Gate resistor installed
Dual N-channel MOSFET

KFCAB22680L
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

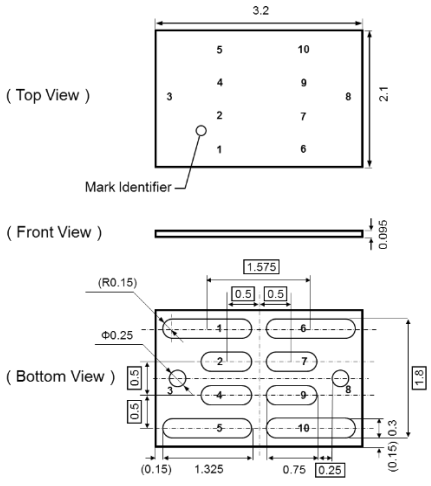
2. FEATURES

- Source-source On-state resistance: RSS (on) typ. = 2.65 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: WF

4. PACKAGING

Embossed type (Thermo-compression sealing): 8,000 pcs / reel (standard)

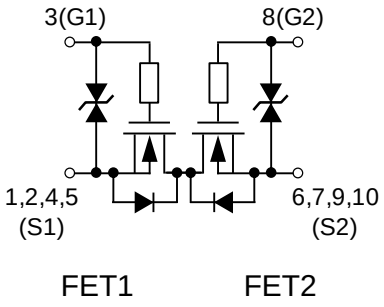


Package	TCSP2132010-N2
JEITA	-
Code	-

5. ABSOLUTE MAXIMUM RATINGS Ta = 25 °C

Parameter		Symbol	Rating	Unit
Source-source Voltage		VSS	23	V
Gate-source Voltage		VGS	±12	V
Source Current	DC	IS1 *1	13	A
		IS2 *2	23.4	
		IS3 *3	31.8	
	Pulsed *4	ISp	130	
Total Power Dissipation	DC	PD1 *1	0.59	W
		PD2 *2	1.9	
		PD3 *3	3.5	
Channel Temperature		Tch	150	°C
Storage Temperature Range		Tstg	-55 to +150	°C

Equivalent circuit



6. THERMAL CHARACTERISTICS Ta = 25 °C

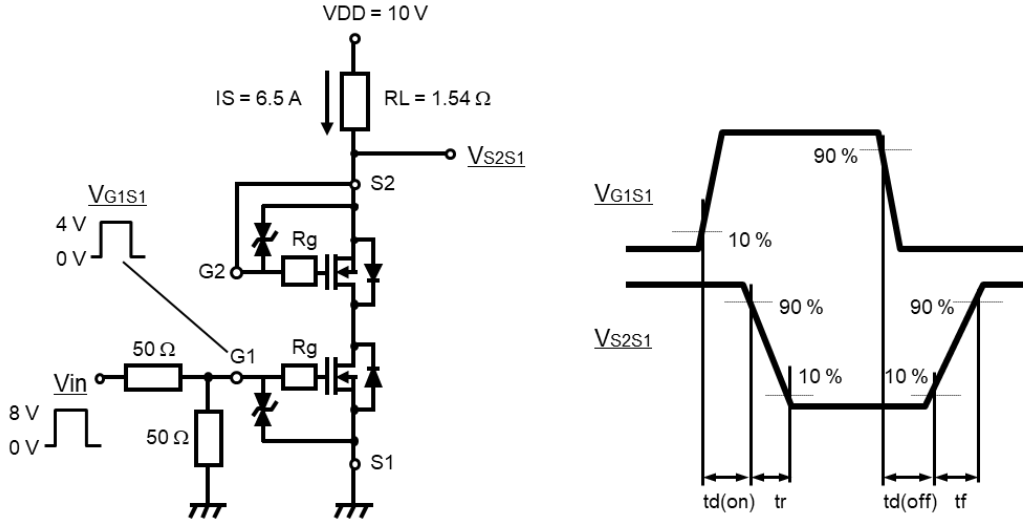
Parameter	Symbol	Rating	Unit
Thermal Resistance (ch-a)	Rth *1	212	°C / W
	Rth *2	66	
	Rth *3	36	

Note *1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm)
FR4 board partially covered with copper pad (42 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 (605 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 %

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

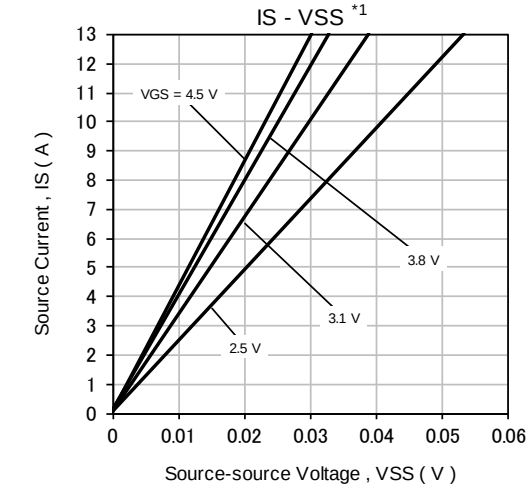
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	IS = 1 mA, VGS = 0 V	23			V
Zero Gate Voltage Source Current	ISSS	VSS = 23 V, VGS = 0 V			1.0	μA
Gate-source Leakage Current	IGSS1	VGS = ±8 V, VSS = 0 V			±10	μA
	IGSS2	VGS = ±5 V, VSS = 0 V			±1.0	
Gate-source Threshold Voltage	Vth	IS = 1.33 mA, VSS = 6 V	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	IS = 6.5 A, VGS = 4.5 V	1.80	2.45	3.20	mΩ
	RSS(on)2	IS = 6.5 A, VGS = 3.8 V	1.90	2.65	3.45	
	RSS(on)3	IS = 6.5 A, VGS = 3.1 V	2.05	3.00	4.50	
	RSS(on)4	IS = 6.5 A, VGS = 2.5 V	2.30	3.85	7.60	
Body Diode Forward Voltage	VF(s-s)	IF = 6.5 A, VGS = 0 V		0.6	1.0	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 kHz		4770		pF
Output Capacitance *1	Coss			460		
Reverse Transfer Capacitance *1	Crss			400		
Turn-on Delay Time *1,*2	td(on)	VDD = 10 V, VGS = 0 to 4 V IS = 6.5 A		1.4		μs
Rise Time *1,*2	tr			2.8		
Turn-off Delay Time *1,*2	td(off)	VDD = 6 V, VGS = 4 to 0 V IS = 6.5 A		5.8		μs
Fall Time *1,*2	tf			4.0		
Total Gate Charge *1	Qg	VDD = 6 V VGS = 0 to 4 V IS = 13 A		36		nC
Gate-source Charge *1	Qgs			18		
Gate-drain Charge *1	Qgd			12		
Gate Resistance *1	Rg	f = 10 kHz	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

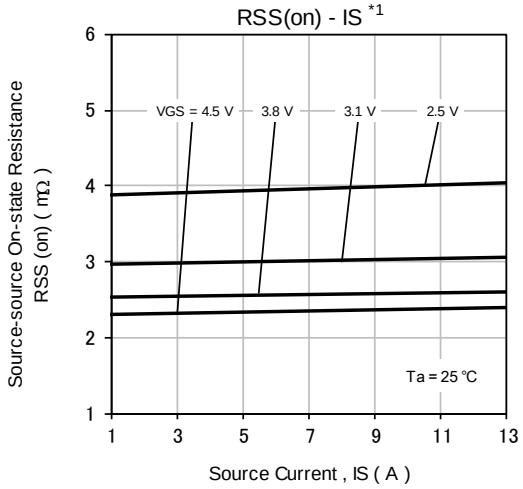


8. TECHNICAL DATA (Reference)

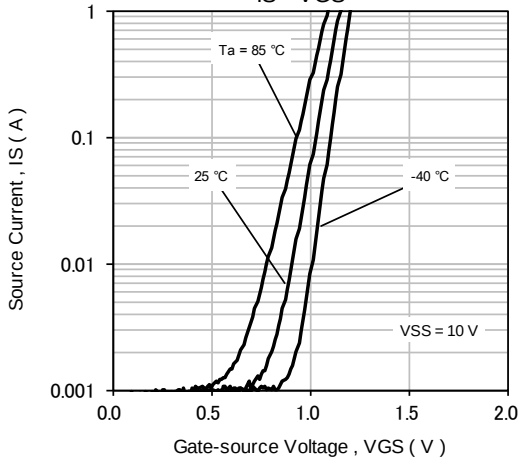
IS - VSS *1



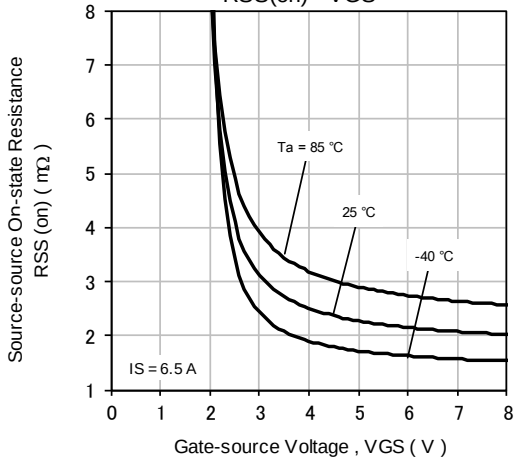
RSS(on) - IS *1



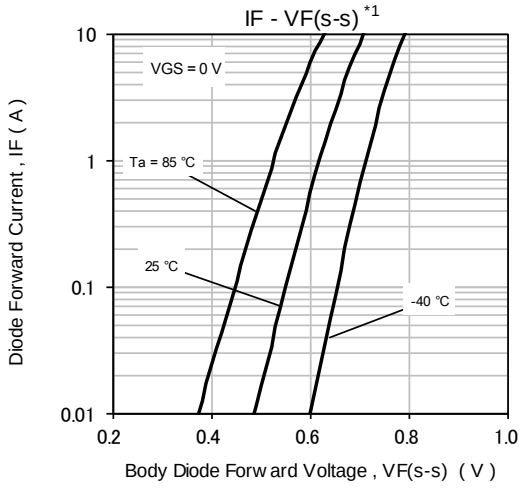
IS - VGS *1



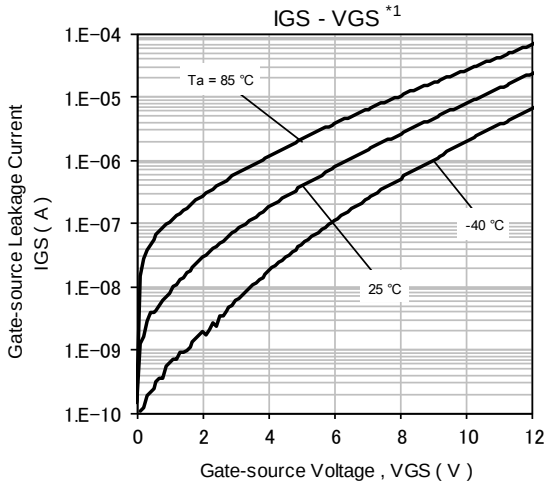
RSS(on) - VGS *1



IF - VF(s-s) *1

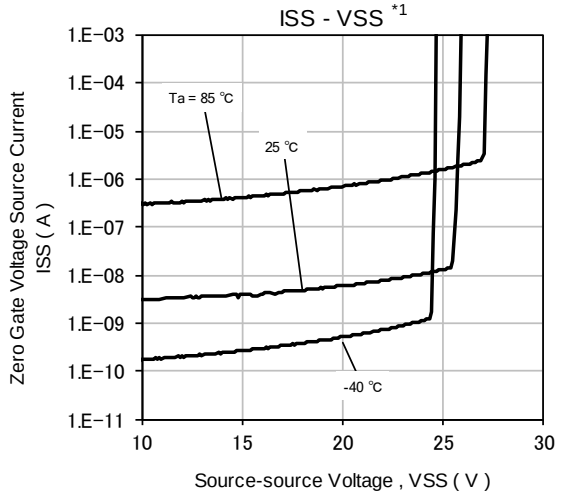


IGS - VGS *1

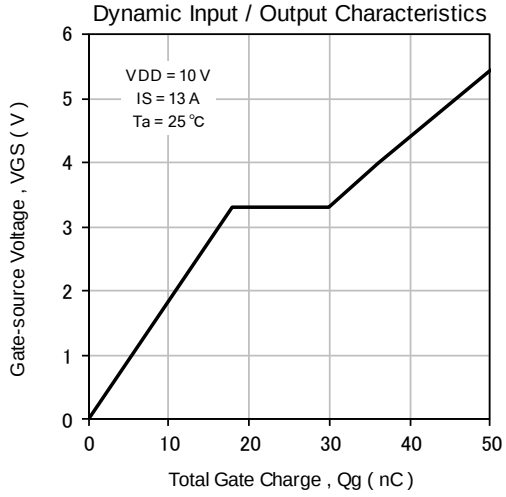


TECHNICAL DATA (Reference)

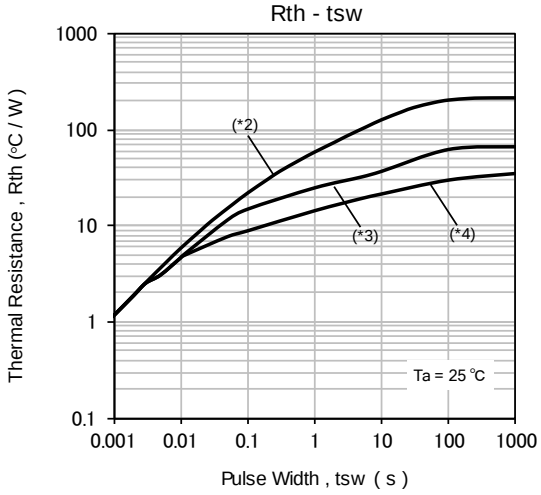
ISS - VSS *1



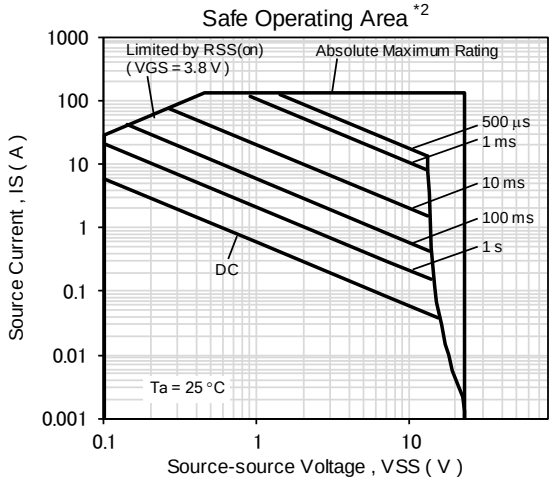
Dynamic Input / Output Characteristics



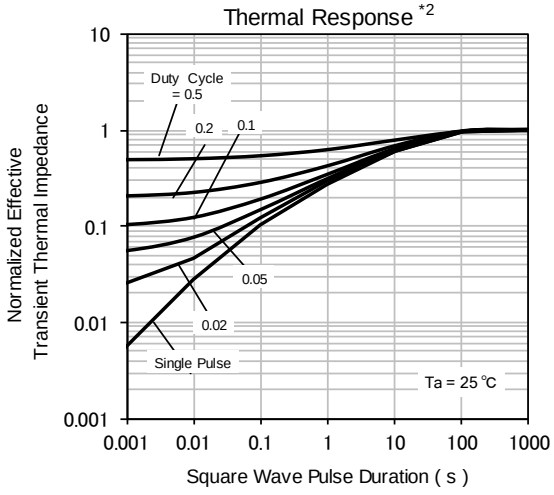
Rth - tsw



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
(42 mm^2 area, 36 µm thickness).

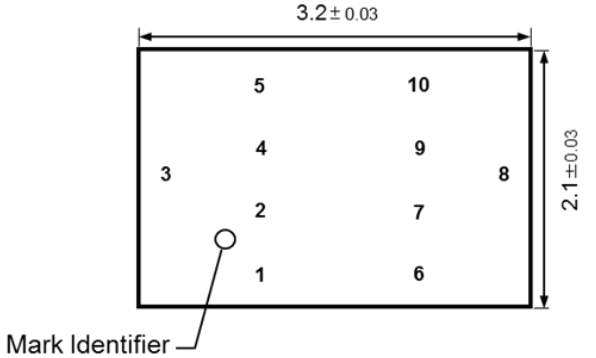
*3 Mounted on FR4 board (25.4 mm × 25.4 mm × t1.0 mm).
FR4 board fully covered with copper pad
(605 mm^2 area, 36 µm thickness).

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

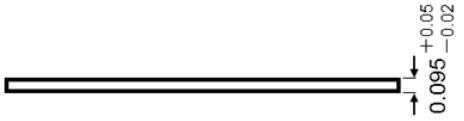
9. OUTLINE

Unit : mm

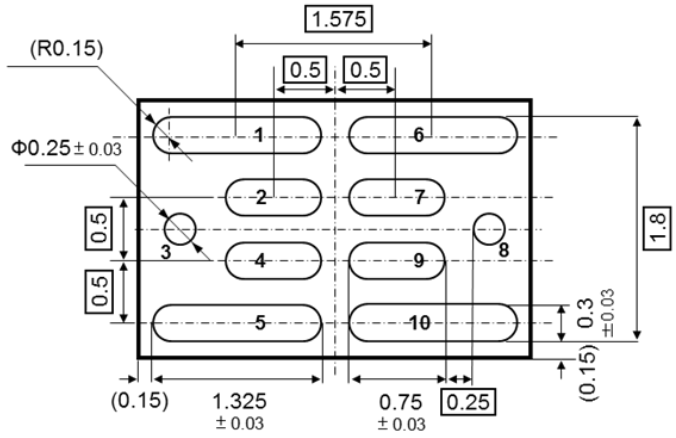
(Top View)



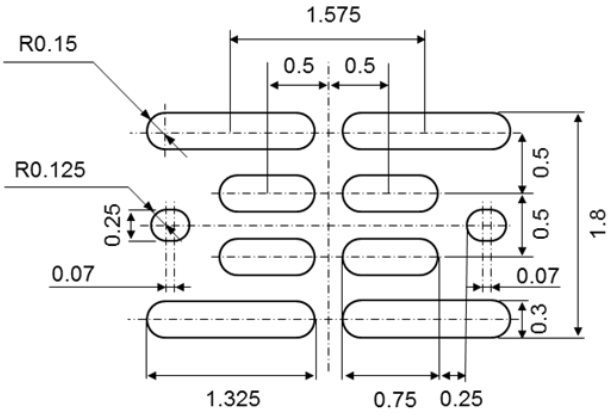
(Front View)



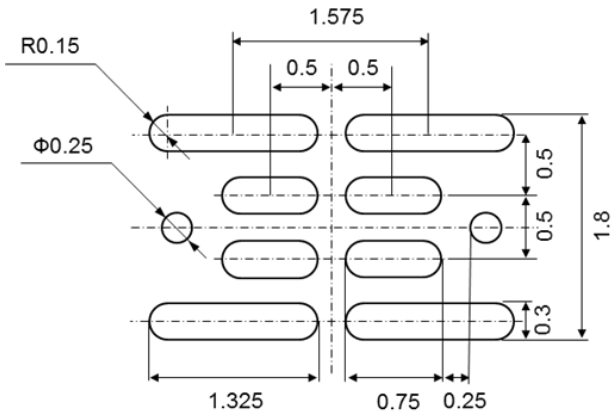
(Bottom View)



10. LAND PATTERN (Reference) Unit: mm



11. STENCIL PATTERN (Reference) Unit: mm



12. REVISION HISTORY

Date	Revision	Description
2021.2.3	1.00	1. initially issued.

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