

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 Ω (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)

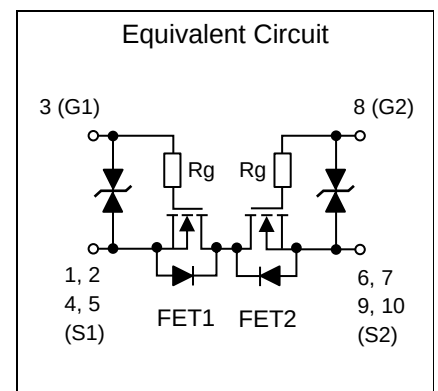
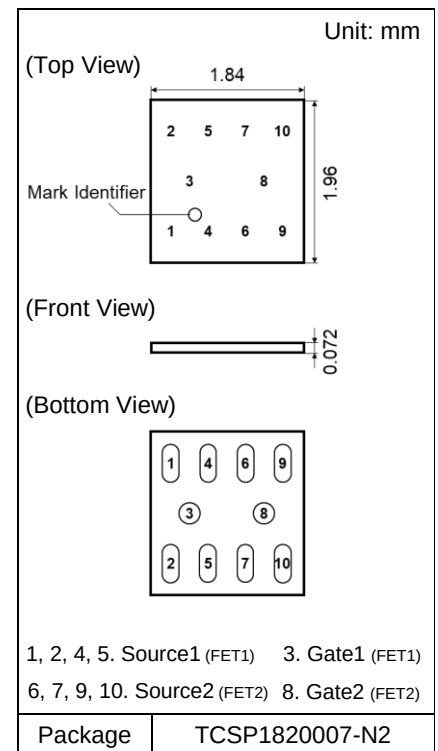
5. ABSOLUTE MAXIMUM RATINGS $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit
Source-source Voltage	VSS	12	V
Gate-source Voltage	VGS	± 8	V
Source Current	DC *1	IS1	A
	DC *2	IS2	
	DC *3	IS3	
	Pulsed *4	ISp	
Total Power Dissipation	DC *1	PD1	W
	DC *2	PD2	
	DC *3	PD3	
Operating Junction and Storage Temperature Range	Tj, Tstg	- 55 to + 150	$^\circ\text{C}$

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

Parameter	Symbol	Rating	Unit
Thermal Resistance (ch-a)	Rth1 *1	245	$^\circ\text{C} / \text{W}$
	Rth2 *2	74	
	Rth3 *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 mm² 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 (604 mm² area, 36 μm thickness).
 - *3 Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).
 - *4 $t = 10 \mu\text{s}$, Duty Cycle $\leq 1\%$.



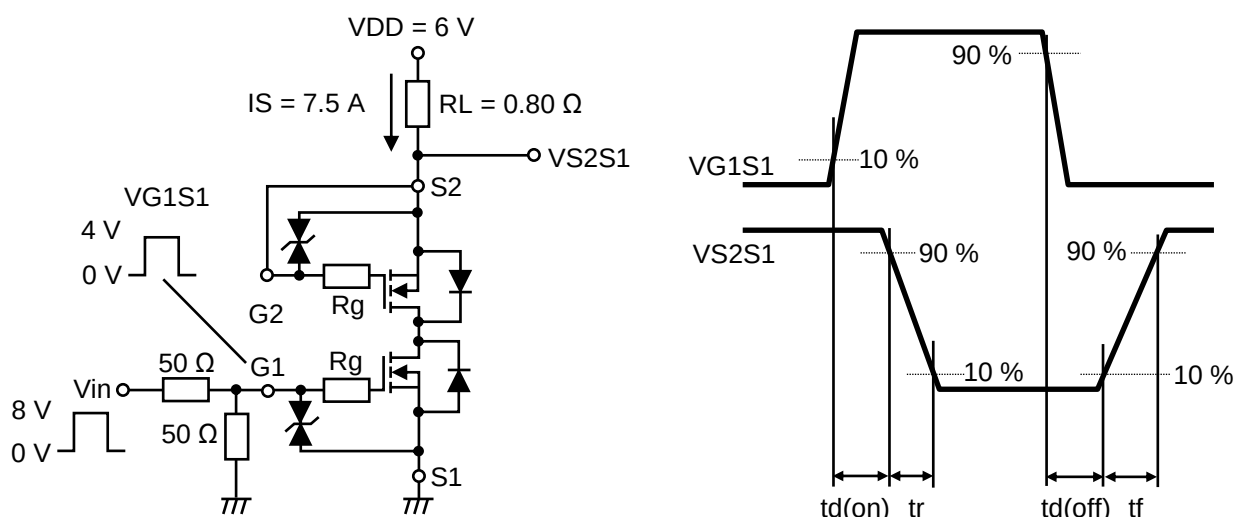
7. ELECTRICAL CHARACTERISTICS $T_a = 25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	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.

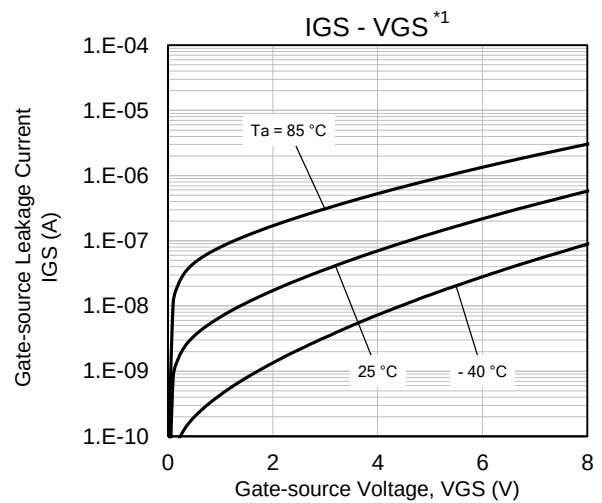
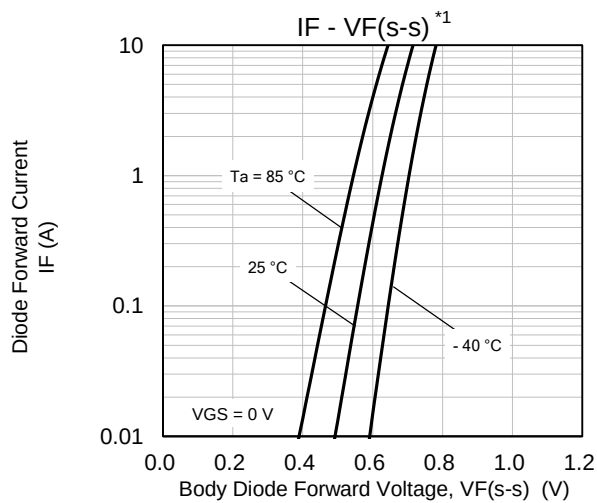
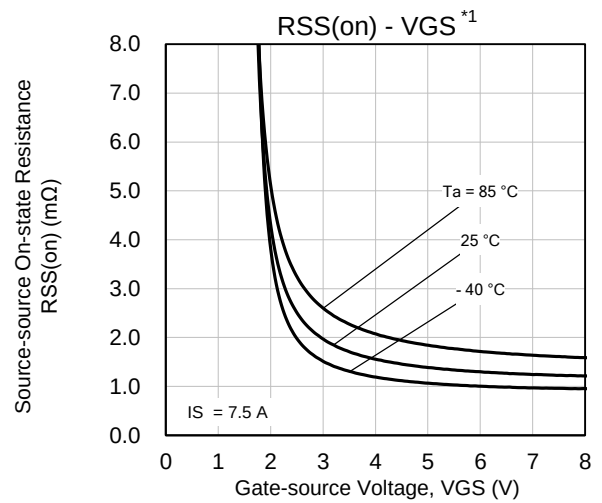
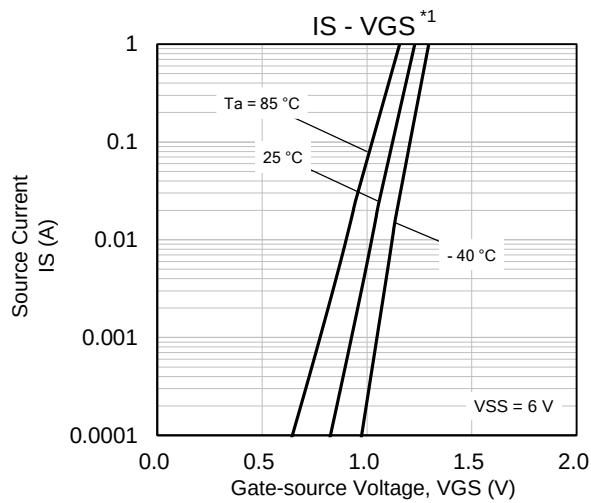
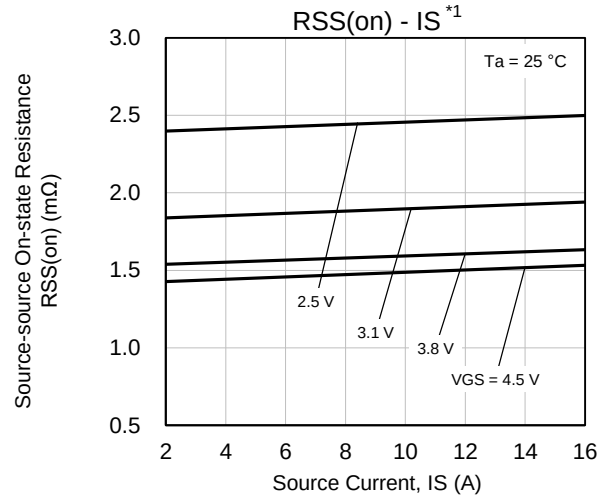
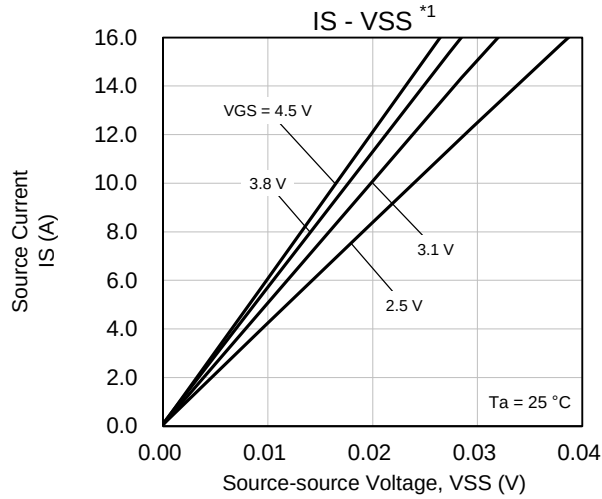
*2 Measurement circuit for Turn-on Delay Time / Rise Time / Turn-off Delay Time / Fall Time.



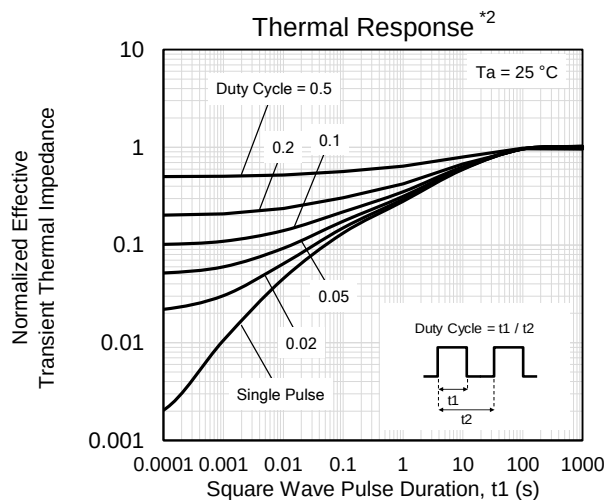
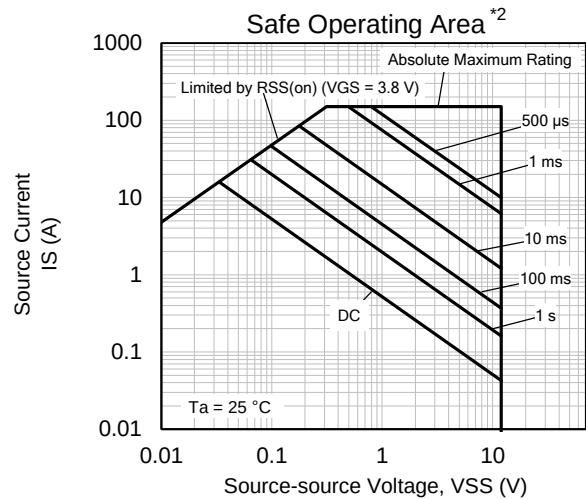
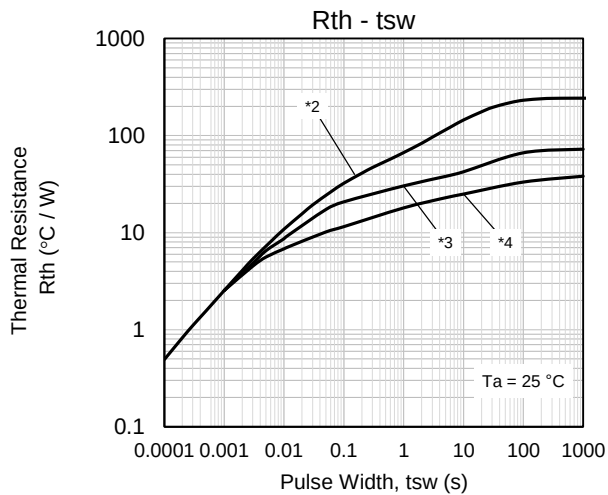
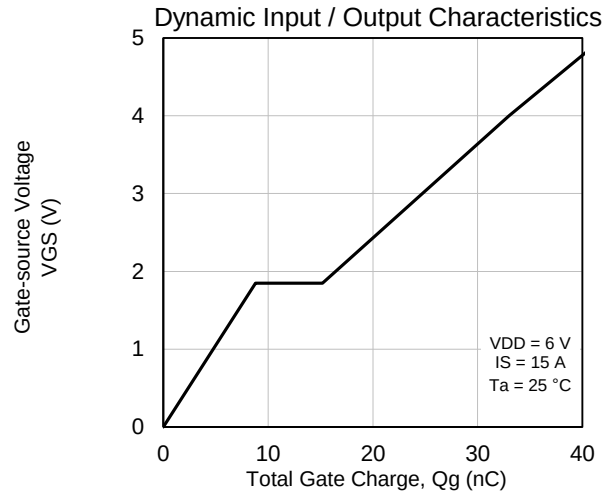
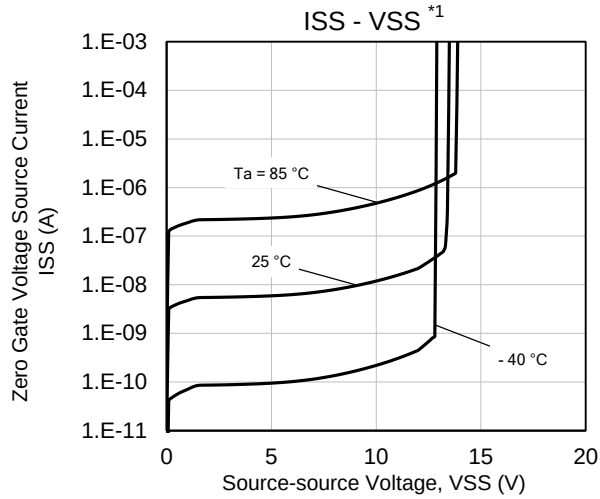
8. ELECTROSTATIC DISCHARGE CHARACTERISTIC $T_a = 25\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$

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)



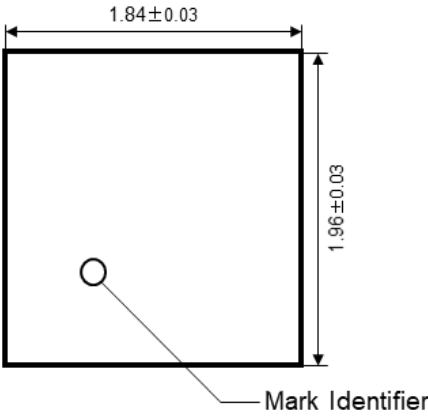
Note

- ^{*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 mm² 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 mm² area, 36 μm thickness).
- ^{*4} Mounted on ceramic board (70 mm x 70 mm x t1.0 mm).

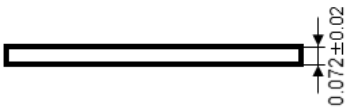
10. OUTLINE

(Top View)

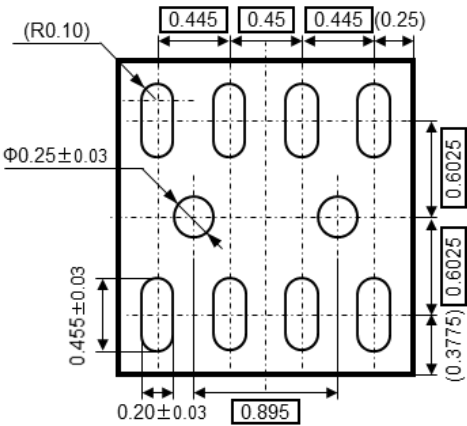
Unit: mm



(Front View)

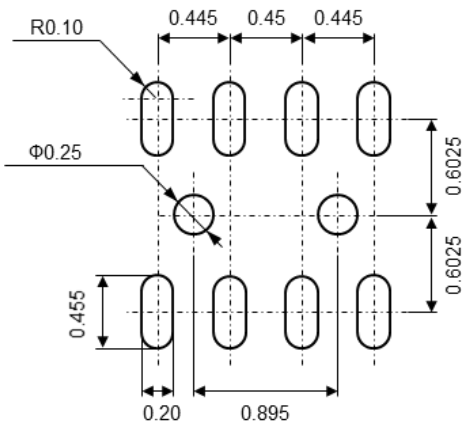


(Bottom View)



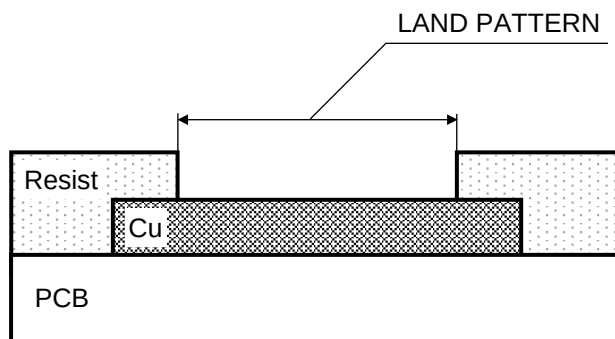
11. LAND *1 & STENCIL PATTERN (Reference)

Unit: mm



Note *1 The definition of land pattern is referred to next page.

DEFINITION OF LAND PATTERN



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
2022.3.4	1.00	1. Initially issued.

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