

Production Discontinuation of CC-Link Remote I/O Station Communication LSIs

■Date of Issue

July 2020

■Relevant Models

A6GA-CCMFP2NN60F, A6GA-CCMFP2NN300F, A6GA-CCMFP2ANN60F, and A6GA-CCMFP2ANN300F

Thank you for your continued support of Mitsubishi Electric programmable controllers.

Production of the CC-Link remote I/O station communication LSIs, A6GA-CCMFP2NN60F, A6GA-CCMFP2NN300F, A6GA-CCMFP2ANN60F, and A6GA-CCMFP2ANN300F, is to be discontinued.

1 MODELS TO BE DISCONTINUED

Product	Model	Packaging unit
CC-Link remote I/O station communication LSI MFP2N (PC03002N)	A6GA-CCMFP2NN60F	60 pieces
	A6GA-CCMFP2NN300F	300 pieces
CC-Link remote I/O station communication LSI MFP2AN (PC97007N)	A6GA-CCMFP2ANN60F	60 pieces
	A6GA-CCMFP2ANN300F	300 pieces

2 SCHEDULE

Order acceptance: Until December 23, 2022

Production discontinuation: March 31, 2023

3 REASON FOR DISCONTINUATION

This product is to be discontinued due to closure of the production line.

4 REPAIR SUPPORT

Repair support period: Until March 29, 2030 (for seven years after the discontinuation of production)

An alternative model is to be returned after examination.

5 ALTERNATIVE MODELS

Product	Model	Packaging unit
CC-Link remote I/O station communication LSI MFP2N (PC18005E)	A6GA-CCMFP2NN60FN	60 pieces
	A6GA-CCMFP2NN300FN	300 pieces
CC-Link remote I/O station communication LSI MFP2AN (PC18006E)	A6GA-CCMFP2ANN60FN	60 pieces
	A6GA-CCMFP2ANN300FN	300 pieces

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6 COMPARISON OF SPECIFICATIONS

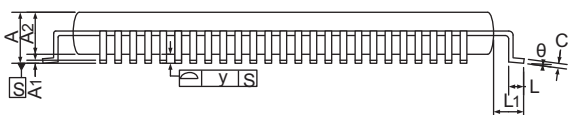
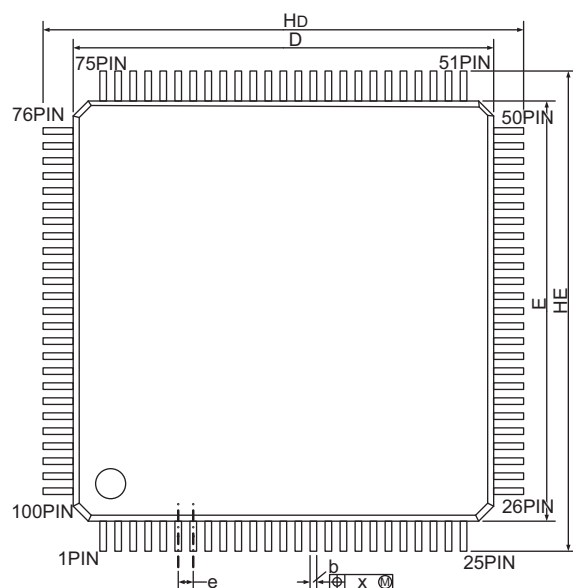
Alternative models differ from discontinued models in terms of specifications such as electrical characteristics.

In addition, the crystal oscillator specified for alternative models differs from the crystal oscillator specified for discontinued models. When replacing the product, refer to the comparison of specifications in this chapter.

6.1 Appearance and Print

External dimensions

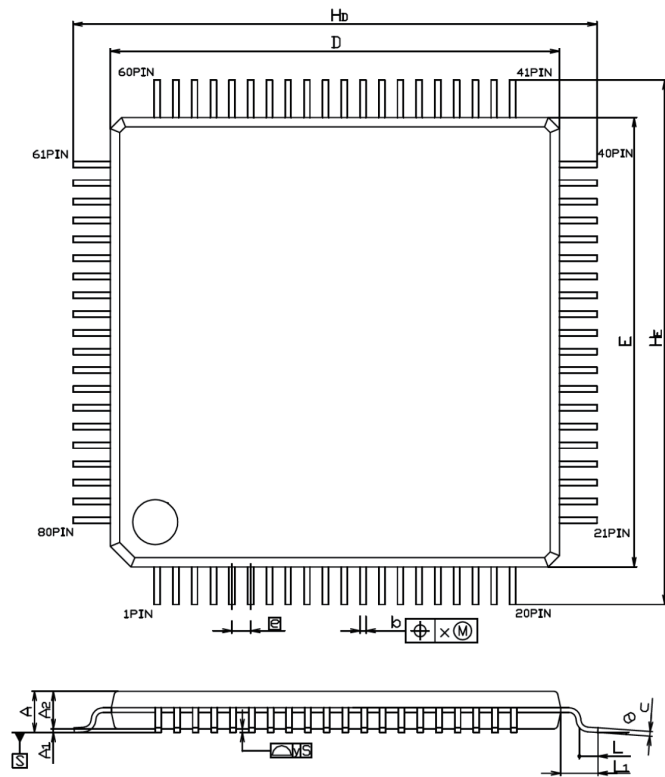
MFP2N



Symbol	PC03002N			PC18005E			Unit
	Min.	Normal	Max.	Min.	Normal	Max.	
E	13.8	14.0	14.2	13.9	14.0	14.1	mm
D	13.8	14.0	14.2	13.9	14.0	14.1	mm
A	—	—	1.6	—	—	1.7	mm
A ₁	0.05	0.1	0.15	0	0.1	0.2	mm
A ₂	1.35	1.4	1.45	1.3	1.4	1.5	mm
e	—	0.5	—	—	0.5	—	mm
b	0.18	0.22	0.27	0.17	0.22	0.27	mm
C	0.1	0.17	0.2	0.09	0.15	0.2	mm
θ	0	3	10	0	5	10	°
L	0.3	0.5	0.7	0.3	0.50	0.75	mm
L ₁	0.8	1.0	1.2	0.8	1.0	1.2	mm
H _E	15.8	16.0	16.2	15.6	16.0	16.4	mm
H _D	15.8	16.0	16.2	15.6	16.0	16.4	mm
x	—	—	0.08	—	—	0.08	mm
y	—	—	0.08	—	—	0.08	mm

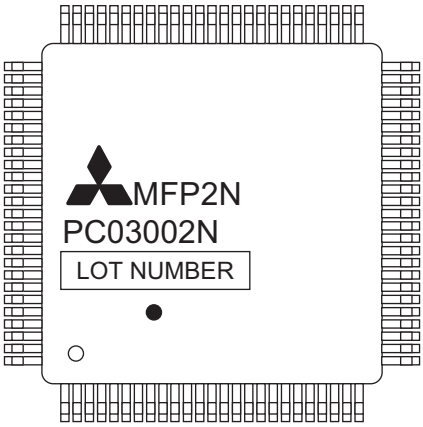
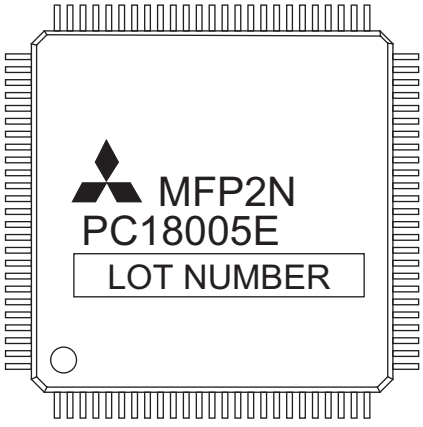
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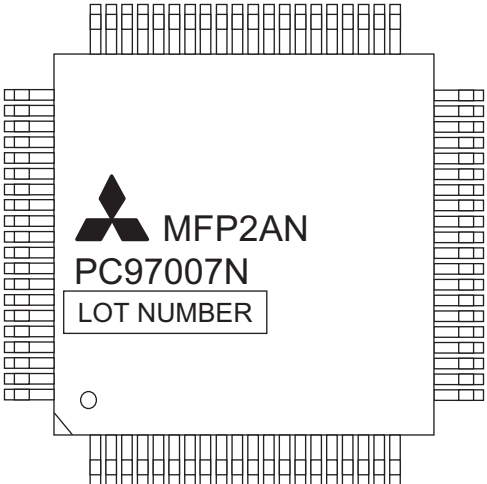
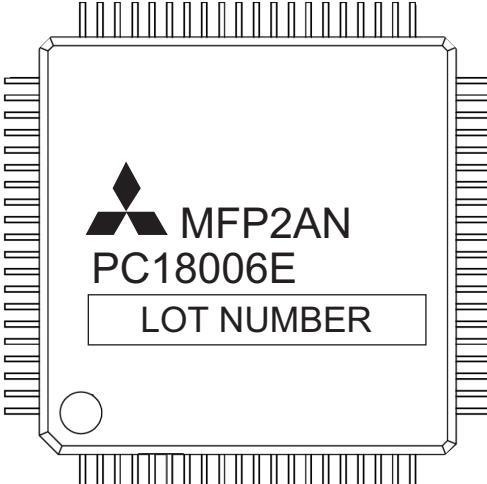
MFP2AN



Symbol	PC97007N			PC18006E			Unit
	Min.	Normal	Max.	Min.	Normal	Max.	
E	11.80	12.00	12.20	11.90	12.00	12.10	mm
D	11.80	12.00	12.20	11.90	12.00	12.10	mm
A	1.00	1.10	1.20	—	—	1.20	mm
A ₁	0.05	0.10	0.15	0.00	0.10	0.20	mm
A ₂	—	—	1.00	0.90	1.00	1.10	mm
e	—	0.50	—	—	0.50	—	mm
b	0.17	0.22	0.27	0.17	0.22	0.27	mm
C	0.10	0.17	0.20	0.09	0.15	0.20	mm
θ	0	3	7	0	3	8	°
L	—	0.50	—	0.30	0.50	0.75	mm
L ₁	0.80	1.00	1.20	0.80	1.00	1.20	mm
H _E	13.80	14.00	14.20	13.60	14.00	14.40	mm
H _D	13.80	14.00	14.20	13.60	14.00	14.40	mm
x	—	—	0.08	—	—	0.08	mm
y	—	—	0.08	—	—	0.08	mm

Print specifications

MFP2N	
PC03002N	PC18005E
 <p>●: Lead-free/RoHS directive compliant identification dot mark</p>	 <p>The product is compliant with lead-free specifications, so the lead-free/RoHS directive compliant identification dot mark is not indicated.</p>

MFP2AN	
PC97007N	PC18006E
 <p>●: Lead-free/RoHS directive compliant identification dot mark</p>	 <p>The product is compliant with lead-free specifications, so the lead-free/RoHS directive compliant identification dot mark is not indicated.</p>

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6.2 Electrical Characteristics

Buffer type list

MFP2N

I/O	Buffer type	PC03002N	PC18005E
I/O	Low Noise Schmitt I/O Buffer (CMOS in: CMOS 3-state out: $I_{OL} = 18\text{mA}$)	BF15W	BH3BT_SP1
I	Input Buffer (CMOS Level in)	FI01	IBC_SP1
I	Input Buffer (TTL Level in)	FI02	IBT_SP1
I	Input Buffer (CMOS-Schmitt in)	FIS1W	IBH_SP1
I	Input Buffer (TTL Schmitt in)	FIS2W	IBS_SP1
I	Input Buffer (CMOS Level in) with Pull-Up Resistor $5\text{k}\Omega$	FIW1	IBCP3_SP1
I	Input Buffer (CMOS-Schmitt in) with Pull-Up Resistor $5\text{k}\Omega$	FWS1W	IBHP3_SP1
O	Nch Open Drain Output Buffer ($I_{OL} = 18\text{mA}$)	EXT5	OD3T_SP1
O	Output Buffer (CMOS Level out: $I_{OL} = 12\text{mA}$)	FO02	OB3BT_SP1
O	Output Buffer (CMOS Level out: $I_{OL} = 6\text{mA}$)	FO04	OB1BT_SP1
O	Output Buffer (CMOS Level out: $I_{OL} = 3\text{mA}$)	FO09	OB1T

MFP2AN

I/O	Buffer type	PC97007N	PC18006E
I/O	I/O Buffer (CMOS Schmitt in: CMOS 3-state out: $I_{OL} = 24\text{mA}$) (Low Noise)	OB32	BH4BT_SP2
I	Input Buffer (CMOS in)	FI01	IBC_SP1
I	Input Buffer (CMOS in) with Pull-Up Resistor $5\text{k}\Omega$	FIW1	IBCP3_SP1
I	Input Buffer (CMOS Schmitt in)	OFI7	IBH_SP1
I	Input Buffer (TTL Schmitt in)	FIS2	IBS_SP1
I	Input Buffer (TTL in)	FI02	IBT_SP1
I	Input Buffer (CMOS Schmitt in) with Pull-Up Resistor $5\text{k}\Omega$	FWS1	IBHP3_SP2
O	Output Buffer (CMOS out: $I_{OL} = 4\text{mA}$)	FO01	OB1T_SP2
O	Output Buffer (CMOS out: $I_{OL} = 12\text{mA}$)	FO03	OB3BT_SP1
O	Output Buffer (Nch open drain) ($I_{OL} = 18\text{mA}$)	EXT5	OD3T_SP1
O	Output Buffer (CMOS out: $I_{OL} = 8\text{mA}$)	FO02	OB2T_SP2

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Comparison of the absolute maximum rated values

MFP2N

Item	PC03002N				PC18005E			Unit
	Symbol	Rated value		Symbol	Rated value			
		Min.	Max.		Min.	Max.		
Power supply voltage	V _{DD}	-0.5	6.0	V _{DD}	-0.5	7.0	V	
Input voltage	V _I	-0.5	V _{DD} + 0.5	V _I	-0.5	V _{DD} + 0.5	V	
Output voltage	V _O	-0.5	V _{DD} + 0.5	V _O	-0.5	V _{DD} + 0.5	V	
Output current	I _{OL} = 3mA type	I _{OUT}	—	±10	I _{OUT}	—	±30	mA
	I _{OL} = 6mA type		—	±15				mA
	I _{OL} = 12mA type		—	±30				mA
	I _{OL} = 18mA type		—	±40		—	±40	mA
Storage temperature	T _{stg}	-65	150	T _{stg}	-65	150	°C	

MFP2AN

Item	PC97007N				PC18006E			Unit
	Symbol	Rated value		Symbol	Rated value			
		Min.	Max.		Min.	Max.		
Power supply voltage	V _{DD}	-0.5	6.5	V _{DD}	-0.5	7.0	V	
Input voltage	V _I	-0.5	V _{DD} + 0.5	V _I	-0.5	V _{DD} + 0.5	V	
Output voltage	V _O	-0.5	V _{DD} + 0.5	V _O	-0.5	V _{DD} + 0.5	V	
Output current	I _{OL} = 4mA type	I _{OUT}	—	±12	I _{OUT}	—	±30	mA
	I _{OL} = 8mA type		—	±24				mA
	I _{OL} = 12mA type		—	±36				mA
	I _{OL} = 18mA type (Used only for N-Ch Open Drain)		—	±36		—	±40	mA
	I _{OL} = 24mA type		—	±48		—	±50	mA
Storage temperature	T _{stg}	-65	150	T _{stg}	-65	150	°C	

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Comparison of the recommended operating conditions

MFP2N

Item		PC03002N				PC18005E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Power supply voltage		V_{DD}	4.5	5.0	5.5	V_{DD}	4.5	5.0	5.5	V
Ambient temperature		T_A	-40	—	85	T_A	-40	—	110	°C
Input rising time	Schmitt	t_{r1}	0	—	10	t_{r1}	0	—	10	ms
	Normal	t_{r2}	0	—	200	t_{r2}	0	—	200	ns
Input falling time	Schmitt	t_{f1}	0	—	10	t_{f1}	0	—	10	ms
	Normal	t_{f2}	0	—	200	t_{f2}	0	—	200	ns

MFP2AN

Item		PC97007N				PC18006E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Power supply voltage		V_{DD}	4.5	5.0	5.5	V_{DD}	4.5	5.0	5.5	V
Ambient temperature		T_A	-40	—	85	T_A	-40	—	110	°C
Input rising time	Schmitt	t_{r1}	0	—	10	t_{r1}	0	—	10	ms
	Normal	t_{r2}	0	—	200	t_{r2}	0	—	200	ns
Input falling time	Schmitt	t_{f1}	0	—	10	t_{f1}	0	—	10	ms
	Normal	t_{f2}	0	—	200	t_{f2}	0	—	200	ns

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Comparison of the electrical characteristics

MFP2N

Item		PC03002N				PC18005E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
"H" input voltage	CMOS	V_{IH1}	$0.7V_{DD}$	—	V_{DD}	V_{IH1}	3.5	—	$V_{DD} + 0.3$	V
	TTL	V_{IH2}	2.29	—	V_{DD}	V_{IH2}	2.29	—	V_{DD}	V
"L" input voltage	CMOS	V_{IL1}	0	—	$0.3V_{DD}$	V_{IL1}	0	—	1.65	V
	TTL	V_{IL2}	0	—	0.77	V_{IL2}	0	—	0.77	V
Positive trigger voltage	CMOS	V_{T1+}	2.85	—	3.75	V_{T1+}	2.55	—	3.75	V
	TTL	V_{T2+}	1.68	—	2.55	V_{T2+}	1.38	—	2.55	V
Negative trigger voltage	CMOS	V_{T1-}	1.15	—	1.75	V_{T1-}	1.15	—	2.05	V
	TTL	V_{T2-}	0.64	—	1.33	V_{T2-}	0.64	—	1.33	V
Hysteresis voltage	CMOS	ΔV	1.3	—	2.07	ΔV	1.1	—	—	V
	TTL	V_{H2}	0.83	—	1.44	V_{H2}	0.64	—	—	V
Static supply current ($T_A = -40$ to 85°C)		I_{DDs}	—	—	100	I_{DDs}	—	—	100	μA
Off-state output current		I_{OZ}	-10	—	10	I_{OZ}	-5	—	5	μA
Leakage current of the input ($V_I = V_{DD}$ or GND)		I_I	-10	$\pm 10^{-5}$	10	I_I	-5	—	5	μA
Pull-up resistance 50k Ω		R_{PU}	17.2	38.2	100	R_{PU}	15	38	100	k Ω
Pull-up resistance 5k Ω			2.5	5.0	12.9		2.5	5.0	12.9	k Ω
"L" output current	$I_{OL} = 3\text{mA}$ type	I_{OL}	3.0	—	—	I_{OL}	3.0	—	—	mA
	$I_{OL} = 6\text{mA}$ type		6.0	—	—		6.0	—	—	mA
	$I_{OL} = 12\text{mA}$ type		12.0	—	—		12.0	—	—	mA
	$I_{OL} = 18\text{mA}$ type		18.0	—	—		18.0	—	—	mA
"H" output current	$I_{OH} = 3\text{mA}$ type	I_{OH}	-3.0	—	—	I_{OH}	-3.0	—	—	mA
	$I_{OH} = 6\text{mA}$ type		-6.0	—	—		-6.0	—	—	mA
	$I_{OH} = 12\text{mA}$ type		-12.0	—	—		-12.0	—	—	mA
	$I_{OH} = 18\text{mA}$ type		-18.0	—	—		-18.0	—	—	mA
"L" output current (I_{OL} = current value of each specifications)		V_{OL}	—	—	0.4	V_{OL}	—	—	0.4	V
"H" output current (I_{OH} = current value of each specifications)		V_{OH}	$V_{DD} - 0.4$	—	—	V_{OH}	$V_{DD} - 0.4$	—	—	V

MFP2AN

Item		PC97007N				PC18006E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
"H" input voltage	CMOS	V _{IH1}	0.7V _{DD}	—	V _{DD}	V _{IH1}	3.5	—	V _{DD} + 0.3	V
	TTL	V _{IH2}	2.2	—	V _{DD}	V _{IH2}	2.29	—	V _{DD}	V
"L" input voltage	CMOS	V _{IL1}	0	—	0.3V _{DD}	V _{IL1}	0	—	1.65	V
	TTL	V _{IL2}	0	—	0.8	V _{IL2}	0	—	0.77	V
CMOS Schmitt trigger (I/O)	Positive trigger voltage	V _{T1+}	2.3	—	4.05	V _{T1+}	2.3	—	4.05	V
	Negative trigger voltage	V _{T1-}	0.9	—	1.92	V _{T1-}	0.9	—	1.92	V
	Hysteresis voltage	ΔV	1.1	—	2.35	ΔV	1.1	—	—	V
CMOS Schmitt trigger (FUSEL)	Positive trigger voltage	V _{T1+}	2.3	—	4.05	V _{T1+}	2.55	—	3.75	V
	Negative trigger voltage	V _{T1-}	0.9	—	1.92	V _{T1-}	1.15	—	2.05	V
	Hysteresis voltage	ΔV	1.1	—	2.35	ΔV	1.1	—	—	V
CMOS Schmitt trigger (RST)	Positive trigger voltage	V _{T1+}	1.8	—	4	V _{T1+}	1.8	—	4	V
	Negative trigger voltage	V _{T1-}	0.6	—	3.1	V _{T1-}	0.6	—	3.1	V
	Hysteresis voltage	ΔV	0.3	—	1.5	ΔV	0.3	—	—	V
TTL Schmitt trigger	Positive trigger voltage	V _{T2+}	1.2	—	2.4	V _{T2+}	1.38	—	2.55	V
	Negative trigger voltage	V _{T2-}	0.6	—	1.8	V _{T2-}	0.64	—	1.33	V
	Hysteresis voltage	V _{H2}	0.3	—	1.5	V _{H2}	0.64	—	—	V
Input leak current		I _{L1}	-10	10 ⁻⁵	10	I _{L1}	-5	—	5	μA
Off-state output current		I _{OZ}	-10	—	10	I _{OZ}	-5	—	5	μA
Pull-up resistance 50kΩ		R _{PU}	25	50	100	R _{PU}	15	38	100	kΩ
Pull-up resistance 5kΩ			2.5	5.0	10		2.5	5.0	12.9	kΩ
"L" output current	I _{OL} = 4mA type	I _{OL}	4.0	—	—	I _{OL}	4.0	—	—	mA
	I _{OL} = 8mA type		8.0	—	—		8.0	—	—	mA
	I _{OL} = 12mA type		12.0	—	—		12.0	—	—	mA
	I _{OL} = 18mA type (Used only for N-Ch Open Drain)		18.0 (V _{OL} = 0.6V)	—	—		18.0	—	—	mA
	I _{OL} = 24mA type		24.0	—	—		24.0	—	—	mA
"H" output current	I _{OH} = 4mA type	I _{OH}	-2.0	—	—	I _{OH}	-2.0	—	—	mA
	I _{OH} = 8mA type		-4.0	—	—		-4.0	—	—	mA
	I _{OH} = 12mA type		-6.0	—	—		-12.0	—	—	mA
	I _{OH} = 24mA type		-12.0	—	—		-12.0	—	—	mA
"L" output current (I _{OL} = current value of each specifications)		V _{OL}	—	—	0.4	V _{OL}	—	—	0.4	V
"H" output current (I _{OH} = current value of each specifications)		V _{OH}	V _{DD} - 0.4	—	—	V _{OH}	V _{DD} - 0.4	—	—	V

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Comparison of the AC characteristics

MFP2N

PC03002N ($T_A = -40$ to $+85^\circ\text{C}$, $V_{DD} = 5V \pm 10\%$), PC18005E ($T_A = 25^\circ\text{C}$, $V_{DD} = 5V$)

Item	Condition	PC03002N				PC18005E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Output rising time	$C_L = 15\text{pF}$	t_r	—	1.23	—	t_r	—	2.5	—	ns
Output falling time		t_f	—	1.62	—	t_f	—	2.5	—	ns

MFP2AN

PC97007N ($T_A = -40$ to $+85^\circ\text{C}$, $V_{DD} = 5V \pm 10\%$), PC18006E ($T_A = 25^\circ\text{C}$, $V_{DD} = 5V$)

Item	Condition	PC97007N				PC18006E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Output rising time	$C_L = 15\text{pF}$	t_r	—	3.6	—	t_r	—	2.5	—	ns
Output falling time		t_f	—	2.7	—	t_f	—	2.5	—	ns

Comparison of the I/O capacity characteristics

MFP2N

($T_A = +25^\circ\text{C}$, $V_{DD} = 0V$)

Item	Condition	PC03002N				PC18005E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Input capacity	$f = 1\text{MHz}$, $V_{DD} = 0V$	C_I	—	10	20	C_I	—	—	10	pF
Output capacity		C_O	—	10	20	C_O	—	—	10	pF
I/O capacity		C_{IO}	—	10	20	C_{IO}	—	—	10	pF

MFP2AN

($T_A = +25^\circ\text{C}$, $V_{DD} = 0V$)

Item	Condition	PC97007N				PC18006E				Unit
		Symbol	Rated value			Symbol	Rated value			
			Min.	TYP	Max.		Min.	TYP	Max.	
Input capacity	$f = 1\text{MHz}$, $V_{DD} = 0V$	C_I	—	10	20	C_I	—	—	10	pF
Output capacity		C_O	—	10	20	C_O	—	—	10	pF
I/O capacity		C_{IO}	—	10	20	C_{IO}	—	—	10	pF

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6.3 Specified Parts (Crystal Oscillation)

MFP2N: PC03002N, MFP2AN: PC97007N		MFP2N: PC18005E, MFP2AN: PC18006E	
Model	Manufacturer	Model	Manufacturer
DSO751SBM 80MHz	Daishinku Corporation www.kds.info	DSO751SBM 80MHz	Daishinku Corporation www.kds.info
DSO751SB 80MHz ^{*1}		DSO321SBN 80MHz	
KC7050B80.0000C5ZBQZ (FXO-37FNB 80MHz) ^{*1}	Kyocera Kinseki Corporation www.kyocera.co.jp	KC7050B80.0000C5ZBRZ	Kyocera Kinseki Corporation www.kyocera.co.jp

*1 Discontinued product

6.4 Precautions for Handling

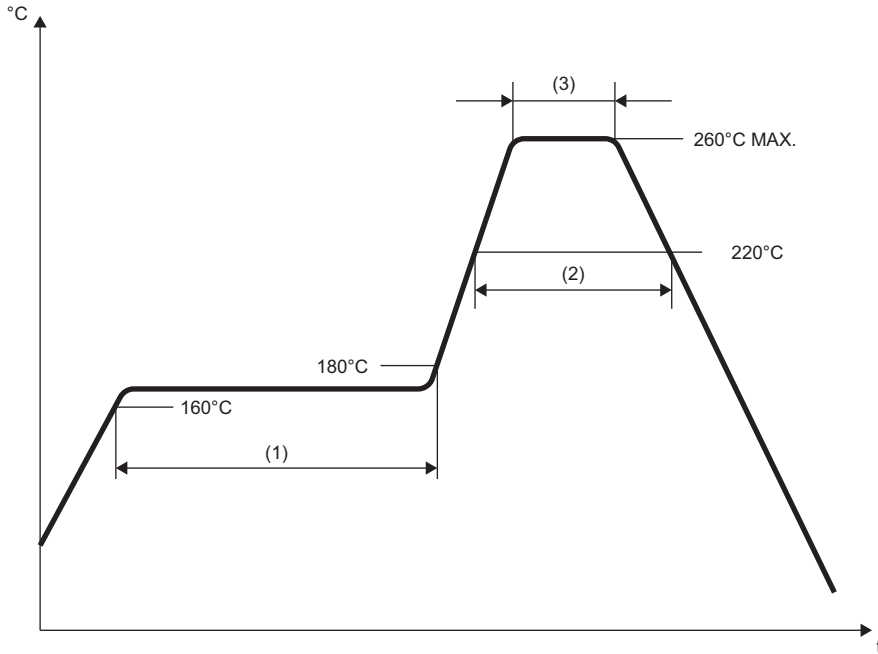
Recommended conditions

Item	MFP2N: PC03002N, MFP2AN: PC97007N	MFP2N: PC18005E, MFP2AN: PC18006E
After unpacked	Within 7 days	Within 7 days
Baking	10 to 72h at 125°C	20 to 36h at 125°C
Maximum temperature (surface temperature of the product)	260°C or lower	260°C or lower
Preheating time	60 to 120s	60 to 120s
Main heating time	60s or shorter at 220°C	60s or shorter at 220°C
Maximum number of reflows	3 times or less	2 times or less

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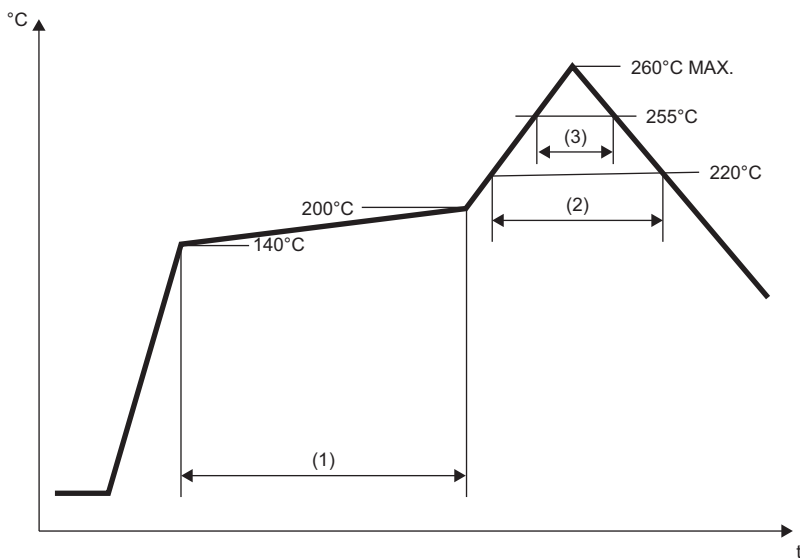
Allowable temperature profile conditions

PC03002N and PC97007N



- °C: Surface temperature of the product
- t: Time
- (1) 60 to 120s (preheating)
- (2) 60s or shorter
- (3) 10s or shorter (main heating)

PC18005E and PC18006E



- °C: Surface temperature of the product
- t: Time
- (1) 60 to 120s (preheating)
- (2) 60s or shorter (main heating)
- (3) 10s or shorter

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REVISIONS

Version	Date of Issue	Revision
A	July 2020	First edition

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