Power management (dual transistors)

EMF20/UMF20N

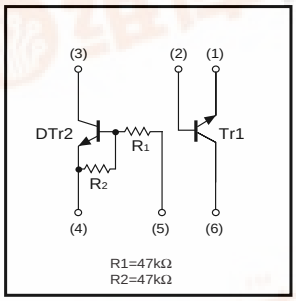
2SC4617and DTC144E are housed independently in a EMT6 or UMT6 package.

●Application
Power management circuit

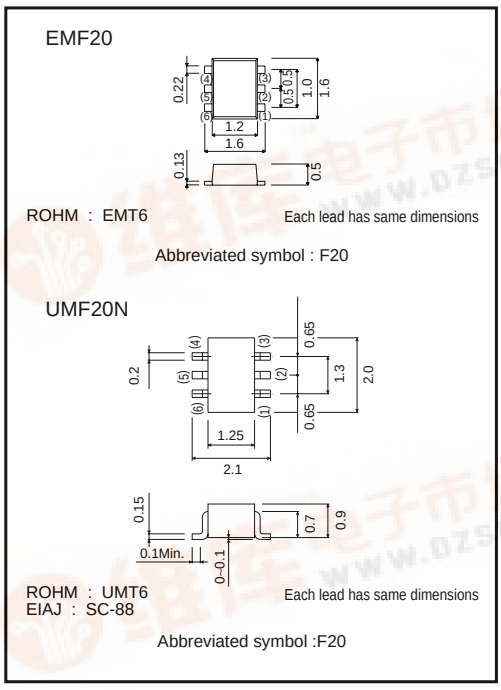
●Features
1) Power switching circuit in a single package.
2) Mounting cost and area can be cut in half.

●Structure
Silicon epitaxial planar transistor

●Equivalent circuits



●External dimensions (Units : mm)



●Package, marking, and packaging specifications

Type	EMF20	UMF20N
Package	EMT6	UMT6
Marking	F20	F20
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}	60	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	7	V
Collector current	I_C	150	mA
Power dissipation	P_C	150 (TOTAL)	mW *
Junction temperature	Tj	150	℃
Storage temperature	Tstg	−55 to +150	℃

* 120mW per element must not be exceeded.

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	℃
Range of storage temperature	Tstg	−55 to +150	℃

*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_{CBO}	60	–	–	V	I_C=50μA
Collector-emitter breakdown voltage	BV_{CEO}	50	–	–	V	I_C=1mA
Emitter-base breakdown voltage	BV_{EBO}	7	–	–	V	I_E=50μA
Collector cutoff current	I_{CBO}	–	–	0.1	μA	V_{CB}=60V
Emitter cutoff current	I_{EBO}	–	–	0.1	μA	V_{EB}=7V
Collector-emitter saturation voltage	$V_{CE\ (sat)}$	–	–	0.4	V	I_C/I_B=50mA/5mA
DC current transfer ratio	h_{FE}	180	–	390	–	V_{CE}=6V, I_C=1mA
Transition frequency	f_T	–	180	–	MHz	V_{CE}=12V, I_E=−2mA, f=100MHz
Output capacitance	Cob	–	2	3.5	PF	V_{CB}=12V, I_E=0A, 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	20	–	–	–	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

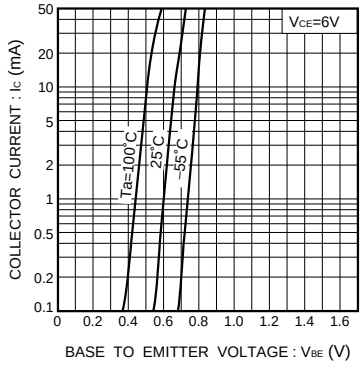


Fig.1 Grounded emitter propagation characteristics

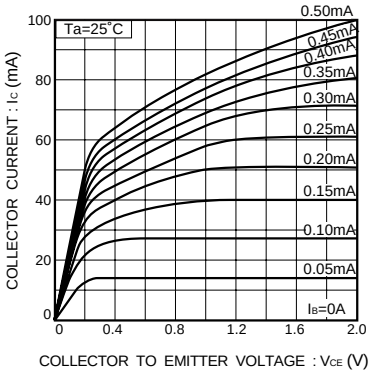


Fig.2 Grounded emitter output characteristics (I)

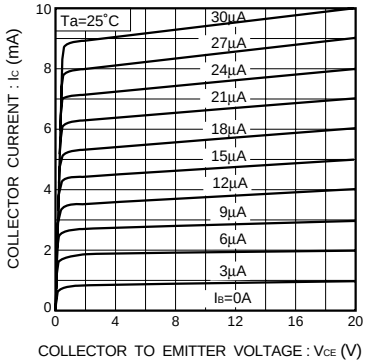


Fig.3 Grounded emitter output characteristics (II)

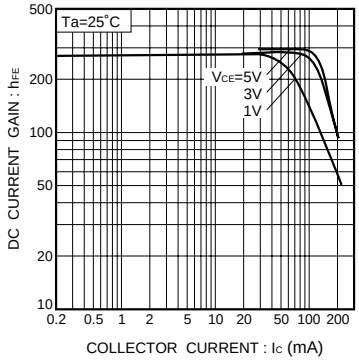


Fig.4 DC current gain vs. collector current (I)

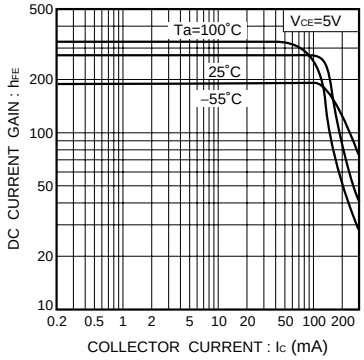


Fig.5 DC current gain vs. collector current (II)

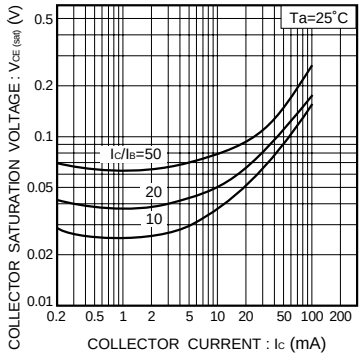


Fig.6 Collector-emitter saturation voltage vs. collector current

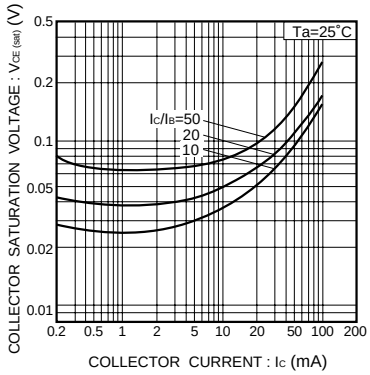


Fig.7 Collector-emitter saturation voltage vs. collector current (I)

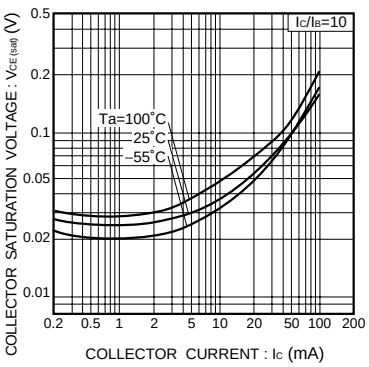


Fig.8 Collector-emitter saturation voltage vs. collector current (II)

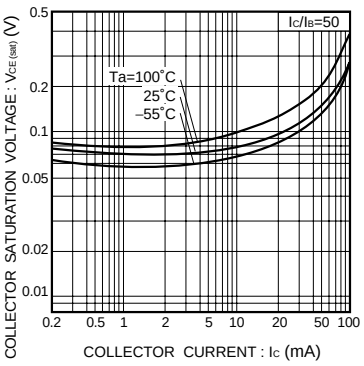


Fig.9 Collector-emitter saturation voltage vs. collector current (III)

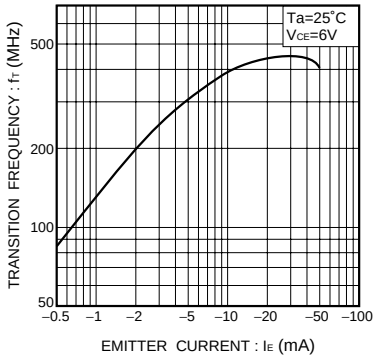


Fig.10 Gain bandwidth product vs. emitter current

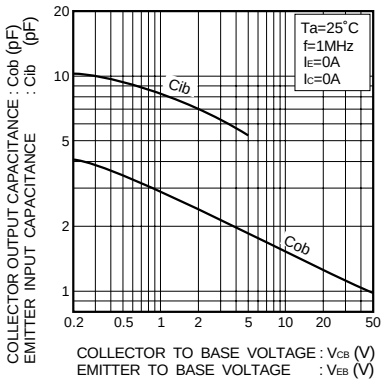


Fig.11 Collector output capacitance vs. collector-base voltage
Emitter input capacitance vs. emitter-base voltage

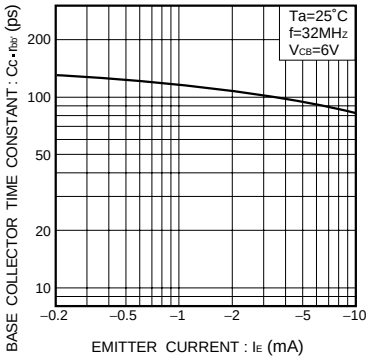


Fig.12 Base-collector time constant vs. emitter current

DTr2

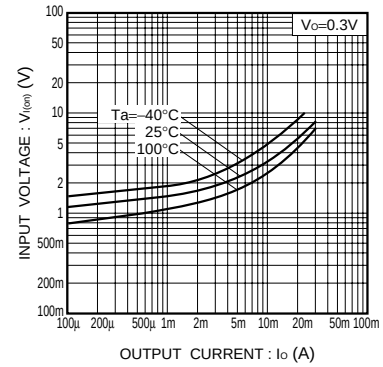


Fig.9 Input voltage vs. output current (ON characteristics)

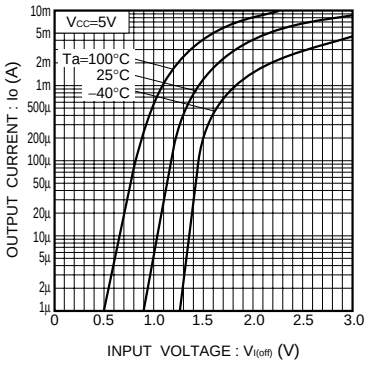


Fig.10 Output current vs. input voltage (OFF characteristics)

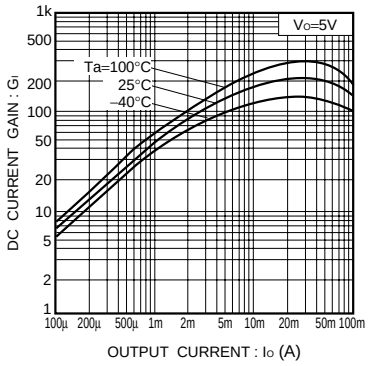


Fig.11 DC current gain vs. output current

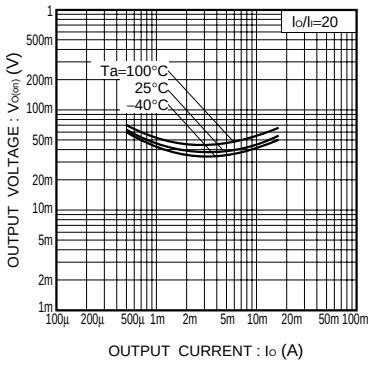


Fig.12 Output voltage vs. output current

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