



FP104

TR:PNP Epitaxial Planar Silicon Transistor  
SBD:Schottky Barrier Diode

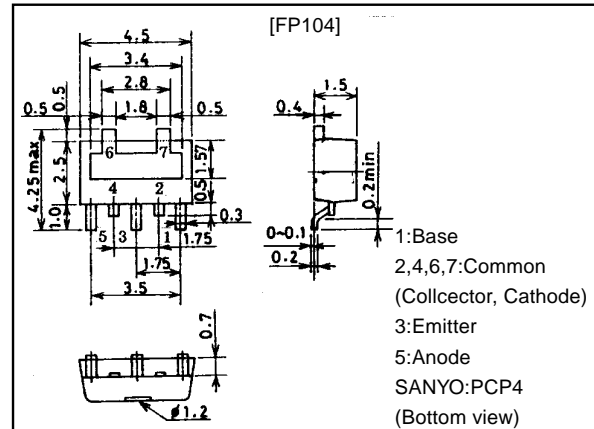
## DC-DC Converter Applications

### Features

- Composite type with 2 devices (PNP transistor and Schottky barrier diode) contained in one package, facilitating high-density mounting.
- The FP104 is formed with a chips, one being equivalent to the 2SA1729 and a chip being equivalent to the SB05-05CP placed in one package.

### Package Dimensions

unit:mm  
2088A



### Specifications

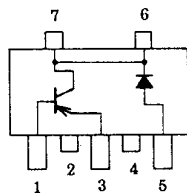
#### Absolute Maximum Ratings at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
[TR]				
Collector-to-Base Voltage	$V_{CBO}$		-50	V
Collector-to-Emitter Voltage	$V_{CEO}$		-40	V
Emitter-to-Base Voltage	$V_{EBO}$		-5	V
Collector Current	$I_C$		-1.5	A
Collector Current (Pulse)	$I_{CP}$		-3	A
Base Current	$I_B$		-300	mA
Collector Dissipation	$P_C$	Mounted on ceramic board (250mm <sup>2</sup> ×0.8mm)	1.3	W
Junction Temperature	$T_j$		150	°C
Storage Temperature	$T_{stg}$		-55 to +150	°C
[SBD]				
Repetitive Peak Reverse Voltage	$V_{RRM}$		50	V
Non-repetitive Peak Reverse Surge Voltage	$V_{RSM}$		55	V
Average Rectified Current	$I_O$		500	mA
Surge Forward Current	$I_{FSM}$	50Hz sine wave, 1cycle	5	A
Junction Temperature	$T_j$		-55 to +125	°C
Storage Temperature	$T_{stg}$		-55 to +125	°C

Marking:202

Continued on next page.

### Electrical Connection



1: Base  
2, 4, 6, 7: Common (Collector, Cathode)  
3: Emitter  
5: Anode

(Top view)

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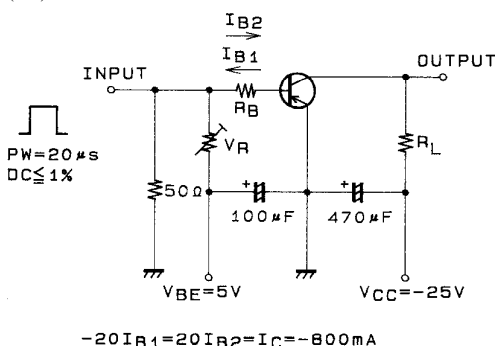
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**Electrical Characteristics at Ta=25°C**

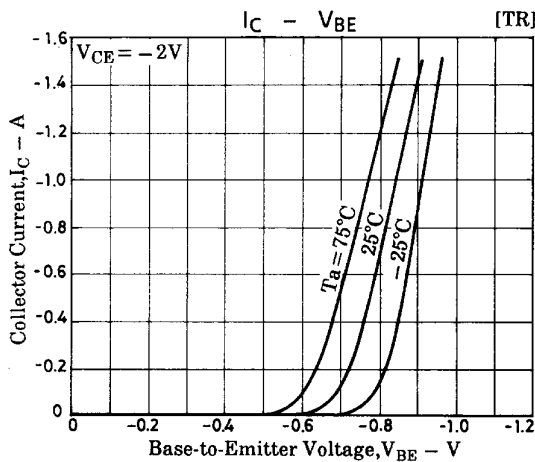
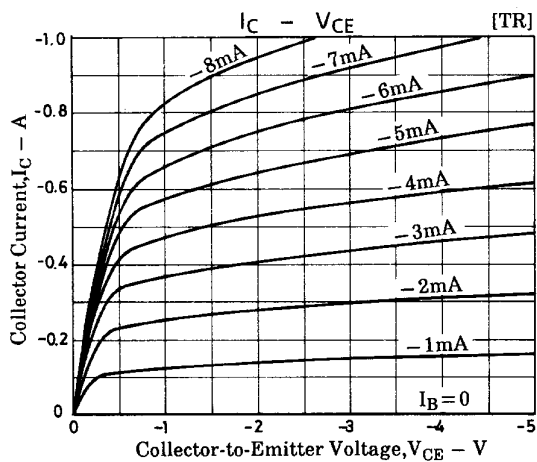
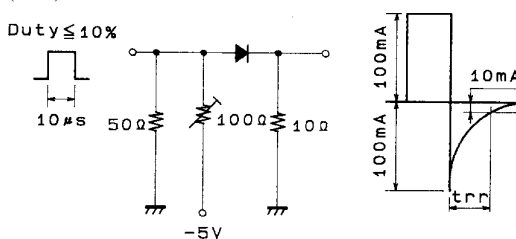
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
[TR]						
Collector Cutoff Current	$I_{CBO}$	$V_{CB}=-40V, I_E=0$			-1.0	$\mu A$
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=-3V, I_C=0$			-1.0	$\mu A$
DC Current Gain	$h_{FE1}$	$V_{CE}=-2V, I_C=-100mA$	100		280	
	$h_{FE2}$	$V_{CE}=-2V, I_C=-1.5A$	25			
Gain-Bandwidth Product	$f_T$	$V_{CE}=-2V, I_C=-100mA$		300		MHz
Output Capacitance	$C_{ob}$	$V_{CE}=-10V, f=1MHz$		18		pF
C-E Saturation Voltage	$V_{CE(sat)}$	$I_C=-800mA, I_B=-40mA$		-0.3	-0.8	V
B-E Saturation Voltage	$V_{BE(sat)}$	$I_C=-800mA, I_B=-40mA$		-0.9	-1.3	V
C-B Breakdown Voltage	$V_{(BR)CBO}$	$I_C=-10\mu A, I_E=0$	-50			V
C-E Breakdown Voltage	$V_{(BR)CEO}$	$I_C=-1mA, R_{BE}=\infty$	-40			V
E-B Breakdown Voltage	$V_{(BR)EBO}$	$I_C=-10\mu A, I_C=0$	-5			V
Turn-ON Time	$t_{on}$	See specified Test Circuit		50		ns
Storage Time	$t_{stg}$	See specified Test Circuit		120		ns
Fall Time	$t_f$	See specified Test Circuit		150		ns
[SBD]						
Reverse Voltage	$V_R$	$I_R=200\mu A$	50			V
Forward Voltage	$V_F$	$I_F=500mA$			0.55	V
Reverse Current	$I_R$	$V_R=25V$			50	$\mu A$
Interterminal Capacitance	$C$	$V_R=10V, f=1MHz$		22		pF
Reverse Recovery Time	$t_{rr}$	$I_F=I_R=100mA$ , See specified Test Circuit			10	ns
Thermal Resistance	$R_{thj-a}$	Mounted on ceramic board (250mm <sup>2</sup> ×0.8mm)		120		°C/W

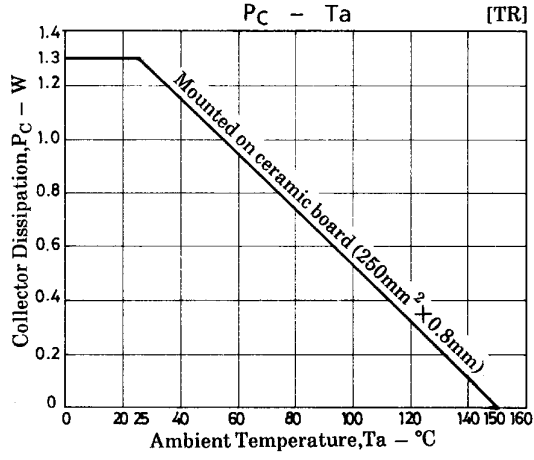
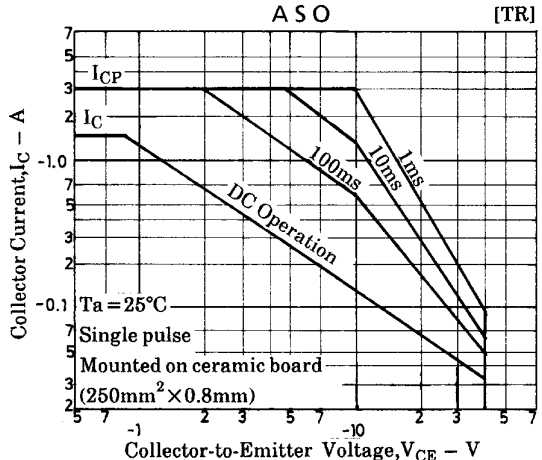
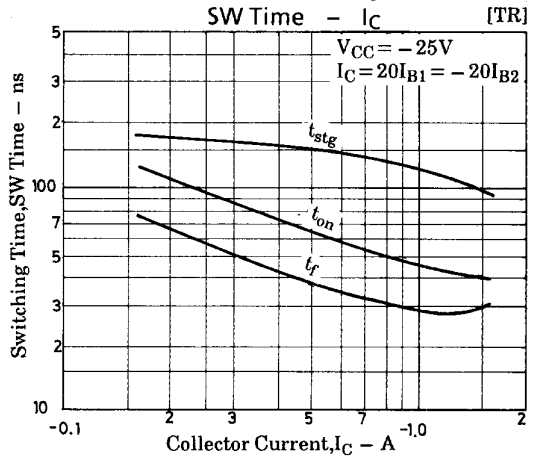
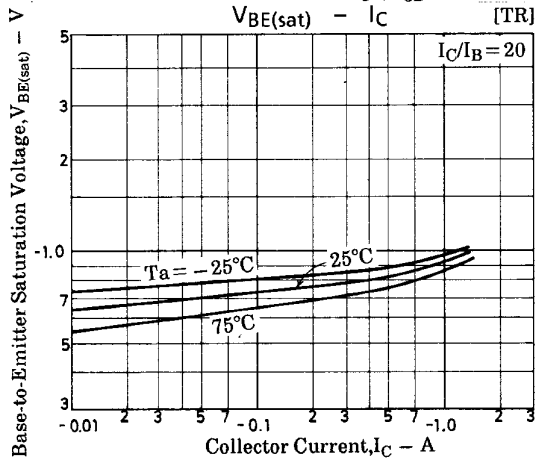
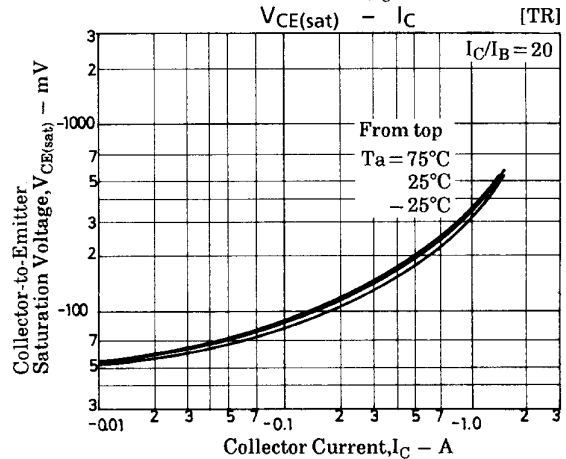
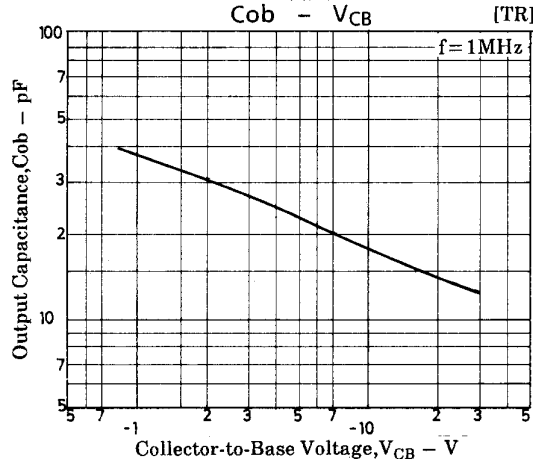
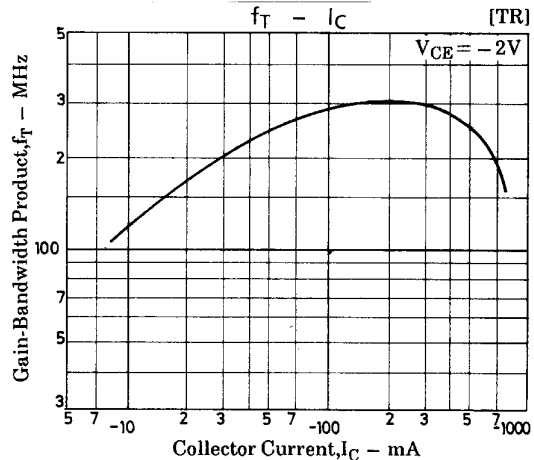
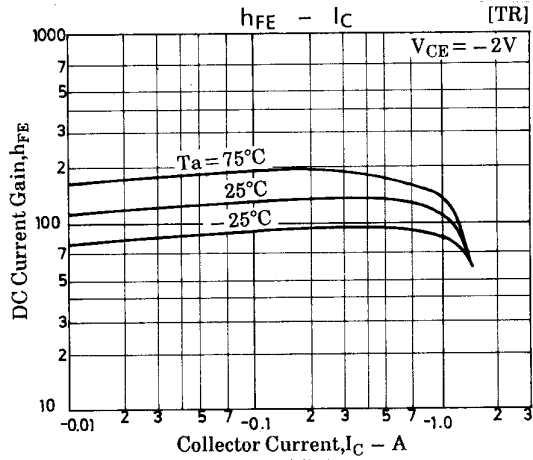
**Switching Time Test Circuit**

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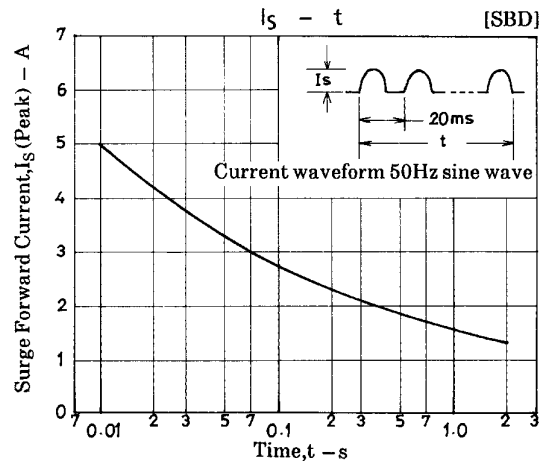
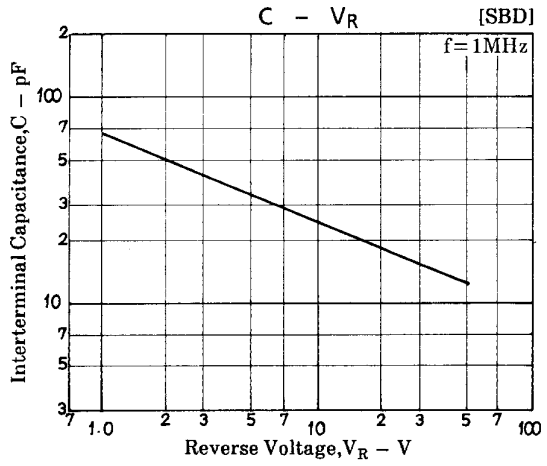
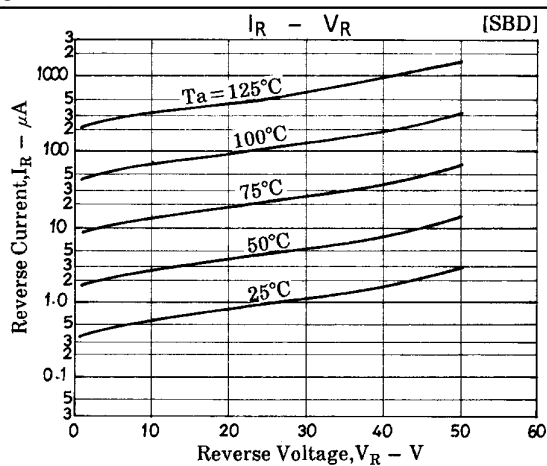
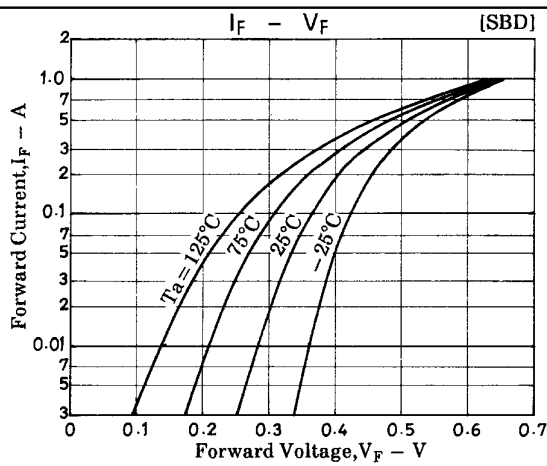


(SBD)





# FP104



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