

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC7900A Series

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

DESCRIPTION

μ PC7900A series are monolithic three terminal negative regulators which employ internally current limiting, thermal shut down, output transistor safe operating area protection make them essentially indestructible.

They are intended as fixed voltage regulators in a wide range of application including local on card regulation for elimination of distribution problems associated wide single point regulation.

FEATURES

- Wide operation temperature range.
TA: $-30\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$
- Good load regulation.
7 mV TYP. ($250\text{ mA} \leq I_o \leq 750\text{ mA}$): μ PC7905AHF
- Low noise.

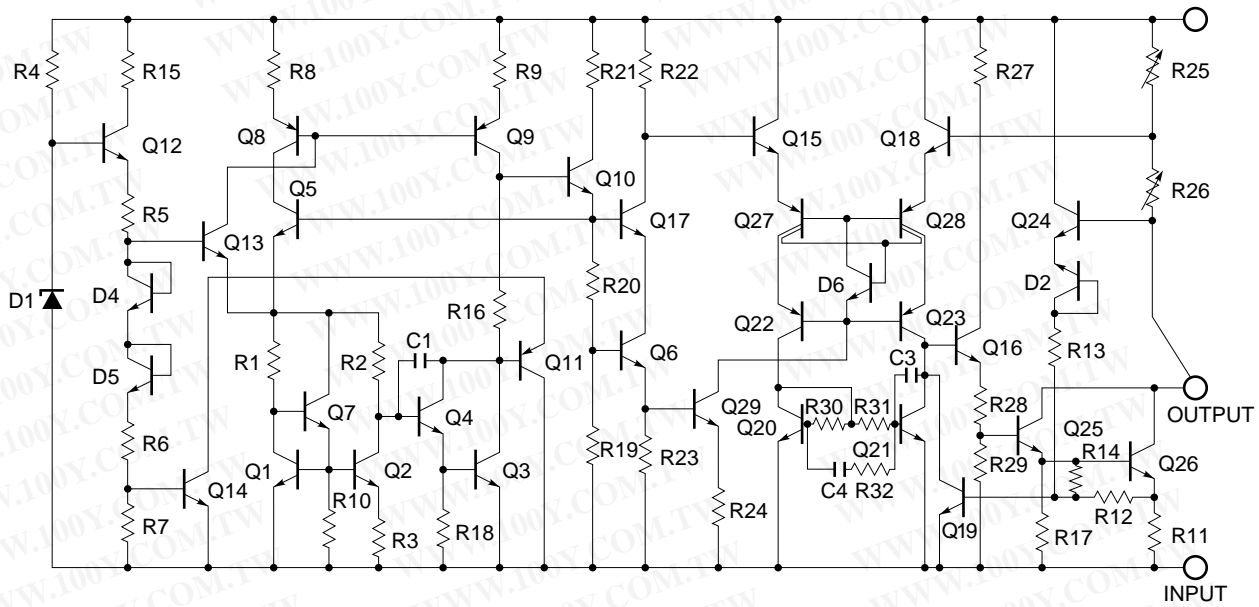
ORDERING INFORMATION

Part Number	Output Voltage	Package
μ PC7905AHF	-5 V	MP-45G (ISOLATED TO-220)
μ PC7908AHF	-8 V	MP-45G (ISOLATED TO-220)
μ PC7912AHF	-12 V	MP-45G (ISOLATED TO-220)
μ PC7915AHF	-15 V	MP-45G (ISOLATED TO-220)
μ PC7918AHF	-18 V	MP-45G (ISOLATED TO-220)
μ PC7924AHF	-24 V	MP-45G (ISOLATED TO-220)

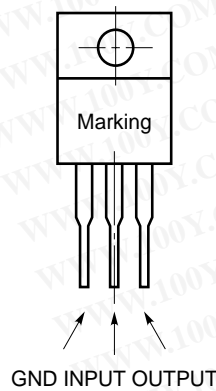
勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

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

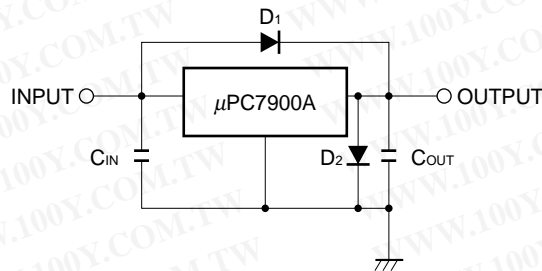
EQUIVALENT CIRCUIT



CONNECTION DIAGRAM



TYPICAL CONNECTION



- C_{IN} : More than 2.2 μF
- C_{OUT}: More than 0.33 μF
- D₁ : Needed for V_{IN} > V_O
- D₂ : Needed for V_O > GND

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ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^\circ\text{C}$)

Parameter	Symbol	Rating	Unit
Input Voltage	V_{IN}	-35/-40 Note 1	V
Internal Power Dissipation	P_T	15 Note 2	W
Operating Ambient Temperature Range	T_A	-30 to +85	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	-30 to +150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Thermal Resistance (junction to case)	$R_{th(J-C)}$	5.0	$^\circ\text{C/W}$
Thermal Resistance (junction to ambient)	$R_{th(J-A)}$	65	$^\circ\text{C/W}$

Note 1. μ PC7905A, 08A, 12A, 15A, 18A: -35 V, μ PC7924A: -40 V

2. Internally limited

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Part Number	MIN.	TYP.	MAX.	Unit
Input Voltage	V_{IN}	μ PC7905AHF	-7	-10	-25	V
		μ PC7908AHF	-10.5	-14	-25	
		μ PC7912AHF	-14.5	-19	-30	
		μ PC7915AHF	-17.5	-23	-30	
		μ PC7918AHF	-21	-27	-33	
		μ PC7924AHF	-27	-33	-38	
Output Current	I_o	All	0.005		1	A
Operating Ambient Temperature	T_A	All	-30		+85	$^\circ\text{C}$
Operating Junction Temperature Range	T_J	All	-30		+125	$^\circ\text{C}$

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C)

μPC7905A

(V_{IN} = -10 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _o	T _J = 25 °C	-4.8	-5.0	-5.2	V
		-7 V ≤ V _{IN} ≤ -20 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-4.75		-5.25	
		-30 °C ≤ T _J ≤ +125 °C	-4.75		-5.25	
Line Regulation	REG _{IN}	T _J = 25 °C, -7 V ≤ V _{IN} ≤ -25 V		25	100	mV
		T _J = 25 °C, -8 V ≤ V _{IN} ≤ -12 V		3	50	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		30	100	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		7	50	
Quiescent Current	I _{BIAS}	T _J = 25 °C		3.6	6.0	mA
Quiescent Current Change	ΔI _{BIAS}	-7 V ≤ V _{IN} ≤ -25 V			1.3	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		77		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, f = 120 Hz, -8 V ≤ V _{IN} ≤ -18 V, I _o = 500 mA	56	63		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _o /ΔT	I _o = 5 mA		0.36		mV/°C

μPC7908A

(V_{IN} = -14 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _o	T _J = 25 °C	-7.7	-8.0	-8.3	V
		-10.5 V ≤ V _{IN} ≤ -23 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-7.6		-8.4	
		-30 °C ≤ T _J ≤ +125 °C	-7.6		-8.4	
Line Regulation	REG _{IN}	T _J = 25 °C, -10.5 V ≤ V _{IN} ≤ -25 V		33	150	mV
		T _J = 25 °C, -11 V ≤ V _{IN} ≤ -17 V		14	75	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		40	160	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		14	80	
Quiescent Current	I _{BIAS}	T _J = 25 °C		3.9	6.0	mA
Quiescent Current Change	ΔI _{BIAS}	-10.5 V ≤ V _{IN} ≤ -25 V			1.0	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		130		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, -11.5 V ≤ V _{IN} ≤ -21.5 V, f = 120 Hz, I _o = 500 mA	52	58		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _o /ΔT	I _o = 5 mA		0.32		mV/°C

μPC7912A

(VIN = -19 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _o	T _J = 25 °C	-11.5	-12	-12.5	V
		-14.5 V ≤ V _{IN} ≤ -27 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-11.4		-12.6	
		-30 °C ≤ T _J ≤ +125 °C	-11.4		-12.6	
Line Regulation	REG _{IN}	T _J = 25 °C, -14.5 V ≤ V _{IN} ≤ -30 V		60	200	mV
		T _J = 25 °C, -16 V ≤ V _{IN} ≤ -22 V		25	100	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		70	220	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		20	110	
Quiescent Current	I _{BIAS}	T _J = 25 °C		4.1	6.2	mA
Quiescent Current Change	ΔI _{BIAS}	-14.5 V ≤ V _{IN} ≤ -30 V			1.0	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		140		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, f = 120 Hz, -15 V ≤ V _{IN} ≤ -25 V, I _o = 500 mA	49	56		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _o /ΔT	I _o = 5 mA		0.04		mV/°C

μPC7915A

(VIN = -23 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _o	T _J = 25 °C	-14.4	-15	-15.6	V
		-17.5 V ≤ V _{IN} ≤ -30 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-14.25		-15.75	
		-30 °C ≤ T _J ≤ +125 °C	-14.25		-15.75	
Line Regulation	REG _{IN}	T _J = 25 °C, -17.5 V ≤ V _{IN} ≤ -30 V		60	200	mV
		T _J = 25 °C, -20 V ≤ V _{IN} ≤ -26 V		30	100	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		100	300	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		30	150	
Quiescent Current	I _{BIAS}	T _J = 25 °C		4.2	6.2	mA
Quiescent Current Change	ΔI _{BIAS}	-17.5 V ≤ V _{IN} ≤ -30 V			1.0	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		240		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, f = 120 Hz, -18.5 V ≤ V _{IN} ≤ -28.5 V, I _o = 500 mA	47	54		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _o /ΔT	I _o = 5 mA		1.2		mV/°C

μPC7918A

(VIN = -27 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

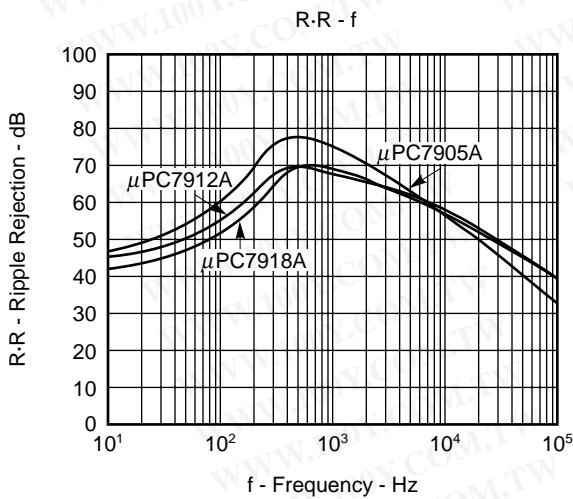
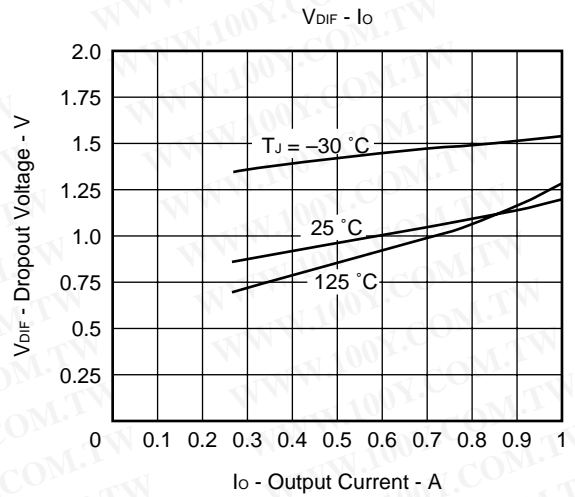
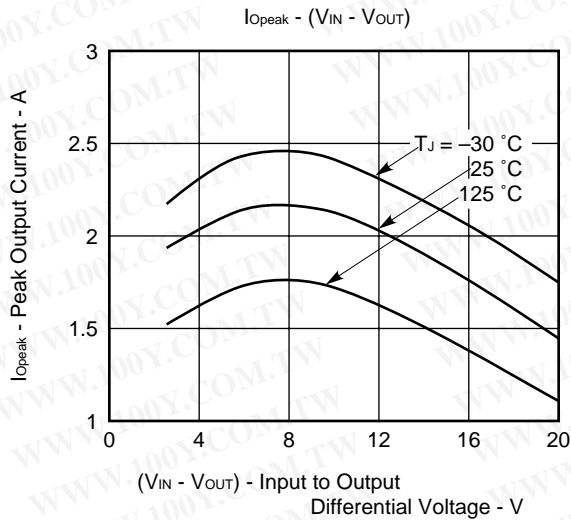
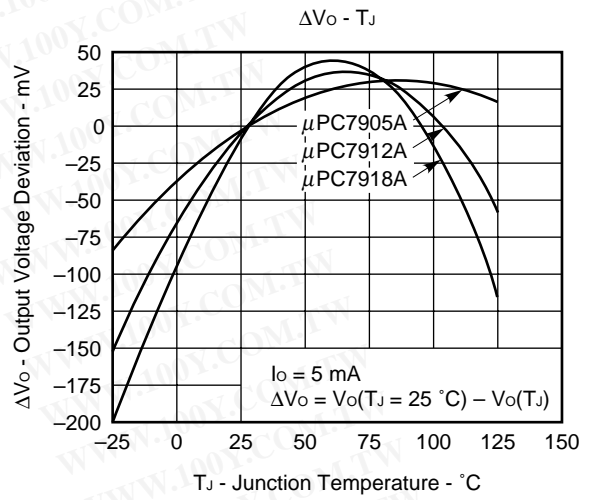
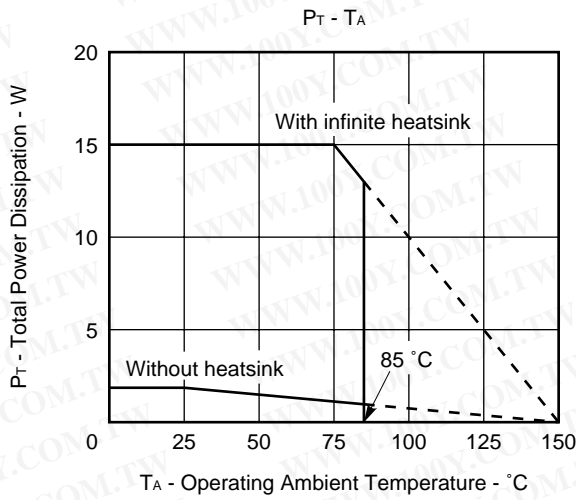
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _O	T _J = 25 °C	-17.3	-18	-18.7	V
		-21 V ≤ V _{IN} ≤ -33 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-17.1		-18.9	
		-30 °C ≤ T _J ≤ +125 °C	-17.1		-18.9	
Line Regulation	REG _{IN}	T _J = 25 °C, -21 V ≤ V _{IN} ≤ -33 V		60	240	mV
		T _J = 25 °C, -24 V ≤ V _{IN} ≤ -30 V		30	120	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		125	360	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		47	180	
Quiescent Current	I _{BIAS}	T _J = 25 °C		4.1	6.5	mA
Quiescent Current Change	ΔI _{BIAS}	-21 V ≤ V _{IN} ≤ -33 V			1.0	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		190		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, f = 120 Hz, -22 V ≤ V _{IN} ≤ -32 V, I _o = 500 mA	45	53		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _o = 5 mA		0.24		mV/°C

μPC7924A

(VIN = -33 V, I_o = 500 mA, 0 °C ≤ T_J ≤ +125 °C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V _O	T _J = 25 °C	-23.0	-24	-25.0	V
		-27 V ≤ V _{IN} ≤ -38 V, 5 mA ≤ I _o ≤ 1 A, P _T ≤ 15 W	-22.8		-25.2	
		-30 °C ≤ T _J ≤ +125 °C	-22.8		-25.2	
Line Regulation	REG _{IN}	T _J = 25 °C, -27 V ≤ V _{IN} ≤ -38 V		70	280	mV
		T _J = 25 °C, -30 V ≤ V _{IN} ≤ -36 V		37	140	
Load Regulation	REG _L	T _J = 25 °C, 5 mA ≤ I _o ≤ 1.5 A		160	480	mV
		T _J = 25 °C, 250 mA ≤ I _o ≤ 750 mA		60	240	
Quiescent Current	I _{BIAS}	T _J = 25 °C		4.2	6.5	mA
Quiescent Current Change	ΔI _{BIAS}	-27 V ≤ V _{IN} ≤ -38 V			1.0	mA
		5 mA ≤ I _o ≤ 1 A			0.5	
Output Noise Voltage	V _n	T _J = 25 °C, 10 Hz ≤ f ≤ 100 kHz		240		μVr.m.s
Ripple Rejection	R•R	T _J = 25 °C, f = 120 Hz, -28 V ≤ V _{IN} ≤ -38 V, I _o = 500 mA	43	49		dB
Dropout Voltage	V _{DIF}	T _J = 25 °C, I _o = 1 A		1.2		V
Peak Output Current	I _{Opeak}	T _J = 25 °C	1.6	2.2	2.8	A
Temperature Coefficient of Output Voltage	ΔV _O /ΔT	I _o = 5 mA		1.1		mV/°C

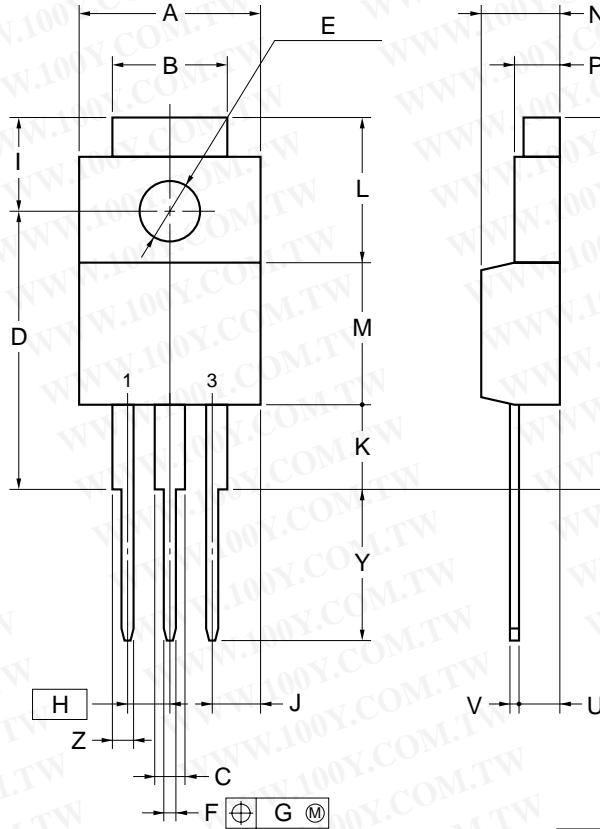
TYPICAL CHARACTERISTICS (T_A = 25 °C)



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μPC7900AHF Series

3PIN PLASTIC SIP (MP-45G)



NOTE

Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	10.4 MAX.	0.410 MAX.
B	7.0	0.276
C	1.2 MIN.	0.047 MIN.
D	17.0±0.3	0.669 ^{+0.013} _{-0.012}
E	φ3.3±0.2	φ0.130±0.008
F	0.75±0.10	0.030 ^{+0.004} _{-0.005}
G	0.25	0.010
H	2.54 (T.P.)	0.100 (T.P.)
I	5.0±0.3	0.197±0.012
J	2.66 MAX.	0.105 MAX.
K	4.8 MIN.	0.188 MIN.
L	8.5	0.335
M	8.5	0.335
N	4.5±0.2	0.177±0.008
P	2.8±0.2	0.110 ^{+0.009} _{-0.008}
Q	22.4 MAX.	0.882 MAX.
U	2.4±0.5	0.094 ^{+0.021} _{-0.020}
V	0.65±0.10	0.026 ^{+0.004} _{-0.005}
Y	8.9±0.7	0.350±0.028
Z	1.0 MIN.	0.039 MIN.

P3HF-254B-2

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RECOMMENDED SOLDERING CONDITIONS

When soldering this product, it is highly recommended to observe the conditions as shown below. If other soldering processes are used, or if the soldering is performed under different conditions, please make sure to consult with our sales offices.

For more details, refer to our document “**SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL**” (C10535E).

TYPES OF THROUGH HOLE MOUNT DEVICE

μPC7900AHF Series

Soldering Process	Soldering Conditions	Symbol
Wave soldering	Solder temperature: 260 °C or below. Flow Time: 10 seconds or below.	

REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	IEI-1212
Quality grade on NEC semiconductor devices.	C11531E
Semiconductor device mounting technology manual.	C10535E
IC package manual.	C10943X
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductors selection guide.	X10679E

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While NEC Corporation has been making continuous effort to enhance the reliability of its semiconductor devices, the possibility of defects cannot be eliminated entirely. To minimize risks of damage or injury to persons or property arising from a defect in an NEC semiconductor device, customers must incorporate sufficient safety measures in its design, such as redundancy, fire-containment, and anti-failure features.

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.