Gate resistor installed
Dual N-channel MOSFET

KFC4B21210L
Data Sheet

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

- Source-source ON resistance: Rss(on) typ. = 13 mΩ (VGS = 3.8 V)
- CSP (Chip Size Package)
- Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)

3. MARKING SYMBOL: 18

4. PACKAGING

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

5. ABSOLUTE MAXIMUM RATINGS Ta = 25 °C

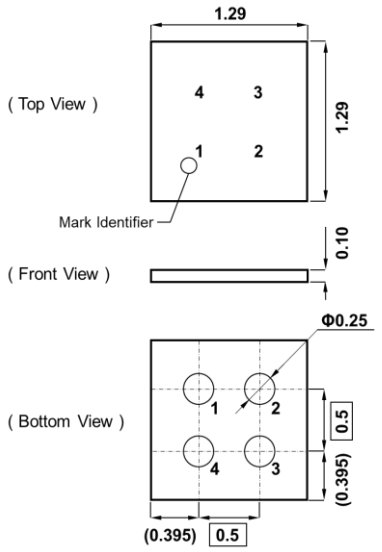
Parameter		Symbol	Rating	Unit
Source-source Voltage		VSS	12	V
Gate-source Voltage		VGS	±8	V
Source Current	DC	IS1 *1	4.7	A
		IS2 *2	7.7	
		IS3 *3	10.4	
	Pulsed *4	ISp	47	
Total Power Dissipation	DC	PD1 *1	0.37	W
		PD2 *2	1.0	
		PD3 *3	1.8	
Channel Temperature		Tch	150	°C
Storage Temperature Range		Tstg	-55 to +150	°C

6. THERMAL CHARACTERISTICS Ta = 25 °C

Parameter	Symbol	Rating	Unit
Thermal Resistance (ch-a)	Rth1 *1	338	°C / W
	Rth2 *2	125	
	Rth3 *3	69	

Note *1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm),
FR4 board partially covered with copper pad (18 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 (613 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 %

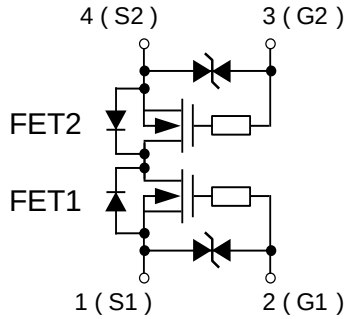
Unit: mm



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

Package	ULGA004-W-1313-RA
JEITA	-
Code	-

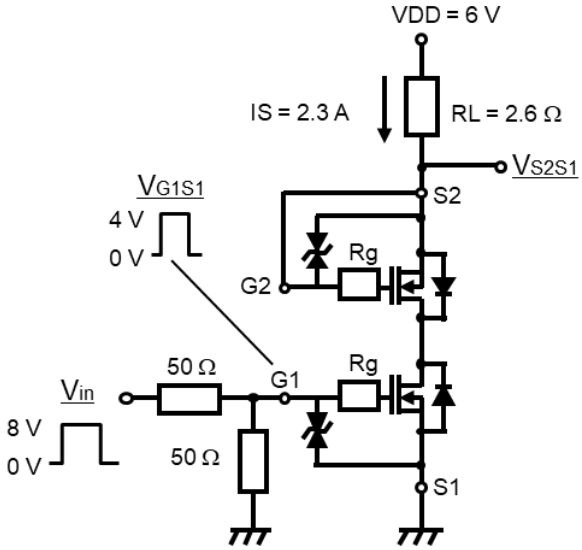
Equivalent circuit

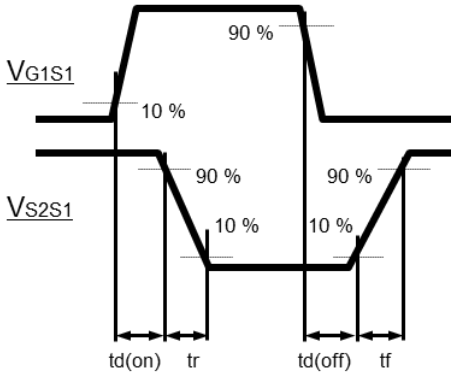


7. ELECTRICAL CHARACTERISTICS Ta = 25 °C ± 3 °C

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			1.0	μA
Gate-Source Leakage Current	IGSS1	VGS = ±8 V, VSS = 0 V			±10	μA
	IGSS2	VGS = ±5 V, VSS = 0 V			±1.0	
Gate-source Threshold Voltage	Vth	IS = 0.31 mA, VSS = 6 V	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	IS = 2.3 A, VGS = 4.5 V	8.0	12.0	14.5	mΩ
	RSS(on)2	IS = 2.3 A, VGS = 3.8 V	9.0	13.0	16.5	
	RSS(on)3	IS = 2.3 A, VGS = 3.1 V	9.5	14.0	21.5	
	RSS(on)4	IS = 2.3 A, VGS = 2.5 V	10.0	17.0	31.5	
Body Diode Forward Voltage	VF(s-s)	IF = 2.3 A, VGS = 0 V		0.7	1.0	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 kHz		1140		pF
Output Capacitance *1	Coss			180		
Reverse Transfer Capacitance *1	Crss			140		
Turn-on Delay Time *1,*2	td(on)	VDD = 6 V, VGS = 0 to 4 V IS = 2.3 A		0.33		μs
Rise Time *1,*2	tr			0.56		
Turn-off Delay Time *1,*2	td(off)	VDD = 6 V, VGS = 4 to 0 V IS = 2.3 A		1.57		μs
Fall Time *1,*2	tf			0.86		
Total Gate Charge *1	Qg	VDD = 6 V VGS = 0 to 4 V IS = 4.7 A		9.4		nC
Gate-source Charge *1	Qgs			2.6		
Gate-drain Charge *1	Qgd			1.9		

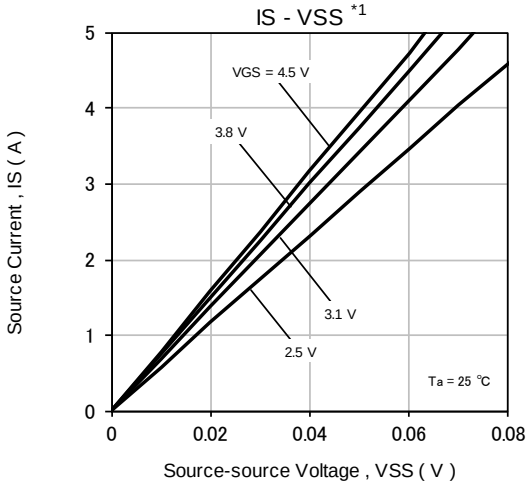
Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.
*1 Guaranteed by design, not subject to production testing
*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time



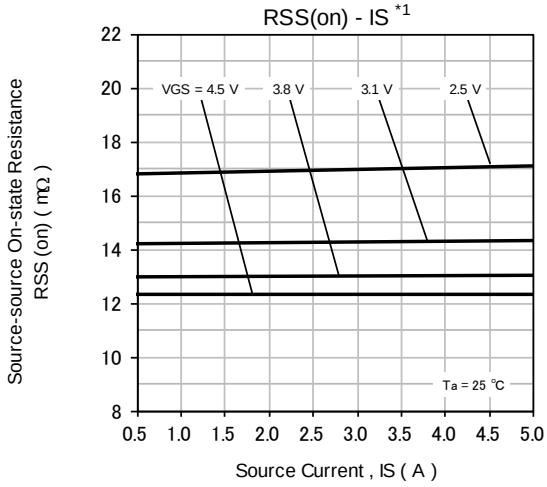


8. TECHNICAL DATA (Reference)

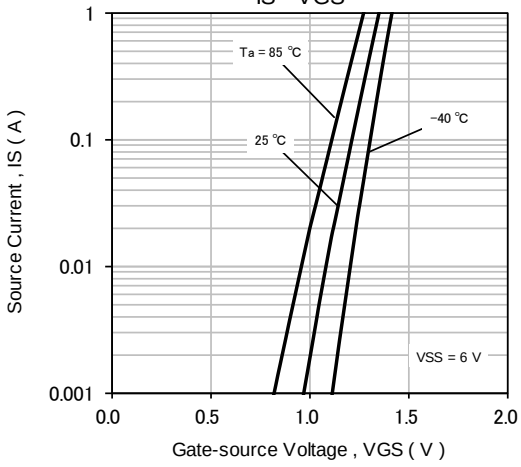
IS - VSS *1



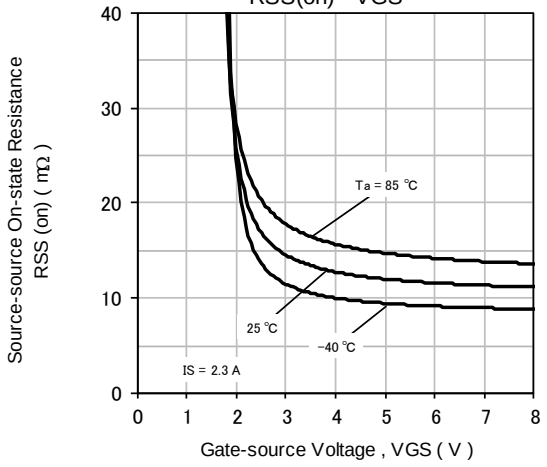
RSS(on) - IS *1



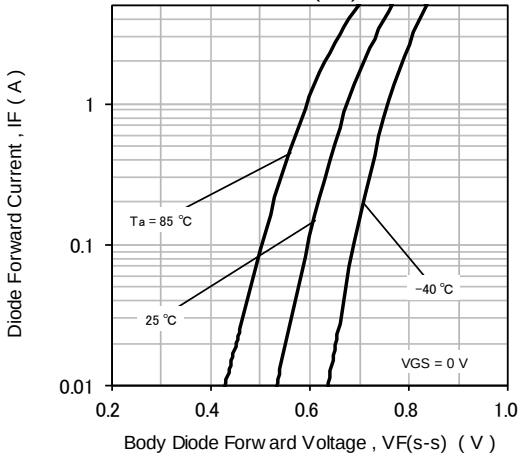
IS - VGS *1



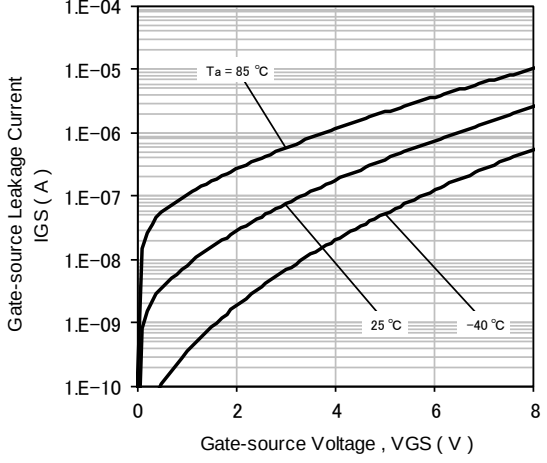
RSS(on) - VGS *1



IF - VF(s-s) *1

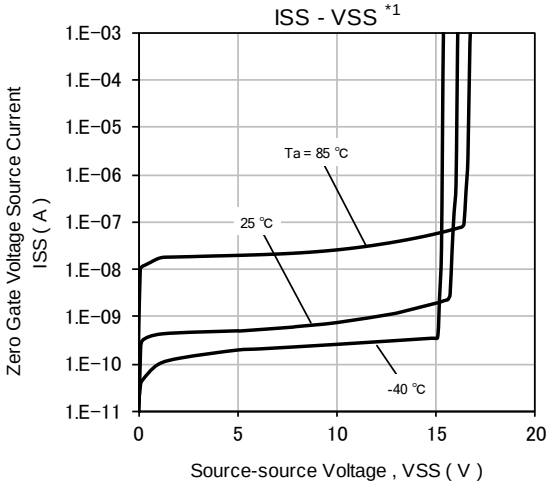


IGS - VGS *1

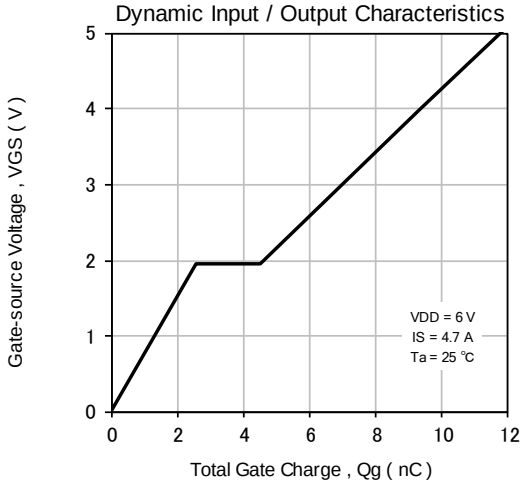


TECHNICAL DATA (Reference)

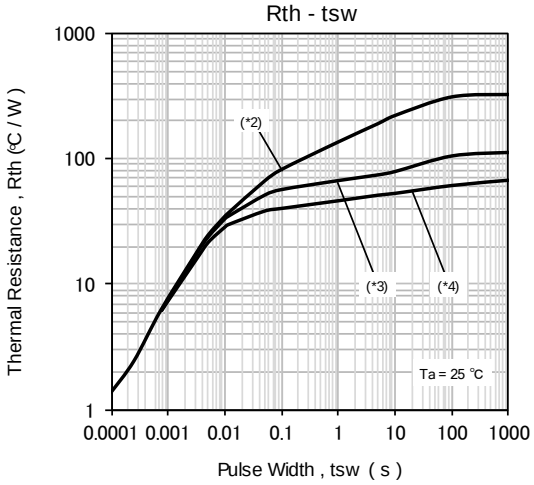
ISS - VSS *1



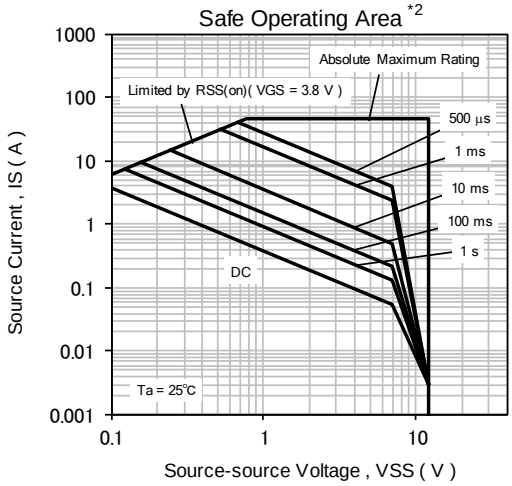
Dynamic Input / Output Characteristics



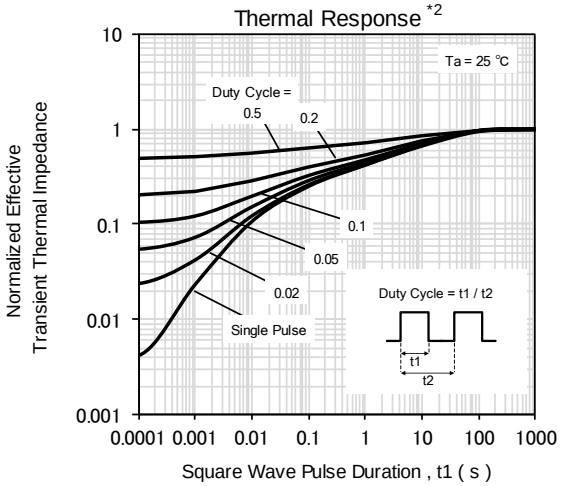
Rth - tsw



Safe Operating Area *2



Thermal Response *2



Note

*1 Pulse measurement.

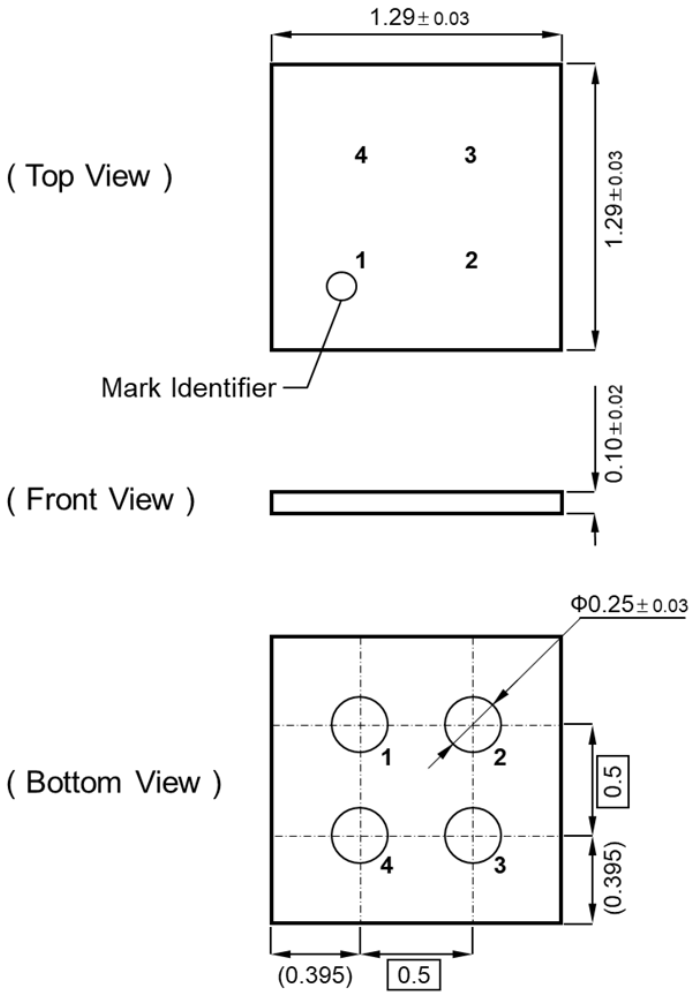
*2 Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm).
FR4 board partially covered with copper pad
(18 mm^2 area, 36 μm thickness).

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

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

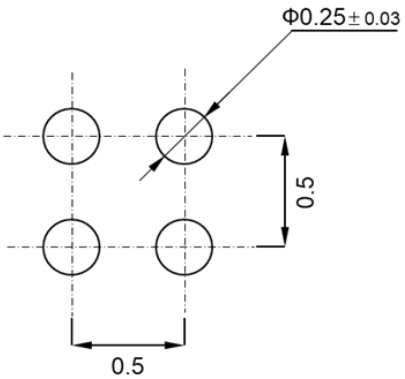
9. OUTLINE

Unit : mm



10. LAND & STENCIL PATTERN (Reference)

Unit : mm



11. REVISION HISTORY

Date	Revision	Description
2021.2.5	1.00	1. initially issued.

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