RC4136, RM4136, RV4136
QUAD GENERAL-PURPOSE OPERATIONAL AMPLIFIERS

The RM4136 and RV4136 are obsolete and are no longer supplied.

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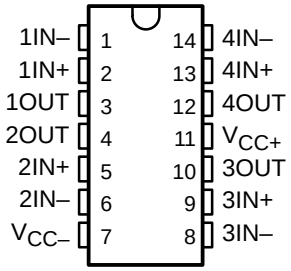
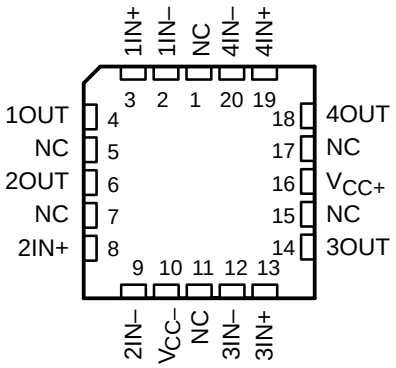
- **Continuous Short-Circuit Protection**
- **Wide Common-Mode and Differential Voltage Ranges**
- **No Frequency Compensation Required**
- **Low Power Consumption**
- **No Latch-Up**
- **Unity-Gain Bandwidth . . . 3 MHz Typ**
- **Gain and Phase Match Between Amplifiers**
- **Designed To Be Interchangeable With Raytheon RC4136, RM4136, and RV4136**
- **Low Noise . . . 8 nV$\sqrt{\text{Hz}}$ Typ at 1 kHz**

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



RM4136 . . . FK PACKAGE
(TOP VIEW)



NC – No internal connection

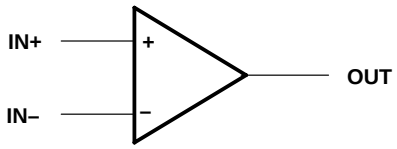
description

The RC4136, RM4136, and RV4136 are quad general-purpose operational amplifiers, with each amplifier electrically similar to the μA741, except that offset null capability is not provided.

The high common-mode input voltage range and the absence of latch-up make these amplifiers ideal for voltage-follower applications. The devices are short-circuit protected and the internal frequency compensation ensures stability without external components.

The RC4136 is characterized for operation from 0°C to 70°C, the RM4136 is characterized for operation over the full military temperature range of –55°C to 125°C, and the RV4136 is characterized for operation from –40°C to 85°C.

symbol (each amplifier)



AVAILABLE OPTIONS

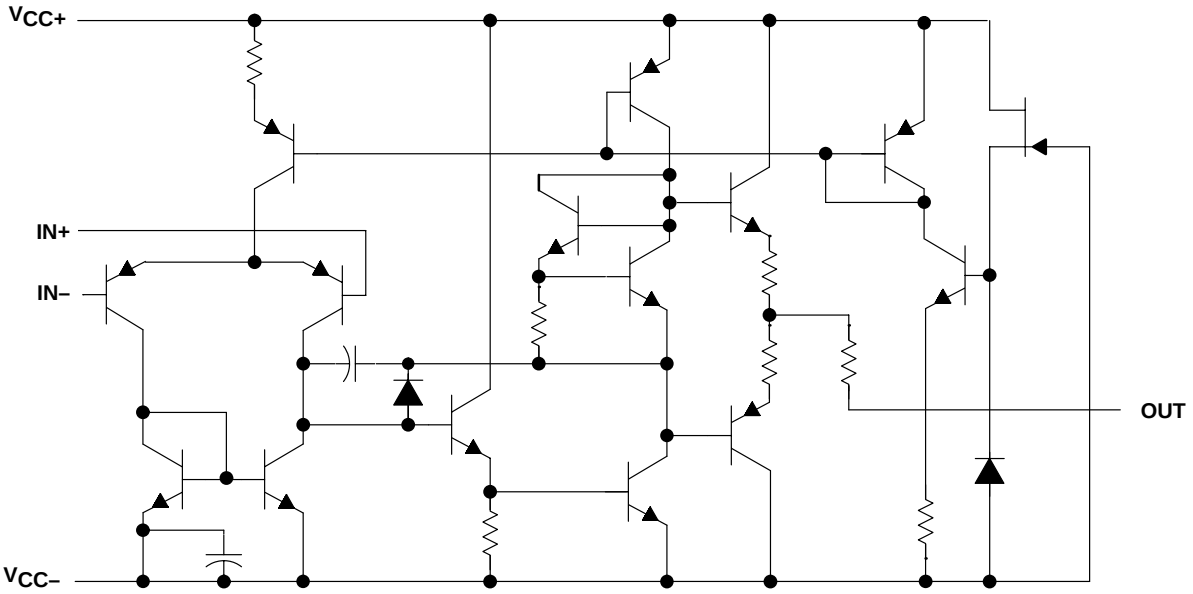
T_A	V_{IO}MAX AT 25°C	PACKAGE				
		SMALL OUTLINE (D)	CHIP CARRIER (FK)	CERAMIC DIP (J)	PLASTIC DIP (N)	FLAT (W)
0°C to 70°C	6 mV	RC4136D	—	—	RC4136N	—
–40°C to 85°C	6 mV	RV4136D	—	—	RV4136N	—
–55°C to 125°C	4 mV	—	RM4136FK	RM4136J	—	RM4136W

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

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

The RM4136 and RV4136 are obsolete and are no longer supplied.

schematic (each amplifier)



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

Supply voltage (see Note 1): V_{CC+}, RC4136 and RV4136 . . . . . 18 V
V_{CC+}, RM4136 . . . . . 22 V
$V_{CC–}$, RC4136 and RV4136 . . . . . –18 V
$V_{CC–}$, RM4136 . . . . . –22 V
Differential input voltage, V_{ID} (see Note 2) . . . . . ±30 V
Input voltage, V_I (any input) (see Notes 1 and 3) . . . . . ±15 V
Duration of output short circuit to ground, one amplifier at a time (see Note 4) . . . . . Unlimited
Continuous total dissipation . . . . . See Dissipation Rating Table
Package thermal impedance, θ_{JA} (see Note 5): D package . . . . . 86°C/W
N package . . . . . 80°C/W
Case temperature for 60 seconds: FK package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds: D or N package . . . . . 260°C
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: J or W package . . . . . 300°C
Storage temperature range, T_{stg} . . . . . –65°C to 150°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

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 IN+ with respect to IN–.
3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
4. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.
5. The package thermal impedance is calculated in accordance with JESD 51-7.

DISSIPATION RATING TABLE

PACKAGE	$T_A \le 25°C$ 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
FK	800 mW	11.0 mW/°C	77°C	800 mW	715 mW	275 mW
J	800 mW	11.0 mW/°C	77°C	800 mW	715 mW	275 mW
W	800 mW	8.0 mW/°C	50°C	640 mW	520 mW	200 mW

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recommended operating conditions

		MIN	MAX	UNIT
V_{CC+}	Supply voltage	5	15	V
V_{CC-}	Supply voltage	–5	–15	V

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

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

* This parameter is not production tested.

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

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operating characteristics, V_{CC+} = 15 V, V_{CC-} = −15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS	TYP	UNIT
t_r	Rise time	V_I = 20 mV, C_L = 100 pF, R_L = 2 kΩ	0.13	μs
	Overshoot factor	V_I = 20 mV, C_L = 100 pF, R_L = 2 kΩ	5	%
SR	Slew rate at unity gain	V_I = 10 V, C_L = 100 pF, R_L = 2 kΩ	1.7	V/μs

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
RC4136N	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	RC4136N	Samples
RC4136NE4	ACTIVE	PDIP	N	14	25	RoHS & Green	NIPDAU	N / A for Pkg Type	0 to 70	RC4136N	Samples

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".
RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.
Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

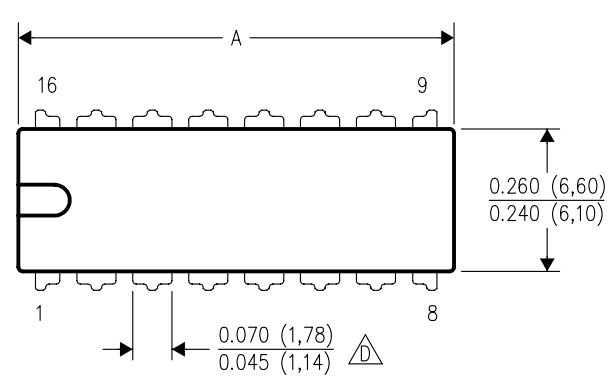
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

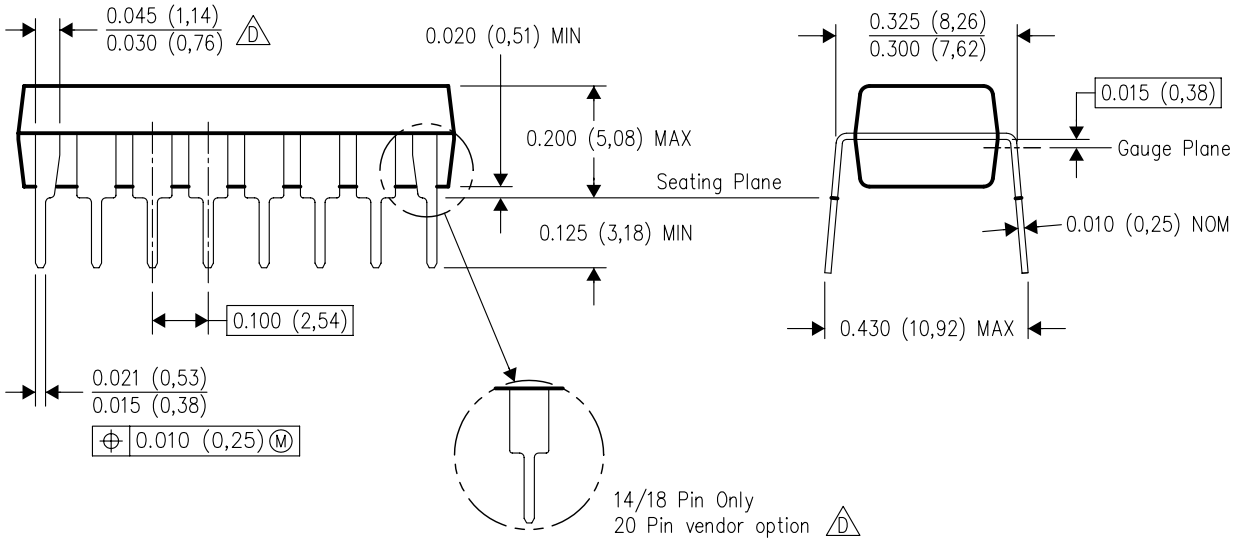
N (R–PDIP–T**)

PLASTIC DUAL–IN–LINE PACKAGE

16 PINS SHOWN



DIM \ PINS **	14	16	18	20
A MAX	0.775 (19,69)	0.775 (19,69)	0.920 (23,37)	1.060 (26,92)
A MIN	0.745 (18,92)	0.745 (18,92)	0.850 (21,59)	0.940 (23,88)
MS–001 VARIATION (C)	AA	BB	AC	AD



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NOTES:
A. All linear dimensions are in inches (millimeters).
B. This drawing is subject to change without notice.
C. Falls within JEDEC MS–001, except 18 and 20 pin minimum body length (Dim A).
D. The 20 pin end lead shoulder width is a vendor option, either half or full width.

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