Power Transistor (−120V, −1.5A)

2SB1236 / 2SB1186

●Features

1) High breakdown voltage. (BV_{CEO}=−120V)
2) Low collector output capacitance. (Typ. 30pF at V_{CB}=−10V)
3) High transition frequency. (f_T=50MHz)
4) Complements the 2SD1857 / 2SD1763.

●Absolute maximum ratings (Ta=25℃)

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	−120	V
Collector-emitter voltage		V_{CEO}	−120	V
Emitter-base voltage		V_{EBO}	−5	V
Collector current		I_C	−1.5	A (DC)
			−3	A (Pulse) ✻1
Collector power dissipation	2SB1236	P_C	1	W ✻2
	2SB1186		2	
			20	W (Tc=25℃)
Junction temperature		Tj	150	℃
Storage temperature		Tstg	−55~+150	℃

✻1 Single pulse Pw=100ms
✻2 Printed circuit board 1.7mm thick, collector plating 1cm² or larger.

●Packaging specifications and h_{FE}

Type	2SB1236	2SB1186
Package	ATV	TO-220FP
h_{FE}	QR	EF
Code	TV2	—
Basic ordering unit (pieces)	2500	500

●Electrical characteristics (Ta=25℃)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage		BV_{CBO}	−120	—	—	V	I_C=−50μA
Collector-emitter breakdown voltage		BV_{CEO}	−120	—	—	V	I_C=−1mA
Emitter-base breakdown voltage		BV_{EBO}	−5	—	—	V	I_E=−50μA
Collector cutoff current		I_{CBO}	—	—	−1	μA	V_{CB}=−100V
Emitter cutoff current		I_{EBO}	—	—	−1	μA	V_{EB}=−4V
Collector-emitter saturation voltage		$V_{CE(sat)}$	—	—	−2	V	I_C/I_B=−1A/−0.1A ✻
Base-emitter saturation voltage		$V_{BE(sat)}$	—	—	−1.5	V	I_C/I_B=−1A/−0.1A ✻
DC current transfer ratio	2SB1236	h_{FE}	120	—	390	—	V_{CE}=−5V, I_C=−1A
	2SB1186		100	—	320		
Transition frequency		f_T	—	50	—	MHz	V_{CE}=−5V, I_E=0.1A, f=30MHz
Output capacitance		Cob	—	30	—	pF	V_{CB}=−10V, I_E=0A, f=1MHz

✻ Measured using pulse current.

(94L-268-A56)

Power Transistor (120V, 1.5A)

2SC4132 / 2SD1857 / 2SD2343 / 2SD1763

●Features

1) High breakdown voltage. (BV_{CEO}=120V)
2) Low collector output capacitance. (Typ. 20pF at V_{CB}=10V)
3) High transition frequency. (f_T=80MHz)
4) Complements the 2SB1236 / 2SB1186.

●Absolute maximum ratings (Ta=25℃)

Parameter		Symbol	Limits	Unit
Collector-base voltage		V_{CBO}	120	V
Collector-emitter voltage		V_{CEO}	120	V
Emitter-base voltage		V_{EBO}	5	V
Collector current		I_C	2	A
		I_{CP}	3	A ✻1
Collector power dissipation	2SC4132	P_C	0.5	✻2
			2	W
	2SD1857		1	
	2SD2343		1.5	
			5	W(Tc=25℃)
	2SD1763		20	
Junction temperature		Tj	150	℃
Storage temperature		Tstg	−55~+150	℃

✻1 Single pulse Pw=10ms
✻2 When mounted on a 40×40×0.7mm ceramic board.

●Packaging specifications and h_{FE}

Type	2SC4132	2SD1857	2SD2343	2SD1763
Package	MPT3	ATV	TO-126F	TO-220FP
h_{FE}	PQR	PQR	PQ	EF
Marking	CB✻	—	—	—
Code	T100	TV2	—	—
Basic ordering unit (pieces)	1000	2500	1000	500

✻ Denotes h_{FE}

●Electrical characteristics (Ta=25℃)

Parameter		Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage		BV_{CBO}	120	—	—	V	I_C=50μA
Collector-emitter breakdown voltage		BV_{CEO}	120	—	—	V	I_C=1mA
Emitter-base breakdown voltage		BV_{EBO}	5	—	—	V	I_E=50μA
Collector cutoff current		I_{CBO}	—	—	1	μA	V_{CB}=100V
Emitter cutoff current		I_{EBO}	—	—	1	μA	V_{EB}=4V
Collector-emitter saturation voltage		$V_{CE(sat)}$	—	—	0.4	V	I_C/I_B=1A/0.1A ✻
DC current transfer ratio	2SC4132,2SD1857	h_{FE}	82	—	390	—	V_{CE}/I_C=5V/0.1A
	2SD2343		82	—	270	—	
	2SD1763		100	—	320	—	
Transition frequency		f_T	—	80	—	MHz	V_{CE}=5V, I_E=−0.1A, f=30MHz ✻
Output capacitance		Cob	—	20	—	pF	V_{CB}=10V, I_E=0A, f=1MHz

✻ Measured using pulse current.

(96-175-C56)

Transistors

TO-220 · TO-220FP · TO-220FN · HRT

TO-220FP is a TO-220 with mold coated fin for easier mounting and higher PC, 2W. TO-220FN is a low profile (by 2mm) version of TO-220FP without fin support pin, for higher mounting density. HRT is a taped power transistor package for use with an automatic placement machine.

Application	Part No.				V_{CEO} (V)	I_C (A)	Pc (W) Tc=25°C			Ta=25°C	h_{FE}	h_{FE} Ranking code	V_{CE} (V)	I_C (A)	Internal circuit
	TO-220	TO-220FP	TO-220FN	HRT			TO-220	TO-220FP	TO-220FN	HRT					
Driver	2SA1634	2SA1635	–	–	−60	−4	40	30	–	–	60~320	D E F	−4	−1	–
	2SB1369	2SB1370	2SB1565	2SB1496	−60	−3	40	30	25	1.8	60~320	D E F	−5	−0.5	–
	2SB1064	2SB1185	2SB1566	2SB1357	−50	−3	30	25	25	1.8	60~320	D E F	−3	−0.5	–
	2SB1085	2SB1186	2SB1569	2SB1353	−120	−1.5	20	20	20	1.8	60~320	D E F	−5	−0.1	–
	2SB1085A	2SB1186A	2SB1569A	2SB1353A	−160	−1.5	20	20	20	1.8	60~200	D E	−5	−0.1	–
	2SB1289	2SB1290	–	2SB1356	−80	−7	40	30	–	1.8	60~320	D E F	−5	−1	–
	2SB1291	2SB1292	–	2SB1358	−80	−5	40	30	–	1.8	60~320	D E F	−5	−1	–
	2SB1293	2SB1294	–	2SB1360	−100	−5	40	30	–	1.8	60~320	D E F	−5	−1	–
	2SB1334	2SB1335	–	2SB1355	−60	−4	40	30	–	1.8	60~320	D E F	−5	−1	–
	2SB1334A	2SB1335A	–	–	−80	−4	40	30	–	–	60~320	D E F	−5	−1	–
	2SC4007	2SC4008	–	2SC4355	80	4	40	30	–	1.8	60~500	D E F G	4	1	–
	2SD2023	2SD2061	2SD2394	2SD2096	60	3	40	30	25	1.8	60~320	D E F	5	0.5	–
	2SD1505	2SD1762	2SD2395	2SD2037	50	3	30	25	25	1.8	60~320	D E F	3	0.5	–
	2SD1562	2SD1763	2SD2400	2SD2033	120	1.5	20	20	20	1.8	60~320	D E F	5	0.1	–
	2SD1562A	2SD1763A	2SD2400A	2SD2033A	160	1.5	20	20	20	1.8	60~200	D E	5	0.1	–
	2SD1580	2SD1833	–	2SD2036	80	7	40	30	–	1.8	60~320	D E F	5	1	–
	2SD1720	2SD1832	–	2SD2038	60	5	40	30	–	1.8	60~320	D E F	5	1	–
	2SD1778	2SD1855	–	2SD2035	60	4	40	30	–	1.8	60~320	D E F	5	1	–
	2SD1778A	2SD1855A	–	–	80	4	40	30	–	–	60~320	D E F	5	1	–
	2SD1896	2SD1897	–	2SD2040	100	5	40	30	–	1.8	60~320	D E F	5	1	–
	2SD1956	2SD1957	–	–	120	7	40	30	–	–	100~500	E F G	5	1	–
Low $V_{CE(sat)}$	–	2SA1757	–	–	−60	−5	–	25	–	–	60~320	D E F	−2	−1	–
	–	2SA1758	–	–	−60	−12	–	30	–	–	60~320	D E F	−2	−2	–
	–	2SC4595	–	–	60	12	–	30	–	–	60~320	D E F	2	2	–
	–	2SC4596	–	–	60	5	–	25	–	–	60~320	D E F	2	1	–
	2SC4845	2SC4846	–	–	120	5	40	30	–	–	60~200	D E	5	3	–
	2SC4848	2SC4849	–	–	120	7	40	30	–	–	60~200	D E	5	3	–
Chroma	–	–	2SC5147	2SC4506	300	0.1	–	–	10	1.5	40~200	C D E	10	0.01	–
High h_{FE}	2SD1943	2SD1944	2SD2396	2SD2044	60	3	40	30	30	1.8	400~2k	H J K	4	0.5	–
High Voltage SW	2SC3968	2SC3969	–	2SC4354	400	2	20	20	–	1.8	16~50	A B	5	0.1	–
	2SC4205	2SC4129	–	–	400	5	40	30	–	–	16~32	A	5	3	–
	☆2SC5112	☆2SC5113	–	–	500	5	40	35	–	–	10~50	–	5	2.5	–
	☆2SC5116	☆2SC5117	–	–	550	4	40	35	–	–	10~50	–	5	2	–
Darlington	2SB1286	2SB1287	2SB1567	2SB1359	−100	−2	25	20	20	1.8	1k~10k	–	−2	−1	Fig.1
	2SB1339	2SB1340	–	2SB1513	−120	−6	40	30	–	1.8	2k~20k	–	−3	−2	Fig.1
	2SB1341	2SB1342	2SB1568	2SB1512	−80	−4	35	30	30	1.8	1k~10k	–	−3	−2	Fig.1
	2SB1343	2SB1344	–	2SB1514	−100	−6	40	30	–	1.8	1k~20k	–	−3	−2	Fig.1
	2SB1550	2SB1551	–	2SB1549	−80	−10	40	30	–	1.8	1k~20k	–	−3	−5	Fig.1
	–	2SB1616	–	–	−80	−4	–	30	–	–	1K~10K	–	−3	−2	Fig.5
	2SC4573	2SC4574	–	2SC4575	60±10	4	35	30	–	1.8	2k~10k	–	5	1.5	Fig.4
	–	2SC4895	–	–	100	3	–	30	–	–	2k~10k	–	2	1.5	Fig.2
	2SD1646	2SD1765	2SD2398	2SD2039	100	2	25	20	20	1.8	1k~10k	–	2	1	Fig.2
	2SD1647	2SD1764	2SD2397	2SD2041	60±10	2	25	20	20	1.8	1k~10k	–	2	1	Fig.4
	–	2SD2091	–	2SD2263	90^{+30}_{-10}	2	–	20	–	1.8	1k~10k	–	2	1	Fig.4
	2SD1783	2SD1856	–	2SD2042	60±10	5	30	25	–	1.8	2k~30k	–	3	2	Fig.4
	2SD1888	2SD1889	–	2SD2043	120	6	40	30	–	1.8	2k~20k	–	3	2	Fig.2
	2SD1932	2SD1933	2SD2399	2SD2032	80	4	35	30	30	1.8	1k~10k	–	3	2	Fig.2
	2SD1986	2SD1987	–	2SD2306	60	4	35	30	–	1.8	1k~10k	–	3	2	Fig.3
	2SD2024	2SD2025	–	2SD2307	100	8	40	30	–	1.8	1k~20k	–	3	2	Fig.2

Note : ☆Under development

Darlington transistor internal circuit

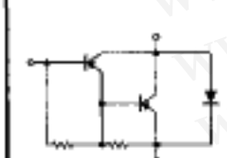


Fig.1

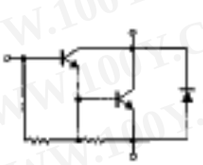


Fig.2

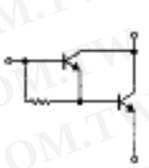


Fig.3

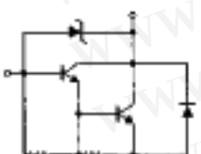


Fig.4

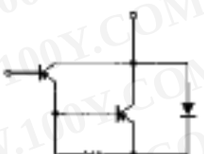


Fig.5

●Product Designation

- When ordering, specify the type.
- Check each code against the tables shown below.
- Fill a space with the next character.

2	S	D	2	3	9	5									

Part No.

Special code

- Omit for standard product.
- Factory assigned for custom product.

Packaging

Package	Code	Package specifications	Quantity/Package (pcs)
TO-220*	None	Bulk	500
	C7	Tube	1,000 (50pcs×20)
TO-220FP*	None	Bulk	500
	C7	Tube	1,000 (50pcs×20)
TO-220FN	None	Bulk	500
	C7	Tube	1,000 (50pcs×20)
HRT	T114	Ammo box	1,000

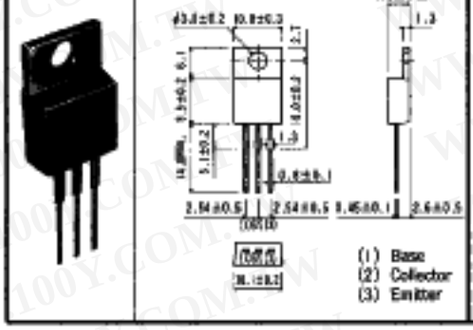
Note : Available in various lead configurations (forming, cut leads).
For further information, contact our sales representatives.

h_{FE} Ranking code

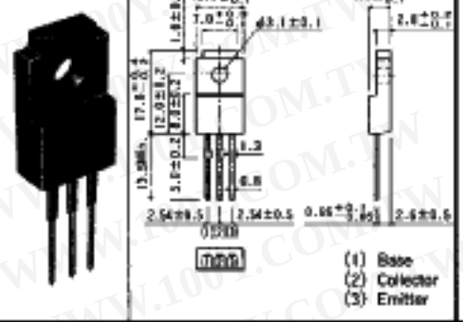
Input h_{FE} rank signal display
One rank prefered: D
Multiple rank prefered: D F
(Min., Max. is displayed)

Code	h_{FE} Range
A	16~32
B	25~50
C	40~80
D	60~120
E	100~200
F	160~320
G	250~500
H	400~800
J	600~1200
K	1000~2000

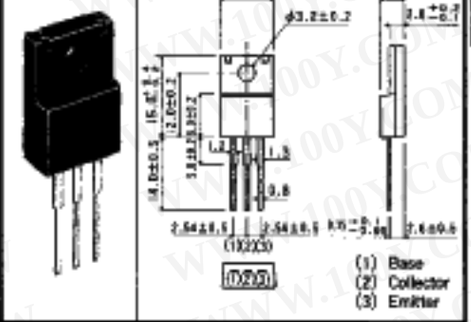
TO-220



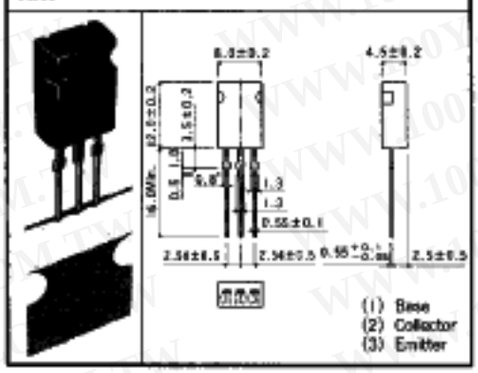
TO-220FP



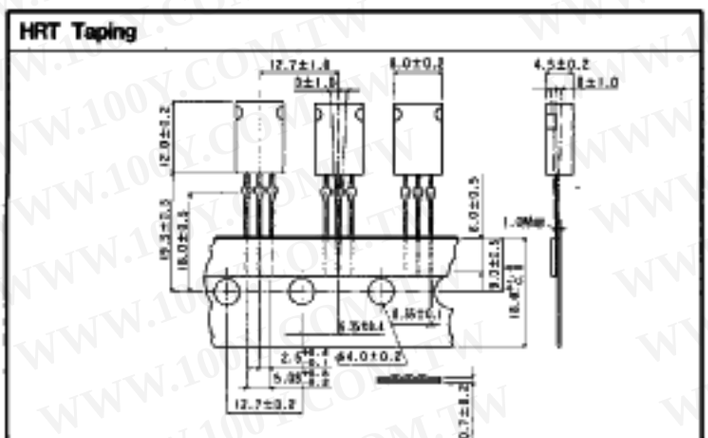
TO-220FN



HRT

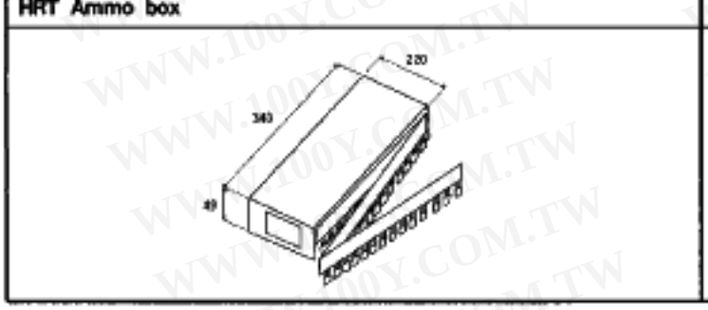


HRT Taping

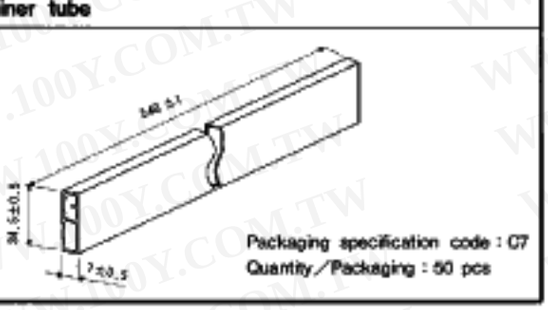


(Unit : mm)

HRT Ammo box



TO-220 Container tube



Packaging specification code : C7
Quantity/Packaging : 50 pcs