

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC7073

μ PC7073 ANALOG SUBSCRIBER LINE LSI (BS-SLIC)

The μ PC7073 is a BS-SLIC that can be used in analog subscriber circuits such as private branch exchangers (PBXs) and switching equipment for central offices. It features two of the functions required for analog subscriber circuits: subscriber line feed control and subscriber line supervision.

Use of the μ PC7073 in combination with a digital CODEC (μ PD9903) can reduce the number of components required in analog subscriber circuits.

FEATURES

- Single-chip, monolithic LSI (bipolar)
- Constant-resistance feed or semi constant-current feed **Note**
- 200- Ω feed, 400- Ω feed, or Tip-to-Ring pin feedout status (HIGH and WET)
- On-chip metering signal superposing circuit
- On-hook sending and receiving
- Loop detection **Note**
- Ground detection and ground-fault/power contact protection **Note**
- Three on-chip relay drivers (flyback prevention diode must be externally provided)
- Two power supply voltages (-48 V and +5 V)
- Low power consumption: 110 mW (TYP., when on hook)

Note Requires μ PD9903.

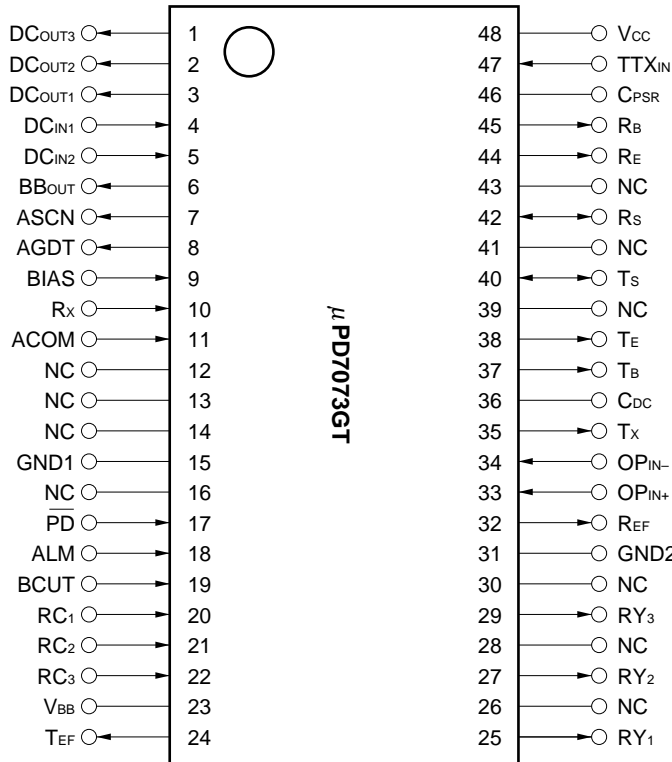
ORDERING INFORMATION

Part Number	Package
μ PC7073GT	48-pin plastic shrink SOP (375 mil)

The information in this document is subject to change without notice.

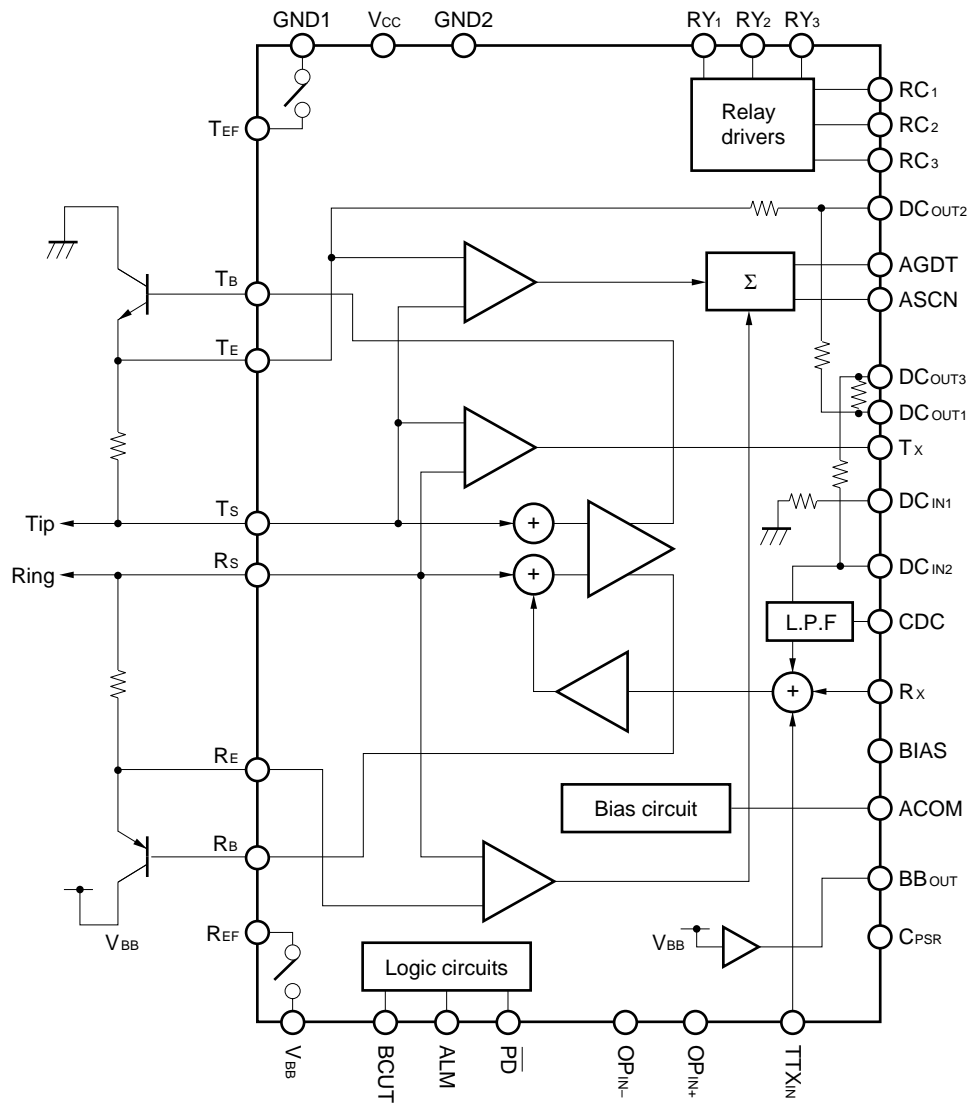
PIN CONFIGURATION

48-pin plastic shrink SOP (375 mil)



- | | | | |
|-----------------|---|---------|---------------------------------|
| ACOM | : ANALOG COMMON VOLTAGE | RB | : RING BASE |
| AGDT | : ANALOG GROUND DETECTION SIGNAL OUT | RC1-RC3 | : RELAY CONTROL IN |
| ALM | : ALARM IN | RE | : RING EMITTER |
| ASCN | : ANALOG LOOP DETECTION SIGNAL OUT | REF | : RING EMITTER PROTECT FEED |
| BBOUT | : V _{BB} VOLTAGE INFORMATION OUT | RS | : RING SENSE |
| BCUT | : BATTERY FEED CUT SIGNAL IN | Rx | : SIGNAL RECEPTION IN |
| BIAS | : BIAS LEVEL | RY1-RY3 | : RELAY DRIVER OUT |
| CDC | : DC FEEDBACK CAPACITOR | TB | : TIP BASE |
| CPSR | : POWER SUPPLY REJECTION CAPACITOR | TE | : TIP EMITTER |
| DCIN1, DCIN2 | : DC FEEDBACK CONTROL IN | TEF | : TIP EMITTER PROJECT FEED |
| DCOUT1-DCOUT3 | : DC FEEDBACK CONTROL OUT | TS | : TIP SENSE |
| GND1, GND2 | : GROUND | TTXIN | : TELETAX SIGNAL IN |
| NC | : NO CONNECTION | Tx | : TRANSSMISSION OUTPUT |
| OPIN+ | : TELETAX SIGNAL CANCEL IN (+) | VBB | : NEGATIVE POWER SUPPLY (-48 V) |
| OPIN- | : TELETAX SINGAL CANCEL IN (-) | VCC | : POSITIVE POWER SUPPLY (+5 V) |
| \overline{PD} | : POWER DOWN CONTROL IN | | |

BLOCK DIAGRAM



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1. PIN FUNCTIONS

Number	Pin Name	I/O	Function
1-3	DC _{OUT1} -DC _{OUT3}	O	DC feedback control output [to the μ PD9903's pin 48-46]
4, 5	DC _{IN1} , DC _{IN2}	I	DC feedback control input [to the μ PD9903's pin 45, 44]
6	BB _{OUT}	O	V _{BB} voltage information output [to the μ PD9903's pin 43]
7	ASCN	O	Tip-Ring difference current detection signal output [to the μ PD9903's pin 42]
8	AGDT	O	Tip-Ring sum current detection signal output [to the μ PD9903's pin 41]
9	BIAS	I	Bias level input. Connect to μ PD9903's A _{IN} pin [to the μ PD9903's pin 40]
10	R _X	I	Receiving input for 4W side [to the μ PD9903's pin 39]
11	ACOM	I	Signal reference voltage (2.4 V TYP) input for 4W side [to the μ PD9903's pin 37, 38]
12-14, 16, 26, 28, 30, 39, 41, 43	NC	–	No-connection pins. Leave these pins unconnected.
15	GND1	–	Ground pin 1, for circuit grounding
17	$\overline{\text{PD}}$	I	Power-down control H: Power-up L: Power-down) TTL level [to the μ PD9903's pin 32]
18	ALM	I	Ground-fault/power line contact protection mode select input H: Protect mode L: Normal feed) TTL level [to the μ PD9903's pin 31]
19	BCUT	I	Feed-out select input H: Feed-out L: Normal feed) TTL level [to the μ PD9903's pin 30]
20	RC ₁	I	Relay control for ringer transmission, high active [to the μ PD9903's pin 29]
21	RC ₂	I	Relay control for line test, high active [to the μ PD9903's pin 28]
22	RC ₃	I	Relay control for network test, high active [to the μ PD9903's pin 27]
23	V _{BB}	–	Negative power supply (–48 V)
24	T _{EF}	O	Feed resistor pin connection for Tip side during ground-fault/power line contact detection
25	RY ₁	O	Relay control for ringer transmission, open collector
27	RY ₂	O	Relay control for line testing, open collector
29	RY ₃	O	Relay control for network testing, open collector
31	GND2	–	Ground pin 2, relay driver
32	R _{EF}	O	Ring feed resistor pin connection for ground-fault/power line contact detection
33	OP _{IN+}	I	TTX (Teletax) signal cancel circuit input pin (+)
34	OP _{IN-}	I	TTX signal cancel circuit input pin (–)
35	T _X	O	Transmission output for 4W side. Connect with BIAS pin via C _{AC} capacitor.
36	C _{DC}	–	Connect to DC feedback capacitor Connect C _{DC} capacitor to this pin
37	T _B	O	Tip-side auxiliary power transistor base connection pin
38	T _E	O	Tip-side feed amplifier output pin. Connect with T _S pin via R _{FT} resistor.
40	T _S	I/O	Tip pin for 2W side
42	R _S	I/O	Ring pin for 2W side

Number	Pin Name	I/O	Function
44	R _E	O	Ring-side feed amplifier output pin. Connect with R _S pin via R _{FR} resistor.
45	R _B	O	Ring-side auxiliary power transistor base connection pin
46	C _{PSR}	–	Connect a capacitor for power supply noise eliminator
47	TTX _{IN}	I	TTX signal input pin
48	V _{CC}	–	Positive power supply (+5 V)

2. USE CAUTIONS

(1) Combined characteristics of μ PC7073 and μ PD9903

- The μ PC7073 is designed to be used in combination with the μ PD9903. Therefore, first half of the electrical characteristics described below are ratings for the μ PC7073 as a discrete unit while the second half are combined ratings that include the μ PD9903.
- Subscriber circuit constants that are determined by factors such as termination impedance are configured to enable setting by external order parameters. Consequently, input of an order that is not suitable for the target impedance may result in failure to obtain the required characteristics.

(2) Absolute maximum ratings

Application of voltage or current in excess of the absolute maximum ratings may result in damage. Be especially cautious about surges, etc.

(3) Load of by-pass capacitor

Because the μ PC7073 and μ PD9903 use several internal high-frequency operational amplifiers, high power supply impedance can cause instability (such as oscillation) in these internal operational amplifiers. To suppress such instability and eliminate power supply noise, connect by-pass capacitors (C_{ACOM} = approx. 0.1 μ F) having superior high frequency characteristics as close as possible to the μ PC7073's power supply pins (V_{BB} and V_{CC}) and the μ PD9903's power supply pins (AV_{DD} and DV_{DD}).

(4) Addition of ACOM pin connection capacitor

The voltage of the ACOM pin between the μ PC7073 and μ PD9903 is the signal source reference voltage for the μ PC7073. Superposition of noise on this pin may have adverse effects on transmission characteristics. Therefore, make the wires between the ACOM pin and the two LSIs as short as possible, and connect capacitors (C_{ACOM} = approx. 0.1 μ F) having superior high frequency characteristics as close as possible to the pins.

(5) Overcurrent prevention measures

Due to its structure, power to the μ PC7073 must first be supplied to a low-voltage potential (V_{BB}). Accordingly, if power is supplied first to a power supply pin other than V_{BB} , an overcurrent will flow within the μ PC7073 (an overcurrent will not flow if power is input to all power supply pins).

Therefore, if feeding to a power supply pin other than V_{BB} first, connect an external diode and limiting resistor (rated at several Ω) in the directions described below.

- Reverse-bias direction between V_{BB} pin and V_{CC} pin.
- Reverse-bias direction between V_{BB} pin and GND.
- Reverse-bias direction between V_{CC} pin and GND.

3. ELECTRICAL SPECIFICATIONS

3.1 Discrete unit ratings

Absolute maximum ratings (T_A = +25 °C)

Parameter	Symbol	Conditions	Rating	Units
Power supply voltage	V _{BB}	Including spike voltage	-63 to +0.3	V
	V _{CC}	Including spike voltage	-0.3 to +7.0	
	V _{ACOM}	ACOM pin	-0.3 to V _{CC} + 0.3	
Input voltage	V _{IN0}	R _X pin	-0.3 to V _{CC} + 0.3	
	V _{IN1}	T _S , R _S , T _E , and R _E pins	V _{BB} - 0.3 to V _{CC} + 0.3	
	V _{IN2}	TTX _{IN} pin	To be defined	
Logic input voltage	V _{IN3}	BCUT, ALM, \overline{PD} , RC ₁ , RC ₂ , and RC ₃ pins	-0.3 to V _{CC} + 0.3	
Relay driver output current	I _{OL}	RY ₁ , RY ₂ , and RY ₃ pins	40	mA
Power consumption	P _T	Thermal resistance: 160 °C/W, T _A = 70 °C	1	W
Ambient operating temperature	T _A		0 to 70	°C
Storage temperature	T _{stg}		-65 to +150	

Caution If the absolute maximum rating for any of the above parameters is exceeded even momentarily, it may adversely affect the quality of this product. In other words, these absolute maximum ratings have been set to prevent physical damage to the product. Do not use the product in such a way as to exceed any of these ratings.

Recommended operating conditions

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Power supply voltage	V _{BB}		-58	-48	-42	V
	V _{CC}		4.75	5.0	5.25	
	V _{ACOM}	ACOM pin	2.38	2.4	2.42	
Ambient operating temperature	T _A		0	25	70	°C
High level input voltage	V _{IH}	BCUT, ALM, \overline{PD} , RC ₁ , RC ₂ , and RC ₃ pins	2.0		V _{CC}	V
Low level input voltage	V _{IL}		0		0.8	
Digital input rise and fall times	t _R	BCUT, ALM, \overline{PD} , RC ₁ , RC ₂ , and RC ₃ pins			200	ns
	t _F				200	
Rx drive impedance			0		50	Ω
Rx-ACOM offset voltage			-0.1		+0.1	V
Loop resistance (line resistance + termination resistance)	R _L	V _{BB} = -51 V	200 Ω × 2 feeding modes		1900	Ω
			400 Ω × 2 feeding modes		1500	
Terminal leakage current during on-hook transmission	I _{ON-LEAK}		0		8	mA
AC inductive current	I _{long}	f = 60 Hz, 2Pw-Tr ^{Note} During loop detection (one line), during ground detection (one line)			5.0	mA _{rms}

Note Pw-Tr is a power transistor for feeding.

DC Characteristics

($V_{BB} = -42$ to -58 V, $V_{CC} = 5$ V \pm 0.25 V, $T_A = 0$ to 70 °C, combined characteristics with μPD9903)

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Units
On-hook supply current 1	I _{BB1}	On-hook, including I _{Pw-Tr} Note I _{long} = 0 mA,	I _L = 0 mA		1.9		mA
	I _{CC1}		V _{BB} = -48 V V _{CC} = +5 V		1		
Off-hook supply current 1	I _{BB2}	Off-hook, not including I _{Pw-Tr} Note I _{long} = 0 mA,	I _L = 20 mA		4.3		
	I _{CC2}		V _{BB} = -48 V V _{CC} = +5 V		2.0		
On-hook supply current 2	I _{BB3}	On-hook, including I _{Pw-Tr} Note I _{long} = 0 mA,	I _L = 0 mA		2.3	2.9	
	I _{CC3}		V _{BB} = -58 V V _{CC} = +5.25 V		1.3	1.7	
Off-hook supply current 2	I _{BB4}	Off-hook, not including I _{Pw-Tr} Note I _{long} = 0 mA,	I _L = 20 mA		4.4	5.5	
	I _{CC4}		V _{BB} = -58 V V _{CC} = +5.25 V		2.2	2.8	
Power current during on-hook transmission	I _{BB6}	On-hook, including I _{Pw-Tr} Note I _{long} = 0 mA,	I _L = 0 mA		3	3.9	
	I _{CC6}		V _{BB} = -58 V V _{CC} = +5.25 V		2.1	2.7	
ACOM input current	I _{ACOM}	ACOM pin	On-hook	-100	-16	+100	μA
			Off-hook	-100	0	+100	
Rx input current	I _{RX}	R _X , V _{RX} = 2.4 V		8	12	16	
Relay driver input current	I _{IH}	V _I = 5.0 V For each RC ₁ , RC ₂ , and RC ₃ pins			1.0	1.5	mA
Relay driver output voltage	V _{OL}	I _{OL} = 35 mA For each RY ₁ , RY ₂ , and RY ₃ pins				+1.1	V
Digital pin high level input current	I _{IH}	V _I = 2.0 V For each BCUT, ALM, \overline{PD} , RC ₁ , RC ₂ , and RC ₃ pins				0.5	mA
Digital pin low level input current	I _{IL}	V _I = 0.0 V For each BCUT, ALM, \overline{PD} , RC ₁ , RC ₂ , and RC ₃ pins			50		μA
Control input voltage		BCUT : I _L = 50 mA → I _L ≤ 1 mA : I _L = 50 mA → - I _L × 90 % : I _L = 50 mA → I _L ≤ 20 mA		2.0			V
		BCUT, I _L = 50 mA → - I _L × 90 %				0.8	
DC feed resistance	R _{BF}	200 Ω feed		180	200	220	Ω
		400 Ω feed		360	400	440	
High and wet impedance	R _{H&W}	R _L = 1900 Ω AC/DC		100			kΩ
Ground-fault/power contact drooping current		V _{BB} = -48 V R _{TE5K} /R _{RE5K} = 3.6 kΩ		12.1	13.1	14.1	mA

Note I_{Pw-Tr} is the current to the power transistor for feeding.

3.2 Combined specifications with μPD9903

DC characteristics

μPC7073 ($V_{BB} = -42$ to -58 V, $V_{CC} = 5$ V \pm 0.25 V, $T_A = 0$ to 70 °C, $18 \leq I_L \leq I_{LMAX}$ (mA))

μPD9903 ($T_A = 0$ to 70 °C, $V_{DD} = 5$ V \pm 0.25 V, $V_{DD} = V_{AG} = 0$ V, $f_{DCLK} = 2048$ kHz)

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Units
DC feed resistance	R _{BF}	200 Ω feed		180	200	220	Ω
		400 Ω feed		360	400	440	
Minimum loop unit	I _{LMIN}	V _{BB} = -51 V R _L = 1900 Ω	200 Ω feed	21.7	22.2	22.6	mA
			400 Ω feed	18.2	18.8	19.3	
Maximum current setting	I _{LMAX}	I _{LMAX} = 76 mA setting	200 Ω feed	70	76	82	mA
			400 Ω feed	50	55	60	
		I _{LMAX} = 45 mA setting		40	45	50	
I _{LMAX} = 35 mA setting		31	35	39			
Pin voltage during on-hook	V _{TS}	Normally on-hook, between Tip and GND, V _{BB} = -48 V		2.25	2.55	2.85	V
	V _{RS}	Normally on-hook, between Ring and V _{BB} , V _{BB} = -48 V		3.05	3.35	3.65	
	V _{TS}	On-hook transmission, between Tip and GND, V _{BB} = -48 V		2.25	2.55	2.85	
	V _{RS}	On-hook transmission, between Ring and V _{BB} , V _{BB} = -48 V		3.05	3.35	3.65	
Voltage between lines during on-hook	V _{TS}	V _{BB} = -48 V		V _{BB} - 7.0	V _{BB} - 5.9	V _{BB} - 5.0	V
Supervisory control - V _{BB} fault voltage	V _{B_{BF}}			32	35	38	V

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Units
Loop detection operating resistance (during normal transmission)	R _{ON1}	Includes termination resistance	200 Ω feed			2500	Ω
Loop detection non-operating resistance (during normal transmission)			400 Ω feed			2100	
Loop detection operating resistance (during on-hook transmission)	R _{ON2}	Includes termination resistance	200 Ω feed	3900		1900	Ω
Loop detection non-operating resistance (during on-hook transmission)			400 Ω feed	3500		1500	
Loop release non-operating resistance	R _{ON3}	Includes termination resistance	200 Ω feed			2960	Ω
Loop release operating resistance			400 Ω feed			2560	
Ground detection 1 (C/O) operating resistance	R _{ON4}	Includes termination resistance				5.2	kΩ
Ground detection 1 (C/O) non-operating resistance				20			
Ground-fault/power line contact detection operating resistance	R _{ON6}	Includes termination resistance Off-hook stage	I _{LMAX} = 45/76 mA			340	Ω
			I _{LMAX} = 35 mA			480	
Ground-fault/power line contact detection non-operating resistance	R _{ON6}	Includes termination resistance	I _{LMAX} = 45/76 mA	870			Ω
			I _{LMAX} = 35 mA	1130			
Ground-fault/power line contact release non-operating resistance	R _{ON7}	Includes termination resistance				1.4	kΩ
Ground-fault/power line contact release operating resistance				10			

Note The above values are resistance-converted values.

Transmission Characteristics

μPC7073 ($V_{BB} = -42$ to -58 V, $V_{CC} = 5$ V \pm 0.25 V, $T_A = 0$ to 70 °C, $18 \leq I_L \leq I_{LMAX}$ (mA))

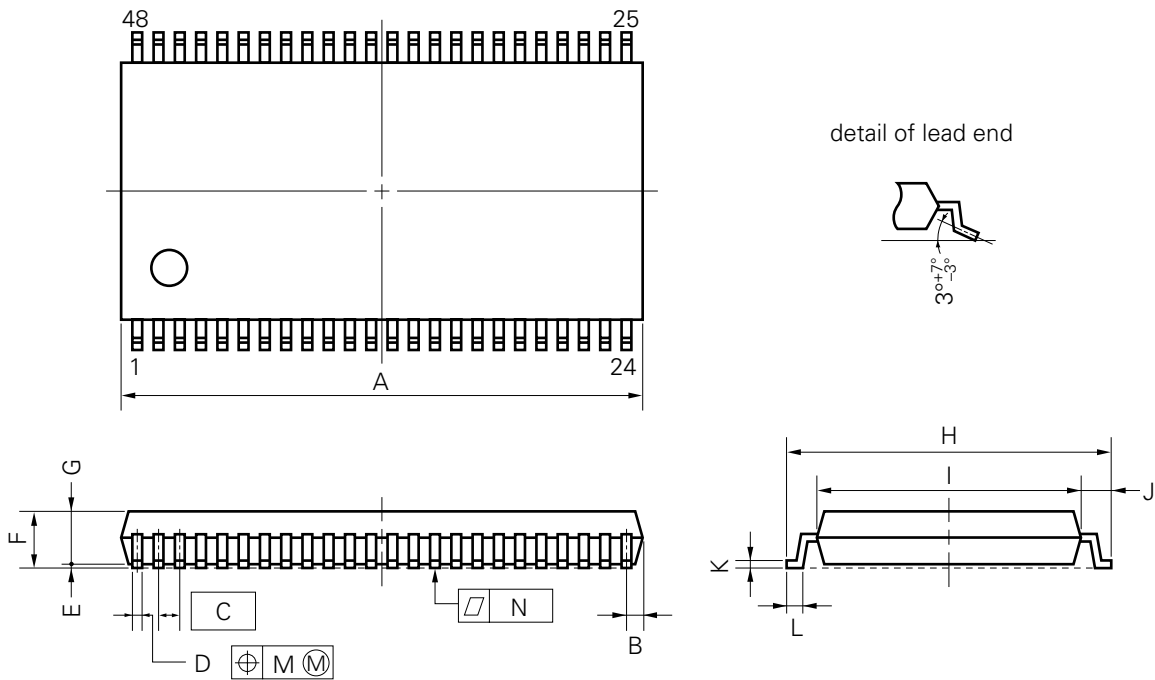
μPD9903 ($T_A = 0$ to 70 °C, $V_{DD} = 5$ V \pm 0.25 V, $V_{DG} = V_{AG} = 0$ V, $f_{DCLK} = 2048$ kHz)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Units
Insertion loss	IL	A-D input signal 0 dBm0 1 kHz	-0.45	0.0	+0.45	dB
		D-A input signal 0 dBm0 1 kHz	-0.45	0.0	+0.45	
Transfer loss frequency characteristics	F _{RX}	A-D 60 Hz	24.0		-	dB
		Reference input signal 200 Hz	0.6		2.0	
		1015 Hz 0 dBm0 300 Hz	-0.15		+0.21	
		400 to 3000 Hz	-0.15		+0.15	
		3200 Hz	-0.15		+0.65	
		3400 Hz	0.2		0.8	
	F _{RR}	D-A 60 Hz	0.2		4.0	
		Reference input signal 200 Hz	0.1		1.0	
		1015 Hz 0 dBm0 300 Hz	-0.15		+0.25	
		400 to 3000 Hz	-0.15		+0.15	
		3200 Hz	-0.15		+0.65	
		3400 Hz	0.2		0.8	
Gain tracking (tone method)	GT _X	A-D +3 to -40 dBm0	-0.2		+0.2	dB
		Reference input signal -50 dBm0	-0.5		+0.5	
	-10 dBm0 -55 dBm0	-1.0		+1.0		
	f = 700 to 1100 Hz					
GT _R	D-A +3 to -40 dBm0	-0.2		+0.2		
	Reference input signal -50 dBm0	-0.4		+0.4		
	-10 dBm0 -55 dBm0	-0.8		+0.8		
	f = 700 to 1100 Hz					
Return loss	RL	Input signal 300 Hz	16			dB
		0 dBm0 500 to 2000 Hz	20			
		Z _T = 600 Ω + 2.16 μF 2000 to 3400 Hz	16			
Echo attenuation	TBRL	Input signal 300 Hz	18			dB
		0 dBm0 500 to 2500 Hz	22			
		Z _T = 600 Ω + 2.16 μF 3400 Hz	18			
Transmit channel total power distortion ratio (tone method)	SD _X	A-D +3 to -30 dBm0	36			dB
		Input signal -40 dBm0	30			
		f = 700 to 1100 Hz -45 dBm0	25			
	SD _R	D-A +3 to -30 dBm0	36			
		Input signal -40 dBm0	30			
		f = 700 to 1100 Hz -45 dBm0	25			

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Units	
Absolute delay characteristics	D _A	A-A input signal 0 dBm0				540	μs	
Absolute delay distortion frequency characteristics	D _O	A-A 500 Hz 600 Hz 1000 to 2600 Hz 2800 Hz				1400 700 200 1400		
Intermodulation (2 Tone)	IMD	A-D input signal f1, f2: 300 to 3400 Hz -4 to -21 dBm0 Measured signal: 2 × f1 - f2 level (2 × f1 - f2) vs level (f1, f2)		44.0			dB	
		D-A input signal f1, f2: 300 to 3400 Hz -4 to -21 dBm0 Measured signal: 2 × f1 - f2 level (2 × f1 - f2) vs level (f1, f2)		44.0				
Single frequency noise	N _{SF}	D-A PAD level set at 0 dB Measured signal up to f = 256 kHz				-54	dBm0	
Deviation in gain setting for transmit channel	ΔDGS _X	Difference from A-D reference set value Setting value: +7.5 to +3.0 dB +3.0 to -3.5 dB		-0.2 -0.1		+0.2 +0.1	dB	
Gain setting deviation for receive channel	ΔDGS _R	Difference from D-A reference set value Setting value: 0.0 to -5.0 dB -5.0 to -8.5 dB		-0.1 -0.2		+0.1 +0.2		
Idle circuit noise	ICN ₂₄	2W-4W	A-law	Psophometric weighted			-67	dBm0p
			μ-law	C message weighted			23	dBrc0
	ICN ₄₂	4W-2W	A-law	Psophometric weighted			-76	dBm0p
			μ-law	C message weighted			14	dBrc0
Line to ground balance attenuation	LB	R _F = 50 Ω		f = 300 to 600 Hz	42		dB	
		Relative accuracy = 0.5 %		f = 600 to 3400 Hz	48			
V _{BB} -PSRR (tone method)	PSRR _B	I _L = 20 mA		f = 60 to 3400 Hz f = 100 kHz	30 -5		dB	
V _{CC} -PSRR (tone method)	PSRR _C	I _L = 20 mA		f = 60 to 3400 Hz f = 100 kHz	25 5			
AC induction noise resistance	LFI	I _L = 0 mA		V _{IN} = 6 V _{rms}			43	dBrc
		I _L = 20 mA		V _{IN} = 15 V _{rms}			20	

5. PACKAGE DRAWING

48 PIN PLASTIC SHRINK SOP (375 mil)



NOTE

Each lead centerline is located within 0.10 mm (0.004 inch) of its true position (T.P.) at maximum material condition.

P48GT-65-375B-1

ITEM	MILLIMETERS	INCHES
A	16.21 MAX.	0.639 MAX.
B	0.63 MAX.	0.025 MAX.
C	0.65 (T.P.)	0.026 (T.P.)
D	0.30±0.10	0.012 ^{+0.004} _{-0.005}
E	0.125±0.075	0.005±0.003
F	2.0 MAX.	0.079 MAX.
G	1.7±0.1	0.067±0.004
H	10.0±0.3	0.394 ^{+0.012} _{-0.013}
I	8.0±0.2	0.315±0.008
J	1.0±0.2	0.039 ^{+0.009} _{-0.008}
K	0.15 ^{+0.10} _{-0.05}	0.006 ^{+0.004} _{-0.002}
L	0.5±0.2	0.020 ^{+0.008} _{-0.009}
M	0.10	0.004
N	0.10	0.004

6. RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the conditions recommended below.

For details of recommended soldering conditions, refer to the information document **Semiconductor Device Mounting Technology Manual (C10535E)**.

For soldering methods and conditions other than those recommended, please contact your NEC sales representative.

SURFACE MOUNT TYPE

μPC7073GT: 48-pin plastic shrink SOP (375 mil)

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared reflow	Package peak temperature: 235 °C Duration: 30 sec. max. (210 °C or above) Number of times: 1	IR35-00-1
Pin heating	Pin temperature: 300 °C max. Duration: 3 sec. max. (per side of device)	—

Note For the storage period after unpacking from the dry-pack, storage conditions are max. 25 °C, 65 % RH.

Notes on Handling Devices against Electrostatic Discharge

Caution When handling this device, special care against electrostatic discharge (ESD) must be taken. If a strong ESD is applied to this device, the junction parts of the internal transistors may be destroyed. Therefore, when transporting or storing this device, be sure to use the conductive tray or magazine case in the packing provided by NEC, or use a conductive buffer material or metal case. Also be sure to ground the operator's body and any tools that may enter in contact with the device during assembly processes. Never put or leave the device on a plastic board or table, and do not touch the device pins directly by hand.

[MEMO]

[MEMO]

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NEC devices are classified into the following three quality grades:

"Standard", "Special", and "Specific". The Specific quality grade applies only to devices developed based on a customer designated "quality assurance program" for a specific application. The recommended applications of a device depend on its quality grade, as indicated below. Customers must check the quality grade of each device before using it in a particular application.

Standard: Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

The quality grade of NEC devices is "Standard" unless otherwise specified in NEC's Data Sheets or Data Books. If customers intend to use NEC devices for applications other than those specified for Standard quality grade, they should contact an NEC sales representative in advance.

Anti-radioactive design is not implemented in this product.