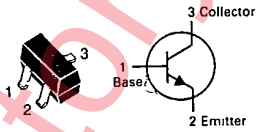
T-31-15

BFS17

CASE 318-02/03, STYLE 6
SOT-23 (TO-236AA/AB)



RF TRANSISTOR

NPN SILICON

3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CBO}	25	Vdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/mW
Total Device Dissipation Alumina Substrate,** T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/mW
Junction and Storage Temperature	T_J, T_{stg}	150	°C

*FR-5 = 1.0 x 0.75 x 0.62 in.
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

BFS17 = E1

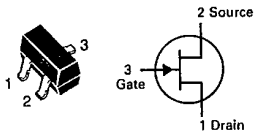
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 10 mA)	$V_{(BR)CEO}$	15	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μA)	$V_{(BR)CBO}$	25	—	Vdc
Collector Cutoff Current (V_{CE} = 10 V)	I_{CEO}	—	25	nA
Collector Cutoff Current (V_{CB} = 10 V)	I_{CBO}	—	25	nA
Emitter Cutoff Current (V_{EB} = 4.0 V)	I_{EBO}	—	100	μA
ON CHARACTERISTICS				
DC Current Gain (I_C = 2.0 mA, V_{CE} = 1.0 V) (I_C = 25 mA, V_{CE} = 1.0 V)	h_{FE}	20 20	150 —	—
Collector-Emitter Saturation Voltage (I_C = 10 mA, I_B = 1.0 mA)	$V_{CE(sat)}$	—	0.4	V
Base-Emitter Saturation Voltage (I_C = 10 mA, I_B = 1.0 mA)	$V_{BE(sat)}$	—	1.0	V
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (I_C = 2.0 mA, V_{CE} = 5.0 V, f = 500 MHz) (I_C = 25 mA, V_{CE} = 5.0 V, f = 500 MHz)	f_T	1.0 1.3*	— —	GHz
Output Capacitance (V_{CB} = 10 V, f = 1.0 MHz)	CCB	—	1.0*	pF
Noise Figure (I_C = 2.0 mA, V_{CE} = 5.0 V, R_S = 50 Ω, f = 30 MHz)	NF	—	5.0*	dB

*Typ

BSR56
BSR57
BSR58

CASE 318-02/03, STYLE 10
SOT-23 (TO-236AA/AB)



JFET SWITCHING TRANSISTOR

N-CHANNEL

3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain-Source Voltage	$\pm V_{DS}$	40	V
Drain-Gate Voltage	V_{DG}	40	V
Gate-Source Voltage	V_{GS}	40	V
Forward Gate Current	$I_{G(f)}$	50	mA

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/mW
Total Device Dissipation Alumina Substrate,** T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/mW
Junction and Storage Temperature	T_J, T_{stg}	150	°C

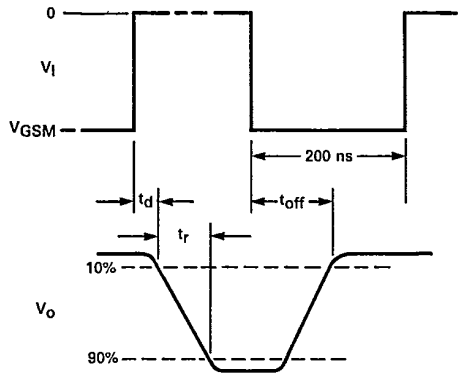
*FR-5 = 1.0 x 0.75 x 0.62 in.
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

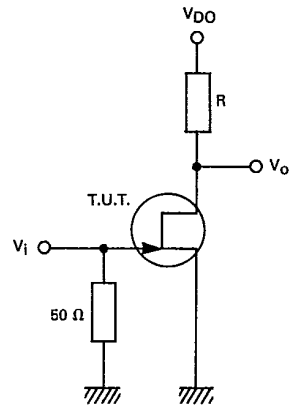
BSR56 = M4; BSR57 = M5; BSR58 = M6

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Gate-Source Breakdown Voltage (I_G = 1.0 μAdc, V_{DS} = 0)		$V_{(BR)GSS}$	40	—	Vdc
Gate-Reverse Current (V_{DS} = 0 V, V_{GS} = 20 V)		I_{GSS}	—	1.0	nA
Gate-Source Cutoff Voltage (V_{DS} = 15 V, I_D = 0.5 nA)	BSR56 BSR57 BSR58	$V_{GS(off)}$	4.0 2.0 0.8	10 6.0 4.0	V
ON CHARACTERISTICS					
Zero-Gate Voltage Drain (V_{DS} = 15 V, V_{GS} = 0)	BSR56 BSR57 BSR58	I_{DSS}	50 20 8.0	— 100 80	mA
Drain-Source On Voltage (I_D = 20 mA, V_{GS} = 0) (I_D = 10 mA, V_{GS} = 0) (I_D = 5.0 mA, V_{GS} = 0)	BSR56 BSR57 BSR58	$V_{DS(on)}$	— — —	0.75 0.5 0.4	Vdc
Static Drain-Source On Resistance (I_D = 0 mAdc, V_{GS} = 0, f = 1.0 kHz)	BSR56 BSR57 BSR58	$r_{DS(on)}$	— — —	25 40 60	Ohms
SWITCHING CHARACTERISTICS					
Delay Time: V_{DD} = 10 V; V_{GS} = 0 (V_{GSM} = 10 V, I_D = 20 mA) (V_{GSM} = 6.0 V, I_D = 10 mA) (V_{GSM} = 4.0 V, I_D = 5.0 mA)	 BSR56 BSR57 BSR58	t_d	 — — —	 6.0 6.0 10	ns
Rise Time: V_{DD} = 10 V; V_{GS} = 0 (V_{GSM} = 10 V, I_D = 20 mA) (V_{GSM} = 6.0 V, I_D = 10 mA) (V_{GSM} = 4.0 V, I_D = 5.0 mA)	 BSR56 BSR57 BSR58	t_r	 — — —	 3.0 4.0 10	ns
Turn-Off Time: V_{DD} = 10 V; V_{GS} = 0 (V_{GSM} = 10 V, I_D = 20 mA (V_{GSM} = 6.0 V, I_D = 10 mA) (V_{GSM} = 4.0 V, I_D = 5.0 mA)	 BSR56 BSR57 BSR58	t_{off}	 — — —	 25 50 100	ns



SWITCHING TIMES WAVEFORMS



BSR56; R = 464 Ω
BSR57; R = 953 Ω
BSR58; R = 1910 Ω

Pulse Generator

$t_r = t_f \leq 1.0$ ns
$\delta = 0.02$
$Z_o = 50\ \Omega$

Oscilloscope

$t_r \leq 0.75$ ns
$R_i \geq 1\ M\Omega$
$C_i \leq 2.5$ pF

3

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	100	Vdc
Collector-Emitter Voltage R_{BE} = 10 kΩ	V_{CER}	110	Vdc
Collector Current — Continuous	I_C	100	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/mW
Total Device Dissipation Alumina Substrate,** T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/mW
Junction and Storage Temperature	T_J, T_{stg}	150	°C

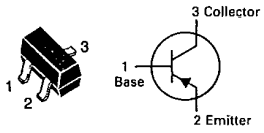
*FR-5 = 1.0 x 0.75 x 0.62 in.
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

BSS63 = T1

BSS63

CASE 318-02/03, STYLE 6
SOT-23 (TO-236AA/AB)



HIGH VOLTAGE TRANSISTOR

PNP SILICON

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 μAdc)	$V_{(BR)CEO}$	100	—	—	Vdc
Collector-Emitter Breakdown Voltage (I_C = 10 μAdc, I_E = 0, R_{BE} = 10 kΩ)	$V_{(BR)CER}$	110	—	—	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{(BR)CBO}$	110	—	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc)	$V_{(BR)EBO}$	6.0	—	—	Vdc
Collector Cutoff Current (V_{CB} = 90 Vdc, I_E = 0)	I_{CBO}	—	—	100	nAdc
Collector Cutoff Current (V_{CE} = 110 Vdc, R_{BE} = 10 kΩ)	I_{CER}	—	—	10	μAdc
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)	I_{EBO}	—	—	200	nAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 10 mAdc, V_{CE} = 1.0 Vdc) (I_C = 25 mAdc, V_{CE} = 1.0 Vdc)	h_{FE}	30 30	— —	— —	—
Collector-Emitter Saturation Voltage (I_C = 25 mAdc, I_B = 2.5 mAdc)	$V_{CE(sat)}$	—	—	250	mVdc
Base-Emitter Saturation Voltage (I_C = 25 mAdc, I_B = 2.5 mAdc)	$V_{BE(sat)}$	—	—	900	mVdc
SMALL-SIGNAL CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 25 mAdc, V_{CE} = 5.0 Vdc, f = 35 MHz)	f_T	50	95	—	MHz
Case Capacitance (I_E = I_C = 0, V_{CB} = 10 Vdc)	C_C	—	—	5.0	pF

T-35-07

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	80	Vdc
Collector-Base Voltage	V_{CBO}	120	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	100	mA

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board,* T_A = 25°C Derate above 25°C	P_D	225 1.8	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	556	°C/mW
Total Device Dissipation Alumina Substrate,** T_A = 25°C Derate above 25°C	P_D	300 2.4	mW mW/°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	417	°C/mW
Junction and Storage Temperature	T_J, T_{stg}	150	°C

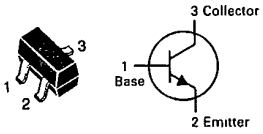
*FR-5 = 1.0 x 0.75 x 0.62 in.
**Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

DEVICE MARKING

BSS64 = AM

BSS64

CASE 318-03, STYLE 6
SOT-23 (TO-236AA/AB)



DRIVER TRANSISTOR

NPN SILICON

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 4.0 mA)	$V_{(BR)CEO}$	80	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μA)	$V_{(BR)CBO}$	120	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μA)	$V_{(BR)EBO}$	5.0	—	Vdc
Collector Cutoff Current (V_{CE} = 90 V) (T_A = 150°C)	I_{CBO}	— —	0.1 500	μA
Emitter Cutoff Current (V_{BE} = 4.0 V)	I_{EBO}	—	200	nA
ON CHARACTERISTICS				
DC Current Gain (V_{CE} = 1.0 V, I_C = 10 mA)	h_{FE}	20	—	—
Collector-Emitter Saturation Voltage (I_C = 4.0 mA, I_B = 400 μA) (I_C = 50 mA, I_B = 15 mA)	$V_{CE(sat)}$	— —	0.15 0.2	Vdc
Forward Base-Emitter Voltage	$V_{BE(sat)}$	—	—	—
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product (I_C = 4.0 mA, V_{CE} = 10 V, f = 35 MHz)	f_T	60	—	MHz
Output Capacitance (V_{CE} = 10 V, f = 1.0 MHz)	C_{ob}	—	5.0	pF