Gate resistor installed
Dual N-channel MOSFET

KFCAB21350L
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. = 2.1 mΩ (VGS = 4.5 V)
- CSP (Chip Size Package)
- RoHS compliant (EU RoHS / MSL: Level 1 compliant)

3. MARKING SYMBOL: 3M

4. PACKAGING

Embossed type (Thermo-compression sealing): 10,000 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 *1	IS1	12	A
	DC *2	IS2	27	
	Pulsed *3	ISp	120	
Total Power Dissipation	DC *1	PD1	0.45	W
	DC *2	PD2	2.1	
Channel Temperature		Tch	150	°C
Storage Temperature Range		Tstg	-55 to +150	°C

6. THERMAL CHARACTERISTICS Ta = 25 °C

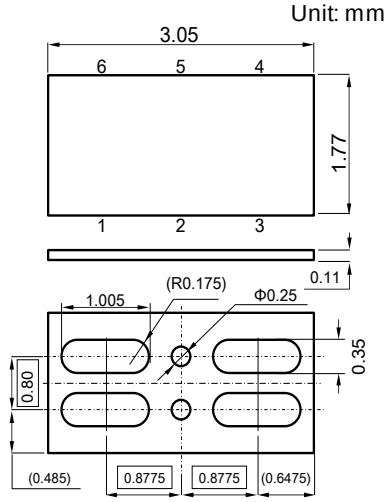
Parameter	Symbol	Rating	Unit
Thermal Resistance (ch-a)	Rth1 *1	278	°C / W
	Rth2 *2	59	

Note *1 Mounted on FR4 board (25.4 mm x 25.4 mm x t1.0 mm) using the minimum recommended pad size (36 μm Copper).

*2 Mounted on Ceramic substrate (70 mm x 70 mm x t1.0 mm).

*3 t = 10 μs, Duty Cycle ≤ 1 %

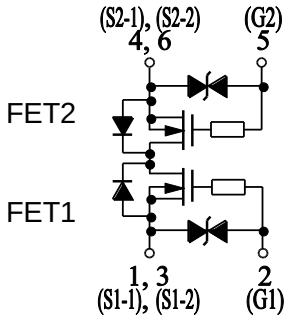
Unit: mm



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

Package	TCSP1831011-N2
JEITA	—
Code	—

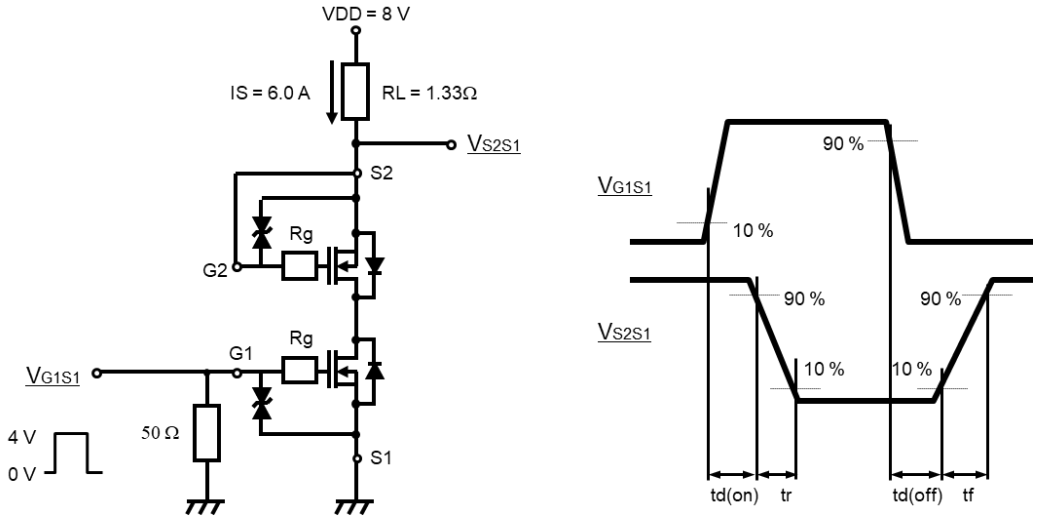
Equivalent circuit



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

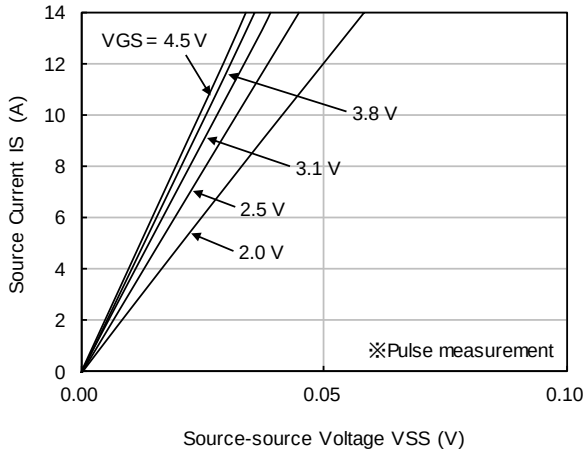
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Source-source Breakdown Voltage	VSSS	IS = 1 mA, VGS = 0 V	12			V
Zero Gate Voltage Source Current	ISSS	VSS = 12 V, VGS = 0 V			1.0	μA
Gate-source Leakage Current	IGSS1	VGS = ±8 V, VSS = 0 V			±10	μA
	IGSS2	VGS = ±5 V, VSS = 0 V			±1.0	
Gate-source Threshold Voltage	Vth	IS = 1.41 mA, VSS = 10 V	0.35	0.90	1.40	V
Source-source On-state Resistance	RSS(on)1	IS = 6.0 A, VGS = 4.5 V	1.55	2.10	2.75	mΩ
	RSS(on)2	IS = 6.0 A, VGS = 3.8 V	1.60	2.20	2.85	
	RSS(on)3	IS = 6.0 A, VGS = 3.1 V	1.65	2.40	3.95	
	RSS(on)4	IS = 6.0 A, VGS = 2.5 V	1.90	3.10	6.10	
Body Diode Forward Voltage	VF(s-s)	IF = 6.0 A, VGS = 0 V		0.8	1.2	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 kHz		4650		pF
Output Capacitance *1	Coss			580		
Reverse Transfer Capacitance *1	Crss			530		
Turn-on Delay Time *1,*2	td(on)	VDD = 8 V, VGS = 0 to 4 V, IS = 6.0 A		1.2		μs
Rise Time *1,*2	tr			2.3		
Turn-off Delay Time *1,*2	td(off)	VDD = 8 V, VGS = 4 to 0 V, IS = 6.0 A		9.0		μs
Fall Time *1,*2	tf			5.0		
Total Gate Charge *1	Qg	VDD = 8 V, VGS = 0 to 4 V, IS = 6.0 A		43		nC
Gate-source Charge *1	Qgs			10		
Gate-drain Charge *1	Qgd			10		

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

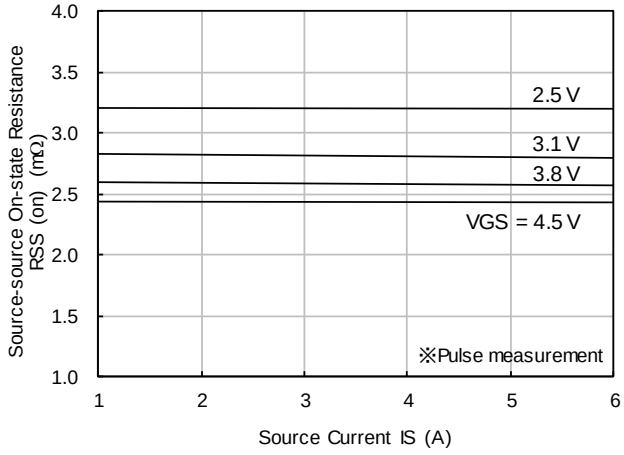


8. TECHNICAL DATA (Reference)

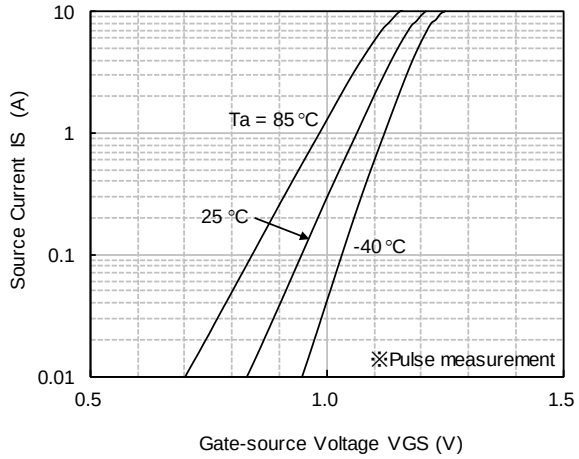
IS - VSS



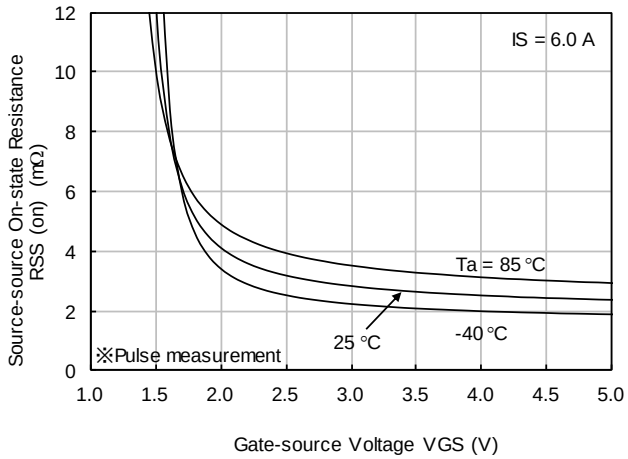
RSS(on) - IS



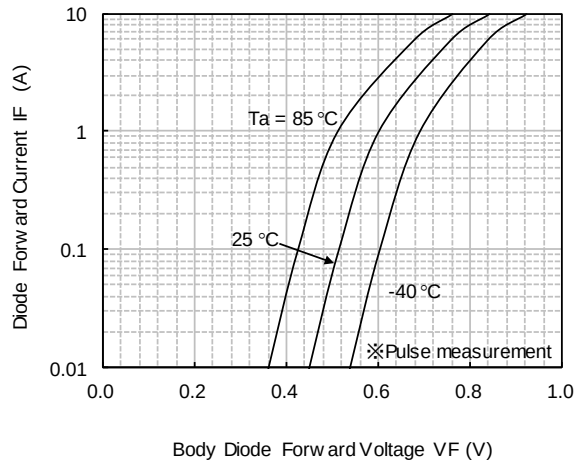
IS - VGS



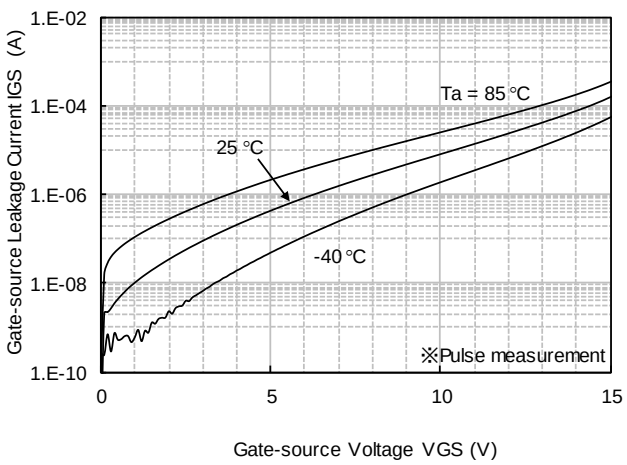
RSS(on) - VGS



IF - VF

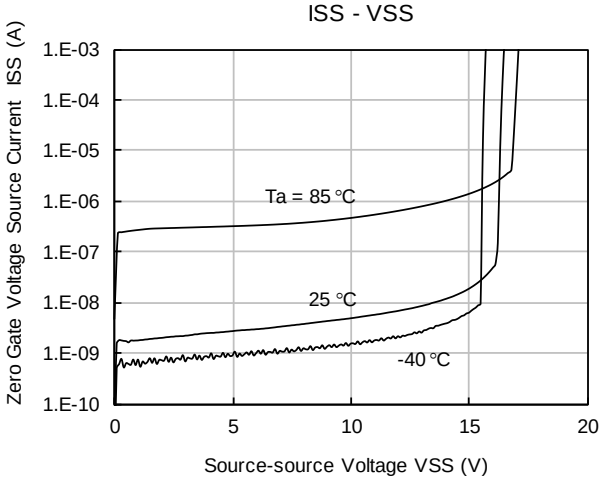


IGS - VGS

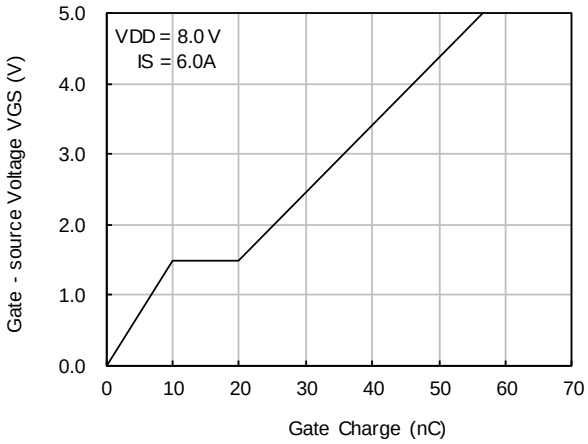


TECHNICAL DATA (Reference)

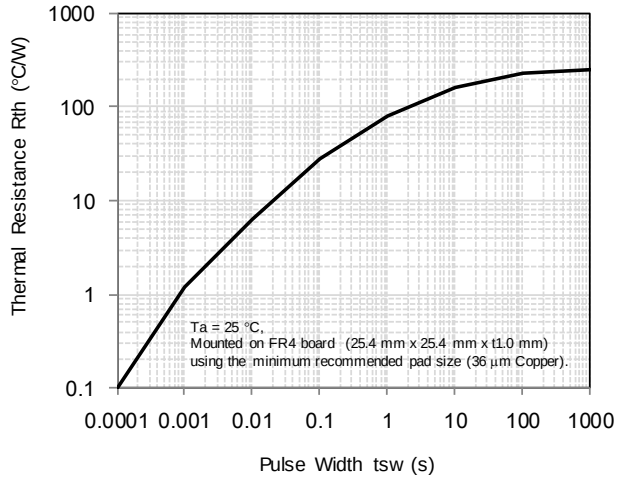
ISS - VSS



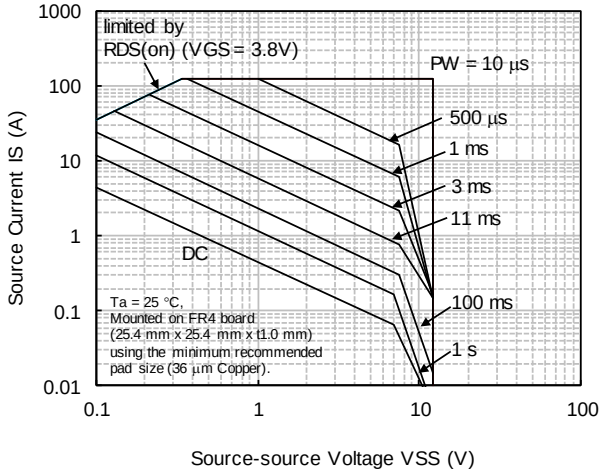
Dynamic Input / Output Characteristics



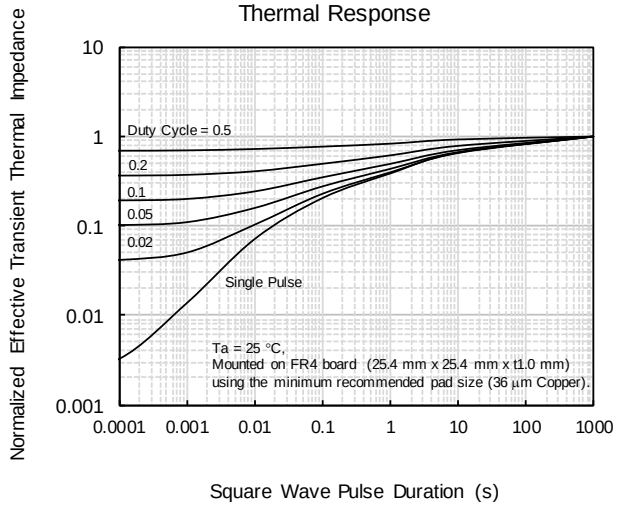
Rth - tsw



Safe Operating Area

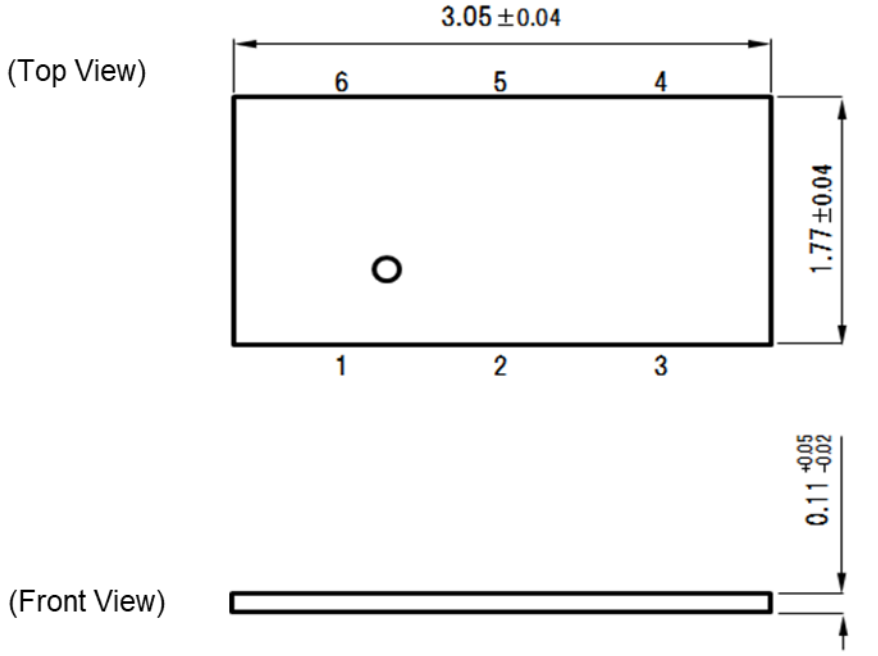


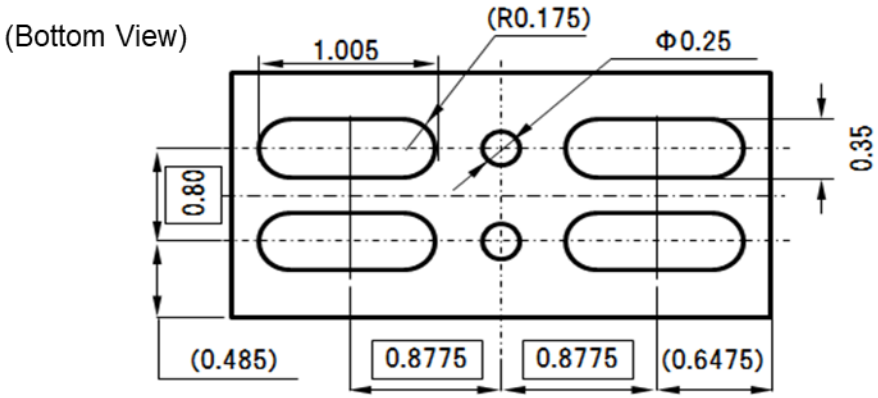
Thermal Response



9. OUTLINE

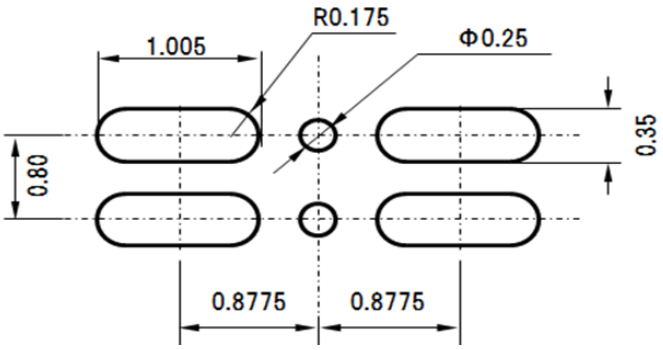
Unit : mm





10. LAND PATTERN (Reference)

Unit : mm



11. REVISION HISTORY

Date	Revision	Description
2021.2.8	1.00	1. initially issued.

Important Notice

Nuvoton Products are neither intended nor warranted for usage in systems or equipment, any malfunction or failure of which may cause loss of human life, bodily injury or severe property damage. Such applications are deemed, "Insecure Usage".

Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.