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

Panasonic

MIP2L40MTSCF

Type	Silicon MOSFET type Integrated Circuit		
Application	For Switching Power Supply Control		
Structure	CMOS type		
Equivalent Circuit	Figure. 7		
Out Line	DIP7-A1-B	Marking	MIP2L4

A. ABSOLUTE MAXIMUM RATINGS (Ta=25℃±3℃)

NO.	Item	Symbol	Ratings	Unit	Note
1	DRAIN Voltage	VD	−0.3 ～ 700	V	※1 : It is guaranteed within the pulse as below. Leading Edge Blanking Pulse + Current Limit Delay ton(BLK)+td(OCL)
2	CONTROL Voltage	VC	-0.3 ～ 8	V	
3	Output Peak Current	IDP	2.7(※1)	A	
4	Junction Temperature	Tj	150	℃	
5	Storage Temperature	Tstg	−55 ～ +150	℃	

B. Recommended Operating Conditions

No.	Item	Symbol	Conditions	Unit	Note
1	Junction Temperature	Tj	−40 ～ +125	℃	

C. ELECTRICAL CHARACTERISTICS

Measure condition (TC=25℃±3℃)

No.	Item	Symbol	Measure Condition (Figure 1)	Typ.	Min	Max	Unit
【CONTROL FUNCTIONS/ ✱ Design Guarantee Item】							
1	Output Frequency	fosc	VC=VCCNT)−0.2V, VD=5 V	100	92	108	kHz
2	Jitter Frequency Deviation	Δf	VC=VC(CNT)−0.2V, VD=5 V	5.5			kHz
*3	Jitter Frequency Modulation Rate	fM	VC=VC(CNT)−0.2V, VD=5 V	270			Hz
4	Maximum Duty Cycle	MAXDC	VC=VC(CNT)−0.2V, VD=5 V	53	50	56	%
*5	PWM Gain	GPWM	VC=VC(CNT)	12.5			dB
6	Before Auto-restart Current	IC(SB)1	VC<VC(ON),VD=5 V	0.5	0.2	0.8	mA
7	After Off-state Current	IC(SB)2	VC>VC(CNT),VD=5 V	0.5	0.2	0.8	mA
8	Operating Current	IC(OP)	VC=VC(CNT) −0.2V,VD=5 V	0.7	0.25	1.15	mA
9	Auto-restart Threshold Voltage	VC(ON)	VD=5 V	6.25	5.75	6.75	V

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10	UV Lockout Threshold Voltage	VC(OFF)	VD=5 V	4.8	4.35	5.25	V
11	Auto-restart maintain Voltage	VC_m	S1=OPEN	5.45	4.95	5.95	V
12	Auto-restart maintain Time	Tm	S1=OPEN	45			ms
13	Auto-restart hysteresis Voltage	⊿VC	VC(ON)-VC(OFF)	1.45	1.05	1.85	V
14	Control Clamp Voltage	VC(CLP)	IC=3mA	6.8	6.2	7.4	V
15	Auto-restart duty cycle	TSW/TTIM	※Figure 5 S1=OPEN	12			%
16	Auto-restart frequency	fTIM	※Figure 5 S1=OPEN	2.6			Hz
17	Control Pin Charging Current	IC(CHG)1	VC=0V,VD=50 V	-9	-14	-6	mA
		IC(CHG)2	VC=5V,VD=50 V	-5.7	-11.2	-2.4	mA
18	Control Pin Voltage	VC(CNT)	VD=5 V	5.9	5.3	6.5	V
*19	Control Pin Voltage hysteresis	⊿VC(CNT)	VD=5 V	10			mV

No.	Item	Symbol	Measure Condition (Figure 1)	Typ.	Min	Max	Unit
【CIRCUIT PROTECTIONS:/ * Design Guarantee Item】							
20	Self Protection Current Limit	ILIMIT	※Figure 2/Figure 3 DUTY=30%	1.35	1.24	1.46	A
21	ILIMIT modified coefficient	R_slope	※Figure 2/Figure 3 VC=VC(CNT)-0.2 V	37			mA/μS
*22	Leading Edge Blanking Delay	ton(BLK)		300	240	360	ns
*23	Current Limit Delay	td(OCL)		210	140	280	ns
*24	Thermal Shutdown Temperature	TOTP		140	130	150	℃
*25 .	Thermal Shutdown Temperature Hysteresis	⊿TOTP		70			℃
【OUTPUT／* Design Guarantee Item】							
*26	Power-up Reset Threshold Voltage	VCreset		2.6	1.8	3.5	V
27	ON-State Resistance	RDS(ON)	ID=0.3 A	5.2		6.7	Ω
28	OFF-State Current	IDSS	VD=650V, VC=6.5 V	10		20	μA
29	Breakdown Voltage	VDSS	ID=100 μA, VC=6.5 V		700		V
30	Rise Time	tr	※Figure4 VC=VC(CNT)-0.2V, VD=5 V	95			ns
31	Fall Time	tf	※Figure4 VC=VC(CNT)-0.2V, VD=5 V	30			ns

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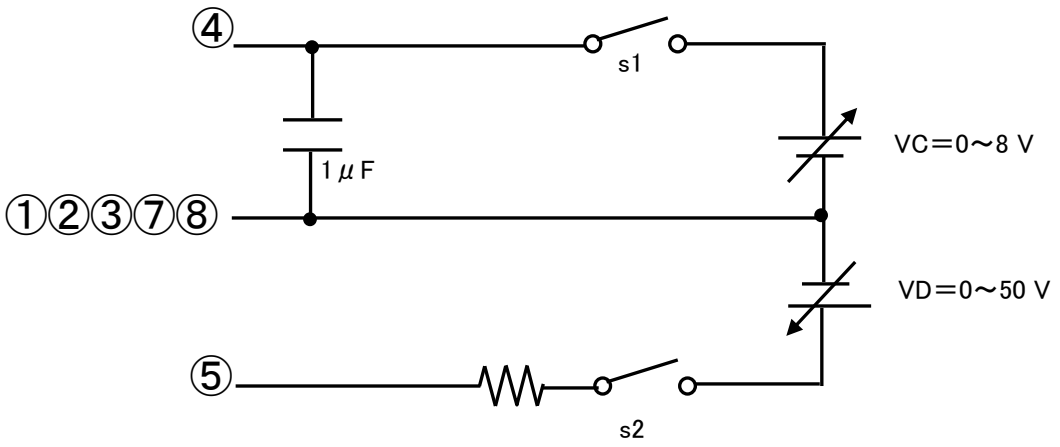
【SUPPLY】							
32	Drain Supply Voltage	VD(MIN)	S1=OPEN		36		V

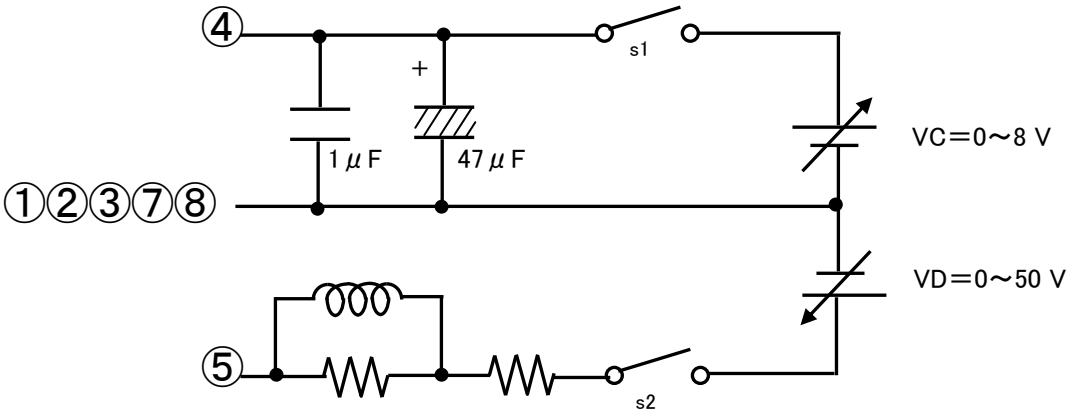
【Figure. 1:Measure Circuit】



＊This measurement circuit can't be useful for ILIMIT measurement

Terminal explanation
④ : CONTROL
①②③⑦⑧ : SOURCE
⑤ : DRAIN

【Figure. 2:Measure Circuit】



Terminal explanation
④ : CONTROL
①②③⑦⑧ : SOURCE
⑤ : DRAIN

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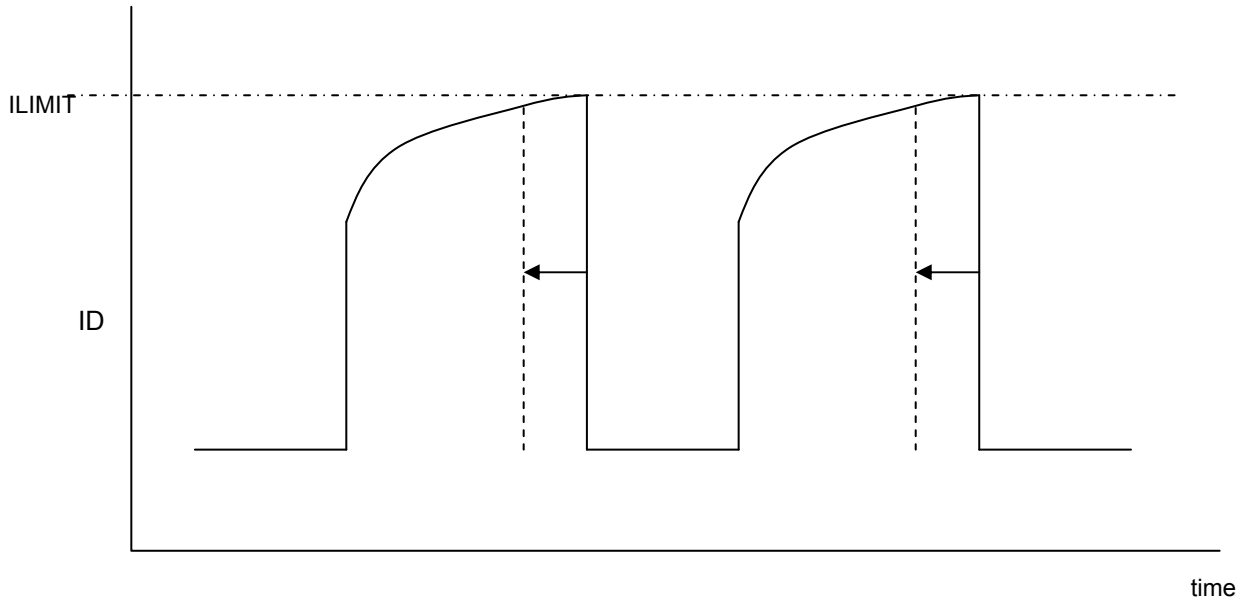
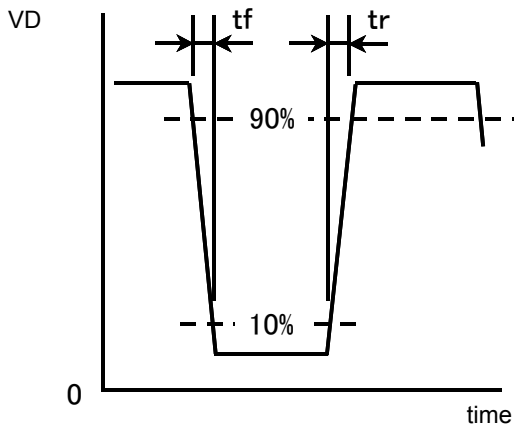
【Figure. 3: ILIMIT Measurement】



R_slope = {(ILIMIT at Duty=30%)-(ILIMIT at Duty=20%)} / {(Ton at Duty=30%)-(Ton at Duty=20%)}

【Figure. 4 : tr、tf Measurement】



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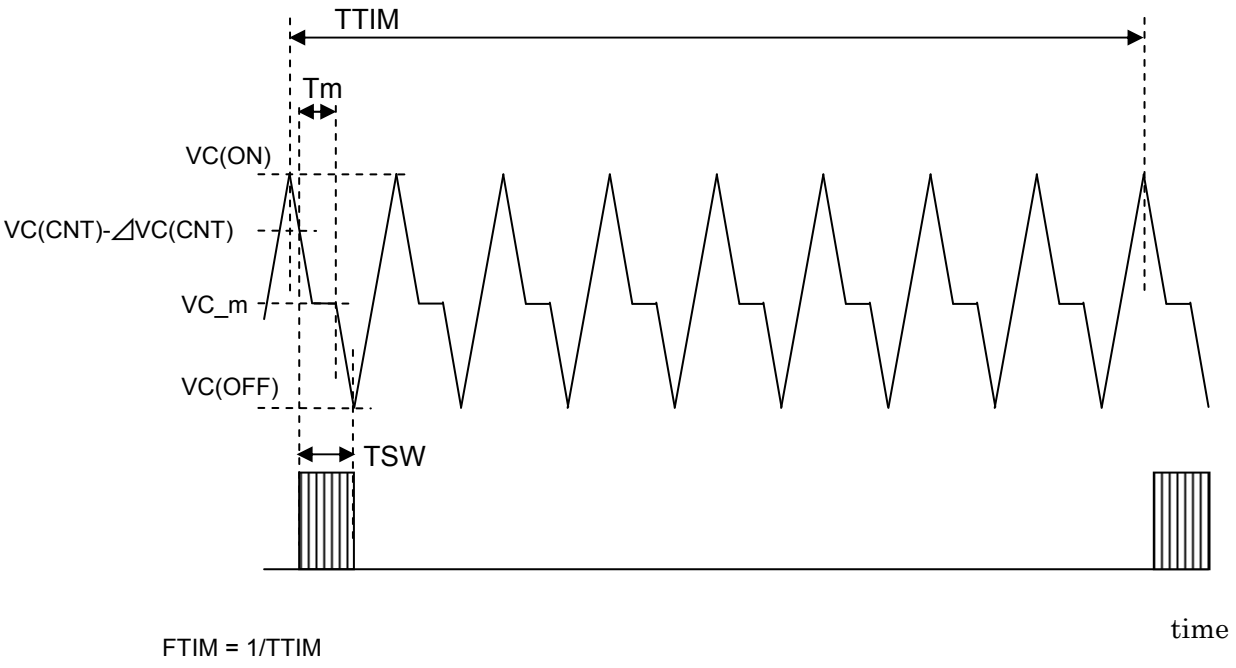
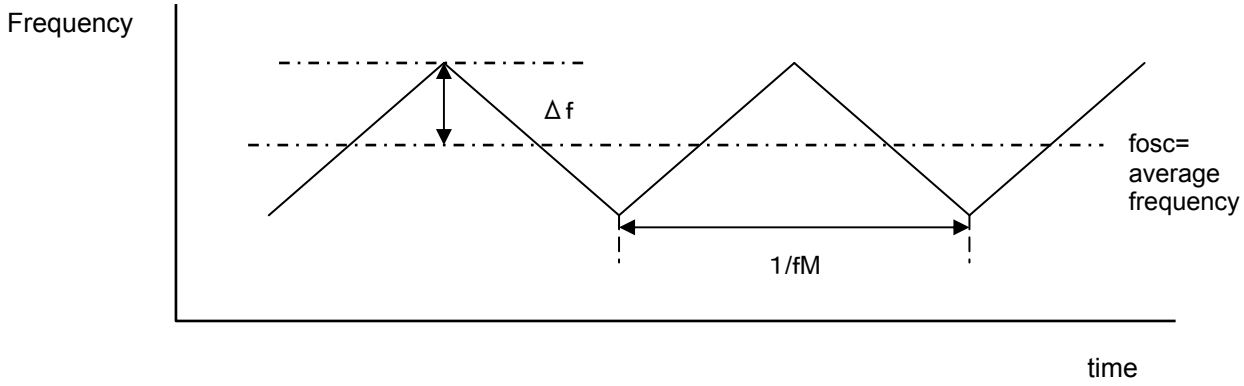
【Figure. 5 : VC_m, Tm, TTSW. TTIM, FTIM Measurement】



【Figure. 6 : Δf、fM Measurement】



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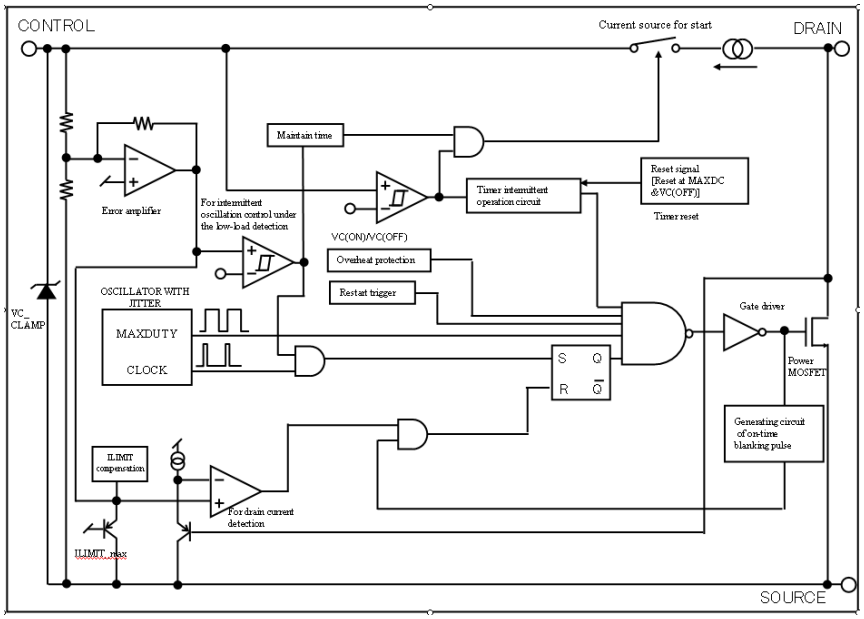
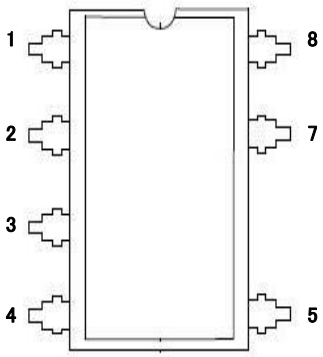
【Figure. 7: Block Diagram】



【Figure. 8: Pin Layout】



Pin No.	Terminal Name
1	SOURCE
2	SOURCE
3	SOURCE
4	CONTROL
5	DRAIN
6	-
7	SOURCE
8	SOURCE

【Precautions for Use 1】

Connect a Ceramic Capacitor (over 0.1 μF) between CONTROL and SOURCE.

【Precautions for Use 2】

The IPD has risks for break-down or burst or giving off smoke in following conditions. Avoid the following use.
Fuse should be added at the input side or connect zener diode between control pin and GND, etc as a countermeasure to pass regulatory Safety Standard. Concrete countermeasure could be provided individually. However, customer should make the final judgment.

(1) Reverse the DRAIN pin and SOURCE pin connection to the power supply board.

(2) DRAIN pin short to CONTROL pin.

(3) DRAIN pin short to SOURCE pin.

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