

RM4136, RV4136, RC4136
QUAD HIGH-PERFORMANCE OPERATIONAL AMPLIFIERS

T-79-05-40

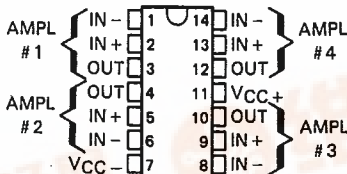
D2142, MARCH 1978 - REVISED NOVEMBER 1988

NOTICE

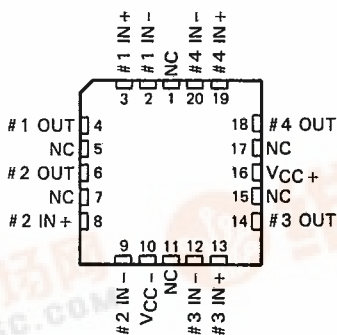
SEE ORDER OF DATA FOR ERRATA INFORMATION

- Continuous-Short-Circuit Protection
- Wide Common-Mode and Differential Voltage Ranges
- No Frequency Compensation Required
- Low Power Consumption
- No Latch-Up
- Unity Gain Bandwidth 3 MHz Typical
- Gain and Phase Match Between Amplifiers
- Designed to be Interchangeable with Raytheon RM4136, RV4136, and RC4136
- Low Noise . . . 8 nV/√Hz Typ at 1 kHz

RM4136 . . . J OR W PACKAGE
ALL OTHERS . . . D, J, OR N PACKAGE
(TOP VIEW)

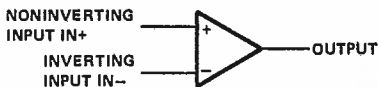


RM4136
FK CHIP CARRIER PACKAGE
(TOP VIEW)



NC—No internal connection

symbol (each amplifier)



AVAILABLE OPTIONS

T _A	V _{IO} MAX at 25°C	PACKAGE				
		SMALL-OUTLINE (D)	CHIP CARRIER (FK)	CERAMIC DIP (J)	PLASTIC DIP (N)	FLAT (W)
0°C to 70°C	6 mV	RC4136D	—	RC4136J	RC4136N	—
-40°C to 85°C	6 mV	RV4136D	—	RV4136J	RV4136N	—
-55°C to 125°C	4 mV	—	RM4136FK	RM4136J	—	RM4136W

The D packages are available taped and reeled. Add the suffix R to the device type. (e.g., RC4136DR)

PRODUCTION DATA documents contain information current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

TEXAS INSTRUMENTS

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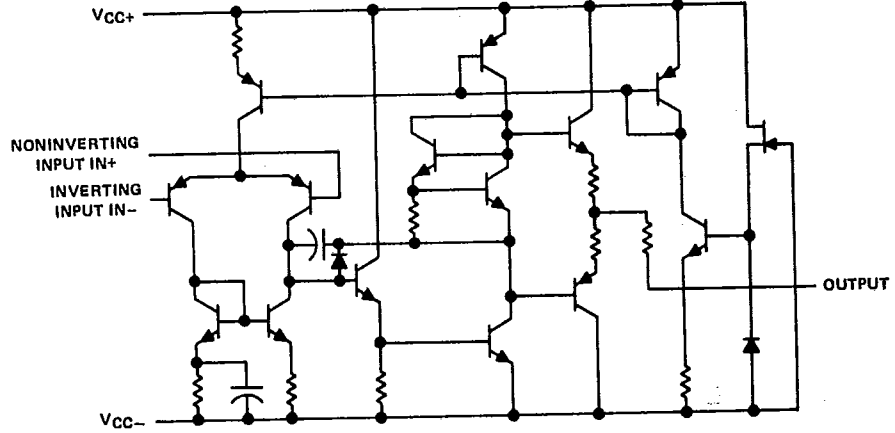
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Operational Amplifiers



2 Operational Amplifiers

schematic (each amplifier)



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)

	RM4136	RV4136	RC4136	UNIT	
Supply voltage V _{CC+} (see Note 1)	22	18	18	V	
Supply voltage V _{CC-} (see Note 1)	-22	-18	-18	V	
Differential input voltage (see Note 2)	±30	±30	±30	V	
Input voltage (any input, see Notes 1 and 3)	±15	±15	±15	V	
Duration of output short-circuit to ground, one amplifier at a time (see Note 4)	unlimited	unlimited	unlimited		
Continuous total dissipation	See Dissipation Rating Table				
Operating free-air temperature range	-55 to 125	-40 to 85	0 to 70	°C	
Storage temperature range	-65 to 150	-65 to 150	-65 to 150	°C	
Case temperature for 60 seconds	FK package	260		°C	
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	J or W package	300	300	300	°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D or N package		260	260	°C

- NOTES: 1. All voltage values, unless otherwise noted, are with respect to the midpoint between V_{CC+} and V_{CC-}.
 2. Differential voltages are at the noninverting input terminal with respect to the inverting input terminal.
 3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
 4. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

DISSIPATION RATING TABLE

PACKAGE	T _A ≤ 25°C POWER RATING	DERATING FACTOR	DERATE ABOVE T _A	T _A = 70°C POWER RATING	T _A = 85°C POWER RATING	T _A = 125°C POWER RATING
D	800 mW	7.6 mW/°C	45°C	608 mW	494 mW	—
FK	800 mW	11.0 mW/°C	77°C	800 mW	715 mW	275 mW
J (RM4136)	800 mW	11.0 mW/°C	77°C	800 mW	715 mW	275 mW
J (others)	800 mW	8.2 mW/°C	52°C	656 mW	533 mW	—
N	800 mW	9.2 mW/°C	63°C	736 mW	598 mW	—
W	800 mW	8.0 mW/°C	50°C	640 mW	520 mW	200 mW

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electrical characteristics at specified free-air temperature, $V_{CC+} = 15\text{ V}$, $V_{CC-} = -15\text{ V}$

PARAMETER	TEST CONDITIONS†	RM4136			RV4136			RC4136			UNIT	
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
V_{IO} Input offset voltage	$V_O = 0$	25°C	0.5	4	0.5	6	0.5	6	0.5	6	mV	
		Full range		6		7.5		7.5		7.5		
I_{IO} Input offset current	$V_O = 0$	25°C	5	150	5	200	5	200	5	200	nA	
		Full range		500		500		300		300		
I_{IB} Input bias current	$V_O = 0$	25°C	140	400	140	500	140	500	140	500	nA	
		Full range		1500		1500		800		800		
V_I Input voltage range		25°C	±12	±14	±12	±14	±12	±14	±12	±14	V	
V_{OM} Maximum peak output voltage swing	$R_L = 10\text{ k}\Omega$	25°C	±12	±14	±12	±14	±12	±14	±12	±14	V	
		$R_L = 2\text{ k}\Omega$	25°C	±10	±13	±10	±13	±10	±13	±10		±13
		$R_L = 2\text{ k}\Omega$	Full range	±10		±10		±10		±10		
A_{VD} Large-signal differential voltage amplification	$V_O = \pm 10\text{ V}$, $R_L = 2\text{ k}\Omega$	25°C	50	350	20	300	20	300			V/mV	
		Full range	25		15		15					
B_1 Unity-gain bandwidth		25°C		3.5		3		3		3	MHz	
r_i Input resistance		25°C	0.3	5	0.3	5	0.3	5	0.3	5	MΩ	
CMRR Common-mode rejection ratio	$V_O = 0$, $R_S = 50\ \Omega$	25°C	70	90	70	90	70	90	70	90	dB	
k_{SVS} Supply voltage sensitivity ($\Delta V_{IO}/\Delta V_{CC}$)	$V_{CC} = \pm 9\text{ V}$ to $\pm 15\text{ V}$, $V_O = 0$	25°C	30	150	30	150	30	150	30	150	$\mu\text{V/V}$	
V_n Equivalent input noise voltage (closed-loop)	$A_{VD} = 100$, $BW = 1\text{ Hz}$, $f = 1\text{ kHz}$, $R_S = 100\ \Omega$	25°C		8		8		8		8	nV/√Hz	
I_{CC} Supply current (All four amplifiers)	$V_O = 0$, No load	25°C	5	11.3	5	11.3	5	11.3	5	11.3	mA	
		MIN T_A	6	13.3	6	13.7	6	13.7	6	13.7		
		MAX T_A	4.5	10	4.5	10	4.5	10	4.5	10		
P_D Total power dissipation (All four amplifiers)	$V_O = 0$, No load	25°C	150	340	150	340	150	340	150	340	mW	
		MIN T_A	180	400	180	400	180	400	180	400		
		MAX T_A	135	300	135	300	135	300	135	300		
V_{O1}/V_{O2} Crosstalk attenuation	$A_{VD} = 100$, $f = 10\text{ kHz}$, $R_S = 1\text{ k}\Omega$	25°C		105		105		105		105	dB	

† All characteristics are measured under open-loop conditions with zero common-mode input voltage unless otherwise specified. Full range is -55°C to 125°C for RM4136, -40°C to 85°C for RV4136, and 0°C to 70°C for RC4136.

operating characteristics, $V_{CC+} = 15\text{ V}$, $V_{CC-} = -15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	RM4136		RV4136, RC4136		UNIT
		MIN	MAX	MIN	MAX	
t_r Rise time	$V_i = 20\text{ mV}$, $R_L = 2\text{ k}\Omega$	0.13		0.13		μs
Overshoot factor	$C_L = 100\text{ pF}$	5%		5%		
SR Slew rate at unity gain	$V_i = 10\text{ V}$, $C_L = 100\text{ pF}$	1.7		1.7		V/ μs

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Operational Amplifiers