

**Dual N-channel MOSFET****KFCAB21B50L  
Datasheet**

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### 1. GENERAL DESCRIPTION

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

### 2. FEATURES

- Source-source On-state Resistance:  $R_{SS(on)}$  typ = 1.6 m $\Omega$  ( $V_{GS} = 3.8$  V)
- CSP (Chip Size Package)
- Halogen-free / RoHS compliant (EU RoHS / UL-94 V-0 / MSL: Level 1)

### 3. MARKING SYMBOL: UR

### 4. PACKAGING

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

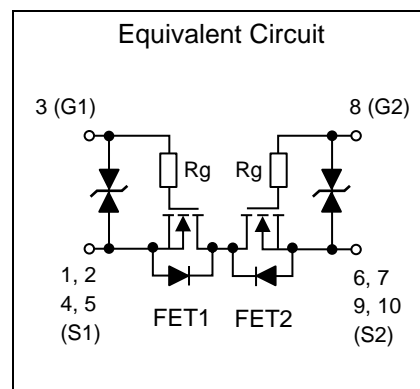
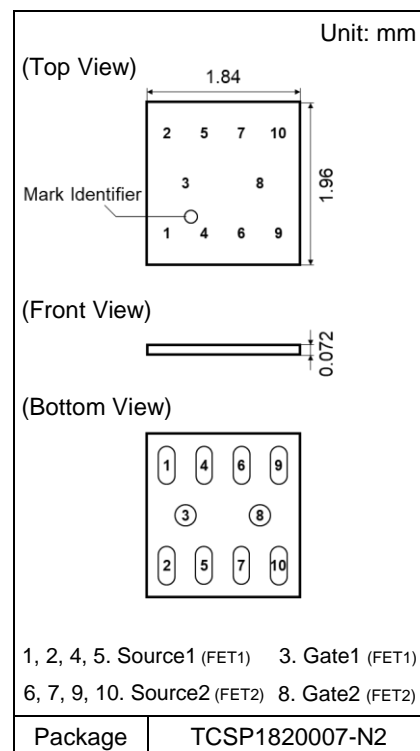
### 5. ABSOLUTE MAXIMUM RATINGS $T_a = 25$ °C

Parameter	Symbol	Rating	Unit
Source-source Voltage	VSS	12	V
Gate-source Voltage	VGS	$\pm 8$	V
Source Current	DC *1	IS1	15
	DC *2	IS2	28
	DC *3	IS3	39
	Pulsed *4	ISp	150
Total Power Dissipation	DC *1	PD1	0.51
	DC *2	PD2	1.70
	DC *3	PD3	3.20
Operating Junction and Storage Temperature Range	$T_j, T_{stg}$	- 55 to + 150	°C

### 6. THERMAL CHARACTERISTICS $T_a = 25$ °C

Parameter	Symbol	Rating	Unit
Thermal Resistance (ch-a)	$R_{th1}$ *1	245	°C / W
	$R_{th2}$ *2	74	
	$R_{th3}$ *3	39	

- Note \*1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).  
FR4 board partially covered with copper pad (22 mm<sup>2</sup> area, 36  $\mu$ m thickness).
- \*2 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm).  
FR4 board fully covered with copper pad (604 mm<sup>2</sup> area, 36  $\mu$ m thickness).
- \*3 Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).
- \*4  $t = 10$   $\mu$ s, Duty Cycle  $\leq 1$  %.



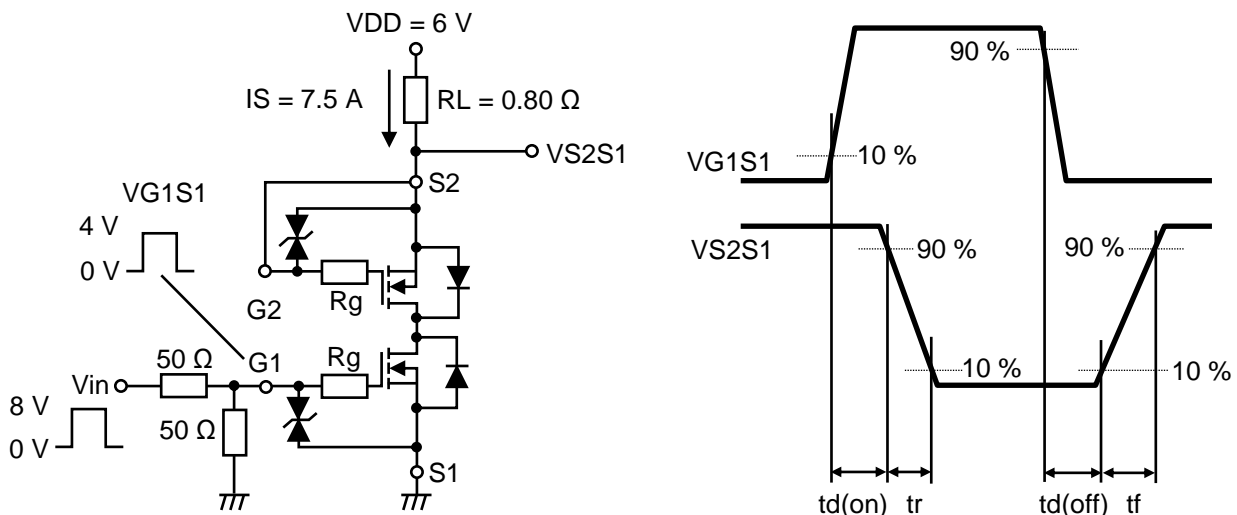
7. ELECTRICAL CHARACTERISTICS Ta = 25 °C ± 3 °C

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	IGSS1	VGS = ± 8 V, VSS = 0 V			± 5	μA
	IGSS2	VGS = ± 5 V, VSS = 0 V			± 0.5	
Gate-source Threshold Voltage	Vth	IS = 0.58 mA, VSS = 6 V	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	IS = 7.5 A, VGS = 4.5 V	1.05	1.50	1.95	mΩ
	RSS(on)2	IS = 7.5 A, VGS = 3.8 V	1.05	1.60	2.10	
	RSS(on)3	IS = 7.5 A, VGS = 3.1 V	1.15	1.90	2.75	
	RSS(on)4	IS = 7.5 A, VGS = 2.5 V	1.50	2.45	4.70	
Body Diode Forward Voltage	VF(s-s)	IF = 7.5 A, VGS = 0 V		0.7	1.0	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 kHz		3900		pF
Output Capacitance *1	Coss			530		
Reverse Transfer Capacitance *1	Crss			480		
Turn-on Delay Time *1,*2	td(on)	VDD = 6 V, VGS = 0 to 4 V		1.2		μs
Rise Time *1,*2	tr	IS = 7.5 A		2.1		
Turn-off Delay Time *1,*2	td(off)	VDD = 6 V, VGS = 4 to 0 V		5.3		μs
Fall Time *1,*2	tf	IS = 7.5 A		3.3		
Total Gate Charge *1	Qg	VDD = 6 V		33.0		nC
Gate-source Charge *1	Qgs	VGS = 0 to 4 V		8.8		
Gate-drain Charge *1	Qgd	IS = 15 A		6.4		
Gate Resistance *1	Rg	f = 1 MHz	400	700	1000	Ω

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.

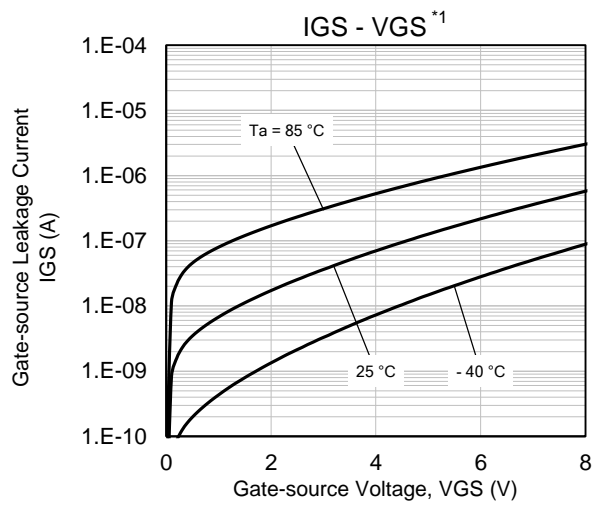
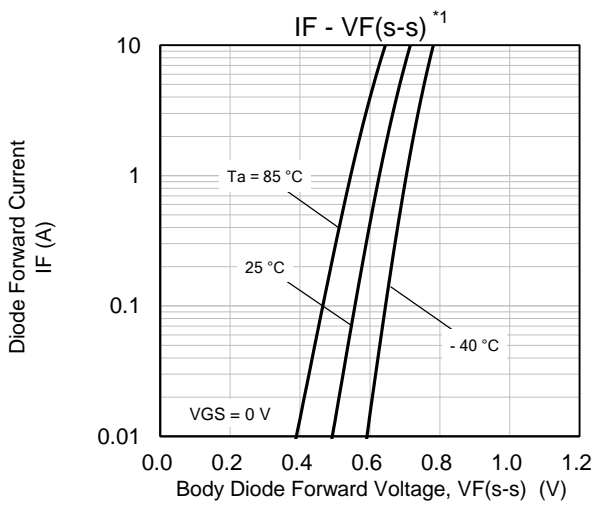
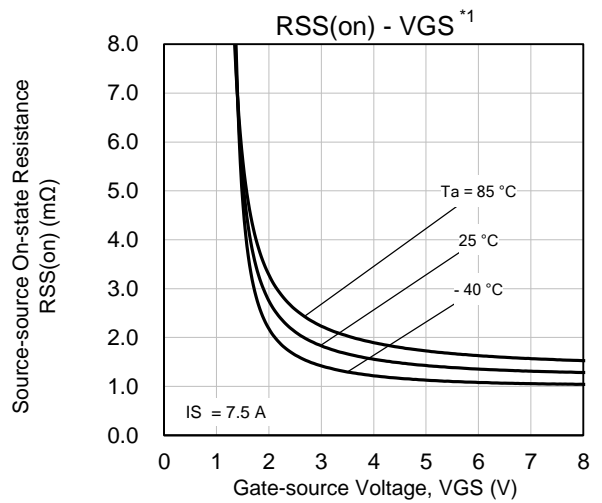
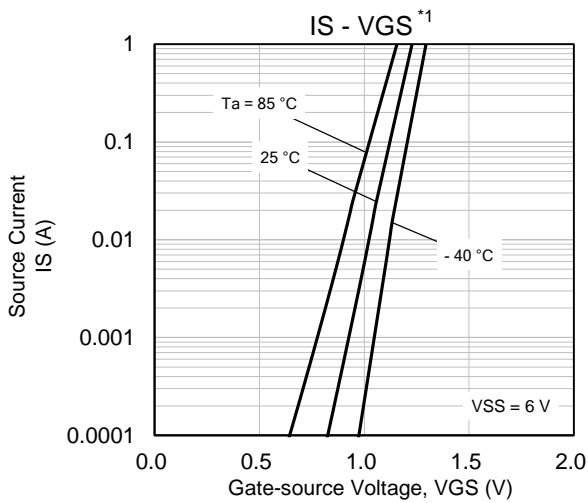
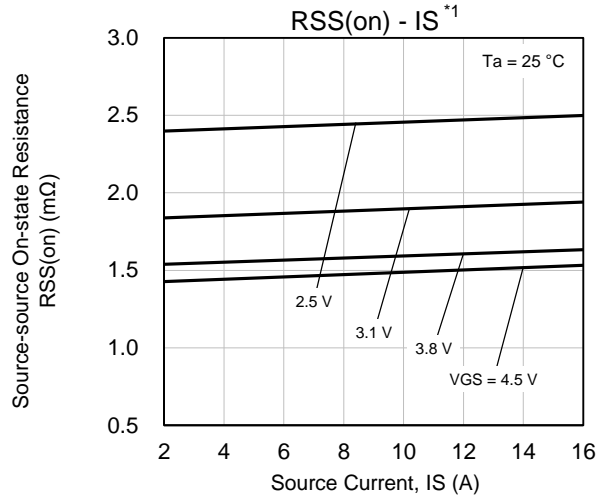
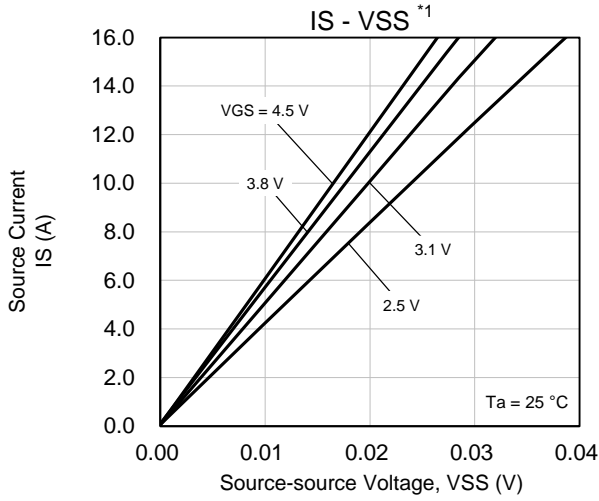
\*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time.



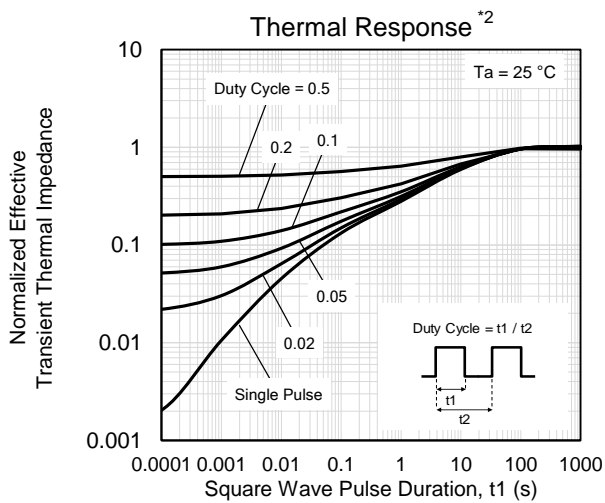
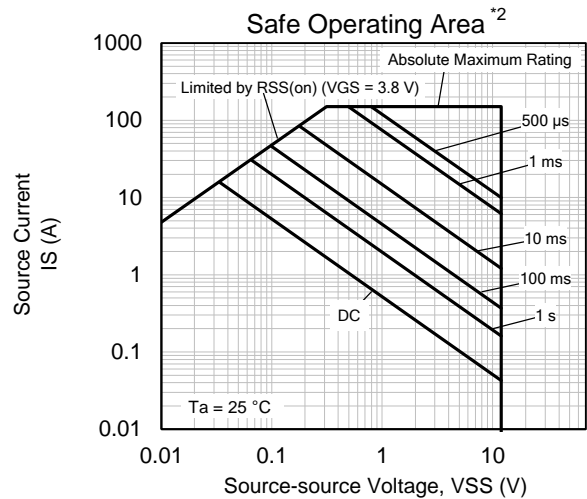
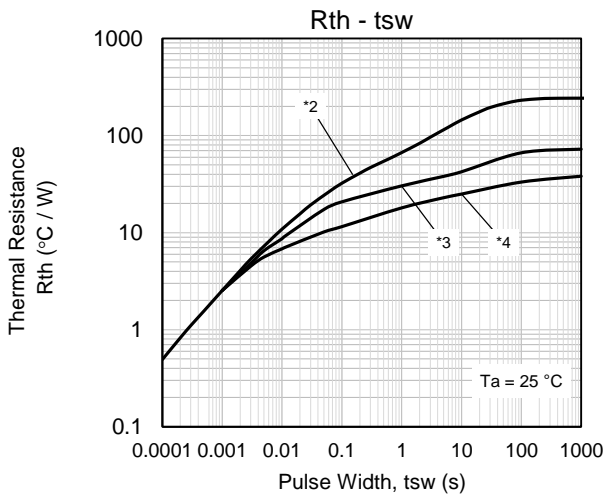
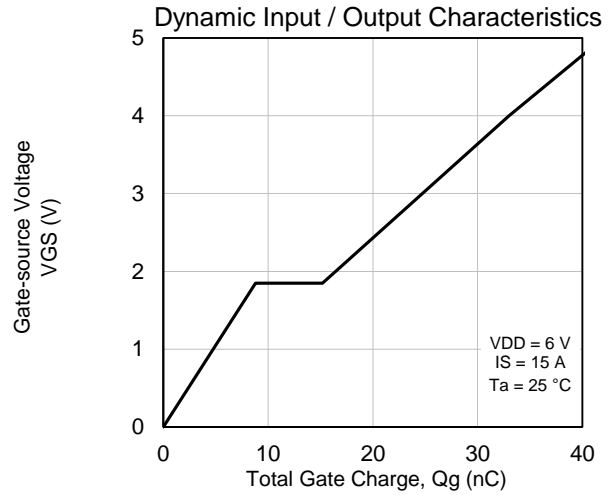
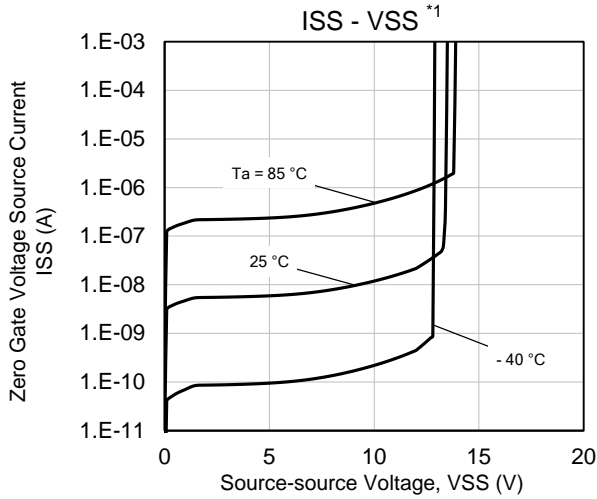
8. ELECTROSTATIC DISCHARGE CHARACTERISTIC Ta = 25 °C ± 3 °C

Standard	Test Type	Symbol	Conditions	Class	Value	Unit
AEC-Q101-001	Human Body Model	HBM	C = 100 pF, R = 1.5 kΩ	H2	> 2 to ≤ 4	kV

9. TECHNICAL DATA (Reference)



TECHNICAL DATA (Reference)

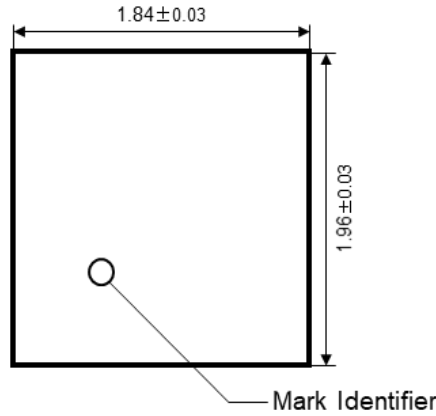


Note

- \*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 (22 mm<sup>2</sup> 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 (604 mm<sup>2</sup> area, 36 μm thickness).
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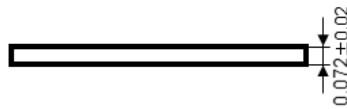
10. OUTLINE

(Top View)

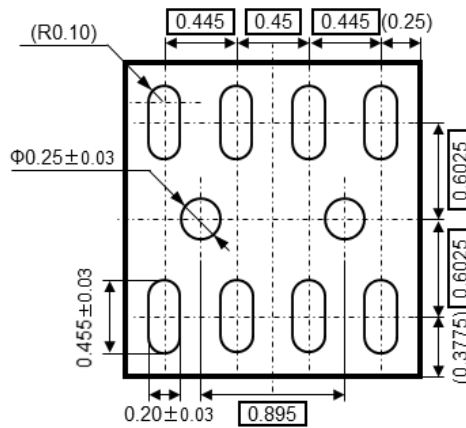


Unit: mm

(Front View)

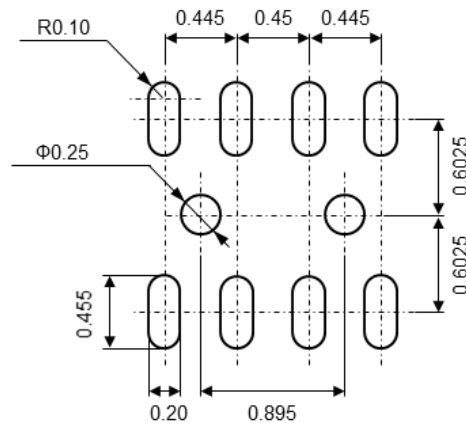


(Bottom View)



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
2021.6.4	1.00	1. Initially issued.
2021.11.5	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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