

AN6535

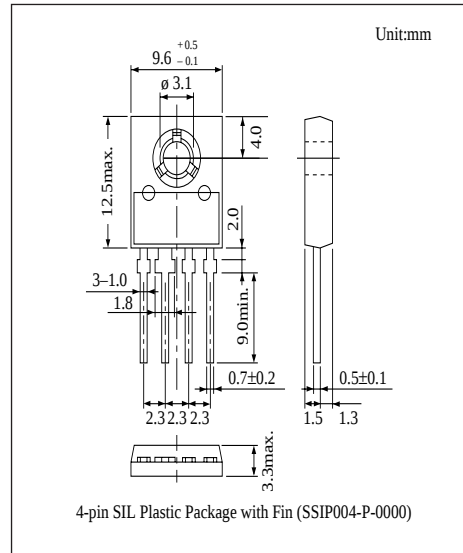
4-pin Negative Adjustable Voltage Regulator

■ Overview

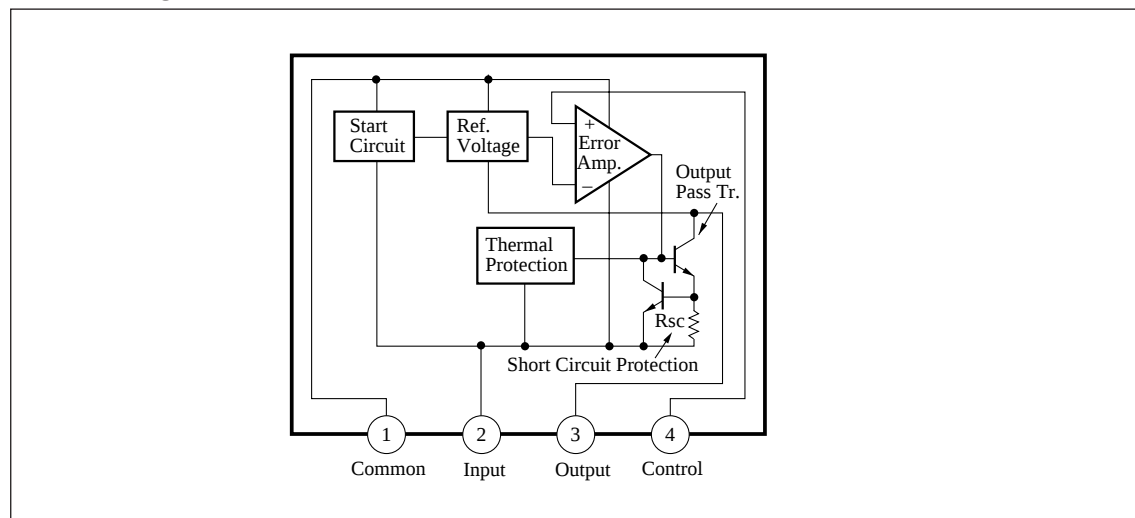
The AN6535 is a monolithic 4-pin negative adjustable voltage regulator. With an external resistor, it provides any stabilized output voltages between -5V and -30V , and is optimum for the power circuits with a current capacitance of up to 0.5A . With various protective circuits built in, it has high reliability and is provided in a 4-lead SIL plastic package.

■ Features

- Wide range of output voltages: $V_{O} = -5$ to -30V
- Internal thermal overload protection
- Internal short-circuit protection
- Output transistor safe area compensation



■ Block Diagram



■ Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V _{CC}	−40	V
Supply current	I _{CC} *1	1	A
Power dissipation	P _D	7.5	W
Operating ambient temperature	T _{opr}	−20 to +80	°C
Storage	T _{stg}	−55 to +150	°C

*1 The internal circuit is provided with a current limiting circuit.

*2 Maximum power dissipation value when there is no heat sink (The value varies depending on the external heat dissipation state)

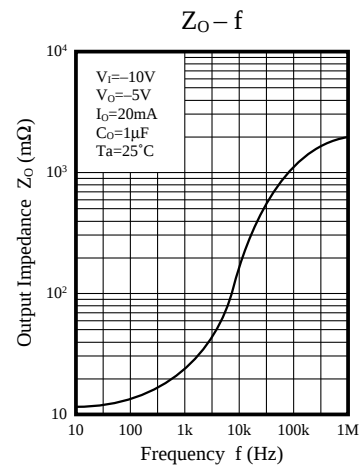
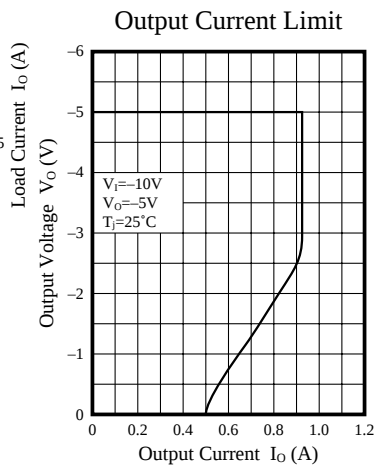
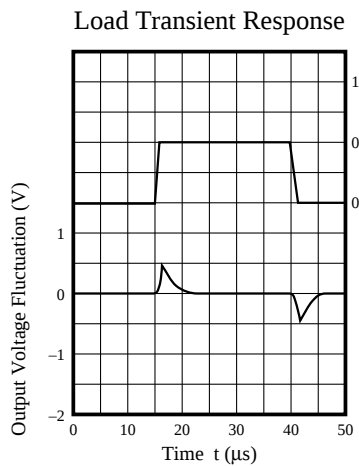
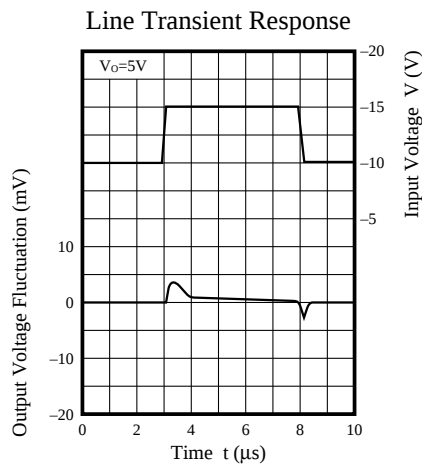
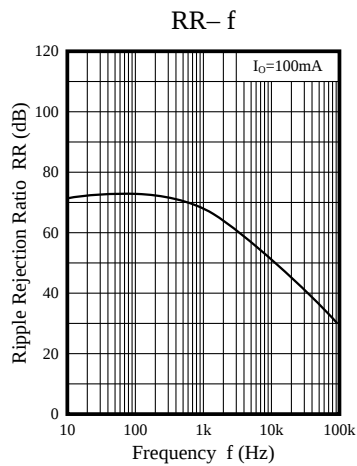
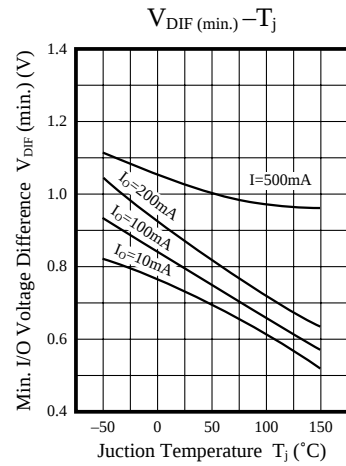
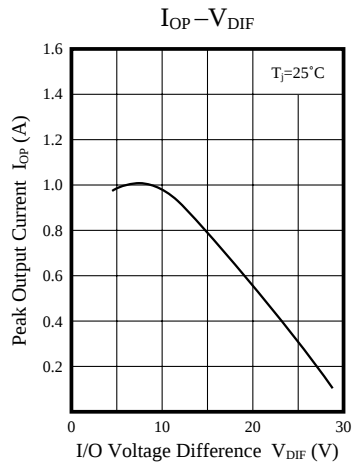
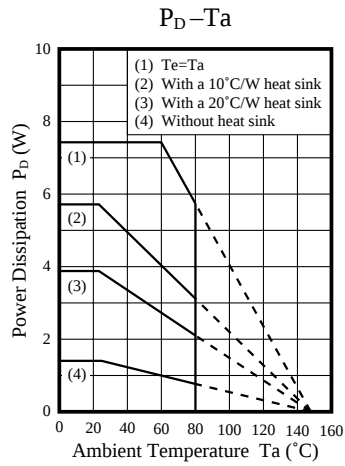
■ Electrical Characteristics (Ta=25°C)

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°C	—	—	4	%
Line regulation	REG _{IN}	V _O =−5V, I _O =200mA, V _I =−7.5 to −25V, T _j =25°C	—	—	1	%
		V _O =−18V, I _O =5mA, V _I =−21 to −33V, T _j =25°C	—	—	0.75	%
		V _O =−18V, I _O =200mA, V _I =−21 to −25V, T _j =25°C	—	—	0.67	%
		V _O =−18V, I _O =200mA, V _I =−21 to −25V, T _j =25°C	—	—	0.67	%
Load regulation	REG _L	I _O =5 to 500mA T _j =25°C	—	—	1	%
Bias current	I _{Bias}	T _j =25°C	—	1.5	3	mA
Control pin current	I _{cont}	T _j =25°C	—	—	3	μA
Ripple rejection ratio	RR	V _I =−8 to −18V, V _O =−5V, f=120Hz	60	—	—	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°C	—	1.1	—	V
Short-circuit current	I _{OS}	V _I =−35V, V _O =−5V, T _j =25°C	—	100	600	mA
Peak output current	I _{OP}	V _O =−5V, T _j =25°C	0.4	0.8	1.4	A
Output voltage temperature coefficient	ΔV _O /Ta	V _O =−5V I _O =5mA	T _j =−20 to +25°C	—	0.2	mV/°C
			T _j =25 to 150°C	—	−0.3	
Control pin voltage	V _{cont}	T _j =25°C	−3.12	−3	−2.88	V

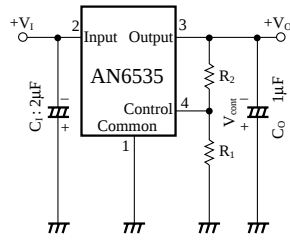
Note 1) The specified condition T_j=25°C means that the test should be conducted with each test time reduced (within 10 ms) so that the drift in the characteristic value due to a temperature rise at chip junction can be ignored.

Note 2) Unless otherwise specified, V_I=−10V, V_O=−5V, I_O=350mA, C_I=2μF, and C_O=1μF

■ Characteristics Curve



■ Basic Regulator Circuit



$$V_0 = V_{\text{cont}} \left(\frac{R_1 + R_2}{R_1} \right)$$

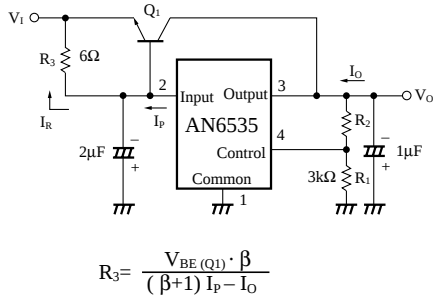
$$(V_{\text{cont}} \cong 3\text{V}, R_1 = 3\text{k}\Omega)$$

C_1 : Necessary when the V_1 line is long.

C_0 : Improves the transient response.

■ Application Circuits

(1) Current Boost Circuit



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

