

# Low Frequency Transistor (60V, 3A)

## 2SD2396

### ●Features

- 1) Low saturation voltage, typically  $V_{CE(sat)} = 0.3V$  at  $I_C / I_B = 2A / 50mA$ .
- 2) High DC current gain.  
(Typically, DC current gain = 1000 at  $V_{CE} = 4V$ ,  $I_C = 0.5A$ )
- 3)  $P_C = 30W$ . ( $T_C = 25^\circ C$ )
- 4) Wide SOA (safe operating area).

### ●Packaging specifications and h<sub>FE</sub>

Type	2SD2396
Package	TO-220FN
h <sub>FE</sub>	HJK
Code	—
Basic ordering unit (pieces)	500

### ●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	80	V
Collector-emitter voltage	$V_{CEO}$	60	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	$I_C$	3	A (DC)
	$I_{CP}$	6	A (Pulse) ※
Collector power dissipation	$P_C$	2	W
		30	W ( $T_C = 25^\circ C$ )
Junction temperature	$T_J$	150	°C
Storage temperature	$T_{stg}$	-55~+150	°C

※ Single pulse  $P_w = 100ms$

### ●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	80	—	—	V	$I_C = 50 \mu A$
Collector-emitter breakdown voltage	$BV_{CEO}$	60	—	—	V	$I_C = 1mA$
Emitter-base breakdown voltage	$BV_{EBO}$	6	—	—	V	$I_E = 50 \mu A$
Collector cutoff current	$I_{CBO}$	—	—	100	$\mu A$	$V_{CB} = 80V$
Emitter cutoff current	$I_{EBO}$	—	—	100	$\mu A$	$V_{EB} = 6V$
DC current transfer ratio	$h_{FE}$	400	—	2000	—	$V_{CE} = 4V$ , $I_C = 0.5A$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	0.3	0.8	V	$I_C / I_B = 2A / 0.05A$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	1.5	V	$I_C / I_B = 2A / 0.05A$
Transition frequency	$f_T$	—	40	—	MHz	$V_{CE} = 5V$ , $I_E = -0.2A$ , $f = 10MHz$
Output capacitance	$C_{ob}$	—	55	—	pF	$V_{CB} = 10V$ , $I_E = 0A$ , $f = 1MHz$

※ Measured using pulse current.

(96-819-D351)

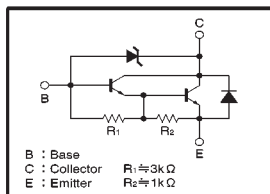
# Power Transistor (90±10V, 3A)

## 2SC5060

### ●Features

- 1) Built-in zener diode between collector and base.
- 2) Zener diode has low voltage dispersion.
- 3) Strong protection against reverse power surges due to "L" loads.
- 4) Darlington connection for high DC current gain.
- 5) Built-in resistor between base and emitter.
- 6) Built-in damper diode.

### ●Circuit diagram



### ●Absolute maximum ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	90±10	V
Collector-emitter voltage	$V_{CEO}$	90±10	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	$I_C$	1	A (DC)
	$I_{CP}$	2	A (Pulse) ※1
Collector power dissipation	$P_C$	1	W ※2
Junction temperature	$T_J$	150	°C
Storage temperature	$T_{stg}$	-55~+150	°C

※1 Single pulse  $P_w = 10ms$

※2 Printed circuit board: 1.7 mm thick, collector copper plating at least 100mm<sup>2</sup>.

### ●Packaging specifications and h<sub>FE</sub>

Type	2SC5060
Package	ATV
h <sub>FE</sub>	M
Code	TV2
Basic ordering unit (pieces)	500

### ●Electrical characteristics (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	$BV_{CBO}$	80	—	100	V	$I_C = 50 \mu A$
Collector-emitter breakdown voltage	$BV_{CEO}$	80	—	100	V	$I_C = 1mA$
Collector cutoff current	$I_{CBO}$	—	—	10	$\mu A$	$V_{CB} = 70V$
Emitter cutoff current	$I_{EBO}$	—	—	3	mA	$V_{EB} = 5V$
DC current transfer ratio	$h_{FE}$	1000	—	2500	—	$V_{CE} = 3V$ , $I_C = 0.5A$
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	—	1.5	V	$I_C / I_B = 500mA / 1mA$
Base-emitter saturation voltage	$V_{BE(sat)}$	—	—	2	V	$I_C / I_B = 500mA / 1mA$
Transition frequency	$f_T$	—	80	—	MHz	$V_{CB} = 5V$ , $I_E = -0.1A$ , $f = 30MHz$
Output capacitance	$C_{ob}$	—	20	—	pF	$V_{CE} = 10V$ , $I_E = 0A$ , $f = 1MHz$
Turn-on time	$t_{on}$	—	0.2	—	$\mu s$	$I_C = 0.8A$ , $R_L = 50 \Omega$
Storage time	$t_{stg}$	—	5	—	$\mu s$	$I_B = -I_{E2} = 8mA$
Fall time	$t_f$	—	0.6	—	$\mu s$	$V_{CC} = 40V$

※1 Measured using pulse current.

※2 Transition frequency of the device.

(96-733-D416)