

# Midium Power Transistors (50V / 3A)

## MP6X13

### ● Structure

NPN Silicon epitaxial planar transistor

### ● Features

1) Low saturation voltage

$$V_{CE(sat)} = 0.35V \text{ (Max.) } (I_C / I_B = 1A / 50mA)$$

2) High speed switching

### ● Applications

Low Frequency Amplifier Driver

### ● Packaging specifications

Type	Package	MPT6
	Code	TR
	Basic ordering unit (pieces)	1000

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

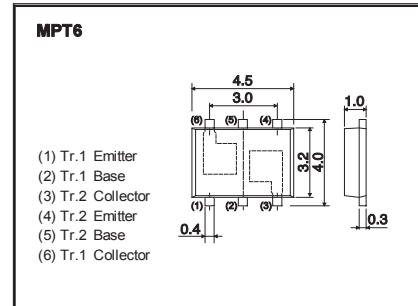
<It is the same ratings for the Tr.1 and Tr.2>

Parameter	Symbol	Limits	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	Continuous	$I_C$	3 A
	Pulsed	$I_{CP}^{*1}$	6 A
Power dissipation	$P_D^{*2}$	2.0	W/Total
	$P_D^{*2}$	1.4	W/Element
Junction temperature	$T_j$	150	°C
Range of storage temperature	$T_{stg}$	-55 to 150	°C

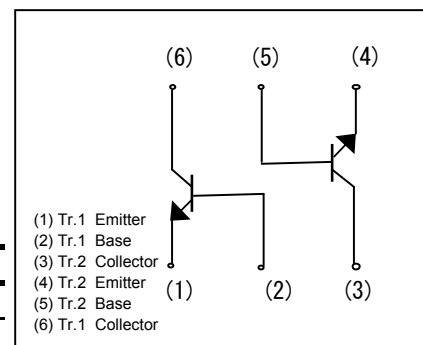
\*1  $P_w=10ms, 1Pulse$

\*2 Mounted on a 40 x 40 x 0.7[mm] ceramic board.

### ● Dimensions (Unit : mm)



### ● Inner circuit



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

<It is the same characteristics for the Tr.1 and Tr.2>

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	$BV_{CEO}$	50	-	-	V	$I_C = 1\text{mA}$
Collector-base breakdown voltage	$BV_{CBO}$	50	-	-	V	$I_C = 100\mu\text{A}$
Emitter-base breakdown voltage	$BV_{EBO}$	6	-	-	V	$I_E = 100\mu\text{A}$
Collector cut-off current	$I_{CBO}$	-	-	1	$\mu\text{A}$	$V_{CB} = 50\text{V}$
Emitter cut-off current	$I_{EBO}$	-	-	1	$\mu\text{A}$	$V_{EB} = 4\text{V}$
Collector-emitter saturation voltage	$V_{CE(sat)}^{*1}$	-	130	350	mV	$I_C = 1\text{A}, I_B = 50\text{mA}$
DC current gain	$h_{FE}$	180	-	450	-	$V_{CE} = 3\text{V}, I_C = 50\text{mA}$
Transition frequency	$f_T^{*1}$	-	320	-	MHz	$V_{CE} = 10\text{V}$ $I_E = -500\text{mA}, f = 100\text{MHz}$
Collector output capacitance	$C_{ob}$	-	13	-	pF	$V_{CB} = 10\text{V}, I_E = 0\text{A}$ $f = 1\text{MHz}$
Turn-on time	$t_{on}^{*2}$	-	50	-	ns	$I_C = 1.5\text{A}, I_{B1} = 150\text{mA},$ $I_{B2} = -150\text{mA}, V_{CC} \approx 10\text{V}$
Storage time	$t_{stg}^{*2}$	-	450	-	ns	
Fall time	$t_f^{*2}$	-	80	-	ns	

\*1 Pulsed

\*2 See switching time test circuit

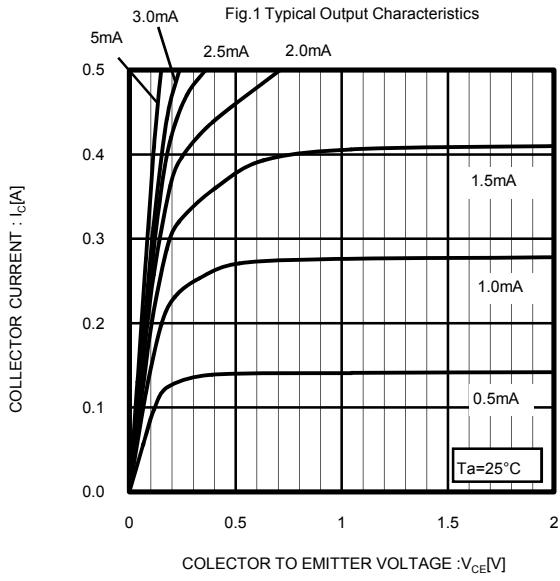


Fig.1 Typical Output Characteristics

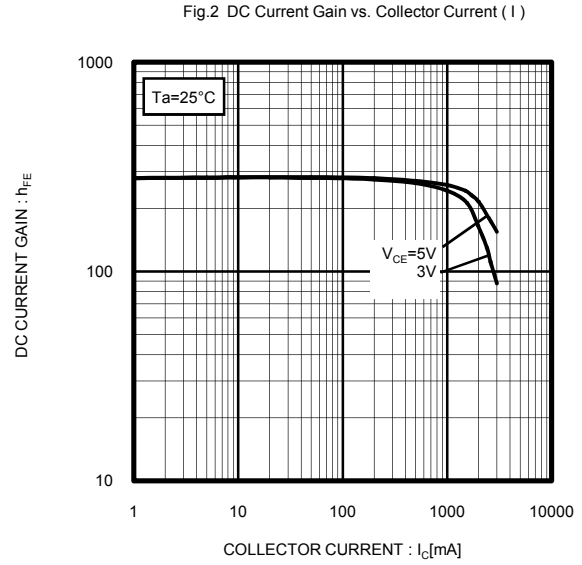


Fig.2 DC Current Gain vs. Collector Current ( I )

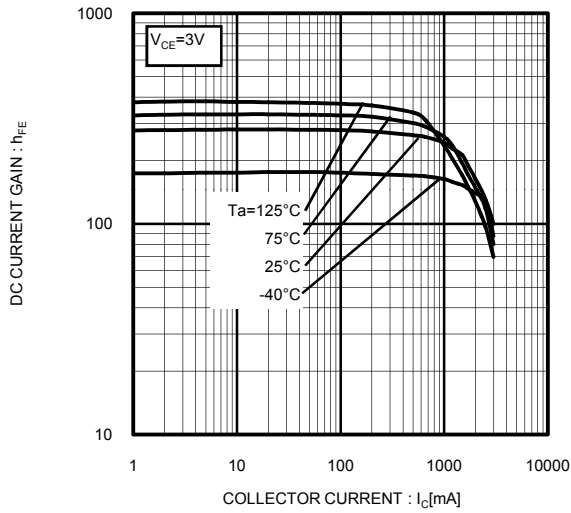


Fig.3 DC Current Gain vs. Collector Current ( II )

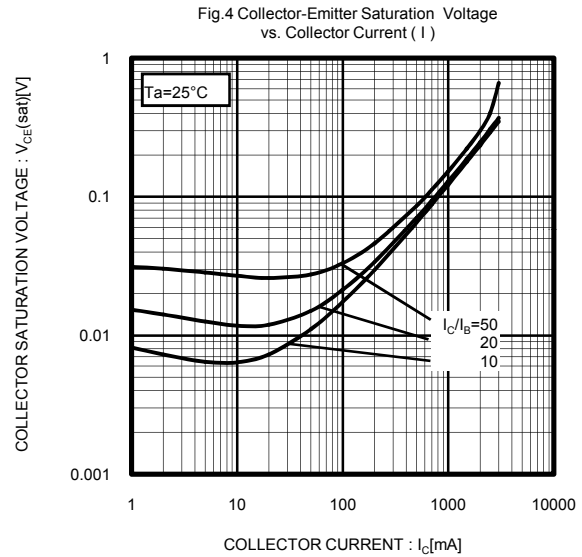


Fig.4 Collector-Emitter Saturation Voltage vs. Collector Current ( I )

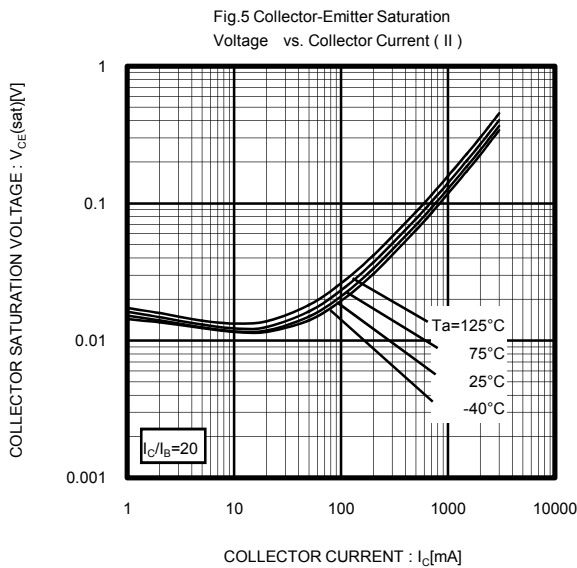


Fig.5 Collector-Emitter Saturation Voltage vs. Collector Current ( II )

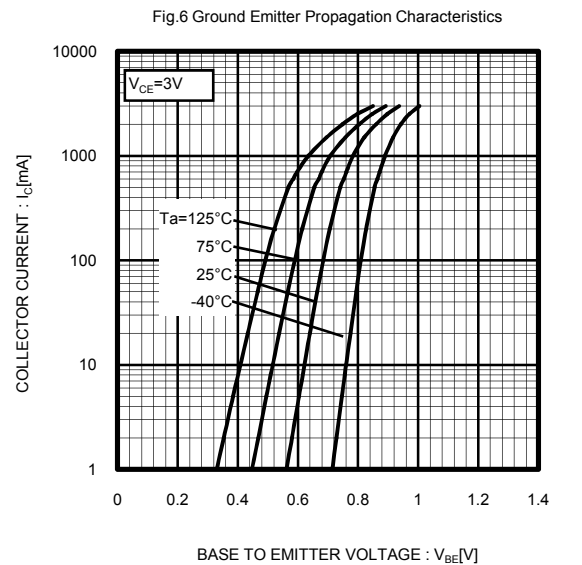


Fig.6 Ground Emitter Propagation Characteristics

Fig.7 Emitter Input Capacitance vs. Emitter-Base Voltage  
Collector Output Capacitance vs. Collector-Base Voltage

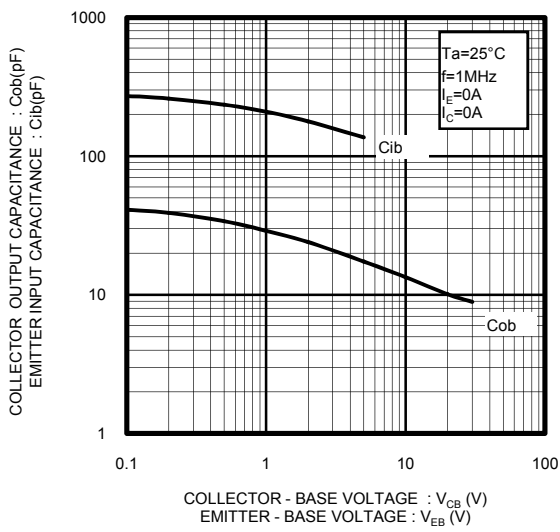


Fig.8 Gain Bandwidth Product vs. Emitter Current

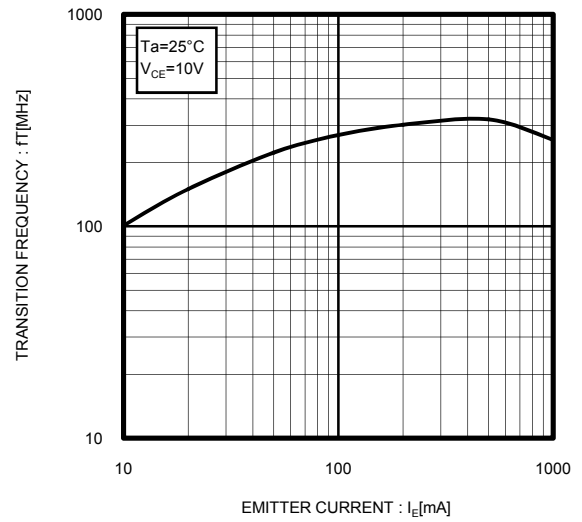
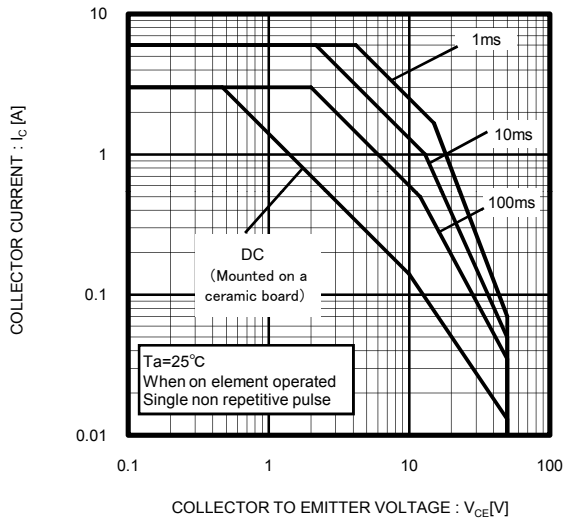
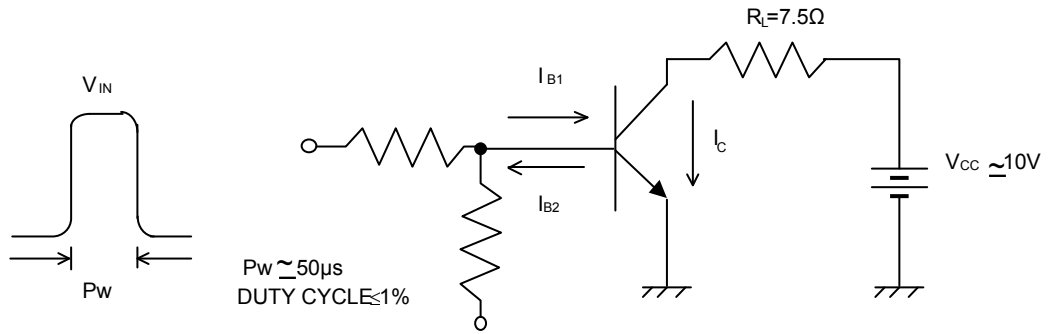


Fig.9 Safe Operating Area

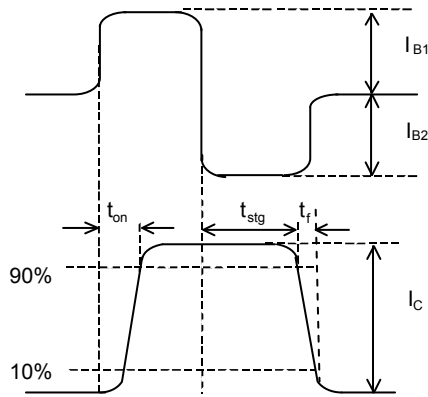


● Switching time test circuit



BASE CURRENT WAVEFORM

COLLECTOR CURRENT WAVEFORM



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