Power management (dual transistors)

UMF5N

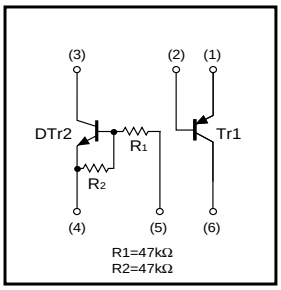
2SA2018 and DTC144EE are housed independently in a UMT package.

●Application
Power management circuit

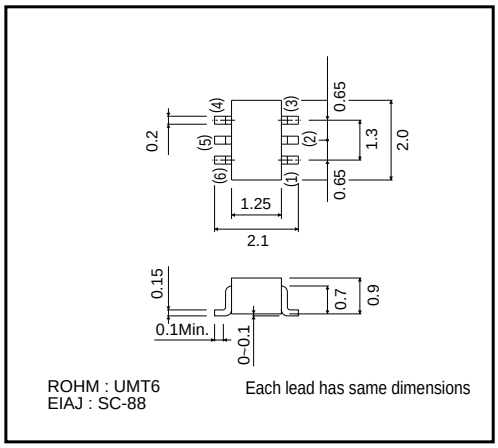
●Features
1) Power switching circuit in a single package.
2) Mounting cost and area can be cut in half.

●Structure
Silicon epitaxial planar transistor

●Equivalent circuits



●External dimensions (Units : mm)



●Packaging specifications

Type	UMF5N
Package	UMT6
Marking	F5
Code	TR
Basic ordering unit (pieces)	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 Pw=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	30	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 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-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
	$V_{I(on)}$	3.0	–	–	V	V_O=0.3V, I_O=2mA
Output voltage	$V_{O(on)}$	–	100	300	mV	V_O=10mA, I_I=0.5mA
Input current	I_I	–	–	180	μA	V_I=5V
Output current	$I_{O(off)}$	–	–	500	nA	V_{CC}=50V, V_I=0V
DC current gain	G_I	68	–	–	–	V_O=5V, I_O=5mA
Transition frequency	f_T	–	250	–	MHz	V_{CE}=10V, I_E=–5mA, f=100MHz *
Input resistance	R_1	32.9	47	61.1	kΩ	–
Resistance ratio	R_2/R_1	0.8	1.0	1.2	–	–

*Characteristics of built-in transistor.

●Electrical characteristic curves

Tr1

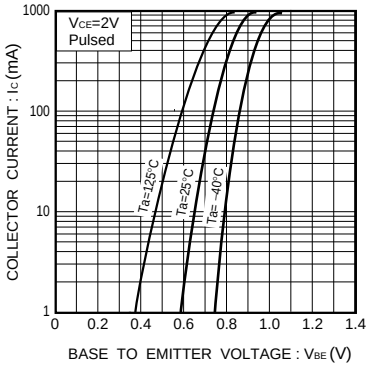


Fig.1 Grounded emitter propagation characteristics

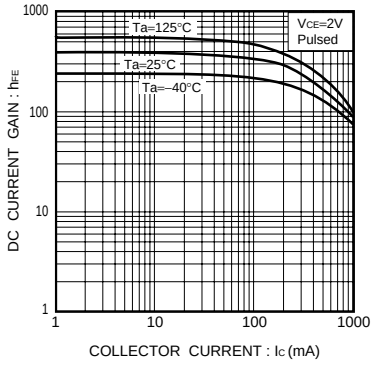


Fig.2 DC current gain vs. collector current

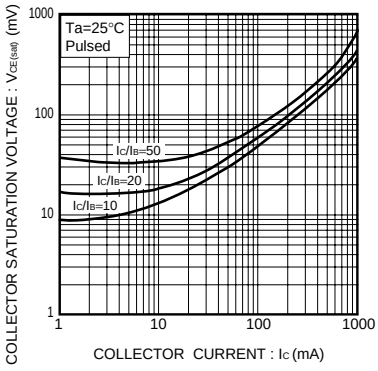


Fig.3 Collector-emitter saturation voltage vs. collector current (I)

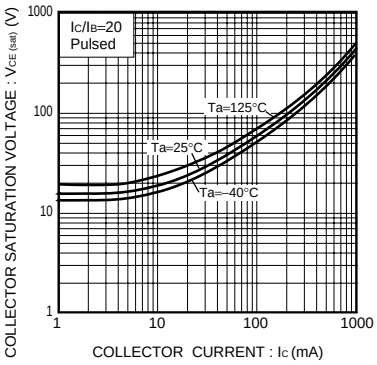


Fig.4 Collector-emitter saturation voltage vs. collector current (II)

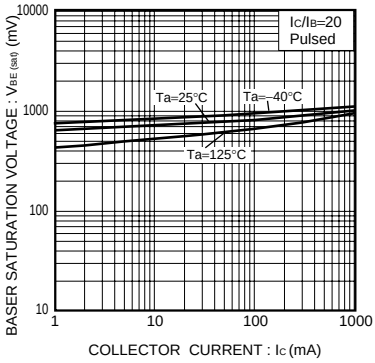


Fig.5 Base-emitter saturation voltage vs. collector current

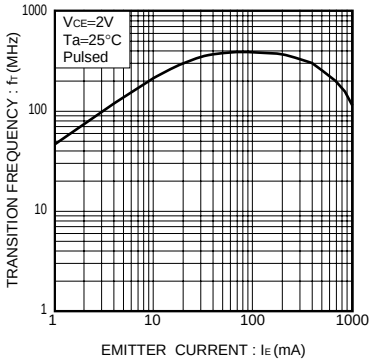


Fig.6 Gain bandwidth product vs. emitter current

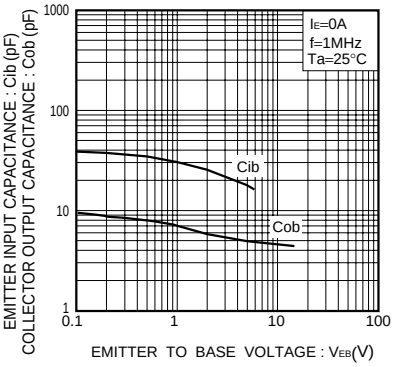


Fig.7 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

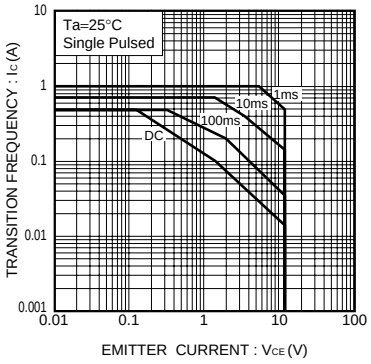


Fig.8 Safe operation area

DTr2

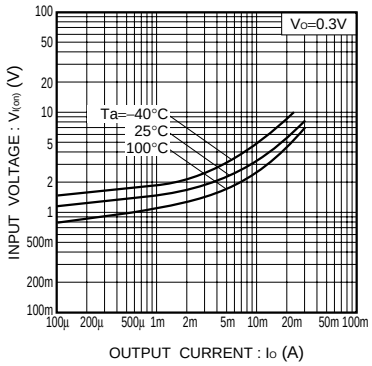


Fig.9 Input voltage vs. output current (ON characteristics)

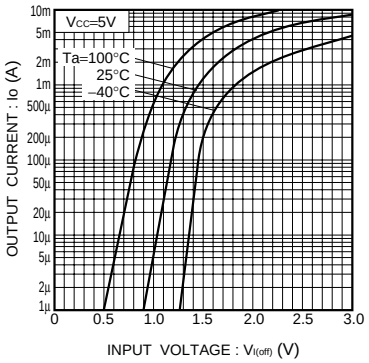


Fig.10 Output current vs. input voltage (OFF characteristics)

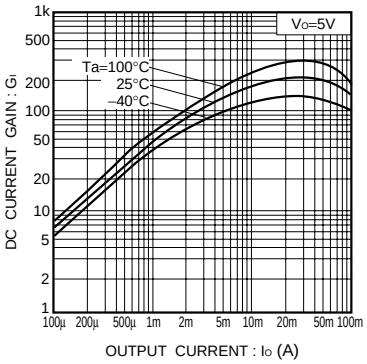


Fig.11 DC current gain vs. output current

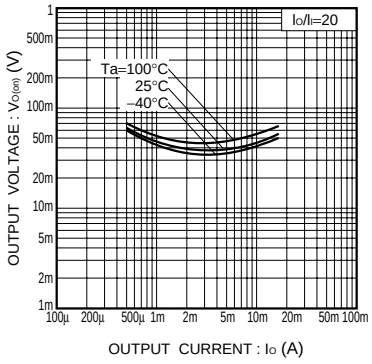


Fig.12 Output voltage vs. output current