Panasonic

AN6530, AN6531

4-pin Positive Adjustable Voltage Regulator

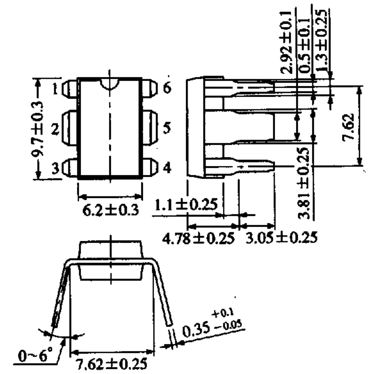
■ Overview

The AN6530 and the AN6531 are the monolithic 4-pin positive adjustable voltage regulators. They provide any stabilized output voltage between 5V and 30V with external resistor, and are ideal for power circuits with current capacitance up to 0.5A. Moreover, these voltage regulators are highly reliable with various internal protection circuits. The AN6530 is in a 6-pin DIL plastic package, and the AN6531 is in a 4-pin SIL plastic package.

■ Features

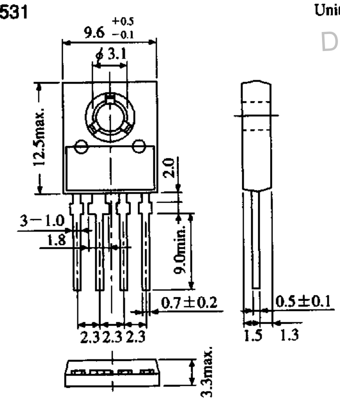
- Wide range of output voltage : V_O=5 to 30V
- Internal thermal overload protection
- Internal short-circuit protection
- Output transistor safe area compensation

AN6530 Unit : mm



6-pin DIL Plastic Package with Fin (HDIP006-P-0300)

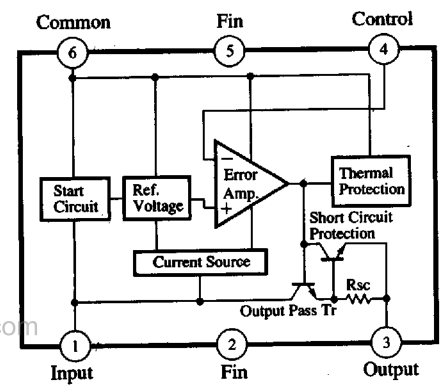
AN6531 Unit : mm



4-pin SIL Plastic Package with Fin (HSIP004-P-0000)

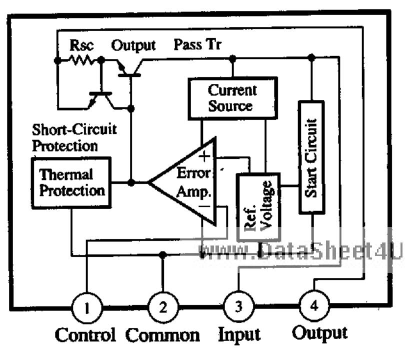
■ Block Diagram

AN6530



Note) Pin② and ⑤ are electrically in common, and can be connected as Common like Pin⑥. Always use Pin⑥ as Common.

AN6531



Absolute Maximum Ratings (Ta = 25℃)

Parameter		Symbol	Rating	Unit
Supply voltage		V_{CC}	40	V
Supply current		I_{CC} *1	1.5	A
Power dissipation	AN6530	P_D	1.5 *2	W
	AN6531		7.5	
Operating ambient temperature		T_{opr}	−20 to +75	℃
Storage temperature		T_{stg}	−55 to +150	℃

*1 The internal circuit is provided with a current limiting circuit.
*2 Maximum power dissipation value in the case where there is no heat sink (The value varies with the external heat dissipation state.)

Electrical Characteristics (Ta = 25℃)

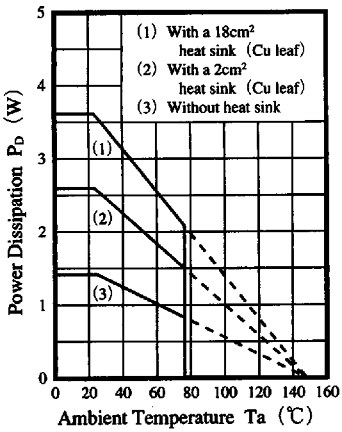
Parameter	Symbol	Condition		min	typ	max	Unit
Output voltage tolerance	V_O	$V_I = V_O + 3V$ to $V_O + 15V$, $I_O = 5$ to $350mA$, $T_j = 25℃$		—	—	4	%
Line regulation	REG_{IN}	$V_O = 5V$, $I_O = 200mA$, $V_I = 7.5$ to $25V$, $T_j = 25℃$		—	—	1	%
		$V_O = 18V$, $I_O = 5mA$, $V_I = 21$ to $33V$, $T_j = 25℃$		—	—	0.75	%
		$V_O = 18V$, $I_O = 200mA$, $V_I = 21$ to $25V$, $T_j = 25℃$		—	—	0.67	%
Load regulation	REG_L	$V_O = 5V$, $V_I = 12V$, $I_O = 5$ to $500mA$, $T_j = 25℃$		—	—	1	%
Bias current	I_{bias}	$T_j = 25℃$		—	3	5	mA
Control pin current	I_{cont}	$T_j = 25℃$		—	1	8	μA
Ripple rejection ratio	RR	$V_I = 8$ to $18V$, $V_O = 5V$, $f = 120Hz$		62	80	—	dB
Output noise voltage	V_{no}	$V_O = 5V$, $f = 10Hz$ to $100kHz$		—	40	—	μV
Minimum input/output voltage difference	$V_{DIF(min.)}$	$I_O = 500mA$, $T_j = 25℃$		—	2	—	V
Short circuit current	I_{OS}	$V_I = 35V$, $V_O = 5V$, $T_j = 25℃$		—	50	600	mA
Peak output current	I_{OP}	$V_O = 5V$, $T_j = 25℃$		0.4	1	1.4	A
Output voltage temperature coefficient	$\Delta V_O/Ta$	$V_O = 5V$	$T_j = -55$ to $+25℃$	—	0.5	—	mV/℃
		$I_O = 5mA$	$T_j = 25$ to $150℃$	—	−0.5	—	mV/℃
Control pin voltage	V_{cont}	$T_j = 25℃$		4.8	5	5.2	V

Note1) The specified condition Tj = 25℃ means that the test should be carried out with the test time so short (within 10ms) that the drift in characteristic value due to the rise in chip junction temperature can be ignored.
Note2) When not specified, $V_I = 10V$, $V_O = 5V$, $I_O = 350mA$, $C_I = 0.33\,\mu F$ and $C_O = 0.1\,\mu F$.

Characteristics Curve

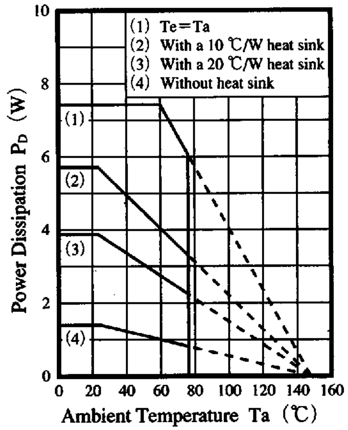
AN6530 Characteristics

$P_D - Ta$



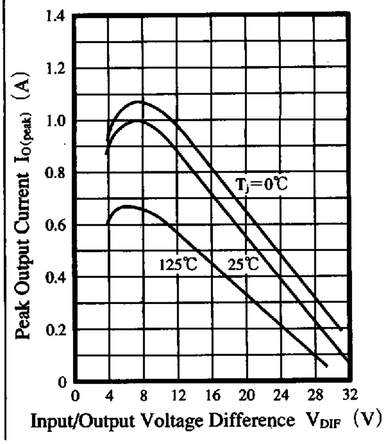
AN6531 Characteristics

$P_D - Ta$

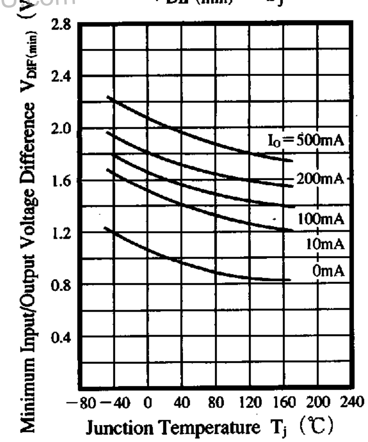


Common Characteristics

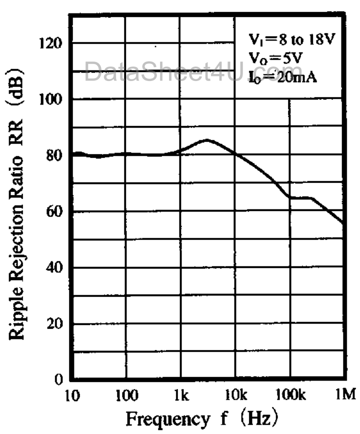
$I_{O\ (peak)} - V_{DIF}$



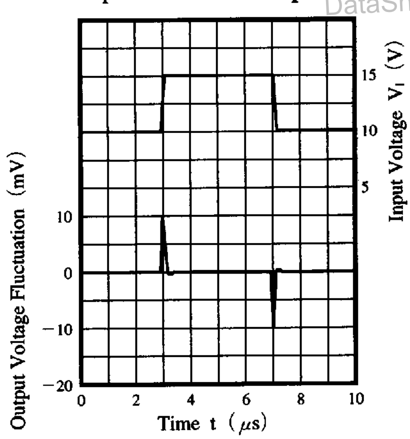
$V_{DIF(min)} - T_j$



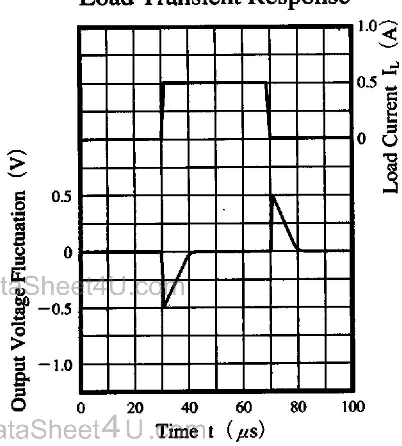
RR − f



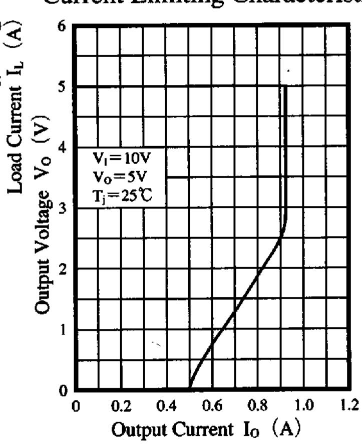
Input Transient Response



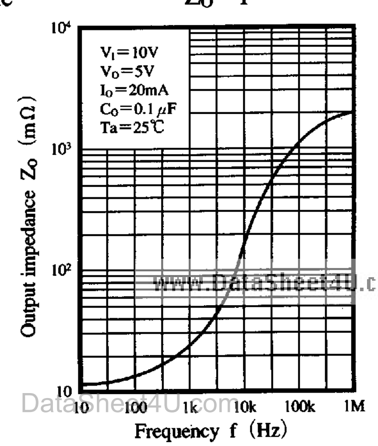
Load Transient Response



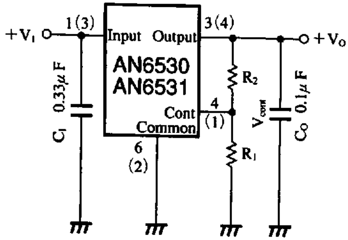
Current Limiting Characteristic



$Z_O - f$



Basic Regulator Circuit



● $V_O = V_{cont}\left(\frac{R_1+R_2}{R_1}\right)$
$(V_{cont} \simeq 5V, R_1 = 5k\Omega)$

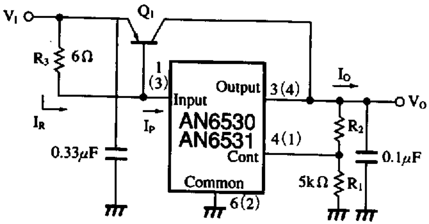
● C_I is necessary when the line of V_I is long.

● C_O improves the transient response.

( ) Pin No. : AN6531

Application Circuits

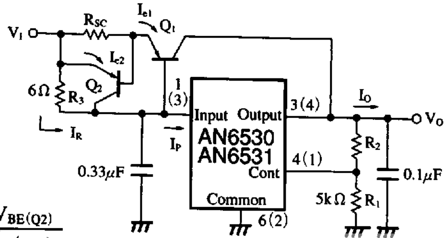
(1) Current Boost Circuit



$$R_3 = \frac{V_{BE(Q1)} \cdot \beta}{(\beta+1)I_P - I_O}$$

( ) Pin No. : AN6531

(2) Current Boost Circuit (With Current Limiting Circuit)



$$R_{SC} = \frac{V_{BE(Q2)}}{I_{e1(max.)}}$$

$$R_3 = \frac{V_{BE(Q1)} + I_{e1}R_{SC}}{I_O - I_{e1}}$$

$$I_{e2(max.)} = I_{P(max.)} - \frac{V_{BE(Q1)} + _{BE(Q2)}}{R_3}$$