NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC2900 Series

THREE TERMINAL LOW DROPOUT VOLTAGE REGULATOR

The μPC2900 series of low dropout voltage three terminal positive regulators is constructed with PNP output transistor. The μPC2900 series feature the ability to source 1 A of output current with a low dropout voltage of typically 0.7 V.

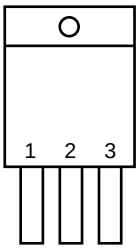
The power dissipation of the μPC2900 series can be drastically reduced compared with the conventional three terminal positive voltage regulators that is constructed with NPN output transistor. Also, this series corresponds to the low voltage output (3 V, 3.3 V) which is not in the conventional low dropout regulators (μPC2400A series).

FEATURES

- Output current in excess of 1.0 A
- Low dropout voltage V_{DIF} = 0.7 V TYP. (at I_O = 1 A)
- On-chip overcurrent and thermal protection circuit
- On-chip output transistor safe area protection circuit

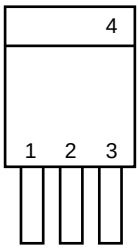
PIN CONFIGURATION (Marking Side)

μPC2900HF Series: MP-45G



1: INPUT
2: GND
3: OUTPUT

μPC2900HB Series: MP-3
μPC2900T Series: MP-3Z



1: INPUT
2: GND
3: OUTPUT
4: GND (Fin)

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

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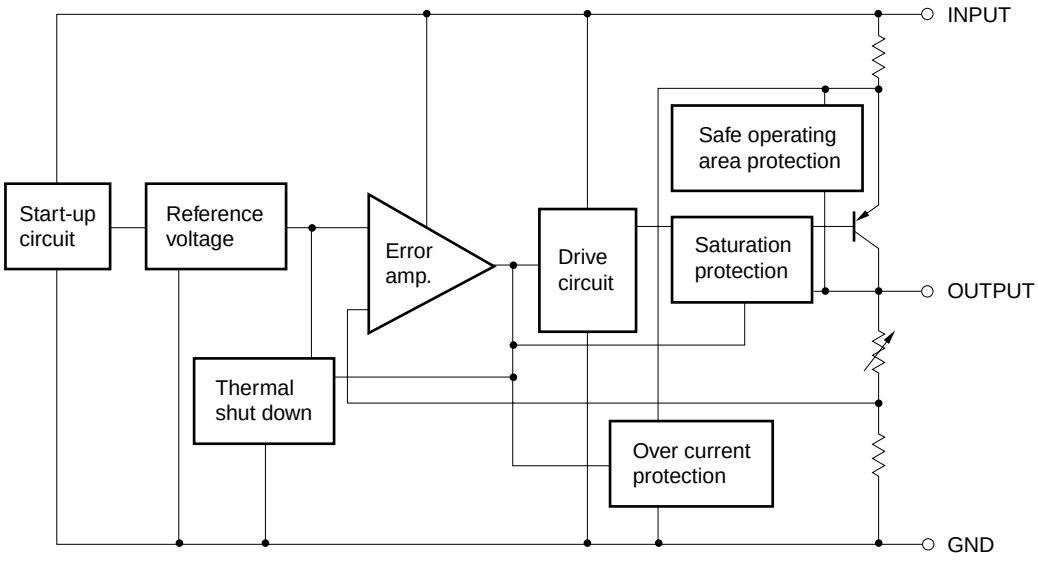
The mark ★ shows major revised points.

BLOCK DIAGRAM



ORDERING INFORMATION

	Part Number	Package	Output Voltage
	μPC2903HF	MP-45G (Isolated TO-220)	3.0 V
	μPC2903HB	MP-3 (SC-64)	3.0 V
	μPC2903T	MP-3Z (SC-63)	3.0 V
	μPC2933HF	MP-45G (Isolated TO-220)	3.3 V
	μPC2933HB	MP-3 (SC-64)	3.3 V
	μPC2933T	MP-3Z (SC-63)	3.3 V
	μPC2905HF	MP-45G (Isolated TO-220)	5.0 V
	μPC2905HB	MP-3 (SC-64)	5.0 V
	μPC2905T	MP-3Z (SC-63)	5.0 V
★	μPC2906HF	MP-45G (Isolated TO-220)	6.0 V
★	μPC2906HB	MP-3 (SC-64)	6.0 V
★	μPC2906T	MP-3Z (SC-63)	6.0 V
★	μPC2907HF	MP-45G (Isolated TO-220)	7.0 V
★	μPC2907HB	MP-3 (SC-64)	7.0 V
★	μPC2907T	MP-3Z (SC-63)	7.0 V
	μPC2908HF	MP-45G (Isolated TO-220)	8.0 V
	μPC2908HB	MP-3 (SC-64)	8.0 V
	μPC2908T	MP-3Z (SC-63)	8.0 V
	μPC2909HF	MP-45G (Isolated TO-220)	9.0 V
	μPC2909HB	MP-3 (SC-64)	9.0 V
	μPC2909T	MP-3Z (SC-63)	9.0 V
	μPC2910HF	MP-45G (Isolated TO-220)	10.0 V
	μPC2910HB	MP-3 (SC-64)	10.0 V
	μPC2910T	MP3Z (SC-63)	10.0 V
	μPC2912HF	MP-45G (Isolated TO-220)	12.0 V
	μPC2912HB	MP-3 (SC-64)	12.0 V
	μPC2912T	MP-3Z (SC-63)	12.0 V

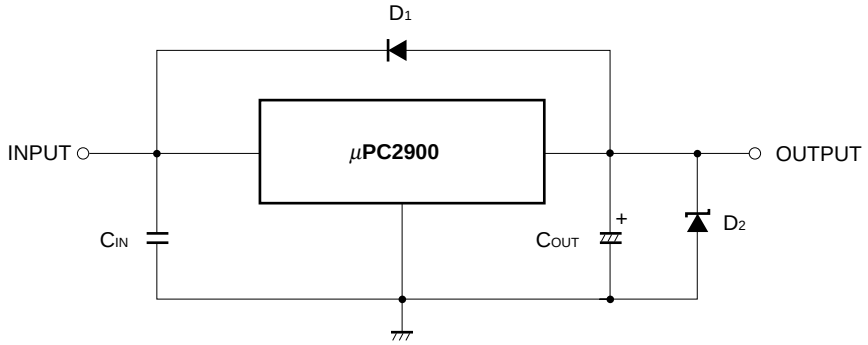
ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, Unless otherwise specified.)

Parameter	Symbol	Rating		Unit
		μPC2900HF	μPC2900HB, μPC2900T	
Input Voltage	V_{IN}	20		V
Internal Power Dissipation[Note]	P_T	15	10	W
Operating Ambient Temperature	T_A	–30 to +85		°C
Operating Junction Temperature	T_J	–30 to +150		°C
Storage Temperature	T_{stg}	–55 to +150		°C
Thermal Resistance (Junction to Case)	$R_{th\ (J-C)}$	7	12.5	°C/W
Thermal Resistance (Junction to Ambient)	$R_{th\ (J-A)}$	65	125	°C/W

Note T_C = 25 °C, Internally limited
When operating junction temperature rises up to 150 °C, the internal circuit shutdown output voltage.

Caution Exposure to Absolute Maximum Ratings for extended periods may affect device reliability; exceeding the ratings could cause permanent damage. The parameters apply independently. The device should be operated within the limits specified under DC and AC Characteristics.

TYPICAL CONNECTION



C_{IN} : More than 0.1 μF. Required if regulator is located an appreciable distance from power supply filter. You must use to prevent from the parasitic oscillation.

C_{OUT} : More than 47 μF. You must use the Low-impedance-type (low ESR) capacitor.

D_1 : Need for $V_O > V_{IN}$

D_2 : Need a shottky barrier diode for V_O < GND.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Type Number	MIN.	TYP.	MAX.	Unit
Input Voltage	V_{IN}	μPC2903	4.0		16	V
		μPC2933	4.3		16	
		μPC2905	6		16	
★		μPC2906	7		16	
★		μPC2907	8		16	
		μPC2908	9		18	
		μPC2909	10		18	
		μPC2910	11		18	
		μPC2912	13		18	
Output Current	I_O	all	0		1.0	A
Operating Ambient Temperature	T_A	all	–30		+85	°C
Operating Junction Temperature	T_J	all	–30		+125	°C

ELECTRICAL CHARACTERISTICS μPC2903 (T_J = 25 °C, V_{IN} = 5 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		2.88	3.0	3.12	V
		0 °C ≤ T_J ≤ 125 °C, 4.0 V ≤ V_{IN} ≤ 16 V, 0 A ≤ I_O ≤ 500 mA	2.85		3.15	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	4.0 V ≤ V_{IN} ≤ 16 V		11	30	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		9	30	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		1.9	4.0	mA
		I_O = 1 A		23	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 2.95 V, I_O = 0 A		12	30	mA
		V_{IN} = 2.95 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 4.0 V ≤ V_{IN} ≤ 16 V		3.2	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		52		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 4.0 V ≤ V_{IN} ≤ 16 V	48	63		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 4.5 V	1.2	1.7	3.0	A
		V_{IN} = 16 V		1.2		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 4.5 V	1.0	1.5	3.0	A
		V_{IN} = 16 V	1.3	1.7	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		–0.5		mV/°C

ELECTRICAL CHARACTERISTICS μPC2933 (T_J = 25 °C, V_{IN} = 5 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		3.17	3.3	3.43	V
		0 °C ≤ T_J ≤ 125 °C, 4.3 V ≤ V_{IN} ≤ 16 V, 0 A ≤ I_O ≤ 500 mA	3.14		3.46	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	4.3 V ≤ V_{IN} ≤ 16 V		12	33	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		23	33	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.0	4.0	mA
		I_O = 1 A		30	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 3.1 V, I_O = 0 A		10	30	mA
		V_{IN} = 3.1 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 4.3 V ≤ V_{IN} ≤ 16 V		3.0	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		55		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 4.3 V ≤ V_{IN} ≤ 16 V	48	64		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 4.5 V	1.2	1.6	3.0	A
		V_{IN} = 16 V		1.2		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 4.5 V	1.0	1.4	3.0	A
		V_{IN} = 16 V	1.3	1.7	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		–0.4		mV/°C

ELECTRICAL CHARACTERISTICS μPC2905 (T_J = 25 °C, V_{IN} = 8 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		4.8	5.0	5.2	V
		0 °C ≤ T_J ≤ 125 °C, 6 V ≤ V_{IN} ≤ 16 V, 0 A ≤ I_O ≤ 500 mA	4.75		5.25	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	6 V ≤ V_{IN} ≤ 16 V		23	50	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		28	50	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.2	4.0	mA
		I_O = 1 A		30	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 4.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 4.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 6 V ≤ V_{IN} ≤ 16 V		2.9	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		90		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 6 V ≤ V_{IN} ≤ 16 V	46	61		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 6.5 V	1.15	1.8	3.0	A
		V_{IN} = 16 V		1.1		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 6.5 V	1.1	1.5	3.0	A
		V_{IN} = 16 V	1.4	2.0	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		0.6		mV/°C

★ **ELECTRICAL CHARACTERISTICS μPC2906 (T_J = 25 °C, V_{IN} = 9 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)**

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		5.76	6.0	6.24	V
		0 °C ≤ T_J ≤ 125 °C, 7 V ≤ V_{IN} ≤ 16 V, 0 A ≤ I_O ≤ 500 mA	5.70		6.30	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	7 V ≤ V_{IN} ≤ 16 V		25	60	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		29	60	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.0	4.0	mA
		I_O = 1 A		23	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 5.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 5.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 7 V ≤ V_{IN} ≤ 16 V		2.2	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		108		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 7 V ≤ V_{IN} ≤ 16 V	44	60		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 7.5 V		1.8		A
		V_{IN} = 16 V		1.1		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 7.5 V	1.1	1.5	3.0	A
		V_{IN} = 16 V	1.4	2.0	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		0.6		mV/°C

★ **ELECTRICAL CHARACTERISTICS μPC2907 (T_J = 25 °C, V_{IN} = 10 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)**

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		6.72	7.0	7.28	V
		0 °C ≤ T_J ≤ 125 °C, 8 V ≤ V_{IN} ≤ 16 V, 0 A ≤ I_O ≤ 500 mA	6.65		7.35	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	8 V ≤ V_{IN} ≤ 16 V		27	70	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		30	70	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.0	4.0	mA
		I_O = 1 A		24	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 6.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 6.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 8 V ≤ V_{IN} ≤ 16 V		2.3	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		126		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 8 V ≤ V_{IN} ≤ 16 V	43	59		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 8.5 V		1.8		A
		V_{IN} = 16 V		1.1		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 8.5 V	1.1	1.5	3.0	A
		V_{IN} = 16 V	1.4	2.0	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		0.6		mV/°C

ELECTRICAL CHARACTERISTICS μPC2908 (T_J = 25 °C, V_{IN} = 11 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		7.68	8.0	8.32	V
		0 °C ≤ T_J ≤ 125 °C, 9 V ≤ V_{IN} ≤ 18 V, 0 A ≤ I_O ≤ 500 mA	7.6		8.4	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	9 V ≤ V_{IN} ≤ 18 V		31	80	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		30	80	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		1.9	4.0	mA
		I_O = 1 A		25	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 7.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 7.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 9 V ≤ V_{IN} ≤ 18 V		2.4	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		145		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 9 V ≤ V_{IN} ≤ 18 V	42	58		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 9.5 V		1.9		A
		V_{IN} = 18 V		1.0		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 9.5 V	1.1	1.5	3.0	A
		V_{IN} = 18 V	1.4	2.0	2.8	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		0.6		mV/°C

ELECTRICAL CHARACTERISTICS μPC2909 (T_J = 25 °C, V_{IN} = 12 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		8.64	9.0	9.36	V
		0 °C ≤ T_J ≤ 125 °C, 10 V ≤ V_{IN} ≤ 18 V, 0 A ≤ I_O ≤ 500 mA	8.55		9.45	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	10 V ≤ V_{IN} ≤ 18 V		31	90	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		32	90	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		1.9	4.0	mA
		I_O = 1 A		27	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 8.5 V, I_O = 0 A		11	30	mA
		V_{IN} = 8.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 10 V ≤ V_{IN} ≤ 18 V		3.0	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		155		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 10 V ≤ V_{IN} ≤ 18 V	41	58		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 10.5 V		1.9		A
		V_{IN} = 18 V		1.0		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 10.5 V	1.1	1.5	3.0	A
		V_{IN} = 18 V	1.4	2.0	3.0	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		1.0		mV/°C

ELECTRICAL CHARACTERISTICS μPC2910 (T_J = 25 °C, V_{IN} = 13 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

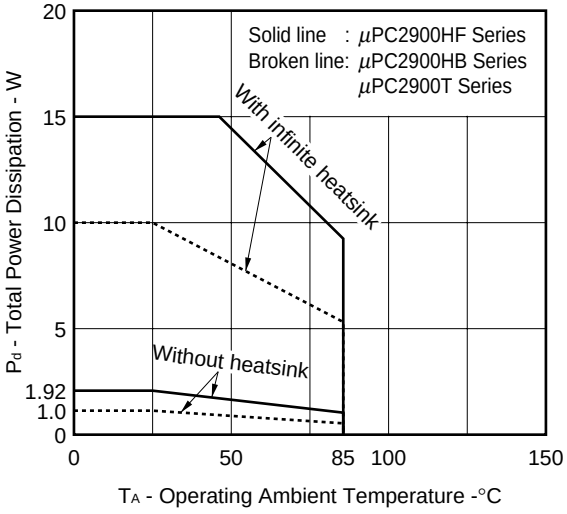
Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		9.6	10.0	10.4	V
		0 °C ≤ T_J ≤ 125 °C, 11 V ≤ V_{IN} ≤ 18 V, 0 A ≤ I_O ≤ 500 mA	9.5		10.5	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	11 V ≤ V_{IN} ≤ 18 V		35	100	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		33	100	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.0	4.0	mA
		I_O = 1 A		25	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 9.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 9.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 11 V ≤ V_{IN} ≤ 18 V		1.9	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		180		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 11 V ≤ V_{IN} ≤ 18 V	40	56		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 11.5 V		1.7		A
		V_{IN} = 18 V		1.0		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 11.5 V	1.1	1.6	3.0	A
		V_{IN} = 18 V	1.4	2.0	3.0	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		2.1		mV/°C

ELECTRICAL CHARACTERISTICS μPC2912 (T_J = 25 °C, V_{IN} = 15 V, I_O = 500 mA, C_{IN} = 0.22 μF, C_{OUT} = 47 μF, unless otherwise specified.)

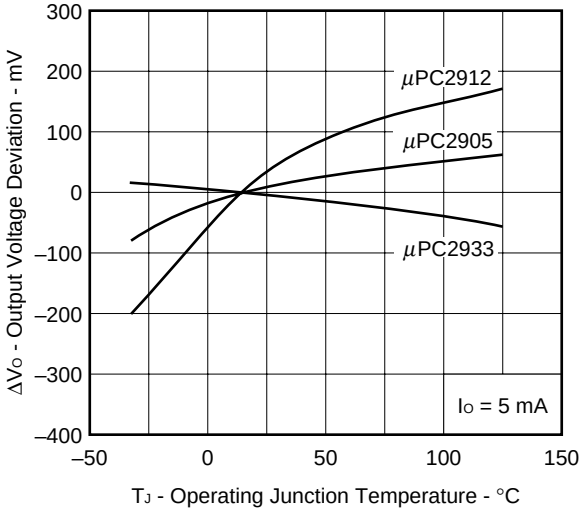
Parameters	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O		11.52	12	12.48	V
		0 °C ≤ T_J ≤ 125 °C, 13 V ≤ V_{IN} ≤ 18 V, 0 A ≤ I_O ≤ 500 mA	11.4		12.6	
		0 °C ≤ T_J ≤ 125 °C, 0 A ≤ I_O ≤ 1 A				
Line Regulation	REG_{IN}	13 V ≤ V_{IN} ≤ 18 V		38	120	mV
Load Regulation	REG_L	0 A ≤ I_O ≤ 1 A		35	120	mV
Quiescent Current	I_{BIAS}	I_O = 0 A		2.1	4.0	mA
		I_O = 1 A		26	60	
Startup Quiescent Current	$I_{BIAS\ (s)}$	V_{IN} = 11.5 V, I_O = 0 A		10	30	mA
		V_{IN} = 11.5 V, I_O = 1 A			80	
Quiescent Current Change	ΔI_{BIAS}	0 °C ≤ T_J ≤ 125 °C, 13 V ≤ V_{IN} ≤ 18 V		1.5	20	mA
Output Noise Voltage	V_n	10 Hz ≤ f ≤ 100 kHz		210		$\mu V_{r.m.s.}$
Ripple Rejection	R·R	f = 120 Hz, 13 V ≤ V_{IN} ≤ 18 V	40	52		dB
Dropout Voltage	V_{DIF}	0 °C ≤ T_J ≤ 125 °C, I_O = 1 A		0.7	1.0	V
Short Circuit Current	$I_{O\ short}$	V_{IN} = 14 V		1.7		A
		V_{IN} = 18 V		1.0		
Peak Output Current	$I_{O\ peak}$	V_{IN} = 14 V	1.1	1.6	3.0	A
		V_{IN} = 18 V	1.4	2.0	3.0	
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	0 °C ≤ T_J ≤ 125 °C, I_O = 5 mA		2.1		mV/°C

TYPICAL CHARACTERISTICS

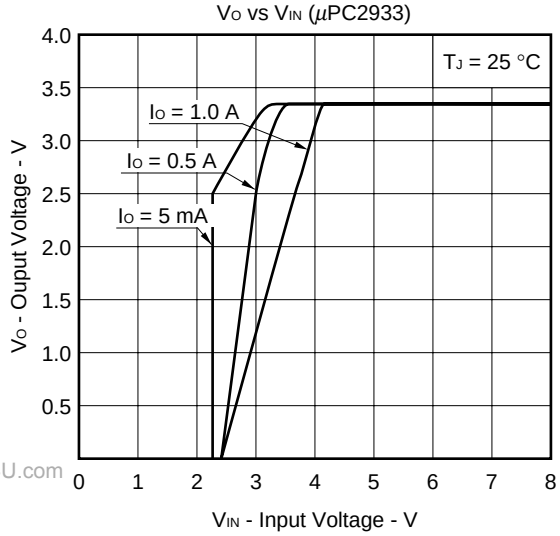
P_d vs T_A



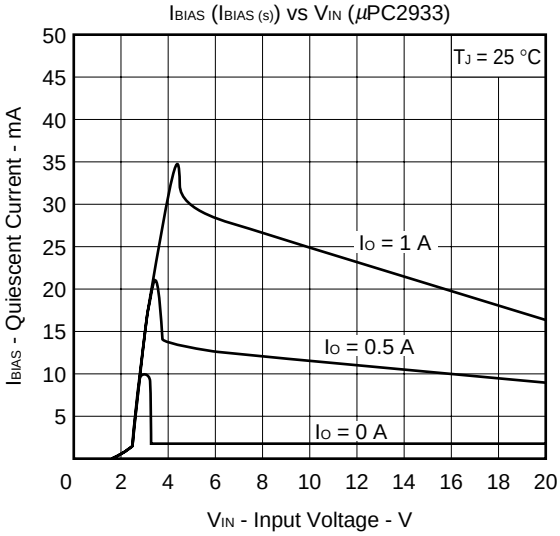
ΔV_O vs T_J



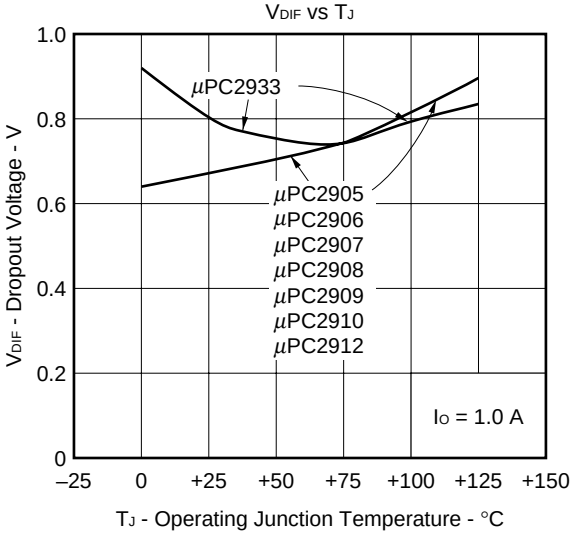
V_O vs V_{IN} (μPC2933)



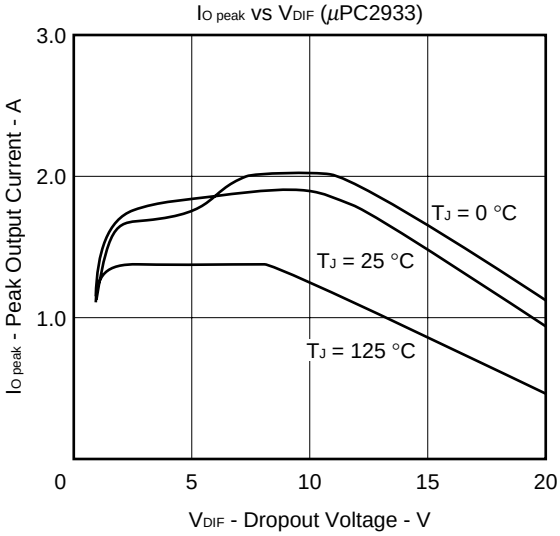
I_{BIAS} ($I_{BIAS\ (S)}$) vs V_{IN} (μPC2933)



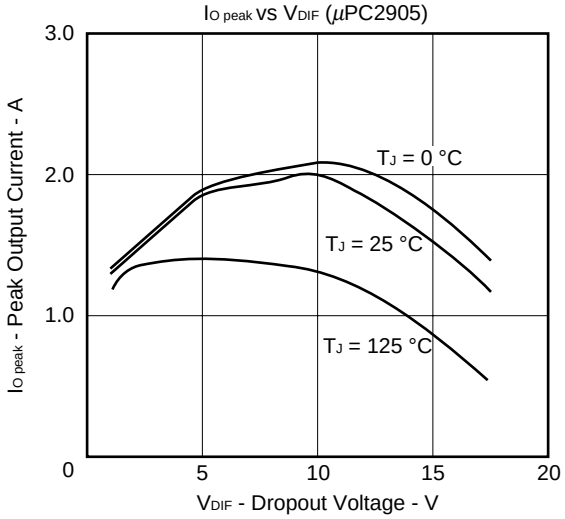
V_{DIF} vs T_J



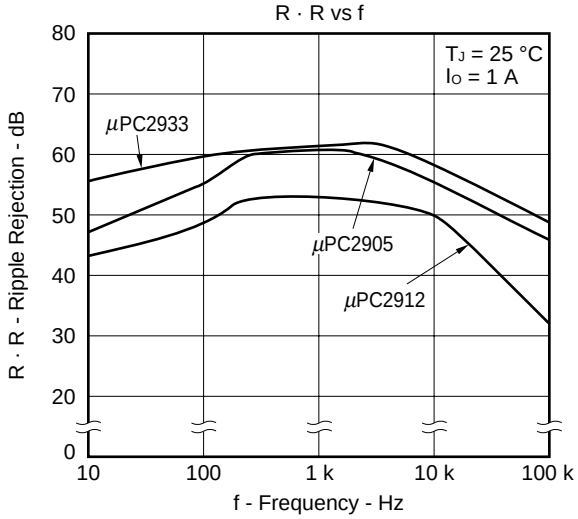
$I_{O\ peak}$ vs V_{DIF} (μPC2933)



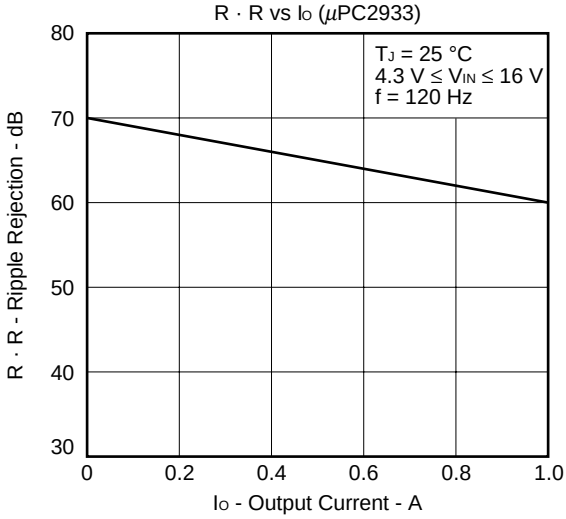
$I_{O\ peak}$ vs V_{DIF} (μPC2905)



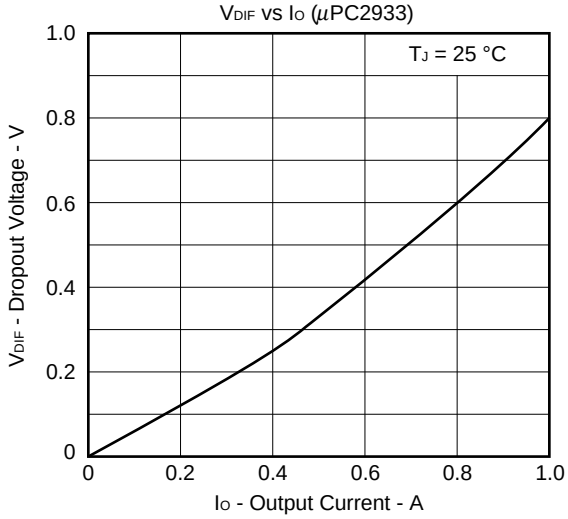
R · R vs f



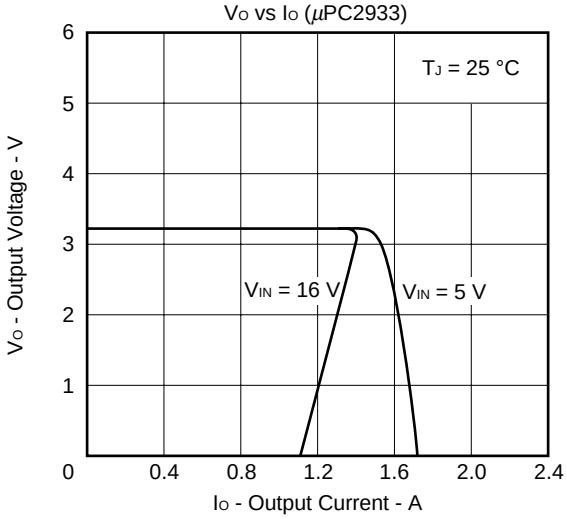
R · R vs I_O (μPC2933)



V_{DIF} vs I_O (μPC2933)



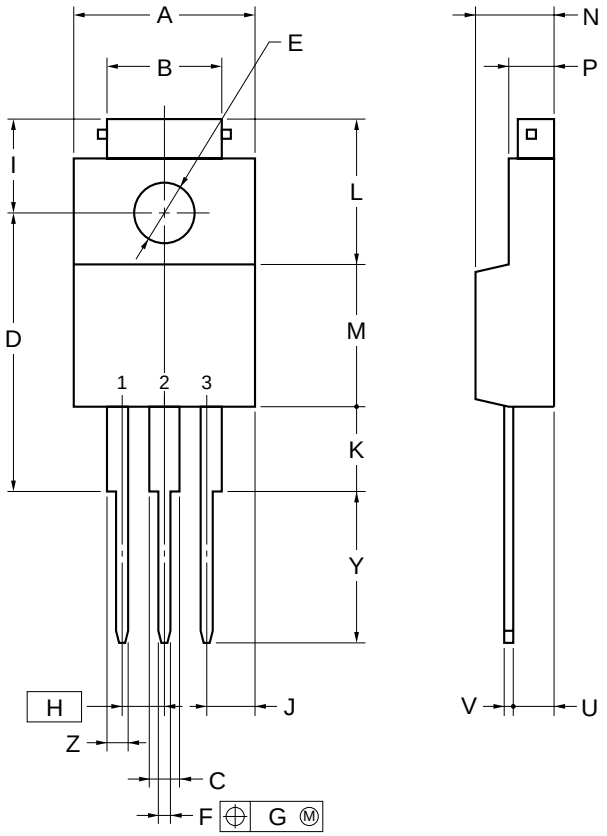
V_O vs I_O (μPC2933)



PACKAGE DRAWINGS

μPC2900HF Series

3PIN PLASTIC SIP (MP-45G)



NOTE

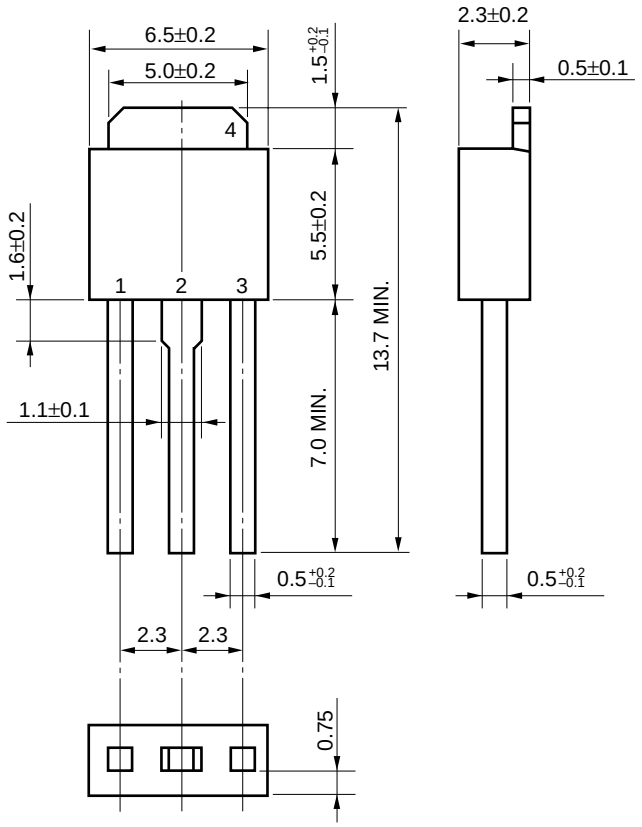
Each lead centerline is located within 0.25 mm of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS
A	10.0±0.2
B	7.0±0.2
C	1.50±0.2
D	17.0±0.3
E	φ3.3±0.2
F	0.75±0.10
G	0.25
H	2.54 (T.P.)
I	5.0±0.3
J	2.46±0.2
K	5.0±0.2
L	8.5±0.2
M	8.5±0.2
N	4.5±0.2
P	2.8±0.2
U	2.4±0.5
V	0.65±0.10
Y	8.9±0.7
Z	1.30±0.2

P3HF-254B-4

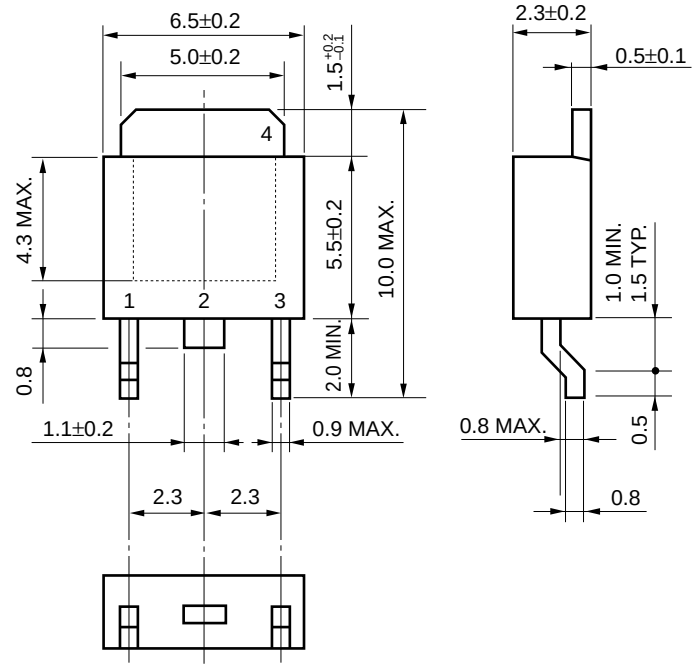
μPC2900HB Series

MP-3 (SC-64) (Unit: mm)



μPC2900T Series

MP-3Z (SC-63) (Unit: mm)



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 perfomed under different condition, please make sure to consult with our sales offices.

Fof more details, refer to our document **"SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL" (C10535E)**.

Surface mount devices

μPC2900T Series: MP-3Z

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 235 °C or below (Package surface temperature), Reflow time: 30 seconds or less (at 210 °C or higher), Maximum number of reflow processes: 2 times.	IR35-00-2
VPS	Peak temperature: 215 °C or below (Package surface temperature), Reflow time: 40 seconds or less (at 200 °C or higher), Maximum number of reflow processes: 2 times.	VP15-00-2
Wave soldering	Solder temperature: 260 °C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time, Pre-heating temperature: 120 °C or below (Package surface temperature).	WS60-00-1
★ Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (Per each side of the device).	—

Caution Apply only one kind of soldering condition to a device, except for "partial heating method", or the device will be damaged by heat stress.

Through-hole devices

μPC2900HF Series: MP-45G
μPC2900HB Series: MP-3

Process	Conditions
Wave soldering (only to leads)	Solder temperature: 260 °C or below, Flow time: 10 seconds or less.
★ Partial heating method	Pin temperature: 300 °C or below, Heat time: 3 seconds or less (Per each pin).

Caution For through-hole device, the wave soldering process must be applied only to leads, and make sure that the package body does not get jet soldered.

CAUTION ON USE

When using the μPC2900 series at the input voltage which is lower than in the recommended operating condition, the big quiescent current flows through devices because the transistor of the output paragraph is saturated (Refer to I_{BIAS} ($I_{BIAS\ (S)}$) vs V_{IN} curves in **TYPICAL CHARACTERISTICS**). The μPC2900 series have saturation protection circuits, but they sometimes need about 80 mA current. Therefore the power supply on the input needs the enough current capacity to pass this quiescent current when the devices startup.

REFERENCE DOCUMENTS

★ QUALITY GRADE ON NEC SEMICONDUCTOR DEVICES	C11531E
SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL	C10535E
IC PACKAGE MANUAL	C10943X
GUIDE TO QUALITY ASSUARANCE FOR SEMICONDUCTOR DEVICES	MEI-1202
SEMICONDUCTORS SELECTION GUIDE	X10679E
NEC SEMICONDUCTOR DEVICE RELIABILITY/QUALITY CONTROL SYSTEM-THREE TERMINAL REGULATOR	IEI-1212

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