ADJUSTABLE 3-TERMINAL POSITIVE VOLTAGE REGULATOR

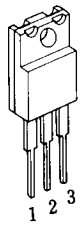
■ GENERAL DESCRIPTION

The NJM317 is adjustable 3-terminal positive voltage regulator IC. It is capable of adjustment from typical 1.25V to 37V output voltage range with two resistors. It is capable of supplying in excess of 1.5A with heat sink.

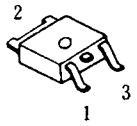
The NJM317 is suitable for the power supply of VCR, CD player and others.

■ PACKAGE OUTLINE

(TO-220F)



(TO-252)



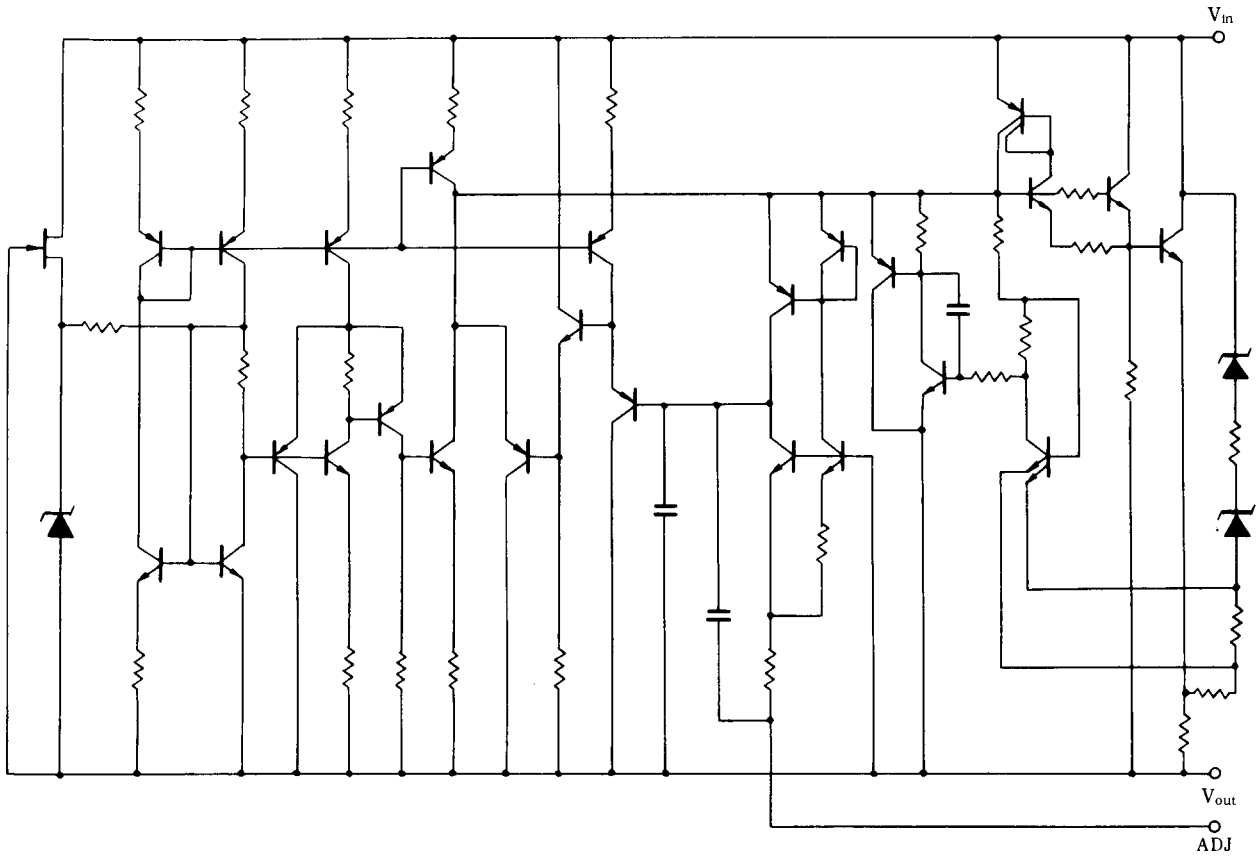
NJM317F **NJM317DL1**

1. Adjustment
2. Output
3. Input

■ FEATURES

- Operating Voltage (+4.25V to +40V)
- Adjustable Output Down to 1.2V
- Guarantee'd 1.5A Output Current
- Line Regulation typically (0.01%/V)
- Load Regulation typically (0.1%)
- 80dB Ripple Rejection
- Package Outline TO-220F
- Bipolar Technology

■ EQUIVALENT CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

(T_a=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Input-Output Differential Voltage	V_{IN} - V_O	40 (T_C=25ºC)	V
Power Dissipation	P_D	TO-220F 16 (T_C≤70ºC) TO-252 10 (Tc≤25ºC) 1 (Ta≤25ºC)	W
Operating Temperature Range (Junction) (Ambient)	T_{opr} (j) T_{opr} (a)	-40 to +150 -40 to +85	ºC
Storage Temperature Range	T_{stg}	-50 to +150	ºC

■ THERMAL CHARACTERISTICS

			TO-220F	TO-252	
Thermal Resistance	Junction-To-Ambient	θja	60	125	ºC/W
	Junction-To-Case	θjc	5	12.5	

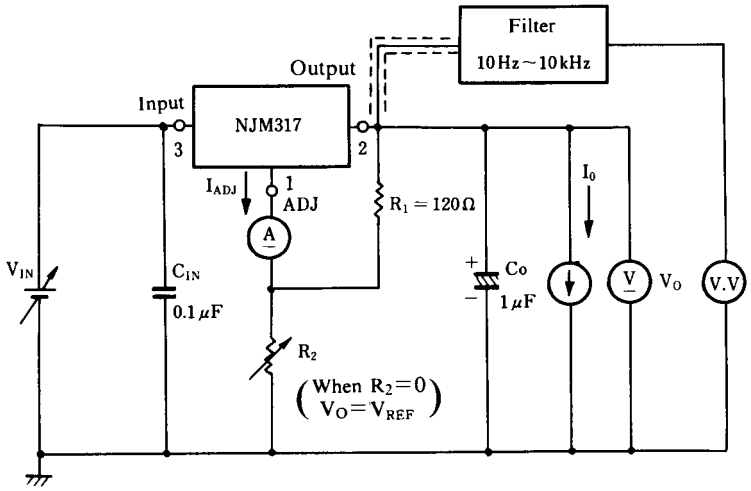
■ ELECTRICAL CHARACTERISTICS (V_{IN} - V_O =5V, I_O=500mA, C_{IN}=0.1µF, C_O=1µF, Tj=25°C)

Measurement is to be conducted in pulse testing.

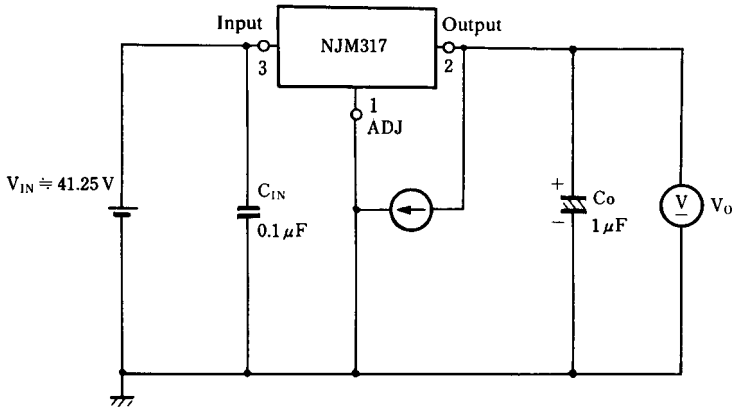
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Reference Voltage	V_{REF} V_{REF}-V_{IN} V_{REF}-I_O	3V ≤ (V_{IN} - V_O) ≤ 40V, I_O=100mA 10mA ≤ I_O ≤ 1.5A (TO-220F) 10mA ≤ I_O ≤ 500mA (TO-252)	1.2 1.2 1.2 1.2	1.25 1.25 1.25 1.25	1.3 1.3 1.3 1.3	V
Reference Voltage Thermal Change	ΔV_{REF}-T	0 ≤ Tj ≤ 125ºC	-	5	-	mV
Adjustment Pin Current	I_{ADJ}		-	50	100	µA
Adjustment Pin Current Change	ΔI_{ADJ} - V_{IN} ΔI_{ADJ} - I_O	3V ≤ (V_{IN} - V_O) ≤ 40V, I_O=100mA 10mA ≤ I_O ≤ 1.5A (TO-220F) 10mA ≤ I_O ≤ 500mA (TO-252)	- - -	0.2 0.2 0.2	5 5 5	µA
Line Regulation	ΔV_O - V_{IN}	3V ≤ (V_{IN} - V_O) ≤ 40V, I_O=100mA	-	0.01	0.04	%/V
Load Regulation	ΔV_O - I_O	10mA ≤ I_O ≤ 1.5A (TO-220F) 10mA ≤ I_O ≤ 500mA (TO-252) V_O ≤ 5V V_O > 5V	 - -	 5 0.1	 25 0.5	 mV %
Minimum Load Current	$I_{O(MIN)}$	(V_{IN} - V_O) = 40V	-	3.5	10	mA
Peak Output Current	$I_{O(PEAK)}$	5V ≤ (V_{IN} - V_O) ≤ 15V (V_{IN} - V_O) = 40V	1.5 0.15	2.2 0.4	- -	A
RMS Output Noise Voltage	V_{NO}	10Hz ≤ f ≤ 10kHz (RMS)	-	0.001	-	%/V_O
Ripple Rejection Ratio	RR	V_O=10V, f= 120Hz, ΔV_{IN} =1Vrms C_{ADJ}=0 C_{ADJ}=10µF	 - 66	 65 80	 - -	dB

■ TEST CIRCUIT

1) (Reference Voltage Thermal Change), (Adjustment Pin Current Change), (Line Regulation), (Load Regulation), (Peak Output Current), (RMS Output Noise Current)

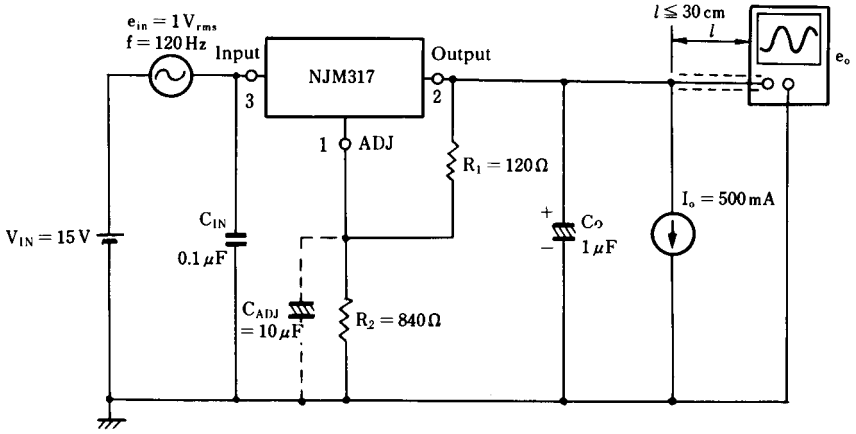


2) Minimum Load Current



I_{OMIN}: Minimum Io for
$V_O = V_{REF}$ (Typical 1.25V)
($V_{IN} = 40 + V_{REF}$)

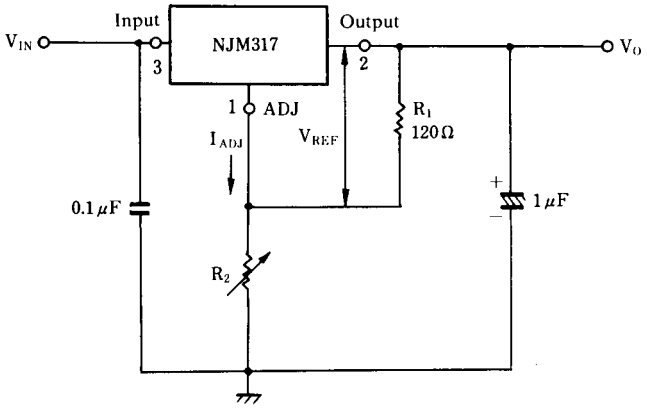
3) Ripple Rejection



Ripple Rejection = $20\log_{10}\left(\frac{e_{IN}}{e_o}\right)$ [dB]

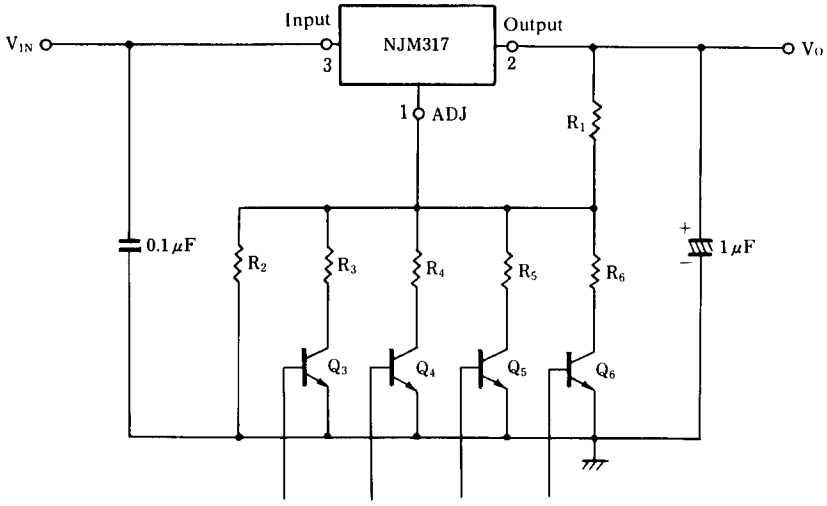
■ TYPICAL APPLICATIONS

1) V_O = 1.25V to 37V Adjustable Voltage Regulator



$$V_O = V_{REF} \times \left(1+\frac{R_2}{R_1}\right) + R_2 \times I_{ADJ}$$

2) Selected Output Voltage



Selective Signal Inputs

The transistors Q_3 are switched by selective signal inputs and the output voltage V_O is controlled by the transistor on or off.

(Example)

When all transistor is off,

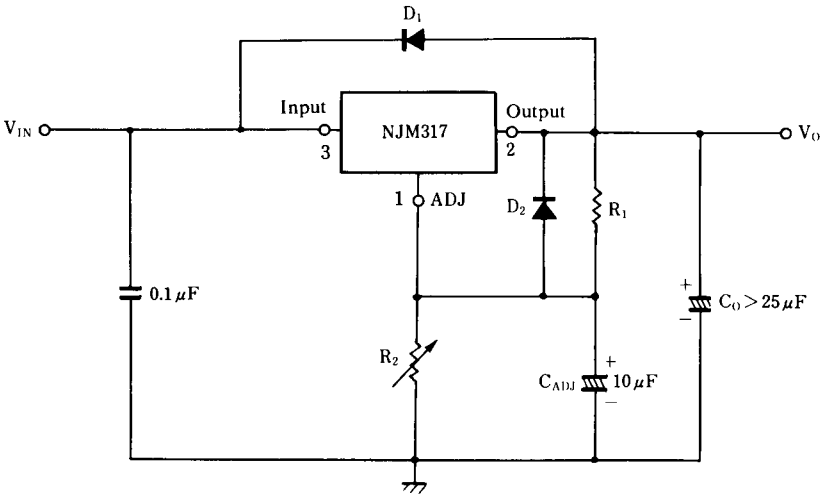
$$V_O \fallingdotseq V_{REF} \times \left(1+\frac{R_2}{R_1}\right)$$

When the transistor Q_3 is on, and others are off.

$$V_O \fallingdotseq V_{REF} \times \left\{1+\frac{R_2 \times R_3}{(R_2+R_3)\times R_1}\right\}$$

*I_{ADJ} ignore.

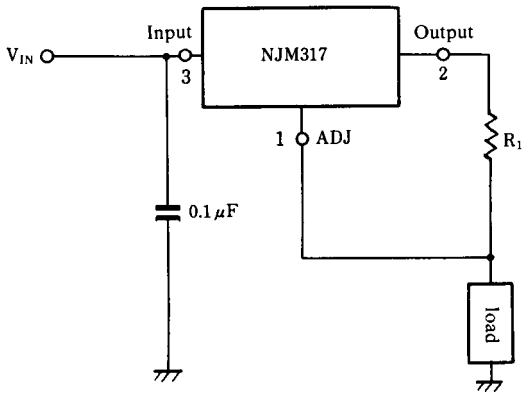
3) Regulater with Protection Diodes



D_1 protects about C_O

D_2 protects about C_{ADJ}

4) Constant Current Regulator



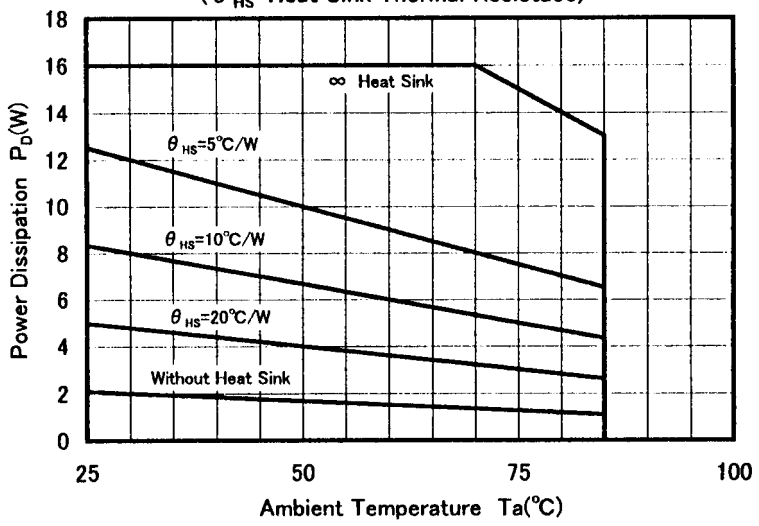
$R_1 \leq 125\Omega$

$10mA \leq I_O \leq 1.5A$

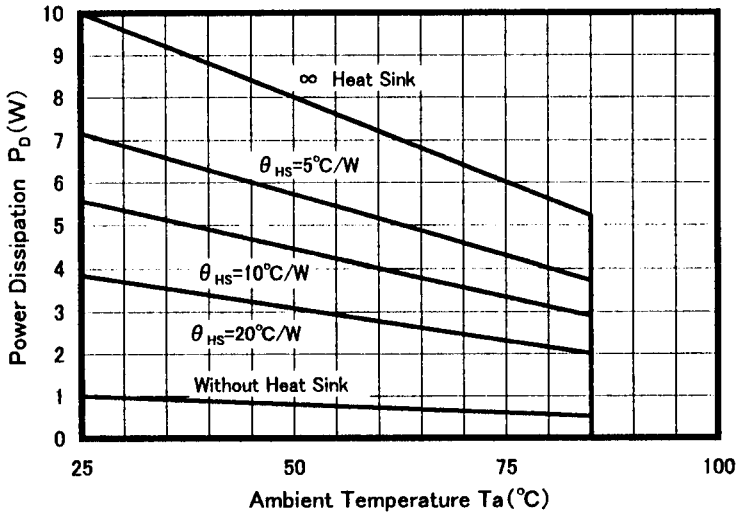
$I_O = \frac{V_{REF}}{R_1}$

NJM317FA

(θ_{HS}=Heat Sink Thermal Resistace)

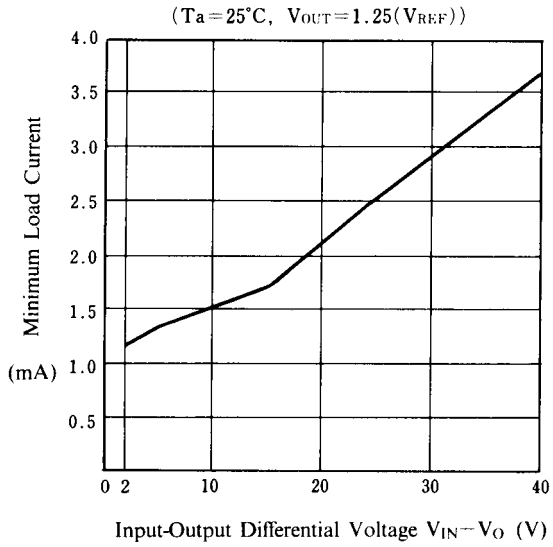


NJM317DL1

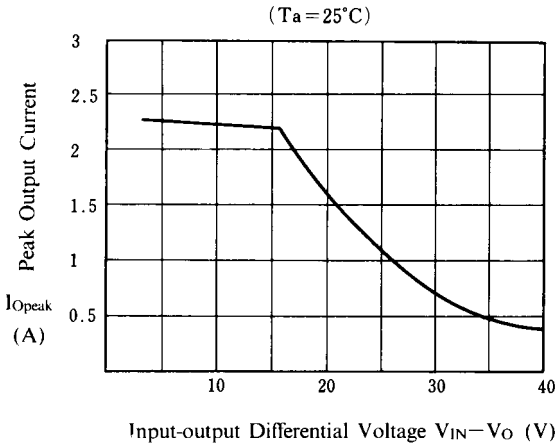


■ TYPICAL CHARACTERISTICS

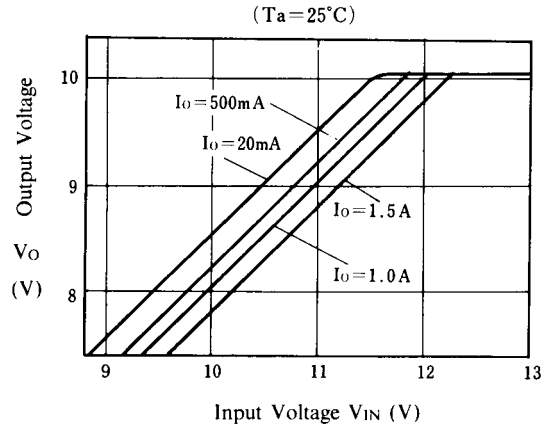
Minimum Load Current



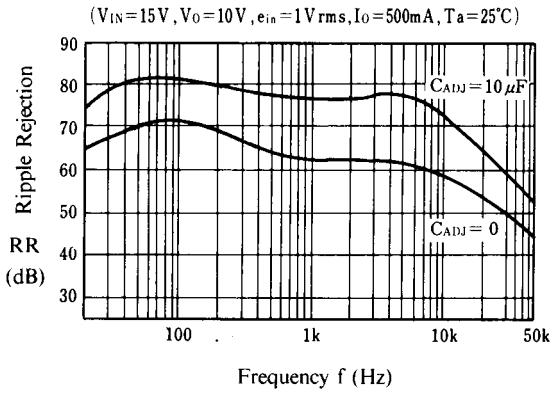
Peak Output Current vs. Input-Output Differential Voltage



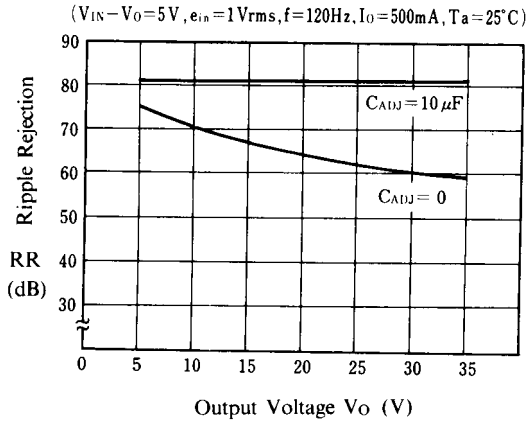
Output Voltage vs. Input Voltage.



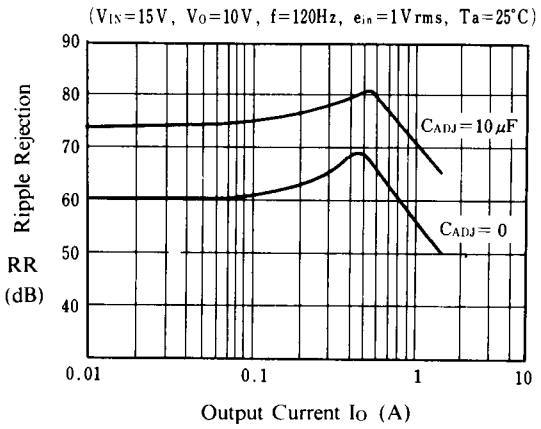
Ripple Rejection vs. Frequency



Ripple Rejection vs. Output Voltage

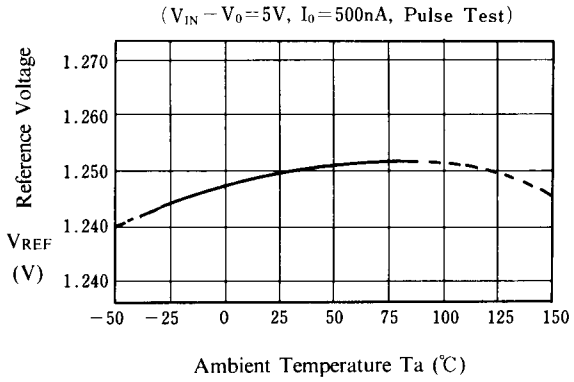


Ripple Rejection vs. Output Current

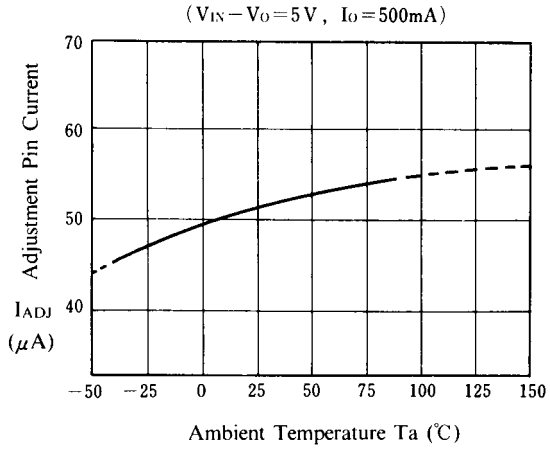


■ TYPICAL CHARACTERISTICS

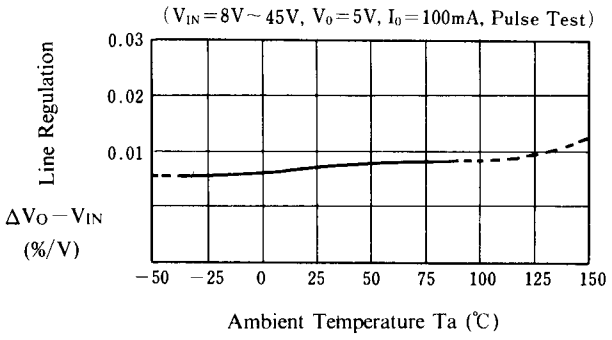
Reference Voltage vs. Temperature



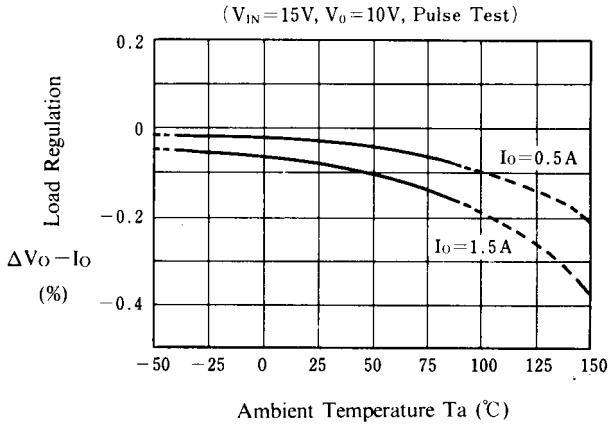
Adjustment Pin Current vs. Temperature



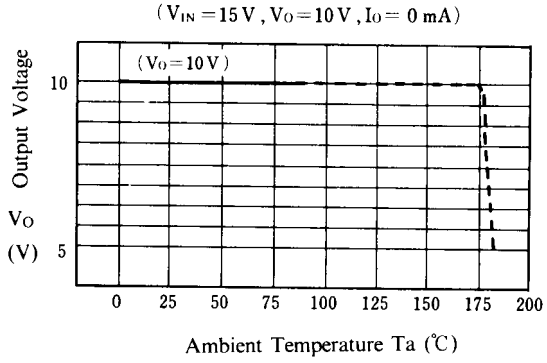
Line Regulation vs. Temperature



Load Regulation vs. Temperature



Thermal Shutdown



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