FERRANTI semiconductors®

BSS65

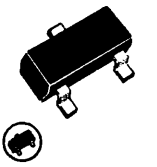
PNP Silicon Planar High Speed Switching Transistor

DESCRIPTION

These devices are intended for use in high speed switching and high frequency amplifier applications.

Encapsulated in the popular SOT-23 package, these devices are designed specifically for use in thin and thick film hybrid circuits in both industrial and commercial applications.

The Ferranti SOT-23 package is formed by transfer moulding a SILICONE plastic specially selected to provide a rugged one piece encapsulation resistant to severe environments.



SOT-23
Actual size in inset

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	BSS65	Unit
Collector-Base Voltage	V_{CBO}	–12	Volts
Collector-Emitter Voltage	V_{CEO}	–12	Volts
Emitter-Base Voltage	V_{EBO}	–4	Volts
Collector Current	I_C	–100	mA
Peak Collector Current (10 ms)	I_{CM}	–200	mA
Base Current	I_B	–50	mA
Power Dissipation at T_{amb} = 25°C	P_{tot}*	200	mW
Operating and Storage Temperature Range		–65 to +175	°C

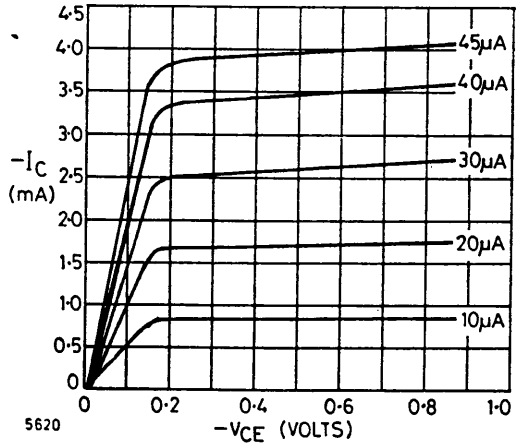
*Maximum power dissipation is calculated assuming that the device is mounted on a ceramic substrate measuring 10 × 8 × 0.6 mm.

BSS65

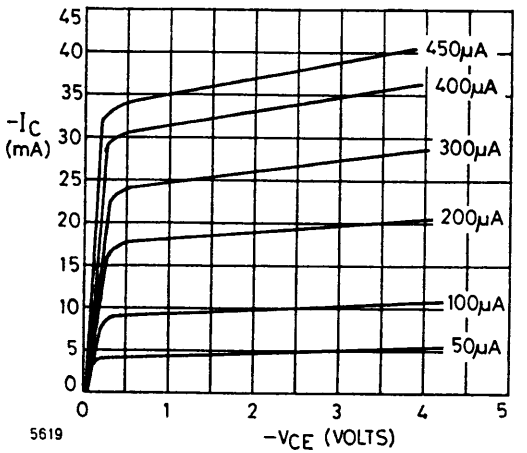
CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

Parameter	Symbol	BSS65			Units	Test Conditions
		Min.	Typ.	Max.		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	–12	—	—	V	$I_C = -10$ mA
Collector-base breakdown voltage	$V_{(BR)CBO}$	–12	—	—	V	$I_C = -10$ μA
Emitter-base breakdown voltage	$V_{(BR)EBO}$	–4	—	—	V	$I_E = -10$ μA
Collector-base cut-off current	I_{CBO}	—	—	–100	nA	$V_{CB} = -6V$, $I_E = 0$
Emitter-base cut-off current	I_{EBO}	—	—	–100	nA	$V_{EB} = -4V$, $I_C = 0$
Collector-emitter saturation voltage	$V_{CE(sat)}$	— —	— —	–0.15 –0.25	V V	$I_C = -10$ mA, $I_B = -1$ mA $I_C = -30$ mA, $I_B = -3$ mA
Base-emitter saturation voltage	$V_{BE(sat)}$	–0.75 –0.82	— —	–0.98 –1.20	V V	$I_C = -10$ mA, $I_B = -1$ mA $I_C = -30$ mA, $I_B = -3$ mA
Static forward current transfer ratio	h_{FE}	30 40	— —	— 150		$I_C = -10$ mA, $V_{CE} = -0.3V$ $I_C = -30$ mA, $V_{CE} = -0.5V$
Transition frequency	f_T	400	—	—	MHz	$I_C = -30$ mA, $V_{CE} = -10V$ $f = 100$ MHz
Collector-base capacitance	C_{cbo}	—	—	6	pF	$V_{CB} = -5V$, $I_E = 0$ $f = 1$ MHz
Emitter-base capacitance	C_{ebo}	—	—	6	pF	$V_{EB} = -0.5V$, $I_C = 0$ $f = 1$ MHz
Switching times Turn-on time Turn-off time	 t_{on} t_{off}	 — —	 23 34	 60 90	 ns ns	 $I_C = -30$ mA $I_{B1} = I_{B2} = -1.5$ mA

TYPICAL CHARACTERISTICS

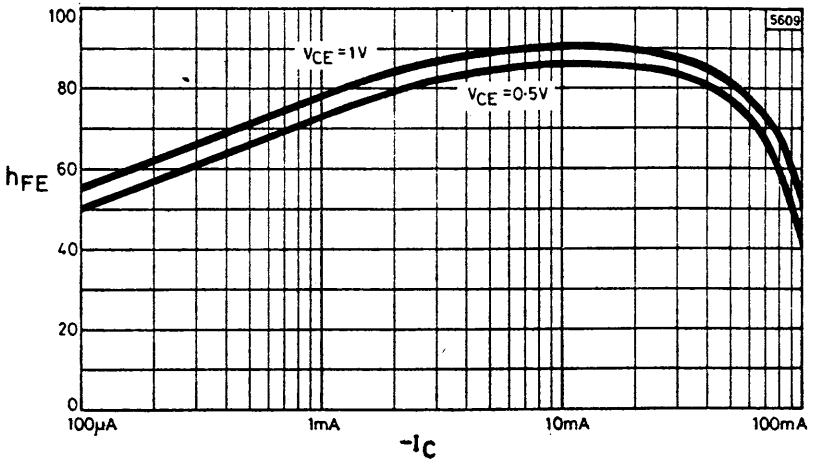


I_C/V_{CE}

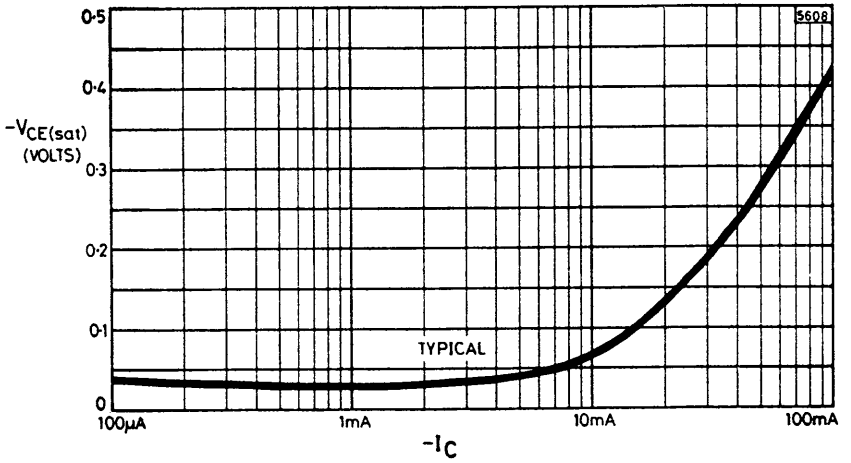


I_C/V_{CE}

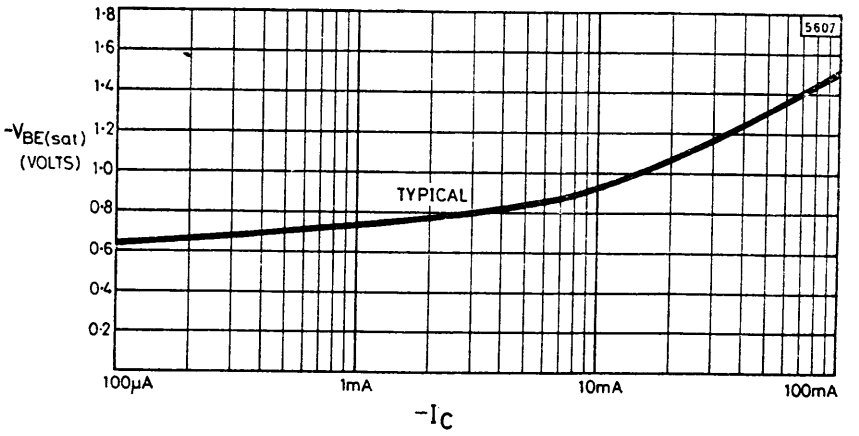
BSS65



h_{FE}/I_C



$V_{CE(sat)}/I_C$



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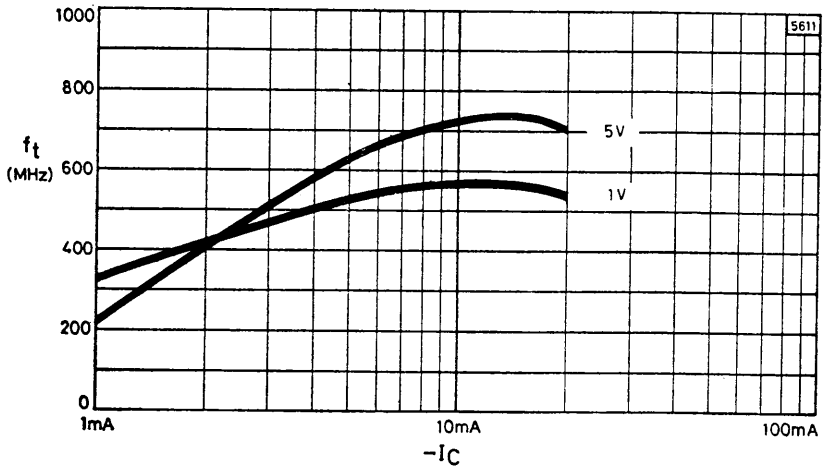
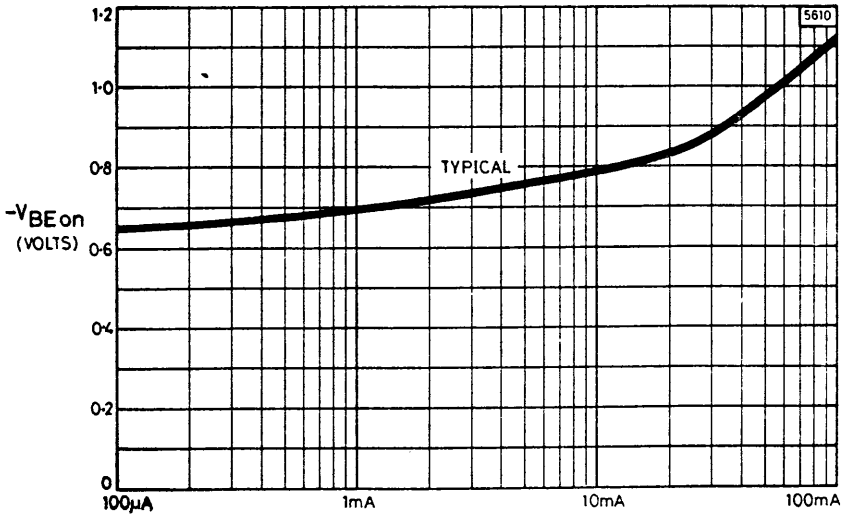


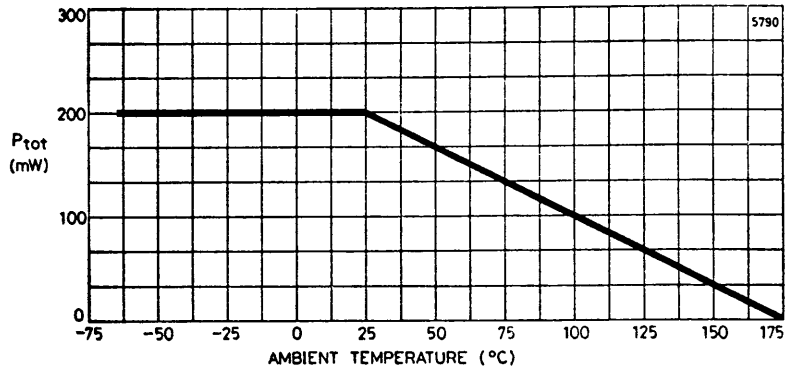
f_T/I_C

BSS65

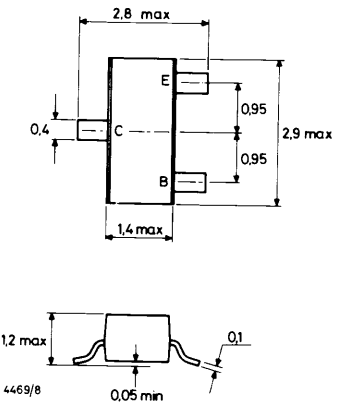


$V_{BE(on)}/I_C$

DERATING CURVE



PACKAGE DETAILS



SOT-23

Dimensions in millimetres

These devices are also available with the base and emitter connections reversed. In this case, the sutfix R after the type number is used. All other electrical and physical data remains unchanged.

Devices are identified by an identification code stamped on the body of the device as follows:

BSS65	L1
BSS65R	L5

FERRANTI semiconductors®

BSS66
BSS67

NPN Silicon Planar Medium Power Switching Transistors

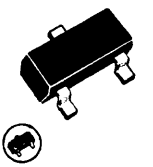
DESCRIPTION

These devices are intended for general purpose switching applications.

Complementary to the BSS69 and BSS70.

Encapsulated in the popular SOT-23 package, these devices are designed specifically for use in thin and thick film hybrid circuits in both industrial and commercial applications.

The Ferranti SOT-23 package is formed by transfer moulding a SILICONE plastic specially selected to provide a rugged one piece encapsulation resistant to severe environments.



SOT-23
Actual size in inset

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	BSS66 & BSS67	Units
Collector-Base Voltage	V_{CBO}	60	Volts
Collector-Emitter Voltage	V_{CEO}	40	Volts
Emitter-Base Voltage	V_{EBO}	6	Volts
Collector Current	I_C	100	mA
Peak Collector Current (10 ms)	I_{CM}	200	mA
Base Current	I_B	50	mA
Power Dissipation at $T_{amb} = 25°C$	P_{tot}*	300	mW
Operating & Storage Temperature Range		−65 to +175	°C

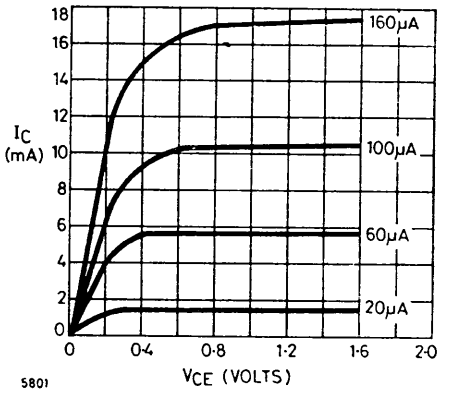
*Maximum power dissipation is calculated assuming that the device is mounted on a ceramic substrate measuring 10 × 8 × 0.6 mm.

BSS66/67

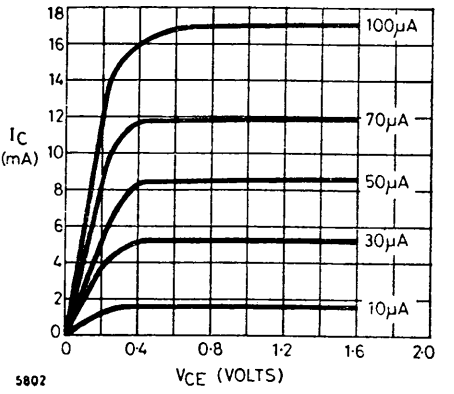
CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

Parameter		Symbol	BSS66 & BSS67			Units	Test Conditions
			Min.	Typ.	Max.		
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	40	—	—	V	$I_C = 1$ mA
Collector-base breakdown voltage		$V_{(BR)CBO}$	60	—	—	V	$I_C = 10\ \mu A$
Emitter-base breakdown voltage		$V_{(BR)EBO}$	6	—	—	V	$I_E = 10\ \mu A$
Collector-emitter cut-off current		I_{CES}	—	—	50	nA	$V_{CES} = 30V$
Collector-emitter saturation voltage		$V_{CE(sat)}$	— —	— —	0.20 0.30	V V	$I_C = 10$ mA, $I_B = 1$ mA $I_C = 50$ mA, $I_B = 5$ mA
Base-emitter saturation voltage		$V_{BE(sat)}$	0.65 —	— —	0.85 0.95	V V	$I_C = 10$ mA, $I_B = 1$ mA $I_C = 50$ mA, $I_B = 5$ mA
Static forward current transfer ratio	BSS66	h_{FE}	20 35 50 30 15	— — — — —	— — 150 — —		$I_C = 100\ \mu A$ $I_C = 1$ mA $I_C = 10$ mA $I_C = 50$ mA $I_C = 100$ mA } $V_{CE} = 1V$
	BSS67	h_{FE}	40 70 100 60 30	— — — — —	— — 300 — —		$I_C = 100\ \mu A$ $I_C = 1$ mA $I_C = 10$ mA $I_C = 50$ mA $I_C = 100$ mA } $V_{CE} = 1V$
Transition frequency	BSS66	f_T	250	—	—	MHz	$I_C = 10$ mA, $V_{CE} = 20V$ $f = 100$ MHz
	BSS67		300	—	—	MHz	
Collector-base capacitance		C_{cbo}	—	—	4.0	pF	$V_{CB} = 5V$, $f = 100$ kHz
Emitter-base capacitance		C_{ebo}	—	—	8	pF	$V_{EB} = 0.5V$, $f = 100$ kHz
Noise figure		N	—	6	—	dB	$I_C = 100\ \mu A$, $V_{CE} = 5V$ $R_s = 1$ kΩ, $f = 10$ Hz to 15.7 kHz
Switching times Delay time Rise time Storage time Fall time		 t_d t_r t_s t_f	 — — — —	 — — — —	 35 35 200 50	 ns ns ns ns	 $V_{CC} = 3V$, $I_C = 10$ mA $I_{B1} = I_{B2} = 1$ mA

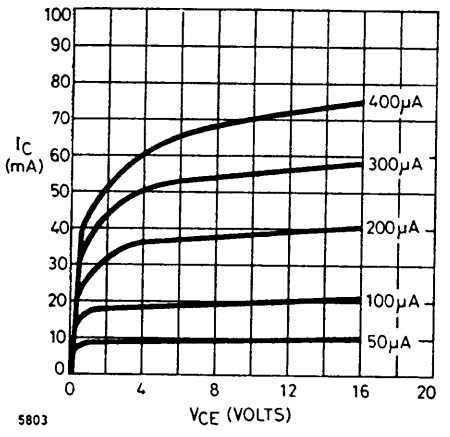
TYPICAL CHARACTERISTICS



BSS66



BSS67



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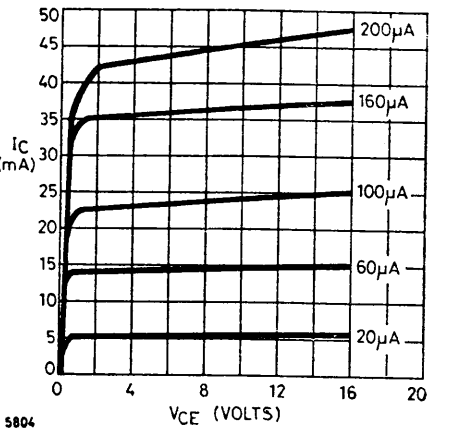
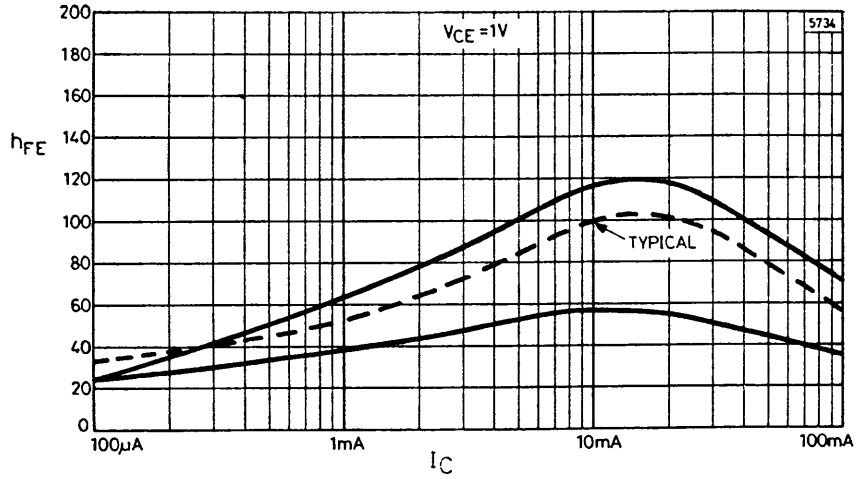
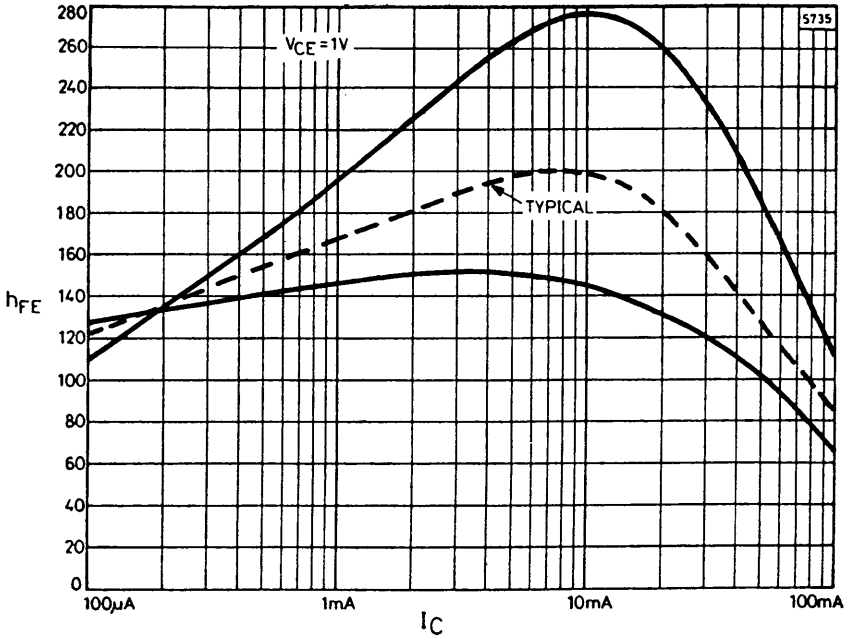


BSS67

BSS66/67



BSS66



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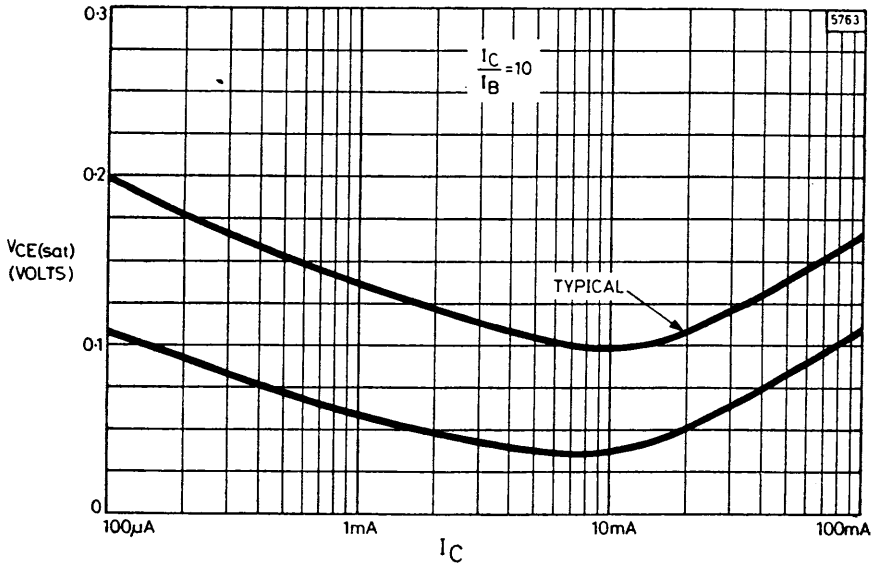
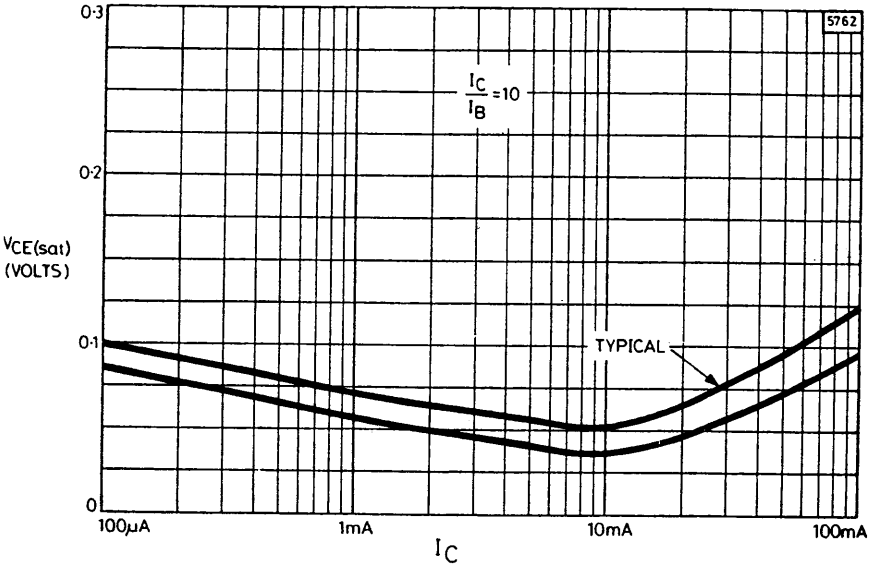
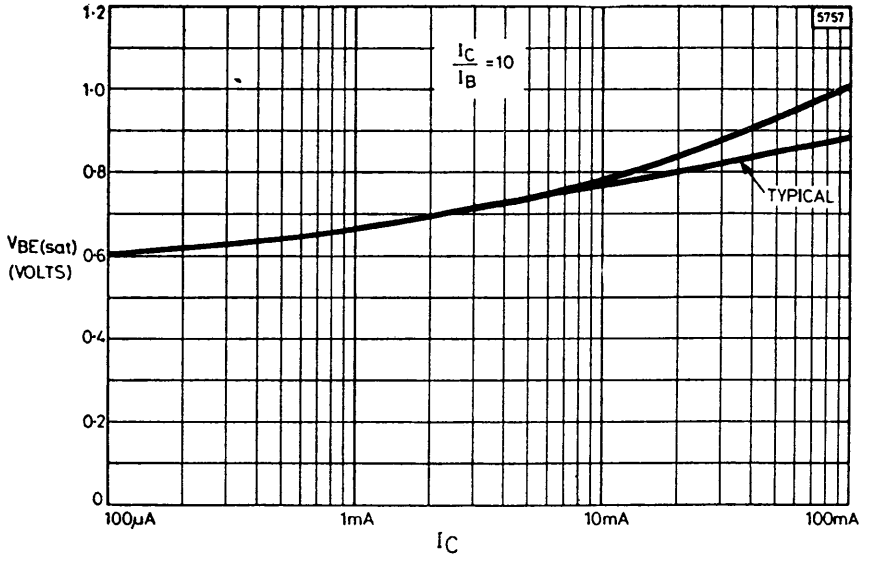

5763
$\frac{I_C}{I_B}$=10
TYPICAL
0·3
0·2
0·1
0
$V_{CE(sat)}$ (VOLTS)
100μA
1mA
10mA
100mA
I_C

BSS66

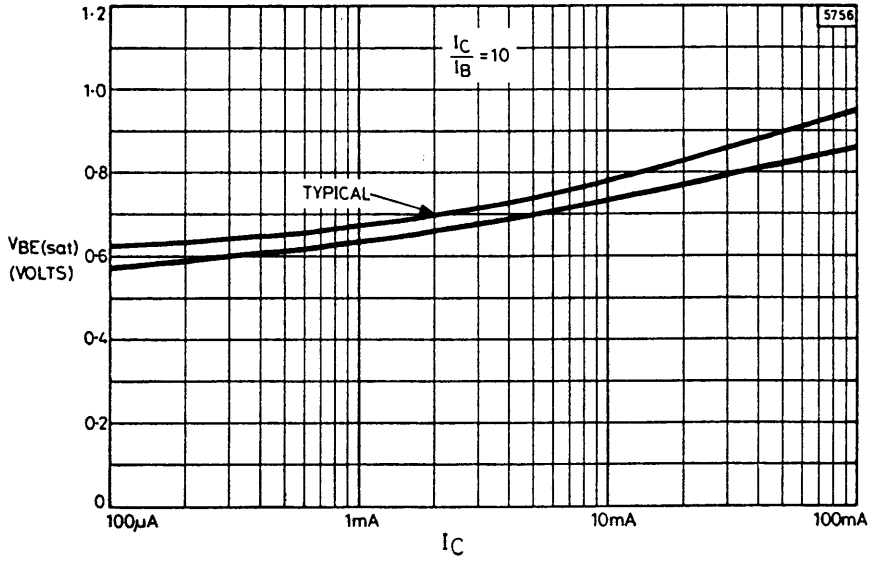

5762
$\frac{I_C}{I_B}$=10
TYPICAL
0·3
0·2
0·1
0
$V_{CE(sat)}$ (VOLTS)
100μA
1mA
10mA
100mA
I_C

BSS67

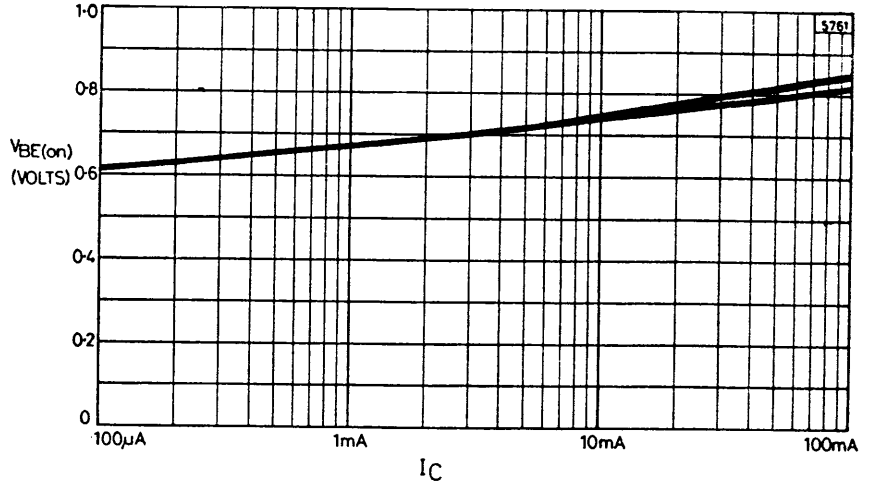
BSS66/67



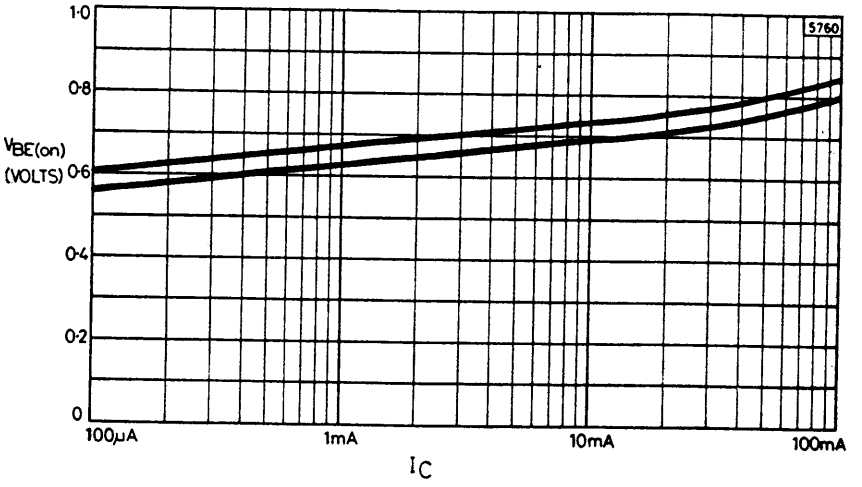
BSS66



BSS67


1·0
0·8
VBE(on)
(VOLTS) 0·6
0·4
0·2
0
5761
100µA
1mA
10mA
100mA
IC

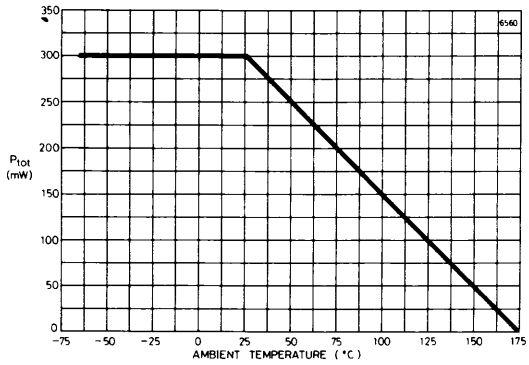
BSS66


1·0
0·8
VBE(on)
(VOLTS) 0·6
0·4
0·2
0
5760
100µA
1mA
10mA
100mA
IC

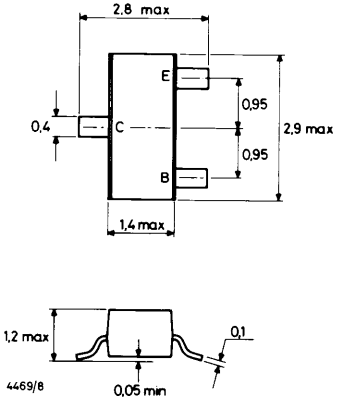
BSS67

BSS66/67

DERATING CURVE



PACKAGE DETAILS



SOT-23
Dimensions in millimetres

These devices are also available with the base and emitter connections reversed. In this case, the suffix R after the type number is used. All other electrical and physical data remains unchanged.

Devices are identified by an identification code stamped on the body of the device as follows:

BSS66	M6
BSS67	M7
BSS66R	M8
BSS67R	M9

FERRANTI semiconductors®

BSS69
BSS70

PNP Silicon Planar Medium Power Switching Transistors

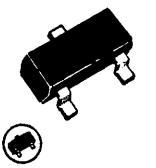
DESCRIPTION

These devices are intended for general purpose switching applications.

Complementary to the BSS66 and BSS67

Encapsulated in the popular SOT-23 package, these devices are designed specifically for use in thin and thick film hybrid circuits in both industrial and commercial applications.

The Ferranti SOT-23 package is formed by transfer moulding a SILICONE plastic specially selected to provide a rugged one piece encapsulation resistant to severe environments.



SOT-23
Actual size in inset

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	BSS69 & BSS70	Units
Collector-Base Voltage	V_{CBO}	–40	Volts
Collector-Emitter Voltage	V_{CEO}	–40	Volts
Emitter-Base Voltage	V_{EBO}	–5	Volts
Collector Current	I_C	–100	mA
Peak Collector Current (10 ms)	I_{CM}	–200	mA
Base Current	I_B	–50	mA
Power Dissipation at T_{amb} = 25°C	P_{tot}*	300	mW
Operating & Storage Temperature Range		–65 to +175	°C

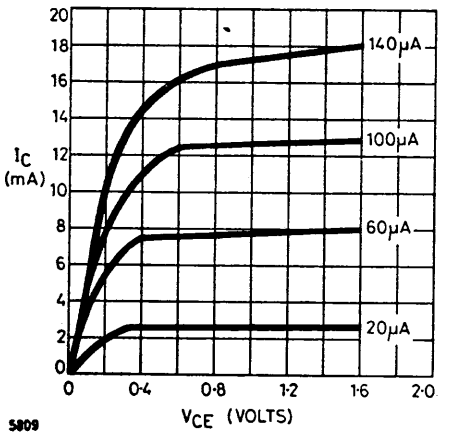
*Maximum power dissipation is calculated assuming that the device is mounted on a ceramic substrate measuring 10 × 8 × 0.6 mm.

BSS69/70

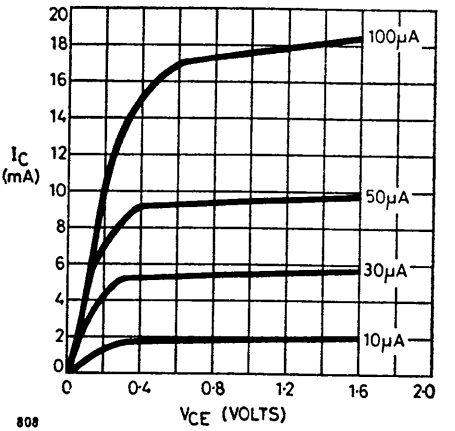
CHARACTERISTICS (at 25°C ambient temperature unless otherwise stated).

Parameter		Symbol	BSS69 & BSS70			Units	Test Conditions
			Min.	Typ.	Max.		
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	–40	—	—	V	$I_C = -1$ mA
Collector-base breakdown voltage		$V_{(BR)CBO}$	–40	—	—	V	$I_C = -10$ μA
Emitter-base breakdown voltage		$V_{(BR)EBO}$	–5	—	—	V	$I_E = -10$ μA
Collector-emitter cut-off current		I_{CES}	—	—	–50	nA	$V_{CES} = -30V$
Collector-emitter saturation voltage		$V_{CE(sat)}$	— —	— —	–0.25 –0.40	V V	$I_C = -10$ mA, $I_B = -1$ mA $I_C = -50$ mA, $I_B = -5$ mA
Base-emitter saturation voltage		$V_{BE(sat)}$	–0.65 —	— —	–0.85 –0.95	V V	$I_C = -10$ mA, $I_B = -1$ mA $I_C = -50$ mA, $I_B = -5$ mA
Static forward current transfer ratio	BSS69	h_{FE}	30 40 50 30 15	— — — — —	— — 150 — —		$I_C = -100$ μA $I_C = -1$ mA $I_C = -10$ mA $I_C = -50$ mA $I_C = -100$ mA } $V_{CE} = -1V$
	BSS70	h_{FE}	60 80 100 60 30	— — — — —	— — 300 — —		$I_C = -100$ μA $I_C = -1$ mA $I_C = -10$ mA $I_C = -50$ mA $I_C = -100$ mA } $V_{CE} = -1V$
Transition frequency	BSS69	f_T	200	—	—	MHz	} $I_C = -10$ mA, $V_{CE} = -20V$, f = 100 MHz
	BSS70		250	—	—	MHz	
Collector-base capacitance		C_{cbo}	—	—	4.5	pF	$V_{CB} = -5V$, f = 100 kHz
Emitter-base capacitance		C_{ebo}	—	—	10	pF	$V_{EB} = -0.5V$, f = 100 kHz
Noise figure		N	—	5	—	dB	$I_C = -100$ μA, $V_{CE} = -5V$ $R_s = 1$ kΩ, f = 10 Hz to 15.7 kHz
Switching times Delay time Rise time Storage time Fall time		 t_d t_r t_s t_f	 — — — —	 — — — —	 35 35 225 75	 ns ns ns ns	} $V_{CC} = -3V$, $I_C = -10$ mA $I_{B1} = I_{B2} = -1$ mA

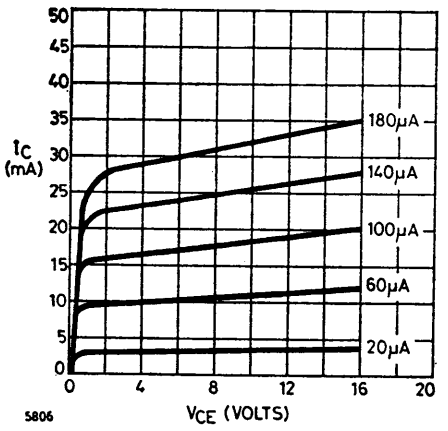
TYPICAL CHARACTERISTICS



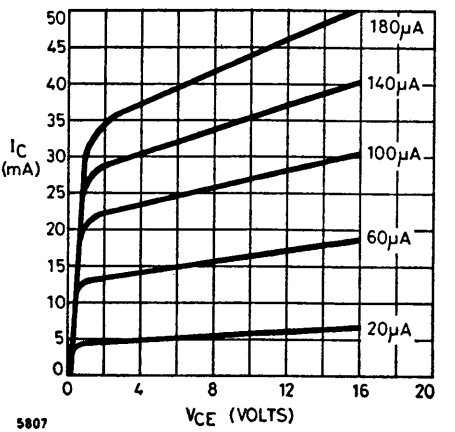
BSS69



BSS70

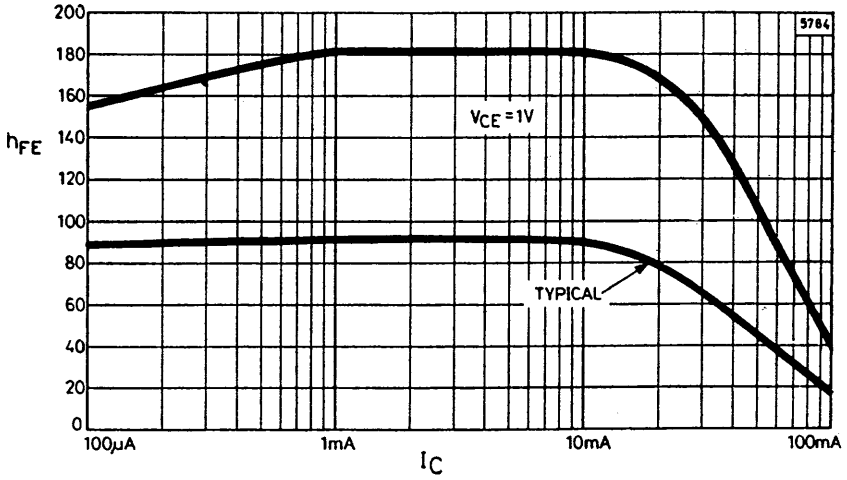


BSS69

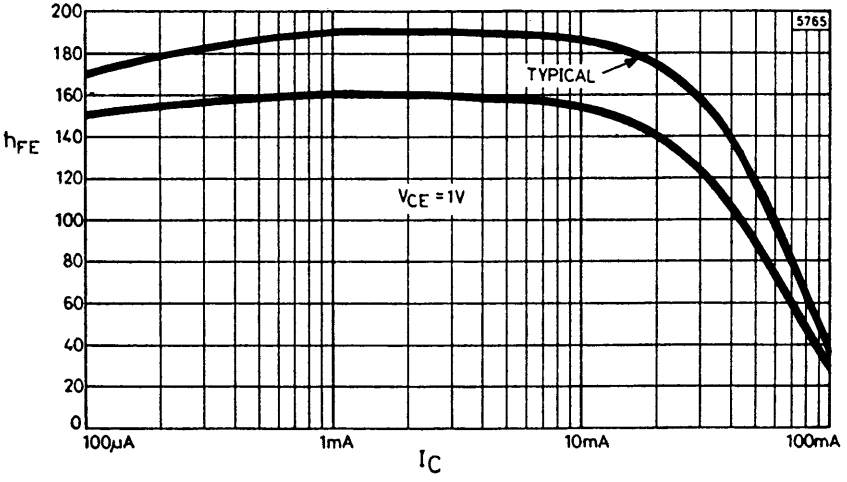


BSS70

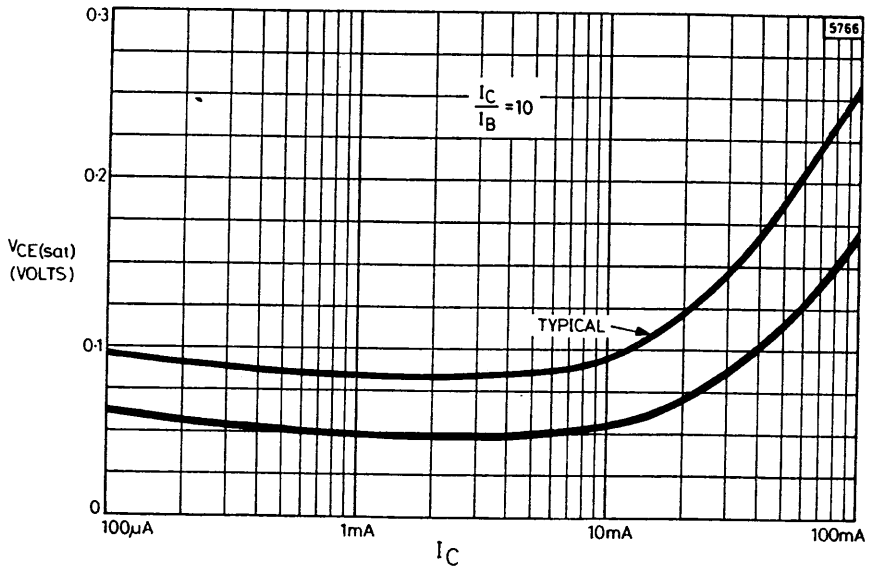
BSS69/70



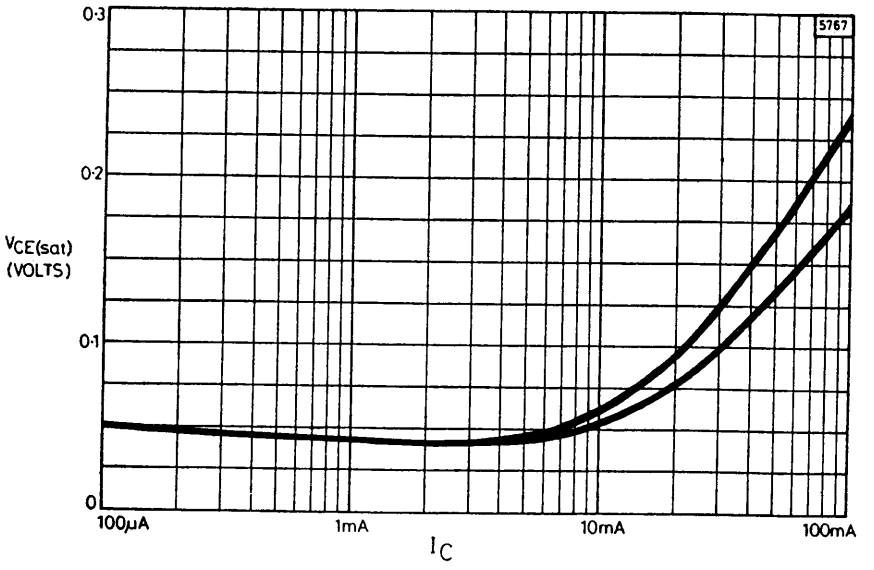
BSS69



BSS70

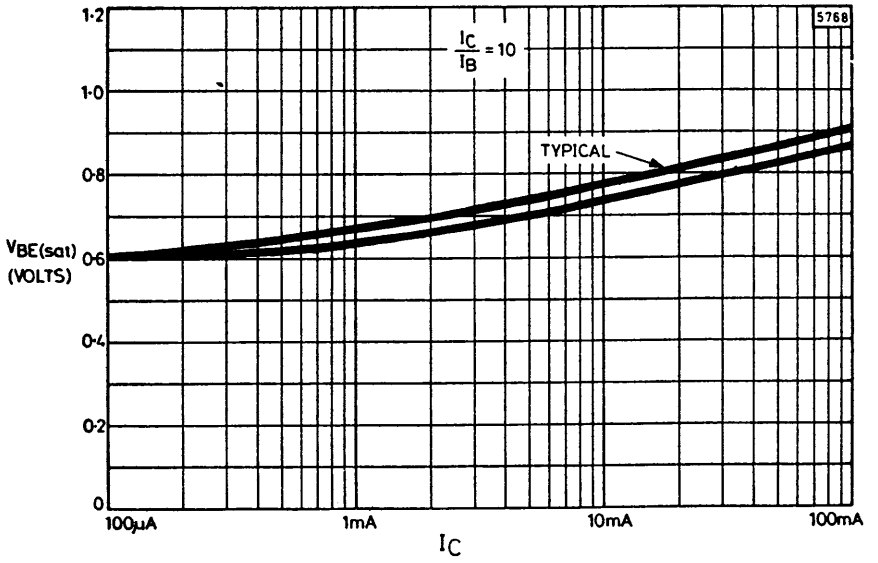

5766
$\frac{I_C}{I_B}$ =10
TYPICAL
$V_{CE(sat)}$ (VOLTS)
0·3
0·2
0·1
0
100µA
1mA
10mA
100mA
I_C

BSS69

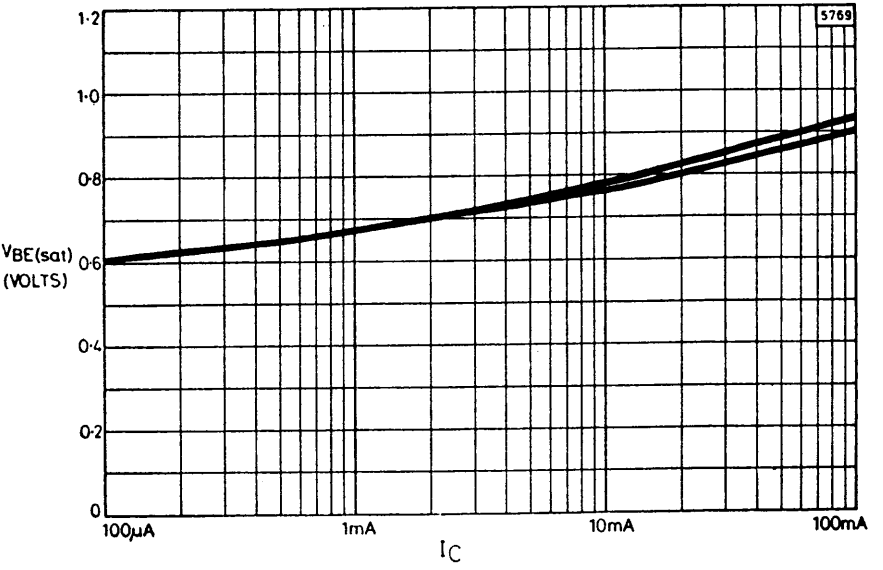

5767
$V_{CE(sat)}$ (VOLTS)
0·3
0·2
0·1
0
100µA
1mA
10mA
100mA
I_C

BSS70

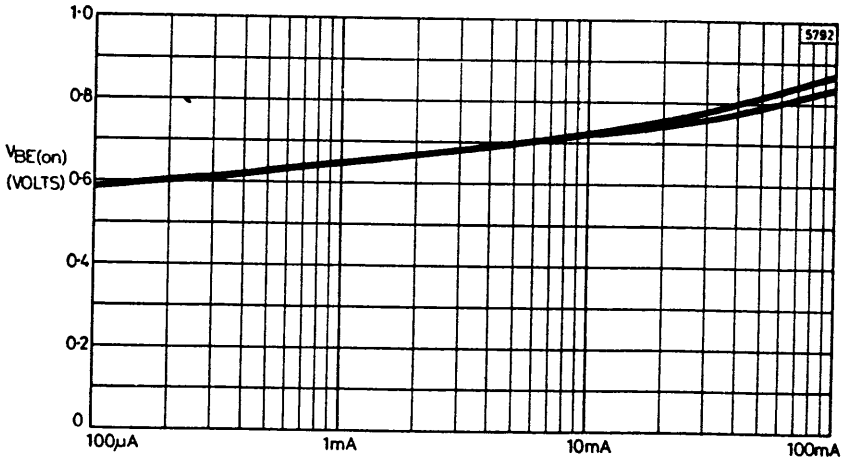
BSS69/70



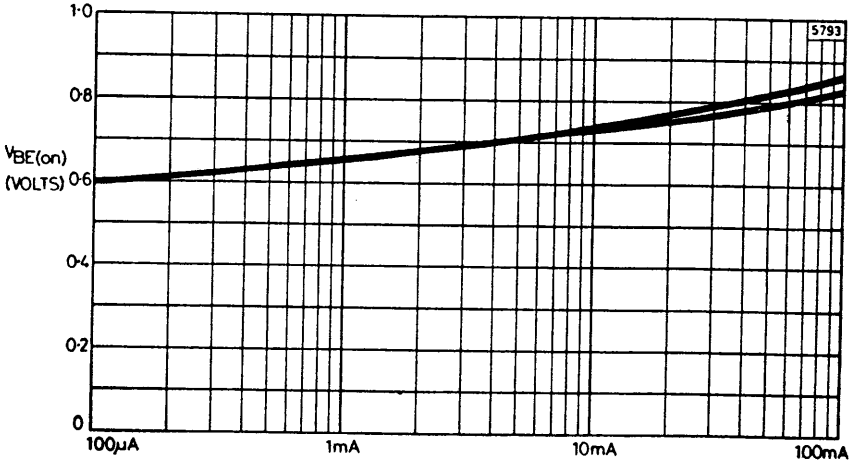
BSS69



BSS70


1·0
0·8
VBE(on)
(VOLTS) 0·6
0·4
0·2
0
100μA
1mA
10mA
100mA
5792
IC

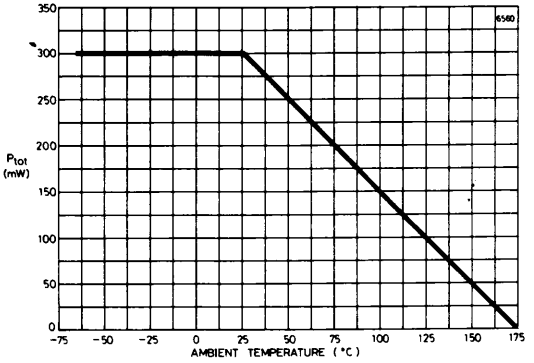
BSS69


1·0
0·8
VBE(on)
(VOLTS) 0·6
0·4
0·2
0
100μA
1mA
10mA
100mA
5793
IC

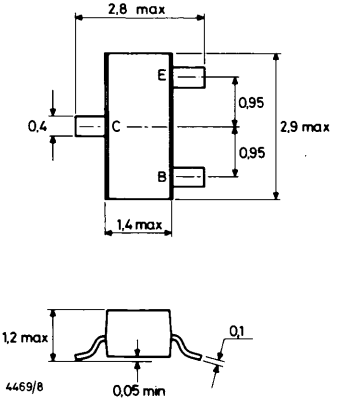
BSS70

BSS69/70

DERATING CURVE



PACKAGE DETAILS



SOT-23
Dimensions in millimetres

These devices are also available with the base and emitter connections reversed. In this case, the suffix R after the type number is used. All other electrical and physical data remains unchanged.

Devices are identified by an identification code stamped on the body of the device as follows:

BSS69	L2
BSS70	L3
BSS69R	L5
BSS70R	L6