

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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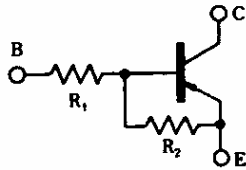
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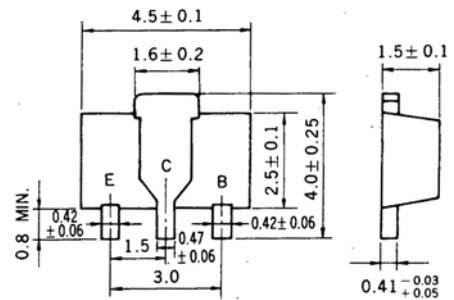
on-chip resistor PNP silicon epitaxial transistor  
For mid-speed switching

FEATURES

- Up to 2A high current drives such as ICs, motors, and solenoids available
- On-chip bias resistor
- Low power consumption during drive



PACKAGE DRAWING (UNIT: mm)



Electrode Connection  
E. Emitter  
C. Collector  
B. Base

HQ1 SERIES LISTS

Products	Marking	R <sub>1</sub> (kΩ)	R <sub>2</sub> (kΩ)
HQ1L2N	DP	0.47	1.0
HQ1A3M	DQ	1.0	1.0
HQ1F3M	DR	2.2	2.2
HQ1F3P	DS	2.2	10
HQ1L2Q	DT	0.47	4.7
HQ1F2Q	DU	0.22	2.2
HQ1A4A	DX	—	10

ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V <sub>CB0</sub>	-20	V
Collector to emitter voltage	V <sub>CE0</sub>	-20	V
Emitter to base voltage	V <sub>EB0</sub>	-10	V
Collector current (DC)	I <sub>C(DC)</sub>	-2.0	A
Collector current (Pulse)	I <sub>C(pulse)</sub> <sup>Note1</sup>	-3.0	A
Base current (DC)	I <sub>B(DC)</sub>	-0.04	A
Total power dissipation	P <sub>T</sub> <sup>Note2</sup>	2.0	W
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

Notes 1. PW ≤ 10 ms, duty cycle ≤ 50 %

2. When 0.7 mm × 16 cm<sup>2</sup> ceramic board is used

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**HQ1L2N**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	50			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.7 A			-0.55	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		329	470	611	Ω
E-to-B resistance	R <sub>2</sub>		0.7	1.0	1.3	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

**HQ1A3M**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	50			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	100			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.5 A			-0.4	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		0.7	1.0	1.3	kΩ
E-to-B resistance	R <sub>2</sub>		0.7	1.0	1.3	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

**HQ1F3M**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	80			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.3 A			-0.3	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		1.54	2.2	2.86	kΩ
E-to-B resistance	R <sub>2</sub>		1.54	2.2	2.86	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

**HQ1F3P**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	200			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.3 A			-0.3	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		1.54	2.2	2.86	kΩ
E-to-B resistance	R <sub>2</sub>		7	10	13	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

**HQ1L2Q**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	150			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.7 A			-0.55	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		329	470	611	Ω
E-to-B resistance	R <sub>2</sub>		3.29	4.7	6.11	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

**HQ1F2Q**

**ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)**

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	80			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Low level output voltage	V <sub>OL</sub> <sup>Note</sup>	V <sub>IN</sub> = -5.0 V, I <sub>C</sub> = -0.7 A			-0.55	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
Input resistance	R <sub>1</sub>		154	220	286	Ω
E-to-B resistance	R <sub>2</sub>		1.54	2.2	2.86	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

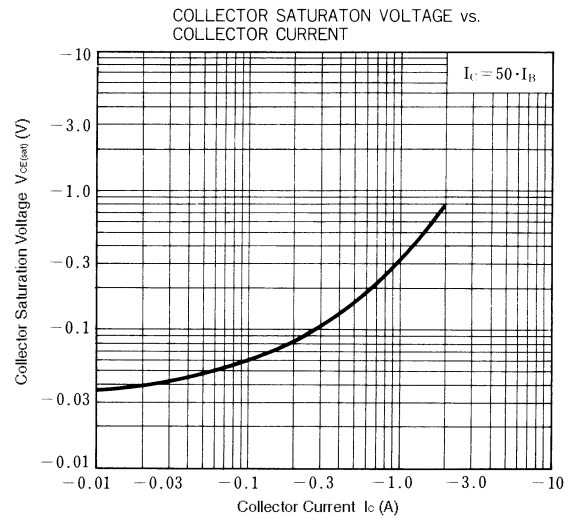
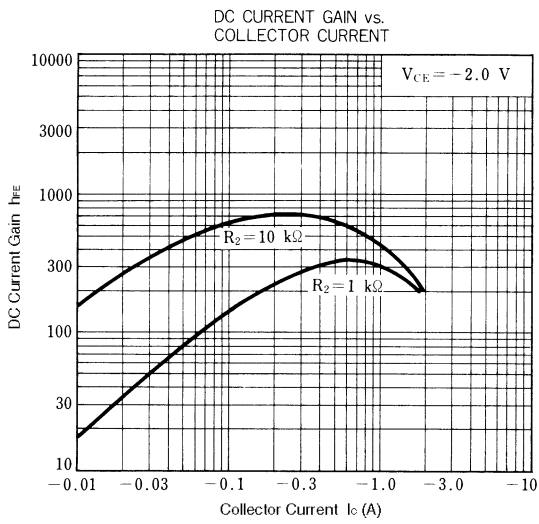
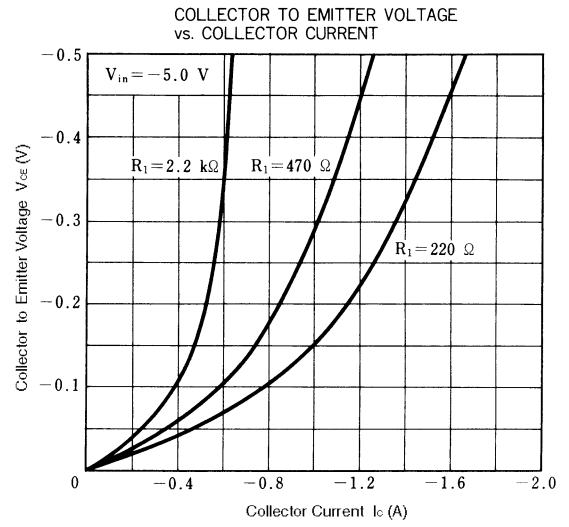
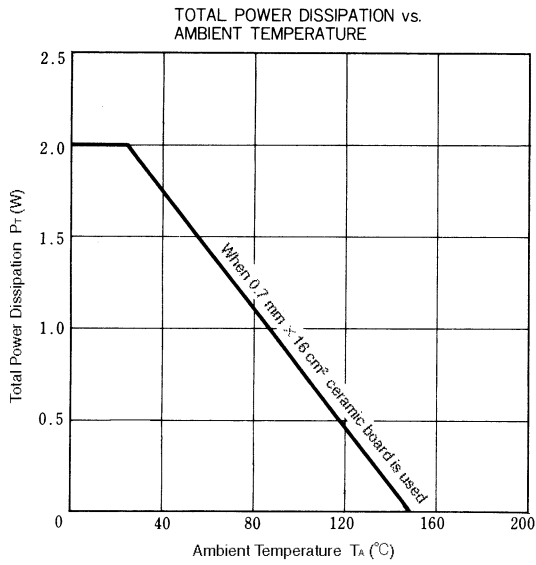
HQ1A4A

ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I <sub>CBO</sub>	V <sub>CB</sub> = -20 V, I <sub>E</sub> = 0			-100	nA
DC current gain	h <sub>FE1</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -0.1 A	200			-
DC current gain	h <sub>FE2</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -1.0 A	150			-
DC current gain	h <sub>FE3</sub> <sup>Note</sup>	V <sub>CE</sub> = -2.0 V, I <sub>C</sub> = -2.0 A	50			-
Collector saturation voltage	V <sub>CE(sat)</sub> <sup>Note</sup>	I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -20 mA		-0.35	-0.45	V
Low level input voltage	V <sub>IL</sub> <sup>Note</sup>	V <sub>CE</sub> = -5.0 V, I <sub>C</sub> = -100 μA			-0.3	V
E-to-B resistance	R <sub>2</sub>		7	10	13	kΩ

**Note** PW ≤ 350 μs, duty cycle ≤ 2 %

<R> TYPICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )



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