

Transistors

General purpose transistor (isolated transistor and diode)

FML9

A 2SB1689 and a RB461F are housed independently in a UMT package.

●Applications

DC / DC converter
Motor driver

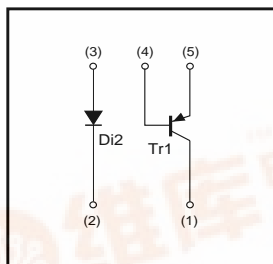
●Features

- 1) Tr : Low $V_{CE(sat)}$
Di : Low V_f
- 2) Small package

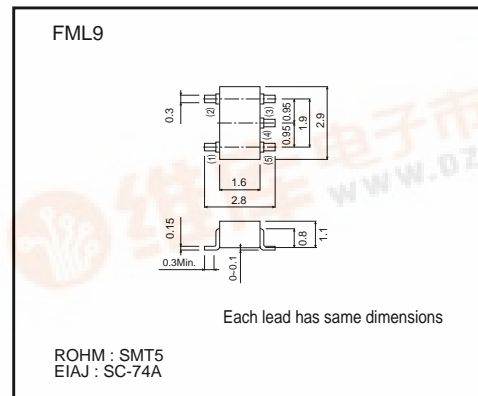
●Structure

Silicon epitaxial planar transistor
Schottky barrier diode

●Equivalent circuit



●External dimensions (Units : mm)



●Packaging specifications

Type	FML9
Package	SMT5
Marking	L9
Code	TR
Basic ordering unit(pieces)	3000

Transistors

●Absolute maximum ratings (Ta=25°C)

Tr1

Parameter	Symbol	Limits	Unit
Collector-base voltage	V _{CB0}	-15	V
Collector-emitter voltage	V _{CE0}	-12	V
Emitter-base voltage	V _{EB0}	-6	V
Collector current	I _C	-1.5	A
	I _{CP}	-3	A *1
Power dissipation	P _C	200	mW *2
Junction temperature	T _j	150	°C
Range of storage temperature	T _{stg}	-40~+125	°C

*1 Single pulse, Pw=1ms.

*2 Each terminal mounted on a recommended land.

Di2

Parameter	Symbol	Limits	Unit
Average rectified forward current	I _F	700	mA
Forward current surge peak (60Hz, 1∞)	I _{FSM}	3	A
Reverse voltage (DC)	V _R	20	V
Junction temperature	T _j	125	°C
Range of storage temperature	T _{stg}	-40~+125	°C

●Electrical characteristics (Ta=25°C)

Tr1

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-emitter breakdown voltage	BV _{CEO}	-12	-	-	V	I _C =-1mA
Collector-base breakdown voltage	BV _{CB0}	-15	-	-	V	I _C =-10μA
Emitter-base breakdown voltage	BV _{EB0}	-6	-	-	V	I _E =-10μA
Collector cut-off current	I _{CBO}	-	-	-100	nA	V _{CB} =-15V
Emitter cut-off current	I _{EBO}	-	-	-100	nA	V _{EB} =-6V
Collector-emitter saturation voltage	V _{CE(sat)}	-	-110	-200	mV	I _C =-500mA, I _B =-25mA
DC current gain	h _{FE}	270	-	680	-	V _{CE} =-2V, I _C =-200mA
Transition frequency	f _T	-	400	-	MHz	V _{CE} =-2V, I _E =200mA, f=100MHz
Collector output capacitance	C _{ob}	-	12	-	pF	V _{CB} =-10V, I _E =0mA, f=1MHz

Di2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V _F	-	-	490	mV	I _F =700mA
Reverse current	I _R	-	-	200	μA	V _R =20V

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● Electrical characteristic curves

Tr1

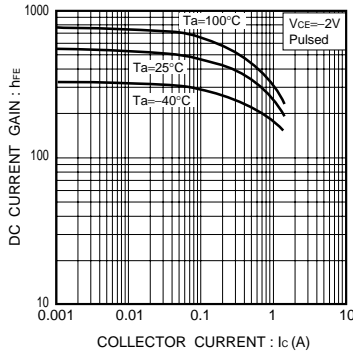


Fig.1 DC current gain vs. collector current

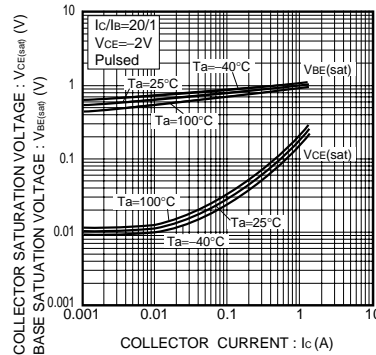


Fig.2 Base-emitter saturation voltage vs. collector current

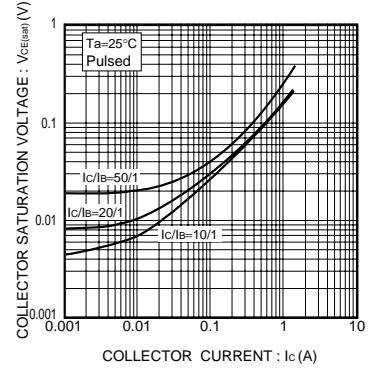


Fig.3 Collector-emitter saturation voltage vs. collector current

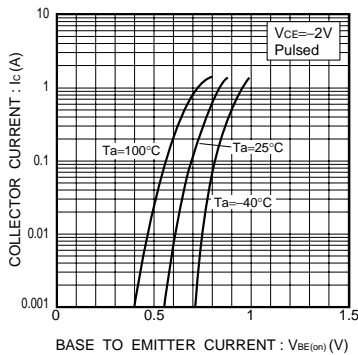


Fig.4 Grounded emitter propagation characteristics

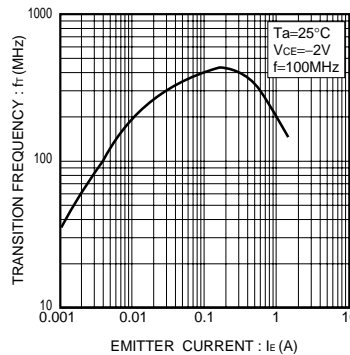


Fig.5 Gain bandwidth product vs. emitter current

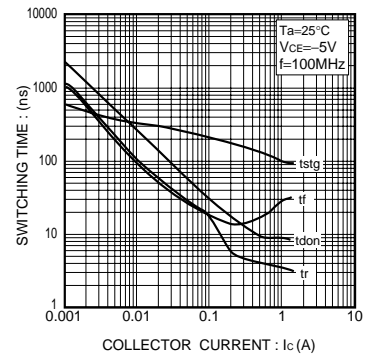


Fig.6 Switching time

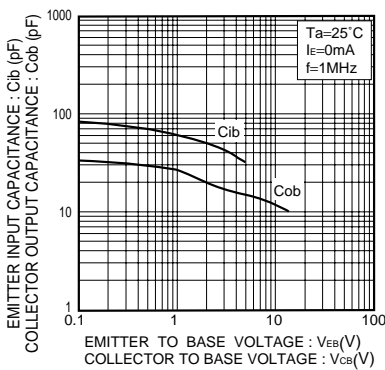


Fig.7 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

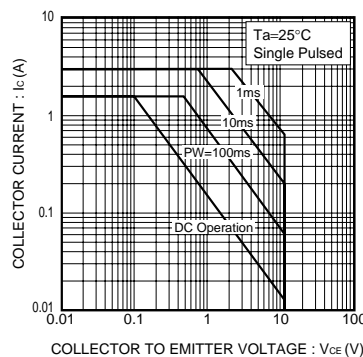


Fig.8 Safe operation area

Transistors

Di2

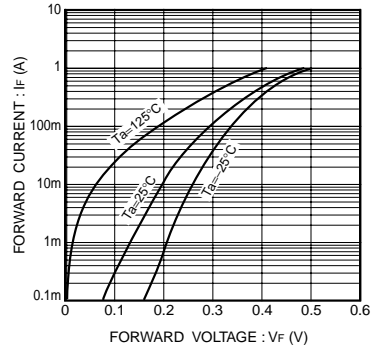


Fig.9 Forward characteristics

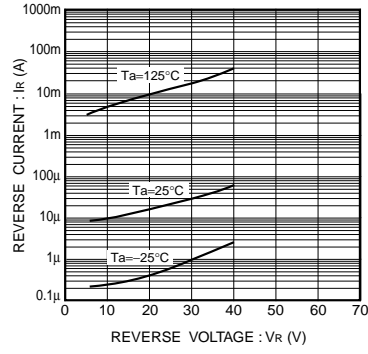


Fig.10 Reverse characteristics