To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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DATA SHEET

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC317

3-TERMINAL POSITIVE ADJUSTABLE REGULATOR

DESCRIPTION

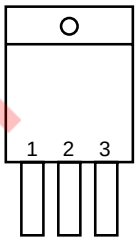
The μPC317 is an adjustable 3-terminal positive voltage regulator, which has 1.5 A capable for the output current. The output voltage can be set any value between 1.3 V and 30 V by two external resistors.

FEATURES

- Output current is up to 1.5 A
- On-chip some protection circuit (over current protection, SOA protection and thermal shut down).

PIN CONFIGURATION (Marking Side)

μPC317HF, μPC317HF-AZ



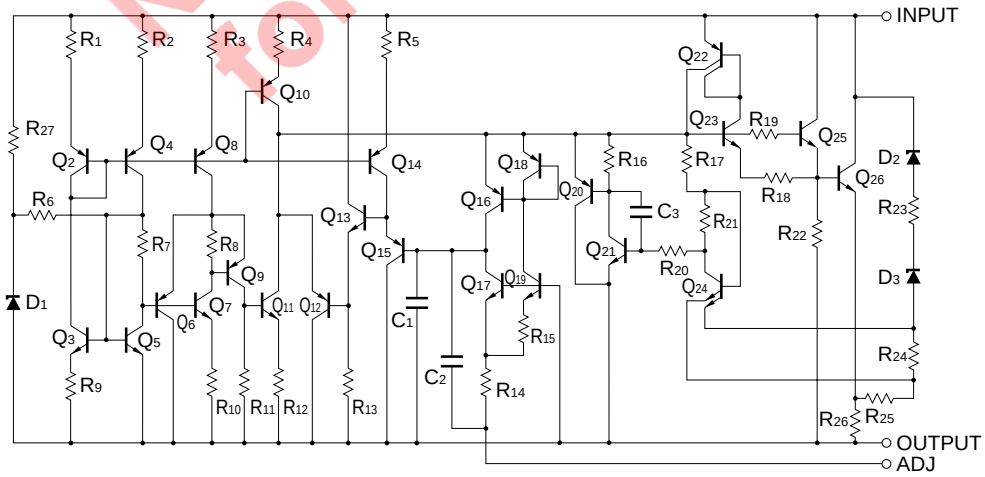
1 : ADJ
2 : OUTPUT
3 : INPUT

<R> ### ORDERING INFORMATION

Part Number	Package	Output Voltage	Marking	Package Type
μPC317HF	3PIN PLASTIC SIP (MP-45G) (Isolated TO-220)	1.3 V to 30 V	C317	Packed in envelope
μPC317HF-AZ Note	3PIN PLASTIC SIP (MP-45G) (Isolated TO-220)	1.3 V to 30 V	C317	Packed in envelope

Note Pb-free (This product does not contain Pb in external electrode.)

EQUIVALENT CIRCUIT



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Printed in Japan

The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

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

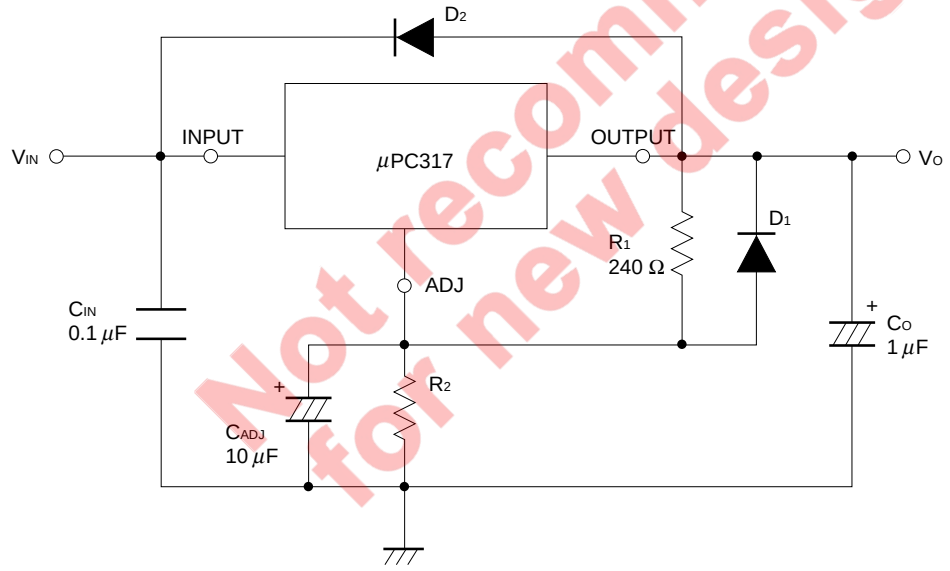
Parameter	Symbol	Rating	Unit
Input-Output Voltage Differential	$V_{IN} - V_O$	40	V
Total Power Dissipation (T_C = 25°C)	P_T	15 Note	W
Operating Ambient Temperature	T_A	–20 to +80	°C
Operating Junction Temperature	T_J	–20 to +150	°C
Storage Temperature	T_{stg}	–65 to +150	°C
Thermal Resistance (junction to case)	$R_{th\ (J-C)}$	5	°C/W
Thermal Resistance (junction to ambient)	$R_{th\ (J-A)}$	65	°C/W

Note Internally limited.

When operating junction temperature rise above 150°C, the internal protection circuit shutdown output voltage.

Caution Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is, the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

TYPICAL CONNECTION



Remark R_1, R_2 : Resistor to set the output voltage.

$$V_O = (1 + \frac{R_2}{R_1}) \bullet V_{REF} + I_{ADJ} \bullet R_2 \cong (1 + \frac{R_2}{R_1}) \bullet V_{REF}$$

V_O (V)	R_2 (Ω : TYP.)
2.5	240
5.0	720
12	2064
24	4368
30	5520

C_{IN} : Need to stop the oscillation for the long input wire length.

C_O : Need to stop the oscillation for the long output wire length.
Improve the transient stability of the output voltage when the load current is suddenly changed.

C_{ADJ} : Improve the ripple rejection and the oscillate rejection.

D_1 : Protect against C_{ADJ} when output pin is shorted.

D_2 : Need for $V_{IN} < V_O$.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Input-Output Voltage Differential	$V_{IN} - V_O$	3		38.7	V
Input Voltage	V_{IN}	4.3		40	V
Output Voltage	V_O	1.3		30	V
Output Current	I_O	0.01		1.5	A
Operating Junction Temperature	T_J	–20		+125	°C

ELECTRICAL CHARACTERISTICS

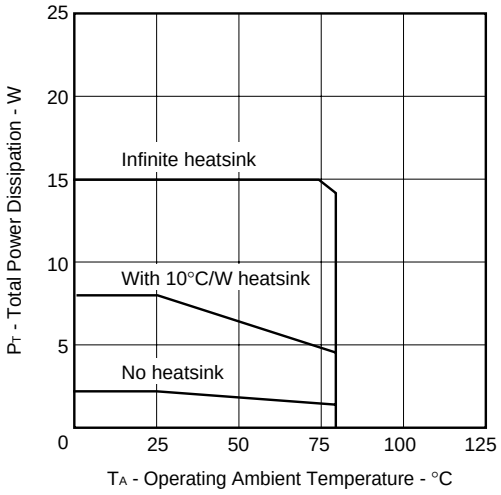
($V_{IN} - V_O$ = 5 V, I_O = 0.5 A, 0°C ≤ T_J ≤ +125°C, unless otherwise specified.)

Parameter	Symbol	Conditions		MIN.	TYP.	MAX.	Unit
Line Regulation	REG_{IN}	T_J = 25°C, 3 V ≤ ($V_{IN} - V_O$) ≤ 40 V, I_O = 0.1 A			0.01	0.04	%/V
		3 V ≤ ($V_{IN} - V_O$) ≤ 40 V, I_O = 0.1 A			0.02	0.07	%/V
Load Regulation	REG_L	T_J = 25°C	V_O ≤ 5 V		5	25	mV
		10 mA ≤ I_O ≤ 1.5 A	V_O ≥ 5 V		0.1	0.5	%
		10 mA ≤ I_O ≤ 1.5 A	V_O ≤ 5 V		20	70	mV
			V_O ≥ 5 V		0.3	1.5	%
Thermal Regulation	REG_{TH}	T_A = 25°C, 0.2 ms ≤ t ≤ 20 ms Note			0.01	0.07	%/W
ADJ pin Output Current	I_{ADJ}				50	100	μA
I_{ADJ} Change	ΔI_{ADJ}	10 mA ≤ I_O ≤ 1.5 A, P_T ≤ 15 W			0.4	5	μA
Reference Voltage	V_{REF}	10 mA ≤ I_O ≤ 1.5 A, P_T ≤ 15 W		1.20	1.25	1.30	V
Temperature Stability of V_{REF}	$\Delta V_{REF}/\Delta T$				0.7		%
Minimum Load Current	$I_{OMIN.}$	$V_{IN} - V_O$ = 40 V			4.7	10	mA
Peak Output Current	I_{Opeak}	5 V ≤ ($V_{IN} - V_O$) ≤ 15 V		1.5	2.2	2.9	A
		$V_{IN} - V_O$ = 40 V		0.15	0.8		A
Output Noise Voltage (RMS)	V_n	T_J = 25°C, 10 Hz ≤ f ≤ 10 kHz			0.001		%
Ripple Rejection	R • R	T_J = 25°C, ΔV_{IN} = 1 $V_{r.m.s.}$	C_{ADJ} = 0 μF		48		dB
		f = 120 Hz, V_O = 10 V	C_{ADJ} = 10 μF	56	65		dB

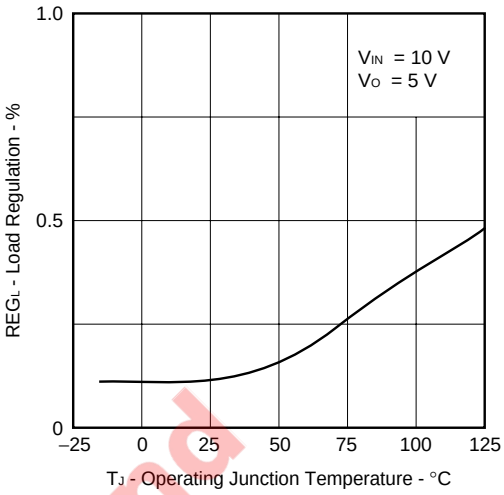
Note Pulse testing Duty Cycle ≤ 2%

TYPICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified. Reference Values.)

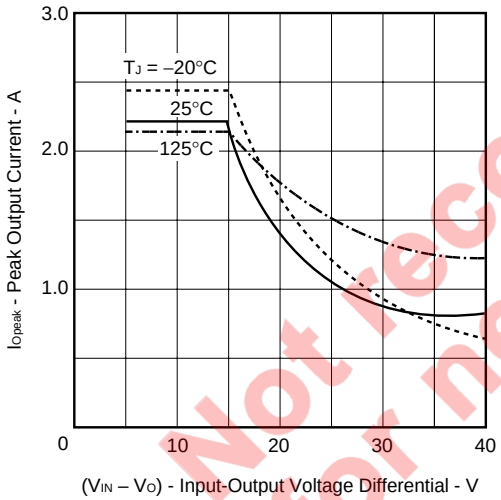
P_T vs T_A



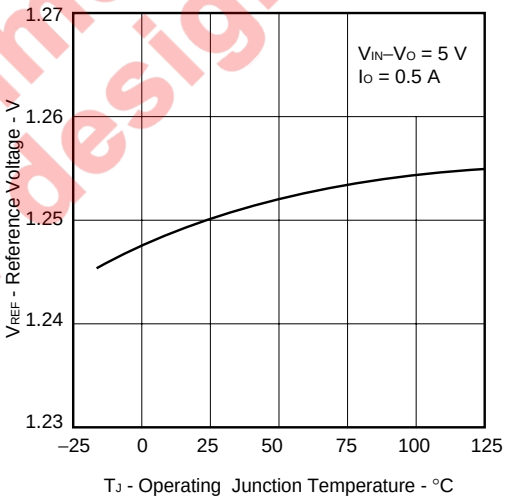
REG_L vs T_J



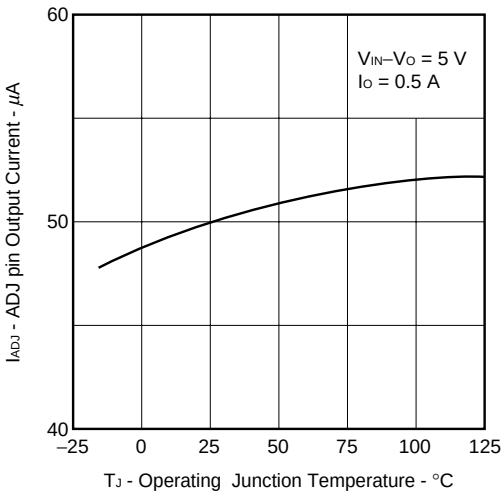
I_{Opeak} vs (V_{IN} – V_O)



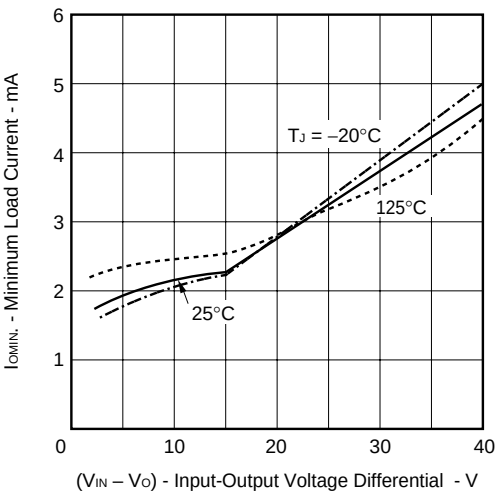
V_{REF} vs T_J



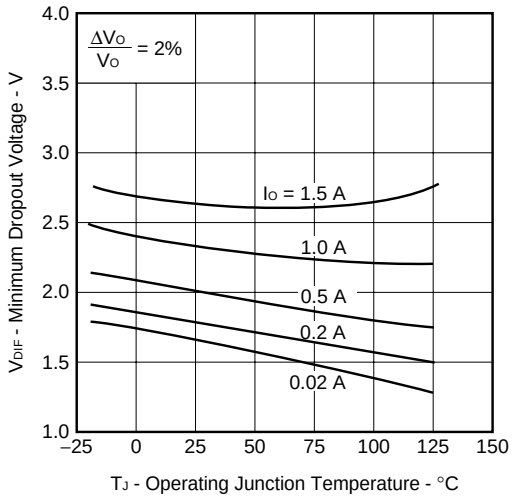
I_{ADJ} vs T_J



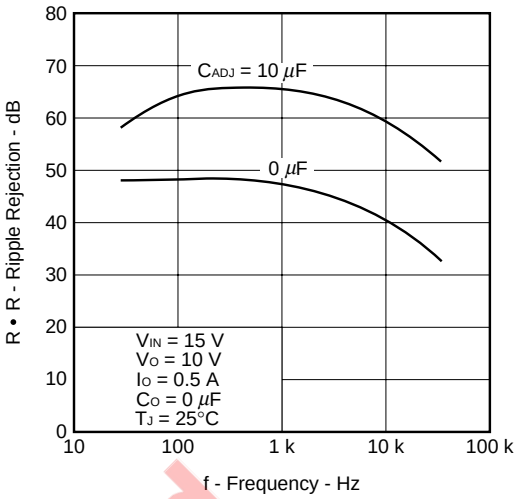
$I_{OMIN.}$ vs (V_{IN} – V_O)



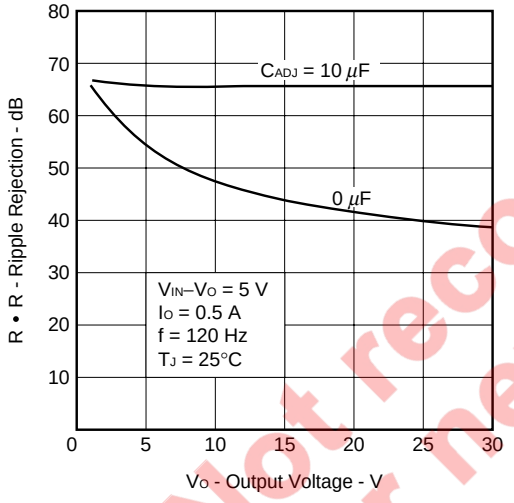
V_{DIF} vs T_J



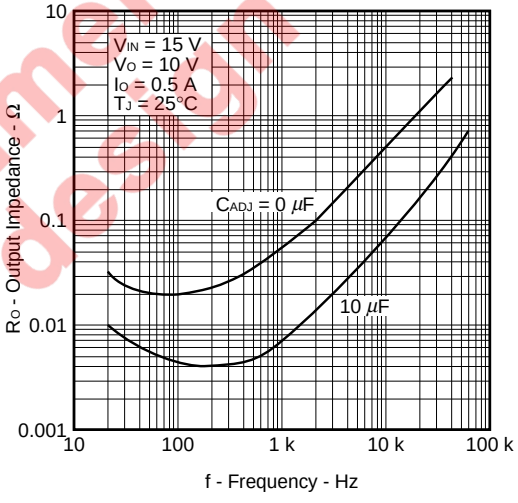
R • R vs f



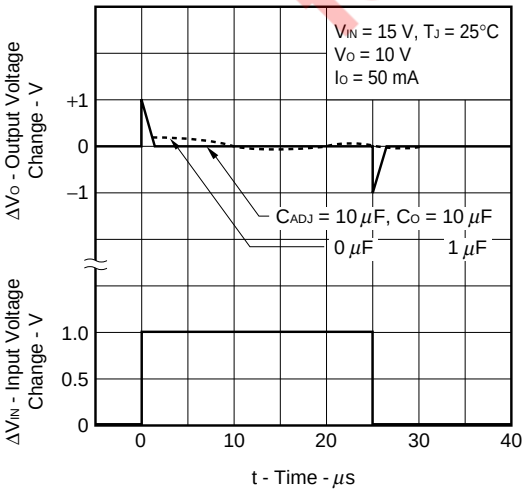
R • R vs V_O



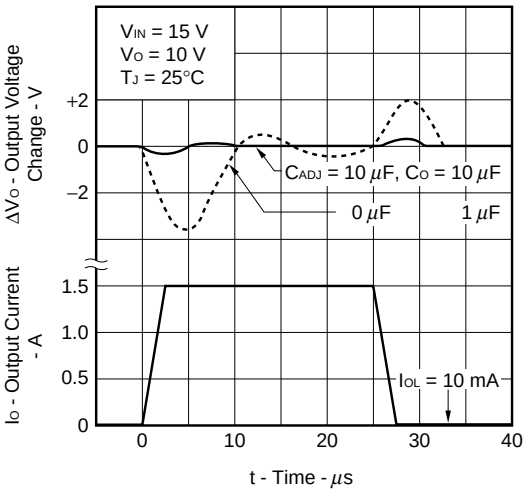
R_O vs f



LINE TRANSIENT RESPONSE

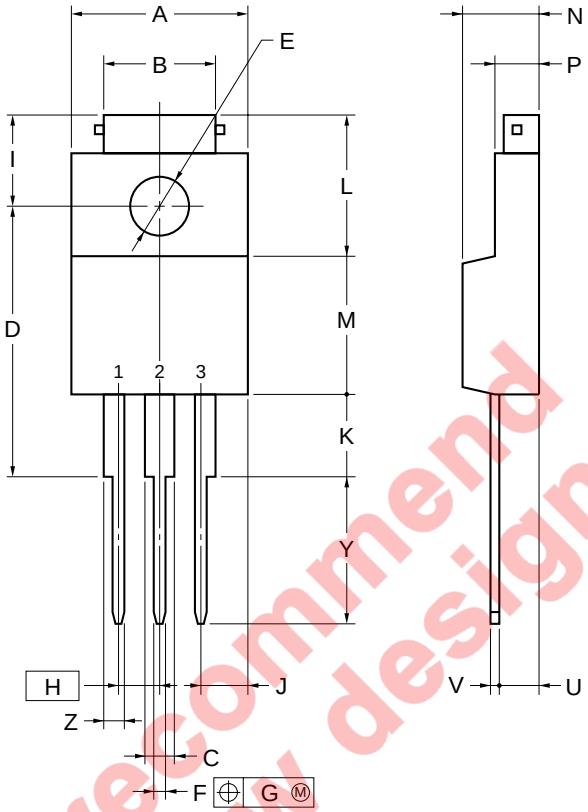


LOAD TRANSIENT RESPONSE



PACKAGE DRAWING

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

<R> RECOMMENDED SOLDERING CONDITIONS

The μPC317 should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC Electronics sales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (http://www.necel.com/pkg/en/mount/index.html)

Through-hole devices

μPC317HF: 3PIN PLASTIC SIP (MP-45G) (Isolated TO-220)

Process	Conditions	Recommend
Wave soldering (only to leads)	Solder temperature: 260°C or below, Flow time: 10 seconds or less.	WS60-00-1
Partial heating method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (Per each pin).	P350

μPC317HF-AZ: 3PIN PLASTIC SIP (MP-45G) (Isolated TO-220) **Note**

Process	Conditions	Recommend
Wave soldering (only to leads)	Solder temperature: 260°C or below, Flow time: 10 seconds or less.	WS60-00-1
Partial heating method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (Per each pin).	P350

Note Pb-free (This product does not contain Pb in external electrode.)

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.

<R> REFERENCE DOCUMENTS

Document Name	Document No.
Usage of Three-Terminal Regulators User's Manual	G12702E
Semiconductor Device Mount Manual	http://www.necel.com/pkg/en/mount/index.html
Review of Quality and Reliability Handbook Information	C12769E

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  "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": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

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