

## Gate resistor installed Dual N-channel MOSFET

# KFC4B22270L Datasheet

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## 1. GENERAL DESCRIPTION

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

## 2. FEATURES

- Low source-source ON Resistance:  $R_{SS}(\text{on})$  typ. = 18 m $\Omega$  ( $V_{GS} = 3.8$  V)
- CSP (Chip Size Package)
- RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)

**3. MARKING SYMBOL: 2J**

#### 4. PACKAGING

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

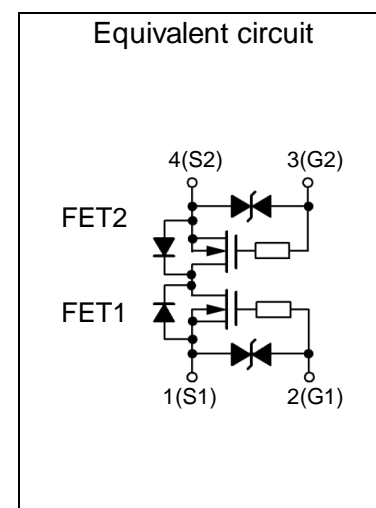
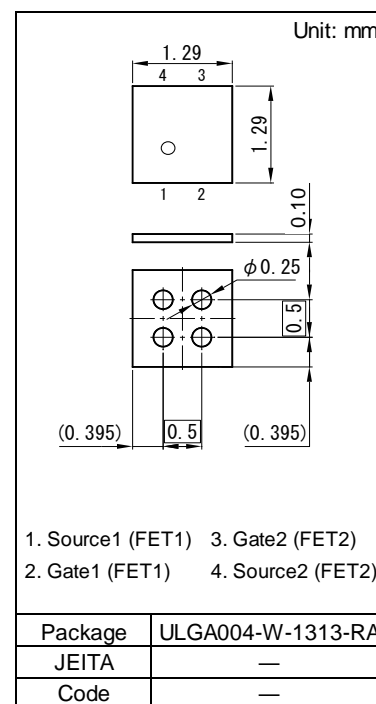
## 5. ABSOLUTE MAXIMUM RATINGS $T_a = 25\text{ }^{\circ}\text{C}$

Parameter		Symbol	Rating	Unit
Source-source Voltage		VSS	20	V
Gate-source Voltage		VGS	±12	V
Source Current	DC	IS1 <sup>*1</sup>	4	A
		IS2 <sup>*2</sup>	8	
	Pulsed	ISp <sup>*3</sup>	40	
Total Power Dissipation	DC	PD1 <sup>*1</sup>	0.37	W
		PD2 <sup>*2</sup>	1.5	
Channel Temperature		Tch	150	°C
Storage Temperature Range		Tstg	-55 to +150	°C

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

Parameter	Symbol	Rating	Unit
Thermal Resistance ( ch-a )	Rth1 <sup>*1</sup>	338	°C / W
	Rth2 <sup>*2</sup>	83	

- 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 Mounted on Ceramic substrate (70 mm x 70 mm x t1.0 mm).  
\*3 t = 10 μs, Duty Cycle ≤ 1 %



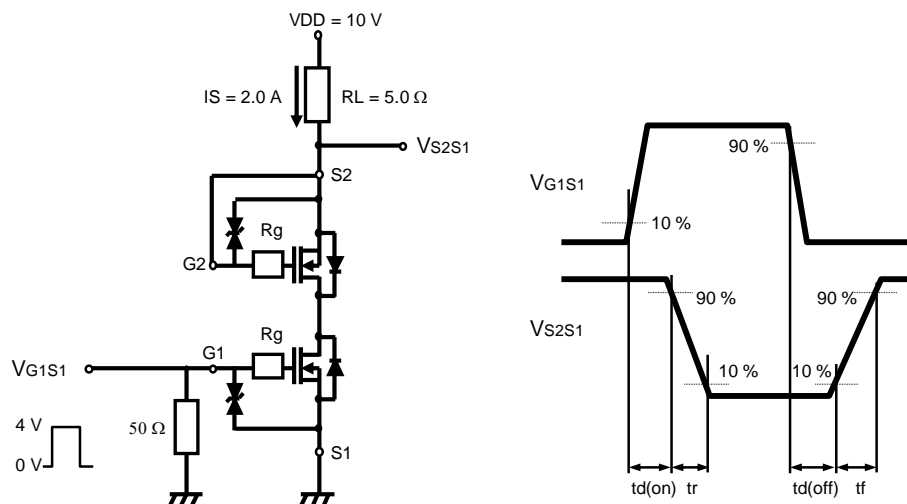
## 7. ELECTRICAL CHARACTERISTICS $T_a = 25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	$I_S = 1\text{ mA}$ , $V_{GS} = 0\text{ V}$	20			V
Zero Gate Voltage Source Current	ISSS	$V_{SS} = 20\text{ V}$ , $V_{GS} = 0\text{ V}$			1.0	$\mu\text{A}$
Gate-source Leakage Current	IGSS	$V_{GS} = \pm 8\text{ V}$ , $V_{SS} = 0\text{ V}$			$\pm 10$	$\mu\text{A}$
Gate-source Threshold Voltage	$V_{th}$	$I_S = 0.31\text{ mA}$ , $V_{SS} = 10\text{ V}$	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	$I_S = 2.0\text{ A}$ , $V_{GS} = 4.5\text{ V}$	12.0	17.0	22.0	$\text{m}\Omega$
	RSS(on)2	$I_S = 2.0\text{ A}$ , $V_{GS} = 3.8\text{ V}$	12.5	18.0	23.0	
	RSS(on)3	$I_S = 2.0\text{ A}$ , $V_{GS} = 3.1\text{ V}$	13.5	19.0	26.5	
	RSS(on)4	$I_S = 2.0\text{ A}$ , $V_{GS} = 2.5\text{ V}$	14.0	22.0	37.0	
Body Diode Forward Voltage	$V_{F(s-s)}$	$I_F = 2.0\text{ A}$ , $V_{GS} = 0\text{ V}$		0.8	1.2	V
Input Capacitance <sup>*1</sup>	Ciss	$V_{SS} = 10\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ kHz}$		910		pF
Output Capacitance <sup>*1</sup>	Coss			105		
Reverse Transfer Capacitance <sup>*1</sup>	Crss			80		
Turn-on Delay Time <sup>*1,2</sup>	$t_{d(on)}$	$V_{DD} = 10\text{ V}$ , $V_{GS} = 0\text{ to }4\text{ V}$ $I_S = 2.0\text{ A}$		0.25		$\mu\text{s}$
Rise Time <sup>*1,2</sup>	$t_r$			0.55		
Turn-off Delay Time <sup>*1,2</sup>	$t_{d(off)}$	$V_{DD} = 10\text{ V}$ , $V_{GS} = 4\text{ to }0\text{ V}$ $I_S = 2.0\text{ A}$		1.65		$\mu\text{s}$
Fall Time <sup>*1,2</sup>	$t_f$			1.0		
Total Gate Charge <sup>*1</sup>	Qg	$V_{DD} = 10\text{ V}$ $V_{GS} = 0\text{ to }4\text{ V}$ $I_S = 2.0\text{ A}$		9		nC
Gate-source Charge <sup>*1</sup>	Qgs			2.6		
Gate-drain Charge <sup>*1</sup>	Qgd			2.4		

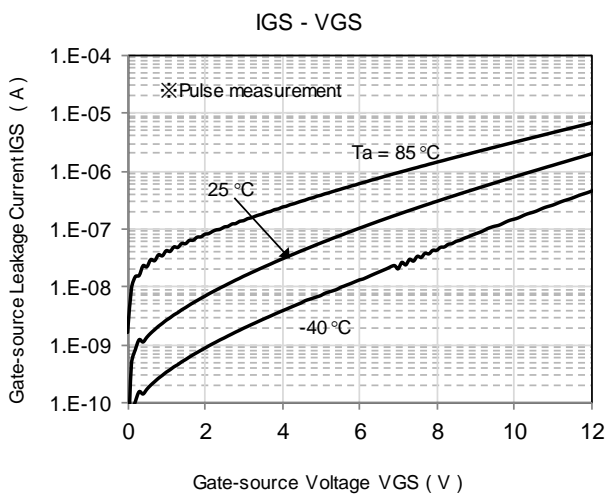
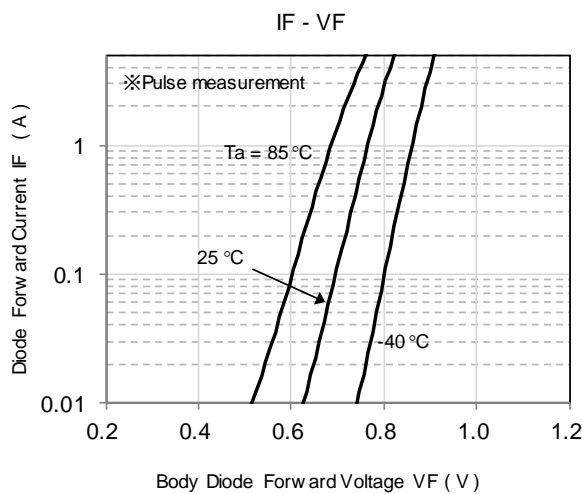
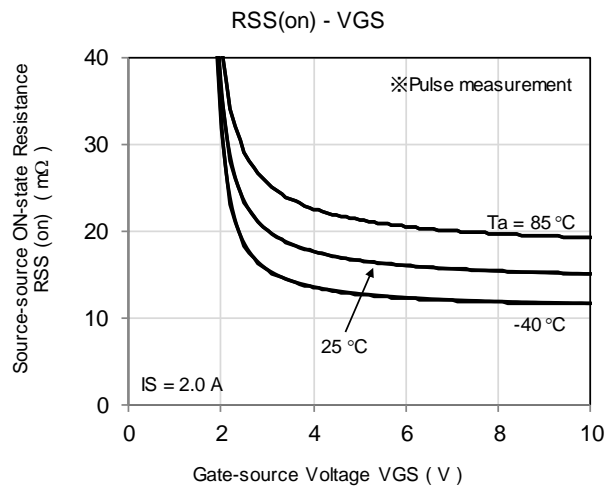
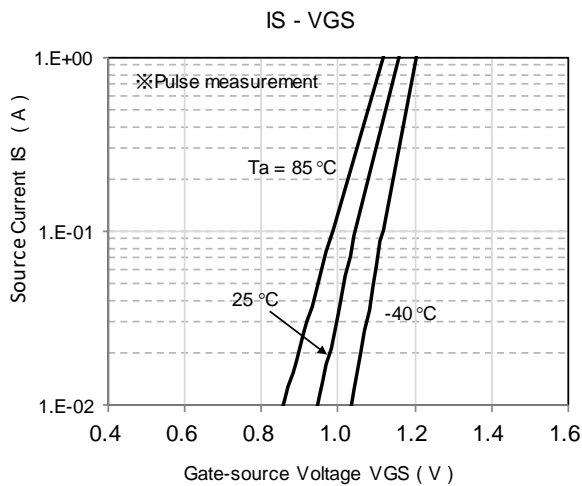
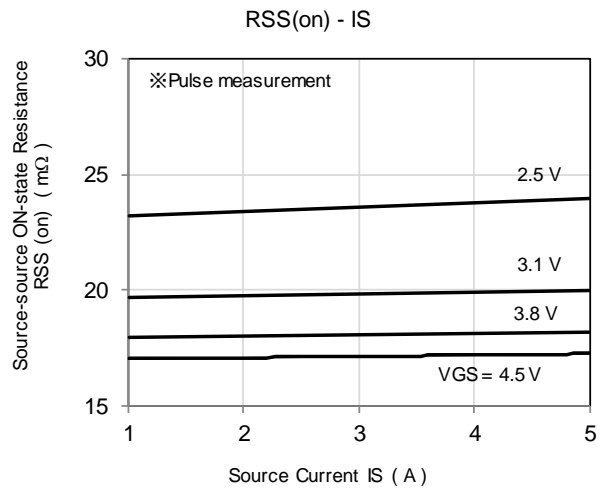
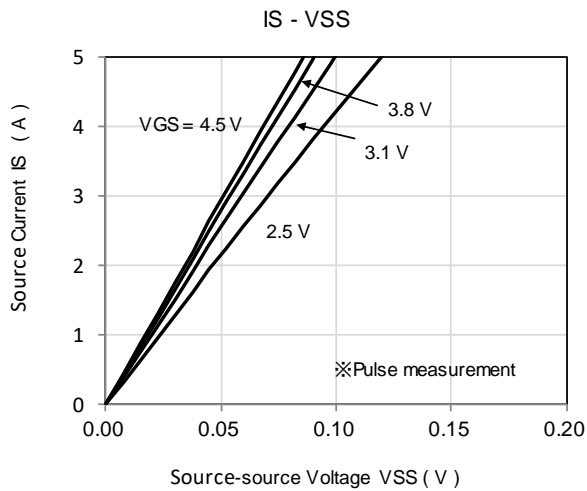
Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.

<sup>\*1</sup> Guaranteed by design, not subject to production testing

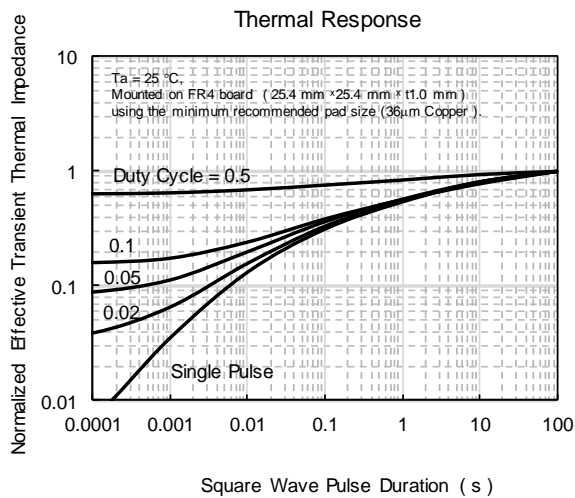
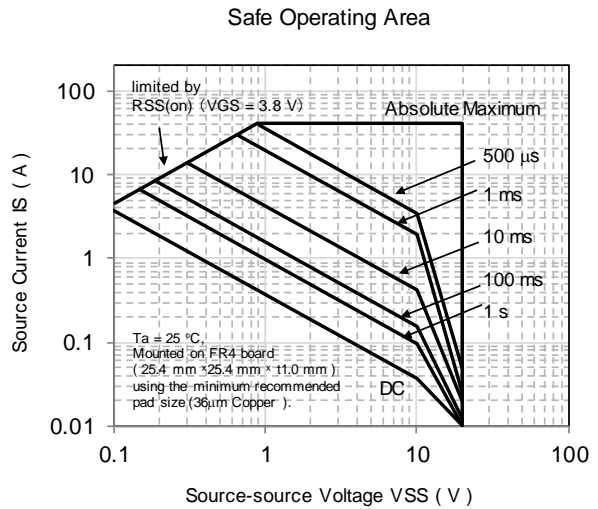
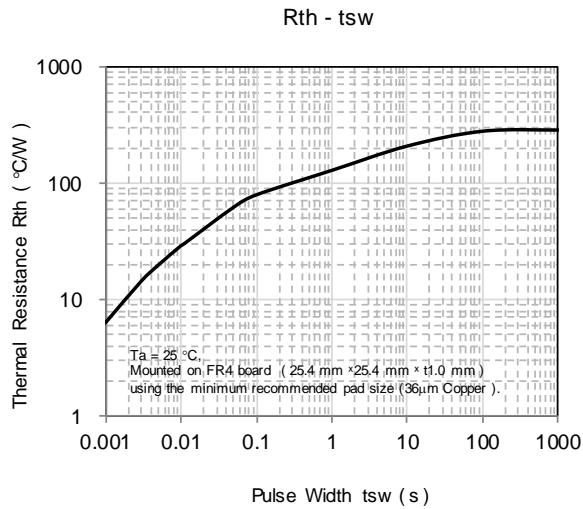
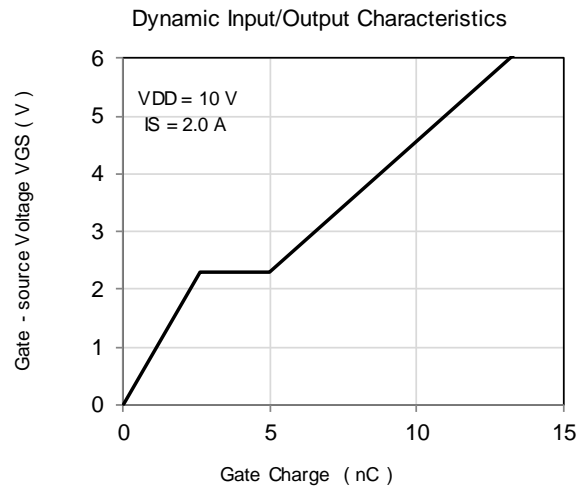
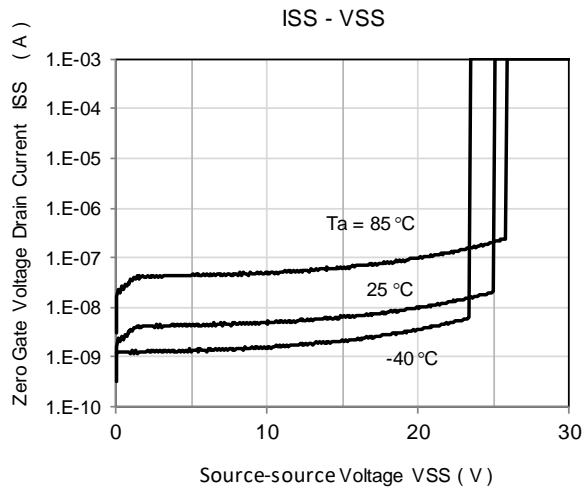
<sup>\*2</sup> Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time



## 8. TECHNICAL DATA (Reference)

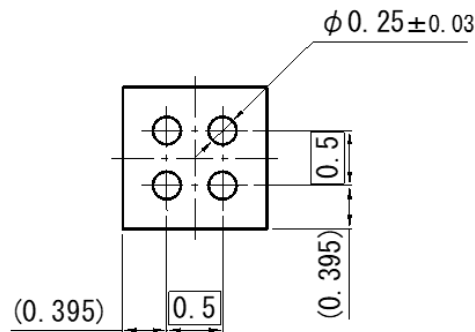
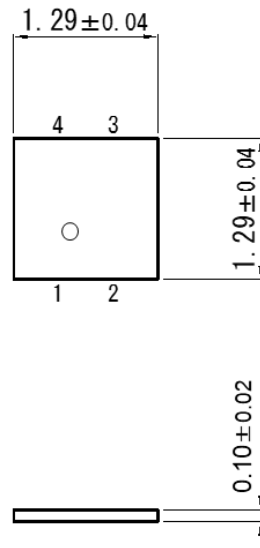


## TECHNICAL DATA (Reference)



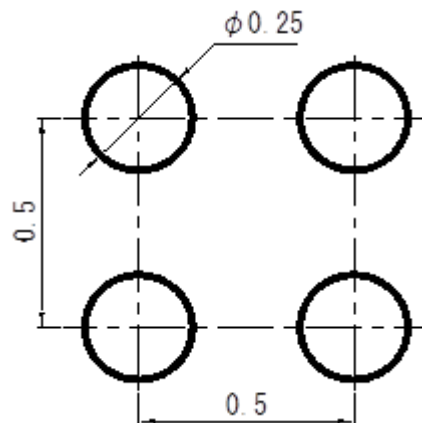
## 9. OUTLINE

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
2021.02.03	1.00	1. Initially issued.
2021.08.31	1.01	1. Changed document name from Product Standards to Datasheet. 2. Added important notice in Land Pattern. 3. Added special attention and precautions notes.

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