

R407H



REFRIGERANTS

R407H

Product information

Product description

Drop-In refrigerant for R404A / R507 and Retrofit refrigerant for R22

- Zeotropic Refrigerant containing R32 / R125 / R134a (32.5% / 15% / 52.5% by weight)
- Refrigerant must be charged from the liquid phase
- Comparable thermo-physical properties to R404A / R507 and R22
- Non flammable, low toxic
- Lower GWP compared to R404A / R507
- Compressors must be charged with POE oils

Applications

- Replacement for R404A / R507 and R22
- Cold storage cells
- Supermarket multiplex systems and display cases
- Ice machines
- Transport refrigeration
- Condensing units, chillers

Environmental aspects

R407H* is a zeotropic blend consisting of R32 / R125 / R134a.

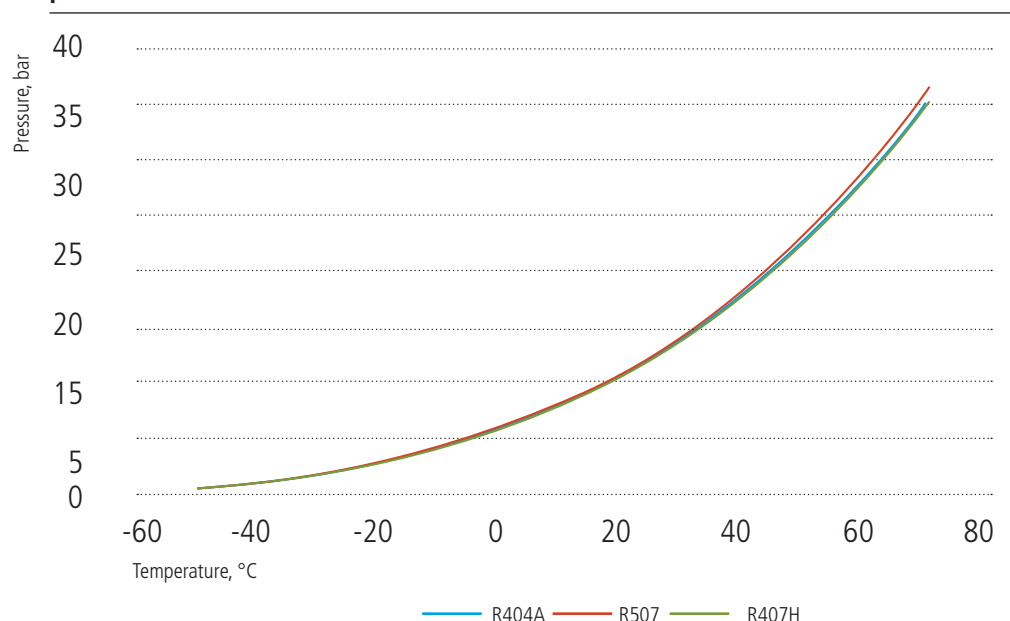
It is designed as a R404A / R507 Drop-In and as a R22 Retrofit replacement in refrigeration systems.

Due to its moderate GWP it is suitable to reduce the GWP load while replacing high GWP refrigerant like R404A / R507 for low temperature applications under the same safety conditions.

*Non flammable, low toxic, ASHRAE 34 safety class A1.

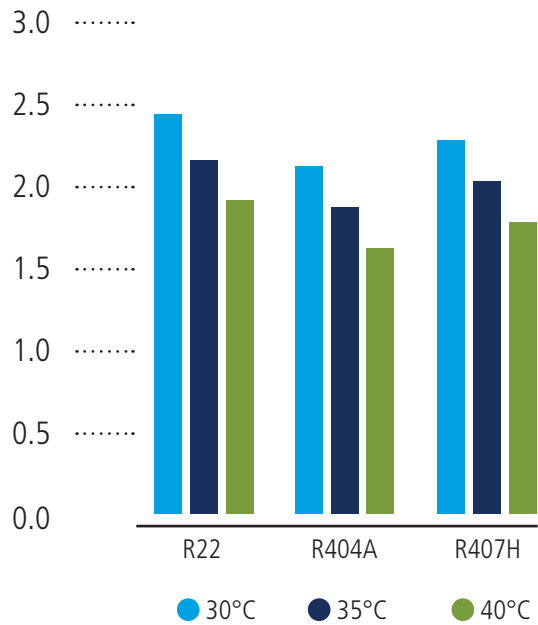
Range of Applications

p/t Curve

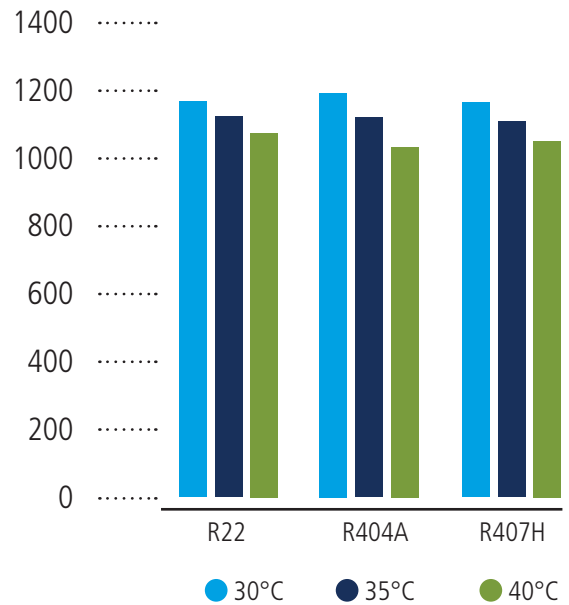


Theoretical Performance¹

COP



Capacity, kJ/m³



¹Conditions Cycle Simulation:
 $t_o: 0^\circ\text{C}$, $t_c = \text{variable}$, $T_{\text{superheat}} = 10\text{K}$, $T_{\text{subc}} = 2\text{K}$, $\text{isent. eff.} = f(p_o/p_c)$

Physical Properties²

		Difluoromethane / Pentafluoroethane / 1,1,1 Tetrafluoroethane
Chemical Name		Difluoromethane / Pentafluoroethane / 1,1,1 Tetrafluoroethane
Chemical Formula		$\text{CH}_2\text{F}_2 / \text{CHF}_2\text{-CF}_3 / \text{CF}_3\text{-CH}_2\text{F}$
GWP ₁₀₀	IPCC 4 th AR / 5 th AR	1495 / 1380
Molecular Weight	kg/kmol	79.1
Boiling Point @ 1.013 bar bubble point / dew point	°C	-44.7 / -37.6
Critical Temperature	°C	86.5
Critical Pressure	bar	48.5
Critical Density	kg/m ³	464.1
Critical Volume	dm ³ /kg	2.155
Liquid Density ³	kg/m ³	1111.2
Vapour Density ³	kg/m ³	41.86
Heat of Vaporization ³	kJ/kg	199.02
$c_p \text{ liq.}^3$	kJ/(kg K)	1.585
$c_p \text{ vap.}^3$	kJ/(kg K)	1.176
Temp. Glide @ NBP	K	7.0
ASHRAE 34 safety class		A1

² All thermo-physical data are based on Refprop 9.0

³sat. @25°C

Packaging

Type	Loan Steel Container	Iso Tank Containers
Size	859 x 2230 (D x L)	6096 x 2438 x 2591 (L x W x H)
Volume	900 l	18000 l
Tara	~ 500 kg	7300 – 9000 kg
Net Content	720 kg	16500 kg
Connections	Valve DIN4676, W 1-1/4	Flange DIN2635, DN40 / PN40 (liq.), DN40 / PN40 (gas)
Other packaging on request		

Wet-Vapor Table of R407H *

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
-50	0.774	0.528	0.731	433.03	1367.87	2.31	130.16	400.13	269.97	0.7196	1.9506
-49	0.815	0.558	0.733	410.95	1364.91	2.43	131.51	400.72	269.21	0.7256	1.9476
-48	0.857	0.589	0.734	390.21	1361.95	2.56	132.86	401.31	268.46	0.7316	1.9446
-47	0.900	0.622	0.736	370.72	1358.98	2.70	134.21	401.91	267.70	0.7376	1.9416
-46	0.946	0.657	0.737	352.39	1356.00	2.84	135.56	402.49	266.94	0.7435	1.9387
-45	0.993	0.693	0.739	335.13	1353.01	2.98	136.91	403.08	266.17	0.7494	1.9359
-44	1.042	0.731	0.741	318.89	1350.02	3.14	138.27	403.67	265.40	0.7553	1.9330
-43	1.093	0.770	0.742	303.59	1347.01	3.29	139.62	404.25	264.63	0.7612	1.9303
-42	1.146	0.811	0.744	289.16	1344.00	3.46	140.98	404.84	263.86	0.7671	1.9275
-41	1.202	0.854	0.746	275.56	1340.98	3.63	142.34	405.42	263.08	0.7730	1.9249
-40	1.259	0.898	0.747	262.72	1337.96	3.81	143.70	406.00	262.30	0.7788	1.9222
-39	1.318	0.944	0.749	250.59	1334.92	3.99	145.07	406.58	261.51	0.7846	1.9196
-38	1.379	0.992	0.751	239.14	1331.87	4.18	146.43	407.15	260.72	0.7904	1.9170
-37	1.443	1.042	0.753	228.31	1328.82	4.38	147.80	407.73	259.93	0.7962	1.9145
-36	1.509	1.094	0.754	218.07	1325.76	4.59	149.17	408.30	259.13	0.8019	1.9120
-35	1.577	1.148	0.756	208.38	1322.68	4.80	150.54	408.87	258.33	0.8077	1.9096
-34	1.648	1.205	0.758	199.20	1319.60	5.02	151.91	409.44	257.53	0.8134	1.9072
-33	1.721	1.263	0.760	190.51	1316.51	5.25	153.28	410.00	256.72	0.8191	1.9048
-32	1.797	1.323	0.761	182.28	1313.41	5.49	154.66	410.56	255.91	0.8248	1.9024
-31	1.875	1.386	0.763	174.47	1310.30	5.73	156.04	411.13	255.09	0.8305	1.9001
-30	1.956	1.451	0.765	167.06	1307.17	5.99	157.42	411.68	254.27	0.8362	1.8979
-29	2.039	1.519	0.767	160.03	1304.04	6.25	158.80	412.24	253.44	0.8418	1.8956
-28	2.125	1.588	0.769	153.35	1300.90	6.52	160.19	412.80	252.61	0.8475	1.8934
-27	2.214	1.661	0.771	147.01	1297.74	6.80	161.57	413.35	251.77	0.8531	1.8912
-26	2.306	1.736	0.772	140.98	1294.58	7.09	162.96	413.90	250.93	0.8587	1.8891
-25	2.401	1.813	0.774	135.25	1291.40	7.39	164.35	414.44	250.09	0.8643	1.8870
-24	2.499	1.894	0.776	129.80	1288.21	7.70	165.75	414.99	249.24	0.8698	1.8849
-23	2.600	1.977	0.778	124.61	1285.01	8.02	167.14	415.53	248.39	0.8754	1.8828
-22	2.704	2.063	0.780	119.68	1281.80	8.36	168.54	416.07	247.53	0.8809	1.8808
-21	2.811	2.151	0.782	114.97	1278.58	8.70	169.94	416.60	246.66	0.8865	1.8788
-20	2.922	2.243	0.784	110.49	1275.34	9.05	171.34	417.13	245.79	0.8920	1.8768
-19	3.036	2.338	0.786	106.22	1272.09	9.41	172.75	417.66	244.91	0.8975	1.8748
-18	3.153	2.435	0.788	102.14	1268.83	9.79	174.16	418.19	244.03	0.9030	1.8729
-17	3.274	2.536	0.790	98.25	1265.55	10.18	175.57	418.72	243.15	0.9085	1.8710

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
-16	3.398	2.640	0.792	94.54	1262.26	10.58	176.98	419.24	242.25	0.9140	1.8691
-15	3.525	2.748	0.794	91.00	1258.96	10.99	178.40	419.75	241.35	0.9194	1.8673
-14	3.657	2.858	0.796	87.61	1255.64	11.41	179.82	420.27	240.45	0.9249	1.8654
-13	3.792	2.973	0.799	84.38	1252.31	11.85	181.24	420.78	239.54	0.9303	1.8636
-12	3.931	3.090	0.801	81.29	1248.97	12.30	182.67	421.29	238.62	0.9357	1.8618
-11	4.073	3.212	0.803	78.33	1245.60	12.77	184.09	421.79	237.70	0.9411	1.8601
-10	4.220	3.336	0.805	75.51	1242.23	13.24	185.52	422.29	236.77	0.9465	1.8583
-9	4.371	3.465	0.807	72.80	1238.84	13.74	186.96	422.79	235.83	0.9519	1.8566
-8	4.525	3.597	0.809	70.21	1235.43	14.24	188.39	423.28	234.89	0.9573	1.8549
-7	4.684	3.734	0.812	67.73	1232.00	14.76	189.83	423.77	233.94	0.9627	1.8532
-6	4.847	3.874	0.814	65.35	1228.56	15.30	191.27	424.26	232.98	0.9680	1.8515
-5	5.014	4.018	0.816	63.08	1225.10	15.85	192.72	424.74	232.02	0.9734	1.8499
-4	5.186	4.166	0.819	60.89	1221.63	16.42	194.17	425.22	231.05	0.9787	1.8482
-3	5.362	4.319	0.821	58.80	1218.13	17.01	195.62	425.70	230.07	0.9841	1.8466
-2	5.543	4.475	0.823	56.79	1214.62	17.61	197.08	426.17	229.09	0.9894	1.8450
-1	5.728	4.636	0.826	54.87	1211.09	18.23	198.54	426.63	228.09	0.9947	1.8434
0	5.917	4.802	0.828	53.02	1207.54	18.86	200.00	427.09	227.09	1.0000	1.8418
1	6.112	4.972	0.831	51.24	1203.98	19.51	201.47	427.55	226.08	1.0053	1.8403
2	6.311	5.146	0.833	49.54	1200.39	20.19	202.94	428.00	225.07	1.0106	1.8387
3	6.515	5.325	0.836	47.90	1196.78	20.88	204.41	428.45	224.04	1.0159	1.8372
4	6.724	5.509	0.838	46.32	1193.15	21.59	205.89	428.90	223.01	1.0212	1.8356
5	6.938	5.697	0.841	44.81	1189.50	22.32	207.37	429.34	221.97	1.0264	1.8341
6	7.157	5.891	0.843	43.35	1185.83	23.07	208.85	429.77	220.92	1.0317	1.8326
7	7.382	6.089	0.846	41.95	1182.13	23.84	210.34	430.20	219.86	1.0369	1.8311
8	7.611	6.293	0.849	40.61	1178.42	24.63	211.84	430.62	218.79	1.0422	1.8297
9	7.846	6.501	0.851	39.31	1174.68	25.44	213.33	431.04	217.71	1.0474	1.8282
10	8.086	6.715	0.854	38.06	1170.91	26.27	214.83	431.46	216.62	1.0527	1.8267
11	8.332	6.934	0.857	36.86	1167.12	27.13	216.34	431.87	215.53	1.0579	1.8253
12	8.583	7.159	0.860	35.70	1163.31	28.01	217.85	432.27	214.42	1.0631	1.8238
13	8.840	7.389	0.862	34.58	1159.47	28.92	219.36	432.67	213.30	1.0684	1.8224
14	9.102	7.624	0.865	33.51	1155.61	29.85	220.88	433.06	212.17	1.0736	1.8210
15	9.370	7.866	0.868	32.47	1151.71	30.80	222.41	433.44	211.04	1.0788	1.8195
16	9.645	8.113	0.871	31.47	1147.79	31.78	223.94	433.82	209.89	1.0840	1.8181
17	9.925	8.366	0.874	30.50	1143.85	32.78	225.47	434.20	208.73	1.0892	1.8167

*based on Refprop 9.0

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
18	10.211	8.624	0.877	29.57	1139.87	33.82	227.01	434.56	207.56	1.0944	1.8153
19	10.503	8.889	0.880	28.67	1135.86	34.88	228.55	434.93	206.37	1.0996	1.8139
20	10.802	9.160	0.884	27.80	1131.83	35.96	230.10	435.28	205.18	1.1048	1.8125
21	11.106	9.437	0.887	26.97	1127.76	37.08	231.65	435.63	203.97	1.1100	1.8111
22	11.417	9.721	0.890	26.16	1123.66	38.23	233.21	435.97	202.75	1.1152	1.8097
23	11.735	10.011	0.893	25.38	1119.52	39.41	234.78	436.30	201.52	1.1204	1.8083
24	12.059	10.307	0.897	24.62	1115.36	40.62	236.35	436.63	200.28	1.1256	1.8069
25	12.389	10.610	0.900	23.89	1111.15	41.86	237.92	436.94	199.02	1.1308	1.8055
26	12.726	10.920	0.903	23.18	1106.91	43.14	239.51	437.26	197.75	1.1360	1.8041
27	13.070	11.237	0.907	22.50	1102.64	44.45	241.09	437.56	196.46	1.1412	1.8027
28	13.421	11.560	0.910	21.84	1098.33	45.79	242.69	437.85	195.16	1.1464	1.8013
29	13.779	11.891	0.914	21.20	1093.97	47.17	244.29	438.14	193.85	1.1516	1.7999
30	14.144	12.228	0.918	20.58	1089.58	48.59	245.90	438.42	192.52	1.1568	1.7984
31	14.516	12.573	0.922	19.98	1085.15	50.05	247.51	438.68	191.17	1.1620	1.7970
32	14.895	12.925	0.925	19.40	1080.67	51.55	249.13	438.94	189.81	1.1672	1.7956
33	15.281	13.285	0.929	18.84	1076.15	53.09	250.76	439.20	188.44	1.1724	1.7942
34	15.675	13.652	0.933	18.29	1071.59	54.67	252.39	439.44	187.04	1.1776	1.7927
35	16.076	14.027	0.937	17.76	1066.98	56.29	254.04	439.67	185.63	1.1829	1.7913
36	16.485	14.410	0.941	17.25	1062.32	57.96	255.69	439.89	184.20	1.1881	1.7898
37	16.902	14.800	0.946	16.76	1057.61	59.68	257.34	440.10	182.76	1.1933	1.7884
38	17.326	15.199	0.950	16.28	1052.84	61.44	259.01	440.30	181.29	1.1985	1.7869
39	17.758	15.606	0.954	15.81	1048.03	63.26	260.68	440.49	179.80	1.2038	1.7854
40	18.198	16.021	0.959	15.36	1043.16	65.12	262.36	440.66	178.30	1.2090	1.7839
41	18.645	16.444	0.963	14.92	1038.23	67.04	264.05	440.83	176.77	1.2143	1.7824
42	19.101	16.876	0.968	14.49	1033.25	69.01	265.75	440.98	175.23	1.2195	1.7809
43	19.566	17.317	0.973	14.08	1028.20	71.04	267.46	441.12	173.66	1.2248	1.7793
44	20.038	17.766	0.977	13.67	1023.09	73.13	269.18	441.25	172.06	1.2301	1.7777
45	20.519	18.224	0.982	13.28	1017.91	75.28	270.91	441.36	170.45	1.2354	1.7761
46	21.008	18.691	0.987	12.90	1012.67	77.50	272.65	441.46	168.81	1.2407	1.7745
47	21.506	19.168	0.993	12.53	1007.35	79.78	274.40	441.54	167.14	1.2460	1.7729
48	22.013	19.654	0.998	12.18	1001.96	82.13	276.16	441.61	165.45	1.2513	1.7712
49	22.528	20.149	1.004	11.83	996.49	84.56	277.93	441.67	163.74	1.2567	1.7696
50	23.052	20.654	1.009	11.49	990.95	87.06	279.71	441.70	161.99	1.2620	1.7679
51	23.585	21.168	1.015	11.16	985.31	89.63	281.51	441.72	160.21	1.2674	1.7661

Temp.	p	p''	v'	v''	rho'	rho''	h'	h''	r	s'	s''
°C	bar	bar	dm³/kg	dm³/kg	kg/m³	kg/m³	kJ/kg	kJ/kg	kJ/kg	kJ/kg K	kJ/kg K
52	24.127	21.693	1.021	10.83	979.59	92.30	283.32	441.72	158.41	1.2728	1.7643
53	24.679	22.227	1.027	10.52	973.78	95.04	285.14	441.71	156.57	1.2782	1.7625
54	25.239	22.772	1.033	10.22	967.86	97.88	286.97	441.67	154.70	1.2837	1.7607
55	25.809	23.327	1.040	9.92	961.85	100.81	288.82	441.61	152.79	1.2891	1.7588
56	26.389	23.893	1.046	9.63	955.73	103.84	290.69	441.54	150.85	1.2946	1.7569
57	26.978	24.470	1.053	9.35	949.49	106.98	292.57	441.43	148.87	1.3002	1.7549
58	27.577	25.058	1.060	9.07	943.14	110.23	294.47	441.31	146.84	1.3057	1.7529
59	28.185	25.657	1.068	8.80	936.66	113.59	296.38	441.16	144.78	1.3113	1.7509
60	28.804	26.267	1.075	8.54	930.04	117.08	298.31	440.99	142.67	1.3169	1.7487
61	29.432	26.889	1.083	8.28	923.28	120.70	300.27	440.78	140.52	1.3225	1.7466
62	30.071	27.522	1.091	8.03	916.36	124.46	302.24	440.55	138.31	1.3282	1.7443
63	30.720	28.168	1.100	7.79	909.29	128.37	304.24	440.29	136.05	1.3340	1.7420
64	31.379	28.826	1.109	7.55	902.03	132.44	306.26	439.99	133.73	1.3398	1.7396
65	32.049	29.496	1.118	7.32	894.59	136.68	308.30	439.66	131.36	1.3456	1.7372
66	32.729	30.180	1.127	7.09	886.94	141.10	310.37	439.29	128.91	1.3515	1.7346
67	33.420	30.876	1.138	6.86	879.07	145.72	312.47	438.88	126.40	1.3574	1.7320
68	34.122	31.586	1.148	6.64	870.96	150.55	314.61	438.42	123.81	1.3635	1.7292
69	34.834	32.310	1.159	6.43	862.58	155.62	316.77	437.92	121.14	1.3696	1.7264
70	35.558	33.048	1.171	6.21	853.92	160.94	318.98	437.36	118.38	1.3757	1.7234
71	36.293	33.801	1.184	6.00	844.93	166.54	321.22	436.75	115.53	1.3820	1.7203
72	37.038	34.568	1.197	5.80	835.58	172.44	323.51	436.07	112.56	1.3884	1.7170
73	37.796	35.351	1.211	5.60	825.84	178.69	325.85	435.33	109.48	1.3949	1.7136
74	38.564	36.150	1.226	5.40	815.64	185.32	328.25	434.51	106.26	1.4016	1.7099
75	39.344	36.966	1.242	5.20	804.93	192.37	330.71	433.60	102.89	1.4084	1.7061
76	40.135	37.799	1.260	5.00	793.63	199.92	333.25	432.60	99.35	1.4154	1.7020
77	40.937	38.650	1.279	4.81	781.64	208.04	335.87	431.48	95.61	1.4226	1.6976
78	41.750	39.521	1.301	4.61	768.84	216.82	338.59	430.23	91.64	1.4300	1.6929
79	42.574	40.411	1.324	4.42	755.05	226.39	341.44	428.83	87.39	1.4378	1.6877
80	43.409	41.324	1.351	4.22	740.04	236.92	344.43	427.24	82.81	1.4460	1.6821
81	44.254	42.260	1.382	4.02	723.48	248.66	347.62	425.41	77.79	1.4547	1.6758
82	45.106	43.223	1.419	3.82	704.83	261.97	351.06	423.28	72.22	1.4640	1.6688
83	45.965	44.217	1.464	3.60	683.19	277.44	354.88	420.74	65.86	1.4744	1.6606
84	46.824	45.249	1.523	3.38	656.75	296.16	359.29	417.58	58.28	1.4865	1.6507
85	47.667	46.333	1.611	3.12	620.84	320.51	364.92	413.36	48.45	1.5018	1.6380

The information contained herein is subject to change without notice, due to the refrigerants being under development. The information contained herein represents examples of actual measurement data, and examples of use herein do not guarantee that the products can be practically applicable for the example of use.

R407H

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