Bipolar Transistors Silicon NPN Epitaxial Type

2SC4116

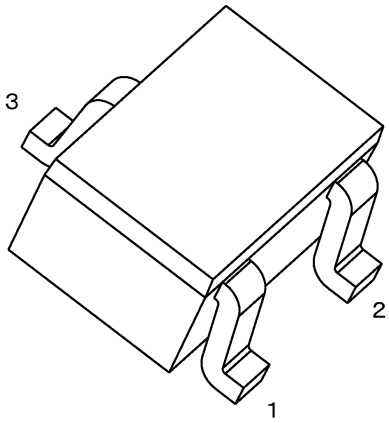
1. Applications

- Low-Frequency Amplifiers
- Audio Frequency General Purpose Amplifier Applications
- AM Amplifiers

2. Features

(1) AEC-Q101 qualified (Please see the orderable part number list)
(2) High voltage: V_{CEO} = 50 V
(3) High collector current: I_C = 150 mA (max)
(4) High h_{FE}: h_{FE} = 70 to 700
(5) Excellent h_{FE} linearity: h_{FE} (I_C = 0.1 mA)/h_{FE} (I_C = 2 mA) = 0.95 (typ.)
(6) Low noise: NF = 1 dB (typ.), 10 dB (max)
(7) Complementary to 2SA1586
(8) Small package

3. Packaging



1: Base
2: Emitter
3: Collector

USM

Start of commercial production
1987-01

4. Orderable part number

Orderable part number		AEC-Q101		Note	
2SC4116-O	2SC4116-O,LF	—		General Use	
	2SC4116-O,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	2SC4116-O,LXHF	YES		Automotive Use	
2SC4116-Y	2SC4116-Y,LF	—		General Use	
	2SC4116-Y,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	2SC4116-Y,LXHF	YES		Automotive Use	
2SC4116-GR	2SC4116-GR,LF	—		General Use	
	2SC4116-GR,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	2SC4116-GR,LXHF	YES		Automotive Use	
2SC4116-BL	2SC4116-BL,LF	—		General Use	
	2SC4116-BL,LXGF	YES	(Note 1)	Unintended Use	(Note 1)
	2SC4116-BL,LXHF	YES		Automotive Use	

Note 1: For more information, please contact our sales or use the inquiry form on our website.

5. Absolute Maximum Ratings (Note) (Unless otherwise specified, T_a = 25 °C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	60	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage		V_{EBO}	5	V
Collector current (DC)		I_C	150	mA
Base current		I_B	30	mA
Collector power dissipation	(Note 2), (Note 4)	P_C	200	mW
	(Note 3)		100	
Junction temperature	(Note 2)	T_j	150	°C
	(Note 3)		125	
Storage temperature	(Note 2)	T_{stg}	-55 to 150	°C
	(Note 3)		-55 to 125	

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 2: For devices with the ordering part number ending in LF(T.

Note 3: For devices with the ordering part number ending in XGF(T, XHF(T.

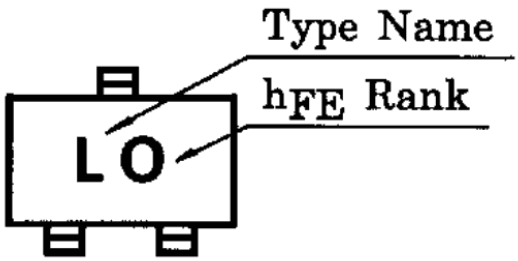
Note 4: Device mounted on an 25.4 mm × 25.4 mm × 1.6 mm FR4 glass epoxy board (Cu pad: 0.5 mm^2 × 3)

6. Electrical Characteristics (Unless otherwise specified, T_a = 25 °C)

Characteristics	Symbol	Note	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}		V_{CB} = 60 V, I_E = 0 mA	—	—	0.1	μA
Emitter cut-off current	I_{EBO}		V_{EB} = 5 V, I_C = 0 mA	—	—	0.1	μA
DC current gain	h_{FE}	(Note 5)	V_{CE} = 6 V, I_C = 2 mA	70	—	700	—
Collector-emitter saturation voltage	$V_{CE(sat)}$		I_C = 100 mA, I_B = 10 mA	—	0.1	0.25	V
Transition frequency	f_T		V_{CE} = 10 V, I_C = 1 mA	80	—	—	MHz
Collector output capacitance	C_{ob}		V_{CB} = 10 V, I_E = 0 A, f = 1 MHz	—	2.0	3.5	pF
Noise figure	NF		V_{CE} = 6 V, I_C = 0.1 mA, f = 1 kHz, R_G = 10 kΩ	—	1.0	10	dB

Note 5: h_{FE} classification O (O): 70 to 140, Y (Y): 120 to 240, GR (G): 200 to 400, BL (L): 350 to 700
( ) marking symbol

7. Marking



8. Characteristics Curves (Note)

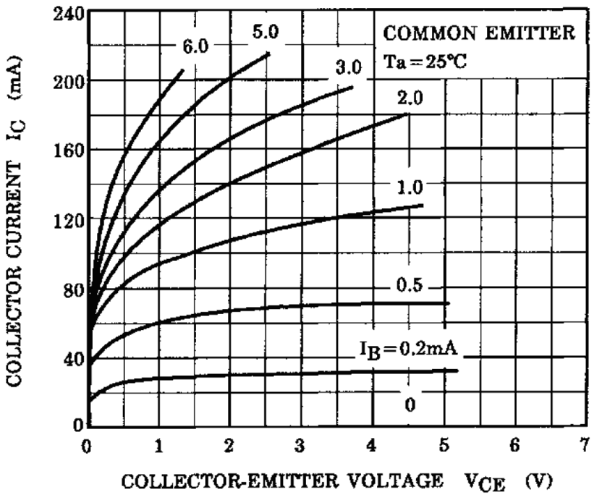


Fig. 8.1 I_C - V_{CE}

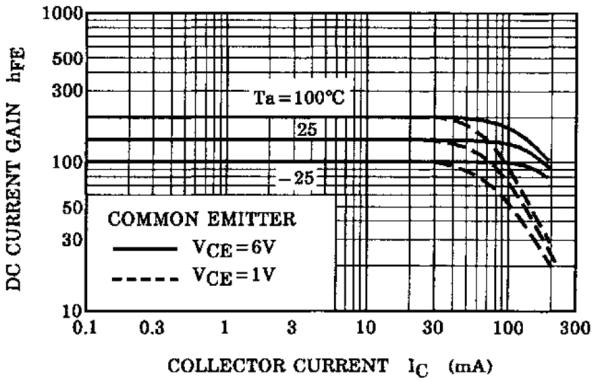


Fig. 8.2 h_{FE} - I_C

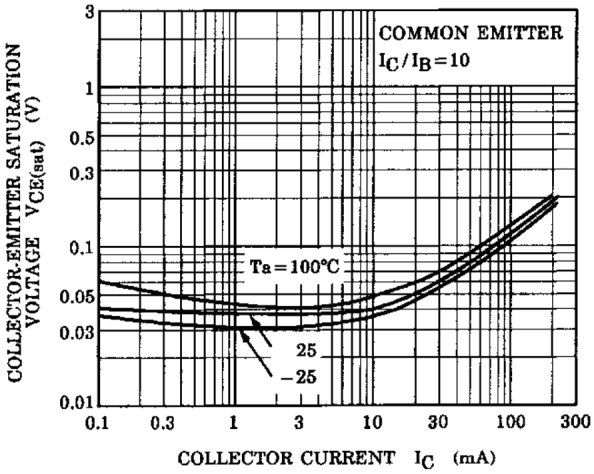


Fig. 8.3 $V_{CE(sat)}$ - I_C

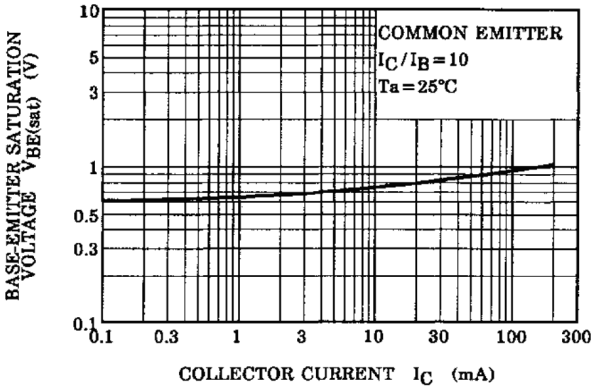


Fig. 8.4 $V_{BE(sat)}$ - I_C

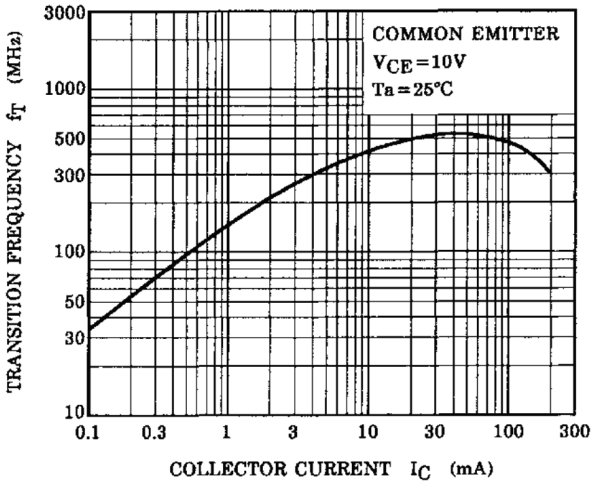


Fig. 8.5 f_T - I_C

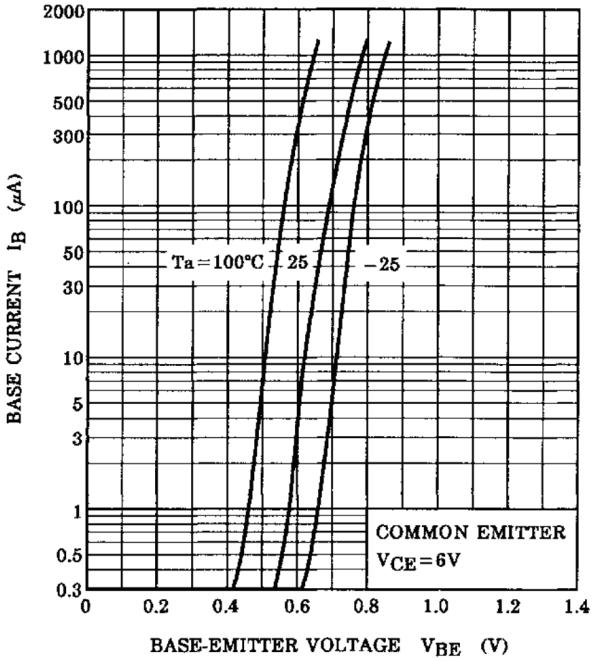


Fig. 8.6 I_B - V_{BE}

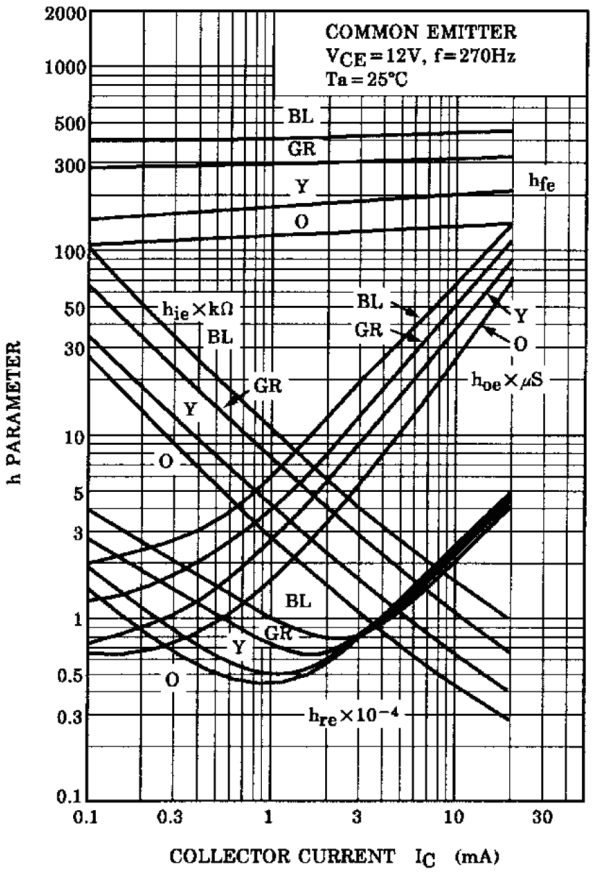


Fig. 8.7 h PARAMETER - I_C

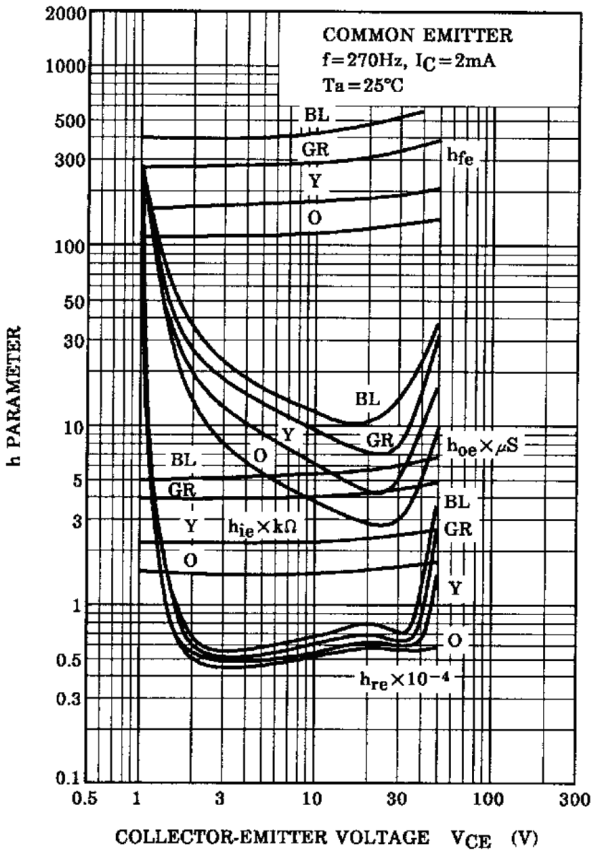


Fig. 8.8 h PARAMETER - V_{CE}

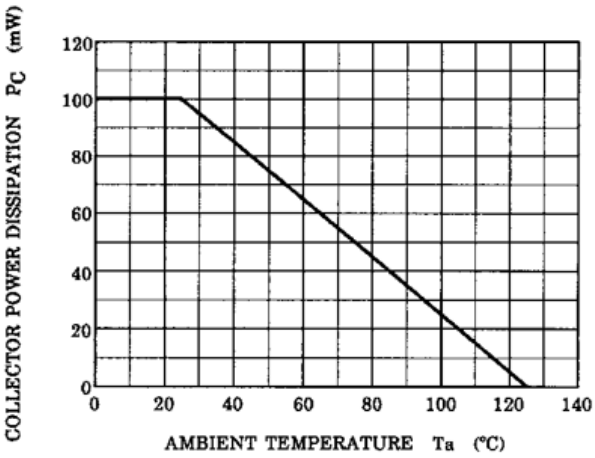


Fig. 8.9 P_C - T_a
Reference only with T_j of 125 °C.

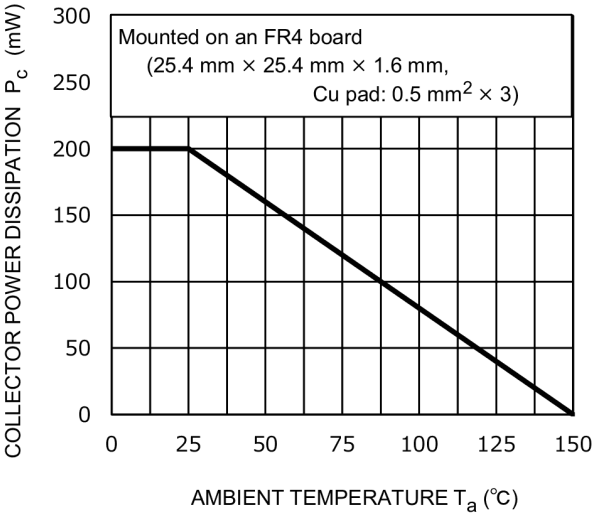
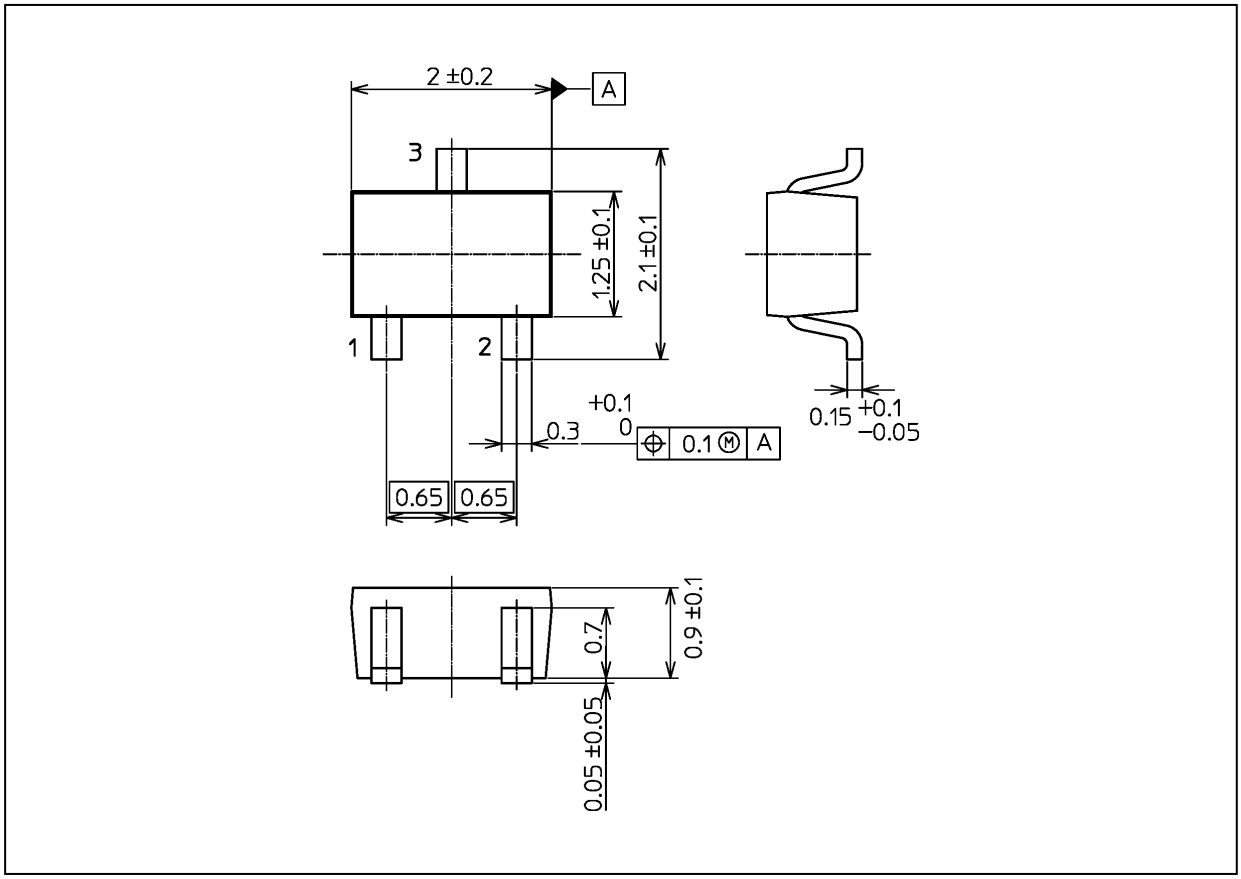


Fig. 8.10 P_C - T_a
Reference only with T_j of 150 °C.

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 6.0 mg (typ.)

Package Name(s)
TOSHIBA: 2-2E1S
Nickname: USM

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