

# Power management (dual transistors)

## EMF23/UMF23N

2SA1774 and DTC114E are housed independently in a EMT6 or UMT6 package.

### ●Application

Power management circuit

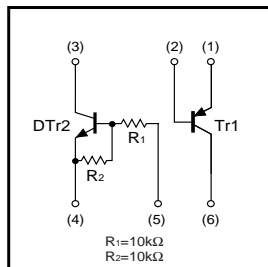
### ●Features

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

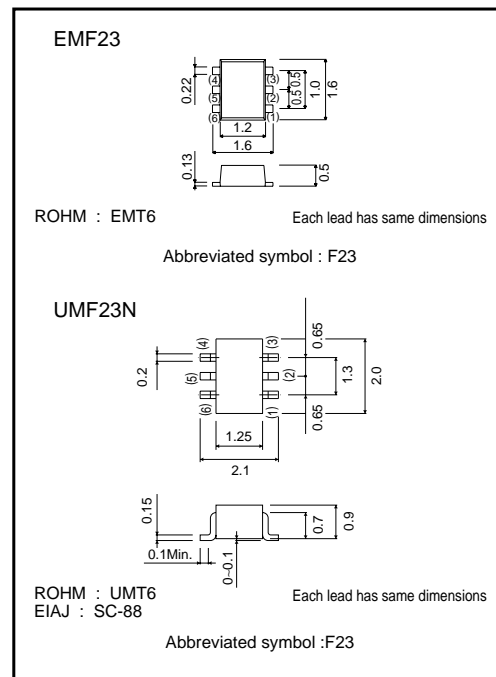
### ●Structure

Silicon epitaxial planar transistor

### ●Equivalent circuits



### ●External dimensions (Units : mm)



### ●Package, marking, and 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>EBO</sub>	-6	V
Collector current	I <sub>c</sub>	-150	mA
Collector 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> =-50mA
Collector-emitter breakdown voltage	BV <sub>CEO</sub>	-50	-	-	V	I <sub>c</sub> =-1mA
Emitter-base breakdown voltage	BV <sub>EBO</sub>	-6	-	-	V	I <sub>E</sub> =-50mA
Collector cutoff current	I <sub>CB0</sub>	-	-	-0.1	mA	V <sub>CB</sub> =-60V
Emitter cutoff current	I <sub>EBO</sub>	-	-	-0.1	mA	V <sub>EB</sub> =-6V
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>	180	-	390	-	V <sub>CE</sub> =-6V, I <sub>c</sub> =-1mA
Transition frequency	f <sub>T</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

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> =100mA
	V <sub>I(on)</sub>	3	-	-		V <sub>o</sub> =0.3V, I <sub>o</sub> =10mA
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	mA	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>1</sub>	7	10	13	kΩ	-
Resistance ratio	R <sub>2</sub> /R <sub>1</sub>	0.8	1	1.2	-	-
Transition frequency	f <sub>T</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

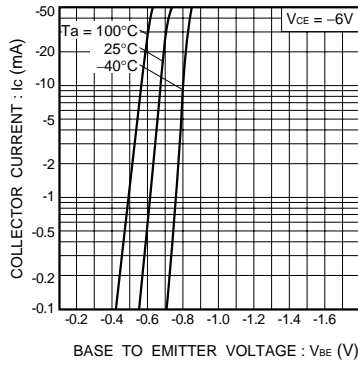


Fig.1 Grounded emitter propagation characteristics

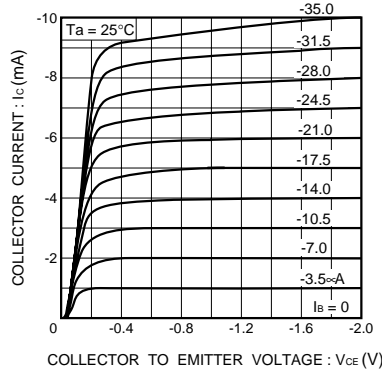


Fig.2 Grounded emitter output characteristics (I)

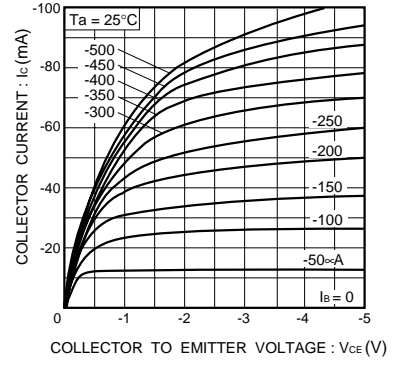


Fig.3 Grounded emitter output characteristics (II)

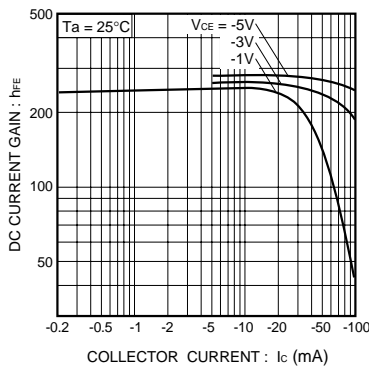


Fig.4 DC current gain vs. collector current (I)

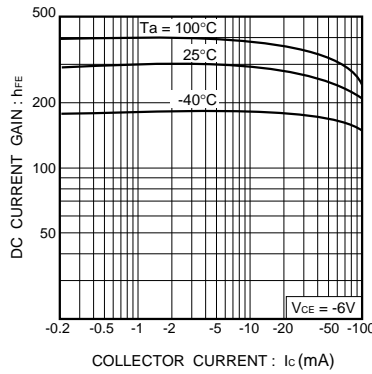


Fig.5 DC current gain vs. collector current (II)

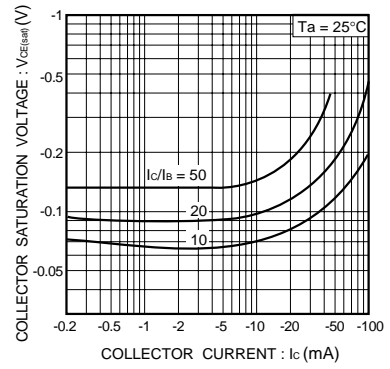


Fig.6 Collector-emitter saturation voltage vs. collector current (I)

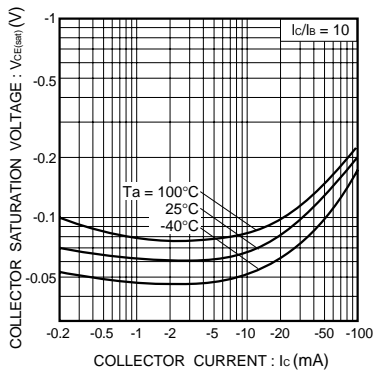


Fig.7 Collector-emitter saturation voltage vs. collector current (II)

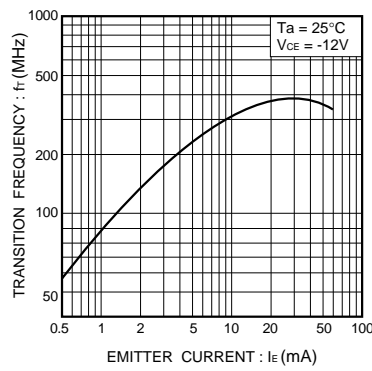


Fig.8 Gain bandwidth product vs. emitter current

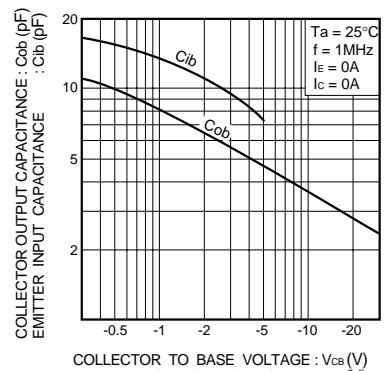


Fig.9 Collector output capacitance vs. collector-base voltage  
Emitter input capacitance vs. emitter-base voltage

Transistors

DTr2

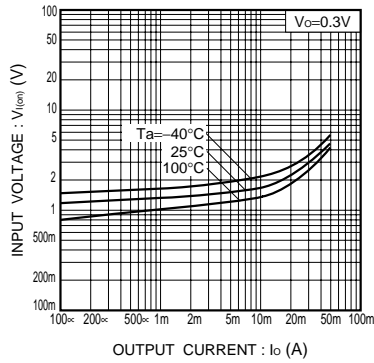


Fig.1 Input voltage vs. output current (ON characteristics)

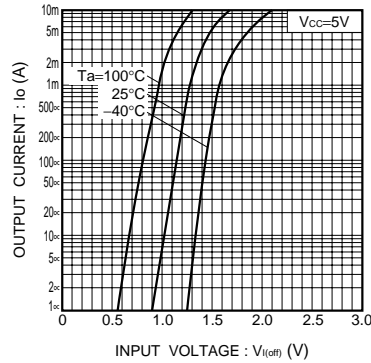


Fig.2 Output current vs. input voltage (OFF characteristics)

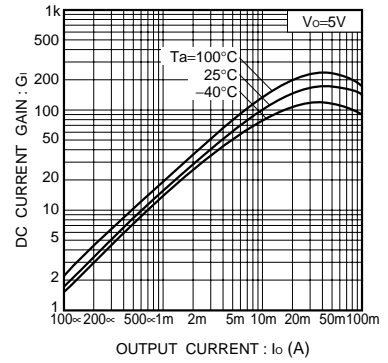


Fig.3 DC current gain vs. output current

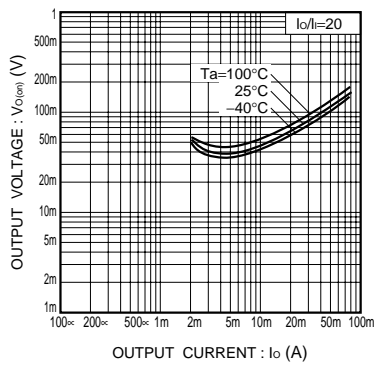


Fig.4 Output voltage vs. output current

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