

## **Notification about the transfer of the semiconductor business**

The semiconductor business of Panasonic Corporation was transferred on September 1, 2020 to Nuvoton Technology Corporation (hereinafter referred to as "Nuvoton"). Accordingly, Panasonic Semiconductor Solutions Co., Ltd. became under the umbrella of the Nuvoton Group, with the new name of Nuvoton Technology Corporation Japan (hereinafter referred to as "NTCJ").

In accordance with this transfer, semiconductor products will be handled as NTCJ-made products after September 1, 2020. However, such products will be continuously sold through Panasonic Corporation.

Publisher of this Document is NTCJ.

If you would find description "Panasonic" or "Panasonic semiconductor solutions", please replace it with NTCJ.

※ Except below description page

"Request for your special attention and precautions in using the technical information and semiconductors described in this book"

**Nuvoton Technology Corporation Japan**



# FCAB21860L

## Gate resistor installed Dual N-channel MOS FET

For lithium-ion secondary battery protection circuits

### ■ Features

- Source-source On-state Resistance : RSS(on) typ. = 1.5 mΩ ( VGS = 3.8 V )
- CSP ( Chip Size Package )
- Halogen-free / RoHS compliant ( EU RoHS / UL-94 V-0 / MSL : Level 1 )

### ■ Marking Symbol : WH

### ■ Packaging

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

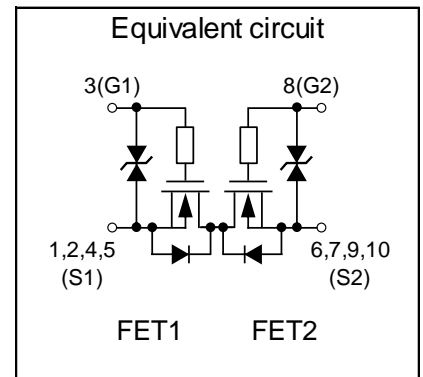
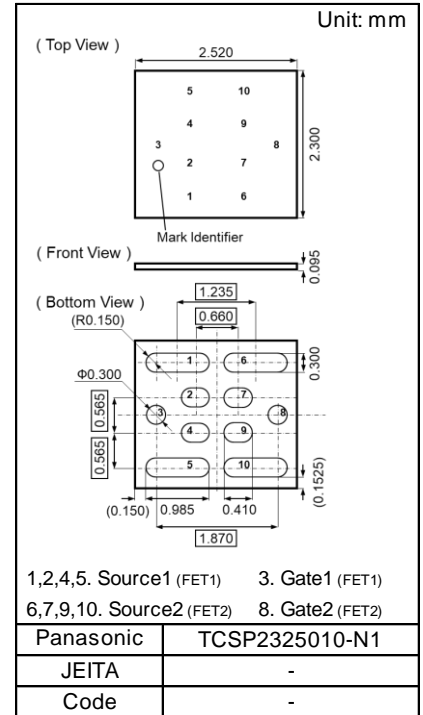
### ■ Absolute Maximum Ratings Ta = 25 °C

Parameter	Symbol	Rating	Unit	
Source-source Voltage	VSS	12	V	
Gate-source Voltage	VGS	±8	V	
Source Current	DC	IS1 <sup>*1</sup>	17	A
		IS2 <sup>*2</sup>	30	
		IS3 <sup>*3</sup>	40.5	
	Pulsed <sup>*4</sup>	ISp	170	
Total Power Dissipation	DC	PD1 <sup>*1</sup>	0.58	W
		PD2 <sup>*2</sup>	1.77	
		PD3 <sup>*3</sup>	3.20	
Channel Temperature	Tch	150	°C	
Storage Temperature Range	Tstg	-55 to +150	°C	

### ■ Thermal Characteristics Ta = 25 °C

Parameter	Symbol	Rating	Unit
Thermal Resistance ( ch-a )	Rth1 <sup>*1</sup>	215	°C / W
	Rth2 <sup>*2</sup>	71	
	Rth3 <sup>*3</sup>	39	

- Note
- \*1 Mounted on FR4 board ( 25.4 mm × 25.4 mm × t1.0 mm ).  
FR4 board partially covered with copper pad ( 42 mm<sup>2</sup> area, 36 μm thickness ).
  - \*2 Mounted on FR4 board ( 25.4 mm × 25.4 mm × t1.0 mm ).  
FR4 board fully covered with copper pad ( 604 mm<sup>2</sup> area, 36 μm thickness ).
  - \*3 Mounted on ceramic board ( 70 mm × 70 mm × t1.0 mm ).
  - \*4 t = 10 μs, Duty Cycle ≤ 1 %.



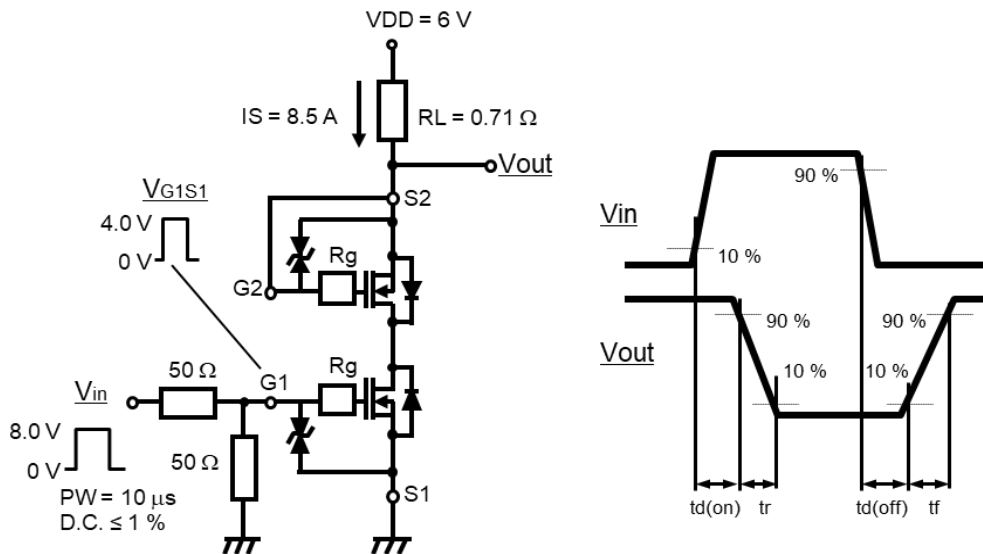
■ Electrical Characteristics Ta = 25 °C ± 3 °C

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 = 1.04 mA, VSS = 6 V	0.35	0.9	1.4	V
Source-source On-state Resistance	RSS(on)1	IS = 8.5 A, VGS = 4.5 V	1.00	1.35	1.75	mΩ
	RSS(on)2	IS = 8.5 A, VGS = 3.8 V	1.10	1.50	1.95	
	RSS(on)3	IS = 8.5 A, VGS = 3.1 V	1.15	1.70	2.80	
	RSS(on)4	IS = 8.5 A, VGS = 2.75 V	1.20	1.95	3.80	
	RSS(on)5	IS = 8.5 A, VGS = 2.5 V	1.40	2.25	4.50	
Body Diode Forward Voltage	VF(s-s)	IF = 8.5 A, VGS = 0 V		0.7	1.0	V
Input Capacitance *1	Ciss	VSS = 10 V, VGS = 0 V, f = 1 kHz		5390		pF
Output Capacitance *1	Coss			890		
Reverse Transfer Capacitance *1	Crss			770		
Turn-on Delay Time *1,2	td(on)	VDD = 6 V, VGS = 0 to 4 V		1.6		μs
Rise Time *1,2	tr	IS = 8.5 A		2.6		
Turn-off Delay Time *1,2	td(off)	VDD = 6 V, VGS = 4 to 0 V		7.5		μs
Fall Time *1,2	tf	IS = 8.5 A		4.0		
Total Gate Charge *1	Qg	VDD = 6 V		45		nC
Gate-source Charge *1	Qgs	VGS = 0 to 4 V		12		
Gate-drain Charge *1	Qgd	IS = 17 A		9		

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

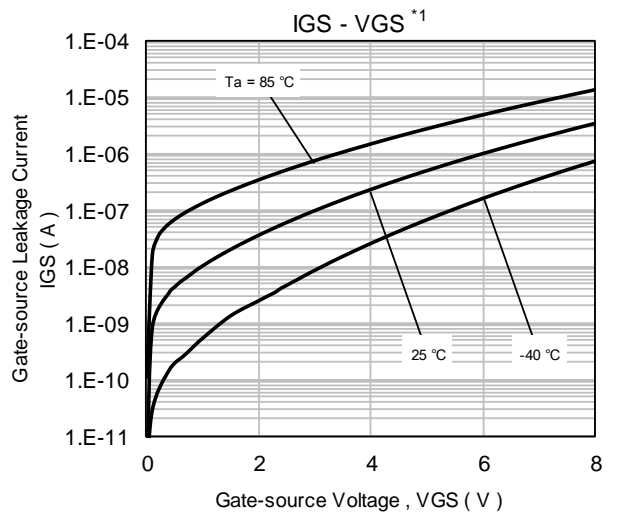
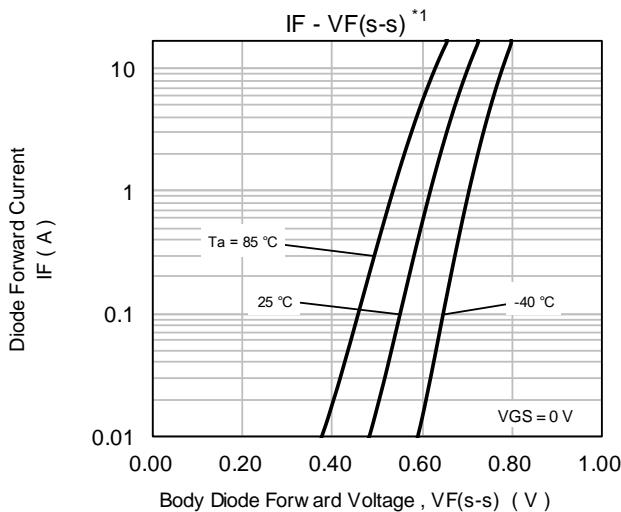
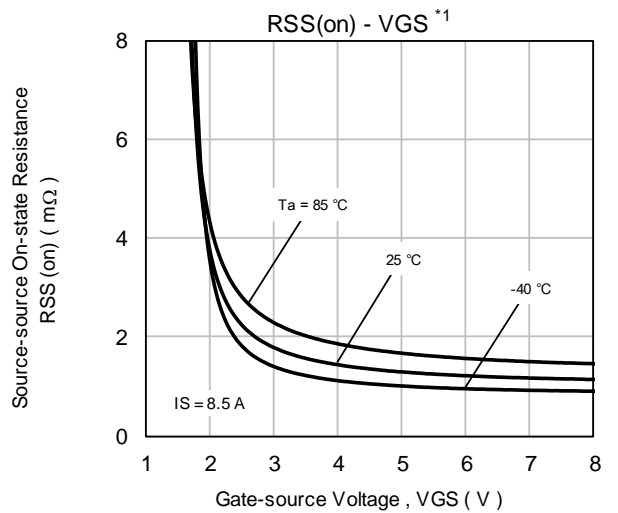
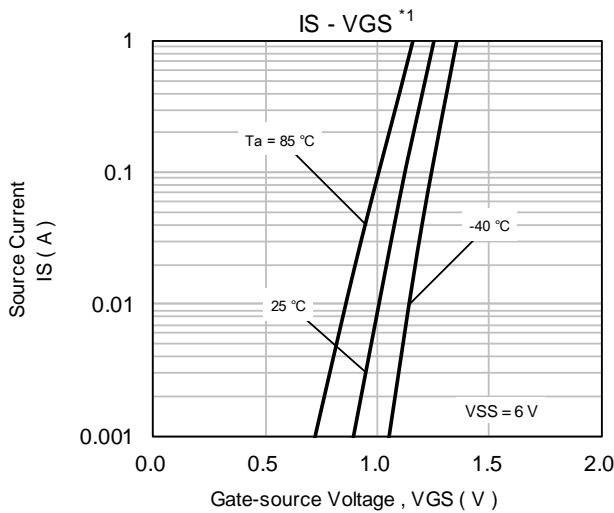
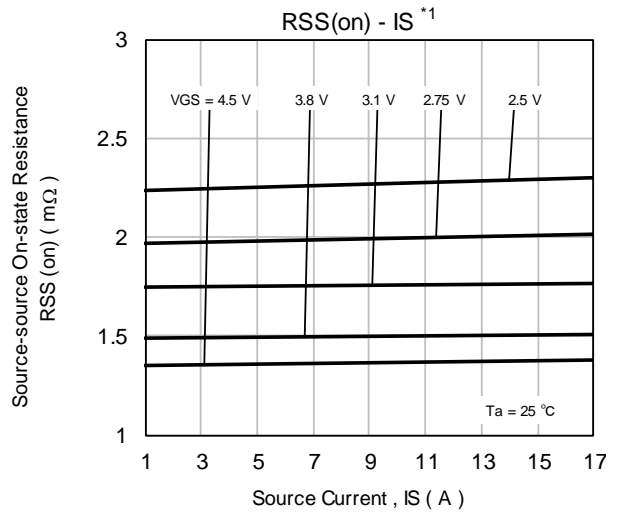
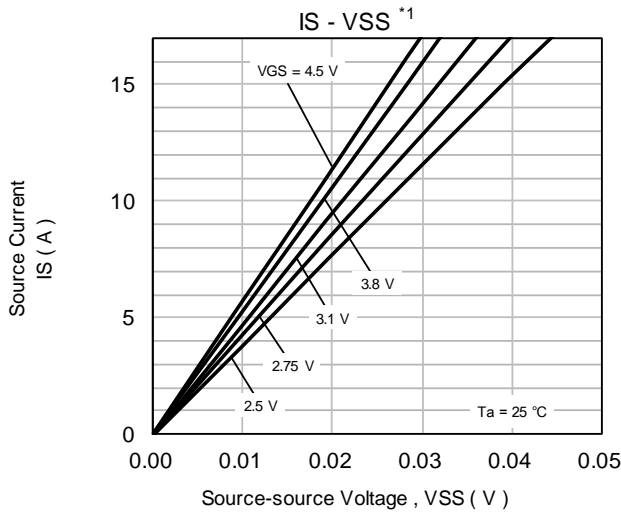
\*1 Guaranteed by design, not subject to production testing.

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



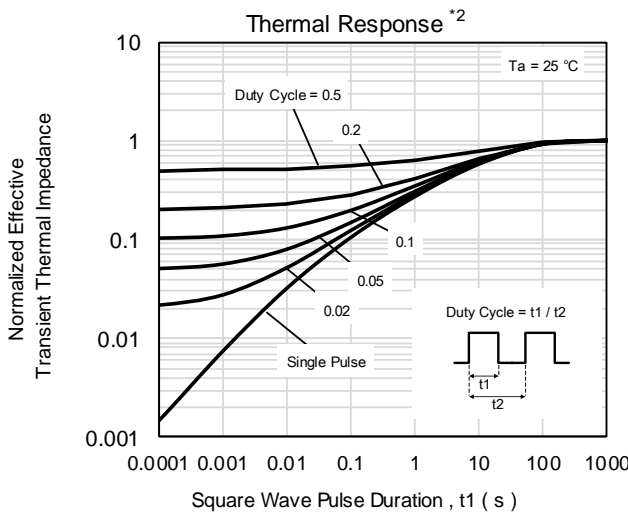
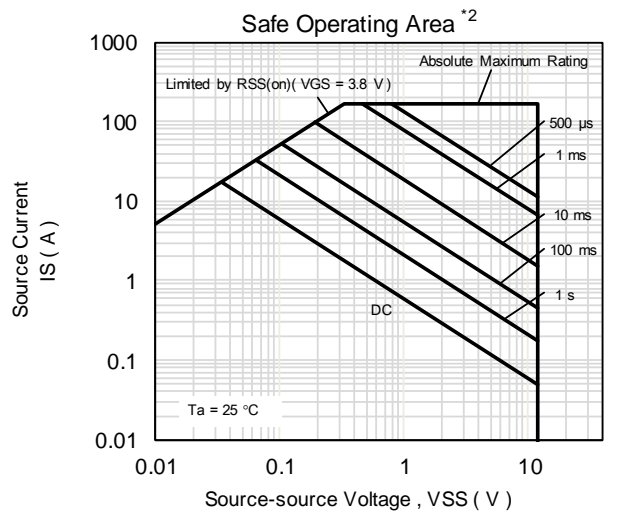
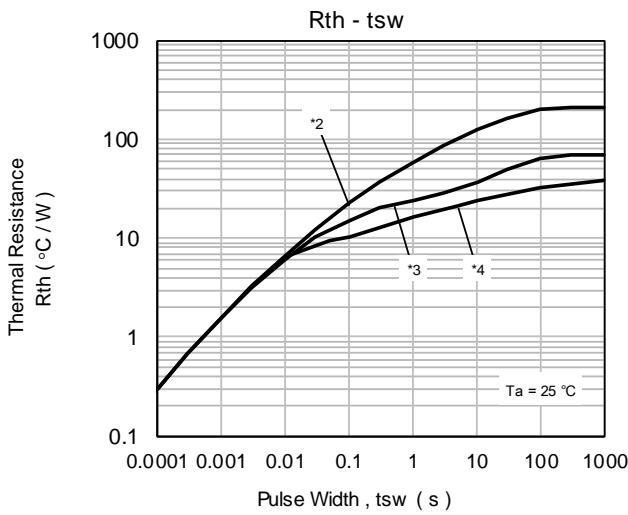
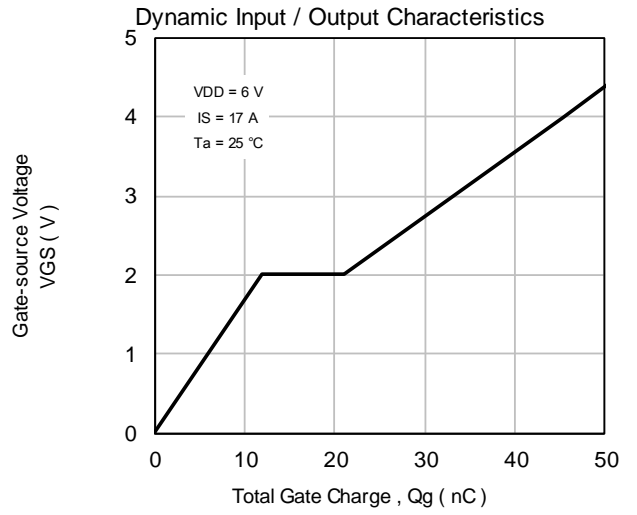
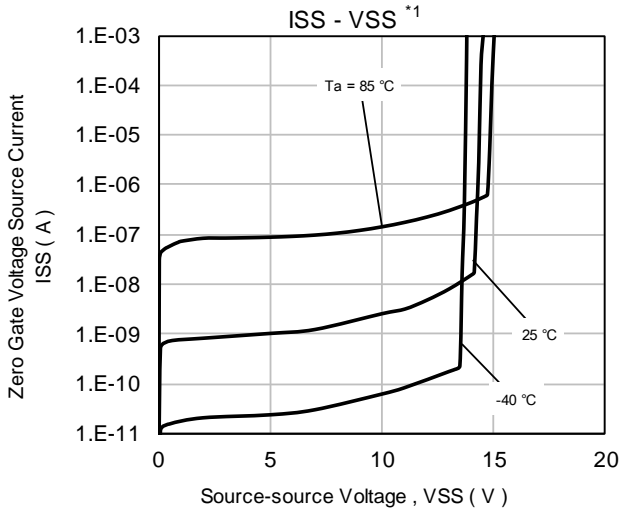


Technical Data ( reference )





Technical Data ( reference )



Note

- \*1 Pulse measurement.
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