

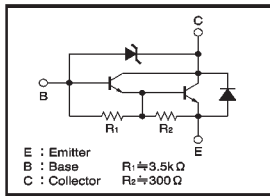
# Medium Power Transistor (Motor, Relay or Solenoid drive) (60±10V, 2A)

2SD2212 / 2SD2143 / 2SD1866 / 2SD1764

●Features

- 1) Built-in zener diode between collector and base.
- 2) Strong protection against reverse surges due to "L" loads.
- 3) Built-in resistor between base and emitter.
- 4) Built-in damper diode.

●Circuit diagram



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	60±10	V
Collector-emitter voltage	V <sub>CE0</sub>	60±10	V
Emitter-base voltage	V <sub>EB0</sub>	6	V
Collector current	I <sub>c</sub>	2	A (DC)
		3	A (Pulse) *1
		2	W *2
Collector power dissipation	P <sub>c</sub>	10	W (T <sub>c</sub> =25°C)
		1	W *3
		20	W (T <sub>c</sub> =25°C)
		150	°C
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55~+150	°C

\*1 Single pulse P<sub>w</sub>=100ms \*2 When mounted on a 40×40×0.7mm ceramic board.  
\*3 Printed circuit board 1.7mm thick, collector plating 1cm<sup>2</sup> or larger.

●Packaging specifications and hFE

Type	2SD2212	2SD2143	2SD1866	2SD1764
Package	MPT3	CPT3	ATV	TO-220FP
hFE	1k~10k	1k~10k	1k~10k	1k~10k
Code	T100	TL	TV2	—
Basic ordering unit (pieces)	1000	2500	2500	500

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	50	—	70	V	I <sub>c</sub> =50 μA
Collector-emitter breakdown voltage	BV <sub>CE0</sub>	50	—	70	V	I <sub>c</sub> =5mA
Collector cutoff current	I <sub>cbo</sub>	—	—	1.0	μA	V <sub>CB</sub> =40V
Emitter cutoff current	I <sub>EB0</sub>	—	—	3	mA	V <sub>EB</sub> =5V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	—	—	1.5	V	I <sub>c</sub> /I <sub>B</sub> =1A/1mA *
DC current transfer ratio	hFE	1000	—	10000	—	V <sub>CE</sub> =2V, I <sub>C</sub> =1A
Output capacitance	C <sub>ob</sub>	—	25	—	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz

\* Measured using pulse current.

(96-762-D84)

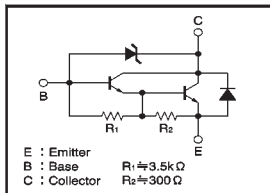
# Medium Power Transistor (Motor, Relay or Solenoid drive) (60±10V, 5A)

2SD1856

●Features

- 1) Built-in zener diode between collector and base.
- 2) Strong protection against reverse surges due to "L" loads.
- 3) Built-in resistor between base and emitter.
- 4) Built-in damper diode.

●Circuit diagram



●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	60±10	V
Collector-emitter voltage	V <sub>CE0</sub>	60±10	V
Emitter-base voltage	V <sub>EB0</sub>	6	V
Collector current	I <sub>c</sub>	5	A (DC)
		10	A (Pulse) *
Collector power dissipation	P <sub>c</sub>	2	W
		25	W (T <sub>c</sub> =25°C)
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55~+150	°C

\* Single pulse P<sub>w</sub>=10ms

●Packaging specifications and hFE

Type	2SD1856
Package	TO-220FP
hFE	2k~30k
Code	—
Basic ordering unit (pieces)	500

●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	50	—	70	V	I <sub>c</sub> =50 μA
Collector-emitter breakdown voltage	BV <sub>CE0</sub>	50	—	70	V	I <sub>c</sub> =5mA
Collector cutoff current	I <sub>cbo</sub>	—	—	10	μA	V <sub>CB</sub> =40V
Emitter cutoff current	I <sub>EB0</sub>	—	—	3	mA	V <sub>EB</sub> =5V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	—	—	1.5	V	I <sub>c</sub> /I <sub>B</sub> =2A/2mA *
DC current transfer ratio	hFE	2000	—	30000	—	V <sub>CE</sub> /I <sub>C</sub> =3V/2A *
Output capacitance	C <sub>ob</sub>	—	75	—	pF	V <sub>CB</sub> =10V, I <sub>E</sub> =0A, f=1MHz

\* Measured using pulse current.

(94L-885-D87)