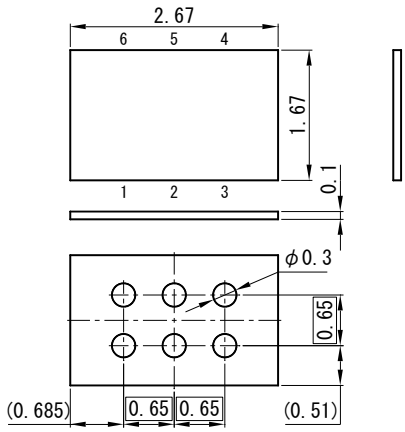
- Low source-source ON Resistance: Rss(on) typ = 4.5 mΩ (VGS = 4.5 V)
- CSP package:smallest & thinnest size
- RoHS compliant (EU RoHS / MSL: Level 1)

3. MARKING SYMBOL: 33

4. PACKAGING

Embossed type (Thermo-compression sealing): 10,000 pcs / reel (standard)

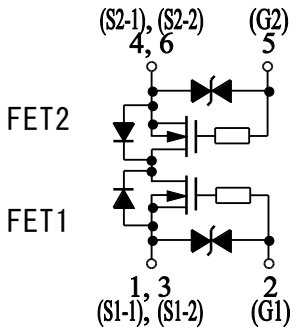
Unit: mm



1. Source1-1 (FET1)
2. Gate1 (FET1)
3. Source1-2 (FET1)
4. Source2-1 (FET2)
5. Gate2 (FET2)
6. Source2-2 (FET2)

Package	MLGA006-W-1727-RA
JEITA	—
Code	—

Equivalent circuit



5. ABSOLUTE MAXIMUM RATINGS Ta = 25 °C

Parameter	Symbol	Rating	Unit
Source-source Voltage	VSS	12	V
Gate-source Voltage	VGS	± 8	V
Source Current (DC) *1	IS	8	A
Source Current (Pulsed) *1,*2	ISp	80	A
Total Power Dissipation *1	PD	0.45	W
Channel Temperature	Tch	150	°C
Storage Temperature Range	Tstg	- 55 to + 150	°C

6. THERMAL CHARACTERISTICS Ta = 25 °C

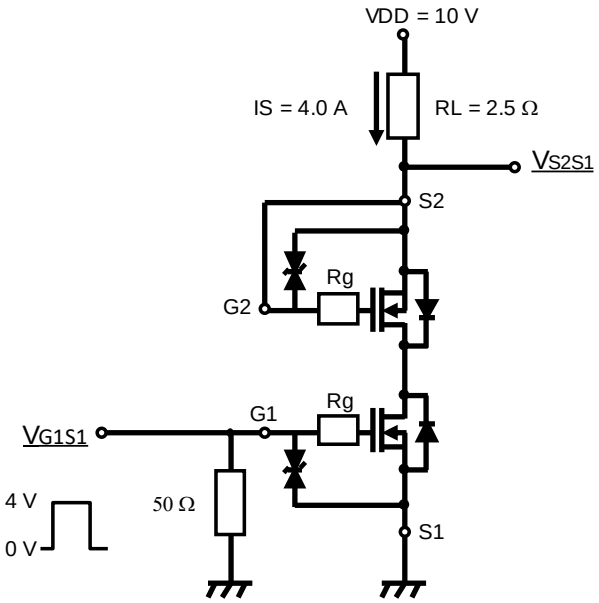
Parameter	Symbol	Rating	Unit
Thermal resistance (ch-a)	Rth(ch-a)	278	°C / W

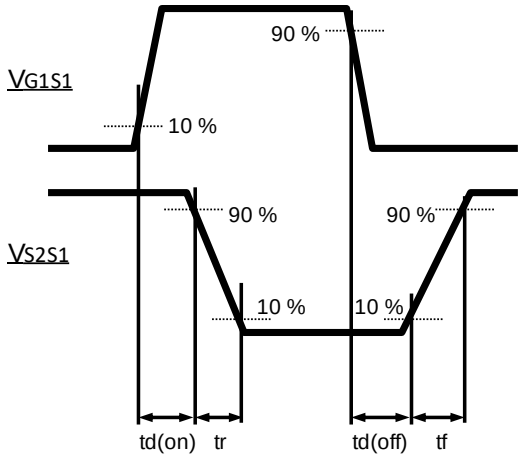
Note *1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).
using the minimum recommended pad size (36μm Copper).
*2 t = 10 μs, Duty Cycle ≤ 1 %.

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	IS = 1 mA, VGS = 0 V	12			V
Zero Gate Voltage Source Current	ISSS	VSS = 12 V, VGS = 0 V			1	μA
Gate-source Leakage Current	IGSS	VGS = ± 8 V, VSS = 0 V			± 10	μA
		VGS = ± 5 V, VSS = 0 V			± 1	
Gate-source Threshold Voltage	Vth	IS = 1.0 mA, VSS = 10 V	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	IS = 4.0 A, VGS = 4.5 V	3.4	4.5	5.7	mΩ
	RSS(on)2	IS = 4.0 A, VGS = 3.8 V	3.6	4.9	6.3	
	RSS(on)3	IS = 4.0 A, VGS = 3.1 V	4.0	5.5	7.8	
	RSS(on)4	IS = 4.0 A, VGS = 2.5 V	4.2	6.5	11.0	
Body Diode Forward Voltage	VF(s-s)	IF = 8.0 A, VGS = 0 V		0.8	1.2	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 MHz		4360		pF
Output Capacitance *1	Coss			720		
Reverse Transfer Capacitance *1	Crss			670		
Turn-on delay Time *1,*2	td(on)	VDD = 10 V, VGS = 0 to 4 V, IS = 4.0 A		2.2		μs
Rise Time *1,*2	tr			5.3		
Turn-off delay Time *1,*2	td(off)	VDD = 10 V, VGS = 4 to 0 V, IS = 4.0 A		13.9		μs
Fall Time *1,*2	tf			12.1		
Total Gate Charge *1	Qg	VDD = 10 V, VGS = 0 to 4 V, IS = 8.0 A		42		nC
Gate-source Charge *1	Qgs			14		
Gate-drain Charge *1	Qgd			13		

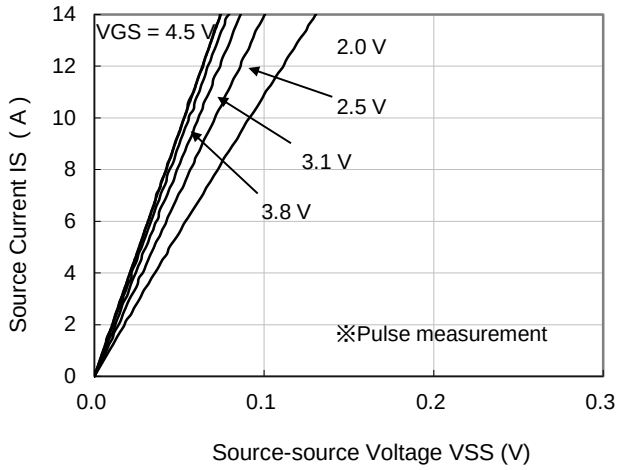
Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.
*1 Guaranteed by design
*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time



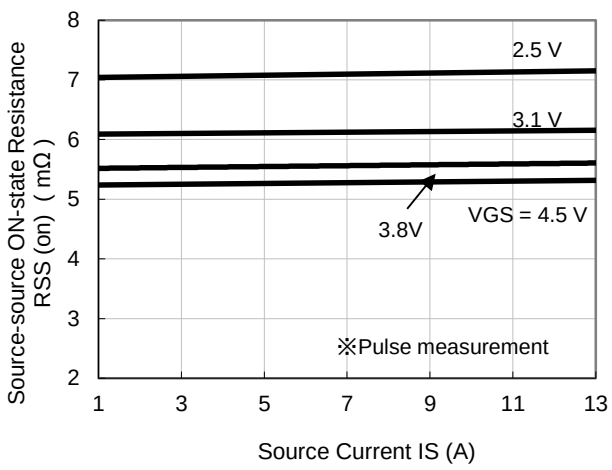


8. TECHNICAL DATA (Reference)

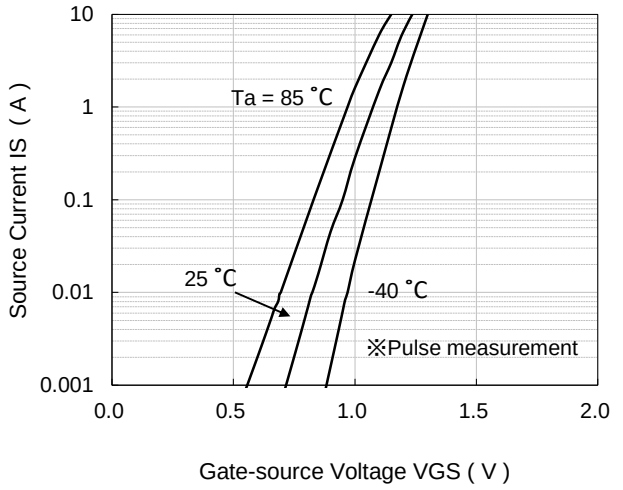
IS - VSS



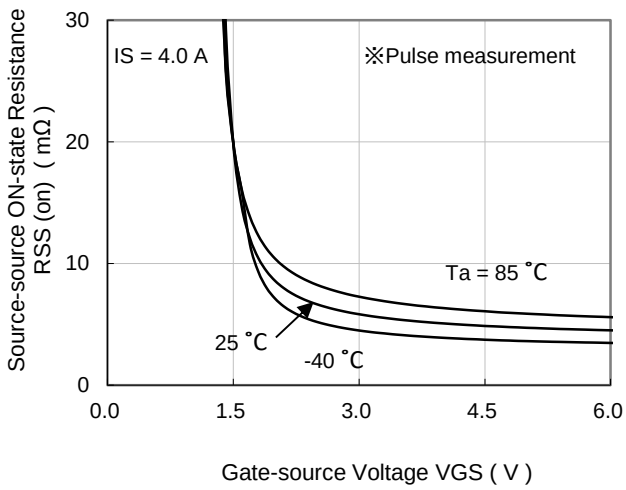
RSS(on) - IS



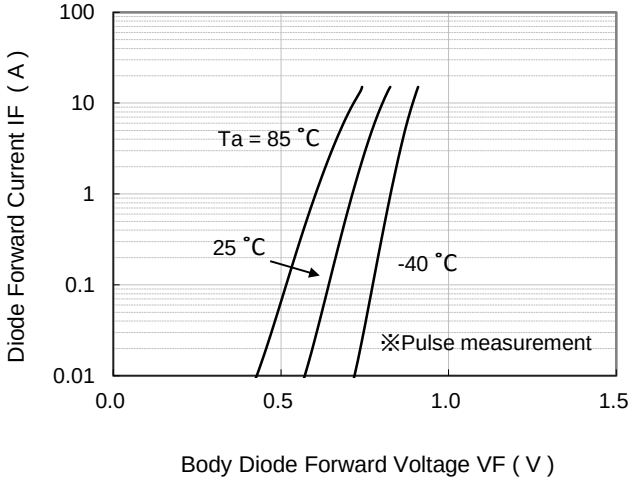
IS - VGS



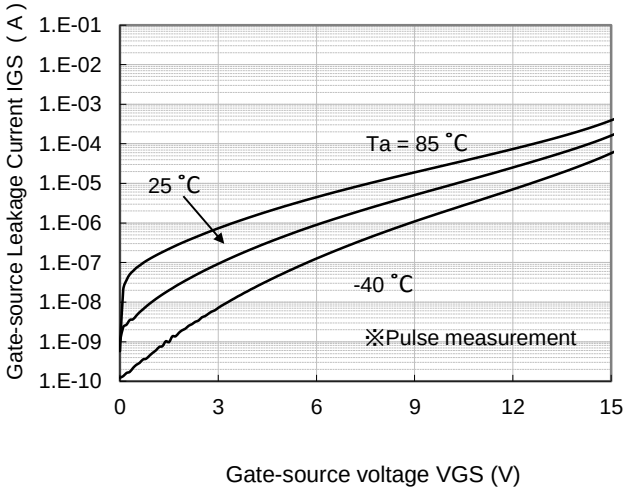
RSS(on) - VGS



IF - VF

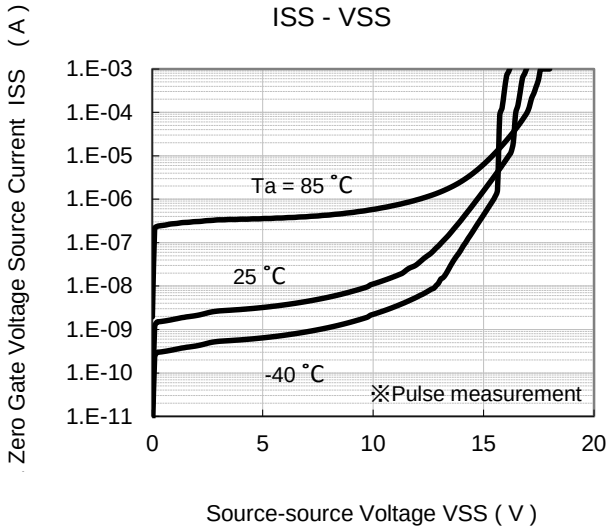


IGS - VGS



TECHNICAL DATA (Reference)

ISS - VSS

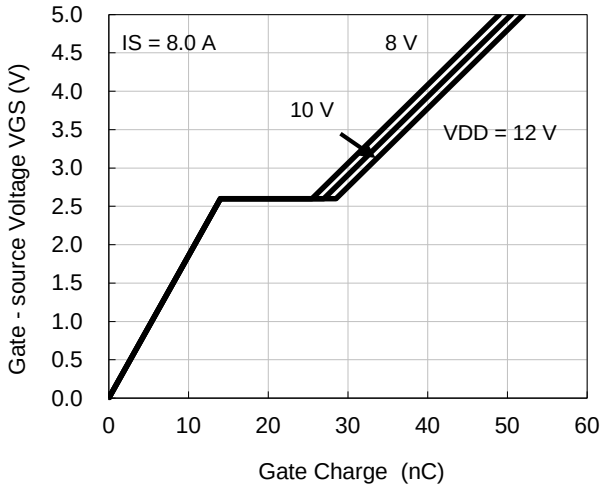


Destruction Current

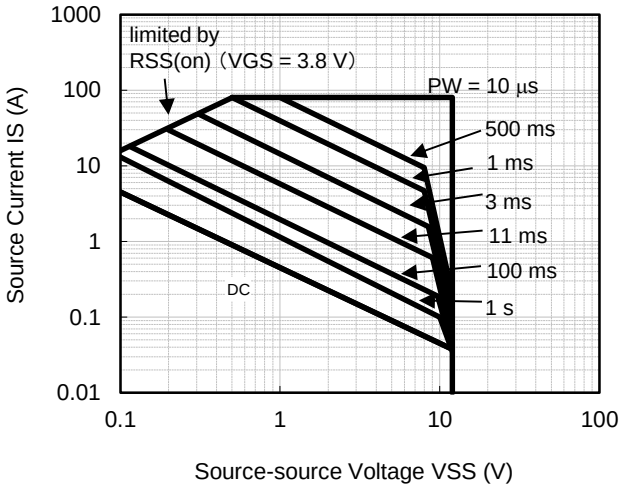
Parameter	Conditions	Result
Operation Test *1	VGS = 3.8 V, IS = 40 A, t = 3 ms	PASS
	VGS = 3.8 V, IS = 15 A, t = 11 ms	PASS
Destruction Current *1	VGS = 3.8 V, t = 300 µs	90 A
	VGS = 3.8 V, t = 10 ms	72 A
	VGS = 3.8 V, t = 20 ms	59 A
	VGS = 3.8 V, t = 50 ms	47 A
	VGS = 3.8 V, t = 100 ms	42 A
	VGS = 3.8 V, t = 200 ms	35 A

Ta = 25 °C,
Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm)
using the minimum recommended pad size (36µm Copper).

Dynamic Input/Output Characteristics



Safe Operating Area



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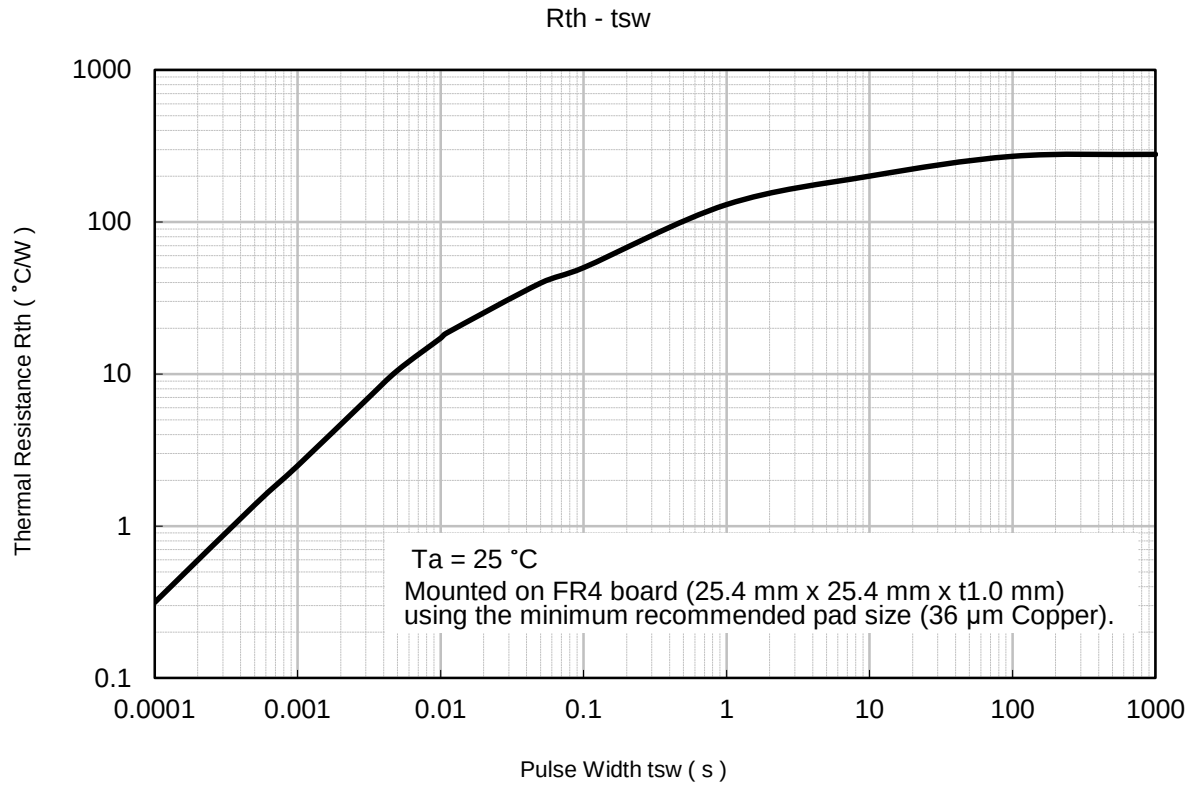
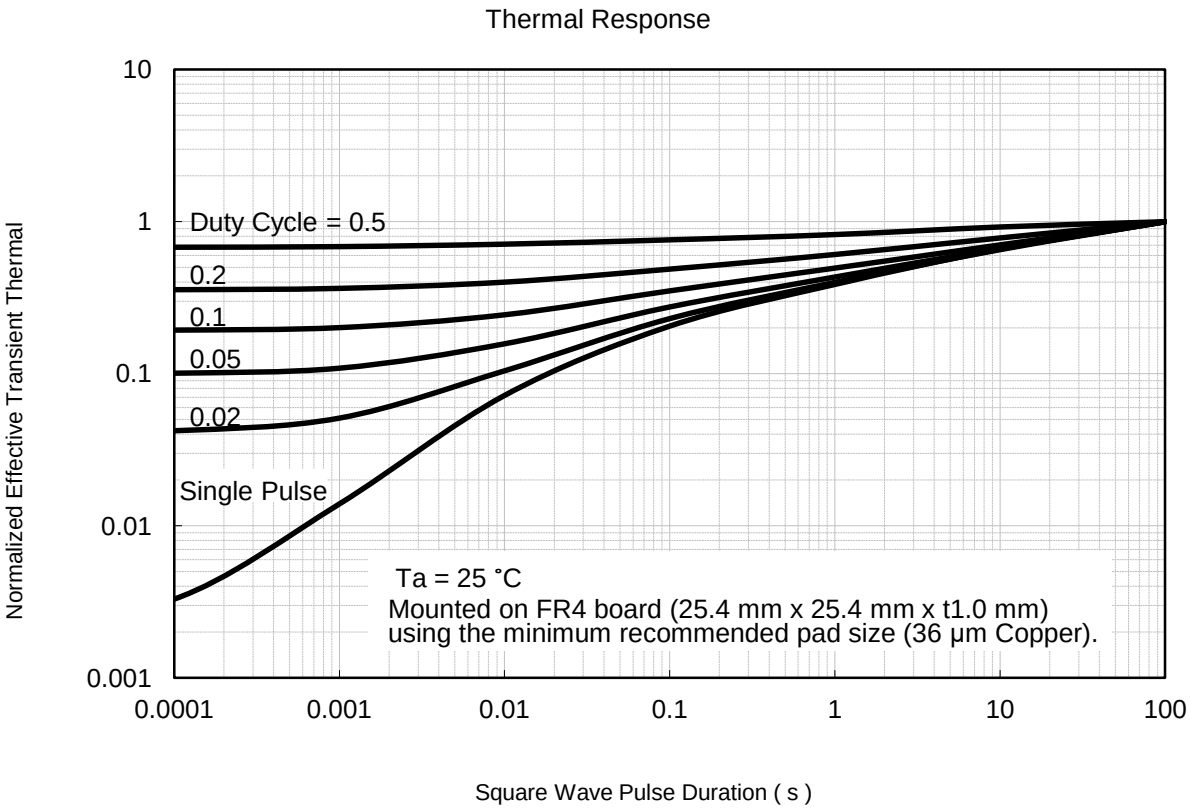
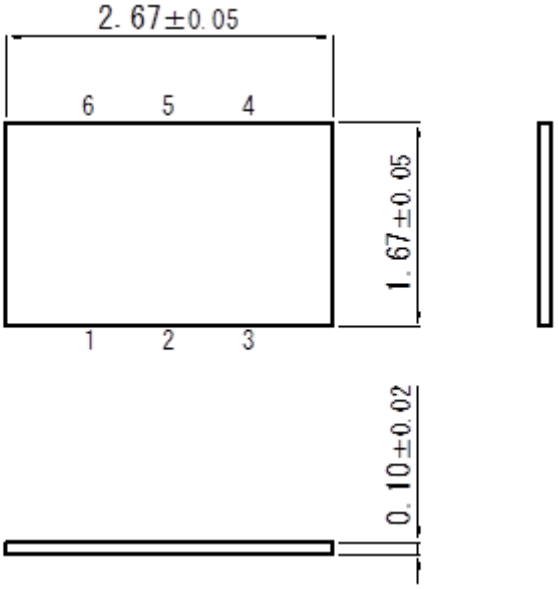
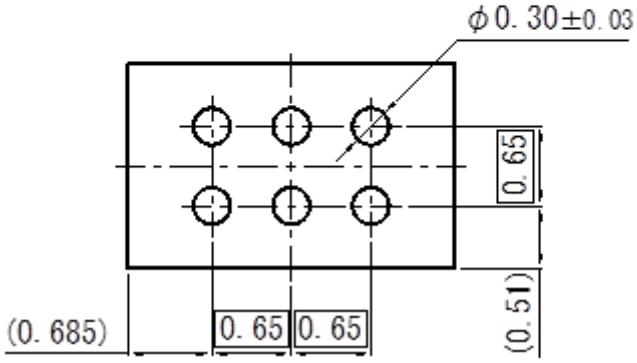




9. OUTLINE

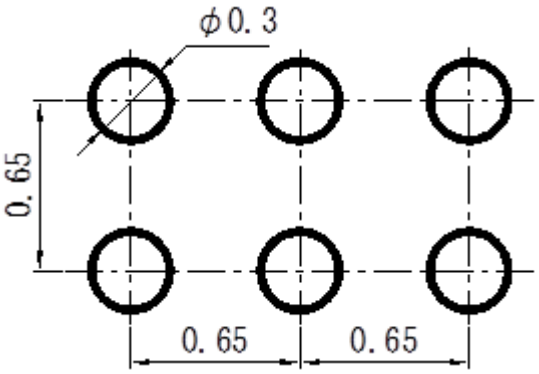
Unit: mm





10. LAND 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.

11. REVISION HISTORY

Date	Revision	Description
2021.04.21	1.00	1. Initially issued.
2021.08.31	1.01	1. Added important notice in Land Pattern. 2. Added special attention and precautions notes.
2021.11.11	1.02	1. Changed document name from Product Standards to Datasheet.

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