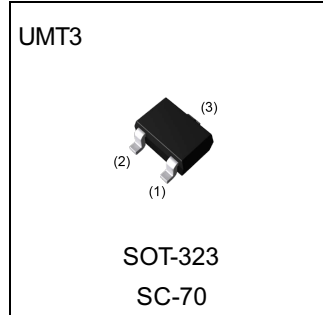


Parameter	Value
V_{CEO}	-12V
I_C	-1.5A

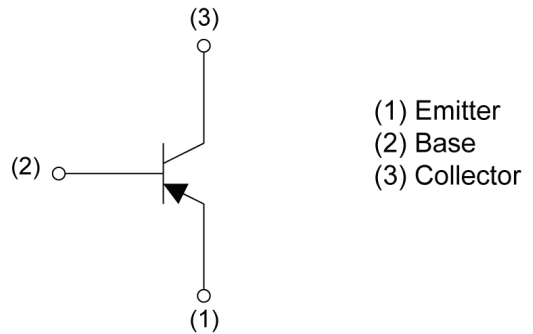
●Outline



●Features

- 1)A collector current is large
- 2)Collector saturation voltage is low.
 $V_{CE(sat)} \leq -200mV$
 at $I_C = -500mA / I_B = -25mA$

●Inner circuit



●Application

LOW FREQUENCY AMPLIFIER, DRIVER

●Packaging specifications

Part No.	Package	Package size	Taping code	Reel size (mm)	Tape width (mm)	Basic ordering unit.(pcs)	Marking
2SB1689	UMT3	2021	T106	180	8	3000	EV

● Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Values	Unit
Collector-base voltage	V_{CBO}	-15	V
Collector-emitter voltage	V_{CEO}	-12	V
Emitter-base voltage	V_{EBO}	-6	V
Collector current	I_{C}	-1.5	A
	I_{CP}^{*1}	-3.0	A
Power dissipation	P_{D}^{*2}	200	mW
Junction temperature	T_{j}	150	$^\circ\text{C}$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

● Electrical characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Collector-base breakdown voltage	BV_{CBO}	$I_{\text{C}} = -10\mu\text{A}$	-15	-	-	V
Collector-emitter breakdown voltage	BV_{CEO}	$I_{\text{C}} = -1\text{mA}$	-12	-	-	V
Emitter-base breakdown voltage	BV_{EBO}	$I_{\text{E}} = -10\mu\text{A}$	-6	-	-	V
Collector cut-off current	I_{CBO}	$V_{\text{CB}} = -15\text{V}$	-	-	-100	nA
Emitter cut-off current	I_{EBO}	$V_{\text{EB}} = -6\text{V}$	-	-	-100	nA
Collector-emitter saturation voltage	$V_{\text{CE(sat)}}$	$I_{\text{C}} = -500\text{mA}$, $I_{\text{B}} = -25\text{mA}$	-	-110	-200	mV
DC current gain	h_{FE}^{*3}	$V_{\text{CE}} = -2\text{V}$, $I_{\text{C}} = -200\text{mA}$	270	-	680	-
Transition frequency	f_{T}^{*3}	$V_{\text{CE}} = -2\text{V}$, $I_{\text{E}} = 200\text{mA}$, $f = 100\text{MHz}$	-	400	-	MHz
Output capacitance	C_{ob}	$V_{\text{CB}} = -10\text{V}$, $I_{\text{E}} = 0\text{A}$, $f = 1\text{MHz}$	-	12	-	pF

*1 $P_w=1\text{ms}$, Single Pulse.

*2 Each terminal mounted on a reference land.

*3 Measured using pulse current.

● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.1 Ground Emitter Propagation Characteristics

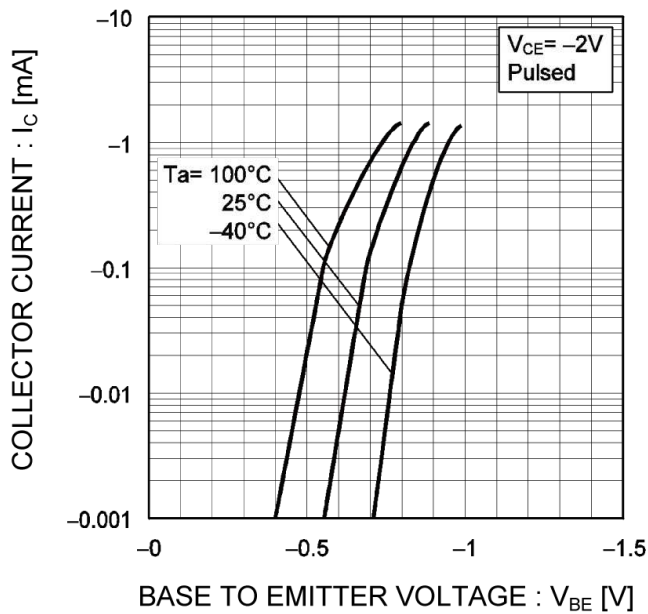


Fig.2 Typical Output Characteristics

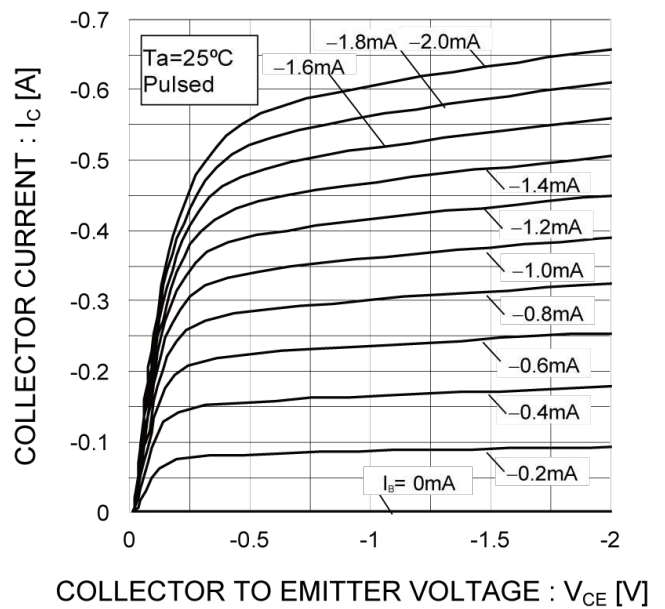


Fig.3 DC Current Gain vs. Collector Current (I)

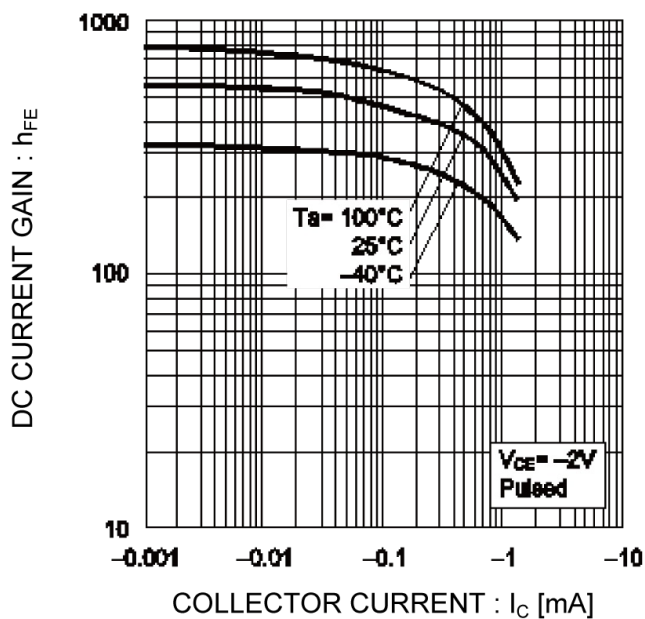
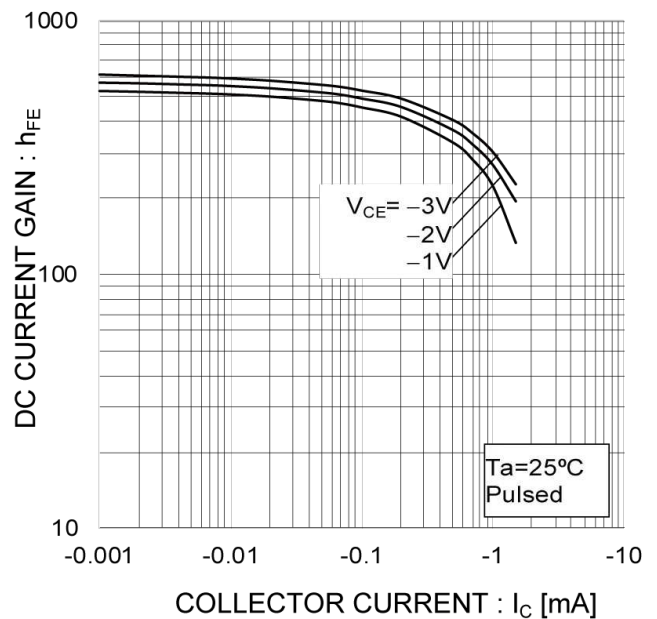


Fig.4 DC Current Gain vs. Collector Current (II)



● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

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

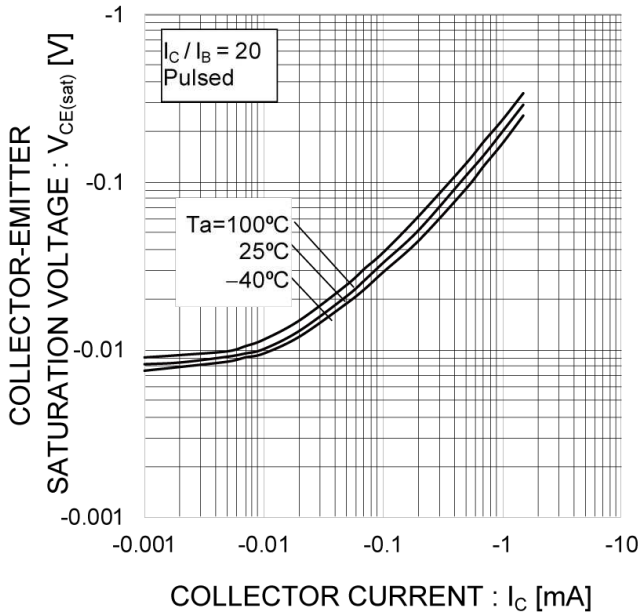


Fig.6 Collector-Emitter Saturation Voltage vs. Collector Current (II)

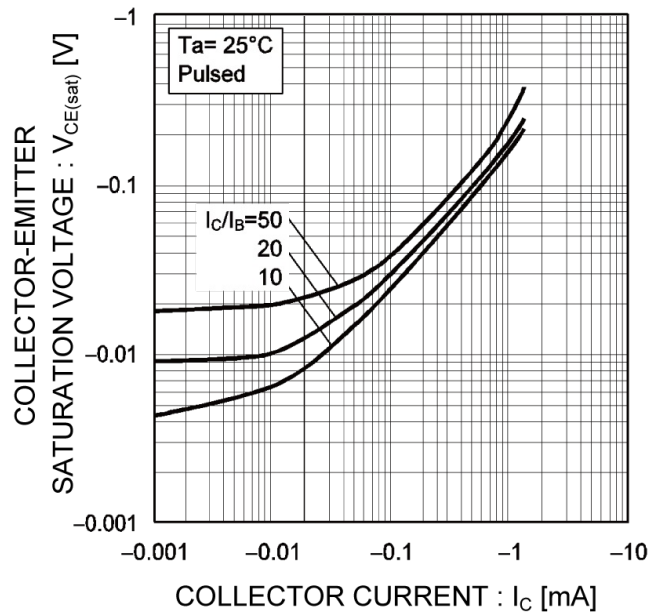


Fig.7 Base-Emitter Saturation Voltage vs. Collector Current

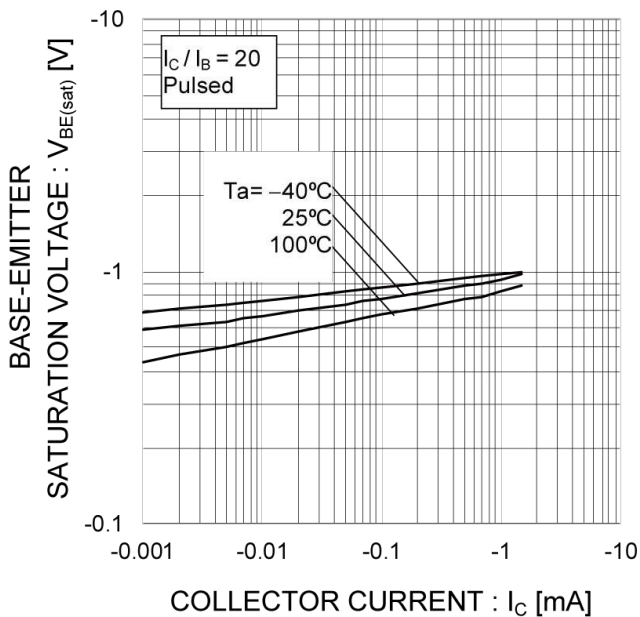
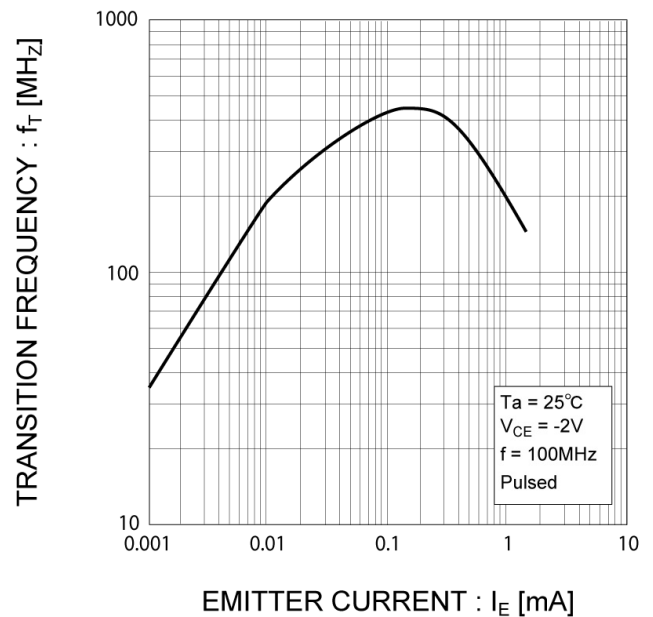


Fig.8 Gain Bandwidth Product vs. Emitter Current



● Electrical characteristic curves ($T_a = 25^\circ\text{C}$)

Fig.9 Emitter Input Capacitance vs. Emitter-Base Voltage
Collector Output Capacitance vs. Collector-Base Voltage

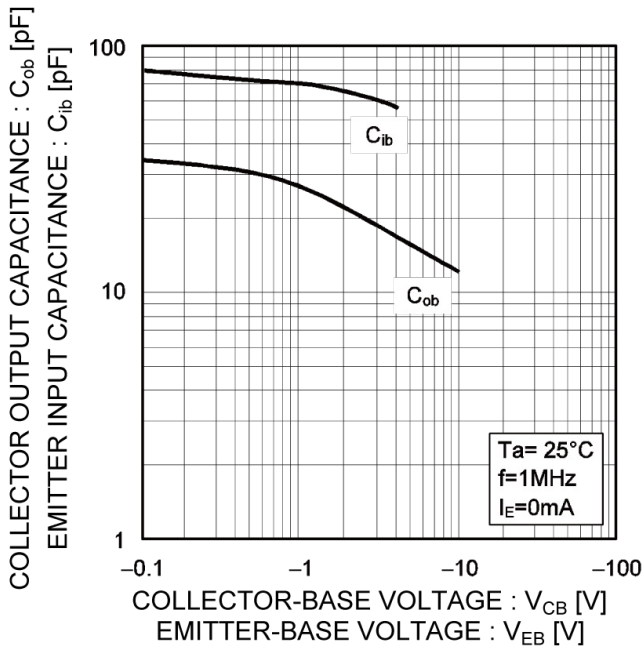
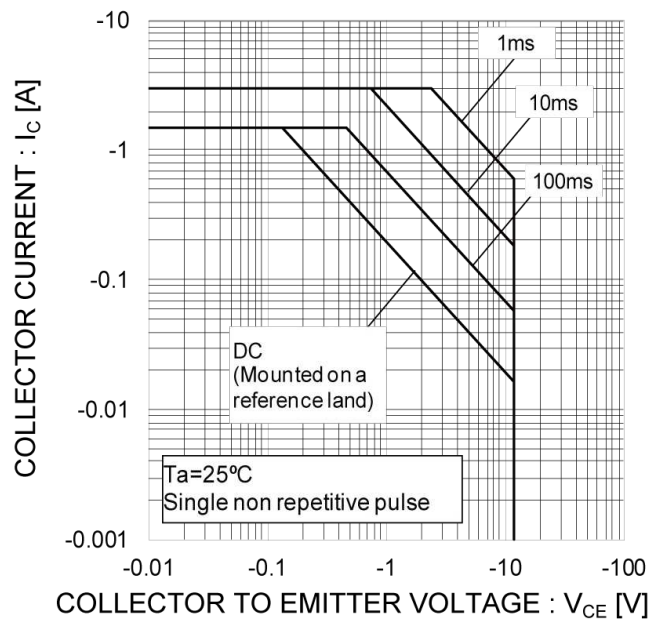
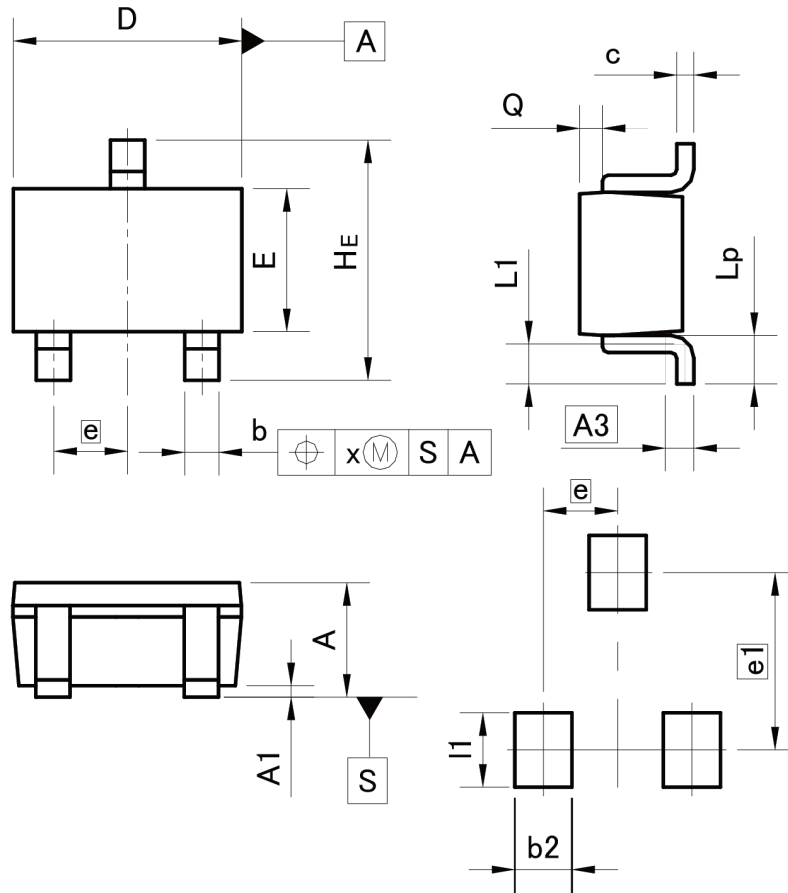


Fig.10 Safe Operating Area



●Dimensions

UMT3



Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80	1.00	0.031	0.039
A1	0.00	0.10	0.000	0.004
A3	0.25		0.010	
b	0.15	0.30	0.006	0.012
c	0.10	0.20	0.004	0.008
D	1.90	2.10	0.075	0.083
E	1.15	1.35	0.045	0.053
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L1	0.20	0.50	0.008	0.020
Lp	0.25	0.55	0.010	0.022
Q	0.10	0.30	0.004	0.012
x	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.50	-	0.020
e1	1.55		0.061	
l1	-	0.65	-	0.026

Dimension in mm/inches

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