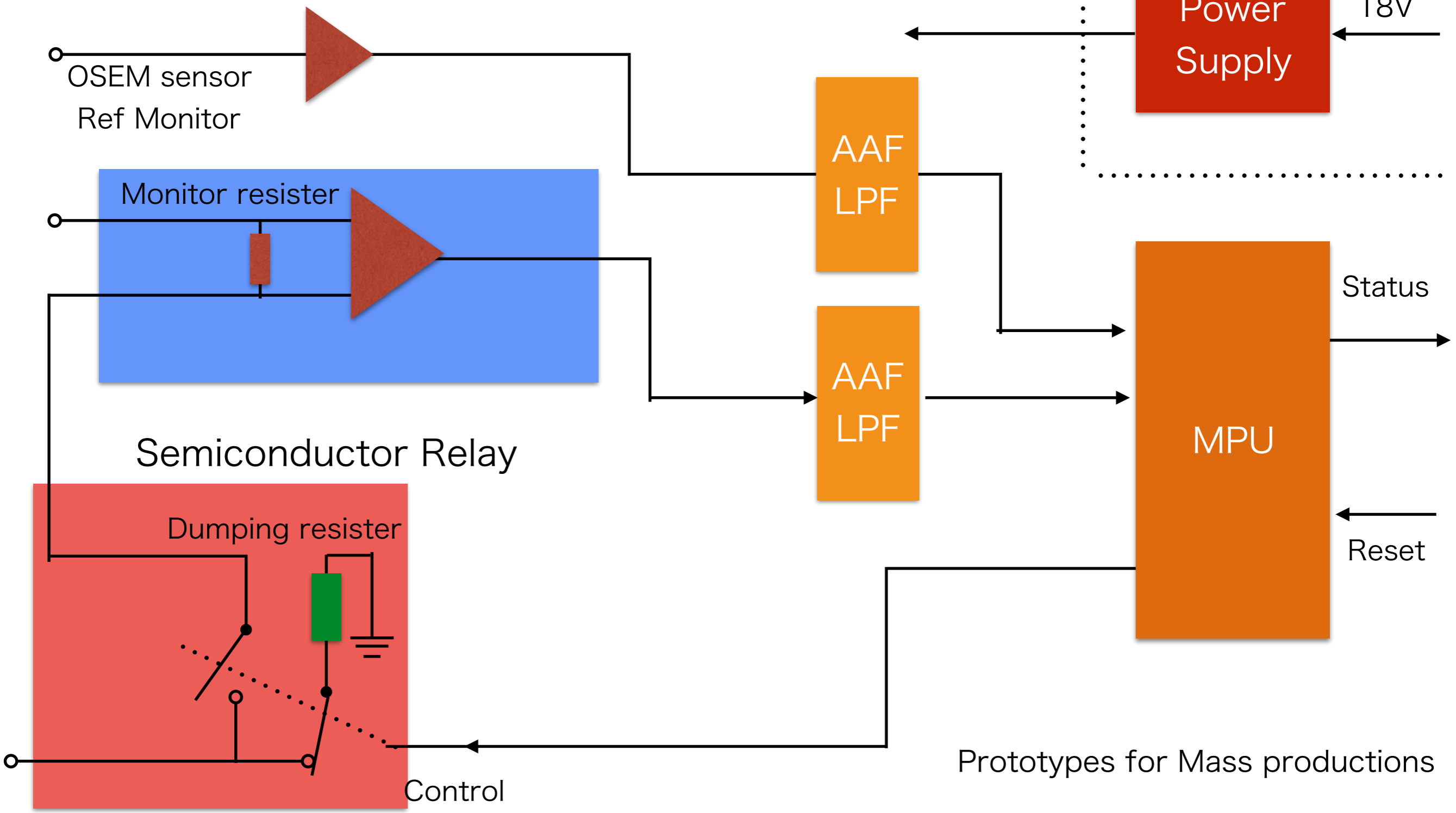


Project-WDS
2016/04/01
GW
Nobuyuki Tanaka

5th System Design Type D

15/12/04 Ver1

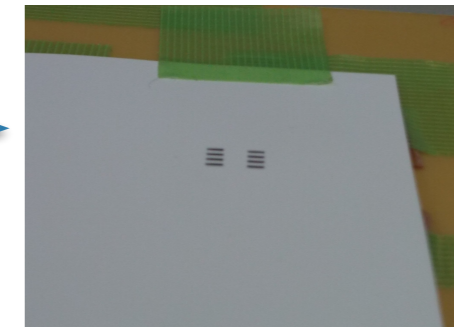
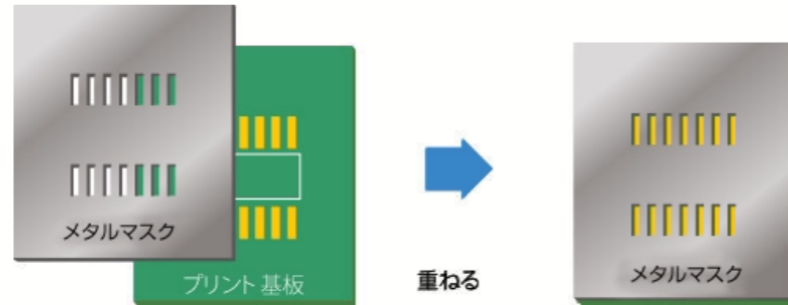
Watchdog system
異常検出・安全装置



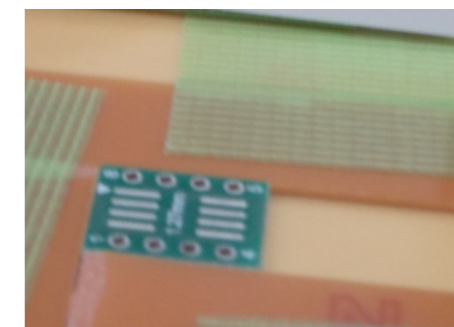
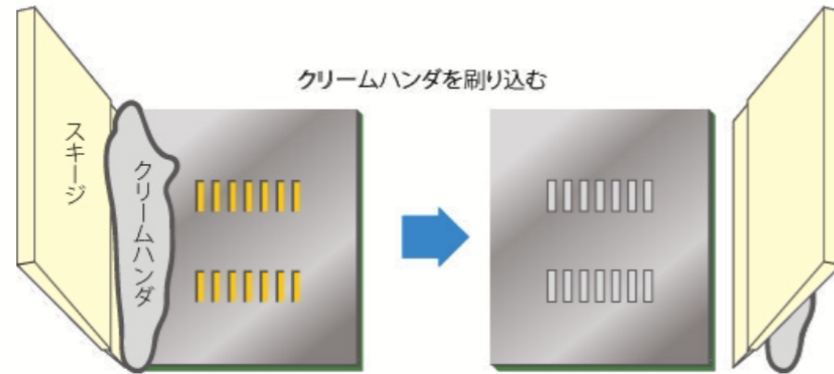
Reflow soldering process

Watchdog system 異常検出・安全装置

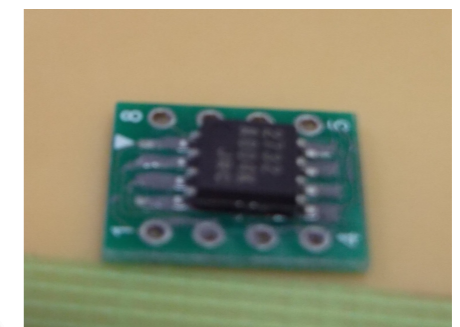
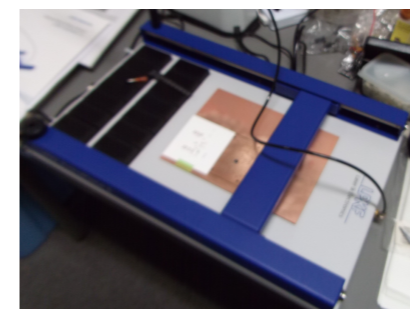
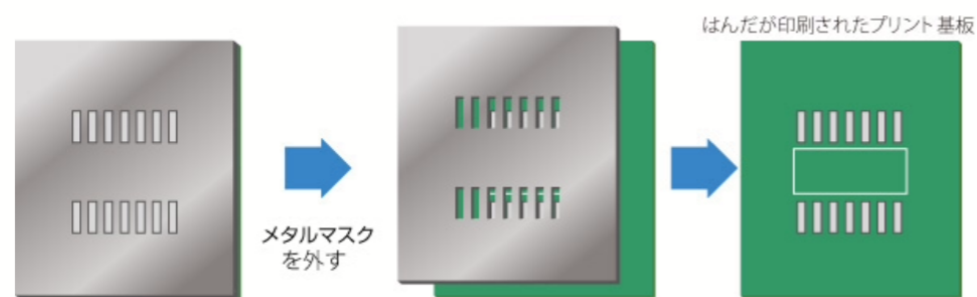
手順1 メタルマスクとプリント基板を重ねます。



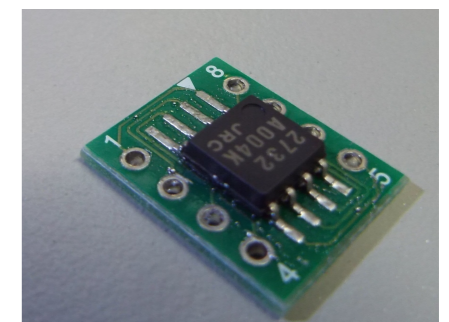
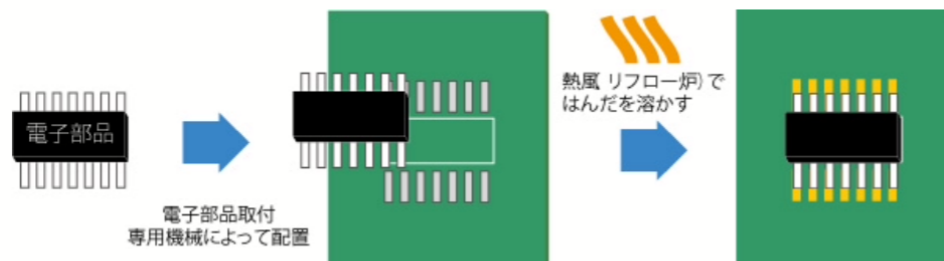
手順2 クリーム状のハンダを流し込み、スキージと呼ばれるヘラで刷り込みます。



そしてメタルマスクを取り除くと、必要な所にだけハンダが印刷されることになります。

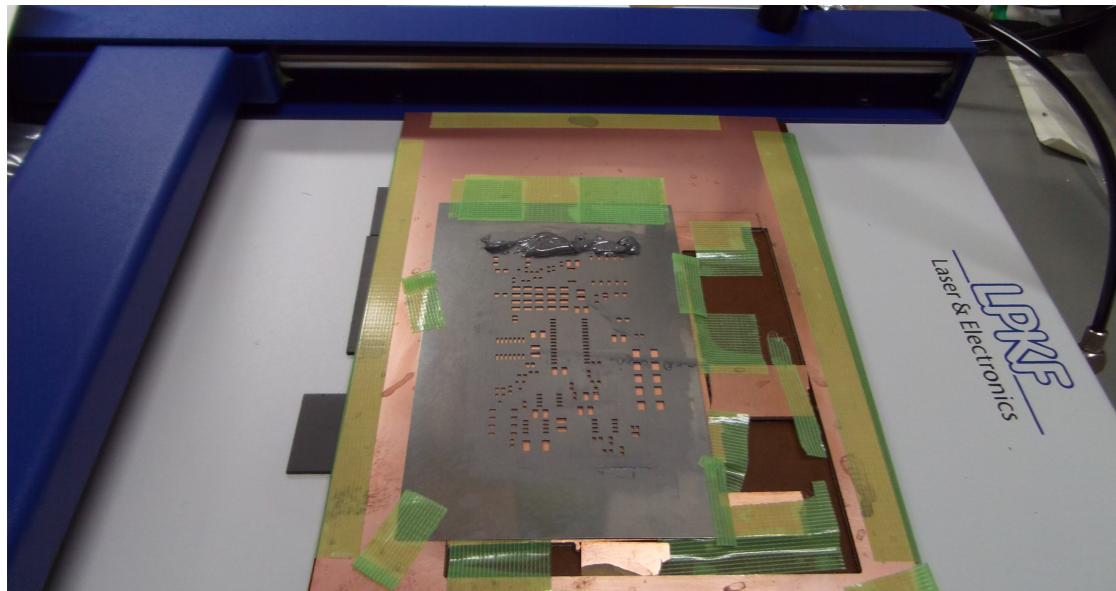


手順3 電子部品取付 専用機械（実装機械）によって電子部品をハンダ上に配置し、熱風（リフロー炉）によって、ハンダを溶かしてプリント基板と電子部品をプリント基板の表側で接続します。

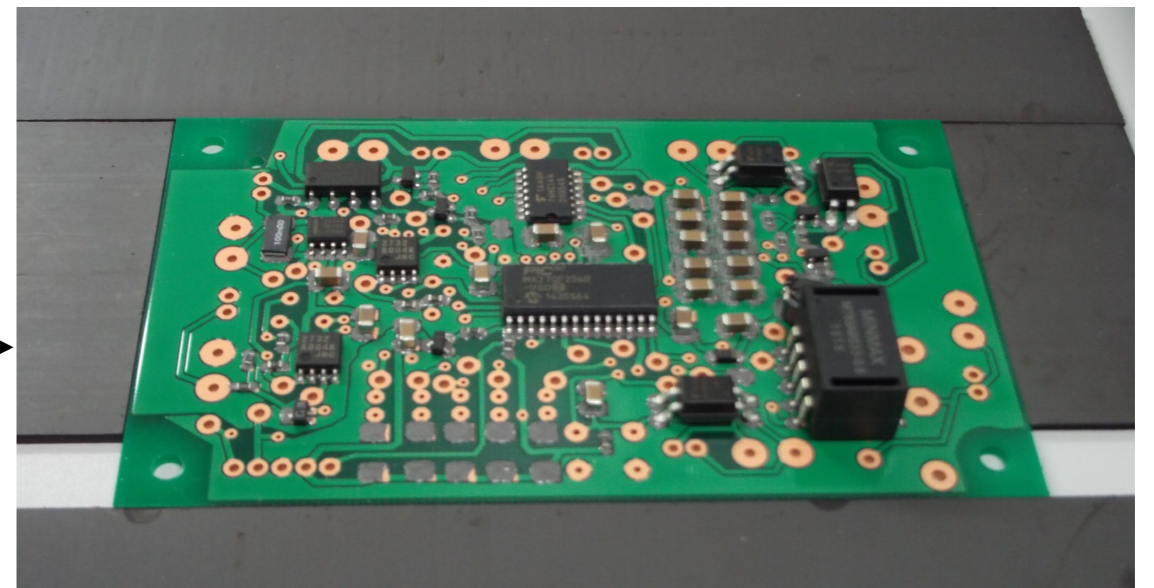
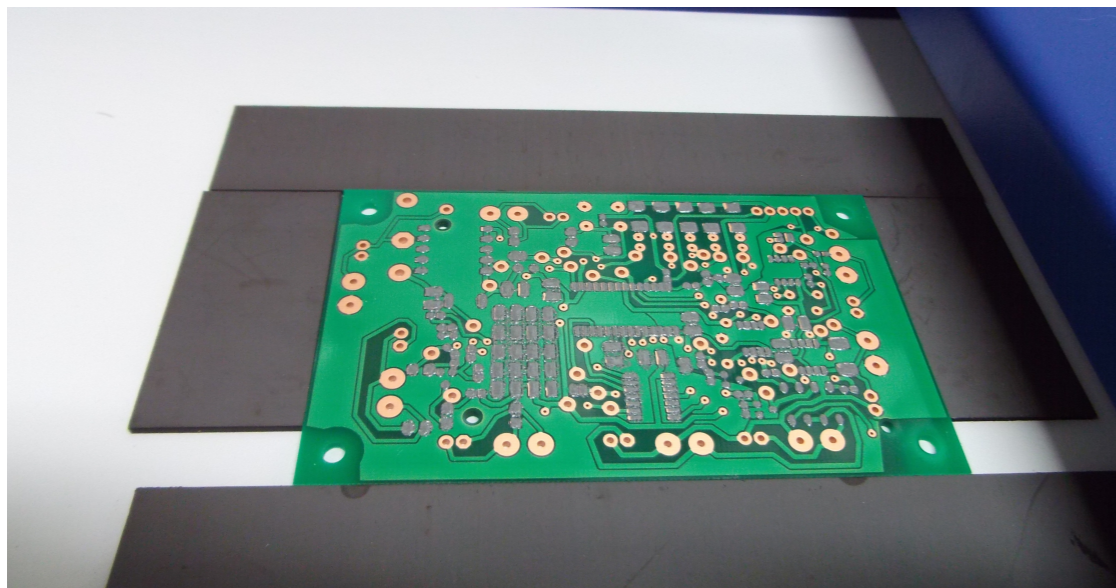
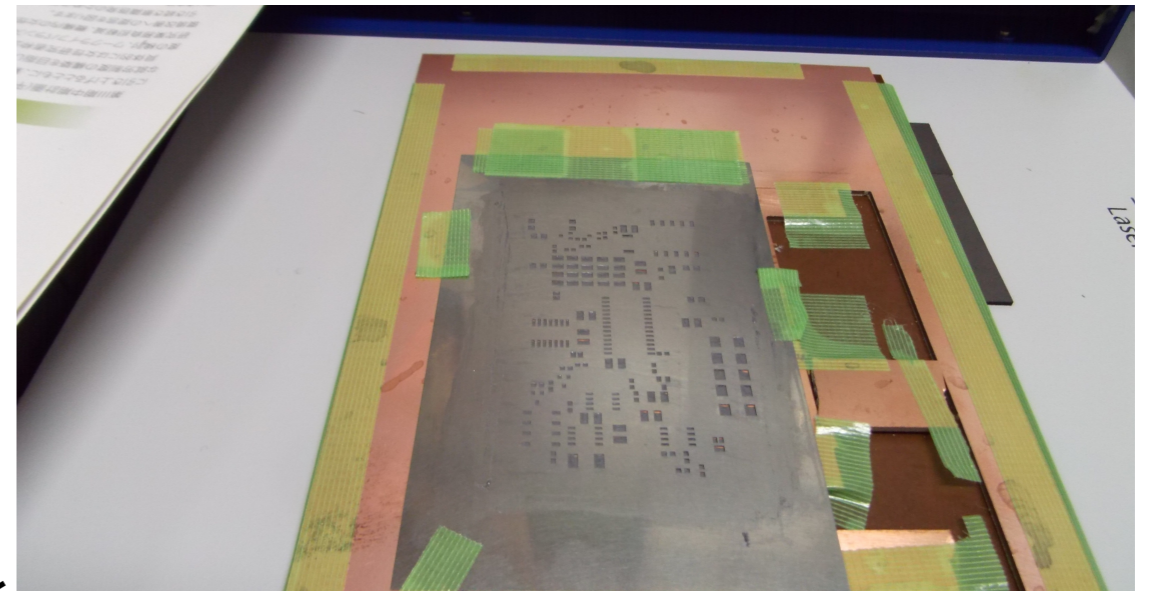


Watchdog system
異常検出・安全装置

Production process by reflow oven



Printing solder paste



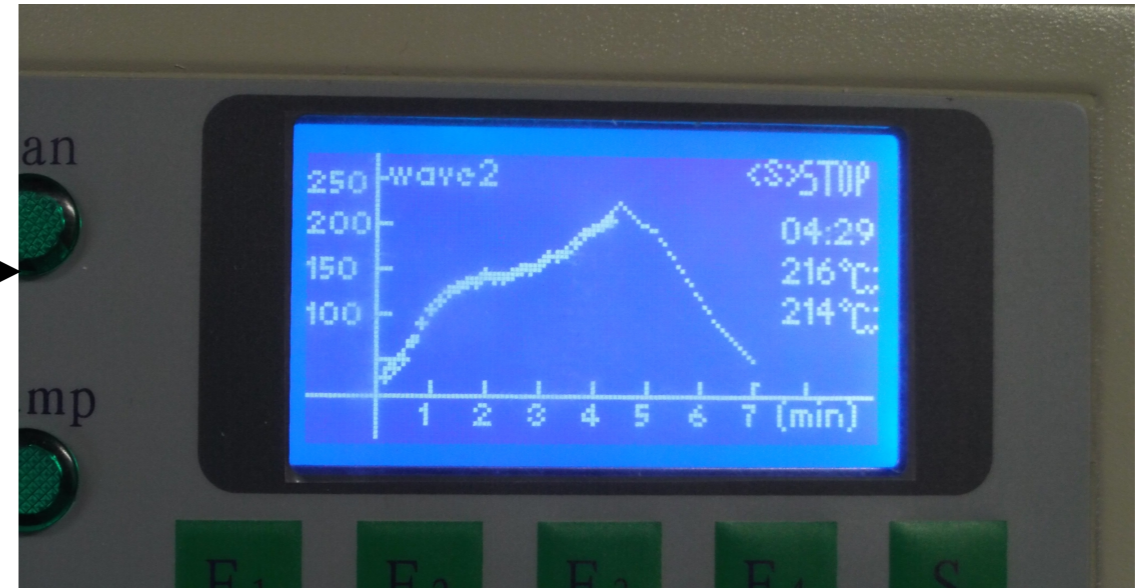
Mounting on SMD

Watchdog system
異常検出・安全装置

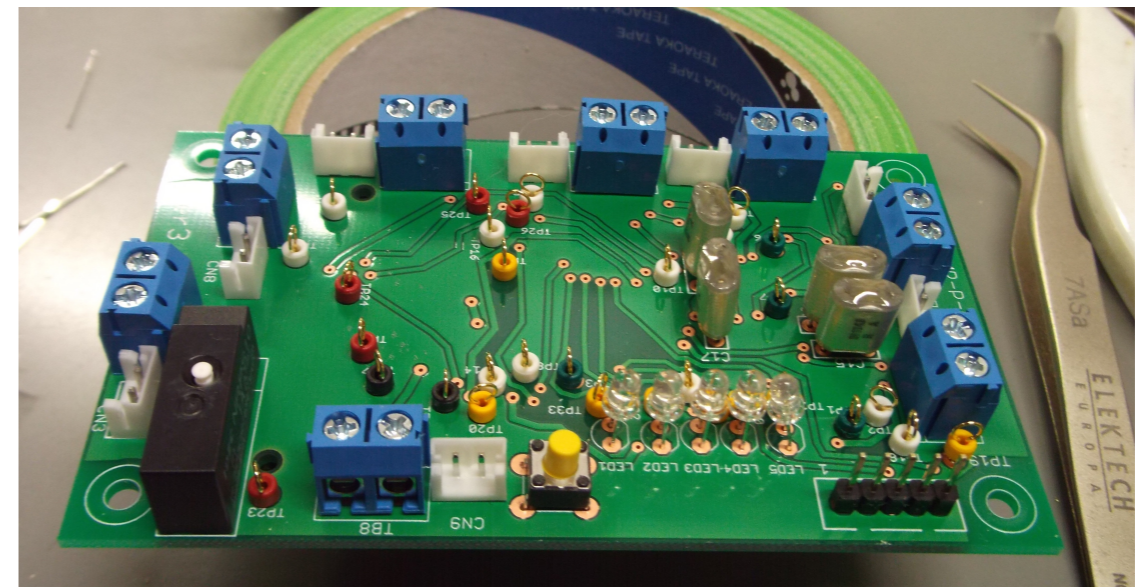
Production process by reflow oven



Heating by Reflow oven.



Heating temperature profile



To implement the parts.

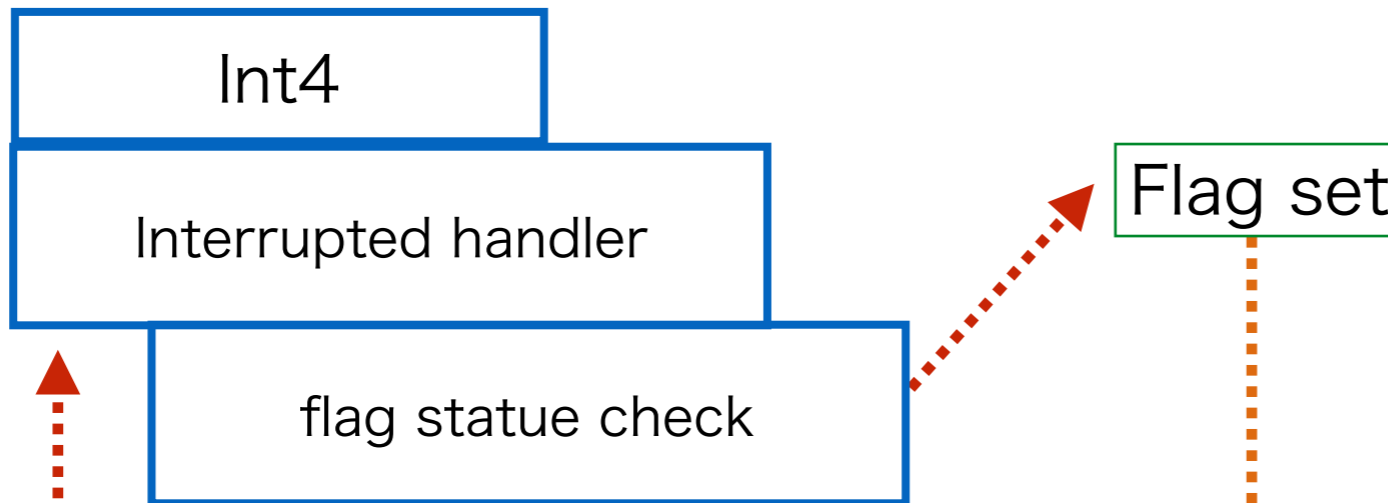
Watchdog system
異常検出・安全装置

I/O Direction	PIN number	PIN assignment
Output(Digital)	RB5(14)	Break on/PhMOS on
Output(Digital)	RB8(17)	Live
Output(Digital)	RB10(21)	LED1
Output(Digital)	RB11(22)	LED2
Output(Digital)	RB13(24)	LED3
Output(Digital)	RB14(25)	LED4
Output(Digital)	RB15(26)	LED5
Input(Digital)	RB7(16)	Restore/INT4
Input(Analog)	AN4(6)	OSEM sensor out
Input(Analog)	AN5(7)	Coil monitor R

S/W Design

INT4

Watchdog system 異常検出・安全装置



Flag set

Interrupt

Main

Manual push
or Ex input
trigger

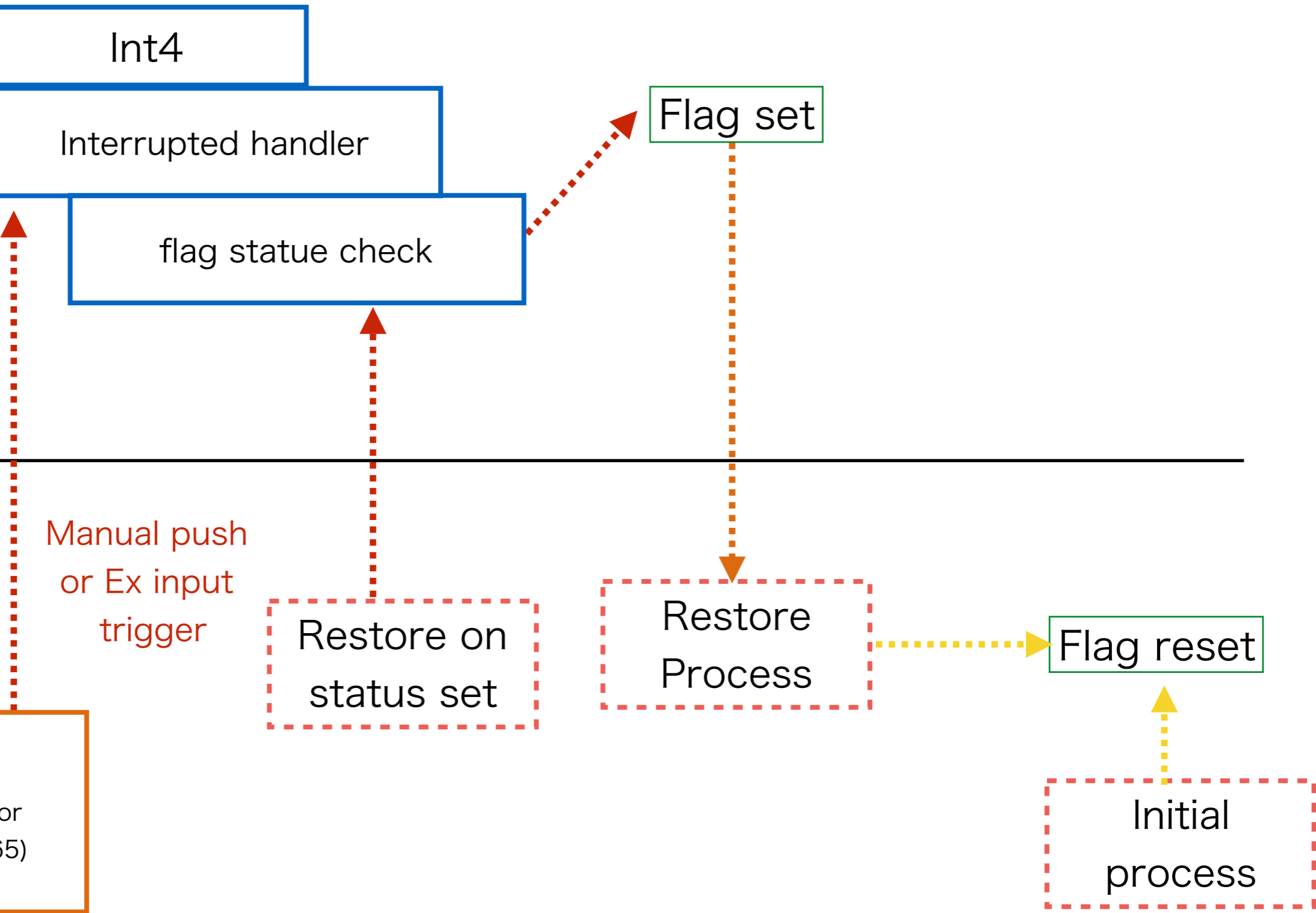
Restore on
status set

Restore
Process

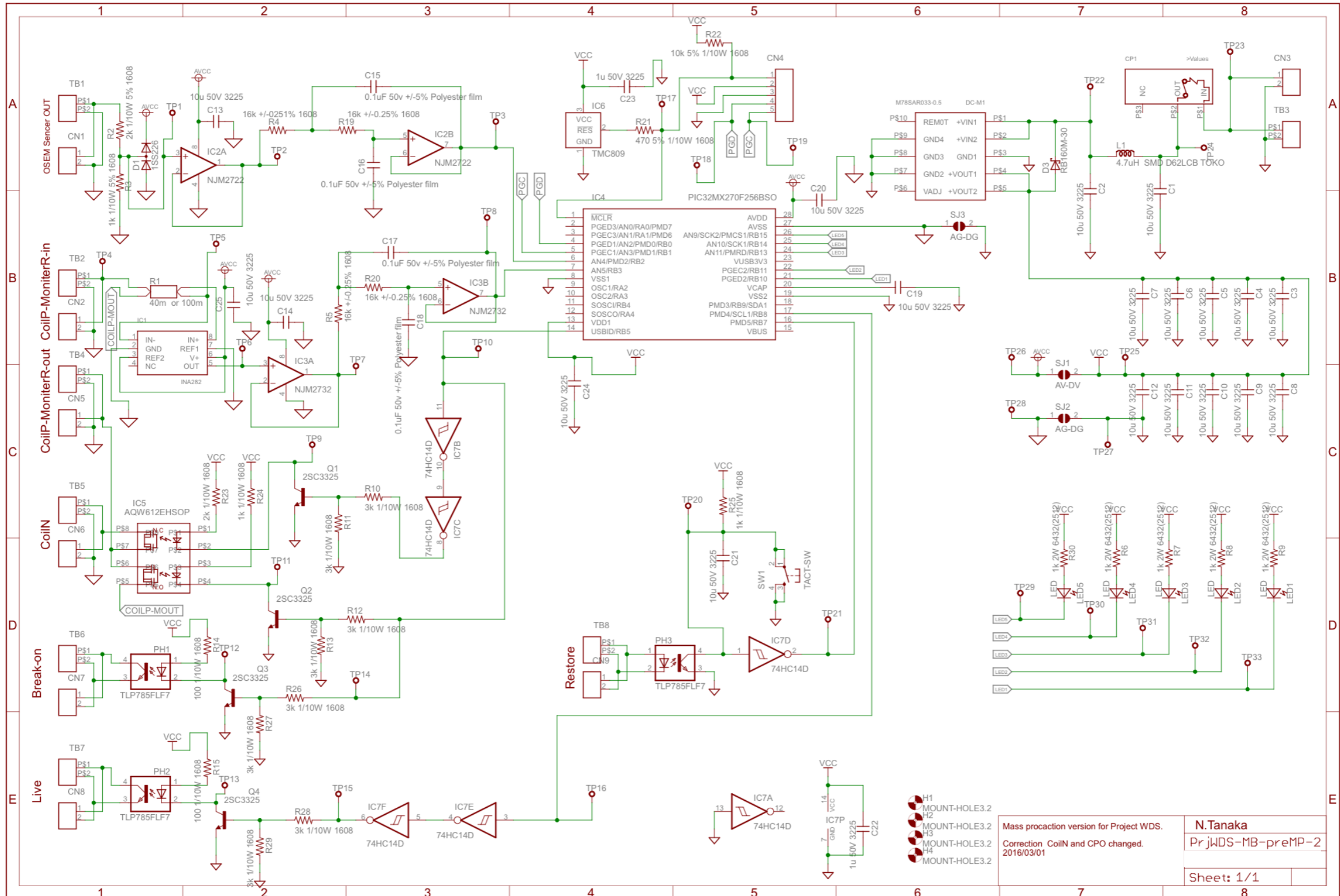
Flag reset

H/W
Manual Push or
Ex Input(TLP765)

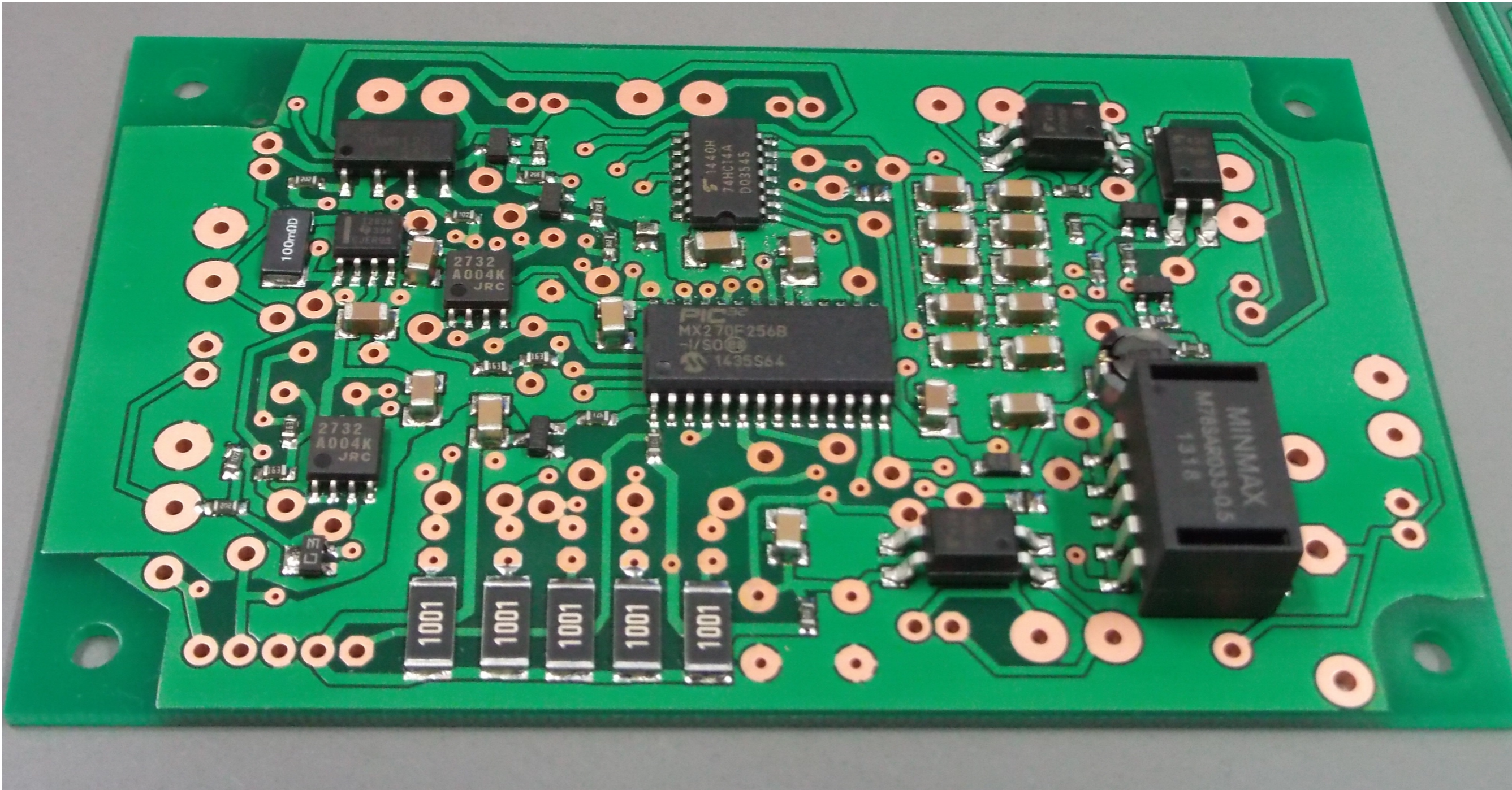
Initial
process



Watchdog system 異常検出・安全装置



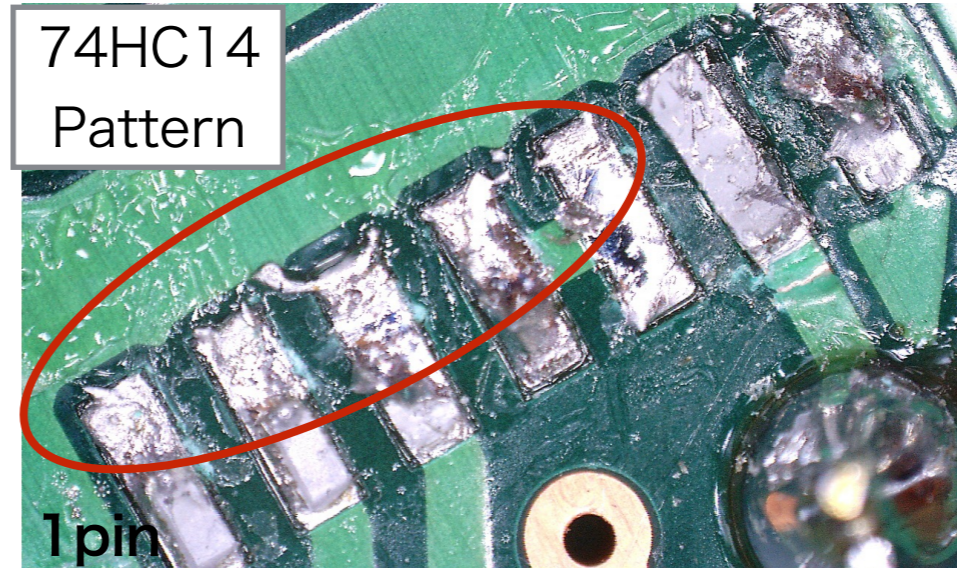
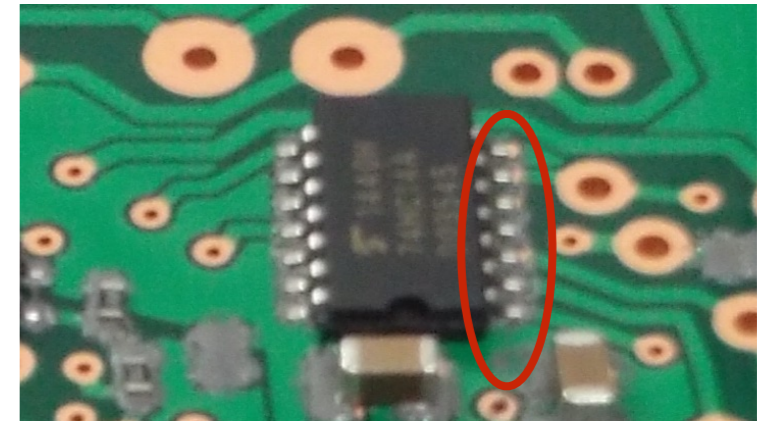
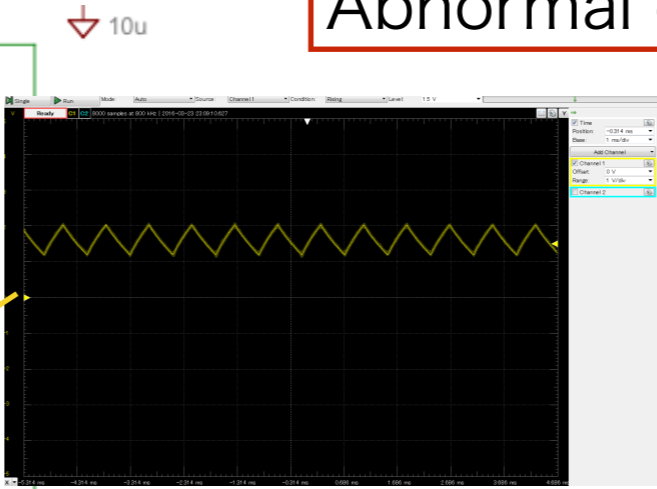
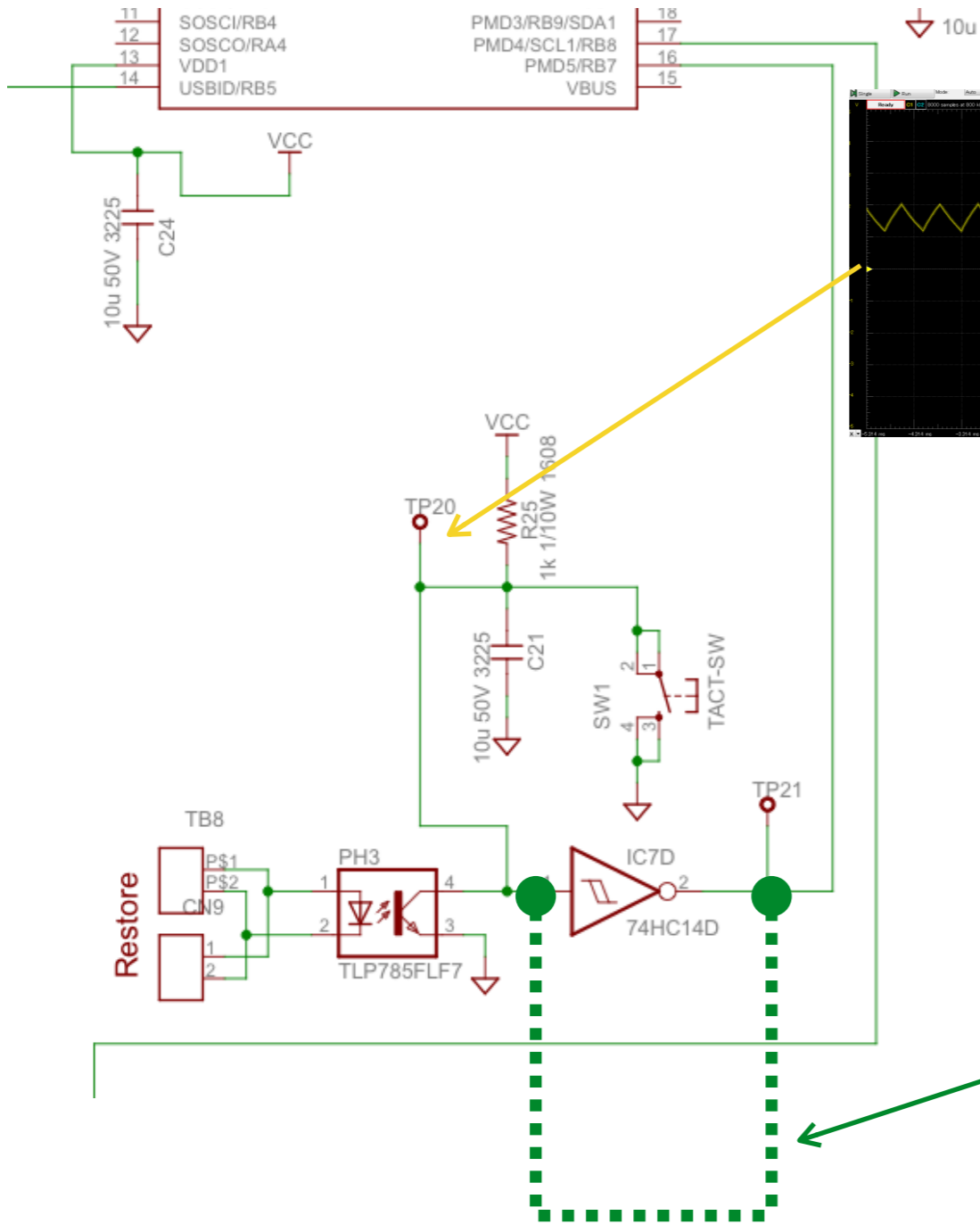
Watchdog system
異常検出・安全装置



Watchdog system 異常検出・安全装置

Trouble on the production

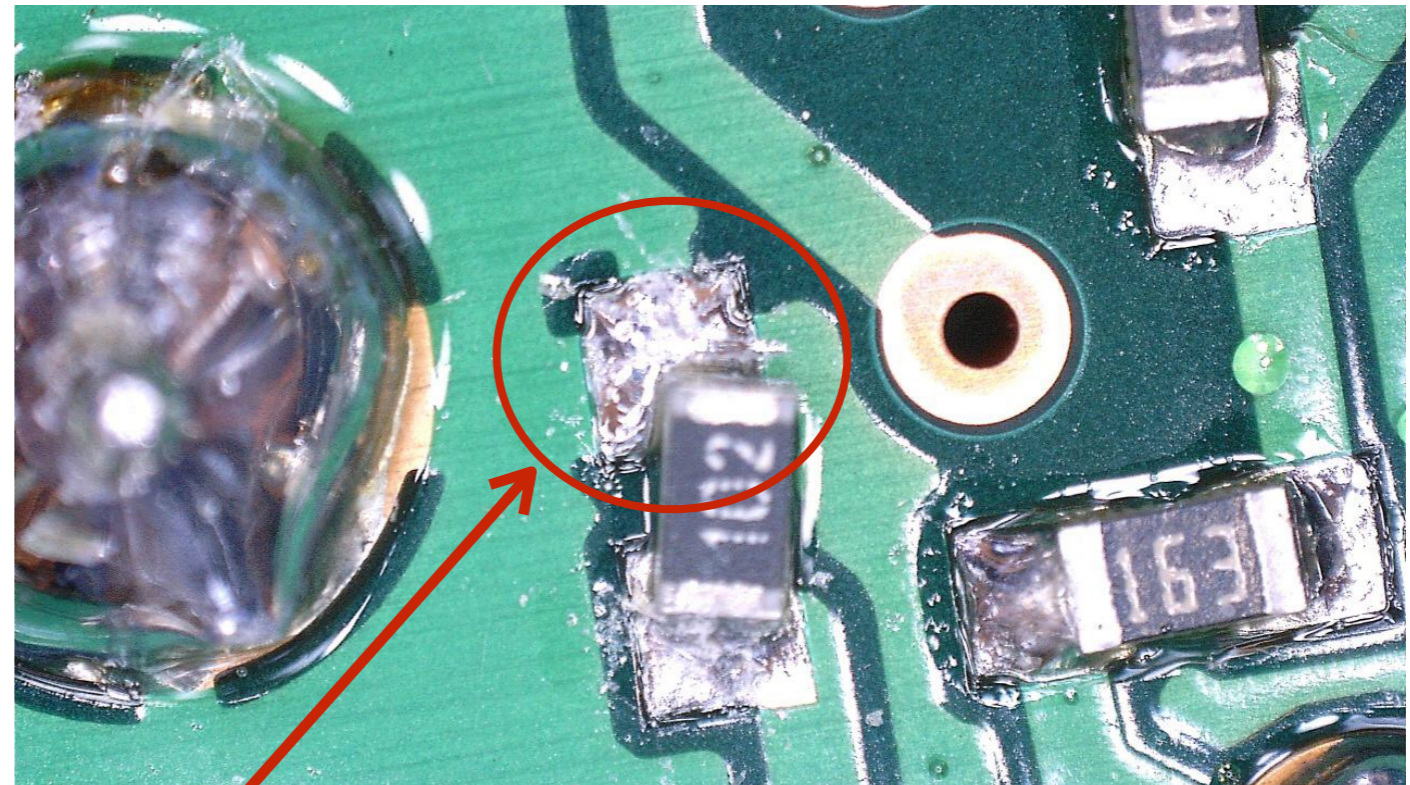
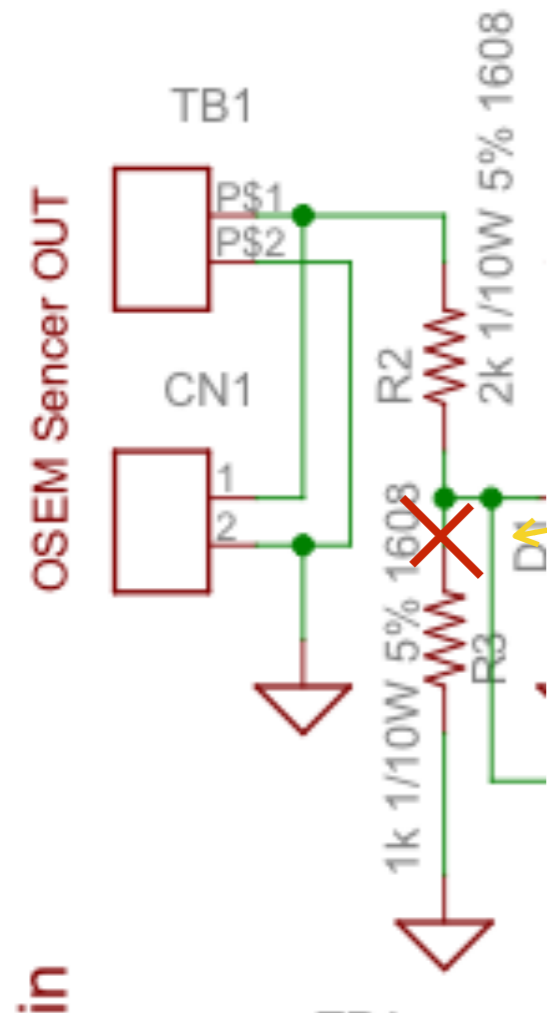
Abnormal oscillation



Watchdog system
異常検出・安全装置

Trouble on the production

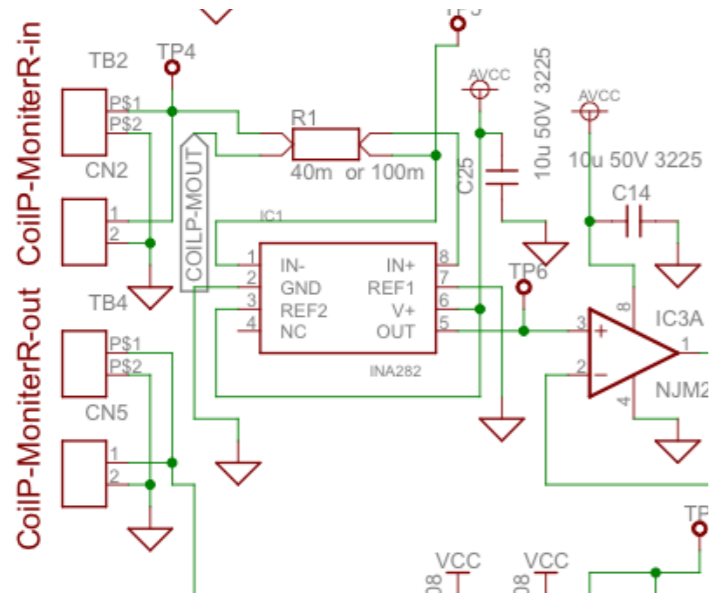
OSEM Input is divided by resistors R2 and R3.



cause: defective soldering of R3.

Current-Shunt Monitor

Watchdog system
異常検出・安全装置



For Low Power
R1:100mΩ

INA283 G:200

For High Power

R1:40mΩ

R1:100mΩ

INA282 G:50



Design datas

Watchdog system 異常検出・安全装置

Current-Shunt Monitor



INA282, INA283
INA284, INA285
INA286

www.ti.com

SBOS485B – NOVEMBER 2009 – REVISED SEPTEMBER 2012

High-Accuracy, Wide Common-Mode Range, Bi-Directional CURRENT SHUNT MONITOR Zero-Drift Series

Check for Samples: [INA282](#), [INA283](#), [INA284](#), [INA285](#), [INA286](#)

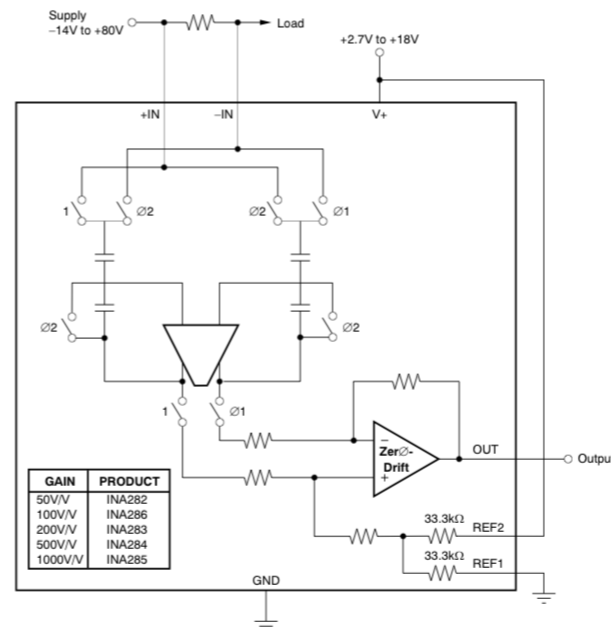
FEATURES

- **WIDE COMMON-MODE RANGE: -14V to 80V**
- **OFFSET VOLTAGE: ±20µV**
- **CMRR: 140dB**
- **ACCURACY:**
 - ±1.4% Gain Error (Max)
 - 0.3µV/°C Offset Drift
 - 0.005%/°C Gain Drift (Max)
- **AVAILABLE GAINS:**
 - 50V/V: INA282
 - 100V/V: INA286
 - 200V/V: INA283
 - 500V/V: INA284
 - 1000V/V: INA285
- **QUIESCENT CURRENT: 900µA (Max)**

DESCRIPTION

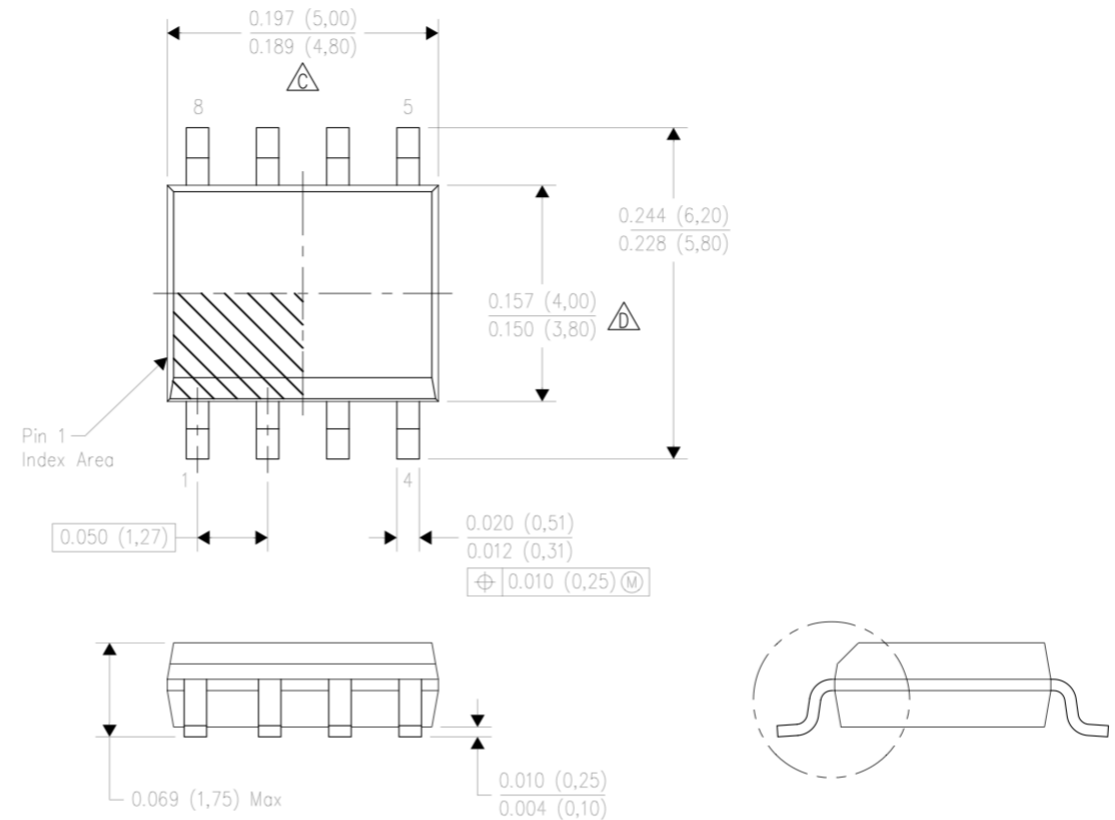
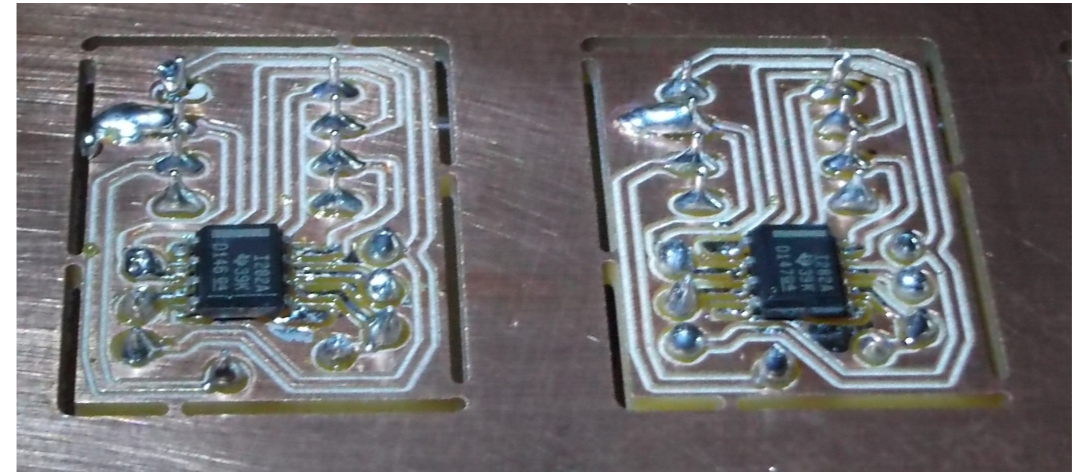
The INA282 family, which includes the INA282, INA283, INA284, INA285, and INA286 devices, are voltage output current shunt monitors that can sense drops across shunts at common-mode voltages from -14V to +80V, independent of the supply voltage. The low offset of the Zero-Drift architecture enables current sensing with maximum drops across the shunt as low as 10mV full-scale.

These current shunt monitors operate from a single +2.7V to +18V supply, drawing a maximum of 900µA of supply current. They are specified over the extended operating temperature range of -40°C to +125°C, and offered in an SOIC-8 package.



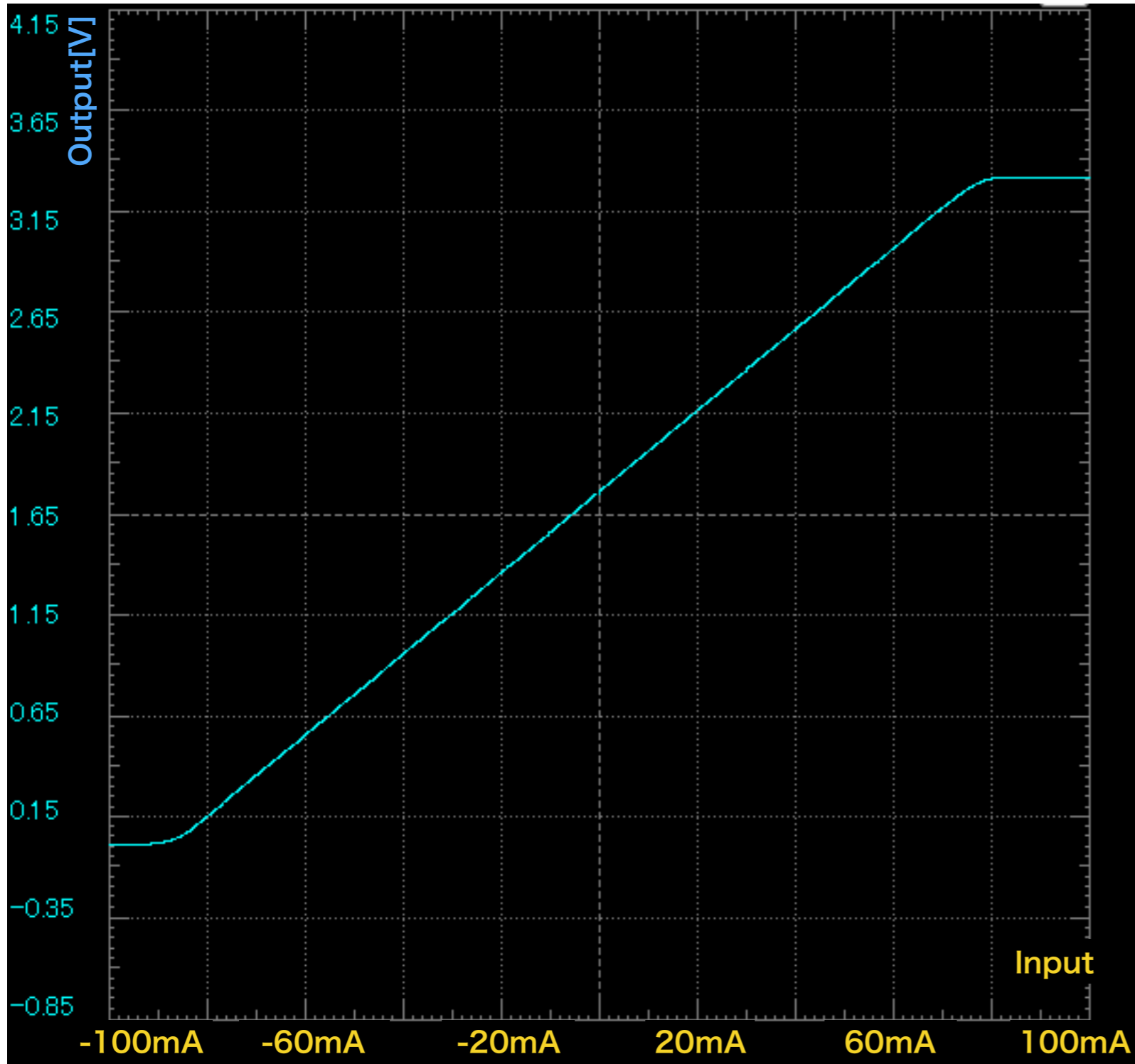
APPLICATIONS

- TELECOM EQUIPMENT
- AUTOMOTIVE
- POWER MANAGEMENT
- SOLAR INVERTERS



Watchdog system
異常検出・安全装置

Current shunt monitor Input-Output
Characteristic



For Low Power

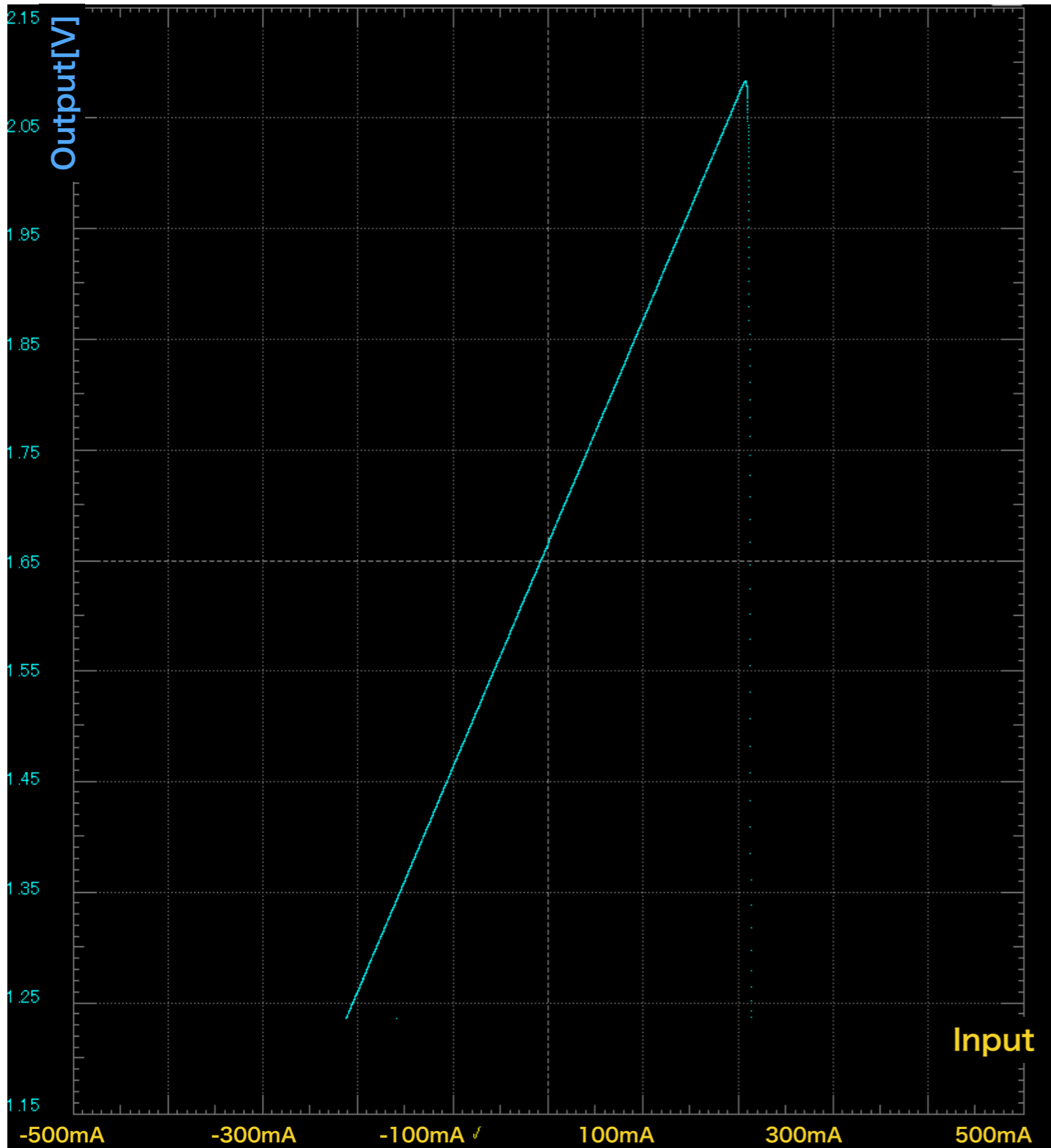
R1:100m Ω

INA283 G:200

0mA \doteq 1.75V

Watchdog system
異常検出・安全装置

Current shunt monitor Input-Output
Characteristic



For High Power

R1:40m Ω

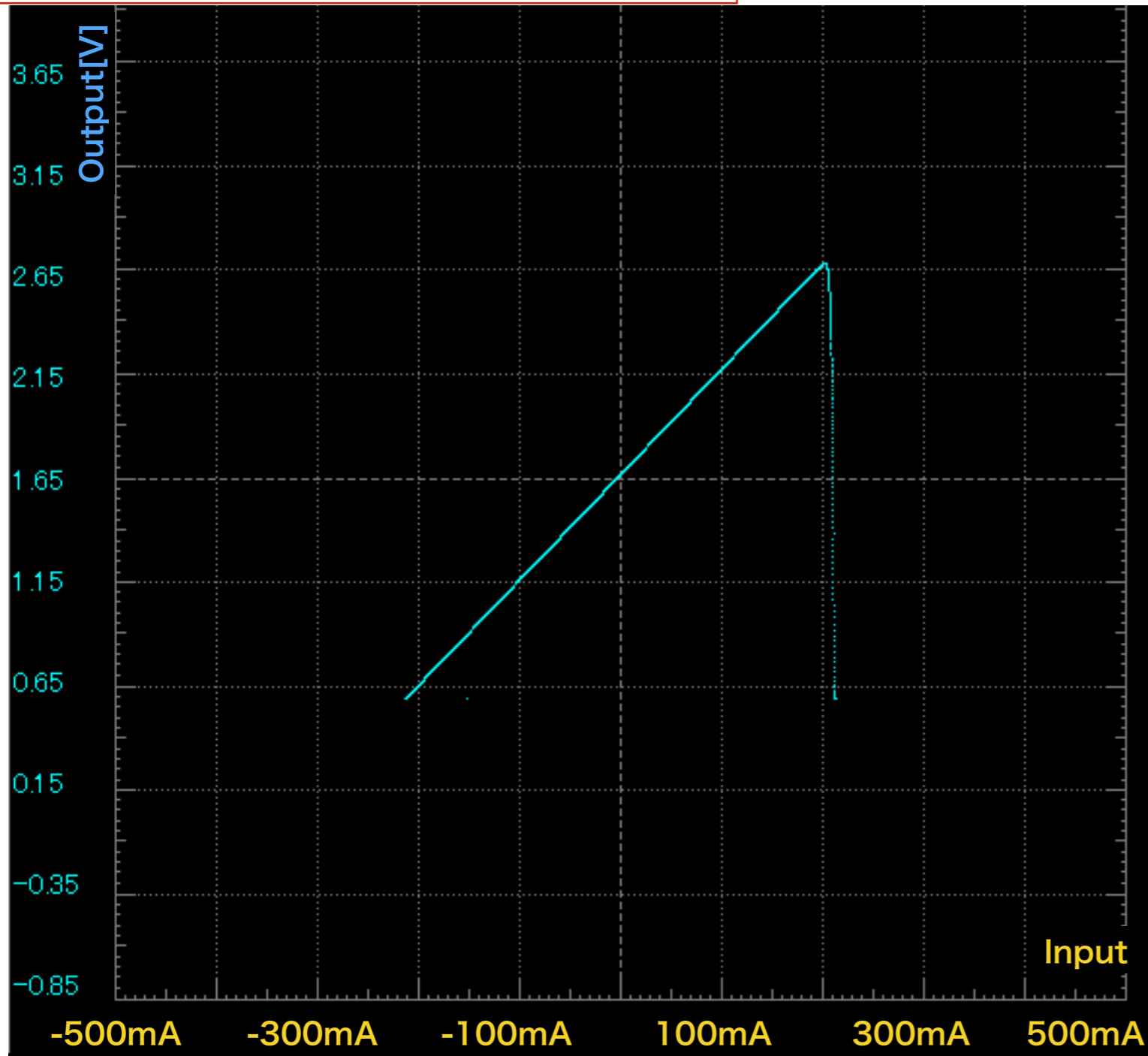
INA282 G:50

0mA \doteq 1.66V

$\pm 200\text{mA} \doteq 1.66\text{V} + 0.43$
 -0.38

Watchdog system
異常検出・安全装置

Current shunt monitor Input-Output
Characteristic



For High Power

R1:100mΩ

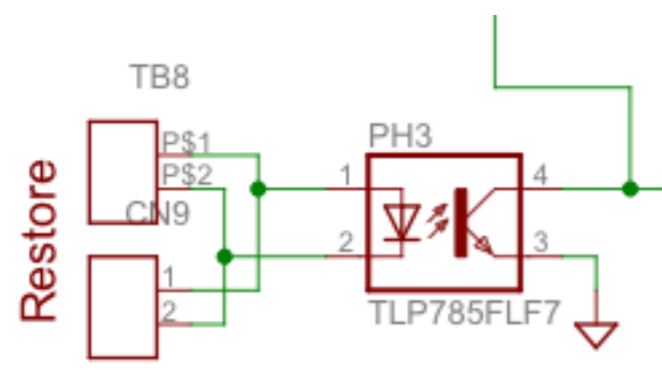
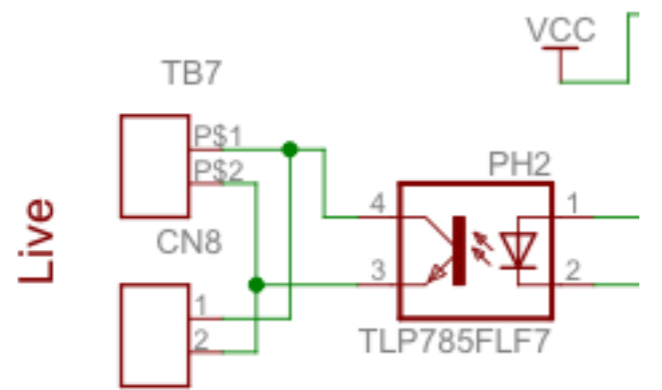
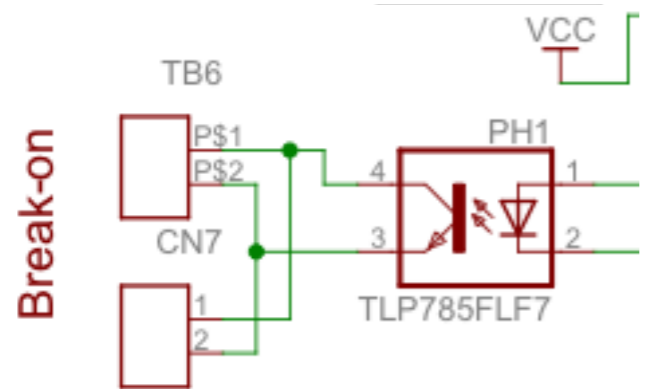
INA282 G:50

0mA ≐ 1.65V

±210mA ≐ 1.65V ± 1.05V

Watchdog system 異常検出・安全装置

Ex I/O(TLP785) data



TOSHIBA

TLP785, TLP785F

Current Transfer Ratio

Type	Classification (Note 1)	Current Transfer Ratio (%) (I_C / I_F)		Marking of Classification
		$I_F = 5\text{mA}, V_{CE} = 5\text{V}, T_a = 25^\circ\text{C}$		
		Min	Max	
TLP785	None	50	600	Blank
	Rank Y	50	150	YE
	Rank GR	100	300	GR
	Rank BL	200	600	BL
	Rank GB	100	600	GB
	Rank YH	75	150	Y+
	Rank GRL	100	200	G
	Rank GRH	150	300	G+
	Rank BLL	200	400	B

(Note 1): Ex. rank GB: TLP785 (GB)

(Note 2): Application type name for certification test, please use standard product type name, i. e. TLP785 (GB): TLP785

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

	Characteristic	Symbol	Rating	Unit
LED	Forward current	I_F	60	mA
	Forward current derating ($T_a \geq 39^\circ\text{C}$)	$\Delta I_F / ^\circ\text{C}$	-0.7	mA / $^\circ\text{C}$
	Pulse forward current (Note 3)	I_{FP}	1	A
	Power dissipation	P_D	90	mW
	Power dissipation derating	$\Delta P_D / ^\circ\text{C}$	-0.9	mW / $^\circ\text{C}$
	Reverse voltage	V_R	5	V
	Junction temperature	T_j	125	$^\circ\text{C}$
Detector	Collector-emitter voltage	V_{CEO}	80	V
	Emitter-collector voltage	V_{ECO}	7	V
	Collector current	I_C	50	mA
	Power dissipation (single circuit)	P_C	150	mW
	Power dissipation derating ($T_a \geq 25^\circ\text{C}$)	$\Delta P_C / ^\circ\text{C}$	-1.5	mW / $^\circ\text{C}$
Junction temperature	T_j	125	$^\circ\text{C}$	

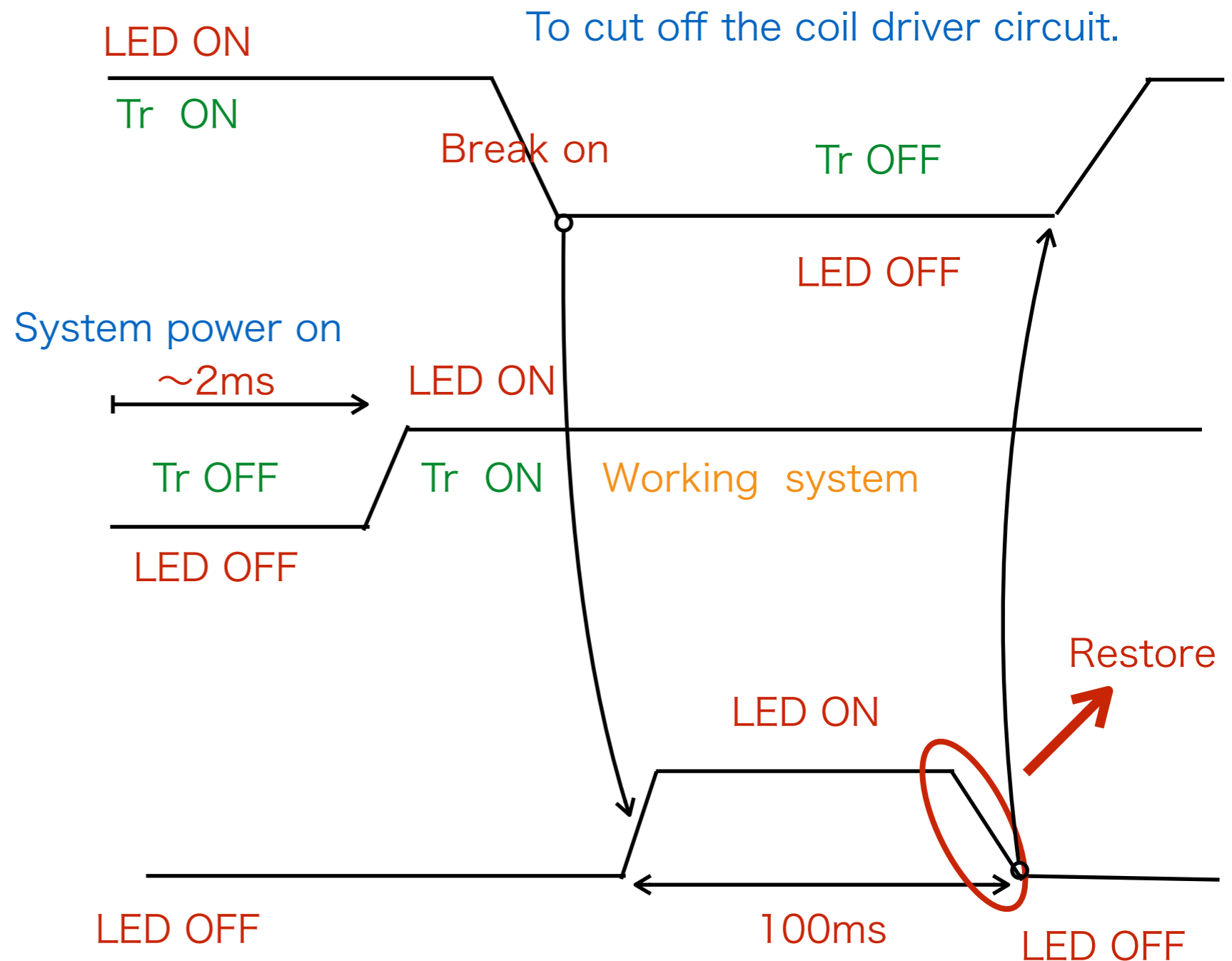
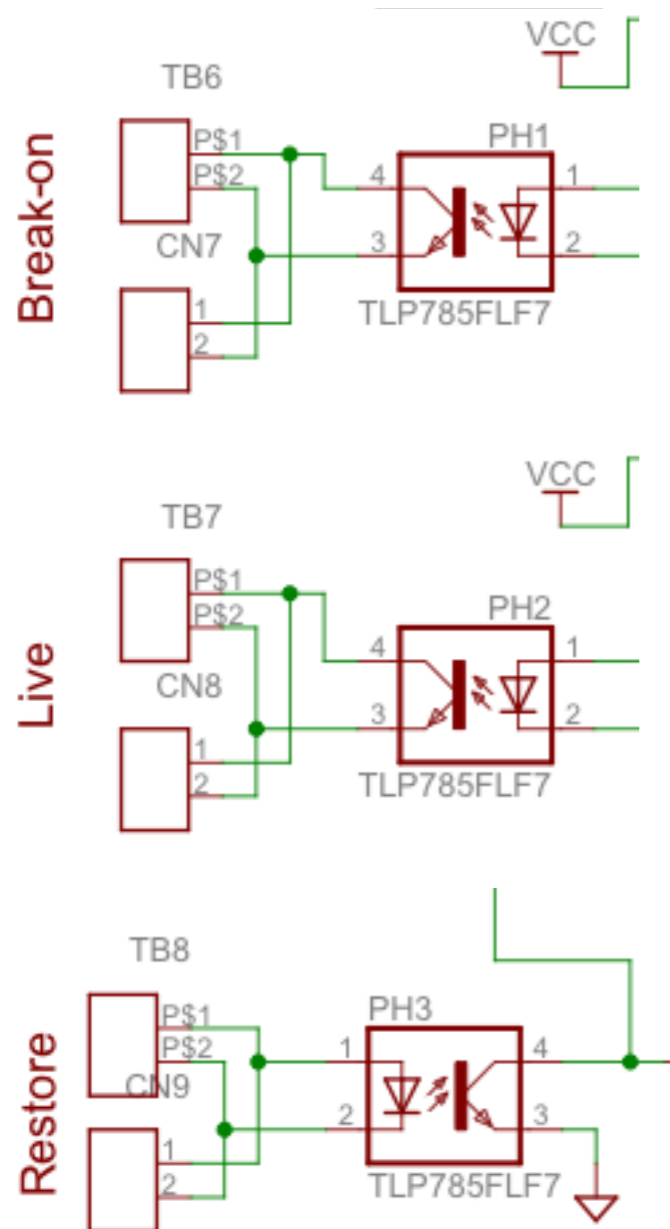
Recommended Operating Conditions (Note)

Characteristic	Symbol	Min	Typ.	Max	Unit
Supply voltage	V_{CC}	—	5	24	V
Forward current	I_F	—	16	25	mA
Collector current	I_C	—	1	10	mA
Operating temperature	T_{opr}	-25	—	85	$^\circ\text{C}$

(Note): Recommended operating conditions are given as a design guideline to obtain expected performance of the device. Additionally, each item is an independent guideline respectively. In developing designs using this product, please confirm specified characteristics shown in this document.

Watchdog system
異常検出・安全装置

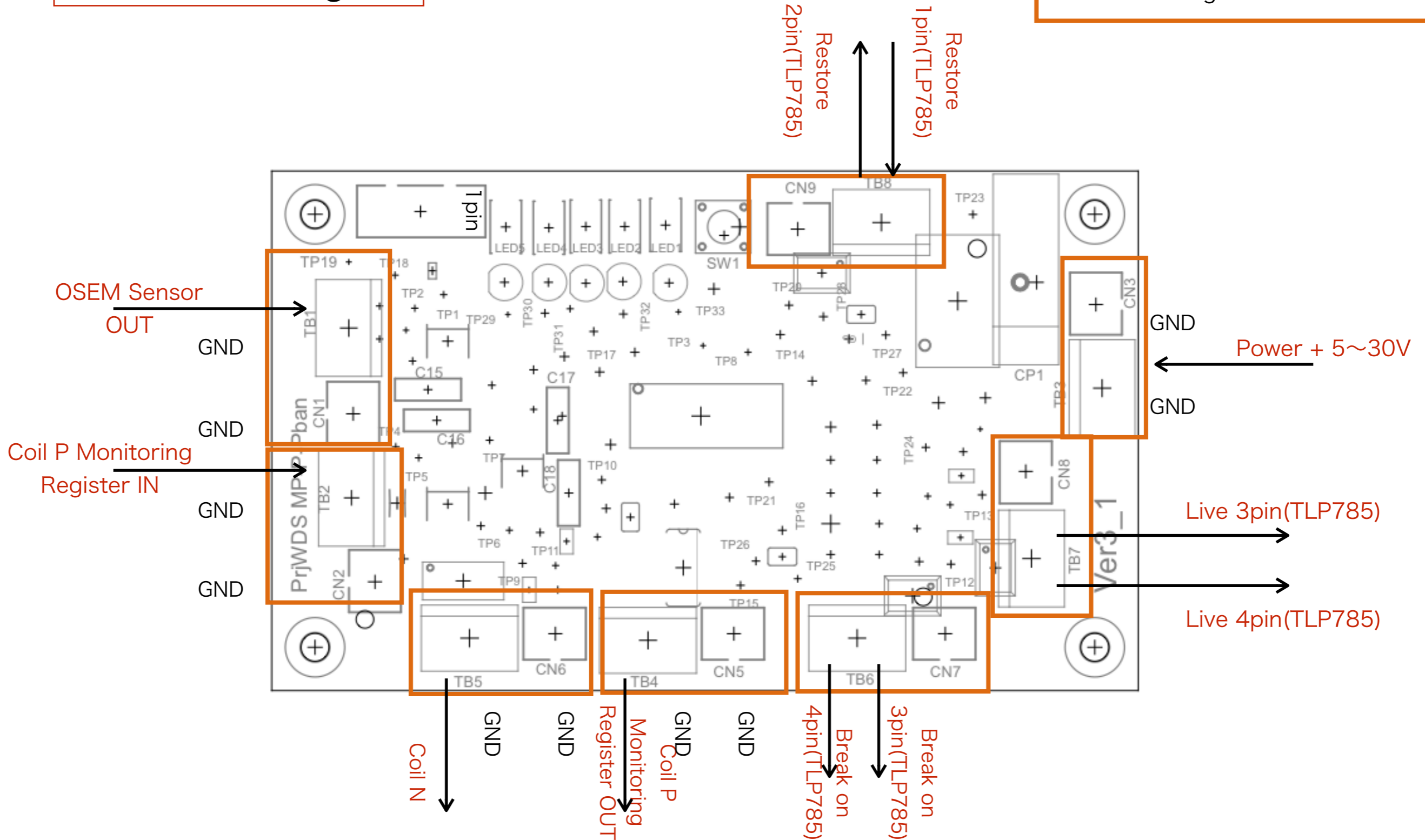
Ex I/O timing chart



Watchdog system 異常検出・安全装置

connection diagram

Terminal arrangement is the same.



Watchdog system
異常検出・安全装置

InterMPU WDT implementation

For Test

Int4

In fact S/W

Interrupted handler

Interrupt

ClearEventWDS();

Main

Configuration
FWDTEN = on//WDT enable
WDTPS = PS65536 //WDT Postscale

ReadEventWDS();
DisableWDS();
ClearEventWDS();
....

Configuration
FWDTEN = on//WDT enable
WDTPS = PS512 //WDT Postscale

H/W
Manual Push or
Ex Input(TLP765)

EnableWDS();

While(1){
...
}

While(1){
...
ClearEventWDS();
}