

# Power management (dual transistors)

## EMF24 / UMF24N

2SC4617 and DTC114E are housed independently in a EMT6 or UMT6 package.

### ●Application

Power management circuit

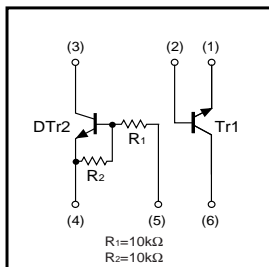
### ●Features

- 1) Power switching circuit in a single package.
- 2) Mounting cost and area can be cut in half.

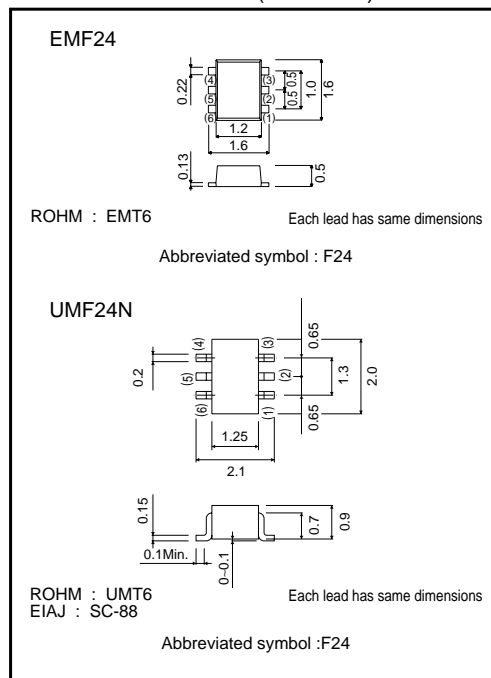
### ●Structure

Silicon epitaxial planar transistor

### ●Equivalent circuits



### ●External dimensions (Units : mm)



### ●Packaging specifications

Type	EMF23	UMF23N
Package	EMT6	UMT6
Marking	F23	F23
Code	T2R	TR
Basic ordering unit(pieces)	8000	3000

## Transistors

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

Tr1

Parameter	Symbol	Limits	Unit
Collector-base voltage	V <sub>CB0</sub>	60	V
Collector-emitter voltage	V <sub>CEO</sub>	50	V
Emitter-base voltage	V <sub>EB0</sub>	7	V
Collector current	I <sub>c</sub>	150	mA
Power dissipation	P <sub>c</sub>	150 (TOTAL)	mW *
Junction temperature	T <sub>j</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

\* 120mW per element must not be exceeded.

DTr2

Parameter	Symbol	Limits	Unit
Supply voltage	V <sub>CC</sub>	50	V
Input voltage	V <sub>IN</sub>	-10~+40	V
Collector current	I <sub>c</sub>	100	mA *1
Output current	I <sub>o</sub>	50	mA
Power dissipation	P <sub>c</sub>	150(TOTAL)	mW *2
Junction temperature	T <sub>j</sub>	150	°C
Range of storage temperature	T <sub>stg</sub>	-55 to +150	°C

\*1 Characteristics of built-in transistor.

\*2 120mW per element must not be exceeded.

Each terminal mounted on a recommended land.

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

Tr1

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Collector-base breakdown voltage	BV <sub>CB0</sub>	60	-	-	V	I <sub>c</sub> =50μA
Collector-emitter breakdown voltage	BV <sub>CEO</sub>	50	-	-	V	I <sub>c</sub> =1mA
Emitter-base breakdown voltage	BV <sub>EB0</sub>	7	-	-	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> =7V
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	-	-	0.4	V	I <sub>c</sub> /I <sub>B</sub> =50mA/5mA
DC current transfer ratio	h <sub>FE</sub>	180	-	390	-	V <sub>CE</sub> =6V, I <sub>c</sub> =1mA
Transition frequency	f <sub>r</sub>	-	180	-	MHz	V <sub>CE</sub> =12V, I <sub>E</sub> =-2mA, f=100MHz
Output capacitance	C <sub>ob</sub>	-	2	3.5	PF	V <sub>CB</sub> =12V, I <sub>E</sub> =0A, f=1MHz

DTr2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	V <sub>I(off)</sub>	-	-	0.5	V	V <sub>CC</sub> =5V, I <sub>o</sub> =100μA
	V <sub>I(on)</sub>	3	-	-		
Output voltage	V <sub>O(on)</sub>	-	0.1	0.3	V	I <sub>o</sub> /I <sub>i</sub> =10mA/0.5mA
Input current	I <sub>i</sub>	-	-	0.88	mA	V <sub>I</sub> =5V
Output current	I <sub>O(off)</sub>	-	-	0.5	μA	V <sub>CC</sub> =50V, V <sub>I</sub> =0V
DC current gain	G <sub>i</sub>	30	-	-	-	V <sub>O</sub> =5V, I <sub>o</sub> =5mA
Input resistance	R <sub>i</sub>	7	10	13	kΩ	-
Resistance ratio	R <sub>2</sub> /R <sub>1</sub>	0.8	1	1.2	-	-
Transition frequency	f <sub>r</sub>	-	250	-	MHz	V <sub>CE</sub> =10V, I <sub>E</sub> =-5mA, f=100MHz *

\* Transition frequency of the device

Transistors

●Electrical characteristic curves

Tr1

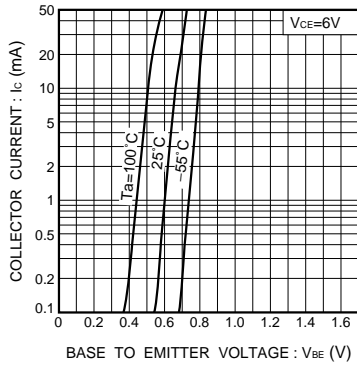


Fig.1 Grounded emitter propagation characteristics

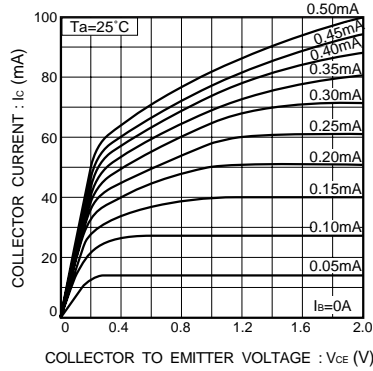


Fig.2 Grounded emitter output characteristics ( I )

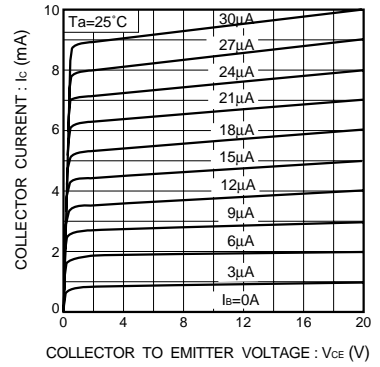


Fig.3 Grounded emitter output characteristics ( II )

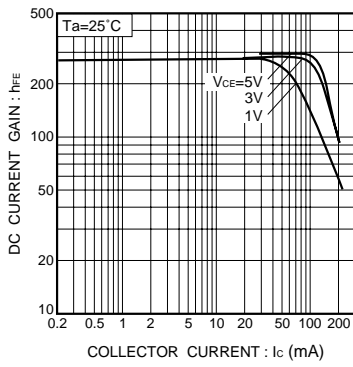


Fig.4 DC current gain vs. collector current ( I )

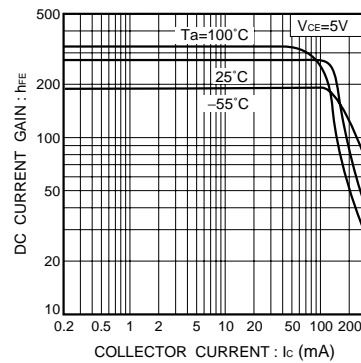


Fig.5 DC current gain vs. collector current ( II )

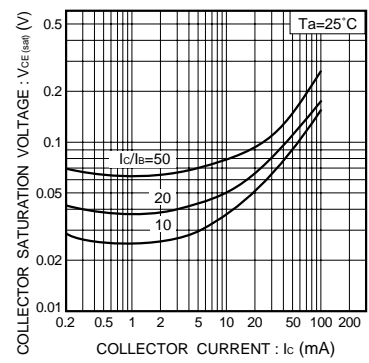


Fig.6 Collector-emitter saturation voltage vs. collector current

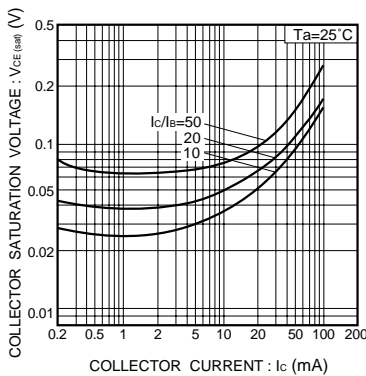


Fig.7 Collector-emitter saturation voltage vs. collector current ( I )

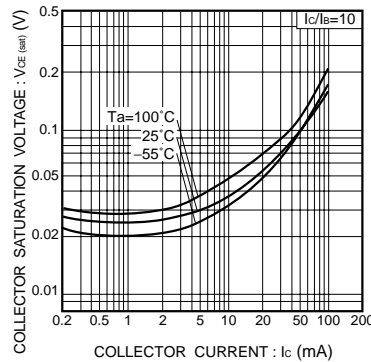


Fig.8 Collector-emitter saturation voltage vs. collector current ( II )

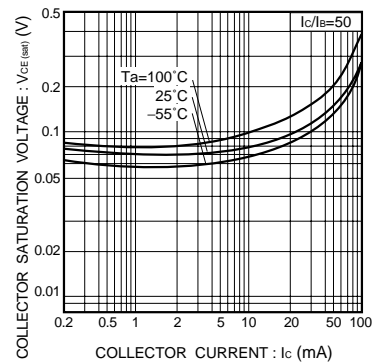


Fig.9 Collector-emitter saturation voltage vs. collector current ( III )