

To our customers,

Old Company Name in Catalogs and Other Documents

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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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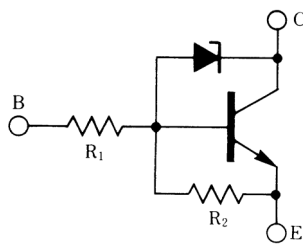
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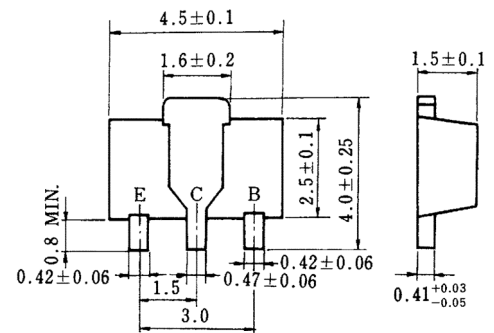
on-chip resistor NPN silicon epitaxial transistor
For mid-speed switching

FEATURES

- High current drives such as IC outputs and actuators available
- On-chip bias resistor
- The zener diode connected between the collector and base of the transistor
- Low power consumption during drive



PACKAGE DRAWING (UNIT: mm)



Electrode Connection
E. Emitter
C. Collector
B. Base

HD2 SERIES LISTS

Products	Marking	R ₁ (kΩ)	R ₂ (kΩ)
HD2A3M	LA	1.0	1.0
HD2F3P	LB	2.2	10
HD2L3N	LC	4.7	10
HD2A4M	LD	10	10
HD2L2Q	LE	0.47	4.7
HD2F2Q	LF	0.22	2.2
HD2A4A	LY	—	10

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	Ratings	Unit
Collector to base voltage	V _{CB0}	60±10	V
Collector to emitter voltage	V _{CE0}	60±10	V
Emitter to base voltage	V _{EB0}	10	V
Collector current (DC)	I _{C(DC)}	1.0	A
Collector current (Pulse)	I _{C(pulse)} ^{Note1}	2.0	A
Base current (DC)	I _{B(DC)}	20	mA
Total power dissipation	P _T ^{Note2}	2.0	W
Junction temperature	T _J	150	°C
Storage temperature	T _{stg}	-55 to +150	°C

- Notes 1. PW ≤ 10 ms, duty cycle ≤ 50 %
2. When 0.7 mm × 16 cm² ceramic board is used

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HD2A3M

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.1 A	80			–
DC current gain	h _{FE2} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.5 A	200			–
DC current gain	h _{FE3} <small>Note</small>	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} <small>Note</small>	V _{IN} = 5.0 V, I _C = 0.5 A			0.35	V
Low level input voltage	V _{IL} <small>Note</small>	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		0.7	1.0	1.3	kΩ
E-to-B resistance	R ₂		0.7	1.0	1.3	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

HD2F3P

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.1 A	200			–
DC current gain	h _{FE2} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.5 A	300			–
DC current gain	h _{FE3} <small>Note</small>	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} <small>Note</small>	V _{IN} = 5.0 V, I _C = 0.3 A		0.12	0.3	V
Low level input voltage	V _{IL} <small>Note</small>	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		1.54	2.2	2.86	kΩ
E-to-B resistance	R ₂		7	10	13	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

HD2L3N

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.1 A	200			–
DC current gain	h _{FE2} <small>Note</small>	V _{CE} = 2.0 V, I _C = 0.5 A	300			–
DC current gain	h _{FE3} <small>Note</small>	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} <small>Note</small>	V _{IN} = 5.0 V, I _C = 0.2 A			0.2	V
Low level input voltage	V _{IL} <small>Note</small>	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		3.29	4.7	6.11	kΩ
E-to-B resistance	R ₂		7	10	13	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

HD2A4M

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} ^{Note}	V _{CE} = 2.0 V, I _C = 0.1 A	200			–
DC current gain	h _{FE2} ^{Note}	V _{CE} = 2.0 V, I _C = 0.5 A	300			–
DC current gain	h _{FE3} ^{Note}	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} ^{Note}	V _{IN} = 5.0 V, I _C = 0.1 A			0.2	V
Low level input voltage	V _{IL} ^{Note}	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		7	10	13	kΩ
E-to-B resistance	R ₂		7	10	13	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

HD2L2Q

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} ^{Note}	V _{CE} = 2.0 V, I _C = 0.1 A	200			–
DC current gain	h _{FE2} ^{Note}	V _{CE} = 2.0 V, I _C = 0.5 A	300			–
DC current gain	h _{FE3} ^{Note}	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} ^{Note}	V _{IN} = 5.0 V, I _C = 1.0 A			0.5	V
Low level input voltage	V _{IL} ^{Note}	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		329	470	611	Ω
E-to-B resistance	R ₂		3.29	4.7	6.11	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

HD2F2Q

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CBO}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} ^{Note}	V _{CE} = 2.0 V, I _C = 0.1 A	100			–
DC current gain	h _{FE2} ^{Note}	V _{CE} = 2.0 V, I _C = 0.5 A	300			–
DC current gain	h _{FE3} ^{Note}	V _{CE} = 2.0 V, I _C = 1.0 A	200			–
Low level output voltage	V _{OL} ^{Note}	V _{IN} = 5.0 V, I _C = 1.0 A			0.5	V
Low level input voltage	V _{IL} ^{Note}	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
Input resistance	R ₁		154	220	286	Ω
E-to-B resistance	R ₂		1.54	2.2	2.86	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

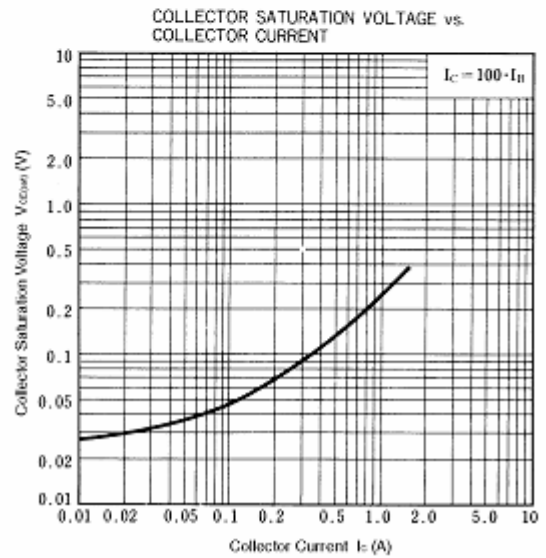
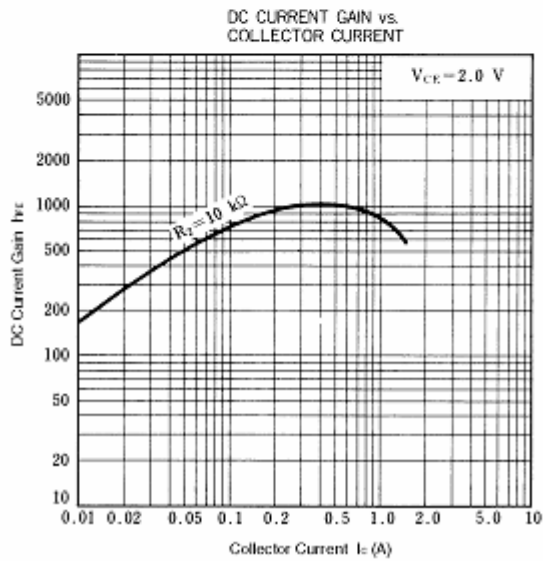
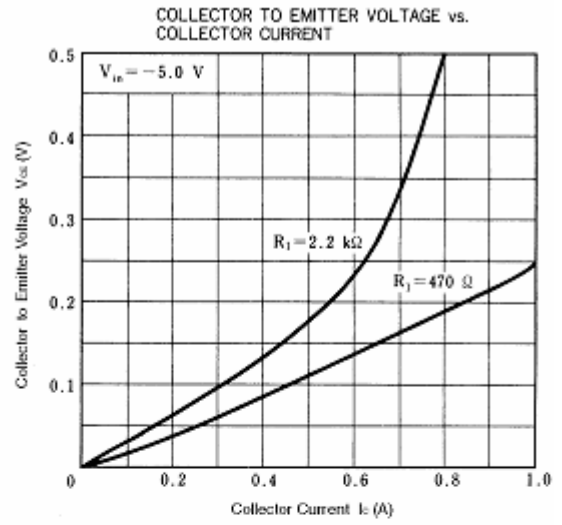
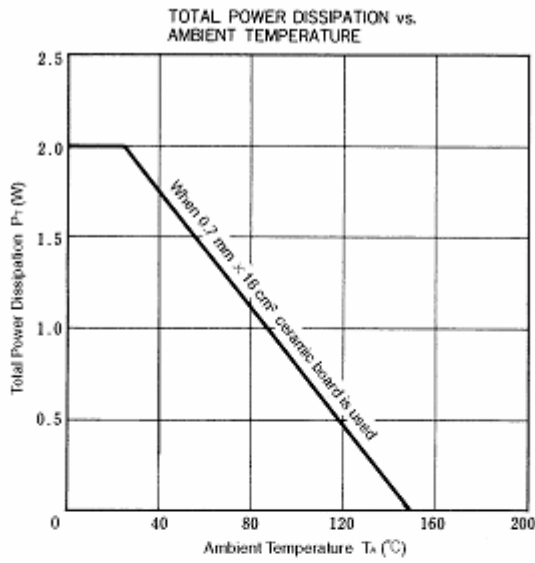
HD2A4A

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Collector cutoff current	I _{CB0}	V _{CB} = 40 V, I _E = 0 A			100	nA
DC current gain	h _{FE1} Note	V _{CE} = 2.0 V, I _C = 0.1 A	200	760		–
DC current gain	h _{FE2} Note	V _{CE} = 2.0 V, I _C = 0.5 A	300	1010		–
DC current gain	h _{FE3} Note	V _{CE} = 2.0 V, I _C = 1.0 A	200	830		–
Collector saturation voltage	V _{CE(sat)} Note	I _C = 1.0 A, I _B = 10 mA		0.25	0.4	V
Low level input voltage	V _{IL} Note	V _{CE} = 5.0 V, I _C = 100 μA			0.3	V
E-to-B resistance	R ₂		7	10	13	kΩ

Note PW ≤ 350 μs, duty cycle ≤ 2 %

TYPICAL CHARACTERISTICS (T_A = 25°C)



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