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

MIP521AMTSCF

Type	Silicon MOSFET type Integrated Circuit		
Application	Switching Power Supply Control		
Structure	CMOSType		
Equivalent Circuit	Refer Figure 7		
Package	DIP7-A1-B	Marking	MIP521A

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

NO.	Item	Symbol	Ratings	Unit	Note
1	DRAIN Voltage	VD	−0.3 ～ 800	V	※1: It is guaranteed within the pulse as below. Leading Edge Blanking Pulse + Over current protection delay ton(BLK)＋td(OCL)
2	VIN Voltage	VIN	−0.3 ～ 650	V	
3	VCC Voltage	VCC	−0.3 ～ 45	V	
4	VDD Voltage	VDD	−0.3 ～ 8	V	
5	Feedback Voltage	VFB	−0.3 ～ 8	V	
6	Feedback Current	IFB	-700	μA	
7	Output Peak Current	IDP	1.2 (※1)	A	
8	Channel Temperature	Tch	150	℃	
9	Storage Temperature	Tstg	−55 ～ +150	℃	
10	Recommended Operating Temperature	Tj	−30 ～ +125	℃	

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B. ELECTRICAL CHARACTERISTICS Measure condition (TC=25℃±3℃)

No.	Item	Symbol	Measure Condition (Refer Fig. 1)	Typ.	Min.	Max.	Unit
【Control function】*Design Guarantee Item, ** Reference Item							
1	Output Frequency	fosc	※Figure 6 VCC=15V, VFB=3V, VD=ILIMIT condition	65	58	72	kHz
2	Jitter Frequency Deviation	d_fosc	※Figure 6 VCC=15V, VFB=3V, VD=ILIMIT condition	3.0	1.5	4.5	kHz
**3	Jitter Frequency Modulation Rate	fM	※Figure 6 VCC=15V, VFB=3V, VD=ILIMIT condition	0.7	–	–	kHz
4	Maximum On-state Time	MAX(ON)	VCC=15V, VFB=3V, VD=5V	22	16	26	μS
5	VDD Voltage	VDD	VCC=15V, VFB=3V, VD=5V	5.9	5.4	6.4	V
6	UV Lockout Threshold Voltage	VUV	VCC=15V, VFB=3V, VD=5V	4.9	4.4	5.4	V
7	VDD start/stop Voltage Hysteresis	ΔVDD	VDD – VUV	1.0	0.5	1.5	V
8	VCC start Voltage	VCC(ON)	VFB=3V, VD=5V	11.8	11.0	13.0	V
9	VCC stop Voltage	VCC(OFF)	VFB=3V, VD=5V	10.8	9.8	11.8	V
**10	VCC start/stop Voltage Hysteresis	VCC(HYS)	VCC(ON) – VCC(OFF)	1.0	–	–	V
11	Feedback Current	IFB_STB	ON→OFF VCC=15V, VD=ILIMIT condition	−160	−200	−120	μA
**12	Feedback Current Hysteresis	IFB(HYS)	OFF→ON VCC=15V, VD=ILIMIT condition	6	–	–	μA
13	FB Pin Voltage	VFB	VCC=15 V, VFB=3V, VD=ILIMIT condition	1.8	1.5	2.1	V
14	FB Pin Grounded Current	IFB_GND	VCC=12V, FB=0 V, VD=ILIMIT condition	−460	−650	−350	μA
15	Pre-start Consuming Current	ICC(SB)	VCC=VCC(ON)−0.2V, VFB=3V, VD=5V	0.47	0.31	0.63	mA
16	Operating Circuit Consuming Current	ICC	VCC=15V, VFB=3V, VD=5V	0.60	0.40	0.85	mA
17	VCC Charging Current	ICCH1 ICCH2	VCC=0V, VIN=50V, VCC=9.5V, VIN=50V	−5.4 −2.5	−6.9 −4.0	−3.5 −1.0	mA mA
18	VDD Charging Current	IDCH1 IDCH2	VDD=0V, VIN=50V, VDD=5.4V, VIN=50V	−4.5 −2.8	−6.8 −4.3	−2.2 −1.2	mA mA

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No.	Item	Symbol	Measure Condition (Refer Fig. 1)	Typ.	Min.	Max.	Unit
【CIRCUIT PROTECTIONS】*Design Guarantee Item, ** Reference Item							
19	Self Protection Current Limit	ILIMIT	※Figure 4 ton=30% duty cycle, VCC=15V, VFB=3V, VD=adjust	0.50	0.45	0.55	A
**20	When OCP Detected Oscillation Off-state Time	Tdet(OC)	VCC=15V, VFB=3V, VD=adjusted	3.0	–	–	μs
**21	Light-load Output Current	ID(OFF)	※Figure 4 ton=30% duty cycle, VCC=15V, IFB=IFB1+5μA, VD=adjust	200	–	–	mA
22	FB Pin Over Load Charging Current	IFBch	VCC=15V, VFB=3V, VD=ILIMIT condition	−9	−12	−6	μA
23	FB Pin Over Load Protection Voltag	VFB(OLP)	VCC=15V, VD=ILIMIT condition	4.2	3.6	4.8	V
24	When MAX(ON) Detected FB Pin Current	IFBMAXON	VCC=15V, VFB=3V, VD=5V	–	–	0.5	μA
25	OLP VCC Oscillation Count	OLP_CNT	※Figure 3 VCC=VCC(ON)⇔VCC(OFF), VD=ILIMIT condition, FB=Open	8			–
*26	Leading Edge Blanking Delay	ton(BLK)		290	230	400	ns
*27	Current Limit Delay	td(OCL)		150	100	250	ns
28	Over Voltage Protection Voltage	VCC(OV)	ON→OFF VFB=3V, VD=5V	33	28	38	V
*29	Thermal Shutdown Temperature	TOTP		140	130	150	℃
*30	Thermal Shutdown Temperature Hysteresis	ΔTOTP		70	–	–	℃
31	Power-up Reset Threshold Voltage	VDDreset		2.4	1.5	3.3	V

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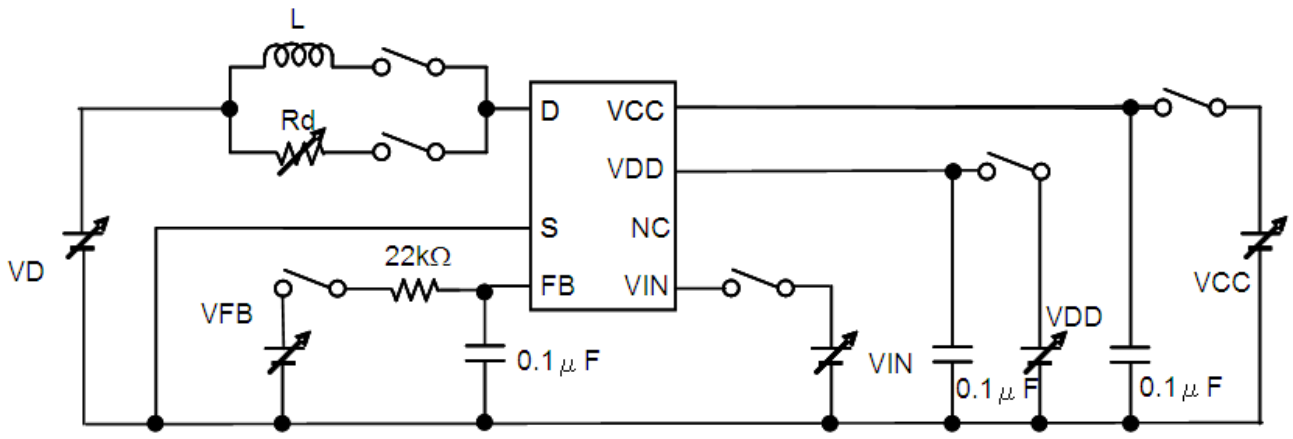
No.	Item	Symbol	Measure Condition (Refer Fig. 1)	Typ.	Min.	Max.	Unit
【High Voltage Input】							
32	Off-state VIN Pin Leakage Current	IIN(LEAK)	VIN=600V, VCC > VCC(OV)	10	–	20	μA
33	VIN Pin Voltage	BVVIN	IIN=100μA, VCC > VCC(OV)	–	650	–	V
34	Minimum VIN Voltage	VIN(MIN)	VFB=3V, VD=5V	–	50	–	V
【Output】							
35	ON-State Resistance	RDS(ON)	VCC = 15V, VFB=3V, IDS=100mA	9.5	–	13	Ω
36	OFF-State Current	IDSS	VCC > VCC(OV), VFB=3V, VD=750V	10	–	20	μA
37	Breakdown Voltage	VDSS	VCC > VCC(OV), VFB=3V, ID=100μA	–	800	–	V
**38	Rise Time	tr	※Figure 5 VCC=15V, VFB=3V, VD=5V	100	–	–	ns
**39	Fall Time	tf	※Figure 5 VCC=15V, VFB=3V, VD=5V	50	–	–	ns

【Figure 1: Measure Circuit】



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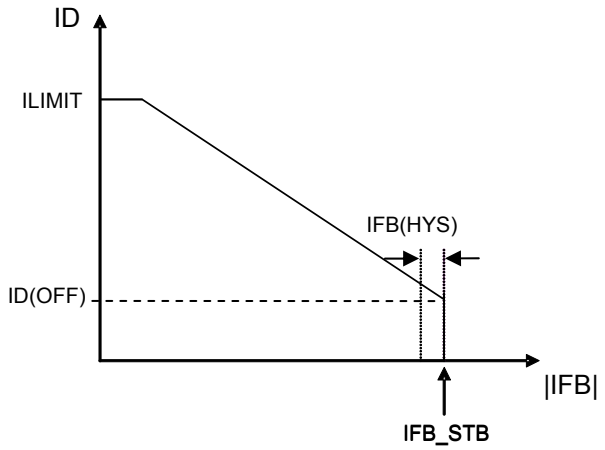
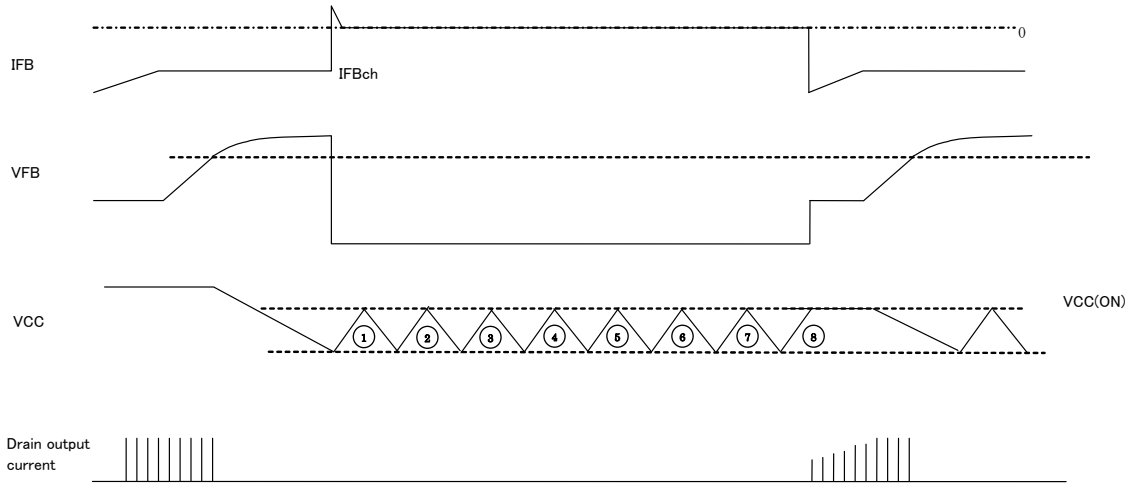
【Figure 2: ID vs IFB Measurement】



【Figure 3: Over-Load Detected Measurement】



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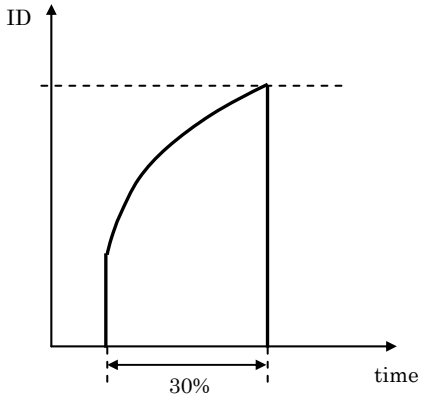
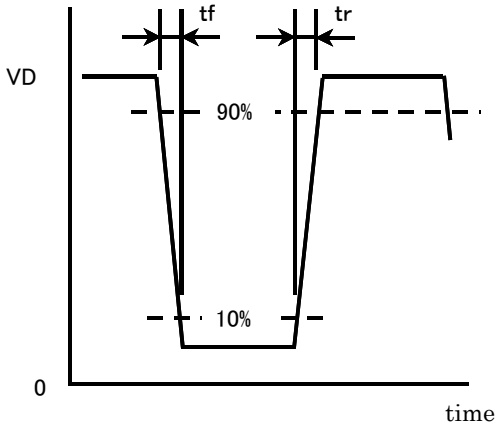
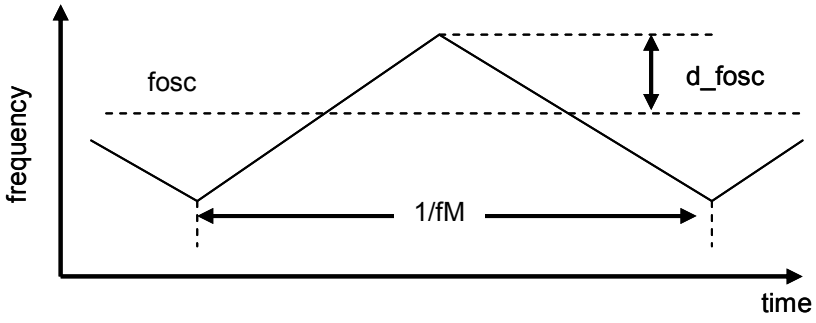
【Figure 4: ILIMIT, ID(OFF) Measurement】



【Figure 5: tr, tf Measurement】



【Figure 6: d_fosc, fM Measurement】



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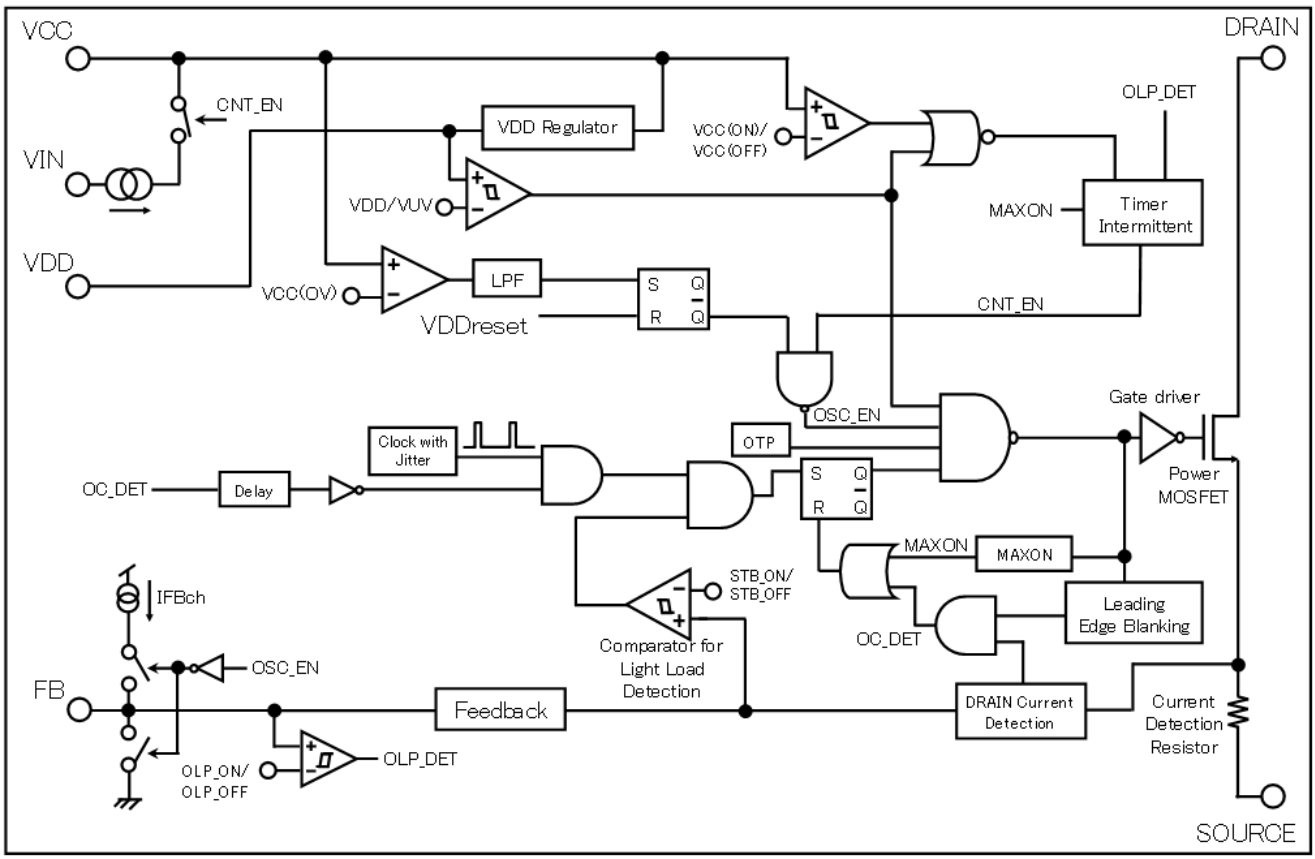
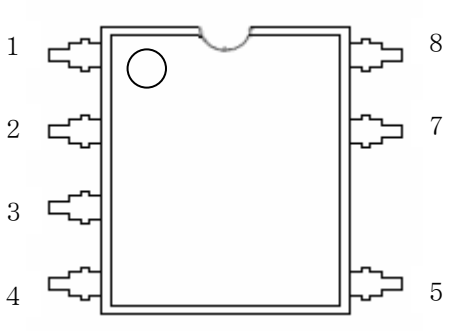
【Figure 7: Block Diagram】



【Figure 8: Pin Layout】



Pin No.	Terminal Name
1	VIN
2	NC
3	VDD
4	VCC
5	DRAIN
6	—
7	SOURCE
8	FB

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【Precautions for Use 1】

Connect a Ceramic Capacitor (over 0.1μF) between VDD Pin 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 SOURCE, etc as a countermeasure to pass regulatory Safety Standard. Concrete countermeasure could be provided individually. However, customer should make the final judgment.

1. DRAIN Pin and FB Pin short circuit.
2. DRAIN Pin and VDD Pin short circuit.
3. DRAIN Pin and VCC Pin short circuit.
4. DRAIN Pin and VIN Pin short circuit.
5. VIN Pin and FB Pin short circuit.
6. VIN Pin and VDD Pin short circuit.
7. VIN Pin and VCC Pin short circuit.
8. VCC Pin and FB Pin short circuit.
9. VCC Pin and VDD Pin short circuit.

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