

3-TERMINAL NEGATIVE VOLTAGE REGULATOR

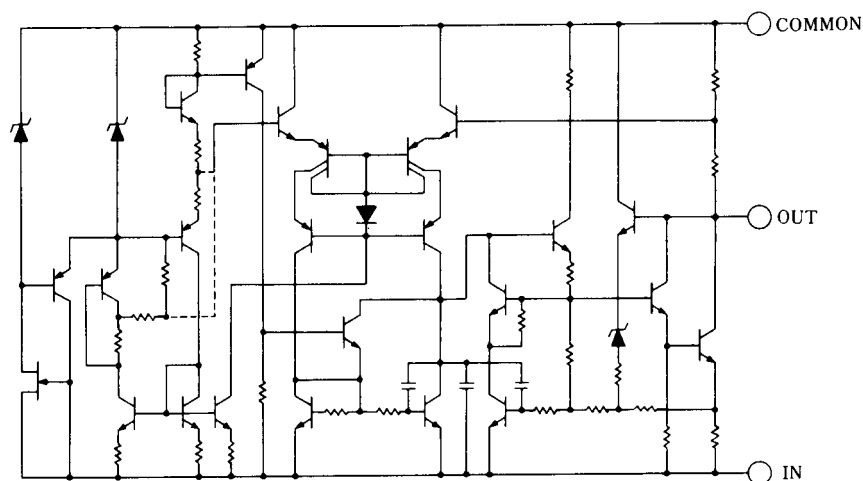
■ GENERAL DESCRIPTION

The NJM79M00 series of 3-Terminal Negative Voltage Regulators are constructed using the New JRC Planar epitaxial process. These regulators employ internal current limiting, thermal shutdown and safearea compensation, making them essentially indestructible. If adequate heat sinking is provided, they can deliver up to 500mA output current. They are intended as fixed voltage regulators in a wide range of applications including local (on-card) regulation for elimination of noise and distribution problems associated with single point regulation. In addition to use a fixed voltage regulators, these devices can be used with external components to obtain adjustable output voltages and currents.

■ FEATURES

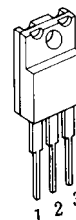
- Internal Short Circuit Current Limit
- Internal Thermal Overload Protection
- Excellent Ripple Rejection
- Guarantee'd 500mA Output Current
- Output Capacitor recommended electrolytic capacitor
- Package Outline TO-220F, TO-252
- Bipolar Technology

■ EQUIVALENT CIRCUIT

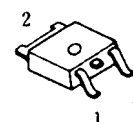


■ PACKAGE OUTLINE

(TO-220F)



(TO-252)



NJM79M00FA

1. COMMON
2. IN
3. OUT

NJM79M00DL1A

1. COMMON
2. IN
3. OUT

(note) The radiation fin is connected to Pin 2.

■ ABSOLUTE MAXIMUM RATINGS

(T_a=25°C)

PARAMETER	SYMBOL	MAXIMUM RATINGS		UNIT
Input Voltage	V _{IN}	79M05 to 79M09 79M12 to 79M15 79M18 to 79M24	-35 -35 -40	V
Storage Temperature Range	T _{stg}	TO-220F -40 to +150 TO-252 -40 to +150		°C
Operating Temperature Range		Operating Junction Temperature Operating Junction Temperature	T _j T _{opr} TO-220F -40 to +150 TO-252 -40 to +150 -40 to +85	°C
Power Dissipation	P _D	7.5(T _C ≤75°C)		W

■ ELECTRICAL CHARACTERISTICS (T_j=25°C, C_{IN}=2.2μF, C_O=1.0μF)

Measurement is to be conducted in pulse testing

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M05FA/DL1A						
Output Voltage	V _O	V _{IN} =-10V, I _O =0.35A	-4.8	-5.0	-5.2	V
Quiescent Current	I _Q	V _{IN} =-10V, I _O =0mA	-	2.2	5.0	mA
Load Regulation	ΔV _O - I _O	V _{IN} =-10V, I _O =0.005 to 0.5A	-	35	50	mV
Line Regulation	ΔV _O - V _{IN}	V _{IN} =-7 to -25V, I _O =0.35A	-	5	50	mV
Ripple Rejection	RR	V _{IN} =-10V, I _O =0.35A, e _{in} =2V _{P-P} , f=120Hz	50	58	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =-10V, I _O =0.35A, BW=10Hz to 100kHz,	-	100	-	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-10V, I _O =5mA	-	-0.4	-	mV/°C

■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, $C_{IN}=2.2\mu\text{F}$, $C_O=1.0\mu\text{F}$)

Measurement is to be conducted in pulse testing.

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M06FA/DL1A						
Output Voltage	V_O	$V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$	-5.75	-6.0	-6.25	V
Quiescent Current	I_Q	$V_{IN}=-11\text{V}$, $I_O=0\text{mA}$	-	2.2	5.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN}=-11\text{V}$, $I_O=0.005$ to 0.5A	-	35	60	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-8$ to -25V , $I_O=0.35\text{A}$	-	5	60	mV
Ripple Rejection	RR	$V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2V_{P-P}$, $f=120\text{Hz}$	50	57	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-11\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}$ to 100kHz ,	-	110	-	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-11\text{V}$, $I_O=5\text{mA}$	-	-0.5	-	$\text{mV}/^{\circ}\text{C}$
NJM79M08FA/DL1A						
Output Voltage	V_O	$V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$	-7.7	-8.0	-8.3	V
Quiescent Current	I_Q	$V_{IN}=-14\text{V}$, $I_O=0\text{mA}$	-	2.2	5.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN}=-14\text{V}$, $I_O=0.005$ to 0.5A	-	40	80	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-10.5$ to -25V , $I_O=0.35\text{A}$	-	8	80	mV
Ripple Rejection	RR	$V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2V_{P-P}$, $f=120\text{Hz}$	50	55	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-14\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}$ to 100kHz ,	-	130	-	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-14\text{V}$, $I_O=5\text{mA}$	-	-0.7	-	$\text{mV}/^{\circ}\text{C}$
NJM79M09FA/DL1A						
Output Voltage	V_O	$V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$	-8.65	-9.0	-9.35	V
Quiescent Current	I_Q	$V_{IN}=-15\text{V}$, $I_O=0\text{mA}$	-	2.2	5.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN}=-15\text{V}$, $I_O=0.005$ to 0.5A	-	40	90	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-11.5$ to -25V , $I_O=0.35\text{A}$	-	8	80	mV
Ripple Rejection	RR	$V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2V_{P-P}$, $f=120\text{Hz}$	50	54	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-15\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}$ to 100kHz ,	-	150	-	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-15\text{V}$, $I_O=5\text{mA}$	-	-0.8	-	$\text{mV}/^{\circ}\text{C}$
NJM79M12FA/DL1A						
Output Voltage	V_O	$V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$	-11.5	-12.0	-12.5	V
Quiescent Current	I_Q	$V_{IN}=-19\text{V}$, $I_O=0\text{mA}$	-	2.7	6.0	mA
Load Regulation	$\Delta V_O - I_O$	$V_{IN}=-19\text{V}$, $I_O=0.005$ to 0.5A	-	30	120	mV
Line Regulation	$\Delta V_O - V_{IN}$	$V_{IN}=-14.5$ to -30V , $I_O=0.35\text{A}$	-	3	80	mV
Ripple Rejection	RR	$V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$, $e_{in}=2V_{P-P}$, $f=120\text{Hz}$	54	71	-	dB
Output Noise Voltage	V_{NO}	$V_{IN}=-19\text{V}$, $I_O=0.35\text{A}$, $BW=10\text{Hz}$ to 100kHz ,	-	150	-	μV
Average Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	$V_{IN}=-19\text{V}$, $I_O=5\text{mA}$	-	-0.4	-	$\text{mV}/^{\circ}\text{C}$

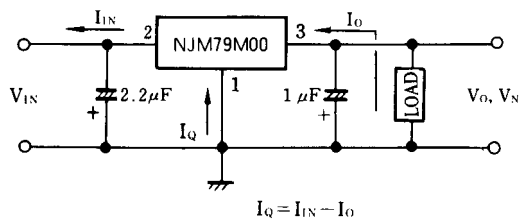
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, C_{IN}=2.2μF, C_O=1.0μF)

Measurement is to be conducted in pulse testing.

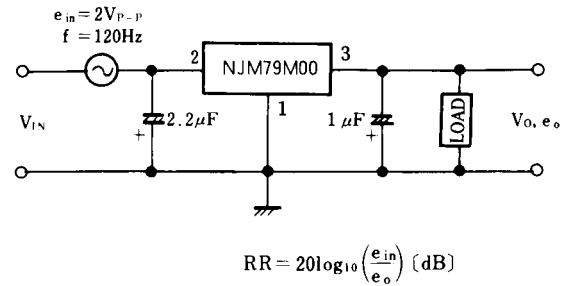
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
NJM79M15FA/DL1A						
Output Voltage	V _O	V _{IN} =-23V, I _O =0.35A	-14.4	-15.0	-15.6	V
Quiescent Current	I _Q	V _{IN} =-23V, I _O =0mA	-	2.7	6.0	mA
Load Regulation	ΔV _O - I _O	V _{IN} =-23V, I _O =0.005 to 0.5A	-	30	150	mV
Line Regulation	ΔV _O - V _{IN}	V _{IN} =-17.5 to -30V, I _O =0.35A	-	3	80	mV
Ripple Rejection	RR	V _{IN} =-23V, I _O =0.35A, e _{in} =2V _{P-P} , f=120Hz	54	70	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =-23V, I _O =0.35A, BW=10Hz to 100kHz	-	170	-	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-23V, I _O =5mA	-	-0.5	-	mV/°C
NJM79M18FA/DL1A						
Output Voltage	V _O	V _{IN} =-27V, I _O =0.35A	-17.3	-18.0	-18.7	V
Quiescent Current	I _Q	V _{IN} =-27V, I _O =0mA	-	2.7	6.0	mA
Load Regulation	ΔV _O - I _O	V _{IN} =-27V, I _O =0.005 to 0.5A	-	35	180	mV
Line Regulation	ΔV _O - V _{IN}	V _{IN} =-21 to -33V, I _O =0.35A	-	4	80	mV
Ripple Rejection	RR	V _{IN} =-27V, I _O =0.35A, e _{in} =2V _{P-P} , f=120Hz	54	69	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =-27V, I _O =0.35A, BW=10Hz to 100kHz	-	200	-	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-27V, I _O =5mA	-	-0.6	-	mV/°C
NJM79M24FA/DL1A						
Output Voltage	V _O	V _{IN} =-33V, I _O =0.35A	-23.0	-24.0	-25.0	V
Quiescent Current	I _Q	V _{IN} =-33V, I _O =0mA	-	2.7	6.0	mA
Load Regulation	ΔV _O - I _O	V _{IN} =-33V, I _O =0.005 to 0.5A	-	40	240	mV
Line Regulation	ΔV _O - V _{IN}	V _{IN} =-27 to -38V, I _O =0.35A	-	5	80	mV
Ripple Rejection	RR	V _{IN} =-33V, I _O =0.35A, e _{in} =2V _{P-P} , f=120Hz	54	66	-	dB
Output Noise Voltage	V _{NO}	V _{IN} =-33V, I _O =0.35A, BW=10Hz to 100kHz	-	300	-	μV
Average Temperature Coefficient of Output Voltage	ΔV _O /ΔT	V _{IN} =-33V, I _O =5mA	-	-0.8	-	mV/°C

■ TEST CIRCUIT

1. Output Voltage, Line Regulation, Load Regulation, Quiescent Current, Average Temperature Coefficient of Output Voltage, Output Noise Voltage



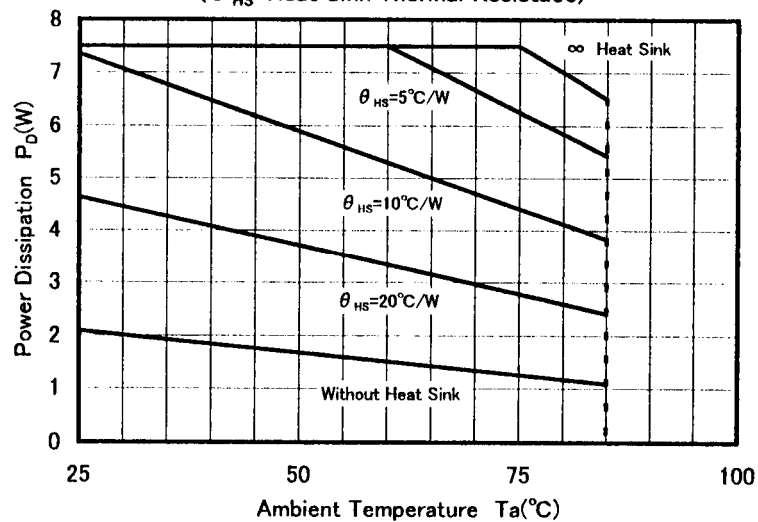
2. Ripple Rejection



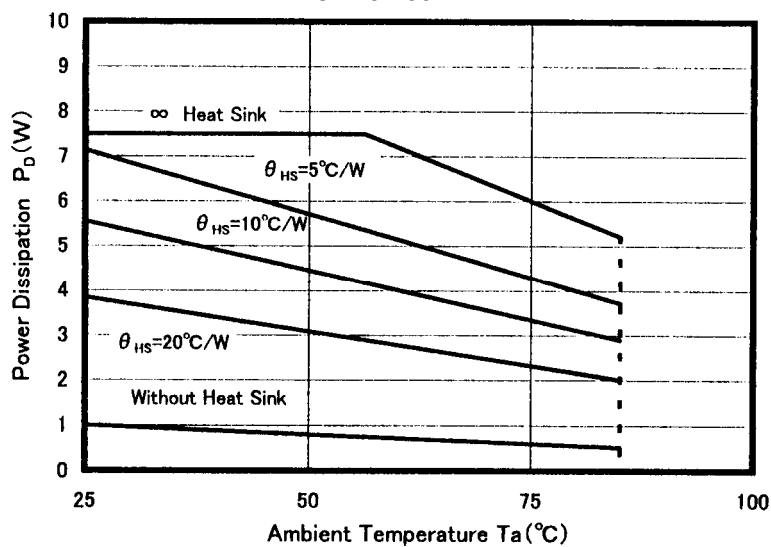
■ POWER DISSIPATION VS. AMBIENT TEMPERATURE

NJM79M00FA

(θ_{HS} =Heat Sink Thermal Resistace)

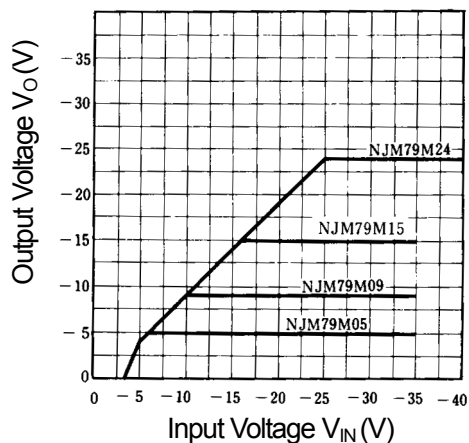


NJM79M00DL1A

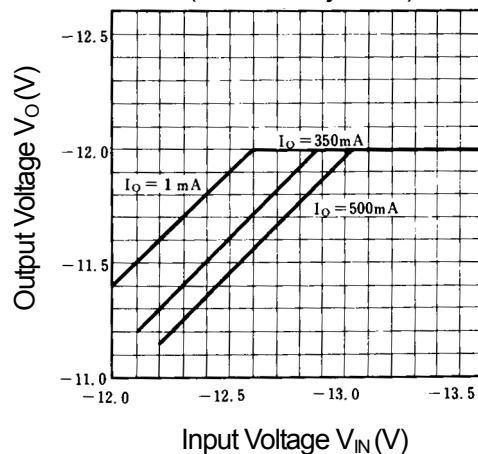


■ TYPICAL CHARACTERISTICS

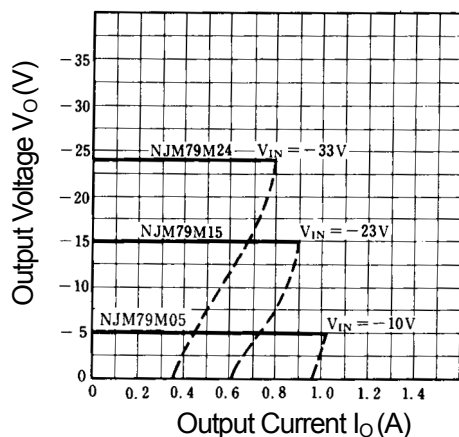
NJM79M00 Output Characteristics
($I_O = 0.35A$, $T_J = 25^\circ C$)



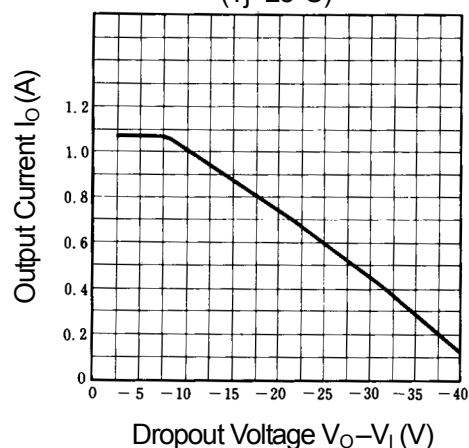
NJM79M12 Output Voltage vs. Low Input Voltage
($I_O = 0.35A$, $T_J = 25^\circ C$)



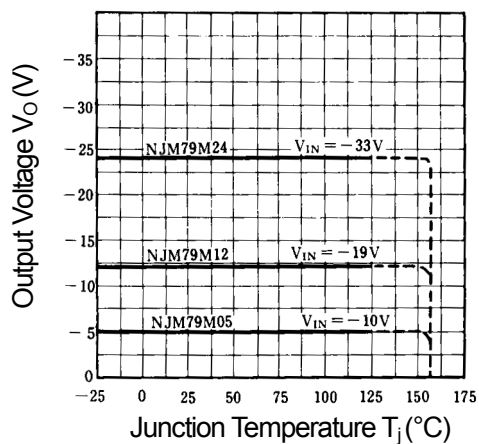
NJM79M05/15/24 Load Characteristics
($T_J = 25^\circ C$)



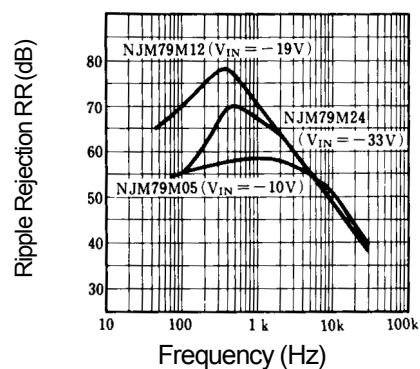
NJM79M00 Series Short Circuit Output Current
($T_J = 25^\circ C$)



NJM7805/15/24 Output Voltage vs. Junction Temperature

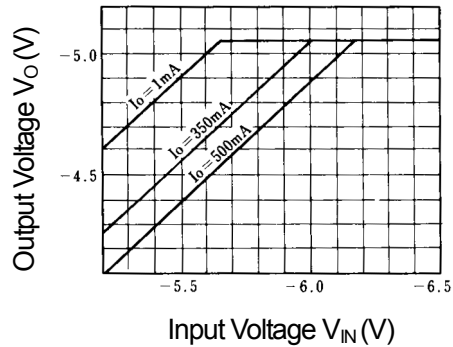


NJM79M05/15/24 Ripple Rejection vs. Frequency
($T_J = 25^\circ C$, $I_O = 0.35A$, $e_{in} = 2V_{P-P}$)

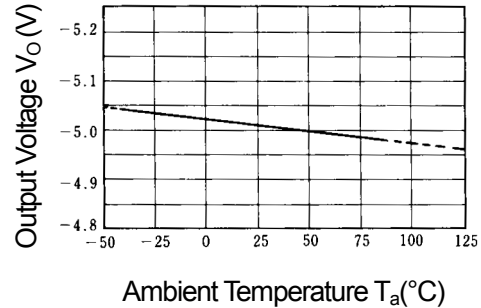


■ TYPICAL CHARACTERISTICS

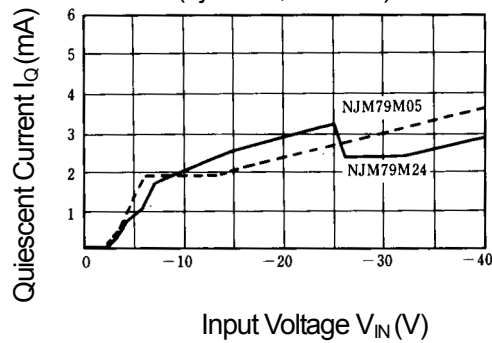
NJM79M05 Dropout Characteristics
($T_j=25^\circ\text{C}$)



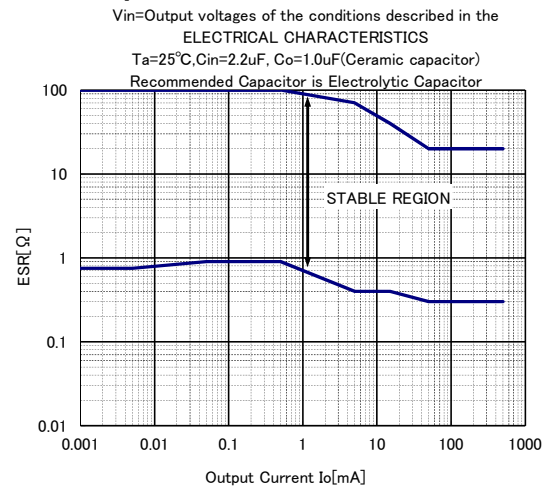
NJM79M05 Output Voltage vs. Temperature



Quiescent Current vs. Input Voltage
($T_j=25^\circ\text{C}$, $I_O=0\text{mA}$)



NJM79M00 Equivalent Series Resistance vs. Output Current



[CAUTION]

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