Power management (dual transistors)

EMF21 / UMF21N

2SA2018 and DTC114E are housed independently in a EMT6 or UMT6 package.

●Application

Power management circuit

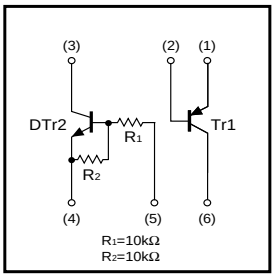
●Features

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

●Structure

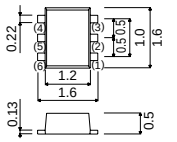
Silicon epitaxial planar transistor

●Equivalent circuits



●External dimensions (Units : mm)

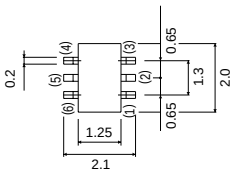
EMF21



Each lead has same dimensions

ROHM : EMT6 Abbreviated symbol : F21

UMF21N



Each lead has same dimensions

ROHM : UMT6
EIAJ : SC-88 Abbreviated symbol :F21

●Package, marking, and packaging specifications

Type	EMF21	UMF21N
Package	EMT6	UMT6
Marking	F21	F21
Code	T2R	TR
Basic ordering unit(pieces)	8000	3000

●Absolute maximum ratings (Ta=25°C)

Tr1

Parameter	Symbol	Limits	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	–500	mA
	I_{CP}	–1.0	A *1
Power dissipation	P_C	150(TOTAL)	mW *2
Junction temperature	Tj	150	°C
Range of storage temperature	Tstg	–55~+150	°C

*1 Single pulse P_W=1ms
*2 120mW per element must not be exceeded.
Each terminal mounted on a recommended land.

DTr2

Parameter	Symbol	Limits	Unit
Supply voltage	V_{CC}	50	V
Input voltage	V_{IN}	–10~+40	V
Collector current	I_C	100	mA *1
Output current	I_O	50	mA
Power dissipation	P_C	150(TOTAL)	mW *2
Junction temperature	Tj	150	°C
Range of storage temperature	Tstg	–55~+150	°C

*1 Characteristics of built-in transistor.
*2 Each terminal mounted on a recommended land.

●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_{CBO}	–15	–	–	V	I_C=–10μA
Emitter-base breakdown voltage	BV_{EBO}	–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	$V_{CE(sat)}$	–	–100	–250	mV	I_C=–200mA, I_B=–10mA
DC current gain	h_{FE}	270	–	680	–	V_{CE}=–2V, I_C=–10mA
Transition frequency	f_T	–	260	–	MHz	V_{CE}=–2V, I_E=10mA, f=100MHz
Collector output capacitance	Cob	–	6.5	–	pF	V_{CB}=–10V, I_E=0mA, f=1MHz

DTr2

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Input voltage	$V_{I(off)}$	–	–	0.5	V	V_{CC}=5V, I_O=100μA
	$V_{I(on)}$	3	–	–		V_O=0.3V, I_O=10mA
Output voltage	$V_{O(on)}$	–	0.1	0.3	V	I_O/I_I=10mA/0.5mA
Input current	I_I	–	–	0.88	mA	V_I=5V
Output current	$I_{O(off)}$	–	–	0.5	μA	V_{CC}=50V, V_I=0V
DC current gain	G_I	30	–	–	–	V_O=5V, I_O=5mA
Input resistance	R_1	7	10	13	kΩ	–
Resistance ratio	R_2/R_1	0.8	1	1.2	–	–
Transition frequency	f_T	–	250	–	MHz	V_{CE}=10V, I_E=–5mA, f=100MHz *

* Transition frequency of the device

●Electrical characteristic curves

Tr1

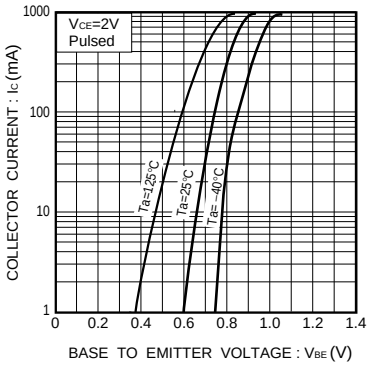


Fig.1 Grounded emitter propagation characteristics

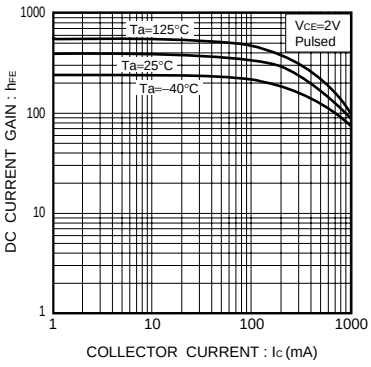


Fig.2 DC current gain vs. collector current

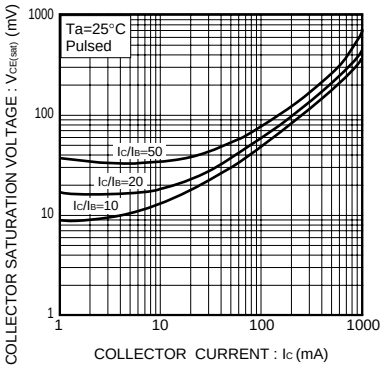


Fig.3 Collector-emitter saturation voltage vs. collector current (I)

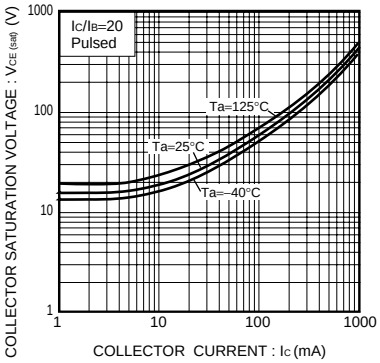


Fig.4 Collector-emitter saturation voltage vs. collector current (II)

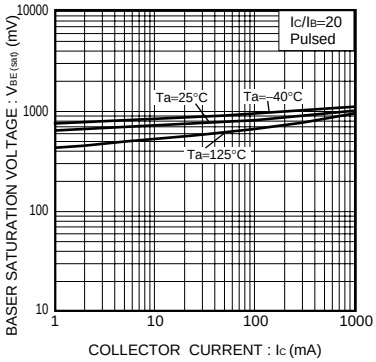


Fig.5 Base-emitter saturation voltage vs. collector current

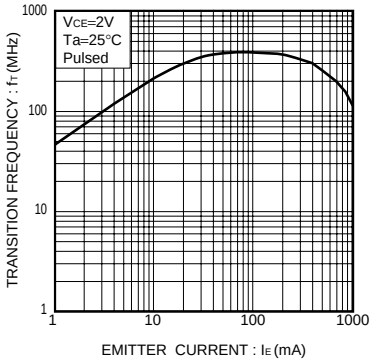


Fig.6 Gain bandwidth product vs. emitter current

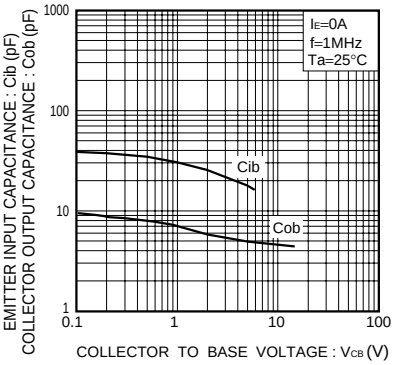


Fig.7 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

DTr2

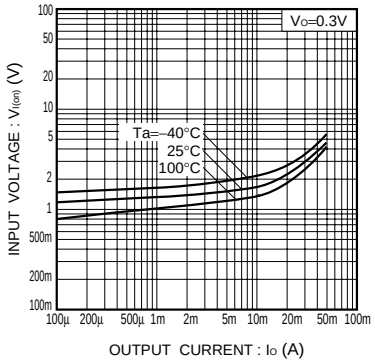


Fig.1 Input voltage vs. output current (ON characteristics)

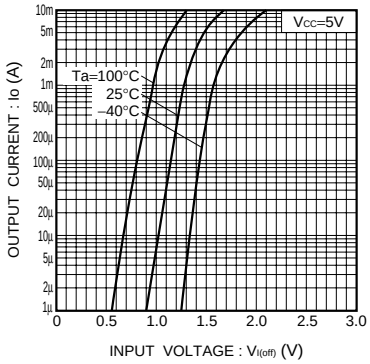


Fig.2 Output current vs. input voltage (OFF characteristics)

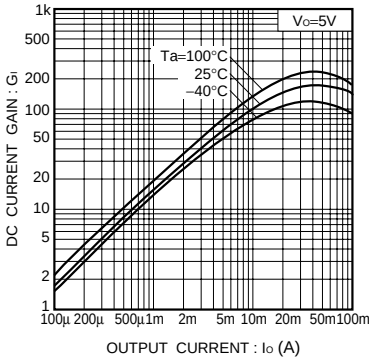


Fig.3 DC current gain vs. output current

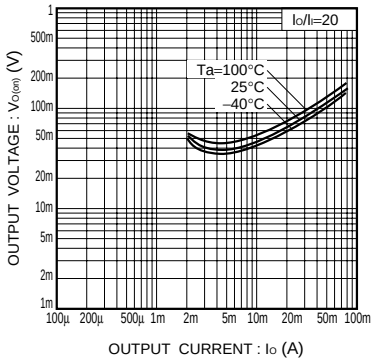


Fig.4 Output voltage vs. output current

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