

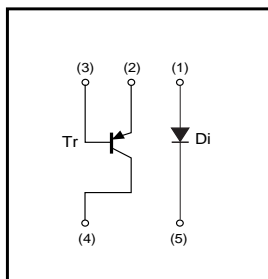
# Low-frequency transistor

## UML1N

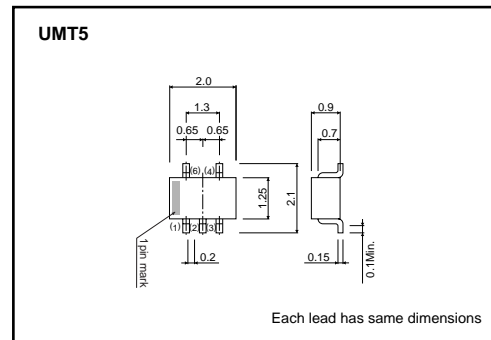
### ●Features

- 1) The 2SA1037AK and a diode are housed independently in a UMT package.

### ●Equivalent circuit



### ●External dimensions (Unit : mm)



### ●Packaging specifications

Type	FML10
Package	SMT5
Marking	L10
Code	TR
Basic ordering unit(pieces)	3000

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

Tr

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	-60	V
Collector-emitter voltage	V <sub>CE0</sub>	-50	V
Emitter-base voltage	V <sub>EB0</sub>	-6	V
Collector current	I <sub>C</sub>	-0.15	A
Collector power dissipatio	P <sub>C</sub>	0.15	W
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

Di

Parameter	Symbol	Limits	Unit
DC reverse voltage	V <sub>R</sub>	80	V
Peak reverse voltage	V <sub>RM</sub>	80	V
Mean rectifying current	I <sub>O</sub>	0.1	A
Peak forward voltage	I <sub>FM</sub>	0.3	A
Surge current	I <sub>surge</sub>	4	A
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C
Specified I/O frequencies	f	100	MHz

Transistors

●Electrical characteristics (Ta=25°C)

Tr

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV <sub>CEO</sub>	-50	-	-	V	I <sub>c</sub> = -1mA
Collector-base breakdown voltage	BV <sub>CBO</sub>	-60	-	-	V	I <sub>c</sub> = -50μA
Emitter-base breakdown voltage	BV <sub>EB0</sub>	-6	-	-	V	I <sub>E</sub> = -50μA
Collector cutoff current	I <sub>CB0</sub>	-	-	-0.1	μA	V <sub>CB</sub> = -60V
Emitter cutoff current	I <sub>EB0</sub>	-	-	-0.1	μA	V <sub>EB</sub> = -5V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	-	-0.5	V	I <sub>c</sub> /I <sub>B</sub> = -50mA/-5mA
DC current transfer ratio	h <sub>FE</sub>	120	-	560	-	V <sub>CE</sub> = -6V, I <sub>c</sub> = -1mA
Transition frequency	f <sub>r</sub>	-	140	-	MHz	V <sub>CE</sub> = -12V, I <sub>E</sub> = 2mA, f= 100MHz
Output capacitance	C <sub>ob</sub>	-	4	5	pF	V <sub>CB</sub> = -12V, I <sub>E</sub> = 0A, f= 1MHz

Di

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V <sub>F</sub>	-	-	1.2	V	I <sub>F</sub> =100mA
Reverse current	I <sub>R</sub>	-	-	0.1	μA	V <sub>R</sub> =70V
Capacitance between terminals	C <sub>T</sub>	-	-	3.5	pF	V <sub>R</sub> =6V, f=1MHz
Reverse recovery time	t <sub>rr</sub>	-	-	4	ns	V <sub>R</sub> =6V, I <sub>F</sub> =5mA, R <sub>L</sub> =50Ω

●Electrical characteristic curves

Tr

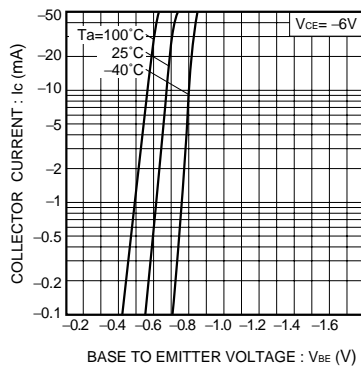


Fig.1 Grounded emitter propagation characteristics

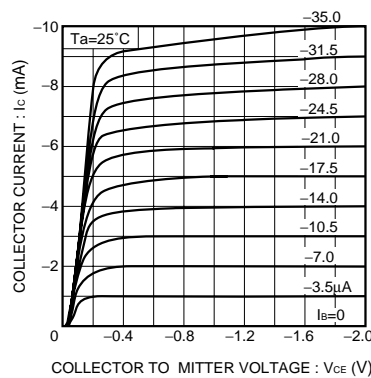


Fig.2 Grounded emitter output characteristics (I)

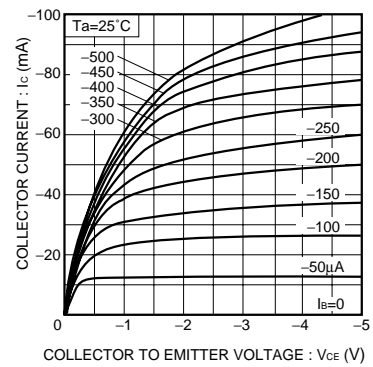


Fig.3 Grounded emitter output characteristics (II)

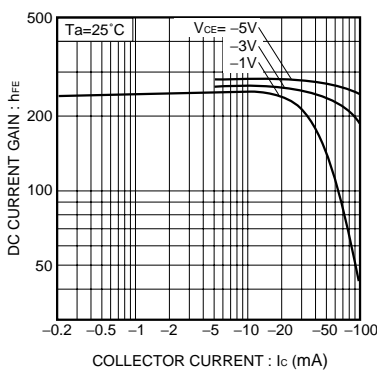


Fig.4 DC current gain vs. collector current (I)

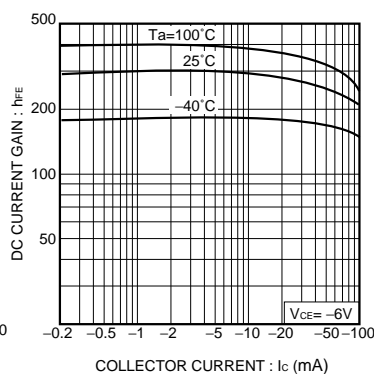


Fig.5 DC current gain vs. collector current (II)

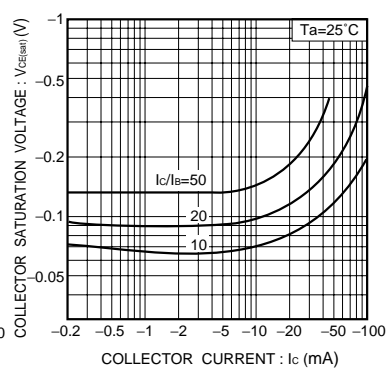


Fig.6 Collector-emitter saturation voltage vs. collector current (I)

Transistors

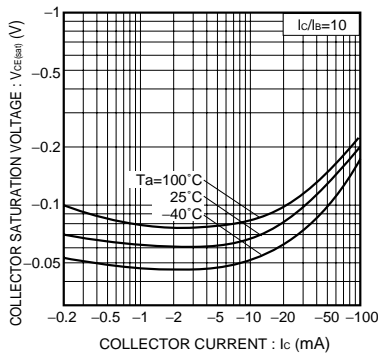


Fig.7 Collector-emitter saturation voltage vs. collector current (II)

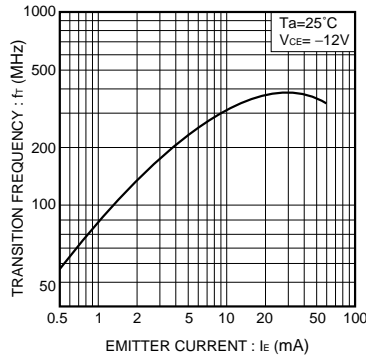


Fig.8 Gain bandwidth product vs. emitter current

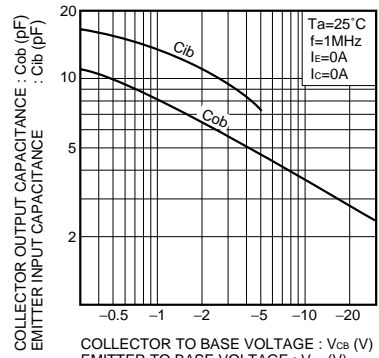


Fig.9 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

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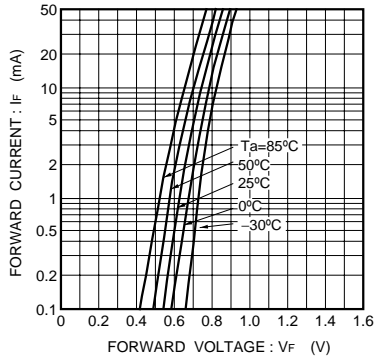


Fig.10 Forward characteristics

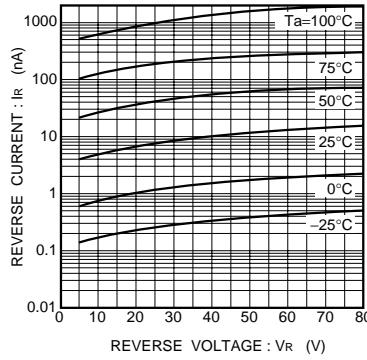


Fig.11 Reverse characteristics

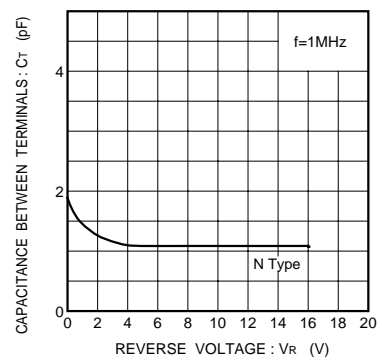


Fig.12 Capacitance between terminals characteristics

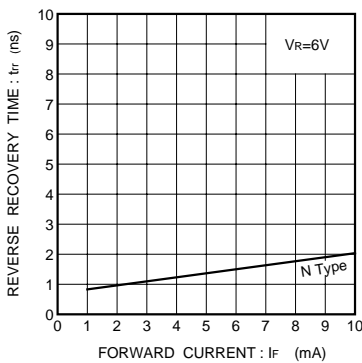


Fig.13 Reverse recovery time

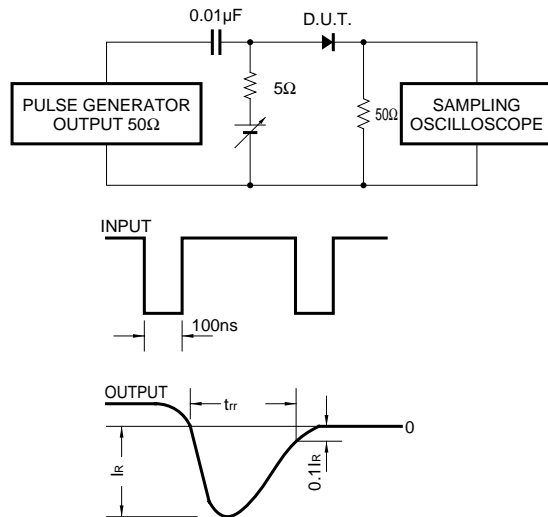


Fig.14 Reverse recovery time ( $t_{rr}$ ) measurement circuit

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