

## **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**

# FC8V22150L

## Gate resistor installed Dual N-channel MOS FET

For lithium-ion secondary battery protection circuits

■ Features

- Low drain-source ON resistance:  $R_{ds(on)}$  typ. = 9.0 m $\Omega$  (VGS = 4.5 V)
- Built-in gate resistor
- Halogen-free / RoHS compliant  
(EU RoHS / UL-94 V-0 / MSL:Level 1 compliant)

■ Marking Symbol: 53

■ Packaging

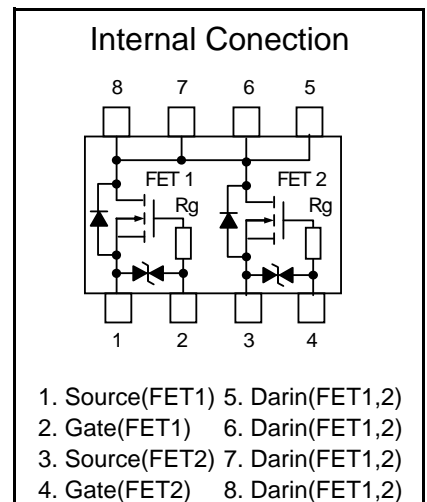
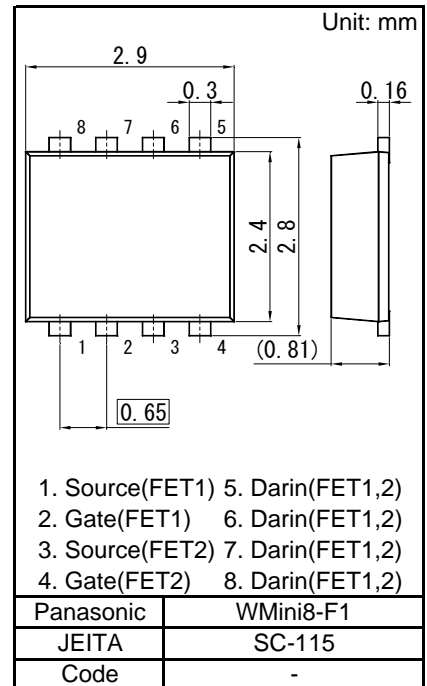
Embossed type (Thermo-compression sealing) : 3 000 pcs / reel (standard)

■ Absolute Maximum Ratings Ta = 25 °C

Parameter	Symbol	Rating	Unit
Drain-source Voltage	VDS	24	V
Gate-source Voltage	VGS	±12	V
Drain Current (DC) *2	ID	12	A
Drain Current (Pulsed) *1	IDp	48	A
Total Power Dissipation	PD	2.0	W
Channel Temperature	Tch	150	°C
Storage Temperature Range	Tstg	-55 to +150	°C
Thermal resistance (ch-a)	Rth(ch-a)	125	°C/W

Note \*1 t = 10  $\mu$ s, Duty Cycle  $\leq$  1 %

\*2 Mounted on Ceramic substrate (70 mm  $\times$  70 mm  $\times$  t1.0 mm).



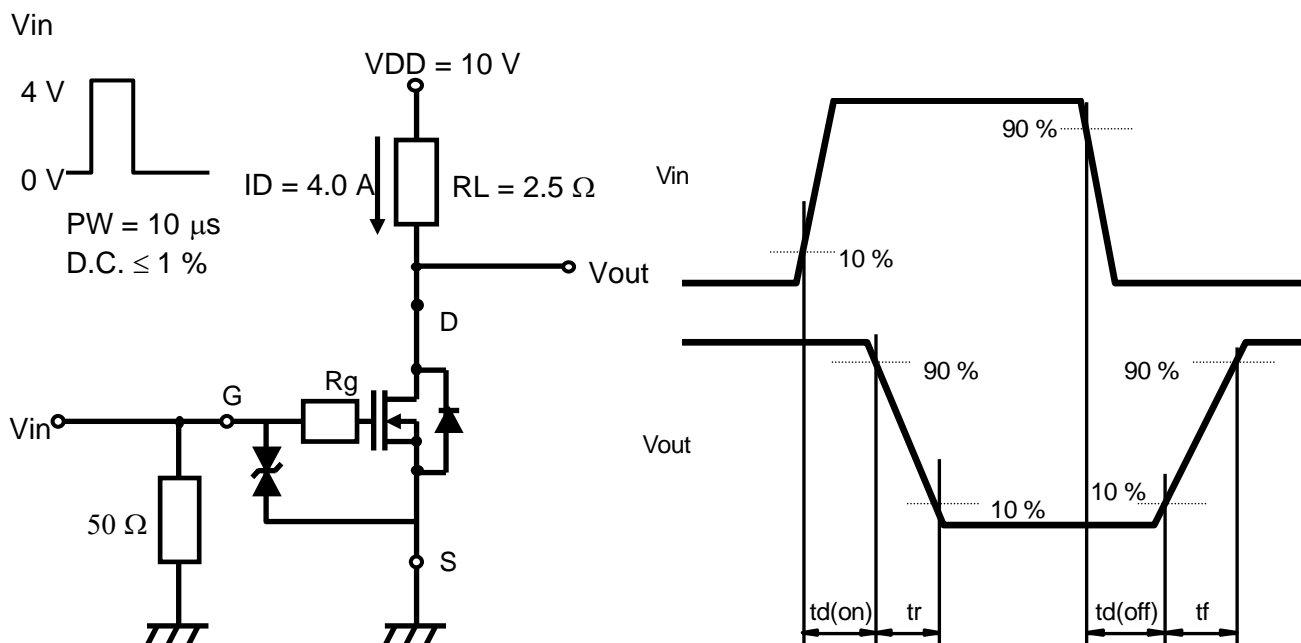
■ Electrical Characteristics Ta = 25 °C ± 3 °C

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Drain-source Breakdown Voltage	V <sub>DSS</sub>	ID = 1 mA, V <sub>GS</sub> = 0 V	24			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0 V			1.0	μA
Gate-source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±8 V, V <sub>SS</sub> = 0 V			±1	μA
Gate-source Threshold Voltage	V <sub>th</sub>	ID = 0.48 mA, V <sub>DS</sub> = 10 V	0.4	0.9	1.4	V
Drain-source On-state Resistance	R <sub>DS(on)1</sub>	ID = 4.0 A, V <sub>GS</sub> = 4.5 V	6.9	9.0	11.8	mΩ
	R <sub>DS(on)2</sub>	ID = 4.0 A, V <sub>GS</sub> = 3.8 V	6.9	9.5	12.9	
	R <sub>DS(on)3</sub>	ID = 4.0 A, V <sub>GS</sub> = 3.1 V	7.3	10.5	15.3	
	R <sub>DS(on)4</sub>	ID = 4.0 A, V <sub>GS</sub> = 2.5 V	7.6	12.2	20	
Body Diode Forward Voltage	V <sub>SD</sub>	IF = 4.0 A, V <sub>GS</sub> = 0 V		0.8	1.2	V
Input Capacitance <sup>*1</sup>	C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz		1230		pF
Output Capacitance <sup>*1</sup>	C <sub>oss</sub>			115		
Reverse Transfer Capacitance <sup>*1</sup>	C <sub>rss</sub>			95		
Turn-on delay Time <sup>*1,*2</sup>	t <sub>d(on)</sub>		V <sub>DD</sub> = 10 V, V <sub>GS</sub> = 0 to 4.0 V		0.45	
Rise Time <sup>*1,*2</sup>	t <sub>r</sub>	ID = 4.0 A		0.75		
Turn-off delay Time <sup>*1,*2</sup>	t <sub>d(off)</sub>	V <sub>DD</sub> = 10 V, V <sub>GS</sub> = 4.0 to 0 V		3		μs
Fall Time <sup>*1,*2</sup>	t <sub>f</sub>	ID = 4.0 A		1.5		
Total Gate Charge <sup>*1</sup>	Q <sub>g</sub>	V <sub>DD</sub> = 10 V		11		nC
Gate-source Charge <sup>*1</sup>	Q <sub>gs</sub>	V <sub>GS</sub> = 0 to 4.0 V,		4		
Gate-drain Charge <sup>*1</sup>	Q <sub>gd</sub>	ID = 8.0 A		2.5		

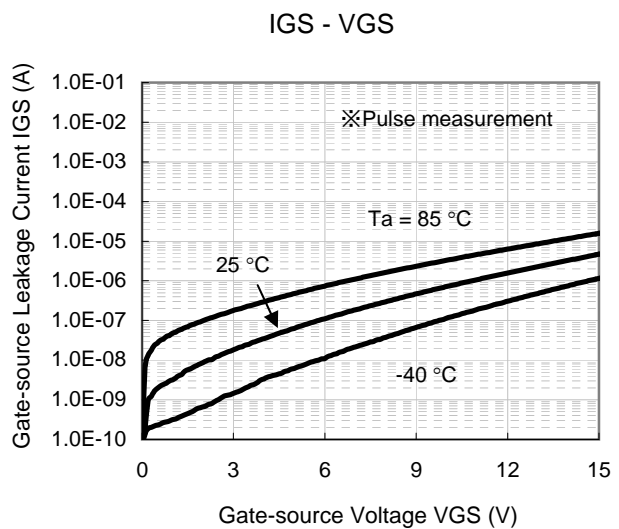
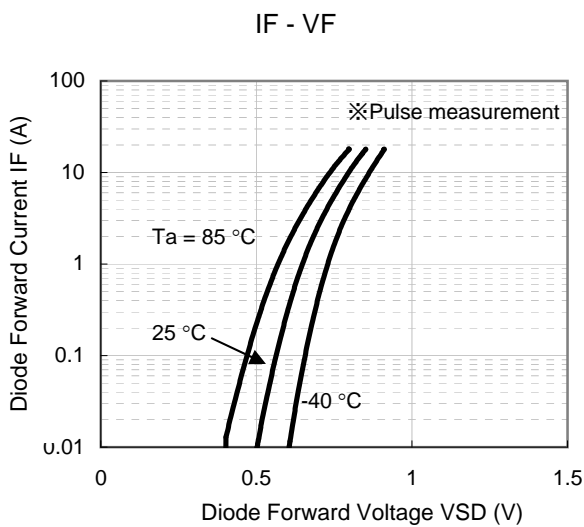
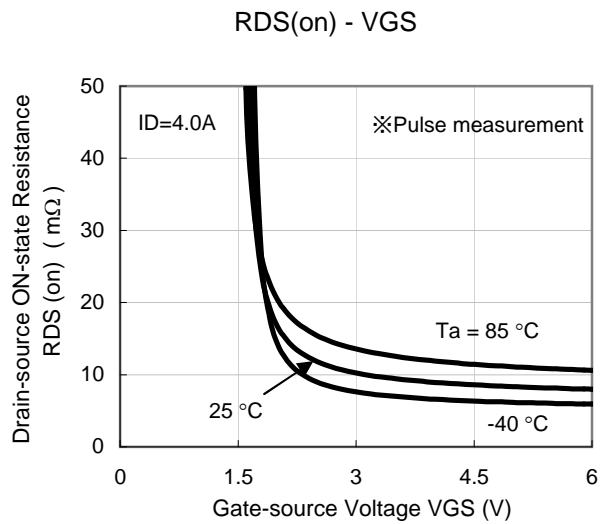
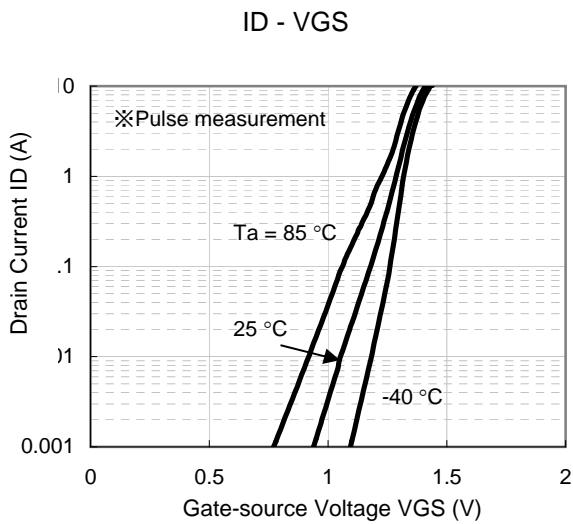
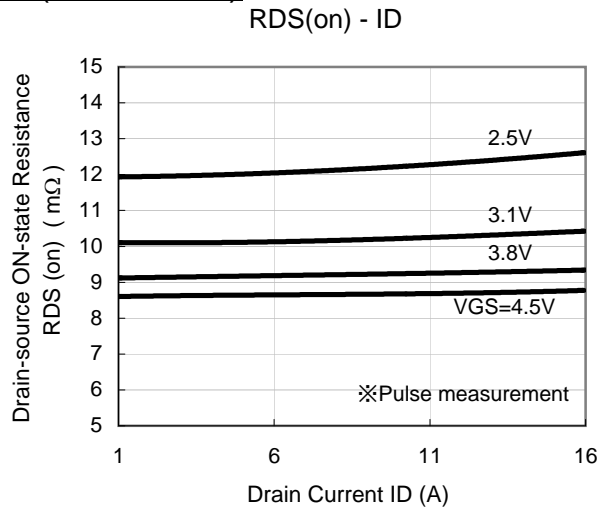
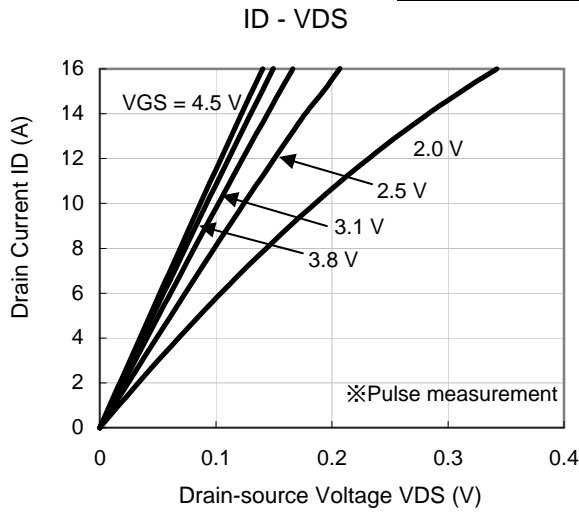
Note Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 Measuring methods for transistors.

\*1 Assured by design

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

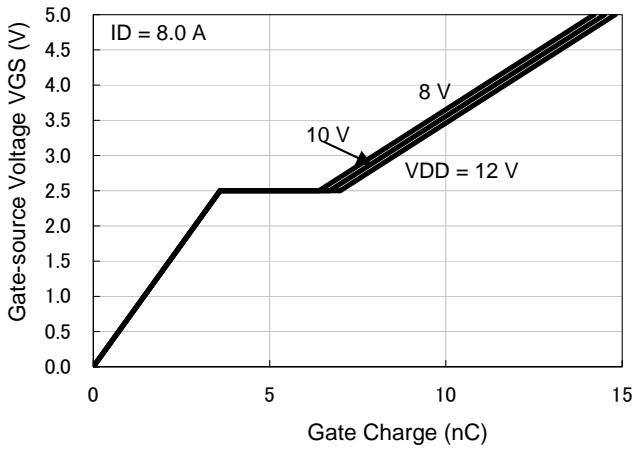


Technical Data ( reference )

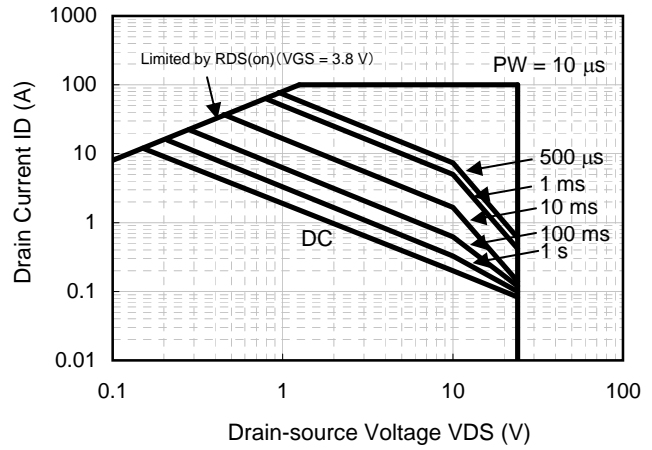


Technical Data ( reference )

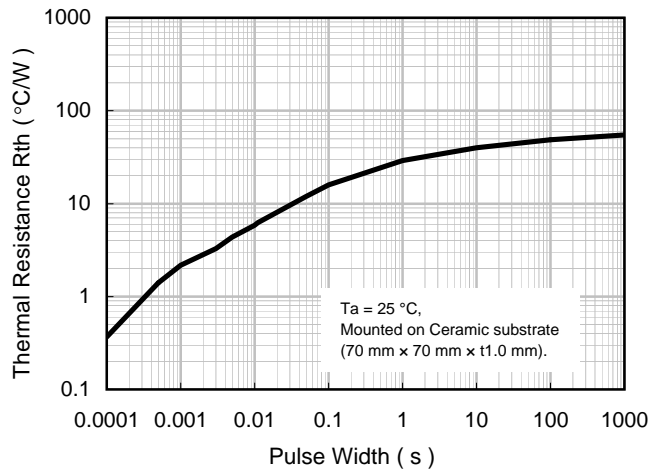
Dynamic Input/Output Characteristics



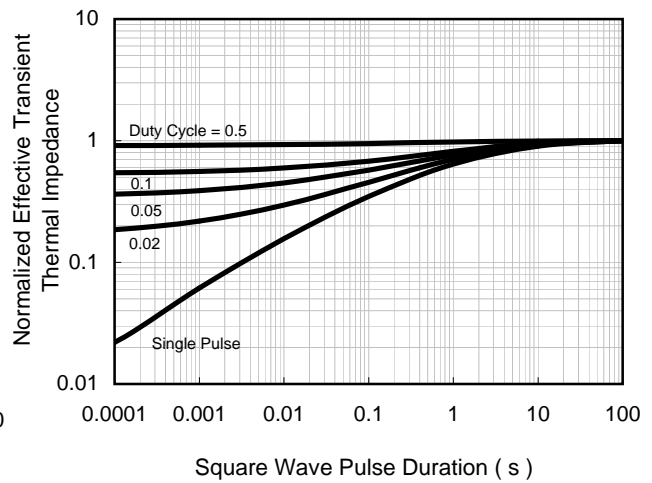
Safe Operating Area



$R_{th} - t_{sw}$

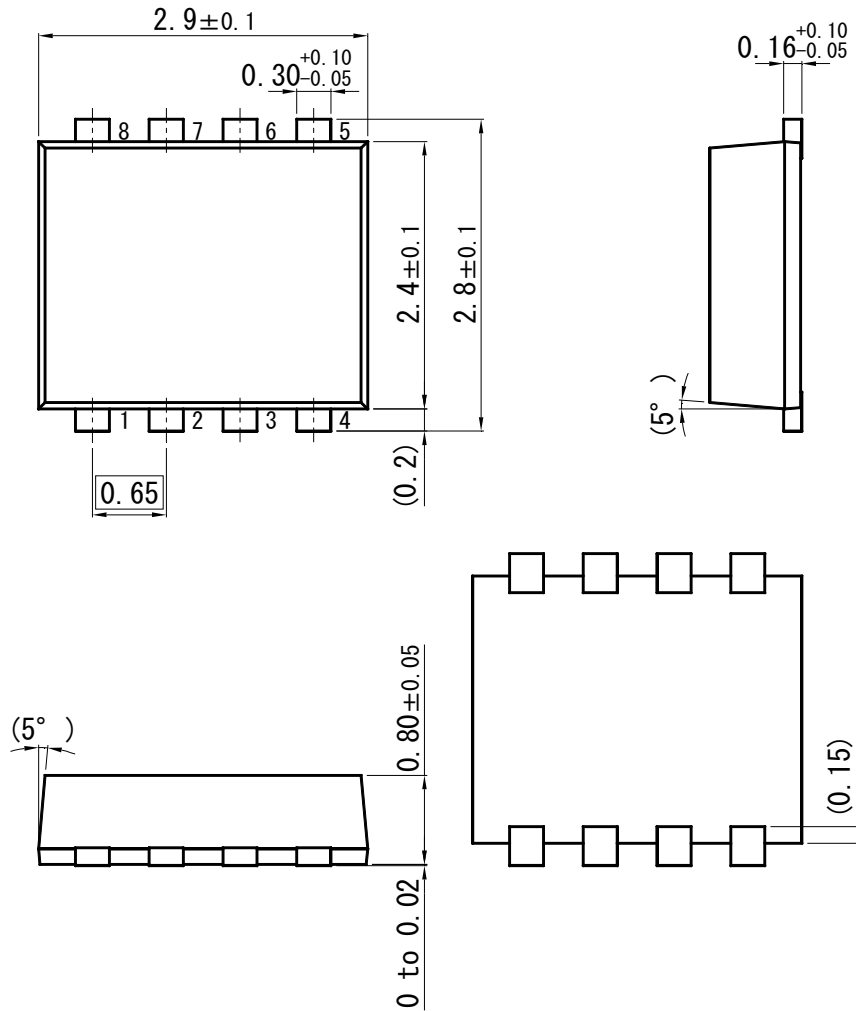


Thermal Response

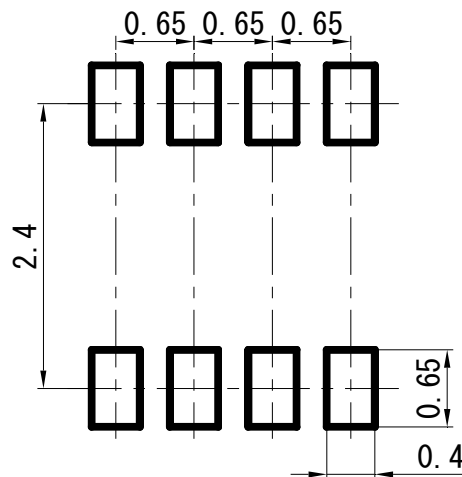


WMini8-F1

Unit: mm



■ Land Pattern (Reference) (Unit: mm)



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